ARCADIAN

November 10, 1981 Volume 4 Number 1

PURPOSE of the ARCADIAN is to act as a user-dominated forum for the dissemination of material having to do with the Bally/AstroVision Arcade cum computer. We include programs, operational hints, tutorials, and hardware items of value. The underlying reason for the paper is to help us all understand how and why the machine operates the way it does. We can then make it operate the way we want it to and expand its usefulness.

HISTORY in a nutshell - The Chicago mail order house of JS&A advertised the Bally system in popular magazines in late 1977, and a number of us bought the unit. There were lots of promises of expansion capability and actual hardware to be available in mid-1978. Delivery was poor, some of the promised material never did show up. The Basic cartridge did appear and I started this paper in November, 1978. I got tired of waiting for the Add-On memory expansion and was about to contract to get one made for us, when the Fidelity Electronics purchase became imminent. We took a second look and opted out, because there was no way we could compete with a factory product. We started to look at smaller projects, and eventually the expansions called 'Blue Ram' and 'Viper' became available. AstroVision finally took over the Bally Consumer Products Div. product, and is now aggressively moving ahead with new videocades and the AddUnder expansion unit.

TECHNICAL ASPECTS of this paper include the fact that all typing is done on an Apple, using the Super Text word processor system, and the output is printed of a Comprint 912S electrostatic printer. Programs are printed using the Arcade as the driver, using the *PRINT command and a tap from the cassette interface. A minor inconvenience is that the printer does not have a divide sign, a multiply sign, or a right arrow - instead, it prints out a lower case letter, as follows:

a = right arrow → b = multiply * c = divide ÷

CALIFORNIA HERE I COME! is being heard around the halls of AstroVision! Yes, they are moving their offices to a small town near Sacramento, and will have a second production facility there. The move is taking place about the time you will be receiving this. The new address will be 11167 Trade Center Drive, Suite D, Rancho Cordoba, CA 95670.

ASTROVISION BASIC FEATURES: EDITOR

Editing of programs is now considerably easier. The operation is: Type the line number of the line to be corrected. Press PAUSE repeatedly to recall each individual entry in the line, one by one. Use ERASE to back up (and therefore eliminate) an entry, allowing the typing in of additional or replacement entries.

You can continue to PAUSE until the entire line is shown, and one more entry will act as the GO command. As a short cut, if you make a change in the beginning of a long line, instead of using PAUSE repeatedly to get to the end of the line, use WORDS SPACE to enter the entire corrected line.

Utilization: After entering a taped program, I LIST the program and watch for ???. Mark down the line numbers where these appear, and when the whole program has been listed, I go back to correct each line. List the single line using LIST nnn,1 where nnn is the line number (the comma and 1 tell the machine to just list one line). Then I look to see where the ??? tells me the problem is, use the PAUSE control, etc., as described above to make the corrections, and finally re-list the line to see that it is correct.

This page is written for the new ARCADIAN reader to give him a very short updating to today's status.

WHAT HAVE I BOUGHT???

The Arcade machine that you have contains four built-in programs as described in the literature that came with the machine, and it will accept Videocades in the game slot for other games, as produced by AstroVision/Bally. One of these Videocades is entitled "Basic", and insertion of this cartridge will allow you to access the Z-80 microprocessor located inside the machine, and that is what we are all about. The machine contains three custom circuits, not available in any other TV game, that help the Z-80 perform. These special circuits are enclosed in three integrated circuit chips called DATA, INPUT/OUTPUT, and ADDRESS. Also included is a memory consisting of approximately 4000 bytes of Random Access Memory (RAM), and 8000 bytes of Read Only Memory (ROM). When you insert the Basic cartridge, you can personally enter a program of up to 1800 bytes into the 4000 byte RAM. The Basic is derived from "Palo Alto Tiny Basic" written by Dr. L. Wang a number of years ago. A listing and discussion of this language is contained in Volume One of "Dr. Dobbs' Journal of Computer Calisthenics and Orthodontia" (Still available at some of the bigger computer outlets.) We can supply a listing with remarks of both the Bally Basic and the AstroVision Basic. Both of these Basics were written by Jay Fenton.

As mentioned above, the largest program that can by entered into the Arcade is 1800 bytes. While some clever program entries have been made to utilize this space efficiently, it is woefully small for any serious programming. To alleviate that problem, three avenues of enlargement are available:

ooo 1.The AstroVision Add Under. This item is currently in a pre-production prototype construction phase. That is, all the critical design parameters have been set and some hand-wired units are being built to test the concept. Meanwhile, the printed circuit board is being laid out for the production version. These prototypes will be available for show/operation at the Consumer Electronics Show (CES) early next year (where most new products are shown to wholesalers). By that time the production system should be moving along well enough so that hardware will be available by February or March for deliveries to start. We shall see. The Add Under will have enough memory for any reasonable program, and a new, different, language called ZGRASS. Its projected cost is $600.

ooo 2.The Perkins Engineering "Blue Ram". This memory addition allows you to expand your programs by 4000 bytes. It plugs directly onto the 50-pin connector at the back of the Arcade, and has a separate power supply. In addition to providing raw memory for programming, numerous 'extras' are included or available to enhance its operation. A keyboard can be attached, for example, and a new language cartridge was just announced. 1004 Pleasant Ave., Boyne City, MI, 49712

ooo 3.Alternative Engineering produces the "Viper System", which has a modular approach to memory expansion. A large box contains a power supply and one (Viper 1) or more (Viper 5 or 10) memory cards (each card has about 16000 bytes). The Arcade sits on top of the Viper box and is connected by a short cable using the 50-pin connector at the rear. A keyboard is available as an extra. The Viper package includes a free copy of the Extended Basic language on tape. P.O.Box 128, Gardiner, ME 04345

Author Steve Walters has sent us a variation and explanation of the loading method he suggests for his program that was listed in the last issue, p.126.

