Secure Console Servers

SCS, SCS-R and Sentinel Models
Product Manual

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Revision I

LOGICAL SOLUTIONS

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SCS, SCS-R and Sentinel 32 Models' Product Manual

The Logical Solutions Secure Console Server Products are certified as:

1 Introduction

Introducing the Logical Solutions Inc. Secure Console Servers

1.1 SCS Models Covered in this Manual

All Logical Solutions Secure Console Server (SCS) models covered in this manual are similar in physical appearance, setup and functionality.

- Model SCS80 - 8-Port 1U Secure Console Server
- Model SCS160 - 16-Port 1U Secure Console Server
- Model SCS320 - 32-Port 1U Secure Console Server
- Model SCS480 - 48-Port 1U Secure Console Server
- Model SCS80R - 8-Port 1U Redundant Power Secure Console Server
- Model SCS160R - 16-Port 1U Redundant Power Secure Console Server
- Model SCS320R - 32-Port 1U Redundant Power Secure Console Server
- Model SCS480R - 48-Port 1U Redundant Power Secure Console Server
- Model Sentinel 32 - 32-Port 1U Modular, Redundant Power Secure Console Server

Figure 1.1 *SCS80, Secure Console Server, front and rear views*

The SCS80R, SCS160R, SCS320R, and SCS480R models are designed with dual hot-swappable Power Modules which operate in a redundant manner, and also offer two network ports and two console port connections. The 'R' models are otherwise very similar to the SCS80, SCS160 and SCS320.

Figure 1.2 *SCS160, Secure Console Server, front and rear views*

Figure 1.3 *SCS320, Secure Console Server, front and rear views*

The Sentinel 32 model is also designed with dual hot-swappable Power Modules which operate in a redundant manner. In addition, the Sentinel 32 offers field replaceable, modular eight port circuit cards, modular network and console port connections, and an analog modem option.

The following SCS models are available for International customers, and are shipped with regionally-appropriate power cordsets (otherwise similar to the SCS80 / SCS160 / SCS320 / SCS480 / SCS80R / SCS160R / SCS320R / SCS480R / Sentinel 32, respectively).

- Model SCS801 - 8-Port 1U Secure Console Server, International
- Model SCS1601 - 16-Port 1U Secure Console Server, International

- Model SCS3201 - 32-Port 1U Secure Console Server, International
- Model SCS4801 - 48-Port 1U Secure Console Server, International
- Model SCS801R - 8-Port 1U Redundant Power Secure Console Server, International
- Model SCS1601R - 16-Port 1U Redundant Power Secure Console Server, International
- Model SCS3201R - 32-Port 1U Redundant Power Secure Console Server, International
- Model SCS4801R - 48-Port 1U Redundant Power Secure Console Server, International
- Model Sovereign 32 - 32-Port 1U Modular, Redundant Power Secure Console Server, International

1.2 System Features

Each SCS system includes the following features:

- Linux operating system and command set
- Ability to connect as many as 16, 32 or 48 EIA-232 serial console ports
- 10baseT / 100baseTX network compatibility
- Preconfiguration from the factory – two minutes from the box
- OpenSSH
- NFS and NIS support
- SSH to a Serial Port support
- Break Safe - no undesired "break" signals are sent to attached servers

The SCS-R models also offer the following additional features:

- Dual Hot-Swappable Redundant Power Modules
- Dual 10baseT / 100baseTX Network Port interfaces
- Dual console port interfaces (one DTE, one DCE)
- Power Monitoring for notification of Module outage

The Sentinel 32 and Sovereign 32 include the features of the SCS-R models plus:

- Hot-swappable, modular console/network and serial port circuit cards
- Optional analog modem in place of the second console port

Figure 1.4 *SCS480 Secure Console Server, front and rear views*

1.3 Software Features

All SCS Models are designed with network administrators in mind. No need for special administration tools, training or procedures. You know Linux, we run Linux.

- Open-source Linux Operating System (Red Hat compatible)
- Proprietary SCS features command-line options that follow the familiar Linux / UNIX command formats for ease of administration
- Factory pre-configured to be operational out-of-the-box within a few minutes - the sysadmin need only set the IP address and add users

The SCS line allows up to 250 simultaneous user sessions to access up to 48 serial ports. The attached components may be any variety of network center servers, workstations, or other devices having a serial port that must be monitored.

Figure 1.5 *SCS80R, Secure Console Server, front and rear views*

1.4 Hardware Features

The SCS systems are designed for network data center applications, which tend to facilitate mounting a product in industry-standard 19-inch network equipment racks. The SCS may be placed on a shelf or counter instead. Each SCS operates independently and is accessible (setup by your System Administrator or "sysadmin") using a secure network connection or a local serial terminal.

- Rack-mount (19 inch), 1U tall (1.75 in./ 4.5 cm) metal chassis
- 16, 32 or 48 serial ports, using Category 5 (RJ45) connectors
- Front panel LCD with push buttons for network setup
- 10/100 BaseT Network Port for your network
- Console port (uses Category 5 connectors and wiring)
- Universal AC power input (100-240V, 50/60 Hz)
- Convection cooling in your rack enclosure
- 256KB-per-port Buffer for Port data

Figure 1.6 *SCS160R, Secure Console Server, front and rear views*

The SCS can help troubleshoot your networking environment. The SCS is a "listening" system that monitors the messages (ASCII data, server error information, etc.) from the serial port of the device to which each Port is connected. The SCS captures the data by writing it to a port buffer, which can hold 256K bytes of data per port. This buffered data gives the sysadmin a history of console port messages which can be reviewed to help troubleshoot a problem with the connected device. After you've had a networking device problem, and have access to its console port messages, the problem with your network equipment will be easier to fix. Downtime in your network site can be minimized by reviewing the buffered information and then eliminating the cause of the error messages.

In most cases, the sysadmin has a method of saving the buffered data from each port buffer to some other server (e.g., via NFS) in your network. This is important to note since the Port data (buffered) is stored in RAM and will be lost if the SCS power is turned off.

1.4.1 SCS80R, SCS160R, and SCS320R Hardware

The SCS80R, SCS160R, and SCS320R models offer hardware redundancy for power, network, and console ports. Having hot-swappable Power Modules with discrete inputs allows the customer to use redundant power sources to the SCS system, and if necessary, they can field-replace a power module. The SCS-R models provide power supply status to alert the system administrator in the event of a power failure from one of the power supplies. With dual NIC inputs and dual console port inputs, the SCS80R, SCS160R, and SCS320R also provide additional benefits for sites needing these capabilities.

Figure 1.7 *SCS320R, Secure Console Server, front and rear views*

1.4.2 SCS480R Hardware

The SCS480R offers redundant, hot-swappable, front panel accessible power supplies. These supplies are hot-swappable without removing the power cords or shutting down the unit.

The SCS480R provides dual NIC interfaces, dual console ports, and 48 serial ports.

Figure 1.8 *SCS480R, Secure Console Server, front and rear views*

1.4.3 Sentinel 32 Hardware

The Sentinel 32 offers redundant power supplies as described in Section 1.4.1. In addition, the Sentinel uses hot-swappable circuit modules that allow for field replacement of groups of eight serial ports (if necessary) without affecting the other ports. The dual network and console ports are also field replaceable. A dual network/console/modem card is also available which replaces the second console port with an analog modem

Figure 1.9 *Sentinel 32 8 Port Interface Module*

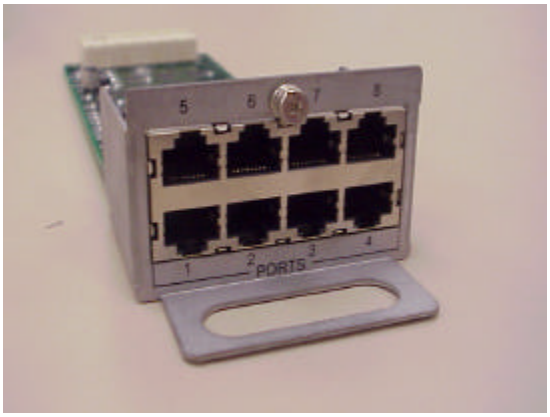


Figure 1.10 *Sentinel 32 Console/Network Module and Console/Network/Modem Module*

Console/Network Module

Console/Network/Modem Module

1.5 Technical Specifications

Each Logical Solutions SCS system is designed to the following specifications:

User Interface	Linux command-line access via ssh or local console port Backlit 2-line front-panel LCD display showing network configuration Five front-panel push buttons with UI for network setup
Serial Interface (Ports)	[SCS80/SCS80R = 8 Ports; SCS160 / SCS160R = 16 Ports; SCS320 / SCS320R / Sentinel 32 = 32 Ports;SCS480/SCS480R = 48 Ports] RJ45-type 8-conductor connector (DTE or DCE; software selectable) Software selectable data rate from 300 baud to 115KBaud Software selectable EIA-232 parameters 256KB FIFO Buffer in RAM (per Port)
Serial Interface (Console)	80/160/320/480: RJ45-type 8-conductor connector (DCE configuration) 80R/160R/320R/Sentinel 32: Dual RJ45-type 8-conductor connector - one DTE, one DCE Software selectable data rate from 300 baud to 115KBaud Software selectable EIA-232 parameters
Network interface (Network)	80/160/320/480: 10/100 BaseT RJ45 8-conductor Ethernet 80R/160R/320R/480R/Sentinel 32: Dual 10/100 BaseT RJ45 8-conductor Ethernet TCP/IP
Modem	A V.92 analog modem is available as an option for the Sentinel 32 for those users who require a connection over the telephone network
CPU & Memory	AMD SC520 CPU, operating at 133 MHz 256MB Compact Flash (CF) memory (non-volatile) 128MB RAM for real time use

Power Supply	Universal AC Power Input, 100-240VAC 50/60 Hz, 0.5A each input IEC-type regional cordset(s) included
Dimensions	1U, 1.75 in x 17.25 in x 14.75 in (4.5 cm x 43.8 cm x 37.5 cm)
Weight	4.5 kg (10 lbs)
Temperature	Operating: 0 to 50 °C (32 to 122 °F), 30 to 90% RH, non-condensing Storage: -20 to 70 °C (-4 to 158 °F), 10 to 90% RH, non-condensing
Relative Humidity	Operating: 10% to 90% non-condensing, 40% to 60% recommended Storage: 10% to 90% non-condensing

Figure 1.11 *Sentinel 32, Secure Console Server, front and rear views*

1.6 Documentation

The SCS comes with the standard Linux man pages installed; English is the default, but several other language (German, French, Italian) versions are also included. Due to space limitations, the 'info' pages are not available.

While this manual gives a brief description of some LSI programs, the SCS contains the latest man pages for the LSI programs, scripts and configuration files. If the man page conflicts with this manual, the man page should be followed. We make every effort to keep the manual current, but if you find a discrepancy, please let us know. What this means is the SCS is the primary source for software documentation, not the manual.

If 'standard' Linux programs (sty is one) are modified by LSI, the corresponding man pages will reflect the changes/additions.

Selected Linux HOWTO's and README's can be found at /usr/local/doc. More documentation can be found at www.tldp.org.

2 Product Overview

Optimize your System Administration and Network Resources

2.1 Intended Application

The Logical Solutions Secure Console Servers are used to securely monitor and centrally manage up to 48 of your networking systems (servers, routers, switches, etc.). They do so by monitoring the console port of your network center's devices and systems. Each attached component must have an EIA-232 compatible serial port. The SCS80 and SCS80R support 8 ports, SCS160 and SCS160R support 16 ports, SCS320, SCS320R, and Sentinel 32 support 32 ports, and the SCS480 and SCS480R support 48 ports. Security is maintained through encryption and user passwords.

TheSCS80R, SCS160R, SCS320R, SCS480R, and Sentinel 32 systems are used where redundant power concerns exist, where hot-swap replacement of Power Modules is a concern, or where more than one network connection or more than one console port connection are required.

User accounts are set up by the root user, who acts as the system administrator of the SCS. A user can access the attached servers using commands from a local terminal, or through an ssh-protocol (secure) network connection. In order to interact with a device, the user must have rights for read, review or write access to that port.

Users can interact with each of the attached devices by logging into the SCS, and entering the `connect` command and the Port number or Port name at the command prompt; the SCS acts as a conduit for the connection but does not interfere. When the user is not interacting with a network system, the SCS can log the output of the console port to a file, so that data may be reviewed later.

User commands are discussed in *Section 9, User Operations,* beginning on page 76.

2.2 System Chassis

Each SCS is housed in a rack-mountable metal chassis. Vents are found on both sides of the chassis, and 3-position rack mount brackets are provided and removable. The front panel of the SCS features a two-line backlit LCD display with push buttons.

2.2.1 SCS80 / SCS160 / SCS320 / SCS480

Each SCS chassis has rear-panel connections for 8, 16, 32 or 48 serial ports, one console port, one network port, and power. The SCS has a built-in universal power supply. A rear-panel power switch and protective fuse are provided.

2.2.2 SCS80R / SCS160R / SCS320R / SCS480R

Each SCS-R chassis has rear-panel connections for 8, 16, 32, or 48 serial ports, two console ports, two network ports. The SCS 'R' has two hot-swappable Universal Power Modules, each with its own power switch and protective fuse (located on the rear of the chassis for the SCS80R, SCS160R and SCS320R; located on the front of the chassis for the SCS480R). Each Power Module is secured with a single screw.

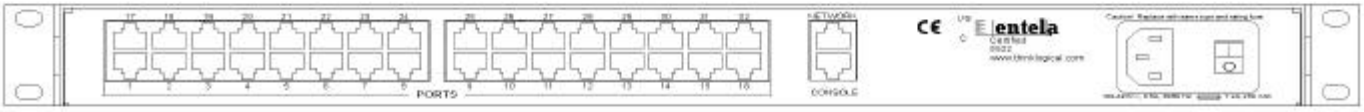
2.2.3 Sentinel 32

Each Sentinel 32 chassis has rear panel connections for 32 serial ports, two console ports, two network ports, and two hot-swappable, Universal Power Modules each with its own power switch and protective fuse. The serial ports are arranged in four modules of eight ports each for easy field replacement. The two console and two network ports are in a single module. A module with two network ports, one console port, and a V.92 modem port is available as an option. All the modules are hot-swappable.

2.3 Connecting to the SCS

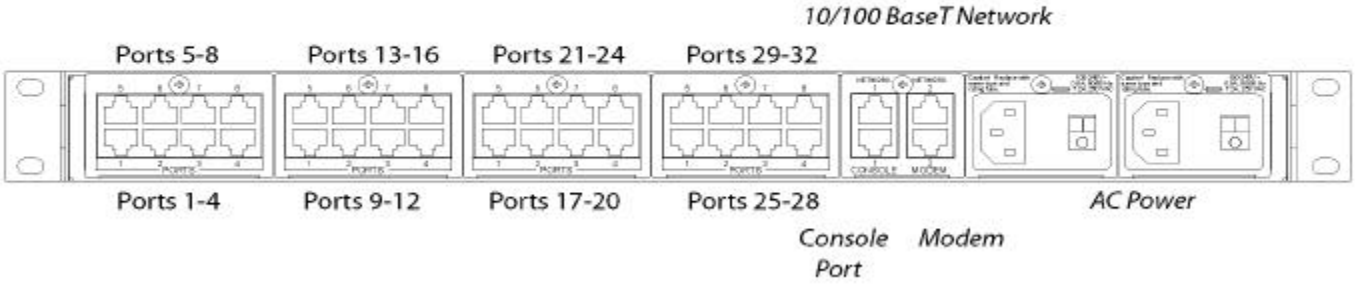
All physical connections to the product are made to the rear panel using industry-standard cabling and connectors (purchased separately). All serial connections and network connections use conventional Category 5 cabling having RJ45 jacks. Power is connected using a cordset, one of which is provided with each SCS system.

Figure 2.1 *Rear View of SCS320 Chassis, showing all connections*



Other SCS models are similar, offering a different number of port connectors. The SCS-R models and Sentinel 32 also have dual NIC, dual console ports and dual power inputs. The rack-mount brackets, shown on each side, may be removed if desired.

Figure 2.2 *Rear View of Sentinel 32 Chassis, showing all connections*



Note

The Sentinel 32 Serial Port connections on the rear of the chassis are numbered differently from the other SCS models.

2.3.1 Serial Devices

All network components attached to both the Ports and the console port must be compatible with the EIA-232 standard. Regular fully-pinned Category 5 cabling with RJ45 connectors is used for the Port connections and for the console port.

System ports (numbered 1 through 48) are default-configured as DCE data ports, and support a range of baud rates from 300 Baud to 115.2K Baud. All Port parameters, including DTE or DCE type and other data parameters are configurable on a per-port basis. Each port may also be assigned a unique name: default port names are `port1` through `port48`, respectively.

2.3.1.1 Break Safe

The Logical Solutions SCS systems are “break-safe”, they will not send a “break” command or other data on the serial ports connected to your servers, unless initiated by a user. A “break” signal could cause problems with your servers.

2.3.2 IP Network

The SCS network interface is an auto-sensing 10 BaseT/100 BaseTX network connector (equipped with an RJ45 jack with dual LEDs) for use with a conventional TCP/IP network using standard RJ45 Category 5 cables. A default IP address is coded into the system (10.9.8.7); however the network settings should be configured by your system administrator to be suitable for your site’s requirements and unique equipment. The SCS products are preconfigured for ssh (secure) access.

Note

The SCS-R and Sentinel 32 models offer two independent network interface ports. Only the first port (NETWORK 1) is enabled by default.

2.3.3 AC Power

2.3.3.1 SCS80 / SCS160 / SCS320 / SCS480

A single IEC-type power entry module is located on the rear of the chassis. The power entry module incorporates a replaceable protective fuse (2A) and an on/off switch. An IEC cordset is provided with each SCS chassis. Connect the cordset to a local AC power source. Turn the power switch on when appropriate.

2.3.3.2 SCS80R / SCS160R / SCS320R / Sentinel 32

Two removable AC Power Modules are found on the rear of the chassis, identified as “Left” and “Right” if looking at the rear of the chassis. Either AC module will fully support the system, and if both are turned on, they operate redundantly. The SCS-R and Sentinel 32 systems have an AC power monitoring capability to alert

the system administrator in the event of an AC power outage from one of the modules.

Each AC Module has an IEC-type power entry module. The power entry module incorporates a replaceable protective fuse (2A) and an On/Off switch. Two IEC cordsets are provided with each SCS-R and Sentinel 32 chassis. Connect each cordset to a local AC power source. Turn the power switch On (I) for each module when appropriate.

Caution

During replacement of a module, it is important to first turn the faulty module off, then remove its power cord, **BEFORE** you remove the screw to allow the module to be pulled out. The potential for handling hazardous voltages could exist otherwise.

2.3.3.3 SCS480R

Two removable AC Power Modules are found on the front of the chassis, identified as "Left" and "Right" if looking at the front of the chassis. Either AC module will fully support the system, and if both are turned on, they operate redundantly. The SCS-R and Sentinel 32 systems have an AC power monitoring capability to alert the system administrator in the event of an AC power outage from one of the modules.

A 250VAC 2A fuse is provided on each SCS480R Power Module and can be replaced when the module is removed from the unit.

2.3.4 DC Power

The Sentinel and SCS-Rs can optionally be equipped with removable -48 DC Power Modules in place of the AC Power Modules described in paragraph 2.3.3. Either module will fully power the system and will operate redundantly if power is turned on to both. The power monitoring circuitry of the SCS-R and Sentinel operates with the DC Power Modules alerting the system administrator in the event of a loss of power to either module.

Caution

During replacement of a module, it is important to first turn the module off, then remove its power cord, **BEFORE** you remove the screw to allow the module to be pulled out. The potential for handling hazardous voltages could exist otherwise.

Additional information on the installation of the -48 VDC modules is shown in Appendix D.

2.4 User Access Control

Access to a Port is controlled on a per-user basis via a user profile, which is stored as a file on the local SCS. This profile is created by the root user using the command 'adduser'. See *Section 8.1.1, adduser,* on page 74. NIS support is also available.

2.4.1 User Sessions

Each SCS supports up to 250 simultaneous user sessions, although this is far greater than what most SCS product applications require.

2.5 Port buffers

The Secure Console Servers provide real-time serial port data buffering. Each Port buffer stores up to 256KB of data, held in RAM in a separate file. This provides hundreds of pages of port data for each attached device, and they can be reviewed at a later time. The data may be viewed while users are not interacting with the attached port. Port buffers are enabled by default.

2.5.1 How to Disable buffering

Buffering is always On when no one is connected in Interactive mode. Buffering may be disabled during an interactive session to ensure privacy after the session ends. (See the `man` page for `stty` --buffer option.)

3 Installation

Place it in your Rack. Connect the Cat5 cables to the Ports. Plug it in.

3.1 Mounting the SCS

You may choose to rack mount your SCS unit or place it on a shelf. The front panel display should be visible and front panel buttons need only be accessible for the initial setup of the system. All connections are made to the rear of the chassis.

3.1.1 Rack Mount or Desktop

The SCS products may either be installed either in an EIA-standard 19-inch rack (1U tall), or placed on a shelf or desktop. For shelf use, rubber feet are provided, and the rack mount brackets may be removed. The SCS chassis does not need to be opened or accessed. The sturdy metal case allows units to be stacked as required.

Note

Be sure to leave adequate ventilation room on both sides of the SCS chassis, especially if units are being stacked.

Each rack mount bracket is held on by 4 screws. The brackets may be positioned so that the unit sits forward, flat or recessed in your rack. If the brackets are removed or repositioned, it is not necessary to re-use the extra rack mount screws.

3.1.2 Front Panel Display and Buttons

The front-panel LCD display should be visible and accessible during system setup. It normally shows the current network settings and the date/time. The front panel buttons are only used during setup, or to review existing SCS settings.

The LCD display can be customized by the root user. See *Section 7.7, Front Panel Display Options,* on page 64 for more information.

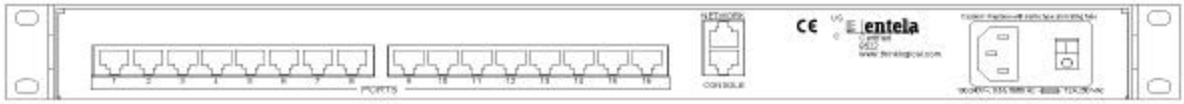
3.1.3 Convection Cooled

The SCS does not require special cooling or ventilation other than what is normally provided in an equipment rack. No fan means that it does not add to the ambient noise in your equipment room. Be sure not to block the air vents on the sides of the unit, and leave space on both sides. If mounted in an enclosed rack, it is recommended that the rack have a ventilation fan to provide adequate airflow through the unit(s).

3.2 Connections

All connections are found on the rear of the SCS chassis. Each Port jack is clearly labeled with the Port number.

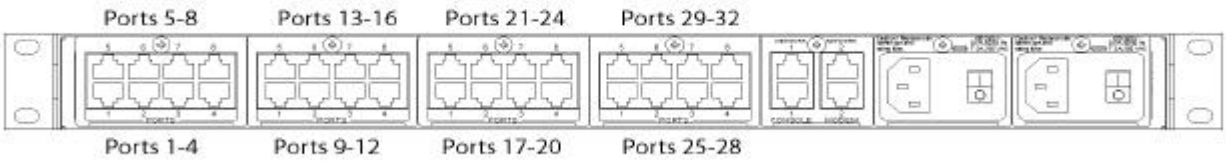
Figure 3.1 *SCS160 Chassis Rear View*



Note

The Sentinel 32 Serial Port connections on the rear of the chassis are numbered differently from the other SCS models.

Figure 3.2 *Sentinel 32 Chassis Rear View*



3.2.1 Power

The SCS product has an internal universal Power Supply. Each SCS unit requires approximately 15w of electrical power. The switching power supply accepts nominal AC input voltage between 100-240 VAC with a frequency range of 50-60 Hz.

Note

The optional -48VDC Power Module is described in *Section Appendix D, DC Power,* on page 115.

3.2.2 AC Input

A single IEC-type AC power entry module with an integral safety fuse and power switch is found on the rear of the chassis in each AC Power Module. The power inlet to the chassis uses a removable IEC-type cordset; one is provided with each AC Power Module in the system. Be sure that your AC power source is properly grounded.

3.2.3 Connecting to the Network Port

Use a conventional fully-pinned Category 5 cable to connect your network connection to the NETWORK jack (RJ45) on the rear of the chassis.

The SCS's network port (auto-selecting 10/100) allows remote access to the attached networking components by the users and the sysadmin functions by the root user. You can change the network parameters from the front panel of the SCS, or you may ssh in to the default address and make changes using Linux commands.

