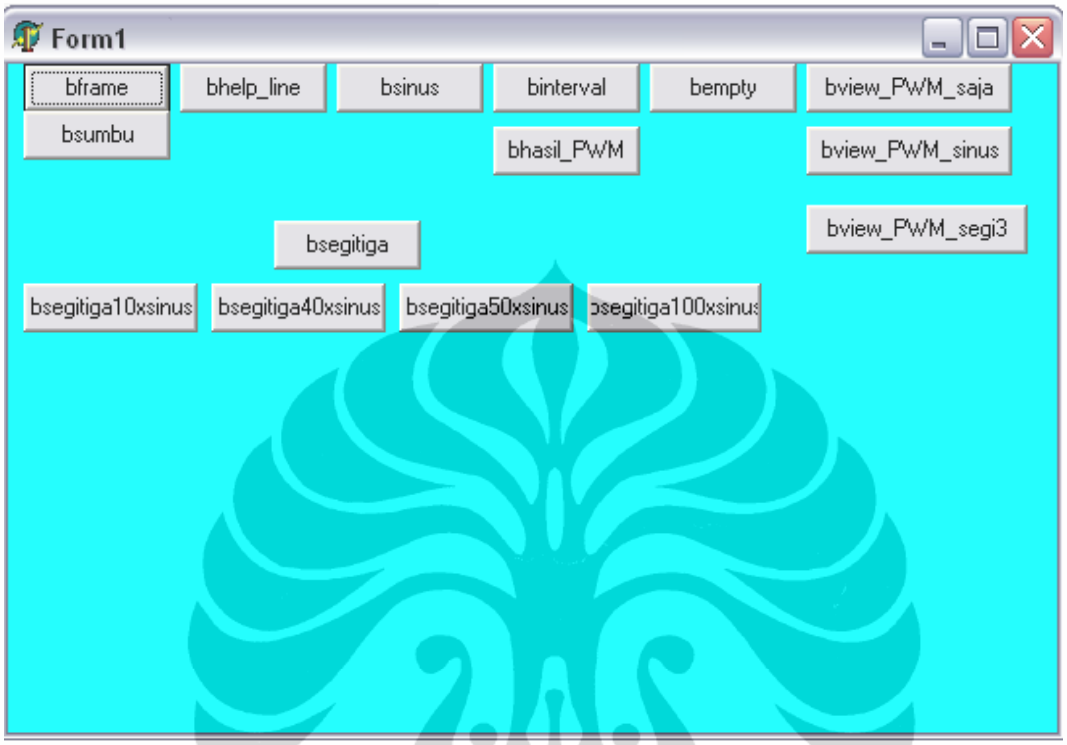
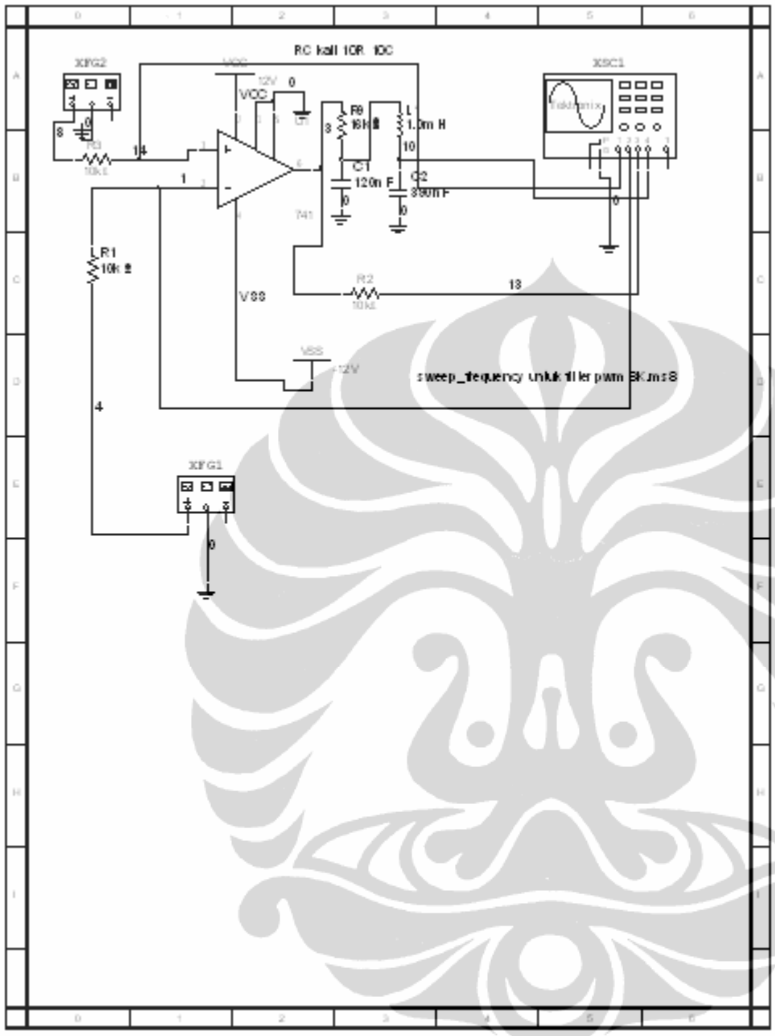
LAMPIRAN

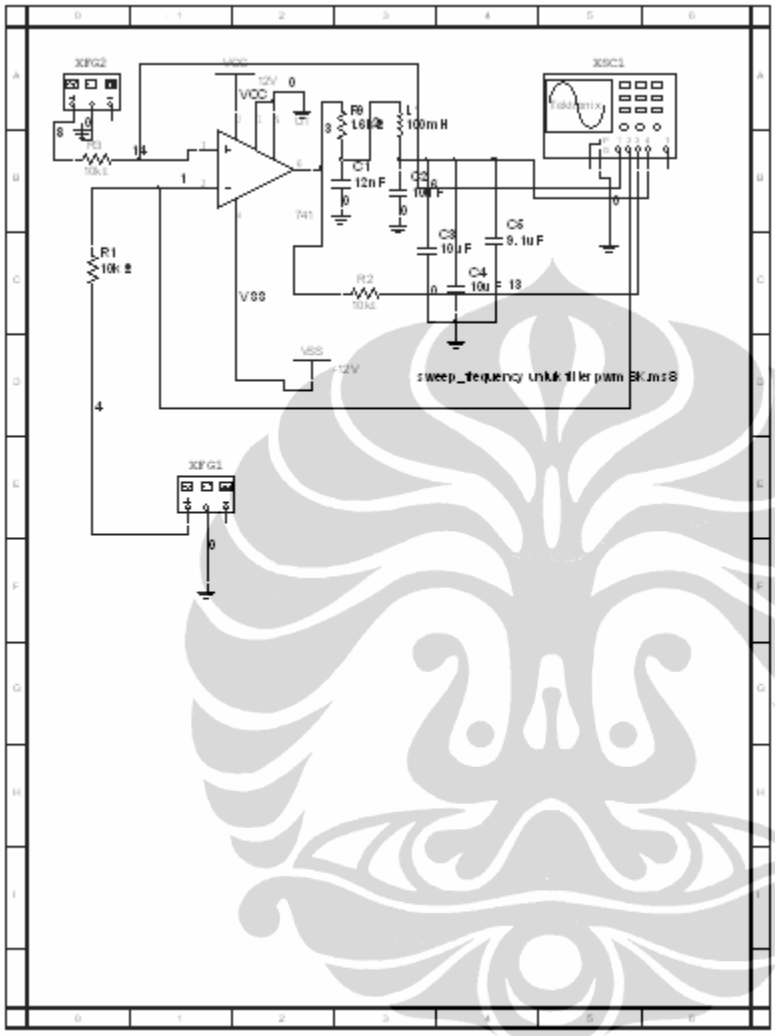
Lampiran 3.1
Ilustrasi Perhitungan Lebar Pulsa *PWM*.exe



