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DYNAMIC

COLOR

NEWS

LUKE 2 *Birth of Christ*

11 "For there is born to you this day in the city of David a Savior, who is Christ the Lord.

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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.

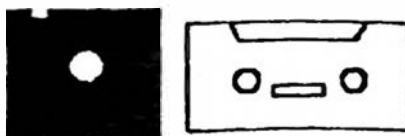
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*****
*
*   DYNAMIC COLOR NEWS   *
*
*   December 1987       *
*
*   Editor and Publisher  *
*   Bill Chapple W4GQC   *
*
*   Secretary            *
*   Dean Chapple        *
*
*****

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KINGPEDE



KINGPEDE is a high quality machine language game. We broke it into two parts for those that like to type in their programs. The two basic programs contain machine language data which is put into memory when the programs are run. After running the second program, the machine language program can be saved to a tape or disk. To save the program type

```
C(SAVEM) "KINGPEDE",17600,
      27600,27541
```

The game is very interesting to play. It requires a joystick. Your position can be changed with the joystick. Press the button to fire your rockets to destroy the enemy. There are 3 levels of difficulty that can be selected. This program is provided as a courtesy of T & D Subscription Software (See their advertisement on page 8) and is used by permission.

```
2 PCLEAR1:CLS
4 PRINT"* * KINGPEDE PART 1 * *"
6 PRINT
10 PRINT:PRINT"STANDBY WHILE MACHINE LANGU
   AGE PROGRAM IS BEING GENERATED":PRINT
12 M=17600
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 IS TRANSFERRED. NOW LOAD T
   HE SECOND PART":END
44 '
```

```
100 DATA 000000000000000000000000000000000000
   FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF00000000
   00000000000000000000000000000000FFFFFFFFFFFF
   FFFFFFFFFFFFFFFFFF8D6A8D5B108E47E08E0420
   8D43108E47F08E04401212108E48028E04408D3
   1108E48128E
110 DATA 04A08D28108E48298E04E08D1F108E484
   28E05008D16AD9FA000813126068601B75C4B39
   813226EE7F5C4B39A6A0270A814125028840A78
   020F2398E04008620A7808C060025F9394F7FFF
   22B7FFC9B7FFCAB7FFCEB7FFC2B7FFC4398E314
   EBF47D88603
120 DATA B75C15B747DA1700B51717711717C3171
   849170106170084171110AD9FA00AB6015A8114
   22177D47DA274A7F47DA7F5C528D4A8E3149BF4
   7D88D5320388128221B8601B147DA272DB747DA
   8603B75C528D2B8E314EBF47D88D3420198602B
   147DA2712B7
130 DATA 47DA8606B75C528D108E3153BF47D88D1
   98601B5FF00269F39BE47D8CC0000ED84ED02ED
   8820ED882239CC5555ED84ED8820ED02ED88223
   9108E49258E3069C60EF747DBC605A6A0A78430
   88205A26F63089FF617A47DB26EB39CE4857C60
   6108E5BB5AE
140 DATA C18CFFFF270E17000C170B308E2710170
   03C20E539A6A0A7843088205A26F6398E354B10
   8E48F3C60AF747DBC605A6A0A7843088205A26F
   63089FF613410170B638E27108D0835107A47DB
   26DF39301F26FC398E3608BF47DDC606F747DFC
   E49C78D0220
150 DATA 2610AEC1C60617FFA8108E498FC606BE4
   7DD300117FF9ABE47DD30890120BF47DD7A47DF
   26DB398E3613BF47DDC602F747DF8DCD10AEC1C
   60617FF75BE47DD308900C0BF47DDC603F747DF
   8DB48E362ABF47DDC606F747DFCE49DF8D02201
   A10AEC13440
160 DATA 1700933540BE47DD30890120BF47DD7A4
   7DF26E7398E3635BF47DDC602F747DF8DD9BE47
   DD308900C0BF47DDC603F747DF8DC8BE47DD308
   9FEE4108E49F5C604F747DB17FED2397A47D326
   1CC603F747D7BE47D5C6056F843088205A26F83
   089FF617A47
170 DATA D726ED39BE47D5B647D481012607108E4
   98C8D1E3981022607108E49898D133981032607
   108E49838D0839108E49778D0139C603F747D7C
   605A6A03DCE499533CBC605A6C0A7843088205A
   26F63089FF617A47D726E13900023DC000314E0
   100FF3C9500
180 DATA 4B2049204E20472050204520442045002
   84329434F505952494748542031393833004259
   20524F4447455220534D495448004A4F5953544
   9434B20545950452831204F522032293F00312E
   20414E414C4F475545285245434F4D4D454E444
   5442900322E
190 DATA 204549474854204449524543544494F4E4
   14C002A402B002BC02C802D402A432B022BC12C
   822D432A452B052BC52C852D452A472B072BC72
   C872D472A4A2B082B0A2BC92BCA2C8A2D4A2A4D
   2A4E2B0C2BCC2C8C2BCE2BCF2C8F2D4D2D4E2A5
   12A522A532B
```

200 DATA 112B132BD12BD22BD32C912D512A552A5
62A572B152BD52BD62C952D552D562D572A592A
5A2B192B1B2BD92BDB2C992C9B2D592D5A2A5D2
A5E2A5F2B1D2BDD2BDE2C9D2D5D2D5E2D5FFFFF
3CC0CFC33C0C333F33330C333333333333333333
3F000C000F0

210 DATA 00000000000C3333330C3333333330C3F3
03C303F3C333C3333FCC0F0C0FE30CCFCCCCFC
C0FC0CFC00000000000000000000000000000000
FC30303030300000000000000000000000000000
00000050001

220 DATA 000001050105000200000205000300000
305000400000050000006000000800000000150015
0015111111115040404040415011510151501050
11510111501011510150115150151115150101
0101151115111515111501015B55BC15B9D5BC
D5BF 75B6F5B

230 DATA FD676967816787611667AB496B496E496
E497149744977497A497D49804986498C041111
1111401111111114111501111101040101012200
11217FAF01A508E4A0ABF5C1C8E5B68BF5C1E17
13B18D308D4517FB588D29170D4417023517013
01704761712

240 DATA CC17131E1713A4170C9FFE5C221706247
A5C151712B77C5C15203C8E28004FA7808C4000
26F939B6FF2384F78A08B7FF23394FB7FFC6B7F
FC8B7FFCBB7FFCBB7FFCBB7FFD0B7FFD2B7FFC0
B7FFC3B7FFC586F8B7FF2239BE5C26301FBF5C2
626098E0025

250 DATA BF5C2617050EBE5C28301FBF5C2826098
E00AFBF5C2817024ABE5C2A301FBF5C2A261D8E
001EBF5C2A8601B5FF0027057D5C18270517066
820068E00C8170213BE5C2C301FBF5C2C26098E
0069BF5C2C170C94BE5C2E301FBF5C2E26098E0
0B4BF5C2E17

260 DATA 0E0C7D5C3C270D7A5C422608860CB75C4
21706D7BE5C30301FBF5C30226098E0109BF5C30
170F04BE5C32301FBF5C3226098E00D7BF5C321
71745BE5C34301FBF5C3426098E00D7BF5C3417
1930BE5C36301FBF5C3626098E00C8BF5C36171
AF216FF2CB6

270 DATA 5C5281061022006E81042236C610F75C1
98E5C55108E29808D02201510AF846F026F036F
046F056F066F0730085A26EC398E5C556C067F5
C437F5C4A8605B75C5339C610F75C195434048E
5C55108E29808DC93504108E299F8D0220D910A
F84861FA702

280 DATA 8601A7036F046F056F066F0730085A26E
839170347840F81092235810422BFC610F75C19
5454F75C1A8E5C55108E29808D86108E299FF65
C1A8DBE108E2A40F65C1A17FF73108E2A5FF65C
1A8DAB2082C610F75C19F75C1A8E5C55108E298
0C60117FF54

290 DATA 7A5C1A1027FF67108E299FC60117FF857
A5C1A1027FF57108E2A40C60117FF347A5C1A10
27FF47108E2A5FC60117FF657A5C1A1027FF372
0BE8E3F4FBF5C22860FB75C248607B75C2586003
B75C158602B75C4D7F5C3C17029FB75C41B75CF
9B76B4FB76B

300 DATA 53841FB76B42860CB75C427F5C147F5C1
67F5C187F5CF37F5CF57F5C497F6B3D7F6B3F7F
6B527F5C397F6B4A7F6B4E8601B75C38B761277
F5C138E01F4BF5C26BF5C28BF5C2ABF5C2CBF5C
2EBF5C30BF5C32BF5C34BF5C367F47D31710E43
9301F26FC39

310 DATA A6A0A7C433C8205A26F639B65C4381102
7067C5C43B65C43B75C448E5C55A6028163270F
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426E47D5C4A26057C5C4A20037F5C4A39A60526
1710AE846FA46FA8206FA8406FA8606FA900806
FA900A039EE

320 DATA 84C6064A2608108E5BB517FF8F39108E5
BC117FF8739A602811F250B20048601A7076C03
1600B2EE843341A6C42709813C27EB1705F820E

AA64126031706E66F05EF846C02C6066D06265C
7D5C4A2606108E5B9D2004108E5BA317FF3F16F
F6F6D02260A

330 DATA 20048601A7076F03206BEE84335FA6C42
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004108E5BAF17FEF816FF287D5C4A260A108E5B
C717FEE916FF19108E5BCD17FEDF16FF0F7D5C4
A260A108E5B

340 DATA D317FED016FF00108E5BD917FEC616FEF
66D042647EE8433C900C06D07270D11833FFF25
176F076C0416FED411833FFF250A170594170A9
66C042020EF001705256F05A6C4812826068601
A7052034813C26308602A7054AA7072027EE843
3C9FF401183

350 DATA 393F220A17055E170A606F0420A3EF001
704EF6F05A6C4812826048601A7056D031026FF
3B16FEF1CC0000FD5C44FD5C468E2A40BF5C1A8
D6784074CB15C44260C7C5C45B65C4581022508
20EA7F5C45B75C44B75C2011833D4025058602B
75C20FE5C1A

360 DATA 8D3A841FB15C46260C7C5C47B65C47810
2250820EB7F5C47B75C4633C6C606108E5BB517
FDE67A5C2026D2FE5C1A33C900C0FF5C1A11833
DC0259839BE5C1C30018C5B6825038E4A0ABF5C
1CBE5C1E301F8C4A0A22038E5B68BF5C1EB65C5
426177C5C54

370 DATA A684A90149A00549A91E49B9015BB9015
AAB0339810126157C5C54BE5C1EA60349B9015B
49A91B49A91FAB0239810226107C5C54A680A98
049A98046AA80AB1D39810326107C5C54BE5C1E
B6015BAB84AB16AB01397F5C54A684AA01AB1DB
B015BAB0639

380 DATA AD9FA00A7FFF207D5C4B2629161BC5102
6FD788602B75C4CB6015A810A25708134102200
AFB6015B8119102500D38124102200FC397F5C4
F7F5C517D5C5026247C5C50B65C518102102701
397C5C51F6015AF15C4D2703F75C4D54F15C242
707227202B

