

Patton Electronics Company, Inc.

7622 Rickenbacker Drive
Gaithersburg, MD 20879 USA
tel: +1 (301) 975-1000
fax: +1 (301) 869-9293
support: +1 (301) 975-1007
web: www.patton.com
e-mail: support@patton.com

Copyright © 2001 & 2002, Patton Electronics Company. All rights reserved.

The information in this document is subject to change without notice. Patton Electronics assumes no liability for errors that may appear in this document.

The software described in this document is furnished under a license and may be used or copied only in accordance with the terms of such license.

Contents

Contents	3
Compliance Information	7
Radio and TV Interference	7
Industry Canada Notice	7
FCC Information	7
FCC Part 68 Compliance Statement	8
CE Notice	8
About this guide	9
Audience.....	9
Structure.....	9
Precautions	10
Typographical conventions used in this document.....	10
General conventions	10
Mouse conventions	11
1 Introduction	13
Model 3092 iDSL DACS overview	14
Hardware overview	15
WAN	15
LAN	16
RS-232 control port	16
Power system	16
Central processing unit	16
iDSL Ports	16
Alarm Port	16
System Timing and Clock Port	17
Temperature	17
Altitude	17
Humidity	17
Physical dimensions	18
Management services	18
LED display	19
Approvals	20
2 Hardware installation	21
Introduction.....	22
Unpacking the Model 3092 DACS	22
DACs chassis installation	22
Cable installation.....	23
Installing the power cables - AC Unit	23
Installing the power cables - DC unit	24
Grounding the Model 3092 - AC and DC Units	25

Connecting the Ethernet ports	26
Connecting the 10/100Base-T Ethernet port to an Ethernet switch or hub	26
Connecting the 10/100Base-T Ethernet port to an Ethernet-capable workstation	27
Connecting the EIA-561 RS-232 configuration port	27
Connecting to the T1/E1 WAN ports	27
Connecting the iDSL Ports	28
Completing the hardware installation	28
3 Configuring the DACS for operation	31
Introduction	32
Configuration prerequisites: Preparing for the configuration	32
Initial Configuration through the RS-232 Control Port	33
Connecting the DB9-RJ45 adapter with the included cable	33
Setting up the HyperTerminal (or similar program) session	33
Using a Web browser to complete Model 3092 configuration	36
Displaying the DACS 3092 Web Administration Pages	37
Home page overview	38
Configuring the DS0 mapping	39
Examples on configuring static connections.	41
Setting the clocking source	42
Activating the iDSL modems	43
Configuring the default gateway	44
Configuring line settings and signaling for E1	45
Configuring the line settings	46
Configuring line settings and signaling for T1	46
Configuring the line settings	46
Saving your configuration.....	46
Completing the installation	49
4 Operation and shutdown	51
Introduction	52
Activating the Model 3092	52
De-activating the Model 3092	52
5 Troubleshooting and maintenance	53
Introduction	54
Fault analysis	56
Periodic maintenance	58
Calibration	58
Maintenance.....	58
Replacing the Model 3092	58
Exporting the current Model 3092 configuration	58
Removing the defective Model 3092	60
Installing the replacement Model 3092	61
Verifying the hardware installation	61
Importing a saved configuration	61

Using the DB9-RJ45 adapter with the included cable61

Setting up the HyperTerminal (or similar program) session62

Completing the installation65

6 Contacting PATTON for assistance 67

 Introduction68

 Contact information.....68

 Warranty Service and Returned Merchandise Authorizations (RMAs).....68

 Warranty coverage68

 Out-of-warranty service68

 Returns for credit68

 Return for credit policy69

 RMA numbers69

 Shipping instructions69

A RJ-21X Wiring Color Chart 71

 Introduction72

Compliance Information

Radio and TV Interference

The Model 3092 generates and uses radio frequency energy, and if not installed and used properly—that is, in strict accordance with the manufacturer's instructions—may cause interference to radio and television reception. The Model 3092 has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart B of Part 15 of FCC rules, which are designed to provide reasonable protection from such interference in a commercial installation. However, there is no guarantee that interference will not occur in a particular installation. If the Model 3092 causes interference to radio or television reception, which can be determined by disconnecting the cables, try to correct the interference by one or more of the following measures: moving the computing equipment away from the receiver, re-orienting the receiving antenna, and/or plugging the receiving equipment into a different AC outlet (such that the computing equipment and receiver are on different branches).

Industry Canada Notice

The Canadian Department of Communications label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction. Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above condition may not prevent degradation of service in some situations. Repairs to some certified equipment should be made by an authorized maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment. Users should ensure for their own protection that the ground connections of the power utility, telephone lines and internal metallic water pipe system, are connected together. This protection may be particularly important in rural areas.



User should not attempt to establish or modify ground connections themselves, instead they should contact the appropriate electric inspection authority or electrician.

FCC Information

The Model 3092 has been tested with the specifications in Part 68 of the FCC rules. Your telephone company may make changes in its facilities, equipment, operations or procedures that could affect the proper operation of the Model 3092. If this happens, the telephone company should give you advance notice to prevent the interruption of your service. The telephone company may decide to temporarily discontinue your service if they believe your Model 3092 may cause harm to the telephone network. Whenever possible, they will contact you in advance. If you elect to do so, you have the right to file a complaint with the FCC. If you have any trouble operating the Model 3092, please contact Patton Electronics Technical Support at +1 301-975-1000. The telephone company may ask you to disconnect the equipment from the telephone network until the problem has been corrected or until you are certain that the Model 3092 is not malfunctioning. In accordance with FCC rules and regulation CFR 47 68.218(b)(6), you must notify the telephone company prior to disconnection. The following information may be required when applying to your local telephone company for leased

line facilities. The Universal Service Order Code (USOC) is RJ48. The Facility Interface Codes (FIC) are 04DU9-BN, 04DU9-DN, 04DU9-1KN, and 04DU9-1SN. The Service Order Code (SOC) is 6.0N.

Service	Facility Interface Code	Service Code	Network Connection
1.544 Mbps SF format without line power	04DU9-BN	6.0N	RJ-48C
1.544 Mbps SF and B8ZS without line power	04DU9-DN	6.0N	RJ-48C
1.544 Mbps ANSI ESF without line power	04DU9-1KN	6.0N	RJ-48C
1.544 Mbps ANSI ESF and B8ZS without line power	04DU9-1SN	6.0N	RJ-48C

FCC Part 68 Compliance Statement

This equipment complies with Part 68 of FCC Rules. Please note the following:

1. You are required to request service from the telephone company before you connect the DACS to a network. When you request T1 Service, you must provide the telephone company with the Facility Interface Code. Provide the telephone company with both of the following codes: 04DU9-B (1.544 MB D4 framing format) and 04DU9-C (1.544 MB ESF format). The telephone company will select the code it has available. The Service Order Code(s) (SOC): 6.0N. The required Universal Service Order Code (USOC) jack: RJ 48C. The make, model number, and FCC Registration number of the DACS.
2. Your telephone company may make changes to its facilities, equipment, operations, or procedures that could affect the proper functioning of your equipment. The telephone company will notify you in advance of such changes to give you and opportunity to maintain uninterrupted telephone service.
3. If your DACS causes harm to the telephone network, the telephone company may temporarily discontinue your service. If possible, they will notify you in advance, but if advance notice is not practical, you will be notified as soon as possible and will be informed of your right to file a complaint with the FCC.
4. If you experience trouble with the DACS, please contact Patton Electronics, Co. for service or repairs. Repairs should be performed only by Patton Electronics Co.
5. You are required to notify the telephone company when you disconnect the DACS from the network.

CE Notice

The CE symbol on your Patton Electronics equipment indicates that it is in compliance with the Electromagnetic Compatibility (EMC) directive and the Low Voltage Directive (LVD) of the European Union (EU). A Certificate of Compliance is available by contacting Technical Support.

About this guide

This guide describes installing and configuring a Patton Electronics Model 3092 iDSL Digital Access and Cross-Connect System (DACS). By the time you are finished with this guide, your DACS will be connected to the remote DSL modems and transferring data. The instructions in this guide are based on the following assumptions:

- The DACS will connect to a T1 or E1
- There is a LAN connected to the Ethernet port of the DACS
- Users will be connected to remote iDSL modems

Audience

This guide is intended for the following users:

- Operators
- Installers
- Maintenance technicians

Structure

This guide contains the following chapters and appendices:

- Chapter 1 describes the DACS
- Chapter 2 describes installing the DACS hardware
- Chapter 3 describes configuring the DACS for use
- Chapter 4 details how to power up and deactivate the DACS
- Chapter 5 contains troubleshooting and maintenance information
- Chapter 6 contains information on contacting Patton technical support for assistance

For best results, read the contents of this guide *before* you install the DACS.

Precautions

Notes and cautions, which have the following meanings, are used throughout this guide to help you become aware of potential DACS problems. *Warnings* relate to personal injury issues, and *Cautions* refer to potential property damage.

Note Calls attention to important information.



The shock hazard symbol and **WARNING** heading indicate a potential electric shock hazard. Strictly follow the warning instructions to avoid injury caused by electric shock.



The alert symbol and **WARNING** heading indicate a potential safety hazard. Strictly follow the warning instructions to avoid personal injury.



The shock hazard symbol and **CAUTION** heading indicate a potential electric shock hazard. Strictly follow the instructions to avoid property damage caused by electric shock.



The alert symbol and **CAUTION** heading indicate a potential hazard. Strictly follow the instructions to avoid property damage.

Typographical conventions used in this document

This section describes the typographical conventions and terms used in this guide.

General conventions

The procedures described in this manual use the following text conventions:

Table 1. General conventions

Convention	Meaning
Futura bold type	Indicates the names of menu bar options.
<i>Italicized Futura type</i>	Indicates the names of options on pull-down menus.
Futura type	Indicates the names of fields or windows.
Garamond bold type	Indicates the names of command buttons that execute an action.
< >	Angle brackets indicate function and keyboard keys, such as <SHIFT>, <CTRL>, <C>, and so on.
Are you ready?	All system messages and prompts appear in the Courier font as the system would display them.
% dir *.*	Bold Courier font indicates where the operator must type a response or command

Mouse conventions

The following conventions are used when describing mouse actions:

Table 2. Mouse conventions

Convention	Meaning
Left mouse button	This button refers to the primary or leftmost mouse button (unless you have changed the default configuration).
Right mouse button	This Button refers the secondary or rightmost mouse button (unless you have changed the default configuration).
Point	This word means to move the mouse in such a way that the tip of the pointing arrow on the screen ends up resting at the desired location.
Click	Means to quickly press and release the left or right mouse button (as instructed in the procedure). Make sure you do not move the mouse pointer while clicking a mouse button.
Double-click	Means to press and release the same mouse button two times quickly
Drag	This word means to point the arrow and then hold down the left or right mouse button (as instructed in the procedure) as you move the mouse to a new location. When you have moved the mouse pointer to the desired location, you can release the mouse button.

Chapter 1 **Introduction**

Chapter contents

Model 3092 iDSL DACS overview	14
Hardware overview	15
WAN	15
LAN	16
RS-232 control port	16
Power system	16
Central processing unit	16
iDSL Ports	16
Alarm Port	16
System Timing and Clock Port	17
Temperature	17
Altitude	17
Humidity	17
Physical dimensions	18
Management services	18
LED display	19
Approvals	20

Model 3092 iDSL DACS overview

The Model 3092 links up 24 iDSL circuits to multiple WAN uplink modules with completely flexible grooming. The DACs combines dual-redundant power supplies, a time-slot multiplexer, and a centralized management system into an ultra-sleek 1U chassis. The subscriber side connects to industry standard iDSL modems for 64/128/144 kbps service over a single pair. The WAN links accept T1 or E1 network connections and by using the built-in digital cross connect, the Model 3092 can flexibly groom any DS0 (64kbps) channel to any other DS0-channel.

