NEC

User's Manual

78K - Hopper

Embedded Web Server Technology
Demonstration Using the 78K-Test it! Evaluation Board

Getting Started

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78K – Test It! complies with the EMC protection requirements

CAUTION

This equipment should be handled like a CMOS semiconductor device. The user must take all precautions to avoid build-up of static electricity while working with this equipment. All test and measurement tool including the workbench must be grounded. The user/operator must be grounded using the wrist strap. The connectors and/or device pins should not be touched with bare hands.

EEDT-ST-004-10

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1. Introduction

1.1. Embedded Systems and the Internet

In recent years the Internet has become a more and more important instrument for communication. It is built on standard protocols defined over the last 30 years, so that now any computer can be connected to the World Wide Web.

Currently most computers with Internet access are PCs running large operating systems. Now, however, with the entry of embedded systems into the Internet world, there has become a definite requirement for solutions without the traditional overheads of PC connectivity.

1.2. Remote Access Applications

Internet connected embedded systems have become key to remote access applications. Up to now, remote access applications have been based on high-cost, inflexible proprietary solutions to provide

- the communications protocol between a remote location and the embedded system
- the embedded system software
- the graphical user interface at the remote location

If it were possible to use the standard TCP/IP and additional protocols used in the Internet, development costs for remote access solutions would be dramatically reduced:

- the communications protocols are standard: PPP, Ethernet, TCP/IP, UDP, HTTP, FTP, TFTP
- the graphical user interface is available on every PC without costs: a standard Internet Browser (e.g. Netscape Communicator™ or Microsoft Internet Explorer™).

So it has become necessary to provide a communication software solution for microcontrollers which supports the protocols mentioned above.

1.3. Embedded Web Server

To fit these demands, a Web server has to become “Embedded”. An Embedded Web Server works with minimal resource requirements, handles the protocols and provides the low-level functions required to access the hardware.

78K-Hopper has been developed as Internet-enabling technology for the NEC 78K0 family of 8-bit microcontrollers.

The product described in this documentation, uses the standard 78K-Test it! Evaluation Board to demonstrate the NEC 78K0 family as a platform for Embedded Web Server technology.

1.4. Main features of *78K – Test it!*

- Easy to use device demonstration capabilities
  78K – Test it! contains elements to easily demonstrate simple I/O-functions, i.e. push buttons, LED output, AD reference voltage, I/O lines, RS232 serial interface using CMX Micronet™ TCP/IP Stack

- Battery powered
  78K – Test it! is battery powered for portability reasons.

- Serial communication for PPP/SLIP connection to PC
  A Windows based Internet browser allows selection and control of application programs to *78K – Test it!* for evaluation purposes.

- Analogue to digital signal conversion is supported

- Various input / output signals available, such as
  - 12 I/O ports prepared to be connected to user hardware
  - Timer input / output signals
  - Two or three wire serial I/O
  - RS232 signals including RTS / CTS
  - 4 analogue input lines
  - 8 I/O ports connected to LED
  - 2 push buttons prepared for external interrupt generation

- 78K0/K0S C Compiler package, Windows Workbench and 78K0 System Simulator / Debugger are included. These packages are restricted in such that maximum program code size is limited to 4 KB of program code.

- Full documentation is included for the NEC μPD78F0066, C Compiler, Windows Workbench and 78K0 System Simulator

- Full Documentation for API calls to integrate embedded application examples included.

The 78K – Test It! Kit is ready to use. Please follow the installation instructions on the following pages.

***78K – Test it!* is not intended for code development. NEC does not allow and does not support in any way any attempt to use *78K – Test it!* in a commercial or technical product.**

1.5. System requirements

HOST PC	A PC supporting Windows NT or Windows 2000 is required for the IAR Workbench demo and NEC Simulator. Pentium 166 MHz (at least), 64 MB of RAM, 256-color display (1024 * 768), mouse, CD-ROM drive and 40 Mbytes of free hard disk space are required to install the tool packages. Above listed requirements are valid if the IAR Embedded Workbench or the NEC System Simulator shall be installed. The communication interface program does not need to be installed to the local hard disk. It can be started from the CDROM.
Host interface	Serial (RS232C) interface capable to handle communication at 38600 baud.

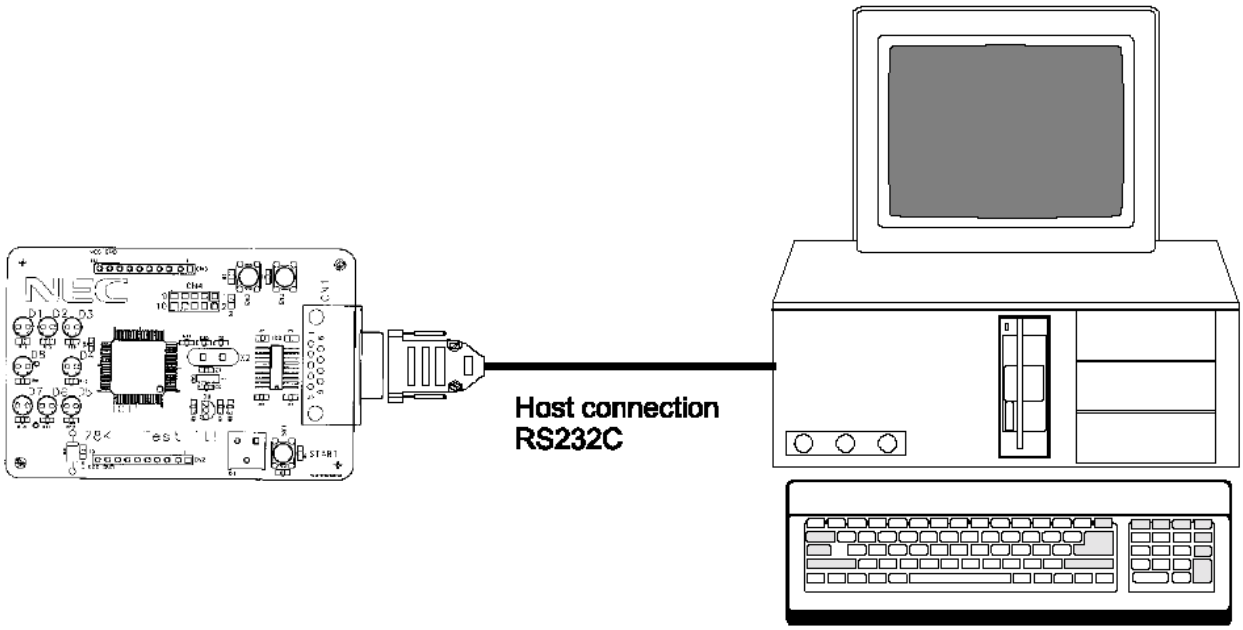
Note: Updates to this User Manual, additional documentation and/or utilities for *78K – Test it*!, if available, may be downloaded from the NEC WEB page(s) at www.ee.nec.de/78K, or www.ee.nec.de/inetcon..

2. Installation

2.1. Hardware

The 78K – Test It! Starter Kit hardware consists of
78K – Test It! Evaluation Board
3 x AA batteries Included
RS 232 Serial Cable

The 78K module is plugged directly into PC via DB-9 RS232 serial connector to either COM 1, or COM 2.



For detailed information about the hardware please read the 78K – Test It! Demonstration Kit for the 78K Family. Chapter 3(*78K – Test it!* Components).

2.2. Software

For detailed information about the software installation please read the 78K – Test It! Demonstration Kit for the 78K Family, chapter 4 (*78K – Test it!* Installation and Operation).

