

2022년 IoT기반 스마트 솔루션 개발자 양성과정



Embedded Application

4-Serial Communication in C#

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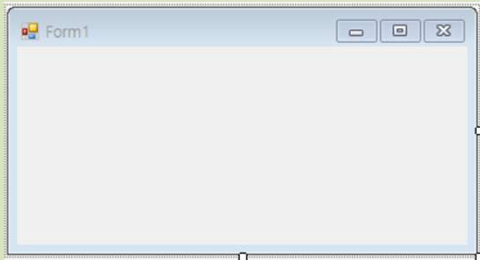


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Multi Thread

Thread #1

```
static void Main( )  
{  
    Application.EnableVisualStyles( );  
    Application.SetCompatibleTextRenderingDefault(false);  
    Application.Run(new Form1( ));  
}
```



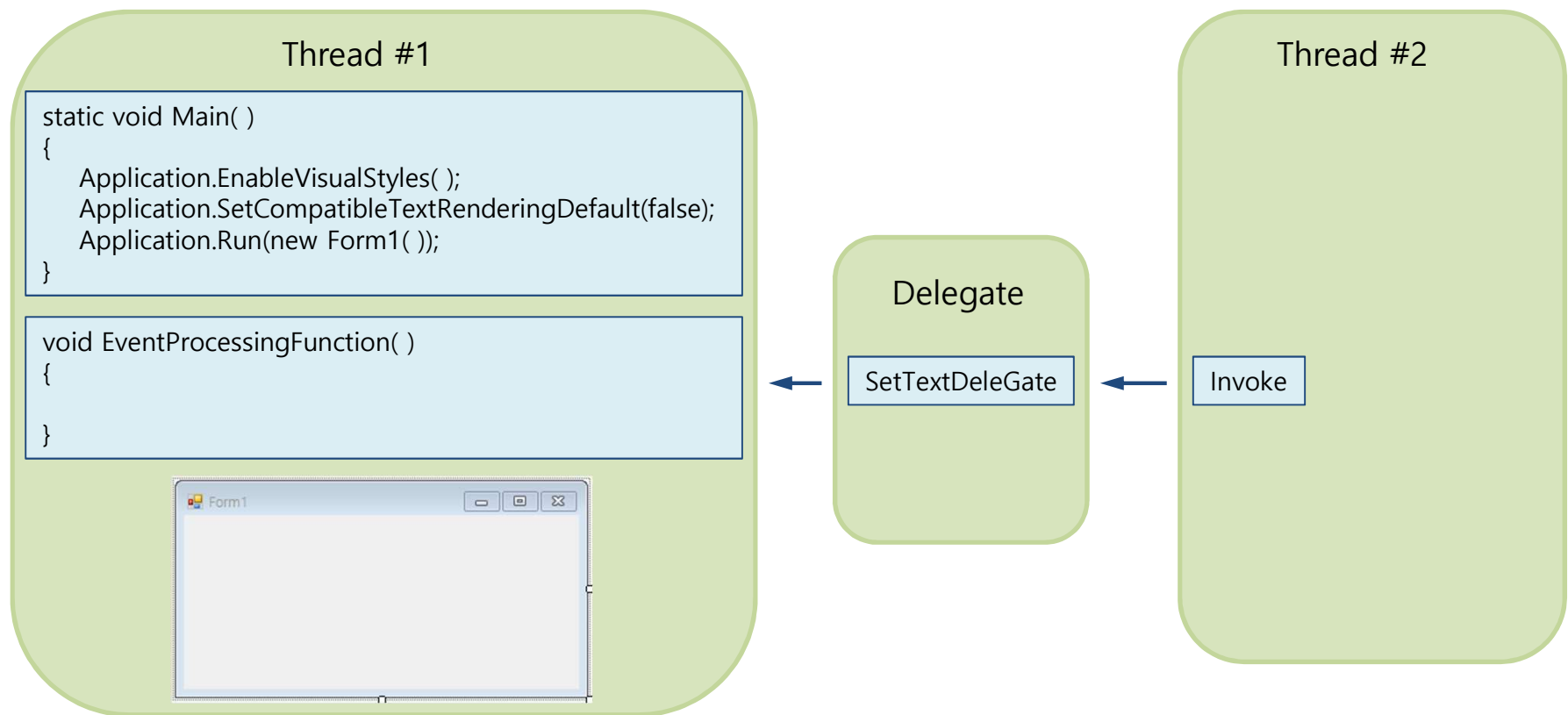
Data/Modify/Action

경합, 교착, 중단

Thread #2



Delegate



Arduino : Serial Test

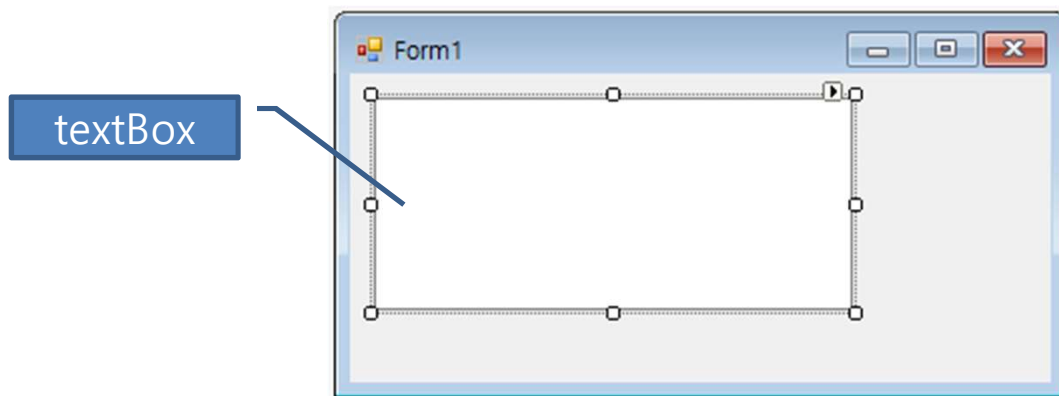
```
int Count=0;

void setup( ) {
  Serial.begin(9600);
}

void loop( ) {
  Serial.println(Count);
  if (++Count>9999) Count=0;
  delay(250);
}
```



C# Window Form



Form1	
Text	Serail Monitor
textBox1	
Name	textBox1
Dock	Fill
Multiline	True
ScrollBars	Vertical



Add Serial Object

```
using System;
using System.Collections.Generic;
using System.Data;
using System.Text;
using System.Threading.Tasks;
using System.Windows.Forms;
using System.IO.Ports;

namespace SerailCommunication
{
    public partial class Form1 : Form
    {
        SerialPort ComPort = new SerialPort( );

        public Form1( )
        {
            InitializeComponent( );
        }
    }
}
```



Form_Load / Closing

```
private void Form1_Load(object sender, EventArgs e)
{
    ComPort.PortName = "COM3";
    ComPort.BaudRate = 9600;
    ComPort.DataBits = 8;
    ComPort.Parity = Parity.None;
    ComPort.StopBits = StopBits.One;
    ComPort.Handshake = Handshake.None;
    ComPort.Open( );
    ComPort.DiscardInBuffer( );
}

private void Form1_FormClosing(object sender, FormClosingEventArgs e)
{
    ComPort.Close( );
    ComPort.Dispose( );
    ComPort = null;
}
```



Add Serial EventHandler

```
public partial class Form1 : Form
{
    SerialPort ComPort = new SerialPort( );

    public Form1( )
    {
        InitializeComponent( );
        ComPort.DataReceived += new SerialDataReceivedEventHandler( DataReceived );
    }

    private void DataReceived(object sender, System.IO.Ports.SerialDataReceivedEventArgs e)
    {
        string rxd = ComPort.ReadTo( "Wn" );
    }

    private void Form1_Load(object sender, EventArgs e) .....

    private void Form1_FormClosing(object sender, FormClosingEventArgs e) .....

}
```