The technique used to load the HALLOWEEN GRAPHICS program involves the direct mode (i.e., no line numbers used). A general explanation was printed in the ARCADIAN in Vol.3, No. 2, p. 20-21 (Dec., 1980) with a correction added in Vol.3, No. 3, p. 31 (Jan., 1981).

For the HALLOWEEN GRAPHICS program, the specific tape-loading procedure is as follows, after you have entered the program (ARCADIAN p. 126) in the computer:

1. enter the following in direct mode (no line number):

```
:PRINT; TV=0; TV=1; PRINT; PRINT ".HALLOWEEN GRAPHICS";
PRINT ".BY S. WALTERS 10/80"; PRINT; LIST; PRINT;
PRINT ".STANDBY FOR"; PRINT ":RETURN; :INPUT 2"
```

   Do not press GO yet. Turn your tape recorder on "record" to record the program, then press GO.

   You will see ?? for the input code, then the title, then the program list. When you see the last item (:RETURN; :INPUT 2) appear on the screen, immediately turn off the tape recorder, but do no rewind the tape.

2. We will now add the data trailer to the tape. Clear the computer memory, then enter LINES 10 thru 40 on ARCADIAN page 127.

   Then in direct mode enter :PRINT; RUN but do not press GO yet. Turn your tape recorder on "record" to record the data, then press GO.

   Again you will see ?? for the input code, then the data print on the screen, and then the last item (:RETURN; RUN). Turn the tape recorder off, rewind, and clear the computer memory.

3. The tape is now ready to load and will run automatically when input is completed. Load the tape into the computer using :INPUT 1 since the TV input code "1" was used.

   The actual input operation involves the following for the computer:

   :INPUT 1 opens the input port, and the computer then responds to the input code 1 by inputing the title (which is ignored by the computer since the period preceeds the characters) and the program. the :RETURN instruction then closes the input port, and the :INPUT 2 reopens the port for an input code 2. This eliminates the junk which results if the tape is simply stopped and restarted for the two taping steps.

   The input code 2 causes the computer to input the data, :RETURN then closes the input port and RUN causes the program to start automatically at the end of the loading.

This program is Nuclear Math, discussed on page 8.

```
  1 L=1;Q=0;S=1;T=80;&(9)=43;BC=248;FC=92;NT=0;GOTO 80
  2 E=RND (10)-1;F=RND (10)-1;RETURN
  3 E=RND (90)+9;F=RND (90)+9;RETURN
  4 E=RND (900)+99;F=RND (900)+99;RETURN
  5 E=RND (6384)+9999;F=RND (6384)+9999;RETURN
  6 E=RND (22768)+9999;F=RND (22768)+9999;RETURN
  7 E=RND (181);F=RND (181);RETURN
  8 E=RND (3);F=RND (3);RETURN
  9 F=RND (20)b5;E=FbRND (10);RETURN
 10 F=RND (9);E=FbRND (10);RETURN
 11 F=RND (9);E=FbRND (100);RETURN
 12 F=RND (999);E=RND (32)bF;RETURN
 13 CX=27;CY=-16;RETURN
 15 GOSUB 13;PRINT "S0RRY!";FOR A=1TO 250;NEXT A;T=T+5;GOSUB 13;PRINT "      ";
RETURN
 16 G0SUB M;BOX 29,-14,80,40,2;RETURN
 20 L=Sc5+1;IF L<1L=1
 22 IF QcS X=RM;IF Q#SIF Qc(Q-S)IF X>RM-1L=L-1
 25 IF L<1L=1
 26 IF L>4L=4
 27 RETURN
 28 CX=34;CY=0;NT=0;PRINT #1,E;CX=20;CY=-8;TV=K;CX=34;CY=-8;PRINT #1,F;BOX 40,-
13,50,1,1;CX=22;CY=-20;INPUT "?"G;Q=Q+1;RETURN
 29 CX=27;PRINT "C0RRECT!";T=T-2;S=S+1;RETURN
 30 BOX -52,-3,1,59,2;FOR Z=40TO T;NT=2;MU=Z;BOX -52,Z-72,1,1,1;NEXT Z;RETURN
 32 GOSUB P;IF G=EbFGOSUB R;RETURN
 33 RETURN
 34 IF (T<41)+(T>99)GOTO Y
 35 RETURN
 40 FOR A=-31TO 21STEP 10;CY=A;PRINT #0,B;B=B+10;NEXT A;RETURN
 80 CLEAR ;CY=0;PRINT "INPUT + - b c?";K=KP;N=Kb10
 90 NT=0;CLEAR ;BOX -45,0,44,79,1;BOX -45,0,42,77,3;BOX -45,0,40,75,1;BOX -45,0
,36,71,3;BOX -52,29,7,6,1;BOX -52,29,5,4,3
100 BOX -52,-3,3,58,1:BOX -52,-3,1,59,3;FOR A=-31TO 26STEP 2;BOX -50,A,1,1,1;NE
XT A;FOR A=-31TO 21STEP 10;BOX -49,A,1,1,1;CX=-43
110 CY=A;PRINT #1,A+71;NEXT A;&(0)=0;&(1)=0;&(2)=7;&(3)=7;&(9)=18;GOTO N
430 GOSUB C;GOSUB L+1;GOSUB P;IF G=E+FGOSUB R
432 GOSUB 16;IF G#E+FGOSUB 15
434 GOSUB 0;GOTO N
450 GOSUB C
452 IF L<4GOSUB L+1;IF E>FGOSUB P;GOTO V
455 IF L=4GOSUB 6;IF E>FGOSUB P;GOTO V
460 GOTO 452
470 IF G=E-FGOSUB R
480 GOSUB 16;IF G#E-FGOSUB 15
490 GOSUB 0;GOTO N
980 GOSUB C
982 IF (L=2)+(L=3)GOSUB L;GOSUB W
984 IF L=1GOSUB 8;GOSUB W
986 IF L=4GOSUB 7;GOSUB W
987 GOSUB 16;IF G#EbFGOSUB 15
989 GOSUB 0;GOTO N
990 GOSUB C
992 GOSUB L+8;GOSUB P;IF G=EcFGOSUB R
994 GOSUB 16;IF G#EcFGOSUB 15
995 GOSUB 0;GOTO N
1000 &(10)=0;CLEAR ;B=35;FOR A=80TO 50STEP -3;B=B-4;BOX -35,B+8,A,4,1;BOX -35,-B
-8,A,4,1;BOX 35,B-8,A,4,1;BOX 35,-B-8,A,4,1;NEXT A
1010 &(9)=43;FOR A=0TO 180;&(10)=A;NEXT A;IF T>99GOTO 1050
1030 GOTO 1100
1050 B=0;&(16)=RND (5)+250;&(17)=RND (5)+250;&(18)=RND (5)+130;&(19)=RND (5)+58;
&(21)=255;&(22)=255
1060 &(23)=255;FOR A=1TO 80;MU=A;BC=Ab3;B=B+2;BOX 0,0,B,B,3;NEXT A;FOR A=16TO 23
;&(A)=0;NEXT A;GOTO 1110
1100 CX=-36;CY=0;PRINT " PLANT SAVED!";FOR A=1TO 30;FOR D=1TO 150;NEXT D;BC=RND
(32)b8;FC=BC+4+RND (32)b8;NEXT A
1105 CY=-8;PRINT " YOU G0T ",#1,S-1," 0UT 0F ",Q,"!!!
1108 FOR A=1TO 500;NEXT A
1110 PRINT " TO PLAY AGAIN PRESS A KEY";IF KPRUN
>
```

