ENGINEERING NOTES
on
Radio Shack Color Computers

April 1986
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DYNACOMP COLOR NEWS

PROGRAMS

* TANKS (Game)
* DRAW DEMO PROGRAM
  (GET & PUT)
* UPPER RAM PROGRAM

INSTRUCTIONAL SERIES

* LARGE MEMORY PROGRAMS (Part 14)
* COMPUTER GRAPHICS (Part 14)
* WRITING PROGRAMS (Part 13)
* INTERFACING COMPUTERS (PART 3)
* BASIC BASIC

SERVICES

* NEW PRODUCTS
* PRODUCT REVIEWS
* QUESTIONS & ANSWERS
* OERATING HINTS

DYNAMIC COLOR NEWS is published monthly by DYNAMIC ELECTRONICS, INC., P.O. Box 896, Hartselle, AL 35640, phone (205) 773-2758. Bill Chapple, President; Dean Chapple, Sec. & Treas.; John Pearson, Ph. D. Consultant; Bob Morgan, Ph. D., Consultant.

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The purpose of this newsletter 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 newsletter 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 newsletter. 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 *
* April 1986 *
* Editor and Publisher *
* Bill Chapple *
* Secretary *
* Dean Chapple *
****

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INTERFACING COMPUTERS
(PART 3)

For many applications it is necessary to transfer information from a computer to an external device and back to the computer. Two examples are disk drives and tape recorders. With these devices we can save programs and data and later load them back into the computer. If you want to communicate with a bulletin board, then your computer must transfer and receive information from a host computer by telephone lines. A modem is used to interface the computer with the telephone lines.

The preceeding examples are for signals going into and out of the computer. We simplify this by using the terms Input/Output (I/O). Some commands are input only and some are output only.

The print command causes information to be displayed on the screen or an external printer. This is a one way command with information only going from the computer to a device. The basic, extended basic, and disk basic read only memories (ROM) are input only devices. The computer goes to them for instructions which are transferred from the ROMS into the computer. Read means to transfer information into the computer and write means to take information from the computer.

More on ASCII

Last month we looked at serial ASCII. By serial we mean that data is transferred one bit at a time. There are one start bit and one or two stop bits. If we send an 8 bit word, one start bit, and 2 stop bits, then we require 11 bits. For just sending text we can reduce the total number of bits to 9 by sending one start bit, 7 data bits, and 1 stop bit.

PARITY

Parity provides a means of checking for an error. The first bit after the data is the parity bit which of course can be a 0 or 1. The procedure for determining the value of the parity bit is to count all of the 1's in the data bits. If the sum is even the parity bit is 0 and if the sum is odd the parity bit is 1. Odd parity just complements the parity bit. This means that if the parity bit is a 0 make it a 1 and if it is a 1 make it a 0. The following is a chart of some ASCII characters and the value of the parity bit. This assumes 7 data bits. If 8 data bits are used the parity bit will be the same as shown since the eighth bit will be a 0. Pa represents parity and IP represents inverted parity.

Ch	D6	D5	D4	D3	D2	D1	D0	Pa	IP
	64	32	16	8	4	2	1		
0-48	0	1	1	0	0	0	0	0	1
1-49	0	1	1	0	0	0	1	1	0
2-50	0	1	1	0	0	1	0	0	1
A-65	1	0	0	0	0	0	1	0	1
B-66	1	0	0	0	0	1	0	0	1
C-67	1	0	0	0	0	1	1	1	0

Device Compatibility

There are some initializations that must be made before information can be transferred from a computer to a printer or another computer using serial ASCII.

First of all the transfer or baud rate must be the same. This is determined by the values in memory locations 149 and 150. If you are having baud rate problems you can change the value in 150. The baud rate for the printer has to be the same as for the computer. For a printer this is usually the only thing that has to be adjusted.

If you are transferring data

between two computers then you might have to select a parity and number of stop bits.

If you are using a terminal program or have one built into the computer's software, then these parameters can be selected from a menu.

NEXT MONTH

How do you wire a plug to connect an external device to your computer? We will discuss this next month. Also we will discuss handshaking. Handshaking allows the receiving device to stop the computer from sending information until the receiving device is ready to accept more characters. So next month we will continue and give some practical examples on using serial ASCII.

WRITING PROGRAMS
(Part 13)

This is a series on how to write basic programs. We are looking at generating seperate files. You might ask "Why do we want a seperate file"? A good example is a word processor. You would not want to save your program with each text file. This takes extra memory. So load your word processor and then load or create a text file. A couple of months ago we gave a simple word processor program. It did not have all of the refinements that we would want for a quality word processor, but it did allow us to create a seperate text file which could be saved and later reloaded.

Editing Text Files

We want to show how to edit a text file using basic. The procedure is the same if you are using an assembler or some other computer language. After we have generated a file we might want to insert or delete characters or do block moves or delete blocks of text. These operations do not require complicated basic commands. We will need to do some house keeping. In other words we will have to be careful and keep what we are doing orderly. We will need vectors to show where the text begins, ends, and where we are within the text. We will need additional vectors or pointers to show where the text that we are going to edit is located.

Deleting & Inserting Text

The following text examples start in memory at 4000:

4	4	4	4	4	4	4
0	0	0	0	0	0	0
0	0	1	1	2	2	3
0	5	0	5	0	5	0

This shows me how to delete.(1)
This shows how to delete. (2)
This shows how to really delete . (3)

In sentence (1) the text goes from 4000 - 4027. In sentence (2) we deleted 3 characters which were "me ". Notice that everything past the deleted characters is moved up 3 characters and that the text is 3 characters shorter. In the third sentence we inserted really before delete. Notice that the characters after really are moved back in memory 7 locations which is the number of characters in "really ".

