



ภาคผนวก

มหาวิทยาลัยพระเชตะวัน



ภาคผนวก ก

โปรแกรม

มหาวิทยาลัยพระรัตน

## โปรแกรมแปลงเมตริกซ์เป็นไฟล์แอสเซมบลี

```

%Convert metrix to Assembly file

%load data *.mdl file

load g1030a.mat;
load g1030b.mat;
load g1030c.mat;
gateA=gateA';
gateB=gateB';
gateC=gateC';

% GATE A
V_AN=gateA;
for t=1:16384
    if gateA(t,2)>=1;
        V_AN(t,2)=1;
    else
        V_AN(t,2)=0;
    end
end

%Gate A included deadtime
VDt_AN=V_AN;
for t=2:16384
    X=[V_AN(t,2) V_AN(t-1,2)];
    if X == [1 0]
        VDt_AN(t,2)=0;
        VDt_AN(t+1,2)=0;
        VDt_AN(t+2,2)=0;
    else
        end
end

% GATE C

```

```

V_CN=gateC;
for t=1:16384
    if gateC(t,2)>=1;
        V_CN(t,2)=1;
    else
        V_CN(t,2)=0;
    end
end

%Gate C included deadline
VDt_CN=V_CN;
for t=2:16384
    X=[V_CN(t,2) V_CN(t-1,2)];
    if X == [1 0]
        VDt_CN(t,2)=0;
        VDt_CN(t+1,2)=0;
        VDt_CN(t+2,2)=0;
    else
        end
end

% GATE B
V_BN=gateB;
for t=1:16384
    if gateB(t,2)>=1;
        V_BN(t,2)=1;
    else
        V_BN(t,2)=0;
    end
end

%Gate B included deadline
VDt_BN=V_BN;
for t=2:16384
    X=[V_BN(t,2) V_BN(t-1,2)];

```

```

if X == [1 0]
    VDt_BN(t,2)=0;
    VDt_BN(t+1,2)=0;
    VDt_BN(t+2,2)=0;
else
end
end

% GATE A INVERSE
Vinv_AN = V_AN;
for t=1:16384
    if V_AN(t,2)==1;
        Vinv_AN(t,2)=0;
    else
        Vinv_AN(t,2)=1;
    end
end

% Gate A inverse included deadline
VinvDt_AN=Vinv_AN;
for t=2:16384
    X=[Vinv_AN(t,2) Vinv_AN(t-1,2)];
    if X == [1 0]
        VinvDt_AN(t,2)=0;
        VinvDt_AN(t+1,2)=0;
        VinvDt_AN(t+2,2)=0;
    else
    end
end

% GATE B INVERSE
Vinv_BN = V_BN;
for t=1:16384
    if V_BN(t,2)==1;
        Vinv_BN(t,2)=0;

```

```

else
    Vinv_BN(t,2)=1;
end
end

%Gate B included deadtime
VinvDt_BN=Vinv_BN;
for t=2:16384
    X=[Vinv_BN(t,2) Vinv_BN(t-1,2)];
    if X == [1 0]
        VinvDt_BN(t,2)=0;
        VinvDt_BN(t+1,2)=0;
        VinvDt_BN(t+2,2)=0;
    else
        end
    end
end

% GATE C INVERSE
Vinv_CN = V_CN;
for t=1:16384
    if V_CN(t,2)==1;
        Vinv_CN(t,2)=0;
    else
        Vinv_CN(t,2)=1;
    end
end

% Gate C inverse included deadtime
VinvDt_CN=Vinv_CN;
for t=2:16384
    X=[Vinv_CN(t,2) Vinv_CN(t-1,2)];
    if X == [1 0]
        VinvDt_CN(t,2)=0;
        VinvDt_CN(t+1,2)=0;
        VinvDt_CN(t+2,2)=0;

```

```

else
end
end

% safety
for i=1:3
    VDt_AN(i,2)=0;
    VDt_BN(i,2)=0;
    VDt_CN(i,2)=0;
    VinvDt_AN(i,2)=0;
    VinvDt_BN(i,2)=0;
    VinvDt_CN(i,2)=0;
end

% check error
Cerror = 0
for i=1:16384
    CG=VDt_CN(i,2);
    CGI=VinvDt_CN(i,2);
    C=CG&CGI;
    if C==1, Cerror=-1
    else
    end
end

% write to file
code = fopen('c:\matlabr11\work\g1030.asm','wt');
up_bit = [0 0 '0'; 0 1 '1'; 1 0 '2'; 1 1 '3'];
down_bit = [0 0 0 0 '0'; 0 0 0 1 '1'; 0 0 1 0 '2'; 0 0 1 1 '3';
            0 1 0 0 '4'; 0 1 0 1 '5'; 0 1 1 0 '6'; 0 1 1 1 '7';
            1 0 0 0 '8'; 1 0 0 1 '9'; 1 0 1 0 'A'; 1 0 1 1 'B';
            1 1 0 0 'C'; 1 1 0 1 'D'; 1 1 1 0 'E'; 1 1 1 1 'F'];
fprintf(code, '%s\n', 'ORG 0000H');
for j=1:16384,
    X=[VDt_CN(j,2) VinvDt_CN(j,2) ];

