Product

Installer's Guide

for

Netcom $^{®}$ II (SGP & Sync/570)
SCO OpenServer 5
UnixWare 2.1x, 7.x

Table of Contents

1 INTRODUCTION

This guide outlines and describes the installation procedure required to make Netcom II a working part of your UNIX system. It describes choices made during installation that affect how the host communicates with the controller card (e.g. memory, I/O and IRQ configuration). It contains a brief description of configuration and how the card communicates with the network. This is described in more detail in the on-line Netcom II Administration Guide.

It is recommended that you take a few minutes to read through the installation steps once before beginning the installation.

1.1 Defaults Supplied

The product installation script installs a default working set of X.25 protocol parameters for Netcom II operation. Use these parameters to ensure the installation is correct before changing configuration parameter files to suit your location.

1.2 Reinstallation / Software Upgrades

The Netcom II Installation scripts are designed to upgrade an existing Netcom II installation or perform a new one. It is not necessary to uninstall a previous version of Netcom II before installing an upgrade.

When reinstalling or upgrading, the installation scripts will return all parameters to defaults.

Before installing the upgrade, you should write down the configuration of your boards, i.e. their memory addresses, interrupt vectors, and I/O locations. When the installation is complete, use the recorded values to configure the new software.

It is also recommended that you save all of your X.25 configuration files, by either copying them to a safe place, or printing them out.

2   INSTALLING THE MANUALS

2.1   Introduction

Most of the information that you will need to know is contained in on-line manuals. The on-line manuals contain information on all post installation configurations, getting technical support and how to contact *The Software Group*. These manuals can be viewed with any Internet browser supporting frames. You do not need to install the on-line manuals on the same machine as you installed Netcom II.

This on-line manual is written for:

- a System Administrator

- a person writing programs that require X.25 communications

- a person using the programs provided by *The Software Group*.

We strongly recommend that you take a few moments to install the on-line manuals. Browse through them, if only to get an idea of what information they contain for future reference.

This installation guide outlines how to install Netcom II and contains information that can be accessed while you are rebooting your machine and turning it off to install the card. However, all post-installation information is contained in the on-line manuals.

2.2   Installation

The online manuals are provided on a DOS format diskette and are installed according to operating system and board type. If you have more than one OS or board type, you should install each manual into a different directory You can install them on PC's running a SCO operating system, Solaris, DOS, Windows 3.1, Windows 95, or Windows NT computers.

On SCO Open Server, do the following as the root user:

```
cd /tmp

doscp a:unixinst .
```

```
chmod +x unixinst

unixinst
```

On SCO UnixWare, do the following as the root user:

```
Mount -r -F dosfs /dev/dsk/f0t /mnt

/mnt/uwinst

umount/mnt
```

On Windows 3.1, Windows 95, or Windows NT, open a DOC command window and at the DOS prompt enter:

```
a:install
```

Follow the instructions on the screen.

2.3   Browsing

Once the installation is complete, go to your browser and Solaris, SCO, or UnixWare:

open the URL *file:///usr/lib/tsg/manuals/tsg.htm*

DOS or Windows:

open the local file *c:\tsgdoc\tsg.htm*

For quite access, add this path to your browser bookmark list.

3 SOFTWARE REGISTRATION (For Sync/570 only)

When first installed, Netcom II will operate for a 60-day trial period. You need to register Netcom II with *The Software Group Limited* within the 60-day trial period to extend use beyond the trial period.

If you do not register, and the 60-day trial period elapses, Netcom II will stop working.

If expiry occurs, you can still register without reinstalling. After registration, the system must be rebooted. When registration occurs before the expiry date, there is no need to reboot the system.

3.1 Installation

At installation time, you enter the serial number(s) and activation key(s) that you received with your software. You will need one serial number / activation key pair for each board that you are installing. The installation script prompts you to enter these numbers and then provides an installation number in return.

Only one installation number is created no matter how many boards are installed.