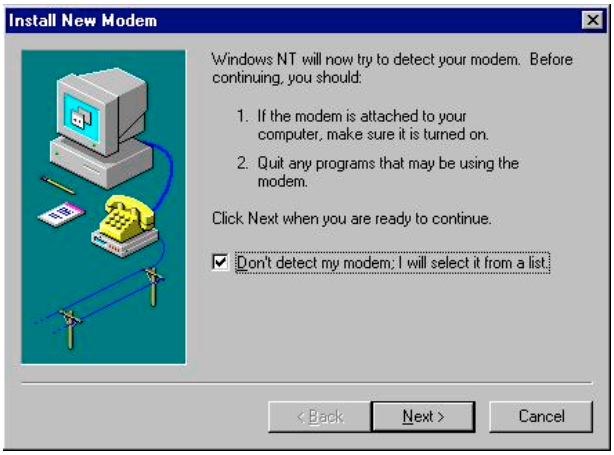
2.3. Installing TCP/IP - PPP connection on Host PC

Make sure that Host PC is either Windows NT, 2000, or XP. (Windows 95/98 do not allow a PPP connection through a serial cable.)

2.3.1. Windows NT Installation

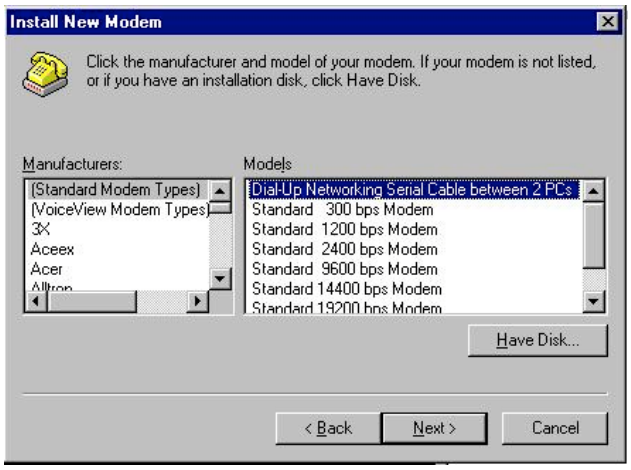
2.3.1.1. In *Control Panel* select *Modems*

2.3.1.2. Do not allow Windows to detect a MODEM. Select *Don't detect my modem. I will select it from the list*.

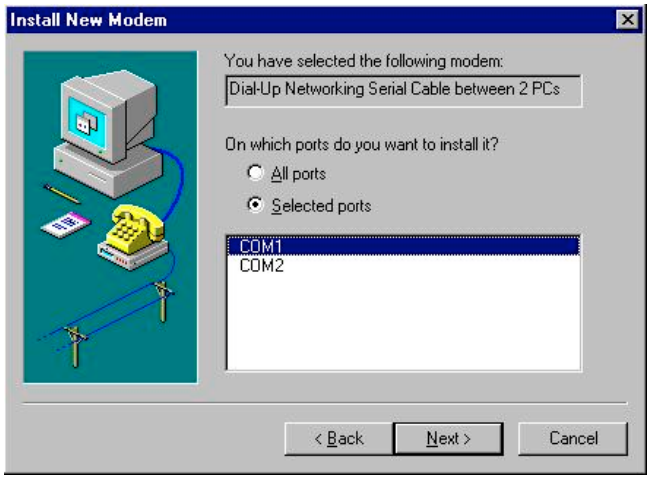


2.3.1.3. Within the *Modems Properties* Press *Add*

2.3.1.4. From the list of MODEMs available choose *Dial-Up Networking Serial Cable between 2 PCs* and Press *Next*.

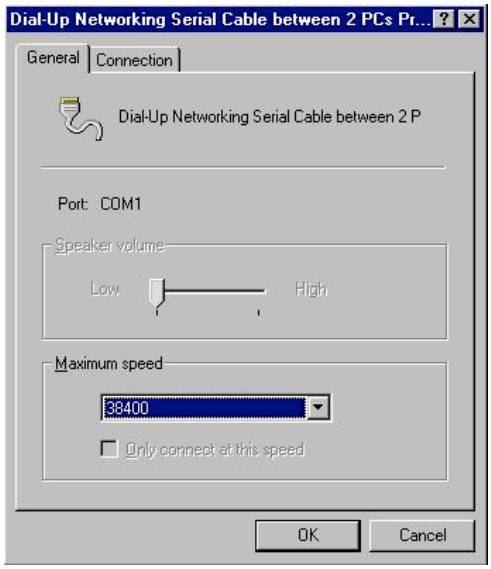


2.3.1.5. Choose the COM port you wish to connect to the 78K – Test It! Evaluation board.

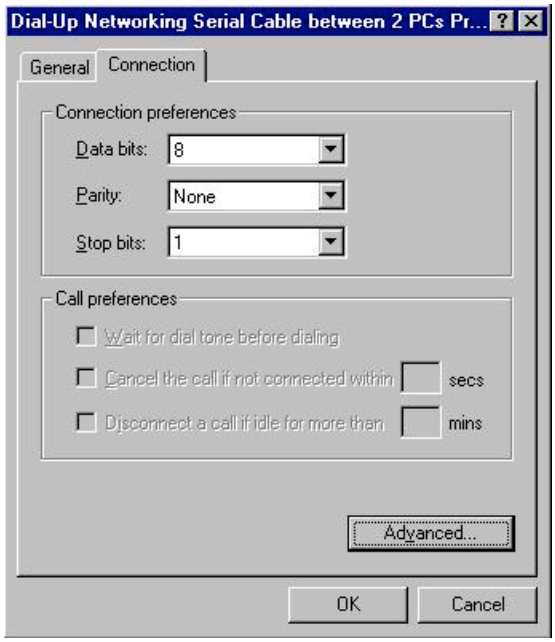


2.3.1.6. After you have set up your MODEM correctly you will find added to the *Modems Properties* window the *Dial-Up Networking Serial Cable between 2 PCs*. Select this option and press the *Properties* option.

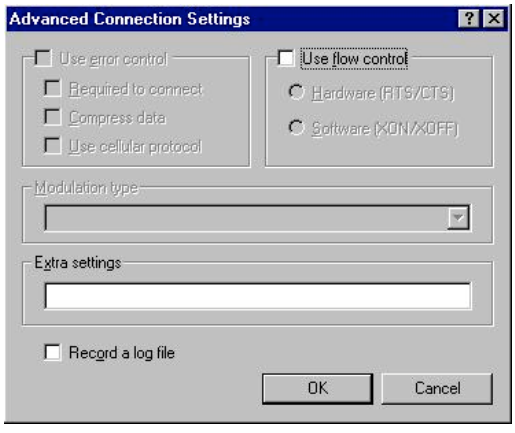
2.3.1.7. Under *General*, *Maximum Speed* select the 38400 BAUD rate required for the 78K – Test It! Evaluation board to operate at



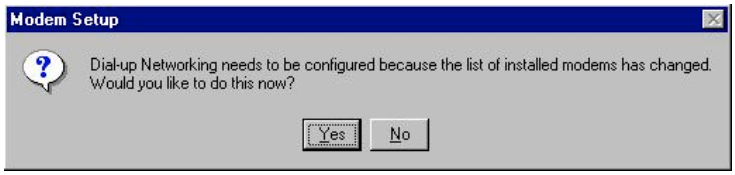
2.3.1.8. Under *Connection* tab set *Data bits to 8*, Parity to None and *Stop bits to 1*. These are the default settings for the 78K – Test It! Evaluation board. Flow control options must also be changed to operate the 78K – Test It! Evaluation board. To do this press *Advanced* to enter the *Advanced Connection Settings*.