```

```

Y=[VDt_BN(j,2) VinvDt_BN(j,2) VDt_AN(j,2) VinvDt_AN(j,2)];
for i=1:4;
    if X==[up_bit(i,1) up_bit(i,2)],
        v=up_bit(i,3);
    else
        end
    end
end
for i=1:16;
    if Y==[down_bit(i,1) down_bit(i,2) down_bit(i,3) down_bit(i,4)]
        q=down_bit(i,5);
    else
        end
    end
    fprintf(code,'DB ');
    fprintf(code,'%s%s%s\n',v,q,'H');
end
fprintf(code,'%s\n','end');
st=fclose(code);

```





## โปรแกรมวิเคราะห์ fast fourier tranfrom , DF1 และ วิเคราะห์ THDv จากการทดลองจริง

```

%fft analysis from scope data
data=dlmread('c:\matlabr11\work\gd0_08v.txt');
Vfft=abs(fft(data)).*((sqrt(2))/(length(data)));
figure(1);
Vt1=Vfft(2:350);
stem(Vt1);
axis([0 350 0 250]);

%THDv analysis
THDv=100*(sqrt(sum((Vt1.^2)))/Vfft(2,1))
Vrms=Vfft(2)
Vt1=(1:100);
Vrms=(sqrt(sum(Vt1.^2)));
Temp=0;
for e=3:10032
DF= sum( Vfft(e,:).^2/(e-1)^2 );
Temp=Temp+DF;
Temp2=sqrt(Temp);
end
DF1=100*(Temp2/Vfft(2,1));

```

## โปรแกรมวิเคราะห์ THDi จากการทดลองจริง

```

%THDi analysis from scope data
data=dlmread('c:\matlabr11\work\spwm10i.txt');
Ifft=abs(fft(data/1.15)).*((sqrt(2))/(length(data/1.15)));
figure(1);
It1=Ifft(2:350);
stem(It1);
axis([0 350 0 1]);
It2=Ifft(3:350);
THDi=100*(sqrt(sum((It2).^2)))/Ifft(2)
%Find DF1 (AC DF for Second order Filter)
Temp=0;
for e=3:10032
    DF= sum( Ifft(e,:).^2/(e-1)^2 );
    Temp=Temp+DF;
    Temp2=sqrt(Temp);
end
DF1=100*(Temp2/Ifft(2,1));

