

# **ASE2000 Communication Test Set Getting Started**

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## **ASE2000 COMMUNICATION TEST SET**

**T**he ASE2000 Communication Test Set (ASE2000) is a software/ hardware package that lets you monitor and test serial and network communication in a data acquisition environment.

ASE2000 supports simulating and monitoring communication between a primary station (also called a master, host, or controlling station) and one or more secondary stations (also called slaves, RTUs, IEDs, or controlled stations), allowing you to construct, send, and monitor messages between stations.

The wide variety of ASE2000 information-display formats provides the flexibility needed to test and troubleshoot communication and protocol problems in a SCADA system environment. ASE2000 presents communication messages in both numeric (raw data) and interpreted formats. The tabular input-point view shows point values in both raw form and engineering units. In addition to its easy-to-read message and point-data views, ASE2000 provides a full complement of useful functions for the beginning and the advanced user.

### **ABOUT THIS MANUAL**

*ASE2000 Communication Test Set Getting Started* is for first-time ASE2000 users, as well as for users upgrading from the ASE Comm/64 RTU Test Set or an earlier version of ASE2000.

Before you begin using ASE2000, be sure to read this manual for software and hardware installation instructions and other important information. This manual contains the following information:

- System requirements for running ASE2000
- An inventory of the product package
- Instructions for installing the ASE2000 software, hardware, and I/O drivers.
- Instructions for cabling the ASE2000 hardware for a variety of test situations including Master Simulation, RTU/IED Simulation, and Line Monitoring.

### **TECHNICAL SUPPORT**

Please see the cover page of this document for Technical Support contact information.

## **SYSTEM REQUIREMENTS**

Minimum computer system requirements for using the ASE2000 are as follows:

- An Intel Pentium (or equivalent CPU) based personal computer (PC), with 500 MHz processor speed, 512 Mbyte main memory, 20Gbyte disk memory.
- Microsoft Windows XP or Microsoft Windows 2000 Operating System.
- For models ASE2000-PCM-RS or ASE2000-PCM-M, a PCMCIA CardBus slot (also referred to as Type II PCMCIA) is required.
- For the model ASE2000-COM, a USB slot or Parallel (LPT) port for the ASE dongle is required.

## **ASE2000 PACKAGE CONTENTS**

The ASE2000 is provided in kit form with all the necessary software, cables, adaptors, and documentation to configure an operational test set. The actual kit contents will vary according to ASE2000 model and are detailed in the following sections.

### **Model ASE2000-PCM-M**

- **ASE2000 Software Installation CD-ROM.** This CD contains both the ASE2000 Application software installation files and the I/O driver files for the ASE dual-channel PCMCIA I/O card and the SafeNet Pro / SuperPro Security Plug (dongle).
- **ASE dual channel Type 2 PCMCIA card** for laptop PCs.
- **ASE dual channel PCMCIA “Y” cable** with two DB-25 Male connectors.
- **ASE Bell-202 or CCITT V.23 dual-channel modem** and two RJ-11 cables with fork-lug connectors (optional only with the PCM models)
- **DB-25 female-female gender changer**
- **DB-25 null modem adapter**
- **DB-9 to DB-25 adaptors**
- **RS-232 monitor-mode adapter cable**
- **ASE2000 documentation** - Includes *ASE2000 Communication Test Set Getting Started* and *ASE2000 Communication Test Set User Guide*.

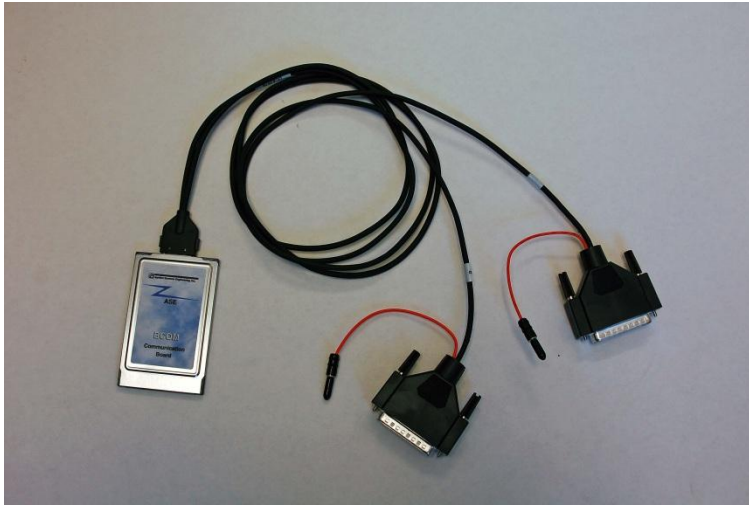
### **Model ASE2000-PCM-RS**

- **ASE2000 Software Installation CD-ROM.** This CD contains both the ASE2000 Application software installation files and the I/O driver files for the ASE dual-channel PCMCIA I/O card and the SafeNet Pro / SuperPro Security Plug (dongle).
- **ASE dual channel Type 2 PCMCIA card** and cable for laptop PCs.
- **ASE dual channel PCMCIA “Y” cable** with two DB-25 Male connectors.
- **DB-25 female-female gender changer**
- **DB-25 null modem adapter**
- **DB-9 to DB-25 adaptors**
- **RS-232 monitor-mode adapter cable**
- **ASE2000 documentation** - Includes *ASE2000 Communication Test Set Getting Started* and *ASE2000 Communication Test Set User Guide*.

### **Model ASE2000-COM**

- **ASE2000 Software Installation CD-ROM.** This CD contains both the ASE2000 Application software installation files and the I/O driver files for the ASE dual-channel PCMCIA I/O card and the SafeNet Pro / SuperPro Security Plug (dongle).
- **SafeNet parallel port (LPT) or USB dongle** for desktop or laptop PCs. The hardware dongle included in this package enables the ASE2000 software.
- **Two RS-232 cables**, each cable with DB-9 Female connector on one end and DB-25 Male connector on the other end.
- **DB-25 female-female gender changer**
- **DB-25 null modem adapter**
- **DB-9 to DB-25 adaptors**
- **RS-232 monitor-mode adapter cable**
- **ASE2000 documentation** - Includes *ASE2000 Communication Test Set Getting Started* and *ASE2000 Communication Test Set User Guide*.

## **ASE2000 Kit Components**

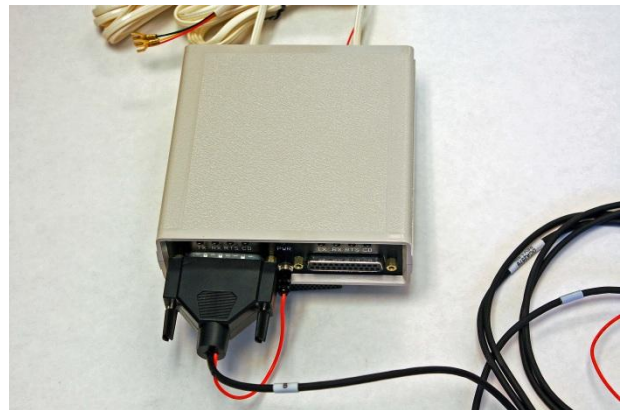
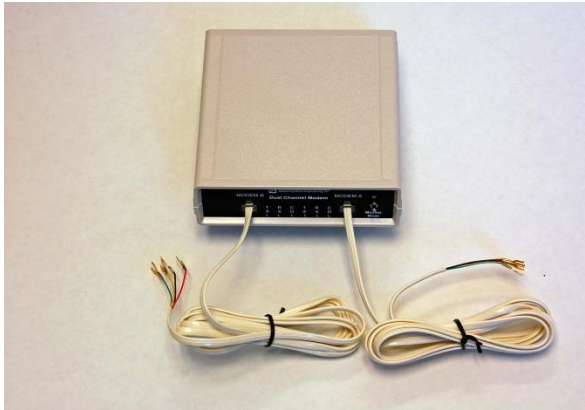


*ASE dual channel Type 2 PCMCIA card ASE Dual Channel PCMCIA "Y" cable with DB-25 Male connectors*



*ASE RS-232 Monitor Adaptor Cable*





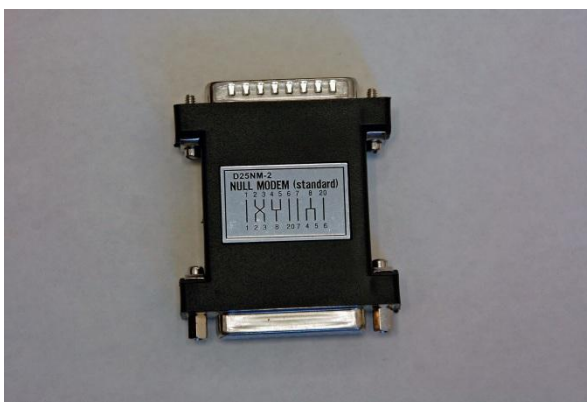
*ASE Bell-202 / CCITT V.23 Dual-Channel Modem*



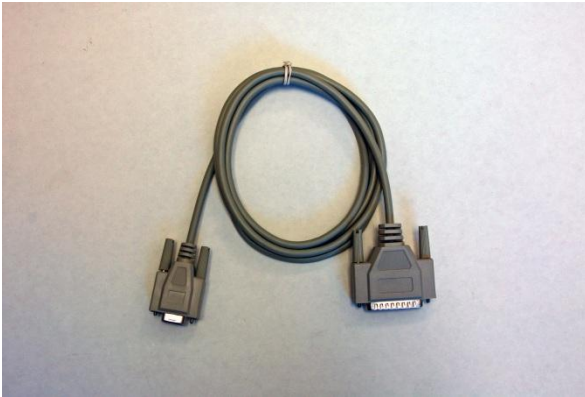
*DB-25 female-female gender changer*



*DB-9 to DB-25 adapter*



*DB-25 null modem adapter*



*RS-232 Cable with DB-9 Female and DB-25 Male*



*SafeNet USB Port and Parallel Port (LPT) dongle*

## INSTALLING AND RUNNING ASE2000

**T**his section describes the procedure for installing the ASE2000 software, hardware, and I/O drivers included in the ASE2000 package. You can install the software and hardware in any order but both must be fully installed before the test set will operate.

### INSTALLING THE ASE2000 APPLICATION SOFTWARE AND I/O DRIVERS

The full software installation process consists of two parts:

1. ASE2000 Application Software installation – This part involves installation of the ASE2000 Test Set software.
2. ASE2000 I/O Driver installation – This part involves installation of the I/O drivers for the specific ASE2000 hardware model purchased; PCM or COM. Depending on the ASE2000 model, it will be necessary to install either the PCMCIA I/O driver for the ASE dual-channel PCMCIA I/O card or the Safenet Sentinel Pro Driver for the hardware security key (dongle).

### PCMCIA I/O Driver Installation for Windows 2000 / XP

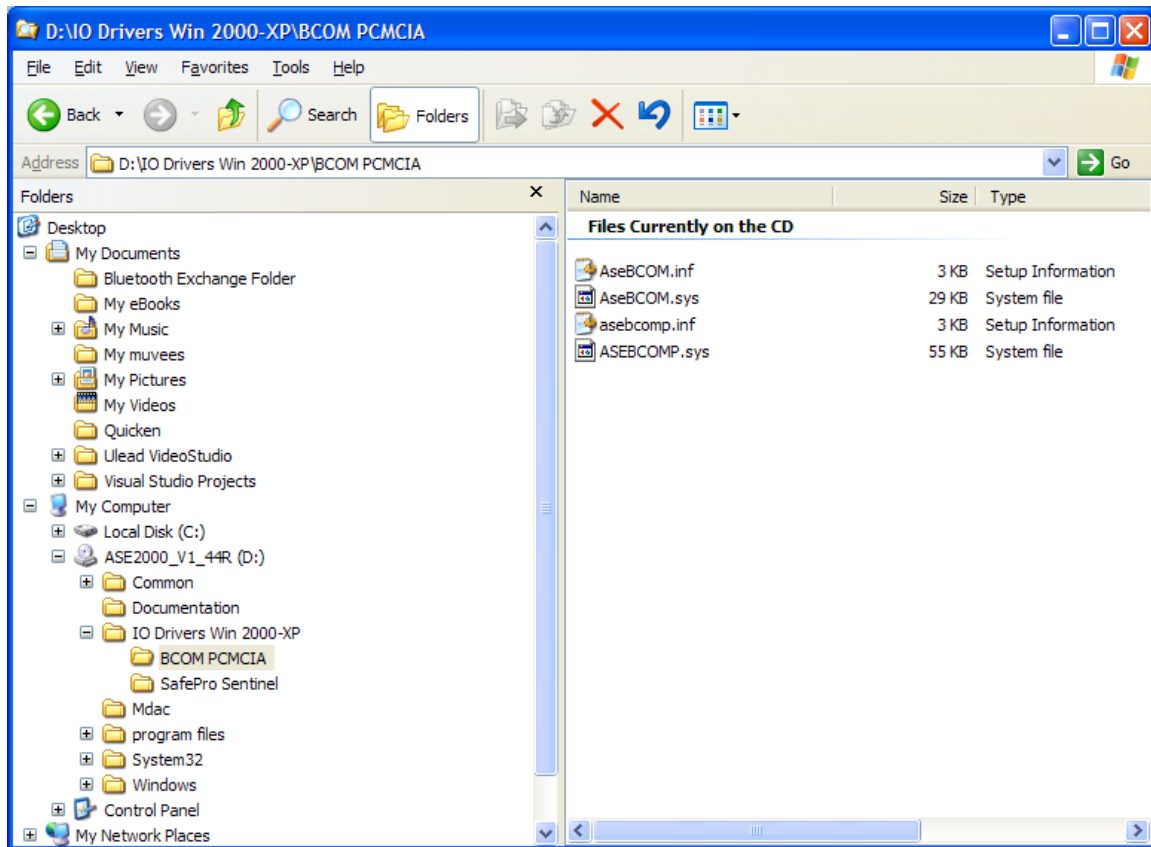
This section describes the procedure for installing the ASE2000 PCMCIA I/O driver for Windows 2000 / XP. Although Windows 2000 and XP use the same I/O driver, the install procedure is slightly different for the two operating systems. The screen shots presented below reflect installation on a Windows XP system but can be used as a guide on Windows 2000 systems as well. **DO NOT ATTEMPT TO USE THE WINDOWS 2000/XP DRIVER FILES FOR WINDOWS 95/98 INSTALLATION.**

