

L A M P I R A N



PROGRAM PENGENDALI STEPPER MOTOR DENGAN CARD PCL-838

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*****
.*
.*      Program ini adalah program demo yang memperlihatkan
.*      bagaimana memanggil fungsi pcl-838 melalui PASCAL
.*
.*      Filename : BUBUT.PAS
.*      Author   : KENDALI EKSPERIMEN
.*      Compiler : TURBO PASCAL 6.00 (BORLAND)
.*      Compiling : tpc Pas838.PAS
.*      Date     : November,01, 1994
.*      Reversion : 3.10
.*
.*
*****/
}

program Pascal838demo(input,output);
uses dos,crt;
const
  { konstanta untuk nomor channel dan aralnya }
  _CH1  = $0001;
  _CH2  = $0002;
  _CH3  = $0004;
  _CW1  = $0000;
  _CW2  = $0000;
  _CW3  = $0000;
  _CCW1 = $0100;
  _CCW2 = $0100;
  _CCW3 = $0100;
  { arti fungsi nomor }
  CMD_SetTime    = 1;
  CMD_SetStep    = 2;
  CMD_SetVelocity = 3;
  CMD_Active     = 10;
  CMD_Transfer   = 11;
  CMD_Run        = 12;
  CMD_Pause      = 13;
  CMD_Continue   = 14;
  CMD_Remain     = 15;
  CMD_Free       = 16;
  CMD_Hold       = 17;
  CMD_Loop       = 18;
  CMD_Stop       = 19;
  CMD_LoopNo     = 20;
  CMD_Output     = 30;
  CMD_Input      = 31;
  CMD_Delay      = 42;
  CMD_Write      = 50;
  CMD_Read       = 51;
  CMD_Base       = 53;
  CMD_Reset      = 54;
  CMD_SetTimer   = 55;
  CMD_WaitTimer  = 56;
  CMD_RemainLp   = 58;
  CMD_Clear      = 59;
  CMD_CwStep     = 60;
  CMD_CcwStep    = 61;
  CMD_StepSpd    = 62;
  CMD_SlowTime   = 63;

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    CMD_SlowStep = 64;
    CMD_SlowVelocity= 65;
    CMD_SlowDown = 66;
    CMD_CwSpeed = 67;
    CMD_CcwSpeed = 68;
    CMD_SetStart = 69;
    CMD_GetIndex = 70;
    CMD_InclIndex = 71;
    CMD_Busy = 72;
    CMD_Firmware = 73;
type FunTable = record
    funNo : Integer;           { fungsi nomor }
    channel : integer;         { byte tinggi untuk arah,rendah untuk channel }
    buffer : ^Byte;
    vi : Integer;              { kecepatan awal }
    vf : Integer;              { kecepatan akhir }
    time,step : Longint;
    data : Integer;
    return Value : Longint;
end;
type
    file_record = file of funtable;
    tulis_nama = string[14];
var
    xy : array[1..9,0..6] of byte;
    result:Integer;table: funtable;
    file_rekam : file_record;
    nama_file,filename:tulis_nama;
    bufer_record:array[1..50] of funtable;
    data,arah :integer;
    kartu_record : array[1..50] of funtable;buf_port :string[5];
    elm : char; banyak_data:integer;
    lop,no,ad,attr,x1,x,x2,y1,y2,attr1:byte;
    isi : array[1..9,0..4000] of byte;
    ck,lop1,a1,dta:word;
{-----}
{
    Memeriksa apakah PCL-838.exe ada dalam memory
}
function InstallStatus : Integer;
var
    regs : Registers;
begin
    regs.ax := $d200;
    intr($2f,regs);
    InstallStatus := regs.ax;
end;
{-----}
{
    Perintah menjalankan PCL-838
    Routine ini untuk semua perintah kecuali
    Set, SetSlow, Remain, In, Out, Read and Write
}
function Cmd838(cmdNo,channel:integer,var data : Integer) : Integer;
var
    regs : Registers;
    table : FunTable;
begin
    table.funNo := cmdNo;
    table.channel := channel;

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        table.data := data;
        regs.ax := $d202;
        regs.bx := ofs(table);
        regs.cx := seg(table);
        intr($2f,regs);
        data := table.data;
        Cmd838 := regs.ax;
    end;
    {-----}
    {
        Perhitungan sinyal untuk mengatur CII#, dir:, T(vi,vf,time)
    }
    function CalcTimeMode(channel,vi,vf: Integer; time:Longint) : Integer;
    var
        regs : Registers;
        table : FunTable;
    begin
        table.funNo := CMD_SetTime;
        table.channel := channel or channel or channel;
        table.vi := vi;
        table.vf := vf;
        table.time := time;
        regs.ax := $d202;
        regs.bx := ofs(table);
        regs.cx := seg(table);
        intr($2f,regs);
        CalcTimeMode := regs.ax;
    end;
    {-----}
    function CalcVelocityMode(channel,vf: Integer; step,time:Longint) : Integer;
    var
        regs : Registers;
        table : FunTable;
    begin
        table.funNo := CMD_SetVelocity;
        table.channel := channel or channel or channel;
        table.vf := vf;
        table.step := step;
        table.time := time;
        regs.ax := $d202;
        regs.bx := ofs(table);
        regs.cx := seg(table);
        intr($2f,regs);
        CalcvelocityMode := regs.ax;
    end;
    {-----}
    function CalcStepMode(channel,vi,vf: Integer; step:Longint) : Integer;
    var
        regs : Registers;
        table : FunTable;
    begin
        table.funNo := CMD_Setstep;
        table.channel := channel or channel or channel;
        table.vi := vi;
        table.vf := vf;
        table.step := step;
        regs.ax := $d202;
        regs.bx := ofs(table);
        regs.cx := seg(table);
        intr($2f,regs);
    end;

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        CalcStepMode := regs.ax;
    end;

    function CalcSlowTimeMode(channel,vi,vf: Integer, time:Longint) : Integer,
    var
        regs : Registers;
        table : FunTable;
    begin
        table.funNo := CMD_SlowTime;
        table.channel := channel or channel or channel;
        table.vi := vi;
        table.vf := vf;
        table.time := time;
        regs.ax := $d202;
        regs.bx := ofs(table);
        regs.cx := seg(table);
        intr($2f,regs);
        CalcSlowTimeMode := regs.ax;
    end;
    {-----}
    function CalcSlowVelocityMode(channel,vf: Integer, step,time:Longint) : Integer,
    var
        regs : Registers;
        table : FunTable;
    begin
        table.funNo := CMD_SlowVelocity;
        table.channel := channel or channel or channel;
        table.vf := vf;
        table.step := step;
        table.time := time;
        regs.ax := $d202;
        regs.bx := ofs(table);
        regs.cx := seg(table);
        intr($2f,regs);
        CalcslowvelocityMode := regs.ax;
    end;
    {-----}
    function CalcSlowStepMode(channel,vi,vf: Integer, step:Longint) : Integer,
    var
        regs : Registers;
        table : FunTable;
    begin
        table.funNo := CMD_Slowstep;
        table.channel := channel or channel or channel;
        table.vi := vi;
        table.vf := vf;
        table.step := step;
        regs.ax := $d202;
        regs.bx := ofs(table);
        regs.cx := seg(table);
        intr($2f,regs);
        CalcslowStepMode := regs.ax;
    end;

    Procedure Clearwindow;
    begin
        textattr:= $1e;
        window(17,19,75,23);clrscr;
        window(1,1,80,25);
        textattr:=$1e;

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    window(1,1,80,25);
end;

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Procedure Bunyi(n,a:word);
begin
    sound(n);delay(a);
end;

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Procedure dasar;
begin
    window(x1+3,y1+1,x2-3,y2-1);
    for lop1 := 1 to 81 do write (' ');
end;

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Procedure Print(x,y,au:byte;jud:string);
begin
    gotoxy(x,y); if au < 1 then
        begin
            textattr := au; attr1 := au;
        end;
    write(jud);
end;

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Procedure Savscr;
begin
    inc(no); if no > 9 then no := 9;
    move(mem[$B800:0],isi[no,0],4000);
    xy[no,1] := x1; xy[no,2] := x2; xy[no,3] := y1; xy[no,4] := y2;
end;

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Procedure atrib(x1,x2,y1,y2:byte);
var n,i : byte;
begin
    for lop:=x1-1 to x2-1 do
        begin
            al:=(y1-1)*160+(lop)*2;
            for lop1:=y1 to y2 do
                begin
                    if i = 0 then move(isi[no,al],mem[$b800:al+n*2],2) else
                        move(i,mem[$b800:al+n*2+1],1);
                    al:=al+160;
                end;
            end;
        end;
end;

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Procedure kotak(x1,y1,x2,y2:byte);
var i : byte;
begin
    gotoxy(x1,y1);write(chr(201));
    for i := x1+1 to x2-1 do write(chr(205));
    write(chr(187));
    for i := y1+1 to y2-1 do
        begin
            gotoxy(x1,i);write(chr(186));
            gotoxy(x2,i);write(chr(186));
        end;
    gotoxy(x1,y2);write(chr(200));
    for i:=x1+1 to x2-1 do write(chr(205));
    write(chr(188));
end;