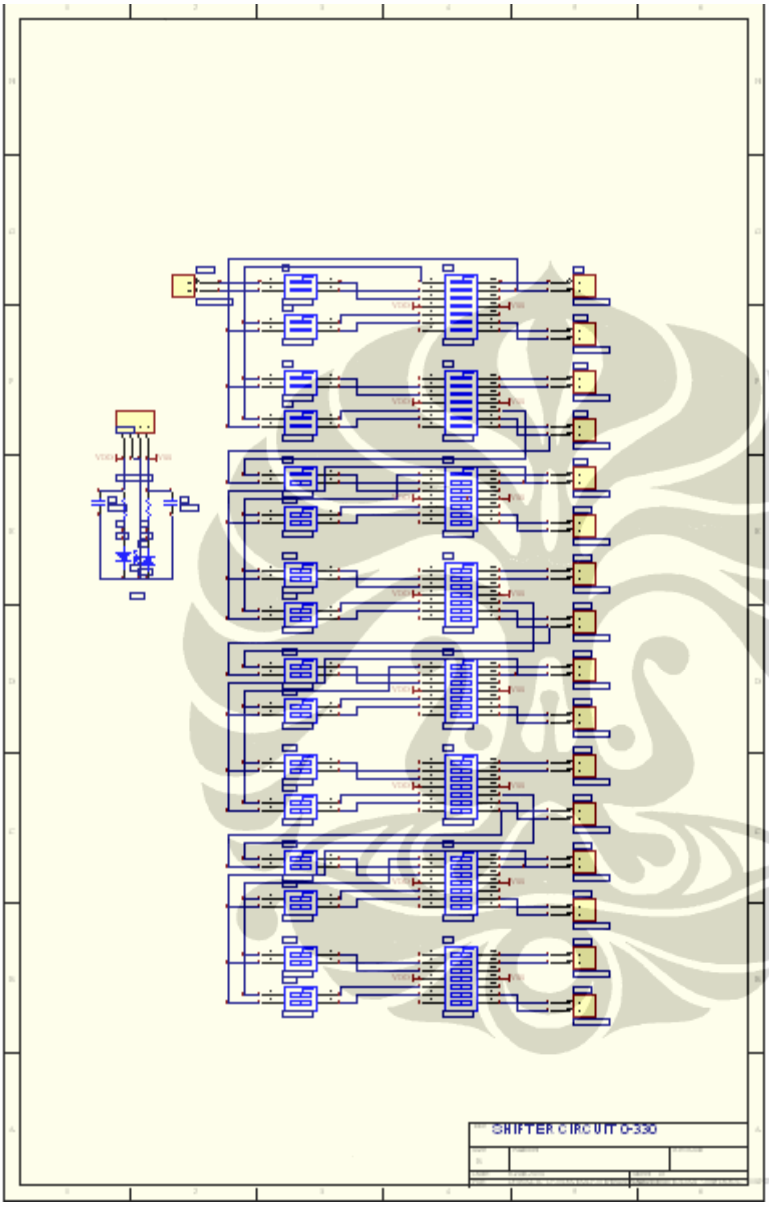
Lampiran 3.2
filter_frequency_fc8k_10R_10C_L_C.ms9



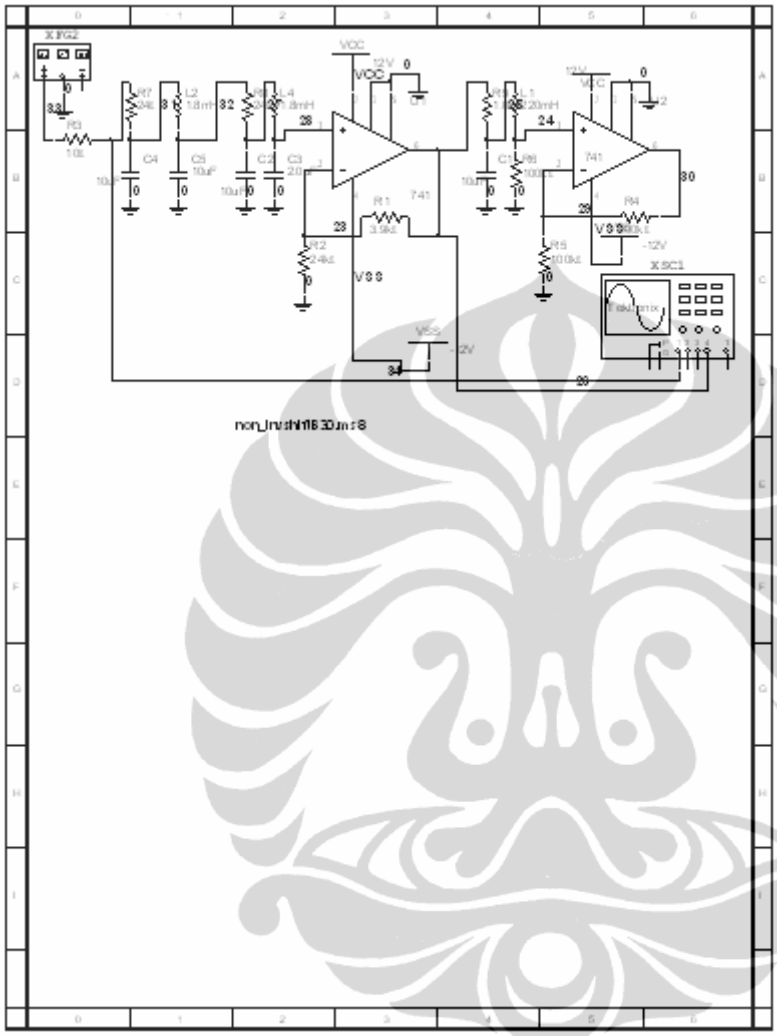
Lampiran 3.3
filter_frequency_fc8k_R_C_100L_100C.ms9



