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MAGAZINE

Feb. 1988
Issue #46

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Dynamic Color

USING ROM ROUTINES
by
John Galus

ham radio & computers
by
bill chapple w4gqc

News

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We have supported the color computer 3 and have given programs for using the memory manager, graphics and error trapping.

All programs are ready to run and complement the editorials in the magazine. We have covered many subjects and there is much more to come. See our cummulative index for a list of subjects. We also have program collections of key programs from past issues. See our advertisement in this issue.

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The purpose of this magazine is to provide instruction on Basic & Machine Language programming, Computer theory, operating techniques, computer expansion, plus provide answers to questions from our subscribers.

The submission of questions, operating hints, and solutions to problems to be published in this magazine are encouraged. All submissions become the property of Dynamic Electronics if the material is used. We reserve the right to edit all material used and not to use material which we determine is unsuited for publication.

We encourage the submission of Basic and Machine Language Programs as well as articles. All Programs must be well documented so the readers can understand how the program works. We will pay for programs and articles based upon their value to the magazine. Material sent will not be returned unless return postage is included. Basic & ML programs should be sent on a tape or disk & comments should be sent as a DAT or BIN file.

DYNAMIC COLOR NEWS

February 1988

Editor and Publisher
Bill Chapple W4GQC

Secretary
Dean Chapple

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* Included in DCN Disk or Tape Package.

USING ROM ROUTINES
by
John Galus

If you followed my ML Programming Series or just like to learn more about the Color Computer, you should find this two part series of interest. Using ROM subroutines will cover many more useful routines contained in the Basic ROM within your Color Computer. You might not know it but, within the Color Computer there is an Assembly language program, the Color Basic ROM, that takes control of the computer when you first turn it on. Many of the functions that Basic performs can be accessed by a programmer if he knows where to look.

All Basic commands are contained in several tables within the ROM's. Each of these tables has a corresponding address table for the actual execution of that function. When the computer is first turned on, during the initialization routine, some of the information contained in the ROM is transferred to zero page RAM used by the system as a scratch pad. The information we are interested in is located at $120 to $13C ($ = HEX) or 288 to 316 decimal. Here we can find the number of keywords, the address of these keywords in ROM and execution address table for these routines.

ADDRESS	DATA	
$120	35	# OF KEYWORDS
$121	$AA66	KEYWORD ADDRESS
$123	$AB67	EXECUTE ADDRESS

From the above table we can see that starting at $120 we find that the first 35 keywords of Basic are located at $AA66 and these keywords' corresponding two byte execution addresses are located starting at $AB67 in ROM. If we have more commands the next block of 5 bytes will contain the data for the location of these commands. For my computer these blocks point to $AA66 for normal Basic, $8183 and $821E for the Extended Basic keyword table. Located at $AB67 and $AA29 for normal Basic and, at $81F0 and $8257 we find the execute tables. These five byte RAM tables may contain different addresses depending on whether the computer is an Extended or Disk Basic system although its structure remains the same. To signify the end of these lists a zero is placed for the number of keywords, a "dummy" address for keyword address, and the execution address points to the Error routine in ROM. If we look at the keyword list, we find the Basic keywords in ASCII except the last letter of each word has $80 (128 decimal) added to it. This is how Basic recognizes the end of a word. For example CLS looks like.

C - $43 L - $4C S - $D3 $53+$80

Basic uses this table to check the syntax of a basic statement and generate the correct "token" based on the position of that keyword. Then when a program is RUN that token is used with the

execute address to calculate where to begin to execute that command. Armed with this information and using a disassembler we could examine how Basic executes its commands.

If you are interested in Rom routines you may have noticed that in the final chapters of the Basic manuals you are given addresses for several ROM routines. These addresses point indirectly to the beginning of Basic ROM. Here are the addresses of a few useful ROM routines:

ADDRESS	NAME	FUNCTION
A000	POLCAT	SCAN KEYBOARD
A002	CHROUT	OUTPUT A CHAR
A004	CSRDON	START CASSETTE
A006	BLKIN	READ A BLOCK
A008	BLKOUT	OUTPUT A BLOCK
A00A	JOYIN	SAMPLE JOYSTK

These routines comprises the "documented" ROM routines. Address $A000 contains the address $A1C1, we can call this routine in Assembler whenever we wish to scan the keyboard for a keypress. If no key is pressed the "Z" zero condition will be set and the "A" register will equal zero. If a key is pressed then "Z" will equal zero and the "A" register will contain the value of the key pressed. You could also call a similar routine at $A1B1. This routine flashes the cursor while it waits for a keypress. The next routine contained in $A002 points to $A282. This routine prints the character in the "A" register to the device specified. The device we wish to output the character to is contained in the RAM memory location $6F.

$6F = 0	VIDEO SCREEN
$6F = -1	CASSETTE
$6F = -2	PRINTER
$6F = 1	DISK DRIVE

Using these two routines we could write a simple Assembly language program that prints the key pressed to the video screen. The BREAK key terminates this routine. You may need to change the SWI command, which returns us to ZBUG using EDTASM+, if you use another Editor/Assembler.

```
START   JSR   $A1C1   SCAN FOR KEY
        BEQ   START   NO KEYPRESS
        CMPA  #3      BREAK KEY?
        BEQ   FIN     YES FINISH
        CLR   $6F     VIDEO OUTPUT
        JSR   $A282   OUPUT CHAR
        BRA   START   LOOP
FIN     SWI           FINISHED
        END
```

There are many other routines that we can use, one of these is the CLS command. If you look at listing #1, you will see an Assembly language routine that simulates the Basic CLS command. We can save work by accessing the ROM routines that performs this function. This routine can be accessed in two ways. The first is the normal CLS that occurs when, for example we hit the CLEAR key in Basic. This routine is executed at $A928. The other is located at $A918 and clears the screen to the color of the number that is contained in the "B" register.

```
START   LDB   #3      BLUE SCREEN
        JSR   $A918   CLS ROUTINE
```

As you can see from the above example these ROM "shortcuts" saves a programmer quite a bit of coding. If you look at listing #2 you will see a Assembly language program which performs the graphic function SET,RESET and POINT. We can use the ROM routines contained in Basic to perform most of these calculations for us (see listing 3). Press "R" to perform a RESET, "P" to perform POINT, and any other key to perform the SET command. If you examine these routines notice how I "trick" the ROM into accepting a ")", which is required by the syntax of the RESET and POINT commands. These ROM rou-

tines are termed "undocumented" but seem to work on all Color Computers. I am not sure if they will work on the new Color Computer 3 since I don't own one yet.

Next we will access the JOYSTICK routines with the address contained in $A00A which points to $A9E9. Assembly listing 4 calls the JOYSTK routine and prints out the values, pointed to by the "X" index register, on the video screen. We might like to put some sound into our programs. There are two possible sound sources available, six-bit or single bit sound. These routines (Assembly listing 5 & 6) are useful in creating special sound effects in our programs. Experiment with these two programs to see what you can come up with. We could use the Basic ROM SOUND routine to create sounds. This routine is located at $A951 and uses the value in the "B" register as the duration and the RAM address at $8C for pitch. The following simulates the Basic command SOUND100,10.

```
SOUND  LDA  #100  PITCH
       STA  $8C   RAM FOR SOUND
       LDB  #10   DURATION
       JSR  $A951 SOUND ROUTINE
       SWI
       END
```

Next time we will examine more ROM routines such as the Hi-resolution graphic routines of PSET,LINE and CIRCLE contained in the EXTENDED BASIC ROM. See you then.

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ASEMBLY LANGUAGE LISTINGS

```
00010 ************************
00020 *
00030 *
00040 * CLS ROUTINE
00050 *
00060 *    BY
00070 * JOHN GALUS
00080 *
00090 *    FOR DYNAMIC COLOR
00100 *      NEWS MAGAZINE
00110 *
00120 * LISTING #1
00130 *
00140 ************************
00150 *
00160 * CLS ROUTINE
00170 *
00180 INKEY EQU $A1C1 ;POLCAT
00190 CLS JSR INKEY ;KEYPRESS?
00200  BEQ CLS
00210  CMPA #3  ;BREAK KEY?
00220  BEQ FIN  ;YES FINISH
00230  SUBA #'0 ;MAKE 0 TO 8
00240  CMPA #0
00250  BLO CLS  ;LESS THEN ZERO
00260  CMPA #8
00270  BHI CLS  ;HIGHER THEN 8
00280  TFR A,B  ;PUT VALUE IN B
00290  TSTB    ;EQUAL ZERO?
00300  BEQ BLACK
00310  DECB    ;COLOR ZERO
00320  LDA #$10 ;SHIFT IT
00330  MUL      ;FIVE BYTES
00340  ORB #$0F ;TURN BLOCK ON
00350 BLACK ORB #$80
00360  LDX #$400 ;SCREEN START
00370 LOOP STB ,X+
00380  CMPX #$05FF ;SCREEN END?
00390  BLS LOOP ;DO SOME MORE
00400  BRA CLS ;DO AGAIN
00410 FIN SWI  ;RETURN TO ZBUG
00420  END CLS


00430 ************************
00440 *
00450 *
00460 * SET/RESET
00470 *   POINT
00480 * ROUTINES
00490 *
00500 *    BY
00510 * JOHN GALUS
00520 *
00530 * FOR DYNAMIC COLOR
00540 *      NEWS
00550 *    MAGAZINE
00560 *
00570 * LISTING #2
00580 ************************
00590 *
00600 * SET ROUTINE
00610 *
00620 INKEY EQU $A1C1 ;POLCAT
00630 CLS EQU $A918   ;CLS ROUT
00640 DPRT EQU $BDCC ;PRT IN D
00650 BEGIN CLRB ;SET SCREEN
00660  JSR CLS ;TO BLACK
00670 START JSR INKEY  ;KEY?
00680  BEQ START  ;NO KEYPRESS
00690  CMPA #3    ;BREAK KEY?
00700  LBEQ FIN
00710  CMPA #'R   ;RESET?
00720  LBEQ RESET
00730  CMPA #'P   ;POINT?
00740  LBEQ POINT
00750 GSET LDA #10
00760  STA XPOS
00770  STA YPOS   ;Y POSITION
00780  LDB #3     ;COLOR 3
00790  STB COLOR
00800  BSR CORD   ;CAL X/Y POS
00810  LDB COLOR
00820  DECB
00830  BMI NO     ;ZERO COLOR
00840  LDA #$10  ;SHIFT 5 BYTES
00850  MUL
00860  BRA NEXT
00870 NO LDB ,X  ;GET A BYTE
00880  BPL ALPHA ;IF ALPHA CHAR
00890  ANDB #$70 ;0 COLOR BYTES
00900  BRA NEXT
00910 ALPHA CLRB ;ZERO BYTE
00920 NEXT PSHS  ;SAVE COLOR
00930  LDA ,X ;GET VIDEO BYTE
00940  BMI GRAPH ;GRAPHIC BYTE?
00950  CLRA      ;ZERO IT
00960 GRAPH ANDA #$0F ;PIX INFO
00970  ORA PIX ;MASK WITH NEW
00980  ORA ,S+ ;ADD COLOR
00990 FIX ORA #$80 ;GRAPHIC ON
01000  STA ,X ;PUT IT ON SCREEN
01010  LBRA START ;TO START
01020 RESET LDA #10
01030  STA XPOS
01040  STA YPOS ;STORE X/Y POS
01050  BSR CORD ;GET VIDEO POS
01060  CLRA     ;SET TO BLACK
01070  LDB ,X   ;GET VIDEO BYTE
01080  BPL FIX ;ALPHA SET BLOCK
01090  COM PIX ;REVERSE INFO
01100  ANDB PIX   ;MASK PIX
01110  STB ,X ;PUT IT IN VIDEO
01120  LBRA START ;TO START
01130 POINT LDA #10
01140  STA XPOS
01150  STA YPOS
01160  BSR CORD
01170  LDB #$FF ;VALUE -1 FALSE
01180  LDA ,X   :GET VIDEO BYTE
```

```
01190  BPL ANSWER ;RETURN VALUE
01200  ANDA PIX ;FIND LIT PIXEL
01210  BEQ TRUE ;ALPHA CHAR?
01220  LDB ,X   ;GET BYTE
01230  LSRB     ;SHIFT COLOR
01240  LSRB
01250  LSRB
01260  LSRB
01270  ANDB #7  ;MASK COLOR
01280 TRUE INCB ;SET COLOR
01290 ANSWER CLRA  ;CLEAR MSB
01300  STB PCOLOR  ;SAVE COLOR
01310  LDX #$0400
01320  STX $88    ;CURSOR LOC
01330  JSR DPRT   ;PRINT IT
01340  LBRA START
01350 *
01360 * X/Y CALCULATE ROUTINE
01370 * PIX HAS PIXEL INFO
01380 * X HAS VIDEO ADDRESS
01390 *
01400 CORD LDB YPOS ;GET Y POS
01410  LSRB     ;Y/2
01420  LDA #32  ;32 ACROSS
01430  MUL
01440  LDX #$0400  ;VIDEO START
01450  LEAX D,X     ;ADD OFFSET
01460  LDB XPOS  ;GET X POS
01470  LSRB    ;X/2
01480  ABX     ;ADD B TO X
01490  LDD YPOS  ;GET Y POS
01500  ANDA #1 ;LEFT OR RIGHT?
01510  RORB    ;SHIFT INFO
01520  ROLA  ;INTO A
01530  LDB #$10  ;START PIX POS
01540 SHIFT LSRB ;SHIFT PIXEL
01550  DECA
01560  BPL SHIFT
01570  STB PIX  ;SAVE PIX INFO
01580  RTS
01590 FIN SWI  ;RETURN TO ZBUG
01600 *
01610 * DATA STORAGE
01620 *
01630 PIX FCB 0     ;PIXEL INFO
01640 COLOR FCB 0   ;COLOR BYTE
01650 PCOLOR FCB 0 ;POINT VALUE
01660 YPOS FCB 0
01670 XPOS FCB 0
01680  END START
```


