JETSTREAM 6x series

User's Guide

FCC Note   The Specialix JETSTREAM product has been found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions in this manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at their own expense.

$C\epsilon$ **Caution:** the JETSTREAM is approved for commercial use only.

About this Guide

The Specialix JETSTREAM is a high-performance terminal server and comprehensive network integration tool for TCP/IP Ethernet networks. This guide describes how to install, use and maintain the JETSTREAM.

This manual is intended for a network system administrator, familiar with Unix operating systems and TCP/IP networks.

Some parts of the manual can be used by operators on Terminals; see Chapter 9 (Basic usage) and Chapter 10 (Running Sessions).

Product Summary

Model types:

6000 : standard product: desktop version or wall-mounted

6001 : as for 6000 except downloaded software has SNMP support

6500 : rack-mounted version; same software as 6000 model

6501 : as for 6500 except downloaded software has SNMP support

Summary of Features:

- Multi-user access to your TCP/IP network. Up to 16 ports with options for RS232, RS422, Parallel, DB25 and RJ45

  Note: 6500 model has RJ45 ports only.

- Up to four telnet/rlogin sessions per user to run simultaneous applications. Users switch between sessions using a user-configurable screen switch character.

- Password-protected user accounts, privileged user levels and predefinable user sessions enable you to control user access to the JETSTREAM and the network.

- Alternatively, configure users to log straight into specific hosts.

- Reverse telnet - enables TCP/IP machines to access external machines via the JETSTREAM.

- Modem and printer support for easy grouping/ accessing of shared resources. Printer and modem hunt groups.

- Host-based modem/printer handling software (MTSD).

- SNMP support.

- Net rebooting.

- Download terminal definitions.

- Command Line and Full Screen Menu modes.

- Remote configuration.

- Save/restore configuration.

- Unauthorised access protection.

Additional software available from Specialix Technical Support:

- MTSRD - allows JETSTREAM ports on a network to behave as standard tty serial ports on a Unix system, i.e. provides full tty simulation.

C o n t e n t s

Quick Start Guide

START

Have you got all devices and cabling?	**No** → check the list at note 1

Yes ↓

If you have an MTA, connect it to the JETSTREAM	**Not sure how to?** → - see Chapter 1

N/A, or OK done ↓

Set your terminal to emulate VT100, ANSI or Wyse 60	**Cannot do?** → see note 2

Yes ↓

Set Terminal to 9600 baud, 8 data bits, no parity, and software flow control

ok, done ↓

Connect your terminal to port 8 on the J/STREAM	**which is port 8 ?** → for 6000 model, see Chapter 1; for 6500 model, see Chapter 2

ok, done ↓

Connect the JETSTREAM's power supply unit; to the mains; turn on mains power

ok, done ↓

Do you see system messages followed by the prompt, " login:"	**no** → see note 3

yes ↓

At the login prompt type "admin" <return>
At the MTS# prompt type "set line 8 termtype 'termtype' ", where "termtype" is your terminal type

ok, done ↓

go to next page.......

continued...

at the MTS# prompt type "screen", which
will take you into the menuing system

Problem?
→ use the cli;
see note 4

↓ Done

From the main menu, go to 'Server
Configuration'. Enter the details at note 5. ----

if you are using the cli,
see the commands
listed at note 6

↓ OK done

From the Main Menu, go to the
'Network Configuration Menu', then 'Host Table'
enter the name of your main host; press Enter ----

using the cli, type the
command "add host"

↓ OK done

Go to menu option 'Change Host',
enter IP address of your host;
press Enter to save, then press Escape ----

using the cli, type the
comand "set host"

↓ ok, done

Power off the JETSTREAM, then connect it to the network.
Power on again. If already connected to the network, go
to 'Network Configuration Menu' and select 'Reboot server' ----

using the cli,
type the
comand
"reboot server"

↓ ok, done

At the login prompt (on any port) type "admin"
you will be asked for a password; just press <return>
then type "telnet 'host name' "

Problem?
→ see note 7

ok, done   either   or

For users on terminals to be
able to log directly into the
host, go to Chapter **4**,
Setting up Login Connections

To set ports for printing
or modem operation,
go to Chapter 7,
Advanced Configuration

For other uses of JETSTREAM, see note 8

FINISH

1.1   Notes

Note number	Details
1	devices are: one of JETSTREAM 6000 (6001) or 6500, Terminal or PC with terminal emulation, cabling is: one cable to connect terminal or PC to JETSTREAM (customer to provide); see Appendixes B or C for pin specifications; mechanism to cable JETSTREAM to customer network
2	If your terminal cannot emulate VT100, ANSI or Wyse 60 terminal modes, continue with your usual emulation. As a result, you will not be able to use the menuing system during this installation; instead you will have to use the command line interface (cli). Post installation you can download additional terminal definitions of your own choice from the Specialix diskette. See Section 8.4 "Downloading Terminal Definitions" on page 66.
3	If you do not see the login prompt, you may have a problem with cabling. Check pin connections at either end of cable (see note 1). Check terminal emulation settings (baud rate, data bits, etc.)
4	If typing "screen" does not take you into the menuing system, you may not be able to use the menuing system due to your terminal emulation. See note 2 and use cli. To follow the cli route through the Quick Start guide flow chart, continue flowing down the chart but see the comments to the right-hand side of each box.
5	enter your JETSTREAM details: server name - the name you want to give your JETSTREAM, e.g. socrates internet address - the ip address you will use for your JETSTREAM, in dot notation, e.g. 192.65.132.6 broadcast address - the address which will reach all the necessary hosts. e.g. 192.65.132.255 subnet mask - e.g. 255.255.255.0 domain name - e.g. Specialix.co.uk
6	the cli commands are: set servername set internet set broadcast set subnet

Note number	Details
7	if you cannot communicate with the host, type "ping <hostname>". If any packet loss is reported, you have a problem. Check: a) the cabling or network connection between the JETSTREAM and the network. b) check the IP addresses and hostnames which have entered **Note:** if your host is on a different network or sub-network, add a gateway into the routing table of the JETSTREAM; see Section 6.11 Add Gateway .
8	What else do you want to do with your JETSTEAM? a) If you want to access a host external to your network from within the network, via your JETSTREAM, use the Reverse Telnet feature. See Section 7.9 Reverse Telnet Connection . b) If you want users to have access to more than one host, go to Chapter 5 (Administration of Users). c) for NetRebooting go to Section 8.2 "Net Rebooting" on page 66 d) for BOOTP, go to Section 8.5 "BOOTP" on page 70 e) for MTSD, a host-based modem/print handling utility which enables applications to use JETSTEAM ports as local device nodes, see Section 7.8 "Modem and Printer Handling Using MTSD" on page 53 f) for the MTSRD utility contact Specialix Technical Support. MTSRD allows JETSTREAM ports on a network to behave as standard tty serial ports on a Unix system, i.e. provides full tty simulation. There are many other features of the JETSTREAM; see the (Product Summary) for an overview, or the Table of Contents or index.

C h a p t e r   1

Installation of 6000 model

1.1 Introduction

Note   *The descriptions of the 6000 model in this chapter apply equally to the 6001 model.*

The JETSTREAM 6000 plan view is shown below, together with the plug-in Modular Terminal Adaptor (MTA):

Figure 1
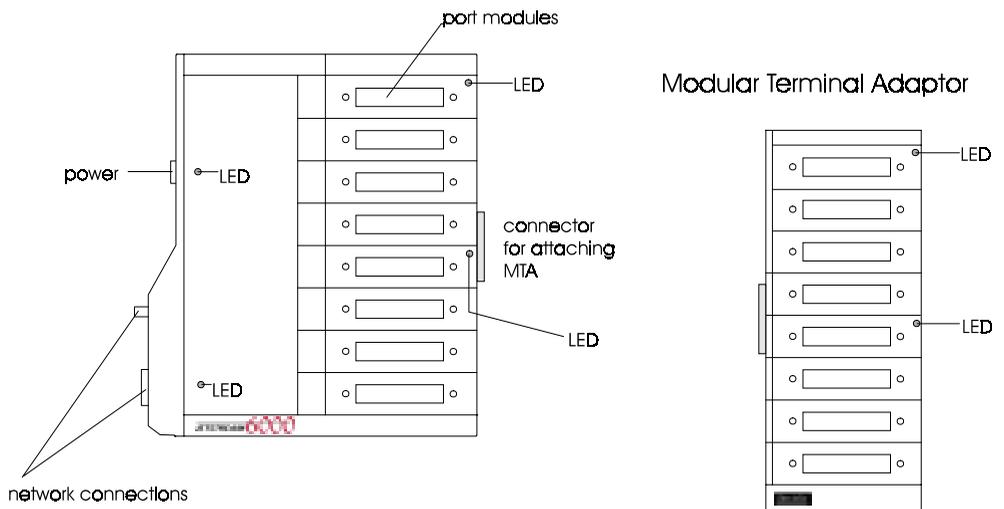
This chapter describes how to get the JETSTREAM up and running on your network. It contains the following sections:

WARNING: the JETSTREAM 6000 and 6001 contain no user-serviceable parts.

Any attempt to gain access to the inside of the chassis enclosure will nullify the product warranty.

If your believe your product faulty it will have to be returned to the factory for diagnosis and repair. Please confirm with your supplier before taking any action.

1.2 Installation Checklist

- One JETSTREAM.

- One power supply unit (with integral power lead).

- One mains lead for the JETSTREAM unit.

- *(optional)* One Modular Terminal Adaptor (MTA).

- JETSTREAM Supplemental diskette - containing MTSD, sample terminal definition files and a version of JETSTREAM software with SNMP support. (This diskette may also include a software upgrade).

- A terminal (or PC) to act as the console for the JETSTREAM.

- An IP address for your JETSTREAM (allocated by you). Information on obtaining an IP (Internet) address for your Company/network is in Section G.10 Internet Registration.

1.3 Attaching a Modular Terminal Adaptor

If you do not want to attach an MTA, skip this section.

You can connect one Modular Terminal Adaptors (MTA) to your JETSTREAM. This 8-port, clip-on module enables you to expand and diversify your system. There are five models of MTA, providing a wide range of serial and parallel options. Descriptions of the MTA models and their port types is given in Appendix B.

WARNING   **Do not connect or disconnect the MTA to/from the JETSTREAM while the power is on. You will damage the units, may cause a fire and possibly injure yourself.**

Locate and remove the connection brackets at the end of both the JETSTREAM and the MTA. See Figures 'step 2a' and 'step 2b'.

Connect the MTA to the JETSTREAM via the 37-way bus connectors on the side of each unit; see Figure 'step 2c'. Together, they form an assembly.

Secure the assembly with the connection brackets, as illustrated in Figure 'step 2d'.

Figure 2 How to find and fit the JETSTREAM and MTA connection brackets

step 2a

step 2b

remove brackets

Specialix product label

Specialix product label

remove brackets

step 2c

Push the MTA.....   .....into the JETSTREAM

.....via their bus connectors

Specialix product label

Specialix product label
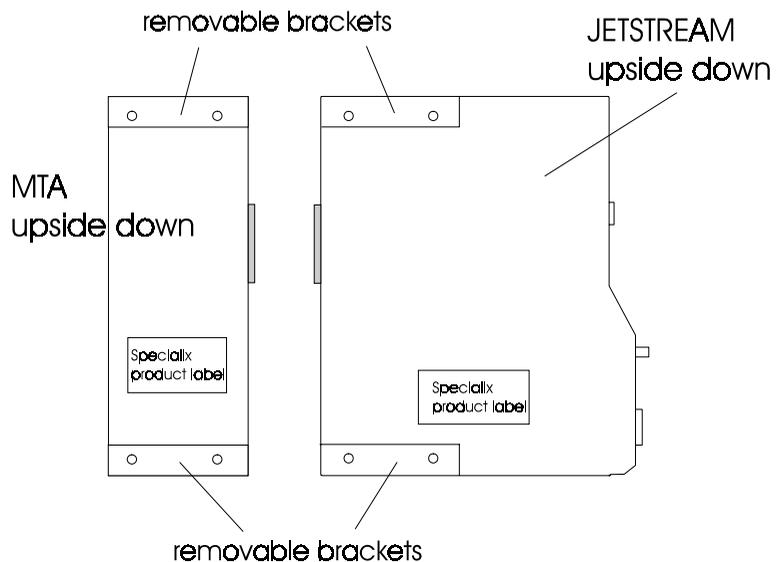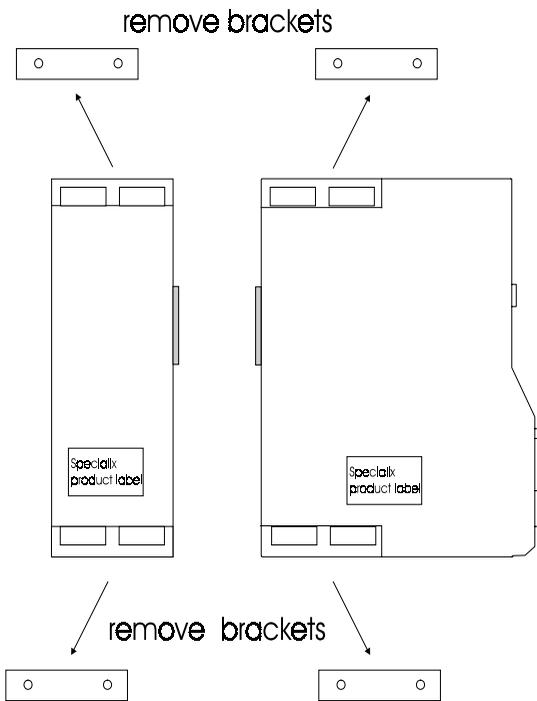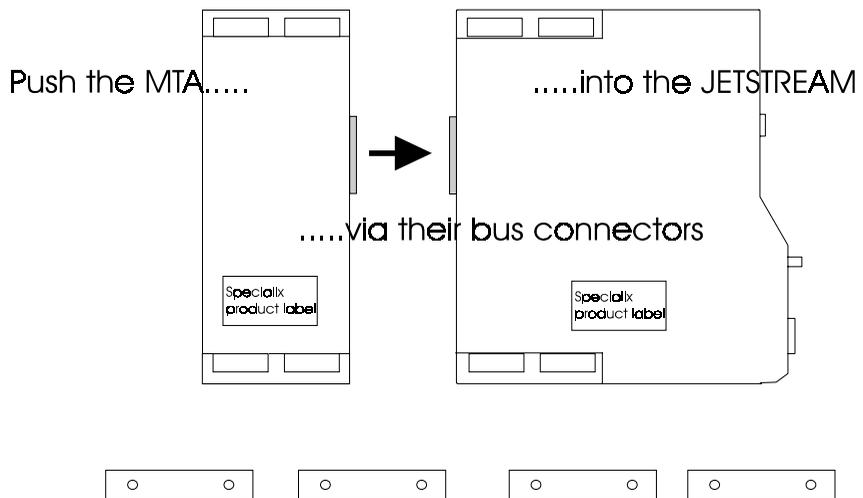
step 2d

join together
JETSTREAM and MTA
with a single bracket

Specialix
product label

Specialix
product label
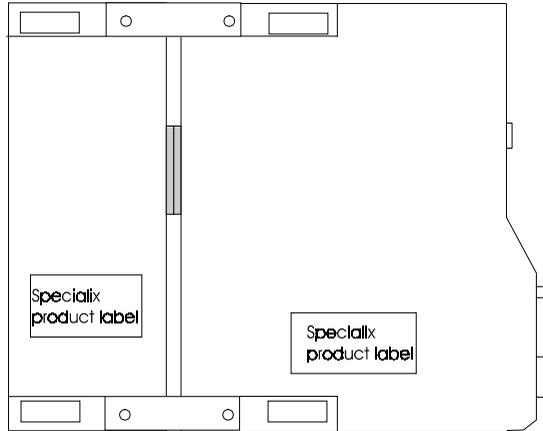
join together
JETSTREAM and MTA
with a single bracket

two unused brackets

1.4 Wall-mounting

To wall-mount the assembly, place the JETSTREAM (and MTA, if you have one) face up. Then:

1. remove the top and bottom covers of the frontages of the JETSTREAM (and MTA); see step 3a.

2. with the covers removed you will see screw holes, as shown in step 3b. Use these screw holes to fix the JETSTREAM (and MTA) to the wall.

3. after screwing to the wall, refit the front cover(s).

Figure 3 How to wall-mount a JETSTREAM

step 3a

step 3b

holes for wall-mounting

units facing upwards

holes for wall-mounting
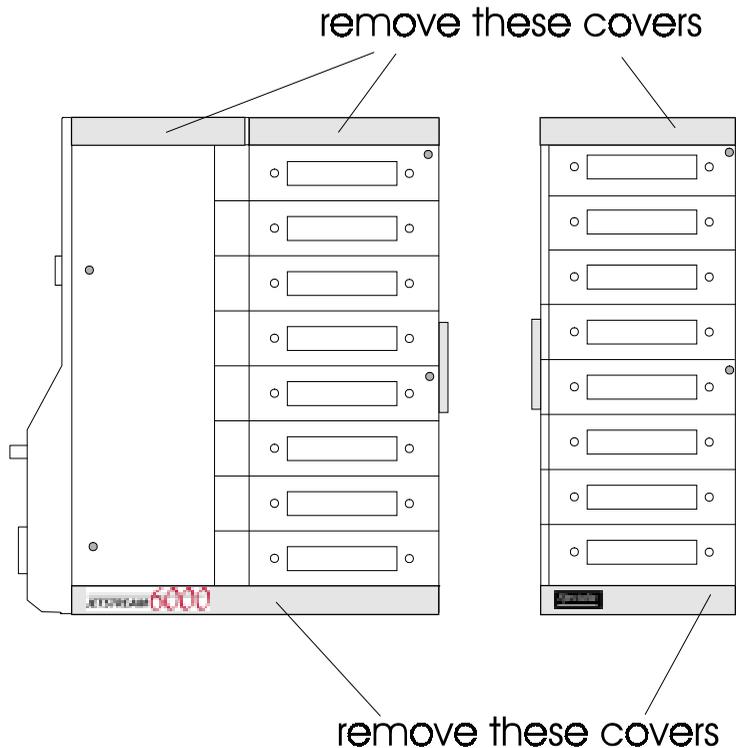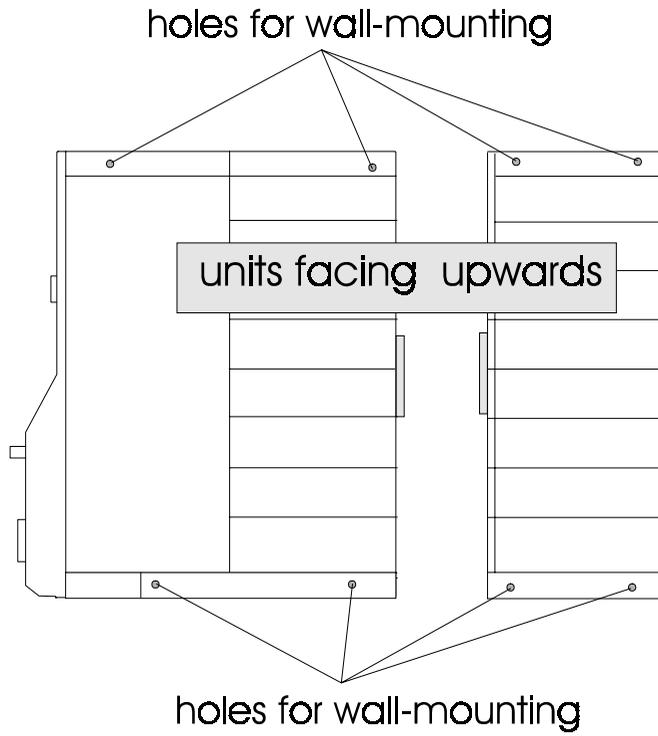
1.5 Cabling the JETSTREAM to the Network

Cable your JETSTREAM to the network depending on which type of JETSTREAM you have. There are two variants:

- the 10BaseT variant with an RJ45 connector; see Figure 4 and associated text. It also has an AUI connector.

- the 10Base2 variant with a BNC connector; see Figure 5 and associated text. It also has an AUI connector.

**Figure 4
the 10BaseT
variant**
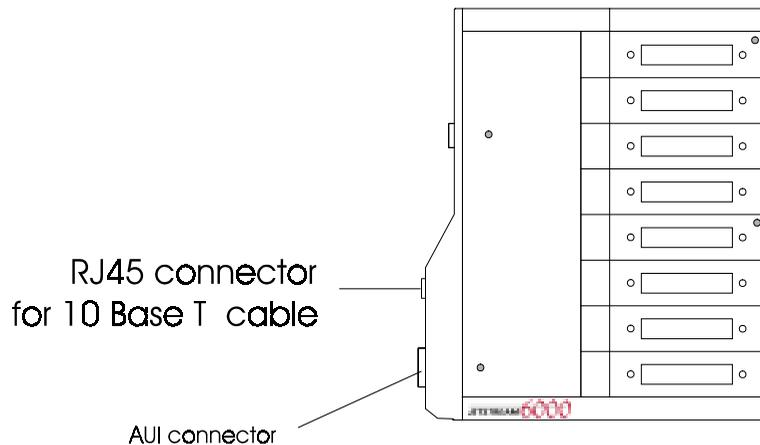
The 10BaseT variant has an RJ45 connector as shown in Figure 4. The connector allows you to connect shielded or unshielded twisted-pair (STP or UTP) cable.

The AUI connector (for connection to various transceiver devices) is the same on either variant.

Connect your ethernet cable to the appropriate connector.

The 10BaseT variant is auto-sensing; that is, it detects automatically the type of ethernet cable attached. There is no set of internal switches.

**Figure 5
the 10Base2
variant**

BNC connector
for 10 Base 2 cable

AUI connector

switches
(remove cover)
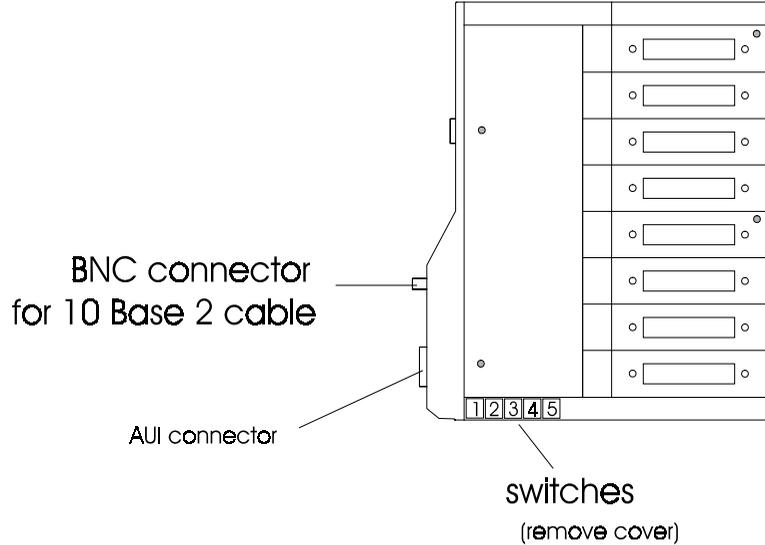
The 10Base2 variant has a BNC connector as shown in Figure 5. The connector allows you to connect 10Base2, i.e. thin-wire co-axial cable. The AUI connector is for connection to various transceiver devices. The AUI connector is the same on both variants.

Connect your ethernet cable to the appropriate connector. If your cable is 10Base2 and the JETSTREAM is the termination point for the cable, you must fit a terminator to the cable connector.

On the 10Base2 variant you have to check or adjust switches inside the unit, depending on which cable type you have connected. See the next section, Switch settings.

1.6.1 Switch settings

At the end of the unit next to the network connectors, remove the panel with the Specialix logo on it. Inside the JETSTREAM you will see five switches.

**Figure 6
Default Switch
settings (for a
10Base2
Connection)**
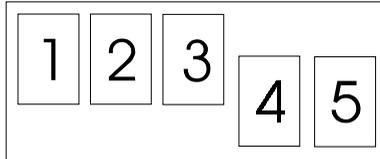
These are the default settings. If you have implemented a 10Base2 (thin-wire) connection you can leave these switches as they are.

If you are using a 10Base5 (thick-wire connection), or an external twisted-pair transceiver, you must move switches 1, 2 and 3 into the 'down' position as illustrated in Figure 7; (switches 4 and 5 are not used).

**Figure 7
Default Switch
settings (for a
Thin-wire
Connection)**
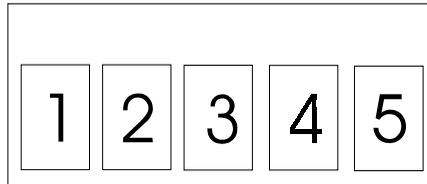
1.7 Powering the JETSTREAM Up

1. Take the pre-moulded cable with the 9-pin connector and attach the power supply unit to the JETSTREAM's power socket.

2. Tighten the retaining screws to secure the connection.

3. Plug the power supply unit into the mains supply using the mains cable supplied.

4. Switch the power on at the mains.

CAUTION:Make sure that the power supply unit is kept in a dry, well ventilated place at all times. DO NOT block any of the vents and NEVER stack power supply units.

WARNING:This Specialix product is supplied with an external Power Supply Unit (PSU). Approvals gained by this product are dependent on the use of the product with the Specialix PSU. Use of a non-proprietary PSU, including PSUs supplied with other Specialix products, may also damage the unit and will invalidate your warranty.

Figure 8 LEDs and port numbers
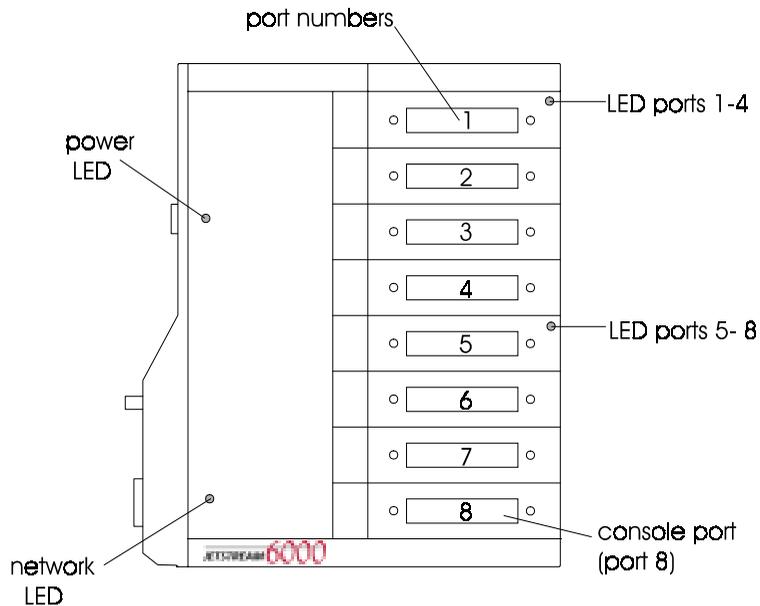
At power up, after the internal diagnostics have been run, all four of the JETSTREAM's LEDs should turn green. The LED next to the power supply socket (see Figure 8) indicates that the JETSTREAM has passed the on-board diagnostic tests, i.e. it is working correctly.

The LED next to the ethernet connectors indicates network activity. If you transmit data across the network, it flashes green. If you receive data across the network, it flashes orange. If an error is detected on the network, it will flash red. After initial start-up activity this LED will turn off.

The other 2 LEDs represent the JETSTREAM's modules (ports 1-4 and ports 5-8). These LEDs indicate that at least one of their ports are open. Since all lines are set up as login connections by default, the LEDs turn green on power up. The MTA LEDs function the same way.

1.8 Setting Up the Console

Now connect a terminal to port 8 on the JETSTREAM unit (the correct port is shown in Figure 8). Port 8 is the console port; all console messages will be output to it. See Section B.9 Terminals for cabling requirements.

You can use any type of terminal on the JETSTREAM. However, if you want to use the menu system (Full Screen mode), as well as Command Line mode, you must use, or emulate, one of the terminal types defined on the JETSTREAM (Wyse60, VT100 or Ansi). The default is Dumb.

Switch the terminal on. Set it to 9600 baud, 8 data bits, 1 stop bit, no parity; this is the default configuration. Press <return> and the JETSTREAM login prompt (MTS#) should be displayed.

Note.   The cli prompt for the JETSTREAM is MTS followed by a character, e.g. MTS#. JETSTREAM has recently re-named from MTS (Modular Terminal Server).

Note.   If you cannot emulate one of these terminal types, you must install using the Command Line Interface (cli). Once you can communicate with a host you can download additional terminal definitions. This is described in Section 8.4 Downloading Terminal Definitions.

Now go to Chapter 3 (Initial Configuration).