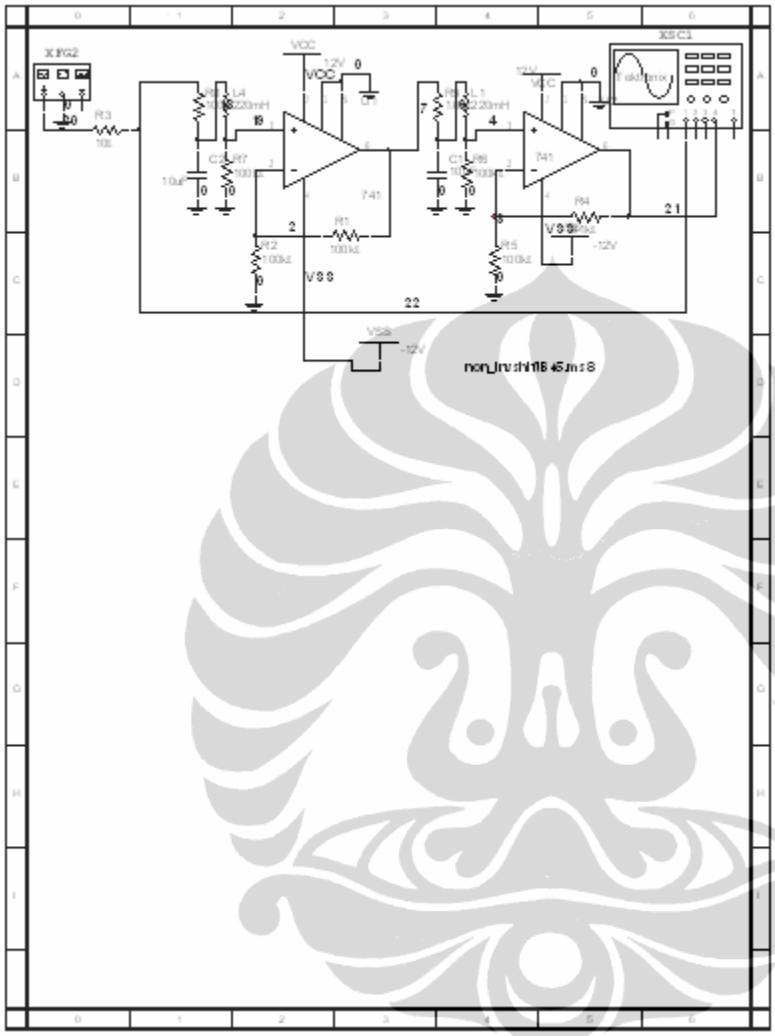
Lampiran 3.4
shifter1.SCH



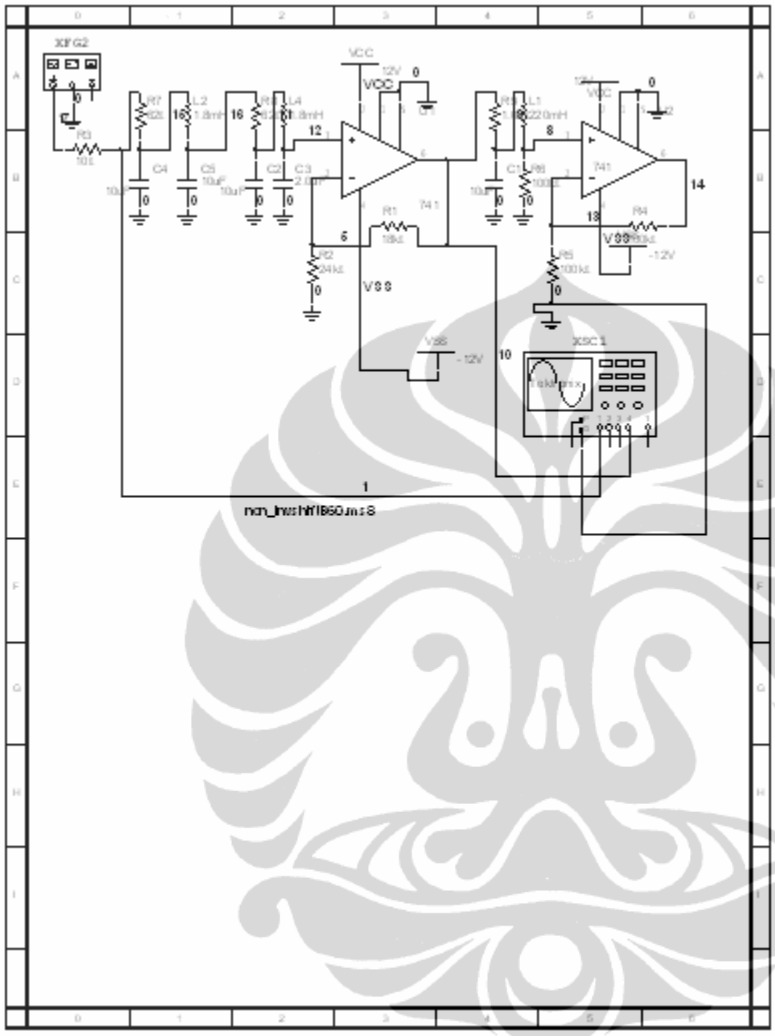
Lampiran 3.5
non_invshift30.ms8



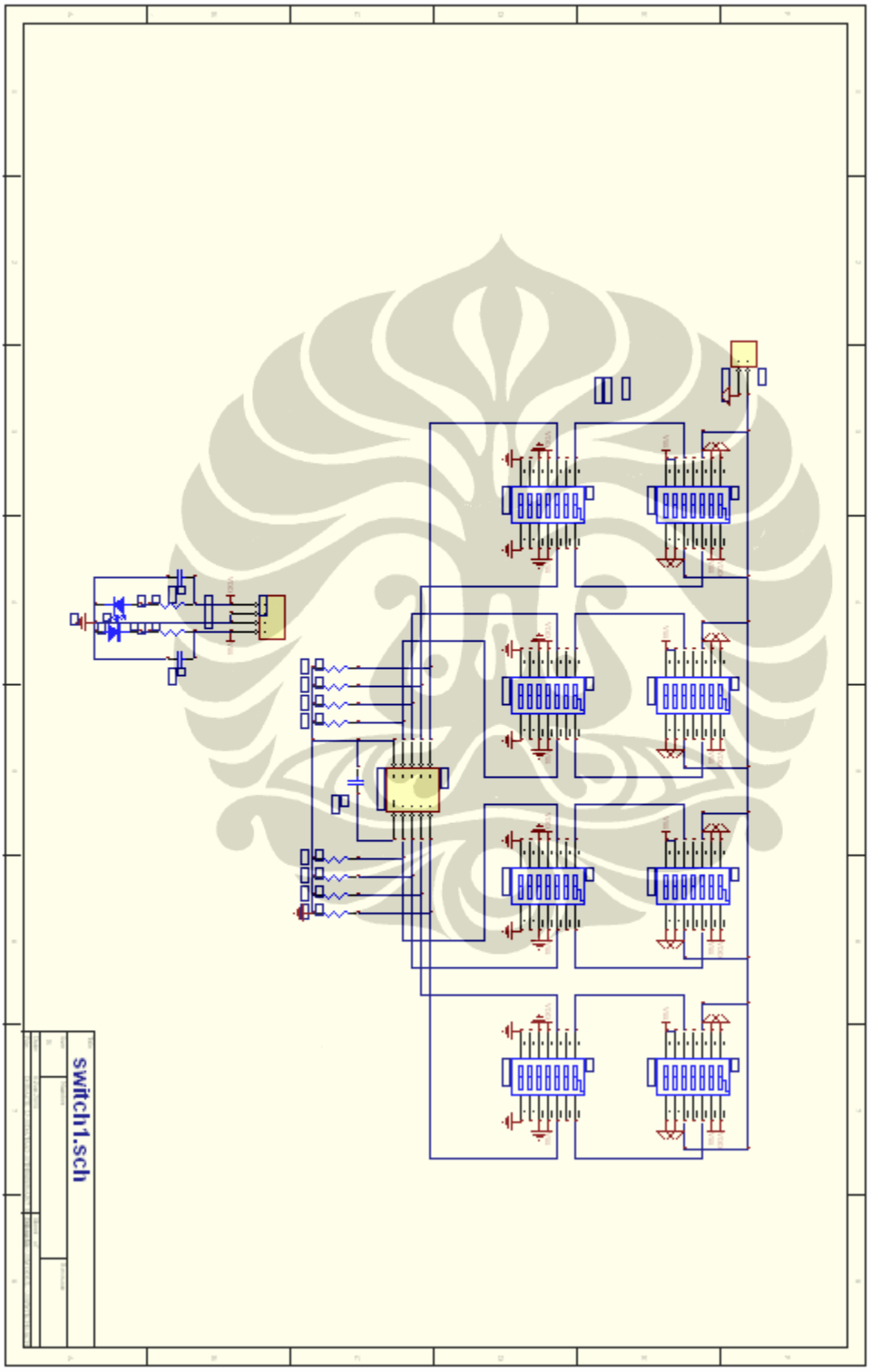
Lampiran 3.6
non_invshiftB45.ms8



Lampiran 3.7
non_invshiftB60.ms8

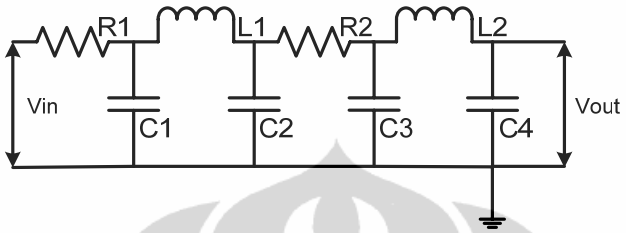


Lampiran 3.8
file switch1.SCH



Lampiran 3.9
PENURUNAN RUMUS RANGKAIAN PENGGESER FASA

Rangkaian penggeser fasa yang digunakan adalah seperti tampak pada Gambar 1.



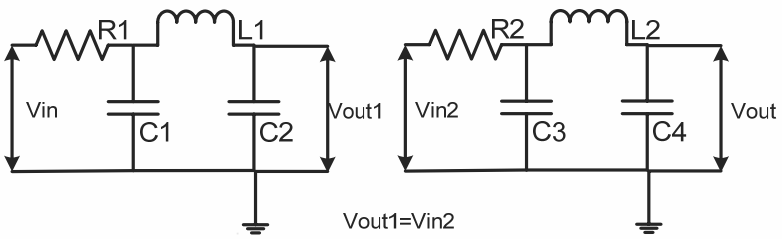
Gambar 1. Rangkaian penggeser fasa

Nilai komponen skematik diatas tampak pada Tabel 1.1.

Tabel 1. Komponen penyusun Rangkaian penggeser fasa

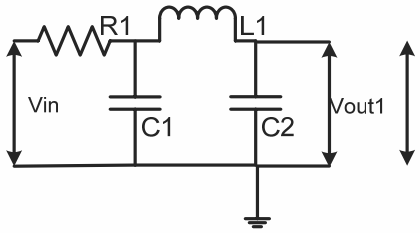
No	Komponen	Nilai	Satuan
1	R1 fasa 30°	24	Ohm
2	R2 fasa 30°	24	Ohm
3	R1 fasa 45°	39	Ohm
4	R2 fasa 45°	39	Ohm
5	R1 fasa 60°	62	Ohm
6	R2 fasa 60°	62	Ohm
7	L1	1,8	mH
8	L2	1,8	mH
9	C1	10	uF
10	C2	10	uF
11	C3	10	uF
12	C4	2	uF

Karena kompleknya rangkaian, maka rangkaian dipecah menjadi 2 yang secara skematik adalah sama, hanya nilainya saja yang berbeda hal ini dilakukan untuk memudahkan analisa. Gambar 2 menunjukan rangkaian yang dipecah menjadi 2 bagian.



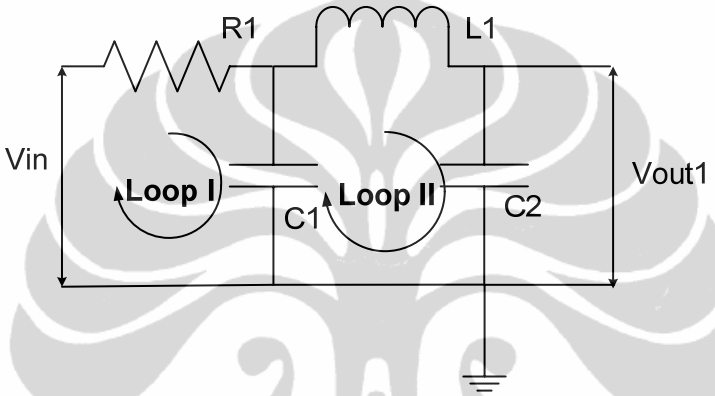
Gambar 2. Rangkaian yang di bagi 2 identik.

Bila disederhanakan maka rangkaian di atas adalah seperti Gambar 3. Hal ini dilakukan untuk memudahkan analisa maka cukup setengahnya saja.



