## **Pinball Game Documentation**

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* PINBALL GAME SET A KEYBOARD	page 1
O400 6A	
0401 01	
SINGLE PLAYER PINBALL	
0402 D1	
0403 36	
TWO PLAYER PINBALL	
0404 D2 0405 3A	
O TOO OA	
0406 140	0
* RANDOM GRAVITY	
3 0400 07	
0408 C7 0409 03	
0107 03	
040A 77	
0408 03	
0400 07	
040C 97 040D 81	
RETURN	
040E C0	
* LEFT FLIPPER AT REST	
040F A9E	
OFOL WAS	
0411 B1	
0412 08	
0/47 24	
0413 B1 0414 00	
0415 B6	
0416 00	
0417 B8	
0417 08	
0419 80	
041A 08	
041B C0	
* RIGHT FLIPPER AT REST	
041C A9EC	
041E B1	
041F 00	
0420 B1	
0421 00	
0422 B8	
0.155 0.0	

0423 10	page 2
0424 B8	
0425 10	
0426 B0	
0427 10	
* POINT RUMPER LOCATION	
* TVA AND NO. OF RIGHT SHIFTS	
0429 5900	
 042B 5A05	
042D 5C05 042F 5E02	
0431 598E	
0433 382838	OBSTACLE
* PINBALL GAME	
ONE PLAYER	
0436 68	
0438 143C	
TWO PLAYER	
 043A 68 043B 01	
* SET UP PINBALL COLOR	
043C A695	
MOVE COLOR DATA  043E 0759	
* DRAW OUTLINE DOT RAM	
0440 69	
0441 02	
0442 A8D2	
0444 B0 0445 E8	
DOT RAM	
0446 A820	
SET DOT	
0448 B1 0449 01	
DRAW TABLE	
044A A68A	
DIRECTION	
044C FC 044D AC	
FINISHED IF 0	
044E 4C	
044F 59	
NO. OF DOTS	
0450 F0	

C	TCDIAV		0451	46					page 3
	ISPLAY		0452	E8					
			0453						
			0454						
-	-		0455						Communication of the last
			0426	52					
*	TNITIAL			144C	PARAMETER	S			
	21121211		************	15 01					
	BSTACLE			A8D1					-
9	DOTACLE			DZ					
			045B						
	CCORE		045C	B1					
В	SCORE	A STATE OF THE PARTY OF THE PAR		0.1			marine and		The state of the s
20 M			045D						
	00000		045E	06					
A	SCORE			0.1					
			045F		Commence of			-	
			0460			200			
В	BALLS								
			0461						
	2.11.2		0462						
A	BALLS								
		The second second second	0463			august the la			
			0464	02					
			0465						
	777		0466						-
	NO. OF								
		Andrew Control of the	0467						
			0468	05					
		(	0469	B1					
		- 1	046A	05					
S	ET NO.	OF BAL	LLS						
			046B	A80D					
			046D	B1					
		and the second second	046E	SECTION SECTION	TOTAL TRANSPORT				
T	WO PLAY								
			046F	58			-		STATE OF THE PARTY
			0470						
			0471	81					
	Territorie d	the second secon	0471		St. Direction				A STATE OF THE STA
			2112	0.0					
				A803					
S	AVE NUM					-			
			475						
			0476	AF					
		(	0477	C1					
		1138		The sale					

