

RADIO SHACK COLOR COMPUTER

MAGAZINE

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EDITOR'S COMMENTS
NEW PRODUCTS
PRODUCT REVIEWS

Dynadisc



Color

News

FREQUENCY COUNTER



HAPPY NEW YEAR

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.

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

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

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

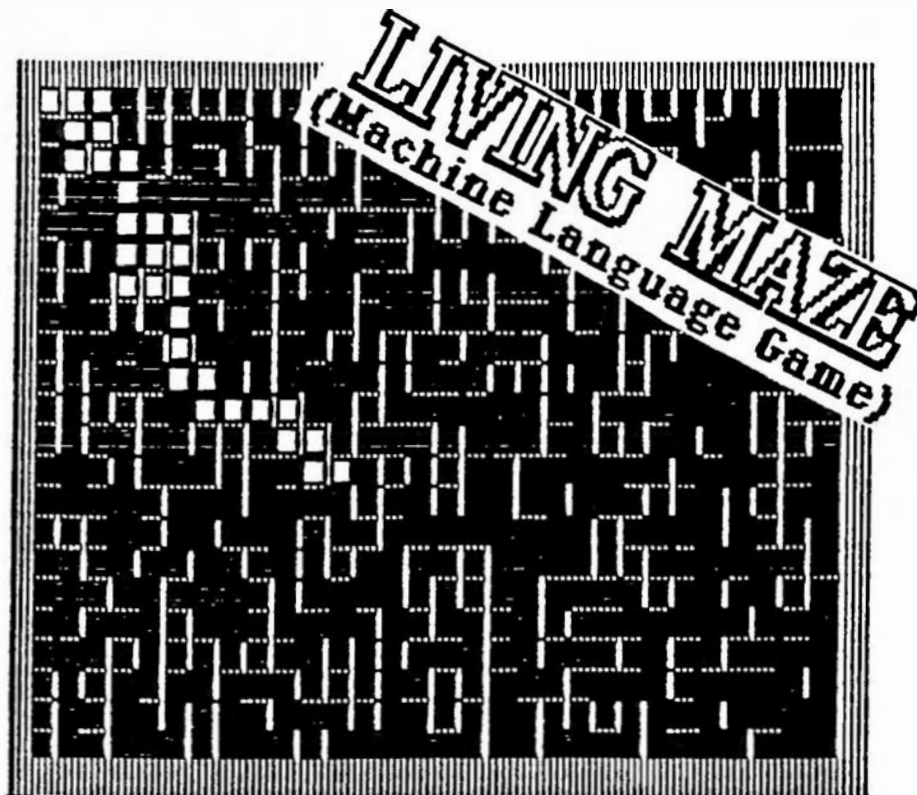
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*
*   DYNAMIC COLOR NEWS   *
*
*   January 1988         *
*
*   Editor and Publisher *
*   Bill Chapple W4GQC  *
*
*   Secretary           *
*   Dean Chapple       *
*
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Mazes that change as you move through can be quite a challenge. You start at the top left corner and move through until you reach the bottom right. If you do not reach your destination within the time limit then you loose. There are 10 levels of difficulty and if you exceed the score for your level then enter your name. Include your friends and see who is the best.

The following basic program loads the program into memory. A machine language version can be made by following the instructions in the program. This program is provided as a courtesy of T & D Subscription Software (See their advertisement on page 8) and is used by permission.

```

10 PCLEAR1:CLS
20 PRINT"* * MAZE * *
30 PRINT
40 PRINT:PRINT"STANDBY WHILE MACHINE LANGUAGE PROGRAM IS BEING GENERATED":PRINT
50 M=19790
60 READ X$
70 IF X$="@" THEN 200
80 L=LEN(X$)
90 FOR J=1 TO L STEP 2
100 A$=MID$(X$,J,2):B=PEEK(M)
110 C$=LEFT$(A$,1):D$=RIGHT$(A$,1)
120 X=ASC(C$):Y=ASC(D$):X=X-48:Y=Y-48
130 IF X>9 THEN X=X-7
140 IF Y>9 THEN Y=Y-7

```

```

150 V=16*X+Y:POKE M,V
160 M=M+1
170 NEXT J
180 PRINTM
190 GOTO60
200 PRINT"DATA IS TRANSFERRED. TO MAKE A MACHINE LANGUAGE SAVE ENTER(C)SAVEM,1979 0,25496,21248"
210 INPUT"ENTER 1 TO EXEC GAME";X:IF X=1 THEN EXEC 25496
220 END
230 DATA 0000001F509E498C0000244C318B30029
F49ECA439864F3402BDA390A6E0260225053001
5A20217EAE093520E1E42302E6E43542342096A
E27147EB2778DC4E6A43A301F9F493021E1C022
0FE7C05C5A27C2A680A7C020F7C606CEC61A7EA
C4635208D7B
240 DATA EB6325F3A663E76317009D1F893384AE6
48D7FEF648DD38D6F8DCF35146EA44C4C4C3440
8D3C96062608BDBC148D6FEDF139E684AE02354
020AA4C4C4C34408D219606260AECF1BDB4F49E
397EBC353384ECF4BDB50FAF42E7C4338435103
00220884497
250 DATA 0625037EB391D7030F05CE0400AEC3341
05A26F97EB42835408C040024020CAE34146EC4
DF51354035143440DE518C040024020AAE395DB
DB7190D542A037EB3ED7EB3FB8E02000DAE2702
9EAB34103A8C040124049FAB35907EB5531F98C
6018DE2A784
260 DATA 395FAD9FA00026F2391E898DD334145C5
A270478020F935943404C6048DC15F8D073502
8D032712393402444444448D043502840F26035
D27EE8A30813A25028B07A7855C393520A6E434
04A0E0270786FF2403E6E4403402EE625C5A260
4A6E0200DA6
270 DATA 80A1C027F38601240140326117FF4D4D6
EA41F98E0622304CE1F985F505C352034066FE2
CE3520AE64E66227625A3AA6E02B09EBE4E1623
504230BCE3261E661E0E45C24015FE761AF6220
BED74F356634063470272DE6652735E162223A
E635A3A3101

```

280 DATA EEE4A6654A9B4FA1622212D64FA680A1C
 027066C6530A020E75A26F1CE6F85326217FED4
 3504202B5D26057EB44A1F01E684201FBD931DB
 D92981F8996B644E4842408C1042507545420F8
 27065F5C58DBC1544F207D8E0052BDA9A2CC020
 0338C053446

290 DATA 7EA9EB4FD651398D0AAEE46E8B8D04351
 06E8B35403402E1E0220586033D2622393540AE
 66ECE42B0DE3842913ED84A3642E0D6EF802E38
 42906ED84A3642CF332686EC4108300022525DD
 4F8D4ADC51D35344564D260F3404A6E43D934F3
 504270D8600

300 DATA 2503DD53CED752301F26DF830000392FF
 D8D21DC51D35344561F03F60113DBAD86073DD7
 AD2B03DF53CCDF51301F26E31F30201ADD530F5
 10F528E00125849301F24FA398D0C8D650D542A
 BF4353C3000139DD4F35703430DF5198519754D
 C4F8DE82706

310 DATA DD4FDC518DE0DD51393540A4E0E4E0344
 020943540AAE0EAE020F4435320888DCD271E8D
 B1301FDD51CC0001200608520951594910934F2
 5040C52934F301F26EDDD77DC51209DD5112710
 964F2602DC503DD7539650D6523D9B53398D043
 4446EA43530

320 DATA ED6135045C6E8435109F644F5F3510ACC
 12420DD4F2706EC5E8DC8308B1F100A0326EA6E
 9F00644F5830EBEE84E6C0D00327C47EB4478DC
 6D7035C8DEA8DC85849EFE420D8DB75CD7038D
 DBED848DB73440E3E4EDE46EA4DF4F3520E7803
 540EF815A26

330 DATA F93504E7806F803A9C4F25F76EA42707C
 6014D2A01501D39BDB4F4C60817FD0433843440
 BDBDDC3510C6FF5CA68526FB398DE58D098620C
 E860D6E9FA0025C5A2721A6808DF420F7BDA35F
 D06C220F39BDA35FD66CD16B24DFD06A24FC508
 DD55A26FB39

340 DATA C639F702D910FE01FE3996BC97BAD7B65
 8CE9707ABC591191022FDB797B75AA6C597B90F
 B3860397B239D7D55F4497D859CE97CAD7D4260
 3CE97B7D4D82715318C39D6D5C40F58ECA5DDD9
 D6D5545454ECA5DDD5E680D703EC810A032709D
 D4FEC8117FE

350 DATA B620F35849301F9FCF308B9FD1DCC3DDC
 7DCC5DDC96EC49894989B98B198A194A1940894
 3458308CF6AE8597C2BD959ACE94208DD86E84B
 D9522CE00CFBD932CC6018D2CDCBDDDCBDCBFDD
 CD96B68502270408D209D1D6D9BD9FF6DDD9D6C
 7BD9FF67E9E

360 DATA FDBD9563BD95A48D037E9912D7D8BD931
 DD6B4BD95637E95A235109F64FE019BDF66338C
 06FF019B7E9695DE66FF019BCE327E10FF01FEB
 E01FCAFE46E9F006435109F64338CEA4D260534
 407EAD26351034501F017EAE568D1AD7C2DFD5B
 D959A35047E

370 DATA 9CD38D0C5FBDA9A2BDA97635047E9A393
 5201F98CE0000C60134466EA42C12CE2E0FCE27
 0CCE2609CE2D06CE2F03C6FF865F1D398E00009
 F49398DF80FAE9668C68A4C2602DDA6CE0200AE
 E43650BDA928308C05C61A16001B50415254532
 04F46205448

380 DATA 49532050524F4752414D205745524500B
 D5174BD5186308C05C611160012435245415445
 44205553494E472054484500BD5174BD5186308
 C05C62C16002D2027434F4C4F52204241534943
 20434F4D50494C4552272028432931393835204
 34F4D505554

390 DATA 45525741524500BD5174BD516E0F6FCC0
 04BD527BCC03E83406DC27BD52A25F3404CE4D
 51CC000934068E4D3CC601BD512A5F3404CE4D3
 CCC000934068E4D27C601BD512A5F3404CE4D27
 CC000B34068E4D0EC601BD512ACC03008E4D09E
 D84CC01008E

400 DATA 4D06ED84CE4D06C6143404CC00163406C
 C000B34068E4C0FC602BD512ACC14008E4BF9ED
 84CC0000FD4BF7CC0000FD4BF5CC000ABD50193
 406CC0001BD5056E3E1FD4BF3FC4BF33406CC00
 01A3E1BD52EC102700037E5423FC4BF3BDA918C
 C00018E4BF1

410 DATA ED843410CC00323406CC00013486CC001
 5BD5019FD4BF3CC0010BD50193406CC0001BD50
 56E3E1FD4BEFFC4BEF3406CC0020BD504E3406F
 C4BF3E3E13406CC01F4A3E1BD52E310270013FC
 4BF13406CC0001BD5056E3E1FD4BF1BD4FC7FC4
 BEF3406CC00