390 DATA 7F5C50B65C518102102701157C5C51F60
15BF15C4E2703F75C4E5454F15C2527BEF15C25
102500751600A17C5C4FFE5C227D5C24102700C
7335FA6C48128102700BD8114102700B76DC900
80102605BF8D107A5C24FF5C22C606108E5BDF1
7CF7F39BE5C

400 DATA 22C6066F843088205A26F8397C5C4FFE5
C22B65C24811F102700803341A6C48128277881
1427746DC900801026057C8DCD7C5C24FF5C222
0BB7C5C4F7D5C25276BFE5C2233C9FF40A6C481
281027005C8114102700566DC900801026054D8
D9E7A5C25FF

410 DATA 5C22208C7C5C4FB65C258107273AFE5C2
233C900C0A6C481281027002B8114102700256D
C900801026051C17FF6C7C5C225FF5C2216FF597
D5C4B1027FEBBB65C4F8102271416FEF37D5C4B
1027FC10B65C4F8102270316FE8E8E01F417FBB
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420 DATA 1DFE5C2233C9FF40BE5C26BC5C2A2208B
E5C2A3002BF5C267C5C181600CEBE5C1617FF15
FE5C1633C9FF4011832980102200B97F5C167F5
C187D5C391026FBBB7D5C191026FBB432621603
9F17F8D0C61E34041704F635045A26F63917F8C
0C632340417

430 DATA 04E68E000217FB4335045A26F03917F8A
AC60C3404C6021704CE8E00C817FB2B35045A26
EE3917F892C60A1704BA3917F889C6033404C61
41704AD8E07D017FB0A35045A26EE3917F871C6
011704993917F868C6033404C61486FA7FFF20B
7FF208E0064

440 DATA 17FAE45A26F135045A26E63917F848C60
1340417046E8E032017FACB35045CC10A26EE39
A6C840274D81EA263AA6C90080270E6FC900806
FC900A017FF4616FF2A8E0005170B373440C606
108E5BEB17FA9A17FF2F35401F318C370022037
C5C1317FE0D

450 DATA 16FF0481DF260BA6C9008026C28E000A2
 0CE34408E5C55F65C43A6028163273C11A30026
 377A5C198663A70234146D0626088E000A170AE
 220068E000F170ADAC606108E5BB517FA3F17FE
 E4351430085A27048601A706354016FEAB30085
 A1026FFB735
 460 DATA 407D5C0B270C11B35C092606FF5C16160
 5BC7D5C3C270B11B35C3A26051F311606AD7D5C
 F5270911B35CF326031607CB7D6B3F270B11B36
 B3D260534101610837D6B522719F66B558E6B5A
 11A3842609FF5C167C6B5616121D30055A26ED7
 D6B4E270911
 470 DATA B36B4A26031613917D5C392738F661258
 E61296D04262911A38426243410C606108E5BEB
 17F999170AFB8E01F4170A2235106C04AE8417F
 D0C7F5C167F5C183930085A26CEFF5C16C60610
 8E5BE517F96F3911B35C1626508663A7027A5C1
 9C0606108E5B
 480 DATA B517F9587F5C167F5C18341017DF5351
 034106D0626088E000A1709D120068E000F1709
 C935107D5C19260532641601627A5C442603326
 23930088601A706326216F93611B35C221026F9
 5732641602427C5C49F65C43108E5C553440A62
 28163270831
 490 DATA 285A26F5354039B65C49264ACE3A008D0
 3354039EFA46F226F236F246F256F278601A726
 7C5C193981022638B65C24811D25057C5C49202
 CCE3E9F8D03354039EFA46F226F246F256F278601A723A7
 24A7266F256F277C5C1939810126CECE3A1F8DE
 135406F2439
 500 DATA 86FFB75C49B65C24810222057C5C49209
 2CE3E808D9A8601A7243540396D061026F8B86D
 032625EC18FF5C1AB35C1A108300011027F8A41
 08300C01027F89C1083FF401027F8948601A706
 391F30A31820DD7D5C191027F882C620F75C208
 E2980BF5C1A
 510 DATA A6884081EA272B81DF272D308900C08C4
 00025ECBE5C1A30017A5C2026DF7D5C151027F8
 521708191701F2FE5C2217FB7739A689008026D
 3108E5BEB6061F1317F7ED17FC8234108E0005
 1708743510108E5BB5C6061F1317F7D534108E3
 A9817F7C835
 520 DATA 1020A47D5C39270B1700527F5C397C5C1
 920028D1917FF7217F6207D5C151027014E7A5C
 151707B57C5C1516F5397D5C19262A7C5C52B65
 C5281081025F7D4810C2505860BB75C527A5C38
 1026F7C48603B75C381700067C5C391609F97D5
 C18270CBE5C
 530 DATA 1617FAE97F5C167F5C187D5C1927028D6
 C7D5C0B270FBE5C0917FAD17F5C0B7F5C0F7F5C
 097D5C3C270CBE5C3A17FABD7F5C3A7F5C3C7D5
 CF5270CBE5CF317FAAC7F5CF37F5CF57D6B3F27
 0CBE6B3D17FA9B7F6B3D7F6B3F7D6B522706171
 0497F6B527D

540 DATA 5C392703170B047D6B4E270CBE6B4A17F
 A777F6B4A7F6B4E39B65C43B75C448E5C55A602
 8163270317F72130087A5C4426F03917FA50FF5
 C22326217F431C614F75C44C628F75C45C6148D
 508001917F6AD7A5C4526F18E03E817F6A28D1
 E7A5C4426DF
 550 DATA 17FA1F8E3F4FBF5C22860FB75C248607B
 75C257A5C1516FEFE7D5C14260A7C5C14FE5C22
 17F9F1397F5C14C606108E5BF1FE5C2217F6693
 986FC7FFF20B7FF205A26F73917075717EFD28D
 138601B5FF0026F917F3A917EED317F3A316F37
 78601B5FF00
 560 DATA 27F939CE5CD5108E3F3FC604860510AFC
 1E7C05A4A26F78605108E3F60C60410AFC1E7C0
 5A4A26F73917FFD77F5C487F5C20F65C48C1052
 7047C5C485CF75C44108E5CD5AEA18C3F4F2739
 8D5D30018D407A5C4426EE108E5CE4F65C48F75
 C44AEA18C3F
 570 DATA 4F27108D41301F8D247A5C4426EE17FA8
 520B831217C5C20B65C20810A26EA3931217C5C
 20B65C20810A26C139AF3EE6A058CE5B75EEC5C
 606A6C0AA84A7843088205A26F4393410C6066F
 843088205A26F83510397F5C0B8601B75C0C7F5
 C0D7F5C0F7F
 580 DATA 5C10397D5C0B102600B97D5C0F260E8D1
 DB65C128105220FB75C112048B65C1181142541
 7F5C0F8E006417F54239B65C13811925097F5C1
 38604B75C1239C6207F5C128E3700BF5C1AA688
 4081EA26037C5C12308900C08C3F4025EDBE5C1
 A30015A26E2
 590 DATA 3917F73C841FF65C0C8E5CFBA18027175
 A26F9F65C0C5CC10A2605C6018E5CFBF75C0CA7
 8420084C812025DA4F20D71F898E29803ABF5C0
 97C5C0B840781022205B75C548B03B75C0EC606
 7F5C0DA68427037C5C0D1F13108E5BF717F4B23
 917F9848D7C
 600 DATA "@"

* * KINGPEDE PART 2 * *


2 PCLEAR1:CLS
 4 PRINT"* * KINGPEDE PART 2 * *"
 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=22600
 14 READ X\$
 16 IF X\$="@ " THEN 42
 18 L=LEN(X\$)

ALL PROGRAMS COUL ER	CHECKERBOARD FILESORT									
	32 OR 64K FILE PROGRAM - BOTH VERSIONS INCL.									
	☐ - \$16.95									
	13	80	54	17	21	75	18	36	63	9
	Bakersfield KENO U1.2									
	62									41
	3									33
	72	49	11	29	44	38	55	27	16	1
	32 OR 64K KENO SIMULATION									
	☐ - \$12.95 ☐ - \$13.95									
GRPH200 GRPH200GRPH200										
ML GRAPHICS DUMP FOR DMP-200										
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ML ROUTINES FOR DATA, EDIT, SORT, REVIEW, SEARCH, ERROR TRAPPING. MANY HARDCOPY OPTIONS.

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310 DATA DC8E01F417FD03BE5C1617EFF035106F8
46F027F5C167F5C1816FF5A11B35C2226053262
16F5886D05260D6C05C606108E61161701C2201
76F05C606108E611C1701B5200A34108E002D17
FEB0351030087A6B3B1026FF1E7D61242701393
2627F5C397D

320 DATA 5C181027F457BE5C1617EF8D7F5C167F5
C188E002DBF5C2A16F4427F5C39F66125F76B3B
8E61296D0426031704CB30087A6B3B26F239C3C
3D755183C3C3C3C14183C012C00280001063413
0001010111303298A000401000A0329970004010
01703299600

330 DATA 04010016033DD0000301001003299F000
401001F03298400040100040329830004010003
0337100001010110033E9000020101100329840
0040100040329850004010005033ACD00010100
0D03298F000401000F03370E000101010E03299
90004010019

340 DATA 03298A000401000A033E8F000201010F0
3358F000301010F03370F000301010F03298400
0401000403364D000101000D032996000401001
6033C4E000101000E0329920004010112032996
0004010016033DD10003010011033E8E0002010
10E03299B00

350 DATA 0401001B03299B000401001B03298D000
401000D033350000201001003298A000401000A
03298D000401000D03299B000401001B0329830
004010003033B91000301011103299F00040100
1F03299B000401001B032997000401001703B6F
F2384F78A08

360 DATA B7FF2339A6A0A7C433C8205A26F6397D4
7D3270417E4D8397D6B3F265C7A6B42B66B4227
088105264917EF583917EC84843F4CB76B42840
12610CE3A00FF6B3D7F6B408601B76B43200ECE
3A1FFF6B3D861FB76B407F6B437C6B3F7F6B417
F6B4417EC50

370 DATA 8407B76B457F6B477F6B4816010C8E006
E17FC913917012AB66B478163271D7D6B472649
7C6B47B66B487C6B4848F66B45587D6B43270D8
E67C1200B7F6B3D7F6B3F20CA8E67B110AE8531
A6A6A4B76B46A6218108261117EBF6840726048
60220068107

380 DATA 26028604B76B49200017001DB66B40270
4811F26068663B76B4739B66B44B16B491026FF
217F6B4739B66B46270F8101102700DB8102102
700E51600F5FE6B3D33C900C0FF6B3D7C6B4411
B35C222605326416F29E11B35C16265BC606108
E6B3517FED8

390 DATA 17FA90B65C25B06B44B747D4810126058
E03202015810226058E0258200C810326058E01
9020038E00C817F9BD8610B747D38E2854BF47D
517E388BE6B3D17EC9C12127F6B3D7F6B3F7F5C
167F5C18326239A6C84081EA26106DC90080260
78602B76B41

400 DATA 20037C6B41C606B66B4681012716108E6
7A517FE5F39BE6B3D1F13B66B41260C17EC5639
108E67AB17FE49397F6B418101260AC606108E6
79917FE3839C606108E679F17FE2E39FE6B3D33
C9FF40FF6B3D7A6B4416FF2BFE6B3D33C900C1F
F6B3D7C6B44

