

Remote Access to MITSUBISHI MELSEC PLC Using a VT-MODEM

Abstract: This document explains the procedure for dialing and establishing communications with an MITSUBISHI MELSEC “A-Series” A1SJCPU PLC using a SIXNET industrial modem (VT-MODEM-#).

A model A1SJCPU PLC from MITSUBISHI can be controlled remotely via an analogue dial-up telephone line using a SIXNET industrial modem. The A1SJCPU can be programmed to perform its poll of I/O modules or other devices through the phone connection.

Software Used:

- MELSEC MEDOC v2.30
- SIXNET VT-MODEM Setup Wizard v1.15
- Hilgraeve HyperTerminal for Windows
- Windows 2000 OS

Hardware Used:

- (1) PC with a serial port connection to a VT-MODEM-1 via the VT-CABLE-MDM
- (1) MITSUBISHI MELSEC A1SJCPU PLC
- (1) MITSUBISHI MELSEC A1SJ71UC24-R2 RS232 DB9 Female adapter port
- (1) VT-MODEM-2
- (1) DB9 gender changer (straight-wired DB9 female-to-male)
- (2) VT-CABLE-MDM (straight wired DB9 male to female)
- (2) RJ11 telephone cables

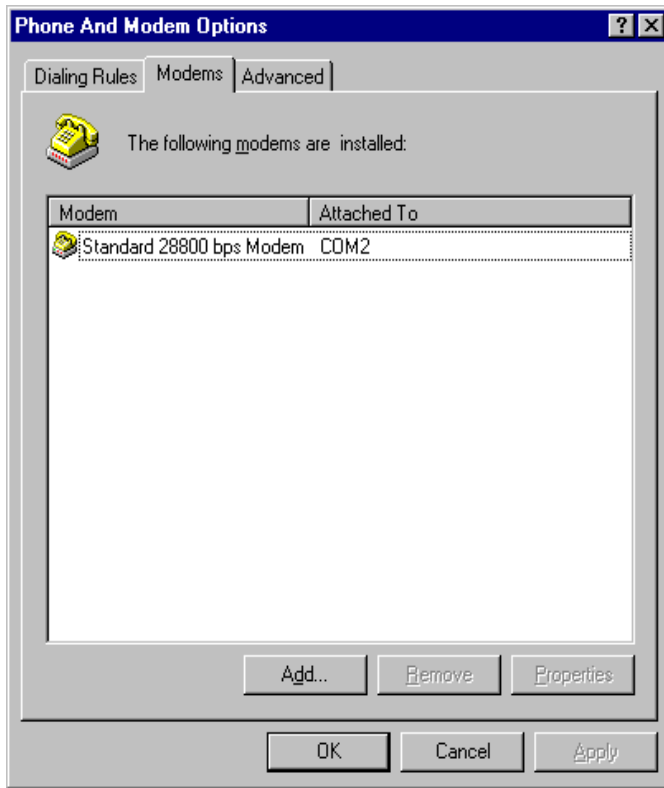
Cable Pin-outs:

VT-CABLE-MDM				
DB9 Female to PC or Male (with gender changer) to PLC (DTE)			DB9 Male to modem (DCE)	
DCD in	1	←	1	DCD out
RD in	2	←	2	RD out
TD out	3	→	3	TD in
DTR out	4	→	4	DTR in
GND	5	–	5	GND
DSR in	6	←	6	DSR out
RTS out	7	→	7	RTS in
CTS in	8	←	8	CTS out
RI in	9	←	9	RI out