see p.1 explanation

Michigan User Group meeting on Nov 22, in Northville. Call Don Gladden (address below) or 313-437-3984 for details.

Don Gladden
59400 Nine Mile Road
South Lyon, MI 48178

New User Group in Peoria
Gerry Thatcher 309-383-4238
Bob Walker 309-745-8225

4D2 is an interesting graphics program that has a number of subtleties, made up by Rusty Blommaert and Dale Smith.

George Moses added lines 3000 and 3010 as a tool for getting the string variables loaded onto tape once you have entered them into the computer, as follows:

Enter the entire program, down through line 3010, then RUN it. The program will first review the contents of @(1) /because of line 2400/, and since the contents are now 0, it will start the process of asking you to enter the string variables, 0 through 87. Enter these from the list on the right. When through, RUN the program again. This time, when the program looks at @(1), it will see the desired 8693, and will jump to line 2450 and continue. Now, to load the program on tape, and save all those strings you just finished loading, HALT the program while it is running, start your tape recorder on RECORD, and enter GOTO 3000. You will see some strange activity as the entire program is loaded at the top of the screen only - have no fear, its ok.

```
 10 GOTO 2400
 20 XY=0;LINE X,Y,3
 30 IF Y XY=0;LINE X,-Y,3
 40 IF XIF Y XY=0;LINE -X,-Y,3
 50 IF X XY=0;LINE -X,Y,3
 60 RETURN
 70 CALL20078
 80 CALL20078
 90 IF TR(1)=0RETURN
100 &(9)=44
110 :RETURN
120 CLEAR
130 CALL1532
140 &(10)=176
160 NT=1
170 GOSUB 2000
180 STOP
200 FOR X=3TO 79STEP 2
210 BOX 0,0,X,X,3
220 NEXT X
230 GOTO 70
300 FOR Y=79TO 3STEP -2
310 BOX 0,0,Y+Y-1,Y,3
320 NEXT Y
330 GOTO 70
500 FOR Y=0TO 40STEP 10
510 FOR X=5TO 75STEP 10
520 GOSUB 20
530 NEXT X
540 NEXT Y
550 GOTO 70
700 FOR Y=0TO 39
710 X=78-2bY
720 GOSUB 20
730 NEXT Y
740 GOTO 70
900 RETURN
1100 FOR X=0TO 79
1110 Y=39-Xc2
1120 GOSUB 20
1130 NEXT X
1140 GOTO 70
1300 X=79
1310 FOR Y=0TO 42
1320 GOSUB 20
1330 NEXT Y
1340 GOTO 70
1500 RETURN
1700 Y=42
1710 FOR X=0TO 79
1720 GOSUB 20
1730 NEXT X
1740 GOTO 70
2000 F=21024;G=19494;H=00;RETURN
2010 F=20303;G=21328;H=33;RETURN
2020 F=13313;G=12868;H=00;RETURN
2030 F=16706;G=19532;H=89;RETURN
2040 F=21313;G=21076;H=79;RETURN
2050 F=16706;G=18771;H=67;RETURN
2060 F=17952;G=20053;H=32;RETURN
2070 F=16711;G=17741;H=83;RETURN
2080 F=21837;G=18771;H=67;RETURN
2090 F=22305;G=22351;H=33;RETURN
2100 F=17736;G=19532;H=79;RETURN
2110 F=16928;G=17753;H=32;RETURN
2200 FOR Z=1TO 32767
2210 W=Zc9
2220 GOSUB 2030+RMb10
2230 W=Zc2
2240 IF RM=0GOSUB 200
2250 FOR V=3TO 17STEP 2
2260 W=ZcV
2270 IF RM=0GOSUB Vb100
2280 NEXT V
2290 NEXT Z
2300 GOTO 2200
2399 .SET-UP SECTION:
2400 IF @(1)=8693GOTO 2450
2410 FOR R=0TO 87
2420 PRINT R,
2430 INPUT ""@(R)
2440 NEXT R
2450 :RETURN
2460 CLEAR
2470 :INPUT
2480 CALL1532
2490 &(9)=44
2500 &(10)=172
2510 A=-43;B=1845;C=-22499
2520 D=20088;E=-13871
2530 GOSUB 2020
2540 CALL20078
2550 FOR R=0TO 87
2560 %(2bR+19824)=@(R)
2570 FC=Rb8-696
2580 NEXT R
2590 J=8438;K=19824
2600 L=16115;M=-4786
2610 N=15943;O=-11390
2620 P=-1267;Q=201
2630 CALL20078
2640 CALL20100
2650 &(9)=20
2660 GOTO 2200
```