```

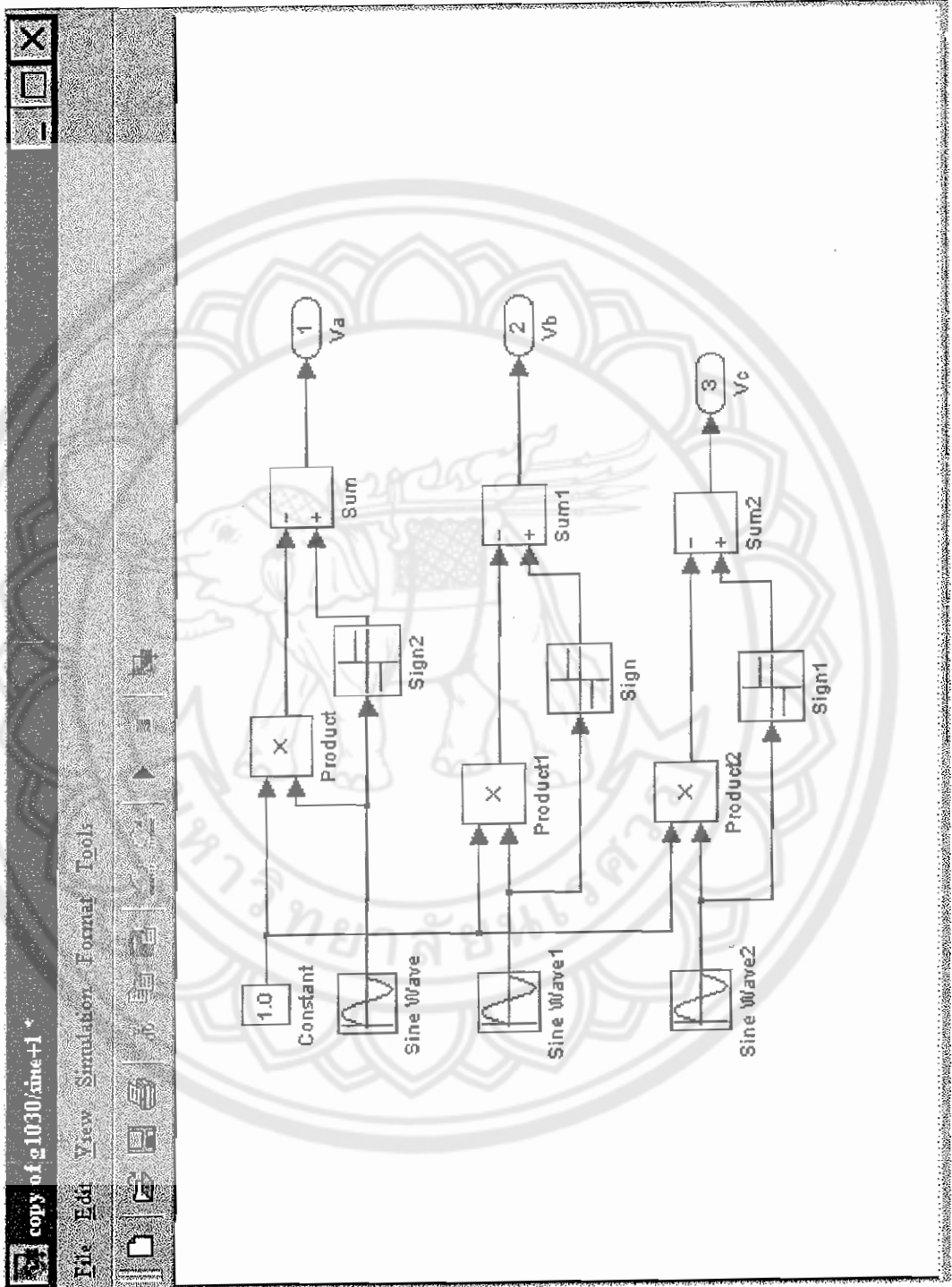
## โปรแกรมวิเคราะห์ fast fourier tranfrom , DF1 และ วิเคราะห์ THDv จาก Simulink

