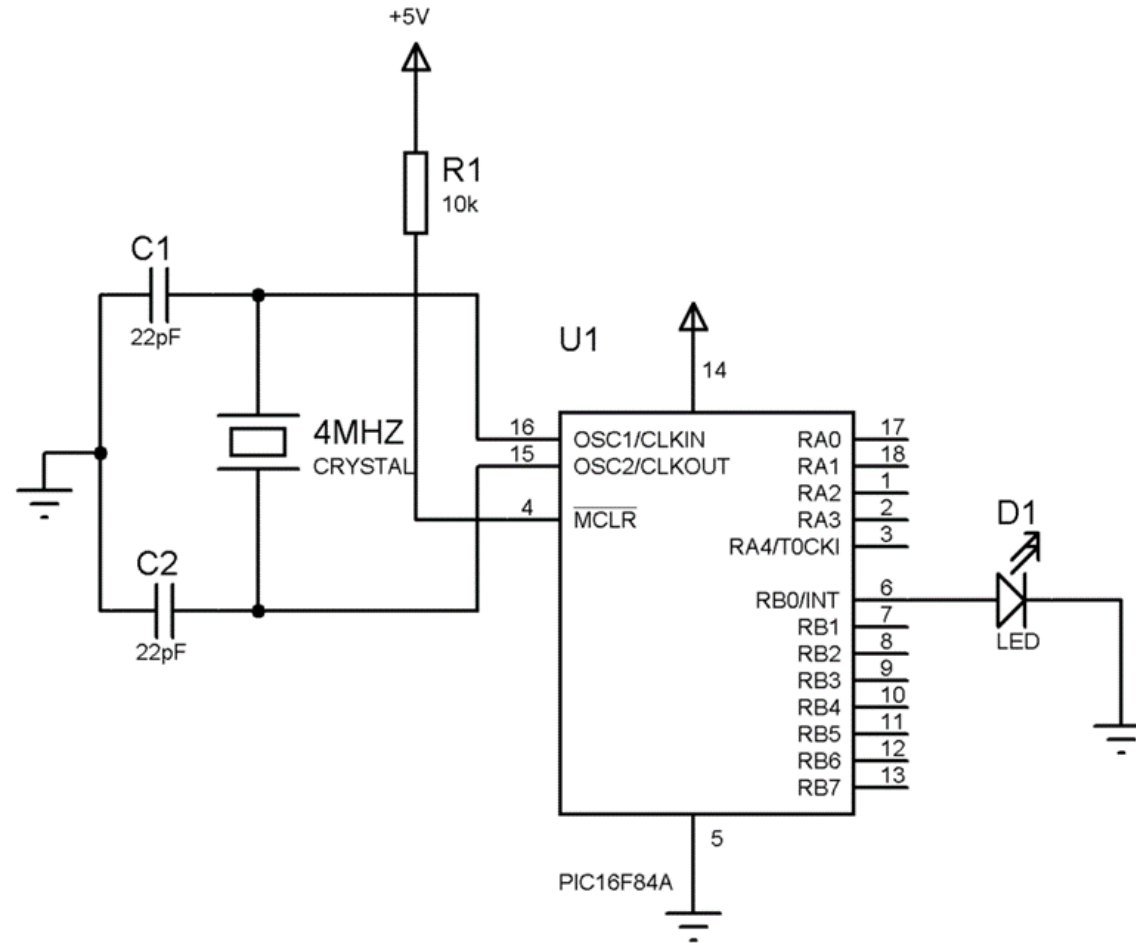




GÖMÜLÜ SİSTEMLER -5

MİKRODENETLEYİCİLER
PROGRAMLAMA

LED BLINK UYGULAMASI

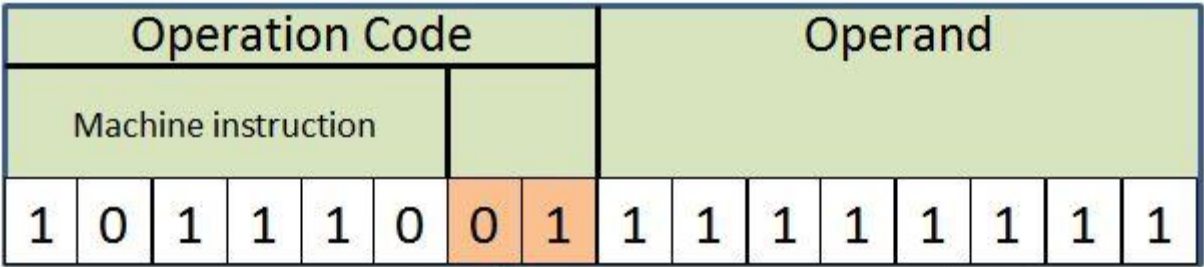
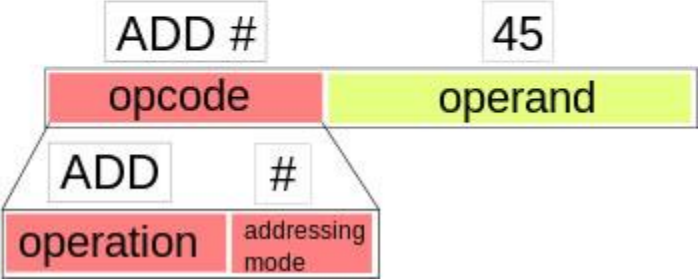


