

HW Problem 2: PIC18F1220 Arithmetic Support

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Problem 02: PIC18F1220 Microprocessor Arithmetic Support

Looking at the datasheets for a Microchip PIC18F1220 processor, answer the following questions:

- (A) What kinds of addition are supported directly in hardware? (i.e., for what bit widths, using what number representations, supported directly with assembly language addition instructions)?

The status register has bit flags for a negative bit, overflow bit, zero bit, digit carry/borrow bit, and carry/borrow bit. This would imply that the hardware supports signed addition/subtraction using 2's complement. These are supported with the following assembly instructions: ADDWF, ADDWFC, ADDLW, SUBLW, SUBWF, SUBWFB

- (B) How is carry and overflow information made available to the programmer?

The carry and overflow information is available in the status register 5-2. Bit 4 of the status register is a flag indication if the result was negative. Bit 3 is a flag that indicates if there was an overflow which caused the sign bit to change. Bit 2 is a bit flag indication the result was either zero or non-zero. Bit 1 is a flag indication a carry from the 4th low-order bit of the result occurred. Bit 0 indicates if a carry-out from the most significant bit of the result occurred.

- (C) What hardware support does the processor provide for multiplication and division?

The processor has an 8 x 8 hardware multiplier that completes in a single instruction cycle. The hardware multiplier performs unsigned multiplication that gives a 16-bit result. The result is stored in the 16bit register PRODH for the high-byte and PRODL for the low byte.