3.2.3.1 SCS-R and Sentinel 32 Dual NIC Interface

TheSCS80R / SCS160R / SCS320R / SCS480R / Sentinel 32 have dual network Ports. Initially, only the first NIC is functional (NETWORK 1 = device `eth0`). The second NIC (NETWORK 2 = device `eth1`) must be enabled by the sysadmin.

To configure the second NIC, the sysadmin will log in and use one of the following commands:

```
netconfig -d eth1
```

or

```
netconfig --device=eth1
```

Refer to Section 6 for other System Commands.

3.2.4 Connect your Console

The console port is used for local access to the SCS. Connect your terminal or computer to the console port with a terminal emulation package. The SCS's console port has a DCE configuration with adjustable parameters.

The default communication parameters for the console port are:

- **9600 baud,**
- **8 data bits,**
- **No parity,**
- **1 stop bit, and**
- **Xon/Xoff flow control**

Use a conventional fully-pinned Category 5 cable to connect your terminal or computer connection to the CONSOLE jack (RJ45) on the rear of the chassis.

Login to the SCS:

When connected to the SCS, the "`login as:`" prompt will appear. You want to log in as "`root`". Press "Enter" to continue.

The "`password:`" prompt comes up next. enter "`root`" (the default root password) and press "Enter".

3.2.4.1 SCS-R and Sentinel 32 Dual Console Interface

The SCS80R / SCS160R / SCS320R / SCS480R / Sentinel 32 have dual console ports, with the console port 1 pinned as DCE and the console port 2 pinned as DTE. The default configuration of these console ports has the second console port disabled. To use the second console port, the sysadmin must enable it.

The second console port is activated by editing the file `/etc/inittab`.

Refer to Section 6 for other System Commands.

3.2.5 Connect to the Ports

Any system (e.g., server, router, switch) with a serial port may be connected to the SCS for consolidated system administration. Server Ports are individually configurable. Consult your server documentation, as necessary.

The default communication parameters for the server Ports are:

- **9600 baud,**
- **8 data bits,**
- **No parity,**
- **1 stop bit,**
- **Xon/Xoff flow control, and**
- **Port type of DCE**

Each Port can be individually configured for baud rates of 300-115, the data parameters, and as DTE or DCE types.

Note

Ports may also be individually disabled, if desired.

3.2.5.1 Automated Port Configuration Tests

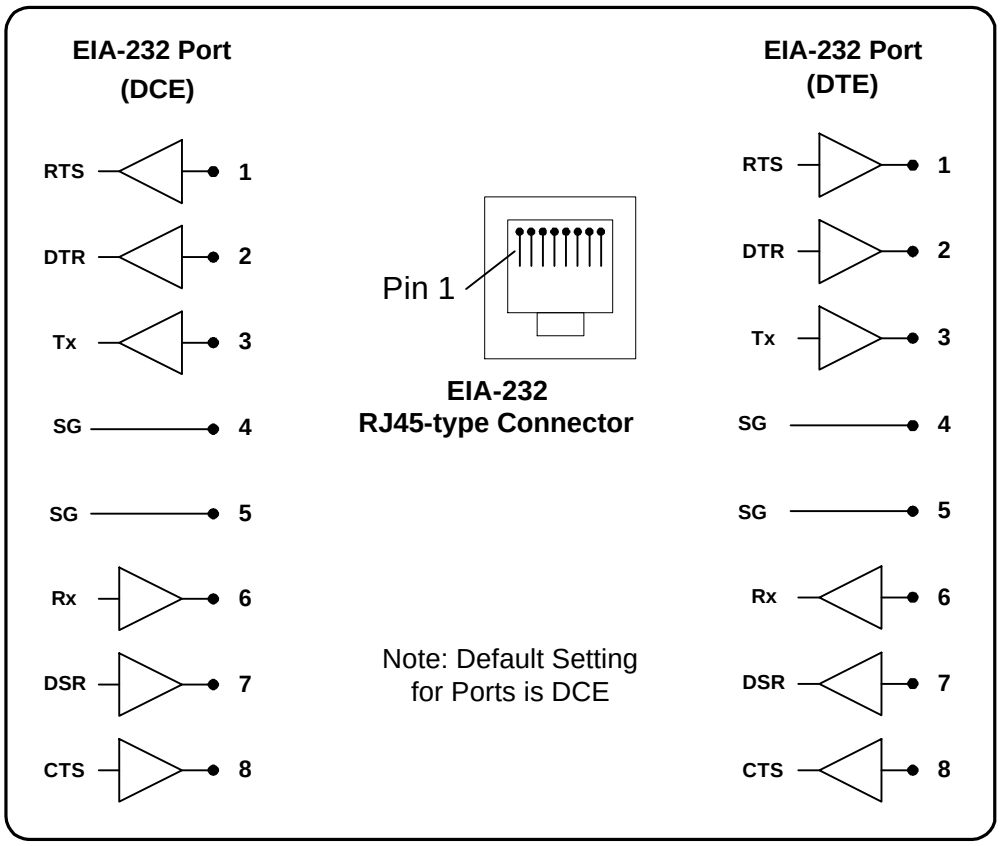
A script named 'pm' is now available that will test the device ports and report the correct DTE/DCE setting for each port. A `man` page exists for pm. This can be used to troubleshoot SCS to server connections. Baud rates are not tested, only the hardware signals from the server.

3.2.5.2 Port Adapters

You may need to adapt the cable connection for your server device. Logical Solutions offers serial-to-RJ45 adapters for serial ports, both DB9 and DB25, for many common network-equipment product applications.

3.2.5.3 Serial Port Pinout

Figure 3.3 *Serial Port Pinout - DCE (default) and DTE*



Use a conventional fully-pinned Category 5 cable to connect the console port from each of your networking components to the Port jacks on the rear of the chassis.

3.3 SCS-R and Sentinel Power Modules

The SCS80R, SCS160R, SCS320R, and Sentinel 32 provide dual AC Power Modules which are field-replaceable and connect to the rear panel of the SCS chassis. Each Power Module has a power entry connection with an IEC-type power connector. The SCS80R, SCS160R, SCS320R, and Sentinel 32 have a power monitoring display shown on the front panel to indicate if one of the power supplies is not powering the system (either AC power failure, a Module is turned off, or the supply has failed).

The SCS480R Power Module is mounted in the front panel of the SCS480R. It has the same capabilities as the SCS 'R' and Sentinel Modules. It is not necessary to remove the AC power cord from the SCS480R when replacing a module.

Note

The Power Module in the SCS160/320/480 is not field serviceable. This option only applies to the SCS80R, SCS160R, SCS320R, SCS480R, and Sentinel 32.

Each Power Module can support the SCS80R/SCS160R/SCS320R/SCS480R/ Sentinel 32 system fully, however the intended design is to have two power sources to keep your SCS system running. When both supplies are active, they will share the system load. If one fails, the remaining supply takes the load.

Figure 3.4 *SCS Front Panel Display, Left AC Power Module Failed*

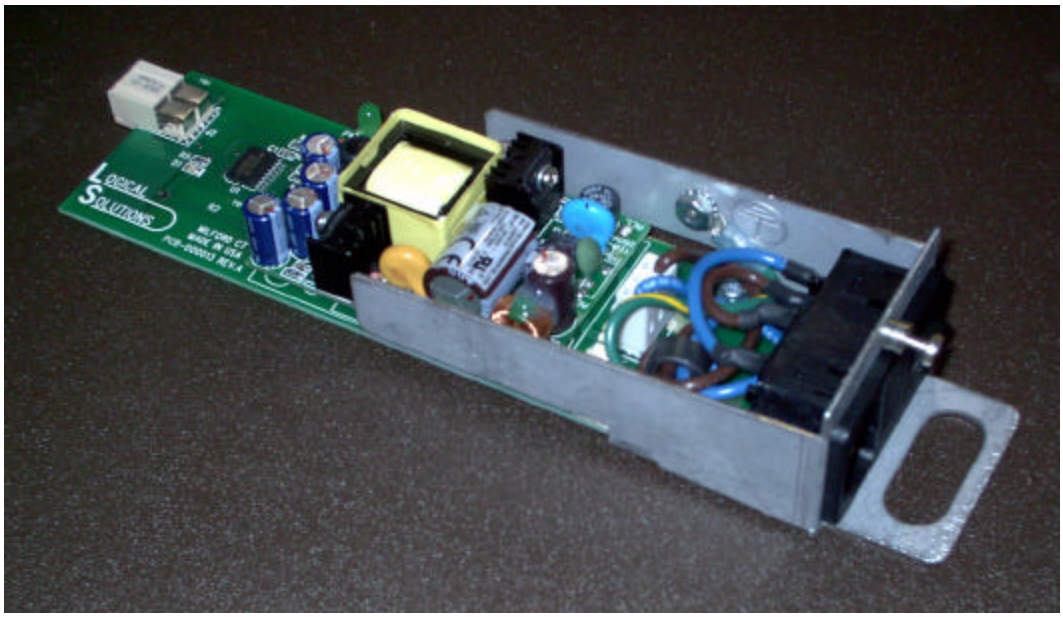
```
Left Supply Failed
Tue Mar 18 15:43:07 2003
```

The SCS80R, SCS160R, SCS320R, SCS480R, and Sentinel 32 ship with two AC power cordsets, one for each module, to allow separate AC power source connection. Plug in the IEC connection to the SCS AC Power Module, and connect the AC plug to an acceptable AC power source.

3.3.1 Power Module Replacement

The Power Modules of the SCS-R and Sentinel 32 Models may be hot-swapped if necessary by a competent technician. Each slide-in Power Module is held in place with a single screw and does not need to be removed except for replacement.

Figure 3.5 *AC Power Module (shown removed from SCS320R)*



For SCS80R, SCS160R, SCS320R, and Sentinel 32:

If you need to replace one of the power supply modules, determine which module has failed (left or right, if looking at the rear of the chassis) by reading the front panel display.

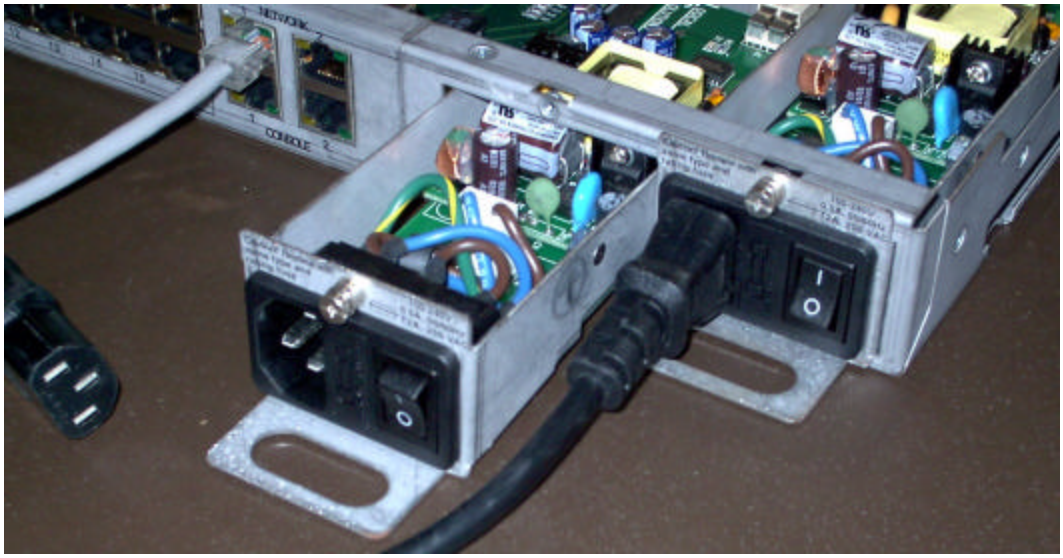
A single captive screw (visible from the rear of the SCS80R, SCS160R, SCS320R, or Sentinel 32 chassis holds the Power Module in place, and also establishes a protective Earth ground connection for the system. Be certain to turn off the failed power module (press switch to O position), then remove its power cord connection. You can then unscrew that module and pull it firmly from the chassis using the metal loop on the module.

For SCS480R:

If you need to replace one of the power supply modules, determine which module has failed (left or right, if looking at the front of the chassis) by reading the front panel display. The module slides in from the front of the chassis.

A single captive screw visible from the front of the SCS480R chassis) holds the Power Module in place, and also establishes a protective Earth ground connection for the system. Be certain to turn off the failed power module (press switch to O position); it is not necessary to remove the power cord. You can then unscrew that module and pull it firmly from the chassis using the metal handle on the module.

Figure 3.6 *Replacing an AC Module from an SCS320R (Left Module shown partially removed)*



Note

To remove the Power Module, you only need to loosen the one captive screw on the Module. You do not need to remove the chassis from your rack, or remove the cover of the chassis for any reason. The photo above shows the cover removed for clarity only.

Insert the replacement power module (it will require a slight amount of force to insert), and tighten the screw. After the screw is tightened, reconnect the cordset to the module, and then you can turn the switch on the module to the On (I) position. When proper power is restored, the front panel display indicating a module has failed will clear after a few moments.

3.4 SCS-R and Sentinel -48Vdc Power Modules

The SCS80R, SCS160R, SCS320R, and Sentinel 32 provide dual -48Vdc Power Modules which are field-replaceable and connect to the rear panel of the SCS chassis. Each Power Module has a power entry connection with a WAGO MCS power connector. The SCS80R, SCS160R, SCS320R, and Sentinel 32 have a power monitoring display shown on the front panel to indicate if one of the power supplies is not powering the system (either DC power failure, a Module is turned off, or the supply has failed).

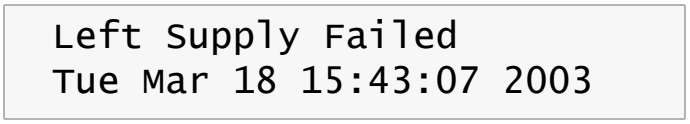
The SCS480R Power Module is mounted in the front panel of the SCS480R. It has the same capabilities as the SCS 'R' and Sentinel Modules. It is not necessary to remove the DC power cord from the SCS480R when replacing a module.

Note

The Power Module in the SCS160/320/480 is not field serviceable. This option only applies to the SCS80R, SCS160R, SCS320R, SCS480R, and Sentinel 32.

Each Power Module can support the SCS80R/SCS160R/SCS320R/SCS480R/ Sentinel 32 system fully, however the intended design is to have two power sources to keep your SCS system running. When both supplies are active, they will share the system load. If one fails, the remaining supply takes the load.

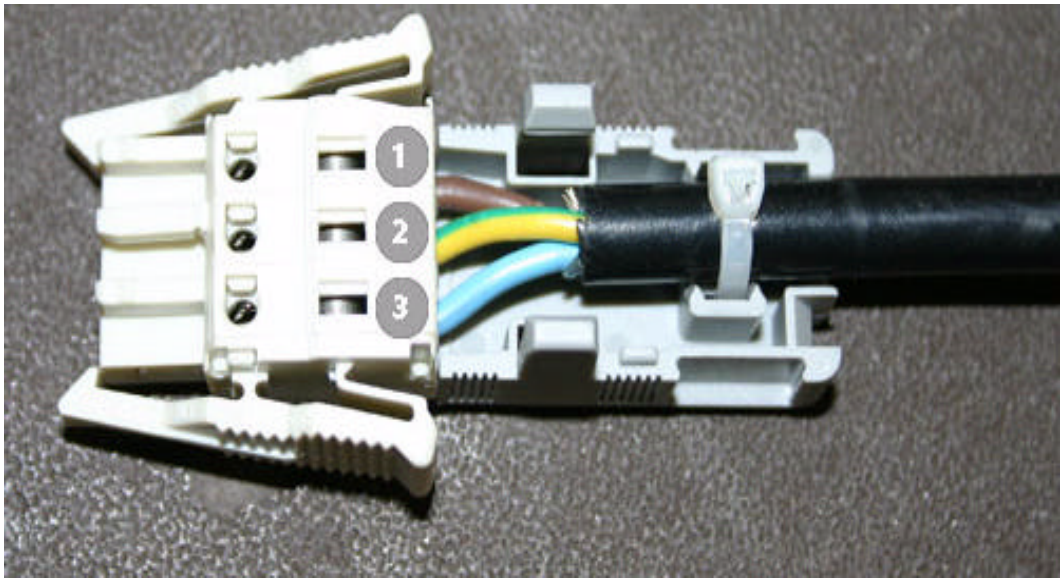
Figure 3.7 *SCS Front Panel Display, Left AC Power Module Failed*



The SCS80R, SCS160R, SCS320R, SCS480R, and Sentinel 32 ship with two WAGO MCS connectors, one for each module, to allow separate DC power source connection. Plug in the WAGO MCS connector to the SCS DC Power Module, and connect to an acceptable DC power source.

3.4.1 Wiring the -48Vdc Connector

Figure 3.8 *WAGO MCS DC power connector*

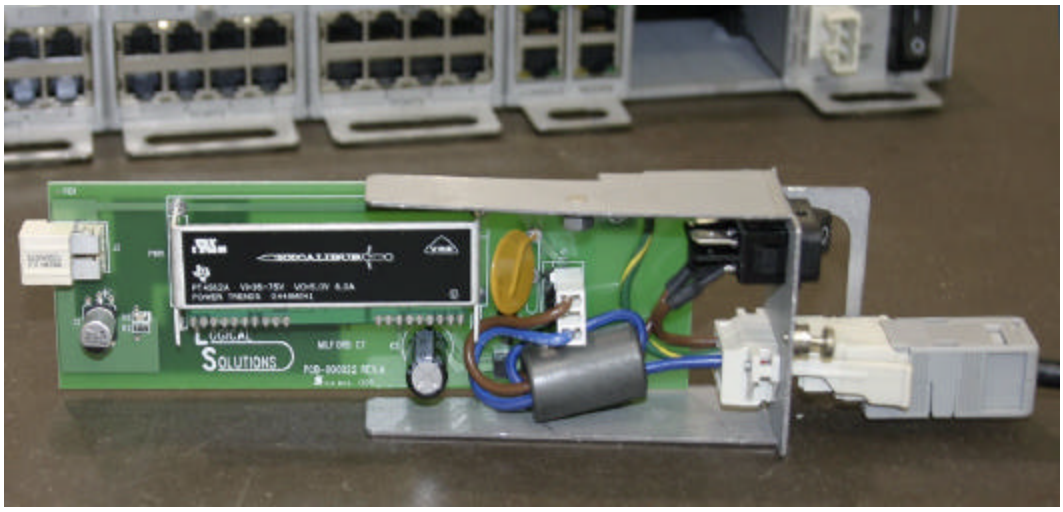


1. -48Vdc (brown)
2. Chassis ground (green/yellow)
3. Common (blue)

3.4.2 -48Vdc Power Module Replacement

The Power Modules of the SCS-R and Sentinel 32 Models may be hot-swapped if necessary by a competent technician. Each slide-in Power Module is held in place with a single screw and does not need to be removed except for replacement.

Figure 3.9 *-48Vdc Power Module (shown removed from Sentinel 32)*



For SCS80R, SCS160R, SCS320R, and Sentinel 32:

If you need to replace one of the power supply modules, determine which module has failed (left or right, if looking at the rear of the chassis) by reading the front panel display.

A single captive screw (visible from the rear of the SCS80R, SCS160R, SCS320R, or Sentinel 32 chassis holds the Power Module in place, and also establishes a protective Earth ground connection for the system. Be certain to turn off the failed power module (press switch to O position), then remove its power cord connection. You can then unscrew that module and pull it firmly from the chassis using the metal loop on the module.

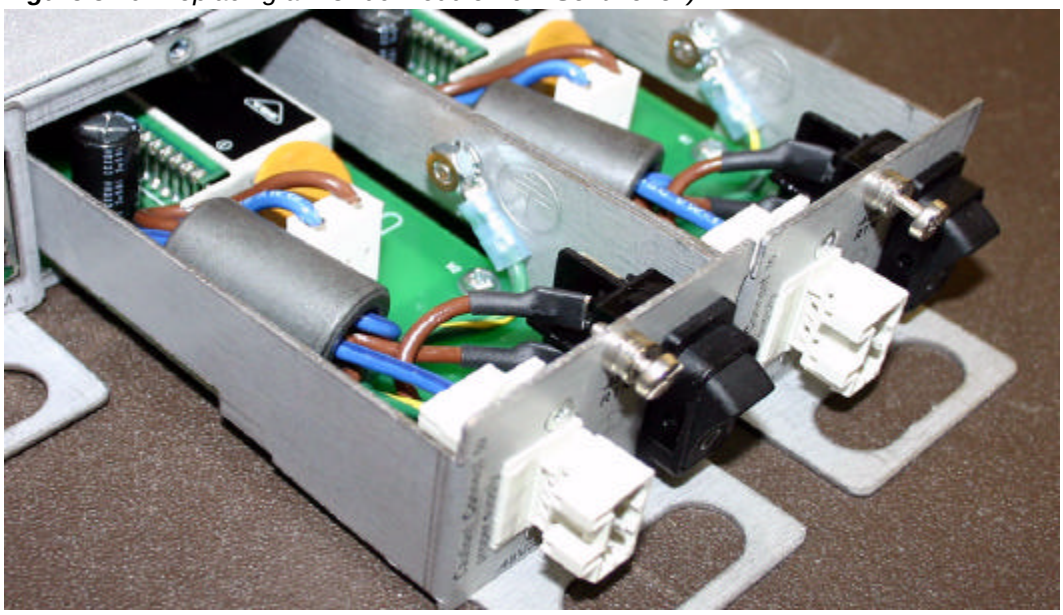
For SCS480R:

If you need to replace one of the power supply modules, determine which module has failed (left or right, if looking at the front of the chassis) by reading the front panel display. The module slides in from the front of the chassis.

A single captive screw visible from the front of the SCS480R chassis) holds the Power Module in place, and also establishes a protective Earth ground connection for the system. Be certain to turn off the failed power module (press switch to O

position); it is not necessary to remove the power cord. You can then unscrew that module and pull it firmly from the chassis using the metal handle on the module.

Figure 3.10 *Replacing a -48Vdc Module from Sentinel 32)*



Note

To remove the Power Module, you only need to loosen the one captive screw on the Module. You do not need to remove the chassis from your rack, or remove the cover of the chassis for any reason. The photo above shows the cover removed for clarity only.

Insert the replacement power module (it will require a slight amount of force to insert), and tighten the screw. After the screw is tightened, reconnect the cordset to the module, and then you can turn the switch on the module to the On (I) position. When proper power is restored, the front panel display indicating a module has failed will clear after a few moments.

4 Initial Configuration

It's Pre-Configured. Set your IP Address. Just Add Users.

4.1 Default Configuration

Out of the box, the SCS is pre-configured, ready to generate ssh keys, with an IP address set to a generic default value of 10.9.8.7 / NetMask 255.0.0.0. It is likely that the sysadmin will need to change to a local IP address.

When you first connect the unit to your network and turn the power on, it will take about two minutes for the SCS to perform the initial ssh host key generation. The front panel display will show the following display after the SCS's power-up is complete and the system is ready.

Figure 4.1 *SCS Front Panel Display, default, normal mode shown*

```
scs.localdomain
Tue Mar 18 15:53:03 2003
```

The top line of the display is the SCS's host and domain name, while the second line is a clock display showing day and date (initially set to Eastern Time Zone).

4.2 Initial System Security Concerns

The first login will require several steps to fully secure the SCS.

When you first connect the SCS and turn it on, the SCS will build the ssh host keys during the first two minutes of system startup. During this time, the front panel

LCD bottom line reads '`start sshd`', and the console port reads 'Starting sshd'. The system is not dead or locked up, but is generating ssh host keys.

The root user should also configure the `ntp` and the `ssh config` files. The dual console/modem and network 2 are disabled. Root is not allowed to login on console 2.

4.3 Front Panel Network Setup

If you changed the network settings via netconfig, you can skip this section.

By default, the Front Panel Display and buttons can be used to set the basic network parameters. There is one Enter button and four arrow buttons (Left, Right, Up and Down). The front panel can change the IP Address, Subnet Mask, and Gateway settings. By default, the front panel will show the Hostname and the Date/Time.

Figure 4.2 *Default Normal Front Panel Display (Hostname and Date/Time)*

```
scs.localdomain
Tue Mar 18 15:53:03 2003
```

4.3.1 Front Panel Edit Mode

By default, the Front Panel Display's Edit mode is enabled. The View mode is similar to Edit mode except that the front panel cannot be used to change the settings. This is described in *Section 7.7, Front Panel Display Options,* on page 64 of this manual.

