

The application note is pertinent to all CT drives with RS232 communications.

Remote Modem Communication with Drives

This document will detail the use of a modem to allow use of several drive software utilities with a drive at a remote location.

Hardware required

1. Two External modems capable of connection at 19.2 K baud. A US robotics 56K external fax modem was used for testing and is the recommended type. The set up instructions in this document are for this modem. One modem will be attached to the local PC communication port and the second to the RS232 or RS485 port of the remote drive.
2. Two 9 pin D female to 25 pin D male RS232 cables.
3. One null modem adapter
4. One male to male 9 pin gender changer.
5. PC running Windows 9x , NT or 2000.

Notes:

1. PCMCIA Hardware (Megahertz XJ1560 was tested) modems made by USR will also work as the local modem with the above utilities except for DriveCom. This fails because it is a DOS program and will not recognize the virtual com port set up by windows when such a modem is installed.
2. PCMCIA "WinModems" will **not** work since they drop the connection when Hyper terminal is closed.

Control Techniques software utilities and drives tested.

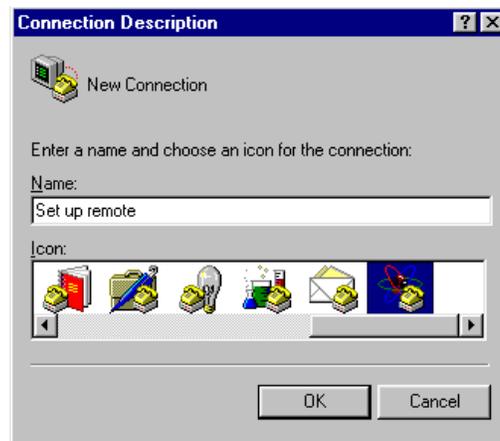
1. UniSoft with Unidrive.
2. DPL toolkit with UD70 and MD29
3. DriveCom with Unidrive and Mentor / Quantum.
4. SyPT
5. CT Net Browser
6. MentorSoft



Remote (drive) Modem Set up

Before connection to a drive the modem must first be set up and the new operating profile stored in its non volatile ram. This is done using the Windows Hyperterminal utility as follows:

1. Set the DIP switches on the back of the modem as follows.
 - a) Pole 1 on This overrides DTR so the modem will not hang up when DTR is absent
 - b) Pole 2 off (default)
 - c) Pole 3 on (default)
 - d) Pole 4 off (default)
 - e) Pole 5 off to enable auto answer.
 - f) Poles 6 & 7 off (default)
 - g) Pole 8 on (default)
2. Connect the modem to the PC com port using one of the cables at item 2 above.
3. Open Hyperterminal in the accessories folder of the windows start menu.
4. Double click the Hypertm.exe icon. This will open up the screen shown below.

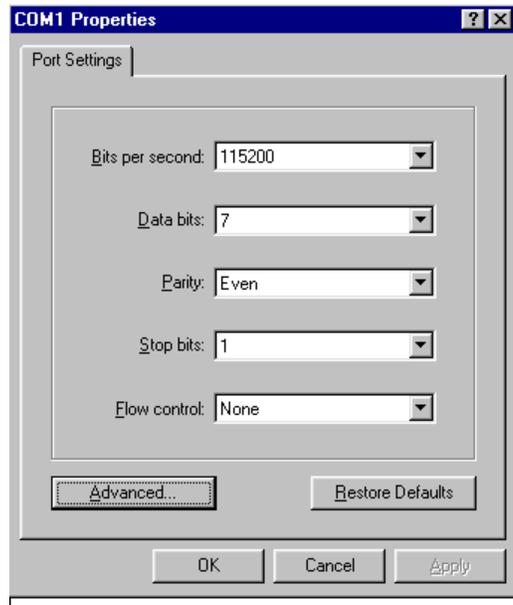


5. Type a name and choose an icon then click OK. This opens a new hyper terminal file and



opens up the window below.

6. Open the drop down menu and select Direct to Com 1 (or Com 2 if this is where the modem is connected). Click OK to open the next screen.
7. Use the drop down menus to set the port parameters as shown in the screen shot below. Click OK and you will be left with main Hyper terminal window.