C h a p t e r   2

Installation of 6500 model

2.1   Introduction

Note   *The descriptions of the 6500 model in this chapter apply equally to the 6501 model.*

The JETSTREAM 6500 is a 19 inch rack-mounted version of the model 6000. The front and rear views are shown below:

Figure 9   Front Panel View
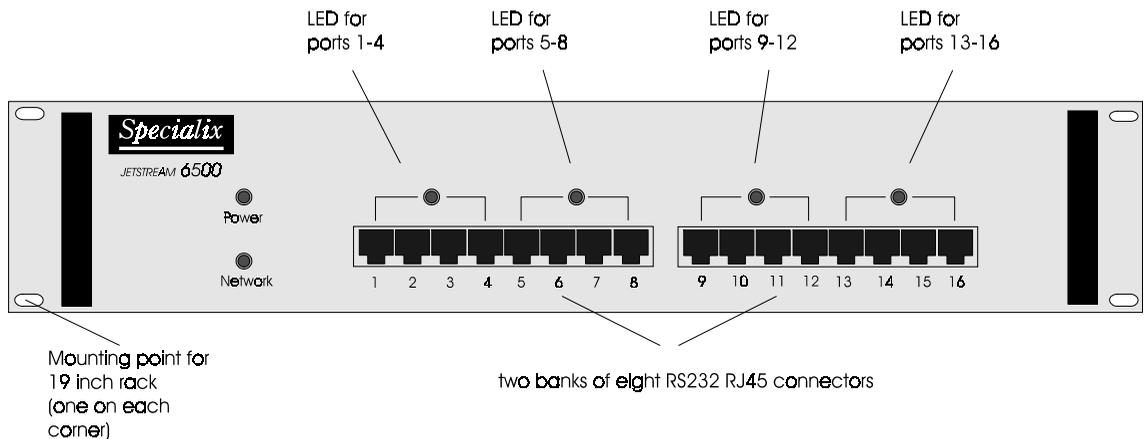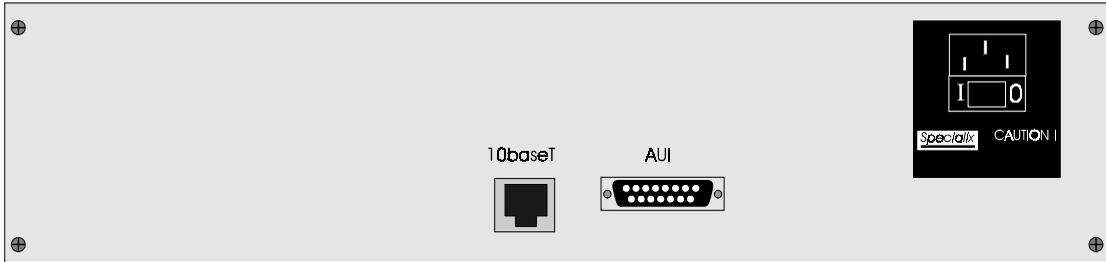
REAR PANEL VIEW

This chapter contains the following sections:

WARNING: the JETSTREAM 6500 and 6501 contain no user-serviceable parts.

Any attempt to gain access to the inside of the chassis enclosure will nullify the product warranty.

If your believe your product faulty it will have to be returned to the factory for diagnosis and repair. Please confirm with your supplier before taking any action.

2.2   Installation Checklist

- One JETSTREAM 6500.

- One mains lead for the JETSTREAM unit.

- JETSTREAM Supplemental diskette - containing MTSD, sample terminal definition files and a version of JETSTREAM software with SNMP support. (This diskette may also include a software upgrade).

- A terminal (or PC) to act as the console for the JETSTREAM.

- An IP address for your JETSTREAM (you allocate). Information on obtaining an IP (Internet) address for your Company/network is in Section G.10 Internet Registration.

2.3   Installation

2.3.1   Into the rack

To mount in a 19 inch rack, four holes are provided on the front panel, one at each corner. The holes are of sufficient size to accommodate a variety of imperial and metric type fasteners. Owing to the number of different 19inch racks, fasteners are not provided. Please use fasteners suitable for your rack.

The weight and dimensions of the product are detailed in the Technical Specification, Section A.4 6500 and 6501 models.

Before connecting your JETSTREAM to the mains power, check that you have been supplied with a mains cable (power cord) suitable for the mains supply in your country. The power range which the JETSTREAM will accept is printed on the label next to the power input connector on the rear panel; it is repeated in the technical specification at the rear of this release note. There is no need to adjust the JETSTREAM for different mains supply ratings, as the internal psu is auto-sensing.

2.3.2   to the Network

Cable your JETSTREAM to the network connection; you have a choice of RJ45 and AUI connections.

2.3.3   Software Installation

For a brand new JETSTREAM 6500 unit, the software is pre-installed. There is no further action required on your part.

2.4   No MTA

The JETSTREAM 6500 already has 16 user ports; there is no need to plug-in - nor will the product accept - a Modular Terminal Adaptor (MTA).

2.5   Powering the JETSTREAM Up

Connect the JETSTREAM to the mains power.

Turn on the power (I/O) switch on the rear of the unit.

2.6   Setting Up the Console

Now connect a terminal to port 8 on the JETSTREAM unit (see Figure 9). Port 8 is the console port; all console messages will be output to it. See Section B.9 Terminals for cabling requirements.

You can use any type of terminal on the JETSTREAM. However, if you want to use the menu system (Full Screen mode), as well as Command Line mode, you must use, or emulate, one of the terminal types defined on the JETSTREAM (Wyse60, VT100 or Ansi). The default is Dumb.

Switch the terminal on. Set it to 9600 baud, 8 data bits, 1 stop bit, no parity; this is the default configuration. Press <return> and the JETSTREAM login prompt (MTS#) should be displayed.

> *Note*   *The cli prompt for the JETSTREAM is MTS followed by a character, e.g. MTS# .*
>   *JETSTREAM has recently re-named from MTS (Modular Terminal Server).*

> *Note*   *If you cannot emulate one of these terminal types, you must install using the Command*
>   *Line Interface (cli). Once you can communicate with a host you can download additional*
>   *terminal definitions. This is described in Section 8.4 Downloading Terminal Definitions.*

2.7 Go to....

Now go to Chapter 3 (Initial Configuration).

C h a p t e r   3

Initial Configuration

3.1   Introduction

This chapter details the initial configuration of a JETSTREAM and applies to all models. It contains the following sections:

3.2   Logging On

We assume you have connected and set up the console; if not go back to Section 1.8 "Setting Up the Console" on page 12 either, *for a model 6000 or 6001*

Section 1.8 "Setting Up the Console" on page 12,

or, *for a model 6500 or 6501*,

Section 2.6 "Setting Up the Console" on page 16

At the login prompt, type *admin* and press <return>. At the password prompt, just press <return>. This is the default admin user password. The Command Line prompt (MTS#) will be displayed.

Note   *The cli prompt for the JETSTREAM is MTS followed by a character, e.g. MTS# .*
              JETSTREAM has recently renamed from MTS (Modular Terminal Server).

You are now logged in as the system administrator. No other user accounts exist on the system at this point.

To use Full Screen mode (menus), you must first set your terminal type. Use the set line command as follows:

```
set line 8 termtype termtype
```

where *termtype* is wyse60, vt100 or ansi. If you want to emulate one of these terminal types, remember to change the terminal's setup as well.

To enter Full Screen mode, type *screen* and press <return>. The main menu will be displayed:

```
                      Main Menu
Sessions
Command Line Mode
Users
Line Configuration
Server Configuration
Network Configuration
```

Note   *In the above menu, the line 'Server Configuration' applies to the JETSTREAM, in its function as a Terminal Server.*

A description of Full Screen mode, and how to use it, can be found in Chapter 9 (Basic usage).

3.3   JETSTREAM Configuration

NOTE: If you are unable to use Full Screen mode, you must enter the JETSTREAM configuration information through the Command Line using the commands *set servername, set internet, set broadcast, set subnet* **and** *set domain***. These are described in Chapter 11 (The CLI commands).**

At the main menu, type 's' and press <return> to select 'Server Configuration'. The following form will be displayed:

```
                   Server
Servername        [                 ]
Internet Address  [               ]
Broadcast         [               ]
Address
Subnet Mask       [                       ]
Domain Name       [                         ]
```

Note   *In the above menu, the line 'Server Configuration' applies to the JETSTREAM, in its function as a Terminal Server.*

Move between the fields using the arrow keys. Use the <del> key to backspace if necessary.

- **Servername** (also known as hostname or alias) - this is a familiar name for your JETSTREAM. You will probably already have a naming scheme for the hosts in your network. The hosts in this guide are named after Ancient Greeks.

- **Internet Address (IP Address)** - this is the JETSTREAM's unique address in the network. It is used for communication between hosts.

- **Broadcast Address** - if you wanted to send information to all hosts on your network simultaneously, the JETSTREAM would use the broadcast address. The broadcast address must cover all the hosts you want to reach. Once you have entered an IP address and subnet mask, the broadcast address will default to the IP address with the host part(s) set to 255.

- **Subnet Mask** - this allows interconnected local networks to coexist with the same network ID. This hides complicated local environment and routing information from external hosts and gateways. If you want the JETSTREAM to belong to the same subnet as other hosts, give it the same subnet mask as them.

Note   *We recommend you set a subnet mask on initial configuration.*

- **Domain Name** - a unique name which describes your domain - your location in the global network. Like Hostname, it is a symbolic rather than a numerical identifier which is easier to recognise.

Example settings for these fields are shown below:

```
                    Server
Servername        [mtsl              ]
Internet Address  [195.49.144.4      ]
Broadcast         [195.49.144.255    ]
Address
Subnet Mask       [255.255.255.0
Domain Name       [specialix.co.uk             ]
```

When you have completed the form, press <return> to exit. The Quit form will be displayed:

```
        Quit Form
Save And Exit Form
Exit Form Without Saving Changes
```

The first option will be highlighted; press <return> to save. You will be returned to the main menu.

Tip   we recommend you keep a record of your JETSTREAM's configuration; see Appendix H
(Configuration record)

3.4   Setting Up the Host Table

The JETSTREAM needs to know the host names and internet addresses of the other hosts in the network (or any hosts anywhere on the internet) which you want to communicate with on a regular basis. These are added to the Host Table. You can add up to twenty hosts. Select 'Host Table' from the Network Configuration menu; the Host Table menu will be displayed:

```
    Host Table
Add Host
Change Host
Delete Host
```

Select 'Add Host' from the menu. You will be asked to enter the host name:

```
Enter Host Name:
```

Type in the name of the host (14 characters maximum) and press <return>. Use the <del> key to backspace if necessary.

Select 'Change Host' from the Host Table menu. The following form will be displayed:

```
            Hosts
Hostname     Internet Address
socrates     [192.49.144.4     ]
aristotle    [0.0.0.1                ]
plato        [0.0.0.1                ]
sophocles    [0.0.0.1                ]
homer        [0.0.0.1                ]
pythagoras   [0.0.0.1                ]
```

This form will list all hosts added to the host table. The default internet address is 0.0.0.1. Enter the correct internet address of each host. Use the <del> key to backspace if necessary.

3.5   Reboot the JETSTREAM

Whenever you set or change the JETSTREAM Configuration, you must reboot the JETSTREAM. This will broadcast the information across the network.

NOTE: If you are not using Full Screen mode, use the command *reboot server* from the command line.

Select 'Reboot' from the Network Configuration menu. The Reboot menu will be displayed:

```
              Reboot
Reboot Server
Set Net Rebooting
```

Select 'Reboot Server'. You will be asked to confirm the reboot:

```
Confirm Reboot Server
(y/n)
```

Type 'y' to reboot. When the JETSTREAM has been rebooted the MTS login prompt will be displayed.

Note   *In the above menus, the 'Server' applies to the JETSTREAM, in its function as a Terminal Server.*

3.6   Verify Installation

To check that you have installed the JETSTREAM successfully, try to ping a remote host using the following command:

```
ping hostname
```

Choose a host that you have defined in the host table. If no packet loss is reported, your JETSTREAM unit is ready to use. If the command returns an error, refer to Section 11.22 ping.

3.7   Software Upgrade

You may have been supplied with a software upgrade. Use the version command (Section 11.57 version) to check the version of JETSTREAM software your unit is running. Compare this with the version number on the Supplementary diskette supplied with the JETSTREAM. If the diskette contains a more recent version of software, you should install it.

Copy the software upgrade onto another TCP/IP host and download to the JETSTREAM via net rebooting. The procedure for this is described in Chapter 8 (System Administration).

C h a p t e r   4

Setting Up Login Connections

4.1 Introduction

By default, JETSTREAM lines are configured as **normal** connections. This is a login connection to the JETSTREAM unit - you have been using one to install the JETSTREAM. Once logged in, the user can start up to four telnet/rlogin sessions to remote hosts. The admin user can predefine these sessions, even configure them to start automatically on login to the JETSTREAM. Although users have access to JETSTREAM commands, this can be restricted by use of user levels. For these users you must create a login account on the JETSTREAM and set a password.

If multiple sessions are not a requirement, you may want to reconfigure lines as **direct** or **silent** login connections. These allow the user to log straight into a specific host, completely bypassing the JETSTREAM login. This is quicker and easier for users and they won't need to learn how to use the JETSTREAM. Direct and silent connections are described in more detail in "Direct and Silent Login Connections".

You must also make sure that the hardware characteristics of the lines are correct. The default line configuration is 9600 baud, 8 data bits, 1 stop bit, no parity and software flow control. Normal connections also require the terminal type and number of video pages to be set. "Line Settings" describes how to edit JETSTREAM line settings.

NOTE: The JETSTREAM will support a maximum of 64 sessions. If you have an 8- or 16-port configuration, this enables you to run up to 4 sessions on all ports if required. Memory limitations may also restrict the number of sessions you can run. You can check the amount of available memory using the CLI *heap* command.

4.2 Chapter contents

This chapter is divided into the following sections:

Note.   An overview of all line types (including those discussed in other chapters in this manual) is provided in Section A.5 Summary of Line types.

4.3 Direct and Silent Login Connections

Direct connections bypass the JETSTREAM enabling the user to log straight into a specific host. A direct connection is recommended where multiple sessions are not a requirement. The message 'Press return to continue' is displayed on the user's screen. The user must hit a key to display the host login prompt. The message is redisplayed on logout.

NOTE: On the console port (no. 8), if the user presses <esc> instead of <return>, an JETSTREAM login prompt can be obtained.

Silent connections are the same as direct connections except that they are permanently established. The host login prompt is displayed on the screen. Logging out redisplays this prompt. Silent connections, unlike direct connections, however, make permanent use of pseudo tty resources and constantly respawn getty processes. They consume host resources even when not in use.

You can select the telnet or rlogin protocol for direct and silent connections. If unsure which to use, consider the following:

- Telnet can be used to access both UNIX and non-UNIX hosts; rlogin can normally only be used with UNIX hosts.

- Telnet provides more options for connecting to hosts, but rlogin uses fewer system resources.

- Rlogin passes your user name and a terminal type to the host. On some older versions of SCO UNIX, however, these may not be passed. Failure to pass the terminal type results in your TERM variable being set to 'unknown' upon login.

4.4 Setting Up Direct/Silent Login Connections

set line, show line Select 'Virtual Circuits' from the Line Configuration menu. The Virtual Circuits form will be displayed:

```
                    Virtual Circuits
Line      hostname      Type        Host Port    MTS Port
1         [socrates ] [normal   ] [23 ]          [ ]
2         [socrates ] [normal   ] [23 ]          [ ]
3         [socrates ] [normal   ] [23 ]          [ ]
4         [socrates ] [normal   ] [23 ]          [ ]
5         [socrates ] [normal   ] [23 ]          [ ]
6         [socrates ] [normal   ] [23 ]          [ ]
7         [socrates ] [normal   ] [23 ]          [ ]
8         [socrates ]  Console     [23 ]          [ ]
9         [socrates ] [normal   ] [23 ]          [ ]
10        [socrates ] [normal   ] [23 ]          [ ]
11        [socrates ] [normal   ] [23 ]          [ ]
12        [socrates ] [normal   ] [23 ]          [ ]
13        [socrates ] [normal   ] [23 ]          [ ]
14        [socrates ] [normal   ] [23 ]          [ ]
15        [socrates ] [normal   ] [23 ]          [ ]
```

By default, the line type is set to **normal**, the TCP Port to 23 (telnet) and the hostname to the first host entered in the host table.

Sixteen lines are created, irrespective of the number of ports physically installed. Scroll up and down the list using the arrow keys or the <PgUp> and <PgDn> keys.

- In the **Hostname** field use the spacebar to cycle through the available hosts. Select the host that you want the user to log into.

- In the **Type** field use the spacebar to cycle through the line types. Select one from dir tel, sil tel, dir rlg and sil rlg. Port 8 (the Console port) can be configured as any of line types, except for silent and printer *(see next paragraph)*.

To configure the console port as silent or printer line type, you must

telnet into the JETSTREAM. This is a precaution to ensure you always have access to configure the JETSTREAM, irrespective of line type setting on port 8.

The other fields can be ignored.

HINT. If you want to configure several lines with the same parameters, you may want to use the *Global Replace* or *Reset to Default* features (see Set All Values To Current Field Value   (Global Replace) and Reset to Default).

4.5 Line Settings

set line, show line The default line configuration is 9600 baud, 8 data bits, 1 stop bit, no parity and software flow control.

Changes to a login line will take effect the next time the user logs in. The exception to this is the line that *you* are logged into. On this line, changes to the terminal type and the number of video pages will take effect immediately. Other changes will take effect the next time you log in.

Select 'Line Settings' from the Line Configuration menu. The Line Settings form will be displayed:

```
                Line Settings
Line  Speed      Terminal  Modem  Flow      Bits  Parity  Stop  Pages  User
1       [9600  ] [dumb  ] [off] [soft] [8]   [none] [1]   [4]    [ ]
2       [9600  ] [dumb  ] [off] [soft] [8]   [none] [1]   [4]    [ ]
3       [9600  ] [dumb  ] [off] [soft] [8]   [none] [1]   [4]    [ ]
4       [9600  ] [dumb  ] [off] [soft] [8]   [none] [1]   [4]    [ ]
5       [9600  ] [dumb  ] [off] [soft] [8]   [none] [1]   [4]    [ ]
6       [9600  ] [dumb  ] [off] [soft] [8]   [none] [1]   [4]    [ ]
7       [9600  ] [dumb  ] [off] [soft] [8]   [none] [1]   [4]    [ ]
8       [9600  ] [dumb  ] [off] [soft] [8]   [none] [1]   [4]    [ ]
9       [9600  ] [dumb  ] [off] [soft] [8]   [none] [1]   [4]    [ ]
10      [9600  ] [dumb  ] [off] [soft] [8]   [none] [1]   [4]    [ ]
11      [9600  ] [dumb  ] [off] [soft] [8]   [none] [1]   [4]    [ ]
12      [9600  ] [dumb  ] [off] [soft] [8]   [none] [1]   [4]    [ ]
13      [9600  ] [dumb  ] [off] [soft] [8]   [none] [1]   [4]    [ ]
14      [9600  ] [dumb  ] [off] [soft] [8]   [none] [1]   [4]    [ ]
15      [9600  ] [dumb  ] [off] [soft] [8]   [none] [1]   [4]    [ ]
```

Scroll through the list using the arrow keys or <PgUp> and <PgDn> keys. Use the spacebar to cycle through the options in each field.

The 'Terminal', 'Pages' and 'User' fields are defined as follows:

- **Terminal** - (normal connections) The default terminal type is dumb. If you want to use Full Screen mode (menus) on the line, you must select one of the predefined terminal types (Wyse60, Ansi or VT100). If you can't use or emulate one of these types, you can download up to three additional terminal definitions of your own choice using the Extraterms utility (see Section 8.4 Downloading Terminal Definitions). This will explain the term1, term2 and term3 options available in this field.

- **Pages** - (normal connections) This is the number of video pages supported by the terminal attached to the line. If you don't specify the correct number of pages, you may experience problems with page displays when switching between sessions. The documentation supplied with your terminal should tell you how many pages it supports.

- **User** - This field enables you to define the name of the line user. On normal connections, this is an option, enabling you to dedicate the line to a specific user. This user won't be prompted for their user name, just their password. On direct and silent rlogin connections, this field is mandatory because the user name is always passed to the UNIX host under the rlogin protocol.

HINT: If you want to configure several lines with the same parameters, you may want to use the Global Replace or Reset to Default features (see Sections "Set All Values To Current Field Value   (Global Replace)" and "Reset to Default").

4.6 Set All Values To Current Field Value (Global Replace)

This feature enables you to change a parameter (e.g. line type) on all lines at the same time. It can be used in the Virtual Circuits and Line Settings forms.

- Select a line and make the required change (e.g. change line speed from 9600 baud to 38400 baud).

- Keeping the cursor in the modified field, press <return> to display the Quit menu:

```
          Quit Form
Save And Exit Form
Exit Form Without Saving Changes
Set All Values To Current Field Value
Reset To Default
```

- Select 'Set All Values To Current Field Value'. The change will be made to all lines.

4.7 Reset to Default

reset line   This feature enables you to reset all JETSTREAM lines to the default settings. It can be used in the Virtual Circuits and Line Settings forms. In the Virtual Circuits form, the line type will be set to 'normal', the TCP Port to '23' and the hostname to the first host entered in the host table. In the line settings form, all lines will be set to 9600 baud, 8 data bits, 1 stop bit, no parity and software flow control.

• Press <return> to display the Quit menu:

```
                 Quit Form
Save And Exit Form
Exit Form Without Saving Changes
Set All Values To Current Field Value
Reset To Default
```

• Select 'Reset To Default'. You will be asked to confirm the reset:

```
Reset All Lines (y/n)
```

• Type 'y' to reset all the lines.

Chapter 5

Administration of Users

5.1   Introduction

Before a user can log into the JETSTREAM, he/she must have a login account. JETSTREAM login accounts are password-protected and assigned a user level which determines the level of access the user has to JETSTREAM commands. A maximum of 48 user accounts can be created.

NOTE: Only users that log into the JETSTREAM (normal connections), or have the option to direct telnet/rlogin, require JETSTREAM login accounts.

5.2   Chapter Contents

This chapter is divided into the following sections:

5.3   User Levels

There are three user levels which can be used to determine the level of access the user has to JETSTREAM commands:

- **Admin** - The system administrator. The admin user has total access to the server. You can create more than one admin user account but it is recommended that you only have one.

- **Normal (default)** - Normal users have access to the Sessions menu only. They can start sessions, predefine sessions and change their own user environment.

- **Restricted** - These users have access to a restricted Sessions menu; they can only open sessions predefined for them by the admin user. Predefined sessions can even be configured to start automatically at login.

5.4   Add a User Account

add user

Select 'Add User' from the Users menu.

Enter a username, not exceeding eight characters, and press <return>. Use the <del> key to backspace if necessary.

Enter a password, again not exceeding eight characters, and press <return>.

Re-enter the password and press <return>.

Admin users can change user passwords using the 'Set Password' feature described in "Change a User's Password". Normal users can change their own passwords using the 'Set Up User' feature described in Section 9.4 Changing your Password.

5.5   Configure a User Account

set user

Select 'Change User' from the Users menu. The details of all current server users will be displayed:

```
          Users
Username   Language     Screen Switch Char   Type
admin      [english]         [1 ]            [admin ]
graham     [english]         [1 ]            [normal ]
jeremy     [english]         [1 ]            [restricted ]
```

When you have a large number of users on the system, this form may take several seconds to display.

- **Language** - currently this can only be set to 'english'.

- **Screen switch character** - this is the 'hot-key' command used, in conjunction with other keys, for switching between sessions. This may need to be changed if it clashes with an application a user is going to run in one of their sessions. It must be entered in hex format; the default is '1' (^A). Refer to the ascii code chart in Section F.2 ASCII to Decimal and Hex Code Chart. Normal users can change their own screen switch character using the 'Set Up User' option on the Sessions menu.

- **Type** - this field cycles through 'admin', 'normal' and 'restricted'. These are described in "User Levels" section. You cannot change the user type of the default admin user account.

If you set up any restricted users, you must predefine their sessions; they can only open sessions predefined for them by the admin user (see "Predefine User Sessions" section).

5.6 Predefine User Sessions

set user   This option enables you to predefine up to four sessions for any user. You must predefine at least one session for each restricted user because they can only open predefined sessions.

Select 'Set Sessions' from the Users menu. Select a user from the list displayed and press <return>. The Sessions form will be displayed:

```
                      Set Sessions
Session  1              2              3              4
Type     [off    ]      [off    ]      [off    ]      [off    ]
Hostname [socrates ]    [socrates ]    [socrates ]    [socrates ]
Termtype [ ]            [ ]            [ ]            [ ]
Auto     [off ]         [off ]         [off ]         [off ]
Echo     [off ]         [off ]         [off ]         [off ]
Mapnl    [off ]         [off ]         [off ]         [off ]
Mode     [off ]         [off ]         [off ]         [off ]
Intr     [7f ]          [7f ]          [7f ]          [7f ]
Quit     [1c ]          [1c ]          [1c ]          [1c ]
EOF      [4  ]          [4  ]          [4  ]          [4  ]
Erase    [8  ]          [8  ]          [8  ]          [8  ]
```

These are the default settings. The fields after 'Auto' are telnet options.

- **Type** - 'off', 'telnet' or 'rlogin'. When not set to 'off', a predefined session will use up one of the user's 4 session slots whether active or not.

- **Hostname** - you can only predefine sessions on hosts defined in the host table. The first entry in the host table will be entered as the default.

- **Termtype** - when connecting to a UNIX host, you must define your terminal type in accordance with its UNIX TERM variable.

- **Auto** - If this field is set to 'on', the session will start up auto- matically when the user logs on. When more than one session is set to auto-start, session 1 will be displayed first. If this field is set to 'off', the session must be started using the 'Start Predefined Sessions' option on the Sessions menu.

5.7   Change a User's Password

set user   Select 'Set Password' from the Users menu.

Select a user from the list displayed.

You will be prompted to enter a password. This can be up to eight characters long. Use the <del> key to backspace if necessary. Enter the password and press <return>.

When prompted, re-enter the password and press <return>.

The password change will take effect next time the user logs in.

5.8   Delete a User Account

delete user   You will be unable to delete the default admin user, users that are logged in or users dedicated to a specific line.

Select 'Delete User' from the Users menu.

Select the user that you want to delete from the list displayed.

You will be asked to confirm the deletion; type 'y' and press <return>.
The user will be deleted.

5.9   Becoming Admin User

normal
Command: admin

This menu option enables you to become an admin user, if you know the admin password. Prior tothis action you must be a 'normal user' (the default); select 'Become Admin User' from the Sessions menu. You will be asked to enter the admin user password

```
Enter Passwords:
```

You will then be logged in as the admin user. The full main menu will be displayed. It should be noted that you can't return to being a normal user unless you log out and log back in again.

C h a p t e r   6

Network Configuration

6.1   Introduction

Through the options of the Network Configuration menu, you can tell the JETSTREAM how the rest of your network is configured. This chapter describes how to define the other TCP/IP hosts, the nameservers and the gateways in your network.

This chapter contains the following sections:

6.2   Host Table

Into the host table, you should add the hostnames and internet addresses of all the other TCP/IP hosts in your network. You can add up to twenty hosts to the host table. The host table acts as the source of available hosts for other menu options (like Add Gateway, Add Name Server, etc.).

Select 'Host Table' from the Network Configuration menu; the Host Table menu will be displayed:

```
     Host Table
Add Host
Change Host
Delete Host
```

6.3   Add Host

add host

This option enables you to add the *hostname* of a host to the host table. You will be asked to enter the host name:

```
Enter Host Name:
```

Type in the name of the host (14 characters maximum) and press <return>. Use the <del> key to backspace if necessary. The host's internet address should be added using the 'Change Host' option.

6.4   Change Host

set host,
show host

This option enables you to add or change a host's internet address. Select 'Change Host' from the Host Table menu; the Hosts form will be displayed:

```
              Hosts
Hostname     Internet Address
socrates     [192.49.144.4     ]
aristotle    [0.0.0.1                ]
plato        [0.0.0.1                ]
sophocles    [0.0.0.1                ]
homer        [0.0.0.1                ]
pythagoras   [0.0.0.1                ]
```

This form will list all hosts added to the host table. The default internet address is 0.0.0.1. Enter the correct internet address of each host. Use the <del> key to backspace if necessary.

6.5 Delete Host

delete host   This option enables you to delete an entry from the host table. If a host is referenced by a predefined session, or is defined as a gateway, name server or boot host, you won't be allowed to delete it. When you select 'Delete Host', the host table will be displayed:

```
        Hosts
     socrates
     aristotle
     plato
     sophocles
     homer
     pythagoras
```

Select the host that you want to delete and press <return>. You will be asked to confirm the deletion:

```
Confirm Delete Host 'socrates' (y/n)
```

Type 'y' to delete the host, 'n' to cancel the command.

6.6 Name Servers

A name server functions as a database of hostnames and corresponding internet addresses. It will contain the details of all the hosts in your local network and possibly other regularly used hosts beyond. If the JETSTREAM can't resolve a hostname it will consult the name server. This enables you to access hosts not defined in the JETSTREAM host table.

