

Dynamic Color News

Radio Shack Color Computer
Magazine

Aug 1988
Issue #52

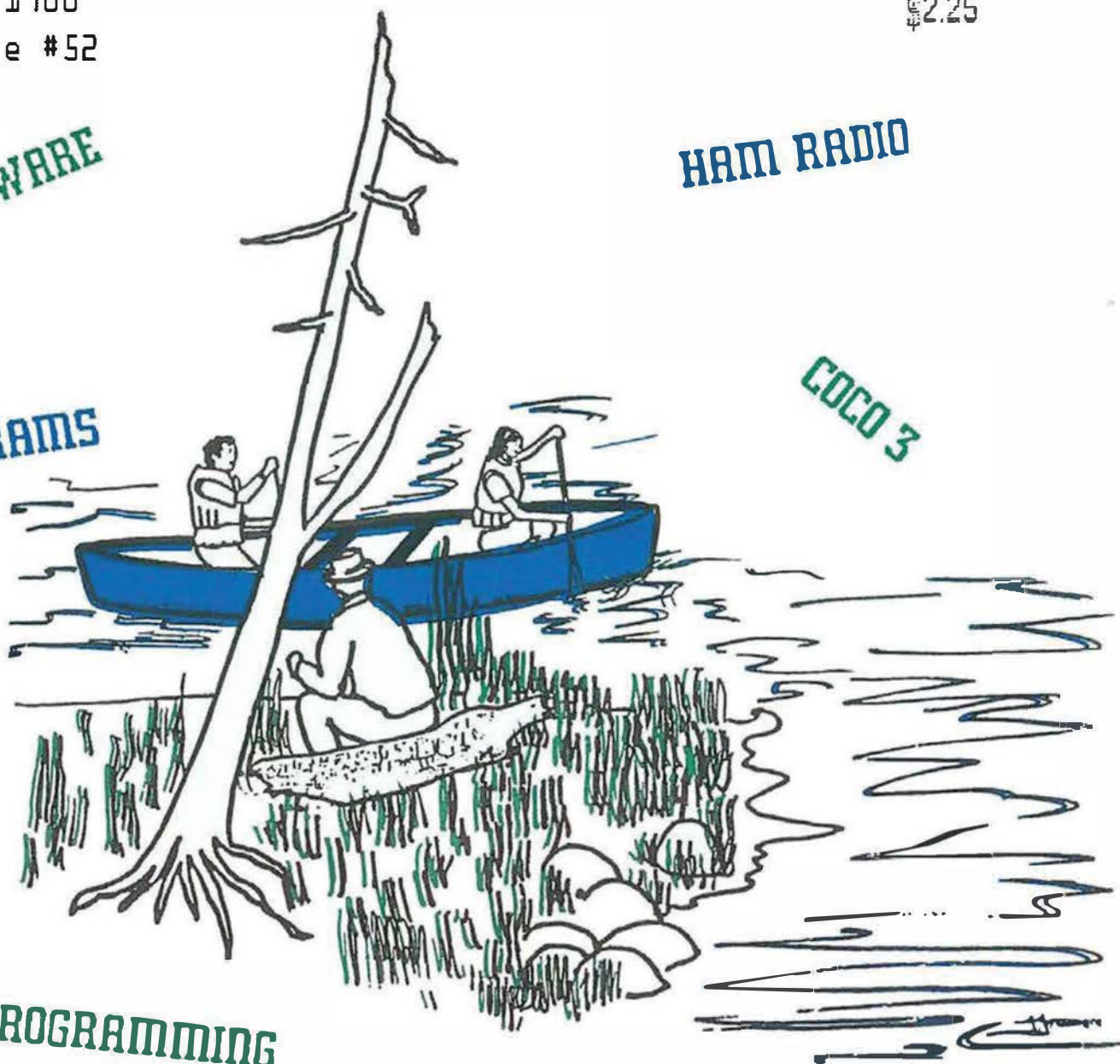
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HARDWARE

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COCO 3



BASIC PROGRAMMING

OS-9 & BASIC 09

Dynamic Color News Aug 1988

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

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

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

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

* Editor and Publisher *
* Bill Chapple W4GQC *
* *
* Secretary - Dean Chapple *
* Artist - Tamara Moore *
* Contributor - John Galus *
* Contributor - Norm Matice *

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# OS-9 Programs are included	
on DCN on DISK.	



CHANGE MAKER ROMAN NUMERALS DECIMALS-FRACTIONS

This is a collection of three programs all rolled into one. The first program, Change Maker, does just that. You enter in an amount between 1 cent and 99 cents and the computer draws and prints the correct coins needed to make the change. In the second program, Roman Numerals, you enter in a number and the correct Roman Numerals are displayed. In the third program, Decimal-Fraction Converter, you enter in a fraction and a decimal appears, or you can enter a decimal and the correct fraction appears.

This program is provided as a courtesy of T & D Subscription Software (See their advertisement on page 8) and is used by permission.

```
1 'A TRIO OF PROGRAMS (C) 1988
  FROM T&D SOFTWARE

      INCLUDES "CHANGE MAK
ER",      "ROMAN NUMERALS"
AND      "FRACTION-DECI
MAL CONVERTER" ALL WRITTEN
BY BILL BERNICO
2 DIMA$(89),Z(26)
3 CLS:PRINTTAB(6)" A TRIO OF PRO
GRAMS":FORX=1024TO1055:POKEX,
PEEK(X)-64:NEXT:PRINT@97,"1.)
CHANGE MAKER":PRINT@161,"2.)
ROMAN NUMERALS":PRINT@225,"3
.) FRACTION-DECIMAL CONVERTER
":PRINT@289,"4.) EXIT TO BASI
C":PRINT@355,"SELECT (1, 2, 3
```

```
OR 4)
4 S$=INKEY$:IFS$=""THEN4
5 S=VAL(S$):ON S GOTO 7,39,73,10
0
6 GOTO 4
7 CLS:PRINT"WHEN ASKED FOR THE A
MOUNT, YOU MUST ENTER A NUMB
ER BETWEEN ONE AND 99 (THE AM
OUNTS OF CENTS). THE COMPUTE
R WILL DISPLAY WHICH COINS GO
INTO MAKING UP THAT PARTI
CULAR AMOUNT.
8 PRINT@484,"HIT SPACEBAR TO TRY
IT";
9 IF INKEY$(<)CHR$(32)THEN 9
10 PMODE4,1:PCLS1:SCREEN1,1:COLO
RO,1:GOSUB34:DRAW"BM0,OR255D1
91U18NL255D18L255U191D18R255"
:DRAW"BM5,5":A$="INPUT AMOUNT
: ":GOSUB33:PLAY"O5T60CBC":G
OSUB24:C=VAL(B$):DRAW"BM143,5
"+A$(67)+"BL6NU2D11
11 Q=INT(C/25):D=INT((C-Q*25)/10
):N=INT((C-Q*25-D*10)/5):P=C-
Q*25-D*10-N*5
12 IFQ=0THEN15ELSEIFQ=3THENA$=ST
R$(Q)+" QUARTERS":DRAW"BM5,35
":GOSUB33:CIRCLE(128,39),15:C
IRCLE(178,39),15:CIRCLE(228,3
9),15:A$="25":DRAW"BM120,35":
GOSUB33:DRAW"BM170,35":GOSUB3
3:DRAW"BM220,35":GOSUB33
13 IFQ=2THENA$=STR$(Q)+" QUARTER
S":DRAW"BM5,35":GOSUB33:CIRCL
E(128,39),15:CIRCLE(178,39),1
5:A$="25":DRAW"BM120,35":GOSU
B33:DRAW"BM170,35":GOSUB33
14 IFQ=1THENA$="1 QUARTER":DRAW"
BM12,35":GOSUB33:CIRCLE(128,3
9),15:A$="25":DRAW"BM120,35":
GOSUB33
```

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15 IFD=0THEN17ELSEIFD=2THENAS$=STR$(D)+" DIMES":DRAW"BM12,70":GOSUB33:CIRCLE(128,76),10:CIRCLE(178,76),10:AS$="10":DRAW"BM121,72":GOSUB33:DRAW"BM171,72":GOSUB33
16 IFD=1THENAS$="1 DIME":DRAW"BM12,70":GOSUB33:CIRCLE(128,76),10:AS$="10":DRAW"BM121,72":GOSUB33
17 IFN=0THEN18ELSEAS$="1 NICKEL":DRAW"BM12,105":GOSUB33:CIRCLE(128,107),13:DRAW"BM125,103"+AS$(53)
18 IFP=4THENAS$=STR$(P)+" PENNIES":DRAW"BM5,140":GOSUB33:CIRCLE(120,145),12:CIRCLE(157,145),12:CIRCLE(194,145),12:CIRCLE(231,145),12:FORX=117TO228STEP37:DRAW"BM=X,,141"+AS$(49):NEXT
19 IFP=3THENAS$=STR$(P)+" PENNIES":DRAW"BM5,140":GOSUB33:CIRCLE(120,145),12:CIRCLE(157,145),12:CIRCLE(194,145),12:FORX=117TO191STEP37:DRAW"BM=X,,141"+AS$(49):NEXT
20 IFP=2THENAS$=STR$(P)+" PENNIES":DRAW"BM5,140":GOSUB33:CIRCLE(120,145),12:CIRCLE(157,145),12:DRAW"BM117,141"+AS$(49)+"BM154,141"+AS$(49)
21 IFP=1THENAS$="1 PENNY":DRAW"BM12,140":GOSUB33:CIRCLE(120,145),12:DRAW"BM117,141"+AS$(49)
22 AS$="TRY AGAIN ? (Y/N)":DRAW"BM50,178":GOSUB33
23 Q$=INKEY$:IFQ$="Y"THEN10ELSEIFQ$="N"THEN3ELSE23
24 C$="" : B$="" : B=0
25 C=PEEK(189)*256+PEEK(190):D=PEEK(191)*256+PEEK(192):C=C+3:DRAW"BM=C,,=D;"
26 D$=CHR$(13)+CHR$(8)+CHR$(32)
27 C$=INKEY$:IFC$=""THEN27ELSEIFINSTR(D$,C$)THEN30
28 IFC$("&ORC$)"Z"THEN27ELSEB$=B$+C$:B=B+1:AS$=C$:GOSUB33
29 IFLEN(B$)=2THENRETURNELSE27
30 IFC$=CHR$(13)THENRETURN
31 IFC$=CHR$(32)THENB$=B$+CHR$(32):B=B+1:AS$=C$:GOSUB33:GOTO27
32 IFB)OTHENE$=B$:B$=LEFT$(B$,LEN(B$)-1):B=B-1:AS$=E$:DRAW"C1BM=C,,=D;":GOSUB33:DRAW"COBM=C,,=D;":IFB$=""THEN27ELSEAS$=B$:GOSUB33:GOTO27
33 E=LEN(A$):FORF=1TOE:H=ASC(MID$(A$,F,1)):DRAWAS$(H):NEXTF:RETURN
34 A$(32)="BR6":A$(40)="BR2G2D4F2BU8BR4":A$(41)="F2D4G2BU8BR6":A$(47)="BR6DG6DBU8BR10
35 A$(48)="BRNR4GD6FR4EU6BU8BR3":A$(49)="BD2E2D8L2R4BU8BR3":A$(50)="BDER4FDG6R6BU8BR3":A$(51)="BDER4FD2GNL2FD2GL4HBU7BR9":A$(52)="BD5NR6E5ND8BR4":A$(53)="BD7FR4EU2HL5U4R6BR3":A$(54)="BD4R5FD2GL4HU6ER4NFBR3":A$(55)="BD8BRUE5U2NL6BR3
36 A$(56)="BRNR4GD2FNR4GD2FR4EU2HEU2HBR4":A$(57)="BD7FR4EU6D3L5HU2ER4BR4":A$(58)="BD3RGRBD2LDRBU7BR3":A$(63)="BDER4FDG3BD2NDBU8BR6":A$(65)="BR3G3DND4R6D4U5H3BR6":A$(67)="BR5NFL4GD6FR4EBU7BR3":A$(68)="RD8LR5EU6HL4BR8":A$(69)="D8NR6U4NR5U4R6BR3
37 A$(71)="BR5NFL4GD6FR4EU2L2BU5BR5":A$(73)="R2D8L2R4L2U8R2BR3":A$(75)="D8U4R2NF4E4BR3":A$(76)="D8R6BU8BR3":A$(77)="ND8F3E3ND8BR3":A$(78)="ND8DF6DU8BR3":A$(79)=A$(48)
38 A$(80)="NR5D8U4R5EU2HBR4":A$(81)="BR5L4GD6FR3EF2H4F2EU5HBR4":A$(82)="NR5D8U4R2NF4R3EU2HBR4":A$(83)="BR5NFL4GD2FR4FD2GL4HBU7BR9":A$(84)="R6L3ND8BR6":A$(85)="D7FR4EU7BR3":A$(89)="D2F3ND3E3U2BR3":RETURN
39 'ROMAN NUMERALS
40 GOSUB65:PMODE4,1:SCREEN1,1:COLOR0,1
41 PCLS1:SOUND191,1:W=1:U=100000:0:T=900000:S=500000:DRAW"BM65,2ND8DF6DU8BR3D7FR4EU7BR3ND8F3E3ND8BR3R5FD2GNL4FD2GL5RU8BR8D8NR6U4NR5U4R6BR3NR5D8U4R2NF4R3EU2HBR4BR2BD3RGRBD2LDRBU7BR9":GOSUB57:R=VAL(B$):IFR<10RR)999999THEN41ELSEFORX=0TO20STEP4
42 IFR)=(U/W)THENZ(2+X)=INT(R/(U/W)):R=R-(Z(2+X)*U/W)
43 IFR)=(T/W)THENZ(3+X)=9:R=R-(T/W)
44 IFR)=(S/W)THENZ(4+X)=INT(R/(S/W)):R=R-(Z(4+X)*(S/W))
45 W=W*10:NEXTX:Z(26)=R:E$="" : F$="CMCDXCXL MXMVC MCDXCXL IXIV*I":FORX=1TO26:FORW=1TOZ(X)

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46 IFZ(X)=0THEN50
47 IFZ(X)=9THENQ=0:GOTO56
48 IFZ(X)=4THENQ=1:GOTO56
49 E$=E$+MID$(F$,X,1):NEXTW
50 Z(X)=0:NEXTX:SOUND150,1:DRAW"
  BM45,65":A$=B$+"":GOSUB64:D
  RAWA$(73)+"ND8DF6DU8BR12NR5D8
  U4R2NF4R3EU2HBR9L4GD6FR4EU6HB
  R4ND8F3E3ND8BR6G3DND4R6D4U5H3
  BR6ND8DF6DU8BR9BD2NR6BD2R6BU4
  BR9":A$=E$:DRAW"BM5,110":GOSU
  B64
51 A$="1.) TRY AGAIN 2.) GO T
  O MENU":DRAW"BM10,175":GOSUB6
  4
52 I$=INKEY$:IFI$=""THEN52
53 IFI$="1"THEN 41
54 IFI$="2"THEN 3
55 GOTO 52
56 E$=E$+MID$(F$,X-(2+Q),2):GOTO
  50
57 C$="" : B$="" : V=0 : I=PEEK(189)*2
  56+PEEK(190) : M=PEEK(191)*256+
  PEEK(192) : I=I+9 : D$=CHR$(13)+C
  HR$(8)+CHR$(32)
58 C$=INKEY$:IFC$=""THEN58ELSEIF
  INSTR(D$,C$)THEN60
59 IFC$("&ORC$)"Z"THEN58ELSEB$=
  B$+C$:V=V+1:A$=C$:GOSUB64:GOT
  O58
60 IFC$=CHR$(13)THENRETURN
61 IFC$=CHR$(32)THENB$=B$+CHR$(3
  2):V=V+1:A$=C$:GOSUB64:GOTO58
62 IFV)0THENE$=B$:B$=LEFT$(B$,LE
  N(B$)-1):V=V-1:A$=E$:DRAW"C1B
  M=I; ,=M; ":GOSUB64:DRAW"COBM=I
  ; ,=M; ":IFB$=""THEN58ELSEA$=B$
  :GOSUB64:GOTO58
63 IFV=0THEN58ELSERETURN
64 E=LEN(A$):FORF=1TOE:H=ASC(MID
  $(A$,F,1)):DRAWA$(H):NEXTF:RE
  TURN
65 A$(32)="BR6":A$(48)="BRNR4GD6
  NE6FR4EU6BUBR3":A$(49)="BD2E2
  D8L2R4BU8BR3":A$(50)="BDER4FD
  G6R6BU8BR3":A$(51)="BDER4FD2G
  NL2FD2GL4HBU7BR9":A$(52)="BD5
  NR6E5ND8BR4":A$(53)="BD7FR4EU
  2HL5U4R6BR3":A$(54)="BD4R5FD2
  GL4HU6ER4NFBR3":A$(55)="BD8BR
  UE5U2NL6BR3
66 A$(56)="BRNR4GD2FNR4GD2FR4EU2
  HEU2HBR4":A$(57)="BD7FR4EU6D3
  L5HU2ER4BR4":A$(67)="BR5NFL4G
  D6FR4EBU7BR3":A$(68)="RD8LR5E
  U6HL4BR8":A$(73)="R2D8L2R4L2U
  8R2BR3":A$(76)="D8R6BU8BR3":A
  $(77)="ND8F3E3ND8BR3":A$(86)=
  "D5F3E3U5BR3":A$(88)="DF6NDH3
  G3NDE6UBR3
67 A$(61)="BD2NR6BD2R6BU4BR3
68 A$(32)="BR6":A$(36)="BR3D9UL2
  NHR4EUH2L2H2ER4FBU2BR4":A$(45
  )="BD5R6BU5BR4":A$(46)="BD7RG
  RBU8BR4":A$(48)="NR4GD6FR4EU6
  HBR4":A$(49)="BD2E2D8L2R4BU8B
  R3":A$(50)="BDER4FDG6R6BU8BR3
  ":A$(51)="BDER4FD2GNL2FD2GL4H
  BU7BR9
69 A$(52)="BD5NR6E5ND8BR4":A$(53
  )="BD7FR4EU2HL5U4R6BR3":A$(54
  )="BD4R5FD2GL4HU6ER4NFBR4":A$
  (55)="BD8BRUE5U2NL6BR3":A$(56
  )="BRNR4GD2FNR4GD2FR4EU2HEU2H
  BR4":A$(57)="BD7FR4EU6NHD3L5H
  U2ER4BR4":A$(63)="BDER4FDG4BD
  2NDBU8BR6":A$(65)="BR3G3DND4R
  6D4U5H3BR6
70 A$(66)="R5FD2GNL4FD2GL5RU8BR8
  ":A$(67)="BR5NFL4GD6FR4EBU7BR
  3":A$(68)="RD8LR5EU6HL4BR8":A
  $(69)="D8NR6U4NR5U4R6BR3":A$(
  70)="D8U4NR5U4R6BR3":A$(71)="
  BR5NFL4GD6FR4EU2L2BU5BR5":A$(
  72)="D8U4R6D4U8BR3":A$(73)="R
  2D8L2R4L2U8R2BR3":A$(76)="D8R
  6BU8BR3
71 A$(77)="ND8F3E3ND8BR3":A$(78)
  ="ND8DF6DU8BR3":A$(79)="BR5L4
  GD6FR4EU6HBR4":A$(82)="NR5D8U
  4R2NF4R3EU2HBR4":A$(83)="BR5N
  FL4GD2FR4FD2GL4HBU7BR9":A$(84
  )="R6L3ND8BR6":A$(85)="D7FR4E
  U7BR3":A$(86)="D5F3E3U5BR3":A
  $(87)="D8E3F3U8BR3":A$(89)="D
  2F3ND3E3U2BR
72 RETURN
73 PMODE4,1:PCLS1:SCREEN1,1:COLO
  RO,1:A$(61)="BD2NR6BD2R6BU4BR
  3
74 A$(32)="BR6":A$(36)="BR3D9UL2
  NHR4EUH2L2H2ER4FBU2BR4":A$(45
  )="BD5R6BU5BR4":A$(46)="BD7RG
  RBU8BR4":A$(48)="NR4GD6FR4EU6
  HBR4":A$(49)="BD2E2D8L2R4BU8B
  R3":A$(50)="BDER4FDG6R6BU8BR3
  ":A$(51)="BDER4FD2GNL2FD2GL4H
  BU7BR9
75 A$(52)="BD5NR6E5ND8BR4":A$(53
  )="BD7FR4EU2HL5U4R6BR3":A$(54
  )="BD4R5FD2GL4HU6ER4NFBR4":A$
  (55)="BD8BRUE5U2NL6BR3":A$(56
  )="BRNR4GD2FNR4GD2FR4EU2HEU2H
  BR4":A$(57)="BD7FR4EU6NHD3L5H
  