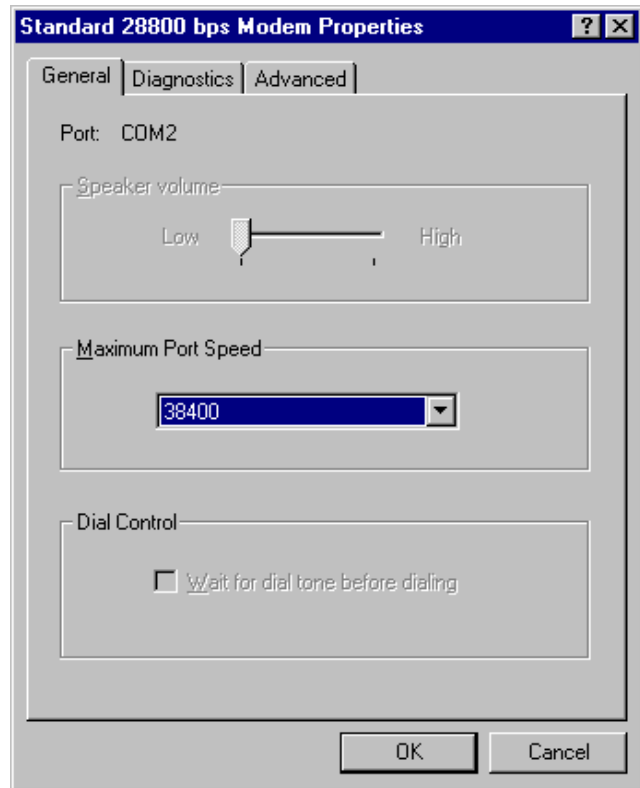
PC and VT-MODEM-1 Windows Setup:

Note: A SIXNET VT-MODEM-1 was used during testing on the local PC running MEDOC software. However, most internal PC modem cards will function properly as the dialing modem in this application.

To configure Windows to recognize the VT-MODEM-1, go to Start → Settings → Control Panel → Phone and Modem options. Next, go to the Modems tab in the Phone and Modem options window, and then click on Add... Next, check the “Don’t detect my modem; I will select it from list” box and manually select “Standard 28800 bps Modem” from the modem type list. Refer to screen shots 1 and 2 below for details of how the modems were configured.



Screen Shot 1



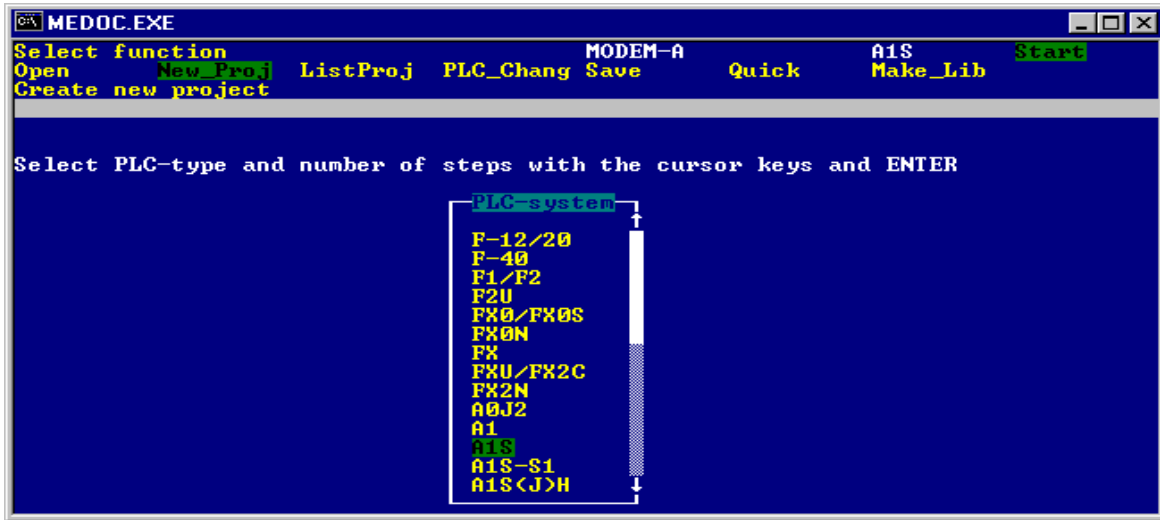
Screen Shot 2

Configuring the Hardware and Software:

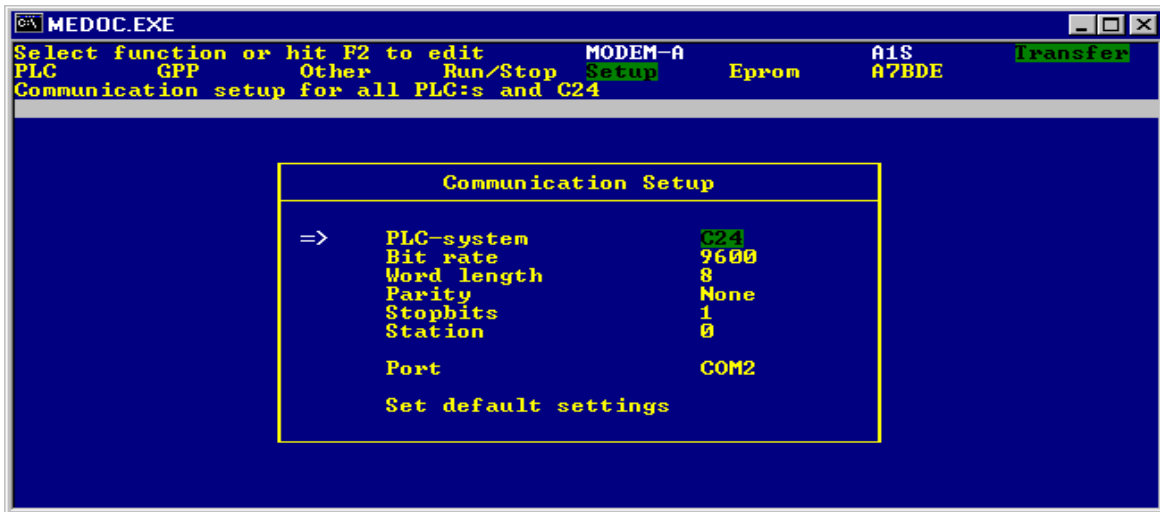
- **A1SJ PLC-** Set the three-position toggle switch on the front of the PLC to the “STOP” mode. In the MELSEC MEDOC v2.30 software, choose the A1S PLC from the PLC option list when creating your project (See Screen Shot 3). Next, go to Transfer → Setup, and set the port settings as displayed in Screen Shot 4. Finally, the Interface option in the PLC transfer Menu, shown in the work area under the Transfer option in the main menu, must be changed to C24. Press F2 and use the Space Bar to toggle the “Interface” option to C24 (See Screen Shot 5). Save this configuration to a disk.
- **A1SJ71UC24-R2 adapter port-** Configure the DIP switches on the port to the configuration shown in table 1. Set the 15-position (0-F) mode setting switch to position 1.

SW03		OFF
SW04	Write during run	ON
SW05	Baud Rate	ON
SW06	9600 BPS	OFF
SW07		ON
SW08	Data Bits	ON 8 bits
SW09	Parity	OFF
SW10	Parity Even/Odd	OFF
SW11	Stop Bits	OFF 1bit
SW12	Checksum	ON