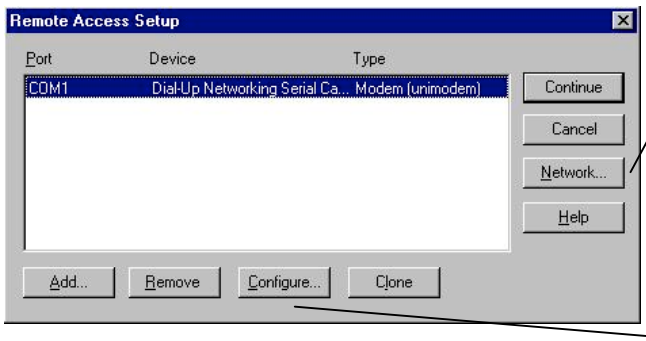
2.3.1.9. Under *Advanced Connection Settings* de-select *Use flow control* NO flow control is enabled on the 78K – Test It! evaluation board.

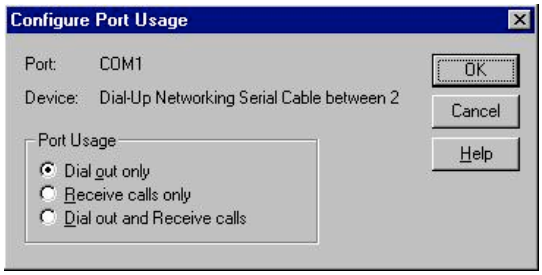


2.3.1.10. If *Dial-up Networking* has not been installed on you version of NT you will need to add this via *Programs – Accessories – Dial-Up Networking.* The dialog box for *Modem Setup* may not appear. Once the MODEM setup has been completed NT will need to configure *Dial-Up Networking* to use the added installed modem option. Press *Yes* to proceed.



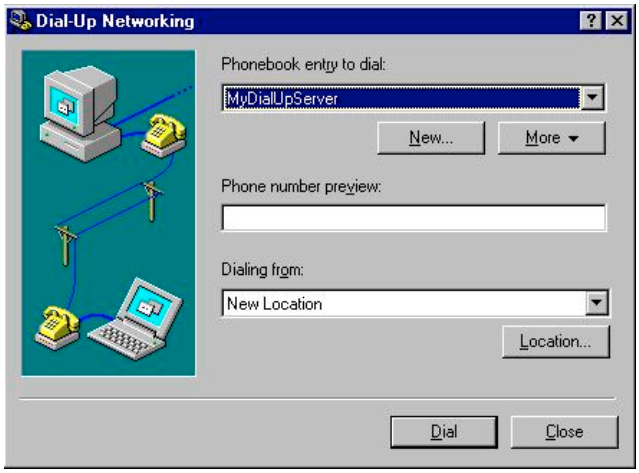
2.3.1.11. Once you have selected *Yes* to proceed and the following *Remote Access Setup* box appears. Press the *Configure* button select *Dial out only* option. Press the *Network* button to select the *Dial out Protocols* to be *TCP/IP*. After this has been completed press *Continue*.



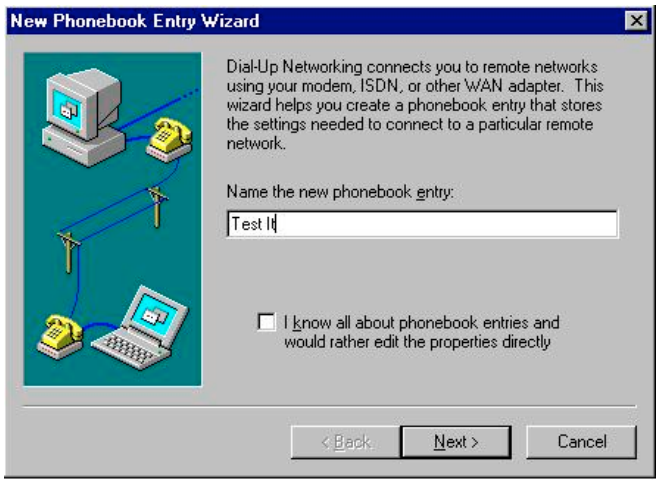


2.3.1.12. After completion it will be nessesary to restart your computer for the new network settings to take effect.

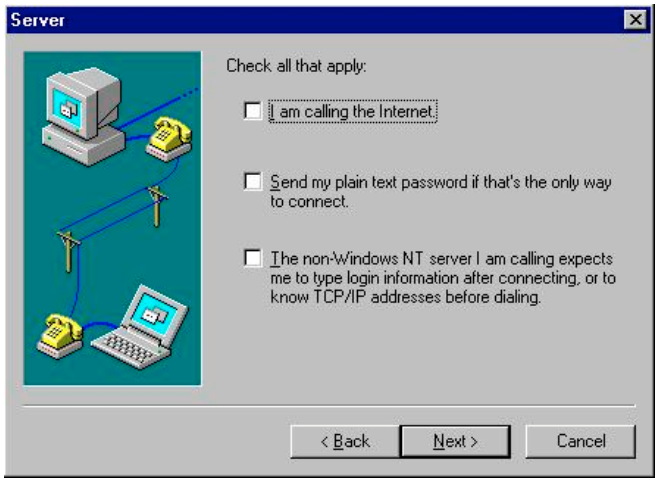
2.3.1.13. Once your PC has been restarted. Go to *Dial-Up Networking* Press *New* to set up a new connection to the 78K – Test It! evaluation board.



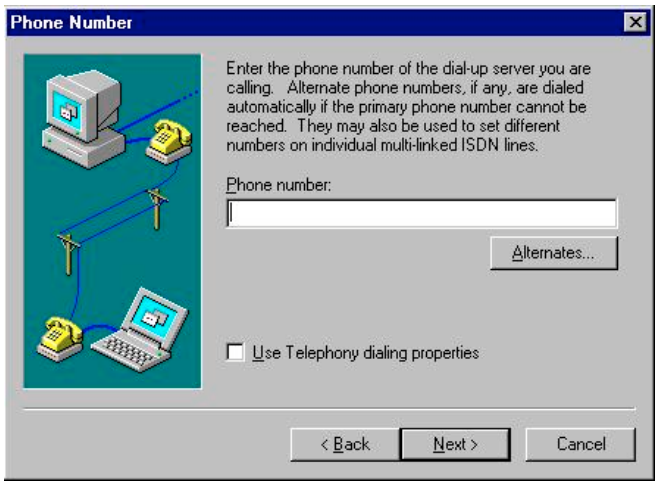
2.3.1.14. Once *New* has been pressed you will need to give the dial-up networking connection a name to add to the phonebook. This can be any name but for the example type in: *Test It* into the *Name the new phonebook entry:*. After the name has been entered press *Next*



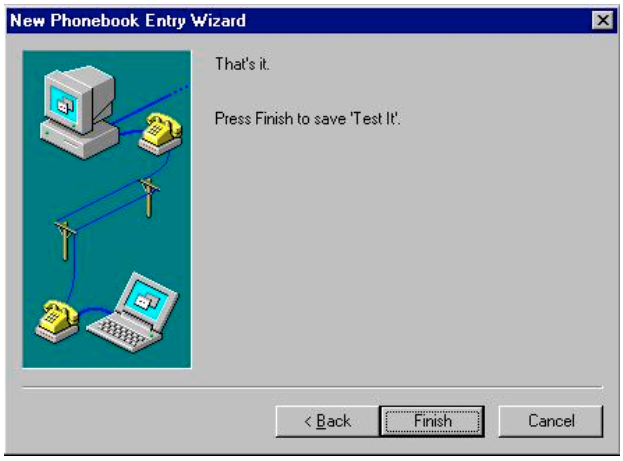
2.3.1.15. Make sure that none of the boxes below are checked. Then select *Next*.



