System 11 pinball hacking

By Francis

I have done this tutorial with the knowledge that I learn in changing my Banzai run. There is still a lot that I need to know about that, but I guess it could help to share the little knowledge that I have on Sys-11 pin.

Francis.

Pinmame Debug:

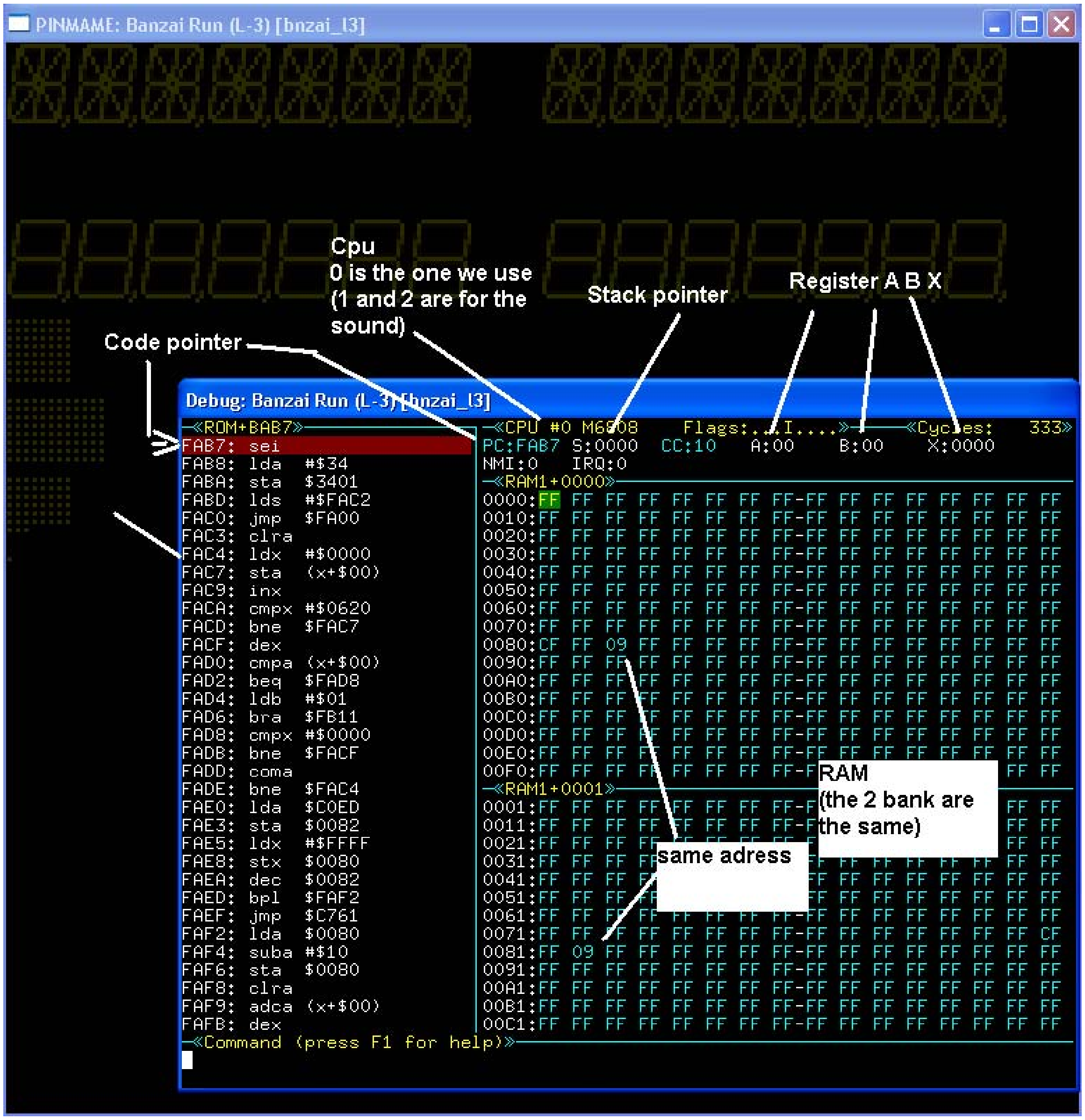
This is probably the harder

- download the latest pinmame the debug version

- To start the pinmame debug with Banzai run rom for example you do the following line in DOS. The best thing to do is to create a .bat file.

  PinMAME_VC60md.exe bnzai_l3.zip –debug

- You Shall then see this kind of screen:



PINMAME: Banzai Run (L-3) [bnzai_l3]
Debug: Banzai Run (L-3) [bnzai_l3]

Code pointer

Cpu
0 is the one we use
(1 and 2 are for the sound)

Stack pointer

Register A B X

RAM
(the 2 bank are the same)