Add Delegate

```
public partial class Form1 : Form
{
    SerialPort ComPort = new SerialPort( );
    private delegate void SetTextDelegate( string getString );

    public Form1( ) .....

    private void DataReceived(object sender, System.IO.Ports.SerialDataReceivedEventArgs e)
    {
        string rxd = ComPort.ReadTo( "Wn" );
        this.BeginInvoke( new SetTextDelegate( SerialReceived ), new object[ ] { rxd } );
    }

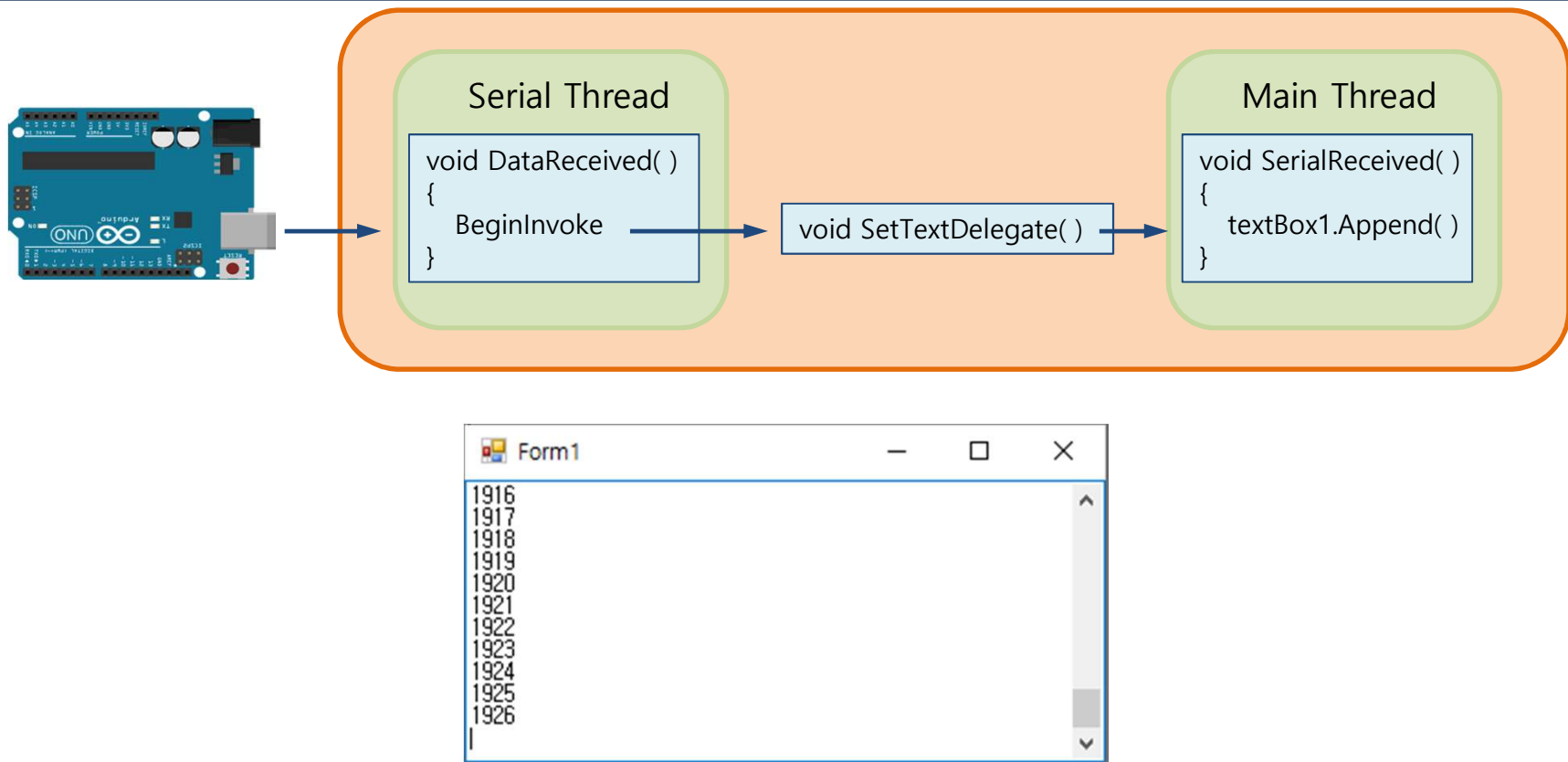
    private void SerialReceived( string inString )
    {
        textBox1.AppendText( inString + "WrWn" );
    }

    private void Form1_Load(object sender, EventArgs e) .....

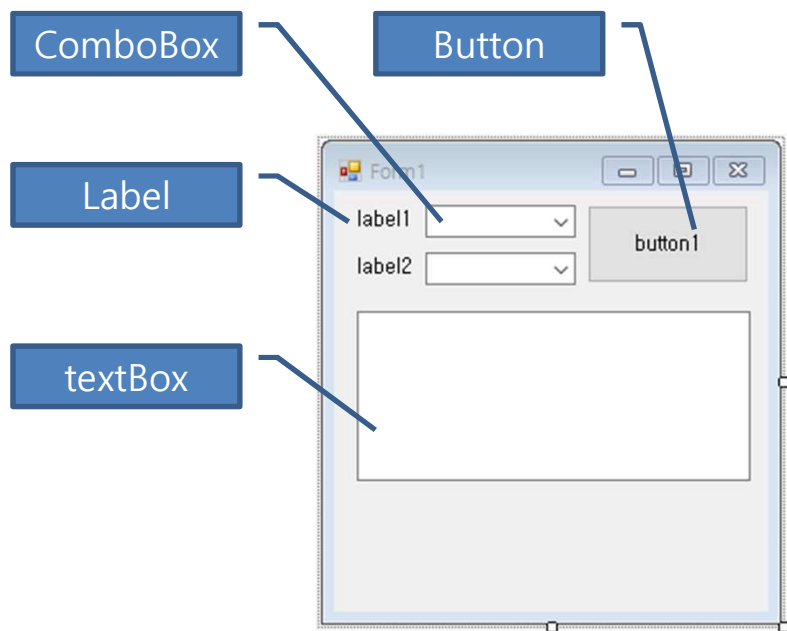
    private void Form1_FormClosing(object sender, FormClosingEventArgs e) .....
}
```



