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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 **MT2834ZD**X 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.

**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.

# 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

Type **AT&V** to display active settings of your modem

Remote 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.

Type **ATL5** to display active settings of your modem

Remote Modem:
AT&W1&F1
ATQ1$BA0$MB9600$SB9600
AT&E1&E3&E7&E12&E14&W0

Local Modem:
AT&W1&F1
AT**Q0**$BA0$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
AT**Q0**$BA0$MB9600$SB9600
AT**&E0**&E3&E7&E12&E14
AT$EB1#P1&W0

### 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 modem setup:** Type **ATL5** to display active settings of your modem

Remote Modem:
AT&F8&W0
AT&F0
AT&F9&W0
AT&D0S0=1
AT#F0$BA1$MB9600$SB9600
AT&E0&E3&E7&E12&E14
ATE0Q1&W0 (NO response from modem)

Local Modem: Use the same settings except use Q0 instead of Q1 and E1 instead of E0.
**Note:** If you have Multitech firmware version 3.13a you may have to use this line to make sure modem is set for NO parity ---- AT$EB0#P0 (Sets 10 bit mode NO parity)

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

Initialization: ATX4E1V1S7=120&C1$BA1$MB9600$SB9600^M
Dial Tone: AT&E0DT

**ODD PARITY modem setup (for use with most of the 'programming' ports):**
Type **ATL5** to display active settings of your modem

Remote Modem:
AT&F8&W0
AT&F0
AT&F9&W0
AT&D0S0=1
AT#F0$BA1$MB9600$SB9600
AT&E0&E3&E7&E12&E14
AT$EB1#P1 (Sets 11 bit mode Odd parity)
ATE0Q1&W0 (NO response from modem)

Local Modem: Use the same settings except use Q0 instead of Q1 and E1 instead of E0.

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

Initialization: ATX4E1V1S7=120&C1$BA1$MB9600$SB9600^M
Dial Tone: AT&E0$EB1#P1DT

## 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 Sportster

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 display 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 application 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

# 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 |
| TI | 435 | Port 2 | Cable #1 |

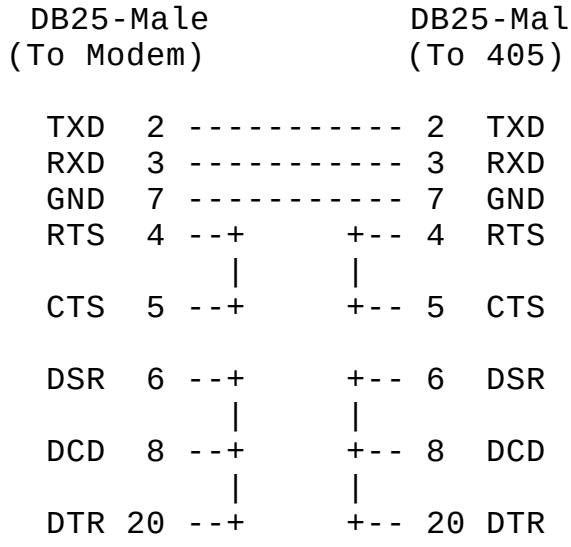
Series 305:

| | | | |
|---|---|---|---|
| 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 | 320 | DCM | Cable #2 |

Series 05 – 105 - 205

| | | | |
|---|---|---|---|
| DL | 250 | Port 2 | Cable #2 or Cable or #4 |
| DL | 240 | Port 2 | Cable #2 or #3 |
| 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**



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

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

```
DB9-Male          DB25-Male
(To Cable)       (To Modem)

  RXD  2 -----------  2  TXD
  TXD  3 -----------  3  RXD
  GND  5 -----------  7  GND

  RTS  7 --+     +--  4  RTS
           |     |
  CTS  8 --+     +--  5  CTS

  DCD  1 --+     +--  6  DSR
           |     |
  DTR  4 --+     +--  8  DCD
           |     |
  DSR  6 --+     +-- 20  DTR
```

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

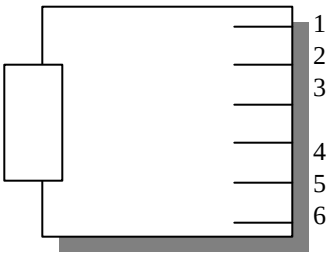
```
   RJ-12       DB25-Male

TXD  4 -----------  2  TXD
RXD  3 -----------  3  RXD
GND  1 -----------  7  GND

                +--  4  RTS
                |
                +--  5  CTS

                +--  6  DSR
                |
                +--  8  DCD
                |
                +-- 20  DTR
```

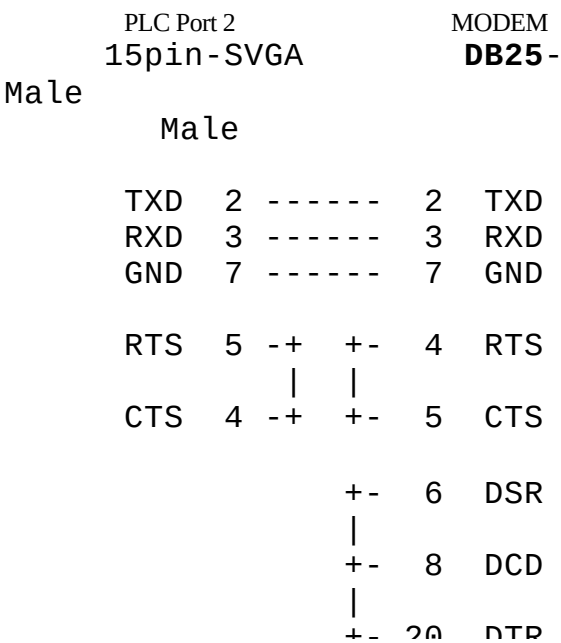
240 RJ-12 Port



## 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**