LAMPIRAN A
LISTING PROGRAM MIKROKONTROLER

```
/*****************************************************
This program was produced by the
CodeWizardAVR V1.25.3 Standard
Automatic Program Generator
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Project :
Version :
Date    : 20/07/2009
Author  : F4CG
Company : F4CG
Comments:


Chip type           : ATmega16
Program type        : Application
Clock frequency     : 8,000000 MHz
Memory model        : Small
External SRAM size  : 0
Data Stack size     : 256
*****************************************************/

#include <mega16.h>
#include <delay.h>
#include <stdio.h>
#define delay delay_us(100)

// Alphanumeric LCD Module functions
#asm
   .equ __lcd_port=0x15 ;PORTC
#endasm
#include <lcd.h>

char text[33],pointer,baris1[16],baris2[16];
int posisi[16];

#define RXB8 1
#define TXB8 0
#define UPE 2
#define OVR 3
#define FE 4
#define UDRE 5
#define RXC 7

#define FRAMING_ERROR (1<<FE)
#define PARITY_ERROR (1<<UPE)
#define DATA_OVERRUN (1<<OVR)
#define DATA_REGISTER_EMPTY (1<<UDRE)
#define RX_COMPLETE (1<<RXC)

char scan_catur(void)
     {

PORTA=0b01111111;
delay;
posisi[0]= PINB;
delay;
```

```
PORTA=0b10111111;
delay;
posisi[1]= PINB;
delay;

PORTA=0b11011111;
delay;
posisi[2]= PINB;
delay;

PORTA=0b11101111;
delay;
posisi[3]= PINB;
delay;

PORTA=0b11110111;
delay;
posisi[4]= PINB;
delay;

PORTA=0b11111011;
delay;
posisi[5]= PINB;
delay;

PORTA=0b11111101;
delay;
posisi[6]= PINB;
delay;

PORTA=0b11111110;
delay;
posisi[7]= PINB;
delay;

PORTA=0b11111111;
return 0;
      }

// USART Receiver buffer
#define RX_BUFFER_SIZE 8
char rx_buffer[RX_BUFFER_SIZE];

#if RX_BUFFER_SIZE<256
unsigned char rx_wr_index,rx_rd_index,rx_counter;
#else
unsigned int rx_wr_index,rx_rd_index,rx_counter;
#endif

// This flag is set on USART Receiver buffer overflow
bit rx_buffer_overflow;

// USART Receiver interrupt service routine
interrupt [USART_RXC] void usart_rx_isr(void)
{
char status,data;
status=UCSRA;
data=UDR;
if ((status & (FRAMING_ERROR | PARITY_ERROR | DATA_OVERRUN))==0)
```

```
  {
  rx_buffer[rx_wr_index]=data;
  if (++rx_wr_index == RX_BUFFER_SIZE) rx_wr_index=0;
  if (++rx_counter == RX_BUFFER_SIZE)
    {
    rx_counter=0;
    rx_buffer_overflow=1;
    };
  };
  //lcd_putchar(data);
  if (data == 13)
  {
  //Program ganti baris
  lcd_clear();
  lcd_puts(baris1);
  lcd_gotoxy(0,1);
  lcd_puts(baris2);
  for (pointer = 0;pointer < 16;pointer ++)
  {
  baris1[pointer] = baris2[pointer];
  baris2[pointer] = ' ';
  }
  pointer = 0;
  }
  else
  {
  baris2[pointer] = data;
  pointer ++;
  }
}

#ifndef _DEBUG_TERMINAL_IO_
// Get a character from the USART Receiver buffer
#define _ALTERNATE_GETCHAR_
#pragma used+
char getchar(void)
{
char data;
while (rx_counter==0);
data=rx_buffer[rx_rd_index];
if (++rx_rd_index == RX_BUFFER_SIZE) rx_rd_index=0;
#asm("cli")
--rx_counter;
#asm("sei")
return data;
}
#pragma used-
#endif

// Standard Input/Output functions


// Declare your global variables here

void main(void)
{
// Declare your local variables here
DDRB=0x00;
PORTB = 0XFF;
DDRA=0xFF;
```

```
// USART initialization
// Communication Parameters: 8 Data, 1 Stop, No Parity
// USART Receiver: On
// USART Transmitter: On
// USART Mode: Asynchronous
// USART Baud rate: 9600
UCSRA=0x00;
UCSRB=0x98;
UCSRC=0x86;
UBRRH=0x00;
UBRRL=0x33;

// LCD module initialization
lcd_init(16);

// Global enable interrupts
#asm("sei")

while (1)
      {
      // Place your code here

sprintf(text,"+%2X,%2X,%2X,%2X,%2X,%2X,%2X,%2X=",posisi[0],posisi[1],posisi[2],posisi[3],posisi[4],
posisi[5],posisi[6],posisi[7]);

puts(text);
putchar(13);
putchar(10);
scan_catur();
delay_ms(500);
      };
}
```