Gambar 3. Rangkaian penggeser fasa yang disederhanakan

Analisa loop rangkaian RLC nya adalah sebagi berikut:



Gambar 4. Analisa Loop I dan Loop II

Dari gambar diatas dapat diturunkan persamaan dibawah ini:

LOOP I:

$$Vin = R1\,i1(t) + \frac{1}{C1}\int (i1 - i2)\,dt$$

LOOP II:

$$\frac{1}{C1}\int (i2 - i1)\,dt + L\frac{di2}{dt} + \frac{1}{C2}\int i2\,dt = 0$$

Tegangan Vout1:

$$Vout1 = \frac{1}{C2}\int i2\,dt$$

Untuk Loop II di-*laplace*-kan:

$$\frac{1}{C1s}(I2 - I1) + Ls\,I2 + \frac{1}{C2s}\,I2 = 0$$

$$\frac{1}{C1s}(I2 - I1) + Ls\,I2 + \frac{1}{C2s}\,I2 = 0$$

$$\frac{I2}{C1s} - \frac{I1}{C1s} + Ls\,I2 + \frac{1}{C2s}\,I2 = 0$$

$$\frac{I2}{C1s} + Ls\,I2 + \frac{1}{C2s}\,I2 = \frac{I1}{C1s}$$

$$\left(\frac{1}{C1s} + Ls + \frac{1}{C2s}\right) I2 = \frac{I1}{C1s}$$

$$I1 = C1s\left(\frac{1}{C1s} + \frac{1}{C2s} + Ls\right) I2$$

Kembali ke loop I:

$$Vin = R1\, I(t) + \frac{1}{C1}\int (I1 - I2)\, dt$$

Loop I di-*laplace*-kan:

$$Vin(s) = R1\, I(s) + \frac{1}{C1s}(I1 - I2)$$

$$Vin(s) = R1\, I(s) + \left(\frac{I1}{C1s} - \frac{I2}{C1s}\right)$$

Subtitusi I1 dengan I2:

$$Vin(s) = R1C1s\left(\frac{1}{C1s} + \frac{1}{C2s} + Ls\right) I2 + \frac{C1s}{C1s}\left(\left(\frac{1}{C1s} + \frac{1}{C2s} + Ls\right) I2\right) - \frac{I2}{C1s}$$