Makine Dili

- 5AF302127C -> Makine dilinde bir Kod örneği

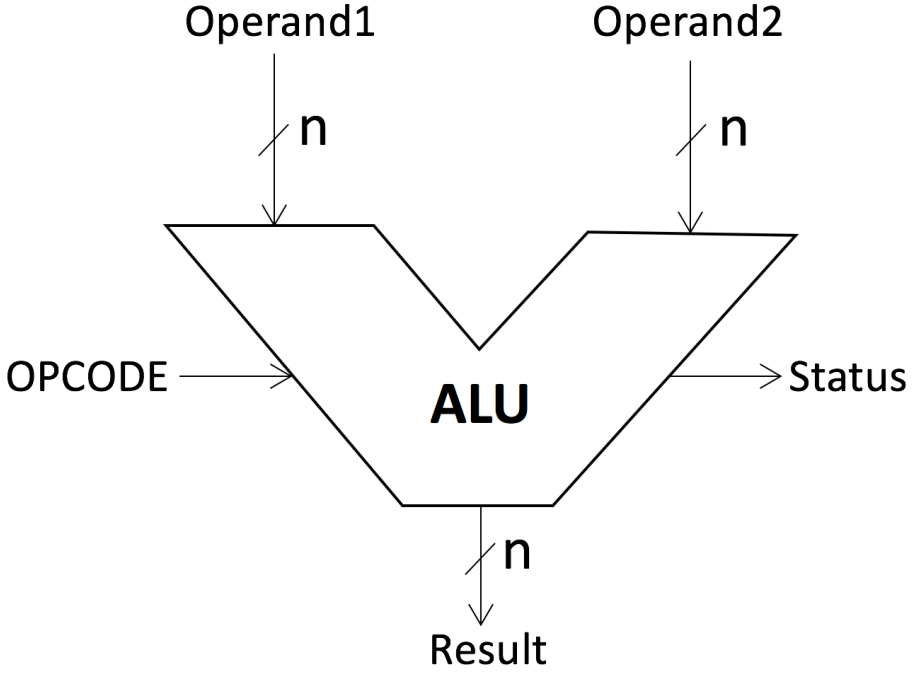
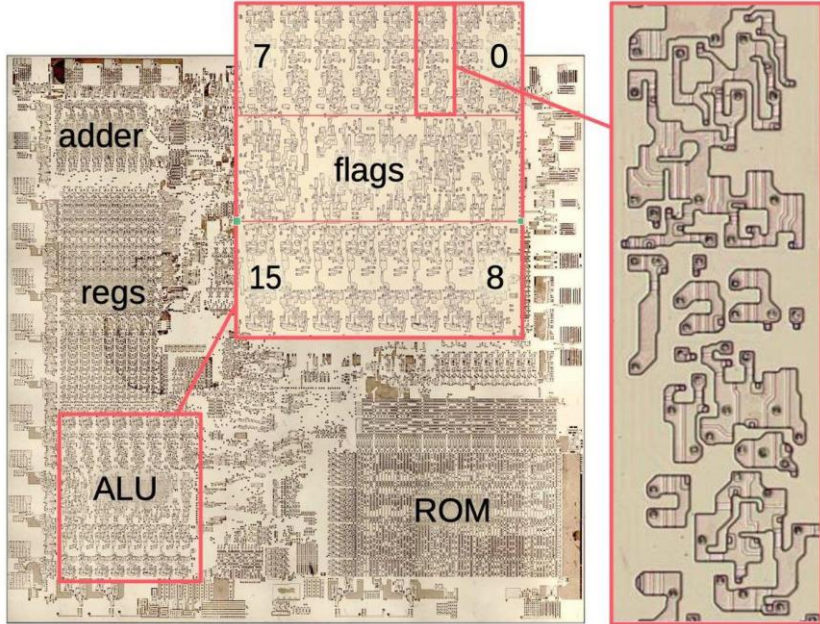
machine instruction