0479 71

047A 03

STORE B MAX KEY PRESSES

047B F1

047C AF

STORE A MAX KEY PRESSES

047D F1 047E AF

\* DISPLAY SCORES AND BALLS TO PLAY

047F 48

0480 85

DISPLAY A SCORE

0481 2711

DISPLAY BALLS REMAINING

0483 2710

SET KEYBOARD

0485 6A

0486 00

DISPLAY B SCORE

0487 2711

DISPLAY BALLS REMAINING

0489 2710

\* DISPLAY BUMPER OBSTACLES

048B 69

048C 01

BUMPER

048D A433

048F E0

0490 E4

0491 E8

0492 93

RIGHT

0493 6C

0494 06

0495 60

0496 OF

SHIFT BUMPER

0497 2731

0499 60

049A 0B

SHIFT BUMPFR

0498 2731

0490 60

049E OF

SHIFT BUMPER

```
049F 2731
* SET UP POINT BUMPERS
 NO. OF POINT BUMPERS
              0441 61
               04A2 04
 INITIALIZE POINT BUMPERS
               04A3 2637
 SUBTRACT 1
               04A5 71
               04A6 FF
               0447 31
               04A8 A3
* SET UP FLIPPER PATTERNS
* DISPLAY FLIPPERS
 SET FLIPPER POST LEFT
               04A9 240F
 SET FLIPPER POST RIGHT
               04AB 241C
* START GAME
 FIRST PLAYER
               04AD 6A
               04AE 00
               04AF 64
               04B0 00
 START IF ON
               04B1 D1
               04B2 C1
 MOVE FLIPPER
               04B3 26C6
 WAIT ON TIMER
               0485 3F
               04B6 B1
 FLASH NO. OF BALLS REMAINING
               04B7 271D
 SET TIMER
               04B9 6F
               04BA 04
               04BB 61
               04BC 01
 SET V4 FLAG TO ERASED
               04BD 84
               04BE 13
               04PF 14B1
               0401 54
               0402 00
 ERASE OLD BALLS LEFT DIGIT
```

0403 2710

04C5 62 04C6 0D

NO. OF BALLS LEFT LOC

04C7 82 04C8 A4 GET DIGIT 0409 91 04CA 22 SUBTRACT 1 04CB 71 04CC FF STORE UPDATED DIGIT 04CD 91 04CE 24 SHOW BALLS REMAINING 04CF 271D 04D1 A806 SET BALL SPEED 04D3 B1 0404 04 BALL PATTERN 0405 65 0406 02 BALL ADDRESS DISP 0407 66 04D8 3F DISPLAY BALL 0409 0704 04DB 14DD WAIT FOR KEY RELEASE 04DD 23C3 SET MOVE BALL LEFT DIRECTION 04DF 64 04E0 04 INITIAL GRAVITY 04F.1 C7 04E2 07 GET RANDOM GRAVITY VARAIBLE 04E3 240A \* MOVE FLIPPERS BALL SPEED 04E5 A806 SET TIMER 04E7 FF 04E8 A6 MOVE FLIPFER 04E9 26C6 WAIT 04EB 3F 04EC EB \* MOVE BALL \* V4 CONTAINS BALL DIRECTION \* V8 CONTAINS GRAVITY COUNTER

DISPLAY BALL (ERASE)

HIT

04ED 07C4

0514 A806 SET BALL SPEED 051C B1 051D 04 051E 1514 DISPLAY BALL 0520 0704 0522 1520 0524 14E5 LONG TONE 0526 6F 0527 20 SOUND TONE 0528 9F 0529 D1 MOVE FLIPPER 0524 2606 WAIT AND MOVE. 052C 3F 0520 28 052E 62 052F 0D GET NUMBER OF PLAYERS IN V8 0530 A803 0532 F8 0533 A6 SET OPPOSITE PLAYER 0534 8A 0535 83 ADD PLAYERS NO. 0536 82 0537 A4 GET REMAINING BALLS 0538 91 0539 22 053A 41 053B 40 053C 14AF RESTORE POINT BUMPER 053E 2641 WARBLE TONE AND STOP 0540 23PF \* INCREASE BALL SPEED 0542 60

0543 04

0544 80

page 9 0545 A4 GET NUMBER OF PUSHES 0546 92 0547 02 GO TOO MANY 0548 42 0549 65 SUBTRACT 1 054A 72 054B FF STORE NUMBER OF PUSHES 0540 92 354D 04 SET BALL HIGH SPEED DURATION 054E 6E 054F F0 SET HIGHER BALL SPEED 0550 B1 0551 02 REVERSE DIRECTION 0552 2736 RESET GRAVITY 0554 2408 0556 14F8 \* SHOW TILT SAVE PLAYER 0558 9A 0559 81 SET A KEYBOARD 055A 6A 055B 01 ERASE NO. OF BALLS 055C 271D SET B KEYBOARD 055E 6A 055F 00 ERASE NO. OF BALLS 0560 271D RESTORE PLAYER 0562 98 0563 A1 RETURN 0564 CO ERASE ALL BALLS REMAINING 0565 2558 DISPLAY TILT 0567 2672 0569 A803 GET NO. OF PLAYERS 056B F8 056C A6 056D 62

