ARCADIAN

Vol 7 No 4 15 Aug 1986

Dear Friends.

This is the end of one of those good things they all talk about. I've had a very enjoyable experience over the years and have met a large number of interesting and talented people, as well as one lemon from Big Bear Lake and a couple of dealers that welched on their debts. The experience has been very educational by helping me understand computer operations both in the hobby or home computing field, but also in the real business world. In addition, I feel that I have contributed something to the welfare of at least seven or eight others who have used this computer system as a springboard for their careers - where we were able to bring together brilliant talents and needs. Not to say they may not have been able to get together eventually, but perhaps we accellerated the events. I just wonder if the new scheme to put cassette games physically into a plug-in cartridge hadn't surfaced three years ago, we may not have had a larger marketing base due to convenience alone, and that may have helped to keep the system going.

What now? Well, we will continue to keep an interest in the Arcade unit and I am willing to maintain a technical interchange clearing house, with perhaps an occasional round-robin letter between interested parties. I know such communications will be going on between the actual do-ers of the group, and I would like to be sent a copy of all such material. I plan to keep the mailing list intact, should there be any use for it in the future.

I also have a few left-overs here - please add a few bucks for postage and boxing-up on these:

ASTRO BATTLE, GALACTIC INVASION, SPACE FORTRESS, BALLY PIN all at $5.00 each. ARTILLERY DUEL, NEW BASIC, OLD BASIC at $10. CONTROL HANDLES at $20.pair EXTENSION CORDS FOR HANDLES at $10. each. Also the following third party cartridges: BLAST DROIDS, TREASURE COVE, SNEAKY SNAKE at $10. each

Bob

LAST PORTION of "COMPUTER CROSS" on p. 58:

MORE MUSIC ARRAYS

THIS IS ANOTHER ARRAY TO TYPE IN BEFORE YOU S
AVE TO TAPE

```
@(770)= 12672
@(771)= 26288
@(772)=-28666
@(773)= 13052
@(774)= 18176
@(775)=  6453
@(776)= 27445
@(777)=  6471
@(778)= 13639
@(779)=  6507
@(780)= 16288
@(781)=  6447
@(782)= 18271
@(783)= 12857
@(784)= 27463
@(785)=  6453
@(786)= 13675
@(787)=  6442
@(788)= 10867
@(789)=  6453
@(790)= 13696
@(791)=  6442
@(792)= 10894
@(793)=  6453
@(794)= 12192
@(795)=  6439
@(796)= 14734
@(797)= 12847
@(798)= 13639
@(799)= 12842
@(800)= 13675
@(801)=  6435
@(802)= 16288
@(803)=  6426
@(804)= 13696
@(805)= 12831
@(806)= 21867
@(807)=  6435
@(808)= 12147
@(809)=  6439
@(810)= 13675
@(811)= 12842
@(812)= 14687
@(813)= 12839
@(814)= 13675
@(815)= 26165
@(816)= 14734
@(817)= 12847
@(818)= 13739
@(819)=  6435
@(820)= 20640
@(821)=  6431
@(822)= 13710
@(823)=  6435
@(824)=  9088
@(825)=  6447
@(826)=  9088
@(827)= 12842
@(828)= 12127
@(829)= 12839
@(830)= 16321
@(831)=  6439
@(832)= 16299
@(833)=  6435
@(834)= 24480
@(835)=  6439
@(836)= 10126
@(837)=  6457
@(838)= 12174
@(839)=  6457
@(840)= 13675
@(841)=  6442
@(842)= 10823
@(843)=  6453
@(844)= 13683
@(845)=  6442
@(846)= 10880
@(847)=  6453
@(848)= 13739
@(849)=  6435
@(850)= 13631
@(851)= 12839
@(852)= 18318
@(853)=  6442
@(854)= 18318
@(855)=  6447
@(856)= 20622
@(857)= 26159
@(858)= 21867
@(859)= -4043
```

COMPUTER CROSS

BY BRUCE BRIGDEN
401 E. MAIN
BELOIT, KANSAS 67420
(913) 738-5881

NICE GRAPHICS WITH HYMNS
USES BLUE RAM BASIC
PLAY COMMAND.
NOTE: YOU MUST TYPE IN THE TWO SEPARATE
MUSIC ARRAYS BEFORE SAVING TO TAPE. (SECOND ARRAY IS ON P.57)
TO SAVE TO TAPE TYPE "GOTO 5000"

LOWERCASE WORDS ARE 1-BYTE KEYPAD WORDS. UND
ERSCORES ARE SPACES.

```
1 default ;BC=7;clear ;box 0,0,140,60,7;box 0
,0,120,40,5;box 0,0,100,20,6;CC=2;CX=-40;CY=0
;print "COMPUTER_CROSS";CC=6
2 for D=1to 1500;next D
5 .COMPUTER_CROSS_PROGRAM_BY_BRUCE_BRIGDEN,_F
OR_WIBW-TV,_JULY_6,_1984
10 clear ;BC=7;FC=252
20 for A=48to 102;CI.0,1,A,7;next A
25 PLAY%(26000)
30 for C=1to 42
34 BC=rnd (32)x8
35 S=rnd (10)x2
36 D=rnd (2)+1
40 for H=-30to 30step 10;box H,9,S,S,D;next H
50 for V=29to -31step -10;box 0,V,S,S,D;next
V
60 for Q=1to 400;next Q
70 next C
74 G=rnd (6);if G=1G=26000;%(G)=128;%(G+1)=49
;goto 170
75 if G=2G=26000;%(G)=128;%(G+1)=71;goto 170
76 if G=3G=26000;%(G)=128;%(G+1)=rnd (2)x12;g
oto 170
77 if G=4G=27000;%(G)=128;%(G+1)=49;goto 170
78 if G=5G=27000;%(G)=128;%(G+1)=71;goto 170
79 if G=6G=27000;%(G)=128;%(G+1)=rnd (2)x12;g
oto 170
80 goto 25
105 clear
110 NT=0;A=27000
120 print #1,"__%(",A,")=",;input "_"B
122 if B=100PLAY%(27000);goto 120
123 %(A)=B
130 A=A+1;%(A)=240
140 goto 120
150 for A=27000to 27500step 2;print A,;X=%(A)
+256;print RM;print X;next A
170 %(G+2)=176;%(G+3)=102;%(G+4)=6;%(G+5)=144
;%(G+6)=252;%(G+7)=50;PLAY%(G);goto 30
5000 %(27950)=27195;%(27952)=13;:print %(2457
6),2000
```

MUSIC ARRAYS

ENTER THESE ARRAYS BEFORE TAPING PROGRAM

```
@(270)= 18304
@(271)= 26288
@(272)=-28666
@(273)= 13052
@(274)= 12800
@(275)= 11583
@(276)= 16170
@(277)=  3890
@(278)= 12842
@(279)=  7743
@(280)= 13612
@(281)=  7808
@(282)= 16165
@(283)= 15488
@(284)=-32726
@(285)=  7730
@(286)= 16178
@(287)=  7808
@(288)= 21824
@(289)= 11621
@(290)= 17209
@(291)=  3935
@(292)= 16178
@(293)=  7781
@(294)= 29487
@(295)=  7755
@(296)= 17199
@(297)= 23211
@(298)= 16178
@(299)=  7808
@(300)= 20530
@(301)= 11656
@(302)= 19231
@(303)=  3976
@(304)=-30689
@(305)=  7755
@(306)=-30689
@(307)=  7755
@(308)= 14625
@(309)=  7816
@(310)=-32731
@(311)=  7730
@(312)= 12842
@(313)=  7800
@(314)= 29497
@(315)=  7727
@(316)= 16178
@(317)= 11621
@(318)= 24377
@(319)=  3903
@(320)= 16185
@(321)=  7775
@(322)= 24373
@(323)=  7743
@(324)= 19253
@(325)= 23135
@(326)= 17202
@(327)=  7760
@(328)= 21810
@(329)= 11648
@(330)=-32718
@(331)=  3925
@(332)= 17209
@(333)=  7775
@(334)= 25919
@(335)=  7808
@(336)=-32711
@(337)=  7775
@(338)= 21810
@(339)=  7808
@(340)=-32721
@(341)=  7755
@(342)= 16170
@(343)=  7808
@(344)= 25898
@(345)= 11583
@(346)= 24357
@(347)=  3915
@(348)= 19237
@(349)=  7775
@(350)= 15397
@(351)=  7781
@(352)=-26574
@(353)= 23100
@(354)= 29487
@(355)=  3897
@(356)= 14639
@(357)=  3955
@(358)= 29487
@(359)= 11577
@(360)=-21727
@(361)=  3897
@(362)= 16165
@(363)=  7851
@(364)=-21718
@(365)=  7727
@(366)= 17199
@(367)=  7851
@(368)=-32718
@(369)=  7743
@(370)= 16178
@(371)=  7808
@(372)=-13014
@(373)=  3903
@(374)=-16081
@(375)=  3903
@(376)= 16175
@(377)= 11718
@(378)=-21710
@(379)=  3925
@(380)= 25919
@(381)=  7851
@(382)=-21710
@(383)=  7765
@(384)= 17209
@(385)= 23211
@(386)=-32705
@(387)= -3995
```

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Editor's Editorial

Hello, once again, fellow *ARCADE* BUGS! I'm sorry for taking so long, but I was trying to get all of these great programs and editorials in order.

There is a new product on the market for our units, and I think it is about the best thing to hit our exclusive market since Extended Basics! I call it the BasiCart. Quite simply, it is the cartridge version of *ANY* AstroBasic program. It is designed and produced by MIKE WHITE. He can take any published AstroBasic (And in most cases BallyBasic changed where necessary) and combine it with a special version of Basic (WITHOUT I/O) to put it all on a play-instantly cartridge made for the ARCADE! The next best thing is the price! He sells these unique cartridges for just $10.00 U.S!! As you've probably seen, he also has EVERY cartridge that has been released for our unit, and even some that weren't, for sale. Write him for further details.

I received a nice postcard from JON R. DAVID of Tappan N.Y. In in he was asking for a 'listing' of any possible software, and 'experts' still around. The only people that I know still involved in the selling of software is:

ABC HOBBYCRAFT (They also sell hardware)
2155 E. MORGAN AVENUE
EVANSVILLE, INDIANA 47711
(812(477-9611

MIKE WHITE
(ADDRESS APPEARS IN THIS ISSUE)

GEORGE MOSES (MAINLY *GREAT* MUSIC)
P.O. BOX 686
BRIGHTON, MICHIGAN 48116

and 2 BLUE RAM games by myself
GOLF (16K) & SPRING THING PT I (4K)

I do want to extend thanks here for all of the people that have helped my get to this issue. MIKE WHITE for his contributions to the editorial sections, GEORGE MOSES for his listing of all of the game programs (except KLAUSE DOERGE'S version of CATERPILLER), LEROY FLAMM, whos PENMAN plotting program is unique, (he also helped MIKE WHITE design the BasiCart), ROBERT FABRIS for being the one that has made this entire publication possible, and one person from the past, MIKE PEACE (WAVEMAKERS) who was always there to answer questions and give support to us all!!

I would like to keep a file of those interested in making or getting new programs for the Astrocade. When I receive any, I will pass them on to whoever is on my list!

I forgot to mention that MIKE WHITE can also do most BLUE RAM games in a modified cartridge. This version will require 1.)The BLUE RAM EXTENDED BASIC Cartridge, and 2.)EXTENDED Memory available in the 6000 hex - 7FFF hex area. I am contemplating making a special unit that will plug into the back 50 pin connector and the light pen jack. This unit will also come with a modified BASIC but will *NOT* have any I/O capability. This unit will allow you to use the BLUE RAM game cartridges as sold by MIKE. Cost will be about $50.00 U.S.

For those of you that have ordered BLUE RAM units from me, please excuse the deletion of a very important part of the ad! I should have included the statement:

PLEASE ALLOW 4-6 WEEKS FOR DELIVERY!

I am happy to announce that I will be selling 2 cartridges of my own. 1.) The BLUE RAM UTILITY with typed out instructions. $20.00 U.S. & 2.)SPRING THING PT I $15.00 U.S.
PLEASE ALLOW 2-3 WEEKS DELIVERY ON THESE CARTS!!!

One ~~somber~~ note. Melanie Moses, the wife of George, just underwent a major surgery. Please pray with me for her health! successful

FOREVER BUILDING,
KEN LILL
6608 S. CAMPBELL
CHICAGO, ILLINOIS 60629
(312) 436-2082 (evenings)

```
1.ARMCHAIR ARTIST BY ALLEN W. SKAGGS 10/25/85
2.USE :INPUT%(-32766)TO RELOAD A SHOW FROM TAPE!
3 CC=6;CLEAR;CF=SM.;LIST 1,2;CC=7;CF=LA.;PRINT"DIAL 0 AND PULL
  TR(1) FOR INSTRUCTIONS.";CF=SM.
7 NT=0;CC=5;PRINT"NEW PICTURE? 1";PRINT"SAME PICTURE? 2"
  ;INPUT"YOUR CHOICE PLEASE?"C;IF C=2GOSUB 200;GOTO 20
9 CLEAR;ZERO
20 CC=7;.MOTION
21 X=X+JX(1)×3
22 Y=Y+JY(1)×3
23 K=KN(1)÷7+18
24 CX=X;CY=Y;TV=98
25 BOX X,Y,3,3,4
26 CX=-75;CY=0;PRINT K
27 IF K=29IF TR(1)=1CX=-75;CY=0;PRINT"CIRCLE";G=2;GOTO27
28 IF K>29M=K+1-30;CX=-75;CY=0;CC=6;CF=LA.;PRINT M;CF=SM.;CC=7;
   IF M=4M=0
29 IF K=28IF TR(1)=1CX=-75;CY=0;PRINT"BOX";G=1;GOTO 29
30 IF K=27IF TR(1)=1CX=-75;CY=0;PRINT"LINE";G=3;GOTO 30
32 IF (TR(1)=1)+(JY(1)=1)=2A=A-5;GOSUB 200
33.TEST XY
34 IF Y>43Y=43
35 IF Y<-43Y=-43
36 IF X<-75X=-75
37 IF X>75X=75
38 IF K=0IF TR(1)=1GOSUB 250;GOSUB 200
39 IF K=26IF TR(1)=1SNAP 0,0,160,88,%(-32766);GOSUB 270
40 IF K=25IF TR(1)=1CLEAR;SHOW 0,0,0,%(-32766);GOSUB 270
41 IF K=24IF TR(1)=1PRINT"SAVING.....";:PRINT %(-32766),(160÷4+
   (RM#0))×88+4;:PRINT;PRINT"DONE SAVING...
42 IF TR(1)=1GOSUB 70;GOSUB 60
50 GOTO 20
59.SAVE GRAPHICS
60.A=ADDRESS NUMBER;@(A)=SIZE;@(A+1)=X;@(A+2)=Y;@(A+3)=MODE;
   @(A+4)=GRAPHIC TYPE
63 A=A+1;@(A)=K;@(A+1)=X;@(A+2)=Y;@(A+3)=M;@(A+4)=G
65 PRINT A,#0,"SIZE",#0,"=",#0,@(A)
66 PRINT A+1,#0,"X",#0,"=",#0,@(A+1)
67 PRINT A+2,#0,"Y",#0,"=",#0,@(A+2)
68 PRINT A+3,#0,"MODE",#0,"=",#0,@(A+3)
69 A=A+4;RETURN
70.GRAPHICS
71 IF G=1BOX X,Y,K,K,M
72 IF G=2CIRCLE X,Y,K,M
73 IF G=3LINE X,Y,M
79 RETURN
200.SHOW PICTURE
201 CLEAR
204 FOR C=1TO A
205 IF @(C+4)=2CIRCLE @(C+1),@(C+2),@(C),@(C+3)
206 IF @(C+4)=1BOX @(C+1),@(C+2),@(C),@(C),@(C+3)
207 CX=-75;CY=-30;CC=5;PRINT "ERASED TO:",;CC=6;PRINT #0,C;CC=7
208 IF @(C+4)=3LINE @(C+1),@(C+2),@(C+3)
209 C=C+4
210 NEXT C
215 X=-75;Y=40;RETURN
```

```
250.INSTRUCTIONS
251 CF=LA.:CLEAR
255 PRINT"NUMBERS ",:CC=6:PRINT#0,"1 TO 20",:CC=7:PRINT#0,"ARE FOR
   GRAPHICS SIZE
256 PRINT "NUMBERS ",:CC=6:PRINT#0,"21 TO 26",:CC=7:PRINT#0," ARE
    COMMANDS ACTIVATED BY TR(1).
260 PRINT"NUMBERS ",:CC=6:PRINT#0,"27 TO 29",:CC=7:PRINT#0," ARE
    GRAPHICS CHOICES.":CC=5:PRINT"27 IS LINE":PRINT"28 IS BOX";
    PRINT"29 IS CIRCLE":CC=7
262 CF=SM.:CC=6:PRINT"DIALING NUMBERS 30 TO 36 WILL PRINT NUMBERS
    1 TO 7.THESE ARE GRAPHIC MODES.
263 IF KP CLEAR
264 CF=LA.:PRINT"DIAL 26 TO SNAP A PICTURE.":PRINT"DIAL 25 TO
    SHOW IT!":PRINT"TOUCH KP TO GO ON.":PRINT"DIAL 24 TO SAVE TO
    TAPE.":CF=SM.
265 CC=7:PRINT"IF YOU WANT TO ERASE AN ENTRY,PULL TR(1) AND PUSH
    UP ON JY(1)":PRINT"TO PRINT TO TAPE,DIAL 24 AND PULL TR(1)
266 LIST 2,1
270 IF KP RETURN
```

This program is better understood if the user is familiar with the graphic drawing modes normally used with Blue Ram Extended. It can be modified to suit personal whims as well.(Like adding color changes)
It will take some practice to get used to the functions being accessed by the trigger and joystick on hand control one,but you shouldn't take long before your first "Masterpiece" is ready to save on tape.The save function also saves the program to tape. The picture is snapped to memory location %(-32766) and there is enough memory left for one more full screen snap at the lower end of that memory portion.
All instructions are included in the "Armchair Artist" and I hope you spend many happy hours using it.

Allen W. Skaggs
9421 Sunset Dr.
Tampa,Fla.33610
(813)626-7345

I liked the calender program and I made some changes to it to for Blue Ram Basic.

```
10 BC=0:FA=RND(255)-2:FB=FA+110:FC=FB+RND(43):E=1:B=1:NT=0:CLEAR
11 CC=6:PRINT:PRINT"      CALENDAR PROGRAM":CC=5:CF=SM.:PRINT:PRINT
   "  ENTER A MONTH,DAY,AND YEAR.I'LL DRAW YOU A CALENDAR!":CC=6:
   CF=LA.:PRINT"     EXAMPLE:12 7 1941
15 INPUT"  ENTER MONTH:"M,"  ENTER DAY:"D,"  ENTER YEAR(4 DIGITS):"Y;
   GOTO 270
```

ADD –

```
281 IF (Y<1801)+(Y>2399)PRINT"OUT OF RANGE!":GOTO 15  .NOTE THAT
   THE LAST TWO CONDITIONS OF LINE 280 ARE NOW IN LINE 281 THERE-
   FORE MAKING IT UNNEEDED IN THAT LINE NOW.
355 CC=7:CX=-70:CY=-44:PRINT"  S  M  T   W  T  F   S
```

These changes make this a pleasant and conversational program.
QUESTION? Wasn't Pearl Harbor bombed on a Sunday?Try 12/7/1941.HMMMMM.