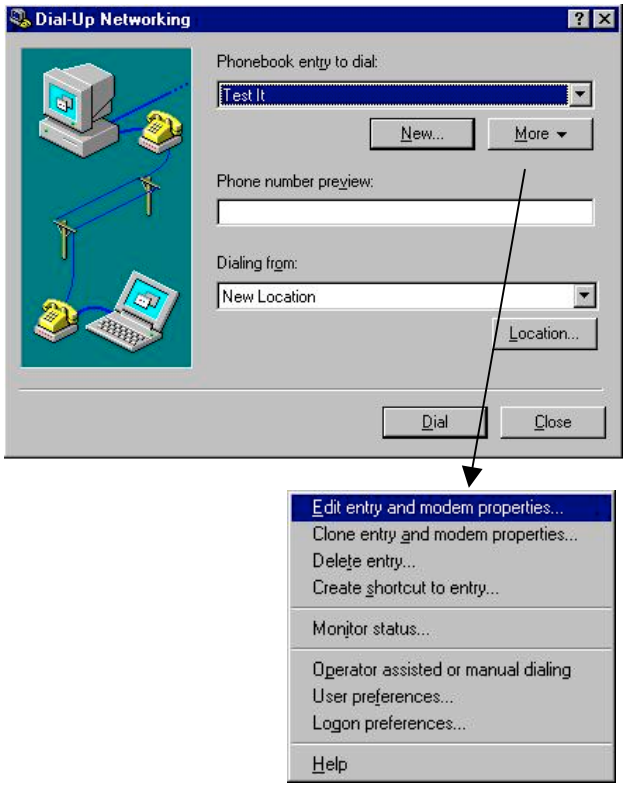
2.3.1.16. Since this is a direct PPP connection to the 78K – Test It! evaluation board. Make sure that a phone number is NOT entered below. Press *Next* to continue.



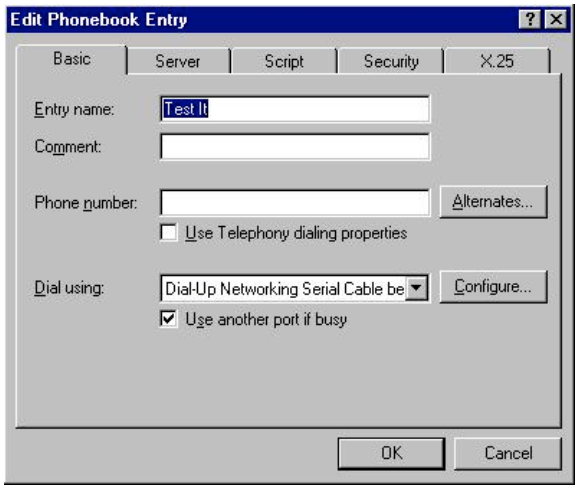
2.3.1.17. Dial-Up Networking setup is now completed. Press *Finish* to continue.



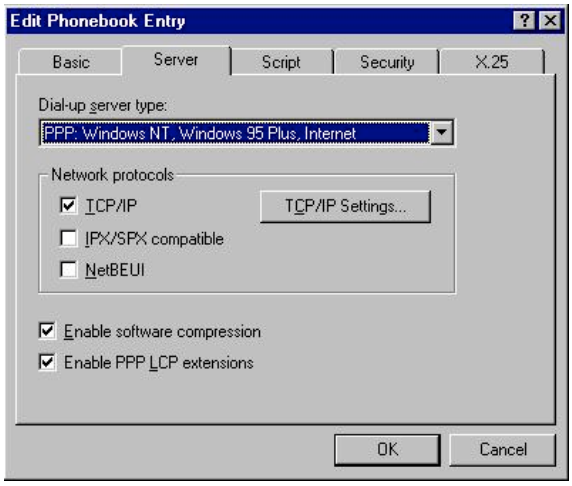
2.3.1.18. Now you have the new *Test It* option under the *Phonebook entry to dial* Press *More* to setup IP addresses for the 78K - Test It! evaluation board. Under the *More* drop down menu select *Edit entry and modem properties…*



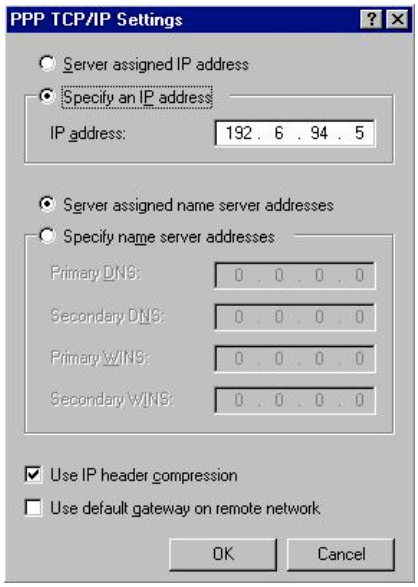
2.3.1.19. Make sure that Under the Basic tab the Entry name: Test It is set up for Dial using: Dial-Up Networking Serial Cable between to PCs



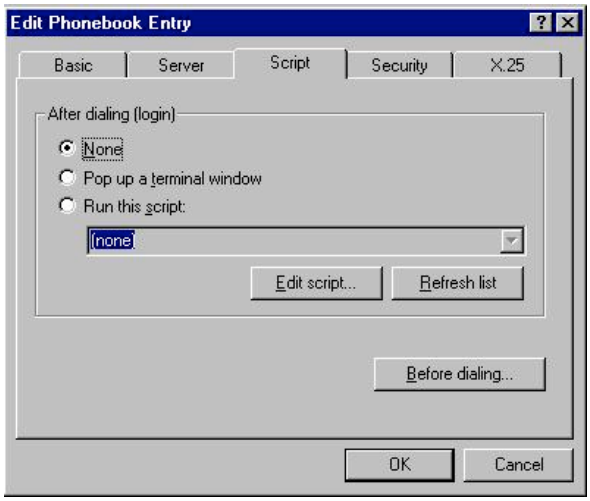
2.3.1.20. Under the *Server* tab make sure that the following options are selected. Next Press the *TCP/IP Settings* button.



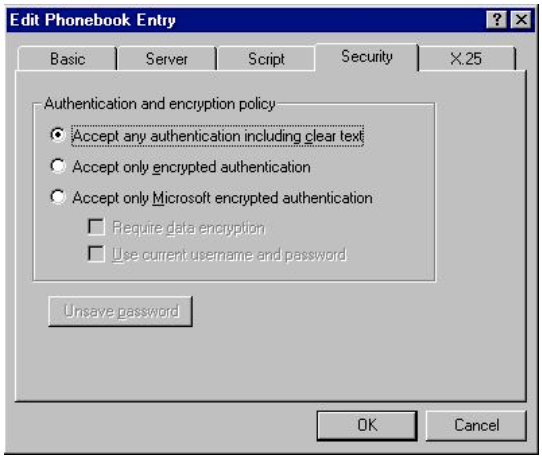
2.3.1.21. You MUST specify an IP address for you PC. This is reffered to as the destination address by the 78K – Test It! evaluation board. For the evaluation the *IP address* is specified as: 192.6.94.5. *Use default gateway on remote network* must also be de-selected. Press *OK* once PPP TCP/IP Settings have been configured.