420 DATA 20BD504E3406FC4BF3E3E1BDA557308C0
 5C60B16000C4C4956494E47204D415A4500BD51
 740F6FFC4BF13406CC0005BD504ED78CC0001B
 DA951BD4FC7CC00018E4BF3ED843410CC001034
 06CC00013486308C05C81D16001E20204C49564
 94E47204D41

430 DATA 5A4520202D20204C4956494E47204D415
 A4500BD5174BD516E0F6FBD4FC7CC01A0BDA557
 CC00203404CC000ECBD4E72E6843502BD4E83BD4
 E2D308C05C62016002120204259204A41435155
 455320424F555247454F4953202D20313938362
 0202000BD4D

440 DATA AEBD4E2DCC001F3404CC00E3BD4E72E68
 43502BD4E83BD4DAEBD51740F6FCC05FF3406CC
 00E3E7F1CC00018E4BF3ED843410CC3A983406C
 C00013486BD4FC7BDA928BD518E0F6F308C05C6
 E616000E7414654455220544845204D415A45205
 7494C4C2042

450 DATA 4520434F4D504C455445444120464C415
 348494E4720435552534F522057494C4C204150
 50454152204154544845205550504552204C454
 65420434F524E4552204F462054484520202020
 53435245454E2E2020594F55204841564520544
 F204252494E

460 DATA 4720495420544F544845204C4F5745522
 0524947485420434F524E455220425920555349
 4E4720544845204152524F57204B4559532E202
 0594F55522053434F5245202020202044455045
 4E4453204F4E205448452054494D45204954205
 4414B455320

470 DATA 594F55544F20444F2000BD5174BD516E0
 F6FBD516E0F6F308C05C61A16001B5052455353
 203C454E5445523E20544F20434F4E54494E554
 52E00BD5174BD516E0F6FCCADFBDD9DAD9F009D
 BDA928BD516E0F6F308C05C6AC1600AD594F552
 043414E4E4F

480 DATA 5420474F205457494345204F4E2054484
 52053414D452053504F542E2020494620594F55
 2041505045415220544F20424520535455434B4
 94E204F4E4520504C4143452C20574149542E20
 2057414C4C53204152452020444953415050454
 152494E4720

490 DATA 41532057454C4C2041532054484559204
 15245415050454152494E472E2020594F55204D
 4159204245204652454520494E204153484F525
 4205748494C452E00BD5174BD516E0F6FBD516E
 0F6F308C05C62916002A5052455353494E47203
 C513E205749

500 DATA 4C4C204C455420594F552051554954202
 05448452047414D452E00BD5174BD516E0F6FBD
 516E0F6FBD516E0F6F308C05C614160015454E5
 44552204C4556454C2028312D3130293A2000BD
 5174CE4D09BD4D638E4D0AE680BD4E4CFD4BEDF
 C4BED3406CC

510 DATA 0001A3E1BD52F23406FC4BED3406CC000
 AA3E1BD52E3BD5081102700037E5807CC0003BD
 51A4CC001BD9653CC0003BD50193406CC0005E
 3E1FD4BEFFC4BEF3406CC0005A3E1BD52EC1027
 00037E585EFC4BEFBD9563BD9536CC0002DDBDC
 C0002DDBFCC

520 DATA 0006DDC3CC0006DDC58E4D3C8601BD51C
 4CC0003BD50193406CC0005E3E1FD4BEBFC4BEB
 3406CC0005A3E1BD52EC3406FC4BEB3406FC4BE
 FA3E1BD52ECBD5081102700037E58B3CC0005FD
 4BF3FC4BF3BD9563BD9536FC4BF3BD9563D7B2F
 C4BEBBD9563

530 DATA D7B3CC0002DDBDCC0002DDBFCC0006DDC
 3CC0006DDC58601C602BD5223CC0002DDBDCC00
 02DDBFCC0006DDC3CC0006DDC58E4D278601BD5
 1C4CC00015DBD95AAC0001BD9682FC4BEBBD95
 63D7B2FC4BF3BD9563D7B3CC0007DDBDCC0006D
 DBFCC00F8DD

540 DATA C3CC00B6DDC58601C601BD5223CC0000D
 DBDCC000DDBFCC00FFDCC3CC00BFDDC58601C6
 01BD5223CC0003DDBDCC0003DDBFFC4BEBD7B4F
 C4BEBBD5263CC0009FD4BE9CC000CFD4BE7CC00
 018E4BF1ED843410FC4BED3406CC00C8BD504E3
 406CC000134

550 DATA 86CC001EBD50193406CC0008BD504E340
 6CC0001BD5056E3E1FD4BE5CC0016BD50193406
 CC0008BD504E3406CC0002BD5056E3E1FD4BEFC
 C0002BD5019FD4BE3BD61A8BD4FC7CC0008DDBD
 CC000EDDBFCC000EDDC3CC000EDDC54F5FBD522
 3CC000EDDBD

560 DATA CC0007DDBFCC000EDDC3CC000EDDC54F5
 FBD5223CC00E2D78CCC000ABDA951CC03E83406
 FC4BEDBD504E3406CC03E8E3E1FD4BF7FC4BE9D
 DBDFC4BE7DDBFFC4BE93406CC0004E3E1DDC3FC

4BE73406CC0004BD5056E3E1DDC58E4D3CC6108
 603BD51C4FC

570 DATA 4BF73406CC0001BD5056E3E1FD4BF7BD4
 E7BCE4D06BD4D968E4D07E680BD4E2DCC005EBD
 4E72BD4EC0BD52EC3406FC4BE73406CC000DA3E
 1BD52E3BD50773406FC4BE9DDBDFC4BE73406CC
 0008BD5056E3E1DDBFBD4F763406FC4BF3A3E1B
 D52ECBD5077

580 DATA 3406FC4BE9DDBDFC4BE73406CC0006BD5
 056E3E1DDBFBD4F763406FC4BF3A3E1BD52ECBD
 50771027003FFC4BE73406CC0008BD5056E3E1F
 D4BE7FC4BE9DDBDFC4BE7DDBFFC4BE93406CC00
 04E3E1DDC3FC4BE73406CC0004BD5056E3E1DDC
 58E4D3CC610

590 DATA 8603BD51C48E4D07E680BD4E2D308C05C
 6011600025100BD4EC0BD52EC102700037E60F7
 8E4D07E680BD4E2DCC000ABD4E72BD4EC0BD52E
 C3406FC4BE73406CC00B5A3E1BD52F2BD507734
 06FC4BE9DDBDFC4BE73406CC0002E3E1DDBFBD4
 F763406FC4B

600 DATA F3A3E1BD52ECBD50773406FC4BE9DDBDF
 C4BE73406CC0008E3E1DDBFBD4F763406FC4BF3
 A3E1BD52ECBD50771027003CFC4BE73406CC000
 8E3E1FD4BE7FC4BE9DDBDFC4BE7DDBFFC4BE934
 06CC0004E3E1DDC3FC4BE73406CC0004BD5056E
 3E1DDC58E4D

610 DATA 3CC6108603BD51C48E4D07E680BD4E2DC
 C0009BD4E72BD4EC0BD52EC3406FC4BE93406CC
 00F1A3E1BD52F2BD50773406FC4BE93406CC000
 6E3E1DDBDFC4BE7DDBFBD4F763406FC4BF3A3E1
 BD52ECBD50773406FC4BE93406CC0008E3E1DDB
 DFC4BE7DDBF

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- 620 DATA BD4F763406FC4BF3A3E1BD52ECBD50771
027003CFC4BE93406CC0008E3E1FD4BE9FC4BE9
DDBDFC4BE7DDBFFC4BE93406CC0004E3E1DDC3F
C4BE73406CC0004BD5056E3E1DDC58E4D3CC610
8603BD51C48E4D07E680BD4E2DCC0008BD4E72B
D4EC0BD52EC
- 630 DATA 3406FC4BE93406CC000AA3E1BD52E3BD5
0773406FC4BE93406CC0003BD5056E3E1DDBDFC
4BE7DDBFFD4F763406FC4BF3A3E1BD52ECBD507
73406FC4BE93406CC0008BD5056E3E1DDBDFC4B
E7DDBFFD4F763406FC4BF3A3E1BD52ECBD50771
027003FFC4B
- 640 DATA E93406CC0008BD5056E3E1FD4BE9FC4BE
9DDBDFC4BE7DDBFFC4BE93406CC0004E3E1DDC3
FC4BE73406CC0004BD5056E3E1DDC58E4D3CC61
08603BD51C4FC4BE9DDBDFC4BE7DDBFFC4BE934
06CC0004E3E1DDC3FC4BE73406CC0004BD5056E
3E1DDC58E4D
- 650 DATA 27C6108603BD51C4FC4BE93406CC00F1A
3E1BD52EC3406FC4BE73406CC00B4A3E1BD52EC
BD5077102700037E5EC5CC0002BD5019FD4BE3C
C001DBD50193406CC0008BD504E3406CC0001BD
5056E3E1FD4BE5CC0015BD50193406CC0008BD5
04E3406CC00
- 660 DATA 02BD5056E3E1FD4BEFBD61A8FC4BF3BD9
563D7B2FC4BE9BD9563D7B3CC0002BD5019FD4B
E3CC001DBD50193406CC0008BD504E3406CC000
1BD5056E3E1FD4BE5CC0015BD50193406CC0008
BD504E3406CC0002BD5056E3E1FD4BEFFC4BE53
406CC0009A3
- 670 DATA E1BD52F23406FC4BEF3406CC0009A3E1B
D52F2BD5081102700037E5E36BD61A8FC4BE9BD
9563D7B2FC4BF3BD9563D7B3FC4BF73406CC000
1A3E1BD52F2102700037E62237E5A66CC03E834
06FC4BEDBD504E3406FC4BF7BD5056E3E13406C
C03E8E3E1FD
- 680 DATA 4BE1CC00018E4BF3ED843410CC000A340
6CC00013486CC0004BD51A4CC0001BD9853BD83
62CC0003BD51A4CC0001BD9653BD6362BD4FC7C
C0009BD50193406CC0001BD5056E3E1FD4BF3FC
4BF33408CC0002A3E1BD52EC102700037E5F19F
C4BF3BDA918
- 690 DATA CC00080BDA557308C05C61116001220202
02020594F55522053434F52453A2000BD5174FC
4BE1BD6187BD516E0F6FFC4BE13406CE4D0E4F3
452FC4BEDBD5108ECF1A3E1BD52E3102700037E
5FE8CC01C0BDA557308C05C61E16001F202A2A
A2A50524553
- 700 DATA 53203C433E20544F20434F4E54494E554
52A2A2A2A00BD5174BD516E0F6FBD4E7BBD4E2D
308C05C6011600024300BD4EC0BD52EC1027000
37E60F77E5FC8CC00018E4BF3ED843410CC22710
3406CC00013486BD4FC7CE4D0E4F3452FC4BEDB
D5108FC4BE1

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COLOR COMPUTER 3 (Reduced)