Rusty Blommaert
2901 Willens Dr. #6
Melrose Park, IL 60164

```
 0= -6715    45=  -767
 1=  8693    46= 11263
 2= 19998    47=  2423
 3= -4090    48= 16582
 4=  7387    49= 11127
 5=-25429    50=  2423
 6=  3855    51=-32570
 7=  3855    52= 11127
 8= 20284    53=  2423
 9=-28290    54=-16186
10= 11127    55= 11127
11= 12517    56=  2423
12= -2807    57=  6145
13=-14722    58= -4856
14= 30472    59= -7749
15=    58    60=  7994
16= -3762    61=-14770
17=-24473    62= 12408
18=  1824    63= 15878
19=-25542    64=   332
20= 12878    65=    -8
21= 19975    66= 12809
22=  4015    67= 19999
23=  3855    68=  4051
24= 28431    69=  2817
25=-14724    70= -4856
26=-24491    71= -3653
27=  1824    72=-15903
28=-25030    73=-13829
29= 12878    74= 30451
30= 19976    75=    64
31= -19025   76=     0
32=  3122    77=     1
33= 31822    78=     0
34= 21974    79=     0
35=  8352    80=     0
36= 14855    81=     0
37= 20122    82=     0
38=  2354    83=     0
39= -20658   84=     0
40=  3855    85=     0
41=  3855    86= -256
42=  2866    87=19456
43=  -7858
44= 32485
```

```
3000 A=-24576;B=%(20050)+176;NT=1;:PRINT ;CLEAR ;PRINT #1,"A=-24576;B=",B,";FOR
N=ATO B;%(N)=KP;NEXT N;%(20050)=B-176;:RETURN ;RUN "
3010 FOR N=ATO B;CY=40;TV=%(N);NEXT N;:RETURN
```

```
  1 .
  3 .CODER-DECODER
  5 .ED GROEBE
  6 CLEAR
  7 BC=8;FC=7
  9 PRINT "AT END OF MESSAGE KEY IN $";PRINT ;PRINT
 10 PRINT "KEY 1(CODE) OR 2(DECODE)
 15 PRINT
 20 M=KP;IF (M>50)GOTO 20
 30 TV=M;IF M=50M=-1
 35 PRINT ;IF M=49M=1;GOSUB 550
 38 PRINT
 40 PRINT "ENTER  MESSAGE
 45 PRINT
 50 FOR Z=1TO 284
 60 IF Z<1Z=1
 70 @(Z)=KP
 80 IF @(Z)=36GOTO 200
 90 IF @(Z)=31GOTO 400
100 TV=@(Z)
110 NEXT Z
200 PRINT ;E=Z-1
210 FOR Z=1TO E
220 IF M=-1GOSUB 490
230 IF @(Z)<78S=1
240 IF @(Z)<58S=0
250 IF @(Z)>77S=-1
260 @(Z)=@(Z)+(Sb13)
270 IF M=1GOSUB 490
280 TV=@(Z)
290 NEXT Z
295 IF M=-1GOTO 600
298 PRINT ;PRINT
300 PRINT "WANT IT DECODED? KEY  2
310 M=KP;IF M=50M=-1;GOTO 200
320 GOTO 310
400 IF CX=-77CY=CY+8;Z=Z-26;BOX 0,CY,160,8,2;GOTO 60
410 CX=CX-6;BOX CX,CY,6,8,2;Z=Z-1;GOTO 60
490 IF @(Z)<58RETURN
500 N=(Z-(Zc10)b10)
510 IF N>7N=7
520 @(Z)=@(Z)-NbM
530 RETURN
550 PRINT "USE LETTERS & NUMBERS ONLY";RETURN
600 IF KPRUN
```

Ed Groebe
12046 Flambeal Drive
Palos Heights, IL 60463

Ads

Bowling Secretary program -- calculates and stores averages, handicaps, games bowled, and total pins for entire bowling league. Sold as witten for $6.95, or custom written for your league (need bowler's names, team numbers and handicapping info. (pct. used)) for $12.95 Don Gladden 59400 Nine Mile, South Lyon, MI 48178 (313) 437-3984

SFP has one cassette interface, orign. carton, for $29.95., Also four original Bally Basic w/orig. carton at $24.95 each. NEWLY released videocades - send for free price list with ARCADIAN discount. Revolving cassette rack at $5.95 hold 20 videocades in cases, or 32 without cases. CA add 6% tax. SFP D-A, 1064 N.Alta, Dinuba, CA, (209)- 591-0555

SUPER SOFTWARE now offers 10 complete sets of programs specifically for the Bally Arcade. We also carry the complete Bally/Astrovision line of accessories for the Arcade. All software orders are being shipped within 48 hours for speedy service. Please write for our free six-page catalog. Super Software, Box 702, Plainfield, NJ 07061-0702

STEREO COLOR ORGAN ON YOUR TV INTERFACES WITH BALLY ARCADE ASTROVISION

ALL COLORS BRILLIANT DISPLAY

Color Organ/Light Show: Interface Bally to any Stereo Speakers, creating New Visual/Musical Forms.