Note

The Front Panel Edit Mode can be disabled, if required. See *Section 7.7, Front Panel Display Options,* beginning on page 64.

With Edit mode enabled, use the arrow buttons on the front panel to access the front panel edit subroutine and change the default network settings (showing the IP address, Netmask, and Gateway) for your SCS system. The front panel controls are self-prompting for the appropriate entries.

Figure 4.3 *SCS Front Panel Display, showing first LCD Mode display*

Note

Use the **Enter** button to 'continue' or to 'accept current setting', whichever is appropriate at that time.

Your front panel entries must be no longer than 30 seconds apart, or the front panel entry program will time out and discard any of your entries. An asterisk to the far right indicates there is a parameter that has changed from the currently-stored value. Your entries will be accepted and held; then, as you are exiting this programming mode, you are given the opportunity to Save or Cancel your new changes. If you do not Save your settings at this time, your new changes will be discarded.

Note

Front panel changes are not written to the Compact Flash memory until the sysadmin uses the command-line 'save' command. Therefore, do NOT turn the system power off or these changes will be lost.

4.3.1.1 Start Front Panel Edit Mode

To start the Edit mode, press the Up or Down Arrow button on the front panel. The display will change from the default Domain Name / Date & Time to the Edit Mode. This mode will time out after 30 seconds, and revert to the normal display.

Figure 4.4 *SCS Front Panel Display, showing first Edit Mode display*

You can scroll through the Edit functions (plus the normal display) that are available by pressing the Up or Down arrows:

- Program Network Settings
- View SCS Settings

Note

If you do not press any buttons, the display will revert to the normal display in approximately 30 seconds, and no changes will be made.

Stop scrolling when you reach the Program Network Settings display.

4.3.1.2 Program Network

When you select the Program Network Settings mode, you step through the parameter entry for Network IP Address, Net Mask and Gateway, and Exit to the previous menu. The Up and Down arrows are used to scroll through the available options.

Network IP Address

Figure 4.2 *SCS Front Panel Display, for Network Programming mode*

Press the Enter button to continue.

Figure 4.3 *SCS Front Panel Display, showing the current IP Address*

The current IP Address will be displayed, shown with leading zeroes. The factory default is 10.9.8.7. If you do nothing, the display will revert to the previous display after 30 seconds, and no changes will be made.

Let's change the IP Address. Press the Enter button to continue.

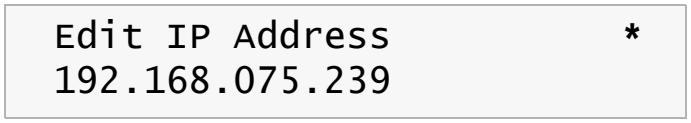
Figure 4.4 *SCS Front Panel Display, showing Edit IP Address*

A cursor appears under the first character of the existing address. Press the Left or Right arrow button to move the cursor to the first digit to be changed. To change a digit, use the Up or Down arrows.

> **Note**
> Ignore any leading zeroes in the display entry. The SCS will adjust for them and will not store the leading zeroes when saving the data.

As soon as you change a digit, an asterisk (*) will appear to the right on the top line, indicating that a parameter has changed.

Figure 4.5 *SCS Front Panel Display, Asterisk indicating a change*



When you have the complete parameter value as it should be, press the Enter button to complete the entry.

The display will show the following:

Figure 4.6 *SCS Front Panel Display, after editing the IP Address*

Your new value will be stored when you are finished setting all the Network parameters.

Net Mask

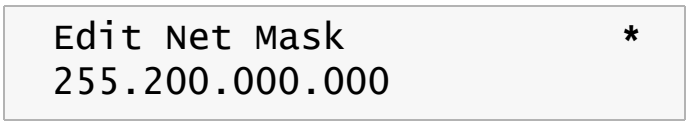
Press the Down Arrow once to advance to the Net Mask parameter.

Figure 4.7 *SCS Front Panel Display, showing the current Net Mask*

Press the Enter button to change the Net Mask parameter. The current Net Mask setting will be displayed, with a cursor under the first digit. The factory default is 255.0.0.0.

Press the Left or Right arrow button to move the cursor to the first digit to be changed. To change a digit, use the Up or Down arrows.

Figure 4.8 *SCS Front Panel Display, editing the Net Mask setting*



As soon as you change a digit, an asterisk (*) will appear to the right on the top line, indicating that a parameter has changed. Change the Net Mask as desired.

Note

Ignore any leading zeroes in the display entry. The SCS will adjust for them and will not store the leading zeroes when saving the data.

When you have the complete parameter value as it should be, press the Enter button to complete the entry. The display will show the following:

Figure 4.9 *SCS Front Panel Display, showing the new Net Mask display*

Your new value will be stored when you are finished setting all the Network parameters.

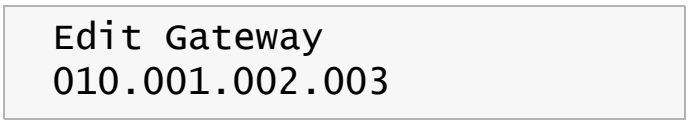
Gateway

Now, enter your Gateway parameter information. Press the Down arrow once to continue.

Figure 4.10 *SCS Front Panel Display, showing the current Gateway setting*

Press the Enter button to edit the Gateway parameter. The current Gateway setting will be displayed, with a cursor under the first digit.

Figure 4.11 *SCS Front Panel Display, Edit the Gateway setting*

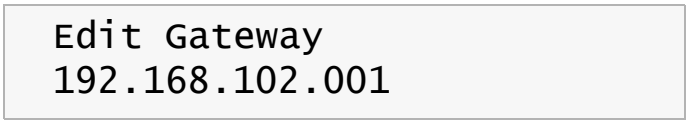


Press the Left or Right arrow button to move the cursor to the first digit to be changed. To change a digit, use the Up or Down arrows to change the number. As soon as you change a digit, an asterisk (*) will appear to the right on the top line, indicating that a parameter has changed.

Note

Ignore any leading zeroes in the display entry. The SCS will adjust for them and will not store the leading zeroes when saving the data.

Figure 4.12 *SCS Front Panel Display, editing the Gateway setting*



When you have the complete parameter value as it should be, press the Enter button to complete the entry. The display will show the following:

Figure 4.13 *SCS Front Panel Display, showing new Gateway setting*

Your new value will be stored when you are finished setting all the Network parameters.

Exit to Main Menu

You are now prompted to Exit to the Main Menu. Press Enter to continue.

Figure 4.14 *SCS Front Panel Display, exiting the LCD Mode*

```
Exit to Main Menu
```

You are given the choice to Save your changes or to Cancel them.

Figure 4.15 *SCS Front Panel Display, Save or Cancel Changes*

```
Enter = Save
Cancel = UP
```

Press Enter to save your network changes, or press the Up arrow to discard them.When you are done with your network settings, and have made changes, the system must restart the network daemon. Progress of this process will be displayed on the front panel display, and you will see a normal display when the network is restored.

Figure 4.16 *SCS Front Panel Display - Saving and Restarting*

```
Saving and Restarting
Network Services
```

When the system is done restarting the network services, the display will show:

Figure 4.17 *Returned to normal SCS Front Panel Display*

```
Save / Reset Complete
Any Key to Continue
```

To permanently save your new Network settings in the system, you must use the "SAVE" command (described later) to write the values to the Compact Flash memory.

Note that if your system loses power before you use the command-line"SAVE" command, your front-panel-entered network parameters changes will be lost.

4.4 Initial Connection via Network

You can access the SCS using `ssh` commands with your existing network. If you add a route to your workstation, you can connect to the SCS via its default address. For security reasons, a telnet server is not active on the SCS.

4.4.1 Network Connection Requirements

- Have your SCS system connected to your network, and turn it on.
- Know your computer's IP address.

4.4.2 Route via Linux workstation

If using a Windows workstation, go to the next section.

If you are accessing the network from your Linux / Unix workstation, enter:

```
route add -net 10.9.8.7 netmask 255.255.255.255 gw <your work-
station's IP address>.
```

Now, from your command line, to access the SCS system using ssh, enter:

```
ssh root@10.9.8.7
```

```
Default root password is root.
```

You should be at the SCS's root command prompt now.

You should change your SCS's network address as one of the first changes you make. See *Section 7.2, Change Network Address,* on page 59.

4.4.3 Route via Windows workstation

If using a Linux workstation, ignore this section.

If using Windows 9x/2000/XP, you can connect to the SCS using your networked Windows PC and an ssh-capable terminal emulation package.

Note

If you don't have an ssh-capable terminal package, try using PuTTY, a freely-distributed package you can download at http://www.chiark.greenend.org.uk/~sgtatham/putty/.

If you use a Windows PC to login to the SCS, do the following:

1. Determine your PC's IP network address.
   One method: open a DOS prompt window and type `ipconfig`, and press "Enter". Your PC's IP address is listed, among other things.
2. Add the route between the PC and the SCS.

From a DOS prompt, enter:

```
route add 10.9.8.7 mask 255.255.255.255 <workstation's IP
address> [press "Enter"]
```

3. Ping the SCS to assure that your network connection is now functioning.

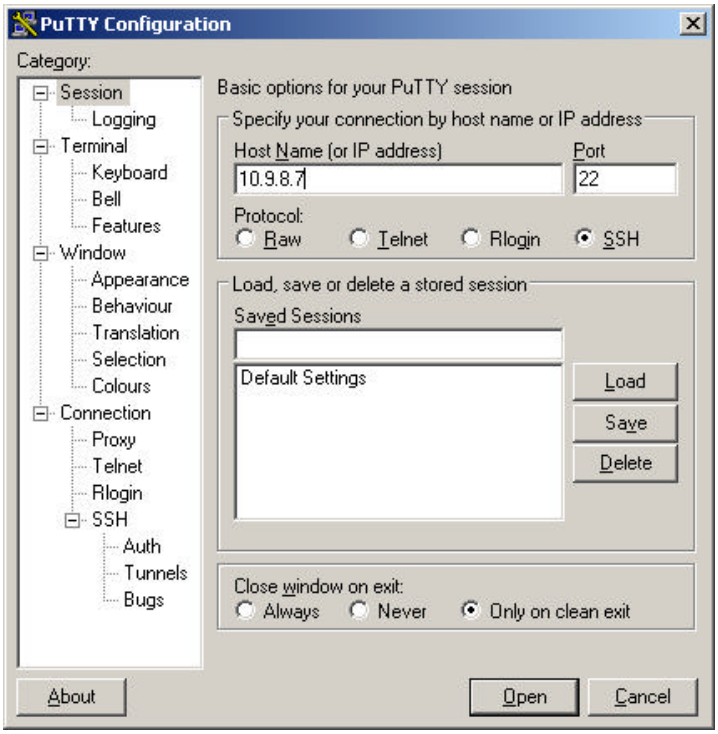
Verify that this route now functions by typing `ping 10.9.8.7` at the DOS prompt, and pressing Enter. Review the results for a positive response.

4. Connect to the SCS using your terminal package, using ssh.

Launch your terminal package, and connect to the default IP address of the SCS of `10.9.8.7` using ssh.

If using PuTTY (shown below), set the Session window IP address to 10.9.8.7, select the ssh radio button, and press "Open".

Figure 4.18 *PuTTY Configuration Screen*



The first time you connect using ssh, you will get a warning about the ssh authentication keys. Accept the newly-generated keys by choosing “yes”.

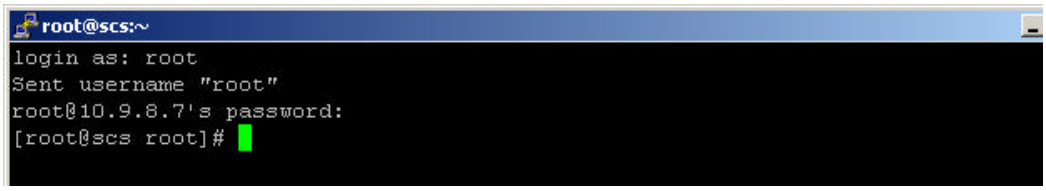
5. Login to the SCS

When connected to the SCS, the “`login as:`” prompt will appear. You want to log in as “`root`”. Press “Enter” to continue.

The “`password:`” prompt comes up next. Enter “`root`” (the default root password) and press “Enter”.

You should be at the SCS’s root command prompt after pressing the `Enter` key. In our case, we connected using PuTTY to ssh into 10.9.8.7:

Figure 4.19 *Terminal screen, showing a typical root login to SCS*



When successfully logged in, you will see the command prompt ending with # followed by your cursor.

You should change your SCS’s network address as one of the first changes you make. See *Section 7.2, Change Network Address,* on page 59.

4.5 Initial Connection via Console port

See *Section 3.2.4, Connect your Console,* on page 28.

4.6 How to Access the LSI SCS Web Setup Interface

Be sure to add the proper route statement to your workstation (see above).

From your browser, type: https://10.9.8.7:8098/

(A predefined SSl certificate will be used. Your browser may warn you that the certificate does not match the host. You may continue using this certificate, but you should create a new certificate after setting up the SCS. Refer to the file /usr/local/doc/ssl.cert.README for more information about creating certificates).

Press `Start`.

Enter `root` as the user name and `root` as the password.

The main configuration menu is now displayed. Make the changes you require; help is available for each page.

When all your changes are made, select Control Panel from the Main Menu, and then select Shutdown/Reboot. Reboot the SCS and all your changes will be in effect.

This interface is for setup only, it can not be used to access the device ports.

To disable the web interface, see the instructions located in /lsi/README.

5 System Overview

5.1 SCS Systems are Linux-based

The Logical Solutions Secure Console Server products use the GNU/Linux operating system.

5.1.1 Linux General Public License

The GNU/Linux source code used in this product has been distributed under a General Public License (GPL) from the Free Software Foundation. You may read about the GNU GPL by reviewing the text version of the GPL, which can be found at http://www.gnu.org/licenses/gpl.txt.

You will find additional GNU license information online at http://www.gnu.org/licenses/licenses.html#GPL.

Please contact Logical Solutions Product Support, should you need to obtain a copy of this source code.

5.1.2 Understanding Linux

Each SCS system is a “Linux box”, meaning you will use Linux commands to administer it. We assume a certain level of Linux understanding from our audience. If you do not know your way around Linux, you may have some difficulties and might want to get some Linux help. This document is not meant to teach you about Linux or the other applications and features available since this system is running Linux. Those that use this type of system and know Linux should have no trouble configuring the SCS.

5.1.3 SCS System Architecture

The SCS software design uses both RAM (volatile) and Compact Flash (non-volatile) memory. All system changes are maintained in RAM until they are written to the Compact Flash memory. A read-only memory system is used since Compact Flash memory devices have a limited number of read-write cycles.

After making administrative changes to the system, the root user must run the `save` command to write the changes to the non-volatile memory. If the data changes are not saved, the parameter changes will be lost in the event of a power failure.

5.2 Initial Sysadmin Access

When the SCS is first powered up, you may need to configure it to operate with your network. You will use `ssh` to access the SCS or the local console (*Section 4.5, Initial Connection via Console port,* on page 48).

The SCS product uses familiar Linux commands to administer the system. This manual will list those Linux commands that are important for the SCS sysadmin to know; other Linux / UNIX commands are discussed in a myriad of Linux reference and training manuals.

5.2.1 Enter Commands

The system administrator enters Linux commands using the command-line interface. Unless otherwise shown, commands are all lower-case and may have modifiers. SCS commands are discussed in *Section 6, Commands,* beginning on page 54.

5.2.2 Log Out

To log out from a session, use the command `logout`. If logging out from a network session, the Console Server will disconnect the `ssh` session.

5.3 Default Services

The following Services are enabled by default:

- network
- ssh
- syslog
- cron

You may add other features and services, depending on your application. When you first log into the system, you will get a reminder message for configuration:

Figure 5.1 *SCS login advice (displayed on-screen when you first log in)*

```
To customize the SCS configuration for your location,
we suggest you do the following:

* CHANGE THE ROOT PASSWORD!!!
* reconfigure the network   (netconfig)
* set the timezone, if not in the Eastern U.S.  (timeconfig)
* add users    (adduser)
* edit the ntp.conf file and then enable the ntpd service

For extra security:

* edit the sshd_config file to not allow root logins

* when all settings are changed, reboot the system to save any
changes
```

5.3.1 Configure the Services

When you first install the SCS system, you should configure the default services for your needs. This addresses the network, the date/time, authorizations, and the system hostname. The feature commands described below are discussed in *Section 7, System Administration,* beginning on page 59.

In order to properly configure the basic services, you must:

1. run all of some of the following: (`netconfig, changehostname, timeconfig, authconfig`).
2. run `save`
3. run `service network restart` to restart the network.

To configure the existing features, use the following commands:

For the Network parameters, use `netconfig`

To change the host and domain name, use `changehostname`

For the Date/Time, use `timeconfig`

(To change timezone)

For the authentication protocols, use `authconfig`

(This may not be necessary)

6 Commands

A summary of special SCS Commands

6.1 System Commands

The SCS products use Linux commands, and `man` pages are available for all system commands. The root user can access the following commands to configure the special features of the SCS:

COMMAND	PURPOSE	CH.
`adduser`	Add a User (creates a new user account)	8
`deluser`	Delete a User account	8
`editbrk`	Edit the 'break' sequence	8
`editesc`	Edit Interactive mode 'escape' sequence	8
`edituser`	Edit user settings for existing User accounts	8
`save`	Commit your programming changes to non-volatile memory	6
`stty`	Configure Port parameters (see Linux commands)	6
`versions`	Show version information	6

The commands are discussed in the Chapter numbers noted.

6.2 save

The SCS systems will maintain your settings in RAM memory as long as system power is applied and the system remains in a normal operating condition. To permanently store your parameters, the system has a `save` command. In order to prevent the inadvertent loss of your precious data due to power failure, the root user must use the `save` command to write the data changes to the non-volatile Compact Flash memory card. This will ensure your data is maintained as desired.

The `save` command does not store buffered port data, which is held in RAM.

Note

The root user should run `save` any time that the system configuration has been changed. This includes user password changes and any command-line system administration changes

The `save` command is automatically run when you execute the `reboot` or the `poweroff` commands. It will copy files located in /etc, /home, /usr, and /root to the CF and restore them when the system is restarted.

6.3 reboot

The `reboot` command may be run at any time. The `save` command is run as a part of the reboot process. Reboot occurs immediately after your data has been saved. After the reboot has properly run the underlying commands, the system will 'reset' and then begin the start up process, as if you had just turned the power on.

Note

No 'break' commands will be sent on the serial Ports during a SCS system reboot. Your servers will not be adversely affected.

The Logical Solutions SCS systems are "break-safe", meaning that they will not send a 'break' command (unless user initiated) or other data on the serial ports connected to your servers. A 'break' might cause problems with your server.

A `reboot` takes a short period of time, a minute or so, to complete.

6.4 poweroff

If you want to turn the SCS off (e.g., to move the chassis, etc.) you must first run the `poweroff` command before turning off the power.

> **Note**
> No 'break' commands will be sent on the serial Ports during a SCS system poweroff cycle. Your servers will not be adversely affected.

`poweroff` may be run at any time. The `save` command is run as part of the `poweroff` process. Once you have entered the `poweroff` command, the operating system will properly shut down and the SCS will cease operating (almost immediately), and the front panel display will show "`OK to Power Off`" when it has completed the underlying commands. You may then safely turn the power switch off.

The only way to recover from a `poweroff` command is to turn the system power off and then turn the power back on.

6.5 Other Linux Commands

The following Linux commands, among others, will be used with the SCS systems.

logout

Use `logout` to quit your session with the system.

man

Use `man <command name>` to search for a help file (online manual pages) or descriptive information for that Linux / UNIX command.

Three general `man` pages are available for the Logical Solutions, Inc. commands and files. They are:

1. lsi.1 for user commands
2. lsi.8 for system commands
3. lsi.5 for Logical Solutions, Inc. file descriptions

passwd

The default root password should be changed by the root user, as soon as possible to prevent access by anyone other than authorized personnel. To change the default root password, type `passwd` (all lower case) at the root login prompt.

scp

Use `scp` for secure copy, using ssh, between two hosts. The process is encrypted and inherently secure.

Refer to the `man` pages for `scp` for a description and any command options.

sftp

Use `sftp` for a secure file transfer transaction between two servers using ssh. This process is similar to `ftp` except that it is encrypted for security.

Refer to the `man` pages for `sftp` for a description and any command options.

ssh

The SCS systems use `ssh` to establish secure connections over your network.

The configuration file for the ssh server is `/etc/ssh/sshd_config`. This controls ssh connections to the SCS.

You use `ssh` to establish a secure connection between two hosts, or to transfer files or data between the systems. The Secure Console Server is a client device, and will be connected to an ssh host elsewhere. The security keys for ssh may need to be generated using ssh-keygen, depending on your application of ssh.

Refer to the `man` pages for `ssh` for a description and any command options.

ssh-keygen

Use `ssh-keygen` to create keys for users so passwords do not have to be used for ssh login. You can generate the security keys for your client system (in this case, the SCS is the client) to interact with an ssh host elsewhere. After the keys have been generated, the user can establish a secure shell connection using ssh over a network.

Refer to the `man` pages for `ssh` for a description and any command options.

stty

Use `stty` to change the configuration for each Port. The system provides a default configuration for the system Ports (`ttyB1` through `ttyB48`), and for the console port (`ttyS0`).

Note

Port changes made using `stty` are temporary (not written to memory). In order to keep any changes, you must edit the configuration file in `/etc/rc.d/rc.serial` and then run "`save`".

The Ports are identified as `/dev/ttyB1` through `/dev/ttyB48` for ports 1 through 48, respectively, and `/dev/ttyS0` for the console port.

Note

For example, to administer Port 7 you would edit the file `rc.serial` and would use `stty -F /dev/ttyB7`.

Refer to the `man` pages for `stty` for a description and any command options.

versions

Use `versions` to see a listing of the release versions of the LSI files in the SCS.

6.6 Change Logging Level

The sysadmin may wish to change the logging level of syslog.

1. Login as `root`
2. Edit the file `/etc/syslog.conf` (`vi /etc/syslog.conf`)
3. Restart the system logger by entering: `service syslog restart`
4. Run `save`.

7 System Administration

This section outlines the administration functions and commands, accessed using your network or the console port.

7.1 Security

The Logical Solutions Secure Console Servers use ssh to provide encryption for a secure network connection. There is only one level of system administration access in the SCS, and that is at the root level.

Caution

Anyone with the root password has the ability to access all SCS features and functions. Your root password should be carefully guarded.

Users do not have the ability to interact with the system-level features. Users that are granted permission to interact with a Port can access the Buffers and may also clear the buffered data.

7.2 Change Network Address

You may use the Front Panel setup (see *Section 4.3, Front Panel Network Setup,* beginning on page 39) to configure the SCS's IP address. This will temporarily change the IP address to allow you to connect to the SCS. Front panel changes are temporary in that there is no way to write the new parameters to non-volatile memory using just the front panel keys.

You must run `netconfig` once you have accessed the SCS to change all of the network parameter options, and then save the parameters to non-volatile memory.

7.2.1 Run netconfig

After you establish a connection to the SCS (either through your console port or via ssh using the default address of 10.9.8.7), you may need to change the IP address setting of the SCS to the desired address on your network, using `netconfig`.

The `netconfig` command is a self-prompting program to set up your system's network information. It supports DHCP/BOOTP setup, or static addressing.

Use the space bar to select / deselect a value (e.g., DHCP). Use the arrow keys to move up and down between the entry fields.

Note

Use of a static IP address is recommended with the SCS.

You will need the following information before running `netconfig`:

- Using BOOTP/DHCP (yes/no)? If No, you need the following:
  - IP Address
  - Net Mask
  - Default Gateway
  - Primary Nameserver

You can add the secondary and tertiary nameservers (if required) by editing your `resolv.conf` file at a later time. After entering the requested information, you are returned to the root prompt. See *Section 7.2.2: More Than One Nameserver*.

