

# Application Notes

## for Serial Communication

Ver. 1.0

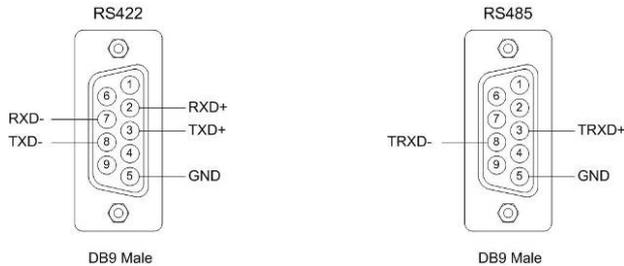


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# ANSC001. How to test RS422 and RS485

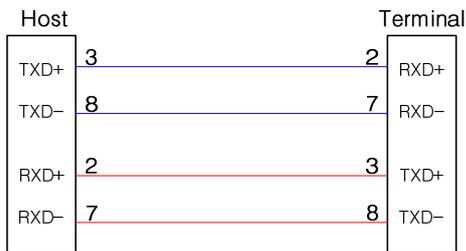
## 1. Pin Assignment of RS422 and RS485 on DB9 Connector



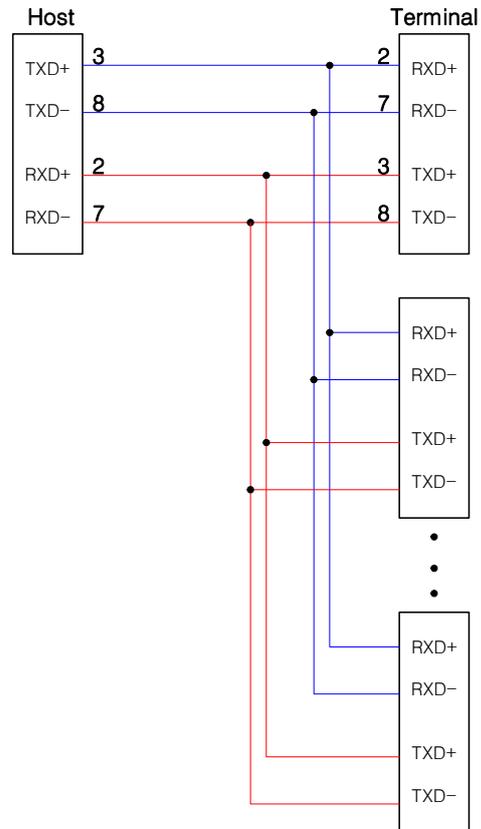
## 2. RS422 and RS485 Networking

### 2.1 RS422 Cabling

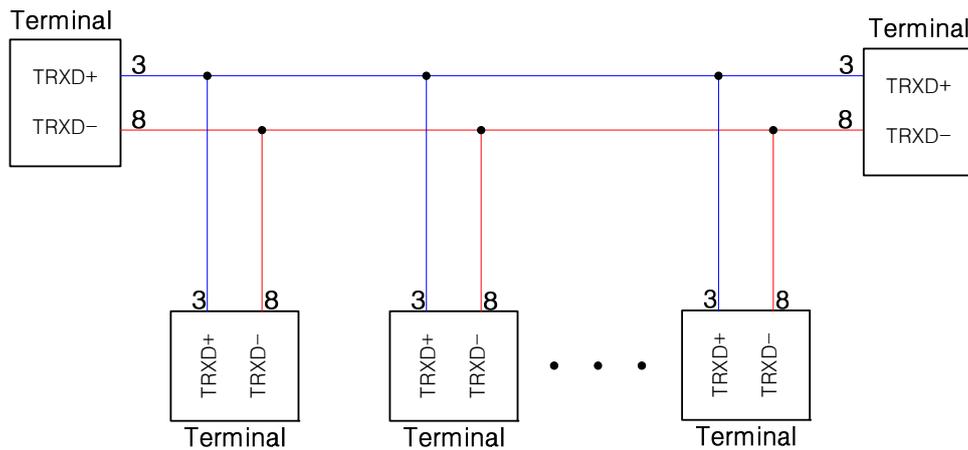
<RS422 Point to Point Networking>



<RS422 Multi-Drop Networking>



### 2.2 RS485 Cabling



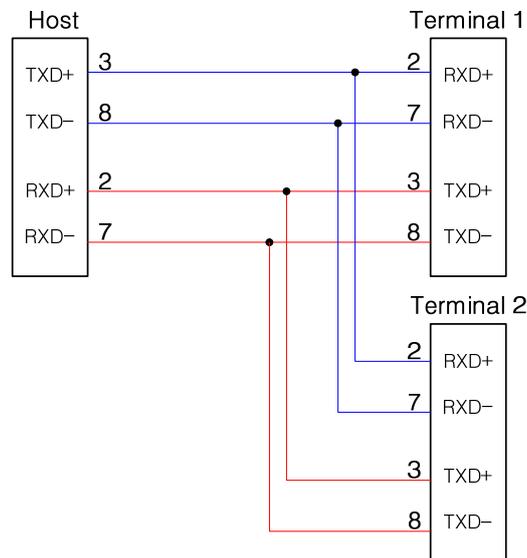
### 3. RS422 Testing

- ① Connect 3 devices with RS422 cabling. (Please refer upper RS422 multi-drop diagram)

In the RS422 point to point mode, the communication is like the RS232 as dull duplex.

