

Using Modems with Directsoft version 1.x/2.x 16bit *Windows 95,98,NT*

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Introduction <u>Recommended modems</u> <u>PLC Setup</u> <u>How to setup modem</u> <u>Let's get connected</u> <u>Help</u> <u>Modem Setup Strings</u> <u>Cable Diagrams</u>

> This document pertains to people using the older versions of *Directsoft versions 1.x or 2.x.*

If you are using Directsoft32 version 3.x, you will need to get the other "Directsoft32 Modem Document" from the Automationdirect.com tech support page. You can also refer to the Directsoft 32 programming manual for assistance.

It is not difficult to establish remote communications with a PLC via a modem. This paper should help you in setting up this type of communications link.

With today's prices, it is possible to buy a high quality modem for a reasonable price. We have established communications with a personal computer using the following brands of modems:

Recommended modems

MultiTech Most preferred (ZDX and Multi-Modem II) (*works with parity as Odd or NONE*)
 The MT2834ZDX modem is our most preferred and has proven reliable. It can also be configured remotely. This may save you a trip to the job site for modem setup changes.

 USRobotics
 (Sportster) (NOT Sportster Si)

 Hayes
 (Optima/Accura)

 Sixnet
 VT-Modem-2 allows Auto dial out using PLC output to initiate

We recommend that you buy an external modem. Internal modems are much harder to debug when things don't work correctly. This is because they do not have indicator lights that we can use to troubleshoot. External modems will give you speaker control and indicator lights. We also prefer that you have a modem that is fairly new and has the latest firmware available from the manufacturer. You can check this on the internet most often



There are a few important steps you **must** take in order to establish remote communications.

1) PLC Setup:

You must configure your PLC communication port for 9600, NO PARITY. The important part is the parity setting. Most popular modems cannot transmit an odd number of bits per character. If parity were enabled, each character would consist of 1 start bit, 8 data bits, 1 parity bit and 1 stop bit, making a total of 11 bits per character.

2) Modem Setup:

You must use a terminal program of some kind, such as the Windows Terminal or HyperTerminal application, to configure the remote modem. You should set the terminal program for the same speed that you have configured your communications port for. We usually use 9600 baud so use 9600, 8, None, 1 and hardware handshaking. Now you must configure the modem to:

- Auto Answer
- Use baud rate adjustment, or use a fixed Serial port baud rate of 9600
- Turn compression OFF
- Turn error correction OFF. (You may have to enable error correction if your telephone line is noisy but you may have some problems executing tasks due to communication delays).

Write these settings to the Non-Volatile RAM by using the "&W0" command. This will save the settings in the modem so that when it is power cycled it will use these settings. Please refer to the configuration command lines examples on page **4**.

3) Cable:

The best way to connect between the modem and the PLC is using the PLC Direct programming cable along with a *NULL-MODEM* cable (Cable#2). You will most likely have to get a 9-25 pin adapter also since our programming cables are made to fit into 9-Pin serial ports. You may be able to find a 9 to 25 pin adapter that is also a NULL modem cable. Appendix 'A' shows the pin-out description for these cables. If you are close to a Radio Shack store you could purchase items 26-264 (DB9 Null Modem Adapter) and 26-1388 (DB25 male / DB9 male).

4) Let's Get Connected

If you have DirectSoft v2.0 or higher, you are now ready to setup your link to use with a modem. (Refer to the Directsoft user Manual).

If you are using a previous version of DirectSoft (1.x) then you must follow the steps below.

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Using Windows Terminal or HyperTerminal

- I. You are now ready to connect your local (computer) modem. To dial the remote modem, you need to use the terminal program. You should dial the modem by sending the following command:
- **II.** AT &D0 DT telephone number (Example: AT&D0 DT 1,2434456666)
- III. The '&D0' command tells the modem to *not* hang up the line when the DTR signal is dropped. Since we will have to exit the terminal program, the communications port is reset and the DTR signal is dropped. If the modem disconnected at this point, we wouldn't be able to connect to the PLC with DirectSoft. With some modems (US Robotics included) terminal must be configured to **not** insert a carriage return (CR) automatically after each command. The carriage return cancels out the Dial request. Look under "Terminal Preferences".
- **IV**. OK, assuming you have used the command above to connect to the remote site, you will have to exit the terminal program *COMPLETELY*. Let me repeat that. You will have to exit the terminal program completely. Otherwise, DirectSoft will not be able to get control of the communications port and you will not be able to get online.
- **V**. Start DirectSoft like you would normally. Create a new link using the communications port that your modem is connected to.

