Cyclades-TS
Installation & Service Manual

Cyclades Corporation

Cyclades-TS Installation & Service Manual
Version 2.7(b) – May 2002

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FCC Warning Statement:
The Cyclades-TS has been tested and found to comply with the limits for Class A digital devices, 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 Installation & Service 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 is required to correct the problem at his or her own expense.

Notice about FCC compliance for the Cyclades-TS1000 and the Cyclades-TS2000:
In order to comply with FCC standards the Cyclades-TS1000 and the Cyclades-TS2000 require the use of a shielded CAT 5 cable for the Ethernet interface. Notice that this cable is not supplied with either of the products and must be provided by the customer.

Canadian DOC Notice:
The **Cyclades-TS** does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le **Cyclades-TS** n'émete pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le règlement sur le brouillage radioélectrique edicté par le Ministère des Communications du Canada.

Table of Contents

CHAPTER 1 HOW TO USE THIS MANUAL

This manual assumes that the reader understands networking basics and is familiar with the terms and concepts used in Local and Wide Area Networking. The Cyclades-TS is a Linux-based terminal server, which gives it great flexibility. It runs an embedded version of the Linux operating system and Unix and Linux users will find the configuration process very familiar. On the other hand, users not familiar with Unix will have a steeper learning curve, but it is not necessary to be a Unix expert.

Configuration of the equipment is done by editing a few plain-text files (commented sample files for the principal profiles are provided in appendix C), and then updating the versions of the files in the Cyclades-TS. The files can be edited in the Cyclades-TS using the vi editor provided, or in another computer with the environment and text editor of your choice. Unix user or not, we strongly recommend that you follow the steps in this Installation & Service Manual before jumping in.

This manual should be read in the order written, with exceptions given in the text.

Chapter 2 - Safety Instructions **-** Safety guidelines to be followed when using the Cyclades-TS.
Chapter 3 - What is in the Box **-** explains how the Cyclades-TS should be connected and what each cable is used for.
Chapter 4 - Summary of the Configuration Process - provides a brief roadmap of the Cyclades-TS configuration
Chapter 5 - Configuration **-** describes the basic configuration process to get the Cyclades-TS up and running for the most common uses.
Chapter 6 - Troubleshooting - provides solutions and test procedures for typical problems.
Appendix A - Linux Information - Information for those who are new to Linux/Unix.
Appendix B - Cabling - Pinout diagrams for cables.
Appendix C - Pslave.conf Sample Files - Example files for 3 profiles and the master file.
Appendix D - Customization - Instructions for those who wish to create their own applications.
Appendix E - The Web Configuration Manager - explains how to configure the TS with a browser.

CHAPTER 2 SAFETY INSTRUCTIONS

Use the following safety guidelines to protect yourself and your Cyclades-TS.

USING YOUR CYCLADES-TS

CAUTION: Do not operate your Cyclades-TS with the cover removed.

- In order to avoid shorting out your Cyclades-TS when disconnecting the network cable, first unplug the cable from the equipment and then from the network jack. When reconnecting a network cable to the equipment, first plug the cable into the network jack, and then into the equipment.

- To help prevent electric shock, plug the Cyclades-TS into a properly grounded power source. The cable is equipped with a 3-prong plug to help ensure proper grounding. Do not use adapter plugs or remove the grounding prong from the cable. If you have to use an extension cable, use a 3-wire cable with properly grounded plugs.

- To help protect the Cyclades-TS from electrical power fluctuations, use a surge suppressor, line conditioner, or uninterruptible power supply.

- Be sure that nothing rests on the cables of the Cyclades-TS and that they are not located where they can be stepped on or tripped over.

- Do not spill food or liquids on the Cyclades-TS. If it gets wet, contact Cyclades.

- Do not push any objects through the openings of the Cyclades-TS. Doing so can cause fire or electric shock by shorting out interior components.

- Keep your Cyclades-TS away from heat sources and do not block cooling vents.

WORKING INSIDE THE CYCLADES-TS

NOTICE: Do not attempt to service the Cyclades-TS yourself, except following instructions from Cyclades Technical Support personnel. If this is the case, first take the following precautions:

- Turn the Cyclades-TS off.
- Ground yourself by touching an unpainted metal surface on the back of the equipment before touching anything inside it.

REPLACING THE BATTERY

A coin-cell battery maintains date and time information. If you have to repeatedly reset time and date information after turning on your Cyclades-TS, replace the battery.

CAUTION: A new battery can explode if it is incorrectly installed. Replace the 3 Volt CR2032 battery only with the same or equivalent type recommended by the battery manufacturer. Discard used batteries according to the battery manufacturer's instructions.

CHAPTER 3 WHAT IS IN THE BOX

The Cyclades-TS is a line of console access and terminal servers. There are several models with differing numbers of serial ports. The following figures show the main units and accessories included in each package and how cables should be connected. The loop-back connector is provided for convenience in case hardware tests are necessary. The RJ-45M - DB-9 F Crossover cable and the RJ-45M - RJ-45 Sun Netra Crossover cable (not shown in the figures) are also included with the TS3000, TS2000, TS1000, TS800 and TS400.

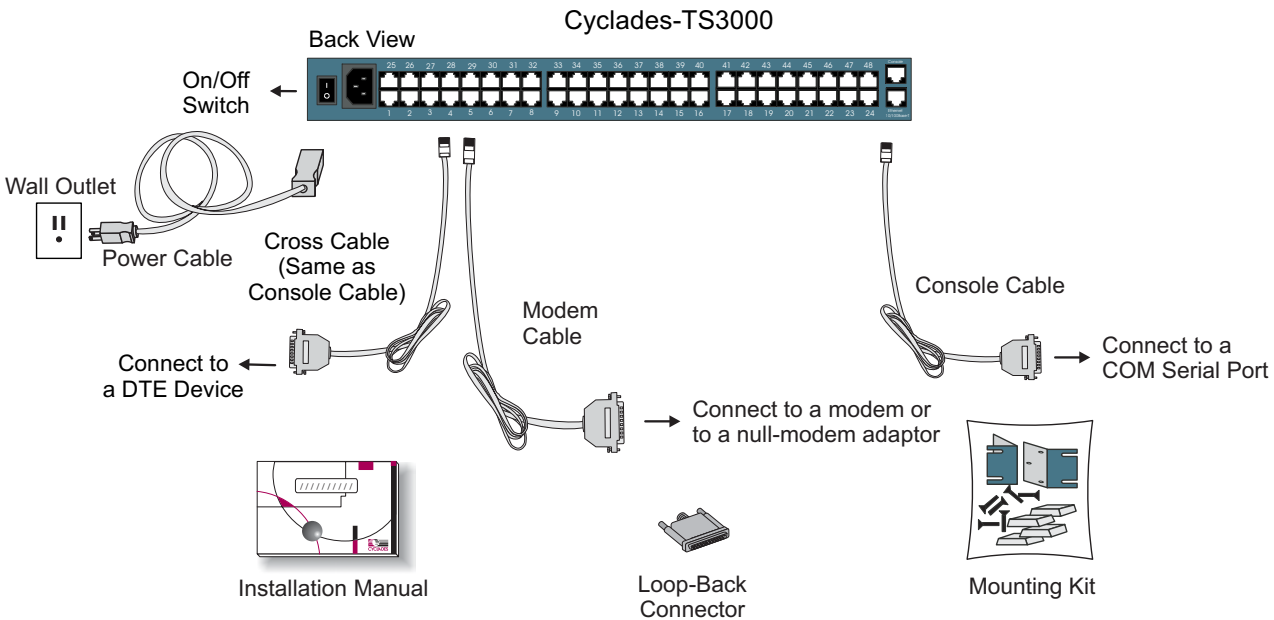


FIGURE 3.1 CYCLADES-TS3000 AND CABLES

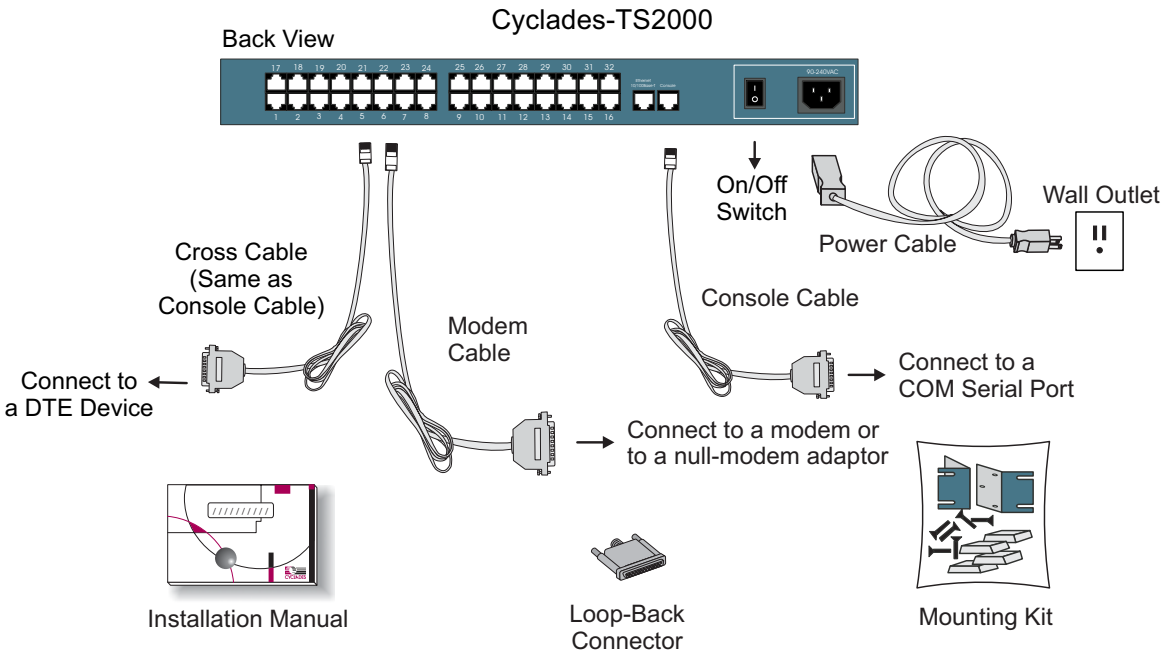


FIGURE 3.2 CYCLADES-TS2000 AND CABLES

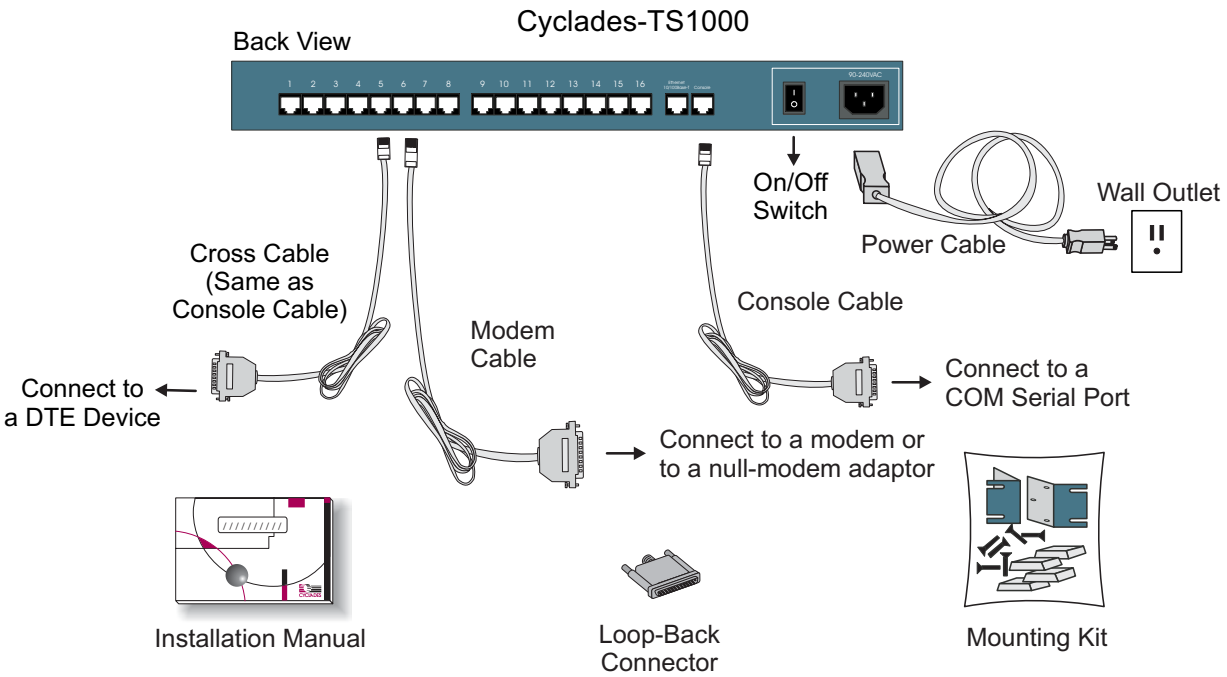


FIGURE 3.3 CYCLADES-TS1000 AND CABLES

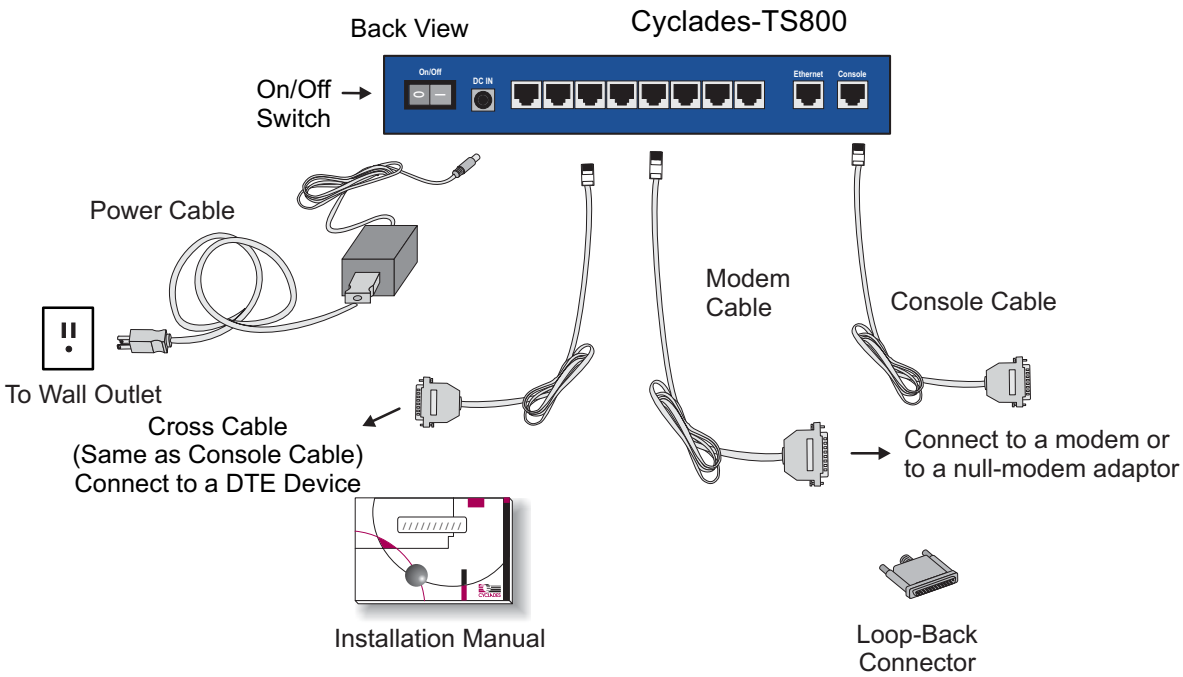


FIGURE 3.4 CYCLADES-TS800 AND CABLES

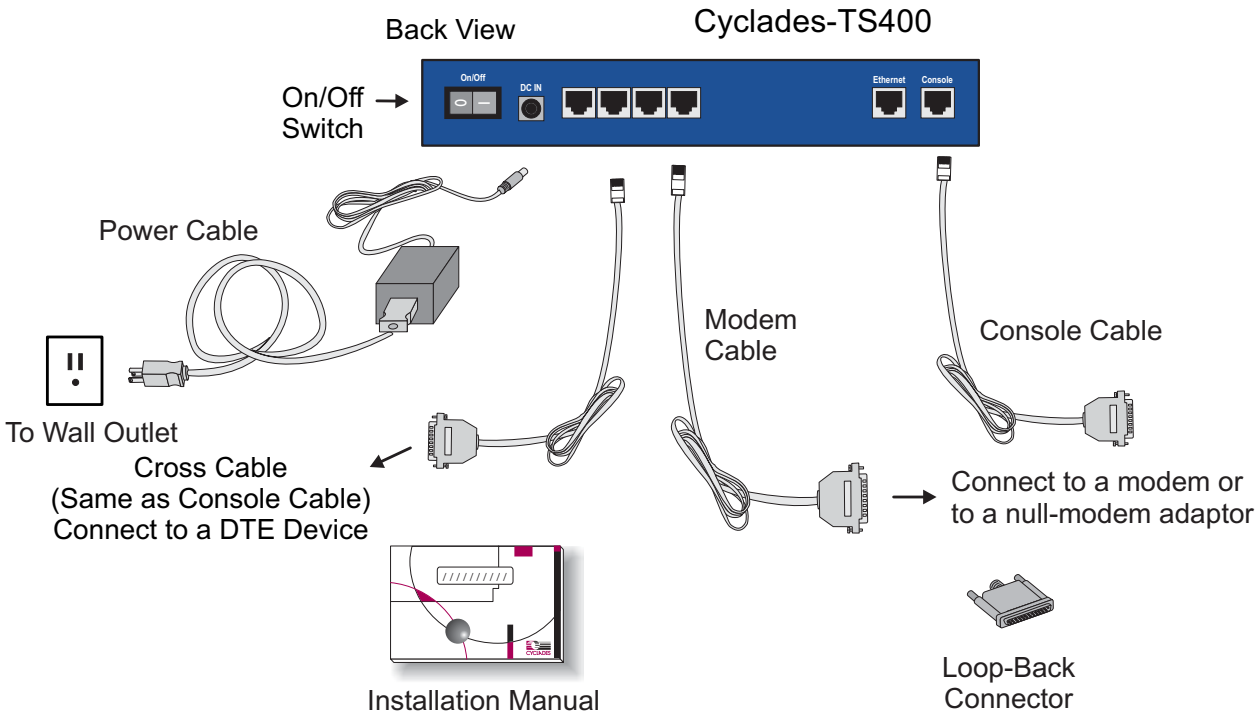


FIGURE 3.5 CYCLADES-TS400 AND CABLES

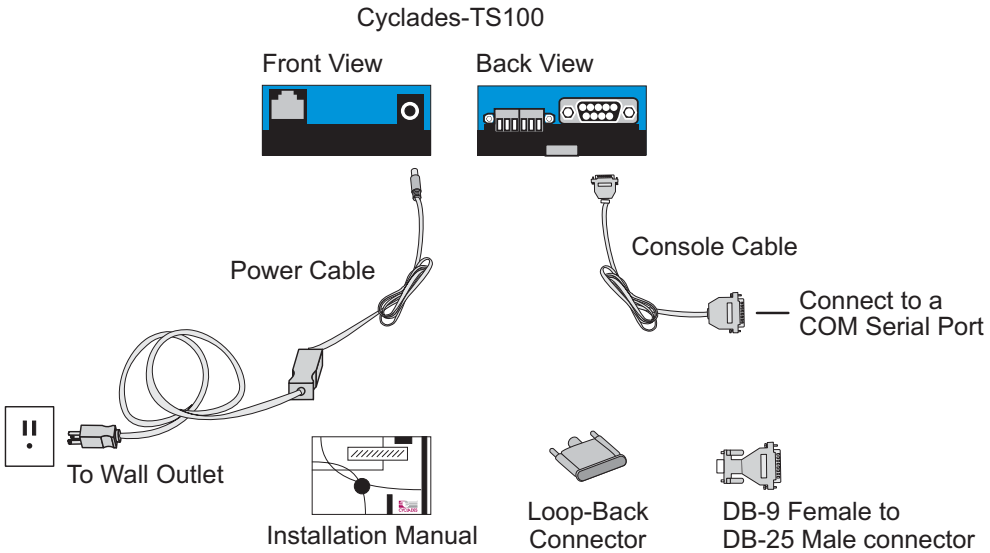


FIGURE 3.6 CYCLADES-TS100 AND CABLES

CHAPTER 4 SUMMARY OF THE CONFIGURATION PROCESS

The Cyclades-TS can be used as a:

- console server,
- terminal server,
- remote access server.

A detailed description of each of these profiles is provided in the next chapter. The Cyclades-TS's operating system is embedded Linux. Even if you are a Unix user and find the tools and files familiar, do not configure this product as you would configure a regular Linux server.