Table 1



Screen Shot 3

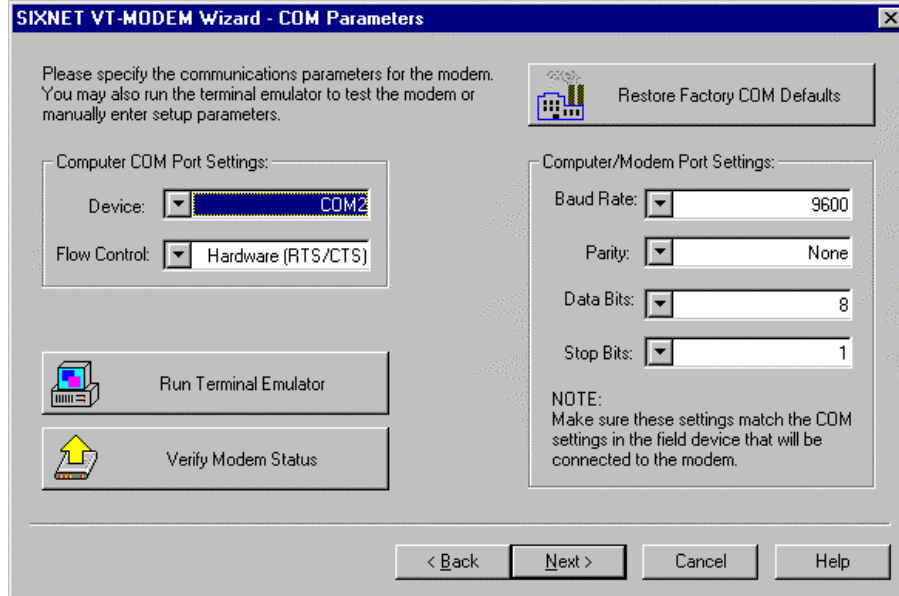


Screen Shot 4



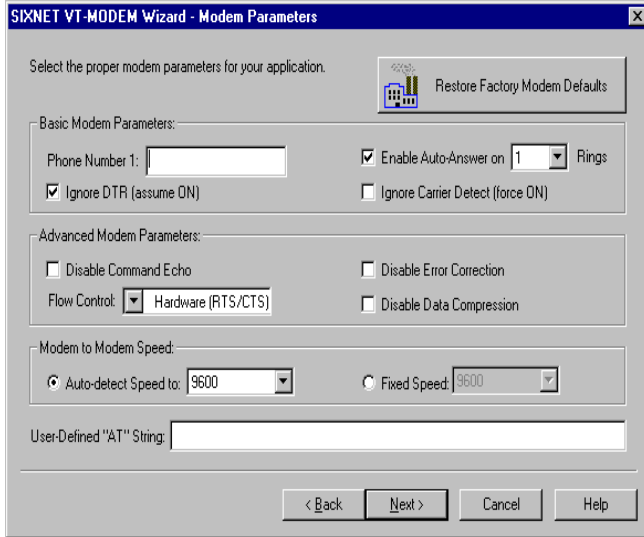
Screen Shot 5

- VT-MODEM-1** – Connect the VT-MODEM-1 to the PC via the VT-CABLE-MDM. Using the SIXNET VT-Modem Setup Wizard choose VT-MODEM-1 in the first window. Select the appropriate communications port (in this case COM 2) with Hardware flow control. Configure the Baud Rate for 9600 with 8 data bits, None Parity, and 1 stop bit (See Screen Shot 6). (Note: The connections in this technical note can also be established using the following port parameters: 8 data bits, Odd Parity, and 1 stop bit.)

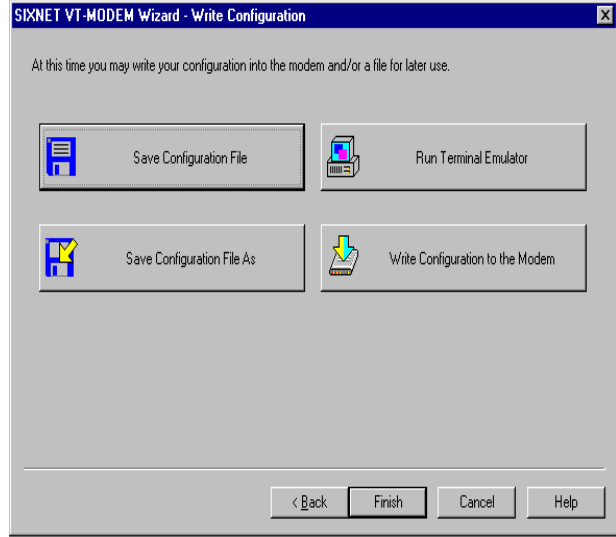


Screen Shot 6

In the “Modem Parameters” setup window, leave all the settings at defaults. Finally, write the configuration to the modem by clicking on the “Write Configuration to the Modem” button (See Screen Shots 7 and 8). (Note: Write this configuration to the VT-MODEM-1 only.)