#### *PCMCIA I/O Driver Files*

The PCMCIA I/O driver files are supplied on the ASE2000 Program Distribution CD for new test set purchases and can also be downloaded from the ASE Web site at:

<http://www.ase-systems.com/downloads/win2kpcmciadrv.zip>

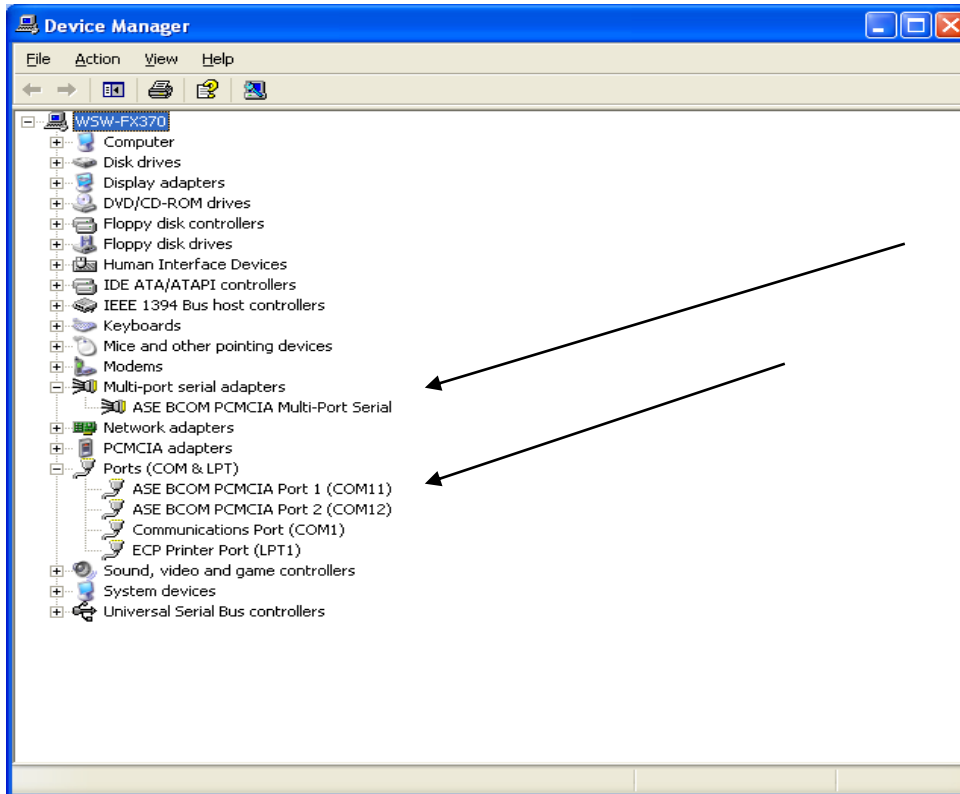
The following screen shot shows the complete set of I/O driver files.



The files *AseBCOM.inf* and *AseBCOM.sys* are the driver files for the multi-port controller portion of the PCMCIA card and *asebcomp.inf* and *ASEBCOMP.sys* are the driver files for the PCMCIA Ports.

### ***PCMCIA I/O Driver Entries in Windows Device Manager***

The following screen shot illustrates a view of the Device Manager screen with the ASE PCMCIA I/O card properly installed. Note that under Windows 2000 / XP, there is an entry under ***Multi-port serial adaptors*** and ***Ports (COM & LPT)*** for the ASE PCMCIA card. Under Windows 95/98/ME, there are entries only under ***Ports (COM & LPT)***. The device type ***Multi-port serial adaptors*** is new for Windows 2000 / XP.



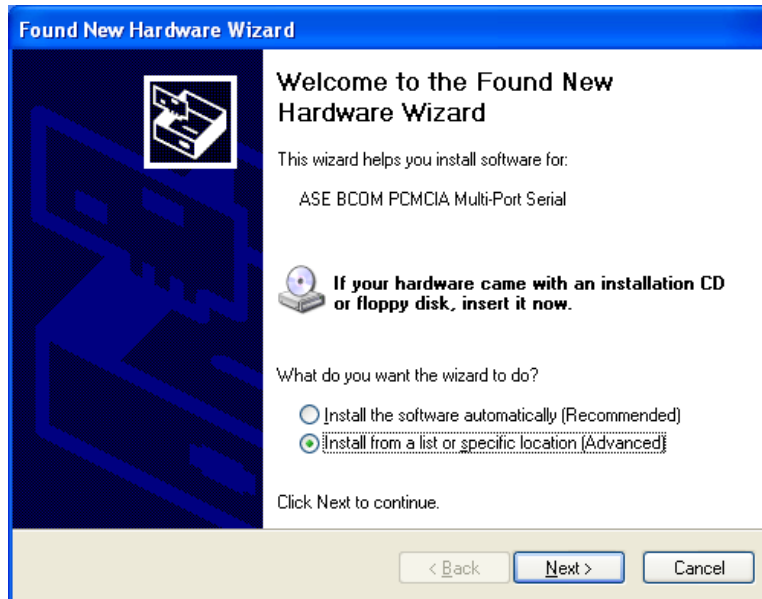
During the actual I/O driver installation process, Windows will cycle through the install steps 3 times; once for each device:

- ASE BCOM PCMCIA Multi-Port Serial
- ASE BCOM PCMCIA Port 1
- ASE BCOM PCMCIA Port 2

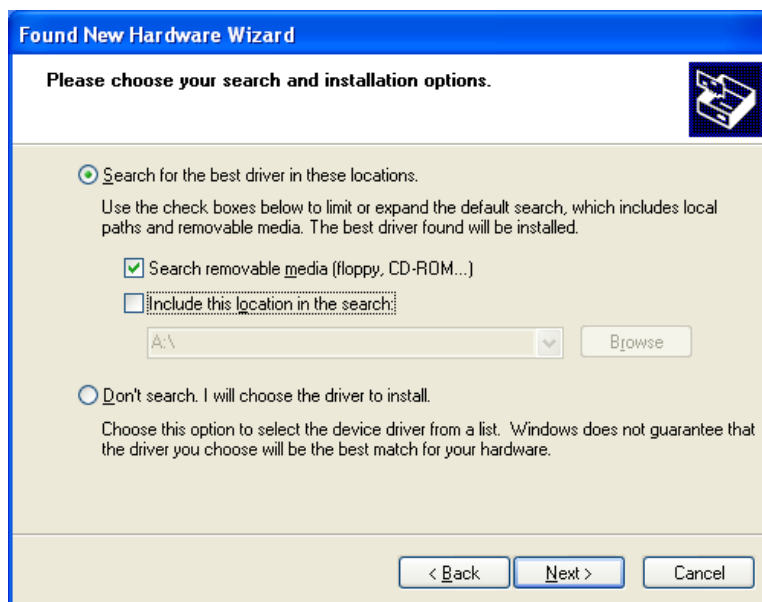
***DO NOT EXIT THE DRIVER INSTALL PROCESS UNTIL WINDOWS HAS COMPLETED THE INSTALLATION FOR ALL 3 ITEMS. PREMATURE EXIT OF THE INSTALL MAY REQUIRE PERFORMING A MANUAL RECOVERY PROCEDURE BEFORE A PROPER INSTALLATION CAN BE PERFORMED.***

### ***PCMCIA I/O Driver Install Procedure***

The following screen will appear when the PCMCIA card is first inserted in the computer. The first install cycle will be for the ASE BCOM Multi-Port Serial. Select “Install from a list or specific location” and press **Next >**.



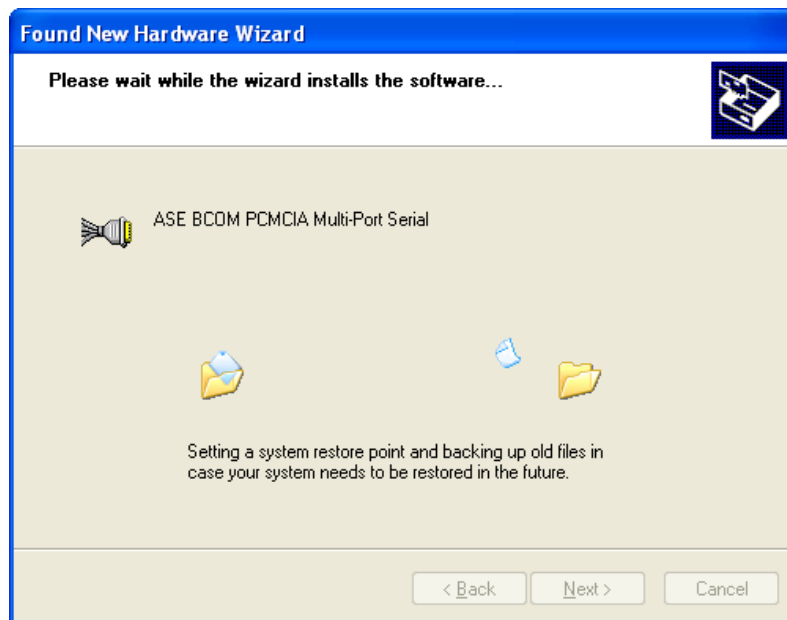
Next, set the scope of the search for the correct driver to the specific device and folder where the driver files are located, preferable the Installation CD, and press **Next >**.



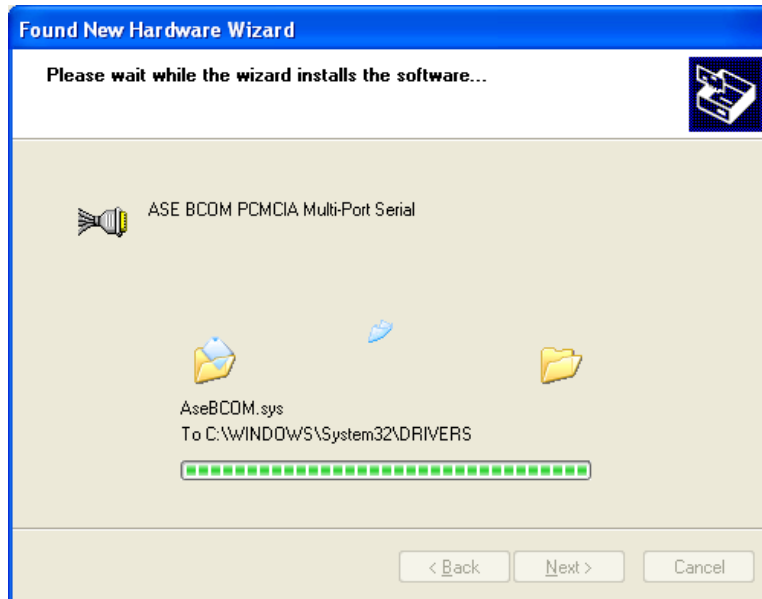
At this point, Windows will display a warning that the driver has not passed “Windows Logo testing”. Press Continue Anyway.



