LAMPIRAN A

KODE PROGRAM

LAMPIRAN A

Pengendali LED RGB dan Motor pada POV

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/*****************************************
*********

This program was produced by the

CodeWizardAVR V2.04.8b Evaluation

Automatic Program Generator

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Project :

Version :

Date    : 11/4/2011

Author  : Freeware, for evaluation and non-commercial
use only

Company :

Comments:

Chip type           : ATmega32

Program type        : Application

AVR Core Clock frequency: 12.000000 MHz

Memory model        : Small

External RAM size   : 0

Data Stack size     : 512

*****************************************
********/


#include <mega32.h>

#include <delay.h>

#define     KOLOM1      PORTD.1

#define     KOLOM2      PORTD.2

#define     KOLOM3      PORTD.3

#define     BARIS1      PIND.4

#define     BARIS2      PIND.5

#define     BARIS3      PIND.6

#define     BARIS4      PIND.7

unsigned char key;

// External Interrupt 2 service routine

interrupt [EXT_INT2] void ext_int2_isr(void)

{

if (PINB.5==1)     //aktifkan  motor

{

// Place your code here

if (key=='1')     //tulisan MARANATHA (warna merah)

    {

    PORTB.7=0;      //huruf A

    PORTB.6=1;

    PORTA=0b11000001;

    delay_us(700);

    PORTA=0b10101111;

    delay_us(700);

    PORTA=0b01101111;

    delay_us(700);

    PORTA=0b10101111;

    delay_us(700);

    PORTA=0b11000001;

    delay_us(700);

    PORTA=0b11111111;

    delay_us(1400);


    PORTB.7=0;      //huruf H

    PORTB.6=1;

    PORTA=0b00000001;

    delay_us(700);

    PORTA=0b11101111;

    delay_us(700);

    PORTA=0b11101111;

    delay_us(700);

    PORTA=0b11101111;

    delay_us(700);

    PORTA=0b00000001;

    delay_us(700);

    PORTA=0b11111111;
```

```
delay_us(1400);

PORTB.7=0;      //huruf T
PORTB.6=1;
PORTA=0b01111111;
delay_us(700);
PORTA=0b01111111;
delay_us(700);
PORTA=0b00000001;
delay_us(700);
PORTA=0b01111111;
delay_us(700);
PORTA=0b01111111;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=0;      //huruf A
PORTB.6=1;
PORTA=0b11000001;
delay_us(700);
PORTA=0b10101111;
delay_us(700);
PORTA=0b01101111;
delay_us(700);
PORTA=0b10101111;
delay_us(700);
PORTA=0b11000001;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=0;      //huruf N
PORTB.6=1;
PORTA=0b00000001;
delay_us(700);
PORTA=0b11110111;
delay_us(700);
PORTA=0b11101111;
delay_us(700);
PORTA=0b11011111;
delay_us(700);
PORTA=0b00000001;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=0;      //huruf A
PORTB.6=1;
PORTA=0b11000001;
delay_us(700);
PORTA=0b10101111;
delay_us(700);
PORTA=0b01101111;
delay_us(700);
PORTA=0b10101111;
delay_us(700);
PORTA=0b11000001;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=0;      //huruf R
PORTB.6=1;
PORTA=0b10011101;
delay_us(700);
PORTA=0b01101011;
delay_us(700);
PORTA=0b01100111;
delay_us(700);
```

```
PORTA=0b01101111;
delay_us(700);
PORTA=0b00000001;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=0;        //huruf A
PORTB.6=1;
PORTA=0b11000001;
delay_us(700);
PORTA=0b10101111;
delay_us(700);
PORTA=0b01101111;
delay_us(700);
PORTA=0b10101111;
delay_us(700);
PORTA=0b11000001;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=0;        //huruf M
PORTB.6=1;
PORTA=0b00000001;
delay_us(700);
PORTA=0b10111111;
delay_us(700);
PORTA=0b11001111;
delay_us(700);
PORTA=0b10111111;
delay_us(700);
PORTA=0b00000001;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);
}
 else
 {
 PORTA=0b11111111;
 };

if (key=='2')     //tulisan MARANATHA (warna hijau)
{
PORTB.7=1;        //huruf A
PORTB.6=0;
PORTA=0b11000001;
delay_us(700);
PORTA=0b10101111;
delay_us(700);
PORTA=0b01101111;
delay_us(700);
PORTA=0b10101111;
delay_us(700);
PORTA=0b11000001;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=1;        //huruf H
PORTB.6=0;
PORTA=0b00000001;
delay_us(700);
PORTA=0b11101111;
delay_us(700);
PORTA=0b11101111;
delay_us(700);
PORTA=0b11101111;
delay_us(700);
PORTA=0b00000001;
```

```
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=1;      //huruf T
PORTB.6=0;
PORTA=0b01111111;
delay_us(700);
PORTA=0b01111111;
delay_us(700);
PORTA=0b00000001;
delay_us(700);
PORTA=0b01111111;
delay_us(700);
PORTA=0b01111111;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=1;      //huruf A
PORTB.6=0;
PORTA=0b11000001;
delay_us(700);
PORTA=0b10101111;
delay_us(700);
PORTA=0b01101111;
delay_us(700);
PORTA=0b10101111;
delay_us(700);
PORTA=0b11000001;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=1;      //huruf N
PORTB.6=0;
PORTA=0b00000001;
delay_us(700);
PORTA=0b11110111;
delay_us(700);
PORTA=0b11101111;
delay_us(700);
PORTA=0b11011111;
delay_us(700);
PORTA=0b00000001;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=1;      //huruf A
PORTB.6=0;
PORTA=0b11000001;
delay_us(700);
PORTA=0b10101111;
delay_us(700);
PORTA=0b01101111;
delay_us(700);
PORTA=0b10101111;
delay_us(700);
PORTA=0b11000001;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=1;      //huruf R
PORTB.6=0;
PORTA=0b10011101;
delay_us(700);
PORTA=0b01101011;
```

```
delay_us(700);
PORTA=0b01100111;
delay_us(700);
PORTA=0b01101111;
delay_us(700);
PORTA=0b00000001;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=1;        //huruf A
PORTB.6=0;
PORTA=0b11000001;
delay_us(700);
PORTA=0b10101111;
delay_us(700);
PORTA=0b01101111;
delay_us(700);
PORTA=0b10101111;
delay_us(700);
PORTA=0b11000001;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=1;        //huruf M
PORTB.6=0;
PORTA=0b00000001;
delay_us(700);
PORTA=0b10111111;
delay_us(700);
PORTA=0b11001111;
delay_us(700);
PORTA=0b10111111;
delay_us(700);
PORTA=0b00000001;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);
}
else
{
PORTA=0b11111111;
};

if (key=='3')     //tulisan MARANATHA (warna biru)
{
PORTB.7=0;        //huruf A
PORTB.6=0;
PORTA=0b11000001;
delay_us(700);
PORTA=0b10101111;
delay_us(700);
PORTA=0b01101111;
delay_us(700);
PORTA=0b10101111;
delay_us(700);
PORTA=0b11000001;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=0;        //huruf H
PORTB.6=0;
PORTA=0b00000001;
delay_us(700);
PORTA=0b11101111;
delay_us(700);
PORTA=0b11101111;
delay_us(700);
```

```
PORTA=0b11101111;
delay_us(700);
PORTA=0b00000001;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=0;      //huruf T
PORTB.6=0;
PORTA=0b01111111;
delay_us(700);
PORTA=0b01111111;
delay_us(700);
PORTA=0b00000001;
delay_us(700);
PORTA=0b01111111;
delay_us(700);
PORTA=0b01111111;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=0;      //huruf A
PORTB.6=0;
PORTA=0b11000001;
delay_us(700);
PORTA=0b10101111;
delay_us(700);
PORTA=0b01101111;
delay_us(700);
PORTA=0b10101111;
delay_us(700);
PORTA=0b11000001;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=0;      //huruf N
PORTB.6=0;
PORTA=0b00000001;
delay_us(700);
PORTA=0b11110111;
delay_us(700);
PORTA=0b11101111;
delay_us(700);
PORTA=0b11011111;
delay_us(700);
PORTA=0b00000001;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=0;      //huruf A
PORTB.6=0;
PORTA=0b11000001;
delay_us(700);
PORTA=0b10101111;
delay_us(700);
PORTA=0b01101111;
delay_us(700);
PORTA=0b10101111;
delay_us(700);
PORTA=0b11000001;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=0;      //huruf R
PORTB.6=0;
PORTA=0b10011101;
```

```
delay_us(700);
PORTA=0b01101011;
delay_us(700);
PORTA=0b01100111;
delay_us(700);
PORTA=0b01101111;
delay_us(700);
PORTA=0b00000001;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=0;        //huruf A
PORTB.6=0;
PORTA=0b11000001;
delay_us(700);
PORTA=0b10101111;
delay_us(700);
PORTA=0b01101111;
delay_us(700);
PORTA=0b10101111;
delay_us(700);
PORTA=0b11000001;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=0;        //huruf M
PORTB.6=0;
PORTA=0b00000001;
delay_us(700);
PORTA=0b10111111;
delay_us(700);
PORTA=0b11001111;
delay_us(700);
PORTA=0b10111111;
delay_us(700);
PORTA=0b00000001;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);
}
else
{
PORTA=0b11111111;
};

if (key=='4') //tulisan HOSEA (warna merah)
{
PORTB.7=0;        //huruf A
PORTB.6=1;
PORTA=0b11000001;
delay_us(700);
PORTA=0b10101111;
delay_us(700);
PORTA=0b01101111;
delay_us(700);
PORTA=0b10101111;
delay_us(700);
PORTA=0b11000001;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=0;        //huruf E
PORTB.6=1;
PORTA=0b01101101;
delay_us(700);
PORTA=0b01101101;
delay_us(700);
```