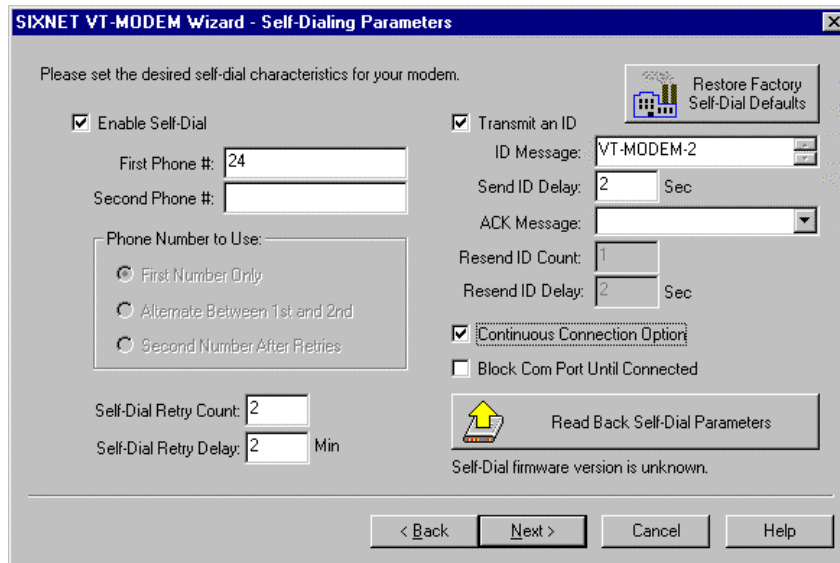


Screen Shot 7



Screen Shot 8

- **VT-MODEM-2-** Configure the VT-MODEM-2 the same as the VT-MODEM-1, or use the VT-MODEM configuration file a1sj_c24_vt2.6ms (if available on your CD). To enable the Self-Dialing feature in the VT-MODEM-2, check the “Enable Self-Dial” check box in the “Self-Dialing Parameters” window in the VT-MODEM Setup Wizard and enter the phone number of your answering modem in the “First Phone #” text box (in this case 24). Use of the other features are optional, but in this case the ID message “VT-MODEM-2” was used to demonstrate the ID message feature (See Screen Shot 9). Load the configuration to the modem.



Screen Shot 9

Connecting the Hardware:

- **Phone Connections-** The two modems were connected to an internal analog phone system through their Line RJ11 jacks using standard RJ11 telephone cable.

- Connecting the modems to the devices-** Connect the VT-MODEM-1 to the computer's communications port (COM 2 in this test) via the VT-CABLE-MDM. Connect the VT-MODEM-2 to the DB9 female connector on the MITSUBISHI MELSEC A1SJ71UC24-R2 RS232 adapter port via the VT-CABLE-MDM and DB9 gender changer. If using the Self-Dial feature connect a discrete output (10-30 VDC) to the "From PLC" (screw terminal 4) input on the VT-MODEM-2. Connection status can be monitored by linking the "To PLC" (screw terminal 5) output to a discrete input on the "A-Series" PLC.

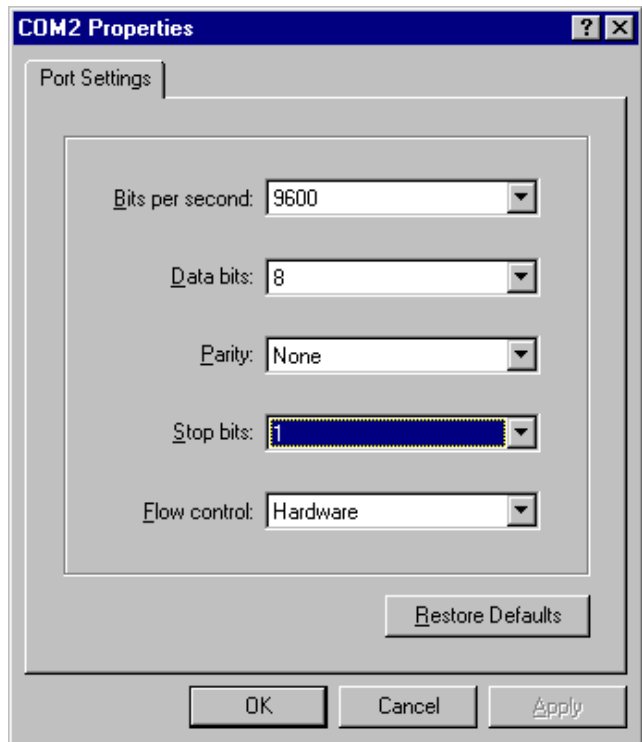
Establishing the connection through HyperTerminal:

To establish remote communication between the PLC and MEDOC software, a dial-up connection must be initiated by the VT-MODEM-1. The windows program HyperTerminal was used to do this.

