

## Schneider Modicon Modbus PLC's

### Remote Access with Westermo Modems



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## Section 1 - Introduction

There are many PLC applications that require a Remote connection, from Monitoring data, SCADA control to PLC programming and register data adjustment. All of these applications require a reliable connection in a variety of industrial conditions. Westermo modems provide a reliable connection for these harsh industrial connections, which can save an Engineer a costly trip to site or provide a communications link to a hazardous area.

This Application Note provides detailed information on connecting Westermo Modems and the Modicon brand of PLC's available from Schneider Electric. The Modicon brand of PLC's use the Modbus protocol as default on the serial programming ports.

The equipment and versions required are as follows:

1x Laptop or Desktop PC with Westermo Modem connected on a comm port and the following software pre-loaded

- ProWorx NXT V2.2 and above. ProWorx NXT32. Unity V2.0.1. Concept V2.6.
- Latest version of Modbus Unity driver where required.
- Microsoft Windows Hyperterminal or similar Terminal package

2x Modem to PC cable, 9 pin for most Westermo Modems and 25 pin for TD32B

- For 9 pin D type on Modem use Westermo cable Article number 9450-0003
- For 25 pin D type on Modem use Westermo cable Article number 9450-0002

2x Analogue telephone lines

- or a Westermo Analogue Line simulator, Article number 9045-001
- or ISDN lines for a Westermo ID-90V90 Modem.

1x Modicon Compact, 984 series, Momentum or Quantum PLC

1x Westermo Modem e.g. TDW33, TD-36, TD-36/485, TD-35 at the PLC.

Please note that a GSM modem is not currently included in this application note. The GSM network introduces small inter-character timing changes which cause the Modbus RTU message to be rejected due to the strict timing constraints with the protocol.

## Section 2 - Setup of RS232 Ports on Modicon Modbus PLCs

The default settings for the complete **Modicon** Compact, 984 Series, Momentum and Quantum range of PLCs are shown below.

9600, 8 Data bits , Even parity and 1 Stop bit using the Modbus Protocol

Due to the different software packages available for the Modbus based PLC's, each having a different communication setup, HyperTerminal has been used for this application note. The Modem dial up connection is made using Windows Hyperterminal and then Hyperterminal is closed down and then the Programming package is used to connect to the PLCs. Once the programming has been completed then Hyperterminal is re-started and the Modem connection is terminated.

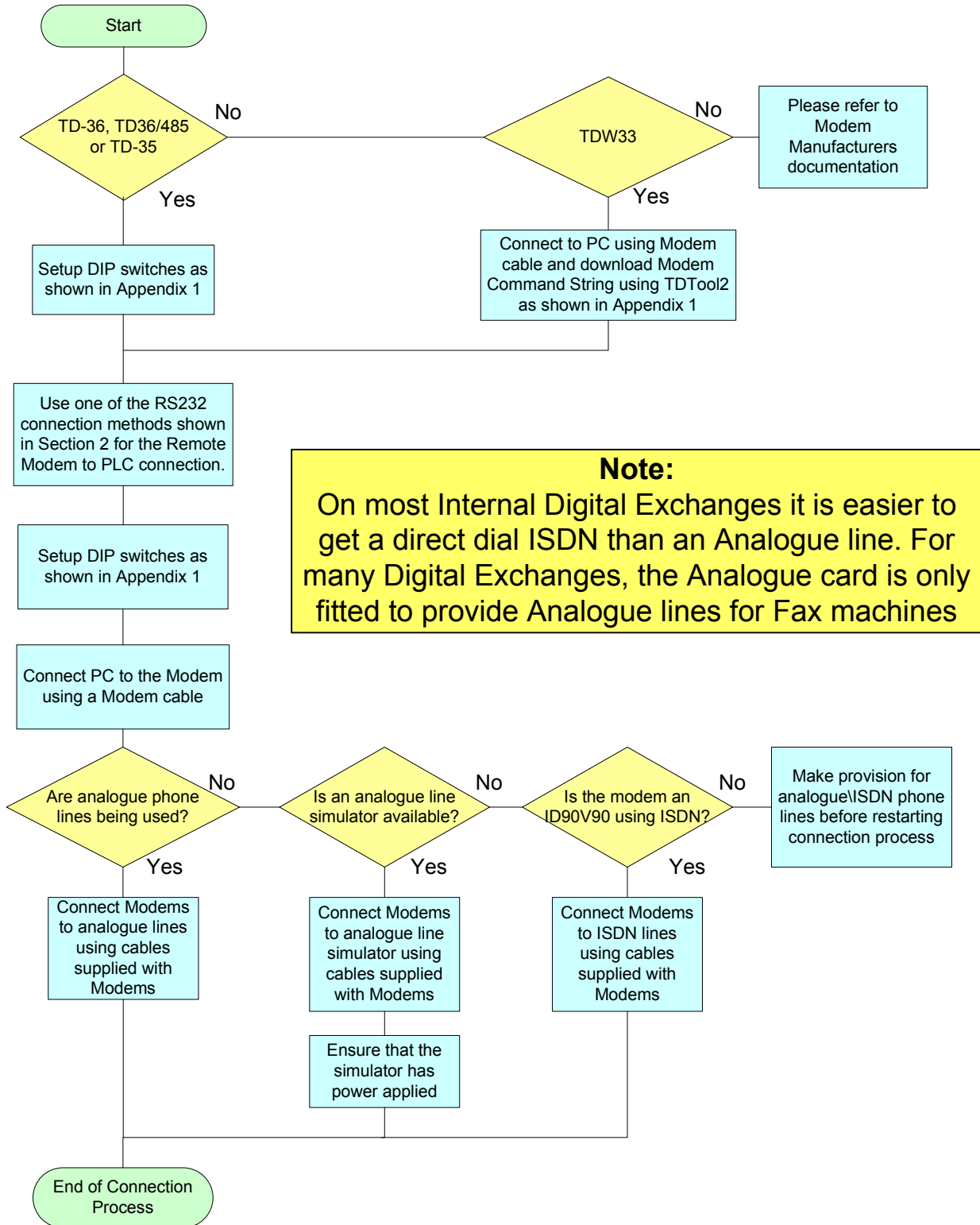
This application note is based around the default settings of the Modbus based PLC's. The settings of 9600,8,E,1 are used as standard memory settings for all of the PLC's listed above. The Compact, 984 Series and Quantum also have a DEF or RTU switch setting that forces the port to be 9600,8,E,1 if the settings have been changed in memory. When using the DEF or RTU switch the PLC address is taken from the switch settings on the PLC that are also used for the PLC's Modbus + address (where applicable).

