Technical Note #610

VT-Modem Connects to Allen-Bradley PLC-5

Abstract: This technical note is an instructional guide for interfacing a SIXNET VT-MODEM-1, industrial telephone modem, with an Allen-Bradley PLC-5.

Twin Cities Industrial Control, a distributor and System Integrator for SIXNET, has created the following tutorial for interfacing the SIXNET Industrial Telephone Modem with Allen-Bradley 6200 Software and the PLC-5. This modem interface provides long distance communication between the operator and the PLC. Diagnostics and troubleshooting can now be done from hundreds of miles away. This provides a great advantage to operators because problems can now be solved and corrected without having to travel to the PLC itself.

Note: *All settings were done using 6200 software from Allen-Bradley. This may cause some of the keystrokes to change should you use other programming software. However the configurations remain the same.*

The first step is to make the physical connection between your PC and the modem, the cable necessary is the one supplied with the modem (VT-CABLE-MDM). It is a straight through cable, DB-9 (male) to DB-9 (female).

DB-9 (female) Computer			DB-9 (male) Modem
DCD	1	1	DCD
TXD	2	2	TXD
RXD	3	3	RXD
DTR	4	4	DTR
GND	5	5	GND
DSR	6	6	DSR
RTS	7	7	RTS
CTS	8	8	CTS
RI	9	9	RI

Connect your modem to a terminal program (i.e. Windows HyperTerminal) for configuration.

— Important —

Choose the baud rate that matches the PLC or other device that will be connected to the modem. Anytime a setting is saved using &W0 or &W1, the RS232 baud rate is memorized by the VT-Modem.

The saved baud rate will be used for future communications with any attached device that does not initiate communications with the modem (such as most PLC's).
Send the following AT commands. The commands in **bold** need to be sent, the others may be necessary if you still cannot communicate.

ATS0=1	**(Sets the modem to auto answer)**
AT%C0	**(Turns off data compression)**
AT%E0	**(Disables the internal line quality check)**
AT&D0	**(Tells the modem to ignore DTR)**
AT&K0	**(Disables flow control)**
AT\N1	**(Sets the operating mode of the modem to direct asynchronous communication, no send/receive buffers, and no error checking)**
ATS37=9	(Sets the modem to modem baud rate to 9600)
ATN0	(Forces modem to communicate to modem at baud rate set up by S37)
AT+H0	(Turns off the Rockwell (voice) chipset)

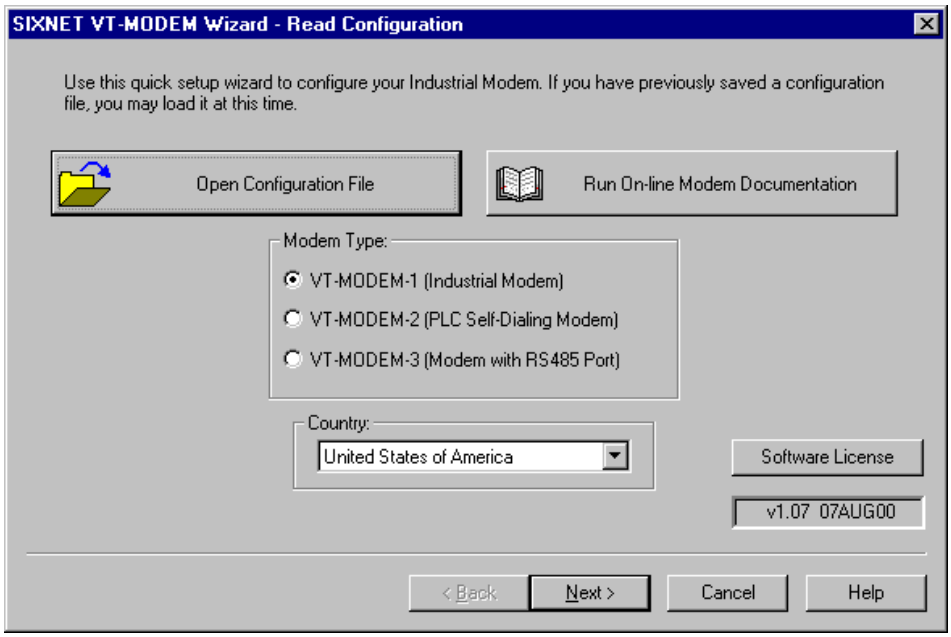
Store the above AT commands to user profile 0 (or 1), with the following command: **AT&W0** (or **W1**).

