7.5 Stack Pointer

The Stack is mainly used for storing temporary data, for storing local variables and for storing return addresses after interrupts and subroutine calls. Note that the Stack is implemented as growing from higher to lower memory locations. The Stack Pointer Register always points to the top of the Stack. The Stack Pointer points to the data SRAM Stack area where the Subroutine and Interrupt Stacks are located. A Stack PUSH command will decrease the Stack Pointer.

The Stack in the data SRAM must be defined by the program before any subroutine calls are executed or interrupts are enabled. Initial Stack Pointer value equals the last address of the internal SRAM and the Stack Pointer must be set to point above start of the SRAM, see Table 8-3 on page 28.

See Table 7-1 for Stack Pointer details.

Table 7-1. Stack Pointer instructions

Instruction	Stack pointer	Description
PUSH	Decremented by 1	Data is pushed onto the stack
CALL ICALL RCALL	Decremented by 2	Return address is pushed onto the stack with a subroutine call or interrupt
POP	Incremented by 1	Data is popped from the stack
RET RETI	Incremented by 2	Return address is popped from the stack with return from subroutine or return from interrupt

The AVR Stack Pointer is implemented as two 8-bit registers in the I/O space. The number of bits actually used is implementation dependent. Note that the data space in some implementations of the AVR architecture is so small that only SPL is needed. In this case, the SPH Register will not be present.

7.5.1 SPH and SPL – Stack Pointer High and Stack Pointer Low Register

Bit	15	14	13	12	11	10	9	8	
0x3E (0x5E)	**SP15**	**SP14**	**SP13**	**SP12**	**SP11**	**SP10**	**SP9**	**SP8**	**SPH**
0x3D (0x5D)	**SP7**	**SP6**	**SP5**	**SP4**	**SP3**	**SP2**	**SP1**	**SP0**	**SPL**
	7	6	5	4	3	2	1	0	
Read/Write	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	
	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	
Initial Value	RAMEND	RAMEND	RAMEND	RAMEND	RAMEND	RAMEND	RAMEND	RAMEND	
	RAMEND	RAMEND	RAMEND	RAMEND	RAMEND	RAMEND	RAMEND	RAMEND	