```
PORTA=0b01101101;
delay_us(700);
PORTA=0b01101101;
delay_us(700);
PORTA=0b00000001;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=0;        //huruf S
PORTB.6=1;
PORTA=0b10110011;
delay_us(700);
PORTA=0b01101101;
delay_us(700);
PORTA=0b01101101;
delay_us(700);
PORTA=0b01101101;
delay_us(700);
PORTA=0b10011011;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=0;        //huruf O
PORTB.6=1;
PORTA=0b10000011;
delay_us(700);
PORTA=0b01111101;
delay_us(700);
PORTA=0b01111101;
delay_us(700);
PORTA=0b01111101;
delay_us(700);
PORTA=0b10000011;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=0;        //huruf H
PORTB.6=1;
PORTA=0b00000001;
delay_us(700);
PORTA=0b11101111;
delay_us(700);
PORTA=0b11101111;
delay_us(700);
PORTA=0b11101111;
delay_us(700);
PORTA=0b00000001;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);
}
else
{
PORTA=0b11111111;
};

if (key=='5') //tulisan HOSEA (warna hijau)
{
PORTB.7=1;        //huruf A
PORTB.6=0;
PORTA=0b11000001;
delay_us(700);
PORTA=0b10101111;
delay_us(700);
PORTA=0b01101111;
delay_us(700);
```

```
PORTA=0b10101111;
delay_us(700);
PORTA=0b11000001;
delay_us(700);
PORTA=0b11111111;
delay_us(1700);

PORTB.7=1;        //huruf E
PORTB.6=0;
PORTA=0b01101101;
delay_us(700);
PORTA=0b01101101;
delay_us(700);
PORTA=0b01101101;
delay_us(700);
PORTA=0b01101101;
delay_us(700);
PORTA=0b00000001;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=1;        //huruf S
PORTB.6=0;
PORTA=0b10110011;
delay_us(700);
PORTA=0b01101101;
delay_us(700);
PORTA=0b01101101;
delay_us(700);
PORTA=0b01101101;
delay_us(700);
PORTA=0b10011011;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=1;        //huruf O
PORTB.6=0;
PORTA=0b10000011;
delay_us(700);
PORTA=0b01111101;
delay_us(700);
PORTA=0b01111101;
delay_us(700);
PORTA=0b01111101;
delay_us(700);
PORTA=0b11111111;
delay_us(700);
PORTA=0b10000011;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=1;        //huruf H
PORTB.6=0;
PORTA=0b11111111;
delay_us(700);
PORTA=0b00000001;
delay_us(700);
PORTA=0b11101111;
delay_us(700);
PORTA=0b11101111;
delay_us(700);
PORTA=0b11101111;
delay_us(700);
PORTA=0b00000001;
delay_us(700);

PORTA=0b11111111;
```

```
    delay_us(1400);
    }
    else
    {
    PORTA=0b11111111;
    };

if (key=='6') //tulisan HOSEA (warna biru)
    {
    PORTB.7=0;      //huruf A
    PORTB.6=0;
    PORTA=0b11000001;
    delay_us(700);
    PORTA=0b10101111;
    delay_us(700);
    PORTA=0b01101111;
    delay_us(700);
    PORTA=0b10101111;
    delay_us(700);
    PORTA=0b11000001;
    delay_us(700);
    PORTA=0b11111111;
    delay_us(1400);

    PORTB.7=0;      //huruf E
    PORTB.6=0;
    PORTA=0b01101101;
    delay_us(700);
    PORTA=0b01101101;
    delay_us(700);
    PORTA=0b01101101;
    delay_us(700);
    PORTA=0b01101101;
    delay_us(700);
    PORTA=0b00000001;
    delay_us(700);
    PORTA=0b11111111;
    delay_us(1400);

    PORTB.7=0;      //huruf S
    PORTB.6=0;
    PORTA=0b10110011;
    delay_us(700);
    PORTA=0b01101101;
    delay_us(700);
    PORTA=0b01101101;
    delay_us(700);
    PORTA=0b01101101;
    delay_us(700);
    PORTA=0b10011011;
    delay_us(700);
    PORTA=0b11111111;
    delay_us(1400);

    PORTB.7=0;      //huruf O
    PORTB.6=0;
    PORTA=0b10000011;
    delay_us(700);
    PORTA=0b01111101;
    delay_us(2100);
    PORTA=0b11111111;
    delay_us(700);
    PORTA=0b10000011;
    delay_us(700);
    PORTA=0b11111111;
    delay_us(1400);

    PORTB.7=0;      //huruf H
    PORTB.6=0;
    PORTA=0b11111111;
```

```
    delay_us(700);
    PORTA=0b00000001;
    delay_us(700);
    PORTA=0b11101111;
    delay_us(700);
    PORTA=0b11101111;
    delay_us(700);
    PORTA=0b11101111;
    delay_us(700);
    PORTA=0b00000001;
    delay_us(700);
    PORTA=0b11111111;
    delay_us(1400);
    }
    else
    {
    PORTA=0b11111111;
    };

if (key=='7')   //tulisan ELEKTRO (warna merah)
{
    PORTB.7=0;      //huruf O
    PORTB.6=1;
    PORTA=0b10000011;
    delay_us(700);
    PORTA=0b01111101;
    delay_us(2100);
    PORTA=0b10000011;
    delay_us(700);
    PORTA=0b11111111;
    delay_us(700);
    PORTA=0b11111111;
    delay_us(700);
    PORTA=0b11111111;
    delay_us(1400);
    PORTB.7=0;      //huruf R
    PORTB.6=1;
    PORTA=0b10011101;
    delay_us(700);
    PORTA=0b01101011;
    delay_us(700);
    PORTA=0b01100111;
    delay_us(700);
    PORTA=0b01101111;
    delay_us(700);
    PORTA=0b00000001;
    delay_us(1400);
    PORTA=0b11111111;
    delay_us(1400);

    PORTB.7=0;      //huruf T
    PORTB.6=1;
    PORTA=0b01111111;
    delay_us(1400);
    PORTA=0b00000001;
    delay_us(700);
    PORTA=0b01111111;
    delay_us(1400);
    PORTA=0b11111111;
    delay_us(1400);

    PORTB.7=0;      //huruf K
    PORTB.6=1;
    PORTA=0b01111101;
    delay_us(700);
    PORTA=0b10111011;
    delay_us(700);
    PORTA=0b11010111;
    delay_us(700);
```

```
PORTA=0b11100111;
delay_us(700);
PORTA=0b00000001;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=0;        //huruf E
PORTB.6=1;
PORTA=0b01101101;
delay_us(2800);
PORTA=0b00000001;
delay_us(700);

PORTA=0b11111111;
delay_us(1400);

PORTB.7=0;        //huruf L
PORTB.6=1;
PORTA=0b11111101;
delay_us(2800);
PORTA=0b00000001;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=0;        //huruf E
PORTB.6=1;
PORTA=0b01101101;
delay_us(2800);
PORTA=0b00000001;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);
}
    else
    {
    PORTA=0b11111111;
    };


if (key=='8')   //tulisan ELEKTRO (warna hijau)
{
    PORTB.7=1;        //huruf O
    PORTB.6=0;
    PORTA=0b10000011;
    delay_us(700);
    PORTA=0b01111101;
    delay_us(700);
    PORTA=0b01111101;
    delay_us(700);
    PORTA=0b01111101;
    delay_us(700);
    PORTA=0b11111111;
    delay_us(700);
    PORTA=0b10000011;
    delay_us(700);
    PORTA=0b11111111;
    delay_us(1400);

    PORTB.7=1;        //huruf R
    PORTB.6=0;
    PORTA=0b10011101;
    delay_us(700);
    PORTA=0b01101011;
    delay_us(700);
    PORTA=0b01100111;
    delay_us(700);
    PORTA=0b01101111;
    delay_us(700);
```

```
PORTA=0b00000001;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=1;      //huruf T
PORTB.6=0;
PORTA=0b01111111;
delay_us(700);
PORTA=0b01111111;
delay_us(700);
PORTA=0b00000001;
delay_us(700);
PORTA=0b01111111;
delay_us(700);
PORTA=0b01111111;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);



PORTB.7=1;      //huruf K
PORTB.6=0;
PORTA=0b01111101;
delay_us(700);
PORTA=0b10111011;
delay_us(700);
PORTA=0b11010111;
delay_us(700);
PORTA=0b11100111;
delay_us(700);
PORTA=0b00000001;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=1;      //huruf E
PORTB.6=0;
PORTA=0b01101101;
delay_us(700);
PORTA=0b01101101;
delay_us(700);
PORTA=0b01101101;
delay_us(700);
PORTA=0b01101101;
delay_us(700);
PORTA=0b00000001;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=1;      //huruf L
PORTB.6=0;
PORTA=0b11111101;
delay_us(700);
PORTA=0b11111101;
delay_us(700);
PORTA=0b11111101;
delay_us(700);
PORTA=0b11111101;
delay_us(700);
PORTA=0b11111101;
delay_us(700);
PORTA=0b00000001;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=1;      //huruf E
PORTB.6=0;
PORTA=0b01101101;
```

```
    delay_us(700);
    PORTA=0b01101101;
    delay_us(700);
    PORTA=0b01101101;
    delay_us(700);
    PORTA=0b01101101;
    delay_us(700);
    PORTA=0b00000001;
    delay_us(700);
    PORTA=0b11111111;
    delay_us(1400);
    }
    else
    {
    PORTA=0b11111111;
    };

if (key=='9')   //tulisan ELEKTRO (warna biru)
{
    PORTB.7=0;      //huruf O
    PORTB.6=0;
    PORTA=0b10000011;
    delay_us(700);
    PORTA=0b01111101;
    delay_us(700);
    PORTA=0b01111101;
    delay_us(700);
    PORTA=0b01111101;
    delay_us(700);
    PORTA=0b11111111;
    delay_us(700);
    PORTA=0b11111111;
    delay_us(700);
    PORTA=0b10000011;
    delay_us(700);
    PORTA=0b11111111;
    delay_us(1400);

    PORTB.7=0;      //huruf R
    PORTB.6=0;
    PORTA=0b10011101;
    delay_us(700);
    PORTA=0b01101011;
    delay_us(700);
    PORTA=0b01100111;
    delay_us(700);
    PORTA=0b01101111;
    delay_us(700);
    PORTA=0b00000001;
    delay_us(700);
    PORTA=0b11111111;
    delay_us(1400);

    PORTB.7=0;      //huruf T
    PORTB.6=0;
    PORTA=0b01111111;
    delay_us(700);
    PORTA=0b01111111;
    delay_us(700);
    PORTA=0b00000001;
    delay_us(700);
    PORTA=0b01111111;
    delay_us(700);
    PORTA=0b01111111;
    delay_us(700);
    PORTA=0b11111111;
    delay_us(1400);