Delete & Insert Subroutines

The following subroutines delete and insert text in a text file. Notice that the powerful FOR-NEXT loops can do the moving. Next month we will continue with this and incorpo-

rate these subroutines into a program to allow text editing.

```
 10?"TEXT DELETE & INSERT DEMO
     PGM
 20?"PGM 4-1-86
 30?"cOPYRIGHT (c) 1986
 40?"dYNAMIC eLECTRONICS iNC.
 50'THESE ARE EXAMPLES TO SHOW
    HOW TO DELETE AND INSERT
    USING BASIC
 60'BF=BEGINNING OF FILE
 65'EF=ENDING OF FILE
 70'BT=BEGINNING OF TEXT
 75'ET=ENDING OF TEXT
 80'X=MEMORY LOCATION TO START
    EDITING
 85'N=NUMBER OF CHARACTERS TO
    INSERT OR DELETE
 100 ?"DELETE SUBROUTINE
 105'PARAMETERS ARE PREVIOUSLY
     DEFINED BEFORE COMING HERE
 110'CALCULATE THE BEGINNING AND
     ENDING OF TEXT TO MOVE
 120 BT=X+N:ET=EF
 130 'DO THE MOVING WITH
      FOR-NEXT LOOP
 140 FOR J=BT TO ET
 150 A=PEEK(J) 'LOAD CHARACTER
     TO BE MOVED INTO A
 160 POKE J-N,A 'STORE THE
     CHARACTER IN MEMORY INDI-
     CATED BY X
 170 NEXT J
 180'UPDATE THE END OF FILE
     VECTOR
 185 EF=EF-N
 190 RETURN
 200'INSERT SUBROUTINE
 210'MAKE ROOM FOR THE CHAR-
     ACTERS BY EXTENDING THE
     FILE BY N CHARACTERS
 220 'X POINTS TO WHERE THE
     CHARACTERS ARE TO BE
     INSERTED. MOVE THE LAST
     CHARACTER TO THE END OF
     FILE AND WORK BACK IN
     MEMORY UNTIL ALL CHAR-
     ACTERS FROM EF TO X HAVE
     BEEN MOVED.
 230 FOR J=EF TO X STEP -1
 240 A=PEEK(J):POKE J+N,A
 250 NEXT J
 260'
 270'THE CHARACTERS TO BE IN-
     SERTED ARE IN A BUFFER
     BLOCK WITH POINTERS BT AND
     ET.  THESE CAN BE MOVED ONE
     BY ONE INTO  THE MEMORY
     CREATED BY THE PRECEEDING
     STEPS.
 280 FOR J=1 0 TO N-1
 290 A=PEEK(J):POKE (X+J),A
 300 NEXT J
 305 'THE CHARACTERS ARE
     INSERTED
 310 RETURN
```

BASIC BASIC

We welcome questions and will print some of general interest. Time will not permit individual replys. Questions or tips may be addressed to Norman R. Shelton C/O Owls Nest Software P.O. Box 579 Ooltewah, TN 37363. O.K. here goes -

I can't print at the last screen location without the screen scrolling up. How do my purchased programs do this?

One way is by using "POKE". POKE and PEEK are two verypowerful commands that let you look into and change certain areas of memory. For example the BAUD rate which was covered in last months column. Lets look at POKES that let you work with the screen display. If you are familiar with your BASIC language you are aware that you can control the location you print on the screen with the PRINT@ command. Another way, and sometimes the only way, to do what you want is to "POKE" the information desired into the screen display. The location for "PRINT@" is 0 to 511. 0 is the upper left and 511 is the lower right. Now lets try to print a screen full of the letter "W". Enter this program -

```
 10 FOR X=0 TO 511
 15 PRINT @X,"W";
 20 NEXT X
 25 GO TO 25
```

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First lets look at the program. In line 10 we tell the computer we want it to start counting X as zero and keep counting until it is 511. Line 15 says to print at location X the letter W. The semi-colon is used to tell the computer not to advance the cursor to the next line but leave it right after the last letter printed. Run the program. It worked but look what happened when you printed at location 511 the screen scrolled up to get ready for the next line. You can't print at the bottom right location without scrolling the screen. Lets look at what we can do with the POKE cmmand. By checking a memory map we find the screen information is contained in memory locations 1024 to 1535. This means that what ever numbers are stored in these locations will be displayed on the screen. Remember the computer gives everything a number. It doesn't really store a W. By consulting an ASCII chart we see a "W" is designated by the number 88. To talk to the computer about a W we can identify the letter W as an 88. Now type NEW <ENTER> to erase the old program and enter this one -

```
10 FOR X=1024 TO 1535
15 POKE X,88
20 NEXT X
25 GO TO 25
```

Run the program and you have just done something you couldn't do without a POKE command. There are even some characters stored in your computer that you can't get from the keyboard but you can with the poke. For example a lowercase reverse slant can't be accessed from the keyboard. This program will display all the characters stored in memory. Type - NEW <ENTER> to erase the old program and enter this one -

```
5  CLS
10 FOR X=0 TO 255
15 PRINT CHR$(X);
20 NEXTX
```

Run the program and look at all the characters your computer knows how to make.

You can play with the screen by typing POKE any number from 1024 (upper left) to 1535 (lower right). Remember some numbers are not used. So if you get a blank try another number.

Now lets have a look at some other things we can do with the POKE. Are you tired of the same old green screen? Type - POKE359,57:SCREEN0,1 <ENTER>. BINGO! an orange screen for your text. To return to normal type - POKE359,126 <ENTER>.

Want to slow down the way the computer prints? First unplug your disk controller if you have one. This poke will crash a disk system. Now type - POKE359,60 <ENTER>. Now load in a short program and type - LIST <ENTER>. As you can see the computers print function has been slowed. If you run a program that prints information on the screen it will all be slowed down like this. To return to normal speed printing type POKE359,126 <ENTER>.

Would you like to prevent someone from listing a program? Type - POKE 383,158 <ENTER> (you can also put the POKE in a program line). Now the list command has been disabled. To return to normal listing type - POKE383,0 <ENTER>.

POKE 282,0 will turn on lowercase. POKE 282,1 will return you to uppercase.

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and "play" commands change tone and should not be used when saving or loading programs. It is POKE 65495,0. If your computer doesn't lock up you can use it. BEFORE using the POKE load a game or some program you wish would operate faster. The difference will amaze you. To return to normal POKE 65494,0.

For a tape system a POKE 25,6: NEW will provide a PCLEAR0 and give you an extra 1.5K of memory. If you have a disk system and want to PCLEAR0 you can use POKE 25,14:POKE&HE00,0:NEW

To disable Extended Basic use POKE298,0: POKE303,0. To return extended basic functions use POKE 298,25: POKE 303,14.