Interface unit with Cassette Demo. & Instructions + Tutorial..$39.95 Create your own Art.

24 games Available. All utilise the special Graphics.,.....Colors and Sounds that the Bally is famous for and employ maximum memory. Any Two (2) games on Cassett, with documentation $ 12.95

T & M SOFTWARE

8599 FRAMEWOOD, DR.
NEWBURGH, IN. 47630

ALL Programs now Available in new Astrovision Basic

Write for FREE pictured Catalog.

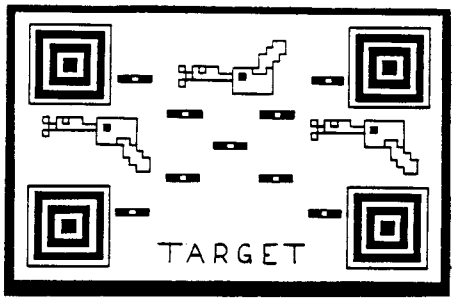
Coyote-Roadrunner Race
The Mummys Treasure
Ayatollah Dart Board
3-D Tic Tac Toe
Target(Trio of games)
** River City Gambler
Fox and the Hare
Galactic War 2002
Sink the U-Boat
Rescue Air Drop
Kill The Vulcan
Search & Destroy
Light Show Program #2
(Use with interface)
Phantom Star Fight 2003

Air Raid
Crazy Ball
Bombardier
Mission Imposs.
Space Quest 2001
Atom Smasher
Star Base 2000
The Black Lagoon
Space Checkers
** Claim Jumpers
** 1 to 5 Players includes computer too.
Super Sleuth

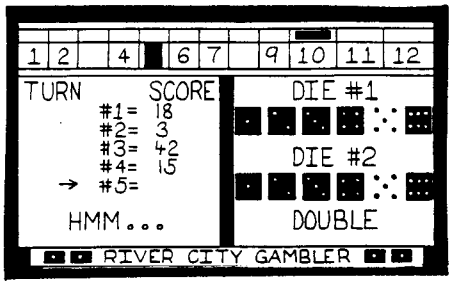
Visa & Master Charge Accepted.

IDENTIFY IF BALLY OR ASTROVISION BASIC

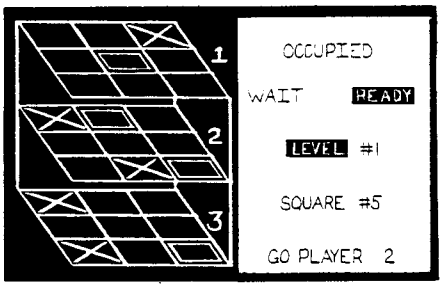
The Folling Graphic Pictures are True Representations of the games we sell



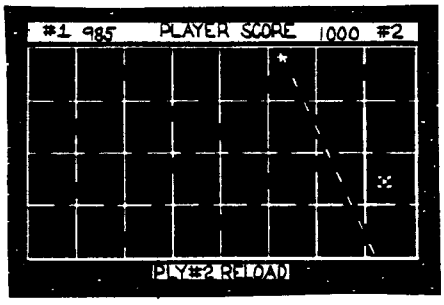
Target
1 to 4 players



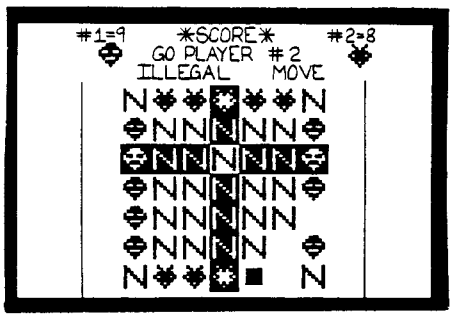
River City Gambler
1 to 5 players **



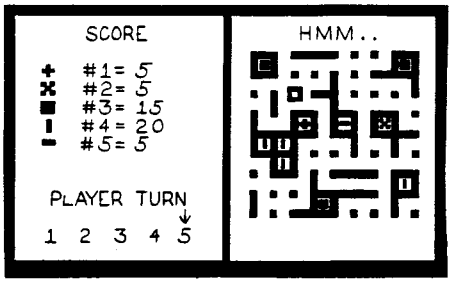
3-D Tic Tac Toe
2 players



Phantom Star Fighters 2003
2 players



Space Checkers
2 players



Claim Jumper
1 to 5 players **

CONTEST ENTRIES this month are three:

o 4D2, which is a purely graphics presentation that gives you something soothing to look at and admire. While the program appears random, I am told that it is a giant loop that starts again in about three days. There is a lot of machine language code in it, and it runs in Bally Basic only. The authors are working on an AstroVision Basic version.

o Nuclear Math is an arithmetic training game that asks the operator to perform math problems. Correct answers will cool the nuclear reactor thermometer, while incorrect ones will drive the temperature up to a calamity.

o Code-Decode is a 'utility' program that is used for a specific purpose. The program will automatically encrypt a message using some special rules. Only another Arcade with the same program will be able to decrypt the message. Note that this is not a substitution type of code, but real encryption, where a single letter does not always have the same meaning.