We are going to test RS422 in the multi-drop mode. In the view of host, transmitting and receiving are always possible. Receiving is always possible but transmitting is not always possible in the view of terminals. The transmitting is only possible when terminal are admitted by the host.

So we use simple network consisted of 3 devices, one host and two terminals.



- ② After RS422 cabling, execute "TestMP2.exe" and open a serial port.

Assume we use a GoldenTulip-4 and host is COM3, terminal1 is COM4 and terminal2 is COM5.

Run "TestMP2.exe" as a serial test program of SystemBase and open a serial port, COM3. It is working as a host.

Run "TestMP2.exe" and open a serial port, COM4. It is working as a terminal.

Run "TestMP2.exe" and open a serial port, COM5. It is working as a terminal.

And then you will see the three windows of TestMP2.

Port Open: Select "Port" of menu bar → Select "Open Port(s)".

③ Host send data to two terminals.

Click 'send data' in the COM3 of TestMP2 window. (select "Port" → Select "Send Test Data".)

You can see test patterns in the COM4 and COM5 windows.

It are a data flows from host to two terminals.

④ Terminal1 send data to host.

Click 'send data' in the COM4 of TestMP2 window. (select "Port" → Select "Send Test Data".)

You can see test patterns in the COM3 as host.

It is a data flow from terminal1 to host.

⑤ Terminal2 send data to host.

Click 'send data' in the COM5 of TestMP2 window. (select "Port" → Select "Send Test Data".)

You can see corrupted test patterns in the COM3 as host.

There is data collision at COM3 receiving port because the terminal1 and terminal2 send data to same destination, COM3 at same time. So the receiving data of COM3 is corrupted.

⑥ Terminal1 quit data sending to host.

Click 'send data' again in the COM4 of TestMP2 window. (select "Port" → Select "Send Test Data".)

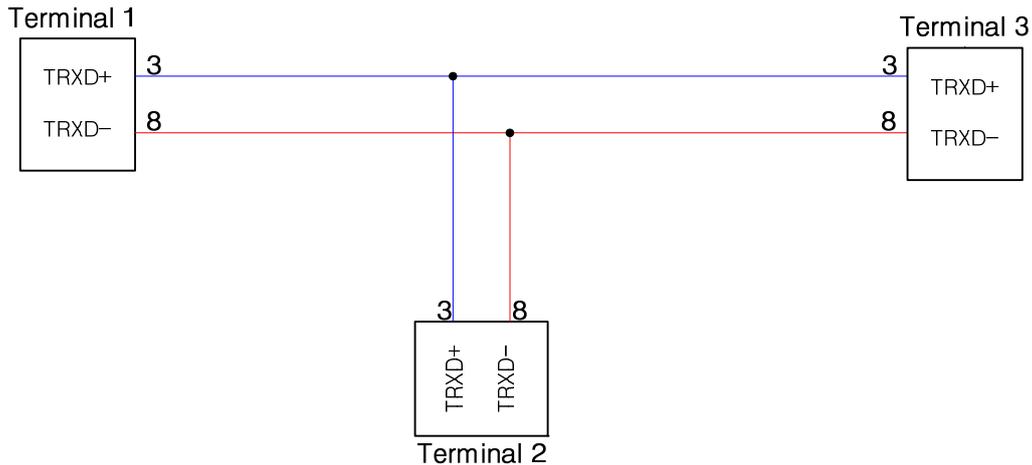
It will stop sending data to host and you can see normal test patterns in the COM3 as host.

The corrupted test data pattern disappear because there is only one data flow from terminal2 to host.

## 4. RS485 Testing

① Connect 3 devices with RS485 cabling. (Please refer upper RS485 networking diagram)

In the RS485 mode, the communication method is half duplex. When one device among the devices on RS485 network send data, other device have to receive only. When more than two devices send data on RS485 network, the data collision take places on RS485 network.



There are two communication mode on RS485. One is Echo Mode and the other is Non-Echo Mode. In the echo mode, the terminal receive data same as transmitting data itself. But the terminal do not receives data transmitting itself.

- ② After RS485 cabling, execute "TestMP2.exe" and open a serial port.

Assume we use a GoldenTulip-4 and terminal2 is COM3, terminal2 is COM4 and terminal3 is COM5.

Run "TestMP2.exe" and open a serial port, COM3. It is working as a terminal1.