3.2 Registration

You will need to send a registration form to *The Software Group* to receive your registration key. This form will include the above serial number / activation key pair(s) as well as the installation number. The registration information can be returned to *The Software Group* in a number of ways:

- On-line (This is the recommended method.)

You can register on-line at The Software Group's website:

www.wanware.com

Before going on-line, you may wish to produce a registration form by following the instructions listed below for e-mail registration. This will ensure that you have all the necessary information for on-line registration.

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- E-mail

Run the utility */usr/lib/x25/utils/register*. This utility can be used to produce the registration form in a electronic format. This file will have the serial number(s) and installation number filled in; you just need to edit this file to complete the rest of the form.

After completing the necessary information, e-mail the file to

registration@wanware.com

- Fax

Run the utility */usr/lib/x25/utils/register*. After requesting that the form be printed to a file, edit the file to complete the form and then print it out.

In case you do not have a printer connected to the machine you need to register, a blank registration form has been included with the product. Copy the serial number / activation key values to the form and then write in the remaining information, including the installation number. You can run */usr/lib/x25/utils/register* at any time to obtain serial numbers, activation keys, and the registration number.

The Software Group's fax number is: **1 (705) 725-9666**.

- Mail

Use the above instructions for faxing your registration, to create a printed copy of the registration form and send the form to:

The Software Group Limited
642 Welham Road Barrie,
Ontario Canada
L4N 9A1
Attn: Registration

3.3   Completing the Registration

The Software Group will provide you with a registration key. It will be sent to you in the same format as your registration form was sent to *The Software Group* (unless you specified otherwise). You need to enter this into the system, by running the */usr/lib/x25/utils/register* utility again and entering in the registration key where prompted.

3.4   Other Register Utility Information

The register utility (*/usr/lib/x25/utils/register*) also provides additional information for the system administrator. For example, it can display the serial numbers that have been used, and which machines have been registered.

3.5   Changing Adapters

If you need to change the number of adapters in the system, we recommend removal and reinstallation of Netcom II using the operating system's standard utilities.

3.6   Mass Installation

If you are mass installing Netcom II by copying a master disk or tape, please contact The Software Group Limited directly for instructions.

3.7   Changing Serial Numbers without Reinstallation

There are a few reasons why you may need to change the Netcom II serial number (like mass installation) without reinstalling the product. Use the following procedure to make the change:

1. Remove /usr/lib/x25/.serno.

2. Run */usr/lib/x25/register*, and select the option to re-enter the serial number and the activation key for the product. This writes a new serial number and installation number files.

3. Press option 3 to create */usr/lib/x25/regform.txt*. At this point, */usr/lib/x25/regform.txt* will contain information for the number of controllers you have installed, and the new serial number(s) and activation key(s) which you provided in step 2.

    If you exited the register utility in step 2, then run /usr/lib/x25/register **again to perform step 3.**

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4   INSTALLING NETCOM II

To install Netcom II, perform the following steps:

1.   Save your working kernel (section 4.1)

2.   Decide on hardware configuration (section 0)

3.   Install the software (section 4.3)

4.   Free up an interrupt vector (section 4.4)

5.   Observe the Reboot (for ISA cards only) (section 4.5)

6.   Select the hardware options (section 4.6)

7.   Install the hardware (section 4.7)

8.   Observe the boot process (section 4.8)

4.1   Save Your Working Kernel

You won't have problems rebooting your kernel if you avoid conflicts between your Netcom hardware and other adapters in your machine. It is, however, recommended that you copy your kernel to another file in the root directory (such as /unix.nox25), in case, the newly built UNIX, that incorporates the Netcom II driver, fails for any reason. Record the kernel file name below for reference.

Old kernel saved as: _____.

If the new kernel doesn't boot properly, you can still get access to the machine by providing the old kernel's name at the boot prompt.