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U2ER4BR4": A$(63)="BDER4FDG4BD
2NDBU8BR6": A$(65)="BR3G3DND4R
6D4U5H3BR6
76 A$(66)="R5FD2GNL4FD2GL5RU8BR8
": A$(67)="BR5NFL4GD6FR4EBU7BR
3": A$(68)="RD8LR5EU6HL4BR8": A
$(69)="D8NR6U4NR5U4R6BR3": A$(
70)="D8U4NR5U4R6BR3": A$(71)="
BR5NFL4GD6FR4EU2L2BU5BR5": A$(
72)="D8U4R6D4U8BR3": A$(73)="R
2D8L2R4L2U8R2BR3": A$(76)="D8R
6BU8BR3
77 A$(77)="ND8F3E3ND8BR3": A$(78)
="ND8DF6DU8BR3": A$(79)="BR5L4
GD6FR4EU6HBR4": A$(82)="NR5D8U
4R2NF4R3EU2HBR4": A$(83)="BR5N
FL4GD2FR4FD2GL4HBU7BR9": A$(84
)="R6L3ND8BR6": A$(85)="D7FR4E
U7BR3": A$(86)="D5F3E3U5BR3": A
$(87)="D8E3F3U8BR3": A$(89)="D
2F3ND3E3U2BR
78 PCLS1: DRAW"BM0, OR255D191L255U
191BF5R245D6OL245NU6OBD5R245D
115L245U115": POKE178, 2: PAINT(
3, 3), , 0: POKE178, 0: A$="DECIMAL
-FRACTION CONVERTER": DRAW"BM1
5, 25": GOSUB97: A$="BY BILL BER
NICO": DRAW"BM65, 40": GOSUB97: F
ORX=1TO1500: NEXT
79 A$="CONVERT WHICH?": DRAW"BM70
, 80": GOSUB97: A$="1. FRACTIONS
TO DECIMALS": DRAW"BM30, 100":
GOSUB97: A$="2. DECIMALS TO FR
ACTIONS": DRAW"BM30, 118": GOSUB
97: A$="3. GO TO MENU": DRAW"BM
30, 136": GOSUB97: A$="HIT 1 2 O
R 3 ": DRAW"BM75, 165": GOSUB97
80 I$=INKEY$: IFI$="1"THEN81ELSEI
FI$="2"THEN83ELSEIFI$="3"THEN
3ELSE80
81 PCLS1: LINE(0, 0)-(255, 191), PSE
T, B: DRAW"BM5, 5": A$="ENTER NUM
ERATOR ": GOSUB97: GOSUB89
: K$=B$: DRAW"BM5, 20": A$="ENTER
DENOMINATOR ": GOSUB97: GOSU
B89: V$=B$: K=VAL(K$): V=VAL(V$)
: A$=STR$(K): DRAW"BM38, 84": GOS
UB97
82 A$=STR$(V): DRAW"BM38, 100": GOS
UB97: DRAW"BM40, 97R20BR8BU2": A
$=" = "+STR$(K/V): GOSUB97: GOS
UB98: GOTO78
83 PCLS1: LINE(0, 0)-(255, 191), PSE
T, B: A$="ENTER DECIMAL NUMBER
": DRAW"BM10, 5": GOSUB97: GOSUB
89: Z$=B$: Z=VAL(Z$)
84 IFZ=INT(Z)THENA$="NUMBER MUST
INCLUDE DECIMAL ": DRAW"BM5, 40
": GOSUB97: FORX=1TO2000: NEXT: G
OTO83
85 G=5: FORQ=1TOG: X(Q)=INT(Z+.000
1)
86 IFABS(X(Q)-Z)<.00001THENG=Q: G
OTO88
87 Z=1/(Z-X(Q)): NEXTQ
88 FORQ=2TOG-1: NEXTQ: F=X(G): W=1:
FORB=G-1TO1STEP-1: Q=F: F=X(B)*
F+W: W=Q: NEXTB: A$=STR$(F): DRAW
"BM30, 80": GOSUB97: A$=STR$(W):
DRAW"BM30, 92": GOSUB97: DRAW"BM
32, 90R30BR8BU2": A$=" = "+STR$
(F/W): GOSUB97: GOSUB98: GOTO78
89 C$="": B$="": V=0
90 I=PEEK(189)*256+PEEK(190): M=P
EEK(191)*256+PEEK(192): I=I+6:
D$=CHR$(13)+CHR$(8)+CHR$(32)
91 C$=INKEY$: IFC$=""THEN91ELSEIF
INSTR(D$, C$)THEN93
92 IFC$<" "ORC$>"z"THEN91ELSEB$=
B$+C$: V=V+1: A$=C$: GOSUB97: GOT
O91
93 IFC$=CHR$(13)THENRETURN
94 IFC$=CHR$(32)THENB$=B$+CHR$(3
2): V=V+1: A$=C$: GOSUB97: GOTO91
95 IFV>0THENE$=B$: B$=LEFT$(B$, LE
N(B$)-1): V=V-1: A$=E$: DRAW"C1B
M=I; , =M; ": GOSUB97: DRAW"COBM=I
; , =M; ": IFB$=""THEN91ELSEA$=B$
: GOSUB97: GOTO91
96 IFV=0THEN91ELSERETURN
97 E=LEN(A$): FORT=1TOE: H=ASC(MID
$(A$, T, 1)): DRAWA$(H): EXEC4334
5: NEXTT: RETURN
98 LINE(0, 165)-(255, 191), PSET, BF
: A$="HIT ENTER TO CONTINUE": D
RAW"BM37, 175C1": GOSUB97: DRAW"
CO
99 IFINKEY$<>CHR$(13)THEN99ELSER
ETURN
100 CLS: END

```

BACK ISSUES

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COCO III

Part 1

By
John Galus

De Re CoCo III in Latin means "all about the CoCo III" and that is what this series is going to deal with. We will be examining many of the new features of the Color Computer III in Basic and Assembly language. First let's look a little history of the Color Computer in general. When the Color Computer first hit the scene about 8 years ago it was a 4K cassette based computer often called the "D" model. This model "D" computer was upgraded to 32K by "piggybacking" two sets of 16K chips on the motherboard. If you had 32K then you were considered to have a lot of memory in those days. The computer's "brain" was the trusty 6809 micro-processor that we still use today. Extended Basic was available but it was quite expensive. Incidentally, this was the Color Computer that I broke my teeth on, and as I remember it cost me about \$500 for a 16K non-Extended Basic version that broke down every few months. This was due to a poorly designed power supply which since has been fixed. There were also several different versions of the Basic ROM's that were introduced.

A few years later, Tandy introduced a new version of the COCO with a redesigned power supply and Extended Color Basic as standard part of the system. This was called the "F" board

series and was the first board that could be expanded to 64K just by replacing the memory chips. The price of this version was more reasonable and disk drives were beginning to become popular although, they were priced a little steep.

After this version of the computer was around for a while, there were many rumours of a new enhanced Color Computer that was about to be released which was the COCO II. This computer had a new look and keyboard but, essentially was the same computer as the older "F" version.

Then lo and behold a few years ago Tandy introduced the new COCO III, much to the delight and relief of Color Computer buffs. This computer was a great improvement over the old Color Computer. Now we had high-resolution 640x192 graphic modes and modes that could display 16 colors at once from a possible 64 colors, Error and Break key trapping, a 40 or 80 column display with lower case, special characters, underlining and blinking characters. Not only that but the new computer had the capacity to be upgraded to 512K!

Also, the keyboard has been altered. The arrow keys have been moved to the far right of the keyboard and four control keys have been added. This keyboard is quite an improvement over the

old "calculator" type keyboard. But, the best thing of all, thanks to the people at Tandy, was the Color Computer's capacity to run almost all of the old COCO software. While most companies was scraping their lower end computers and going to high priced, complex systems, Tandy expanded the Color Computer and did not destroyed it. With the lower priced Disk Drives on the market today you can obtain a nice system for under \$400.

That's enough about history. let's continue with our discussion on this latest computer. At first look, the Color Computer III appears to be the same as its predecessors. Don't be fooled. Although this computer can simulate the old color computer, inside it is quite a different machine. The COCO III still uses the 6809 as its brain but, it uses a faster version of this chip that can handle the high speed poke. This version is called the 68B09 chip. To obtain this high speed mode POKE 65497,0 and to turn it off POKE 65496,0. This high speed mode will not function properly using Disk or Cassette I/O due to the timing.

There is also, another chip that manages the memory and new graphic features. This chip is called the GIME chip. This computer has the capacity to use an analog RGB monitor to display its screen. The COCO III is essentially a 128K computer and can excess 64K of memory at any one time. This is due to the fact that the computer uses the 6809 processor which is an eight bit chip that can only address 64K of memory at one time. The computer uses the MMU (Memory Management Unit) in the new GIME chip to "switch" banks of memory in and out of use. On startup, the computer is placed in an all "RAM" mode. We will examine this in more detail in a later part of this series. Microware has provided COCO III owners with a new powerful Super Extended

Basic that controls all of the new commands. One thing good about the new computer is that memory used for Basic programs is no longer used for the new high-resolution graphic modes. This screen is placed in the top half of the 128K memory. Also the HGET & HPUT commands use the extra memory for its function. Here is a list of the new Super Extended Basic commands with there addresses in memory.

SUPER EXTENDED BASIC:

COMMAND:	ADDRESS:
WIDTH	\$F636
PALETTE	\$E5F0
HSCREEN	\$E688
LPOKE	\$E545
HCLS	\$E6CF
HCOLOR	\$E6F4
HPAINT	\$EBF5
HCIRCLE	\$EA49
HLINE	\$E882
HGET	\$EDE5
HPUT	\$EDED
HBUFF	\$ED58
HPRINT	\$EF3F
ERR	\$E3D4
BRK	\$E3E6
LOCATE	\$F8D2
HSTAT	\$F925
HSET	\$E761
HRESET	\$E765
HDRAW	\$F39D
CMP	\$E676
RGB	\$E674
ATTR	\$F9B9
LPEEK	\$E573
BUTTON	\$E5B1
HPOINT	\$E85C
ERNO	\$E4E9

As you might have noticed the new Extended commands are located in the area above the area used for Disk starting at \$E000. We will be looking at some of these new commands in detail later. For now see if you can disassemble some of these routines from the list above and figure out how they work. Good luck and stay tuned to Dynamic Color News for more information.



This month we will cover the rename, copy and delete commands. These commands will allow you to move your files around on a disk, so that your disk is setup to best serve you. We will also cover overlay windows as was promised last month.

To manipulate files we first have to have a file. Let us create a text file for the purpose of moving. To do this we will use the BUILD command that we had covered earlier. For our file we will use a list of the current top five movies (at the time of this writing). Let us call our list, list.

```
OS-9:BUILD list
? CROCODILE DUNDEE II
? BIG
? BIG BUSINESS
? RAMBO III
? WILLOW
?
```

If we now do a DIR command we will find our file in the root directory. We used lower case letters for the filename. As you remember, by convention we use capital letters to denote directories. Now there is nothing wrong with leaving our file in the root directory, but if we create a lot of files it won't take long for the root directory to get crowded. It would be better to make a directory to put our file in. Suppose we wanted to keep track of the top five movies every week. If we

made a directory called MOVIES we could then put our files in that directory. When we asked for the directory of the root only MOVIES would show up to indicate that we are keeping those files rather than each filename for each week.

We covered the MAKDIR command earlier and now we will have a chance to exercise it.

MAKDIR MOVIES

We now have an empty directory that we can fill with our files. We are only limited by disk space. The next thing for us to do is move our file to our new directory. This is where the COPY command enters the picture. The COPY command will expect us to provide it with a complete pathlist, for both the file we are going to copy and the file it is going to be copied to. Let's try copying our movie list into our MOVIES directory. One thing to note in our copying is that we have an opportunity to rename our file in the process. We will give this a try, but we could just as easily keep the same name if we so desired.

```
COPY /D0/list /D0/MOVIES/top5
```

Okay, the file has been moved into our new directory. To complete our housekeeping we ought to get rid of the file list in the root directory. Doing this will involve the use of the DEL

command. All it needs is the name of the file to be deleted and a pathlist to that file. In the case of our example, the pathlist is optional, because the file we wish to delete is in the root directory.

DEL list

A quick DIR command will reveal that our list file has indeed faded from existence. The whole idea behind our creating the MOVIES directory was because we were going to add a list weekly. If we do this, maybe using the name top5 for our file wasn't such a good idea. A better scheme would be to label each week with a different number, starting logically enough with week 1.

This means that we will need to rename our file again. This time we are not moving from one directory to another, so we will have to use the RENAME command. Enter the following command line.

```
RENAME /DO/MOVIES/top5 week1
```

Because we defined the pathlist getting to the file top5 we don't need to repeat it for week1. If you do a DIR you will find that top5 has been renamed.

The last thing we will do is clean up after ourselves. Since this was an example, there is no good reason for it to continue to remain on your system disk where space is at a premium. Let us first delete the file and then the directory. Enter the next two lines, one at time.

```
DEL /DO/MOVIES/week1  
DELDIR /DO/MOVIES
```

This will clean up the disk. At this point we will leave the folks with level I to practice and those of us with level II will move on to opening overlay windows.

To open an overlay window we will be using the display command again. There are a few rules to follow when using overlay windows. The first consideration is whether you want to save the information under your overlay or not. The saving of that information of course has a price which is memory. The overlay window must be the same type as the device window under it. That means that if our device window (what we usually refer to as just window) is a text window, then the overlay window must also be a text window. The overlay window can be the same size or smaller than the device window. It can not in any way overlap outside the area of the device window it is opened on.

One last note before we start. Page 3-24 of the windows section of your OS-9 manual covers overlay windows. There is a mistake as to the order of specifying the foreground and background colors. The first color chosen is the foreground and the second is the background. The book has them in reverse order.

Now lets go to a device window and try to open an overlay window on it. Remember we are using the DISPLAY command therefore all our numbers must be hexadecimal. Following is the window I'll be using to open overlays on:

```
INIZ /W6  
DISPLAY 1B 20 7 0 0 50 18 0 1 1  
>/W6  
SHELL i=/W6&
```

If you would rather open your own window and experiment, feel free. Now we will write the command to open our first overlay.

```
DISPLAY 1B 22 1 0 0 50 10 5 1
```

This should create an overlay window as wide as the device window and about half as long,

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starting at position 0,0. That is what the numbers 0 (xstart) 0 (ystart) 50 (xwidth) 10 (ylength) represent. The 1B 22 indicates to the display command that we are opening an overlay window. The first 1 tells OS-9 we wish to save the information under our overlay window. If we had put a 0 in this position we would have overwritten our device window. The 5 indicates the foreground color and the 1 specifies the background color.

One thing you might have noticed is that the shell followed us into the overlay window. At this point we can open an overlay window on our overlay window. Let's start this one someplace other than the upper left corner and let's not save the screen underneath it. First do DIR command so we can see that the information underneath is not saved then type in the following command:

```
DISPLAY 1B 22 0 5 5 28 5 0 1
```

Now do another DIR and you can watch as the new overlay window overwrites our first overlay window. Again the shell followed us when we moved, so we can still enter commands. The last thing we will worry about is shutting the overlay windows down. This is done with the DISPLAY command again. Type the following command.

```
DISPLAY 1B 23
```

This shut the top overlay window off. That in turn dropped us back into the overlay window under it. If we repeat that command again, either by retyping it or pressing CTRL-A, we will be set back into our device window. Notice when we get back to the device window everything in it has been saved.

That should be enough to digest for this month.

BASIC 09

Last month we looked at one of the two new types of loops available to us in BASIC09. This month we will cover the other new loop, the WHILE/DO/ENDWHILE loop. Of course BASIC09 also has the FOR/NEXT/STEP loop, which is identical to the one in Color BASIC.

The WHILE/DO/ENDWHILE does what the code between the DO and the ENDWHILE dictates as long as the expression between the WHILE and the DO is true. The programming example below demonstrates this. The program is a simple guess the number game. While the guess does not match the selected number the program will loop between DO and ENDWHILE. Therefore the program continues to ask for a new guess until the right number is guessed. Once the condition for the expression to be true is met, then the program breaks out of the loop and continues on its way.

We could have accomplished the same thing with an IF/THEN statement and a couple of GOTO STATEMENTS such as follows.