Proworx NXT does have a modem setting which forces the comm port settings at the PC end to 9600,8,N,1. These settings are generally better for internal PC modems (which are usually setup for Internet connections), but it means that the PLC port at the remote site will require reconfiguring to these settings. The same settings will then have to be used for any local programming on that PLC port as well. These settings work fine with Westermo Modems but to keep everything the same for all Modbus based PLC programming packages, the modem option is not used in this application note.

### NOTE:

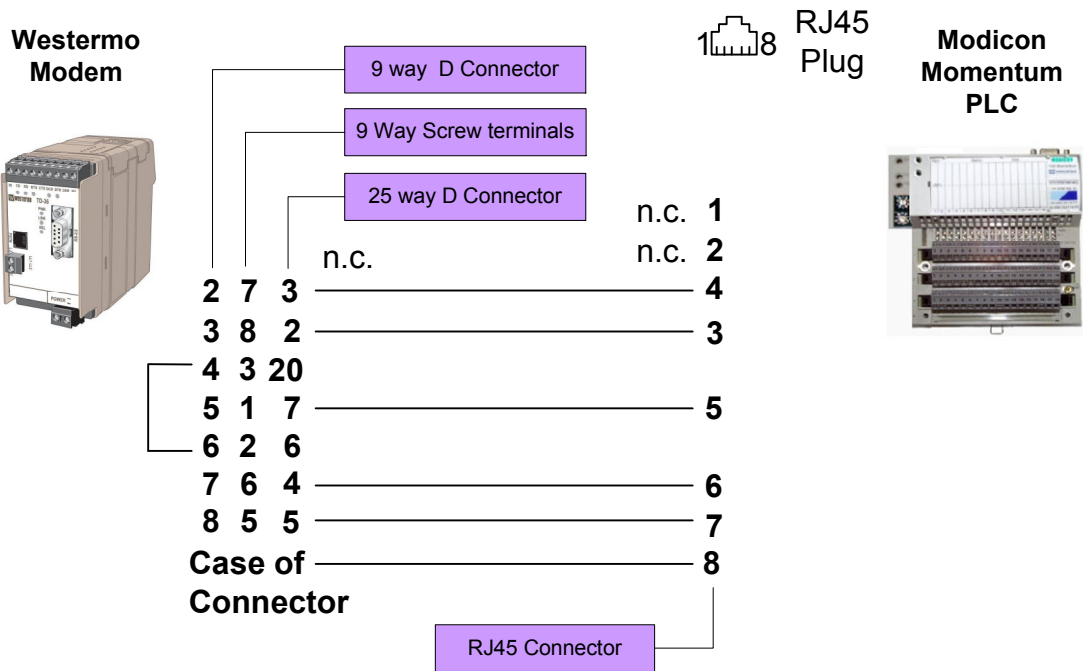
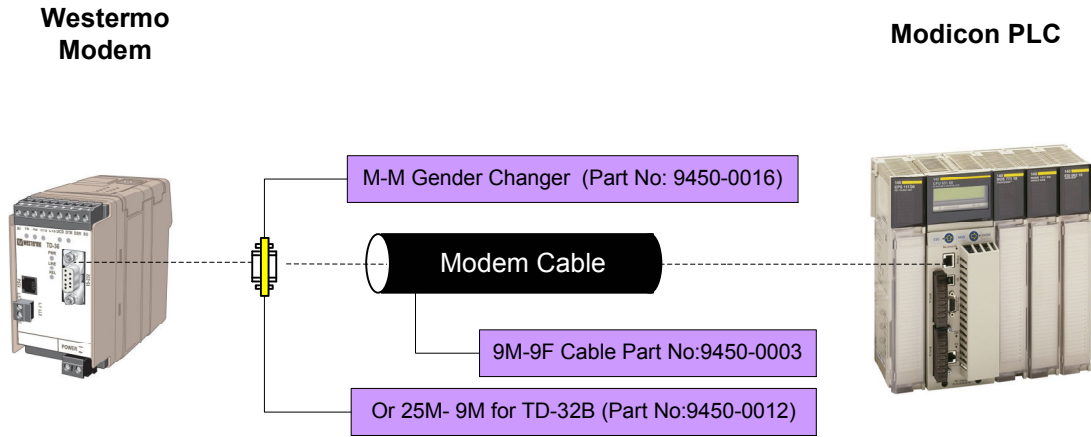
**ENSURE THAT THE PROCESS / MACHINERY IS IN A SAFE STATE BEFORE DOWNLOADING, STARTING OR STOPPING THE PLC.**