To save the working kernel on SCO OpenServer 5:

```
umount /stand

mount /dev/stand /stand

cp /stand/unix /stand/unix.nox25

mount -r /dev/stand /stand
```

To save the working kernel on UnixWare:

```
cp /stand/unix /stand/unix.nox25
```

To save the working kernel on all other systems:

```
cp /unix /unix.nox25
```

4.2 Decide on Hardware Configuration

The UNIX CPU and Netcom II communications controller exchange information through RAM memory and/or I/O port addresses. The install script asks UNIX which I/O and memory locations are used by other devices. It will report those that are available and are supported by the card.

> *It is critical that the addresses you select for a card are not occupied by any other hardware in the system to avoid hardware conflicts.*

The Appendices of this guide describe the resources used by each controller type. Refer to the appropriate appendix as you proceed through the installation.

BIOS Interrupt Selections

If you are using a system that supports PCI cards you need to be careful with the interrupt mapping in the BIOS. This applies even if you are using an ISA card.

On PCI machines, the BIOS usually has an option to map interrupts to either Legacy ISA or PCI/plug-and-play. Verify that the interrupt you use for your Netcom II card is mapped to Legacy ISA for ISA Netcom II cards and to PCI/Plug-and-play for PCI Netcom II cards. If you have this wrong, the card will generate interrupts, but they will not be routed to the CPU by the motherboard.

> *The record keeping that Unix performs, to help you pick an appropriate (unused) interrupt, does not take into account the ISA versus PCI BIOS mapping.*

When you complete the installation, enter the BIOS to ensure that the interrupt you chose for the Netcom II card is mapped to the correct bus type.

Avoiding Memory Overlaps

If you are using a PCI card, you can go directly to Section 4.3 and skip this section. PCI cards typically are mapped by the BIOS into the high end of memory space, near 4 GBytes thus avoiding conflicts with non-PCI devices and system memory.

All of our ISA memory-mapped controllers can be installed in either extended memory (between 1 Megabyte and 16 Megabytes) or DOS memory (generally, between 640K and 1 Megabyte). We recommend installing the card in extended memory where possible (when your machine has less than 16 Megabytes of RAM installed), as the DOS area is becoming crowded with other adapters (VGA and SCSI BIOS, and Ethernet card RAM addresses, for example).

Here is a summary of typical DOS memory usage:

A0000 through BFFFF

Usually at least partly occupied by your screen adapter:

Monochrome: B0000 - B3FFF

Colour/Graphics: B8000 - BFFFF

VGA: A0000 - BFFFF

C0000 through DFFFF

Portions normally available. Watch out for VGA extended BIOS, which often occupies C0000 through C8000. Asynchronous multiport cards, Ethernet adapters, and disk controllers may also use portions of this area.

E0000 through FFFFF

Documented as being reserved for the machine's BIOS. Depending on the PC manufacturer, there may be enough space for your board, but you should exhaust all other avenues before attempting to locate a board here.

Finding Out What is Where In Memory

Take the time to find out what is where in your system. Here is a UNIX command the root user can use to see if there is an adapter installed in the memory at 0xD0000:

```
hd -s 0xd0000 /dev/mem | more
```

Displayed random hex bytes usually indicate the presence of an adapter. Strings of 0xff or 0xfe indicate the memory is probably available for use by your Netcom II adapter card.

Avoiding 8/16 Bit Memory Conflicts

Although the ISA bus allows memory cycles to transfer either 8 or 16 bits of information at a time, an 8 and a 16 bit card cannot occupy the same 128K block of memory. The electronic design of the memory bus causes 16 bit cards to identify an entire 128K block of memory as 16 bit, even when they occupy much less space. Below 1 Megabyte, the 128K sections are:

- A0000 - BFFFF
- C0000 - DFFFF
- E0000 - FFFFF

Make sure that each 128K section has only 8 bit devices or only 16 bit devices. The appendices of this guide can be used to identify whether your X.25 controller card is an 8 or 16 bit device.