2.3.1.22. Under the *Script* tab *After dialing (login)* must be selected to be *None*

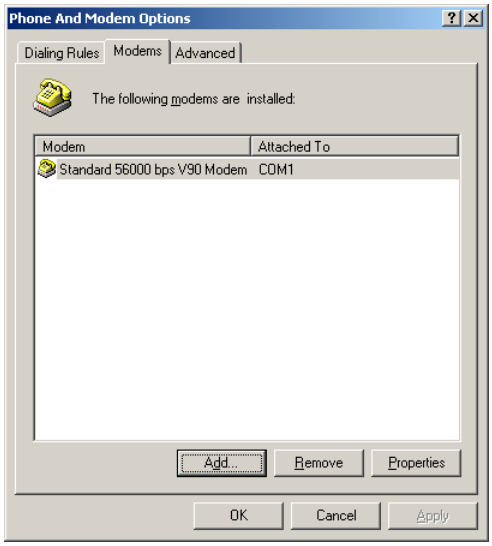


2.3.1.23. Under the *Security* tab *Authentication and encryption policy* must be set to *Accept an authentication including clear text*. Once completed press *OK*. Dial-Up networking has now been set up. Press *Close* to exit Dial-Up Networking.

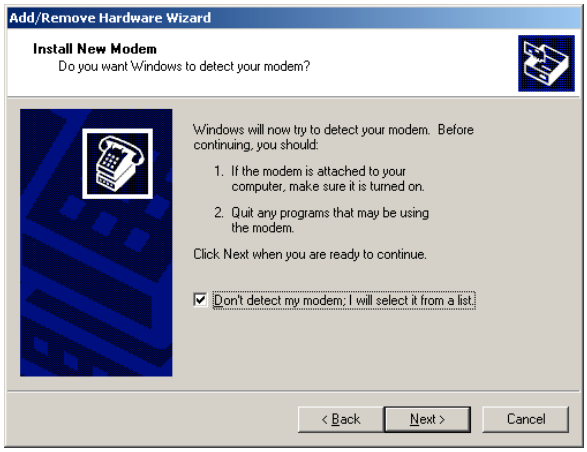


2.3.2. Windows 2000 Installation

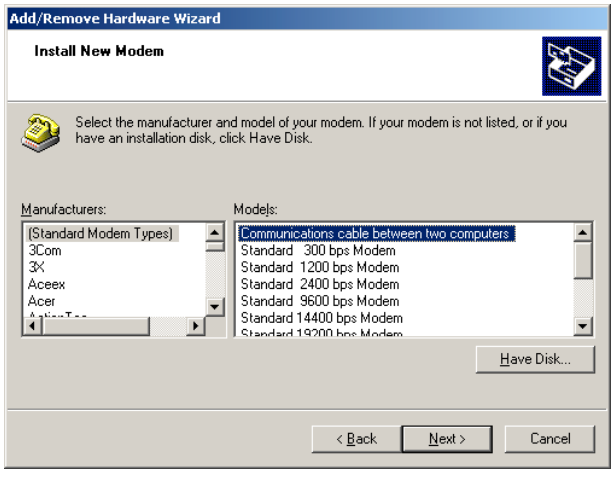
2.3.2.1. In *Control Panel* select *Modem*. Select *Add* from the modem propertis dialog box



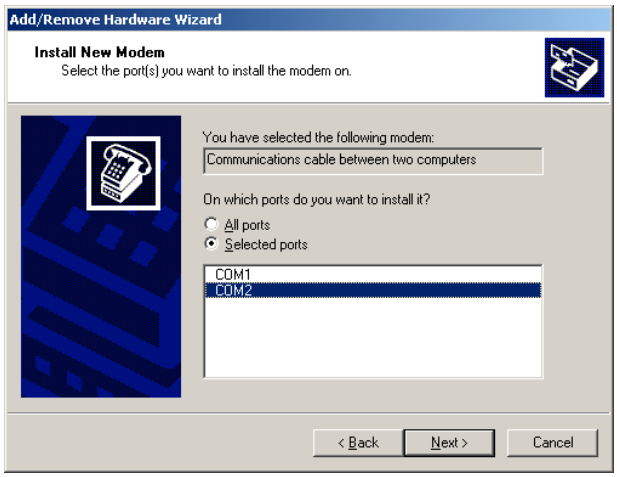
2.3.2.2. Do not allow Windows to detect a MODEM. Select *Don't detect my modem. I will select it from the list*.



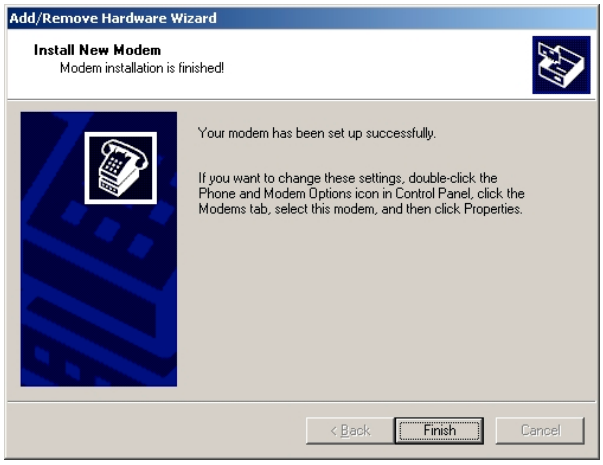
2.3.2.3. Select *Communications cable between two computers* and press *Next*



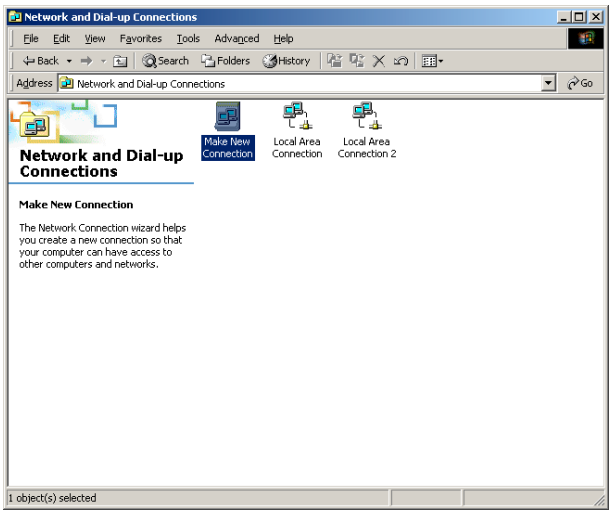
2.3.2.4. Select required communications port and press *Next*