SNOOP CAMERA INSTRUCTIONS

```
     USE :INPUT TO LOAD
SELECT SOURCE WITH KN+TR(1)
FOLLOW ON SCREEN INSTRUCTIONS
(NOTE)
# 1 HOLD [RESET] BUTTON IN WHILE SWAPPING CARTRIDGES
# 2 MUST HAVE 64K RAM BOARD WITH RAM IN %(!2000) TO %(3FFF) AND MAKE THIS
     YOUR FIRST SELECTION IF YOU USE IT. (ONLY 2 SNAPS WITH AN 8K TAPE)
# 3 MUST LOAD SNOOP CAMERA TWICE
# 4 LOADS AB TITLE SCREENS AS WELL AS SCREENS SAVED FROM DEVELOPER OR BRB
# 5 SAME RULES AS #1 (YOU START WITH 3 SNAPS. USE ANY WAY YOU WANT)
(DEVELOPER FOLLOWES CAMERA PROGRAM ON SAME TAPE)
     [TO CHANGE PROGRAM FOR YOUR PRINTER]
REWIND TAPE AND RESET BALLY
LOAD USING :LIST ;:LIST :INPUT ;:INPUT %(!7000)
REWIND TAPE AND ENTER :LIST ;:LIST
PLAY TAPE TILL CURSOR RETURNS (QUING TAPE FOR DEVELOPER PROGRAM)
SET YOUR BLUE RAM TO SAVE AND CONNECT YOUR RECORDER UP FOR TAPING
YOU CAN NOW LIST DEVELOPER PROGRAM, LINES 55 56 57 58 59 75 CONTROL PRINTER
TV=27 TURNS ON DOT MATRIX MODE
PRINT "T0",? CONTROLS LINE FEED AT HALF DOT SPACING
(EXAMPLE) PRINT "T04" SETS LINE FEED AT 2 DOTS
PRINT "S0",?,?,? SETS NUMBER OF CHARACTERS RECIEVED BEFORE DEFAULT OCCURS
(THIS MUST BE S+4 DIGIT NUMBER IN MY PRINTER)
(LINE FEED CONTROL MUST BE T+2 DIGIT NUMBER AND THEY MUST FOLLOW TV=27)
(IN MY PRINTER THAT IS)
```

GOOD LUCK!

```
TO TAPE ENTER :PRINT %(24576),1622;:PRINT %(!7000),2048
[NOTE]
DEVELOPER LOADS AUTOMATICALLY JUST PLAY TAPE
WHITE, BLACK, AND 5 SHADES OF GRAY ARE AVALABLE
(NOTE) INTERRUPT COLOR CHANGE LINE FALLS IN LOWER COLOR FIELD, UNLESS
GIANT SIZE IS CHOSEN
(NOTE) ZERO IS ON THE LEFT EDGE OF THE PAGE FOR CENTERING, THE HIGHEST
NUMBER YOU CAN DIAL IS THE RIGHT EDGE
```

LOWERCASE WORDS ARE 1-BYTE KEYPAD WORDS. UNDERSCORES ARE SPACES.

[SZ=2823]

SNOOP CAMERA TITLE SCREEN

BY M.D.W. [ENTER AND SNAP SCREEN TO %(!7000) BEFORE ENTERING TEXT]

```
ENTER>DE.;clear
10 clear ;print ;CX=-34;print "SN00P_CAMERA
20 print ;CX=-38;print "BY_MIKE_WHITE
30 print ;CX=-22;print "(C)_1984
40 Y=-23;box 0,Y,30,20,7;box 0,Y,18,18,4;box 0,Y,16,16,6;box 0,Y,14,14,7
50 for X=-4to 4step 4;line Xx2,-32,0;line Xx3,-48,2;next X
60 circle 0,Y,6,4;circle 0,Y,4,6
70 box 0,-11,4,4,7;box 0,-11,2,2,4
80 box -10,-8,6,10,7;box -10,-8,4,8,5
90 snap 0,1,160,102,%(!7000)
ENTER>run [GO]
PRESS [RESET]
(YOU MAY NOW KEY IN SNOOP CAMERA TEXT)
```

LOWERCASE WORDS ARE 1-BYTE KEYPAD WORDS. UNDERSCORES ARE SPACES.

[SZ=1416]

SNOOP CAMERA

BY M.D.W. + S.K. [BRB + 16K + 64K RAM BOARD - RAM AT %(!2000) TO %(!3FFF)]

```
ENTER>DE.:clear
1 if Qdata BC,74,74,74,74;gosub 17,Q,0:default ;goto 4,NT,0
2 gosub 20,BC,7,7,7,7;H=H+1;&(9)=63;PL.:&(10)=204:default ;gosub 21,NT,0
3 clear ;data CX,-40,16;if Eprint "AN0THER_snap ?";gosub 25;if Xgoto 61
4 data CX,-8,8;print "L0AD";data CX,-23,-8,6;print "DEVEL0PER";data Y,27948,Y;fo
r X=>5to >6step 2;%(Y)=%(X);Y=Y+2;next X;%(Z)=8224;CALL>6
5 print ";:input ;BC=0;for D=0to 200;next D;:input %(16384);run
6 ABCD
17 if TR(1)=0goto 17
18 clear
19 for D=0to 999;next D;return
20 snap 0,1,160,102,%(F);return
21 if E=2F=!8006
22 if E=3F=!7000
23 E=E-1;return
25 gosub 54
26 data CX,-7,-16;X=&(28)÷128;if Xprint "YES
27 if X=0print "N0_
28 if TR(1)goto 18
29 goto 26
30 data E,3,!900C;return
31 show 0,1,0,%(F);return
54 data CX,-34,-24,7;print "USE_KN+TR(1)";return
58 &(10)=204;:input %(16384);gosub 19,BC,7,7,7,7;box 0,24,160,40,4;default ;data
 CX,-13,40,6;print "00PS!
59 data CX,-36,24,5,0,13084;print "LENS_C0VER_STILL_0N";data CX,-28,8,7;print "M
AYBE_next TIME";gosub 19
60 default ;zero ;gosub 30,NT,0
61 clear ;print "___ENTER_PICTURE_S0URCE";gosub 63,CY,32,6;print "1_CARTRIDGE";g
osub 63;print "2_TAPED_CARTRIDGE
62 gosub 63;print "3_BLUE_RAM_BASIC_4-16K";gosub 63;print "4_TAPED_SCREEN";gosub
 63;print "5_ASTR0_0R_BALLY_BASIC";gosub 66,Y,1,52;goto 60+Xx5,R,!9200,X
63 CX=-60;return
65 goto 85
66 gosub 54,X,CY;CY=X
67 CX=Y;X=&(28)÷Z+Y;print #2,X,;if TR(1)goto 18
68 goto 67
70 if E#3goto 85
71 for X=Fto Rstep 2;%(X)=0;next X;clear ;data CX,-34,0;print "L0AD_PR0GRAM";LC=
0;:input %(!8006);if LCgoto 71
72 for X=Fto Rstep 2;if %(X)P=1
73 next X;if Pgosub 21
74 goto 85
75 clear ;print "1_PUT";CC=6;print "if &(23):print %(16384),2048";CC=7;print "__
_INT0_PR0GRAM";print "2_START_L0NG_TAPE_AND";print "___run PR0GRAM
76 print "3_HIT_LEFT_KEY_C0LUMN";print "___T0_SAVE";print "4_:input UTILITY_AND"
;print "___USE_#4_(TAPED_SCREEN)
77 STOP
80 CX=-25;print "H0W_MANY?";gosub 66,Y,1,86x(4-E);for Y=1to X
81 data CX,-37,0;print ":input SCREEN";LC=0;:input %(16384);if LC_CX=-28;print "
TRY_AGAIN";gosub 19;clear ;goto 81
82 gosub 20;gosub 21,H,H+1;next Y;goto 3
85 clear ;if S=2print "1_THR0W_64K";print "___RAM_SWITCHES";print "___THEN_PRESS
_[G0]
```

```
90 if S#2print "1_HIT_[RESET]_AND";print "___SWAP_CARTRIDGES";if S>4print "___TH
EN_:input TAPE
93 if S#2print "2_run PR0GRAM";print '3_USE_"B0MB_REC0VERY"_T0';print "___return
 (WITH_SCREEN)";print "___T0_UTILITY";print "4_ENTER_run [G0]
94 data NT,3,-76,48,0,0,13084;if S=2CALL28108
ENTER>clear ;for A=28108to 28326step 2;print "%(",#1,A,;input ")="%(A);next A
ENTER>[NUMBER STRING] PRESSING [GO] AFTER EACH ENTRY
      (NOTE) [READ EACH COLUMN DOWN WHEN ENTERING]

   -9229  -20243   21842   23328   21077   21333    8270   22868
  -13545     -39    8270   17746   11845    8261   22312   13614
   10311      53   21072   17747    8244   16930   21577   18516
   15098    6144   18224   23892    8224   19760    8264   20037
   27854   28148   16722   12320   18516    8258    8224   17696
     766   30425   11853    8270   12370   17746    8224   21582
     -64    8242    8243    8224    8279   12355   17235   21061
      27   18760   21072    8224   22355   17750   17746   21024
      64    8276   21317   17732   21577   22866   20037   20053
      16   21083    8275   18771   18499    8226    8233   23328
      17   21317   20033   17746   21317   12372   12372   12359
    8480   21573    8260    8260   16672   21024   21792      93
  -32762    8285   12360   18768   17486   21573   18772
   19266    8235   17484   21571    8224   21077   18764
ENTER>print ";goto A;goto A";DA.>6,11537,-13971;A=58;:print %(24576),1877;:print
 %(28676),2048[REC]
PRESS [RESET], THEN ENTER AND TAPE ELECTRONIC DARKROOM BEHIND SNOOP CAMERA
```

LOWERCASE WORDS ARE 1-BYTE KEYPAD WORDS. UNDERSCORES ARE SPACES.

[SZ=2753]

ELECTRONIC DARKROOM TITLE SCREEN

BY M.D.W. [ENTER AND SNAP SCREEN TO %(!7000) BEFORE ENTERING TEXT]

```
ENTER>DE.:clear
10 clear ;CX=-53;print "ELECTR0NIC_DARKR00M
20 CX=-3;print "BY
30 A=100:gosub A,B,28108,8665,B;gosub A,C,0;gosub A,C,12601;gosub A,C,20000
40 gosub A,C,-27;gosub A,C,53;gosub A,C,22552;gosub A,C,28128;gosub A,C,-1567
50 gosub A,C,-13863;gosub A,C,18765;gosub A,C,17739;gosub A,C,22304
60 gosub A,C,18760;gosub A,C,17748;gosub A,C,10272;gosub A,C,10563
70 gosub A,C,12576;gosub A,C,14393;gosub A,C,52;CALLD
80 box 0,-36,160,8,4;snap 0,1,160,102,%(!7000)
90 STOP
100 %(B)=C;B=B+2;return
ENTER>run [GO]
PRESS [RESET]
(YOU MAY NOW KEY IN ELECTRONIC DARKROOM TEXT)
```

LOWERCASE WORDS ARE 1-BYTE KEYPAD WORDS. UNDERSCORES ARE SPACES.

[SZ=498]

ELECTRONIC DARKROOM

BY M.D.W. + D.C. + G.M. [BRB + 16K + DOT MATRIX PRINTER + PARALLEL INTERFACE]

```
ENTER>DE.:clear
4 clear ;default ;print "___DEVEL0PING_NEGATIVES";gosub 19;gosub 30,BC,239;if Pg
osub 21
5 for G=1to H;gosub 31,NT,0,-37,16;print "SAVE_T0_TAPE?";gosub 25;if X_CC=6;prin
t "____T0_:print USE_TR(1)";gosub 17,CX,-19;print "DUMPING";:print %(F+4),2048;d
ata CX,-13,0,5;print ":list ";LC=0;:list ;if LCgoto 5
6 gosub 31,CX,-64,0,7;print "REM0VE_AB+BB_TEXT_BITS?";gosub 25;if Xgosub 31;for
Y=-51to 52;line 80,Y,0;line -79,Y,9;line 80,Y,1;next Y;gosub 20
7 gosub 21;next G;gosub 30,NT,3;clear ;print "____DEVEL0PING__PRINTS";gosub 19;i
f Pgosub 21
8 gosub 31,NT,0,-13,8;print "FIRST";for G=1to H
9 data NT,0,-10,0;print "snap ";gosub 19,CX,-43;print "MAKE_A_Xprint ?";gosub 25
;if X=0gosub 21,CX,-10,8;gosub 31;print "next ";next G;goto 60
10 CX=-25;print "USES_&(9)?";gosub 25;J=X;for B=0to 7step 2;gosub 32;%(B+27856)=
A+Z;next B;R=V;if Jgosub 32;R=A
11 CX=-43;print "#_0F_INTERRUPTS";gosub 66,Y,0,10;I=X;if Xfor B=-1to -Xstep -1;g
osub 32;@(-B)=Z;next B
12 Y=0;if Ifor B=1to I;Y=Y+(T<@(B))+(U>@(B));next B;if I>1for B=2to I;Y=Y+(@(B-1
)<@(B));next B
13 if Y+(T<U)+(W<V)+(R<V)+(R>W)goto 10
14 CX=-31;print "GIANT_SIZE?";gosub 25;A=X;CX=-28;print "MULTI_C0L0R?";gosub 25;
goto 70,M,Xx2+1,X+1
17 if TR(1)=0goto 17
18 clear
19 for D=0to 999;next D;return
20 snap 0,1,160,102,%(F);return
21 if E=2F=!8006
22 if E=3F=!7000
23 E=E-1;return
24 print "_SIZE_MULTIPLIER";return
25 gosub 54
26 data CX,-7,-16;X=&(28)÷128;if Xprint "YES
27 if X=0print "N0_
28 if TR(1)goto 18
29 goto 26
30 data E,3,!900C;return
31 show 0,1,0,%(F);return
32 clear ;CY=8;print "__M0VE_line T0_INSIDE_0F";A=0;data X,1,102,0;CX=-16;if B=0
print "T0P
33 if B<3data X,160,1;if B=2print "B0TT0M
34 if B=4print "LEFT
35 if B=6print "RIGHT
36 if B=8print "LEFT_0F_&(9)
37 if B<0print "T0P_0F_INTERRUPT
38 CX=-10;print "EDGE";gosub 19;gosub 19;gosub 31;gosub 53
39 if &(16)gosub 53;Z=Z+JY(1)x(B<3);A=A+JX(1)x(B>3);gosub 53
40 if TR(1)goto 18
41 goto 39
42 gosub 31;print "_____TRANSLATE_C0L0RS";return
43 data CX,-22,12;print "BC";for X=65to 67;CX=-22;TV=70;TV=X;print ;next X;CY=12
;return
44 CX=-4;X=&(28)÷37;B=0;if X=0print "BLANK__",;B=1
```

```
45 if X=1print "D0TS_1_",
46 if X=2print "D0TS_2_",
47 if X=3print "LINES_1",
48 if X=4print "LINES_2",
49 if X=5print "CR0SSES",
50 if X=6print "S0LID__",;B=1
51 if (N=2)+Bif TR(1)print ;@(C)=%(2xX+)69+1);goto 19
52 goto 44
53 box A,Z,X,Y,3;return
54 data CX,-34,-24,7;print "USE_KN+TR(1)";return
55 print "T04";O=5x(T-U+1);D=I;for X=Uto W;for Z=1to 2;TV=27;print "S0",;if O<10
0TV=48;if O<10TV=48
56 print #1,O,;for Y=Uto T;D=D-(Y=@(D))x(D>0);B=@(4x(X>R)+PX(X,Y)+Dx8+27);for C=
1to 5;A=C÷2;TV=B.(B,RM);next C;next Y;D=I;print ;next Z;next X;return
57 print "T0",#1,Nx2;O=KxNx(W-U+1);D=1;for Y=Tto Ustep -1;D=D+(Y=@(D))x(D<=I);fo
r Z=1to L;TV=27;print "S0",;if O<100TV=48;if O<10TV=48
58 print #1,O,;for X=Uto W;B=@(4x(X>R)+PX(X,Y)+Dx8+19);for C=1to K;TV=B-(N=1)x(B
=771);if N=2TV=B.(B,1)
59 next C;next X;print ;next Z;next Y;return
60 clear ;data CX,-13,12;print "REL0AD";CX=-31;print "SN00P_CAMERA";data Y,27948
,Y;for X=>61to >62step 2;%(Y)=%(X);Y=Y+2;next X;%(Z)=8224;CALL>62
61 print ";:input
62 ABCD
66 gosub 54,X,CY;CY=X
67 CX=Y;X=&(28)÷Z+Y;print #2,X,;if TR(1)goto 18
68 goto 67
69 .ABCDEFGHIJKLMN
70 S=0;O=0;if A=0print "_VERTICAL",;gosub 24;gosub 66,Y,1,52xM;L=X;print "H0RIZ0
NTAL",;gosub 24;gosub 66,Y,1,86xM;K=X;print "_____PAGE_CENTERING";gosub 66,Y,0,
255÷(81-21xNxK)+1;O=X÷10;S=RM
71 Z=19;for Y=0to I;Z=Z+8;gosub 42;gosub 43;for C=Zto Z+3;gosub 44;@(C+4)=@(C);n
ext C;if Jclear ;gosub 42;CX=-37;print "RIGHT_0F_&(9)";gosub 43;for C=Z+4to Z+7;
gosub 44;next C
75 clear ;next Y;data CX,-58,4;print "L0AD_AND_ARM_PRINTER";print "____T0_%print
 USE_TR(1)";gosub 17;gosub 31;NT=!1800;TV=27;print "L0",#1,O,S,;TV=27;gosub 57-A
x2;data NT,1,-10,8;print "SAME";goto 9
ENTER>DA.>69+1,0,1,258,257,768,769,771;DA.>62,11537,-13971;:print %(24576),1622;
:print %(28676),2048[REC]
(TAPE FOLLOWING SNOOP CAMERA)
(SEE INSTRUCTIONS FOR CHANGES TO YOUR PRINTER OR INTERFACE)
```

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LIGHT PEN GRAPHICS . L. FLAMM

```
   1 :INPUT %(!8000);CLEAR ;GOTO
2300;.SZ=230 JUNE,1984
   2 INPUT "SNAP 1 2 3   4=NO SNA
P"K;IF K>3RETURN
   3 SNAP 0,0,24,18,%(!9920+K*150
);RETURN
   4 PRINT "PULL TR(2) TO SNAP PI
CTURE";SNAP 1,0,28,20,%(!9920);:I
NPUT 300;BOX 0,0,26,20,7;BOX 0,0,
24,18,4;RETURN
   5 GOSUB 30;SHOW 1,0,0,%(!9920)
;GOTO 1000
   6 B=1;GOSUB 500;CY=-32;CX=-77;
CC=6;NT=1;RETURN
   7 CY=-32;CX=-77;CC=6;RETURN
   8 SHOW X,Y,2,%(!99B6);SHOW X,Y
,2,%(!99B6);SHOW X,Y,2,%(!9A4C);S
HOW X,Y,2,%(!9A4C);SHOW X,Y,2,%(!
9AE2);SHOW X,Y,2,%(!9AE2);IF TR(2
)GOTO 1000
   9 X=&(15)-99;Y=-&(14)*2+50;GOT
O 8
  10 A=1;B=1;C=2;D=1;X=0;Y=0
  20 :INPUT 300;CLEAR ;LINE 80,-2
8,0;LINE -79,-28,5
  30 IF &(23)=2A=1
  40 IF &(23)=4A=2
  50 IF &(23)=8A=3
  60 IF &(23)=16A=4
  70 IF &(21)=4B=1
  75 IF &(21)=2B=2
  80 LINE X,Y,0;X=&(15)-99;Y=-&(1
4)*2+50;IF B=2GOSUB 400
  90 IF &(23)=32C=0
 100 IF &(22)=32C=1
 110 IF &(21)=32C=2
 120 IF &(20)=32C=3
 130 IF &(22)=4GOSUB 6;:RETURN ;I
NPUT "0=XOR 1=OVERLAY 2=OR 3=AND"
N;GOTO 870
 140 M=N*4+C
 150 IF TR(1)D=&(28)*12+1;GOSUB 4
20
 160 IF &(20)=2GOSUB 420
 165 IF &(22)=8GOTO 1000
 167 IF TR(2)GOSUB 6;:RETURN ;GOS
UB 2;RETURN
 170 IF A=1BOX X,Y,D,D,M;D=1
 180 IF A=2LINE X,Y,M
 190 IF A=3GOTO 780
 200 IF A=4GOTO 900
 210 IF &(21)=8GOTO 2100
 250 IF &(23)=1GOTO 2000
 300 IF &(21)=16GOSUB 6;:RETURN ;
INPUT "SNAP PICTURE 1 OR 2 ?"G;GO
SUB 930;GOTO 870
 310 IF &(20)=16GOSUB 6;:RETURN ;
INPUT "SHOW PICTURE 1 2 3 ?"G;GOS
UB 960;GOTO 870
 320 IF &(22)=2GOSUB 6;:RETURN ;I
NPUT "1-BC  2-FA  3-FB  4-FC"L;GO
SUB 500;GOTO 560
 330 IF &(20)=4GOSUB 500
 340 IF &(20)=8GOTO 20
 350 NT=1;MU=87;GOTO 30
 400 GOSUB 7;NT=0;PRINT "   X   Y
 410 CY=-40;PRINT #4,X,Y,;RETURN
 420 GOSUB 7;NT=0;PRINT "   X   Y
 ",;CF=SM.;PRINT " SHAPE MOD RAD
PER F- SO
 430 CF=L.;CY=-40;CX=-77;PRINT #4
,X,Y,A,M,#3,D,#2,P,C,G,;RETURN
 500 IF B=1BOX -56,-36,49,15,4
 510 BOX 24,-36,112,15,4;RETURN
 560 IF L=1E=BC
 570 IF L=2E=FA
 580 IF L=3E=FB
 590 IF L=4E=FC
 600 IF &(16)=1E=E+8
 610 IF &(16)=2E=E-8
 620 IF &(16)=8E=E+1
 630 IF &(16)=4E=E-1
 640 IF E<0E=E+255
 650 IF E>255E=E-255
 660 IF L=1BC=E
 665 IF L=2FA=E
 670 IF L=3FB=E
 675 IF L=4FC=E
 680 BOX -62,-32,36,7,6;CY=-32;NT
=0;CC=7;PRINT "BC=",#3,BC,;CC=5;P
RINT "FA=",#3,FA,;CC=6;PRINT "FB=
",#3,FB,;CC=7;PRINT "FC=",#3,FC
 690 IF TR(1)GOSUB 500;CC=6;GOTO
30
 700 GOTO 600
 780 :RETURN ;GOSUB 6;INPUT "RADI
US="D
 790 CX=-8;CY=-32;INPUT "PERIMETE
R="P
 800 U=1;F=X-D;FOR W=FTO F+2*D;S=
D*D-((W-X)*(W-X));T=U*4;IF T>D*8T
=U-1
```