8. You should now be able to type commands directly to the modem. To test this type AT and hit carriage return. The modem should respond with OK. If so proceed to step 8 if not check that your modem is connected to the correct com port and switched on.
9. Type the following characters and then press carriage return. This assumes that the modem was previously set to factory defaults. If this is not the case a full set of values for the remote modem commands required for the remote location is included at appendix A of this document. For an explanation of the function of these commands refer to the manufacturers Technical Reference manual included on the CDROM supplied with the modem.
ATS0=1&B0&D0&H0&K0&R1 (Note 0 is zero not letter o)
Table 1 at the end of this document explains the function of each of these commands.
10. The operating mode of the modem is now set but will need to be stored to non volatile ram as a profile and this profile should then be set as the power on default. To accomplish this enter **AT&W1** followed by carriage return then **ATY1** followed by carriage return.
11. To check that the commands are set correctly power the modem down momentarily then enter: **ATI4** followed by carriage return. Hyper terminal will display the settings for the active profile. Check that these are as shown in appendix A.

Local Modem Set up

The steps required to accomplish set up of the local modem are identical to those above for the remote except for the following:

Step 7. Bits per second should be set at 19200

Step 9. Input the following character string at this step. Note appendix B lists the full set of values for the local modem.

AT&B1&D0&H0&K0&N10&R1

Notes:

- a) Do not forget to carry out steps 10 and 11 to ensure the profile has been saved and activated
- b) This will leave hyper terminal ready to establish phone connection to the remote when you are ready to use the modem to connect to a remote drive.

Electrical Connections

1. The Local modem should be connected to the PC com port as described above. It will also have to be connected to a suitable **analog** phone line. **Be careful never to connect a modem to a digital phone system since these use higher voltage levels which may damage the modem.**
2. Remote modem should be connected to either the drive com port or the UD70 / MD29 programming port using suitable cables and a null modem adapter. Full cable pin outs for Unidrive modules and Mentor / Quantum drive are at appendix C. Ideally this modem should be connected to a dedicated **analog** phone line. Connecting through a factory PBX makes things considerably more complicated but not impossible.

Drive Parameter settings.

1. Unidrive:

- a) For access through a UD71 communications module RS232 programming port.
#11.24 = 1 ANSI 4 wire
#11.25 = 19200
The value of parameter #11.23 will need to be known so that UniSoft or DriveCom can be set to the correct drive address.
- b) If UD70 programming port is to be accessed using DPL toolkit: the baud rate is fixed at 19200. The baud rate for other packages such as CTNet Browser or SyPT is defined in the CTNETAPI.INI file located in the Windows folder of your PC. For access through the UD70 RS485 port using a suitable patch cable (See appendix C for pin out) or RS232 to RS485 converter:
#17.06 = 1 (ANSI 4 wire)
#17.07 = 19200
The value of parameter #17.05 will need to be known to allow the drive utility software to be set to the correct address

2. Mentor / Quantum:

- a) For access through the RS485 port of the drive:
#11.12 = 1 (9600 Baud)
#11.13 = 1 (ANSI)
- b) If an MD29 programming port is to be accessed using DPL toolkit and the MD29 is later than revision 1 the programming RS232 port baud rate is fixed at 19200. For a revision 1 MD29 the baud rate is 9600.
- c) For access through the MD29 RS485 port using a suitable patch cable or RS232 to RS485 converter:
#14.02 = 1 (ANSI 4 wire)
#14.03 = 192 (19200) baud
The value of parameter #14.01 will need to be known to allow the drive utility software to be set for the correct drive address

Setting up the Drive utility software for use with modem communications.

All of these utilities work by polling the drive parameters and waiting for a response from the drive. In all cases except DriveCom the wait time for this response needs to be increased from the default value when using a modem. The following table show the default value and the modified value which testing found to produce consistent results. If results are inconsistent it may be necessary to lengthen these times still further. For both UniSoft & MentorSoft the "Wait" parameters are accessible from the file menu under General set up. The CTNETAPI settings are contained in the file CTNETAPI.INI located in the Windows folder. This will need to be edited manually using Windows Notepad or a suitable text editor.