4.3   Install Software

Different operating systems use different software installation methods. Follow the method appropriate for your operating system.

SCO OpenServer 5:

Insert volume 1 into the drive and run **CUSTOM**.

SCO UnixWare 2.1x and 7.x:

Insert volume 1 into the drive and run:

```
pkgadd -d /dev/diskette1
```

Alternatively, you can install the software using the software management tools in the graphical desktop of UNIX.

For all of the Operating Systems:

Follow the instructions presented by the installation script. Record the I/O address, memory address and interrupt vector chosen for the card to the space provided below. At the end of the script, you should choose to rebuild the kernel and the kernel environment.

I/O address chosen for the card: _____

Memory address chosen for the card: _____

Interrupt vector chosen for the card: _____

4.4 Free up an Interrupt Vector

Since interrupts are mapped by the BIOS for PCI cards, this section applies only to ISA cards.

If your host is very crowded with peripheral devices, the install script might not be able to find a valid vector for the x25 controller card. If you do not see this error listed below, during installation, continue on to section 4.5.

Error message:

```
No Interrupt Vector or I/O Address Available
```

To free up an interrupt for the X.25 card, you will need to exit the install script and make manual changes to the files in */etc/conf/sdevice.d*.

To check current IRQ assignments, change directory to */etc/conf/sdevice.d* and enter the following command:

```
grep Y * > /tmp/fileout
```

This will produce several lines in */tmp/fileout*, one for each device configured into the kernel in the following format.

```
as570:as570 Y 1 5 1 15 300 307 D0000 D0FFF
                 ↑      ↑ ↑
```

The fields marked with "↑" indicate that, in this example, the device "x25" is using IRQ "15". If you are trying to free up an IRQ, find a device with both a "Y" and a "1" that is not being used in your system (2nd hard drive?) and change the "1" to "0". This would free IRQ 15 in this example.

> ⚠ *An important note for* UnixWare 2.1x and 7.x: **do not edit the files in sdevice.d directly. Instead change them using the utility dcu.**

4.5 Observe the Reboot Perform

> ⚠ ***Note – this section is for systems with ISA cards only. PCI cards should continue on to section 4.6.***

Assuming the kernel rebuilt in the last step of the installation script succeeds, reboot the machine **without installing Netcom hardware.**

The Netcom II software will fail to find hardware and complain:

```
No Sync570 cards found; the driver can not operate.
```

This message, or one similar to it corresponding to your card type, appears during the operating system's switch into multiuser mode.

Subsequent error messages will appear due to these items failing. Observe the machine while it's rebooting to make sure that the driver has been integrated properly.

If the software finds the card without the controller plugged in, there is a conflict with another adapter, or with the main memory installed on your machine. Fix it before proceeding further. Section 5.2 describes how to modify controller parameters without re-installing the software.

4.6   Select Hardware Options

If you have an ISA card, adjust the straps and switches on your communications controller hardware so that the card corresponds to the hardware options selected during installation.

If you didn't record them, and forgot what you requested, you can look at the file: */etc/conf/sdevice.d/as570* (for a Sync/570).

The appendices of this guide contain the information you'll need to adjust your communications controller to the addresses you selected earlier.

4.7   Install The Hardware

- Shut down your machine by turning the power off.
- Leave the case plugged into the wall socket to ensure good grounding.
- Ensure you are properly grounded to the case before working inside the case.
- Install the hardware ensuring the adapter is seated properly and it is screwed down so that it doesn't shift when you plug in the cable that connects the controller to the modem or DSU/CSU.

- Reassemble the cabinet and turn the machine on.

4.8 Observe the Boot Process

Observe the machine when it boots with the hardware installed to make sure that the card is found, with a message similar to:

```
sgp - 15 - 2 port card found at E0000000
```

This message appears as the system switches into multiuser mode. If you don't get this message showing where the memory is mapped to, and you have an ISA card, then there is likely a discrepancy between the hardware straps/switches and the driver software configuration. Shut down the machine, remove the hardware and correct the problem by adjusting hardware straps and switches to the correct values.