Each 64/128/144 kbps iDSL port requires only a single pair of wires for reliable data transmission at ranges in excess of 5.5 km. 2B1Q line encoding ensures spectral compatibility within existing voice/data bundles. Each WAN port terminates T1/E1 with flexible any-to-any DS0 mapping. The entire system can be managed through SNMP/HTTP-based management screens.

The Model 3092 uses 24 iDSL remote modems at any DTE rate supported by the modem to extend the connections between digital (ATM/FR/DDN/IP) networks, thus permitting multi-service access to CLECs, ISPs, and PTTs.



Figure 1. Model 3092 DACS (Cobalt Blue version shown)

Hardware overview

The Model 3092 combines transmission and networking technology, concentrating 24 iDSL ports and four T1/E1 WAN links into a single 1U managed chassis. The DACS (see figure 2) comprises a 1U-high 19-inch wide chassis that contains a motherboard and two dual-redundant power supplies. A full set of LEDs are present on the chassis front panel, while connections for WAN, LAN, alarm relay, composite clock, and control ports are present on the rear of the chassis. Two IEC-320 receptacles provide for AC. The optional power input of -48 VDC is also available.

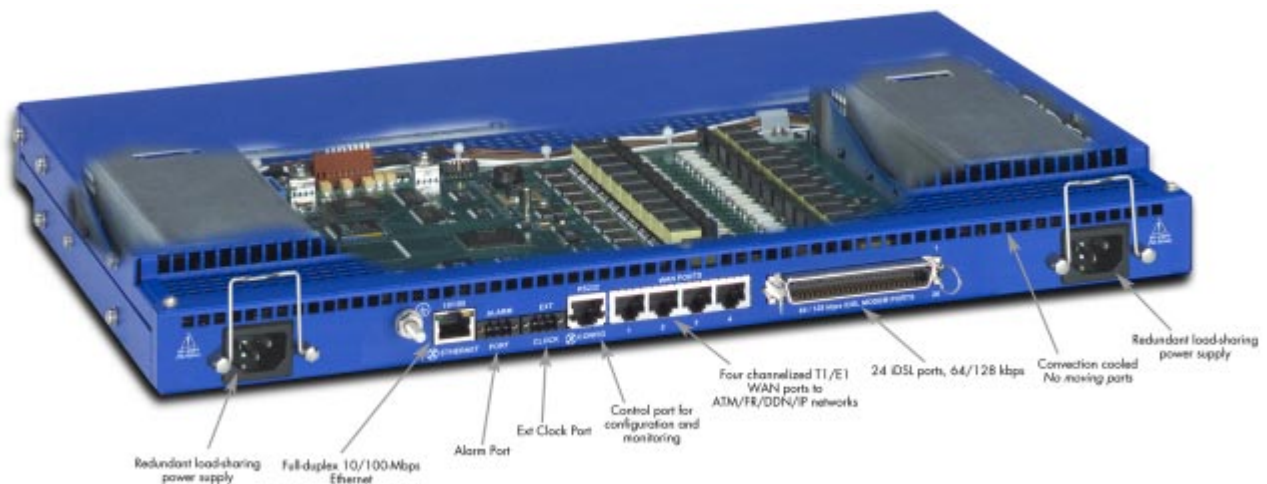


Figure 2. Model 3092 DACS features

WAN

The 3092 includes four WAN uplink ports selectable for T1 or E1 connection to ATM/FR/DDN/IP network backbones. Also included are:

- Four built-in T1/E1 CSU/DSUs
- T1 1.544 Mbps with
 - D4 or ESF framing
 - AMI or B8ZS line coding
 - FCC Part 68 compliant
- E1 2.048 Mbps
 - framing with or without CRC4 framing
 - AMI/HDB3 line coding
 - CTR-12 and CTR-13 compliant

LAN

The 10/100-Mbps Ethernet LAN port is presented on an RJ-45 connector with an auto-sensing/full-duplex 10Base-T or 100Base-TX interface. Also included are:

- 100Base-TX half-/full-duplex operation (100 + 100)
- 10Base-T half-/full-duplex operation (10 + 10)
- Auto detection and fallback
- 10/100 Mbps link and status indicators

RS-232 control port

- The RS-232 port provides for initial configuration of the Model 3092. The RS-232 port supports:
- Asynchronous data rates of 19.2 kbps
- An RJ-45 connector with EIA-561 (RS-232) pinouts
- A management interface (such as HyperTerminal) that supports VT-100 terminals
- Hardware CD and DTR signals for external modems

Power system

- Internal dual-redundant, load-sharing power supplies
- Universal-input voltage range, 100–240 VAC, 50/60 Hz via IEC-320 connectors, rated current is 2A
- Optional DC power supply with -40 to -72VDC via 4-way power block, rated current is 1A

Central processing unit

The 3092 employs an Intel i960VH RISC processor operating at 33 MHz/100 Mips. The CPU controls the memory, front/back-panel and management interface for iDSL port/WAN time slot mapping, local switching, loopback and the management system. The memory holds:

- 4 Mbytes Flash ROM
- 8 Mbytes EDO DRAM

iDSL Ports

The 24 iDSL ports operate at any DTE rate supported by the remote modem via an RJ-21X 50-pin telco connector. Each port uses a single 2-wire twisted pair for full-duplex communication. The iDSL ports can be concentrated into TDM data output on the WAN ports. Other features include:

- 2B1Q line encoding.
- Built-in surge protection.
- iDSL configuration parameters and line status indicators accessible to upper-level utility or application software.

Alarm Port

The alarm port is used to notify the operator that a pre-defined alarm has occurred. The principal features are

- User-defined alarm condition configured through the NMS
- User selectable major and minor alarms for iDSL, WAN, system clock, power, and over-temperature.

- 3-contact dry relay for external alarm systems via a 3-pin terminal block connector

System Timing and Clock Port

The iDSL Multiplexer's system timing may be derived from the composite Clock Port, an Internal Clock from an on-board chip, or a Network Clock from the T1/E1 WAN interface. The system timing is configured through the NMS. The Clock Port features are:

- Input for an external 64 kHz BITS (Building Integrated Timing Supply), reference clock.
- External reference drives timing for all iDSL and WAN ports.
- Selectable Master and Fallback Clock

Temperature

Operating range: 0–40°C (32–104°F)

Internal temperature: Available in real-time on the DACS Web management pages

Altitude

Maximum operating altitude: 15,000 feet (4,752 meters)

Humidity

5 to 90% relative humidity (RH), non-condensing

Physical dimensions

Weight: 8.94 lbs (20.12 kg)

Refer to figure 3 for height, width, and depth dimensions.

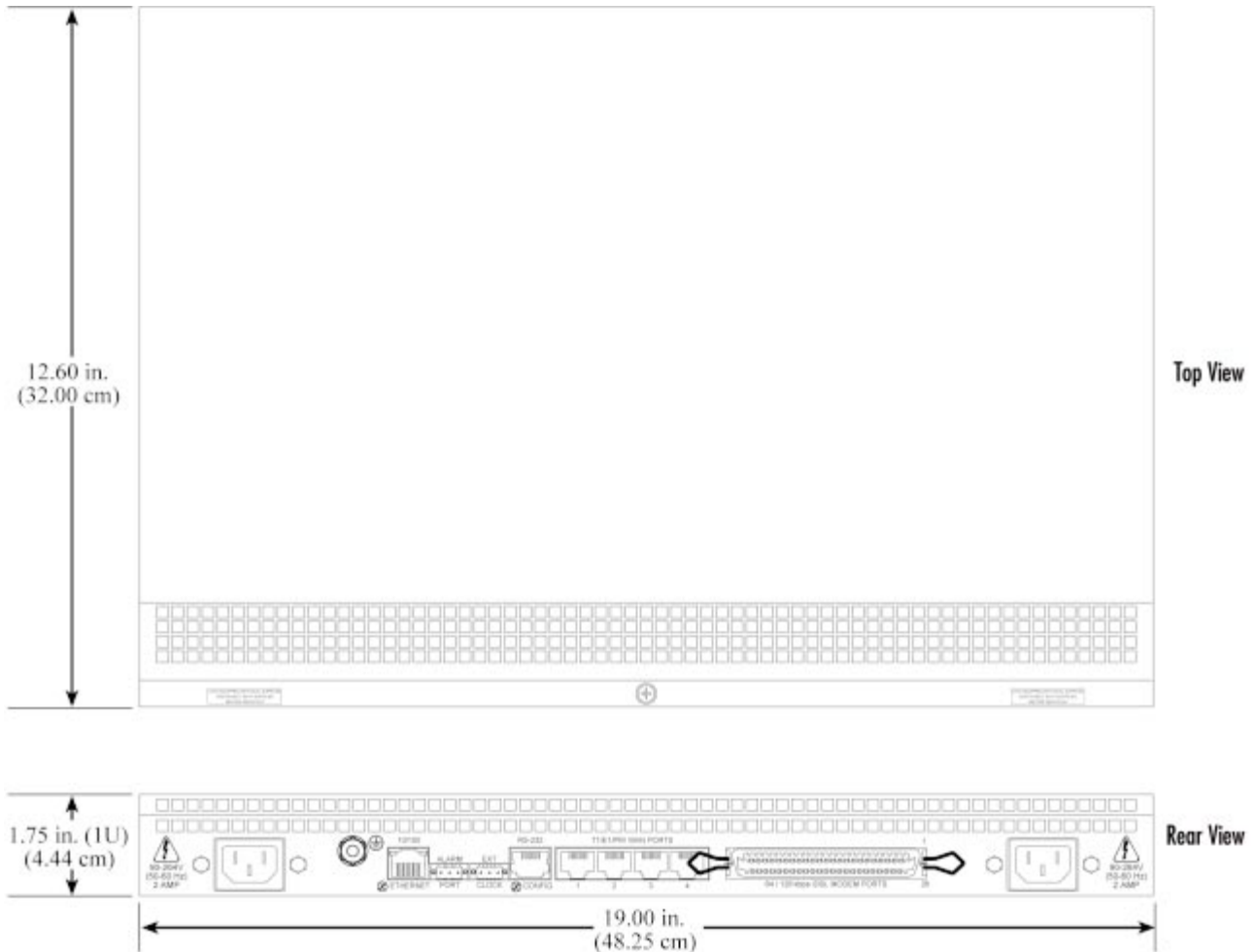


Figure 3. Model 3092 DACS chassis physical dimensions

Management services

- EIA-561 configuration port for management and control
- SNMP version 1 and 2 configuration management
- TELNET
- Ethernet
- SYSLOG Client
- Remote Software Upgrade via FTP
- Built in HTTP server for complete configuration and control using a standard Web browser

