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HAM RADIO

COCO 3

BASIC PROGRAMMING

OS-9 & BASIC 09

PROGRAMS

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.

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```
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Most programs and editorials are available on disk or tape.

* Included on Disk or Tape.
\# OS-9 Procedures are included on DCN on DISK.

OS-9   by Norm Matice   BASIC09

This month let's take a second look at our startup file. As you know the startup file is the file that is automatically executed by OS-9 after the system has booted up. It can be made to open windows for you at startup or set your software clock or send you a message or a number of other uses.

To take a look at this file we simply have to type LIST STARTUP. This will cause OS-9 to print the contents of the startup file to the screen. The LIST command will do this to any type of text file you have, including files with OS-9 readable commands. It will not however, list the contents of OS-9 modules such as COPY, FORMAT, DIR, DELETE, and any other commands in your CMDS directory.

If you still have the STARTUP file that Radio Shack supplied on your OS-9 system disk, or if the only changes you made were additions to the original file, then there are a couple of commands there that we will talk about next.

The first of these commands is the SETIME command. This is the command that makes the computer ask for the date and time when the system first comes up. If we were to use this command at the OS-9 prompt, the computer would once again ask us for the date and time. If you would like to try this type in SETIME at the prompt. If you feel that you don't need the software clock all the time and you are tired of typing in the time and date each time the system boots up, then you can delete that line from your STARTUP file. If at some point you need the date and time entered you can use the SETIME command to input it.

One thing to remember about the time and date is that OS-9 keeps track of when a file is created by the software clock. It will put down whatever time the file was created according to the software clock. If you don't set it, it will start at JAN 1,1900 00:00:00. This isn't a big deal unless you want accurate records as to when you created certain files.

The other command we find in the STARTUP file that has to do with time is the DATE command. The DATE command will do as the name implies, it will print the date on the screen for us. You might have noticed the T following DATE. That is an option when using the DATE command. What it will do is tell OS-9 to not only give us the date but also the time. Let's try using the command both with and without the T. First DATE and enter and then DATE T and enter. Of course to have the present date and time respond to the command you had to answer the SETIME command in the STARTUP file correctly.

The DCHECK command is used to check the status of your disk. There are a number of options available with the DCHECK command. To get a list of these

options type DCHECK -O at the prompt. Let's try running the command with one of these options. In addition to being able to specify an option we must also specify which disk drive our disk is in. Try the following command line DCHECK -S /D0. On my system this returns 3 directories and 63 files. I now know how many directories and how many files are on the system disk I'm currently using. If you want a more detailed view of your disk then type in DCHECK /D0. I will not attempt to go over the output of that command here. You might want to try checking the OS-9 command reference section of your manual, page 6-25.

This month we will take a look at the boldtype command, that is available in OS-9 level two. The boldface type will be, as you might of guessed, turned on and off by the DISPLAY command. The boldface type is available only if you have a graphics screen. For those of you that like to scramble for copies of back issues, a file to build a graphics screen is in the June 88 issue of DYNAMIC COLOR NEWS. For those of you who would just as soon not, I'll repeat the file here.

```
iniz w6
merge /d0/sys/stdfonts >/w6
display 1b 20 7 0 0 50 18 0 2 2
   >/w6
shell i=/w6&
```

Now that you have the graphics window open you can try the file below to observe the boldface type. The command that does the switching between boldface and regular type is the DISPLAY 1B 3D. If it is followed by a one then the boldface is switched on and if it is followed by a zero then the boldface is turned off.

```
echo This is without the
boldface option turned on
```

```
display 1b 3d 1
echo Here the boldface is
turned on
echo check out the alphabet

echo A B C D E F G H I J K L M
N O P Q R S T U V W X Y Z
echo a b c d e f g h i j k l m
n o p q r s t u v w x y z
echo and these numbers
echo 1 2 3 4 5 6 7 8 9 10
echo let us return to normal
display 1b 3d 0
echo Here we are back to normal
```

Let's try one more level two window command. This time we will attempt to change the size of our window while we are still inside of it. This time the DISPLAY command will be followed by a 1B 25. That will be followed by the new starting location for x and y and then the size of x and the size of y.

As might be expected we can not change a window size so that it is larger than it was originally set up for. Therefore we must pick parameters that will result in a reduction of window size. Using the graphic window from the file above, type in the following command line:

```
DISPLAY 1B 25 A 5 40 10
```

Your OS-9 prompt should have moved in toward the center of the screen. Any writing you had outside the parameters of the newly shrunken window will remain intact. Anything under the new smaller window will be lost.

At this point we can expand our window back to its original size. Type DISPLAY 1B 25 0 0 50 18. That should get you back to where you started from if you used the graphic window from the file above. Just remember when changing the window size to keep your parameters from running past the original window whose size you are changing.

BASIC 09

As was promised last month, we will take a look at high resolution graphics using BASIC09. Since this is the October issue we will, appropriately enough, draw a pumpkin. For this program I will be using a window in OS9 level II.

The first thing we need to do is open up a high resolution window. If you have a 128K CoCo III, you will have to kill the shell in the VDG (green screen) window, before you start in the hi-res window. If you run the file below it will create a 640 by 192 four color window. This window will have a 40 column text capability to it. I have called the file BASWIN.

```
montype rgb
iniz w1
merge sys/stdfonts›/w1
wcreate /w1 -s=6 0 0 40 24 6 1
  1
shell i=/w1&
```

As you can see in my file I have defined MONTYPE as RGB. If you have a composite monitor you may define it using the MONTYPE command or ignore it because the system defaults to composite monitors.

After you run the file above you will have to kill the shell in the VDG window and move to the graphics window. To do that you will type EX in the VDG window. At that point you will no longer be able to enter text on that screen. Push the CLEAR key and you will be transported to the graphics window which will have a shell up and running for your use.

One other thing about the file above, it creates green text on a white background. While this looked rather unique at first after using it awhile it was a little hard on the eyes. You may wish to change that for your own use.

At this point you are ready to take out your system disk and insert your backup copy of your BASIC09 disk. Don't forget to change your data and execution directories.

As usual the first thing I did was clear off my screen. I followed that by setting up the palettes for the colors I was going to use in my drawing. As you will notice, after the first command, everything has a RUN GFX2 before it. This is the way we get to use the hi-res drawing commands. For the med-res drawing commands (what was hi-res on the CoCo I & II) we would use the RUN GFX command. Also most of the commands work about the same as the drawing commands in extended BASIC.

Keep in mind that the colors I selected reflect those for an RGB monitor. The colors for black and orange (the 0 and 38 respectively in the PALETTE command) are the same for both types of monitors. The colors for dark green and yellow are different number codes for the two types of monitors.

The COLOR command set the foreground, background and border colors. The first ELLIPSE command draws the main body of the pumpkin. The SETDPTR command moves the graphics cursor to its next starting point. The DRAW command is like the extended BASIC draw command except it uses compass directions insted of a single letter to specify direction. I personally found it easier to remember than the G,H and so forth directions of extended BASIC.

The first DRAW draws the nose, the second the left eye and the third the right eye. That is followed by the second ELLIPSE command which draws the mouth. The FILL command works like the old PAINT command except it uses the present foreground color and stops when it hits a color other than the one that is at the specified starting point. The first FILL com-

mand colors the body of the pumpkin orange. To fill in the eyes the foreground color is switched to yellow, and stays yellow for the filling of the nose and mouth. After all that is filled .in the foreground, color is switch to dark green and the stem is drawn on the pumpkin, and is filled in. Happy Halloween!

PROCEDURE PUMPKIN

```
SHELL "DISPLAY C" RUN
GFX2("PALETTE",0,0) RUN
GFX2("PALETTE",1,38) RUN
GFX2("PALETTE",2,54) RUN
GFX2("PALETTE",3,2) RUN
GFX2("COLOR",1,0,0) RUN
GFX2("ELLIPSE",320,96,250,80)
RUN GFX2("SETDPTR",320,80) RUN
GFX2("DRAW","SE25,W50,NE25") RUN
GFX2("SETDPTR",220,60) RUN
GFX2("DRAW","SE25,W50,NE25") RUN
GFX2("SETDPTR",420,60) RUN
GFX2("DRAW","SE25,W50,NE25") RUN
GFX2("ELLIPSE",320,130,200,5)
RUN GFX2("FILL",320,20) RUN
GFX2("COLOR",2,0,0) RUN
GFX2("FILL",320,96) RUN
GFX2("FILL",225,70) RUN
GFX2("FILL",425,70) RUN
GFX2("FILL",320,130) RUN
GFX2("COLOR",3,0,0) RUN
GFX2("BOX",305,16,335,2) RUN
GFX2("FILL",320,10)
```

COCO III

Part 3

by
John Galus

One of the most interesting new features on the COCO III is the new graphic modes available. We now have resolution as high as 640x192 pixels and a mode that can display 16 colors out of a palette of 64. This is quite an improvement over the old color computer's Pmodes. All of the older graphic modes are available including four new higher resolution modes called HSCREEN1 to 4. Just as the older model CoCo had extra modes that were not accessed in Basic normally, the Color Computer III actually can display 22 graphic modes and 12 different text modes of 32, 40, 64 and 80 columns, as we shall see! These new display modes are controlled by the new GIME chip within the computer and are accessed by registers in the high memory of the computer. Here is a list of the registers and their addresses that control the graphics in this new computer.

DISPLAY MODE REGISTER:

$FF90 BIT 7 CONTROLS THE DISPLAY MODE THAT THE COMPUTER IS USING. WHEN SET WE ARE IN THE LOW RESO-LUTION (OLD COCO) MODE AND WHEN CLEARED WE HAVE ACCESS TO THE NEW HIGH-RESOLUTION MODES

VIDEO DISPLAY REGISTER: $FF98

DETERMINES THE CURRENT HIGH RE-SOLUTION MODE WE ARE USING.
 BIT 7 CLEAR = TEXT MODE
 BIT 7 SET = GRAPHICS

BIT 0-2   = DETERMINES
    VERTICAL SIZE OF A PIXCEL OR
    CHARACTER

VIDEO RESOLUTION REGISTER:
    $FF99

DETERMINES SCREEN RESOLUTION AND HEIGHT

VERTICAL OFFSET REGISTERS: $FF9D & $FF9E IS A TWO BYTE REGISTER THAT CONTAIN THE STARTING ADDRESS OF THE VIDEO SCREEN.

BORDER REGISTER: $FF9A

DETERMINES BORDER COLOR 0 TO 64.

Remember we are working in binary:

BITS:							
7	6	5	4	3	2	1	0
128	64	32	16	8	4	2	1

Here is table of the four modes available in the CO CO IIII.

HSCREEN	RES.	COLORS	MEMORY REQUIRED (BYTES)
1	320 X 192	4	15,360
2	320 X 192	16	30,720
3	640 X 192	2	15,360
4	640 X 192	4	30,720

We will now look at how a graphic mode is set. Let's sim-ulate the HSCREEN2 mode, which is probably the most used be-cause it can use 16 colors.

```
1 POKE&HE6,2:EXEC &HE6D1  'HCLS
10 POKE&HFF90,0  'GRAPHICS ON
20 POKE&HFF98,128
30 POKE&HFF99,30 ;HSCREEN 2
   GRAPHIC MODE
40 POKE&HFF9D,0:POKE&HFF9E
   'SCREEN START
50 GOTO 50
```

Garbage may be on the graphic screen if it wasn't cleared out by calling the HCLS subroutine at line # 1. The Hscreen command usually performs a HCLS when executed. An easier method of obtaining these four modes is by calling a ROM subroutine. We find that at $E6A5 we find a spot that we can enter to obtain these modes. The number of the mode we wish to access must be in the "B" register for example, to obtain HSCREEN 2 do the following:

```
LDB #2 JSR $E6A5
```

To return to a HSCREEN0 normal text mode call the subroutine at $E690. The HSCREEN mode number is placed in $E6 by the Basic interpreter and it checks this location at the beginning of a graphic routine, this is why we get a HP error. All of the new graphic modes have one of three possible pixel formats, where either one, two or fours bits controls the color and resolution. Here are the three formats.

```
FORMAT:    #BITS THAT CONTROL A
                   PIXEL:

1                  1
2                  2
3                  4
```

As I mentioned earlier, there are a number of other graphic modes available here is list of them.

BIT 7 OF $FF98 MUST BE SET AND
BIT 7 OF $FF90 MUST BE CLEARED:

PLACE THE STARTING SCREEN ADDRESS IN THE VIDEO OFFSET REGISTERS AT $FF9D AND $FF9E

VRR = VIDEO RESOLUTION REGISTER AT $FF99 (ALL MODES HAVE A VERTICAL RESOLUTION OF 192)

MODE-	#IN VRR	HRES	COLORS	BIT FORMAT
0	0	128	2	1
1	1	64	4	2
2	4	160	2	1
3	5	60	4	2
4	8	256	2	1
5	9	128	4	2
6	10	64	16	3
7	12	320	2	1
8	13	160	4	2
9	14	80	16	3
10	16	512	2	1
11	17	256	4	2
12	18	128	16	3
13	20	640	2	1
14	21	320	4	2
15	22	160	16	3
16	24	1024	2	1
17	25	512	4	2
18	26	256	16	3
19	28	1280	2	1
20	29	640	4	2
21	30	320	16	3

Notice that there is a video display of 1280 x 192 that is not used in Basic. You can even have no video screen at all by setting bits 0 and 1 of the VVR register. Try doing a HSCREEN2 command in a Basic program and draw something on the video screen, then poke $FF99 with 31 to blank out the screen. The information will remain on the screen but you will not be able to see it. Poke $FF99 with 30 to get the screen back. Try different values and see what you can come up with. Next time we'll look at the new TEXT screens, see you later!

OPERATING HINT

You can disable the cartridge port with POKE 65314,54. Enable it with POKE 65315,52.

