

RADIO SHACK COLOR COMPUTER MAGAZINE

\$1.95

Nov. 1987
Issue #43

DYNAMICS



Ham Radio

Programming

Games

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; Bob Morgan, Ph. D., Consultant.

Entire Contents (c) by DYNAMIC ELECTRONICS INC., 1987. DYNAMIC COLOR NEWS is intended for the private use of our subscribers and purchasers. All rights reserved. Contents of this magazine may not be copied in whole or in part without written permission from DYNAMIC ELECTRONICS INC. Subscriptions are \$15/yr for U.S.A. \$18 Canada & Mexico, \$30 other foreign.

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

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

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

```

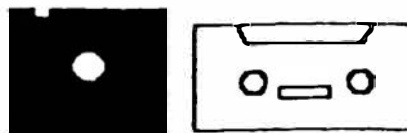
*****
*
*   DYNAMIC COLOR NEWS
*
*   Nov. 1987
*
*   Editor and Publisher
*   Bill Chapple W4GQC
*
*   Secretary
*   Dean Chapple
*
*****

```

CONTENTS

Save the Maiden (game)	4 *
Taking Control (Part 2)	12 *
(Basic Programming)	
ML Programming	18 *
Reformatting Data (Part 2)	24 *
Music (Program)	26 *
New Products	28
Questions & Answers	29
Editor's Comments	32
Ham Radio & Computers	33 *
(Packet Radio)	
Product Reviews	35 *

* Included in DCN Disk or Tape Package.



CC-THERM (new)

CC-THERM is a digital thermometer for Radio Shack Color Computers. It consists of a thermistor wired to the end of a flat cable. The other end of the cable is wired to a joystick plug. The thermistor can be mounted on a wall, inside equipment, or outside for temperature measurements. It can be used to monitor the temperature inside a computer or other equipment where a remote temperature measurement is desired. The computer could be used to control a relay to turn on a heater or air conditioner for regulating temperature. A dual version is available for measuring temperature in two locations or for measuring both inside and outside temperatures. The outside temperature can be read from your screen for Ham Radio use. Basic software on tape or disk continuously prints the temperature in both Fahrenheit and Centigrade. The software could be merged with other programs to expand its usefulness.

CC-THERM \$12.95, CC-THERM 2 \$19.95

CC-LIGHT (new)

Similar to CC-TERM except photo cells are used in place of the thermistors. Use the computer to record relative light intensities or turn on lights at dark. CC-LIGHT uses one joystick port and has the photo cell attached to the end of a 10' flat cable. A dual version has photo cells on 10' and 20' cables.

CC-LIGHT \$12.95, CC-LIGHT 2 \$19.95

CC-LT (new)

We combined CC-TERM and CC-LIGHT to provide an assembly that measures both temperature and light. A joystick assembly includes a light and temperature sensor at the end of a 20' flat cable. Uses only one joystick plug.

CC-LT \$19.95

Specify tape or disk software for CC-LIGHT or CC-TERM.

INTRODUCING DYPRINT

BANNER

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.

The printer parameters can be used to expand the size and quality of the signs. For example high density signs can be printed with printers that use compressed characters. Darker signs can be printed by using double strike.

MAXPRINT

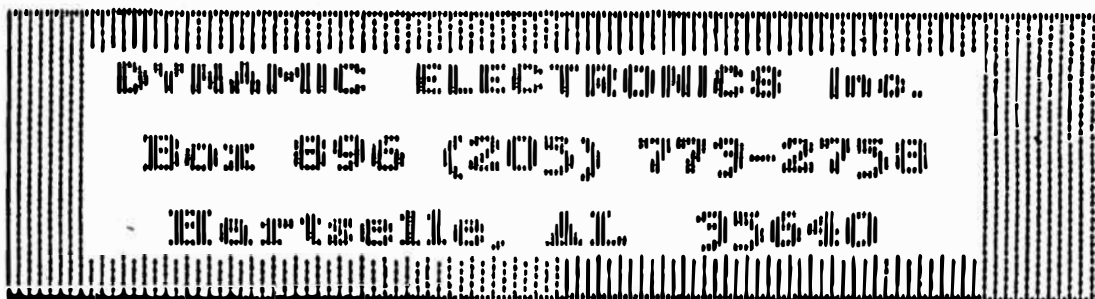
MAXPRINT allows graphics to be blown up and printed on a standard printer. Any PMODE 4 picture generated by COCOMAX, MAGIGRAPH, VIDEO DIGITIZERS, or BASIC can be printed. This allows a large picture or poster to be made. The program supports all 8 graphics pages for a total of 12288 bytes. MAXPRINT prints 8 characters per byte for a total of 98304 characters.

The graphics picture is 256 characters wide and is printed with 2 passes for the 128 character per line mode or 8 passes for the 32 character per line mode using large characters. The results from each pass can be trimmed and taped together to form a large blown up picture.

Use MAXPRINT to blow up pictures of friends and family and make posters announcing sales or special events.

The DYPRINT package contains both BANNER and MAXPRINT. The cost is only \$19.95 plus \$3 shipping for tape or disk.

Checks, VISA & MC Cards
Add \$3 Shipping



SAVE THE MAIDEN



SAVE THE MAIDEN is a Hangman type educational game. The game plays with the same rules as hangman except the dragon gets closer to the poor, defenseless, and tasty maiden each time you miss a letter. If you guess the word before the dragon gets to the maiden then you win. Watch what happens when the dragon wins!

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

```

Ø REM COPYRIGHT (C) T&D SOFTW
  ARE 1987      save maiden
1 CLEAR200,&H7F00
2 EE=1:GOTO1010
4 GOSUB1201
8 Z=RND(-TIMER)
9 RUN10
10 DIM A$(90),D(42),W(231),W$(23
  1)
11 PMODE3,1:PCLS2:SCREEN1,Ø:DRAW
  "C3S8"
12 A$(46)="BD5DRULBU5BR4":A$(32)
  ="BR6"
13 A$(65)="BDD5RU6R3D4NL3D2RU5BU
  BR3
14 A$(66)="D6RU6R3DRNDLD2NL3DRND
  LD2L3BU6BR7
15 A$(67)="BDD4RDU6R2FBD4GL2BU6B
  R6
16 A$(68)="D6RU6R3D6ENU4GL3BU6BR
  7
17 A$(69)="D6RU6R3BD3BLL2D3R3BU6
  BR3
18 A$(70)="D6RU6NR3D3R2BU3BR4
19 A$(71)="BDD4FU6R3FBD2D3LNU3L3
  BU6BR7
20 A$(72)="D6RU6D3R3U3D6RU6BR3
21 A$(73)="D6RU6BR3
  
```

```

22 A$(74)="BR4ND5LD6L2HBU5BR7
23 A$(75)="D6RU6D3RF2DBU3BL2E2UB
  R3
24 A$(76)="D6RNU6R2BU6BR3
25 A$(77)="ND6RD2ED2ED2E3D5RU6BR
  3
26 A$(78)="ND6FD2ED2ED2FU6BR3
27 A$(79)="BDD4FU6R3D6NL3EU4BUBR
  3
28 A$(80)="D6RU6R3D3NL3EUBUBR3
29 A$(81)="BDD4FU6R3D5GNL2EFH2R2
  U3BUBR3
30 A$(82)="D6RU6R3D3L2F3RH3REUBU
  BR3
31 A$(83)="BDDFRF2NH3DL3ULBR5UHB
  H3R3DRBUBR3
32 A$(84)="R2D6RU6R2BR3
33 A$(85)="D5FNU6R3U6RND5BR3
34 A$(86)="D6RNU6R2EU5RND4BR3
35 A$(87)="D6RNU6R2U6RD6REU5RND4
  BR3
36 A$(88)="D2BD2D2RU6D3R3U3D6RU2
  BU2U2BR3
37 A$(89)="D2FNU3RD3RU3RU3RND2BR
  3
38 A$(90)="BRR4NG5DG5R5BU6BR3
100 PMODE3,1:SCREEN1,Ø:PCLS2
110 DRAW"BM40,160S8C1L7H2U12HGU5
  F3GFD8E5U4H4EHR2UFR2FR3GL4FNR
  2GFD6GFR3NRGL4F2D2G2R5NRG"
115 PAINT(30,157),1,1:PAINT(30,1
  22),1,1:PAINT(20,128),1,1
120 PSET(36,118,4):PSET(37,118,4
  ):PSET(37,119,4):CIRCLE(46,11
  9),1,3,1
140 GET(16,116)-(50,162),D,G
200 DRAW"BM240,160S8C1L3RENU6DNU
  6RU6NR2L5U3EUEU2H2E2HNUHNU2BR
  EUL3UER2F2D4GNH F6NE2NR2L2H3
  DNL2DNL2F2D4"
205 PAINT(236,120),4,1
206 PAINT(238,140),1,1
210 DRAW"BM243,160C3U13BU3U11RD1
  3BD2D12"
490 B$="R6BR6":F$="R2ERERBD5H2LG
  LHLF2R2NEF2"
  
```

```

500 BL=10:GA=50:EA=16:FORX=1TO23
1:READW$(X):NEXT
510 W=RND(231):IF W(W)=1 THEN510
ELSEW(W)=1
520 WD$=W$(W):L=LEN(W$(W)):DRAW"
C3BM12,80":FORX=1 TO L:DRAWB$
:NEXT
525 DRAW"C3BM20,10":A$="CHOOSE A
LETTER":GOSUB1000
530 DRAW"C2":LINE(120,30)-(136,4
2),PSET,BF:DRAW"C3BM20,10":A$
="CHOOSE A LETTER":GOSUB1000
540 I$=INKEY$:IFI$="" THEN540
545 A$=I$:DRAW"BM120,30":GOSUB10
00
550 FORX=1 TO L:IF I$=MID$(W$(W)
,X,1) THENDRAW"BM"+STR$(X-1)
*24+12)+" ,60":GOSUB1000:R=1:N
L=NL+1:MID$(W$(W),X,1)="":NE
XT ELSE NEXT
570 IFR=1 THENR=0:IFNL=L THEN700
ELSE530
580 FORX=1TO3:DRAW"C4BM"+STR$(GA
-2)+" ,122XF$;":PLAY"V20T25501
EFGBCAEDAGFC":DRAW"C2BM"+STR$
(GA-2)+" ,122XF$;":NEXTX
600 IFWA=9 THEN610 ELSE FORX=2 T
O 20STEP2:PUT(EA+X,116)-(GA+X
,162),D,PSET:NEXT:GA=GA+X-2:E
A=EA+X-2:WA=WA+1:DRAW"C3BM"+S
TR$(BL)+" ,170":A$=I$:GOSUB100
0:BL=BL+20:GOTO530
610 WW=WW+1:DRAW"C2":LINE(20,10)
-(250,30),PSET,BF:LINE(120,30)
-(136,42),PSET,BF:DRAW"C3BM2
0,20":A$="THE WORD IS":GOSUB1
000:DRAW"BM20,40":A$=WD$:GOSU
B1000:FORX=1TO1500:NEXT:GOTO1
010
700 DRAW"C2":LINE(20,10)-(250,30
),PSET,BF:LINE(120,30)-(136,4
2),PSET,BF:DRAW"C3BM60,20":A$
="CORRECT":GOSUB1000CW=CW+1:R
=0:NL=0:WA=0:EA=16:GA=50:I$="
":BL=10
710 FORX=1TO1500:NEXT
720 DRAW"C2":LINE(6,10)-(250,80)
,PSET,BF:LINE(10,116)-(228,18
2),PSET,BF:PUT(16,116)-(50,16
2),D,PSET:GOTO510
800 '
802 DATA SIRLOIN,HELP,ASSIST,DON
E,REMEMBER,WORK,LADY,NAME,PRO
GRAM,NUMBER,CIGAR,GRAPH,DISH,
MOTOR,ENGINE,BODY,AUTOMOBILE,
TRUCK,SWEEP,LAMP,LIGHT,DISPLA
Y,RECIPE,AUTOMATIC,FEATURE,AD
VENTURE,CONTEST,MEMORY,QUICK,
MACHINE,ANNUAL,HUNDRED,THOUSA
ND,SUGAR,BECOME
804 DATA BOOK,PAPER,AUTHOR,SEXY,
FUEL,SPANK,BUCKET,PAIL,LAZY,Q
UIT,CHURCH,CHAPEL,STAR,SHIP,C
OMET,PLANET,ROCK,ROCKET,INDEX
,EQUAL,EVEN,SAIL,SHELL,OYSTER
,LOBSTER,PLEASE,RELEASE,EDITO
R,WRITE,POWERFUL,SCREEN,ALLOW
,SAMPLE,THROUGH,MANY,PURSUE,E
ACH,COPY,BOMB
806 DATA FACE,NOSE,CHEEK,BONE,FA
CT,MUSIC,TELEVISION,RADIO,LEW
D,SENIOR,JUNIOR,FRESH,SCHOOL,
LIFT,RAISE,LOWER,MEDIUM,PLAIN
,FANCY,LOVER,RANCH,WING,SOME,
OTHER,BELIEVE,THIS,JUST,WILD,
ORGY,PARTY,HOTEL,AUNT,SHOCK,E
XACT,GENEROUS,BROWN,BLUE,GREE
N,PURPLE,SIGHT
808 DATA INDIAN,STATE,COUNTY,THA
T,POLICE,SPOKE,WARM,BROOM,SAG
E,PEPPER,MALT,DRUG,STAMP,ENVE
LOPE,HEAT,CLEAN,DIRTY,CARPET,
SOFA,COUCH,TABLE,FLOWER,SHACK
,LOOK,SHOE,PANTS,DRESS,SHIRT,
SOCK,SKIRT,GLOVE,STRANGE,CITY
,TOWN,BRIGHT,BEAUTIFUL,NOVEL,
SWING,SWISH
810 DATA CABINET,DRIFT,FLOAT,PRE
TEND,AUDIO,DOCTOR,DENTIST,NUR
SE,RENT,LEASE,SKILLET,BROIL,B
AKE,FLAKE,MOVE,CHICKEN,DUCK,G
OOSE,HORSE,PONY,COLT,KNIGHT,R
IDE,PLAN,POST,MORTGAGE,PLAYER
,PINT,TENT,KNOW,TEACH,DRINK,D
ARK,VOICE,HORROR,MOTEL,INTIMA
TE,STORY,SLIDE
812 DATA SIZE,CENTER,FORWARD,GUA
RD,TICKLE,GOAL,BACK,GROUND,PR
ESENT,GIFT,LOCKER,CIRCLE,POWE
R,CRYSTAL,JEWEL,COFFEE,FLEA,C
RIME,MUSCLE,HOLD,UGLY,PRETTY,
MILD,GENTLE,HAMMER,BALL,THEIR
,THEY,WHERE,GIRL,WARM,SOFT,YI
ELD,CREATURE,FAST,SLOW,EVERYO
NE,SUCH,END
1000 FORXX=1TO LEN(A$):YY=ASC(MI
D$(A$,XX,1)):DRAWA$(YY):NEXT:
RETURN
1010 DIM G$(122)
1011 PMODE4,1:PCLS1:SCREEN0,0:CO
LOR0,1:CLS4:PRINT@198,"PLEASE
WAIT A MINUTE";
1012 G$(32)="BR8
1013 G$(33)="BR2G2RED8BD2D2HR2HB
U2U3LU3R2D3U5FBU2BR2
1014 G$(34)="BRBUGDRND2RULBR3DRN
D2RULUBR3

```



A TRS-80 Color Computer users magazine

Sell or trade your unwanted programs or hardware in this monthly mazazine. Find great buys. List your Club or BBS. Full of Tips, articles, reviews and programs all for your COCO. A HELP column for you to get quick help with a problem. Classified ads are only \$.15 per word, and it will be read by over 8000 new COCO owners.

Yes I would like to subscribe to COCO ADS.