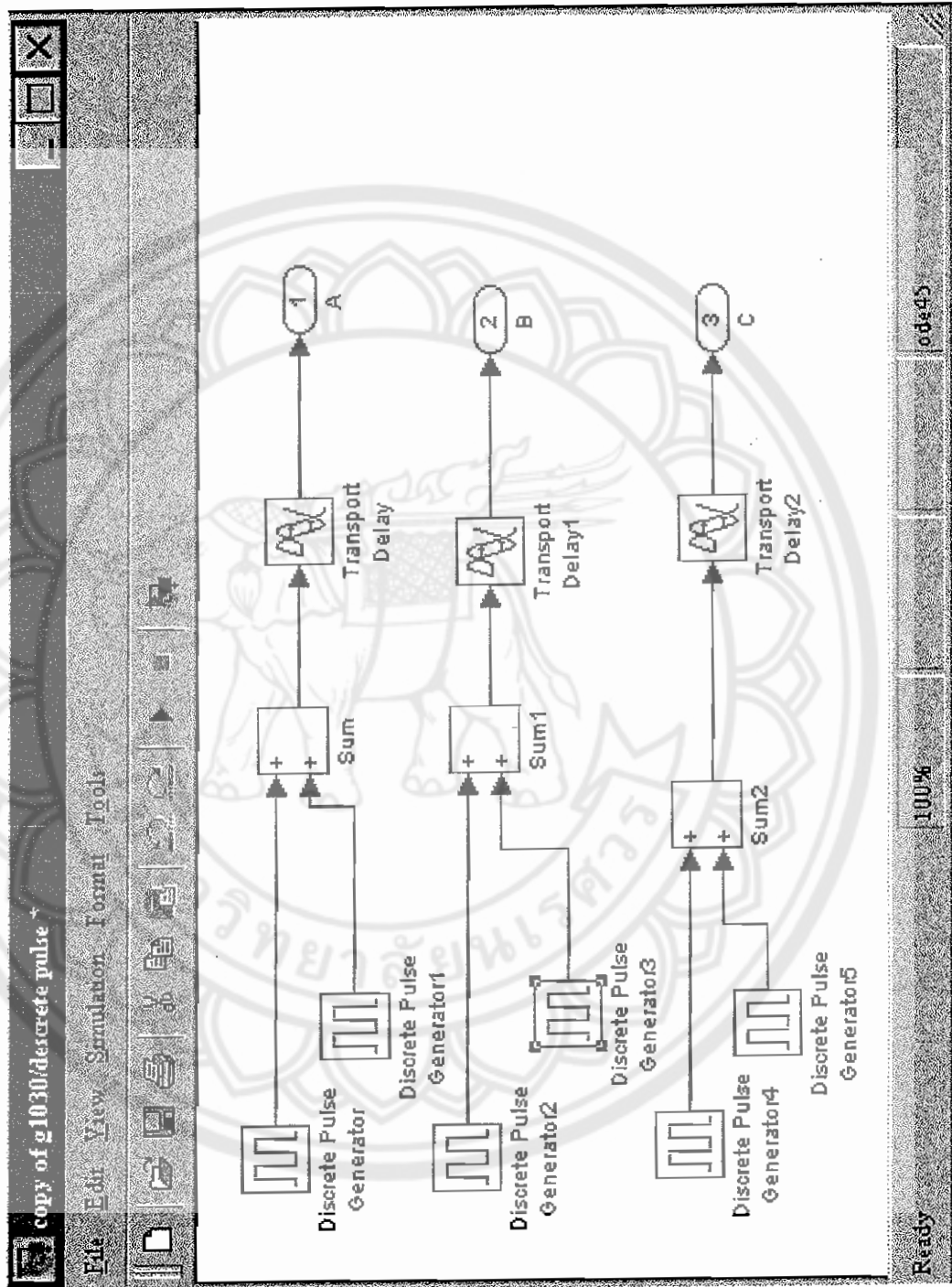
```

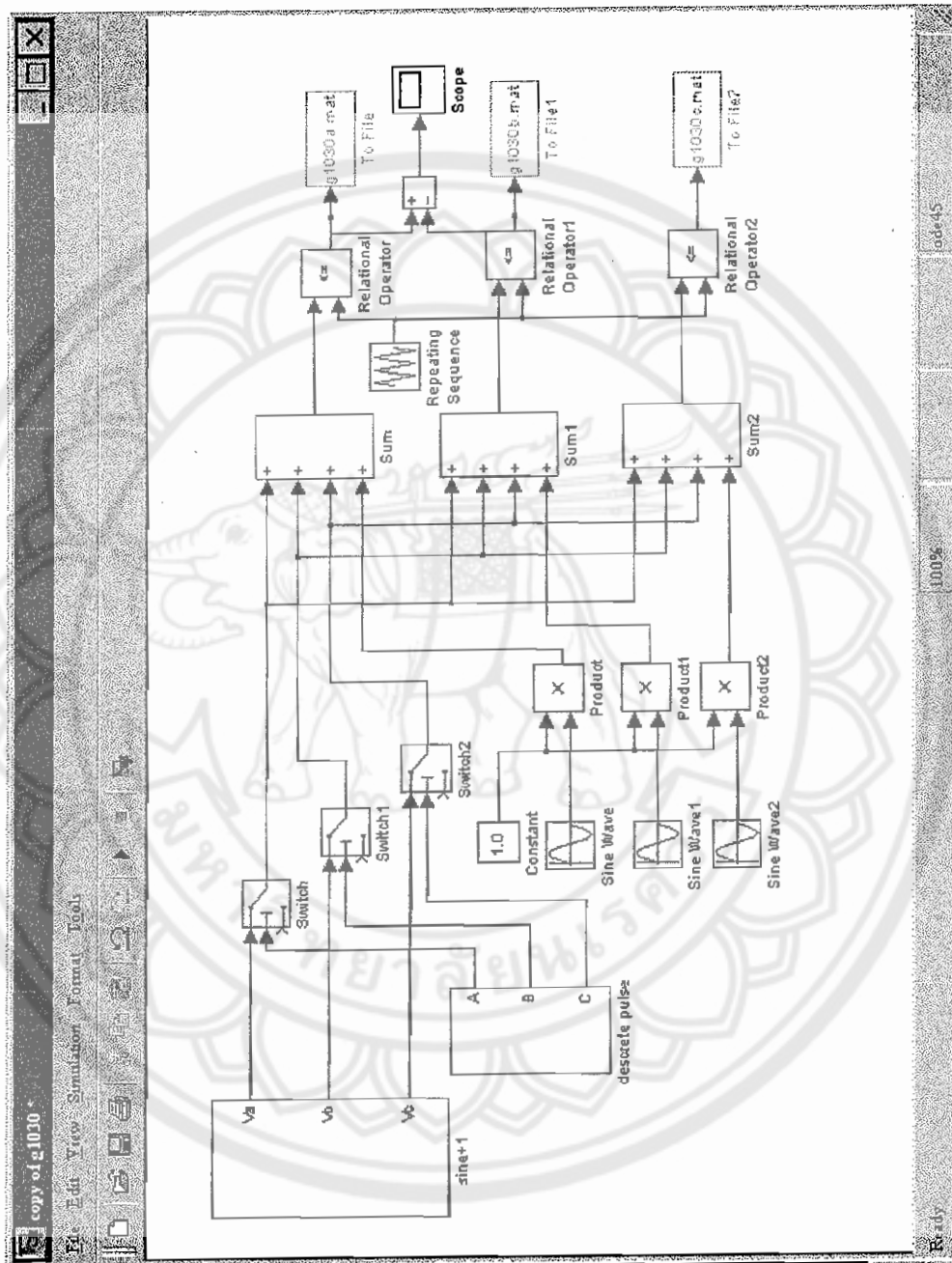
%Program analysis THDv and DF from simulink
%load data *.mdl file
load spwm.mat;
load inputtemp.mat;
c=Van';
d=temp';
for q=1:16384
    a=c(q+16384,2);
    d(q,2)=a;
end
Vfft=abs(fft(d(:,2))).*((sqrt(2))/(length(d(:,2))));
figure(1);
Vt1=Vfft(2:350);
stem(Vt1);