If there is an interrupt problem, you will see the following message shortly after the above one:

```
SGP  ATTACH  failed:  Selected  card  (0)  is  not  able  to
generate  configured  interrupt  (15).  Please  check  for
conflict and check the BIOS (including PCI) configuration.
```

As the message indicates, the first place to look for the problem is in the BIOS. If your machine supports PCI cards (even if you are not using a PCI card) the BIOS usually has an option to map each interrupt to either Legacy ISA or PCI/plug-and-play. You need to be sure that the interrupt you use for your Netcom II card is mapped to the appropriate choice. If you have this wrong, the card will generate interrupts, but they will not be routed to the CPU by the motherboard. The record keeping that Unix performs to help you pick an appropriate (unused) interrupt does not take into account the ISA versus PCI BIOS mapping.

If all attempts to obtain the messages in this section fail, contact your distributor of Netcom II for technical support.

If you have successfully completed the above steps, Netcom II will now be installed. A complete description of the configuration of the card to network interface is covered in the on-line Administration Guide. Section 5 will give you a brief overview of this topic.

5 X.25 LINK CONFIGURATION

The on-line Administration Guide supplies detailed information on Netcom II X.25 link configuration. This Chapter contains a brief overview of the steps taken in configuring X.25 links to will help you get started quickly.

5.1 X.25 Link Configuration

Netcom II comes with a set of X.25 link configuration defaults parameters, and it uses those parameters whenever you run x25net start (the process that builds the protocol stacks). The configuration files used for the stack are located in the directory /usr/lib/x25/config. The name of the link configuration file is identified in /etc/packetnets. Look for lines in this file of the form:

```
CONFIG link0
```

By default, Netcom II uses file names link0, link1, link2...etc.

We recommend that you use the utility *tsgconfig* to make changes to the link configuration.

Configuration Keywords

You can also choose to review or modify the link configuration files directly. X.25 link configuration is keyword driven. Each configuration file is an ASCII file which contains a list of keywords and parameter values.

Default Configuration

The "linkx" file does not need to contain any keyword/parameter pairs. All necessary parameters have default values which are built in during the compile process. For reference purposes only, the default configuration settings are listed in readable form in the file */usr/lib/x25/config/net.default*. Modifying this *net.default* file doesn't do anything to the defaults.

5.2   Change X.25 Link Configuration

This section describes the parameters, which you will likely need to change to make X.25 useful for your specific network connection. You should review the service you are paying for with your network provider and use tsgconfig to set those parameters that are different from the default values.

Number of Logical Channels: bwc_num

bwc_num represents the number of X.25 Switched Virtual Circuits (SVCs) that you're running on the link. Strictly speaking, there are three classes of SVCs allowed: Incoming Only, Outgoing Only, and Both-way. bwc_num is the number of Both-way SVCs. Usually, bwc_num is the only non-zero number, because the number of logical channels in other classes are only used in special applications. The default value is 8. It should be set to the actual number of SVCs being provided by the network.

Packet Window Size Negotiation: window_neg

If window_neg is YES, it will allow Call Setup packets to contain the `packet window size' negotiation facility. If window_neg is NO, Netcom clears call requests and incoming calls which contain this facility. The clear will contain cause 3 and diagnostic 65 (41 hex).

Packet Size Negotiation: pktsize_neg

If pktsize_neg is YES, it will allow Call Setup packets to contain the `packet size' negotiation facility. If pktsize_neg is NO, Netcom clears all call requests and incoming calls which contain this facility. The clear will contain cause 3 and diagnostic 65 (41 hex).

Throughput Class Negotiation: class_neg

If class_neg is YES, it will allow Call Setup packets to contain the `throughput class' negotiation facility. If class_neg is NO, Netcom clears all call requests and incoming calls which contain this facility. The clear will contain cause 3 and diagnostic 65 (41 hex).

