



RC Serial Protocol Setup With HyperTerminal

**Revision 1
1/11/2006**



Preface: This document will allow you to test the RC serial protocol via a program such as HyperTerminal. Before attempting to communicate via the serial protocol, please be sure the unit can communicate with the PC software or with a Teaching Pendant.

Applicable to the following controllers/products:

RCP2

ERC

RCS

ECON

Procedure:

1. With controller power off, connect the PC communication cable to the PC and the RC controller.
2. Apply power to the controller and be sure the port switch is in the “ON” position.
3. Open the PC software and connect to the controller, if you have trouble connecting please check all wiring and make sure any programs on the PC that use the serial port have been exited.
4. Go to Parameter > Edit in the PC software and select the axis number then click “OK”. Find the SIO baud rate parameter (#16) and change it to the baud rate you want. Valid baud rates are 9600, 19200, 38400, and 115200 bps. See Figure #1.

No	Name	Value
8	Default speed [mm/sec]	150
9	Default ACC [G]	0.20
10	Default position band [mm]	0.10
11	Default MAX ACC(G) flag	0
12	Default positioning current limit [%]	35
13	Default home current limit [%]	35
14	(For future expansion)	0
15	Disable 'STOP' Input [0:Enable/1:Disable]	0
16	SIO Baudrate[bps]	38400
17	Min delay for activating local transmitter[msec]	5

Fig. 1 SIO Baud Rate Parameter

5. Be sure you have written any parameter changes and restarted the controller. After restarting the controller, please power the controller down and then reapply power. *When the software connects to the controller, it changes the baud rate automatically. Powering down the controller ensures that the baud rate specified in the parameters will be used.*
6. Close the RC Software. Open HyperTerminal or another program you can use to send serial strings to the controller.
7. Name the connection and select an icon, then click “OK”. Next, choose the communication port (usually COM 1) and click “OK”. Finally set the communication settings to those found in figure 2 and click “OK” (please note that your baud rate may be different).

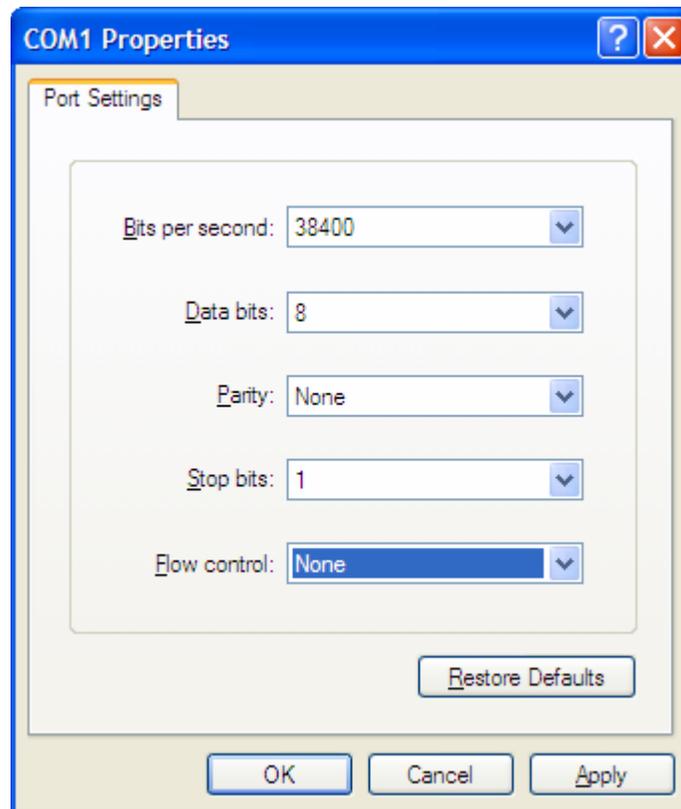


Fig. 2 HyperTerminal COM Settings

8. Once you have “connected” to the COM port, click File > Properties. Then choose the Settings tab as shown in Fig. 3. Next, click on ASCII Setup... and finally, check the “Echo typed characters locally”. Then click “OK” for both windows.