```
10 INPUT "What is your guess?"
   IF A=B THEN GOTO 20 ELSE
GOTO 10
20 PRINT "You are right!"
```

In Color BASIC there would be no easy way around using the GOTOS to accomplish our goal, but with BASIC09 we have no problem eliminating the GOTO and thereby eliminating the prerequisite line numbers. Why are we so persistent in writing programs without line numbers? One reason would be that line numbers take up space in memory. As I pointed out last month GOTOS also make the program logic a little harder to follow, with the jumping all over the place. If possible it will benefit us

to keep these things to a minimum.

We have one more new feature to discuss involving the program example. The first line of our program has a DIM statement in it. What this command allows us to do is assign a type to our variables. If you will remember last month's program, the 4-function calculator, we did not declare the variables type. We were able to get away with this because BASIC09 treated the undeclared variables as real numbers. This was evident by integer answers to problems being followed by the decimal point. In creating a calculator we would have declared the variables as real so it didn't cost us anything to let them fall into it by default.

In the case of the GUESS program, it would be a disaster to allow the variables to be real. The random number generator takes it to heart if it is told it is working with a real variable. It will generate a real random number. Try this short program.

```
A=RND(10)
PRINT A
```

This should produce a random number that will have a fractional part to it. This would not be very good for a guessing game, because it increases the set of numbers from a finite set (such as twenty) to an infinite number of possibilities.

At one point in the program we see the B (guessed) variable being set to 0. We do this because BASIC09 does not automatically set all the variables to 0 at the start of the program as Color BASIC does. It is conceivable that the B location could have the selected number in it before we broke into the WHILE/DO/ENDWHILE loop. Therefore we make sure it has a number that will not end the loop before the

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

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first guess.

This month we also have a nested IF/THEN/ELSE loop. Although it looks fairly normal in the listing below, when you list it after entering it in BASIC09, you will see that the compiler will indent it, making it easy to see in that listing. You might also notice the two ENDIF commands that are sitting together. Both are necessary for the program to work. The compiler pairs the first one with the inner most loop and the second one with the outside loop. These give the program the ability to notify the guesser of how there are doing.

Type in the program below and experiment with it. Next month we'll try to forge ahead with more.

PROCEDURE GUESS

```
DIM A,B:INTEGER
SHELL "DISPLAY C"
PRINT "I am thinking of a number
      between 1 and 20."
PRINT "Can you guess that number?"
A=RND(20)
B=0
WHILE B(<>)A DO
INPUT "What is your guess?",B
IF A>B THEN
PRINT"Your guess is low."
ELSE
IF A<B THEN
PRINT"Your guess is high."
ENDIF
ENDIF
ENDWHILE
PRINT "You are right!"
```

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.



CoCo 3 Screen Saving

by
Andrew Bartels

Now that the CoCo 3 has been out for awhile, we see many quite ingenious methods of saving the HSCREENs. But there is one thing most lack...compatibility with BASIC. Most of the CoCo 3 pictures you find these days require a special loader program in order to view them. I found this to be a little troublesome, and that's why I wrote CoCo 3 Saver.

I found that by creating a segmented machine language file, I could actually make a CoCo 3 picture set its colors and completely load into HSCREEN memory, all with the LOADM command! Thus, you don't need any special software to see these pictures.

Listing 1 is the program you use to save these CoCo 3 screens. Make sure you have the picture to be saved in memory, and all the PALETTEs set cor-

rectly for it, and then run the saver. It will record the PALETTEs and the picture in one fifteen granule file on disk.

To see a picture you have saved this way, all you really need to do is CLEAR200,&H5FFF and LOADM the file. Listing 2 is an example of how simple it really is to load these files.

This method of saving and loading pictures is pretty fast. You might consider using it for a graphics editor. With a little imagination, you can even convert Atari ST and MGE files to this format. Enjoy!

HSCREEN SAVER

Listing 1

```
0 'COCO 3 HSCREEN SAVER - COPYRI
  GHT (C) 1988 BY ANDREW BARTELS
1 'FROM DIGITAL INNOVATIONS
    1859 EAST 8TH STREET
```

```

MESA, AZ 85203-6649
2 PCLEAR1: CLEAR500, &H5FFF: POKE&H
  E6C6, 18: POKE&HE5C7, 18: READA$:
  X=&HE00: FORY=1 TO LEN(A$) STEP 2:
  POKE X, VAL("&H"+MID$(A$, Y, 2)):
  X=X+1: NEXT: READA$: FORY=1 TO LEN
  (A$) STEP 2: POKE X, VAL("&H"+MID$
  (A$, Y, 2)): X=X+1: NEXT: A$=""
3 CLS: INPUT "FILENAME"; F$: IF LEN(F
  $) > 8 OR F$="" THEN 3
4 F1$=F$: IF LEN(F$) < 8 THEN FOR Q=
  7 TO LEN(F$) STEP -1: F1$=F1$+
  " ": NEXT
5 HSCREEN2: OPEN "O", #1, F$+".CC3"
6 EXEC&HE38
7 CLOSE#1
8 FOR S=3 TO 11: DSKI$0, 17, S, A$, B$: F
  ORQ=1 TO LEN(A$) STEP 32: IF MID$(
  A$, Q, 11)=F1$+"CC3" THEN MID$(
  A$, Q+11, 2)=CHR$(2)+CHR$(0): DSK
  O$0, 17, S, A$, B$: Q=129: S=12
9 NEXT: FOR Q=1 TO LEN(B$) STEP 32: IF
  MID$(B$, Q, 11)=F1$+"CC3" THEN
  MID$(B$, Q+11, 2)=CHR$(2)+CHR$(
  0): DSKO$0, 17, S, A$, B$: Q=129: S=
  12
10 NEXT Q, S
11 CMP: DIR: END
12 DATA "3416C605A6803404AD9FA00
  235045A26F335963452CE2000A680
  3440AD9FA0023540335F118300002
  6EE35D23410BE0E84A680BF0E8435
  908E0E86BF0E848601976F8E0E8A8
  DB98EFFB0A680AD9FA0028CFFC026
  F58DD54D2718B7FFA38E0E8F8D9EA
  D9FA0028E0E948D958E60008DA320
  E38E0E8F"
13 DATA "8D89863BAD9FA0028E0E991
  7FF7D390E8630313233000010FFB0
  000001FFA30020006000FF00008C1
  B"

```

HSCREEN LOADER

Listing 2

```

0 'COCO 3 HSCREEN LOADER DEMO -
  COPYRIGHT (C) 1988
  BY ANDREW BARTELS
1 'FROM DIGITAL INNOVATIONS
  1859 EAST 8TH STREET
  MESA, AZ 85203-6649
2 PCLEAR1: CLEAR500, &H5FFF: POKE&
  HE6C6, 18: POKE&HE5C7, 18: ON
  BRK GOTO 7: ON ERR GOTO 8

```

```

3 POKE&HE06C, &H35: POKE&HE06D, &H3
  E: POKE&HE06E, &H34: POKE&HE06F,
  &H3D: POKE&HEB75, 199: POKE&HE7B
  A, 200: POKE&HE7BE, 199: POKE&HEF
  8F, 18 'SET GRAPHICS CMDS FOR
  200 PIXELS VERTICAL
4 CMP: CLS: INPUT "FILENAME (NO EXT
  .)"; F$
5 INPUT "WHICH HSCREEN MODE (2 OR
  4)"; M: IF M < 2 AND M > 4 THEN 5
  ELSE HSCREEN M: HCLSO: LOADMF$+
  ".CC3"
6 IF INKEY$="" THEN 6 ELSE HCLSO: HSC
  REENO: GOTO 4
7 HSCREENO: CLS: CMP: END
8 HSCREENO: CLS4: PRINT#0, "*** ERRO
  R! ***": SOUND1, 5: STOP

```

EDITOR'S NOTE: These are very good utilities for loading and saving CoCo 3 Hi-Resolution pictures. A picture is included in this month's DCN on disk along with the picture LOADER and SAVE programs.

MEMORY MANAGER

for the Color Computer 2

Did you know that the 64K Color Computer 2 and earlier computers have an extra 32K that is generally not used? Our Memory Manager allows basic or machine language programs to be run in either 32K bank. Banks are exchanged with an EXEC command. Also the second bank can be used as a ramdisk to store programs. This makes cassette operation faster than a disk. A third option configures the computer for the all ram mode allowing data or programs to be stored in the upper memory. The Memory Manager software is available on either cassette or disk and costs only \$18.95 +\$2 ship.

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EDT-MAC

by
Bob Helms

Various assemblers used with the Color Computer require source code files to be in different formats. My favorite assembler, MACRO-80C from The Micro Works, offers many more features than early versions of Microsoft's EDTASM+. The BASIC program EDT-MAC shown in Listing 1 below will convert Microsoft EDTASM+ files to the format required by Micro Works MACRO-80C. Although both assemblers will read ASCII files, the differences in syntax make it very tedious to make the required changes with a word processor or text editor.

FORMAT COMPARISONS: The most obvious difference in assembly language source files for EDTASM and MACRO-80C is the lack of line numbers in the latter. Luckily EDTASM generates constant length, five digit line numbers which may be easily removed from the beginning of each line. A less obvious contrast is the use of horizontal tabulation characters within EDTASM files. Each time a right-arrow is hit in EDTASM's text editor, a CHR\$(9) byte is inserted into the text file.

Unfortunately, the disk read routine used by MACRO-80C filters out these bytes which leaves the text on a line without delimiters. The symbol, instruction and operand columns become one long jumble of characters which will not assemble with MACRO-80C. Lastly, several assembler directives differ between the two programs. Conditional assembly, multiple files and macro routines are created with different syntax for each assembler. EDT-MAC searches for these and prompts the user whether the string found should be substituted with the equivalent command for MACRO-80C. The end result is an equivalent MACRO-80C file which should assemble correctly and without errors.

TYPING AND USING EDT-MAC: The only tricky portion of the listing is the DATA statements at the end. The exact use of spaces should be followed to avoid assembler errors. EDT-MAC will work on any disk based CoCo 1, 2 or 3 with any amount of RAM or number of drives. CoCo 3 users may choose any screen

WIDTH and owners of multiple drives should direct the output MACRO-80C file to a separate drive for increased speed. The program will request filenames and then start processing the text. Be patient, the many string manipulations and disk accesses will take some time. When an assembler directive is found, the user will be prompted before a change is made. This is necessary since many assembler directives will appear as part of remarks or longer words and should not be changed. The prompt will show the context of the search string.

HOW IT WORKS: Program logic is well commented in the listing. However some unique approaches may need elaboration. The EDTASM input file is read as a direct access data file with a record length of one. BASIC's sequential file read statements OPEN "I",#1 and INPUT#1 will filter out the needed horizontal tab characters making the file unusable. Reading the file a byte at a time with direct access is slow but effective. The read bytes form the text one line at a time in A\$. When a carriage return (CHR\$(13)) is read it signifies the end of a line. Once each line is formed, INSTR searches and string commands (LEFT\$, and RIGHT\$) are used to replace assembler directives and chop off the line numbers at the start of each line.

MOTOR CONTROL: Early versions of this program allowed the drive motors to stop during string processing and pauses between drive accesses. This caused additional delay as the system had to wait for the drive to reach operating speed and load the heads each time in order to read or write. The POKES and PEEKs to the control register of the PIA at address

&HFF03 (65283) disable the interrupts which are counted to time out the drive motors thereby keeping the drives on until the files are complete. The boolean AND and OR statements with the given values control bit 0 which is the 16.7 ms IRQ enable/disable function. If an error occurs or the BREAK key is struck during program operation, the drives will remain on. You may type and enter GOTO190 or hit RESET to restore normal operation.

DISCLAIMER: EDTASM uses a group of OPT assembler directive switches to control listing and expansion of macro routines which MACRO-80C does not directly support. Lack of this feature in EDT-MAC and MACRO-80C will NOT affect the binary object code produced but may affect output listings.

SUMMARY: The output format from EDT-MAC will also assemble correctly in most cases with Computerware's MAC and TSC's ASMB FLEX assemblers.

Inquiries should include a SASE and be addressed to Bob Helms, 12406 Breckenridge Drive, Eagle River, AK 99577. Enjoy!

EDT-MAC

PROGRAM LISTING

```
10 REM COPYRIGHT (c) 1988 BY BOB
   HELMS, AF5Z FOR DYNAMIC COLO
   R NEWS.
20 CLS:PRINT" === EDTASM+ FILE C
   ONVERTER ===":PRINT
30 PRINT"CONVERTS EDTASM+ SOURCE
   FILES TOMACRO-80C FILES.":PR
   INT:PRINT"EDTASM FILE IS LEFT
   INTACT AND MACRO-80C FILE I
   S CREATED.":PRINT
40 CLEAR1000:DIMT$(12):A$="":B$=
   "":FORX=1TO12:READ T$(X):NEXT
50 LINEINPUT"EDTASM+ FILE: ";E
   F$
```

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```

60 LINEINPUT"MACRO-80C FILE: ";M
   F$
70 PRINT:PRINT"REMOVING LINE NUM
   BERS, CHANGING TABS TO SPACES
   , AND CONVERTING ASSEMBLER D
   IRECTIVES. ":PRINT
80 POKE65283, PEEK(65283)AND254
   DISABLE INTERRUPTS TO KEEP DR
   IVES ON
90 OPEN "D", #1, EF$, 1 'PROCESS ED
   TASM FILE AS DIRECT ACCESS
100 FIELD #1, 1 AS I$:L=LOF(1)
110 OPEN"O", #2, MF$
120 IF G=L THEN150 ELSEG=G+1:GET
   #1, G:B$=I$
130 IF ASC(B$)=9 THEN B$=" " 'CH
   ANGE EDTASM HORIZ TAB (CHR$(9
   )) TO SPACE
140 IFASC(B$)<>13 THEN A$=A$+B$:
   GOTO120 'GET A LINE AT A TIME
150 IFLEN(A$)>5 THENA$=RIGHT$(A$
   ,(LEN(A$)-6)) ELSEA$="":B$=""
   :IF G<L THEN120 ELSE190 'CHOP
    
```

```

FIRST 6 BYTES IN EACH LINE T
O REMOVE LINE NUMBERS
160 FORX=1TO6:P=INSTR(A$,T$(X))
170 IFP THENPRINTA$:PRINT:PRINT"
   CHANGE ";T$(X);" TO ";T$(X+6)
   ;" IN LINE ABOVE (Y/N)";:INPU
   TC$:IFC$="Y"THENA$=LEFT$(A$,P
   -1)+T$(X+6)+RIGHT$(A$,LEN(A$)
   -P-LEN(T$(X))+1):PRINT ELSEPR
   INT
180 NEXTX:PRINT#2,A$:A$="":B$=""
   :IF G<L THEN120 'WRITE MACRO-
   80C FILE
190 CLOSE:PRINT:PRINT"EDTASM OPT
   ION SWITCHES FOR MACROLISTING
   S MAY REQUIRE MANUAL EDIT
   ING.":PRINT:PRINT"SOFTWARE BY
   BOB HELMS, AF5Z. ":POKE65283,
   PEEK(65283)OR1:END 'ENABLE IN
   TERRUPTS
200 DATA INCLUDE ,TITLE ,COND ,M
   ACRO,OPT L,OPT NOL,INCL ,NAM
   ,IFNE ,MACR ,LIST ,NLST
    
```



This is a series on basic programming. Each month we give new material and write demonstration programs to show how to use the information. Last month we looked at opening and closing sequential files on tape or disk. A sequential file is one in which data must be read in order. For example if it is desired to obtain the data on the thirteenth variable, then all variables from 1 to 12 must be read before the thirteenth can be used. This is similar to using the READ - DATA approach to obtaining data from basic statements. With this approach data has to be properly ordered.

There are many ways to handle information. In this series three different methods have been presented. The READ -DATA method allows information to be saved with the basic program. This has the advantage of not requiring an additional file on disk or tape. Information can also be stored in memory and saved as a machine language program or file. This requires

a separate file. Opening a file on disk or tape was introduced last month. This has the advantage of allowing data to be entered from the keyboard as the program is run. Also the program can be written so that data can easily be changed. With the READ-DATA method data statements have to be edited to change the data.

This month we want to continue with the sequential file approach to saving data and give another example program. We will use some of the previous commands that were presented earlier.

Let's write a program for a school teacher that keeps track of students and their performance. To make the program flexible, the number of students and the number of grades could be made variable. Also the weight of each grade could be entered. For example suppose there are to be 5 exams which will be 60% of the final grade. Special assignments such as term papers or homework will be worth 20% of

the final grade and the final exam will be worth 20%. All of these or any other desired weights could be programmed into the program.

Our program will handle up to 5 tests for each student. We will make each test have the same weight.

Arrays

Arrays allow the computer to handle data quickly. Suppose we allow for a total of 25 students. Each student will be assigned a number which we can use to determine the grade for any test. The first thing we would want to do is to enter the names of the students. To use arrays a DIM statement is required. The DIM statement should be near the beginning of the program.

```
2 N=25 'NUMBER OF STUDENTS
4 U=5 'NUMBER OF TESTS
10 DIM N$(N),T(N,U)
```

Before writing the program lets make a sample chart of what we are going to expect.

NO	Name	1	2	3	4	5	AV.
1	J. Smith	65	87	95	56	33	67
2.	A. Jones	76	45	88	85	90	77
3.	B. Terry	89	95	99	98	87	94
4.	C. Smith	35	65	83	62	77	64
5.	F James	67	73	77	65	70	70

Notice from the DIM statement that there are two arrays we are establishing. The first is the names of the students N\$(J). The second is a two dimensional array for the tests T(J,V). For the first test the second argument will be a 1, and it will be a two for the second test. The grade for the third test and forth student would be T(3,4) and would have a value of 83 from our chart. Refer to your programming manual if you are

having trouble with arrays. The average is the sum of the grades divided by 5.

Entering Data

Before we can get the program to do anything, the data has to be entered. Last month we showed how to write data to a tape or disk file. Suppose we have a mistake in a name or grade. This will have to be corrected. The arrays will allow us to change the information for any student. After we have completed editing our data we can save it as a new file on tape or disk.