Utility or interface	MentorSoft		UniSoft		CT NET API	
Parameter name	Wait mS		Wait mS		Timeout	
	Default	New	Default	New	Default	New
Values	200	250	200	250	100	1500

If the CT net browser utility is being used it is also necessary to manually edit the Protocol parameter in the CTNETAPI.INI file as follows:

1. For communication through an RS232 port on the drive or option module set this to 1 (MD29MON).
2. For communication through the RS485 port of a drive or module set the protocol to 2 (ANSI)

Using the modems to connect to a remote drive

1. For Unidrive and Mentor through MD29 RS485 port or RS232 port later than revision 1. **(19200 baud)**
 - a) Open HyperTerminal.
 - b) Type in the following command:
ATDT(phone number of remote modem)
 - c) Hit the carriage return key and your modem will dial. (You should hear the tones through the modem speaker if the volume is set)
 - d) When the modem connects successfully you will see the following message displayed:
Connect 19200/ARQ/V34/LAPM
 - e) Close Hyper terminal, the modem should remain on line indicated by the CD and ARQ LED's remaining on.
 - f) Start up and use your drive utility as normal remembering to set the comms baud rate to 19200 and the correct drive address if required.
 - g) When you are complete close the drive utility and reopen Hyper terminal.
 - h) Disconnect from the remote modem by hitting +++ (plus three times quickly). The modem should respond with an OK if not repeat.
 - i) Now type **ATH0** followed by carriage return to put the modem back on hook.
 - j) You may also disconnect by simply removing the phone RJ11 plug from the back of the modem or by switching off its power.

2. For Mentor directly to its RS485 port or the programming RS232 port of an MD29 of revision 1. (**9600 baud**)

- a) Open HyperTerminal.
- b) Pull down the file menu and choose Properties.
- c) Click on the Configure Button under the phone number tab.
- d) Change the Bits Per second to 9600 and click on OK.
- e) Close then reopen Hyper terminal (this is necessary to set the modem serial port rate to 9600).
- f) Type the following and hit carriage return, this sets the maximum connect rate to 9600
AT&N6
- g) Type in the following command:
ATDT(*phone number of remote modem*)
- h) Hit the carriage return key and your modem will dial. (You should hear the tones through the modem speaker if the volume is set)
- i) When the modem connects successfully you will see the following message displayed:
Connect 9600/ARQ/V34/LAPM
- j) Close Hyper terminal, the modem should remain on line indicated by the CD and ARQ LED's remaining on.
- k) Start up and use your drive utility as normal remembering to set the comms baud rate to 19200 and the correct drive address if required.
- l) When you are complete close the drive utility and reopen Hyper terminal.
- m) Disconnect from the remote modem by hitting +++ (plus three times quickly). The modem should respond with an OK if not repeat.
- n) Now type **ATH0** followed by carriage return to put the modem back on hook.
- o) You may also disconnect by simply removing the phone RJ11 plug from the back of the modem or by switching off its power.

3. Connection to a remote modem on an extension line of a PBX system:

- a) Ensure that the phone system at the remote location is analog.
- b) **Never connect a modem to a digital phone line.**
- c) Plug a telephone handset into the local modem phone socket.
- d) Start Hyper terminal.
- e) Type **ATD** with no phone number and press carriage return
- f) Pick up the handset and manually dial the remote location, then depending on the phone system either dial the extension or ask to be connected.
- g) When the extension rings immediately hang up the handset.
- h) The modems will connect as in steps 1 and 2.
- i) The remainder of the procedure is identical to that in steps 1 and 2.

Notes:

1. If your local phone connection requires you to dial a number to access an outside line you will need to precede the phone number at steps b) or g) with that number followed by a comma. For example if you need to dial 9 to access a line and then dial the number 775 3601 use the following: **ATDT9,7753601**