LAMPIRAN B
LISTING PROGRAM VISUAL BASIC

```
Private Type Bidak
   koordx As Integer
   koordy As Integer
   warna As Integer
   gambar As String
End Type


Dim Pp As Bidak
Dim Ph As Bidak
Dim Bp(16) As Bidak
Dim Bh(16) As Bidak
Dim Data_Lama(8) As String
Dim Data_Baru(8) As String


Public Function RoundDown(ByVal cdblRound As Double) As Double
   RoundDown = IIf(Round(cdblRound, 0) - cdblRound > 0, Round(cdblRound) - 1, Round(cdblRound))
End Function


Public Function strPosisi(ByVal strKata As String, ByVal strChar As String) As Integer
   Dim intIdx As Integer

   For intIdx = 1 To Len(strKata)
      If Mid(strKata, intIdx, 1) = strChar Then Exit For
   Next intIdx
   strPosisi = intIdx
End Function


Public Function DecToBiner(ByVal vNewValue As Double) As String
   Dim strTmp  As String
   Dim dblBagi As Double, intSisa As Integer

   dblBagi = vNewValue
   Do While dblBagi <> 0
      intSisa = dblBagi Mod 2
      dblBagi = RoundDown(dblBagi / 2)
      strTmp = Trim(Str(intSisa) & strTmp)
   Loop
   DecToBiner = strTmp
End Function


Public Function HexToBiner(ByVal vNewValue As String) As String
   Dim strTmp      As String
   Dim strHasil    As String
   Dim strHexa     As String

   strHexa = "0123456789ABCDEF"
   strTmp = vNewValue
   Do While Len(strTmp) > 0
      strHasil = Trim(Right("0000" & DecToBiner(strPosisi(strHexa, Right(strTmp, 1)) - 1), 4) & strHasil)

      strTmp = Left(strTmp, Len(strTmp) - 1)
   Loop
   HexToBiner = Val(strHasil)
End Function
```

```
Public Function BinToByte(Biner As String) As Byte
If Biner = "0" Then
    BinToByte = 0
  ElseIf Biner = "1" Then
    BinToByte = 1
  ElseIf Biner = "10" Then
    BinToByte = 2
  ElseIf Biner = "11" Then
    BinToByte = 3
  ElseIf Biner = "100" Then
    BinToByte = 4
  ElseIf Biner = "101" Then
    BinToByte = 5
  ElseIf Biner = "110" Then
    BinToByte = 6
  ElseIf Biner = "111" Then
    BinToByte = 7
  ElseIf Biner = "1000" Then
    BinToByte = 8
  ElseIf Biner = "1001" Then
    BinToByte = 9
  ElseIf Biner = "1010" Then
    BinToByte = 10
  ElseIf Biner = "1011" Then
    BinToByte = 11
  ElseIf Biner = "1100" Then
    BinToByte = 12
  ElseIf Biner = "1101" Then
    BinToByte = 13
  ElseIf Biner = "1110" Then
    BinToByte = 14
  ElseIf Biner = "1111" Then
    BinToByte = 15
  ElseIf Biner = "10000" Then
    BinToByte = 16
  ElseIf Biner = "10001" Then
    BinToByte = 17
  ElseIf Biner = "10010" Then
    BinToByte = 18
  ElseIf Biner = "10011" Then
    BinToByte = 19
  ElseIf Biner = "10100" Then
    BinToByte = 20
  ElseIf Biner = "10101" Then
    BinToByte = 21
  ElseIf Biner = "10110" Then
    BinToByte = 22
  ElseIf Biner = "10111" Then
    BinToByte = 23
  ElseIf Biner = "11000" Then
    BinToByte = 24
  ElseIf Biner = "11001" Then
    BinToByte = 25
  ElseIf Biner = "11010" Then
    BinToByte = 26
  ElseIf Biner = "11011" Then
    BinToByte = 27
  ElseIf Biner = "11100" Then
    BinToByte = 28
```

```
ElseIf Biner = "11101" Then
   BinToByte = 29
ElseIf Biner = "11110" Then
   BinToByte = 30
ElseIf Biner = "11111" Then
   BinToByte = 31
ElseIf Biner = "100000" Then
   BinToByte = 32
ElseIf Biner = "100001" Then
   BinToByte = 33
ElseIf Biner = "100001" Then
   BinToByte = 34
ElseIf Biner = "100011" Then
   BinToByte = 35
ElseIf Biner = "100100" Then
   BinToByte = 36
ElseIf Biner = "100101" Then
   BinToByte = 37
ElseIf Biner = "100110" Then
   BinToByte = 38
ElseIf Biner = "100111" Then
   BinToByte = 39
ElseIf Biner = "101000" Then
   BinToByte = 40
ElseIf Biner = "101001" Then
   BinToByte = 41
ElseIf Biner = "101010" Then
   BinToByte = 42
ElseIf Biner = "101011" Then
   BinToByte = 43
ElseIf Biner = "101100" Then
   BinToByte = 44
ElseIf Biner = "101101" Then
   BinToByte = 45
ElseIf Biner = "101110" Then
   BinToByte = 46
ElseIf Biner = "101111" Then
   BinToByte = 47
ElseIf Biner = "110000" Then
   BinToByte = 48
ElseIf Biner = "110001" Then
   BinToByte = 49
ElseIf Biner = "110010" Then
   BinToByte = 50
ElseIf Biner = "110011" Then
   BinToByte = 51
ElseIf Biner = "110100" Then
   BinToByte = 52
ElseIf Biner = "110101" Then
   BinToByte = 53
ElseIf Biner = "110110" Then
   BinToByte = 54
ElseIf Biner = "110111" Then
   BinToByte = 55
ElseIf Biner = "111000" Then
   BinToByte = 56
ElseIf Biner = "111001" Then
   BinToByte = 57
ElseIf Biner = "111010" Then
   BinToByte = 58
```

```
ElseIf Biner = "111011" Then
   BinToByte = 59
ElseIf Biner = "111100" Then
   BinToByte = 60
ElseIf Biner = "111101" Then
   BinToByte = 61
ElseIf Biner = "111110" Then
   BinToByte = 62
ElseIf Biner = "111111" Then
   BinToByte = 63
ElseIf Biner = "1000000" Then
   BinToByte = 64
ElseIf Biner = "1000001" Then
   BinToByte = 65
ElseIf Biner = "1000010" Then
   BinToByte = 66
ElseIf Biner = "1000011" Then
   BinToByte = 67
ElseIf Biner = "1000100" Then
   BinToByte = 68
ElseIf Biner = "1000101" Then
   BinToByte = 69
ElseIf Biner = "1000110" Then
   BinToByte = 70
ElseIf Biner = "1000111" Then
   BinToByte = 71
ElseIf Biner = "1001000" Then
   BinToByte = 72
ElseIf Biner = "1001001" Then
   BinToByte = 73
ElseIf Biner = "1001010" Then
   BinToByte = 74
ElseIf Biner = "1001011" Then
   BinToByte = 75
ElseIf Biner = "1001100" Then
   BinToByte = 76
ElseIf Biner = "1001101" Then
   BinToByte = 77
ElseIf Biner = "1001110" Then
   BinToByte = 78
ElseIf Biner = "1001111" Then
   BinToByte = 79
ElseIf Biner = "1010000" Then
   BinToByte = 80
ElseIf Biner = "1010001" Then
   BinToByte = 81
ElseIf Biner = "1010010" Then
   BinToByte = 82
ElseIf Biner = "1010011" Then
   BinToByte = 83
ElseIf Biner = "1010100" Then
   BinToByte = 84
ElseIf Biner = "1010101" Then
   BinToByte = 85
ElseIf Biner = "1010110" Then
   BinToByte = 86
ElseIf Biner = "1010111" Then
   BinToByte = 87
ElseIf Biner = "1011000" Then
   BinToByte = 88
```

```
ElseIf Biner = "1011001" Then
   BinToByte = 89
ElseIf Biner = "1011010" Then
   BinToByte = 90
ElseIf Biner = "1011011" Then
   BinToByte = 91
ElseIf Biner = "1011100" Then
   BinToByte = 92
ElseIf Biner = "1011101" Then
   BinToByte = 93
ElseIf Biner = "1011110" Then
   BinToByte = 94
ElseIf Biner = "1011111" Then
   BinToByte = 95
ElseIf Biner = "1100000" Then
   BinToByte = 96
ElseIf Biner = "1100001" Then
   BinToByte = 97
ElseIf Biner = "1100010" Then
   BinToByte = 98
ElseIf Biner = "1100011" Then
   BinToByte = 99
ElseIf Biner = "1100100" Then
   BinToByte = 100
ElseIf Biner = "1100101" Then
   BinToByte = 101
ElseIf Biner = "1100110" Then
   BinToByte = 102
ElseIf Biner = "1100111" Then
   BinToByte = 103
ElseIf Biner = "1101000" Then
   BinToByte = 104
ElseIf Biner = "1101001" Then
   BinToByte = 105
ElseIf Biner = "1101010" Then
   BinToByte = 106
ElseIf Biner = "1101011" Then
   BinToByte = 107
ElseIf Biner = "1101100" Then
   BinToByte = 108
ElseIf Biner = "1101101" Then
   BinToByte = 109
ElseIf Biner = "1101110" Then
   BinToByte = 110
ElseIf Biner = "1101111" Then
   BinToByte = 111
ElseIf Biner = "1110000" Then
   BinToByte = 112
ElseIf Biner = "1110001" Then
   BinToByte = 113
ElseIf Biner = "1110010" Then
   BinToByte = 114
ElseIf Biner = "1110011" Then
   BinToByte = 115
ElseIf Biner = "1110100" Then
   BinToByte = 116
ElseIf Biner = "1110101" Then
   BinToByte = 117
ElseIf Biner = "1110110" Then
   BinToByte = 118
```

```
ElseIf Biner = "1110111" Then
   BinToByte = 119
ElseIf Biner = "1111000" Then
   BinToByte = 120
ElseIf Biner = "1111001" Then
   BinToByte = 121
ElseIf Biner = "1111010" Then
   BinToByte = 122
ElseIf Biner = "1111011" Then
   BinToByte = 123
ElseIf Biner = "1111100" Then
   BinToByte = 124
ElseIf Biner = "1111101" Then
   BinToByte = 125
ElseIf Biner = "1111110" Then
   BinToByte = 126
ElseIf Biner = "1111111" Then
   BinToByte = 127
ElseIf Biner = "10000000" Then
   BinToByte = 128
ElseIf Biner = "10000001" Then
   BinToByte = 129
ElseIf Biner = "10000010" Then
   BinToByte = 130
ElseIf Biner = "10000011" Then
   BinToByte = 131
ElseIf Biner = "10000100" Then
   BinToByte = 132
ElseIf Biner = "10000101" Then
   BinToByte = 133
ElseIf Biner = "10000110" Then
   BinToByte = 134
ElseIf Biner = "10000111" Then
   BinToByte = 135
ElseIf Biner = "10001000" Then
   BinToByte = 136
ElseIf Biner = "10001001" Then
   BinToByte = 137
ElseIf Biner = "10001010" Then
   BinToByte = 138
ElseIf Biner = "10001011" Then
   BinToByte = 139
ElseIf Biner = "10001100" Then
   BinToByte = 140
ElseIf Biner = "10001101" Then
   BinToByte = 141
ElseIf Biner = "10001110" Then
   BinToByte = 142
ElseIf Biner = "10001111" Then
   BinToByte = 143
ElseIf Biner = "10010000" Then
   BinToByte = 144
ElseIf Biner = "10010001" Then
   BinToByte = 145
ElseIf Biner = "10010010" Then
   BinToByte = 146
ElseIf Biner = "10010011" Then
   BinToByte = 147
ElseIf Biner = "10010100" Then
   BinToByte = 148
```

```
ElseIf Biner = "10010101" Then
   BinToByte = 149
ElseIf Biner = "10010110" Then
   BinToByte = 150
ElseIf Biner = "10010111" Then
   BinToByte = 151
ElseIf Biner = "10011000" Then
   BinToByte = 152
ElseIf Biner = "10011001" Then
   BinToByte = 153
ElseIf Biner = "10011010" Then
   BinToByte = 154
ElseIf Biner = "10011011" Then
   BinToByte = 155
ElseIf Biner = "10011100" Then
   BinToByte = 156
ElseIf Biner = "10011101" Then
   BinToByte = 157
ElseIf Biner = "10011110" Then
   BinToByte = 158
ElseIf Biner = "10011111" Then
   BinToByte = 159
ElseIf Biner = "10100000" Then
   BinToByte = 160
ElseIf Biner = "10100001" Then
   BinToByte = 161
ElseIf Biner = "10100010" Then
   BinToByte = 162
ElseIf Biner = "10100011" Then
   BinToByte = 163
ElseIf Biner = "10100100" Then
   BinToByte = 164
ElseIf Biner = "10100101" Then
   BinToByte = 165
ElseIf Biner = "10100110" Then
   BinToByte = 166
ElseIf Biner = "10100111" Then
   BinToByte = 167
ElseIf Biner = "10101000" Then
   BinToByte = 168
ElseIf Biner = "10101001" Then
   BinToByte = 169
ElseIf Biner = "10101010" Then
   BinToByte = 170
ElseIf Biner = "10101011" Then
   BinToByte = 171
ElseIf Biner = "10101100" Then
   BinToByte = 172
ElseIf Biner = "10101101" Then
   BinToByte = 173
ElseIf Biner = "10101110" Then
   BinToByte = 174
ElseIf Biner = "10101111" Then
   BinToByte = 175
ElseIf Biner = "10110000" Then
   BinToByte = 176
ElseIf Biner = "10110001" Then
   BinToByte = 177
ElseIf Biner = "10110010" Then
   BinToByte = 178
```

```
ElseIf Biner = "10110011" Then
   BinToByte = 179
ElseIf Biner = "10110100" Then
   BinToByte = 180
ElseIf Biner = "10110101" Then
   BinToByte = 181
ElseIf Biner = "10110110" Then
   BinToByte = 182
ElseIf Biner = "10110111" Then
   BinToByte = 183
ElseIf Biner = "10111000" Then
   BinToByte = 184
ElseIf Biner = "10111001" Then
   BinToByte = 185
ElseIf Biner = "10111010" Then
   BinToByte = 186
ElseIf Biner = "10111011" Then
   BinToByte = 187
ElseIf Biner = "10111100" Then
   BinToByte = 188
ElseIf Biner = "10111101" Then
   BinToByte = 189
ElseIf Biner = "10111110" Then
   BinToByte = 190
ElseIf Biner = "10111111" Then
   BinToByte = 191
ElseIf Biner = "11000000" Then
   BinToByte = 192
ElseIf Biner = "11000001" Then
   BinToByte = 193
ElseIf Biner = "11000010" Then
   BinToByte = 194
ElseIf Biner = "11000011" Then
   BinToByte = 195
ElseIf Biner = "11000100" Then
   BinToByte = 196
ElseIf Biner = "11000101" Then
   BinToByte = 197
ElseIf Biner = "11000110" Then
   BinToByte = 198
ElseIf Biner = "11000111" Then
   BinToByte = 199
ElseIf Biner = "11001000" Then
   BinToByte = 200
ElseIf Biner = "11001001" Then
   BinToByte = 201
ElseIf Biner = "11001010" Then
   BinToByte = 202
ElseIf Biner = "11001011" Then
   BinToByte = 203
ElseIf Biner = "11001100" Then
   BinToByte = 204
ElseIf Biner = "11001101" Then
   BinToByte = 205
ElseIf Biner = "11001110" Then
   BinToByte = 206
ElseIf Biner = "11001111" Then
   BinToByte = 207
ElseIf Biner = "11010000" Then
   BinToByte = 208
```

```
ElseIf Biner = "11010001" Then
   BinToByte = 209
ElseIf Biner = "11010010" Then
   BinToByte = 210
ElseIf Biner = "11010011" Then
   BinToByte = 211
ElseIf Biner = "11010100" Then
   BinToByte = 212
ElseIf Biner = "11010101" Then
   BinToByte = 213
ElseIf Biner = "11010110" Then
   BinToByte = 214
ElseIf Biner = "11010111" Then
   BinToByte = 215
ElseIf Biner = "11011000" Then
   BinToByte = 216
ElseIf Biner = "11011001" Then
   BinToByte = 217
ElseIf Biner = "11011010" Then
   BinToByte = 218
ElseIf Biner = "11011011" Then
   BinToByte = 219
ElseIf Biner = "11011100" Then
   BinToByte = 220
ElseIf Biner = "11011101" Then
   BinToByte = 221
ElseIf Biner = "11011110" Then
   BinToByte = 222
ElseIf Biner = "11011111" Then
   BinToByte = 223
ElseIf Biner = "11100000" Then
   BinToByte = 224
ElseIf Biner = "11100001" Then
   BinToByte = 225
ElseIf Biner = "11100010" Then
   BinToByte = 226
ElseIf Biner = "11100011" Then
   BinToByte = 227
ElseIf Biner = "11100100" Then
   BinToByte = 228
ElseIf Biner = "11100101" Then
   BinToByte = 229
ElseIf Biner = "11100110" Then
   BinToByte = 230
ElseIf Biner = "11100111" Then
   BinToByte = 231
ElseIf Biner = "11101000" Then
   BinToByte = 232
ElseIf Biner = "11101001" Then
   BinToByte = 233
ElseIf Biner = "11101010" Then
   BinToByte = 234
ElseIf Biner = "11101011" Then
   BinToByte = 235
ElseIf Biner = "11101100" Then
   BinToByte = 236
ElseIf Biner = "11101101" Then
   BinToByte = 237
ElseIf Biner = "11101110" Then
   BinToByte = 238
```

```
  ElseIf Biner = "11101111" Then
    BinToByte = 239
  ElseIf Biner = "11110000" Then
    BinToByte = 240
  ElseIf Biner = "11110001" Then
    BinToByte = 241
  ElseIf Biner = "11110010" Then
    BinToByte = 242
  ElseIf Biner = "11110011" Then
    BinToByte = 243
  ElseIf Biner = "11110100" Then
    BinToByte = 244
  ElseIf Biner = "11110101" Then
    BinToByte = 245
  ElseIf Biner = "11110110" Then
    BinToByte = 246
  ElseIf Biner = "11110111" Then
    BinToByte = 247
  ElseIf Biner = "11111000" Then
    BinToByte = 248
  ElseIf Biner = "11111001" Then
    BinToByte = 249
  ElseIf Biner = "11111010" Then
    BinToByte = 250
  ElseIf Biner = "11111011" Then
    BinToByte = 251
  ElseIf Biner = "11111100" Then
    BinToByte = 252
  ElseIf Biner = "11111101" Then
    BinToByte = 253
  ElseIf Biner = "11111110" Then
    BinToByte = 254
  ElseIf Biner = "11111111" Then
    BinToByte = 255
  End If
End Function


Function konversi(ByVal Koordinat As String) As Integer
  If Koordinat = "a8" Then
    konversi = 0
  ElseIf Koordinat = "b8" Then
    konversi = 1
  ElseIf Koordinat = "c8" Then
    konversi = 2
  ElseIf Koordinat = "d8" Then
    konversi = 3
  ElseIf Koordinat = "e8" Then
    konversi = 4
  ElseIf Koordinat = "f8" Then
    konversi = 5
  ElseIf Koordinat = "g8" Then
    konversi = 6
  ElseIf Koordinat = "h8" Then
    konversi = 7
  ElseIf Koordinat = "a7" Then
    konversi = 8
  ElseIf Koordinat = "b7" Then
    konversi = 9
  ElseIf Koordinat = "c7" Then
```

```
    konversi = 10
ElseIf Koordinat = "d7" Then
    konversi = 11
ElseIf Koordinat = "e7" Then
    konversi = 12
ElseIf Koordinat = "f7" Then
    konversi = 13
ElseIf Koordinat = "g7" Then
    konversi = 14
ElseIf Koordinat = "h7" Then
    konversi = 15
ElseIf Koordinat = "a6" Then
    konversi = 16
ElseIf Koordinat = "b6" Then
    konversi = 17
ElseIf Koordinat = "c6" Then
    konversi = 18
ElseIf Koordinat = "d6" Then
    konversi = 19
ElseIf Koordinat = "e6" Then
    konversi = 20
ElseIf Koordinat = "f6" Then
    konversi = 21
ElseIf Koordinat = "g6" Then
    konversi = 22
ElseIf Koordinat = "h6" Then
    konversi = 23
ElseIf Koordinat = "a5" Then
    konversi = 24