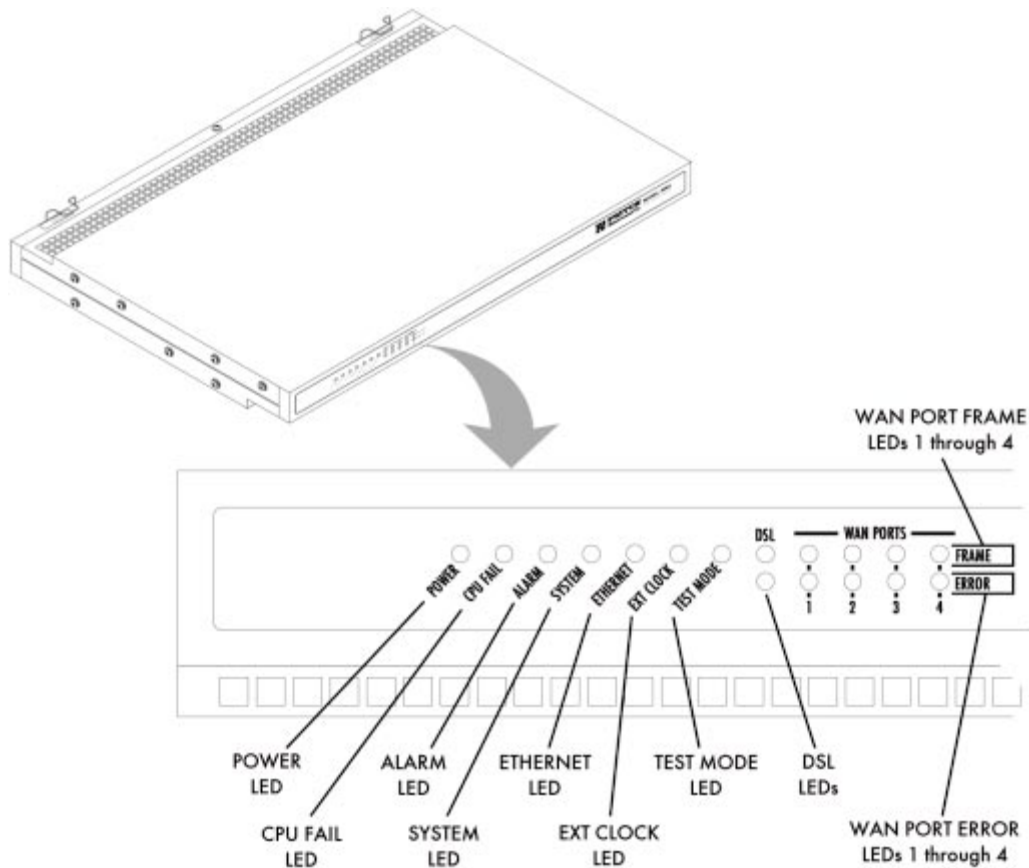


Figure 4. Model 3092 front panel LEDs

LED display

The front panel's LEDs (see figure 4) display the status of the four WAN ports, the iDSL ports, the Ethernet LAN port, power, and the alarms. The front panel includes LEDs for:

- **POWER:** Green if power is being applied. Flashing if one power supply fails.
- **CPU FAIL:** Red if the CPU fails.
- **ALARM:** If the DACS is operating normally, the LED will be off. If a major alarm has occurred, the yellow LED will flash; if a minor alarm condition exists, the LED will be lit constantly.
- **SYSTEM:** Flashes green if the iDSL Multiplexer is operating normally.
- **ETHERNET:** Green if Ethernet link status is normal.
- **EXT. CLOCK:** Green if the iDSL Digital Cross Connect is being driven by the BITS clock. Off if the Model 3092 is connected to a (T1/E1) Network Clock or Internal Clock.
- **TEST MODE:** Yellow if any of the 24 DSL ports or any of the T1/E1 ports are in local switching or loop-back mode, respectively. Off if all ports are in normal operation.
- **DSL PORTS:** Green to indicate end-user activity on any of the 24 iDSL ports. Red indicates loss of sync on any DSL port.

- WAN PORTS: Green indicates normal activity for each T1/E1 link. Red indicates an error on the port (for example, loss of sync).

Approvals

The Model 3092 DACS has achieved the following approvals:

- Safety: Patton's Internal Safety and UL/CSA testing
 - UL1950 (MET)
 - Canadian cMET
 - Canadian CS-03
- EMC
 - R&TTE Directive 99/5/EC
 - FCC Part 15 Subpart B, Class A
- Telecom
 - CE Mark
 - ITU-T CTR-13
 - FCC Part 68

Chapter 2 **Hardware installation**

Chapter contents

Introduction	22
Unpacking the Model 3092 DACS	22
DACS chassis installation	22
Cable installation.....	23
Installing the power cables - AC Unit	23
Installing the power cables - DC unit	24
Grounding the Model 3092 - AC and DC Units	25
Connecting the Ethernet ports	26
Connecting the 10/100Base-T Ethernet port to an Ethernet switch or hub	26
Connecting the 10/100Base-T Ethernet port to an Ethernet-capable workstation	27
Connecting the EIA-561 RS-232 configuration port	27
Connecting to the T1/E1 WAN ports	27
Connecting the iDSL Ports	28
Completing the hardware installation	28

Introduction

This chapter contains the following procedures for installing the Model 3092 DACS:

Note Before installing the DACS, you will need obtain the line type and encoding of the T1/E1 line from your local telephone company (Telco).

- “Unpacking the Model 3092 DACS”—lists the contents of the DACS shipping container
- “DACS chassis installation”—describes installing the DACS on a flat surface or in a standard 19-inch rack.
- “Cable installation” on page 23—describes installing the power and network interface cables
- “Completing the hardware installation” on page 28—describes testing the DACS hardware to verify that it is ready for software configuration.

Unpacking the Model 3092 DACS

Inspect the shipping carton for external damage. Note any damage before removing the container contents. Report equipment damage to the shipping carrier immediately for claim purposes. Save all packing materials in case you need to return an item to the factory for servicing.

The DACS comes with the following items:

- The Model 3092 Digital Cross-Connect (DACS)
- An RJ-45-to-RJ-45 cable for use with the console and Ethernet ports
- A DB9-RJ45 (EIA-561) adapter for connecting a PC's serial port to the DACS console port
- Rack mounting kit with rack ears and mounting hardware
- *Model 3092 DACS Getting Started Guide*
- CD-ROM containing product literature and the *iDSL DACS Administrator's Reference Guide*

Note Power cables are shipped separately from the Model 3092 DACS.

Note Contact Patton Electronics for the proper RJ-21X cable for the iDSL ports.

DACS chassis installation

Do the following:

1. If you have not done so already, remove the DACS from its shipping container.

Note The DACS should be placed as close as possible to the termination jack provided by the Telco. Avoid installing the DACS in a location where the power cords or network interface cables could be accidentally disconnected. The location should be well ventilated. Do not block the DACS's cooling vents.

2. If you are installing the DACS in a 19-inch rack, go to step 3. Otherwise, place the DACS at the desired location, then go to “Cable installation” on page 23.
3. Install the rack mounting ears onto the DACS using the mounting hardware provided.
4. Place the DACS at the desired position in the rack.
5. Secure the DACS in position with the mounting screws.

Cable installation

This section describes installing the power, ground, and network interface cables.

Installing the power cables - AC Unit

This section describes installing the power cables into the IEC-320 connectors on the DACS. *Do not connect the remaining end of the power cables to the power outlet at this time.* Do the following:

1. Install a power cable into an IEC-320 connector (see figure 5). The AC main socket outlet shall be within 3 meters of the equipment and shall be easily accessible.

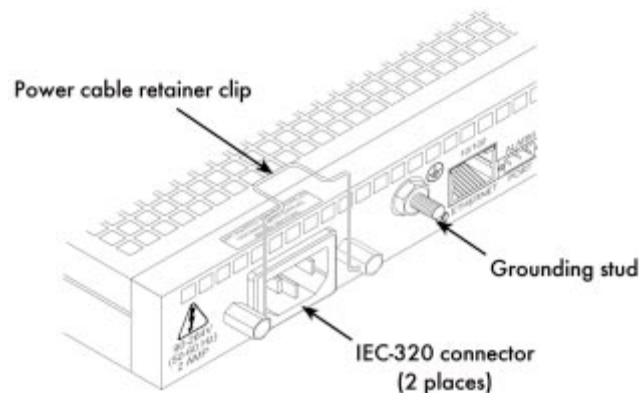


Figure 5. IEC-320 connector and grounding stud locations



To avoid the risk of injury from electric shock, the power cords connected to the IEC-320 connectors must be grounded power cords.

2. Rotate the power cable retainer clip so it secures the power cable plug in the IEC-320 connector as shown in figure 6.

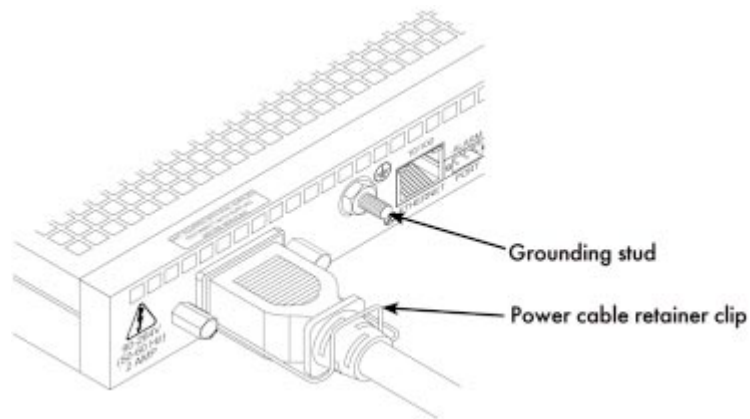


Figure 6. Power cable retainer clip

3. Repeat steps 1 and 2 to install the remaining power cable.

Installing the power cables - DC unit

This section describes installing the DACS for using DC power. **Do not connect the remaining end of the power cables to the DC power source.** For the DC power source, the DACS is equipped with a two-position, screw-down terminal block.



Use copper conductors between AWG 12 - 18 only.



While looking into the DC power connector, the +DC input is on the right and the -DC input is on the left (see figure 7).

1. Connect the earth ground of the DC source to the grounding stud on the DACS as described in the following section "Grounding the Model 3092."
2. Strip back the insulation on each of the wires approximately π inch.
3. Insert the stripped end of the positive lead into the "+DC input" of the terminal block. Tighten the screw until the power lead is firmly fastened. Repeat the procedure for the negative lead, using the "-DC input" of the terminal block. Make sure that all strands of the wire are captured and that there is no exposed wire.

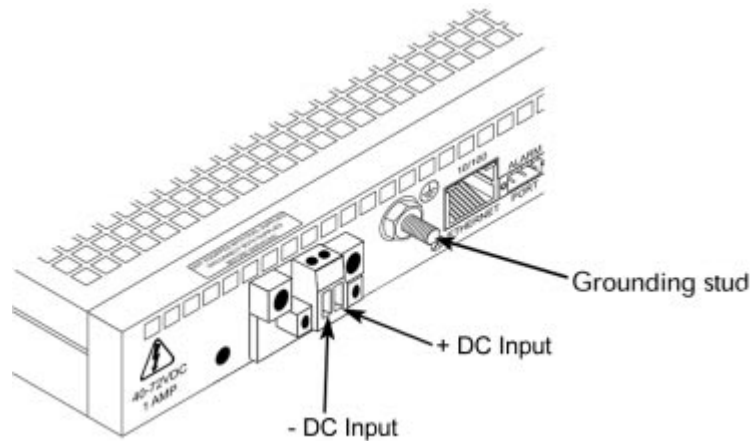


Figure 7. DC connector, - DC and + DC Input view

4. Repeat steps 1 through 3 to install the remaining DC power connection.

Grounding the Model 3092 - AC and DC Units

Do the following:

1. Assemble a ground wire using #10 AWG wire with green-colored insulation and two ring terminals. Make the wire long enough to reach one of the following ground sources:
 - The building ground rod (generally located at the site's main service entrance)
 - A sprinkler system pipe
 - A cold-water pipe
 - Building structural steel



To avoid the risk of personal injury, the distance between ground and the equipment rack must not exceed the distance specified in either local electrical codes or the National Electrical Code.

2. Install the ground wire between the grounding stud (see figure 6) and the grounding source.

Connecting the Ethernet ports

The DACS has a single 10/100 Ethernet interface for connection to your LAN (see figure 8). The Ethernet port will autosense the correct speed of the local LAN and automatically negotiate half- or full-duplex operation. This section describes connecting the DACS to the Ethernet LAN via an Ethernet hub, switch, or workstation.