2.3.2.5. Press *Finish* to complete this stage

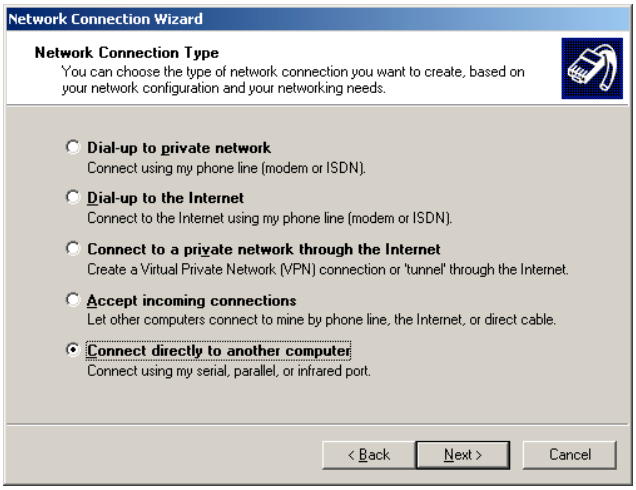


2.3.2.6. From *Control Panel lauch Network and Dial-up connections* and select *Make New Connection*

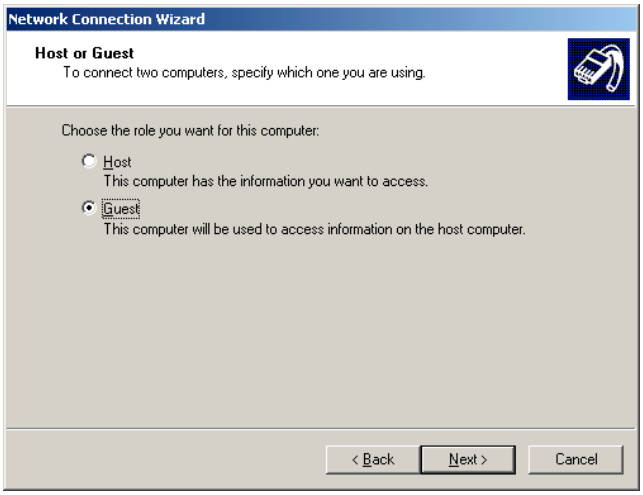


2.3.2.7. Select *Next* to launch the wizard

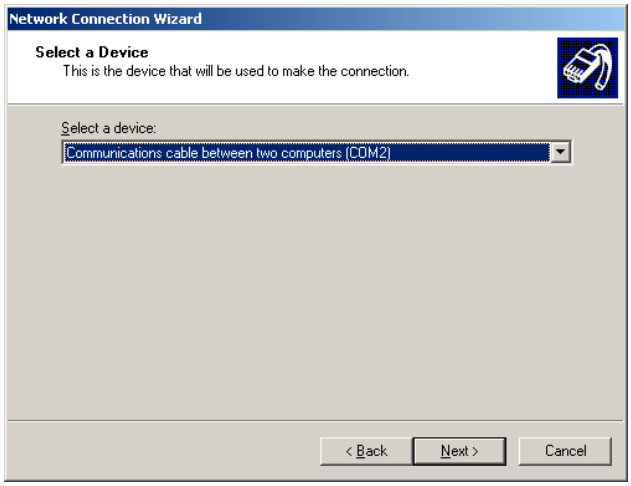
2.3.2.8. Select *Connect directly to another computer* and press *Next*



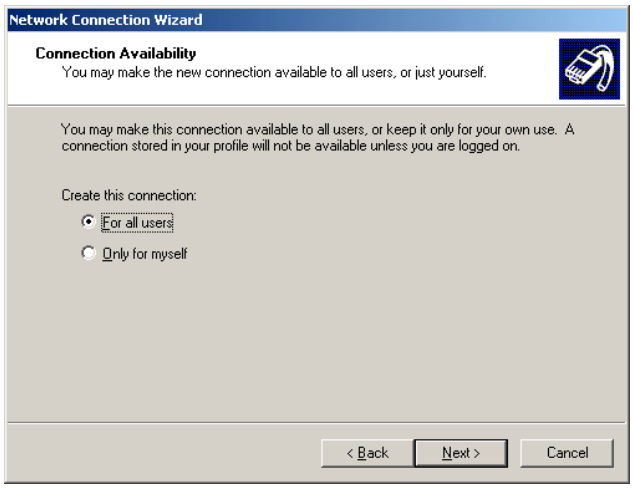
2.3.2.9. Select *Guest* and press *Next*



2.3.2.10. *Select the device* as *Communications cable between two computers* and press *Next*

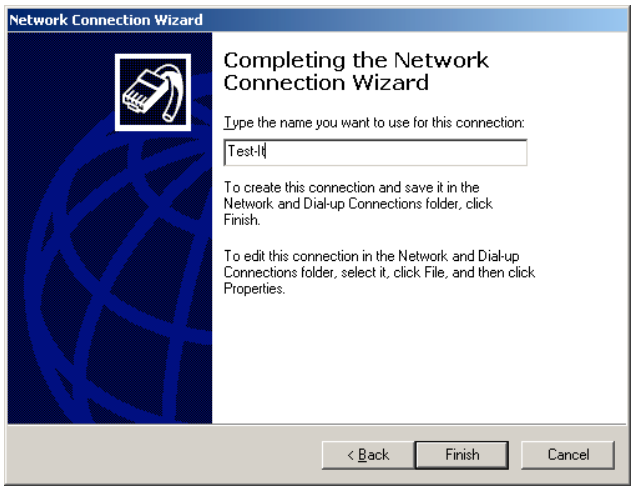


2.3.2.11. Select required option and press *Next*

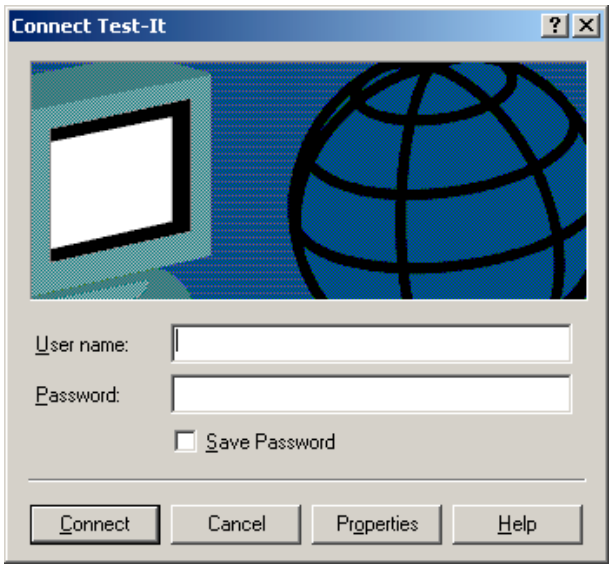


2.3.2.12. Enter connection name and press *Finish*

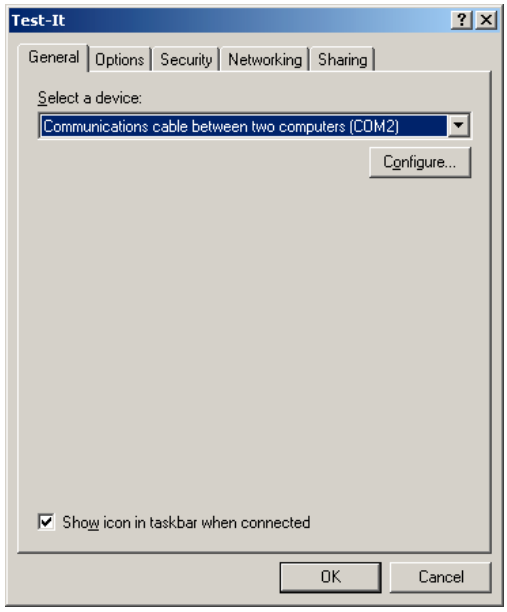
2.3.2.13.