axis([0 350 0 200]);
%THDv analysis
THDv=100*(sqrt(sum((Vt1).^2))/Vfft(2,1))
V1rms=Vfft(2)
Vrms=(sqrt(sum(Vt1.^2)));
% DF1 analysis
Temp=0;
for e=3:300
    DF= sum( (Vt1(e,:).^2) / ((e)^2) );
    Temp=Temp+DF;
    Temp2=sqrt(Temp);
end
DF1=100*(Temp2/Vfft(2,1))

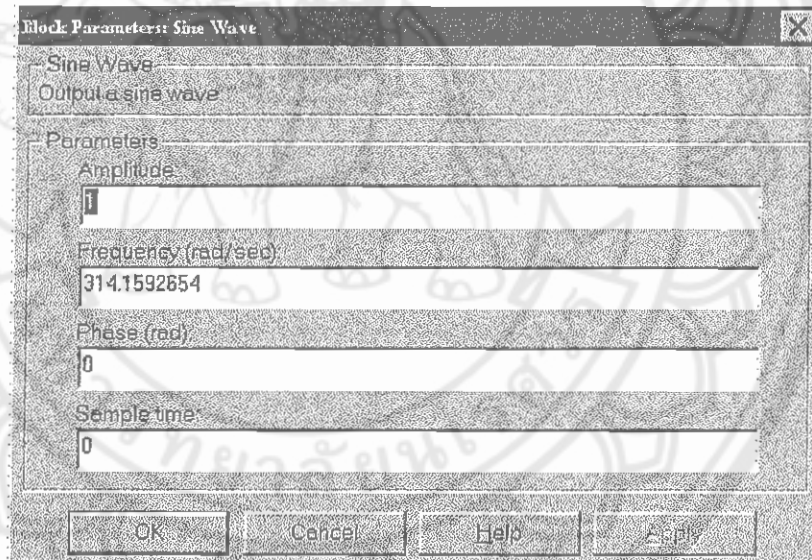
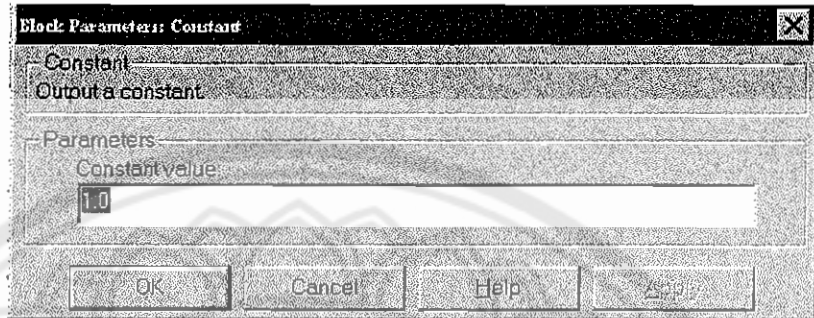
```