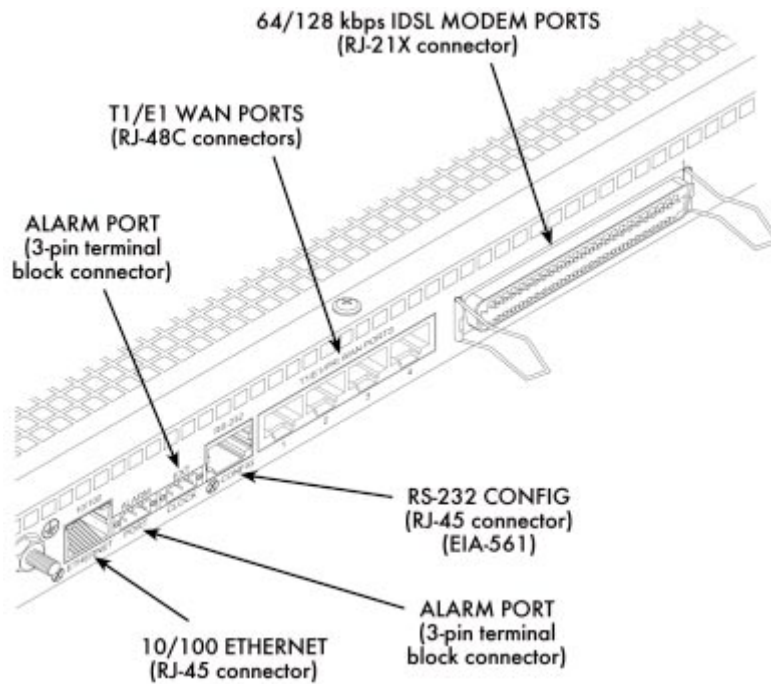


Figure 8. Model 3092 network and configuration ports

Connecting the 10/100Base-T Ethernet port to an Ethernet switch or hub

The 10/100Base-T Ethernet port (see figure 8 on page 26) is designed to connect to an Ethernet switch or hub. Connect a straight-through CAT-5 cable (wired as shown in figure 9) between the DACS and the hub/switch.

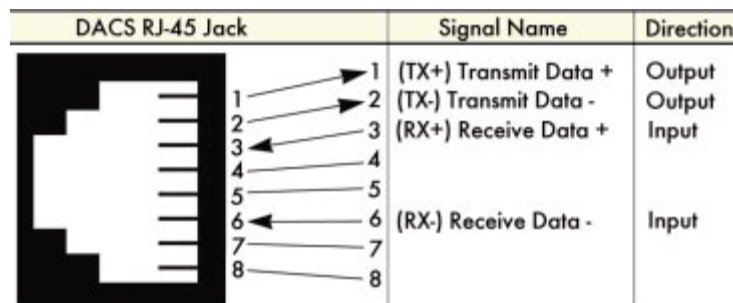


Figure 9. Straight-through RJ-45-to-RJ-45 Ethernet cable diagram

Connecting the 10/100Base-T Ethernet port to an Ethernet-capable workstation

The 10/100Base-T Ethernet port can connect to a single Ethernet-capable workstation by means of a cross-over cable. Refer to figure 10 to assemble a cross-connect cable that will connect between the NIC Ethernet port in the workstation and the DACS 10/100Base-T Ethernet port.

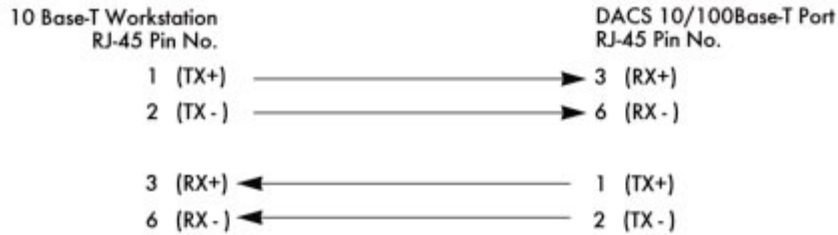


Figure 10. Cross-over RJ-45-to-RJ-45 Ethernet cable diagram

Connecting the EIA-561 RS-232 configuration port

Install the supplied DB-9-to-RJ-45 cable between the DACS RS-232 port (see figure 8 on page 26) and an open serial port on your computer. If you need to assemble your own cable, refer to the pinout diagram in figure 11.

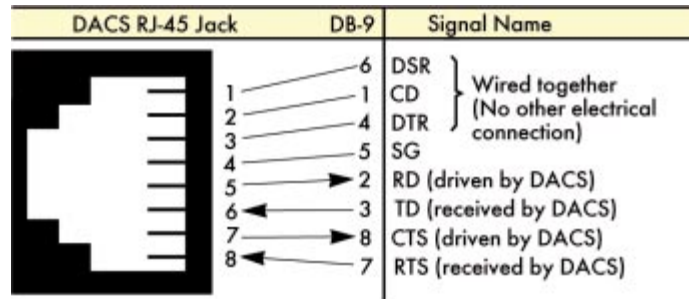


Figure 11. DB-9-to-RJ-45 cable diagram

Connecting to the T1/E1 WAN ports

An active T1/E1 is not necessary to configure the DACS. However, an active T1/E1 connection is required to transfer data from the subscriber’s DSL modem through the WAN port. The factory-set default configuration of the access server has the T1/E1 ports disabled.

Note The cable connecting the T1/E1 WAN ports to the RJ-48C termination jack should be CAT-3 or higher and extend no farther than one mile from the digital services termination.

1. Refer to figure 12 for the T1/E1 RJ-48C pinout diagram.

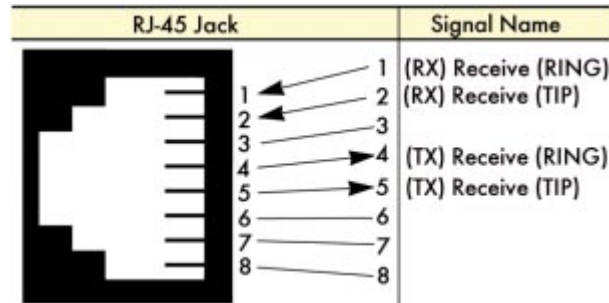


Figure 12. T1/E1 RJ-48C pinout diagram

2. Attach the network cable from the telephone network demarc to the Primary T1/E1 port (RJ-48C) on the DACS.

Note For 75-ohm twin-coax E1 connections, use the Patton Model 460 E1 120-ohm/75-ohm balun to convert from a 75-ohm dual-coax (from the telco) to the 120-ohm twisted-pair interface the DACS uses.

Connecting the iDSL Ports

The remote (CPE) iDSL modems are connected to the DACS via the RJ-21X cable. Consult *Appendix A, "RJ-21X Wiring Color Chart"* in order to connect the CPE iDSL modems to the selected iDSL modem port on the DACS.

Note The 2-wire iDSL modem lines are polarity insensitive so you only need to match the correct twisted pairs without being concerned about matching the individual wires of the twisted pair.

1. Connect the RJ-21X connector of the cable into the 50-pin RJ-21X receptacle on the rear of the DACS.
2. The other end of the cable has 25 non-terminated twisted-pairs for connection to punch-down blocks. Select the twisted-pairs which will be used for active iDSL modem connections and terminate on the punch-down blocks. Only 24 of the twisted pairs will be used since there are 24 iDSL modem connections, each being a 2-wire connection.
3. Select and attach the appropriate twisted pair from each remote (CPE) iDSL modem on punch-down blocks for connection to the chosen iDSL port in the DACS.

Completing the hardware installation

This section verifies that the DACS hardware is operational to the point where you can begin configuring the software settings. For AC units, do the following:



The DACS power supply automatically adjusts to accept an input voltage from 100 to 240 VAC (50/60 Hz).

Verify that the proper voltage is present before plugging the power cord into the receptacle. Failure to do so could result in equipment damage.

1. Verify that the AC power cord included with your DACS is compatible with local standards. If it is not, refer to Chapter 7, “Contacting PATTON for assistance” to find out how to replace it with a compatible power cord.
2. Connect the male end of the power cord to an appropriate power outlet.
3. Verify that the green *POWER* LED is lit. If the *POWER* LED is flashing green, refer to Chapter 5, “Troubleshooting and maintenance”.

Hardware installation is complete. Refer to Chapter 3, “Configuring the DACS for operation”.

For DC units, do the following:



An approved external SELV power supply that incorporates a disconnect device must be used and positioned within easy reach of the operator's position.

1. Connect the equipment to a 40 - 72 Volt DC, 1A supply source that is electrically isolated from the AC source as stated below. The 40 - 72 Volt DC source is to be reliably connected to earth.
 - First, connect the negative lead to the negative side of the DC Supply.
 - Second, connect the positive lead to the positive side of the DC Supply.
2. Verify that the green *POWER* LED is lit. If the *POWER* LED is flashing green, refer to Chapter 5, "Troubleshooting and maintenance."

Hardware installation is complete. Refer to Chapter 3, "Configuring the DACS for operation."

Chapter 3 **Configuring the DACS for operation**

Chapter contents

Introduction	32
Configuration prerequisites: Preparing for the configuration	32
Initial Configuration through the RS-232 Control Port	33
Connecting the DB9-RJ45 adapter with the included cable	33
Setting up the HyperTerminal (or similar program) session	33
Using a Web browser to complete Model 3092 configuration	36
Displaying the DACS 3092 Web Administration Pages	37
Home page overview	38
Configuring the DS0 mapping	39
Examples on configuring static connections.	41
Setting the clocking source	42
Activating the iDSL modems	43
Configuring the default gateway	44
Configuring line settings and signaling for E1	45
Configuring the line settings	46
Configuring line settings and signaling for T1	46
Configuring the line settings	46
Saving your configuration.....	46
Completing the installation	49

Introduction

This chapter contains the following procedures for configuring the Model 3092 DACS for operation:

- “Configuration prerequisites: Preparing for the configuration”—lists the items you need to have on hand before configuring the DACS.
- “Initial Configuration through the RS-232 Control Port” on page 33—describes setting up the 3092’s LAN IP address and netmask parameters.
- “Using a Web browser to complete Model 3092 configuration” on page 36—describes the process to complete the software installation parameters—that is, to bring it on line. The steps are:
 - Setting Static Connections with DS0 Mapping
 - Setting the System Clock Source
 - iDSL Modem Activation
 - IP Default Gateway
 - T1/E1 WAN Links
- “Saving your configuration” on page 46—tells you how to save the configuration settings.
- “Completing the installation” on page 49—describes testing the DACS to verify that it is fully operational.

Configuration prerequisites: Preparing for the configuration

You will need the following to configure the DACS:

- A PC that includes the following:
 - RS-232/V.24 serial port
 - VT-100 terminal program, such as HyperTerminal
 - Ethernet port
 - Web browser (for example, Netscape Communicator or Microsoft Internet Explorer)
- You will need the following information to configure the Model 3092:
 - The IP address and subnet mask for the 3092’s Ethernet port
 - The IP address of the default gateway
 - The 3092 iDSL port each customer premises equipment (CPE) iDSL modem will be using
 - Whether each CPE iDSL modem will be using one or two of the B-channels (DS0, 64-kbps channels)
 - The final destination of the CPE’s iDSL modem connection
- If you are using a T1 WAN line, you will need the following information from the telephone company (central office):
 - Line Type: either ESF or D4
 - Line Coding: either B8ZS or AMI
- If you are using a E1 WAN line, you will need the following information from the Telco:

- Line Type: either E1 or E1-CRC
- Line Coding: either HDB3 or AMI

Initial Configuration through the RS-232 Control Port

Initially you must configure the 3092's IP address and—in rare instances—change the netmask from the default settings.

Note Do *not* connect power or the Ethernet connection to the Model 3092 at this time.