056F 82

0570 A4

RESET NO. OF DIGITS

0571 9B

0572 24

OPPOSITE PLAYER

0573 8A

0574 83

SUBTRACT 1

0575 78

0576 FF

STORE NO. OF PLAYERS

0577 F8

0578 A9

0579 38

057A 40

057B D1

057C 7F

057D 157B

ERASE TILT

057F 2672

SET YELLOW AGAIN

0581 AB03

0583 B1

0584 05

0585 B1

0586 05

DISPLAY ALL BALLS REMAINING

0587 2558

0589 152E

\* SOUND RANDOM TONE FOR HIT

058B C1

058C 3F

058D 71

058E 08

058F 074B

0591 C1

SOUND TONE

0592 6D

0593 02

RANDOM GRAVITY VARIABLE

0594 2408

\* CHECK FOR POINT PUMPER HIT

SET RANGE TABLE

```
0596 A431
* V6 CONTAINS BALL ADDRESS
* A POINTS TO RANGE LIMITS
* ON EXIT BALL IS IN RANGE IF VB NE O
              0598 96
               0599 11
 GET LOWER LIMIT
               059A F2
              059B AC
 BALL ADDRESS GE?
              0590 81
              0590 25
 NO
              059E 4B
              059F E7
              05A0 96
              05A1 11
 GET UPPER LIMIT
              05A2 F2
              05A3 AC
BALL ADDRESS LT?
              05A4 82
              05A5 15
NO
              05A6 4B
              0547
YES
              05A8 61
              05A9 07
GET BALL ADDRESS
              05AA 81
              05AB 62
POINT BUMPER TABLE
              05AC A7F8
ADD V1 TO A
              05AE 0750
              0580 C1
              05B1 41
              05B2 E7
ERASE POINT BUMPER
              0583 2641
ERASE SCORE
              0585 2711
MOVE FLIPPER
              0587 2606
              0589 63
              05BA F7
ADD BUMPER NO.
```

05BB 83 05BC 14

05BD 9B

GET POINT VALUE

```
05BE 32
* ADD DIGIT TO SCORE
* VB CONTAINS DIGIT TO ADD TO SCORE
SET B SCORE LOCATION
              05BF 62
              0500 09
              05C1 5A
              0502 01
SET A SCORE LOC
              0503 72
              0504 03
              0505 60
              0506 03
GET DIGIT
              0507 99
              0508 22
ADD IN CAFRY
              0509 89
              05CA B4
              05CB 6C
              050C 0A
SUM GE 10
              05CD 89
              05CE C5
YES
              05CF 3B
              05D0 D3
NO, ADD BACK 10
              0501 79
              05D2 0A
STORE DIGIT
              05D3 99
              0504 24
SUBTRACT 1
              0505 72
              0506 FF
              0507 70
              05D8 C7
GO IF MAX
              05D9 3B
              05DA 3E
              05DB C2
              05DC 01
              05DD 32
              05DE E3
SET NEW POINT BUMPER
              05DF 2637
              05E1 15E5
DISPLAY OLD POINT BUMPER
```

DISPLAY NEW SCORE

05F5 2711

\* COMPUTE DEFLECTION DIRECTION

MOVE FLIPPER

05E7 26C6

SPECIAL CASE BOUNCE?