same adress

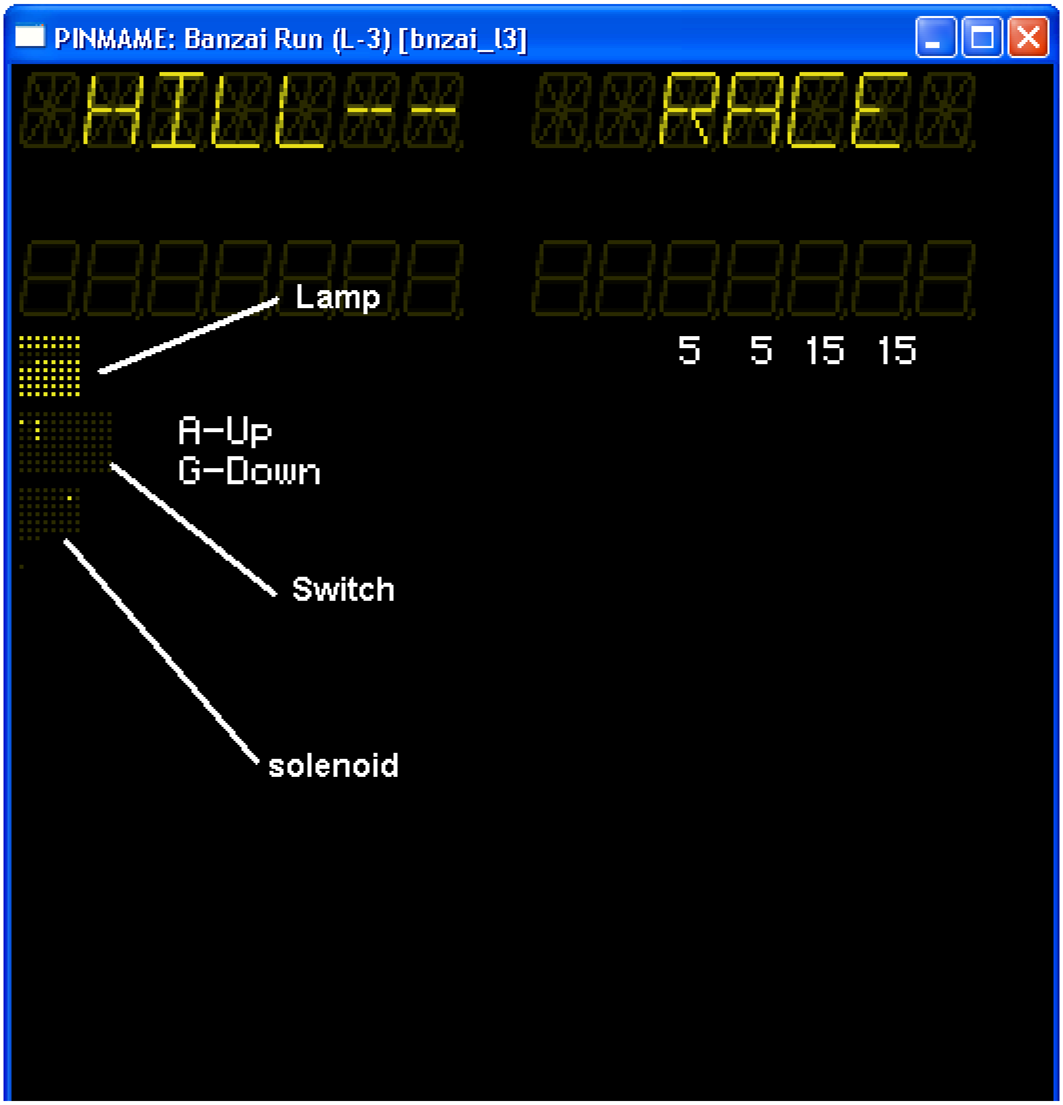
```
«ROM+BAB7»
FAB7: sei
FAB8: lda  #$34
FABA: sta  $3401
FABD: lds  #$FAC2
FAC0: jmp  $FA00
FAC3: clra
FAC4: ldx  #$0000
FAC7: sta  (x+$00)
FAC9: inx
FACA: cmpx #$0620
FACD: bne  $FAC7
FACF: dex
FAD0: cmpa (x+$00)
FAD2: beq  $FAD8
FAD4: ldb  #$01
FAD6: bra  $FB11
FAD8: cmpx #$0000
FADB: bne  $FACF
FADD: coma
FADE: bne  $FAC4
FAE0: lda  $C0ED
FAE3: sta  $0082
FAE5: ldx  #$FFFF
FAE8: stx  $0080
FAEA: dec  $0082
FAED: bpl  $FAF2
FAEF: jmp  $C761
FAF2: lda  $0080
FAF4: suba #$10
FAF6: sta  $0080
FAF8: clra
FAF9: adca (x+$00)
FAFB: dex
```

```
«CPU #0 M6808    Flags:...I....»      «Cycles:     333»
PC:FAB7 S:0000  CC:10    A:00     B:00     X:0000
NMI:0   IRQ:0
«RAM1+0000»
0000:FF FF FF FF FF FF FF FF-FF FF FF FF FF FF FF FF
0010:FF FF FF FF FF FF FF FF-FF FF FF FF FF FF FF FF
0020:FF FF FF FF FF FF FF FF-FF FF FF FF FF FF FF FF
0030:FF FF FF FF FF FF FF FF-FF FF FF FF FF FF FF FF
0040:FF FF FF FF FF FF FF FF-FF FF FF FF FF FF FF FF
0050:FF FF FF FF FF FF FF FF-FF FF FF FF FF FF FF FF
0060:FF FF FF FF FF FF FF FF-FF FF FF FF FF FF FF FF
0070:FF FF FF FF FF FF FF FF-FF FF FF FF FF FF FF FF
0080:CF FF 09 FF FF FF FF FF-FF FF FF FF FF FF FF FF
0090:FF FF FF FF FF FF FF FF-FF FF FF FF FF FF FF FF
00A0:FF FF FF FF FF FF FF FF-FF FF FF FF FF FF FF FF
00B0:FF FF FF FF FF FF FF FF-FF FF FF FF FF FF FF FF
00C0:FF FF FF FF FF FF FF FF-FF FF FF FF FF FF FF FF
00D0:FF FF FF FF FF FF FF FF-FF FF FF FF FF FF FF FF
00E0:FF FF FF FF FF FF FF FF-FF FF FF FF FF FF FF FF
00F0:FF FF FF FF FF FF FF FF-F                FF FF
«RAM1+0001»
0001:FF FF FF FF FF FF FF FF-F                FF FF
0011:FF FF FF FF FF FF FF FF-F                FF FF
0021:FF FF FF FF                              FF FF
0031:FF FF FF FF               FF FF FF FF FF FF FF
0041:FF FF FF F                FF FF FF FF FF FF FF FF
0051:FF FF FF F                FF FF FF FF FF FF FF FF
0061:FF FF FF FF            FF-FF FF FF FF FF FF FF FF
0071:FF FF FF FF FF FF FF FF-FF FF FF FF FF FF FF CF
0081:FF 09 FF FF FF FF FF FF-FF FF FF FF FF FF FF FF
0091:FF FF FF FF FF FF FF FF-FF FF FF FF FF FF FF FF
00A1:FF FF FF FF FF FF FF FF-FF FF FF FF FF FF FF FF
00B1:FF FF FF FF FF FF FF FF-FF FF FF FF FF FF FF FF
00C1:FF FF FF FF FF FF FF FF-FF FF FF FF FF FF FF FF
«Command (press F1 for help)»
```

	Most used command in pinmame debug
G	Go
SD	Sound Disable
F8	Step one instruction
F6	step from one Cpu to another (usefull when you are in CPU 1 for example)
Shift + Enter	Step one instruction but skip loop
DASM	Disasemble the code (ex: dasm rom26.dasm 4000 8000)
Trace	Trace the code you are going to execute until you do "trace off." I recommand using this king of line Trace hit_target_one.dasm A B X this way the trace is going to register the value of A B and X
Trace off	stop trace
BP	Break point
BC	Clear Break point
WP	put a watch point on the RAM ex: WP 0200 (break when score change)
WC	Clear Watch point
RP	Put a Registry point ex: RP A (break when the register A change) or: RP X 0723 (break when X = 0723)
RC	clear registry point

You can do **G** to start and “ **~** “ (the character beside 1 on your keyboard) to toggle the debug window.