(Note: To perform this step successfully, MELSEC MEDOC v2.30 and the VT-MODEM setup Wizard must be closed completely.) Start HyperTerminal, and enter a name (In this case the name is MITSUBISHI_PLC). In the "Connect To" drop down list select the COM port that the VT-MODEM-1 is connected to on your PC (in this case COM 2). In the "COM 2 Properties" window, configure the Baud Rate for 9600 with 8 data bits, No Parity, and 1 stop bit (See Screen Shots 9 and 10).

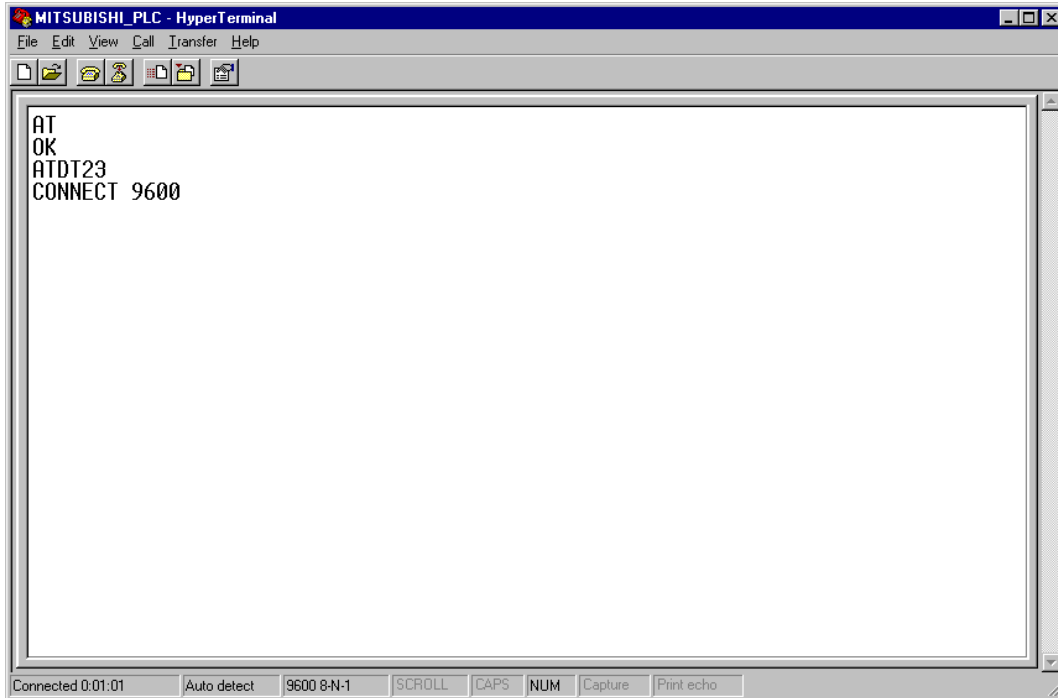


Screen Shot 9



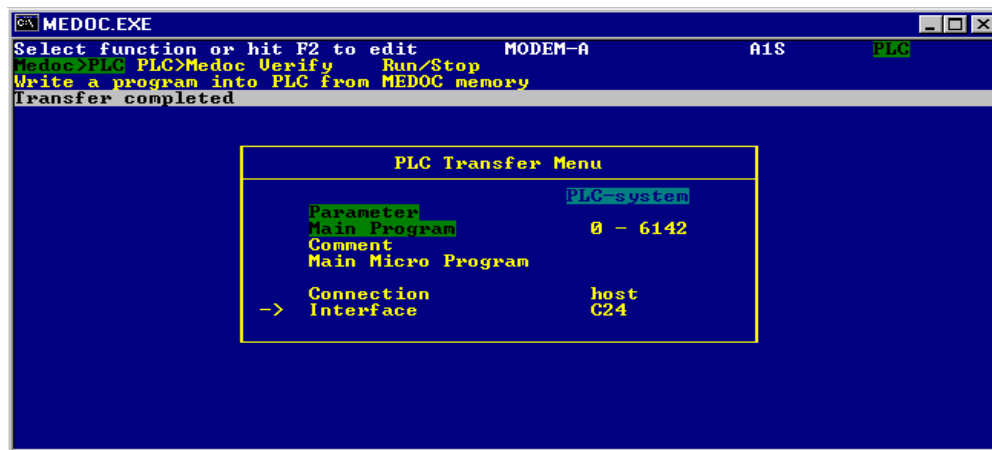
Screen Shot 10

In HyperTerminal's main window, issue an AT command to verify that the PC and Modem are communicating. The Modem should send back an "OK". Then issue