512K MEMORY

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Hartselle, Al 35640

ML Programming

by
John Galus

Part 20
LOOSE ENDS

* * * * *

I want to thank John for the fine job he has done in this series. Although this is the last part, John has submitted some very good material on other subjects and will continue to write for us. If you still need help, I suggest ordering all the issues in this series or consider the publications listed at the end. - Editor

* * * * *

This will be the last part of this series and I will try and cover some subjects that we didn't cover in past parts. First some information about how to generate sound using Assembly language. Sound is generated by storing data to the PIA chip in the computer. This PIA chip is connected to the DAC (Digital to Analog Converter) which takes the digital value found in the PIA and converts it into a voltage. This voltage which is converted from the value in the PIA into a value of 0 to +5 volts is sent to the TV audio where we hear the sound. This signal can be sent to different devices such as the TV or cassette player. The DAC output is routed to a device that selects which device the signal is to be sent to. The control of the selection depends on the values held in \$FF01 and \$FF03. To generate

sound, these addresses must be set to select audio out and the PIA must be set to 6-bit sound by masking the PIA control register held in \$FF23. Here is how sound is generated:

```
SOUND LDA $FF01 ;SELECT SOUND
      AND #$F7 ;MASK BYTE
      STA $FF01 ;SOUND OUT
      LDA $FF03 ;SELECT SOUND
      AND #$F7 ;MASK BYTE
      STA $FF03 ;SOUND OUT
      LDA $FF23 ;PIA
      ORA #8 ;ENABLE 6BIT
      STA $FF23 ;SOUND OUT
SND   LDX #$A000;POINT TO ROM
SNF   LDA ,X+ ;GET SOME DATA
      ANDA #$FC ;MASK BYTE
      STA $FF20 ;TO PIA OUTPUT
      BSR DEL ;DELAY
      CMPX #$A200; DURATION
      BNE SNF
      SWI
DEL   LDA DUR ;DURATION
DEL2  DECA
      BNE DEL2
      RTS
DEL   FCB 255 ;LONGEST DUR
      END
```

Notice how I use ROM for data that I output to the TV audio. There is a 36 value sine wave table which is used in the Basic SOUND command located at \$A85C, try and use this table and see what you can come up with. Sometimes we might find it useful to use an Assembly language routine in a Basic program. In this

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NEWSLETTER [winter 1988]

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After the logon is complete you will get introductory messages and a "WAIT...". The computer then loads the main system and will display a main menu for you. Press the () bracketed letter for the magazine or section you want.

Current options on the main menu are: (G)eneral Messages; (C)rossbow Hunter Mag; Elect (L)iterature Mag; (N)ovel; Teleco(M)puting Mag; Ne(V)er ending story; S(Y)stem management; (*)Time on system; (H)elp file and (T)erminate option. All (E)xits from these sub-menus will bring you back to this Main menu.

All communications are in ASCII. This means downloads go directly to your screen. Special protocols are not necessary for download. If you have a capture buffer you can open it to save your download to disk or printer to read later.

All Magazines and downloads are handled the same. As an example we will select (C)rossbow Hunter magazine. Press a C from your computer and after another "WAIT.." you will be at the Crossbow Hunter menu.

Issues #1, 2, and 3 are offered. Unlike printed magazines, Electronic magazines can offer all back issues as easily as the current one. To select any section you press the () bracketed key in the title.

If you press the D for (D)ownload issue 1 you will go to another download menu to where you will have more options. Here you can select the specific articles. You don't have to read the entire issue. The selection is made by a number and then an <ENTER/RETURN>. You will then be asked for auto buffer open or manual. With either auto or manual the selection will go directly to your computer screen.

In the various Crossbow Hunter issues are major articles that are written by a professional writer. Titles include: Deer Hunting, The Hunting Crossbow, Turkey Hunting, Crossbow Regulations and others. Each board also has its own interactive message base. You can read current up to the minute messages as well as leave messages to others.

You are limited to 20 minutes. However, you can call back if you need more time.

Press (T) to terminate and sign off.

example I will show you how to pass a parameter to Assembly language which will be used in a SQUARE-ROOT routine. The two important Subroutines to be familiar with when using Assembly language in a basic program is \$B3ED and \$BF4F. The routine at \$B3ED passes a parameter held in a Basic variable in the USR command and places it in the "D" register where it can be used by an Assembly language routine. The routine located at \$B4F4 returns the value held in the "D" register and stores it in the Basic variable before the equals sign in the USR instruction. Here is the Assembly language program. I will place the origin of the program at \$7000.

```

    ORG $7000
SQR JSR $B3ED ;GET PAR TO D
    LDX #-1
    LDY #1 ;ODD INT
    STY MEM ;SAVE IT
LOP LEAX 1,X ;SQR+1
    LEAY -2,Y ;ODD INTEGER
    STY MEM
    ADDD MEM
    BCS LOP ;IF NOT MINUS
    TFR X,D ;SQR TO D
    JSR $B4F4 ;PAR TO BASIC
    RTS ;RETURN
MEM FDB 0
    END

```

Here is the Basic driver that uses this square-root routine.

```

10 CLEAR200,&H6FFF
20 CLS:DEFUSR0=&H7000:X=&H7000
30 READ A$:IF A$="FIN" THEN 100
40 A=VAL("&H"+A$):POKE X,A
50 X=X+1:GOTO30
60 DATA FC,30,0,8E,FF,FF,10
61 DATA 8E,0,1,10,BF,70,20
62 DATA 30,1,31,3E,10,BF,70
63 DATA 20,F3,70,20,25,F3,1F
64 DATA 10,BD,B4,F4,39,FIN
100 INPUT"NUMBER: ";NU
110 SQ=USR0(NU)
120 PRINT"SQUARE ROOT = ";SQ
130 GOTO100

```

Assembly language is often used to animate objects on the screen because of its speed. Animation is quite simple. All

that is necessary is to draw an object, move it to a new position, and erase the old figure to make it appear to move. Here is a routine that will move a two by three byte figure on the text screen controlled by the keyboard.

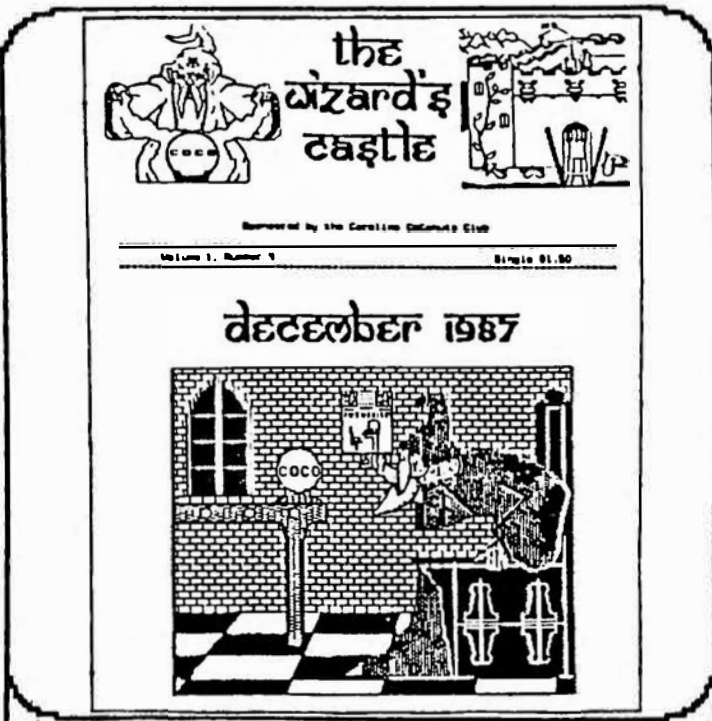
```

ANIM JSR $A928 ;CLS
BACK JSR DRAW ;DRAW IT
LOX JSR $A1C1 ;KEYPRESS?
    BEQ LOX ;NO KEY
    CMPA #3 ;BREAK KEY?
    BEQ FIN ;FINISHED IT SO
    CMPA #'U ;UP?
    BEQ UP
    CMPA #'D ;DOWN
    BEQ DWN
    CMPA #'R ;RIGHT
    LBEQ RIG
    CMPA #'L ;LEFT?
    LBEQ LEF
    BRA LOX
FIN SWI
UP LDX POS
    CMPX #$500 ;TO HIGH?
    BHI LOX
    JSR BLA ;CLEAR OLD
    LEAX 32,X ;UP A LINE
    STX POS
    JMP BACK
DWN LDX POS
    CMPX #$410 ;TO LOW?
    BLO LOX
    JSR BLA
    LEAX -32,X ;DOWN A LINE
    STX POS
    JMP BACK
RIG LDX POS
    CMPX #$500
    BHI LOX
    JSR BLA
    LEAX 1,X
    STX POS
    JMP BACK
LEF LDX POS
    CMPX #$410
    BLO LOX
    JSR BLA
    LEAX -1,X
    STX POS
    JMP BACK
DRAW LDX POS
    LDY #FIG
    LDB #2 ;THREE TIMES
AGA LDU ,Y++ ;GET TWO BYTES
    STU ,X ;ON SCREEN
    LEAX 32,X
    DECB ;ONE LESS
    BNE AGA
    RTS

```

```

BNE AGA
RTS
BLA PSHS X ;SAVE XPOS
LDX POS
LDY #BK
LDB #2
BSR AGA
PULS X ;GET X BACK
RTS
FIG FCC /AAAAAA/
POS FDB $0430 ;START
BK FDB $6060 / ;SIX SPACES
FDB $6060
FDB $6060
END
    
```



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Of course there are many other routines and techniques to discover using Assembly language; the rest is up to you. Depending on the time and desire you have, it is not beyond your capacity to grasp the concepts and become an excellent Assembly language programmer. Best of luck! Here is a list of good text books that might help you further.

TRS-80 ASSEMBLY LANGUAGE PROGRAMMING
 BY WILLIAM BARDEN JR.
 RADIO SHACK CAT. NO. 62-2077

ASSEMBLY LANGUAGE PROGRAMMING FOR THE TRS-80 COLOR COMPUTER
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HAM RADIO & COMPUTERS

by

Bill Chapple W4GQC

In this series I am developing ideas, programs, and hardware for ham radio use. The programs and ideas can be used in other applications. For example last month I presented an accurate audio frequency generator. This can be used by anyone experimenting with audio or telephone circuits.

I have received many requests for packet radio programs. In the November 1987 issue I looked at packet and concluded that the color computer should be able to generate and decode packet signals. I suggest you read that article if you are not familiar with how packet works. To do this I will need some tools. Last month I developed an audio frequency generator. For transmitting I will send audio tones through the microphone circuits of my transceiver. For frequencies below 30 Mhz these will be fed into the microphone circuits of my single sideband (SSB) transceiver. These will produce frequency shifted keying which means that the frequency of the transceiver will shift when the tone is changed in frequency. This approach was used for the radio teletype (RTTY) program that I presented in the October 1987 issue. I have used this program and it works very well. For VHF I will also feed the frequency shifted audio into the microphone circuits. I am not set up for two meters (144 Mhz) like I am for

frequencies below 30 Mhz. However I do have equipment and it is easy to reach the repeaters in Huntsville.

