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SoftwareSerialRS485Example (/SoftwareSerialRS485Example)

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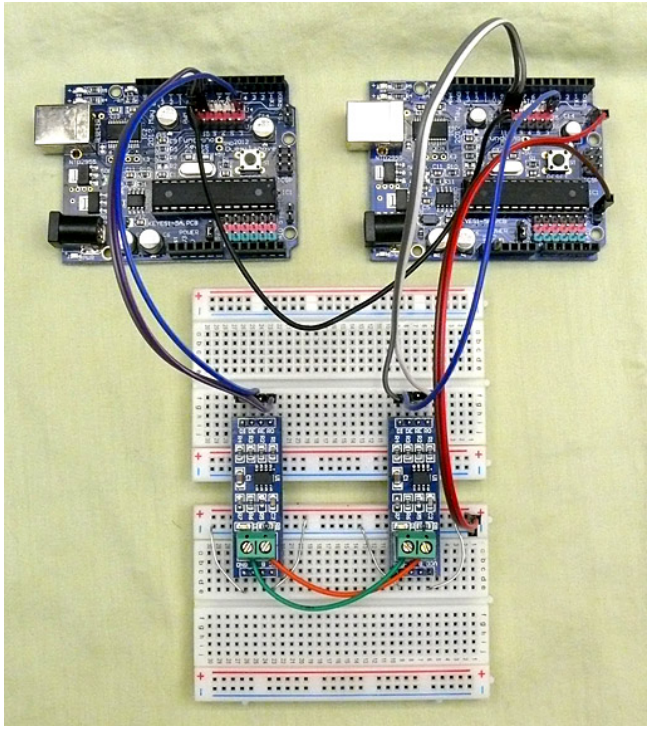

RS485 is a physical connection standard for Serial data transfer. It can be used between 2 or more Arduinos and to various I/O devices that support it.

The example on the right shows two Arduinos connected with low-cost RS485 "Electronic Bricks" or "breakout boards" that use a MAX485 chip. See it HERE:

More details HERE.

RS485 uses a pair of wires in a differential configuration that allows long distance communication (up to 1.2 Km) and very high speeds. It also allows multiple senders/receivers along the same cable: "**Multi-Drop**". It also needs Ground - but that usually can be the local electrical ground, so only the two wires (usually a twisted pair in some type of cable) are needed.

In the example these are the red and green wires connected to **A** and **B** at the bottom. Also note the connection details on the right photo and refer to the pin connections shown in the software examples below:

- DI (data in) to pin 11
- RO (receive out) to pin 10
- DE (data enable) and RE (receive enable) jumpered together and to pin 3
- Vcc and Gnd connected
- A and B : the RS485 pair
- Gnd between distant Arduinos can be in cable or local electrical ground.

RS485 in this example we show is **Half-Duplex**. This means it can send or receive on the same wires, but in only one direction at a time. See more about these modules and RS485 networks HERE:

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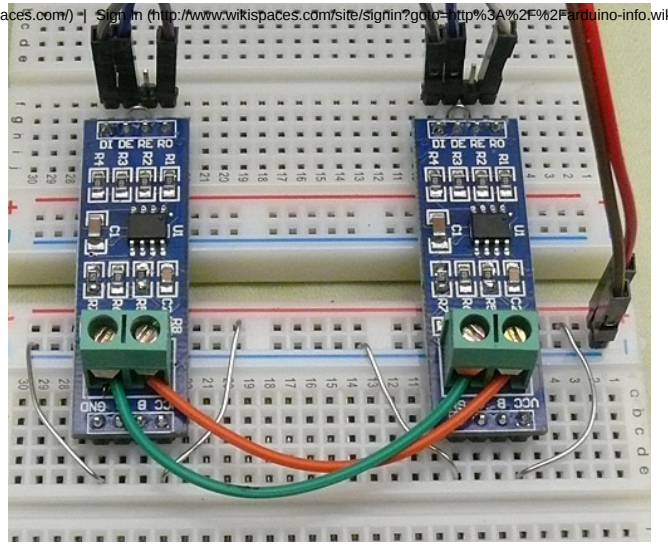
The example Software Sketches below use the Software Serial library that is provided with the Arduino IDE. This allows use of almost any Arduino pins for Serial Data connections, and allows simultaneous use of the standard Arduino USB Serial communications. The example here uses the Arduino serial monitor to allow you to type in data to send to the Master Arduino. Another serial port is created with the Software Serial library, using pins 11 and 12.
This port sends the data to a second remote Arduino over RS485. That Arduino sends the same data back to the Master Arduino where it is sent back to the Serial Monitor for you, the user to view.



NOTE: A working system with your application running over multiple Arduinos should have some organized data movement and error-checking. Nick Gammon has a nice library that does this here: http://www.gammon.com.au/forum/?id=11428

The second Arduino runs the code in the second example below. You can copy and paste these into the Arduino IDE. (NOTE: You can run two copies of the Arduino software at once if you wish. Keep track of which Arduino is on which Serial Port!).