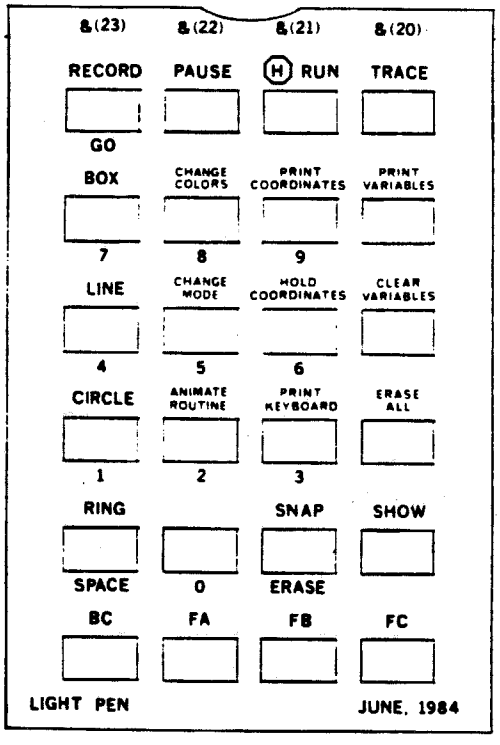
```
 810 FOR U=TTO 500;IF (U*U)>SGOTO
 830
 820 NEXT U
 830 U=U-1;IF (S-U*U)<((U+1)*(U-1
))-SGOTO 850
 840 U=U+1
 850 Z=U+Y
 860 BOX W,Z,P,P,M;BOX W,Z-(2*U),
P,P,M;BOX Z-Y+X,W-X+Y,P,P,M;BOX Z
-Y-(2*U)+X,W-X+Y,P,P,M;NEXT W;D=1
 870 CC=M;B=1;A=1;:INPUT 300;GOSU
B 500;GOTO 30
 900 :RETURN ;GOSUB 6;CC=M;INPUT
"RADIUS="D;CIRCLE X,Y,D,M;D=1;GOT
O 870
 930 I=!8000;IF G=2I=!8C90
 940 SNAP 0,11,159,80,%(I);PRINT
"PICTURE",#2,G," IS SNAPPED";IF K
PRETURN
 960 I=!8000;IF G=2I=!8C90
 970 IF G=3GOTO 990
 980 SHOW 0,11,0,%(I);PRINT "PICT
URE",#2,G," IS SHOWING";IF KPRETU
RN
 990 PRINT "COMPOSITE PICTURE SHO
WING
 995 SHOW 0,11,0,%(!8000);SHOW 0,
11,0,%(!8C90);IF &(23)#1GOTO 995
 996 RETURN
1000 :RETURN ;GOSUB 6;INPUT "1=DR
AW  2=SHOW  3=ANIMATE 4=BACK TO M
AIN PROGRAM"J;GOSUB 6;GOTO J*100+
1000
1100 PRINT "DRAW IN BOX ";GOSUB 4
;GOTO 5
1200 INPUT "SHOW 1 2 3 ="K;GOSUB
4;SHOW 0,0,0,%(!9920+K*150);BOX 1
3,0,1,20,7;GOTO 5
1300 PRINT "USE PEN TO MOVE ANIMA
TION USE TR(2) TO RETURN ";:INPUT
 300;GOTO 8
1400 GOTO 870
2000 :RETURN ;GOSUB 6;PRINT "STAR
T TAPE.  PRESS GO.";IF KP CC=7;PR
INT "TAPING";:PRINT ;:PRINT %(!80
00),!DBC
2010 GOSUB 6;CC=7;PRINT "PEN CONN
ECTED?  TAP GO.";IF KPGOTO 870
2100 :RETURN ;GOSUB 6;CC=M;PRINT
"TV=KEYBOARD CHARACTOR";CY=Y;CX=X
;TV=KP;GOTO 870
2300 &(9)=118;CF=L.;NT=1;BC=224;F
C=174;FA=91;FB=7;CY=32;CX=-65;CC=
7;PRINT "LIGHT-PEN  COORDINATE";C
X=-7;PRINT "&";PRINT "    GRAPHIC
S  PROGRAM";CY=0;CX=-11;PRINT "BY
2310 CC=6;PRINT "      LEROY G. FL
AMM";CC=5;CY=-24;PRINT " CONNECT
PEN.  PRESS GO.";CC=7;IF KP CLEAR
 ;GOTO 10
```

<u>LIGHT-PEN GRAPHICS PROGRAM</u>

BY LEROY G. FLAMM
306 SYCAMORE STREET
MOHNTON, PA. 19540

SEND A SELF ADDRESSED AND STAMPED RETURN PACKAGE WITH YOUR TAPE TO ME IF YOU WANT A TAPE OF THIS PROGRAM WITH SOME GRAPHICS TO START YOU OUT.

<u>KEYBOARD OVERLAY IS BELOW.</u>



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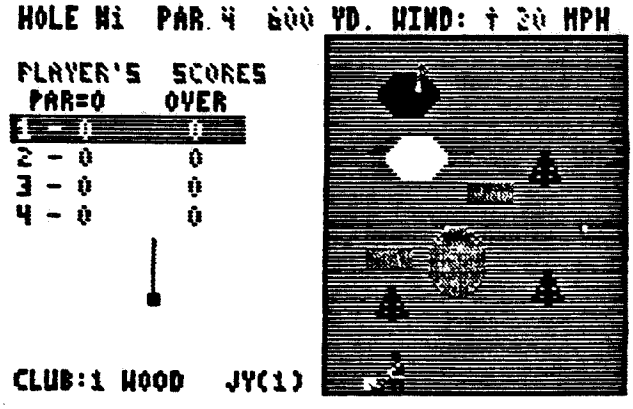

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```

LAST MONTH I SAID THAT I WOULD SHOW YOU THE MARTIAN AND THE MAZE, BOTH FROM THE 16K **QUADRA**, RUNNING IN AB! HERE'S THE MAZE:

```
10 CLEAR ;C=20253;%(C)=-32728;CALLA
20 GOSUB 90;%(C)=-32664;CLEAR ;CALLA
30 GOSUB 90;%(C)=-32600;CLEAR ;CALLA
40 GOSUB 90;%(C)=-32536;CLEAR
50 CY=24;CX=-10;PRINT "5:00
60 CX=-28;PRINT "FUSE TIMER
70 GOSUB 90;&(9)=-1;CALLA;GOSUB 90
80 GOSUB 90;&(9)=63;CLEAR ;STOP
90 FOR D=0TO 3000;NEXT D;RETURN
ENTER>A=20237;FOR B=ATO A+56STEP 2;INPUT %(B);NEXT B
ENTER>[NUMBER STRING] PRESSING [GO] AFTER EACH ENTRY
      (NOTE) [READ EACH COLUMN DOWN WHEN ENTERING]

    8669   10456  -32536    2563  -24574    1402   21856      96
   20258     128  -12032   20265     876    5600  -24422
     -43   13311  -32567    -393    5984  -32518   27253
   -3789    2048       0   21728  -32514   25962     224
```

[READ EACH COLUNM DOWN] MEANS THAT THE SECOND ENTRY MUST BE 20258, NOT 10456! THIS IS MACHINE CODE. IF IT'S NOT RIGHT WHEN YOU RUN IT, YOU WILL PROBABLY GET A [RESET]. IF YOU DO GET IT RUNNING, THE MAZE WILL APPEAR IN IT'S TRUE FORM, A SINGLE **CHRDIS** CHARACTER (SEE VOL.5 PG.14,15,37, AND 72 ARCADIAN). THE SCREEN IS THEN CLEARED, AND THE MAZE APPEARS AGAIN AT 2x SIZE. THEN, IT IS SHOWN AT 4x SIZE, AND, AS IT APPEARS IN THE GAME, AT 8x SIZE. THIS WAY, ALL THE MAZE BLOCKS ARE 8x8 PIXEL SQUARES, MAKING THE CHARACTER MOVEMENT AN EASY 8 PIXEL JUMP. HOWEVER, THE CHARACTER MUST BE 3 BYTES WIDE TO COVER A 20 BLOCK SCREEN (20x8=160), AND THERE ARE 24 PIXELS COVERED BY A 3 BYTE WIDE CHARACTER (8x3=24) (8 PIXELS PER BYTE). AT 8x SIZE THAT'S (24x8=192), WHICH WILL NEVER FIT ON THE SCREEN WITHOUT A "WRAPAROUND" OF 4 BLOCKS! THE PART THAT "WRAPS" IS KEPT ALL WHITE, AND THE MAZE IS XORED ONTO THE SCREEN, SO THE "WRAPAROUND" REMAINS INVISIBLE, AND DOESN'T INTERFERE WITH THE SCRATCHPAD. (IT "WRAPS" INTO THAT ALSO)!

AS FOR THE APPEARANCE OF THE MARTIAN, A FLYING SAUCER SENDS A BEAM DOWN, THEN THE BEAM GETS CUT OFF, AND THE MARTIAN APPEARS OUT OF IT HEAD FIRST! &(10) CANNOT BE USED, AS PART OF THE BEAM IS STILL VISIBLE, AND CONVENTIONAL ERASING GOES TOO SLOW TO LOOK RIGHT. THE FOLLOWING DEMONSTRATOR (IN AB) SHOWS HOW IT WAS DONE:

```
10 CLEAR ;NT=-1;FOR X=-60TO 0;GOSUB 20;NEXT X;GOTO 50
20 &(22)=-1;&(20)=150;&(17)=30;BOX X-1,31,31,8,2;BOX X,30,29,5,1
;BOX X,30,31,3,1;BOX X,33,9,3,1;RETURN
30 M=27;N=-40;P=-1;R=3
40 FOR Y=MTO NSTEP P;BOX 0,Y,7,1,R;NEXT Y;RETURN
50 &(17)=90;&(20)=0;GOSUB 30;N=-31;GOSUB 40;C=19276
60 FOR %(B)=128TO 136;%(B-3)=C;CALLA;C=C+256;NEXT %(B)
70 &(22)=0;FOR D=0TO 2000;NEXT D;&(22)=-1
80 GOSUB 30;M=N;N=27;P=1;R=2;GOSUB 40
90 FOR X=0TO 60;GOSUB 20;NEXT X;CLEAR ;NT=2
ENTER>A=20260;FOR B=ATO A+28STEP 2;INPUT %(B);NEXT B;B=A+10
ENTER>[NUMBER STRING] PRESSING [GO] AFTER EACH ENTRY
      (NOTE) [READ EACH COLUMN DOWN WHEN ENTERING]

    8669      -43    10331  -13871      256    32591      119    23915
   20274    30771      128      128    14593    25443    30549
```

THIS PROGRAM IS A SIMPLE CARTOON, WHERE A FLYING SAUCER FLYS ONTO THE SCREEN AND BEAMS DOWN OUR MARTIAN (FROM 16K **QUADRA**) RAY GUN IN EACH HAND. THEN HE BEAMS UP, AND THE SAUCER FLYS OFF. THE MARTIAN IS A "CHRDIS" CHARACTER THAT APPEARS ONE BYTE AT A TIME. LINE #60 DOES THE TRICK. THE CHARACTER FONT IS REDUCED TO A ONE BYTE CHARACTER, AND THE CHARACTER NUMBER INCREASES AS THE SCREEN LOCATION GOES DOWN (C=C+256). THE CHARACTER IS **XORED** ONTO THE SCREEN, SO IT HAD TO BE PROGRAMED IN AS A NEGATIVE CHARACTER. IN OTHER WORDS, WHEN FIGURING OUT MY CHARACTER PIXEL COLORS, I SET THE WHITE TO APPEAR BLACK AND THE BLACK TO APPEAR WHITE, EXCEPT THE LEFT COLUMN WHICH FALLS ON ALREADY WHITE BACKGROUND (MY BEAM IS 7 PIXELS WIDE, SEE LINE #40). THE CHARACTER COULD APPEAR IN THE OPPOSITE DIRECTION, FEET FIRST, IF THE LOOPS WERE REVERSED. THIS WOULD ALLOW FOR A WAY TO RAISE A STAGE CURTIN ON A PLAY, IF THAT IS WHAT YOU WANT. IF YOU ENTER> %(A+8)=2139, AND CHANGE THE LAST 5 "POKED IN" NUMBERS TO: 79, 7196, 32520, 2090, AND 8724, THE CHARACTER "PLOPS" ONTO THE SCREEN, AND COULD BECOME ANAMATED WITH MORE PROGRAMING. BE CAREFULL THOUGH! IN AB OR BB, "PLOPING" A CHARACTER DOWN LIKE THIS, WIPES OUT ANY TEXT THAT HAPPENS TO LAY "UNDERNEATH" THAT PART OF THE SCREEN THAT THE CHARACTER WILL OCCUPY. TO SEE THE TEXT, USE: &(0)=0;&(1)=90;&(2)=132;&(3)=6; &(9)=0. &(9)=63 RETURNS TO NORMAL.

I COULD GO ON TALKING ABOUT FANCY DISPLAY TRICKS, BUT THERE ARE TWO OTHER TOPICS OF GREATER IMPORTANCE THAT I HAVEN'T HARDLY MENTIONED YET, **TIME SHARING**, AND **STRINGS**! TIME SHARING IS A WAY OF MAKING 1800 BYTES GO FARTHER, BY USING THE SAME MEMORY TO DO MULTIPLE TASKS. VARIABLES ARE THE MOST READILY TIME SHARED, (SEE ABOVE PROGRAM). THE "B" VARIABLE STEPS BY TWO'S DURING THE TIME WE ARE INPUTING DATA, THEN BECOMES 20270 (A+10) DURING THE TIME THE PROGRAM GETS RUN. WE CAN DO THIS BECAUSE THESE TWO NUMBERS NEVER NEED TO BE KEPT AT THE SAME TIME! WE CAN ALSO TIME SHARE A STRING, OR EVEN THE WHOLE TEXT! HOW? YOU MAY ASK? SEE **QUADRA**, OR THIS COLUMN NEXT MONTH. KEEP BUGGIN' *

TRICKS OF THE TRADE

A TUTORIAL BY
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TIME SHARING
(THE USE OF USED MEMORY)

LAST MONTH I INTRODUCED YOU TO THE IDEA OF TIME SHARING. WE "BORROWED" A VARIABLE TO DO A TASK, THEN RESTORED IT TO A "POKE" VALUE USED IN THE PROGRAM. IF YOU KEYED THE DEMONSTRATOR PROGRAM IN (AB) AND RAN IT, YOU ACTUALLY "TIME SHARED" VARIABLE "B".

THE RULES FOR TIME SHARING ARE SIMPLE. ONE, IF A PORTION OF MEMORY (ANY PART) IS NOT CURRENTLY IN USE, IT MAY BE "BORROWED" FOR ANOTHER TASK (EVEN TEMPORARILY). ON PG. 25+27 VOL. 2 OF THIS NEWSLETTER IS THE LISTING AND SECRET TO **REPACK**. THE ENTIRE TEXT IS TIME SHARED WITH THE OBJECT PROGRAM. REMEMBER THIS! IN ASTRO BASIC (ONLY), EACH LINE OF BASIC IS "UNPACKED" (COPIED) INTO THE LINE INPUT BUFFER, AND EXECUTED FROM THE LINE INPUT BUFFER. ONLY WHEN ANOTHER LINE IS NEEDED DOES THE TEXT AREA GET USED, SO WE CAN "TIME SHARE" THE TEXT. **FILE SEARCHER** ALSO BORROWS THE TEXT TEMPORARILY. THE AB VERSION TO **QUADRA** TAKES THIS PRINCIPLE ONE STEP FARTHER BY "TIME SHARING" THE TEXT AREA WITH IT'S 4 "SLAVE" GAME PROGRAMS IN A "BACK AND FORTH" TYPE OF FASHON. IN THE EB 4K VERSION ANOTHER TRICK WAS USED. THE SECOND PROGRAM CONTAINS TWO "QUADRANTS", **LASER,&SLIDE**, AND **U.F.O. ATTACK**. THE FORMER USES A "FIXED" STRING CONTAINING COLOR DATA AND ACCELERATION FACTORS. THE LATTER NEEDS AN AREA TO KEEP FLYING SAUCER LOCATIONS, AND GUESS WHAT! THERE ISN'T ROOM FOR BOTH! SO THE STRING WAS TAPED WITH THE "FIXED" DATA LOADED, AND THESE TWO PROGRAMS SHARE THE SAME STRING SPACE! THIS IS POSSIBLE BECAUSE ONLY ONE PROGRAM (OR THE OTHER) GETS RUN, AND THEN THE MENU PROGRAM MUST BE BROUGHT UP, SO WE SEE A FRESH TAPE LOAD BEFORE EVERY "QUADRANT". ALSO, IS IT ANY WONDER HOW I COULD USE "THE STACK" TO "CARRY OVER MEMORY" AND GENERATE "CHRDIS" CHARACTORS (SEE ARCADIAN VOLUME 5 PG. 14,15,37, AND 72). A "FOR NEXT" LOOP SIMPLY MOVES SCORES TO AND FROM STRINGS, AND PLACES MACHINE CODE INTO "THE STACK" FROM STRING LOCATIONS WHEN NEEDED. THE LINE INPUT BUFFER GETS "TIME SHARED" ALSO, WHEN WE SET UP "AUTO RUN". THE FORMAT IS:

```
PRINT ";(YOUR PROG. DATA);RUN ";:PRINT %(A),B [REC]
```

THE FORMAT USES 15 BYTES (MINIMUM) TO SET UP. THAT LEAVES 89 BYTES FROM THE LINE INPUT BUFFER'S 104 (104-15=89) THAT ARE NOT COUNTED IN THE "1800 BYTES" THAT TEXT IS ALLOWED IN AB AND BB. HOWEVER, THIS LINE RUNS ONCE AND THEN GETS ERASED WHEN "ASTRO UNPACKS" (COPIES) THE FIRST LINE OF TEXT INTO IT.

NOTE: IN ASTRO BASIC YOU CANNOT USE THE "GOSUB" COMMAND FROM THE LINE INPUT BUFFER, EITHER DIRECTLY OR WITH "AUTO RUN". THE REASON IS, THAT SINCE THE ENTIRE TEXT EXECUTES FROM THE LINE INPUT BUFFER, THE ADDRESS THAT WE WOULD NEED TO "RETURN" TO IS SEEN AS INVALID. (BUT IT WILL WORK IN EB OR BB, TRY IT!!)

