ATARI 2600 HARDWARE REFERENCE GUIDE

Hardware Registers Quick Reference

TIA - Write

Addr	Name	7	6	5	4	3	2	1	0	Function
$00	VSYNC	-	-	-	-	-	-	1	-	Vertical sync
$01	VBLANK	D	L	-	-	-	-	B	-	Vertical blank: Dump I0,I1,I2,I3, Latch I4, I5, Blank enable.
$02	WSYNC	-	S	T	R	O	B	E	-	Wait for start of horizontal sync.
$03	RSYNC	-	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	1	Audio frequency channel 0
$18	AUDF1	-	-	-	1	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 2	Bit 1	Bit 0	Video Clocks 8	16	24	32	40	48	56	64	72	Player (PPP) 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 5	Bit 4	Video Clocks 1	2	3	4	5	6	7	8	Missile (MM), Ball (BB) 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 tigger)
$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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