If you just want to play experiment with poking numers into the cursor locations. They are stored in locations 135 and 136. If you poke a number less then 3 into 136 your cursor will go off the screen. Hitting <ENTER> several times will bring it back. You can backspace the cursor or move it at will by poking different numbers. It can be a good learning experience and a lot of fun.

Nothing you POKE into the computer will hurt it. You may get a "lock up" but cycling the computer off and back on will return it to normal and reset all values changed with the POKE.

By the way - do wait a few seconds after turning the computer off before you turn it back on. It will prevent damage to your chips.

In our next column we will answer some questions concerning screen displays. Keep those questions and tips coming.

Until next month

TANK8

This is an exciting war game. You are the driver of a tank and try to destroy an enemy tank before you are destroyed. You use the right joystick to position your tank and fire its cannon by pressing the button. This program is provided by courtesy of T & D Software (advertisement on page 7) and is used by permission.

```
1 REM COPYRIGHT (C) T&D SOFTWARE
 1986      tanks
2 PMODE0:GOTO60000
3 PUT(X,Y)-(X+DX,Y+DY),BL,PSET:R
ETURN
4 PUT(PX,PY)-(PX+DX,PY+DY),PR,PS
ET:RETURN
5 PUT(PX,PY)-(PX+DX,PY+DY),PL,PS
ET:RETURN
6 PUT(PX,PY)-(PX+DX,PY+DY),PD,PS
ET:RETURN
7 PUT(PX,PY)-(PX+DX,PY+DY),PU,PS
ET:RETURN
8 PUT(CX,CY)-(CX+DX,CY+DY),CR,PS
ET:RETURN
9 PUT(CX,CY)-(CX+DX,CY+DY),CL,PS
ET:RETURN
10 PUT(CX,CY)-(CX+DX,CY+DY),CD,P
SET:RETURN
11 PUT(CX,CY)-(CX+DX,CY+DY),CU,P
SET:RETURN
12 X=(L-1)*32:Y=(I-1)*16:GOSUB40
:X=X+16:GOSUB40:RETURN
13 PX=QX*32:PY=QY*16:ON QD GOTO7
,4,6,5
14 CX=RX*32:CY=RY*16:ON RD GOTO1
1,8,10,9
15 X=QX*32:Y=QY*16:GOSUB3:RETURN
16 IFRND(2)=1 THEN18
17 IFQX>RX THENRD=2:RETURN ELSEI
FQX<RX THENRD=4:RETURN
18 IFQY<RY THENRD=1:RETURN ELSEI
FQY>RY THENRD=3:RETURN
19 RD=RND(4):RETURN
20 IFH<10 THEN25
21 IFH>53 THEN30
22 IFV<10 THEN33
23 IFV>53 THEN36
24 RETURN
25 IFQD<>4 THENPLAY"O2E":QD=4:GO
```

```
SUB13:RETURN
26 IFBD(QX,QY+1) THENRETURN
27 GOSUB15:QX=QX-1:GOSUB13:RETUR
N
30 IFQD<>2 THENPLAY"O3E":QD=2:GO
SUB13:RETURN
31 IFBD(QX+2,QY+1) THENRETURN
32 GOSUB15:QX=QX+1:GOSUB13:RETUR
N
33 IFQD<>1 THENPLAY"O1E":QD=1:GO
SUB13:RETURN
34 IFBD(QX+1,QY) THENRETURN
35 GOSUB15:QY=QY-1:GOSUB13:RETUR
N
36 IFQD<>3 THENPLAY"O4E":QD=3:GO
SUB13:RETURN
37 IFBD(QX+1,QY+2) THENRETURN
38 GOSUB15:QY=QY+1:GOSUB13:RETUR
N
39 X=RX*32:Y=RY*16:GOSUB3:RETURN
40 PUT(X,Y)-(X+15,Y+15),BR,PSET:
RETURN
45 ON SD GOTO46,47,48,49
46 SY=SY-8:RETURN
47 SX=SX+8:RETURN
48 SY=SY+8:RETURN
49 SX=SX-8:RETURN
50 CLEAR200:DX=31:DY=15:DIM BL(2
0),PR(20),PL(20),PD(20),PU(20),C
R(20),CL(20),CD(20),CU(20),BR(20
),BD(8,12):PLAY"T200L200V31"
52 CLS:PRINT:PRINT"                t
anks"
54 PRINT" IN TANKS, YOU WILL USE
 THE      RIGHT JOYSTICK TO CONT
ROL YOUR  RED TANK. THE COMPUTER
 WILL     CONTROL THE BLUE TANK
AND WILL  TRY TO RAM INTO YOUR T
ANK,      ENDING THE GAME."
56 PRINT" YOU CAN TEMPORARILY PU
T THE     COMPUTER'S TANK OUT OF
 COM-     MISSION BY SHOOTING AN
D HIT-    TING IT. WHILE THE COM
PUTER'S   TANK IS DAMAGED, YOU C
AN RUN    OVER IT WITHOUT FEAR."
57 GOSUB9000:CLS:PRINT@96
58 PRINT" TO END EACH ROUND, YOU
 MUST     SHOOT THE COMPUTER'S F
LAG 3     TIMES. COMPLETING EACH
 ROUND    SCORES 500 BONUS POINT
S."
59 GOSUB3000:
70 PMODE1:PCLS:GET(0,0)-(DX,DY),
BL,G:AD=PEEK(186)*256+PEEK(187):
POKEAD,&H55:POKEAD+1,&H55:POKEAD
+32,&HFF:POKEAD+33,&HFF:POKEAD+6
4,&H55:POKEAD+65,&H55:POKEAD+96,
&HFD:POKEAD+97,&HFF
71 POKEAD+128,&H55:POKEAD+129,&H
55:POKEAD+160,&HFF:POKEAD+161,&H
FF:POKEAD+192,&H55:POKEAD+193,&H
55:POKEAD+224,&HFD:POKEAD+225,&H
FF:GET(0,0)-(15,15),BR,G
72 READD:IFD<>-1 THENPOKEAD,D:AD
=AD+1:GOTO72
74 GET(0,0)-(DX,DY),PR,G:GET(32,
0)-(32+DX,DY),PL,G
75 GET(64,0)-(64+DX,DY),PD,G:GET
(96,0)-(96+DX,DY),PU,G
76 GET(134,0)-(134+DX,DY),CR,G:G
ET(168,0)-(168+DX,DY),CL,G
77 GET(200,0)-(200+DX,DY),CD,G
78 GET(224,0)-(224+DX,DY),CU,G
79 FORI=1 TO 12:READL$:FORL=1 TO
 8:BD(L,I)=VAL(MID$(L$,L,1)):NEX
T:NEXT:PS=0
80 PCLS:FORI=1 TO 12