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```
01690 *************************
01700 *
01710 *
01720 * SET/RESET
01730 *   POINT
01740 * ROM ROUTINES
01750 *
01760 *    BY
01770 * JOHN GALUS
01780 *
01790 * FOR DYNAMIC COLOR
01800 *     NEWS
01810 *
01820 * LISTING #3
01830 *
01840 *************************
01850 *
01860 * SET ROUTINE
01870 *
01880 EQU $A8D7 ;X/Y CALCULATE
01890 EQU $A88D ;SET ROUT
01900 RES EQU $A8B5 ;RESET ROUT
01910 PO EQU $A8F7 ;POINT ROUT
01920 CLS EQU $A918 ;CLS ROUT
01930 INKEY EQU $A000 ;POLCAT
01940 GET EQU $B3ED ;GET FPAC
01950 DOUT EQU $BDCC ;PRINT D
01960 BEGIN CLRB  ;SCREEN BLACK
01970  JSR CLS
01980 START JSR $A1C1 ;SCAN KEY
01990  BEQ START ;NO KEYPRESS
02000  CMPA #3 ;BREAK KEY?
02010  BEQ FIN ;YES FINISH
02020  CMPA #'R ;RESET?
02030  BEQ RESET
02040  CMPA #'P ;POINT?
02050  BEQ POINT
02060 *
02070 * SET ROUTINE
02080 * A REG HAS X CORD
02090 * B REG HAS Y CORD
02100 *
02110 PSTART LDA #10 ;SET A DOT
02120  STA XPOS
02130  STA YPOS
02140  BSR PAR ;FIX SYNTAX
02150  LDB #4 ;COLOR 4
02160  STB COLOR
02170  LDD XPOS ;GET X/Y
02180  LDX #SKIP
02190  PSHS X
02200  PSHS A ;SAVE X FOR ROM
02210  JMP CAL ;CALCULATE POS
02220 *
02230 * X REG NOW HAS VIDEO LOC
02240 *
02250 SKIP LDB COLOR ;COLOR
02260  JSR VSET ;SET POINT
02270  BRA START
02280 *
02290 * RESET ROUTINE
02300 *
02310 RESET LDA#10 ;RESET10,10
02320  STA XPOS
02330  STA YPOS
02340  LDD XPOS ;GET X/Y
02350  LDX #SKIP2
02360  PSHS X ;TRICK ROM RETURN
02370  PSHS A ;SAVE X CORD
02380  JMP CAL ;CAL X/Y POS
02390 SKIP2 JSR RES ;DO RESET
02400  BRA START
02410 PAR LDX #PART ;PUT A ")"
02420  LEAX -1,X ;AS BASIC PAR
02430  STX $A6 ;TO AVOID ERROR
02440  JSR $9F ;GET NEXT CHAR
02450  RTS
02460 *
02470 * POINT ROUTINE
02480 *
02490 * RESULT IS IN FPAC1
02500 *
02510 POINT LDA #10 ;POINT10,10
02520  STA XPOS
02530  STA YPOS
02540  BSR PAR ;FIX SYNTAX
02550  LDX #SKIP3 ;TRICK ROM
02560  PSHS X
02570  LDD XPOS
02580  PSHS A
02590  JMP CAL
02600 SKIP3 JSR PO
02610  LDX #$0400 ;START SCREEN
02620  STX $88 ;NEW CURSOR LOC
02630  JSR GET ;VALUE TO "D"
02640  JSR DOUT ;PRT VALUE IN D
02650  LBRA START
02660 PART FCC /)/ ;PARENTHESES
02670  FCB 0
02680 FIN SWI  ;RETURN ZBUG
02690 COLOR FCB 0
02700 XPOS FCB 0
02710 YPOS FCB 0
02720  END BEGIN
```


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```
02730 ************************
02740 *
02750 *
02760 * JOYSTICK
02770 * ROM ROUTINE
02780 *
02790 *    BY
02800 * JOHN GALUS
02810 *
02820 * FOR DYNAMIC COLOR
02830 *     NEWS
02840 *
02850 * LISTING #4
02860 *
02870 ************************
02880 *
02890 * JOYSTK ROUTINE
02900 *
02910 INKEY EQU $A1C1 ;POLCAT
02920 POUT EQU $A282 ;PRINT
02930 CLS EQU $A928 ;CLS ROUT
02940 JOY EQU $A00A ;JOYSTK
02950 DOUT EQU $BDCC ;PRT IN D
02960 PRTAT EQU $A557 ;PRINT @
02970 BEGIN JSR CLS ;CLS SCREEN
02980  LDX #MESS ;TO MESSAGE
02990  BSR PRINT ;PRINT IT
03000 START JSR INKEY ;KEYBOARD
03010  CMPA #3 ;BREAK KEY?
03020  BEQ FIN ;YES FINISH
03030  LDD #91 ;PRINT AT START
03040  STD POS ;SAVE POS
03050 JOYSTK JSR JOY ;JOYSTICKS
03060  PSHS X ;SAVE X REGISTER
03070  LDD #128 ;PRT @ 128
03080  JSR PRTAT ;PRT @ ROUTINE
03090  LDA $FF00 ;BUTTON PRESS?
03100  CMPA #126 ;RIGHT BUTTON?
03110  BEQ RIGHT ;YES RIGHT
03120  CMPA #254 ;RIGHT BUTTON
03130  BEQ RIGHT ;YES
03140  CMPA #125 ;LEFT BUTTON
03150  BEQ LEFT ;YES LEFT
03160  CMPA #253 ;LEFT?
03170  BEQ LEFT ;YES LEFT
03180  BRA NONE ;NO BUTTON
03190 RIGHT LDX #RI ;TO MESSAGE
03200  BSR PRINT ;PRINT IT
03210  BRA  NONE
03220 LEFT LDX #LI ;TO LEFT
03230  BSR PRINT ;PRINT IT
03240 NONE PULS X ;GET ADDRESS
03250  LDB ,X+ ;GET JOYSTK(0)
03260  BSR PRT ;PRINT IT
03270  LDB ,X+ ;GET JOYSTK(1)
03280  BSR PRT ;PRT IT
03290  LDB ,X+ ;GET JOYSTK(2)
03300  BSR PRT
03310  LDB ,X ;GET JOYSTK(3)
03320  BSR PRT ;PRINT IT
03330  BRA START
03340 PRT PSHS B,X
03350  LDD POS
03360  ADDD  #6 ;MOVE OVER SIX
03370  STD POS ;NEW PRINT@ POS
03380  JSR PRTAT ;SET PRINT POS
03390  PULS B ;GET B BACK
03400  CLRA
03410  JSR DOUT
03420  PULS X ;GET X BACK
03430  RTS
03440 FIN SWI  ;RETURN MONITOR
03450 RET RTS  ;RETURN
03460 PRINT LDA ,X ;GET A CHAR
03470  BEQ RET ;RETURN IF END
03480  JSR POUT ;PRT CHAR IN A
03490  LEAX 1,X ;ADD ONE TO X
03500  BRA PRINT ;DO MORE
03510 MESS FCC /     JOYSTICKS/
03520  FCB $0D ;CARRIAGE RETURN
03530  FCC /(0)  (1)  (2)  (3)/
03540  FDB $0D00 ;CR AND ZERO
03550 POS FDB 0
03560 LI FCC /LEFT /
03570  FCB 0
03580 RI FCC /RIGHT/
03590  FCB 0
03600  END BEGIN

03610 ************************
03620 *
03630 *
03640 * SINGLE-BIT
03650 *   SOUND
03660 *
03670 *
03680 *     BY
03690 * JOHN GALUS
03700 *
03710 *     FOR
03720 * DYNAMIC COLOR
03730 *    NEWS
03740 *
03750 * LISTING #5
03760 *
03770 ************************
03780 *
03790 * SETUP PIA FOR SOUND
03800 *
03810 SINGLE LDX #$FF22 ;PIA
03820  LDA 1,X ;CONTROL DATA
03830  ANDA #$FB ;MASK BYTE
03840  STA 1,X ;MAKE DATA DIR
03850  LDB ,X ;GET STATUS
03860  ORB #$FA ;MASK BYTE
03870  STB ,X ;NOW AN OUTPUT
03880  ORA #4 ;BIT 2 HIGH
03890  STA 1,X ;ENABLE PIA
03900 SOUND LDX #$0300 ;DUR
03910 PIA TFR X,D ;PUT IT IN D
03920  EXG A,B ;SWAP A AND B
03930  ANDA #2 ;MASK BYTE
03940  PSHS A ;SAVE MASK
```

```
03950  LDB $FF22 ;PIA OUTPUT
03960  ANDB #$FD ;MASK SOUND
03970  ORB ,S+ ;MASK BYTE
03980  STB $FF22 ;SOUND ON
03990  LDA #$50 ;PITCH
04000 LOOP DECA  ;ONE LESS
04010  BNE LOOP ;NOT ZERO LOOP
04020  LEAX -1,X ;ONE LESS DUR
04030  BNE PIA ;DO SOME MORE
04040  SWI  ;FINISHED
04050  END SINGLE


04060 *************************
04070 *
04080 *
04090 *  SIX-BIT
04100 *   SOUND
04110 *
04120 *
04130 *     BY
04140 * JOHN GALUS
04150 *
04160 *     FOR
04170 * DYNAMIC COLOR
04180 * NEWS MAGAZINE
04190 *
04200 * LISTING #6
04210 *
04220 *************************
04230 *
04240 * SETUP PIA FOR SOUND
04250 *
04260 SIX LDA $FF01 ;SELECT
04270  ANDA #$F7 ;SOUND
04280  STA $FF01 ;OUT
04290  LDA $FF03 ;PIA TO OUTPUT
04300  ANDA #$F7
04310  STA $FF03
04320  LDA $FF23 ;ENABLE
04330  ORA #8 ;SIX-BIT
04340  STA $FF23 ;SOUND
04350  LDB #50 ;TIMES
04360 GOTO LDX #$A000 ;RND DATA
04370 LOOP LDA ,X+ ;GET A BYTE
04380  CMPX #$A200 ;LEN SOUND
04390  BEQ AGAIN
04400  ANDA #$FC ;MASK BYTE
04410  STA $FF20 ;TO OUTPUT
04420  BRA LOOP
04430 AGAIN DECB ;DEC B ONE
04440  BNE GOTO ;DO ANOTHER
04450 FIN SWI ;RTS TO MONITOR
04460  END SIX
```

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TAKING CONTROL
(Basic Programming Part 5)

In this series we are showing how to write basic programs. It is not hard to write programs but does require a knowlege of the commands and proper usage. Commands are ordered by line numbers and their location within a line. Commands can be chained on a line by seperating them with a ":". For large programs where memory may become a problem, program commands are stacked on lines. Each line can contain only one command or instruction. This is costly because each line requires 5 bits to identify the line. A zero seperates each basic line in memory. The first two bytes are a "vector" or "pointer" that points to the next basic line. The next two bytes indicate the line number. Only one byte is required for a ":". Therefore stacking commands on one line saves 4 bytes per command.

PEEKS AND POKES

These are powerful commands that allow us to look at values stored in memory and change them. They are easy to remember. PEEK looks at memory and POKE puts a value into memory. The following are examples for using peeks and pokes:

```
(a) X=PEEK (3500)
(b) W=PEEK(M)
(c) POKE 20000, X
(d) POKE M,V
```

Notice that the peek requires (). This is easy to remember as you can associate shielding your eyes to look or peek at an object. In (a) X is the value and 3500 is the memory. In (d) we place the value V into memory M.

VECTORS or POINTERS

As mentioned earlier these refer to locations in memory. A vector requires two bytes called the least significant (LS) and the most significant (MS). The procedure is to multiply the most significant byte by 256 and add the least significant byte to form the value of the vector.

(1) V=256 * MS + LS

The value (V) of the vector can be calculated by equation (1). The "*" symbol indicates multiplication.

USING VECTORS

Let's take some examples of using vectors. Since vectors take two bytes, we will designate a vector by referring to the lower memory byte. The following are 3 vectors that are used with basic:

Memory	Vector
25	Start of basic
27	End of basic
136	Cursor

Let's write a program that calculates the beginning and ending of basic. The length of the program can be calculated by

subtracting the beginning from the ending.

```
10 PRINT"VECTOR DEMONSTRATION
   PROGRAM
20 PRINT"FOR DYNAMIC COLOR NEWS
30 PRINT"      CONT-1":PRINT
40 'CALCULATE THE BEGINNING
50 BE=256*PEEK(25) + PEEK(26)
60 'CALCULATE THE ENDING
70 EN=256*PEEK(27 )+ PEEK(28)
80 'CALCULATE PROGRAM LENGTH
90 LE=EN-BE
100 'CALCULATE THE CURSOR
110 'PRINT THE RESULTS
120 PRINT"THIS PROGRAM STARTS
   AT";BE
130 PRINT"AND ENDS AT ";EN
140 PRINT"IT IS ";LE;"BYTES LONG"
150 CU=256*PEEK(136)+PEEK(137)
160 PRINT"THE CURSOR IS AT "CU
```

STRINGS AND SUBSTRINGS

We have discussed numerical and string variables. A numerical variable stands for a number and a string variable stands for a collection of characters. There are some operations that can be performed on strings that are very useful. They can be broken down into sub-strings and converted to a value. When it is converted to a value a numerical variable can be created. Therefore strings can be used to contain data. As an example look at the "MUSIC" program on page 28 of last month's magazine. Note line 12:

```
12 READ X$
```

Now notice the data statements which contain combinations of numbers and characters. The program breaks the string down into substrings of 2 characters, converts the characters to a number, and stores the number in memory. This allows us to carry machine language programs within basic programs. Now let's look at some commands for strings.

LEFT$

If it is desired to remove some characters from the left of a string then the LEFT$ command can be used. The format is:

X$=LEFT$(Y$, N)

where X$ is the name of the sub-string, Y$ is the name of the original string, and N is the number of characters desired in X$. Suppose Y$="MEMORY" and N=2, then X$="ME". The first two characters of Y$ are removed to for the string X$. Y$ is not changed in the process.

RIGHT $

A substring is formed by taking a specified number of characters from the right side of a string. Suppose X$="MEMORY" and we want the 4 right characters in the string Z$. Then the formula will be:

Z$=RIGHT$(X$,4)

Z$ will equal "MORY".

MID$

This is used to remove characters from any location within a string. The format follows:

P$=MID$ (X$,POS,NUM)

X$ is the original string, POS is the position or number of characters from the left, and NUM is the number of characters in the new string.

```
If Y$="MEMORY" then

Z$=MID$(Y$,2,3)

Z$ will be "EMO"
```

LEN

This command gives the length of a string. Its format is:

Y=LEN(Y$)

If Y$="MEMORY" then Y=6 since there are 6 characters in the string. Again refer to last month's article on MUSIC and notice line 16.

```
16 L=LEN(X$)
```

This gives us the number of characters in the string which we can use to disassemble the string into substrings or form new strings of a given length. There are numerous comparisions we can make if we know the length of a string.

VAL

The VAL command converts a string into its numerical value. Calculations can not be performed with strings but can be performed with numbers. Con sider the following:

```
X$="1000": X=VAL(X$)
```

X will take the value of 1000. X$ is only a 1 followed by three zeros. This has no numerical significance.

STR$

This is the opposite of the VAL command. The STR$ command converts a numerical variable into a string variable. The advantage of this will be for combining strings into strings of uniform length. This could make it easier to print results since the same number of characters could be sent to the printer.

Let's consider an example program to demonstrate how to break a string into a substring.

STRING-SUBSTRING PROGRAM

```
10 CLS:PRINT"DYNAMIC COLOR NEW
   S":PRINT"FEBRUARY 1988"
20 PRINT"CONT-2
30 PRINT:PRINT"THIS DEMONSTRATES
   LEFT$
40 X$="COMPUTER":PRINT"X$="X$
50 INPUT"ENTER NUMBER OF CHARACT
   ERS OR PRESS ENTER FOR NEXT
   SECTION";N
60 L=LEN(X$): IF N>L THEN 100
70 IF N=0 THEN GOTO100
80 PRINT"THE SUBSTRING IS ";
   LEFT$ (X$,N)
90 GOTO 30
100 PRINT:PRINT"THIS DEMONSTRAT
   ES RIGHT$
110 X$="COMPUTER":PRINT"X$="X$
120 INPUT"ENTER NUMBER OF CHARAC
   TERS OR PRESS ENTER FOR NEXT
   SECTION";N
130 IFN>L THEN 170
140 IF N=0 THEN 170
150 PRINT"THE SUBSTRING IS "
   RIGHT$(X$,N)
160 GOTO 100
170 PRINT:PRINT"THIS DEMONSTRAT
   ES MID$
180 X$="COMPUTER":PRINT"X$="X$
190 INPUT"ENTER POSITION 1-6";X
200 PRINT"POSITION(X)="X
210 INPUT"ENTER NUMBER OF CHARAC
   TERS";N
220 PRINT"NUMBER OF CHAR(N)="N
230 IF N>6 THEN 270
240 IF N=0 THEN 270
250 PRINT"MID$(X$,X,N)="MID$
   (X$,X,N)
260 GOTO170
270 END
```

USING STRINGS FOR DATA

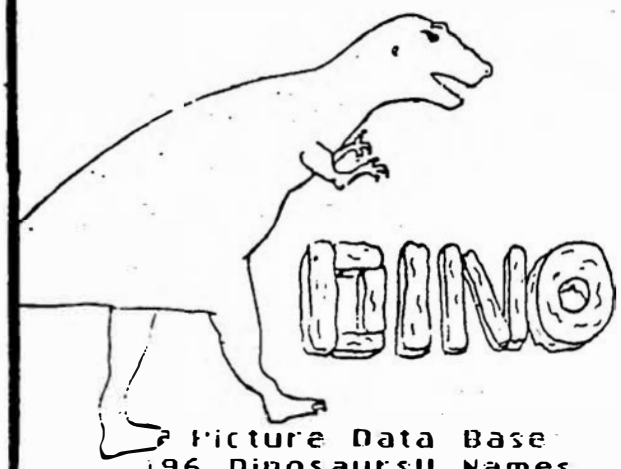
Let's take an example to demonstrate handling string and numerical variables in one string. Let's consider part of an inventory program where we will have a number of items, a value for each item, and a description. We can allot a given number of characters for each part as follows:

```
Name of item   (10)
Number  (3)
Value of each (7)
```

This will take 25 characters. Let's write data statements to contain the information.

```
999 '      ITEM......NUM.VALUE.
1000 DATA PIANO        2 2977.35
1010 DATA CLARINET     4  475.95
1020 DATA TRUMPET      3  415.95
1030 DATA DRUMS        1 1595.00
1040 DATA ORGAN        1 8769.95
1050 DATA FLUTE        8  535.98
1060 DATA @
```

Now we want to read in the data and remove the value of each item, multiply this by the number and print a total for the item. Then we will go to the next item and continue until all of the data has been processed.



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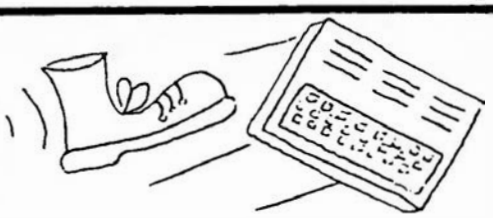

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STRING-DATA DEMO PROGRAM

```
10 PRINT"STRING DEMO PROGRAM
15 PRINT"DYNAMIC COLOR NEWS
20 PRINT"     CONT-3":PRINT
30 READ X$
35 IF X$="@" THEN 200
40 I$=LEFT$(X$,10) 'ITEM
50 N$=MID$(X$,11,3) 'NUMBER
60 V$=RIGHT$(X$,7) 'VALUE
70 N=VAL(N$) 'CONVERT N
80 V=VAL(V$) 'CONVERT V
90 W=N*V 'CALCULATE TOTAL
100 S=S+W 'NEW SUM
110 PRINTI$;N$;V;W
120 GOTO 30
200 PRINT"TOTAL VALUE IS"S
210 END
999 '      ITEM......NUM.VALUE.
1000 DATA PIANO       2 2977.35
1010 DATA CLARINET    4  475.95
1020 DATA TRUMPET     3  415.95
1030 DATA DRUMS       1 1595.00
1040 DATA ORGAN       1 8769.95
1050 DATA FLUTE       8  535.98
1060 DATA @
```

Notice lines 40, 50, and 60 and the procedure used to remove the substrings. Notice that the strings are converted into numerical variables in lines 70 and 80. An advantage of using this method is that each data statement is sufficient for an item. A disadvantage is that the substrings in the data statements have to be perfectly ordered. Line 999 was used to provide a heading for ordering the data as it is entered.