Sementara *Laplace* Vout1 adalah:

$$Vout1(s) = \frac{1}{C2s} I2$$

Oleh karena itu tranfer function Vout1(s)/ Vi(s) adalah

$$\frac{Vout1(s)}{Vin(s)}$$

$$= \frac{\frac{1}{C2s} I2}{R1C1s\left(\frac{1}{C1s} + \frac{1}{C2s} + Ls\right) I2 + \frac{C1s}{C1s}\left(\left(\frac{1}{C1s} + \frac{1}{C2s} + Ls\right) I2\right) - \frac{I2}{C1s}}$$

$$\frac{Vout1(s)}{Vin(s)} = \frac{\frac{1}{C2s}}{R1C1s\left(\frac{1}{C1s} + \frac{1}{C2s} + Ls\right) + \left(\left(\frac{1}{C1s} + \frac{1}{C2s} + Ls\right)\right) - \frac{1}{C1s}}$$

$$\frac{Vout1(s)}{Vin(s)} = \frac{\frac{C1}{C2}}{R1C1^2s^2\left(\frac{1}{C1s} + \frac{1}{C2s} + Ls\right) + C1s\left(\left(\frac{1}{C1s} + \frac{1}{C2s} + Ls\right)\right) - 1}$$

$$\frac{Vout1(s)}{Vin(s)}$$

$$= \frac{\frac{C1}{C2}}{R1C1^2s^2\left(\frac{C1s + C2s + C1C2Ls^3}{C1C2s^2}\right) + C1s\left(\frac{C1s + C2s + C1C2Ls^3}{C1C2s^2}\right) - 1}$$

$$\frac{Vout1(s)}{Vin(s)} = \frac{\frac{C1}{C2}}{R1C1^2s^2\left(\frac{C1 + C2 + C1C2Ls^2}{C1C2s}\right) + C1s\left(\frac{C1 + C2 + C1C2Ls^2}{C1C2s}\right) - 1}$$

$$\frac{Vout1(s)}{Vin(s)} = \frac{\frac{C1}{C2}}{R1C1s\left(\frac{C1+C2+C1C2Ls^2}{C2}\right)+\left(\frac{C1+C2+C1C2Ls^2}{C2}\right)-1}$$

$$\frac{Vout1(s)}{Vin(s)} = \frac{C1}{R1C1s(C1+C2+C1C2Ls^2)+(C1+C2+C1C2Ls^2)-C2}$$

$$\frac{Vout1(s)}{Vin(s)} = \frac{C1}{R1C1^2C2Ls^3+R1\,C1^2s+R1\,C1C2s+C1C2Ls^2+C1}$$

$$\frac{Vout1(s)}{Vin(s)} = \frac{C1}{R1C1^2C2Ls^3+(R1\,C1^2+R1\,C1C2)s+C1C2Ls^2+C1}$$

$$\frac{Vout1(s)}{Vin(s)} = \frac{1}{R1C1C2Ls^3+(R1\,C1+R1\,C2)s+C2Ls^2+1}$$

$$\frac{Vout1(s)}{Vin(s)} = \frac{1}{(R1C1C2L)s^3+(R1C1+R1C2)s+(C2L)s^2+1}$$

$$\frac{Vout1(s)}{Vin(s)} = \frac{1}{(R1C1C2L)s^3+(C2L)s^2+(R1C1+R1C2)s+1}$$

Persamaan diatas merupakan persamaan pangkat 3, karena adanya kesulitan untuk menguraikan persamaan tersebut ke dalam bentuk yang lebih sederhana maka *transfer function* tetap ditulis dalam bentuk *Laplace*.

Maka transfer fungsi untuk rangkain penggeser fasa 30° (pada rangakain penggeser fasa 30° nilai R1= R2= 24 Ohm, L1=L2=1.8mH, C1=C3= 10 uF, C2=10 uF dan C4= 2 uF) adalah sebagai berikut:

$$\frac{Vout1(s)}{Vin(s)} = \frac{1}{(R1C1C2L)s^3+(C2L)s^2+(R1\,C1+R1\,C2)s+1}$$

$$\frac{Vout1(s)}{Vin(s)} = -\frac{1}{(24*10uF*10uF*1.8mH)s^3+(10uF*1.8mH)s^2+(24*10uF+24*10uF)s+1}$$

Persamaan diatas merupakan persamaan pangkat 3, karena adanya kesulitan untuk menguraikan persamaan tersebut ke dalam bentuk yang lebih sederhana maka *transfer function* tetap ditulis dalam bentuk *Laplace*.

$$\frac{Vout(s)}{Vin2(s)} = \frac{Vout(s)}{Vout1(s)} = \frac{1}{(R1C1C4L)s^3+(C4L)s^2+(R1C1+R1C4)s+1}$$

$$\frac{Vout(s)}{Vin2(s)} = \frac{Vout(s)}{Vout1(s)} = \frac{1}{(24*10uF*2uF*1.8mH)s^3+(2uF*1.8mH)s^2+(24*10uF+24*2uF)s+1}$$

Persamaan diatas merupakan persamaan pangkat 3, karena adanya kesulitan untuk menguraikan persamaan tersebut ke dalam bentuk yang lebih sederhana maka *transfer function* tetap ditulis dalam bentuk *Laplace*.

Langkah terakhir adalah mencari anti *Laplace*-nya:

$$\frac{Vout(t)}{Vin(t)} = \frac{Vout1(t)}{Vin(t)} \times \frac{Vout(t)}{Vin2(t)}$$

$$\frac{Vout(t)}{Vin(t)} = \frac{Vout1(t)}{Vin(t)} \times \frac{Vout(t)}{Vout1(t)}$$

Hasil akhirnya adalah:

$$\frac{Vout(t)}{Vin(t)} = \mathcal{L}^{-1}\left(\frac{Vout1(s)}{Vin(s)}\right) \times \mathcal{L}^{-1}\left(\frac{Vout(s)}{Vout1(s)}\right)$$

Lampiran 4.1
Setting_hardware_PWM_100x_50x_40x.JPG.