    PORTB.7=0;      //huruf K
    PORTB.6=0;
```

```
PORTA=0b01111101;
delay_us(700);
PORTA=0b10111011;
delay_us(700);
PORTA=0b11010111;
delay_us(700);
PORTA=0b11100111;
delay_us(700);
PORTA=0b00000001;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=0;        //huruf E
PORTB.6=0;
PORTA=0b01101101;
delay_us(700);
PORTA=0b01101101;
delay_us(700);
PORTA=0b01101101;
delay_us(700);
PORTA=0b01101101;
delay_us(700);
PORTA=0b00000001;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=0;        //huruf L
PORTB.6=0;
PORTA=0b11111101;
delay_us(700);
PORTA=0b11111101;
delay_us(700);
PORTA=0b11111101;
delay_us(700);
PORTA=0b11111101;
delay_us(700);
PORTA=0b11111101;
delay_us(700);
PORTA=0b00000001;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=0;        //huruf E
PORTB.6=0;
PORTA=0b01101101;
delay_us(700);
PORTA=0b01101101;
delay_us(700);
PORTA=0b01101101;
delay_us(700);
PORTA=0b01101101;
delay_us(700);
PORTA=0b00000001;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);
}
else
{
PORTA=0b11111111;
};

if (key=='*')   //tulisan I LOVE YOU (biru-merah-hijau)
{
    PORTB.7=1;        //huruf U (hijau)
    PORTB.6=0;
    PORTA=0b11111111;
    delay_us(700);
    PORTA=0b11100000;
```

```
delay_us(700);
PORTA=0b11111110;
delay_us(2100);
PORTA=0b11111111;
delay_us(700);
PORTA=0b11100000;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=1;      //huruf O (hijau)
PORTB.6=0;
PORTA=0b11000001;
delay_us(700);
PORTA=0b11011101;
delay_us(2100);
PORTA=0b11111111;
delay_us(700);
PORTA=0b11000001;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=1;      //huruf Y (hijau)
PORTB.6=0;
PORTA=0b00011111;
delay_us(700);
PORTA=0b11011111;
delay_us(700);
PORTA=0b11000011;
delay_us(700);
PORTA=0b11011111;
delay_us(700);
PORTA=0b00011111;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=0;      //huruf LOVE (merah)
PORTB.6=1;
PORTA=0b10001111;
delay_us(700);
PORTA=0b00000111;
delay_us(1400);
PORTA=0b10000001;
delay_us(700);
PORTA=0b00000111;
delay_us(1400);
PORTA=0b10001111;
delay_us(700);
PORTA=0b11111111;
delay_us(1400);

PORTB.7=0;      //huruf I (biru)
PORTB.6=0;
PORTA=0b01111110;
delay_us(1400);
PORTA=0b00000000;
delay_us(700);
PORTA=0b01111110;
delay_us(1400);

PORTA=0b11111111;
delay_us(1400);
}
else
{
PORTA=0b11111111;
};
```

```
if (key=='0')   // B(merah)3(biru) garis bawahnya hijau
{
    PORTB.7=0;       //angka 3 (biru)
    PORTB.6=0;
    PORTA=0b10010011;
    delay_us(700);
    PORTA=0b11111111;
    delay_us(1);
    PORTB.7=1;
    PORTB.6=0;
    PORTA.0=0;
    delay_us(700);
    PORTA=0b11111111;
    delay_us(1);

    PORTB.7=0;       //angka 3 (biru)
    PORTB.6=0;
    PORTA=0b01101101;
    delay_us(700);
    PORTA=0b11111111;
    delay_us(1);
    PORTB.7=1;
    PORTB.6=0;
    PORTA.0=0;
    delay_us(700);
    PORTA=0b11111111;
    delay_us(1);

    PORTB.7=0;       //angka 3 (biru)
    PORTB.6=0;
    PORTA=0b01101101;
    delay_us(700);
    PORTA=0b11111111;
    delay_us(1);
    PORTB.7=1;
    PORTB.6=0;
    PORTA.0=0;
    delay_us(700);
    PORTA=0b11111111;
    delay_us(1);

    PORTB.7=0;       //angka 3 (biru)
    PORTB.6=0;
    PORTA=0b01101101;
    delay_us(700);
    PORTA=0b11111111;
    delay_us(1);
    PORTB.7=1;
    PORTB.6=0;
    PORTA.0=0;
    delay_us(700);
    PORTA=0b11111111;
    delay_us(1);

    PORTB.7=0;       //angka 3 (biru)
    PORTB.6=0;
    PORTA=0b10111011;
    delay_us(700);
    PORTA=0b11111111;
    delay_us(1);
    PORTB.7=1;
    PORTB.6=0;
    PORTA.0=0;
    delay_us(700);
    PORTA=0b11111111;
    delay_us(1);

    PORTB.7=0;       //huruf B (merah)
    PORTB.6=1;
    PORTA=0b10010011;
```

```
delay_us(700);
PORTA=0b11111111;
delay_us(1);
PORTB.7=1;
PORTB.6=0;
PORTA.0=0;
delay_us(700);
PORTA=0b11111111;
delay_us(1);

PORTB.7=0;        //huruf B (merah)
PORTB.6=1;
PORTA=0b01101101;
delay_us(700);
PORTA=0b11111111;
delay_us(1);
PORTB.7=1;
PORTB.6=0;
PORTA.0=0;
delay_us(700);
PORTA=0b11111111;
delay_us(1);

PORTB.7=0;        //huruf B (merah)
PORTB.6=1;
PORTA=0b01101101;
delay_us(700);
PORTA=0b11111111;
delay_us(1);
PORTB.7=1;
PORTB.6=0;
PORTA.0=0;
delay_us(700);
PORTA=0b11111111;
delay_us(1);
PORTB.7=0;        //huruf B (merah)
PORTB.6=1;
PORTA=0b01101101;
delay_us(700);
PORTA=0b11111111;
delay_us(1);
PORTB.7=1;
PORTB.6=0;
PORTA.0=0;
delay_us(700);
PORTA=0b11111111;
delay_us(1);

PORTB.7=0;        //huruf B (merah)
PORTB.6=1;
PORTA=0b00000001;
delay_us(700);
PORTA=0b11111111;
delay_us(1);
PORTB.7=1;
PORTB.6=0;
PORTA.0=0;
delay_us(700);
PORTA=0b11111111;
delay_us(1);
PORTA=0b11111111;
delay_us(1400);
}
else
{
PORTA=0b11111111;
};
}
}
```

```
// Declare your global variables here

void main(void)

{

// Declare your local variables here

// Input/Output Ports initialization

// Port A initialization

// Func7=Out Func6=Out Func5=Out Func4=Out
Func3=Out Func2=Out Func1=Out Func0=Out

// State7=0 State6=0 State5=0 State4=0 State3=0
State2=0 State1=0 State0=0

PORTA=0x00;

DDRA=0xFF;

// Port B initialization

// Func7=Out Func6=Out Func5=In Func4=In
Func3=Out Func2=In Func1=In Func0=In

// State7=0 State6=0 State5=P State4=T State3=0
State2=P State1=T State0=T

PORTB=0x24;

DDRB=0xC8;

// Port C initialization

// Func7=In Func6=In Func5=In Func4=In Func3=In
Func2=In Func1=In Func0=In

// State7=T State6=T State5=T State4=T State3=T
State2=T State1=T State0=T

PORTC=0x00;

DDRC=0x00;

// Port D initialization

// Func7=In Func6=In Func5=In Func4=In Func3=In
Func2=In Func1=In Func0=In

// State7=P State6=P State5=P State4=P State3=P
State2=P State1=P State0=T

PORTD=0xFE;

DDRD=0x0E;

// Timer/Counter 0 initialization

// Clock source: System Clock

// Clock value: 12000.000 kHz

// Mode: Phase correct PWM top=0xFF

// OC0 output: Non-Inverted PWM

TCCR0=0x61;

TCNT0=0x00;

OCR0=0xFF;


// Timer/Counter 1 initialization

// Clock source: System Clock

// Clock value: Timer1 Stopped

// Mode: Normal top=FFFFh

// OC1A output: Discon.

// OC1B output: Discon.

// Noise Canceler: Off

// Input Capture on Falling Edge

// Timer1 Overflow Interrupt: Off

// Input Capture Interrupt: Off

// Compare A Match Interrupt: Off

// Compare B Match Interrupt: Off

TCCR1A=0x00;

TCCR1B=0x00;

TCNT1H=0x00;

TCNT1L=0x00;

ICR1H=0x00;

ICR1L=0x00;

OCR1AH=0x00;

OCR1AL=0x00;

OCR1BH=0x00;

OCR1BL=0x00;


// Timer/Counter 2 initialization

// Clock source: System Clock

// Clock value: Timer2 Stopped

// Mode: Normal top=FFh

// OC2 output: Disconnected

ASSR=0x00;

TCCR2=0x00;

TCNT2=0x00;
```

```
OCR2=0x00;

// External Interrupt(s) initialization
// INT0: Off
// INT1: Off
// INT2: On
// INT2 Mode: Falling Edge
GICR|=0x20;
MCUCR=0x00;
MCUCSR=0x00;
GIFR=0x20;

// Timer(s)/Counter(s) Interrupt(s) initialization
TIMSK=0x00;

// USART initialization
// USART disabled
UCSRB=0x00;

// Analog Comparator initialization
// Analog Comparator: Off
// Analog Comparator Input Capture by Timer/Counter 1: Off
ACSR=0x80;
SFIOR=0x00;

// ADC initialization
// ADC disabled
ADCSRA=0x00;

// SPI initialization
// SPI disabled
SPCR=0x00;

// TWI initialization
// TWI disabled
TWCR=0x00;

// Global enable interrupts
#asm("sei")
PORTA=0b11111111;
while (1)
    {
    // Place your code here
    KOLOM1 = 0; KOLOM2 = 1; KOLOM3 = 1;
    delay_us(900);
    if (BARIS1==0) key = '1';
    if (BARIS2==0) key = '4';
    if (BARIS3==0) key = '7';
    if (BARIS4==0) key = '*';

    KOLOM1 = 1; KOLOM2 = 0; KOLOM3 = 1;
    delay_us(900);
    if (BARIS1==0) key = '2';
    if (BARIS2==0) key = '5';
    if (BARIS3==0) key = '8';
    if (BARIS4==0) key = '0';