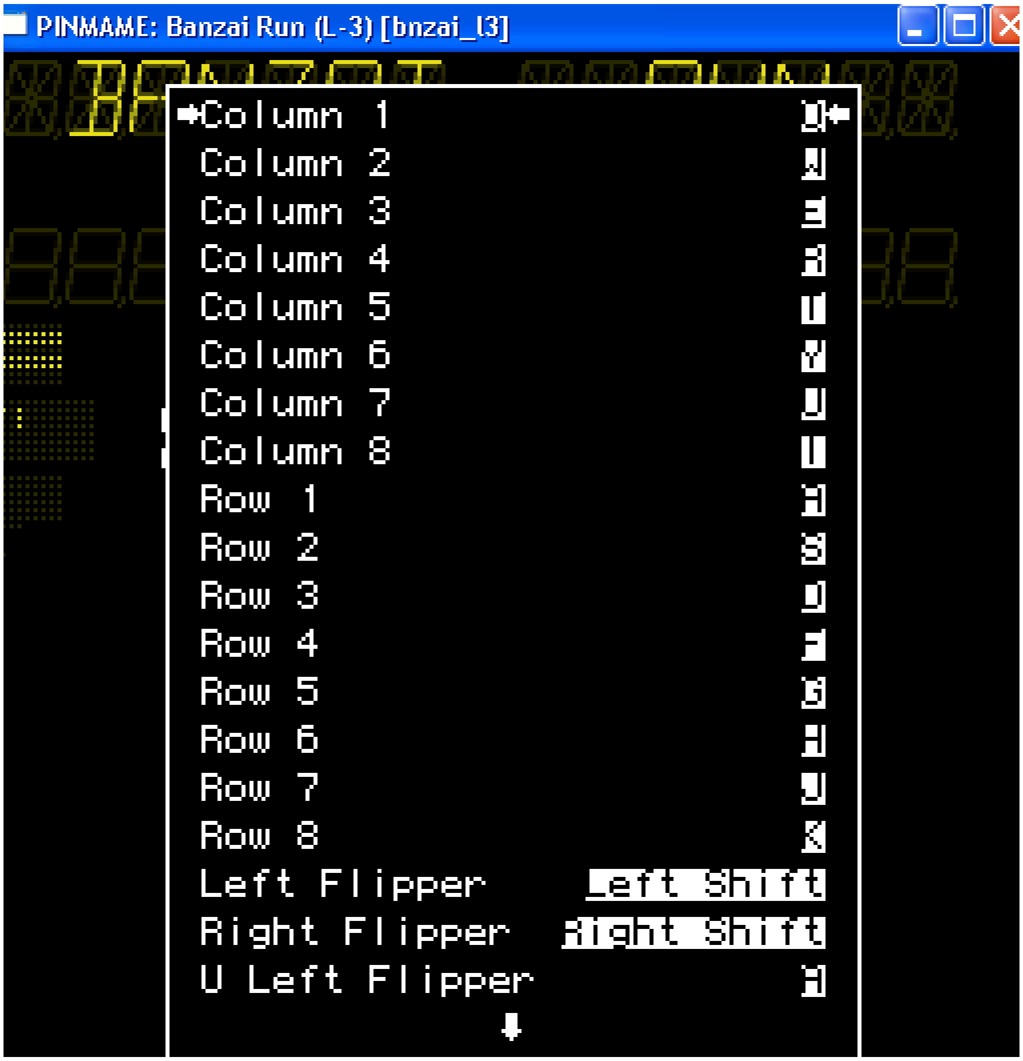
Once the game is started (G), you can see the screen below.



Switch and Lamp

“ Pinball Missing “ If you have that message, you must put the switch for the ball through at on.

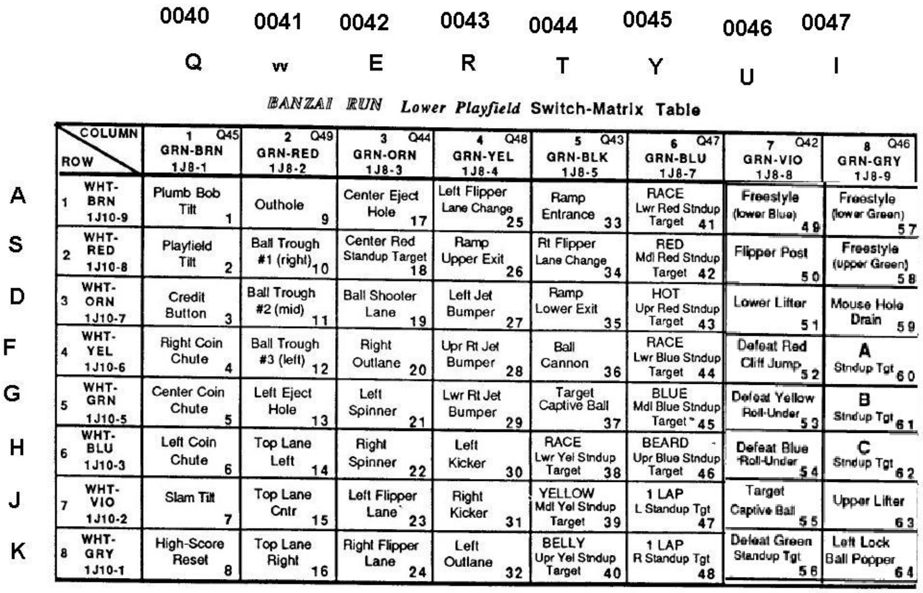
In Pin MAME you have the row and columns.



PINMAME: Banzai Run (L-3) [bnzai_l3]

```
Column 1              Q
Column 2              W
Column 3              E
Column 4              R
Column 5              T
Column 6              Y
Column 7              U
Column 8              I
Row 1                 A
Row 2                 S
Row 3                 D
Row 4                 F
Row 5                 G
Row 6                 H
Row 7                 J
Row 8                 K
Left Flipper          Left Shift
Right Flipper         Right Shift
U Left Flipper        A
```

Each row and columns correspond to a switch in Pinmame.

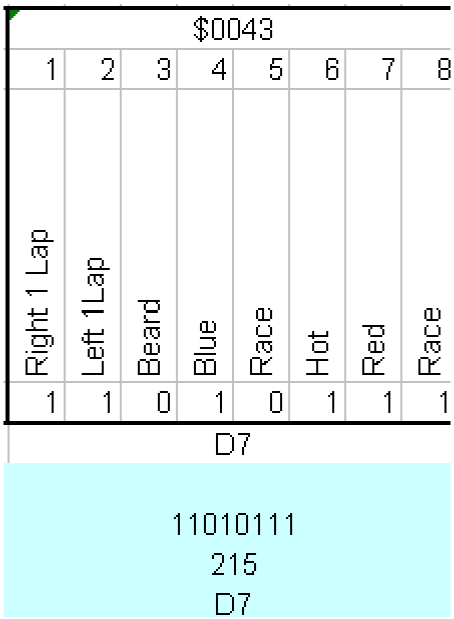


BANZAI RUN *Lower Playfield* **Switch-Matrix Table**

		0040	0041	0042	0043	0044	0045	0046	0047
		Q	vv	E	R	T	Y	U	I
	COLUMN ROW	1 Q45 GRN-BRN 1J8-1	2 Q49 GRN-RED 1J8-2	3 Q44 GRN-ORN 1J8-3	4 Q48 GRN-YEL 1J8-4	5 Q43 GRN-BLK 1J8-5	6 Q47 GRN-BLU 1J8-7	7 Q42 GRN-VIO 1J8-8	8 Q46 GRN-GRY 1J8-9
A	1 WHT-BRN 1J10-9	Plumb Bob Tilt 1	Outhole 9	Center Eject Hole 17	Left Flipper Lane Change 25	Ramp Entrance 33	RACE Lwr Red Stndup Target 41	Freestyle (lower Blue) 49	Freestyle (lower Green) 57
S	2 WHT-RED 1J10-8	Playfield Tilt 2	Ball Trough #1 (right) 10	Center Red Standup Target 18	Ramp Upper Exit 26	Rt Flipper Lane Change 34	RED Mdl Red Stndup Target 42	Flipper Post 50	Freestyle (upper Green) 58
D	3 WHT-ORN 1J10-7	Credit Button 3	Ball Trough #2 (mid) 11	Ball Shooter Lane 19	Left Jet Bumper 27	Ramp Lower Exit 35	HOT Upr Red Stndup Target 43	Lower Lifter 51	Mouse Hole Drain 59
F	4 WHT-YEL 1J10-6	Right Coin Chute 4	Ball Trough #3 (left) 12	Right Outlane 20	Upr Rt Jet Bumper 28	Ball Cannon 36	RACE Lwr Blue Stndup Target 44	Defeat Red Cliff Jump 52	A Stndup Tgt 60
G	5 WHT-GRN 1J10-5	Center Coin Chute 5	Left Eject Hole 13	Left Spinner 21	Lwr Rt Jet Bumper 29	Target Captive Ball 37	BLUE Mdl Blue Stndup Target 45	Defeat Yellow Roll-Under 53	B Stndup Tgt 61
H	6 WHT-BLU 1J10-3	Left Coin Chute 6	Top Lane Left 14	Right Spinner 22	Left Kicker 30	RACE Lwr Yel Stndup Target 38	BEARD Upr Blue Stndup Target 46	Defeat Blue Roll-Under 54	C Stndup Tgt 62
J	7 WHT-VIO 1J10-2	Slam Tilt 7	Top Lane Cntr 15	Left Flipper Lane 23	Right Kicker 31	YELLOW Mdl Yel Stndup Target 39	1 LAP L Standup Tgt 47	Target Captive Ball 55	Upper Lifter 63
K	8 WHT-GRY 1J10-1	High-Score Reset 8	Top Lane Right 16	Right Flipper Lane 24	Left Outlane 32	BELLY Upr Yel Stndup Target 40	1 LAP R Standup Tgt 48	Defeat Green Standup Tgt 56	Left Lock Ball Popper 64

Example if you want to make pinmame believe that there is 3 ball in the ballthrough, you must hit W+ S , W+ D, W+F.