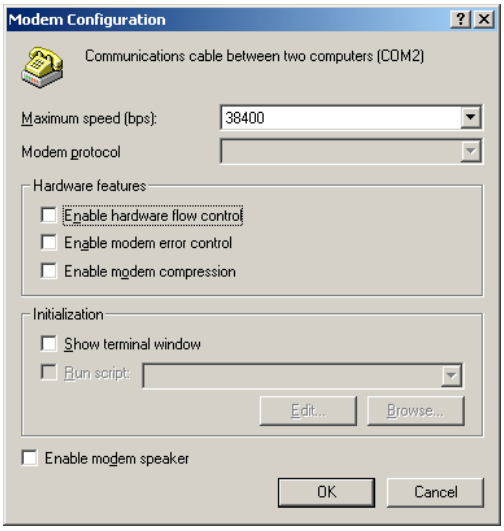
Blank out the *User name* field and then press *Properties*



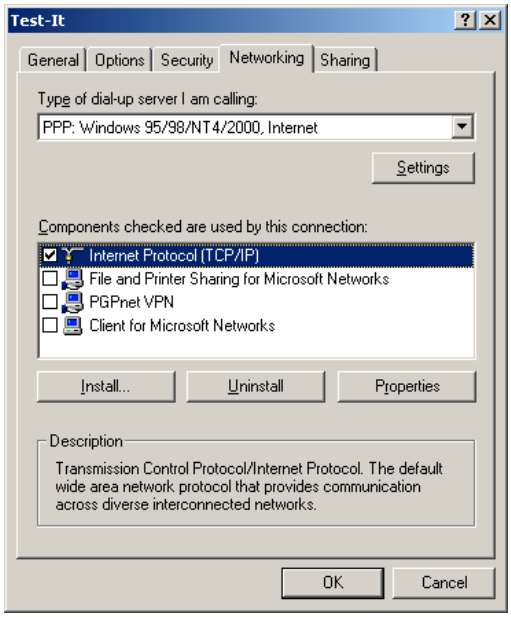
2.3.2.14. Select *Configure* from the dialog box



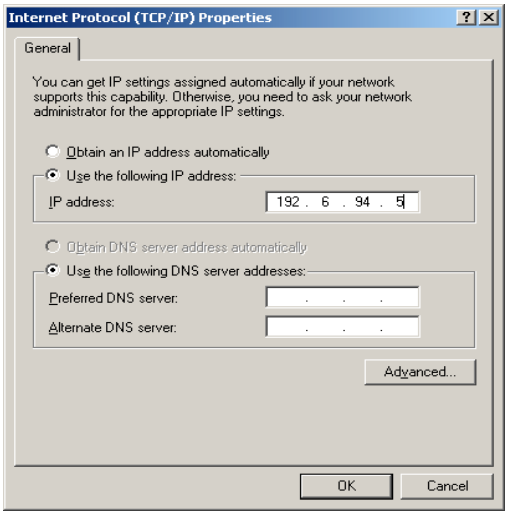
2.3.2.15. Select 38400 as the speed setting and leave all other check boxes clear. Press *OK*.



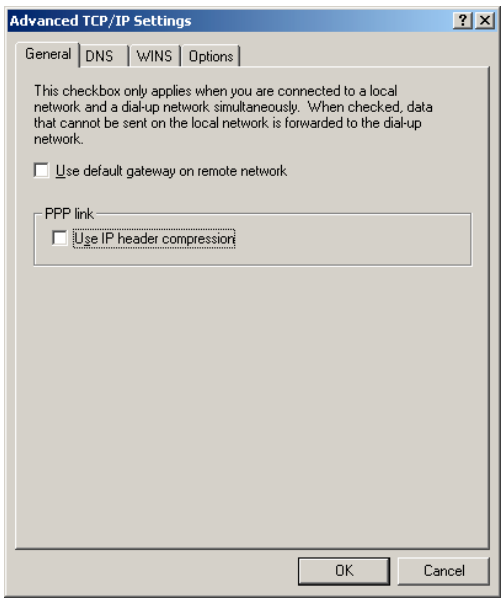
2.3.2.16. Select *Networking* and clear all of the check boxes *except Internet Protocol (TCPIP)*. Then press *Properties*.



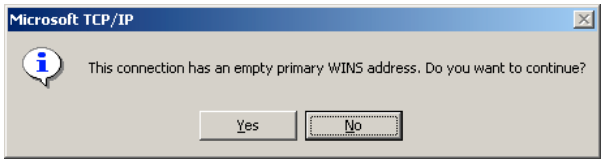
2.3.2.17. Select *Use the following IP address automatically* and enter the following number 192.6.94.5 and select *Advanced*



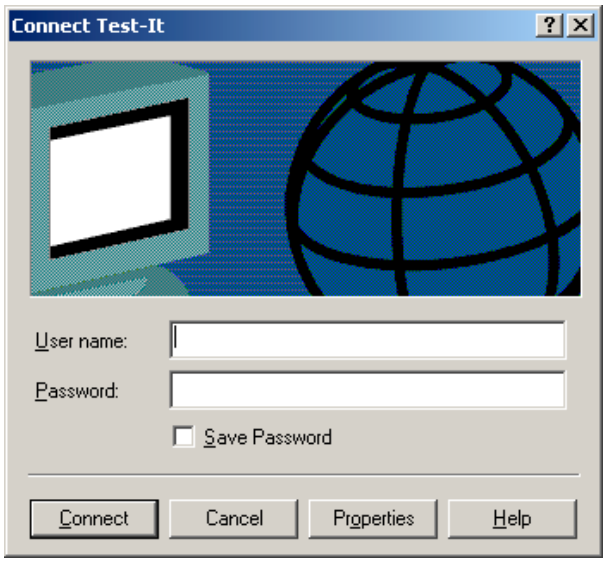
2.3.2.18. Clear the check boxes and then press *OK*



2.3.2.19. Select *Yes* when the following dialog appears



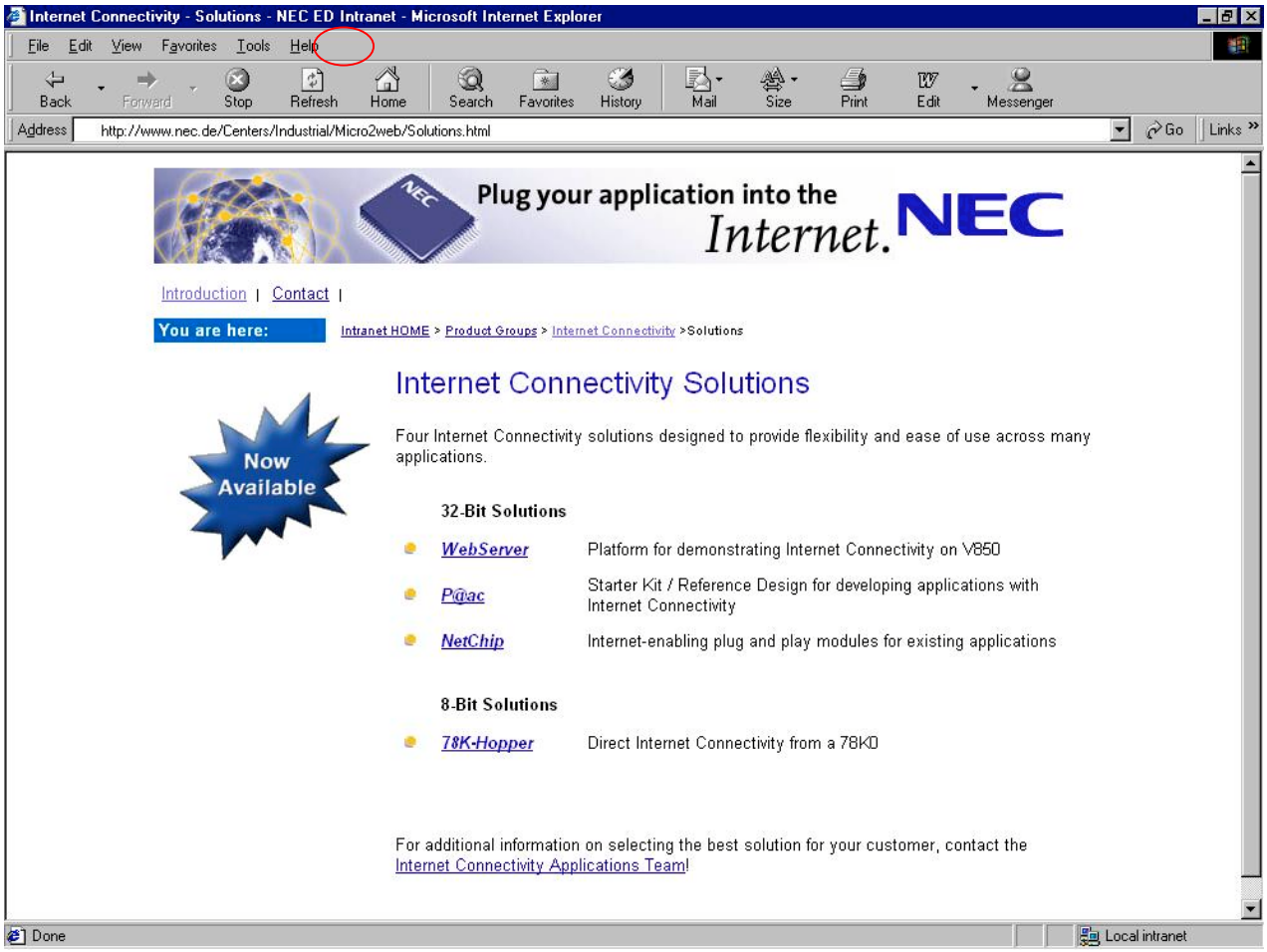
2.3.2.20. Keep pressing *OK* until the following dialog appears. Press *Cancel* this will create a dial-up icon for Test-it in the Networking program group.