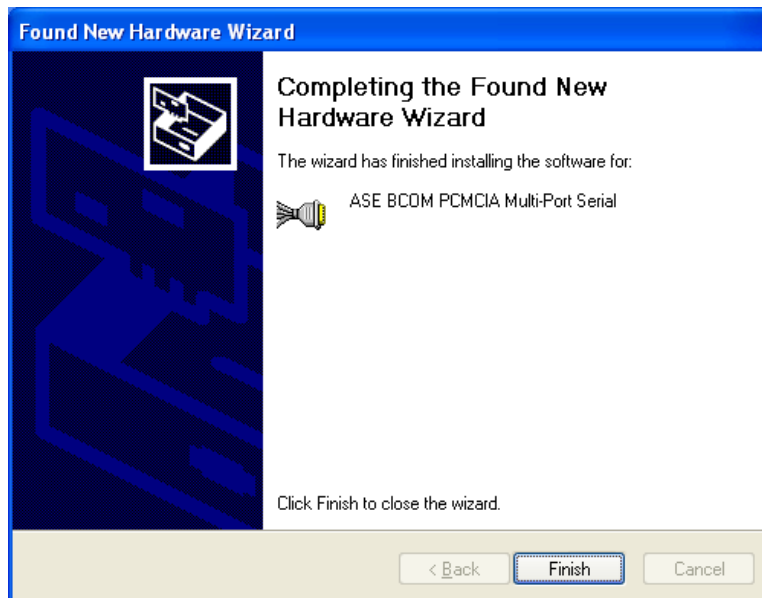
Windows XP will then set a system restore point before proceeding.



Windows will then copy the I/O driver files for the ASE BCOM Multi-Port Serial to the Windows DRIVERS folder. When the copy is complete, press **Next >**.

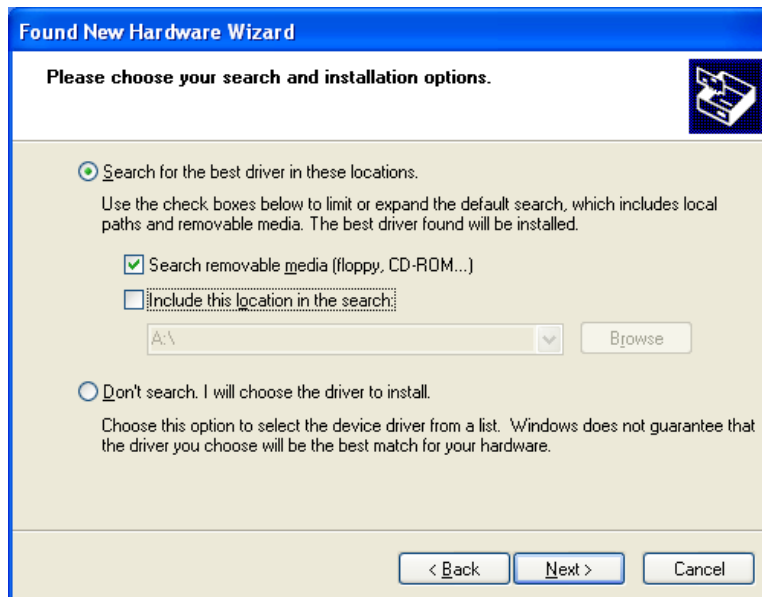


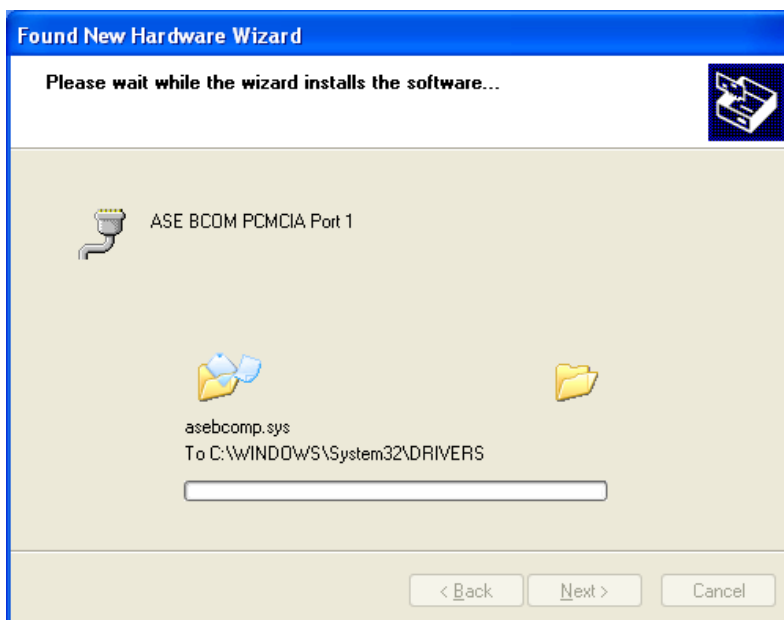
This completes the install for the ASE BCOM Multi-Port Serial. Press **Finish** and Windows will proceed with installing ASE BCOM Serial Ports 1 and 2



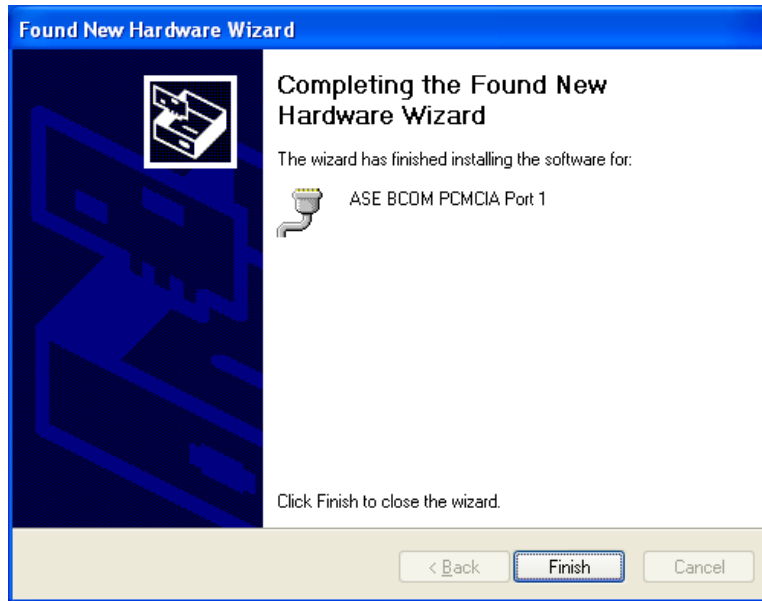


Windows will then indicate that it has detected “New Hardware” which is for ASE BCOM PCMCIA Serial Port 1. Follow similar procedures as those described above for installing the “Multi-port Serial”.

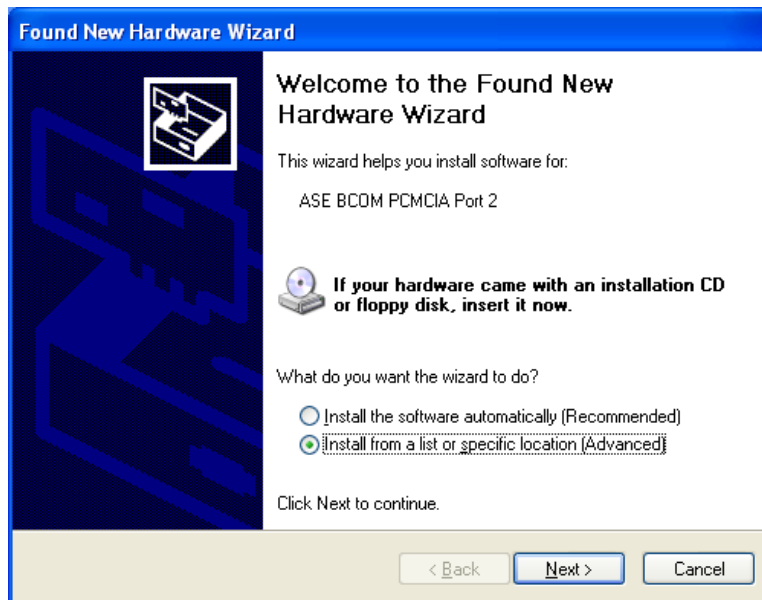




This completes the install for the ASE BCOM Serial Port 1. Press Finish and Windows will proceed with installing ASE BCOM Serial Port 2.




Windows will indicate that it has detected “New Hardware” which is for ASE BCOM PCMCIA Serial Port 2. Follow similar procedures as those described above for installing the “Multi-port Serial and Serial Port 1”.



**Found New Hardware Wizard**

Please choose your search and installation options.



☒ Search for the best driver in these locations.  
Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.

☒ Search removable media (floppy, CD-ROM...)

☐ Include this location in the search:  
A:\

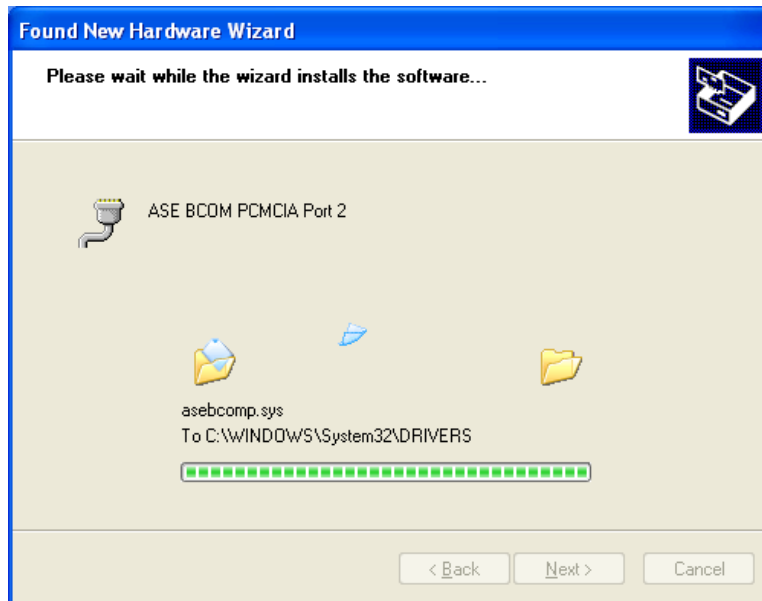
☐ Don't search. I will choose the driver to install.  
Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.

**Hardware Installation**

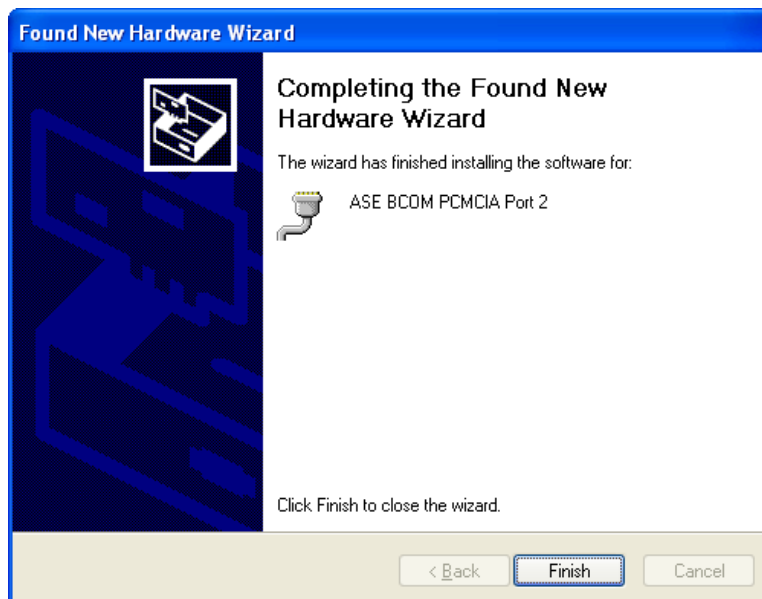
 The software you are installing for this hardware:  
ASE BCDM PCMCIA Port 2

has not passed Windows Logo testing to verify its compatibility with Windows XP. [Tell me why this testing is important.](#)

**Continuing your installation of this software may impair or destabilize the correct operation of your system either immediately or in the future. Microsoft strongly recommends that you stop this installation now and contact the hardware vendor for software that has passed Windows Logo testing.**



This completes the install for the ASE BCOM Serial Port 2 which is the final step in the complete driver installation process. Press **Finish** and Windows will indicate that the newly installed hardware is ready for use.



## **Installing the Hardware Key for Model ASE2000-COM**

The model ASE2000-COM Test Set requires a hardware key, sometimes called a “dongle” to enable the ASE2000 software. Attempting to run the ASE2000 software without the I/O driver properly installed and the dongle inserted will result in the following error message: “ASE Hardware Not Installed, Cannot Continue”. There are two options for the physical dongle; one is the Safenet Sentinel Pro Parallel Port key and the other is the Sentinel Ultra Pro USB key. Either of these keys, as supplied with the ASE2000 Test Set, will enable the ASE2000 software. The Safenet Sentinel Pro Parallel Port key requires the PC be equipped with a parallel (LPT) port and the Sentinel Ultra Pro USB key requires the PC be equipped with at least one USB 1.1 or USB 2.0 port.