THE SECOND (AND ONLY OTHER) RULE TO "TIME SHARING" IS THAT WHAT WE DID TO RAM SPACE (RULE ONE) APPLIES TO DATA. A LOOK IN **MONKEY JUMP** (WAVEMAKERS), OR **SAFE CRACKER** (FROM **QUADRA** BY ME), REVEALS A STRANGE LINE NUMBERING SYSTEM. THIS WAS DONE TO SAVE SPACE BY EMPLOYING A "FIXED" VARIABLE TO DO MULTIPLE TASKS. A LINE NUMBER USES TWO BYTES OF MEMORY, WHETHER LINE #1 OR #32767. BUT A DIFFERENCE OCCURRS WHEN REFERENCING TO LINE NUMBERS. SEE THE FOLLOWING CHART:

GOTO 1	(USES 2 BYTES)	**GOSUB 1**	(USES 2 BYTES)
GOTO 32767	(USES 6 BYTES)	**GOSUB 32767**	(USES 6 BYTES)
GOTO A	(USES 2 BYTES)	**GOSUB A**	(USES 2 BYTES)

THIS ONLY SHOWS THE EXTREMES, BUT AS YOU CAN SEE, THE NUMBER FOLLOWING A "GOTO " OR "GOSUB " IS KEPT IN MEMORY AS DIGITS! SO, WE SET OUR LINE NUMBERS TO OUR "POKE" VALUES AND KILL TWO BIRDS WITH ONE STONE. FOR INSTANCE, IN **SAFE CRACKER**, %(B)=%(20244), (1ST CHRDIS SCREEN LOCATION), AND "GOSUB B" STARTS A "MULTI USE" SUBROUTINE. SUBROUTINES ARE THE GREATEST DEMONSTRATORS OF RULE TWO. TAKE THIS LINE FROM **U.F.O. ATTACK (QUADRA)** FOR EXAMPLE:

```
5 I=H÷2+1;BOX X,Y,Hx8-3,Ix2-1,(H>1);BOX X,Y,Hx8-1,HxH÷8+1,1;
  BOX X,Y+I,Ix4-3,HxH÷8+1,1;RETURN
```

THIS ONE SUBROUTINE DRAWS ALL 3 FLYING SAUCERS! IF H=1 YOU GET THE SMALL FIGHTER SHIP. H=2 GIVES THE MEDIUM SIZED CRUISERS, AND SETTING H=4 GIVES THE MOTHER SHIP. TO SEE WHAT H=3 GIVES, RUN THIS SUBROUTINE (AB OR BB) ("X" + "Y" ARE SCREEN LOCATIONS). **HINT** USE THIS LINE: > 1 CLEAR ;INPUT H,X,Y;GOSUB 5;IF KPRUN

ANOTHER GOOD PLACE TO LOOK INTO IS IN **SPACE MISSION [PART 1]** (PG. 48 VOL. 2 **NIAGARA BUG BULLETIN**). LINES 340 TO 380 FORM ONE SUBROUTINE TO DO CAPSULE SEPARATION HORIZONTALLY AND VERTICALLY, PLUS SUSTAINER ENGINE FLIGHT BOTH HORIZONTALLY AND VERTICALLY, AND BOOSTER SEPARATION VERTICALLY, ALL BY CHANGING 8 VARIABLES.

DO YOU GET THE IDEA? HAVE YOU FOLLOWED ME SO FAR? ARE YOU READY TO SIT DOWN AND COMPOSE THAT "MASTERPIECE" PROGRAM YET? WELL, YOU WILL BE WHEN WE'RE FINISHED DISCUSSING:

THINGS CALLED STRINGS

ON PG. 78 ASTRO BASIC HANDBOOK YOU WILL FIND THE LISTING TO **PLAYER PIANO.** TO THE RAW BEGINNER TRYING TO FOLLOW THIS PROGRAM IT SHOULDN'T WORK, UNTILL HE SEE'S THAT @(A) (LINE 90) IS THE SAME STRING AS @(C) (LINE 140), AS LONG AS A=C. BUT! THEY DON'T HAVE TO BE THE SAME! TILL NEXT MONTH, KEEP BUGGIN'! ✱

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TRICKS OF THE TRADE

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STRINGS

BEFORE WE LOOK AT MULTIPLE ARRAYS, I WISH TO DISCUSS THE TWO TYPES OF STRINGS MENTIONED LAST MONTH.

"FIXED" ARRAYS ARE THOSE WHERE THE AUTHOR FILLS A STRING UP WITH NUMBERS AND TAPES THE ARRAY WITH THE PROGRAM. THE PROGRAM READS DATA OUT OF THE ARRAY, BUT NEVER ERASES OR WRITES INTO THE ARRAY. IF THE ARRAY GETS COPIED TO ANOTHER LOCATION THE "FIXED" PORTION REMAINS. A TOTALLY "MOVING" ARRAY (WHERE THE "FIXED" PORTION DISSAPPEARS AFTER THE MOVE) IS VERY RARE. MY COLLECTION OF BALLY SOFTWARE IS FAR FROM COMPLETE, BUT I CAN FIND NO SAMPLE OF A "MOVING" ARRAY, ANYWHERE!

THE OTHER TYPE IS THE "AREA". SCORES ETC. FORM THESE STRINGS WHICH GET ERASED, WRITTEN INTO, READ, AND BECOME "MOVING" ON OCCASION. SEE **QUADRA** AB, AND REREAD "TIME SHARING" (LAST MONTHS "TRICKS" COLUMN **NIAGARA BUG BULLETIN**). BOTH "FIXED" STRINGS AND AN "AREA" ARE HANDLED THE SAME WAY WHEN USING MULTIPLE ARRAYS.

AS I STATED EARLIER, THERE ARE 5 WAYS! THEY ARE:

1 - **THE HARDWARE METHOD**
2 - **THE MATH METHOD**
3 - **THE BIT-SPLIT METHOD**
4 - **THE DIRECTORY METHOD**
5 - **THE PHANTOM-START METHOD**

LET'S TAKE EACH OF THESE IN TURN.

THE HARDWARE METHOD

LAST MONTH WE LOOKED BRIEFLY AT **PLAYER PIANO** (AB HANDBOOK PG.78). @(A) (LINE 90) = @(C) (LINE 140) BECAUSE BOTH "A" + "C" ARE ONLY VARIABLES REFERING TO THE @(X) STRING, AND @(0)=@(0) WHETHER THE "0" IS REPRESENTED BY AN "A", OR A "Z"! (UNLESS THE "PHANTOM-START METHOD" IS USED. WE WILL DISCUSS THAT LATER). IF YOU WISHED THERE TO BE ANOTHER @(0), THE MAKERS OF ASTRO BASIC GAVE US 5 "BUILT IN" (HARDWARE) STRING ALLOCATIONS. THEY ARE:

```
@(X)   - SZ÷2-¥(X)=NUMBER OF PLACES (WORDS) AVAILABLE
¥(X)   - SZ÷2-@(X)=NUMBER OF PLACES (WORDS) AVAILABLE
%(-X)  - ANYWHERE IN THE TEXT AREA, LIMIT 902-TEXT÷2-@(X)-¥(X)
%(+X)  - UNDER &(10) IN SCREEN, LIMIT 1808-TEXT OR PICTURE SPACE
%(X)   - STACK AREA, SAME AS %(+X), LIMIT 102-LONGEST LINE÷2
```

THE @(X) STRING AND THE ¥(X) ARRAY OPERATE THE SAME, OTHER THAN TAPING. FOR EXAMPLE; TO TAPE 150 STRING ENTRIES USE:

:PRINT @(0),150 - OR - :PRINT ¥(149),150

ONLY THE ¥(X) ARRAY TAPES BACKWARDS, BECAUSE IT RESIDES IN MEMORY BACKWARDS. (THERE IS NO BACKWARDS TAPING ROUTINE IN ANY OF THE PRESENT SOFTWARE, ANYWHERE!) %(-X) INCLUDES BOTH REM STATEMENTS AND FREE TEXT SPACE. (SEE PG. 70 AB HANDBOOK AND THE ARCADIAN VOL. 4 PG. 10). THIS SHOWS THE SAME PROGRAM USING %(-X) TWO DIFFERENT WAYS, AS REM STATEMENTS, AND AS FREE SPACE POKES. NOTE: THE PROGRAM ON PG. 10 VOL. 4 ARCADIAN IS FOR BB. FOR AB; %(20050) MUST READ %(20000), ":RETURN ;" HAS TO BE DELETED, AND LINES 15 AND 16 (USED FOR TAPING) MUST BE:

15 PRINT ";GOTO 6";:PRINT %(16384),1890

THE %(+X) AND %(X) ALLOCATIONS REFER TO SCREEN ADDRESSES, WITH %(+X) FROM %(16384) TO %(19999), AND %(X) FROM %(20000) TO %(20358), (SCRATCHPAD). THE END OF THE LINE INPUT BUFFER AND THE "STACK AREA" (DOWN TO %(20358)) ARE THE BEST USEABLE POKES. REMEMBER THOUGH, AB USES THE LINE INPUT BUFFER WHILE RUNNING A PROGRAM, SO THE LONGEST LINE (OF BASIC TEXT) MUST BE TAKEN AS THE STARTING POINT. ALSO, BY NESTING SUBROUTINES AND LOOPS, THE STACK ITSELF GETS DEEPER. %(20358) IS HALF WAY DOWN. **"REPACK"** STOPS AT THIS ADDRESS ALSO, (IF YOU WISHED TO USE THE UTILITY ON A PROGRAM WITH A FIXED ARRAY). GOING FURTHER BEGS FOR TROUBLE. THE SCREEN ITSELF %(+X) CAN BE USED IN TWO WAYS, BY HIDING IT AT THE BOTTOM UNDER &(10) (&(10) MUST BE BROUGHT UP), OR AT THE TOP UNDER AN INTERRUPT. THERE ARE SOME CARTRIDGES THAT DO THIS, BUT NO AB PROGRAM THAT I HAVE SEEN (OR HEARD OF) YET HAS IT IN. &(9) "HIDES" THE SCRATCHPAD IN **MUNCHER**, BUT NOBODY USES "HIDE AND SURPRISE" TRICKS TO HIDE STRING DATA IN BASIC. HOWEVER, THE BOTTOM OF THE SCREEN (UNDER &(10)) IS QUITE POPULAR. **CANDY MAN** [L+M], AND **CHICKEN**, [BIT FIDDLERS], ARE TWO EXAMPLES. THE TITLE PROGRAM HIDES **CANDY MAN**, BUT YOU CAN SEE THE DATA WHEN **CHICKEN** LOADS FROM TAPE. TWO WORDS OF CAUTION ABOUT USING "ON SCREEN" POKES. IF THE SCREEN GETS CLEARED (CLEAR COMMAND), OR SCROLLS, OR ANY GRAPHICS (BOX, LINE, PRINT, TV=, CHRDIS, ETC.) REACH THE STRING AREA, <u>YOU'VE LOST IT</u>! ALSO, BE CAREFULL NOT TO POKE INTO A PLACE WHERE @(X), ¥(X), %(-X), OR THE BASIC TEXT, WILL RESIDE BENEATH. TO SEE @(X), ¥(X), %(-X), AND THE TEXT, USE:

&(0)=0;&(1)=90;&(2)=132;&(3)=6;&(9)=0
&(9)=63 RETURNS TO NORMAL.

ONE LAST TIP ON "PEEKING" OR "POKING" STRINGS WITH A "FOR NEXT" LOOP, ALWAYS USE "STEP 2", AS BOTH "PEEKING" AND "POKING" ACCESS 2 BYTES (ONE WORD) EACH TIME. NEXT MONTH, MULTIPLE ARRAYS BY SOFTWARE METHODS (<u>RUNNING ALL AT ONCE</u>)! KEEP BUGGIN'!! ¥

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TRICKS OF THE TRADE

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MORE ON STRINGS

"RUNNING ALL AT ONCE" TO QUOTE MYSELF FROM LAST MONTH, MEANS THAT ALL FIVE MULTIPLE STRING METHODS CAN EXIST IN A PROGRAM AT THE SAME TIME! THE BOTTOM LINE IS THIS; FROM NOW ON, WE'LL BE DISCUSSING THE @(X) STRING AS AN EXAMPLE. BUT REMEMBER, THE METHODS DISCUSSED APPLY TO THE ¥(X), %(-X), %(+X), AND THE %(X) ARRAYS AS WELL AS @(X) (WITH 1 EXCEPTION). THEY CAN EVEN EXIST WITHIN EACH OTHER! THEY ARE COMPATIBLE! HOW? LET'S SEE:

THE MATH METHOD

SAY WE WISH TO KEEP 4 PLAYERS SCORES, DIFFICULTY LEVELS, AND NUMBER OF LIVES IN A GIVEN PROGRAM. "PLAYER UP" IS KEPT IN THE VARIABLE "P". USING THIS METHOD, WE VERY SIMPLY SAY: SCORE=@(P), DIFFICULTY=@(P+4), AND LIVES=@(P+8). THE @(X) STRING WILL LOOK LIKE THE FOLLOWING CHART:

PLAYER UP	SCORES	DIFFICULTY	LIVES
1	@(1)	@(5)	@(9)
2	@(2)	@(6)	@(10)
3	@(3)	@(7)	@(11)
4	@(4)	@(8)	@(12)

THE "+" KEY CAN EVEN BEGIN ANOTHER STRING STARTING AT @(13). THE "x" KEY CAN TAKE THE IDEA FARTHER, AS SEEN IN THIS LINE FROM **SNOOP CAMERA**! (OUR SCREEN DUMP PROGRAM):

```
58 PRINT #1,0,;FOR X=VTO W;B=@(4x(X>R)+PX(X,Y)+Dx8+19);
FOR C=1TO K;TV=B-(N=1)x(B=771);IF N=2TV=B.(B,1)
```

THE COLOR CODE IS IN THE @(X) STRING. IF X>R WE ARE RIGHT OF THE &(9) BOUNDRY LINE. ALSO, "D=D+1" AS WE CROSS AN INTERRUPT COLOR CHANGE LINE. TO ALLOW FOR A FOUR COLOR SCREEN, WE MOVE 4 PLACES UP THE STRING WHEN WE CROSS &(9), AND 8 WHEN WE CROSS AN INTERRUPT. THE FIRST 26 @(X) ADDRESSES HOLDS THE INTERRUPT LINE SCREEN LOCATIONS. "D=1" WHEN THE "¥PRINT " LOOP (OF WHICH LINE #58 IS PART OF) STARTS, THUS Dx8+19=27. THE PRINTER RECEIVES THE "TV=?" COMMANDS AT THE END OF LINE #58, WHICH SENDS DOT IMMAGE GRAPHICS DATA OUT, ONE BYTE AT A TIME! (SEE PG. 38,42, AND 43 OF VOL. 2 **NIAGARA BUG BULLETIN** TO REVIEW THE "BYTE" COMMAND IN EB). THIS COMBINES "THE MATH METHOD" WITH:

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THE BIT-SPLIT METHOD

IN **MONKEY JUMP** (WAVEMAKERS) EACH PLAYER RESUMES THE SCREEN OF BANANAS HE WAS EATING, WITH EACH TURN! THE ROUTINES ARE:

```
14 H=1;FOR D=1TO M;H=Hx10;NEXT D;I=H÷10
16 D=1;FOR A=-30TO 33STEP 12;BOX 1,A-6,138,3,3
17 FOR B=-60TO 60STEP 20;C=@(D)÷H
18 BOX B,A,2,2,(RM>I-1);D=D+1;NEXT B;NEXT A
```

THE @(X) STRING IS "DIGIT-SPLIT" TO HOLD ALL FOUR SCREENS OF BANANAS IN THE SPACE OF ONE STRING! IF @(1)=1111, ALL 4 PLAYERS WOULD GET THAT BANANA RESTORED ON THE NEXT TURN. IF @(1)=1010 ONLY THE 2ND AND 4TH PLAYER WOULD, AND IF @(1)=0 NO ONE WOULD. "M" HOLDS THE PLAYER UP, AND "H" AND "I" SEPARATE THE DIGITS. HOWEVER, <u>ALL NUMBERS IN A COMPUTER ARE BINARY</u>! SO, IF WE CAN DIVIDE BY 10 AND GET AWAY WITH IT, WHY NOT ANY NUMBER? <u>**IT CAN BE DONE**</u>!! **BOWLING** (FROM **NIAGARA BUGS CLUB TAPE**) CONTAINS THIS:

```
260 @(V)=Sx100+Rx10+Q;IF Z=6PRINT " x ",
```

THIS LINE PUTS NUMBERS BACK IN THE STRING AFTER A PLAYERS TURN ENDS. SINCE THE HIGHEST POSSIBLE SCORE IS 300, THE FIRST 3 DIGITS HOLD THE SCORE, AND THE OTHER TWO HOLD STRIKE AND SPARE INFORMATION TO FIGURE SCORING (ADDS TO THE NEXT FRAME ETC.). IN **U.F.O. ATTACK** IT'S MORE COMPLEX. THESE TWO SUBROUTINES KEEP THE FLYING SAUCER LOCATIONS AND SIZES IN THE SAME STRING SPACE:

```
2 X=@(R)÷100;Y=(ABS(RM)÷5)x5-50;H=RM;RETURN
3 @(P)=Xx100+H+Y+50-2x(X<0)x(H+Y+50);RETURN
```

"X" AND "Y" ARE SCREEN LOCATIONS AND "H" IS THE SAUCERS SIZE AS EXPLAINED IN THIS COLUMN TWO MONTHS BACK. "Y" INCREMENTS IN 5 PIXEL STEPS, SO THE NUMBERS BETWEEN THOSE STEPS HOLD OUR SAUCER SIZE. USING "ABS" TO RETRIEVE "Y" IN LINE #2 RESULTS IN GETTING ONLY POSITIVE NUMBERS, HENSEFORTH THE "-50". "÷5)x5" IN LINE #2 YIELDS UP A NEW "RM", SO "H=RM". IN LINE #3 THE 50 MUST BE ADDED BACK ON, AND ALLOWANCE MUST BE MADE FOR "X" TO GO NEGATIVE. IF "X" IS NEGATIVE "H" AND "Y" MUST BE SUBTRACTED INSTEAD OF BEING ADDED, OR "ABS" WILL GIVE THE WRONG NUMBERS, "-2x(X<0)x" RESULTS IN A SUBTRACTION (H+Y+50-2x(H+Y+50)=-H-Y-50 OR, X-2xX=-X).

IF YOU'RE USING "THE BIT-SPLIT METHOD" DON'T BE AFRAID TO DIVIDE BY 2,5,90,32767, OR WHATEVER! IN **PUT-PUT GOLF** (ON **NIAGARA BUGS CLUB TAPE**) YOU WILL FIND "X=@(U+4)÷90;Y=ABS(RM)-45" IN LINE #22. THIS SAVES A BYTE OF BASIC TEXT BY DIVIDING BY 90 INSTEAD OF 100, SINCE THE SCREEN IS LIMITED VERTICALLY FROM 43 TO -44. 8 DATA PIECES FROM 1 ADDRESS ARE POSSIBLE WITH A TRUE "BIT-SPLIT"!

ALL THE STRINGS DISCUSSED THIS MONTH HAVE A COMMON FEATURE, THEY'RE SYMMETRICAL (4 SCORES, 4 DIFFICULTIES, 4 LIVES, ETC.). WHAT IF THEY WERE DIFFERENT? NEXT MONTH! KEEP BUGGIN'!!! ✱

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STILL MORE ON STRINGS

LAST MONTH I SAID THAT WE WOULD BE LOOKING AT A METHOD WHERE DIFFERENT LENGTH SEGMENTS ARE HANDLED IN ONE ARRAY. IT'S CALLED:

THE DIRECTORY METHOD

THIS IS WHAT I FOUND INSIDE **THE GREAT AMERICAN JIGSAW** FROM ESOTERICA LIMITED, P.O. BOX 614, WARREN, OHIO 44482 (IF YOU'VE NEVER SEEN THIS BEFORE, YOU SHOULD! IF YOU GET NO RESULTS BY WRITING TO DAN DREACHER, WRITE ME). THE 1800 BYTE PROGRAM DRAWS ALL 48 CONTINENTAL UNITED STATES ON THE SCREEN. THE PROGRAM IS ABOUT 900 BYTES LONG AND USES %(-X) TO HOLD THE DRAWING STRING. HERE'S THE LINES THAT DO IT!!!

```
490 F=1;L=1
500 E=%(-23676+(Sx2))÷1000;B=RM
505 K=0;J=0;FOR A=-23582+BTO -23582+B+ESTEP 2
510 C=%(A)÷10000;X=RM÷100;Y=RM;C=ABS(C)
520 IF C=1Y=-Y
530 IF F=2IF A=-23582+B K=-52-X;J=-35-Y;L=2
533 X=X+K;Y=Y+J
534 IF A=-23582+BLINE X,Y,4;G=X;H=Y;NEXT A
540 LINE X,Y,L;NEXT A;LINE G,H,L;RETURN
```

THE "DIRECTORY" STARTS AT %(-23680) AND RUNS 96 (48x2) BYTES LONG. THE "FOR NEXT" LOOP IN LINE 505 SETS UP WITH THE DATA FROM THE "DIRECTORY" AND DRAWS ALL 48 STATES USING THE LINE COMMANDS SHOWN. THIS WAY **TEXAS** (25 LINES) AND **RHODE ISLAND** (4 LINES), CAN BE IN THE SAME STRING. THE PART WITH J,K,+L IS SO THE STATE CAN BE DRAWN IN THE LOWER LEFT CORNER OF THE SCREEN BEFORE IT GETS PUT IN THE MAP. THIS IS THE GAME CONCEPT OF THE PROGRAM. PLAYERS 1+2 TRY TO RECOGNIZE STATES BY THIER SHAPE AND LOCATION. "GOSUB 500" PUTS A STATE IN LOWER LEFT, "GOSUB 490" PUTS IT IN THE MAP. F=2 AND S=RND (48) WHEN THIS ROUTINE GETS RUN.