NOTE: You can only do this from the command line or by using silent telnet/ rlogin connections. Using Full Screen mode you are forced to select a host from the host table.

Select 'Name Servers' from the Network Configuration menu; the Name Servers menu will be displayed:

```
     Name Servers
Add Name Server
Change Name Server
Delete Name Server
```

6.7   Add Name Server

add nameserver This option enables you to define the nameservers in your network. You can define up to two name servers. Select 'Add Name Server' and the host table will be displayed:

```
      Hosts
   socrates
   aristotle
   plato
   sophocles
   homer
   pythagoras
```

Select a host. Now refer to 'Change Name Server'.

6.8   Change Name Server

set nameserver The name service, like other software facilities, is accessed by other 'client' hosts using a TCP port number. For each name server you have defined, you must define the TCP port number running the name service.

Select 'Change Name Server' and the Name Servers form will be displayed:

```
       Name Servers
Name     Server        socrates
TCP Port              [53        ]
```

If you have defined two name servers, the second will be listed under the first. Enter the required TCP port number (the default is 53). Use the <del> key to backspace if necessary.

6.9   Delete Name Server

delete nameserver If your name service is moved to a different host, or removed permanently from a host, you can use this option to remove the unwanted host from the list of name servers. The host will NOT be deleted from the host table. Select 'Delete Name Server' to list your name servers:

```
      Delete Name Servers
socrates
plato
```

Select the name server that you want to delete. You will be asked to confirm the deletion:

```
Confirm Delete Name Server  'socrates' (y/n)
```

Type 'y' to delete the nameserver, 'n' to cancel the command.

6.10 Gateways

Gateways are hosts that connect Local Area Networks (LANs) together. If you want to access a host which isn't on your local network you will be connected via a gateway. Gateways route data via other gateways until the destination local network is reached. The JETSTREAM will recognise up to eight gateways. There are three types:

- **Default** - this is a gateway which provides general access beyond your local network.

- **Host** - this a gateway reserved for accessing a specific host external to your local network.

- **Network** - this is a gateway reserved for accessing a specific network external to your local network.

Particularly useful when checking routes to/from gateways is the *show route* command; see Section 11.51 show route.

6.10.1 Active and Static Gateways

The JETSTREAM supports both active and static gateways. The default is active. Definitions of these types are as follows:

Active gateway: a gateway which is temporarily listed in the JETSTREAM's routing table (while RIP packets are received). If the JETSTREAM detects that the gateway is no longer operating (no RIP packets received) it will be deleted from the routing table.

Static gateway: a gateway which is permanently listed in the JETSTREAM's routing table. It is thus always available.

6.10.2 How to Configure a Gateway

Select 'Gateway' from the Network Configuration menu; the Gateway menu will be displayed:

```
     Gateway
Add Gateway
Change Gateway
Delete Gateway
```

You can also type 'add gateway' at the command line prompt.

Note   *You can configure a single static gateway using BOOTP. See Section 8.5 BOOTP.*

6.11 Add Gateway

add gateway   This option enables you to define the gateways in your network. Hosts can only be defined as a gateway once. Select 'Add Gateway' and the host table will be displayed:

```
     Hosts
  socrates
  aristotle
  plato
  sophocles
  homer
  pythagoras
```

Select a host. Now define the gateway type using the 'Change Gateway' option (see below).

6.12 Change Gateway

set gateway
show gateways

When you have added a gateway, you must define its type. Select 'Change Gateway' and the Gateways form will be displayed (for example):

```
                        Gateways
Hostname    Type        Internet Address    Static
socrates    [host]     [ ]                  [no]
```

This form lists all gateways defined for your network. In this example, only one has been defined.

In the Type field, use the spacebar to cycle through 'host', 'network' and 'default'. If you set the field to 'host' or 'network', you must include the internet address of the target host or network. If you change a gateway from 'host' or 'network' to 'default', the internet address will be ignored.

In the 'Static' field, use the spacebar to toggle between 'yes' for a static gateway, and 'no' for an active gateway.

Use the <del> key to backspace if necessary.

6.13 Delete Gateway

delete gateway

If a host on your network is retired from gateway duty, you can use this option to delete it from the list of gateways. Note that the host will NOT be deleted from the host table. Select 'Delete Gateway' to list your gateways:

```
     Delete Gateway
socrates
plato
```

Select the gateway that you want to delete. You will be asked to confirm the deletion:

```
Confirm Delete Gateway 'plato' (y/n)
```

Type 'y' to delete the gateway, 'n' to cancel the command.

C h a p t e r 7

Advanced Configuration

7.1 Introduction

This chapter describes more advanced uses of the JETSTREAM. It is divided into the following sections:

7.2   Overview of Line Types

Setting up login connections on JETSTREAM ports has already been described in Section 4.4 Setting Up Direct/Silent Login Connections. The JETSTREAM, however, provides much greater scope for connections into and out from your network. This section gives an overview of the line types provided and their practical uses.

- **Printer** - this line type enables remote file copy, using RCP, from TCP/IP hosts to printers connected to the JETSTREAM.

- **Silent/Direct Raw** - these line types enable external machines to establish connections on TCP/IP hosts via JETSTREAM ports. The JETSTREAM is effectively transparent. Silent connections are established automatically and are more suitable for computer to computer communication. A typical use is for dialin connections. Direct connections are established by pressing <return> and are recommended for user applications. This prevents TCP resources being used while the connection is not in use. On the console port (port 8) pressing <esc> instead of <return> enables the user to obtain a JETSTREAM login.

- **Reverse Raw** - this line type enables TCP/IP hosts to establish connections on external machines via JETSTREAM ports. The JETSTREAM is effectively transparent. Reverse raw connections are typically used to access printers or dialout modems in conjunction with host-based print/modem handling software.

- **Reverse Telnet** - this line type enables TCP/IP hosts to establish login connections on external machines via JETSTREAM ports. The JETSTREAM is effectively transparent. Reverse telnet connections could be used for access to machines like protocol converters and statistical multiplexors or for access to Wide Area Networks (WANs).

- **Bidir** - this line type allows a bidirectional modem connection to be set up on an JETSTREAM port. This enables the modem to be used for dialin and dialout purposes simultaneously.

Note   *An overview of all line types (including those discussed in other chapters in this manual) is provided in Section A.5 Summary of Line types.*

7.3   Remote Printing Using RCP

set line   Printers connected to JETSTREAM ports can be accessed by other TCP/IP hosts
                         in the network using the RCP protocol. These connections are set up using the
                         printer line type.

                         Select 'Virtual Circuits' from the Line Configuration menu. Set the Type field to
                         'printer'. Look at the example line below:

```
Line   Hostname  Type         Host Port  MTS Port
[1]    [ ]       [printer ]   [ ]        [ ]
```

                         The Hostname, Host Port and MTS Port fields may contain default or last-used
                         values, but these will be ignored by JETSTREAM.

Note   *To configure the console port (port 8) as silent or printer line type, you must telnet into
                the JETSTREAM. This is a precaution to ensure you can always access to configure the
                JETSTREAM, irrespective of line type setting on port 8.*

                         There are two ways to direct output to the printer: you can either modify the
                         printer interface script(s) to direct output across the network using RCP rather
                         than to a local printer, or you can issue the rcp command from the command line.

                         On typical UNIX V.3.2 systems, the print spooler provides a set of back-end shell
                         scripts for talking to printers. An example of how you might modify one of these
                         scripts for remote printing is given below.

                         These scripts are usually found in the /usr/spool/lp directory tree. If you want to
                         use all printer ports as a hunt group, specify *servername*: instead of
                         servername:mts_p*n*. The JETSTREAM will output the job to the first free printer
                         port it comes across.

```
while [   "$copies" -gt 0 ]
do
        for file
        do
                while true
                do
                rcp $file servername:mts_pn
                if [ $? = 0  ]
                then
                break
                fi
                done
        done
        copies='expr $copies -1'
done
```

To execute an *rcp* job from the command line, use the following command:

```
    rcp filename servername:mts_pn
```

Where:

servername is the hostname assigned to the JETSTREAM unit.

n is the port that the printer is connected to.

If the port is busy, or not set up as a printer port, the job will fail.

Multiple 'printer' connections will act as a hunt group, providing the same type of printer is connected to each. To direct output to the hunt group, you don't need to specify a port number:

```
    rcp filename servername:
```

JETSTREAM will output the file to the first free printer port it finds.

7.4 Remote Printing Using Host-Based Print Handling Software

set line

Printers connected to JETSTREAM ports can be accessed by TCP/IP hosts using print handling software. This type of connection uses the **reverse raw** line type. The print handling software needs to know the name of the JETSTREAM unit and the TCP Port number assigned to the printer port. The same TCP Port can be assigned to a number of ports to form a hunt group.

To setup a reverse raw printing connection, follow these steps:

1. Select 'Virtual Circuits' from the Line Configuration menu and select the line that you want to configure.

2. Set the Type field to 'rev raw'.

3. Enter a TCP port number in the MTS Port field. If you select a TCP port being used by another process, a connection will not be made (using a number in the range 900-1023 should work).

4. To set up a hunt group, assign the same TCP port number to each printer line. The JETSTREAM will use the first free line in the group. You can set up a maximum of eight hunt groups.

    The line should now be configured similar to the following:

    ```
    Line   Hostname   Type         Host Port   MTS Port
    [1]    [ ]        [rev raw ]   [ ]         [1000 ]
    ```

    The Hostname and Host Port fields may contain default or last-used values, but these will be ignored. Save the changes.

5. On each TCP/IP host wanting to access the printer, set up a process to talk to the TCP port assigned to the JETSTREAM port. You can either write a program to do this, or you can use the MTSD print handling service described in the section Section 7.8 Modem and Printer Handling Using MTSD.

7.5   Dialin Modem Connections

set line

A dialin connection involves an external host connected to a JETSTREAM port trying to establish a connection with a TCP/IP host. In effect, the JETSTREAM is trying to establish the connection. This type of connection uses the **silent raw** line type. The JETSTREAM needs to know the name of the target TCP/IP host and the TCP Port number assigned, on the host, to listen for the dialin connection.

NOTE: The JETSTREAM performs no modem configuration or initialisation. You must do this BEFORE connecting a modem to the JETSTREAM. Modems must be set to AUTO-ANSWER mode.

To set up a dialin connection, follow these steps:

1.   On the target TCP/IP host, assign a TCP port to listen for the dialin process.

2.   On the JETSTREAM, select 'Virtual Circuits' from the Line Configuration menu and select the line that you want to configure.

3.   Set the line type to 'sil raw'.

4.   Enter the name of the target TCP/IP host in the Hostname field.

5.   Enter the allocated TCP port number in the Host Port field.

6.   The line should now be configured similar to the following:

```
Line   Hostname      Type          Host Port MTS Port
[1]    [socrates ]   [sil raw ]    [1000]    [ ]
```

The MTS Port field may contain a last-used value, but this will be ignored by the JETSTREAM. Save the changes.

Note   *To configure the console port (port 8) as silent or printer line type, you must telnet into the JETSTREAM. This is a precaution to ensure you can always access to configure the JETSTREAM, irrespective of line type setting on port 8.*

7.   Select Line Settings from the Line Configuration menu. For each dialin line, set the 'Modem' field to on. Configure the line settings as required.

8.   On the TCP/IP host, set up a process to receive data on the Host TCP port. You can either write a program to do this, or you can use the MTSD modem handling service described in the section "Section 7.8 Modem and Printer Handling Using MTSD".

7.6   **Dialout Modem Connections**

set line   Modems connected to JETSTREAM ports can be accessed for dialout purposes
                      by TCP/IP hosts using modem handling software. This type of connection uses
                      the **reverse raw** line type. The modem handling software needs to know the name
                      of the JETSTREAM unit and the TCP Port number assigned to the modem port.
                      The same TCP Port can be assigned to a number of ports to form a hunt group.

                      **NOTE: The JETSTREAM performs no modem configuration or initialisation.
                      You must do this BEFORE connecting a modem to the JETSTREAM. Modems
                      must be set to AUTO-ANSWER mode.**

                      To set up a dialout connection, follow these steps:

                      1.   Select 'Virtual Circuits' from the Line Configuration menu and select the line that
                           you want to configure.

                      2.   Set the Type field to 'rev raw'.

                      3.   Enter a TCP port number to the MTS Port field. If you select a TCP port being
                           used by another process, a connection will not be established (using a number in
                           the range 900-1023 should work).

                      4.   To set up a hunt group, assign the same TCP port number to each dialout line. The
                           JETSTREAM will use the first free line in the group.

                      5.   The line should now be configured similar to the following:

```
 Line   Hostname      Type        Host Port MTS Port
 [1]    [ ]           [rev raw ] []         [ 1000]
```

                           The Hostname and Host TCP Port fields may contain default or previous
                           values, but these will be ignored. Save the changes.

                      6.   On each TCP/IP host that wants to access the modem(s), set up a process to talk to
                           the JETSTREAM TCP port. You can either write a program to do this, or you can
                           use the MTSD modem handling service described in the section "Section 7.8
                           Modem and Printer Handling Using MTSD".

7.7   bidirectional Modem Connections

set line

You can set up bidirectional modem connections on an JETSTREAM port using the **bidir** line type. This enables a modem connected to an JETSTREAM port to be used for dialin and dialout purposes simultaneously. To set up a bidirectional modem connection, follow these steps:

1. On the network host targeted by the dialin connection, assign a TCP port to listen for the connection.

2. On the JETSTREAM, select Virtual Circuits from the Line Configuration menu and select the line you want to configure.

3. Set the line type to **bidir**.

4. To enable the dialout process, a TCP port number must be added to the 'MTS Port' field. If you select a TCP port being used by another process, a connection will not be established (using a number in the range 900-1023 should be safe).

5. To set up a hunt group, specify the same TCP port number in the 'MTS Port' field of each bimodem line. The JETSTREAM will use the first free line in the group. You can create up to eight hunt groups.

6. For the dialin process, specify the TCP port assigned on the target host in the 'Host Port' field.

7. Enter the name of the target host in the 'Hostname' field.

8. The line should now be configured similar to the following:

```
 Line   Hostname    Type       Host Port    MTS Port
 [1]    [plato ]    [bidir ]   [2000]       [ 900]
```
   Save the changes.

9. Select Line Settings from the Line Configuration menu. For each dialin line, set the 'Modem' field to **on**. Configure the line settings as required.

10. On the TCP/IP host targeted by the dialin connection, you must set up a process to receive data on the chosen TCP port. You can write your own program to do this or you can use the MTSD modem handling service described in the section Section 7.8 Modem and Printer Handling Using MTSD.

11. On each TCP/IP host which wants to use the dialout facility, set up a process to talk to the JETSTREAM TCP port. You can either write a program to do this, or you can use MTSD.

7.8   Modem and Printer Handling Using MTSD

MTSD is a host-based modem/print handling utility which enables applications, like kermit, uucp and lp, to use JETSTREAM ports as local device nodes. It links pseudo devices to JETSTREAM ports via a 'link file' on the host machine. MTSD can be used to provide the following services:

- Dialin modem handler

- Dialout modem handler

- bidirectional modem link

- Printer server

These modes can be invoked from the command line or set up to start automatically at boot (by editing UNIX start-up files). Thereafter the user can read/write to the link file created by the process.

MTSD can be installed on any TCP/IP host running SCO UNIX/ XENIX, INTERACTIVE UNIX, UNIX SVR4, IBM AIX RS/6000 or RISCOS.

7.8.1   Installing MTSD

You will find MTSD on the Supplemental disk supplied with the JETSTREAM. To install MTSD, follow these steps:

1.   Tar the contents of the diskette onto the TCP/IP host.

2.   The diskette contains an executable for each supported operating systems. They are called mtsd.sco, mtsd.xen, mtsd.isc, mtsd.svr4, mtsd.rs6000 and mtsd.riscos. Copy the appropriate executable file to the hard disk (into /usr/bin, for example).

3.   If, for any reason, you need to compile the makefile yourself, use the appropriate make command from the list below:

```
Make sco

make xen

make isc

make svr4

make rs6000

make riscos
```

MTSD is now installed. The modes of operation and the commands used to invoke them are described below. All MTSD commands can be abbreviated to the shortest

unambiguous form. A comprehensive menu-driven help utility can be accessed by typing **mtsd -help** in the directory in which MTSD is resident. The help utility provides information on each mode of operation and each command option. MTSD outputs a software version number when run.

The MTSD source code is provided on the JETSTREAM supplementary diskette. Use the code to compile MTSD on other operating systems.

Note　　*Any changes to the source code are not supported by Specialix.*

7.8.2 Start a Dialin Modem Handling Process

On dialin connections, MTSD will now, by default, start a login process on a pseudo tty directly (rather than set up a getty to spawn a login process on the linkfile).

Instead of reopening the same pseudo tty, MTSD selects the next available device in the list p01->pff->q01->qff->r01->rff->p01.

To set up a process to receive data on the TCP port assigned to the dialin connection, use the following command:

```
mtsd -dialin -hostport<tcpportno>
```

Where:

　　<tcpportno> is the TCP port to accept connection on the host.

The section "Section 7.5 Dialin Modem Connections" describes how to set up a dialin connection on a JETSTREAM port.

Invoking a non-login process

On dialin connections, MTSD by default invokes /bin/login with 'sane' tty settings. There are a set of options which enable you to invoke a non-login process.

These are as follows:

　-path <pathname>

　　pathname of required process (e.g. /bin/cat).

　-prog <program_name>

name of program (e.g. cat).

-parg1...9 <argument>

enable you to specify a maximum of 9 arguments.

-termfile <filename>

the name of the file containing the termio settings (in stty -g format) to be used by the pseudo tty instead of the default 'sane' settings. After completion of the invoked process, the 'sane' tty settings will be resumed.

-nologin

defines the process as a USER_PROCESS for the purpose of updating /etc/utmp and wtmp files correctly.

> *An example is given below:*

```
mtsd -dialin -hostport <tcpportno> -path /bin/cat -
prog cat -parg1<filename>-nologin
```

-ttyname option on dialin connections

On dialin connections, the **-ttyname** option will enable you to allocate a specific name to the selected pseudo tty. This name will then be displayed, instead of the ptty device name, when commands such as ps, tty and who are issued. When the connection is established, the pseudo tty will be removed from the /dev directory and replaced by the specified ttyname. This will be recorded in the file /etc/mtsd/ttyname enabling MTSD to recover the pseudo tty should the system crash.

Note   *You may have to create the /etc/mtsd/ directory.*

-nolinger option on dialin connections

There is a mechanism which prevents a network connection being closed before all data has been received and acknowledged by the other end. It is called the SO_LINGER mechanism

The **-nolinger** option enables you to disable the SO_LINGER mechanism. If you are experiencing problems with the SO_LINGER mechanism, try using the **-drain** option to extend the timeout before resorting to the **-nolinger** option.

Dialin under Unix SVR4

On dialin connections under SVR4, the line discipline module is added by default. The relevant option is -noldterm.

7.8.3   Start a Dialout Modem Handling Process

MTSD can be used to set up a dialout process to read/write from a named link file and connect to the TCP port assigned to the JETSTREAM port. To set up a dialout process, use the following command:

```
mtsd -dialout/-printer -mtsname <hostname>
-mtsport <tcpportno> -linkfile <filename>
```

Where:

> *tcpportno* is the TCP port number assigned to the JETSTREAM port. If this TCP port is assigned to a hunt group, MTSD will use the first free port in the group.

> *filename* is the name you want to assign to the file linked to the pseudo tty being used for the process.

> *hostname* is the hostname or internet address of the JETSTREAM unit.

The section "Section 7.6 Dialout Modem Connections" describes how to set up dialout connections on JETSTREAM ports.

For dialout connections, a **-noclose** option is provided which will hold the pseudo tty open after the network connection has closed, thus avoiding any connection closing issues. The **-inactivity** option enables you to set a period in minutes after which the pseudo tty should be closed regardless.

7.8.4   Start a bidirectional Modem Handling Process

MTSD can be used to set up a dialin process to receive data on the host TCP port number and read/write to a named link file, then start a dialout process to read from the link file and connect to the JETSTREAM TCP port.

Note that the linkfile will be unlinked during dialin operation to prevent a dialout process being started. The link will be restored as soon as the dialin process has completed.

To start this process, enter the following command:

```
mtsd -both -mtsport <tcpportnoA> -hostport <tcpportnoB> -
link <filename> -mtsname <hostname>
```

Where:

> *tcpportnoA* is the TCP port assigned to the JETSTREAM port. If the TCP
> port is used by a hunt group, MTSD will use the first free port it finds.

> *tcpportnoB* is the TCP port number assigned on the TCP/IP host for the
> dialin connection.

> *filename* is a name you want to assign to the link file.

> *hostname* is the hostname or internet address of the JETSTREAM unit.

The section "Section 7.7 bidirectional Modem Connections" describes how to set
up a bidirectional connection.

**NOTE: When running uugetty using the MTSD bidirectional facility, you must
set it up so that it doesn't send the 'login:' prompt until the connection has been
established. If you are running SCO UNIX & XENIX, this is performed by
MTSD.**

7.8.5 Start a Print Handling Process

MTSD can be used to start a print handling process to read/write from a named
link file and connect to the TCP port assigned to the printer port. To start this
process, enter the following command:

```
mtsd -print -mtsname <hostname> -mtsport <tcpportno>
[- newline] -linkfile <filename>
```

Where:

> *hostname* is the hostname or internet address of the JETSTREAM unit.

> *tcpportno* is the TCP port assigned to the JETSTREAM port that the
> printer is attached to. If this TCP port number is assigned to a hunt group,
> the first free port in the group will be used.

> *newline* is an optional argument which will perform newline to carriage
> return newline mapping.

> *filename* is a name you want to assign to the link file. You must configure
> your UNIX printer to use this file as the print device.

The section "Section 7.4 Remote Printing Using Host-Based Print Handling
Software" describes how to set up a remote printing connection.

7.8.6 List of MTSD command options

Table 1   A full list of MTSD command options is:

MTSD Command Option	Function
-both|bidirectional	Select bidirectional operation
-debug	If you include this argument, brief debug information will be displayed.
-dialin|in	select dial-in operation
-dialout|out	select dial-out operation
-drain *n*	This option enables you to specify the number of seconds before a connection is closed down. The default is 5 seconds. If you find that files or print jobs are being truncated, increase this value.
-hostport <tcpportno>	TCP port to accept connection on host
-inactivity	inactivity before connection is closed
-linkfile|file	select linkfile name
-mtsname|host <hostname>	select JETSTREAM unit to connect to
-mtsport <tcpportno>	TCP port assigned to hunt group on JETSTREAM
-newline|mapping	Enable NL to CRNL mapping on output
-noclose	keep network connection open
-noldterm| nolinedisc	Do not push on 'ldterm/linedisc'
-nolinger	Do not invoke SO_LINGER
-nologin	invoke a program other than a login

-opens n	This argument enables you to specify the number of times (after a one-second interval) that MTSD attempts to open the master pseudo tty. By default, MTSD makes 10 attempts. You will need to increase this value if the following error message is displayed:
	
	`MTSD: re-open of master ptty`
	`failed.`

-pargx <argument>	arguments; x is in the range 1-9
-path <program_path>	program's path
-print	select print operation to JETSTREAM
-prog <program_name>	program to be invoked

-reconnects n	This option enables you to specify the number of times (after a two second interval) that MTSD will try to establish a connection with the JETSTREAM. The default is 50. You will need to increase this value if you see the following message:
	
	`MTSD: reconnection tries`
	`exhausted - aborting.`

-retry *n*	This option enables you to specify the number of times (after a one-second interval) that MTSD attempts to read the master pseudo tty before deciding that no process is active. By default, MTSD makes 5 attempts. You will need to increase this value if you find that connections are being closed whilst still active. If you find that connections are being reopened too quickly, set retry to 0.
-termfile	termio settings file to use
-ttyname	specify a fixed tty name
-verbose	Include this argument if you want to receive full debug information.

7.9   Reverse Telnet Connection

set line   A reverse telnet connection enables a TCP/IP host to establish a login connection on a machine external to the network via an JETSTREAM port (see Figure 10). The JETSTREAM will effectively be transparent.

Figure 10   A Typical Reverse Telnet Configuration
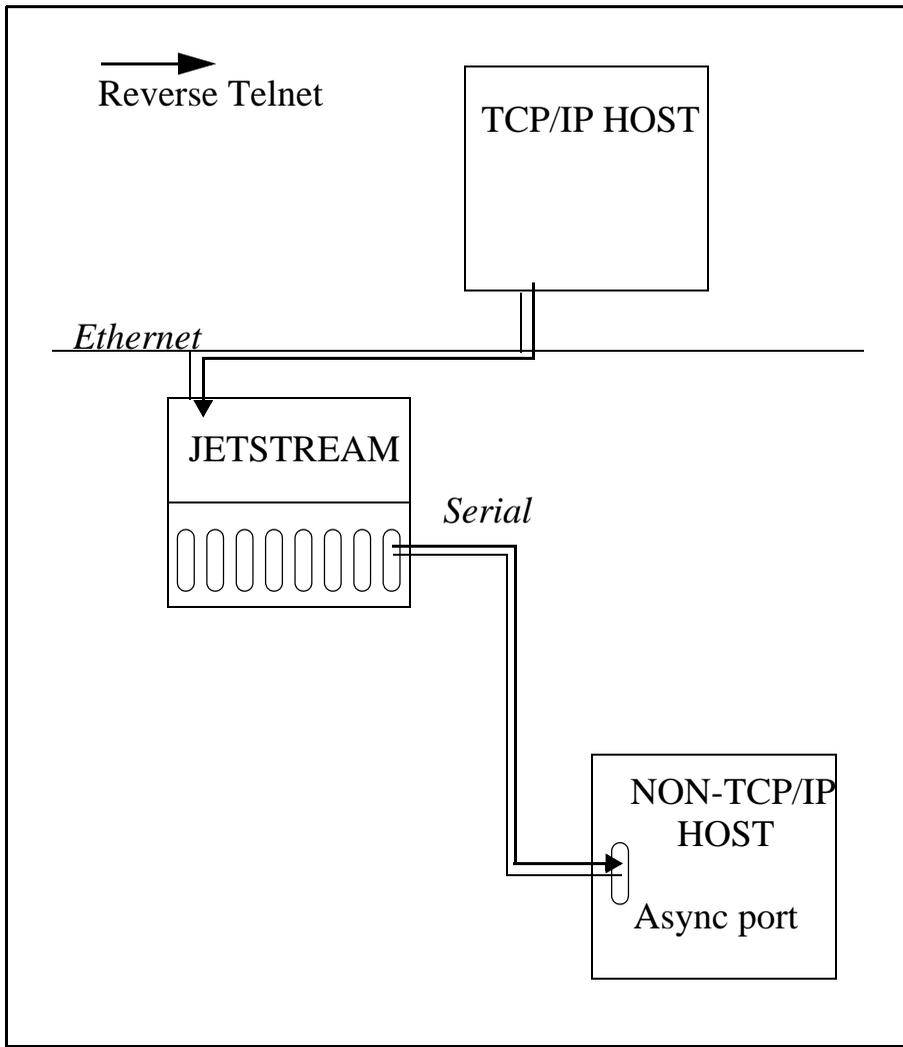
To set up a reverse telnet connection, follow these steps:

1. Select Virtual Circuits from the Line Configuration menu then select the line that you want to configure.

2. Set the 'Type' field to rev tel.

3. Assign a TCP port number to the JETSTREAM port using the 'MTS Port' field. This TCP port number will be used by any host wanting to access the JETSTREAM port. If you select a TCP port being used by another process, a connection will not be established (using a number in the range 900-1023 should be safe).

4. To set up a hunt group, assign the same TCP port number to more than one reverse telnet port. The JETSTREAM will use the first free port it finds in the group.

5. The line should now be configured similar to the following:

```
 Line   Hostname      Type          Host Port MTS Port
 [1]    [ ]           [rev tel]     [ ]         [ 900]
```

   The 'Hostname' and 'Host Port' fields may contain default or last-used values, but these will be ignored. Save the changes.

6. On the non-TCP/IP machine, configure the line for the required purpose (e.g. login).

7. To access the external machine from a TCP/IP host, use the following command:

```
 telnet servername mts_port
```

   Where:

   servername is the hostname of the JETSTREAM unit.

   mts_port is the TCP port number assigned to the JETSTREAM port.

7.10 Set Security

set security on/off The remote access features of the JETSTREAM (remote configuration, reverse and printer line types) enable access to the unit from other hosts. To help prevent unauthorised access, the JETSTREAM includes a security feature which enables you to restrict incoming connections to those hosts 'known' to the JETSTREAM, i.e. those hosts defined in the host table. This feature is enabled/disabled using the 'Security' option on the Network Configuration menu.

7.11 Simple Network Management Protocol

The Simple Network Management Protocol (SNMP) is a protocol for access and control of network management information on TCP/IP networks. JETSTREAM provides an SNMP agent, able to respond to SNMP requests generated by SNMP Managers. The JETSTREAM implementation of SNMP is compatible with MIB II (RFC 1213) as specified by the SNMP SMI document (RFC1155). For a full description of SNMP, refer to your SNMP documentation.