7.2.1.1 Save your netconfig changes

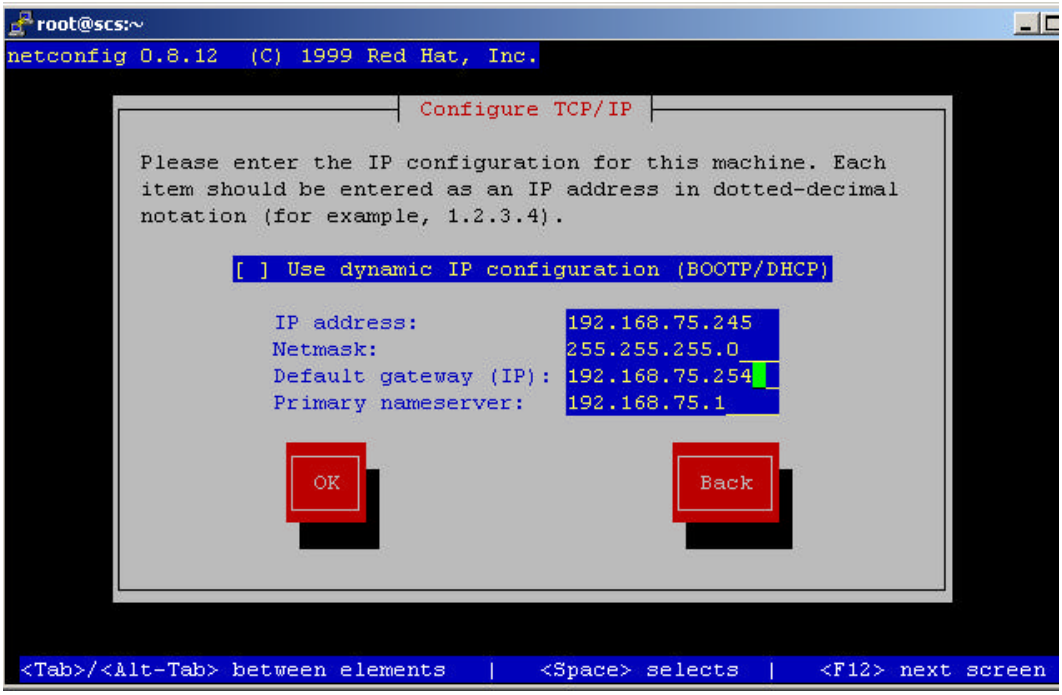
After running `netconfig` to set up your system as desired, you run the `save` command to keep your changes, and then restart the network using the following steps:

1. Make all changes
2. Run `save`
3. Run `service network restart` to restart the network
4. Make a new ssh connection.

Note

If you are making several changes to the system configuration, you may wait until all the changes are made and then run `save`.

Figure 7.1 *Example of* `netconfig` *fill-in fields*



When you have filled in the fields, arrow down to the OK button and press Enter to accept your entries.

7.2.2 More Than One Nameserver

The `netconfig` command allows the user to set up one nameserver's IP address.
It is possible to have multiple nameservers, which must be done outside of the `netconfig` command. The nameserver data is in the file `/etc/resolv.conf`.

If you want to have more than one nameserver, you must edit the file `/etc/resolv.conf`. For more information, refer to the `man` page for `resolv.conf`.

In this file, you will find the IP address you entered with `netconfig`. You can add more lines (a maximum of 3 nameservers is allowed) to this file with the address of additional nameservers.

The format of a line is: `nameserver <IP address>`.

7.3 Change Hostname

The SCS includes a command `changehostname` which allows the root user to change the long hostname of the SCS unit.

1. Log in as root.
2. Type `changehostname`. The current hostname is displayed, and you are prompted to choose `y/n` to proceed.
3. If you select `y` to change, you are prompted to enter the new hostname.

> **Note**
>
> If you make a mistake in your entry, simply continue (do not attempt to edit); you can reject your bad entry and re-enter the value properly.

4. Enter your new hostname value. Press "`y`" to accept the new value.
5. Remember to run `save` when done to keep your new values.
6. After changing the hostname and/or clock settings, the SCS should be rebooted to make changes permanent. These two settings (clock and hostname) are only saved during an orderly shutdown; a loss of power before a reboot will restore the old values.

7.4 Time Configuration

Use the command `timeconfig` to set up the date/time and time coordinates. This is a self-prompting utility. Remember to run `save` when done to keep your values. After changing clock settings, the SCS should be rebooted to make changes permanent.

> **Note**
>
> If changing the Time Zone (during `timeconfig` changes) it is necessary to restart the lcd display service in order for the front panel display to update. This is done by using the command `service lcd restart` after completing the timeconfig options.

7.5 Change NIC Speed

You can change the NIC interface configuration from auto-sensing to be fixed, for full or half duplex, and 10Mbit or 100Mbit. The following file information is found in the file `/etc/modules.conf`, but with some additional instructions added as to how to set the NIC speed.

This file already has the various commands in place, but they are commented out. Edit your `/etc/modules.conf` as appropriate. Remove the '#' from one of the four options lines above, and then reload the NIC driver.

```
alias eth0 eepro100
alias char-major-72 exser
alias char-major-4  off
options -k exser
##
## options to control NIC speed and mode
## remove the leading '#' from ONE of the options lines below
##
### 100Mbit half-duplex
#options eepro100 options=0x20, 0x30
### 10Mbit half-duplex
#options eepro100 options=0x40, 0x50
```

The SCS system should be power cycled (using poweroff, not reboot). The power-off is done to convince whatever switch the NIC is connected to, that it is indeed off.

> **Note**
>
> In the SCS-R and Sentinel 32 Models, these changes affect **BOTH** network ports. It is not possible to only change one of the network ports.

7.6 Configure Authentications

Use `authconfig` to set up the authentication protocols. You may only need to run this if you need remote authentication such as NIS, LDAP, Kerberos, etc.

The first checkbox, `cache information`, will start the `nscd` daemon if selected. Refer to the `man` page `nscd` for configuration options. This is not required for normal operation and need not be selected.

Other aspects of the authentication options in `authconfig` are self-prompting for parameters for NIS, LDAP and/or Hesiod.

Remember to run `save` when done to keep your new values.

7.7 Front Panel Display Options

The front panel display is a two line, 24 character backlit LCD. It shows system messages during certain system events (e.g., `network restart, poweroff`), but most of the time is idle and shows a "normal" display.

The LCD Display offers several "normal' display features. The default display shows the Hostname on the top line, and the Date/Time on the lower line. The display can be customized, if desired, to show other information in the top line or the bottom line, or both. This might be useful to provide a method of labeling each SCS in a rack with multiple units installed. The normal display can also be turned off.

Figure 7.2 *Default 'Normal' Front Panel Display,*

```
scs.localdomain
Tue Mar 18 15:53:03 2003
```

The front panel will display system messages (e.g., during `reboot` or `save` events) but will return to the 'normal' display after these events are done.

Note

The Edit mode can be disabled, and the front panel display's normal display can also be changed.

The default setting allows the editing of the IP address information using the front panel buttons. This can be disabled to prevent unauthorized changes.

7.7.1 Display Mode Parameters

The various LCD Display modes are controlled by the entries maintained in the file `/etc/sysconfig/lsi` :

```
LCD_LINE_1=
LCD_LINE_2=
LCD_DISPLAY_SETTING=
```

- LCD_LINE_1= and LCD_LINE_2= allows text entry of up to 24 characters to be displayed.
- LCD_DISPLAY_SETTING= can be set to EDIT (default), VIEW, or OFF.

7.7.1.1 Edit

The Edit mode (LCD_DISPLAY=EDIT) allows the front panel display to show the current display information normally, and allows anyone to use the front panel display to change the network parameters (IP Address, Net Mask, and Gateway).

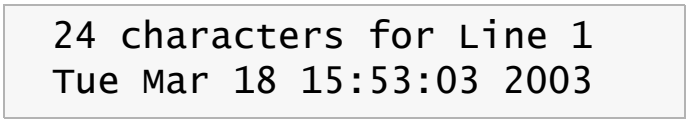
7.7.1.2 View

The View mode (LCD_DISPLAY=VIEW) allows the front panel display to show the current information, but disables the editing using the front panel buttons. This prohibits unauthorized changes to your network settings from the front panel.

7.7.1.3 LINE_1

LINE_1= info allows the customer to show any data they choose on the upper line of the display. The root user enters a left-justified text line, up to 24 characters, which will be displayed. The upper line of the display is otherwise the SCS's Hostname.

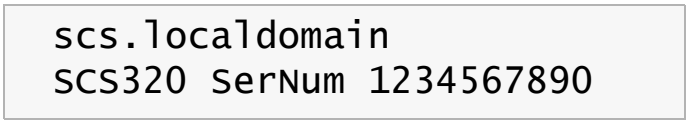
Figure 7.3 *LINE_1 Changed in SCS Front Panel Display,*



7.7.1.4 LINE_2

LINE_2= info allows the customer to show any data they choose on the lower line of the display. The root user enters a left-justified text line, up to 24 characters, which will be displayed. The lower line of the display is normally a clock/date display.

Figure 7.4 *LINE_2 Changed in SCS Front Panel Display*



7.7.1.5 Display OFF

The Off mode (LCD_DISPLAY=OFF) disables the front panel LCD display during normal mode. The backlighting will remain on, but the display is blank.

7.8 Network Time Service

Network Time Service is supported. To use the network time service, you must edit two files (`/etc/ntp.conf` and `/etc/ntp/step-tickers`) and start the `ntpd` service.

Note

More information is available at www.ntp.org

7.8.1 Configure NTP

The file `/etc/ntp.conf` has many options. We want to define the time servers to use. You need the hostname (or IP address) of the time servers you wish to access. Using your editor, edit the file and add the line:

```
server <my time server name or IP address>
```

to the end of the file.

For example, let's use the name `ts1.mydomain`. Your entry is

```
server ts1.mydomain
```

You need the hostname (or IP address) of the time servers you wish to access.

You should also add the server names to the file `/etc/ntp/step-tickers`. This file just needs the name of the time servers (the word 'server' as used in the file `/etc/ntp.conf` is not needed)

7.8.2 Start the NTP Service

To start the NTP service manually:

```
service ntpd start
```

To cause NTP to start automatically during startup:

```
chkconfig ntpd on
```

7.9 NIS and User Port Permissions

The SCS can use NIS to control user access to the Ports in addition to controlling user access to the SCS itself. This is an extension to the normal NIS capabilities. Some of the NIS files must be installed on your NIS server. The user must create/modify their NIS database to include records containing user port permissions.

Note

Source documents, including this information, are stored on the SCS system.
NIS information is located in `/usr/local/doc/nis`.

7.9.1 User Port Control

The SCS can use NIS to control which user can access a port on the SCS. To utilize this feature, a database must be created on the NIS server. The following files are needed to set up the port access database:

`lsi_port_access`	Port Access Permission Definition file
`lsi_port_user`	Port Access User Definition file
`lsi_port_awk`	Port Access AWK file (required for the Make file)
`Makefilenis.portAccess`	Make file used to build the LSI database

7.9.2 NIS Port Access

The file `lsi_port_access` contains the port permissions for connect, monitor and clear. It is referenced by a group; you may define any number of groups you need. The following example will illustrate how the group file is constructed.

```
group name : console server name : connect perm : monitor perm : clear perm
```

where:

group name	is the name of the user's group
console server name	is the SCS's hostname
connect perm	port that a group can connect with
monitor perm	ports that a group can monitor
clear perm	ports that a group are allowed to clear

For example:

```
pbxgrp : tvscs320 : 1,2-6,13 : 5-9 : 1,7
itgrp : tvscs160 : 8-16 : 7 : 1,3,5,7-11
```

The above example shows two groups (`pbxgrp` and `itgrp`) that are allowed to access port on a Secure Console Server.

The first group, pbxgrp, can access an SCS with the hostname of tvscs320. The group can connect to ports 1,2,3,4,5,6 and 13. It can monitor ports 5,6,7,8 and 9. This group is allowed to clear ports 1,2,3,4,5,6 and 7.

The second group, itgrp, can access the SCS with a hostname of tvscs160. This group can connect to ports 8,9,10,11,12,13,14, 15 and 16. It can monitor port 7, and can clear ports 1,3,5,7,8,9,10 and 11.

```
# LSI Port Access Permission file...
# Port Access Permission for the user defined group name(s) are defined below
# Permissions can be any or all of the forms:
# - decimal value
# - decimal range using a dash (-) as the range indicator
# - a comma (,) is used to separate digits and/or ranges
# - a colon (:) is used as the field separator.
#
# group name : console server name : connect perm : monitor perm : clear perm

user_group1 : scs160_milford : 1-16 : 1-3,5,8,16 : 0
user_group2 : scs320_boston : 1-6 : 12,15 : 3-7
```

7.9.3 User Names and Groups

The LSI Port User Definition file (`/nis/lsi_port_users`) is used to assign a user to a given Port Access group. This file information is found in `/usr/local/doc/nis`.

The following example will illustrate how it is set up.

```
user name : group name
```

where

user name	a valid SCS user
group name	a valid user's group

Example:

```
tomv : pbxgrp
billf : itgrp
```

The above example shows two users, tomv and billf. User tomv is in the group pbxgrp and billf is in the group itgrp. When used with the lsi_port_access file, it illustrates how tomv can log into tvscs320 and be able to connect, monitor and clear the ports that were set up in the previous example. The same goes for billf.

```
# LSI Port Access User definition file...
# Port Access user and their respective 'port access group name is defined
# below.
# Users must be valid system usernames.
# Group names are those defined in the "lsi_port_access" file.
#
# user_name : group_name

lsiuser1 : user_group1
lsiuser2 : user_group1
lsiuser3 : user_group2
lsiuser4 : user_group2
```

Group Permissions

A user may not get access to a port, depending on their group permissions. Only members of the scsusers group (group id of 701) may access SCS ports. Only members of the monitor group (group id of 702) may access SCS monitor ports.

7.9.4 NIS Database file

The `lsi_port_awk` file is used to create the lsi database file (`lsiportdbase`) on the NIS server. It contains the awk code that the Make file needs.

7.9.5 NIS Make file

The file `Makefile.nis.portAccess` is used to create the lsi port database.

To build the database, the above files (listed in *Section 7.9, NIS and User Port Permissions,* on page 67) need to be loaded on the NIS server. The system has been tested on a linux machine running RedHat 8.0. The files were placed in the `/var/yp` directory. After the make file executed, the lsi database file was placed in the NIS host directory.

7.9.6 NIS Configuration File

The NIS configuration file (located at `/etc/nsswitch.conf`) must be edited by the user to support your NIS server. To do this:

1. Open the file `/etc/nsswitch.conf` using your editor.
2. Edit (add or modify) a line to your config file that supports local files for local users, and if not assigned locally, refers to the NIS database. The line should read:

```
port_access : files nis
```

3. Save your updated `nsswitch.conf` file.

7.10 NFS

NFS information can be obtained from the `man` pages. Refer to the following `man` pages: `nfs`, `mount`, `fstab`.

This section is an overview of setup information for an NFS application, as it pertains to the SCS.

7.10.1 Remote NFS Directory

To mount a remote directory onto the SCS, you must start the `portmap` service and the `netfs` service.

To manually start these services (`portmap` and `netfs`):

```
service portmap start
service netfs start
```

You may have these services start automatically at power On. To do so, enter the commands:

```
chkconfig portmap on
chkconfig netfs on
```

Determine which local directory name you will use to refer to the remote directory. The standard name used is /mnt. If you need more than one remote directory mounted, then create the additional directories under the /mnt directory (e.g., /mnt/dir1, /mnt/dir2, /mnt/dir3...).

To test the mounting, enter the following:

```
mount -t nfs <remote server name>:<remote directory name>
  <local directory name>
  Example: mount -t nfs nyc:/usr/local/cvs /mnt/dir2
```

Note

To have this mount occur at startup, you must edit the file /etc/fstab. See the man pages above for details.

Here is a sample entry:

```
nyc:/isr/local/cvs  /mnt/dir2  nfs  hard,intr
```

7.11 SNMP

SNMP is supported in the SCS. SNMP as "read only". Refer to the man pages for SNMP for more details.

7.11.1 Start SNMP

SNMP is started with the command service snmpd start

```
chkconfig snmpd on
```

7.12 syslog

Using default settings, the SCS will log all warnings and higher events. The SCS keeps a system log file called /var/log/messages. The level of logging is controlled by the file /etc/syslog.conf.

The SCS products can log the following:

- Notice level events:
  - port settings changed
  - begin and end Interactive mode
  - port buffer cleared

- Info level events:
  - user settings modified
  - Port buffer accessed

The default file entry is `*.notice`, with lower level settings (a lower level generates more messages) in `*.info`.

7.13 Timeouts

The SCS system supports timeout on the network port. Refer to the `man` page for `timeout` options.

Use the commands `timeoutd` and `timeouts`.

7.14 Changing Serial Port settings

Use `stty` to change things like the port name, baud rate, hard/soft flow control. Note that these changes are temporary, and will but lost on the next reboot. To make the changes permanent, the file `/etc/rc.d/rc.serial` must be edited. This file contains a list of `stty` commands (one for each port).

7.14.1 Disable buffering while in Interactive

It may be desirable for security reasons to not store data in the Port buffer while in Interactive mode. Normally, all data from the serial device is stored in the buffer and can be viewed at a later time.

To disable buffering (only while the Interactive mode is in progress), use the following command:

```
stty -F /dev/ttyBn -buffer
```

8 Administering Users

The following commands are used to change settings for Users. You can define as many Users as you wish, up to the memory capacity of the system. The limiting factor when it comes to Users is not the number of users but the number of simultaneous sessions invoked by any number of users (250 sessions maximum).

8.1 User Setup

Each user account must have a unique name, and each has its own password. Each User account has the following parameters:

Parameter	Constraints
name	A unique user name made up of contiguous characters; it cannot be renamed. This name will be displayed at the command prompt when a user has logged in.
password	Linux password for this user account.
port range or port group (used below)	Default is set to access all ports in the SCS chassis (1-16, 1-32 or 1-48). Ports can be assigned individually (1), in a contiguous range (2-7), in random ports (3,6,9,15) or any combination of the above (1,4-7,12,15-16) of valid port numbers for that chassis.
ESCAPE_SEQ	Escape sequence. Default is “Esc-A”. Displayed in ASCII (x1bA)
BREAK_SEQ	Break sequence. Default is “Esc-B”. Displayed in ASCII (x1bB)
ALLOW_CLEAR	Range or group of Ports for which this User account can Clear the Port Buffers.
ALLOW_CONNECT	Range or group of Ports to which this User account can connect
ALLOW_MONITOR	Range or group of Ports which the User can monitor

There are three permissions in the user config files:

ALLOW_CONNECT

User can enter Interactive mode (file name is /dev/ttyBnnn). In order to browse a buffer, a user must have connect permissions on that port.

ALLOW_MONITOR

A user can watch a port (file name is /dev/monitor_portnnn, must be opened in Read-Only mode)

ALLOW_CLEAR

A user can clear a buffer (file name is /proc/port_buffers/nnn)

8.1.1 adduser

SCS Users are identified by a name. The `adduser` command is used to create a new user account. The user's name, password, and port access configurations are set, along with the `escape` and `break` command keystrokes. After a user has been added, this user can log into the system from a network or console port connection.

8.1.2 edituser

The `edituser` command is used to change the parameters for an existing user. The user name cannot be edited using `edituser`; in order to modify a user's name, you must generate a new user account and enter the appropriate assignments. You should then delete the original user account.

8.1.3 deluser

The `deluser` command is used to delete an existing user account.

Note

The following command modifiers (options) apply to the `adduser` and `edituser` commands.

8.1.4 Other Editing Commands

The following commands may be entered to change the following parameters. The root user may change the preset values for these parameters, and a User may also use this command to change the parameter for the Port to which he/she is connected.

8.1.4.1 editbrk <name>

Use `editbrk <name>` to edit the `break` sequence for a user. The `break` sequence (user key strokes, default is 'ESC - B') is presented in its ASCII form.

8.1.4.2 editesc <name>

Use `editesc <name>` to edit the `escape` sequence for a user. The `escape` sequence (user key strokes, default is 'ESC - A') is presented in its ASCII form.

9 User Operations

Commands that End Users need to connect to their Servers through the SCS

9.1 User Accounts

The SCS has two types of user accounts: user and root.

The SCS supports multiple user accounts, each having a unique combination of read, write and review privileges for each of the Ports. Each defined user may or may not have the ability to interact with any of the attached servers, in any possible combination. Each user account is password protected.

9.1.1 SCS users

SCS users are individuals that must connect with any or all of the attached networking devices, for service, support or access needs. There can be many users defined, many more than would normally be required. Each user, when connecting to the system, establishes a session with a selected device by entering the `connect` command. There may be up to 250 simultaneous user sessions.

9.1.2 root user

The root user is not like other SCS users. The root user will act as the System Administrator of the SCS and has full access to the each of the SCS Ports. There is only one root user for each SCS system.

The root user defines the access rights of all users in the SCS system. The root user's access is secured with the root password (default password is root). The root password should be changed and carefully guarded to prevent undesirable access.

9.2 Port Identities

Each Port is numbered (1 through 48) and has a default name (port1 through port48, respectively) and may also be given a familiar name by the Sysadmin. The Users interact with the servers connected to the ports by entering a command associated with either the port number or port name.

9.3 What Can A User Do?

Summary: use `connect <Port number or name>` to access a specific server or network device.

9.3.1 Access via Network

To access a connected server via the SCS network port, the user should use an ssh client to ssh to the IP address of the SCS.

9.3.1.1 ssh to a Port

You can ssh directly to a port by using the following command:

```
ssh user@scs -t -t connect <port number or name>
```

9.3.2 Access via console port

The console port is normally used by the System Administrator during service events, however, it can be used by any user that has access to the terminal and has a password to log into the system and access system Ports.

9.3.3 Interactive Mode

If a user desires to interact directly with an attached server he/she must enter Interactive mode. Use `connect <port name or number>` to connect to a port (only applies to ports for which this user is allowed CONNECT access).

The user's terminal will then be directly connected to the server, and will act as if the terminal was physically connected to the server. The SCS displays the last page of the port buffer along with a system information message indicating which Port is selected as the user enters Interactive mode.

When a user attempts to connect to a port that is already in use, they will receive a message `Device or Resource busy`.

To escape from Interactive mode, the Interactive mode escape sequence must be used. The Interactive mode escape sequence is a series of two to ten characters that allow the user to leave Interactive mode and return to the system prompt. The default for the Interactive mode escape sequence is <ESC> A (escape key, then uppercase "A"), but the user may change the sequence by using the command `editesc`.

9.3.3.1 Break Sequence

The user is not directly connected to the server, but rather is connected through the SCS, and therefore cannot use the “break” key. While a user is connected to a port in the Interactive mode, the user can send a break signal to the port by entering a command to cause the `break` sequence to occur.

The default value for this sequence is 'ESC - B'.

editbrk

When not in the Interactive mode, a user can enter `editbrk` to edit or view their preset `break` sequence. The `break` sequence (user key strokes, default is 'ESC - B') is presented in its ASCII form (x1bB). If the user wishes to keep the existing sequence, he/she needs only to press Enter to keep the existing setting.

Caution

It is generally best to have the sysadmin change the `break` sequence, as there may have been an equipment change or other issue that a remote user might not be aware of.

9.3.3.2 Escape Sequence

A user-defined sequence of keys is used to leave the Interactive mode.

The default value for this sequence is 'ESC - A'.

Note

It is best to NOT use combinations of the <CTRL> key and other keys for the `escape` sequence, as these combinations are usually reserved for sending and receiving special characters through a terminal.

Edit Escape Sequence

The User can edit the `escape` command sequence, if necessary. The user should only change the `escape` sequence if it causes problems with the hardware or software used.

When logged in, a user can enter `editesc` to edit or view their preset `escape` sequence. The `escape` sequence (user key strokes, default is 'ESC - A') is presented in its ASCII form (x1bA). If the user wishes to keep the existing sequence, he/she needs only to press "Enter" to keep the existing setting.

Caution

It is generally best to have the sysadmin change the `escape` sequence, as there may have been an equipment change or other issue that a remote user might not be aware of.

9.4 Monitor Mode

Monitor mode allows a user to view the traffic on a port, but not interact with it. Once in Monitor mode, pressing any key will close the connection. Multiple users may monitor the same port at one time, unlike Interactive mode which is limited to one user. A port may be monitored while an interactive session is in progress.

The `monitor` command uses the same syntax as the `connect` command.

9.5 Browse the buffers

Any of the Linux text browsing commands (less, more, ftp, tftp, scp, etc.) may be used to view the Port buffers. These buffers are named:

`/lsi/ports/buf_<name>`

or

`/proc/port_buffers/<number>`

9.6 Clear the Port buffers

Use the following command to erase the data in a Port buffer:

`stty --clear -F /proc/port_buffers/<n>`

or

`stty --clear -F /lsi/ports/buf_<name>`

10 Regulatory & Safety

Regulatory Information and Contact Information

10.1 Safety Requirements

10.1.1 Symbols found on the Product

Markings and labels on the product follow industry-standard conventions. Regulatory markings found on the products comply with requirements.