## Section 2 - Connecting Westermo Modems to a Modicon PLC



## Section 2 - Cable Pin Out Connections

### RS232 Options

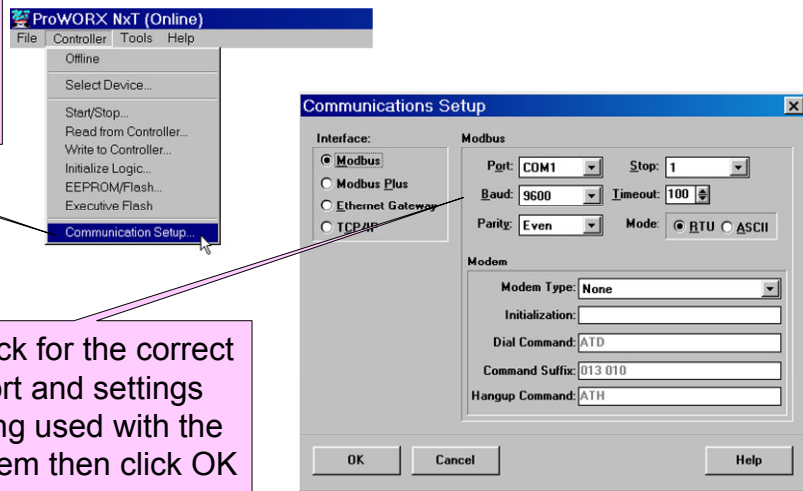


## Section 2 - Software Port Settings

### Proworx NXT

With Proworx NXT there are two methods of working with a PLC. The first is Offline where there is a copy of the PLC program already opened in Proworx and when connecting to a PLC the programs must match in the PLC and on the PC. The second method is Online which is a direct connection to the program in the PLC. In Offline mode the communications settings are saved as part of the program whereas Online settings are saved as the last used.

With either a program loaded in Offline mode or with Proworx in Online mode, select Communications Setup

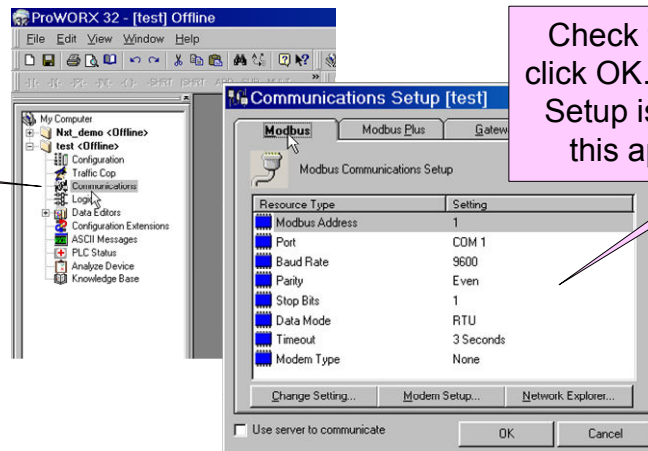


Check for the correct port and settings being used with the Modem then click OK

### Proworx NXT32

With Proworx NXT32 there are the same Offline and Online modes as described above but with the addition of Emulation mode. Emulation mode is a simulator that runs locally in the PC and is not used for PLC communications. For Online mode setup please see Section 3 Testing the Modem connection.