You do not need to be a Unix user to configure the Cyclades-TS. Additional information about the files and tools needed for configuration is provided in appendix A.

The basic configuration steps are:

A. Connecting the Cyclades-TS to the network and other devices. Consult Chapter 3, What is in the Box, for questions on which cable should be used for which device.

B. Connect a PC or terminal to the Cyclades-TS via the console port and login.

C. Modify the Linux files
`/etc/hostname`
`/etc/hosts`
`/etc/resolv.conf`
`/etc/network/st_routes`
`/etc/inittab` (Cyclades-TS100 only. See "Configuring the Cyclades-TS100 for the First Time" in chapter 5)
to let the Cyclades-TS know about its local environment

D. Configure the boot parameters using the script bootconf

E. Edit the pslave.conf file. This is the main configuration file that concentrates most product parameters and defines the functionality of the Cyclades-TS. The modifications made to this file will depend on the profile.

F. Activate the changes.

G. Test the configuration to make sure the ports have been set up properly.

H. Save the changes and restart the server application.

Full details on each step listed above and how to perform them are provided in the next chapter. Make sure to always complete ALL the steps for your application before testing or switching to another profile.

WARNING! The Cyclades-TS provides both a command-line and a web interface for your convenience. Both are enabled by default and both have default passwords. Make sure BOTH default passwords are changed to avoid unauthorized access to your network.

CHAPTER 5 CONFIGURATION

This chapter guides you step by step through the configuration of the Cyclades-TS for the three principal applications:

1. Console Server,
2. Terminal Server, and
3. Remote Access Server.

Many steps are common to both, so please read the entire chapter before beginning.

STEP ONE

Connect a PC or terminal to the Cyclades-TS using the console cable. If using a PC, HyperTerminal can be used in the Windows operating system and Kermit or Minicom in the Unix operating system. The terminal parameters should be set as follows:

- Serial Speed: 9600 bps
- Data Length: 8 bits
- Parity: None
- Stop Bits: 1 stop bit
- Flow Control: none
- Ansi emulation (Note: if your terminal does not have ansi emulation, select vt100; then, on the TS, log in as root and switch to vt100 by typing “TERM=vt100;export TERM”)

When the Cyclades-TS boots properly, a login banner will appear.

Log in as *root* (there is no password). A password should be created as soon as possible. The Cyclades-TS runs Linux, a Unix-like operating system, and those familiar with the Unix operating system will feel quite at home. A description of the Linux file system and basic commands is given in the Linux appendix at the end of this manual.

STEP TWO

In this step, four Linux files must be modified to identify the TS1000 and its neighbors. Then, the boot parameters are configured. The operating system provides the vi editor, which is described in the Linux appendix for the uninitiated. The first file is /etc/hostname. The only entry should be the hostname of the Cyclades-TS. An example is shown in Figure 5.1.

```
TS1000
```

FIGURE 5.1 CONTENTS OF THE /ETC/HOSTNAME FILE

The second file is /etc/hosts. It should contain the IP address for the Ethernet interface and the same hostname entered in the /etc/hostname file. It may also contain IP addresses and host names for other hosts in the network.

```
200.200.200.1    TS1000
200.200.200.2    RadiusServer
127.0.0.1        localhost
```

FIGURE 5.2 CONTENTS OF THE /ETC/HOSTS FILE

The third file that must be modified is /etc/resolv.conf. It must contain the domain name and nameserver information for the network.

```
domain      mycompany.com
nameserver  200.200.200.2
```

FIGURE 5.3 CONTENTS OF THE /ETC/RESOLV.CONF FILE

The fourth file defines static routes and is called /etc/network/st_routes. In the console server example in Figure 5.5, the PR1000 is the gateway router and thus its IP address is configured in this file to be the default gateway. Other static routes are also configured in this file.

```
route add default gw   200.200.200.5
```

FIGURE 5.4 CONTENTS OF THE /ETC/NETWORK/ST_ROUTES FILE

Now, use the bootconf utility to configure the boot parameters. The console speed parameter should be changed if the terminal used as a console requires a different speed. The option to skip the flash test speeds up the boot process. The last option determines the operational mode of the Ethernet connection.

Type bootconf on the command line. The script will first ask if you want to return all parameters to their default values. If you respond No, it will ask you to enter parameter values one by one:

```
MAC address assigned to Ethernet [00:60:2e:00:0e:23]
IP address assigned to Ethernet interface [209.81.55.79]
Watchdog timer ((A)ctive or (I)nactive) [A]
TSLinux boot from ((F)lash or (N)etwork) [N]
Boot type ((B)ootp,(T)ftp or Bot(H)) [T]
Boot File Name [zvmppcts.bin]
Server's IP address [209.81.55.126]
Console speed [9600]
(P)erform or (S)kip Flash test [S]
(S)kip, (Q)uick or (F)ull RAM test [S]
Fast Ethernet ((A)uto Neg, (1)00 BtH, 100 Bt(F), 10 B(t)F, 10 Bt(H)) [A]
Fast Ethernet Maximum Interrupt Events [0]
```

after modifying these parameters, the script will ask:

```
Do you confirm these changes in flash ( (Y)es, (N)o (Q)uit ) [N] :
```

Y = changes are saved to flash
N = the parameters are presented again
Q = the script quits without saving any changes made

STEP THREE
This is where the configuration for the three profiles - Console Server, Terminal Server and Remote Access Server diverge. Follow step three for the appropriate profile.

STEP THREE - CONSOLE SERVER

A console server application is shown in Figure 5.5.

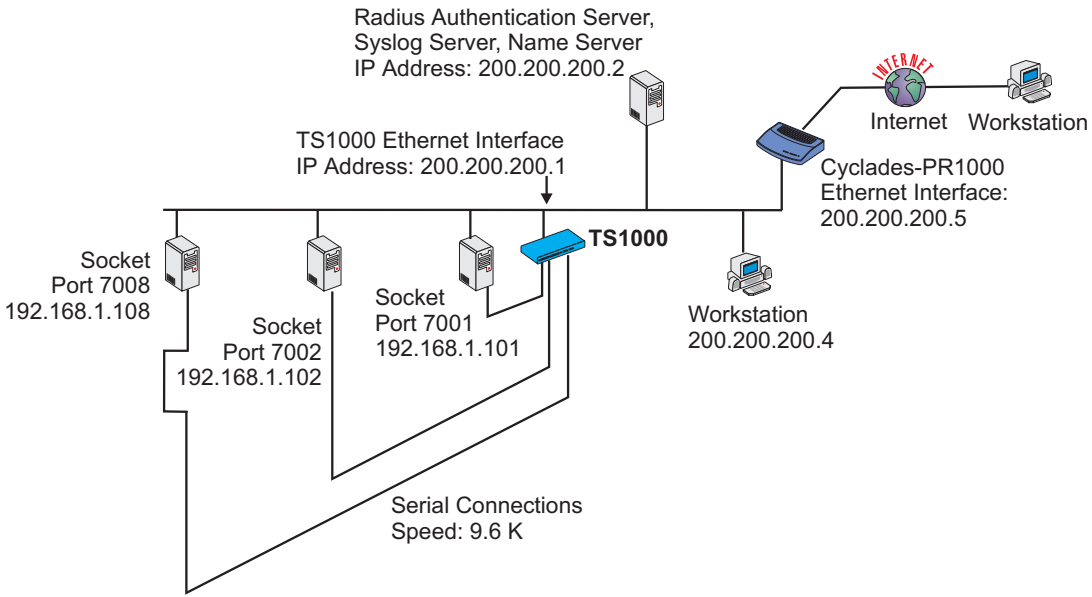


FIGURE 5.5 CONSOLE SERVER APPLICATION

This application allows a user to access a server connected to the Cyclades-TS through its serial console port from a workstation on the LAN or WAN. A server console is opened on the workstation. The authentication is usually performed by a Radius server and either telnet or ssh (a secure shell session) can be used. See the Linux appendix for more information about ssh.

The fifth file is specific to the Cyclades-TS and a sample file with comments is supplied in the Linux file system. It is called /etc/portslave/pslave.conf. A listing of the pslave.conf file with all possible parameters, as well as the files used to create the three applications in this chapter, is provided in Appendix C. There are three basic types of parameters: conf.* parameters are global or apply to the Ethernet interface; all.* parameters are used to set default parameters for all ports, and s#.* parameters change the default port parameters for individual ports. An all.* parameter can be overriden by a s#.* parameter appearing later in the pslave.conf file (or vice-versa). A brief description of each parameter used for the console server profile is given in Figures 5.6-5.7.

Parameter	**Description**	**Value for This Example**
conf.eth_ip	The IP address of the Ethernet interface. This parameter, along with the next two, is used by the cy_ras program to OVERWRITE the file /etc/network/ifcfg_eth0 as soon as the command "signal_ras HUP" is executed. The file /etc/network/ifcfg_eth0 should not be edited by the user unless the cy_ras application is not going to be used.	200.200.200.1
conf.eth_mask	The mask for the Ethernet network.	255.255.255.0
conf.eth_mtu	The Maximum Transmission Unit size, which determines whether or not packets should be broken up.	1500
conf.nfs_data_ buffering	Remote Network File System where data buffering will be written instead of the default directory '/var/run/DB. The directory tree to which the file will be written must be NFS-mounted. If data buffering is turned on for port 1, for example, the data will be stored in the file ttyS1.data in the directory and server indicated by this variable. The remote host must have NFS installed and the administrator must create, export and allow reading/writing to this directory. The size of this file is not limited by the value of the parameter s1.data_buffering, though the value cannot be zero since a zero value turns off data buffering.	commented
conf.lockdir	The lock directory , which is /var/lock for the Cyclades-TS. It should not be changed unless the user decides to customize the operating system.	/var/lock

FIGURE 5.6 CONSOLE SERVER PSLAVE.CONF GLOBAL PARAMETERS

Parameter	Description	Value for This Example
conf.syslog	The IP address of a remote syslog daemon can be provided here, if desired.	200.200.200.2
conf.facility	This value (0-7) is sent to the syslog server (the TS is a syslog client) to indicate in which file the syslog messages sent by portslave should be stored. The file /etc/syslog.conf on the syslog server contains a mapping between facility numbers and server log files.	7
conf.DB_facility	This value (0-7) is sent to the syslog server (the TS is a syslog client) to indicate in which file the syslog messages sent by the data buffering feature should be stored. See description for conf.facility.	0
conf.group	Used to group users to simplify configuration of the parameter all.users later on. This parameter can be used to define more than one group.	group_name**:** user1, user2

FIGURE 5.6 CONSOLE SERVER PSLAVE.CONF GLOBAL PARAMETERS (CONT.)

Parameter	Description	Value in Exp.
all.syslog_level	This variable determines which syslog messages will be sent to the syslog server configured in the conf.syslog parameter. A value of 0 suppresses all but emergency messages while values between 1 and 7 send progressively more types of messages for each increment. **This value (as for all "all." parameters) can later be overridden for individual ports using the s*<port number>*.syslog_level parameter.**	4
all.console_level	This variable determines which syslog messages will be sent to the Cyclades-TS console connected through the console interface. See the previous parameter for a description of possible values	4
all.speed	The speed for all ports.	9600
all.datasize	The data size for all ports.	8
all.stopbits	The number of stop bits for all ports	1
all.parity	The parity for all ports.	none

FIGURE 5.7 CONSOLE SERVER PSLAVE.CONF PORT-SPECIFIC PARAMETERS

Parameter	Description	Value for This Example
all.authtype	There are several authentication type options: local (authentication is performed using the /etc/passwd file), radius (authentication is performed using a Radius authentication server), none, local/radius (authentication is performed locally first, switching to Radius if unsuccessful), radius/local (the opposite of the previous option) and RadiusDownLocal (local authentication is tried only when the Radius server is down). Note that this parameter controls the authentication required by the Cyclades-TS. The authentication required by the device to which the user is connecting is controlled separately.	radius
all.authhost1	This address indicates the location of the Radius authentication server and is only necessary if this option is chosen in the previous parameter. A second Radius authentication server can be configured with the parameter all.authhost2.	200.200.200.2
all.accthost1	This address indicates the location of the Radius accounting server, which can be used to track how long users are connected after being authorized by the authentication server. Its use is optional.	200.200.200.2
all.radtimeout	This is the timeout (in seconds) for a radius authentication query. The first server (authhost1) is tried "radretries" times, and then the second (if configured) is contacted "radretries" times. If the second also fails to respond, Radius authentication fails.	3
all.radretries	Defines the number of times each Radius server is tried before another is contacted. The default, if not configured, is 5.	5
all.secret	This is the shared secret necessary for communication between the Cyclades-TS and the Radius servers.	cyclades

FIGURE 5.7 CONSOLE SERVER PSLAVE.CONF PORT-SPECIFIC PARAMETERS(CONT.)

Parameter	Description	Value for This Example
all.ipno	This is the default IP address of the Cyclades-TS's serial ports. The "+" indicates that the first port should be addressed as 192.168.1.101 and the following ports should have consecutive values. Any host can access a port using its IP address as long as a path to the address exists in the host's routing table.	192.168.1.101+
all.issue	This text determines the format of the login banner that is issued when a connection is made to the Cyclades-TS. \n represents a new line and \r represents a carriage return. Expansion characters, listed in Appendix C, can be used here.	\r\n\ TSLINUX - Portslave Internet Services\n\ \r\n\ Welcome to terminal server %h port S%p \n\ \r\n\ Customer Support: 510-770-9727 www.cyclades.com/\n\ \r\n
all.prompt	This text defines the format of the login prompt. Expansion characters, listed in Appendix C, can be used here.	%h login:
all.flow	This sets the flow control to hardware, software, or none.	hard
all.poll_interval	Valid only for protocols *socker_server* and *raw_data*. When not set to zero, this parameter sets the wait for a TCP connection keep-alive timer. If no traffic passes through the Cyclades-TS for this period of time, the Cyclades-TS will send a line status message to the remote device to see if the connection is still up. If not configured, 1000 ms is assumed. If set to zero, line status messages will not be sent to the socket client.	0
all.socket_port	This defines an alternative labeling system for the Cyclades-TS ports. The '+' after the numerical value causes the interfaces to be numbered consecutively. In this example, interface 1 is assigned the port value 7001, interface 2 is assigned the port value 7002, etc.	7001+

FIGURE 5.7 CONSOLE SERVER PSLAVE.CONF PORT-SPECIFIC PARAMETERS (CONT.)

Parameter	Description	Value for This Example
all.protocol	For the console server profile, the possible protocols are socket_server (when telnet is used), socket_ssh (when ssh version one or two is used) or raw_data (to exchange data in transparent mode – similar to socket_server mode, but without telnet negotiation, breaks to serial ports, etc.)	socket_server
all.data_buffering	A non-zero value activates data buffering. A file is created on the Cyclades-TS and all data received from the port is captured. The file contains a maximum size equal to this parameter. Each time the maximum is reached the oldest 10% of stored data is discarded, releasing space for new data (FIFO system). This file can be viewed using the normal Unix tools (cat, vi, more, etc.). See the section on data buffering in the Linux Appendix for details.	0
all.syslog_buffering	When non-zero, the contents of the data buffer are sent to the syslog server every time a quantity of data equal to this parameter is collected. The syslog level for data buffering is hard coded to level 5, so the parameter syslog_level should be greater than or equal to 5, and data_buffering non-zero for syslog generation.	0
all.dont_show_DB menu	When *zero*, a menu with data buffering options is shown when a non-empty data buffering file is found. When *1*, the data buffering menu is not shown. When *2*, the data buffering menu is not shown but the data buffering file is shown if not empty. When *3*, the data buffering menu is shown, but without the *erase* and *show and erase* options.	1

FIGURE 5.7 CONSOLE SERVER PSLAVE.CONF PORT-SPECIFIC PARAMETERS (CONT.)

Parameter	Description	Value for This Example
all.users	Restricts access to ports by user name (only the users listed can access the port or, using the character "!', all **but** the users listed can access the port .) In this example, the users joe, mark and members of user_group cannot access the port. A single comma and spaces/tabs may be used between names. A comma may not appear between the ! and the first user name. The users may be local or Radius. User groups (defined with the parameter conf.group) can be used in combination with user names in the parameter list.	! joe, mark, user_group
all.sniff_mode	This parameter determines what the second connected user (see parameter admin_users below) can see of the session of the first connected user: *in* shows data written to the port, *out* shows data received from the port, and *i/o* shows both streams. The second session is called a sniff session and this feature is activated whenever the protocol parameter is set to socket_ssh or socket_server.	out
all.admin_users	This parameter determines which users can open a *sniff session*, which is where a second connected user can see everything that a first connected user is doing on a given port. The second user can also cancel the first user's session (and take over). Only two users can connect to the same port simultaneously. This parameter is obligatory when *authtype* is not *none*, to determine who can open a sniff session or cancel a previous session. User groups (defined with the parameter conf.group) can be used in combination with user names in the parameter list.	peter, john, user_group
all.tx_interval	Valid for protocols *socket_server* and *raw_data*. Defines the delay (in milliseconds) before transmission to the Ethernet of data received through a serial port. If not configured, 100ms is assumed. If set to zero or a value above 1000, no buffering will take place.	100

FIGURE 5.7 CONSOLE SERVER PSLAVE.CONF PORT-SPECIFIC PARAMETERS (CONT.)

Parameter	Description	Value for This Example
all.idletimeout	Valid only for the CAS profile (protocols *socket_servet*, *socket_ssh* and *raw_data*). Specifies how long (in minutes) a connection can remain inactive before it is cut off. If set to zero (the default), the connection will not time out.	0
s1.tty	The device name for the port is set to the value given in this parameter. If a device name is not provided for a port, it will not function.	ttyS1
s1.authtype	Authtype must not be none for the *sniff session* feature to function with authentication. If none is chosen, any user can open a sniff session and/or cancel sessions of other users.	local
s2.tty	See the s1.tty entry in this table.	ttyS2
s8.tty	See the s1.tty entry in this table.	ttyS8

FIGURE 5.7 CONSOLE SERVER PSLAVE.CONF PORT-SPECIFIC PARAMETERS (CONT.)

Execute the command **`signal_ras hup`** to activate the changes. At this point, the configuration should be tested. A step-by-step check list follows.

1. Since Radius authentication was chosen, create a new user on the Radius authentication server called test and provide him with the password test.
2. From the console, ping 200.200.200.2 to make sure the Radius authentication server is reachable.
3. Make sure that the physical connection between the Cyclades-TS and the servers is correct. A cross cable (not the modem cable provided with the product) should be used. Please see the hardware specifications appendix for pin-out diagrams.
4. The Cyclades-TS has been set for communication at 9600 bps, 8N1. The server must also be configured to communicate on the serial console port with the same parameters. Also make sure that the computer is configured to route console data to the serial console port.
5. From a server on the LAN (not from the console), try to telnet to the server connected to the first port of the Cyclades-TS using the following command:

```
telnet 200.200.200.1 7001
```

For both telnet and ssh sessions, the servers can be reached by either:

1. Ethernet IP of the Cyclades-TS and assigned socket port

or

2. Individual IP assigned to each port.

If everything is configured correctly, a telnet session should open on the server connected to port 1. If not, check the configuration, follow the steps above again, and check the troubleshooting appendix. Now continue on to step four later in this chapter.

STEP THREE - TERMINAL SERVER

The terminal server profile allows a terminal user to access a server on the LAN. The terminal can be either a dumb terminal or a terminal emulation program on a PC. No authentication is used in this example and rlogin is chosen as the protocol.

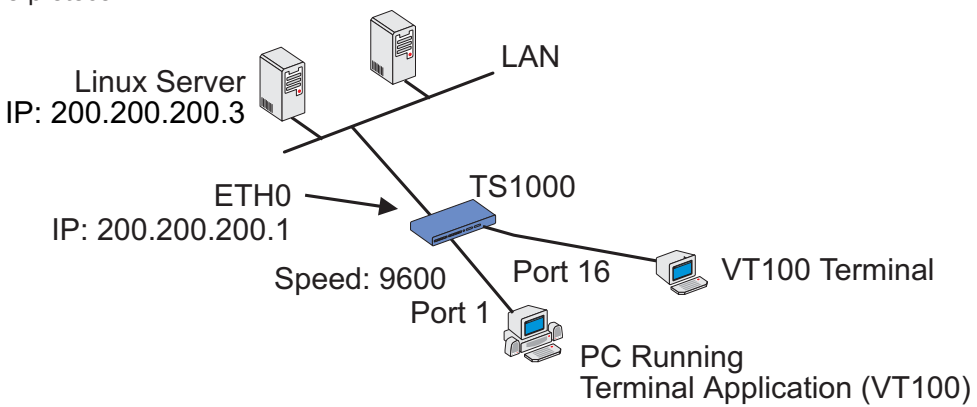


FIGURE 5.8 TERMINAL SERVER APPLICATION

The fifth configuration file (the first four were described in step two) is specific to the Cyclades-TS and a sample file with comments is supplied in the Linux file system. It is called /etc/portslave/pslave.conf. A listing of the pslave.conf file with all possible parameters, as well as the files used to create the three applications in this chapter, is provided in Appendix C. There are three basic types of parameters: conf.* parameters are global or apply to the Ethernet interface; all.* parameters are used to set default parameters for all ports, and s#.* parameters change the default port parameters for individual ports. An all.* parameter can be overriden by a s#.* parameter appearing later in the pslave.conf file (or vice-versa). A brief description of each parameter used for the terminal server profile is given in Figures 4.9-4.10.