You should now be able to communicate with your PLC just like it was connected to your computer. When you are done with the connection, you will have to exit DirectSoft, restart the terminal program and disconnect the modem using the +++ (wait for OK response) and ATH <CR>command sequence.

5) HELP

If you cannot connect then you can refer to our web site where we will be posting FAQ's. Also check the following before calling Tech Support:

Frequent Reasons for not connecting:

- 1. Modem settings are not correct or have not been written to NVRAM.
- 2. Directsoft Link settings are not correct
- 3. Cable is not correct.
- 4. PLC port has not been configured correctly.
- 5. The Phone line may be noisy. Raise the Link Timeout to 2000ms and the Retry to 5.We find that this is very helpful in most cases.
- 6. Make sure your fax machine sharing the same line is not answering the call.



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Modem Configuration Setup Strings

Hayes Accura 336/56K

	Type AT&V to display active configuration for your modem
Remote Modem:	AT&F&W0
	ATS0=1
	AT&D0%C0%E0&K0S37=9N0\N1
	AT&W0
Local Modem:	AT&F N0 S37=9 S46=136 &C1 &K0 &Q5 &R1 &Y0 &W0

Hayes Optima 9600

Remote Modem:	Type AT&V to display active settings of your modem AT&F N0 S37=9 S46=136 &C1 &K0 &Q5 &R1 &Y0 S0=1
	AT Q1 &W0
Local Modem:	AT&F N0 S37=9 S46=136 &C1 &K0 &Q5 &R1 &Y0 &W0

MultiTech MT932EAB

This modem is no longer available from MultiTech. The newer MultiModem II models should work with the same configuration.

Use the default DIP switch settings except set switch 1 to force DTR ON and switch 5 to Auto Answer mode.

Remote Modem:	Type ATL5 to display active settings of your modem AT&W1&F1
	ATQ1\$BA0\$MB9600\$SB9600
	AT&E1&E3&E7&E12&E14&W0
Local Modem:	AT&W1&F1
	ATQ0\$BA0\$MB9600\$SB9600
	AT &E0 &E3&E7&E12&E14&W0

If you are using a port configured for ODD parity, such as the programming ports on our PLC's, then the following:

	Type ATL5 to display active settings of your modem
Remote Modem:	AT&W1&F1
	ATQ1\$BA0\$MB9600\$SB9600
	AT&E1&E3&E7&E12&E14
	AT\$EB1#P1&W0

Local Modem:	AT&W1&F1
	ATQ0\$BA0\$MB9600\$SB9600
	AT &E0 &E3&E7&E12&E14
	AT\$EB1#P1&W0



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MultiTech MT1932ZDX and MT2834ZDX (see note)

Note: For ODD parity applications, the MT2834 ZDX modems will work if they have a firmware revision of 3.13A or older. (We have been told by some of our customers that the newer versions of the firmware, 1998 vintage, have the odd parity support again, so you might try the configuration and see if it works.) MultiTech has removed the odd parity support on the newer modems in order to incorporate other features. Their technical support group is willing to send you the firmware with odd parity support if you need that feature. This is only a problem if you want to use the ZDX modems for programming a port that has been configured for ODD parity, such as the programming ports on the 105, 205 and 405 PLCs.

NOTE: A modem set for ODD parity will only communicate with other modems set for ODD parity.