Run



Serial Setting UI



Form1	
Text	Serail Monitor
FormBorderStyle	FixedSingle
MaximizeBox	False
MinimizeBox	False
Label1	
Text	ComPort
Label2	
Text	BoardRate
comboBox1	
Name	cmbComPort
comboBox2	
Name	cmbBoardRate

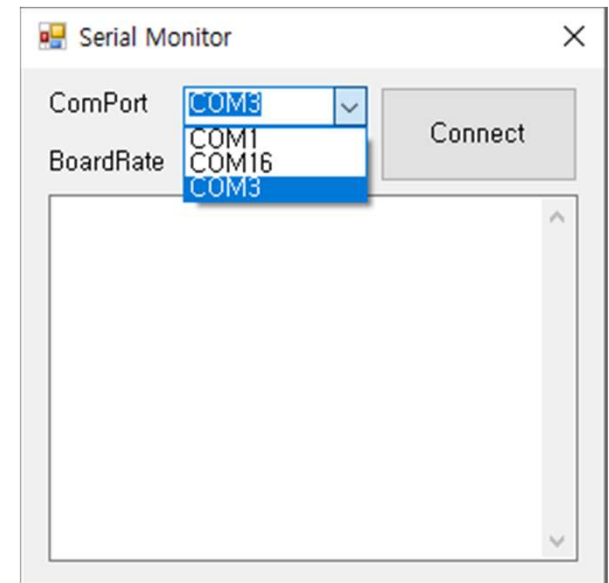
button1	
Text	Connect
textBox1	
Dock	None
Multiline	True
ScrollBars	Vertical