ElseIf Koordinat = "b5" Then
    konversi = 25
ElseIf Koordinat = "c5" Then
    konversi = 26
ElseIf Koordinat = "d5" Then
    konversi = 27
ElseIf Koordinat = "e5" Then
    konversi = 28
ElseIf Koordinat = "f5" Then
    konversi = 29
ElseIf Koordinat = "g5" Then
    konversi = 30
ElseIf Koordinat = "h5" Then
    konversi = 31
ElseIf Koordinat = "a4" Then
    konversi = 32
ElseIf Koordinat = "b4" Then
    konversi = 33
ElseIf Koordinat = "c4" Then
    konversi = 34
ElseIf Koordinat = "d4" Then
    konversi = 35
ElseIf Koordinat = "e4" Then
    konversi = 36
ElseIf Koordinat = "f4" Then
    konversi = 37
ElseIf Koordinat = "g4" Then
    konversi = 38
ElseIf Koordinat = "h4" Then
    konversi = 39
ElseIf Koordinat = "a3" Then
```

```
      konversi = 40
   ElseIf Koordinat = "b3" Then
      konversi = 41
   ElseIf Koordinat = "c3" Then
      konversi = 42
   ElseIf Koordinat = "d3" Then
      konversi = 43
   ElseIf Koordinat = "e3" Then
      konversi = 44
   ElseIf Koordinat = "f3" Then
      konversi = 45
   ElseIf Koordinat = "g3" Then
      konversi = 46
   ElseIf Koordinat = "h3" Then
      konversi = 47
   ElseIf Koordinat = "a2" Then
      konversi = 48
   ElseIf Koordinat = "b2" Then
      konversi = 49
   ElseIf Koordinat = "c2" Then
      konversi = 50
   ElseIf Koordinat = "d2" Then
      konversi = 51
   ElseIf Koordinat = "e2" Then
      konversi = 52
   ElseIf Koordinat = "f2" Then
      konversi = 53
   ElseIf Koordinat = "g2" Then
      konversi = 54
   ElseIf Koordinat = "h2" Then
      konversi = 55
   ElseIf Koordinat = "a1" Then
      konversi = 56
   ElseIf Koordinat = "b1" Then
      konversi = 57
   ElseIf Koordinat = "c1" Then
      konversi = 58
   ElseIf Koordinat = "d1" Then
      konversi = 59
   ElseIf Koordinat = "e1" Then
      konversi = 60
   ElseIf Koordinat = "f1" Then
      konversi = 61
   ElseIf Koordinat = "g1" Then
      konversi = 62
   ElseIf Koordinat = "h1" Then
      konversi = 63
   End If
End Function

Function petak(ByVal Koordinat As String) As Integer
   If Koordinat = "a8" Or Koordinat = "c8" Or Koordinat = "e8" Or Koordinat = "g8" Or Koordinat = "b7" Or
Koordinat = "d7" Or Koordinat = "f7" Or Koordinat = "h7" Or Koordinat = "a6" Or Koordinat = "c6" Or
Koordinat = "e6" Or Koordinat = "g6" Or Koordinat = "b5" Or Koordinat = "d5" Or Koordinat = "f5" Or
Koordinat = "h5" Or Koordinat = "a4" Or Koordinat = "c4" Or Koordinat = "e4" Or Koordinat = "g4" Or
Koordinat = "b3" Or Koordinat = "d3" Or Koordinat = "f3" Or Koordinat = "h3" Or Koordinat = "a2" Or
Koordinat = "c2" Or Koordinat = "e2" Or Koordinat = "g2" Or Koordinat = "b1" Or Koordinat = "d1" Or
Koordinat = "f1" Or Koordinat = "h1" Then
      petak = 64
   Else: petak = 65
```

```
    End If
End Function


Public Sub Data_Bidak()

'Keterangan :
'Bp = Bidak Putih
'Bh = Bidak Hitam

'Bp(1) = Pion1
'Bp(2) = Pion2
'Bp(3) = Pion3
'Bp(4) = Pion4
'Bp(5) = Pion5
'Bp(6) = Pion6
'Bp(7) = Pion7
'Bp(8) = Pion8
'Bp(9) = Benteng1
'Bp(10) = Kuda1
'Bp(11) = Perdana Mentri1
'Bp(12) = Ratu
'Bp(13) = Raja
'Bp(14) = Perdana Mentri2
'Bp(15) = Kuda2
'Bp(16) = Benteng2

'Bh(1) = Benteng1
'Bh(2) = Kuda1
'Bh(3) = Perdana Mentri1
'Bh(4) = Ratu
'Bh(5) = Raja
'Bh(6) = Perdana Mentri2
'Bh(7) = Kuda2
'Bh(8) = Benteng2
'Bh(9) = Pion1
'Bh(10) = Pion2
'Bh(11) = Pion3
'Bh(12) = Pion4
'Bh(13) = Pion5
'Bh(14) = Pion6
'Bh(15) = Pion7
'Bh(16) = Pion8

    Bp(1).koordx = 1
    Bp(1).koordy = 2
    Bp(1).warna = 0
    Bp(1).gambar = "1P_Putih.bmp"

    Bp(2).koordx = 2
    Bp(2).koordy = 2
    Bp(2).warna = 1
    Bp(2).gambar = "2P_Putih.bmp"

    Bp(3).koordx = 3
    Bp(3).koordy = 2
    Bp(3).warna = 0
    Bp(3).gambar = "1P_Putih.bmp"

    Bp(4).koordx = 4
```

```
Bp(4).koordy = 2
Bp(4).warna = 1
Bp(4).gambar = "2P_Putih.bmp"

Bp(5).koordx = 5
Bp(5).koordy = 2
Bp(5).warna = 0
Bp(5).gambar = "1P_Putih.bmp"

Bp(6).koordx = 6
Bp(6).koordy = 2
Bp(6).warna = 1
Bp(6).gambar = "2P_Putih.bmp"

Bp(7).koordx = 7
Bp(7).koordy = 2
Bp(7).warna = 0
Bp(7).gambar = "1P_Putih.bmp"

Bp(8).koordx = 8
Bp(8).koordy = 2
Bp(8).warna = 1
Bp(8).gambar = "2P_Putih.bmp"

Bp(9).koordx = 1
Bp(9).koordy = 1
Bp(9).warna = 1
Bp(9).gambar = "2R_Putih.bmp"

Bp(10).koordx = 2
Bp(10).koordy = 1
Bp(10).warna = 0
Bp(10).gambar = "1N_Putih.bmp"

Bp(11).koordx = 3
Bp(11).koordy = 1
Bp(11).warna = 1
Bp(11).gambar = "2B_Putih.bmp"

Bp(12).koordx = 4
Bp(12).koordy = 1
Bp(12).warna = 0
Bp(12).gambar = "1Q_Putih.bmp"

Bp(13).koordx = 5
Bp(13).koordy = 1
Bp(13).warna = 1
Bp(13).gambar = "2K_Putih.bmp"

Bp(14).koordx = 6
Bp(14).koordy = 1
Bp(14).warna = 0
Bp(14).gambar = "1B_Putih.bmp"

Bp(15).koordx = 7
Bp(15).koordy = 1
Bp(15).warna = 1
Bp(15).gambar = "2N_Putih.bmp"

Bp(16).koordx = 8
```

```
    Bp(16).koordy = 1
    Bp(16).warna = 0
    Bp(16).gambar = "1R_Putih.bmp"

'-------------------------------------------------------------------------------

    Bh(1).koordx = 1
    Bh(1).koordy = 8
    Bh(1).warna = 0
    Bh(1).gambar = "1R_Hitam.bmp"

    Bh(2).koordx = 2
    Bh(2).koordy = 8
    Bh(2).warna = 1
    Bh(2).gambar = "2N_Hitam.bmp"

    Bh(3).koordx = 3
    Bh(3).koordy = 8
    Bh(3).warna = 0
    Bh(3).gambar = "1B_Hitam.bmp"

    Bh(4).koordx = 4
    Bh(4).koordy = 8
    Bh(4).warna = 1
    Bh(4).gambar = "2Q_Hitam.bmp"

    Bh(5).koordx = 5
    Bh(5).koordy = 8
    Bh(5).warna = 0
    Bh(5).gambar = "1K_Hitam.bmp"

    Bh(6).koordx = 6
    Bh(6).koordy = 8
    Bh(6).warna = 1
    Bh(6).gambar = "2B_Hitam.bmp"

    Bh(7).koordx = 7
    Bh(7).koordy = 8
    Bh(7).warna = 0
    Bh(7).gambar = "1N_Hitam.bmp"

    Bh(8).koordx = 8
    Bh(8).koordy = 8
    Bh(8).warna = 1
    Bh(8).gambar = "2R_Hitam.bmp"

    Bh(9).koordx = 1
    Bh(9).koordy = 7
    Bh(9).warna = 1
    Bh(9).gambar = "2P_Hitam.bmp"

    Bh(10).koordx = 2
    Bh(10).koordy = 7
    Bh(10).warna = 0
    Bh(10).gambar = "1P_Hitam.bmp"

    Bh(11).koordx = 3
    Bh(11).koordy = 7
    Bh(11).warna = 1
    Bh(11).gambar = "2P_Hitam.bmp"
```

```
   Bh(12).koordx = 4
   Bh(12).koordy = 7
   Bh(12).warna = 0
   Bh(12).gambar = "1P_Hitam.bmp"

   Bh(13).koordx = 5
   Bh(13).koordy = 7
   Bh(13).warna = 1
   Bh(13).gambar = "2P_Hitam.bmp"

   Bh(14).koordx = 6
   Bh(14).koordy = 7
   Bh(14).warna = 0
   Bh(14).gambar = "1P_Hitam.bmp"

   Bh(15).koordx = 7
   Bh(15).koordy = 7
   Bh(15).warna = 1
   Bh(15).gambar = "2P_Hitam.bmp"

   Bh(16).koordx = 8
   Bh(16).koordy = 7
   Bh(16).warna = 0
   Bh(16).gambar = "1P_Hitam.bmp"

   Pp.gambar = "Petak_Putih.bmp"
   Ph.gambar = "Petak_Hitam.bmp"
End Sub


Private Sub Form_Load()
Call Data_Bidak
Dim i, x As Integer

Data_Lama(1) = " 0"
Data_Lama(2) = " 0"
Data_Lama(3) = "FF"
Data_Lama(4) = "FF"
Data_Lama(5) = "FF"
Data_Lama(6) = "FF"
Data_Lama(7) = " 0"
Data_Lama(8) = " 0"

For i = 1 To 16
   Picture2(i - 1).Picture = LoadPicture(Bh(i).gambar)
   Picture2(i + 47).Picture = LoadPicture(Bp(i).gambar)
Next i

For x = 16 To 47
   If x = 16 Or x = 18 Or x = 20 Or x = 22 Or x = 25 Or x = 27 Or x = 29 Or x = 31 Or x = 32 Or x = 34 Or x =
36 Or x = 38 Or x = 41 Or x = 43 Or x = 45 Or x = 47 Then
   Picture2(x).Picture = LoadPicture(Pp.gambar)
   Else
   Picture2(x).Picture = LoadPicture(Ph.gambar)
   End If
Next x

MSComm1.CommPort = 1
MSComm1.Settings = "9600,N,8,1"
```

```
MSComm1.InputLen = 0
MSComm1.PortOpen = True
End Sub


Private Sub Koordinat2_Change()
Dim Tujuan As Integer
Dim Asal As Integer
Dim kotak As Integer
Dim asalx, asaly, tujuanx, tujuany, k, i As Integer

If Koordinat1.Text <> "" And Len(Koordinat2.Text) = 2 Then
kotak = petak(Koordinat1.Text)

Asal = konversi(Koordinat1.Text)
asalx = Asal Mod 8 + 1
asaly = 8 - Int(Asal / 8)

Tujuan = konversi(Koordinat2.Text)
tujuanx = Tujuan Mod 8 + 1
tujuany = 8 - Int(Tujuan / 8)

Picture2(Tujuan).Picture = Picture2(Asal).Picture
Picture2(Asal).Picture = Picture2(kotak).Picture

k = 1
If Tujuan = 0 Or Tujuan = 2 Or Tujuan = 4 Or Tujuan = 6 Or Tujuan = 9 Or Tujuan = 11 Or Tujuan = 13 Or
Tujuan = 15 Or Tujuan = 16 Or Tujuan = 18 Or Tujuan = 20 Or Tujuan = 22 Or Tujuan = 25 Or Tujuan = 27 Or
Tujuan = 29 Or Tujuan = 31 Or Tujuan = 32 Or Tujuan = 34 Or Tujuan = 36 Or Tujuan = 38 Or Tujuan = 41 Or
Tujuan = 43 Or Tujuan = 45 Or Tujuan = 47 Or Tujuan = 48 Or Tujuan = 50 Or Tujuan = 52 Or Tujuan = 54 Or
Tujuan = 57 Or Tujuan = 59 Or Tujuan = 61 Or Tujuan = 63 Then
   For i = 1 To 16
     If (Bp(i).koordx = asalx) And (Bp(i).koordy = asaly) Then
       Bidak_Catur = "1" + Mid(Bp(i).gambar, 2)
       k = i
     End If
   Next i
Else
   For i = 1 To 16
     If (Bp(i).koordx = asalx) And (Bp(i).koordy = asaly) Then
       Bidak_Catur = "2" + Mid(Bp(i).gambar, 2)
       k = i
     End If
   Next i
End If

If Tujuan = 0 Or Tujuan = 2 Or Tujuan = 4 Or Tujuan = 6 Or Tujuan = 9 Or Tujuan = 11 Or Tujuan = 13 Or
Tujuan = 15 Or Tujuan = 16 Or Tujuan = 18 Or Tujuan = 20 Or Tujuan = 22 Or Tujuan = 25 Or Tujuan = 27 Or
Tujuan = 29 Or Tujuan = 31 Or Tujuan = 32 Or Tujuan = 34 Or Tujuan = 36 Or Tujuan = 38 Or Tujuan = 41 Or
Tujuan = 43 Or Tujuan = 45 Or Tujuan = 47 Or Tujuan = 48 Or Tujuan = 50 Or Tujuan = 52 Or Tujuan = 54 Or
Tujuan = 57 Or Tujuan = 59 Or Tujuan = 61 Or Tujuan = 63 Then
   For i = 1 To 16
     If (Bh(i).koordx = asalx) And (Bh(i).koordy = asaly) Then
       Bidak_Catur = "1" + Mid(Bh(i).gambar, 2)
       k = i
     End If
   Next i
Else
   For i = 1 To 16
     If (Bh(i).koordx = asalx) And (Bh(i).koordy = asaly) Then
```

```
      Bidak_Catur = "2" + Mid(Bh(i).gambar, 2)
      k = i
     End If
   Next i
End If

If Mid(Bidak_Catur, 4, 5) = "Putih" Then
   Debug.Print "Awal "; Asal; "="; Bp(k).koordx; ","; Bp(k).koordy; "->"; Bp(k).gambar
Else
   Debug.Print "Awal "; Asal; "="; Bh(k).koordx; ","; Bh(k).koordy; "->"; Bh(k).gambar
End If

   Picture2(Tujuan).Picture = LoadPicture(Bidak_Catur)


Y = Mid(Bidak_Catur, 2, 1) & "    " & Koordinat1.Text & " - " & Koordinat2.Text
List1.AddItem (Y)
MSComm1.Output = Y & Chr(13)
Koordinat1.Text = ""
Koordinat2.Text = ""

'Update Koordinat Bidak :
If Mid(Bidak_Catur, 4, 5) = "Putih" Then
   Bp(k).koordx = tujuanx
   Bp(k).koordy = tujuany
Else
   Bh(k).koordx = tujuanx
   Bh(k).koordy = tujuany
End If

If Mid(Bidak_Catur, 4, 5) = "Putih" Then
   Debug.Print "Akhir "; Tujuan; "="; Bp(k).koordx; ","; Bp(k).koordy; "->"; Bidak_Catur
Else
   Debug.Print "Akhir "; Tujuan; "="; Bh(k).koordx; ","; Bh(k).koordy; "->"; Bidak_Catur
End If
End If

If Koordinat2.Text = "" Then
   Koordinat1.SetFocus
End If
End Sub


Private Sub Timer1_Timer()
Dim Masukan1, Masukan2, Hasil As String

If MSComm1.PortOpen = True Then
Mikro = MSComm1.Input
Label18.Caption = Mikro

Data_Baru(1) = Mid(Mikro, 23, 2)
Data_Baru(2) = Mid(Mikro, 20, 2)
Data_Baru(3) = Mid(Mikro, 17, 2)
Data_Baru(4) = Mid(Mikro, 14, 2)
Data_Baru(5) = Mid(Mikro, 11, 2)
Data_Baru(6) = Mid(Mikro, 8, 2)
Data_Baru(7) = Mid(Mikro, 5, 2)
Data_Baru(8) = Mid(Mikro, 2, 2)

m = 1
```

```
n = 1
For j = 1 To 8
 If Data_Baru(j) > Data_Lama(j) Then
    Baris = j
    m = j
    Masukan1 = BinToByte(HexToBiner(Data_Baru(j)))
    Masukan2 = BinToByte(HexToBiner(Data_Lama(j)))
    Hasil = Masukan1 Xor Masukan2
    Debug.Print "Masukan1 "; "="; Masukan1
    Debug.Print "Masukan2 "; "="; Masukan2
    Debug.Print "Hasil "; "="; Hasil

    Select Case Hasil
       Case 1
       Huruf = "a"
       Case 2
       Huruf = "b"
       Case 4
       Huruf = "c"
       Case 8
       Huruf = "d"
       Case 16
       Huruf = "e"
       Case 32
       Huruf = "f"
       Case 64
       Huruf = "g"
       Case 128
       Huruf = "h"
       Case Else
       Huruf = ""
    End Select

Koordinat1.Text = Huruf & Baris
 End If
Next j
Data_Lama(m) = Data_Baru(m)

For j = 1 To 8
 If Data_Baru(j) < Data_Lama(j) Then
    Baris = j
    n = j
    Masukan1 = BinToByte(HexToBiner(Data_Baru(j)))
    Masukan2 = BinToByte(HexToBiner(Data_Lama(j)))
    Hasil = Masukan1 Xor Masukan2
    Debug.Print "Masukan1 "; "="; Masukan1
    Debug.Print "Masukan2 "; "="; Masukan2
    Debug.Print "Hasil "; "="; Hasil

    Select Case Hasil
       Case 1
       Huruf = "a"
       Case 2
       Huruf = "b"
       Case 4
       Huruf = "c"
       Case 8
       Huruf = "d"
       Case 16
       Huruf = "e"
```

```
      Case 32
      Huruf = "f"
      Case 64
      Huruf = "g"
      Case 128
      Huruf = "h"
      Case Else
      Huruf = ""
   End Select

Koordinat2.Text = Huruf & Baris
 End If
Next j
Data_Lama(n) = Data_Baru(n)
Debug.Print "Data_Lama "; m; "="; Data_Lama(m)
Debug.Print "Data_Lama "; n; "="; Data_Lama(n)
End If
End Sub


Private Sub tmblNext_Click()
Dim Tujuan As Integer
Dim Asal As Integer
Dim kotak As Integer
Dim asalx, asaly, tujuanx, tujuany, k, i As Integer

c = List2.ListCount
a = List2.List(c - 1)

If c <> 0 Then
List2.RemoveItem (c - 1)
End If

Koordinat1.Text = Mid(a, 6, 2)
Koordinat2.Text = Mid(a, 11, 2)

kotak = petak(Koordinat1.Text)

Asal = konversi(Koordinat1.Text)
asalx = Asal Mod 8 + 1
asaly = 8 - Int(Asal / 8)

Tujuan = konversi(Koordinat2.Text)
tujuanx = Tujuan Mod 8 + 1
tujuany = 8 - Int(Tujuan / 8)

Picture2(Tujuan).Picture = Picture2(Asal).Picture
Picture2(Asal).Picture = Picture2(kotak).Picture

k = 1
If Tujuan = 0 Or Tujuan = 2 Or Tujuan = 4 Or Tujuan = 6 Or Tujuan = 9 Or Tujuan = 11 Or Tujuan = 13 Or
Tujuan = 15 Or Tujuan = 16 Or Tujuan = 18 Or Tujuan = 20 Or Tujuan = 22 Or Tujuan = 25 Or Tujuan = 27 Or
Tujuan = 29 Or Tujuan = 31 Or Tujuan = 32 Or Tujuan = 34 Or Tujuan = 36 Or Tujuan = 38 Or Tujuan = 41 Or
Tujuan = 43 Or Tujuan = 45 Or Tujuan = 47 Or Tujuan = 48 Or Tujuan = 50 Or Tujuan = 52 Or Tujuan = 54 Or
Tujuan = 57 Or Tujuan = 59 Or Tujuan = 61 Or Tujuan = 63 Then
   For i = 1 To 16
     If (Bp(i).koordx = asalx) And (Bp(i).koordy = asaly) Then
       Bidak_Catur = "1" + Mid(Bp(i).gambar, 2)
       k = i
     End If
```

```
   Next i
Else
   For i = 1 To 16
    If (Bp(i).koordx = asalx) And (Bp(i).koordy = asaly) Then
      Bidak_Catur = "2" + Mid(Bp(i).gambar, 2)
      k = i
    End If
   Next i
End If

If Tujuan = 0 Or Tujuan = 2 Or Tujuan = 4 Or Tujuan = 6 Or Tujuan = 9 Or Tujuan = 11 Or Tujuan = 13 Or
Tujuan = 15 Or Tujuan = 16 Or Tujuan = 18 Or Tujuan = 20 Or Tujuan = 22 Or Tujuan = 25 Or Tujuan = 27 Or
Tujuan = 29 Or Tujuan = 31 Or Tujuan = 32 Or Tujuan = 34 Or Tujuan = 36 Or Tujuan = 38 Or Tujuan = 41 Or
Tujuan = 43 Or Tujuan = 45 Or Tujuan = 47 Or Tujuan = 48 Or Tujuan = 50 Or Tujuan = 52 Or Tujuan = 54 Or
Tujuan = 57 Or Tujuan = 59 Or Tujuan = 61 Or Tujuan = 63 Then
   For i = 1 To 16
    If (Bh(i).koordx = asalx) And (Bh(i).koordy = asaly) Then
      Bidak_Catur = "1" + Mid(Bh(i).gambar, 2)
      k = i
    End If
   Next i
Else
   For i = 1 To 16
    If (Bh(i).koordx = asalx) And (Bh(i).koordy = asaly) Then
      Bidak_Catur = "2" + Mid(Bh(i).gambar, 2)
      k = i
    End If
   Next i
End If

If Mid(Bidak_Catur, 4, 5) = "Putih" Then
   Debug.Print "Awal "; Asal; "="; Bp(k).koordx; ","; Bp(k).koordy; "->"; Bp(k).gambar
Else
   Debug.Print "Awal "; Asal; "="; Bh(k).koordx; ","; Bh(k).koordy; "->"; Bh(k).gambar
End If

   Picture2(Tujuan).Picture = LoadPicture(Bidak_Catur)

'Update Koordinat Bidak :
If Mid(Bidak_Catur, 4, 5) = "Putih" Then
   Bp(k).koordx = tujuanx
   Bp(k).koordy = tujuany
Else
   Bh(k).koordx = tujuanx
   Bh(k).koordy = tujuany
End If

If Mid(Bidak_Catur, 4, 5) = "Putih" Then
   Debug.Print "Akhir "; Tujuan; "="; Bp(k).koordx; ","; Bp(k).koordy; "->"; Bidak_Catur
Else
   Debug.Print "Akhir "; Tujuan; "="; Bh(k).koordx; ","; Bh(k).koordy; "->"; Bidak_Catur
End If

Koordinat1.Text = ""
Koordinat2.Text = ""
```