Enterprise-specific parameters are defined by the Specialix Private MIB. Table 2 below gives a summary of the objects defined by the Specialix MIB. For full details, refer to Appendix E (Specialix Private MIB Definitions).

7.11.1 Implementing JETSTREAM SNMP Support

A separate copy of the JETSTREAM software, containing SNMP support, is supplied on diskette. Download this version to the JETSTREAM using the net rebooting process. See Section 8.2 Net Rebooting.

The JETSTREAM SNMP Agent will only provide information to hosts defined by an SNMP community. You can create up to four communities using the CLI command **add community**; you can remove communities using the command **delete community**.

SNMP Trap messages generated by the JETSTREAM will only be broadcast to hosts defined by SNMP Trap communities. You can create up to four trap communities using the CLI command **add trap**; you can remove trap communities using the command **delete trap**.

NOTE: The JETSTREAM generates no enterprise-specific traps.

You can configure the SNMP sysContact and sysLocation objects using the CLI commands **set contact** *contact_name* and **set location** *location*.

These commands are described in full detail in Chapter 11 (The CLI commands).

Table 2
Summary of
Objects Defined
in the Specialix
Private MIB

OBJECT NAME	ADDRESS	TYPE	PERMISSIONS
ServerInfo	1.3.6.1.4.1.667.1.1	Aggregate	not-accessible
freeSpace	1.3.6.1.4.1.667.1.1.1	Guage	read-only
swVersion	1.3.6.1.4.1.667.1.1.2	DisplayString	read-only
serverName	1.3.6.1.4.1.667.1.1.3	DisplayString	read-only
domaiName	1.3.6.1.4.1.667.1.1.4	DisplayString	read-only
portsInfo	1.3.6.1.4.1.667.1.2	Aggregate	not-accessible
portsNumber	1.3.6.1.4.1.667.1.2.1	INTEGER	read-only
portsInfoTable	1.3.6.1.4.1.667.1.2.2	Aggregate	not-accessible
portsInfoEntry	1.3.6.1.4.1.667.1.2.2.1	Aggregate	not-accessible
portId	1.3.6.1.4.1.667.1.2.2.1.1	INTEGER	read-only
terminalType	1.3.6.1.4.1.667.1.2.2.1.2	INTEGER	read-write
baudRate	1.3.6.1.4.1.667.1.2.2.1.3	INTEGER	read-write
dataBits	1.3.6.1.4.1.667.1.2.2.1.4	INTEGER	read-write
parity	1.3.6.1.4.1.667.1.2.2.1.5	INTEGER	read-write
stopBits	1.3.6.1.4.1.667.1.2.2.1.6	INTEGER	read-write
pages	1.3.6.1.4.1.667.1.2.2.1.7	INTEGER	read-write
defaultUser	1.3.6.1.4.1.667.1.2.2.1.8	INTEGER	read-write
validUser	1.3.6.1.4.1.667.1.2.2.1.9	INTEGER	read-write
modem	1.3.6.1.4.1.667.1.2.2.1.10	INTEGER	read-write
flowControl	1.3.6.1.4.1.667.1.2.2.1.11	INTEGER	read-write
lineType	1.3.6.1.4.1.667.1.2.2.1.12	INTEGER	read-write
hostPort	1.3.6.1.4.1.667.1.2.2.1.13	INTEGER	read-write
mtsPort	1.3.6.1.4.1.667.1.2.2.1.14	INTEGER	read-write
host	1.3.6.1.4.1.667.1.2.2.1.15	INTEGER	read-write
pinDCD	1.3.6.1.4.1.667.1.2.2.1.16	INTEGER	read-only
pinDTR	1.3.6.1.4.1.667.1.2.2.1.17	INTEGER	read-only
pinRTS	1.3.6.1.4.1.667.1.2.2.1.18	INTEGER	read-only
charSends	1.3.6.1.4.1.667.1.2.2.1.19	Counter	read-write
charReceiveds	1.3.6.1.4.1.667.1.2.2.1.20	Counter	read-write

C h a p t e r   8

System Administration

8.1   Introduction

This chapter describes the other major tasks, apart from installing and configuring the JETSTREAM, that you - as the system administrator - may need to perform. It is divided into the following sections:

8.2   Net Rebooting

Net rebooting is a process which enables you to download files to the JETSTREAM from another TCP/IP host (boot host) at bootup. This has two important applications:

• **Upgrading system software** - downloading software upgrades avoids having to replace ROM chips. See Section 8.3.

• **Downloading terminal definitions** - enables you to use Full Screen mode (menus) on more terminal types than those defined by default (Wyse60, Ansi, VT100). See Section 8.4.

8.3   Upgrading System Software

To set up a net rebooting environment and upgrade your JETSTREAM software, follow these steps:

1.   Decide which TCP/IP host you are going to use as the boot host. It must be a UNIX machine and must have *tftp* enabled. If you already have a boot host defined (for downloading terminal definition files), you can use this host. You can define two boot hosts if you want a good safeguard against the first host being off-line when required.

2.   Tar the file *mtsprom* from the upgrade diskette onto the boot host. This is the **boot file**.Make sure it has global read/execute permission for its entire path. If you have defined two boot hosts, copy the software onto both of them.

3.   Define the boot host and boot file (if not already defined) using the **Add Boot Host** feature (see the section Section 8.6 Adding a Boot Host).

4.   Enable net rebooting and reboot the JETSTREAM using the **Reboot Server** feature (see the section Section 8.8 Rebooting the JETSTREAM). If the JETSTREAM can't download the boot file for any reason, it will boot from ROM.

8.4   Downloading Terminal Definitions

This section tells you how to set up a net rebooting environment and download terminal definitions.

All terminal types can be used on the JETSTREAM. Terminal types which aren't defined on the JETSTREAM, however, are unable to use Full Screen mode (menus) and may not be able to page through sessions properly. When installed, the JETSTREAM has three defined terminal types - Wyse60, VT100 and Ansi.

If you are not using, or can't emulate, any of these terminal types, you can add up to three additional terminal definitions using the JETSTREAM **Extraterms** feature. The terminal definitions are downloaded from another TCP/IP host using the net rebooting process.

Three sample terminal definitions are supplied on the Supplemental disk supplied with the JETSTREAM. These areTVI950, IBM3161 and Adds Viewpoint.

To set up a net rebooting environment and download terminal definitions, follow these steps:

1. Decide which TCP/IP host you are going to use as the boot host. It must be a UNIX machine and must have *tftp* enabled. If you already have a boot host defined (for upgrading software), you must use this host (terminal definition files will only be downloaded from boot host 1).

2. Create the required terminal definition files on the boot host (see the section Section 8.4.1 Creating Terminal Definition Files), or load the sample files provided on diskette (see the section Section 8.4.2 Using the Sample Terminal Definition Files). Terminal definition files must be installed in the directory /etc/mts on the boot host. Use the names term1, term2 and term3.

    Note: if you are using tftp with the secure option, i.e. "tftpd -s /tftpboot", create a /tftpboot/etc/mts/ directory and place the term files in there.

3. Enable the **Extraterms** feature (see the section Section 8.4.3 Enabling the Extraterms Feature).

4. Define the boot host (if not already defined) using the **Add Boot Host** feature (see the section Section 8.6 Adding a Boot Host).

5. Reboot the JETSTREAM using the **Reboot Server** feature (see the section Section 8.8 Rebooting the JETSTREAM).

8.4.1 Creating Terminal Definition Files

To create new terminal definition files, you need to copy and edit the information from the terminfo database.

1. On the boot host, change directory to /usr/lib/terminfo/*x* (where *x* is the first letter of the required terminal type). For a Wyse50, for example, you would enter the command **cd /usr/lib/terminfo/w**.

2. The termcap files are compiled, so use the command **infocmp** *termfile* to read the required file (for example: **infocmp wy50**).

3. Check the file for the attribute **xmc#*n*** (where *n* is greater than or equal to 1). This will corrupt menu and form displays making the terminal type unsuitable for using Full Screen mode.

4. If the terminal definition is suitable, change directory to /etc/mts.

5. Rename and copy the file to the current directory using the command **infocmp** *termfile* **> term***n* where *n* is greater than or equal to 1; (e.g. **infocmp wy50 > term1**). Make sure the file has global read and execute permission for its entire path.

6. Edit the file to include the following capabilities in this format:

```
term=
acsc=
bold=
civis=
clear=
cnorm=
cup=
rev=
rmacs=
rmso=
smacs=
smso=
page=
circ=
```

For example:

```
term=AT386 | at386| 386AT|386at |at/386 console
acsc=jYk?lZm@qDtCu4x3
bold=\E[1m
civis=
clear=\E[2J`E[H
cnorm=
cup=\E[%i%p1%02d;%p2%02dH
rev=\E4A
rmacs=\E[10m
rmso=\E[m
smacs=\E[12m
smso=\E[7m
page=
circ=n
```

NOTE: As you can see from the example, capabilities which are not defined in the terminfo file must still be included (albeit with no value). Each entry has an 80 character limit.

On some versions of UNIX, some of the capabilities are appended with a millisecond delay (of the form $\$<n>$). These are ignored by JETSTREAM and can be left out.

The 'acsc' capability, if defined, contains a list of character pairs. These pairs map the characters used by the terminal for graphics characters to those of the standard (VT100) character set.
Include only the following character pairs:

<div align="center">

jx, kx, lx, mx, qx, tx, ux and *xx*

</div>

(where *x* must be substituted by the character used by the terminal). These are the box-drawing characters used to display the forms and menus of Full Screen mode. They must be entered in this order.

The last two capabilities will not be found in the terminfo file. In the 'page' field you must enter the escape sequence used by the terminal to change screens. The 'circ' field defines whether the terminal can use 'previous page' and 'next page' control sequences. It must be set to 'y' or 'n'. These capabilities can be found in the documentation supplied with the terminal.

8.4.2 Using the Sample Terminal Definition Files

Tar the sample files from the Supplemental disk onto the boot host. They are called ET.tvi950, ET.addsvp and ET.ibm3161. Copy them to/etc/mts using the filenames term1, term2 and term3. Make sure they have global read and execute permission for their entire path.

8.4.3 Enabling the Extraterms Feature

set extraterms   From the Network Configuration menu, select 'Extraterms'. The following form will be displayed:

```
     Extraterms
 Set Extraterms [off]
```

Toggle the setting to 'on'.

8.4.4   Using Downloaded Terminal Definitions

set line   Terminal type is selected per line through the Line Settings form (see Section 4.5 Line Settings). In the 'Terminal' field, use the spacebar to cycle through the available terminal definitions. These will include term1, term2 and term3. These definitions default to Wyse60 unless replaced by a downloaded definition of the same name.

HINT: If, when using a downloaded terminal definition, you have problems using arrow keys, you can use Ctrl-K, Ctrl-J, Ctrl-H and Ctrl-L for up, down, left and right.

8.5   BOOTP

BOOTP is a useful tool for auto-configuring one or more JETSTREAM units at bootup, and is particularly useful for multiple installations. This enables you to do all JETSTREAM configuration in one BOOTP file, rather than configure each JETSTREAM unit manually.

On bootup, the JETSTREAM, having only its ethernet address, will broadcast a request to BOOTP servers, for its network configuration details (internet address, subnet mask, etc.).

BOOTP should not be confused with:

a) *net rebooting*, which downloads the JETSTREAM software from a boot host, and
b) *save/restore configuration*, which saves/restores user and port configuration information to/from a boot host.

BOOTP can be used to download instructions for: net rebooting, restore configuration, extraterms, and set security. Details of these features are explained in this Manual.

The JETSTREAM implementation of BOOTP is compatible with RFCs 951 and 1497.

8.5.1   How to setup BOOTP

In the BOOTPTAB file on the host, add the Ethernet address of the JETSTREAM. (On UNIX systems the BOOTPTAB file is usually file /etc/bootptab). An example of a BOOTPTAB file is at Figure 11.

The JETSTREAM - on reboot or power-up - will always transmit a BOOTP request across the network. If a reply is received from a BOOTP host, the JETSTREAM will boot using the BOOTPTAB file configuration information.

Whether or not a BOOTP reply is received, the JETSTREAM will continue to boot, either via net rebooting (if enabled) or, if not, from its own PROM.

8.5.2 The BOOTPTAB file

In the BOOTPTAB file of the responding host(s), the following fields should be set:

    ht (hardware type) set to 1 (=10Mb ethernet).
    ha (hardware address) set to the ethernet address of the JETSTREAM.
    ip (internet address) set to internet address of the JETSTREAM.
    sm (subnet mask) set to the subnet mask of the JETSTREAM.
    bf (bootfile name) set to the name of the file on the host to boot from.
    ds (domain servers) ip address of up to two nameservers.

    gw (gateway) ip address of a single static gateway
    hn (hostname).
    vm=rfc1048

Notes on the above:

1. If the subnet mask (sm) has not been explicitly specified by a BOOTPREPLY packet, it will be derived from the class of internet address.

2. If domain name servers are specified their port number will always be set to the default for a name server (53).

3. If you include the gw (gateway) flag you are configuring a single static gateway. The JETSTREAM will ignore RIP packets and the gateway you have specified will be permanent; it will also be the only available gateway.

4. We suggest you always enter the fields ip, sm and bf. If in doubt enter all of the fields.

In addition there are Specialix-specific fields; Table 3 lists these fields. They are optional:

Table 3:

Specialix bootp tag format	Description
T128=0xc04192ff	network Broadcast address (hexadecimal)
T129="/etc/mts/snmpprom"	second bootfile (quoted string); see Section 8.5.4
T130="yes"	autoreboot - Y/N
T131="yes"	extraterms - Y/N
T132="no"	security - Y/N
T133="yes"	autorestore of configuration - Y/N
T134="iris"	bootp server hosts name
T135="boot2"	second boot hosts name; see Section 8.5.4
T136=0xc04192fe	second boot host's IP address (hexadecimal); see Section 8.5.4

Notes:

1. The speech marks, e.g in "iris", are mandatory.

2. The server name option (T134) should be specified.

3. If the broadcast address (T128) has not been explicitly specified by a BOOTPREPLY packet, it will be calculated from the internet address and the subnet mask.

An example of a bootptab file is shown in Figure 11:

Figure 11
Example
bootptab file

common is the collective name for
the list of information in this file

bf means boot file

sm means
subnet mask

T134, T135 etc.
are Specialix
tags

cusmts1 is the
name of the
first or only
JETSTREAM

cusmts2 is the name
of the second JETSTREAM

ethernet addresses
of JETSTREAMs

tc=info means use all the information
listed under 'common:\' above

```
                    common:\

                      :bf=/usr/mts/mts6001p.cus:\
                      :sm=255.255.255.224:hn:\
                      :T134="iris":\
                      :T135="rrdc":\
                      :T129="/u/mp":\
                      :T130="yes":\
                      :vm=rfc1048:\
                      :gw=192.101.35.254:

             cusmts1:ht=1:ha=0080ba000024:
             ip=192.101.34.193:tc=common:

             cusmts2:ht=1:ha=0080ba000025:
             ip=192.101.34.194:tc=common:
```

Notes on Figure 11:

1. if you have multiple JETSTREAMs, list them at the bottom of the file; so cusmts1 is the first (as in the example) and your second JETSTREAM is cusmts2.

2. So that all JETSTREAMs that you list use the same BOOTP information, terminate the lines detailing each JETSTREAM with the same syntax tc=*name* (in the example above tc=common).

8.5.3   Disabling the BOOTP file

You cannot disable BOOTP; however, you can disable the transmission of the BOOTP reply packet back to the JETSTREAM.

To disable this transmission, place a hash # before the last line; so in the example in Figure 11, the last line would read:

```
# cusmts2:ht=1:ha=0080ba000025:ip=192.101.34.194
  :tc=common:
```

8.5.4   Using BOOTP with a Secondary Host

The following Specialix defined bootp tags can be used to configure the JETSTREAM to download a bootfile image from a secondary host:

T129="u/mp"   - second bootfile (quoted string)
T135="rrdc"   - second boot hosts name (quoted string)
T136=0xc06522c3 - second boot host's IP address (must be in hexadecimal)

Figure 12
example bootptab
file for a
secondary host

```
common:\

        :bf=/usr/mts/mts6001p.cus:\
        :sm=255.255.255.224:hn:\
    #   :T134="iris":\
        :T135="rrdc":\
        :T129="/u/mp":\
        :T130="yes":\
        :T136=0xc06522c3:

cusmts1:ht=1:ha=0080ba000024:
ip=192.101.34.193:tc=common:
```

hash symbol
means name
of bootp server
is not down-
loaded to
JETSTREAM

8.6   Adding a Boot Host

add boothost   Select 'Boot Hosts' from the Network Configuration menu; the Boot Hosts menu will be displayed:

```
    Boot Hosts
Add Boot Host
Delete Boot Host
```

Select 'Add Boot Host' and the host table will be displayed:

```
     Hosts
socrates
aristotle
plato
sophocles
homer
pythagoras
```

Select the required host. You will be prompted to enter the pathname of the boot file:

```
    Filename:
```

Enter the full pathname of the boot file (60 characters maximum) and press <return>. Use the <del> key to backspace if necessary. If you are setting up a boot host for downloading terminal definitions only, you must still enter a boot file (it will be ignored and the JETSTREAM will reboot from ROM).

8.7   Deleting a Boot Host

delete boothost   Select 'Boot Hosts' from the Network Configuration menu; the Boot Hosts menu will be displayed:

```
    Boot Hosts
Add Boot Host
Delete Boot Host
```

Select 'Delete Boot Host' to list your boot hosts:

```
         Delete Boot Hosts
socrates:/etc/mts/mtsprom
homer:/etc/mts/mtsprom
```

Select the boot host that you want to delete. You will be asked to confirm the deletion:

```
Confirm Delete Boot Host 'socratesr' (y/n)
```

Type 'y' to delete the boot host, 'n' to cancel the command.

8.8   Rebooting the JETSTREAM

set netboot, reboot

From the Network Configuration menu select 'Reboot'. The following menu will be displayed:

```
        Reboot
Reboot Server
Set Net Rebooting
```

Select 'Set Net Rebooting'; the following form will be displayed.

```
    Set Net Rebooting
Set Net Rebooting [off]
```

For rebooting from ROM and downloading terminal definition files, net rebooting must be set to 'off'. For rebooting from a boot file, it must be set to 'on'. Quit and save.

Select 'Reboot Server'. You will be asked to confirm the action:

```
Confirm Reboot Server (y/n)
```

Type 'y' and the JETSTREAM will reboot.

When net rebooting, the JETSTREAM will continue trying to download the boot file until successful or until you press a key on the console to interrupt. This caters for the situation where the boot host takes longer to boot than the JETSTREAM after a power break. If boot host 1 fails, the JETSTREAM will attempt to access boot host 2. If the JETSTREAM fails to find a boot file at all, it will eventually timeout and reboot from ROM.

NOTE: As installed from SCO, TCP/IP for SCO XENIX will not allow JETSTREAM to reboot across the network. This problem can be resolved by a simple modification to the file */etc/inetd.conf*. The line that reads:

```
  tftp dgram udp wait sync /etc/tftpd tftpd
```

should be changed to:

```
  tftp dgram udp wait root /etc/tftpd tftpd
```

8.9   Resetting the Server to Factory Defaults

reset factory   This feature enables you to reset the JETSTREAM to its default settings. This will clear all configuration data entered by the admin user, and all user accounts, except the default admin user, will be deleted. Select 'Reset' from the Network Configuration menu; you will be asked to confirm the reset:

> ```
> Confirm Reset To Factory Defaults   (y/n)
> ```

Type 'y' to reset the JETSTREAM, 'n' to cancel the command.

8.10 Remote Configuration

You can configure the JETSTREAM unit remotely by starting a telnet to its standard telnet port (23) from another host on the network. No configuration is necessary to use this feature and two such sessions can be run simultaneously. You will be prompted for a login name and password. All functionality will be available except the ability to access other hosts. You can use Full Screen mode if you use a terminal type defined on the JETSTREAM.

The JETSTREAM includes a security feature which enables you to restrict incoming connections to only those hosts defined in the host table. This is described in Section 7.10 Set Security.

8.11 Save/Restore Configuration
(to a remote host)

save, restore   JETSTREAM configuration information can be saved to a remote host, and subsequently restored, using the CLI commands save and restore. The following information will be saved:

        User Profiles

        Port Configuration

        Host Table

        Gateways

Fixed (hard-coded) data and JETSTREAM details will not be saved. Information will be saved to the file /etc/mts/config/servername on boot host 1 (where servername is the name assigned to the JETSTREAM unit). Most UNIX versions of TFTP require this file to exist and have global write permission before transfer can take place.

8.12 Lost Password

If you are an admin user, and you forget your password, here is a way of logging on without it. This can only be done on port 8 (the console port).

Reboot the JETSTREAM (power-cycle the unit).

When the unit has powered up and initialised itself, the power LED will turn orange for five seconds. During this time, type in the magic string (detailed on a separate release note (document number SP-US293)) and press <Return>.

This will set the admin password to <Return> for this login attempt only. Once you have logged in, select a new admin password using the **set user** command.

If you find that you can't type in the magic string within the 5 seconds, try mapping it to one of the function keys (not forgetting the carriage-return required afterwards).

Note   *The magic string information (release note) should be kept in a secure place because it enables access to the JETSTREAM and your network without a password.*

C h a p t e r   9

Basic usage

9.1   Introduction

This chapter shows basic usage of the JETSTREAM. It is provided for users, who do not need to be familiar with system administration matters.

It is divided into the following sections:

Starting sessions on other machines from the JETSTREAM is described in Chapter 10 (Running Sessions).

9.2   Logging into the Server

To be able to log in you must have a login name and password. The system administrator should have set these for you.

- Switch your terminal on and press <return> to call the login prompt.

- Enter your login name and press <return>. If your line has been dedicated to you, your login name will be displayed in brackets automatically, along with the password prompt.

- At the password prompt, enter your password and press <return> (your password will not be displayed as you type it).

When you log in, the JETSTREAM is in Command Line mode. For admin users, the prompt is MTS#; for normal and restricted users it is MTS$.

If you are a restricted user, predefined sessions, set up by the system administrator, may start up automatically. If this is the case, go to Chapter 10 (Running Sessions).

9.2.1   Logging in via a Modem

Logging in via modem is the same as if you are directly connected to the JETSTREAM. An additional feature, however, is automatic baud rate detection.

If your terminal is set to a different baud rate to the JETSTREAM line, pressing <return> for the login prompt will display garbled characters or nothing at all. If you send a line break (<break> key) the JETSTREAM will try the next line speed setting. Send breaks until the login prompt appears. At the slower speeds it may take some time for a response.

NOTE: If you do change the line speed by sending breaks, the following message will be displayed at login:

```
Warning: Baud Rate Changed to new_speed
```

Set the line speed using the set line command, as follows:

```
set line n speed new_speed
```

9.3   Modes of Operation

The JETSTREAM has two modes of operation: Full Screen Mode (FSM) - the menu system - and the Command Line Interface (CLI). The CLI is designed for more experienced users. Normal and restricted users may prefer to use the menu system.

9.3.1 **Full Screen Mode**

Full Screen mode is a menu system, designed for easy access to commands.To enter Full Screen mode, type *screen* and press <return>. The main menu will be displayed. For normal and restricted users the main menu contains the following options:

```
              Main Menu
Sessions
Command Line Mode
```

For admin users, the complete main menu will be displayed:

```
              Main Menu
Sessions
Command Line Mode
Users
Line Configuration
Server Configuration
Network Configuration
```

At the top of the screen is a banner which contains your username, your line number and the current version of software. At the foot of the screen is a context-sensitive help line which describes how to move around and select menu options.

To exit Full Screen mode, select 'Command Line Mode' from the main menu.

9.3.2 **Menus**

Move up and down menus using the arrow keys, or by typing the first letter of the option you want to select. Select a menu option by pressing <return>; return to the previous menu by pressing <esc>. Type '?' to display help information.

9.3.3 **Forms**

Forms contain one or more data fields for you to complete. There are two types of data field:

- Fields in which you must type a value. These fields start off blank; they have no default value. Some fields may require hex values. If in doubt, type the help command (?) when in the field. Use the <del> key to backspace.

• Fields where you select from a list of values. One of these values will be entered as a default. You can cycle through the list of values using the <spacebar> key, or list them by typing 'l'.

Movement between fields is controlled by the following keys:

<arrows>   Use the arrow keys to move between fields in any direction. If a form covers more than one page, press the up arrow key on the first line of the form to display any previous page. Press the down arrow key on the last line of the form to display any next page.

<Tab>   Moves you through fields on the same line, from left to right. The <backspace> key moves you in the opposite direction.

<PgUp>   If the form covers more than one page, you can use the <PgUp> key to display any previous page.

<PgDn>   If the form covers more than one page, you can use the <PgDn> key to display any next page.

NOTE: On Ansi and VT100 terminals, the <PgUp> and <PgDn> keys won't work unless they are programmed as ^[J and ^[K respectively (where ^[= Escape).

There are two ways to exit a form:

<return>   Use this key if you want to save the changes made to the form. The following menu will be displayed:

```
              Quit Form
Save And Exit Form
Exit Form Without Saving Changes
```

<esc>   Use this key if you haven't made any changes, or if you don't want to save the changes you have made. If you haven't made any changes to the form, you will be returned to the menu. If you have made changes to the form, the following message will be displayed:

```
Changes Will Be Lost, Proceed?  (y/n)
```

Type 'y' to escape, 'n' to return to the form.

9.3.4 Command Line Interface (CLI)

Using the CLI you can enter JETSTREAM commands directly rather than through menu options. It is designed for the more experienced user. The Command Line has two features that make it extremely easy to use: context-sensitive help and command abbreviation.

9.3.5 Help

The help key (?) can be pressed at any time to display the options available to you. Look at the following example:

```
MTS# set user . ?
password
level
session
switch
MTS# set user .
```

Notice how your original command is always preserved, so that you don't have to type it in again. If you type ? at the CLI prompt, all the commands available to your user level would be listed.

9.3.6 Command Abbreviation

You can use the shortest unambiguous abbreviation of any command. For example, the command:

```
set line 1 termtype wy60
```

could be entered as:

```
se l 1 te w
```

9.4 Changing your Password

admin, normal Command: set user

Select the Sessions menu from the main menu. From here, select 'Set Up User' and then 'Set Password'. You will be asked to enter your old (current) password:

```
Old Passwords:
```

You will then be asked to enter a new password:

```
Enter Passwords:
```

The password can have up to eight characters. Use the <del> key to backspace if necessary. You will be asked to repeat the password:

```
Re-enter Passwords:
```

You will be returned to the Set Up User menu.

9.5   Changing your Terminal Setup

admin, normal Command: set user

You are unlikely to need to change your terminal setup, especially while running in Full Screen mode. If you do, remember to make the same changes to your terminal's setup utility.

Changes to your terminal type or the number of video pages supported will take effect immediately. Other changes will take effect the next time you log in.

Don't change the number of video pages your terminal supports while you have sessions running.

Select 'Set Up Terminal' from the Sessions menu. The following form will be displayed.

```
                   Set Up Terminal
Speed    Terminal Modem  Flow   Bits Parity Stop Pages
[9600 ] [vt100]  [off ] [soft] [8]  [none] [1]  [3]
```

These are the default settings. In each field, use the <spacebar> to cycle through the available settings, or type 'l' to list them.

9.6   Changing your User Environment

admin, normal Command: set user

The only reason you should need to change your environment is if your screen switch character clashes with an application you are using in one of your sessions. From the main menu select the Sessions menu. From this menu, select the Set Up User menu. Then select 'Set Environment'.

The following form will be displayed:

```
                  User Environment
Language                    [english]
Screen Switch Char [1 ]
```

Currently the Language field can only be set to 'english'. The screen switch character must be entered in hex format; see Appendix F (ASCII and HEX code charts).

9.7   Logging Out

All users   To log off the JETSTREAM, select 'Logout' from the Sessions menu. You will be
Command: logout unable to log out if you still have sessions running.

Chapter 10

Running Sessions

10.1 Introduction

Users logged into the JETSTREAM can start up to four login sessions on remote hosts. Sessions are started through the menu option 'Sessions' (or through the CLI). You can run multiple sessions simultaneously on the same host or on different hosts. You can switch between different sessions and between sessions and the JETSTREAM using hot-key commands.

Admin and normal users can predefine sessions, even configure them to start automatically on login to the JETSTREAM. The system administrator can predefine sessions for other users. Restricted users can only start sessions predefined for them.

This chapter is divided into the following sections:

10.2 Starting a Session

**admin, normal
Commands:
telnet, rlogin**

You can start up to four sessions on other TCP/IP hosts. The actual number of sessions available is four minus the number of predefined sessions set up on your line.

If you have four predefined sessions, you will have no free sessions left. You can get around this by disabling one of your predefined sessions (in the 'Set Sessions' form, set the Type field to 'off').