For those interested in learning to program, we suggest you use the CONT programs as guidelines for writing your own programs. Make up your own practice program and see if you can get it to do a particular task. Programming is similar to math because it takes practice to become proficient.

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There is much interest in OS9 and as a result we are starting this series. We have OS-9 level 1 and have ordered OS-9 level 2 for the color computer 3. This month we want to explain what OS-9 is and what can be expected from it.

OS-9 is an operating system that can be expanded to meet individual needs. An operating system is supposed to make it easier to operate the computer. OS-9 is a high level language and allows multi-tasking. This means that several tasks can be performed at the same time. Actually the computer can only perform one task at a time, but it does it at super fast rate. It can do part of one task and proceed to other tasks giving the appearance of doing all tasks at once. Multi-tasking can be done from basic or assembly language but instructions have to be written. OS-9 also manages memory and input/output (I/O) tasks. This is useful for large memories and hard disks.

To run OS-9, a 64K computer with one disk drive is required. OS-9 level 1 is for the color computer 2 and earlier computers. OS-9 level 2 is for the color computer 3.

One major disadvantage of OS-9 is that it is not compatible with Microsoft basic. This means that calculations can not be performed unless assembly language routines are used. Basic Ø9 is supposed to overcome this limitation and we will include Basic Ø9 in our discussions.

LOADING OS-9

Two disks are included in the OS-9 package which are BOOT OS-9 and SYSTEM MASTER. The earlier systems required using the BOOT disk. To use it insert it in the disk drive and type RUN "*". Select the BOOT OS-9 option and insert the SYSTEM MASTER disk. The boot disk contains a program that tests the speed of the disk drive.

For versions after 1.Ø the SYSTEM MASTER disk can be inserted without using the BOOT OS-9 disk. To bring up OS-9 from the keyboard type DOS ENTER. OS-9 will then be loaded from the SYSYEM MASTER disk. After this is entered the OS-9 prompt appears as "OS9:". Instructions can then be entered.

FORMATTING & BACKING UP DISKS

To format a disk enter "FORMAT /DØ" when the OS-9 prompt appears. The format instructions are on the SYSTEM MASTER (SM) disk which must be inserted in drive Ø. The instruction is repeated followed by "READY?". At this point remove the SM disk and insert the disk to be formatted. Then press ENTER. Information is displayed on the screen while the formatting is taking place.

To backup a disk enter "BACKUP /DO" with the SM disk installed. The command will be repeated and it is necessary to enter a "Y". Then insert the distination disk. This is similar to the backup procedure using Radio Shack's disk basic. Several disk

swaps are required to backup up the disk. Make a backup of the OS-9 disks and put the originals in a safe place.

CREATING DIRECTORIES

OS-9 allows the creation of directories. This has the advantage of allowing a directory to contain the files for various subjects simplifing the directory structure. This is especially useful for a 512K computer or a hard disk system. The command for making a directory is MAKDIR which is an abreviation of "make directory". If we wanted to create a directory called WORK then we would enter:

MAKDIR WORK <ENTER>

A subdirectory can be created. Suppose we desire to make a directory of maintenance under WORK. We can create the subdirectory CAR by entering:

MAKDIR/DØ/WORK/CAR <ENTER>

DELETING DIRECTORIES

If a directory contains a sub directory then all of the files in the sub directory will be deleted with the directory. The following is an example of deleting a directory:

DEL/DO/WORK

RENAMING A DIRECTORY

The name of a directory can be changed with the **RENAME** command. Suppose we want to change the name of the directory DO/WORK to DO/PLAY. Then we would enter the following:

RENAME /DO/WORK PLAY

To verify that the file has been renamed type LIST DO/PLAY and the file will be listed and should contain the same information as the original file.

CREATING & EDITING FILES

OS-9 is very powerful for handling files. Let's take an example and create a file and call it "FIRST". To get the editor started type:

EDIT FIRST

The file will be created and the following prompt will appear:

E:

To insert lines press the space bar and begin typing. After typing a line, press ENTER and again the E: will be displayed. The first location is reserved for commands. After typing in a few lines you will want to go to the top of the buffer and review your work. To do this type:

CLEAR 7 ENTER

The preceeding command will take you to the beginning of the buffer. Now to list all lines type:

L*

You can move down a line at a time by pressing the ENTER key. If you want to insert a line just type it in at the proper location and it is automatically inserted. To delete a line just type D in the first space and the line will be printed and deleted.

SAVING YOUR WORK

One thing that is nice about an operating system is that it does most of the hard things for you. You don't have to worry about formats, just enter the proper commands. The command for terminating the file is "Q". So press the "Q" key and then the enter key and the updated file is saved.

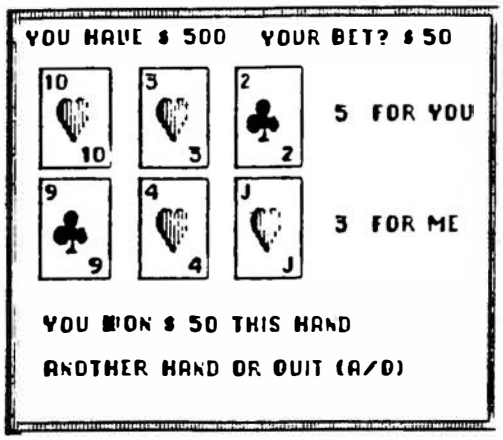
LISTING THE FILE

After saving the file, list it to verify that all of the lines were saved. Do this by typing:

LIST FIRST

Next month we will continue with OS-9 commands and examples. We suggest you practice the material covered this month if you are interested in becoming proficient in using OS-9.

BARRACAT



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```
1 'LAS VEGAS BACCARAT
2 'PROGRAMMED BY BILL BERNICO
3 '(C)1988 T&D SOFTWARE
4 '
5 CLS:PRINT@226,"IF SCREEN IS BL
   UE, HIT RESET    IF SCREEN IS
    RED,  HIT ENTER
6 FOR D=1TO2500:NEXT
7 CLS3:A=PEEK(116)*256+PEEK(117)
   -20:X=INT(A/256):Y=A-(X*256):
   POKE113,85:POKE114,X:POKE115,
   Y:FORI=A TO A+17:READ B:POKE
   I,B:NEXT I:DATA 18,182,255,3,
   138,1,183,255,3,189,173,33,18
   9,172,239,126,173,158:PMODE4,
   1:PCLS0:SCREEN1,1:PMODE3:PCLS
   2
8 PMODE4:COLOR0,1:LINE(108,90)-(
   134,100),PRESET,BF:DRAW"C0BM1
   12,98U6R3FDGL3R2F2DBR3NR4U3NR
   3U3R4BD6BR4NR3U6R3FD4G":IFINK
   EY$<>CHR$(13)THEN8
9 DIMA(10),C(10),A$(89):PC=500:G
   OSUB65:PMODE4,1:PCLS1:SCREEN1
   ,1:COLOR0,1
10 S$(1)="HUH2UH2UH2UHU3EUE2R3F2
   E2R3F2DFD3GDG2DG2DG2DG":S$(2)
   ="L3ER2HU5G3L3H2U3E2R3FEH2U3E
   2R3F2D3G2FER3F2D3G2L3H3D5F2L2
   ":S$(3)="H10E10F10G10":S$(4)=
   "L2EU7G3L2H2U4EUE7F7DFD4G2L2H
   3D7FL2"
11 PCLS1:LINE(0,0)-(255,191),PSE
   T,B:A$="BACCARAT":DRAW"BM100,
   10":GOSUB118:A$="FROM T&D SOF
   TWARE":DRAW"BM60,30":GOSUB118
   :A$="INSTRUCTIONS? (Y/N)":DRA
   W"BM60,90":GOSUB118
12 I$=INKEY$:IFI$="Y"THEN136ELSE
   IFI$="N"THEN13ELSE12
13 GOSUB62:PCLS1:LINE(0,0)-(255,
   191),PSET,B:LINE(5,4)-(251,18
   7),PSET,B:POKE178,2:PAINT(2,2
   ),,0:POKE178,0:A$="YOU HAVE $
   "+STR$(PC):DRAW"BM10,10":GOSU
   B118
14 IF PC<1 THEN 129
15 A$="YOUR BET? $ ":DRAW"BM132,
   10":GOSUB118:GOSUB119:Z$=B$:G
   =VAL(B$)
16 IF G<1 THEN 134
17 IF G>PC THEN 135
18 D=0:E=0:B=1:GOTO 41
19 A(B)=RND(52)+1
20 C(B)=A(B)-13*INT(A(B)/13)
21 IF C(B)=0 THEN 35
22 ON C(B) GOTO 23,24,25,26,27,2
   8,29,30,31,32,33,34
23 DRAWY$+A$(65):DRAWZ$+A$(65):G
   OTO36
24 DRAWY$+A$(50):DRAWZ$+A$(50):G
   OTO36
25 DRAWY$+A$(51):DRAWZ$+A$(51):G
   OTO36
26 DRAWY$+A$(52):DRAWZ$+A$(52):G
   OTO36
27 DRAWY$+A$(53):DRAWZ$+A$(53):G
   OTO36
28 DRAWY$+A$(54):DRAWZ$+A$(54):G
   OTO36
29 DRAWY$+A$(55):DRAWZ$+A$(55):G
   OTO36
30 DRAWY$+A$(56):DRAWZ$+A$(56):G
   OTO36
31 DRAWY$+A$(57):DRAWZ$+A$(57):G
   OTO36
```