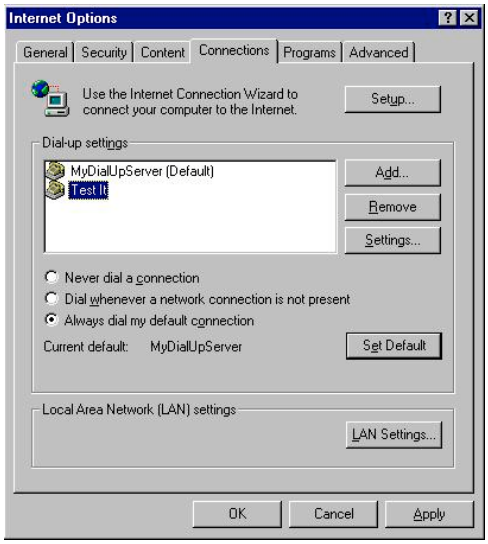
2.4. Setting up Web Browser to Connect to 78K – Test It! evaluation board.

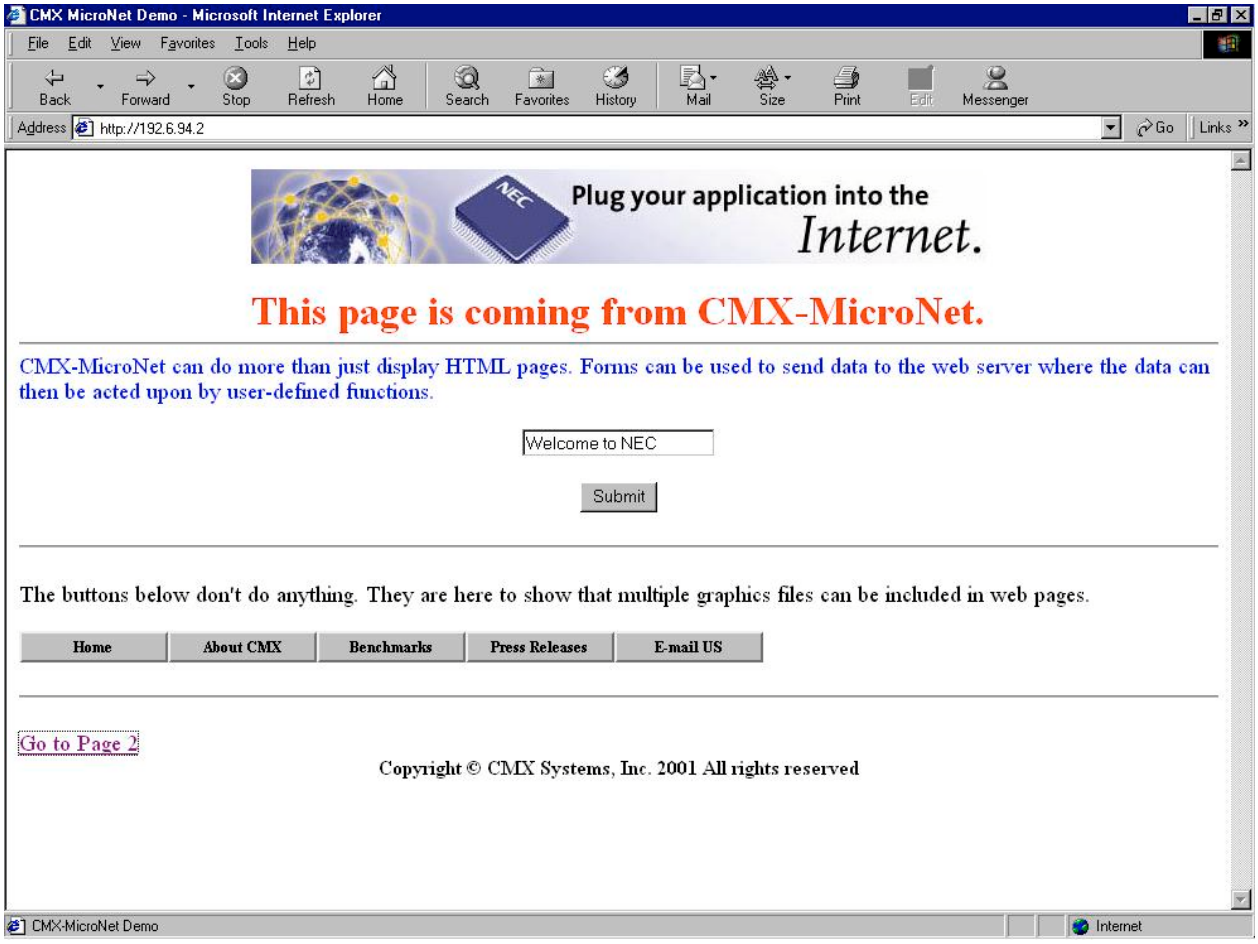
2.4.1. Windows Explorer

2.4.1.1. Within Windows Explorer select the *Tools* drop down menu and select *Internet Options.*



2.4.1.2. Select the *Connections* Tab. Highlight the Test It *Dial-Up Settings*. Select *Always dial my default connection*. Then press *Set Default*. Then press *OK*. This will set the PPP connection to the 78K – Test It! evaluation board. It can be changed back to your origial settings for access to the normal internet.



2.4.1.3. Type in the following at the address line within Windows Explorer: http://192.6.94.2. The following *Dial-Up Connection* window will apear. A user name and password are not required just press the *Connect* button. The PC will start *Dialling attempt 1* within a few seconds the message will appear *Connected to remote computer Verifying user name and password…*

2.4.1.4. You should now be connected to the 78K – Test It! evaluation board and the following first page will be displayed.