THE GREAT AMERICAN JIGSAW IS THE ONLY BASIC PROGRAM I'VE EVER SEEN USING THIS STRING METHOD. FOR MORE INFORMATION CONSULT **PROGRAMMING THE Z80** BY [RODNAY ZAKS] (TO BE FOUND IN MOST **RADIO SHACK** STORES). THIS METHOD IS COMMON IN MACHINE CODE PROGRAMS.

THE LAST METHOD IS ACTUALLY A HARDWARE METHOD THAT NOBODY (EXCEPT ME) EVER USED. ONLY IN THE 16K VERSION OF **QUADRA** CAN YOU FIND IT, AND IT'S LIMITED TO @(X) ALLOCATIONS ONLY! I CALL IT:

THE PHANTOM-START METHOD

TO DEMONSTRATE, PUT AB IN THE SLOT AND RUN THIS:

```
10 .CD00N GYR0AUT UKLNA0TWI 0WNHSA!T  IYT0 UW 0DRIKDS?!
20 CLEAR ;A=20000;C=%(A);%(A)=-24571;GOSUB 40
30 %(A)=-24570;GOSUB 40;%(A)=C;IF KPRUN
40 FOR B=0TO 25;TV=@(B);NEXT B;RETURN
```

BE SURE TO KEY IN LINE 10 EXACTLY AS SHOWN SPACES AND ALL!!! %(20000) IS THE "TXTUNF" IN AB (SEE PG. 103 AB HANDBOOK). WHEN THIS NUMBER CHANGES (AS WHEN WE CHANGE OUR BASIC TEXT) @(0) GETS MOVED TO A NEW ADDRESS. BY GIVING THE "TXTUNF" A PHANTOM ADDRESS WE START A PHANTOM STRING, EITHER INSIDE THE TEXT (SHOWN ABOVE), OR IN THE FREE SPACE BEYOND. THE PROGRAM CAN BE LISTED, RUN, OR TAPED, BUT NOT EDITED OR CHANGED, UNLESS THE CORRECT "TXTUNF" HAS BEEN RESTORED. "C=%(A)" AND "%(A)=C" SAVES IT IN THE PROGRAM ABOVE. THIS IDEA IS BETTER SEEN IN EB WHERE THE TEXT CAN BE IN %(!6000) ADDRESSES, WITH THE @(X) IN %(!7000) ADDRESSES, OR VICE VERSA. TO RUN THE ABOVE PROGRAM IN BB CHANGE "20000" TO "20050". FOR BRB, CHANGE "20000" TO "27778", AND "-24571" AND "-24570" TO "24579" AND "24580". IN VIPER-SOFT, CHANGE "20000" TO "-32638", AND "-24571" AND "-24570" BECOMES "-31743" AND "-31742". IN LINE 40, "TV=@(B)" PRINTS ONLY THE LOWER BYTE OF THE @(X) LOCATIONS.

ONE LAST NOTE ON "HARDWARE" STRING ALLOCATIONS. CERTAIN DATA IS BEST KEPT IN CERTAIN ALLOCATIONS. SINCE @(X) IS SHORTER THAN "%(X+20258)" IN THE BASIC TEXT, @(X) OR ¥(X) IS BEST FOR KEEPING PLAYERS SCORES, ETCETERA. SINCE ¥(X) DOESN'T CHANGE WITH A LAST MINUTE TEXT CHANGE, IT WORKS BEST FOR "FIXED" STRINGS, AND @(X) WORKS BEST AS AN "AREA". ALSO, MACHINE CODE WON'T RUN FROM @(X), ¥(X), OR %(-X), IN AB AND BB BECAUSE THESE ALLOCATIONS ADDRESSES EXIST ONLY IN THE CARTRIDGE AS NEGATIVE NUMBERS. MACHINE CODE RUNS "AROUND" THE CARTRIDGE, LEAVING US WITH ONLY %(X) OR %(+X), AND %(X) WORKS BEST. HOWEVER, MACHINE CODE CAN RUN FROM ANYWHERE INSIDE EXISTING MEMORY IN EB. (SEE ARCADIAN VOL. 5 PAGES 60, 61, 113, 117, 145, AND 175 FOR MORE INFORMATION).

IN CLOSING THIS SERIES I CAN ONLY REPEAT A LINE I USED IN EVERY ISSUE LAST YEAR. **"IF ANY OF MY PROGRAMS PUZZLE YOU, DON'T HESITATE TO WRITE. A S.A.S.E. SPEEDS UP REPLYS".**

FINALLY, HERE IS A SHORT PROGRAM THAT SHOULD GIVE YOU A GOOD LAUGH!! (**EB ONLY**! SORRY ABOUT THAT):

SILLY-FACE BY MIKE WHITE

```
10 CLEAR ;FOR A=27TO 30;CIRCLE 0,12,A,6;NEXT A;BOX 0,32,160,40,4
20 FOR B=-15TO 15STEP 30;FOR A=7TO 9;CIRCLE B,20,A,5;NEXT A
30 BOX B,20,3,3,7;NEXT B;DATA CX,-33,-32,6,0,L.
40 PRINT "HAPPINESS IS";FOR B=1TO 3000;NEXT B;FOR A=37 TO 40
50 CIRCLE 0,12,A,5;NEXT A;BOX 0,10,9,9,7;DATA CX,-57,-40,7
60 PRINT "A BLUE RAM SYSTEM!!!",;IF KPRUN
```

FOR SALE:300 BAUD,16K BLUE RAM WITH ASSEMBLY INSTRUCTIONS,AND THREE TAPES.(UTILITY,KEYBOARD,OPERATING SYSTEM PROGRAMS)NEEDS MINOR WIRE WRAPPING REPAIR.ASKING $100.00 OR TRADE FOR MLM CART. AND BALCHECK OR MS.CANDYMAN.ALSO I AM LOOKING FOR A B.R. PRINTER INTERFACE OR MORE DETAILED INFO ON USING THE 300 BAUD SERIAL PORT.(I HAVE THIS) I HAVE AN AQUARIUS THERMAL PRINTER.IT PLUGS RIGHT IN.IT PRINTS GRAPHIC CHARACTERS.DOES ANYONE HAVE A PROGRAM TO STRAIGHTEN THIS OUT?SEND TO: ALLEN SKAGGS,9421 SUNSET DR.,TAMPA,FLA.33610(813)626-7345

Also From Allen:

I added a TPDT switch just to the right top corner by the cassette plug in area and drilled a small hole allowing a short coaxial cable to be pulled out when needed for A.B. I installed two short coaxial cables at the right lower rear of the unit.These go to B.R. and on the lower left rear area I installed two input jacks for the 2000 baud tape player.The coaxial cables have 1/8 inch plugs on them.

This allows me to keep a tape player connected to my 300 baud interface,keep the B.R. plugged into another one which is also used for A.B. tapes.Cable switching eliminated by the switch.All wiring is neatly inside and the coaxials are retractable into the unit. I may add an audio speaker into the Bally soon.I have discovered a need for it recently.

DOT TO DOT

BY BRUCE BRIGDEN
401 E. MAIN
BELOIT, KANSAS 67420
(913) 738-5881

IN BLUE RAM BASIC

LOWERCASE WORDS ARE 1-BYTE KEYPAD WORDS. UNDERSCORES ARE SPACES.

```
1 default ;BC=7;clear ;box 0,0,120,80,7;box 0
,0,100,60,5;box 0,0,80,40,6;CY=0;CX=-27;CC=2;
print "DOT-TO-DOT";CC=7;for D=0to 1500;next D
;BC=0;FC=252;gosub 20;gosub 215;S=0;R=0;goto
50
2 box X,Y,3,3,3;return
3 gosub 2;gosub 2;return
4 if P=1S=S+1;CY=0;CX=-65;print #0,S
5 if P=2R=R+1;CY=0;CX=65;print #0,R
7 X=X+JX(P)x10;Y=Y+JY(P)x10;if X>30X=30
8 if X<-30X=-30
9 if Y>30Y=30
10 if Y<-30Y=-30
11 return
12 box -65,20,9,11,1;return
13 box 65,20,9,11,2;return
14 if P=1box A,B,3,5,5;box A,B,5,3,5
15 if P=2box A,B,5,5,2;box A,B,3,3,2;box A,B,
1,1,2
16 return
17 gosub 14;C=1;gosub 4;return
20 scroll 0,0,160,80,20;CY=-30;CX=-30;print "
DOT-TO-DOT";print ;CX=-30;print "J(XY)=MOVE";
CX=-33;print "TR=REGISTER
30 for Z=1to 2000;next Z;clear ;return
50 for X=-30to 30step 10;for Y=-30to 30step 1
0;gosub 2;next Y;next X;CY=20;CX=-65;print "1
",;CX=65;print "2
60 X=0;Y=0;P=1;C=0;gosub 12;A=-65;B=-20;gosub
 14;P=2;A=65;gosub 14;P=1
70 gosub 7;gosub 3;if TR(P)line X,Y,0;A=X;B=Y
;MU=10;MU=30;MU=50;MU=70;goto 90
80 goto 70
90 gosub 7;gosub 3;if TR(P)MU=25;MU=52;if (AB
S(X-A)+ABS(Y-B))=10line X,Y,1;MU=55;MU=55;MU=
55;MU=55;goto 110
100 goto 90
110 if PX(X+5,Y)>0if PX(X,Y+5)>0if PX(X+5,Y+1
0)>0if PX(X+10,Y+5)>0if PX(X+5,Y+5)=0A=X+5;B=
Y+5;gosub 17
120 if PX(X+5,Y)>0if PX(X,Y-5)>0if PX(X+10,Y-
5)>0if PX(X+5,Y-10)>0if PX(X+5,Y-5)=0A=X+5;B=
Y-5;gosub 17
130 if PX(X,Y+5)>0if PX(X-5,Y)>0if PX(X-10,Y+
5)>0if PX(X-5,Y+10)>0if PX(X-5,Y+5)=0A=X-5;B=
Y+5;gosub 17
140 if PX(X,Y-5)>0if PX(X-5,Y)>0if PX(X-5,Y-1
0)>0if PX(X-10,Y-5)>0if PX(X-5,Y-5)=0A=X-5;B=
Y-5;gosub 17
150 if R+S=36goto 190
160 if C_C=0;goto 70
170 P=P+1;if P>2P=1
180 gosub 12;gosub 13;goto 70
190 box 0,0,80,20,2;CY=0;CX=-23;print "GAME_O
VER
200 box 0,0,80,20,3;for Z=1to 50;next Z;if TR
(1)clear ;R=0;S=0;goto 50
210 goto 200
215 if TR(1)+TR(2)return
220 print "_THE_PURPOSE_OF_THIS_GAME___IS_TO_
PULL_THE_TRIGGER___ON_2_DOTS_TO_DRAW_A_LINE
230 print "___THAT_COMPLETES_A_TINY_____SQUA
RE.
240 print "_YOU_WIN_EACH_SQUARE_YOU_________
COMPLETE.
250 for A=1to 2000;next A;clear ;return
5000 %(27950)=27195;%(27952)=13;;print %(2457
6),2000
-256
```

ZAP ATTACK

BY BRUCE BRIGDEN
401 E. MAIN
BELOIT, KANSAS 67420
(913) 738-5881

BLUE RAM BASIC

LOWERCASE WORDS ARE 1-BYTE KEYPAD WORDS. UNDERSCORES ARE SPACES.

```
1 default ;BC=7;clear ;box 0,0,120,80,7;box 0
,0,100,60,5;box 0,0,80,40,6;CY=0;CX=-27;CC=2;
print "ZAP_ATTACK";for D=1to 1500;next D;CC=7
10 clear ;BC=66;FC=6;P=0;Q=10;CX=P;CY=Q;Z=430
;gosub 540
15 NT=0;CX=-60;CY=-29;print "__ZAP_ATTACK!
20 CY=-39;print "___NUMBER_OF_WALLS?:
30 U=KN(1)÷10+13;CX=30;CY=-39;print U;if TR(1
)=0goto 30
40 if TR(1)=1U=U+6;goto 60
50 A=rnd (99)
60 @(1)=rnd (99);for A=2to U
70 L=rnd (99);N=A-1;for B=1to N;NT=3;MU=L+B;N
T=0;if L=@(B)goto 70
80 next B
90 @(A)=L;next A
100 P=0;Q=0;clear ;BC=6;FC=9;gosub 540;P=P-28
;Q=Q-23;for A=7to U;gosub 470;gosub 490;next
A
110 for A=2to 6;gosub 470;gosub 510;next A;X=
@(1);Y=(X-1)÷10;X=X-Yx10;gosub 520
120 CX=-36;CY=42;print ">_YOUR_MOVE_<
130 if TR(1)#0goto 155
140 K=JX(1);J=JY(1);if K=0if J=0goto 130
150 gosub 460;box H,I,5,5,7;X=X+Kx(&(28)+127)
÷75;Y=Y+Jx(&(28)+127)÷75
155 gosub 520;if X<1goto Z
160 if X>10goto Z
170 if Y<0goto Z
180 if Y>9goto Z
190 C=Yx10+X;for A=2to U;if C=@(A)goto Z
200 next A
210 for A=2to 6;L=@(A);if L<1goto 350
220 T=(L-1)÷10;S=L-Tx10;V=X-S;W=Y-T;for B=2to
 6;if A=Bgoto 240
230 if L=@(B)goto 250
240 next B;gosub 480;box H,I,5,5,7
250 if V=0goto 280
260 if V<0S=S-1
270 if V>0S=S+1
280 if W=0goto 310
290 if W<0T=T-1
300 if W>0T=T+1
310 gosub 500;D=Tx10+S;@(A)=D;if D=Cgoto 440
320 for B=7to U;if D#@(B)goto 340
330 @(A)=-1;gosub 530;goto 350
340 next B
350 next A
360 for A=2to 5;L=@(A);if L<1goto 390
370 for B=A+1to 6;if L=@(B)@(A)=-1
380 next B
390 next A
400 for A=2to 6;if @(A)>0goto 120
410 next A;for A=1to 5;gosub 520;next A
420 BC=202;FC=7;CY=42;CC=1;print "__ALL_ATTAC
KERS_DESTROYED!";CC=7;for E=1to 30;NT=5;MU=70
;next E;run
430 BC=1;FC=118;CY=42;CC=1;print "____YOU_ZAP
PED_YOURSELF!";CC=7;goto 450
440 FC=98;CY=42;CC=1;print "_____YOU_ARE_ZAP
PED!";CC=7
450 NT=2;for A=1to 15;MU=44;X=FC;MU=46;FC=BC;
MU=48;BC=X;MU=46;next A
452 for T=1to 5;&(17)=31;&(19)=37;&(21)=47;&(
22)=31;for S=35to 15step -1;&(16)=S;next S;fo
r S=15to 35;&(16)=S;next S;next T
454 for O=22to 16step -1;&(O)=0;next O;run
460 H=P+Xx5;I=Q+Yx5;return
470 S=@(A);T=(S-1)÷10;S=S-Tx10
480 H=P+Sx5;I=Q+Tx5;return
490 box H,I,5,5,4;NT=2;MU=H;MU=I;NT=0;return
500 gosub 480
510 box H,I,5,1,5;box H,I,1,5,5;box H,I,3,3,5
;NT=2;MU=55;MU=53;MU=51;MU=53;MU=55;NT=0;retu
rn
520 gosub 460;box 0,42,160,12,6;box H,I,3,3,6
;box H,I,1,1,2;NT=3;for E=1to 9;MU=80;next E;
NT=0;return
530 box H,I,5,5,4;box H,I,3,3,2;box H,I,1,1,2
;box H,I,5,5,4
535 NT=2;for E=1to 15;MU=33;next E;NT=0;retur
n
540 box P,Q,62,62,3;box P,Q,60,60,3;box P,Q,5
0,50,3;return
5000 %(27950)=27195;%(27952)=13;:print %(2457
6),2000
-256
```

DESCRIPTION OF "CATERPILLAR"

Caterpillar is a solo game of skill and luck, originated by Kevin O'Neill,published in the Arcadian August 24, 1984 in volume 6, #10, page 95, and now greatly enhanced for virtually limitless play with scoring precisely taylored to the player's performance.

The Astrocade's accumulation limit of 32,767 has been bypassed and this rather addicting game could easily become one of those we Arcadians will play competitively for highest score. The score limit on this game is 32,789,999.

Caterpillar progresses through 9 levels within each a floppy disk has to be moved 5 times by touching it in order to reach the next, more difficult level. Sometimes the caterpillar will go straight through the disk without further consequence and you must return to it to touch it again before the disk is actually moved, whereby the gap the removed disk leaves behind in the caterpillar's trail will help recover smoothly from this tight looping. One must not penetrate any walls or the caterpillar's trail or it will promptly disintegrate with rare exceptions you cannot count on, however, constituting a glimpse of hope in case of an emergency. If you must, you can make it through a wall, but it'll cost 1 or 2 blow-ups depending on the wall's thickness. - Don't worry, though; this creature has 3 lives, thus giving you 3 chances on each level to make it through. The time within which one has to complete each disk move is limited and a timing bar under the score display, with a special warning after 75% of elapsed time, enables you to monitor your status continually, because running out of time is fatal to the caterpillar and final for the game. - One special word about level 9 being, of course, the most difficult:
After you have moved the disk 3 times and had no blow-ups, one barrier is eliminated and an additional opening created so you can triumphantly finish this ridiculously designed level.

Upon completion of the 9th level you will be credited with 1000 bonus points, increasing by 500 every time you do within the same game, after which the game will return to level 1 by pressing TR, retaining your achieved score.

The score is calculated as follows:

50 points for each disk move
x the number of disks moved
x the number of level you're on
- the time used (total available time equals 160 points)
x the number of blow-ups x 2
x the number of level you're on

It might happen that your first, or several early, scores on level 1 will produce a negative number, but do not be discouraged - it'll progress into high numbers quickly as you go on. Keep in mind, however, that running into walls or the caterpillar's trail has an increasingly heavy toll on your score accumulation and may, in fact, reduce your score at any given stage of the game. Also, time limitation dictates to reach the disk via the shortest way possible, remembering, however, not to create inaccessible areas with your caterpillar's trail which often necessitates a quick decision on from what direction to best approach that persistent disk. - An average score after 9 levels without major disasters lies between 15,000 and 25,000.
Typical score display:

2.6 1 16754 + 25K 2

(# of level / fraction in increments of 2 tens toward the next level / # of set of 9 levels you're on / score / 25,000 points already reached / # of blow-ups happened on this level)

Be meticulous inputting this program since there's only 15bytesoutside the listing for execution.

Good luck and much fun!!!