If there is already an Offline copy of the program then select Communications



Check the settings then click OK. Note that Modem Setup is not required for this application note.

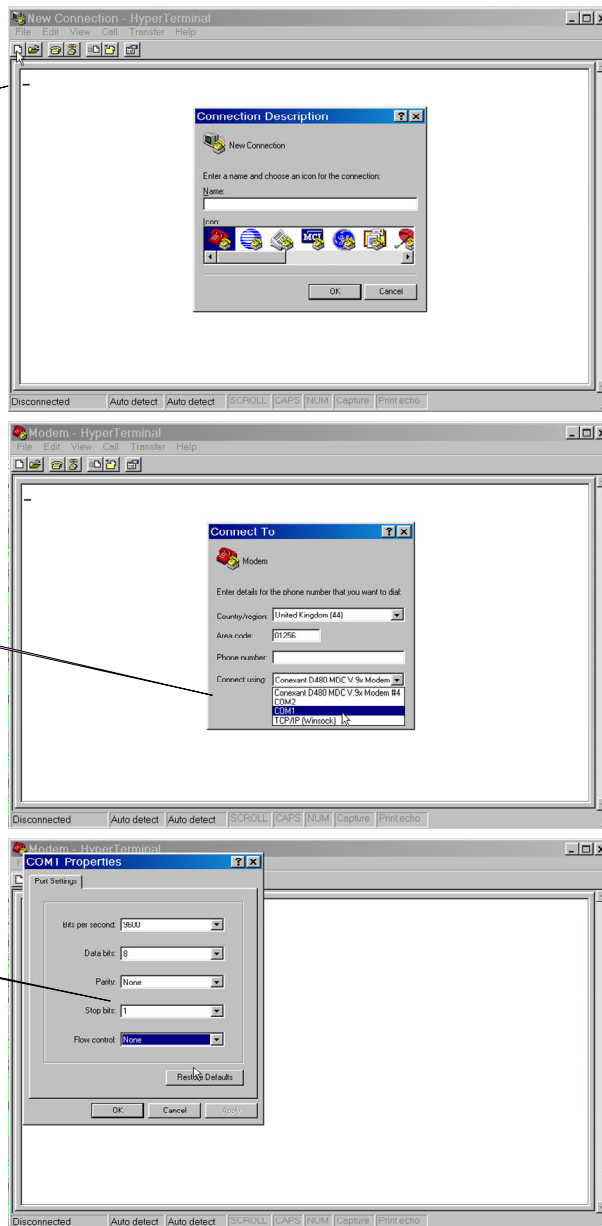


## Section 3 - Using Hyperterminal for Dialling the Modem Connection

Start Windows Hyperterminal and create a New Connection. Enter a name and an icon for the New Connection.

Select the PC com port that is connected to the Westermo Modem. Then click on OK.

For standard Modbus settings, configure the PC com port to be 9600,8,Even,1 and None for the Flow Control. Then click on OK. **Ensure that the PLC Port Settings are the same.**



### Analogue and ISDN Dialling Command String

Using Hyperterminal, enter the following string to dial  
ATDPhone Number

### Analogue Phone Line Simulator Command String

Using Hyperterminal, enter the following string to dial  
ATD,,Phone Number

Once the Modems have connected, save and shutdown Hyperterminal. Hyperterminal will be used again after using the Programming package to hang up the modem connection. Using the command +++ (with no return) then ATH (return)

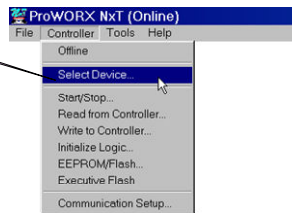


## Section 3 - Testing the Modem connection

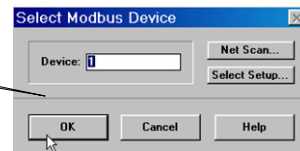
Once the Modem connection has been established and the Modems are showing the DCD led indicating that they are connected then close Hyperterminal and open the Programming package. The following pages show how to connect across the established modem connection using Proworx NXT, Proworx NXT32 and Unity. The same principles shown in this application note can be applied to Concept and even older software packages such as Modsoft if the PC is running Windows 98 first edition or earlier.

### Proworx NXT

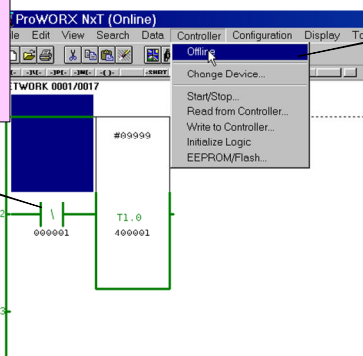
To connect to a PLC from Offline or Online in Proworx NXT, select Controller - Select Device.



Then enter the PLC address. Default address is 1.