410 DATA 7C6B4016FF18FE6B3D33C900BFFF6B3D7
C6B447A6B4016FF05B65C528107255B7F6B577D
6B5226117A6B53264E7C6B5217EA8DB76B53170
17CB66B55810627044C7C6B55B76B3B8E6B5A6D
03102601136D00262E7D6B542618341017EA623
510841FCE29

420 DATA 8033C6EF84FF6B587C6B5420277F6B54F
E6B58EF84201D8E022617FA94391700F0EE8433
C900C0EF841183400025056C031600CB7C6B578
D02202DA6C84081EA26106DC9008026058602A7
02398601A7023981DF1026FD5E6DC9008026058
604A7023986

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430 DATA 03A7023911B35C222605326216F0F011B
 35C16266C8D031600813410C606108E6B3517FD
 23C606108E6B35FE5C1633C9FF4011832980251
 717FD0D7D6B56260FBE5C163089FE808C298025
 0317EAFE17F9068E015E17F802BE5C1617EAEFB
 E5C163089FF

440 DATA 408C2980250317EAE07F5C167F5C18351
 06F846F056C036C087F6B5639C6066D04260B6C
 04108E678117FCB820096F04108E678717FCAD3
 0057A6B3B1026FEDE7D6B5726037F6B5239C606
 EE84A602260A3410AE8417EA913510396F02810
 12608108E67

450 DATA 9917FC7C3981022608108E679F17FC703
 981032608108E678D17FC6439108E679317FC5C
 39C6068E6B5A6F846F026F036F0430055A26F37
 F6B557F6B567F6B54397F6B52F66B55F76B3B8E
 6B5A6D03260517FF916F0030057A6B3B26F039B
 65C52810525

460 DATA 2D7D6B4E262F7A6B4F262317E8BEB76B4
 F7C6B4E841FCE298033C6FF6B4AB76B507F6B4C
 8401B76B4D7F6B5120678E007817F8ED398E6B4
 A17FF467D6B4D26787D6B5026057C6B4D206EFE
 6B4A33C900BFFF6B4A1183400025077F6B4A7F6
 B4E397A6B50

470 DATA 11B35C222605326216EF6411B35C16262
 0C606108E6B3517FB9E17F7C18E012C17F6A7BE
 6B4A17E9947F5C167F5C1820C58E6B4A17FE10C
 6067D6B51260B7C6B51108E676917FB70397F6B
 51108E676F17FB6539B66B50811F26067F6B4D1
 6FF7BFE6B4A

480 DATA 33C900C1FF6B4A11834000250316FF827
 C6B5011B35C222605326216EED11B35C161027
 FF878E6B4A17FDB7C6067D6B51260B7C6B51108
 E677517FB17397F6B51108E677B17FB0C390404
 455040500101041040401010510501054040100
 40101505054

490 DATA 1505050505155450503CD7DFFF3C3C3CD
 7DFFF000028EAEAAA282828EAEA000000E79918
 E78181E79918E7810067D167F76815685368816
 8BB68E1691F6959698969D169F76A3B6A6F6AA7
 6AF103070100000801000008010003070100030
 70100000801

500 DATA 000007010803070100030701000307030
 801000307010003070100000701080307010003
 070104030701000307030301000007010400070
 108030701020007010403070104030701000008
 010000080100030801000307010403070104002
 70100030701

510 DATA 000008010003070307010403070104030
 701000008010000080100030401000007010400
 070104030701000307010000080100030703050
 100000701000008010003070102000701050307
 010000080100000801000307010403070100000
 30100030401

520 DATA 000007010000070100030703070100030
 701000007010403070100030401000007010303
 070100030701000007010003070308010000080
 100000701080307010003070102030701000008
 010000080100000701000307010400070100030
 70108000701

530 DATA 000008010000080100030703010100000
 701040307010000080100030701000008010000
 080100030701000307010000070108000701000
 008010003070100030701000307020301000007
 010000080100000801000207010000080100020
 70104000701

540 DATA 000207010402070100000801000207010
 002080100000701000208010000080100000801
 000007010402070100000801000207010400070
 100000801000207010402070100000801000008
 010000070104020701000207010002070104020
 70104020701

550 DATA 000008010000080100000402070100000
 701040207010002070100020101000007010402
 070100000801000008010000080100020701040
 007010000080100000801000208010000070100
 020701000007010002070100000801000207010
 00205010000

560 DATA 070100000801000008010002070104000
 701000008010002070100020701040007010000
 080100000801000207010002080100000801000
 007010402070104020701000008010002070103
 000701000008010000080100020701040207010
 00207010002

570 DATA 070100020400070100000801000207010
 402070100000801000008010002070100000801
 000008010002080100020801000007010400070
 104020701000208010000080100000701000207
 010002080100020801000208010000070104020
 70100000801

580 DATA 000007010402070100000801000207010
 002080100000701000008010002070104000701
 000008010002070100C33C0C303CC300003A0D0
 10D004001000201000A00009700010073170100
 73000600022994009D000100001D00010100DA0
 00100001A00

590 DATA 010100540000000094000001120000000
 0000000FD7E4A0A8E015E301F26FC7A5C4C1026
 E1A916E42E12865597718E6B959F7217F3117E4
 A0A12FFFFFFF0000000000000000000000000000
 00
 000000000000

600 DATA "@"

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OPERATING HINT

Basic programs can be transfer-
 red between two computers using
 the serial port either directly
 or through telephone lines with
 a modem. Both computers must
 have a terminal program. If the
 computers are the same types
 then each byte of a basic or
 machine language program can be
 transferred. For different type
 computers, the files must be in
 ASCII.

TAKING CONTROL

(Basic Programming Part 3)



Last month we looked at arithmetic operators and variables. Then we gave instructions on writing a program.

Let's review variables. Numerical variables can be designated by any letter of the alphabet. Additional variables can be designated by following the first letter with a second letter or number as follows:

A, AX, X5, C3

A variable can be longer than two characters, but basic only recognizes the first two characters.

FIRST, SECOND, LAST

For FIRST basic recognizes FI, for SECOND basic recognizes SE and for LAST basic recognizes LA. To verify this enter the following practice program:

```
10 FIRST =25
20 SECOND =113
30 THIRD =255
40 ?FI;SE;TH
```

Notice that 25,113, and 255 will be printed when the program is run.

String variables are used to represent a collection of characters. A string variable contains a "\$" sign after it. Examples are X\$, A1\$, and ZP\$.

MORE ON PRINT COMMANDS

The print commands allow results to be displayed on the

screen or printed to a printer. The LIST command allows a program to be printed on the screen. This is probably the most used command for people who write programs. Let's consider different options for the list command.

(1) LIST. This lists all of the program.

(2) LIST-10. This lists all lines preceding and including line 10.

(3) LIST 512-3000. This lists all lines starting at 512 and ending at 3000.

(4) LIST 900-. This lists all lines from 900 to the end of the program.

To list the program to a printer type LLIST. You can list parts of the program to the printer by using the notation in (1) through (4) and replacing LIST with LLIST.

FIELDS

A field consists of 16 characters. If you want to skip to the next field then place a comma after the print command.

```
(1) ? A;B
(2) ? A,B
```

In (1) the variables A and B will be printed together. In (2) the variable A will be printed to the left of the screen and B will start in the

middle. Consider the following example program:

```
1 A=35:B=50
2 ?A;B
3 ?A,B
```

Clear out any previous programs by typing NEW and pressing the enter key. Then type this program in and run it. Notice the different locations for the results. When a semicolon (;) is used to separate variables to be printed, the variables will be printed one after the other. For numerical variables, two spaces are automatically printed to separate the variables. No spaces are left when printing strings. If a space is needed with strings then it must be included in the string.

PRINT @

The print command causes data to be printed at the location of the cursor. The ?@ command designates a screen location for the information to be printed. This works on all computers and the color computer 3 in the 32 character mode. Positions are numbered starting with 0 as the upper left hand location. The upper right hand position is 31. The beginning of the second line is location 32. Suppose we wanted to print the results of X at the top of the screen. We would write ?@0,X for the command. The first position of the last line would be 15*32 or location 480. If we wanted to print P\$ at the beginning of the last line we would enter ?@480,P\$.

FOR-NEXT LOOPS

These are one of the most powerful programming tools available for basic. A FOR-NEXT loop allows a series of commands to be executed a specified number of times. Since we have been looking at printing, let's take a printing example. Suppose

we want to print the @ symbol 35 times. The following program will do this:

```
10 FOR J=1 TO 35
20 ?"@";
30 NEXT J
```

Line 10 determines the number of times the program goes through the loop. J starts with 1 and the @ is printed in line 20. Line 30 tells basic to let J take on the next value. The program branches to line 10 and J becomes a 2. The "@" symbol is again printed in line 20. Basic continuously goes from lines 10 to 30 for a total of 35 times executing the commands between the lines. To verify this type in the program. Then press the clear key and run the program. The FOR-NEXT loop is equivalent to writing line 20, 35 times.

After printing the @ suppose we want to print a *. All that would be required would be to change the @ in line 20 to a *.

VARIABLE LOOP

Suppose we want to change the number or characters and the character printed easily. We can let variables stand for the parameters in the FOR-NEXT loop.

```
10 ?"ENTER THE NUMBER OF TIMES
TO PRINT THE CHARACTER"; INPUT N
20 ?"ENTER THE CHARACTER TO
PRINT":INPUT C$
30 FOR J=1 TO N
40 ?C$;
50 NEXT J
60 ? :GO TO 10
```

There is more that can be said for FOR-NEXT loops. For example they can be made to increment or increase in steps of any integer value. They can also step backwards. If it is desired to step in increments of 3 then we would write:

```
10 FOR K=1 to N STEP 3
```

and K will take on values 1, 4,

7, 10, etc. until K=N. They can also be made to count backwards from the highest number to the lowest. Look at the following example:

```
10 FOR K=100 TO 1 STEP -1
```

K will be 100, 99, 98, and continue in this sequence until it equals 1. Generally standard loops will be all that will be required.

COMBINING ? AND INPUT

Last month we showed how to enter data from the keyboard using the INPUT command. In order to know what data the computer is needing it is necessary to print instructions. Let's return to our check book example and suppose the computer is ready for us to enter a check.

```
5 ?"ENTER THE VALUE OF THE CHECK":INPUT CK
```

Notice that two commands are required and are separated by the ":". You may wonder why this is done instead of using a line for each command. The answer is that it takes much less memory when commands are combined. Basic has a form that allows print and input commands to be combined. The preceding statement can be replaced by the following:

```
5 INPUT"ENTER THE VALUE OF THE CHECK";CK
```

Notice the quotations around the label. Also a ";" is required after the label and then the variable. It is very important to be able to handle variables and data. In fact this is why a computer is needed. The following is a list of methods of handling data:

- (1) READ-DATA method
- (2) Define variables with statements

- (3) Data in remarks (see our first issue)
- (4) Data in strings
- (5) Data in files

We have covered (2) and will cover the other methods. There are many options available and we will be giving examples for each option.