- 1 Year basic third class mail \$10.00
1 Year First Class Mail \$16.00

Name _____

Addr _____

City _____

Zip _____

Please send all orders to

P D SOFTWARE
P O BOX 13256
HOUSTON, TX 77256

- 1015 G\$(35)="BR7G2D6L2DU6L2GR3D3L3GR3ND2R4UNL2D3EU5NL3UL2NUR3U5D5R2EL3U3R3EL3U2EBR5
1016 G\$(36)="BR5DND15G4D4RNU4E3R3D6LNU6DL3HL2NDE2GR2DR2U10R FURUNL3EBUBR3
1017 G\$(37)="BR4LG3DED2ED2EDE3LEL2EL2EBR6G2RDL2HD3HD3HD3HD2U BR6REL3EL2ELE3DED2ED3EUBU7BR2
1018 G\$(38)="BR6RF2NG3L2UL2G2RGD EDRND3G2NR3G3RGDERGDERGD2EURE 3H2R2D2F5REUGLNH4UH4E2R2D2REN L5BU8BR3
1019 G\$(39)="BRD4UHR2UL2BUBR5
1020 G\$(40)="BR6G4REG3REG3R2UG2N D5RD7RU4D5RU3FDBU16BR3
1021 G\$(41)="BD17E4LGE3LGE3LGUE2 DHENU3LNU5HNU5UHU3GDBU2BR7
1022 G\$(42)="BR3D3ND3NL3NR3NG2NH 2NF2E2BUBR3
1023 G\$(43)="BR5BD4D4ND4NL4LND5N U3DL4R8UL3R4BU8BR3
1024 G\$(44)="BRBD13D3GE2UL2RBU14 BR5
1025 G\$(45)="BD9NR6ER6BU8BR3
1026 G\$(46)="BD15R2GU2BU14BR5
1027 G\$(47)="BD16E2LELE2DHE2DHE2 DHE2DHE2DHE2BR3
1028 G\$(48)="BR4G3D8UHU4E4NR2DNR 3FNR3FR2GR2D4LU4D6G3UNE3L2H2E DRDRBU12BR8
1029 G\$(49)="BD2E2ND13GR2UD13H2R 4GE2BU11BR3
1030 G\$(50)="BD4E4L2D3HUR2ER2DRN D5FD3NG3LNG7LG5D3GUENR6FNR4FR 2E2HREBU10BR3
1031 G\$(51)="BR3G3NF2RE2RNG3DRF2 DHD2HD4H2ED2R2D4ENU2G4H3LE2D2 ED2ED2EUBU13BR6
1032 G\$(52)="BR6D14FU14LG6DR8FL8 R6D3FDEBU13BR3
1033 G\$(53)="BR9G3L4U2R5GL4D6E3R G2RERGR2FND3L3FRD3G3LHNR3HNR5 HLR4H2GRBU10BR10
1034 G\$(54)="BR5F2RGH2LF2DH2LG2D 9HNU6UE5D2EUD3EUND5FD3G5U3LU3 BU11BR9
1035 G\$(55)="BD3E2R7GNL7G2RG2RG2 ERG3ERG2ERG2D2FU3ED4E2LBU13BR 6
1036 G\$(56)="BDBR6L3G3R2DL2FRED3 HR3HD2R3HD3HR3ND3GD3G2NH4L2UR 2NH4L3ULULUE8L2DEUL2UBR6
1037 G\$(57)="BUBR4G4D3FNU4EUD3RU 2FE4ND5GD6G2NL5G2HRU2L2EUBU7BR 4R2UH2LF2LNLH2LHU2BR7
1038 G\$(58)="BD7R2GU2BD6D2HR2BU1 3BR4
1039 G\$(59)="BD7R2HD2BD4D3GE2UL2 BU13BR6

1040 G\$(61)="BD6R6EL6BD3R6GNL6BU
9BR5
1041 G\$(63)="BR3G3ER4HLD2R3DL2FR
G4DBD2D2HR2BU13BR6
1042 G\$(65)="BD6U3NE2RE3NR3DR4G3
L2DEUR3EG2DGDG2NH3NR7DNR7G2NR
3DNR4DFBR3HR2E3D3FNE2U14GND9E
2BR3
1043 G\$(66)="BD3UEDRUR3EG3D4L2GD
ER2D5LG2NDE2REU9FED8EU8EDER3G
R2D2HD2G2HUND9D2R3ND5FD4LG2L5
GE3R3DL3BU13BR8
1044 G\$(67)="BDBR4G3RG2ND4RD6FNU
4RNU2ED2NR4UR6NE2NUL3U12G3D6E
U6ER5GLU2LUBR6
1045 G\$(68)="BDBR2NR7FR8GR2GRD2N
L2D3NL2D3GNL6GL6GE3U10G3D7G2E
3U2L3GE2R2U4E2R2D5RGD2RGDBU11
BR7
1046 G\$(69)="BR4G3ND8RG2D4RED4RN
U2FNU2NR4ER5NE2NUL3U12G3D6EU6
ENR7ER2D2R3G4R4UNL3BU5BR3
1047 G\$(70)="BD6E2DR3UL2EU2D14L2
GR2ERURUHU11R7NUL2UL3ED13GU8R
3EL4U4BUBR8
1048 G\$(71)="BD6D4FDU8E3D9G2U2D3
NR7ERD2R4HU12L2ND8R5HD2R2GR2G
4R4HLD2R2ND3LD3G2BU13BR6
1049 G\$(72)="BD3UNR5ER5EG4D9GREN
U9FRNU11EU11E2NRG2D4RE3D2END9
RD7G2LEBU13BR5
1050 G\$(73)="BD3URUR2D12L2GDR2UE
U11EBR3G2D12L2DRE2U12EBR3
1051 G\$(74)="BD5BRRUL2U2E2R3DL4R
6DL3R5LG3D9GL3G2ER3DRUR3U2RU1
0ED9BL3DU9E2RERBUBR3
1052 G\$(75)="BD3E2R3NEGL2FD8G2LG
E5DU8BR2NE2D8G3R4HLD2FURE3D2F
U2FRDH4LF2EH2E3LEL3GE2RBU3BR6
1053 G\$(76)="BD2E2R4EG2NL4D11L2G
2ERENU9RNE3R2F2RNE3HRNE2UE2LH
BL3NU7FU7EBU3BR7
1054 G\$(77)="BR6LG4D11LUREU5L2UR
2U4ERD11NG2U5R6D5EG3H2R3GNU12
HU6LNR5RU5LHR2DR6H2GRGND5R2DR
2D12NEHU11E2BUBR3
1050 G\$(73)="BD3URUR2D12L2GDR
2UEU11EBR3G2D12L2DRE2U12EBR3
1055 G\$(78)="BD3E2D2R3H2D14L3NDE
R2EU10RED11NG2U4E3R4GDGDGDGDR
4EG2L2U2RHEUEUEU3L3FRU2L3G3E4
RL5E2RGR2BUBR7
1056 G\$(79)="BR9L4G5ND6RD8R8LGL4
U2LUE2NU8LU7ER6FL3HGD10UE3R3D
G3REU5FUL3NG2RE2DHULBU3BR6
1057 G\$(80)="BUBD3E3D2LR2HD2LR2N
D14GND13DG3R2GRDFGLNG2DR2D4R3
U3NU13R4GU2L3R5EL2E2DNU7HU2L2

G3FRLHE3REUL3NGR2EU2GU2GL2E2N
DBR8
1058 G\$(81)="BR8L3G5ND6RD8R10GR2
EGHL3GL4UHUF2R2NU13R2E4G2DEU9
L3HR3D2LFNG3DERD4L3G3UBL3NU8E
U8EBR11
1059 G\$(82)="BD14E5U8EG2L2GE2RD1
0G2E3FG2R5G2HRU2LUENU8ENE4F4D
NE3H2R3H3LNF3UE2U4L4E2D3FR2UL
2U2BUBR8
1060 G\$(83)="BR11G6H3UE2R3D2REL6
GF3NR6L2HG2DED2ED2NR7ENR5RE2L
2R8GR2ND3GD3G3UGU4RNDG5L3HU2R
7DH2RL5R2UBU10BR13
1061 G\$(84)="BD3E2DE2NR5DR9EG2L5
D6G3NU3LU7NE3RG2D3F2E2NU5G2NR
2DR8NE2NULGNL4U12BUBR7
1062 G\$(85)="BD3E2R6EG2L6R4G4ND4
RNED6FU3FD2FU2FR3NE4GNL2U13G2
D6GU5EBR4E3D13E2L3DU11FRBU3BR
4
1063 G\$(86)="BD3UE2RG2RD10NLENU1
1D2F2NE6H2R3GUHRUNE3U3NE3U6H2
BR7NG3D9ENL3U3NL3U3NL2UHBR4
1064 G\$(87)="BD3E3D14H2RU9LE2RFD
12GU3FRE2U10GE2D14HUF2DU3RD2N
E4U13BR2UED11EU9HBR4
1065 G\$(88)="BD3E3D4FU4LGR2D6L3E
R3U4D6GDG2ND2L3NDERFRBR4R4EG3
REL2U2LND2LU5R3GL3D3R2UL2U5EU
E2LED3FU3FDEBU2BR4
1066 G\$(89)="R3GRD10NG3LG2D2ED2N
R3ER4HR5DGBU3L2BU2RL4U10FRUD9
UE3R3D2G2LEURU4L3NGR4DU3GU2GU
2GUL2BR8
1067 G\$(90)="BD3UE2D2LR8U2GNL7D2
NG5LG3L3R8L2GLDR3L8R4G2RERG3U
GD2GUR8GU2R2L7RER5EBU11BR3
1068 G\$(97)="BD6NE3F2G2D2F2U3HD2
RFUR3D2EL2NU9EU8NEL3F2DGNLEU3
HBU3BR6
1069 G\$(98)="RD12NLFNU13FU2FUREN
U7RU6L2U2G3U6EBR7
1070 G\$(99)="BD6NE3RD5GR5EG2LGU3
LRU6E2D2ED2EBU5BR3
1071 G\$(100)="BFGDERGR2GR2G4ND4R
D5FU3FD3E3NU6LNGU5NE2ULURBU5B
R5
1072 G\$(101)="BD7RNE3D4GRFNU6F2N
E3UEL2ELU2E4L3FU2LBU5BR6
1073 G\$(102)="BR3G2D12LR3GU9L2R4
L2U4EDED2EBU2BR3
1074 G\$(103)="BD17R5EL5E6D5L2EU2
L2GLEL2NU5EU4E3D2ED5EU4EBU4BR
3
1075 G\$(104)="BDFD13E2NL3HU10NE2
D6E4GDED9G3ERE2U9BU5BR3
1076 G\$(105)="BD6ED9FE2LGU9RHBU2
URBUBR4

SPECIAL DEAL ON 500 PROGRAMS!

GET 50 DISKS OR 50 CASSETTE TAPES FULL OF OVER 500 PROGRAMS. HERE IS WHAT YOU'LL RECEIVE:

- * Over 250 Utility/Home Application Programs including a Word Processor, DataBase, Spreadsheet, Account Manager, 2 Basic Compilers, Terminal Programs; ROM Copies, Mail List, Machine Language Tutorials, Plus Much More!
- * Over 200 exciting games including Warlords, Star Trek, Super Vaders, Solar Conquest, Horse Races, Football, Baseball, Frog Jump, Invader, Plus Much More! (Many machine language games)
- * Over 30 adventures including The College Adventure, Dungeon Master, Space Lab, Ice World, Ship Wreck, Zigma Experiment. Plus 32K Graphic Adventures.

EACH INDIVIDUAL ISSUE SOLD FOR \$9.00 EACH OR \$450 FOR ALL 50 ISSUES. WE SLASHED THE PRICE TO ONLY 149⁹⁹.

REG. \$450

NOW \$149⁹⁹

★★THIS MONTH ONLY★★

Buy this package of 500 programs and receive a free 6 month subscription. (A \$35 value)



Available on COCO 1, 2 and 3!
All Programs Include Documentation!



THE GREATEST SOFTWARE DEAL ON EARTH JUST GOT BETTER!

THAT'S RIGHT! THIS MONTH WE'VE DROPPED OUR YEARLY SUBSCRIPTION RATE AN UNBELIEVABLE \$10.00 TO ENTICE YOU INTO SUBSCRIBING WITH US. GET 12 DISKS OR TAPES A YEAR CONTAINING OVER 120 QUALITY PROGRAMS. A SUBSCRIPTION TO T & D SOFTWARE CONSISTS OF 10 READY-TO-LOAD PROGRAMS DELIVERED BY FIRST CLASS MAIL EVERY MONTH.

NO WE ARE NOT THE SAME AS THE RAINBOW ON TAPE. IN FACT, MANY SUBSCRIBERS HAVE WRITTEN IN AND SAID THAT WE ARE MUCH BETTER THAN RAINBOW ON TAPE!



	TAPE	THIS MONTH ONLY
1 YEAR (12 Issues)	79.00	60.00
6 MO. (6 Issues)	48.00	35.00
1 ISSUE	9.00	8.00

Michigan Residents Add 4%
Overseas Add \$10 to Subscription Price
Personal Checks Welcome!

- * 16K-64K Color Computer
- * Over 4000 Satisfied Customers
- * Back Issues Available From
- * July '82 (Over 500 Programs)

OUR LATEST ISSUE CONTAINED

1. Accounts Receivable
2. Work Mate
3. Calendar
4. Invasion
5. Trip Adventure
6. Foot Race
7. Flippy the Seal
8. Screen Calculator
9. Able Builders
10. Super Error 2