This document describes the procedure for installing the Sentinel Ultra Pro USB and Sentinel Pro Parallel Port Driver I/O driver for Windows 2000 / XP.

### ***Sentinel Pro and Ultra Pro I/O Driver File***

The Sentinel Pro / Ultra Pro I/O driver file is supplied on the ASE2000 Program Distribution CD for new test set purchases and can also be downloaded from the ASE Web site at:

<http://www.ase-systems.com/downloads/SentinelProDrv.zip>

If downloading from the web site, download the ZIP file and un-zip the contents to a temporary folder.

The executable file from the installation CD or un-ZIPped from the web download is:

#### **Sentinel Protection Installer 7.2.2.exe**

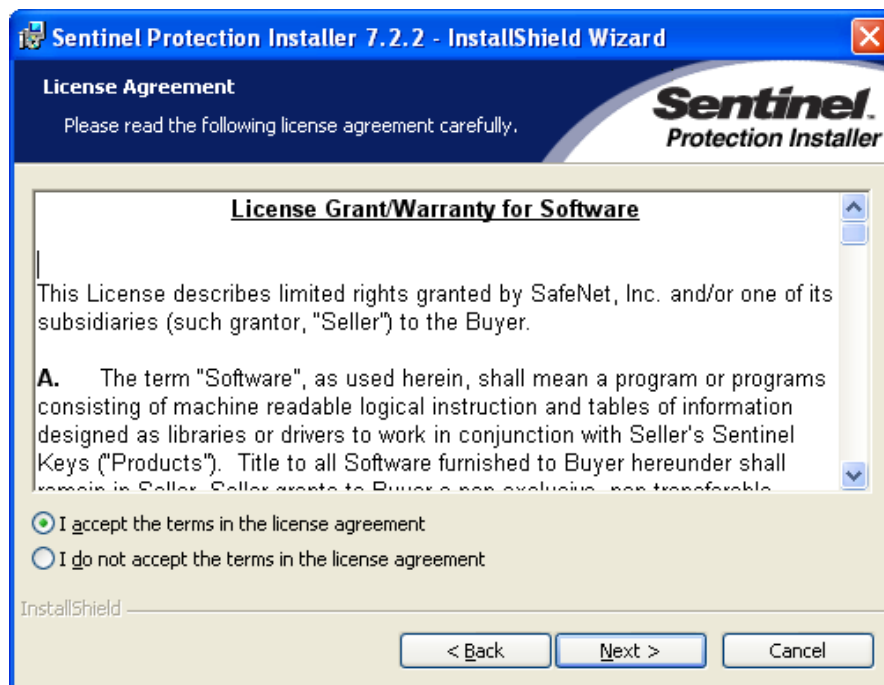
Double-click the file name to execute the installation program and follow the instructions below.

## *Installation*

The initial installation screen is the standard InstallShield screen.



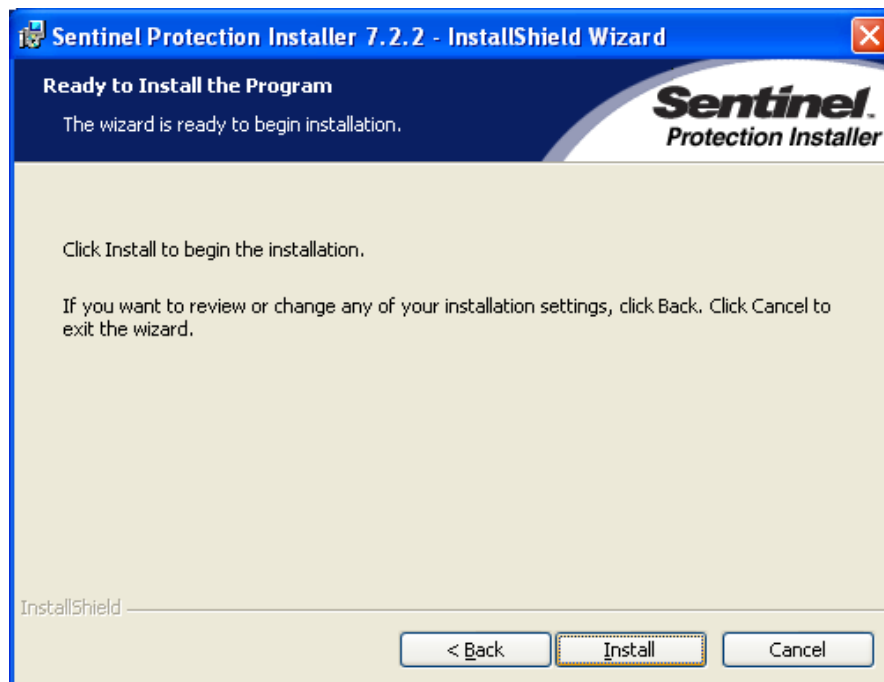
Accept the License Agreement terms and select Next.



Select **Complete** and then **Next**



Select **Install**

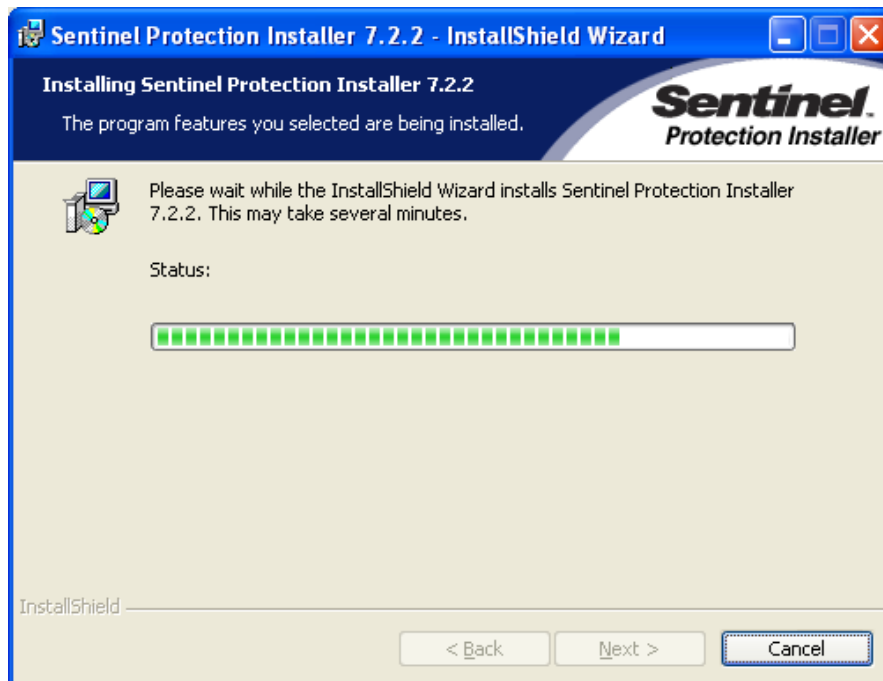




In most cases, select **No** for this.



Installation begins and displays progress on following screen.



When the installation is complete, select Finish. If requested to re-start the computer, do this before running the ASE2000 software.

## **RUNNING ASE2000 TEST SET**

To run the ASE2000 test set program, choose **Start>Programs>ASE2000 Communication Test Set**.

You can also create a Shortcut on the desktop for more convenient program initiation.

The first time the ASE2000 program is run following the first installation on a computer, you will be prompted to enter the ASE2000 Protocol License Code. Once entered, the Protocol License Code will be stored in the Windows Registry and will enable the protocols for which you are licensed and they will appear in a menu display when you select "File > Select Protocol".

Each time the ASE2000 program starts, it will utilize the protocol and preferences in affect the last time a "File>Save" or "File Save As" operation was performed.

Detailed information on using the ASE2000 program is contained in the *ASE2000 Communication Test Set User Guide* and the ASE2000 Help facility.

## ASE2000 CABLING

**T**his section describes various cabling configurations used to connect the ASE2000 for the different operational modes (*Master Simulation, RTU/IED Simulation, Monitor Mode*), the different hardware models (*PCM, COM*) and different connection types (*Modem, RS-232*). Cabling for network based communication is discussed in a separate section titled ***ASE2000 Network Protocol Use***.

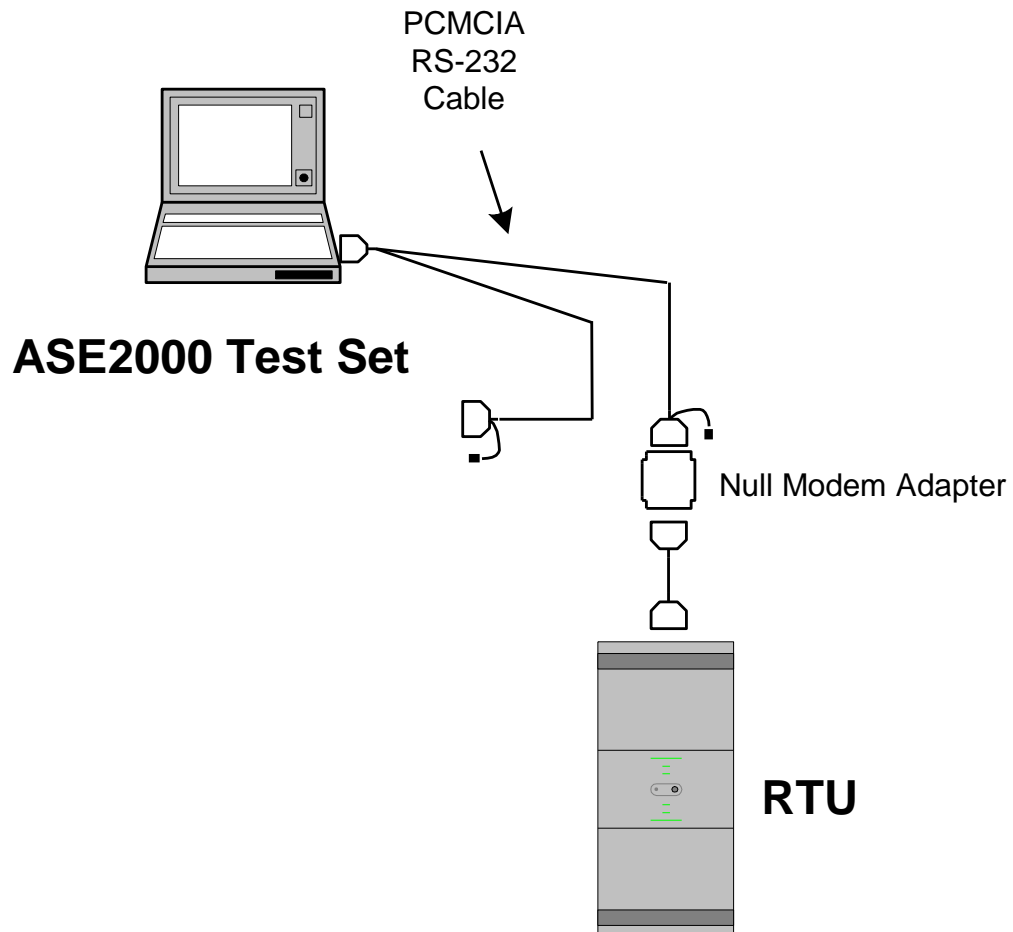
- **Master simulation.** In this mode, ASE2000 simulates the primary station (Master), allowing you to construct and transmit requests to one or more secondary stations (RTU/IED).
- **RTU simulation.** In this mode, ASE2000 simulates one or more secondary stations (RTU/IED), allowing you to construct responses or unsolicited messages and transmit them to the primary station.
- **Monitor.** In this mode, ASE2000 monitors the communication line connecting the primary station and one or more secondary stations and displays the messages exchanged between them.

For the three modes of operation, connections can be made at the RS-232 level, at the Telco level using ASE supplied or other modems, or at the network level for network based protocols.