10.1.2 Product Serial Number

The SCS products have a unique serial number, imprinted on a small silver label that is placed on the bottom of the chassis. The serial number includes a date code. The Ethernet MAC address may be used in place of the printed serial number.

10.1.3 Connection to the Product

Connections and installation hardware for the product use industry-standard devices and methods. All wiring connections to the customer equipment are done in a fashion to minimize proprietary or customized connectors or cabling. Power connections are made with regionally appropriate power cords and approved methods. Rack mounting equipment is designed for industry-standard 19-inch rack units.

10.2 Regulatory Compliance

The Logical Solutions Inc. SCS products are designed and made in the U.S.A. The SCS products have been tested by a nationally recognized testing laboratory and

found to be compliant with the following standards (both domestic USA and many international locations).

10.3 North America

These products comply with the following standards:

Safety

- UL60950 : 2000
- CAN/CSA C22.2 No. 60950-00

Electromagnetic Interference

- FCC CFR47, Part 15, Class A
- Industry Canada ICES-003 Issue 2, Revision 1

10.4 European Union

10.4.1 Declaration of Conformity

Manufacturer's Name & Address

Logical Solutions Inc.
100 Washington Street
Milford, Connecticut 06460 USA
Telephone (203) 647-8700

Product Name

- Model: SCS80 Secure Console Server, SCS801 Secure Console Server
- Model: SCS160 Secure Console Server, SCS1601 Secure Console Server
- Model: SCS320 Secure Console Server, SCS3201 Secure Console Server
- Model SCS480 Secure Console Server, SCS4801 Secure Console Server
- Model: SCS80R Secure Console Server, SCS801R Secure Console Server
- Model: SCS160R Secure Console Server, SCS1601R Secure Console Server
- Model: SCS320R Secure Console Server, SCS3201R Secure Console Server
- Model: SCS480R Secure Console Server, SCS4801R Secure Console Server
- Model: Sentinel 32 Secure Console Server, Sovereign 32 Secure Console Server

These products comply with the requirements of the Low Voltage Directive 72/23/EEC and the EMC Directive 89/336/EEC.

10.4.2 Standards With Which the Products Comply

Safety

- IEC60950:1992+A1, A2, A3, A4, A11

Electromagnetic Emissions

- EN55022: 1994 (IEC/CSPIR22: 1993)
- EN61000-3-2/A14: 2000
- EN61000-3-3: 1994

Electromagnetic Immunity

- EN55024: 1998 Information Technology Equipment-Immunity Characteristics
- EN61000-4-2: 1995 Electro-Static Discharge Test
- EN61000-4-3: 1996 Radiated Immunity Field Test
- EN61000-4-4: 1995 Electrical Fast Transient Test
- EN61000-4-5: 1995 Power Supply Surge Test
- EN61000-4-6: 1996 Conducted Immunity Test
- EN61000-4-8: 1993 Magnetic Field Test
- EN61000-4-11: 1994 Voltage Dips & Interrupts Test

10.4.3 Supplementary Information

The following statements may be appropriate for certain geographical regions and might not apply to your location.

Note

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

Note

This Class A digital apparatus complies with Canadian ICES-003 and has been verified as being compliant within the Class A limits of the FCC Radio Frequency Device Rules (FCC Title 47, Part 15, Subpart B CLASS A), measured to CISPR 22: 1993 limits and methods of measurement of Radio Disturbance Characteristics of Information Technology Equipment.

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigencies du Règlement sur le matérial brouilleur du Canada.

WARNING

This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

10.5 Australia & New Zealand

This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

10.6 Lithium Battery

The SCS products have a replaceable long-life Lithium battery to support the system BIOS, which will likely never need field replacement. However, if it must be replaced, the following caution statement applies:

Caution

RISK OF EXPLOSION IF BATTERY IS REPLACED BY AN INCORRECT TYPE. DISPOSE OF UNUSED BATTERIES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.

10.7 SCS-R Models and Sentinel 32 Power Modules

The SCS80R, SCS160R, SCS320R, SCS480R, and Sentinel 32 systems have hot-swappable Power Modules which can be replaced by a competent technician in the field without interrupting service. Each Power Module is held in place with a single captive screw.

When servicing the product, it is very important for the user to heed the following Caution:

Caution

When replacing a Power Module in the field, you must first turn its power switch off, then remove its Power Cord, **BEFORE** you loosen the screw and pull the module out. When replacing the module, fully insert the module and tighten its screw before replacing its power cord.

11 How to Contact Us

11.1 Customer Support

Thank You for choosing a Logical Solutions product for your application. We appreciate your business and are interested in helping you successfully use our products.

Logical is here to help you. To contact Logical Solutions, use the following internet-based methods and telephone numbers.

If you're not yet a Customer, but are interested in finding a Logical Solution for your application, we'll be glad to help you. Our expert Sales staff will help determine the best solution for your needs, and will help you be certain that you've come to a "logical solution", too.

Any information we gain about our customers is held in confidence. We do not share customer names or contact information with other companies.

11.1.1 Website

Check out our website for current product offerings, support information, and general information about all of the Logical Solutions we offer.

Our internet website offers product information on all current systems, including technical specification sheets and installation guides (for viewing on-line or for download), product diagrams showing physical connections, and other information you might need. We are constantly updating our website, so be sure to "refresh" your browser when visiting the Logical Solutions website to see the most up-to-date information.

Internet: www.thinklogical.com

Note

Most online documents are stored as Adobe Acrobat "PDF" files. If you do not have the Adobe Acrobat Reader needed to view PDF files, visit www.adobe.com for this free download.

11.1.2 E-mail

Logical Solutions is staffed Monday through Friday from 8:30AM to 5:30PM, Eastern Time Zone. We will try to respond to your email inquiries promptly, using the following email addresses for your different needs:

info@thinklogical.com -- Information on Logical Solutions and our products

sales@thinklogical.com -- Sales Department - orders, questions or issues

support@thinklogical.com -- Product support, technical issues or questions, product repairs, requests for Return Authorization, any other issue.

11.1.3 Telephone

Telephone Sales: Contact our expert technically-oriented Sales staff via telephone in Milford, Connecticut, at (203) 647-8700 or if in the continental US, you may use our toll-free number (800) 291-3211. We're here Monday through Friday, 8:30AM to 5:30PM, Eastern Time Zone. Ask for their direct dial phone number when you call!

Telephone Product Support: Contact Product Support via telephone in Milford, Connecticut, at (203) 647-8700. The support lines are manned Monday through Friday, 9AM to 5PM, Eastern Time Zone.

International Sales: Please contact our US Sales staff in Milford, Connecticut, at (203) 647-8700. We're here Monday through Friday, 8:30AM to 5:30PM, Eastern Time Zone (same as New York City). If leaving a voice message, please provide a 'best time to call back' so we may reach you at your convenience.

We have an automated attendant answering our main telephone switchboard 24 hours a day. You can leave voice messages for individuals at any time. Our Sales Representatives have direct numbers to speed up your next call to us.

11.1.4 Fax

Our company facsimile number is (203) 783-9949. Please indicate the nature of the fax on your cover sheet, and provide return contact information.

11.2 Product Support

Logical Solutions Inc.'s support personnel are available Monday through Friday from 8:30AM to 5:30PM, Eastern Time Zone.

If your application might require assistance at some time outside of our normal business hours, please contact us beforehand and we will do our best to make arrangements to help you with your Logical Solutions products.

11.2.1 Warranty

Logical Solutions Inc.'s products carry a one year warranty, with longer-term warranties available at time of purchase on most products. Please refer to your product invoice for your product's Warranty Terms and Conditions.

For specific details about the product warranties, please contact Sales.

11.2.2 Return Authorization

If, for some reason, you need to return your Logical Solutions product to us, please get a Return Authorization Number (RA# or RMA#) from Logical's Product Support department before returning the unit. Return Authorization must include contact information (phone preferred) in the event we have any questions.

After receiving your RA or RMA Number, please ship the unit postpaid, with the RA# (or RMA#) prominently displayed on the shipping container.

We will contact you about your product once we determine its status.

Products received without Return Authorization and/or Contact information may require additional attention on our part that may delay any desired service or support with your system.

11.2.3 Our Address

If you have any issue with the product, have product questions, or need technical assistance with your Logical SCS system, please call us (203) 647-8700 and let us help.

If shipping something with an RA# (or RMA#), or if you'd like to write us, we are located at:

Logical Solutions Inc.
100 Washington Street
Milford, CT 06460 USA

Appendix A File System

A.1 Read-Only vs. Read-Write

You may need to interact directly with the SCS's file system, in which case, you must mount it for read-write access before changes can be made to the system's Compact Flash.

To mount R/W: `mount -o remount,rw /`

Caution

Regular SCS use does not require changes to Read-Write operation. An experienced sysadmin may only need to use this if they need to interact with the SCS's Linux file system directly. Do not leave the system in Read-Write mode.

The SCS's file system is normally mounted in a Read-Only mode and is run from RAM, to prolong the life (Read-Write cycles) of the system's Compact Flash memory card. If the system were to be left in Read-Write mode, the life span of the SCS would be shortened considerably.

To mount R/O: `mount -o remount,ro /`

A.1.1 Read-Only Mode for Normal Use

Note

It is **VERY IMPORTANT** to remount / as Read-Only when you are done with any changes (e.g., `mount -o remount,ro /`).

During system startup, the tar file is expanded into RAM. The root filesystem is then mounted as Read-Only. It must be remounted Read-Write in order to make changes (e.g., `mount -o remount,rw /`).

A.1.2 LSI Directories

The following LSI directories are important for the SCS products:

```
/etc
/home
/var
/root
/lsi
```

The `save` command tar's these directories and stores the tar file in `/misc`.

Appendix B FAQ

A few frequently-asked questions

B.1 How do I do this?

This section is a collection of tips and hints for various setup items. The root user can change the following features using the given command steps:

B.1.1 Change Port Parameters

Serial Port settings are modified via the `stty` command (see `man` page `stty`). The serial port settings must be modified in the `rc.serial` file in order to be permanently changed. Note the following:

- Changing port names is persistent over a reboot
- Changing port communication settings (baud rate, parity etc.) is temporary - the file `/etc/rc.serial` must be edited in order to save the settings

To change the Port Parameters, you edit the file:

```
/etc/rc.d/rc.serial
```

For example, to change the baud rate for Port 5 to 19,200 baud, you enter:

```
stty -F /dev/ttyB5 19200 {other options}
```

B.1.2 Change the Name of a Port

You can change the name of a Port if you know the original name. For example, to change the Port <current name> to “payroll”, you enter:

```
stty --name=payroll -F /lsi/ports/<current name>
```

B.1.3 View a Buffer

You use less, cat, etc.to view a port's buffer. There are at least two methods:

/lsi/ports/buf_<portname>

or

/proc/port_buffers/<portnumber>

Appendix C Sentinel 32 Modem Commands

The following information pertaining to the Modem Commands have been extracted with permission from the Developer's Guide printed by the modem manufacturer, Multi-Tech Systems, Inc.

Introduction

The AT commands are used to control the operation of your modem. They are called *AT* commands because the characters AT must precede each command to get the *AT*tention of the modem.

AT commands can be issued only when the modem is in command mode or online command mode.

The modem is in *command mode* whenever it is not connected to another modem.

The modem is in *data mode* whenever it is connected to another modem and ready to exchange data. *Online command mode* is a temporary state in which you can issue commands to the modem while connected to another modem.

To put the modem into online command mode from data mode, you must issue an *escape sequence* (**+++**) followed immediately by the *AT* characters and the command, e.g., **+++ATH** to hang up the modem. To return to data mode from online command mode, you must issue the command **ATO**.

To send AT commands to the modem you must use a communications program, such as the HyperTerminal applet in Windows 98/95 and NT 4.0, or some other available terminal program. You can issue commands to the modem either directly, by typing them in the terminal window of the communications program, or indirectly, by configuring the operating system or communications program to send the commands automatically. Fortunately, communications programs make daily operation of modems effortless by hiding the commands from the user. Most users, therefore, need to use AT commands only when reconfiguring the modem, e.g., to turn auto answer on or off.

The format for entering an AT command is **AT*X n***, where *X* is the command and *n* is the specific value for the command, sometimes called the command *parameter*. The value is always a number. If the value is zero, you can omit it from the command; thus, **AT&W** is equivalent to **AT&W0**. Most commands have a *default* value, which is the value that is set at the factory. The default values are shown in the "AT Command Summary" (See below).

You must press ENTER (it could be some other key depending on the terminal program) to send the command to the modem. Any time the modem receives a command, it sends a response known as a *result code*. The most common result codes are *OK*, *ERROR*, and the *CONNECT* messages that the modem sends to the computer when it is connecting to another modem. See a table of valid result codes at the end of this chapter.

You can issue several commands in one line, in what is called a command *string*. The command string begins with **AT** and ends when you press ENTER. Spaces to separate the commands are optional; the command interpreter ignores them. The most familiar command string is the *initialization string*, which is used to configure the modem when it is turned on or reset, or when your communications software calls another modem.

AT Command Summary

Organization of AT Commands on the following pages: 1st, by the initial command character (&, +, %)

2nd, alphabetized by the second command character (Except for listing of **AT**)

Command	Description
AT	Attention Code
A	Answer
A/	Repeat Last Command
B*n*	Communication Standard Setting
D*s*	Dial
DS=*y*	Dial Stored Telephone Number
E*n*	Echo Command Mode Characters
F*n*	Echo Online Data Characters
H*n*	Hook Control
I*n*	Information Request
M*n*	Monitor Speaker Mode
N*n*	Modulation Handshake
O*n*	Return Online to Data Mode
P	Pulse Dialing
Q*n*	Result Codes Enable/Disable
S*r*=*n*	Set Register Value
S*r*?	Read Register Value
T	Tone Dialing
V*n*	Result Code Format
W*n*	Result Code Options
X*n*	Result Code Selection
Z*n*	Modem Reset
&C*n*	Data Carrier Detect (DCD) Control
&D*n*	Data Terminal Ready (DTR) Control
&E*n*	XON/XOFF Pass-Through
&F*n*	Load Factory Settings
&G*n*	V.22bis Guard Tone Control
&K*n*	Flow Control Selection
&L*n*	Leased Line Operation
&P*n*	Pulse Dial Make-to-Break Ratio Selection
&Q*n*	Asynchronous Communications Mode
&S*n*	Data Set Ready (DSR) Control
&T*n*	Loopback Test (V.54 Test) Commands
&V	Display Current Settings
&W*n*	Store Current Configuration
&Zy=*x*	Store Dialing Command
\A*n*	Select Maximum MNP Block Size
\B*n*	Transmit Break
\K*n*	Break Control
\N*n*	Error Correction Mode Selection
\Q*n*	Flow Control Selection
\T*n*	Inactivity Timer
\V*n*	Protocol Result Code
-C*n*	Data Calling Tone
%A	Adaptive Answer Result Code Enable

%B	View Numbers in Blacklist
%C*n*	Data Compression Control
%DC*n*	AT Command Control
%E*n*	Fallback and Fall Forward Control
%H*n*	Direct Connect Enable
%R*n*	Cisco Configuration
%S*n*	Command Speed Response
$EB*n*	Asynchronous Word Length
$D*n*	DTR Dialing
$MB*n*	Online BPS Speed
$SB*n*	Serial Port Baud Rate
#CBA*n*	Callback Attempts
#CBD*n*	Callback Delay
# CBF?	Callback Failed Attempts Display
# CBFR	Callback Failed Attempts Reset
# CBI*n*	Local Callback Inactivity Timer
# CBN*y=n*	Store Callback Password
# CBP*n*	Callback Parity
# CBR*y*	Callback Security Reset
# CBS*n*	Callback Enable/Disable
#P*n*	Set 11-bit Parity
#S*x*	Enter Setup Password
#S=*x*	Store Setup Password
+VDR=*x, y*	Distinctive Ring Report
+++AT<CR>	Escape Sequence
%%%ATMTSMODEM<CR>	Remote Configuration Escape Sequence
V.92 Commands	

AT Commands

Command: **AT** **Attention Code**
Values: n/a
Description: The attention code precedes all command lines except **A/**, **A:** and escape sequences.

Command: **ENTER Key**
Values: n/a
Description: Press the ENTER (RETURN) key to execute most commands.

Command: **A** **Answer**
Values: n/a
Description: Answer call before final ring.

Command: **A/** **Repeat Last Command**
Values: n/a
Description: Repeat the last command string. Do not precede this command with **AT**. Do not press ENTER to execute.

Command: **B*n*** **Communication Standard Setting**
Values: *n* = 0–3, 15, 16
Default: 0 and 15
Description:
B0 Select ITU-T V.22 mode when modem is at 1200 bps.
B1 Select Bell 212A when modem is at 1200 bps.
B2 Deselect V.23 reverse channel (same as **B3**).
B3 Deselect V.23 reverse channel (same as **B2**).
B15 Select V.21 when the modem is at 300 bps.
B16 Select Bell 103J when the modem is at 300 bps.

Command: **D*s*** **Dial**
Values: *s* = dial string (phone number and dial modifiers)
Default: none
Description: Dial telephone number *s*, where *s* may up to 40 characters long and include the 0–9, *, #, , B, C, and D characters, and the **L**, **P**, **T**, **V**, **W**, **S**, comma (**,**), semicolon (**;**), **!**, @, **^** and **$** dial string modifiers.

Dial string modifiers:

L Redial last number. (Must be placed immediately after **ATD**.)
P Pulse-dial following numbers in command.
T Tone-dial following numbers in command (default).
V Switch to speakerphone mode and dial the following number. Use **ATH** command to hang up.
W Wait for a new dial tone before continuing to dial. (**X2**, **X4**, **X5**, **X6**, or **X7** must be selected.)
, Pause during dialing for time set in register S8.
; Return to command mode after dialing. (Place at end of dial string.)
! Hook flash. Causes the modem to go on-hook for one-half second, then off-hook again.
@ Wait for quiet answer. Causes modem to wait for a ringback, then 5 seconds of silence, before processing next part of command. If silence is not detected, the modem returns a NO ANSWER code.
^ Disable data calling tone transmission.
$ Detect AT&T call card "bong" tone. The character should follow the phone number and precede the user's call card number: **ATDT1028806127853500$123456789**

Command: **DS=*y*** **Dial Stored Telephone Number**
Values: *n* = 0–2 (0–1 for SMI-Parallel {internal})
Default: none
Description: Dial a number previously stored in directory number *y* by the **&Zy=x** command. Example: **ATDS=2**

Command: **E*n*** **Echo Command Mode Characters**
Values: *n* = 0 or 1
Default: 1
Description:
E0 Do not echo keyboard input to the terminal.
E1 Do echo keyboard input to the terminal.

Command: **F*n*** **Echo Online Data Characters**
Values: *n* = 1
Default: 1
F0 Enable online data character echo. (Not supported.)
F1 Disable online data character echo (included for backward compatibility with some software).

Command: **H*n*** **Hook Control**
Values: *n* = 0 or 1
Default: 0
Description:
H0 Go on-hook (hang up).
H1 Go off-hook (make the phone line busy).

Command: **I*n*** **Information Request**
Values: *n* = 0–5, 9, 11
Default: None
Description:
I0 Display default speed and controller firmware version.
I1 Calculate and display ROM checksum (e.g., *12AB*).
I2 Check ROM and verify the checksum, displaying *OK* or *ERROR*.
I3 Display default speed and controller firmware version.
I4 Display firmware version for data pump (e.g., 94).
I5 Display the board ID: software version, hardware version, and country ID
I9 Display the country code (e.g., *NA Ver. 1*).
I11 Display diagnostic information for the last modem connection, such as DSP and firmware version, link type, line speed, serial speed, type of error correction/data compression, number of past retrains, etc.

Command: **M*n*** **Monitor Speaker Mode**
Values: *n* = 0, 1, 2, or 3
Default: 1
Description:
M0 Speaker always off.
M1 Speaker on until carrier signal detected.
M2 Speaker always on when modem is off-hook.
M3 Speaker on until carrier is detected, except while dialing.

Command: **N*n*** **Modulation Handshake**
Values: *n* = 0 or 1
Default: 1
Description:
N0 Modem performs handshake only at communication standard specified by **S37** and the **B** command.

N1Modem begins handshake at communication standard specified by **S37** and the **B** command. During handshake, fallback to a lower speed can occur.

Command: **O*n*** **Return Online to Data Mode**
Values: 0, 1, 3
Default: None
Description:
O0 Exit online command mode and return to data mode (see ***+++AT<CR>*** escape sequence).
O1 Issue a retrain and return to online data mode.
O3 Issue a rate renegotiation and return to data mode.

Command: **P** **Pulse Dialing**
Values: P, T
Default: T
Description: Configures the modem for pulse (non-touch-tone) dialing. Dialed digits are pulsed until a **T** command or dial modifier is received.

Command: **Q*n*** **Result Codes Enable/Disable**
Values: *n* = 0 or 1
Default: 0
Description:
Q0 Enable result codes.
Q1 Disable result codes.
Q2 Returns an *OK* for backward compatibility with some software.

Command: **Sr=*n*** **Set Register Value**
Values: *r* = S-register number; *n* varies
Default: None
Description: Set value of register S*r* to value of *n*, where *n* is entered in decimal format (e.g., S0=1).

Command: **Sr?** **Read Register Value**
Values: *r* = S-register number
Default: None
Description: Read value of register **S*r*** and display it in 3-digit decimal form (e.g., **S2?** gives the response *043)*.

Command: **T** **Tone Dialing**
Values: P, T
Default: T
Description: Configures the modem for DTMF (touch-tone) dialing. Dialed digits are tone dialed until a **P** command or dial modifier is received.

Command: **V*n*** **Result Code Format**
Values: *n* = 0 or 1
Default: 1
Description: V0 Displays result codes as digits (terse response).
V1 Displays result codes as words (verbose response).

Command: **W*n*** **Result Code Options**
Values: *n* = 0, 1, or 2
Default: 2
Description: W0 CONNECT result code reports serial port speed, disables protocol result codes.
W1 CONNECT result code reports serial port speed, enables protocol result codes.
W2 CONNECT result code reports line speed, enables protocol result codes.

Command: **X*n*** **Result Code Selection**
Values: *n* = 0–7
Default: 4
Description: X0 Basic result codes (*CONNECT*); does not look for dial tone or busy signal.
X1 Extended result codes (*CONNECT 46000 V42bis*); does not look for dial tone or busy signal.
X2 Extended result codes with *NO DIALTONE*; does not look for busy signal.
X3 Extended result codes with *BUSY*; does not look for dial tone.
X4 Extended result codes with *NO DIALTONE* and *BUSY*.
X5 Extended result codes with *NO DIALTONE* and *BUSY*.
X6 Extended result codes with *NO DIALTONE* and *BUSY*.
X7 Basic result codes with *NO DIALTONE* and *BUSY*.

Command: **Z*n*** **Modem Reset**
Values: *n* = 0 or 1
Default: None
Description: Z0 Reset modem to profile saved by the last **&W** command.
Z1 Same as **Z0**.

Command: **&C*n*** **Data Carrier Detect (DCD) Control**
Values: *n* = 0, 1, 2
Default: 1
Description: &C0 Forces the DCD circuit to be always ON.
&C1 DCD goes ON when the remote modem's carrier signal is detected, and goes OFF when the carrier signal is not detected.
&C2 DCD turns OFF upon disconnect for time set by S18. It then goes high again (for some PBX phone systems).

Command: **&D*n*** **Data Terminal Ready (DTR) Control**
Values: *n* = 0, 1, 2, or 3
Default: 2
Description:
&D0 Modem ignores true status of DTR signal and responds as if it is always on.
&D1 If DTR drops while in online data mode, the modem enters command mode, issues an *OK*, and remains connected.
&D2 If DTR drops while in online data mode, the modem hangs up. If the signal is not present, the modem will not answer or dial.
&D3 If DTR drops, modem hangs up and resets as if **ATZ** command were issued.

Command: **&E*n*** **XON/XOFF Pacing Control**
Values: *n* = 12 or 13
Default: 12
Description:
&E12 Disables XON/XOFF pacing.
&E13 Enables XON/XOFF pacing.

Command: **&F*n*** **Load Factory Settings**
Values: *n* = 0
Default: None
Description:
&F0 Load factory settings as active configuration.
Note: See also the **Z** command.

Command: **&G*n*** **V.22bis Guard Tone Control**
Values: *n* = 0, 1, or 2
Default: 0
Description:
&G0 Disable guard tone.
&G1 Set guard tone to 550 Hz.
&G2 Set guard tone to 1800 Hz.
Note: The **&G** command is not used in North America.