Block: Parameters: Sine Wave2

Sine Wave  
Output a sine wave.

Parameters

Amplitude:  
1

Frequency (rad/sec):  
314.1592654

Phase (rad):  
-2.094395102

Sample time:  
0

OK Cancel Help Apply

Block: Parameters: Sine Wave1

Sine Wave  
Output a sine wave.

Parameters

Amplitude:  
1

Frequency (rad/sec):  
314.1592654

Phase (rad):  
2.094395102

Sample time:  
0

OK Cancel Help Apply

**Block Parameters: Discrete Pulse Generator** [X]

- Discrete Pulse Generator -  
Generate pulses at regular intervals. Specify parameters as integer multiples of the sample time.

Parameters

Amplitude:

Period (number of samples):

Pulse width (number of samples):

Phase delay (number of samples):

Sample time:

OK Cancel Help Apply

**Block Parameters: Discrete Pulse Generator 1** [X]

- Discrete Pulse Generator -  
Generate pulses at regular intervals. Specify parameters as integer multiples of the sample time.

Parameters

Amplitude:

Period (number of samples):

Pulse width (number of samples):

Phase delay (number of samples):

Sample time:

OK Cancel Help Apply

**Block Parameters: Discrete Pulse Generator2** [X]

- Discrete Pulse Generator -  
Generate pulses at regular intervals. Specify parameters as integer multiples of the sample time.

Parameters

Amplitude:

Period (number of samples):

Pulse width (number of samples):

Phase delay (number of samples):

Sample time:

OK Cancel Help Apply

**Block Parameters: Discrete Pulse Generator1** [X]

- Discrete Pulse Generator -  
Generate pulses at regular intervals. Specify parameters as integer multiples of the sample time.

Parameters

Amplitude:

Period (number of samples):

Pulse width (number of samples):

Phase delay (number of samples):

Sample time:

OK Cancel Help Apply

**Block Parameters: Discrete Pulse Generator 4**

Discrete Pulse Generator  
Generate pulses at regular intervals. Specify parameters as integer multiples of the sample time.

Parameters

Amplitude: 1

Period (number of samples): 12

Pulse width (number of samples): 2

Phase delay (number of samples): 3

Sample time: 0.00166666666667

OK Cancel Help Apply

**Block Parameters: Discrete Pulse Generator 5**

Discrete Pulse Generator  
Generate pulses at regular intervals. Specify parameters as integer multiples of the sample time.

Parameters

Amplitude: 1

Period (number of samples): 12

Pulse width (number of samples): 2

Phase delay (number of samples): 9

Sample time: 0.00166666666667

OK Cancel Help Apply

**Block Parameters: Switch** [X]

Switch  
Pass through input 1 when input 2 is greater than or equal to threshold, otherwise pass through input 3.

Parameters

Threshold  
0.5

OK Cancel Help Apply

**Block Parameters: Repeating Sequence** [X]

Repeating table (mask) (link)  
Repeating table

Parameters

Time values  
[0 0.25 0.5 0.75 1]\*0.0002489135802

Output values  
[0 1 0 -1 0]

OK Cancel Help Apply

**Block Parameters: To File** [X]

To File  
Write time and input to specified MAT file in row format. Time is in row 1.