For receiving packet or RTTY, audio tones are passed to the computer via the cassette port. Since RTTY and packet both work on shifting tones, it is necessary to have a means of detecting when a tone shifts. This is the same procedure that is used by the color computer for saving and loading programs on a cassette.

I developed a program for timing a cycle of an audio signal. If the time is known the frequency can be calculated from the following formula:

$$(1) F = K/T$$

where F is the frequency, T is the time for one cycle, and K is a constant.

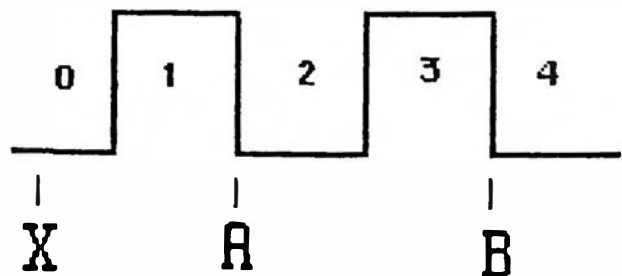


Figure 1

Consider Figure 1. To measure the frequency we can measure the time from A to B. There is a problem that had to be resolved. When the input is sampled, it is necessary to know when the signal changes from 0 to + as shown at A. Then the timing can start.

When the input is sampled, it could be 0 as shown by point X. My procedure was to wait until the input changed from + to 0 to start the timing at point A. If X started in region 1 as shown then it is necessary to wait until the input changed from 0 to + or logical "1" in region 1. Also it was necessary to wait until the input changed from 1 to 0 in region 2. This could almost be a complete cycle depending upon where we started in the cycle.

If the input were 1, then it would be necessary to wait for a half cycle or less. When the input changed from 1 to 0, the timing starts. Timing involves clearing a register. Then the input is sampled and the value in the register is increased until the input changes. There are two timing sections that time while the input is 0 and while it is +. After going through these routines, the timing is completed at B in Figure 1. This value is stored in memory and control is returned to basic. To calculate K from equation (1), it was necessary to measure a frequency with a frequency counter. K turned

out to be 74000 for the routine I was using.

The machine language subroutine is short so I used the READ-DATA method of loading it into memory. I chose memory from 510 to 550 for the routine. A disassembled listing of the machine language subroutine follows:

ML LISTING

(All numbers in decimal)

```

510 LDA E 65312 'Put audio
      input value in A register
513 ANDA I 1
515 BEQ 510 'Wait until
      input=1
517 LDA E 65312
520 ANDA I 1 'Remove audio
      bit
522 BNE 517 'Wait until
      input=0
      'This times for input=0

524 CLRB ' Set B=0
525 LDA E 65312
528 INCB 'B=B+1 Advance counter
529 ANDA I 1
531 BEQ 525 'Go to 525 if
      input=0
533 BRA 537
      'This times for input=1

537 LDA E 65312
540 INCB 'B=B+1 Advance counter
541 ANDA I 1
543 BNE 537 'Go to 537 if
      input=1
545 STB E 501 'save time
548 RTS 'Return to basic
    
```

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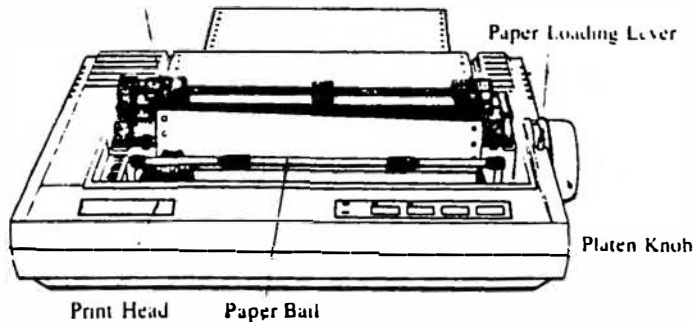


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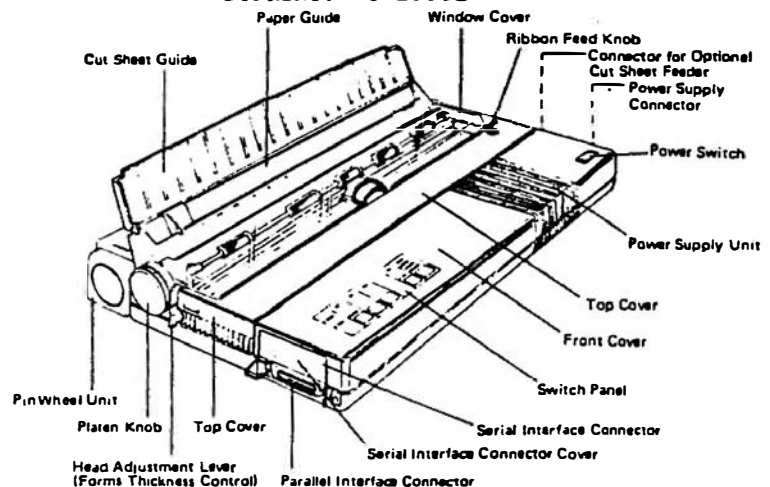
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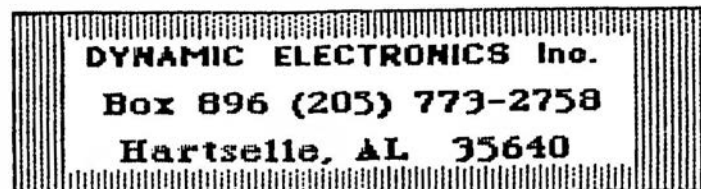
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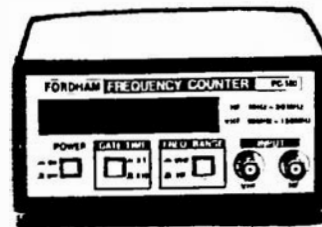


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FREQUENCY COUNTER



This program will accurately measure audio frequencies from 300 to 1200 hertz. The audio is connected through a cassette cable. The program runs in either the normal or fast speed and works on all color computers.

As the program is run the copyright notice appears followed by a menu. From the menu select the computer type and speed. The normal speed should be used for low frequencies as it will give more counts and better accuracy. The high speed mode gives better accuracy for higher frequencies. The program is very fast and continuously prints the frequency at the top of the screen. To change the speed press a key which will return the menu. Then the other speed option can be selected.

```

5 ?"AUDIO FREQUENCY COUNTER
10 ?"COPYRIGHT (c) 1987
15 ?"DYNAMIC eLECTRONICS INC.
17 FOR J=1 TO 100: NEXT
20 CLS:A=PEEK(498):B=PEEK(499)
  IF A=0 THEN CC=2 IF B=0 THEN
  NORMAL SPEED
30 GOSUB 320
40 IF A>0 THEN A=2 ELSE IF B>0
  THEN B=2
50 IF B=0 THEN B$="NORMAL" ELSE
  B$="FAST"
60 IF B=0 THEN POKE 65494+A,0
70 IF B>0 THEN POKE 65495+A,0
75 A$="3"
80 IF A=0 THEN A$="2"
90 PRINT"1 COLOR COMPUTER "A$
100 PRINT"2 "B$" SPEED"
110 PRINT"ENTER NUMBER OR PRESS
  ENTER"
120 P$=INKEY$:IF P$=""THEN 120
130 P=VAL(P$):IF P=0 THEN 190
140 IF P=2 THEN 170
150 A=A+2:IF A>2 THEN A=0
160 POKE 498,A:GOTO20
170 B=B+2:IF B>2 THEN B=0
180 POKE 499,B:GOTO20
190 CLS
200 EXEC 510
210 D=PEEK(501):IF D=0 THEN 280
220 F=74000/D:F=INT(F)
230 IF B=2 THEN F=F*2
240 PRINT@0,"FREQUENCY="F
250 PRINTB$ " SPEED"
260 P$=INKEY$:IF P$="" THEN 200

```

```

270 GOTO20
280 PRINT"OUT OF RANGE. ADJUST
  OSCILLATOR
290 PRINT"PRESS A KEY TO CONTIN
  UE
300 R$=INKEY$:IF R$=""THEN 300
310 GOTO20
320 DATA 182,255,32,132,1,39,249
  ,182,255,32,132,1,38,249,95,1
  82,255,32,92,132,1,39,248,32,
  2,244,95,182,255,32,92,132,1,
  38,248,247,1,245,57,18,,
330 FOR J=510 TO 549:READV:POKE
  J,V:NEXTJ
340 RESTORE:RETURN

```

I am looking forward to spending much time on ham radio programs during the holidays. There is still much interest in CW but our interface is a problem with some people. A program could possibly be written that uses the cassette interface like we presented in the RTTY article in October 1987. One thing that has bothered me about using this approach is the generation of clean tones to feed into the microphone jack. Key clicks and harmonic distortion can occur which might result in a QSL card from the FCC. However a transmitter can be keyed using the motor on and motor off commands. This will require additional research.

This month and last month I developed software for generating and measuring audio frequencies. These tools will allow the generation of tones for controlling devices and detecting them. For example the frequency counter could be used to turn on a device if the frequency was equal to a given number. The program I developed this month can easily be modified for this purpose as follows:

```
245 IF F=3500 THEN MOTOR ON
```

Let me know if there are any other ham radio subjects that you would like for me to cover.

+ + + 73's Bill + + +

TAKING CONTROL

(Basic Programming Part 4)



Last month we gave an example program that printed COLOR COMPUTER surrounded by a border of stars. This used subroutines and FOR-NEXT loops. These are very powerful programming tools and we want to review them.

SUBROUTINE

A subroutine is part of a basic program. It is called from basic with the GOSUB command. The line number for the start of the subroutine appears after GOSUB. If the subroutine started at 5000 then to call it we could write GOSUB 5000 or GO SUB 5000. Some versions of basic do not allow a space after GO. The version of basic used in color computers allows spaces which gives more programming flexibility. The basic used by color computers is very good and can easily be adapted to other computers such as IBM, Apple, or Commodore.

To write the subroutine part, just write basic commands for the task to be accomplished at the designated line numbers. At the end of the subroutine put the command "RETURN". Program control returns to the next command after the GO SUB.

There are many advantages of using subroutines. One is to save from having to retype commands. Another is to simplify the program structure. For involved programs it is easy to lose track of where you are. Let's take an example. Suppose we have an income tax program that requires 5 different parts. We can write a subroutine for each part at 1000, 2000, 3000, 4000, and 5000. Now

the programming is broken down into 6 parts. Each subroutine is a part and the main program is a part. An example of the control program could be as follows:

```
10 GOSUB 1000
20 GOSUB 2000
30 GOSUB 3000
40 GOSUB 4000
50 GOSUB 5000
60 END
```

Notice how simple the subroutines make the program structure. Line 60 contains the END command. This tells basic that the program is finished. If it were not used basic would go to the next statement which would be the subroutine at 1000.

FOR-NEXT LOOPS

For operations that need to be repeated the FOR-NEXT loops can be used. Their structure is:

```
FOR K=1 to N
PERFORM DESIRED OPERATIONS
NEXT K
```

Any variable can be used although J is the most common. There can be any number of operations to be performed. End the operations with NEXT K or just NEXT. The variable can be omitted at the end if only one loop is being used. However it is good practice to always use a variable with the NEXT. After the operations are performed the specified number of times, the program continues with the command after NEXT K.