Once connected to the PLC, the screen will show the animated logic and the PLC RUN/STOP state at the bottom of the screen



To disconnect from the PLC select Controller - Offline.

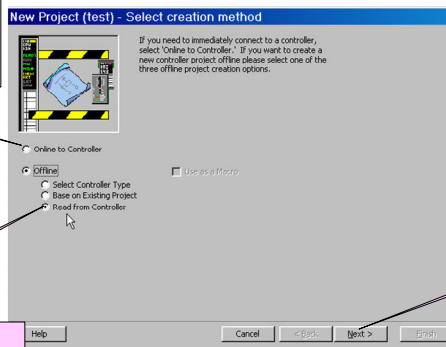
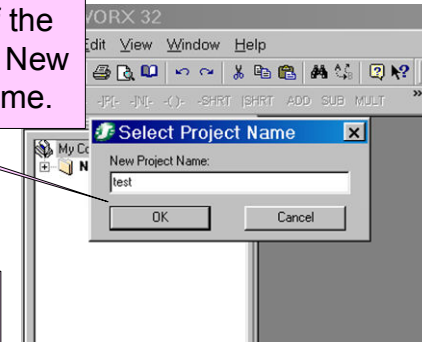
## Section 3 - Testing the Modem connection

### Proworx NXT32 Online

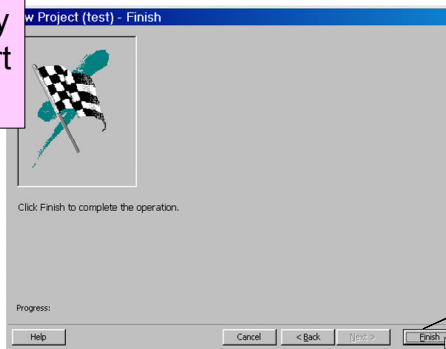
To go Online either direct or to download a copy of the PLC program, create a New project and enter a name.

Either Select Online to controller to work with the program in the PLC without an Offline copy

Or select Read from Controller to upload a copy of the PLC program as part of connecting to the PLC



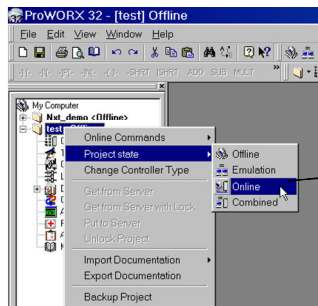
Then select Next



Then Finish to begin the PLC Connection over the already established Modem connection.

### Proworx NXT32 Offline

If there is already an Offline copy of the PLC program then right click on the program name and then select Project State - Online. To disconnect from the PLC select Project State - Offline.



## Section 3 - Testing the Modem connection

When Unity is started the Modbus driver icon can be seen in the windows tray at the bottom right hand corner of the screen. Right click on the icon and then select configure.

To test the connection from Unity, select either PLC - Connect or select PLC - Set Address as described here