CATERPILLAR

revised by Klause Doerge

small italics = 1-BYTE KEYPAD WORDS
UNDERSCORES = SPACES
1785 CHARACTERS USED SZ = 15

```
 1 A=0;P=500;W=0
 2 ↓;L=0
 3 clear ;CY=R;BC=5;FC=5;box 0,I,160,74,
   1;box 0,I,134+Lx2,48+Lx2,2;C=1;D=0;L=
   L+1;X=0;Y=0;if L>1gosub L+21
 4 FC=rnd (32)x8+1;if W=0print
   "_CATERPILLAR",
 5 if W+TR(1)=0goto 5
 6 E=0;CX=-75;print #0,L,".",2xD,#4,
   P+500,#8,W,;if Aprint "_+",#3,A,
   "K",;if K_MO=25;gosub R;K=0
 7 G=rnd (145)-73;H=rnd (59)-37;if PX(G+2,
   H)+ PX(G-2,H)+PX(G,H-2)+PX(G,H+2)
   goto 7
 8 box 0,32,160,3,2;MO=rnd (F)+V;for T=-2
   to 2;VA=9;TA=T+9;box G,H+T,5,1,1;↓;next
   T;box G,H,3,1,2;box G,H,1,3,2;box 0,32,
   160,1,1
 9 Z=M;Q=N;M=JX(1)x2;N=JY(1)x2;if M=0if N=
   0M=Z;N=Q
10 if PX(X+Z,Y+Q)goto 13
11 E=E+1;box E-81,32,1,3,3-(E>119)x2;ifE>
   160goto 58
12 X=X+M;Y=Y+N;MO=V;VA=9;TA=rnd (4);box X,
   Y,3,1,1;box X,Y,1,3,1;↓;goto 9
13 if ABS(X-G)<5if ABS(Y-H)<5gosub 70;
   goto 19
14 C=C+2-(C=3);CX=72;print #0,C+2,;NM=1;
   NV=R;J=1
15 TA=Cx2;VA=TA;for T=0to C;MO=T-V;
   gosub 17;next T;J=2;for T=0to C;MO=F-T;
   gosub 17;next T;↓;if C=6goto F
16 goto 9
17 box X+T,Y,1,1,J;box X+T,Y+T,1,1,J;box
   X+T,Y-T,1,1,J;box X,Y+T,1,1,J;box X,
   Y-T,1,1,J;box X-T,Y+T,1,1,J;box X-T,
   Y,1,1,J
18 box X-T,Y-T,1,1,J;return
19 if L+D=14MO=I;gosub R;gosub R;gosub R;
   goto V
20 if L=9if C=1if D=3MO=S;gosub R;VA=9;
   for  T=-17to 3;TA=5-T;box 5,T,5,9,2;
   next T;↓
21 if D=5MO=99;for U=0to L;MO=MO-3;
   gosub R;next U;goto 3
22 goto 6
23 box rnd (R)-20,I,70,5,1;return
24 box 0,rnd (15)-25,F,5,1;box rnd (V)
   +9,I,5,V,1;return
25 box 0,9,rnd (F)+V,5,1;box 0,-24,rnd
   (F)+V,5,1;box rnd (R)+9,I,3,20,1;
   return
26 box 0,I,90,rnd (14)+32,1;box 4,I,90,
   24,2;return
27 box -V,I,3,44,1;box V,I,3,44,1;box rnd
   (R)-20,9,V,3,1;box 0,rnd (15)-22,99,
   6,1;return
28 box 0,I,F,R,1;box 0,I,V,27,2;box=0 I,
   I,V,rnd (9)+9,2;box rnd (26)+R,I,5,V,
   1; box rnd (20)-F,I,5,V,1;return
29 box 25,11,98,5,1;box 25,-25,98,5,1;X=
   rnd (2)-1;box Xx5-26,I,98,5,1;box rnd
   (25)+R,I+Xx7,5,21,1;return
30 box 3,I,145,3,1;box I,11,F,7,1;box I,
   -25,F,7,1;box V,14,17,23,1;box V,-29,
   17,23,1;box 5,I,2,R,1;return
39 TA=9;TB=13;for O=15to 0step -1;VA=O;
   VB=O;for T=0to O;next T;next O;↓;
   return
50 P=P+500;BC=0;FC=7;CX=V;print #5,P,;
   W=W+P;gosub S;TA=9;TB=17
51 for O=15to 0step -1;VA=O;VB=O;for T=
   Rto F;MO=T;next T;box 64,R,29,9,3;
   next O;goto 2
58 CX=72;print "↓",;NM=0;VR=9;VF=-1;
   NT=127;MV=-F;NT=0
60 BC=FC;FC=5;CX=-23;CY=0;print "_GAME_
   OVER
61 box 71,R,11,9,3;goto 61-TR(1)xF
70 D=D+1;J=VxDxL-ExCxL;CX=-45;print #2,
   E,#8,J,"_______",;box G,H,5,5,2;
   gosub R;W=W+J
25000 if W>S_W=W-S;A=A+25;K=1
25010 return
```

NOW TYPE IN WITHOUT A LINE NUMBER:

B=160;F=60;I=-7;NT=0;R=39;S=25000;
V=50"GO"

RECORD PROGRAM BEFORE PLAYING!

3 PART HARMONY

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Send check or money order to:

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Vol 7 No 4 ARCADIAN 15 Aug 1986

ATTENTION! ATTENTION!!

AS OF JANUARY 1ST 1986 A NEW SERVICE HAS BEGUN! ANY TAPED AB OR BRB PROGRAM THAT YOU WOULD LIKE TO SEE IN A CARTRIDGE CAN BE DONE FOR ONLY $9.95 A CARTRIDGE! THIS DOES NOT MEAN THAT THE PROGRAMS WILL BE IMPROVED. IT MEANS THAT WE'VE DISCOVERED A WAY TO PUT BASIC INTO CARTRIDGES AND MAKE IT RUN!!

NOTE: SOME PROGRAMS THAT WE DON'T ALREADY HAVE IN OUR POSSESSION MAY REQUIRE A SUBMITTED TAPE TO BURN.

BRB (USES ADDITIONAL MEMORY)

BLUE RAM UTILITY (PERKINS)
COLLISION COURSE (WAVEMAKERS)
WHACK-A-MOLE (WAVEMAKERS)
C-8 LINE ART (STANLEY KENDALL)
MONKEY JUMP (WAVEMAKERS)
SLOTS OF FUN (WAVEMAKERS)
BEATLE MUSIC (GEORGE MOSES)
SPRING THING (GAMBITS)
GOLD DIGGER (DAVE CARSON)
DUNGEONS OF DRACULA (WAVEMAKERS)
THE GATE ESCAPE (WAVEMAKERS)
ARCADE GOLF (GAMBITS)
FLYING ACE (WAVEMAKERS)
OUTPOST 19 (WAVEMAKERS)
EIGHT DAYS A WEEK (GEORGE MOSES)
FLIGHT SIMULATOR (WAVEMAKERS)

PLUS THESE FEW THAT REQUIRE 16K BLUE RAMS PLUS PARALLEL PRINTER INTERFACE

THE LISTER (GEORGE MOSES) (MODIFIED)
LETTER WRITER (PERKINS) (MODIFIED)
ENVELOPE ADDRESSER (PERKINS) (MODIFIED)
SNOOP CAMERA (MIKE WHITE SOFTWARE)

FINALLY THESE. THAT REQUIRE NOTHING MORE THAN A BALLY-ASTROCADE CONSOLE:

CHICKEN (BIT FIDDLERS)
WILDCATTER (ESOTERICA)
GREAT AMERICAN JIGSAW (ESOTERICA)
SIMON (NIAGARA BUGS)
GOBBLERS (ARCADIAN)
OLD BENT NOSE (ARCADIAN)
CLAIM JUMPER (L&M)
RIVER CITY GAMBLER (L&M)
FROG LEAP (DAVE IBACH)
MEMORY LANE (WAVEMAKERS)
CASTLE OF HORRER (WAVEMAKERS)
LOOK OUT FOR THE BULL (WAVEMAKERS)
TOMB PIRATES (WAVEMAKERS)
TOWER OF HANOI (ARCADIAN)
CANDY MAN (L&M)
BOMB SQUAD (ESOTERICA)
TREASURE ISLAND (NIAGARA BUGS)
THE PITS (ARCADIAN)
O-JELLO (PERKINS)
CONNECT FOUR (ARCADIAN)
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NAM-CAP #4 (NEW IMAGE)
HI-Q SOLITARE (NEW IMAGE)
SOUND EFFECTS (WAVEMAKERS)
L.T. (PARTS 1 OR 2) (WAVEMAKERS)
QB-2B (WAVEMAKERS)
AYATOLLA DART BOARD (L&M)
REBOUND (ARCADIAN)

PLUS ALL PROGRAMS IN BRB FROM WAVEMAKERS, EXCEPT FLIGHT SIMULATOR, ARE ALSO AVAILABLE FOR AB! AND NEARLY ALL OF GEORGE MOSES'S MUSIC TAPES AND MANY MORE!

COLLECTING MORE,
MIKE WHITE SOFTWARE

SEND TO:

MICHAEL D. WHITE
4585 COUNTY LINE #2
R.D.#1 BOX 373
WAKEMAN, OHIO 44889

LOWERCASE WORDS ARE 1-BYTE KEYPAD WORDS. UNDERSCORES ARE SPACES.

[SZ=442]

HANGMAN

BY MIKE WHITE 4585 COUNTY LINE #2 WAKEMAN, OHIO 44889

```
1 NT=7;gosub O;print "S?";D=KP-48;if (D<1)+(D>2)run
2 NT=0;A=0;if D=2A=1;gosub M;A=0;gosub M;goto 4
3 @(0)=47;@(1)=0;D=rnd (Z)-1;@(2)=*(D)÷99;@(3)=RM;@(4)=*(D+Z)÷99;@(5
)=RM
4 E=@(A)÷K;if RM=0if F=0CX=H;print "GAME_0VER",;if KPrun
5 D=0:F=RM;if F=0goto Q
6 gosub O;print #2,1+A,"_UP";print F,"_TRYS_LEFT";G=1+AxK;print E,"_
LETTERS";CX=-60;B=KP;for C=1to E;if B=@(C+G)print "_YES",;D=1
7 next C;if D=0print "N0";F=F-1;CY=24;print F
8 D=0;CY=0;CX=J;print "GUESS_W0RD?";CY=-K;CX=-70;for C=1to E:B=KP;if
 &(21)=16box 0,-K,160,8,2;goto 8
9 if B=48goto W
10 TV=B;if B=@(C+G)D=D+1
11 next C;if D=Eprint ;CX=H;print "IS_RIGHT!";gosub N;F=0;goto Q
12 gosub S
20 if F<1gosub R;gosub N
8012 @(A)=ExK+F;A=1-A;NT=0;CY=J;goto 4
20260 clear ;CX=-W;FC=0;BC=7;print "HANGMAN";CX=-55;print "PLAYER",;
return
20267 C=0;G=1+AxK;gosub O;print #2,2-A,"_ENTER_W0RD
20270 CY=W;print C,"_LETTERS_ENTERED";B=KP;if B=13@(A)=CxK+7;return
20271 if B=31goto M
20272 if B<91if B>64C=C+1;if C<11@(C+G)=B;goto P
20273 CX=-51;print "T00_HARD_TRY_AGAIN";for D=1to 500;next D;goto M
20274 NT=U;&(17)=V;&(22)=U;for BC=255to 0step U;FC=BC+132
20275 &(18)=BC;&(W)=BC;next BC;return
20277 clear ;BC=223;FC=88;box 0,0,70,3,1;box J,Y,3,44,1;box X,Y,3.44
,1;box 28,15,3,X,1;box 14,29,28,3,1;line J,Y,0
20287 line X,I,1;line X,Y,0;line J,I,1;line 28,W,0;line 18,X,1;line
0,X,0;%(M)=L;%(N)=Q;%(R)=128;CALLO;line 0,5,1
20297 %(P)=128;%(M)=Q;%(R)=129;NT=15;for D=Sto T;MU=%(D);next D;NT=7
;print "THE_W0RD_WAS
20307 CX=-71;CY=X;NT=W;for D=1to E;TV=@(D+G);next D;for D=0to 999;ne
xt D;NT=1;MU=49;box 0,0,12,3,2;box 6,-6,3,12,1
20317 MU=32;line 0,13,0;NT=U;&(22)=U;for D=Xto 45;CALLO;line 0,43-D,
1;&(18)=Dx2;%(M)=%(N);%(N)=%(N)+256;%(P)=129;next D
20327 &(18)=0;%(N)=%(M);%(R)=130;CALLO
20328 NT=U;&(21)=240;&(22)=127;&(23)=88;for D=Zto V;&(17)=D
20352 next D;NT=0;return
```

```
ENTER>clear :for A=0to 199step 1;print "¥(",#1,A,;input ")="¥(A);next A
ENTER>[NUMBER STRING] PRESSING [GO] AFTER EACH ENTRY
      (NOTE) [READ EACH COLUMN DOWN WHEN ENTERING]

    8678    7985    8979    6705    8297    7601    8197    7901
    6999    6613    8695    7197    7608    7791    6515    7604
    7791    8381    8678    7003    8796    7599    7599    8301
    7111    8583    7102    6619    6501    8207    7014    7703
    7907    6511    7985    7006    6913    8296    7985    7901
    7391    8282    8401    8678    6801    7295    8401    7790
    8686    6610    7193    7993    7790    7908    8186    7989
    6705    8191    7593    7003    7307    7793    7014    7600
    7015    6718    7311    6607    7600    6603    6705    8186
    8104    8191    8692    6712    7311    6705    8186    7692
    6797    7114    7597    8197    8385    7594    8301    6708
    6607    8301    7003    6603    7494    7901    8289    6513
    7609    6613    7094    7999    6708    7905    7692    8202
    8495    7702    7193    6715    7899    6801    7793    7908
    6896    7201    6698    7603    8306    7101    7600    8286
    7688    8388    7193    7603    8979    7305    7790    8301
    8880    6698    8381    7009    6517    8289    7989    7905
    7702    7094    8290    6919    8583    8583    7793    7311
    7193    8296    8187    6995    7603    7014    8301    6801
    7405    6712    8289    8296    7494    7689    8499    6515
    6698    6999    7901    7688    7494    6915    6909    7303
    7305    7996    8301    8296    8395    8486    6911    8495
    7498    7498    7597    7193    8385    8686    7791    8583
    7801    6502    7411    7989    8286    7197    7703    6517
    6599    7105    8989    7985    6708    6503    7791    7309
ENTER>clear :for A=20260to 20352step 2;print "%(",#1,A,;input ")="%(A);next A
ENTER>[NUMBER STRING] PRESSING [GO] AFTER EACH ENTRY
      (NOTE) [READ EACH COLUMN DOWN WHEN ENTERING]

    8669   13311    3329    5140    5128    7196   12592   12337
   20281    8012   20288      54   16674   13884   12337   12589
     -43  -32728    7196    7168       0    9236   11056   12337
   -3789  -12032    2076   23901    7196      34   12338   12336
   10456  -32567   18815   32585    2076   12337   12850      32
     128       0   18761    2056    6152   12592   12592
ENTER>clear :for A=20016to 20052step 2;print "%(",#1,A,;input ")="%(A);next A
ENTER>[NUMBER STRING] PRESSING [GO] AFTER EACH ENTRY
      (NOTE) [READ EACH COLUMN DOWN WHEN ENTERING]

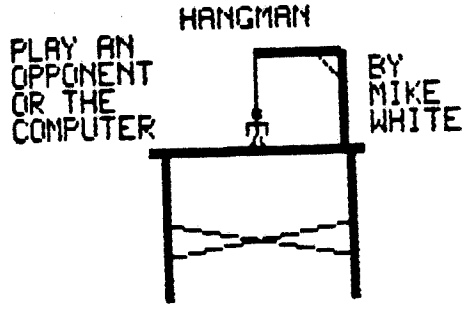
     -24   20267   20277      20
     -32   20274   20328      30
     -30   20260   20352     -22
      10   20270      -1     100
   -9999    8012     200
ENTER>print ":run ":;print %(16384),1985[REC]
```

AFTER TEXT HAS BEEN TAPED, ENTER TITLE SCREEN, BUT
DO NOT PRESS [RESET]

HANGMAN TITLE SCREEN
BY M.D.W. (ENTER AFTER TAPING TEXT, WITH TEXT STILL IN MEMORY)

```
20290 return
30000 gosub R:CX=-W:print "HANGMAN":print :CX=40:print "BY
30010 CX=40:print "MIKE
30020 CX=40:print "WHITE
30030 CY=32:print "PLAY_AN
30040 print "OPPONENT
30050 print "OR_THE
30060 print "COMPUTER
30070 :print %(16384),1972
ENTER>goto 30000:[REC]
```

(NOTE) USE "REF-CR" TO ASSEMBLE FINISHED PROGRAM
(SEE NIAGARA BUG BULLETIN VOL.2 PG.24 + 25, OR WRITE ME)



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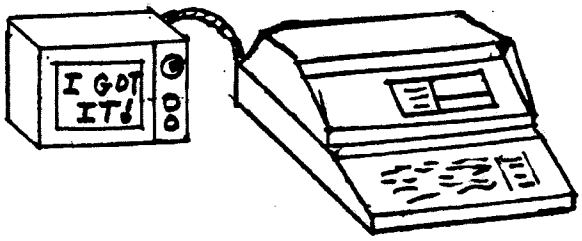
ZGRASS RUMOR - FACT OR FICTION?



I HAVE HEARD THAT SOME ZGRASS ADD-UNDER UNITS HAD BEEN SHIPPED IN VARYING CONFIGURATIONS BEFORE ALTERNATIVE ENGINEERING WENT UNDER. SOME VARIATIONS WERE IN THE TYPE OF DISK DRIVE THAT WAS USED, THE KEYBOARD CONNECTING, THE CABINET STYLING, THE DEGREE OF DESIGN AND CIRCUIT COMPLETION. IF YOU HAVE ONE OF THESE UNITS OR KNOW OF ANY ONE ELSE THAT HAS ONE, PLEASE DROP ME A LINE TELLING ME YOUR CONFIGURATION AND WHETHER ALL OF IT ACTUALLY WORKS FOR YOU. THANK YOU.
LEROY G. FLAMM 306 SYCAMORE ST.
MOHNTON, PA. 19540 (215)777-4187

FOR SALE: 2 R&L 64K RAM Boards, 1 is a kit (180.00 U.S.) and the other is a tested and assembled unit with 4K of RAM ($220.00).These boards are BRAND NEW, complete with documentation. Contact KEN LILL.

I have a limited quantity of old BALLY game cartridges for sale. contact me for details of what I have left and it's price. KEN LILL

Due to recent problems beyond my control, I only have 16K BLUE RAMs. However, if a 32K is what you want, I will send you a 16K, with a coupon entitling you to a 32K for the $25.00 U.S. difference. Upgrading a 4K into a 16K BLUE RAM costs $75.00 U.S.($100.00 U.S. for a 32K when they become available). KEN LILL

A BasiCart of the version of Caterpillar that is in this issue will be available soon. Contact MIKE WHITE.

If you want YOUR game shortened and possibly sped up, I will perform this service for $5.00 U.S. It can then be forwarded by me to MIKE WHITE to be put into a BasiCart, if you want. Pay MIKE the $10.00.
KEN LILL

BLUE RAM SCHEMATICS
$10.00 — KEN LILL

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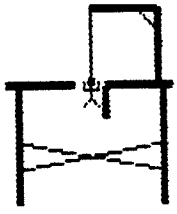
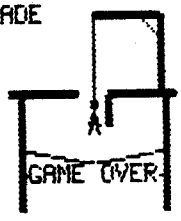
HANGMAN

GAME PLAYS ENTIRELY ON KEYPAD, NO HAND CONTROLS ARE USED
PLAYERS?
CHOOSE 1, AND PLAY AGAINST THE 100 FOUR LETTER WORD VOCABULARY
CHOOSE 2, AND PLAY EACH OTHER, OR PLAY IN TEAMS
PLAYER (1 OR 2) ENTER WORD
UP TO 10 ALPHABETIC LETTERS ALLOWED!
(NO NUMBERS, SPACES, OR SYMBOLS, THAT'S TOO HARD!)
SPELL IT RIGHT!! PRESS [ERASE] TO START OVER
PRESS [GO], AND YOUR OPPONENT ENTERS A WORD FOR YOU!
PLAYER (1 OR 2) UP
KEY IN A SINGLE LETTER, BALLY WILL ANSWER:
YES - THE LETTER IS IN THE HIDDEN WORD
NO - IT ISN'T!
YES YES - THE LETTER APPEARS IN THE WORD, TWICE!
GUESS WORD?
PRESS THE ZERO KEY TO PASS THIS PORTION.
GUESS RIGHT, AND YOU WIN!
GUESS WRONG, AND YOU GET RAZZED!
PRESS [ERASE] TO CLEAR WORD
NO TRIES LEFT, AND YOU GET STRUNG UP!
BALLY WILL TELL YOU WHAT "THE WORD WAS"
(JUST BEFORE YOU "PULL THE HEMP"!)
(HINT) USE PENCIL + PAD TO AVOID A "NECKTIE PARTY"!
(HIT ANY KEY FOR ANOTHER GAME)

THE WORD WAS
GRAB



THE WORD WAS
ASTROCADE



Michael Matte, 8605 W. Douglas Ave., Milwaukee,WI, 53225, has been doing a lot of work in the area of upgrading the mother board of the Arcade unit, as well as adding generally beneficial features. One of his packages has to do with the power supply, and I am including those revisions in this issue. While the power supply has been relatively trouble-free, there have been some failures and off-the-shelf replacements do not exist, so you may be interested in Mike's proposals for regulated sources.