Parameters

Filename  
g1030a.mat

Variable name  
gateA

Decimation  
1

Sample Time  
-1

OK Cancel Help Apply

**Block Parameters: To File1**

**To File**  
Write time and input to specified MAT file in row format. Time is in row 1.

**Parameters**

Filename:  
g1030b.mat

Variable name:  
gateB

Decimation:  
1

Sample Time:  
-1

OK Cancel Help Apply

**Block Parameters: To File2**

**To File**  
Write time and input to specified MAT file in row format. Time is in row 1.

**Parameters**

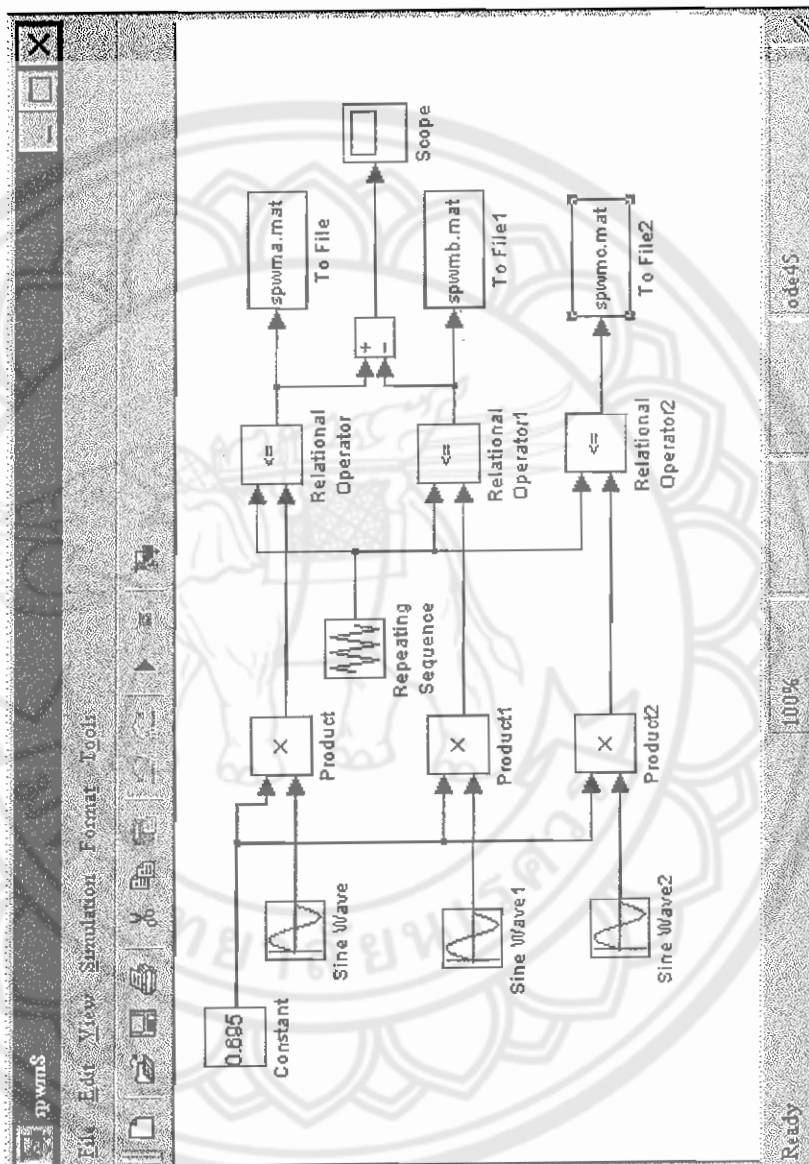
Filename:  
g1030c.mat

Variable name:  
gateC

Decimation:  
1

Sample Time:  
-1

OK Cancel Help Apply



Block Parameters: Sine Wave

Sine Wave  
Output a sine wave

Parameters

Amplitude  
1

Frequency (rad/sec)  
314.1592654

Phase (rad)  
0

Sample time  
0

OK Cancel Help Apply

Block Parameters: Sine Wave

Sine Wave  
Output a sine wave

Parameters

Amplitude  
1

Frequency (rad/sec)  
314.1592654

Phase (rad)  
2.094395102

Sample time  
0

OK Cancel Help Apply



Block Parameters: Sine Wave2

Sine Wave  
Output a sine wave

Parameters

Amplitude:  
0

Frequency (rad/sec):  
314.1592654

Phase (rad):  
-2.094395102

Sample time:  
0

OK Cancel Help Apply

Block Parameters: To File

To File  
Write time and input to specified MAT file in row format. Time is in row 1.

Parameters

Filename:  
spwme.mat

Variable name:  
ans

Decimation:  
1

Sample Time:  
-1

OK Cancel Help Apply

**Block Parameters: To File1** [X]

To File  
Write time and input to specified MAT file in row format. Time is in row 1.

Parameters

Filename:  
spwmb.mat

Variable name:  
ans

Decimation:  
1

Sample Time:  
-1

OK Cancel Help Exit

**Block Parameters: To File2** [X]

To File  
Write time and input to specified MAT file in row format. Time is in row 1.