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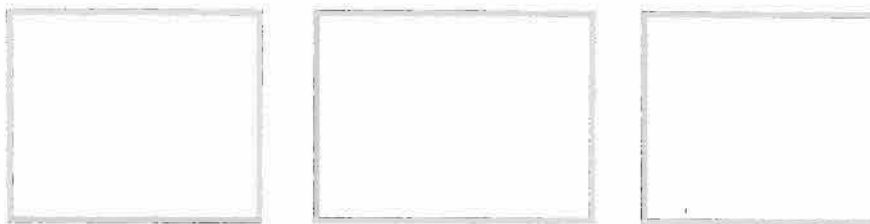
SQUARES

This is an interesting machine language game which involves using the arrow keys to move blocks in a grid of 16 by 11 blocks to form a continuous line of 16 identical horizontal blocks. The bottom line of the screen shows the time you used and the total number of moves it took you to complete the task. The "C" key alternates the colors and the BREAK key can be used to exit play before the end.

The machine language part is generated from the "SQUARE ML LOADER" program and can be saved to a cassette or disk. Then run "SQUALOAD" which clears memory and loads the machine language subroutine SQUARE. This program is provided as a courtsey of T & D Subscription Software (See their advertisement on page 8) and is used by permission.

SQUARE ML LOADER

```
2 PCLEAR 4:CLS
4 '
6 PRINT
8 PRINT:PRINT"STANDBY WHILE MACH
  INE LANGUAGE  PROGRAM IS BEIN
  G GENERATED":PRINT
10 BE=23900:M=BE:EN=26623
12 READ X$
14 IF X$="@" THEN 40
16 L=LEN(X$)
18 FOR J=1 TO L STEP 2
20 A$=MID$(X$,J,2):B=PEEK(M)
22 C$=LEFT$(A$,1):D$=RIGHT$(A$,1
   )
24 X=ASC(C$):Y=ASC(D$):X=X-48:Y=
   Y-48
26 IF X>9 THEN X=X-7
28 IF Y>9 THEN Y=Y-7
30 V=16*X+Y:POKE M,V
32 M=M+1:IF M=EN THEN 40
34 NEXT J
36 PRINTM
38 GOTO12
40 PRINT"DATA IS TRANSFERRED
42 PRINT"1 SAVE ML PGM TO DISK
44 PRINT"2 SAVE ML PGM TO CASSET
   TE
46 INPUT X
48 X$="SQUARE"
49 M=EN:EX=BE
50 IF X=1 THEN SAVEM X$,BE,EN,EX
52 IF X=2 THEN CSAVEM X$,BE,EN,E
   X
60 END
100 DATA BD5DEBBD6249127C635BAD9
    FA000B76359BD5F2DBD614BBD5E68
    BD5DB0BD5EE5BD5FE8BD5F4CB6635
    8260AB66359810327037E5D62BD5E
    8512BD5E687C635B2603BD62FC12A
    D9FA000810027EB81591027FFAD39
    B663638199260AB66362819926037
    E5D
110 DATA C23912BD5E687C637B2608B
    D62FC8664BD5F0312AD9FA00081 00
    27E77F63637F6362BD629C8628BD5
    F0339BD62A6BD62EDBD62C48632BD
    5F038E0008BD61F28637BD5F03BD5
    E45863CBD5F03BD5E218641BD5F03
    8E000086144A26FD301F26F7398 60
    0B7
120 DATA 637A8E6464E6864FC001C41
    F1F01B6637AC60ABD5EA97C637AB6
    637A812026DF394FB7637A8E6484E
    6864FC001C41F1F01B6637AC607BD
    5EA97C637AB6637A812026DF39CC0
    BB883000126FB39B66359812A260A
    8699B763628689B76363123939860
    0B7
130 DATA 637A8E6444E6864FC001C41
    F1F01B6637AC60ABD5EA97C637AB6
    637A812026DF39841FC1172502C61
    712B76376F76377BF63781E89C368
    001F021F104FC41FC365001F01C60
    8A684A7A430882031A8205A26F3B6
    6376F66377BE637839B6635B840F2
    701
140 DATA 39B663638B0119B76363B66
```

```
      362890019B76362BD60A539B76374
      86FCB76375B6637584FDB7FF20B66
      3744A26FD8600B7FF20B663744A26
      FD7A637526E2B6637439B66359813
      D270139128E637C8600C601E7864C
      810F26F9C602E786BD629C39BD5F9
      681
150 DATA FF26013912B76371BD5FA9B
      D6003CC0032FD6372B66371BD5FA9
      BD6215843FBD600DFC6372830001F
      D637226E78664BD606843BD606843
      4C4C818C26F28650BD5F037C63583
      98600BD5FC5C10026084C810B26F4
      86FF391239810B2502860012485FC
      368
160 DATA 001F01C30200FD636F6380B
      C636F26F939B7636EC6103DC3637C
      1F014FE684E186260B4C811026F7B
      6636EC60139B6636EC60039B66359
      814327013912BD5FFA8664BD60683
      9B6FF228808B7FF223986FABD602A
      4A4A26F939BD602A8B05BD602A8B0
      5BD
170 DATA 602A8B0ABD602A8B0ABD602
      A8B0ABD602A39B7636D8E0019BD60
      4A8480B7FF20B6636D4A26FD301F2
      6EE4FB7FF20B6636D39B6636C2605
      863FB7636CB6636C4444B8636C444
      4B6636C46B7636C398632B7635C8E
      00328680B7FF20B6635C4A26FD860
      0B7
180 DATA FF20B6635C4A26FD301F26E
      6B6635C39B663658B0119B76365B6
      6364890019B76364BD60B4BD60663
      9B66362C60ABD60C3B66363BD60C3
      39B66364C61ABD60C3B66365BD60C
      339B76361444444448B16BD610C5C
      B66361840F8B16BD610C5CB663613
      986
190 DATA 3BC604BD610C4C5C814026F
      78635C613BD610C4C5C813B26F77F
      63627F6363BD60A57F63657F6364B
      D60B439B7635FF763608E68003089
      1680C41F3A108E6600B6635F81202
      50431A90100F6635FC41F1E123A1E
      128608E6A4E78431A8203088204A2
      6F3
200 DATA B6635FF6636039B66359810
      9261FB6635A840F2718F6635A8E63
      7C3AA61FA7848609A71F7A635ABD6
      29CBD608CB66359810B2621B6635A
      840F810F2718F6635A8E637C3AA60
      1A7848609A7017C635ABD629CBD60
      8CB66359815E2626B6635A819F221
      FF6
210 DATA 635A8E637C3AA68810A7848
      609A78810B6635A8B10B7635ABD62
```

```
      9CBD608CB66359810A2624B6635A8
      110251DF6635A8E637C3AA610A784
      8609A710B6635A8010B7635ABD629
      CBD608C394F5FBD630B4C811026F8
      5CC10C26F3398E0000A6896600A78
      968
220 DATA 0030018C020026F139BE635
      D8CA00025088CBFF022037E62288E
      A009A680BF635D39108E0000BD621
      58407A7A9637C3121108C00C026EF
      8609B763A5397F6358BD62A6BD62E
      DBD622E8629B7635ABD629CBD60DF
      BD62C4BD5FFABD600386B4BD5F038
      678
230 DATA BD5F0386B4BD5F0339B7636
      B1F894FC3637C1F01E6844F1F01B6
      636B840FF6636B54545454BD630BB
      6636B394FBD62794C81B026F839B6
      FF0184F7B7FF01B6FF0384F7B7FF0
      3B6FF238A08B7FF238600B7FF2039
      B7FFD2B7FFD1B7FFCFB7FFCCB7FFC
      BB7
240 DATA FFC8B7FFC6B7FFC0B7FFC3B
      7FFC5B6FF2284078AF0B7FF22398E
      00006F89680030018C180026F5398
      E00006389680030018C180026F539
      840FC10B2502C60B12B76366F7636
      7BF63681F10C40F86023DC366001F
      02B66367BB63675FC368001F01F66
      366
250 DATA 583A8610B7636AECA4ED843
      1A8203088207A636A26F1B66366F6
      6367BE636839000000000000000000
      00000000000U00000000000000000000
      00000000000000000000000000000000
      00000000000000000000000000000000
      00000000000000000000000000000000
      000
260 DATA 000000000000000000000000
      00000000000000000000000000000000
      00000000000000000000000000000000
      00000000000000000000000000000000
      00000000000000000000000000000000
      00000000000000000000000000000000
      00000000000000000000000000000000
      000
270 DATA 000000000000000000000000
      00000000000000000000000000000000
      00000000000000000000000000000000
      00000000000000000000000000000000
      00000000000000000000000000000202
      0202020505245535320592054420
      504C415920414741494E202020202
      020
280 DATA 2020202043F50595249474
      854203B203C3D3E3E204259205443F
      442020202020202020202020205351554
```

```
      15245553204259204120504148455
      534B49202020202020000000000000
      00000000000000000000000000000000
      00000000000000000000000000000000
      000
290 DATA 000000000000000000000000
      00000000000000000000000000000000
      00000000000000000000000000000000
      00000000000000000000000000000000
      00000000000000000000000000000000
      00000000000000000000000000000000
      000000007E7C3C7C7E7E7E663C0E6
      660
300 DATA 63633C7C3C7C3C7E66666B6
      6667E42187E7E0800666666666060
      6666180666607773666666666660186
      6666B6666069978666660800666660
      6660606066180666607F7B6666666
      63C1866246B3C3C0CA11866663E00
      7E7C60667E7E6E7E180678606B6F6
      67C
310 DATA 667C0618663C3E3C1830A11
      87E7E3E006666666666606066661866
      6660636766606E660618661836661
      860991806660800667C3C7C7E607E
      663C3C667E63633C603F663C183C1
      82266187E4218067E080000000000
      00000000000000000000000000000
      000
320 DATA 000000000000000000000000
      00000000000000000000000000000000
      000000000000FF55FFFFFFFFFFFFF
      FFFFFFF7FFE7FFE7FFE7FFE7FFE7F
      FE7FFE781E00000000815581E7818
      1F981818181817FFE7FFE7FFE7FFE
      7FFE7FFE7FFE781E2AA8000081559
      9C7
330 DATA 999999999D9999996006600
      6600660066006600660066062AA8
      0000815599E7F9F9999F9FF981996
      00663C66FF6608661066556600660
      062AA80000815599E78181818181F
      19981600667E6600660C663066556
      600600002AA80000815599E79FF9F
      9F9
340 DATA 99F199F960066FF66FF667E
      667E6655667E600002AA800008155
      81818181F98181F181F960066FF66
      00667F66FE6655667E600002AA800
      00FF55FFFFFFFFFFFFFFFFFFF2760U
      66FF66FF667F66FE6655667E60000
      2AA8000000000000000000000000
      000
350 DATA 60066FF6600667E667E6655
      667E600002AA8000000060E3C663E
      3EFF9C701CFF600667E66FF660C66
      3066556600600002AA8000000079E
```

```
      66667060CC9C783CE0600663C6600
      6608661066556600660062AA80000
      0007FE6666707C0C1C7C7CF860066
      006
360 DATA 6006600660066006600660066
      62AA800000006FE66667E3E0C1C77
      DCE07FFE7FFE7FFE7FFE7FFE7FFE7
      FFE781E2AA8000000066E663C700E
      0C1C739CE07FFE7FFE7FFE7FFE7FF
      E7FFE7FFE781E00000000000060E3C
      183E7C0C1C701CFF0000000000000
      000
370 DATA 000000000000000000000000
      0000000000000000000000000270000
      FFFFFFFF00000000FFFFFFFF00000
      000FFFFFFFF00000000FFFFFFFF00
      000000FFFFFFFF00000000FFFFFFF
      F00000000FFFFFFFF00000000FFFF
      FFFF00000000FFFFFFFF00000000F
      FFF
380 DATA @,@
```
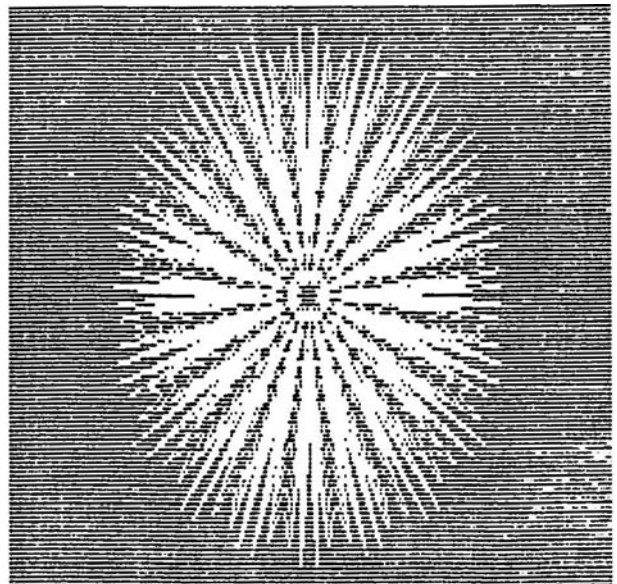
The following program runs the game after the machine language subroutine has been saved:

SQUALOAD

```
10 CLEAR 100,23000
20 LOADM"SQUARE"
30 EXEC 23900
```

COCO COOTIE

By
Bill Bernico

COCO 3 GAME

This game requires a Color Computer 3 and two players. The purpose of the game is to be the first to put a bug together. Each player will have a turn to hit a key which will produce a part of the bug. If there is nothing to attach the part to, then the next player plays. The screen is divided into two parts and each player can observe the progress that has been made on his bug. The first to complete the bug wins the game.

```
1 'COCO COOTIE (C) 1988 FROM
     BILL BERNICO SOFTWARE

2 CLEAR500:CLS0:PRINTTAB(10)"COC
     O-COOTIE":FORX=1024TO1055:POK
     EX,PEEK(X)-64:NEXTX:PRINT:PRI
     NT"PLAYER'S NAME MUST BE LESS
     THAN EIGHT CHARACTERS EACH":
     PRINT:INPUT"PLAYER 1'S NAME";
     N1$:IFLEN(N1$)>8THEN2
3 PRINT@192,STRING$(32,143):PRIN
     T@224,STRING$(32,143):PRINT@2
     24,"";:INPUT"PLAYER 2'S NAME"
     ;N2$:IFLEN(N2$)>8THEN3
4 POKE65497,0:CMP:HSCREEN2:HCLS4
     :HCOLOR8,4:ONBRKGOTO131:DT$="
     RDLU2R2D3L3U3F":D$="BL4BUR22D
     22L22U22E4R22NG4D22NG4U22L22G
     4BF3":LR$="G10D20L4DR5U21E10R
     G10D20L5DNR6DR6U22E10RG10
5 HCLS4:HLINE(0,0)-(160,191),PSE
     T,B:HLINE(5,5)-(155,186),PSET
     ,B:HPAINT(2,2),2,8:HLINE(160,
     0)-(319,191),PSET,B:HLINE(165
     ,5)-(314,186),PSET,B:HPAINT(1
     67,2),3,8
6 IFP2=13THEN100ELSEGOSUB113:D=R
     ND(6):HCOLOR2:PLAY"O2T20B":HP
     RINT(1,1),N1$+",HIT A KEY":EX
     EC44539:HDRAW"BM30,27"+D$:Z=D
     :GOSUB106:PLAY"O4T60CBDAEGFC
7 ON Z GOTO 8,12,18,26,34,40
8 HPRINT(10,4),"1=BODY
9 IFB1=1THEN11
10 IFB1=0THEN X=87:Y=93:H=60:GOS
     UB114:B1=1:P1=P1+1:GOTO52
11 GOSUB127:GOTO52
12 HPRINT(10,4),"2=HEAD
13 IFH1=1THEN16
14 IFB1=0THEN17
15 IFH1=0THEN H=100:GOSUB115:H1=
     1:P1=P1+1:GOTO52
16 GOSUB127:GOTO52
17 HPRINT(3,21),"YOU NEED A BODY
     ":GOTO52
18 HPRINT(10,4),"3=EYES
19 IFH1=0THEN24
20 IFE1=2THEN25
21 IFE1=0THEN H=113:GOSUB116
22 IFE1=1THEN H=98:GOSUB117:P1=P
     1+2
23 E1=E1+1:GOTO52
24 HPRINT(3,21),"YOU NEED A HEAD
     ":GOTO52
25 GOSUB127:GOTO52
26 HPRINT(10,4),"4=FEELERS
27 IFH1=0THEN33
28 IFF1=2THEN32
29 IFF1=0THEN H=95:GOSUB118
30 IFF1=1THEN H=102:GOSUB119:P1=
     P1+2
31 F1=F1+1:GOTO52
32 GOSUB127:GOTO52
33 HPRINT(3,21),"YOU NEED A HEAD
     ":GOTO52
34 HPRINT(10,4),"5=TONGUE
35 IFH1=0THEN38
36 IFT1=1THEN39
37 IFT1=0THENX=100:H=106:GOSUB12
     0:T1=1:P1=P1+1:GOTO52
38 HPRINT(3,21),"YOU NEED A HEAD
```

```
":GOTO52
39 GOSUB127:GOTO52
40 HPRINT(10,4),"6=LEGS
41 IFB1=0THEN51
42 IFL1=6THEN50
43 IFL1=0THEN H=85:GOSUB121
44 IFL1=1THEN H=62:GOSUB122
45 IFL1=2THEN H=42:GOSUB123
46 IFL1=3THEN H=38:GOSUB124
47 IFL1=4THEN H=55:GOSUB125
48 IFL1=5THEN H=77:GOSUB126:P1=P
   1+6
49 L1=L1+1:GOTO52
50 GOSUB128:GOTO52
51 HPRINT(3,21),"YOU NEED A BODY
52 FORX=1TO1500:NEXTX:IFP1=13THE
   N99ELSEGOSUB113:F=RND(6):HCOL
   OR3:PLAY"O3T20B":HPRINT(21,1)
   ,N2$+",HIT A KEY":EXEC44539:H
   DRAW"BM190,27"+D$:Z=F:GOSUB10
   6:PLAY"O4T60CBDAEGFC
53 ON Z GOTO 54,58,64,72,80,86
54 HPRINT(30,4),"1=BODY
55 IFB2=1THEN57
56 IFB2=0THEN X=247:Y=93:H=220:G
   OSUB114:B2=1:P2=P2+1:GOTO98
57 GOSUB129:GOTO98
58 HPRINT(30,4),"2=HEAD
59 IFH2=1THEN62
60 IFB2=0THEN63
61 IFH2=0THEN H=260:GOSUB115:H2=
   1:P2=P2+1:GOTO98
62 GOSUB129:GOTO98
63 HPRINT(23,21),"YOU NEED A BOD
   Y":GOTO98
64 HPRINT(30,4),"3=EYES
65 IFH2=0THEN70
66 IFE2=2THEN71
67 IFE2=0THEN H=273:GOSUB116
68 IFE2=1THEN H=258:GOSUB117:P2=
   P2+2
69 E2=E2+1:GOTO98
70 HPRINT(23,21),"YOU NEED A HEA
   D":GOTO98
71 GOSUB129:GOTO98
72 HPRINT(30,4),"4=FEELERS
73 IFH2=0THEN79
74 IFF2=2THEN78
75 IFF2=0THEN H=255:GOSUB118
76 IFF2=1THEN H=262:GOSUB119:P2=
   P2+2
77 F2=F2+1:GOTO98
78 GOSUB129:GOTO98
79 HPRINT(23,21),"YOU NEED A HEA
   D":GOTO98
80 HPRINT(30,4),"5=TONGUE
81 IFH2=0THEN84
82 IFT2=1THEN85
83 X=260:H=266:GOSUB120:T2=1:P2=
   P2+1:GOTO98
84 HPRINT(23,21),"YOU NEED A HEA
   D":GOTO98
85 GOSUB129:GOTO98
86 HPRINT(30,4),"6=LEGS
87 IFB2=0THEN97
88 IFL2=6THEN96
89 IFL2=0THEN H=245:GOSUB121
90 IFL2=1THEN H=222:GOSUB122
91 IFL2=2THEN H=202:GOSUB123
92 IFL2=3THEN H=198:GOSUB124
93 IFL2=4THEN H=215:GOSUB125
94 IFL2=5THEN H=237:GOSUB126:P2=
   P2+6
95 L2=L2+1:GOTO98
96 GOSUB130:GOTO98
97 HPRINT(23,21),"YOU NEED A BOD
   Y
98 GOTO6
99 GOSUB113:HPRINT(3,21),"THE WI
   NNER!":PLAY"O1T60CDEFGABO2CDE
   FGABO3CDEFGABO4CDEFGABO5CDEFG
   AB":FORG=1TO2000:NEXTG:GOTO10
   1
100 GOSUB113:HPRINT(23,21),"THE
    WINNER!":PLAY"O1T60CDEFGABO2C
    DEFGABO3CDEFGABO4CDEFGABO5CDE
    FGAB":FORG=1TO2000:NEXTG:GOTO
    101
101 HCOLOR6:HLINE(110,75)-(210,1
    20),PRESET,BF:HLINE(110,75)-(
    210,120),PSET,B:HLINE(115,80)
    -(205,115),PSET,B:HPAINT(112,
    77),6,6:HPRINT(15,11),"PLAY A
    GAIN":HPRINT(17,13),"(Y/N)?
102 I$=INKEY$:IFI$=""THEN102
103 IFI$="Y"THENRUN
104 IFI$="N"THEN131
105 GOTO102
106 IF Z=1THENHDRAW"BR7BD8"+DT$
107 IF Z=2THENHDRAW"BR2BD2"+DT$+
    "BR10BD12"+DT$
108 IF Z=3THENHDRAW"BR2BD2"+DT$+
    "BR5BD6"+DT$+"BR5BD6"+DT$
109 IF Z=4THENHDRAW"BR2BD2"+DT$+
    "BR10BD12"+DT$+"BU12"+DT$+"BD
    12BL10"+DT$
110 IF Z=5THENHDRAW"BR2BD2"+DT$+
    "BR10BD12"+DT$+"BU12"+DT$+"BD
    12BL10"+DT$+"BU6BR5"+DT$
111 IFZ=6THENHDRAW"BR2BD2"+DT$+"
    BD6"+DT$+"BD6"+DT$+"BR10"+DT$
    +"BU6"+DT$+"BU6"+DT$
112 RETURN
113 HLINE(6,6)-(150,48),PRESET,B
    F:HLINE(166,6)-(310,48),PRESE
    T,BF:HLINE(9,165)-(150,175),P
```

```
    RESET,BF:HLINE(169,165)-(310,
    175),PRESET,BF:RETURN
114 HCOLOR1:HCIRCLE(H,100),35,,.
    4,.11,.9:HDRAW"BM"+STR$(X)+",
    "+STR$(Y)+"D15":HPAINT(H,100)
    ,1,1:RETURN
115 HCOLOR0:HCIRCLE(H,100),13,,1
    .7:HPAINT(H,100),0,0:RETURN
116 HCOLOR6:HCIRCLE(H,90),5:HPAI
    NT(H,90),6,6:RETURN
117 HCOLOR6:HCIRCLE(H,91),5:HPAI
    NT(H,91),6,6:RETURN
118 HCOLOR2:HDRAW"BM"+STR$(H)+",
    80H10RF10RH10UHLGDFRULUR":RET
    URN
119 HCOLOR2:HDRAW"BM"+STR$(H)+",
    80E10RG10RE10HUERFDGLURUL":RE
    TURN
120 HCOLOR5:HDRAW"BM"+STR$(X)+",
    121D8RU8":HCIRCLE(H,130),7:HP
    AINT(H,130),5,5:RETURN
121 HCOLOR3:HDRAW"BM"+STR$(H)+",
    110NFLF2D15LU15H2LF2D16R6DL6D
    R6":RETURN
122 HCOLOR3:HDRAW"BM"+STR$(H)+",
    114ND13LD13LU13D14R6DL6DR6":R
    ETURN
123 HCOLOR3:HDRAW"BM"+STR$(H)+",
    112ND13LD13LU13D14R6DL6DR6":R
    ETURN
124 HCOLOR3:HDRAW"BM"+STR$(H)+",
    103"+LR$:RETURN
125 HCOLOR3:HDRAW"BM"+STR$(H)+",
    105"+LR$:RETURN
126 HCOLOR3:HDRAW"BM"+STR$(H)+",
    105"+LR$:RETURN
127 HPRINT(3,21),"ALREADY HAVE I
    T":RETURN
128 HPRINT(3,21),"YOU HAVE ENOUG
    H":RETURN
129 HPRINT(23,21),"ALREADY HAVE
    IT":RETURN
130 HPRINT(23,21),"YOU HAVE ENOU
    GH":RETURN
131 POKE65496,0:WIDTH32:CLS:END
```

OPERATING HINT

Define Strings first for multiple saves. If you need to make multiple saves to cassette or disk then define the program name first. Example type X$="COMPUTER"<ENTER>. Then for each save type "(C)SAVE X$ <ENTER>. This saves having to type the name each time.

BASIC PROGRAMMING

USING DISK FILES

SEQUENTIAL FILES

This is a series on basic programming. Each month we present material on using basic commands and give example programs for using these commands. Last month we looked at direct access disk files and gave an example program for using them. Before continuing with direct access files, let's review sequential files.

Sequential files are similar to data statements in that all data has to be read up to the one we want. This takes time waiting for unwanted data to be read until the desired data is reached. This approach is the only one that can be used for a cassette and it can be used to load data into arrays as long as there is enough computer memory. We could set up arrays for the students and each grade and store the information in a sequential file. A dimension statement is required to set up arrays.

```
10 DIM N$(50),G(50,5)
```

The above line sets up the arrays for 50 student's names and 5 grades each. The names can be read in from one file and then a file can be created for each of the grades. Names of the files could be as follows:

```
N$/DAT, G1/DAT, G2/DAT, G3/DAT,
G4/DAT, G5/DAT
```

To read in the data ,a for- next loop is needed.

```
100 OPEN "I", #1, N$/DAT
```

```
100 FOR J=1 TO 50
110 INPUT #1, N$(J)
120 NEXT J
```

The preceeding would be for a disk drive. For a cassette the #1 would be #-1 for the file. Reading data into arrays is a nice way to handle information because we can quickly extract information from any element in the array. The disadvantage is that the computer's string memory limits the amount of information that can be contained within an array.

DIRECT ACCESS FILES

A direct access file allows us to go to the disk and get information directly from it. Our arrays are placed on a disk instead of in memory. Suppose we have a direct access file for a class of 50 students. If each student has a record number from 1 to 50 and we want the grades for student number 38 then we can quickly get the information for that student. We have a new dimension in programming. First of all the programming is easier. We do not have to read data into the computer since we can go directly to the disk to get it. Secondly we can handle more information. Our limitation will only be the amount of information we can place on a disk.

Last month we gave a direct access program that allowed us to write variables on the disk. This worked fine but required a sector or 256 bytes for each variable. We can compact our information and put several

variables on a sector. To easily do this, all variables will have to be converted to strings. Let's look at some new commands.

The Open Command

Let's again consider a teacher with 50 students and a requirement for 8 grades each. This is a total of 9 variables for each student. Our record will need 15 spaces for the name and 5 spaces for each grade. This gives a total of 15 plus 40 or 55 spaces for each student.

The first thing we will have to do is to modify the OPEN command and specify our record length of 55. If we call the file "FIRST" then the following line will be required:

```
100 OPEN "D", #1, "FIRST", 55
```

Notice the 55 at the end of the line. This establishes a record of 55 spaces. If no number is used then the record will be 256 spaces.

Field Command

The Field Command allows us to decide how many spaces we want to leave in each record for each variable. The procedure is to place a number in front of the variable followed by the word "AS and then the variable name. For example if we use N$ as the variable for the studen'ts name and we allow 15 spaces, then we will have 15 AS N$ to designate this. Likewise we will reserve 5 spaces for each grade. The grades will be entered as strings and converted to numbers to calculate the average. An array can be used to handle the grades which will be labelled G$(1), G$(2), G$(3), ... G$(8). We will then designate each variable in our field statement with commands such as 5 AS G$(1), 5 AS G$(2), etc. The following statement will reserve spaces for the student's name and grades:

```
110 FIELD #1, 15 AS N$, 5 AS
G$(1), 5 AS G$(2), 5 AS G$(3), 5
AS G$(4), 5 AS G$(5), 5 AS
G$(6), 5 AS G$(7), 5 AS G$(8)
```

LSET and RSET Command

These two commands will left set and right set a string variable within a field. Suppose we have a string A$="COMPUTER" and a field 12 characters long. Since A$ has 8 characters then if it is left set and right set it will be as follows in the field.