CoCo 3

Fortunately we can tell if we are using a color computer 3 by looking at the value in memory 33021. If this value is 50 then we have a color computer. The palette can be adjusted to give a screen with reversed characters and the width can be set. This can be accomplished by a subroutine as the program is run. The 40 character display is easy to read with a monitor. The 32 character display should be used with a television. In our subroutine the width can be set for the most desired width.

Disk System

The program can also detect if a disk drive is being used. Location 188 contains the information for a disk drive. If the value in 188 is 14 then a disk drive is connected. We can use this to branch to sections for loading or saving files to a disk. These tests are included in the program.

A support program called "GRADES" is included on our DCN on DISK or TAPE for this month. This has 3 students with 5 grades each and will demonstrate how the program works.

**TEACHER GRADE
PROGRAM**

```

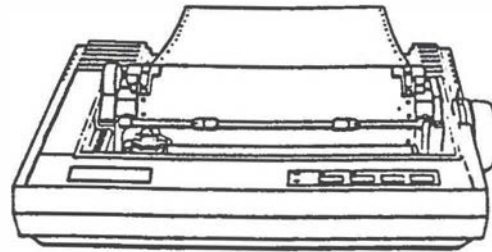
5 IF PEEK(33021)=50 THEN GOSUB 1
  0000 'TEST FOR CC-3
10 PRINT"TEACHER GRADE PROGRAM
20 PRINT"COPYRIGHT (c) 1988
30 PRINT"DYNAMIC ELECTRONICS INC

40 PRINT"THIS SUPPORTS CASSETTE
  AND
50 PRINT"DISK SYSTEMS, COCO 2"
60 PRINT"AND COCO 3.
70 INPUT"PRESS ENTER";P$
80 POKE 500,1
100 CLS:PRINT"1 ENTER STUDENTS N
  AMES
110 PRINT"2 ENTER GRADES
120 PRINT"3 CORRECT A GRADE
130 PRINT"4 READ DATA FROM A FIL
  E
140 PRINT"5 WRITE DATA TO A FILE
150 PRINT"6 PRINT RESULTS
160 X$=INKEY$:IF X$=""THEN160
170 X=VAL(X$)
200 ON X GO SUB 1000,2000,3000,4
  000,5000,6000
210 GOTO 100
999 '
1000 PRINT"THIS ENTERS STUDENTS
  NAMES INTO THE ARRAY.
1002 PRINT"PRESS THE @ KEY TO EN
  D"
1005 S=PEEK(500)
1007 PRINT"THERE ARE "S" STUDENT
  S
1010 FOR J=S TO 25
1020 PRINTJ:INPUT"ENTER NAME";N$(
  J)
1030 IF N$(J)="@" THEN 1050
1040 NEXT J
1050 POKE 500,J-1 'SAVE NUMBER O
  F STUDENTS
1060 PRINT"THIS REVIEWS STUDENTS
  NAMES"
1070 PRINT"PRESS 'C' KEY FOR COR
  RECTIONS"
1080 X=PEEK(500)
1090 FOR J=1 TO X
1100 PRINTJ;N$(J)
1110 X$=INKEY$:IF X$="C" THEN 13
  00 ELSE IF X$=""THEN1110
1120 NEXT J
1130 RETURN
1299 '
1300 PRINT"THIS MAKES A NAME COR
  RECTION"
1310 INPUT"ENTER STUDENT NUMBER"
  ;J
1320 PRINTJ;N$(J)
1330 INPUT"ENTER CORRECT NAME";N
  $(J)
1340 GOTO 1000
1999 '
2000 PRINT"THIS ENTERS GRADES"
2010 INPUT"TEST NUMBER";U
2020 S=PEEK(500): PRINT"THERE AR
  E "S" STUDENTS."
2030 FOR J=1 TO S
2040 PRINTJ;N$(J)
2050 INPUT"ENTER GRADE";T(J,U)
2060 PRINT"GRADE FOR "N$(J)" IS.
  "T(J,U)
2070 INPUT"PRESS E FOR ERROR";X$
2080 IF X$="E" THEN 2040
2090 NEXT J
2100 PRINT"LAST STUDENT"
2110 RETURN
2999 '
3000 PRINT"SUDENTS AND GRADES
3005 PRINT"PRESS C FOR CORRECTIO
  N
3010 S=PEEK(500)
3020 FOR J=1 TO S
3030 FOR K=1 TO 5
3040 PRINTT(J,K);
3050 NEXT K
3060 INPUT"PRESS C FOR CORRECTIO
  N";X$
3070 IF X$="C" THEN GOSUB 3200:G
  OTO3020
3080 NEXT J
3090 RETURN
3195 '
3199 'CORRECT GRADE ERROR
3200 INPUT"ENTER STUDENT'S NUMBE
  R TO CORRECT";X
3210 PRINTN$(X):FOR P=1 TO 5
3220 PRINT"TEST #"P;T(X,P)
3230 NEXT P
3240 INPUT"ENTER TEST #";A
3250 INPUT"ENTER CORRECT GRADE";
  T(X,A)
3260 RETURN
3999 '
4000 PRINT"THIS READS DATA FROM
  FILE
4010 Z=PEEK(188):IF Z=14 THEN 42
  00
4020 OPEN"I", #-1,"NAMES"
4030 FOR J=1 TO 25
4040 INPUT #-1,N$(J)
4060 IF N$(J)="@" THEN POKE 500,
  J:GOTO 4110

```

```

4080 FOR P=1 TO 5:INPUT#-1,T(J,P
):NEXTP
4100 NEXT J
4110 POKE 500,J-1:CLOSE:RETURN
4199 '
4200 'DISK SYSTEM
4210 DIR:INPUT"FILE NAME";N$:OPE
N"I",#1,N$
4215 FOR J=1 TO 25
4220 INPUT #1, N$(J):IF N$(J)="@
" THEN 4110
4230 FOR P=1 TO 5:INPUT#1,T(J,P)
:NEXTP:NEXT J
4250 GOTO4110
4999 '
5000 PRINT"THIS WRITES DATA TO D
ISK OR TAPE FILE
5010 Z=PEEK(188):IF Z=14 THEN IN
PUT "ENTER NAME";N$:OPEN "O",
#1,N$:GOTO 5030
5020 INPUT"READY CASSETTE PRESS
ENTER";V:OPEN "O",#-1,"NAMES
5030 S=PEEK(500)
5040 IF Z=14 THEN 5200 'DISK SYS
TEM
5050 FOR J=1 TO S
5060 WRITE#-1,N$(J)
5070 FOR P=1 TO 5:WRITE#-1,T(J,P
)
5080 NEXT P
5090 NEXT J
5100 CLOSE: RETURN
5199 '
5200 FOR J=1 TO S
5210 WRITE#1,N$(J)
5215 FOR P=1 TO 5:WRITE #1,T(J,P
)
5220 NEXT P
5230 NEXT J:WRITE #1,"@"
5240 CLOSE:RETURN
5899 '
6000 PRINT"THIS REVIEWS GRADES
6010 S=PEEK(500)
6020 FOR J=1 TO S
6030 PRINTJ;N$(J);" ";:SU=0
6040 FOR P=1 TO 5
6050 PRINTT(J,P);:SU=SU+T(J,P):N
EXT P
6060 AV=SU/5:PRINT"AVERAGE="AV
6070 INPUT"PRESS ENTER TO CONTIN
UE";XX:PRINT
6080 NEXT J:RETURN
10000 'COLOR COMPUTER 3 40 CHARA
CTER SCREEN
10010 PALETTE 12,63:PALETTE 13,0
:WIDTH 40:PALETTE 8,63: PALET
TE 0,0:CLS1:RETURN
    
```



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ham radio & computers

by

bill chapple w4gqc

In this section I am discussing applications for using Color Computers with a ham radio station. These computers are very powerful and can be programmed for many different tasks. Unfortunately there is only one serial port. I used this port for the Morse code terminal. If a printer is to be used a switching arrangement will have to be built.

The cassette port can be used for various applications beside saving and storing programs to a cassette. I have presented radio teletype (RTTY) and weather facsimile (WEFAX) programs that use the cassette port. I mounted jacks into a microphone connector for my FT-757. I plug the cassette cable into these jacks when I want to use RTTY or WEFAX. The audio out and relay cable go to the microphone connector. The audio in goes to the audio out jack of my transceiver. I made an adapter plug and jack for this purpose.

The joystick ports for color computers allow a voltage from 0 to 5 volts to be digitized. This means that a voltage is converted into a digital word that the computer can process. I have been working on digitizing audio for the past few months. The audio entering the cassette port can be digitized. The problem with this approach is that the audio is coupled through a capacitor into the computer. A capacitor will remove any direct

current. Since audio goes above and below a reference, this reference is lost when a signal is passed into the cassette port. However last month I used this port to detect a signal in the Squelch circuit.

A problem I was having using one of the joystick ports is that the audio got distorted as I was doing the digitizing. I bought an adapter to plug into the audio out jack of my transceiver. This adapter allows two 1/4 inch phone plugs to be plugged in at the same time. One of the plugs goes to the joystick port through a coupling capacitor. The port is biased at 2.5 volts with two equal resistors. This gives a reading of 32 when no audio is present. With audio present the value swings above and below the 32 reference. I do not have to have the computer's audio on which simplifies things. I now hear the audio in an external speaker freeing the computer for processing the signal. Next month I will have more on this.

There is quite a bit of interest in packet radio. I am not on packet and am mostly a high frequency (HF) operator. I have heard that packet is very slow on HF due to interference (QRM) from other stations. I do not know about VHF but suppose it works well there. I would appreciate receiving comments about this from those of you who are packet operators.

I downloaded a MSDOS public domain ham program from one of our MSDOS computers. This program does Ohm's Law, Resistance, Dipole, Quad, and Beam Antenna designs. I had to change a few statements to get it to work on color computers, but it does a good job. It will work with the color computer 3 in the 80 column width display.

HANDY HAM PROGRAM

```

10 DIM N(100)
11 CLS
20 PRINT "HANDY HAM PROGRAMS"
50 PRINT
60 PRINT
70 PRINT "1 OHMS LAW PROGRAM"
80 PRINT "2 DESIGN DIPOLE ANTENNA"
90 PRINT "3 DESIGN QUAD ANTENNA"
100 PRINT "4 DESIGN BEAM ANTENNA"
110 PRINT "5 CALCULATE PARALLEL RESISTANCE"
120 PRINT "6 RETURN TO BASIC"
130 PRINT
140 PRINT
150 INPUT "ENTER NUMBER OF OPTION DESIRED AND PRESS RET KEY";O
160 IF O=0 THEN 20
170 IF O>6 THEN 20
180 ON O GOTO 210, 970, 1270, 520, 1710, 190
190 PRINT
200 END
210 REM OHMS LAW
220 PRINT "ENTER E IN VOLTS, O IF UNKNOWN":PRINT
230 INPUT E: PRINT
240 PRINT "ENTER I IN AMPS, O IF UNKNOWN":PRINT
250 INPUT I : PRINT
260 PRINT "ENTER R IN OHMS, O IF UNKNOWN":PRINT
270 INPUT R:PRINT
280 IF E+I+R=0 GOTO 470
290 IF E=0 GOTO 330
300 IF I=0 GOTO 380
310 IF R=0 GOTO 430
320 GOTO 470
330 E=I*R
340 PRINT "E=";E
350 PRINT
360 PRINT
370 GOTO 470
380 I=E/R
390 PRINT "I=";I
400 PRINT
410 PRINT
420 GOTO 470
430 R=E/I
440 PRINT "R=";R
450 PRINT
460 PRINT
470 PRINT "DO YOU WANT TO DO ANOTHER Y OR N "
480 INPUT R$
490 IF R$="Y" GOTO 210
500 GOTO 60
510 '
520 REM DESIGN BEAM ANTENNA
530 PRINT "    DESIGN VHF"
540 PRINT
550 PRINT "    BEAM ANTENNA"
560 PRINT
570 REM
580 REM
590 REM
600 PRINT
610 PRINT "    ENTER"
620 PRINT
630 PRINT "FREQUENCY IN MHZ"
640 PRINT
650 PRINT
660 INPUT F
670 D=5600/F
680 A=D*.05
690 R1=D+A
700 A1=D*.05
710 D1=D-A1
720 A2=D1*.02
730 D2=D1-A2
740 A3=D2*.02
750 D3=D2-A3
760 S1=492/F*12*2*.208
770 S2=492/F*12*2*.15
780 S3=492/F*12*2*.2
790 S4=492/F*12*2*.256
800 REM
810 PRINT "-----";"R
      1 IN.=";R1
820 PRINT "          !      @"
830 PRINT "          !      @";"S
      1 IN.=";S1
840 PRINT "-----";"D
      IN.=";D
850 PRINT "          !      @"
860 PRINT "          !      @";"S

```

Dynamic Color News Aug 1988

```

2 IN. =";S2
870 PRINT "-----";"D
1 IN. =";D1
880 PRINT "      !      @"
890 PRINT "      !      @";"S
3 IN. =";S3
900 PRINT "-----";"D
2 IN. =";D2
910 PRINT "      !      @"
920 PRINT "      !      @";"S
4 IN. =";S4
930 PRINT "-----";"D
3 IN. =";D3
940 INPUT "DO YOU WANT TO DO ANO
THER YES OR NO";Y$
950 IF Y$="YES" THEN 520
960 GOTO 60
970 REM DESIGN DIPOLE ANTENNA
980 PRINT "      DESIGN"
990 PRINT "DIPOLE ANTENNA"
1000 PRINT
1010 PRINT "      ENTER"
1020 PRINT "FREQUENCY IN MHZ. "
1100 PRINT
1110 INPUT A
1120 PRINT
1130 L=468/A/2
1140 PRINT "MHZ. "
1150 PRINT "      DIPOLE"
1160 PRINT "CUT AS FIGURE"
1170 PRINT
1180 PRINT
1190 PRINT "O-----O-----O"
1200 PRINT " !<- 'L '-> !<- 'L '-> !"
1210 PRINT
1220 PRINT "                                L="
,L, " FT"
1230 PRINT
1240 INPUT "DO YOU WANT TO DO AN
OTHER YES OR NO ";Y$
1250 IF Y$="YES" THEN 970
1260 GOTO 60
1270 REM DESIGN QUAD ANTENNA
1280 PRINT "DESIGN QUAD ANTENNA"
1290 PRINT
1300 PRINT "ENTER"
1310 PRINT
1320 PRINT "FREQUENCY IN MHZ. "
1330 PRINT
1400 '
1410 INPUT F
1420 PRINT
1430 PRINT
1440 PRINT "ENTER"
1450 PRINT "ELEMENT SPACING IN W
AVE LENGTHS"
1460 INPUT A
1470 S=984/F*A

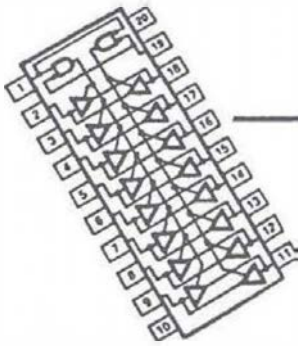
```

```

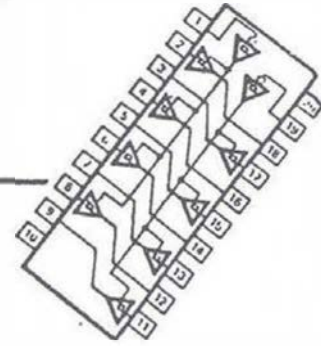
1480 D=246/F
1490 B=D*.05
1500 R=B+D
1510 T=R*4
1520 L=D*4
1530 PRINT "DREVEN ELEMENT"
1540 PRINT "LENGTH EACH SIDE"
1550 PRINT D, " FT. "
1560 PRINT "TOTAL LENGTH"
1570 PRINT L, " FT. "
1580 PRINT "REFLECTOR ELEMENT"
1590 PRINT "LENGTH EACH SIDE"
1600 PRINT R, " FT. "
1610 PRINT "TOTAL LENGTH"
1620 PRINT T, " FT. "
1630 PRINT "ELEMENT SPACING"
1640 PRINT S, " FT. "
1650 PRINT "SPACING"
1660 PRINT "WAVE LENGTH =", A
1670 PRINT "FREQUENCY =", F, "MH
Z. "
1680 INPUT "DO YOU WANT TO DO AN
OTHER YES OR NO ";Y$
1690 IF Y$="YES" THEN 1270
1700 GOTO 60
1710 CLS:PRINT "COMPUTE PARALLEL
RESTANCES"
1720 PRINT
1730 PRINT
1740 PRINT "      1 TO 100 RESI
STORS "
1750 PRINT
1760 PRINT
1770 PRINT
1780 REM RESISTANCE PARALLEL
1790 FOR X=1 TO 100
1800 PRINT "ENTER R , 0 TO STOP"

1810 INPUT "R= ";N(X)
1820 IF N(X)=0 THEN 1840
1830 NEXT X
1840 PRINT "RESISTANCES ARE"
1850 R=0
1860 X=X-1
1870 FOR K=1 TO X
1880 PRINT "RESISTANCE OF R",K, "
IS",N(K), " OHMS"
1890 R=R+1/N(K)
1900 NEXT K
1910 R=1/R
1920 PRINT "TOTAL RESISTANCE IS"
,R, " OHMS"
1930 INPUT "DO YOU WANT TO DO MO
RE YES OR NO ";Y$
1940 IF Y$ = "YES" OR Y$ = "Y" T
HEN 1710 ELSE 1700
1950 END

```

HARDWARE



This section is a result of requests from our readers. Hardware consists of physical components that allow the computer to perform tasks. A printer, monitor, modem, joystick, Multipack Interface, and disk drive are examples of hardware items. Software is a collection of computer instructions that makes the computer perform the desired task. Basic, Assembly, Forth, Pascal, and Basic 09 are languages that allow computer instructions to be written. Most of our effort is devoted to writing instructions. The reason for this is that once hardware is connected, instructions for using it are required. In other words, hardware also requires software in order to be useful in most cases.

As an example suppose you wish to connect a printer to the computer. If you have used a printer with a color computer, all you had to do was connect it to the serial port on the computer. If it were a Radio Shack printer, then a cable was included that plugged into the serial port. Everytime you give commands like LLIST and PRINT #-2, software was required to send the information from your computer to the printer. Fortunately this software is contained within the read only memories (ROMS) inside the computer.

Last year we presented several articles on using the joystick ports for various projects. We provided software that converted the voltage at these ports to a

number representing temperature, resistance, voltage, or light intensity. Software was required to support the hardware.