Check PLC address and Modbus01, then Communication Parameters

Then click on the Modbus Test tab and select Modbus Serial

Check comms settings then click Hide

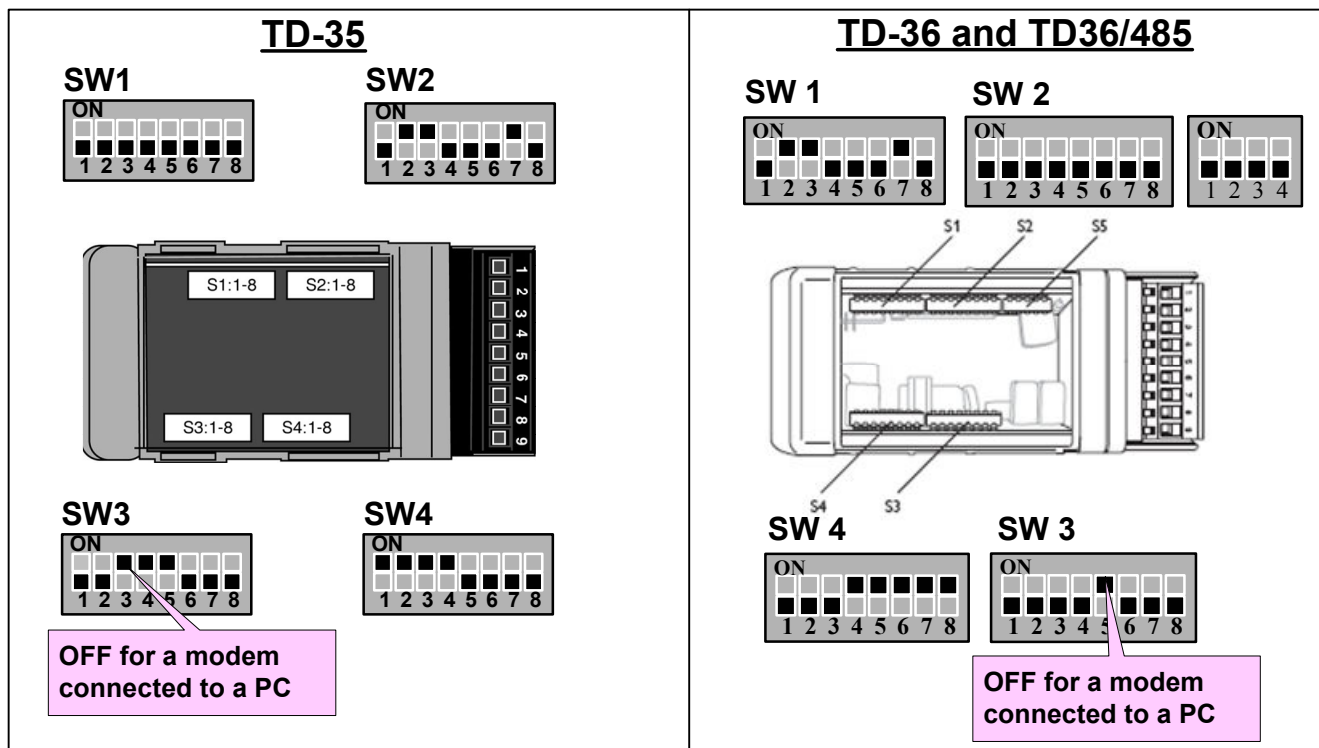
Then select Driver Settings

The connection can now be tested using Connect then Start. If the connection has been made then the Request indicator will flash and the number of requests will clock up. Select Stop then Disconnect to finish.

To get back to the Unity main menu, select OK on each window

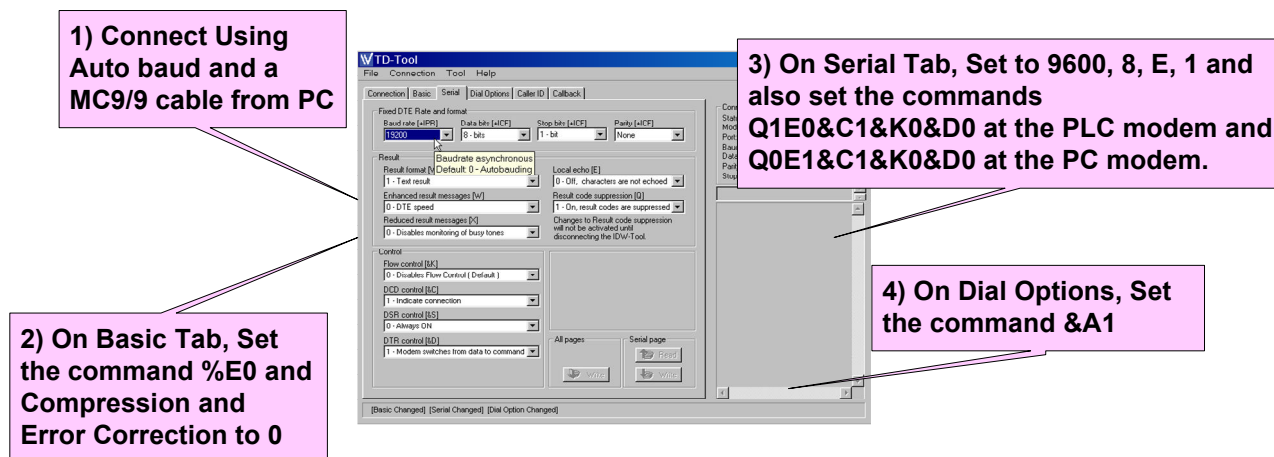
## Appendix 1 - Modem Switch Settings and TDTool2

It is also possible to use the DIP Switches to configure the Westermo Modems, TD-36, TD-36/485 and TD-35, instead of using the CX Modem Support Tool or a Terminal package, such as Hyperterminal, to enter the Modem Command Strings. The DIP Switch settings shown below are the recommended settings for these Modems.



### TDW33

The TDW33 is configured using TDTool 2 which is delivered with the modem. The Windows based tool allows for simple configuration of the modem using pulldown options for the AT command strings. TDTool 2 can also be used to configure the TD36 and TD36/485 modems. **Once the configuration has been entered on each screen select WRITE to store the new profile in the modem.**



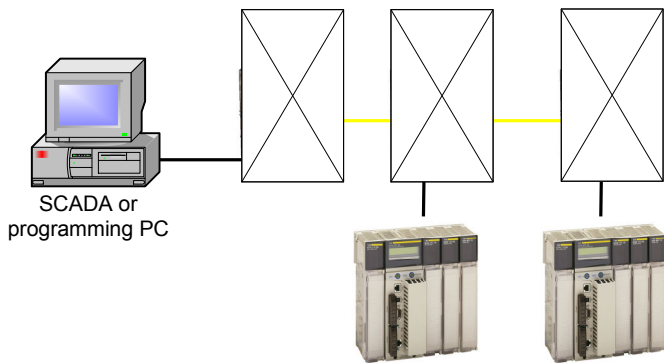
## Appendix 2 - Alternative Westermo to Modicon PLC Connections

There are many other ways of connecting Modicon PLC's using Westermo devices. There are some example applications shown below, but for any other connection method please contact Westermo.