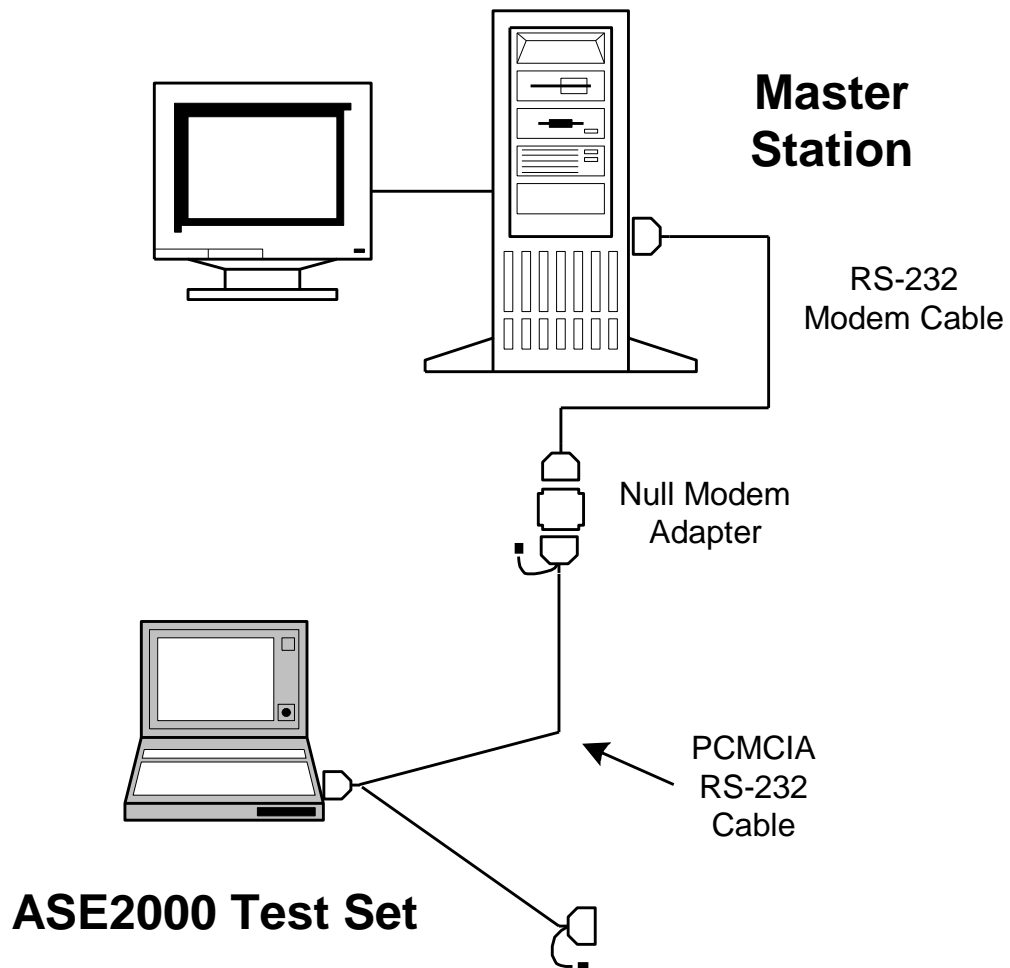
## RS-232 CONNECTIONS

The following figures illustrate different cabling configurations for connecting the ASE2000 testset equipment at the RS-232 level. The ASE Dual-Channel RS-232 PCMCIA I/O card is used in the illustrations but the same principles apply to any RS-232 I/O device.

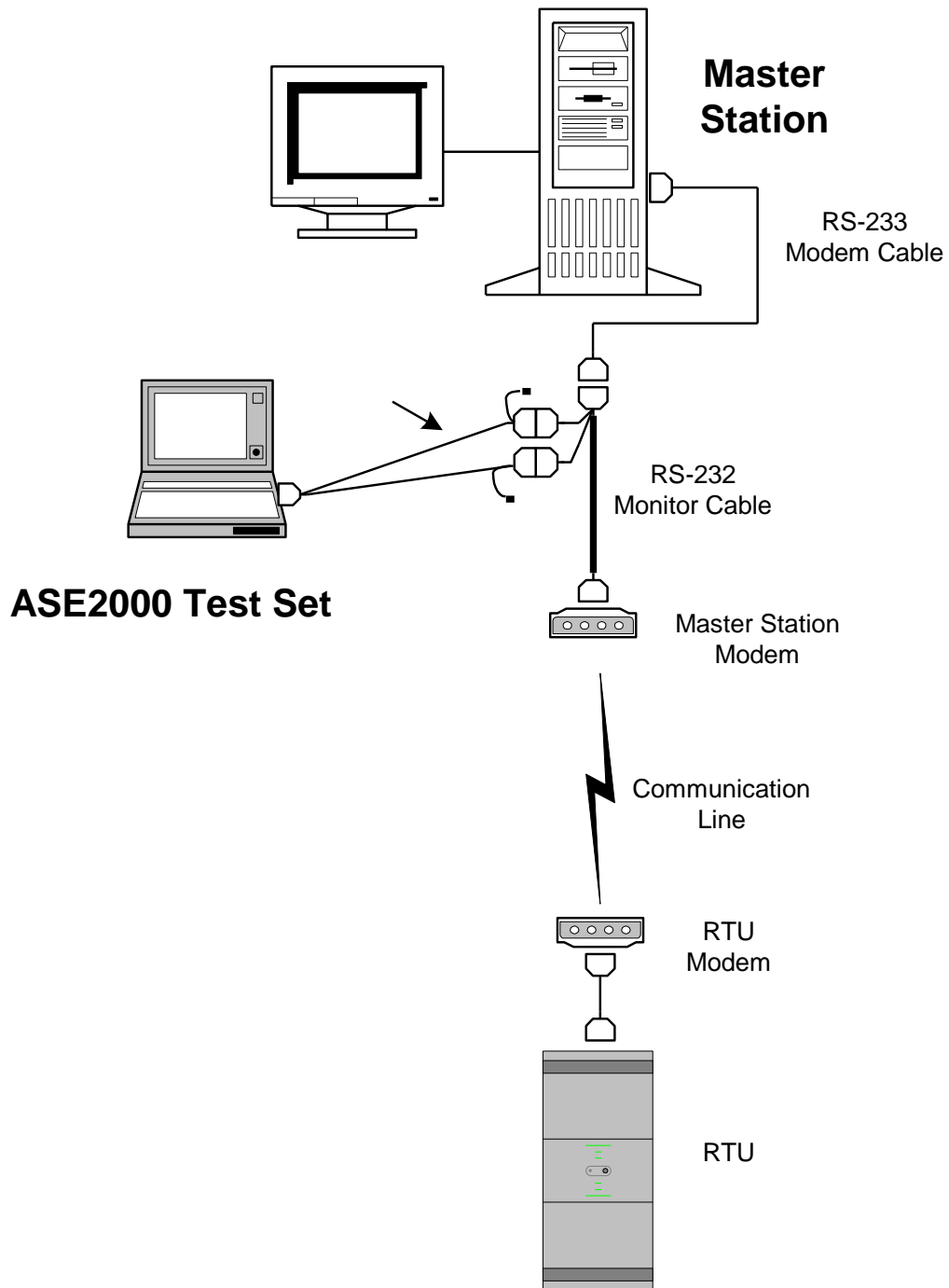
## Master Simulation Mode – RS-232



## RTU/IED Simulation Mode – RS-232



## Monitor Mode – RS-232

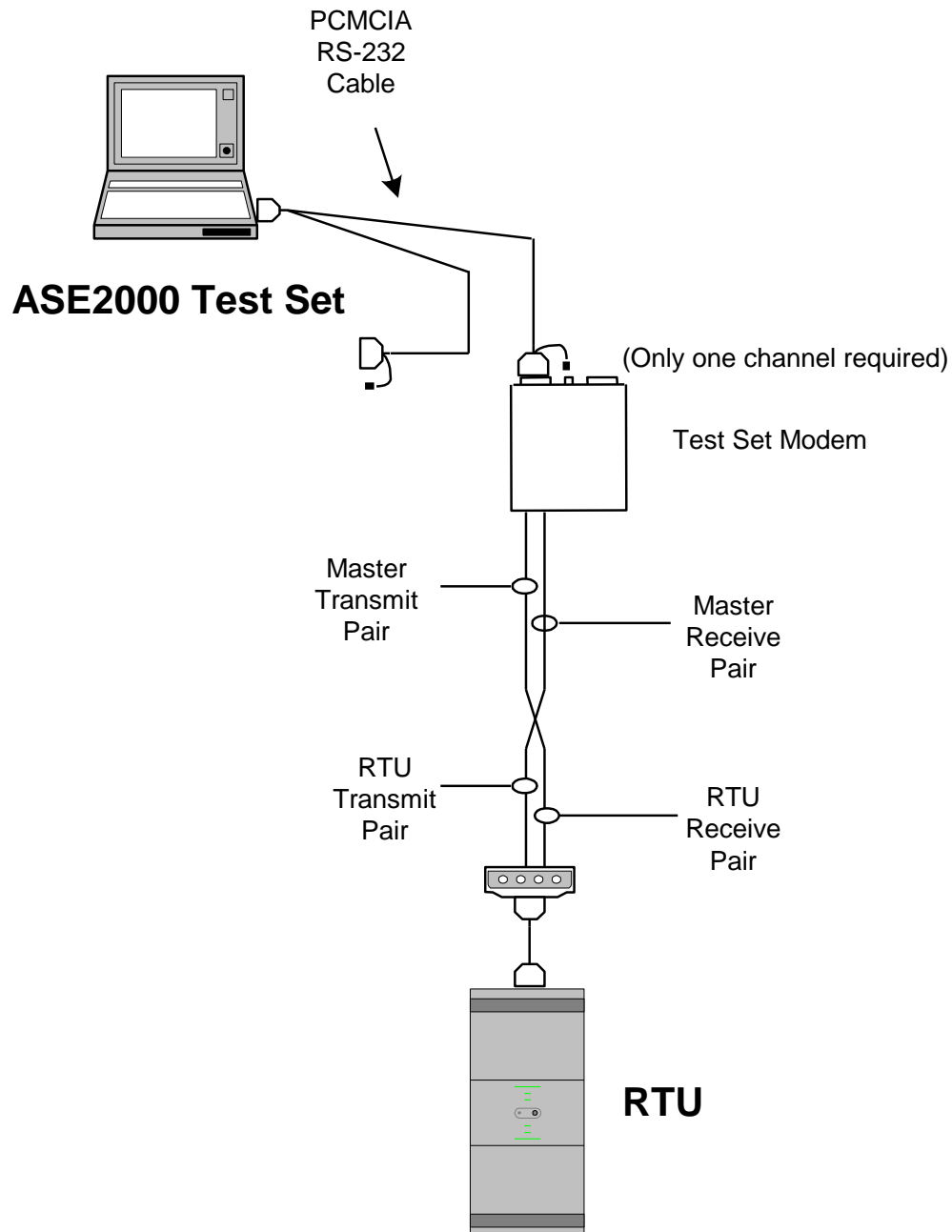


## MODEM CONNECTIONS

The following figures illustrate different cabling configurations for connecting the ASE2000 testset equipment to the phone line circuits through a modem. The ASE Dual-Channel modem is used in the illustrations but the same principles apply to any modem. The ASE modem is a dual-channel modem with two DB-25 female connectors and a power connector on one side of the modem box, and two RJ-11 receptacles on the opposite side of the box. When using the modem for Monitor Mode, ASE recommends setting the monitor mode switch to the ON position to correctly balance the line. If you are not running in Monitor Mode, set this switch to OFF.