6   MAKING CHANGES MANUALLY

It is sometimes necessary to change the configuration chosen in the installation of the X.25 software. Perhaps other components of your system have changed or you didn't have all of the information at the installation time, resulting in some incorrect choices. This section describes how to make changes to the system configuration without having to reinstall the product.

The hardware configuration is held in system files in the directory */etc/conf/sdevice.d*. The file name will be:

    sgp (for an SGP)

    as570 (for a Sync/570 and 570i) or

In this file there is a line for each communications controller, starting from card number 0. Comments in this file document the fields. For each controller there is a board type and interrupt vector. Boards that are configured into memory and/or I/O have their address ranges recorded here.

On OpenServer 5 systems, PCI cards will have no resources declared in the sdevice.d file since they are dynamically assigned by the BIOS each time you boot the computer.

On UnixWare systems, this file should not be modified directly. Instead, use the utility dcu. Note that you should only modify the configuration of ISA cards; the resources shown by dcu for PCI cards are those assigned by the BIOS and should not be changed by the user.

After working through this chapter to change the configuration file, you must make a new kernel by running */etc/conf/bin/idbuild* (or *idbuild -B* for UnixWare) as the root user.

6.1   Changing Controller Memory Address

If you are changing controller memory, you need to make changes to the appropriate file in */etc/conf/sdevice.d*. For example, an entry, for a board in high memory, at 'D' megabytes may look like:

```
as570 Y 1 5 1 15 300 307 D00000 D0FFFF
```

If you're going to move the board to the 16KB starting at 0xD8000 (within the DOS memory area), the new entry should look like this:

```
as570 Y 1 5 1 15 300 307 D8000 DBFFF
```

> ***Note that the Sync/570 occupies less memory when mapped below 1MB.***

6.2 Changing Controller I/O Address

You make changes to the */etc/conf/sdevice.d* file to change your controller's I/O address. For example, suppose that you've got a controller that's at 0x300, and need to move it to 0x310. You'd change the file in */etc/conf/sdevice.d* from:

```
A5570 Y 1 5 1 15 300 307 D8000 DBFFF
```

to:

```
A5570 Y 1 5 1 15 310 317 D8000 DBFFF
```

The number of addresses used by a particular controller is dependent on the board type used.

6.3 Changing Interrupt Vector

Column 6 of the sdevice.d file defines the interrupt vector. For example, to change from IRQ 15 to IRQ 2, you'd change:

```
as570 Y 1 5 1 15 310 317 D8000 D8FFF
```

to:

```
as570 Y 1 5 1 9 310 317 D8000 D8FFF
```

> ***The digit `9' above is not a misprint. You actually have to enter a `9' instead of `2', because of the architecture of interrupt controller cascading in PC's.***

7   TESTING THE INSTALLATION

Assuming you have not seen any error messages at boot time, follow this short procedure to ensure that your X.25 link is working. If you don't get the results described in each of the sections below, refer to the Troubleshooting chapter in the on-line Administrator's Guide for further guidance.

- Check HDLC operation (section 7.1)

- Taking X.25 calls (section 7.2)

7.1   Check HDLC Operation

When the protocol stack is built and configured, the software immediately attempts to set up the HDLC link with the remote. Normally, this process takes less than a few seconds, so your link should be operational by the time your machine finishes booting and you log in to check your installation.

The easiest check of HDLC operation is to run */etc/tsgstat*. The first line the program displays should be:

```
Network Name: link0 ID:0, The link is UP
```

The key information on link operation is that your HDLC link is UP, meaning that it is able to transfer packets between your machine and the remote. By using the 'n' option of the menu presented by tsgstat, you can check the status of other links.