Let's write a program to fill

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the screen with \$ marks using a FOR-NEXT loop. All of our example programs are included in our DCN on tape or disk.

```

5 'CONT-1
10 'THIS FILLS THE SCREEN WITH
  $ SIGN
20 CLS 'CLEAR THE SCREEN
30 FOR X=1 TO 511
40 ?"""; 'PRINT THE DOLLAR SIGN
50 NEXT X
60 FOR K=1 TO 1000: NEXT K 'ADD
  A DELAY
    
```

Notice the simplicity of the program. Line 20 clears the screen placing the cursor at the top left position. Lines 30-50 are the FOR-NEXT loop with X as the variable. Notice the ";" after the print command in line 40. This means to move the cursor only one position after the character is printed. Line 60 is another FOR-NEXT loop to provide a delay. When the program ends an OK will appear which will scroll everything up a line.

READ-DATA

For bringing variables into the computer we have been defining them within the program. Suppose the data does not change after it is entered. For example entries in a check book program are permanent since once a check is written, it is always that value. DATA statements allow data to become a permanent part of the program. The procedure for using DATA statements is to enter a line number and then the word DATA. The data items are listed and separated by a comma.

```

10 DATA FIRST, 25, SECOND, 90,
  LAST, 155
    
```

Notice that string and numerical variables can be used in data statements as shown in the example. To recognize the data a READ command is required. DATA statements can be anywhere in a program. Let's write a program to demonstrate using data statements.

```

10 'CONT-2
20 FOR J=1 to 3
    
```

```

30 READ X$,X
40 S=S+X
50 ?X$;X;S
60 NEXT J
70 DATA FIRST, 25, SECOND, 90,
  LAST, 155

```

Notice the absence of quotation marks. These are required for strings but are not needed with the data statements. Line 20 is the beginning of the FOR-NEXT loop which reads the data 3 times. Line 30 reads X\$ and X from the data. This does the same as the input command except the variables are read from the data. Line 40 sums X and line 50 prints the results. Line 60 is the ending of the FOR-NEXT loop. Line 70 contains the data. Notice that data is listed in the order that it is to be read. It is very important to properly order the data to prevent the wrong data element from being read. Notice also that a comma can not be used in the string because basic recognizes the comma as a separator for data elements.

GO TO COMMAND

This command is simple and powerful. Suppose you finish a section of a program and want to go back to line 20 to continue. You could put GOTO 20 or GO TO 20 as a command at the end of the section. This will transfer control back to line 20. The GO TO command can be used to skip steps either backwards or forward. This is called branching.

IF - THEN COMMANDS

There are many other programming tools available with Micro-Soft Basic. The IF- THEN command allows branching if certain conditions are met. Logic operators used with these commands are:

```

= Equal to
< Less than
> Greater than
<> or >< not equal
<= or =< Less than or equal
>= or => Greater than or equal

```

Notice that the less than and greater than symbols open up to the larger value. This is an easy way to keep them straight.

Here are some examples:

(1) 100 IF X= 0 THEN 300' THIS MEANS TO GO TO LINE 300 IF X=0

(2) 150 IF A<B THEN 500' THIS MEANS TO GO TO LINE 500 IF A IS LESS THAN B.

(3) 520 IF W<> 100 THEN 20' THIS MEANS TO GO TO LINE 20 IF W IS NOT EQUAL TO 100.

EXAMPLE PROGRAM

To summarize some of the concepts covered we wrote a simple inventory program. It allows items and their quantities to be entered in data statements.

INVENTORY DEMO PGM

```

2 'CONT-3
5 CLS
10 PRINT"INVENTORY PROGRAM TO
  DEMONSTRATE
20 PRINT"READ-DATA AND IF- THEN
  COMMANDS.
30 PRINT"ENTER INFORMATION IN
  THE
40 PRINT"   FOLLOWING ORDER:
50 PRINT"1 NUMBER ON HAND
60 PRINT"2 ITEM NAME
70 PRINT"3 UNIT VALUE
90 PRINT"USE ONE DATA STATEMENT
  FOR EACH
100 PRINT"ITEM.THE PROGRAM WILL
  PRINT THE
110 PRINT"TOTAL VALUE FOR ALL
  ITEMS.
120 PRINT"EXAMPLE DATA ITEMS
  ARE GIVEN.
130 INPUT"PRESS ENTER TO
  CONTINUE";P
140 READ N: IF N=0 THEN 1000
150 READ N$,V
160 T=N*V: S=S+T
170 PRINTN"-";N$,V,T
175 PRINT
177 GOSUB 900
180 GOTO 140
500 DATA 5,HAMMER,4.95
510 DATA 3,HAND SAW, 6.29
520 DATA 12, FILES, 1.49
530 DATA 15,6 INCH WREN, 3.59
540 DATA 9,8 INCH WREN, 4.89
550 DATA 12,18 INCH LEVEL,6.25
560 DATA 0,'WE USED A 0 TO
  INDICATE THE END OF DATA
900 FOR K=1 TO 200:NEXT K:
  RETURN
910 'THIS PROVIDES A DELAY TO
  SLOW DOWN THE PROGRAM
1000 PRINT"TOTAL IS "S

```

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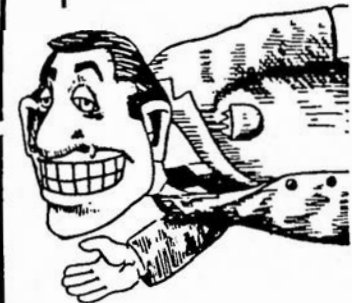
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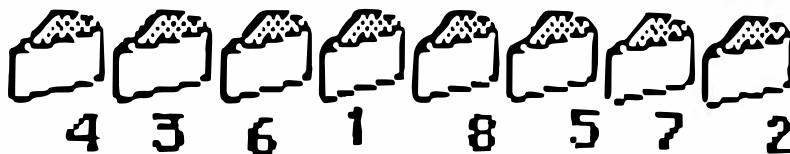
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Pmode 4



HIGH-RES

REFORMATTING DATA

Part 6

Perhaps a better title for this series would be "Advanced Basic Programming". In this series we are showing techniques and applications for reformatting or rearranging data. This is a never ending task for programming. The bits in a byte have to be removed one at a time or used to form a new byte. Let's take a few examples of the problem.

To send data out through the RS-232 or ASCII port, it is necessary to form a word with start and stop bits, parity, and the data bits. Information is sent serially or one piece of information at a time. Data bits have to be removed from a byte one bit at a time as they are required to be sent.

For ham radio communications using either Morse code or Baudot teletype, the computer's ASCII word has to be changed into an equivalent Morse or Baudot word. This is relatively easy and can be accomplished with a look up table.

Last month we showed how to rearrange the bits from a PMODE 4 graphics picture so that the picture could be printed on a dot matrix printer.

This month we are presenting a program that will allow a PMODE 4 graphics picture to be converted to a HI-Resolution picture for the color computer 3. Let's first look at the problem and then the program.

Fortunately there are 192 lines in a PMODE 4 and a high resolution color computer 3 picture. For the PMODE 4 picture there are 256 bits per line with each byte containing 8 bits. For the HSCREEN 4 there are 320 bits consisting of 160 bytes or 2 bits per byte. This allows each bit to have 16 color possibilities. We can only transfer 256 bits to the HSCREEN 4 which will leave 320-256 or 64 bits unused. This will leave a blank area to the right of the screen if we transfer the left most bits.

ORGANIZING THE BITS

To form the HI-RES byte we must remove two bits from the PMODE-4 byte and combine them with a color multiplier to form the new byte. Let's suppose we want to transfer over and select a color during the transfer. Let's let C represent the color which can be a number from 0 to 15.

A7 A6 A5 A4 A3 A2 A1 A0 PMODE4

If the PMODE 4 byte is as shown with A7 being the most significant bit, then the first HI-RES byte will be as shown:

X X X X Y Y Y Y HIRES4

If A7 is 1 then we will put the color number in the locations with X. If A7 is 0 then we will put a 0 in the X locations. If A6 is 1 then we will put the color number in the places marked by Y. If A6 is 0 then we will put a 0 in the Y locations.

If the PMODE byte is A, then how do we remove A7, A6, etc from the byte? We can use the basic AND operator. The following equations will remove the bit:

```
A7=A AND 128: A6 = A AND 64:
A5=AA AND 32: A4=A AND 16: A3=A
AND 8: A2=A AND 4: A1=A AND 2:
A0=A AND 1
```

To simplify the program we can write a routine that will break the byte A down into 4 HIRES bytes.

```
340 C=128
350 FOR P=1 TO 4
360 'S IS THE VALUE OF THE NEW H
    IRES BYTE
370 S=0
380 X=A AND C
390 C=C/2:Y=A AND C 'REMOVE THE
    MOST SIGNIFICANT BIT
400 ' X AND Y ARE THE BITS USED
    FOR THE HIRES BYTE
410 IFX>0 THEN S=16*CL
420 IFY>0 THEN S=S+CL
430 LPOKE N,S:N=N+1:C=C/2
440 NEXT P
```

In the preceding program segment N is the location for the HIRES byte to be LPOKED. A is the PMODE 4 byte, X is the most significant bit, Y is the least significant byte, and CL is the color. To shift the bits 4 places to the left we can multiply the color number by 16. This is done if X is not 0. We add the color value if Y is not 0. See lines 410 and 420. The value is then LPOKED into memory N.

Basic is slow but does the job of transferring the picture elements. We speeded up the process by writing a machine

language subroutine that takes a PMODE 4 byte and forms 4 HIRES bytes. In machine language programming there are convenient tools for removing bits or rearranging them. We can rotate a byte into the carry bit and then branch depending upon the carry bit. To multiply we can rotate bits to the left. The subroutine starts at 510 and ends at 553. The listing follows using decimal notation:

ML SUBROUTING

```
510 LDX I 501
513 CLRA
514 ASLA
515 ASL E 499
518 BHS 522
522 ASL E 499
525 BHS 529
527 BSR 550
529 STA X +
531 CMPX 505
534 BLT 513
536 RTS
537 BRA 514
539 NOP
540 CLR B
541 RORB
542 ADDA E 500
545 ROLA
546 ROLA
547 ROLA
548 ROLA
549 RTS
550 ADDA E 500
553 RTS
```

The byte is in 499 and the color is in 500. The new bytes are in 501, 502, 503, and 504. When we are returned to basic all we have to do is to peek the memory and LPOKE the bits to HIRES memory. Our program contains both the basic and the modified basic subroutines so the speed can be compared.

PMODE 4 TO HSCREEN4 PROGRAM

This program will load a PMODE 4 program from either a cassette or disk. It will transfer it to the HSCREEN4

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

DCN-1

* 64K all RAM, * 2- bank address file, Alarm Clock, Loan Interest, Character Generator, * Bank Switching.
* CC-2 Memory managers

DCN-2

Check Book Program., Ball Team Sort Program., Card Shuffling, Student Study Program, Address File.