If you wish to load this profile upon power up, you will want to use the load command:
AT&Y0 (or **Y1**) depending upon which stored profile you saved the previous set of commands to.

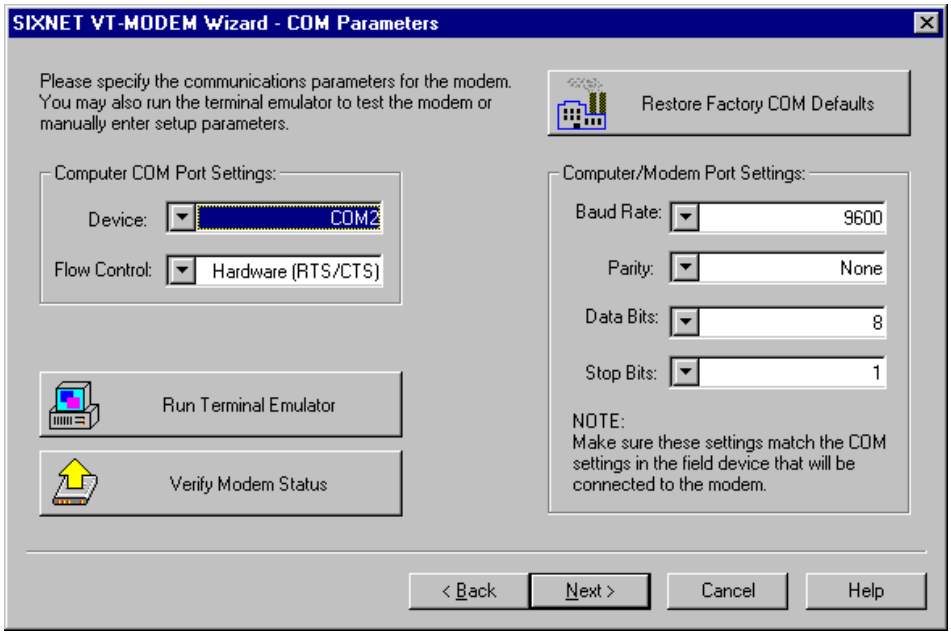
Now, the receiving modem is set up. You do not need to configure the sending modem.

Loading Pre-Configured Settings into the VT-MODEM-1:

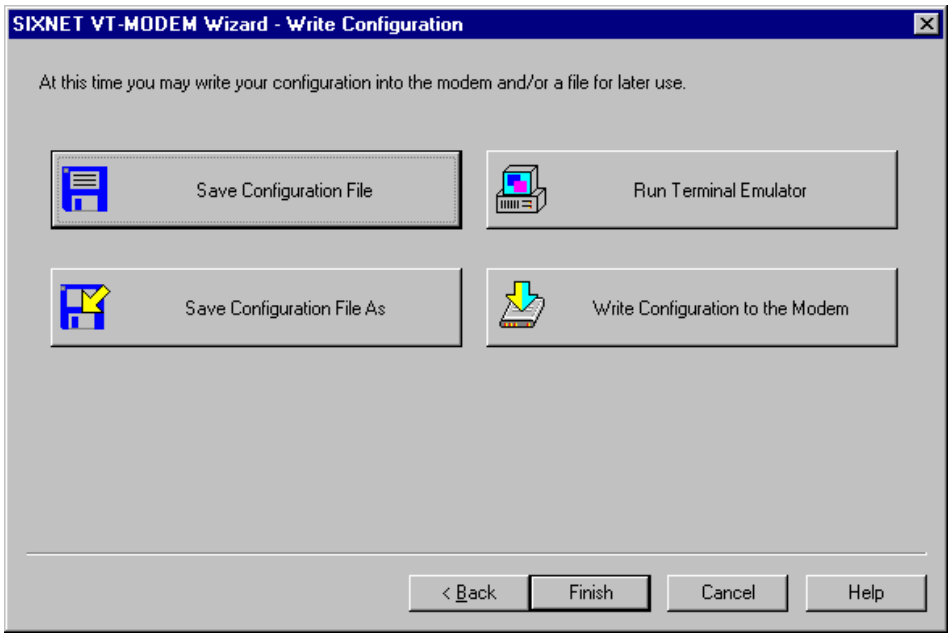
The Modem settings above can also be loaded using the VT-MODEM Setup Wizard included with the VT-MODEM-#. Use the configuration file (ABPLC5.6ms) located on the latest SIXNET CD, your local SIXNET representative and the modem section in www.Get2Support.com. Open the VT-MODEM Setup Wizard. In the *Load Configuration* window click on the "Open Configuration File" button, and open the ABPLC5.6 file (See Screen Shot 1). Select the communications port the SIXNET VT-MODEM-1 is connected to (COM 2 in this case) in the *COM Parameters* window (See Screen Shot 2). Load the configuration into the modem using the "Write Configuration to the Modem" button in the *Write Configuration* Window (See Screen Shot 3).