************ 12 char field

COMPUTER   LSET

Computer RSET

These two commands just move the variable all the way to the left or all of the way to the right in the field.

GRADE PROGRAM

We presented a teacher grade book program in our August edition. This was a sequential file and used arrays to contain the variables. Compare the length of that program with this one. Since this program writes data directly to the disk, less programming is required.

The first time the program is run for a particular file, the file must be initialized. This is done by selecting the option from the first menu. Then the variables for the students can be entered. A variable can be easily changed by selecting the first option of the first menu. The program prints the grade average as the information for each student is displayed.

```
10 CLS
20 PRINT"GRADE BOOK PROGRAM
30 PRINT"USING DIRECT ACCESS FIL
   ES
40 PRINT"COPYRIGHT (C) 1988
50 PRINT"DYNAMIC ELECTRONICS INC

60 FOR J=1 TO 599:NEXT
70 DIM G$(10):CLS
80 IF PEEK(33021)=50 THEN PALETT
   E 12,63:PALETTE 13,0' REVERSE
   SCREEN FOR COCO3
90 PRINT"THIS PROGRAM CAN BE USE
   D TO KEEP GRADE RECORDS FOR S
   TUDENTS.IT  WILL HANDLE 50 ST
   UDENTS AND  8  GRADES FOR EAC
   H ONE. THE
100 PRINT"AVERAGE IS CALCULATED
    AS THE     NAMES ARE DISPLAYED
    THIS IS A
110 PRINT"DIRECT ACCESS DISK FIL
    E AND     INFORMATION IS WRIT
    TEN TO THE   DISK AS IT IS EN
    TERED OR
120 PRINT"CHANGED. FOR SEVERAL C
    LASSES,    DIFFERENT GRADE FIL
    ES CAN BE    CREATED.
130 INPUT"PRESS ENTER";MM
140 DIR:INPUT"ENTER FILE NAME";F
    $
150 OPEN "D", #1, F$,60
160 FIELD #1, 15 AS N$, 5 AS G$(
    1),5 AS G$(2), 5 AS G$(3), 5
    AS G$(4), 5 AS G$(5), 5 AS G$
    (6), 5 AS G$(7), 5 AS G$(8),
    5 AS G$(9)
170 'THE FIELD ALLOWS 15 SPACES
    FOR THE NAME AND 5 SPACES EAC
    H FOR EACH GRADE.
180 CLS
190 PRINT"1 REVIEW AND MODIFY DA
    TA
200 PRINT"2 INITIALIZE A DISK FI
    LE
210 INPUT"ENTER NUMBER";X
220 ON X GO TO 240,640
230 INPUT"PRESS A KEY TO CONTINU
    E";XX:GOTO180
240 PRINT"THIS REVIEWS DATA
250 INPUT"ENTER STUDENT NUMBER";
    N
260 IF NT=0 THEN NT=1
270 FOR J=N TO 50
280 CLS:GET #1,J:S=0
290 INPUT #1,N$
300 PRINTJ;N$
310 PRINT:PRINT"THE FOLLOWING AR
    E THE GRADES
320 FOR K=1 TO 8:INPUT#1,G$(K):A
    =VAL(G$(K)):S=S+A
330 PRINTK;G$(K),:NEXTK
340 AV=S/NT:PRINT"AVERAGE="AV" N
    UMBER OF TESTS="NT
350 PRINT"1 CHANGE NAME":PRINT"2
    CHANGE GRADE
360 PRINT"3 EXIT THIS SECTION
370 PRINT"4 ENTER NEW STUDENT NU
    MBER
380 PRINT"5 ENTER NUMBER OF TEST
    S
390 X$=INKEY$:IF X$="" THEN 390
400 X=VAL(X$)
410 IF X=0 THEN 520
420 ON X GO TO 450,470,530,250,4
    40
430 GO TO 280
440 INPUT"ENTER NUMBER OF TESTS"
    ;NT:GOTO280
450 PRINT"PRESENT NAME IS "N$:IN
    PUT"ENTER A 1 TO ABORT";A:IF
    A=1 THEN 280
460 INPUT"ENTER CORRECT NAME";N$
    :GOSUB 540:GOTO280
470 PRINT"ENTER CORRECT GRADE NU
    MBER
480 K$=INKEY$:IF K$=""THEN 480
490 K=VAL(K$)
500 INPUT"ENTER CORRECT GRADE";G
    $(K):IF G$(K)="" THEN 280
510 GOSUB 540:GOTO280
520 NEXT J
530 GOTO180
540 WRITE #1,N$:FOR K=1 TO 8:WRI
    TE #1,G$(K):NEXT K:PUT #1,J:R
    ETURN
550 PRINT"THIS ENTERS STUDENT'S
    NAMES
560 FOR J=1 TO 50
570 INPUT"ENTER NAME";N$
580 WRITE #1,N$
590 PUT#1,J
600 PRINTJ;N$
610 X$=INKEY$:IF X$="" THEN 610
620 IF X$="E" THEN GOTO180
630 NEXT J
640 PRINT"THIS INITIALIZES A NEW
    DISK    FILE.  THIS SETS UP
    THE RECORD  SIZE AND FIELDS
    FOR THE PGM.
650 FOR J=1 TO 50
660 N$="     ":G$="    "
670 WRITE #1,N$
680 FOR K=1 TO 8
690 G$(K)=G$:WRITE #1,G$(K)
700 NEXT K
710 PUT #1,J
720 NEXT J
730 GOTO180
```
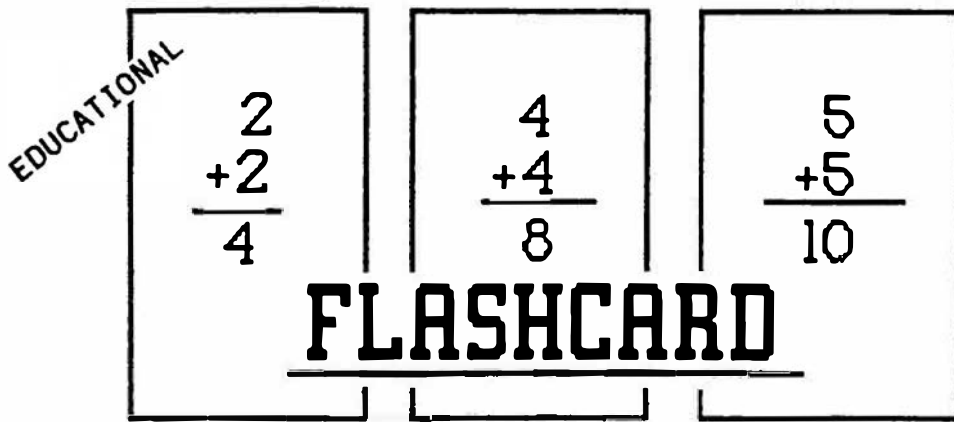
EDUCATIONAL

$$2 \\ +2 \\ \overline{} \\ 4$$

$$4 \\ +4 \\ \overline{} \\ 8$$

$$5 \\ +5 \\ \overline{} \\ 10$$

FLASHCARD

by
Doug Canfield

Of the many programs available for use in teaching math, there are few that are dedicated to drilling the basic math facts. This is the area that the author, a school teacher, finds most lacking in his lower math students. A drilling program is necessarily pretty dry, but this deficiency has been offset by the student being regularly rewarded by a game if he accumulates 10 more correct answers than wrong answers.

The features of this program include:

-Full control over which basic facts will be reveiwed.

-As the student gets more answers correct, the program speeds up until it finds his optimum speed.

-If a problem is missed, it is reviewed until it is learned.

-A built in reward for getting answers correct.

-Reveiw of both multiplication and addition.

After typing in and running the program you will be faced with the Menu screen. You can at this point change the para-

meters by using the up and down arrows, and typing the desired limits.

The program will randomly choose numbers within the boundaries set by "High" and "Low" for one of the terms. The other will be randomly chosen from one to nine. If you set "Low" to a number greater than "High" the program will set "Low" back to zero and choose numbers for BOTH terms between zero and "High" (inclusive).

"Seconds" controls how long you have to answer the fact before running out of time. The actual time allowed will vary between no seconds and the number set, depending on how many answers are answered right or wrong. The program will stop giving new problems after you miss as many as the "Most you can miss" parameter. It will return to giving new problems after at least one of the "missed" problems has been reveiwed sufficiently.

Pressing "Enter" from the Menu screen gives the first problem. You now type in your answer (Using the correction key if needed) and wait for the time to run out, or press "Enter" for an immediate judgement. The computer will display "RIGHT", "WRONG", OR "OUT OF TIME", and the problem with the correct answer. If the problem was

missed, the computer will write it at the bottom left, along with the number of times it must be answered correctly to be reveiwed. At this screen, the space bar will give a new problem, or pressing "M" will return to the Menu to change parameters. After 10 boxes are accumulated at the top of the screen, the computer breaks into a "ski" game for a short repreive!

```
1 '"FLASHCARD" BY DOUG CANFIELD
2 ' RT. 1 BOX 86
3 ' FALKVILLE, ALABAMA  35622
5 '
6 'MENU SCREEN, SET PARAMETERS
9 HI=9: LO=0: S=3: U=5: AD=0
10 CLS:PRINT@11,"flashcards":PRI
   NT@98,"HIGH-";HI:PRINT@162,"L
   OW-";LO:PRINT@226,"SECONDS-";
   S:PRINT@290,"MOST YOU CAN MIS
   S-";U:PRINT@354,"TIMES (T) OR
    PLUS (P)-":PRINT@454,"HIT ‹E
   NTER› TO PLAY":IF AD=0 THEN P
   RINT@377,"T" ELSE PRINT@377,"
   P"
20 T$=CHR$(129)+CHR$(131)+CHR$(1
   30):M$=CHR$(133):R$=CHR$(138)
   :B$=CHR$(131)+CHR$(131)+CHR$(
   131)
30 N=3:GOSUB 80
40 I$=INKEY$:IF I$=CHR$(13) THEN
    GOTO 120 ELSE IF I$=CHR$(94)
    THEN N=N-1:GOSUB 60 ELSE IF
   I$=CHR$(10)THEN N=N+1:GOSUB 6
   0 ELSE IF I$="" THEN 40 ELSE
   GOSUB 80
50 GOTO 40
60 PRINT@X-32,"   ";:PRINT@X," "
   ;:PRINT@X+2," ";:PRINT@X+32,"
    "
70 IF N‹1 THEN N=1 ELSE IF N>5 T
   HEN N=5
80 IF N=1 THEN X=103 ELSE IF N=2
    THEN X=166 ELSE IF N=3 THEN
   X=234 ELSE IF N=4 THEN X=308
   ELSE IF N=5 THEN X=376
90 PRINT@X,M$;:PRINT@X+2,R$:PRIN
   T@X-32,T$;:PRINT@X+32,B$;
100 IF I$=CHR$(10) OR I$=CHR$(94
   ) OR I$=CHR$(13) THEN I$=""
110 PRINT@X+1,I$;:RETURN
120 X=1024:Y=112:HI=PEEK(X+104)-
   Y:LO=PEEK(X+167)-Y:S=PEEK(X+2
   35)-Y:U=PEEK(X+309)-Y:IF PEEK
   (X+377)=84 THEN AD=0 ELSE AD=
   1
125 ' ? CHOOSE NEW OR MISSED PRO
   BLEM
130 CLS:IF U>5 THEN U=5
140 RN=RND(4):RD=RND(U)
150 IF M>0 AND RN=2 OR RD<=M THE
   N 160 ELSE 205
155 ' MISSED PROBLEM
160 Z=RND(5)
170 A=P(Z,0):B=P(Z,1)
180 IF P(Z,1)=0 THEN 160
190 F=1
200 GOTO250
205 IF LO>HI THEN LO=0:HI=HI+.5
210 A=LO+RND(HI-LO+1)-1
220 IF HI=INT(HI) THEN B=RND(9)
   ELSE B=LO+RND(HI-LO+1)-1
230 IF B=0 THEN   220
240 F=0
245 ' ? SWAP TERMS
250 IF A=0 THEN 260 ELSE IF RND(
   2)=1 THEN AB=A:A=B:B=AB
255 'DISPLAY PROB. & GET ANSWER
260 IF AD=1 THEN C=A+B:GOTO 280
270 C=A*B
```

```
280 IF AD=1 THEN PRINT@203,A"+"B
    "=":GOTO 300
290 PRINT @203,A"X"B"="
300 TIMER=0
310 A$=INKEY$
320 IF A$="" OR A$=" " OR A$=CHR
    $(8) THEN 410
330 IF AD=1 THEN CLS:PRINT@203,A
    "+"B"= "A$:GOTO350
340 CLS: PRINT @203,A"X"B"= "A$
350 B$=INKEY$
360 IF B$="" OR B$=" "THEN 420
370 IF B$=CHR$(8) THEN A$="":PRI
    NT@ 212," ":GOTO 310 ELSE IF
    B$=CHR$(13) THEN 760
380 IF AD=1 THEN CLS:PRINT@203,.A
    "+"B"= "A$B$:GOTO400
390 CLS:PRINT @203,A"X"B"= "A$B$

400 GOTO 750
410 IF TIMER<60*S-3*T THEN310 EL
    SE 430
420 IF TIMER<60*S-3*T THEN 350
430 IF A$<>"" AND B$="" THEN 750

435 ' OUT OF TIME!
436 ' IF NEW PROB. THEN
437 ' WRITE IN MISSED ARRAY
440 IF F=0 THEN GOSUB 910 ELSE
       P(Z,2)=0
450 SOUND 25,5
460 PRINT TAB(10)"OUT OF TIME!"
470 T=T-1:R=R-1:IF R<0 THEN R=0'
    ADJUST SPEED & NUBER CORRECT
    FOR GAME
480 IF AD=1 THEN PRINTTAB(11)A"+
    "B"="C:GOTO 580
490 PRINT TAB(11)A"X"B"="C
495 ' DISPLAY MISSED PROBLEMS
580 PRINT:FOR G=1TO5
590 L$="----"
600 L$=LEFT$(L$,4-P(G,2))
610 IF AD=1 THEN IF P(G,1)>0THEN
       PRINT P(G,0)"+"P(G,1);L$:
         GOTO 630
620 IF P(G,1)>0 THEN PRINT P(G,0
    )"X"P(G,1);L$
630 NEXT G
640 IF T<0 THEN T=0
655 ' DISPLAY COUNT TO GAME
660 POKE &H88,&H04:POKE&H89,0
670 IF R=0 THEN 700
680 FOR PS=1 TO 3*R STEP 3
690 PRINT@PS+1,CHR$(140);:NEXT P
    S
695 ' WAIT FOR NEW PROBLEM
700 S$=INKEY$
710 IF S$="M" THEN 10
```

```
720 IF S$<>" "THEN 700
725 ' ? GO TO GAME
730 IF R>=10 THEN R=0:GOSUB 1000
    0:CLS:PRINT@ 228,"READY FOR N
    EXT PROBLEM":EXEC44539
740 GOTO 130'GO GET NEW PROBLEM

745 ' CHECK FOR CORRECTION
750 C$=INKEY$:IF C$=CHR$(8) THEN
    PRINT@ 213," ":GOTO 350 ELSE
    IF C$=CHR$(13) THEN 760 ELSE
    GOTO 820
755 ' ? RIGHT OR WRONG
760 IF VAL(A$+B$)=C THEN 830 'GO
    TO RIGHT
765 ' WRONG, IF NEW PROB. THEN
766 ' WRITE IN MISSED ARRAY
770 IF F=0 THEN GOSUB 910 ELSE
       P(Z,2)=0
780 SOUND 50,5
790 PRINT TAB(13)"WRONG"
800 T=T-1:R=R-1:IF R<0 THEN R=0
810 GOTO 480 'GET NEW PROBLEM
820 IF TIMER>60*S-3*T THEN 760 E
    LSE 750 'LET TIME RUN OUT BFO
    RE ANSWERING
825 ' RIGHT
830 IF F=1 THEN 880
840 PRINT TAB(13)"RIGHT!"
850 R=R+1
860 IF M<2 THEN T=T+1 'ADJUST TI
    ME
870 GOTO 480 'GET NEW PROB.
875 ' ADJUST MISSED ARRAY
876 ' FOR CORRECT PROBLEM
880 P(Z,2)=P(Z,2)+1
890 IF P(Z,2)=4 THEN P(Z,0)=0:
       P(Z,1)=0: P(Z,2)=0: M=M-1

900 GOTO840
905 ' WRITE MISSED PROBLEM
906 ' INTO ARRAY
910 M=M+1
920 Q=1
930 IF P(Q,1)=0 THEN P(Q,0)=A:P(
    Q,1)=B ELSE950
940 RETURN
950 Q=Q+1
960 GOTO930
970 ' "SKI" GAME
10000 GOTO10260 '
10010 CLS0:Q=28:H=1:FORA=1TO31:Y
      $ =Y$+CHR$(128):NEXT:P$=CHR$(
      175):FORA=1TO2:P$=P$+P$:NEXT:
      SL=1:SCR=0:N=0
10020 IFQQ=2THENN=200ELSEIFQQ=3T
      HENN=400
10030 L$=CHR$(8):R$=CHR$(9)
```