NO PARITY mod	dem setup:	Type A	ATL5 to display active settings of your modem
Remote Modem:	A	T&F8&W0	
	А	T&F0	
	А	T&F9&W0	
	A	T&D0S0=1	
	A	T#F0\$BA1\$MI	B9600\$SB9600
	A	T&E0&E3&E7	7&E12&E14
	А	ATE0Q1&W0	(NO response from modem)
Local Modem:	Use the same	me settings exc	cept use Q0 instead of Q1 and E1 instead of E0.
	•		ech firmware version 3.13a you may have to use this line to make
	sure mode	m is set for NO	parity AT\$EB0#P0 (Sets 10 bit mode NO parity)
In Direc	tSoft (v2.x a	an higher) in th	ne modem configuration use:
		nitialization:	ATX4E1V1S7=120&C1\$BA1\$MB9600\$SB9600^M
	D	Dial Tone:	AT&E0DT
	1	(f	·····
ODD PARITY m	-		most of the 'programming' ports):
Remote Modem:		ype A1L5 to d AT&F8&W0	lisplay active settings of your modem
Remote Modem:		T&F8&W0	
		T&F9&W0	
		T&D0S0=1	
			B9600\$SB9600
		T&E0&E3&E7	
		T\$EB1#P1	(Sets 11 bit mode Odd parity)
		TE0Q1&W0	(NO response from modem)
Local Modem:	Ŭ	Jse the same se	ettings except use Q0 instead of Q1 and E1 instead of E0.
In DirectSoft (v2.	.x an higher) in the modem	a configuration use:
Initializa	ation: A	TX4E1V1S7=1	120&C1\$BA1\$MB9600\$SB9600^M
Dial Tor	ne: A	AT&E0\$EB1#P1	1DT

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Supra FaxModem 14.4k V.32

Remote Modem:	AT&F0 N0 S37=9 %C0 \N3 &C1 &K0 &Q5 &R1 &Y0 S0=1 &W0
Local Modem:	AT&F0 N0 S37=9 %C0 \N3 &C1 &K0 &Q5 &R1 &Y0 &W0
USRobotics Sportsto	er
	Type ATI4 to display active settings of your modem
Remote Modem:	Use default switch settings except for switch 1 & 5.
	AT&F1&B0&N6&D0&H1&R1&I0&K0&M4&W0
Local Modem:	Use default switch settings
	AT&F1&D0&M0&W0

In DirectSoft (v2.x an higher) in the modem configuration use:

Initialization:	ATX4E1V1S7=60&C1^M
Dial Tone:	AT&N6&K0&M0DT

NOTE: By setting the &M4 option in the remote modem, it allows the modem to switch between Error Correction and Non Error Correction mode. When the calling modem uses the &M0 switch, both modems will use the Non Error Correction mode. This is the desired connection. If the telephone lines are noisy, error correction may be necessary to establish any kind of connection. To do this, the &M4 switch should be used on the local modem and since the remote modem is set to automatically switch between the two modes, nothing will have to be changed there.

SixNet VT-Modem-1

	Type AT&V to disp	play active settings of your modem
Remote Modem:	AT&F&W0	Set modem to factory settings
	ATS0=1	Sets the modem to auto-answer
	AT&V	Use this to verify changes
	AT&D0	Tells modem to ignore DTR
	AT%C0	Disables data compression
	AT%E0	Disables internal line Quality Check
	AT%K0	Disables flow control
	ATS37=9	Set Modem to Modem baud at 9600
	ATN0	Forces modem to modem baud setup in S37
	AT+H0	Turns OFF Rockwell Chipset
	AT\N1	Sets the Operating Mode of the modem to direct
		asynchronous communications, no send/receive
		buffers and no error checking
	AT&W0	Store settings to user profile 0
	AT&Y0	(Optional) Loads profile 0 on power up
	Sixnet has an applic	cation note for the VT-modem used with a 250 CPU.
	Go to their web site	for info. http://www.sixnetio.com/