Parameter	Description	Value for This Example
conf.eth_ip	The IP address of the Ethernet interface. This parameter, along with the next two, is used by the cy_ras program to OVERWRITE the file /etc/network/ifcfg_eth0 as soon as the command "signal_ras HUP" is executed. The file /etc/network/ifcfg_eth0 should not be edited by the user unless the cy_ras application is not going to be used.	200.200.200.1
conf.eth_mask	The mask for the Ethernet network.	255.255.255.0
conf.eth_mtu	The Maximum Transmission Unit size, which determines whether or not packets should be broken up.	1500
conf.lockdir	The lock directory , which is /var/lock for the Cyclades-TS. It should not be changed unless the user decides to customize the operating system.	/var/lock
conf.rlogin	Location of the rlogin binary that accepts the -i flag.	/usr/local/bin/ rlogin-radius
conf.telnet	Location of the telnet utility.	/bin/telnet
conf.ssh	Location of the ssh utility.	/bin/ssh
conf.locallogins	This parameter is only necessary when authentication is being performed for a port. When set to one, it is possible to log in to the Cyclades-TS directly by placing a "!" before your login name, then using your normal password. This is useful if the Radius authentication server is down.	0

FIGURE 5.9 TERMINAL SERVER PSLAVE.CONF GLOBAL PARAMETERS

Parameter	Description	Value for This Example
all.speed	The speed for all ports. **This value (as for all "all." parameters) can later be overridden for individual ports using the s*<port number>*.speed parameter.**	9600
all.datasize	The data size for all ports.	8
all.stopbits	The number of stop bits for all ports	1
all.parity	The parity for all ports.	none
all.authtype	There are several authentication type options: local (authentication is performed using the /etc/passwd file), radius (authentication is performed using a Radius authentication server), none, local/radius (authentication is performed locally first, switching to Radius if unsuccessful), radius/local (the opposite of the previous option) and RadiusDownLocal (local authentication is tried only when the Radius server is down). Note that this parameter controls the authentication required by the Cyclades-TS. The authentication required by the device to which the user is connecting is controlled separately.	none
all.protocol	For the terminal server profile, the possible protocols are login (which requests username and password) and rlogin (which receives the username from the TS and requests a password), telnet, ssh and ssh2.	rlogin
all.host	The IP address of the host to which the terminals will connect.	200.200.200.3

FIGURE 5.10 TERMINAL SERVER PSLAVE.CONF PORT-SPECIFIC PARAMETERS

Parameter	Description	Value for This Example
all.issue	This text determines the format of the login banner that is issued when a connection is made to the Cyclades-TS. \n represents a new line and \r represents a carriage return.	\r\n\ TSLINUX - Portslave Internet Services\n\ \r\n\ Welcome to terminal server %h port S%p \n\ \r\n\ Customer Support: 510-770-9727 www.cyclades.com/\n\ \r\n
all.prompt	This text defines the format of the login prompt. Expansion characters, listed in Appendix C, can be used here.	%h login:
all.term	This parameter defines the terminal type assumed when performing rlogin or telnet to other hosts.	vt100
all.flow	This sets the flow control to hardware, software, or none.	hard
all.socket_port	This parameter defines the port(s) to be used by the protocols telnet, socket_client and socket_server. It is mandatory for the socket_server protocol; for the other two protocols a default value of 23 is used when no value is configured.	23
all.users	Restricts access to ports by user name (only the users listed can access the port or, using the character "!', all **but** the users listed can access the port .) In this example, the users joe, mark and members of user_group cannot access the port. A single comma and spaces/tabs may be used between names. A comma may not appear between the ! and the first user name. The users may be local or Radius. User groups (defined with the parameter conf.group) can be used in combination with user names in the parameter list.	! joe, mark, user_group
s1.tty	The device name for the port is set to the value given in this parameter. If a device name is not provided for a port, it will not function.	ttyS1
s16.tty	See the s1.tty entry in this table.	ttyS16

FIGURE 5.10 TERMINAL SERVER PSLAVE.CONF PORT-SPECIFIC PARAMETERS (CONTINUED)

Execute the command **signal_ras hup** to activate the changes. At this point, the configuration should be tested. A step-by-step check list follows.

1. Since authentication was set to none, the Cyclades-TS will not authenticate the user. However, the Linux Server receiving the connection will. Create a new user on the server called test and provide him with the password test.
2. From the console, ping 200.200.200.3 to make sure the server is reachable.
3. Make sure that the physical connection between the Cyclades-TS and the terminals is correct. A cross cable (not the modem cable provided with the product) should be used. Please see the hardware specifications appendix for pin-out diagrams.
4. The Cyclades-TS has been set for communication at 9600 bps, 8N1. The terminals must also be configured with the same parameters.
5. From a terminal connected to the Cyclades-TS, try to log in to the server using the username and password configured in item one.

Now continue on to step four later in this chapter.

STEP THREE - REMOTE ACCESS SERVER

The remote access server profile allows a modem user to access the LAN. Radius authentication is used in this example and ppp is chosen as the protocol.

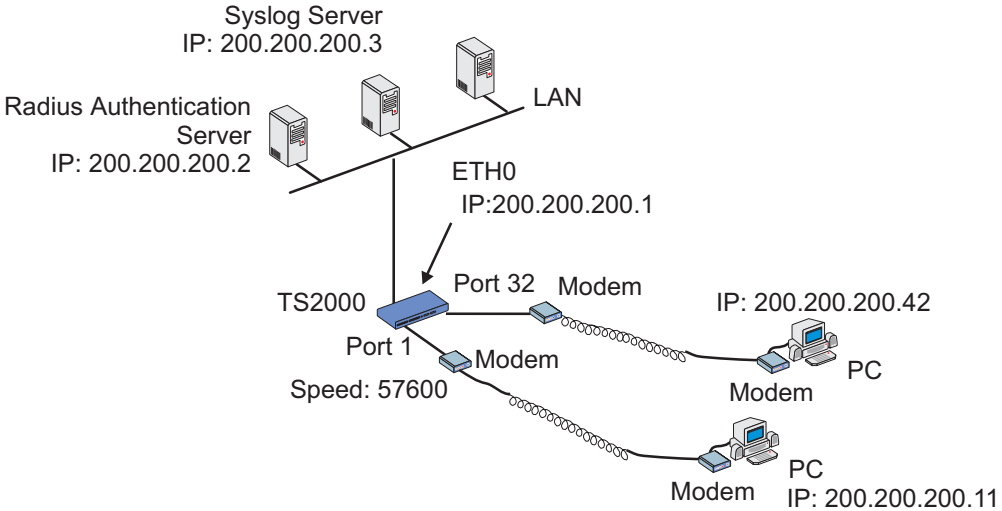


FIGURE 5.11 REMOTE ACCESS SERVER APPLICATION

The fifth configuration file (the first four were described in step two) is specific to the Cyclades-TS and a sample file with comments is supplied in the Linux file system. It is called /etc/portslave/pslave.conf. A listing of the pslave.conf file with all possible parameters, as well as the files used to create the three applications in this chapter, is provided in Appendix C. There are three basic types of parameters: conf.* parameters are global or apply to the Ethernet interface; all.* parameters are used to set default parameters for all ports, and s#.* parameters change the default port parameters for individual ports. An all.* parameter can be overriden by a s#.* parameter appearing later in the pslave.conf file (or vice-versa). A brief description of each parameter used for the remote access server profile is given in Figures 4.12-4.13.

Parameter	Description	Value for This Example
conf.eth_ip	The IP address of the Ethernet interface. This parameter, along with the next two, is used by the cy_ras program to OVERWRITE the file /etc/network/ifcfg_eth0 as soon as the command "signal_ras HUP" is executed. The file /etc/network/ifcfg_eth0 should not be edited by the user unless the cy_ras application is not going to be used.	200.200.200.1
conf.eth_mask	The mask for the Ethernet network.	255.255.255.0
conf.eth_mtu	The Maximum Transmission Unit size, which determines whether or not packets should be broken up.	1500
conf.lockdir	The lock directory , which is /var/lock for the Cyclades-TS. It should not be changed unless the user decides to customize the operating system.	/var/lock
conf.pppd	Location of the ppp daemon with Radius.	/usr/local/sbin/pppd
conf.syslog	The IP address of a remote syslog daemon can be provided here, if desired.	200.200.200.3
conf.facility	This value (0-7) is sent to the syslog server (the TS is a syslog client) to indicate in which file the syslog messages should be stored. The file /etc/syslog.conf on the syslog server contains a mapping between facility numbers and server log files.	7

FIGURE 5.12 REMOTE ACCESS SERVER PSLAVE.CONF GLOBAL PARAMETERS

Parameter	Description	Value for This Example
all.speed	The speed for all ports. **This value (as for all "all." parameters) can later be overridden for individual ports using the s*<port number>*.speed parameter.**	57600
all.datasize	The data size for all ports.	8
all.stopbits	The number of stop bits for all ports	1
all.parity	The parity for all ports.	none
all.syslog_level	This variable determines which syslog messages will be sent to the syslog server configured in the conf.syslog parameter. A value of 0 suppresses all but emergency messages while values between 1 and 7 send progressively more types of messages for each increment.	4
all.console_level	This variable determines which syslog messages will be sent to the Cyclades-TS console connected through the console interface. See the previous parameter for a description of possible values	4
all.authtype	There are several authentication type options: local (authentication is performed using the /etc/passwd file), radius (authentication is performed using a Radius authentication server), none, local/radius (authentication is performed locally first, switching to Radius if unsuccessful), radius/local (the opposite of the previous option) and RadiusDownLocal (local authentication is tried only when the Radius server is down). Note that this parameter controls the authentication required by the Cyclades-TS. The authentication required by the device to which the user is connecting is controlled separately.	radius

FIGURE 5.13 REMOTE ACCESS SERVER PSLAVE.CONF PORT-SPECIFIC PARAMETERS

Parameter	Description	Value for This Example
all.authhost1	This address indicates the location of the Radius authentication server and is only necessary if this option is chosen in the previous parameter. A second Radius authentication server can be configured with the parameter all.authhost2.	200.200.200.2
all.accthost1	This address indicates the location of the Radius accounting server, which can be used to track how long users are connected after being authorized by the authentication server. Its use is optional.	200.200.200.2
all.radtimeout	This is the timeout (in seconds) for a radius authentication query. The first server (authhost1) is tried "radretries" times, and then the second (if configured) is contacted "radretries" times. If the second also fails to respond, Radius authentication fails.	5
all.radretries	Defines the number of times each Radius server is tried before another is contacted. The default, if not configured, is 5.	5
all.secret	This is the shared secret necessary for communication between the Cyclades-TS and the Radius servers.	cocomero
all.protocol	For the remote access server profile, the available protocols are PPP, SLIP and CSLIP.	ppp
all.ipno	The IP address to be assigned to the dial-in users. The "+" indicates that the first port should be addressed as 192.168.1.101 and the following ports should have consecutive values.	200.200.200.11+
all.netmask	The netmask corresponding to the IP number provided in the previous parameter.	255.255.255.255
all.mtu	The maximum transmission unit (MTU) that can be transmitted in a PPP packet.	1500
all.mru	The maximum reception unit (MRU) that can be received in a PPP packet.	1500

FIGURE 5.13 REMOTE ACCESS SERVER PSLAVE.CONF PORT-SPECIFIC PARAMETERS (CONTINUED)

Parameter	Description	Value for This Example
all.initchat	Modem initialization string.	TIMEOUT 10 "" \d\l\dATZ \ OK\r\n-ATZ-OK\r\n "" \ "" ATMO OK\R\N "" \ TIMEOUT 3600 RING "" \ STATUS Incoming %p:I.HANDSHAKE "" ATA \ TIMEOUT 60 CONNECT@ "" \ STATUS Connected %p:I.HANDSHAKE
all.flow	This sets the flow control to hardware, software, or none.	hard
all.autoppp	PPP options to auto-detect a ppp session. The cb-script parameter defines the file used for callback and enables negotiation with the callback server. Callback is available in combination with Radius Server authentication. When a registered user calls the TS, it will disconnect the user, then call the user back. The following three parameters must be configured in the Radius Server: attribute Service_type(6) : Callback Framed; attribute Framed_Protocol(7): PPP; attribute Callback_Number(19): the dial number (example: 50903300).	%i:%j novj \ proxyarp modem asyncmap 000A0000 \ noipx noccp login auth require-pap refuse-chap \ mtu %t mru %t \ cb-script /etc/portslave/cb_script plugin /usr/lib/libpsr.so
all.pppopt	PPP options when user has already been authenticated.	%i:%j novj \ proxyarp modem asyncmap 000A0000 \ noipx noccp mtu %t mru %t netmask %m \ idle %I maxconnect %T \ plugin /usr/lib/libpsr.so

FIGURE 5.13 REMOTE ACCESS SERVER PSLAVE.CONF PORT-SPECIFIC PARAMETERS (CONTINUED)

Parameter	Description	Value for This Example
s1.tty	The device name for the port is set to the value given in this parameter. If a device name is not provided for a port, it will not function.	ttyS1
s32.tty	See the s1.tty entry in this table.	ttyS32

FIGURE 5.13 REMOTE ACCESS SERVER PSLAVE.CONF PORT-SPECIFIC PARAMETERS (CONTINUED)

Execute the command **`signal_ras hup`** to activate the changes. At this point, the configuration should be tested. A step-by-step check list follows.

1. Since Radius authentication was chosen, create a new user on the Radius authentication server called test and provide him with the password test.
2. From the console, ping 200.200.200.2 to make sure the Radius authentication server is reachable.

3. Make sure that the physical connection between the Cyclades-TS and the modems is correct. The modem cable provided with the product should be used. Please see the hardware specifications appendix for pin-out diagrams.

4. The Cyclades-TS has been set for communication at 57600 bps, 8N1. The modems should be programmed to operate at the same speed on the DTE interface. Also make sure that the computer is configured to route console data to the serial console port.

5. Try to dial in to the Cyclades-TS from a remote computer using the username and password configured in item one. The computer dialing in must be configured to receive its IP address from the remote access server (the Cyclades-TS in this case) and to use PAP authentication.

Now continue on to step four.

STEP FOUR - FOR ALL PROFILES

TS100 owners, please skip to the special section on the TS100 later in this chapter, then return to this section to continue with step four.

Restart the cy_ras process using its process ID. This can be done by executing the command:

```
signal_ras hup
```

This executes the ps command, searches for the cy_ras process id, then sends the signal HUP to the process, all in one step.

Next, the command `saveconf`, which reads the /etc/config_files file, should then be run. The command `saveconf` copies all the files listed in the file /etc/config_files from the ramdisk to /proc/flash/script. The previous contents of the file /proc/flash/script will be lost.

Now the configuration is complete.

saveconf is equivalent to `tar -czf /proc/flash/script -T /etc/config_files` in standard Linux (saveconf must be used because tar on the TS does not support the z flag).

restoreconf does the opposite of saveconf, copying the contents of the `/proc/flash/script` file to the corresponding files in the ramdisk. The files on the ramdisk are overwritten. **restoreconf** is run automatically each time the Cyclades-TS is booted.

Information applicable only to the Cyclades-TS100

Since there are two physical interfaces available in the Cyclades-TS100, RS-232 and RS-485, this model requires the configuration of the parameter described in the Figure 5.14.

Parameter	Description
all.media **or*** s1.media	For the TS100 only. *rs232* (RS-232 interface and DB-9 connector), *rs485_half_terminator* (RS-485 interface, half duplex communication with two wires, DB-9 or block connector, the TS100 terminates the network), *rs485_full_terminator* (RS-485 interface, full duplex communication with four wires, DB-9 or block connector, the TS100 terminates the network), *rs485_half* (RS-485 interface, half duplex communication with two wires, DB-9 or block connector, the TS100 in the middle of the network) or *rs485_full* (RS-485 interface, full duplex communication with four wires, DB-9 or block connector, the TS in the middle of the network).
***NOTE:** all.* parameters are used to set default parameters for all ports and s#.* parameters change the default parameters for individual ports. As the TS100 has only one port, either s1.* or all.* can be used, interchangeably.	

FIGURE 5.14 CYCLADES-TS100-MEDIA PARAMETER

The next step is to update the system with the modified data in the files above. Make sure the file named /etc/config_files contains the names of all files that should be saved to flash.

Configuring the Cyclades-TS100 for the first time

The Cyclades-TS100 does not have a dedicated console port. After configuring the serial port, edit the file /etc/inittab and comment the line that designates the console port (add a "#" to it):

```
# ttyS0::respawn:/sbin/getty -p ttyS0 ansi
```

Then, edit the file /etc/config_files and add the line

```
/etc/inittab
```

Next, the command `saveconf`, which reads the /etc/config_files file, should be run. The command `saveconf` copies all the files listed in the file /etc/config_files from the ramdisk to /proc/flash/script. The previous contents of the file /proc/flash/script will be lost.

After rebooting the TS100, the initial configuration is complete.

Clustering

Clustering has been added to the Cyclades-TS with firmware version 1.3.0 (except for the TS100). It allows the stringing of Terminal Servers so that one master Cyclades-TS can be used to access all Cyclades-TSs on a LAN. The master Cyclades-TS can manage up to 512 serial ports, so

- 1 Master TS1000 + 31 slave TS1000s, or
- 1 Master TS2000 + 15 slave TS2000s, or
- 1 Master TS3000 + 9 slave TS3000s + 1 slave TS2000

can be clustered.

An example with one master TS2000 and two slave TS2000s is shown in Figure 5.15.

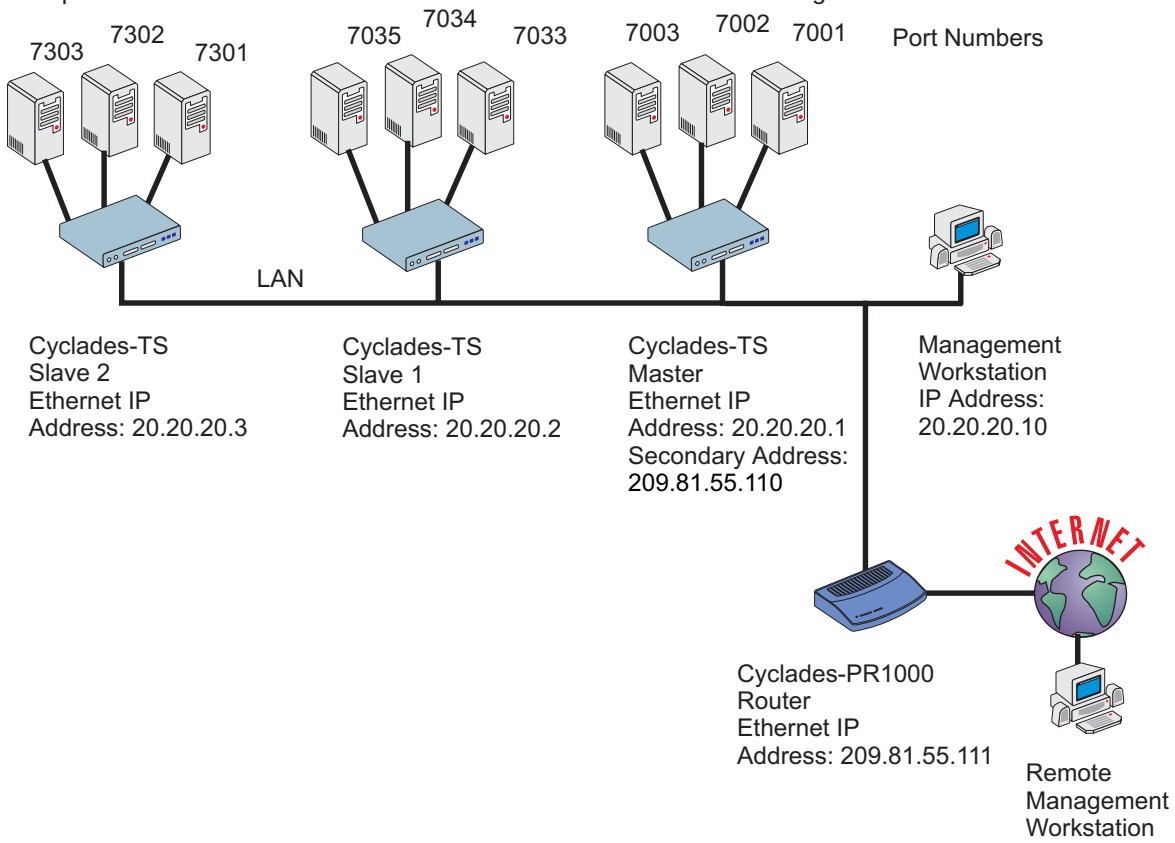


FIGURE 5.15 EXAMPLE USING THE CLUSTERING FEATURE.