Select 'Start telnet/rlogin' from the Sessions menu. The following form will be displayed:

```
Free Session
Type      [telnet]
Hostname  [                              ]
Termtype  [            ]
Username  [        ]
Echo      [off]
Mapnl     [off]
Mode      [off]
Intr      [7f]
Quit      [1c]
EOF       [4 ]
Erase     [8 ]
```

Complete the fields as follows (using the <del> key to backspace if necessary):

- **Type** - this is the connection protocol you want to use: telnet (default) or rlogin. The relative merits of these protocols are discussed in Chapter 4 (Direct and Silent Login Connections).

- **Hostname** - the name or internet address of the machine that you want to access. You must have a login account on this machine. If you want to access a machine in your local network which isn't defined in the host table, you can only use the hostname if it can be resolved by a name server in your network. If you want to access a host outside your local network, it is best to use the internet address.

- **Termtype** - the terminal type you enter here will be passed to the host you are trying to log into. The termtype must be a name recognised by the host. Your system administrator should be able to tell you what to enter.

- **Username** (rlogin only) rlogin will pass your JETSTREAM username to the target host. If your username on the target host is different, or if you want to log in as somebody else, enter the required username here.

The fields after 'Username' are telnet options only. Set up the session as required and press <return>. You will be connected to the host.

Using telnet, you will be prompted for your login name then your password; using rlogin, you will be prompted for your password only. Once you have logged in, you can use the host as if you were directly connected. To close a session, log out as normal. You will be returned to the JETSTREAM exactly where you left off. You can switch to other sessions, and back to the JETSTREAM, without logging out - see Section 10.5 Hot-key Commands.

10.3 Predefining Sessions

admin, normal
Command:
set user

You can predefine up to four sessions. Predefined sessions can be started using the 'Start Predefined Session' menu option, or they can be set up to start automatically. Select 'Set Up User' from the Sessions menu. Select 'Set Sessions' from the Set Up User menu. The Set Sessions form will be displayed:

```
Session   1             2             3             4
Type      [off ]        [off ]        [off ]        [off ]
Hostname  [socrates]    [socrates]    [socrates]  [socrates]
Termtype  [         ] [ ]            [           ] [         ]
Auto      [off]         [off]         [off]         [off]
Echo      [off]         [off]         [off]         [off]
Mapnl     [off]         [off]         [off]         [off]
Mode      [off]         [off]         [off]         [off]
Intr      [7f]          [7f]          [7f]          [7f]
Quit      [1c]          [1c]          [1c]          [1c]
EOF       [4 ]          [4 ]          [4 ]          [4 ]
Erase     [8]           [8]           [8]           [8]
```

These are the default settings. Complete the fields as follows (using the <del> key to backspace if necessary):

•   **Type** - this is the connection protocol you want to use: telnet or rlogin. The relative merits of these protocols are discussed in Chapter 4 (Direct and Silent Login Connections). Once this field has been set to telnet or rlogin, this session will take up one of your four session slots - whether it is active or not.

•   **Hostname** - this is the name of the machine that you want to access. You can only predefine sessions on a host defined in the host table. The first host defined in the host table will be entered as the default. To be able to log in to a machine you must have a login account on it.

- **Termtype** - the terminal type you enter here will be passed to the host you are trying to log into. The termtype must be a name recognised by the host. Your system administrator should be able to tell you what to enter.

- **Auto** - if this field is set to 'off', the session must be started using the 'Start Predefined Sessions' menu option. If the 'Auto' field is set to 'on', the session will start up automatically when the user logs in to the JETSTREAM. If more than one session is set up like this, session 1 will be displayed first.

The fields after 'Auto' are telnet options only.

10.4 Starting a Predefined Session

All users
Command: start

Use this option to start a predefined session. Select 'Start Predefined Session' from the Sessions menu. Your predefined sessions will be listed:

```
Predefined Sessions
telnet socrates
telnet plato
```

Select the session that you want to start. You will be connected to the host. If you are using telnet, you will be prompted for your login name and then your password. If you are using rlogin, you will be prompted for your password only. If you use rlogin, and your JETSTREAM login name has been entered in the 'rhost' file of the target login directory, you will be logged straight in.

Once you have logged in, you can use the host as if you were directly connected.

To close a session, log out as normal. You will be returned to the JETSTREAM exactly where you left off. You can switch to other sessions, and between sessions and the JETSTREAM, without logging out (see the section "Hot-key Commands").

10.5 Hot-key Commands

All users   The commands described in Table 4 can be used to switch between sessions, and to switch between sessions and Full Screen/Command Line mode. The command ^a means hold down the <control>and <a> keys together. This is the screen switch character (or 'hot-key').

NOTE: You can change the screen switch character (^a) if it clashes with a command used by an application you are running in one of your sessions. See Section 9.6 Changing your User Environment.

Table 4 **Hot-Key Commands for Session Controls**

Function	Hot-key	Description
Switch Sessions	^a *n*	To switch from one session to another, press ^a and then the required session number. For example, ^a 2 would switch you to session 2. You can also use these commands from the JETSTREAM to resume sessions. Pressing ^a 0 will return you to the JETSTREAM.
Display Next Session	^a n	Use this command to display the next session. The current session will remain active. If you use this command from the JETSTREAM, the lowest numbered active session will be displayed.
Display Previous Session	^a p	Use this command to display the previous session. The current session will remain active. If you use this command from the JETSTREAM, the highest numbered active session will be displayed.
Switch to JETSTREAM	^a m	To exit a session and return to the JETSTREAM, use this command. You will be returned to where you left off. The session will be left running
Redraw Screen	^r	When you switch from a session back to Full Screen Mode, the screen may not be redrawn correctly. If this happens, use this command to redraw it properly.

10.5.1 Video Pages

You can run four sessions simultaneously. Running the menu system or Command Line counts as a fifth session. If your terminal supports five video pages or more, each session can use a different page. The result of this is that when you switch between sessions their appearance will be maintained - they will retain their context.

However, if your terminal supports less than five video pages, sessions may have to share pages. Such sessions are termed 'unpaged'. When you switch to an unpaged session, its context will be lost. The following message will be displayed:

```
[unpaged session n]
```

Similarly, when you switch from an unpaged session to a paged session:

```
[paged session n]
```

10.6 Resuming a Session

**All users
Command:
resume**

To resume an active session from the FSM, select 'Resume Session' from the Sessions menu. A list of active sessions will be displayed:

```
   Active Sessions
telnet socrates
telnet plato
```

Select the session that you want to resume. It will be resumed where you left off. Alternatively, you can use the hot-key commands described in Table 4.

10.7 Killing a Session

**All users
Command:
kill session**

This command enables you to kill a session from the FSM. You can't log out from the JETSTREAM while you still have sessions running. Select 'Kill Session' from the Sessions menu. A list of your active sessions will be displayed, for example:

```
   Active Sessions
telnet socrates
telnet plato
```

Select the session that you want to kill. The following prompt will be displayed:

```
Confirm Kill Session 1  (y/n)
```

Type 'y' to kill the session, 'n' to cancel the command.

C h a p t e r   1 1

The CLI commands

11.1   Introduction

This chapter contains a full description of each CLI command. The commands
are described in alphabetical order and each section includes the user level
required to use the command. Most but not all CLI commands have menu
equivalents. Table 5 plots the menu options against their equivalent CLI
commands.

Table 5 **Menu Option/ Command Equivalents**

MENU	MENU OPTION	EQUIVALENT CLI COMMAND(S)
Sessions	Set Up Terminal.	set line, show line
	Set Up User Options	set user, show user
	Kill Session	kill session
	Logout	logout
	Resume Session	resume
	Start Predefined Session	start
	Start Telnet/Rlogin	telnet, rlogin
	Become Admin User	admin
Users	Add User	add user
	Change User	set user, show user
	Set Sessions	set user, show user
	Delete User	delete user
	Set Password	set user, show user
Line Configuration	Line Settings	set line, show line
	Virtual Circuits	set line, show line
	Kill Line	kill line
Server Configuration	Servername	set servername, show serverinfo
	Internet Address	set internet, show serverinfo
	Broadcast Address	set broadcast, show serverinfo
	Subnet Mask	set subnet, show serverinfo
	Domain Name	set domain, show serverinfo
Network Configuration	Reset	reset factory
	Host Table Options	add host, set host, delete host, show hosts
	Boot Host Options	add boothost, delete boothost, show serverinfo
	Name Server Options	add nameserver, set nameserver, delete nameserver, show serverinfo
	Gateway Options	add gateway, set gateway, delete gateway, show gateways
	-	show route
	Security	set security
	Extraterms	set extraterms
	Reboot	reboot

11.2   add boothost

admin   This command enables you to set up a boot host and boot file for net rebooting the JETSTREAM and/or downloading additional terminal definitions. Both of these features are explained in Chapter 8 (System Administration). You can define up to two boot hosts.

Syntax

```
add boothost hostname filename
```

Where:

hostname	is the name of the host that you want to define as a boot host. You can only define a host that has been added to the host table.
filename	is the full pathname of the bootfile (60 characters maximum).

Menu equivalent

Network Configuration - Boot Hosts - Add Boot Host

See also

delete boothost, reboot, set extraterms, set netboot, show serverinfo

11.3   add community

admin   This command is only available on the SNMP version of the JETSTREAM. It enables you to define up to four SNMP communities.

Syntax

```
add community community_name inetaddress
  none | readonly | readwrite
```

Where:

community_name	is an arbitrary name assigned to the community.
inetaddress	is the internet address that identifies the host(s) in the community.
none / *readonly* / *readwrite*	defines the access permissions for the community.

See also

add trap, delete community, set contact, set location, show serverinfo

11.4   add gateway

admin

This command enables you to define the gateways in your network. You can add up to eight gateways and these must be hosts that have been defined in the host table.

Syntax

```
add gateway hostname type [inetaddress] [static]
```

Where:

hostname	is the name of the host that you want to define as a gateway
type	is the gateway type: default, host or network.
inetaddress	if you define the type as host or network, you must define the internet address of the target host or network.
static	will configure the gateway as static.
	For definitions of active and static see Section 6.10 Gateways.

Menu equivalent

Network Configuration - Gateway - Add Gateway

See also

delete gateway, set gateway

11.5   add host

admin   This command enables you to add the details of the other hosts in your network. These will be added to the host table. You can also add hosts accessed frequently not in your LAN.

Syntax

```
add host hostname inetaddress
```

Where:

hostname   is the name of the host (14 characters maximum).

inetaddress   is the internet address of the machine.

Menu equivalent

Network Configuration - Host Table - Add Host

See also

delete host, set host

11.6   add nameserver

admin   This command enables you to define the nameservers in your network. You can
define a maximum of two nameservers.

Syntax

```
add nameserver hostname tcp_port
```
Where:

hostname   is the name of the nameserver.

tcp_port   is the TCP port running the nameservice (this defaults to 53).

Menu equivalent

Network Configuration - Name Servers - Add Name Server

See also

delete nameserver, set nameserver, show serverinfo

11.7   add trap

admin   If using the SNMP version of JETSTREAM software, you can use this command
to define communities which will receive trap messages generated by the
JETSTREAM. Note that the JETSTREAM does not generate any enterprise-
specific traps. Up to four trap comunities may be defined.

Syntax

```
add trap trap_name inetaddress
```

Where:

trap_name	is an arbitrary name assigned to the community.
inetaddress	is the internet address that identifies the host(s) in the community.

See also

add community, delete trap, set contact, set location, show serverinfo

11.8   add user

admin   This command enables you to add a new user to the system. You will be prompted to enter a password (maximum 8 chars). You must also set the user's level using the set user command.

Syntax

```
add user username
```

Where *username* is the required login name (8 chars maximum).

Menu equivalent

Users - Add User

See also

delete user, set user, show user

11.9   admin

normal   If you are a normal user, this command enables you to enter Admin mode. But
only if you know the admin password. This will give you full access to the
JETSTREAM commands. The JETSTREAM prompt will change to a hash
(MTS#) to indicate that you are in admin mode. You must log out and back in
again to revert to your original mode.

Syntax

```
admin
```

Menu equivalent

Sessions - Become Admin User

11.10   delete boothost

admin   This command enables you to delete a boot host. The host will not be deleted
from the host table. If you have defined the same host as boot host 1 and 2 (with
different boot files), you must specify the name of the boot host and the full
pathname of the boot file.

Syntax

```
delete boothost hostname:filename
```
e.g. `delete boothost socrates:/etc/mts/mtsprom`

Menu equivalent

Network Configuration - Boot Hosts - Delete Boot Host

See also

add boothost, set boothost

11.11   delete community

admin   This command enables you to delete SNMP communities defined using the add community command.

Syntax

```
delete community 1 | 2 | 3 | 4
```

Communities are numbered according to the order they are created in. You can list them using the show serverinfo command.

See also

add community, delete trap, show serverinfo.

11.12   delete trap

admin   This command enables you to delete SNMP trapcommunities defined using the **add trap** command.

Syntax

```
delete trap 1 | 2 | 3 | 4
```

Communities are numbered according to the order they are created in. You can list them using the show serverinfo command.

See also

add trap, delete community, show serverinfo.

11.13   delete gateway

admin   This command enables you to delete a gateway. The host will not be deleted from
the host table.

Syntax

```
delete gateway hostname
```

Menu equivalent

Network Configuration - Gateways

See also

add gateway, set gateway

11.14   delete host

admin   This command enables you to delete a host from the host table. If the host is
referenced by any predefined telnet or rlogin session, or is defined as a gateway,
nameserver or boot host, the message <in use> will be displayed and it will not
be deleted.

Syntax

```
delete host hostname
```

If you see a message saying your host is in use, you may have configured your host
as a boothost or as a nameserver. Delete your host as a boothost or nameserver then
retry the delete host command.

Menu equivalent

Network Configuration - Host Table

See also

add host, set host

11.15   delete nameserver

admin   This command enables you to delete a name server. The host will not be deleted
from the host table.

Syntax

```
delete nameserver hostname
```

Menu equivalent

Network Configuration - Name Servers

See also

add nameserver, set nameserver

11.16   delete user

admin   This command enables you to delete a user. You cannot delete the default admin
user, users that are logged in or users whose line is dedicated to them.

Syntax

```
delete user username
```

Menu equivalent

Users - delete user

See also

add user, set user, show user

11.17   heap

admin   This command tells you how much free memory currently exists and the largest available fragment.

Syntax

```
heap
```

11.18   help

all users   The *help* command displays a brief description of how to use the Command Line:

```
Type ? at any time to list possible options
(e.g. set user?)
```

Syntax

```
help
```

11.19   kill line

admin   This command can be used to kill the processes on a line.

Syntax

```
kill line n
```

Where *n* is the line that you want to kill.

Menu equivalent

Line Configuration - Kill Line

See also

kill session, restart, resume, set line, show line

11.20   kill session

all users   This command enables you to kill a session.

Syntax

```
kill session n
```

Where *n* is the session that you want to kill. To see how your sessions are
numbered, use the show sessions command.

Menu equivalent

Sessions - Kill Session

See also

kill line, logout, resume, show sessions

11.21   logout

all users   This command logs you off the JETSTREAM. You won't be allowed to log out if you still have sessions running.

Syntax

```
logout
```

Menu equivalent

Sessions - Logout

See also

kill line, kill session

11.22   ping

all users   If you are having trouble accessing a host, try the *ping* command. This tries to elicit a response from the specified host. If successful, a report similar to the following will be generated:

```
# ping socrates

PING socrates    (192.101.34.1): 100 data bytes
108  bytes from 192.101.34.1:   icmp.seq=0.    time=15. ms
108  bytes from 192.101.34.1:   icmp.seq=1.    time=12. ms
108  bytes from 192.101.34.1:   icmp.seq=2.    time=12. ms
108  bytes from 192.101.34.1:   icmp.seq=3.    time=12. ms
108  bytes from 192.101.34.1:   icmp.seq=4.    time=12. ms
108  bytes from 192.101.34.1:   icmp.seq=5.    time=12. ms
108  bytes from 192.101.34.1:   icmp.seq=6.    time=12. ms
108  bytes from 192.101.34.1:   icmp.seq=7.    time=12. ms
108  bytes from 192.101.34.1:   icmp.seq=8.    time=12. ms
108  bytes from 192.101.34.1:   icmp.seq=9.    time=12. ms

- - - socrates PING statistics - - -
10 packets transmitted, 10 packets received, 0% packet loss
round-trip (ms)    min/avg/max = 12/12/15
```

You can interrupt the process by pressing any key.

If the hostname cannot be resolved, the following message will be displayed:

```
Ping: hostname: Host not found
```

If the host has been resolved, but the network it is on is unreachable, the following output will be generated:

```
ping hostname/inetaddress        100 data bytes

ping: t_rcvudata: ENETUNREACH - Network is
unreachable
```

If the host has been resolved, but it isn't answering, the following will be displayed:

```
ping hostname/inetaddress        100 data bytes

10 packets transmitted, 0 packets received,
100% packet loss.
```

Syntax

```
ping hostname/inetaddress [packet_size]
[packets_sent]
```

Where:

hostname/ inetaddress	is the hostname or internet address of the machine that you want to ping.
packet_size	is the size of packet sent (default = 100 bytes).
packets_sent	is the number of packets sent (default = 10).

11.23   reboot

admin

This command will reboot the JETSTREAM. You will be asked to confirm the reboot with the following prompt:

```
Confirm Reboot Server (y/n)
```

Type 'y' to reboot, 'n' to cancel.

By default, the JETSTREAM boots from ROM. If the net rebooting facility has been enabled, it will try to reboot from a specified boot file. The JETSTREAM will continue trying to access the boot file until successful or until you interrupt the process by pressing a key on the console. If no boot file is found on boot host 1, the process will be repeated on boot host 2 if defined. If no boot file is found, JETSTREAM will boot from ROM.

Rebooting does not reset the JETSTREAM to factory default settings.

The rebooting process can also be used to download terminal definitions (see Section 8.4 Downloading Terminal Definitions).

Syntax

```
reboot
```

Menu equivalent

Network Configuration - Reboot - Reboot Server

See also

set extraterms, set netboot, show serverinfo

11.24   reset factory

admin   This command will reset the JETSTREAM to its default values.

Syntax

```
reset factory
```

Menu equivalent

Network Configuration - Reset

See also

reboot

11.25   reset line

admin   This command will reset the specified line(s) to the default line configuration.

Syntax

```
reset line ./n/*
```

Where:

.	specifies the current line.
n	is a specific line number.
*	specifies all lines.

Menu equivalent

Line Configuration - Line Settings/Virtual Circuits - Quit form

See also

reboot

11.26   reset user

admin   This command will reset the specified user(s) to the default user settings. This sets the user level to 'normal' and the screen switch character to '1'. Any predefined sessions are switched off. The default admin user will not be reset.

Syntax

```
reset user ./*/username
```

Where:

.	specifies the current user.
username	is the name of a specific user.
*	specifies all users.

See also

reboot

11.27   restart

admin   When there is insufficient free memory to start a login or virtual circuit on a line, that line will appear dead and you will be unable to restart it. You must wait until sufficient memory is available and then restart all such lines using this command. You can enter the command on any active line.

Syntax

```
restart
```

See also

heap

11.28 restore

admin

This command enables you to restore the configuration information saved to boot host 1.

Syntax

```
restore
```

You will be asked to confirm the restore configuration.

See also

save

11.29 resume

all users

The resume command enables you to resume any session that you have left running. You will be returned to where you left off.

Syntax

```
resume n
```

Where *n* is the session you want to resume.

Menu equivalent

Sessions - Resume Session

See also

kill session, start

11.30   rlogin

admin normal   This command will establish a connection with a host using the rlogin protocol. Rlogin passes your login name to the host, so you are prompted for your password only. If your JETSTREAM login name exists in the 'rhost' file of the target login directory, you won't be prompted for a password. You will be logged straight in. Rlogin and telnet are compared in Chapter 10 (Running Sessions).

Syntax

```
rlogin hostname/inetaddress [termtype termtype]
[user username]
```

Where:

hostname/ inetaddress	is the hostname or internet address of the machine you want to log into.
termtype	is your terminal type. By default a dumb terminal type is passed to the host. When connecting to a UNIX host, you must define the termtype in accordance with its UNIX TERM variable.
username	is your login name on the target host if different to your JETSTREAM login. You can also use this argument to log in as someone else.

Menu equivalent

Sessions - Start telnet/rlogin

See also

kill session, resume, show line, start, telnet

11.31   save

admin   This command enables you to save the configuration of your JETSTREAM unit
to a remote host. The configuration can subsequently be reloaded using the
restore command. The following information will be saved:

> User Profiles
>
> Port Configuration
>
> Host Table
>
> Gateways

Fixed data and JETSTREAM information will not be saved. Data will be written
to the file /etc/mts/config/*servername* on boot host 1. Most UNIX versions of
TFTP require this file to exist and to have global write permission before transfer
can take place.

Syntax

```
save
```

You will be asked to confirm the restore configuration.

See also

```
restore
```

11.32   screen

all users   This command will change you from Command Line mode to Full Screen mode
(on supported terminal types only).

Syntax

```
screen
```

11.33   set broadcast

admin
- This command enables you to set or change your broadcast address. Once you have entered an IP address and subnet mask, the broadcast address will default to the IP address with the host part(s) set to 255.

. You must reboot after changing the broadcast address.

Syntax

```
set broadcast broadcast_address
```

Menu equivalent

Server Configuration

See also

reboot, show serverinfo

11.34   set contact

admin
If using the SNMP version of JETSTREAM, this command enables you to configure the SNMP sysContact object.

Syntax

```
set contact contact_name
```

Where *contact_name* is a string which cannot contain spaces (e.g. john.smith, john_smith or johnsmith)

See also

set location

11.35   set domain

admin   This command enables you to set or change your domain name. You must reboot the JETSTREAM afterwards.

Syntax

```
set domain domain_name
```

Menu equivalent

Server Configuration

See also

reboot, show serverinfo

11.36   set extraterms

admin   The Extraterms feature enables you to download additional terminal definitions from a remote host at boot time (see Section 8.4 Downloading Terminal Definitions). The set extraterms command allows you to enable/ disable this feature.

Syntax

```
set extraterms on/off
```

Menu equivalent

Network Configuration - Extraterms

See also

add boothost, set netboot

11.37 set gateway

admin   This command enables you to redefine a gateway.

Syntax

```
set gateway hostname type [inetaddress] [static]
```
Where:

hostname	is the name of the gateway.
type	is 'default', 'host' or 'network'. If host or network.
inetaddress	is the internet address of the target host or network.
static	will configure the gateway as static.
	For definitions of active and static see Section 6.10 Gateways.

Menu equivalent

Network Configuration - Gateway - Change Gateway

See also

add gateway, delete gateway

11.38 set host

admin   Use this command if you need to change the internet address of one of the hosts in your host table.

Syntax

```
set host hostname inetaddress
```

Menu equivalent

Network Configuration - Host Table - Change Host

See also

add host, delete host, show hosts

11.39   set internet

admin   This command enables you to set or change the internet address of the
JETSTREAM. You must reboot the JETSTREAM afterwards.

Syntax

```
set internet inetaddress
```

Menu equivalent

Server Configuration

See also

reboot, show serverinfo

11.40   set line

Use this command to configure lines. An admin user can change the setup of any line; a normal user can change their own line only. On login connections, changes to the terminal type or number of video pages will take effect immediately. Other changes will take effect when someone next logs in on the line.

Syntax

```
set line line_number [speed speed] [parity
parity][stop stop_bits] [data data_bits] [flow
flow_control]  [pages no_pages] [termtype
termtype] [modem on/off] [user username]
[nouser] [type line_type raw/telnet hostname
mts_port host_port]
```

Where:

line_number	may also be specified as '*' for all lines or '.' for the line currently being used.
pages	(for normal connections) is the number of video pages the terminal supports.
user	(for normal connections) can be used to dedicate the line to a specific user. Only this user will be able to log in on this line and they won't need to enter their login name - just their password.
nouser	(for normal connections) nullifies the user argument; it enables any user to log in on this line.
line_type	is the type of connection required: normal, direct, silent, reverse, printer or bimodem.
raw/telnet	(for direct, silent or reverse connections) specifies whether you want the connection to be 'raw' or 'telnet'.
hostname	(for direct, silent and bimodem connections) is the name of the target host.

mts_port	(for reverse raw and bimodem connections) is the TCP port number assigned to the JETSTREAM port. TCP/IP hosts will use this TCP port to establish a connection with the JETSTREAM.
host_port	(for direct raw, silent raw and bidir connections) is the TCP port assigned on the target host to listen for the incoming connection.

The other arguments are standard line setting arguments. Any number or combination of the arguments can be used.

Examples:

```
set line 6 type silent telnet plato
set line 3 type reverse raw 1000
set line 9 speed 38400 modem on type bimodem
homer 1000 900
```

Menu equivalent

Line Configuration - Line Settings/Virtual Circuits

See also

show line

11.41   set location

admin   If using the SNMP version of JETSTREAM, this command enables you to configure the SNMP sysLocation object.

Syntax

```
set location location
```

See also

set contact

11.42   set nameserver

admin   Use this command to re-define the TCP port number running the nameservice on a nameserver.

Syntax

```
set nameserver hostname tcp_port
```

Menu equivalent

Network Configuration - Name Servers - Change Name Server

See also

add nameserver, delete nameserver

11.43   set netboot

admin   If you want to reboot the JETSTREAM from ROM, *set netboot* must be set to 'off'. This is the default setting. If you want to net reboot the JETSTREAM, *set netboot* must be set to 'on'. This command will not reboot the JETSTREAM, you must use the reboot command for that.

Net rebooting is described in more detail in Chapter 8 (System Administration) under the heading Upgrading System Software.

Syntax

```
set netboot on/off
```

Menu equivalent

Network Configuration - Reboot - Set Net Reboot

See also

add boothost, reboot, show serverinfo

11.44   set security

admin   By enabling this feature, you restrict incoming connections (reverse and printer line types and remote configuration) to the hosts defined in the host table. By default, this feature is disabled (off).

Syntax

```
set security on/off
```

Menu equivalent

Network Configuration - Security

11.45   set servername

admin   This command enables you to set or change the name of the JETSTREAM (in its function as a Terminal Server). The name can be a maximum of 14 characters. You must reboot the JETSTREAM afterwards.

Syntax

```
set servername servername
```

Menu equivalent

Server Configuration

See also

reboot, show serverinfo

11.46   set subnet

admin   Use this command to set or change the subnet mask of your network. For a definition of subnet mask, see Section 3.3 JETSTREAM Configuration. You must reboot the JETSTREAM afterwards.

Syntax

```
set subnet subnet_mask
```

Menu equivalent

Server Configuration

See also

reboot, show serverinfo

11.47   set user

admin normal   This command enables you to set or modify a user's setup, including predefined sessions. An admin user can change any user setup; a normal user can only change their own setup.

Syntax

```
set user username/. [password] [level
user_level]  [switch screen_switch_char]
[session n ... ]
```

Where:

password	if you include this argument you will prompted to enter a new password.
user_level	is 'admin', 'normal' or 'restricted'.
screen_ switch_char	is the hex value of the 'hot-key' used for switching sessions. The default is 1 (^a). See the ascii code chart in Section F.2 ASCII to Decimal and Hex Code Chart.
session	use this argument to predefine sessions for the user. You can predefine one specified session (*n*), or all sessions (*). It takes the following arguments:

```
... session n/* type telnet/rlogin host hostname
[termtype termtype] [auto on/off] [echo on/
off][mapnl on/off] [mode on/off] [intr <hex>]
[quit <hex>] [eof <hex>] [erase <hex>]
```

You must specify the type and hostname. The other arguments are optional. The arguments after auto are telnet options.

You can use any number or combination of the arguments. Use the ? command to list the options for each one. An example is given below:

```
set user john level normal switch 02 session* type
telnet host socrates termtype wyse60
```

This command has set up four predefined telnet sessions on host socrates for user 'john'.

Menu equivalent

Users - Change User/Set Password

See also

add user, delete user

11.48 show gateways

admin normal Use this command to list the gateways you have defined. The list will be displayed in the following format:

```
Hostname    Type          Internet Address  Static
socrates    default                         No
plato       host          192.65.144.4      Yes
```

Syntax

show gateways

Menu equivalent

Network Configuration - Gateways - Change Gateway

See also

add gateway, delete gateway, set gateway

11.49 show hosts

admin normal Use this command to list the contents of the host table:

```
Hostname     Internet Address
socrates     192.65.144.89
plato        192.65.144.4
homer        192.65.144.76
aristotle    192.65.144.11
```

Syntax

show hosts

Menu equivalent

Network Configuration - Host Table - Change Host

See also

add host, delete host, set host

11.50   show line

admin normal   This command can be used to display the configuration of a single line or all lines. Admin users can show all lines, normal users can only display the configuration of their own line. If you specify all lines, the display will look like this:

```
Line   Speed   Usage
1      57600   sil tel plato 23 virtual circuit
2      57600   sil tel plato 23 virtual circuit
3      57600   sil tel plato 23 virtual circuit
4      57600   sil tel plato 23 virtual circuit
5      57600   sil haw plato 24 virtual circuit
6      57600   reverse 900
7      57600   printer
8      38400   Console admin telnet
:
16     38400   alan       rlogin rlogin
```

If you specify a particular line, the following information will be displayed:

line settings, line type (including hostname and tcp port where appropriate), current user (normal line type only) and active sessions.