```
32 DRAWY$+A$(49)+A$(48):DRAWZ$+"
   BL4"+A$(49)+A$(48):C(B)=Ø:GOT
   O36
33 DRAWY$+A$(74):DRAWZ$+A$(74):C
   (B)=Ø:GOTO36
34 DRAWY$+A$(81):DRAWZ$+A$(81):C
   (B)=Ø:GOTO36
35 DRAWY$+A$(75):DRAWZ$+A$(75):C
   (B)=Ø
36 ON A(B)/13 GOTO 37,38,39,4Ø
37 DRAWP$+S$(1):POKE178,1:PAINT(
   L,K),,Ø:POKE178,Ø:RETURN
38 DRAWP$+S$(2):PAINT(L,K),Ø,Ø:R
   ETURN
39 DRAWP$+S$(3):POKE178,1:PAINT(
   L,K),,Ø:POKE178,Ø:RETURN
4Ø DRAWP$+S$(4):PAINT(L,K),,Ø:RE
   TURN
41 DRAW"BM17,27R35D45L35U45":Y$=
   "BM2Ø,3Ø":Z$="BM43,63":P$="BM
   34,6Ø":L=34:K=45:GOSUB19:D=D+
   C(B):B=B+1:DRAW"BM67,27R35D45
   L35U45":Y$="BM7Ø,3Ø":Z$="BM93
   ,63":P$="BM84,6Ø":L=84:K=45:G
   OSUB19:D=D+C(B):B=B+1:A$="ANO
   THER CARD?":DRAW"BM13Ø,5Ø":GO
   SUB118
42 J$=INKEY$:IFJ$="Y"THEN44ELSEI
   FJ$="N"THEN43ELSE42
43 A$="ANOTHER CARD?":DRAW"C1BM1
   3Ø,5Ø":GOSUB118:DRAW"CØ":C(3)
   =Ø:D=D+C(B):B=B+1:GOTO45
44 A$="ANOTHER CARD?":DRAW"C1BM1
   3Ø,5Ø":GOSUB118:DRAW"CØBM117,
   27R35D45L35U45":Y$="BM12Ø,3Ø"
   :Z$="BM143,63":P$="BM133,6Ø":
   L=133:K=45:GOSUB19:D=D+C(B):B
   =B+1
45 DRAW"BM17,77R35D45L35U45":Y$=
   "BM2Ø,8Ø":Z$="BM43,113":P$="B
   M34,11Ø":L=34:K=95:GOSUB19:E=
   E+C(B):B=B+1:DRAW"BM67,77R35D
   45L35U45":Y$="BM7Ø,8Ø":Z$="BM
   93,113":P$="BM84,11Ø":L=84:K=
   95:GOSUB19:E=E+C(B):B=B+1
46 IF E<1Ø THEN 48
47 E=E-1Ø:GOTO46
48 IF E<6 THEN 5Ø
49 C(6)=Ø:GOTO51
5Ø DRAW"BM117,77R35D45L35U45":Y$
   ="BM12Ø,8Ø":Z$="BM143,113":P$
   ="BM134,11Ø":L=134:K=95:GOSUB
   19
51 E=E+C(6)
52 IF D<1Ø THEN 54
53 D=D-1Ø:GOTO52
54 A$=STR$(D)+"  FOR YOU":DRAW"B
   M165,45":GOSUB118
55 IF E<1Ø THEN 57
56 E=E-1Ø:GOTO55
57 A$=STR$(E)+"  FOR ME":DRAW"BM
   165,95":GOSUB118
```


These are collections of programs from Dynamic Color News. Number after program is the issue number.

DCN-1

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DCN-7

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```
58 IF D<=E THENPC=PC-G:A$="YOU L
   OST $"+STR$(G)+" THIS HAND":D
   RAW"BM2Ø,14Ø":PLAY"O4T4ØBAGFE
   DCO3BAGFEDC":GOSUB118:GOTO6Ø
59 IF D>E THENPC=PC+G:A$="YOU WO
   N $"+STR$(G)+" THIS HAND":DRA
   W"BM2Ø,14Ø":PLAY"O4T4ØCDEFGAB
   O5CDEFGAB":GOSUB118
```

```
60 FORX=1TO1000:NEXTX:SOUND191,1
   :GOSUB62:A$="ANOTHER HAND OR
   QUIT (A/Q)":DRAW"BM20,160":GO
   SUB118
61 K$=INKEY$:IFK$="Q"THENCLS:END
   ELSEIFK$="A"THEN13ELSE61
62 IF PC>9999THEN63ELSEIF PC<=0
   THEN PCLS1:A$="YOU'RE OUT OF
   MONEY...GAME OVER!":DRAW"BM20
   ,90":GOSUB118:FORX=1TO9:DRAW"
   C0BM15,85R235D16L235U16":FORT
   =1TO150:NEXTT:DRAW"C1R235D16L
   235U16C0":FORY=1TO150:NEXTY:P
   LAY"O4T20BP2":NEXTX:CLS:ENDEL
   SERETURN
63 PCLS1:A$="YOU BROKE THE BANK!
    - PLAY AGAIN?":DRAW"BM10,90"
   :GOSUB118:FORX=1TO3:DRAW"C0BM
   5,85R245D16L245U16":FORT=1TO1
   50:NEXTT:DRAW"C1R245D16L245U1
   6":FORY=1TO150:NEXTY:PLAY"O4T
   20BP2":NEXTX
64 U$=INKEY$:IFU$="Y"THENRUNELSE
   IFU$="N"THENCLS:ENDELSE64
65 A$(32)="BR6":A$(33)="BRD4BD2R
   BU2U4BR4
66 A$(36)="BD5R2DEH3RF2RH3EDR2BU
   BR3
67 A$(38)="BRNR2D6HUBU2UER2ND3FD
   BD2LULF3NL4RH2REBU3BR3
68 A$(39)="D2RU2BR3
69 A$(40)="BR2LD6NRHU4EBR4
70 A$(41)="RD6NLEU4BUBR3
71 A$(43)="BD3R5L3U2D4RU4BUBR5
72 A$(44)="BD7RU2RDBU6BR3
73 A$(45)="BD3R4BU3BR3
74 A$(46)="BD5DRULBU5BR4
75 A$(47)="BD6RNE6UE5BR4
76 A$(48)="BDD4FU6R3D6NL3EU4BUBR
   3
77 A$(49)="BDED6RU6BR3
78 A$(50)="BDRUR2DRG4DNE4R4BU6BR
   3
79 A$(51)="R5LD2NL3D4L3HBR5U2BU3
   BR3
80 A$(52)="BR3G3DR6L2U4D6RU6BR3
81 A$(53)="ND2R5L4D2R3D4L3HBR5U2
   BU3BR3
82 A$(54)="BR4L2DLGD3FNU4R3U3NL3
   FDBU5BR3
83 A$(55)="R5DRG4DNRE4U2BR3
84 A$(56)="BRNR3D6HUBU2UF2R2D3NL
   3EUBU2UHND6BR4
85 A$(57)="BRNR3D3HNUFR3U3D4G2LR
   2E2U3BUBR3
86 A$(58)="BDDBD2DRUBU2UBUBR3
87 A$(59)="DBD2D2NGRU2BU2UBR3
88 A$(60)="BR3G3F3RH3E3BR3
89 A$(61)="BD2R4BD2NL4BU4BR3
90 A$(62)="F3G3RE3H3BR6
91 A$(63)="BDER3DG2DE3DG2BD2LBU6
   BR6
92 A$(65)="BDD5RU6R3D4NL3D2RU5BU
   BR3
93 A$(66)="D6RU6R3DRNDLD2NL3DRND
   LD2L3BU6BR7
94 A$(67)="BDD4RDU6R2FBD4GL2BU6B
   R6
95 A$(68)="D6RU6R3D6ENU4GL3BU6BR
   7
96 A$(69)="D6RU6R3BD3BLL2D3R3BU6
   BR3
97 A$(70)="D6RU6NR3D3R2BU3BR4
98 A$(71)="BDD4FU6R3FBD2D3LNU3L3
   BU6BR7
99 A$(72)="D6RU6D3R3U3D6RU6BR3
100 A$(73)="D6RU6BR3
101 A$(74)="BR4ND5LD6L2HBU5BR7
102 A$(75)="D6RU6D3RF2DBU3BL2E2U
   BR3
103 A$(76)="D6RNU6R2BU6BR3
104 A$(77)="ND6RD2ED2ED2E3D5RU6B
   R3
105 A$(78)="ND6FD2ED2ED2FU6BR3
106 A$(79)="BDD4FU6R3D6NL3EU4BUB
   R3
107 A$(80)="D6RU6R3D3NL3EUBUBR3
108 A$(81)="BDD4FU6R3D5GNL2EFH2R
   2U3BUBR3
109 A$(82)="D6RU6R3D3L2F3RH3REUB
   UBR3
110 A$(83)="BDDFRF2NH3DL3ULBR5UH
   DH3UR3DRBUBR3
111 A$(84)="R2D6RU6R2BR3
112 A$(85)="D5FNU6R3U6RND5BR3
113 A$(86)="D6RNU6R2EU5RND4BR3
114 A$(87)="D6RNU6R2U6RD6REU5RND
   4BR3
115 A$(88)="D2BD2D2RU6D3R3U3D6RU
   2BU2U2BR3
116 A$(89)="D2FNU3RD3RU3RU3RND2B
   R3
117 RETURN
118 FORZ=1TOLEN(A$):DRAWA$(ASC(M
   ID$(A$,Z,1))):NEXT:RETURN
119 C$="":B$="":B=0
120 C=PEEK(189)*256+PEEK(190):D=
   PEEK(191)*256+PEEK(192):C=C+3
   :DRAW"BM=C;,=D;"
121 D$=CHR$(13)+CHR$(8)+CHR$(32)
122 C$=INKEY$:IFC$=""THEN122ELSE
   IFINSTR(D$,C$)THEN125
123 IFC$<" "ORC$>"Z"THEN122ELSEB
   $=B$+C$:B=B+1:A$=C$:GOSUB118
124 IF LEN(B$)=3 THEN RETURN ELS
   E 122
125 IFC$=CHR$(13)THENRETURN
126 IFC$=CHR$(32)THENB$=B$+CHR$(
   32):B=B+1:A$=C$:GOSUB118:GOTO
   122
127 IFB>0THENE$=B$:B$=LEFT$(B$,L
   EN(B$)-1):B=B-1:A$=E$:DRAW"C1
   BM=C;,=D;":GOSUB118:DRAW"C0BM
   =C;,=D;":IFB$=""THEN122ELSEA$
   =B$:GOSUB118:GOTO122
128 IFB=0THEN122ELSERETURN
```

```
129 A$="YOU RAN OUT OF MONEY":DR
    AW"BM63,100":GOSUB118:PLAY"O1
    T4BP22C":A$="GAME OVER":DRAW"
    BM94,113":GOSUB118:A$="WANNA
    PLAY AGAIN? (Y/N)":DRAW"BM50,
    126":GOSUB118
130 I$=INKEY$:IF I$=""THEN 130
131 IF I$="Y"THEN RUN
132 IF I$="N"THEN CLS:END
133 GOTO 130
134 PLAY"O5T14CP8O4AP8FP8C":A$="
    MINIMUM BET IS ONE DOLLAR":DR
    AW"BM28,60":GOSUB118:A$="TRY
    AGAIN!":DRAW"BM60,80":GOSUB11
    8:FORX=1TO999:NEXT:GOTO13
135 PLAY"O4T14CP8FP8AP8O5C":A$="
    YOU ONLY HAVE $"+STR$(PC):DRA
    W"BM40,60":GOSUB118:A$="TRY A
    GAIN!":DRAW"BM60,80":GOSUB118
    :FORX=1TO2000:NEXT:GOTO13
136 PCLS1:A$="THIS IS THE LAS VE
    GAS CARD GAME OF":DRAW"BM0,0"
    :GOSUB118:A$="BACCARAT.  THE
    OBJECT OF THIS GAME":DRAW"BM0
    ,10":GOSUB118:A$="IS TO GET A
     TOTAL OF NINE OR AT":DRAW"BM
    0,20":GOSUB118
137 A$="LEAST CLOSER TO NINE THA
    N YOUR":DRAW"BM0,30":GOSUB118
    :A$="OPPONENT (THE COMPUTER).
      YOU GET":DRAW"BM0,40":GOSUB
    118:A$="TWO CARDS DEALT TO YO
    U.  YOU HAVE":DRAW"BM0,50":GO
    SUB118:A$="THE OPTION TO TAKE
     ANOTHER CARD IF":DRAW"BM0,60
    ":GOSUB118
138 A$="YOU WISH.  THE COMPUTER
    WILL ALSO":DRAW"BM0,70":GOSUB
    118:A$="GET TWO OR THREE CARD
    S.  YOU WILL":DRAW"BM0,80":GO
    SUB118:A$="WIN OR LOSE THE AM
    OUNT YOU BET":DRAW"BM0,90":GO
    SUB118:A$="EACH HAND.  THE GA
    ME ENDS WHEN YOU":DRAW"BM0,10
    0"
139 GOSUB118:A$="EITHER BREAK TH
    E BANK OR RUN OUT OF":DRAW"BM
    0,110":GOSUB118:A$="MONEY.  Y
    OU CAN BREAK THE BANK BY":DRA
    W"BM0,120":GOSUB118:A$="WINNI
    NG AT LEAST $10,000.":DRAW"BM
    0,130":GOSUB118
140 A$="HIT ANY KEY FOR FURTHER
    INSTRUCTIONS":DRAW"BM0,180":G
    OSUB118:EXEC44539:PCLS1:A$="I
    N THE EVENT OF A TIE, THE COM
    PUTER":DRAW"BM0,0":GOSUB118:A
    $="WINS.  TO INPUT YOUR BET,
    YOU MAY":DRAW"BM0,10":GOSUB11
    8
141 A$="ENTER UP TO THREE DIGITS
    .  THE BET":DRAW"BM0,20":GOSU
    B118:A$="MUST BE AT LEAST ONE
     DOLLAR BUT NOT":DRAW"BM0,30"
    :GOSUB118:A$="MORE THAN 999 D
    OLLARS.  AN INPUT OF":DRAW"BM
    0,40":GOSUB118:A$="ONE OR TWO
     DIGITS REQUIRES THAT YOU":DR
    AW"BM0,50"
142 GOSUB118:A$="HIT <ENTER> AFT
    ER YOUR INPUT.  AN":DRAW"BM0,6
    0":GOSUB118:A$="INPUT OF THRE
    E DIGITS AUTOMATICALLY":DRAW"
    BM0,70":GOSUB118:A$="ENTERS T
    HAT AMOUNT.  IF YOU CHANGE":D
    RAW"BM0,80":GOSUB118
143 A$="YOUR MIND ABOUT THE AMOU
    NT YOU'VE":DRAW"BM0,90":GOSUB
    118:A$="ENTERED, YOU CAN BACK
    SPACE AND RE-":DRAW"BM0,100":
    GOSUB118:A$="ENTER A NEW AMOU
    NT PROVIDED YOU":DRAW"BM0,110
    ":GOSUB118
144 A$="HAVEN'T ALREADY ENTERED
    A THIRD":DRAW"BM0,120":GOSUB1
    18:A$="DIGIT.":DRAW"BM0,130":
    GOSUB118:A$="HIT ANY KEY FOR
    FURTHER INSTRUCTIONS":DRAW"BM
    0,180":GOSUB118:EXEC44539:PCL
    S1:A$="WHEN YOU ADD UP YOUR C
    ARDS, YOU":DRAW"BM0,0":GOSUB1
    18
145 A$="MUST REMEMBER THAT WHEN
    THE SUM":DRAW"BM0,10":GOSUB11
    8:A$="OF 2 OR 3 CARDS IS MORE
     THAN TEN":DRAW"BM0,20":GOSUB
    118:A$="THAT THE TENS VALUE I
    S DROPPED.  FOR":DRAW"BM0,30":
    GOSUB118
146 A$="EXAMPLE:  A JACK AND A 3
    EQUAL 13,":DRAW"BM0,40":GOSUB
    118:A$="BUT SINCE THE TENS VA
    LUE IS DROPPED":DRAW"BM0,50":
    GOSUB118:A$="THE TOTAL IS ACT
    UALLY 3.  A QUEEN":DRAW"BM0,6
    0":GOSUB118:A$="AND A KING WO
    ULD EQUAL 0 AND SO ON.":DRAW"
    BM0,70"
147 GOSUB118:A$="AN ACE COUNTS F
    OR ONE, THE TEN,":DRAW"BM0,80
    ":GOSUB118:A$="JACK, QUEEN AN
    D KING COUNT AS TEN,":DRAW"BM
    0,90":GOSUB118:A$="AND THE 2
    THROUGH 9 COUNT THEIR":DRAW"B
    M0,100":GOSUB118
148 A$="FACE VALUE.  - GOOD LUCK!
    ":DRAW"BM0,110":GOSUB118
149 A$="HIT ANY KEY TO PLAY BACC
    ARAT":DRAW"BM15,180":GOSUB118
    :EXEC44539:GOTO13
```

ham radio & computers
bg
bill chapple w4gqc

PACKET RADIO

Last month I presented a frequency meter which could be used to accurately measure audio frequencies from about 300 to 12000 hertz. This is necessary for decoding teletype or packet signals which are frequency modulated. I have done quite a bit of reading on packet and have concluded that there are two steps that have to be taken.

The first is to be able to decode and transmit packet signals. A terminal program that generates and decodes frequencies instead of voltage levels is required. For a "1" I want to generate the higher frequency and for a "0" I want the lower frequency. In our December 1987 issue I showed how to generate accurate audio frequencies with our computer. High frequency (HF) from 3 to 30 MHZ uses audio frequency shifts of 200 hertz. The two frequencies are 1800 and 1600 hertz. These frequencies are high enough so that harmonic distortion should not be a problem. Our procedure for transmitting will be to feed audio frequency shifted tones into the microphone circuit. This will frequency modulate the transmitter. For receiving I must decode the tones into bits and reconstruct the packet.

The second part will be software. I can construct any format for packet by properly programming the computer. Packet radio is not established like teletype and Morse code, so there will be changes to the software format. An advantage for using a computer rather than dedicated hardware is that these changes can easily be incorporated into the software.

I have made some progress on packet. I modified the frequency meter from last month to a tuning meter. This allows me to correctly tune the receiver for the packet signals. This is not a problem on VHF. On HF the radio frequencies (RF) are frequency modulated. It is necessary to insert a carrier as a reference. This is automatically done in the single sideband (SSB) or continuous wave (CW) mode. Next the receiver has to be tuned until the proper audio tones of 1800 and 1600 hertz are received. Then when a packet is transmitted tones of 1800 and 1600 hertz will be used. A baud rate of 300 is used for HF packet.

One thing that I would like to do is to use my sharp CW filter for packet. It seems feasible to tune in the packet signals using my tuning indicators, and then turn on my clarifier. The only problem is that the clarifier just works in the CW mode and I need to use the SSB mode for transmitting. So to transmit it would be necessary to switch the mode switch. Anyway I am going to experiment with this.

For VHF a baud rate of 1200 is used. The frequencies are 1200 and 2200 hertz. It appears that a 1200 baud modem could be used to generate and decode the packet signals. A 1200 baud modem gives audio frequencies of 1200 and 2200 hertz which could possibly be used on VHF. However I believe the color computer can

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directly generate and decode these signals.

Next month I will continue with packet. I have the tools needed and it is just a matter of putting the pieces together. We have had many requests for packet software so I am working hard on it.

Improved Ham Log

In our August 1987 issue I presented a HAM LOG program. The search routine was slow and it did not have a print option. This month I modified the program to include a fast machine language sort routine and a print option. The first statement contains the machine language data for the sort routine. To enter the machine language data create line 1 as a remark and fill it with about 50 spaces. Run the program and then press the BREAK key. Then enter ?UU. UU is where the machine language subroutine will start and is 5127 for disk basic. Lines 15000- allow the data to be entered. Type GOTO 15000 and then POKE the following values into memory starting at UU:

190, 39, 12, 188, 39, 14, 36, 20, 166, 128, 38, 247, 166, 128, 177, 1, 244, 38, 240, 166, 128, 177, 1, 245, 38, 233, 48, 131, 191, 39, 12, 31, 16, 189, 180, 244, 57

The program is easy to run and user friendly. Just answer the questions as they are asked. When entering data, the previous information will be displayed. If this is to be the same then press the enter key. If it is to be changed then enter the new data.

All of the log can be printed by enabling the printer software when the REVIEW LOG option is selected. Ten entries are printed on a page. The printer can also be enabled in the SEARCH FOR STATION section. This allows all the information for a station to be printed.

I want to thank Garland Sawyers KB6FHH for sending a copy of his log for my use in improving the program. - Bill -

```
2 PCLEAR1:CLS
3 UU=256*PEEK(25)+PEEK(26)+6
4 DIM X$(13),Y$(13):FOR J=1 TO 1
  2:READ X$(J):NEXT J
10 PRINT:PRINT"HAM RADIO LOG 2
20 PRINT"COPYRIGHT (c) 1988
30 PRINT"dYNAMIC eLECTRONICS iNC
35 PRINT"WRITTEN BY bILL cHAPPLE
   W4GQC
40 PRINT
50 PRINT"1 ERASE ALL INFORMATION
  "'800
60 PRINT"2 SEARCH FOR A STATION"
  '2000
70 PRINT"3 ADD A STATION"'4000
75 PRINT"4 REVIEW LOG"'6000
77 PRINT"5 LOAD OR SAVE LOG"'800
  0
78 PRINT"SELECT AN OPTION
80 X$=INKEY$:IF X$=""THEN80
90 X=VAL(X$):ONX GOTO 800,2000,4
  000,6000,8000
100 GOTO80
800 POKE 9998,39:POKE9999,16 'PU
  T ENDING VECTOR T=10000
810 PRINT"INFORMATION IS ERASED"
  :GOTO40
2000 PRINT"THIS SEARCHES FOR A S
  TATION":DEFUSR0=UU
2005 PRINT"PRESS P FOR PRINTER O
  N
2007 ZZ$=INKEY$:IF ZZ$="" THEN 2
  007
2008 IF ZZ$="P" THEN P=1
2010 INPUT"ENTER STATION CALL";V
  $
2015 FOR WW=1 TO LEN(V$):Q$=MID$
  (V$,WW,1):Q=ASC(Q$):POKE 499+
  WW,Q:NEXT WW
2020 L=LEN(V$):M=10000:E=256*PEE
  K(9998)+PEEK(9999):POKE 9996,
  39:POKE9997,16
2022 M=USR0(0):IFM<E THEN 2030
2023 IF M>=E THEN 2200
2024 M=M+2:MS=INT(M/256):LS=M-25
  6*MS:POKE9996,MS:POKE9997,LS:
  GOTO2022
2030 V=M:GOSUB 2500:IF U=0 THEN
  2024
2040 IF U=1 THEN M=V:CLS:GOSUB 6
  020
2050 PRINT:PRINT"PRESS 1 TO FIND
   NEXT OCCURANCE
2060 Z$=INKEY$:IF Z$=""THEN2060
2070 Z=VAL(Z$):IF Z=0 THEN GOTO
  10
```

```
2080 M=M+L:GOTO2022
2200 PRINT"THIS IS THE END OF DA
   TA":PRINT"PRESS 1 TO STAY IN
   SEARCH MODE
2205 ZZ$=INKEY$:IF ZZ$=""THEN220
   5
2210 IF ZZ$="1" THEN 2010 ELSE 1
   0
2499 '
2500 FOR J=1 TO L
2510 A$=MID$(V$,J,1):A=ASC(A$)
2520 B=PEEK(M):IF A<>B THEN 2550
2530 M=M+1:NEXT J
2540 U=1:RETURN
2550 U=0:RETURN
4000 PRINT:PRINT"THIS ADDS A STA
   TION TO THE LOG
4002 PRINT"ENTER NEW DATA OR PRE
   SS ENTER TO PRESERVE THE OLD
   DATA
4003 M=256*PEEK(9998)+PEEK(9999)
   +1'MARK BEG OF NEW DATA
4009 '
4010 FOR J=1 TO 12
4020 PRINTX$(J)": "Y$(J)
4030 LINE INPUT P$
4040 IF P$="" THEN 4055
4050 Y$(J)=P$
4055 GOSUB 4410:POKE M,58:M=M+1
   'SEPERATE ITEMS WITH A :
4060 NEXT J
4070 M=M-1:POKE M,0:MS=INT(M/256
   ):LS=M-256*MS:POKE 9998,MS:PO
   KE 9999,LS:GOTO10
4399 '
4400 'THIS BREAKS STRINGS DOWN &
    STORES IN MEMORY
4410 L=LEN(Y$(J))
4420 FOR AA=1 TO L:A$=MID$(Y$(J)
   ,AA,1):A=ASC(A$)
4430 POKE M,A:M=M+1:NEXT AA:RETU
   RN
5999 '
6000 PRINT"THIS REVIEWS THE LOG
6002 AF=0:PRINT"ENTER 1 TO PRINT
    ALL FILES
6003 ZZ$=INKEY$:IF ZZ$=""THEN600
   3
6004 IF ZZ$="1" THEN AF=1
6005 PRINT"ENTER 1 TO PRINT RESU
   LTS"6006 ZZ$=INKEY$:IF ZZ$=""
   THEN 6006
6007 IF ZZ$="1"THENP=1 ELSEP=0
6008 IF P=1THENLL=1
6010 M=10000:E=256*PEEK(9998)+PE
   EK(9999)
6015 FOR K=1 TO 13:Y$(K)="":NEXT
    K
6016 CLS:GOSUB 6020:GOTO6062
6020 PRINT:FOR J=1 TO 12:P$=""
```


HAM RADIO PROGRAMS

MORSE - This program allows a key to be pressed and then sounds the Morse equivalent. It also will send random characters. This is an excellent tool for developing code speed for the the Novice, Technician, or General class licenses.