    KOLOM1 = 1; KOLOM2 = 1; KOLOM3 = 0;
    delay_us(900);
    if (BARIS1==0) key = '3';
    if (BARIS2==0) key = '6';
    if (BARIS3==0) key = '9';
    if (BARIS4==0) key = '#';
    }
}
```

LAMPIRAN B

FOTO ALAT

LAMPIRAN B

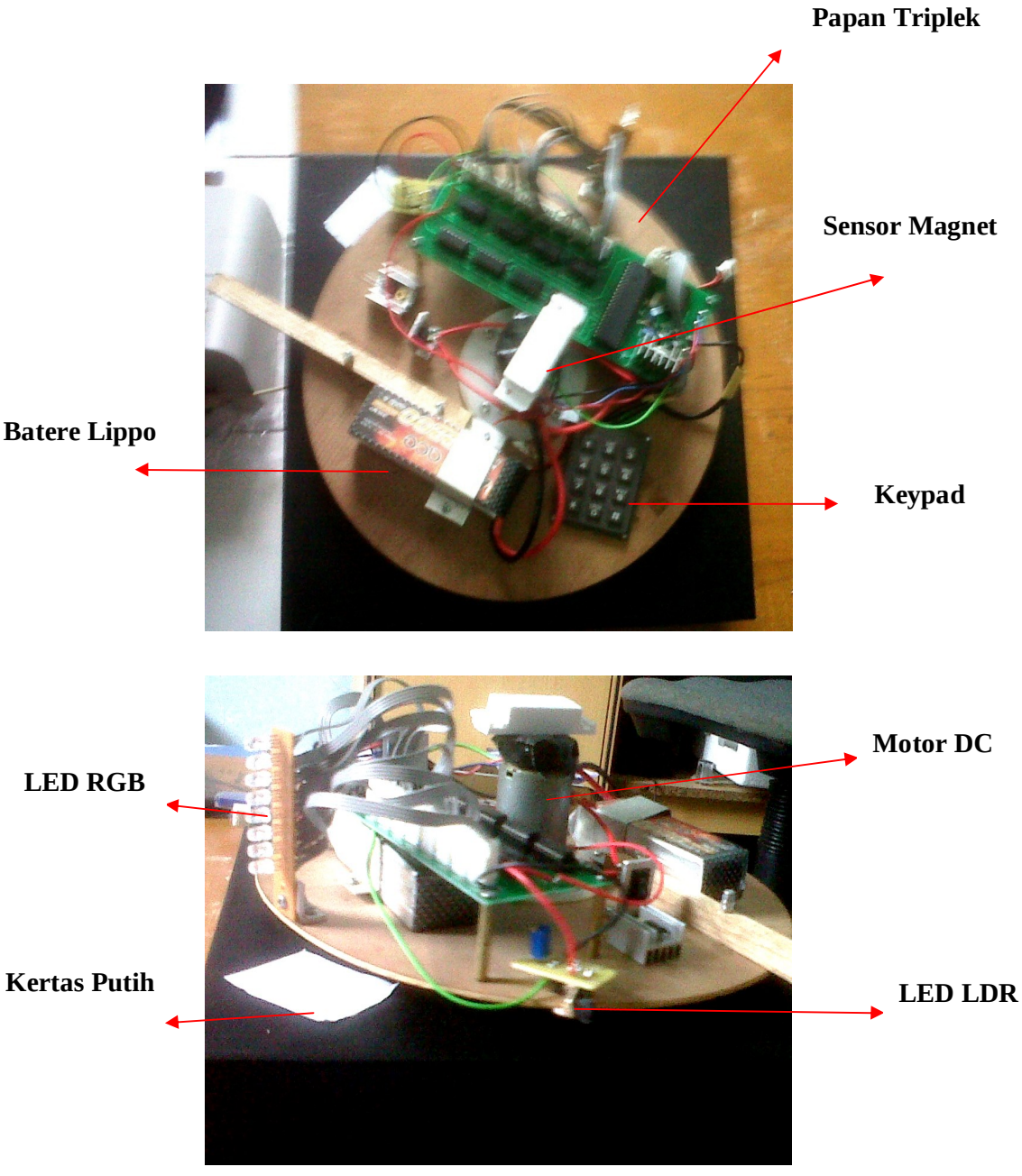


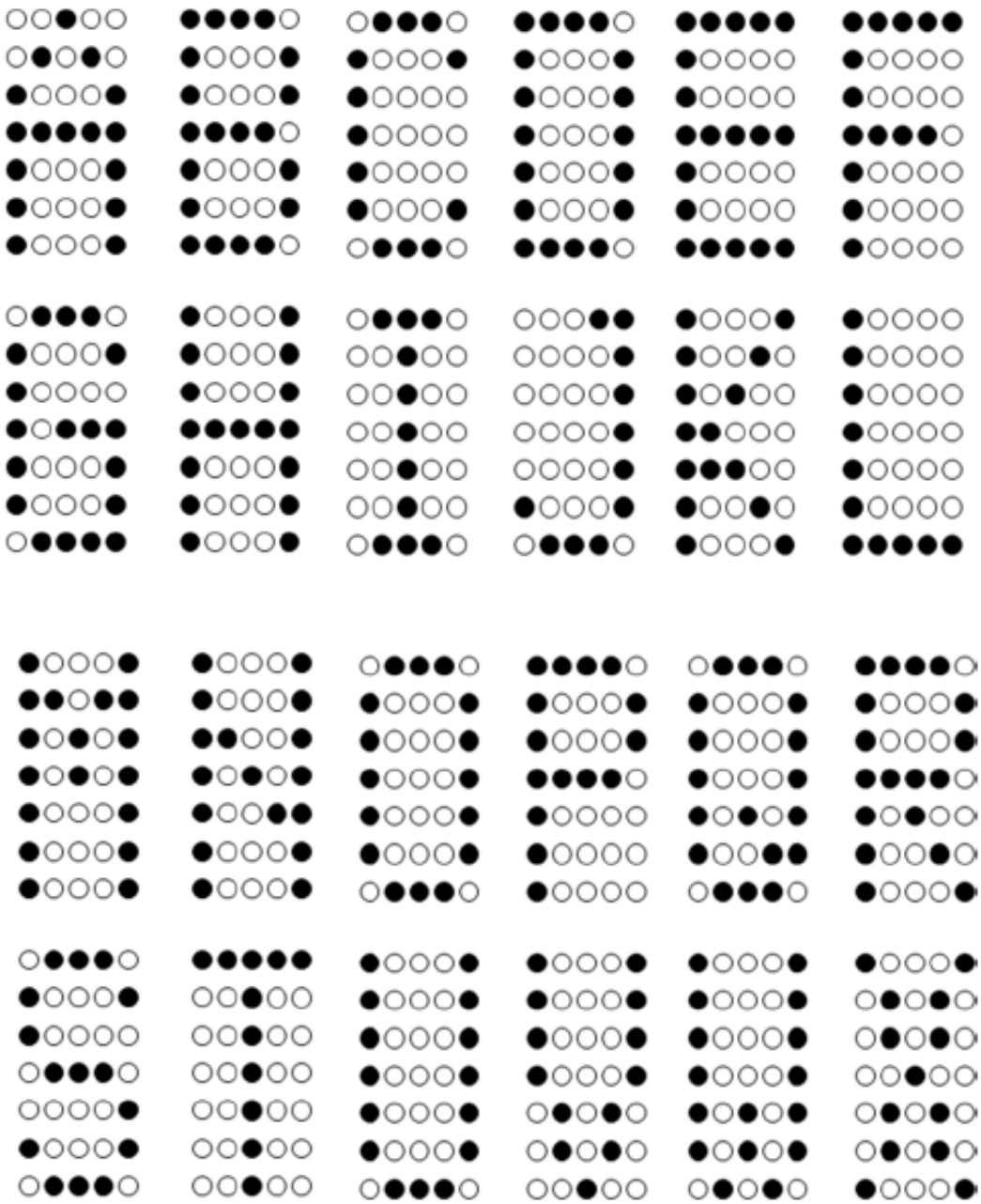
Foto Alat POV

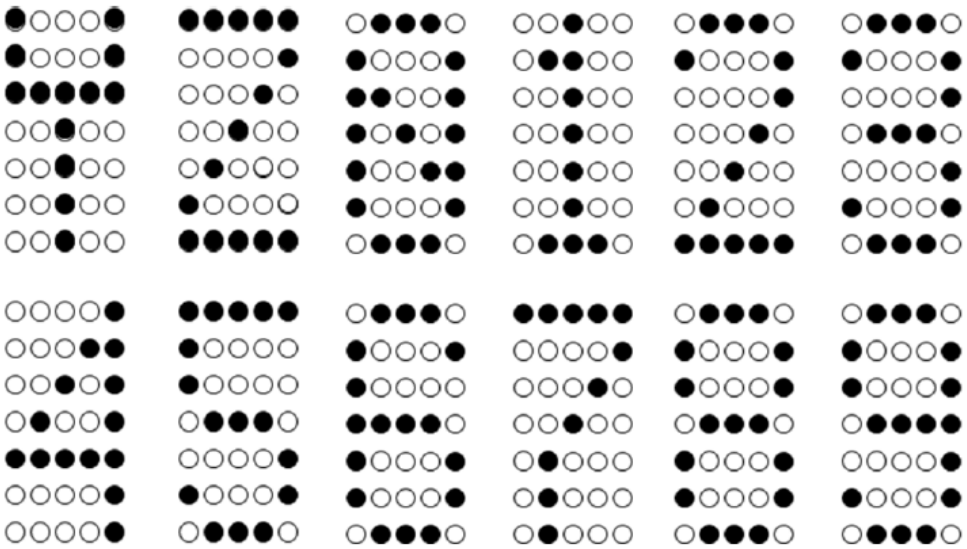
LAMPIRAN C

KOMBINASI KARAKTER

LAMPIRAN C

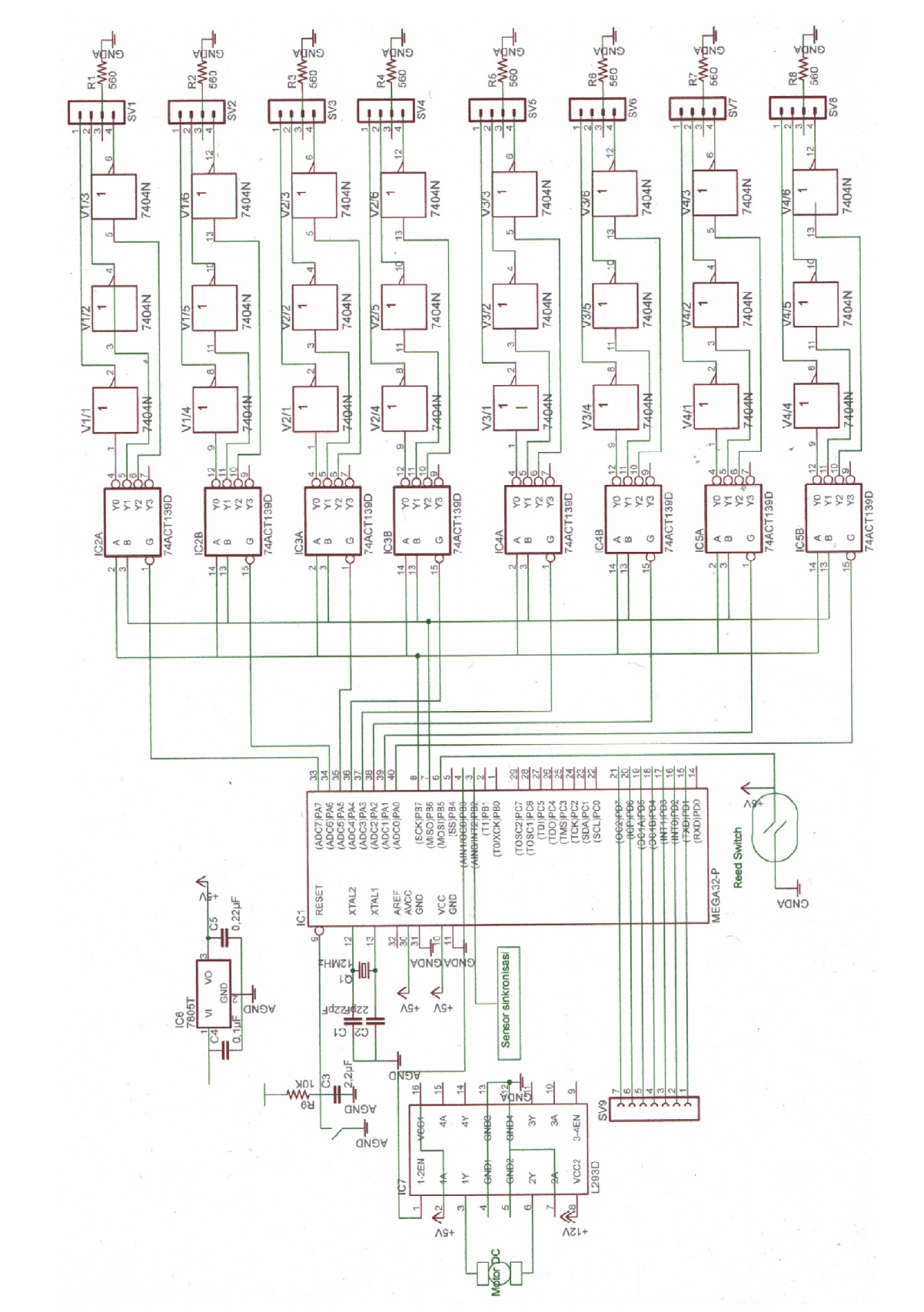
Kombinasi karakter yang ditampilkan dengan menggunakan 7 buah LED.





LAMPIRAN D

SKEMATIK RANGKAIAN


MEGA32-P
74ACT139D
7404N
L293D
7805T
Reed Switch
Sensor sinkronisasi
Motor DC
+5V
+12V
AGND
GNDA

LAMPIRAN E
DATASHEET

Features

- High-performance, Low-power Atmel®AVR® 8-bit Microcontroller
- Advanced RISC Architecture
  - 131 Powerful Instructions – Most Single-clock Cycle Execution
  - 32 x 8 General Purpose Working Registers
  - Fully Static Operation
  - Up to 16 MIPS Throughput at 16MHz
  - On-chip 2-cycle Multiplier
- High Endurance Non-volatile Memory segments
  - 32Kbytes of In-System Self-programmable Flash program memory
  - 1024Bytes EEPROM
  - 2Kbytes Internal SRAM
  - Write/Erase Cycles: 10,000 Flash/100,000 EEPROM
  - Data retention: 20 years at 85°C/100 years at 25°C[1]
  - Optional Boot Code Section with Independent Lock Bits
    In-System Programming by On-chip Boot Program
    True Read-While-Write Operation
  - Programming Lock for Software Security
- JTAG (IEEE std. 1149.1 Compliant) Interface
  - Boundary-scan Capabilities According to the JTAG Standard
  - Extensive On-chip Debug Support
  - Programming of Flash, EEPROM, Fuses, and Lock Bits through the JTAG Interface
- Peripheral Features
  - Two 8-bit Timer/Counters with Separate Prescalers and Compare Modes
  - One 16-bit Timer/Counter with Separate Prescaler, Compare Mode, and Capture Mode
  - Real Time Counter with Separate Oscillator
  - Four PWM Channels
  - 8-channel, 10-bit ADC
    8 Single-ended Channels
    7 Differential Channels in TQFP Package Only
    2 Differential Channels with Programmable Gain at 1x, 10x, or 200x
  - Byte-oriented Two-wire Serial Interface
  - Programmable Serial USART
  - Master/Slave SPI Serial Interface
  - Programmable Watchdog Timer with Separate On-chip Oscillator
  - On-chip Analog Comparator
- Special Microcontroller Features
  - Power-on Reset and Programmable Brown-out Detection
  - Internal Calibrated RC Oscillator
  - External and Internal Interrupt Sources
  - Six Sleep Modes: Idle, ADC Noise Reduction, Power-save, Power-down, Standby and Extended Standby
- I/O and Packages
  - 32 Programmable I/O Lines
  - 40-pin PDIP, 44-lead TQFP, and 44-pad QFN/MLF
- Operating Voltages
  - 2.7V - 5.5V for ATmega32L
  - 4.5V - 5.5V for ATmega32
- Speed Grades
  - 0 - 8MHz for ATmega32L
  - 0 - 16MHz for ATmega32
- Power Consumption at 1MHz, 3V, 25°C
  - Active: 1.1mA
  - Idle Mode: 0.35mA
  - Power-down Mode: < 1µA

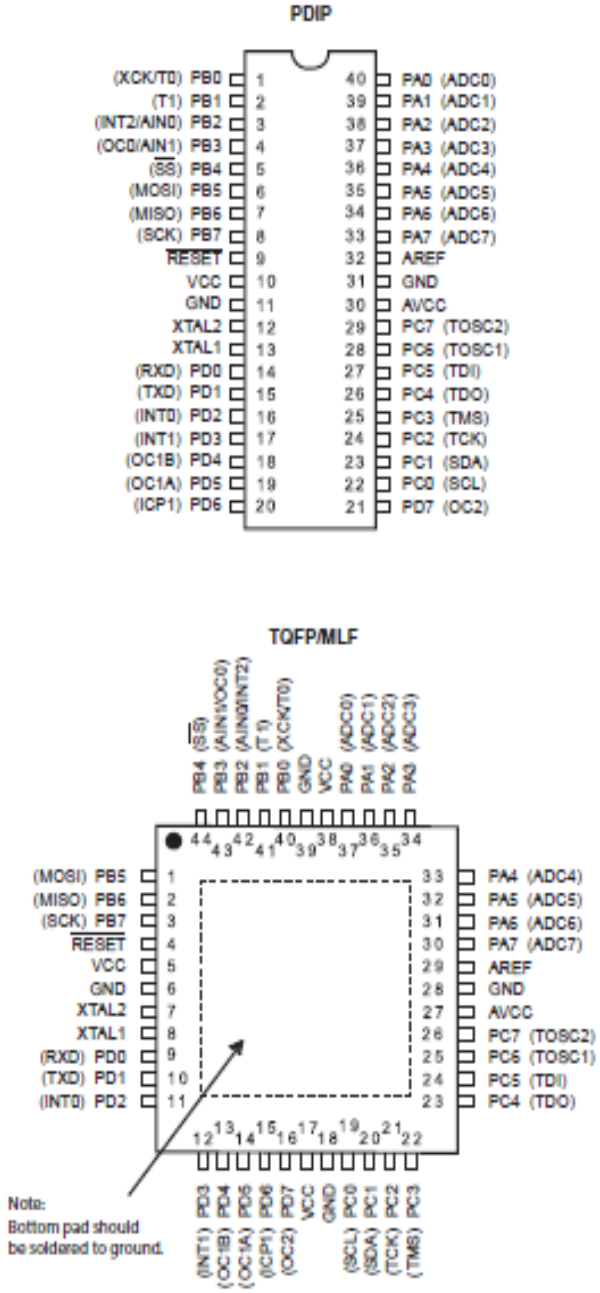
8-bit AVR® Microcontroller with 32KBytes In-System Programmable Flash

ATmega32
ATmega32L

2503Q–AVR–02/11

Pin Configurations

Figure 1. Pinout ATmega32

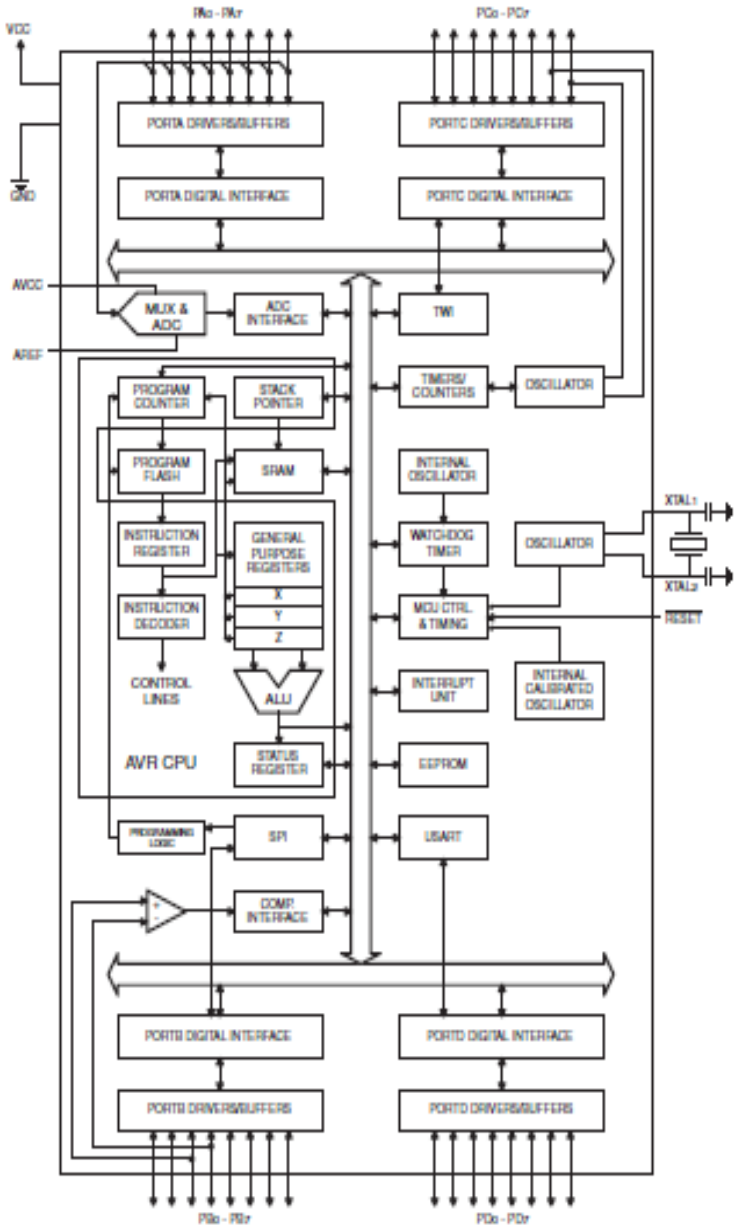


Overview

The Atmel®AVR®ATmega32 is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega32 achieves throughputs approaching 1 MIPS per MHz allowing the system designer to optimize power consumption versus processing speed.

Block Diagram

Figure 2. Block Diagram



The Atmel®AVR®AVR core combines a rich instruction set with 32 general purpose working registers. All the 32 registers are directly connected to the Arithmetic Logic Unit (ALU), allowing two independent registers to be accessed in one single instruction executed in one clock cycle. The resulting architecture is more code efficient while achieving throughputs up to ten times faster than conventional CISC microcontrollers.