SUBROUTINES

When a part of a program is to be repeated a number of times, it can be accessed easily with a subroutine. A subroutine is just a program segment that is accessed by a GO SUB command. The program segment ends with the RETURN command. This month we want to show how to make a title for a program using the commands we have presented. Figure 1 is the results we want. Notice the first line consists of 31 stars. The following will do this:

```
400 FOR J=1 TO 31:?"*";NEXTJ
405 RETURN
```

Whenever we want to print a line of stars, we can put GO SUB 400 in our program. Notice line 405 returns us to the location in the program that called the subroutine.

The second line prints a *, 29 spaces, and another *. Let's let a subroutine at 500 do this as follows:

```
500 ?"*";:FOR J=1 TO 29:" ";
505 NEXT J: ?"*"
510 RETURN
```

Let's write a subroutine at 600 to print the middle line:

```
600 ?"*          COLOR COMPUTER
        *"
605 RETURN
```

OPERATING HINT

32K lowercase COCO 3 and reversed video - POKE 359,57: POKE 65314,16: POKE 65468,63: POKE 65469,0.

REMARKS

We can write comments within a program by using the remark command. The remark command can be written either as a "'" symbol or the letters REM. This is helpful to identify what each part of the program does. The remark should be the last command in a line. It can occupy the whole line or the last part. Examples using remarks are:

```
10 INPUT X 'ENTER POSITION
20 REM THIS IS A COMMENT
```

BORDER PROGRAM

The border program is just a collection of subroutines. It is advantageous to write parts of a program as subroutines because this simplifies the main program making it easier to spot errors. The CLS command in line 5 clears the screen.

```
5 CLS
10 GOSUB 400 'PRINT THE FIRST
   LINE
15 PRINT
20 FOR K=1 TO 3:GOSUB
   500:PRINT:NEXT K
30 'LINE 20 PRINTS THE 2ND, 3RD
   & 4TH LINES
40 GOSUB 600 'PRINT MIDDLE
50 FOR K=1 TO 3:GOSUB
   500:PRINT:NEXTK
60 'PRINT 3 LINES FROM SUB 500
70 GOSUB 400' PRINT LINE OF
   STARS
80 END
90 '
400 FOR J=1 TO 31:PRINT
   "*" ;:NEXTJ
405 RETURN
500 PRINT"*";:FOR J=1 TO 29:
   PRINT " ";
505 NEXT J: PRINT"*";
510 RETURN
600 PRINT"*          COLOR COMPUT
   ER          *":RETURN
```

```
*****
*
*
*
*          COLOR COMPUTER
*
*
*
*****
```

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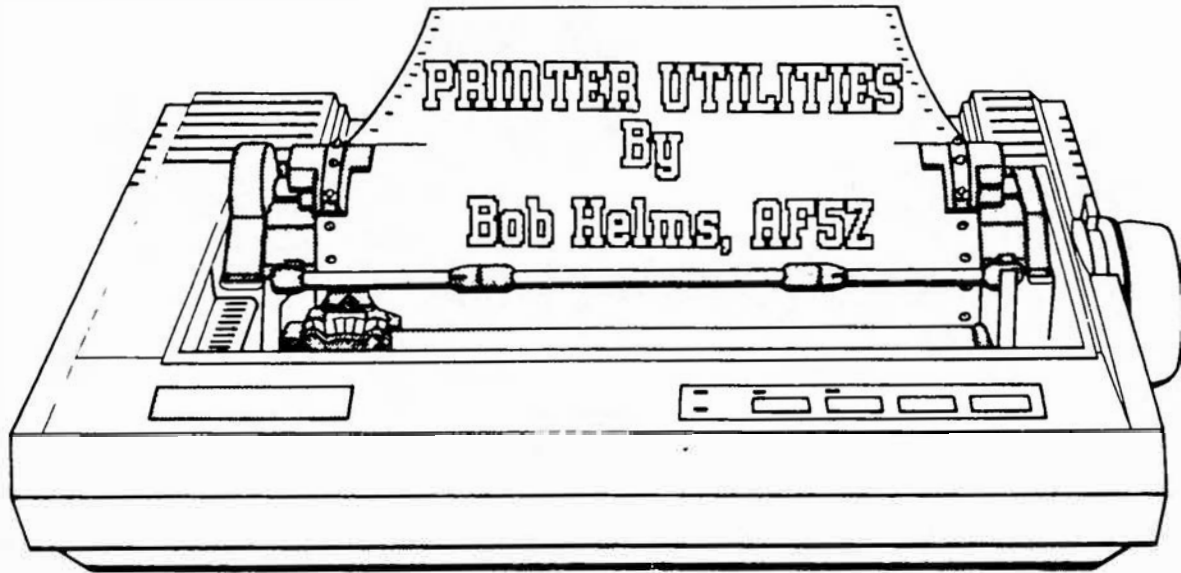
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Would you like simultaneous output from your Coco to the screen and printer? How about a double-spaced LLIST command? The short subroutines shown in Listings 1 through 4 below will do that and more.

Each listing is a subroutine intended to be merged or typed into your program. They serve to demonstrate their operation but won't do much as stand alone programs. The easiest way to get the routines working is to type in the BASIC listings, however the assembly language source code with comments is included to help you understand how the machine language portions work.

PRNTLINK.BAS (Listing 1) redirects all text output to the screen so that it will also go to the printer. This is quite useful in a BASIC program used on the Coco 3 in 80 column WIDTH mode. The time spent formatting the screen display can also be used on your 80 column printer! Routines in your program that list to the screen can now also produce a hardcopy. Naturally, you don't want repeated printouts of your menus and screen prompts so there must be a way to turn the "link" on and off. GOSUB 80 to do just that. Each time the subroutine in lines 80 through 100 is called, the

printer will be either turned on, or if already on, it will be turned off.

Heed the notes in lines 50 and 60 about variables used and DATA/READ statements. If there are conflicts in variable names, you may rename variables in the subroutine. If your program uses DATA and READ statements, put the PRNTLINK data statements before all data statements of your program and make sure line 30 of the subroutine is before any READ statement of your program. Then add the statements GOSUB80:GOSUB80 to the end of line 30. This will enable and then disable the printer link but leave BASIC's READ DATA pointer at the first data statement in your program.

Have you every locked up your Coco by attempting to print something when the printer wasn't ready? Often the first character is lost if you figure out what happened and turn the printer on with the computer trying to print. Line 80 of the PRNTLINK subroutine in Listing 1 will prevent that mistake. The status of the printer ready / handshake line is shown by memory location 65314 (\$FF22). The statements in line 80 form a trap to give you a message and sound a beep until the printer is ready. Since you don't at-

tempt to send anything to the printer until it is ready, no characters are lost.

I've often wished the LLIST command had an option of producing double-spaced listings. The extra space would be nice for editing and adding comments to program listings. DBLSPACE.BAS (Listing 2) gives double spacing on a standard printer. It also can be used to interface non-standard printers.

Some older printers such as the Model 33 or 35 ASCII teletype machines, don't automatically do a line feed (L/F) after each carriage return (C/R). The Coco printer driver routine sends only C/Rs and expects the printer to advance the paper. DBLSPACE will add the needed L/F and also limits the line length to 72 characters. This sets a right margin for printers that don't automatically go to the next line if given a line of text that is longer than what the printer can print.

A few comments are in order about the assembly language source code (Listings 3 and 4). Use the MACRO-80C assembler to assemble to disk. EDTASM+ should work but may need minor changes in syntax. The routines PRNTLINK and DBLSPACE both use BASIC's Console out RAM vector at \$167-\$169 (359-361 decimal) as a hook to direct printed output to the subroutine. The general approach is to write a machine language routine to modify the print command and then change the address at \$168-\$169 so that it is used.

The M/L object code produced by the assembler can't be loaded into memory and executed because BASIC won't know where it is and use it. To correct this follow the steps in the beginning of each source code listing. LOADM the object code produced by the assembler, then POKE the execute address (\$MMSS) into the vector at \$168 and \$169 with the statement POKE360,&HMM: POKE361,&HSS. Enter both POKES at one time so that both bytes get changed be-

fore anything is printed to the screen.

For the M/L programmers - - can you enable both DBLSPACE and PRNTLINK at the same time? The hints above and careful study of the source code comments should help you meet this challenge.

LISTING 1

```

5 'LISTING 1
10 'PRINTER LINK V1.0 BY BOB HEL
    MS, AF5Z
20 'INITIALIZE AS PRINTER OFF &
    SAVE VECTOR
25 'LINE BELOW must BE RUN BEFOR
    E PRINTER LINK IS ENABLED.
30 P=0:P$="PRINTER OFF":V1=PEEK(
    360):V2=PEEK(361)
40 'PUT YOUR PROGRAM BODY HERE.
50 'VARIABLES USED IN THIS ROUTI
    NE ARE - A,P,P$,V1,V2, & X.
55 'RENAME THESE IF THEY ARE ALS
    O USED IN YOUR PROGRAM TO AVO
    ID CONFLICTS.
60 'NOTE - THIS PROGRAM USES REA
    D, DATA & RESTORE STATEMENTS.
65 'MODIFICATION WILL BE NEEDED
    IF USED WITH ANOTHER PRORAM T
    HAT DOES ALSO.
70 'PUT A GOSUB TO LINES BELOW I
    N YOUR PROGRAM TO TOGGLE PRIN
    TER ON & OFF.
80 IFPEEK(65314)/2<>INT(PEEK(653
    14)/2)THENPRINT"PRINTER NOT O
    N-LINE":SOUND100,10:GOTO80 'L
    INE TO CHECK IF PRINTER IS ON
    -LINE
90 P=1-P:IFP THENP$="PRINTER ON"
    :RESTORE:FORX=1TO15:READA:POK
    E1007+X,A:NEXT:POKE360,3:POKE
    361,240:RETURN
100 P$="PRINTER OFF":POKE360,V1:
    POKE361,V2:RETURN
110 'EACH TIME THE SUBROUTINE AB
    OVE IS CALLED THE PRINTER LIN
    K WILL BE TURNED ON OR OFF.
120 'P=1 AND P$="PRINTER ON" WHE
    N PRINTING TO SCREEN & PRINTE
    R.
130 'P=0 AND P$="PRINTER OFF" WH
    EN PRINTING IS TO THE SCREEN
    ONLY.
140 'M/L DATA FOR PRINTER LINK
150 DATA 52,22,198,254,215,111,1
    90,180,2,173,3,15,111,53,150
160 'COMMENTS & ALL REFERENCES T
    O P$ MAY BE OMITTED

```

LISTING 2

**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
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DYNAMIC ELECTRONICS Inc
Box 896 (205) 773-2758
Hartselle, Al 35640

```

10 'LISTING 2
20 'DOUBLE SPACE V1.0
30 'BY BOB HELMS, AF5Z
40 'ROUTINE TO DOUBLE SPACE ON A
   STANDARD COCO PRINTER OR TO
50 'DRIVE A NON-STANDARD PRINTER
   SUCH AS A ASCII TELETYPE OR
60 'DECWRITER. ALSO LIMITS LINE
   LENGTH TO 72 CHARACTERS.
70 CLEAR200,&H7FCE 'PROTECT M/L
   ROUTINE FROM BEING OVERWRITE
   N
80 'BY BASIC'S STACK.
90 POKE&H9B,72 'SET RIGHT MARGIN
   / LINE LENGTH
100 FOR A=&H7FCF TO &H7FFF 'PUT
   M/L IN HIGH RAM
110 READ D:POKE A,D:NEXT A
120 POKE359,126:POKE360,&H7F:POK
   E361,&HCF:END 'POINT BASIC'S
   PRINT VECTOR TO M/L
130 DATA 52,20,214,111,193,254
140 DATA 38,18,214,156,92,209
150 DATA 155,39,14,129,13,38,7
160 DATA 190,160,2,173,3,134,10
170 DATA 53,20,57,52,2,134,13
180 DATA 190,160,2,173,3,134,10
190 DATA 173,3,53,2,32,236,65
200 DATA 67,69
210 'VARIABLES USED - A & D
    
```