The Master Cyclades-TS must contain references to the Slave ports. The configuration described earlier for Console Access Servers should be followed with the following exceptions for the Master and Slaves:

Master Configuration:

Parameter	Description	Value for This Example
conf.eth_ip	Ethernet Interface IP address.	20.20.20.1
conf.eth_ip_alias	Secondary IP address for the Ethernet Interface (needed for clustering feature).	209.81.55.110
conf.eth_mask_alias	Mask for secondary IP address above.	255.255.255.0
all.socket_port	This value applies to both the local ports and ports on slave Cyclades-TSs.	7001+
all.protocol	Depends on the application.	Socket_ssh or socket_server
all.authtype	Depends on the application.	Radius or local or none
s33.tty	This parameter must be created in the master TS file for every slave port. Its format is IP_of_Slave:[slave_socket_port] for non-master ports. In this case, the slave_socket_port value is not necessary because s33.socket_port is automatically set to 7033 by all.socket_port above.	20.20.20.2:7033
s33.serverfarm	An alias for this port.	Server_on_slave1_serial_s1
s33.ipno	This parameter must be created in the master TS file for every slave port, unless configured using all.ipno.	0.0.0.0
s34.tty	See s33.tty.	20.20.20.2:7034
s34.serverfarm	An alias for this port.	Server_on_slave1_serial_s2
s34.ipno	See s33.ipno.	0.0.0.0

FIGURE 5.16 MASTER CYCLADES-TS CONFIGURATION (WHERE IT DIFFERS FROM THE STANDARD CAS PROFILE)

Parameter	Description	Value for This Example
s35.tty	See s33.tty.	20.20.20.2:7035
s35.serverfarm	An alias for this port.	Server_on_slave1_serial_s3
s35.ipno	See s33.ipno.	0.0.0.0
etc. for s36-s64		
S65.tty	The format of this parameter is IP_of_Slave:[slave_socket_port] for non-master ports. The value 7301 was chosen arbitrarily for this example.	20.20.20.3:7301
S65.serverfarm	An alias for this port.	Server_on_slave2_serial_s1
S65.ipno	See s33.ipno.	0.0.0.0
S66.tty	See s65.tty.	20.20.20.3:7302
S66.serverfarm	An alias for this port.	Server_on_slave2_serial_s2
S66.ipno	See s33.ipno.	0.0.0.0
S67.tty	See s65.tty.	20.20.20.3:7303
S67.serverfarm	An alias for this port.	Server_on_slave2_serial_s3
S67.ipno	See s33.ipno.	0.0.0.0
etc. for s68-s96		

FIGURE 5.16 MASTER CYCLADES-TS CONFIGURATION (CONT.)

The Slave Cyclades-TSs do not need to know they are being accessed through the Master Cyclades-TS. Their port numbers, however, must agree with those assigned by the Master.

Parameter	Value for This Example
all.protocol	socket_server
all.authtype	none
conf.eth_ip	20.20.20.2
all.socket_port	7033+

FIGURE 5.17 CYCLADES-TS CONFIGURATION FOR SLAVE 1 (WHERE IT DIFFERS FROM THE STANDARD CAS PROFILE)

Parameter	Value for This Example
all.protocol	Socket_server
all.authtype	None
conf.eth_ip	20.20.20.3
all.socket_port	7301+

FIGURE 5.18 CYCLADES-TS CONFIGURATION FOR SLAVE 2 (WHERE IT DIFFERS FROM THE STANDARD CAS PROFILE)

To access ports from the remote management workstation, use telnet with the secondary IP address:

```
Telnet 209.81.55.110 7001 to access the first port of the Master Cyclades-TS
Telnet 209.81.55.110 7033 to access the first port of Slave 1
Telnet 209.81.55.110 7065 to access the first port of Slave 2
```

Note that socket port 7065 is being used in the last example to access port 7301 in Slave 2.

ssh can also be used from the remote management workstation:

```
ssh -l <username>:Server_on_slave2_serial_s3 209.81.55.110 to access the
third port of Slave 2
ssh -l <username>:7069 209.81.55.110 to access the fifth port of Slave 2
```

Centralized Management - Include File

The Cyclades-TS allows centralized management through the use of a master pslave.conf file. Administrator's should consider this approach to configure multiple Cyclades-TSs. Using this feature, each unit has a simplified pslave.conf file where a master include file is cited. This common configuration file contains information for all units, properly separated in separate sections, and would be stored on one central server. This file, in our example shown in figure 5.19, is /etc/portslave/TScommon.conf. It must be downloaded to each Cyclades-TS.

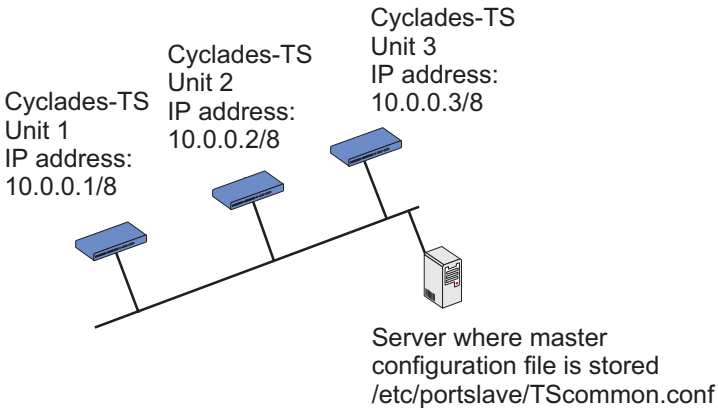


FIGURE 5.19 EXAMPLE OF CENTRALIZED MANAGEMENT

The abbreviated pslave.conf and /etc/hostname files in each unit, for the example are:
unit 1:

```
unit1
```

FIGURE 5.20 /ETC/HOSTNAME FILE IN UNIT 1

```
conf.eth_ip       10.0.0.1
conf.eth_mask     255.0.0.0
conf.include      /etc/portslave/TScommon.conf
```

FIGURE 5.21 PSLAVE.CONF FILE IN UNIT 1

unit 2:

```
unit2
```

FIGURE 5.22 /ETC/HOSTNAME FILE IN UNIT 2

```
conf.eth_ip       10.0.0.2
conf.eth_mask     255.0.0.0
conf.include      /etc/portslave/TScommon.conf
```

FIGURE 5.23 PSLAVE.CONF FILE IN UNIT 2

unit 3:

```
unit3
```

FIGURE 5.24 /ETC/HOSTNAME FILE IN UNIT 1

```
conf.eth_ip       10.0.0.3
conf.eth_mask     255.0.0.0
conf.include      /etc/portslave/TScommon.conf
```

FIGURE 5.25 PSLAVE.CONF FILE IN UNIT 3

The common include file for the example is:

```
conf.host_config  unit1

<parameters for unit1 following the rules for pslave.conf>

conf.host_config  unit2

<parameters for unit2 following the rules for pslave.conf>

conf.host_config  unit3

<parameters for unit3 following the rules for pslave.conf>
conf.host_config .end
```

FIGURE 5.26 TSCOMMON.CONF FILE

When this file is included, unit1 would read only the information between “conf.host_config unit1” and conf.host_config unit2". Unit2 would use only the information between “conf.host_config unit2” and conf.host_config unit3" and unit3 would use information after “conf.host_config unit3” and before conf.host_config .end.

The following steps should be followed to use centralized configuration

1. Create and save the /etc/portslave/pslave.conf and /etc/hostname files in each Cyclades-TS
2. Execute the command signal_ras hup on each unit.
3. Create and save the common configuration file on the server, then download it (probably using scp) to each unit. Make sure to put it in the directory set in the pslave.conf file (/etc/portslave in the example).
4. Execute the command signal_ras hup on each unit again.
5. Test each unit. If everything works, add the line /etc/portslave/TScommon.conf to the /etc/config_files file. Save the file and close it. Next, execute the saveconf command.

NOTE: The included file /etc/portslave/TScommon.conf cannot contain an other include file (i.e. the parameter conf.include must not be defined).

CHAPTER 6 UPGRADES AND TROUBLESHOOTING

Upgrades

All 6 files added by Cyclades to the standard Linux files are in the /proc/flash directory. They are:
boot_ori - original boot code
boot_alt - alternate boot code
syslog - event logs (not used by Linux)
config - configuration parameters, only the boot parameters are used by the boot code
zImage - Linux kernel image
script - file where all Cyclades-TS configuration information is stored

To upgrade the Cyclades-TS, proceed as follows:

A) Log in to the TS as root (provide the root password if requested)

B) Go to the /proc/flash directory using the following command:

```
cd /proc/flash
```

C) Ftp to the host where the new firmware is located, log in using your username and password, go to the directory where the firmware is located, select binary transfer and “get” the firmware file. NOTE: the destination file name in the /proc/flash directory must be zImage. Example (hostname = server; directory = /tftpboot; username = admin; password = adminpw; firmware filename on that server = zImage.132):

```
ftp
> open server
> user admin
> Password: adminpw
> cd /tftpboot
> bin
> get zImage.132 zImage
> quit
```

NOTE: Due to space limitations, the new zImage file may not be downloaded with a different name, then renamed. The TS searches for a file named zImage when booting and there is no room in flash for two zImage files.

D) Issue the command reboot

```
reboot
```

E) After rebooting, the new Linux kernel will take over. This can be confirmed by typing `cat /proc/version` to see the Linux kernel version.

Troubleshooting

If the contents of flash memory are lost after an upgrade, please follow the instructions below to restore your system:

a. Turn the TS OFF, then back ON
b. Using the console, during self test, press <Esc> after the Ethernet test
c. When the Watch Dog Timer prompt appears, press <Enter>
d. Choose the option Network Boot when asked
e. Enter the IP address of the Ethernet interface
f. Enter the IP address of the host where the new zImage file is located
g. Enter the file name of the zImage file on the host
h. Select the TFTP option instead of BOOTP (the host must be running TFTPD and the new zImage file must be located in the proper directory. e.g. /tftpboot for Linux).
i. Accept the default MAC address by pressing <Enter>
j. The TS should begin to boot off the network and the new image will be downloaded and begin running in RAM. At this point, follow the upgrade steps above (login, cd /proc/flash, ftp, and so forth) to save the new zImage file into flash again.

NOTE: possible causes for the loss of flash memory: downloaded wrong zImage file, downloaded as ASCII instead of binary; problems with flash memory.

If the Cyclades-TS booted properly, the interfaces can be verified using ifconfig and ping. If ping does not work, check the routing table using the command route. Of course, all this should be tried after checking that the cables are connected correctly.

As mentioned in Chapter 5, the file /etc/config_files contains a list of files acted upon by saveconf and restoreconf. If a file is missing, it will not be loaded onto the ramdisk on boot. The following table lists files that should be included in the /etc/config_files file and which programs use each.

File	Program
/etc/securetty	telnet, login, su
/etc/issue	getty
/etc/getty_ttyS0	login (via console)
/etc/hostname	tcp
/etc/hosts	tcp
/etc/host.conf	tcp
/etc/nsswitch.conf	dns
/etc/resolv.conf	dns
/etc/config_files	saveconf
/etc/passwd	login, passwd, adduser...
/etc/group	login, passwd, adduser...
/etc/ssh/ssh_host_key.pub	sshd
/etc/ssh/sshd_config	sshd
/etc/ssh/ssh_config	ssh client
/etc/ssh/ssh_host_key	sshd (ssh1)
/etc/ssh/ssh_host_key.pub	sshd (ssh1)
/etc/ssh/ssh_host_dsa_key	sshd (ssh2)
/etc/ssh/ssh_host_dsa_key.pub	sshd (ssh2)
/etc/snmp/snmpd.conf	snmpd

File	Program
/etc/portslave/pslave.conf	cy_ras, portslave, TS configuration information
/etc/network/ifcfg_eth0	ifconfig eth0, cy_ras, rc.sysinit
/etc/network/ifcfg*	ifconfig, cy_ras, rc.sysinit
/etc/network/ifcfg_lo	ifconfig lo, cy_ras, rc.sysinit
/var/run/radsession.id	radinit, radius authentication process
/home	adduser, passwd
/etc/network/st_routes	ifconfig, cy_ras, rc.sysinit

If any of the files listed in /etc/config_files is modified, the Cyclades-TS administrator must execute the command saveconf before rebooting the Cyclades-TS or the changes will be lost. If a file is created (or a file name altered), its name must be added to this file before executing saveconf and reboot.

Cyclades Technical Support is always ready to help with any configuration problems. Before calling, execute the command
`cat /proc/version`
and note the Linux version and Cyclades-TS version written to the screen. This will speed resolution of most problems.

Hardware Test

A hardware test called tstest is included with the Cyclades-TS firmware. It is a menu-driven program, run by typing tstest at the command prompt, and the various options are described below. Note that the Cyclades-TS should not be tested while in use as the test will inactivate all ports.

Port Test

Either a cross cable or a loop-back connector is necessary for this test. Their pinout diagrams are supplied in appendix B. Connect the loop-back connector to the modem cable and then connect the modem cable to the port to be tested (or connect a cross cable between two ports to be tested). In the case of the TS100, connect the DB-25 loop-back connector to the console cable using a DB-9 - DB-25 convertor. When tstest senses the presence of the cable or connector, the test will be run automatically and the result shown on the screen.

Each line of data correponds to a port in test. The last 4 columns (DATA, CTS, DCD, and DSR) indicate errors. The values in these columns should be zero. The figure below is an example of the output screen.

			<- Packets ->			<- Errors ->		
From		To	Sent	Received	Passes	Data	CTS	DCD	DSR
2	<->	2	35	35	35	0	0	0	0
4	<->	5	35	35	35	0	0	0	0
5	<->	4	35	35	35	0	0	0	0

When this test is run with a cable or connector without the DSR signal (see the pinout diagram for the cable or connector being used), errors will appear in the DSR column. This does not indicate a problem with the port. In the example above, tstest perceived that a loop-back connector was attached to port 2 and that a cross cable was used to connect ports 4 and 5.

Port Conversation

This test sends and receives data on the selected port. One way to run this test is to place a loop-back connector on the port to be tested and begin. Enter the number of the port and a baud rate (9600 is a typical value). Type some letters, and if the letters appear on the screen, the port is working. If the letters do not appear on the screen (which also occurs if the loop-back connector is removed), the port is not functioning correctly.

A second method that can be used to test the port is to connect it to a modem with a straight cable. Begin the test and type “at”. The modem should respond with “OK”, which will appear on the screen. Other commands can be sent to the modem or to any other serial device.

Test Signals Manually

This test confirms that signals are being sent and received on the selected port. Neither the loop-back connector nor the cross cable are necessary. Enter the number of the port to be tested and begin the test.

State	DTR	DCD	DSR	RTS	CTS
ON	X			X	
	↓			↓	
OFF		X	X		X

First, type Ctrl-D to see the X in the DTR column move position, then type Ctrl-R to see the X in the RTS column change position. If each of the Xs moves in response to its command, the signals are being sent.

Another method to test the signals is to use a loop-back connector. Enter the number of the port with the loop-back connector and start the test. In this case, when Ctrl-D is typed, the Xs in the first three columns will move as shown below.

State	DTR	DCD	DSR	RTS	CTS
ON	X	X	X	X	
	↓	↓	↓		
OFF					X

This is because the test is receiving the DTR signal sent through the DCD and DSR pins. When Ctrl-R is typed, the Xs in the RTS and CTS columns should move together. If the Xs change position as described, the signals are being sent and received correctly.

Single User Mode

The Cyclades-TS has a single user mode used when:

- The name or password of the user with root privileges is lost or forgotten,
- After an upgrade or downgrade which leaves the Cyclades-TS unstable,
- After a configuration change which leaves the Cyclades-TS inoperative or unstable.

Type the word “ single” (with a blank space before the word) during boot using a console connection. This cannot be done using a telnet or other remote connection.

The initial output of the boot process is shown below.

```
Entry Point = 0x00002120
loaded at: 00002120 0000D370
relocated to: 00300020 0030B270
board data at: 003052C8 0030537C
relocated to: 002FF120 002FF1D4
zimage at: 00008100 0006827E
relocated to: 00DB7000 00E1717E
initrd at: 0006827E 0024F814
relocated to: 00E18000 00FFF596
avail ram: 0030B270 00E18000
Linux/PPC load: root=/dev/ram
```

After printing “Linux/PPC load: root=/dev/ram”, the Cyclades-TS waits approximately 10 seconds for user input. This is where the user should type “ single”. When the boot process is complete, the Linux prompt will appear on the console:

```
[root@(none) /]#
```

If the password or username was forgotten, execute the following commands:

```
passwd
saveconf
reboot
```

For configuration problems, the user has two options:

1. Edit the file(s) causing the problem with vi, then execute the commands
   ```
   saveconf
   reboot
   ```

2. Reset the configuration by executing the commands:
   ```
   echo 0 > /proc/flash/script
   reboot
   ```

If the problem is due to an upgrade/downgrade, a second downgrade/upgrade will be necessary to reverse the

process. First, the network must be initialized in order to reach a ftp server. Execute the following script, replacing the parameters with values appropriate for your system. If your ftp server is on the same network as the TS, the gw and mask parameters are optional.

```
config_eth0 ip 200.200.200.1 mask 255.255.255.0 gw 200.200.200.5
```

At this point, the DNS configuration (in the file /etc/resolv.conf) should be checked. Then, download the kernel image using the ftp command.

Recover the access to the Cyclades-TS100 console port

There is no dedicated console port available in the Cyclades-TS100. As factory default the serial port is set to work as a console port to allow initial product configuration. After that, changes can still be made through the Ethernet port and a Telnet command. If for some reason this access is lost (usually misconfiguration), the product can only be configured if the steps bellow are followed.

1. Power the Cyclades-TS100 off.
2. Remove the product top cover (press the tabs through the two holes on each side of the product and pull the top cover off).
3. Short circuit the two pins in the middle of the board identified with “J7” and “TEST” using the jumper provided.
4. Connect the Cyclades-TS100 to a terminal configured to work at 9600 bps, with 8 bits, no parity and 1 stop bit.
5. Power the Cyclades-TS100 on.

The Cyclades-TS100 will be now in single user mode, the serial port will work as a console port and the product can de reconfigured. Notice that no previous configuration is lost. After finishing, **save the configuration** (saveconf), power the Cyclades-TS100 off, **remove the jumper** and reconnect the original device to the serial port.

APPENDIX A INFORMATION FOR USERS NOT FAMILIAR WITH LINUX

Users and Passwords

A username and password are necessary to log in to the Cyclades-TS. The user “root” is predefined, without a password. A password should be configured as soon as possible to avoid unauthorized access.
Type the command:

```
passwd
```

to create a password for the root user.

To create a regular user (without root privileges), use the commands:

```
adduser user_name
passwd user_name
```

To log out, type “logout” at the command prompt.

Linux File Structure

The Linux file system is organized hierarchically, with the base (or root) directory represented by the symbol “/”. All folders and files are nested within each other below this base directory. The directories located just below the base directory are:

/home	Contains the work directories of system users.
/bin	Contains applications and utilities used during system initialization.
/dev	Contains files for devices and ports.
/etc	Contains configuration files specific to the operating system.
/lib	Contains shared libraries.
/proc	Contains process information
/mnt	Contains information about mounted disks.
/opt	Location where packages not supplied with the operating system are stored.
/tmp	Location where temporary files are stored.
/usr	Contains most of the operating system files.
/var	Contains operating system data files.

Basic File Manipulation Commands

The basic file manipulation commands allow the user to copy, delete and move files and create and delete directories.

cp *file_name destination* a) cp text.txt /tmp b) cp /chap/robo.php ./excess.php	Copies the file indicated by *file_name* to the path indicated by *destination*. a) copies the file text.txt in the current directory to the tmp directory. b) copies the file robo.php in the chap directory to the current directory and renames the copy excess.php.
rm *file_name*	Removes the file indicated by *file_name*.
mv *file_name destination*	Moves the file indicated by *file_name* to the path indicated by destination.
mkdir *directory_name* a) mkdir spot b) mkdir /tmp/snuggles	Creates a directory named directory_name. a) creates the directory spot in the current directory. b) creates the directory snuggles in the directory tmp.
rmdir *directory_name*	Removes the directory indicated by *directory_name*.