T & D SUBSCRIPTION SOFTWARE, 2490 MILES STANDISH DR., HOLLAND, MI 49424 (616) 399-9648

```
1077 G$(106)="BD5ED2ED10GE2U8H2B
U2URBUBR4
1078 G$(107)="BDFD12HR4G2U13NE2D
6E3R2FL3FRG4ER2GR2D4EUL2U3BU1
0BR5
1079 G$(108)="BDFD11NL2DFELU13EB
R3
1080 G$(109)="BD6UED10HF2ELU9FNR
E2D10FU10FNRE2D10RNE2U9FBU6BR
3
1081 G$(110)="BD5NE2RED9FE2LGU9F
NE2RED2RU2D9FE2LGU8EBU4BR4
1082 G$(111)="BD8NE4ND4RD5F2UHUF
2E2NU6LU4H2EDFU2BU5BR4"
1083 G$(112)="BD5E2D13LR2NFU5NL2
U7FE2D2ED9GH3R5DL3FE2U6BU5BR3
1084 G$(113)="BD6NE3ND6RNE2D7FU2
FE2D5NGR2HU9FG2DU5L2EBU4BR6
1085 G$(114)="BD5NE2RED8HF3E2LGU
2GU8FE2D2ED3EUBU5BR3
1086 G$(115)="BD13NE8R6GLU2NL3BR
3ENU2LU3LD2HL3EL2NU2EU2E2DR4G
NL2E2BU3BR3
1087 G$(116)="BD4NE3RD9HR2D2EDNE
2HU10FRBU4BR4
1088 G$(117)="BD5NE2RED8FNU9FU3F
DEF2E2L3FU10G2R3G2D5U8BU4BR6
1089 G$(118)="BR3G3RDEUD10NLF2NE
4U2RL2ELU7BR4NHD7EU5BU5BR3
```

```
1090 G$(119)="BR2G2D2RU3D12HF2EU
GU9FE2ND9FD8F2E2RGNHEU9NG3FND
8BU4BR3
1091 G$(120)="BD6E3DGRD2RU2D5G4U
3FRE2RD2RD2E3GLHUHUE4D2HLE2BU
3BR3
1092 G$(121)="BD5NE2RED10GDFR3EU
GBH3RNU10EDE4NU6LU5G2BU6BR6
1093 G$(122)="BD7UE3D2ED2EDG4R4H
LD2R3DL2D2EL2DL2GDFR2EBU16BR5
":IFEE=1 THEN4
1094 G$="Sometimes the Dragon":D
RAW"BM30,150S4":GOSUB1097
1095 G$="wins":DRAW"BM100,170":G
OSUB1097
1096 GOTO1103
1097 FOR X=1 TO LEN(G$)
1098 Y=ASC(MID$(G$,X,1))
1099 IF Y<0 THEN Y=0
1000 '
1100 DRAW G$(Y)
1101 NEXT:RETURN
1103 CIRCLE(195,35),4,0,1:CIRCLE
(205,35),4,0,1:CIRCLE(195,36)
,4,0,.5,.5:CIRCLE(205,36),4,0
,.5,.5
1104 CIRCLE(194,36),1,0,1:CIRCLE
(203,36),1,0,1
```



```

1105 CIRCLE(208,35),8,0,1,.35,.5
: CIRCLE(203,44),3,0,1,.8,.25:
CIRCLE(229,134),90,0,1,.68,.7
1: CIRCLE(186,50),6,0,1,.15,.4
8: CIRCLE(178,50),5,0,1,.1,.5
1106 CIRCLE(172,2),45,0,1,.14,.2
2: CIRCLE(174,49),2,0,1,1: PAIN
T(174,49),0: CIRCLE(186,50),2,
0,1,1: PAINT(186,50),0: CIRCLE(
186,49),5,0,1,.55,.95: CIRCLE(
176,49),5,0,1,.55,.95
1107 CIRCLE(188,57),15,0,1,.81,.
85: CIRCLE(194,53),12,0,1,.75,
.85
1108 CIRCLE(182,55),4,0,1,.1,.5
1109 CIRCLE(204,38),14,0,1,.6,.9
: CIRCLE(178,43),40,0,1,.95,0:
CIRCLE(195,26),5,0,1,.68,0: CI
RCLE(192,27),5,0,1,.7,.0: CIRC
LE(209,26),6,0,1,.68,.1: CIRCL
E(205,27),6,0,1,.7,.0
1110 LINE(224,36)-(212,40),PSET:
LINE(214,42)-(227,41),PSET: LI
NE(213,44)-(225,45),PSET
1111 CIRCLE(203,64),14,0,1,.66,.
8: CIRCLE(181,35),25,0,1,.15,.
24
1112 CIRCLE(210,73),11,0,1,0,.3:
CIRCLE(206,68),18,0,1,.6,.1: C
IRCLE(244,40),26,0,1,.4,.48
1113 CIRCLE(243,72),10,0,1,.4,.
6: CIRCLE(225,73),6,0,1,.85,.1
: CIRCLE(232,66),5,0,1,.38,.52
: CIRCLE(235,88),5,0,1,.0,.5
1114 CIRCLE(230,86),11,0,1,.85,0
: CIRCLE(234,80),7,0,1,.4,.6
1115 CIRCLE(245,70),4,0,1: LINE(2
45,73)-(198,50),PSET: LINE-(24
8,68),PSET: LINE(245,71)-(2557
4),PSET: LINE(246,70)-(255,74)
,PSET
1116 CIRCLE(254,74),2,0,1,1: CIRC
LE(250,62),1,0,1,1: CIRCLE(239
,76),1,0,1,1
1117 DRAW"BM236,64EU4HNNH2LD2GBL2
U3H3BD3D2BU5G3 BLU3HLG5R3"
1118 DRAW"BM238,75NE12FNE11ENE10
1119 CIRCLE(207,85),35,0,1,.0,.2
5: CIRCLE(205,109),12,0,1,.2,.
4: CIRCLE(210,80),40,0,1,.3,.4
2: CIRCLE(169,128),42,0,1,.8,.
92
1120 CIRCLE(190,120),35,0,1,.6,.
71: CIRCLE(158,96),5,0,1,.1,.5
5: CIRCLE(172,103),5,0,1,.5,.9
1: CIRCLE(165,98),16,0,1,.1,.2
1: CIRCLE(212,123),50,0,1,.55,
.58
1121 CIRCLE(171,117),4,0,1,.25,.
65: CIRCLE(158,106),8,0,1,.1,.
25: DRAW"BM172,122RER2F2DH2G3L
2H2L6G2LG5 BU17BR2GL4GL4G2L4
HLG2NL3F2R10D2G2L2GL2G3LG BR8
E10R3D2G8"
1122 DRAW"BM154,94UHUH3NL2D2FD2
G2H4L2HNL3D2 F5DF2DGH2L2H3L2H
2NL3D2F2DF2RF2R3F2R2F3R3FR3"
1123 CIRCLE(196,89),2,0,1: CIRCLE
(199,85),2,0,1: CIRCLE(205,84)
,2,0,1: DRAW"BM195,90F2R2NF2EH
3 BU3F7RNF2EH7 BR3F4RNF2EH3"
1124 DRAW"BM196,88LGLG4"
1125 CIRCLE(204,85),16,0,1,.98,.
21: DRAW"BM210,100F5RE4H5BR3 F
5RE3H9BE2F5RE3H7"
1126 CIRCLE(160,30),145,0,.7,.21
,.32: CIRCLE(158,32),150,0,.7,
.21,.32: CIRCLE(160,14),140,0,
.7,.25,.32: CIRCLE(106,114),9,
0,1,.25,.75: CIRCLE(101,114),1
4,0,1,.25,.75
1127 DRAW"BM198,124NF3R20G10H3L2
"
1128 CIRCLE(120,146),70,0,.7,.7,
.8: DRAW"BM106,106R8"
1129 CIRCLE(150,110),10,0,1,.5,.
6: CIRCLE(140,110),10,0,1,.55,
.7: CIRCLE(130,110),11,0,1,.6,
.72: CIRCLE(120,110),12,0,1,.6
,.74: CIRCLE(110,106),8,0,1,.5
,.7
1130 CIRCLE(190,84),45,0,.7,.25,
.32
1131 CIRCLE(104,102),8,0,1,.35,.
55: CIRCLE(104,106),12,0,1,.35
,.52: CIRCLE(94,100),20,0,1,.2
,.3: CIRCLE(94,100),15,0,1,.28
,.32
1132 CIRCLE(190,130),3,0,1,.3,.5
: CIRCLE(180,132),3,0,1,.3,.6:
CIRCLE(170,132),3,0,1,.3,.6: C
IRCLE(160,132),3,0,1,.2,.6: CI
RCLE(150,132),3,0,1,.2,.6: CIR
CLE(140,132),3,0,1,.2,.6: CIRC
LE(130,132),3,0,1,.2,.7
1133 CIRCLE(120,130),3,0,1,.2,.7
: CIRCLE(120,130),3,0,1,.2,.7:
CIRCLE(110,128),3,0,1,.2,.7: C
IRCLE(100,124),3,0,1,.2,.75: C
IRCLE(198,128),3,0,1,.3,.6
1134 LINE(206,128)-(214,126),PSE
T
1135 DRAW"BM230,0D8FD3GD10GD30":
CIRCLE(240,20),4,0,1,.25,.77:
DRAW"BM238,18E3RE10": DRAW"BM2
38,24RE:2RUEUE10


```

```

1136 DRAW"BM243,ØD12BD7D1ØFD2ØFD
2ØBD4D28F3R4FR4F2L7H2L3HL3GLG
LGLGLGLGLG"
1137 DRAW"BM24Ø,3D6FD3BG2BD12GD8
BFBD12D8 BH6BU6U8"
1138 SCREEN1,1
114Ø FORQ=1TO3:PLAY"T5ØL2ØØGGGGE
EEEEAA":NEXTQ:G$="Play again?
":DRAW"BM2,1Ø":GOSUB1Ø97
1142 I$=INKEY$:IF I$=""THEN1142
1144 IFI$="Y"THEN9ELSE 2ØØØ
12Ø1 PMODE4,1:PCLS1:SCREENØ,Ø:DR
AW"BM8Ø,7ØCØS8U11L1ØU3R1ØU4L1
4D11R1ØD3L1ØD4R14NU BR4U14E4R
6NF4BD4L6D3R6U3BR4D14L4U7L6D7
NL4BR22 H7U11R4D1ØF3E3U1ØR4D1
1G7BR11 U18R14D4L1ØD3R8D3L8D4
R1ØD4NL14"
12Ø3 DRAW"BM11Ø,9ØS4LNU8LU6L3UNR
8UR8D2L3D6BR8 U8RND8RD3R3U3RN
D8RD4NL5D4L2U3L3D3BR11 U8RND8
R5DNL6DL4D2NR2D2R4DNL6DL6"
12Ø4 DRAW"BM25,136S8U18R2F5E5R2D
18L4U1ØG3H3D1ØL4BR18 U14E4R6N
F4BD4L6D3R6U3BR4D14L4U7L6D7NL
4BR14 NR4U18R4D18BR4 U18R1ØF3
D12G3L1ØBU3BR4U12R4FD1ØGNL4BF
3BR6 U18R14D4L1ØD3R8D4L8D3R1Ø
D4NL14BR4 U18R4F5D3F3U11R4D18
L4H5U3H3D11L4"
12Ø6 PAINT(77,68),Ø,Ø:PAINT(9Ø,6
6),Ø,Ø:PAINT(136,6Ø),Ø,Ø:PAIN
T(166,68),Ø,Ø:PAINT(27,13Ø),Ø
,Ø:PAINT(84,13Ø),Ø,Ø:PAINT(1Ø
2,13Ø):PAINT(118,13Ø),Ø,Ø:PAI
NT(15Ø,13Ø),Ø,Ø:PAINT(186,13Ø
),Ø,Ø
    
```

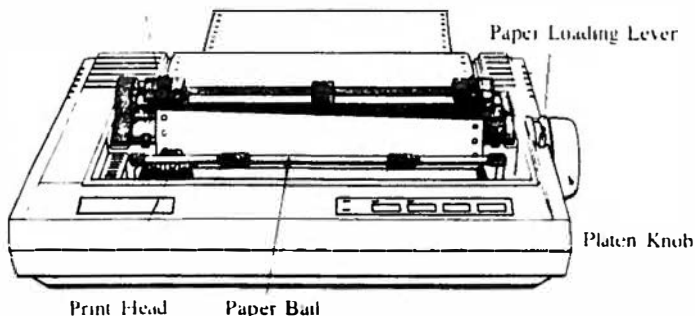
```

12Ø7 G$="by George & Ellen":DR
AW"BM2Ø,15ØS4":GOSUB1Ø97:G$="
Aftamonow":DRAW"BM7Ø,17Ø":GOS
UB1Ø97
12Ø8 SCREEN1,1
12Ø9 PLAY"T3L8Ø2DL4DL8DL4EGL2BBL
8DL4DL8DL4EGL1AL8DL4DL8DL4EGL
2AAL8AP64L4AL8BL4GEL1G"
121Ø PCLS1:DRAW"BM2Ø,5ØS4":G$="N
eed Instructions?":GOSUB1Ø97
122Ø I$=INKEY$:IFI$="" THEN122Ø
123Ø IFI$="N" THENRETURN
124Ø IFI$<>"Y" THEN122Ø
125Ø PCLS1:DRAW"BM4,1Ø":G$="The
object is to guess ":GOSU
B1Ø97:DRAW"BM6,3Ø":G$="the
hidden word . Each":GOSUB1Ø
97:DRAW"BM6,5Ø":G$="time you
fail to guess ":GOSUB1Ø97
:DRAW"BM4,7Ø":G$="a letter, t
he dragon moves ":GOSUB1Ø97
1252 DRAW"BM4,9Ø":G$="closer to
the maiden.":GOSUB1Ø97
1254 DRAW"BM1Ø,17Ø":G$="Hit any
key to continue":GOSUB1Ø97
126Ø I$=INKEY$:IFI$="" THEN126Ø
127Ø RETURN
2ØØØ CLS:PRINTØ2Ø6,"THE";:PRINTØ
27Ø,"END";
2ØØ8 FORI=&H7FØØ TO &H7F23:READX
:POKEI,X:NEXTI
2Ø1Ø DATA142,4,,52,4,95,9Ø,39,2,
32,251,53,4,124,127,34,39,17,
166,132,129,96,39,1,74,167,12
8,14Ø,5,255,39,224,32,24Ø,,57
2Ø2Ø DEFUSR=&H7FØØ
2Ø3Ø AA=USRØ(Ø)
2Ø4Ø CLS
2Ø5Ø 'GEORGE & ELLEN AFTAMONOW
46 HOWE ST
MILFORD, CONN Ø646Ø
    
```

ALL PROGRAMS AVAILABLE	CHECKERBOARD FILESORT		ML ROUTINES FOR DATA, EDIT, SORT, REVIEW, SEARCH, ERROR TRAPPING. MANY HARDCOPY OPTIONS.																																								
	32 OR 64K FILE PROGRAM - BOTH VERSIONS INCL.																																										
	☐ - \$16.95		ENJOY A STIMULATING GAME OF KENO. A GRAPHIC DELIGHT FILLED WITH REALISTIC, EXCITING ACTION. PICK 1 TO 15 SPOTS. COMPLETELY RANDOM WINNERS. PREPARE FOR AN EXTREMELY CHALLENGING GAME. CAN YOU BREAK THE HOUSE?																																								
	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>13</td><td>80</td><td>54</td><td>17</td><td>21</td><td>75</td><td>18</td><td>36</td><td>63</td><td>9</td> </tr> <tr> <td>62</td><td colspan="7">Bakersfield KENO U1.2</td><td>41</td><td></td> </tr> <tr> <td>3</td><td colspan="7"></td><td>33</td><td></td> </tr> <tr> <td>72</td><td>49</td><td>11</td><td>29</td><td>44</td><td>33</td><td>55</td><td>27</td><td>16</td><td>1</td> </tr> </table>			13	80	54	17	21	75	18	36	63	9	62	Bakersfield KENO U1.2							41		3								33		72	49	11	29	44	33	55	27	16	1
	13	80		54	17	21	75	18	36	63	9																																
	62	Bakersfield KENO U1.2							41																																		
	3								33																																		
	72	49	11	29	44	33	55	27	16	1																																	
	32 OR 64K KENO SIMULATION																																										
	☐ - \$12.95 ◼ - \$13.95																																										
GRPH200 GRPH200GRPH200		ML GRAPHICS DUMP FOR THE DMP-200. POSITION GRAPHIC PAGES 1-4, 5-8, OR 1-8 ANY PLACE ON PAPER. MENU PROMPTS! STANDARD, CONDENSED, OR COMPRESSED. PRINTOUTS IN NORMAL, ELONGATED, DOUBLE-, OR TRIPLE-SIZE.																																									
ML GRAPHICS DUMP FOR DMP-200																																											
16/32,64K ☐ \$15.95	16/32,64K ◼ \$16.95																																										
		 PØ BOX 6464 BAKERSFIELD, CA 93386																																									
		CHECK OR MONEY ORDER. CALIF RESIDENTS ADD 6% WE WILL MODIFY PROGRAMS TO WORK WITH YOUR PRINTER - NO EXTRA!																																									

SEIKOSHA & BROTHER PRINTERS

We now have two printers that we can recommend for color computers that do not require an interface and have excellent features at a reasonable price. Both are Epson and IBM compatible and work on popular software such as COCO MAX. Both tractor and friction feed are included for printing single sheets or continuous paper or address labels. As a special we are including our DYPRINT package at no extra charge. This will allow you to print banners or blown up graphics pictures.



SEIKOSHA SP-1000AS

FEATURES

- * Impact dot matrix method of printing.
- * 100 (Draft mode), 20 cps (Near Letter Quality) print speed
- * Functions include Underline, Bold Print & Double Strike.
- * Many print character sets including Pica, Elite, Elongated, Proportional, Condensed, Italics, Super/Subscript & Italic Super/Subscripts.
- * Adjustable tractor and friction feed.
- * Automatic paper loading function.
- * Paper empty detector.
- * Right, left margin set function.
- * Self-test and Automatic printing.
- * 2 year warranty.
- * COCO Cable is included.
- * List \$299

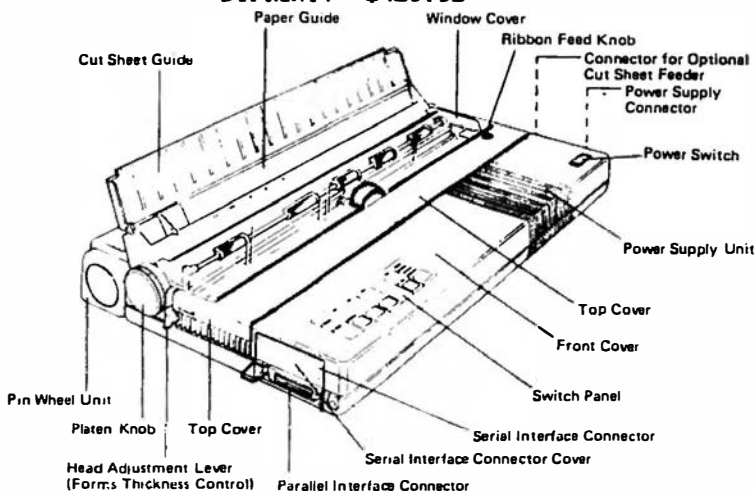
Order SP- 1000AS for COCO & specify tape or disk software for DYPRINT. **\$229.95**

BROTHER M-1509

This is a wide carriage high speed dot matrix printer with both a serial and parallel interfaces. Features include:

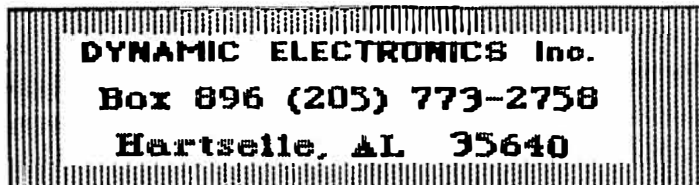
- * 180 cps draft mode
- * 9 Pin Print Head
- * Both Serial & Parallel Interfaces
- * 3K Buffer expandable to 19K
- * Automatically loads single sheets
- * Contains 18 character sets
- * Accepts user defined characters
- * Friction & Tractor Feed
- * Epson FX & IBM Graphics Compatible (works with IBM clones using parallel interface)
- * Uses cassette ribbons
- * Font Cartridges available
- * One year warranty
- * CoCo cable is included
- * List price \$549.