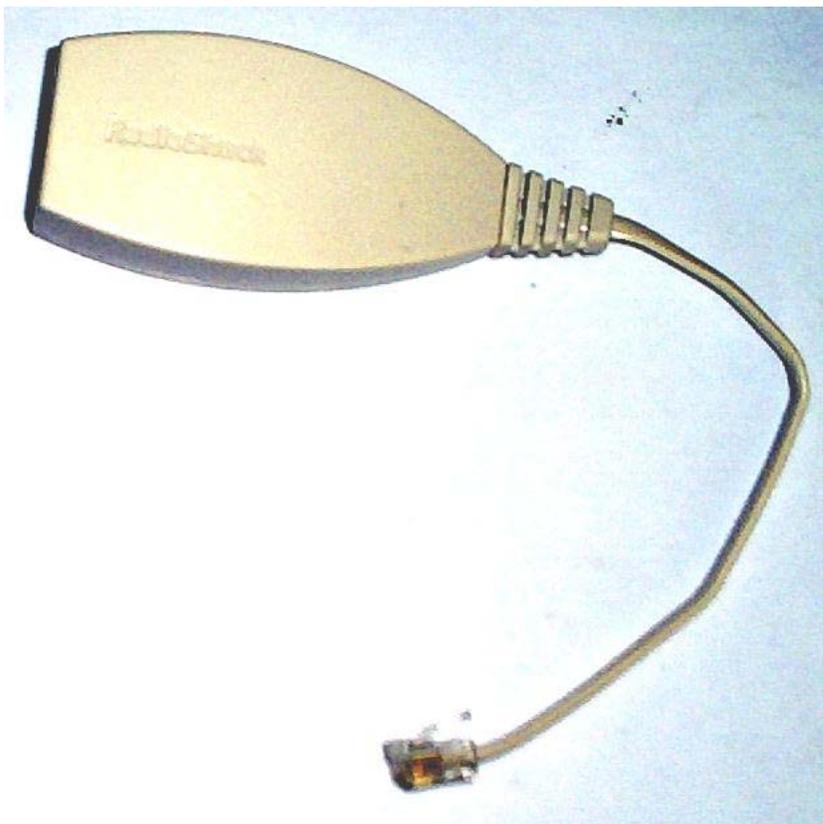
Table 1. explanation of set up commands

Command	Function
S0 = 1	Sets auto answer to 1 ring.
&B0	Serial port baud rate (modem to Drive) variable and follows connection rate
&B1	Serial port rate (modem to PC) fixed.
&D0	DTR override (also set by DIP switch pole 1 on this modem)
&H0	Disable flow control (handshaking)
&K0	Disable data compression
&N10	Forces maximum modem to modem connection rate to 19200 baud
&R1	Ignore RTS

Note that the table only explains those commands which differ from their default values and are used in the set up strings above. The full modem profiles are at appendix A and B. For an explanation of all available commands refer to the Manufacturers Technical Reference Manual supplied on the CDROM which comes with the modem.

Un-Reliable Communications

Should you experience intermittent communication drop-outs, it is most likely due to electrical noise disturbances. In this case we have found that a simple, low-cost remedy for many such situations can be the application of a telephone line filter readily available from Radio Shack. See photos below of this item.



Occasionally communications may still be unreliable even when the simple filter is used. This may be particularly evident when connecting to a Unidrive through the UD7x RS232 port. In these cases it is strongly recommended that a suitable port opto isolator is used between the drive and the modem. Model 232POP4 from Black Box electronics was tested. If this model is used it needs to be separately powered with a 12VDC 30mA supply on the drive (DCE) side of the interface. The isolator uses 25 pin D connections and could be connected directly to the back of the modem. Please note that this will require a male / male 25 pin gender changer on the modem side and a female / female 25 pin gender changer on the output side where the 25 pin to 9 pin serial adapter is fitted.

The manufacturers instruction sheet for this isolator is appended at appendix C of this application note.

Questions? Ask the Author:

Author: Terry Walsh **e-mail :** terry.walsh@emersonct.com **(716)-774-0093**

Appendix A: Full profile for remote modem

```
DRIVES - HyperTerminal
File Edit View Call Transfer Help

ati4
U.S. Robotics 56K FAX EXT Settings...

B0 E1 F1 M1 Q0 V1 X4 Y1
BAUD=19200 PARITY=E WORDLEN=7
DIAL=TONE ON HOOK CID=0

&A3 &B0 &C1 &D0 &G0 &H0 &I0 &K0
&M4 &N0 &P0 &R1 &S0 &T5 &U0 &Y1

S00=001 S01=000 S02=043 S03=013 S04=010 S05=008 S06=002
S07=060 S08=002 S09=006 S10=014 S11=070 S12=050 S13=000
S15=000 S16=000 S18=000 S19=000 S21=010 S22=017 S23=019
S25=005 S27=000 S28=008 S29=020 S30=000 S31=128 S32=002
S33=000 S34=000 S35=000 S36=014 S38=000 S39=000 S40=001
S41=000 S42=000

LAST DIALED #:

OK

Connected 0:00:10 ANSI 19200 7-E-1 SCROLL CAPS NUM Capture Print echo
```