23

```
10040 J$(1)=CHR$(215)+CHR$(219):
      J$(2)=CHR$(215)+CHR$(223)+CHR
      $(219):J$(3)=CHR$(215)+CHR$(2
      23)+CHR$(223)+CHR$(219):J$(4)
      =CHR$(215)+CHR$(223)+CHR$(223
      )+CHR$(223)+CHR$(219)
10050 A=15:B=30:C$=CHR$(128)
10060 IF(PEEK(343)AND8)=0THENX$=
      L$ELSEIF(PEEK(344)AND8)=0THEN
      X$=R$ELSEX$=CHR$(133)
10070 IFX$=L$ANDA>0THENZ$=CHR$(2
      46):A=A-1:B=B-2ELSEIFX$=R$AND
      A<30THENZ$=CHR$(249):A=A+1:B=
      B+2 ELSEZ$=CHR$(245)
10080 PRINT@A,C$+Z$+C$;
10090 IFPOINT(B+2,2)=3THENN=N+40
      :E=E+40:FORL=240TO1STEP-20:PR
      INT@480,Y$:SOUNDL,1:NEXTL:GOT
      O10110ELSEIFPOINT(B+2,2)=2THE
      NSCR=SCR+100:SOUND150,1:GOTO1
      0110
10100 IFPOINT(B+2,2)<>0ORPOINT(B
      +3,2)<>0THEN10190
10110 PRINT@VI+RND(Q+1),J$(H);
10120 P=RND(30):IFP=1THENPRINT@V
      I-1+RND(26),P$;ELSEIFP<7ANDSR
      =1  THENPRINT@VI-1+RND(32),CH
      R$(159);
10130 PRINT@480,Y$
10140 IFN/10=INT(N/10)THENPRINT@
      VI+RND(Q),N;:FORKT=1TO40:NEXT
      :PRINT@480,Y$
10150 N=N+1
10160 IFN>199THENH=2ELSEIFN>399T
      HENH=3ELSEIFN>699THENH=4
10170 PRINT@A,C$+Z$+C$;
10180 GOTO10060
10190 FORX=1TO15:SOUNDRND(10)*15
      ,1:SET(A+A+RND(3),RND(3),RND(
      8)):NEXT
10200 N=N-13:CLS:PRINT@139,"YARD
      S"N:PRINT@267,"SCORE";SCR:FOR
      XX=1TO500:NEXT:QQ$=INKEY$
10210 POKE65495,0:FORZZ=1 TON:IF
      SR=1 THENSCR=SCR+1:N=N-1ELSES
      CR=SCR+2:N=N-1
10220 PRINT@144,N"    ":PRINT@27
      2,SCR:SOUND50,1:IFINKEY$<>""T
      HEN10240 ELSENEXTZZ
10230 POKE65494,0:FORXX=1 TO200:
      NEXTXX:GOTO10260
10240 SCR=SCR+N
10250 IFSR=0 THENSCR=SCR+N
10260 POKE65494,0:CLS:PRINT@73,"
      ALPINE SLOPES":PRINT@171,"SCO
      RE"SCR:IFSCR>HS THENHS=SCR:IV
      =1
10270 IFIV=1THENPRINT@264,"HIGH
      SCORE";HS ELSEPRINT@264,"HIGH
      SCORE"HS
10280 PRINT@389,"PRESS ANY KEY T
      O PLAY"
10290 IV=0:Q$=INKEY$
10300 Q$=INKEY$:IFQ$=""THEN10300
10310 FLAG=FLAG+1:IF FLAG>2 THEN
      FLAG=0:RETURN
10320 CLS:PRINT@133,"DIFFICULTY
      LEVEL (1-3)"
10330 QQ$=INKEY$
10340 QQ$=INKEY$:IFQQ$=""THEN103
      40
10350 QQ=VAL(QQ$):IFQQ<1ORQQ>3TH
      EN10340
10360 PRINT@200,"(F)AST OR (S)LO
      W":QQ$=INKEY$
10370 QQ$=INKEY$:IFQQ$=""THEN103
      70ELSEIFQQ$="F"THENPOKE65495,
      0ELSEIFQQ$<>"S"THEN10370
10380 PRINT@261,"(S)LOLOM OR (D)
      OWNHILL"
10390 QQ$=INKEY$
10400 QQ$=INKEY$:IFQQ$=""THEN104
      00ELSEIFQQ$="D"THENSR=0 ELSES
      R=1
10410 PRINT@322,"VISIBLITY (1- G
      OOD 4- BAD)"
10420 QQ$=INKEY$
10430 QQ$=INKEY$:IFQQ$=""THEN104
      30
10440 WW=VAL(QQ$):IFWW<1OR WW>4T
      HEN10430
10450 IFWW=1 THENVI=448ELSEIFWW=
      2 THENVI=354ELSEIFWW=3THEN VI
      =224ELSEVI=128
10460 Y$="":P$="":GOTO10010
```

PRODUCT REVIEWS

This section is open to all producers of color computer products. We will review your products free of charge.

KORONIS RIFT
by
Norm Matice

For the Color Computer 3

The game Koronis Rift is written for 128K, one disk CoCo III (or more capable) systems. This game is a feast for the eyes. It shows off the graphic capabilities of the CoCo III.

As the scenario opens you are onboard a mothership, about to disembark for the planet below. The planet has a series of rifts across its surface. In these rifts are long since abandoned spacecrafts. Your job as a space salvager is to comb the old spacecrafts for useable items. To do this you will be able to send a small robot out to search the ships. Naturally nothing comes easy on alien worlds. To vex your travels there are guard ships that will try and destroy you. You will have to defend yourself from them.

Although the game plays well with much to do, it is the graphics that make the game. On board the mothership there is a robot that will process all that you have found on the planet's surface. The screen containing the robot makes brilliant use of color and shading. Even though the lower one third of the screen is done in grays the shading gives it a three dimensional look. The robot itself is animated and when asked to do a task its little metal fingers are flying, punching the keyboards of the computer consoles surrounding it.

Attention to detail was also lavashed on the background of this scene. Again with an effective use of shading lending a realistic touch to it.

Once on the surface of the planet the monitors at the top of the screen give you pertinent data about your mission at a glance. The landscape goes by your window as you drive along from wreck to wreck, in a good simulation of motion.

The descent to planetside and takeoff to return to the mothership are handled equally well. About the only complaint I can muster for this game is that the ship that does the salvaging doesn't hold enough. For each rift a couple of trips back to the mother ship to unload are necessary.

The game is available at Radio Shack and costs $29.95.

OS-9 LEVEL II
Development System
by
Norm Matice

For the Color Computer 3

The OS-9 Level II Development System is essentially what was traded for BASIC09 when Tandy went from Level I to Level II. It is an editor/assembler/debugger, allowing you to write machine language programs for your Level II system.

For the vast majority of programmers the trade for BASIC09 was a good deal. For those that

felt left out by the trade this program will get you where you want to be. Before I go any further I should warn you that this program is for advanced programmers. The first thing you notice going through the manual is an absence of instructions on how to load the program into the computer.

As an example, to load the debug program you should first boot up OS-9 with your system disk. Then swap disks in your drive (assuming a 1 drive system), and change your execution and data directories. At that point you can load in the debug by giving the pathname /d0/ cmds/debug. After debug is loaded a DB: prompt will appear and you are ready to explore the contents of memory.

The system comes with a screen-oriented text editor. This will allow you to enter your programs. It is easy to use and does not take much time to get used to. Also included in the package is a Virtual Disk/ RAM disk driver, allowing you to create a software disk in the memory of your computer. To use this feature you will need a 512K computer.

If you are a machine language programmer and you want to program on the Level II system this is the tool for you. The program is available form Radio Shack and lists for $99.95.

TypeMate
by
Doug Canfield

For all Color Computers

TypeMate, a plug in cartridge, is a program offered to help you develop your typing skills. It will work on all CoCo computers, and can use a cassette recorder and printer if desired.

Although instructions are provided, I was able to easily guide myself about with only the aid of the onscreen help menus. On the start-up menu you are offered choices of doing exercises, creating or executing your own lessons, displaying graphically your progress, changing the program parameters, or learning which fingers should be used for the different keys.

During the entire tutorial, a high resolution display of the CoCo 2 keyboard shows you which keys you are pressing. The program default is to have the letters written on the keys, but you can choose to have the keys shown as blank if you prefer. You may also give yourself the abilty, during your lessons, to correct your mistakes and automatically return at the end of a line - in the "Word Processor" mode.

The exercises provided by the computer consist of random letters grouped in "words" of about one to five letters. The lesson to be typed is scrolled through a two line window which blacks out the charcters that are missed. The actual keys that are pressed are printed on a piece of graphic paper which is fed out of the graphic typewriter. An on screen display of your typing speed, number of errors, and progress through the lesson is also provided.

If you are disconcerted by long strings of random letters, provision is made for you to create your own lessons with a simple editor, and store them on tape. They may also be printed if you would rather follow a sheet of paper than the computer's screen. The practice lesson that I stored on tape could not be read by TW-64, so I assume that you are restricted to the lessons that you create with the TypeMate cartridge.

After you finish your lesson

you are informed of how well you
have done, and you can have the
errors graphed according to
hands, specific fingers, or
letters. You may then have the
computer drill you again, con-
centrating on the exact problem
areas.

The "Fingers and Keys" op-
tion from the main menu, allows
you to press any key, and the
computer will tell you what
fingers of which hands should be
pressed for that letter. Type-
Mate is available at Radio Shack
for $24.95.

NEW PRODUCTS

This section is provided free
to producers of color Computer
products.

IRONSIDES & CRIMSON SAILS

This is a two player naval
game for the 512K color computer
3 running OS9 Level 2. It is a
game of strategy and tactics
which is easy to learn yet dif-
ficult to master. It utilizes a
640 x 192 pixel high resolution,
four color graphics screen which
provides the most defined and
entertaining graphics. Ironsides
and Crimson Sails contains con-
text-sensitive error windows in
addition to help screens which
are accessible at any time by
pressing the ‹?› hey.

It comes with 5 different
naval scenarios on a diskette
which makes it 5 games in one.
A game can be saved and con-
tinued later. The cost is only
$8.95 check or money order.

SoftWar
The Ameritrust Building
17140 Lorain Ave.
Cleveland, OH 44111
(216) 251-8085.