05E9 56 05EA E8

YES

05EB 162F

95ED 56

OSEE EF

05EF 162F

05F1 61

05F2 00

UP

05F3 6C

05F4 02

SHIFT BALL

05F5 0770

CHECK FOR POSSIBLE HIT

05F7 07C9

ADD 1 IF HIT ON UP

05F9 71

05FA 01

SET LEFT DOWN

05FB 6C

05FC 07

SHIFT BALL

05FD 0770

CHECK FOR POSSIBLE HIT

05FF 07C9

ADD 2 IF HIT ON LEFT

0601 71

0602 02

SET RIGHT DOWN

0603 6C

0604 09

SHIFT BALL

0605 0770

CHECK FOR POSSIBLE HIT

0607 0709

ADD 4 IF HIT ON DOWN

0609 71

060A 04

SET RIGHT UP

060B 6C

0600 03

SHIFT BALL

060D 0770

CHECK FOR POSSIBLE HIT

ADD 8 IF HIT ON RIGHT

0611 71 0612 08

LEFT

0613 6C 0614 04

RESTORE BALL TO ORIGINAL POSITION

0615 9770

\* CHECK DEFLECTION

\* CHECK REVERSE HORZ

0617 51 0618 05

0619 14F3

061B 51 061C 07

061D 14F3

061F 51 0620 0D

0621 14F3

0623 51 0624 01

\* CHECK REVERSE VERTICAL

0627 51 0628 0A

0629 1633

062B 51 062C 0B

062D 1633

\* REVERSE BOTH HORZ AND VERT REVERSE BOTH

062F 2736

0631 14F8

\* REVERSE VERTICAL

0633 A7EE

0635 14F5

\* SET RANDOM NUMBER POINT BUMPER

0637 62 0638 F7

RANDOM POINT

```
0639 03
                                                          page 15
               063A 07
  POINTS RANGE FROM 2-9
               063B 73
               0630 02
  SET V2 TO POINT MEM LOC
               063D 82
               063E 14
 STORE POINT
               063F 93
               0640 24
* DISPLAY OR ERASE POINT BUMPER
* V1 CONTAINS RELATIVE POINT BUMPER NUMBER (1-4)
* POINTS STORAGE IS ACCESSED FOR POINT VALUE
               0641 62
               0642 F7
 SET POINT LOCATION
               0643 82
               0644 14
 SET POINT BUMPER RAM
               0645 69
              0646 01
 SET HEIGHT
               0647 A8D9
               0649 B1
              064A 05
               064B E0
 SET A TO DIGIT ADDRESS
               0640 2396
 COPY DIGIT TO RAM
              064E E4
 SET RIGHT
              064F 6C
              0650 06
              0651 E2
 SET HEIGHT
              0652 A8D9
              0654 81
              0655 07
BUMPER LOCATION
              0656 60
              0657 01
 DOUBLE BUMPER NO.
              0658 82
              0659 1E
BUMPER LOCATIONS
              065A A427
ADD V2 TO A
              065C 0750
              065E C2
GET TABLE ENTRY
              065F F3
```

page 16

0681 82 0682 E0 0683 E4 0684 A8D6 SET LOCATION

				- 44	7
5	9	C	0		
- 12	a	×	-		
P	u	6	-	-	- 6

0686	6 B1
0687	7 05
	3 1385
	04070217063F0817
	2 040800
* PINBALL COLOR M	
	5 55555555
and the same of th	55555555
	54111145
	1 54111145 5 54111145
	9 55335335
	0 55335335
	1 56666665
* PATTERNS	3000000
	5 FCFCFCFCFCFC
	7222222200
	1 4742427200
* MOVE FLIPPER	
060	6 63
06C	7 0 1
GET DELAY COUNT	
The second secon	8 92
060	9 32
	A 32
06C	B D7
0.00	C D A
AND AND DESCRIPTION OF THE PROPERTY OF THE PRO	C D 4 D E A
000	
060	E 63
	F OF
GET DELAY COUNT	
	0 92
	1 32
060	2 32
060	3 E1
060	4 D6
060	5 F2
RETURN	
060	6 C O
	7 70
	7 72
060	8 FF
0.40	0 90
The second secon	9 92 A 34
009	
0.60	B 52
000	

06DC 03

	0600	240F
	CEDF	16CE
	06E1	72
	06E2	
	0653	92
	06E4	
	06E5	5.2
	06E6	
	06F7	2410
RETURN		
	06E9	CO
	06EA	26FA
	OSEC	62
	06ED	09
	06EE	6D
	06EF	02
	06F0	1609
SET FLIPPER		
	06F2	2704
	06F4	62
SOUND TONE	06F5	09
SUOND TOME	06F6	6D
	06F7	02
	0658	16E3
* SET LEFT FI		
	06FA	A9E9
	OFFC	B1
	06FD	OF
	06FE	81
	06FF	
	0700	B6
	0701	
	0702	1700
* SET RIGHT		