DCN-3

Restore-Recover program lost after NEW command, Fast Food, Bar Graph, Memory Peek & Poke, Graphics draw.

DCN-4

Address File with Sort up to 100 names, Morse Code Generator, Star Constellations, Dueling Cannons.

DCN-5

COLOR COMPUTER 3 PROGRAMS
CC-3 Memory Manager- Switch 8K blocks #38, CC-3 Error Trapping- Program to print error message #37, CC-3 Graphics #38, CC-3 Graphics Save #40

DCN-6

Accounts Payable- Business program #38, Dog Race (game) #40, Compound Interest-Figure best investment deal. #40, Address File Disk Sort (up to 100 names) #40, Invoice Program- Example for writing your own #36.

DCN-7

Meteors (game) #41, Graphics print-Use regular print for large picture #42, Parachute (game) #42, Music (Peace)- Hear quality computer music. #43, Geneology- Keep records of your family tree #39.

DCN-8

Oware (Game) #36, Save the Maiden (Word game) #43, Printer Utilities - Print information on screen to printer #44, Graphics Screen Dump Program #44.

Programs are \$5.95 each tape or disk. Add \$1 shipping. Checks, VISA & MC.

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OPERATING HINT

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

memory and allow selection of the background and pixel colors. After transferring the bits, both pictures can be compared. Since there are 16 color possibilities with the HSCREEN4, it is possible to color the picture. Maybe we can show how to do this in a future issue. There are plenty of PMODE 4 pictures available, so this can be useful for those interested in pictures.

The LPOKE command seems to be rather slow. For speed we could move the appropriate 8K blocks into lower memory and do normal pokes. However it only takes about 7 minutes with this program which was adequate for our purpose.

```

10 GOSUB 770 'READ IN ML SUB
20 PALETTE 12,63:PALETTE 13,0'ENABLE REVERSED VIDEO
30 CLS:PRINT"DATA REFORMATTING PROGRAM REFORM-1
40 PRINT"COPYRIGHT (c) 1987
50 PRINT"dYNAMIC ELECTRONICS INC.:PRINT
60 PRINT"THIS PROGRAM ALLOWS A PMODE 4
70 PRINT"GRAPHICS PICTURE TO BE USED TO
80 PRINT"GENERATE A HIGH-RES PICTURE.
90 PRINT:PRINT"1 LOAD PMODE 4 PICTURE
100 PRINT"2 VIEW PMODE 4 PICTURE
110 PRINT"3 GENERATE HI-RES PICTURE
120 PRINT"4 VIEW HIRES PICTURE
130 PRINT"ENTER NUMBER
140 V$=INKEY$:IF V$=""THEN 140
150 V=VAL(V$)
160 ON V GO TO 700,600,190,650
170 GOTO30
180 'TRANSFER PICTURE
190 POKE &HE6C6,&H21 'PREVENT ERASING OLD PICTURE
200 POKE65497,0:PRINT"HIGH SPEED ENABLED
210 PRINT"0 GRAY","1 GREEN","2 GREEN-YEL","4 YELLOW","5 YEL-ORANGE","6 RED-ORANGE","7 RED","8 RED-MAG
220 PRINT"9 MAGENTA","10 INDIGO","11 BLUE","12 BLUE-CYAN","13 CYAN","14 GREEN-CYAN","15 BLUE-GREEN
    
```

```

230 INPUT"ENTER COLOR NUMBER";CL
240 INPUT"BACKGROUND COLOR";B
250 'THE COLOR CAN BE ANY VALUE
    FROM 0 TO 15
260 HSCREEN 4:HCLSB 'SET UP FOR
    HIRES DISPLAY WITH BACKGROUND
    COLOR B
270 FOR J=0 TO 191 'THERE ARE 19
    2 LINES IN BOTH PMODE4 AND HI
    RES4 DISPLAYS
280 FOR K=0 TO 31 'THESE ARE THE
    BYTES IN A PMODE 4 LINE
290 M=3584+32*J+K:N=393216+160*J
    +4*K
300 'PMODE 4 STARTS AT 3584 AND
    HIRES4 STARTS AT 393216
310 'EACH PMODE 4 BYTE IS CONVER
    TED TO 4 HIRES BYTES
320 A=PEEK(M) 'GET PMODE 4 BYTE
325 'GO TO 340 'ADD THIS LINE TO
    BY PASS THE ML SUBROUTINE
330 GO TO 510
340 C=128
350 FOR P=1 TO 4
360 'S IS THE VALUE OF THE NEW H
    IRES BYTE
370 S=0
380 X=A AND C
390 C=C/2:Y=A AND C 'REMOVE THE
    MOST SIGNIFICANT BIT
400 ' X AND Y ARE THE BITS USED
    FOR THE HIRES BYTE
410 IFX>0 THEN S=16*CL
420 IFY>0 THEN S=S+CL
430 LPOKE N,S:N=N+1:C=C/2
440 X$=INKEY$: IF X$=""THEN470
450 HSCREEN0:INPUT"ENTER COLOR N
    UMBER";CL
460 HSCREEN4
470 NEXT P
480 NEXT K
490 NEXT J
500 END
510 POKE 499,A:POKE500,CL 'SET U
    P PARAMETERS FOR THE ML SUBRO
    UTINE
520 EXEC 510
530 FOR Q=1 TO 4 'POKE THE 4 BYT
    ES GENERATED BY THE ML SUB IN
    TO HIRES MEMORY
540 ZZ=PEEK(Q+500):LPOKE N,ZZ:N=
    N+1
550 NEXT Q
560 NEXT K
570 NEXTJ
575 '
580 HSCREEN0:GOTO30
590 'VIEW PMODE 4 PICTURE

```

```

600 WIDTH 32:PMODE4,1:SCREEN1,0
610 FOR WW=1 TO 100:NEXT WW
620 W$=INKEY$:IFW$=""THEN620
630 GOTO30
640 '
650 POKE 59078,33
660 HSCREEN4 'VIEW HIRES SCREEN
670 PX$=INKEY$: IF PX$=""THEN 67
    0
680 HSCREEN0:GOTO30
690 '
700 PRINT"THIS LOADS PMODE4 PICT
    URE"
710 PRINT"PRESS C FOR CASSETTE
720 PX$=INKEY$: IF PX$=""THEN 720
730 IF PX$="C" THEN CLOADM:GOTO3
    0
740 DIR
750 INPUT"ENTER FILE & EXT";PW$
760 LOADM PW$:GOTO30
770 FOR J=510 TO 553:READ A:POKE
    J,A:NEXT:RETURN
780 DATA 142,1,245,79,72,120,1,2
    43,36,2,141,18,120,1,243,36,2
    ,141,21,167,128,140,1,249,45
790 DATA233,57,32,231,18,95,86,1
    87,1,244,73,73,73,73,57,187,1
    ,244,57,,

```

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

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
TYPING	SET	2	B	1
EPSON	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
LONI4	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
DISKLABEL 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
MASTHIND 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 0
ORCH DOC 1 A 3
OCNVRT BIN 2 B 2
GHOSBUST MUS 4 M 3
STELMO MUS 4 M 2
MASH MUS 4 M 2
BOND1 MUS 4 M 2
2001 MUS 4 M 2
ARIA MUS 4 M 2
INVENTI MUS 4 M 1
BATTSTAR MUS 4 M 2
BOND2 MUS 4 M 2
CLOSENCT MUS 4 M 2
SCARBORO MUS 4 M 1
FUGUEINC MUS 4 M 1
MINUET MUS 4 M 1
LONGTIME MUS 4 M 2
MESSIAH MUS 4 M 3

* PD-22 MUSIC-1

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

ADDPLAY BAS 0 B 1
DEPLAY BAS 0 B 1
MSQUEZ BAS 0 B 2
ALSOSPAK MUS 2 B 5
BOOGIE MUS 2 B 5
CIRCUS MUS 2 B 5
CLOWN MUS 2 B 2
CLOWNS MUS 2 B 4
HAYDEN MUS 2 B 8
JBG00D 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
STRAY MUS 2 B 4
FOGGY MUS 2 B 4

FUNERAL MUS 2 B 3
HARDDAY MUS 2 B 2
INVENT MUS 2 B 2
INVENT11 MUS 2 B 3
INVENT15 MUS 2 B 3
INVENT7 MUS 2 B 3
INVENT8 MUS 2 B 2
JOPLIN MUS 2 B 4
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
CAHELOT 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
SUITEGH MUS 2 B 6
SUPERMAN MUS 2 B 2
WHENH64 MUS 2 B 4
ROOTBEER MUS 2 B 7
WAYUARE MUS 2 B 3
AXELF MUS 2 B 2
TOCATTA 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

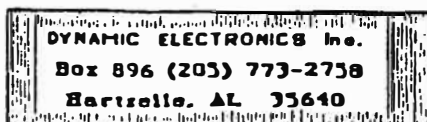
GOSTSHIP BAS 0 B 8
INT RATE BAS 0 B 2
INVSTANL PC 0 B 4
MENU BAS 0 B 4
MOTOJUMP BAS 0 B 3
SCREEN MAX 2 B 6
SCREEN1 BIN 2 B 3
SCREEN2 BIN 2 B 3
SCREEN2 MAX 2 B 6
STRINGTU BAS 0 B 4
TTERM DSK 2 B 4
TTHelp DAT 1 A 4
USING BAS 0 B 3
WF-DOC JP 0 B 2
WORDFILE JP 0 B 4
PARM1 DAT 1 A 1