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* PD-61 Pictures          SLOTS    BAS 0 B 2    CASSDIR  BAS 0 B 1    PD-69 Disk Utilities   JETI     BIN 2 B 3
                          TROLL    BAS 0 B 6    CONTOUR  BAS 0 B 1                           MOONLIT  BAS 2 B 3
HAGAR    PIC 2 B 3        -----------------     CONVERGE BAS 0 B 1    DIRPBR   BAS 0 B 2     RONDO    BIN 2 B 4
SHIPS    BAS 0 B 2                              CONVERT  BAS 0 B 3    DISKLOOK BAS 0 B 1     LOOKLOVE BIN 2 B 4
SIGNS    BAS 0 B 1        * PD-64 Basic Pgms    COUNT    BAS 0 B 1    DKTODK   BAS 0 B 3     MENU     BAS 0 B 1
SPACE    BAS 0 B 8                              CVERT    BAS 0 B 1    DSK2TP   BAS 0 B 2     WE       BAS 0 B 1
3GUYS    MAX 2 B 3        OHMSLAW  BAS 0 B 1    DEC<>HEX BAS 0 B 1    DSKLIBRY BAS 0 B 3     MESSAGE  BAS 0 B 1
AIRPORT  BIN 2 B 6        POWER UP BAS 0 B 1    FUELCOST BAS 0 B 1    DSKMSTER BAS 0 B 4     OBJECTS  BIN 2 B 2
BIGCAT   MAX 2 B 3        ROMPACK  BAS 0 B 1    HEXLOAD  BAS 0 B 1    DSKSPEED BAS 0 B 1     ODIE     PIX 2 B 3
CUBE     BIN 2 B 3        ROMRAM   BAS 0 B 1    HEXTODEC BAS 0 B 1    DTOD     BAS 0 B 2     TANK     BIN 2 B 4
DOGPICT  BAS 0 B 2        SCRDUMP  BAS 0 B 1    IN-OUT   BAS 0 B 1    D UTIL   BAS 0 B 2     TRIANGLE BIN 2 B 2
EARTH    MAX 2 B 3        SLOSKROL BAS 0 B 1    HOMONYMS BAS 0 B 1    DDCOPY   BAS 0 B 2     WORLDMAP BIN 2 B 4
GARFIELD PIX 2 B 3        SORT     BAS 0 B 1    JOYPAINT BAS 0 B 1    DIRGET   BAS 0 B 1     PAINT    BAS 0 B 1
GIRL     MAX 2 B 3        SPEDMATH BAS 0 B 3    KALVOS   BAS 0 B 1    DIRLIST  BAS 0 B 2     SCRDATA  BIN 2 B 1
NEWWAVE  MAX 2 B 3        SPOOLER  BIN 2 B 1    LINES    BAS 0 B 1    DIRSAVE  BAS 0 B 1     RES      BAS 0 B 1
OLIVER   MAX 2 B 3        UPPER32K BAS 0 B 1    MACDATA  BAS 0 B 1    DISK FIX BAS 0 B 3     SCAN     BAS 0 B 1
OWL      MAX 2 B 3        STRIKE   BAS 0 B 1    MISSLETT BAS 0 B 1    DISKDIRE BAS 0 B 3     --------------
PEANUTS  PIX 2 B 3        SHIPS    BAS 0 B 2    ------------------    DISKDUMP BAS 0 B 1     * PD 72 Basic and
SHUTTLE  MAX 2 B 3        WILLSADV BAS 0 B 5                         DISKEDIT BAS 0 B 4       Machine Lang. Pgms
SR-71    MAX 2 B 3        RACEWAY  BAS 0 B 4    * PD-67 Basic Pgms    DISKLIST BAS 0 B 1
ZEBCHESS MAX 2 B 3        TREK     BAS 0 B 4                         DISKSORT BAS 0 B 1     FIND     BAS 0 B 1
ZIGGY    PIX 2 B 3        TXTCNVRT BAS 0 B 1    LOAN     BAS 0 B 3    DISKTEST BAS 0 B 1     LOCFIND  BAS 0 B 1
--------------           --------------------   LOANAMOR BAS 0 B 1    DISKTIME BAS 0 B 1     ML ADDR  BAS 0 B 1
                                                64KLOOK  BAS 0 B 8    DSKCLEAN BAS 0 B 1     MLFINDER BAS 0 B 1
* PD- 62 Basic Pgms      * PD-65 Music          ASSEMBLR BAS 0 B 3    MASTRDSK BAS 0 B 4     MLTTD    BAS 0 B 1
                                                DISASSY  BAS 0 B 4    --------------------   READBIN  BAS 0 B 1
ALARM    BAS 0 B 2       MUSIC    BIN 2 B 7     FINANCE  BAS 0 B 8                           RELOCAT  BAS 0 B 1
BIBLE    BAS 0 B 2       MUSIC1   BAS 0 B 1     ROMDUMP  BAS 0 B 1    * PD-70  Basic Pgms    CHKBOOK  BAS 0 B 3
BINGOCD  BAS 0 B 1       SOUND    ASM 1 A 1     WEREWAND BAS 0 B 5                           FINANAD  BAS 0 B 6
CHECKS   BAS 0 B 3       SOUNDDEM BAS 0 A 1     CHECKS   BAS 0 B 4    MLADFND  BAS 0 B 2     GRAPHICS BAS 0 B 5
CLOCK    BAS 0 B 1       SOUNDS   BAS 0 B 3     MONEYHLP BAS 0 B 4    BIGHILL  BAS 0 B 1     HOMEUTIL BAS 0 B 6
DATA3    BAS 0 B 3       SOUNDS2  BAS 0 B 1     CHKBOOK  BAS 0 B 3    BLACKJK  BAS 0 B 4     LIFE     BAS 0 B 4
DATES    BAS 0 B 2       SWAN     BIN 2 B 1     STAT-LOG BAS 0 B 3    CIA      BAS 0 B 6     MCONVERT BAS 0 B 2
DECIDE   BAS 0 B 3       SYNMUSIC BIN 2 B 4     WORDPRC  BAS 0 B 5    CIPHER   BAS 0 B 1     METCONV  BAS 0 B 1
EXREF    BAS 0 B 3       DEEPPURP BIN 2 B 5     WORDSCAR BAS 0 B 2    CUBES    BAS 0 B 1     JOYLIST  BAS 0 B 1
FILES    BAS 0 B 4       ALFEX    BIN 2 B 2     TYPING   BAS 0 B 2    DOGFIGHT BAS 0 B 1     CLOCK    BIN 2 B 1
FLIPPAGE BAS 0 B 3       BACH     BIN 2 B 4     --------------------  FISH     BAS 0 B 1     CAMELOT  BIN 2 B 2
LABELPRT BAS 0 B 1       BUMBLE   BIN 2 B 3                          FLIP     BAS 0 B 2     FIRE     BIN 2 B 6
MESSAGE  BAS 0 B 1       CANON    BIN 2 B 3     * PD-68 Basic Pgms    FOOTBALL BAS 0 B 4     CLOCK    DAT 1 A 1
OFFSET   BAS 0 B 1       DIAMOND  BIN 2 B 3                          GOLDMINE BAS 0 B 3     --------------------
PHONE    BAS 0 B 1       ENTAIN   BIN 2 B 1     ART      BAS 0 B 1    HANGMAN  BAS 0 B 2     * PD 73 Basic Pgms
PHONEDIR BAS 0 B 2       FUNERAL  BIN 2 B 3     BARGRAPH BAS 0 B 1    HILOW    BAS 0 B 3
PILOT    BAS 0 B 2       GRENGRSS BIN 2 B 4     BEGIN    BAS 0 B 1    HOBBIT   BAS 0 B 2     CARTEL   BAS 0 B 7
PROJEVAL BAS 0 B 4       HILLST   BIN 2 B 4     BWDUMP   BIN 2 B 1    HUSTLE   BAS 0 B 1     DODGE-EM BAS 0 B 2
SPELWORD BAS 0 B 1       --------------------   CHAR     BAS 0 B 2    JUMP     BAS 0 B 1     DOGS     BAS 0 B 1
VALENCE  BAS 0 B 2       * PD-66 Basic Pgms     COM      BAS 0 B 2    MEMORY   BAS 0 B 2     DOORS    BAS 0 B 1
--------------------                            DISMON   BAS 0 B 7    PROTECT  BAS 0 B 2     PINGPONG BAS 0 B 1
                         64KMEMT  BAS 0 B 2     DOT      BAS 0 B 1    QUEST    BAS 0 B 4     CACAPHON BAS 0 B 1
* PD-63 Basic Pgms       AUTODIAL BAS 0 B 2     EDITOR   BAS 0 B 3    SLITHER  BAS 0 B 1     SUB      BAS 0 B 5
                         FINDAWRD BAS 0 B 2     EXTNDKYB BAS 0 B 4    STOCK    BAS 0 B 3     SURVIVAL BAS 0 B 5
ANIMALS  BAS 0 B 3       FLASHCRD BAS 0 B 2     EXTNDKYB DOC 1 A 7    --------------------   TREK     BAS 0 B 5
BALOONS  BAS 0 B 3       PHONEWRD BAS 0 B 1     FREE     BAS 0 B 1                           TYCOON   BAS 0 B 2
BATSHIP  BAS 0 B 4       64KTEST  BAS 0 B 1     GRADBOOK BAS 0 B 1    * PD-71 Basic &        SCRAMBLE BAS 0 B 5
BUGS     BAS 0 B 6       ABBREV   BAS 0 B 4     GRNDSTFF BAS 0 B 1      Machine Lang. Pgms   SIMON    BAS 0 B 2
CONNECT4 BAS 0 B 4       BASECONV BAS 0 B 1     INSTR    BAS 0 B 1                           WHERISIT BAS 0 B 2
DIGGEM   BAS 0 B'3       BIORYTHM BAS 0 B 3     LET      BAS 0 B 3    DISASSEM BAS 0 B 2     WALLHIT  BAS 0 B 1
FACTORS  BAS 0 B 4       BOWLSUM  BAS 0 B 2     STOCKS   BAS 0 B 5    PAYMENT  BAS 0 B 1     TICTACT  BAS 0 B 2
GEOGAME  BAS 0 B 4       BOXLABEL BAS 0 B 1     TWOLINER BAS 0 B 1    STATCAP  BAS 0 B 2     CHBASIC  BAS 0 B 1
KINGDOM  BAS 0 B 6       CALENDAR BAS 0 B 2     ATOMS    BAS 0 B 2    TEMPCONV BAS 0 B 1
MAZE3    BAS 0 B 3       CALENDR2 BAS 0 B 1     BEAST    BAS 0 B 1    ECHOSONG BAS 0 B 1
MISSILES BAS 0 B 2       CAR CALC BAS 0 B 1     --------------------  MUSCONV  BAS 0 B 1
POKER    BAS 0 B 4                                                   FUGUE    BIN 2 B 3
```

PUBLIC DOMAIN SOFTWARE

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

1-4 $4.95, 5-9 $4.50, 10-24 $4.00, 25 up $3.50

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Dynamic Electronics Inc.
P. O. Box 896 (205) 773-2758
Hartselle, AL 35640

Pingpong

This is an active game with plenty of action for both young and old. You decide how hard or simple you want the game. The screen comes up with three choices -- 1=Easy, 3=Medium and 9=Hard. A joystick is required. Next comes the pingpong table with net and flashing bar. Using the joystick, move the flashing bar to hit the ball toward the net. Each hit is one score. Two scores are accumulated when the ball goes through the net. Each player has 3 tries to accumulate scores.

```
100 CLS:E$=CHR$(128)+CHR$(128):Z
    $=CHR$(159)+CHR$(159)
110 T=TIMER
120 IF T>1000 THEN T=T-1000:GOTO
    120
130 FOR R=1 TO T STEP 10
140 S=RND(1):NEXT R
150 PRINT"DIFFICULTY FACTOR:"
160 INPUT"(1=EASY, 3=MEDIUM,  9=
    HARD)";Z1
170 IF Z1=9 THEN F1=2.173:GOTO 2
    00
180 IF Z1=3 THEN F1=2.334:E$=E$+
    E$:Z$=Z$+Z$:GOTO 200
190 IF Z1<>1 THEN 150 ELSE F1=2.
    521:E$=E$+E$+E$+E$:Z$=Z$+Z$+Z
    $+Z$
200 P=0:M=3:CLS(0)
230 Z=464:FORY=2 TO 3
250 FOR X=0 TO 63
260 SET(X,Y,6)
270 SET(X,Y+6,4)
280 SET(X,Y+8,5)
290 SET(X,Y+10,3)
300 SET(X,Y+28,7)
310 NEXT X
320 NEXT Y
330 FOR X=0 TO 1
340 FOR Y=4 TO 29
350 SET(X,Y,1)
360 SET(X+62,Y,1)
370 NEXT Y:NEXT X
380 PRINT@Z,Z$;
390 PRINT@1,"MEN LEFT";
400 PRINT@11,M;
410 PRINT@17,"POINTS";
420 PRINT@25,P;
430 CT=0
440 Y=14
450 B=1 :IF PEEK(65280)=126 OR P
    EEK(65280)=254 THEN 460 ELSE
    PRINT@Z,E$;:Z=INT(JOYSTK(0)/F
    1)+449:PRINT@Z,Z$;:GOTO450
460 IF RND(2)=1 THEN X=61:A=-1:G
    OTO 480
470 X=2:A=1
480 RESET(X,Y)
490 X=X+A:Y=Y+B
500 SET(X,Y,8)
510 PRINT@Z,E$;
520 Z=INT(JOYSTK(0)/F1)+449
530 PRINT@Z,Z$;
540 ON (POINT(X+A,Y+B))+1 GOTO 4
    80,570,580,590,660,650,580,67
    0
550 SOUND 1,1
560 IF POINT(X+A,Y+B)>0 THEN 540
    ELSE 480
570 A=-A:GOTO 550
580 FG=1:B=-B:A=(RND(3)-2)*RND(2
    ):GOTO 550
590 P=P+Z1:S=50:CH=1
600 PRINT@25,P;
610 PRINT@(INT((X+A)/2)+32*INT((
    Y+B)/2)),CHR$(128);:SOUND S,1
    :RESET(X,Y):X=X+A:Y=Y+B:SET(X
    ,Y,8):GOSUB 680
620 IF CH=1 THEN IF ABS(B)=2 THE
    N B=B/2
630 IF CH=2 THEN IF ABS(B)=1 THE
    N B=B*2
640 CT=CT+1:IF CT<90 THEN 560 EL
    SE M=M+1:GOTO 220
650 P=P+2*Z1:S=100:GOTO 600
660 P=P+4*Z1:S=150:CH=2:GOTO600
670 RESET(X,Y):SOUND1,25:M=M-1:P
    RINT@11,M;:IF M>0THEN 440 ELS
    E FOR J=1 TO 2000:NEXT J:GOTO
    200
680 IF FG=1 THEN B=-B
690 FG=0:RETURN
```

ham radio & computers
by
bill chapple w4gqc

In this series I discuss using the color computer for ham radio applications. I have several projects that I have started and this month I have an improved Morse Code keyer program. This was requested by one of our readers, and if you have a subject or a need I would like to hear from you. There is a software problem with some of the commercial interfaces. Software is available for Commodore and IBM compatible computers. These interfaces use the ASCII communications port to connect to the computer. A terminal program is needed to accept the ASCII from the interface. Public domain software such as MTERM should work well. However programs requiring graphics such as slow scan TV and WEFEAX will require additional software. Fortunately the color computers can decode these signals directly and an interface is not needed. I have presented a WEFAX program and I am working on SSTV.

The Morse keyer was presented in the January 1987 issue of Dynamic Color News. The one I have this month is an improvement over that one and uses the same interface. There are two features that I added which were not in the original keyer. The first was the ability to send messages such as CQ, CQ DX, my call, the weather, the first transmission of a QSO, etc. The program can contain up to 10 of these short messages.

The second thing I added was the ability to enter the call letters of the station worked and his name. The computer will send these by selecting the letters A or B from the operating menu.

To enter data, I decided to use the data statement method. I put data at the end of the program so I could modify it easily. A label is entered first followed by a comma and then the actual message. If you want a comma to be sent then enclose the data with quotation marks. If you do not do this, the computer will recognize the comma as a seperator betweeen data. I included the data that I entered in the program so you can see how to enter it. If you do not need all of the messsage capability then enter several commas or you will get an out of data error. The station's call sign is entered by pressing the "C" key from the operating menu. Then enter the call sign. The same procedure applies for entering his name. His call and name will appear after the A and B in the menu and they will be sent when the letter is pressed. Any of the messages will be sent when you press the number beside the label for the message. For example if I pressed a "3" then "DE W4GQC" would be sent. Suppose XE5FF was being worked and I wanted to enter his call. Then I would just press the letter A

each time I wanted to send XE5FF. To send directly from the keyboard press enter and then start sending. To return to the menu press the up arrow. A message from one of the buffers can be interrupted by pressing the up arrow.

An interface is required and I used the one developed earlier. A diagram is included in Figure 1. The motor relay of the computer could possibly be used. However I would not recommend it as continued use may cause it to wear out quickly. These are not easy to change on the color computers. The interface uses a relay. However on the new solid state rigs, electronic keying may be possible.

As the program is run, it is necessary to set the speed. This can be set in the program by modifying Z. It can also be set with the - key and the right arrow. The smaller the value, the faster the speed. This can be set as you are sending from the keyboard and the speed value will be printed on the screen. The smaller the value, the faster the speed. This actually is the time for sending the bits.

I used the improved keyer for several contacts. It was really nice to be able to select the messages I wanted to send from the menu. I liked the feature for sending his name and call sign as I sometimes forget these.

IMPROVED MORSE KEYER