0704 A9EC

		0706	B1			page 19
		0707				
DE .		0708				
		0709	FF			
		070 A				
		070B	F0			
		070C				
*		0700	0.0			
		070E				
		070F	0.0			
		0710	CO			
	* DISPLAY SC		FO NO		The same trades	
	* VA CONTAIN	NS PLAT	ER NO			
		0711				
	SET RAM	0712	04			
	OLI NAI	0713	89			
		9714				
		0715				
		0716	09			
		0717	5 A			
		0718	Marin Co. A. Williams & St. St.			*
	SET A SCORE	LOCAT 0719				
		071A	The second second second second		AND THE PARTY OF T	
		0718	1372			
	* DISPLAY BA			CONTAINS PLAYER	NO.	
		0710	60			
		071E	The second secon			
	SET RAM					
		071F 0720				
		0721	E O			
		0722	62			
		0723				
	SET DIGIT L					
		0724				
	GET NO.	017.5	- Т			
		0726	90			
		0727				
	EXIT IF ZER	The second section of the sect	Z. Eras			
		0728				
AND AND THE PARTY OF A		1157				
			W Talk			

RIGHT

072D 6C

072C E4

072E 06

072F 60

0730 06 \* SHIFT AND DISPLAY

0731 E2

0732 70 0733 31

0734 1385

\* REVERSE BOTH HORZ AND VERT

0736 61

0737 OA

0738 81 0739 45

073A 91

073B 41

RETURN

073C CO

\* SHIFT RAM PATTERN AREA DOWN ONE LINE

073D 45

SET R6 TO RAM ADDR

073E A6

073F 91

GET PREVIOUS BYTE

0740 AF

SAVE CURRENT BYTE

0741 06

0742 BF

0743 8F

STORE BYTE

0744 56

NEXT TWO BYTES

0745 16

0746 16

0747 9F

0748 3A

0749 40

074A D4

- \* GENERATE TONE
- \* CALLED BY EXEC FUNCTION
- \* BYTE AFTER EXEC CALL CONTAINS ADDRESS DISP OF TONE GET ADDR DISP

0748 45

074C A6

074D E6

OUTPUT NEW FREQ

074E 64

RETURN

074F D4

- \* ADD MEMORY TO A REGISTER AND LOAD M(A) INTO VARIABLE
- \* CALLED BY EXEC FUNCTION

0750 45

0751 A6

0752 E6

0753 84

ADD MEMEORY TO LOW ORDER A

0754 F4

RESTORE A

0755 AA

GET TABLE ENTRY

0756 OA

STORE INTO VARIABLE

0757 56

RETURN

0758 D4

- \* SET UP COLOR MAP
- \* A POINTS TO 32 BYTE AREA CONTAINING COMPACT COLOR HEX DIGIT
- \* CALLED BY EXEC FUNCTION SET RC TO COLOR MAP RAM

0759 F8

075A 0B

075B BC

GET ZERO

0750 91

075D AC

075E F8

075F 20

SET RF TO NO. OF BYTES

0760 AF

GET BYTE

0761 OA

SHIFT RIGHT 4 BITS

0762 F6

0764 F6

0765 F6

STORE INTO COLOR PAM

0766 5C

NEXT LOCATION

0767 10

GET BYTE. INCREMENT A

0768 4A

STORE INTO COLOR RAM

0769 5C

NEXT LOCATION

076A 1C

076B 2F

076C 8F

GO IF MORE BYTES

076D 3A

076E 61

RETURN

076F D4

- \* SHIFT DOT (BALL) SUBROUTINE
- \* VC CONTAINS THE SHIFT DIRECTION
- \* CALL BY EXEC FUNCTION
- \* LOCATION BALL CONTAINS THE BALL PATTERN
- \* LOCATION BALL+1 CONTAINS THE BALL TV ADDRESS DISPLACEMENT