Form_Load()

```
private void Form1_Load(object sender, EventArgs e)
{
    cmbComPort.Items.Clear( );
    var portName = System.IO.Ports.SerialPort.GetPortNames( );
    cmbComPort.Items.AddRange( portName );
    cmbComPort.SelectedIndex = cmbComPort.Items.Count - 1;

    cmbBoardRate.Items.Clear( );
    cmbBoardRate.Items.Add( "9600" );
    cmbBoardRate.Items.Add( "19200" );
    cmbBoardRate.Items.Add( "57600" );
    cmbBoardRate.Items.Add( "115200" );
    cmbBoardRate.SelectedIndex=0;
}
```



Form_Closing()

```
private void Form1_FormClosing(object sender, FormClosingEventArgs e)
{
    if (ComPort.IsOpen)
    {
        ComPort.Close( );
        ComPort.Dispose( );
        ComPort = null;
    }
}
```

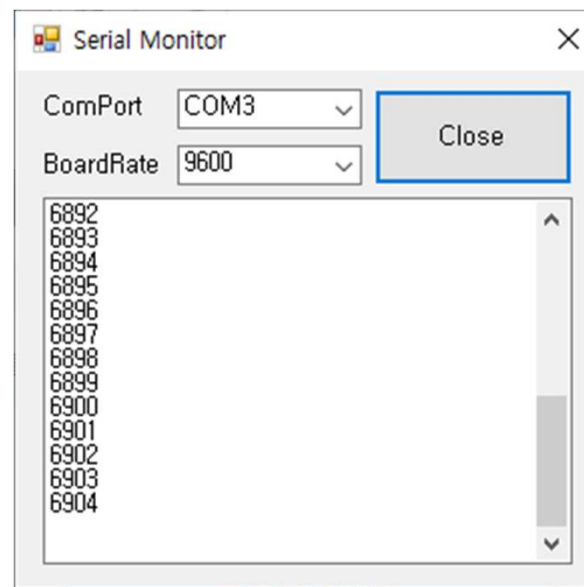


Button_Click()

```
private void button1_Click(object sender, EventArgs e)
{
    if ( button1.Text == "Connect" )
    {
        ComPort.PortName = cmbComPort.Text;
        ComPort.BaudRate = Convert.ToInt32( cmbBoardRate.Text );
        ComPort.DataBits = 8;
        ComPort.Parity = Parity.None;
        ComPort.StopBits = StopBits.One;
        ComPort.Handshake = Handshake.None;
        ComPort.Open( );
        ComPort.DiscardInBuffer( );
        button1.Text = "Close";
    }
    else
    {
        ComPort.Close( );
        button1.Text = "Connect";
    }
}
```

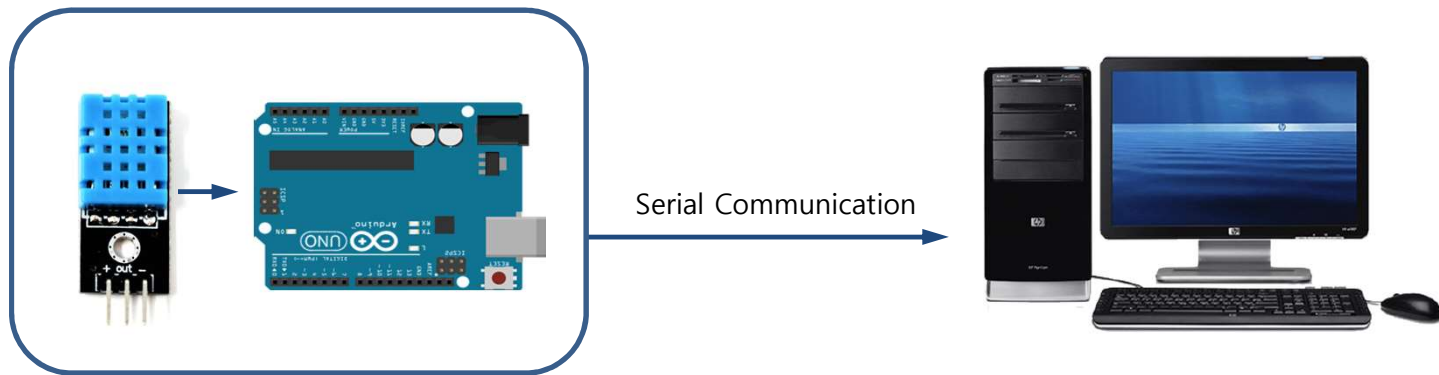
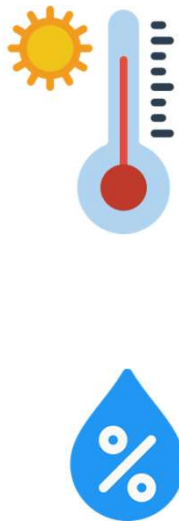