DX - Consists of two parts. The first part allows notes to be typed onto the screen. The second part allows the countries for a letter or number prefix to be displayed.

ANTENNA - An antenna design program that calculates the dimensions for a wide spaced Yagi antenna of up to 4 elements.

Order HR-1 (3 programs) $11.95

MORSE TERMINAL

When used with an interface this converts your color computer into a Morse Terminal. To transmit just type the Morse characters and the computer keys your transmitter. In the receive mode the computer decodes and displays the Morse characters on the screen. Instructions are included for building an interface with off the shelf parts. HR-2 $12.95

STATION LOG

Keep a record of your contacts. Just enter the information as it is requested. Items that are the same such as date, frequency, and type of emission need only be entered once and changed as needed. Save and load records to tape or disk. Add to the log and quickly find stations. HR-3 $9.95

THERMOMETER

Now your computer can give you the temperature in both Fahrenheit and Centigrade. Assembly plugs into a joystick port and consists of a thermistor on a 10' cable for the single unit and a second thermistor on a 20' flat cable for the dual unit. The dual unit can be used to measure inside and outside temperature. CC-THERM $12.95, CC-THERM 2 $19.95.

MEMORY SAVER 2

A battery backup for all color computers. Leave programs in your computer and the Memory Saver will preserve them in case of a power failure. A real time saver for cassette systems. $39.95

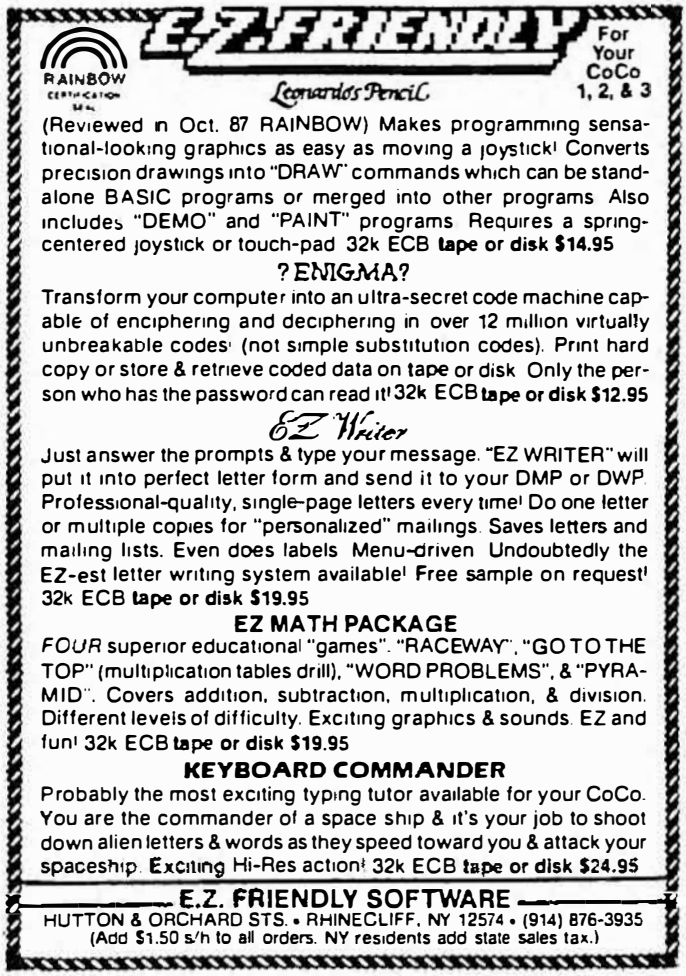
HAM RTTY TERMINAL

Uses the cassette port. Requires simple interface to connect cassette audio into the Mic jack and receiver audio into the cassette port. Interface instructions are included. 60 WPM Baudot. $6.95.

All programs are color computer 3 compatible unless indicated and are on tape or disk. Please specify tape or disk software.

Checks, VISA or MC, Add $3 shipping.

DYNAMIC ELECTRONICS
Box 896 (205) 773-2758
Hartselle, Al 35640




```
6025 IF M>=E THEN 6100
6030 A=PEEK(M):A$=CHR$(A):IF A$=
   ":" THEN 6050
6035 IF A=0 THEN 6050
6040 P$=P$+A$:M=M+1:GOTO 6030
6050 Y$(J)=P$:PRINTX$(J)": "Y$(J
   )
6055 IF P=1 THEN GOSUB 15000
6060 M=M+1:NEXT J:RETURN
6062 IF AF=1 THEN 6090
6065 PRINT"PRESS ENTER FOR MORE,
   E TO END";
6070 Z$=INKEY$:IF Z$="" THEN 607
   0
6080 IF Z$="E" THEN 10
6090 PRINT:GOTO 6016
6100 PRINT:PRINT"LAST ENTRY PRES
   S ENTER";
6110 Z$=INKEY$:IF Z$="" THEN 611
   0
6120 GOTO10
8000 CLS:PRINT"THIS LOADS OR SAV
   ES FILES
8010 EN=256*PEEK(9998)+PEEK(9999
   ):BE=10000:EX=BE
8020 PRINT"1 LOAD CASSETTE FILE
8030 PRINT"2 SAVE CASSETTE FILE
8040 PRINT"3 LOAD DISK FILE
8050 PRINT"4 SAVE DISK FILE
8060 PRINT"ENTER NUMBER
8070 Z$=INKEY$:IF Z$="" THEN 807
   0
8080 Z=VAL(Z$):ON Z GO SUB 8200,
   8300,8400,8500
8090 GOTO10
8199 'LOAD CASSETTE FILE
8200 CLS:PRINT"LOADING A CASSETT
   E FILE":INPUT"FILE NAME OR EN
   TER";X$
8210 CLOADM X$:RETURN
8299 '
8300 CLS:PRINT"SAVING FILE TO A
   CASSETTE":PRINT"MAKE SURE CAS
   SETTE IS READY.
8310 INPUT"NAME";X$:CSAVEM X$,BE
   ,EN,EX:RETURN
8399 '
8400 PRINT"LOAD A DISK FILE":INP
   UT"1 FOR DIRECTORY";X:IF X=1
   THEN DIR
8410 INPUT"ENTER FILE TO LOAD";X
   $
8420 LOADM X$:RETURN
8499 '
8500 PRINT"THIS SAVES THE FILE T
   O DISK":INPUT"ENTER 1 FOR DIR
   ECTORY";X
8510 IF X=1 THEN DIR
8520 INPUT"ENTER NAME OF FILE TO
    SAVE";X$
8530 SAVEM X$,BE,EN,EX:RETURN
9999 '
10000 DATA STN,DATE,BEG,END,MY S
   IG,HIS SIG,FREQ, EMISSION,POW
   ER, WEATHER, HIS RIG,COMMENTS
   ,,
12000 PRINT"THIS PEEKS MEMORY
12010 INPUT"MEMORY STARTING";G
12020 F=PEEK(G):F$=CHR$(F):PRINT
   G;F;F$
12030 G=G+1:GOTO12020
15000 'THIS PRINTS THE FILE TO T
   HE PRINTER
15010 IF J=1 THEN PRINT#-2,"  "
15020 IF J=5 THEN PRINT#-2,"  "
15030 IF J=9 THEN PRINT#-2,"  "
15035 IF J=11 THEN PRINT#-2,"  "
15040 PRINT#-2,X$(J)": "Y$(J),
15050 IF J=12 THEN PRINT#-2," ":
   LL=LL+1
15060 IF LL>10 THEN LL=1:PRINT#-
   2,CHR$(12)
15070 RETURN
16000 INPUT"MEMORY";M
16010 PRINTM;:INPUT"VALUE";V
16020 POKE M,V:M=M+1:GOTO16010
18000 PRINT"PRESS E TO END OR C
   TO CONTINUE
18010 ZZ$=INKEY$:IF ZZ$=""THEN 1
   8010
18020 RETURN
```

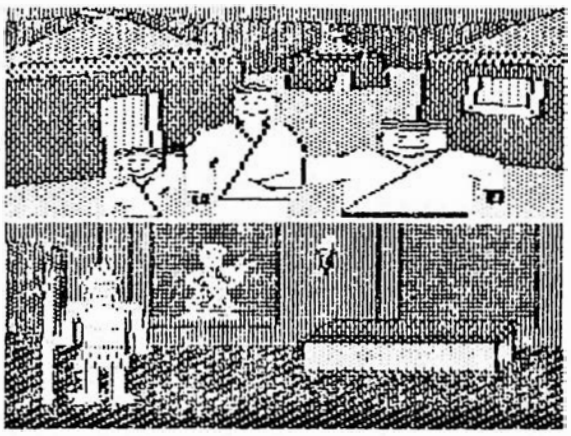
VALKYRIE

VALKYRIE Software, P.O.Box 2120, Monroe, NY 10950 (914) 783-0191

Tomb of T'ien

64K 100% ML Animated/Graphics Adventure Game
Requirements: 64K Color Computer 1,2 or 3
Tape OR Disk required

RAINBOW CERTIFICATION SEAL

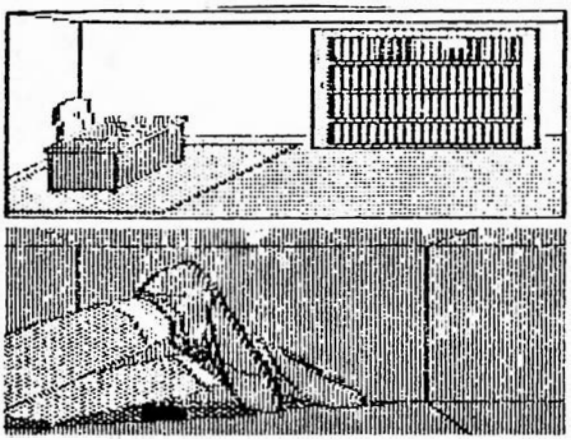


This is a game you're going to love to play! Picture this, a full color graphics adventure game that understands over 200 words, has realistic animation, a meaningful story plot, characters to talk to and who talk to you, monsters, puzzles and more. Enter the TOMB OF T'IEN and you will experience this excitement! Here's the background: your village has been burned and its sacred shrine stolen by the mythical dragon in the legend of Emporer T'ien. You have been chosen by lottery to retrieve the shrine and conquer the dragon so that your village may live in peace. But peace is not what you will find outside your village in your quest for the TOMB OF T'IEN.
64K Color Computer $19.95

Mr. Corey

64K 100% ML Animated/Graphics Adventure Game
Requirements: 64K Color Computer 1,2 or 3
Tape OR Disk required

Now this is a GREAT game! If you have played TOMB OF T'IEN, you probably thought it was the best, but now we have MR. COREY and you know it's going to be better! How does more animation, more vocabulary, more thrill, more adventure and the same amount of money sound to you! Here's the story: you are a secret agent for a government agency named ATHENA who sent you to spy on the most villainous man alive, Mr. Corey. Unfortunately, before you were able to find out anything about Corey's new scheme, you were discovered and locked up in a room with a nuclear time bomb. With only hours to spare, you must find Corey and put an end to his plot, but first you have to escape from the bomb! This game is so realistic and requires so much memory that it is in two parts. Solve the first and you're a pro, but the second will take you to your knees! (Both parts included.)
64K Color Computer $19.95



All games come in their own color folders, with color disk or tape, and instructions.
Programs are guaranteed to load for at least one year.

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NEW	Task Force: Modern Naval War in the Med (CC64K D HR MLS)	$27
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UPGRADED	Battle Hymn: Battle of Gettysburg (CC64K D HR ML)	$25
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	River Crossing	$17
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NEW	Beach Head	$17
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Barbarossa, Luftflotte, Battle Hymn (256K) available Tandy 1000

New for the Tandy 1000:

	Gray Storm Rising: War in the North Atlantic	$25

Codes CC — Color Computer, all versions CC3 CoCo 3 only
D — Disk only (no D means program available tape or disk)
HR — High Resolution SG — Semigraphics ML — Machine Language
MLS — Machine Language Subroutines B — Basic

Write for free catalog!

(Upgrades may be acquired for $5. Original tape or disk must be returned with order.)

Prices on all programs include shipping costs to USA and Canada. Others add $3.00. COD's available in USA only, add $3.50. Personal Checks accepted with no delays in USA. Others send M.O. or Bank Draft in US funds. Programs shipped within 24 hours except on weekends. Color Computer and Tandy 1000, TM Tandy Corp. Florida residents add 5% sales tax.

Canadians may order direct from: M & M Software, #203 818 Watson Cres., Dawson Creek, B.C. V1G 1N8. Write M & M Software for information.

ARK ROYAL GAMES
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ARK ROYAL GAMES

EDITOR'S COMMENTS

When I first started this venture in 1984, I could not imagine that 5 years later I would still be publishing a computer magazine. Three times we got too far behind and jumped a month by combining an issue. Now we try to mail each issue near the end of the preceeding month. This issue will be mailed near the end of January and you should receive it around February 15.

Most of my experience has been in Electronics. I earned an Associate Degree in Electronics and was an electronics technician for several years. Later I taught Electronics at a Junior College while working on my Math Degree at night school. After obtaining my Math degree I continued in night school studying engineering. I earned both my math and engineering degrees at the University of Alabama in Huntsville.

I have had much experience with hands on hardware. As an electronics engineer I worked designing switching power supplies, analog circuits, and later logic circuits. I felt very secure as both an analog and digital designer until microprocessors appeared. It is a shame that things change and new methods have to be learned. Instead of designing with hardware components, it was becomming necessary to use a microprocessor. I had no knowlege about computers and did not want to learn about them. I visualized computers as collections of ones and zeros which would take a tremendous amount of work to understand. I knew how to write programs using FORTRAN but these took a large computer and many hours of work. However I was forced to learn microprocessor technology in order to be a successful hardware engineer. Today it is easy to use a computer for hardware tasks. Basic is the programming language for microcomputers and it is easy to learn.

All of the circuits I used to wire up to perform a task were very time consuming. If a change were to be made, wires had to be physically moved from one place to another. Now if we want to make a change we change a line in our program. What could be quicker?

Once information is moved into a computer, then the power of the computer can be used to manipulate the data and transform it into a different form. As an example let's consider using the joystick ports for entering data. We wrote a series on this last year. We gave instructions for building a simple interface in a joystick plug. We can monitor a voltage on a joystick port and the computer can cause a sound to be made if the voltage is not within specified limits. It would take time to do this with hardware. The hardware could not easily be modify to perform a different task. Years ago a friend of mine told me to get a computer and then I could program it to do any task. He was right and I took his advice about 15 years later.