LISTING 3

```

* LISTING 3
* PRINT LINK V1.0
* BY BOB HELMS, AF5Z
* ALL OUTPUT TO SCREEN WILL ALSO
  GO TO PRINTER
* TO USE:
* 1. LOADM ASSEMBLED OBJECT CODE
  . DO NOT EXEC.
* 2. POKE360,3:POKE361,240 <ENTE
  R>
* 3. ABOVE POKES MUST BE ENTERED
  AS ONE COMMAND.
*****
                                ORG   $3F0 PUT ASSEMBLED
                                      OBJECT IN
* MEMORY AT $3F0
START PSHS X,B,A SAVE CONTENTS
      OF REGISTERS ON STACK
LDB   #$FE MAKE -1 FOR PR
      INTER DEVICE #
    
```

```

STB   $6F BASIC'S DEVICE
      NUMBER
LDX   $A002 GET ADDRESS O
      F BASICS CHARACTER
* OUTPUT ROUTINE
  JSR  3,X JUMP IN ROM RO
      UTINE AFTER
* RAM HOOK TO PRINT CHARACTER TO
      PRINTER.
  CLR  $6F SWITCH DEVICE N
      UMBER BACK TO SCREEN=0
  PULS PC,X,B,A RESTORE VA
      LUES IN REGISTERS
* AND RETURN TO BASIC
  END  START

```

```

CMPB  $9B IS IT AT END OF
      LINE?
BEQ   CRLF IF SO, GO DO A
      C/R & L/F
CMPA  #$0D IS CHARACTER A
      CARRIAGE RETURN
      (C/R)?
BNE   EXIT IF NOT, GO
      EXIT
LDX   $A002 GET ADDRESS O
      F BASIC'S CHARACTER
* OUTPUT ROUTINE IN X REG
  JSR  3,X GO OUTPUT CHARA
      CTER WITHOUT CHECKING
* RAM VECTOR ADDRESS
  LDA  #$0A PUT A LINE FEE
      D (L/F) IN A REG
EXIT  PULS X,B RESTORE X & B
      REGS TO ORIGINAL
      VALUES
RTS   RETURN TO BASIC & P
      RINT L/F
CRLF  PSHS A SAVE THE CHARACTE
      R IN A ON STACK
  LDA  #$0D PUT A C/R IN A
      REG
  LDX  $A002 GET ADDRESS F
      OR CHARACTER OUTPUT
  JSR  3,X OUTPUT CHARACTE
      R WITHOUT
* CHECKING RAM VECTOR ADDRESS
  LDA  #$0A PUT A L/F IN A
      REG
  JSR  3,X OUTPUT IT TO PR
      INTER
  PULS A GET ORIGINAL CHAR
      ACTER BACK IN A
  BRA  EXIT GO EXIT & PRIN
      T IT
  END  START

```

LISTING 4

- * LISTING 4
- * DOUBLE SPACE V1.0
- * BY BOB HELMS, AF5Z
- * USED TO MODIFY BASIC'S PRINTER DRIVER FOR
- * DOUBLE SPACED PRINTING AND LIMIT LINE LENGTH
- * TO 72 CHARACTERS.
- * TO USE:
- * 1. CLEAR200,&H7FCE TO PROTECT M/L FROM
- * BEING OVERWRITTEN BY BASIC'S STACK.
- * 2. LOADM ASSEMBLED OBJECT CODE . DO NOT EXEC.
- * 3. POKE359,126:POKE360,&H7F:POKE361,&HCF.
- * 4. ABOVE POKES MUST BE ENTERED AS ONE COMMAND.
- * 5. POKE&H9B,XX WHERE XX IS DESIRED LINE LENGTH.

```

ORG   $7FCF PUT OBJECT CODE AT $7FCF
START PSHS X,B SAVE VALUES IN X & B OR STACK
      LDB  $6F GET DEVICE NUMBER IN B
* DEVICE 0=SCREEN & $FE=PRINTER
      -2
  CMPB #$FE IS PRINTER IN USE?
  BNE  EXIT IF NOT, GO EXIT
  LDB  $9C GET PRINTER POSITION IN B
  INCB INCREMENT TO ACT AS CHARACTER COUNTER

```

Dynamic Color News
 is now available on
 tape or disk for \$6.95
 for 1 month, \$35 for
 6 months, & \$60 for
 12 months.

ML Programming

by

John Galus

PART 19 DISK CONTROL

If you own a Disk drive for your Color computer it is possible for you to communicate data to and from your disk to the computer. Within the Disk controller is the 1793 Disk controller chip that controls the interface between the disk and the color computer. The control lines that link this chip to the computer are mapped in the top of RAM. One spot known as the Disk Control Port is located at \$FF40. This address controls the drive selected and motor of the drives among other things. By setting a bit on in this memory spot we cause the controller chip to react to our commands. Here is a list of the functions controlled by this port:

\$FF40 DRIVE CONTROL PORT

BIT 0:SELECT DRIVE 0
 BIT 1:SELECT DRIVE 1
 BIT 2:SELECT DRIVE 2
 BIT 3:TURN DRIVE MOTORS ON
 BIT 4:WRITE PRECOMPENSATION
 BIT 5:DOUBLE DENSITY
 BIT 6:SELECT DRIVE 3
 BIT 7:WAIT SYNC

Try poking \$FF40 with one. The ready light on drive one should come on. Now we can control the drive selected and turn on the motors that cause the drives to spin. There are others areas used by the Color Computer to send commands to the disk controller chip that will allow the disk to read or write data to and from the Disk. These

command areas are located at \$FF48 to \$FF4C. Here is a list of these functions:

1793 COMMAND PORTS

FF48 STATUS/COMMAND REGISTER
 FF49 TRACK REGISTER
 FF4A SECTOR REGISTER
 FF4B DATA REGISTER

There are several commands that we can give to \$FF48 the Command register. Commands are given to this register by storing these numbers in the register.

COMMANDS TO \$FF48

03 RESTORE HEAD TO TRACK 0
 13 HEAD TO TRACK GIVEN IN \$FF49
 80 READ SECTOR IN SECTOR REG
 A0 WRITE SECTOR IN SECTOR REG
 F0 FORMAT TRACK USED IN DSKINI
 D0 TERMINATE CURRENT FUNCTION.

These commands will only function if the disk drive has been selected and turned on using the control port at \$FF40. The other addresses control the track and sector number to read or write to and the address of a 256 byte data area we wish to write from or read into. The data register is a two byte register. Using the above information it would be possible to write your own disk control routines. If you do try and experiment with these disk areas be sure and place a blank test disk into the drive, a mistake might crash a disk. Luckily for

us the programmers of Disk Basic ROM have done this work for us. The contents of \$C004 and \$C005 which contain the address of a routine called DSKCON. In my Disk version 1.1 this points to \$D57F which will be different if you own Disk version 1.0. Using this routine we can read and write data to and from our disk drive quite easily. DSKCON's parameter list is pointed to by the contents of addresses \$C006 and \$C007 which points to a zero page area starting at \$EA. These addresses starting at \$EA control the following functions used with DSKCON:

```

$EA OPERATION CODE:
    $00 = RESTORE TO TRACK 0
    $02 = READ SECTOR
    $03 = WRITE SECTOR
$EB DRIVE SELECT 0-3
$EC TRACK NUMBER $00-$34
$ED SECTOR NUMBER $01-$12
$EE TWO BYTE DATA BUFFER
    ADDRESS OF 256 BYTE BUFFER
    FOR READ/WRITE DATA
$F0 STATUS RESPONSE:
    0-NO ERROR
    1-BUSY
    2-LOST DATA
    3-CRC ERROR
    4-SECTOR NOT FOUND
    5-WRITE FAULT
    6-WRITE PROTECTED
    7-DRIVE NOT READY
    
```

Here is how we can use DSKCON to write a 256 byte area to the disk. I will write to sector1/track0 and will use the text screen as data.

```

DISK LDA #3 ;WRITE
     STA $EA
     CLR $EB ;DRIVE 0
     CLR $EC ;TRACK 0
     LDA #1 ;SECTOR 1
     STA $ED
     LDX #$400
     STX $EE ;DATA
     LDX $C004
     JSR ,X ;PERFORM DSKCON
     SWI
     END
    
```

Data written to the disk is not verified. To read this information back all we need do with this routine is to change the 3 to 2 and the saved data will be placed back into memory starting at the address held in \$EE. This DSKCON routine is very similar to the Disk Basic DSKI\$/DSKO\$ commands. If you examined the directory after using such a routine you would notice no change. You could use this routine to place hidden data on a disk.

+ + +

OPERATING HINT

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

ALL OF A SUDDEN YOU'RE IN

NOTELAND

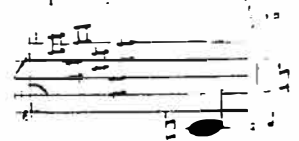
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HAM RADIO & COMPUTERS

by

Bill Chapple W4GQC

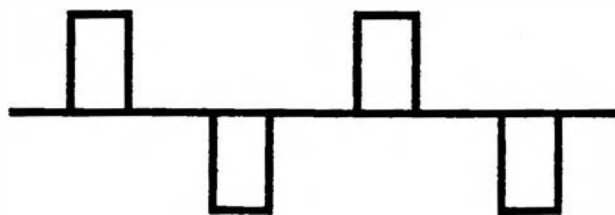
Last month we looked at packet radio. The question we wanted to answer is "Can the Color Computer generate and decode packet signals"? From our study it appears that packet signals are not any faster than the audio coming from and going to a cassette recorder when programs are being loaded or saved.

There are two tools that will be needed. The first is the ability to generate the packets and the second is the ability to decode the packets. This month I began looking at methods of generating different audio frequencies. Our approach will be to generate the required audio frequencies and send them to the microphone circuits of a single sideband (SSB) or very high frequency (VHF) transceiver. Most of my operating experience has been on the high frequencies below 30 Mhz. I do have a two meter transceiver so I can operate on two meters.

I spent much more time this month on ham radio and the computer than I have been spending and hope to be able to continue. This month I developed a method of generating very accurate audio frequencies. Since the computer is crystal controlled, the frequencies are related to the crystal and are very accurate. I did much contem-

plating on what type signals to generate. Signals that are being fed into a microphone circuit should be relatively clean of harmonics especially on HF. Ideally a sine wave should be used but this is not practical without additional circuitry.

I analyzed the sounds generated by the basic sound commands. They are digital sine waves with waveforms as shown in Figure 1. This waveform has less distortion than square waves and has the same root means value (RMS) as a sine wave.