RS-232 PORT

The RS-232 or ASCII port can be used for a printer or to interface with a modem or other computer. A switch box can be connected to the computer that will allow various devices to be selected. Most RS-232 devices use a 25 pin plug. There are two configurations for the cable that connects from a device to the color computer's ASCII port. For a printer with a 25 pin connector, pins 3, 7, and 20 of the printer are connected to pins 4, 3, and 2 respectively of the color computer. For connecting to another computer or modem pins 2, 3, and 7 are connected to pins 2, 4, and 3 respectively of the color computer's 4 pin serial jack. This can be demonstrated by the following chart:

	COCO	MODEM	PRINTER
2	DATA IN	2	20
3	GND	7	7
4	DATA out	3	3

Notice that the only pin that is different is pin 2 of the COCO. It either goes to pin 2 or 20 of the 25 pin connector. A switch can be installed to connect either pin 2 of the COCO to pin 2 or pin 20 of the 25 pin connector. This will al-

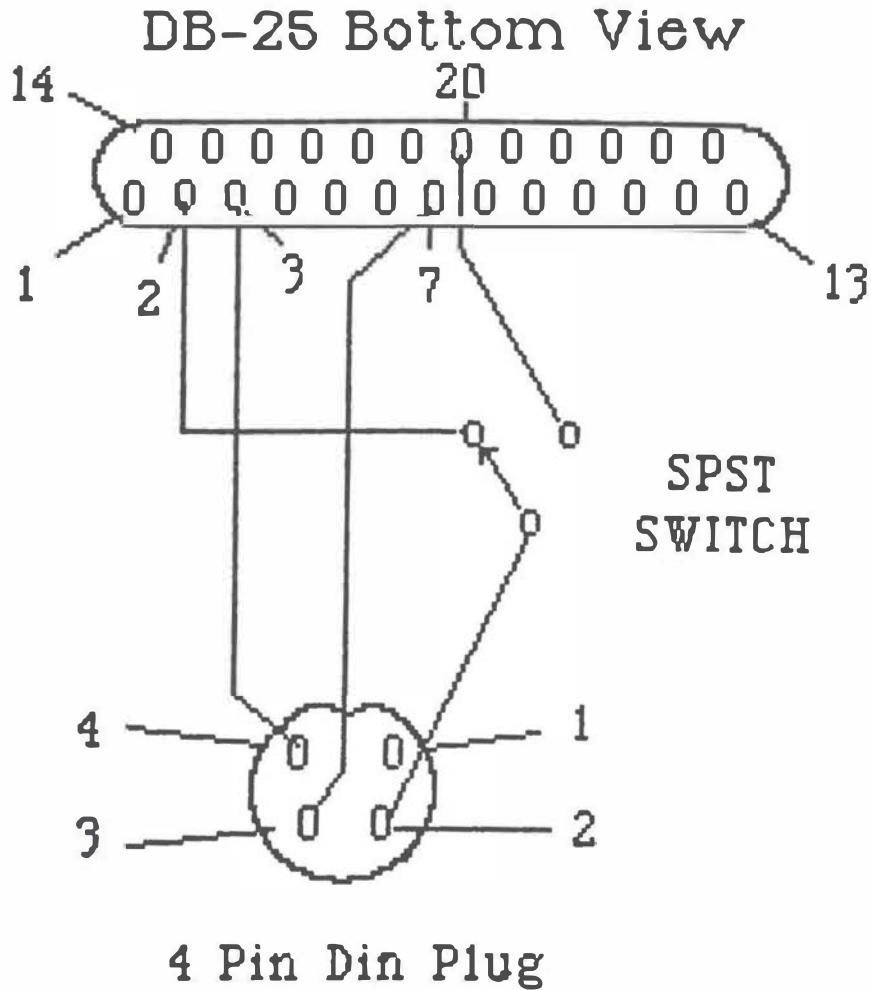


Figure 1

low the same cable to work on printers and other devices.

Figure 1 is a schematic diagram showing how to connect the wires from the color computer to the 25 pin connector and the single pole single throw (SPST) switch.

Switch boxes are available at a reasonable cost that can select up to 4-25 pin devices. Standard 25 pin cables can be used to connect from the box to each device. This eliminates a

lot of plugging and unplugging. Flat computer cable can be used and lengths up to 15 or 20 feet can be used if desired to connect the color computer to a switch box, printer, modem, or other computer.

This is a simple hardware project that is very useful when different devices are connected to the COCO's serial port. If a device does not work place the switch in the other position.

EDITOR'S COMMENTS

It is fairly hard to keep on schedule with the nice weather we have been having. Outside activities are very tempting. We made one trip to North Carolina to engage in white water canoeing and rafting. My oldest son went with me in the canoe. We did good for a while but finally turned it over due to our lack of experience. My daughter and her husband joined us the next day and we all enjoyed rafting. We got wet but did not turn the raft over.

Since Radio Shack has discontinued the Color Computer 2, you can expect to see more and more Color Computer 3 programs and articles. I have gone through several levels of change since I have been involved with color computers. The first changes involved adding more memory. My first computer had only 4K which limited the size of a program. I then expanded to 16K and later to 32K. A 32K computer was very powerful then and is still a good computer. Next came 64K, 256K and 512K. Ramdisks became available with 256K memories. A ramdisk with a computer will allow a disk to be copied into the computer's memory. The computer's ramdisk can be copied onto a formatted disk. This backs up a disk in only one pass. I have never had more than one disk drive for a color computer. We have several color computer work stations, but each has only one drive. With the ramdisks, this has been adequate for us.

Also my first computer did not have extended basic. I could not edit a line, and had to retype it if it had an error. The features of the extended basic were welcomed when I upgraded.

Now the standard 128K color computer 3 has additional features that are very nice. The screen can be 32, 40, or 80 characters. It can be used with a television or a monitor. It has high resolution graphics and allocates memory for the high resolution graphics and the 40 and 80 character displays. The color computer 3 is being covered by John Galus so I will not get into the advantages of it here. The point is that now we are on a higher level because of the color computer 3 and can expect

better programs.

OS9 level 2 for the color computer 3 is an excellent operating system. It also includes Basic 09 which allows programs similar to Microsoft's basic to be written. This is the operating system for the color computers and Norm Matice is doing an excellent job explaining how to use OS9 and Basic 09.

We will still support all of the color computers. The color computer 3 in the 32 character mode is about 95% compatible with the older computers. Radio Shack did a good job of retaining compatibility. There are memory peeks we can use to determine if the computer is a color computer 3 or if a disk is being used. We incorporated these in our Teacher program this month. A program can be written that will work on all of the color computers. Programs that use the special features of the color computer 3 will not work on the other computers. Our programs will work on all color computers unless otherwise stated.

In our hardware section we have an article for making a cable to interface with a printer, modem, or other computer using the series port. Files and programs can be transferred between different type computers using the serial port. The files have to be in ASCII and a terminal program is required. I transfer files frequently both ways from my Model 100 and a MSCOS clone to color computers. This is a very powerful feature to have, and I have found it to be very useful.

Interest in our Ham Radio Section is increasing. There are a many people who have a color computer and are also hams. We will be attending the hamfest in Huntsville on August 20 to demonstrate how to use color computers with ham radio.

I want to thank each of you who have written a letter. We are tailoring our articles to your needs. If we do not hear from you, we will not know what you want us to cover. The OS-9 and Hardware sections were added because reader's requested them. Any comments about the magazine will be appreciated.



"The WIZARD'S CASTLE" is a very special 'TANDY' 'Color Computer' magazine. We devote our entire magazine to the 'CoCo family'. Our articles include columns like: "Wizard's Corner", "Letters to the Editor", "Questions for the Wizard", "Pencil-Pals", "Wizard's Castle Scoreboard", "Word Search", "Post-It-Notes", "Programmers Corner", "Software Reviews", "Hardware Reviews", "Doctor CoCo", "Hardware Modifications", "Adventure Hints", and "BBS Updates". If you have been looking for a smaller more 'PERSONAL' version of a CoCo 'MAG' then we're 'EXACTLY' what you've been looking for. Remember we're exclusively for owners of any of Tandy's Color Computers. We support CoCo's 1, 2, and 3.

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 # offices. You can place orders #
 # here also. BBS# (704)434-2629 #
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This educational program will display information about any of the 50 states. To access this information just enter the two letter abbreviation for the state. For example enter AL for Alabama and WA for Washington. This program is provided by Bill Bernico Software and is used by permission.

```

1 'U.S. STATS by Bill Bernico
  (C) 1988 BILL BERNICO SOFTW
  ARE
2 Z$=CHR$(175)
3 CLS3:PRINT@5, "state"+Z$+"infor
  mation"+Z$+"file";
4 PRINT@198, " YOU MUST INPUT YOU
  R ";:PRINT@230, " STATE'S TWO-
  LETTER ";:PRINT@262, " ABBREV
  IATION. THE ";:PRINT@292, "
  COMPUTER WILL DO THE REST";
5 PRINT@484, "hit"+Z$+"any"+Z$+"k
  ey"+Z$+"to"+Z$+"continue";
6 EXEC44539:CLS3:PRINT@234, " REA
  DING DATA ";
7 DATA AL, ALABAMA, MONTGOMERY, DEC
  .14 1819, 3444165, 21ST, 67, 5070
  8, 28TH
8 DATA AK, ALASKA, JUNEAU, JAN. 3 19
  59, 302173, 50TH, 10, 566432, 1ST
9 DATA AZ, ARIZONA, PHOENIX, FEB. 14
  1912, 1772482, 33RD, 14, 113417,
  6TH
10 DATA AR, ARKANSAS, LITTLE ROCK,
  JUNE 15 1836, 1923295, 32ND, 75,

```

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51945, 27TH
11 DATA CA, CALIFORNIA, SACRAMENTO
  , SEPT. 9 1850, 19953134, 1ST, 58,
  156361, 3RD
12 DATA CO, COLORADO, DENVER, AUG. 1
  1876, 2207259, 30TH, 63, 103766,
  8TH
13 DATA CT, CONNECTICUT, HARTFORD,
  JAN. 9 1788, 3032217, 24TH, 8, 486
  2, 48TH
14 DATA DE, DELAWARE, DOVER, DEC. 7
  1787, 583000, 47TH, 3, 1982, 49TH
15 DATA FL, FLORIDA, TALLAHASSEE, M
  AR. 3 1845, 8594000, 8TH, 67, 5409
  0, 26TH
16 DATA GA, GEORGIA, ATLANTA, JAN. 2
  1788, 5084000, 14TH, 159, 58073,
  21ST
17 DATA HI, HAWAII, HONOLULU, AUG. 2
  1 1959, 769913, 40TH, 4, 6425, 47T
  H
18 DATA ID, IDAHO, BOISE, JULY 3 18
  90, 713008, 42ND, 44, 82677, 11TH
19 DATA IL, ILLINOIS, SPRINGFIELD,
  DEC. 3 1818, 8712176, 4TH, 102, 56
  400, 23RD
20 DATA IN, INDIANA, INDIANAPOLIS,
  DEC. 11 1816, 5193669, 11TH, 92, 3
  6097, 38TH
21 DATA IA, IOWA, DES MOINES, DEC. 2
  8 1846, 2825041, 25TH, 99, 55491,
  24TH
22 DATA KS, KANSAS, TOPFKA, JAN. 29
  1861, 2249071, 28TH, 105, 81787, 1
  3TH
23 DATA KY, KENTUCKY, FRANKFORT, JU
  NE 1 1792, 3219311, 23RD, 120, 39

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650, 37TH
24 DATA LA, LOUISIANA, BATON ROUGE,
  APR. 30 1812, 3643180, 20TH, 64, 4
  4930, 33RD
25 DATA ME, MAINE, AUGUSTA, MAR. 15
  1820, 993663, 38TH, 16, 30920, 39T
  H
26 DATA MD, MARYLAND, ANNAPOLIS, AP
  R. 28 1788, 3922399, 18TH, 23, 989
  1, 42ND
27 DATA MA, MASSACHUSETTS, BOSTON,
  FEB. 6 1788, 5689170, 10TH, 14, 78
  26, 45TH
28 DATA MI, MICHIGAN, LANSING, JAN.
  26 1837, 8875083, 7TH, 83, 56817,
  22ND
29 DATA MN, MINNESOTA, ST. PAUL, MA
  Y 11 1858, 3805069, 19TH, 87, 792
  89, 14TH
30 DATA MS, MISSISSIPPI, JACKSON, D
  EC. 10 1817, 2216912, 29TH, 82, 47
  296, 31ST
31 DATA MO, MISSOURI, JEFFERSON CI
  TY, AUG. 10 1821, 4677399, 13TH, 1
  14, 68995, 18TH
32 DATA MT, MONTANA, HELENA, NOV. 8
  1889, 694409, 43RD, 56, 145587, 4T
  H
33 DATA NE, NEBRASKA, LINCOLN, MAR.
  1 1867, 1483791, 35TH, 93, 76483,
  15TH
34 DATA NV, NEVADA, CARSON CITY, OC
  T. 31 1864, 488738, 47TH, 16, 1098
  89, 7TH
35 DATA NH, NEW HAMPSHIRE, CONCORD
  , JUNE 21 1788, 737681, 41ST, 10,
  9027, 44TH
36 DATA NJ, NEW JERSEY, TRENTON, DE
  C. 18 1787, 7168164, 8TH, 21, 7521
  , 46TH
37 DATA NM, NEW MEXICO, SANTA FE, J
  AN. 6 1912, 1016000, 37TH, 32, 121
  412, 5TH
38 DATA NY, NEW YORK, ALBANY, JULY
  26 1788, 18241266, 2ND, 62, 47831
  , 30TH
39 DATA NC, NORTH CAROLINA, RALEIG
  H, NOV. 21 1789, 5082059, 12TH, 10
  0, 48798, 29TH
40 DATA NC, NORTH DAKOTA, BISMARCK
  , NOV. 2 1889, 617761, 45TH, 53, 69
  273, 17TH
41 DATA OH, OHIO, COLUMBUS, MAR. 1 1
  803, 10652017, 6TH, 88, 40975, 35T
  H
42 DATA OK, OKLAHOMA, OKLAHOMA CIT
  Y, NOV. 16 1907, 2559253, 27TH, 77
  , 68782, 19TH
43 DATA OR, OREGON, SALEM, FEB. 14 1
  859, 2091385, 31ST, 36, 96184, 10T
  H
44 DATA PA, PENNSYLVANIA, HARRISBU
  RG, DEC. 12 1787, 11793909, 3RD, 6
  7, 44966, 32ND
45 DATA RI, RHODE ISLAND, PROVIDEN
  CE, MAY 29 1790, 949723, 39TH, 5,
  1049, 50TH
46 DATA SC, SOUTH CAROLINA, COLUMB
  IA, MAY 23 1788, 2918000, 25TH, 4
  6, 30225, 40TH
47 DATA SD, SOUTH DAKOTA, PIERRE, N
  OV. 2 1889, 666257, 44TH, 67, 7595
  5, 16TH
48 DATA TN, TENNESSEE, NASHVILLE, J
  UNE 1 1796, 3924164, 17TH, 95, 41
  328, 34TH
49 DATA TX, TEXAS, AUSTIN, DEC. 29 1
  845, 11196730, 4TH, 254, 262134, 2
  ND
50 DATA UT, UTAH, SALT LAKE CITY, J
  AN. 4 1896, 1059273, 36TH, 29, 820
  96, 12TH
51 DATA VT, VERMONT, MONTPELIER, MA
  R. 4 1791, 444732, 48TH, 14, 9276,
  43RD
52 DATA VA, VIRGINIA, RICHMOND, JUN
  E 25 1788, 4648494, 14TH, 95, 397
  80, 36TH
53 DATA WA, WASHINGTON, OLYMPIA, NO
  V. 11 1889, 3409169, 22ND, 39, 665
  70, 20TH
54 DATA WY, WEST VIRGINIA, CHARLES
  TON, JUNE 20 1863, 1744237, 41ST
  , 55, 24070, 41ST
55 DATA WI, WISCONSIN, MADISON, MAY
  29 1848, 4417933, 16TH, 72, 5446
  4, 25TH
56 DATA WY, WYOMING, CHEYENNE, JULY
  10 1890, 332416, 49TH, 23, 97203
  , 9TH
57 DIMK$(51), Q$(51), J$(51), M$(51
  ), Z(51), A$(51), B(51), T(51), Y$
  (51)
58 FOR X=1TO50
59 READ K$(X), Q$(X), J$(X), M$(X),
  Z(X), A$(X), B(X), T(X), Y$(X):NE
  XTX:CLS3
60 PRINT@57, " ";:PRINT@32, """:;I
  NPUT"WHICH STATE (2 LETTERS)"
  ;N$
61 IFN$="AL"THEN N=1:GOTO112
62 IFN$="AK"THEN N=2:GOTO112
63 IFN$="AZ"THEN N=3:GOTO112
64 IFN$="AR"THEN N=4:GOTO112
65 IFN$="CA"THEN N=5:GOTO112
66 IFN$="CO"THEN N=6:GOTO112

```


HAM RADIO PROGRAMS

MORSE - Morse Code practice program for developing code speed for the Novice, Technician, or General class licenses.

DX - Displays countries by entering the first letter or number of the DX call sign.

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

Order **HR-1** (3 programs) \$11.95 T or D

MORSE TERMINAL

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

STATION LOG

Keep a record of your contacts. Save and load records to tape or disk. Add to the log and quickly find stations. Print the log to a printer **HR-3** \$9.95

THERMOMETER

Now your computer can give you the temperature in both Fahrenheit and Centigrade. Assembly plugs into a joystick port and consists of two thermistor on a 10' and a 20' cable for both inside and outside temperatures. **CC-THERM 2** \$19.95.

DCN on DISK or TAPE PROGRAMS
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AUDIO GENERATOR - Generates exact audio frequencies using digital sine waves. #44.

FREQUENCY COUNTER - Accurately measure audio frequencies up to 12000 hertz. #45.

TONING METER - Indicates proper tuning for RTTY and Slow Scan Television. #48.

WEFAX - Weather facimile program draws weather maps on the screen. #47.

RAM MATH - Solves most problems with circuits, antennas, decibels, etc. #49.

RAM RTTY - Uses the cassette port. Interface instructions are included. Operate at 60, 67, 75, & 100 baud Baudot. #50.

All programs are color computer 3 compatible unless indicated and are on tape or disk. A 32K computer is required. Please specify tape or disk software.

Checks, VISA or MC, Add \$3 shipping.

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```

67 IFN$="CT"THEN N=7:GOTO112
68 IFN$="DE"THEN N=8:GOTO112
69 IFN$="FL"THEN N=9:GOTO112
70 IFN$="GA"THEN N=10:GOTO112
71 IFN$="HI"THEN N=11:GOTO112
72 IFN$="ID"THEN N=12:GOTO112
73 IFN$="IL"THEN N=13:GOTO112
74 IFN$="IN"THEN N=14:GOTO112
75 IFN$="IA"THEN N=15:GOTO112
76 IFN$="KS"THEN N=16:GOTO112
77 IFN$="KY"THEN N=17:GOTO112
78 IFN$="LA"THEN N=18:GOTO112
79 IFN$="ME"THEN N=19:GOTO112
80 IFN$="MD"THEN N=20:GOTO112
81 IFN$="MA"THEN N=21:GOTO112
82 IFN$="MI"THEN N=22:GOTO112
83 IFN$="MN"THEN N=23:GOTO112
84 IFN$="MS"THEN N=24:GOTO112
85 IFN$="MO"THEN N=25:GOTO112
86 IFN$="MT"THEN N=26:GOTO112
87 IFN$="NE"THEN N=27:GOTO112
88 IFN$="NV"THEN N=28:GOTO112
89 IFN$="NH"THEN N=29:GOTO112
90 IFN$="NJ"THEN N=30:GOTO112
91 IFN$="NM"THEN N=31:GOTO112
92 IFN$="NY"THEN N=32:GOTO112
93 IFN$="NC"THEN N=33:GOTO112
94 IFN$="ND"THEN N=34:GOTO112
95 IFN$="OH"THEN N=35:GOTO112
96 IFN$="OK"THEN N=36:GOTO112
97 IFN$="OR"THEN N=37:GOTO112
98 IFN$="PA"THEN N=38:GOTO112
99 IFN$="RI"THEN N=39:GOTO112
100 IFN$="SC"THEN N=40:GOTO112
101 IFN$="SD"THEN N=41:GOTO112
102 IFN$="TN"THEN N=42:GOTO112
103 IFN$="TX"THEN N=43:GOTO112
104 IFN$="UT"THEN N=44:GOTO112
105 IFN$="VT"THEN N=45:GOTO112
106 IFN$="VA"THEN N=46:GOTO112
107 IFN$="WA"THEN N=47:GOTO112
108 IFN$="WV"THEN N=48:GOTO112
109 IFN$="WI"THEN N=49:GOTO112
110 IFN$="WY"THEN N=50:GOTO112
111 GOTO 60
112 PRINT@160,"ABBREVIATION   :
      "K$(N):EXEC43345
113 PRINT@192,"FULL NAME     :
      "Q$(N):EXEC43345
114 PRINT@224,"CAPITAL      :
      "J$(N):EXEC43345
115 PRINT@256,"STATEHOOD    :
      "M$(N):EXEC43345
116 PRINT@288,"POPULATION   :
      ";:PRINTUSING"###,###,###";Z(N
      ):EXEC43345
117 PRINT@320,"POP. RANK 1-50 :
      "A$(N):EXEC43345
118 PRINT@352,"# OF COUNTIES :
      B(N):EXEC43345
119 PRINT@384,"AREA - SQ.MI.  :
      ";:PRINTUSING"###,###";T(N)
120 PRINT@416,"SIZE RANK 1-50 :
      "Y$(N):EXEC43345
121 GOTO 60
    
```