```
10 DIM N$(100),T$(15),D$(15)
20 FOR J=1 TO 10:READ T$(J),D$(J
   ):NEXT J
30 POKE 500,0 'NORMAL SPEED
40 CLS:PRINT"IMPROVED MORSE CODE
   KEYER
50 PRINT"WRITTEN BY BILL CHAPPLE
   W4GQC
60 PRINT"cOPYRITE (c) 1988
70 PRINT"dYNAMIC eLECTRONICS iNC
80 INPUT"PRESS 1 FOR FAST SPEED"
   ;XZ:POKE500,XZ
```

```
90 PRINT:C3=0
100 IF PEEK(33021)=50 THEN C3=2:
    PALETTE 12,63:PALETTE 13,0
110 IF PEEK(500)=0 THENS$="NORMA
    L"ELSE S$="FAST
120 CLS:PRINTS$" SPEED
130 DS=PEEK(500):IF DS=1 THEN PO
    KE 65495+C3,1 ELSE POKE 65494
    +C3,0
140 Z=10 'THIS IS THE SPEED VALU
    E
160 PRINT"PRESS RIGHT ARROW TO I
    NCREASE":PRINT"SPEED
170 PRINT"PRESS - KEY TO DECREAS
    E SPEED
180 PRINT"@ KEY SENDS THE BT CHA
    RACTER.
190 PRINT"PRESS DOWN ARROW TO WR
    ITE NOTES ON THE SCREEN.
200 PRINT"ON THE NEXT MENU SELEC
    T THE      NUMBER TO THE LEFT
    OF THE MSG   TO SEND.  PRESS
    ENTER TO SEND
210 PRINT"DIRECTLY FROM THE KEYB
    OARD.  THE UP ARROW WILL RETU
    RN TO THE     MENU.
220 INPUT"PRESS ENTER TO CONTINU
    E";LL
230 'EMPTY THE ARRAY
240 FOR K=0 TO 99:N$(K)="":NEXT
    K
250 'DEFINE THE CHARACTERS
260 N$(8)="IIIIIIII" 'ERROR BACK
     SPACE
270 N$(46)="IDIDID":N$(44)="DDII
    DD":N$(63)="IIDDII"' . , ?
280 N$(64)="DIIID":N$(47)="DIIDI
    "' ' BT  /
290 N$(48)="DDDDD":N$(49)="IDDDD
    "' 0 & 1
300 N$(50)="IIDDD":N$(51)="IIIDD
    "'2 & 3
310 N$(52)="IIIID":N$(53)="IIIII
    ":N$(54)="DIIII":N$(55)="DDII
    I"'4,5,6,7
320 N$(56)="DDDII":N$(57)="DDDDI
    ":N$(65)="ID":N$(66)="DIII"'8
    ,9,A,B
330 'N$(65)=A
340 N$(67)="DIDI":N$(68)="DII":N
    $(69)="I":N$(70)="IIDI":N$(71
    )="DDI":N$(72)="IIII":N$(73)=
    "II"'C,D,E,F,G,H,I
350 N$(74)="IDDD":N$(75)="DID":N
    $(76)="IDII":N$(77)="DD":N$(7
    8)="DI":N$(79)="DDD":N$(80)="
    IDDI"'J,K,L,M,N,O,P
360 N$(81)="DDID":N$(82)="IDI":N
```

```
$(83)="III":N$(84)="D":N$(85)
="IID":N$(86)="IIIID":N$(87)="
IDD"'Q,R,S,T,U,V,W
370 N$(88)="DIID":N$(89)="DIDD":
    N$(90)="DDII"'X,Y,Z
380 GO SUB 400
390 GO TO 380
400 CLS:FOR Q=1 TO 10:PRINTQ;T$(
    Q):NEXT
410 PRINT" A "D$(11)
420 PRINT" B "D$(12)
430 PRINT" C ";"ENTER STATIONS C
    ALL SIGN"
440 PRINT" D ENTER HIS NAME"
450 Q$=INKEY$:IF Q$=""THEN 450
460 IF Q$="C" THEN INPUT "ENTER
    STATIONS CALL SIGN";D$(11):GO
    TO400
470 IF Q$="A" THEN Q=11:GOTO510
480 IF Q$="D"THEN INPUT"HIS NAME
    ";D$(12):GOTO400
490 IF Q$="B"THEN Q=12:GOTO510
500 Q=VAL(Q$)
510 IF Q=0 THEN 530
520 LL=LEN(D$(Q)):FOR JJ=1 TO LL
    :P$=MID$(D$(Q),JJ,1):GOSUB 56
    0:NEXTJJ:GOTO400
530 GOSUB 540:GOTO530
540 P$=INKEY$:IF P$="" THEN 540
550 IF P$=CHR$(94) THEN 380
560 IF P$=CHR$(10) THEN 810
570 XZ$=INKEY$:IF XZ$<>""THEN 38
    0
580 'IF KEY IS - DECREASE SPEED
590 P=ASC(P$)
600 IF P=45THEN Z=Z+1:PRINT"SPEE
    D="Z;:GO TO 540
610 'INCREASE SPEED FOR RIGHT AR
    ROW P=9
620 IF P=9 THEN Z=Z-1:PRINT"SPEE
    D ="Z;:GO TO 540
630 IF Z=0 THEN Z=1
640 IF P=32 THEN PRINT" ";
650 PRINTP$;
660 P=ASC(P$):IF P=8 THEN 680
670 'IF P<33 THEN 430
680 N=P
690 IF N$(N)="" THEN PRINTCHR$(8
    );:RETURN
700 L=LEN(N$(N))
710 '
720 'THIS DECODES THE CHARACTER
730 FOR J=1 TO L:X$=MID$(N$(N),J
    ,1):IF X$="D" THEN Y=3 ELSE I
    F X$="I" THEN Y=1
740 W=Y*Z
750 IF W<1 THEN W=1
760 'SEND DOT OR DASH
```
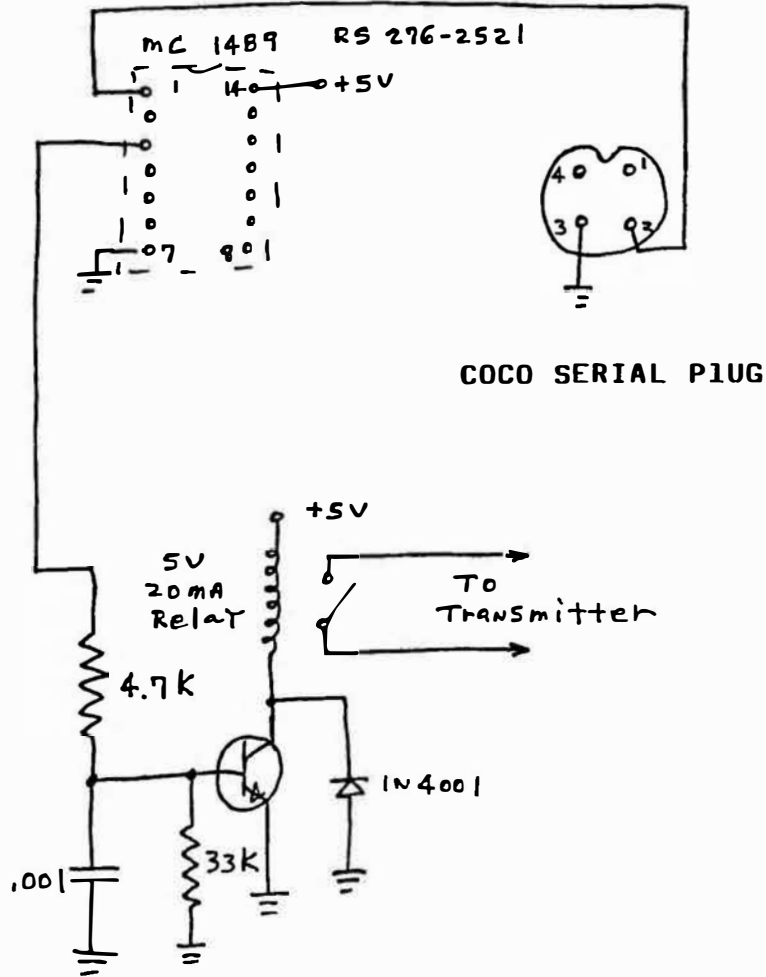
MORSE KEYER WIRING DIAGRAM

Figure 1

770 POKE65312,2:FOR PP=1 TO 4*W:
    NEXT PP:POKE65312,0:FOR PP=1
    TO Z:NEXT
780 NEXT J
790 RETURN
800 'THIS PRINTS COMMENTS ON SCR
    EEN
810 X$=INKEY$:PRINTX$;
820 IF X$=CHR$(10) THEN 540
830 GOTO 810
840 '
850 DATA SEND CQ,CQ CQ CQ DE W4G
    QC W4GQC W4GQC CQ CQ CQ CQ DE
    W4GQC W4GQC W4GQC K
860 DATA FIRST TRANSMISSION," TN

X FOR THE CALL OM @ THE NAME
HERE IS BILL BILL QTH IS HART
SELLE,AL HARTSELLE, AL @"
870 DATA DE W4GQC,DE W4GQC
880 DATA SECOND TRANSMISSION, TH
    E RIG HERE IS A YAESU FT 757G
    X WITH A DIPOLE ANTENNA AND A
    HEATH SB200 LINEAR @
890 DATA W4GQC,W4GQC
900 DATA CQ DX, CQ DX CQ DX CQ D
    X DE W4GQC W4GQC CQ DX CQ DX
    CQ DX DE W4GQC W4GQC W4GQC DX
    K
910 DATA ,,,,,,,,,,,,,,,,,,,,,,,

37

Questions and Answers

These are questions we have received from our readers. If you have a question you would like to have answered here, we would like to hear from you. If you have a solution to a computer problem, we would like to hear from you too.

Dear Bill,

I too am a amateur Radio Operator and have enjoyed the hobby for nearly eleven years. I love what the magazine is doing for the CoCo. I really do enjoy your ham radio articles.

I was wondering if you have thought of offering the hardware and interfacing projects for the COCO that you have in the magazine in a kit form. I for one would support this program. This way a person could get everything at once instead of running around over town to get everything.

Keep up the great work and hope to catch you on the air soon.

Thank you,

Troy Hudson

PS I would be interested in the Morse Terminal.

***

Troy thank you for your letter. I had thought of offering a kit for the Morse Terminal interface but decided against it. It takes time to put a kit together and since the parts layout is not critical we decided not to do this. We are glad you like the magazine and thank you for writing.

+++++++

Dear Mr. Chapple,

In your column, "Ham Radio & Computers", Sept 1988 issue of "DYNAMIC COLOR NEWS", you state that MS-DOS computers have become accepted as a standard for ham radio use. I am happy to report that I am one ham that does not use a MS-DOS computer. I have used a Color Computer on packet radio for 2 years now and am completely satisfied. They are easy to operate and tough enough to be used 24 hours a day as a dedicated terminal.

Now a few words on packet radio. In the aforementioned column, you imply that only MS-DOS and Commodore computers can operate packet because software is only written for them. A Packet TNC (Terminal Node Controller, the modem that interfaces a computer or terminal to a radio) is simply an RS-232 device. That is, it looks just like a telephone modem to the Color Computer. Following this line of logic, any terminal program (i.e. Autoterm, Mikeyterm, Ultimaterm, etc) should (and does!) work. In fact, most TNC instruction manuals give instructions to build the cable (or just use the one you use with your telecommunications modem).

There is much packet activity on 14100-14115 Khz in the 20 meter band, but it is not limited to there. The 10 and 15 meter can be found between 21100 and 21110 in the 15 meter band and between 28100 and 28110 in the 10 meter band. I personally enjoy HF packet more than 2 meters.

Two meter packet (at least here in Oklahoma) has become nothing more than a huge network set up to access bulletin board systems. There are no longer any CQ's sent, and the days of the ragchew are gone. If Alabama is the same, and I assume it probably is, then 2 meter packet is a big waste of time unless BBB's are your thing.

I commend you for your effort to support the Color Computer in ham radio. If there were more like you, then there would be no doubt that the Color Computer is the king of ham computers. Commodore and IBM must use interfaces for such things as RTTY and Fax, while the Color Computer does not. I dare say even TNC-less packet may be possible with proper programming. There is also software for packet BBS's that is completely compatible with mail forwarding systems run on MS-DOS machines.

Please do not give up on the Color Computer as so many others have. It is a superb machine perfectly suited for ham use, unlike MS-DOS machines which are business oriented. With more support from knowledgeable hams such as ourselves, the ham community can learn what we know- the Color Computer is ideal for multi-mode digital communications at a low cost.

Thank you,

Colin J. Smith

* * *

Colin I agree with you 100%. I did not mean to imply that the Color computers will not work with ham radio. What I wanted to say is that the all mode terminals like the PK-232 do not come with software for the COCO. Most software I have seen advertised is for either the Commodore or MS-DOS computers. Terminal programs will provide software for these terminals. Thanks for the information on packet. There is much interest in this mode of operation. I am not giving up on the COCO. It is a. great computer and I enjoy working with it.

OPERATING HINT

You can print your disk directory to a printer by POKE 111,254:DIR <ENTER>

WORLD MAP

This program will draw a world map on a PMODE 4 graphics screen. There are 3 options for drawing different maps. After a map is drawn press the break key and run the program to draw a different map. This works on all color computers with at least 32K of memory.