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Procedure jendela(z1,z2,v1,v2,au:byte;jud:string);
begin
  x1 := z1; x2 := z2; y1 := v1; y2 := v2; attr:= au;textattr:=au;
  savscr;
  ck :=(x2-x1) div 2;
  if(y2<23) or (x2<78) then
    begin
      for lop := 2 to ck do
        begin
          window(x2-ck-lop,y1,x2-ck+lop,y2);clrscr;
        end;
      end;
      window(x1,y1,x2,y2);textattr:=attr;clrscr;
      kotak(2,1,78,24);
      ck := length(jud) div 2; al :=(x2-x1) div 2;
      print(al-ck,1,1,jud);
    end;

Procedure loadno;
begin
  x1 := xy[no,1];x2 := xy[no,2];y1 := xy[no,3];y2 := xy[no,4];
  window(x1,y1,x2,y2);attr1:=xy[no,0];attr:=attr1;
  textattr:=attr1;gotoxy(xy[no,5],xy[no,6]);
end;

Procedure Savno;
begin
  xy[no,0]:=attr1;xy[no,5]:=wherex;xy[no,6]:=wherey;
end;

Procedure Selesai;
begin
  window(1,1,80,25);textattr:=$1f;gotoxy(1,26);
  writeln;writeln;window(1,1,80,25);textattr:=$1f;gotoxy(1,26);
  textattr:=7;window(1,1,80,25);gotoxy(1,25);
  for lop := 1 to 24 do
    begin
      writeln;delay(10);
    end;
  clrscr;halt;
end;

Procedure nama_dan_Rekam(var filevar : File_record ;nama_file:tulis_nama;
                          banyak_data :integer);
var i : integer;
begin
  assign(filevar,nama_file);
  rewrite(filevar);
  i := 1;
  repeat
    write(filevar,Kartu_record[i]);
    i := i + 1;
  until i > banyak_data;
  close(filevar);
end;

Procedure masuk_data(banyak_data:integer);
var i :integer; kado :array['a'..'z'] of integer;
    channel,channel1,channel2,vi,vf : integer;time:longint;maher:char;

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filevar : File_record ;filename:tulis_nama;
begin
  textcolor(15);textbackground(blue);
  kotak(21,12,44,14);window(22,13,43,15);textattr:=52e;
  gotoxy(22,15);write(' banyak data : ');readln(banyak_data);clearwindow;
  textcolor(15);textbackground(red);
  gotoxy(13,12);writeln(' _____ ');
  gotoxy(13,13);writeln(' no.  chn chn chn arah  vi  vf  time  ');
  gotoxy(13,14);writeln(' _____ ');
  i := 1;
  repeat
    with kartu_record[i] do
      begin
        bunyi(200,10);nosound;
        gotoxy(13,i+14);write(i:8, ' ');
        gotoxy(26,i+14);readln(channel);
        if not ((channel=1)or(channel=2)or(channel=3)) then
          begin
            sound(200);
            gotoxy(20,23);write(' Datanya salah om, Ulangi lagi ! ');
            masuk_data(banyak_data);
          end;
        gotoxy(30,i+14);readln(channel);
        if not ((channel=1)or(channel=2)or(channel=3)) then
          begin
            gotoxy(20,23);write(' Datanya salah om, Ulangi lagi ! ');
            masuk_data(banyak_data);
          end;
        gotoxy(34,i+14);readln(channel);
        if not ((channel=1)or(channel=2)or(channel=3)) then
          begin
            gotoxy(20,23);write(' Datanya salah om, Ulangi lagi ! ');
            masuk_data(banyak_data);
          end;
        gotoxy(40,i+14);readln(arah);
        if not((arah=0) or (arah=256)) then
          begin
            gotoxy(20,23);write(' Datanya salah om, Ulangi lagi ! ');
            masuk_data(banyak_data);
          end;
        gotoxy(48,i+14);readln(vi);
        if not(vi in[1..250]) then
          begin
            gotoxy(20,23);write(' Datanya salah om, Ulangi lagi ! ');
            masuk_data(banyak_data);
          end;
        gotoxy(55,i+14);readln(vf);
        if not(vf in[1..250]) then
          begin
            gotoxy(20,23);write(' Datanya salah om, Ulangi lagi ! ');
            masuk_data(banyak_data);
          end;
        gotoxy(64,i+14);readln(time);
        channel := channel or channel or channel;
        channel2:= channel or arah;
        result := calctimemode(channel2,vi,vf,time);
      end;
      i := i + 1;
    until i>banyak_data;
    gotoxy(20,24);write(' Apakah datanya sudah benar (y/t)? ');

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repeat;
clm := readkey;
until (clm='y') or (clm='t');
if clm ='t' then
masuk_data(banyak_data);
    result := cmd838(cmd_transfer_ch1,data);
    result := cmd838(cmd_run_ch1,data);
    result := cmd838(cmd_Free_ch1,data);
    result := cmd838(cmd_transfer_ch2,data);
    result := cmd838(cmd_run_ch2,data);
    result := cmd838(cmd_Free_ch2,data);
    result := cmd838(cmd_transfer_ch3,data);
    result := cmd838(cmd_run_ch3,data);
    result := cmd838(cmd_Free_ch3,data);
begin
gotoxy(20,24);write(' Record direkam ke nama_file ? ');readln(nama_file);
nama_dan_Rekam (filevar,nama_file,banyak_data);
end;
clearwindow;
end;

Procedure masuk_data1(banyak_data:integer);
var i :integer;arah:word;
    channel,channel1,channel2,vi,vf : integer;step:longint;maher:char;
    filevar : File_record ;filename:tulis_nama;
begin
textcolor(15);textbackground(blue);
kotak(21,12,44,14);window(22,13,43,15);textattr:=$2e;
gotoxy(22,15);write(' banyak data : ');readln(banyak_data);clearwindow;
textcolor(15);textbackground(red);
gotoxy(13,12);writeln(' ');
gotoxy(13,13);writeln(' no.  chn chn chn arah  vi  vf  step  ');
gotoxy(13,14);writeln(' ');
i := 1;
repeat
with kartu_record[i] do
begin
gotoxy(13,i+14);write(i:8, ' ');
gotoxy(26,i+14);readln(channel);
if not ((channel=1)or(channel=2)or(channel=3)) then
begin
gotoxy(20,23);write(' Datanya salah om, Ulangi lagi ! ');
masuk_data1(banyak_data);
end;
gotoxy(30,i+14);readln(channel);
if not ((channel=1)or(channel=2)or(channel=3)) then
begin
gotoxy(20,23);write(' Datanya salah om, Ulangi lagi ! ');
masuk_data1(banyak_data);
end;
gotoxy(34,i+14);readln(channel);
if not ((channel=1)or(channel=2)or(channel=3)) then
begin
gotoxy(20,23);write(' Datanya salah om, Ulangi lagi ! ');
masuk_data1(banyak_data);
end;
gotoxy(39,i+14);readln(arah);
if not((arah=0) or (arah=256)) then
begin
gotoxy(20,23);write(' Datanya salah om, Ulangi lagi ! ');

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        masuk_data1(banyak_data);
    end;
    gotoxy(47,i+14);readln(vi);
    if not(vi in[1..250]) then
    begin
        gotoxy(20,23);write(' Datanya salah om, Ulangi lagi ! ');
        masuk_data1(banyak_data);
    end;
    gotoxy(54,i+14);readln(vf);
    if not(vf in[1..250]) then
    begin
        gotoxy(20,23);write(' Datanya salah om, Ulangi lagi ! ');
        masuk_data1(banyak_data);
    end;
    gotoxy(63,i+14);readln(step);
    channel := channel or channel or channel;
    channel2 := channel or arah;
    result := calcstepmode(channel,vi,vf,step);
end;
i := i + 1;
until i>banyak_data;
gotoxy(20,24);write(' Apakah datanya sudah benar (y/t)? ');
repeat;
elm := readkey;
until (elm='y') or (elm='t');
if elm = 't' then
begin
    masuk_data1(banyak_data);
end;
result := cmd838(cmd_transfer_ch1,data);
result := cmd838(cmd_run_ch1,data);
result := cmd838(cmd_Free_ch1,data);
result := cmd838(cmd_transfer_ch2,data);
result := cmd838(cmd_run_ch2,data);
result := cmd838(cmd_Free_ch2,data);
result := cmd838(cmd_transfer_ch3,data);
result := cmd838(cmd_run_ch3,data);
result := cmd838(cmd_Free_ch3,data);
begin
    gotoxy(20,24);write(' Record direkam ke nama_file ? ');readln(nama_file);
    nama_dan_Rekam (filevar,nama_file,banyak_data);
end;
clearwindow;
end;

Procedure masuk_data2(banyak_data:integer);
var i :integer;
    channel,channel1,channel2,vf : integer;step,Time:longint;maher:char;
    filevar : File_record ;filename:tulis_nama;
begin
    textcolor(15);textbackground(blue);
    kotak(21,12,44,14);window(22,13,43,15);textattr:=$2e;
    gotoxy(22,15);write(' banyak data : ');readln(banyak_data);clearwindow;
    textcolor(15);textbackground(red);
    gotoxy(13,12);writeln(' _____ ');
    gotoxy(13,13);writeln(' no. chn chn chn arah vf step time ');
    gotoxy(13,14);writeln(' _____ ');
    i := 1;
    repeat
    with kartu_record[i] do