Other commands allow the user to change directories and see the contents of a directory.

pwd	Supplies the name of the current directory. While logged in, the user is always "in" a directory. The default initial directory is the user's home directory, /home/<username>
ls [options] *directory_name*	Lists the files and directories within *directory_name*. Some useful options are -l for more detailed output and -a which shows hidden system files.
cd *directory_name*	Changes the directory to the one specified
cat *file_name*	Prints the contents of *file_name* to the screen.

Shortcuts:

. (a dot)	represents the current directory
.. (two dots)	represents one directory above the current directory (i.e. one directory closer to the base directory).

The vi Editor

To edit a file using the vi editor, type

```
vi file_name
```

vi is a three-state line editor: it has a command mode, a line mode and an editing mode. If in doubt as to which mode you are in, press the <ESC> key which will bring you to the command mode.

Mode	What is done there	How to Get There
command mode	navigation within the open file	Press the <ESC> key.
editing mode	text editing	See list of editing commands below.
line mode	file saving, opening, etc. exiting from vi	From the command mode, type ":" (the colon).

Entering the program, the user is automatically in the command mode. To navigate to the part of the file to be edited, use the following keys:

`h`	moves the cursor to the left (left arrow)
`j`	moves the cursor to the next line (down arrow)
`k`	moves the cursor to the previous line (up arrow)
`l`	moves the cursor to the right (right arrow)

Having arrived at the location where text should be changed, use these commands to modify the text (note commands “i” and “o” will move you into the editing mode and everything typed will be taken literally until you press the <ESC> key to return to the command mode)

`i`	insert text before the cursor position (everything to the right of the cursor is shifted right)
`o`	create a new line below the current line and insert text (all lines are shifted down)
`dd`	remove the entire current line
`u`	undo the last modification
`x`	delete the letter at the cursor position

Now that the file has been modified, enter the line mode (by typing “:” from the command mode) and use one of the following commands:

`w`	save the file (w is for write)
`wq`	save and close the file (q is for quit)
`q!`	close the file without saving
`w` *`file`*	save the file with the name *file*
`e` *`file`*	opens the file named *file*

The Routing Table

The Cyclades-TS has a static routing table that can be seen using the commands

```
route
```

or

```
netstat -rn
```

The file /etc/network/st_routes shown in Figure 5.5 is the Cyclades-TS's method for configuring static routes. Routes should be added to the file (which is a script run when the Cyclades-TS is initialized) or at the prompt (for temporary routes) using the following syntax:

```
route [add|del] [-net|-host] target netmask nt_msk [gw gt_way] interf
```

`[add|del]`	one of these tags must be present -- routes can be either added or deleted.
`[-net|-host]`	-net is for routes to a network and -host is for routes to a single host.
target	*target* is the IP address of the destination host or network
netmask *nt_msk*	the tag netmask and a mask are necessary only when subnetting is used. Otherwise, a mask appropriate to the *target* is assumed. *nt_msk* must be specified in dot notation.
gw *gt_way*	specifies a gateway, when applicable. *gt_way* is the IP address or hostname of the gateway.
interf	the interface to use for this route. Must be specified if a gateway is not. When a gateway is specified, the operating system determines which interface is to be used.

ssh - The Secure Shell Session

ssh is a command interface and protocol often used by network administrators to connect securely to a remote computer. ssh replaces its non-secure counterpart rsh and rlogin. There are two versions of the protocol, ssh and ssh2. The Cyclades-TS offers both.

The command to start an ssh client session from a **Unix** workstation is

```
ssh -t <user>@<hostname>
```

where

```
<user> = <username>:ttySnn or
         <username>:socket_port or
         <username>:ip_addr or
         <username>:serverfarm
```

Note: “serverfarm” is a physical port alias. It can be configured in the file pslave.conf.

An example:

username:	cyclades
TS1000 IP address:	192.168.160.1
host name:	ts1000
servername for port 1:	file_server

ttyS1 addressed by IP 10.0.0.1 or socket port 7001. The various ways to access the server connected to the port are:

```
ssh -t cyclades:ttyS1@ts1000
ssh -t cyclades:7001@ts1000
ssh -t cyclades:10.0.0.1@ts1000
ssh -t cyclades:file_server@ts1000
ssh -t -l cyclades:10.0.0.1
ssh -t -l cyclades:7001 ts1000
```

Note that either -l or @ are used, but not both. For openssh version 3.1p1 or later (Cyclades-TS V_1.3.2 or later), ssh2 is the default. In that case, the -1 flag is used for ssh1.

`ssh -t cyclades:7001@ts1000` (openssh earlier than 3.1p1 - Cyclades-TS V_1.3.1 and earlier -> ssh1 will be used)

`ssh -t -2 cyclades:7001@ts1000` (openssh earlier than 3.1p1 - Cyclades-TS V_1.3.1 and earlier -> ssh2 will be used)

`ssh -t cyclades:7001@ts1000` (openssh 3.1p1 or later - Cyclades-TS V_1.3.2 or later -> ssh2 will be

used)
`ssh -t -1 cyclades:7001@ts1000` (openssh 3.1p1 or later - Cyclades-TS V_1.3.2 or later -> ssh1 will be used)

To log in to a port that does not require authentication, the username is not necessary:
`ssh -t -2 :ttyS1@ts1000`

Note: In this case, the file sshd_config must be changed in the following way:
PermitRootLogin Yes
PermitEmptyPassword Yes

Configuring sshd's client authentication using SSH Protocol version 1

1. Only RhostsAuthentication yes in sshd_config

- One of these:

  hostname or ipaddress in /etc/hosts.equiv or /etc/ssh/shosts.equiv

  hostname or ipaddress and username in ~/.rhosts or ~/.shosts and IgnoreRhosts no in sshd_config

- Client start-up command: ssh -t <TS_ip or Serial_port_ip> (if the ssh client is running under a session belonging to a username present both in the workstation's database and the TS's database)

- Client start-up command: ssh -t -l <username> <TS_ip or Serial_port_ip> (if the ssh client is running under a session belonging to a username present only in the workstation's database. In this case, the <username> indicated would have to be a username present in the TS's database)

Note 1: Some ssh clients do not allow just this type of authentication, for security reasons.

Note 2: To access the serial port, the TS must be configured for local authentication.
Note 3: No root user should be used as username.

2. Only RhostsRSAAuthentication yes in sshd_config

- One of the RhostsAuthentication above settings
- Client machine's host key ($ETC/ssh_host_key.pub) copied into the TS /tmp/known_hosts file. The client hostname plus the information inside this file must be appended in one single line inside the file /etc/ssh/ssh_known_hosts or ~/.ssh/known_hosts and IgnoreUserKnownHosts no inside sshd_config. The following commands can be used for example:

  echo –n "client_hostname " >> /etc/ssh/ssh_known_hosts or ~/.ssh/known_hosts

  cat /tmp/known_hosts >> /etc/ssh/ssh_known_hosts or ~/.ssh/known_hosts

- client start-up command: ssh -t <TS_ip or Serial_port_ip>

Note 1: "client_hostname" should be the DNS name.
Note 2: To access the serial port, the TS must be configured for local authentication.
Note 3: No root user should be used as username.

3. Only RSAAuthentication yes in sshd_config

- Removal of TS's *.equiv, ~/.?hosts, and *known_hosts files
- client identity created by ssh-keygen and its public part (~/.ssh/identity.pub) copied into TS's ~/.ssh/authorized_keys
- client start-up command: ssh -t <TS_ip or Serial_port_ip>

4. Only PasswdAuthentication yes in sshd_config

- Removal of TS's *.equiv, ~/.?hosts, *known_hosts, and *authorized_keys files
- client startup command: ssh –t -l <username> <TS_ip or Serial_port_ip> or ssh –t –l <username:alias> <TS_ip>

Configuring sshd's client authentication using SSH Protocol version 2

1. Only PasswdAuthentication yes in sshd_config DSA Authentication is the default (Make sure the parameter PubkeyAuthentication is enabled)

- Client DSA identity created by ssh-keygen -d and its public part (~/.ssh/id_dsa.pub) copied into TS's ~/.ssh/authorized_keys2 file
- Password Authentication is performed if DSA key is not known to the TS.

client start-up command: ssh -2 -t <TS_ip or Serial_port_ip>

Notice:

All files "~/*" or "~/.ssh/*" must be owned by the user and readable only by others.
All files created or updated must have their full path and file name inside the file config_files and the command saveconf must be executed before rebooting the TS.

The Process Table

The process table shows which processes are running. Type ps -a to see a table similar to that below.

```
PID     Uid       State     Command
1       root      S         /sbin/inetd
31      root      S         /sbin/sshd
32      root      S         /sbin/cy_ras
36      root      S         /sbin/cy_wdt_led wdt led
154     root      R         /ps -a
```

To restart the cy_ras process use its process ID or execute the command:

```
signal_ras hup
```

This executes the ps command, searches for the cy_ras process id, then sends the signal HUP to the process, all in one step. Never kill cy_ras with the signals -9 or SIGKILL.

NTP Client Functionality

In order for the Cyclades-TS to work as a NTP (Network Timer Protocol) client, the IP address and either hostname or domain name of the NTP server must be set in the file /etc/hosts. The date and time will be updated from the NTP server after rebooting.

The Crond Utility

To use crond, first create the following two files for every process that it will execute:
1. crontab - the file that specifies frequency of execution, name of shell script, etc. should be set using the traditional crontab file format.
2. script shell - a script file with the Linux commands to be executed.

Next, create a line in the file /etc/crontab_files for each process to be run.
Each line must contain the three items:

- status (active or inactive) - if this item is not active, the script will not be executed.
- user - the process will be run with the privileges of this user, who must be a valid local user.
- source - pathname of the crontab file.

When the /etc/crontab_files file contains the following line:

```
active root /etc/tst_cron.src
```

and the /etc/tst_cron.src file contains the following line:

```
0-59 * * * * /etc/test_cron.sh
```

crond will execute the script listed in test_cron.sh with root privileges each minute.

Example files are in the /etc directory.

The next step is to update the system with the modified data in the files above and reboot the Cyclades-TS. Make sure the file named /etc/config_files contains the names of all files that should be saved to flash. Next, the command saveconf, which reads the /etc/config_files file, should then be run.

saveconf copies all the files listed in the file /etc/config_files from the ramdisk to /proc/flash/script. See step 4 in chapter 5 for more details.

The DHCP (Dynamic Host Configuration Protocol) Client

(Note: This feature is only available for firmware versions 1.2.x and above)
DHCP is a protocol that allows network administrators to assign IP addresses automatically to network devices. Without DHCP (or a similar protocol like BOOTP), each device would have to be manually configured. DHCP automatically sends a new IP address to a connected device when it is moved to another location on the network. DHCP uses the concept of a fixed time period during which the assigned IP address is valid for the device it was assigned for. This “lease” time can vary for each device. A short lease time can be used when there are more devices than available IP numbers. For more information, see RFC 2131.

The DHCP client on the Ethernet Interface can be configured in two different ways, depending on the action the Cyclades-TS should take in case the DHCP server does not answer the IP address request:

1. No action is taken and no IP address is assigned to the Ethernet Interface (most common configuration):

- Set the global parameter **conf.dhcp_client** to **1**
- Comment all other parameters related to the Ethernet Interface (conf.eth_ip, etc.)
- Add the necessary options to the file /etc/network/dhcpcd_cmd (some options are described below)

2. The Cyclades-TS restores the last IP address previously provided in another boot and assigns this IP address to the Ethernet Interface:

- Set the global parameter **conf.dhcp_client** to **2**
- Comment all other parameters related to the Ethernet Interface (conf.eth_ip, etc.)
- Add the following lines to the file /etc/config_files:
  /etc/network/dhcpcd_cmd
  /etc/dhcpcd-eth0.save
- Add the option “-x” to the factory default content of the file /etc/network/dhcpcd_cmd:
  /sbin/dhcpcd -x -c /sbin/handle_dhcp
- Add all other necessary options to the file /etc/network/dhcpcd_cmd (some options are described below)

In both cases if the IP address of the Cyclades-TS or the default gateway are changed, the Cyclades-TS will adjusts routing table accordingly.

Two files are related to DHCP:
/bin/handle_dhcp - the script which is run by the DHCP client each time an IP address negotiation takes place.

/etc/network/dhcpcd_cmd - contains a command that activates the DHCP client (used by the cy_ras program). Its factory contents are:

```
/sbin/dhcpcd -c /sbin/handle_dhcp
```

The options available that can be used on this command line are:

-D This option forces dhcpcd to set the domain name of the host to the domain name parameter sent by the DHCP server. The default option is to NOT set the domain name of the host to the domain name parameter sent by the DHCP server.

-H This option forces dhcpcd to set the host name of the host to the hostname parameter sent by the DHCP server. The default option is to NOT set the host name of the host to the hostname parameter sent by the DHCP server.

-R This option prevents dhcpcd from replacing the existing /etc/resolv.conf file.

The user should not modify the -c /sbin/handle_dhcp option.

Data Buffering

Since version 1.3.2 of the Cyclades-TS software, additional ramdisks can be created and used, for example, to buffer data. This removed the previous 700 kbyte restriction for all TS ports. Data buffering files are created in the directory /var/run/DB. Previously, data buffering files were named ttyS<nn>.data (where <nn> is the port number). Now, if the parameter s<nn>.serverfarm is configured for the port <nn>, this name will be used. For example, if the serverfarm is called bunny, the data buffering file will be named bunny.data.

The shell script /bin/build_DB_ramdisk creates a 4 Mbyte ramdisk for the TS3000. Use this script as a model to create customized ramdisks for your environment. Any user-created scripts should be listed in the file /etc/user_scripts because rc.sysinit executes all shell scripts found there. This avoids changing rc.sysinit itself.

Packet Filtering using ipchains

(Note: This feature is only available for firmware versions 1.2.x and above)
The Cyclades-TS uses the Linux utility ipchains to filter IP packets entering, leaving and passing through its interfaces. An ipchains tutorial is beyond the scope of this manual. For more information on ipchains, see the ipchains man page (not included with the Cyclades-TS) or the howto: http://netfilter.filewatcher.org/ipchains/HOWTO.html.

The syntax of the ipchains command is:

```
ipchains -command chain [-s source] [-d destination] [-p protocol] [-j target] [-i interface]
```

where **command** is one of the following:

A - Add a condition or rule to the end of the chain. Note that the order in which a condition appears in a chain can modify its application and the first rule added to a chain is processed first, etc.
D - Delete a condition from the chain. The condition must match exactly with the command's arguments to be deleted.
R- Replace a condition in the chain.
I - Insert a condition in a specified location in the chain.
L - List all conditions in the chain.
F - Flush (remove) all conditions in the chain.
N - Create a new chain.
X - Deletes a user-created chain
P - Policy applied for default handling

chain is one of the following:

input - filters incoming packets

output - filters outgoing packets
forward - filters packets which are not created by the Cyclades-TS and are not destined to the Cyclades-TS
user_created_chain - a previously defined (or in the process of being defined) chain created using the N command described above.

The output chain controls which packets are sent. A packet can be accepted by the input chain, but then rejected by the output chain. Likewise, the forward chain controls which packets will be routed. The input chain controls incoming packet filtering. The packet is either destined for the router or for another computer. In the latter case, the packet is processed by the forward chain. Packets that pass through the forward chain will then be processed by the output chain.

source and **destination** have the following format:
`[!]`*`address`*`[/`*`mask`*`] [!][`*`port`*`[:`*`port`*`]]`
! : reverses the definition, resulting in the opposite.
address : host or network IP
port : defines a specific port
port:port : defines a range of ports
If a source or destination is not specified then 0.0.0.0/0 is used.

protocol is one of the following:
tcp, udp, icmp, all or a protocol number (see the file /etc/protocols for a list).

target is one of the following:
ACCEPT
DENY
the name of another chain

interface is:
eth0 (The Ethernet interface is the only option on the Cyclades-TS.) Lists do not need to be associated to an interface, so this option may be omitted.

To save changes made using the ipchains command, execute fwset. This command will save the filter configuration in the file /etc/network/firewall and then save the file in flash memory.

To delete the changes made (before fwset is executed) execute fwset restore to return to the lists previously saved in /etc/network/firewall. Only the lists previously saved using fwset will then be defined. This command is executed at boot to invoke the last configuration saved.
Another option is to edit the file /etc/network/firewall (or another file) directly, following the syntax defined in the file itself. If the file is edited in this way, the command fwset cannot be used to save and restore the configuration. Use
`ipchains-save > file_name` to save the lists in file_name
`updatefiles file_name` to save file_name to flash memory
`ipchains-restore < file_name` to restore the lists to the configuration in file_name

An example of the use of ipchains for a console access server

Referring to Fig 5.5
If the administrator wishes to restrict access to the consoles connected to the Cyclades-TS to a user on the workstation with IP address 200.200.200.4, a filter can be set up as shown below.

```
ipchains -P input ACCEPT
ipchains -P output ACCEPT
ipchains -P forward ACCEPT
ipchains -A input -p tcp -s ! 200.200.200.4 -d 0.0.0.0/0 23 -j DENY
ipchains -A input -p tcp -s ! 200.200.200.4 -d 200.200.200.1 7001:7032 -j DENY
ipchains -A input -p tcp -s ! 200.200.200.4 -d 0.0.0.0/0 22 -j DENY
```

ts_menu Script to Simplify telnet and ssh Connections

(Note: This feature is only available for firmware versions 1.2.x and above)
The ts_menu script can be used to avoid typing long telnet or ssh commands. It presents a short menu with the names of the servers connected to the serial ports of the Cyclades-TS. The server is selected by its corresponding number. ts_menu must be executed from a local session: via console, telnet, ssh, dumb terminal connected to a serial port, etc.

Only ports configured for console access (protocols socket_server or socket_ssh) will be presented. An example is:

```
> ts_menu
Cyclades-TS: Serial Console Server Connection menu

1 ttyS1 2 snoopy 3 linus 4 lucy
5 charlie 6 vt100-ssh

Type 'q' to quit, a valid option [1-6], or anything else to refresh :
```

selecting option 2 will telnet/ssh to the server snoopy. The names defined using the parameter serverfarm are used to make up the list. When no name is configured, ttyS<N> is used where N is the port number.

The ts_menu script has the following line options:

-p : Displays Ethernet IP Address and TCP port instead of server names

```
Cyclades-TS: Serial Console Server Connection menu

1 209.81.55.79 7001 2 209.81.55.79 7002 3 209.81.55.79 7003
4 209.81.55.79 7004 5 209.81.55.79 7005 6 209.81.55.79 7006

Type 'q' to quit, a valid option [1-6], or anything else to refresh :
```

-i : Displays Local IP assigned to the serial port instead of server names

```
Cyclades-TS: Serial Console Server Connection menu

1 192.168.1.101 2 192.168.1.102 3 192.168.1.103 4 192.168.1.104
5 192.168.1.105 6 192.168.1.106

Type 'q' to quit, a valid option [1-6], or anything else to refresh :
```

-u <name> : Username to be used in ssh/telnet command. The default username is that used to log in to the Cyclades-TS.

-h : lists script options

APPENDIX B HARDWARE SPECIFICATIONS AND CABLING

General Hardware Specifications

The power requirements, environmental conditions and physical specifications of the Cyclades-TS are listed in the table below.