Connecting the DB9-RJ45 adapter with the included cable

Do the following:

1. Connect the DB9-RJ45 adapter to your PC's RS-232 serial port
2. Connect the RJ45-RJ45 cable between the adapter you installed in step 1 and the *RS-232 Config* port on the rear of the Model 3092.

Setting up the HyperTerminal (or similar program) session

Do the following:

1. Open a HyperTerminal session by double-clicking on *HYPERTRM.EXE*.



Figure 13. Connection Description window

2. Type a connection name (for example, *3092 Config*), select an icon, then click **OK** (see figure 13).



Figure 14. Connect To window

3. On the *Connect To* window (see figure 14), set *Connect using:* to one of the options named *Direct to Com?* (where the question mark (?) refers to the number identifying the RS-232 serial port on the PC). In the following procedure, *Com1* will be the used as the port identifier.
4. Click on **OK**.
5. The *COM1 Properties* window displays.
6. Configure your COM port settings as shown in figure 15, then click **OK**.



Figure 15. COM1 Properties window

7. Click on the **File** menu, then select *Properties*.
8. Configure the settings for *Function, arrow and ctrl keys act as* to *Terminal keys* as shown in figure 16, then click **OK**.

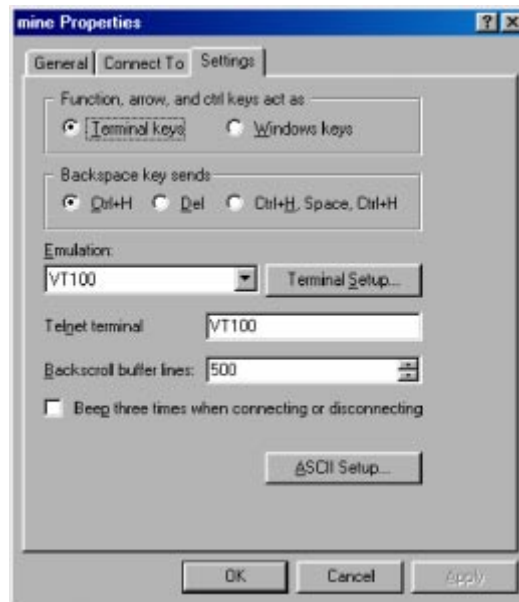


Figure 16. Terminal keys configuration

9. Connect the male end of the 3092 DACS' power cables to the power outlets.
10. On your HyperTerminal connection window, boot up information will display, eventually followed by a login request window resembling that shown in figure 17.

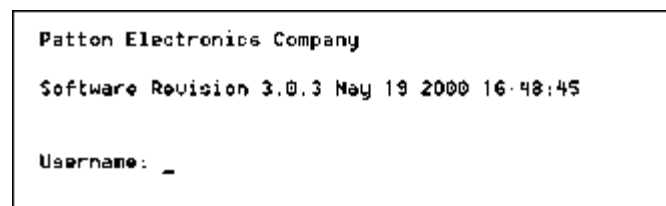


Figure 17. Login window

11. For the user name, type **superuser**.

12. For the password, type **superuser**; the TOP LEVEL MANAGEMENT window then appears (see figure 18).

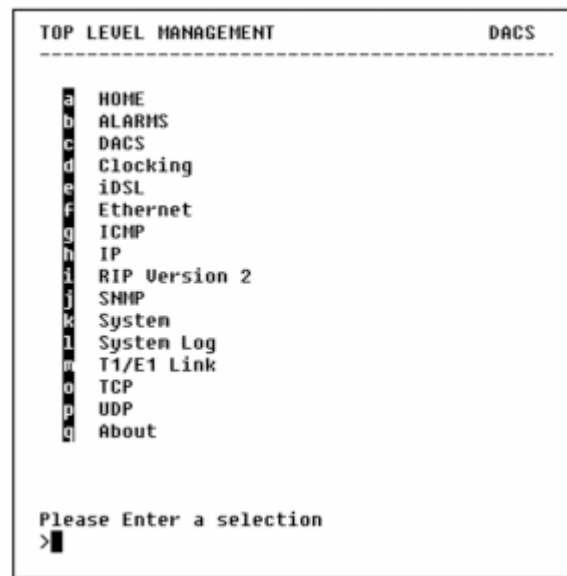


Figure 18. VT-100 Top Level Management window

13. Type **k** for System, then press <Enter>.
14. Under System, type **1** for Details, then press <Enter>.
15. Enter **g** for LAN Address, then press <Enter>.
16. Type your LAN IP address followed by pressing <Enter>.
17. Press the left-arrow cursor key on your keyboard to return to the previous screen.
18. If you do not need to change the LAN Mask from the default of 255.255.255.0, go to step 21. Otherwise, press **h** and type the new LAN Mask in the same manner as when entering a LAN IP address.
19. Press the left-arrow cursor key until the TOP LEVEL MANAGEMENT window displays.
20. Select **a** for Home, then press <Enter>.
21. Under the Current Status page, type **1** (store Config(1)) to save the changes you have just made to the configuration.

This completes the initial configuration of the Model 3092. The next steps in configuration will be done directly through Ethernet via your Web browser.

Using a Web browser to complete Model 3092 configuration

This section describes configuring the following:

- Displaying the DACS home page (see “Displaying the DACS 3092 Web Administration Pages” on page 37)
- Setting static connections with DS0 mapping (see “Configuring the DS0 mapping” on page 39)

- Setting the clocking source (see “Setting the clocking source” on page 42)
- iDSL modem activation (see “Activating the iDSL modems” on page 43)
- Configuring the IP default gateway (see “Configuring the default gateway” on page 44)
- Configuring the T1/E1 WAN links (see “Configuring line settings and signaling for E1” on page 45 or “Configuring line settings and signaling for T1” on page 46)

Displaying the DACS 3092 Web Administration Pages

Do the following:

1. Connect your PC's Ethernet connection to the Ethernet.
2. Connect the 3092's DACS 10/100 Ethernet connection to the Ethernet LAN.
3. Start a Web browser session. In the portion of the browser window where the URL is displayed, type the IP address of the Model 3092 (for example, if the Model 3092 IP address *123.124.221.10*, you would type **123.124.221.10** in the browser's URL area). If you do not have an IP address in your DACS, refer to “Initial Configuration through the RS-232 Control Port” on page 33.
4. When prompted for a username, type **superuser**, then press <Enter>. Next type **superuser** as the password, then press <Enter>.
5. The DACS home page displays (see figure 19).

The screenshot displays the web administration interface for the Model 3092 iDSL Cross Connect. On the left is a vertical navigation menu with links for HOME, Import/Export, Alarms, DSO Mapping, Clocking, iDSL, Ethernet, Filter IP, ICMP, IP, TCP, UDP, RIP Version 2, SNMP, System, System Log, T1/E1 Link, T1/E1 Assignment, About, and License. The main content area features a title box with the device name and software revision. Below this is a table titled 'STATUS OF Server' showing various system metrics. At the bottom, there are three buttons under the heading 'IMMEDIATE ACTIONS': Record Current Configuration, Hard Reset, and Set Factory Default Configuration.

STATUS OF Server	
Total Available iDSL Ports:	24
iDSL Ports Activated:	24
iDSL Ports Connected:	22
Total Fail iDSL Ports:	0
% CPU Idle:	99
Running Since Last Boot:	5 days 18:54:47 hours
Total System Alarms:	0

Figure 19. Home page

Home page overview

The HOME window is divided into two *panes*: the Configuration Menu pane and the configuration/information pane (see figure 20). The Configuration Menu contains the links to the various Model 3092 subsystems, while the configuration/information pane is where you can view status and other information, or make changes to the system configuration. Unlike the Configuration Menu pane, which looks the same no matter which subsystem page you may move to, the configuration/information pane contents will change as you move from one subsystem page to another.

Configuration Menu pane

Configuration/information pane

HOME
[Import/Export](#)
[Alarms](#)
[DSD Mapping](#)
[Clocking](#)
[iDSL](#)
[Ethernet](#)
[Filter IP](#)
[ICMP](#)
[IP](#)
[TCP](#)
[UDP](#)
[RIP Version 2](#)
[SNMP](#)
[System](#)
[System Log](#)
[T1/E1 Link](#)
[T1/E1 Assignment](#)
[About](#)
[License](#)

Model 3092 iDSL Cross Connect
 Software Revision 1.0.5 Mar 26 2001 15:17:13

STATUS OF Server

Total Available iDSL Ports	24
iDSL Ports Activated	24
iDSL Ports Connected	22
Total Fail iDSL Ports	0
% CPU Idle	99
Running Since Last Boot	5 days 18:54:47 hours
Total System Alarms	0

IMMEDIATE ACTIONS

[Record Current Configuration](#)

[Hard Reset](#)

[Set Factory Default Configuration](#)

Figure 20. HOME page window panes

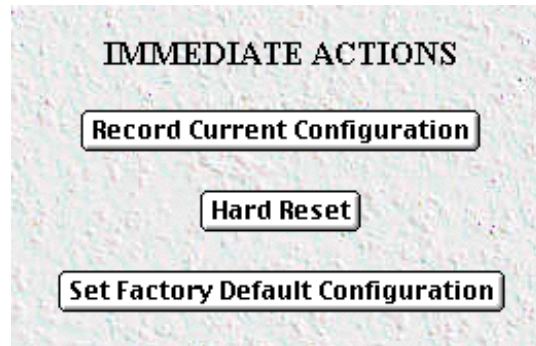


Figure 21. Immediate Actions buttons

From the Home page, the following actions can be performed:

- **Record Current Configuration**—clicking on this button (see figure 21) saves the current configuration in volatile DRAM memory to FLASH memory. Once the configuration is saved into FLASH memory, the configuration will not be lost even if the power is cycled on the 3092. Initially, any changes made to the 3092 configuration are stored in volatile RAM first, enabling the user to set the box up with a working configuration before committing it to storage in FLASH. The configuration changes become permanent when you select **Record Current Configuration**.

Note If you want to save the configuration changes that you have made, you must click on **Record Current Configuration**, otherwise all configuration changes will be lost if the power to the Model 3092 is turned off.

- **Hard Reset**—this button (see figure 21) causes the Model 3092 to perform a cold restart. When you select **Hard Reset**, the DACS confirms that you want to execute this command. Then, the DACS will disconnect all current sessions, re-initialize the interfaces, and re-load configuration parameters from FLASH.
- **Set Factory Default Configuration**—this button (see figure 21) clears out the configuration in FLASH and loads the factory default parameters into FLASH memory. The factory default settings will not execute on the Model 3092 until it is re-booted by doing a Hard Reset.

Note **Set Factory Default Configuration** (figure 21) will delete any routing information, the Model 3092's Ethernet IP address, and any other site-specific settings made for your particular installation. You will have to re-enter the Model 3092's Ethernet IP address and netmask using the rear panel control port before using the HTTP/HTML Management pages.

Configuring the DS0 mapping


You need to make internal connections between an iDSL modem link and its destination. The destination of iDSL modem #1 may be at the end of a T1 or E1 link, or other iDSL port. Each iDSL modem inside the 3092 DACS is configured by selecting the number of DS0 time slots, each time slot being 64 kbps with a maximum of three time slots. By choosing to map either 1 or more of the DS0 time slots in the iDSL modem, you will be selecting how many DS0 time slots shall be implemented. The most common destination for the iDSL modems will be at the remote end of a T1/E1 WAN link.

The DACS window (Digital Cross Connect Configuration) provides three methods for configuring the DACS which define the connections within the 3092. The connections may be between an iDSL modem and a WAN port, between two iDSL modems, or between WAN time slots. Without defining the mapping, all the modems would not be connected to their destination and similarly with the WAN ports. The DACS functions like a 2-dimensional matrix switch.

