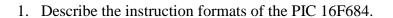
16.317: Microprocessor Systems Design I

Spring 2012

Lecture 31: Key Questions April 18, 2012



2. Describe how variables can be declared in PIC assembly language.

3. Describe the PIC instructions for clearing or moving registers.

4. Describe the PIC instructions for manipulating a single bit.

5. **Example:** Show the values of all changed registers after the following sequence cblock 0x30

CDIOCK	0X30	
x		
У		
endc		
clrw		
movwf	x	
movlw	0xFE	
movwf	У	
swapf	y, F	
bcf	у, 3	
bsf	x, 3	
movf	y, W	

6. Describe the PIC instructions for increment, decrement, and complement operations.

7. Describe the PIC instructions for addition and subtraction.

8. **Example**: Show the values of all changed registers after the following sequence

cblock 0x20varA varB varC endc clrf varA clrf varC incf varA, W $0 \times 0 F$ sublw addwf varB, F varB, F decf varB, W comf varC, F subwf

TABLE 13-2: PIC16F684 INSTRUCTION SET

Mnemonic, Operands		Description	Curles	14-Bit Opcode				Status			
		Description	Cycles	MSb			LSb	Affected	Notes		
BYTE-ORIENTED FILE REGISTER OPERATIONS											
ADDWF	f, d	Add W and f	1	00	0111	dfff	ffff	C, DC, Z	1, 2		
ANDWF	f, d	AND W with f	1	00	0101	dfff	ffff	Z	1, 2		
CLRF	f	Clear f	1	00	0001	1fff	ffff	Z	2		
CLRW	-	Clear W	1	00	0001	03000	20000	Z			
COMF	f, d	Complement f	1	00	1001	dfff	ffff	Z	1, 2		
DECF	f, d	Decrement f	1	00	0011	dfff	ffff	Z	1, 2		
DECFSZ	f, d	Decrement f, Skip if 0	1(2)	00	1011	dfff	ffff		1, 2, 3		
INCF	f, d	Increment f	1	00	1010	dfff	ffff	Z	1, 2		
INCFSZ	f, d	Increment f, Skip if 0	1(2)	00	1111	dfff	ffff		1, 2, 3		
IORWF	f, d	Inclusive OR W with f	1	00	0100	dfff	ffff	Z	1, 2		
MOVF	f, d	Move f	1	00	1000	dfff	ffff	Z	1, 2		
MOVWF	f	Move W to f	1	00	0000	1fff	ffff				
NOP	-	No Operation	1	00	0000	00000	0000				
RLF	f, d	Rotate Left f through Carry	1	00	1101	dfff	ffff	С	1, 2		
RRF	f, d	Rotate Right f through Carry	1	00	1100	dfff	ffff	С	1, 2		
SUBWF	f, d	Subtract W from f	1	00	0010	dfff	ffff	C, DC, Z	1, 2		
SWAPF	f, d	Swap nibbles in f	1	00	1110	dfff	ffff		1, 2		
XORWF	f, d	Exclusive OR W with f	1	00	0110	dfff	ffff	Z	1, 2		
		BIT-ORIENTED FILE REGIS	TER OPER	RATION	1S						
BCF	f, b	Bit Clear f	1	01	00ьь	bfff	ffff		1, 2		
BSF	f, b	Bit Set f	1	01	01bb	bfff	ffff		1, 2		
BTFSC	f, b	Bit Test f, Skip if Clear	1 (2)	01	10bb	bfff	ffff		3		
BTFSS	f, b	Bit Test f, Skip if Set	1 (2)	01	11bb	bfff	ffff		3		
		LITERAL AND CONTRO	OPERAT	IONS							
ADDLW	k	Add literal and W	1	11	111x	kkkk	kkkk	C, DC, Z			
ANDLW	k	AND literal with W	1	11	1001	kkkk	kkkk	Z			
CALL	k	Call Subroutine	2	10	0kkk	kkkk	kkkk	l			
CLRWDT	-	Clear Watchdog Timer	1	00	0000	0110	0100	TO, PD			
GOTO	k	Go to address	2	10	1kkk	kkkk	kkkk				
IORLW	k	Inclusive OR literal with W	1	11		kkkk		Z			
MOVLW	k	Move literal to W	1	11		kkkk					
RETFIE	-	Return from interrupt	2	00	0000		1001				
RETLW	k	Return with literal in W	2	11		kkkk					
RETURN	-	Return from Subroutine	2	00	0000		1000				
SLEEP	_	Go into Standby mode	1	00	0000	0110	0011	TO, PD			
SUBLW	k	Subtract W from literal	1	11		kkkk		C, DC, Z			
XORLW	k	Exclusive OR literal with W	1	11	1010	kkkk	kkkk	Z			

<u>Source:</u> PIC 16F684 Data Sheet http://ww1.microchip.com/downloads/en/devicedoc/41202f-print.pdf