Order M-1509 for COCO & specify tape or disk software for DYPRINT. **\$429.95**



NOTE: We can get other printers. Contact us for all of your printer needs.

Give street address for UPS. Add \$5 shipping. Checks VISA & MC.



TAKING CONTROL

(Basic Programming Part 2)



Last month this series was started and titled "TAKING CONTROL". The objective of this series is to give instructions on computer terminology and basic programming. It is not hard to write programs but it requires a knowledge of the basic instructions and practice in using them.

MORE ON MEMORIES

The minimum memory required to run most programs is 64K. In the early developmental stages of color computers, memories were very expensive. The 4K color computer cost \$399. Memories are designated in terms of thousands (K) of bytes. The basic memory unit is the bit and eight bits make a computer word or byte. Therefore a 4K computer contains around 4,000 bytes and a 64K computer contains approximately 64,000 bytes. Actually the term "1K of memory" means that there are 1024 bytes instead of 1000. This is the terminology used to give relative sizes. A 32K memory will contain 32×1024 or 32768 bytes and a 64K memory will contain 64×1024 or 65536 bytes. A 512K memory will contain 524288 bytes.

To keep from getting confused when writing programs, do not designate numbers by using a comma. Basic does not recognize a comma to separate thousands. To designate 65,535 use 65535.

The comma is used by basic to indicate the next field for printing results. The use of the comma will be covered later.

Generally the more memory the computer has, the better. A 64K computer can run most programs. The color computer 3 has a minimum of 128K which is adequate. However with 256K enough memory is available to store all of the information contained on a disk. A 512K computer can contain information for two disks. A couple of years ago Spectrum Projects introduced the Thunder Ram which was a 256K memory upgrade. It had enough memory for a ramdisk. A ramdisk is a software program that allows part of the computer's memory to be used like a disk. Programs can be saved or loaded to the ramdisk many times faster than a disk. Also a disk can be copied into the ramdisk and the ramdisk can be copied into the disk. This provides a quick and easy way to make copies of disks for a one drive system without the multiple disk swaps required by Radio Shack's disk basic.

HOW MUCH PROGRAMMING MEMORY?

For a 512K computer one could assume that there would be several thousand bytes available for a basic program. However this is not the case. A 512K computer does not have any more memory for a program than a 64K computer. This is because basic is

written for 64K. The upper 32K is reserved for the read only memories (ROM) that contain the basic, extended basic, and disk basic instructions. This leaves 32K for basic or machine language programs.

Another factor is the microprocessor. The color computers use the Motorola 6809 series of microprocessors. These are 8 bit processors with a 16 bit address line. A 16 bit address line can only address 64K of memory. The color computer 3 uses a memory manager that switches 8K blocks of memory. The memory available for a basic program is about 22K depending upon how many graphics memory pages have been cleared. To test for the amount of memory available for a basic program enter the following:

?MEM

MEM is the basic command that returns the amount of memory available for programs. There are other things that can change the amount of available memory which we will cover later in our definitions.

USING EXTRA MEMORY

If the computer only has about 32K available, then how can the extra memory be used? Perhaps the easiest way to use it is to configure it as a ramdisk and save and load files from it. The program has to be written so that it loads files from the disk and saves new files to the disk. A physical disk or ramdisk can be used for this purpose. The color computer 3 has the advantage that 8K blocks of data can be switched in by the memory manager by simple memory pokes. We showed how to do this on page 18 of our May 1987 edition. This puts a new dimension into programming allowing data files to be quickly manipulated.

PROGRAMMING

Each month programming terms will be defined and examples given using them. Last month an example was given for obtaining a check book balance by using the PRINT or ? command. No programming was used and commands were entered from the keyboard. Basic can take commands either from basic program steps or directly from the keyboard. Keyboard commands are useful if no program has been loaded or if the desired command has not been entered into the program. The previous example for obtaining the amount of free memory can be obtained by typing the following from the keyboard:

?MEM <ENTER>

This notation means to press the ENTER key after typing ?MEM. To execute a command the ENTER key must be pressed.

ALL OF A SUDDEN YOU'RE IN

NOTELAND

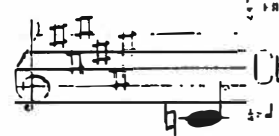
...where learning to read music

Already a classic! is easy and fun! Now also for CoCo 3!



NOTELAND, a unique combination of a musical instrument and a course in music developed by Boston composer Andy Gaus, will let you:

- approach music as a complete beginner;
- learn from an audio cassette and a written manual;
- fool around and be learning;
- play a tune with a joystick (optional) or cursor keys;
- record a tune and play it back with notation;
- save your tune on tape or disk;
- test yourself with a beat-the-clock quiz;
- load the program from disk or cassette if you have a CoCo 1



- or CoCo 2 with 32K and Extended Color Basic;
- take it home with you—IF YOU ORDER NOW—for the special introductory price of \$24.95. (Mass. residents add 5% sales tax.)

Be sure to specify disk or cassette.

Elegant Software

89 Massachusetts Avenue, Box 251
Boston, MA 02115
617-232-3896

STRING VARIABLES

VARIABLES

A variable is a symbol or group of symbols that represents numbers or words. It is called a variable because the number or group of words can change. This is what makes a computer useful. A check book program dedicated to one set of entries would be usable only for that set of entries. It would be desirable to have a program that would work for any month. Therefore we let variables represent quantities that can change.

There are two kinds of variables. The first kind is numerical variables. As the name implies, this type data deals with numbers. A variable can have a name consisting of two characters or a character and a number. The following are examples of numerical variables:

A, XA, Y1, X, Z, ZZ

To show how variables can be used let's assign 1024 to variable X by entering the following:

X=1024

Remember 1024 is the amount of memory in 1K. The "*" symbol is used for multiplication. To find the amount of memory in 32K then enter:

?32*X

The computer will display 32768. To find the memory in 64K enter:

?64*X

The value of any variable can be printed to the screen by using the print command. This will be a powerful debugging tool when a program fails to work properly as the values of variables can be determined.

Basic can handle word or character phrases. Enter the following:

X\$="COLOR"
Y\$="COMPUTER"

Remember to type in the commands as shown and press the <ENTER> key. An OK will appear if the computer accepts the command. To verify that these have been accepted ask the computer to print X\$ and Y\$:

?X\$
?Y\$

Strings can be printed one after the other by using the "+" operator. Now enter the following:

?X\$+Y\$

The computer will then display "COLORCOMPUTER". Notice that there is no space between the variables. Now enter:

?X\$+" "+Y\$

The computer will display "COLOR COMPUTER". It was instructed to add a space when " " was inserted between the variables. Any group of characters can be printed by inserting them inside quotation marks and preceding them with the print command.

Suppose a new variable to represent "COLOR COMPUTER" is needed. If Z\$ stands for the new variable then Z\$ can be defined as follows:

Z\$=X\$+" "+Y\$

Now enter the following commands:

?X\$
?Y\$
?Z\$

Notice the results as they are displayed on the screen.

OPERATORS

An operator is needed to perform arithmetical calculations using variables. The 4 basic operators are:

+ for Addition
 - for Subtraction
 * for Multiplication
 / for Division

To get a feel for using these, let's define the following:

A=21
 B=5.3

Now enter the following commands from the keyboard:

?A+B
 ?A-B
 ?A*B
 ?A/B

WRITING A PROGRAM

We are now ready to write a program. Basic commands can be given from the keyboard or from program statements. To start a program any previous programs should be erased. This can be done entering the following command:

NEW

Numbers are used to organize the program. To write a statement a number is typed followed by the Basic command. Of course the <ENTER> key is always used to enter commands into the computer. The numbers can go from 0 to about 60000. It is best to pick multiples of 5 or 10 so insertions can be made between numbers. Let's take an example program that will demonstrate the 4 basic arithmetical operations.

10 A=25.35
 20 B=75.88
 30 ?A+B

40 ?A-B
 50 ?A*B
 60 ?A/B

Type in the program. After the program has been typed press the "CLEAR" key and enter "LIST". The LIST command will print or list the program to the screen. The word "PRINT" will be used for print statements instead of ? when the program is listed. If there is an error in a line then retype it. A line can be edited by the edit commands which will be covered later. To run it type "RUN <ENTER>". The "RUN" command tells basic to execute the program that resides in the computer's memory. It takes the commands in numerical order. Notice that the results of lines 30,40,50 and 60 are displayed on the screen. However this leaves us wondering what the numbers mean. The program can be improved by inserting print statements as follows:

10 A=25.35
 15 ?"A="A
 20 B=75.88
 25 ?"B="B
 30 ?"A+B="A+B
 40 ?"A-B="A-B
 50 ?"A*B="A*B
 60 ?"A/B="A/B

Notice that lines 15 and 25 were inserted after the variables were defined. In lines 30-60 labels are inserted in the print commands to identify what is being printed. Notice that the + operator is used for chain printing strings and numerical values. In line 30 basic will calculate the sum of A and B and then print the result.

Next month more commands will be covered and example programs will be given using them. If you are not familiar with the material then write practice programs using the commands covered.

DYNAMIC ELECTRONICS INC.

PUBLIC DOMAIN SOFTWARE

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

* PD-1 GAMES

MENU	BAS	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
TARTUS	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	9
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	9
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

GRID	BIN	2	B	2
ZEROG	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	6
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	6
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
SCRN51	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	19
MTCONFIG	BAS	0	B	3
MTERM+	BIN	2	B	6
DATATRDE	BIN	2	B	3
KERMIT	BAS	1	A	1
KERMIT	BIN	2	B	2
HAYESAE	BIN	2	B	4
HAYESAE	DOC	1	A	6

PD-10

COLOR COMPUTER FORTH

MENU	BAS	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
32KFORTH	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-ME	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	6
STARS	BIN	2	B	2
1940S	SET	2	B	1
BLOON	SET	2	B	1
BOLD	SET	2	B	1

FANCY	SET	2	B	1
GREEK	SET	2	B	1
GREEKU	SET	2	B	1
HEBREW	SET	2	B	1
OLDENG	SET	2	B	1
TPPING	SET	2	B	1
EYFON	DRV	2	B	1
EPSON2	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

PMODE 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
LONIA4	BAS	0	A	3

PD-13

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

PICTURES GCM 1 B 68

PD-14

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

PICTURES GCM 1 B 68

PD-15

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

PICTURES GCM 1 B 68

PD-16

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

PICTURES GCM 1 B 68

PD-17 DISK UTILITIES

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

PD-18 TAPE TO DISK
DISK UTILITIES

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

* PD-19 GAMES

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

* PD-20 GAMES

PEG BAS 0 B 3
RABBIT BAS 0 B 1
SAFE BAS 0 B 2
SAUACER BAS 0 B 1
SHOOTEM BAS 0 B 2

SIMMON BAS 0 A 1
SLITHER BAS 0 A 2
SPACE WA BAS 0 B 4
STAR TRE BAS 0 B 1
SUBCHASE BAS 0 B 2
SUBDESTR BAS 0 B 2
SUNDANCE BAS 0 B 2
TANKS BAS 0 B 2
TOWER BAS 0 B 2
UNDROVER BAS 0 B 1

PD-21 MUSIC

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

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

* PD-22 MUSIC-1

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

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

* PD-23 MUSIC-2

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

ADDPLAY BAS 0 B 1
DEPLAY BAS 0 B 1
MSQUEZ BAS 0 B 2
RAIN MUS 2 B 2
SONATA3 MUS 2 B 3
STRAV MUS 2 B 4
FOGGY MUS 2 B 4

FUNERAL MUS 2 B 3
HARDDAY MUS 2 B 2
INVENT MUS 2 B 2
INVENT11 MUS 2 B 3
INVENT15 MUS 2 B 3
INVENT7 MUS 2 B 3
INVENT8 MUS 2 B 2
JOPLIN MUS 2 B 4
KHAN MUS 2 B 6

* PD-24 MUSIC-3

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

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

* PD-25 MUSIC-4

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

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

* PD-26 LAST WILL

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

* 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
LUNARLD BAS 0 B 2
NUMBERS BAS 0 B 1
OBSTACLE BAS 0 B 1
POOLGAME BAS 0 B 4
RETURN BAS 0 B 1
REVERSI BAS 0 B 2
STARTREK BAS 0 B 2
TTREK BAS 0 B 3

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

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

PD-29 COMM, WORD
PRO, GAMES

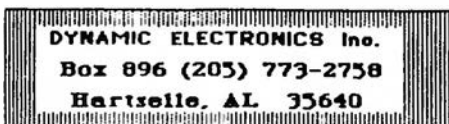
GOSTSHIP BAS 0 B 8
INT RATE BAS 0 B 2
INVSTANL PC 0 B 4
MENU BAS 0 B 4
MOTOJUMP BAS 0 B 3
SCREEN MAX 2 B 6
SCREEN1 BIN 2 B 3
SCREEN2 BIN 2 B 3
SCREEN2 MAX 2 B 6
STRINGTU BAS 0 B 4
TTERM DSK 2 B 4
TTHelp DAT 1 A 4
USING BAS 0 B 3
WF-DOC JP 0 B 2
WORDFILE JP 0 B 4
PARM1 DAT 1 A 1

PD-30 CHECK BOOK,
UTILITIES

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

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

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



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

ML Programming

by
John Galus

PART 18 MORE GRAPHICS

You may know from reading your Color Basic manual that High resolution graphics are available without Extended Basic. But, in order to obtain the desired graphic mode you must set or reset the correct video display registers. If you remember from last time memory addresses starting from \$FFC6 to \$FFD3 controls the starting address of the video display and \$FFC0 to \$FFC5 controls the display mode. These registers are control registers for the SAM chip which makes it possible for us to select different display starting addresses and video modes. The odd thing about these registers is not what value you store there but which register is set or cleared. Writing data to an even numbered register will set a register while, writing to an odd numbered address will clear that register. The following is a table of these registers:

CLEAR	SET	REGISTER	
0	1		

FFD2	FFD3	R6	
FFD0	FFD1	R5	DISPLAY
FFCE	FFCF	R4	ADDRESS
FFCC	FFCD	R3	OFFSET IN
FFCA	FFCB	R2	512 BYTES
FFC8	FFC9	R1	
FFC6	FFC7	R0	

VIDEO MODE REGISTERS

FFC4	FFC5	V2
FFC2	FFC3	V1
FFC0	FFC1	V0

Another important location dealing with the video is \$FF22 which controls the VDG mode. The register at \$FF22 is a PIA data register where bit 3 controls the color set selected for a 2 or 4 color video mode and bit 7-4 controls the video mode. The following is a table of the Video control modes available on the Color Computer II.