Below is an example:

```
MTS # sh li 6
Line Speed Term Modem Flow Bits Parity Stop Pages Type ho/
                                                        mts
```

```
6     9600   wyse off    soft 8    none   1    3      rev  --/
             60                                       erse 900
```

In this example, in the ho/mts field, the --/900 are tcp port numbers. As this is a reverse raw connection, the tcp port (900) is allocated on the JETSTREAM (MTS); no tcp port is allocated on the host.

Syntax

```
show line ./n/*
```

Where:

.	specifies the current line.
n	is a specific line number.
*	specifies all lines

Menu equivalent

Line Configuration - Virtual Circuits/Line Settings

See also

set line, show user

11.51   show route

The output of this command will give you a better understanding of your network. Below is an example:

```
Destination        Gateway         Flags Refs Use  Inter
                                                    -face
192.101.35.192 192.101.35.217       U     1    1    1e0
0.0.0.0        192.101.35.217       UG    0    0    1e0
```

Syntax

show route

Menu equivalent

there is no menu equivalent

Note   *the output to this command is synonymous with that from the 'netstat -r' command on most Unix systems. See the manpages (type "man netstat" on your Unix system for more information.*

11.52   show serverinfo

admin   This command displays the configuration of the JETSTREAM, for example:

```
Servername          mts
Internet address    192.65.144.91
Subnet Mask         255.255.255.0
Broadcast address   192.65.144.255
Domain Name         specialix.co.uk

Name Servers        plato (53)
Boot Hosts          plato:/etc/mts/mtsprom
Net Reboot          on
Security            off
Extraterms          on

SNMP:
Contact             johnsmith
Location            x235
Communities:        1. homer 192.65.144.78 read/write
                    2. local 192.65.144.2.55 read only
Traps:              1. local 192.65.144.255
```

The SNMP information is only displayed if you are running JETSTREAM software which includes SNMP support (referred to as models 6001 and 6501).

Syntax

```
show serverinfo
```

Menu equivalent

Server Configuration

See also

add boothost, add community, add trap, set broadcast, set contact, set domain, set extraterms, set internet, set location, set netboot, set security, set servername, set subnet

11.53   show sessions

admin normal   This command lists your active sessions (including active predefined sessions), for example:

```
1 telnet socrates
```

Syntax

```
show sessions
```

Menu equivalent

User - Set Up User - Set Sessions

See also

resume

11.54   show user

admin normal   Use this command to display a user's setup, including predefined sessions (see
                     below). The admin user can show details of any user, a normal user can only view
                     their own details.

```
# show user
Username  Language Screen Switch Char       Type
admin     english  01                       admin
  Type     Hostname Auto    Echo    Mapnl Mode Intr Quit EOF Erase Term
1 rlogin  socrates off     off     off   off  7f   1c   04  08    ansi
2 rlogin  homer    off     off     off   off  7f   1c   04  08    ansi
```

Syntax

```
show user ./username
```

Where:

.   specifies the current user.

username   is the name of a specific user.

Menu equivalent

Admin user: Users - Change User/Set Sessions.
Normal user: Sessions - Set Up User/Set Sessions

See also

set user

11.55   start

all users   Use this command to start a predefined session. This is a particularly important
                     command for restricted users who can only start sessions predefined for them by
                     system administrator. If you are using telnet, the target host will prompt you for
                     your login name. If you are using rlogin, the host will prompt you for your
                     password. If you are using rlogin and your JETSTREAM login name is entered in
                     the 'rhost' file of the target login directory, you will be logged straight in.

Syntax

```
start n
```

Where *n* is the predefined session that you want to start.

Menu equivalent

Sessions - Start Predefined Session

See also

resume, start telnet/rlogin

11.56   telnet

admin normal   This command will establish a connection with another host on the network using the telnet protocol. You must specify the target host but the other arguments are optional. When the connection is made you will be prompted for your login name.

Syntax

```
telnet hostname/inetaddress [termtype termtype]
[echo on/off] [mapnl on/off] [mode on/off]
[intr <hex>] [quit <hex>] [eof <hex>] [erase
<hex>]
```

Where:

hostname/ inetaddress	is the name or internet address of the machine you want to log into
termtype	is your terminal type. This argument enables you to pass your terminal type to the host. When connecting to a UNIX host, you must define the termtype in accordance with its UNIX TERM variable.

Menu equivalent

User - Start telnet/rlogin

See also

kill session, resume, rlogin, show session, start

11.57   version

admin normal   This command tells you what version of software your JETSTREAM is running.

Syntax

```
version
```

Menu equivalent

Version of software is displayed at the top of the screen.

A p p e n d i x   A

Technical Specifications

A.1 Introduction

This appendix contains the following technical specifications:

- in Section A.2 6000 and 6001 models (desk/wall-mounted versions)

- in Section A.3 Modular Terminal Adaptor (MTA)in Section A.4 6500 and 6501 models (rack-mounted versions).

It also contains:

- Section A.5 Summary of Line types

A.2 6000 and 6001 models

Environmental

Ambient Temperature	Operating	0°C - +50°C
	Storage	-40°C - +85°C
Relative Humidity	Operating	5% - 95% non-condensing
	Storage	0% - 100% non-condensing
		5% - 95% condensing
Emissions	Conforms to EN55022 Class A, FCC Class A	
Immunity	Conforms to EN50082-1	

Accommodation

Dimensions	Length:	257mm (10.12 in)
	Width:	200mm (7.78 in)
	Height:	32mm (1.26 in)
Mounting	wall or desk	

Power

The 6000 and 6001 models have an external power supply.

Power Supply Rating	44W
Power consumption	10W

Microprocessor

Device	80386 25MHz

A.3 Modular Terminal Adaptor (MTA)

Summary

JETSTREAM model numbers to which an MTA can attach	6000 and 6001
Number of MTAs which you can attach to a JETSTREAM	one only

Environmental

Ambient Temperature	Operating	0°C - +50°C
	Storage	-40°C - +85°C
Relative Humidity	Operating	5% - 95% non-condensing
	Storage	0% - 100% non-condensing
		5% - 95% condensing
Emissions		Conforms to EN55022 Class A, FCC Class A
Immunity		Conforms to EN50082-1

Accommodation

Dimensions	Length:	257mm (10.12 in)
	Width:	95 mm (3.7 in)
	Height:	32 mm (1.26 in)
Mounting		via the JETSTREAM to which it is attached (and to the wall, if wall-mounted).

Power   The MTA takes power from the JETSTREAM to which it is attached.

WARNING   **Do not connect or disconnect the MTA to/from the JETSTREAM while the power is on. You will damage the units, may cause a fire and possibly injure yourself.**

A.4 6500 and 6501 models

Environmental

Ambient Temperature	Operating	0°C - +50°C
	Storage	-40°C - +85°C
Relative Humidity	Operating	5% - 95% non-condensing
	Storage	0% - 100% non-condensing
		5% - 95% condensing
Safety of IT equipment including electrical business equipment	Conforms to EN60950 and CAN/CSA C22.2 No 950-95/UL1950	
Emissions	Conforms to EN55022 Class A, FCC Class A	
Immunity	Conforms to EN50082-1	

Accommodation

Dimensions	Height:	89mm (2U)	
	Width:	483mm	
	Depth:	without handles,	245mm
		with handles,	285mm
Mounting	standard 19 inch rack practise		
Weight	3.8 kg, assembled		

Power

The JETSTREAM 6500 connects directly to mains power. The internal power supply converts mains voltage to the required operating voltage.

Input	110V - 240V, 50-60 Hz AC
Power consumption	20W

Microprocessor

Device	80386 25MHz

A.5 Summary of Line types

Line Type	Uses	Example	How to setup
Normal	The default connection. You are logged into the JETSTREAM. Then, four telnet/rlogin sessions can be started to remote hosts.	For JETSTREAM configuration. Also for users customizing their own sessions.	Section 4.1 Introduction
Direct (telnet or rlogin)	To bypass the JETSTREAM and allow users to login straight into a specific host. *These are non-permanent connections*	Users on terminals.	Section 4.4 Setting Up Direct/ Silent Login Connections
Silent (telnet or rlogin)	To bypass the JETSTREAM and allow users to login straight into a specific host. *These are permanent connections, therefore consume system resources*	Users on terminals.	Section 4.4 Setting Up Direct/ Silent Login Connections
Printer	Remote printing using RCP	Using JETSTREAM as a printer server	Section 7.3 Remote Printing Using RCP
Silent Raw	Enables external non-login devices to access TCP/IP servers via JETSTREAM. *These connections are established automatically*; they are suitable for computer to computer communications.	Dialin connections	Section 7.5 Dialin Modem Connections

Line Type	Uses	Example	How to setup
Direct Raw	Enables external non-login devices to access TCP/IP servers via JETSTREAM. *These connections are established by pressing <return>.*	User applications	Section 7.2 Overview of Line Types
Reverse Raw	Simple pipe between a TCP/IP host and a machine/device attached to a JETSTREAM port	Typically to access printers or dialout modems (need host-based print/modem handling software).	Section 7.4 Remote Printing Using Host-Based Print Handling Software see also: Section 7.6 Dialout Modem Connections
Reverse Telnet	a) Enables a TCP/IP host to establish a login connection on an external machine attached to a JETSTREAM port b) Enables a TCP/IP host to establish a login connection to the JETSTREAM	a) To access machines like protocol converters or statistical multiplexors. b) for admin purposes.	Section 7.9 Reverse Telnet Connection
Bidir	Allows a bidirectional modem connection on a JETSTREAM port	Since the modem can be used for simultaneous dialin and dialout connections, an example use would be a UUCP connection for batch file transfer and printing.	Section 7.7 bidirectional Modem Connections

A p p e n d i x   B

Port Specification & Cabling, 6000 model only

B.1 Overview

Note.   The information in this appendix concerns the 6000 and 6001 models only.
*   For the 6500 and 6501 models go to Appendix C (Port Specifications &*
Cabling: 6500 model only).

This appendix describes pin specifications of the various types of Specialix connectors. It also guides you in cabling your devices to Specialix equipment.

The contents of this appendix is pin specifications, and example connections for most Specialix connectors.

Pin specifications:

- RS232 DB25 Ports (Female) DCE   Section B.2

- RS232 DB25 Ports (Male) DTE   Section B.3

- RS232* (asterisk) DB25 Ports   Section B.4

- RS232 RJ45 ports (with shielded connector)   Section B.5

- Parallel DB25 Port   Section B.28

- RS232 RJ45 Opto-isolated Ports   Section B.29

- RS422 DB25 Ports   Section B.30

Connection examples:

- for Direct (1:1) connections, see mini-Table of Contents at Section B.8.1.

- for Structured Cabling Systems, see mini-Table of Contents at Section B.22.1

B.2   RS232 DB25 Ports (Female) DCE

These ports provide a full RS232 interface for serial devices. The female DB25 connectors are wired as RS232 Data Communications Equipment (DCE).

Use a straight through cable to be used when connecting to DTE devices such as terminals. When connecting to other DCE devices, such as modems, a crossover cable must be used. See Section B.8.1 Example Connections for guidance.

The RS232 DB25 DCE serial pinouts are:

Table 6
RS232 DB25
(female) pin-outs

Pin	Circuit	Direction	Function
1	P/GND	-	Connect to case
2	RXD	Input	Receive Data
3	TXD	Output	Transmit Data
4	RTS	Input	Transmit Hardware Flow Control
5	CTS	Output	Receive Hardware Flow Control
6	DSR	Output	Data Set Ready
7	S/GND	-	Connect to logic 0V
8	DCD	Input	Data Carrier Detect
20	DTR	Input	Data Terminal Ready
22	RI	Input	Ring Indicator

Notes:

1.   P/GND means Protective (Chassis) Ground

2.   S/GND means Signal Ground

Optionally you can order these ports with **surge suppression.** This feature enables the ports to absorb high static discharges and surges. Contact your Specialix supplier for more information.

B.3   RS232 DB25 Ports (Male) DTE

These ports provide a full RS232 interface for serial devices. The male DB25 connectors are wired as RS232 Data Terminal Equipment (DTE).

You can use straight (pin 1 to pin 1, etc.) connections to Data Communications Equipment (DCE) such as modems. When connecting to other DTE devices, such as terminals, a crossover cable or device must be used. See Section B.8.1 Example Connections for guidance.

The RS232 DB25 DTE serial pin-outs are:

Table 7
RS232 DB25
(male) pin-outs

Pin	Circuit	Direction	Function
1	P/GND	—	Connect to case
2	TXD	Output	Transmit Data
3	RXD	Input	Receive Data
4	RTS	Output	Receive Hardware Flow Control
5	CTS	Input	Transmit Hardware Flow Control
6	DSR	Input	Data Set Ready
7	S/GND	—	Connect to logic 0V
8	DCD	Input	Data Carrier Detect
20	DTR	Output	Data Terminal Ready
22	RI	Input	Ring Indicator

Notes:

1.   P/GND means Protective (Chassis) Ground

2.   S/GND means Signal Ground

Optionally you can order these ports with **surge suppression.** This feature enables the ports to absorb high static discharges and surges. Contact your Specialix supplier for more information.

B.4   RS232* (asterisk) DB25 Ports

On the casing of your product, DB25 ports marked with an asterisk after the letters RS232. These RS232 ports have reduced capability: they do not support the Ring Indicator (RI) or Data Terminal Ready (DTR) signals. When cabling your devices to a RS232* port, bear in mind this limitation.

See pin-out details for DB25 connectors in Table 6 or Table 7.

The RS232 * ports are part of an option where a parallel port is provided; see Figure 13. One of the ports in the group is a parallel port.

Figure 13
RS232* ports
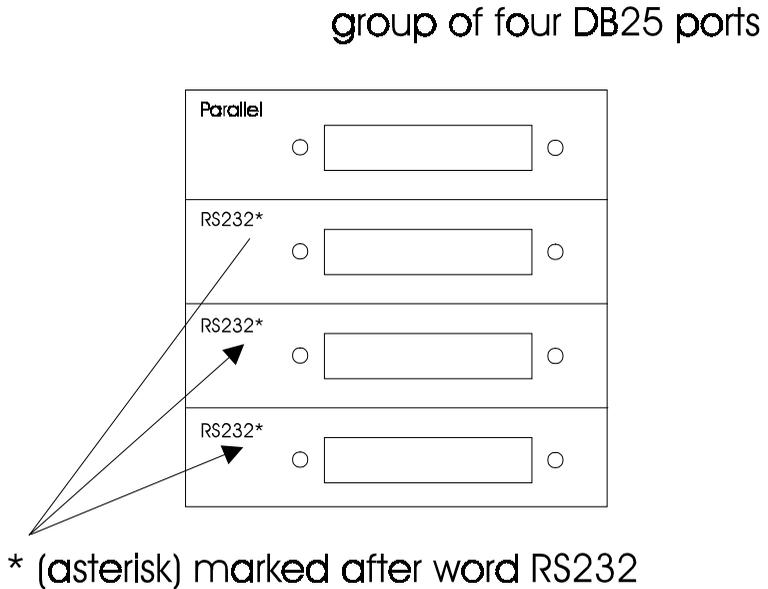
As an option you can have order the RS232* ports with surge suppression capability. This feature allows the ports to absorb high static discharges and surges.

B.5 RS232 RJ45 ports (with shielded connector)

The shielded RS232 RJ45 ports comply with the RS232 specification.

Note.   (There is an older non-shielded version of these ports; see Section B.6 RJ45 Ports (no shielding).

For help on cabling, see Section B.8.1 Example Connections. The examples include structured cabling environments.

There is additional information on structured cabling systems; see Section B.21 Structured Cabling Systems.

The pin-outs are shown in Table 8.

Table 8 shielded RJ45 pin-outs

Pin	Circuit	Direction	Function
1	DCD	Input	Data Carrier Detect
2	DSR	Output	Data Set Ready
3	DTR	Input	Data Terminal Ready
4	S/GND	—	Signal Ground
5	TXD	Output	Transmit Data
6	RXD	Input	Receive Data
7	CTS	Output	Clear To Send
8	RTS	Input	Request To Send
Shield	P/GND	—	Protective (Chassis) Ground

Notes:

1. P/GND means Protective (Chassis) Ground

2. S/GND means Signal Ground

Optionally you can order these ports with **surge suppression.** This feature enables the ports to absorb high static discharges and surges. Contact your Specialix supplier for more information.

The pins in the RJ45 socket are located at the top, with pin 1 on the left (see Figure 14).

Viewing the RJ45 plug from above (with the clip underneath), the pins are numbered as follows:

Figure 14
RJ45 Pin
Numbering

1 2 3 4 5 6 7 8

Pins

Wires

Cable
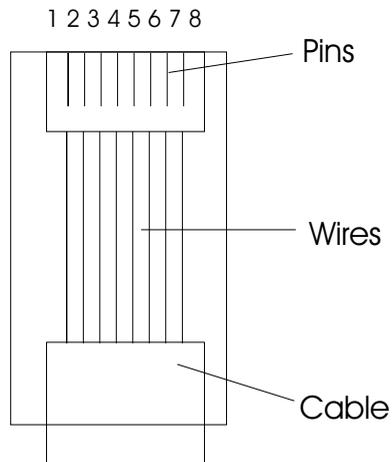
B.6   RJ45 Ports *(no shielding)*

These RJ45 ports do not have shielding around the connector.

Note: these ports are being phased out. Their replacement are the shielded RJ45 ports; (see Section B.5 RS232 RJ45 ports (with shielded connector)).

The pin-outs are as follows:

Table 9
non-shielded
RJ45 pin-outs

Pin	Circuit	Direction	Function
1	DSR	Output	Data Set Ready
2	DCD	Input	Data Carrier Detect
3	RXD	Input	Receive Data
4	CTS	Output	Receive Hardware Flow Control
5	S/GND	—	Ground
6	TXD	Output	Transmit Data
7	DTR	Input	Data Terminal Ready
8	RTS	Input	Receive Hardware Flow Control

Notes:

1.   S/GND means Signal Ground

To determine the position of pins inside the connector, see Figure 14.

B.7   Direct (1:1) Connections

This section details direct (1:1) connections (definition below). For structured cabling systems, go toSection B.21 Structured Cabling Systems.

Definition of a Direct (1:1) connection:

a single length of cable joins the Specialix device and your equipment; there is *no* structured cabling system or any other connection in-between.

Notes:

1.   Some user equipment need additional signals on the connector. These may not be supported by the Specialix device or your cable. The normal way to overcome this is to loop-back - on your equipment - one of the output lines to the required input. Refer to the documentation supplied with your equipment, or the supplier of the equipment, for information on which loop-backs, if any, are required.

2.   Other than a specific requirement at your equipment (as in note 1), do not connect unused pins on either connector.

3.   On the DB25 connector, Protective Ground (P/GND) is pin 1. On the RJ45 connector, Protective Ground (P/GND) terminates on the connector and so does not have a pin number.

B.8.1   Example Connections

In this section we show example connections between Specialix ports and the following devices:

Terminals	
Terminals (slow speed or using software flow control)	**Section B.10.1**
Terminals (faster speed or using Hardware Flow Control)	**Section B.11.2**
Terminal Connection using the modem device, Without hardware flow control:	**Section B.13.1**

Terminals	
Terminal Connection using the modem device, With hardware flow control:	**Section B.14.2**

Modems	
direct (1:1) connections:	**Section B.16.1**

PCs (DB9 connectors)	
direct (1:1) connections	**Section B.17**

Serial Printers	
with software flow control	**Section B.19.1**
with hardware flow control	**Section B.20.2**

B.9 Terminals

B.10.1 Terminals (slow speed or using software flow control)

For a standard terminal operating at slow speeds, or using software flow control, a simple 3-pin connection can be used:

```
Specialix device                                    Terminal
DB 25 Female (DCE)                                   DB 25


          RXD     2    <————————  2    TXD
          TXD     3    ————————>  3    RXD
          GND     7    ————————   7    GND
```

```
Specialix device                                    Terminal
DB 25 Male (DTE)                                     DB 25


          TXD     2    ————————>  3    TXD
          RXD     3    <————————  2    RXD
          GND     7    ————————   7    GND
```

Notes:

1. Some terminals need additional signals on the connector. These signals may not be supported by the Specialix device, or your cable. The normal way to overcome this is to loop-back one of the output lines from the terminal into the required input. Refer to the documentation supplied with your terminal, or the supplier of the terminal, for information on which loop-backs, if any, are required.

2. In addition to the signals shown in the examples above, you may connect Protective Ground (P/GND), at *either* your equipment *or* the Specialix device (but not both). P/GND will reduce interference in noisy environments.

Terminal connections (slow speed or using software flow control)

continued:

with a Specialix RJ45 connector and a direct (1:1) connection
(no structured cabling system present):

```
(shielded RJ45 ports only;
- see note 2. below)


Specialix device                    Terminal
RJ45                                DB25


        RXD    6   <————————   2   TXD
        TXD    5   ————————->  3   RXD
        S/GND  4   ————————–   7   S/GND
```

Notes:

1. In addition to the signals shown in the examples above, you may connect
    Protective Ground (P/GND) if you have shielded twisted-pair (STP) cable.
    Connect P/GND at *either* your equipment *or* the Specialix device (but not both).
    P/GND will reduce interference in noisy environments.

2. the example for RJ45 connector shown above is for shielded ports only. If you
    have non-shielded RJ45 ports, use the pin-outs for the Specialix device detailed in
    Section B.6.

B.11.2 Terminals
(faster speed or using Hardware Flow Control)

For a slow terminal operating at speeds faster than 9600 baud, or for a terminal which can't use xon/xoff flow control, the following connections are required:

```
Specialix device                                     Terminal
DB25 Female (DCE)                                     DB25

          RXD   2   <———————   2        TXD
          TXD   3   ———————>   3        RXD
          RTS   4   <———————   4 or 20  RTS/
                                        DTR
          *CTS  5   ———————>   5        *CTS
          GND   7   ———————    7        GND
```

:

```
Specialix device                                     Terminal
DB25 Male (DTE)                                       DB25

          TXD   2   ———————>   3        RXD
          RXD   3   <———————   2        TXD
          *RTS  4   ———————>   5        *CTS
          CTS   5   <———————   4 or     RTS/
                               20       DTR
          GND   7   ———————    7        GND
```

Notes:

1. * asterisk denotes that you should connect these pins only if input (from the Terminal to the Specialix device) flow control is required.

2. the pins used for hardware flow control may vary from terminal to terminal, but RTS (pin 4) on the Specialix device port must be connected to the pin on the terminal which indicates that the terminal buffer is full.

3. In addition to the signals shown in the examples above, you may connect Protective Ground (P/GND), at *either* your equipment *or* the Specialix device (but not both). P/GND will reduce interference in noisy environments.

4.   Some terminals need additional signals on the connector. These may not be supported by the Specialix device, or your cable. The normal way to overcome this is to loopback one of the output lines from the terminal into the required input. Refer to the documentation supplied with your terminal, or the supplier of the terminal, for information on which loop-backs, if any, are required.

Terminals (faster speed or using Hardware Flow Control)

continued:

with a Specialix RJ45 connector on a direct (1:1) connection
(no structured cabling system present):

```
(shielded RJ45 ports only;
- see note 2. below)


Specialix device                          Terminal
RJ45                                      DB25


        RXD    6   <————————  2        TXD
        TXD    5   ————————>  3        RXD
        RTS    8   <————————  4 or     RTS or
                              20        DTR
        *CTS   7   ————————>  5        *CTS
        S/GND  4   —————————  7        S/GND
```

Notes:

1. In addition to the signals shown in the examples above, you may connect
    Protective Ground (P/GND) if you have shielded twisted-pair (STP) cable.
    Connect P/GND at *either* your equipment *or* the Specialix device (but not both).
    P/GND will reduce interference in noisy environments.

2. the example for RJ45 connector shown above is for shielded ports only. If you
    have non-shielded RJ45 ports, use the pin-outs for the Specialix device detailed in
    Section B.6.

3. * asterisk denotes that you connect CTS to CTS only if input flow control (from
    the Terminal to the Specialix device) is required.

B.12 Terminal Connection *using the modem device*

B.13.1 *Without* hardware flow control:

Using the modem device on a local connection, you can ensure that the login process is killed when the terminal is switched off. This is achieved by wiring RTS or DTR on the terminal to DCD on the Specialix device port:

```
Specialix device                              Terminal
DB25 Female (DCE)                             DB25

RTA       RXD   2    <————————    2    TXD
          TXD   3    ————————>    3    RXD
          GND   7    —————————    7    GND
          DCD   8    <———————     4/   RTS/
                                  20   DTR
```

```
Specialix device                              Terminal
DB25 Male (DTE)                               DB25

RTA       TXD   2    ————————>    3    RXD
          RXD   3    <———————     2    TXD
          GND   7    —————————    7    GND
          DCD   8    <———————     4/   RTS/
                                  20   DTR
```

Notes:

1. Some terminals need additional signals on the connector. These may not be supported by the Specialix device, or your cable. The normal way to overcome this is to loopback one of the output lines from the terminal into the required input. Refer to the documentation supplied with your terminal, or the supplier of the terminal, for information on which loop-backs, if any, are required.

2. In addition to the signals shown in the examples above, you may connect Protective Ground (P/GND), at *either* your equipment *or* the Specialix device (but not both). P/GND will reduce interference in noisy environments.

Terminal Connection *using the modem device*

Without **hardware flow control**

(continued)

with a Specialix RJ45 connector on a direct (1:1) connection
(no structured cabling system present):

```
(shielded RJ45 ports only;
- see note 2. below)


Specialix device                    Terminal
RJ45                                DB25


        RXD    6   <————————  2   TXD
        TXD    5   ————————->  3   RXD
        S/GND  4   ————————-  7   S/GND
        DCD    1   <————————  4/  RTS/
                              20  DTR
```

Notes:

1. In addition to the signals shown in the examples above, you may connect
    Protective Ground (P/GND) if you have shielded twisted-pair (STP) cable.
    Connect P/GND at *either* your equipment *or* the Specialix device (but not both).
    P/GND will reduce interference in noisy environments.

2. the example for RJ45 connector shown above is for shielded RJ45 ports only. If
    you have non-shielded RJ45 ports use the pin-outs for the Specialix device detailed
    in Section B.6.

Terminal Connection *using the modem device*

B.14.2 *With* hardware flow control:

Using the modem device on a local connection, you can ensure that the login process is killed when the terminal is switched off. This is achieved by wiring RTS on the terminal to DCD on the Specialix device port:

```
Specialix device                                 Terminal
DB25 Female (DCE)                                DB25


        RXD    2    <───────    2     TXD
        TXD    3    ───────>    3     RXD
        RTS    4    <───────    20    DTR
        GND    7    ────────    7     GND
        DCD    8    <───────    4     RTS
```

```
Specialix device                                 Terminal
DB25 Male (DTE)                                  DB25


        TXD  2  ───────>   3      RXD
        RXD  3  <───────   2      TXD
        CTS  5  <───────   20     DTR
        GND  7  ────────   7      GND
        DCD  8  <───────   4      RTS
```

Notes:

1. The above examples assume that DTR on the terminal is being used for hardware flow control.

    If you are using RTS on the terminal as the hardware flow control pin, connect DTR on the Terminal to DCD on the Specialix device, and connect RTS on the terminal to either RTS or CTS on the Specialix device (RTS if Specialix connector is female (wired as DCE); CTS if Specialix connector is male (wired as DTE)).

2. In addition to the signals shown in the examples above, you may connect Protective Ground (P/GND), at *either* your equipment *or* the Specialix device (but not both). P/GND will reduce interference in noisy environments.

3. If your terminal still needs additional signals on the connector, note that these signals may not be supported by the Specialix device, or your cable. The normal way to overcome this is to loopback one of the output lines from the terminal into the required input. Refer to the documentation supplied with your terminal, or the supplier of the terminal, for information on which loop-backs, if any, are required.

Terminal Connection *using the modem device*

With **hardware flow control:**

(continued)

with a Specialix RJ45 connector on a direct (1:1) connection
(no structured cabling system present):

```
(shielded RJ45 ports only;
- see note 2. below)


Specialix device                    Terminal
RJ45                                DB25

        RXD    6   <————————  2   TXD
        TXD    5   ————————->  3   RXD
        RTS    8   <————————  20  DTR
        S/GND  4   ————————   7   S/GND
        DCD    1   <————————  4   RTS
```

Notes:

1. In addition to the signals shown in the examples above, you may connect
    Protective Ground (P/GND) if you have shielded twisted-pair (STP) cable.
    Connect P/GND at *either* your equipment *or* the Specialix device (but not both).
    P/GND will reduce interference in noisy environments.