ADD #45

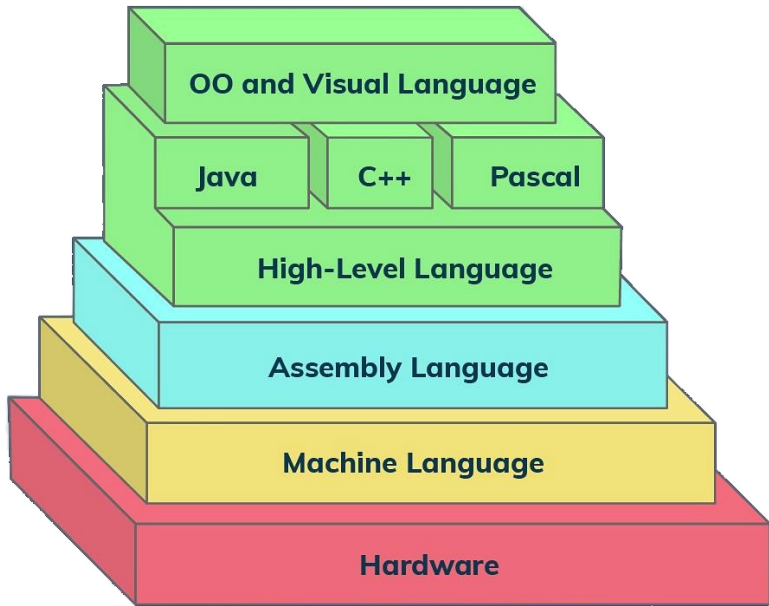


Address Mode

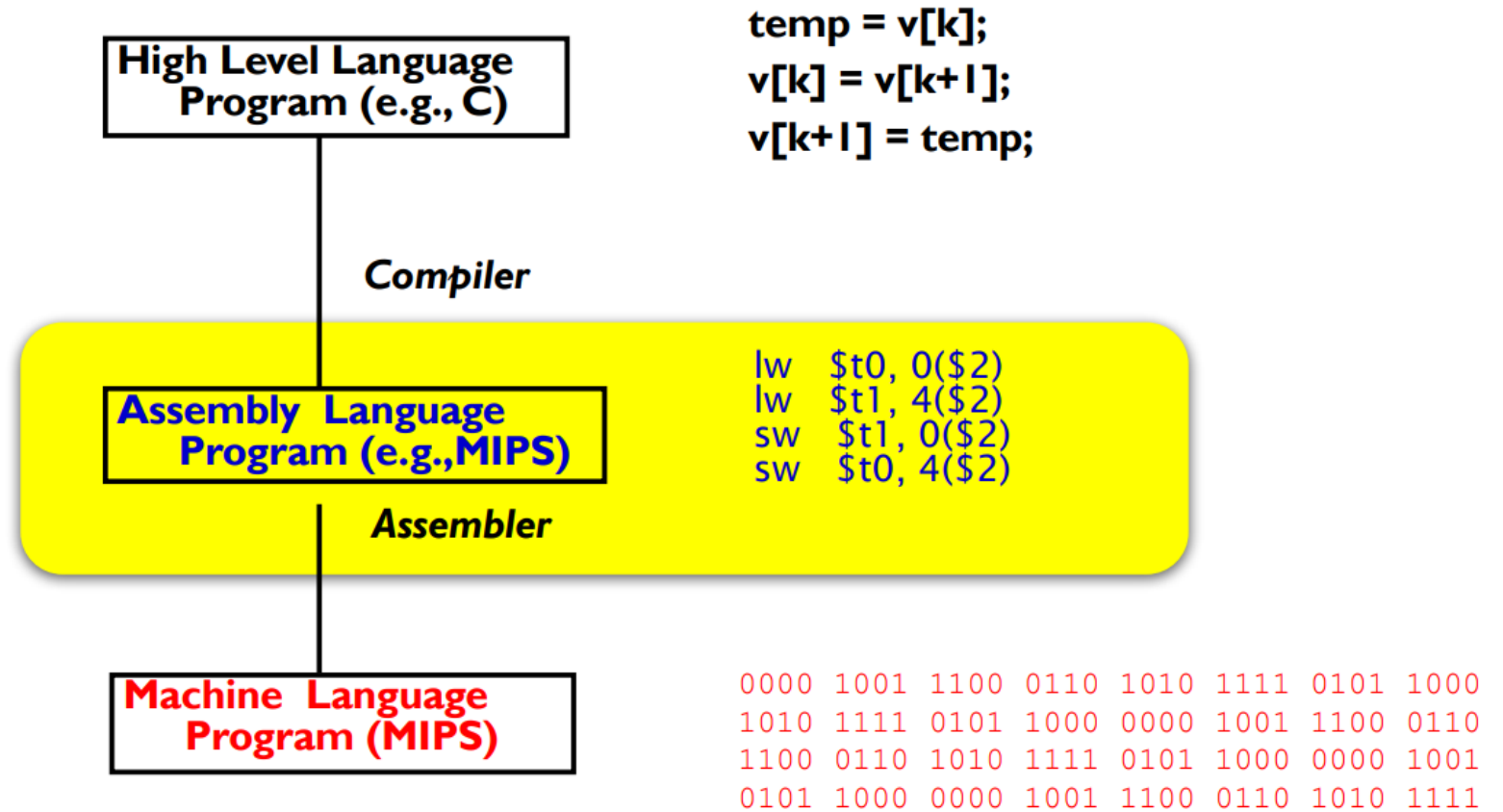
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ASSEMBLY Dili