Do the following to set the DS0 Mapping of the iDSL Modems:

1. Click on DS0 Mapping on the Configuration Menu.
2. Set the *DS0 Display Type* (see figure 22) to *displayLongForm(0)*. To create each static connection (which is the DS0 Mapping Process), you will select from the following parameters:
 - Device Type. This setting specifies the physical interface onto which you will be connecting. Within the Model 3092, the user has the option of selecting either a T1/E1 WAN line or an iDSL modem. The two Device Types choices are *t1-e1(1)* and *iDSL(2)*.

Note Both sides of the connection can be T1/E1 or both sides can be iDSL.



port has 24 or 31 DS0 channels, respectively. When selecting the slots you must select the same number of slots on the "A" and "B" side of the connection. The slots are selected by entering a string that represents the slots. For the iDSL ports, the slots that are available are 1, 2 and 3. For a WAN port configured as a T1, the available slots are numbered from 1–24. For a WAN port configured as an E1, the available slots are 1–31. The following notation should be used for entering the slots.

- dash: (-) 1 - 4
- comma: (,) 1,4,9
- combo: 1 - 2, 3, 6 - 7
- "A" and "B" identify the two ends of the static connection.

Examples on configuring static connections.

Example 1

Connect iDSL modem, Port 3 (referring to modem #3), time slots 1 and 2, to a T1 line on (WAN) Port 1, timeslots 4 and 5.

Solution: Complete the following steps.

1. Under "Dev Type A," select iDSL(2)
2. Under "Dev Num A," select port3(3)
3. Under "Dev Slots A," enter 1-2
4. Under "Dev Type B," select t1-e1(1)
5. Under "Dev Num B," select port1(1)
6. Under "Dev Slots B," enter 4-5.
7. Click on the "Submit Query" button located to the right of the static connection entry you just completed.
8. Click on the iDSL subsystem in the 3092 Configuration Menu. You will see that the two time slots of iDSL modem #3 (i.e., port #3) are connected to time slots 4 and 5 on T1/E1 WAN port #1.

Example 2

Connect a T1 line, (WAN) Port 2, timeslots 4 – 5 and 7, to another T1 line, (WAN) Port 3, timeslots 8 – 10.

Solution: Complete the following steps.

1. Under "Dev Type A," select t1-e1(1)
2. Under "Dev Num A," select port2(2)
3. Under "Dev Slots A," enter 4-5,7
4. Under "Dev Type B," select t1-e1(1)
5. Under "Dev Num B," select port3(3)
6. Under "Dev Slots B," enter 8-10
7. Click on "Submit Query" to the right of the static connection entry which you just completed.
8. Click on the T1/E1 Assignment subsystem in the 3092 Configuration Menu. You will see the appropriate three time slots statically mapped between WAN port 2 and WAN port 3.

Example 3

Connect two iDSL modems together--iDSL modem #6, timeslots 1 – 2, to iDSL modem #20, timeslots 1 – 2.

Solution: Complete the following steps.

1. Under “Dev Type A,” select iDSL(2)
2. Under “Dev Num A,” select port6(6)
3. Under “Dev Slots A,” enter 1-2
4. Under “Dev Type B,” select iDSL(2)
5. Under “Dev Num B,” select port20(20)
6. Under “Dev Slots B,” enter 1-2
7. Click on “Submit Query” to the right of the static connection entry which you just completed.
8. Click on the iDSL subsystem in the 3092 Configuration Menu. You will see that the two time slots of iDSL modem #6 (i.e., port #6) are connected to time slots 1 and 2 of iDSL modem #20 (i.e., port #20).

Example 4

Connect an iDSL modem, Port 2 (referring to modem #2), time slots 1, 2, and 3 (for 144kbps) to a T1/E1 line on (WAN) Port 3, time slots 8-10.

Solution: Complete the following steps.

1. Under "Dev Type A," select iDSL(2).
2. Under "Dev Num A," select port13(13).
3. Under "Dev Slots A," enter 1 - 3.
4. Under "Dev Type B," select t1-e1(1).
5. Under "Dev Num B," select port3(3).
6. Under "Dev Slots B," enter 8 - 10.
7. Click on "Submit Query" to the right of the static connection entry which you just completed.
8. Click on the T1/E1 Assignment subsystem in the 3092 Configuration Menu. You will see the appropriate three time slots statically mapped between iDSL modem #2 and WAN port 3. Note that the iDSL modem is configured for 144 kbps but that three 64 kbps WAN time slots are required for this 144 kbps connection.

Setting the clocking source

This section configures the Main Reference and Fallback Reference Clock for the 3092 DACS. You can choose any of the WAN ports, an internal oscillator or an externally provided clock for the system clock in the 3092. The Main Reference provides the 3092's system clock unless it fails or is disconnected. Should this occur, the Fallback Reference will be the clocking source for the 3092's system clock.

Do the following to set the clocking source:

1. Click on Clocking on the Configuration Menu.

- Connect your T1/E1 WAN connection to WAN Port #1 on the rear panel of the 3092. Assuming this is the WAN link you wish to use as the Main Reference, set Main Reference to *wan-1(1)* (see figure 23).

System Clocking Configuration

Main Reference:

Fallback Reference:

Clock Status: No Alarm

Figure 23. System Clocking Configuration window

- Set the Fallback Reference to *none(0)* if you have no other T1/E1 WAN links for connection to the 3092. Otherwise, select the appropriate WAN port under Fallback Reference.
- Click on **Submit Query**.

iDSL Port Configuration

iDSL Available: 24
iDSL Failed: 0
iDSL Activated: 1
iDSL Connected: 0
iDSL Test Mode: 0

Port	Circuit ID	Current State	Desire State	Device	iDSL Channel B1		iDSL Channel B2	
					Port	Slot	Port	Slot
1	None	lineDown (?)	activate(1)	Open			Open	
2	None	deactivate (0)	deactivate(0)	Open			Open	
3	None	deactivate (0)	deactivate(0)	t1-e1	port2(2)	4	t1-e1	port2(2) 5
4	None	deactivate (0)	deactivate(0)	Open			Open	

Activating the iDSL modems

Before data transmission can occur, the internal iDSL modems must be activated. Do the following to activate the modems:

- Click on iDSL on the Configuration Menu.
- If you have 24 iDSL modem links, click on **Activate All 24 Ports**. Otherwise, select *activate(1)* in the pull-down menu under Desired State. After you have activated all desired modems, click on **Submit Query**.

Note Both **Submit Query** buttons on this page fulfill the same function. You do not need to click **Submit Query** if you chose **Activate All 24 Ports**.

Configuring the default gateway

Do the following to add the default gateway:

1. Select IP on the Configuration Menu, then click on Routing Info...(see figure 24).

IP ROUTING INFORMATION

Destination	Mask	Gateway	Cost	Interface	Protocol	State
0.0.0.0	0.0.0.0	192.49.110.1	1	1	user(2)	active(2)
192.49.110.0	255.255.255.0	0.0.0.0	1	1	local(1)	active(2)

Add a route:

Destination	Mask	Gateway	
0.0.0.0		0.0.0.0	Add Route
0.0.0.0	0.0.0.0	0.0.0.0	Add Route
Advanced...		Interface	
0.0.0.0	0.0.0.0	0	Add Route

[O/S forwarding table](#)

Figure 24. IP Routing Information window

2. The route which you already see in the table appeared upon the configuration of the LAN IP address.
3. To enter the default gateway, use the first *Add Route* line. The *Destination* shall remain as *0.0.0.0*. There is no mask to enter.
4. Enter the IP address in the Gateway box. This is the default gateway.
5. Click on the **Add Route** button.



Figure 25. T1/E1 Link Activity window

Configuring line settings and signaling for E1

1. Select T1/E1 Link on the Configuration Menu. The T1/E1 Link Activity window appears (see figure 25).
2. Link: 1 corresponds to Line 1 on the DACS. Under Link 1, Click on Configuration then Modify. The Line Interface Settings section of the WAN Circuit Configuration window appears (see figure 26).

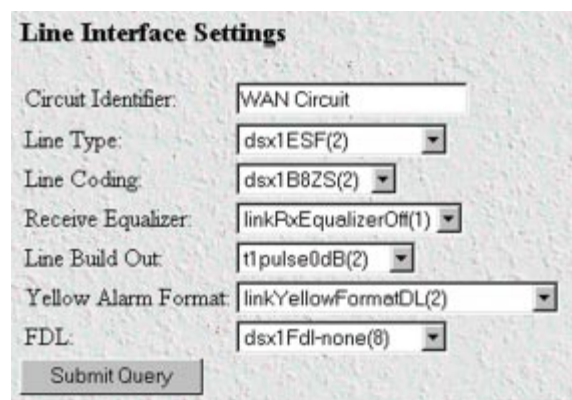


Figure 26. WAN Circuit Configuration window, Line Interface Settings section

Configuring the line settings

1. Click on the Line Type pop-up menu (see figure 26 on page 45) and choose either dsx1EX(4) or dsx1E1-CRC(5).
2. Click on the Line Coding pop-up menu (see figure 26 on page 45) and choose either dsx1AMI(5) or dsxHDB3(3). Most installations will use HDB3.
3. Click on the Line Build Out pop-up menu (see figure 26 on page 45) and select e1pulse(1).
4. Click on **Submit Query**.

At this point, the WAN front panel LEDs will become active. A solid green *FRAME* light indicator means that the DACS has synchronized with the E1 line. If the E1 line is not connected to the 3092, you will see Alarms on that WAN port. These should disappear upon connecting the E1 line to the WAN port on the rear of the Model 3092.

Configuring line settings and signaling for T1

1. Select T1/E1 Link on the Configuration Menu. The T1/E1 Link Activity window appears (see figure 25 on page 45).
2. Link: 1 corresponds to Line 1 on the DACS. Under Link 1, Click on Configuration then Modify. The Line Interface Settings section of the WAN Circuit Configuration window appears (see figure 26 on page 45).

Configuring the line settings

1. Click on the Line Type pop-up menu (see figure 26 on page 45) and choose from the following options:
 - dsx1ESF Extended SuperFrame DS1
 - dsx1D4 AT&T D4 format DS1
2. Click on the Line Coding pop-up menu (see figure 26 on page 45). The most common options are: dsx1B8ZS and dsx1AMI.
3. Click on the Line Build Out pop-up menu (see figure 26 on page 45) and select t1pulse0dB(1).
4. Click on **Submit Query**.

At this point, the WAN front panel LEDs will become active. A solid green *FRAME* light indicator means that the DACS has synchronized with the T1 line. If the T1 line is not connected to the 3092, you will see Alarms on that WAN port. These should disappear upon connecting the T1 line to the WAN port on the rear of the Model 3092.

Saving your configuration

The basic configuration for the DACS is now finished. Do the following to save your configuration settings:

1. Select Home on the Configuration Menu. The Home window appears (see figure 19 on page 37).
2. Click on the **Record Current Configuration** button (see figure 21 on page 39).

Note Failing to click on the **Record Current Configuration** button before you power down or reset the DACS will cause your changes to be lost.

3. The Import/Export function enables you to make a backup (or *export*) copy of your access server's configuration parameters. By exporting the configurations, the saved files can quickly be loaded (or *imported*) into a replacement access server—greatly speeding up the installation process should an access server need replacing.

Note All actions for Import/Export require superuser access privileges.

4. To import or export a configuration, click on Import/Export under the Configuration Menu to display the Import/Export main window (see figure 27).

IMPORT / EXPORT Server

EXPORT CURRENT FLASH CONFIGURATION

The current power up settings as stored in the system flash will be dumped to your screen. You may then save them in a file for later import back into the system.

Note that the information which is exported is the current hard storage settings, NOT the current settings. You may want to issue a "Record Current Configuration" on the home page first.