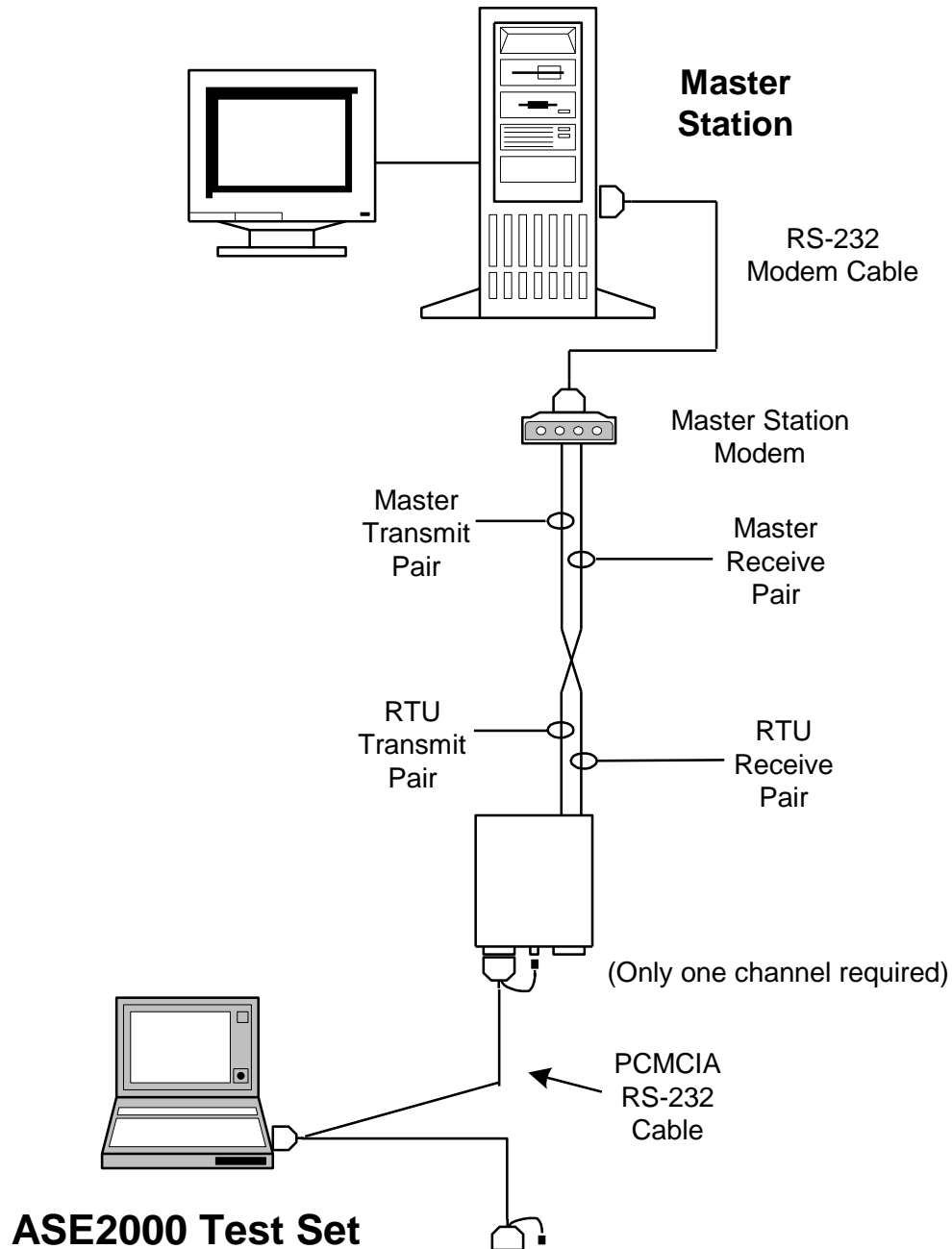
**Note:** *When set to on, the switch forces the modem to run in high-impedance mode by removing the 600  $\Omega$  load from the receive line.*

## Master Simulation Mode – Modem Connection

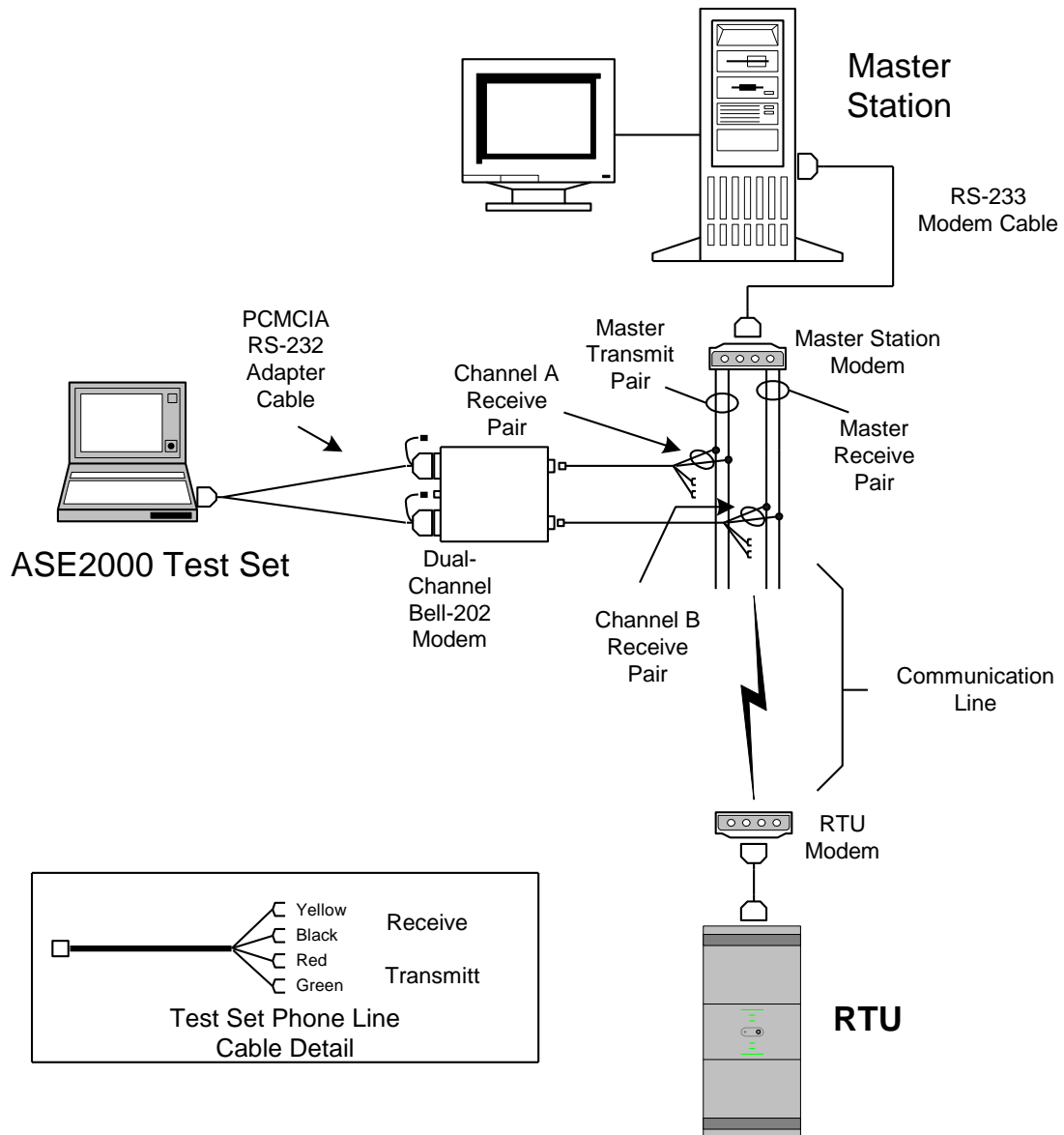




## RTU/IED Simulation Mode – Modem Connection



## Monitor Mode – Modem Connection

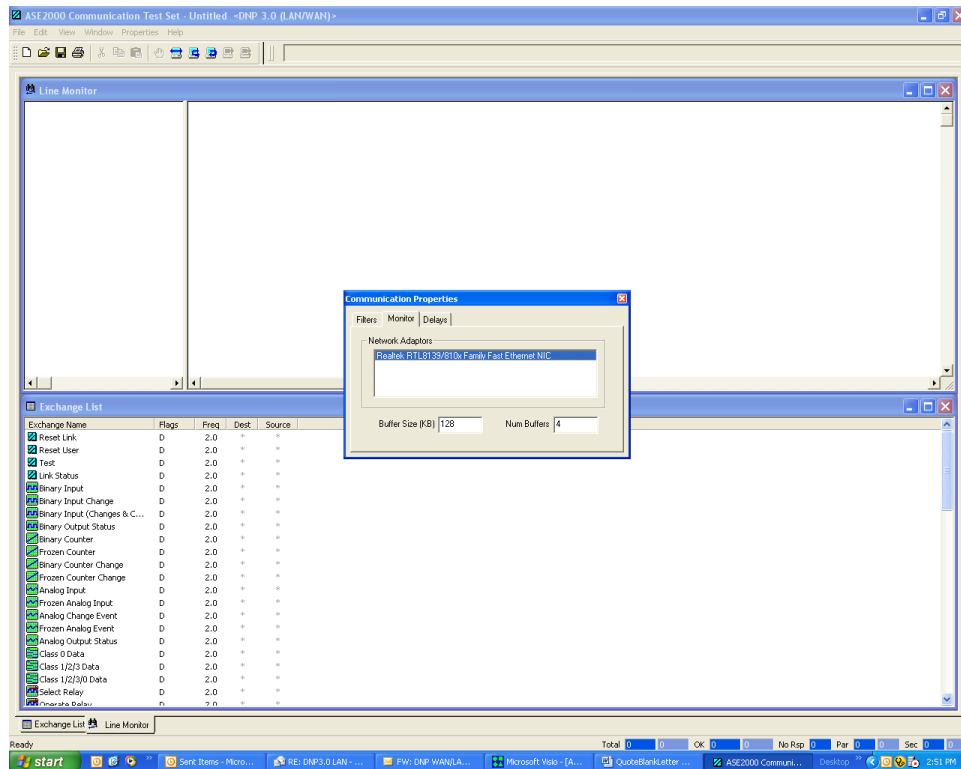


## ASE2000 NETWORK PROTOCOL USE

The ASE2000 currently supports three network based protocols, DNP 3 Wan/Lan, Modbus TCP, and IEC 870-5-104. All three test set modes, Master, RTU, and Monitor mode are supported but there are different physical connection requirements depending on which mode(s) is to be used.

The ASE2000 uses the standard PC network interface device (NIC) for all network communication but still requires that either the ASE PCMCIA card or Rainbow Sentinel Security Plug (dongle) be installed on the PC where the ASE2000 software is to be run. Even though the PC network interface is used for network communication, the PCMCIA card or dongle is still used to enable the ASE2000 software.

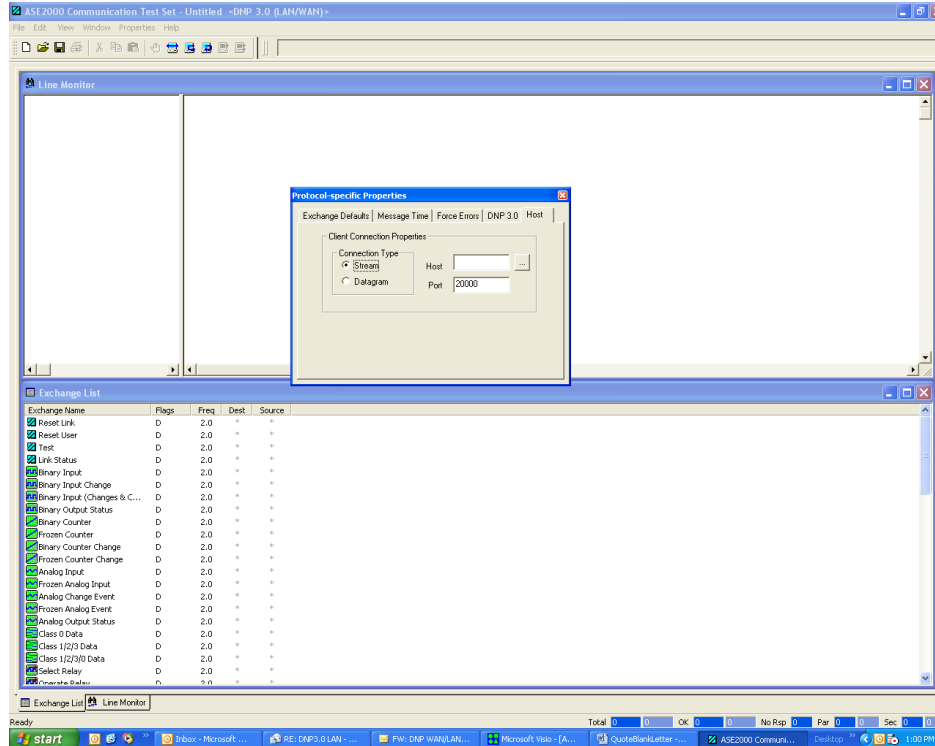
If the test set computer has multiple network adaptor interfaces, it may be necessary to designate which adaptor the ASE2000 test set should use. For devices with multiple adaptors, select “**Properties > Communication > Monitor tab**” and select the appropriate adaptor.



Basic test set operation is the same for both network and serial protocols but there are a few set-up differences that the user must be aware of.

## MASTER MODE

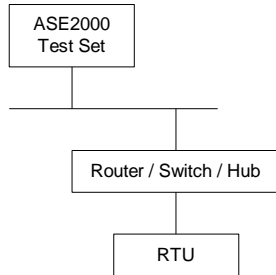
In Master Mode, the test set will operate as a Master and issue commands to and receive responses from a remote device. To address the proper device, it will be necessary to configure both the IP address and device (RTU/IED) address in the ASE2000. To set the network address of the remote device, select ***“Properties > Protocol Specific > Host tab”*** and enter the remote device node name or IP address. For DNP 3 Wan/Lan, specify ***Stream*** for TCP or ***Datagram*** for UDP. Also for DNP 3 Wan/Lan the Port address can be changed but it is recommended that the default value of 20000 be used.



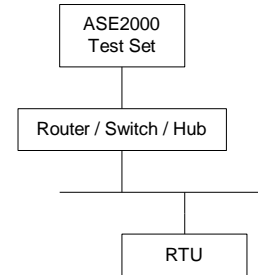
The protocol address (RTU address) of the device is specified the same as with the serial version of the protocol on the Exchange List view by double-clicking on the exchange name or setting the address on all exchanges using the ***“Properties > Protocol Specific > Exchange Defaults tab”***.