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begin
  gotoxy(13,i+14);write(i:8,      ');
  gotoxy(26,i+14);readln(channel);
  if not ((channel=1)or(channel=2)or(channel=3)) then
  begin
    gotoxy(20,23);write(' Datanya salah om, Ulangi lagi ! ');
    masuk_data2(banyak_data);
  end;
  gotoxy(30,i+14);readln(channel);
  if not ((channel=1)or(channel=2)or(channel=3)) then
  begin
    gotoxy(20,23);write(' Datanya salah om, Ulangi lagi ! ');
    masuk_data2(banyak_data);
  end;
  gotoxy(34,i+14);readln(channel);
  if not ((channel=1)or(channel=2)or(channel=3)) then
  begin
    gotoxy(20,23);write(' Datanya salah om, Ulangi lagi ! ');
    masuk_data2(banyak_data);
  end;
  gotoxy(39,i+14);readln(arah);
  if not((arah=0) or (arah=256)) then
  begin
    gotoxy(20,23);write(' Datanya salah om, Ulangi lagi ! ');
    masuk_data2(banyak_data);
  end;
  gotoxy(47,i+14);readln(vf);
  if not(vf in[1..250]) then
  begin
    gotoxy(20,23);write(' Datanya salah om, Ulangi lagi ! ');
    masuk_data2(banyak_data);
  end;
  gotoxy(54,i+14);readln(step);
  gotoxy(63,i+14);readln(time);
  channel := channel or channel or channel;
  channel2 := channel or arah;
  result := calcvelocitymode(channel2,vf,step,time);
end;
i := i + 1;
until i>banyak_data;
gotoxy(20,24);write(' Apakah datanya sudah benar (y/t)? ');
repeat;
  elm := readkey;
until (elm='y') or (elm='t');
if elm = 't' then
masuk_data2(banyak_data);
  result := cmd838(cmd_transfer_ch1,data);
  result := cmd838(cmd_run_ch1,data);
  result := cmd838(cmd_Free_ch1,data);
  result := cmd838(cmd_transfer_ch2,data);
  result := cmd838(cmd_run_ch2,data);
  result := cmd838(cmd_Free_ch2,data);
  result := cmd838(cmd_transfer_ch3,data);
  result := cmd838(cmd_run_ch3,data);
  result := cmd838(cmd_Free_ch3,data);
begin
  gotoxy(20,24);write(' Record direkam ke nama file ? ');read(nama_file);
  nama_dan_Rekam (filevar,nama_file,banyak_data);
end;
clearwindow;

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end;

Procedure Menu1;
var maher,pilih : char;masukan:array[1..3] of integer;
    channel1,channel2,i : integer;banyak_data:integer;
    vi,vf:integer; time,step:longint;
begin
    window(1,1,80,25);
    textcolor(15); textbackground(cyan);
    gotoxy(19,1);write(' AUTOMATISASI MESIN BUBUT by KENDEKS 1994 ');
    gotoxy(25,25);write(' TEKAN ANGKAMURUF MERAH ');
    gotoxy(60,25);write('Esc : Menu');
    kotak(8,2,71,4);
    textatlr := $4e;
    gotoxy(10,3); write('Command ');
    gotoxy(19,3); write('COM(ch,ch,ch) ');
    gotoxy(33,3); write('COM(ch,value) ');
    gotoxy(48,3); write('COM(ch) ');
    gotoxy(56,3); write('MasData ');
    gotoxy(66,3); write('eXit ');
    textcolor(red); textbackground(15);
    gotoxy(10,3);write('C');
    gotoxy(20,3);write('O');
    gotoxy(35,3);write('M');
    gotoxy(53,3);write('IT');
    gotoxy(59,3);write('D');
    gotoxy(67,3);write('X');
    gotoxy(60,25);write('Esc');
    maher := upcase(readkey);
    IF MAHER ='C' THEN
    begin
        repeat
            textcolor(15); textbackground(0);
            kotak(5,5,18,12); window(6,6,17,12);
            gotoxy(35,5);write(' B. Base ');
            gotoxy(36,6);write(' R. Reset ');
            gotoxy(36,8);write(' D. Delay ');
            gotoxy(36,9);write(' S. Settimer');
            gotoxy(36,10);write(' W. Waittime');
            textcolor(red); textbackground(15);
            gotoxy(34,3);write(' R');
            gotoxy(34,4);write('W');
            gotoxy(34,3);write('D');
            gotoxy(34,3);write('B');
            gotoxy(34,3);write('S ');
            maher:= upcase(readkey);
            if maher='R' then
            begin
                result:=cmd838(cmd_Reset,0,data);
                clrscr;
                jendela(1,80,1,25,$1e,");dasar;menu1;
            end;
            if maher='W' then
            begin
                result := cmd838(cmd_waittimer,0,data);
                clrscr;
                jendela(1,80,1,25,$1e,");dasar;menu1;
            end;
            if maher ='D' then
            begin

```

```

window(19,23,60,23);
gotoxy(20,23);write(' Lamanya Delay : ');read(data);
result := cmd838(cmd_delay,0,data);
clearwindow;
end;
if maher='B' then
begin
window(19,23,60,23);repeat
data := $02c0;
result := cmd838(cmd_base,0,data);
gotoxy(20,23);write(' Base pada funno : $02c0');
maher:=Upcase(readkey);
until maher = #13;
clearwindow;
end;
if maher='S' then
begin
window(19,23,60,23);
gotoxy(20,23);write(' Lamanya settimer : ');read(data);
result := cmd838(cmd_settimer,0,data);
clearwindow;
end;
until maher=#27;
clearwindow;jendela(1,80,1,25,$1c,"");dasar;
menu1;
end;

```

IF MAHER ='O' THEN

```

begin
gotoxy(32,6);write(' Untuk command Cw/Cew step dan Cw/Cew speed ');
gotoxy(32,7);write(' Matikan dulu Motornya ! ');
repeat
textcolor(15); textbackground(0);
kotak(16,5,29,22);window(17,6,28,22);
gotoxy(33,3);write(' 1. Active ');
gotoxy(33,4);write(' 2. Transfer');
gotoxy(33,5);write(' Run,Free');
gotoxy(33,7);write(' 3. Pause ');
gotoxy(33,8);write(' 4. Continue');
gotoxy(33,9);write(' 5. Hold ');
gotoxy(33,10);write(' 6. Loop ');
gotoxy(45,3);write(' 7. Stop ');
gotoxy(45,4);write(' 8. cWstep ');
gotoxy(45,5);write(' 9. ccwstEp ');
gotoxy(45,6);write(' W. slowlown');
gotoxy(45,7);write(' Y. cwSPeEd ');
gotoxy(45,8);write(' D. ccwspeED');
gotoxy(45,9);write(' E. cleAr ');
textcolor(red); textbackground(15);
gotoxy(34,3);write(' 1');
gotoxy(34,4);write('2');
gotoxy(34,7);write('3');
gotoxy(34,8);write('4');
gotoxy(34,9);write('5');
gotoxy(34,10);write('6');
gotoxy(46,3);write('7');
gotoxy(46,4);write('8');
gotoxy(46,5);write('9');
gotoxy(46,6);write(' W');
gotoxy(46,7);write('Y');

```

```

gotoxy(46,8);write('D');
gotoxy(46,9);write('E ');
maher := upcase(readkey);
if maher = '1' then
begin
  window(31,19,63,20);
  channel1 :=channel or channel or channel;
  gotoxy(32,19);write(' Active Channel No (1,2,3) : '); readln(channel1);
  case channel1 of
    1 : result :=cmd838(cmd_active,_ch1,data);
    2 : result :=cmd838(cmd_active,_ch2,data);
    3 : result :=cmd838(cmd_active,_ch3,data);
  end;
  clearvindow;
end;
if maher = '2' then
begin
  textcolor(red); textbackground(15);
  window(31,19,75,23);
  gotoxy(20,18);write('Datanya sudah dimasukan/dipanggil (y/t)? ');
  repeat;
  elm := readkey;
  until (elm='y') or (elm='t');
  if elm = 't' then
  begin
    gotoxy(20,19);write('Baca dari nama file : ');readln(filename);
  end;
  gotoxy(20,20);write('Channel yang akan di transfer (1,2,3 :)');read(channel);
  case channel of
    1 : begin
      result := cmd838(cmd_transfer,_ch1 ,data);
      gotoxy(20,21);write('Channel yang akan di run (1,2,3 :)');read(channel);
      result := cmd838(cmd_run,_ch1,data);
      gotoxy(20,22);write('Free pada channel (1,2,3 :)');read(channel);
      result := cmd838(cmd_Free,_ch1,data);
    end;
    2 : begin
      result := cmd838(cmd_transfer,_ch2,data);
      gotoxy(20,22);write('Channel yang akan di run (1,2,3 :)');read(channel);
      result := cmd838(cmd_run,_ch2,data);
      gotoxy(20,23);write('Free pada channel (1,2,3 :)');read(channel);
      result := cmd838(cmd_Free,_ch2,data);
    end;
    3 : begin
      result := cmd838(cmd_transfer,_ch3,data);
      gotoxy(20,22);write('Channel yang akan di run (1,2,3 :)');read(channel);
      result := cmd838(cmd_run,_ch3,data);
      gotoxy(20,23);write('Free pada channel (1,2,3 :)');read(channel);
      result := cmd838(cmd_Free,_ch3,data);
    end;
  end;
  clearvindow;
end;
if maher = '3' then
begin
  window(31,21,74,23);
  gotoxy(20,21);write('Channel yang akan di pause (1,2,3 :)');read(channel);
  result := cmd838(cmd_pause,_ch1,data);
  result := cmd838(cmd_pause,_ch2,data);
  result := cmd838(cmd_pause,_ch3,data);

```