Question & Answers

These are questions from our readers with our answers. If you have a question or would like to provide information to our readers, then I would like for you to write. - Bill.

Dear Bill

Help!!! I recently purchased PD-34 "Bulletin Board". In "Getting COBBS online", it mentions the COBBSINT.DAT file. I don't have that on the diskette. When I go to SMF/EDI file, it locks up my CoCo. What am I doing wrong? I have a CoCo3 with 2 Disk Drives, 128K, Multi-pak Interface, CM-8 Color Monitor, DMP 106, RS-232 Program-Pak and a DCM-7 modem. I am interested in starting up my own BBS with ham radio as the main portion of it. Also I would like your recommendations on upgrading this to 512K and if any modifications have to be done to the Multi-Pak. Any and all help would be greatly appreciated. Keep up the good work!

Bill McCollum , KAOZFZ
1314 Deer Park Blvd.
Omaha, NE 68108

Bill thank you for your letter and I am sorry that you are having problems with the bulletin board program.

I need reader help on answering Bill's question about the bulletin board programs. Does any one have the COBBSINT.DAT program? Can our bulletin board program be run without it? I would appreciate hearing from

anyone who can solve Bill's problem. We are withdrawing this program from our public domain list until we are sure it will work. We purchased our public domain program from various sources and have checked most of them out. This is one that we haven't checked.

A 512K memory expanders for the CoCo 3 will cost you from \$200-225 depending upon the price of memory chips. Chips cost about \$12 and 16 are required. Then there is the cost of the memory board.

You will not have to do anything to the multipack interface. If you want me to get you a memory upgrade call me some evening. We used to sell them but stopped when the prices of memory chips started soaring.

Thanks for your letter - Bill

Dear Bill,

How do I tie my computer to my Radio Shack TRS 80 Dmp 200 Printer so that I can print incoming RTTY or CW? Do I need a command to add to the program or ???

I assume you have the printer cable installed. Our CW terminal program uses the printer port. The CW would have to be saved to tape or disk and printed later. It would be nice if there were two serial ports. A patch would have to be written for RTTY. Both of these take additional software that is not

included in the programs. I do not have the required patches. Radio Shack used to market a RS-232 program pack. It has been discontinued but would allow two serial operations to be performed at the same time.

The following is a letter from Bob Helms. He submitted a printer utility article which we printed in our December 87 issue. His EDT-MAC program is in this issue. He answers many questions and asks a few. We thought the letter would be of interest to our readers. - Bill.

Bob Helms, AF5Z
12406 Breckenridge Drive
Eagle River, AK 99577
Phone (907) 694-5821

Dynamic Electronics Inc.
P.O. Box 896
Hartselle, AL 35640

Hi Bill & Dean,

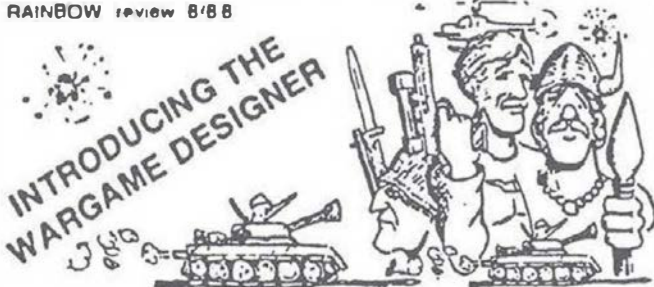
Dynamic Color News is looking good ! The improvements in size and quality of articles is a credit to your publication. If you recall, you published some of my printer utilities in your December '87 issue, Thanks. I am enclosing a simple file conversion utility to change assembly language source code files from Microsoft's EDTASM format to that required by Microworks MACRO-80C assembler. I wish to submit it for paid publication.

I would like to offer some general comments to you as I flip thru your May '88 issue. These are intended to be constructive and may answer some readers questions.

The series by John Galus on "The Marriage of M/L and BASIC" is quite well done. Only advanced programmers understand the use

of the USR and VARPTR statements with the COCO. There is an error in LINE 100 of each of the BASIC listings #1 through #4 in the May '88 issue. The protected memory area reserved for the M/L object code should be CLEAR200,&H6FFF instead of CLEAR200,&H7EFF since the first byte of the M/L subroutine is at &H7000 instead of &H7F00. Luckily this won't usually cause a problem since BASIC's stack seldom is large enough to expand downward from &H7E37 to overwrite the M/L subroutine in the &H7000-&H7020 area. However should this happen, the machine will crash with unpredictable results. I suspect this error occurred in a last minute edit to match last month's manuscript or to save memory.

RAINBOW review 8'88




INTRODUCING THE WARGAME DESIGNER

TAKE COMMAND! Now you can create your own 1 & 2 player wargames and more. If you are into wargames, science fiction or Dungeons and dragons, you'll love the WGD system.


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I have a response to Bill Morrissey concerning ERROR #215 and #216 when he attempts to use the OS-9 system on a DESKMATE disk. These error codes are "Bad Path Name" and "Path Name Not Found" respectively. They occur when you enter a command or filename that doesn't exist in the execution directory of the OS-9 system. The files contained on the DESKMATE disk are only a very small portion of those contained on the standard OS-9 System Disk. The only utility command files there are those required for the DESKMATE application software to function. OS-9 is a disk-based operating system - commands are read from a system disk instead of called from the internal read-only-memory (ROM) inside the computer. In simple terms, commands improperly entered or "not found" on the disk cause a sort of "syntax" error in OS-9.

I am glad to see you get involved in packet radio. I may be reached through the WORLI PBBS system by AF5Z @ KL7AA-7. I have really enjoyed packet since August '84 on both VHF and HF. The Coco ham community is in dire need of specialized data communications software with advanced features such as split screen (RX/TX), menu-driven packet commands, multi-mode terminal operation (CW, Baudot, AMTOR, ASCII, FAX), canned message buffers, and full disk access.

Some important tips to interfacing the Coco to a TNC is to insure that software flow control is enabled in the TNC. The TAPR commands to achieve this are TRFLOW ON, TXFLOW ON, and XFLOW ON. The Coco terminal software used MUST provide XON/XOFF protocol in BOTH directions! That is, the TNC must be able to pause the computer's output when sending a file to avoid overflowing the TNC buffer

AND the computer must be able to pause the TNC data flow when receiving a file to allow the terminal software time to process incoming characters. Some software will allow hardware flow control with the deluxe RS-232-C program pack but the three wire serial I/O port on the Coco only allows hardware flow control (handshake) during file transmission. I've sent dozens of large files successfully with Mike Ward's shareware terminal MIKEY TERM. Several other programs will work but it is hard to beat the performance, user support and cost of MIKEY TERM. Any 300 baud ASCII dumb terminal will allow you to converse on the keyboard with packet but more advanced programs are needed for file transfers without loss of data.

I see you are starting to publish BBS and club information - you might list the COCONET BBS at 405-376-1494 in the Oklahoma City, OK area which operates 24 hrs per day with no password or connect fees required. The system is operated by the Central Oklahoma Computer Organization, INC. (COCO, INC.) and contains almost 2 megabytes of COCO software and related files. Drop a DCN issue to them at 6440 N. Peniel, Apt #73; Okla. City, OK 75132 for some prospective subscribers. The group is dedicated to the Coco and has over a hundred members.

Ahh, another tip - - There is an error in the Coco 3 manuals and quick reference guide which caused me some frustration. The HSTAT command used to obtain information regarding the hi resolution text screen cursor is improperly documented. The example syntax is shown as

```
HSTAT          v1,v2,v3,v4
example --> HSTAT C,A,X,Y
```

Where v1 character code

v2 character attribute
v3 Cursor X coordinate
v4 Cursor Y coordinate

The error is the description and use of variable v1 (C in the example) - - v1 should be v1\$ - - a STRING variable containing the actual character instead of a numeric variable containing the character code.

Example --) HSTAT C\$,A,X,Y.

Bill, do you operate RTTY? That was my original reason for getting a computer ! Little did I know the computer would take most of my hamming time. The RTTY software on the DATA COMMUNICATIONS directory of Delphi's COCO SIG called SMARTY by Jim Sanford is excellent. It is for Coco 3 only but uses the 80 column display, allows disk I/O and operates in BAUDOT and ASCII modes. It is interrupt driven and has many features I haven't seen for the Coco. It is shareware - - perhaps he would like you to distribute it for him. I bought the assembly source from him and am trying to add some features to it but I will include the documentation and object file on the disk.

I am working on several programming projects related to ham radio - - they include a packet terminal and message handling utilities.. If I can get them polished, perhaps you might publish them. Have you seen any teletype or packet BBS software for the Coco ? I read rumors of the WORLI/WA7MBL software being ported to OS-9 but don't have a source for it yet.

Well, I've rambled on long enough. If you are looking for a particular program to do something with the Coco, let me know. I don't do much with graphics or sound but enjoy writing application and utility programs in either BASIC or assembly. I look forward to hearing from you on the enclosed manuscript and program.

Sincerely,

Bob Helms

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Newport, NC 28570

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The Computer Cellar
300/1200/2400 Baud
24 hrs. /day (319) 277-0646
Kevin Langenwaller
2605 Eddie St
Cedar Falls, IA 50613

The CoCo Nut Tree
300/1200 Baud, 24 hrs,
7 days a week, no parity,
7 data bits, 1 stop bits,
echo off. (216) 792-9745

The "Manton Modem" BBS 300 Baud, full Duplex 7E1 24 hrs daily. Running on a CoCo 3, 512K OS9 Level 11 with S.D. Roberson's PBBS V.5.0 storage on a 30 meg harddrive. (616) 824-6026
SYSOP- Carl Johnson
6030 N. 43rd
Manton, MI 49663

FAT NEWSLETTER 300/1200 Baud
FAT 1010
Concord Av
Piqua, OH 45356
(513) 778-9624

Hot CoCo Users Group
La Porte City, IA 50651
Monthly News Letter & BBS
(319) 277-0646

Electronic Information Network
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Syslink (312) 622-4442
Chicago Syslink Network
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Chicago, IL 60639-4321

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PRODUCT REVIEWS

This section is open to all producers of color computer products. We will review your product and write a review free of charge. Any comments about the review will be printed in a later issue.

CAVE WALKER

This is an exciting adventure game by Radio Shack. The purpose is to explore the Cave of the Mystics and find the hidden treasure. The program requires a 64K color computer, a disk drive and a joystick. It is an OS-9 based program and the required OS-9 system operating instructions are included on the disk. First a backup disk should be made using the standard backup procedures. The original disk should be stored in a safe place after a backup is made. The CAVE WALKER game can be stopped at any level and saved to the disk. This allows the game to be continued at a later time and prevents losing the game when a power failure or other interruption occurs.

After a backup is made, the game is started with the backup disk by entering "DOS" from the keyboard. The words "OS9 BOOT" will appear on the screen. The disk drive will turn for a few seconds after which an OS-9 title will appear and the program asks for the time. Press enter and continue. Next a picture appears and you are asked if the sky is blue or red. Move the joystick left or right and a box will appear around the words blue or red.

Press the fire button when the words match your sky background. The next screen asks for a practice or real game. The practice game allows you to become familiar with the game. You can practice your strategy and jumps without worrying about the score. If the computer is left unattended for a while, it starts playing a game by itself. This makes an interesting display.

As you travel through the cave, there are various objects that you can obtain that will give you points. These are door keys, bread, lock keys, bags of gold, lock, umbrella, flask, rings, crowns, treasure chest, gold bar, diamond, and spell books. A key allows you to open a door, an umbrella keeps you from being killed as you fall, and a ring repels the great white bat. The number of points you receive from each of these and their purpose are explained in the instruction book.

There are three cave phenomena that allow you to move easily within the cave. These are pillars, floating islands, and springs. You must be careful not to get too close to a fireball, be caught up in a jet stream, be hit by a cannon, or be bitten by the bat.

The game is for one person at a time and can provide many hours of fun and entertainment. Play with your friends and see who can get the highest score. CAVE WALKER is available at your local Radio Shack Store and costs \$24.95.

LOAN PROGRAM

This program will calculate the payments for a loan. If you are planning on buying a car, boat, or house, then this program can help you figure your budget. A monthly analysis is included.

```

120 CLEAR 50:CLS
130 PRINT TAB(4);"LOAN CALCULATOR"
140 PRINT
150 INPUT "LOAN AMOUNT";A
155 GOSUB1000:IFA=0THEN150
160 INPUT "INTEREST RATE";R
170 INPUT "LENGTH OF LOAN (MONTHS)";N
180 R=ABS(R):M=R/1200
190 GOSUB800
200 W=(1+M)n
210 P=(A*M*W)/(W-1)
220 P=INT(P*100+.99):P=P/100
230 PRINT"MONTHLY PAYMENT IS";P
240 FP=P:PRINT
250 PRINT "NEXT ACTION:"
260 PRINT " 1 - SHOW MONTHLY ANALYSIS"
280 PRINT " 2 - OVERRIDE MONTHLY PAYMENT"
290 PRINT " 3 - START OVER"
300 PRINT " 4 - END"
310 A$=INKEY$:IF A$=""THEN310
315 C=VAL(A$)
320 ON C GOTO 440, 400, 120, 370
330 PRINT "CHOICES ARE 1, 2, 3, OR 4"
340 GOTO 250
370 END
400 PRINT:INPUT"MONTHLY PAYMENT";P
410 GOTO240
440 GOSUB450:GOTO510
450 GOSUB800

```

```

460 PRINT TAB(4);"REMAINING";TAB(15);
470 PRINT "----INTEREST----"
480 PRINT "MO BALANCE";TAB(15);
490 PRINT "MONTH TO-DATE"
500 RETURN
510 B=A*100:TT=0:TR=0:L=0:P=P*100:R$=""
520 FOR J=1TON
530 T=M*B
540 T=INT(T+.5)
550 IF J=N THEN P=B+T
560 TP=TP+P:B=B-P+T:TT=TT+T
565 IF B<0 THEN GOSUB 2000
570 IF R$="T" THEN 660
580 PB=B/100
590 PT=T/100
600 T2=TT/100
610 PRINTJ;
615 PRINT USING "$$###.##-";PB;P;T;T2
617 IF B=0 THEN J=N:GOTO 630
620 L=L+1:IF L<6 THEN 660
630 PRINT "PRESS 'T' FOR TOTALS,":PRINT "ANY OTHER KEY TO CONTINUE";
640 R$=INKEY$:IF R$=""THEN 640
650 L=0:GOSUB450:IF R$="T" THEN CLS:PRINT "CALCULATING TOTALS"
660 NEXT
670 PRINT:PRINT "LAST PAYMENT =" ;P/100
680 PRINT "TOTAL PAYMENTS =" ;TP/100
690 PRINT "MONTHLY PAYMENT WAS";FP
710 PRINT:PRINT"PRESS ANY KEY TO CONTINUE"
720 R$=INKEY$:IF R$=""THEN720
730 P=FP:GOTO240
800 CLS
810 PRINT A;"FOR";N;"MONTHS AT";R;"%"
830 RETURN
1000 A=ABS(A):A=INT(A)

```

DYNAMIC COLOR NEWS CUMULATIVE INDEX

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MPM Program Listing
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* PD-41
Picture files

STAMPS MAX 2 8 3
STARTREK MAX 2 8 3
ST-TREK2 MAX 2 8 3
SCHOOL MAX 2 8 3
SATURN MAX 2 8 3
ESCHER MAX 2 8 3
LABOR MAX 2 8 3
MASK MAX 2 8 3
BUG BOX MAX 2 8 3
SPACE MAX 2 8 3
EASTER MAX 2 8 3
SPACE 2 MAX 2 8 3
POPEYE MAX 2 8 3
GARFIELS MAX 2 8 3
BEETLE 8 MAX 2 8 3
POLO MAX 2 8 3
HAGAR MAX 2 8 3
X-PAD MAX 2 8 3
CASTLE MAX 2 8 3
MUSIC TV MAX 2 8 3
COCO MAX 2 8 3

* PD-42
Picture files

TITLES MAX 2 8 3
PIXFILES BAS 0 8 3
THOLIAN MAX 2 8 3
JODIAO MAX 2 8 3
F15 MAX 2 8 3
QUIEN MAX 2 8 3
BRNCOS MAX 2 8 3
STARTREX MAX 2 8 3
ROOM MAX 2 8 3
RAMBO MAX 2 8 3
OWL MAX 2 8 3
ENTERPR MAX 2 8 3
STAR-T3 MAX 2 8 3
NCC-1701 MAX 2 8 3
SAT-2 MAX 2 8 3
ATMOSP MAX 2 8 3
STARWARS MAX 2 8 3
ORIENTAL MAX 2 8 3

* PD-43
Picture files

STAMP MAX 2 8 3
STRIPE MAX 2 8 3
WOMAN MAX 2 8 3
BLUEJAY MAX 2 8 3
LUCY MAX 2 8 3
OLD ENO MAX 2 8 3
MENU1 MAX 2 8 3
OWL MAX 2 8 3
VAN GOD MAX 2 8 3
WOMANI MAX 2 8 3
PSN MAX 2 8 3
DUCKPOND MAX 2 8 3
RANGER MAX 2 8 3
PLANET MAX 2 8 3
CHRSTMAS MAX 2 8 3
PEACE MAX 2 8 3
WOMAN3 MAX 2 8 3
HAWK MAX 2 8 3
PHASER MAX 2 8 3
PIXFILES BAS 0 8 3

PD-44
Terminal program with documentation. This will work with the CoCo-3. Instructions are included.