Run "TestMP2.exe" and open a serial port, COM4. It is working as a terminal2.

Run "TestMP2.exe" and open a serial port, COM5. It is working as a terminal3.

And then you will see the three windows of TestMP2.

Port Open: Select "Port" of menu bar → Select "Open Port(s)".

- ③ Terminal1 send data to RS485 network.

Click 'send data' in the COM3 of TestMP2 window. (select "Port" → Select "Send Test Data".)

You can see the test patterns in the COM4 and COM5 windows.

It is a data flow from terminal1 to terminal2 and terminal3.

If you set the terminal to RS485 echo mode, you can see the test patterns in the COM3 windows.

The patterns are transmitting data itself.

The transmitting data loop back to receiving port of COM3.

- ④ Terminal2 send data to RS485 network.

Click 'send data' in the COM4 of TestMP2 window. (select "Port" → Select "Send Test Data".)

You can see the corrupted test patterns in the COM3 and COM5 windows.

There are two data flows. One is from terminal1 to terminal2 and terminal3. The Other is from terminal2 to terminal1 and terminal3. These two data flow conflict on RS485 network.

If you set the terminal2 to RS485 echo mode, you can see the corrupted test patterns in the COM4 windows.

- ⑤ Terminal1 quit data sending to RS485 network.

Click 'send data' again in the COM3 of TestMP2 window. (select "Port" → Select "Send Test Data".)

It will stop sending data from terminal1 and you can see normal test patterns in the COM4 and COM5. If you set the terminal to RS485 echo mode, you can see the test patterns in the COM3 windows.

- ⑥ Terminal3 send data to RS485 network.

Click 'send data' in the COM5 of TestMP2 window. (select "Port" → Select "Send Test Data".)

You can see the corrupted test patterns in the COM3 and COM4 windows.

There are two data flows. One is from terminal2 to terminal1 and terminal3. The Other is from terminal3 to terminal1 and terminal2. These two data flow conflict on RS485 network.

If you set the terminal2 to RS485 echo mode, you can see the corrupted test patterns in the COM5 windows.

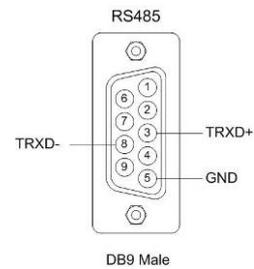
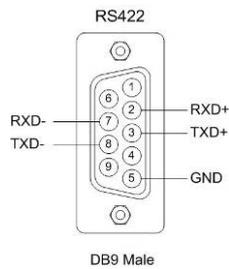
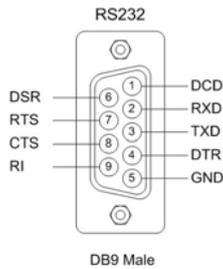
- ⑦ Terminal2 quit data sending to RS485 network.

Click 'send data' again in the COM4 of TestMP2 window. (select "Port" → Select "Send Test Data".)

It will stop sending data from terminal2 and you can see normal test patterns in the COM3 and COM5. If you set the terminal to RS485 echo mode, you can see the test patterns in the COM4 windows.

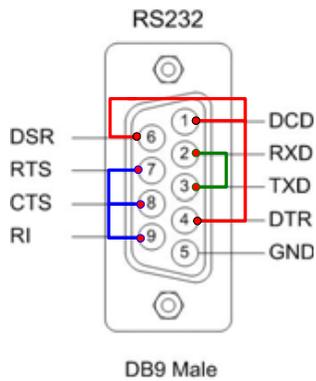
# ANSC002. How to make loopback connectors

## 1. Pin Assignment of RS232/RS422/RS485 on DB9 Connector



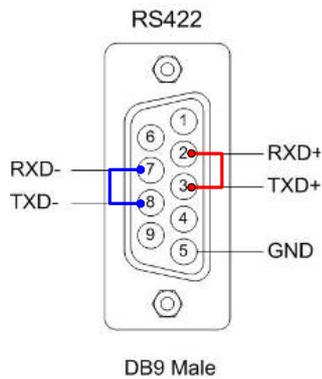
## 2. Loopback

### 2.1 RS232 Loopback



- ① Connect TXD (3) and RXD(2).
- ② Connect DTR (4), DSR(6) and DCD(1).
- ③ Connect RTS (7), CTS(8) and RI(9).

### 2.2 RS422 Loopback



- ① Connect TXD+ (3) and RXD+ (2).
- ② Connect TXD- (8) and RXD- (7).

### 2.3 RS485 Loopback (Do not need a loopback connector)

If you use the echo mode of RS485, transmitting data get back to receive data.

## 3. Testing in DOS

SystemBase support a DOS test program, SBTEST1050 for manufacturer.

It can help to test in manufacturing quickly. SbTEST1050 tests the multiport for local loopback, external loopback and interrupts for each port.

Below figure is the testing display of SBTEST1050.