81 FORL=1 TO 8
82 IFBD(L,I) THENGOSUB12
83 NEXT:NEXT
84 DRAW"C3":GOSUB85:GOTO90
85 DRAW"BM200,42 R4NR4U16R2F2R4D
4L4H2L2":RETURN
90 QX=1:QY=1:QD=2:GOSUB13
92 RX=RND(8):RY=RND(12):IFBD(RX,
RY) THEN92
94 RX=RX-1:RY=RY-1:RD=RND(4):GOS
UB14
95 TC=0:FC=1
99 SCREEN1,0
100 H=JOYSTK(0):V=JOYSTK(1):P=PE
EK(&HFF00)AND1:GOSUB20
150 IF P THEN200
155 SD=QD:SX=QX*32+16:SY=QY*16+2
:PSET(SX,SY,4):SC=4
160 PSET(SX,SY,1):GOSUB45:IFSX<1
0 OR SX>240 OR SY<8 OR SY>182 TH
EN190
162 AX=SX/32:AY=SY/16:IFBD(AX+1,
AY+1) THEN190
164 SC=SC+1:IFSC=5 THENSC=2
166 PSET(SX,SY,SC):PLAY"O5F"
168 IFABS(SX-(CX+16))<16 AND ABS
(SY-(CY+8))<8 THEN170 ELSEIFABS(
SX-200)<16 AND ABS(SY-42)<16 THE
N500 ELSE160
170 IFTC THEN190 ELSECIRCLE(CX+1
4,CY+8),4,2:CIRCLE(CX+14,CY+8),8
,2:PLAY"O1CDEFGABO2CDEFGABO5CDEF
GABBCBCB":PS=PS+100:TC=RND(20)+1
0:GOTO190
175 GOTO160
190 PLAY"O5BAGFEDCO3GFEDCBAO2GFE
DCBA":PLAY"O2FEFDEO1AD"
200 IFTC THENTC=TC-1:GOTO100
201 IFRND(4)=1 THEN100
```

```
202 ON RD GOTO210,220,230,240
210 IFBD(RX+1,RY) THENGOSUB16:GO
TO300
212 GOSUB39:RY=RY-1:GOSUB14
219 GOTO290
220 IFBD(RX+2,RY+1) THENGOSUB16:
GOTO300
222 GOSUB39:RX=RX+1:GOSUB14
229 GOTO290
230 IFBD(RX+1,RY+2) THENGOSUB16:
GOTO300
232 GOSUB39:RY=RY+1:GOSUB14
239 GOTO290
240 IFBD(RX,RY+1) THENGOSUB16:G
OTO300
242 GOSUB39:RX=RX-1:GOSUB14
290 IFQX=RX AND QY=RY THEN950 EL
SE100
300 GOSUB14:GOTO100
500 FC=FC+1:IF FC=4 THEN800
505 IFFC/2=INT(FC/2) THENDRAW"C4
":GOSUB85:PLAY"O5EDAEADA" ELSEDR
AW"C3":GOSUB85:PLAY"O5EDAEADA"
510 GOTO190
800 PS=PS+500:GOSUB900:GOSUB3000
:GOTO80
900 CLS:PRINT@233,"score: ";PS
910 RETURN
950 FORI=0TO10:CIRCLE(PX+14,PY+8
),I,I AND 7:NEXT:PLAY"O5CDEFGBAO
4CDEFGBAO3CDEFGBAO2CDEFGAB":GOSU
B900:PRINT:PRINT"          game o
ver"
960 PRINT:PRINT"        play agai
n ? y/n"
970 K$=INKEY$:IFK$="Y" THENPS=0:
GOSUB3000:GOTO80
972 IFK$<>"N" THEN970
999 END
3000 PRINT@427,"working";:RETURN
9000 PRINT@484,"press [enter] to
continue";
9001 IFINKEY$<>CHR$(13) THEN9001
9002 RETURN
50000 DATA 0,255,0,0,0,0,255,0,0
,255,255,252,0,63,255,255,0,0,17
0,0
50002 DATA 0,0,0,170,0,170,170,1
68,0,42,170,170,0,255,255,192,3,
255,255,0
50004 DATA 0,255,255,252,0,63,25
1,255,0,0,170,170,128,2,170,170,
0,170,170,168
50006 DATA 0,42,174,170,0,255,0,
0,0,0,255,0,0,250,170,188,0,63,2
51,255
50008 DATA 0,0,170,0,0,0,0,170,0
,175,255,232,0,42,174,170,255,25
5,255,240
50010 DATA 15,255,255,255,0,251,
255,188,0,62,170,175,0,170,170,1
70,160,10,170,170
50012 DATA 170,174,170,232,0,43,
255,250,61,85,87,192,3,213,85,12
4,0,250,170,188
50014 DATA 0,62,255,239,0,41,85,
86,128,2,149,85,104,175,255,232,
0,43,170,186
50016 DATA 15,255,255,0,0,255,25
5,240,0,255,239,252,0,62,170,175
,0,10,170,170
50018 DATA 0,0,170,170,160,170,1
86,168,0,43,255,250,0,0,0,0,0,0,
0,0
50020 DATA 0,255,239,252,0,63,25
5,255,0,0,0,0,0,0,0,0,0,170,186,
168
50022 DATA 0,42,170,170,0,0,0,0,
0,0,0,0,0,255,255,252,0,63,255,2
55
50024 DATA 0,0,0,0,0,0,0,0,0,170
,170,168,0,42,170,170,0,0,0,0
50026 DATA-1
51000 DATA11111111
51002 DATA10000101
51004 DATA10101001
51006 DATA10101011
51008 DATA10001001
51010 DATA10111101
51012 DATA10010001
51014 DATA10010111
51016 DATA10110001
51018 DATA10011101
51020 DATA10000001
51022 DATA11111111
60000 PCLEAR2:GOTO50
```

+ + +

```
+ ++ + ++ + ++ ++ ++ + ++ + ++ +
+                               +
+        RENEWAL TIME?          +
+                               +
+ The date beside your name on +
+ the address label indcates +
+ the last issue you will re- +
+ ceive. Send in your renewal +
+ if you want to continue re- +
+ ceiving technical informa- +
+ tion on Color Computers. +
+ This is the last issue for +
+ those with 4/86.           +
+                               +
+ + ++ + ++ + ++ ++ ++ + ++ + ++
```

EDITOR'S COMMENTS

The weather is very nice here in Alabama. The flowers and trees are in bloom and are very beautiful. Dean and I are getting adjusted to working together. She does all of our printing and will be handling subscriptions, orders and advertising. So if you need something contact her. This leaves me free to concentrate on writing articles programs, and working on hardware projects.

