

ATARI 2600 HARDWARE REFERENCE GUIDE

Hardware Registers Quick Reference

TIA - Write

Addr	Name	7	6	5	4	3	2	1	0	Function
\$00	VSYNCR	-	-	-	-	-	-	1	-	Vertical sync
\$01	VBLANK	D	L	-	-	-	-	B	-	Vertical blank: Dump I/O, I1, I2, I3, Latch I4, I5, Blank enable.
\$02	WSYNCR	-	S	T	R	O	B	E	-	Wait for start of horizontal sync.
\$03	RSYNCR	-	S	T	R	O	B	E	-	Reset sync (chip testing).
\$04	NUSIZ0	-	-	M	M	-	P	P	P	Number / size of Player 0 Size of Missile 0
\$05	NUSIZ1	-	-	M	M	-	P	P	P	Number / size of Player 1 Size of Missile 1
\$06	COLUP0	C	C	C	C	L	L	L	X	Colour / Lum. player 0, PF score left
\$07	COLUP1	C	C	C	C	L	L	L	X	Colour / Lum. player 1, PF score right
\$08	COLUPF	C	C	C	C	L	L	L	X	Colour / Lum. playfield (PF), Ball (BL)
\$09	COLUBK	C	C	C	C	L	L	L	X	Colour / Luminance background
\$0A	CTRLPF	-	-	B	B	-	P	S	R	Playfield control: Ball size, Playfield priority, Score, Reflect.
\$0B	REFP0	-	-	-	-	1	-	-	-	Reflect player 0
\$0C	REFP1	-	-	-	-	1	-	-	-	Reflect player 1
\$0D	PF0	1	1	1	1	-	-	-	-	Playfield register 0 (bits 4-7)
\$0E	PF1	1	1	1	1	1	1	1	1	Playfield register 1 (bits 7-0)
\$0F	PF2	1	1	1	1	1	1	1	1	Playfield register 2 (bits 0-7)
\$10	RESP0	-	S	T	R	O	B	E	-	Reset player 0 horizontal position.
\$11	RESP1	-	S	T	R	O	B	E	-	Reset player 1 horizontal position.
\$12	RESM0	-	S	T	R	O	B	E	-	Reset missile 0 horizontal position.
\$13	RESM1	-	S	T	R	O	B	E	-	Reset missile 1 horizontal position.
\$14	RESBL	-	S	T	R	O	B	E	-	Reset ball horizontal position.
\$15	AUDC0	-	-	-	-	1	1	1	1	Audio control channel 0
\$16	AUDC1	-	-	-	-	1	1	1	1	Audio control channel 1
\$17	AUDF0	-	-	-	-	1	1	1	1	Audio frequency channel 0
\$18	AUDF1	-	-	-	-	1	1	1	1	Audio frequency channel 1
\$19	AUDV0	-	-	-	-	1	1	1	1	Audio volume channel 0
\$1A	AUDV1	-	-	-	-	1	1	1	1	Audio volume channel 1
\$1B	GRP0	1	1	1	1	1	1	1	1	Graphics player 0
\$1C	GRP1	1	1	1	1	1	1	1	1	Graphics player 1
\$1D	ENAM0	-	-	-	-	-	-	1	-	Enable missile 0
\$1E	ENAM1	-	-	-	-	-	-	1	-	Enable missile 1
\$1F	ENABL	-	-	-	-	-	-	1	-	Enable ball.
\$20	HMP0	1	1	1	1	-	-	-	-	Horizontal fine motion player 0
\$21	HMP1	1	1	1	1	-	-	-	-	Horizontal fine motion player 1
\$22	HMM0	1	1	1	1	-	-	-	-	Horizontal fine motion missile 0
\$23	HMM1	1	1	1	1	-	-	-	-	Horizontal fine motion missile 1
\$24	HMBL	1	1	1	1	-	-	-	-	Horizontal fine motion ball
\$25	VDELP0	-	-	-	-	-	-	-	1	Vertical delay player 0
\$26	VDELP1	-	-	-	-	-	-	-	1	Vertical delay player 1
\$27	VDELBL	-	-	-	-	-	-	-	1	Vertical delay ball
\$28	RESMP0	-	-	-	-	-	-	1	-	Reset missile 0 to player 0
\$29	RESMP1	-	-	-	-	-	-	1	-	Reset missile 1 to player 1
\$2A	HMOVE	-	S	T	R	O	B	E	-	Apply horizontal motion.
\$2B	HMCLR	-	S	T	R	O	B	E	-	Clear horizontal motion registers
\$2C	CXCLR	-	S	T	R	O	B	E	-	Clear collision latches

NUSIZ0 / NUSIZ1

Bit	Bit	Bit	Video Clocks	Player (PPP)
2	1	0	8 16 24 32 40 48 56 64 72	Description
0	0	0		One copy
0	0	1		Two copies, Close gap
0	1	0		Two copies, Medium gap
0	1	1		Three copies, Close gap
1	0	0		Two copies, Wide gap
1	0	1		Double size (pixel width x 2)
1	1	0		Three copies, Medium gap
1	1	1		Quad size (pixel width x 4)