BLUE RAM EXTENDED BASIC cartridges are now being delivered. See their ad for details of the cartridge. Attach the Blue Ram memory addition, and then insert the Blue Ram cartridge. The screen goes blue and the title (as printed above) comes up. Then the cursor shows up in the small font format, as does anything entered. By using CF=LARGE, the font size changes to the standard. If you have the Ble Ram Keyboard, it can be attached, and all entries made through it. The ROM cartridge contains the keyboard operating system, eliminating the old tape entry method.. The keypad works as well. We'll be including some tutorials and programs for the Ram's new Basic cartridge very soon.

Advertisements - The two or three-line items on the last page are free to subscribers until they get overwhelming. Small display ads up to 1/4 page are also free. Send for rates on half-page or larger ads.

Programs in the ARCADIAN are entirely the work of subscribers. Programs should be sent on a tape (if you have the Bally Basic, I prefer it that way), accompanied by a listing (which may be hand written, as long as it is legible - we only use it in case the tape fails), and a complete description as to operation, etc., of the program. Submittal of a program is considered to be a donation for the common betterment and education of all, and no payment is made. We do, however, have a monthly contest. Any program submitted to the contest requires a statement that the program is an original work and not a copy of an existing program. Contestants will vie for a $100 prize, supplied by the ARCADIAN. We have a 5-man rotating judging panel who use their own criteria to decide between contestants. There must be at least two entrants for the contest to operate. At the end of the Volume year, we go back and select 10 of the most popular programs from the entire stock (except contest winners), and make up a tape to be sold by dealers and directly. Sales of these "Best of ARCADIAN, 198x" programs will result in royalty payments to the authors.

PLEASANT DILEMMA is caused by having both the Blue Ram and Viper extended memory systems here, and having to pick and choose which one to plug into the Arcade. Well, there are two Arcades here now, each with an extended memory and so we will be able to try out both systems in parallel, entering programs into both to check operation and compatibility.

The Bit Fiddlers will be presenting a cartridge that will allow machine code programming directly from the keyboard later this month. I expect a full ad in the next issue.

NEW 3 VOICE MUSIC ASSEMBLER FEATURING NO REM STATEMENTS!

BY GEORGE MOSES

In May, 1980 The Arcadian published an introduction of three-voice music programming to Bally Basic afficianados. I received this program, previously thought impossible in Basic, from its creator, Brett Bilbrey of Dearborn, Michigan and spent about 3 months refining it to make it more easily used and understood by Arcadian Subscribers.

This program opened the door to a new realm of creative expression with my Arcade and I spent hundreds of hours programming sheet music. Along the way, I made changes in the program to clean up the timing problems inherent in the many counting loops and IF statements of the original program. That whole program has now faded into obsolescence as new discoveries have initiated a complete overhaul of the music assembly methods used in the past. Somewhere you have to quit changing a program and say, finally, "This is the way it's gonna be!" That's the program we've included here.

Shortly before completing it, I received a letter from Jim Dunson in Pensacola, Florida that led to the biggest and final revision, the elimination of REM (.) statements for storing the poked data. Jim discovered that you can poke data into the text memory area beyond %(20050), which is the memory address of the SZ indicator at the end of your program. If you command the computer to PRINT %(20050) GO it will print out the memory address of the end of the program. The advantage of this method is that you no longer have to type in those long REM statements at the beginning of the program to store your data. However, you need to use a new method to write the data to tape as your computer won't list the data beyond %(20050). So, I've included a print-to-tape subroutine beginning on line 15 and created for this purpose by Dave Ibach of Northville, Michigan.

THE MUSIC PROGRAM

BY GEORGE MOSES

With the help of Brett Bilbrey, Jim Dunson & Dave Ibach

```
1  :RETURN ;NT=0;K=127;L=255;M=256;GOTO 3
2  FOR C=A-1TO E-2STEP 3;&(17)=%(C)÷M
   +K;&(18)=%(C+1)÷M+K;&(19)=%(C+2)÷M
   +K;FOR D=1TO T;NEXT D;NEXT C;RETURN
3  NT=0;IF B=0B=%(20050)+6;%(B-1)=1;E=B
4  FOR N=0TO 2;PRINT #1,E,;INPUT ""J;IF J►M
   INPUT "START AT?"A;GOTO 6
5  J=J-K;J=J+L×(J◄0);@(N)=J;NEXT N;NT=1;
   INPUT "DURATION"D;FOR N=1TO D;FOR A=
   0TO 2;%(E+A)=%(E+A)÷M×M+@(A);NEXT A;
   E=E+3;NEXT N;RUN
6  CLEAR ;BC=RND (32)×8+2;FC=BC+4;NT=0;
   K=127;M=256
7  T=15;&(16)=49;&(21)=12;&(22)=204
8  GOSUB 2
9  FOR F=22TO 16STEP -1;&(F)=0;NEXT F;CY=0;
   PRINT "[1]REPLAY";PRINT "[2]INPUT ";PRINT "[3]
   CHANGE";PRINT "[4]PRINT TO TAPE
10 R=KP;IF R=49GOTO 6
11 IF R=50RUN
12 IF R=51INPUT "ADDRESS OF CHORD?"E;RUN
13 IF R=52GOTO 15
14 GOTO 10
15 H=-24576;NT=1;:PRINT ;CLEAR ;PRINT "H
   =",#1,H,";E=",E,";B=",B,";A=B;
   FOR N=H TO E;%(N)=KP;NEXT N;%(20050)=
   B-6;:RETURN ;GOTO 6
16 FOR N=H TO E;CY=40;TV=%(N);NEXT N;
   :RETURN
```

SAMPLE DURATION CHART

(If song's shortest note is 16th note)

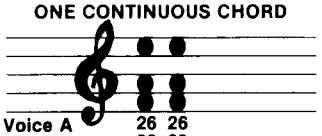
NOTE	INPUT
16th	*1*
8th	*2*
Quarter	*4*
Half	*8*
Whole	*16*

FIG. 1

Song's shortest note is the reference point receiving a duration of 1. Then, each advance in note category doubles in duration value.