I believe that only a small part of the computer's capability is used. We can get fancy

programs that do impressive tasks, but the computer can usually do even more. It wastes a lot of time waiting on us to give it additional instructions.

This month we are starting a series on OS-9. We have had many requests for OS-9. OS-9 is an operating system that has good and bad points. It is not for beginners. You should be familiar with the operation of your computer with a disk drive before diving into OS-9. We now have level 2 with Basic Ø9. Read our editorial in this issue if you are interested. There will be more next month.

There is much interest in learning more about computers. If you are a beginner, become familiar with basic and at least know how to edit a program. Even if you do not want to write programs, you should know how to make changes to them. Concentrate on one thing at a time. When you purchase a printer or disk drive concentrate on them until you have them mastered. Each will have things that will need to be learned. Don't tackle several learning tasks at once or you may become confused.

We still need names of potential subscribers. If you know of people who you think would like to see a copy of our magazine we would appreciate your sending us their names so we can send them a sample.

Also we need articles and programs. We received some recently and will be making offers to the authors. If you have a program or article send it to us and let us know what you expect for it. We can pay, trade your article for a product, or extend your subscription.

Let us know if you have a subject you would like for us to cover. We again started OS-9 due to your requests. We have had requests for hardware projects and I am looking at some possibilities. It has been a while since I have worked on hardware and I am ready to start a new project.

As we start our fifth year I want to thank you for your support. I have enjoyed the past four years and am looking forward to this year.

+ + + BILL + + +

DOES THIS NEWS JUST TICKLE YOUR EAR?

REMUSIC 1.0 is here!

REMUSIC is a versatile, programmable music synthesis software package requiring only a 16K disk-based CoCo(32K recommended). Enter musical data as BASIC program REM statements -- no graphic interface is used. Once loaded, REMUSIC keeps a low profile as you roll merrily along in BASIC. Here are a few of REMUSIC's powerful features:

*Four independent voice tracks *Definable and dynamically assignable tone waves and amplitude envelopes, allowing such effects as decay, vibrato, and tremolo *Music plays through TV or monitor speaker *Nestable multiple music repeats with the option of different endings *Key signature and two different transposition modes *Ability to mathematically link repeat iterations with such functions as transposition, octave, tempo, waveform assignment and subordinate repeats and endings *Ability to convert music to independent machine-language programs for use in your own programs *Since music source files are actually BASIC programs, they can be edited and merged as other BASIC programs can.

Package includes program diskette, sample music files, and documentation.

Send check or money order for $25.00* to:

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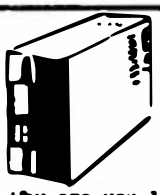
GREAT COCO III STUFF



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Why are you limiting yourself to just 35 track, 160K single sided drives? Now you can step up to 720K, 80 track, double sided, 3 1/2" drives! You still can be compatible with 5 1/4 software by removing the filler plate & adding your existing 5 1/4" drive! (Or buy one from us!) Intro price $229.95*

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* - Includes PS & Case and hookups for 2nd drive (5 1/4")
** - Eliminates OS9 type-ahead problems!
NOTE the 3 1/2 system ($229.95) doesn't include a controller. Also, the 5 1/4" drive must be a half-height drive.

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SPECIAL BONUS - BUY ABOVE 4 for only $99.95 !!! (Add $10 for COLORMAX DELUXE version)

TW-80 - 80 columns for TW-64 on CoCo III

See pg.138, 10/87 Rainbow review!

It's finally here! An 80 column version of Telewriter-64 for the CoCo III with TELEPATCH features plus much, much more! Includes PRINT SPOOLER & (2) ultra-fast RAM DISKS for 512K users, plus changeable CHARACTER FONTS & a setup CONFIG pgm. Req. TW-64 DISK & 128K CoCo III $39.95 / TW-80 & TW-64 combo! $99.95

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HI-RES JOYSTICK utility software BONANZA!

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Sharper & Brighter than Tandy CM-8!

Do NOT be FOOLED! The CM-8 has a dot-pitch of .52mm & will not work with any other computer or VCR! The '8515' has a SHARP .42mm dot-pitch, will work with IBM PCs/Tandy 1000 and its COLOR COMPOSITE input displays PMODE4 artifact colors unlike the CM-8! *$299.95 when purchased with a $24.95 CoCoIII cable - Add $14 shipping.

CoCo III 512K RAM sticker $4.99
Level II Quick Ref Guide $4.99
Level II Basic09 binder ..$9.95
CoCo III Multipak PAL chip $19.95
CoCoIII Assembly Language .$19.95
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CoCo III Utilities

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CoCo III Secrets Revealed

An introduction to the Color Computer III that compares the differences between the CoCoI/II and the NEW CoCoIII. Includes: IDE chip specs, CoCoII to CoCoIII converter and a 128/512K RAM test. "Offers some very good information to programmers." - Rainbow review 2/87 $19.95

CoCo III Screen Dump

This is the program for HARDCOPY GRAPHICS for Radio Shack bit-image, dot-matrix printers (DMP-105, DMP-110, etc.) and Epson compatibles (Star Micronics, Panasonic, etc.). Will print HSCREEN 1-4 and PMODE 0-4. 16 patterns can be CUSTOMIZED for any color on the screen! 128K CoCoIII DISK $24.95

Fkeys III

A productivity enhancement that gives you the capability to add twenty (20) predefined functions to the CoCoIII by using the CTRL, F1 and F2 keys!! $24.95 "Get more from your keyboard with FKEYS III" - Rainbow review 4/87

C III Graphics

A drawing program for the CoCoIII using the new ENHANCED graphic features: 320X192 graphics, 16 of any 64 colors, plus the ability to SAVE and LOAD 32K screens. "Paint pretty pictures on the CoCo3." - Rainbow review 12/86 $19.95

OS-9 Solution

NOW, a program that creates a "USER FRIENDLY" environment within OS-9. The OS-9 SOLUTION replaces 20 of the old "USER HOSTILE" commands with single keystroke, menu driven commands. No more typing in simplex long pathnames or remember any complicated syntaxes! $29.95

Telepatch III

All the FEATURES of TELEPATCH plus the classically proportioned characters of the WIZARD with TRUE lowercase! Now CoCoIII compatible! (Upgrade $15 w/proof of purchase) $29.95

Tape/Disk Utility

A powerful package that transfers tape to disk and disk to tape automatically. Does an automatic copy of an entire disk of programs to tape. Ideal for Rainbow On Tape to disk. Also copies tape to tape & prints tape & disk directories. TAPE/DISK $24.95

Multi-Pak Crak

Save ROMPAKS on your 64K Disk System using the RS Multi-Pak Interface. Eliminate constant plugging in of ROMPAKS by keeping all PAK software on disk. Includes POKES for "PROBLEM" ROMPAKS & the NEW 16K PAKS (Demon Attack, Dragons Lair..) $29.95 NOW CoCo3 compatible! Upgrade $15 w/proof of purchase

Disk Utility 2.1A

A multi-featured tool for USER FRIENDLY disk handling. Utilize a directory window to selectively sort, move, rename & kill file entries. Lightning fast Disk I/O for format, copy & backup. Single execution of both Basic & ML programs. 64K DISK $29.95. NOW also CoCoIII compatible! Upgrade only $15 w/proof of purchase

Spectrum DOS

Add 24 NEW Disk commands with 2 Hi-Res screens! Supports 40 track & Double-sided drives, 6ms stepping, auto disk search, error trapping and "EPROMABLE". 64K DISK $49.95 *New LOW price!* $29.95

Mikey Dial

When used with any Hayes compatible modem and Deluxe Program Pak, adds to Mikeyterm 4.0 the ability to Autodial 22 numbers from a menu and load a set of 3 MACROS for each directory choice. Also EASY redial & changing of MODEM settings by command menu. $19.95 (see 12/86 Rainbow review)

Spectrum Font Generator

Write files using any CoCo Word Processor (TW-64, EliteWord, etc.) and convert them to Highly Detailed character sets! Some of the character sets supported are Italics, Old English, ~~Futuristic & Block! Character set editor included~~ & supports most dot-matrix printers! $29.95

Schematic Drafting Processor

Save time and design pro looking diagrams using a 480X540 pixel worksheet w/6 viewing windows. Over 30 electronic symbols w/10 definable symbols. (Even Logic gates & Multipin chips!) Print hard copy & save to disk. 64K DISK $29.95

CoCo Checker

Something possibly wrong with your CoCo? CoCo Checker is the answer! Will test your ROMs, RAMs, Disk Drives & Controller, Printer, Keyboard, Cassette, Joysticks, Sound, PIAs, VDG, Internal Clock Speed, Multi-pak Interface and more! $24.95

Rickeyterm 2.0

Supports 40/80 column mode, ASCII or XMODEM uploads & downloads, Deluxe RS232 PAK or Serial 'BITBANGER' port, 300/1200 Baud! Plus 'STRINGS' (predefined sequences of text) can be read into the BUFFER from DISK & transmitted by NAME! Type ahead & auto-repeat are also supported. 128K CoCoIII DISK $39.95 (see 9/87 Rainbow review)

64K Disk Utility Package

Take advantage of an expanded 64K machine. Make an additional 8K of RAM available by relocating the ~~Ext Basic ROM~~ from $8000 to $0800. Copy ROMPAKs to disk (even "protected" PAKs) and create a 32K SPOOL buffer for printing. $24.95

EZ Base

A truly friendly data base program at an affordable price! Keep inventories, hobby collections, recipes, card lists and much more! Hi-Res screen, up to 500 records with 15 fields, record or field search & a MAILING LABELS option. 32K DISK $29.95

Blackjack Royale

A Hi-Res graphics casino blackjack simulation and card counting tutor. Fully realistic play includes: double down, splits, surrender, insurance, 1-8 decks, burnt cards, shuffle frequency and more! "This fine program is a must for the CoCo Blackjack player." - Rainbow review $24.95

Spectrum Adventure Generator

The Spectrum Adventure Generator creates adventure games that are 100% ML & very fast! Up to 99 rooms, 255 objects, 70 command words & 255 conditional flags can be used. 64K DISK $29.95

CoCo Calendar

Get organized for 365 days today with the CoCo Calendar! Designed for recording the entire year's occasions and daily appointments so you can plan ahead. You can store HUNDREDS of entries and our GRAPHIC calendar will show all MEMOS! $19.95

THE KITCHEN SINK ...

Everything but the KITCHEN SINK!!! Receive all twenty-three (23) Colorful Utilities from top to bottom, the Software Bonanza Pak to CoCo Calendar (a $500 plus value) for a SPECIAL price $149.95!!!

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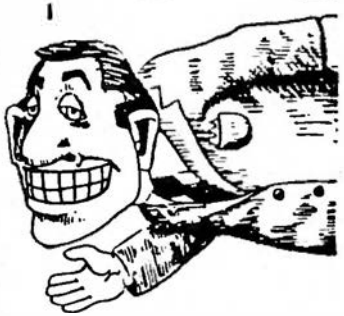
Graphics Designer - $29.95
Spit'N'Image - $34.95
ADOS-3 - $34.95
EliteWord 80/Spel - $99.95



PRODUCT REVIEWS

This section is open to all producers and dealers of color computer products. We will review your product free of charge and write an editorial on the product. We do not use a rating system but will explain what the product does, and what can be expected from it. Any comments about the review from the firm submitting the product will be printed in a later issue.

BACKUP LIGHTNING

This is one of the finest disk utility programs we have seen. It requires a 512K color computer 3 and can be customized for any disk configuration. It backs up both RS DOS and OS-9 disks. Since RS DOS and OS-9 disks are formatted differently, without Backup Lightning, OS-9 disks have to be formatted from the OS-9 system. Now both can be formatted from RS DOS using Backup Lightning.

Before using Backup Lightning it is necessary to configure the program. Up to 5 different configurations can be saved on a work disk. It is necessary to make a working disk before using Backup Lightning because the configurations have to be loaded.

To set up a configuration, answer the questions as they appear on the screen. Parameters such as number of drives, number of sides and tracks, step rate, and the target drives must be selected. A configuration setup number is then selected and the configuration is saved on the work disk.

To duplicate a disk press "D" from the menu after a configuration has been loaded. Then select the source drive and insert the disk to be duplicated into the source drive. Press ENTER and the disk is copied into the computer's memory. The track numbers are printed on the screen as the master disk is being copied. When copying is completed, the computer will make a sound and instructions to insert a blank disk appears on the screen. An unformatted disk can be used. Press ENTER and the new disk is formatted and copied in just a few seconds. Again the computer will sound after the copying is completed. To make additional copies remove the disk and insert another unformatted disk. In just a few seconds the computer will sound indicating the completion of another copy. The number of copies are displayed on the screen.

Backup Lighting claims to make identical copies in several drives at the same time. We only have single drive setups so could not verify this. The speed with which it makes copies without formatting and the ability to copy OS-9 disks from RS DOS are real assets if a lot of disk copying is to be done. Backup Lightning costs $19.95 +$3S/H. Spectrum Projects, P. O. Box 11414, Howard Beach, NY 11414.

BOOKS of the HOLY BIBLE

This program gives a brief description of any book in the Bible, old or new Testament. It will list the number of chapters, verses, and words in the book as they appear in the King James Version.

After the title message a book can be entered. A brief summary about the book is printed on the screen. A printed copy of the information can be made or information on a different book can be obtained and displayed.

The names of the books have to be spelled correctly. Misspelling a book causes a blank screen to be displayed. Control can be returned to the menu where another attempt can be

DYNAMIC ELECTRONICS INC.

PUBLIC DOMAIN SOFTWARE

This large collection of programs will allow you to quickly expand your library. All programs are on disk and programs with a * can be supplied on tape. Some programs require a joystick. Instructions are included in some collections as DAT or TXT files

* PD-1 GAMES

MENU	BAS	Ø	B	1
BEAST	BAS	Ø	B	1
BEAST	DAT	1	A	1
BOBO	BAS	Ø	B	3
GUNNER	BAS	Ø	B	2
HOW	BAS	Ø	B	3
LANDER	BAS	Ø	B	3
LIFE	BAS	Ø	B	3
MAX	BAS	Ø	B	3
POKER	BAS	Ø	B	2
BIORITHM	BAS	Ø	B	3
BLACKBOX	BAS	Ø	B	2
BLOCKADE	BAS	Ø	B	1
BUSJUMP	BAS	Ø	B	1
CHUTE	BAS	Ø	B	2
GO	BAS	Ø	B	3
HANGMAN	BAS	Ø	B	2
OTHELLO	BAS	Ø	B	2
TARTUS	BAS	Ø	B	1
TARTUS2	BAS	Ø	B	1

* PD-2 GAMES

MENU	BAS	Ø	B	1
RUBIC	BAS	Ø	B	5
FRACTAL	BAS	Ø	B	1
KALSCOPE	BAS	Ø	B	2
TARTUS	BAS	Ø	B	1
TARTUS2	BAS	Ø	B	1
WORLD3D	BAS	Ø	B	4
LIFE	BAS	Ø	B	2
ADVENT	BAS	Ø	B	4
ADVENT	DOC	1	A	2
HURKLE	BAS	Ø	B	2
REVERSE	BAS	Ø	B	2
GUESSFR	BAS	Ø	B	2
SCRAMBLE	BAS	Ø	B	3
PIZZA	BAS	Ø	B	2
CINQUAIN	BAS	Ø	B	2

* PD-3 GAMES

MENU	BAS	Ø	B	1
AANDAN	BAS	Ø	B	2
STARTREK	BAS	Ø	B	9
TREKINST	BAS	Ø	B	3
SEQUENCE	BAS	Ø	B	2
ALPHABET	BAS	Ø	B	3
GEOGRAPH	BAS	Ø	B	4
FLASH	BAS	Ø	B	4
BAGELS	BAS	Ø	B	3
OREGON	BAS	Ø	B	9
MULTIPLY	BAS	Ø	B	2

* PD-4 ML GAMES

MENU	BAS	Ø	B	1
PONG	BIN	2	B	1
SQUASH	BIN	2	B	2
BLOCKADE	BIN	2	B	2
GERM	BIN	2	B	1
WIGWORM	BIN	2	B	2
GRID	BIN	2	B	2
ZEROG	BIN	2	B	2
3DTICTAC	BIN	2	B	7
HOPBOP	BIN	2	B	5
ICEWAR	BAS	Ø	B	6
CIVILWAR	BAS	Ø	B	4
TICTACTO	BIN	2	B	7

* PD-5 GAMES

MENU	BAS	Ø	B	1
CAVE	BAS	Ø	B	4
WARGAME	BAS	Ø	B	2
WARGAME	BIN	2	B	1
WARGAME2	BAS	Ø	B	5
WARROOM	BIN	2	B	3
NORAD	BAS	Ø	B	3
ANDREA	BAS	Ø	B	5
CURSE	BAS	Ø	B	4
GARGOYLE	BAS	Ø	B	6
KINGTUT	BAS	Ø	B	7
TAIPAN	BAS	Ø	B	6