The ATmega32 provides the following features: 32Kbytes of In-System Programmable Flash Program memory with Read-While-Write capabilities, 1024bytes EEPROM, 2Kbyte SRAM, 32 general purpose I/O lines, 32 general purpose working registers, a JTAG interface for Boundary-scan, On-chip Debugging support and programming, three flexible Timer/Counters with compare modes, Internal and External Interrupts, a serial programmable USART, a byte oriented Two-wire Serial Interface, an 8-channel, 10-bit ADC with optional differential input stage with programmable gain (TQFP package only), a programmable Watchdog Timer with Internal Oscillator, an SPI serial port, and six software selectable power saving modes. The Idle mode stops the CPU while allowing the USART, Two-wire interface, A/D Converter, SRAM, Timer/Counters, SPI port, and interrupt system to continue functioning. The Power-down mode saves the register contents but freezes the Oscillator, disabling all other chip functions until the next External Interrupt or Hardware Reset. In Power-save mode, the Asynchronous Timer continues to run, allowing the user to maintain a timer base while the rest of the device is sleeping. The ADC Noise Reduction mode stops the CPU and all I/O modules except Asynchronous Timer and ADC, to minimize switching noise during ADC conversions. In Standby mode, the crystal/resonator Oscillator is running while the rest of the device is sleeping. This allows very fast start-up combined with low-power consumption. In Extended Standby mode, both the main Oscillator and the Asynchronous Timer continue to run.

The device is manufactured using Atmel's high density nonvolatile memory technology. The On-chip ISP Flash allows the program memory to be reprogrammed in-system through an SPI serial interface, by a conventional nonvolatile memory programmer, or by an On-chip Boot program running on the AVR core. The boot program can use any interface to download the application program in the Application Flash memory. Software in the Boot Flash section will continue to run while the Application Flash section is updated, providing true Read-While-Write operation. By combining an 8-bit RISC CPU with In-System Self-Programmable Flash on a monolithic chip, the Atmel ATmega32 is a powerful microcontroller that provides a highly-flexible and cost-effective solution to many embedded control applications.

The Atmel AVR ATmega32 is supported with a full suite of program and system development tools including: C compilers, macro assemblers, program debugger/simulators, in-circuit emulators, and evaluation kits.

Pin Descriptions

VCC Digital supply voltage.

GND Ground.

Port A (PA7..PA0) Port A serves as the analog inputs to the A/D Converter.

Port A also serves as an 8-bit bi-directional I/O port, if the A/D Converter is not used. Port pins can provide internal pull-up resistors (selected for each bit). The Port A output buffers have symmetrical drive characteristics with both high sink and source capability. When pins PA0 to PA7 are used as inputs and are externally pulled low, they will source current if the internal pull-up resistors are activated. The Port A pins are tri-stated when a reset condition becomes active, even if the clock is not running.

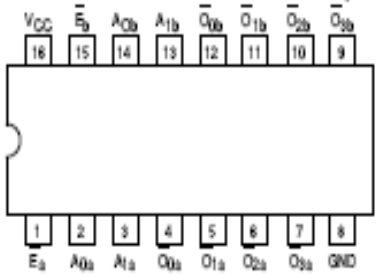
MOTOROLA

DUAL 1-OF-4 DECODER/ DEMULTIPLEXER