In Master Mode, there are no special connection requirements or connection restrictions. The test set PC can be connected directly to the remote device, through a router, a switch, or a hub as shown below.

### Master Mode



**Master Mode Example 1**



**Master Mode Example 2**

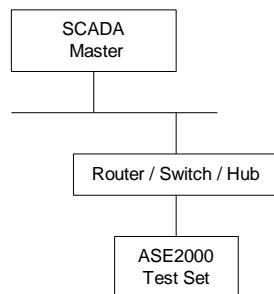
Once the address configuration and physical connection is complete, test set operation is the same as for serial operation.

### RTU MODE

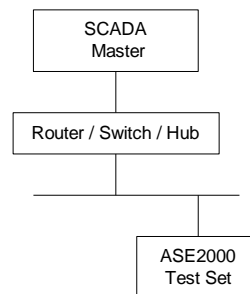
In RTU Mode, the test set will operate as a remote device and respond to commands received from a SCADA Master. It is not necessary to do special configuration due to using network communication. As the “remote” device, the test set software will accept an incoming connection request and, from that point on, test set operation is the same as with a serial connection. If the device protocol address is let to the default value \*, the test set will respond to requests containing any address. Alternatively, a specific protocol address (RTU address) for the device can be specified the same as with the serial version of the protocol on the Exchange List view by double-clicking on the exchange name or setting the address on all exchanges using the ***“Properties > Protocol Specific > Exchange Defaults tab”***.

In RTU Mode, there are no special connection requirements or connection restrictions. The test set PC can be connected directly to the remote device, through a router, a switch, or a hub as shown below.

### RTU Mode



**RTU Mode Example 1**



**RTU Mode Example 2**

Once the address configuration and physical connection is complete, test set operation is the same as for serial operation.

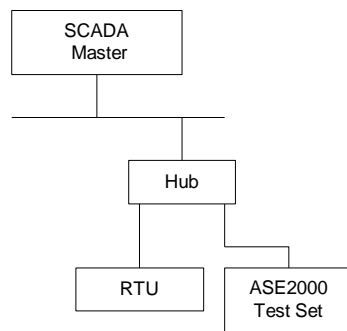
## MONITOR MODE

In Monitor Mode, the test set will monitor and display communication messages between two or more devices that are communicating using the designated network protocol.

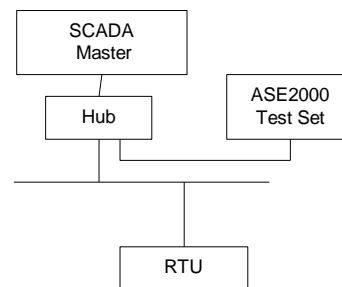
Unlike Master Mode and RTU Mode, there are physical connection requirements that must be followed in order for the test set to have access to the messages between the devices to be monitored.

In Monitor Mode, the ASE2000 test set forces the network interface to operate in what is called “promiscuous” mode. This allows the test set to read network messages that are not addressed to the device the test set is running on. In order for this to work, it is necessary for the test set PC and either the SCADA Master or the remote device to be on a common network segment. This is most commonly accomplished by plugging the devices into a common hub; not a router or switch. It is necessary to use a hub in this case so the messages between the devices being monitored will be present on the LAN segment the test set is connected to. A router or switch will only pass messages to a port if the addressed device is known by the switch or router to be connected to that port. So, if you connect the test set directly to a port on a router or switch for monitoring purposes it won’t work since the router/switch will not pass the data to that port. As described above, a router or switch can be used for Master or RTU mode but not Monitor mode. Since a hub passes all data to all connected ports, data for the devices being monitored will be available to the test set only if the test set and at least one of the devices being monitored is connected to the hub. It is possible, and most likely necessary, to use routers and switches in other parts of the network but a hub must be used for the monitored devices. See connection examples below.

### Monitor Mode



**Monitor Mode Example 1**

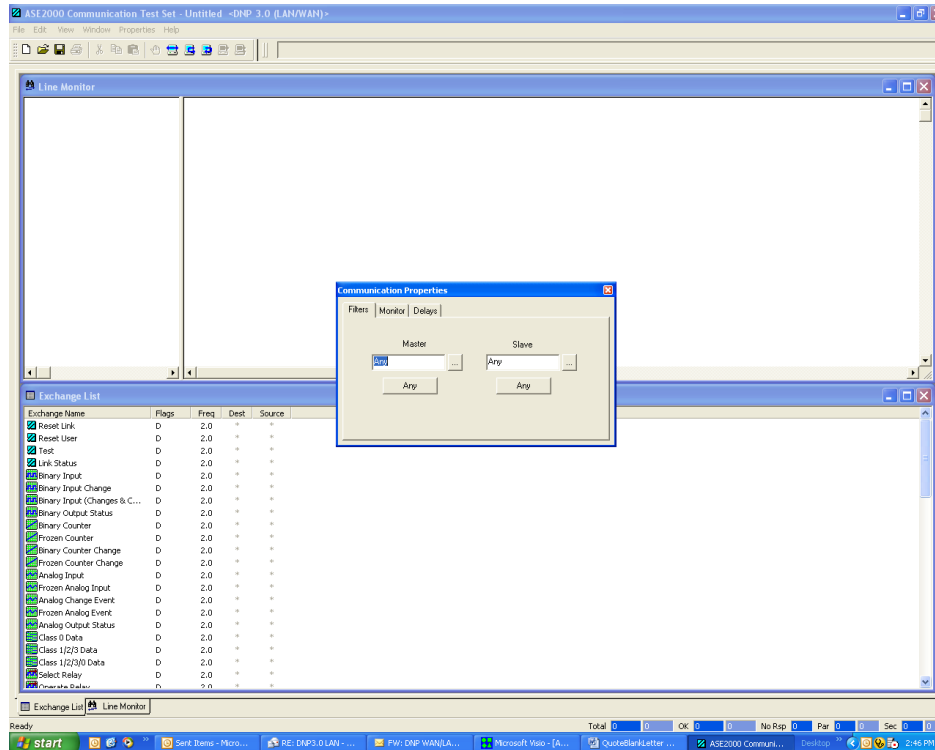


**Monitor Mode Example 2**

As with serial communication, it is possible to filter the data processed and displayed by ASE2000 test set using network protocols. With serial communications, the filtering is accomplished by setting the device address on the Exchange List view. With network protocols, filtering can be set at the IP addresses level and the device address level.

To set an address filter at the IP address level, select ***“Properties > Communication > Filters tab”*** and set the host name or IP address of the device to be monitored. The

default value **“Any”** will display messages between all devices on the network segment using the designated protocol.



## **ASE BCOM PCMCIA I/O CARD TROUBLESHOOTING**

The most common requests for technical support relating to the PCMCIA card are for I/O driver installation support or communication problems. Also, there has been a problem reported with a few PCMCIA cards shipped in late 2005 and early 2006 where the PC will lock-up when an attempt is made to communicate using the PCMCIA card. See the procedure below to test for this condition.

### **PCMCIA I/O DRIVER INSTALLATION PROBLEMS**

I/O driver installation is a procedure that is performed the first time the PCMCIA card is inserted into a computer and should not have to be performed on that computer again, regardless of the number of times the PCMCIA card is inserted. Once the I/O driver has been installed, Windows will ‘recognize’ the card and not prompt for the driver again. If your question or problem relates to I/O driver installation, please refer to the documents

<http://www.ase-systems.com/downloads/W2K-XPPCMCIADriverInstall.pdf>

and

<http://www.ase-systems.com/downloads/W2K-XPPCMCIADriverRemoval.pdf>

### **PCMCIA I/O DRIVER COMMUNICATION PROBLEMS**

If the I/O drivers appear to be installed correctly but you are unable to communicate with the device you want to test, the first thing to do is verify that communications through the PCMCIA card is working properly. To do this, the two PCMCIA communication channels will be connected together and two copies of the ASE2000 software will be used to verify communications. One copy will simulate Master operation and the other will simulate RTU operation. Basically the ability to send and receive on both PCMCIA ports will be tested.

1. Connect the “A” and “B” DB-25 connectors on the PCMCIA cable together through a NULL Modem Adaptor and Gender Changer.
2. Use the following link:

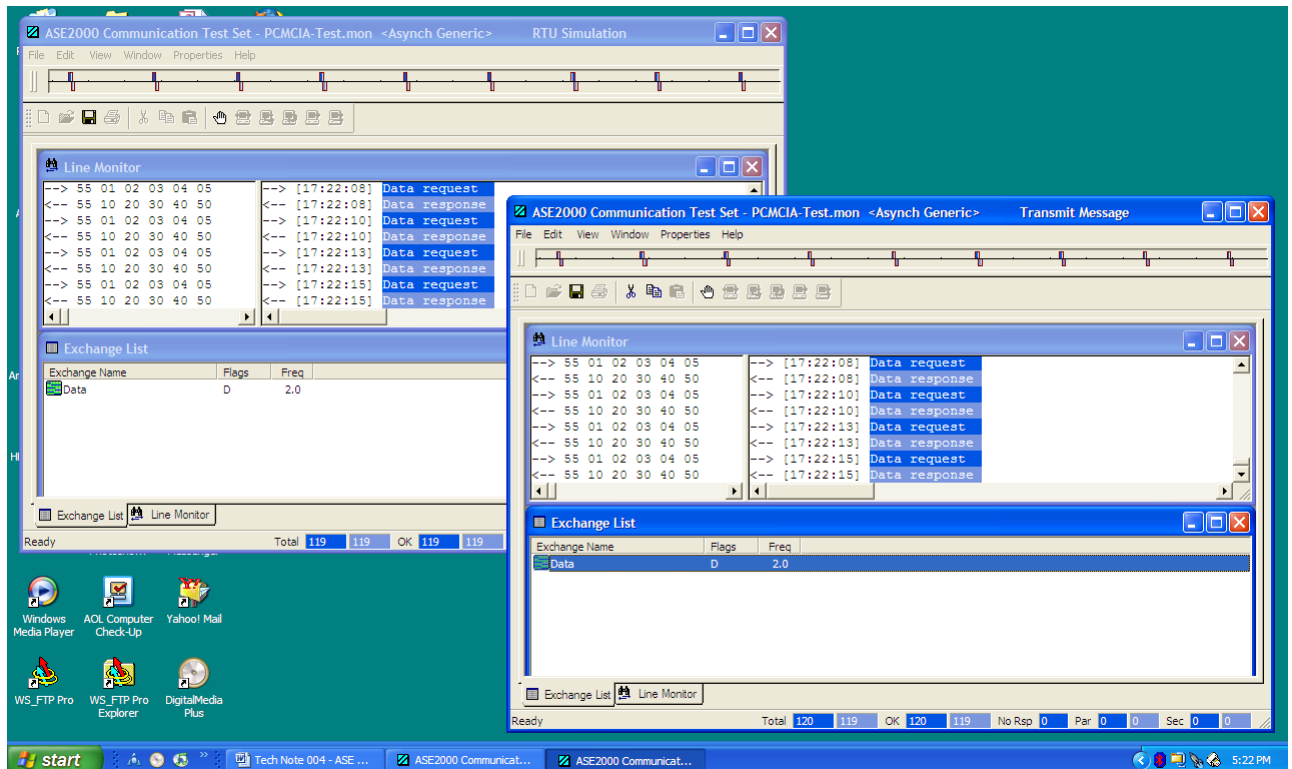
<http://www.ase-systems.com/downloads/PCMCIA-Test.mon>

to download the configuration file which will be used with the ASE2000 software to send/receive data. Save the PCMCIA-Test.mon file in a folder on the local hard drive.



3. Launch the first copy (instance) of the ASE2000 test set by double-clicking on the PCMCIA-Test.mon file name. Launch the second copy (instance) of the ASE2000 test set by double-clicking on the PCMCIA-Test.mon file name.
4. At this point, there should be two copies of the test set active but not communicating.
5. On one of the test copies, select “File > Simulate RTU” or select the “Simulate RTU” icon.
6. On the other test set copy, move the mouse pointer over the “Data” exchange name in the “Exchange List” view then select “File > Send Continuously” or select the “Send Continuously” icon.
7. At this point, if the PCMCIA card is working properly, the screen should look similar to the example below. In the Line Monitor view for each test set window there should be a series of “Data request” and “Data Response” entries in the interpreted data section and the following data in the raw data section:

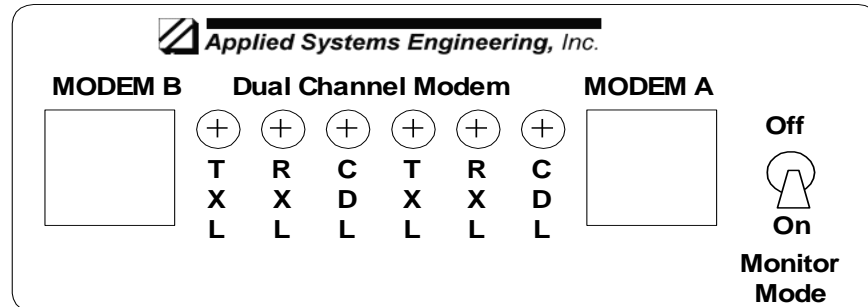
```
--> 55 01 02 03 04 05
<-- 55 10 20 30 40 50
```



8. If the test set screen looks similar to the above screen, the PCMCIA card is most likely installed and functioning correctly.