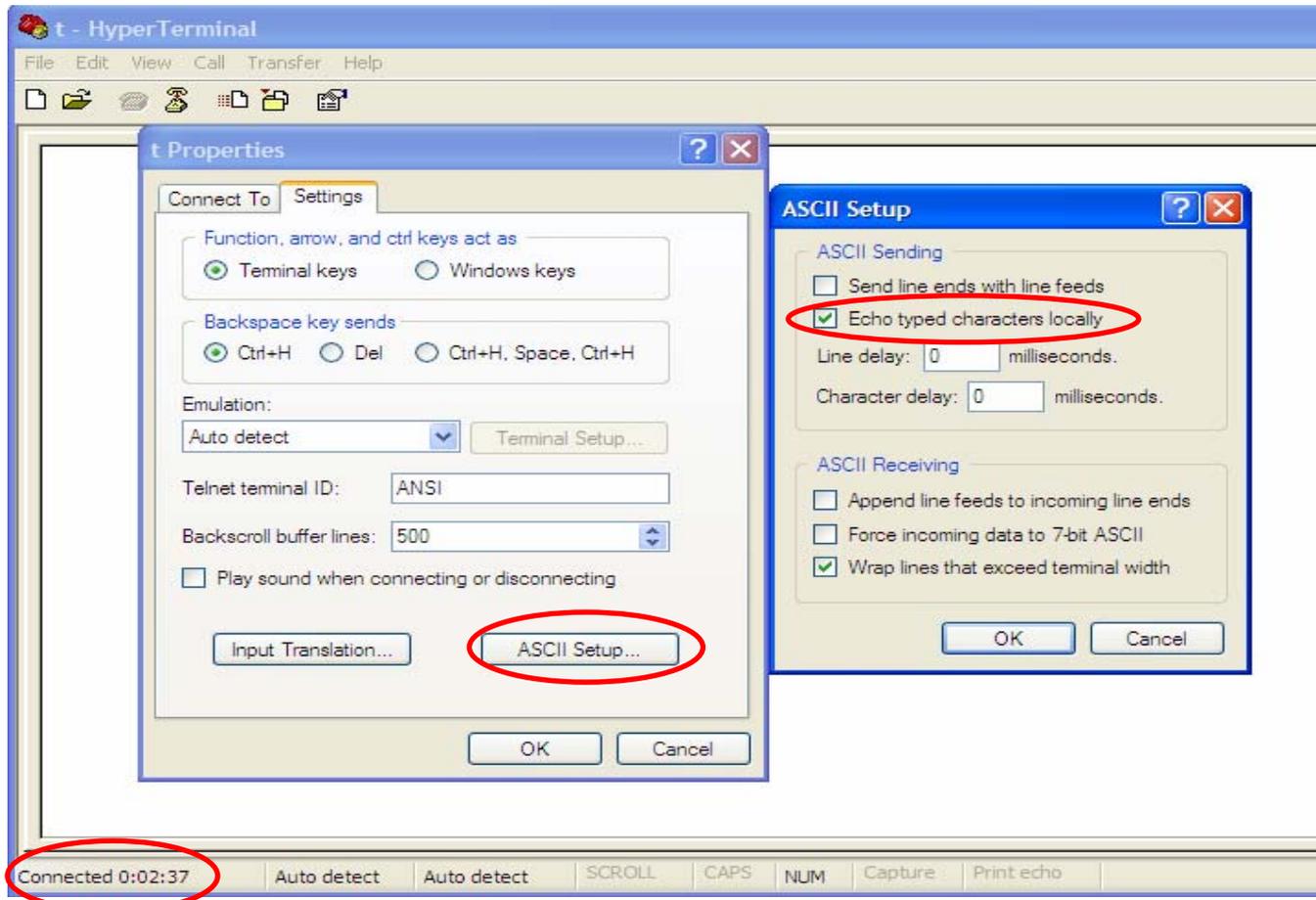


Fig. 3 HyperTerminal Setup

9. The status inquiry string has the following format:
[stx][Addr.]n000000000[BCC][etx]. The stx is the start transmission character (ASCII character 02hex). The Addr. is the controller address (default of 0). The n000000000 is the actual command. The BCC is a two character check (see the appendix for more information). The etx is the end transmission character (ASCII character 03hex). We will learn how to send this next.

10. The BCC will vary by address. A list of the commands can be found in Fig. 4 (without the start and end characters).

Address	Command
0	0n0000000000082
1	1n0000000000081
2	2n0000000000080
3	3n000000000007F
4	4n000000000007E
5	5n000000000007D
6	6n000000000007C
7	7n000000000007B
8	8n000000000007A
9	9n0000000000079
A	An0000000000071
B	Bn0000000000070
C	Cn000000000006F
D	Dn000000000006E
E	En000000000006D
F	Fn000000000006C

Fig. 4 Status Inquiry Commands

11. Type the command in HyperTerminal. To insert the start transmission character press ctrl+b (it should look like a darkened smiley face). Then type the command from Fig 4 for your address followed by the end transmission character, ctrl+c (dark heart). Just by typing the command you will not receive a response, you need to copy the whole command then go to Edit>Copy and then Edit> Paste to Host. This is shown in figures 5 and 6.