```

gotoxy(20,22);write('Channel yang akan di pause (1,2,3) : ');read(channel);
result := cmd838(cmd_pause,_ch1,data);
result := cmd838(cmd_pause,_ch2,data);
result := cmd838(cmd_pause,_ch3,data);
gotoxy(20,23);write('Channel yang akan di pause (1,2,3) : ');read(channel);
result := cmd838(cmd_pause,_ch1,data);
result := cmd838(cmd_pause,_ch2,data);
result := cmd838(cmd_pause,_ch3,data);
clearwindow;
end;
if maher = '4' then
begin
window(31,21,74,23);
gotoxy(20,21);write('Continue untk channel (1,2,3) : ');read(channel);
result := cmd838(cmd_continue,_ch1,data);
result := cmd838(cmd_continue,_ch2,data);
result := cmd838(cmd_continue,_ch3,data);
gotoxy(20,22);write('Continue untk channel 1,2,3 : ');read(channel);
result := cmd838(cmd_continue,_ch1,data);
result := cmd838(cmd_continue,_ch2,data);
result := cmd838(cmd_continue,_ch3,data);
gotoxy(20,23);write('Continue untk channel 1,2,3 : ');read(channel);
result := cmd838(cmd_continue,_ch1,data);
result := cmd838(cmd_continue,_ch2,data);
result := cmd838(cmd_continue,_ch3,data);
clearwindow;
end;
if maher = '5' then
begin
window(31,21,74,23);
gotoxy(20,21);write(' Hold channel no (1,2,3) : ');read(channel);
result := cmd838(cmd_hold,_ch1,data);
result := cmd838(cmd_hold,_ch2,data);
result := cmd838(cmd_hold,_ch3,data);
gotoxy(20,22);write(' Hold channel no (1,2,3) : ');read(channel);
result := cmd838(cmd_hold,_ch1,data);
result := cmd838(cmd_hold,_ch2,data);
result := cmd838(cmd_hold,_ch3,data);
gotoxy(20,23);write(' Hold channel no (1,2,3) : ');read(channel);
result := cmd838(cmd_hold,_ch1,data);
result := cmd838(cmd_hold,_ch2,data);
result := cmd838(cmd_hold,_ch3,data);
clearwindow;
end;
if maher = '6' then
begin
window(31,21,74,23);
channel := Channel or channel or channel;
gotoxy(20,21);write(' Loop untuk channel (1,2,3) : ');read(channel);
result := cmd838(cmd_loop,_ch1,data);
result := cmd838(cmd_loop,_ch2,data);
result := cmd838(cmd_loop,_ch3,data);
gotoxy(20,22);write(' Loop untuk channel (1,2,3) : ');read(channel);
result := cmd838(cmd_loop,_ch1,data);
result := cmd838(cmd_loop,_ch2,data);
result := cmd838(cmd_loop,_ch3,data);
gotoxy(20,23);write(' Loop untuk channel (1,2,3) : ');read(channel);
result := cmd838(cmd_loop,_ch1,data);
result := cmd838(cmd_loop,_ch2,data);
result := cmd838(cmd_loop,_ch3,data);

```

```

clearwindow;
end;
if maher = '7' then
begin
window(31,21,72,23);
gotoxy(20,21);write(' Stop untuk channel (1,2,3) : ');read(channel);
result := cmd838(cmd_stop,_ch1,data);
result := cmd838(cmd_stop,_ch2,data);
result := cmd838(cmd_stop,_ch3,data);
gotoxy(20,22);write(' Stop untuk channel (1,2,3) : ');read(channel);
result := cmd838(cmd_stop,_ch1,data);
result := cmd838(cmd_stop,_ch2,data);
result := cmd838(cmd_stop,_ch3,data);
gotoxy(20,23);write(' Stop untuk channel (1,2,3) : ');read(channel);
result := cmd838(cmd_stop,_ch1,data);
result := cmd838(cmd_stop,_ch2,data);
result := cmd838(cmd_stop,_ch3,data);
clearwindow;
end;
if maher = '8' then
begin
window(31,21,74,23);
gotoxy(20,21);write(' Cwstep untuk channel (1,2,3) : ');read(channel);
result := cmd838(cmd_cwstep,_ch1,data);
result := cmd838(cmd_cwstep,_ch2,data);
result := cmd838(cmd_cwstep,_ch3,data);
gotoxy(20,22);write(' Cwstep untuk channel (1,2,3) : ');read(channel);
result := cmd838(cmd_cwstep,_ch1,data);
result := cmd838(cmd_cwstep,_ch2,data);
result := cmd838(cmd_cwstep,_ch3,data);
gotoxy(20,23);write(' Cwstep untuk channel (1,2,3) : ');read(channel);
result := cmd838(cmd_cwstep,_ch1,data);
result := cmd838(cmd_cwstep,_ch2,data);
result := cmd838(cmd_cwstep,_ch3,data);
clearwindow;
end;
if maher = '9' then
begin
window(31,21,72,23);
gotoxy(20,21);write('Cewstep untuk channel (1,2,3) : ');read(channel);
result := cmd838(cmd_ccwstep,_ch1,data);
result := cmd838(cmd_ccwstep,_ch2,data);
result := cmd838(cmd_ccwstep,_ch3,data);
gotoxy(20,22);write('Cewstep untuk channel (1,2,3) : ');read(channel);
result := cmd838(cmd_ccwstep,_ch1,data);
result := cmd838(cmd_ccwstep,_ch2,data);
result := cmd838(cmd_ccwstep,_ch3,data);
gotoxy(20,23);write('Cewstep untuk channel (1,2,3) : ');read(channel);
result := cmd838(cmd_ccwstep,_ch1,data);
result := cmd838(cmd_ccwstep,_ch2,data);
result := cmd838(cmd_ccwstep,_ch3,data);
clearwindow;
end;
if maher= 'W' then
begin
window(31,19,74,23);
begin
gotoxy(33,14);write('Slowdown channel (1,2,3) : ');read(channel);
result := cmd838(cmd_slowdown,_ch1,data);
result := cmd838(cmd_slowdown,_ch2,data);

```

```

    result := cmd838(cmd_slowdown,_ch3,data);
end;
begin
gotoxy(33,14);write('Slowdown channel (1,2,3) :');read(channel);
result := cmd838(cmd_slowdown,_ch1,data);
result := cmd838(cmd_slowdown,_ch2,data);
result := cmd838(cmd_slowdown,_ch3,data);
end;
begin
gotoxy(33,14);write('Slowdown channel (1,2,3) :');read(channel);
result := cmd838(cmd_slowdown,_ch1,data);
result := cmd838(cmd_slowdown,_ch2,data);
result := cmd838(cmd_slowdown,_ch3,data);
end;
gotoxy(33,16); write('Masukan Data (1/T,2/S,3/V):');read(banyak_data);
case banyak_data of
1: begin
    gotoxy(33,16);write('channel (1,2,3) :');read(channel);
    gotoxy(33,17);write('channel (1,2,3) :');read(channel);
    gotoxy(33,18);write('channel (1,2,3) :');read(channel);
    gotoxy(33,19);write('arah (0/256) :');read(arah);
    gotoxy(33,20);write(' vi :');read(vi);
    gotoxy(33,21);write(' vf :');read(vf);
    gotoxy(33,22);write(' time :');read(time);
    channel := channel or channel or channel;
    channel2 := channel or arah;
    result := calcslowtimemode(channel2,vi,vf,time);
    result := cmd838(cmd_transfer,_ch1,data);
    result := cmd838(cmd_run,_ch1,data);
end;
2: begin
    gotoxy(33,16);write('channel (1,2,3) :');read(channel);
    gotoxy(33,17);write('channel (1,2,3) :');read(channel);
    gotoxy(33,18);write('channel (1,2,3) :');read(channel);
    gotoxy(33,19);write('arah (0/256) :');read(arah);
    gotoxy(33,20);write(' vi :');read(vi);
    gotoxy(33,21);write(' vf :');read(vf);
    gotoxy(33,23);write(' step :');read(step);
    channel := channel or channel or channel;
    channel2 := channel or arah;
    result := calcslowstepmode(channel2,vi,vf,step);
    result := cmd838(cmd_transfer,_ch2,data);
    result := cmd838(cmd_run,_ch2,data);
end;
3: begin
    gotoxy(33,16);write('channel (1,2,3) :');read(channel);
    gotoxy(33,17);write('channel (1,2,3) :');read(channel);
    gotoxy(33,18);write('channel (1,2,3) :');read(channel);
    gotoxy(33,19);write('arah (0/256) :');read(arah);
    gotoxy(33,21);write(' vf :');read(vf);
    gotoxy(33,22);write(' time :');read(time);
    gotoxy(33,23);write(' step :');read(step);
    channel := channel or channel or channel;
    channel2 := channel or arah;
    result := calcslowvelocitymode(channel2,vf,step,time);
    result := cmd838(cmd_transfer,_ch3,data);
    result := cmd838(cmd_run,_ch3,data);
end;end;
clearwindow;
end;

```