PART	RATING	1986 Radio Shack Cat.#
Line cord		278-1255
Fuse	1.0A, fast blow	270-1273
Fuse holder		270-365
Transformer T1, T3	120VAC:12.6VAC @300mA	273-1385
Transformer T2	120VAC:12.6VAC CT @3.0A	273-1511
	END, CT, END — 12.6VAC END TO END; 6.3VAC END TO CT; CT = CENTER TAP	
Electrolytic capacitor (axial leads)	100uf,35WVDC	272-1016
Strain-relief		278-1636
Vinyl grommet		64-3025
Butt connectors (optional)		64-3036

Figure 2 - Parts list

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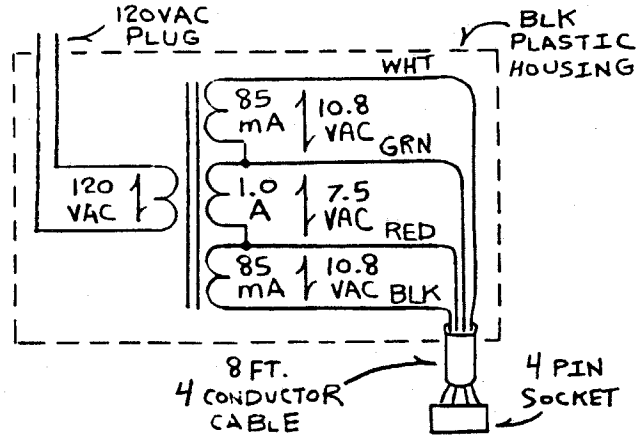
Experimenting With Your Astrocade
By Michael C. Matte
A Power Transformer Substitution

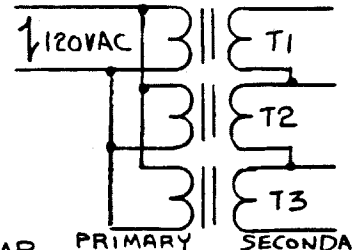
So your Astrocade power transformer has just quit and you can't get your hands on a replacement. Well, consider building the substitution presented in this article.

That black box that plugs into a 120VAC outlet houses a power transformer.



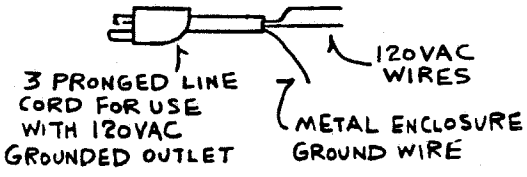
The transformer has 3 secondary windings: two rated 10.8VAC @85mA and one rated 7.5 VAC @1.0A when 120VAC is applied at the primary (input) winding. These ratings are indicated on the plastic housing. Earlier transformers apparently had two windings rated 11.5VAC in lieu of 10.8 VAC. The 8 feet four conductor cable is color coded. The color code is also indicated on the plastic housing. The 4 pin socket, which connects to the Astrocade motherboard, is not polarized and may be reversed since the power transformer secondary is symmetrical.

The custom Astrocade power transformer can be substituted with 3 power transformers wired and rated as shown below. Figure 1 shows a practical substitution for the Astrocade power transformer. Three power transformers are mounted side by side. The 3 transformer primaries are wired to the fuse holder and one end of a line cord. The remaining end of the line cord is wired to the other side of the fuse holder. The 4 conductor cable, cut at the Astrocade power transformer, is stripped and wired to the 3 transformer secondaries.

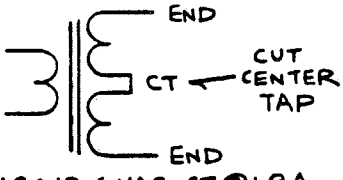


XFMR	PRIMARY VOLTAGE	SECONDARY VOLTAGE	MINIMUM SECONDARY CURRENT
T1,T3	120VAC	12.6VAC	85mA
T2	120VAC	6.3VAC	2.4A

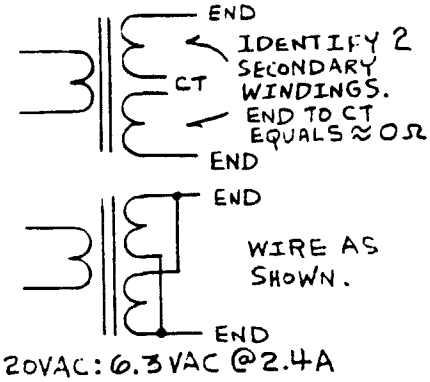
The wire terminations of figure 1 can be made with solder or a butt connector and insulated with electrical tape or heat shrinkable tubing. The fuse holder and the 3 power transformers should be mounted inside a vented metal enclosure. The metal enclosure will act like a heat sink and help remove some of the heat generated by the transformers. The line cord should be fed through a strain relief and the 4 conductor cable fed through a vinyl grommet. All wiring should be insulated from the metal enclosure to prevent electrical shock. For added protection from electrical shock, consider grounding the metal enclosure via a 3 pronged grounded line cord.



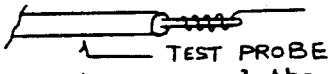
For the more daring, who are familiar with transformers and the use of an ohm-meter, a transformer physically smaller than the transformer T2 listed in figure 1 can be used. A transformer rated 120VAC:12.6VAC CT @1.2A (Radio Shack 1986 cat.#273-1352 or equal) can be modified to produce a rating of 120 VAC:6.3VAC @2.4A, assuming the center tap is accessible (brought out to a terminal). The modification is shown below.



120VAC:12.6VAC CT@1.2A



Testing of the Astrocade power transformer substitution can be performed before it is actually connected to the Astrocade computer by using an AC voltmeter. Wrap a fine wire around the tip of each voltmeter test probe as shown below.



Then wrap some tape around the probe so the wire won't slip off the probe tip. Fasten down somehow the 4 pin socket so it won't move during testing. Plug the 120VAC line cord into a 120VAC outlet and measure the voltages at the 4 pin socket terminals from white to green, from red to black and from green to red. Avoid shorting any of the 4 pin socket terminals. All is well if the voltages are near 12.6, 12.6 and 6.3VAC respectively. Zero or other voltage readings indicate a blown fuse, incorrect wiring or a bad transformer, assuming the AC voltmeter or AC outlet are functioning properly. Incidently, the Astrocade power transformer can be tested in a similar manner, however, the voltage readings will be 10.8, 10.8 and 7.5VAC as indicated on the transformer's plastic housing.

Figure 1 shows that capacitor C10 on the Astrocade motherboard must be rated ≥ 25V. The capacitor on your Astrocade motherboard is probably rated 16V. Desolder this capacitor C10 from the motherboard noting its polarity and solder a 100uf, 35V (see figure 2) capacitor in its place. Again, make sure the polarity is correct. Use a low wattage soldering iron, Radio Shack 1986 cat.#64-2070 or equal. It might be necessary to drill a tiny hole in the motherboard, so the positive lead of the 100uf, 35V capacitor can be soldered in place.

This scheme, a power transformer substitution, could be extended to supply power to circuitry external to the Astrocade computer. Transformers T1, T2 or T3 would have to be sized, rectifiers and voltage regulators added to meet the power supply demands of the external circuitry. Although the scheme of figure 1 can supply power to external circuitry, the amount of available power for external circuits has not been determined.

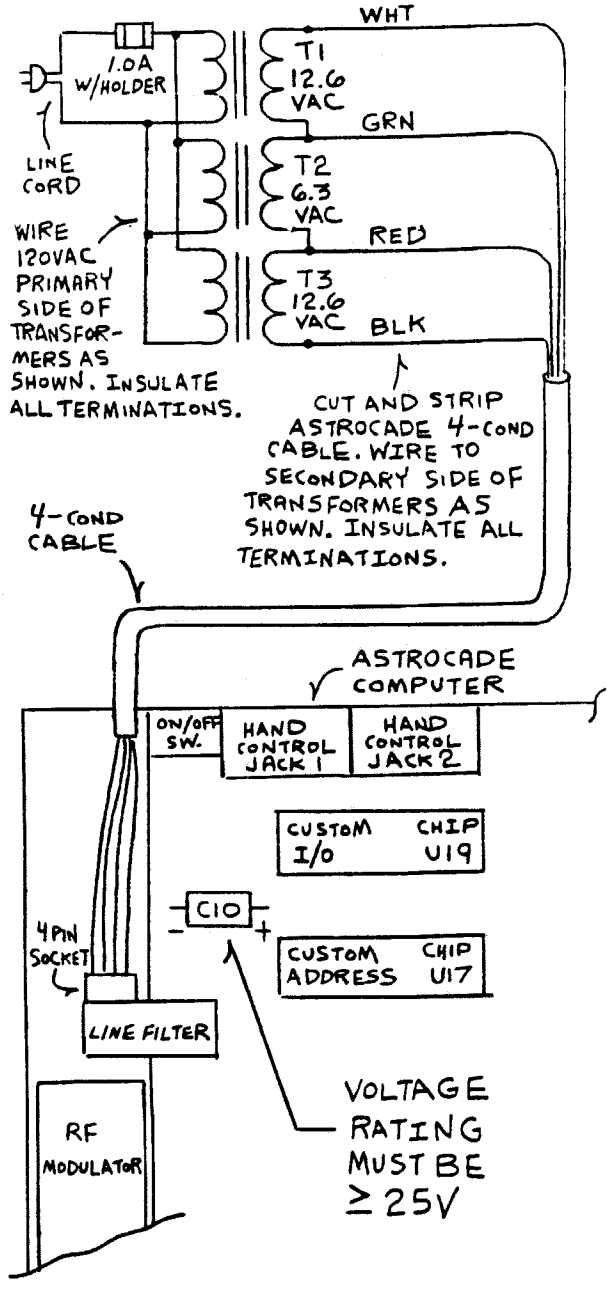


FIGURE 1
PRACTICAL SUBSTITUTION FOR ASTROCADE POWER TRANSFORMER

ARCADIAN

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IF YOU ARE STILL INTERESTED IN OBTAINING CARTRIDGES FOR THE BALLY-ASTROCADE SYSTEM, WE ARE NOW SUPPLYING THEM. SEND PAYMENT TO:

MICHAEL D. WHITE
4585 COUNTY LINE #2
R.D.#1 BOX 373
WAKEMAN, OHIO 44889

MUSIC MAKER	$44.95	(WITH TAPE INTERFACE AND 8 PAGES OF INSTRUCTIONS)
CHECKERS	$19.95	(BET YOU DIDN'T THINK THIS EVER EXISTED)
MAZEMAN	$29.95	(FORMERLY FROM DAVE CARSON)
BOWLING	$29.95	(FINALLY!!!)
SONGS	$19.95	(MUSIC TO ENJOY) (NOTE: THIS IS NOT MUSIC MAKER!!)
CONAN THE BARBARIAN	$29.95	(AT LONG LAST!!!)
SOCCER	$29.95	(AS PROMISED AGAIN AND AGAIN!!!)
VIDEO STORY BOOK	$29.95	(THE "MYSTERY CARTRIDGE". TELL US WHAT IT IS!)
MISSILE ATTACK	$29.95	(IF DON GLADDEN CAN'T SUPPLY THEM FOR LESS)
LIFE	$19.95	(IF UNAVAILABLE FROM DON GLADDEN)
PACMAN	$29.95	(PREVIOUSLY SOLD AS MUNCHER)

THE FOLLOWING IS A LIST OF "OLDIE" CARTRIDGES THAT ARE NOW AVAILABLE AT $29.95. THEY DON'T CONTAIN THE ORIGINAL PACKAGING OR ANY DOCUMENTATION.

CLOWNS - BRICKYARD
BLACKJACK,POKER AND ACEY-DEUCY
AMAZING MAZE - TIC-TAC-TOE
TORNADO BASEBALL,TENNIS,HOCKEY AND HANDBALL
ELEMENTARY MATH AND BINGO MATH
LETTER MATCH - SPELL'N SCORE - CROSSWORDS
PANZER ATTACK AND RED BARON
GRAND PRIX - DEMOLITION DERBY
SPACE FORTRESS (SPACE ZAP)
THE INCREDIBLE WIZARD (WIZARD OF WOR)
GALACTIC INVASION (GALIXIAN)
SOLAR CONQUEROR
DOG PATCH
SEAWOLF AND MISSILE
DEMO (STORE DEMO)
SPACE INVADERS
BALLY PIN (PINBALL)
STAR BATTLE
FOOTBALL
280 ZZZAP - DODGEM
BIORHYTHM
PIRATES CHASE
ARTILLARY DUEL
COSMIC RAIDERS

PLUS THESE "3RD PARTY" CARTRIDGES:

TREASURE COVE (ESOTERICA INC.)
BLAST DROIDS (ESOTERICA INC.)
MACHINE LANGUAGE MANAGER (BIT FIDDLERS)
MS. CANDYMAN (L+M SOFTWARE)
SEA DEVIL (L+M SOFTWARE)
SNEAKY SNAKE (NEW IMAGE)

PLUS THESE TWO "BASICS":

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THE MUSIC CASSETTE

A TECHNICAL DESCRIPTION

BY SCOT L. NORRIS

THE MUSIC CASSETTE IS AN EASY WAY TO WRITE MUSIC ON THE BALLY ARCADE. IN FACT, ONE NEEDS TO KNOW NOTHING ABOUT MUSIC TO USE THE MUSIC CASSETTE. AT PRESENT, THE BEGINNER WHO WANTS TO SIMPLY WRITE AND HEAR MUSIC, AND THE ADVANCED USER, WHO WANTS COMPLEX SOUNDS (NOT JUST MUSIC) CAN WRITE MUSIC (IN THE BROAD SENSE) FROM THE COMFORT OF THIER EASY CHAIR; THANKS TO HAND CONTROL #1, WHICH HAS ALMOST ALL THE EDITING FUNCTIONS ON IT. AND IF YOUR EASY CHAIR IS CLOSE TO THE KEYBOARD, ALL THE FUNCTIONS OF THE MUSIC CASSETTE ARE AT YOUR FINGERTIPS. THE POTENTIAL EXPERTISE AND VERSATILITY TO THE USER IS AS DEEP AS ALL THE MUSICAL SOUNDS EVER HEARD.

THE OPERATION OF THIS CASSETTE FOR MUSIC WRITING, WITH THE EXCEPTION OF RESTS, CAN BE DONE ENTIRELY FROM HAND CONTROL #1. JOYSTICK #1 CONTROLS THE LOCATION OF THE NOTE ON THE STAVES (THE LINES ON THE SCREEN). THE NOTE CURRENTLY BEING WORKED ON IS FLASHED ON AND OFF THE SCREEN. THE TRIGGER INSERTS THE NOTE INTO THE SCORE AT THE LOCATION SPECIFIED BY THE JOYSTICK. THE NOTE WILL THEN REMAIN AFTER THE CURSOR (THE FLASHING NOTE) IS MOVED AWAY.

THE ARCADE ALLOWS THREE-NOTE CHORDS. THAT IS, THREE NOTES ON ANY IMAGINARY VERTICAL LINE. TWISTING KNOB #1 DISPLAYS THE DIFFERENT NOTE DURATIONS AT THE CURSOR, AS WELL AS SHARPED NOTES. STARTING AT THE LEFT AND TWISTING RIGHT. THE FIRST NOTE ENCOUNTERED:

IS AN EIGHTH NOTE (♪),
THEN A SHARPED EIGHTH NOTE (#♪),
A DOTTED EIGHTH NOTE (♪.),
AND THEN A SHARPED, DOTTED EIGHTH NOTE (#♪.).
THE SEQUENCE IS REPEATED FOR:
QUARTER NOTES (♩),(#♩),(♩.),(#♩.),
HALF NOTES (𝅗𝅥),(#𝅗𝅥),(𝅗𝅥.),(#𝅗𝅥.),
BUT, JUST TWO WHOLE NOTES, (𝅝),(#𝅝).
AT THE FAR LEFT END OF THE KNOB IS A "P" FOR "PLAY", AND AT THE RIGHT END, A "D" FOR "DELETE".

PULLING THE TRIGGER WITH THE "P" DISPLAYED WILL PLAY THE CURRENT MUSIC IN MEMORY, WHILE PLACING THE "D" ON A NOTE AND PULLING THE TRIGGER WILL DELETE THAT NOTE FROM THE SCORE.

THE PROGRAM HAS SEVERAL FEATURES WORTH "NOTE-ING". AS EACH NOTE IS ENTERED, THE PROGRAM PLAYS THE ENTIRE CHORD RETAINING THAT NOTE. WHEN THE LAST CHORD IS STILL BEING PLAYED AND THE TRIGGER IS PULLED FOR THE NEXT CHORD, THE NEXT CHORD MAY NOT SOUND BECAUSE OF THE LAST CHORD NOT BEING FINISHED. SET THE TEMPO FASTER (SEE KNOB #2) TO ALLEVIATE THIS PROBLEM. "DELETE" ALSO PLAYS THE REMAINING CHORD AFTER DELETING THE REQUIRED NOTE. IF NO NOTE IS FOUND TO DELETE, THE EXISTING CHORD IS PLAYED AS WRITTEN.

ONE WAY TO HEAR A SMALL SECTION OF MUSIC IS TO FIND A STAFF LINE THAT HAS NO NOTES ON IT AND PLACE THE CURSOR ON "D", THEN MOVING THE CURSOR RIGHT AND PULLING THE TRIGGER WILL GIVE THE GENERAL FLOW OF A PORTION OF MUSIC. ANOTHER WAY TO HEAR JUST PART OF A SONG IS TO USE THE "PARTIAL PLAY" OPTION FROM THE KEYBOARD. WHEN "PP" IS SET, THE MUSIC CASSETTE WILL ONLY PLAY FIVE CHORDS FROM THE CURRENT CURSOR LOCATION. CONVENIENTLY, IF THE CURSOR IS ON THE LEFT OR FIRST DISPLAYED CHORD, THE CURRENTLY DISPLAYED SCREEN IS PLAYED. DURING PLAYBACK MODE, THE LEFT-MOST CHORD ON THE SCREEN IS THE CHORD CURRENTLY BEING PLAYED, SO THE USER CAN SEE WHAT LIES AHEAD IN THE NEXT FOUR NOTES.

ANOTHER FEATURE IS THE SCROLLING NOTES. SINCE THE SCREEN ONLY HAS ROOM FOR FIVE CHORDS, THE SCREEN IS ACTUALLY A "WINDOW" INTO THE SCORE. "BUMPING" THE RIGHT EDGE WITH THE CURSOR BRINGS THE NEXT NOTE ONTO THE SCREEN OR LEAVES ROOM FOR ONE MORE NOTE AT THE RIGHT EDGE OF THE SCREEN, DROPPING THE LEFT-MOST NOTE OR CHORD OFF THE SCREEN. SIMILIARLY, MOVING THE CURSOR, OR CURSORING, (NOT CURSING) AGAINST THE LEFT EDGE SCROLLS THE MUSIC TOWARDS THE BEGINING OF THE SCORE. WHILE CURSORING, ONE NOTICES A SPACE BETWEEN THE FIRST NOTE AND THE LEFT EDGE OF THE SCREEN. IN FACT, EACH PAIR OF CHORDS HAS A SPACE BETWEEN THEM. THIS SPACE IS FOR THE "AUTO-INSERT" MODE.

TO INSERT A NOTE BETWEEN 2 CHORDS, PLACE THE APPROPRIATE CURSOR-NOTE BETWEEN THE DESIRED CHORDS AND PULL THE TRIGGER. THE PROGRAM WILL MOVE THE NOTES APART, AND DISPLAY THE NEW NOTE ONE STEP TO RIGHT OF WHERE THE OLD CURSOR WAS LOCATED.

THE MUSIC CASSETTE LETS THE USER CHOOSE THE SPEED BY TWISTING KNOB #2 TO THE DESIRED VALUE. A TEMPO SETTING OF ONE THROUGH FIVE (1-5) IS TOO FAST FOR THE NOTES TO SCROLL WITH THE MUSIC, SO SCROLLING WILL NOT OCCUR, BUT THE MUSIC WILL CONTINUE TO SPEED UP. FAST TEMPOS CREATE EXHILERATING AND EXCITING EFFECTS.