Run



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Data Parsing



Header	Data 1	Separator	Data 2	Terminator
\$	22.5	,	45	WrWn



Arduino : Dual Random Data

```
int Data_1, Data_2;

void setup( ) {
  Serial.begin( 9600 );
  randomSeed( analogRead( A5 ) );
}

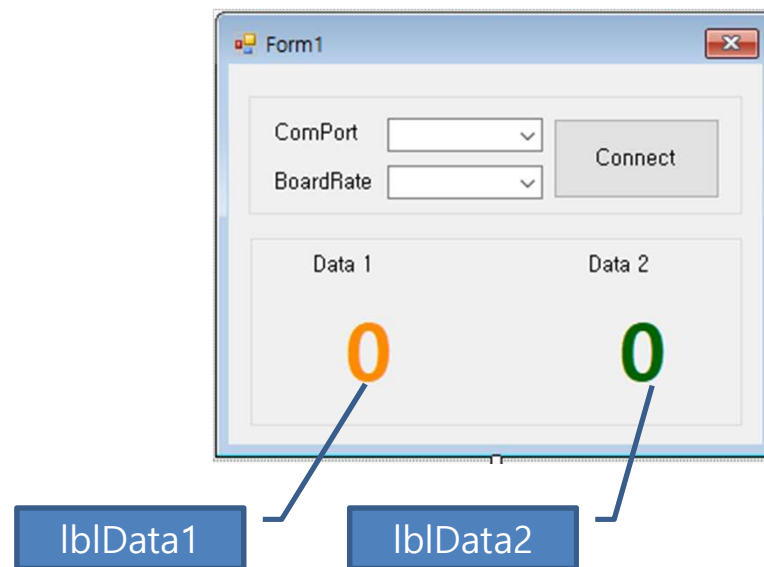
void loop( ) {
  Data_1=random( 0, 49 );
  Data_2=random( 50, 99 );

  Serial.print( "$" );
  Serial.print( Data_1 );
  Serial.print( "," );
  Serial.print( Data_2 );
  Serial.print( "rWn" );

  delay(500);
}
```



Data Parsing UI



SerialReceived()

```
private void SerialReceived(string inString)
{
    string Head = inString.Substring( 0, 1 );
    string Data = inString.Substring( 1 );

    if ( Head == "$" )
    {
        string[] PasingData = Data.Split( ',' );

        lblData1.Text = PasingData[ 0 ];
        lblData2.Text = PasingData[ 1 ];
    }
}
```



Run

The screenshot shows a Windows application window titled "Form1". Inside the window, there are two dropdown menus: "ComPort" set to "COM3" and "BoardRate" set to "9600". To the right of these menus is a "Close" button. Below the configuration section, there are two data labels: "Data 1" and "Data 2". Under "Data 1" is the number "47" in orange, and under "Data 2" is the number "78" in green.

ComPort	BoardRate	Close
COM3	9600	

Data 1	Data 2
47	78