```

if maher= 'Y' then
begin
window(31,21,65,23);
gotoxy(32,21);write('Cwspeed untuk channel (1,2,3) : ');read(channel);
case channel of
1 : result := cmd838(cmd_cwspeed,_ch1,data);
2 : result := cmd838(cmd_cwspeed,_ch2,data);
3 : result := cmd838(cmd_cwspeed,_ch3,data);
end;
clearwindow;
end;
if maher= 'D' then
begin
window(31,21,65,23);
gotoxy(32,21);write('Cwspeed untuk channel (1,2,3) : ');read(channel);
result := cmd838(cmd_cwspeed,_ch1,data);
result := cmd838(cmd_cwspeed,_ch2,data);
result := cmd838(cmd_cwspeed,_ch3,data);
gotoxy(32,22);write('Cwspeed untuk channel (1,2,3) : ');read(channel);
result := cmd838(cmd_cwspeed,_ch1,data);
result := cmd838(cmd_cwspeed,_ch2,data);
result := cmd838(cmd_cwspeed,_ch3,data);
gotoxy(32,23);write('Cwspeed untuk channel (1,2,3) : ');read(channel);
result := cmd838(cmd_cwspeed,_ch1,data);
result := cmd838(cmd_cwspeed,_ch2,data);
result := cmd838(cmd_cwspeed,_ch3,data);
clearwindow;
end;
if maher= 'E' then
begin
window(31,20,65,20);
gotoxy(32,20);write('Clear untuk channel (1,2,3) : ');read(channel);
case channel of
1 : result := cmd838(cmd_clear,_ch1,data);
2 : result := cmd838(cmd_clear,_ch2,data);
3 : result := cmd838(cmd_clear,_ch3,data);
end;
clearwindow;
end;
until maher=#27;
clearwindow;jendela(1,80,1,25,$1e,"");dasar;
menu1;
end;

```

```

IF MAHER='M' THEN
begin
textbackground($2f);
repeat
textcolor(15); textbackground(0);
kotak(26,5,40,11);window(27,6,39,11);
gotoxy(33,3);write(' F. LoopNo ');
gotoxy(33,4);write(' G. Stepspd ');
gotoxy(33,5);write(' H. Setstart ');
gotoxy(33,6);write(' I. InclIndex ');
textcolor(red); textbackground(15);
gotoxy(34,3);write(' F');
gotoxy(34,4);write('G');
gotoxy(34,5);write('H');
gotoxy(34,6);write('I ');
maher:= upcase(readkey);

```

```

if maher='F' then
begin
window(19,22,68,23);
gotoxy(20,22);write(' LoopNo pada channel (1,2,3) : ');read(channel);
case channel of
1 : begin
result := cmd838(cmd_loopno,_chl,data);
gotoxy(20,23);write(' Banyak data loop : ');read(data);
result := cmd838(cmd_loopno,_chl,data);
clearwindow;
end;
2 : begin
result := cmd838(cmd_loopno,_chl,data);
gotoxy(20,23);write(' Banyak data loop : ');read(data);
result := cmd838(cmd_loopno,_chl,data);
clearwindow;
end;
3 : begin
result := cmd838(cmd_loopno,_chl,data);
gotoxy(20,23);write(' Banyak data loop : ');read(data);
result := cmd838(cmd_loopno,_chl,data);
clearwindow;
end;
end;
clearwindow;
end;
if maher='G' then
begin
window(19,21,68,23);
gotoxy(20,22);write(' Stepspd channel (1,2,3) : ');read(channel);
case channel of
1 : begin
result := cmd838(cmd_stepspd,_chl,data);
gotoxy(20,23);write(' Banyak data pps(pulse per second) : ');read(data);
result := cmd838(cmd_stepspd,_chl,data);
gotoxy(20,21);write('arah putaran (1/cw,2/ccw) : ');read(data);
case data of
1: begin
gotoxy(20,22);write(' Cwspeed untuk channel 1,2,3 : ');read(channel);
result := cmd838(cmd_stepspd,_chl,data);
end;
2: begin
gotoxy(20,23);write(' Cwspeed untuk channel 1,2,3 : ');read(channel);
result := cmd838(cmd_stepspd,_chl,data);
end;end;
clearwindow;
end;
2 : begin
result := cmd838(cmd_stepspd,_chl,data);
gotoxy(20,23);write(' Banyak data pps(pulse per second) : ');read(data);
result := cmd838(cmd_stepspd,_chl,data);
clearwindow;
gotoxy(20,21);write('arah putaran (1/cw,2/ccw) : ');read(data);
case data of
1: begin
gotoxy(20,22);write(' Cwspeed untuk channel 1,2,3 : ');read(channel);
result := cmd838(cmd_stepspd,_chl,data);
end;
2: begin
gotoxy(20,23);write(' Cwspeed untuk channel 1,2,3 : ');read(channel);

```

```

        result := cmd838(cmd_stepspd,_ch1,data);
    end;end;
    clearwindow;
end;
3 : begin
    result := cmd838(cmd_stepspd,_ch3,data);
    gotoxy(20,23);write(' Banyak data pps(pulse per second) : ');read(data);
    result := cmd838(cmd_stepspd,_ch3,data);
    clearwindow;
    gotoxy(20,21);write('arah putaran (1/cw,2/ccw) : ');read(data);
    case data of
    1: begin
        gotoxy(20,22);write(' Cwspeed untuk channel 1,2,3 : ');read(channel);
        result := cmd838(cmd_stepspd,_ch1,data);
        end;
    2: begin
        gotoxy(20,23);write(' Ccwspeed untuk channel 1,2,3 : ');read(channel);
        result := cmd838(cmd_stepspd,_ch1,data);
        end;end;
    clearwindow;
end;end;
clearwindow;
end;
if maher='H' then
begin
    window(19,21,68,23);
    gotoxy(20,22);write(' Setstart pada channel (1,2,3) : ');read(channel);
    case channel of
    1 : begin
        result := cmd838(cmd_setstart,_ch1,data);
        gotoxy(20,23);write(' Banyak index : ');read(data);
        result := cmd838(cmd_setstart,_ch1,data);
        end;
    2 : begin
        result := cmd838(cmd_setstart,_ch2,data);
        gotoxy(20,23);write(' Banyak index : ');read(data);
        result := cmd838(cmd_setstart,_ch2,data);
        end;
    3 : begin
        result := cmd838(cmd_setstart,_ch3,data);
        gotoxy(20,23);write(' Banyak index : ');read(data);
        result := cmd838(cmd_setstart,_ch3,data);
        end;
    end;
clearwindow;
end;
if maher='I' then
begin
    window(19,21,60,23);
    gotoxy(20,22);write(' Incindex pada channel (1,2,3) : ');read(channel);
    case channel of
    1 : begin
        result := cmd838(cmd_Incindex,_ch1,data);
        gotoxy(20,23);write(' Value : ');read(data);
        result := cmd838(cmd_Incindex,_ch1,data);
        end;
    2 : begin
        result := cmd838(cmd_Incindex,_ch2,data);
        gotoxy(20,23);write(' Value : ');read(data);
        result := cmd838(cmd_Incindex,_ch1,data);
    end;
end;

```

```

    end;
3 : begin
    result := cmd838(cmd_Incindex,_ch3,data);
    gotoxy(20,23);write(' Value      ');read(data);
    result := cmd838(cmd_Incindex,_ch1,data);
    end;
    end;
clearwindow;
end;
until maher=#27;
clearwindow;jendela(1,80,1,25,$1e,");dasar;
menul;
end;