Command: **&K*n*** **Flow Control Selection**
Values: *n* = 0, 3, or 4
Defaults: 3
Description:
&K0 Disable flow control.
&K3 Enable CTS/RTS hardware flow control.
&K4 Enable XON/XOFF software flow control.

Command: **&L*n*** **Leased Line Operation**
Values: *n* = 0, 1, or 2
Defaults: 0
Description:
&L0 The modem is set for standard dial-up operation.
&L1 The modem is set for leased line operation in originate mode.
&L2 The modem is set for leased line operation in answer mode.
Note: For **&L1** and **&L2**, there is a 30-second window between power up and the starting of the leased line handshake. During this time, you can turn off the command, if desired.

Command: **&P*n*** **Pulse Dial Make-to-Break Ratio Selection**
Values: *n* = 0, 1, or 2
Default: 0
Description:
&P0 60/40 make-to-break ratio
&P1 67/33 make-to-break ratio
&P2 20 pulses per second
Note: The **&P2** command is available only if the country code is set to Japan.

Command: **&Q*n*** **Asynchronous Communications Mode**
Values: *n* = 0, 5, 6, 8, or 9
Default: 5
Description:
&Q0 Asynchronous with data buffering. Same as **\N0**.
&Q5 Error control with data buffering. Same as **\N3**.
&Q6 Asynchronous with data buffering. Same as **\N0**.
&Q8 MNP error control mode. If MNP error control is not established, the modem falls back according to the setting in **S36**.
&Q9 V.42 or MNP error control mode. If neither error control is established, the modem falls back according to the setting in **S36**.

Command: **&S*n*** **Data Set Ready (DSR) Control**
Values: *n* = 0 or 1
Default: 0
Description:
&S0 DSR is always ON.
&S1 DSR goes ON only during a connection.

Command: **&T*n*** **Loopback Test (V.54 Test) Commands**
Values: *n* = 0, 1, 3, 6
Default: None
Description: The modem can perform selected test and diagnostic functions. A test can be run only when the modem is operating in non-error-correction mode (normal or direct mode). For tests 3 and 6, a connection between the two modems must be established. To terminate a test in progress, the escape sequence (**+++AT**) must be entered.
&T0 Stops any test in progress.
&T1 Starts a local analog loopback, V.54 Loop 3, test. If a connection exists when this command is issued, the modem hangs up. When the test starts, a *CONNECT* message is displayed.
&T3 Starts local digital loopback, V.54 Loop 2, test. If no connection exists, *ERROR* is returned.
&T6 Initiates a remote digital loopback, V.54 Loop 2, test without self-test. If no connection exists, *ERROR* is returned.

Command: **&V** **Display Current Settings**
Values: n/a
Description: Displays the active modem settings.

Command: **&W*n*** **Store Current Configuration**
Values: *n* = 0 or 1
Default: 1
Description:
&W0 Stores current modem settings in non-volatile memory and causes them to be loaded at power-on or following the **ATZ** command instead of the factory defaults. See **&F** command.
&W1 Clears user default settings from non-volatile memory and causes the factory defaults to be loaded at power-on or following the **ATZ** command.

Command: **&Zy=*x*** **Store Dialing Command**
Values: *y* = 0–2 (0–1SMI-Parallel {internal})
x = Dialing command
Default: None
Description: Stores dialing command *x* in memory location *y*. Dial the stored number using the command **ATDS=y**. See Also the #CBS command, a callback security command.

Command: **\A*n*** **Select Maximum MNP Block Size**
Values: *n* = 0, 1, 2, or 3
Default: 3
Description: \A0 64-character maximum
\A1 128-character maximum
\A2 192-character maximum
\A3 256-character maximum

Command: **\B*n*** ***Transmit Break***
Values: *n = 0–9 in 100 ms units*
Default: *3*
Description: *In non-error-correction mode only, sends a break signal of the specified length to a remote modem. Works in conjunction with the* ***\K*** *command.*

Command: **\K*n*** ***Break Control***
Values: *n = 0–5*
Default: *5*
Description: *Controls the modem's response to a break received from: computer, remote modem, or* ***\B*** *command. Response is different for each of three different states.*

Data mode. Modem receives the break from the computer:
\K0 Enter online command mode, no break sent to the remote modem.
\K1 Clear data buffers and send break to the remote modem.
\K2 Same as ***\K0****.*
\K3 Send break immediately to the remote modem.
\K4 Same as ***\K0****.*
\K5 Send break to the remote modem in sequence with the transmitted data.

Data mode. Modem receives the break from the remote modem:
\K0 Clear data buffers and send break to the computer.
\K1 Same as ***\K0****.*
\K2 Send break immediately to the computer.
\K3 Same as ***\K2****.*
\K4 Send break to the computer in sequence with the received data.
\K5 Same as ***\K4****.*

Online command mode. Modem receives a \Bn command from the computer:
\K0 Clear data buffers and send break to the remote modem.
\K1 Same as ***\K0****.*
\K2 Send break immediately to the remote modem.
\K3 Same as ***\K2****.*
\K4 Send break to the remote modem in sequence with the transmitted data.
\K5Same as ***\K4****.*

Command: **\N*n*** **Error Correction Mode Selection**
Values: *n* = 0–5, or 7
Default: 3
Description: \N0 Non-error correction mode with data buffering (buffer mode; same as **&Q6**).
\N1 Direct mode.
\N2 MNP reliable mode. If the modem cannot make an MNP connection, it disconnects.
\N3 V.42/MNP auto-reliable mode. The modem attempts first to connect in V.42 error correction mode, then in MNP mode, and finally in non-error correction (buffer) mode with continued operation.
\N4 V.42 reliable mode. If the modem cannot make a V.42 connection, it disconnects.
\N5 V.42, MNP, or non-error correction (same as **\ N3**).
\N7 V.42, MNP, or non-error correction (same as **\ N3**).

Command: **\Q*n*** **Flow Control Selection**
Values: n = 0, 1, or 3
Default: 3
Description:
\Q0 Disable flow control (same as **&K0**).
\Q1 XON/XOFF software flow control (same as **&K4**).
\Q2 CTS-only flow control. Not supported.
\Q3 RTS/CTS hardware flow control (same as **&K3**).

Command: **\Tn** **Inactivity Timer**
Values: n = 0, 1–255
Default: 0
Description: Sets the time (in minutes) after the last character is sent or received that the modem waits before disconnecting. A value of zero disables the timer. Applies only in buffer mode.
Note: You can also set the inactivity timer by changing the value of **S30**.

Command: **\Vn** **Protocol Result Code**
Values: n = 0, 1, or 2
Default: 1
Description:
\V0 Disables the appending of the protocol result code to the DCE speed.
\V1 Enables the appending of the protocol result code to the DCE speed.
\V2 Same as **\V1**.

Command: **\X*n*** **XON/XOFF Pass-Through**
Values: *n* = 0 or 1
Default: 0
Description:
\X0 Modem responds to and discards XON/XOFF characters.
\X1 Modem responds to and passes XON/XOFF characters.
Note: This is also controlled via **&E6** and **&E7**.

Command: **-C*n*** **Data Calling Tone**
Values: *n* = 0 or 1
Defaults: 1
Description:
-C0 Disable V.25 data calling tone to deny remote data/fax/voice discrimination.
-C1 Enable V.25 data calling tone to allow remote data/fax/voice discrimination.

Command: **%A** **Adaptive Answer Result Code Enable**
Values: *n* = 0 or 1
Default: 0
Description: The %A command controls whether the DATA or FAX result codes will be sent by the modem. The modem must be in fax mode for this command to work. Also, the modem must be set to **+FAA=1**, which enables the modem to distinguish between a fax and a data call. When these commands are enabled, the modem sends DATA to the computer when it detects data tones and FAX when it detects fax tones. These strings are used by some servers to select the appropriate communication program.
%A0 Disables adaptive answer result codes.
%A1 Enables adaptive answer result codes.

Command: **%B** **View Numbers in Blacklist**
Values: n/a
Description: If blacklisting is in effect, **AT%B** displays the numbers for which the last call attempted in the previous two hours failed. In countries that do not require blacklisting, the *ERROR* result code appears.

Command: **%C*n*** **Data Compression Control**
Values: *n* = 0 or 1
Default: 1
Description: %C0 Disable V.42bis/MNP 5 data compression.
%C1 Enable V.42bis/MNP 5 data compression.

Command: **%DC*n*** **AT Command Control**
Values: *n* = 0 or 1
Default: 0
Description: %DC0 The modem responds to AT commands.
%DC1 The modem ignores AT commands.
Note: The modem will respond to **AT%DC** for 10 seconds after power-up.

Command: **%E*n*** **Fallback and Fall Forward Control**
Values: *n* = 0, 1, or 2
Default: 2
Description: %E0 Disable fallback and fall forward.
%E1 Enable fallback, disable fall forward.
%E2 Enable fallback and fall forward.

Command: **%H*n*** **Direct Connect Enable**
Values: *n* = 0, 1
Default: 0
Description: %H0 Sets callback security to normal operation.
%H1 All callback security calls will be direct connect regardless of whether the password or phone number has the **-** character.

Command: **%R*n*** **Cisco Configuration**
Values: *n* = 0, 1
Default: 0
Description: %R0 Disables Cisco configuration.
%R1 Sets **E0**, **Q1**, **&D0**, **\N0**, **$SB9600**, and **%S1** for operation with a Cisco router.

Command: **%S*n*** **Command Speed Response**
Values: *n* = 0, 1
Default: 0
Description: %S0 Sets modem to respond to AT commands at all normal speeds.
%S1 AT commands accepted at 115200 bps only. Commands at other speeds are ignored.

Command: **$D*n*** **DTR Dialing**
Values: *n* = 0 or 1
Default: 0
Description: $D0 Disables DTR dialing.
$D1Dials the number in memory location 0 when DTR goes high.

Command: **$EB*n*** **Asynchronous Word Length**
Values: *n* = 0 or 1
Default: 0
Description: $EB0 Enables 10-bit mode.
$EB1 Enables 11-bit mode.

Command: **$MB*n*** **Online BPS Speed**
Values: *n* = speed in bits per second
Default: 28,800
Description:

$MB75	Selects CCITT V.23 mode
$MB300	Selects 300 bps on-line
$MB1200	Selects 1200 bps on-line
$MB2400	Selects 2400 bps on-line
$MB4800	Selects 4800 bps on-line
$MB9600	Selects 9600 bps on-line
$MB14400	Selects 14400 bps on-line
$MB19200	Selects 19200 bps on-line
$MB28800	Selects 28800 bps on-line
$MB33600	Selects 33600 bps on-line

Command: **$RP*n*** **Ring Priority vs. AT Command Priority**
Values: *n* = 0 or 1
Default: 1
Description:

$RP0	The AT command will have priority over the ring. S1 will be reset to 0 if an AT command is received. This command is storable to memory.
$RP1	The ring will have priority over the AT command. S1 will increment even if an AT command and ring are received together and the incoming call will be answered when S1 is equal to S0. **Note:** SocketModems do not detect ring cadence of TelTone telephone line simulators as a valid ring.

Command: **$SB*n*** **Serial Port Baud Rate**
Values: *n*= speed in bits per second
Default: 115200
Description:

$SB300	Sets serial port to 300 bps
$SB1200	Sets serial port to 1200 bps
$SB2400	Sets serial port to 2400 bps
$SB4800	Sets serial port to 4800 bps
$SB9600	Sets serial port to 9600 bpst
$SB19200	Sets serial port to 19200 bps
$SB38400	Sets serial port to 38400 bps
$SB57600	Sets serial port to 57600 bps
$SB115200	Sets serial port to 115200 bps
$SB230400	Sets serial port to 230400 bps

Command: **+VDR=x, y Distinctive Ring Report**
Values:
x = 0, 1 Distinctive Ring report control. See description.
y = 0–255 Minimum ring interval in 100 ms units. See description.
Default: 0, 0
Description: Enables reporting of ring cadence information to the DTE and specifies the minimum ring cadence that will be reported.

The report format is one line per silence period and one line per ring period. The length of the silence period is in the form DROF=number in units of 100 ms<CR><LF>, and the length of the ring is in the form DRON=number in units of 100 ms<CR> <LF>. The modem may produce a Ring event code after the DRON message if enabled by the y parameter. The y parameter must be set to a value equal to or smaller than the expected ring cadence in order to pass the report to the DTE.

+VDR=0, n/a	Disables Distinctive Ring cadence reporting.
+VDR=1, 0	Enables Distinctive Ring cadence reporting. Other call progress result codes (including RING) are reported as normal.
+VDR=1, >0	Enables Distinctive Ring cadence reporting. The RING result code is reported after the falling edge of the ring pulse (i.e., after the DRON report).

+VDR=? Displays the allowed values.
+VDR? Displays the current value.

Command: **#CBAn** **Callback Attempts**
Values: n = 1–255
Default: 4
Description: Sets the number of callback attempts that are allowed after passwords have been exchanged between modems.

Command: **#CBDn** **Callback Delay**
Values: n = 0–255
Default: 15
Description: Sets the length of time (in seconds) that the modem waits before calling back the remote modem.

Command: **#CBF?** **Callback Failed Attempts Display**
Values: n/a
Default: n/a
Description: Requests the number of failed callback passwords since reset or power-up. This number can be stored to nonvolatile memory using the **&W** command.

Command: **#CBFR** **Callback Failed Attempts Reset**
Values: n/a
Default: n/a
Description: Resets the number of failed callback passwords to 0. This does not reset the number stored in nonvolatile memory.

Command: **#CBIn** **Local Callback Inactivity Timer**
Values: n = 1–255
Default: 20
Description: Sets the time (in minutes) that the modem waits for a command before forcing the user to enter the setup password again.

Command: **#CBNy=x** **Store Callback Password**
Values: y = 0–29
x = password
Defaults: None
Description: Sets the callback security password for the y memory location. The password must have 6 to 10 characters, and cannot include the + or - characters.

Command: **#CBPn** **Callback Parity**
Values: n = 0, 1, or 2
Default: 0
Description: Sets parity for the callback security messages.
#CBP0 No parity.
#CBP1 Odd parity.
#CBP2 Even parity.

Command: **#CBRy** **Callback Security Reset**
Values: y = 0–29
Default: None
Description: Clears the password and phone number in the **y** memory location.

Command: **#CBSn** **Callback Enable/Disable**
Values: n = 0, 1, 2, or 3
Default: 0
Description:
#CBS0 Disables callback security.
#CBS1 Enables local and remote callback security.
#CBS2 Enables remote callback security only.
#CBS3 Disables callback security until local hangup or reset.

Command: **#Pn** **Set 11-bit Parity**
Values: n = 0 or 1
Default: 2
Description:
#P0 No parity.
#P1 Odd parity.
#P2 Even parity.

Command: **#S*x*** **Enter Setup Password**
Values: *x*= password (1–8 characters, case sensitive)
Default: MTSMODEM
Description: Enters the remote configuration setup password.

Command: **#S=*x*** **Store Setup Password**
Values: *x*= password (1–8 characters, case sensitive)
Default: MTSMODEM
Description: Stores a new remote configuration setup password.

Escape AT Commands

Command: **+++AT<CR>** **Escape Sequence**
Values: n/a
Description: Puts the modem in command mode (and optionally issues a command) while remaining online. Type **+++AT** and up to six optional command characters; then press ENTER. Used mostly to issue the hang-up command: **+++ATH<CR>**.

Command: **%%%ATMTSMODEM<CR>** **Remote Configuration Escape Sequence**
Values: n/a
Description: Initiates remote configuration mode while online with remote modem. The remote configuration escape character (%) is defined in register **S13**.

V.92 Commands

Command: **+MS=** **Modulation Selection**
Values: See description.
Defaults: See description.
Description: This extended-format command selects modulation, enables or disables automode, and specifies the highest downstream and upstream connection rates using one to four subparameters.
The command syntax is
+MS=[mod][,[automode][,[0][,[max_rate][,[0][,[max_rx_rate]]]]]]<CR>
Subparameters that are not entered retain their current value. Commas separate optional subparameters, and must be inserted to skip a subparameter. Example: +MS=,0<CR> disables automode and keeps all other settings at their current values.

+MS=? Reports supported options in the format (list of supported mod values),(list of supported automode values),(0),(list of supported max_rate values),(0),(list of supported max_rx_rate values). Example: +MS: (BELL103, V21, BELL212A, V22, V22B, V23C, V32, V32B, V34, V90, V92), (0, 1), (0), (0-33600), (0), (0-56000)

+MS? Reports current options in the format mod, automode, 0, max_rate, 0, max_rx_rate. Example: +MS: V92, 1, 0, 31200, 0, 56000.

Subparameters

mod Specifies the preferred modulation (automode enabled) or the modulation to use in originating or answering a connection (automode disabled). The default is V92.

mod	**Modulation**	**Possible rates (bps)[1]**
V92[2]	V92	56000, 54666, 53333, 52000, 50666, 49333, 48000, 46666, 45333, 44000,
V903	V.90	56000, 54666, 53333, 52000, 50666, 49333, 48000, 46666, 45333, 44000,
V34	V.34	33600, 31200, 28800, 26400, 24000, 21600,19200, 16800, 14400, 12000,
V32B	V.32bis	14400, 12000, 9600, 7200, or 4800
V32	V.32	9600 or 4800
V22B	V.22bis	2400 or 1200
V22	V.22	1200
V23C	V.23	1200
V21	V.21	300
Bell212A	Bell 212A	1200
Bell103	Bell 103	300

Notes:
1. See optional <*automode*>, <*max_rate*>, and <*max_RX_rate*> subparameters.
2. Selects V.92 modulation as first priority. If a V.92 connection cannot be established, the modem attempts V.90, V.34, V.32bis, etc.
3. Selects V.90 modulation as first priority. If a V.90 connection cannot be established, the modem attempts V.34, V.32bis, etc.

automode An optional numeric value that enables or disables automatic modulation negotiation using V.8 bis/V.8 or V.32 bis Annex A. Automode is disabled if values are specified for the max_rate and max_rx_rate parameters. The options are:

0 Disable automode

1 Enable automode (default)

max_rate An optional number that specifies the highest rate at which the modem may establish an upstream (transmit) connection. The value is decimal coded in units of bps, for example, 33600 specifies the highest rate to be 33600 bps.

0 Maximum rate determined by the modulation selected in mod (default).

300–33600 Maximum rate value limited by the modulation selected in mod. For valid max_rate values for each mod value, see the following table.

mod value	Valid *max_rate* values (bps)
V92, V90, V34	31200, 28800, 26400, 24000, 21600,19200, 16800, 14400, 12000, 9600, 7200,
V32B	19200, 16800, 14400, 12000, 9600, 7200, 4800
V32	14400, 12000, 9600, 7200, 4800
V22B	2400
V22, V23C, Bell212A	1200
V21, Bell103	300

max_rx_rate An optional number that specifies the highest rate at which the modem may establish a downstream (receive) connection. The value is decimal coded in units of bps, e.g., 28800 specifies the highest rate to be 28800 bps.

0 Maximum rate determined by the modulation selected in *mod* (default).

300–56000 Maximum rate value limited by the modulation selected in *mod*. See “Possible rates” in the *mod* table.

Command: **+PCW=n** **Call Waiting Enable**
Values: n = 0, 1, or 2
Default: 2
Description: Controls the action to be taken upon detection of a call waiting tone in V.92 mode. Values specified by this command are not modified when an **AT&F** command is issued.

+PCW=0 Toggles V.24 Circuit 125 and collects Caller ID if enabled by +VCID
+PCW=1 Hangs up
+PCW=2 Ignores V.92 call waiting
+PCW=? Displays the allowed values
+PCW? Displays the current value

Command: **+PIG=n** **PCM Upstream Ignore**
Values: n = 0 or 1
Default: 1
Description: Controls the use of PCM upstream during V.92 operation. PCM upstream allows faster upload speeds to a V.92 server.

+PIG=0 Disables PCM upstream
+PIG=1 Enables PCM upstream
+PIG=? Displays the allowed values
+PIG? Displays the current value

Command: **+PMH=n** **Modem on Hold Enable**
Values: n = 0 or 1
Default: 1
Description: Controls if modem on hold procedures are enabled during V.92 operation. Normally controlled by a modem on hold program. Values specified by this command are not modified when an **AT&F** command is issued.

+PMH=0 Enables V.92 modem on hold
+PMH=1 Disables V.92 modem on hold
+PMH=? Displays the allowed values
+PMH? Displays the current value

Command: **+PMHF** **V.92 Modem Hook Flash**
Values: n/a
Default: n/a
Description: Causes the DCE to go on-hook for a specified period of time, and then return off-hook for at least a specified period of time. The specified period of time is normally one-half second, but may be governed by national regulations. “ERROR” is returned if MOH is not enabled.

Command: **+PMHR=n** **Modem on Hold Initiate**
Values: n = 0–13
Default: 0
Description: +PMHR is an action command that causes the modem to initiate MOH with the central site modem. It returns the following values to indicate what has been negotiated. Valid only if MOH is enabled and the modem is off-hook or in data mode. Otherwise, ERROR will be returned.

+PMHR=0	Deny MOH request
+PMHR=1	Grant MOH request with 10 second timeout
+PMHR=2	Grant MOH request with 20 second timeout
+PMHR=3	Grant MOH request with 30 second timeout
+PMHR=4	Grant MOH request with 40 second timeout
+PMHR=5	Grant MOH request with 1 minute timeout
+PMHR=6	Grant MOH request with 2 minute timeout
+PMHR=7	Grant MOH request with 3 minute timeout
+PMHR=8	Grant MOH request with 4 minute timeout
+PMHR=9	Grant MOH request with 6 minute timeout
+PMHR=10	Grant MOH request with 8 minute timeout
+PMHR=11	Grant MOH request with 12 minute timeout
+PMHR=12	Grant MOH request with 16 minute timeout
+PMHR=13	Grant MOH request with indefinite timeout
+PMHR=?	Displays the allowed values
+PMHR?	Displays the current value

Command: **+PMHT=n** **Modem on Hold Timer**
Values: *n* = 0–13
Default: 0
Description: Determines if the modem will accept a V.92 Modem on Hold (MOH) request and will set the MoH timeout.

+PMHT=0	Deny MOH request
+PMHT=1	Grant MOH request with 10 second timeout
+PMHT=2	Grant MOH request with 20 second timeout
+PMHT=3	Grant MOH request with 30 second timeout
+PMHT=4	Grant MOH request with 40 second timeout
+PMHT=5	Grant MOH request with 1 minute timeout
+PMHT=6	Grant MOH request with 2 minute timeout
+PMHT=7	Grant MOH request with 3 minute timeout
+PMHT=8	Grant MOH request with 4 minute timeout
+PMHT=9	Grant MOH request with 6 minute timeout
+PMHT=10	Grant MOH request with 8 minute timeout
+PMHT=11	Grant MOH request with 12 minute timeout
+PMHT=12	Grant MOH request with 16 minute timeout
+PMHT=13	Grant MOH request with indefinite timeout
+PMHT=?	Displays the allowed values
+PMHT?	Displays the current value

Command: **+PQC=n** **Quick Connect Control**
Values: n = 0, 1, 2, or 3
Default: 3
Description: Controls V.92 shortened Phase 1 and Phase 2 startup procedures (Quick Connect). When line conditions are stable, quick connect results in shortened connect times; however, significant fluctuation in line conditions from call to call can cause longer connect times; thus, it may be advisable to disable quick connect.

+PQC=0	Enables Short Phase 1 and Short Phase 2 (Quick Connect)
+PQC=1	Enables Short Phase 1
+PQC=2	Enables Short Phase 2
+PQC=3	Disables Short Phase 1 and Short Phase 2
+PQC=?	Displays the allowed values
+PQC?	Displays the current value

Command: **+VCID=n** **Caller ID Selection**
Values: n = 0, 1, or 2
Default: 0
Description: Enables Caller ID detection and configures the reporting and presentation of the Caller ID data that is detected after the first ring. The reported data includes the date and time of the call, the caller's name and number, and a message. Set S0=2.

+VCID=0	Disables Caller ID
+VCID=1	Enables Caller ID with formatted data
+VCID=2	Enables Caller ID with unformatted data
+VCID=?	Displays the allowed values
+VCID?	Displays the current value

Command: **+VDR=x, y** **Distinctive Ring Report**
Values: x = 0, 1 Distinctive Ring report control. See description.
y = 0–255 Minimum ring interval in 100 ms units. See description.
Default: 0, 0
Description: Enables reporting of ring cadence information to the DTE and specifies the minimum ring cadence that will be reported.
Report format is one line per silence period and one line per ring period. The length of the silence period is in the form DROF=number in units of 100 ms<CR><LF>, and the length of the ring is in the form DRON=number in units of 100 ms<CR> <LF>. The modem may produce a Ring event code after the DRON message if enabled by the y parameter. The *y* parameter must be set to a value equal to or smaller than the expected ring cadence in order to pass the report to the DTE.