POWER SPECIFICATIONS						
	TS100	TS400	TS800	TS1000	TS2000	TS3000
Input Voltage Range	External Universal Input Desktop Power Supply (100-240VAC auto-range input, 5VDC output)	External Universal Input Desktop Power Supply (100-240VAC auto-range input, 5VDC output)	External Universal Input Desktop Power Supply (100-240VAC auto-range input, 5VDC output)	Internal 100-240VAC auto-range (-48VDC option available)	Internal 100-240VAC auto-range (-48VDC option available)	Internal 100-240VAC auto-range
Input Frequency Range	50/60Hz	50/60Hz	50/60Hz	50/60Hz	50/60Hz	50/60Hz
Power	6 W max	6 W max	8 W max	28 W max	37 W max	17 W max
ENVIRONMENTAL INFORMATION						
	TS100	TS400	TS800	TS1000	TS2000	TS3000
Operating Temperature	40F to 104F (10°C to 40°C)	40F to 104F (10°C to 40°C)	40F to 104F (10°C to 40°C)	40F to 104F (10°C to 40°C)	40F to 104F (10°C to 40°C)	40F to 104F (10°C to 40°C)
Relative Humidity	10 to 90%, non-condensing	10 to 90%, non-condensing	10 to 90%, non-condensing	10 to 90%, non-condensing	10 to 90%, non-condensing	10 to 90%, non-condensing

PHYSICAL SPECIFICATIONS						
	TS100	TS400	TS800	TS1000	TS2000	TS3000
External Dimensions	2.76in x 3.35 in x 1.18 in	8.5in x 4.75in x 1in	8.5in x 4.75in x 1in	17in x 8.5 in x 1.75 in	17in x 8.5 in x 1.75 in	17in x 8.5 in x 1.75 in
Weight	0.3 lb	1.5 lb	1.6 lb	6 lb	6.2 lb	8 lb
SAFETY						
	TS100	TS400	TS800	TS1000	TS2000	TS3000
Approvals	FCC Class A, CE					

This section has all the information you need to quickly and successfully purchase or build cables to the Cyclades-TS. It focuses on information related to the RS-232 interface, which applies not only to the Cyclades-TS but also to any RS-232 cabling. At the end of this chapter you will also find some information about the RS-485 interface, which is available in the Cyclades-TS100 model only.

The RS-232 Standard

RS-232C, EIA RS-232, or simply RS-232 refer to a standard defined by the Electronic Industries Association in 1969 for serial communication. More than 30 years later, we have found more applications for this standard than its creators could have imagined. Almost all electronic devices nowadays have serial communication ports.

RS-232 was defined to connect Data Terminal Equipment, (DTE, usually a computer or terminal) to Data Communication Equipment (DCE, usually a modem):

DTE —> RS-232 —> DCE —> communication line –> DCE —> RS-232 –> DTE

RS-232 is now mostly being used to connect DTE devices directly (without modems or communication lines in

between). While that was not the original intention, it is possible with some wiring tricks. The relevant signals (or wires) in a RS-232 cable, from the standpoint of the computer (DTE) , are:

Receive Data (RxD) and Transmit Data (TxD) – The actual data signals
Signal Ground (Gnd) - Electrical reference for both ends
Data Terminal Ready (DTR) - Indicates that the computer (DTE) is active
Data Set Ready (DSR) - Indicates that the modem (DCE) is active.
Data Carrier Ready (DCD) - Indicates that the connection over the communication line is active
CTS (Clear to Send, an input) – Flow control for data flowing from DTE to DCE
RTS (Request to Send, an output) – Flow control for data flowing from DCE to DTE

Not all signals are necessary for every application, so the RS-232 cable may not need all 7 wires.
The RS-232 interface defines communication parameters such as parity, number of bits per character, number of stop-bits and the baud rate. Both sides must be configured with the same parameters. That is the first thing to verify if you think you have the correct cable and things still do not work. The most common configuration is 8N1 (8 bits of data per character, no parity bit included with the data, 1 stop-bit to indicate the end of a character). The baud rate in a RS-232 line translates directly into the data speed in bits per second (bps). Usual transmission speeds range between 9,600 bps and 19,200bps (used in most automation and console applications) to 115,200 bps (used by the fastest modems).

Cable Length

The original RS-232 specifications were defined to work at a maximum speed of 19,200 bps over distances up to 15 meters (or about 50 feet). That was 30 years ago. Today, RS-232 interfaces can drive signals faster and through longer cables.
As a general rule, consider:

- If the speed is lower than 38.4 kbps, you are safe with any cable up to 30 meters (100 feet)
- If the speed is 38.4 kbps or higher, cables should be shorter than 10 meters (30 feet)
- If your application is outside the above limits (high speed, long distances), you will need better quality (low-impedance, low-capacitance) cables.

Successful RS-232 data transmission depends on many variables that are specific to each environment. The general rules above are empirical and have a lot of safety margins built-in.

Connectors

The connector traditionally used with RS-232 is the 25-pin D-shaped connector (DB-25). Most analog modems and most older computers and serial equipment use this connector. The RS-232 interface on DB-25 connector always uses the same standard pin assignment.

The 9-pin D-shaped connector (DB-9) saves some space and is also used for RS-232. Most new PC COM ports and serial equipment (specially when compact size is important) uses this connector. RS-232 interfaces on DB-9 connectors always use the same standard pin assignment.

The telephone-type modular RJ-45 plug and jack are very compact, inexpensive and compatible with the phone and Ethernet wiring systems present in most buildings and data centers. Most networking equipment and new servers use RJ-45 connectors for serial communication. Unfortunately there is no standard RS-232 pin assignment for RJ-45 connectors. Every equipment vendor has its pin assignment.

Most connectors have two versions. The ones with pins are said to be “male” and the ones with holes are said to be “female”.

RS-232 Signal	Name/Function (Input/Output)	DB-25 pins (Standard)	DB-9 pins (Standard)	RJ-45 pins (Cyclades)
Chassis	Safety Ground	1	Shell	Shell
TxD	Transmit Data (O)	2	3	3
RxD	Receive Data (I)	3	2	6
DTR	Data Terminal Ready (O)	20	4	2
DSR	Data Set Ready (I)	6	6	8
DCD	Data Carrier Detect (I)	8	1	7
RTS	Request To Send (O)	4	7	1
CTS	Clear To Send (I)	5	8	5
Gnd	Signal Ground	7	5	4

Straight-Through vs. Crossover Cables

The RS-232 interface was originally intended to connect a DTE (computer, printer and other serial devices) to a DCE (modem) using a straight-through cable (all signals on one side connecting to the corresponding signals on the other side one-to-one). By using some “cabling tricks”, we can use RS-232 to connect two DTEs as is the case in most modern applications.

A crossover (a.k.a. null-modem) cable is used to connect two DTEs directly, without modems or communication lines in between. The data signals between the two sides are transmitted and received and there are many variations on how the other control signals are wired. A “complete” crossover cable would connect TxD with RxD, DTR with DCD/DSR, and RTS with CTS on both sides. A “simplified” crossover cable would cross TxD and RxD and locally short-circuit DTR with DCD/DSR and RTS with CTS.

Which Cable Should be Used

First, look up the proper cable for your application in the table below. Next, purchase standard off-the-shelf cables from a computer store or cable vendor. For custom cables, refer to the cable diagrams to build your own cables or order them from Cyclades or a cable vendor.

To Connect To	Use Cable
DCE DB-25 Female (standard) - Analog Modems - ISDN Terminal Adapters	Cable 1 – RJ-45 to DB-25 M straight-through (Custom) This custom cable can be ordered from Cyclades or other cable vendors. A sample is included with the product ("straight-through").
DTE DB-25 Male or Female (standard) - Serial Terminals - Old PC COM ports - Most serial printers - Some Console Ports - Most automation devices	Cable 2 – RJ-45 to DB-25 F/M crossover (Custom) This custom cable can be ordered from Cyclades or other cable vendors. A sample is included with the products ("Console").
DTE DB-9 Male or Female (standard) - Newer PC COM ports - Most Mice and pointing devices - Some automation devices	Cable 3 – RJ-45 to DB-9 F/M crossover (custom) This custom cable can be ordered from Cyclades or other cable vendors. A sample is included with the products ("Console").
DTE RJ-45 Cyclades (custom) - All Cyclades Console Ports	Cable 4 – RJ-45 to RJ-45 crossover (custom) This custom cable can be ordered from Cyclades or cable vendors using the provided wiring diagram.
DTE RJ-45 Netra (custom) - Sun Netra Console Ports - Cisco Console Ports	Cable 5- RJ-45 to RJ-45 crossover (custom) This custom cable can be ordered from Cyclades or cable vendors using the provided wiring diagram.

Cable Diagrams

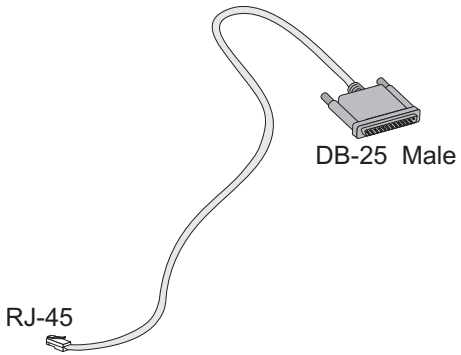
Before using the following cable diagrams refer to the tables above to select the correct cable for your application. Sometimes, crossover cables are wired slightly differently depending on the application. A “complete” crossover

cable would connect the TxD with RxD, DTR with DCD/DSR, and RTS with CTS across both sides. A “simplified” crossover cable would cross TxD and RxD and locally short-circuit DTR with DCD/DSR and RTS with CTS.

Most of the diagrams in this document show the “complete” version of the crossover cables, with support for modem control signals and hardware flow control. Applications that do not require such features have just to configure NO hardware flow control and NO DCD detection on their side. Both ends should have the same configuration for better use of the complete version of the cables.

Cable #1: Cyclades RJ-45 to DB-25 Male, Straight Through

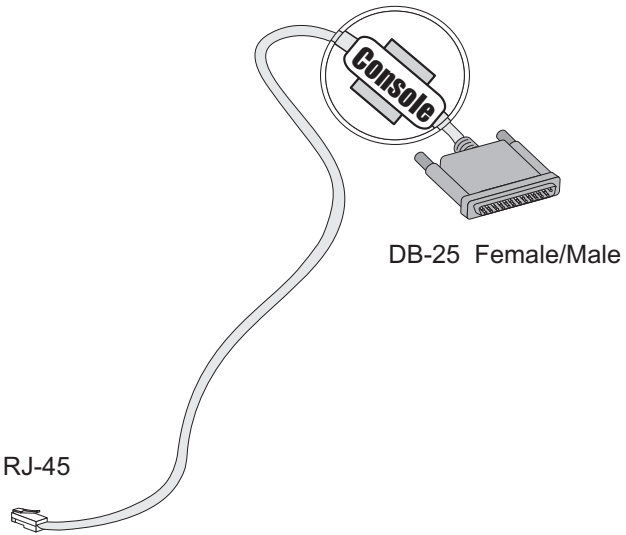
Application: It connects Cyclades products (serial ports) to modems and other DCE RS-232 devices.



RJ-45 Male		**DB-25 Male**
TxD 3	———	TxD 2
RxD 6	———	RxD 3
Gnd 4	———	Gnd 7
DTR 2	———	DTR 20
DSR 8	———	DSR 6
DCD 7	———	DCD 8
RTS 1	———	RTS 4
CTS 5	———	CTS 5

Cable #2: Cyclades RJ-45 to DB-25 Female/Male, Crossover

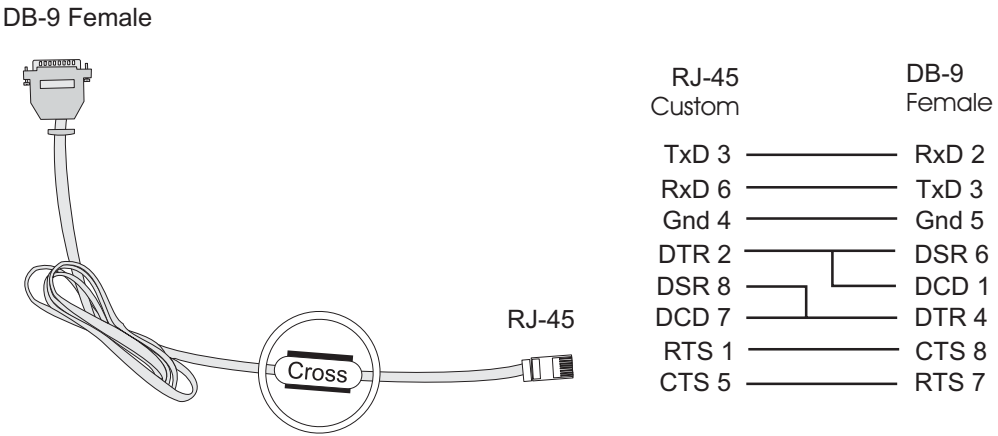
Application: It connects Cyclades products (serial ports) to console ports, terminals, printers and other DTE RS-232 devices.



RJ-45 Custom		DB-25 F/M
TxD 3	———	RxD 3
RxD 6	———	TxD 2
Gnd 4	———	Gnd 7
DTR 2	———	DSR 6
DSR 8	———	DCD 8
DCD 7	———	DTR 20
RTS 1	———	CTS 5
CTS 5	———	RTS 4

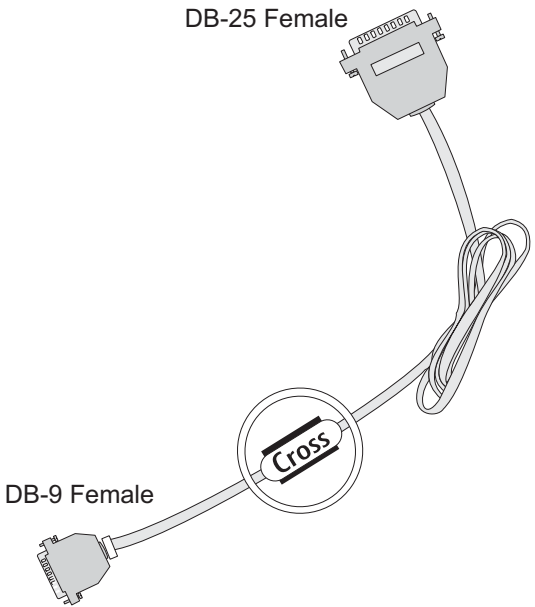
Cable #3: Cyclades RJ-45 to DB-9 Female, Crossover

Application: It connects Cyclades products (serial ports) to console ports, terminals, printers and other DTE RS-232 devices.



Cable #4: DB-9 Female to DB-25 Female, Crossover

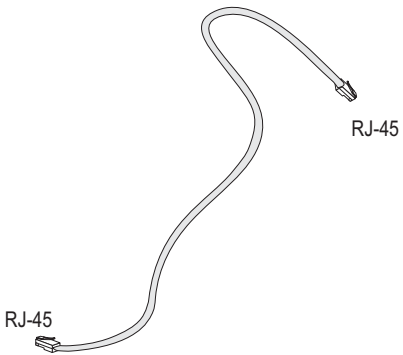
Application: It connects the Cyclades-TS100 (serial port) to terminals, printers and other DTE RS-232 devices.



DB-9 Female		DB-25 Female
RxD 2	———	2 TxD
TxD 3	———	3 RxD
Gnd 5	———	7 Gnd
DSR 6	———	20 DTR
DCD 1		
DTR 4	———	6 DsR
		8 DCD
RTS 7	———	5 CTS
CTS 8	———	4 RTS

Cable #5: Cyclades RJ-45 to Cyclades RJ-45, Crossover

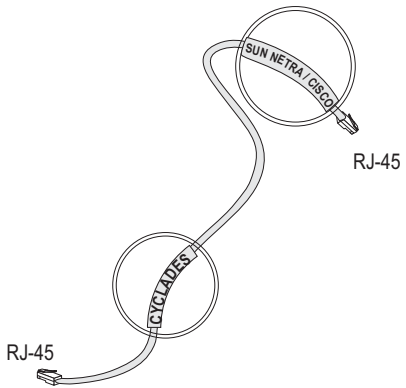
Application: Usually used to connect two ports of a Cyclades product ("loopback") for testing purposes.



RJ-45 Male		RJ-45 Male
TxD 3	———	RxD 6
RxD 6	———	TxD 3
Gnd 4	———	Gnd 4
DTR 2	———	DSR 8
DSR 8	———	DCD 7
DCD 7	———	DTR 2
RTS 1	———	CTS 5
CTS 5	———	RTS 1

Cable #6: Cyclades RJ-45 to Netra RJ-45, Crossover

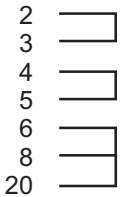
Usually used in console management applications to connect Cyclades products to a Sun Netra server or to a Cisco product.

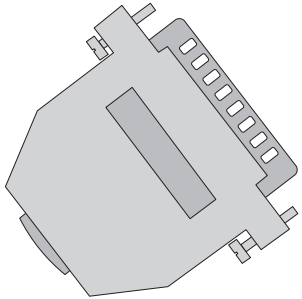


RJ-45 Custom		RJ-45 Netra
TxD 3	———	RxD 6
RxD 6	———	TxD 3
Gnd 4	———	Gnd 4
DTR 2	———	DSR 7
DCD 7	———	DTR 2
RTS 1	———	CTS 8
CTS 5	———	RTS 1

Loop-Back Connector for Hardware Test

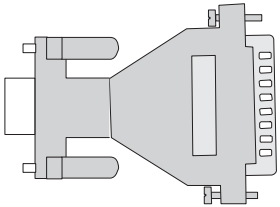
The use of the following DB-25 connector is explained in the Troubleshooting chapter.





DB-25 Male to DB-9 Female Adapter

The following adapter may be necessary.



DB-25	DB-9
2	3
3	2
4	7
5	8
6	6
7	5
8	1
20	4
22	9

Cabling Information Applicable only to the TS100

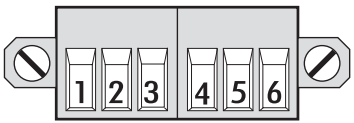
The RS-485 Standard

The RS-485 is another standard for serial communication and is available only in the Cyclades-TS100. Different from the RS-232, the RS-485 uses fewer wires - either two wires (one twisted pair) for half duplex communication or four wires (two twisted pairs) for full duplex communication. Another RS-485 characteristic is the “termination”. In a network that uses the RS-485 standard, the equipments are connected one to the other in a cascade arrangement. A “termination” is required from the last equipment to set the end of this network.

TS100 Connectors

Although the RS-485 can be provided in different kinds of connectors, the Cyclades-TS100 uses a 9-pin D-shaped connector (DB-9) and a block connector with the pin assignment described below.

RS-485 Signal	Name/Function	DB-9 pins	Block connector pins
Chassis	Safety Ground		1
TXD-	Transmit Data - (A)	7	2
TXD+	Transmit Data + (B)	3	3
RXD+	Receive Data + (B)	2	4
RXD-	Receive Data - (A)	8	5
Chassis	Safety Ground		6



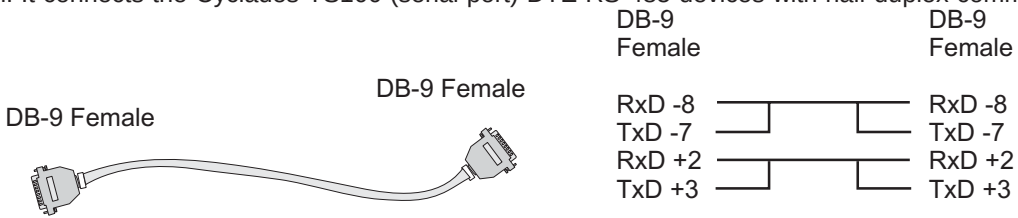
Notice that if the Cyclades-TS100 is configured to use RS-485, the RS-485 signals will be available in both DB-

9 and block connector. In this case, the DB-9 pins used in an RS-232 connection can be considered not connected.

Cable diagrams

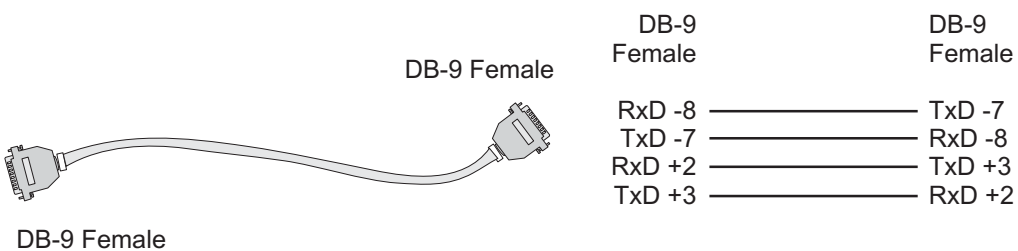
Cable #1: DB-9 Female to DB-9 Female, Crossover half duplex

Application: It connects the Cyclades-TS100 (serial port) DTE RS-485 devices with half duplex communication.



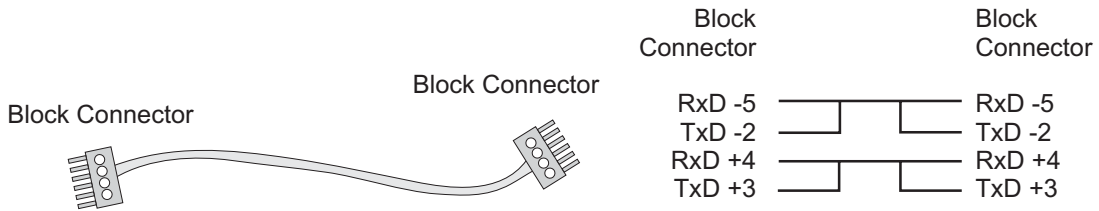
Cable #2: DB-9 Female to DB-9 Female, Crossover full duplex

Application: It connects the Cyclades-TS100 (serial port) to DTE RS-485 devices with full duplex communication.