Each switch correspond to a bit in pinmame for example the columns Y or 1j8-7 shown bellow:

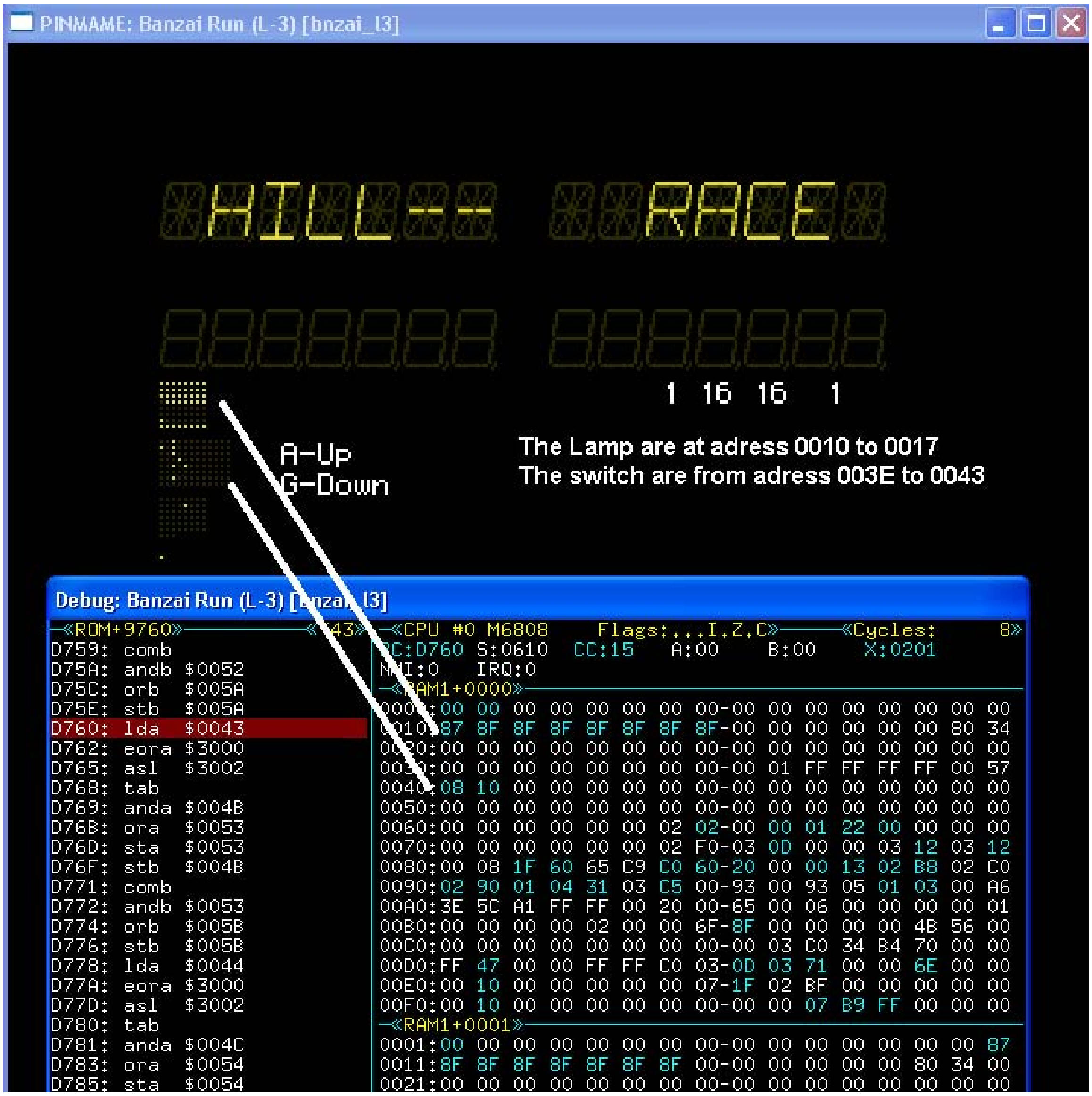


$0043							
1	2	3	4	5	6	7	8
Right 1 Lap	Left 1Lap	Beard	Blue	Race	Hot	Red	Race
1	1	0	1	0	1	1	1

D7

11010111
215
D7

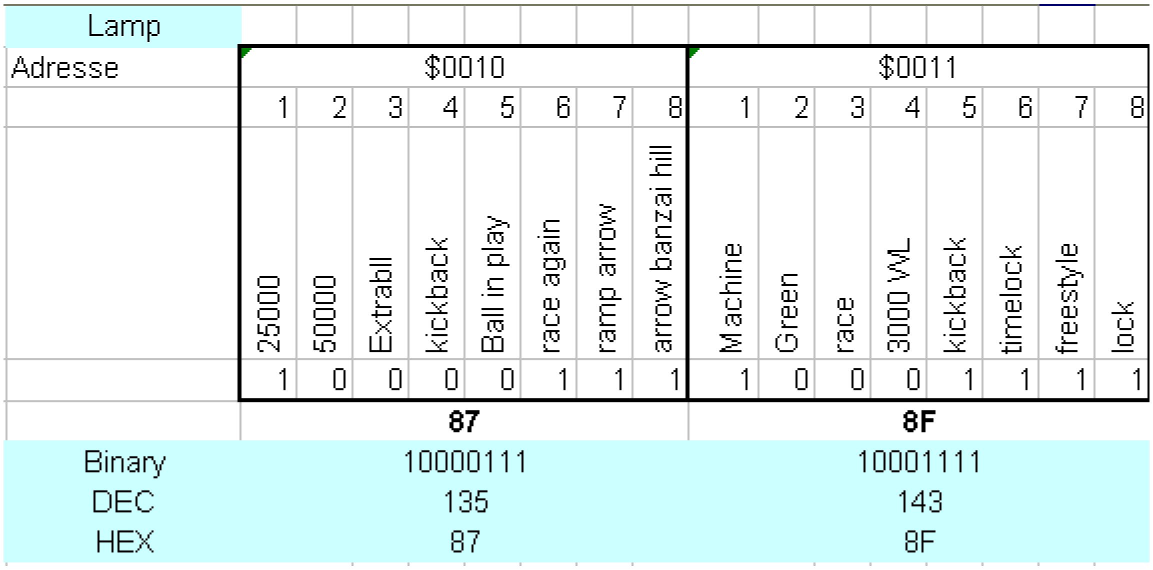
You can see the switch and Lamp, in the rom below