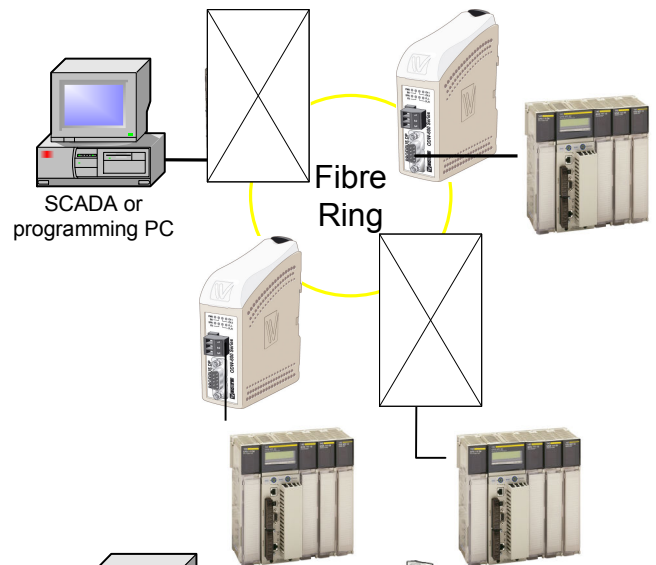
The first applications shown below use the RS232 Fibre Optic Line Sharing modems to create Linear and Redundant Ring configurations.

The first Ethernet example application shows the SDW541 Ethernet Switches connected by up to 2Km of Multi Mode or up to 15Km of Single Mode Fibre Optic Cable. The second Ethernet example application shows a Redundant Fibre Optic Ethernet ring using Switches that can recover from a breakdown of the ring within 30mS.

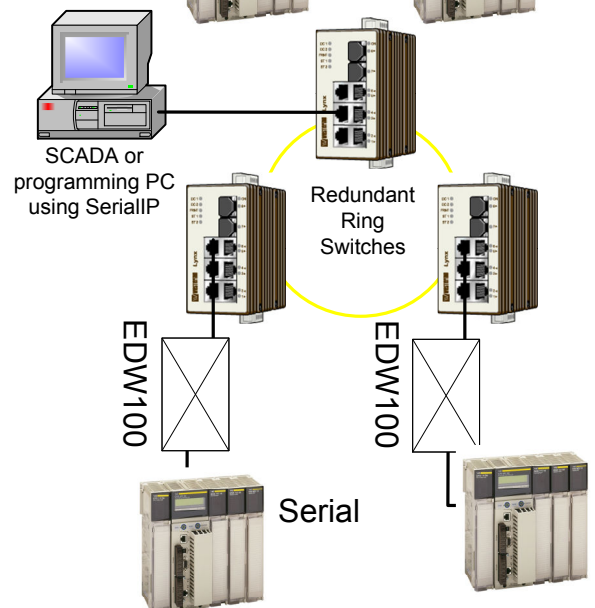
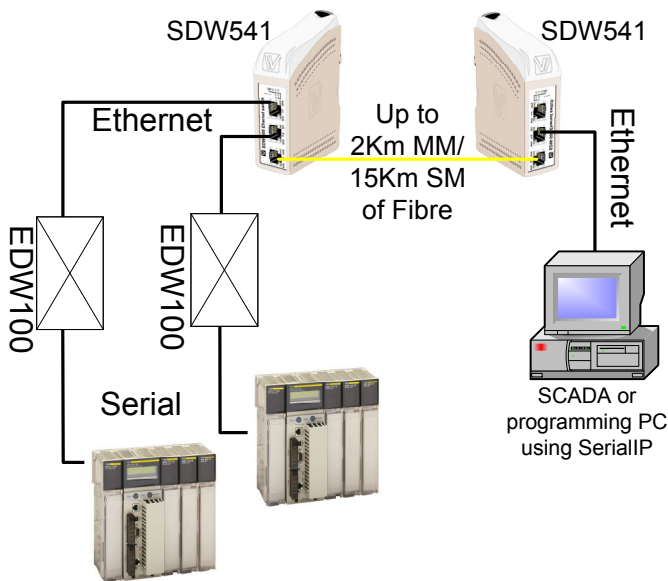
### ODW622 RS232 Linear Fibre Optic Network