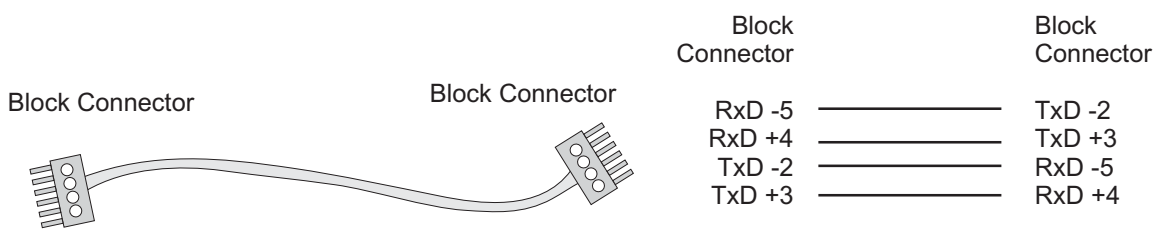
Cable #3: Block Connector to Block Connector, Crossover half duplex

Application: It connects the Cyclades-TS100 (serial port) to DTE RS-485 devices with half duplex communication.



Cable #4: Block Connector to Block Connector, Crossover full duplex

Application: It connects the Cyclades-TS100 (serial port) to DTE RS-485 devices with full duplex communication.



APPENDIX C SAMPLE PSLAVE.CONF FILES

The pslave.conf file with all possible parameters and their descriptions is presented first. The pslave.conf files for the three examples configured in chapter 5 follow.

The Complete pslave.conf File Provided with the Cyclades-TS

```
#
# pslave.conf   Sample server configuration file.
#
# The Terminal Server uses a virtual terminal concept.  Virtual terminals are
# named s1, s2, etc. Every virtual terminal should have a related
# physical device tty (without the "/dev/"). The tty parameter
# must be configured and must be unique for each virtual terminal.
#
# There two types of parameters:
#
# 1) Global parameters
#    These parameters have the prefix "conf." Example of global parameters
#    are ethernet ip address, etc.
#
# 2) Terminal Parameters.
#    These parameters have prefixes "all.", "s1.", "s2.", etc.
#
#    The "all." entries are used as a template for all virtual terminals.
#    Setting all.speed to 9600 will set all virtual terminal (s1, s2,
#    s3, etc.) speeds to 9600.
#
#    Note that you can change the "all." settings one by one.
#    If the parameter "s4.speed 19200" appears later in the file, all
terminals
#    except s4 will have speed 9600 bps and "s4" will have speed 19200 bps.
#

# Expansion Variables
#
# A list of format strings used by some parameters is provided here
# for reference.
#
# %l: login name
```

```
# %L: stripped login name
# %p: NAS port number
# %P: protocol
# %b: port speed
# %i: local IP
# %j: remote IP
# %1: first byte (MSB) of remote IP
# %2: second byte of remote IP
# %3: third byte of remote IP
# %4: fourth (LSB) byte of remote IP
# %c: connect-info
# %m: netmask
# %t: MTU
# %r: MRU
# %I: idle timeout
# %T: session timeout
# %h: hostname
# %%: %

# Generic SAMPLE:
# all async ports at 9600 bps, 8N1, no flow control
# Eth IP address 192.169.160.10/24 (MTU=1500)
# protocol socket_server
# host IP 192.168.160.8/24
# syslogd IP 192.168.160.1
# Radius Server IP 192.168.160.3 (authentication and accounting)
# authentication none
#

#
# Ethernet configuration.
#
# These parameters should only be configured in the file
# /etc/network/ifcfg_eth0  _IF_ the customer will not be using the
# cy_ras/portslave aplications. If the cy_ras/portslave aplications are _NOT_
# used put all ifconfig commands for the ethernet directly in the
# /etc/network/ifcfg_eth0.
#
# The cy_ras application OVERWRITES the ifcfg_eth0 file with the
# values configured here.
#
# The Cyclades-TS can request all of its ethernet parameters to a DHCP server.
```

```
# The administrator can activate the dhcp client with more options changing
# the file /etc/network/dhcpcd_cmd.
#
# Valid values 0: DHCP disabled (default)
#              1: DHCP active
#              2: DHCP active and the TS saves in flash the last ip assigned
#                 by the DHCP server. This option requires changes in the
#                 files /etc/config_files and /etc/network/dhcpcd_cmd
#
#                 SEE Cyclades-TS manual for more information.
#
#conf.dhcp_client       1

conf.eth_ip     192.168.160.10
conf.eth_mask   255.255.255.0
conf.eth_mtu1500

#
# Secondary IP address of ethernet
#

#conf.eth_ip_alias   192.168.161.10
#conf.eth_mask_alias 255.255.255.0

#
# Remote Network File System where data buffering will be written instead
# of the default directory '/var/run/DB'. The directory tree to which the
# file will be written must be NFS-mounted.
#
# If data buffering is turned on for port 1, for example, the data will be
# stored in /tmp/ts_data_buffer/{ttyS1.data | serverfarm} on the machines
# with IP address 192.168.160.11. The remote host must have NFS installed
# and the administrator must create, export and allow reading/writing to
# this directory.
# The size of this file is not limited by the value of the parameter
# s1.data_buffering, though the value cannot be zero since a zero value turns
# off data buffering.
#
#conf.nfs_data_buffering 192.168.160.11:/tmp/ts_data_buffer

#
# Lock directory - The lock directory is /var/lock for the Cyclades-TS.
```

```
#   It should not be changed unless the user decides to customize the
#   operating system.
#
conf.lockdir/var/lock
#
# Location of the rlogin binary that accepts the "-i" flag.
#
conf.rlogin /usr/local/bin/rlogin-radius
#
# Location of our patched pppd with Radius linked in.
#
conf.pppd   /usr/local/sbin/pppd
#
# Location of the telnet utility. This can be the system telnet. (Optional)
#
conf.telnet /bin/telnet
#
# Location of ssh utility. This can be the system SSH. (Optional)
#
conf.ssh    /bin/ssh
#
# This parameter is only necessary when authentication is being
# performed for a port.  When set to one, it is possible to log
# in to the Terminal Server directly
# by placing a "!" before your login name, then using your normal
# password. This is useful if the Radius authentication server is down.
#
conf.localloginsl
#
# Syslog server:  syslog is the IP address of a remote syslog daemon.
facility
#         is a value from 0 to 7 which is sent to the syslog server to
#         indicate in which file the syslog messages should be stored.
#         The file /etc/syslog.conf on the syslog server contains a mapping
#         between facility numbers and server log files.
#
conf.syslog     192.168.160.1

#
# Syslog facility for portslave
#
conf.facility   7
```

```
#
# Syslog facility for Data Buffering
#
conf.DB_facility 7

#
# User groups make the configuration of Port access restrictions
# easier. The parameter s<nn>.users, that will be explained later,
# can be configured using a combination of group names and user names.
#
#conf.group mkt: paul, sam
#
#conf.group adm: joe, mark
#
#s1.users mkt, joe
#
#s2.users adm, sam

#
# Speed. All ports are set to 9600 baud rate, 8 bits, No parity, 1 stop bit.
# These values can be changed port by port later in the file.
#
all.speed       9600
all.datasize    8
all.stopbits    1
all.parity      none

#
# Media type - define media type and operation mode (half/full) duplex.
#
# valid values:
#   rs232                 - RS232 (default value).
#   rs485_half            - RS485 half duplex without terminator
#   rs485_full            - RS485 full duplex without terminator
#   rs485_half_terminator  - RS485 half duplex with terminator
#   rs485_full_terminator  - RS485 full duplex with terminator
#   rs422                 - alike rs485_full
#   rs422_terminator      - alike rs485_full_terminator

#all.media rs232
```

```
#
# Syslog server message level. An integer between 0 and 7. Zero: does not send
# syslog messages to the syslog server.
#
all.syslog_level 4

#
# Syslog Console message level. An integer between 0 and 7. Zero: does not
send
# syslog messages to the console.
#
all.console_level    4

#
# Authentication type - either "local", "radius", "none", "remote"
# "local/radius", "radius/local", or "RadiusDownLocal".
#
# If the authentication type is configured as "local/radius" the portslave
# first tries to authenticate locally.  If it fails, portslave will try to
# authenticate using the radius server.
#
# If the authentication type is configured as "RadiusDownLocal" the portslave
# first tries to authenticate using the radius server.  If the Radius server
# sends back a rejection, authentication will fail.  Local authentication
# will be tried only if the Radius server is down (timeout).
#
all.authtype    none
#
# Authentication host and accounting host.  Two of each can be configured
# per port. The first is tried 'radretries' times before the
# second is tried. If 'radretries' is not configured, 5 is used by default.
# The parameter 'radtimeout' sets the timeout per query in seconds.
#
all.authhost1   192.168.160.3
all.accthost1   192.168.160.3
all.radtimeout  3
all.radretries  5
#all.authhost2  192.168.160.4
#all.accthost2  192.168.160.4
#
# The shared secret used by RADIUS.
#
```

```
all.secret  cyclades

#
# Default protocol.
#
# Valid values are
#  RAS profile: "slip", "cslip", "ppp", "ppp_only"
#  TS  profile: "login", "rlogin", "telnet", # "ssh", "ssh2", "socket_client"
#  CAS profile: "socket_server", "socket_ssh", "raw_data"
#
#  ppp_only ==> PPP over leased lines (only authentication PAP/CHAP)
#
#  ppp      ==> PPP with terminal post dialing (Auto detect PPP)
#
all.protocolsocket_server

#
# Default ip address of linux host to which the terminals will connect.
# Used by the protocols rlogin, ssh, socket_client, etc.
#
all.host    192.168.160.8

#
# IP Address assigned to the serial port.
# The '+' after the value causes the interfaces to have
# consecutive ip addresses. Ex. 192.168.1.101, 192.168.1.107, etc.
#
# The IP number of a port is used when the RADIUS
# server does not send an IP number, or if it tells us to use a dynamic IP no.
#
all.ipno    192.168.1.101+
all.netmask 255.255.255.255

#
# Maximum reception/transmission unit size for the port
#
all.mtu     1500
all.mru     1500

#
# Standard message issued on connect.
#
```

```
all.issue       \r\n\
                TSLINUX - Portslave Internet Services\n\
\r\n\
    Welcome to terminal server %h port S%p \n\
\r\n\
Customer Support: 510-770-9727    http://www.cyclades.com/\n\
\r\n

#
# Login prompt.
#
all.prompt  %h login:

#
# Terminal type, for rlogin/telnet sessions.
#
all.term    vt100

#
# If you want the Terminal Server to update the
# login records (written to the /var/run/utmp and/or /var/log/wtmp
# files), set sysutmp/syswtmp to 1. This is useful for tracking
# who has accessed the Terminal Server and what they did.
#
all.sysutmp 1
all.syswtmp 0
all.utmpfrom    "%p:%P.%3.%4"

#
# Use initchat to initialize the modem.
#
# d == delay (1 sec), p == pause (0.1 sec), l == toggle DTR
# r == <CR>, l == <LF>
#
#all.initchat    TIMEOUT 10 \
#       "" \d\l\dATZ \
#       OK\r\n-ATZ-OK\r\n "" \
#       TIMEOUT 10 \
#       "" ATM0 \
#       OK\r\n "" \
#       TIMEOUT 3600 \
#       RING "" \
```

```
#       STATUS Incoming %p:I.HANDSHAKE \
#       "" ATA \
#       TIMEOUT 60 \
#       CONNECT@ "" \
#       STATUS Connected %p:I.HANDSHAKE

#
# Serial port flow control:
#    hard - hardware, rts/cts
#    soft - software, CTRL-S / CTRL-Q
#    none.
#
all.flow    none

#
#  DCD signal (sets the tty parameter CLOCAL). Valid values are 0 or 1.
#     In a socket session, if all.dcd=0, a connection request (telnet or
#     ssh) will be accepted regardless of the DCD signal and the connection
#     will not be closed if the DCD signal is set to DOWN.
#     In a socket connection, if all.dcd=1 a connection request will be
#     accepted only if the DCD signal is UP and the connection (telnet or
#     ssh) will be closed if the DCD signal is set to DOWN.
#
all.dcd     0

#
# PPP options - used if a PPP session is autodetected.
# Note that mru and mtu are both set to the MTU setting.
# Callback server is enabled when cb-script parameter is set.
#
#all.autoppp%i:%j novj \
#       proxyarp modem asyncmap 000A0000 \
#       noipx noccp login auth require-pap refuse-chap \
#       mtu %t mru %t \
#       ms-dns 192.168.160.5 ms-dns 0.0.0.0 \
#       cb-script /etc/portslave/cb_script \
#       plugin /usr/lib/libpsr.so

#
# PPP options - User already authenticated and service type is PPP.
#
#all.pppopt %i:%j novj \
```

```
#       proxyarp modem asyncmap 000A0000 \
#       noipx noccp mtu %t mru %t netmask %m \
#       idle %I maxconnect %T \
#       ms-dns 192.168.160.5 ms-dns 0.0.0.0 \
#       plugin /usr/lib/libpsr.so
#

#
# When not set to zero, this parameter sets the wait for a TCP connection
# keep-alive timer. If no traffic passes through the Terminal Server for
# this period of time (ms), the Terminal Server will send a modem statuss
# message to the remote device to see if the connection is still up.
#
#all.poll_interval   1000

#
# Transmission interval - Controls the interval between two consecutive datas
#                         packets transmited to the Ethernet. Only valid for
#                         protocols socket_server, raw_data, and
socket_client.
#
# Valid values : 0 - transmit packet immediately (no interval).
#                10, 20, 30, ... interval in milliseconds.
#
#all.tx_interval 100

#
# Inactivity timeout - Defines the time in minutes that a conection can
#                      remains without activity (rx/tx). Only for CAS profile
#                      and socket_client protocol.
#
#all.idletimeout 5

# This defines an alternative labeling system for the Terminal Server ports.
# This parameter is used by the protocols telnet, socket_client and
# socket_server. It is mandadory if the protocol is socket_server, otherwise
# 23 will be used.
#
# The '+' after the numerical value causes the interfaces to be numbered
# consecutively.  Ex. 7001, 7002, 7003, etc.
#
all.socket_port      7001+
```

```
# Data buffering configuration
#
# A non-zero value activates data buffering. The number is equal to the
# buffer size. A file /var/run/DB/{ttyS#.data | serverfarm} is created on
# the Cyclades-TS and all data received from the port is captured.
# The files for all buffered ports combined can contain up to the amount
# of available memory in the ram disk. This amount can be discovered
# by typing: "df<enter>".
# Each file is a revolving file which is overwritten as the limit of buffer
# size is reached. These files can be viewed using the normal Unix tools
# (cat, vi, more, etc.).
# If there is not enough available ram disk, NFS_buffering can be used.  There
# is effectively no limit to NFS buffer size.
#
all.data_buffering 0

#
# When non-zero, the contents of the data buffer are sent to the syslog
# server every time a quantity of data equal to this parameter is collected.
# [40 to 255 recomended]
#
# all.syslog_level should be greater than or equal to 5, and data_buffering
# non-zero for syslog generation.
#
all.syslog_buffering 0

#
# Controls the presentation of the Data buffering menu
#
# MENU:
# "A non-empty Data Buffering File was found. Choose wich action
#  should be performed ( (I)gnore, (D)isplay, (E)rase or (S)how and erase ) :"
#
#  valid values:
#   0 - Shows the menu with all options.
#   1 - Doesn't show the menu and any non empty data buffering file
#   2 - Doesn't show the menu but shows a non empty data buffering file
#   3 - Shows the menu without the options "erase" and "show and erase".
#
#all.dont_show_DBmenu 1
```

```
#
# Send Break to the TTY when this string is received (ssh only).
#
all.break_sequence ~break

#
# Authentication of Radius users registered without passwords
#
# When enabled (value 1) and a user registered in
# the Radius database with a blank password tries to log in, the user
# is authenticated.  This is a very weak level of security since
# a user would only need to know that a particular username exists.
# This does not affect Radius users registered with passwords.
#
all.radnullpass 0

#
# Automatic User Definition (more useful when used to a specific port)
#
# This parameter is only used if the port is configured as a Terminal Server
# (login, telnet, rlogin, ssh and ssh2) and authentication type 'none'.
#
#all.userauto edson

#
# Port access restriction (more useful when used to a specific port).
#   A single comma and spaces/tabs may be used between names.
#   A comma may not appear between the ! and the first user name.
#   The users may be local or Radius.
#
# In this example, the users joe and mark CANNOT access any serial port
#
#all.users ! joe, mark
#
# In this example, ONLY the users joe and mark CAN access any serial port
#
#all.users   joe, mark

#
# Serverfarm is an alias name for a server connected to the Cyclades-TS
# through one of its serial ports (only useful if assigned to a specific
port).
```

```
# This alias is used as name to the data buffering file and in ssh command to
# select a serial port that should be configured as "socket_ssh".
#
# The value entered here should be the same used in the ssh command. Ex.
#
# ssh -t <username>:<server_connected_to_serial1>@<tsname>  or
# ssh -t -l <username>:<server_connected_to_serial1> <tsname>
#
#s1.serverfarm server_connected_to_serial1

#
# Snif session mode (in, out, i/o). With this parameter the user can select
# which data will be sent to the monitor. The default is "out".
#
all.sniff_mode out

#
# Users that are allowed to sniff sessionsI (administrator). This field has
# the same format "all.users", but the '!' should be used used with
PRECAUTION.
#
# In this example, ONLY the users joe, mark, and peter CAN access any
# serial port (to create first session) but ONLY the user peter can
# sniff or cancel another session.
#
#all.users           joe, mark
#all.admin_users peter

#
# Port-specific parameters
#
s1.tty      ttyS1
s2.tty      ttyS2
s3.tty      ttyS3
s4.tty      ttyS4
s5.tty      ttyS5
s6.tty      ttyS6
s7.tty      ttyS7
s8.tty      ttyS8
s9.tty      ttyS9
s10.tty     ttyS10
s11.tty     ttyS11
```

```
s12.tty     ttyS12
s13.tty     ttyS13
s14.tty     ttyS14
s15.tty     ttyS15
s16.tty     ttyS16

# for TS2000 uncomment s17 through s32
#s17.tty    ttyS17
#s18.tty    ttyS18
#s19.tty    ttyS19
#s20.tty    ttyS20
#s21.tty    ttyS21
#s22.tty    ttyS22
#s23.tty    ttyS23
#s24.tty    ttyS24
#s25.tty    ttyS25
#s26.tty    ttyS26
#s27.tty    ttyS27
#s28.tty    ttyS28
#s29.tty    ttyS29
#s30.tty    ttyS30
#s31.tty    ttyS31
#s32.tty    ttyS32

# for TS3000 uncomment s33 through s48
#s33.tty    ttyS33
#s34.tty    ttyS34
#s35.tty    ttyS35
#s36.tty    ttyS36
#s37.tty    ttyS37
#s38.tty    ttyS38
#s39.tty    ttyS39
#s40.tty    ttyS40
#s41.tty    ttyS41
#s42.tty    ttyS42
#s43.tty    ttyS43
#s44.tty    ttyS44
#s45.tty    ttyS45
#s46.tty    ttyS46
#s47.tty    ttyS47
#s48.tty    ttyS48
```

The pslave.cas File Provided With the Cyclades-TS for the Console Access Server Example

```
#
# pslave.conf   Sample server configuration file.
#
# Console Access Server Profile
#


conf.eth_ip     200.200.200.1
conf.eth_mask    255.255.255.0
conf.eth_mtu1500
#conf.nfs_data_buffering 192.168.160.11:/tmp/ts_data_buffer
conf.lockdir/var/lock
conf.syslog     200.200.200.2
conf.facility   7

all.syslog_level4
all.console_level   4
all.speed       9600
all.datasize    8
all.stopbits    1
all.parity      none
all.authtype    radius
all.authhost1   200.200.200.2
all.accthost1   200.200.200.2
all.radtimeout  3
all.radretries 5
all.secret      cyclades
all.ipno    192.168.1.101+
all.term    vt100
all.issue       \r\n\
                TSLINUX - Portslave Internet Services\n\
\r\n\
     Welcome to terminal server %h port S%p \n\
\r\n\
Customer Support: 510-770-9727    http://www.cyclades.com/\n\
\r\n

all.prompt  %h login:
all.term        vt100
all.flow    hard
```

```
all.poll_interval    0
all.socket_port      7001+
all.protocol socket_server
all.data_buffering 0
all.syslog_buffering 0
#all.dont_show_DBmenu 1

#
# Users joe and mark will only have access granted to the serial port ttyS2
#
all.users ! joe, mark

#
# Sniff sessions will only display data sent by servers connected
# to the serial port.
#
all.sniff_mode out

#
# Only users peter and john can open a sniff session
#
all.admin_users peter, john

#
# Port-specific parameters
#

#-----------------
# PORT 1
#-----------------

s1.tty        ttyS1
s1.authtype   local
s1.serverfarm server_connected_serial1

#-----------------
# PORT 2
#-----------------
s2.tty      ttyS2
s2.users   joe, mark
s2.protocol   socket_ssh
```

```
#-----------------
# PORT 8
#-----------------

s8.tty        ttyS8
s8.protocol   socket_ssh
s8.authtype   none
s8.serverfarm server_connected_serial8
```