[Export Flash...](#)

IMPORT FLASH CONFIGURATION FROM FILE

If you have previously exported the system configuration to a file then you can submit that file below and the system will update its flash configuration from the data saved in the file.

After this operation the system should be rebooted to activate the new settings. The configuration is loaded directly into the flash and so does NOT immediately modify any settings.

WARNING: This operation will erase whatever settings you currently have in the system.

Browse...

Submit Query

Figure 27. Import/Export main window

5. To export the flash configuration, click on the Export Flash link on the Import/Export main page. The access server will display text configuration information resembling that shown in figure 28.

```

*****
Flash configuration data for: Server

The data below is the current hexadecimal representation
of your configurable data in the system. Select the
File/Save As option to save the data to a file. This
file can be reloaded into your system at a later date.

You may edit and comment the top portion of this file
but do not modify any data after the "at" symbol. Also,
do not put an "at" symbol in the comment area.

START CONFIGURATION DATA
@

fconfigData.5 = "0x01:00:00:00:04:04:04:04:04:04:04:04:08:08:08:08:08:08:04:04:04:04
:04:04:04:08:08:08:08:08:08:08:08:04:04:04:04:04:04:04:08:08:08
:08:08:08:04:04:04:04:08:04:04:08:08:08:08:08:08:08:00:00:00:00

fconfigData.6 = "0x01:00:00:00:04:04:04:04:04:04:04:04:08:08:08:08:08:08:04:04:04:04
:04:04:04:08:08:08:08:08:08:08:08:04:04:04:04:04:04:04:08:08:08
:08:08:08:04:04:04:04:08:04:04:08:08:08:08:08:08:08:08:08:08:00:00:00:00
    
```

Figure 28. Typical access server flash memory configuration data

To save the displayed data as a text file, select the **Save** option on your browser (see figure 29). For example, under Netscape, select **File > Save As**. A dialog box will display enabling you to save the contents of the export parameters to a text file. Select the location where you want the file stored, type a file name, and click **Save**.

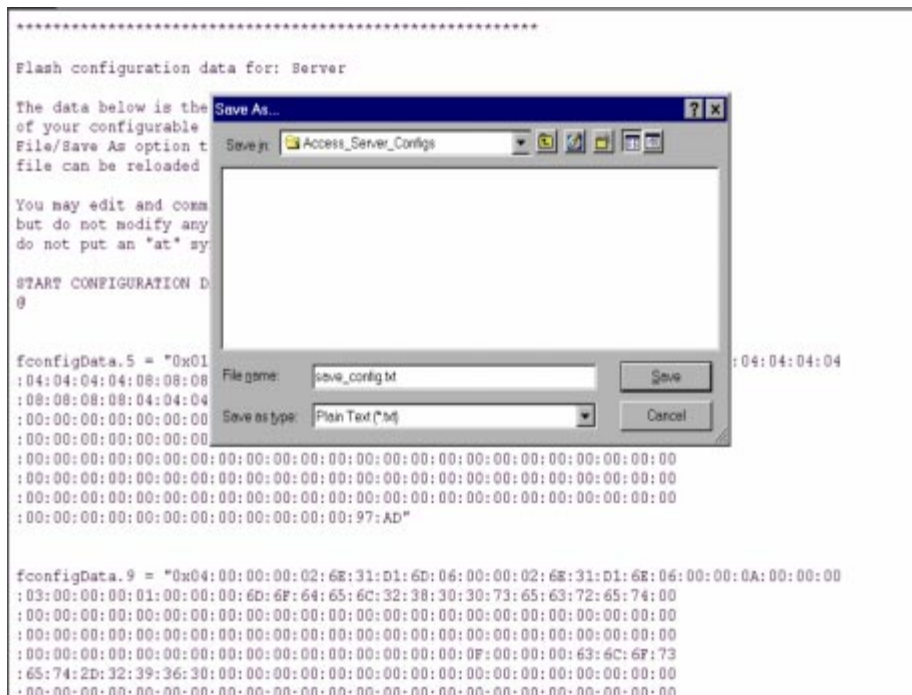


Figure 29. Saving the access server flash memory configuration data as a text file

Completing the installation

This section verifies that the Model 3092 is fully operational.

1. Temporarily disconnect the male ends of both power cords from the power outlet. Wait 30 seconds, then plug the power cords in again.
2. Verify that the green *POWER* LED is lit. If the *POWER* LED is flashing green, refer to Chapter 5, “Troubleshooting and maintenance”.
3. Verify that the *Link 1 Frame* LED illuminates, indicating that the DACS is synchronizing with the T1/E1 signal.
4. Verify that after 5 seconds, the *Link A Error* LED begins flashing, indicating that the DACS is satisfied with the quality of the T1/E1 signal.
5. Verify that after 10 seconds, the *Link A Error* LED extinguishes, indicating that the DACS is satisfied with the network signal and that the link is ready for use.

Note If the DACS does not respond as described, the most likely cause is that the DACS default settings are not compatible with the T1/E1 line. If this is the case, use the RS-232 CONFIG port to correct the DACS settings. You will have to examine the T1/E1 Link section in the configuration pages in the DACS.

6. There are two LEDs on the DACS 10/100 Ethernet port: a green LED that indicates link status and activity, and a yellow LED that indicates line speed.

Verify that the green LED is either flashing green (meaning that packets are being received at the Ethernet port) or solid green (meaning that the link is valid but no packets are being received).

Congratulations! Your DACS is now installed. For more in-depth information about configuring your DACS settings, refer to the *DSL DACS Administrator's Reference Guide* included on your Model 3092 CD-ROM. Otherwise, refer to Chapter 4, “Operation and shutdown” for information on activating and de-activating your Model 3092 DACS.

Chapter 4 **Operation and shutdown**

Chapter contents

Introduction	52
Activating the Model 3092	52
De-activating the Model 3092	52

Introduction

This chapter describes how to start or power-down the Model 3092.

Activating the Model 3092

Once the Model 3092 has been installed, no operator action is required under normal conditions; the Model 3092 is designed for unattended operation. The Model 3092 does not have a power switch and powers up immediately upon connecting the power cords to the 3092. When either power supply is connected to power, the Model 3092 will immediately begin its boot-up cycle. However, both power supplies must be connected to power for the redundancy feature to work.

When power is applied to the Model 3092 the following should occur:

1. The *POWER* LED illuminates.
2. The *Link 1 Frame* LED illuminates, indicating that the Model 3092 is synchronizing with the T1/E1 signal.
3. After 5 seconds, the *Link A Error* LED flashes, indicating that the Model 3092 is satisfied with the quality of the T1/E1 signal.
4. After 10 seconds, the *Link A Error* LED extinguishes, indicating that the Model 3092 is satisfied with the network signal and that the link is ready for use.
5. There are two LEDs on the Model 3092 10/100 Ethernet port: a green LED that indicates link status and activity, and a yellow LED that indicates line speed.

The green LED is either flashing green (meaning that packets are being received at the Ethernet port) or solid green (meaning that the link is valid but no packets are being received).

The yellow LED is either lit (indicating 100-Mbps operation) or off (indicating 10-Mbps operation).

Note The yellow LED reflects the speed of the last valid Ethernet connection.

The Model 3092 is operational.

De-activating the Model 3092

Perform the following procedure to deactivate the Model 3092.

1. Disconnect the male ends of both power cords from the power distribution strip or to a wall outlet.
2. Verify that the *POWER* LED extinguishes.

Chapter 5 **Troubleshooting and maintenance**

Chapter contents

- Introduction54
- Fault analysis56
- Periodic maintenance58
 - Calibration58
- Maintenance.....58
 - Replacing the Model 309258
 - Exporting the current Model 3092 configuration58
 - Removing the defective Model 309260
 - Installing the replacement Model 309261
 - Verifying the hardware installation61
 - Importing a saved configuration61
 - Using the DB9-RJ45 adapter with the included cable61
 - Setting up the HyperTerminal (or similar program) session62
 - Completing the installation65

Introduction

This chapter describes troubleshooting and fault analysis that can be performed by the operator. If you require more help, refer to Chapter 6, “Contacting PATTON for assistance”. Refer to table 3 for a list of common symptoms and suggested remedies.

Note The following information assumes that there is only one failure involving the Model 3092 and that if you perform the corrective action listed, it will solve the problem. If you are unable to correct a failure, refer to Chapter 6, “Contacting PATTON for assistance”.

Table 3. Symptoms

Problem	Corrective Action
POWER LED is extinguished	Verify that power is being supplied to the Model 3092.
POWER LED is flashing	Either one of the external power sources or one of the 3092's power supplies has failed. The Model 3092 will function normally indefinitely with one power supply. To verify the suspected problem, contact Patton Technical Support to determine whether the DACS needs to be replaced or not.
CPU FAIL LED is lit	CPU is unable to load the software from FLASH to RAM for operation. As soon as possible, unplug both power cables from the Model 3092, wait 30 seconds, then plug the cables back into the Model 3092 to see if the problem disappears. If the CPU FAIL LED remains lit after the Model 3092 completes the power-up cycle, contact Patton Technical Support to determine whether the DACS needs to be replaced or not.
ALARM LED is lit	Indicates that an alarm condition has been detected.
SYSTEM LED is not flashing	The Model 3092 is not functioning properly. As soon as possible, unplug both power cables from the Model 3092, wait 30 seconds, then plug the cables back into the Model 3092 to see if the problem disappears. If the SYSTEM LED remains lit after the Model 3092 completes the power-up cycle, contact Patton Technical Support to determine whether the DACS needs to be replaced or not.
ETHERNET green LED is extinguished	<ul style="list-style-type: none"> • A valid link has not been detected. Verify that the cable is plugged into the hub, switch, or workstation and the Model 3092. • Verify that the hub, switch, or workstation is powered on. • Verify that the correct cable is being used. Depending on whether you are connecting to a workstation (PC), hub, or switch, either a straight-through or cross-over cable. • Replace the cable. If the problem still exists, contact Patton Technical Support to determine whether the DACS needs to be replaced or not.

Fault analysis

The following procedures outline steps you should follow when troubleshooting a Model 3092 malfunction.

1. If possible, talk to the person who filed the trouble complaint and determine the operational symptoms. Record the symptoms on the appropriate trouble report form (include the front panel LED indications).
2. Refer to table 4 for LED definitions and compare the recorded results from the trouble report against those in the table, then refer to the section recommended in the table for the maintenance procedure that will repair the malfunction.

Table 4. LED definitions

LED	Location	Color	Status	Meaning
POWER	Front panel	Green	On solid	Power is being applied. No action recommended.
			Flashing	Either one of the external power sources or one of the 3092's power supplies has failed. The Model 3092 will function normally indefinitely with one power supply. To verify the suspected problem, contact Patton Technical Support to determine whether the DACS needs to be replaced or not.
			Off	No input power is being applied. Verify that power is being supplied to the Model 3092.
CPU FAIL	Front panel	Red	On solid	CPU is unable to load the software from FLASH to RAM for operation. As soon as possible, unplug both power cables from the Model 3092, wait 30 seconds, then plug the cables back into the Mode 3092 to see if the problem disappears. If the CPU FAIL LED remains lit after the Model 3092 completes the power-up cycle, contact Patton Technical Support to determine whether the DACS needs to be replaced or not.
			Off	The CPU is operating normally. No action recommended.
ALARM	Front panel	Red	On solid	A minor alarm condition has been detected.
			Flashing	A major alarm condition has been detected.
			Off	The Model 3092 is operating normally. No action recommended.
SYSTEM	Front panel	Green	Flashing	The Model 3092 is operating normally. No action recommended.
			Off	The Model 3092 is not functioning properly. As soon as possible, unplug both power cables from the Model 3092, wait 30 seconds, then plug the cables back into the Mode 3092 to see if the problem disappears. If the SYSTEM LED remains lit after the Model 3092 completes the power-up cycle, contact Patton Technical Support to determine whether the DACS needs to be replaced or not.