Ask for Technical Note #614



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Windows 95,98,NT Page 8 of 10 modem_1 6bit.doc Page 8 of 10 CABLE DIAGRAMS The following PLC's can be used remotely: Series 405: DL 450 Port 1 Cable #1 DL 450 Port 2 (RJ-12 port) Cable #2 or Cable #3 DL 440 Port 2 Cable #1 DL 430 Port 2 Cable #1 DL 430 Port 2 Cable #1 Series 305: DL 350 Port 1 and Port 2 / DCU Cable #2 DL 350 Port 1 and Port 2 / DCU Cable #2 DL 330 DCM Cable #2 TI 330 DCM Cable #2 TI 330 DCM Cable #2 TI 320 DCM Cable #2 TI 320 DCM Cable	10 10 TO 10 10 TO 10 10	Using Modems v ersion 1.x/2.x 1		ft		Tech-note:
Page 8 of 10 CABLE DIAGRAMS The following PLC's can be used remotely: Series 405: Cable #1 DL 450 Port 2 (RJ-12 port) Cable #1 DL 450 Port 2 (RJ-12 port) Cable #1 DL 430 Port 2 Cable #1 DL 430 Port 2 Cable #1 DL 350 Port 2 Cable #1 DL 330 DCU Cable #2 DL 330 DCM Cable #2 TI 330 DCM DL 250 Cable #2 DL 250 Port 2 Cable #2 Cable #2	Contraction and a second		UDIL			Last reviewed: 19-Nov-01
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Series 405: DL 450 Port 1 Cable #1 DL 450 Port 2 (RJ-12 port) Cable #2 DL 440 Port 2 Cable #1 DL 430 Port 2 Cable #1 DL 430 Port 2 Cable #1 TI 435 Port 2 Cable #1 Series 305: DL 350 Port 2 Cable #1 DL 340 Port 1 and Port 2 / DCU Cable #2 Cable #2 DL 330 DCU Cable #2 Cable #2 TI 335 programming port / DCU Cable #2 Cable #2 TI 330 DCM Cable #2 Cable #2 TI 330 DCM Cable #2 Cable #2 TI 320 DCM Cable #2 Cable #2 Series 05 – 105 - 205 DL 250 Port 2 Cable #2 or Cable #2 DL 05 Port 2 Cable #2 or fable ort Cable #2 or fable #2 DL 05 Port 2 Cable #2 or fable ort Cable #2 or fable #3 DL <td>CABLE D</td> <td>AGRAMS</td> <td></td> <td></td> <td></td> <td></td>	CABLE D	AGRAMS				
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TI 435 Port 2 Cable #1 Series 305: DL 350 Port 2 Cable #1 DL 340 Port 1 and Port 2 / DCU Cable #2 DL 330 DCU Cable #2 DL 330P DCU Cable #2 TI 335 programming port / DCU Cable #2 TI 330 DCM Cable #2 TI 330 DCM Cable #2 TI 330 DCM Cable #2 TI 320 DCM Cable #2 Series 05 - 105 - 205 Cable #2 or Cable or 1 Cable #2 or Cable or 1 DL 250 Port 2 Cable #2 or Cable or 1 DL 05 - 105 - 230 Port 1 only with MultiTech moderns (support ODD transmit bits) Cable #2 or #3 DL 05 Port 2 Cable #2 or Gable #3 Cable #1: Modem (DB25) to Series 405 Port 1 (DB25) cable TXD DL 2	DL	440	Port 2			Cable #1
Series 305: DL 350 Port 2 Cable #1 DL 340 Port 1 and Port 2 / DCU Cable #2 DL 330 DCU Cable #2 DL 330P DCU Cable #2 DL 330P DCU Cable #2 TI 335 programming port / DCU Cable #2 TI 330 DCM Cable #2 TI 330 DCM Cable #2 TI 330 DCM Cable #2 TI 320 DCM Cable #2 Series 05 – 105 - 205 Cable #2 or Cable #2 Cable #2 or Cable #2 DL 250 Port 2 Cable #2 or Cable #2 DL 05 - 105 - 230 Port 1 only with MultiTech modems (support ODD transmit bits) Cable #2 or Cable #3 DL 05 Port 2 Cable #2 or #3 Cable #1: Modem (DB25) to Series 405 Port 1 (DB25) cable TXD 2	DL	430	Port 2			Cable #1
$\begin{array}{c ccccc} DL & 350 & Port 2 & Cable \#1 \\ DL & 340 & Port 1 and Port 2 / DCU & Cable \#2 \\ DL & 330 & DCU & Cable \#2 \\ DL & 330P & DCU & Cable \#2 \\ TI & 335 & programming port / DCU & Cable \#2 \\ TI & 330 & DCM & Cable \#2 \\ TI & 320 & DCM & Cable #2 \\ \hline DL & 250 & Port 2 & Cable #2 \\ DL & 240 & Port 2 & Cable #2 \\ DL & 05-105-230 & Port 1 & only with MultiTech modems (support ODD transmit bits) \\ DL & 05 & Port 2 & Cable #2 or Cable #3 \\ \hline Cable #1: & Modem (DB25) to Series 405 Port 1 (DB25) cable \\ \hline \begin{array}{c} DB25-Male & DB25-Male \\ (To & Modem) & (To & 405) \\ TXD & 2 & & 2 & TXD \\ RXD & 3 & & 3 & RXD \\ GND & 7 & & 7 & GND \\ RTS & 4 & -+ & + & 4 & RTS \\ & & -+ & + & 4 & RTS \\ & & & -+ & + & 4 & RTS \\ & & & & -+ & + & 5 & CTS \\ DSR & 6 &+ & + & 6 & DSR \\ DCD & 8 &+ & + & 8 & DCD \\ & & & & & -+ & + & 8 & DCD \\ & & & & & & -+ & + & 8 & DCD \\ \hline \end{array}$	TI	435	Port 2			Cable #1