DSK-6

SPELL & FIX
FIND SPELLING ERRORS
IN TXT DISK FILES

MENU	BAS	Ø	B	1
MANUAL	TXT	1	A	12
SPELLFX2	BAS	Ø	B	1
SPELLFX2	BIN	2	B	6
SPELLFIX	BAS	Ø	B	1
DICT	TXT	1	A	33
COREDICT	TXT	1	A	1
SAMPLE	TXT	1	A	1
BUILD	BAS	Ø	B	1
LIST	BAS	Ø	B	1
RESET	BAS	Ø	B	1
APPEND	BAS	Ø	B	1
ADDWORDS	BIN	2	B	3

PD-7 DISK UTILITIES

MENU	BAS	Ø	B	1
BASIC64	BIN	2	B	1
BSEARCH	BIN	2	B	1
DISKCOMP	BIN	2	B	1
DISKTEST	BIN	2	B	3
DISKWASH	BAS	Ø	B	1
DOS64K	BAS	Ø	B	2
DSDBOOT	BIN	2	B	1
LIST	BIN	2	B	2
PRINT	BIN	2	B	3
PRINTDIR	BAS	Ø	B	1
RECOVER	BIN	2	B	1
ROMBACK	BAS	Ø	B	1
ROMFIX	BIN	2	B	1

PD-8 DISK UTILITIES

SCRN51	BAS	Ø	B	1
SCRN51	BIN	2	B	1
SCRNDEMO	BAS	Ø	B	2
SDC	BIN	2	B	1
SQUEEZE	BIN	2	B	1
SSDBOOT	BIN	2	B	1
TAPE2DSK	BAS	Ø	B	1
TIMER	BIN	2	B	2
UNLOCK	BIN	2	B	1
BACKUP	BIN	2	B	1
BACKUP1	BIN	2	B	1
MORE	BIN	2	B	3
SPEAK	BIN	2	B	3
PCLEARFX	BIN	2	B	1
MULTBACK	BIN	2	B	1
MULTBACK	DOC	1	A	1

PD-9

TERMINAL PROGRAMS

MENU	BAS	Ø	B	1
TELETERM	BIN	2	B	3
TELETERM	CAS	2	B	3
TTHELP	DAT	1	A	4
MTERM	BIN	2	B	6
MTERM	VIP	1	A	19
MTCONFIG	BAS	Ø	B	3
MTERM+	BIN	2	B	6
DATATRDE	BIN	2	B	3
KERMIT	BAS	1	A	1
KERMIT	BIN	2	B	2
HAYESAE	BIN	2	B	4
HAYESAE	DOC	1	A	6

PD-10

COLOR COMPUTER FORTH

MENU	BAS	Ø	B	1
FORTHMAN	UL1	2	B	7
FORTHMAN	UL2	2	B	7
FORTHMAN	UL3	2	B	1
FORTH	BIN	2	B	3
EDIT	DAT	1	A	3
FRTHDOC1	TXT	1	A	7
FRTHDOC2	TXT	1	A	7
FRTHDOC3	TXT	1	A	1
FRTHDOC4	TXT	1	A	7
32KFORTH	BIN	2	B	4
NEWFORTH	BIN	2	B	3
WE	BAS	Ø	B	1

PD-11 MCPAINT

A COMPLETE GRAPHICS
DEVELOPMENT PROGRAM
WITH INSTRUCTIONS

RUN-ME	BAS	Ø	B	1
MCPAINT	BIN	2	B	11
ICONS	SYS	2	B	3
MCDOC	DOC	1	A	11
PRINTDOC	BAS	1	A	1
GLASDEMO	BIN	2	B	6
STARS	BIN	2	B	2
1940S	SET	2	B	1
BLOON	SET	2	B	1
BOLD	SET	2	B	1
FANCY	SET	2	B	1
GREEK	SET	2	B	1
GREEKU	SET	2	B	1
HEBREW	SET	2	B	1
OLDENG	SET	2	B	1
TYPING	SET	2	B	1
EPSON	DRV	2	B	1
EPSON2	DRV	2	B	1
ANIMATE	BAS	Ø	B	1
ANIMAT	BIN	2	B	1
BANNER	BAS	Ø	B	2
MCUTIL	BIN	2	B	1

* PD-12

PMODE 4 PICTURES

CHURCH, ROSES, HOUSE
RUN "PIXFILES"
JOYSTICK IS REQUIRED

XIXCMP	BAS	Ø	A	3
OUTPOST	BAS	Ø	A	3
OUTPOST	BIN	2	B	3
SFIELD	BAS	Ø	A	2
SFIELD	BIN	2	B	3
PIXFILES	BAS	Ø	B	3
TRUCK	BIN	2	B	3
MODEM	BIN	2	B	3
HORSE	BIN	2	B	3
MISSION	BIN	2	B	3
CLOISTER	BIN	2	B	3
RAIN	BIN	2	B	3
EAGLE	BIN	2	B	3
ROSES	BIN	2	B	3
CHURCH	BIN	2	B	3
GARDEN	BIN	2	B	3
PRES	BIN	2	B	3
LONI4	BAS	Ø	A	3

PD-13

GRAPHICON PICTURE
DISK-1. REQUIRES
PIXFILES/BAS FROM
PD-12 & JOYSTICK

PICTURES GCM 1 B 68

PD-14

GRAPHICON PICTURE
DISK-2. REQUIRES
PIXFILES/BAS FROM
PD-12 & JOYSTICK

PICTURES GCM 1 B 68

PD-15

GRAPHICON PICTURE
DISK-3 REQUIRES
PIXFILES/BAS FROM
PD-12 & JOYSTICK

PICTURES GCM 1 B 68

PD-16

GRAPHICON PICTURE
DISK-4 REQUIRES
PIXFILES/BAS FROM
PD-12 & JOYSTICK

PICTURES GCM 1 B 68

PD-17 DISK UTILITIES

64KBHW	BAS	0	A	1
AUTOSTRT	BAS	0	B	1
BAKDIR	BAS	0	A	3
BIN>BAS	BAS	0	A	1
CASSLABL	BAS	0	B	1
CURSOR	BAS	0	B	1
CUSTOM	BAS	0	B	3
CUSTOMIZ	BAS	0	B	1
DIR	BIN	2	B	1
DIR32	BAS	0	A	2
DIR32C	DOC	1	A	3
DIRLISTR	BAK	0	B	1
DIRLISTR	BAS	0	B	1

PD-18 TAPE TO DISK
DISK UTILITIES

DIRSORT	BAS	0	A	1
DISK-DIR	BAS	0	A	1
DISKLABL	BAS	0	A	1
LOADSOLU	BAS	0	B	1
MENU	BAS	0	B	1
PDIR	BAS	0	A	1
SORT	BAS	0	B	1
SORTPRT	BAS	0	B	1
SORTSAVE	BAS	0	A	1
SOULTION	BIN	2	B	1
SUPERBAC	BIN	2	B	1
T2D	BIN	2	B	2
TIMER	BAS	0	B	1
TPTODSK	BIN	2	B	1

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* PD-19 GAMES

3DMAZE	BAS	0	A	2
BOXES	BAS	0	B	1
CLOSE EN	BAS	0	B	2
CRITICAL	BAS	0	B	1
GAMMON	BAS	0	B	3
GOLDMINE	BAS	0	A	3
HOCKEY	BAS	0	A	1
HOGJOWL	BAS	0	A	8
HORSERAC	BAS	0	A	3
JUMPING	BAS	0	B	1
KALIDESC	BAS	0	B	1
MASTMIND	BAS	0	B	1
MEMORY	BAS	0	B	1
MOONBASE	BAS	0	B	2
NAMES	BAS	0	B	4
OTHELLO	BAS	0	B	4

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* PD-20 GAMES

PEG	BAS	0	B	3
RABBIT	BAS	0	B	1
SAFE	BAS	0	B	2
SAUACER	BAS	0	B	1
SHOOTEM	BAS	0	B	2
SIMMON	BAS	0	A	1
SLITHER	BAS	0	A	2
SPACE WA	BAS	0	B	4
STAR TRE	BAS	0	B	1
SUBCHASE	BAS	0	B	2
SUBDESTR	BAS	0	B	2
SUNDANCE	BAS	0	B	2
TANKS	BAS	0	B	2
TOWER	BAS	0	B	2
UNDROVER	BAS	0	B	1

PD-21 MUSIC

PLAY MUSIC THROUGH
YOUR TV OR MONITOR.
COMPOSE & EDIT MUSIC.

ORCH	BIN	2	B	8
ORCH	DOC	1	A	3
OCNVRT	BIN	2	B	2
GHOSBUST	MUS	4	M	3
STELMO	MUS	4	M	2
MASH	MUS	4	M	2
BOND1	MUS	4	M	2
2001	MUS	4	M	2
ARIA	MUS	4	M	2
INVENTI	MUS	4	M	1
BATTSTAR	MUS	4	M	2
BOND2	MUS	4	M	2
CLOSENCT	MUS	4	M	2
SCARBORO	MUS	4	M	1
FUGUEINC	MUS	4	M	1
MINUET	MUS	4	M	1
LONGTIME	MUS	4	M	2
MESSIAH	MUS	4	M	3

---

* PD-22 MUSIC-1

LOADM "NAME/MUS"
EXEC TO PLAY MUSIC
THROUGH TV OR MON.

ADDPLAY	BAS	0	B	1
DEPLAY	BAS	0	B	1
MSQUEZ	BAS	0	B	2
ALSOSPAK	MUS	2	B	5
BOOGIE	MUS	2	B	5
CIRCUS	MUS	2	B	5
CLOWN	MUS	2	B	2
CLOWNS	MUS	2	B	4
HAYDEN	MUS	2	B	8
JBGOOD	MUS	2	B	4
PEACE	MUS	2	B	2
PEACH	MUS	2	B	5
PUFF	MUS	2	B	6
GOODDIEY	MUS	2	B	4

---

* PD-23 MUSIC-2

LOADM "NAME/MUS"
EXEC TO PLAY MUSIC
THROUGH TV OR MON.

ADDPLAY	BAS	0	B	1
DEPLAY	BAS	0	B	1
MSQUEZ	BAS	0	B	2
RAIN	MUS	2	B	2
SONATA3	MUS	2	B	3
STRAV	MUS	2	B	4
FOGGY	MUS	2	B	4
FUNERAL	MUS	2	B	3
HARDDAY	MUS	2	B	2
INVENT	MUS	2	B	2
INVENT11	MUS	2	B	3
INVENT15	MUS	2	B	3
INVENT7	MUS	2	B	3
INVENT8	MUS	2	B	2
JOPLIN	MUS	2	B	4
KHAN	MUS	2	B	6

---

* PD-24 MUSIC-3

LOADM "NAME/MUS"
EXEC TO PLAY MUSIC
THROUGH TV OR MON.

ADDPLAY	BAS	0	B	1
DEPLAY	BAS	0	B	1
MSQUEZ	BAS	0	B	2
PEANUTS	MUS	2	B	3
ROCK	MUS	2	B	5
ROXANNE	MUS	2	B	5
SCHERZO	MUS	2	B	2
TEACH	MUS	2	B	2
PIANOMAN	MUS	2	B	5
STRANGER	MUS	2	B	5
CAMELOT	MUS	2	B	4
CHACONNE	MUS	2	B	6
DIAMOND	MUS	2	B	3
DOWNROAD	MUS	2	B	4
FANTASY1	MUS	2	B	2

---

* PD-25 MUSIC-4

LOADM "NAME/MUS"
EXEC TO PLAY MUSIC
THROUGH TV OR MON.

FANTASY2	MUS	2	B	3
GRENGRAS	MUS	2	B	4
HUMOR	MUS	2	B	4
INCROW	MUS	2	B	3
STARWARS	MUS	2	B	2
SUITEGM	MUS	2	B	6
SUPERMAN	MUS	2	B	2
WHENIM64	MUS	2	B	4
ROOTBEER	MUS	2	B	7
WAYUARE	MUS	2	B	3
AXELF	MUS	2	B	2
TOCATTA	MUS	2	B	3

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* PD-26 LAST WILL

LOAN	BAS	0	B	1
LASTWILL	BAS	0	B	6
IMEGA	BAS	0	B	3
AWARI	BAS	0	B	1
BACARAT	BAS	0	B	2
BAGELS	BAS	0	B	1
BLACKJAC	BAS	0	B	1
CHUCK	BAS	0	B	1
CONCENTR	BAS	0	B	1
CUBES	BAS	0	B	2

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* PD-27 GAMES

DEFUZE	BAS	0	B	1
DR ZEE	BAS	0	B	1
FLIPFLOP	BAS	0	B	1
GO-FISH	BAS	0	B	2
HANGMAN	BAS	0	B	2
HIGHLOW	BAS	0	B	1
JACKPOT	BAS	0	B	1
KEYS	BAS	0	B	1
L E M	BAS	O	B	3
LUNARLD	BAS	0	B	2
NUMBERS	BAS	0	B	1
OBSTACLE	BAS	0	B	1
POOLGAME	BAS	0	B	4
RETURN	BAS	0	B	1
REVERSI	BAS	0	B	2
STARTREK	BAS	0	B	2
TTREK	BAS	0	B	3

PD-28 COMM. CC-TALK,
BBS, TERM

BBS'S	DAT	1	A	1
CCT	IO	2	B	1
CCTALK	BAS	0	B	1
CNFG40V1	BAS	0	A	5
CNFG40V2	BAS	0	A	4
CTLKEY	BAS	1	A	1
MTERM1	DOC	1	A	11
MTERM2	DOC	1	A	8
MTERM40	BIN	2	B	8
REDIAL	BAS	0	A	1
PACREDIA	BAS	0	A	1

PD-29 COMM, WORD
PRO, GAMES

GOSTSHIP	BAS	0	B	8
INT RATE	BAS	0	B	2
INVSTANL	PC	0	B	4
MENU	BAS	0	B	4
MOTOJUMP	BAS	0	B	3
SCREEN	MAX	2	B	6
SCREEN1	BIN	2	B	3
SCREEN2	BIN	2	B	3
SCREEN2	MAX	2	B	6
STRINGTU	BAS	0	B	4
TTERM	DSK	2	B	4
TTHELP	DAT	1	A	4
USING	BAS	0	B	3
WF-DOC	JP	0	B	2
WORDFILE	JP	0	B	4
PARM1	DAT	1	A	1

PD-30 CHECK BOOK,
UTILITIES

CHECKBOK	BAS	0	B	4
CHECKBOK	DOC	1	A	9
DIRR	CMD	2	B	1
DVIEW	BAS	0	B	1
FILEMAID	BAS	0	B	2
LISTER	BAS	0	B	1
PAINTPOT	BAS	0	B	4
SCREEN	MAX	2	B	6
SCREEN1	BIN	2	B	3
SCREEN2	BIN	2	B	3
SCREEN2	MAX	2	B	6
SPECZAP	BAS	0	B	5
TAPETYPE	BIN	2	B	1
TTERM	DSK	2	B	4
DVIEW	DSK	0	B	1
MENU	BAS	0	B	4

All program collections are available on disk. Collections with a * are also available on tape.

1-4 $4.95
5-9 $4.50
10- $4.00

DYNAMIC ELECTRONICS
Box 896 (205) 773-2758
Hartselle, Al 35640

Add $1 shipping
Specify Tape or Disk
Checks, Visa, or MC

made at spelling the book. However the instructions contain a reference sheet with the correct spelling of all of the books.

This is a good learning program for those wishing to learn about the books of the Bible. The cost is $5 +$1 S/H. Country Software, Route 1, Box 590, Taylorsville, MS 39168.

OKINAWA

This is a high resolution machine language game of the war in the Pacific with a hi-resolution screen dump for DMP-130 compatible printers.

It takes about a minute for the program to load and set up. You are then asked for a level of difficulty from 1 to 5. A new game can be started or a previous game continued. The object of the game is to capture all Japanese air bases and any 22 of the redoubts which are fortified positions such as caves and dugouts.

A turn involves making a decision on each of the 50 units. After a turn, the game can be saved to disk. It is a good idea to save the game after each turn. After saving the game it can be continued.

When a redoubt is taken the computer sounds a tone and updates the number of redoubts taken. When combat occurs the loses from each side are displayed. The computer generates sound to simulate the firing of weapons. When artillary is used it is aimed by using the arrow keys and is fired when the clear key is pressed. Units can be moved by pressing the "M" key and then the 4 arrow keys. The "<" and ">" keys allow diagonal movement.

The screen can be scrolled by pressing the "L" key and using the up and down arrows. The display is in color and can be played using either a monitor or television. The program works on both the color computer 3 and the color computer 2. It can take several hours to complete a game, and the ability to save the game after each turn allows it to be continued at a later time. The cost is $27 including shipping. ARC Royal Games, P. O. Box 14806, Jacksonville, FL 32238.