PINMAME: Banzai Run (L-3) [bnzai_l3]
HILL-- RACE
1 16 16 1
A-Up
G-Down
Debug: Banzai Run (L-3) [bnzai_l3]

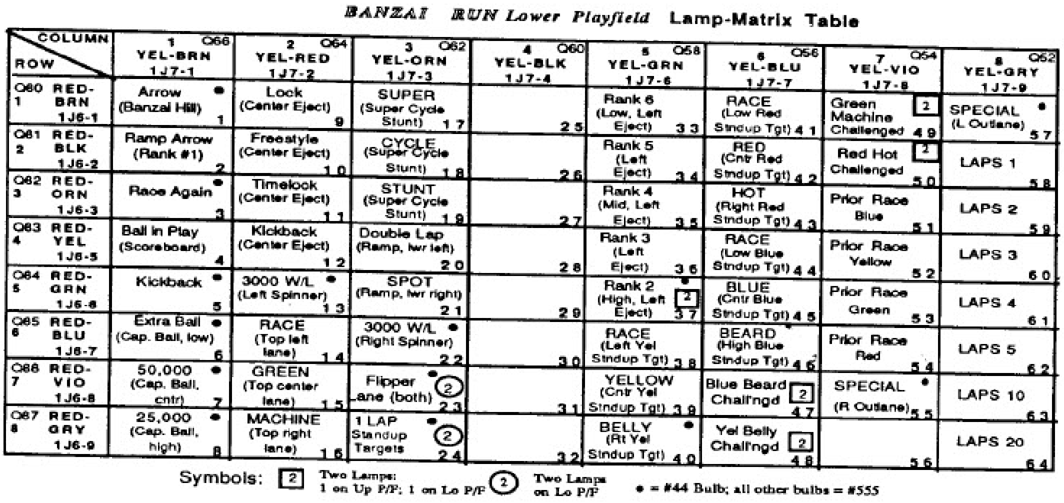
The Lamp are at adress 0010 to 0017
The switch are from adress 003E to 0043

```
—«ROM+9760»——————————«$0043»—«CPU #0 M6808    Flags:...I.Z.C»———«Cycles:     8»
D759: comb           PC:D760 S:0610  CC:15    A:00    B:00    X:0201
D75A: andb $0052     NMI:0   IRQ:0
D75C: orb  $005A     —«RAM1+0000»————————————————————————————————————
D75E: stb  $005A     0000:00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00
D760: lda  $0043     0010:87 8F 8F 8F 8F 8F 8F 8F-00 00 00 00 00 00 80 34
D762: eora $3000     0020:00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00
D765: asl  $3002     0030:00 00 00 00 00 00 00 00-00 01 FF FF FF FF 00 57
D768: tab            0040:08 10 00 00 00 00 00 00-00 00 00 00 00 00 00 00
D769: anda $004B     0050:00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00
D76B: ora  $0053     0060:00 00 00 00 00 00 02 02-00 00 01 22 00 00 00 00
D76D: sta  $0053     0070:00 00 00 00 00 00 02 F0-03 0D 00 00 03 12 03 12
D76F: stb  $004B     0080:00 08 1F 60 65 C9 C0 60-20 00 00 13 02 B8 02 C0
D771: comb           0090:02 90 01 04 31 03 C5 00-93 00 93 05 01 03 00 A6
D772: andb $0053     00A0:3E 5C A1 FF FF 00 20 00-65 00 06 00 00 00 00 01
D774: orb  $005B     00B0:00 00 00 00 02 00 00 6F-8F 00 00 00 00 4B 56 00
D776: stb  $005B     00C0:00 00 00 00 00 00 00 00-00 03 C0 34 B4 70 00 00
D778: lda  $0044     00D0:FF 47 00 00 FF FF C0 03-0D 03 71 00 00 6E 00 00
D77A: eora $3000     00E0:00 10 00 00 00 00 00 07-1F 02 BF 00 00 00 00 00
D77D: asl  $3002     00F0:00 10 00 00 00 00 00 00-00 00 07 B9 FF 00 00 00
D780: tab            —«RAM1+0001»————————————————————————————————————
D781: anda $004C     0001:00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 87
D783: ora  $0054     0011:8F 8F 8F 8F 8F 8F 8F 00-00 00 00 00 00 80 34 00
D785: sta  $0054     0021:00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00
```

Like the switch, each lamp correspond to a bit in pinmame like bellow (address 0010 and 0011)



Lamp																
Adresse	$0010								$0011							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
	25000	50000	Extrabll	kickback	Ball in play	race again	ramp arrow	arrow banzai hill	Machine	Green	race	3000 W/L	kickback	timelock	freestyle	lock
	1	0	0	0	0	1	1	1	1	0	0	0	1	1	1	1
	87								8F							
Binary	10000111								10001111							
DEC	135								143							
HEX	87								8F							



BANZAI RUN Lower Playfield **Lamp-Matrix Table**

COLUMN ROW	1 Q66 YEL-BRN 1J7-1	2 Q64 YEL-RED 1J7-2	3 Q62 YEL-ORN 1J7-3	4 Q60 YEL-BLK 1J7-4	5 Q58 YEL-GRN 1J7-6	6 Q56 YEL-BLU 1J7-7	7 Q54 YEL-VIO 1J7-8	8 Q52 YEL-GRY 1J7-9
Q60 RED- 1 BRN 1J6-1	Arrow ● (Banzai Hill) 1	Lock (Center Eject) 9	SUPER (Super Cycle Stunt) 17	25	Rank 6 (Low, Left Eject) 33	RACE (Low Red Stndup Tgt) 41	Green 2⃞ Machine Challenged 49	SPECIAL ● (L Outlane) 57
Q61 RED- 2 BLK 1J6-2	Ramp Arrow (Rank #1) 2	Freestyle (Center Eject) 10	CYCLE (Super Cycle Stunt) 18	26	Rank 5 (Left Eject) 34	RED (Cntr Red Stndup Tgt) 42	Red Hot 2⃞ Challenged 50	LAPS 1 58
Q62 RED- 3 ORN 1J6-3	Race Again ● 3	Timelock (Center Eject) 11	STUNT (Super Cycle Stunt) 19	27	Rank 4 (Mid, Left Eject) 35	HOT (Right Red Stndup Tgt) 43	Prior Race Blue 51	LAPS 2 59
Q63 RED- 4 YEL 1J6-5	Ball in Play (Scoreboard) 4	Kickback (Center Eject) 12	Double Lap (Ramp, lwr left) 20	28	Rank 3 (Left Eject) 36	RACE (Low Blue Stndup Tgt) 44	Prior Race Yellow 52	LAPS 3 60
Q64 RED- 5 GRN 1J6-6	Kickback ● 5	3000 W/L ● (Left Spinner) 13	SPOT (Ramp, lwr right) 21	29	Rank 2 ● (High, Left 2⃞ Eject) 37	BLUE (Cntr Blue Stndup Tgt) 45	Prior Race Green 53	LAPS 4 61
Q65 RED- 6 BLU 1J6-7	Extra Ball ● (Cap. Ball, low) 6	RACE (Top left lane) 14	3000 W/L ● (Right Spinner) 22	30	RACE (Left Yel Stndup Tgt) 38	BEARD ● (High Blue Stndup Tgt) 46	Prior Race Red 54	LAPS 5 62
Q66 RED- 7 VIO 1J6-8	50,000 ● (Cap. Ball, cntr) 7	GREEN (Top center lane) 15	Flipper ● ② Lane (both) 23	31	YELLOW (Cntr Yel Stndup Tgt) 39	Blue Beard 2⃞ Chall'ngd 47	SPECIAL ● (R Outlane) 55	LAPS 10 63
Q67 RED- 8 GRY 1J6-9	25,000 ● (Cap. Ball, high) 8	MACHINE (Top right lane) 16	1 LAP ● Standup ② Targets 24	32	BELLY ● (Rt Yel Stndup Tgt) 40	Yel Belly 2⃞ Chall'ngd 48	56	LAPS 20 64