I have received many questions on expanding memory. Let me briefly explain what you can expect when you add more memory. First of all you will not have more that 32K at a time unless you configure the computer for the all ram mode which will give 64K. However you will only have about 8K more that you can use in the all ram mode and this will be at the top of the memory. For a 64K computer you can use the second 32K bank for programs or data. We discussed this in our Large Memory Series. If you have a larger memory and can hardware select 64K banks, then you can use any of the banks for any type program and switch programs with the switch. This is the case where chips are piggy backed and you select one of the two memory banks. Problems can occur when the two banks are not running the same type programs. You can run basic in either bank and safely switch banks without having to reset the computer. However if you have a graphics program or program that configures the computer for the all ram mode in one bank, and normal basic in the other, then you can have a problem when you switch banks.

For 256K memories software is required. The Banker RAM and Thunder RAM include software. We use these for a RAM disk for storing progams and backing up disks. If the computer hangs up and we reset it, we have to access the software by reloading it in the Banker RAM. The Thunder RAM has its software in ROM so we can do memory pokes to bring it up. In both cases our programs are protected when the computer is reset. Since we only have 32K for our programs, a good way to use the extra memory is to bring in information as machine language files by using the ramdisk.

Other uses for the extra memory are printer spoolers and storing graphics pages. Some 256K software allows configuring the computer for four 64K banks or eight 32K banks. This may give problems if you reset the computer when it is in one of the banks.

I hope these comments are helpful. The extra memory is nice to have, but as with anything else there are tradeoffs to be made. If you understand what can be done with the extra memory, then you can design your programs or modify your operating habits to best utilize the extra memory.

Which computers can be upgraded? The older D,E, & 285 and the older CoCo 2 computers had sockets for all of the chips. These can be easily upgraded. There are two major versions of the newer CoCo 2. Some have 8-64K memory chips. These are in 16 pin packages and are easy to identify because there are 8 of them. Some of the computers have these chips soldered which makes upgrading difficult. The 16K Korean CoCo 2 has 2-4Kx4 memory chips. This can be upgraded to 64K by replacing the chips with 16Kx4 chips and making one solder connection. The standard 256K upgrades will not work on this computer without a special adapter.

If you have questions please write and we will be glad to answer them for you. If we do

not know the answer we will ask for help from our readers.

+ + +

****
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LARGE MEMORY PROGRAMS
(PART 14)

This has been an exciting series for us. The extra 32K memory bank in 64K computers can be used for many things. We have showed how to copy the first bank into the second. This allows us to use both banks for basic programs. For the past few months we have been developing a ramdisk program which allows programs to be stored in the second bank. We finished the ramdisk program last month. Also we showed how to configure the computer for the all RAM mode.

This month we want to return to the all RAM mode and consider placing a program in the upper 8K of memory. What would be the advantages and disadvantages of doing this? First let's look at what we can and can not do.

Basic assumes the program is in the lower 32K of RAM. Strings must be stored in the lower 32K. To give an example of a potential problem do the following:

```
POKE 25, 224: NEW
```

You will get an error message. Now enter the following:

```
?MEM <ENTER>
```

The screen will display "OM ERROR". What this means is that there is no memory left for strings. This is a fatal mistake because you will probably have to turn off your computer to reset it.

Well what can we do? We can load a program into lower memory from a cassette or disk, and transfer it to upper memory by a machine language subroutine. Then we can POKE 224 into location 25 and run the program in upper memory.

We can return to lower memory by poking a value into 25. The program in upper memory can not be edited. So we must have an error free program. What type program can we put in upper memory?

Utilities, terminal, word processors, accounting, assemblers, are program examples. If you need a lot of string space or data then put your program in upper memory and use the lower memory for data or strings.

ML SUBROUTINE

To move a program to upper memory we will need a machine language subroutine. First of all we need the subroutine to partition the computer for the all ram mode. We covered this back last Summer in our July issue, but we will cover it again. After we enter the all RAM mode we can move the basic program into upper memory. Let's set a procedure for doing this.

Our machine language subroutine can be at 500. This will be in a memory area that will not conflict with our basic program. The basic program can not be over 7800 bytes long. The length of a basic program can be determined from the following:

```
BE= 256*PEEK(25) +PEEK(26): EN=
256*PEEK(27      )      +PEEK(28):
PL=EN-BE:?PL
```

PL is the length of the program.

Moving the Program

Let's look at what is required to move the program after configuring the computer for the 64K all ram mode.

```
 1 CLEAR 57344' This puts a zero
   in the byte before basic
   starts.
 2 LOAD X WITH 25 'Put the
   beginning vector in X.
 3 LOAD Y WITH 57345 'This is
   where the data is going.
 4 LOAD A,X+ 'Load A indexed to
   X and increment X (X=X+1).
 5 STORE A,Y+ 'Store the value
   in upper memory indexed to Y
   and increment Y.
 6 CMPY to 65000 'Compare the
   value of Y to see if we have
   finished.
 7 BGT to 4 'Go to step 4 if we
   have not finished moving the
   data.
 8 RTS 'Return from subroutine.
```