Parameters

Filename:  
spwmc.mat

Variable name:  
ans

Decimation:  
1

Sample Time:  
-1

OK Cancel Help Exit



ภาคผนวก ก

รูปวงจรถ่ายใช้ในการทดลอง

มหาวิทยาลัยพระนคร

### วงจรควบคุมที่ใช้ในการทดลอง

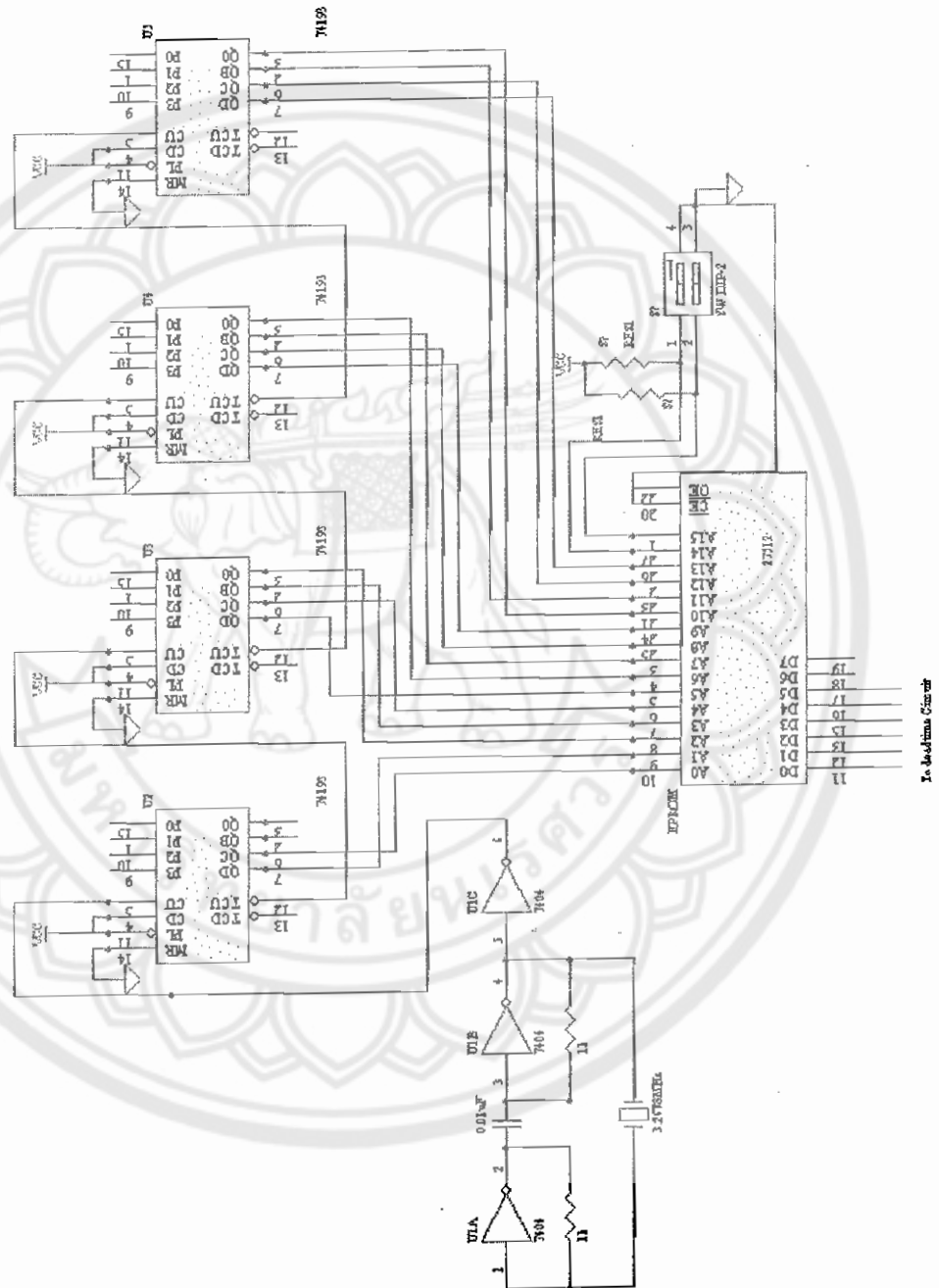
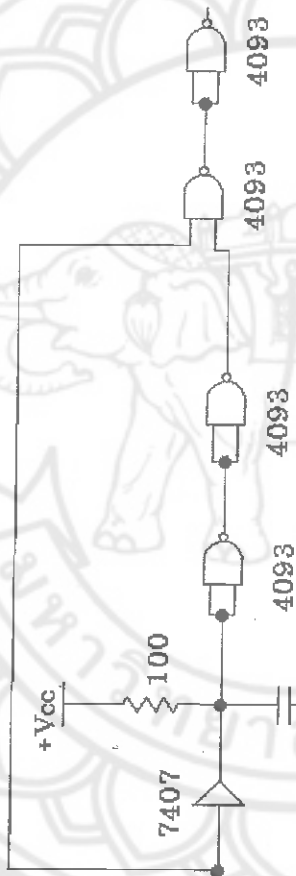


Fig. 1.1.1. Control Circuit

วงจรถัดใหม่



วงจรขับเกด