The pslave.ts File provided with the Cyclades-TS for the Terminal Server Example

```
#
# pslave.conf   Sample server configuration file.
#
#  Terminal Server Profile


conf.eth_ip     200.200.200.1
conf.eth_mask   255.255.255.0
conf.eth_mtu1500
conf.lockdir/var/lock
conf.rlogin /usr/local/bin/rlogin-radius
conf.telnet /bin/telnet
conf.ssh    /bin/ssh
conf.locallogins 0

all.speed       9600
all.datasize    8
all.stopbits     1
all.parity      none
all.authtype    none
all.protocoltelnet
all.host    200.200.200.3
all.issue       \r\n\
                TSLINUX - Portslave Internet Services\n\
\r\n\
     Welcome to terminal server %h port S%p \n\
\r\n\
Customer Support: 510-770-9727    http://www.cyclades.com/\n\
\r\n


all.prompt  %h login:
all.term    vt100
all.flow    hard
all.socket_port  23

#
# Users joe and mark will only have access to serial port ttyS5
#
all.users ! joe, mark
```

```
#
# Port-specific parameters
#
s1.tty          ttyS1

s2.tty          ttyS2
s2.authtype     local
s2.protocol     rlogin
s2.speed        19200
s2.datasize     7
s2.stopbits     2
s2.parity       even

s3.tty          ttyS3
s3.protocol     ssh2
s3.authtype     remote

s4.tty          ttyS4
s4.protocol     ssh
s4.authtype     remote

s5.tty          ttyS5
s5.users   joe, mark
```

The pslave.ras File Provided With the Cyclades-TS for the Remote Access Server Example

```
#
# pslave.conf   Sample server configuration file.
#
# Remote Access Server Profile
#

conf.eth_ip 200.200.200.1
conf.eth_mask   255.255.255.0
conf.eth_mtu1500
conf.lockdir/var/lock
conf.pppd   /usr/local/sbin/pppd-radius
conf.syslog     200.200.200.3
conf.facility   7
all.speed       57600
all.datasize    8
all.stopbits    1
all.parity      none
all.syslog_level4
all.console_level   4
all.authtype    radius
all.authhost1   200.200.200.2
all.accthost1   200.200.200.2
all.radtimeout  5
all.radretries  5
all.secret  cocomero
all.protocolppp
all.ipno    200.200.200.11+
all.netmask 255.255.255.255
all.mtu     1500
all.mru     1500
all.issue       \r\n\
                TSLINUX - Portslave Internet Services\n\
\r\n\
     Welcome to terminal server %h port S%p \n\
\r\n\
Customer Support: 510-770-9727    http://www.cyclades.com/\n\
\r\n
```

```
all.initchat    TIMEOUT 10 \
        "" \d\l\dATZ \
        OK\r\n-ATZ-OK\r\n "" \
        "" ATMO \
        OK\R\N "" \
        TIMEOUT 3600 \
        RING "" \
        STATUS Incoming %p:I.HANDSHAKE \
        "" ATA \
        TIMEOUT 60 \
        CONNECT@ "" \
        STATUS Connected %p:I.HANDSHAKE


all.flow    hard
all.dcd     1
all.autoppp %i:%j novj \
        proxyarp modem asyncmap 000A0000 \
        noipx noccp login auth require-pap refuse-chap \
        mtu %t mru %t \
        plugin /usr/lib/libpsr.so

all.pppopt  %i:%j novj \
        proxyarp modem asyncmap 000A0000 \
        noipx noccp mtu %t mru %t netmask %m \
        idle %I maxconnect %T \
        plugin /usr/lib/libpsr.so

#
# Port-specific parameters
#

#-----------------------------------------------
# PORT 1 PPP dial in with terminal post dialing
#-----------------------------------------------
s1.tty      ttyS1

#-----------------------------------------------
# PORT 2 PPP dial in with terminal post dialing
#-----------------------------------------------
s2.tty      ttyS2
s2.authtype local/radius
```

```
#-----------------------------------------
# PORT 3 PPP Leased line
#-----------------------------------------
s3.tty      ttyS3
s3.protocol ppp_only
s3.pppopt   %i:%j novj \
        proxyarp modem asyncmap 000A0000 \
        noipx noccp login auth require-pap refuse-chap \
        mtu %t mru %t \
        plugin /usr/lib/libpsr.so
s3.initchat ""
s3.issue    ""
```

APPENDIX D CUSTOMIZATION

Everything related to the Cyclades-TS can be traced back to two files: `/etc/rc.sysinit` and `/etc/inittab`. All Cyclades-TS application programs are started during boot by the init process. The related lines in the `/etc/inittab` file are listed below:

```
# System initialization.
::sysinit:/etc/rc.sysinit

# Single user shell
#console::respawn:/bin/sh < /dev/console > /dev/console 2> /dev/console
ttyS0::respawn:/sbin/getty -p ttyS0 ansi
::respawn:/sbin/cy_wdt_led wdt led

# Cyclades RAS
::once:/sbin/cron
::once:/sbin/snmpd
::once:/sbin/cy_buffering
::once:/sbin/cy_ras
::once:/sbin/sshd -f /etc/ssh/sshd_config
::once:/sbin/ex_ntpclient
::wait:/sbin/fwset restore
```

To customize the Cyclades-TS, change these lines or add others. If the /etc/inittab file is changed, edit the /etc/config_files file and add a line containing only “/etc/inittab”. Save the file and exit the editor. Save the new configuration by executing saveconf. Then, the Cyclades-TS should be turned off and then turned on again. This is necessary because the init program provided by Busybox, a tool that emulates rm, cp, etc., but uses much less space, does not support the option ‘q’.

Cyclades provides a development kit which allows changes to be made to the Cyclades-TS’s software. However, Cyclades does not provide free technical support for systems modified in this way. Any changes are the responsability of the user.

APPENDIX E THE WEB CONFIGURATION MANAGER

An HTML server to facilitate administration and configuration of the Cyclades-TS was implemented in software v.1.3.0. To use this feature:

1. Connect the Cyclades-TS to a terminal using the console cable,
2. Log in to the Cyclades-TS from the terminal with root privileges,
3. Change the IP address/mask/gateway using the command

```
config_eth0 ip 200.200.200.1 mask 255.255.255.0 gw 200.200.200.5
```

   replacing the IP numbers in the line above with IP numbers appropriate to your system.
4. Open a browser (Netscape, Internet Explorer, etc.) and type the IP address of the TS's Ethernet interface (200.200.200.1 above). A page similar to that shown in Fig. E.1 will appear.

Type root in the username field and tslinux in the password field to use the Web Configuration Manager. Change the root password as soon as possible: the user database for the Web Configuration Manager is different than the system user database, so the root password can be different.

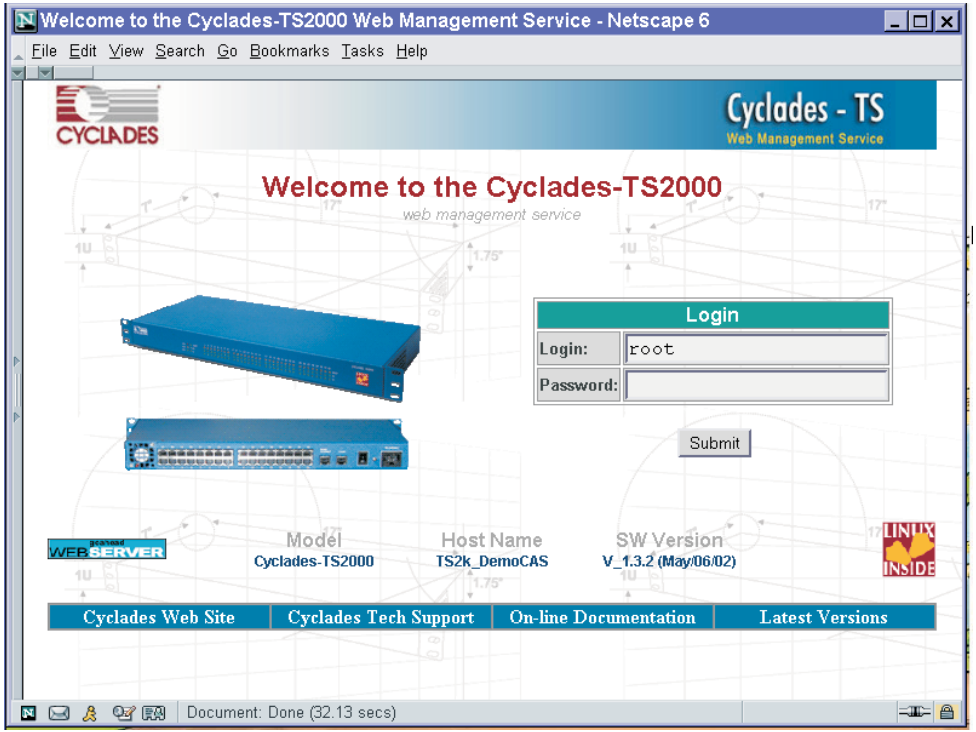


FIGURE E.1 LOGIN PAGE OF THE WEB CONFIGURATION MANAGER

After logging in, the screen shown in Figure E.2 appears.

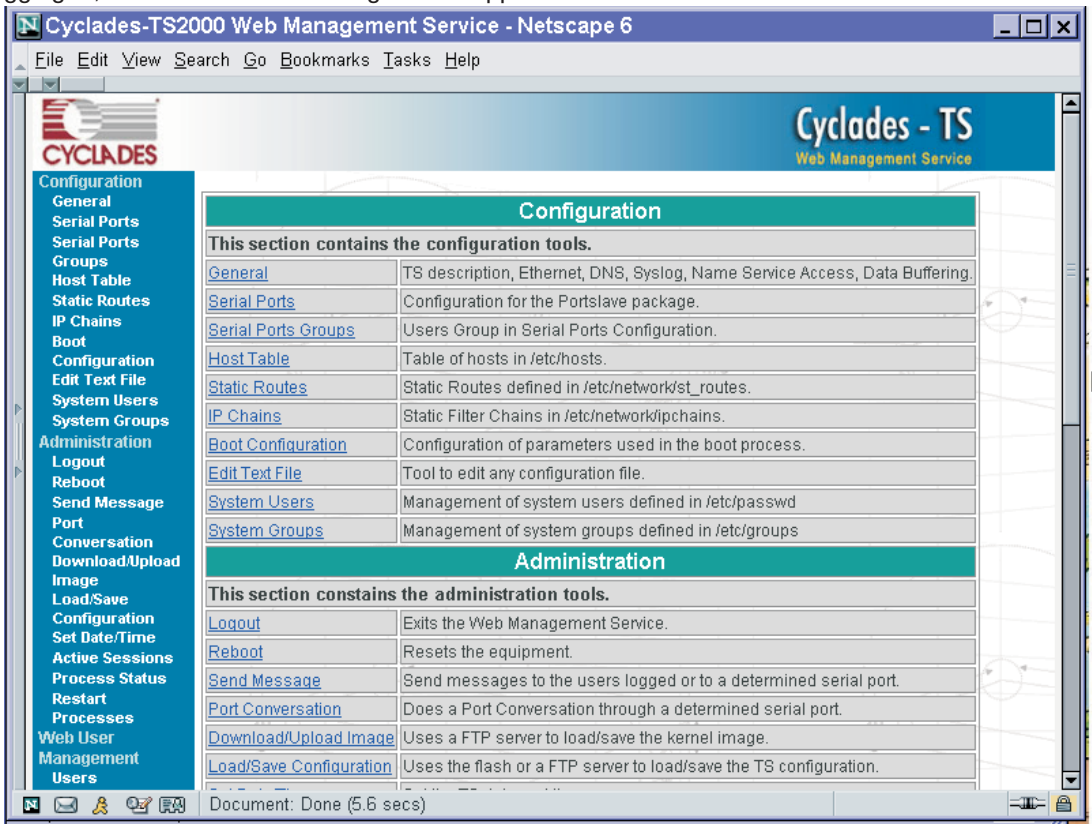


FIGURE E.2 PAGE FOLLOWING LOGIN

This page gives a brief description of all menu options.

To change the password:

1. Click on the link *Web User Management->Users*
2. Select the user root, then click on the *Change Password* button.
3. Type the new password twice and submit the request.
4. The next page will require a new login, type root and the new password
5. Click on the link *Web User Management->Load/Save Configuration* and click on the *Save Configuration* button.
6. Then, click on the link *Administration->Load/Save Configuration* and click on the *Save Configuration to flash button*.

To logout, click on the *Administration->Log out* link.

The General page of the Web Configuration Manager is shown in Fig. E.3

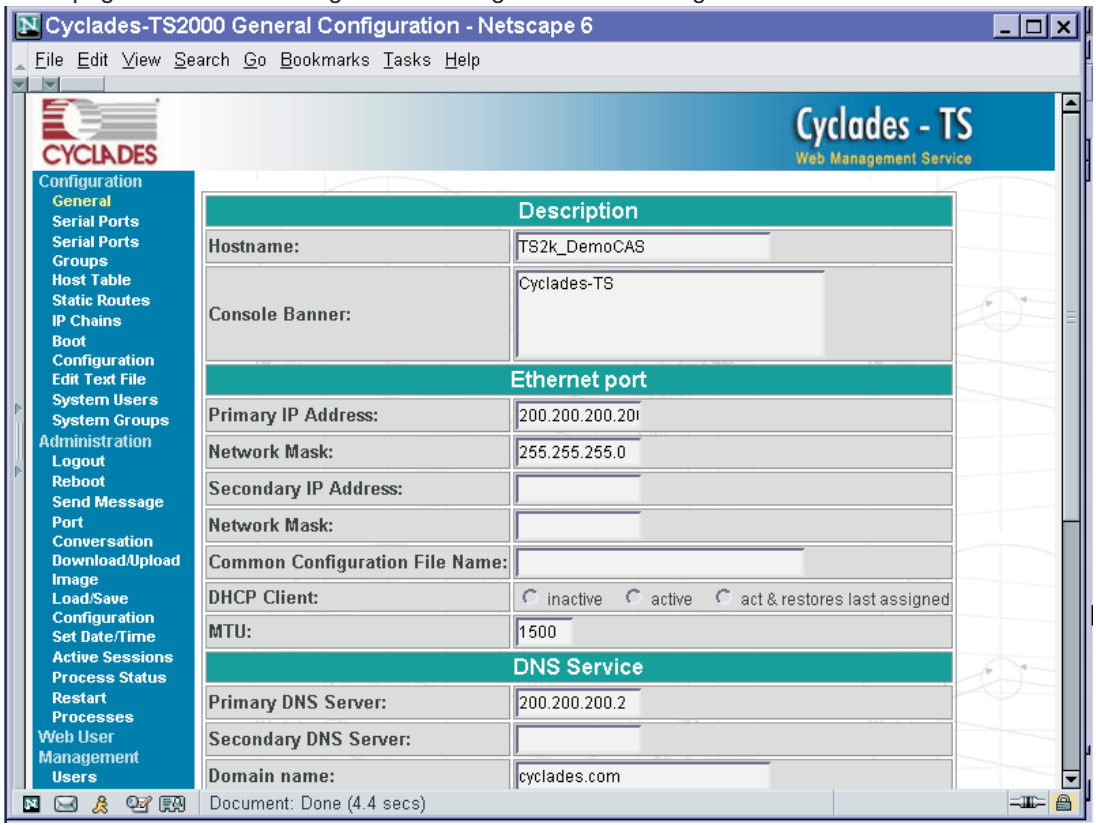


FIGURE E.3 GENERAL PAGE OF THE WEB CONFIGURATION MANAGER

A Menu of links is provided along the left side of the page. A summary of what each link leads to is shown in the following figures.

Link Name	Description of Page Contents
General	Description, Ethernet, DNS, Syslog, Name Service Access, Data Buffering.
Serial Ports	Configuration for the Portslave package.
Serial Port Groups	User Groups in Serial Ports Configuration.
Host Table	Table of hosts in /etc/hosts.
Static Routes	Static routes defined in /etc/network/st_routes.
IP Chains	Static Firewall Chains in /etc/network/ipchains.
Boot Configuration	Configuration of parameters used in the boot process.
Edit Text File	Tool to read and edit a configuration file.
System Users	Management of system users defined in /etc/passwd.
System Groups	Management of system groups defined in /etc/groups.

FIGURE E.4 THE CONFIGURATION SECTION

Link Name	Description of Page Contents
Users	List of users allowed to access the web server.
Groups	List of possible access groups.
Access Limits	List of access limits for specific URL's.
Load/Save Configuration	Load/Save web user configuration in /etc/websum.conf.

FIGURE E.5 THE WEB USER MANAGEMENT SECTION

Link Name	Description of Page Contents
Logout	Exits the Web Manager.
Reboot	Resets the equipment.
Send Message	Sends messages to users logged in to a serial port.
Port Conversation	Does a port conversation through a serial port.
Download/Upload Image	Uses an FTP server to load and save a kernel image.
Load/Save Configuration	Uses flash memory or an FTP server to load or save the TS's configuration.
Set Date/Time	Set the TS's date and time.
Active Sessions	Shows the active sessions and allows the administrator to kill them.
Process Status	Shows the running processes and allows the administrator to kill them.
Restart Processes	Allows the administrator to start or stop some processes.

FIGURE E.6 THE ADMINISTRATION SECTION

Link Name	Description of Page Contents
Interface Statistics	Shows statistics for all active interfaces.
Serial Ports	Shows the status of all serial ports
Routing Table	Shows the routing table and allows the administrator to add or delete routes.
ARP Cache	Shows the ARP cache.
IP Chains	Shows IP Chains Entries.
IP Rules	Shows Firewall, NAT and IP Accounting rules.
IP Statistics	Shows IP protocol statistics.
ICMP Statistics	Shows ICMP protocol statistics.
TCP Statistics	Shows TCP protocol statistics.
UDP Statistics	Shows UDP protocol statistics.
RAM Disk Usage	Shows the TS File System.
System Information	Shows information about the kernel, Time, CPU and Memory.

FIGURE E.7 THE INFORMATION SECTION

Troubleshooting the Web Configuration Manager

1. What to do when the initial web page does not appear.

Try pinging, telnetting or tracerouting to the Cyclades-TS to make sure it is reachable. If not, the problem is probably in the network or network configuration. Are the interfaces up? Are the IP addresses correct? Are filters configured which block the packets?

If the Cyclades-TS is reachable, see if the /bin/webs process is running by executing the command ps. If it is not, type /bin/webs & to start it. If the /bin/webs process is not being initialized during boot, change the file /etc/inittab.

2. How to restore the default configuration of the Web Configuration Manager

This would be required only when the root password was lost or the configuration file /etc/websum.conf was damaged.

From a console or telnet session, edit the file /etc/config_files. Find the reference to /etc/websum.conf and delete it. Save the modified /etc/config_files file. Execute the command saveconf. Reboot the system. Enter into the Web Configuration Manager with the default username and password (root/tslinux). Edit the file /etc/config_files and insert the reference to /etc/websum.conf.

Cyclades Australia
Phone: +61 7 3279 4320
Fax: +61 7 3279 4393
www.au.cyclades.com

Cyclades Corporation
41829 Albrae Street
Fremont, CA 94538 - USA
Phone: (510) 770-9727
Fax: (510) 770-0355
www.cyclades.com

Cyclades South America
Phone: 55-11-5033-3333
Fax: 55-11-5033-3388
www.cyclades.com.br

Cyclades Philippines
Phone: (632) 813-0353
Fax: (632) 655-2610
www.ph.cyclades.com

Cyclades Italy
Phone: 39 329 0990451

Cyclades UK
Phone: +44 1724 277179
Fax: +44 1724 279981
www.uk.cyclades.com

CYCLADES
The Leader in Linux Connectivity

Cyclades Germany
Phone: +49 (0)81 22 90 99-90
Fax: +49 (0)81 22 90 999-33
www.cyclades.de