NEW PRODUCTS

This section is available free for producers and dealers of color computer products. These products have not been reviewed by us but are included for our reader's information.

REMUSIC 1

REMUSIC 1 allows the user to program and play four-part music with features such as amplitude envelopes and using BASIC program REM statements as music language. It requires 16K extended basic with 32K recommended. The cost is $25. CODIS Enterprises, 2301-C Central Dr., Ste. 684, Bedford, TX 76021

ALL PROGRAMS COCO 1 OR 2

CHECKERBOARD FILESORT
32 OR 64K FILE PROGRAM . . . $16.95 / Cassette — BOTH VERSIONS INCLUDE:
ML ROUTINES FOR DATA, EDIT, SORT, REVIEW, SEARCH, ERROR TRAPPING. MANY HARDCOPY OPTIONS.

SEIBYTE SOFTWARE
P.O.BOX 6464
BAKERSFIELD, CA 93386

13	80	54	17	21	75	18	36	63	9
62									41
3				Bakersfield KENO V1.2					33
72	49	11	29	44	38	55	27	16	1

ENJOY A STIMULATING GAME OF KENO.
A GRAPHIC DELIGHT FILLED WITH REALISTIC, EXCITING ACTION. PICK 1 TO 15 SPOTS. COMPLETELY RANDOM WINNERS. PREPARE FOR AN EXTREMELY CHALLENGING GAME. CAN *YOU* BREAK THE HOUSE?

32 OR 64K KENO SIMULATION
Cassette . . . $12.95 Disk . . . $13.95

GRPH200 GRPH200 GRPH200 GRPH200

ML GRAPHICS DUMP FOR THE DMP-200.
POSITION GRAPHIC PAGES 1-4, 5-8, OR 1-8 ANY PLACE ON PAPER. MENU PROMPTS! STANDARD, CONDENSED, OR COMPRESSED. PRINTOUTS IN NORMAL, ELONGATED, DOUBLE-, OR TRIPLE-SIZE.

ML GRAPHICS DUMP FOR DMP-200
16 / 32 / 64K Cassette . . . $15.95 16 / 32 / 64K Disk . . . $16.95

SEND CHECK OR MONEY ORDER. CALIF. RESIDENTS ADD 6% SALES TAX
WE WILL MODIFY PROGRAMS TO WORK WITH YOUR PRINTER - NO EXTRA!

QUESTIONS & ANSWERS

These are letters that have been written to us. If you have not written or if you have a question then we would like to hear from you. I can usually be reached in the evenings if you would like to call - Bill.

QUESTION: I purchased a Panasonic RK-T36 typewriter which I had hoped to use as a true letter quality printer with my CoCo 3. However, now I've been informed by the local service that the optional Interface Adaptor RP-K100 is not available. Any suggestions aside from building my own interface? - Frank Bakor

ANSWER: Write a letter to the company and request a schematic diagram of the interface. You will need this to build an interface. You might also ask them if they have a substitute interface that will work or know of one that could be used.

QUESTION: I enjoy DCN very much. I am a retired secretary who likes keying the programs. I traded my CoCo2 for a CoCo III plus 2 disk drives and a DMP-110 printer. I have copied files from disk to disk and somehow I have 3 or 4 DAT files that are hanging out on a limb. How do I find out what program drives them? - Bette Washburn

ANSWER: DAT files are ASCII files which could be instructions. They can be viewed by using a word processor or from basic by opening the file, reading in a string variable and printing it to the screen. We include a program on our DCN on disk for reading these files. Maybe when you read one you can determine what it goes with. Another possibility is to list your programs and see if any of them refer to the names of the DAT files.

SP-1200AS PRINTERS

The superior SP-1200AS printer has features found in more expensive printers. They can operate at 9600 baud and the 10K buffer allows over two pages of storage within the printer freeing the computer while printing is being completed. It has 8 graphics modes and is compatible with COCO MAX and other graphics programs that have EPSON print drivers. It has near letter quality print and user defined characters can be generated and downloaded. Compare these specifications before deciding on a printer.

MAIN FEATURES

* Paper-out detection
* Automatic paper loading
* Automatic paper ejection
* Character pitch settings (via switches or commands)
* Variety of chacter fonts including Near Letter Quality, Propportional, & Graphic printing.
* Form feed function, provided by switch or command.
* Self-Test printing
* Automatic Printing
* Double-Width Character mode
* Bold Character mode
* Double-Strike Character mode
* Italic Character mode
* Superscript/Subscript Character mode
* Buzzer function
* Internal Ram error detection
* Input data hexadecimal dump
* Download character function (user-defined character) A maximum of 128 download characters in Draft mode
* Standard mode/IBM mode, selected by using a dip switch (Epson compatible in standard mode).
* Optional Automatic Cut Sheet Feeder
* 10.3K-byte communications buffer (8.7K-byte communications buffer when using download chacter)
* Baud rates of 1200, 2400, 4800, and 9600
* 185 Characters & Symbols
* 49 International characters
* Print Modes: Pica-10CPI, Elite-12 CPI, Condensed-17CPI, Condensed Elite-20CPI
* 8 graphics modes consisting of &480, 576, 640, 720, &960, 1920, 1152. & 8 or 9 dots vertical
* Select print type with front panel switches
* Cable for color computer is included
* Includes DYPRINT software for printing banners or large graphics pictures

Order SP-1200AS and specify tape or disk software for DYPRINT. $229 + $5 S/H.

Checks VISA or MC Cards

DYNAMIC ELECTRONICS
BOX 896 (205) 773-2758
HARTSELLE, AL 35640

DYNAMIC COLOR NEWS
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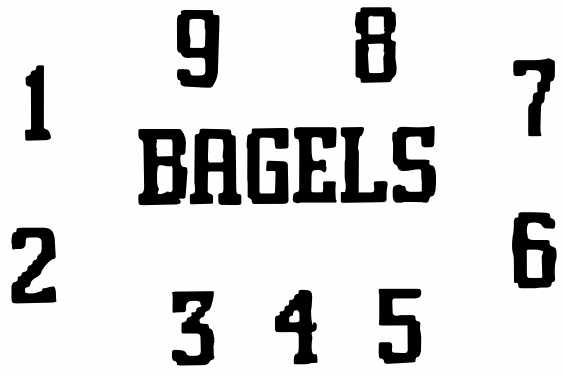

This is an exciting numbers game. You try to guess a three digit number. After each guess the following words will be used to indicate your degree of success:

PICO means you have one digit correct but in the wrong place. FERMI means one digit is correct. BAGELS means that there are no correct digits.

Play with a friend and see who can guess the number the quickest.

```
10 CLS: PRINT @ 40, "BAGELS"
50 DIM A1(6),A(3),B(3)
60 Y=0
65 T=255
70 PRINT:PRINT:PRINT
80 INPUT "WOULD YOU LIKE THE RUL
   ES (YES OR NO)";A$
90 IF LEFT$(A$,1)="N" THEN CLS:
   PRINT:PRINT: GOTO 130
100 CLS: PRINT
110 PRINT "I AM THINKING OF A TH
   REE-DIGIT NUMBER. TRY TO GUES
   S"
120 PRINT "MY NUMBER AND I WILL
   GIVE YOU CLUES AS FOLLOWS:"
130 PRINT "   PICO  - ONE DIGIT
   CORRECT BUT IN THE WRONG POSI
   TION"
140 PRINT "   FERMI - ONE DIGIT
   CORRECT AND IN THE RIGHT POSI
   TION"
150 PRINT "   BAGELS- NO DIGITS
   CORRECT"
153 PRINT "PRESS ENTER TO CONTIN
   UE"
154 INPUT A$:A$=INKEY$
155 CLS
160 FOR I=1 TO 3
170 A(I)=INT(10*RND(0))
180 IF I-1=0 THEN 220
190 FOR J=1 TO I-1
200 IF A(I)=A(J) THEN 170
210 NEXT J
220 NEXT I
230 PRINT:PRINT @ 2, "O.K.  I HA
   VE A NUMBER IN MIND."
240 FOR I=1 TO 20
250 PRINT @ 300, "
260 PRINT @200, "GUESS #";I
270 INPUT A$
280 PRINT
290 IF LEN(A$)<>3 THEN 730
300 FOR Z=1 TO 3:A1(Z)=ASC(MID$(
   A$,Z,1)):NEXT Z
310 FOR J=1 TO 3
320 IF A1(J)<48 THEN 370
330 IF A1(J)>57 THEN 370
340 B(J)=A1(J)-48
350 NEXT J
360 GOTO 390
370 PRINT "WHAT?"
380 GOTO 250
390 IF B(1)=B(2) THEN 740
400 IF B(2)=B(3) THEN 740
410 IF B(3)=B(1) THEN 740
420 C=0:D=0
430 FOR J=1 TO 2
440 IF A(J)<>B(J+1) THEN 460
450 C=C+1
460 IF A(J+1)<>B(J) THEN 480
470 C=C+1
480 NEXT J
490 IF A(1)<>B(3) THEN 510
500 C=C+1
510 IF A(3)<>B(1) THEN 530
520 C=C+1
530 FOR J=1 TO 3
540 IF A(J)<>B(J) THEN 560
550 D=D+1
560 NEXT J
570 IF D=3 THEN 760
```

```
580 IF C=0 THEN 620
590 FOR J=1 TO C
600 PRINT "PICO ";
610 NEXT J
620 IF D=0 THEN 660
630 FOR J=1 TO D
640 PRINT "FERMI ";
650 NEXT J
660 IF C+D<>0 THEN 680
670 PRINT "BAGELS";
680 PRINT
690 NEXT I
700 PRINT "OH WELL.";
710 PRINT "THAT'S TWENTY GUESSES
   . MY NUMBER WAS";100*A(1)+10*
   A(2)+A(3)
720 GOTO 780
730 PRINT "TRY GUESSING A THREE-
   DIGIT NUMBER.":GOTO 250
740 PRINT "OH, I FORGOT TO TELL
   YOU THAT THE NUMBER I HAVE IN
    MIND"
750 PRINT "HAS NO TWO DIGITS THE
    SAME": GOTO 250
760 PRINT "YOU GOT IT!!!"
765 FOR X=50 TO 150 STEP 5:SOUND
   X,1
766 NEXT X
770 Y=Y+1
780 INPUT "   PLAY AGAIN (YES OR
    NO)";A$
790 IF LEFT$(A$,1)="Y" THEN CLS:
    PRINT:PRINT: GOTO 130
800 IF Y=0 THEN 820
810 PRINT "   A";Y;"POINT BAGELS
    BUFF!!!"
820 PRINT "   HOPE YOU HAD FUN.
    BYE."
830 END
```

OPERATING HINT

COCO MAX A/D

You can use the high resolution joystick port in COCO MAX in your games or programs. PEEK the following memory locations for the values.

Memory	Function
$FF90 (65424)	Button value
$FF92 (65425)	Vertical (0-255)
$FF93 (65426)	Horizontal (0-255)

For graphics the vertical can be from 0-255 but the horizontal can be only from 0 to 191.

ADVERTISER'S INDEX

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Have you considered our low advertising rates?

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1. 10 cents a word, $3 minimum.
2. Name, Address, & Telephone listed free.
3. Send payment with ad.
4. Closing date 1st of the preceeding month. Ex. Nov ad closing is Oct. 1.
5. No X-Rated ads.

PREMIUM QUALITY DISKS. You don't have to pay a lot for QUALITY disks. Our disks are boxed in tens complete with labels, sleeves, and write protect tabs and work on COCO's and MSDOS computers. These are double sided double density disks and will be replaced if defective. DSK-2 $5.95 /box. Add $1.00 S/H. Dynamic Electronics, Box 896, Hartselle, AL 35640. (205) 773-2758

NEED A PROGRAM for making a Software list? Here is DISK FILER a Machine Language program that will sort and print out lists in a convenient layout. Only $15.00 + $2.50 s/h Cash, Check, COD Send to: COLORado Software PO Box 84, Chimney Rock, CO 81127. Questions? (303) 731-4208 (5pm-10pm MT)

RENEWAL TIME?

IF 2/88 is beside your name on your address label then your subscription has expired.

DISPLAY ADS

(Rate sheet 2 - March 1986)
Closing 1st of preceeding month.

Pages	1 time	2 times	3 times
*2	25	23	22
1	30	27	25
1/2	23	20	18
1/3	19	17	15
1/4	15	13	12

* We can use colored paper at no extra charge if ads are on both sides.

We can do ads in Red, Blue, or Brown. No all one color ads will be accepted. For color ads send artwork for each color. Add 40% for each color. Example: One page black and red for 3 times costs $25 + 10.00 = $35.00 each month.

Artwork must be camera ready and can be enlarged or reduced at no extra cost. Rates are per page or fraction thereof. We can set up your ad for a reasonable price. Enclose payment with ad copy. No X-Rated ads.

DYNAMIC ELECTRONICS INC.
P. O. Box 896 (205) 773-2758
Hartselle, AL 35640

BULK RATE US
POSTAGE PAID
HARTSELLE, AL
35640 PERMIT #21

DYPRINT

Now you can print LARGE signs for special occassions such as birthdays, parties, or yard sales. Even make your own FOR SALE signs when you need to sell that old car or lawnmower. BANNER uses standard print characters and is compatible with any printer. The characters are formed by a 21 x 27 dot pattern and are printed sideways across the paper. The basic character can be expanded up to 4 times for making large characters up to a full page.

MAXPRINT allows graphics to be blown up and printed on a standard printer. Any PMODE 4 picture can be printed. The program supports all 8 graphics pages for a total of 12288 bytes.MAXPRINT prints 8 characters per byte for a total of 98304 characters. Blow up pictures of friends and family generated by the DS-69B or other digitizer or make posters announcing sales or special events.

The DYPRINT package contains both BANNER and MAXPRINT. The cost is only $19.95

COLOR COMPUTER 2 KIT

(SPECIAL PURCHASE)

Now you can build your own Color Computer 2. These kits were designed for a school and are complete with a step by step instruction manual plus the normal Radio Shack operating manuals. They use 4164 memory chips and sockets are included for all integrated circuits. If you have an older CC-1 or CC-2 then this is an excellent source for spare parts. Replacement parts would cost more than this kit. A fine gift. CC-2 Kit $59 95.

CLOSEOUTS

Telewriter 64 Word Processor
Disk $49.95

Telepatch- Telewriter enhancer
Disk $9.95

Dyterm - Terminal Program $9.95
Disasm - Decimal Assembler $9.95

COCOMAX II

The best graphics program for the Color Computer 2. Draw a picture, label it, rotate it, copy it, and shrink it. Then print it on a graphics printer. Needs a "Y" cable or multipack expander for disk version.

COCOMAX II disk version $69.95
COCOMAX II Tape version $59.95
Y cable 24.95

COCOMAX 3

The ultimate graphics generator for the COCO 3. Similar to COCO MAX II except has additional features. Uses the high resolution screen. The included interface plugs into a joystick port without requiring a Y cable. Excellent for setting type for advertising or a newsletter. Complete with software for reading COCO MAX 2 files. Compatible with DS-69B digitizer.
COCO MAX 3 $74.95.

DS-69 DIGITIZER

Capture pictures from your VCR or video camera. Display them on the COCO 3's high resolution screen. Label them with COCO MAX and print them on a graphics printer or save them on disk. 256 x 256 resolution, 64 levels of grey, & 8 images per second. Plug in ROM pack requires a multipack expander. Works with all color computer disk systems. DS-69B $149.95.

CC-THERM (new)

CC-THERM 2 is a dual digital thermometer for Radio Shack Color Computers. It consists of two thermistors wired to the end of 10' and 20' flat cables for measuring inside and outside temperatures. The other end of the cable is wired to a joystick plug. The thermistors can be mounted on a wall, inside equipment, or outside for temperature measurements. Basic software on tape or disk continuously prints the temperature in both Fahrenheit and Centigrade. Tape or disk software CC-THERM 2 $19.95

128K MEMORIES

Double the memory in your 64K computer. Plug in assembly with switch for selecting memory banks. Memory Manager Software for utilizing the extra 32K in each bank is included.

Upgrade CoCo-2 Computers with two 4464 chips to 128K. Order ME-10A $49.95

Upgrade 8-chip 4164 type 64K computers to 128K. ME-12 $49.95

VIDEO REVERSER

Reduces eye strain by producing bright characters on a dark background. Integrated circuit mounts on the 6847 chip. Minor soldering required. $9.95.

MEMORY MANAGER

(FOR COLOR COMPUTER 2)

Did you know that the 64K Color Computer 2 and earlier computers have an extra 32K that is generally not used? Our Memory Manager allows basic or machine language programs to be run in either 32K bank. Banks are exchanged with an EXEC command. Also the second bank can be used as a ramdisk to store programs. This makes cassette operation faster than a disk. A third option configures the computer for the all ram mode allowing data or programs to be stored in the upper memory. The Memory Manager software is available on either cassette or disk and costs only
MEMORY MANAGER $19.95.

MEMORY SAVER II

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