End Sub

```
Private Sub tmblPrev_Click()
Dim Tujuan As Integer
Dim Asal As Integer
Dim kotak As Integer
Dim asalx, asaly, tujuanx, tujuany, k, i As Integer

w = List1.ListCount
o = List2.ListCount
e = List1.List(w - 1)

If w <> 0 Then
List1.RemoveItem (w - 1)
List2.AddItem (e)
End If

Koordinat2.Text = Mid(e, 6, 2)
Koordinat1.Text = Mid(e, 11, 2)

kotak = petak(Koordinat1.Text)

Asal = konversi(Koordinat1.Text)
asalx = Asal Mod 8 + 1
asaly = 8 - Int(Asal / 8)

Tujuan = konversi(Koordinat2.Text)
tujuanx = Tujuan Mod 8 + 1
tujuany = 8 - Int(Tujuan / 8)

Picture2(Tujuan).Picture = Picture2(Asal).Picture
Picture2(Asal).Picture = Picture2(kotak).Picture

k = 1
If Tujuan = 0 Or Tujuan = 2 Or Tujuan = 4 Or Tujuan = 6 Or Tujuan = 9 Or Tujuan = 11 Or Tujuan = 13 Or
Tujuan = 15 Or Tujuan = 16 Or Tujuan = 18 Or Tujuan = 20 Or Tujuan = 22 Or Tujuan = 25 Or Tujuan = 27 Or
Tujuan = 29 Or Tujuan = 31 Or Tujuan = 32 Or Tujuan = 34 Or Tujuan = 36 Or Tujuan = 38 Or Tujuan = 41 Or
Tujuan = 43 Or Tujuan = 45 Or Tujuan = 47 Or Tujuan = 48 Or Tujuan = 50 Or Tujuan = 52 Or Tujuan = 54 Or
Tujuan = 57 Or Tujuan = 59 Or Tujuan = 61 Or Tujuan = 63 Then
   For i = 1 To 16
     If (Bp(i).koordx = asalx) And (Bp(i).koordy = asaly) Then
       Bidak_Catur = "1" + Mid(Bp(i).gambar, 2)
       k = i
     End If
   Next i
Else
   For i = 1 To 16
     If (Bp(i).koordx = asalx) And (Bp(i).koordy = asaly) Then
       Bidak_Catur = "2" + Mid(Bp(i).gambar, 2)
       k = i
     End If
   Next i
End If

If Tujuan = 0 Or Tujuan = 2 Or Tujuan = 4 Or Tujuan = 6 Or Tujuan = 9 Or Tujuan = 11 Or Tujuan = 13 Or
Tujuan = 15 Or Tujuan = 16 Or Tujuan = 18 Or Tujuan = 20 Or Tujuan = 22 Or Tujuan = 25 Or Tujuan = 27 Or
Tujuan = 29 Or Tujuan = 31 Or Tujuan = 32 Or Tujuan = 34 Or Tujuan = 36 Or Tujuan = 38 Or Tujuan = 41 Or
Tujuan = 43 Or Tujuan = 45 Or Tujuan = 47 Or Tujuan = 48 Or Tujuan = 50 Or Tujuan = 52 Or Tujuan = 54 Or
Tujuan = 57 Or Tujuan = 59 Or Tujuan = 61 Or Tujuan = 63 Then
   For i = 1 To 16
     If (Bh(i).koordx = asalx) And (Bh(i).koordy = asaly) Then
```