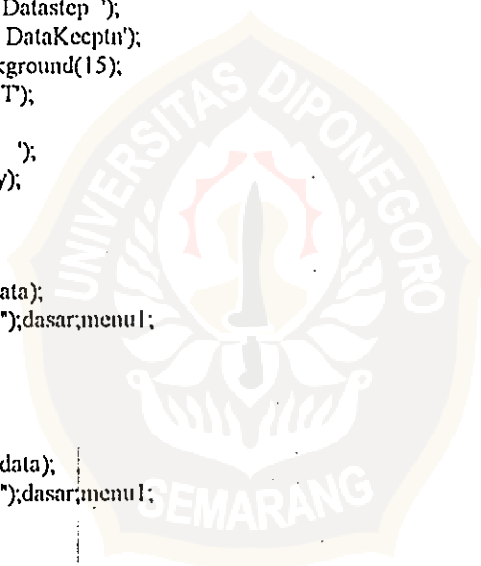
IF MAHER ='H' then
begin
repeat
textcolor(15); textbackground(0);
kotak(45,5,59,10);window(46,6,58,10);
gotoxy(33,3);write(' R. Remainlp ');
gotoxy(33,4);write(' G. Getindex ');
gotoxy(33,5);write(' B Busy ');
textcolor(red); textbackground(15);
gotoxy(34,3);write('R');
gotoxy(34,4);write('G');
gotoxy(34,5);write('B');
maher := upcase(readkey);
if maher ='R' then
begin
window(19,21,65,23);
begin
gotoxy(20,21);write(' Remainlp pada channel (1,2,3) : ');read(channel);
result := cmd838(cmd_Remainlp,_ch1,data);
result := cmd838(cmd_Remainlp,_ch2,data);
result := cmd838(cmd_Remainlp,_ch3,data);
gotoxy(20,22);write(' Remainlp pada channel (1,2,3) : ');read(channel);
result := cmd838(cmd_Remainlp,_ch1,data);
result := cmd838(cmd_Remainlp,_ch2,data);
result := cmd838(cmd_Remainlp,_ch3,data);
gotoxy(20,23);write(' Remainlp pada channel (1,2,3) : ');read(channel);
result := cmd838(cmd_Remainlp,_ch1,data);
result := cmd838(cmd_Remainlp,_ch2,data);
result := cmd838(cmd_Remainlp,_ch3,data);
end;
clearwindow;
end;
if maher ='G' then
begin
window(19,21,65,23);
gotoxy(20,21);write(' Getindex pada channel (1,2,3) : ');read(channel);
result := cmd838(cmd_getindex,_ch1,data);
result := cmd838(cmd_getindex,_ch2,data);
result := cmd838(cmd_getindex,_ch3,data);
gotoxy(20,22);write(' Getindex pada channel (1,2,3) : ');read(channel);
result := cmd838(cmd_getindex,_ch1,data);
result := cmd838(cmd_getindex,_ch2,data);
result := cmd838(cmd_getindex,_ch3,data);
gotoxy(20,23);write(' Getindex pada channel (1,2,3) : ');read(channel);
result := cmd838(cmd_getindex,_ch1,data);
result := cmd838(cmd_getindex,_ch2,data);

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```

    result := cmd838(cmd_getindex,_ch3,data);
    clearwindow;
end;
if maher ='B' then
begin
    window(19,23,63,23);
    gotoxy(20,23); write(' Busy pada channel (1,2,3) : ');read(channel);
    case channel of
        1 : result := cmd838(cmd_busy,_ch1,data);
        2 : result := cmd838(cmd_busy,_ch2,data);
        3 : result := cmd838(cmd_busy,_ch3,data);
    end;
    clearwindow;
end;
until maher=#27;
clearwindow;jendela(1,80,1,25,$1e,");dasar;
menu1;
end;
IF MAHER ='D' THEN
begin
    repeat
        gotoxy(20,7);write(' Arah Putar : ');
        gotoxy(20,8);write(' 0 untuk CW ');
        gotoxy(20,9);write(' 256 untuk CCW ');
        textcolor(15); textbackground(0);
        kotak(53,5,68,10);window(54,6,67,10);
        gotoxy(33,3);write(' T. DataWaktu ');
        gotoxy(33,4);write(' S. Datastep ');
        gotoxy(33,5);write(' V. DataKecptn');
        textcolor(red); textbackground(15);
        gotoxy(34,3);write(' T');
        gotoxy(34,4);write(' S');
        gotoxy(34,5);write(' V ');
        maher:=upcase(readkey);
        if maher='T' then
            begin
                clearwindow;
                masuk_data(banyak_data);
                jendela(1,80,3,25,$1e,");dasar;menu1;
            end;
        if maher='S' then
            begin
                clearwindow;
                masuk_data1(banyak_data);
                jendela(1,80,3,25,$1e,");dasar;menu1;
            end;
        if maher='V' then
            begin
                clearwindow;
                masuk_data2(banyak_data);
                jendela(1,80,3,25,$1e,");dasar;menu1;
            end;
        until maher=#27;
        clearwindow;jendela(1,80,1,25,$1e,");dasar;
        menu1;
    end;
    IF MAHER='X' then begin
        selesai;clrscr;end;
end;

```