Lampiran 4.2
Setting_pwm_100sample_multifreq

LAMPIRAN LANJUTAN

LAMPIRAN I

```
// GEN III
// soft zero cross ini bekerja dengan baik.....
 #asm
.equ __lcd_port=0x18 ;PORTB
#endasm

  #asm
.equ    PORTD         = 0x12
.equ    DDRD = 0x11
.equ    PIND   = 0x10

.equ    PORTC         = 0x15
.equ    DDRC = 0x14
.equ    PINC   = 0x13

; ***** PORTC ************************
; PORTC - Port C Data Register
.equ    PORTC0        = 0      ; Port C Data Register bit 0
.equ    PC0    = 0      ; For compatibility
.equ    PORTC1        = 1      ; Port C Data Register bit 1
.equ    PC1    = 1      ; For compatibility
.equ    PORTC2        = 2      ; Port C Data Register bit 2
.equ    PC2    = 2      ; For compatibility
.equ    PORTC3        = 3      ; Port C Data Register bit 3
.equ    PC3    = 3      ; For compatibility
.equ    PORTC4        = 4      ; Port C Data Register bit 4
.equ    PC4    = 4      ; For compatibility
.equ    PORTC5        = 5      ; Port C Data Register bit 5
.equ    PC5    = 5      ; For compatibility
.equ    PORTC6        = 6      ; Port C Data Register bit 6
.equ    PC6    = 6      ; For compatibility
.equ    PORTC7        = 7      ; Port C Data Register bit 7
.equ    PC7    = 7      ; For compatibility

; DDRC - Port C Data Direction Register
.equ    DDC0  = 0       ; Port C Data Direction Register bit 0
.equ    DDC1  = 1       ; Port C Data Direction Register bit 1
.equ    DDC2  = 2       ; Port C Data Direction Register bit 2
.equ    DDC3  = 3       ; Port C Data Direction Register bit 3
.equ    DDC4  = 4       ; Port C Data Direction Register bit 4
.equ    DDC5  = 5       ; Port C Data Direction Register bit 5
.equ    DDC6  = 6       ; Port C Data Direction Register bit 6
.equ    DDC7  = 7       ; Port C Data Direction Register bit 7

; PINC - Port C Input Pins
.equ    PINC0 = 0       ; Port C Input Pins bit 0
.equ    PINC1 = 1       ; Port C Input Pins bit 1
.equ    PINC2 = 2       ; Port C Input Pins bit 2
```

```
.equ    PINC3 = 3       ; Port C Input Pins bit 3
.equ    PINC4 = 4       ; Port C Input Pins bit 4
.equ    PINC5 = 5       ; Port C Input Pins bit 5
.equ    PINC6 = 6       ; Port C Input Pins bit 6
.equ    PINC7 = 7       ; Port C Input Pins bit 7


#endasm
//#include<mega8535.h>
#include<mega16.h>
//#include<mega32.h>
#include<delay.h>
#include<lcd.h>
#include<stdio.h>
char lcd_buffer[33];
 #define  MAX 16
 char a;  // int a;
 int z;
 // int k;
 char k;
 int baca_diregister_nya;
 //char baca_diregister_nya;
 char kinputlagi; // int kinputlagi;
  char  pilihan_tampilan;  //  int pilihan_tampilan;
 char wa; // int wa;

 void ambil_data(void){
     for(k=0;k<=48;k++)  {
       for(z=0;z<=8191;z++)  {pilihan_tampilan=PINA;
     if
((pilihan_tampilan==1)||(pilihan_tampilan==2)||(pilihan_tampilan==4)||(pilihan_t
ampilan==8))
            {wa=1;k=48; break; }
          else {wa=0;}
        } }
     }
void isiarray(int *arr,int n);
void cetakarray_lambat(int *arr,int n);
void cetakarray_cepat(int *arr,int n);
void cetakarray_sdang(int *arr,int n);
void cetakarray_ideal(int *arr,int n);

void isiarray(int *arr,int n)
    {
     int i;
     for (i=0; i< n;i++)
           {
            arr[i]= PINA;
```

```
          if (arr[i]==0)
             {i=i-1;
              lcd_gotoxy(0,0);lcd_putsf("masukan data nya");
              lcd_gotoxy(0,1);lcd_putsf("dgn cr tekan pad");
              }
else if(arr[i]== 1)
             {lcd_gotoxy(0,1);sprintf(lcd_buffer,"data[%2d]:fs 1 on",(i+1));
                lcd_puts(lcd_buffer);
       for(a=0;a<=1;a++) {kinputlagi= PINA;
       if(kinputlagi==arr[i]){a=0;}else {a=1;}}
              delay_ms(3000);
              }
        else if(arr[i]== 2)
             {lcd_gotoxy(0,1);sprintf(lcd_buffer,"data[%2d]:fs 2 on",(i+1));
              lcd_puts(lcd_buffer);
       for(a=0;a<=1;a++) {kinputlagi= PINA;
       if(kinputlagi==arr[i]){a=0;}else {a=1;}}
              delay_ms(3000);
              }
        else if(arr[i]== 4)
             {lcd_gotoxy(0,1);sprintf(lcd_buffer,"data[%2d]:fs 3 on",(i+1));
              lcd_puts(lcd_buffer);
       for(a=0;a<=1;a++) {kinputlagi= PINA;
       if(kinputlagi==arr[i]){a=0;}else {a=1;}}
              delay_ms(3000);
              }
        else if(arr[i]== 8)
             {lcd_gotoxy(0,1);sprintf(lcd_buffer,"data[%2d]:fs 4 on",(i+1));
              lcd_puts(lcd_buffer);
       for(a=0;a<=1;a++) {kinputlagi= PINA;
       if(kinputlagi==arr[i]){a=0;}else {a=1;}}
              delay_ms(3000);
              }
        else if(arr[i]== 16)
             {lcd_gotoxy(0,1);sprintf(lcd_buffer,"data[%2d]:fs 5 on",(i+1));
              lcd_puts(lcd_buffer);
       for(a=0;a<=1;a++) {kinputlagi= PINA;
       if(kinputlagi==arr[i]){a=0;}else {a=1;}}
              delay_ms(3000);
              }
        else if(arr[i]== 32)
             {lcd_gotoxy(0,1);sprintf(lcd_buffer,"data[%2d]:fs 6 on",(i+1));
              lcd_puts(lcd_buffer);
       for(a=0;a<=1;a++) {kinputlagi= PINA;
       if(kinputlagi==arr[i]){a=0;}else {a=1;}}
              delay_ms(3000);
              }
        else if(arr[i]== 64)
```

```
            {lcd_gotoxy(0,1);sprintf(lcd_buffer,"data[%2d]:fs 7 on",(i+1));
             lcd_puts(lcd_buffer);
        for(a=0;a<=1;a++) {kinputlagi= PINA;
        if(kinputlagi==arr[i]){a=0;}else {a=1;}}
             delay_ms(3000);
             }
         else if(arr[i]== 128)
            {lcd_gotoxy(0,1);sprintf(lcd_buffer,"data[%2d]:fs 8 on",(i+1));
             lcd_puts(lcd_buffer);
        for(a=0;a<=1;a++) {kinputlagi= PINA;
        if(kinputlagi==arr[i]){a=0;}else {a=1;}}
             delay_ms(3000);
              }
         else   {i=i-1;
        lcd_gotoxy(0,1);sprintf(lcd_buffer,"pin  ? lain on",(i+1));
        lcd_puts(lcd_buffer);
        for(a=0;a<=1;a++) {kinputlagi= PINA;
        if(kinputlagi==arr[i]){a=0;}else {a=1;}}
             delay_ms(3000);
         }
          }
    }

//////lambat mulai disini

void cetakarray_lambat(int *arr,int n)
    {
     int i;
     lcd_gotoxy(0,0);
     lcd_putsf("zerocross triggr");
     lcd_gotoxy(0,1);
     lcd_putsf("Lihat Osciloskop");delay_ms(250);

     for (i=0; i< n;i++)
         {    baca_diregister_nya=arr[i];

//#####################################################################
//di BAWAH sini ZERO CROSS DETECTOR harus men-trigger
//RUTIN ZERO CRSOOS HARUS DILIHAT PADA  SOUR CE COSDE
//bahasa asemblrer
       #asm
       push r16
            testlagi_lambat:
            in r16,PinC
                 ;sbic portC,0
            sbrc r16,0
                 jmp testlagi_lambat
            lagi_lambat:
```

```
            in r16,PinC
                  ;sbis portC,0
            sbrs r16,0
                  jmp lagi_lambat
      ;pop r16
      #endasm
//di ATAS  sini ZERO CROSS DETECTOR harus men-trigger
 //#####################################################################
      #asm
      sbrc  r8,0
            jmp fase_000_lambat
      sbrc  r8,1
            jmp fase_045_lambat
      sbrc  r8,2
            jmp fase_090_lambat
      sbrc  r8,3
            jmp fase_135_lambat
      sbrc  r8,4
            jmp fase_180_lambat
      sbrc  r8,5
            jmp fase_225_lambat
      sbrc  r8,6
            jmp fase_270_lambat
      sbrc  r8,7
            jmp fase_315_lambat

      jmp akhiri_rutin_lambat

;????????????????????????????????????????????????????
;????????????????????????????????????????????????????
      fase_000_lambat:
            ldi r16,1
            out portD,r16
            jmp akhiri_rutin_lambat
      fase_045_lambat:
            ldi r16,2
            out portD,r16
            jmp akhiri_rutin_lambat
      fase_090_lambat:
            ldi r16,4
            out portD,r16
            jmp akhiri_rutin_lambat
      fase_135_lambat:
            ldi r16,8
            out portD,r16
            jmp akhiri_rutin_lambat
      fase_180_lambat:
            ldi r16,16
```