VIDEO CONTROL MODES:

SIZE	COLORS	BITS	SAM	BITS

X -- Y		7-6-5-4	V2-V1-V0	

256X192	2	1 1 1 1	1 1 0	
128X192	4	1 1 1 0	1 1 0	
128X192	2	1 1 0 1	1 0 1	
128X96	4	1 1 0 0	1 0 0	
128X96	2	1 0 1 1	0 1 1	
128X64	4	1 0 1 0	0 1 0	
128X64	2	1 0 0 1	0 0 1	
64X64	4	1 0 0 0	0 0 1	
ALPHA	2	0 0 0 0	0 0 0	
64X32	8	0 0 0 0	0 0 0	
64X48	4	0 0 0 1	0 0 0	
64X64	8	0 0 0 0	0 1 0	
64X96	8	0 0 0 0	1 0 0	
64X192	8	0 0 0 0	1 1 0	

GRAPHIC MODES:

MODE	COLOR SET Ø/1	MEMORY SIZE
SG6	16/24	512
G1C	128/136	2048
G1R	144/152	1024
G2C	160/168	2048
G2R	176/184	1536
G3C	192/200	3072
G3R	208/216	3072
G6C	224/232	6144
G6R	240/248	6144

As in the last part in this series about graphics you saw that by setting bit four of \$FF22 we obtained semi-graphic 6 (64X48) mode. To set bit 4 we stored 16 in \$FF22. But to obtain the high resolution graphic modes it is a little bit more complex. First we must decide where we want to place the start of our graphic screen. We do this by switching the page select registers to a 512 byte memory boundary. This is calculated by taking the address of the start of video RAM and dividing it by 512 to determine the correct offset. Then set or clear the correct page registers that would represent this offset in binary. For example, if the screen start was \$0E00 then OFFSET=\$E00/512 or OFFSET=14. The 7 bit binary equivalent of 14 equals 0 0 0 1 1 1 0. Then we must set or clear the correct registers to obtain the desired video mode. Here is an example of how we would simulate PMODE 4,1: SCREEN1,Ø with a video

RENEWAL TIME?

The date beside your name on the address label indicates the last issue you will receive. Send in your renewal if you want to continue receiving technical information on Color Computers. This is the last issue for those with 11/87

starting address of \$0E00 in Assembly:

```
LDA #1
STA $FFC7
STA $FFC9
STA $FFCB
STA $FFCD
STA $FFCE
STA $FFD0
STA $FFD2
STA $FFC3
STA $FFC5
LDA #240
STA $FF22
```

Using this approach requires a lot of work always having to figure out the correct registers to set or clear whenever we wish to use a high resolution screen. Here is routine you can use that will do most of the work for you. The only information you need supply to the routine is where the screen should start, the VDG mode you want at \$FF22 and the size of the video screen. I placed the starting screen at \$4000 to place it above Disk EDTASM+ in the following example. It's good practice to always save the program you are working on when using High-resolution video screens since it's possible to destroy your program or Editor/Assembler by placing the video screen at an incorrect address thereby crashing the system.

```
SBEG FDB $4000
VDG LDA #240 ;COLOR SET Ø
STA $FF22
LDD SBEG
LSRA
ORA #$80
LDX #$FFC6 ;REG ADDRESS
STA -6,X
STA -3,X
STA -1,X
LOOP LSRA
BEQ OUT
BCS OVER
STA ,X++
BRA LOOP
OVER STA ,X
LEAX 2,X
BRA LOOP
OUT JSR $A1C1 ;KEYPRESS?
BEQ OUT
SWI
END
```

COLOR COMPUTER 3
(Reduced)
512K MEMORY

Upgrade your Color Computer 3 to 512K. Our plug in board is easy to install and will give you the maximum addressable memory. With 512K you can have two ramdisks with the included ramdisk disk software. Complete assembly ME-30 \$89.95

Wired 512K board with disk software. ME-30B \$32.95.

512K RAMDISK

A ramdisk operates from memory just like a disk drive except it is many times faster. The 512K ramdisk allows drive 2 and 3 to be ramdisks. You can backup a disk to either ramdisk or select either ramdisk for quickly loading programs. Also included is a memory test program. \$17.95

MEMORY SAVER 2
 For all Color Computers

Now you can save your computer's memory when power fails. Assembly consists of a small rechargeable battery that mounts under the keyboard and an enable switch. When power fails the electronic control circuit connects the battery to the memories saving all data or programs for about an hour depending upon current requirements and accessories. Easy installation with only one wire to solder.

MS-2 \$39.95

Checks, Visa, or MC
 Add \$3 shipping

DYNAMIC ELECTRONICS Inc.
 Box 896 (205) 773-2758
 Hartselle, AL 35640

After setting up the video we will need to clear out the video memory, this is done by storing zero in the entire video screen as follows.

```
SEND RMB 2
SBEG FDB $4000
SIZE FDB 6144
START LDD SBEG
      ADDD SIZE
      STD SEND
PCLS LDD #0
      LDX SBEG
CLS  STD ,X++
      CMPX SEND
      BLO PCLS
      RTS
```

You should place this routine in the preceding video routine and call the routine starting at PCLS when you wish to clear out your video screen. The instructions at START should be placed at the beginning of the video setting routine. We can put something on this screen by simply storing the contents of a register in a location on the video screen.

```
LDA #255
STA $4114
```

Experiment with different values and see what they look like on the video screen. In extended Color Basic we have a command known as PSET that places a dot at a certain location on the screen. Here is a routine that simulates the PSET instruction for a PMODE4 screen.

```
PSET LDA YPOS ;FIND BYTE
      LDB #32
      MUL
      ADDD SBEG
      TFR D,X
      LDB XPOS
      LSRB
      LSRB ;X/8
      LSRB
      ABX
      LDA #$80 ;MASK
      LDB XPOS
```

```

IN      ANDB #7      ;FIND BIT
        BEQ  DIS
        LSRA
        DECB
        BRA  IN
DIS     PSHS A
        LDB  ,X      ;GET BTYE
        ORB  ,S+    ;MASK BYTE
        STB  ,X      ;ON SCREEN
        RTS
YPOS    FCB  128
XPOS    FCB  96
    
```

For further information concerning setting up graphic modes and mapping out a video screen see your Color Basic manual. As we saw in the last part of this series on Graphics we used ROM subroutines to help us with some of the work. We can also use this method using Extended Color Basic ROM routines. This is how we could simulate the following Basic line using ROM subroutines.

```
10 PMODE4,1:SCREEN1,0:PCLS
```

```

START   LDX  #PMODE
        BSR  PARSE
        JSR  $9621
        LDX  #SCREEN
        BSR  PARSE
        JSR  $9670
        CLR B
        JSR  $9532 ;PCLS
LOOP    JSR  $A1C1
        BEQ  LOOP
PARSE   LEAX -1,X
        STX  $A6
        JSR  $9F
        RTS
PMODE   FCC  /4,1/
        FCB  0
SCREEN  FCC  /1,0/
        FCB  0
        END
    
```

As you may have noticed we "tricked" basic into excepting an Assembly language directive such, as at PMODE and interpreting it as a Basic command. Be sure to place a zero after any statement or you will receive a

syntax error. Of course, using this method we can only use the graphic modes available in Extended Color Basic but, it does save quite a bit of work. We can also use the PSET ROM routine in the same fashion.

```
PSET(128,96)
```

```

PSET   LDA #128
        STA $BE
        LDA #96
        STA $C0
        JSR $9374
    
```

Be sure to setup a High-resolution graphic mode using the preceding ROM routine method before using this routine. There are other routines in ROM that can be used but, I will leave this up to you to discover them for yourself. Refer to the ROM routine list in another part of this series for more information. Good luck!

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 \$19.95 +\$2 ship.

DYNAMIC ELECTRONICS Inc.
 Box 896 (205) 773-2758
 Hartselle, AL 35640

Software Bonanza Pak

A **SPECTACULAR SOFTWARE BONANZA** with the following 12 programs: CoCo Checker, Multi-Pak Crak, CoCo Screen Dump, Disk Utility 2.1, Spectrum Font Generator, Tape/Disk Utility, Pasttube II, 64K Disk Utility, Spectrum DOS, Basic, CoCo Calendar & OS-9-Solution (a \$300 plus value) for only \$99.95

CoCo III Software Library

Create an instant library of Spectrum Projects TOP CoCoIII software! Get FONT BONANZA, FONT DISK #1, FKEYS III, C III GRAPHICS, CoCoIII UTILITIES and FASTDUPE II (a \$150 plus value) for only \$49.95

CoCo III Utilities

Terrific utility programs for the Color Computer III! Includes a CoCoII to CoCoIII Converter, 32K Hi-Res screen saver, 40/80 Column Word Processor, RAM tester, DEMO BALL generator, SMOOTH Scrolling demos. 128K DISK \$24.95 (see 3/87 Rainbow review)

CoCo III Secrets Revealed

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

CoCo III Screen Dump

This is the program for **HARDCOPY GRAPHICS** for Radio Shack bit-image, dot-matrix printers (DMP-105, DMP-130, etc.) and Epson compatibles (Star Micronics, Panasonic, etc.). Will print **SCREEN 1-4** and **MODE 0-4**. 16 patterns can be **CUSTOMIZED** for any color on the screen! 128K CoCoIII DISK \$24.95

Fkeys III

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

C III Graphics

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

OS-9 Solution

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

Telepatch III

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

Tape/Disk Utility

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

Multi-Pak Crak

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

Disk Utility 2.1A

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

Spectrum DOS

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

Mikey Dial

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

Spectrum Font Generator

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

Schematic Drafting Processor

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

CoCo Checker

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

Rickeyterm 2.0

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

64K Disk Utility Package

Take advantage of an expanded 64K machine. Make an additional **8K** of RAM available by relocating the **Ext Basic ROM** from \$8000 to \$D800. Copy **ROMPAKS** to disk (even "protected" PAKs) and create a **32K SPOOL** buffer for printing. \$24.95

EZ Base

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

Blackjack Royale

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

Spectrum Adventure Generator

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

CoCo Calendar

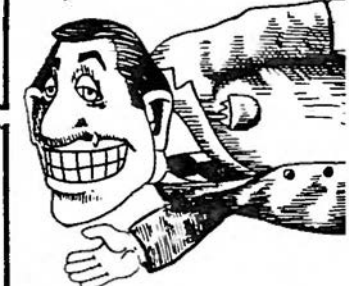
Get organized for 365 days today with the **CoCo Calendar!** Designed for recording the entire year's occasions and daily appointments so you can plan ahead. You can store **HUNDREDS** of entries and our **GRAPHIC calendar** will show all **MEMOS!** \$19.95

THE KITCHEN SINK ...

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

SPECTRUM PROJECTS
PO BOX 264
HOWARD BEACH NY 11414
All orders plus \$3.00 shipping/handling
(Foreign orders please add \$5.00)
NYS Residents add sales tax.

- Turn sideways for more Colorful Utilities!
Graphics Designer - \$29.95
Spit N' Image - \$34.95
ADOS-3 - \$34.95
EliteWord 80/Spel - \$99.95



GREAT COCO III STUFF



OS9 Lev.II Users - 720K/80 Tracks DS 3 1/2" DRIVES

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

Drive 1 (5 1/4") - \$99.95 Disk Controller - \$99.95
 (10) 3 1/2" disks - \$24.95 OS-9 Controller - \$149.95**

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

300 COCO III POKES

Get more POWER for your CoCoIII. Has enhancements for CoCoIII BASIC! \$19.95

RAINBOW GUIDE OS9 LEVEL II

Dale Puckett has done it again!! Vol.1: "A Beginners Guide to Windows". Almost 300 pages with helpful tips! \$19.95
 Rainbow Guide to OS9 Lev.II DISK \$19.95

COCO III UNRAVELED

A COMPLETE DISASSEMBLY of the CoCoIII's new ROM code! "Well worth the price"- Rainbow review. Over 100 pages! \$29.95

COLORMAX III & COLORMAX DELUXE (512K Version) \$69.95

It's here! The CoCoIII BREAKTHROUGH PRODUCT everyone was waiting for! 320x200 graphics, pull down menus, icons the choice of any 16 colors from the CoCo III's 64 color palette plus RGB support! Eleven (11) fonts are included for hundreds of lettering styles and painting is a breeze with 16 colors and 32 editable patterns!!! Color Max III requires a 128K CoCo III and Hi-Res Joystick interface. (Specify printer!) \$59.95. Color Max III Font Editor - create and modify fonts for use with Color Max III \$29.95/Font Disk#1 (11 more Fonts!) \$19.95. Hi-Res Joystick interface \$14.95.

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

TW-80 - 80 columns for TW-64 on CoCo III See pg.138, 10/87 Rainbow review!

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

PYRAMIX - Best CoCo III action game ever!

CoCoIII version of the popular 3D Cube Maze game, Cubix! Written exclusively to take ADVANTAGE of all the power in your CoCoIII. Colors are absolutely BRILLIANT!, the graphics SHARP & the action HOT! 128K DISK \$29.95

512K UPGRADE (\$79.95*) LOWEST PRICES OS9 Lev.II Ramdisk Driver \$29.95

Easy installation with a superior design for a reliable upgrade, processing efficiency and AVAILABLE NOW for the CoCo III! (*\$79.95 when purchased with our 512K RAM DISK program for \$24.95) A 512K upgrade without RAM chips \$39.95 - The lowest upgrade prices in the Rainbow magazine, period!!! FREE 512K RAM sticker w/purchase!

HI-RES JOYSTICK utility software BONANZA!

New useful programs for the Tandy Hi-Res Joystick Interface! Get FULL 640X640 mouse & joystick resolution from BASIC or run both CoCoMaxII & MaxEdit on the CoCoIII w/o the CoCoMax cartridge & get a 256X192 screen! \$24.95

RGB PATCH - No more BLACK & WHITE dots ...

Did you buy an expensive RGB monitor (CM-8) just so that you could see your Hi-Res artifacting CoCo 2 games in BLACK & WHITE ??? RGB PATCH converts most games to display in COLOR on an RGB monitor. 128K DISK \$29.95

COCO NEWSROOM - 22 Fonts & 50 Pictures!

Compose your own "CoCo NEWSPAPER" w/BANNER HEADLINES & 6 ARTICLES using a SOPHISTICATED graphics editor with importing of PICTURES, FONTS & FILL PATTERNS from disk. Over 140K of code & WYSIWYG! CoCoIII DISK \$49.95

MAGNAVOX 8515 (\$299.95*) LOWEST PRICES Sharper & Brighter than Tandy CM-8!

Do NOT be FOOLED! The CM-8 has a dot-pitch of .52mm & will not work with any other computer or VCR! The '8515' has a SHARP .42mm dot-pitch, will work with IBM PCs/Tandy 1000 and its COLOR COMPOSITE input displays PM0084 artifact colors unlike the CM-8! \$299.95 when purchased with a \$24.95 CoCoIII cable - Add \$14 shipping.

CoCo III 512K RAM sticker \$4.99
 Level II Quick Ref Guide \$4.99
 Level II Basic09 binder ..\$9.95

CoCo III Multipak PAL chip \$19.95
 CoCoIII Assembly Language \$19.95
 Guide to CoCoIII Graphics \$21.95

Better CoCoIII Graphics \$24.95
 CoCo III Service Manual \$39.95
 512K CoCo III Computer \$299.95

FASTDUPE 512 Format & Backup up to 4 single-/double-sided, 35/40 trk disks in 1 PASS! Even OS9 Lev.II! \$19.95
 BIG BUFFER - 437,888 byte spooler for a 512K CoCoIII! Print up to 200 text pages while using your CoCo! \$19.95
 OS-9 Level II Font Editor \$29.95



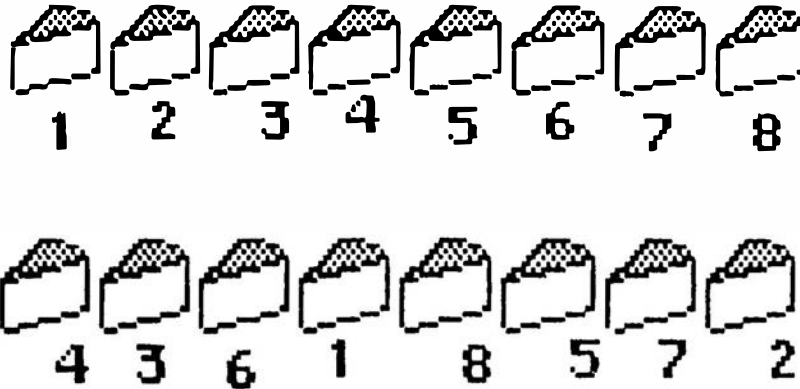
All orders plus \$3 S/H (Foreign add \$5) - NYS Residents add Sales Tax
 Most orders shipped from stock. Allow 1-3 weeks for processing backorders.