After you've input the program, record it on tape for safekeeping. Then press RUN and GO. The screen will clear and you'll see the beginning address of the first chord at the top of the screen. Using the notes from your sheet music converted to the numbers on the note chart (FIG 2), input the 3 notes in your first chord. Then the computer will ask for the duration of the chord. (See FIG. 1). The duration of a chord is determined by the shortest note in the chord. If all three notes are of identical length there's no problem. Any notes of longer duration than the shortest sounding note should be carried into the next chord and even into the chords following, if necessary, until their total duration has been accounted for. When carrying a note through two or more chords input it into the same voice and it will continue to play as one continuous, but longer sounding note. To play the same note in successive stacatto beats just input it into a different voice for each chord. (See FIGS. 3 & 4.)

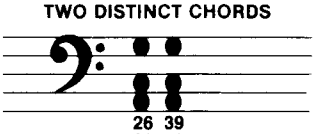
ONE CONTINUOUS CHORD



Voice A	26 26
Voice B	39 39
Voice C	50 50
Duration	4 4

FIG. 3

TWO DISTINCT CHORDS



	26 39
	39 50
	50 26
	4 4

FIG. 4

To illustrate FIG. 3, press WORDS RUN GO to get the program running. Input the first chord thusly:

26 GO
39 GO
50 GO
4 GO Allow an interval of time after the Duration entry for the computer to perform the pokes to memory. Then go to the next chord and repeat the process. To hear the two chords type:
333 GO and the computer will ask "START AT?" Type:
B GO

Listen! It's just one long, continuous chord. Now input FIG. 4. Select CHANGE from the menu. Then the computer will ask: "ADDRESS OF CHORD?" Type "B" to get back to the beginning of data storage and input FIG. 4 just as you did FIG. 3. Listen to the two chords in FIG. 4. You heard two distinct chords, didn't you? That's what happens when you switch the notes to different voices in succeeding chords. If you have less than 3 notes in a chord, or no notes at all, as in a rest, just input a zero into any voice not being used.

After you input a duration the computer will poke the entire chord into memory as many times as the duration number you selected. Then the screen will print the beginning address of the next chord. Anytime you wish to hear the music played up to the last chord you've input, just put in any number greater than 256. I like to use 333. (Don't do this when the computer is asking for a duration or that chord will be poked into memory 333 times, using 999 bytes of memory faster than you can say "OOOPS".)

Next you'll be asked for the "START" address of the music. If you want to hear the song from the beginning simply input P which stores the memory address of the first chord. To begi listening in the middle of the song, input the memory address of the chord you want to start at. To hear it again, press the number 1. To resume inputting data where you left off press 2. To change a chord that doesn't sound right press 3. If you press 3 you'll be ask-

ed for a starting location for changing notes. The same rule applies as for hearing music. Input B for starting at the beginning, or use the chord address to start at a specific chord in the middle of the song.

To keep track of where chords are in memory I mark the chord address at the end of each measure on the sheet music. Then I can easily return to the beginning of any measure to hear or change my music. If at any time you input a wrong note and are immediately aware of it, if you haven't put in the duration for that chord yet HALT the computer and press RUN GO. You'll be inputting at the beginning of the same chord you were just working on because the computer doesn't execute a poke to memory until you input the duration. If you have already input the duratin, you can get back to the chord you want to correct by pressing HALT. Then set the variable E equal to the address of the chord you want to correct. RUN the program and you'll be back at that chord. Type in the correct numbers and work forward from there. The timing on this program is very accurate because a chord is poked into memory in sequence as many times as the number of its duration. When the song is played the computer peeks into the locations in the same way, reading the musical data at a constant speed.

The data is read and played by line 2 which is a subroutine of line 8. The starting location of each block of music is stored in the variable A and the end is stored in E. The significance of this is that you can play the entire song with the statement

8 GOSUB 2.

To play the song twice as in a repeat bar just use the statement

8 GOSUB 2;GOSUB 2

which calls the subroutine twice. If you want to repeat only a portion of the music you would preface your second GOSUB with **A = −nnnnn;E = −nnnnn;** where A is the beginning memory address of the block and E is the ending address so the computer will know where to start and stop reading the data.

CAUTION: With this program the data is stored in memory addresses just beyond the end of the program, so you can't add any bytes to its length once you start inputting or you'll destroy the beginning of your data. You can remove bytes with no effect at all. In fact, once you're done inputting a song you can eliminate lines 4, 5, 11 and 12. But remember that this will make the [2]INPUT and the [3]CHANGE menu selections inoperative.

The speed of the music is controlled by the variable T in line 7. The lower the value of T, the faster the music will play. Line 8 is a good place to print the title of your song on the screen. Just be sure you've removed enough bytes of program to make room for the additional text you're using for the title. Then, use a PRINT command to add your title, followed by GOSUB 2. Example:

8 CY = 0;PRINT "CHOPSTICKS";GOSUB 2

To save your program on tape simply get your tape recorder running and then press the number 4 when the menu is on the screen that says **[4]PRINT TO TAPE**. The entire program will be saved automatically, including the variables that tell the computer where to start and stop playing the music.