The LSTTL/MSI SN54/74LS139 is a high speed Dual 1-of-4 Decoder/Demultiplexer. The device has two independent decoders, each accepting two inputs and providing four mutually exclusive active LOW Outputs. Each decoder has an active LOW Enable input which can be used as a data input for a 4-output demultiplexer. Each half of the LS139 can be used as a function generator providing all four minterms of two variables. The LS139 is fabricated with the Schottky barrier diode process for high speed and is completely compatible with all Motorola TTL families.

- Schottky Process for High Speed
- Multifunction Capability
- Two Completely Independent 1-of-4 Decoders
- Active Low Mutually Exclusive Outputs
- Input Clamp Diodes Limit High Speed Termination Effects
- ESD > 3500 Volts

CONNECTION DIAGRAM DIP (TOP VIEW)

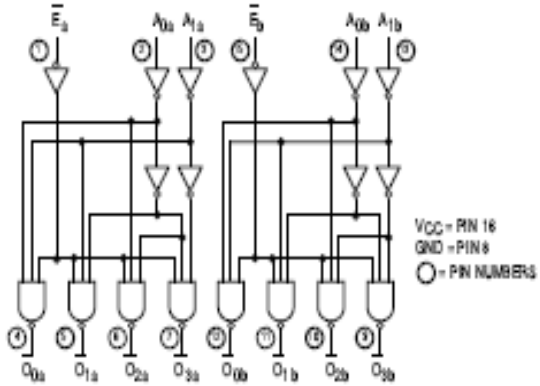


NOTE:
The Flatpak version has the same pinouts (Connection Diagram) as the Dual In-Line Package.

PIN NAMES		LOADING (Note a)	
		HIGH	LOW
A_0, A_1	Address Inputs	0.5 U.L.	0.25 U.L.
$\overline{E}$	Enable (Active LOW) Input	0.5 U.L.	0.25 U.L.
$\overline{O}_0 - \overline{O}_3$	Active LOW Outputs (Note b)	10 U.L.	5 (2.5) U.L.

NOTES:
a) 1 TTL Unit Load (U.L.) = 40 µA HIGH/1.6 mA LOW.
b) The Output LOW drive factor is 2.5 U.L. for Military (54) and 5 U.L. for Commercial (74) Temperature Ranges.

LOGIC DIAGRAM



SN54/74LS139

DUAL 1-OF-4 DECODER/ DEMULTIPLEXER

LOW POWER SCHOTTKY

J SUFFIX
CERAMIC
CASE 620-09

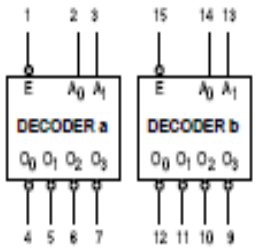
N SUFFIX
PLASTIC
CASE 648-08

D SUFFIX
SOIC
CASE 751B-03

ORDERING INFORMATION

SN54LSXXXJ	Ceramic
SN74LSXXXN	Plastic
SN74LSXXXD	SOIC

LOGIC SYMBOL



VCC = PIN 16
GND = PIN 8

FUNCTIONAL DESCRIPTION

The LS139 is a high speed dual 1-of-4 decoder/demultiplexer fabricated with the Schottky barrier diode process. The device has two independent decoders, each of which accept two binary weighted inputs (A_0–A_1) and provide four mutually exclusive active LOW outputs ($\overline{O}_0$–$\overline{O}_3$). Each decoder has an active LOW Enable ($\overline{E}$). When $\overline{E}$ is HIGH all outputs are forced HIGH. The enable can be used as the data input for a 4-output demultiplexer application.

Each half of the LS139 generates all four minterms of two variables. These four minterms are useful in some applications, replacing multiple gate functions as shown in Fig. a, and thereby reducing the number of packages required in a logic network.

TRUTH TABLE

INPUTS			OUTPUTS			
$\overline{E}$	A_0	A_1	$\overline{O}_0$	$\overline{O}_1$	$\overline{O}_2$	$\overline{O}_3$
H	X	X	H	H	H	H
L	L	L	L	H	H	H
L	H	L	H	L	H	H
L	L	H	H	H	L	H
L	H	H	H	H	H	L

H = HIGH Voltage Level
L = LOW Voltage Level
X = Don't Care

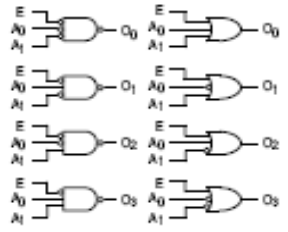


Figure a

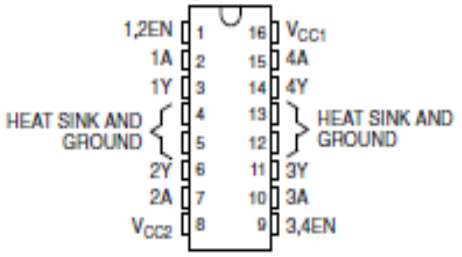
GUARANTEED OPERATING RANGES

Symbol	Parameter		Min	Typ	Max	Unit
V_{CC}	Supply Voltage	54 74	4.5 4.75	5.0 5.0	5.5 5.25	V
T_A	Operating Ambient Temperature Range	54 74	−55 0	25 25	125 70	°C
I_{OH}	Output Current — High	54, 74			−0.4	mA
I_{OL}	Output Current — Low	54 74			4.0 8.0	mA

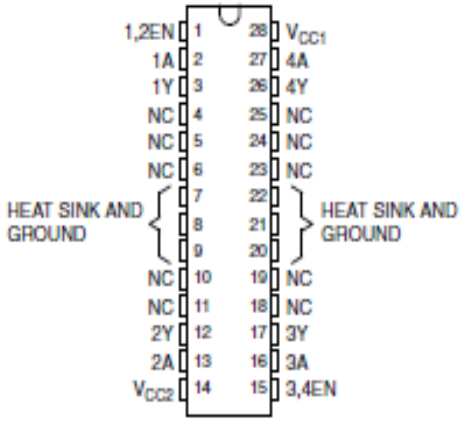
SLRS008C – SEPTEMBER 1986 – REVISED NOVEMBER 2004

- Featuring Unitrode L293 and L293D Products Now From Texas Instruments
- Wide Supply-Voltage Range: 4.5 V to 36 V
- Separate Input-Logic Supply
- Internal ESD Protection
- Thermal Shutdown
- High-Noise-Immunity Inputs
- Functionally Similar to SGS L293 and SGS L293D
- Output Current 1 A Per Channel (600 mA for L293D)
- Peak Output Current 2 A Per Channel (1.2 A for L293D)
- Output Clamp Diodes for Inductive Transient Suppression (L293D)

L293 . . . N OR NE PACKAGE
L293D . . . NE PACKAGE
(TOP VIEW)



L293 . . . DWP PACKAGE
(TOP VIEW)