THE TEMPO SETTING IS IN "TICKS", OR SIXTIETHS (1/60) OF A SECOND. IF THE TEMPO IS SET AT 1, A SIXTEENTH NOTE (𝅘𝅥𝅯), IF IT WERE AVAILABLE, WOULD BE ONE "TICK" OR ONE-SIXTIETH OF A SECOND LONG. AN EIGHTH NOTE (𝅘𝅥𝅮), THE SHORTEST NOTE AVAILABLE, IS THEN TWO "TICKS" LONG. A "DOT" MAKES THE NOTE ONE-HALF LONGER THAN BEFORE, SO A DOTTED EIGHTH NOTE IS THREE "TICKS" LONG IF THE TEMPO WAS SET TO 1. QUARTER NOTES ARE FOUR "TICKS", DOTTED QUARTERS ARE SIX "TICKS", HALF NOTES ARE EIGHT "TICKS", DOTTED HALF NOTES ARE TWELVE "TICKS", AND A WHOLE NOTE IS SIXTEEN "TICKS" LONG.

IN TABULAR FORM, IF THE TEMPO SETTING EQUALS "T",

WRITTEN NOTE	VISIBLE NOTE	DURATION F(T)
EIGHT	𝅘𝅥𝅮	2T
DOTTED-EIGHT	𝅘𝅥𝅮.	3T
QUARTER	𝅘𝅥	4T
DOTTED-QUARTER	𝅘𝅥.	6T
HALF	𝅗𝅥	8T
DOTTED-HALF	𝅗𝅥.	12T
WHOLE	o	16T

WHERE AN EIGHTH NOTE IS TWO TIMES THE TEMPO SETTING "T" IN LENGTH. THE TEMPO "T" CAN VARY FROM 1 TO 63.

HAND CONTROL #1 HAS DIFFERENT FEATURES WHILE A SONG IS PLAYING. KNOB #1 CONTROLS THE PITCH OR MASTER OSCILLATOR (MO). PULLING THE TRIGGER TOGGLES KNOB 1 OVER TO CONTROLLING THE VIBRATO (VI). PULLING IT AGAIN TOGGLES BACK TO THE (MO). OR MORE SIMPLY, TRIGGER #1 TOGGLES KNOB 1 BETWEEN THE MASTER OSCILLATOR AND VIBRATO. WHEN CONTROLLING THE VIBRATO, THERE ARE 64 DEPTH SETTINGS (0-63), AND 4 SPEED SETTINGS, 0 BEING THE FASTEST, 3 IS THE SLOWEST. TO CHANGE A SPEED SETTING, ONE MUST WALK THRU ALL THE DEPTH SETTINGS, AS 263, SPEED=2, DEPTH=63, IS DIRECTLY BEFORE 300, SPEED=3, DEPTH=0.

JOYSTICK #1 CONTROLS THE VOLUME (UNDER MS) DURING THE PLAYED SCORE. WHEN A SCORE IS NOT BEING PLAYED, HAND CONTROL #1 CONTROLS THE EDITING FEATURES AS DESCRIBED BEFORE, SO THERE ARE ALSO KEYBOARD BUTTONS TO CONTROL THE FUNCTIONS THAT HAND CONTROL #1 CONTROLS DURING PLAY MODE. THE BUTTONS FROM THE KEYBOARD FUNCTION DURING EDITING, OR DURING A SONG.

KNOB #2 CONTROLS THE TEMPO (TM) AND TOGGLES ON THE TRIGGER TO THE NOISE (NO). JOYSTICK #2 CONTROLS THE MASTER OSCILLATOR SETTING (MS). THE "MS" IS A COMPLEX INTERACTION BETWEEN THE MO, THE VIBS, AND THE NOISE. THE INTERACTION WILL BE EXPLAINED AFTER THE VIDEO DISPLAY OF THE HAND CONTROL INFORMATION IS MADE CLEAR.

ON THE BOTTOM OF THE TV SCREEN IS A DISPLAY AS FOLLOWS:

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MO  VI  TM  NO  MS
000 000 000 000 000
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WHERE:

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MO = MASTER OSCILATOR, 0 TO 255
VI = VIBRATO, LEFT-MOST DIGIT IS SPEED OF VIBRATO,
     AND THE RIGHT 2 DIGITS ARE DEPTH OF THE VIBRATO
TM = TEMPO, RANGED 1 TO 63
NO = NOISE, 0 TO 255
MS = MASTER OSCILLATOR SETTING AND VOLUMES,
     WITH THE RIGHT 2 DIGITS BEING THE VOLUMES 0 TO 15,
     AS IN THE VIBRATO EXAMPLE,
     AND THE LEFT DIGIT IS A CODE
     FOR THE INTERACTION OF THE MO, NO, AND VI.
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THE LINE ABOVE THESE TWO LINES OF NUMERICAL DISPLAY IS AN INFORMATION LINE THAT WILL BE DISCUSSED LATER.

THE INTERACTION BETWEEN THE MO, VIBS, AND THE NOISE IS CONTROLLED BY THE MASTER OSCILLATOR SETTING (MS) DESCRIBED AS FOLLOWS:

AN MS OF 0 CAUSES THE MO TO BE MODULATED (SUMMED) WITH THE DEPTH PORTION OF THE VIBRATO AT A SPEED SET BY THE SPEED PORTION OF THE VIBRATO. THE VALUES GOING OUT ARE:

MO, MO+VI, MO, MO+VI, ETC.

AN MS OF 1 CAUSES THE NOISE GENERATOR TO BE SUMMED INTO THE MO ACCORDING TO THE LEVEL IN THE NO DISPLAY. THIS IS CALLED FREQUENCY MODULATED, OR "FM" NOISE. IN THIS CASE, THE VALUES GOING OUT ARE:

MO+NO, MO-NO, MO+NO, MO-NO, ETC.

AN MS OF 2 ALLOWS VIBRATO MODULATION WITH WHITE NOISE OR AMPLITUDE MODULATED (AM) NOISE, WHICH IS NOT RELATED TO PITCH. IN REALITY, THE NOISE GENERATOR VALUE GOES STRAIGHT TO THE SPEAKER.

AN MS OF 3 HAS "FM" NOISE WITH "AM" NOISE.

THE REALM OF EXCITING AND RICH SOUNDS LIES IN THE MS SELECTING THE MODULATION OF VARIOUS VALUES WITH THE MO. ONE OTHER NOTE HOWEVER. WHEN SUMMING A VALUE WITH THE MO, A "WRAP-AROUND" OCCURS AT 256, WHICH BECOMES 0. SO AN MO=3 AND AN NO=8 WITH MS=1 OR 3 PRODUCES A VERY DEEP, NOISY SOUND AND SOME HIGH TONES BECAUSE OF "WRAP-AROUND".

THE KEYBOARD IS CURRENTLY CAPABLE OF ENTERING ANY NOTE THAT WOULD BE FROM HAND CONTROL #1. THE G, G#, THRU F#, ARE THE 12 AVAILABLE NOTES. THE 1, 2, AND 3, ARE THE 3 OCTAVE RANGE IN THE STAVES. THE 1/8, 1/4, 1/2, AND "WHOLE", ARE THE FOUR BASIC NOTES WITH THE "DOT" ADDED TO EACH ON A DIFFERENT KEY. THE MAJOR DIFFERENCE BETWEEN THE KEYBOARD AND THE HAND CONTROL IS IN THE MANNER IN WHICH THE NOTES ARE ENTERED.

THE KEYBOARD ENTERS NOTES IN A MELODIC SEQUENCE, THAT IS, WHEN A NOTE IS ENTERED, THE CURSOR MOVES TO THE NEXT VERTICAL CHORD LOCATION, TO THE RIGHT. IN THIS MANNER A SONG CAN BE ENTERED AS A MELODY LINE. THEN A FIRST HARMONY LINE, THEN A SECOND HARMONY LINE. THUS, THE THREE KEYS "MASTER, 1ST, AND 2ND" ARE FOR MELODY LINE OR MASTER NOTE, THEN 1ST SLAVE TO THE MASTER, OR 1ST HARMONY NOTE, THEN 2ND SLAVE OR 2ND HARMONY NOTE.

SIMILIARLY, IF THE 2ND SLAVE IS BEING WORKED ON FROM THE KEYBOARD, "DEL" OR DELETE WILL ONLY DELETE THE 2ND SLAVE IN THE CHORD, NOT ANY OTHER NOTES. IF THE MASTER, IN BEING WORKED ON, GETS DELETED, THE FIRST SLAVE BECOMES THE NEW MASTER, IF IT EXISTED, OTHERWISE THE CURSOR IS MOVED TO THE NEXT CHORD, STILL ON THE MASTER. THUS, LARGE AMOUNTS OF SCORE CAN BE DELETED BY HOLDING THE "DEL" KEY DOWN AND DELETING MASTER AFTER MASTER.

THE INFORMATION LINE ON THE SCREEN, NOT THE KNOB-STATUS LINE, BUT ABOVE IT, CONTAINS AN M, 1, OR 2, FOR THE NOTE CURRENTLY BEING INSERTED OR DELETED. THE CURSOR DOES NOT NEED TO BE ON TOP OF THE NOTE TO DELETE, BECAUSE THE CURRENT MASTER, SLAVE 1, OR SLAVE 2, IS CHOSEN.

THE OTHER DIFFERENCE BETWEEN THE KEYBOARD AND THE HAND CONTROL, IS THAT THE NOTE TO BE ENTERED MUST BE "BUILT" BEFORE IT IS ENTERED. FOR EXAMPLE, ENTERING A G# IN THE TOP OR 3RD OCTAVE AS A DOTTED HALF-NOTE IS ENTERED AS FOLLOWS:

3 - MOVE TO OCTAVE 3. THE CURSOR WILL JUMP TO THE HIGHEST OCTAVE.

1/2 - MAKE THE CURSOR A HALF-NOTE.

DOT - ADD THE DOT TO THE HALF-NOTE.

AT THIS POINT, THE CURSOR IS SOMEWHERE IN THE HIGHEST OCTAVE AND IS FLASHING A DOTTED HALF-NOTE.

G# - CHOOSE A G# IN THIS OCTAVE WITH THE CURRENT CURSOR FEATURES.

THE NOTE G THRU F# IS THE "TRIGGER" TO THE PROGRAM TO ENTER THE CURRENT NOTE. THE "OCTAVE" KEYS CAN BE DEPRESSED ANYWHERE IN THE SEQUENCE BEFORE THE NOTE IS ENTERED. THE "DOT" MUST BE ADDED AFTER ONE OF THE DURATIONS, 1/8 TO "WHOLE", IS ENTERED. ANY ERRORS IN SETTING UP A NOTE CAN BE RETYPED. FOR EXAMPLE, IF A 2 WAS MISTAKENLY PUNCHED, JUST PUNCH A 3 BEFORE ENTERING THE NOTE. WHERE THIS METHOD REALLY GAINS SPEED IS HERE. GENERALLY, SEVERAL NOTES IN THE SAME OCTAVE AND OF THE SAME DURATION ARE TOGETHER IN A SCORE, SO ONLY THE NEW NOTE TO BE ENTERED HAS TO BE TYPED, SINCE THE CURSOR HAS ALREADY MOVED TO THE NEXT CHORD.

RESTS ARE IMPLEMENTED IN A SIMPLE MANNER. ANYWHERE IN THE NOTE BUILDING PROCESS THE "REST" KEY CAN MAKE THE FOLLOWING NOTES RESTS. PLACING A NOTE INTO THE SCORE DOES NOT REMOVE THE REST FROM THE CURSOR, SO MANY RESTS CAN BE PLACED IN A ROW. TO REMOVE THE REST, HIT THE "REST" KEY AGAIN, AS IT TOGGLES BETWEEN RESTS AND NOTES. INCIDENTALLY, THE NOTE ENTERED, G THRU F#, IS DISREGARDED IN THE PLAYING OF THE TUNE. HOWEVER, THE DISPLAY DOES NOT DISREGARD THE NOTE. A REST NOTE IS DISPLAYED AS AN "R" DISPLACED SLIGHTLY ABOVE AND RIGHT OF THE NOTE ENTERED, SO THE USER CAN MOVE THE RESTS AWAY FROM THE REMAINDER OF THE SCORE.

OTHER KEYBOARD FUNCTIONS INCLUDE:

"HALT", WHICH WILL HALT A SONG IN PROGRESS;

"PARTIAL", WHICH WILL PLAY PART OF A SONG, AS PREVIOUSLY DESCRIBED;

A "DECAY" BUTTON WHICH GOES FROM LEGATO, OR SMOOTH NOTES, TO STACCATO, OR CHOPPED SHORT NOTES, TO AN ENVELOPE CONTROL WITH AN ATTACK, DECAY, SUSTAIN, STRUCTURE, AND THEN BACK TO LEGATO NOTES;

"MS0", "MS1", "MS2", AND "MS3", WHICH SET THE MASTER OSCILLATOR SETTING;

THERE ARE RAPID LEFT & RAPID RIGHT MOVEMENT BUTTONS, "<" AND ">", TO FACILITATE MOVING QUICKLY THROUGH LARGE SCORES;

"STORE" AND "LOAD" BUTTONS FOR SAVING AND RETRIEVING A FINISHED SONG ON AN AUDIO CASSETTE, VIA THE AUDIO CASSETTE INTERFACE;

A "SEE DATA" ON/OFF BUTTON WHICH ALLOWS THE USER TO SEE HOW MUCH MEMORY HAS BEEN USED UP;

THE "MO-UP" AND "MO-DOWN" BUTTONS FOR SMOOTH MOVEMENT OF THE MASTER OSCILLATOR;

THE "VI-MORE" AND "VI-LESS" BUTTONS FOR INCREASING AND DECREASING THE DEPTH AND SPEED OF THE VIBRATO;

THE "VOL-UP" AND "VOL-DOWN" BUTTONS FOR CONTROLLING THE VOLUME:

THE "SHIFT" BUTTON WHICH ALLOWS ACCESS TO THE UPPER COMMANDS AND ALSO PRODUCES AN "@" DISPLAY IN THE INFORMATION LINE;

A "REPEAT" KEY AUTOMATICALLY REPEATS A SCORE WHEN THE END IS REACHED, AND DISPLAYS "INF" FOR "INFINATE" ON THE INFORMATION LINE;

AND, A "PLAY" KEY FOR STARTING EXECUTION OF THE SCORE OR PART OF IT FROM THE KEYBOARD.

THE INFORMATION LINE CAN LOOK LIKE:

#NOTES 00 M INFPP @

THE INFO LINE CONTAINS SEVERAL IMPORTANT DISPLAYS. THE RIGHT-MOST DISPLAY IS AN "@" SIGN FOR THE "SHIFT" KEYBOARD. PROCEEDING LEFT, AT FIRST A SINGLE "P" IS DISPLAYED FOR "PLAY" MODE. TURNING ON "PARTIAL" PLAY ADDS A "P" IN FRONT OF THE "PLAY" "P". TURNING "REPEAT" ON DISPLAYS "INF" IN FRONT OF THE "PP". IN THE MIDDLE OF THE INFO LINE IS AN "M". THIS CHANGES TO A "1" OR A "2" DEPENDING ON WHICH NOTE, MASTER, 1ST, OR 2ND SLAVE, IS BEING LOOKED AT FROM THE KEYBOARD. INITIALLY, AT THE LEFT IS A SPACE FOR COUNTING THE NOTES GOING INTO THE MUSIC GENERATOR. WHEN TURNED ON, IT APPEARS AS "#NOTES 00".

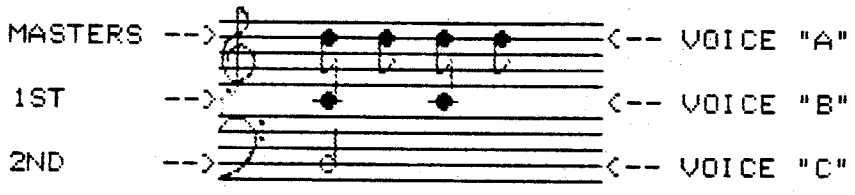
THE ONLY UNTROD AREA IS THE COMPUTER MUSIC GENERATOR. THE MUSIC CASSETTE HAS THE ABILITY TO GENERATE ITS OWN MUSIC. THE CONCEPT USED IS IF THE USER TELLS THE CASSETTE TO PLAY A NON-EXISTANT (EMPTY) SCORE, THE CASSETTE WILL GENERATE ITS OWN SCORE TO PLAY. THE EASIEST WAY TO DO THIS IS TO RESET THE CASSETTE, TURN KNOB #1 TO PLAY, THE CURSORED "P", AND PULL THE TRIGGER. SINCE THERE IS NO SCORE TO PLAY, THE MUSIC CASSETTE WILL USE MELODIC, HARMONIC, RHYTHMIC, AND COUNTRAPUNTAL RULES TO GENERATE A SONG.

AND FOR SPORT, ENTERING "PLAY" OFF OF THE KEYBOARD WILL ALLOW THE USER TO PUT IN 12 NOTES TO BE USED AS THE "KEY SIGNATURE". IN THIS CASE, THE MUSIC GENERATOR WILL ONLY PICK NOTES FROM THE ONE'S THE USER HAS GIVEN IT. IT IS ALSO WILLING TO GENERATE 1, 2, OR 3 NOTES PER CHORD, IF THE USER WANTS IT TO DO SO. THE DEFAULT IS THREE NOTES PER CHORD, BUT BEFORE ENTERING THE 12TH NOTE, PRESS THE NUMBERS 1, 2, OR 3 FROM THE OCTAVES, AND THAT WILL BE THE NUMBER OF NOTES PER CHORD GENERATED. ON THE INFORMATION LINE, "#NOTES 00" WILL APPEAR TO COUNT THE 12 NOTES THE USER ENTERS.

UPON COMPLETION OF THE 12 NOTES FROM THE KEYBOARD, OR ON THE TRIGGER PULL IN "PLAY" POSITION, THE SCREEN WILL CHANGE COLORS AND DISPLAY "COMPOSING MUSIC" AT THE BOTTOM. THE COLOR CHANGE ACTUALLY SHOWS THE DATA OF THE NOTES BEING GENERATED.

WHEN THE MUSIC CASSETTE IS THROUGH GENERATING THE SCORE, IT WILL PLAY ITS COMPOSITION. IT'S TRUE! YOU DON'T NEED TO KNOW ANYTHING ABOUT MUSIC TO USE THE MUSIC CASSETTE!!!

ONE LAST TECHNICAL POINT THOUGH, IN ORDER TO GET THREE DIFFERENT SIMULTANEOUS RHYTHMS OUT OF THE MUSIC CASSETTE, THE MASTER NOTES MUST BE IN THE SEQUENCE OF NOTES THAT NEEDS TO BE REFRESHED. FOR EXAMPLE: THE SCORE:



WHERE VOICE "A" (ARBITRARILY CHOSEN) IS THE MELODY, CONSISTING OF ALL EIGHTH NOTES. VOICE "B" IS A HARMONY LINE MADE OF QUARTER NOTES, AND VOICE "C" IS A BASS LINE OF HALF NOTES. TO DO THIS CORRECTLY, THE EIGHTH NOTES MUST BE MADE THE MASTERS, SO THAT

THE MASTER MUST EXPIRE TO REPLACE ANY EXPIRED NOTES.

IN THIS CASE, THE EIGHTH NOTES MUST EXPIRE TO REPLACE THE QUARTER AND HALF NOTES. IF, FOR EXAMPLE, A HALF NOTE WAS THE MASTER, THEN WHEN THE EIGHTH NOTE "RAN OUT" OF TIME, IT WOULD BE SILENT FOR THE REMAINDER OF THE HALF NOTE, THAT IS, UNTIL THE MASTER EXPIRED. SIMILIARLY, THE QUARTER NOTE WOULD BE SILENT FOR THE LAST HALF OF THE HALF NOTE. OF COURSE, ONE CAN USE THIS TO AN ADVANTAGE AS SORT OF A "BUILT-IN REST", AND IT SAVES SPACE, BUT A LISTENER MAY BE CONFUSED AS TO WHAT HAS TRANSPIRED WHEN WATCHING A SCORE PLAY, SINCE WHAT THE EAR HEARS, THE EYE DOES NOT SEE.

THE INTENTION OF THIS MANUAL IS TO EXPLAIN THE FEATURES OF THE MUSIC CASSETTE. THIS MANUAL IS NOT INTENDED TO BE MUSIC INSTRUCTION. I HOPE THAT IT IS SATISFACTORY FOR YOUR SPECIFIC PURPOSES. PLEASE GET BACK TO ME WITH ANY COMMENTS, CRITICISMS, OR IDEAS THAT YOU MAY HAVE.

SINCERELY,
SCOT L. NORRIS
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