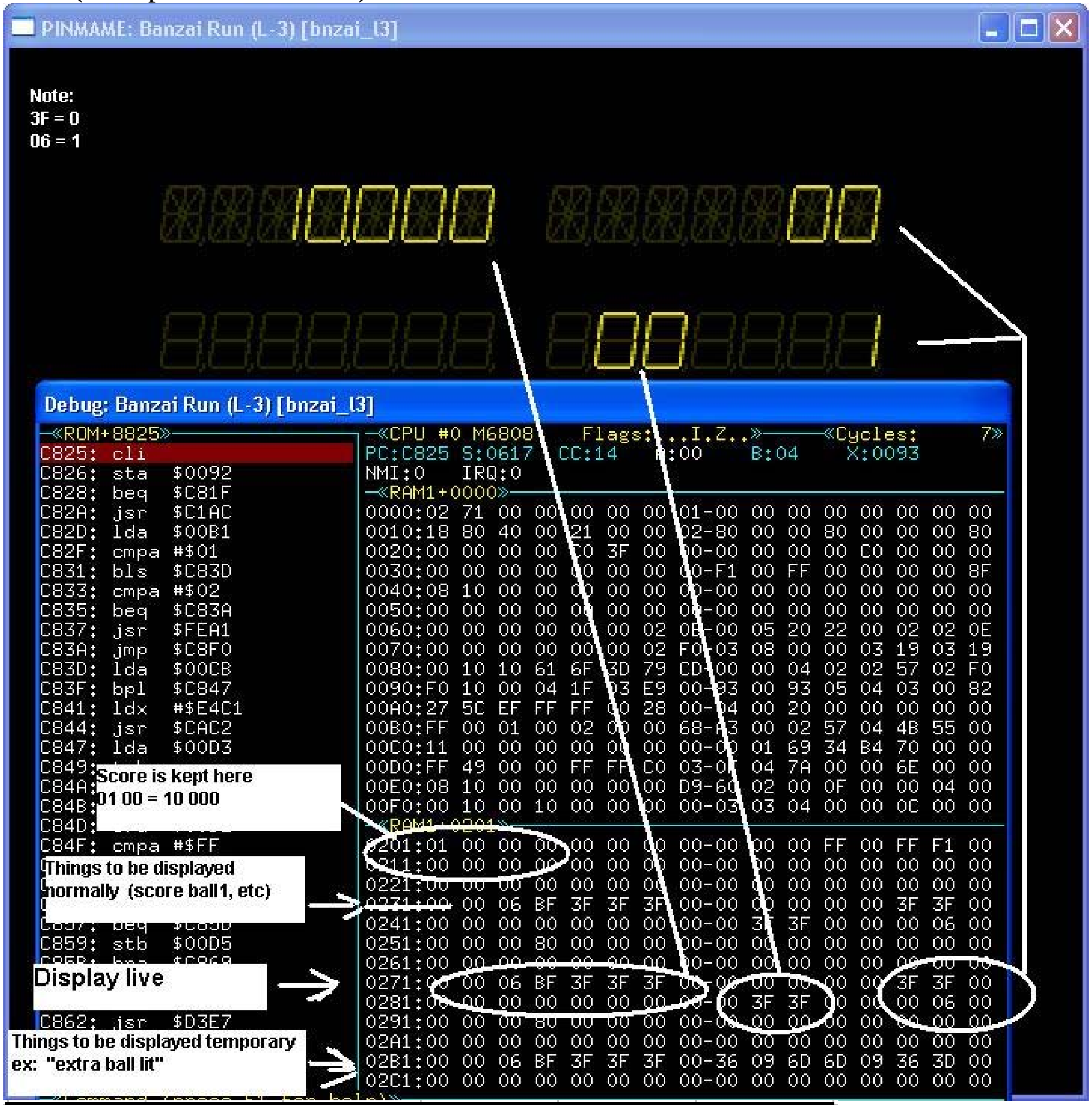
Symbols: 2⃞ Two Lamps: 1 on Up P/F; 1 on Lo P/F ② Two Lamps on Lo P/F ● = #44 Bulb; all other bulbs = #555

Score and Display:
In system 11 pins, the score is kept at adress $0200 .to $0202 for the player 1.

The display lived (the one that is actually displayed is at address 0270 to 027F

The address that are used to displays something temporary is address 02B0 to 02BF (example “ Extra ball lit” or “red hot challenge”

The address that are used to displays something more permanent are the address 0230 to 023F (example the score etc.)



PINMAME: Banzai Run (L-3) [bnzai_l3]

Note:
3F = 0
06 = 1

Debug: Banzai Run (L-3) [bnzai_l3]

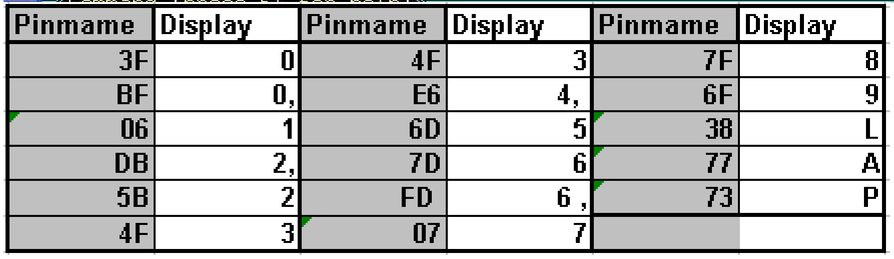
```
—«ROM+8825»——————————      —«CPU #0 M6808    Flags:...I.Z..»————«Cycles:      7»
C825: cli                  PC:C825 S:0617  CC:14   A:00    B:04    X:0093
C826: sta  $0092           NMI:0   IRQ:0
C828: beq  $C81F           —«RAM1+0000»——————————————————————————————————————————
C82A: jsr  $C1AC           0000:02 71 00 00 00 00 00 01-00 00 00 00 00 00 00 00
C82D: lda  $00B1           0010:18 80 40 00 21 00 00 02-80 00 00 80 00 00 00 80
C82F: cmpa #$01            0020:00 00 00 00 C0 3F 00 00-00 00 00 00 C0 00 00 00
C831: bls  $C83D           0030:00 00 00 00 00 00 00 00-F1 00 FF 00 00 00 00 8F
C833: cmpa #$02            0040:08 10 00 00 00 00 00 00-00 00 00 00 00 00 00 00
C835: beq  $C83A           0050:00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00
C837: jsr  $FEA1           0060:00 00 00 00 00 00 02 0B-00 05 20 22 00 02 02 0E
C83A: jmp  $C8F0           0070:00 00 00 00 00 00 02 F0-03 08 00 00 03 19 03 19
C83D: lda  $00CB           0080:00 10 10 61 6F 3D 79 CD-00 00 04 02 02 57 02 F0
C83F: bpl  $C847           0090:F0 10 00 04 1F 03 E9 00-93 00 93 05 04 03 00 82
C841: ldx  #$E4C1          00A0:27 5C EF FF FF 00 28 00-04 00 20 00 00 00 00 00
C844: jsr  $CAC2           00B0:FF 00 01 00 02 00 00 68-A3 00 02 57 04 4B 55 00
C847: lda  $00D3           00C0:11 00 00 00 00 00 00 00-00 01 69 34 B4 70 00 00
C849:                      00D0:FF 49 00 00 FF FF C0 03-0F 04 7A 00 00 6E 00 00
C84A:                      00E0:08 10 00 00 00 00 00 D9-60 02 00 0F 00 00 04 00
C84B:                      00F0:00 10 00 10 00 00 00 00-03 03 04 00 00 0C 00 00
C84D:                      —«RAM1+0201»——————————————————————————————————————————
C84F: cmpa #$FF            0201:01 00 00 00 00 00 00 00-00 00 00 FF 00 FF F1 00
                           0211:00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00
                           0221:00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00
                           0231:00 00 06 BF 3F 3F 3F 00-00 00 00 00 00 3F 3F 00
C857: beq  $C85D           0241:00 00 00 00 00 00 00 00-00 3F 3F 00 00 00 06 00
C859: stb  $00D5           0251:00 00 00 80 00 00 00 00-00 00 00 00 00 00 00 00
C85B: bne  $C868           0261:00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00
                           0271:00 00 06 BF 3F 3F 3F 00-00 00 00 00 00 3F 3F 00
                           0281:00 00 00 00 00 00 00 00-00 3F 3F 00 00 00 06 00
C862: jsr  $D3E7           0291:00 00 00 80 00 00 00 00-00 00 00 00 00 00 00 00
                           02A1:00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00
                           02B1:00 00 06 BF 3F 3F 3F 00-36 09 6D 6D 09 36 3D 00
                           02C1:00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00
```