7.2   Taking X.25 Calls

Assuming that you know your X.121 network address, you can use xpad to call yourself:

```
xpad -d 9999999
```

Substitute 9999999 with your X.121 address, and you should see:

```
xpad V1.8: Copyright (c) 1991-1994 The Software Group Limited
Call Made
Awaiting Call Acceptance ... Call Accepted
```

followed by a login prompt. Log in to the system, and then log out and the call will be cleared.

At this point, you've successfully tested Netcom II. The product is essentially ready to use.

APPENDIX A: SGP HARDWARE NOTES

The memory, I/O and interrupt used by the SGP are configured by the PCI BIOS. No hardware settings are required for this card.

The SGP is a two port card, with link 0 at the top (furthest from the motherboard when plugged into the PC) and link 1 at the bottom.

By default, the SGP supports an RS-232 interface on each link. This can be replaced with another electrical interface such as V.35 or X.21, either at order time or in the field.

To change link 0 from RS-232 to another electrical interface, remove the chips U8 and U9. Place the daughter card in J2 with the main body of the daughter card directed to the right.

To change link 1 from RS-232 to another electrical interface, remove the chips U11 and U12. Place the daughter card in J4 with the main body of the daughter card directed to the right.

RS-232 Cable Specifications

To retain FCC Class A qualification all cables must be fully shielded and the shielding must be connected to the metal connectors.

SGX RS-323 Cable

Pin Number		Description		Direction
Female DB15	Male DB25			From/To SGX
2	2	TD,	Transmit Data	From
4	3	RD,	Receive Data	To
3	4	RTS,	Request to Send	From
10	5	CTS,	Clear to Send	To
12	6	DSR,	Data Set Ready	To
8	7	GND,	Common Signal Ground	N/A
5	8	CD,	Carrier Detect	To
13	15	TC,	Transmit Clock	To
14	17	RC,	Receive Clock	To
1	20	DTR,	Data Terminal Ready	From
15	24	XTC,	DTE Clock	From

V.35 Cable Specifications

Pin Number		Description	Direction
Female DB15	Male V.35		From/To SGX
1	H	DTR, Data Terminal Ready	From
2	P	Transmit Data A-wire	From
3	C	RTS, Request to Send	From
4	R	Receive Data A-wire	To
5	Y	Transmit Clock A-wire	To
6	V	Receive Clock A-wire	To
7	W	DTE Clock B-wire	From
8	B	GND, Common Signal Ground	N/A
9	S	Transmit Data B-wire	From
10	D	CTS, Clear to Send	To
11	T	Receive Data B-wire	To
12	E	DSR, Data Set Ready	To
13	AA	Transmit Clock B-wire	To
14	X	Receive Clock B-wire	To
15	U	DTE Clock A-wire	From

X.21 Cable Specifications

Pin Number		Description	Direction
Female DB15	Male V.35		From/To SGX
2	2	Transmit Data A-wire	From
3	3	RTS, Request to Send A-wire	From
4	4	Receive Data A-wire	To
5	5	DCD, Data Carrier Detect A-wire	To
6	6	Clock A-wire	To/From
8	8	GND, Common Signal Ground	N/A
9	9	Transmit Data B-wire	From
10	10	RTS, Request to Send B-wire	From
11	11	Receive Data B-wire	To
12	12	DCD, Data Carrier Detect B-wire	To
13	13	Clock B-wire	To/From

APPENDIX B: SYNC/570   HARDWARE NOTES

The memory, I/O and interrupt used by the ISA version of this card are configured into the kernel, described in section 4. Only the I/O address has to be set on the card. This is done with a set of DIP switches at the top of the card. PCI versions of this card have no switches that need to be set.