## ASE BELL-202 DUAL-CHANNEL MODEM ADJUSTMENT

This section illustrates and explains the *gain* and *sensitivity* adjustments on the ASE Bell-202 Dual-Channel Modem.



### Modem Adjustments

The modem contains six potentiometers as shown in the diagram above, three for Channel A and 3 for Channel B. The adjustments control transmitter gain, receiver gain, and carrier detect sensitivity levels. ***NOTE: There are two types of potentiometers that are assembled in the modems. Most of the modems are supplied with white potentiometers but some modems manufactured after 1998 have yellow or orange colored potentiometers. The adjustment direction for these potentiometers is reversed from the white potentiometers. Consequently, the meanings of cw and ccw are interchanged.***

**Make sure you identify the type of potentiometer before attempting adjustments.**

The type of potentiometer can be determined by looking through the adjustment hole to determine the color.

#### Adjusting Modems With White Colored Potentiometers

- TXL** Transmitter Gain - Factory setting is 1/8 of a turn from the counterclockwise (ccw) end. Transmit levels range from -50 dBm in the ccw direction to -6 dBm in the clockwise (cw) direction.
- RXL** Receiver Gain - Factory setting is 1/4 of a turn from the counterclockwise end. Receive sensitivity levels range from -6 dBm in the ccw direction to -54 dBm in the cw direction.
- CDL** Carrier Detect Sensitivity - Factory setting is completely counterclockwise. Sensitivity is -30 dBm in the ccw direction to -48 in the cw direction.



**Adjusting Modems With Orange or Yellow Colored Potentiometers**

- TXL** Transmitter Gain - Factory setting is 1/8 of a turn from the clockwise (cw) end. Transmit levels range from -50 dBm in the cw direction to -6 dBm in the counterclockwise (ccw) direction.
- RXL** Receiver Gain - Factory setting is 1/4 of a turn from the clockwise end. Receive sensitivity levels range from -6 dBm in the cw direction to -54 dBm in the ccw direction.
- CDL** Carrier Detect Sensitivity - Factory setting is completely clockwise. Sensitivity is -30 dBm in the cw direction to -48 in the ccw direction.

## RS-232 CABLE AND ADAPTER PIN-OUT

### DB-25 CONNECTOR PIN-OUT

Pin	Signal Name	Signal Description
1	----	Protective Ground
2	TXD	Transmitted Data
3	RXD	Request To Send
4	RTS	Request To Send
5	CTS	Clear To Send
6	DSR	Data Set Ready
7	GND	Signal Ground/Common
8	CD	Carrier Detect
9	---	+Voltage
10	---	-Voltage
11	---	----
12	SCF	2nd Line Detector
13	SCB	2nd Clear To Send
14	SBA	2nd Transmitted Data
15	DB	DCE Element Timing
16	SBB	2nd Received Data
17	DD	Received Element Timing
18	-----	Unassigned
19	SCA	2nd Request To Send
20	DTR	Data Terminal Ready
21	CG	Signal Quality Detector
22	RI	Ring Detector
23	CH/CI	Data Signal Rate Detector
24	DA	DTE Element Timing
25	----	Unassigned

## DB-9 TO DB-25 ADAPTOR

The following table illustrates the pin-out of a “standard” DB-9 to DB-25 adaptor.

DB-9	DB-25	Signal Description
1	8	DCD – Data Carrier Detect
2	3	RXD – Receive Data
3	2	TXD – Transmit Data
4	20	DTR – Data Terminal Ready
5	7	Com – Common
6	6	DSR – Data Set Ready
7	4	RTS – Request To Send
8	5	CTS – Clear To Send
9	22	RI – Ring Indicator

This type adaptor should be used whenever it is necessary to convert between a DB-25 and DB-9 connector.

## DB-25 NULL MODEM ADAPTOR (STANDARD)

The following table illustrates the pin-out of a “standard” DB25 to DB-25 Null Modem Adaptor.

Signal Description	DB-25M	DB-25F	Signal Description
Protective Ground	1	1	Protective Ground
TXD – Transmit Data	2	3	RXD – Receive Data
RXD – Receive Data	3	2	TXD – Transmit Data
RTS – Request To Send**	4	8	DCD – Carrier Detect
CTS – Clear To Send**	5	8	DCD – Carrier Detect
DSR – Data Set Ready	6	20	DTR – Data Terminal Ready
COM – Common (Sig. Gnd)	7	7	COM – Common (Sig. Gnd)
DCD – Carrier Detect	8	4	RTS – Request To Send**
DCD – Carrier Detect	8	5	CTS – Clear To Send**
DTR – Data Terminal Ready	20	6	DSR – Data Set Ready

\*\*NOTE: Pins 4 and 5 (RTS, CTS) on both the DB-25 Male and DB-25 Female side are tied together and connected to pin 8 (DCD) of the other side.

## DB-9 NULL MODEM ADAPTOR (STANDARD)

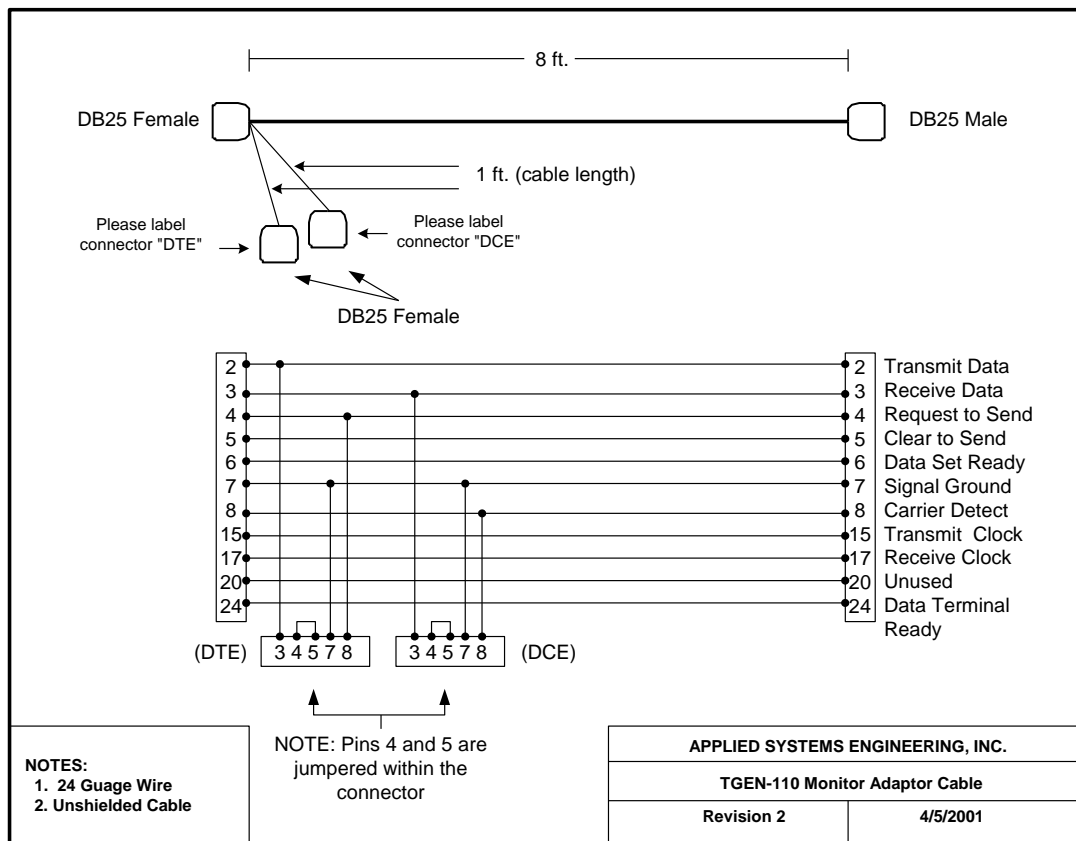
The following table illustrates the pin-out of a “standard” DB9 to DB-9 Null Modem Adaptor.

Signal Description	DB-9M	DB-9F	Signal Description
DCD – Data Carrier Detect	1	7	RTS – Request To Send**

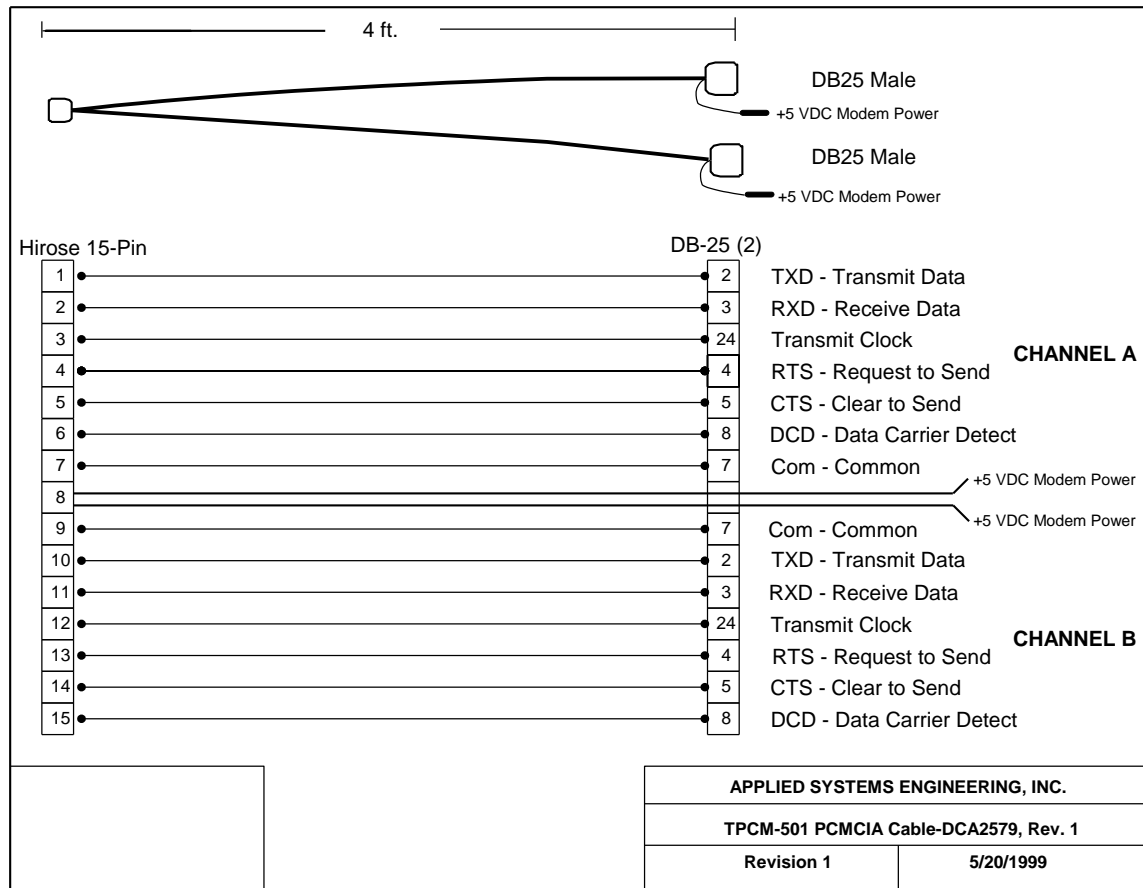
DCD – Data Carrier Detect	1	8	CTS – Clear To Send**
RXD – Receive Data	2	3	TXD – Transmit Data
TXD – Transmit Data	3	2	RXD – Receive Data
DTR – Data Terminal Ready	4	6	DSR – Data Set Ready
COM – Common (Sig. Gnd)	5	5	COM – Common (Sig. Gnd)
DSR – Data Set Ready	6	4	DTR – Data Terminal Ready
RTS – Request To Send**	7	1	DCD – Data Carrier Detect
CTS – Clear To Send**	8	1	DCD – Data Carrier Detect

\*\*NOTE: Pins 7 and 8 (RTS, CTS) on both the DB-9 Male and DB-9 Female side are tied together and connected to pin 1 (DCD) of the other side.

### ASE RS-232 MONITOR ADAPTOR CABLE



## ASE PCMCIA 2-CHANNEL CABLE





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