Score is kept here
01 00 = 10 000

Things to be displayed normally (score ball1, etc)

Display live

Things to be displayed temporary
ex: "extra ball lit"



Pinmame	Display	Pinmame	Display	Pinmame	Display
3F	0	4F	3	7F	8
BF	0,	E6	4,	6F	9
06	1	6D	5	38	L
DB	2,	7D	6	77	A
5B	2	FD	6 ,	73	P
4F	3	07	7		

How to use trace, BP and WP.

Once the game is started. You can toggle the debug window and then put a break point or a watch point where you want the debugger to stop.

For example if you want to simulate a lap (ramp upper exit, switch R+S) , toggle the debugger “**~**“, put a watch point at address 0201 (WP 0201) to make the debugger stop when the score is updated.
Then trace the code that is gonna be executed with the register **(trace LAP.dasm A B X**).
Then Go, and quickly hit **R+S.** you shall toggle the debugger once the score is updated.
Then **Trace off**

In the same repertory as pinmame debug you shall see a file named with the corresponding name “**LAP.dasm “**
I suggest to open it with **notepad ++**
Don’t be afraid, the trace shall be something like 20 000 lines.

You shall see something like that on the last part of the file

```
A:03 B:01 X:01FE CE4E: rts
A:03 B:01 X:01FE CE1C: decb
A:03 B:00 X:01FE CE1D: bne  $CE18
A:03 B:00 X:01FE CE1F: ldb  $0087
A:03 B:00 X:01FE CE21: beq  $CE45
A:03 B:00 X:01FE CE45: sta  (x+$03)
A:03 B:00 X:01FE CE47: rts
```

You can see now the line where the score is updated (CE 45) , the score is updated by putting A (03) into (x+$03) ($201).

SYSTEM 11 MEMORY MAP
0010 to 0017 LAMP
003E to 0045 Switch
0000-007F 128 BYTE INTERNAL CPU RAM
0080-07FF 2K RAM U25 (BATTERY BACKED - ends higher up but games usually don't go over 7ff for storage)
0200 score

0230 to 024F approx , used to store the things to be displayed more
0270 display real time
0230 to 024F approx , used to store the things to be displayed temporary

0346 approx place where the lamp are stored for the next player

Close to 0740 = highscore
0740-07E0 – adjustement stored and kept with the battery

2000-2003 U9 6821 PIA
2100-2103 U10 6821 PIA
2200 U28 LS374 OCTAL FLIP-FLOP
2400-2403 U34 6821 PIA
2800-2803 U51 6821 PIA
2C00-2C03 U14 6821 PIA
3000-3003 U38 6821 PIA
3400-3403 U42 6821 PIA A:DISPLAYS B:SOUND BOARD

4000-7FFF U26 GAME ROM

8000-FFFF U27 GAME ROM

On the Rom it self:
4780 is used to store the address of things to be displayed.
4900 to 5700 used to store thing to be displayed.

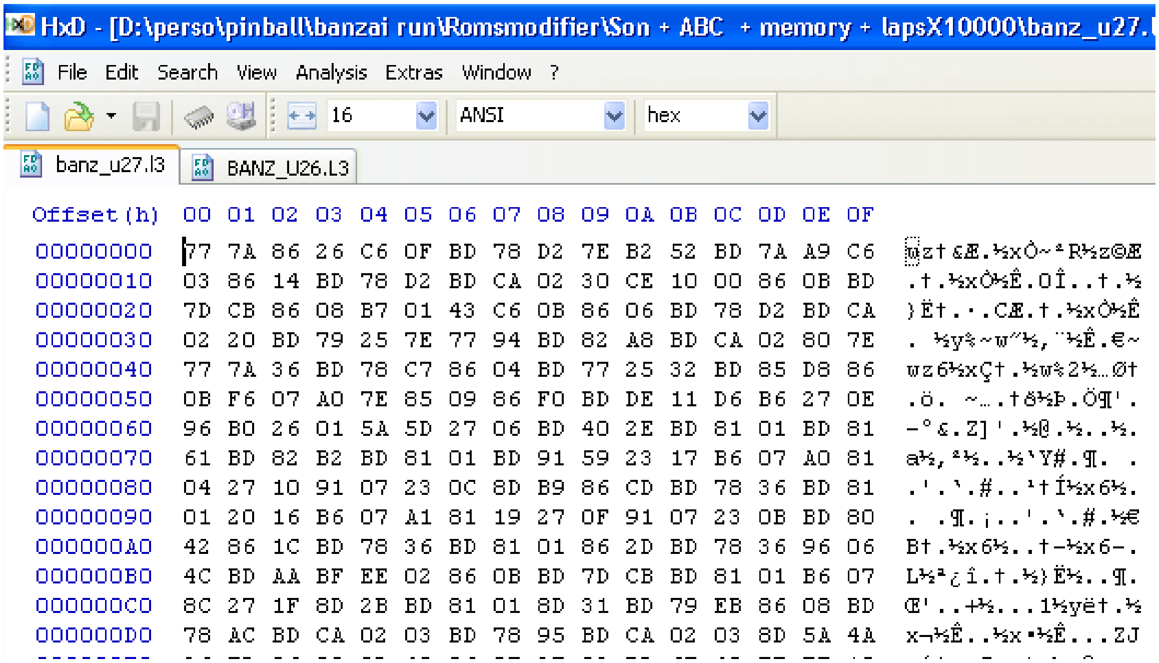
Around 5D70 the number of the sound to be played are stored here