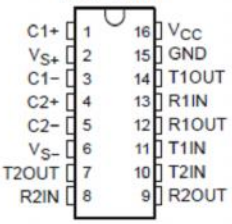
```
      Bidak_Catur = "1" + Mid(Bh(i).gambar, 2)
      k = i
     End If
    Next i
Else
    For i = 1 To 16
     If (Bh(i).koordx = asalx) And (Bh(i).koordy = asaly) Then
      Bidak_Catur = "2" + Mid(Bh(i).gambar, 2)
      k = i
     End If
    Next i
End If

If Mid(Bidak_Catur, 4, 5) = "Putih" Then
    Debug.Print "Awal "; Asal; "="; Bp(k).koordx; ","; Bp(k).koordy; "->"; Bp(k).gambar
Else
    Debug.Print "Awal "; Asal; "="; Bh(k).koordx; ","; Bh(k).koordy; "->"; Bh(k).gambar
End If

    Picture2(Tujuan).Picture = LoadPicture(Bidak_Catur)

'Update Koordinat Bidak :
If Mid(Bidak_Catur, 4, 5) = "Putih" Then
    Bp(k).koordx = tujuanx
    Bp(k).koordy = tujuany
Else
    Bh(k).koordx = tujuanx
    Bh(k).koordy = tujuany
End If

If Mid(Bidak_Catur, 4, 5) = "Putih" Then
    Debug.Print "Akhir "; Tujuan; "="; Bp(k).koordx; ","; Bp(k).koordy; "->"; Bidak_Catur
Else
    Debug.Print "Akhir "; Tujuan; "="; Bh(k).koordx; ","; Bh(k).koordy; "->"; Bidak_Catur
End If

Koordinat1.Text = ""
Koordinat2.Text = ""
End Sub
```