NOTE	VALUE	SHARP	FLAT
E	12	NA	13
D	14	13	15
C	16	15	17
B	17	16	18
A	19	18	20
G	22	20	23
F	24	23	26
E	26	24	28
D	29	28	31
C	33	31	35
B	35	33	37
A	39	37	42
G	44	42	47
F	50	47	53
E	53	50	57
D	60	57	63
MIDDLE C	67	63	71
B	71	67	75
A	80	75	85
G	90	85	95
F	101	95	107
E	107	101	114
D	120	114	128
C	136	128	142
B	142	136	152
A	160	152	171
G	180	171	192
F	205	192	216
E	216	205	230
D	241	230	254
C	NA	254	NA

FIG. 2

THE MUSIC FROM THE BALLY DEMO CARTRIDGE

Run the program and input the following data in columns of four. For example, the first chord is input like this:

24 GO
0 GO
0 GO
1 GO Then move one column to the right and continue. When you want to hear the music up to the last chord you've input, type 333 GO. Then input B when asked for the starting address. This is the Bach Allemande you may have heard on the Bally DEMO cartridge your dealer uses to display the Arcade at point of purchase. If you'd like to hear the complete 865 bytes of this song you can find the sheet music for this piece in Schirmer's Library of Musical Classics, Vol. 20, Bach Partitas For the Piano, Book 1, priced at $3.50 at your local music store. This Allemande is on page 6. In this case every chord has a duration of 1.

24	152	152	152	152	37	29	50	37	60	50	75	60	50	42	29	24	22	28	37	39	37	28	44	37	57	44	75	57	44	37	28	22	19	28	33	37	33	28	39	33	57	39	67	57
0	24	29	37	39	0	0	0	0	0	0	0	0	0	0	0	0	152	152	152	152	0	0	0	0	0	0	0	0	0	0	0	0	152	152	152	152	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

39	33	28	19	18	24	29	33	29	24	37	29	50	37	60	50	75	44	80	50	152	152	152	152	53	44	67	53	95	95	95	95	60	67	33	60	57	44	33	35	33	28	39	33	47
0	0	0	0	152	152	152	152	0	0	0	0	0	0	0	0	0	0	0	0	0	33	53	60	0	0	0	0	0	80	67	57	0	0	0	0	90	90	90	90	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	90	90	90	90	0	0	0	0	160	160	160	160	0	0	0	0	180	180	180	180	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

39	33	28	29	33	19	33	180	180	37	39	37	29	26	24	22	33	37	39	37	22	37	24	37	24	26	29	26	22	19	18	16	24	26	29	26	16	26	18	26	18	19	22	24	19
0	0	0	0	0	0	0	0	33	90	90	90	90	101	101	107	107	53	53	53	53	60	60	67	67	136	136	136	136	152	152	160	160	80	80	80	80	90	90	101	101	50	50	39	39
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

26	19	29	19	29	33	37	29	39	29
33	33	37	37	75	75	60	60	50	50
0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1

If you feel diffident about buying the sheet music then send a blank tape and $2.00 to me at P.O. Box 686, Brighton, MI 48116. I'll put the complete allemande on your tape plus a companion piece that's just as beautiful, and rush it back to you first class.

INTRODUCTORY OFFER: New ARCADE PLUS(with ASTROVISION BASIC) $250.
Astrovision BASIC cartridge only $45. Other cartridges 10% off.
Z-GRASS-32 ADD UNDER Unit (when available) 25% off.
** Offer good only on orders received before December 31,1981. **
CALL or WRITE: Robert Taylor,1555 Venus St.,Merritt Is.,Fla. 32952
305-453-2631 VISA or MASTERCARD accepted.

BALLY PROFESSIONAL ARCADE, NEW, with 6 controllers, Basic w/cassette interface, 12 game carts., many audio games. Lists for $820, will sell for $450. (408) 997-3063 (Cal)

Bally with Basic and cassette interface (A-1 shape) 5 factory cartridges, 7 cassettes of skill and adventure, several from Arcadian. Practically complete 3 years of Arcadian. $350. K.Doughty 2344 S R 261 Newburgh, IN 47630

Bally Arcade with 6 controllers, basic, audio interface, works fine $200 plus most videocades at additional cost. L.Burchett, (313) 973 -1096 (Mich)

Bally Arcade, 2 hand controllers, cassette interface, Blue Ram, Basic,programmer sampler cart., maze/tic-tac-toe cart., XY Tutorial cart.,football. Supporting software, Hacker's Guide Arcadian (since 1979) and Cursor (since Jan 80) Best Offer. Al Zarker, 11814 Indianhead Dr., Austin TX 78753

Bally Arcade 2 controllers, Basic, cassette interface, Football, Baseball,Bally Pin, Space Invader, Elem. Math, Vol 1-3 Arcadian, hacker's guide, Service Manual PA-1. Runs great $350 or best offer Glen Walker (916) 363-5967 (Cal)

I have a 12 year old friend that is crazy over my Bally Arcade. I am looking for an Arcade with problems; I have the ability to fix. Send information to Larry W. Horrall, RR#1 Box 62, Wheatland, IN, 47597

Bally Arcade with 4 controllers, Basic, Cassette Interface and 3 game carts.Near new condition.Will include 1 year's subscription or extension in the Arcadian. $250/ofr. Pete (415) 591-9479

R. Fabris, Purposeful
3626 Morrie Dr.
San Jose, CA 95127-9990

The SOURCE TCD959