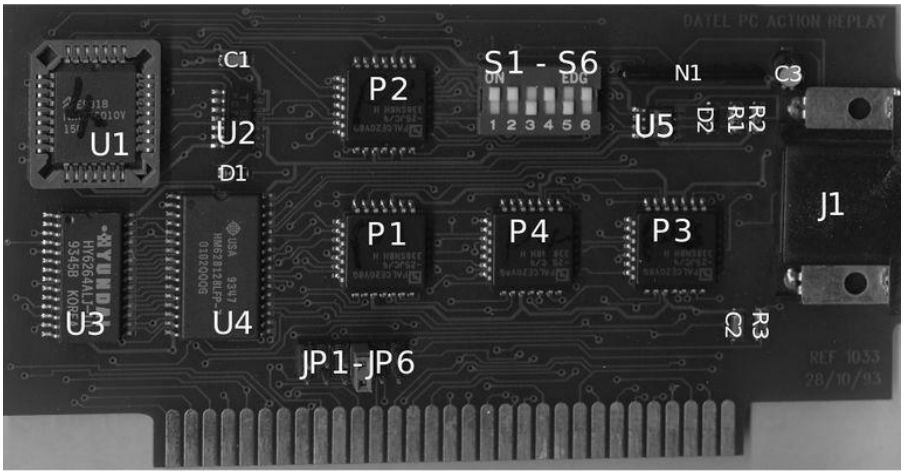
Datel Action Replay PC

Contents

PCB components:



The front side of the PCB, with labels (created by me)

Name	Type	Manufacturer	Name/Value	Pins	Info	Notes
U1	EPROM	National Semiconductor	NM27C010	32	datasheet (http://pdf.datasheetcatalog.com/datasheet/nationalsemiconductor/DS010798.PDF)	
U2	Dual Flip-flop		HC74A	14	datasheet (https://www.onsemi.com/pub/Collateral/MC74HC74A-D.PDF)	
U3	SRAM (8KB)	Hyundai	HM6264ALJ-10	28	datasheet (http://www.protronix.co.za/images/info/HM6264.pdf)	8 Kilobytes (8K words by 8-bits), 10 nanoseconds
U4	SRAM (128KB)	Hitachi	HM628128LFP-7	32	datasheet (https://www.digchip.com/datasheets/parts/datasheet/740/HM628128-pdf.php)	128 Kilobytes (8K words by 8-bits), 70 nanoseconds. L=low standby power (10 uW)
U5	555 Timer	STMicroelectronics	NE555	8	datasheet (http://www.ti.com/lit/ds/symlink/ne555.pdf)	
P1	Programmable Logic Array	AMD	PALCE20V8Q	24	datasheet (https://www.latticesemi.com/-/media/LatticeSemi/Documents/DataSheets/PAL/PALCE20V8DataSheet.ashx?la=en)	The part number "PALCE20V8Q" decodes as: 20 inputs, 8 flip/flops or outputs, Quarter power (55 mA Icc)
P2	Programmable Logic Array	AMD	PALCE20V8Q	24	datasheet (https://www.lattice	

					semi.com/-/media/LatticeSemi/Documents/DataSheets/PAL/PALCE20V8DataSheet.ashx?la=en)	
P3	Programmable Logic Array	AMD	PALCE20V8Q	24	datasheet (https://www.latticesemi.com/-/media/LatticeSemi/Documents/DataSheets/PAL/PALCE20V8DataSheet.ashx?la=en)	
P4	Programmable Logic Array	AMD	PALCE20V8Q	24	datasheet (https://www.latticesemi.com/-/media/LatticeSemi/Documents/DataSheets/PAL/PALCE20V8DataSheet.ashx?la=en)	
C1	Capacitor					
C2	Capacitor					
C3	Capacitor		1 uF / 63v			
D1	Diode					
D2	Diode					
R1	Resistor		23k Ω			
R2	Resistor		100k Ω			
R3	Resistor		1K Ω			
J1	Connector		DB-9 male			

Dip Switches / Jumpers:

The right 3 switches on the dip switch block (S4-S6) control the ROM address, while the left two switches control the IO port. S3, the third switch from the left, is not explained.

The 6 jumper pins at JP1-6 are used to set the IRQ. A vertical pin closing the top and bottom contact selects that IRQ

The manual lists the following values:

ROM Address

S4	S5	S6	Address
UP	UP	UP	DC00h
UP	DOWN	DOWN	D800h
DOWN	UP	DOWN	D400h
DOWN	UP	UP	D200h
UP	UP	DOWN	D000h
DOWN	DOWN	UP	CC00h
UP	DOWN	UP	C800h
DOWN	DOWN	DOWN	Unspecified (TODO: test)

IO Port

S1	S2	Port
UP	UP	280h
DOWN	UP	290h
UP	DOWN	2A0h
DOWN	DOWN	2B0h

IRQ

JP1	JP2	JP3	JP4	JP5	JP6
2	3	4	5	6	7

Firmware

The firmware (https://archive.org/details/actionreplaypcfirmwarev4) is 128 kilobytes, separated into 16 8KB Pages. Each page begins with a header that says which page it is, and mentions "(c) 1993 DATEL"

The AREPLAY.COM file has error strings for "Action Replay ram not switchable" and "Replay base address is not being shadowed" which suggests the larger SRAM chip (U4) is being used to shadow the EPROM at runtime.

There was at least one upgrade to the EPROM provided, which involved mailing out a replacement chip to users.

Anti-virus functionality

The firmware contains the signature of 50 viruses (https://twitter.com/Foone/status/1232324301656735745), starting at offset 0x164D8.

Each name is proceeded by an 0xFE character, can be up to 26 letters long, and is padded with spaces.

IBM Control

The external "paddle" features a button, switch, and LED. The PCB inside calls it the "Datel IBM Control"

DB9 (female)

	Connection	Color
1	N/C	N/A
2	LED	Brown
3	Switch	Black
4	Button	Blue
5	Ground	Green
6	N/C	
7	N/C	Yellow
8	N/C	
9	N/C	
Shell	N/C	Orange

Credits:

The firmware contains credits at offset 4F64: (TODO: See if you can view this from within the program)

```
       Action  Replay  v1.3         (c) 1993 DATEL
Programmer ........................... Simon P.Constable
Project Manager ...................... Wayne H.Beckett
Design ............................... Mike J.Connors
..................................... Wayne H.Beckett
Hardware ............................. Roy C.Harding
Support .............................. Mark Wallace
..................................... Damon P.Barwin
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Twitter Threads:

- When the Brandon unit first showed up on ebay (https://twitter.com/Foone/status/1121138306673041408) (April 24th, 2019)
- In response to the LGR video (https://twitter.com/Foone/status/1230957506798612480) (February 21st, 2020)
- Firmware image reverse engineering (https://twitter.com/Foone/status/1232324216650780674) (February 25th 2020)
- Status update after the card arrived (https://twitter.com/Foone/status/1233109217592004608) (February 27th, 2020)

Related Links:

- Lazy Game Reviews video on the Action Replay PC (https://www.youtube.com/watch?v=usaioMbE8EQ)
- Manual, PCB images, and software (https://archive.org/details/PCactionreplay1993)
- VCFed thread (http://www.vcfed.org/forum/showthread.php?72650-Action-Replay-PC-(ISA-card)-manual-box-disk-PCB-scans)
- Version 4 firmware dump (https://archive.org/details/actionreplaypcfirmwarev4)