We decided to place our subroutine at location 500. The 64K all RAM subroutine is from 500 - 525. We added a few non operational commands (NOP) so that our program move subroutine could start at 530. To make it easy to enter, we are including a basic program you can run to load the machine language program. We call this program "UPPER". After it is run, then EXEC 500 to configure the computer for the 64K all ram mode. Then when you want to transfer a program to upper memory EXEC 530. Do this after the program is loaded of course. To see where you are operating do a peek of location 25. To go to the upper program POKE 25,224. Then enter RUN. To return to the normal location POKE 25, Original Value. You can then load in a second program. The upper program can be accessed at any time by doing the memory pokes as previously described.

```
10 ?"UPPER
20 ?"cOPYRIGHT (c) 1986
30 ?"dYNAMIC eLECTRONICS iNC.
40 'PGM 4-1-86
50 ?"THIS CONTAINS THE DATA
    THAT ALLOWS PROGRAMS TO BE
    TRANSFERRED TO UPPER MEMORY.
60 'READ THE DATA
70 FOR J= 500 TO 549
80 READ A: POKE J, A: NEXT J
90 ?"THE DATA IS READ.  THIS
   PROGRAM IS NO LONGER NEEDED.
95 'CONFIGURE THE COMPUTER FOR
    THE ALL RAM MODE
100 EXEC 500
110 ?"NOW LOAD YOUR PROGRAM AND
    EXEC 530 TO TRANSFER IT TO
    UPPER MEMORY.
120 X=PEEK(25):?"THE PEEK OF 25
    FOR THIS PROGRAM IS "X.  IF
    WE CALL THIS X THEN POKE 25
    ,X TO RETURN TO THIS
    PROGRAM."
130 ?"EXEC 530 TO TRANSFER A
     PROGRAM TO UPPER MEMORY.
140 '
150 'DATA FOLLOWS
160 DATA 26,80,142,128,0,166,132
170 DATA 183,255,223,167,128,183
```

```
180 DATA 255,222,140,255,0,38
190 DATA 241,183,255,223,28,175
200 DATA 57,18,18,18,18,127,224
210 DATA 0,158,25,16,142,224,1
220 DATA 166,128,167,160,16,140
230 DATA 253,232,35,246,57
```

+ + +

COMPUTER GRAPHICS
(PART 14)

GET & PUT

We have been looking at the various graphics commands. We have covered drawing lines, circles, boxes, rotating a drawing, and scalling. Suppose you have a figure on a portion of your screen that you would like to transfer or copy to another area of the screen. One way would be to move to the new area and redraw the figure. Another way would be to put all elements in the area containing the figure into an array. Then these elements could be placed in another portion of the video page to reproduce the figure. This is the method used by PUT and GET.

ARRAYS

An array contains ordered elements. It is established with a DIM statement. An array can be either one dimensional or two dimensional. The DIM statement should be near the beginning of the program. We will be using two dimensional arrays.

```
10 DIM A(29,39)
```

Array A contains 30 * 40 or 1200 elements. The number of elements required will depend upon the size of the figure we want to GET.

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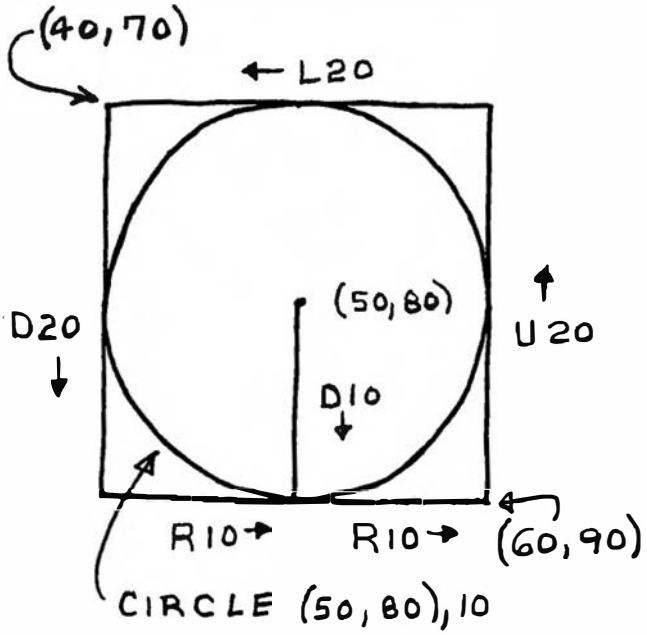


FIGURE 1

```
GET (X1,Y1)-(X2,Y2),A
```

The GET command is used to put the elements from the desired screen area into the array. This is easy to remember because it is very similar to the line command. The points defined by X1,Y1 and X2,Y2 are corners of a closed box containing the figure we want to get. The A in the command is the name of the dimensioned array. To calculate the number of elements needed for the array use the following:

```
X=X2-X1-1: Y=Y2-Y1-1: N=X * Y
```

Where X is the horizontallength, Y is the vertical length, and N is the number of elements in the array. The -1 in the X and Y equations is needed because location 0 contains elements.

USiNG ARRAYS

We will be using two dimensional arrays. You can think of an array as a chart where you list one item down the page and another item across the page. As an example suppose we want a monthly record of expenses. We will have 12 months in a year, and let's choose 20 items to record each month. Then we will have an array consisting of 12 * 20 or 240 elements. Suppose we want to look at the expense for the 9th month and the 15th expense item. Then this could be E(8,14). The DIM statement would be

```
10 DIM E(11,19)
```

Our values will go from E(0,0) to E(11,19).

GRAPHICS DEMO PROGRAM
USING GET & PUT

The following programs allows the object shown in Figure 1 to be moved over the screen by using the arrows on the keyboard. The figure is obtained by using the GET command. Comments are included to show what each section does.

```
  2 'PGM 4-3-86
  4 'cOPYRiGHT (c) 1986
  6  'dYNAMIC eLECTRONICS iNC.
 10 PRINT"THIS IS A GRAPHICS PGM
 15 'SET UP AN ARRAY
 20 DIM A(20,20)
 25 'SET UP GRAPHICS MODE
 30 PMODE 3,1:SCREEN1,0:PCLS
 35 DRAW A CIRCLE
 40 CIRCLE (50,80),10
 45 'DRAW A SQUARE AROUND THE
    BOX
 50 DRAW "BM50, 80D10R10U20
         L20D20R10
 70 'DEFINE THE CORNERS OF THE
    FIGURE
 60 X1=40:Y1=70:X2=60:Y2=90
 70 'PUT THE FIGURE INTO AN
    ARRAY
 80 GET (40,70)-(60,90),A
```

```
85 PUT THE FIGURE IN THE BOX
   DEFINED BY X1,Y1 AND X2,Y2
90 PUT (X1,Y1)-(X2,Y2),A
110 X$=INKEY$:IF X$=""THEN 110
115 'INCREASE X BY 20 IF RIGHT
    ARROW KEY IS PRESSED
120 IF X$=CHR$(9) THEN
    X1=X1+20:X2=X2+20
125 'DECREASE X BY 20 IF LEFT
    ARROW KEY IS PRESSED
130 IF X$=CHR$(8) THEN
    X1=X1-20:X2=X2-20
135 'INCRESE Y BY 20 IF UP
    ARROW IS PRESSED
140 IF X$=CHR$(10) THEN
    Y1=Y1+20:Y2=Y2+20
145 'DECREASE Y BY 20 IF DOWN
    ARROW IS PRESSED
150 IF X$=CHR$(94) THEN
    Y1=Y1-20:Y2=Y2-20
155 'CHECK FOR END OF SCREEN
160 IF X1<10 THEN X1=10:X2=30
    ELSE IF X2>255 THEN X2
    =250: X1=230
170 IF Y1<10 THEN Y1=5:Y2=25
    ELSE IF Y2>190 THEN
    Y2 = 190:Y1 = 170
175 'ERASE OLD GRAPHICS
180 PCLS
190 GO TO 90
```