LAMPIRAN C
DATA SHEET IC MAX232

SLLS047L – FEBRUARY 1989 – REVISED MARCH 2004

- Meets or Exceeds TIA/EIA-232-F and ITU Recommendation V.28
- Operates From a Single 5-V Power Supply With 1.0-μF Charge-Pump Capacitors
- Operates Up To 120 kbit/s
- Two Drivers and Two Receivers
- ±30-V Input Levels
- Low Supply Current . . . 8 mA Typical
- ESD Protection Exceeds JESD 22
  - 2000-V Human-Body Model (A114-A)
- Upgrade With Improved ESD (15-kV HBM) and 0.1-μF Charge-Pump Capacitors is Available With the MAX202
- Applications
  - TIA/EIA-232-F, Battery-Powered Systems, Terminals, Modems, and Computers

MAX232 . . . D, DW, N, OR NS PACKAGE
MAX232I . . . D, DW, OR N PACKAGE
(TOP VIEW)



description/ordering information

The MAX232 is a dual driver/receiver that includes a capacitive voltage generator to supply TIA/EIA-232-F voltage levels from a single 5-V supply. Each receiver converts TIA/EIA-232-F inputs to 5-V TTL/CMOS levels. These receivers have a typical threshold of 1.3 V, a typical hysteresis of 0.5 V, and can accept ±30-V inputs. Each driver converts TTL/CMOS input levels into TIA/EIA-232-F levels. The driver, receiver, and voltage-generator functions are available as cells in the Texas Instruments LinASIC™ library.