$\begin{array}{c cccccc} DL & 340 & Port 1 and Port 2 / DCU & Cable #2 \\ DL & 330 & DCU & Cable #2 \\ DL & 330P & DCU & Cable #2 \\ TI & 335 & programming port / DCU & Cable #2 \\ TI & 330 & DCM & Cable #2 \\ TI & 320 & DCM & Cable #2 \\ \hline TI & 320 & DCM & Cable #2 \\ \hline DL & 250 & Port 2 & Cable #2 \\ DL & 240 & Port 2 & Cable #2 or Cable or 3 \\ DL & 05-105-230 & Port 1 & only with MultiTech & Cable #2 or Cable #3 \\ \hline DL & 05 & Port 2 & Cable #2 or Cable #3 \\ \hline DL & 05 & Port 2 & Cable #2 or Cable #3 \\ \hline DL & 05 & Port 2 & Cable #2 or T and the end to the end to$	Series 305:					
$\begin{array}{c ccccc} DL & 330 & DCU & Cable #2 \\ DL & 330P & DCU & Cable #2 \\ TI & 335 & programming port / DCU & Cable #2 \\ TI & 330 & DCM & Cable #2 \\ TI & 320 & DCM & Cable #2 \\ \hline TI & 320 & DCM & Cable #2 \\ \hline DL & 250 & Port 2 & Cable #2 or Cable or 2 \\ DL & 240 & Port 2 & Cable #2 or Cable #3 \\ \hline DL & 05 & Port 2 & Cable #2 or Cable #3 \\ \hline DL & 05 & Port 2 & Cable #2 or Cable #3 \\ \hline DL & 05 & Port 2 & Cable #2 or #3 \\ \hline Cable #1: & Modem (DB25) to Series 405 Port 1 (DB25) cable \\ \hline \\ \hline DB25-Male & DB25-Male \\ (To & Modem) & (To & 405) \\ \hline \\ TXD & 2 & & 3 & RXD \\ GND & 7 & & 7 & GND \\ RTS & 4 & -++ & + & 4 & RTS \\ & & & & & & & & \\ DSR & 6 & -++ & + & 6 & DSR \\ & & & & & & & & \\ DCD & 8 & -++ & + & 8 & DCD \\ & & & & & & & & \\ \hline \end{array}$	DL	350	Port 2			Cable #1
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DL 250 Port 2 DL 240 Port 2 DL 05-105-230 Port 1 only with MultiTech modems (support ODD transmit bits) DL 05 Port 2 Cable #2 or Cable #3 Cable #2 or #	TI	320	DCM			Cable #2
DL 240 Port 2 DL 05-105-230 Port 1 only with MultiTech modems (support ODD transmit bits) DL 05 Port 2 Cable #2 or #3 Cable #1: Modem (DB25) to Series 405 Port 1 (DB25) cable $\begin{array}{c} DB25-Male & DB25-Male \\ (To Modem) & (To 405) \\ TXD 22 & TXD \\ RXD 33 & RXD \\ GND 77 & GND \\ RTS 4+ & + 4 & RTS \\ & & & & & \\ CTS 5+ & + 5 & CTS \\ DSR 6+ & + 6 & DSR \\ DCD 8+ & + 8 & DCD \\ & & & & & \\ \end{array}$	Series 05 – 10	5 - 205				
DL 05-105-230 Port 1 only with MultiTech modems (support ODD transmit bits) DL 05 Port 2 Cable #2 or $(able #2 or #3)$ Cable #1: Modem (DB25) to Series 405 Port 1 (DB25) cable $\begin{array}{c} DB25-Male & DB25-Male \\ (To Modem) & (To 405) \end{array}$ $\begin{array}{c} TXD & 2 &2 & TXD \\ RXD & 3 &3 & RXD \\ GND & 7 &7 & GND \\ RTS & 4 & -++ & + & 4 & RTS \end{array}$ $\begin{array}{c} i & i \\ CTS & 5 & -++ & + & 5 & CTS \end{array}$ $\begin{array}{c} DSR & 6 &+ & + & 6 & DSR \\ DCD & 8 & -++ & + & 8 & DCD \end{array}$	DL	250	Port 2			Cable #2 or <u>Cable or #4</u>
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DL 05 Port 2 Cable #2 or #3 Cable #1: Modem (DB25) to Series 405 Port 1 (DB25) cable DB25-Male DB25-Male (To Modem) (To 405) TXD 2 RXD 3 GND 7 GND 7 Moder 0 CTS 5 OS 0 DSR 6 DCD 8 OCD 8	DL			•		Cable #2 or Cable #3
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	DL					Cable #2 or #3
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	Cable #1:	Modem (DB2	5) to Series 4	05 Port 1 (DI	B25) cable	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$			Mala	נסת	E-Malo	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$						
GND 7 7 GND RTS 4+ + 4 RTS CTS 5+ + 5 CTS DSR 6+ + 6 DSR DCD 8+ + 8 DCD 						
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 CTS 5+ + 5 CTS DSR 6+ + 6 DSR DCD 8+ + 8 DCD 				•		
DSR 6+ + 6 DSR DCD 8+ + 8 DCD 		RTS	4+	+ 4	RTS	
DCD 8+ + 8 DCD		CTS	5+	+ 5	CTS	
		DSR	б+	+ б І	DSR	
DTR 20+ + 20 DTR		DCD	 8+ 	 + 8 	DCD	
		DTR	20+	ı + 20	DTR	