LAMPIRAN II

```
#asm
.equ __lcd_port=0x18 ;PORTB
#endasm

 #asm
 .equ	PORTA	= 0x1b
.equ	DDRA	= 0x1a
.equ	PINA	= 0x19
.equ	PORTC	= 0x15
.equ	DDRC	= 0x14
.equ	PINC	= 0x13

.equ	PORTD	= 0x12
.equ	DDRD	= 0x11
.equ	PIND	= 0x10

; ***** PORTA *************************
; PORTA - Port A Data Register
.equ	PORTA0	= 0		; Port A Data Register bit 0
.equ	PA0	= 0		; For compatibility
.equ	PORTA1	= 1		; Port A Data Register bit 1
.equ	PA1	= 1		; For compatibility
.equ	PORTA2	= 2		; Port A Data Register bit 2
.equ	PA2	= 2		; For compatibility
.equ	PORTA3	= 3		; Port A Data Register bit 3
.equ	PA3	= 3		; For compatibility
.equ	PORTA4	= 4		; Port A Data Register bit 4
.equ	PA4	= 4		; For compatibility
.equ	PORTA5	= 5		; Port A Data Register bit 5
.equ	PA5	= 5		; For compatibility
.equ	PORTA6	= 6		; Port A Data Register bit 6
.equ	PA6	= 6		; For compatibility
.equ	PORTA7	= 7		; Port A Data Register bit 7
.equ	PA7	= 7		; For compatibility

; DDRA - Port A Data Direction Register
.equ	DDA0	= 0		; Data Direction Register, Port A, bit 0
.equ	DDA1	= 1		; Data Direction Register, Port A, bit 1
.equ	DDA2	= 2		; Data Direction Register, Port A, bit 2
.equ	DDA3	= 3		; Data Direction Register, Port A, bit 3
.equ	DDA4	= 4		; Data Direction Register, Port A, bit 4
.equ	DDA5	= 5		; Data Direction Register, Port A, bit 5
.equ	DDA6	= 6		; Data Direction Register, Port A, bit 6
.equ	DDA7	= 7		; Data Direction Register, Port A, bit 7

; PINA - Port A Input Pins
.equ	PINA0	= 0		; Input Pins, Port A bit 0
.equ	PINA1	= 1		; Input Pins, Port A bit 1
.equ	PINA2	= 2		; Input Pins, Port A bit 2
.equ	PINA3	= 3		; Input Pins, Port A bit 3
.equ	PINA4	= 4		; Input Pins, Port A bit 4
.equ	PINA5	= 5		; Input Pins, Port A bit 5
.equ	PINA6	= 6		; Input Pins, Port A bit 6
.equ	PINA7	= 7		; Input Pins, Port A bit 7



#endasm
#include<mega16.h>
//#include<mega32.h>
#include<delay.h>
#include<lcd.h>
#include<stdio.h>
char lcd_buffer[33];
 #define  MAX 16 //u/ mega 16
 char z;
 char a;
int banyaknya_looping;
int kinput;

 void  menuawal(void)
{
```

```
lcd_gotoxy(0,0);lcd_putsf("   Ada 8 Sinus  ");
        #asm
          in r17,PINA   ;
      sbrc r17,7   ;1/2/3 siklus
          jmp selesai1
      sbrc r17,6  ;1/2/3 siklus
          jmp selesai1
      sbrc r17,5  ;1/2/3 siklus
          jmp selesai1
      sbrc r17,4  ;1/2/3 siklus
          jmp selesai1
      sbrc r17,3  ;1/2/3 siklus
          jmp selesai1
      sbrc r17,2  ;1/2/3 siklus
          jmp selesai1
      sbrc r17,1  ;1/2/3 siklus
          jmp selesai1
      sbrc r17,0  ;1/2/3 siklus
          jmp selesai1
        #endasm
lcd_gotoxy(0,1);lcd_putsf("1.PWM100 X8Mhz11");delay_ms(500);
        #asm
          in r17,PINA   ;
      sbrc r17,7   ;1/2/3 siklus
          jmp selesai1
      sbrc r17,6  ;1/2/3 siklus
          jmp selesai1
      sbrc r17,5  ;1/2/3 siklus
          jmp selesai1
      sbrc r17,4  ;1/2/3 siklus
          jmp selesai1
      sbrc r17,3  ;1/2/3 siklus
          jmp selesai1
      sbrc r17,2  ;1/2/3 siklus
          jmp selesai1
      sbrc r17,1  ;1/2/3 siklus
          jmp selesai1
      sbrc r17,0  ;1/2/3 siklus
          jmp selesai1
        #endasm
lcd_gotoxy(0,1);lcd_putsf("2.PWM100 X8Mhz12");delay_ms(400);
        #asm
          in r17,PINA   ;
      sbrc r17,7   ;1/2/3 siklus
          jmp selesai1
      sbrc r17,6  ;1/2/3 siklus
          jmp selesai1
      sbrc r17,5  ;1/2/3 siklus
          jmp selesai1
      sbrc r17,4  ;1/2/3 siklus
          jmp selesai1
      sbrc r17,3  ;1/2/3 siklus
          jmp selesai1
      sbrc r17,2  ;1/2/3 siklus
          jmp selesai1
      sbrc r17,1  ;1/2/3 siklus
          jmp selesai1
      sbrc r17,0  ;1/2/3 siklus
          jmp selesai1
        #endasm
lcd_gotoxy(0,1);lcd_putsf("3.PWM_50 X8Mhz11");delay_ms(400);
        #asm
          in r17,PINA   ;
      sbrc r17,7   ;1/2/3 siklus
          jmp selesai1
      sbrc r17,6  ;1/2/3 siklus
          jmp selesai1
      sbrc r17,5  ;1/2/3 siklus
          jmp selesai1
      sbrc r17,4  ;1/2/3 siklus
          jmp selesai1
      sbrc r17,3  ;1/2/3 siklus
```

```
        jmp selesai1
    sbrc r17,2  ;1/2/3 siklus
        jmp selesai1
    sbrc r17,1  ;1/2/3 siklus
        jmp selesai1