+VDR=0, n/a	Disables Distinctive Ring cadence reporting.
+VDR=1, 0	Enables Distinctive Ring cadence reporting. Other call progress result codes (including RING) are reported as normal.
+VDR=1, >0	Enables Distinctive Ring cadence reporting. RING result code is reported after falling edge of the ring pulse (after the DRON report).
+VDR=?	Displays the allowed values.
+VDR?	Displays the current value.

Command: **#CBAn** **Callback Attempts**
Values: n = 1–255
Default: 4
Description: Sets the number of callback attempts that are allowed after passwords have been exchanged between modems.

Command: **#CBDn** **Callback Delay**
Values: n = 0–255
Default: 15
Description: Sets the length of time (in seconds) that the modem waits before calling back the remote modem.

Command: **#CBF?** **Callback Failed Attempts Display**
Values: n/a
Default: n/a
Description: Requests the number of failed callback passwords since reset or power-up. This number can be stored to nonvolatile memory using the &W command.

Command: **#CBFR** **Callback Failed Attempts Reset**
Values: n/a
Default: n/a
Description: Resets the number of failed callback passwords to 0. This does not reset the number stored in nonvolatile memory.

Command: **#CBIn** **Local Callback Inactivity Timer**
Values: n = 1–255
Default: 20
Description: Sets the time (in minutes) that the modem waits for a command before forcing the user to enter the setup password again.

Command: **#CBNy=x** **Store Callback Password**
Values: y = 0–29
x = password
Defaults: None
Description: Sets the callback security password for the y memory location. The password must have 6 to 10 characters, and cannot include the + or - characters.

Command: **#CBPn** **Callback Parity**
Values: n = 0, 1, or 2
Default: 0
Description: Sets parity for the callback security messages.
#CBP0 No parity.
#CBP1 Odd parity.
#CBP2 Even parity.

Command: **#CBRy** **Callback Security Reset**
Values: y = 0–29
Default: None
Description: Clears the password and phone number in the y memory location.

Command: **#CBSn** **Callback Enable/Disable**
Values: n = 0, 1, 2, or 3
Default: 0
Description:
#CBS0 Disables callback security.
#CBS1 Enables local and remote callback security.
#CBS2 Enables remote callback security only.
#CBS3 Disables callback security until local hangup or reset.

Command: **#Pn** **Set 11-bit Parity**
Values: n = 0 or 1
Default: 2
Description:
#P0 No parity.
#P1 Odd parity.
#P2 Even parity.

Command: **#Sx** **Enter Setup Password**
Values: x= password (1–8 characters, case sensitive)
Default: MTSMODEM
Description: Enters the callback security setup password.

Command: **#S=x** **Store Setup Password**
Values: x= password (1–8 characters, case sensitive)
Default: MTSMODEM
Description: Stores a new callback security and remote configuration setup password.

S-Registers

Certain modem values, or parameters, are stored in memory locations called S-Registers. Use the **S** command to read or to alter the contents of S-Registers (see previous section).

Register	Unit	Range	Default	Description
S0	1 ring	0, 1–255	1	Sets the number of rings until the modem answers. ATS0=0 disables auto answer completely.
S1	1 ring	0–255	0	Counts the rings that have occurred.
S2	decimal	0–127 128–255	43 (+)	Sets ASCII code for the escape sequence character. Values greater than 127 disable escape.
S3	decimal	0–127	13 (^M)	Sets the ASCII code for the carriage return character.
S4	decimal	0–127	10 (^J)	Sets the ASCII code for the line feed character.
S5	decimal	0–32 33–127	8 (^H)	Sets the ASCII code for the backspace character. Values greater than 32 disable backspace.
S6	seconds	2–65*	2*	Sets the time the modem waits after it goes off-hook before it begins to dial the telephone number.
S7	seconds	35-65*	50*	Sets the time the modem waits for a carrier signal before aborting a call. Also sets the wait for silence time for the @ dial modifier.
S8	seconds	0–65	2	Sets the length of a pause caused by a comma character in a dialing command.
S9	decimal	0, 1–127	37 (%)	Sets ASCII code for remote configuration escape character. **S9=0** disables remote configuration.
S10	100 ms	1–254	20	Sets how long a carrier signal must be lost before the modem disconnects.
S11	1 ms	50–150*	95*	Sets spacing and duration of dialing tones.
S28	decimal	0, 1–255	1	0 disables, 1–255 enables V.34 modulation.
S30	1 minute	0, 1–255	0	Sets the length of time that the modem waits before disconnecting when no data is sent or received. A value of zero disables the timer. See also the **\T** command
S35	decimal	0–1	1	0 disables, 1 enables the V.25 calling tone, which allows remote data/fax/voice discrimination.
S36	decimal	0–7	7	Specifies the action to take in the event of a negotiation failure when error control is selected. (See **S48**.)
S37	decimal	0–19	0	Sets the maximum V.34 “upstream” speed at which the modem attempts to connect. 0 = maximum speed 1 = reserved 2 = 1200/75 bps 3 = 300 bps 4 = reserved 5 = 1200 bps 6 = 2400 bps

				7 = 4800 bps 8 = 7200 bps 9 = 9600 bps 10 = 12000 bps 11 = 14400 bps 12 = 16800 bps 13 = 19200 bps 14 = 21600 bps 15 = 24000 bps 16 = 26400 bps 17 = 28800 bps 18 = 31200 bps 19 = 33600 bps
S38	decimal	0–23	1	Sets "downstream" data rate where V.90 provides rates of 28,000 to 56,000 bps in increments of 1,333 bps. 0 = V.90 disabled 1 = V.90 auto rate 2 = 28,000 bps 3 = 29,333 bps 4 = 30,666 bps 5 = 32,000 bps 6 = 33,333 bps 7 = 34,666 bps 8 = 36,000 bps 9 = 37,333 bps 10 = 38,666 bps 11 = 40,000 bps 12 = 41,333 bps 13 = 42,666 bps 14 = 44,000 bps 15 = 45,333 bps 16 = 46,666 bps 17 = 48,000 bps 18 = 49,333 bps 19 = 50,666 bps 20 = 52,000 bps 21 = 53,333 bps 22 = 54,666 bps 23 = 56,000 bps **Upstream data rates:** Upstream V.90 data rates are 4800 to 33,600 bps in 2400 bps increments.
S43	decimal	0–1	1	For testing and debugging only. Enables/disables V.32bis start-up auto mode operation. 0 = disable; 1 = enable.
S48	decimal	7 or 128	7	Enables (7) or disables (128) LAPM negotiation. The following table lists the **S36** and **S48** configuration settings for certain types of connections.

	S48=7	**S48=128**
S36=0, 2	LAPM or hang up	Do not use
S36=1, 3	LAPM or async	Async
S36=4, 6	LAPM, MNP, or hang up	MNP or hang up
S36=5, 7	LAPM, MNP, or async	MNP or async

S89	seconds	0, 5–255	10	Sets the length of time in the off-line command mode before the modem goes into standby mode or “sleep mode”. A value of zero prevents standby mode; a value of 1–4 sets the value to 5. Standby mode (sleep mode or low power mode) is controlled by **S89**. It programs the number of seconds of inactivity before the modem will go to sleep. The default value is 0. A value of 0 disables standby mode. The modem will wake on an incoming ring or an AT command.
S108	decimal	0–3, 6, 7	6	Selects the 56K digital loss if using the modem through a PBX line. The default value is -6 dB loss, the value used when calling from a typical POTS line long distance. 0 = -0 dB digital loss, no robbed-bit signaling 1 = -3 dB PBX digital loss 2 = -2 dB digital loss 3 = -3 dB digital loss 6 = -6 dB digital loss 7 = -0 dB digital loss with robbed-bit signaling

Result Codes

In command mode your modem can send responses called **Result Codes** to your computer. Result codes are used by communications programs and can also appear on your monitor.

Terse	Verbose	Description
0	OK	Command executed
1	CONNECT	Modem connected to line
2	RING	Ring signal detected
3	NO CARRIER	Carrier signal lost or not detected
4	ERROR	Invalid command
5 *	CONNECT 1200	Connected at 1200 bps
6	NO DIALTONE	No dial tone detected
7	BUSY	Busy signal detected
8	NO ANSWER	No answer at remote end
9	CONNECT 75	Connected at 75 bps
10*	CONNECT 2400	Connected at 2400 bps
11*	CONNECT 4800	Connected at 4800 bps
12*	CONNECT 9600	Connected at 9600 bps
13*	CONNECT 14400	Connected at 14400 bps
14*	CONNECT 19200	Connected at 19200 bps
18	CONNECT 57600	Connected at 57600 bps
24*	CONNECT 7200	Connected at 7200 bps
25*	CONNECT 12000	Connected at 12000 bps
28	CONNECT 38400	Connected at 38400 bps
40*	CONNECT 300	Connected at 300 bps
55*	CONNECT 21600	Connected at 21600 bps
56*	CONNECT 24000	Connected at 24000 bps
57*	CONNECT 26400	Connected at 26400 bps
58*	CONNECT 28800	Connected at 28800 bps
59*	CONNECT 31200	Connected at 31200 bps
60*	CONNECT 33600	Connected at 33600 bps
70	CONNECT 32000	Connected at 32000 bps
71	CONNECT 34000	Connected at 34000 bps
72	CONNECT 36000	Connected at 36000 bps
73	CONNECT 38000	Connected at 38000 bps
74	CONNECT 40000	Connected at 40000 bps
75	CONNECT 42000	Connected at 42000 bps
76	CONNECT 44000	Connected at 44000 bps

77	CONNECT 46000	Connected at 46000 bps
78	CONNECT 48000	Connected at 48000 bps
79	CONNECT 50000	Connected at 50000 bps
80	CONNECT 52000	Connected at 52000 bps
81	CONNECT 54000	Connected at 54000 bps
82	CONNECT 56000	Connected at 56000 bps
83	CONNECT 58000	Connected at 58000 bps
84	CONNECT 60000	Connected at 60000 bps
86	CONNECT 16800	Connected at 16800 bps
87	CONNECT 115200	Connected at 115200 bps
88	DELAYED	Delay is in effect for the dialed number
89	BLACKLISTED	Dialed number is blacklisted
90	BLACKLIST FULL	Blacklist is full
91	CONNECT 230400	Connected at 230400 bps
100	CONNECT 28000	Connected at 28000 bps
101	CONNECT 29333	Connected at 29333 bps
102	CONNECT 30666	Connected at 30666 bps
103	CONNECT 33333	Connected at 33333 bps
104	CONNECT 34666	Connected at 34666 bps
105	CONNECT 37333	Connected at 37333 bps
106	CONNECT 38666	Connected at 38666 bps
107	CONNECT 41333	Connected at 41333 bps
108	CONNECT 42666	Connected at 42666 bps
109	CONNECT 45333	Connected at 45333 bps
110	CONNECT 46666	Connected at 46666 bps
111	CONNECT 49333	Connected at 49333 bps
112	CONNECT 50666	Connected at 50666 bps
113	CONNECT 53333	Connected at 53333 bps
114	CONNECT 54666	Connected at 54666 bps
115	CONNECT 25333	Connected at 25333 bps
116	CONNECT 26666	Connected at 26666 bps

* EC is added to these result codes when the extended result codes configuration option is enabled. EC is replaced by one of the following codes, depending on the type of error control connection:

V42bis – V.42 error control (LAP-M) and V.42bis data compression
V42 – V.42 error control (LAP-M) only
MNP5 – MNP 4 error control and MNP 5 data compression
MNP4 – MNP 4 error control only
NoEC – No error control protocol).

Appendix D DC Power

D.1 Installation

Materials:

- Small flat-blade screwdriver
- Wire stripper
- DC power connector kit
- Wires to 48 VDC power (See Appendix D.3)

1.Turn off the circuit breaker to the DC power supply.

2.Select a three-wire set (-48V, -48 Return, and Power Supply Ground) from the power supply.

3.Strip 0.35 inches (9 mm) of installation from each wire.

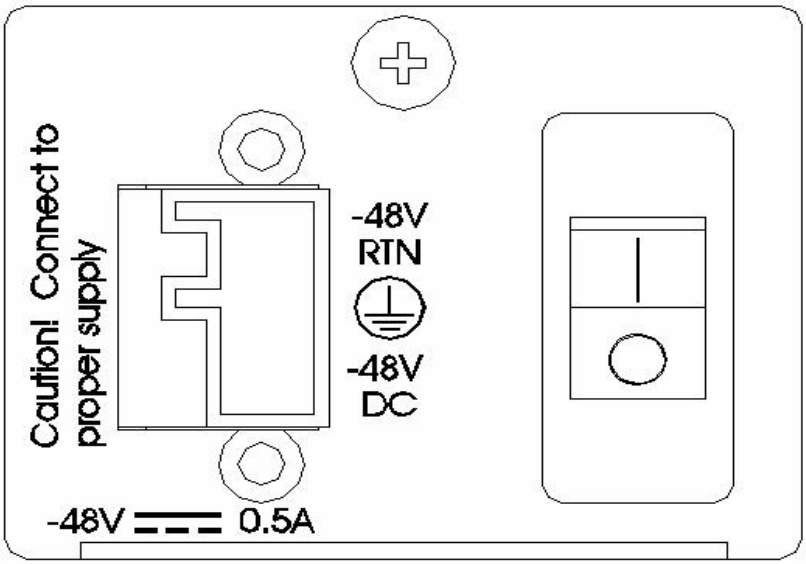
4.Insert a small flat-blade screwdriver in the provided connector to depress the internal wire clamp.

5.Insert the appropriate wire into the connector. Remove the screwdriver.

Check that the clamp has captured the wire. Repeat steps 4 and 5 for all wires.

6.Attach the provided strain relief to the connector. Be sure to use a tie-wrap to firmly attach the strain relief to the cable.

7.Attach the connector to the socket on the back of the Console Server. Repeat the above steps to attach each power module input



Panel View of the DC Power Supply

Input voltage:-48VDC
Minimum voltage:-40 VDC
Maximum voltage:-60 VDC
Maximum operating current:0.5A

The DC power source must be:

- Electrically isolated from any AC source
- Reliably connected to earth
- Capable of providing up to 100 Watts of continuous power

D.2 Overcurrent Protection

Overcurrent protection requirements:

- 10 Amp trip
- double pole
- fast trip
- DC rated

"Overcurrent protection devices (e.g., circuit breakers) must be provided as part of each equipment rack, and are not included with the Console Server.

"The device must be located between the DC power source and the Console Server.

D.3 DC Supply Connector

The supply input connectors are provided with each Console Server. However, the conductors are not. See below for conductor specifications.

Conductor material: copper only

Wire gauge:16 AWG

Insulation rating:75 °C minimum, low smoke fume, flame retardant

Branch circuit cable insulation color:per applicable national electrical codes

Grounding cable insulation color:green/yellow

The cable type should be one of the following:

- UL style 1028 or other UL 1581 (VW-1) compliant equivalent
- IEEE 383 compliant
- IEEE 1202-1991 compliant

Appendix E Assigning IP Addresses to a Device Port

Version 1.7-9 of the SCS software now offers the ability to assign an IP address to the SCS's device ports. With this feature, the user can use ssh to access a port directly without having to first login to the SCS. If DNS is used to give names to each address, it becomes easier to associate device ports with the corresponding server.

In order to accomplish this, it was necessary to modify the openSSH server code. The SCS ships with the original ssh code installed and running. Several steps must be taken by the user to start using the modified ssh program and to assign the addresses to the device ports. There is a README file called: /usr/local/doc/README.lsisshd that explains the steps to use the feature.

In general, the steps are:

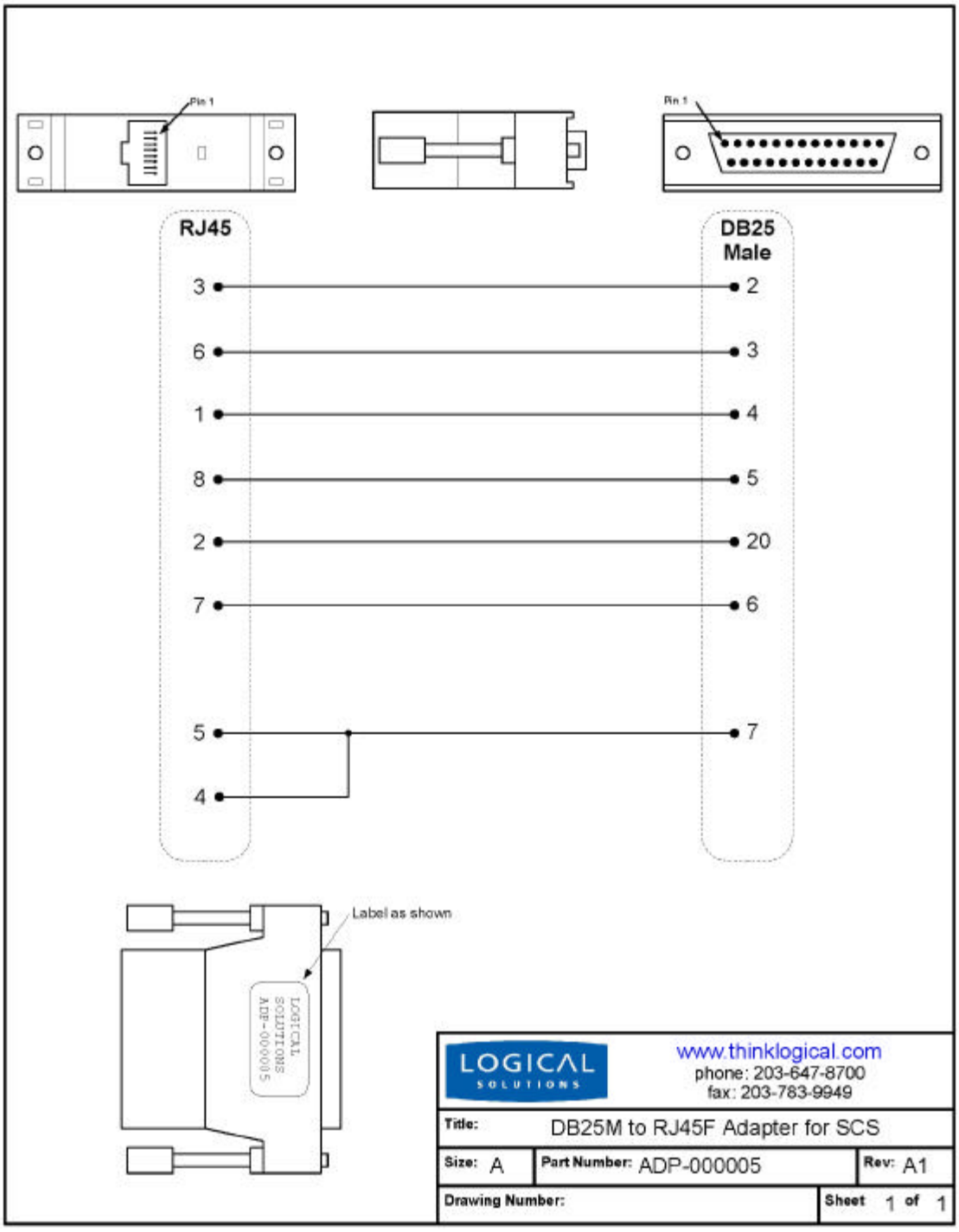
1. run a makefile to replace the original ssh with our modified version
2. edit the configuration file that defines the IP addressing
3. run a makefile that creates the IP configuration

Appendix F Adapter Pinouts

The following pages show the pinout drawings for the adapters which are supplied in the accessory kit with each Console Server.

KIT-000001 contains:

- ADP-000005
- ADP-000006
- ADP-000007
- ADP-000008
- ADP-000009
- ADP-000010
- ADP-000011
- ADP-000012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Pin 1
RJ45
DB25
Male
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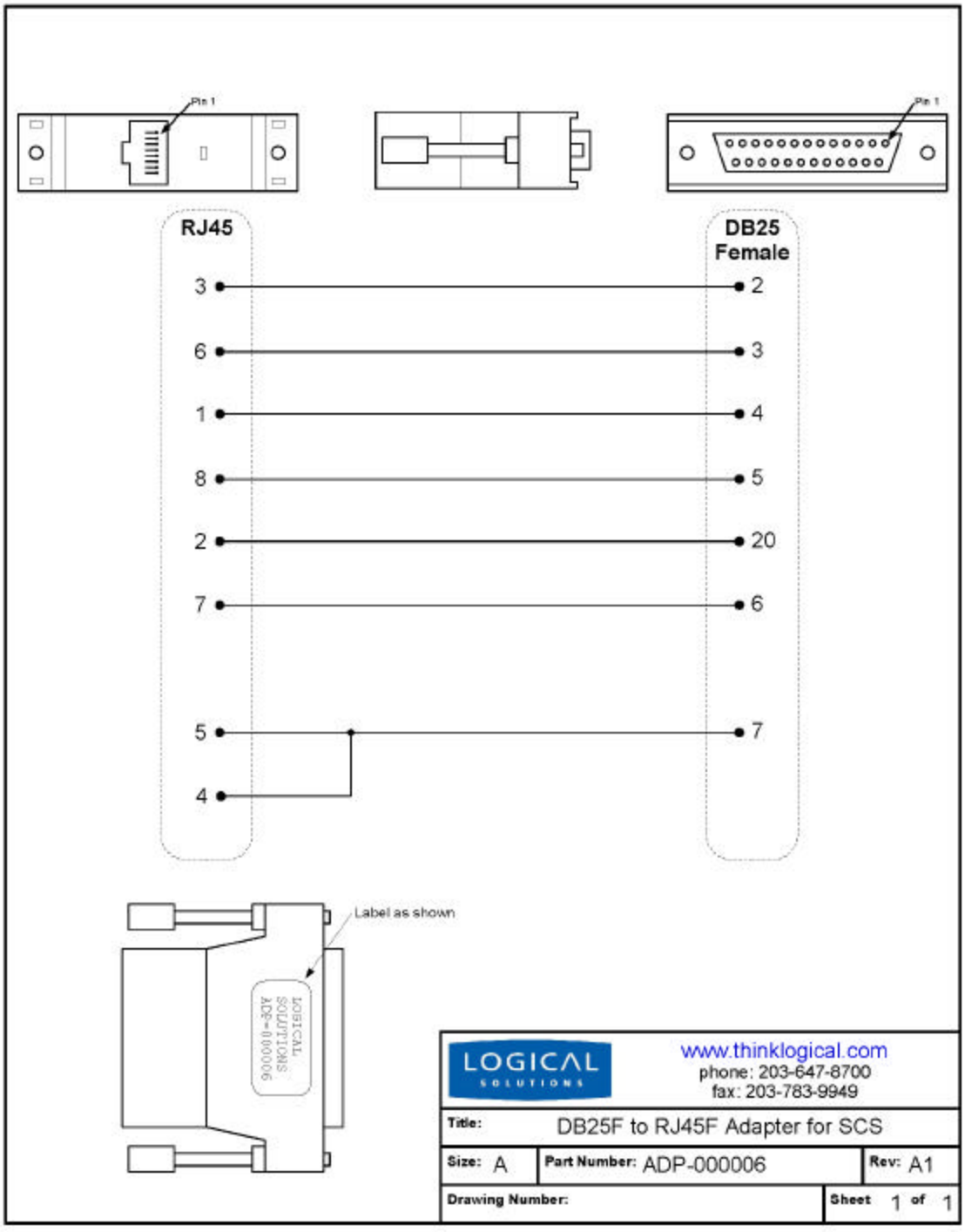
2
6
3
1
4
8
5
2
20
7
6
5
7
4
Label as shown
LOGICAL
SOLUTIONS
ADP-000005
LOGICAL
SOLUTIONS
www.thinklogical.com
phone: 203-647-8700
fax: 203-783-9949
Title:
DB25M to RJ45F Adapter for SCS
Size: A
Part Number: ADP-000005
Rev: A1
Drawing Number:
Sheet 1 of 1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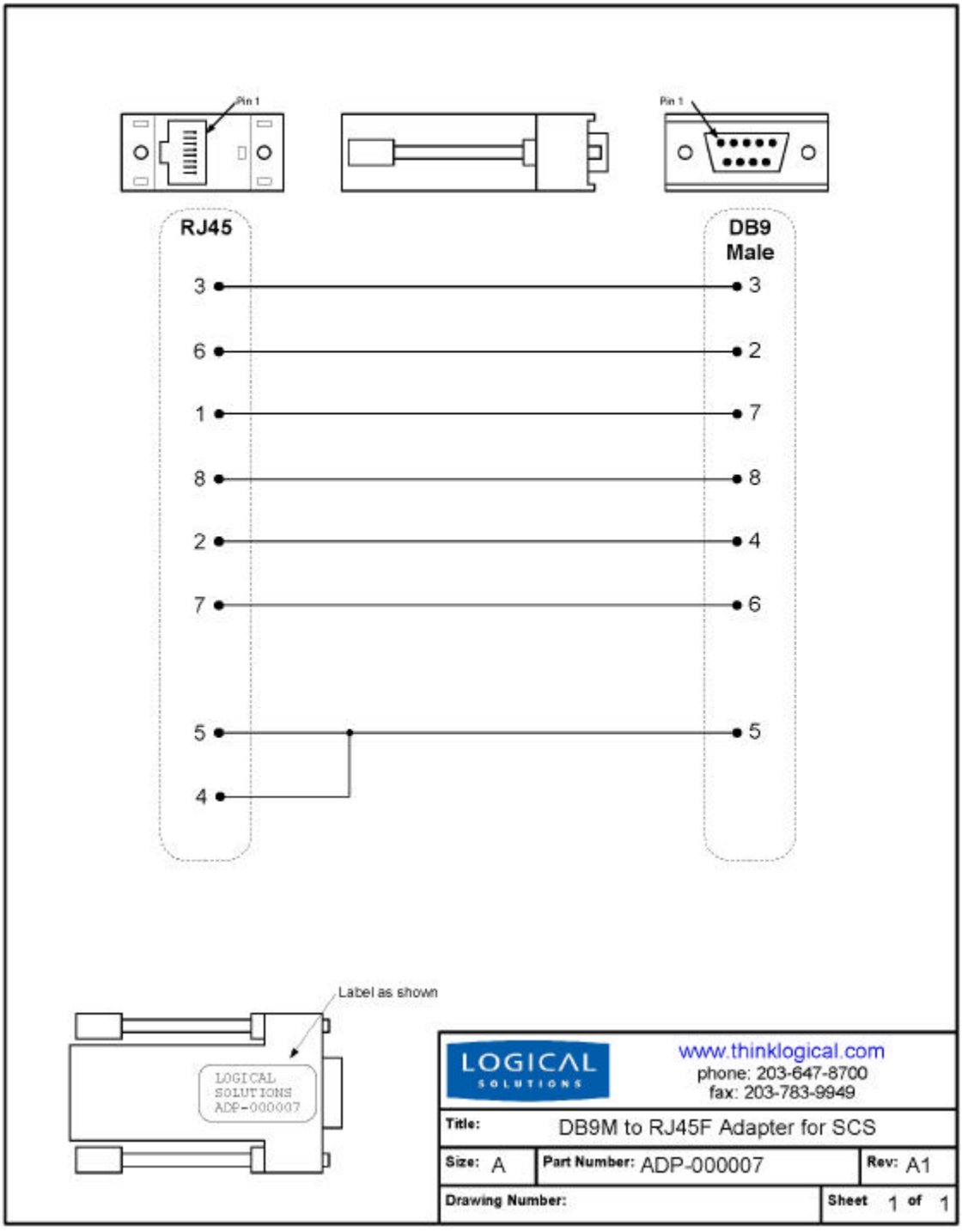
Label as shown
LOGICAL
SOLUTIONS
ADP-000006
LOGICAL
SOLUTIONS
www.thinklogical.com
phone: 203-647-8700
fax: 203-783-9949
Title:
DB25F to RJ45F Adapter for SCS
Size: A
Part Number: ADP-000006
Rev: A1
Drawing Number:
Sheet 1 of 1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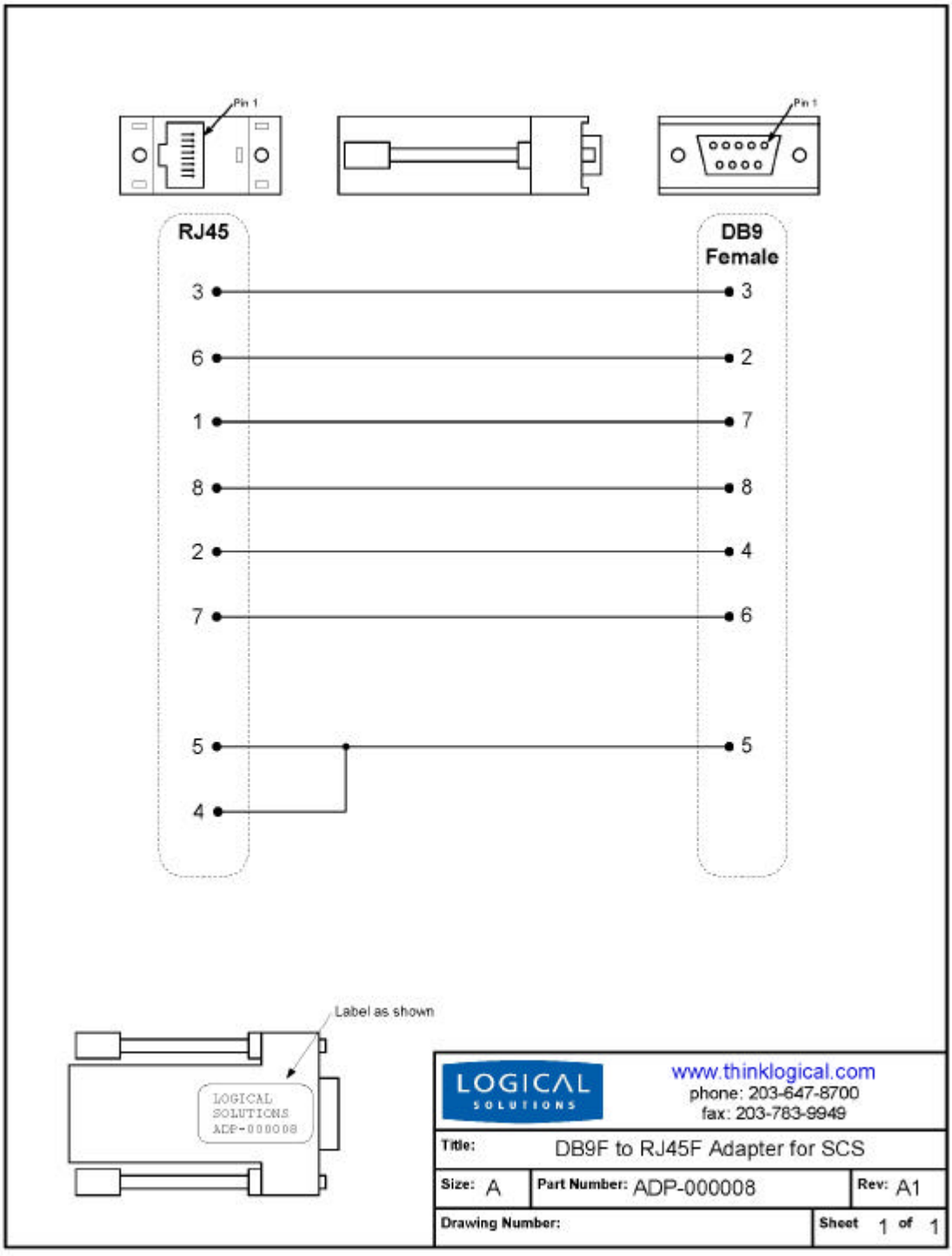
Label as shown
LOGICAL
SOLUTIONS
ADP-000007
LOGICAL
SOLUTIONS
www.thinklogical.com
phone: 203-647-8700
fax: 203-783-9949
Title:
DB9M to RJ45F Adapter for SCS
Size: A
Part Number: ADP-000007
Rev: A1
Drawing Number:
Sheet 1 of 1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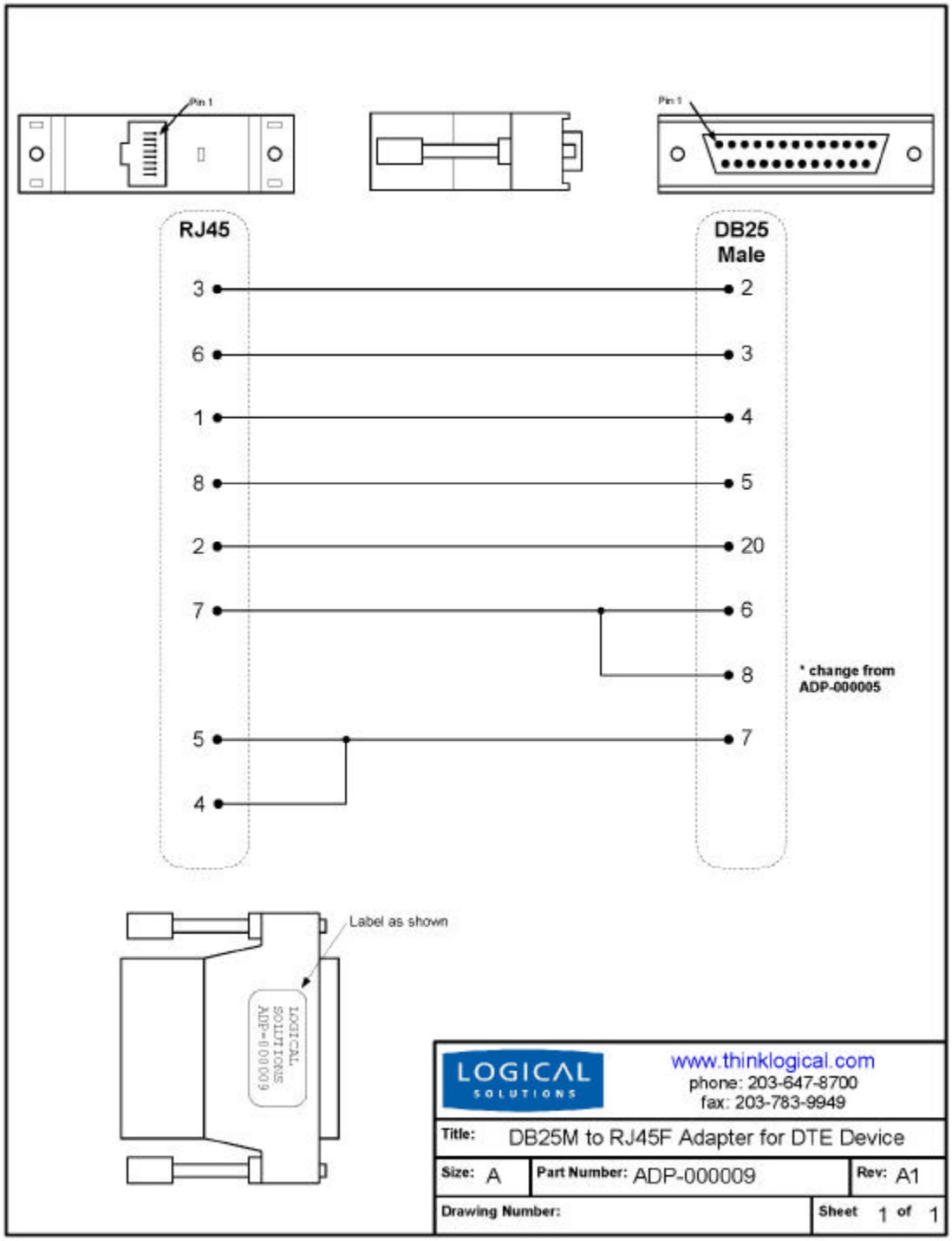
LOGICAL
SOLUTIONS
ADP-000008
LOGICAL
SOLUTIONS
www.thinklogical.com
phone: 203-647-8700
fax: 203-783-9949
Title:
DB9F to RJ45F Adapter for SCS
Size: A
Part Number: ADP-000008
Rev: A1
Drawing Number:
Sheet 1 of 1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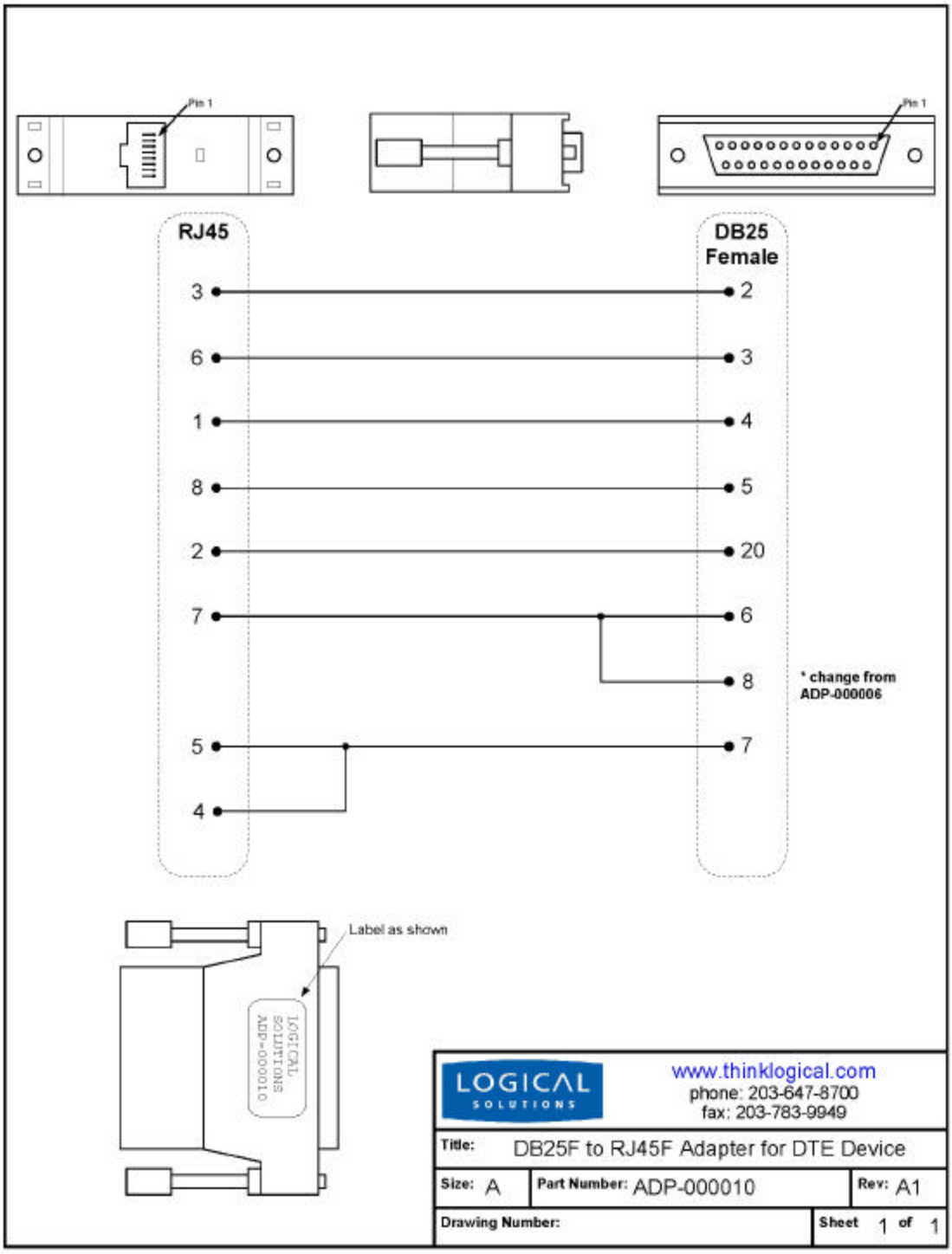
4
* change from
ADP-000005
Label as shown
LOGICAL
SOLUTIONS
ADP-000009
LOGICAL
SOLUTIONS
www.thinklogical.com
phone: 203-647-8700
fax: 203-783-9949
Title: DB25M to RJ45F Adapter for DTE Device
Size: A
Part Number: ADP-000009
Rev: A1
Drawing Number:
Sheet 1 of 1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DB25
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7
* change from
ADP-000006
Label as shown
LOGICAL
SOLUTIONS
ADP-000010
LOGICAL
SOLUTIONS
www.thinklogical.com
phone: 203-647-8700
fax: 203-783-9949
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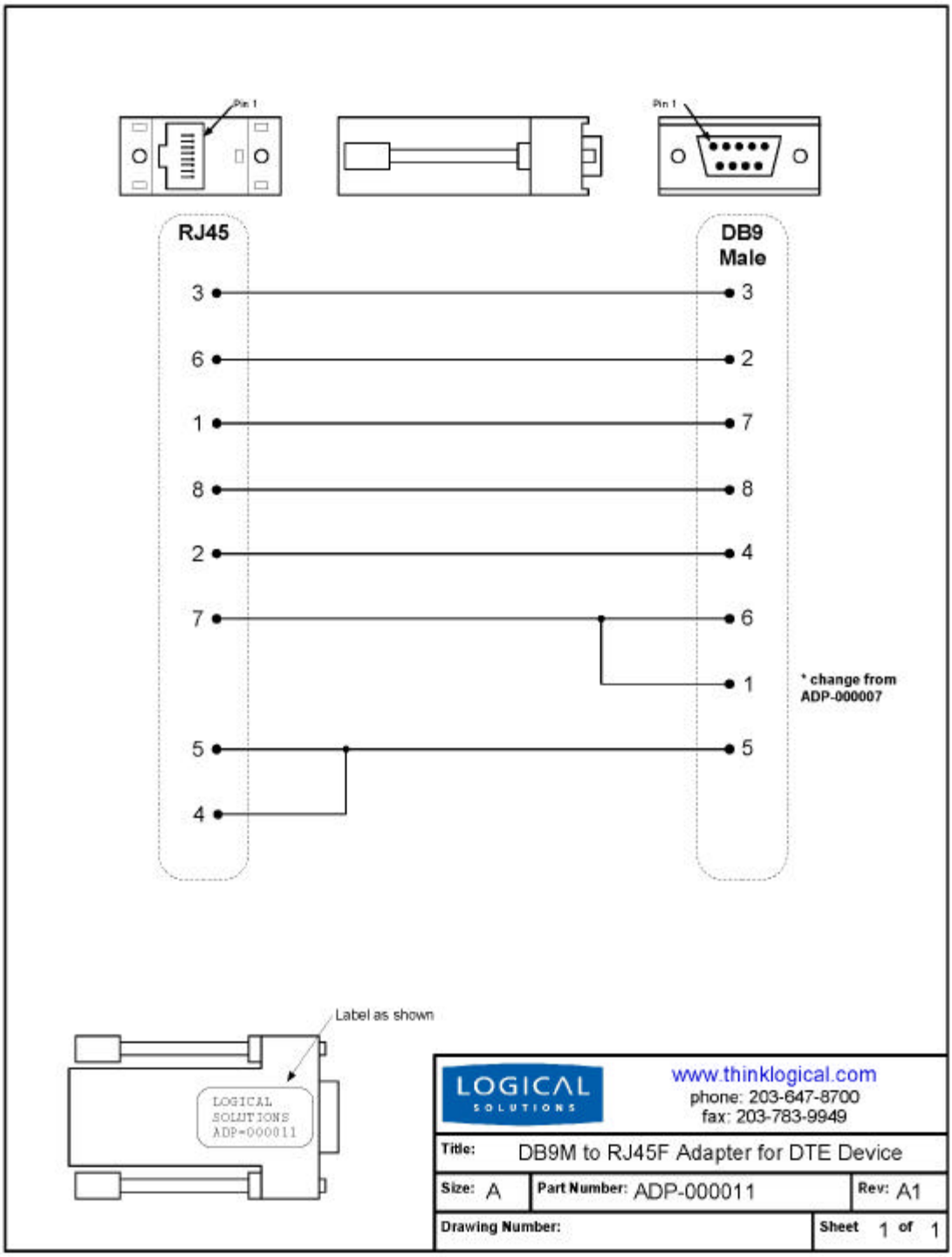
Size: A
Part Number: ADP-000010
Rev: A1
Drawing Number:
Sheet 1 of 1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6
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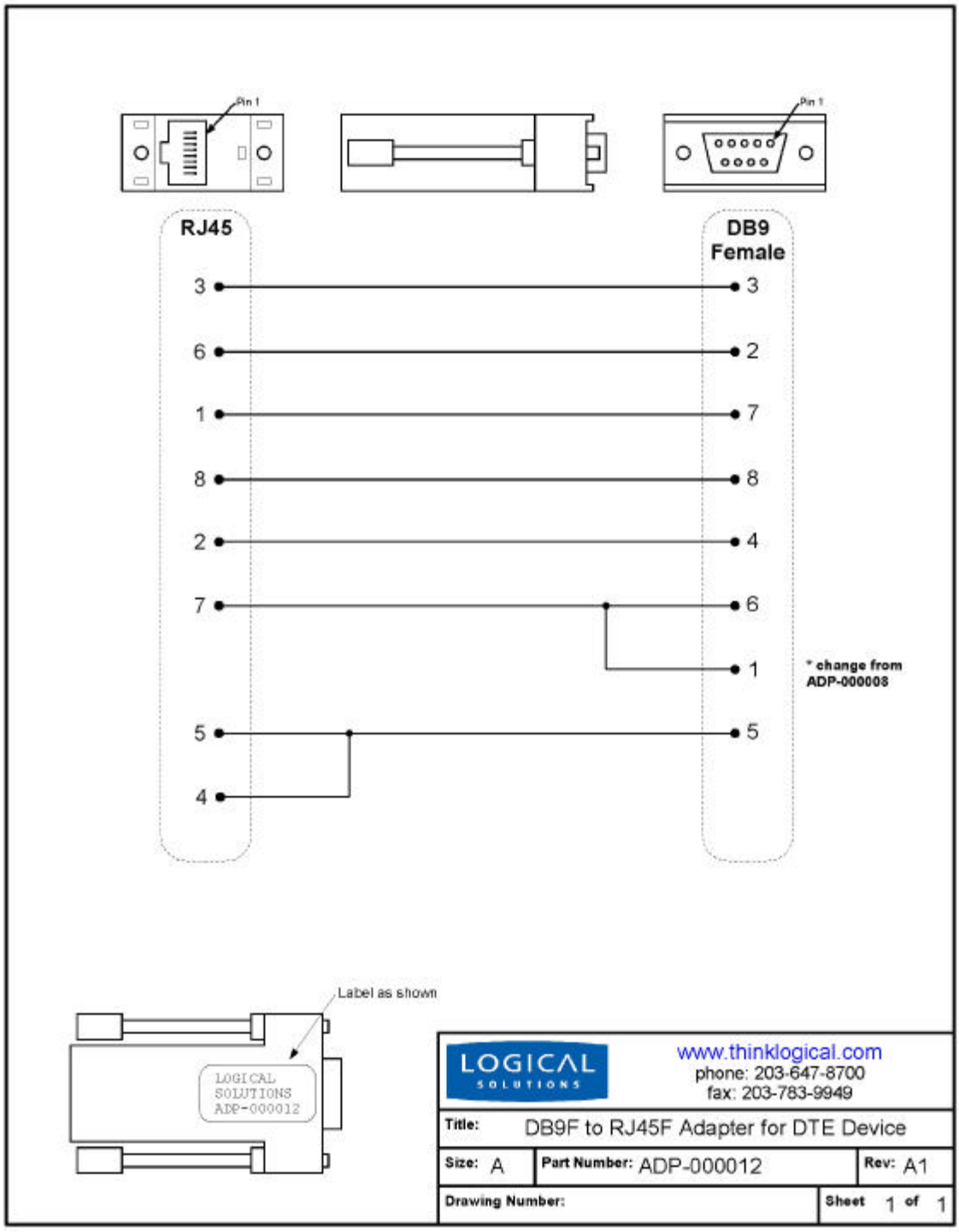
5
* change from
ADP-000007
Label as shown
LOGICAL
SOLUTIONS
ADP-000011
LOGICAL
SOLUTIONS
www.thinklogical.com
phone: 203-647-8700
fax: 203-783-9949
Title:
DB9M to RJ45F Adapter for DTE Device
Size: A
Part Number: ADP-000011
Rev: A1
Drawing Number:
Sheet 1 of 1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6
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5
* change from
ADP-000008
Label as shown
LOGICAL
SOLUTIONS
ADP-000012
LOGICAL
SOLUTIONS
www.thinklogical.com
phone: 203-647-8700
fax: 203-783-9949
Title: DB9F to RJ45F Adapter for DTE Device
Size: A
Part Number: ADP-000012
Rev: A1
Drawing Number:
Sheet 1 of 1