Digital Sine Waves

Figure 1

However there is one hidden factor that we can use. The microphone circuits limit the frequency response of the audio. We can use these circuits to remove harmonics of our signals if we make them high enough in frequency. Therefore

I decided to use square waves for generating the frequencies.

Square waves have harmonic frequencies at odd multiples of the fundamental frequency. If the fundamental frequency is 1000 hertz then harmonics will be at 3000, 5000, 7000, etc. If we make the fundamental frequency 2000 then the first harmonic will be at 6000 and we can depend upon the audio filtering to take care of it.

FREQUENCY GENERATION

I developed a program for generating very accurate audio frequencies. The digital to analog converter is located at 65312 and it uses the 6 most significant bits. To generate a square wave we can continuously poke a 0 and then a 255 into 65312. To vary the frequency a delay is needed for each poke. This delay can vary from 1 to 255 and is stored in 500. The smaller delay gives the fastest frequency. To make the generator versatile I reserved locations 501 to 504 for values to make up the waveform. The digital sinewave can be generated by putting the following values into 501-504:

```
501 0
502 128
503 255
504 128
```

Sine wave values

These values will give the waveform shown in Figure 1. A square wave is either 0 or 255 and the following values are stored in 501-504 for square waves.

```
501 0
502 255
503 0
504 255
```

Square wave values

The square wave goes through 2 cycles while the sine wave goes through 1 cycle. More points can be used to generate better waveforms at a sacrifice of upper frequency limit. I did generate a triangle wave by increasing the value by 4 until it reached 252 and then decreasing it by 4 until it reached 0. It would only operate at about 200 hertz which is too slow for our packet applications.

ML SUBROUTINE

Since basic is too slow I wrote a machine language subroutine to generate the frequencies. I used our decimal assembler and placed the subroutine at 510 in memory. The subroutine is carried as data in the main program. The waveform is broken into 4 parts with values in 501 to 504. Location 500 contains a delay number that will control the frequency. The listing follows with comments. For our assembler I stands for immediate addressing mode and E stands for extended addressing.

```
510 ORCCI      80 'mask out
                interrupts
512 LDA E      501 'get first part
515 BSR        540 'go to sub at 540
517 LDA E      502 'get second part
520 BSR        540 'go to sub at 540
522 LDA E      503 'get third part
525 BSR        540 'go to sub at 540
527 LDA E      504 'get fourth part
530 BSR        540 'go to sub at 540
532 BRA        512 'go to 512 to
                start next cycle

539 NOP
540 STA E      65312 'output
value
543 LDB E      500 'get time
delay
546 DECB      'count down
547 BNE        546
549 RTS
```

AUDIO GENERATOR

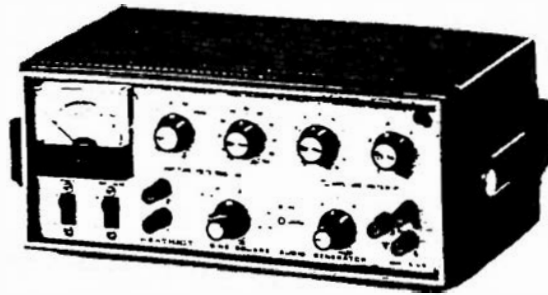
The program generates precise audio frequencies and outputs them to the cassette output cable. These frequencies may not be heard on the monitor or television but can be heard on a recorder. They can also be recorded on a cassette. The computer generates sine and square waves. The sine waves are modified square waves as shown in figure 1. This is the equivalent to the sound and play frequencies generated by basic except the interrupt is masked out. The program generates 255 frequencies which were measured with a frequency counter and put into an array.

The computer is completely dedicated to generating the frequencies. To stop the computer press the rear reset button. Type either "RUN" or "GOTO 300". The GOTO 300 command is quicker if it is desirable just to enter a different frequency. The computer compares the desired frequency with those stored in the array and generates the closest one. The desired value and the generated one are displayed on the screen. The frequencies can be saved on tape to be used later if an accurate audio frequency is desired.

```

1 CLS:PRINT"AUDIO FREQUENCY GENE
  RATOR
2 PRINT"COPYRIGHT (c) 1987
3 PRINT"DYNAMIC ELECTRONICS INC.
4 PRINT
10 PCLEAR 1:POKE501,0:POKE502,25
  5:POKE503,0:POKE504,255 'SET
  UP FOR SQUARE WAVES
20 INPUT"ENTER 1 FOR SINEWAVES";
  P
40 IF P=1 THEN POKE 501,0:POKE50
  2,128:POKE503,255:POKE504,128
45 'THE 4 LOCATIONS FROM 501 THR
  OUGH 504 SET UP THE 4 SEGMENT
  S OF THE WAVEFORM.
50 DIM V(255) 'SET UP ARRAY FOR
  MEASURED VALUES

```



```

55 PRINT"READING THE DATA"
60 FOR J=510 TO 550
70 READ A:POKEJ,A:NEXT J
80 'ML DATA FOLLOWS
90 DATA 26,80,182,1,245,141,23,1
  82,1,246,141,18,182,1,247,141
  ,13,182,1,248,141,8,32,234,18
100 DATA 18,18,18,18,18,18,183,2
  55,32,246,1,244,90,38,253,57
110 FOR K=1 TO 255
120 READ V(K):IF P=1 THEN V(K)=V
  (K)/2
125 'IF P=1 THEN DIVIDE THE FREQ
  UENCIES BY TWO AS THEY ARE RE
  AD INTO THE ARRAY. THE SQUAR
  E WAVES ARE TWICE THE FREQUEN
  CIES OF THE SINE WAVES.
130 NEXT K
140 '
150 DATA 12877,11256,10000,8994,
  8173,7487,6910,6415,5986,5611
  ,5280,4985,4722,4486,4272,407
  7,3899
160 '
170 DATA 3736,3567,3449,3321,320
  1,3091,2988,2891,2800,2716,26
  36,2560,2489,2422,2358,2298,2
  240,2185
180 '
190 DATA 2133,2084,2036,1991,194
  8,1906,1866,1828,1792,1756,17
  23,1690,1659,1629,1599,1571,1
  544,1518
200 '
210 DATA 1493,1468,1445,1422,139
  9,1378,1357,1337,1317,1298,12
  79,1261,1244,1227,1210,1194,1
  178,1163
220 '
230 DATA 1148,1133,1119,1105,109
  2,1079,1066,1053,1041,1029,10
  17,1006,995,984,973,963,953,9
  42,933
240 '
250 DATA 923,914,904,895,886,878
  ,869,861,853,845,837,829,821,
  814,807,799,792,785,779,772,7
  65,759,752
260 '

```

```

270 DATA 746,740,734,728,722,716
,711,705,699,694,689,683,678,
673,668,663,658,653,649,644,6
39,635
280 '
290 DATA 630,626,622,617,613,609
,605,601,597,593,589,585,581,
578,574,570,567,563,559,556,5
53,549
300 '
310 DATA 546,543,539,536,533,530
,527,523,520,517,514,512,509,
506,503,500,497,495,492,489,4
86,484
320 '
330 DATA 481,479,476,474,471,469
,466,464,461,459,457,454,452,
450,448,445,443,441,439,437,4
35,432,430
340 '
350 DATA 428,426,424,422,420,418
,416,414,412,411,409,407,405,
403,401,400,398,396,394,393,3
91,389
360 '
370 DATA 387,386,384,383,381,379
,378,376,375,373,371,370,368,
367,365,364,362,361,359,358,3
57,355
380 '
390 DATA 354,352,351,350,348,347
,346,344,343
400 INPUT"ENTER FREQUENCY";F
402 MF=343/(1+P):IF F<MF THEN PR
INT"FREQUENCY IS TOO LOW":GOT
O400
403 UL=12877/(1+P):IF F>UL THEN
PRINT"FREQUENCY IS TOO HIGH":
GOTO400
410 FOR L=1 TO 255
415 'LOOKUP VALUES IN THE ARRAY
THAT ARE THE CLOSEST TO THE D
ESIRED FREQUENCY
420 IF V(L)<F THEN 440
430 NEXT L
440 PRINT"CLOSEST FREQUENCIES AR
E"
450 PRINT"0 "V(L)
460 PRINT"1 "V(L-1)
470 U=F-V(L-1):V=V(L)-F
475 'CHECK TO SEE WHICH FREQUENC
Y IS CLOSER TO THE DESIRED ON
E
480 IF U<V THEN PRINT"USING "V(L
) "FOR"F:X=0:GOTO500
490 PRINT"USING "V(L-1) "FOR"F:X
=1
500 AUDIOON:CLS
510 IF X=0 THEN POKE 500,L
515 'MEMORY LOCATION 500 CONTAIN
S THE DELAY OR ARRAY NUMBER
520 IF X=1 THEN POKE 500,L-1
530 PRINT"GENERATING A FREQUENCY
OF"V(L-X):PRINT"HERTZ FOR "F
" HERTZ"
535 'PRINT DESIRED FREQ AND THE
FREQ WE ARE GENERATING
540 AUDIOON
550 EXEC 510
555 '

```

RAM-RAND 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 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 ER-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. ER-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. ER-3 \$9.95

THERMOMETER

Now your computer can give you the temperature in both Fahrenheit and Centigrade. Assembly plugs into a joystick port and consists of 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-RANDY 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



REFORMATTING DATA

In this series we are concerned with rearranging data for different applications. This month we are presenting a screen print program for a PMODE 4 graphics picture. This program forces the printer to print 4 dots instead of 1 and leave a space between the dots. This eliminates the space that can occur with graphics printers when the paper is not rolled up the proper amount. The picture covers most of a printer page and looks very good. We also added the option of reversing the print.

The bits of a PMODE 4 graphics byte are horizontal. Graphics printers require a vertical byte. Therefore the bits have to be reorganized into a printer byte.

Let's look at what we want the output to look like. We will be using 3 bytes to form our printer byte. Consider the following:

```
X7 X6 X5 X4 X3 X2 X1 X0 M
Y7 Y6 Y5 Y4 Y3 Y2 Y1 Y0 M+32
Z7 Z6 Z5 Z4 Z3 Z2 Z1 Z0 M+64
```

First 3 vertical picture bytes

```
1 2 3 4 5 6
X7 X7 SP X6 X6 SP
X7 X7 SP X6 X6 SP
SP SP SP SP SP SP
Y7 Y7 SP Y7 Y7 SP
Y7 Y7 SP Y7 Y7 SP
SP SP SP SP SP SP
Z7 Z7 SP Z7 Z7 SP
Z7 Z7 SP Z7 Z7 SP
```

SP is a space

Printer Bytes

Notice that each bit is printed 4 times, 2 horizontally and 2 vertically.

Machine Language Subroutine

We reserved memory locations 500-502 for the 3 bytes from memory M, M+32, and M+64. For graphics a 0 represents darkness and a 1 represents brightness. A machine language subroutine located at 31000-\$7918 rearranges the bits and prints them. Our procedure is to rotate left the bits in locations 500-502. We then test the carry bit to see if it is a 1 or 0. If it is a 0 then we add a value to the A register. If it is a 1 we go to the next memory. Our procedure is as follows:

1. CLR A (Make A=0)
2. Rotate left 500. This rotates the most significant bit into the carry bit.
3. If carry = 0 then add 192 to A which makes the two most significant bits=1. This means to print the bit.
4. Rotate left 501.
5. If carry = 0 then add 24 to A. These are the fourth and fifth bits.
6. Rotate left 502.
7. If carry= 0 then add 3 to A. These are the first and second bits.
8. The byte is completed and is printed twice. This is done by a machine language subroutine at 41663 (\$A2FB).