+ + +

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. Send a description of new products to:

DEI, BOX 896, HARTSELLE, AL 35640

NEW CC MAGAZINE

Most of the magazines that cover the Tandy Color Computer have either merged with another magazine and taken the back seat or vanished all together. With more than a million color computers in service today, this lack of support material is a disturbing development for a great number of people. SPECTROGRAM Magazine wants to fill the void.

The magazine features the latest achievements in the world of the Color Computer; programs for business, self- improvement, home management, games, and utilities; reviews of both the new and the old products on the market; tutorials on programming in Assembly, C, Pascal, and of course, Basic; plus any material that may help readers in becoming better acquainted with their computer systems. The cover price for SPECTROGRAM magazine is $30 a year. The subscription price is $18 a year which is 40% off the cover price. Club discounts for 5 or more subscriptions are $15 a year. June 1986 will be the first edition. This will be printed around the first of May. For more information contact: SPECTOGRAM Magazine, P. O. Box 138, Rockfork, IL 61105.

GOLD PLUG 80

The GOLD PLUG 80 card edge connector for the TRS 80 Color Computer disk module eliminates the dreaded I/O error and directory bombs that are caused by oxidation of the tin/lead card edge connectors. The GOLD PLUG 80 solders to the existing connector. The GOLD PLUG 80 equipped module then plugs into the computer port and the disk drive cable. The GOLD PLUG 80 connectors do not oxidize so contact problems are eliminated. The cost of GOLD PLUG 80 for a disk drive or cartridge is $7.95. For more information contact: E.A.P. Company, P. O. Box 14, Keller, TX 76248.

****
* BACK ISSUES *
* Back issues of DCN are available for $1.95 each, 3 for $5, or 12 for $15 pp. *
* Foreigners other than Canada add $2 for Air Mail postage. *
****

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.

SCHEMATIC DRAFTING PROCESSOR

For those of us who work in electronics it is necessary to draw schematic drawing of our circuits. An ideal situation would be to draw the schematic on the computer's television screen and then make a hard copy of it on our printer. This is exactly what the Schematic Drafting Processor (SDP) from Spectrum Projects does. Also the completed drawing can be saved to a disk for later use.

SDP requires a 64K computer, disk drive and optional Epson, RS, or Gemini printer if a hard copy is desired. It has 6 overlapping screens to make a 480 x 540 pixel worksheet. Text can be printed on the schematic and each mode has a HELP file. SDP supports over 30 electronics symbols, up to 10 user definable symbols, logic gates, and multipin chips.

To run the program type RUN "SDP ENTER. The program will load and start running. You will be given the option of selecting a joystick or arrows. We tried both the joystick and the arrows and found the arrows easier to use. Then you have to select whether to load auxiliary symbols or not. If the standard symbols included with the program are sufficient then select N. Next you are asked if you want to load an old drawing. Again select N to do a new drawing.

We used a black and white television for this review. A dark screen appears with a small blinking cursor. The beginning point is marked so you can move the cursor in any direction. To draw a line just enter D which takes you to the draw mode and then press L for line. You can draw continuous lines by just using this command. This feature can be used to draw objects or large letters. Notice I drew my name in the figure. You can move to a different area with the arrows and press M. This marks the new beginning. This is like picking up your pencil and placing it down somewhere else.

Let's list the figures that can be drawn and the symbols for drawing them. Each is preceeded by a "D".

A- Antenna, B-Battery, C-Capacitor, D-Diode, E-Logic Gates, F-Fuse, G-Ground, H-SCR, I-Inductor, J-Junction, K-L.E.D., L-Line, M-Multipin Chips, N-Pushbutton, O-Op. Amp, P-Point, Q-square, R-resistor, S-Switch, T-Transistor, U-Crystal, V-Variable Resistor, W-AC plug, X-Transformer, Y-Circle, Z-Zener diode, .- FET, <- Mic., >-Connector, @- Dotted line, ,-Small circle with + sign, - - Small circle with - sign, /- Photo diode, :-Small line with arrow at end, 0-9 User defined symbols. In addition, standard buffer AND, OR, NAND, and NOR gates can be drawn up to 4 inputs.

There is an angle command that allows you to rotate the component in 90 degree increments. This allows components to be drawn up, down, left, or to the right.

If you made a mistake then you can use the erase command to eliminate the mistake. Just mark the corners of a box containing the errors and press the "E" key to erase everything within the

box.

There are six overlapping screens on which to do the drawing. To select the screen just type SN where N is a number from 1 to 6. If you run out of room on one screen just select the adjacent screen and continue.

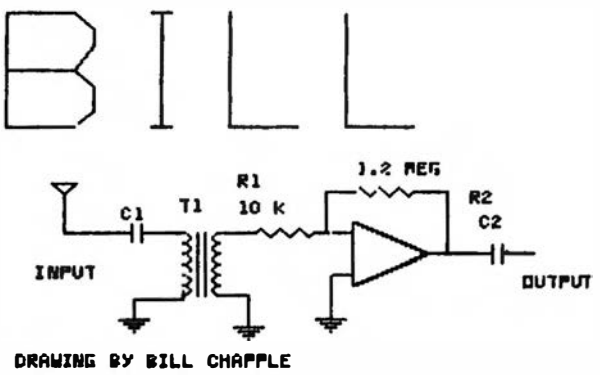
To label your components a text mode is included. It includes all of the letters and numbers in the alphabet, +-./@, the ohms symbol, the AC symbol and the space bar. The CLEAR key brings up a HELP file. In fact the CLEAR key brings up the HELP file for all of the Menus.