0770 F8

0771 CC

REGISTER 7 POINTS TO VC MEMORY LOC

0772 A7

0773 E7

0774 F8

0775 07

SET REGISTER TO TABLE+2\*VC

0776 BD

0777 F8

0778 8E

0779 F4

077A F4

RD CONTAINS TABLE ADDRESS

077B AD

BALL ADDRESS

077C F8

077D C5

077E A6

BALL PATTERN

0780 72

0781 AE 0782 93

SUBROUTINE ENTRY ADDRESS REGISTER

0783 BC

0784 4D

0785 AC

CALL SUBROUTINE

0785 DC

0787 4D

0788 AC

CALL SUBROUTINE

0789 DC

078 A 8F

SET R6 TO BALL PATTERN ADDRESS

0788 26

STORE BALL PATTERN IN MEMORY

078C 56

RETURN

078D D4

\* VC DIRECTION TABLE RANGE 0-9

0

078E B7

078F B7

1

0790 A7

-

0791 R8

2

0792 A7

7

0793 B7

3

0794 47

1.

0795 AC

4

0796 B8

5

0797 B7

10

0798 B7

,

0799 B7

6

079A AC

7	0798	3 B7				
	0.790	: A2				
	0/50	- AZ				
	0790	B8	a E			
8.						
	079E	Δ2				
	079F	87				
9						
	07A0	A2				
	0741	10				
* SHIFT SUBRO						
* R(X) POINTS	TO L	OW OR	DER D	TSPLAY	ADDRESS	
* R(E).0 CONT	AINS	BALL	PATTER	RN	ADDKE 32	
	0742					
ADD 8 TO TV F	07A3	08				
	0744					
STORE POINTER	}	1				
	07A5	56				
OTHERWISE . RE	TURN					
	07A6	03				
	0747	Fo				
	07A8					
SUBTRACT 8 FR	OM TV	POIN	ITER			
	07A9					
STORE POINTER						-
OTHERWISE, RE	07AA	56				
	07AB	D3				
BALL PATTERN	BYTE					
	07AC	8 E				
SHIFT RIGHT						
EXIT IF DF=0	O7AD	F6				
	O 7AE	3 B				
	O7AF					
	07B0 F					
DD 1 TO TU DO	)7B1 (	01				
DD 1 TO TV PO	TINTER					
TORE POINTER	1152 1	4				
0	7B3 5	56				
EW BALL DATTE	DAL			-		

NEW BALL PATTERN

SAVE BALL RYTE

RETURN

0784 F8 0785 80

0786 AE

37B8 8E

SHIFT LEFT

0789 FE

07BA 3B 07BB B6

079C F8

07BD 01

SUBTRACT 1 FROM TV POINTER

07BE F5

STORE POINTER

07BF 56

NEW BALL PATTERN

07C0 F8 0701 01

0702 30

0703 B6

- \* BALL DISFLAY SUBROUTINE
- \* TWO ENTRY POINTS
  - \* BALLD PERFORMS LIKE THE INTERPRETIVE INSTRUCTION SHOW AND D
  - \* THE BALL PATTERN
  - \* BALLC DOES NOT DISPLAY BALL BUT CHECKS FOR HIT

07C4 F8

0705 00

SET C TO C FOR DISPLAY

07C6 BC

0707 30

07C8 CC

07C9 F8

07CA 01

SET C TO 1 FOR CHECK

07CB BC

BALL PATTERN ADDRESS

07CC F8

07CD C5

O7CE A6

07CF E6

GET BALL AND ADVANCE X

0700 72

BALL BYTE

07D1 AE

TV HIGH OPDER ADDR

07D2 F8

07D3 09

07D4 BF

```
F CONTAINS TV ADDRESS
07D6 AF
```

07D7 EF

BALL BYTE

XOR DISPLAY WITH BALL 07D9 F3

SAVE DISPLAY BYTE

07DA BE

ORIGINAL BALL BYTE

AND DISPLAY WITH BALL

07DC F2

07DD 3A

07DE E1

SKIP NEXT INTERPRETIVE INSTRUCTION

07DF 15

07E0 15 07E1 9C

07E2 3A 07E3 E6

STORE DISPLAY BYTE

0755 5F

RETURN

07E6 D4

\* REVERSE TABLES ( MUST BE LOCATED ENTIRELY IN PAGE )

07E7 0309010300010902 07EF 0708090100030102

07F7 03

07F8 0001020203030400

