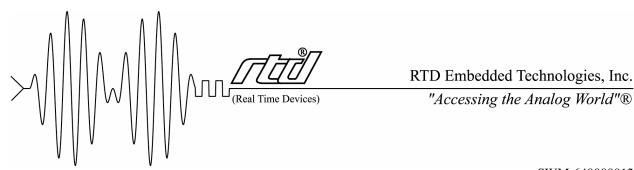
APPLICATION NOTE

Programming Serial Ports in RS422/RS485 Mode



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Revision History

03/26/2004 Revision A issued.

New manual naming method.

06/11/2004 Revision B issued.

Removed references to ANC115.

Cleaned up formatting.

Cleaned up copyright and trademarks.

Added section for Linux

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Introduction

All cpuModules and utilityModules CM310, CM312, CM313 designed by Real Time Devices have serial ports which support RS232 and RS422/485. RS-232 is a well known interface used to connect a computer to serial mice, modems and other devices. RS422/485 is less popular but it has some advantages such as cable length up to 4000 feet and the option to connect up to 32 computers/devices in a network. Due to the fact that there are no standard RS422/485 devices (like mice or modems) users need to develop their own protocol and software for serial communication with RS422/485. For more details on RS422/485 see a book: Jan Axelson "Serial Port Complete" ISBN 0965081923

Programming

In software, using RS422/485 is very similar to using RS232. One difference is that when using interface RS422/485 several computers can be connected together. When connecting more then 2 nodes some form of arbitration is needed. The user must develop a protocol to make sure that no two devices send data at the same time. Usually, communication is initiated by a specified master computer. The other computer/device transmits data in reply to the master's request. All other computers/devices would stay in receiving mode with disabled sending (line break). To control sending, the RTS signal is used. On all RTD boards, a low RTS signal enables sending and high RTS disables it. Hardware flow control is not used for RS422/485 communications because RTS is in use.

DOS Example Code

```
DRVR485.C
    File Name:
    Operating System:
                            ROM-DOS
    Compiler:
                            Borland C++ 3.1
    Version:
                                   1.0
Sending a string of data. The first byte to be sent is the address of the recipient computer/device. All computers must
check the address and ignore the message if it is different from its own.
PORT – IO address the serial port.
TERMINATION – end of transmitting byte = 0xC
    Copyright (c) 2003, Real Time Devices USA, Inc.
//send a string to the other computer
//address - address of the other computer/device
// commandString - pointer to a string to send
// returns TRUE if string sent,
// FASLE if error occur
BOOL sendString(char address, char* commandString) {
       char byteToSend=0;
       //flag that sets when TX buffer is ready to get more bytes
       char checkbuffer = 0x20;
       /* Turn RTS off to enable transmission*/
       outportb(portVar.PORT + 4, 0x09);
       outportb(portVar.PORT, address);
```

// wait until buffer is ready

while (1) {

// wait for buffer ready or empty (depending on buffercheck)

while((inportb(portVar.PORT+5) & checkbuffer) == 0x00);

if (TERMINATION==byteToSend) break;

Windows Example Code

This code is a modified Visual C++ 6.0 example from the Microsoft Development Network (MSDN). The original example program can be downloaded from the following URL:

http://msdn.microsoft.com/library/default.asp?url=/library/en-us/vcsample98/html/vcsmpserialsampleforcommunicationsdemonstration.asp

To make this program work with interface RS422/485 need to modify the following code of the original program:

```
1) In function
BOOL NEAR SetupConnection( HWND hWnd )
Replace code:
if (bSet)
    dcb.fDtrControl = DTR_CONTROL_HANDSHAKE;
else
    dcb.fDtrControl = DTR_CONTROL_ENABLE;
with the following code:
    dcb.rRtsControl = RTS_CONTROL_DISABLE; //disable hardware flow control

2) In function
BOOL NEAR WriteCommBlock( HWND hWnd, LPSTR lpByte, DWORD dwBytesToWrite)

After code:
if (NULL == (npTTYInfo = GETNPTTYINFO( hWnd )))
    return ( FALSE );

need to insert the following code:
```

EscapeCommFunction(COMDEV(npTTYINFO), CLRRTS); // Clear RTS right before //starting transmitting

Linux Example Code

For an example of how to use RS422/485 serial port mode under Linux, please see the Software Product SWP-700020032 "RS422/485 Serial Port Mode Example Program for Linux" available from the RTD web site.