Levels of Program Code



ASSEMBLY Dili

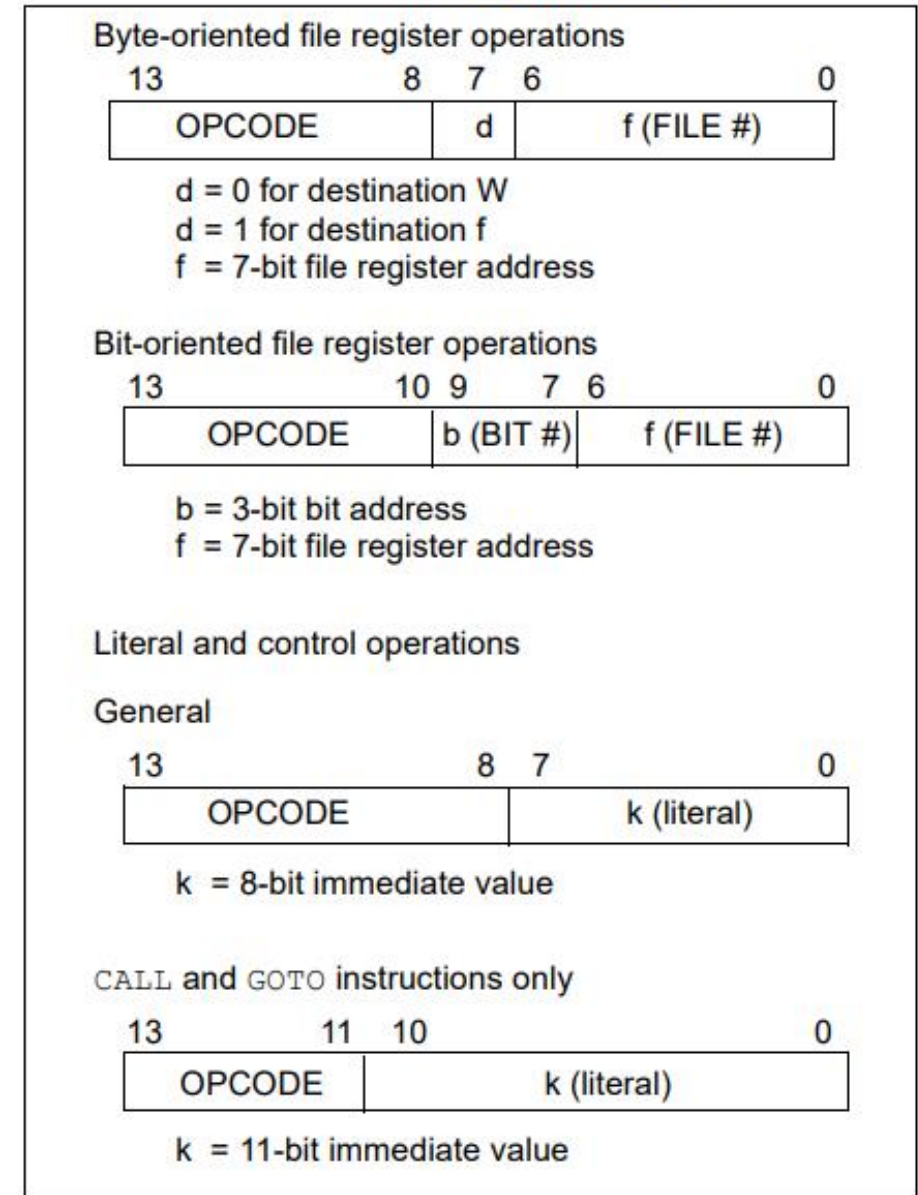
TABLE 7-1: OPCODE FIELD DESCRIPTIONS

Field	Description
f	Register file address (0x00 to 0x7F)
W	Working register (accumulator)
b	Bit address within an 8-bit file register
k	Literal field, constant data or label
x	Don't care location (= 0 or 1) The assembler will generate code with x = 0. It is the recommended form of use for compatibility with all Microchip software tools.
d	Destination select; d = 0: store result in W, d = 1: store result in file register f. Default is d = 1
PC	Program Counter
TO	Time-out bit
PD	Power-down bit

The instruction set is highly orthogonal and is grouped into three basic categories:

- **Byte-oriented** operations
- **Bit-oriented** operations
- **Literal and control** operations