Screen Shot 1



Screen Shot 2



Screen Shot 3

PLC-5 Configuration Settings

Step 1: Connect your computer to the PLC using a null modem cable (Cross-wire).

DB-9 (female) Computer			DB-25 (male) PLC-5	
DCD	1	8	DCD	
TXD	2	2	RXD	
RXD	3	3	TXD	
DTR	4	20	DTR	
GND	5	7	GND	
DSR	6	6	DSR	
RTS	7	4	RTS	
CTS	8	5	CTS	
RI	9	22	RI	*(not used)*

Step 2: Go online with the PLC.
Go to channel configuration and look at channel 0 of the PLC. It should read:
Channel 0:SYSTEM (POINT-TO-POINT)

Step 3: Enter the configuration of the channel. Leave all defaults except for the baud rate, set the baud rate to 9600. You may wish to enable a diagnostic file as well if you do not have one configured.

[Here is a snapshot of what the CH 0 configuration looks like:]

Diag. File:	**N50**		
Remote mode change:	**ENABLED**	**System mode char:**	**S**
Mode attention char:	**\0x1b**	**User mode char:**	**U**
Baud rate:	**9600**	**Parity:**	**NONE**
Stop bits:	**1**		
Control line:	**NO HANDSHAKING**		
Duplicate detect:	**ON**	**Error detect:**	**BCC**
ACK timeout (20 ms):	**50**	**NAK receive:**	**3**
		DF1 ENQS:	**3**

Now the PLC is set to receive remote data through **Channel 0** at 9600 baud.

Connecting the modem to the PLC-5

This connection requires a straight through cable, like the one used to connect your PC to an external modem. This cable has DB-9 (female) and a DB-25 (male) connectors. You can use the VT-CABLE-MDM, but a gender changer is needed on the male side. Otherwise, you will have to make your own cable or have SIXNET custom make one for you.

DB-9 (female) Modem		DB-25 (male) PLC-5
DCD	1 ——	8 DCD
TXD	2 ——	3 TXD
RXD	3 ——	2 RXD
DTR	4 ——	20 DTR
GND	5 ——	7 GND
DSR	6 ——	6 DSR
RTS	7 ——	4 RTS
CTS	8 ——	5 CTS
RI	9 ——	22 RI

From the main menu, go to: **Online Configr (F2)**
When the configuration screen comes up, Tap the **F2** key until it says "**Serial to PLC, KE/KF**"
Next, tap **F1** until you have the correct serial port (**com1 or com2**).
Tap the **F3** key until you are set to the correct baud rate (9600 in this example).

An example of what the screen looked like follows:

F1 Port COM2

F2 Communication Port **Serial to PLC, KE/KF**
F3 Baud Rate **9600**
F4 Device Address **077**
F5 PLC Address **002**
F6 Parity **NONE**
F7 Duplex **FULL**
F8 Error Check **BCC**
F9 Save Configuration

F10 Modem Setup

*Everything is default except **F1, F2, F3 and F10 (Modem Setup)**.*

Hit **F10** and a new screen pops up.

F7 Use Modem **Yes**
F8 Modem String **[AT]**

Toggle **F7** to use the modem, and then tap **F8**. That will bring up the place to enter the modem string. If your dial out modem is internal, the string should look something like this:

AT&T2&W DT1,234,1234567\x0D

The last characters, **\x0D** can also be changed to **\o15** or **\d13**.
If your dial out modem is not internal, you will not need the first set of characters **&T2&W**. your string will look something like this:

ATDT1,234,1234567

Hit escape two times, and you will be back at the main menu. You are now ready to dial out to the PLC. Tap the **F1** key, and communications will proceed. It takes about 30 seconds for the computer and PLC to begin talking.