When you have finished or want to save what you have done then press the "Q" key. You can then save the drawing, dump the drawing to a graphics printer, or return to the drawing.

If you need a symbol that is not defined in the program, then you can define your own symbols. A sample program is given for defining symbols. We did not try defining symbols because the program symbols were adequate. These would be useful if you wanted to use the program for another drawing application such as drawing house plans.

We found the program to be superior in all aspects. The 6 overlapping graphics pages allow a drawing to made that will fill a standard 8 1/2 x 11 printer page. Also there are many other drawing applications for which the program could be used.

For more information contact Spectrum Projects, P. O. Box 21272, Woodhaven, NY 11421. $29.95 +$3 S/H.



DRAWING BY BILL CHAPPLE

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(Rate sheet 2 - March 1986)
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1/4	15	13	12

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* * * * * * * * ** * * * * * * * *
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LETTERS

Let me say thanks to those of you who have written notes and suggested subjects for us to cover. As a result of your inputs we will start a series on machine language programming. We will cover some computer architecture and show how machine language can be written by looking up codes and poking them into memory. Then we will expand and show how a simple assembler works. We can develop an assembler you can use and cover the operations in detail so you can use ours or someone elses. This may start as soon as next month so be watching.

You may have noticed that we use basic to call machine language subroutines. This makes a nice combination. Use basic for your control program and ML subroutines for speed. I know a very good programmer who shares this philosophy with me. We demonstrated in our RAMDISK program the power of using this technique.

I am trying to come up with some hardware projects that can be built without damaging the computer should something go wrong. We still need letters so write us and let us know of additional subjects you would like for us to cover. If you would like to call I am usually available at nights and on weekends.

The following is a letter from Neil Edge. Thank you Neil for your letter.

- EDITOR -

4/14/86

DEAR EDITOR,

HELLO. I AM ONE OF THE PROUD OWNER OF A COCO2, AND A SUBSCRIPTION TO YOUR NEWSLETTER. I LOVE COM!, AND HAVE RECOMENDED IT TO "COCO QUESTORS'

A COCO GAME CLUB I AM PART OF. NOW I WOULD LIKE TO RECOMEND IT TO ALL OF YOUR READERS. THE CLUB'S DUES ARE ONLY $2.00, AND A BIMOUNTHLY NEWSLETTER IS PUT OUT. IN ADDITION TO THE HINTS, AND TIPS ON PLAYING GAMES, THERE IS A PUBLIC DOMAIN LIBRARY. EVERY NEWSLETTER HAS AN UPDATE ON ALL OF THE NEW MEMBERS, WITH THEIR ADDRESSES SO YOU CAN SAY HELLO TO ALL OF THE LUCKY PEOPLE WHO CHOOSE "COCO QUESTORS". FOR MORE INFORMATION ON "COCO QUESTORS' YOU CAN WRITE TO SCOTT BELLMAN (PRESIDENT OF THE CLUB) AT:

COCO QUESTORS
2420 SALEM CT.
BETTENDORF, IA.
52722

THIS IS THE BEST OF MANY CLUBS I AM PART OF!

I HAVE OWNED MY COCO2 WITH CASSETTE RECORDER FOR ONLY 1 YEAR. FROM WHAT JOHN GORDON RIED SAID IN HIS LETTER TO YOU (NO OFFENSE PLEASE) HE MUST THINK THAT EVERYONE KNOWS JUST WHAT HE IS SAYING WHEN HE TALKS ABOUT EPROM VDG CHIPS! SO IF YOU USE HIS IDEAS MAY I SUGGEST EXPLAINING EVERY STEP YOU TAKE SO THE LESS EXPERIENCED COCOIST WILL UNDERSTAND ALSO.
I WOULD LIKE YOU TO COVER SOME THINGS THAT JOHN DID'NT MENTION. HERE ARE A FEW:

1. HOW ABOUT SOME USEFUL COMMANDS LIKE HOW TO TURN OFF THE BREAK KEY CLEAR KEY, RESET KEY, ECT.
2. AN EDITORIAL ON HOW TO PROGRAM IN ML(LIKE JOHN MENTIONED).
3. JOHN WANTED HARDWARE PROJECTS, ME TO, BUT SOME FOR THOSE OF US WHO HAVE'NT DONE ANY HARDWARE PROJECTS BEFORE. THE ONE YOU HAD IN THE OCT. 1985 ISSUE SAID NOT TO DO IF YOU ARE A BEGGINER.

THAT'S ALL FROM ME, AND NOW I WOULD LIKE TO GIVE THE READERS SOME HINTS.

1. FOR THOSE WHO HAVE A DMP-110 OR DMP-105 PRINTER, AND USE 'EWDUMP' FOR SCREEN DUMPS, THEN YOU CAN GET A FULL PAGE DUMP BY PUTTING THE PRINTER INTO ELONGATED MODE BEFORE LOADING UP 'EWDUMP'.
2. IF YOU HAVE A DMP-110, AND 'EWDUMP', THEN AFTER LOADING UP 'EWDUMP TYPE IN THE SPEED UP POKE (POKE 65495,0), AND SWITCH THE BAUD RATE IN BACK OF THE PRINTER TO 1200. THIS WILL MAKE THE PRINTER PRINT AT TWICE THE SPEED!!
3. HERE IS A NEAT LITTLE POKE THAT WILL CHANGE ALL TEXT CHARACTERS ON THE SCREEN TO LOW RESOLUTION GRAPHIC CHARACTERS. IF THERE IS A PROGRAM IN THE COMPUTERS MEMORY DON'T WORRY, IT WILL RIN JUST JUST FINE, BUT ANY TEXT WON'T LOOK THE SAME. THE POKE IS: POKE 359,128: TO CANCLE IT OUT TYPE IN: POKE 359,126.

WELL I HOPE THIS WILL HELP OUT SOMEONE.
THATS ALL FOR NOW.

SINCERELY YOURS,

Neil Edge

NEIL EDGE

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