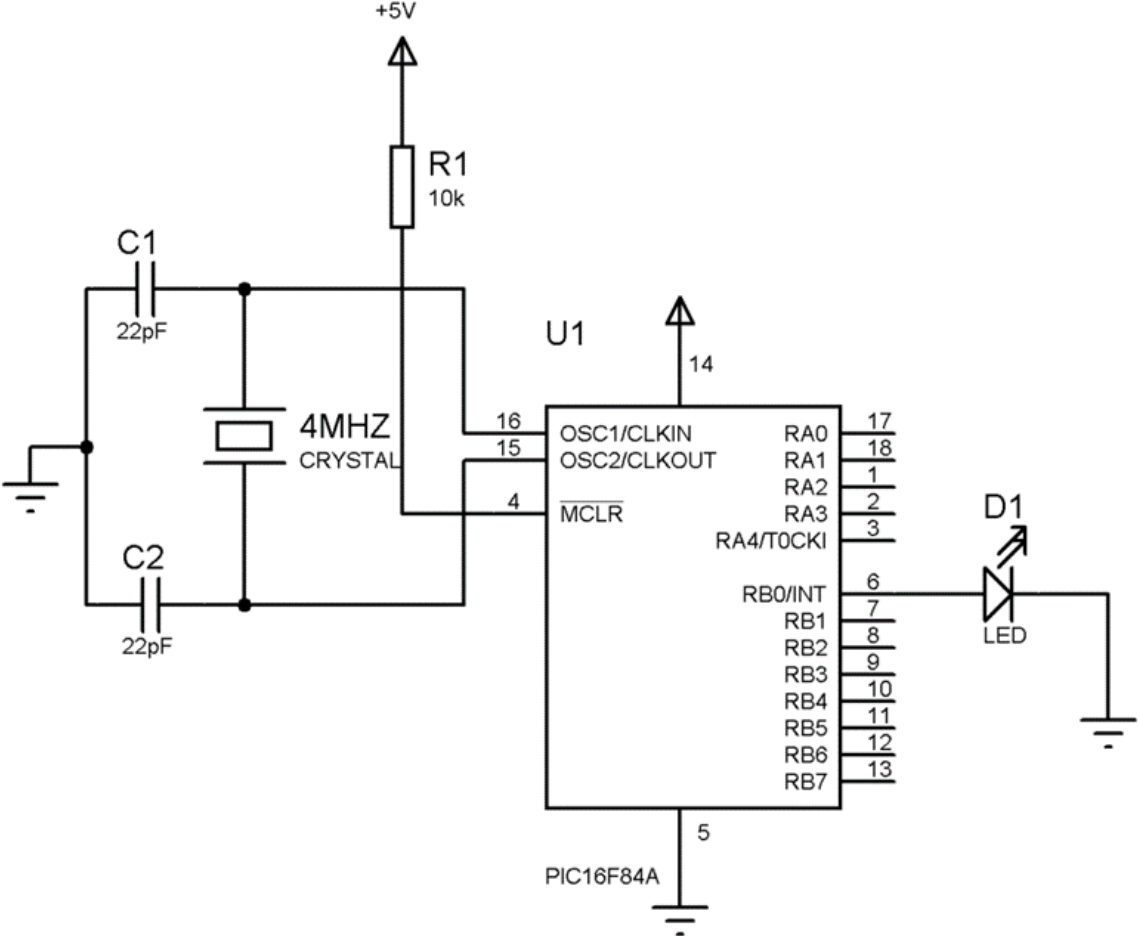
FIGURE 7-1: GENERAL FORMAT FOR INSTRUCTIONS