```

{ .....
*      PROGRAM UTAMA      *
* ..... }

begin
result := InstallStatus;
if (result and $00ff) <> $ff then
begin
  WriteLn('TCL-838.EXE was not installed');
  Sound(200);
  Delay(200);
  NoSound;
  Exit;
end;
textcolor(15);textbackground(0);
jendela(1,80,1,25,$1c,");dasar;
menu1;
repeat
  menu1;MENU1;MENU1;MENU1;MENU1;
until readkey=#66;
end.

```



10

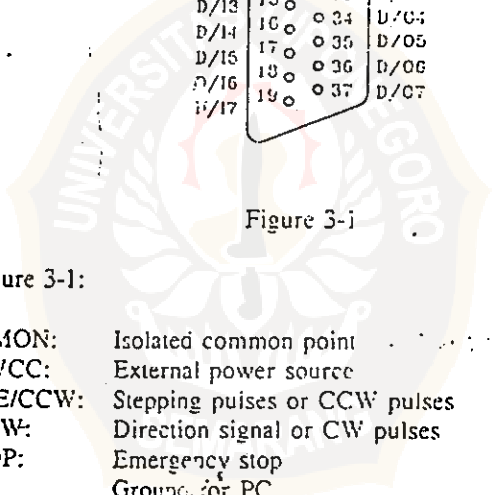


Figure 3-i

Key to Figure 3-1:

COMMON:	Isolated common point
EXT.VCC:	External power source
PULSE/CCW:	Stepping pulses or CCW pulses
DIR/CW:	Direction signal or CW pulses
E.STOP:	Emergency stop
GND:	Ground for PC
D/I0 - D/I7:	Digital input channels
D/O0 - D/O7:	Digital output channels

DAFTAR KOMPONEN RANGKAIAN PENCACAH-PENGEMUDI

Untuk rangkaian saklar otomatis

Operasi amplifier : IC 741
Potensiometer : 5 K
Resistor : 2K2, 12K, 100
Dioda : 1N 4007
Kapasitor : 47 F/16V
Transistor : 2N 2222

Untuk rangkaian pencacah

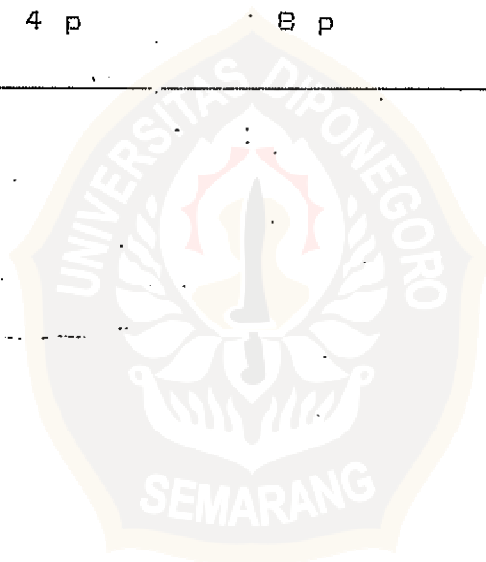
Pencacah : IC 4071
Kapasitor : 100 nF

Untuk rangkaian pengemudi

IC 4071
Transistor : TIP 3055
2N 3904
Resistor : 100
Dioda : 1N 4002

DATA TRANSISTOR

	2N3904	2N2222	TIP3055
Vcb	60 V	60 V	100 V
Vce	40 V	30 V	70 V
Veb	6 V	5 V	7 V
Ic	200 mA	800 mA	15 A
Ptot	310 meV	500 meV	90 meV
Fmin	250 m	250 m	3 m
Hfe	100 mn	100 mn	-
Cob	4 p	8 p	-



National Semiconductor

IC LINIER

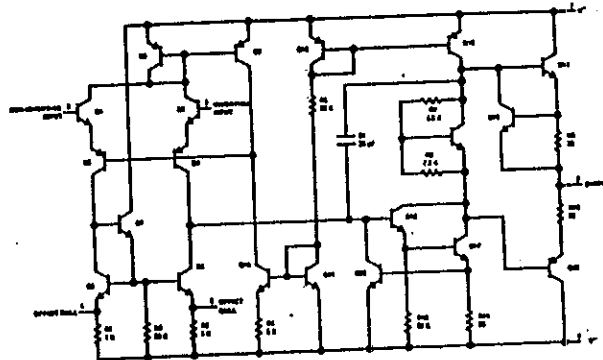
LM 741/LM 741A/LM 741C/LM 741E Penguat Operasi (Operational Amplifier)

Penjelasan umum

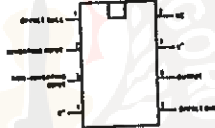
Seri LM 741 adalah penguat operasi untuk keperluan umum yang penampilannya lebih baik dari standar industri seperti LM 709. Mereka dalam banyak penerapan dapat dengan langsung menggantikan LM 709C, LM 201, MC 1439 dan 748.

Penguat-penguat itu memiliki sifat-sifat yang membuat penerapannya hampir tak dapat gagal: proteksi beban lebih di masukan maupun di keluaran, tidak macet kalau jangkah ragam tunggal dilampaui, dan juga tidak akan berguncang.

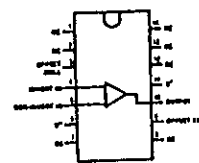
LM 741C/LM 741E adalah identik dengan LM 741/LM 741A terkecuali bahwa LM 741C/LM 741E penampilannya terjamin dalam jelajahan suhu antara 0°C hingga $+70^{\circ}\text{C}$, dan tidak dalam -55°C hingga $+125^{\circ}\text{C}$.



Kemasan Baris-berdua (DIL)



Kemasan Baris-berdua (DIL)

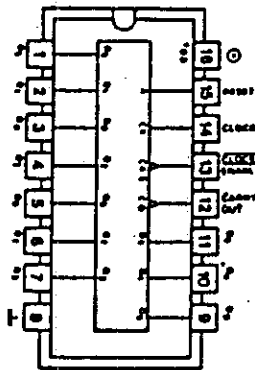


Tarif Maksimum Mutlak

	LM 741A	LM 741E	LM 741	741
Tegangan catu	$\pm 22\text{ V}$	$\pm 22\text{ V}$	$\pm 22\text{ V}$	$\pm 18\text{ V}$
Boros daya	500 mW	500 mW	500 mW	500 mW
Tegangan masukan diferensial	$\pm 30\text{ V}$	$\pm 30\text{ V}$	$\pm 30\text{ V}$	$\pm 30\text{ V}$
Tegangan masukan Lama hubungsingkat keluaran	$\pm 15\text{ V}$ tak tertentu	$\pm 15\text{ V}$ tak tertentu	$\pm 15\text{ V}$ tak tertentu	$\pm 15\text{ V}$ tak tertentu
Jelajahan suhu operasi	-55°C hingga $+125^{\circ}\text{C}$	0°C hingga $+70^{\circ}\text{C}$	-55°C hingga $+125^{\circ}\text{C}$	0°C hingga $+70^{\circ}\text{C}$
Jelajahan suhu simpan	-65°C hingga $+150^{\circ}\text{C}$	-65°C hingga $+150^{\circ}\text{C}$	-65°C hingga $+150^{\circ}\text{C}$	300°C
Suhu timah (Penyolderan 10 detik)	300°C	300°C	300°C	

Karakteristik elektrik

PARAMETER	CONDITIONS	LM701A/LM701E			LM701			LM701C			UNIT
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
Input Offset Voltage	$T_A = 25^\circ\text{C}$										mV
	$R_g = 10\text{ k}\Omega$										mV
	$R_g = 50\Omega$	0.8	3.0		1.0	5.8		2.0	6.0		mV
	$T_{\text{MIN}} < T_A < T_{\text{MAX}}$										mV
Average Input Offset Voltage Drift	$R_g = 50\Omega$			4.0							mV
	$R_g = 10\text{ k}\Omega$					5.8			7.5		mV
				15							mV/°C
											mV/°C
Input Offset Voltage Adjustment Range	$T_A = 25^\circ\text{C}, V_S = +20\text{V}$	-10			-15			-15			mV
Input Offset Current	$T_A = 25^\circ\text{C}$	3.0	30		20	200		20	200		nA
	$T_{\text{MIN}} < T_A < T_{\text{MAX}}$		70		85	500			300		nA
			0.5								nA/°C
Average Input Offset Current Drift				0.5							nA/°C
Input Bias Current	$T_A = 25^\circ\text{C}$	30	80		80	500		80	500		nA
	$T_{\text{MIN}} < T_A < T_{\text{MAX}}$		0.710			1.5			0.8		nA