Appendix B: Full Profile for Local Modem (19200 connection rate).

```
DRIVES - HyperTerminal
File Edit View Call Transfer Help

ati4
U.S. Robotics 56K FAX EXT Settings...

B0 E1 F1 M1 Q0 V1 X4 Y1
BAUD=19200 PARITY=E WORDLEN=7
DIAL=TONE ON HOOK CID=0

&A3 &B1 &C1 &D0 &G0 &H0 &I0 &K0
&M4 &N10 &P0 &R1 &S0 &T5 &U0 &Y1

S00=001 S01=000 S02=043 S03=013 S04=010 S05=008 S06=002
S07=060 S08=002 S09=006 S10=014 S11=070 S12=050 S13=000
S15=000 S16=000 S18=000 S19=000 S21=010 S22=017 S23=019
S25=005 S27=000 S28=008 S29=020 S30=000 S31=128 S32=002
S33=000 S34=000 S35=000 S36=014 S38=000 S39=000 S40=001
S41=000 S42=000

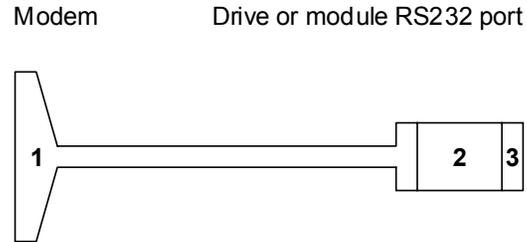
LAST DIALED #: 7753601

OK
-
```

Connected 0:00:11 ANSI 19200 7-E-1 SCROLL CAPS NUM Capture Print echo

Appendix C: Modem to Drive Cables

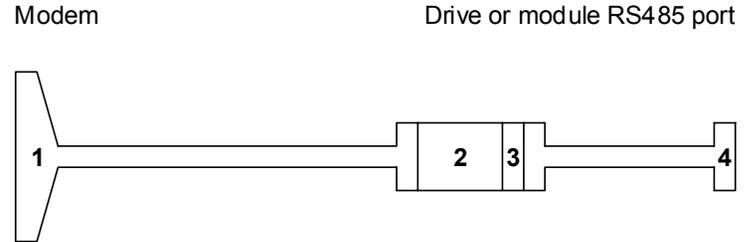
Drive RS232 port connection scheme



Key:

1. 25 pin D male to 9 pin D female RS232 Cable.
2. Null modem adaptor 9 pin male to female
3. 9 pin male - male gender changer

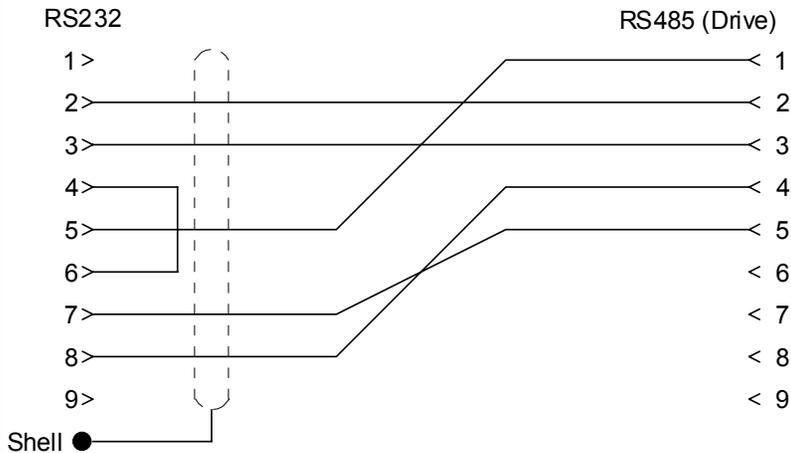
Drive RS485 port connection scheme



Key:

1. 25 pin D male to 9 pin D female RS232 Cable.
2. Null modem adaptor 9 pin male to female
3. 9 pin male - male gender changer
4. RS232 9 pin female to RS485 9 pin female patch cable

ITEM 4. RS232 to RS485 Patch cable pin out



Control Techniques Drives Inc			
<small>DRAWN</small> Terry Walsh 8-1-2000	Cable schemes RS232 & RS485		
<small>ENGINEER</small> Terry Walsh 8-1-2000			
<small>SIZE</small> A	<small>DWG NUMBER</small> Appendix C		
<small>SCALE</small> 1 : 1	<small>REV</small> -	<small>SHEET</small> 1 OF 1	

For additional information click on link below

www.bb-elec.com

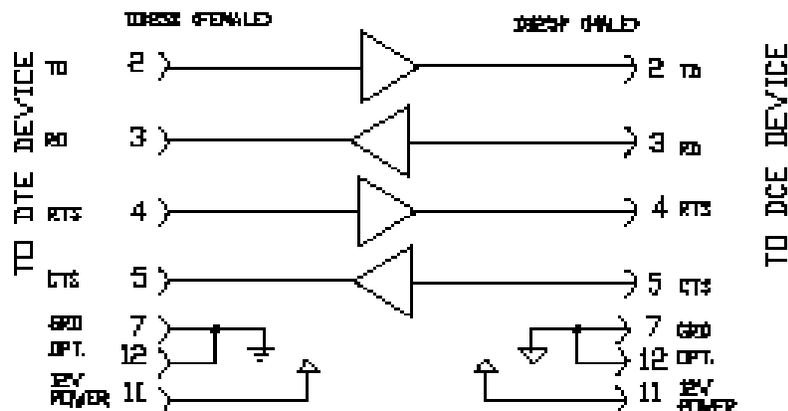
232SPOP44995 - pg. 1/2

RS-232 to RS-232 Port-Powered Optical Isolator MODEL 232SPOP4

Document No. 232SPOP44995



The Model 232SPOP4 optically isolates four RS-232 lines. The isolator has a DB25S female connector on the DTE side and a DB25P male connector on the DCE side of the isolator. Signals pass through the isolator as follows:



When connecting the Model 232SPOP4 it is recommended that all signals that are outputs be connected. The Model 232SPOP4 derives power from these signals, even if they are not used by your system.

On a DTE device, with a DB25 pin connector, the following lines are outputs:
TD(2), RTS(4), DTE READY(DTR) (20)

On a DCE device, with a DB25 pin connector, the following lines are outputs:
RD(3), CTS(5), DCE READY(DSR) (6), RLSD(CD) (8)

On a DB9 pin IBM compatible computer with a standard serial port the outputs are:
TD(3), RTS(7), DTE READY(DTR) (4)

If you don't know if your ports are DTE or DCE disconnect the cables and connect a breakout box. Connect the breakout box to only one port at a time. When the output lines are in the idle condition, they will indicate a negative state. If the output lines are in a constant active condition, they will indicate the positive state. If the lines are inputs, the LEDs on the breakout box will not light.

If your port meets the low voltage requirements of RS-562, you will need to externally power the isolator. An RS-562 port will only produce about 3.7 volts, which is not adequate to power the isolator. Probably the only devices that will have this type of port are notebook computers or very low power laptop computers. To externally power the isolator connect each side of the isolator to a separately isolated +12 V power supply (30 ma). Connect +12 VDC to pin 11 and Ground to pin 12 on one side of the isolator to one power supply. Connect +12 VDC to pin 11 and Ground to pin 12 on the other side of the isolator to the second power supply.

NOTE: When using an external supply, the supply should be connected only to specifically labeled power inputs (power jack, terminal block, etc.). Connecting an external power supply to the handshake lines may damage the unit. Contact technical support for more information on connecting an external power supply to the handshake lines.

The Model 232SPOP4 can be used at data rates up to 38.4K baud.

© B&B Electronics - Revised December 1995

B & B electronics
MANUFACTURING COMPANY

707 Dayton Road • PO Box 1040
Orion, IL 61350 USA
Phone: (815) 433-5180 • FAX: (815) 434-7094