    sbrc r17,0  ;1/2/3 siklus
        jmp selesai1
       #endasm
lcd_gotoxy(0,1);lcd_putsf("4.PWM_40 X8Mhz11");delay_ms(400);
       #asm
        in r17,PINA   ;
    sbrc r17,7   ;1/2/3 siklus
        jmp selesai1
    sbrc r17,6  ;1/2/3 siklus
        jmp selesai1
    sbrc r17,5  ;1/2/3 siklus
        jmp selesai1
    sbrc r17,4  ;1/2/3 siklus
        jmp selesai1
    sbrc r17,3  ;1/2/3 siklus
        jmp selesai1
    sbrc r17,2  ;1/2/3 siklus
        jmp selesai1
    sbrc r17,1  ;1/2/3 siklus
        jmp selesai1
    sbrc r17,0  ;1/2/3 siklus
        jmp selesai1
       #endasm
lcd_gotoxy(0,1);lcd_putsf("5.DAC256 X8Mhz  ");delay_ms(400);
       #asm
        in r17,PINA   ;
    sbrc r17,7   ;1/2/3 siklus
        jmp selesai1
    sbrc r17,6  ;1/2/3 siklus
        jmp selesai1
    sbrc r17,5  ;1/2/3 siklus
        jmp selesai1
    sbrc r17,4  ;1/2/3 siklus
        jmp selesai1
    sbrc r17,3  ;1/2/3 siklus
        jmp selesai1
    sbrc r17,2  ;1/2/3 siklus
        jmp selesai1
    sbrc r17,1  ;1/2/3 siklus
        jmp selesai1
    sbrc r17,0  ;1/2/3 siklus
        jmp selesai1
       #endasm
lcd_gotoxy(0,1);lcd_putsf("6.DAC128 X8Mhz  ");delay_ms(400);
       #asm
        in r17,PINA   ;
    sbrc r17,7   ;1/2/3 siklus
        jmp selesai1
    sbrc r17,6  ;1/2/3 siklus
        jmp selesai1
    sbrc r17,5  ;1/2/3 siklus
        jmp selesai1
    sbrc r17,4  ;1/2/3 siklus
        jmp selesai1
    sbrc r17,3  ;1/2/3 siklus
        jmp selesai1
    sbrc r17,2  ;1/2/3 siklus
        jmp selesai1
    sbrc r17,1  ;1/2/3 siklus
        jmp selesai1
    sbrc r17,0  ;1/2/3 siklus
        jmp selesai1
       #endasm
lcd_gotoxy(0,1);lcd_putsf("7.DAC_64 X8Mhz  ");delay_ms(400);
       #asm
        in r17,PINA   ;
    sbrc r17,7   ;1/2/3 siklus
```

```
        jmp selesai1
    sbrc r17,6  ;1/2/3 siklus
        jmp selesai1
    sbrc r17,5  ;1/2/3 siklus
        jmp selesai1
    sbrc r17,4  ;1/2/3 siklus
        jmp selesai1
    sbrc r17,3  ;1/2/3 siklus
        jmp selesai1
    sbrc r17,2  ;1/2/3 siklus
        jmp selesai1
    sbrc r17,1  ;1/2/3 siklus
        jmp selesai1
    sbrc r17,0  ;1/2/3 siklus
        jmp selesai1
       #endasm
lcd_gotoxy(0,1);lcd_putsf("8.DAC_32 X8Mhz  ");delay_ms(400);
       #asm
        in r17,PINA   ;
    sbrc r17,7   ;1/2/3 siklus
        jmp selesai1
    sbrc r17,6  ;1/2/3 siklus
        jmp selesai1
    sbrc r17,5  ;1/2/3 siklus
        jmp selesai1
    sbrc r17,4  ;1/2/3 siklus
        jmp selesai1
    sbrc r17,3  ;1/2/3 siklus
        jmp selesai1
    sbrc r17,2  ;1/2/3 siklus
        jmp selesai1
    sbrc r17,1  ;1/2/3 siklus
        jmp selesai1
    sbrc r17,0  ;1/2/3 siklus
        jmp selesai1
       #endasm
       #asm

    selesai1:
    nop
       #endasm
}

void  lcd_PWM100_X8Mhz11(void) {lcd_gotoxy(0,0);lcd_putsf("anda telah pilih");lcd_gotoxy(0,1);lcd_putsf("PWM100
X8Mhz_1_1");}
void  lcd_PWM100_X8Mhz12(void) {lcd_gotoxy(0,0);lcd_putsf("anda telah pilih");lcd_gotoxy(0,1);lcd_putsf("PWM100
X8Mhz_1_2");}
void  lcd_PWM_50_X8Mhz11(void) {lcd_gotoxy(0,0);lcd_putsf("anda telah pilih");lcd_gotoxy(0,1);lcd_putsf("PWM_50
X8Mhz_1_1");}
void  lcd_PWM_40_X8Mhz11(void) {lcd_gotoxy(0,0);lcd_putsf("anda telah pilih");lcd_gotoxy(0,1);lcd_putsf("PWM_40
X8Mhz_1_1");}
void  lcd_DAC256_X8Mhz__(void) {lcd_gotoxy(0,0);lcd_putsf("anda telah pilih");lcd_gotoxy(0,1);lcd_putsf("DAC256
X8Mhz    ");}
void  lcd_DAC128_X8Mhz__(void) {lcd_gotoxy(0,0);lcd_putsf("anda telah pilih");lcd_gotoxy(0,1);lcd_putsf("DAC128
X8Mhz    ");}
void  lcd_DAC_64_X8Mhz__(void) {lcd_gotoxy(0,0);lcd_putsf("anda telah pilih");lcd_gotoxy(0,1);lcd_putsf("DAC_64
X8Mhz    ");}
void  lcd_DAC_32_X8Mhz__(void) {lcd_gotoxy(0,0);lcd_putsf("anda telah pilih");lcd_gotoxy(0,1);lcd_putsf("DAC_32
X8Mhz    ");}

void  lcd_liat_scope(void) {lcd_gotoxy(0,0);    lcd_putsf("lihat osciloskop");//delay_ms(300);
                        }


void plug_in_dac(void)
    { //int pengambilan_data;
     lcd_gotoxy(0,0); lcd_putsf("plug in port D  ");
     lcd_gotoxy(0,1); lcd_putsf("ke DAC board    "); delay_ms(800);
     lcd_gotoxy(0,0); lcd_putsf("jk portD#DACbrd ");
     lcd_gotoxy(0,1); lcd_putsf("mk tkn pad 8/yes");
     #asm
     ini_dia_ambil_data:          ;
```