SPECTRUM PROJECTS

PO BOX 264 HOWARD BEACH NY 11414

See our other ads on pages 27 & 29 !!!





REFORMATTING DATA

In this series we are concerned with rearranging bytes from one configuration to form different bytes for another application. A PMODE 4 graphics picture has the bits or pixels oriented horizontally with each byte containing 8 pixels for two color graphics. Last month we showed how to print a PMODE 4 graphics picture on a standard printer by removing each pixel and printing a character if the pixel is "0" and printing a space if the pixel is a "1". Also we gave a program that allows a blown up picture to be printed on a printer using compressed print in two passes. This is excellent for making posters, signs, or billboards.

PMODE 4 SCREEN DUMP

Let's review what is required to reformat bytes in order to do a screen dump to a graphics printer. This was covered in the September issue and is repeated here for emphasis. A PMODE 4 graphics picture has 256h x 192v pixels. Each horizontal line has 32 bytes and each byte contains 8 pixels giving the 256 pixels for the line. Let's consider 8 bytes located at M, M+32, M+64, M+96, M+128, M+160, M+192, and M+224. The pixels are horizontal as shown in Figure 1.

Bits	7	6	5	4	3	2	1	0
1 M	A7	A6	A5	A4	A3	A2	A1	A0
2 M+32	B7	B6	B5	B4	B3	B2	B1	B0
3 M+64	C7	C6	C5	C4	C3	C2	C1	C0
4 M+96	D7	D6	D5	D4	D3	D2	D1	D0
5 M+128	E7	E6	E5	E4	E3	E2	E1	E0
6 M+160	F7	F6	F5	F4	F3	F2	F1	F0
7 M+192	G7	G6	G5	G4	G3	G2	G1	G0
8 M+224	H7	H6	H5	H4	H3	H2	H1	H0
Printer Bytes	1	2	3	4	5	6	7	8

FIGURE 1

A graphics printer requires a byte composed of 8 vertical bits. The first byte would be composed of A7, B7, C7, D7, E7, F7, G7, and H7. The second byte would be composed of A6, B6, C6, D6, E6, F6, G6, and H6. Notice that the 8 original bytes are reformatted into 8 new bytes for a printer. We will cover a graphics screen dump later but first we want to look at the color computer 3 high resolution graphics because it is a little different.

COLOR COMPUTER 3

	Pixels	Colors	Dots /byte
HSCREEN 1	320 x 192	4	4
HSCREEN 2	320 x 192	16	2
HSCREEN 3	640 x 192	2	8
HSCREEN 4	640 x 192	4	4
PMODE 4	256 x 192	2	8

**COLOR COMPUTER 3 HIGH
RESOLUTION GRAPHICS**

FIGURE 2

The color computer 3 will also display PMODE 4 graphics pictures. However from Figure 2 it can be seen that there are more options. One thing that is common to all graphics is the number of lines. Each type picture has 192 lines. This makes it easier because the horizontal is the only variable. Each line requires either 80 or 160 bytes while a PMODE 4 line requires 32 bytes.

Let's consider colors. A two color picture will consist of color and no color or black/green or black/buff. There are 3 basic colors which are red, green, and blue. The various colors are obtained by mixing portions of these 3 basic colors. These 3 basic color components are supplied to the inputs of a RGB monitor. The term RGB stands for red, green, and blue. If you have a color printer, then a program could be written to give a graphics screen dump in color. However since most people do not have a color printer, we will restrict ourselves to printing in black and white.

MODE	bytes/line
HSCREEN 1	80
HSCREEN 2	160
HSCREEN 3	80
HSCREEN 4	160
PMODE 4	32

Bytes per line for HRES screens

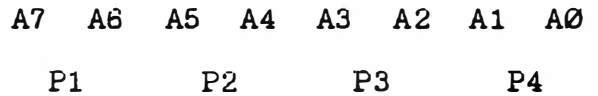
FIGURE 3

Another difference in HRES screens is the number of bytes required for a line. Notice

from Figure 3 the number of bytes / line. Also notice that 2 bits contain 1 picture element in the HSCREEN 4 mode. This presents a problem. For our printer we can print something or nothing. So we have to decide on a format. One possibility is to print if there is color and print a space for no color.

HRES MEMORY

The color computer 3 has memory from 393216 to 425983 reserved for the high resolution graphics. The bytes can be obtained from basic with the LPEEK command. Since there are 4 picture elements contained in 1 byte it will be necessary to remove the bits and set up a procedure. Let's take an example. Suppose the components of a byte are designated by A7,A6,A5,..., etc. The printer bits will be determined by bit pairs as follows:



P1 will be the combination of A7 and A6. P2 will be the combination of A5 and A4. We have shown how to break a byte down into bits. Now the bit pairs will have to be combined to form a printer bit. We will continue with this next month.

BACK ISSUES

Back issues of Dynamic Color News are available for \$1.95 each, 3 for \$5 or 12 for \$15 pp.

Foreigners other than Canada add \$2 for Air Mail postage.

350 DATA 4A4A4C4C4C4E4E4E4E505252545456565
85A5A5C5E5E606264646466686A6A6A6C6C66E
6E6E7070707070706E6E6C6C6A686866664
2605E5C5A585652504E4A4844423E3C3A363230
2E2A2824226E40404141FE40404141642D0C251
0123F0C2D0C

360 DATA 2D0C251015B30E7B0C2D0C2510185B123
F0C2D0C251015B310420C2D0C2510185B0E7B0A
D90AD1101B5710420AD90AD1101CF7123F0AD90
AD1101B57123F0AD90AD1FF185B0C2D091F0917
10185B0C2D091F09171015B30E7B091F0917101
85B123F091F

370 DATA 09171015B31042091F091710185B0E7B0
8210819101B57104208210819101CF7123F0821
0819101B57104208210819FF15B30DAB091F091
71015B30DAB091F0917101B57123F091F091710
1CF715B3091F0917101B5715B3091F091710208
4123F091F09

380 DATA 17101CF7123F091F0917101B571042000
009171015B30DAB0000917FF00000000000000
00FE40404141642D0C2510123F0C2D0C2D0C251
015B30E7B0C2D0C2510185B123F0C2D0C251015
B310420C2D0C2510185B0E7B0AD90AD1101B571
0420AD90AD1

390 DATA 101CF7123F0AD90AD1101B57123F0AD90
AD1FF185B0C2D091F09171015B310420E7B0E73
10185B123F0E7B0E731015B310420E7B0E73101
23F0E7B0E7B0E7310135610420DAB0DA31015B3
10420DAB0DA310185B123F0DAB0DA31015B3123
F0DAB0DA3FF

400 DATA 000000000000000010123F0E7B0C2D0C2
51015B310420C2D0C2510185B123F0C2D0C2510
15B3123F0C2D0C2510185B0E7B0AD90AD1101B5
710420AD90AD1102084123F0AD90AD1101CF712
3F0AD90AD1FF000000000000000010247F15B30
91F09171020

410 DATA 841356091F0917101B57123F091F09171
0185B123F091F09171013561042082108191015
B3123F08210819101B5713560821081910185B1
35608210819FF00000000000000001015B3123F
091F09171015B31042091F091710147B0DAB091
F091710123F

420 DATA 0DAB091F091710123F0E7B091F0917101
47B1042091F09171015B3123F00000000101B57
123F00000000FF00000000000000000FE424040
36400000010185B0E7B0000000010185B0E7B09
1F061610185B0DAB0821061610185B0E7B091F0
6161015B310

430 DATA 42091F06161015B31042091F06D51015B
30E7B082106D51015B31042091F06D5FF000000
000000000010123F0C2D091F06D510123F0C2D0
91F073D10123F0DAB0821073D10123F0C2D091F
073D1010420DAB0A3D073D1010420DAB0A3D082
11010420C2D

440 DATA 0A3D08211010420DAB0A3D0821FF00000
000000000010123F0AD9091F048F10123F0C2D
0A3D048F10123F0DAB0AD9048F10123F0C2D0A3
D048F10123F0AD9091F048F10123F0AD9082104
8F1000000AD906D5048F1000000AD9073D048FF
F0000000000

450 DATA 00000010185B0E7B091F030B10185B123
F0C2D061610185B10420C2D061610185B0E7B0A
D906161015B30E7B0C2D039E1015B3123F0AD90
73D1015B310420A3D073D1015B30E7B091F073D
FF00000000000000010123F0DAB0AD9048F101
23F10420DAB

460 DATA 091F10123F0E7B0C2D091F10123F0DAB0
AD9091F1010420DAB0A3D036A1010420C2D091F
06D51010420E7B0AD906D51010420DAB0A3D06D
5FF00000000000000010DAB0AD9091F048F10
0DAB0A3D0821048F100DAB0C2D091F048F100DA
B0AD9091F04

470 DATA 8F100DAB0AD90A3D048F100DAB0AD9091
F048F1000000AD90821048F1000000AD9091F04
8FF000000000000000FE40414043640000001
0123F0C2D073D030B1015B30C2D0821030B1018
5B0C2D091F030B1015B30C2D0821030B10185B0
AD9073D030B

480 DATA 101B570AD90821030B101CF70AD9091F0
30B101B570AD90A3D030BFF0000091F00000000
10185B091F0C2D048F1015B3091F0DAB048F101
85B091F0C2D048F101B57091F0AD9048F101CF7
08210A3D048F101B5708210A3D048F10185B082
10A3D048F10

490 DATA 147B08210A3D048FFF000000000000000
01015B3091F0AD9048F101B57091F0AD9048F10
1CF7091F0C2D048F101B57091F0AD9048F10185
B091F0A3D048F1015B3091F091F048F10147B00
000821048F10123F000006D5048FFF000000000
00000001012

500 DATA 3F0C2D073D030B1015B30C2D0821030B1
0185B0C2D091F030B1015B30C2D0821030B1018
5B0AD9073D030B101B570AD90821030B101CF70
AD9091F030B101B570AD90A3D030BFF0000091F
0000000101CF7091F0C2D048F101B57091F0DA
B048F10185B

510 DATA 091F0C2D048F101B57091F0AD9048F101
47B08210C2D048F1015B308210AD9048F10185B
08210A3D048F10147B08210A3D048FFF0000000
0000000001015B306D5091F048F101B5706D50A
D9048F101CF706D50C2D048F101B5706D50AD90
48F10185B06

520 DATA D50A3D048F1015B306D5091F048F10147
B00000021048F101042000006D5048FFF0000000
0000000000FE404040406400000010185B0E7B0
000000010185B0E7B091F061610185B0DAB0821
061610185B0E7B091F06161015B31042091F061
61015B31042

530 DATA 091F06D51015B30E7B082106D51015B31
042091F06D5FF000000000000000010123F0C2D
091F06D510123F0C2D091F073D10123F0DAB082
1073D10123F0C2D091F073D1010420DAB0A3D07
3D1010420DAB0A3D08211010420C2D0A3D08211
010420DAB0A

540 DATA 3D0821FF000000000000000010123F0AD
9091F048F10123F0C2D0A3D048F10123F0DAB0A
D9048F10123F0C2D0A3D048F10123F0AD9091F0
48F10123F0AD90821048F1000000AD906D5048F
1000000AD9073D048FFF000000000000000101
85B0E7B091F

550 DATA 030B1015B3123F0C2D061610185B10420
C2D0616101B570E7B0AD9061610185B0E7B0C2D
039E1015B3123F0AD9073D1015B310420A3D073
D10147B0E7B091F073DFF000000000000000010
123F0DAB0AD9048F10123F10420DAB091F10147
B0E7B0C2D09

560 DATA 1F10123F0DAB0AD9091F1010420DAB0A3
D036A1010420C2D091F06D51010420E7B0AD906
D51010420DAB0A3D06D5FF0000000000000001
00DAB0AD9091F048F100DAB0A3D0821048F100D
AB0C2D091F048F100DAB0AD9091F048FFE40404
0406E3D048F

570 DATA 100DAB0AD90A3D048F100DAB0AD9091F0
48FFE404040407821048F1010420AD90821048F
1010420AD9091F048FFF00000000000000000FE4
04041416E2D0C2510123F0C2D0C2D0C251015B3
0E7B0C2D0C25FE40404141642D0C2510185B123
F0C2D0C2510

580 DATA 15B310420C2D0C2510185B0E7B0AD90AD
1101B5710420AD90AD1101CF7123F0AD90AD110
1B57123F0AD90AD1FF185B0C2D091F091710185
B0C2D091F09171015B30E7B091F091710185B12
3F091F09171015B31042091F091710185B0E7B0
8210819101B

590 DATA 57104208210819101CF7123F082108191
01B57104208210819FF15B30DAB091F09171015
B30DAB091F0917101B57123F091F0917FE40404
1416E1F0917101CF715B3091F0917101B5715B3
091F0917FE404041417E1F0917102084123F091
F0917101CF7

600 DATA 123F091F0917FE404041416E000917101
B57104200009171015B30DAB0000917FF0000
000000000000FE40404141642D0C2510123F0C2
D0C2D0C251015B30E7B0C2D0C2510185B123F0C
2D0C251015B310420C2D0C2510185B0E7B0AD90
AD1101B5710

610 DATA 420AD90AD1101CF7123F0AD90AD1101B5
 7123F0AD90AD1FF185B0C2D091F09171015B310
 420E7B0E7310185B123F0E7B0E731015B310420
 E7B0E7310123F0E7B0E7B0E7310135610420DAB
 0DA31015B310420DAB0DA310185B123F0DAB0DA
 31015B3123F
 620 DATA 0DAB0DA3FF0000000000000000010123F0
 E7B0C2D0C251015B310420C2D0C2510185B123F
 0C2D0C251015B3123F0C2D0C2510185B0E7B0AD
 90AD1101B5710420AD90AD1FE404041416ED90A
 B1102084123F0AD90AD1101CF7123F0AD90AD1F
 F00000000000
 630 DATA 000000FE40404141781F091710247F15B
 3091F09171020841356091F0917FE404041416E
 1F0917101B57123F091F091710185B123F091F0
 917FE4040414164210819101356104208210819
 1015B3123F08210819101B57135608210819101
 85B13560821
 640 DATA 0819FF0000000000000000FE404041416
 E1F09171015B3123F091F09171015B31042091F
 091710147B0DAB091F091710123F0DAB091F091
 7FE40404141781F091710123F0E7B091F091710
 147B1042091F0917FE40404141821F09171015B
 3123F091F09

650 DATA 17101B57123F091F0917FF000000000000
 00000FE404040438C2D0C2510185B0E7B091F06
 161015B31042091F0616FE40404043963D06161
 01B5710420A3D061610185B0E7B091F06162018
 5B0E7B091F030B20185B0E7B091F030BFF00000
 000000000000
 660 DATA 0039833120363A3930303030303030823
 220393A3937313531303030863320393A393033
 3230303030823420393A3938323330303030004
 12043414E5449434C45204F4620504541434520
 4259204C2E2048414E4453204F43544F4245522
 0352C203139
 670 DATA 383420202020202020202020202020202020
 020200039833120393A39373533303030308232
 20393A3938303030303030863320393A3938303
 030303030823420393A39383530303030300020
 202020202020202020202020202020202020
 02020202020
 680 DATA 202020202020202020202020202020202020
 0202020202020202020202020202020202020
 2020000C2D09AB0413560E7B0C2D09AB0400000
 E7B0C2D09ABFF1356000000000000201356056C
 00000002010420DAB09AB000020123F056C000
 00000201356
 690 DATA @

NEW PRODUCTS

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

NOTELAND

NOTELAND is a complete course in music developed by Boston composer Andy Gaus. It assumes the student is a beginner and displays a piano keyboard along with a music staff. Notes can be moved up or down with a joystick while being displayed on the piano keyboard and music staff. Tunes can be composed and saved or played through the computer. NOTELAND costs \$24.95 for tape or disk. Elegant Software, 89 Massachusetts Ave., Box 251, Boston, MA 02115.