This machine language subroutine is at 31040 (\$7940).

For reversed printing the procedure is the same except that branching occurs if the carry =1. This subroutine starts at 31000 (\$7918). The machine language subroutines are in data statements. We wrote it with our decimal assembler "DISASM". For addressing DISASM uses "I" for immediate and "E" for extended. The listing for the ML subroutines follows:

ML LISTING

```

31000 LDB I 8
31002 CLRA
31003 ROL E 500
31006 BHS 31010
31008 ADDA I 192
31010 ROL E 501
31013 BHS 31017
31015 ADDA I 24
31017 ROL E 502
31020 BHS 31024
31022 ADDA I 3
31024 JSR E 41663
31027 JSR E 41663
31030 CLRA
31031 JSR E 41663
31034 DECB
31035 BNE 31002
31037 RTS
31038 NOP
31039 NOP
31040 LDB I 8
31042 CLRA
31043 ROL E 500
31046 BLO 31050
31048 ADDA I 192
31050 ROL E 501
31053 BLO 31057
31055 ADDA I 24
31057 ROL E 502
31060 BLO 31064
31062 ADDA I 3
31064 JSR E 41663
31067 JSR E 41663
31070 CLRA
31071 JSR E 41663
31074 DECB
31075 BNE 31042
31077 RTS

```

SCREEN DUMP PROGRAM

The program prints a PMODE-4 graphics picture. It allows for printing long pictures up to 8 graphics pages. Each picture element is printed 4 times and a space is left between each group of 4 dots. The program is for Epson Compatible printers but can be easily modified for other types by changing lines 490 and 550.

```

10 PCLEAR8: CLEAR 200,31000
20 FOR J=31000 TO 31077: READ A:P
   OKEJ,A: NEXT J
30 CLS: PRINT "GRAPHICS PRINT PROG
   RAM
40 PRINT "COPYRIGHT (c) 1987
50 PRINT "DYNAMIC ELECTRONICS INC
60 PRINT
70 PRINT "1 LOAD OR VIEW PICTURE
80 PRINT "2 PRINT THE PICTURE
90 PRINT "PRESS NUMBER"
100 X$=INKEY$: IF X$="" THEN 100 'W
   AIT FOR KEY TO BE PRESSED
110 X=VAL(X$): IF X>2 THEN 70' CH
   ANGE X$ TO X
120 IF X=0 THEN 70
130 'REMOVE VALUES OF X=0 AND X>
   2
140 IF X=2 THEN 480
150 'THIS HANDLES THE PICTURE
160 CLS: INPUT "ENTER D FOR DISK D
   IRECTORY OR C TO LOAD FROM A
   CASSETTE OR PRESS ENTER TO BY
   PASS LOADING"; D$
170 IF D$="D" THEN DIR: GOTO 200 '
   DISK
180 IF D$="C" THEN CLOADM 'CASSE
   TTE
190 GO TO 220 'SKIP DISK PART
200 INPUT "ENTER NAME OF PICTURE
   TO LOAD "; N$: IF N$="" THEN
   170
210 LOADMN$
220 CLS: PRINT "TO SAVE PRINTING T
   IME SCROLL": PRINT "THE PICTURE
   UP AND DOWN USING": PRINT "THE
   U AND D KEYS. MOVE THE
230 PRINT "PICTURE UNTIL THE BOTT
   OM OF THE": PRINT "PICTURE IS J
   UST ON THE SCREEN": PRINT "THEN
   PRESS THE 'E' KEY TO MARK": P
   RINT "THE NUMBER OF LINES. PRE
   SS Q TO

```



```

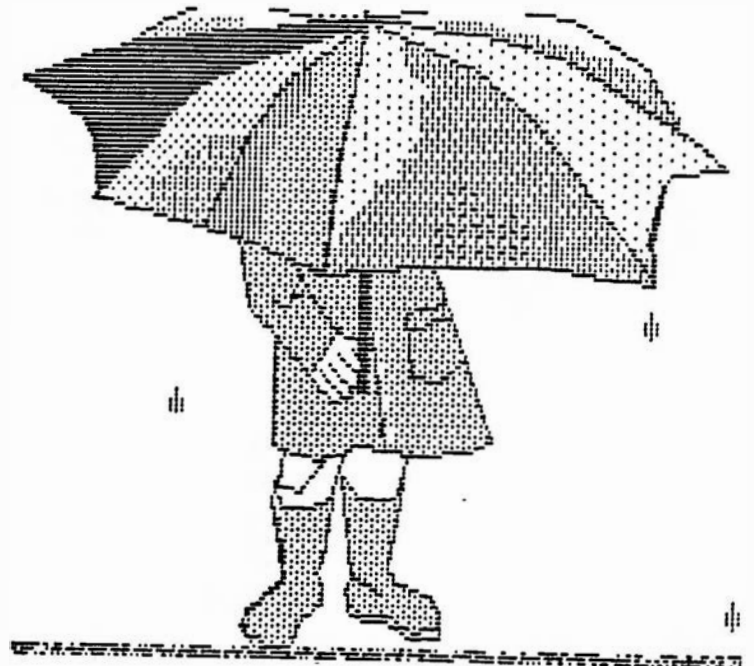
240 PRINT"RETURN TO THE PROGRAM.
    THIS WILL ALLOW PICTURES UP
    TO 8 GRAPHICS PAGES TO BE PRI
    NTED.
250 PRINT:INPUT"PRESS ENTER TO C
    ONTINUE";C
260 X=1 'X IS THE STARTING GRAPH
    ICS PAGE. WE CAN SCROLL PAGE
    S BY VARYING X TO MARK THE EN
    D OF THE PICTURE WHICH CAN BE
    UP TO 8 GRAPHICS PAGES
270 PMODE 4,X:SCREEN 1,1
280 X$=INKEY$:IF X$="" THEN 280
290 IF X$="U" THEN X=X+1 'SCROLL
    UP A PAGE
300 IF X$="D" THEN X=X-1 'SCROLL
    DOWN A PAGE
310 IF X$="E" THEN GOSUB 350 'MA
    RK THE NUMBER OF LINES
320 IF X$="Q" THEN 30 'RETURN TO
    MAIN MENU
330 IF X<1 THEN X=1 ELSE IF X>5
    THEN X=5
340 GOTO 270
350 CLS:EL=6144+1536*(X-1):EL=EL
    /32:PRINT"THERE ARE "EL" LINE
    S":INPUT"PRESS ENTER TO CONTI
    NUE THEN PRESS Q FOR MENU"
    ;P
360 MS=INT(EL/256):LS=EL-256*MS:
    POKE497,MS:POKE498,LS:RETURN
370 '
380 FOR J=1 TO 32:V=130:PRINTCHR
    $(V);:NEXT:RETURN
390 PRINTZ$;:FORJ=1 TO 30:PRINT"
    ";:NEXTJ:PRINTZ$;:RETURN
400 '
410 'DATA FOR 31000 SCREEN PRINT
420 DATA 198,8,79,121,1,244,36,2
    ,139,192,121,1,245,36,2,139,2
    4
430 DATA 121,1,246,36,2,139,3,18
    9,162,191,189,162,191,79,189
440 DATA 162,191,90,38,221,57,18
    ,18,198,8,79,121,1,244,37,2,1
    39,192,121,1
450 '
460 DATA 245,37,2,139,24,121,1,2
    46,37,2,139,3,189,162,191,189
470 DATA 162,191,79,189,162,191,
    90,38,221,57,,
480 PRINT"THIS PRINTS DOT PATER
    NS
490 C$=CHR$(27):PRINT#-2,C$"3"+C
    HR$(10)'SET LINE SPACING. C$
    "3"+CHR$(10) SETS UP LINE FEE
    D OF 10/256.
500 BE=3584:L1=256*PEEK(497)+PEE
    K(498):UU=256*PEEK(25)+7

```

```

510 INPUT"ENTER 1 FOR REVERSED P
    RINT";RP
520 PMODE 4,1:SCREEN 1,1
530 FOR J=0TO L1 STEP 3
540 'J REPRESENTS THE LINE NUMBE
    R
550 PRINT#-2,C$"L"+CHR$(0)+CHR$(
    3); 'C$"L" SETS UP GRAPHICS &
    CHR$(0)+CHR$(3) MEANS 3*256+0
    BYTES PER LINE
560 FOR K=0 TO 31
570 'K IS THE BYTE NUMBER ON A L
    INE
580 M=BE+J*32+K
590 'M IS THE MEMORY FOR THE PIC
    TURE ELEMENT
600 B(1)=PEEK(M):B(2)=PEEK(M+32)
    :B(3)=PEEK(M+64)
610 POKE 500,B(1):POKE501,B(2):P
    OKE502,B(3)
620 IF RP=1 THEN EXEC 31000 ELSE
    EXEC 31040
630 NEXT K:PRINT#-2,CHR$(13)
640 'PRINT LINE FEED & CR AFTER
    EACH LINE
650 NEXT J
660 GOTO70

```



Disk drives have dropped also in price. Did you know that an IBM disk drive would work for a color computer? We replaced two defective drives with single sided double density IBM drives. Many people are going to hard disks especially those with IBM compatible systems. Hard disks have not been well accepted for COCO users because most require OS-9. One company developed software that would allow basic to be used with a hard disk but I haven't seen this advertised recently. Floppies work very well and I think that they will be the main means of data storage for a long time for color computers. We have two work stations. Each one has a disk drive and a ramdisk for backing up disks.

We can use more articles and programs. If you have written an original program send us a copy. It should be supported with a description of what the program does written on a word processor file. Send it on either tape or disk.

Dean and I want to thank each of you for your support and wish you a Merry Christmas and a Happy New Year.

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.

CoCo Clipboard Magazine

This is a new magazine for Color Computer owners. It is published bi-monthly (6 times a year) and costs \$12 for a one year's subscription. See their advertisement in this issue. CoCo Clipboard Magazine, 3742 U. S. 20, Box 3, Fredonia, N.Y. 14063.

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.

NOTELAND

Noteland is a music tutorial for those who want to learn music. The program comes on tape or disk as a machine language program named NOTELAND. The program is loaded by typing (C)LOADM "NOTELAND". As the program is run a title appears and warns you to prepare to land on middle C. A treble clef music staff is drawn and a note appears at the top of the staff and descends until middle C is reached. The note then sounds through the speaker. About 2 octaves of a piano keyboard are then drawn at the bottom of the screen and a title block allows selection of a review of what the various keys do. After going through the tutorial, the keyboard and treble clef lines and spaces are drawn with a quarter note on middle C.

A note can be played by entering the letter for the note and pressing the ENTER key. The note is displayed on the music clef and the keyboard. Notes can also be selected with a joystick connected to the right joystick port. Moving the joystick up and down selects the pitch of the notes. The type note is selected by moving the joystick right or left. Notes range from 1/16 to a whole note. To select the type note from the keyboard press the letter and a number. As an example to select a half note press the number 2.