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

210 DATA 7676757473737272727070706F6E6D6C6
 B6A6968676564636261605E5D5C5B5A59575554
 5251504E4C4B4A4947464442413F3E3C3A39383
 7353332302F2E2C2A29282625242220201F1D1B
 1A1817171514121211100F0E0D0C0B090908070
 70605040403
 220 DATA 02010100000000000000000000000000
 0000000000000000000000000101020303040505
 07070708090A0B0C0D0F1010111213141617181
 91B1C1E1F20222324252728292B2D2E30313335
 363838393B6440404040FE40404142820000000
 8123F121712
 230 DATA 3F07AC08185B1833185B07AC080F580F3
 00F58061608185B1833185B0616081042101A10
 4206D508185B1833185B06D5FF00000000000000
 00008123F1217123F07AC08185B1833185B07AC
 080F580F300F58061608185B1833185B0616081
 042101A1042
 240 DATA 06D508185B1833185B06D5FF0000000000
 000000008123F1217123F07AC08185B1833185B
 07AC0816FD16D516FD082108147B1453147B082
 108123F1217123F091F081042101A1042091FFF
 000000000000000080F580F300F580616080C2
 D0C050C2D06
 250 DATA 16080DAB0D830DAB048F080B7E0B560B7
 E048F100C2D0C050C2D030BFF00000000000000
 00081042101A104205BF081042101A1042091F0
 81B571B2F1B57048F081B571B2F1B57091F0810
 42101A104205BF081042101A1042091FFF00000
 000000000000
 260 DATA 080F580F300F580616080F580F300F580
 91F08185B1833185B07AC08185B1833185B091F
 080F580F300F580616080F580F300F58091FFF0
 000000000000000081042101A104205BF081042
 101A1042091F081B571B2F1B57048F081B571B2
 F1B57091F08
 270 DATA 1042101A104205BF081042101A1042091
 FFF000000000000000000080F580F300F58061608
 0F580F300F58091F08185B1833185B07AC08185
 B1833185B091F080F580F300F580616080F580F
 300F58091FFF00000000000000008147B14531
 47B089C0811
 280 DATA 3911111139089C080DAB0D830DAB089C0
 80DAB0D830DAB0C2D0800000000000000B7E0800
 000000000000A3DFF0000000000000000816FD1
 8D516FD091F08123F1217123F091F080F580F30
 0F58091F080F580F300F580DAB08000000000000
 00C2D080000
 290 DATA 000000000B7E0F0000000000000000081
 85B1833185B0A3D08147B1453147B0A3D081139
 111111390A3D081139111111390F580800000000
 000000DAB08000000000000000C2DFF0000000000
 000000081B571B2F1B570B7E0816FD16D516FD0
 B7E08123F12
 300 DATA 17123F0B7E08123F1217123F104208000
 0000000000F58080000000000000DABFF000000
 000000000081EB01E881EB00C2D081B571B2F1
 B570C2D08185B1833185B0C2D0816FD16D516FD
 0C2D08147B1453147B000008123F1217123F000
 0FF000000000
 310 DATA 0000000008247F2457247F0B7E08123F1
 217123F0B7E0816FD16D516FD0DAB08123F1217
 123F0DAB081B571B2F1B57091F08123F1217123
 F091FFF0000000000000000081EB01E881EB00C
 2D081B571B2F1B570C2D08185B1833185B0C2D0
 816FD16D516

320 DATA FD0C2D08147B1453147B0000008123F121
 7123F00000FF000000000000000000008247F245724
 7F0C2D08123F1217123F0C2D08185B1833185B0
 F5808123F1217123F0F58081EB01E881EB0091F
 08123F1217123F091FFF0000000000000000081
 85B1833185B
 330 DATA 0F580816FD16D516FD0DAB08147B14531
 47B0C2D08123F1217123F0B7E08113911111139
 0A3D080F580F300F58091FFF000000000000000
 0080DAB0D830DAB089C08113911111139089C08
 147B1453147B06D508185B1833185B06D50816F
 D16D516FD08
 340 DATA 9C08147B1453147B089CFF000000000000
 000000516FD16D516FD091F05185B1833185B0A
 3D051B571B2F1B570B7E05185B1833185B0A3D0
 51B571B2F1B570B7E051EB01E881EB00C2D051B
 571B2F1B570B7E051EB01E881EB00C2D0520842
 05C20840DAB
 350 DATA FF0000000000000000051EB01E881EB00
 C2D052272224A22720DAB05247F2457247F0F58
 052272224A22720A3D05247F2457247F0B7E052
 8F728CF28F70C2D10247F2457247F0B7E0520842
 0000000000008123F1217123F05BF08123F121
 7123F05BF08
 360 DATA 16FD16D516FD061608147B1453147B061
 608123F1217123F06D50811391111113906D5FF
 000000000000000008123F1217123F048F08123
 F1217123F05BF08123F1217123F06D508123F12
 17123F091F0800000000000007AC08000000000
 0000616FF00
 370 DATA 00000000000000008147B1453147B04100
 815B3158B15B3041008185B1833185B04100814
 7B1453147B04100815B3158B15B303D608123F1
 217123F03D6FF0000000000000000081042101A
 10420410081042101A1042051E081042101A104
 20616081042
 380 DATA 101A104208210815B3158B15B3048F081
 5B3158B15B307ACFF0000000000000000008147B
 1453147B04100815B3158B15B3041008185B183
 3185B041008147B1453147B04100815B3158B15
 B303D608123F1217123F03D6FF00000000000000
 00008104210
 390 DATA 1A10420410081042101A1042051E08104
 2101A10420616081042101A10420821080000000
 00000007AC0800000000000006D5FF000000000
 00000008123F1217123F067308123F1217123F
 0A3D081EB01E881EB0051E081EB01E881EB00A3
 D080F580F30
 400 DATA @

RENEWAL TIME?

IF 1/88 is beside your name on your address label then your subscription has expired.