```
0 PCLEAR4:PMODE4,1:PCLS:CLEAR10:
  S=90:PI=3.1415927:CLS:PRINT@7
  ,"*** WORLD MAP ***":PRINT@12
  8,"MENU:":PRINT"1 MERCATOR":P
  RINT"2 ORTHOGRAPHIC":PRINT"3
  POLAR ORTHOGRAPHIC":INPUT"WHI
  CH";A:ONA GOTO12,1,56:'(C) CL
  OAD 1981
1 INPUT"CENTER (0-360)";C:SCREEN
  1,1:CIRCLE(127,94),S+1:LINE(1
  27-S,94)-(127+S,94),PSET
2 READX,Y:IFX=-1ANDY=-1THEN66
3 IFX=99ANDY=99THENN3=0:N4=0:GOT
  O2
4 X=X*15-30-C:IFX>180THENX=X-360
6 IFX<-180THENX=X+360
7 IFX>OORX<-180THENN3=0:N4=0:GOT
  O2
8 GOSUB11:IFN3=0ANDN4=0THEN10
9 LINE(N1,N2)-(N3,N4),PSET
10 N3=N1:N4=N2:GOTO2
11 IX=X*PI/180:IY=Y*PI/180:N1=CO
   S(IY)*(S*COS(IX))+127:N2=191-
   (S*SIN(IY)+96):RETURN
12 S=255/360:SCREEN1,1
13 READX,Y:IFX=-1ANDY=-1THEN66
14 IFX=99ANDY=99THENX1=0:Y1=0:GO
   TO13
16 Y=192-((Y+SGN(Y)*(ABS(Y/8)+AB
   S(Y*Y/150)))/1.1*S+96):X=X*15
   *S:IFX1=0ANDY1=0THEN18
17 LINE(X1,Y1)-(X,Y),PSET
18 X1=X:Y1=Y:GOTO13
19 DATA0,25,.5,25,.75,21,.83,22,
   1.15,8,1.4,10,1.4,15.5,1.9,22
   ,2,22,2.1,23,2.16,20,2.3,19
20 DATA2.3,15.2,2.5,15.8,2.6,11,
   2.56,8.5,2.65,8.7,2.74,3,2.95
   ,1.5,2.9,6,2.7,7,2.65,11
21 DATA2.7,14,2.74,13,2.83,12.5,
   2.83,11,3,10.5,3,8,3.3,11.5,3
   .32,14,3.15,18,3.1,20.5,3.23,
   22,3.38,22,3.56,23,3.65,23.5,
   4,25.5,4,26.5,4.13,29
22 DATA 4.11,31.5,3.95,36,4.2,37
   .5,4.05,38,3.9,37.2,3.77,40,3
   .87,40,4.1,41,4.1,39.5,4.35,4
   0,4.35,38,4.5,38,4.44,35,4.6,
```

```
   36,4.6,37.5,4.54,38.5
23 DATA4.8,43,4.95,42.8,5.4,49,5
   .47,52,5.47,53,5.4,54,5.15,53
   .5,5.57,59.7,5.95,59.5,5.97,6
   0,6.15,59,6.32,59.7,6.3,60,6.
   5,62,6.75,62.3,6.75,60.5,6.9,
   62,6.9,61,6.45,56,6.5,51,6.6,
   52,6.67,53,6.8,53,6.8,58,6.9,
   60,7.45,60,8,62.5
24 DATA7.72,65,7.9,64.6,8.05,65.
   5,8.25,65.8,8.5,64.8,8.5,65.3
   ,8.65,65.3,8.5,66.7,8.4,66.6,
   8.38,67.2,8.13,68,7.4,70,7.5,
   68.5,7.35,68,7.28,69.5,6.7,69
   .5,6.7,71,6.2,71,6,71.5,5.35,
   72
25 DATA5.37,70,4.9,70,4.85,69,4.
   6,71.5,3.5,73.5,3,72,3.5,75,3
   .48,76.5,3.15,76.5,3,77.5,2.7
   3,77,2.75,76.5,2,75.5,1.7,74.
   5,1.7,74,1.47,74,1.47,73,.6,7
   3.3,.5,71.5,.5,69,0,70
26 DATA99,99,11,69,10.45,70,9.55
   ,71,9.15,70,9.1,69,8.95,69,8.
   9,68.5,9.1,67.5,9.2,67.5,9.2,
   66.5,9.07,66.5,9.05,67,8.85,6
   6.3,8.8,66.2,8.9,65.5,9.2,65.
   7,9.3,66,9.35,64.5,9.27,64.5,
   8.9,62,9,60.5,9.2,60,9.25,60,
   9.3,60.5
27 DATA9.3,58.5,9.4,59,9.55,58.5
   ,9.5,57,9.2,55,9,54,9.48,56,9
   .75,59,9.75,60,9.95,61.5,9.8,
   60.5,9.8,59.3,10.2,61,10.35,6
```

```
   1,10.4,60,10.65,59.5,10.9,58.
   5,11,59,11.1,59,11.45,51.5,11
   .8,50.5,11.85,49.5,11.7,49.5,
   11.75,47
28 DATA11.7,42.5,11.77,38.5,11.8
   5,37.5,12,35,12.2,34,12.35,29
   ,12.4,28.5,12.45,27,12.42,27,
   12.42,27.5,12.5,25,12.55,24,1
   2.6,22.5,12.67,23,12.55,25.5,
   12.4,30,12.38,32,12.48,32,12.
   51,30,12.75,26,12.75,25,12.92
   ,22,13,19,13.3,16.5
29 DATA13.6,16,13.7,16.5,13.97,1
   4,14,14,14.15,13,14.25,11,14.
   25,10.5,14.47,9,14.65,8.5,14.
   77,9,14.77,8,14.8,7.5,14.82,5
   ,14.8,4,14.7,1,14.6,-1.5,14.7
   ,-2,14.6,-4,14.65,-5,14.7,-7,
   14.75,-9.5,14.87,-14,15.37,-1
   7,15.3,-25,15.25,-30,15.2,-33
   ,15.2,-37
30 DATA15.1,-38,15.05,-40.5,15.2
   ,-40,15.1,-46,15,-46.6,15.1,-
   47,15.02,-48,15.06,-51.5,15.1
   ,-51,15.15,-51.8,15.15,-52,15
   .4,-51,15.35,-50.5,15.55,-48,
   15.6,-47.3,15.5,-46,15.5,-45.
   4,15.53,-45,15.6,-45,15.65,-4
   2.5,15.7,-42.5,15.65,-43,15.6
   2,-41.5,15.75,
31 DATA15.8,-40.5,16.1,-39.5,16.
   2,-37,16.1,-36,16.05,-35,16.4
   5,-35.5,16.55,-33,16.65,-30.5
   ,16.75,-28,16.77,-24.5,17.1,-
```

```
    23,17.25,-22.5,17.4,-19,17.45
    ,-16,17.46,-13,17.65,-7,17.6,
    -5.5,17.5,-3,17.1,-2.5
32  DATA16.7,0,16.6,0,16.66,1.5,1
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    21.5,13.95,19.5
33  DATA13.7,19,13.6,20,13.5,23,1
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    15.34,42,15.5,44.5,15.6,46,15
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    15.7,60,15.6,59.7,15.6,59,15.
    45,59,15.45,61,15.3,61.5,14.8
    ,62,14.8,60
35  DATA14.75,59,14.8,58,14.85,56
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    .5,14.65,52.5,14.65,55,14.3,5
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    13.75,59,13.77,62,14,64.5,14.
    2,65.5,14.55,66,14.5,68.5,14.
    35,69,14.25,67,14.2,68.5,14,6
    7.5,13.8,71,13.6,70,13.8,68,1
    2.9,68.5,12.35
36  DATA12.4,69,11.5,70.5,11,69,9
    9,99,0,-68,.7,-68,.7,-69,1,-6
    9.5,1.8,-67,3,-67,3.45,-66,4.
    1,-67.5,5,-67,5.8,-67.5,5.8,-
    68,7.45,-70.5,6.9,-75,6.85,-7
    7,7,-78,6.7,-78,6.7,-82,10,-8
    6,10,-85,9.7,-84.5,9.7,-81,10
    .35,-80.5,9.5,-77,10.25,-78,1
    0.25,-76,11.2,
37  DATA 11.2,-75,11.5,-76,11.8,-
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    .5,15.55,-72.5,15.45,-68.5,15
    .6,-66,16.2,-63,15.6,-67,16,-
    73,16,-77,17.5,-78,18.8,-73,2
    0,-70,21.9,-70,23.75,-66,24,-
    68,99,99
38  DATA3.6,-21,3.6,-24,3.75,-32.
    5,3.7,-34,3.8,-34.3,4.35,-33.
    5,4.8,-31.5,4.97,-33,5.1,-34,
    5.25,-33,5.45,-38.5,6,-37.5,6
    .25,-29,6.3,-28,5.8,-19,5.55,
    -12,5.5,-16.5,5.1,-14.5,5.2,-
    13,4.8,-12,4.6,-15,4.45,-14.5
    ,4.1,-19,3.6,-21,99,99
39  DATA2.45,5,3,-6,3.1,-3,2.6,5,
    2.45,5,99,99,3.35,1,3.4,-2,3.
    8,-2.5,3.95,.5,3.95,5.5,3.85,
    6,3.35,1,99,99,3.1,-6.5,3.65,
    -7,3.65,-6.5,3.1,-6,3.1,-6.5,
    99,99,4,0,4.3,.1,4,-5,4,0,99,
    99,4.8,-.5,4.85,-3,5.2,-3.5,5
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40  DATA5.7,-3,5.2,-1.5,5.05,-2.5
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    59.5,21.2,60.5
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    7.5,20.2,42
44  DATA20.2,44,20.7,45,20.73,43,
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    20.25,6.5,20.4,5,20.6,5,20.65
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    -18.5,21,-26,21.25,-32.5,21.2
    ,-33,21.35,-34,21.75,-33,22.2
    5,-29,22.25,-20.5,22.4,-19.5,
```

22.3,-19
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47 DATA22.75,-11.5,22.7,-5,23.2,
4,23.4,12,23,11,22.7,15,22.2,
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22.85,-22.5,23,-21,23.2,-20.5
,23.3,-12,99,9
48 DATA19.7,58,19.6,57,19.7,54,1
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1.9,41,22.45,42,22.55,41,22.8
,41.5,22.8,42.5,22.55,45,22.6
5,47,22.3,46
53 DATA22.5,45,22.25,45,22.1,46.
5,22,47,99,99,14.4,22.5,14.55

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      ,22.5,15.05,20,14.8,19.5,14.5
      5,22,14.4,22,99,99,15.1,18,15
      .4,18.5,15.1,20,15.1,18,99,99
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      16.22,49,16.25,50,99,99,15.2,
      -52,15.4,-53.5,15.6,-54,15.5,
      -53,15.45,-51.
   54 DATA99,99,23.5,47.5,23.2,46.7
      ,23.1,45,23.4,40,23.3,37,23.5
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      39.5,23.65,42,23.4,45,23.65,4
      5.5,23.5,47.5,-1,-1
   56 INPUT"N OR S";A$:IFA$="N"THEN
      H=1
   57 SCREEN1,1:CIRCLE(127,96),S+1:
      CIRCLE(127,96),2
   58 READX,Y:IFX=-1ANDY=-1THEN66
   59 IFX=99ANDY=99THENX1=0:Y1=0:GO
      TO58
   60 IFH=1ANDY<0THENX1=0:Y1=0:GOTO
      58
   61 IFH=0ANDY>0THENX1=0:Y1=0:GOTO
      58
   62 XI=X*15*PI/180:YI=Y*PI/180:X=
      127+COS(YI)*(S*SIN(XI)):Y=96+
      COS(YI)*(S*COS(XI)):IFH=0THEN
      Y=191-Y
   63 IFX1=0ANDY1=0THEN65
   64 LINE(X1,Y1)-(X,Y),PSET
   65 X1=X:Y1=Y:GOTO58
   66 GOTO66
```

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