### ODW632 RS232 Fibre Optic Ring



### Ethernet and Fibre Optic Networks

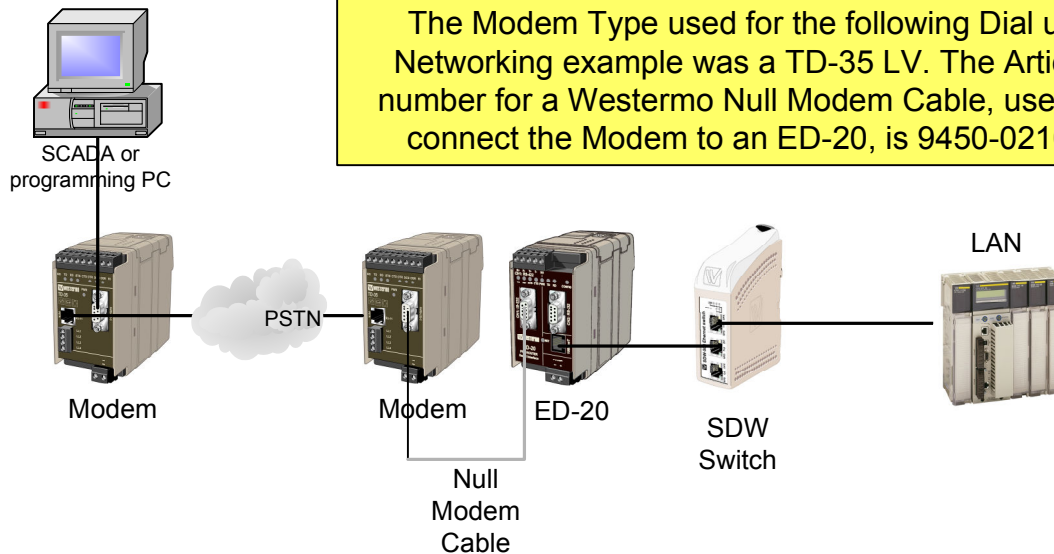




## Appendix 3 - Westermo ED-20 to Ethernet Enabled PLC's

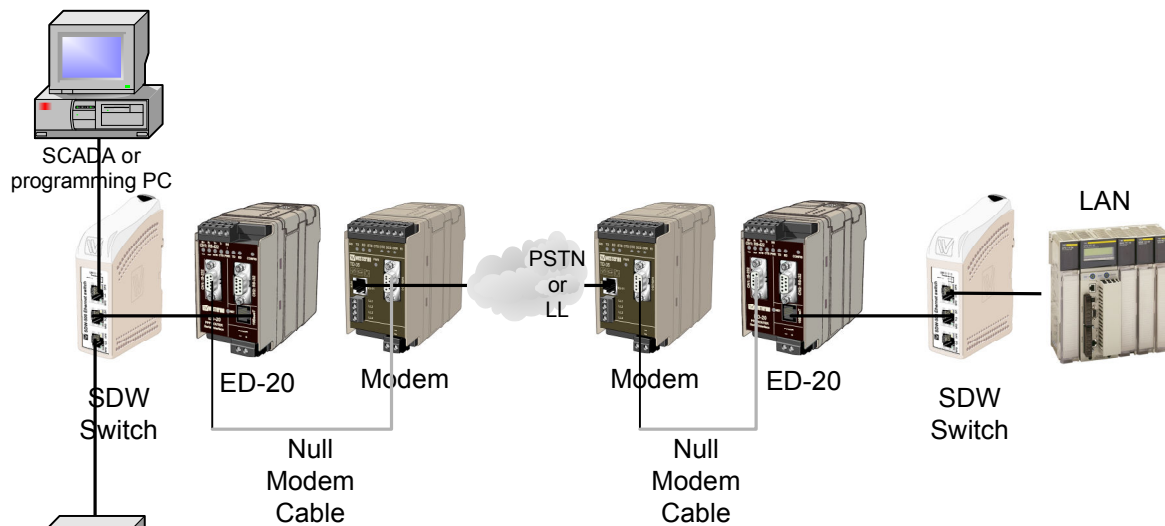
It is possible to use Westermo Modems with Westermo ED-20's to either link two Ethernet Networks or to connect to a PLC Ethernet Network using Microsoft Windows Dial Up Networking. For greater detail on configuring the ED20, please see the ED20 Application Note available from Westermo.

### Dial Up Networking



**Note:**  
The Modem Type used for the following Dial up Networking example was a TD-35 LV. The Article number for a Westermo Null Modem Cable, used to connect the Modem to an ED-20, is 9450-0210.

### Connecting Ethernet Networks



**Note2:**  
It is also possible to connect same subnet networks with a pair of DDW-100 SHDSL Ethernet Extenders using existing twisted pair cable, in the same manner as shown above with the DDW-100s being used in place of the ED-20 and Modems.









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