Data Acquisition/Output Board

The Model DAB-1 enables the TRS-80 Color Computer to be used to acquire data from and to control devices such as instruments, temperature monitoring and control, and burglar alarms. The DAB-1 is useful in the laboratory, plant, school, or home. The cost is \$175. Group Technology Ltd., 6925 Dogwood Rd., Baltimore, MD 21207.

OS-9 Ramdisk Driver

A ramdisk package for both level 1 and level 2 OS-9 is available from Spectrum Projects. The package includes ramdisk service module, ramdisk device driver, and ramdisk device descriptors. The cost is \$29.95 +\$3 s/h. Spectrum Projects, P. O. Box 264, Howard Beach, NY 11414.

Questions and Answers

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

+ + +

Bill,

I'm interested in getting some ideas started for the COCO 3. Since your magazine seems to be interested in machine language as well as good balance of BASIC, I thought I'd see what you think. Specifically, I'd like to see a ML driver or the logic to use the RS High Resolution Joystick Interface on the COCO 3. Those who have written software for it seem to want to "sell" the idea in the form of a program. To me that's the fastest way to kill a computer user base. I think we need to see if we can stir up some people to feed in ideas to "share" not hide them.

Toward this end, I took a quick look inside the hardware Hi-Res Interface and it seems to take a Cassette port signal (sine wave probably of fixed frequency), amplify and buffer it, integrate it into pulses after rectifying off one side, then clocking this against the horizontal joystick line. Attached is a sketch of the circuitry. The position of the stick must be "read" by a software routine that samples the number of pulses as a

function of 0-640 (Horz. resolution).

Not being an electronics whiz, maybe I'm all wet, but if someone else can give me a clue as to what's needed I do know the 6809 and the COCO's and I can write the ML code to go from there. Any ideas on how we can get some ideas or exchange of IN DEPTH facts going on for this great COCO 3 machine??

Thanks for your help,

Sincerely,

Bob Fink.

+ + +

Bob thanks for your letter and comments. First of all Radio Shack should have provided software for the interface. I think they let us down by not doing this. You mentioned people wanting to sell the idea of using the interface. If there is no software and someone develops it, then they should be able to sell it. I agree that this is a good project for us to tackle as a group.

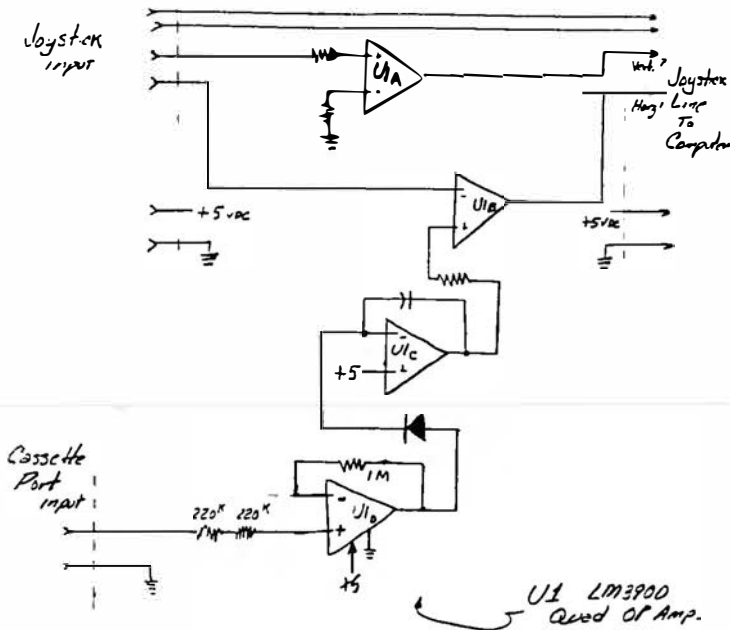
From your diagram it looks like they are using the integrator method of analog to digital conversion. This involves measuring the time for a voltage to rise from zero to an unknown which will be the joystick voltage. Remember from our editorials on joysticks, that the value at the joystick port can be any value from 0 to 5 volts.

The formula for an integrator is $v=kt$ where v is the output voltage, k is a constant and t is the time. The computer counts time and stops when the integrator voltage equals the joystick voltage. The number of counts is the value.

We are printing the diagram and would appreciate any help or comments on how the circuit works.

+ + +

This is the only letter we had this month. The World Series is over so let us hear from you. - Bill.



Quick Check of RS High Res Joystick Interface

OPERATING HINT

Disable COCO 3 high resolution screen clear. To prevent the high resolution screen from clearing POKE &HE6C6, 33.

**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. Upgrade to 128K, 256K or 512K with Banker RAMS. If you have an older CCI or CC-2 then this is an excellent source for spare parts. Replacement parts would cost more than this kit. A fine gift for that teenager.

CC-2 Kit \$59.95.

CLOSEOUTS

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

COCOMAX II disk version \$75.95
COCOMAX II Tape version \$85.95
Y cable 24.95

Telewriter 64 Word Processor
Disk \$49.95

Telepatch- Telewriter enhancer
Disk \$9.95

DIGITIZER

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

COCO MAX 3

The ultimate graphics generator for the COCO 3. Similar to COCO MAX II except has additional features. Uses the high resolution screen. The included high resolution interface plugs into a joystick port without requiring a Y cable. Excellent for setting type for advertising or a newsletter. Complete with software for reading COCO MAX 2 files. Compatible with DS-69B digitizer. \$79.95.

Add \$3 shipping

DYNAMIC ELECTRONICS
Box 898 - (205) 773-2758
Hartselle, AL 36840

DYNAMIC COLOR NEWS

on
Disk or Tape

Now you can have all of our editorials and programs for your tape or disk library. Programs are ready to load and run. We have a variety of programs such as games, geneology, home management, business, and utility programs. The editorials are saved with a 32 column width as a word processor file so you can review them on your screen or print them on your printer. Software is included for viewing the editorials. Combine each part of a series to form a booklet on each subject.

If you are interested in programming then study the examples given in our programming series. We are covering both basic and assembly (machine language) programming. Suppose you want to use the extra memory in a 64K color computer. Then review the editorials and examples on managing the extra memory and run the memory manager programs.

Do you want to learn to interface your computer using the joystick port? We had a series on this with example programs for making a voltmeter, thermometer, ohmmeter, and light meter.

If your interest is ham radio then we have articles each month since August 1986. We covered Morse code, Antenna design, DX stations, Morse Keyer, Morse Terminal, and Radio Teletype with support programs.

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

All programs are ready to run and complement the editorials in the magazine. We have covered many subjects and there is much more to come. See our cumulative index for a list of subjects. All back issues are available.

COST

	USA & Can.	Foreign (Air)
1 year	\$60.00	\$75.00
6 months	35.00	49.00
1 month	6.95	8.95

Back issues are at the same rate. Look for our Cumulative index for subjects.

 * Please sign me up for one year for DYNAMIC COLOR NEWS. I want
 * to receive instruction on programming, Computer Theory, Operating
 * Techniques, Computer Expansion, plus information on New Products,
 * Product Reviews, Programs and Answers to Questions.
 *
 * Magazine Subscription \$15 USA, \$18 Canada \$30 other foreign.
 * Back issues \$1.95 each, 3 for \$5, 12 for \$15 including shipping.
 * Disk or Tape Subscriptions are \$60 USA & Canada, (\$75) foreign.
 * Single Copy \$6.95 (8.95), 6 for \$35 (49.00), 12 for \$60 (75.00)
 * Send back issues _____
 *
 * 10% club discounts for 5 or more subscriptions.
 *
 * Name _____ Mail payment to
 * Address _____ Dynamic Electronics Inc
 * City _____ P. O. Box 896
 * State & Zip _____ Hartselle, AL 35640
 * Enclosed is a check _____
 * charge to VISA _____ MC _____ Number _____ Exp. _____
 * *****

DYNAMIC COLOR NEWS

We are very encouraged by the number of renewals and new subscriptions we have received. I want to thank each of you who are supporting us. Without adequate support we would not be able to do the things we are doing and make additions and improvements.

Starting this month we are offering Dynamic Color News on tape or disk. All of our programs will be included as well as the editorials. We have covered many subjects since our first issue. Sometimes I have to refer to past issues for information. Fortunately I have all the back issues on disk as well as printed copies. All of the games, utilities, and educational programs will be on the disk or tape. We have tried to hold down the cost as much as possible, and I suggest you compare our prices with others. Our objective from the start has been to provide information at the lowest possible cost. However I can see that we will have to make some adjustments as the magazine gets thicker. Our music program is printed with reduced print and wider columns. We will be doing more of this to reduce both printing and shipping costs.

I want to thank Bob Rosen of Spectrum Projects and Dr. Preble of Dr. Prebles Programs for their support in a joint promotional effort. We need more subscribers and would appreciate receiving names of people interested in color computers so we can send them a free sample.

We can supply copies for club meetings. If you can pass them out to your club we would appreciate it. Write or call Dean and she will send them to you. If you purchase something from one of our advertisers, we would appreciate it if you would tell them you saw their advertisement in Dynamic Color News. This will let them know that advertising with us is effective.

The music program is a first for us. The color computers can generate very good music. The program can be typed in and run. I have been thinking of a good way to present machine language data. Tables with data listed are very dull to type in. So we wrote a basic program to generate the machine language program. This will allow using basic's editor to correct mistakes and will be the approach we will take for most machine language programs.



HAM RADIO & COMPUTERS

by

Bill Chapple W4GQC

PACKET RADIO

For the past few years I have heard the term "packet radio". Until recently I was not interested in it, but responses from our readers indicate that many hams are becoming interested. So I started searching for information.

Packet radio is a digital form of communications. The term "digital" means two states as compared to "analog" which means continuous. Voice communications is analog and Morse code, teletype and packet are digital. Computers are digital devices with memories that can have either a logic 0 or 1. Morse code consists of characters formed from a signal or an absence of a signal. Generating teletype is similar to sending computer data through a telephone line. Audio frequency tones are frequency shifted to represent a logical "0" or "1". These tones are fed into the microphone circuits of a high frequency (HF) transmitter to generate frequency shifted keying (FSK). For a vhf transmitter, audio frequency shifted keying (AFSK) is generated. The ASCII code is a standard for serial transfer of data. We have covered ASCII in detail in previous issues. ASCII is now legal on all of the ham bands.

The older Baudot code had a tremendous impact on communications. In fact it is a good code for transmitting words and is efficient because only 5 bits are required as compared to 7

bits for ASCII. Since 5 bits can only represent 32 characters, Baudot has to send a shift character to enable the rest of the characters.

There are two applications for packet radio. Most of my operating experience has been on the HF bands from 75 through 10 meters. I do have a two meter rig and operate mostly mobile with it. Packet is used on the HF bands and I have heard signals on 20 and 40 meters. The ASCII code is used with a special format for sending data. A frequency shift of 200 hertz is used in HF packet. The frequencies used to generate the audio are 1070 and 1270 hertz. This is a standard called Bell 103. Bell 202 is the standard for audio tones used on vhf and it uses frequencies of 1200 Hz for mark and 2200 Hz for space. These tones are fed into the microphone circuits of either an HF or VHF transceiver. This is the same method we used last month for our RTTY program.

COCO POWER

Let's consider our RTTY program from last month. It operated at 60 words a minute and generated the desired audio frequency tones for transmitting. For receiving the audio tones were sent to the computer by the cassette cable and the computer decoded them into the bits and displayed the character received. I have used the program several times since the last month's article was written

and really like it. Years ago I tried to get on RTTY with a model 15 teletype machine. That was a quite a piece of machinery and made a lot of noise. I never did get it working very well. There were problems with my homebrew electronic converter as well as mechanical problems with the machine. Now the received characters are displayed on my screen and I can turn down the television and eliminate all noise.

Are the color computers fast enough to generate the tones needed for various modes of communications without an interface? The answer is yes for most applications. The cassette tones are around 1500 baud. VHF packet uses 1200 and some 2400 baud. The CoCo can handle this. HF packet uses 300 baud which is much slower.

HOW PACKET WORKS

Our objective is to write software so that an interface is not required to operate on HF and VHF packet. The conventional method of getting on packet is to purchase a Terminal Node Controller (TNC). A TNC is just another computer programmed to do a specific task. A terminal program is needed to connect the computer to the TNC.

Now if we can program our computers to provide the same signals as a TNC then the TNC will not be required saving a large expense. This is my objective.

A packet is a burst of data followed by a wait period. An acknowledgment is sent by the receiving station. If no acknowledgment is received within a given time, the packet is repeated.

Flags are used to indicate the beginning and ending of the packet. The flag consists of the following bits:

01111110

RAM RAM PROGRAMS

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

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

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

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

MORSE TERMINAL

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

STATION LOG

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

TEMPERATURE

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

MEMORY SAVER 2

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

RAM BERTY TERMINAL

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

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

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

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

For packet groups of 8 bits of information are called octets. This is equivalent to a computer byte which is also 8 bits. Next are sent the address octets which consists of 14 or 21 octets. The destination station's call letters are sent first followed by the source or sending station's call. If a repeater is used it is sent last.

A control octet is sent next. Its purpose is to identify the type of frame, a connection request, ready condition, frame numbering and the mode of operation.

Next a protocol identifier (PID) is sent followed by the information field. This field can be up to 256 octets although it is generally limited to one

line or 80 characters.

Two octets are next sent for a frame check or to check for errors. Finally an ending flag is sent. This completes one packet. If it is acknowledged then another packet can be sent.

SUMMARY

It should be obvious that there is a lot of programming required. The first task is to generate the required audio tones. Then the computer will have to decode them or change the received tones into computer bits. Next the bits will have to be combined into words. It appears that the color computers can do all of these tasks.

PRODUCT REVIEWS

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

FINANCIAL TIME CONVERSIONS

This program provides information that can aid in making financial decisions. It allows conversion among present, uniform series, gradient series, proportional series, and future amounts. Results can be printed to a printer. The terminology may be a little difficult for those not familiar with financial terms, but examples are given to show how to use each section.

For example suppose it is desired to purchase a house and not let the payments exceed \$800. For a 20 year loan with

12 periods a year and 11% interest a house costing \$77505.23 could be purchased. A 30 year loan would allow a purchase price of \$84005.08 which is not much more.

The program will also calculate the monthly payments for a loan. Suppose it is desirable to borrow \$10000 to purchase a boat. The interest is 9.5% and the loan is for 5 years. The monthly payments will be \$210.02. The program will also print an amortization listing to the screen or a printer. This could be very helpful in making decisions involving loans.

Suppose it is desired to save \$30000 over a 20 year period. If the interest rate will be 9% compounded monthly, how much should be placed into savings each month? Entering these values into the program gives \$44.92.

The cost of the program is \$14.00 on tape or disk. Prometheus Software, 14684 Joshua Tree Ave., Moreno Valley, CA 92388.

BASIC FREEDOM

Basic Freedom is a full screen editor. It allows lines to be listed and edited directly on the screen. The autokey repeat allows the cursor to quickly be moved anywhere on the screen. Commands can be entered in either lower case or upper case.

Basic Freedom is loaded by entering RUN"*" for Disk Extended Basic 1.0/2.0. For Disk Extended Basic 1.1/2.1 type "DOS ENTER". After loading the program the editor is turned on by typing "EDIT ON". It is turned off by typing "EDIT OFF". For the Color Computer 3 the F2 key will turn the editor on.

To use the editor list the lines to be edited. Then using the arrow keys move to the location in a line and make insertions or deletions. Characters can be changed by typing over them. They are deleted by pressing the shift left arrow keys. To insert characters press the shift right arrow keys. The shift @ keys puts an up arrow on the screen at the cursor location. The control left arrow keys move the cursor to the beginning of the line while the control right arrow keys move the cursor to the end of the line.

Two program lines can be merged by deleting the numbers for the second line and adding a ":" to indicate additional commands. The second line is retained within the program and can be deleted if not required.

Some special list features are included that allow listing a specified number of lines or listing several lines. For example LIST 10,100 lists lines 10 and 100. LIST !3 lists the first 3 lines.