SWITCH SETTINGS FOR ISA DIGI SUNC/570 I/O ADDRESS						
Switch Number						I/O
1	2	3	4	5	6	location
Setting the first digit (x = not important)						
x	x	x	x	ON	OFF	2xx
x	x	x	x	OFF	OFF	3xx
Setting the second and third digits (x = not important)						
ON	ON	ON	ON	x	x	x00
OFF	ON	ON	ON	x	x	x10
ON	OFF	ON	ON	x	x	x20
OFF	OFF	ON	ON	x	x	x30
ON	ON	OFF	ON	x	x	x40
OFF	ON	OFF	ON	x	x	x50
ON	OFF	OFF	ON	x	x	x60
OFF	OFF	OFF	ON	x	x	x70
ON	ON	ON	OFF	x	x	x80
OFF	ON	ON	OFF	x	x	x90
ON	OFF	ON	OFF	x	x	xA0
OFF	OFF	ON	OFF	x	x	xB0
ON	ON	OFF	OFF	x	x	xC0
OFF	ON	OFF	OFF	x	x	xD0
ON	OFF	OFF	OFF	x	x	xE0
OFF	OFF	OFF	OFF	x	x	xF0
Examples						
ON	ON	ON	ON	OFF	OFF	300
OFF	ON	ON	ON	OFF	OFF	310

Summary Information

Host Memory Use:

16 Kbytes, locatable on any 16K boundary

Memory Data Bus Width:

16 bit

Host I/O Use:

16 bytes

Interrupt:

One of 3, 5, 7, 10, 11, 12, 15

Links:

On the Sync/570, the lower connector is link 0, the upper one is link1. The Sync/570i uses a single cable to separate out the various links. The ends of the cables are labelled with the link number.

RS-232 Cable Specifications

To retain FCC Class A qualification all cables must be fully shielded and the shielding must be connected to the metal connectors.

RS-232 Cable

Pin Number		Description		Direction
Female DB15	Male DB25			From/To SGX
2	2	TD,	Transmit Data	From
4	3	RD,	Receive Data	To
3	4	RTS,	Request to Send	From
10	5	CTS,	Clear to Send	To
12	6	DSR,	Data Set Ready	To
8	7	GND,	Common Signal Ground	N/A
5	8	CD,	Carrier Detect	To
13	15	TC,	Transmit Clock	To
14	17	RC,	Receive Clock	To
1	20	DTR,	Data Terminal Ready	From
15	24	XTC,	DTE Clock	From

APPENDIX C: LOOPBACK CABLE

If you are using the internal clocking option of the controller card, you will require this cable. We recommend that you use an `I-E' cable as an extension to the standard RS-232.

The `I' end is connected to a link that is internally clocked, where we provide our transmit clock. The `E' end is connected to a device, which wants clocks provided externally.

This cable also swaps Receive and Transmit Data and other EIA signals, so that it is a modem eliminator, or null modem cable. Because of this, DO NOT USE THE I-E JUST TO CONNECT TWO MALES TOGETHER.

The on-line manuals contain information on connecting two machines together without an X.25 network, using this cable.

For Direct Connection

DCE	Standard modem cable Or one leg of Y cable		I-E cable		Other X.25 DTE
Male	Female	Male	Female	Female	Male
(Provides Clocks)			I	E	(Accepts Clocks)

I-E Cable

"DCE"		I	E		"DTE"
Internally Clocked Clock Provider Description		Pin Number		Externally Clocked Clock Acceptor Description	
GND,	Common Signal Ground	1	1	GND,	Common Signal Ground
RD,	Receive Data	3	2	TD,	Transmit Data
TD,	Transmit Data	2	3	RD,	Receive Data
CD,	Carrier Detect	8	4	RTS,	Request to Send
DTR,	Data Terminal Ready	20	6	DSR,	Data Set Ready
			5	CTS,	Clear to Send
GND,	Common Signal Ground	7	7	GND,	Common Signal Ground
RTS,	Request to Send	4	8	CD,	Carrier Detect
RC,	Receive Clock	17	15	TC,	Transmit Clock
XTC,	DTE Clock	24	17	RC,	Receive Clock
		15			
CTS,	Clear to Send	5	20	DTR,	Data Terminal Ready
DSR,	Data Set Ready	6			