FANTASY2- Part 2

```

2 PCLEAR1:CLS
4 PRINT"SECOND PART OF FANTASY2
6 PRINT
10 PRINT:PRINT"STANDBY WHILE MACHINE LANGU
AGE PROGRAM IS BEING GENERATED":PRINT
11 PRINT"THIS ASSUMES FIRST PART HAS BEEN
LOADED.
12 M=19128
14 READ X$
16 IF X$="@" THEN 42
18 L=LEN(X$)
20 FOR J=1 TO L STEP 2
22 A$=MID$(X$,J,2):B=PEEK(M)
24 C$=LEFT$(A$,1):D$=RIGHT$(A$,1)
26 X=ASC(C$):Y=ASC(D$):X=X-48:Y=Y-48
28 IF X>9 THEN X=X-7
30 IF Y>9 THEN Y=Y-7
32 V=16*X+Y:POKE M,V
34 M=M+1
36 NEXT J
38 PRINTM
40 GOTO14
42 PRINT"DATA TRANSFERRED. A MACHINE LANG
UAGE SAVE CAN NOW BE MADE.
43 BE=16128: EN=21518: EX=16128:X$="FANTAS
Y2
44 PRINT"TO MAKE A MACHINE LANGUAGE SAVE E
NTER (C)SAVEM X$,BE,EN,EX:?"REPEAT FOR
ADDITIONAL SAVES":END
100 DATA 0F580673080F580F300F580A3DFF00000
000000000081042101A104206D5081042101A
10420A3D08147B1453147B082108147B1453147
B0A3D081B571B2F1B5706D5081B571B2F1B570A
3DFF000000000000000008123F1217123F06730
8123F121712
110 DATA 3F0A3D081EB01E881EB0051E081EB01E8
81EB0A3D080F580F300F580673080F580F300F
580A3DFF0000000000000000081042101A10420
6D5081042101A10420A3D08147B1453147B0821
08147B1453147B0A3D081B571B2F1B5706D5081
B571B2F1B57
120 DATA 0A3DFF000000000000000008000000000
00009AA0816FD16D516FD09AA081EB01E881EB0
09AA081B571B2F1B5709AA08185B1833185B07A
C0816FD16D516FD07ACFF00000000000007AC05
185B1833185B0A3D051B571B2F1B570B7E051EB
01E881EB00C
130 DATA 2D051B571B2F1B570B7E051EB01E881EB
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FD16D516FD06D508147B1453147B07AC0813551
32D135507AC
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00000000000A3DFF0000000000000000081042
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3147B06D508
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F081042101A1042048F081042101A1042048FFF
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B048F080F58
170 DATA 0F300F58048F08185B1833185B048F080
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3185B07AC080F580F300F58061608185B183318
5B0616081042101A104206D508185B1833185B0
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B1833185B07AC080F580F300F58061608185B18
33185B0616081042101A104206D508185B18331
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200 DATA 7E05BF08091F08F7091F05BF08091F08F
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080A3D0A150A3D091F08000000000000821080
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AB0D830DAB0000080C2D0C050C2D0000FF00000
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1217123F0821081042101A10420821080F580F3
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240 DATA 0DAB0D830DAB0000080C2D0C050C2D000
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1081EB01E88
280 DATA 1EB0091F021B571B2F1B57091F021EB01
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B048FFF0000000000000000008185B1833185B06
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8185B183318
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48F081B571B2F1B57091F081042101A104205BF
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80F580F300F580616080F580F300F58091FFF00
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D830DAB048F
320 DATA 080DAB0D830DAB048F080DAB0D830DAB0
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1833185B07AC0416FD16D516FD07AC04147B145
3147B07AC08
330 DATA 123F1217123F0821081042101A1042082
1080F580F300F58091F080DAB0D830DAB091FFF
000000000000000100C2D0C050C2D0616100C2
D0C050C2D0616100C2D0C050C2D0616FF000000
000000000FF000000000000000000000000000
FFFFFF0000
340 DATA @

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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.

THE WIZARD'S CASTLE

This is a new magazine on the color computer. It has articles on various subjects, hardware and software reviews, Doctor Co-co plus much more. The cost is \$10 a year for USA and Canada. See their advertisement in this issue. The Wizard's Castle, 1737 Farmville Road, Shelby, NC 28150.

RADIO LOG +3

This software is designed to keep an Amateur Radio station log. It is compatible with all versions of the Color Computer,

with special programming provided for the C0C03. The program enables the operator to enter contacts and search/display/edit all log information. Log data may be listed on a printer by call sign or date. System selects and records printer baud rate by operator entry. This software requires the use of one disk drive, and may be converted to a two drive system by the operator. Backup copies may be made, however the system is run protected via a code plug the software requires on startup. RADIOLOG +3 sells for \$19.95 plus \$2.00 shipping. Florida residents add \$1.00 sales tax. Sunrise Software, 8901 NW 26 Street, Sunrise, FL 33322.

NEW FROM ARK ROYAL!

NEW	Pro Football: Strategy Gridiron game (CC3 128K HR B)	\$20
NEW	Okinawa: The Big Invasion (CC64K D HR ML)	\$27
NEW	Blitzkrieg West: A Bigger Bulge (CC64K D HR ML)	\$27
NEW	Bataan: Historical & Hypothetical games in one (CC64K D HR ML)	\$29
NEW	Desert Fox: Rommel (CC64K D HR MLS)	\$27
NEW	Task Force: Modern Naval War in the Med (CC64K D HR MLS)	\$27
UPGRADED	D DAY: The 6th of June (CC64K HR ML)	\$25
UPGRADED	Battle Hymn: Battle of Gettysburg (CC64K D HR ML)	\$25
UPGRADED	Company Commander: Squad level Wargame (CC32K SG MLS)	\$25
	(House to House Module included in Company Commander)	
	Additional Models for Company Commander 3.0	
	River Crossing	\$17
NEW	Gemini	\$17
NEW	Cauldron	\$17
NEW	Beach Head	\$17
	Fire One: Submarine Simulation (CC3 D HR B)	\$25
	Luftlotte: Battle of Britain (CC32K SG MLS)	\$25
	Stalingrad: The turning point. (CC64K HR ML)	\$25
	Final Frontier: War in Space (CC32K D HR MLS)	\$25
	Fire & Steel: Waterloo Campaign (CC64K D HR MLS)	\$22
	Barbarossa: The War in Russia (CC64K HR ML)	\$22
	RedStar: NATO vs Warsaw Pact (CC32K D HR ML)	\$22
	DarkHorse: RedStar Sequel (CC64K D HR ML)	\$22
	Midway: The Turning Point in the Pacific (CC32K HR MLS)	\$20
	Escape From Denna: Dungeons I (CC32K SG MLS)	\$15
	Tunis: War in the Desert (CC32K SG B)	\$15
	Battle of the Bulge 1 or 2 player (CC32K SG B)	\$15
	Phalanx: Alexander the Great (CC32K HR ML)	\$15
	Rubicon II: Invasion game (CC32K SG B)	\$10
	Guadalcanal: America Strikes Back (CC32K SG MLS)	\$10
	Waterloo: Napoleon (CC32K SG MLS)	\$10
	Bomber Command: Strategic Bombing Mission (CC32K SG MLS)	\$10
	Kamikaze: Naval War in the Pacific (CC32K HR B)	\$10
	Starblazer: Strategy Star Trek (CC32K SG-MLS)	\$10
	Mission Empire: Build an Empire in Space (CC32K SG B)	\$10
	Galactic Taiwan: Economics in Space (CC32K SG B)	\$10
	Keyboard General: Bi-monthly newsletter yearly sub	\$15
	Barbarossa, Luftlotte, Battle Hymn (256K) available Tandy 1000	
	New for the Tandy 1000:	
	Gray Storm Rising: War in the North Atlantic	\$25
	Codes CC — Color Computer, all versions — CC3 CoCo 3 only	
	D — Disk only (no D means program available tape or disk)	
	HR — High Resolution — SG — Semlgraphics — ML — Machine Language	
	MLS — Machine Language Subroutines — B — Basic	

Write for free catalog!

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

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

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

ARK ROYAL GAMES
 P.O. Box 14806
 Jacksonville, FL 32238
 (904) 786-8603



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.

SUPER MAX III INTERFACE

The new high resolution joystick interface introduced by Radio Shack in 1986 allowed the resolution of joysticks to be increased from 64 to 640. This high resolution allows each dot on a graphics screen to be selected with the joystick. However Radio Shack did not provide any software for the product.

With the Super Max III Interface, the interface for graphics programs like COCOMAX2, COCOMAX3, and COLORMAX is not required. The interface is a modified Radio Shack interface with the addition of two switches. These switches allow the interface to be set to the original Radio Shack configuration. With the proper setting of the switches the interface can substitute for the one normally used with the graphics packages.

To test the interface, the switches were switched to the standard position and the connectors were plugged into the cassette and right joystick ports. It was tried with a patched version of COCOMAX which was used in the "HI-RES JOYSTICK & COCOPATCH" review in our October 1987 edition. Our purpose was to see if the interface would work with the switches in the standard position. This worked fine and the patched

version of COCOMAX2 was loaded with no problems. This was tested on a color computer 3.

The next step was to see if the interface would substitute for the COCOMAX3 interface. Both switches were switched to the "OTHER" position. The unmodified software was run and after a few seconds the familiar screen appeared. The joystick did not work. The joystick connector on the interface was removed from the right joystick jack and plugged into the left joystick jack on the computer. COCOMAX 3 then worked as well as it did with its original interface.

The Super Max III interface works as advertised. The cost is \$34.95+\$3 S/H including software for the high resolution joystick and COCOMAX patch. Spectrum Projects, P.O. Box 264, Howard Beach, NY 11414.

BLITZKRIEG WEST

This is an advanced war game from ARC Royal Games. The Allies are engaged in combat with the Germans and you are the Allied commander. What decisions will you make and what will be the results? You have tanks, infantry, rangers, artillery, supply, and airborne at your disposal. Your objective is to prevent the enemy from capturing city R. There are 50 turns and at the end of each turn the game can be saved. This allows the game to be continued at a later time.

Each turn the game rotates through each of the 45 remaining units. Decisions must continuously be made. Should the unit be advanced toward the enemy or should it be moved back close to Allied forces. Sound decisions must be made to protect each unit. For example an in-

fantry unit attacking a tank unit is destined for destruction. You can call for air and artillery support but care must be taken not to exhaust these. Supply is important. A tank out of gas and artillery without shells are virtually useless. A high resolution screen continuously displays the terrain showing the American and German units. Units are identified by symbols representing men, artillery, trucks, and tanks. After each decision, combat results are displayed on the

screen. American units are identified with flags and the German units are identified with swastikas.

The game is very interesting and becomes more enjoyable the more it is played. It takes experience to be a good commander which comes with practice. The game ends when a decision is obvious. It is basically a one person game although friends can make suggestions. The cost is \$27 including shipping. ARC Royal Games, P. O. Box 14806, Jacksonville, FL 32238.

QUESTIONS & ANSWERS

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

+ + +

QUESTION: I have a 16K old grey computer and want to upgrade it to 64K. Do you have upgrades for this and do you recommend upgrading it or purchasing a new computer.

ANSWER: We have discontinued our upgrades for the older computers because of the small demand. If you are a hardware type then there were several articles in the magazines on upgrading them. A color computer 2 can be purchased for under \$100 and for most situations it would be advisable to purchase a used 64K computer.

QUESTION: Back in 1984 you developed the battery back-up (UPS) system for the COCO which brings me to my query for this letter. Hopefully in this next year we will be moving to our new home which will be off of the power grid and eventually

will be powered by a hybrid system consisting of solar, wind and a propane powered generator. For the near future we will rely on the 110/220 vac generator to run construction equipment and charge the 12vdc batter(s) for lights, radio & tv. The question is would it be practical to power the COCO directly from the DC (via a step-down transformer 12v to 5v)?

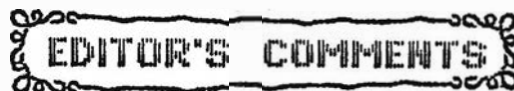
My computer seems to be the only device that really requires an inverter and I'd prefer just using DC than having the power loss through the inverter. I'll run essential programs from tape and only use the disk drive when the generator is running to pump water.

Thanks for being there to keep us novices from going to far off track. Must add that I've enjoyed DCN over the years as much as the other COCO magazines. Keep up the good work. - Bill Morrisseau.

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.


 A decorative banner with a scalloped border containing the text "EDITOR'S COMMENTS".

ANSWER: Bill thanks for your letter. Our UPS units work on 6 volt batteries. However to answer your question the COCO can be run from 12 volts by using a series regulator. An inverter may be as efficient because power is wasted in the series regulator. We will write an editorial on this subject soon. It sounds like you will really be moving out in the wilderness. I bet you will have plenty of privacy and we know you will enjoy your new home. Thanks for you letter.

QUESTION: My address has changed again this year and I missed the issues from May 1987 to November 1987. I like your magazine as additional information to the Rainbow. I'm very interested to see in the Future more little or big hardware products in the "NEW's". Like a software driven (POKES) hardware switch with relay outputs, or a buffer for the address + the data bus (Bi-directional) to hook circuits up like a clock or a speech system software (address selectable). How can I switch the DOS or any other ROM chip without a system crash? - Dieter Herbrich (West Germany).

ANSWER: Deiter we sent you the copies that you missed. The issues were returned to us but we couldn't read the writing since we can't read German. We assumed they could not be forwarded to you. Last year we covered more hardware projects than we have ever covered. Mainly we concentrated on using joystick ports but also had an article on a relay driver. A DOS should only be switched before powering up the computer. There is memory that is reserved for an additional PIA chip (6821). This could be used to drive relay drivers or a clock. I'll put this in my file for future subjects. Thanks for your letter.

Let me take this opportunity to wish each of you a happy 1988. We are encouraged by the support we are receiving and will continue to provide programming instruction and programs.

Computers are very powerful devices and can be used for many different purposes. About 15 years ago a friend of mine who is a computer expert advised me to get a computer and I could program it to do whatever task I would need. I did not take his advice because computers were very expensive or if one was purchased on the surplus market, a lot of work would be involved in using it. In the early and mid 70s computers and support equipment were very expensive. A memory of 16K was quite a feat and there were no floppy disk drives that were within my budget. Also printers were in the thousands of dollar range. My friend used a baudot 60 word per minute teletype for a keyboard and printer.

Now all of this has changed. A 64K computer is less than \$100 and programs can be saved to a cassette. A television can be used as a monitor and a disk drive can be purchased for under \$200. Also printers with almost typewriter clarity called near letter quality (NLQ) are available in the \$200 price range.

A few years ago software was not very abundant. My friend had to write all of the instructions for his computer using machine language. Now we have Basic, Assembly, Pascal, and Forth to name a few languages. The purpose of a programming language is to make it easier to write instructions for the computer. Many people do not want to write programs. This is acceptable because there are numerous programs available on

just about any subject. It is necessary for them to purchase a program that will do their tasks. I have purchased some programs and have written a number of programs. The word processor I am using was purchased. I wrote the routines that print programs in the 32 and 42 column formats that we use for printing programs. We purchased COCO MAX for doing our titles and have been very pleased with it.

A good word processor is the most valuable piece of software for me. With it I can keep records, write and modify basic programs, and of course write letters and editorials.

I am excited about the advances being made in the computer field. A few years ago who would have thought that video cameras and recorders would be available? I can take a picture on my camera-recorder (camcorder), digitize it, and store the picture information on disk. I can also print the picture on my printer.

Who would have thought that a computer could control devices such as air conditioners, heat pumps, and motors. Now all of this is possible at a small cost using a color computer and an inexpensive interface. Last year we showed how to measure temperature using the joystick ports. A simple basic program can control a device using the cassette motor relay to control a larger power handling device.

Computers can be used as educational devices. Elementary, high school, and colleges now have computers for students. College students can now have their own computer for study purposes. I remember years ago when I had to memorize information especially words in a foreign language course, I would write the word on one side of an index card and the answer on the other. Now a simple basic program will do this. In fact it can randomly select questions from an array.

As we start the new year I want to give some advice to those of you who want to learn as quickly as possible. First of all you can't learn everything at once. Concentrate on one thing until you have it under control. Maybe you do not know how to operate the computer or run some of the software you have. After you learn how to operate the computer, then you can gradually learn to write your own programs. If you do not know how to load and save programs, then it will not do you any good to write programs if you can't load or save them. I know this is an exaggerated example but it will show my point. Don't try assembly language programming until you can write a simple basic program.

I want to thank those of you who sent us names of prospective subscribers. We still need names and if you know of someone who has a color computer and is not a subscriber, we would appreciate your sending us their name and address so we can send them a free sample.

We need more programs and articles. If you have a program that has not been submitted to a magazine, we would like to see it. Send the program on disk or tape with some supporting documentation as a DAT or TXT file explaining what the program does. If you don't have a word processor write the description as a basic program using remarks for each line. We can convert that to our word processor. We pay for articles or can extend your subscription. Let us know what you expect for your program or article.

If you have a problem we would like to hear from it. We answer questions in our Questions & Answers section. Someone else may have the same question so don't hesitate to write or call. I can be reached usually after 4PM central time and Dean is available anytime.

DISPLAY ADS

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

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

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

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

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

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

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Gregory Young	Classified
COLORado Software	Classified

ATTENTION DEALERS

Are you taking advantage of our free services? We will list your new products free in our new products section. Also there is no charge for product reviews. So send us your new product releases and products to review.

Have you considered our low advertising rates?

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 preceeding month. Ex. Nov ad closing is Oct. 1.
5. No X-Rated ads.

**DYNAMIC COLOR
NEWS SUBJECT
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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 #45 or January 1988.

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