You use this by bringing up both connected Arduinos and running the Serial Monitor on the "Master". Type in the top window of the Serial Monitor and it should be echoed back as it is sent to the second Arduino and looped back. You should see the Pin13 LED on the Remote Arduino blink as the data is received and sent back.

Master Arduino Sketch:

```
/* YourDuino SoftwareSerialExample1
   - Connect to another Arduino running "YD_SoftwareSerialExampleRS485_1Remote"
   - Connect this unit Pins 10, 11, Gnd
   - Pin 3 used for RS485 direction control
   - To other unit Pins 11,10, Gnd  (Cross over)
   - Open Serial Monitor, type in top window.
   - Should see same characters echoed back from remote Arduino

   Questions: terry@yourduino.com
*/

/*-----( Import needed libraries )-----*/
#include <SoftwareSerial.h>
/*-----( Declare Constants and Pin Numbers )-----*/
#define SSerialRX        10  //Serial Receive pin
#define SSerialTX        11  //Serial Transmit pin

#define SSerialTxControl 3   //RS485 Direction control

#define RS485Transmit    HIGH
#define RS485Receive     LOW
```

```
#define Pin13LED          13

/*-----( Declare objects )-----*/
SoftwareSerial RS485Serial(SSerialRX, SSerialTX); // RX, TX

/*-----( Declare Variables )-----*/
int byteReceived;
int byteSend;

void setup()   /****** SETUP: RUNS ONCE ******/
{
  // Start the built-in serial port, probably to Serial Monitor
  Serial.begin(9600);
  Serial.println("YourDuino.com SoftwareSerial remote loop example");
  Serial.println("Use Serial Monitor, type in upper window, ENTER");

  pinMode(Pin13LED, OUTPUT);
  pinMode(SSerialTxControl, OUTPUT);

  digitalWrite(SSerialTxControl, RS485Receive);  // Init Transceiver

  // Start the software serial port, to another device
  RS485Serial.begin(4800);   // set the data rate

}//--(end setup )---


void loop()   /****** LOOP: RUNS CONSTANTLY ******/
{
  digitalWrite(Pin13LED, HIGH);  // Show activity
  if (Serial.available())
  {
    byteReceived = Serial.read();

    digitalWrite(SSerialTxControl, RS485Transmit);  // Enable RS485 Transmit
    RS485Serial.write(byteReceived);          // Send byte to Remote Arduino

    digitalWrite(Pin13LED, LOW);  // Show activity
    delay(10);
    digitalWrite(SSerialTxControl, RS485Receive);  // Disable RS485 Transmit
  }

  if (RS485Serial.available())  //Look for data from other Arduino
   {
    digitalWrite(Pin13LED, HIGH);  // Show activity
    byteReceived = RS485Serial.read();    // Read received byte
    Serial.write(byteReceived);        // Show on Serial Monitor
    delay(10);
    digitalWrite(Pin13LED, LOW);  // Show activity
   }

}//--(end main loop )---

/*-----( Declare User-written Functions )-----*/

//NONE
//*********( THE END )***********
```

Remote Arduino Sketch:

```
/* YourDuino SoftwareSerialExample1Remote
   - Used with YD_SoftwareSerialExampleRS485_1 on another Arduino
   - Remote: Receive data, loop it back...
   - Connect this unit Pins 10, 11, Gnd
   - To other unit Pins 11,10, Gnd  (Cross over)
   - Pin 3 used for RS485 direction control
   - Pin 13 LED blinks when data is received

   Questions: terry@yourduino.com
*/

/*-----( Import needed libraries )-----*/
#include <SoftwareSerial.h>
/*-----( Declare Constants and Pin Numbers )-----*/
#define SSerialRX        10  //Serial Receive pin
#define SSerialTX        11  //Serial Transmit pin

#define SSerialTxControl 3   //RS485 Direction control
#define RS485Transmit    HIGH
#define RS485Receive     LOW

#define Pin13LED         13

/*-----( Declare objects )-----*/
SoftwareSerial RS485Serial(SSerialRX, SSerialTX); // RX, TX

/*-----( Declare Variables )-----*/
int byteReceived;
int byteSend;

void setup()   /****** SETUP: RUNS ONCE ******/
{
  // Start the built-in serial port, probably to Serial Monitor
  Serial.begin(9600);
  Serial.println("SerialRemote");  // Can be ignored

  pinMode(Pin13LED, OUTPUT);
  pinMode(SSerialTxControl, OUTPUT);

  digitalWrite(SSerialTxControl, RS485Receive);  // Init Transceiver

  // Start the software serial port, to another device
  RS485Serial.begin(4800);   // set the data rate
}//--(end setup )---


void loop()   /****** LOOP: RUNS CONSTANTLY ******/
{
  //Copy input data to output
  if (RS485Serial.available())
  {
    byteSend = RS485Serial.read();   // Read the byte

    digitalWrite(Pin13LED, HIGH);  // Show activity
```

```
    delay(10);
    digitalWrite(Pin13LED, LOW);

    digitalWrite(SSerialTxControl, RS485Transmit);  // Enable RS485 Transmit
    RS485Serial.write(byteSend); // Send the byte back
    delay(10);
    digitalWrite(SSerialTxControl, RS485Receive);  // Disable RS485 Transmit
//    delay(100);
  }// End If RS485SerialAvailable

}//--(end main loop )---

/*-----( Declare User-written Functions )-----*/
//NONE

//*********( THE END )***********
```