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DB9 to DB25 Null Modem Adapter for connection to programming Cable #2: cables

This cable is used in conjunction with a programming cable to connect to the modem.

DB9-Male (To Cable)				25-M Mod	
RXD TXD GND	2 3 5			2 3 7	TXD RXD GND
RTS	7	+	+	4	RTS
CTS	8	 +	 +	5	CTS
DCD	1	+	+	б	DSR
DTR	4	 + 	 + 	8	DCD
DSR	6	 +	 +	20	DTR

Cable #3: **DL-240 to DB25 Modem Connector**

R	J — 1	12 1	DB25	-Ma]	Le		240 RJ-12 Port	
TXD RXD GND	4 3 1		 	2 3 7	TXD RXD GND			
			+	4	RTS			
			 +	5	CTS	L		
			+	б	DSR			
			 +	8	DCD			
			 + :	20	DTR			

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Cable #4: DL-250 to DB25 Modem Connector

If you are close to a Radio Shack Store you can purchase the 15pin-SVGA Male connector. The part number is **276-1501**

DB-25 Pin Modem					DB-9 Pin Modem						
PLC Port 2 15pin-SVGA Male				MODEM DB25 -		PLC Port 2 15pin-SVGA Male			MODEM DB9 -Male		
Male											
							TXD	2		3	TXD
TXD	2		2	TXD			RXD	3		2	RXD
RXD	3		3	RXD			GND	7		5	GND
GND	7		7	GND							
							RTS	5 -+	+ -	7	RTS
RTS	5 -+	+ -	4	RTS							
							CTS	4 -+	+ -	8	CTS
CTS	4 -+	+-	5	CTS							
		+-	б	DSR			*Used	with	the	VT-	modem
		+- 	8	DCD							
		 	сυ	סייירו							

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