ORDERING INFORMATION

T_A	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
0°C to 70°C	PDIP (N)	Tube of 25	MAX232N	MAX232N
	SOIC (D)	Tube of 40	MAX232D	MAX232
		Reel of 2500	MAX232DR	
	SOIC (DW)	Tube of 40	MAX232DW	MAX232
		Reel of 2000	MAX232DWR	
	SOP (NS)	Reel of 2000	MAX232NSR	MAX232
−40°C to 85°C	PDIP (N)	Tube of 25	MAX232IN	MAX232IN
	SOIC (D)	Tube of 40	MAX232ID	MAX232I
		Reel of 2500	MAX232IDR	
	SOIC (DW)	Tube of 40	MAX232IDW	MAX232I
		Reel of 2000	MAX232IDWR	

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

TEXAS INSTRUMENTS

Function Tables

EACH DRIVER

INPUT TIN	OUTPUT TOUT
L	H
H	L

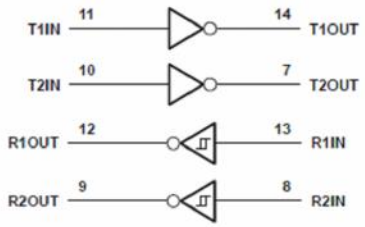
H = high level, L = low level

EACH RECEIVER

INPUT RIN	OUTPUT ROUT
L	H
H	L

H = high level, L = low level

logic diagram (positive logic)



absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

Input supply voltage range, V_{CC} (see Note 1) ..... −0.3 V to 6 V
Positive output supply voltage range, V_{S+} ..... V_{CC} − 0.3 V to 15 V
Negative output supply voltage range, V_{S-} ..... −0.3 V to −15 V
Input voltage range, V_I: Driver ..... −0.3 V to V_{CC} + 0.3 V
Receiver ..... ±30 V
Output voltage range, V_O: T1OUT, T2OUT ..... V_{S-} − 0.3 V to V_{S+} + 0.3 V
R1OUT, R2OUT ..... −0.3 V to V_{CC} + 0.3 V
Short-circuit duration: T1OUT, T2OUT ..... Unlimited
Package thermal impedance, θ_{JA} (see Notes 2 and 3): D package ..... 73°C/W
DW package ..... 57°C/W
N package ..... 67°C/W
NS package ..... 64°C/W
Operating virtual junction temperature, T_J ..... 150°C
Storage temperature range, T_{stg} ..... −65°C to 150°C

† Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTES: 1. All voltages are with respect to network GND.
2. Maximum power dissipation is a function of $T_J(max)$, θ_{JA}, and T_A. The maximum allowable power dissipation at any allowable ambient temperature is $P_D = (T_J(max) - T_A)/\theta_{JA}$. Operating at the absolute maximum T_J of 150°C can affect reliability.
3. The package thermal impedance is calculated in accordance with JESD 51-7.

recommended operating conditions

			MIN	NOM	MAX	UNIT
V_{CC}	Supply voltage		4.5	5	5.5	V
V_{IH}	High-level input voltage (T1IN,T2IN)		2			V
V_{IL}	Low-level input voltage (T1IN, T2IN)				0.8	V
R1IN, R2IN	Receiver input voltage				±30	V
T_A	Operating free-air temperature	MAX232	0		70	°C
		MAX232I	−40		85	

electrical characteristics over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see Note 4 and Figure 4)

PARAMETER		TEST CONDITIONS	MIN	TYP‡	MAX	UNIT
I_{CC}	Supply current	V_{CC} = 5.5 V, All outputs open, T_A = 25°C		8	10	mA

‡ All typical values are at V_{CC} = 5 V and T_A = 25°C.
NOTE 4: Test conditions are C1–C4 = 1 µF at V_{CC} = 5 V ± 0.5 V.

DRIVER SECTION

electrical characteristics over recommended ranges of supply voltage and operating free-air temperature range (see Note 4)

PARAMETER			TEST CONDITIONS		MIN	TYP†	MAX	UNIT
V_{OH}	High-level output voltage	T1OUT, T2OUT	R_L = 3 kΩ to GND		5	7		V
V_{OL}	Low-level output voltage‡	T1OUT, T2OUT	R_L = 3 kΩ to GND			−7	−5	V
r_o	Output resistance	T1OUT, T2OUT	V_{S+} = V_{S-} = 0,	V_O = ±2 V	300			Ω
I_{OS}§	Short-circuit output current	T1OUT, T2OUT	V_{CC} = 5.5 V,	V_O = 0		±10		mA
I_{IS}	Short-circuit input current	T1IN, T2IN	V_I = 0				200	µA

† All typical values are at V_{CC} = 5 V, T_A = 25°C.
‡ The algebraic convention, in which the least-positive (most negative) value is designated minimum, is used in this data sheet for logic voltage levels only.
§ Not more than one output should be shorted at a time.
NOTE 4: Test conditions are C1–C4 = 1 µF at V_{CC} = 5 V ± 0.5 V.

switching characteristics, V_{CC} = 5 V, T_A = 25°C (see Note 4)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
SR	Driver slew rate	R_L = 3 kΩ to 7 kΩ, See Figure 2			30	V/µs
SR(t)	Driver transition region slew rate	See Figure 3		3		V/µs
	Data rate	One TOUT switching		120		kbit/s

NOTE 4: Test conditions are C1–C4 = 1 µF at V_{CC} = 5 V ± 0.5 V.

RECEIVER SECTION

electrical characteristics over recommended ranges of supply voltage and operating free-air temperature range (see Note 4)

PARAMETER			TEST CONDITIONS		MIN	TYP†	MAX	UNIT
V_{OH}	High-level output voltage	R1OUT, R2OUT	I_{OH} = −1 mA		3.5			V
V_{OL}	Low-level output voltage‡	R1OUT, R2OUT	I_{OL} = 3.2 mA				0.4	V
V_{IT+}	Receiver positive-going input threshold voltage	R1IN, R2IN	V_{CC} = 5 V,	T_A = 25°C		1.7	2.4	V
V_{IT-}	Receiver negative-going input threshold voltage	R1IN, R2IN	V_{CC} = 5 V,	T_A = 25°C	0.8	1.2		V
V_{hys}	Input hysteresis voltage	R1IN, R2IN	V_{CC} = 5 V		0.2	0.5	1	V
r_i	Receiver input resistance	R1IN, R2IN	V_{CC} = 5,	T_A = 25°C	3	5	7	kΩ

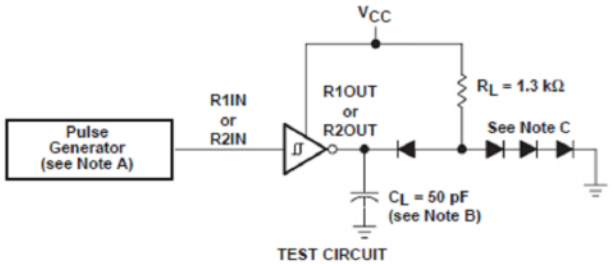
† All typical values are at V_{CC} = 5 V, T_A = 25°C.
‡ The algebraic convention, in which the least-positive (most negative) value is designated minimum, is used in this data sheet for logic voltage levels only.
NOTE 4: Test conditions are C1–C4 = 1 µF at V_{CC} = 5 V ± 0.5 V.

switching characteristics, V_{CC} = 5 V, T_A = 25°C (see Note 4 and Figure 1)

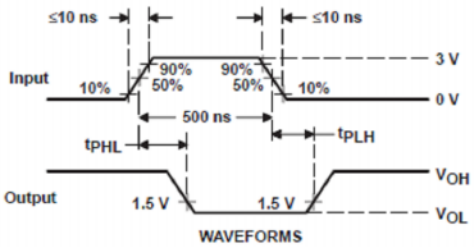
PARAMETER		TYP	UNIT
$t_{PLH(R)}$	Receiver propagation delay time, low- to high-level output	500	ns
$t_{PHL(R)}$	Receiver propagation delay time, high- to low-level output	500	ns

NOTE 4: Test conditions are C1–C4 = 1 µF at V_{CC} = 5 V ± 0.5 V.

PARAMETER MEASUREMENT INFORMATION



TEST CIRCUIT

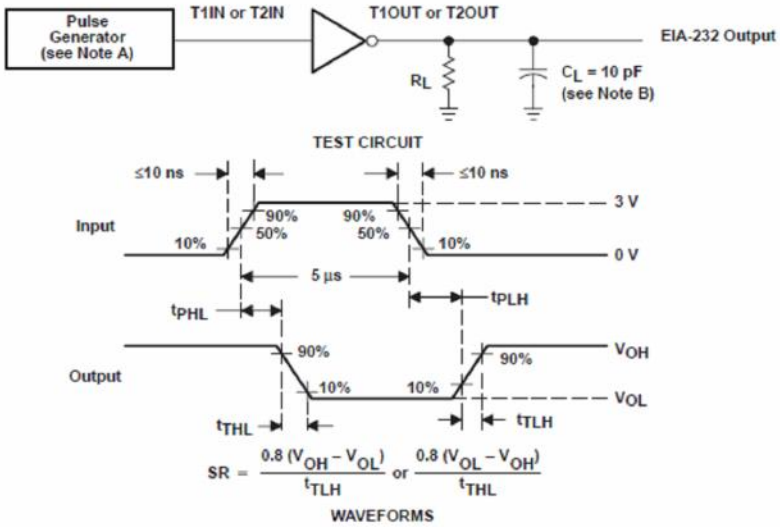


WAVEFORMS

NOTES: A. The pulse generator has the following characteristics: Z_O = 50 Ω, duty cycle ≤ 50%.
B. C_L includes probe and jig capacitance.
C. All diodes are 1N3064 or equivalent.