We found Basic Freedom to perform well and make editing basic programs easy. The full screen editor allows a line to be changed or combined with another line. The program is available for the CoCo 3 and earlier computers. Dr. Preble's Programs, 6540 Outer Loop, Louisville, KY 40288.

BIG BUFFER (Printer Lightning)

Printer Lightning is a printer utility for the Color Computer 3. If you do a lot of printing you are aware of the fact that the computer is disabled while printing occurs. If the printer is slow then the computer can not be used for any other task until the printing is completed. Some printers have buffers or spoolers that quickly receive characters from the computer and allow them to be printed as soon as a character is finished. If the buffer is larger than the text being printed then the characters can be quickly transferred from the computer to the printer.

If the printer does not have a buffer then the computer is tied up during the printing process. Printer Lightning eliminates the problem by allowing the printing to be done on an interrupt basic.

To install Printer Lightning type LOADM "PRINTER":EXEC. Answer the questions about your computer and printer. After answering the questions the familiar OK will appear indicating that the program is installed.

The computer operates the same with the program installed as it did before the program was installed. When something is to be printed, the computer is quickly released and printing occurs freeing the computer for other tasks. You can play a game or write a letter on a word processor. The only problems will be with programs that use interrupts or those that use the same memory area as Printer Lightning.

We found Printer Lightning to be very good and perform as advertised. It worked with the Telewriter word processor with the TW-80 patch. We sent many pages of text to the printer without filling the buffer. The buffer size is variable depending upon whether ramdisks are used or graphics. The size can vary up to around 400K bytes which will hold about 200 pages of text. It sells for \$24.95 +\$3 s/h. Spectrum Projects, P. O. Box 264, Howard Beach, NY 11414.

New!
from

DR. PREBLE'S PROGRAMS

Introducing PYRAMIX For your Color Computer 3!

Product of
ColorVenture

PYRAMIX is a 100% machine language game written exclusively to take advantage of all the power in your 128K CoCo 3. The colors are brilliant, the graphics sharp, the action hot.

PYRAMIX features the finest in animation, graphics, sound effects and game play available today. It has all the extras you want, too, such as a pause option, RGB and CPM modes, keyboard or joystick play, help screen, multiple skill level, and the ability to backup your disk.

Best of all is the low price! Available today, for only \$24.95 on disk + s/h!



And Lightning Strikes!

LIGHTNING RAM DISK is the most versatile RAM disk for your 512K Color Computer 3! **LIGHTNING RAM DISK** will allow you to use up to 4 mechanical drives and 2 RAM drives simultaneously for a total of 6 Drives! This RAM DISK will also work simultaneously with our amazing **LIGHTNING PRINTER SPOOLER!** \$19.95 on disk + s/h.

LIGHTNING PRINTER SPOOLER for the 128K or 512K Color Computer 3. Multitask your computer! Dump more than 400K of text to the spooler "instantly." Then, continue your keyboard work while it all prints out! Also compatible with our **LIGHTNING RAM DISK** above. \$14.95 on disk + s/h.

LIGHTNING BACKUP utility for your 512K Color Computer 3 reads your master disk once and then makes superior multiple disk backups on all four drives! No need to format blank disks. Supports 35, 40 or 50 tracks, double or single sided disks and adjustable step rate. \$14.95 on disk + s/h.

Order all 3 for only \$44.95 + s/h

Dr. Preble's Prescriptions...



BASIC FREEDOM! No one wants to be chained down. And yet, if you type in BASIC programs, you have been subject to involuntary servitude! The culprit? BASIC's limited EDIT command.

Demand Your BASIC FREEDOM! Programmed by Chris Babcock for ColorVenture, this software gives you a full screen editor for typing in and editing BASIC programs! Move the cursor anywhere on the screen. Insert, delete or add text. It's the same concept as in a word processor, except you never have to leave BASIC! **BASIC FREEDOM** is an invisible machine language program which you can turn on and off at will. Even pressing RESET will not hurt your BASIC FREEDOM! Simple, yet powerful with an easy to read manual. Many extra "nice touches" included, like KEY REPEAT and LOWERCASE INTERPRETER which lets you type BASIC commands in upper or lower case for ease of programming. Translation to uppercase is automatic for commands. Text in quotes is not affected. For CoCo 1, 2 or 3!

SPECIAL CODE 3 VERSION lets you work in 32, 40, or 80 column display modes. A separate version is available for the CoCo 1 and 2. Available on disk for \$24.95 + s/h.

MENTAL FREEDOM by Dr. Preble! IMAGINE! Some day, a computer so advanced that it responds to your very thoughts and emotions. Imagine, some day, thought-controlled graphics: levitation and materialization! **PLUG IN YOUR MIND AND UNHOOK YOUR JOYSTICKS**—that day is now! The Radio Shack Color Computer has many advanced capabilities, just waiting to be tapped. Dr. Preble's Programs combines the advanced technology of the CoCo with the amazing Radio Shack Biofeedback Monitor to bring you "Mental Freedom." For CoCo 2 or 3

THOUGHT-CONTROLLED VIDEO CHALLENGE! Unlike any video game you have ever played, our Thoughtware tests your ability to handle stress, to remain calm under adverse circumstances. **LIGHTNING FAST** reflexes will do you no good here, unless you first tame the fickle dragon of your mind. Are you the **secretly nervous** type? Many people can keep a "Poker Face" even when they are worried so that others may not notice; but can you really stop the worry itself? Find out with **Mental Freedom!**

AND IT TALKS! Did you know that the CoCo can produce incredibly realistic digital speech without a special speech synthesizer? The voice quality is so good, it sounds human! None! Best of all, no extra hardware is needed for speech, just some clever programming by Dr. Preble.

MENTAL FREEDOM - Next time your friends ask what your computer can do, show them Dr. Preble's Thoughtware! Requires Radio Shack's Biofeedback Monitor Catalogue #63-675. **Mental Freedom** - DISK only \$24.95 + s/h

CoCoBraille

Emboss Grade 1 or Grade 2 Braille using your CoCo 1, 2 or 3 and a Brother Daisy Wheel printer! Fast Print to Braille conversion algorithms converts word processor files, program listings and data files into touch readable Braille. For use by the blind or the sighted. No knowledge of the Braille code is necessary. Just send print to the program and out comes Braille! Note: The complex Grade 2 conversion is very good and though not always perfect, quite readable. Requires 64K or more. Brother HR series printer or the IF-50 interface series required. Low cost! Stellar software costs 3 times as much. Only \$95.

Disk Directory Dazzler

Dress up your Disk Directory with colorful messages and borders. Create useful help messages. Add that professional touch to your creations! Only \$95

VDOS, the **UnDISK**: Save multiple programs in memory. Or save multiple graphic pictures in memory. Works with or without a disk. Let's you SAVE, LOAD and KILL stored programs or graphics. **DIRECTORY** function lists files, gives the start, end and execution addresses of machine language programs and number of free bytes remaining. Own a RAM disk without buying a disk drive! Requires 64K CoCo 1 or 2. Available on tape or disk for \$24.95 + shipping/handling.

VDOS, for the **UnDISK**: Backup all your **UnDISK** files to a single tape file for easy reloading. A must for **VDOS** users! On tape for \$14.95 + shipping/handling.

VPRENT, for the **UnDISK**: Paper printout for **UnDISK** Directory. On tape, \$9.95 + shipping/handling.

Check, Money Order, MasterCard, VISA or CDD accepted. For Shipping to USA or Canada add \$2.50, to other countries, add \$5.00.



For CoCo 1 or 2
Color Programs
T.I.D.



Order From
Dr. Preble's Programs
6540 Outer Loop
Louisville KY 40228
(502) 966-8281
Phone Orders accepted
Mon., Wed., Fri., and Sat. 10-5

DYNAMIC COLOR NEWS SUBJECT INDEX

We have listed our subjects by Volume and Issue. Our first issue was February 1984. The first and second year we printed 11 issues each. This listing is complete through Issue #43 or November 1987.

Basic Programming

Imm. mode, Vectors #1
Variables #2
Arrays, Read, Data #3
Data Handling Tech. #8
Memory Searching #9
Random Numbers #10, 11
FOR- NEXT Loops #16
DIM, Arrays, IF-THEN #17
Branching, ASCII, #19
Word Processor Dev. #20
LEFT\$, RIGHT\$, etc. #21
Seperate Data Files #23
EXEC Command #24
Data in Files #25
Editing Statements #26, 27
Seperate files #28
Print Using, Sorting #29
Tracing Programs #30
Disk Commands #31,32,33
Sorting Data #33
STR\$, Arrays #36
Reformat data #40 th 43
Taking Control (prog) 42,43

ML Programming

Microprocessor, EXEC #1
Indexed Addressing #2
Data Rel. & Branching #3
Sound Subroutine #10, 11
Bank Switching Sub. #13
Block Move Subroutine #14
64K All RAM #17
2-Bank Subroutines #20
Upper Mem. #25
ML Pgm. (Part 1) #26
ML Addition #27,28
ML Subtraction #29
Disk Disassembler #29
ML Data Move #30
ML ASCII Subs. #30
Cursor Move Subs #31
Assembly Language Pgm #32
through 43

Articles

Memory Expansion #2
ASCII & BASIC #3,4
Infac. ASCII Devices #5
Remarks-Word Proc. #5
Uninterrupted Power #5
Word Processing #6
Computer Sound #9, 10
Lrg. Mem. Pgms. #12 th #26
Computer Graph. #12 th #27
Writing Programs #13
CoCo Heat Problem #17
Graphics, Lines, etc. #19
Using Page -1 #20
Circle Command #21
Draw Command #23
Interfac. Comp. #24 to #33
Basic Basic #23, 24
Graphics Scalling #24
Ramdisk Improvements #24
Page -1 Progs. #26, 27
Dev. Drawing Program #26
Intro. to OS-9 #31,32
Ham Radio & Computers
Each issue since #29
Color Comp.3 3#32,33,
36,37,38
Joysticks #34,35,36,37
EPROMS #36,37,38,39
Thermometer #37,38
Computer Terminology #40

Programs

Multiprogram Manager #1
Utility #4
Remark Print Word Pr. #5
Check Book #6
Memory Search #8
Ball Team Sort #9
Sound Generator #10
Card Shuffling #11
Sound Learning #11
Bank Switching Program #14
Gas Mileage #15
Graphics Demo #15
Grade Book #16
Character Generator #17
Alarm Clock #17
Address File #18
Student Study #18
Line Demo #18
Vector Corrector #19
Fast Food #19
Draw Bar Graphs #19
Word Processing #20
Bar Graph & Ch. Gen. #20
Ram Disk #21
Recipe #21
Electric Cost #21
Circle Demo #21

Check Book #21
Inventory #22
ARC & Circle Demo #22
Ship War Game #22
Ram Delete Subroutine #23
Draw Demo #23, 24
Bouncing Ball Game #23
File Demo #23
Electronic Billboard #24
RamDisk Subroutines #24
Tanks (game) #25
Draw Demo (GET & PUT) #25
Programs in Upper RAM #25
ROULETTE (game) #26
RESTORE -Restores pgms #26
Graphic Draw #26,27
Memory Peek #27
Chords (Music Program) #27
Inventory #27,28
Graphics zoom, ASCII Demo,
Astro Dodge Game #27
Organize VCR Tapes #29
Morse Code (Ham) #29
Disk File #30
Antenna Design (Ham) #30
Money Chase (Game) #31
Multiple Choice Test #31
Dueling Cannons #32
DX Program (Ham) #32
Star Constellations #32
Dyterm Terminal Pgm #33
Lucky Money #33
Jungle Adventure #34
Morse Code Keyer #34
Address File (sort) #34
Gallows (game) #35
Scrolling Around #35
Oware (game) #36
Invoice Program #36
Diver (game) #37
CC-3 Error Trapping #37
Temperature Program #38
CC-3 Memory Manager #38
Accounts Payable #38
Improved Sort #38
Geneology #39
Graphics Demo Program #39
Calendar #39
Morse Terminal Prog. #39
Job Costing #40
Compound Interest #40
Dog Race #40
CC-3 Graphics Save #40
Convert #41
Meteors #41
Astro-Dodge #41
Disk Cataloger #42
Graphics Print #42
Parachute (Game) #42
Save the Maiden #43
Music (Peace) #43

Hardware Projects

Interrupt Switch #4
 Video Reverser #12
 Add a Second Port #20
 Interfacing Computers 31
 Hardware ASCII Int. 32
 Cassette Switch #34
 Morse Code Keyer #34
 Joystick Voltmeter #34
 Joystick Ohmmeter #36
 Tone Decoder #36,38
 Digital Thermometer #38
 Measuring Light #39
 Relay Interface #41

Product Reviews

Spectrum DOS 1.0 #17
 Thunder RAM #18
 Telepatch #19
 Lowercase C.G. #19
 Basic + #20
 COCO Calender #22
 Assembly Language Pro-
 gramming (Book) #23
 Schematic Drafting #25
 Equation Solver #26
 Programming Aid #27
 Super Programming Aid,
 CoCo Keyboard #28
 Checkers -32K #29
 TX Word Processor #30
 Banner #31
 CoCo Max II #32
 Ultra Telepatch #33
 Van CoCo #33
 DS-69, A Digitizers #34
 Diskman & Chess-32 #35
 Super Ramdisk #36
 Hires Font Monifier #36
 Art Gallery #36
 DC-4 Disk Controller #37
 CC-3 512K ramdisks #37
 FKEYS III, MAGIGRAPH,
 CC3 DRAW #38
 Assembly Language Pgm
 for CoCo 3 (Book) #39
 Pyramix, Life #40
 CoCo 3 Secrets, Word Pro-
 cessor 2, Draw Poker #41
 Hi-RES Joystick, Hi-Res
 Joystick Interface, TW-
 80, Mini-Ledger #42
 Financial Time Conv.,
 Basic Freedom, Big
 Buffer #43

Printed copies are available
 for \$1.95 each, 3 for \$5, or
 12 for \$15 USA & Canada.

DCN or Disk or Tape Prices

	USA & Can.	Foreign (Air)
12 months	\$60.00	\$75.00
6 months	35.00	49.00
1 month	6.95	8.95

Order back issues by issue
 Number.

Issue Month- Number Year

01	2 -84
02	3 -84
03	4- 84
04	5- 84
05	6,7-84
06	8-84
07	9-84
08	10-84
09	11-84
10	12-84
11	1-85
12	2-85
13	3-85
14	4-85
15	5-85
16	6-85
17	7-85
18	8-85
19	9-85
20	10-85
21	11/12-85
22	1-86
23	2-86
24	3-86
25	4-86
26	5-86
27	6-86
28	7-86
29	8-86
30	9-86
31	10-86
32	11-86
33	12-86
34	1-87
35	2-87
36	3-87
37	4-87
38	5-87
39	6/7-87
40	8-87
41	9-87
42	10-87
43	11-87

DISPLAY ADS

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

CLASSIFIED ADS

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

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

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

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

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

PREMIUM QUALITY DISKS. You don't have to pay a lot for **QUALITY** disks. Our disks are boxed in tens complete with labels, sleeves, and write protect tabs and work on COCO's and MSDOS computers. These are double sided double density disks and will be replaced if defective. DSK-2 \$6.95 /box. Add \$1.50 S/H. Dynamic Electronics, Box 896, Hartselle, AL 35640. (205) 773-2758

EDUCATIONAL MILITARY DATA on Color Scrip- tape or Disk Color Scrip. Files on Aircraft Carriers, US Aircraft US & USSR Naval Forces, USSR-Air, USSR-Sea, Text, Missiles, Details of Military Hardware, Bases, and Combat Capabilities. Non-Classified factual information. The data was over a year in collecting the details, some systems could have changed. Cassette \$15, Disk \$20. Gregory Young, 457 Buena Vista, Apt #202, Alameda, CA 94501 (415) 521-7656.

ADVERTISER'S INDEX

We would appreciate it if you would let these advertisers know that you saw their advertisement in **Dynamic Color News**.

Elegant Software	13
Dynamic Electronics Inc. 3,11,16 17,20,21,30,31,34	
PD Software	6
Gregory Young	Classified
T & D Subscription Software .	8
Seibyte Software	10
Spectrum Projects	22,23
Dr Preble's Programs	37

DYNAMIC ELECTRONICS INC.

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