an ATDT# command where # represents the phone number of the VT-MODEM-2 connected to the PLC. When the modems connect HyperTerminal will display a "Connect 9600" message (See Screen Shot 11). Save the session and close HyperTerminal completely.



Screen Shot 11

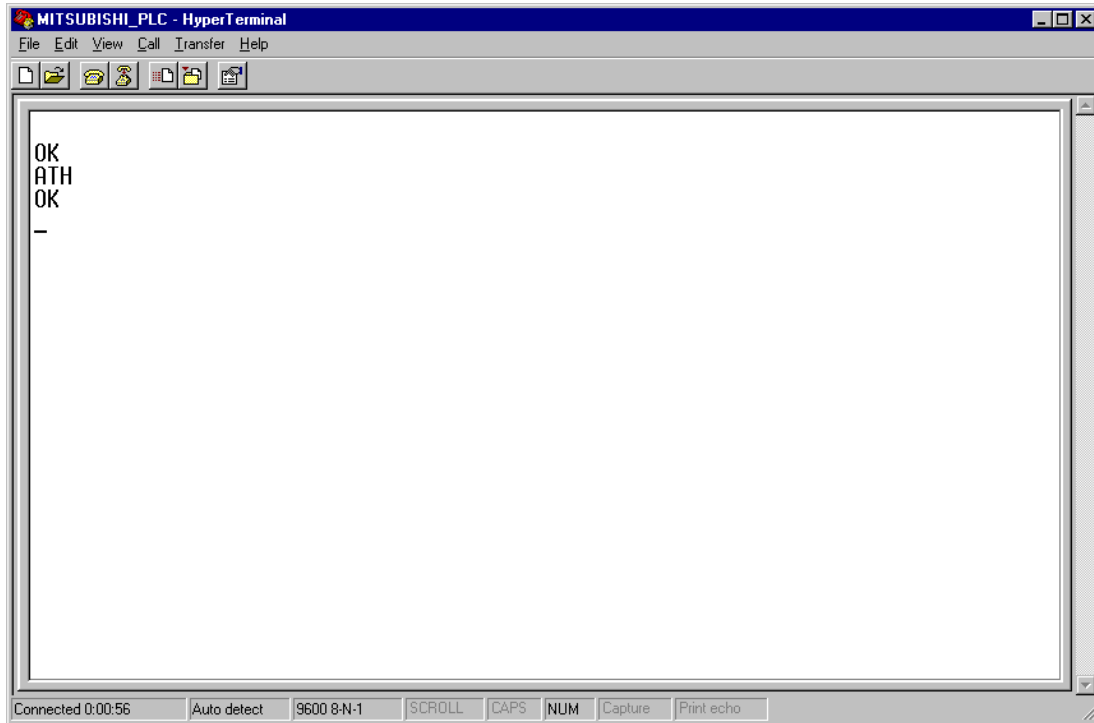
Run MELSEC MEDOC v2.30 and open the file that matches the configuration in the “Configuring the Hardware” section of this technical note. To test that a program can be loaded to the MITSUBISHI MELSEC A1SJCPU PLC from the PC, go to Transfer → PLC → Medoc>PLC, press enter, and answer yes to the following questions. When the program has been transferred, MEDOC will display a Transfer Completed message (See Screen Shot 12).