NUSIZ0 / NUSIZ1 / CTRLPF

Bit	Bit	Video Clocks	Missile (MM), Ball (BB)
5	4	1 2 3 4 5 6 7 8	Description
0	0		Standard size (pixel width x 1)
0	1		Double size (pixel width x 2)
1	0		Quad size (pixel width x 4)
1	1		Octo size (pixel width x 8)

TIA - Read

Addr	Name	7	6	5	4	3	2	1	0	Function
\$00	CXM0P	1	1	-	-	-	-	-	-	Read collision: 7: M0 P1, 6: M0 P1
\$01	CXM1P	1	1	-	-	-	-	-	-	Read collision: 7: M1 P0, 6: M1 P1
\$02	CXP0FB	1	1	-	-	-	-	-	-	Read collision: 7: P0 PF, 6: P0 BL
\$03	CXP1FB	1	1	-	-	-	-	-	-	Read collision: 7: P1 PF, 6: P1 BL
\$04	CXM0FB	1	1	-	-	-	-	-	-	Read collision: 7: M0 PF, 6: M0 BL
\$05	CXM1FB	1	1	-	-	-	-	-	-	Read collision: 7: M1 PF, 6: M1 BL
\$06	CXBLPF	1	-	-	-	-	-	-	-	Read collision: 7: BL PF
\$07	CXPPMM	1	1	-	-	-	-	-	-	Read collision: 7: P0 P1, 6: M0 M1
\$08	INPT0	1	-	-	-	-	-	-	-	Read POT port 0 (paddle trigger)
\$09	INPT1	1	-	-	-	-	-	-	-	Read POT port 1 (paddle trigger)
\$0A	INPT2	1	-	-	-	-	-	-	-	Read POT port 2 (paddle trigger)
\$0B	INPT3	1	-	-	-	-	-	-	-	Read POT port 3 (paddle trigger)
\$0C	INPT4	1	-	-	-	-	-	-	-	Read input 0 (joystick left P0 fire)
\$0D	INPT5	1	-	-	-	-	-	-	-	Read input 1 (joystick right P1 fire)

RIOT

Addr	Name	7	6	5	4	3	2	1	0	Function
\$280	SWCHA	1	1	1	1	1	1	1	1	Port A Data (Joystick / Controllers)
\$281	SWACNT	1	1	1	1	1	1	1	1	Port A Control (DDR) (write only)
\$282	SWCHB	1	1	1	1	1	1	1	1	Port B Data (Console Switches)
\$283	SWBCNT	1	1	1	1	1	1	1	1	Port B Control (DDR) (write only)
\$284	INTIM	1	1	1	1	1	1	1	1	Timer (read only)
\$294	TIM1T	1	1	1	1	1	1	1	1	Set timer 1 clock interval (write)
\$295	TIM8T	1	1	1	1	1	1	1	1	Set timer 8 clock intervals (write)
\$296	TIM64T	1	1	1	1	1	1	1	1	Set timer 64 clock intervals (write)
\$297	TIM1024T	1	1	1	1	1	1	1	1	Set timer 1K clock intervals (write)

SWCHA (Joystick / Controller)

Bit	Direction	Player
7	Right	Left (P0)
6	Left	Left (P0)
5	Down	Left (P0)
4	Up	Left (P0)
3	Right	Right (P1)
2	Left	Right (P1)
1	Down	Right (P1)
0	Up	Right (P1)

SWCHB (Console Switches)

Bit	Switch	Description
7	Right (P1) difficulty	0 = (B)eginner/Easy/Novice, 1 = (A)dvance/Normal/Pro
6	Left (P0) difficulty	0 = (B)eginner/Easy/Novice, 1 = (A)dvance/Normal/Pro
5	Unused	Unused
4	Unused	Unused
3	Colour / B&W	0 = B&W, 1 = Colour (SECAM hard wired to ground)
2	Unused	Unused
1	Select	0 = Depressed
0	Reset	0 = Depressed

Memory Map

Start Addr	End Addr	Hardware Integrated Circuit	Type	Description
\$0000	\$002C	TIA	TIA	TIA
\$002D	\$007F			Unused / Shadow
\$0080	\$00FF	RIOT	RAM	128 Bytes RAM CPU Stack / RAM
\$0100	\$027F			Unused / Shadow
\$0280	\$0283	RIOT	I/O	I/O
\$0284	\$0284	RIOT	Timer	Timer
\$0285	\$0293			Unused / Shadow
\$0294	\$0297	RIOT	Timer	Timer
\$0298	\$0FFF			Unused / Shadow
\$1000	\$EFFF			Unused / Shadow
\$F000	\$F3FF	Cartridge	ROM	Software
\$F400	\$FFF9			Unused / Shadow
\$FFFA	\$FFFB	CPU	Vector	NMI
\$FFFC	\$FFFD	CPU	Vector	Reset
\$FFFE	\$FFFF	CPU	Vector	IRQ/BRK

Note: ROM - \$F000 to \$F3FF (4KB) shadow at any address with bit 12 set e.g. \$1000, \$3000, etc.

DOCUMENT INFORMATION

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