description/ordering information

The L293 and L293D are quadruple high-current half-H drivers. The L293 is designed to provide bidirectional drive currents of up to 1 A at voltages from 4.5 V to 36 V. The L293D is designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. Both devices are designed to drive inductive loads such as relays, solenoids, dc and bipolar stepping motors, as well as other high-current/high-voltage loads in positive-supply applications.

All inputs are TTL compatible. Each output is a complete totem-pole drive circuit, with a Darlington transistor sink and a pseudo-Darlington source. Drivers are enabled in pairs, with drivers 1 and 2 enabled by 1,2EN and drivers 3 and 4 enabled by 3,4EN. When an enable input is high, the associated drivers are enabled, and their outputs are active and in phase with their inputs. When the enable input is low, those drivers are disabled, and their outputs are off and in the high-impedance state. With the proper data inputs, each pair of drivers forms a full-H (or bridge) reversible drive suitable for solenoid or motor applications.

ORDERING INFORMATION

T_A	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
0°C to 70°C	HSOP (DWP)	Tube of 20	L293DWP	L293DWP
	PDIP (N)	Tube of 25	L293N	L293N
	PDIP (NE)	Tube of 25	L293NE	L293NE
		Tube of 25	L293DNE	L293DNE

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.

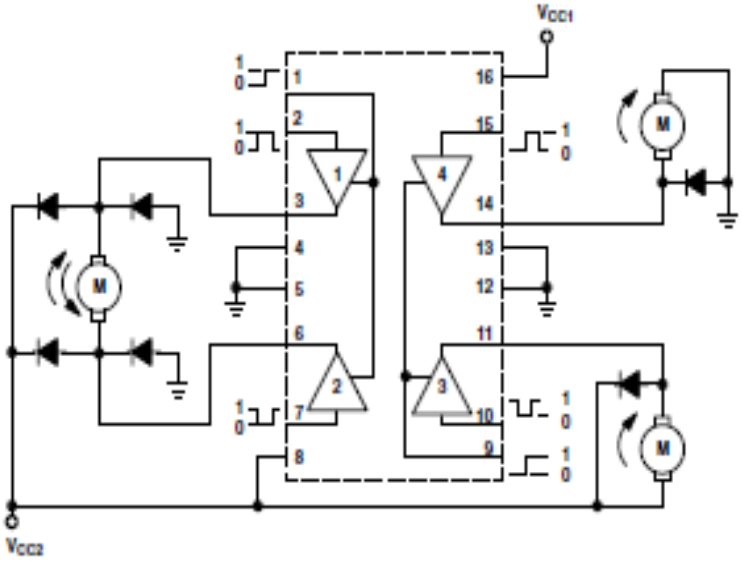
description/ordering information (continued)

On the L293, external high-speed output clamp diodes should be used for inductive transient suppression.

A V_{CC1} terminal, separate from V_{CC2}, is provided for the logic inputs to minimize device power dissipation.

The L293and L293D are characterized for operation from 0°C to 70°C.

block diagram



NOTE: Output diodes are internal in L293D.

FUNCTION TABLE
(each driver)

INPUTS†		OUTPUT
A	EN	Y
H	H	H
L	H	L
X	L	Z

H = high level, L = low level, X = irrelevant,
Z = high impedance (off)
† In the thermal shutdown mode, the output is in the high-impedance state, regardless of the input levels.

recommended operating conditions

			MIN	MAX	UNIT
	Supply voltage	V_{CC1}	4.5	7	V
		V_{CC2}	V_{CC1}	36	
V_{IH}	High-level input voltage	$V_{CC1} \leq 7$ V	2.3	V_{CC1}	V
		$V_{CC1} \geq 7$ V	2.3	7	V
V_{IL}	Low-level output voltage		–0.3†	1.5	V
T_A	Operating free-air temperature		0	70	°C

† The algebraic convention, in which the least positive (most negative) designated minimum, is used in this data sheet for logic voltage levels.

electrical characteristics, V_{CC1} = 5 V, V_{CC2} = 24 V, T_A = 25°C

PARAMETER			TEST CONDITIONS		MIN	TYP	MAX	UNIT
V_{OH}	High-level output voltage		L293: I_{OH} = –1 A L293D: I_{OH} = –0.6 A		V_{CC2} – 1.8	V_{CC2} – 1.4		V
V_{OL}	Low-level output voltage		L293: I_{OL} = 1 A L293D: I_{OL} = 0.6 A			1.2	1.8	V
V_{OKH}	High-level output clamp voltage		L293D: I_{OK} = –0.6 A			V_{CC2} + 1.3		V
V_{OKL}	Low-level output clamp voltage		L293D: I_{OK} = 0.6 A			1.3		V
I_{IH}	High-level input current	A	V_I = 7 V			0.2	100	μA
		EN				0.2	10	
I_{IL}	Low-level input current	A	V_I = 0			–3	–10	μA
		EN				–2	–100	
I_{CC1}	Logic supply current		I_O = 0	All outputs at high level		13	22	mA
				All outputs at low level		35	60	
				All outputs at high impedance		8	24	
I_{CC2}	Output supply current		I_O = 0	All outputs at high level		14	24	mA
				All outputs at low level		2	6	
				All outputs at high impedance		2	4	

switching characteristics, V_{CC1} = 5 V, V_{CC2} = 24 V, T_A = 25°C

PARAMETER		TEST CONDITIONS	L293NE, L293DNE			UNIT
			MIN	TYP	MAX	
t_{PLH}	Propagation delay time, low-to-high-level output from A input	C_L = 30 pF, See Figure 1		800		ns