2. the example for RJ45 connector shown above is for shielded RJ45 ports only. If
    you have a non-shielded RJ45 ports, use the pin-outs for the Specialix device
    detailed in Section B.6.

3. The above example assumes that DTR on the terminal is being used for hardware
    flow control.

    If you are using RTS on the terminal as the hardware flow control pin, connect
    DTR on the Terminal to DCD on the Specialix device, and connect RTS on the
    terminal to RTS on the Specialix device.

B.15 Modems

B.16.1 direct (1:1) connections:

```
Specialix device                                          Modem
DB25 Female (DCE)                                          DB25

          RXD   2   <————————   3   RXD   Modem
          TXD   3   ————————>   2   TXD
          RTS   4   <———————    5   CTS
          CTS   5   ———————>    4   RTS
          DSR   6   ———————>   20   DTR
          GND   7   ———————     7   GND
          DCD   8   <———————    8   DCD
          DTR  20   <———————    6   DSR
```

```
Specialix device                                          Modem
DB25 Male (DTE)                                            DB25

          TXD   2   ———————>    2   TXD   Modem
          RXD   3   <———————    3   RXD
          RTS   4   ———————>    4   RTS
          CTS   5   <———————    5   CTS
          DSR   6   <———————    6   DSR
          GND   7   ———————     7   GND
          DCD   8   <———————    8   DCD
          DTR  20   ———————>   20   DTR
```

Notes:

1. In addition to the signals shown in the examples above, you may connect
    Protective Ground (P/GND), at *either* your equipment *or* the Specialix device (but
    not both). P/GND will reduce interference in noisy environments.

Modems; example connections,

continued:

with a Specialix RJ45 connector and a direct (1:1) connection to the modem (no structured cabling system present):

```
(shielded RJ45 ports only;
- see note 2. below)


Specialix device                      Modem
RJ45                                  DB25

        RXD    6   <————————  3   RXD
        TXD    5   ————————>  2   TXD
        RTS    8   <————————  5   CTS
        CTS    7   ————————>  4   RTS
        DSR    2   ————————>  20  DTR
        S/GND  4   ————————   7   S/GND
        DCD    1   <————————  8   DCD
        DTR    3   <————————  6   DSR
```

Notes:

1. at the modem, signal RXD is received data from the PSTN; signal TXD is transmitted data to the PSTN.

2. In addition to the signals shown in the examples above, you may connect Protective Ground (P/GND) if you have shielded twisted-pair (STP) cable. Connect P/GND at *either* your equipment *or* the Specialix device (but not both). P/GND will reduce interference in noisy environments.

3. the example for RJ45 connector shown above is for shielded RJ45 ports only. If you have non-shielded RJ45 ports use the pin-outs for the Specialix device detailed in Section B.6.

B.17 PCs (DB9 connectors)

example connections:

```
Specialix device                                    PC
DB25 Female (DCE)                                   DB9

        TXD       3      ───────>   2     RXD          PC
        RXD       2      <───────   3     TXD
        CTS       5      ───────>   8     CTS
        RTS       4      <───────   7     RTS
        GND       7      ───────    5     GND
        DTR       20     <───────   4     DTR
        DSR       6      ───────>   6     DSR
```

```
Specialix device                                    PC
DB25 Male (DTE)                                     DB9

        TXD       2      ───────>   2     RXD          PC
        RXD       3      <───────   3     TXD
        RTS       4      ───────>   8     CTS
        CTS       5      <───────   7     RTS
        GND       7      ───────    5     GND
        DSR       6      <───────   4     DTR
        DTR       20     ───────>   6     DSR
```

Note:

1. In addition to the signals shown in the examples above, you may connect
    Protective Ground (P/GND), at *either* your equipment *or* the Specialix device (but
    not both). P/GND will reduce interference in noisy environments.

2. if your PC is fitted with a DB25 connector, use the same DB25 pin-outs as for
    modems, shown in Section B.15 Modems

PC, example connections,

(continued):

```
(shielded RJ45 ports only;
- see note 4. below)

Specialix device                        PC
RJ45                                    DB9

        TXD    5    ––––––––>   3    TXD
        RXD    6    <––––––––   2    RXD
        RTS    8    <––––––––   7    RTS
        CTS    7    ––––––––>   8    CTS
        S/GND  4    ––––––––    5    S/GND
```

1. if your PC is fitted with a DB25 connector, use the same DB25 pin-outs as for modems, shown in Section B.15 Modems

2. we assume you are connecting your PC directly to the Specialix device (no structured cabling system).

3. In addition to the signals shown in the examples above, you may connect Protective Ground (P/GND) if you have shielded twisted-pair (STP) cable. Connect P/GND at *either* your equipment *or* the Specialix device (but not both). P/GND will reduce interference in noisy environments.

4. the example for RJ45 connector shown above is for shielded RJ45 ports only. If you have non-shielded RJ45 ports use the pin-outs for the Specialix device detailed in Section B.6.

B.18 Serial Printers

B.19.1 with *software* flow control

```
Specialix device                                    Printer
DB25 Female DCE                                        DB25


     RXD   2   <————————        2       TXD
     TXD   3   ————————>        3       RXD
     GND   7   ————————         7       GND
```

```
Specialix device                                    Printer
DB25 Male DTE                                          DB25


     TXD   2   ————————>        3       RXD
     RXD   3   <————————        2       TXD
     GND   7   ————————         7       GND
```

Notes on both examples:

1. In addition to the signals shown, you may connect Protective Ground (P/GND), at *either* your equipment *or* the Specialix device (but not both). P/GND will reduce interference in noisy environments.

2. Some printers require additional pins to be held high (connected). Check your printer's documentation and follow any instructions.

Serial Printers; example connections,

with *software* flow control

(continued)

with a Specialix RJ45 connector and a direct (1:1) connection to the printer
(no structured cabling system present):

```
(shielded RJ45 ports only;
- see note 1. below)


Specialix device                    Printer
RJ45                                DB25

        RXD    6   <————————  2   TXD
        TXD    5   ————————->  3   RXD
        S/GND  4   ————————   7   S/GND
```

Notes:

1. the example for RJ45 connector shown above is for shielded ports only. If you
    have non-shielded RJ45 ports, use the pin-outs for the Specialix device detailed in
    Section B.6.

2. In addition to the signals shown in the examples above, you may connect
    Protective Ground (P/GND) if you have shielded twisted-pair (STP) cable.
    Connect P/GND at *either* your equipment *or* the Specialix device (but not both).
    P/GND will reduce interference in noisy environments.

3. Some printers require additional pins to be held high (connected). Check your
    printer's documentation and follow any instructions.

Serial Printers, example connections, continued:

B.20.2 with *hardware* flow control

```
Specialix device                                   Printer
DB25 Female DCE                                       DB25

      RXD   2   <————————      2      TXD
      TXD   3   ————————>      3      RXD
      RTS   4   <————————     20      DTR
      GND   7   ————————       7      GND
```

```
Specialix device                                   Printer
DB25 Male DTE                                         DB25

      TXD   2   ————————>      3      RXD
      RXD   3   <————————      2      TXD
      CTS   5   <————————     20      DTR
      GND   7   ————————       7      GND
```

Notes on both examples:

1. Printers have independent hardware flow control, using their DTR pin. Check your printer is doing the same.

2. In addition to the signals shown, you may connect Protective Ground (P/GND), at *either* your equipment *or* the Specialix device (but not both). P/GND will reduce interference in noisy environments.

3. Some printers require additional pins to be held high (connected). Check your printer's documentation and follow any instructions.

Serial Printers; example connections,

with *hardware* flow control

(continued)

with a Specialix RJ45 connector and a direct (1:1) connection to the printer
(no structured cabling system present):

```
(shielded RJ45 ports only;
- see note 1. below)


Specialix device                   Printer
RJ45                               DB25


        RXD    6    <————————   2    TXD
        TXD    5    ————————>   3    RXD
        RTS    8    <————————   20   DTR
        S/GND  4    ————————    7    S/GND
```

Notes:

1. the example for RJ45 connector shown above is for shielded ports only. If you
    have non-shielded RJ45 ports, use the pin-outs for the Specialix device detailed in
    Section B.6.

2. the printer has independent hardware flow control, using its DTR pin. Check your
    printer is doing the same.

3. In addition to the signals shown in the examples above, you may connect
    Protective Ground (P/GND) if you have shielded twisted-pair (STP) cable.
    Connect P/GND at *either* your equipment *or* the Specialix device (but not both).
    P/GND will reduce interference in noisy environments.

4. Some printers require additional pins to be held high (connected). Check your
    printer's documentation and follow any instructions.

B.21 Structured Cabling Systems

This section details structured cabling systems. For direct (1:1) connections, go to Section B.7 Direct (1:1) Connections.

Notes:

1. In the connection examples which follow, the signals shown refer to the connection at the end of the cabling system to which your equipment is attached - see Figure 15. At the other end of the cabling system, where the Specialix device is attached, we assume - and recommend - you use a straight-through RJ45 cable to connect our Specialix device to the cabling system.

Figure 15   structured cabling system environment
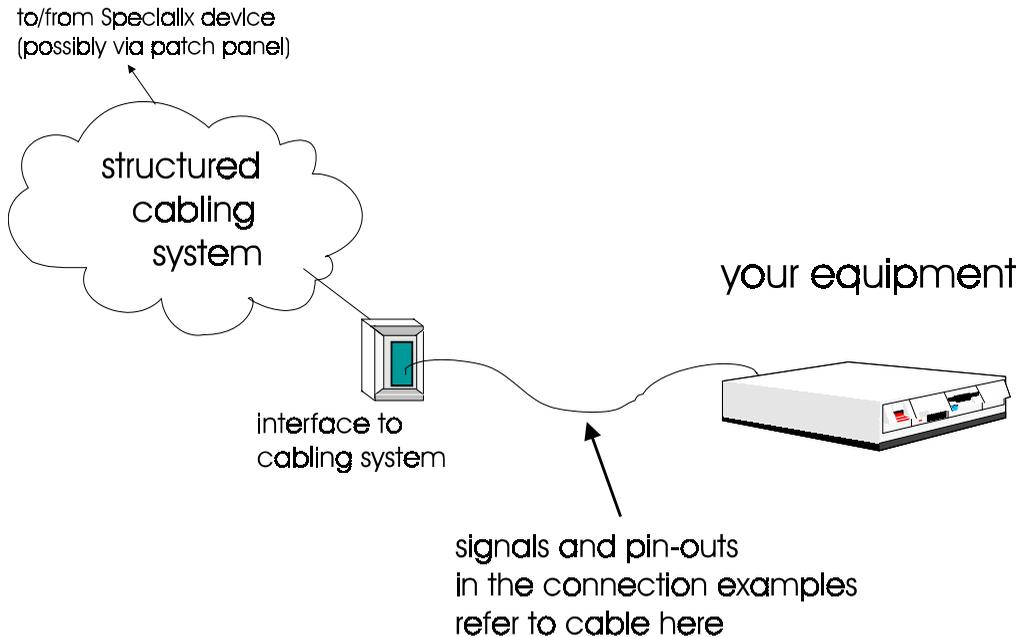
2. *Within* the structured cabling system, we presume you use straight-through cabling, i.e. pin 1 to pin 1, pin 2 to pin 2, etc.

3. Some user equipment need additional signals on the connector. These may not be supported by the Specialix device, or your cable. The normal way to overcome this is to loopback - on the your equipment - one of the output lines to the required input. Refer to the documentation supplied with your equipment, or the supplier of the equipment, for information on which loop-backs, if any, are required.

4. At each end of the cable, you must terminate all pairs of wires on connector pins. An unconnected wire will receive electromagnetic radiation and possibly create interference in the cable.

5. If you have wiring other than shown in the connection examples, and DCD is an input on your equipment, ensure that it is **not** connected to DCD in the Specialix device.

6. On the RJ45 connector, Protective Ground (P/GND) terminates on the connector and so does not have a pin number.

B.22.1 Example Connections

In this section we show example connections between Specialix ports and the following devices:

Terminals	
structured cabling system	**Section B.23.2**
Terminal Connection using the modem device	**Section B.24.3**

Modems	
structured cabling system	**Section B.25.4**

PCs (DB9 connectors)	
structured cabling system	**Section B.26.5**

Serial Printers	
structured cabling system	**Section B.27.6**

Terminals, example connections:

B.23.2 structured cabling system

With a structured cabling system, use the example below to connect any type of terminal. The pins and signals refer to the end of the cabling system to which the terminal is attached - see Figure 15. We have shown the signals of a Wyse 60 terminal; for any other type of terminal, refer to the product's documentation.

```
(- see note 2. below about the Specialix
RJ45 connectors

Interface to cabling system        Terminal
RJ45                                DB25

        RXD    6    <————————   2    TXD
        TXD    5    ————————>   3    RXD
        RTS    8    <————————  20    DTR
        CTS    7    ————————>   5    CTS
        DSR    2    ————————>   6    DSR
        S/GND  4    ————————    7    S/GND
        DCD    1    <———————|
                                4    RTS
        DTR    3    <———————|
                (n/c)               DCD
```

Notes:

1. in addition to the signals shown in the examples above, you may connect Protective Ground (P/GND) if you have shielded twisted-pair cable. Connect P/GND at *either* your equipment *or* the interface to cabling system (but not both). P/GND will reduce interference in noisy environments.

2. *meaning of* | :the DCD and DTR signals to the interface to the cabling system originate jointly on the RTS pin at the terminal.

3. the DCD pin at the terminal is not connected (n/c); (devices other than the Wyse 60 may require that the DCD pin is held high).

4. at the end of the cabling system to which the Specialix device is attached, use a straight-through cable.

5. the example for RJ45 connector shown above is for shielded RJ45 ports only. If you have non-shielded RJ45 ports, use the pin-outs for the Specialix device detailed in Section B.6.

6. the minimum connection requirement is the RXD/TXD, TXD/RXD, RTS/RTS or DTR, CTS/CTS (if input flow control required) and S/GND signals (Interface to Cabling System/Terminal). The other pins may be connected (as in our example) to ensure minimum interference from unconnected pins.

7. for general advice on structured cabling systems, see Section B.21 Structured Cabling Systems.

Terminal Connection *using the modem device*

example connections:

B.24.3 structured cabling system:

```
(- see note 2. below about the Specialix
RJ45 connectors

Interface to cabling system        Terminal
RJ45                               DB25

        RXD    6    <---------  2    TXD
        TXD    5    --------->  3    RXD
        RTS    8    <---------  20   DTR
        CTS    7    --------->  5    CTS
        DSR    2    --------->  6    DSR
        S/GND  4    ---------   7    S/GND
        DCD    1    <-------|
                                4    RTS
        DTR    3    <-------|
               (n/c)             DCD
```

Notes:

1. in addition to the signals shown in the examples above, you may connect
    Protective Ground (P/GND) if you have shielded twisted-pair (STP) cable.
    Connect P/GND at *either* your equipment *or* the interface to the cabling system
    (but not both). P/GND will reduce interference in noisy environments.

2. the example for RJ45 connector shown above is for shielded RJ45 ports only. If
    you have a non-shielded RJ45 ports, use the pin-outs for the Specialix device
    detailed in Section B.6.

3. the above example assumes that DTR on the terminal is being used for hardware
    flow control. If you are using RTS on the terminal as the hardware flow control
    pin, connect DTR on the Terminal to DCD and DTR on the interface to the cabling
    system, and connect RTS on the terminal to RTS on the interface to the cabling
    system.

4. *meaning of* | the DCD and DTR signals at the interface to the cabling system
    originate jointly on the RTS pin at the terminal.

5. the minimum connection requirement is the RXD/TXD, TXD/RXD, RTS/DTR, S/GND and DCD-DTR/RTS signals (Interface to Cabling System/Terminal). The other pins may be connected (as in our example) to ensure minimum interference from unconnected pins.

Modems, example connections:

B.25.4 structured cabling system

with a structured cabling system present, the example below is shown at the modem end - see Figure 15; (use a straight-through cable at the Specialix device end).

```
(- shielded RJ45 ports only;
see note 3. below)


Interface to cabling system        Modem
RJ45                               DB25


        RXD    6   <---------  3   RXD
        TXD    5   --------->  2   TXD
        RTS    8   <---------  5   CTS
        CTS    7   --------->  4   RTS
        DSR    2   --------->  20  DTR
        S/GND  4   ---------   7   S/GND
        DCD    1   <---------  8   DCD
        DTR    3   <---------  6   DSR
```

Notes:

1. at the modem, signal RXD is received data from the PSTN; signal TXD is transmitted data to the PSTN.

2. in addition to the signals shown in the examples above, you may connect Protective Ground (P/GND) if you have shielded twisted-pair (STP) cable. Connect P/GND at *either* your equipment *or* the interface to cabling system (but not both). P/GND will reduce interference in noisy environments.

3. at the Specialix device we assume you are using shielded RJ45 ports (as per details in Section B.5). If you have non-shielded RJ45 ports use the pin numbers detailed in Section B.6.

4. for general advice on structured cabling systems, see Section B.21 Structured Cabling Systems.

PC, example connections:

B.26.5 structured cabling system

```
(shielded RJ45 ports only;
- see note 3. below)


Interface to cabling system     PC
RJ45                            DB9

        TXD   5   ————————>  3   TXD
        RXD   6   <————————  2   RXD
        RTS   8   <————————  7   RTS
        CTS   7   ————————>  8   CTS
        S/GND 4   —————————  5   S/GND
        DCD   1   <————————  1   DCD
        DSR   2   ————————>  6   DSR
        DTR   3   <————————  4   DTR
```

1. if your PC is fitted with a DB25 connector, use the same DB25 pin-outs as for modems, shown in Section B.25.4

2. in addition to the signals shown in the examples above, you may connect Protective Ground (P/GND) if you have shielded twisted-pair (STP) cable. Connect P/GND at *either* your equipment *or* the interface to cabling system (but not both). P/GND will reduce interference in noisy environments.

3. the example for RJ45 connector shown above is for shielded RJ45 ports only. If you have non-shielded RJ45 ports use the pin-outs for the Specialix device detailed in Section B.6.

4. the minimum connection requirement is the TXD/TXD, RXD/RXD, RTS/RTS, S/GND and CTS/CTS signals (Interface to Cabling System/Terminal). The other pins may be connected (as in our example) to ensure minimum interference from unconnected pins.

5. for general advice on structured cabling systems, see Section B.21 Structured Cabling Systems.

Serial Printers, example connections:

B.27.6 structured cabling system

with a structured cabling system present, the example below is shown at the printer end; (use a straight-through cable at the Specialix device end).

```
(shielded RJ45 ports only
- see note 6. below)


Interface to cabling system     Printer
RJ45                            DB25

        RXD    6    <————————  2   TXD
        TXD    5    ————————>  3   RXD
        RTS    8    <————————  20  DTR
        CTS    7    ————————>  5   CTS
        DSR    2    ————————>  6   DSR
        S/GND  4    —————————  7   S/GND
        DCD    1    <———————|
        DTR    3    <———————|  4   RTS
                    (n/c)         DCD
```

Notes:

1. *meaning of | :*the DCD and DTR wires at the cabling system originate jointly on the RTS pin at the printer.

2. the DCD pin at the printer is not connected (n/c); (other printers may require that the DCD pin is held high).

3. the minimum connection requirement is the RXD/TXD, TXD/RXD, RTS/DTR and S/GND connections (Interface to Cabling System/Printer). The other pins may be connected (as in our example) to ensure that there is minimum interference from unterminated pins.

4. in addition to the signals shown in the examples above, you may connect Protective Ground (P/GND) if you have shielded twisted-pair (STP) cable. Connect P/GND at *either* your equipment *or* the interface to cabling system (but not both). P/GND will reduce interference in noisy environments.

5. the above example applies to a printer using both hardware and software flow control.

6. the example for RJ45 connector shown above is for shielded RJ45 ports only. If you have non-shielded RJ45 ports use the pin-outs for the Specialix device detailed in Section B.6.

7. for general advice on structured cabling systems, see Section B.21

B.28 Parallel DB25 Port

This port provides a Centronics-type interface for Parallel printers. Parallel cables use a straight 25-way connection.

Table 10 Parallel pin-outs

Pin	Circuit	Direction	Function
1	STROBEN*	Output	PSTROBE
2	D0	Output	DATA 1
3	D1	Output	DATA 2
4	D2	Output	DATA 3
5	D3	Output	DATA 4
6	D4	Output	DATA 5
7	D5	Output	DATA 6
8	D6	Output	DATA 7
9	D7	Output	DATA 8
10	PACKN*	Input	ACK
11	PBUSY	Input	BUSY
12	PPE	Input	PE
13	PSLCT	Input	SLCT
14	AUTOFDXT*	Output	AUTOFEED
15	PERRORN*	Input	FAULT
16	PINITN*	Output	INPUT PRIME
17	PSLINN*	Output	SLCT IN
18	GND	—	GROUND
19	GND	—	GROUND
20	GND	—	GROUND
21	GND	—	GROUND
22	GND	—	GROUND
23	GND	—	GROUND
24	GND	—	GROUND
25	GND	—	GROUND

* = Active low

B.29 RS232 RJ45 Opto-isolated Ports

These ports have the RXD+ and RXD- pins electrically isolated from the rest of the unit using opto-isolators. This provides two advantages: the signal will not pick up interference, and power surges or sparks caused by voltage changes will not be transmitted.

Further noise reductions can be achieved by using software flow control. The pin-outs for these ports are as follows:

Table 11
RS232 RJ45 Opto-isolated pin-outs

Pin	Signal	Direction	Function
1	Chassis	—	Chassis Ground
2	RTS-	Output	Inverse RTS
3	TXD-	Output	Inverse TXD
4	RXD+	Input	Receive Data
5	RXD-	Input	Inverse RXD
6	Ground	—	Signal Ground
7	CTS	Input	Clear To Send
8	Chassis	—	Chassis Ground

Pin 6 (Ground) should be used as TXD+; pin 7 (CTS) should be connected to pin 2 (RTS-) on the peripheral device.

The pins in the RJ45 socket are located at the top, with pin 1 on the left (see Figure 14).

B.30 RS422 DB25 Ports

These ports provide a full RS422 interface for serial devices. When wiring with RS422 ports refer to the documentation supplied with the device, or the suppliers of the device, for wiring instructions.

RS422 twisted-pair cable allows you to run a serial device at 115.2Kb up to 1km from the Specialix device port.

The RS422 D25 pin descriptions are:

Table 12
RS422 DB25 pin-
outs

Pin	Circuit	Direction	Function
1	Chassis		Connects to case
2	RXD+	Input	Receive Data
3	TXD+	Output	Transmit Data
4	RTS+	Input	Receive Hardware Flow Control
5	CTS+	Output	Transmit Hardware Flow Control
6	DTR+	Output	Data Terminal Ready
7	Ground	—	Connects to logic 0V
8	DSR+	Input	Data Set Ready
10	DSR-	Input	Inverse DSR
13	CTS-	Output	Inverse CTS
14	RXD-	Input	Inverse RXD
16	TXD-	Output	Inverse TXD
18	DTR-	Output	Inverse DTR
19	RTS-	Input	Inverse RTS
20	DCD+	Input	Data Carrier Detect
21	RI-	Input	Inverse RI
22	RI+	Input	Ring Indicator
23	DCD-	Input	Inverse DCD

The two wires (+ and -) for each signal must be twisted together to form a pair.

The names of some of these signals are often used in reverse. Here, CTS and DTR are outputs, RTS and DSR are inputs.

Appendix C

Port Specifications & Cabling: 6500 model only

C.1 Overview

This appendix describes pin specifications for the types of Specialix connectors on the 6500 and 6501 models only. For detail on the 6000 and 6001 model go to Appendix B (Port Specification & Cabling, 6000 model only).

The contents of this appendix are:

- AUI 15-way female D-type connector,   Section C.2
- RJ45 10BaseT port,   Section C.3
- RS232 shielded RJ45 ports,   Section C.4

Pin specifications

C.2   AUI 15-way female D-type connector

Note   *These pin-outs refer to the 6500 and 6501 models only.*

Pin	Signal	Pin	Signal
1	Ground/chassis link	9	Collision-
2	Collision+	10	Data Out-
3	Data Out+	11	Ground
4	Ground	12	Data In-
5	Data In+	13	+12 volt
6	Ground	14	Ground
7	no connection	15	no connection
8	Ground		

C.3   RJ45 10BaseT port

Note   *These pin-outs refer to the 6500 and 6501 models only. On these models this connector is on the **rear** of the product.*

Pin	Signal	Function
1	TXD+	Transmit Data+
2	TXD-	Transmit Data-
3	RXD+	Receive Data+
4	n/c	no connection
5	n/c	no connection
6	RXD-	Receive Data-
7	n/c	no connection
8	n/c	no connection

C.4 RS232 shielded RJ45 ports

Note   *These pin-outs refer to the 6500 and 6501 models only. On these models this connector is on the front of the product.*

Pin	Signal	Direction	Function
1	DCD	IN	Data Carrier Detect
2	DSR	OUT	Data Set Ready
3	DTR	IN	Data Terminal Ready
4	Signal Ground	-	Connects to Logic 0V
5	TXD	OUT	Transmit Data
6	RXD	IN	Receive Data
7	CTS	OUT	Clear To Send
8	RTS	IN	Request To Send
Shield	Frame Ground	-	Connects to frame

A p p e n d i x   D

Troubleshooting

D.1   Introduction

This appendix contains solutions for problems that may arise while using the JETSTREAM.

If you bought your JETSTREAM from a registered Specialix Supplier, you must contact their Technical Support department; they are qualified to deal with your problem.

If you are a registered Specialix Supplier, and bought your JETSTREAM from Specialix, please contact the Technical Support department of your nearest Specialix office. The addresses and telephone numbers of your nearest Specialix office are contained in Section D.6 Technical Support.

D.2   General communication checks

A good general communication check is as follows:

- ping your host; if you cannot ping at all, check the cabling between the JETSTREAM and your network. If you can ping but packet loss is reported, ping another host/device on the same network. You will appreciate whether the problem is specific to a host/device or general to the network. If there is a problem with the network check the state of the network, including number of nodes.

- use the *show route* command (command line only). Is there a route to the host? The show route command is explained in more detail at Section 11.51 show route.

D.3   Problems concerned with accessing a host(s)

D.3.1   Cannot access a host by name

• if using DNS or DNS is required, ensure a nameserver is configured on your JETSTREAM and is accessible (ping it).

• if not using DNS, ensure the host is configured in the host table. Check access to the host by pinging it using the host's IP address.

D.3.2   Cannot access a host on a local network

ensure:

• the network address is correct.

• the subnet mask is set correctly and reflects the network configuration.

• the broadcast address is set correctly and reflects the network configuration.

D.3.3   Cannot access a host on a remote network

• use the *show route* command to verify that there is a route to the remote host. If no gateway is specified, ensure a default gateway is specified. Ping the default gateway to check if it is working.

• Consider the situation beyond the gateway; e.g. are intermediate gateways and the remote host available? Also, check the messages returned by the *show route* command; e.g. that a particular host or gateway is unreachable.

D.3.4   Access to host lost after a few minutes

• Earlier versions of JETSTREAM did not support static routing. If the route to this host goes through routers, make sure those routers are all sending RIP packets.

D.4   Problems using your terminal

The following section concerns problems with the appearance of data on your terminal screen:

D.4.1 Corrupt data

• check your line settings (baud rate, stop bits, etc.)

D.4.2 Missing data

• ensure the same type of flow control is set in both your terminal and on the JETSTREAM port.

D.4.3 Screen corruption when using the menuing system

• check that the terminal setup in the JETSTREAM matches your terminal.

• check that entries in the term file match your terminal setup.

• if using a PC, ensure the type of terminal emulation selected in your application matches those supported by the JETSTREAM. If you still have the problem, you may be suffering with poorly written terminal emulation in your application. Instead use the command line mode.

D.4.4 When using the function keys on your keyboard, nothing happens or your sessions keep swapping.

The function keys on the keyboards of some terminals (e.g. Wyse 60) send character sequences which begin with ^a. This is the default screen switch character, or 'hot- key', which you use to switch between sessions. You can change your own screen switch character by using the 'Set Environment' menu option on the Set Up User menu (see Section 9.6 Changing your User Environment). A valid alternative would be ^b (hex=02). If you are the system administrator, you can change any user's screen switch character using the 'Change User' option on the Users menu (see Section 5.5 Configure a User Account).

D.4.5 When using a downloaded terminal definition, you are having problems using arrow keys.

• Use Ctrl-K, Ctrl-J, Ctrl-H and Ctrl-L for up, down, left and right respectively.

D.4.6 When switching from a session back to Full Screen mode, both screen images are superimposed.

• Press ^r to redraw the screen.

D.5 Other Problems

D.5.1 Poor responsiveness

• Implement load-balancing by distributing the processing. For example, try not to cluster on the JETSTREAM devices which require high throughput.

• Ensure routes to/from your host are as direct as possible; e.g. ensure the JETSTREAM is on the same network as your host so that bridges/routers do not act as bottlenecks.