Screen Shot 12

To disconnect the phone connection, close MEDOC completely, and open the saved session of HyperTerminal. Type “+ + +” (three plus signs), wait for the modem to send an “OK”, type “ATH”,

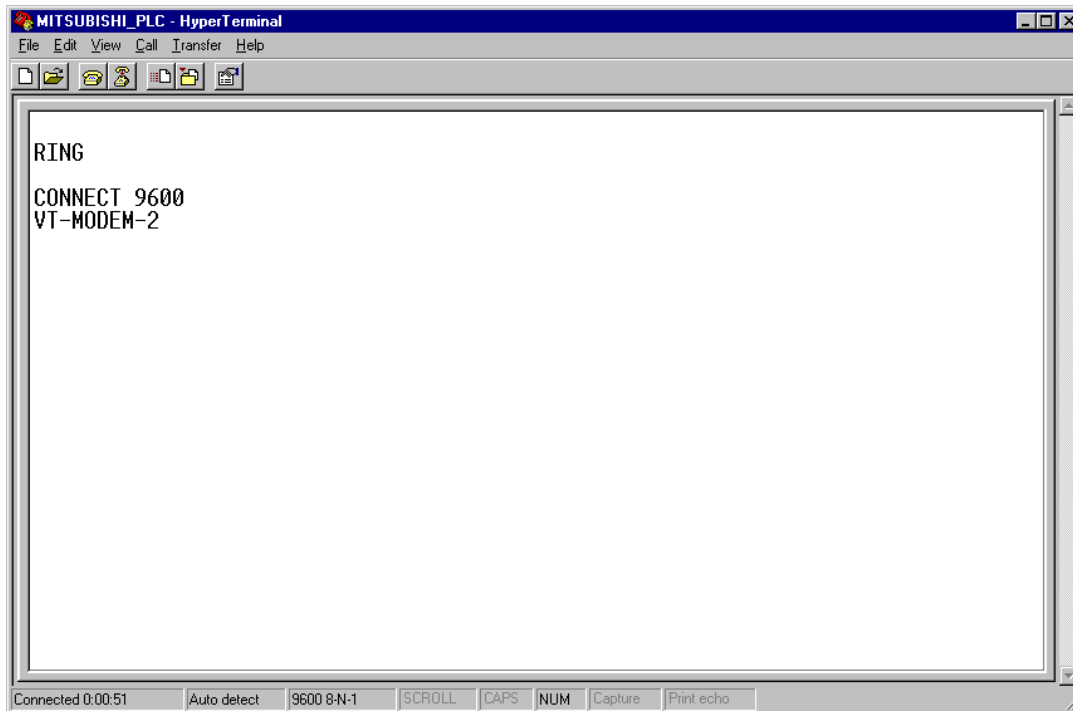
and then press the Enter button. When the modem sends back an “OK” then the modems have disconnected (See Screen Shot 13).



Screen Shot 13

Establishing a connection using the Self-Dialing feature:

To establish remote communication between the PLC and MEDOC software using the Self-Dialing feature, a dial-up connection must be initiated by the remote VT-MODEM-2. The feature is initiated by activating a discrete input to the “From PLC” input on the VT-MODEM-2. To verify that the connection is established and the ID message is sent successfully, use HyperTerminal to monitor the incoming data at the destination modem. In this case, the VT-MODEM-1 was used as the answering modem. To prepare for the connection, start Windows HyperTerminal (see previous section). To initiate the Self-Dialing sequence, apply a continuous supply of 10-30 VDC to the “From PLC” input on the VT-MODEM-2. When the Self-Dialing feature is enabled, the Power LED on the modem should blink rapidly. You should see the following messages in your HyperTerminal window: Ring, Connect 9600, and ID String (See Screen Shot 14). To hang-up the connection, disconnect the 10-30 VDC on the “From PLC” input on the modem, and the modem will hang-up automatically.



Screen Shot 14

Conclusion:

This test successfully established communications between a PC and A1SJ via SIXNET industrial modems.