A note can be made flat by pressing the "L" key. The flat symbol appears on the screen. The "N" key cancels the flat and a "S" key causes a note to be sharpened.

EDITORIAL COMMENTS

The weather has been relatively warm for this time of the year here in Alabama. We have been very busy and have not had much opportunity to enjoy it. You may notice that we are making some changes. We can now print up to 11 x 17 inches. This means that we can make wrap around covers giving a better appearance. We are still using staples and will probably continue with them for a while. We print our articles as they are written which saves us work at the end.

Our promotional effort is doing good. I want to thank those who asked for copies to pass out at clubs. I think we have the most magazine for the money and would like for every color computer owner to see a copy. If you are a member of a color computer club and can pass out copies drop us a line and let us know how many copies you can use. Or send us the names and addresses of your members and we will mail them a copy. We do our mailing around the end of the preceeding issue month. This December issue will be mailed near the end of November. So you can expect to receive your copy in the third or fourth week of December.

It is exciting watching computers develop into more and more complex machines. The color computer 3 is now selling for \$129 at Radio Shack stores. It can be upgraded to 512K for \$80-100 giving a very powerful computer for a little over \$200. With this much memory available, very good software can be written.

We are continuing our normal series and have more programs in this issue. There still seems to be quite a number of people using cassettes so we want to make sure programs are available for them. I probably have a higher regard for saving programs on cassette than most people because I used one for over a year before purchasing my first disk drive. Programs load relatively fast, and depending upon the application, the cassette serves its purpose. I use a cassette with my ham station and it works fine.

Printers and disk drives have dropped in price. My first printer was an Epson MX 80. It would not print near letter quality but would print emphasized which I used in our earlier issues. Some circuitry failed destroying one of the strikers in the print head. Not knowing what the problem was I purchased a replacement print head and the circuitry damaged it the same way. The price of print heads was too high and it was more economical to purchase a new printer. Some of the cheaper printers will print as good as the more expensive ones. The trade off is speed and character fonts. For around \$200 a good printer with graphics capability can be obtained. We use an Epson FX-85 and a Brother M-1509 for text and titles. We also have a Sheiksha SP-1000AS that we dedicate to printing labels. I have always wanted to do this because of the aggrevation in loading labels in the printer.

The bass clef is selected by pressing the @ key. Notes are displayed and labeled as in the treble clef.

A song can be recorded by pressing the "R" key. Then enter the notes and their time and press the enter key. Press the "P" key to play the recording. Instructions are included for saving the recording.

Also several numbers are included with the program. They are called jukebox numbers and are played by pressing J and a number. This is a good way to see how music is written as the notes along with rests are displayed as the tunes are played.

The program is very complete and is an excellent tutorial for those wishing to learn the fundamentals of music. The cost is \$24.95. Elegant Software, 89 Massachusetts Ave., Box 251, Boston, MA 02115.

DISK MINIZAP

This is a disk utility program that solves some problems with a disk system. It allows the directory to be printed to a printer, sorted, and backed up on another disk. To run the program type RUN"DISKMZAP". The program is then ready for a command and displays COMMAND:

The program is very easy to use. A help file is displayed by entering H for the command. Each command consists of one command. The commands from the

help menu are:

- A-Alphabetize Directory
- B-Backup Directory
- C-Convert Gran. to track/sector
- D-Directory
- E-Edit Sector
- H-Help (command list)
- L-Load Sector from disk
- P-Printer copy of directory
- R-Replace bad directory
- S-Save sector to disk
- Z-Change printer baud rate

The alphabetized directory is a nice feature allowing programs to be quickly found. The backup directory feature allows a backup directory to be saved to another disk. Then if the directory is destroyed, the backup directory can be loaded. To use this feature a new backup directory must be loaded each time a program is added to or deleted from the directory. The backup directory is loaded by using the R command to replace the bad directory.

The program allows a sector to be modified. To do this load it with the L command and use the E command to edit it. The bytes can be changed one at a time. After the sector is modified it can be saved replacing the original sector.

DISK MINIZAP is easy to use and is a good disk utility. It costs \$6.00 including shipping. Drayon Software, P. O. Box 2516, Renton, WA 98056

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.

+ + +

Question: I have one of your video reversers that I use on my CC-2. Do you have one that will work on the CC-3?

Answer: The video for the color computer 3 can be reversed with software. PALLETTE 12,63: PALETTE 13,0 will reverse the 32 column display. PALETTE 0,0: PALETTE 8,63 will reverse the 40 & 80 column displays. CLS1 clears the background in the 40 and 80 columns. These commands can be placed within a program to automatically reverse the screen as the program is run.

Question: Bill, the new issue of Dynamic Color News looks good. I think you're on the way toward a successful publication. The depth of the ML programming article and the article on Hi Res screen graphics formatting are both very well done.

Funny how you are working on a project and along comes an answer or some help. I've wanted to see a method of getting full 4 voice sound (not the "PLAY" command note/duration noise) for the CoCo for a long time. I found a program in the December Rainbow ("Do You Hear What I Hear"), disassembled the driver code at the start and was puzzling over the way he stores music data in two tables and then decodes it. Well along comes your magazine and the EXACT SAME CODE is used as the driver on page 26 in "MUSIC".

There's no author's name so I assume you wrote it. Was that driver in a previous issue with an explanation in Assembly Language? - Bob Fink -

Answer: Bob thank you for your comments about the magazine. The music program came from our Public Domain collection of programs. I did not write the routine. It is on our disk #21 which contains ORCH/ BIN and the documentation. I was surprised at how good the music sounds. The SOUND and PLAY commands do not sound very good probably because the interrupts are not masked out. Your letter comes at a good time as I am experimenting with audio for ham radio use. See the audio frequency generator in this issue.

Renewal Time?

If 12/87 is beside your name on the address label your sub. has expired.

These are collections of programs from Dynamic Color News.

DCN-1

- 1.* 64K all RAM
- 2.* 2- bank address file
3. Alarm Clock
4. Loan Interest
5. Character Generator
- 6.* Bank Switching
 - * Won't work on CC-3
 - CC-2 Memory managers

DCN-2

1. Check Book Program.
2. Ball Team Sort Program.
3. Card Shuffling
4. Student Study Program
5. Address File

DCN-3

1. Restore-Recover program lost after NEW command.
2. Fast Food
3. Bar Graph
4. Memory Peek & Poke
5. Graphics draw

DCN-4

1. Address File with Sort
2. Morse Code Generator
3. Star Constellations
4. Dueling Cannons

DCN-5

COLOR COMPUTER 3 PROGRAMS

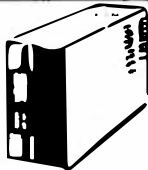
1. CC-3 Memory Manager
2. CC-3 Error Trapping
3. CC-3 Graphics
4. CC-3 Graphics Save

DCN-6

1. Accounts Payable
2. Dog Race
3. Compound Interest
4. Address File Disk Sort
5. Invoice Program

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

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 CoCo III. Has enhancements for CoCo III 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 CoCo III'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 CoCo III 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! (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 combo! \$99.95

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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 CoCo III 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

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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! CoCo III DISK \$49.95

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- | | | |
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| Level II Basic09 binder ..\$9.95 | Guide to CoCo III Graphics \$21.95 | 512K CoCo III Computer \$299.95 |

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 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 !!!



**DYNAMIC COLOR
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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 #44 or December 1987.

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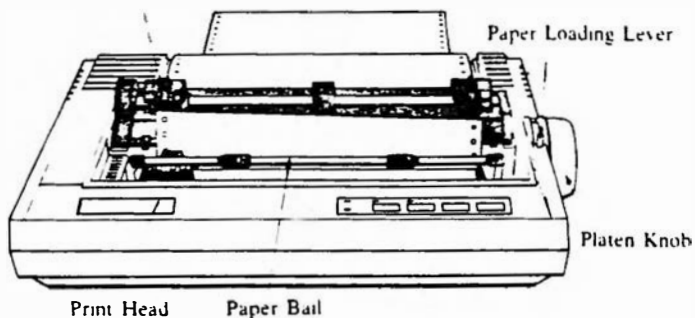
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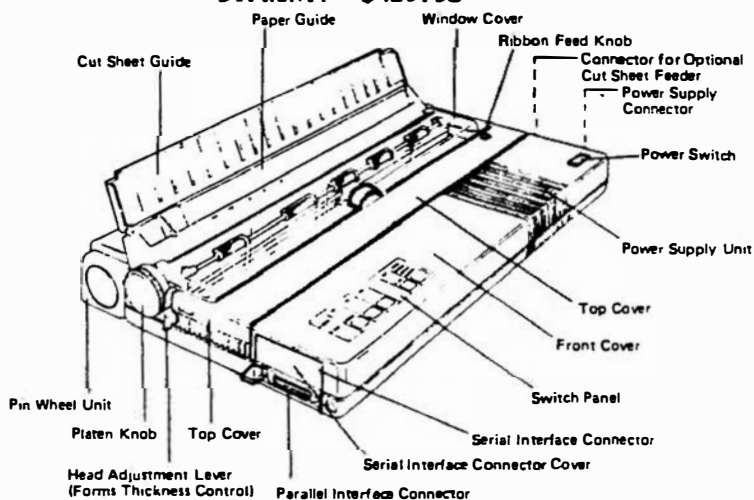
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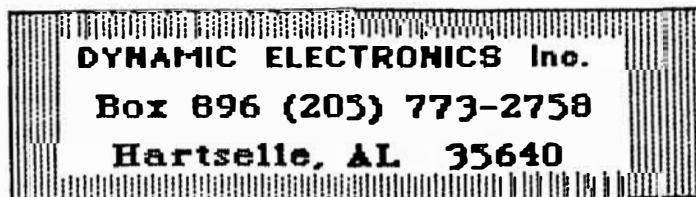
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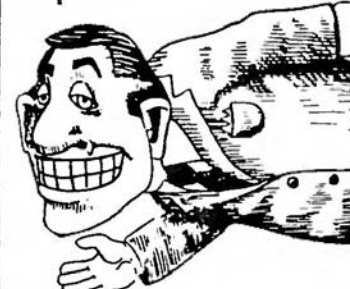
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PD-16

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PD-17 DISK UTILITIES

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AUTOSTRT BAS 0 B 1
BAKDIR BAS 0 A 3
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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

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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

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RABBIT BAS 0 B 1
SAFE BAS 0 B 2
SAUCER 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

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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.

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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
JBGOOD 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
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

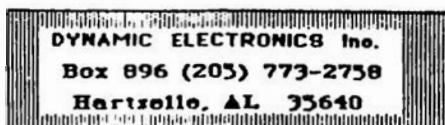
GOSTSHIP BAS 0 B 8
INT RATE BAS 0 B 2
INVSTANL PC 0 B 4
MENU BAS 0 B 4
MOTOJUMP BAS 0 B 3
SCREEN MAX 2 B 6
SCREEN1 BIN 2 B 3
SCREEN2 BIN 2 B 3
SCREEN2 MAX 2 B 6
STRINGTU BAS 0 B 4
TTERM DSK 2 B 4
TTHelp DAT 1 A 4
USING BAS 0 B 3
WF-DOC JP 0 B 2
WORDFILE JP 0 B 4
PARM1 DAT 1 A 1

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

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* 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
 LONIA 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

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