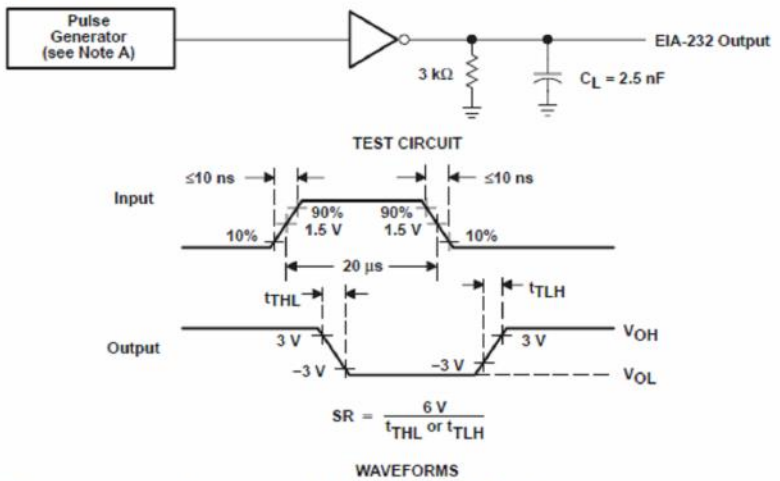
Figure 1. Receiver Test Circuit and Waveforms for t_{PHL} and t_{PLH} Measurements

PARAMETER MEASUREMENT INFORMATION



NOTES: A. The pulse generator has the following characteristics: Z_O = 50 Ω, duty cycle ≤ 50%.
B. C_L includes probe and jig capacitance.

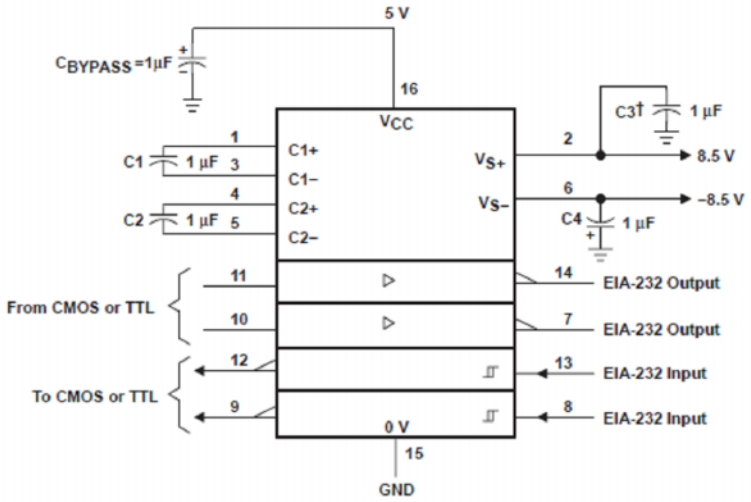
Figure 2. Driver Test Circuit and Waveforms for t_{PHL} and t_{PLH} Measurements (5-µs Input)



NOTE A: The pulse generator has the following characteristics: Z_O = 50 Ω, duty cycle ≤ 50%.

Figure 3. Test Circuit and Waveforms for t_{THL} and t_{TLH} Measurements (20-µs Input)

APPLICATION INFORMATION



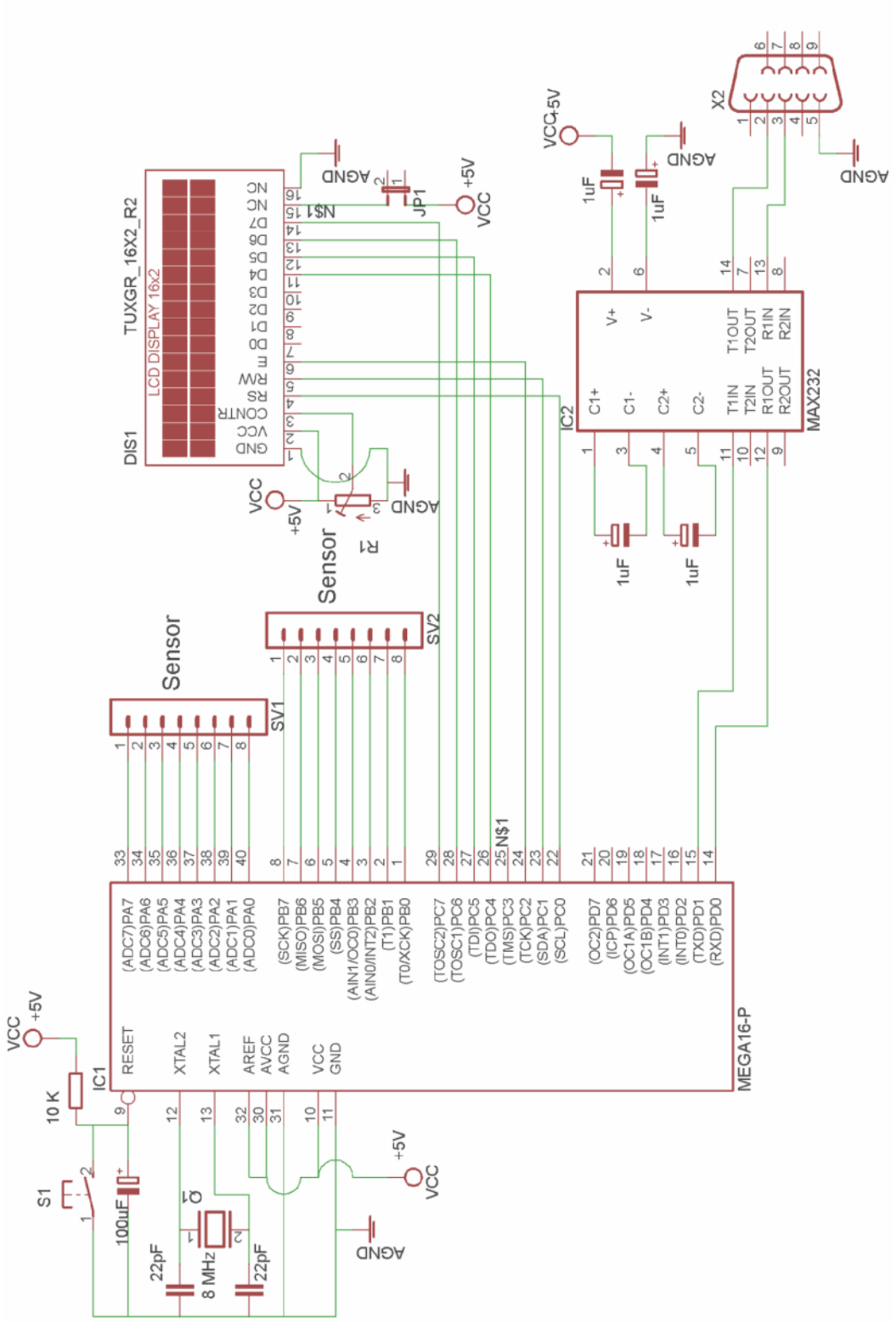
† C3 can be connected to V_{CC} or GND.

NOTES: A. Resistor values shown are nominal.

B. Nonpolarized ceramic capacitors are acceptable. If polarized tantalum or electrolytic capacitors are used, they should be connected as shown. In addition to the 1-µF capacitors shown, the MAX202 can operate with 0.1-µF capacitors.

Figure 4. Typical Operating Circuit

LAMPIRAN D
SKEMATIK ALAT


MEGA16-P
IC1
RESET
XTAL2
XTAL1
AREF
AVCC
AGND
VCC
GND
(ADC7)PA7
(ADC6)PA6
(ADC5)PA5
(ADC4)PA4
(ADC3)PA3
(ADC2)PA2
(ADC1)PA1
(ADC0)PA0
(SCK)PB7
(MISO)PB6
(MOSI)PB5
(SS)PB4
(AIN1/OC0)PB3
(AIN0/INT2)PB2
(T1)PB1
(T0/XCK)PB0
(TOSC2)PC7
(TOSC1)PC6
(TDI)PC5
(TDO)PC4
(TMS)PC3
(TCK)PC2
(SDA)PC1
(SCL)PC0
(OC2)PD7
(ICP)PD6
(OC1A)PD5
(OC1B)PD4
(INT1)PD3
(INT0)PD2
(TXD)PD1
(RXD)PD0
N$1
VCC
+5V
10 K
S1
100uF
22pF
8 MHz
Q
Sensor
SV1
SV2
DIS1
TUXGR_16X2_R2
LCD DISPLAY 16x2
GND
VCC
CONTR
RS
RW
JP1
R1
IC2
MAX232
C1+
C1-
C2+
C2-
V+
V-
T1IN
T2IN
R1OUT
R2OUT
T1OUT
T2OUT
R1IN
R2IN
1uF
X2
AGND