C000 to C130 on rom 27, factory setting.
(ex. Free play is $C026)

Using HX DeN

Once you made your change.
You can edit the ROM using HX den

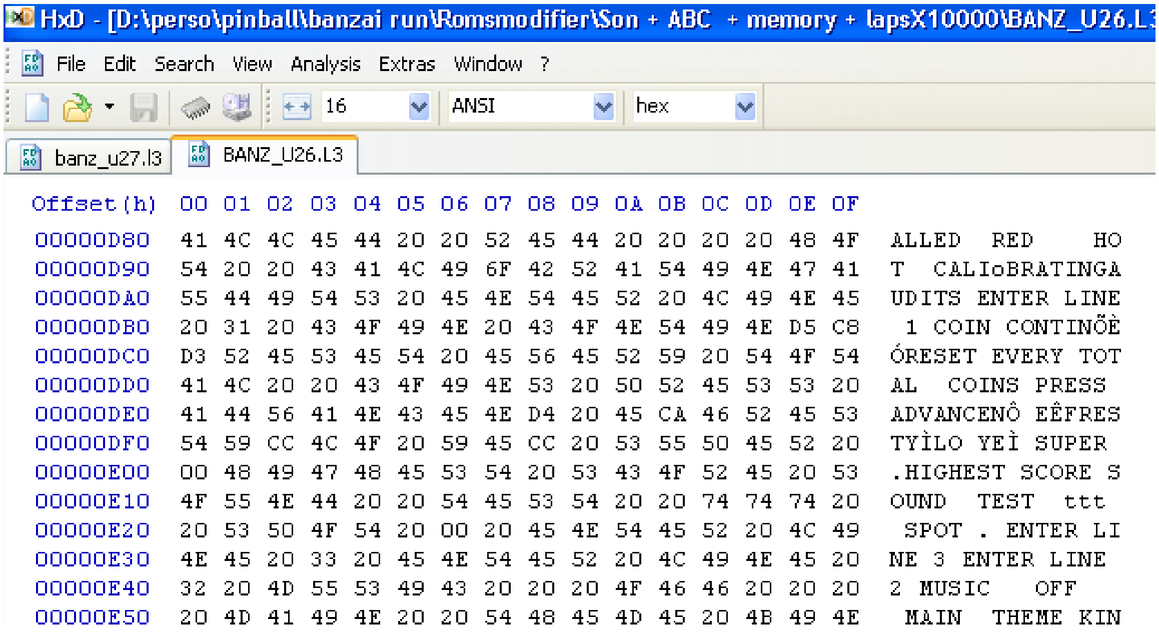
For the ROM 27 , remember that 0000 = 8000 on DASM.


HxD - [D:\perso\pinball\banzai run\Romsmodifier\Son + ABC + memory + lapsX10000\banz_u27.
File Edit Search View Analysis Extras Window ?
16
ANSI
hex
banz_u27.l3
BANZ_U26.L3

```
Offset(h) 00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F

00000000  77 7A 86 26 C6 0F BD 78 D2 7E B2 52 BD 7A A9 C6  wz†&Æ.½xÒ~²R½z©Æ
00000010  03 86 14 BD 78 D2 BD CA 02 30 CE 10 00 86 0B BD  .†.½xÒ½Ê.0Î..†.½
00000020  7D CB 86 08 B7 01 43 C6 0B 86 06 BD 78 D2 BD CA  }Ë†.·.CÆ.†.½xÒ½Ê
00000030  02 20 BD 79 25 7E 77 94 BD 82 A8 BD CA 02 80 7E  . ½y%~w”½‚¨½Ê.€~
00000040  77 7A 36 BD 78 C7 86 04 BD 77 25 32 BD 85 D8 86  wz6½xÇ†.½w%2½…Ø†
00000050  0B F6 07 A0 7E 85 09 86 F0 BD DE 11 D6 B6 27 0E  .ö. ~….†ð½Þ.Ö¶'.
00000060  96 B0 26 01 5A 5D 27 06 BD 40 2E BD 81 01 BD 81  –°&.Z]'.½@.½..½.
00000070  61 BD 82 B2 BD 81 01 BD 91 59 23 17 B6 07 A0 81  a½‚²½..½‘Y#.¶. .
00000080  04 27 10 91 07 23 0C 8D B9 86 CD BD 78 36 BD 81  .'.‘.#..¹†Í½x6½.
00000090  01 20 16 B6 07 A1 81 19 27 0F 91 07 23 0B BD 80  . .¶.¡..'.‘.#.½€
000000A0  42 86 1C BD 78 36 BD 81 01 86 2D BD 78 36 96 06  B†.½x6½..†-½x6–.
000000B0  4C BD AA BF EE 02 86 0B BD 7D CB BD 81 01 B6 07  L½ª¿î.†.½}Ë½..¶.
000000C0  8C 27 1F 8D 2B BD 81 01 8D 31 BD 79 EB 86 08 BD  Œ'..+½...1½yë†.½
000000D0  78 AC BD CA 02 03 BD 78 95 BD CA 02 03 8D 5A 4A  x¬½Ê..½x•½Ê...ZJ
```

You can see on the rom 26 that the things to be displayed are simply written in ANSI.


HxD - [D:\perso\pinball\banzai run\Romsmodifier\Son + ABC + memory + lapsX10000\BANZ_U26.L3
File Edit Search View Analysis Extras Window ?
16
ANSI
hex
banz_u27.l3
BANZ_U26.L3

```
Offset(h) 00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F

00000D80  41 4C 4C 45 44 20 20 52 45 44 20 20 20 20 48 4F  ALLED  RED    HO
00000D90  54 20 20 43 41 4C 49 6F 42 52 41 54 49 4E 47 41  T  CALIoBRATINGA
00000DA0  55 44 49 54 53 20 45 4E 54 45 52 20 4C 49 4E 45  UDITS ENTER LINE
00000DB0  20 31 20 43 4F 49 4E 20 43 4F 4E 54 49 4E D5 C8   1 COIN CONTINÕÈ
00000DC0  D3 52 45 53 45 54 20 45 56 45 52 59 20 54 4F 54  ÓRESET EVERY TOT
00000DD0  41 4C 20 20 43 4F 49 4E 53 20 50 52 45 53 53 20  AL  COINS PRESS 
00000DE0  41 44 56 41 4E 43 45 4E D4 20 45 CA 46 52 45 53  ADVANCENÔ EÊFRES
00000DF0  54 59 CC 4C 4F 20 59 45 CC 20 53 55 50 45 52 20  TYÌLO YEÌ SUPER 
00000E00  00 48 49 47 48 45 53 54 20 53 43 4F 52 45 20 53  .HIGHEST SCORE S
00000E10  4F 55 4E 44 20 20 54 45 53 54 20 20 74 74 74 20  OUND  TEST  ttt 
00000E20  20 53 50 4F 54 20 00 20 45 4E 54 45 52 20 4C 49   SPOT . ENTER LI
00000E30  4E 45 20 33 20 45 4E 54 45 52 20 4C 49 4E 45 20  NE 3 ENTER LINE 
00000E40  32 20 4D 55 53 49 43 20 20 20 4F 46 46 20 20 20  2 MUSIC   OFF   
00000E50  20 4D 41 49 4E 20 20 54 48 45 4D 45 20 4B 49 4E   MAIN  THEME KIN
```

Thanks for reading.
Francis