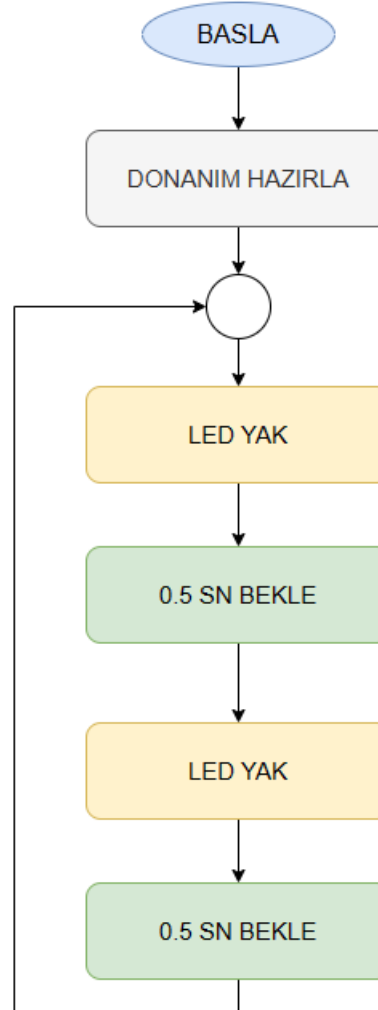
ASSEMBLY Dili

Başlık bloğu	{	<code>;PORTB'nin 0.bitine bağlı ledi yak</code>
		<code>LIST P=16F84</code>
Adres atama bloğu	{	<code>INCLUDE "P16F84.INC"</code>
Port atama ve program bloğu	{	<code>CLRF PORTB</code>
		<code>BSF STATUS,5</code>
		<code>CLRF TRISB</code>
		<code>BCF STATUS,5</code>
		<code>BSF PORTB,0</code>
Sonlandırma bloğu	{	<code>END</code>

LED BLINK UYGULAMASI



LED BLINK UYGULAMASI AKIŞ DİYAGRAMI



LED BLINK UYGULAMASI C KODU

```
#define led      PORTB.0
#define led_io  TRISB.0
#define cikis   0
#define yak     1
#define sondur  0

void main ()
{
    led_io = cikis; // led in bağlı olduğu B0 pinini çıkış yap
    while(1)
    {
        led = yak; //led i yak
        __delay_ms(500); //Yarım saniye bekle
        led = sondur; //led i söndür
        __delay_ms(500); //Yarım saniye bekle
    }
}
```

LED BLINK UYGULAMASI ASSEMBLY KODU

```
)
list p      = pic16f84a      ;assembler a bu kodu işlemci için yazdığımızı söyler
#include    'lcd_ekran.inc'
__CONFIG    _WDT_OFF & _PWRT_OFF & _XT_OSC & _CP_ON
;----- AÇIKLAMA SATIRI -----
d1      equ    0x0C      ;0-255  50.000
d2      equ    0x0D
d3      equ    0x0E
;-----
org      0      ;bundan sonraki kodların program hafızasında nereye yerleşeceğini söyler
GOTO    START
;-----
org      700
START   BSF     STATUS,RP0    ;STATUS REG RP0 BİTİNİ 1 YAP, BANK1 İ AKTİF ETTİM    -BSF BİT SET FİLE
        BCF     TRISB,0      ;TRISB 0. BİTİNİ 0 YAPARAK LEDİN BAĞLI OLDUĞU PİNİ ÇIKIŞ YAPTIK  -BCF BİT CLEAR FİLE
        BCF     STATUS,RP0   ;BANK 0 İ AKTİF ETTİM PORTB REGISTERİNİ KULLANMAK İCİN
DONGU   BSF     PORTB,0      ;LED YAKTIM
        CALL    BEKLE        ;0.5 SN BEKLEME PROSEDÜRÜNÜ ÇAĞIR
        BCF     PORTB,0      ; LED SÖNDÜR
        CALL    BEKLE
        GOTO    DONGU
;-----
BEKLE   MOVLW   255      ; W = 255;
        MOVWF  d1      ; d1 = W;
DNG     NOP
        NOP
        NOP
        NOP
        NOP
        NOP
        NOP
        NOP
        NOP
        NOP
        NOP
        DECFSZ d1,F    ;d1-- EĞER d1 == 0 ATLA
        GOTO   DNG
        RETURN
;-----
END
```