t_{PHL}	Propagation delay time, high-to-low-level output from A input			400		ns
t_{TLH}	Transition time, low-to-high-level output			300		ns
t_{THL}	Transition time, high-to-low-level output			300		ns

switching characteristics, V_{CC1} = 5 V, V_{CC2} = 24 V, T_A = 25°C

PARAMETER		TEST CONDITIONS	L293DWP, L293N L293DN			UNIT
			MIN	TYP	MAX	
t_{PLH}	Propagation delay time, low-to-high-level output from A input	C_L = 30 pF, See Figure 1		750		ns
t_{PHL}	Propagation delay time, high-to-low-level output from A input			200		ns
t_{TLH}	Transition time, low-to-high-level output			100		ns
t_{THL}	Transition time, high-to-low-level output			350		ns

APPLICATION INFORMATION

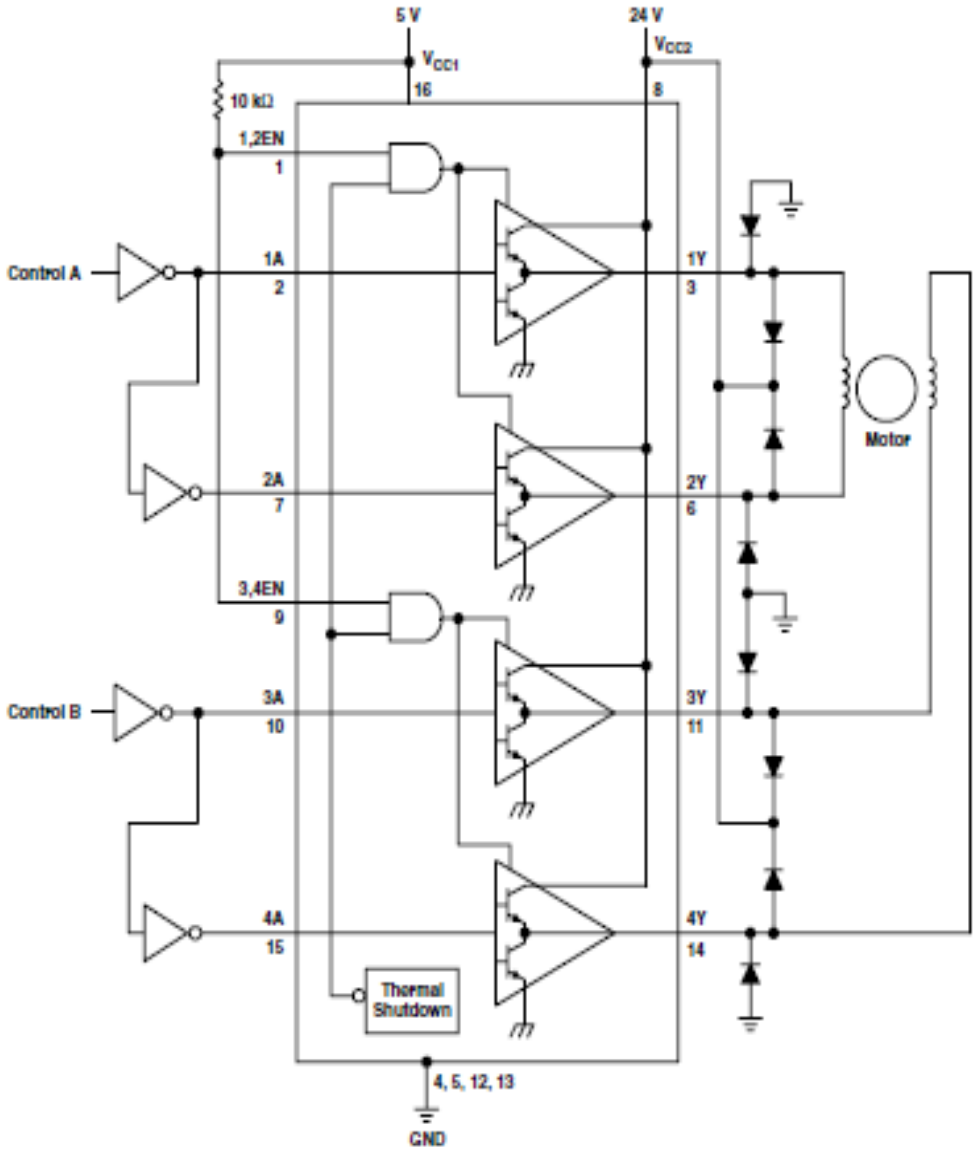


Figure 2. Two-Phase Motor Driver (L293)

APPLICATION INFORMATION

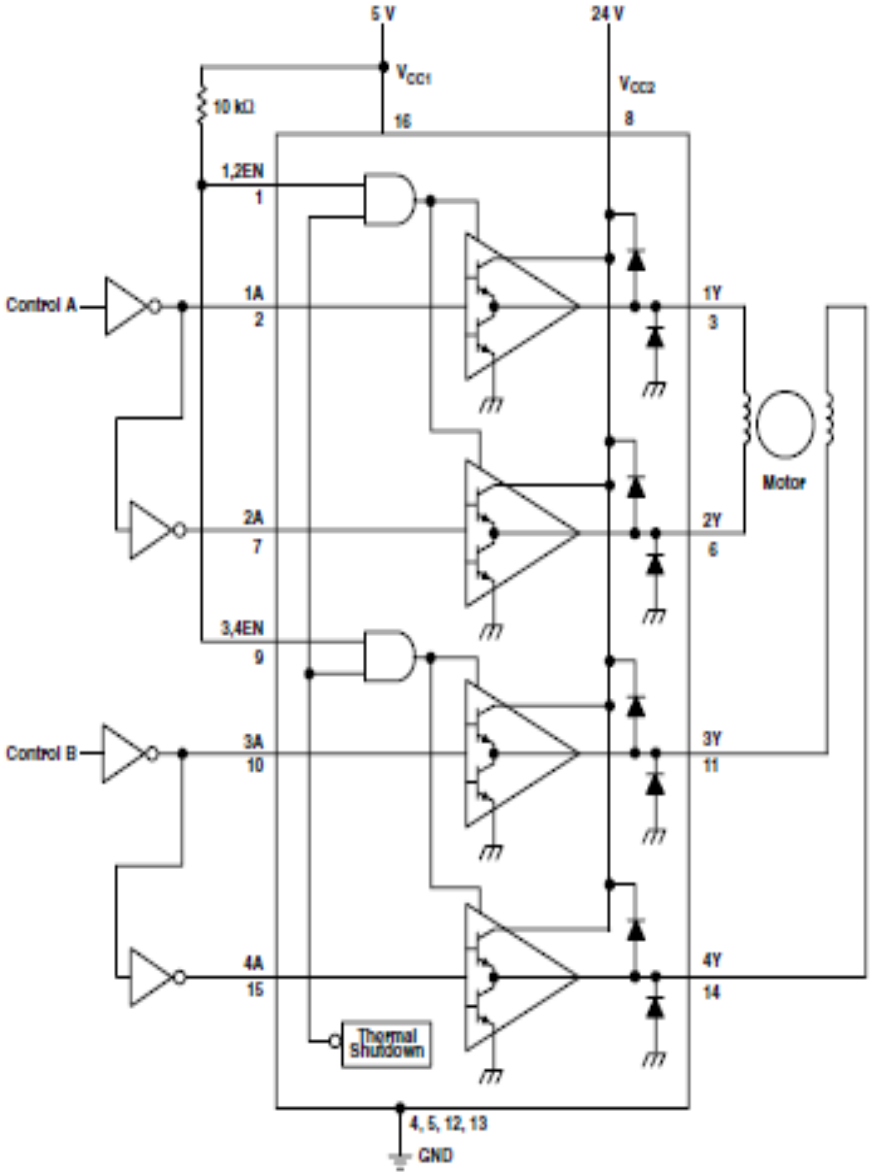
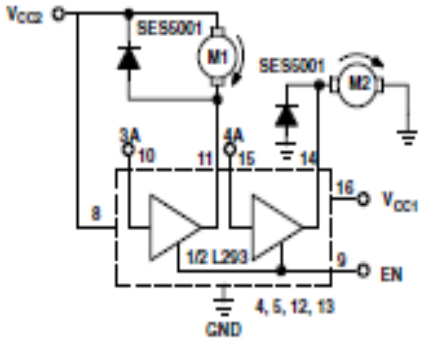


Figure 3. Two-Phase Motor Driver (L293D)

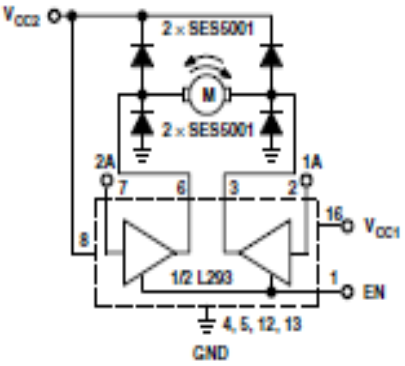
APPLICATION INFORMATION



EN	3A	M1	4A	M2
H	H	Fast motor stop	H	Run
H	L	Run	L	Fast motor stop
L	X	Free-running motor stop	X	Free-running motor stop

L = low, H = high, X = don't care

Figure 4. DC Motor Controls (connections to ground and to supply voltage)



EN	1A	2A	FUNCTION
H	L	H	Turn right
H	H	L	Turn left
H	L	L	Fast motor stop
H	H	H	Fast motor stop
L	X	X	Fast motor stop

L = low, H = high, X = don't care

Figure 5. Bidirectional DC Motor Control

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CHINA YOUNG SUN LED TECHNOLOGY CO., LTD.
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Model No.: YSL-R596CR3G4B5C-C10
RED/GREEN/BLUE Triple Color LED

Applications:

- Moving Message Display
- Full Color Display
- Banking Board
- Score Boards
- Digital Display

LED Chip Absolute Maximum Ratings: (Ta=25℃)

Parameter	Symbol	Red	Green	Blue	Unit
Forward current	I_F	20	20	20	mA
Peak forward current (Duty Cycle=1/10, 1KHz)	I_{FP}	30	30	30	mA
Reverse current (VR=5V)	I_R	10	10	10	μA
Operating temp	T_{OPR}	-25~ 85	-25~ 85	-25~ 85	℃
Storage temp	T_{STG}	-30~85	-30~85	-30~85	℃
Peak Emission Wavelength	λP_H	625	520	467.5	nm

* Soldering Bath: not more than 5 seconds @260 ℃.The bottom ends of the plastic reflector should be at least 2mm above the solder surface

Soldering Iron: not more than 3 seconds @300 ℃ under 30W

LED Chip Typical Electircal & Optical Characteristics: (Ta=25℃)

ITEMS	Color	Symbol	Condition	Min.	Typ.	Max.	Unit
Forward Voltage	Red	V_F	I_F=20mA	1.8	2.0	2.2	V
	Green			3.0	3.2	3.4	
	Blue			3.0	3.2	3.4	
Luminous Intensity	Red	I_V	I_F=20mA	---	---	800	mcd
	Green			---	---	4000	
	Blue			---	---	900	
Wavelenength	Red	$\Delta\lambda$	I_F=20mA	620	623	625	nm
	Green			515	517.5	520	
	Blue			465	466	467.5	
Light Degradation after 1000 hours	Red	-4.68% ~ -8.27%					
	Green	-11.37% ~ -15.30%					
	Blue	-8.23% ~ -16.81%					

Address: 5/F, Building B, Anzhilong Indl., Qinghua East Road., Longhua Town, Shenzhen CHINA. 518109

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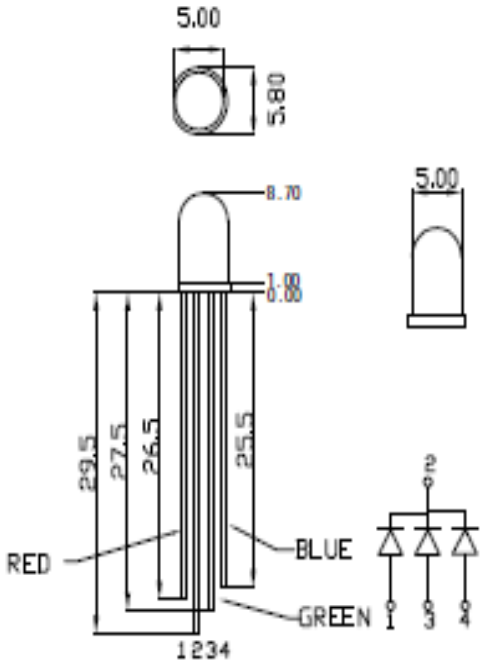
Light Degradation in mcd: (Ir=20mA)

Hours / Colors	Light Degradation in mcd after Different Hours					
	216 Hrs	360 Hrs	792 Hrs	1104 Hrs	1992 Hrs	2328 Hrs
Red	1.52%	-1.22%	-3.10%	-4.68%	-5.72%	-8.27%
Green	-8.02%	-9.78%	-10.25%	-11.37%	-13.79%	-15.30%
Blue	3.13%	-0.33%	-3.84%	-8.23%	-14.32%	-16.81%

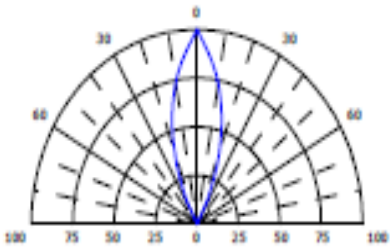
Mechanical Dimensions:

- All dimension are in mm, tolerance is ¡ 0.2mm unless otherwise noted
- An epoxy meniscus may extend about 1.5mm down the leads.
- Burr around bottom of epoxy may be 0.5mm Maximum

Unit: mm



Viewing Angle Drawing



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