MTRM43 BIN 2 8 8
CONFIG43 BAS 0 8 4
MSTART BAS 0 8 4
MTRM1 DOC 1 A 11
MTRM2 DOC 1 A 8
MTRM3 DOC 1 A 7
DOS BOOT DAT 1 A 1
* 0 8 1
* 1 A 1
READOOC BAS 0 8 1

* PD-45
Picture Files

DRAGON MAX 2 8 3
HOT LIPS MAX 2 8 3
ANIMALS MAX 2 8 3
CLOWN 7 MAX 2 8 3
FISH MAX 2 8 3

3 MEN MAX 2 8 3
S MAP MAX 2 8 3
BUOS MAX 2 8 3
CFISH MAX 2 8 3
HERG MAX 2 8 3
WHAP MAX 2 8 3
GSCOTT MAX 2 8 3
STATES MAX 2 8 3
HORSE MAX 2 8 3
CROSS MAX 2 8 3
FOOD4 MAX 2 8 3
RSTONE MAX 2 8 3
COCO MAX 2 8 3
ALIEN MAX 2 8 3
PIXFILES BAS 0 8 3

* PD-46
Talk and Music Files
(C)LOADM "FILE" then EXEC.

TALK BIN 2 8 11
TALK2 BIN 2 8 11
WILLTELL BIN 2 8 9
MUSICBOX BIN 2 8 1
BEATLES BIN 2 8 4
JUMP BIN 2 8 5
GREIN BIN 2 8 5
GHOST BIN 2 8 4
JINGLE BIN 2 8 3
WORLD BIN 2 8 5
CTRYROAD BIN 2 8 2

* PD-47
Miscellaneous Pgs

T BAS 0 8 2
SANTEE2 BAS 0 8 1
MILEAGE BAS 0 8 1
M BAS 0 8 1
DIGITS BAS 0 8 1
NUMBLIST BAS 0 8 1
COUNT BAS 0 8 1
SC BAS 0 8 1
DRAWTEXT BAS 0 8 1
SAMPLE BAS 0 8 1
GRSCRWRT BAS 0 8 2
HRTXT2 BAS 0 8 3
DRAW BAS 0 8 2
WRITES BAS 0 8 1
TYPEBIT BAS 0 8 2
WRITEBIT BAS 0 8 2
TEXT2 BAS 0 8 2
SANTEE BAS 0 8 2
SHUTTLE BAS 0 8 1
AJOCK BAS 0 8 1
PLATFORM BAS 0 8 1
HAZE BAS 0 8 4
DISKZAPR BAS 0 8 2
ZAP BAS 0 8 3
DETHSHIP BAS 0 8 3
BACKUP3S BAS 0 8 1
BOOT BAS 0 8 1
SCRNLIST BAS 0 8 1
DOSSTART BAS 0 8 1
LABEL BAS 0 8 2
DSKDSABL BAS 0 8 1
NOFREEO BAS 0 8 1
FORMATER BAS 0 8 1
ROMRAM BIN 2 8 1
SUPDUP BIN 2 8 1
TESTTEXT BAS 0 8 1

* PD-48
Miscellaneous Pgs

EXTBAS BAS 0 8 3
DISAPPEAR BAS 0 8 1
PAINT BAS 0 8 1
DATA BIN 2 8 1
DATA2 BIN 2 8 1
SCRDATA BIN 2 8 1
FILL2 BIN 2 8 2
QUADDRAW BAS 0 8 1
CELTIC BAS 0 8 2
ALL RAM BAS 0 8 1
CHARGEN BIN 2 8 1
ROMRAM BIN 2 8 1
OBSTACLE BAS 0 8 1
64K RAM BAS 0 8 1
COLORSEL BAS 0 8 1
TRIO BAS 0 8 4
ALGEBRA BAS 0 8 4
ANIMALS BAS 0 8 1
STATECAP BAS 0 8 2
MLSOUNDS BAS 0 8 1
ROTATION BAS 0 8 2

PARABOLA BAS 0 8 2
INSTAPIC BAS 0 8 1
CLOVER BAS 0 8 1
MAT-PLOT BAS 0 8 1
WHEEL 1 BAS 0 8 1
LETTER-R PAR 1 A 1
3-LINES ROT 1 A 1
TRAPZOID ROT 1 A 2
PYRAMID ROT 1 A 2
CUBE ROT 1 A 3
SIX24 BAS 0 8 2
WINDOW BAS 0 8 5
GGPRTSU BAS 0 8 1
KALEIDO BAS 0 8 1
CK83APRT BAS 0 8 1
NUMCHYTR BAS 0 8 1
ADVRTH BAS 0 8 1

* PD-49
Miscellaneous Pgs.

BC BIN 2 8 10
PEDRO BIN 2 8 11
BLOCKADE BAS 0 8 3
REPEAT BAS 0 8 1
AIRPLANE BAS 0 8 1
BUSTOUT BAS 0 8 1
GOLF BAS 0 8 7
CITY BAS 0 8 2
AIR-RAID BAS 0 8 2
HAZE BAS 0 8 4
D'IALDUP BIN 2 8 2
DIRMAP BAS 0 8 3
CHESS BAS 0 8 5
WHATZIT BAS 0 8 4
BATLSHIP BAS 0 8 3
SP*ROCKS BAS 0 8 1

* PD-50
Miscellaneous PGMS

GOBBLER BAS 0 8 2
PYTHON BAS 0 8 2
LUNAR BAS 0 8 2
LUNALANA BAS 0 8 1
AMAZING BAS 0 8 2
BALLOON BAS 0 8 1
VAPORWRM BAS 0 8 2
ABN BAS 0 8 3
BULLSEYE BAS 0 8 1
CRASH BAS 0 8 1
DOTS BAS 0 8 3
E-16 BAS 0 8 3
KRYPTON ART 2 8 3
KRYPTON BAS 0 8 1
KRYPTON GAM 0 8 1
NUKEATTK BAS 0 8 2
ASTEROID BAS 0 8 1
PRIX BAS 0 8 2
ONE BIN 2 8 3
TWO BIN 2 8 3
THREE BIN 2 8 3
FOUR BIN 2 8 3
TEMPEST BAS 0 8 2
SNAKE BAS 0 8 2
SCORE DAT 1 A 1
OTHELLO BAS 0 8 4
ROCKS BAS 0 8 3
LANDER BAS 0 8 2

* PD-51
Games & Programs

DRAGRACE BAS 0 8 1
WORMER BAS 0 8 2
SIMON BAS 0 8 2
RIDER BAS 0 8 2
MISSILE BAS 0 8 3
LETSHOOT BAS 0 8 2
SHOOTGAL BAS 0 8 2
MISSILE2 BAS 0 8 3
FENCE BAS 0 8 3
BANDIT BAS 0 8 1
CHICKEN BAS 0 8 2
MAXIMUM BAS 0 8 3
FLIGHT BAS 0 8 2
COVERUP BAS 0 8 2
WORLDMAP BAS 0 8 4
POUNCE BAS 0 8 1
MARTIANS BAS 0 8 2
FINDIT BAS 0 8 3
SCRAMBLE BAS 0 8 5
BOUNBABY BAS 0 8 2
CHICK BAS 0 8 3
BOBO BAS 0 8 3
RUBIC BAS 0 8 4
MCJUMP BAS 0 8 3

PD-56

Glossary, Memory
Maps, Programs

COCO VIP 1 A 4
VIP ON 3 VIP 1 A 1
BEEP VIP 1 A 1
MCTR33 VIP 1 A 1
GLOSSARY VIP 1 A 7
POKEPEEK VIP 1 A 17
WIDTH VIP 1 A 1
COCO 3 VIP 1 A 17
MISSLES BAS 0 8 2
CLOCK BAS 0 8 1
JET BAS 0 8 4

* PD-57
Picture Files

VAHPRE PIC 2 8 3
ATLANTA BAS 0 8 3
NOGHOST PIC 2 8 3
AIRPORT BAS 0 8 4
S EASTON BAS 0 8 4
15MLSTEP BAS 0 8 4
HAGAR PIC 2 8 3
SUNSET BAS 0 8 3
B NICKS BAS 0 8 4
SNOOPY1 BAS 0 8 3
HICKEY BIN 1 8 8
DONALD BIN 2 8 8
SNOOPY2 BAS 0 8 4
SNOOPY3 BAS 0 8 4
SNOOPY4 BAS 0 8 4

* PD-58
Miscellaneous Pgs.

DISKLIST BAS 0 8 1
DIRLIST BAS 0 8 2
ML ADDR BAS 0 8 1
DISKDOUP BAS 0 8 1
PRINTUTIL BAS 0 8 2
CALPRINT BAS 0 8 3
ALPHASONG BAS 0 8 1
PAINT BAS 0 8 1
DOGPICT BAS 0 8 2
EVADER BAS 0 8 1
NUKATTC BAS 0 8 2
BASICHAP BAS 0 8 3
JOYPAINT BAS 0 8 1
PUMPKIN BAS 0 8 1
HOMOYMS BAS 0 8 1
ABBREV BAS 0 8 4
CONVERT BAS 0 8 3
CASSDIR BAS 0 8 1
CVERT BAS 0 8 1
FLASCARD BAS 0 8 1
MESSAGE BAS 0 8 1
RELOCAT BAS 0 8 1
COUNT BAS 0 8 1
CALENDAR BAS 0 8 1
DOGS BAS 0 8 1
DOGFIGHR BAS 0 8 1
BEAST BAS 0 8 1

* PD-59
GAMES, UTILITIES

64X64P BAS 0 8 1
RND#S BAS 0 8 1
SCROLLER BAS 0 8 1
COCOBUG BAS 0 8 2
DRWBOARD BAS 0 8 1
SPACE BAS 0 8 1
DIR-ADDR BAS 0 8 1
BACKGAMN BIN 2 8 2
CHESS BIN 2 8 3
BATTLE BIN 2 8 2
GERM BIN 2 8 1
BLEEP BAS 0 8 2
TICKER BAS 0 8 3
LEAKYTAP BAS 0 8 3
UTOPIAN BAS 0 8 4
COLORDOT BAS 0 8 3
STAYALIV BAS 0 8 2
TIMEFLT BAS 0 8 3
NAVYGUNS BAS 0 8 2
ATACHAN BAS 0 8 3
CALENDAR BAS 0 8 1
POKER25 BAS 0 8 1
VIEWERS BAS 0 8 1
STUFF BAS 0 8 1

* PD-52
Picture files

COCO MAX 2 8 6
COL COCO MAX 2 8 6
HOOSHEAD MAX 2 8 6
COKE MAX 2 8 6
CUBS MAX 2 8 6
REDS MAX 2 8 6
BREAKERS MAX 2 8 6
USFL MAX 2 8 6
SPACE BIN 2 8 3
OIZMO MAX 2 8 3
DINASOUR MAX 2 8 3

* PD 53
Picture Files

INDIAN MAX 2 8 6
HOMECOME MAX 2 8 6
GRIN BIN 2 8 3
TARD BIN 2 8 3
STUD BIN 2 8 3
COMET BIN 2 8 3
DESERT BIN 2 8 3
FOOD BIN 2 8 3
SHIRK BIN 2 8 3
PLAYA BIN 2 8 3
HELLO BIN 2 8 3
GROVER BIN 2 8 3
DRIVE IN BIN 2 8 3
TIME BIN 2 8 3
KOALA BIN 2 8 3
PATTERN BIN 2 8 3
HAGAR BIN 2 8 3
CHIPS BIN 2 8 3

* PD 54
Picture Files

PENTAGON PIC 2 8 3
GRID 2 PIC 2 8 3
SNOWFLAK PIC 2 8 3
CONETUNL PIC 2 8 3
4-POINT PIC 2 8 3
BALTSTR MAX 2 8 3
CARTOON MAX 2 8 3
HUBLEWIS MAX 2 8 3
STARTREK MAX 2 8 3
HOUSE1 MAX 2 8 6
HOUSE2 MAX 2 8 6
LIFECYCL MAX 2 8 6
COCOMAO MAX 2 8 3
MASCATL MAX 2 8 3
COLUMBIA MAX 2 8 3
POLO MAX 2 8 3
ET BAS 0 8 7
WHEEL 1 PIC 2 8 3

* PD-55
Picture Files

PARKERT MAX 2 8 3
TOWER PIC 2 8 3
TOWER2 PIC 2 8 3
SCREEN PIC 2 8 3
BOHB PIC 2 8 3
ANDRON PIC 2 8 3
SALE PIC 2 8 3
CHIPS PIC 2 8 3
TUNLOAD BIN 2 8 3
LONEROAD BIN 2 8 3
CITYROAD BIN 2 8 3
LAKEROAD BIN 2 8 3
CROSSROAD BIN 2 8 3
BLACK BIN 2 8 3
CAL1 BIN 2 8 3
CAL2 BIN 2 8 3
CAL3 BIN 2 8 3
3-LEAF PIC 2 8 3
5-STARS PIC 2 8 3
SPHERE PIC 2 8 3
15-LEAF PIC 2 8 3

PD-21 MUSIC

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

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

• PD-22 MUSIC-1

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

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

• PD-23 MUSIC-2

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

ADDPLAY BAS 0 B 1
DEPLAY BAS 0 B 1
MSQUEZ BAS 0 B 2
RAIN MUS 2 B 2
SONATAJ MUS 2 B 3
STRAY MUS 2 B 4
FOGGY MUS 2 B 4
FUNERAL MUS 2 B 3
HARDDAY MUS 2 B 2
INVENT MUS 2 B 2
INVENT11 MUS 2 B 3
INVENT15 MUS 2 B 3
INVENT7 MUS 2 B 3
INVENT8 MUS 2 B 2
JOPLIN MUS 2 B 4
KHAH MUS 2 B 0

• PD-24 MUSIC-3

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

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

CRACONNE MUS 2 B 8
DIAMOND MUS 2 B 3
DOWNROAD MUS 2 B 4
FANTASY1 MUS 2 B 2

• PD-25 MUSIC-4

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

FANTASY2 MUS 2 B 3
GRENGRAS MUS 2 B 4
HUNOR MUS 2 B 4
INCROW MUS 2 B 3
STARWARS MUS 2 B 2
SUITECH MUS 2 B 6
SUPERMAN MUS 2 B 2
WHENIM64 MUS 2 B 4
ROOTBEER MUS 2 B 7
WAYUARE MUS 2 B 3
AXELF MUS 2 B 2
TOCATTI MUS 2 B 3

• PD-26 LAST WILL

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

• PD-27 GAMES

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

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

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

PD-29 COMM, WORD PRO, GAMES

GOSTSHIP BAS 0 B 8
INT RATE BAS 0 B 2
INVTANL PC 0 B 4
MENU BAS 0 B 4
MOTOJUMP BAS 0 B 3
SCREEN MAX 2 B 6
SCREEN1 BIN 2 B 3
SCREEN2 BIN 2 B 3
SCREEN2 MAX 2 B 6
STRINGTU BAS 0 B 4
TTERM DSK 2 B 4

USING BAS 0 B 3
WF-DOC JP 0 B 2
WORDFILE JP 0 B 4
PARMI DAT 1 A 1

PD-30 CHECK BOOK, UTILITIES

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

PD-31

PIRATES TREASURE -
As you explore the cave looking for the treasure, a picture appears on the screen as you go from room to room. These pictures are loaded from disk. A computer with a disk drive is required and a ramdisk is preferred.

PD-32

Color Computer 3 moving pictures. Consists of a beautiful waterfall and a colorful bouncing ball.