											nA/°C
Input Resistance	$T_A = 25^\circ\text{C}, V_S = +20\text{V}$	1.8	6.0		0.3	2.0		0.3	2.0		M Ω
	$T_{\text{MIN}} < T_A < T_{\text{MAX}}$	0.5									M Ω
	$V_S = +20\text{V}$										M Ω
											M Ω
Input Voltage Range	$T_A = 25^\circ\text{C}$										V
	$T_{\text{MIN}} < T_A < T_{\text{MAX}}$										V
	$T_A = 25^\circ\text{C}, R_L = 2\text{ k}\Omega$										V
	$V_S = +20\text{V}, V_D = +15\text{V}$										V
Linear Signal Voltage Gain	$V_S = +15\text{V}, V_D = +10\text{V}$	50			50	200		20	200		V/mV
	$T_{\text{MIN}} < T_A < T_{\text{MAX}}$										V/mV
	$R_L = 2\text{ k}\Omega$										V/mV
	$V_S = +20\text{V}, V_D = +15\text{V}$	32									V/mV
Output Voltage Swing	$V_S = +15\text{V}, V_D = +10\text{V}$	10			25			15			V/mV
	$V_S = +15\text{V}, V_D = +2\text{V}$										V/mV
	$V_S = +20\text{V}$										V/mV
	$R_L = 10\text{ k}\Omega$	-18									V
Output Short Circuit Current	$R_L = 2\text{ k}\Omega$	-15									V
	$V_S = +15\text{V}$										V
	$R_L = 10\text{ k}\Omega$				-12	-14		-12	-14		V
	$R_L = 2\text{ k}\Omega$				-10	-12		-10	-12		V
Common Mode Rejection Ratio	$T_A = 25^\circ\text{C}$	10	75	75	25			25			dB
	$T_{\text{MIN}} < T_A < T_{\text{MAX}}$	10		40							dB
											dB
Supply Voltage Regulation Ratio	$R_S = 10\text{ k}\Omega, V_{\text{CM}} = +12\text{V}$				70	90		70	90		dB
	$R_S = 50\text{ k}\Omega, V_{\text{CM}} = +12\text{V}$	80	95								dB
	$T_{\text{MIN}} < T_A < T_{\text{MAX}}$										dB
Transient Response	$V_S = +20\text{V}$										dB
	$R_S = 10\text{ k}\Omega$	80	95								dB
	$R_S = 50\text{ k}\Omega$										dB
Bandwidth	$T_A = 25^\circ\text{C}$										dB
	$T_{\text{MIN}} < T_A < T_{\text{MAX}}$										dB
											dB
Slew Rate	$T_A = 25^\circ\text{C}$										V/μs
	$T_{\text{MIN}} < T_A < T_{\text{MAX}}$										V/μs
											V/μs
Power Consumption	$T_A = 25^\circ\text{C}$										mW
	$V_S = +20\text{V}$										mW
	$V_S = +15\text{V}$										mW
LM701A	$V_S = +20\text{V}$										mW
	$T_A = T_{\text{MIN}}$										mW
	$T_A = T_{\text{MAX}}$										mW
LM701E	$V_S = +20\text{V}$										mW
	$T_A = T_{\text{MIN}}$										mW
	$T_A = T_{\text{MAX}}$										mW
LM701	$V_S = +15\text{V}$										mW
	$T_A = T_{\text{MIN}}$										mW
	$T_A = T_{\text{MAX}}$										mW



4017 PEMBAGI/PENCACAH DEKADA DENGAN 10 JALANKELUAR TERBACA SANDINYA (DECODED)

Pencacah dimulainya dengan transisi RENDAH ke TINGGI pada jalanmasuk lonceng (CK) sementara jalanmasuk $\overline{CKE}$ sedang RENDAH, ataupun dimulainya dengan transisi TINGGI ke RENDAH pada jalanmasuk $\overline{CKE}$ sementara jalanmasuk lonceng CK adalah TINGGI.

Kalau pencacah-pencacah 4017 dikaskadakan, jalankeluar $\overline{Carry Out}$ akan dapat dipakai untuk menggerakkan jalanmasuk lonceng 4017 berikutnya. Jalankeluar $\overline{Carry Out}$ tersebut sedang RENDAH sementara pencacah berada dalam status 5, 6, 7, 8 dan 9.

TINGGI pada jalanmasuk *Reset* (R) mereset pencacah pada nol ($Q_0 = \overline{Carry Out} =$ TINGGI, $Q_1 \dots Q_9 =$ RENDAH) takbergantung pada masukan-masukan lonceng.

VDD	5	10	15	V
Max. Clock Frequency	2	5	6	MHz

Tabel kebenaran

CLOCK	CLOCK ENABLE	RESET	DECODE OUTPUT = n
0	X	0	n
X	1	0	n
X	X	1	00
X	0	0	n+1
X	X	0	n
X	1	0	n
1	X	0	n+1

X = sebarang bila $n < 5$ carry = '1', kalau tidak = '0'

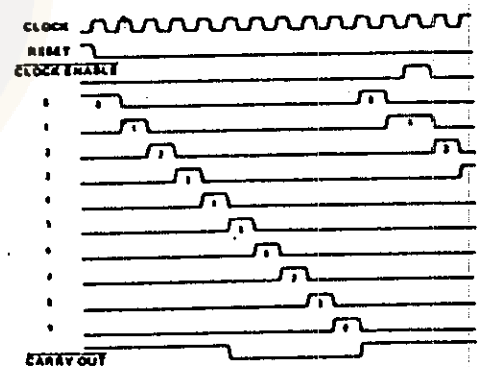
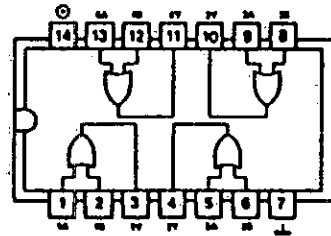


Diagram waktu untuk 4017



4071 GERBANG. OR 2-JALANMASUK BEREMPAT

$$Y = A + B$$



DATA STEPPER MOTOR

Model 103-815-2 (21)

Sudut langkah $1,8^{\circ}$

Tegangan 2,5 volt

Arus 4,6 Ampere

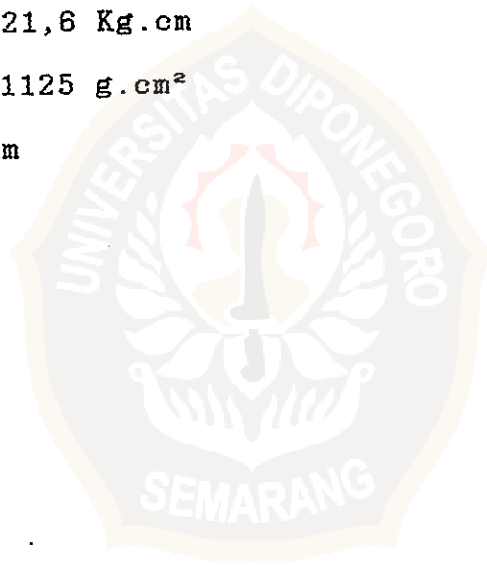
Tahanan 0,55 /phasa

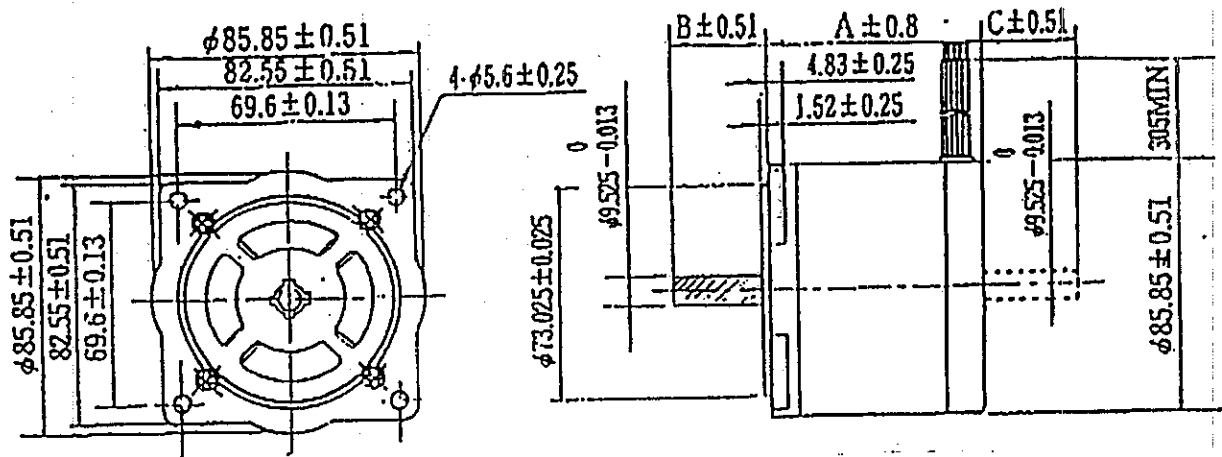
Inductans 2,5 mH/Phasa

Holding Torsi 21,6 Kg.cm

Rotor inertia 1125 g.cm²

Berat 2500 gram

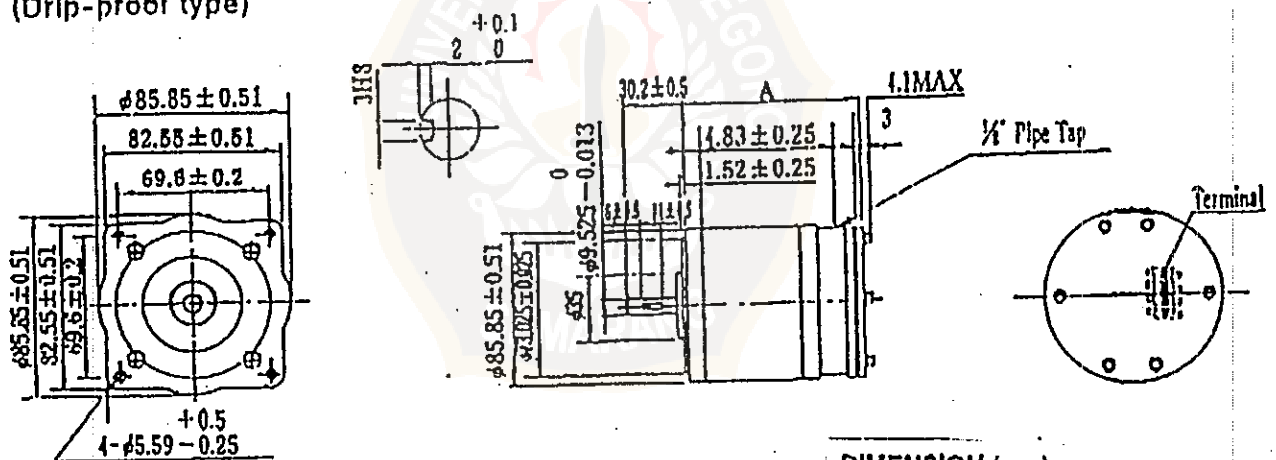




DIMENSION (mm)

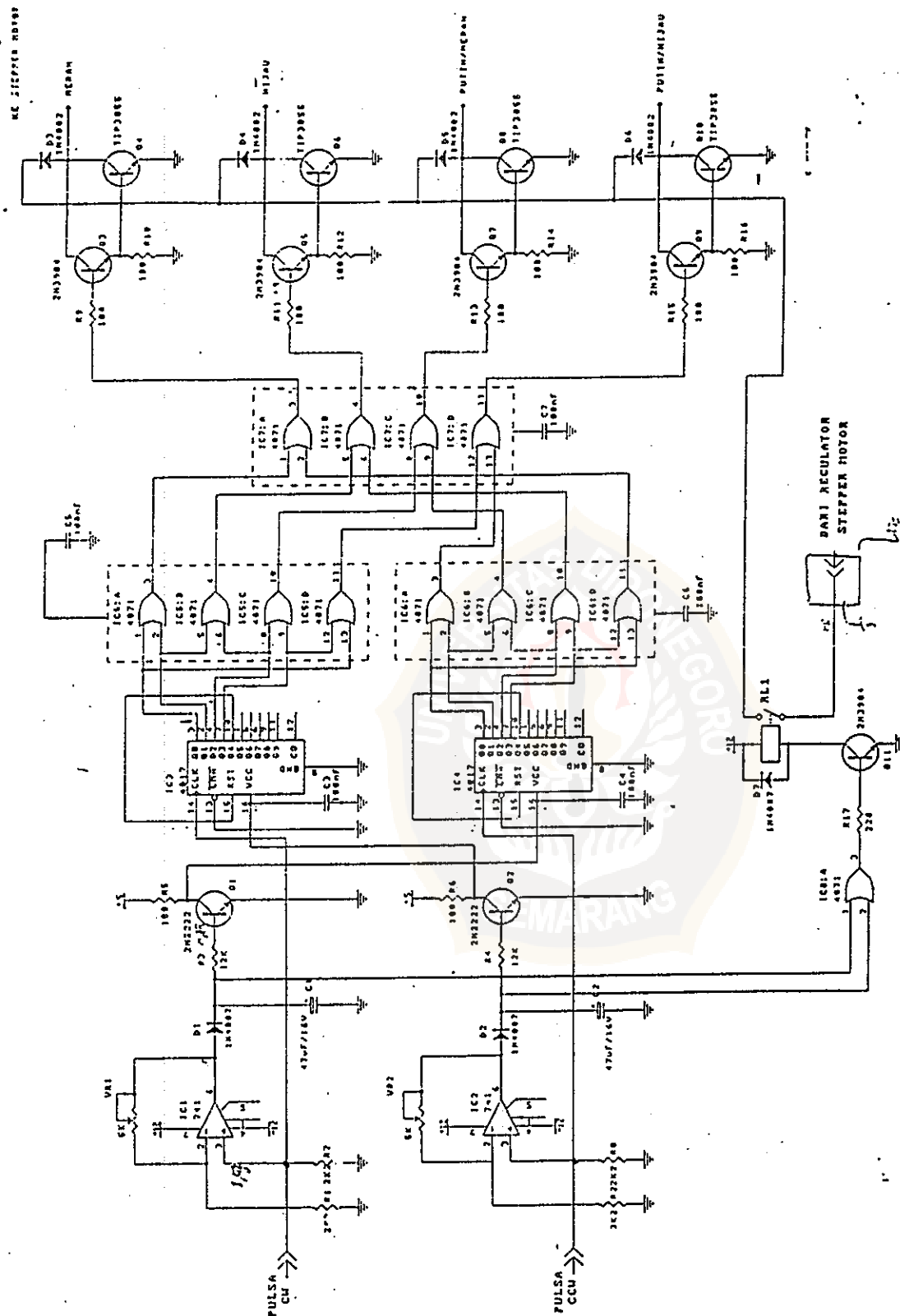
Model number	A	B	C
103-B10-	93.8	30.2	30.2

(Drp-proof type)



DIMENSION (mm)

Model number	A	B
103-810-0890	121.5	103.3



Rangkaian pencacah - pengemudi stepper motor untuk PCL-838