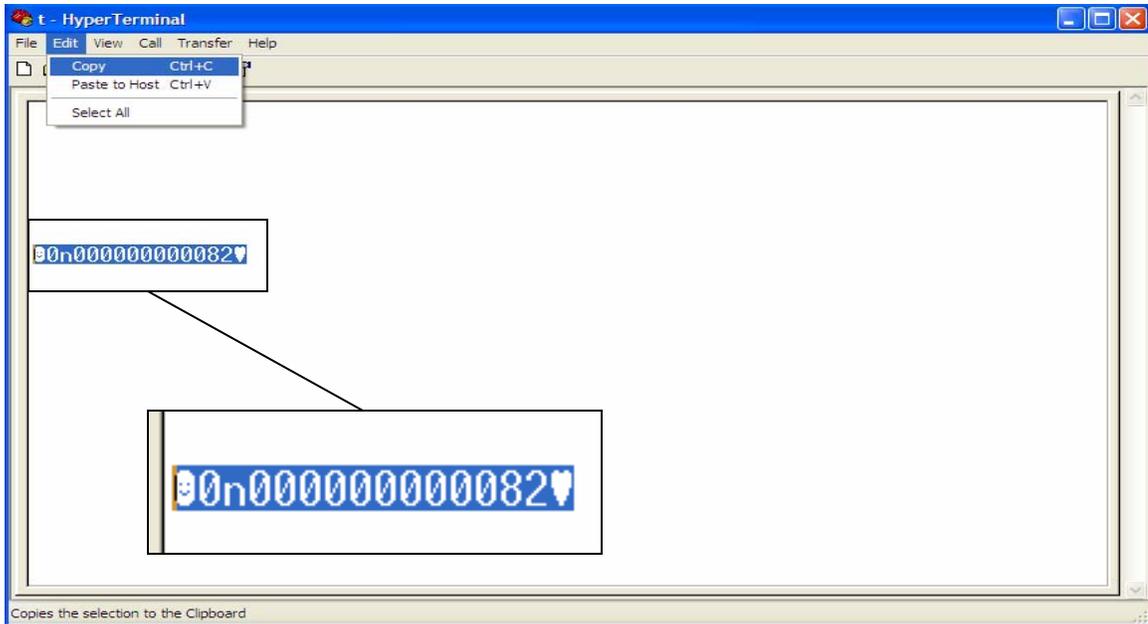


Fig. 5 Copy the Command

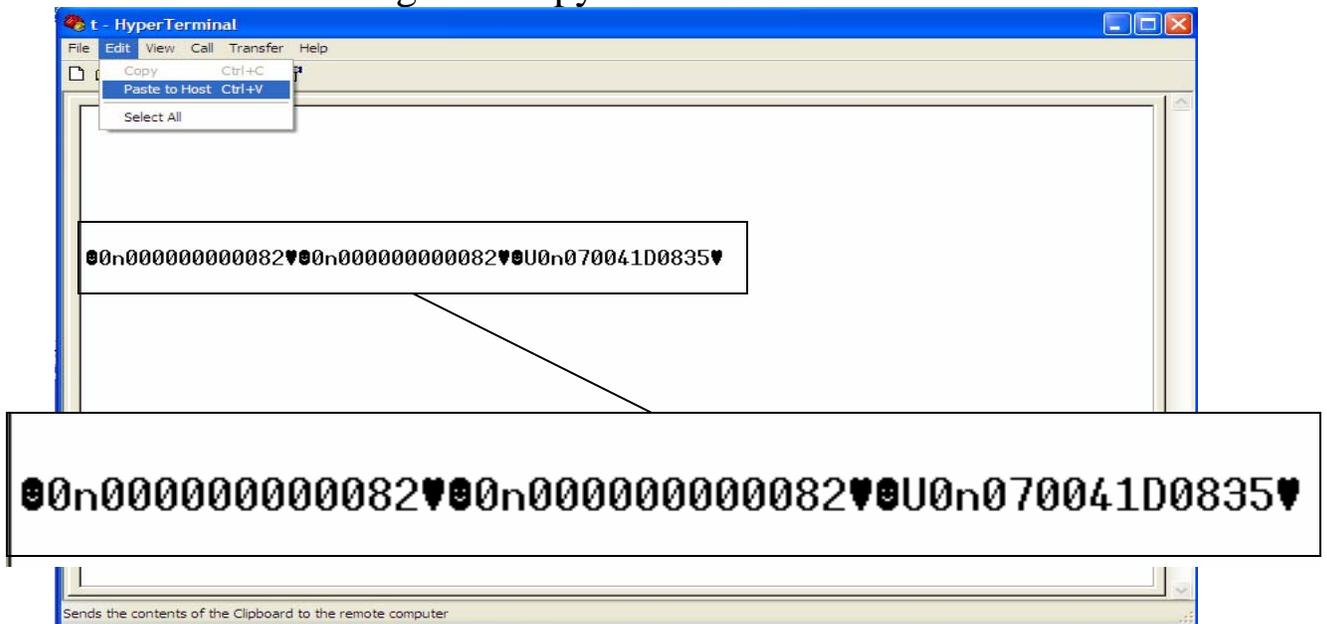


Fig. 6 Paste the command to the host

12. Here, you can see the controller response `U0n070041D0835` in this case.

More Commands

Homing:

The command to home the actuator is
 [stx][addr.]o[org]00000000[bcc x 2][edx]
 “org” is the home direction and the options are listed below

RCP2/ERC

Normal Type: “07” for Home Dir = 1 “08” for Home Dir = 0
 Folded Motor Type: “08” for Hm Dir =1 “07” for Hm Dir = 0

RCS/ECON

Normal Type: “09” for Home Dir = 1 “0A” for Home Dir = 0
 Folded Motor Type: “0A” for Hm Dir =1 “09” for Hm Dir = 0

The commands:

Address	Normal Type (RCP2/ERC)	Folded Motor Type(RCP2/ERC)
0	0o07000000007A	0o080000000079
1	1o070000000079	1o080000000078
2	2o070000000078	2o080000000077
3	3o070000000077	3o080000000076
4	4o070000000076	4o080000000075
5	5o070000000075	5o080000000074
6	6o070000000074	6o080000000073
7	7o070000000073	7o080000000072
8	8o070000000072	8o080000000071
9	9o070000000071	9o080000000070
A	Ao070000000069	Ao080000000064
B	Bo070000000068	Bo080000000065
C	Co070000000067	Co080000000066
D	Do070000000066	Do080000000065
E	Eo070000000065	Eo080000000064
F	Fo070000000064	Fo080000000063

Absolute Position Move:

The command to move the actuator to a specific position is
[stx][addr]a[position(pulses)]00[bcc][edx].

The position (pulses) is calculated by the following formula:

$$\text{Position (pulses)} = \text{Position (mm)} * \text{PPR} / \text{Lead}$$

$$\begin{aligned} \text{Where PPR} = & 800 \text{ for RCP2/ERC} \\ & 16384 \text{ for RCS/ECON} \\ & 8192 \text{ for RA35} \\ & 3072 \text{ for RB75} \end{aligned}$$

From here you take the two's complement only if home dir =1:
FFFFFFFF-Position(Pulses) + 1

Example:

RCP2-SA5-I-PM-3-300-P1-M

The lead is 3 and PPR is 800, we want to move to 150mm

$$\text{Position (pulses)} = 150 * 800 / 3$$

$$\text{Position (pulses)} = 40000 = 9C40(\text{hex})^*$$

$$\text{FFFFFFFF-9C40} + 1 = \text{FFFF63C0}$$

Your command for would be

[stx][addr]aFFFF63C000[bcc][etx]

In order to be able to move, the servo must be on and the hold input has to be on (or disabled).

Example 2:

RCS-RA55-I-100-GN-M-200-S

The lead is 8 and PPR is 16384, we want to move to 50mm

$$\text{Position (pulses)} = 50 * 16384 / 8 = 102400 = 19000 (\text{hex})^*$$

$$\text{FFFFFFFF-19000} = \text{FFFE7000}$$

Command = [stx][addr]aFFFE7000[bcc][etx]

*Use these Hex values with leading 0's if Home Dir = 0

Appendix

A. BCC Calculation Examples

The BCC is calculated by summing all of the hexadecimal ASCII codes of the characters between the STX character and the start of the BCC.

Example 1:

Command = STX 0n0000000000 BCC ETX

Convert each character between STX and BCC to its hexadecimal ASCII code

0 n 0 0 0 0 0 0 0 0 0 0
ASCII = 30 6E 30 30 30 30 30 30 30 30 30 30

$30+6E+30+30+30+30+30+30+30+30+30+30=27E$

Take the two's compliment: $FFFF-27E = FD81$
 $FD81+1=FD82$

Take the 2 least significant characters: BCC = 82

Example 2:

Command = STX AR4000074000 BCC ETX

A R 4 0 0 0 0 7 4 0 0 0
41 52 34 30 30 30 30 37 34 30 30 30

$41+52+34+30+30+30+30+37+34+30+30+30=282$ (hex)

$FFFF-282 = FD7D$
 $FD7D+1 = FD7E$ BCC=7E

B. Troubleshooting

Problem	Possible Solutions
No Response from the controller	<p>Check controller's address</p> <p>Check for correct COM Port</p> <p>Be sure the COM Port is working properly (Can you connect with the PC Software?)</p> <p>Check the Baud Rate</p> <p>Be sure your communication device does not send Breaks when it is idle as this will cause the controller to default to 9600 bps</p> <p>Check BCC</p> <p>Commands are Case Sensitive</p> <p>Please note that some commands are different between RCP2/ERC and RCS/ECON</p> <p>Are you using a USB to Serial Converter? Try a different converter or a PC with a Serial Port.</p>
Can not open COM Port	<p>Make sure you have the correct COM Port</p> <p>Close all processes that may be using the COM Port</p>