WATRFALL BAS 0 B 1
WATRFALL BIN 2 B 1
WATRFALL MGE 1 B 1
BALL BAS 0 B 1
BALL2 BAS 0 B 1
BOUNCE BIN 2 B 1
BALL2 HR1 2 B 4
BALL2 HR2 2 B 4
BALL2 HR3 2 B 4
BALL2 HR4 2 B 4

PD-33

EDUCATIONAL PROGRAMS

ABBREV BAS 0 B 4
ABCPPOP BAS 0 B 3
ALPHAAL BAS 0 B 1
EDUCATE BAS 0 B 1
HANGP BAS 0 B 1
HOMONYM BAS 0 B 1
SPELWORD BAS 0 B 1
MATH BAS 0 B 2
DRILL BAS 0 B 2
MLTP BAS 0 B 1
ROUND BAS 0 B 2
AREA BAS 0 B 6
METCONV BAS 0 B 3
NUMBERS BAS 0 B 2
SIEVE BAS 0 B 1

PD 35

ADDRESS FILES AND FINANCE PROGRAMS

PHONE BAS 0 B 1
LABELPRT BAS 0 B 1
LETTER BAS 0 B 3
MAILLIST BAS 0 B 2
PHONLST BAS 0 B 1
MINIWORD BAS 0 B 2
LNWIDTH BAS 0 B 1
CNKWRITE BAS 0 B 2
CNKANAL BAS 0 B 4
PRNTCHK BAS 0 A 1
CHECKS BAS 0 B 4
CNCKSTUB BAS 0 B 1
TOTALS DAT 1 A 1
CHECKS DAT 1 A 1
ORAPH BAS 0 B 4
LOAN BAS 0 B 3
CALC BAS 0 B 1
PAYMENT BAS 0 B 1
CASHJNL BAS 0 B 3
AMORT BAS 0 B 3

PD 39

ADDRESS FILES AND FINANCE PROGRAMS

PHONE BAS 0 B 1
LABELPRT BAS 0 B 1
LETTER BAS 0 B 3
MAILLIST BAS 0 B 1
WORDPROC BAS 0 B 3
MAILLIST BAS 0 B 2
PHONLST BAS 0 B 1
MINIWORD BAS 0 B 2
LNWIDTH BAS 0 B 1
CNKWRITE BAS 0 B 2
CNKANAL BAS 0 B 4
PRNTCHK BAS 0 A 1
CHECKS BAS 0 B 4
CNCKSTUB BAS 0 B 1
TOTALS DAT 1 A 1
CHECKS DAT 1 A 1
ORAPH BAS 0 B 4
LOAN BAS 0 B 3
CALC BAS 0 B 1
PAYMENT BAS 0 B 1
CASHJNL BAS 0 B 3
AMORT BAS 0 B 3

PD 36

COMP.SCIENCE PGMS 1:
These programs are tutorials on basic programming.

COMPSC1 BAS 0 B 8
COMPSC2 BAS 0 B 3
COMPSC3 BAS 0 B 0
COMPSC4 BAS 0 B 5
COMPSC5 BAS 0 B 0
COMPSC6 BAS 0 B 5
GETPUT BAS 0 B 2

TAPE-DSK & DSK-TAPE
With these programs you can copy a disk to tape or a tape to disk.

T2D BIN 2 B 2
DTCOPY BIN 2 B 1
DSK-TP BAS 0 B 1
DISKLIST BAS 0 B 1
DIRLIST BAS 0 B 2
DISKDUHP BAS 0 B 1
CASDDIR BAS 0 B 1

PD 37

COMP. SCIENCE PGMS 2

These programs are tutorials on basic programming.

IFTNEN DAC 0 B 8
EXTENDED BAS 0 B 2
GETPUT BAS 0 B 2
COMPSC18 BAS 0 B 8
COMPSC19 BAS 0 B 5
COMPSC17 BAS 0 B 7
EXTDSMO BAS 0 B 3

Pictures can be loaded with CoCo MAX or our PIXFILES/BAS program. They can be printed on a graphics printer. See Dynamic Color News issue #44 for a Graphics screen dup program. Our DYPHINT package allows large blown up pictures to be printed using standard print.

• PD 38

EDUCATIONAL PROGRAMS

These programs are excellent learning tools for school children.

ABBREV BAS 0 B 4
ABCPPOP BAS 0 B 3
ALPHAAL BAS 0 B 1
EDUCATE BAS 0 B 1
HANGP BAS 0 B 1
HOMONYM BAS 0 B 1
SPELWORD BAS 0 B 2
MATH BAS 0 B 2
DRILL BAS 0 B 2
MLTP BAS 0 B 1
ROUND BAS 0 B 2
AREA BAS 0 B 6
METCONV BAS 0 B 3
NUMBERS BAS 0 B 2

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

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

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PUBLIC DOMAIN SOFTWARE

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

* PD-1 GAMES

MENU BAS 0 B 1
 BEAST BAS 0 B 1
 BEAST DAT 1 A 1
 BOBO BAS 0 B 3
 GUNNER BAS 0 B 2
 HOW BAS 0 B 3
 LANDER BAS 0 B 3
 LIFE BAS 0 B 3
 MAX BAS 0 B 3
 POKER BAS 0 B 2
 BIORITHM BAS 0 B 3
 BLACKBOX BAS 0 B 2
 BLOCKADE BAS 0 B 1
 BUSJUMP BAS 0 B 1
 CHUTE BAS 0 B 2
 GO BAS 0 B 3
 HANGMAN BAS 0 B 2
 OTHELLO BAS 0 B 2
 TARTOS BAS 0 B 1
 TARTUS2 BAS 0 B 1

* PD-2 GAMES

MENU BAS 0 B 1
 RUBIC BAS 0 B 5
 FRACTAL BAS 0 B 1
 KALSCOPE BAS 0 B 2
 TARTUS BAS 0 B 1
 TARTUS2 BAS 0 B 1
 WORLD3D BAS 0 B 4
 LIFE BAS 0 B 2
 ADVENT BAS 0 B 4
 ADVENT DOC 1 A 2
 HURKLE BAS 0 B 2
 REVERSE BAS 0 B 2
 GUESSFR BAS 0 B 2
 SCRAMBLE BAS 0 B 3
 PIZZA BAS 0 B 2
 CINQUAIN BAS 0 B 2

* PD-3 GAMES

MENU BAS 0 B 1
 AANDAN BAS 0 B 2
 STARTREK BAS 0 B 0
 TREKINST BAS 0 B 3
 SEQUENCE BAS 0 B 2
 ALPHABET BAS 0 B 3
 GEOGRAPH BAS 0 B 4
 FLASH BAS 0 B 4
 BAGELS BAS 0 B 3
 OREGON BAS 0 B 0
 MULTIPLY BAS 0 B 2

* PD-4 ML GAMES

MENU BAS 0 B 1
 PONG BIN 2 B 1
 SQUASH BIN 2 B 2
 BLOCKADE BIN 2 B 2
 GERM BIN 2 B 1
 WIGWORM BIN 2 B 2
 GRID BIN 2 B 2
 ZEROQ BIN 2 B 2
 3DTICTAC BIN 2 B 7
 HOPBOP BIN 2 B 5
 ICEWAR BAS 0 B 6
 CIVILWAR BAS 0 B 4
 TICTACTO BIN 2 B 7

* PD-5 GAMES

MENU BAS 0 B 1
 CAVE BAS 0 B 4
 WARGAME BAS 0 B 2
 WARGAME BIN 2 B 1
 WARGAME2 BAS 0 B 5
 WARROOM BIN 2 B 3
 NORAD BAS 0 B 3
 ANDREA BAS 0 B 5
 CURSE BAS 0 B 4
 GARGOYLE BAS 0 B 0
 KINGTUT BAS 0 B 7
 TAIPAN BAS 0 B 6

DSK-6

SPELL & FIX- FIND
 SPELLING ERRORS
 IN TXT DISK FILES

MENU BAS 0 B 1
 MANUAL TXT 1 A 12
 SPELLFX2 BAS 0 B 1
 SPELLFX2 BIN 2 B 0
 SPELLFIX BAS 0 B 1
 DICT TXT 1 A 33
 COREDICT TXT 1 A 1
 SAMPLE TXT 1 A 1
 BUILD BAS 0 B 1
 LIST BAS 0 B 1
 RESET BAS 0 B 1
 APPEND BAS 0 B 1
 ADDWORDS BIN 2 B 3

PD-7 DISK UTILITIES

MENU BAS 0 B 1
 BASIC64 BIN 2 B 1
 BSEARCH BIN 2 B 1
 DISKCOMP BIN 2 B 1
 DISKTEST BIN 2 B 3
 DISKWASH BAS 0 B 1
 DOS64K BAS 0 B 2
 DSDBOOT BIN 2 B 1
 LIST BIN 2 B 2
 PRINT BIN 2 B 3
 PRINTDIR BAS 0 B 1
 RECOVER BIN 2 B 1
 ROMBACK BAS 0 B 1
 ROMFIX BIN 2 B 1

PD-8 DISK UTILITIES

SCRN51 BAS 0 B 1
 SCRNS1 BIN 2 B 1
 SCRNDemo BAS 0 B 2
 SDC BIN 2 B 1
 SQUEEZE BIN 2 B 1
 SSDBOOT BIN 2 B 1
 TAPE2DSK BAS 0 B 1
 TIMER BIN 2 B 2
 UNLOCK BIN 2 B 1
 BACKUP BIN 2 B 1
 BACKUP1 BIN 2 B 1
 MORE BIN 2 B 3
 SPEAK BIN 2 B 3
 PCLEARFX BIN 2 B 1
 MULTBACK BIN 2 B 1
 MULTBACK DOC 1 A 1

PD-9

TERMINAL PROGRAMS

MENU BAS 0 B 1
 TELETERM BIN 2 B 3
 TELETERM CAS 2 B 3
 TTHELP DAT 1 A 4
 MTERM BIN 2 B 6
 MTERM VIP 1 A 10
 MTERH BIN 2 B 6
 MTERH+ BIN 2 B 6
 DATATRDE BIN 2 B 3
 KERMIT BAS 1 A 1
 KERMIT BIN 2 B 2
 HAYESAE BIN 2 B 4
 HAYESAE DOC 1 A 6

PD-10

COLOR COMP. FORTH

MENU BAS 0 B 1
 FORTHMAN UL1 2 B 7
 FORTHMAN UL2 2 B 7
 FORTHMAN UL3 2 B 1
 FORTH BIN 2 B 3
 EDIT DAT 1 A 3
 FRTHDOC1 TXT 1 A 7

FRTHDOC2 TXT 1 A 7
 FRTHDOC3 TXT 1 A 1
 FRTHDOC4 TXT 1 A 7
 J2KFORTH BIN 2 B 4
 NEWFORTH BIN 2 B 3
 WE BAS 0 B 1

PD-11 MCPAINT

A COMPLETE GRAPHICS
 DEVELOPMENT PROGRAM
 WITH INSTRUCTIONS

RUN-HE BAS 0 B 1
 MCPAINT BIN 2 B 11
 ICONS SYS 2 B 3
 MCDOC DOC 1 A 11
 PRINTDOC BAS 1 A 1
 GLASDEMO BIN 2 B 0
 STARS BIN 2 B 2
 1940S SET 2 B 1
 BLOON SET 2 B 1
 BOLD SET 2 B 1
 FANCY SET 2 B 1
 GREEK SET 2 B 1
 GREEKU SET 2 B 1
 HEBREW SET 2 B 1
 OLDENG SET 2 B 1
 TYPING SET 2 B 1
 EPSON DRV 2 B 1
 EPSO2 DRV 2 B 1
 ANIMATE BAS 0 B 1
 ANIMAT BIN 2 B 1
 BANNER BAS 0 B 2
 MCUTIL BIN 2 B 1

* PD-12

PHODE 4 PICTURES

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

XIXCMP BAS 0 A 3
 OUTPOST BAS 0 A 3
 OUTPOST BIN 2 B 3
 SFIELD BAS 0 A 2
 SFIELD BIN 2 B 3
 PIXFILES BAS 0 B 3
 TRUCK BIN 2 B 3
 MODEM BIN 2 B 3
 HORSE BIN 2 B 3
 MISSION BIN 2 B 3
 CLOISTER BIN 2 B 3
 RAIN BIN 2 B 3
 EAGLE BIN 2 B 3
 ROSES BIN 2 B 3
 CHURCH BIN 2 B 3
 GARDEN BIN 2 B 3
 PRES BIN 2 B 3
 LONIA BAS 0 A 3

PD-13

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

PICTURES GCM 1 B 60

PD-14

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

PICTURES GCM 1 B 60

PD-15

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

PICTURES GCM 1 B 60

PD-16

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

PICTURES GCM 1 B 60

PD-17 DISK UTILITIES

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

PD-18 TAPE TO DISK
 DISK UTILITIES

DIRSORT BAS 0 A 1
 DISK-DIR BAS 0 A 1
 DISKLABL BAS 0 A 1
 LOADSOLO BAS 0 B 1
 MENU BAS 0 B 1
 PDIR BAS 0 A 1
 SORT BAS 0 B 1
 SORTPRT BAS 0 B 1
 SORTSAVE BAS 0 A 1
 SOULTION BIN 2 B 1
 SUPERBAC BIN 2 B 1
 T2U BIN 2 B 2
 TIMER BAS 0 B 1
 TPTODSK BIN 2 B 1

* PD-19 GAMES

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

* PD-20 GAMES

PEO BAS 0 B 3
 RABBIT BAS 0 B 1
 SAFE BAS 0 B 2
 SAUCER BAS 0 B 1
 SHOOTEM BAS 0 B 2
 SIMON BAS 0 A 1
 SLITHER BAS 0 A 2
 SPACE WA BAS 0 B 4
 STAR TRE BAS 0 B 1
 SUBCHASE BAS 0 B 2
 SUBDESTR BAS 0 B 2
 SUNDANCE BAS 0 B 2
 TANKS BAS 0 B 2
 TOWER BAS 0 B 2
 UNDRIVER BAS 0 B 1

PROGRAMS! PROGRAMS! and even more PROGRAMS!
from
Bill Bernico Software

Response from my Rainbow ad (May '88 - Page 56) was so great that I'm extending my offer. I'm selling ALL 7 of my "Pack" disks at half price. That's right, you'll get COCOPACK, FUNPACK, VALUPACK, SUBPACK, UTILPACK and 3-PACK (Volumns 1 & 2). These 'Pack' disk originally sold for \$6 EACH! Now they can be yours for the low low price of just \$21.00. That's HALF PRICE! I'll even pay shipping and handling. \$21 is all you pay. You'll get games, graphics, utilities, tutorials, educational, home help, disk management, font styles, printer, music, graphic lettering and input programs and many more useful, helpful and entertaining programs for your CoCo 1, 2 AND 3. Over 230 programs in all, and over 50 of those are for the new CoCo 3. The graphics are terrific.

Here's what you'll find on each disk:

COCOPACK - Over 60 programs, featuring selections from all catagories. Many graphic screen fonts.

FUNPACK - This disk includes additional and expanded fonts as well as 'CoCoSize', the exercise program for the Color Computer. (See the Rainbow review April '87 page 143 for details)

VALUPACK - This disk could have been called CoCoPack II because it contains dozens more programs in lots of catagories.

SUBPACK - Attention programmers! Here's a disk crammed with dozens of handy subroutines for you to use in your own programs. Throw dice, deal cards, display text on the graphics screen (CoCo 1&2) and much more!

UTILPACK - Find ML addresses, format your printer, figure business and finance deals, or calculate camera settings. These are just SOME of the many Utilities you'll find.

3-PACKs - Volumns 1 and 2 of contain many many programs just for the Color Computer 3. The graphics capabilities of this marvelous machine make it a natural for exciting games, graphics, and all the other catagories as well. A must for your growing collection of CoCo 3 programs!

Just to see if you're paying attention, for anyone who orders this collection of my goodies, I'll throw in disk number 8...it's called 3-PACK (Volumn III) and it's loaded with many more goodies just for the Color Computer 3. Remember, \$21 will get you 8, not 7 disks. U.S. funds only. Send cash, check or money order only to:

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DYPRINT

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

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

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

COLOR COMPUTER 2 KIT (SPECIAL PURCHASE)

Now you can build your own Color Computer 2. These Kits were designed for a school and are complete with a step by step instruction manual plus the normal Radio Shack operating manuals. They use 4164 memory chips and sockets are included for all integrated circuits. If you have an older CC-1 or CC-2 then this is an excellent source for spare parts. Replacement parts would cost more than this kit. CC-2 Kit reduced to \$49.95.

NEW TERMINAL PROGRAM

DYTERM 2 - Allows a Color Computer to interface with Modems, Terminals, or other Computers using the ASCII port. 300-2400 baud, 1 or 2 Stop bits, 7 or 8 bit words, variable parity. Download programs from bulletin boards or other computers or upload your ASCII programs. Supports CoCo 2 and CoCo 3 Disk or Tape computers. Basic program with machine language sub-routines is easily modified.

Tape or Disk \$19.95.

DECIMAL ML ASSEMBLER

DISASM is a 6809 Assembler-Disassembler that allows machine codes to be assembled using English mnemonics & decimal arithmetic. It supports all 6809 codes and is especially useful for beginners. Learn Assembly programming without using hex. Disassemble machine language programs and print them to a printer. \$9.95

COCOMAX II (Disk)

Requires a "Y" cable or multipack expander. \$59.95, "Y" Cable \$24.95.

DS-69B DIGITIZER

Capture pictures from your VCR or video camera. Then print them on your graphics printer. Have your friends over for an evening of fun and digitize and print their pictures. Supports all color computers. The picture can be displayed on the COCO 3's high resolution screen. Pictures can be Labeled with **COCO MAX** and printed on a graphics printer or saved on disk. 256 x 256 resolution, 64 levels of grey, & 8 images per second. Plug in ROM pack requires a multipack expander. Works with all color computer disk systems.

DS-69B \$149.95 including shipping.

CC-THERM 2

CC-THERM 2 is a dual digital thermometer for Radio Shack Color Computers. It consists of two thermistors wired to the end of 10' and 20' flat cables for measuring inside and outside temperatures. The other end of the cable is wired to a joystick plug. The thermistors can be mounted on a wall, inside equipment, or outside for temperature measurements. Basic software on tape or disk continuously prints the temperature in both Fahrenheit and Centigrade. T or D software. \$19.95

CC-LT

Now you can measure both temperature and light. The joystick assembly includes a light and temperature sensor at the end of a 20' flat cable. Uses one joystick plug. T or D Software 19.95.

MEMORY MANAGER (for the Color Computer 2)

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

MEMORY SAVER II

Have you ever had a power failure or brownout to wipe out your program? The **Memory Saver II** is a battery backup assembly that prevents loss of programs due to power failures. It mounts under the keyboard and works with all color computers. Consists of gel rechargeable battery, control circuit, & miniature toggle switch. Will power a color computer for up to a couple of hours during a power failure.

Special sale price. \$29.95.

Add \$3 S/H. Specify Tape or Disk Software. Checks, VISA, & MC.

Dynamic Electronics Inc., Box 696, Hartselle, AL 35640