• If your network is congested, subnet it with a bridge; however, bear in mind the recommendations in the previous paragraph.

D.5.2 You can't download files from a boot host.

• Make sure TFTP is enabled on the boot host and that the file(s) to be downloaded have global read/write permission.

• If you are using TFTP with the secure option make sure you follow the instructions in Section 8.4 Downloading Terminal Definitions.

D.5.3 INIT: Error in terminal file /etc/mts/term*n*

This error indicates that you have exceeded the 80 character limit for one or more of the terminal capabilities defined in the reported file.

D.5.4 INIT: Error on line *n* in terminal file /etc/mts/term*y*

You have omitted the '=' sign from the reported line.

D.5.5 BOOTP does not work

• in the BOOTPTAB file on your host, enter all of the fields listed at Section 8.5.2 The BOOTPTAB file; i.e. all of ht, ha, ip, sm, etc.

• Check the hosts' documentation for requirements on BOOTPTAB file entries.

D.5.6 MTSD problems

On some operating systems, the system timeouts used to establish and break network connections can disrupt the operation of MTSD. To avoid this, check the arguments you are using with MTSD commands. Type mtsd -help and see the applicability of each command. In this manual, see Section 7.8.6 List of MTSD command options.

Include or take-out arguments which you feel are appropriate.

D.5.7 Cannot configure console port as certain line types

Port 8 (the Console port) deliberately cannot be configured as silent and printer line types. This precaution prevents all JETSTREAM ports being configured as silent or printer connections, thereby denying you access to the JETSTREAM for configuration.

• To configure the console port as silent or printer line type, you must telnet into the JETSTREAM.

D.5.8 Emergency Recovery

Problem:

All ports are set to direct or silent telnet/rlogin (i.e. direct to a host) and you want to get to the JETSTREAM login. Recovery procedure is:

- on port 8 (the console port) telnet/rlogin into the JETSTREAM (and see a login prompt from a host), wait until the host login has timed out and press <esc>. You should see a login to the JETSTREAM.

Problem:

You have a JETSTREAM already configured and,

- have lost, misconfigured or don't know the IP address of the JETSTREAM, and

- you cannot obtain a login on any port (including the console port), and

- you have lost or don't know your password

the recovery procedure is the same as for a lost password (see Section 8.12).

Note the following:

- before you type in the magic string you will not see a login prompt. After you have successfully typed in the magic string, you will see a login prompt.

- when you have successfully gained access to your unit, the line settings will be set to factory default (see Section 1.8 Setting Up the Console) for the duration of that login only. Other configuration information will be unchanged.

- Next time you login (using your preferred password) the original stored line settings will be restored.

Problem:

You have a JETSTREAM already configured and,

- you do know your password, but

- have lost, misconfigured or don't know the IP address of the JETSTREAM, and

- you cannot obtain a login on any port (including the console port)

The emergency recovery method is to use BOOTP (see Section 8.5 BOOTP).

- Setup a host machine on your network to run BOOTP. Using the ethernet address of the JETSTREAM (printed on the base of the product) BOOTP will assign the JETSTREAM a known IP address.

- Now, you should be able to telnet onto the JETSTREAM and change its IP address.

Using BOOTP to recover access to your JETSTREAM in this manner will preserve all configuration settings - apart from the IP address.

D.6 Technical Support

If you bought your JETSTREAM from a registered Specialix Supplier, you must contact their Technical Support department; they are qualified to deal with your problem.

If you are a registered Specialix Supplier, and bought your JETSTREAM from Specialix, contact Specialix Technical Support at these offices:

D.6.1 Europe

United Kingdom

Specialix Europe Ltd.
3 Wintersells Road
Byfleet Surrey KT14 7LF
UK

Telephone: +44 (0) 1932 792555 (Support)
              +44 (0) 1932 792592 (Main SwitchBoard)
              (previously, Main SwitchBoard was +44 (0) 1932 354254)

Facsimile: +44 (0) 1932 792593
              (was +44 (0) 1932 352781)

e-mail: support@specialix.co.uk

ftp site: ftp@specialix.co.uk. Use your e-mail address for your password.

web site: www@specialix.co.uk

Bulletin Board Service. +44 (0) 1932 355654. All speeds up to 28800 Baud. To log in, the user id is 'bbs', the password 'support'. The BBS can also be accessed via our ftp site ftp.specialix.co.uk (see above).

France

Specialix Ltd.
13 Avenue Morane - Saulnier
78140 Velizy
FRANCE
Telephone: +33 (1) 34 63 0670
Facsimile: +33 (1) 34 65 38 60

e-mail, ftp and www contact details, as for UK.

Germany

Specialix Ltd.
Lyonerstrasse 14
D-60528 Frankfurt/Main
GERMANY
Telephone: +49 (0) 69 6655 4460
Facsimile: +49 (0) 69 6655 4100

e-mail, ftp and www contact details, as for UK.

D.6.2 USA

Specialix Inc.
745 Camden Avenue #129
Campbell
CA95008-4146
USA
Telephone: +1 (408) 378-7919
(Freephone): +1 (800) 423-5364 (USA only)
Facsimile: +1 (408) 378-0786

US support is open from 7am Pacific (10am Eastern) time until
5pm Pacific(8 Eastern) time.

E-mail: support@specialix.com

World Wide Web: www@specialix.com

Bulletin Board Service (BBS). The US BBS can be accessed using the following numbers:

> +1-408-378-4766 Hayes 2400 Baud

> +1-408-378-4767 MultiTech 28800 Baud

> +1-408-378-4768 MultiTech 28800 Baud

> +1-408-378-4769 US Robotics 14400 Baud

To log into the BBS, the user id is guest and the password support. The BBS can also be accessed from our FTP site slxbbs.specialix.com. Use your e-mail address for your password.

D.6.3 Singapore

Specialix (Asia) Pte Ltd.
Yu Li Industrial Building
No 37 Lor 23 Sims Avenue #04-01/05
Singapore 388371

Telephone: +65 (0) 749 1700
Facsimile: +65 (0) 749 2003

Email: support@specialix.co.uk

D.6.4 Australia

Specialix Pty Ltd.
Unit 15a, 390 Eastern Valley Way
Roseville
NSW 2069
AUSTRALIA

Telephone: +61 (0) 2 417 3666
Facsimile: +61 (0) 2 417 3791

A p p e n d i x E

Specialix Private MIB Definitions

OBJECT TYPE	SYNTAX	ACCESS	STATUS	DEFINITION
ServerName	DisplayString	Read-write	Mandatory	The hostname of the JETSTREAM unit
freeSpace	Gauge	Read-only	Mandatory	The amount of free memory available on the JETSTREAM
swVersion	DisplayString	Read-only	Mandatory	The software version number
serverInfo	ServerInfo	Not accessible	Mandatory	A list of objects relating to general server information
domainName	DisplayString	Read-write	Mandatory	The domain name of the JETSTREAM unit
portsNumber	INTEGER	Read-only	Mandatory	The number of ports on the JETSTREAM unit
portsInfoTable	SEQUENCE of PortsInfoEntry	Not accessible	Mandatory	The serial ports info table
portsInfoEntry	PortsInfoEntry	Not accessible	Mandatory	An entry in the PortsInfoTable, relating to an JETSTREAM port
portID	INTERGER	Read-only	Mandatory	An index that uniquely identifies the port
terminalType	INTEGER { wyse60(1) vt100(2) ansi(3) dumb(4) term1(5) term2(6) term3(7) }	Read-write	Mandatory	The terminal type of the port

OBJECT TYPE	SYNTAX	ACCESS	STATUS	DEFINITION

baudRate	INTEGER {
	b75(1)
	b300(2)
	b600(3)
	b1200(4)
	b1800(5)
	b2400(6)
	b4800(7)
	b9600(8)
	b19200(9)
	b38400(10)
	b57600(11)
	b115200(12)
	}
		Read-write	Mandatory	The baud rate of the port

dataBits	INTEGER {
	d5(1)
	d6(2)
	d7(3)
	d8(4)
	}
		Read-write	Mandatory	The number of databits used on the port

parity	INTEGER {
	none (1)
	odd (2)
	even (3)
	}
		Read-write	Mandatory	The parity of the port

stopBits	INTEGER {
	s1 (1)
	s2 (2)
	}
		Read-write	Mandatory	The number of stop bits used on the port

pages	INTEGER {
	p1 (1)
	p2 (2)
	p3 (3)
	p4 (4)
	p5 (5)
	p6 (6)
	p7 (7)
	}
		Read-write	Mandatory	The number of pages available on the port

defaultUser	INTEGER	Read-write	Mandatory	The default user of the port

validUser	INTEGER {
	no (1)
	yes (2)
	}
		Read-write	Mandatory	Is there a default user user of the port ?

OBJECT TYPE	SYNTAX	ACCESS	STATUS	DEFINITION

modem	INTEGER {
	off (1)
	on (2)
	}
		Read-write	Mandatory	The modem status of the port

flowControl	INTEGER {
	none (1)
	soft (2)
	hard (3)
	both (4)
	}
		Read-write	Mandatory	The flow control being used on the port

lineType	INTEGER {
	normal (1)
	directraw (2)
	silentraw (3)
	printer (4)
	directtelnet (5)
	silenttelnet (6)
	reversetelnet (7)
	reverseraw (8)
	bimodem (9)
	directlogin (10)
	silentlogin (11)
	}
		Read-write	Mandatory	The type of connection being used on the port

hostPort	INTEGER	Read-write	Mandatory	The host TCP port assigned to the virtual circuit
mtsPort	INTEGER	Read-write	Mandatory	The TCP port assigned to the port
host	INTEGER	Read-write	Mandatory	The host for the virtual circuit

pinDCD	INTEGER {
	off (1)
	on (2)
	}
		Read-only	Mandatory	The current status of the port's DCD pin. If the port is a Parallel port, 'on' means printer not busy, 'off' means printer busy

pinDTR	INTEGER {
	off (1)
	on (2)
	}
		Read-only	Mandatory	The current status of the port's DTR pin. If the port is a serial port on a parallel module, pinDTR returns an error. If the port is a Parallel port, 'on' means error, 'off' means no error

OBJECT TYPE	SYNTAX	ACCESS	STATUS	DEFINITION
pinRTS	INTEGER { off (1) on (2) }	Read-only	Mandatory	The current status of the port's RTS pin. If the port is a Parallel port, 'off' means printer selected, 'on' means printer not selected
charSends	Counter	Read-write	Mandatory	The (resettable) count of the number of characters sent through the port
charReceiveds	Counter	Read-write	Mandatory	The (resettable) count of the number of characters received by the port

A p p e n d i x   F

ASCII and HEX code charts

F.1   Introduction

This appendix contains the following:

- Section F.2 ASCII to Decimal and Hex Code Chart

- Section F.3 Binary to Hex Code Chart

F.2   ASCII to Decimal and Hex Code Chart

ASCII	DEC	HEX	ASCII	DEC	HEX	ASCII	DEC	HEX
NUL (^@)	000	00	DC3 (^S)	019	13	&	038	26
SOH (^A)	001	01	DC4 (^T)	020	14	'	039	27
STX (^B)	002	02	NAK (^U)	021	15	(	040	28
ETX (^C)	003	03	SYN (^V)	022	16	)	041	29
EOT (^D)	004	04	ETB (^W)	023	17	*	042	2A
ENQ (^E)	005	05	CAN (^X)	024	18	+	043	2B
ACK (^F)	006	06	EM (^Y)	025	19	,	044	2C
BEL (^G)	007	07	SUB (^Z)	026	1A	-	045	2D
BS (^H)	008	08	ESC	027	1B	.	046	2E
HT (^I)	009	09	FS	028	1C	/	047	2F
LF (^J)	010	0A	GS	029	1D	0	048	30
VT (^K)	011	0B	RS	030	1E	1	049	31
FF (^L)	012	0C	US	031	1F	2	050	32
CR (^M)	013	0D	SP	032	20	3	051	33
SO (^N)	014	0E	!	033	21	4	052	34
SI (^O)	015	0F	"	034	22	5	053	35
DLE (^P)	016	10	#	035	23	6	054	36
DC1 (^Q)	017	11	$	036	24	7	055	37
DC2 (^R)	018	12	%	037	25	8	056	38

ASCII	DEC	HEX	ASCII	DEC	HEX	ASCII	DEC	HEX
9	057	39	Q	081	51	i	105	69
:	058	3A	R	082	52	j	106	6A
;	059	3B	S	083	53	k	107	6B
<	060	3C	T	084	54	l	108	6C
=	061	3D	U	085	55	m	109	6D
>	062	3E	V	086	56	n	110	6E
?	063	3F	W	087	57	o	111	6F
@	064	40	X	088	58	p	112	70
A	065	41	Y	089	59	q	113	71
B	066	42	Z	090	5A	r	114	72
C	067	43	[	091	5B	s	115	73
D	068	44	\	092	5C	t	116	74
E	069	45	]	093	5D	u	117	75
F	070	46	^	094	5E	v	118	76
G	071	47	-	095	5F	w	119	77
H	072	48	'	096	60	x	120	78

ASCII	DEC	HEX
I	073	49
J	074	4A
K	075	4B
L	076	4C
M	077	4D
N	078	4E
O	079	4F
P	080	50

ASCII	DEC	HEX
a	097	61
b	098	62
c	099	63
d	100	64
e	101	65
f	102	66
g	103	67
h	104	68

ASCII	DEC	HEX
y	121	79
z	122	7A
{	123	7B
		124	7C
}	125	7D
~	126	7ES
DEL	127	7F

F.3   Binary to Hex Code Chart

Binary	Hex
0000	0
0001	1
0010	2
0011	3
0100	4
0101	5
0110	6
0111	7
1000	8
1001	9
1010	A
1011	B
1100	C
1101	D
1110	E
1111	F

Notes:

To represent two letters/two numbers flow binary numbers sequentially, so :

0F is 0 followed by F, i.e. 0000 followed by 1111.

0F is therefore 00001111 in binary.

Likewise, the binary digits 10110100 would equate to:

1011 followed by 0100, which is B followed by 4;

therefore 10110100 is B4 in hex.

Appendix G

TCP/IP and Terminal Servers

G.1 Introduction

The purpose of this appendix is to provide a background to, and general information on, Terminal Servers and the TCP/IP protocol suite, for those who are either unfamiliar with the technology or need further information. The aim is to provide sufficient information to allow installation and testing of products on a TCP/IP network.

G.2 Terminal Servers

Traditionally, terminals, modems and printers have been directly attached to multi-user computer systems through the use of dedicated hardware contained within the host computer system. Such hardware is normally described as a serial multiplexor or multi-port card, and indeed Specialix makes a range of these products for use with PC bus technology systems.

An alternate, network-based, method of connection has been used by a number of proprietary system manufacturers, most notably IBM's SNA-based 3270 communications controllers and DEC's LAT network terminal server.

The advantage of such schemes revolve around the ability to connect terminals significantly further from the host machine and, through a configurable network, to provide connections to a number of hosts from a single terminal.

An example of such a scheme might be a manufacturing company that runs a production database on one system, general accounts on another, and office applications on a third. A financial analyst may well require access to all three systems, for different functions. Such a person could have three different terminals, a practice which has occurred in the past. However, through a network-based connection, a single terminal can easily access many hosts.

In addition to the benefits of access to multiple hosts, terminal servers also offload the processing requirements associated with the handling of serial devices, line discipline etc.

Once the requirement for network-based access from terminals to such hosts is established, the need arises for a set of standards to determine and manage the connection methods. TCP/IP is one of these standards.

G.3 History

TCP/IP networking is generally associated with UNIX. Its origins, however, lie with the US government's Defence Advance Research Projects Agency (DARPA).

DARPA sponsored the development of TCP/IP to provide a coherent suite of network protocols for ARPANET, which links key defence, government and research computer systems. Many of these sites use supercomputers, employing proprietary operating systems, but to encourage academic involvement, and offer broader access, DARPA funded the development of TCP/IP software for use with 'Berkeley Standard Distribution' (BSD) UNIX.

By the mid-eighties, the National Science Foundation (NSF) had realised the value of ARPANET, but saw the benefit of expanding access to a wider community, it therefore funded the development of a higher-performance, wider-access network system. Although the NSF still runs the major elements of this network, access is available worldwide, primarily through access points provided by the academic community. The network is the INTERNET.

Perhaps because of its academic and research bias, but more likely out of commercial self-interest, the major computer vendors (primarily DEC and IBM) have tended to support but not encourage the use of TCP/IP. However, today there is hardly any computer system that cannot be accessed using TCP/IP protocols.

With the growth in demand for remote access, two protocols were developed. Firstly there was SLIP (Serial Line Interface Protocol) and then there was PPP (Point to Point Protocol). By allowing the transmission of IP packets over a serial line these protocols fuelled the remote access market.

Specialix support the SLIP and PPP protocols through their JETSTREAM 7x series product range of Communication Servers.

G.4 Local Vs Wide Area Networks

This guide primarily concentrates on TCP/IP running on Ethernet local area networks (LANs), however TCP/IP's principal strength is that it also easily supports wide area connections, which after all are what the internet provides. Access to host systems distributed world-wide is as easy as accessing local machines.

G.5 Network Addressing

To construct a worldwide internet, some mechanism has to be provided to ensure each network node (or host) has a unique address. Because TCP/IP supports many transmission media (not just Ethernet but also Token Ring, Pronet, ARCNET and various WAN link technologies), its addressing scheme must be independent of the network connection method used.

All TCP/IP nodes have an 'internet address', these can be set autonomously, but to be connected to the internet, the address has to be provided by, and registered with NSF. Details of this registration process are provided at the end of this chapter.

Internet addresses exist in three classes. The originators of the internet, DARPA, assumed in the early design that a small number of sites, with potentially large numbers of computers at each site, would be the norm. However once it became obvious that a broader academic and commercial involvement would occur, the addressing scheme had to be expanded to allow more sites.

The basic internet address is a 32 bit number. To allow ease of representation this address is broken into 4 octets (bytes) and reported in 'dotted decimal' notation, thus:

nnn.nnn.nnn.nnn

where nnn can be any number in the range 0 to 255.

e.g. 128.213.120.151 or 192.65.144.23 or 1.0.0.1

All internet addresses are deemed to have two parts, one identifying the network, and the other the particular device. Three classes of address are supported:

G.5.1 Class A

1	2	7	8	32
0	netid		hostid	

The first format supports 128 networks of 16 million nodes, addresses are easily identified as the first octet of the address is in the range 0 to 126 (addresses with the first octet set to 127 are reserved for loopback).

G.5.2 Class B

1	2	3 16	17 32
1	0	netid	hostid

This format supports 16 thousand networks of 64 thousand nodes. Addresses are identified through the first octet of the address being in the range 128 to 191.

G.5.3 Class C

1	2	3	4 24	25 32
1	1	0	netid	hostid

The most commonly used format, this scheme supports one million networks of 223 nodes. The first octet of the address is in the range 192 to 223. The address octet 255 is normally reserved for special use.

G.6 Hostnames

Although, all hosts have a unique internet address, it is normal in day-to-day use to use hostnames. Because we are in the world of Technology, these hostnames are often unusual, to say the least. For instance: names of characters in science fiction series, planets or other stellar bodies. In more commercial concerns, structured name schemes may be used.

To convert hostnames to internet addresses, a lookup table is used, much like a telephone directory. In a small system this is normally performed by a file called /etc/hosts, but on larger systems, or if connected to the internet, management of this list becomes very difficult. A number of systems are available for managing larger networks including DNS (Domain Name Service) and SUN's NIS (which used to be called Yellow Pages). The operation of these schemes is outside the remit of this manual, but they are well covered in UNIX documentation.

Below is an example of an /etc/hosts file:

```
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *   *
*                                                                   *
*              SAMPLE etc/hosts File                                *
*                                                                   *
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *   *
#              @ (#)      1.2 Lachman System V STREAMS
               hosts      TCP Source
#              SCCS IDENTIFICATION
127.0.0.1                localhost
192.65.131.1             mercury
                         mercury.specialix.co.uk
192.65.131.2             venus venus.specialix.co.uk
192.65.131.3             earth
192.65.131.4             mars
192.65.131.5             jupiter
192.65.131.6             saturn
192.65.131.7             uranus    nameserver
192.65.131.8             neptune
192.65.131.9             pluto     sipport
192.65.131.10            titan
192.65.131.11            moon
```

G.7 Address Resolution Protocol

Those familiar with Ethernet will know that each ethernet device, be it a PC adaptor card, a complete computer system, terminal server or bridge has a unique address (48 bits long), allocated via the manufacturer by the IEEE.

All ethernet messages are passed using this address, which unfortunately bears no resemblance to the internet address. To establish connections between TCP/IP devices each has to be able to find out the ethernet address associated with a particular TCP/IP address. The mechanism used to achieve this is called ARP. It's operation is normally transparent to the network user, but direct intervention is sometimes required. Once a TCP/IP session is established the connection is normally used to run a standard application.

G.8   TCP/IP Applications - Terminal Access

G.8.1   Telnet

This is the most commonly used TCP/IP application. It provides a terminal level connection between devices. A user initiates a Telnet session from a terminal server or another network host. The target machine recognises the incoming message as a telnet session, and performs the necessary actions to attach a pseudo-tty and spawn a getty process. From this point onwards, the connection is treated by the host like any other terminal session.

G.8.2   Rlogin

Rlogin is similar to telnet; it was developed as part of the Berkeley TCP/IP suite. It offers additional features appropriate to UNIX operation, such as passing username and termtype. In addition, in a trusted environment, the identification of username can be used to bypass normal login security and provide a direct connection. On a UNIX system this operation is controlled by the file /etc/hosts.equiv for global machine access, and the file .rhosts in the home directory of individual users.

Although normally restricted to use on UNIX hosts supporting the Berkeley UNIX TCP/IP extensions, a number of third parties now support Rlogin to mnemonics hosts, e.g. Multinet (VAX and 9370) and DEC VMS-ULTRIX integration products.

G.9   TCP/IP Applications - File Transfer

G.9.1   FTP

This is a full function, interactive file transfer program. Normal host security mechanisms are maintained through the use of an interactive login. Once a connection is established remote file system directories can be listed and files transferred in both directions. In addition, data representation (ASCII, EBCDIC, Binary) can be specified. FTP is not currently supported on the JETSTREAM, but is used on the Specialix Network Printer Server (NPS).

G.9.2 TFTP

This is a reduced-security version of FTP, often used for downloading boot and configuration files to a network device or diskless client. No security checking is performed and the TFTP client has access to any globally readable file on the host system. Because of this, some security managers will not allow the TFTP daemon to be activated. Most systems support secure TFTP, this version limits file access to a particular directory branch. TFTP an be used by the JETSTREAM to download firmware upgrades and terminal definitions.

G.9.3 RCP

This is the Berkeley file transfer program. It operates in the same way as the standard UNIX cp command, but to and from a remote system. Security is checked against the permission associated with the supplied username. Like Rlogin, security is controlled by the files */etc/hosts.equiv, $HOME/.rhosts* and *etc/passwd*.

RCP is used by JETSTREAM to provide file copying to a printer port.

G.9.4 TCP/IP Ports

As TCP/IP supports a number of applications, the application type is identified, within an IP package, by the 'port number'. A number of these ports are defined in the various TCP/IP standards. A host system identifies incoming packets through a file */etc/services* a sample of which is given below:

```
*********************************************************     *
*                                                             *
*            SAMPLE etc/services File                         *
*                                                             *
*********************************************************     *
#            @ (#)       5.1 Lachman System V STREAMS TCP Source
             services
#
#            System V STREAMS TCP - Release 4.0
#
# Network services, Internet style
#
echo        7/tcp
echo        7/udp
discard     9/tcp       sink null
discard     9/udp       sink null
systat      11/tcp      users
daytime     13/tcp
daytime     13/udp
netstat     15/tcp
gotd        17/tcp      quote
chargen     19/tcp      ttytst source
chargen     19/udp      ttytst source
ftp         21/tcp
telnet      23/tcp
smtp        25/tcp      mail
time        37/tcp      timserver
time        37/udp      timeserver
rlp         39/udp      resource         # resource location
nameserver  42/tcp      name             # IEN 116
whois       43/tcp      nicname
domain      53/tcp      nameserver       # name-domain server
domain      53/udp      nameserver
bootps      67/udp      boots            # bootp server
bootpc      68/udp      bootpc           # bootp client
tftp        69/udp
finger      79/tcp
link        87/tcp      ttylink
hostnames   101/tcp     hostname         # usually from sri-nic
sunrpc      111/tcp
sunrpc      111/udp
auth        113/tcp     authentication
uucp-path   117/tcp
```

Once a packet type has been identified, the appropriate service is started using entries in the file /etc/inetd.conf, an example of which is shown below:

```
************************************************          *
*                                                        *
*       SAMPLE /etc/inetd.conf File                      *
*                                                        *
************************************************          *
#       @ (#) inetd.conf    5.2 Lachman System V STREAMS TCP Source
#
#       System V STREAMS TCP - Release 4.0
#
#       Copyright 1990 Interactive Systems Corporation,
        (ISC)
#       All Rights Reserved
#
#       Copyright 1987, 1988, 1989 Lachman Associates, Incorporated
        (LAI)
#       All Right Reserved.
#
#       SCCS IDENTIFICATION
ftp     stream    tcp        nowait   NOLUID  /etc/ftpd      ftpd
telnet  stream    tcp        nowait   NOLUID  /etc/telnetd   telnetd
shell   stream    tcp        nowait   NOLUID  /etc/rshd      rshd
login   stream    tcp        nowait   NOLUID  /etc/rlogind   rlogind
exec    stream    tcp        nowait   NOLUID  /etc/rexecd    rexecd
finger  stream    tcp        nowait   nouser  /etc/          fingerd
                                              fingered
#uucp   stream    tcp        nowait   NOLUID  /etc/uucpd     uucpd
# Enabling this allows public read files to be accessed via TFTP.
#tftp   dgram     udp        wait     nouser  /etc/tftpd     tftpd
# This is the more secure method, since only files from /tftpboot
can
# be accessed via TFTP. This must be roof in order to de the chroot
# to /tftpboot. /tftpboot must be created by hand.
# tftp  dgram     udp        wait     root    /etc/tftpd tftpd -s /
                                              tftpboot
comsat  dgram     udp        wait     root    /etc/comsat    comsat
ntalk   dgram     udp        wait     root    /etc/talkd     talkd
#bootps dgram     udp        wait     root    /etc/bootpd    bootpd
echo    stream    tcp        nowait   root    internal
discard stream    tcp        nowait   root    internal
chargen stream    tcp        nowait   root    internal
daytime stream    tcp        nowait   root    internal
time    stream    tcp        nowait   root    internal
echo    dgram     udp        wait     root    internal
discard dgram     udp        wait     root    internal
chargen dgram     udp        wait     root    internal
daytime dgram     udp        wait     root    internal
time    dgram     udp        wait     root    internal
smtp    stream    tcp        nowait   mmdf    /usr/mmdf/chans/smtpd
                                              smtpd
                                              /usr/mmdf/chans/
                                              smtpsrvr smtp
```

G.10 Internet Registration

Before connecting to the Internet, you will need to register your company name and obtain valid IP addresses from the relevant authorities.

In the USA, Internet registration is controlled by InterNIC:

Network Solutions
InterNIC Registration Services
505 Huntmar Park Drive
Herndon VA20170

Tel: (703) 742-4777
Fax: (703) 742-9552

In Europe, registration activities are controlled by RIPE NCC (Reseaux IP Europeens) based in Amsterdam in the Netherlands. RIPE delegates the issuing of network numbers to authorised Internet service providers. Contact your local service provider.

In the Asia and Pacific region, registration is controlled by APNIC (Asian-Pacific Network Information Centre).

APNIC,
Tokyo Central Post Office Box 351
Tokyo, 100-91
Japan

Tel: +81-3-5500-0480
Fax: +81-3-5500-0481

Australian Internet Registry Services are provided by AUNIC:

AUNIC Registration Service
Locked Bag 5744
Canberra
ACT 2601

Fax: 06 248 6165

A p p e n d i x   H

Configuration record

H.1   Introduction

Use the table below to record configuration information on your JETSTREAM (s):

JETSTR EAM #	NAME (descriptive)	ETHERNET ADDRESS	IP ADDRESS
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

JETSTR EAM #	NAME (descriptive)	ETHERNET ADDRESS	IP ADDRESS
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

A p p e n d i x   I

Feedback

I.1   Introduction

We welcome your comments on this manual.

Please send us your views, by post or fax, to any Specialix office worldwide.
(see details in Section D.6 Technical Support). Send it for the attention of
Documentation Feedback, c/o Technical Support. Use a photocopy of this page.

Alternatively, you can send us an e-mail, at:

        docfeedback@specialix.co.uk

We will endeavour to incorporate your comments in the next edition of this manual.

I.2   Comments

Document: JETSTREAM 6x series, User's Guide

Page No.(s)   Section No.(s)

Paragraph starting with the words:

Comments:

Document: JETSTREAM 6x series, User's Guide

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