(http://www.wikispaces.com/user/view/justpassingthru)

The issue of crossover
justpassingthru (http://www.wikispaces.com/user/view/justpassingthru) Dec 19, 2017

I'm going to go out on limb here with a guess. That is that the code started life as a standard software serial demo between two Arduini, with no RS485, and then yes the wires between the two units need crossing over. Then I'll bet the code got re-purposed for the RS485 demo, and the comment about cross over got left in.

(http://www.wikispaces.com/user/view/marjentor)

Trouble with circuit using Leonardo Arduino
marjentor (http://www.wikispaces.com/user/view/marjentor) Jun 7, 2017

Hi, thanks for your article, it is a great help. Unfortunately I build the circuit, using MAX485 chip, and two Arduino Leonardo using both the software Serial, and the hardware Serial1 provided by the Leonardo, but it looks like the message is never sent.
Can the issue come from the Leonardo board?

(http://www.wikispaces.com/user/view/felixwmc)

This sample does not work
felixwmc (http://www.wikispaces.com/user/view/felixwmc) Mar 27, 2017

how can you use rs485 and cross the rx tx pin? that is not right at all.

(http://www.wikispaces.com/user/view/TerryKing) TerryKing (http://www.wikispaces.com/user/view/TerryKing) *May 5, 2017*
Hello. This circuit has been built and tested. Many people have used it. Have you built it? What problem are you having?

(http://www.wikispaces.com/user/view/arvindall) arvindall (http://www.wikispaces.com/user/view/arvindall) *Jul 27, 2017*
same! how can you cross the rx tx pins when you are connecting your rx tx pins to the rs 485 ro and di pins, respectively? :o I also could not achieve successful communication. Message is never sent!!

(http://www.wikispaces.com/user/view/jgustavoam) jgustavoam (http://www.wikispaces.com/user/view/jgustavoam) *Nov 18, 2017*
Hi, this information is wrong = To other unit Pins 11,10, Gnd (Cross over). You do not need cross wires. Connect Slave same as Master. Uncomment // delay(100); . I did a test, but received some wrong characters.

(http://www.wikispaces.com/user/view/jgustavoam) jgustavoam (http://www.wikispaces.com/user/view/jgustavoam) *Nov 18, 2017*
OBS: long cable = 6 meters

(http://www.wikispaces.com/user/view/jgustavoam) jgustavoam (http://www.wikispaces.com/user/view/jgustavoam) *Nov 18, 2017*
OBS: long cable = 6 meters

(http://www.wikispaces.com/user/view/felixwmc)

More slave sample ino

felixwmc (http://www.wikispaces.com/user/view/felixwmc) Mar 25, 2017

Can anyone hook up more slave to one master and have it working?
I try 2 slave, sen them one byte i.e ascii '7' and '8' as the slave id. when they get the right id it will send a meg. back. but no matter what i send as id. the first slave will send back meg.
Any idea? I hook my circuit same as the sample about with 2 slaves

(http://www.wikispaces.com/user/view/fordgordie)

recieving data

fordgordie (http://www.wikispaces.com/user/view/fordgordie) Mar 7, 2017

Any idea why the slave board would not be responding. I'm using a Mega so I switched the DI to pin 18 and the RO to pin 19 on the master. The Slave is DI to 19, RO to 18. Everything lights up when plugged in. When letters are inputted into serial the rx light on the master flashes. Any ideas what I did, or how I need to modify this to work with the mega instead of the UNO?

(http://www.wikispaces.com/user/view/nickmaat)

Small suggestions for the pinning description

nickmaat (http://www.wikispaces.com/user/view/nickmaat) Sep 5, 2016

First of all thank you for this page, it helped me a lot.
I would suggest a small enhancement concerning the wiring example DI, RO, etc. Namely to change them from "DI (data in) to pin 11" to "DI (data in) to TXO", s.t. they apply not just to the Arduinos you use but to all other versions too.
Further an explanation why "DE (data enable) and RE [are] jumpered together" whould be nice too, something like: because one is Low-Active, the other is High-Active.
Best

(http://www.wikispaces.com/user/view/lasanthalikitha)

how to add sensor to master arduino?

lasanthalikitha (http://www.wikispaces.com/user/view/lasanthalikitha) Dec 17, 2015

I want to know how to add temperature sensor to master arduino and how to sent temperature reading to slave arduino ? Please reply ASAP..