Table 4. LED definitions

LED	Location	Color	Status	Meaning
ETHERNET	Front panel	Green	On solid	Link status is nominal for the Ethernet port. No action recommended.
			Off	<ul style="list-style-type: none"> • A valid link has not been detected. • Verify that the cable is plugged into the hub, switch, or workstation and the Model 3092. • Verify that the hub, switch, or workstation is powered on. • Verify that the correct cable is being used. Depending on whether you are connecting to a workstation (PC), hub, or switch, either a straight-through or cross-over cable. • Replace the cable. If the problem still exists, contact Patton Technical Support to determine whether the DACS needs to be replaced or not.
Ext.Clock	Front Panel	Green	On solid	An external clock source is being used.
Test Mode	Front panel	Green	On solid	One or more of the iDSL ports is in test mode.
			Off	None of the iDSL ports is in test mode.
DSL Frame	Front Panel	Green	On solid	One or more iDSL ports has linked up successfully.
			Off	No iDSL ports have linked up.
DSL Error	Front panel	Red	On solid	One or more iDSL ports has errors.
			Off	No iDSL ports has an error.
WAN PORT— FRAME	Front panel	Green	On solid	Indicates normal activity at each of the four T1/E1/PRI links. No action recommended.
			Flashing	Indicates that the Model 3092 is detecting the network, but is unable to synchronize with it.
			Off	Indicates an error.
WAN PORT— ERROR	Front panel	Red	Off	Indicates normal activity at each of the four T1/E1/PRI links. No action recommended.
			On solid	Indicates an error.

Table 4. LED definitions

LED	Location	Color	Status	Meaning
10/100 ETHERNET	Rear panel	Green	On solid	Link is valid. No action recommended.
			Off	<ul style="list-style-type: none"> • A valid link has not been detected. • Verify that the cable is plugged into the hub, switch, or workstation and the Model 3092. • Verify that the hub, switch, or workstation is powered on. • Verify that the correct cable is being used. Depending on whether you are connecting to a workstation (PC), hub, or switch, either a straight-through or cross-over cable. • Replace the cable. If the problem still exists, contact Patton Technical Support to determine whether the DACS needs to be replaced or not.
			Flashing	Packets are detected at the Ethernet port. No action recommended.
10/100 ETHERNET	Rear panel	Yellow	On solid	100 Mbps speed. No action recommended.
			Off	10 Mbps speed. No action recommended.

Periodic maintenance

Other than using a lint-free cloth to clean dust off the Model 3092 chassis, the Model 3092 requires no periodic maintenance.

Calibration

The Model 3092 requires no calibration.

Maintenance

This section describes replacing the Model 3092.

Replacing the Model 3092

If you isolate a problem to the a Model 3092 component, the entire Model 3092 must be replaced as follows:

Exporting the current Model 3092 configuration

The Import/Export function enables you to make a backup (or *export*) copy of your access server's configuration parameters. By exporting the configurations, the saved files can quickly be loaded (or *imported*) into a replacement access server—greatly speeding up the installation process should an access server need replacing.

1. If you already have a recently exported backup of your configuration, go to “Removing the defective Model 3092” on page 60.

- To export a configuration, connect your Web browser to the Administration Pages, then click on Import/Export under the Configuration Menu to display the Import/Export main window (see figure 30).

IMPORT / EXPORT Server

EXPORT CURRENT FLASH CONFIGURATION

The current power up settings as stored in the system flash will be dumped to your screen. You may then save them in a file for later import back into the system.

Note that the information which is exported is the current hard storage settings, NOT the current settings. You may want to issue a "Record Current Configuration" on the home page first.

[Export Flash...](#)

IMPORT FLASH CONFIGURATION FROM FILE

If you have previously exported the system configuration to a file then you can submit that file below and the system will update its flash configuration from the data saved in the file.

After this operation the system should be rebooted to activate the new settings. The configuration is loaded directly into the flash and so does NOT immediately modify any settings.

WARNING: This operation will erase whatever settings you currently have in the system.

Browse...

Submit Query

Figure 30. Import/Export main window

Note The parameters that will be exported are the power-up settings as they are stored in flash memory and *may not* be the current operating parameters. To ensure that you export the most current parameters, go to HOME, then click on the **Record Current Configuration** button under Immediate Actions.

- To export the flash configuration, click on the Export Flash link on the Import/Export main page. The access server will display text configuration information resembling that shown in figure 31.

2. Unplug both male power cable connectors from their outlets.
3. Rotate the power cord retainer clips out of the way, then remove both power cables from the malfunctioning Model 3092.
4. Disconnect and label the following cables from the malfunctioning Model 3092:
 - the T1/E1 WAN cables
 - the RS-232 CONFIG cable
 - the 10/100 ETHERNET cable
5. Disconnect the ground wire from the grounding stud.
6. If the Model 3092 is mounted in a rack, remove it from the rack.
7. Place the malfunctioning Model 3092 in the container that the replacement Model 3092 came in so you can return the Model 3092 for repair.

Installing the replacement Model 3092

1. If you are installing the replacement Model 3092 in a 19-inch rack, go to step 2. Otherwise, place the Model 3092 at the desired location, then go to step 5.
2. Install the rack mounting ears onto the Model 3092 using the mounting hardware provided.
3. Place the Model 3092 at the desired position in the rack.
4. Secure the Model 3092 in position with the mounting screws.
5. Install the ground wire onto the grounding stud.
6. Connect the following cables onto the Model 3092:
 - the T1/E1 WAN cables
 - the RS-232 CONFIG cable
 - the 10/100 ETHERNET cable
7. Install the power cable into their IEC-320 connectors.
8. Rotate the power cable retainer clips so they secure the power cable plugs in the IEC-320 connectors.

Verifying the hardware installation

1. Connect the male end of the power cord to a power distribution strip or to a wall outlet.
2. Verify that the green *POWER* LED is lit.

Importing a saved configuration

Before the Model 3092 can be configured, the IP address and the netmask needs to be set up. This setup is done through the Model 3092 RS-232 CONFIG port on the Model 3092.

Using the DB9-RJ45 adapter with the included cable

Do the following:

1. Connect the DB9-RJ45 adapter to your PC's RS-232 serial port

2. Connect the RJ45-RJ45 cable between the adapter you installed in step 1 and the *RS-232 Config* port on the rear of the Model 3092.

Setting up the HyperTerminal (or similar program) session

Do the following:

1. Open a HyperTerminal session by double-clicking on *HYPERTRM.EXE*.



Figure 33. Connection Description window

2. Type a connection name (for example, *3092 Config*), select an icon, then click **OK** (see figure 33).



Figure 34. Connect To window

3. On the *Connect To* window (see figure 34), set *Connect using:* to one of the options named *Direct to Com?* (where the question mark (?) refers to the number identifying the RS-232 serial port on the PC). In the following procedure, *Com1* will be the used as the port identifier.
4. Click on **OK**.
5. The *COM1 Properties* window displays.

- Configure your COM port settings as shown in figure 35, then click **OK**.



Figure 35. COM1 Properties window

- Click on the **File** menu, then select *Properties*.
- Configure the settings for *Function, arrow and ctrl keys act as to Terminal keys* as shown in figure 36, then click **OK**.

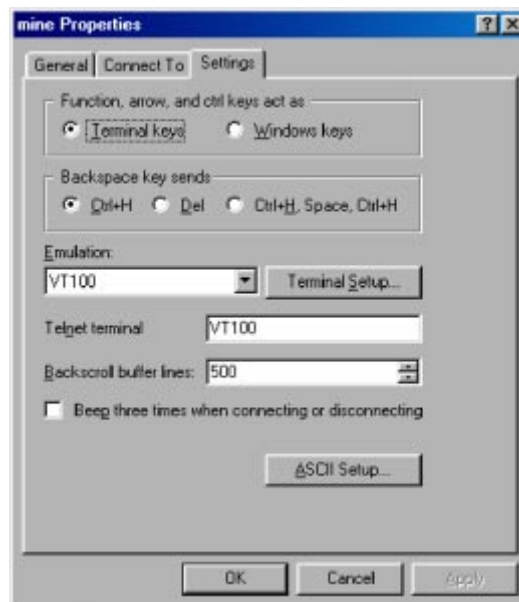


Figure 36. Terminal keys configuration

9. Connect the male end of the 3092 DACS power cables to the power outlets.
10. On your HyperTerminal connection window, boot up information will display, eventually followed by a login request window resembling that shown in figure 37.

```

Patton Electronics Company

Software Revision 3.0.3 May 19 2000 16:48:45

Username: _

```

Figure 37. Login window

11. For the user name, type **superuser**.
12. For the password, type **superuser**; the TOP LEVEL MANAGEMENT window then appears (see figure 38).

```

TOP LEVEL MANAGEMENT                                DACS
-----
a HOME
b ALARMS
c DACS
d Clocking
e iDSL
f Ethernet
g ICMP
h IP
i RIP Version 2
j SNMP
k System
l System Log
m T1/E1 Link
n TCP
o UDP
p
q About

Please Enter a selection
>

```

Figure 38. VT-100 Top Level Management window

13. Type **k** for System, then press <Enter>.
14. Under System, type **l** for Details, then press <Enter>.
15. Enter **g** for LAN Address, then press <Enter>.
16. Type your LAN IP address followed by pressing <Enter>.
17. Press the left-arrow cursor key on your keyboard to return to the previous screen.
18. If you do not need to change the LAN Mask from the default of 255.255.255.0, go to step 21. Otherwise, press **h** and type the new LAN Mask in the same manner as when entering a LAN IP address.

19. Press the left-arrow cursor key until the TOP LEVEL MANAGEMENT window displays.
20. Select **a** for Home, then press <Enter>.
21. Under the Current Status page, type **1** (storeConfig(1)) to save the changes you have just made to the configuration.
22. To import a saved configuration, connect your Web browser to the Administration Pages, then click on Import/Export under the Configuration Menu to display the Import/Export main window (see figure 30 on page 59).
23. To import a configuration file into the Model 3092, type the complete path and filename for the configuration file you wish to load or click on the **Browse...** button to select the desired file, then click on the **Submit Query** button (see figure 30 on page 59).

Upon successfully importing the file, the Model 3092 will display *Configuration Load Complete*, indicating that the new operating parameters have been loaded into flash memory.

24. Click on HOME under the Configuration Menu, then click on the **Hard Reset** button under Immediate Actions.

Note Do not select **Record Current Configuration** after importing configuration parameters.

Completing the installation

This section verifies that the Model 3092 is fully operational.

1. Temporarily disconnect the male ends of both power cords from the power distribution strip or to a wall outlet. Wait 30 seconds, then plug the power cords in again.
2. Verify that the green *POWER* LED is lit. If the *POWER* LED is flashing green, refer to Chapter 5, “Troubleshooting and maintenance”.
3. Verify that the *Link 1 Frame* LED illuminates, indicating that the Model 3092 is synchronizing with the T1/E1 signal.
4. Verify that after 5 seconds, the *Link A Error* LED begins flashing, indicating that the Model 3092 is satisfied with the quality of the T1/E1 signal.
5. Verify that after 10 seconds, the *Link A Error* LED extinguishes, indicating that the Model 3092 is satisfied with the network signal and that the link is ready for use.
6. There are two LEDs on the Model 3092 10/100 Ethernet port: a green LED that indicates link status and activity, and a yellow LED that indicates line speed.

Verify that the green LED is either flashing green (meaning that packets are being received at the Ethernet port) or solid green (meaning that the link is valid but no packets are being received).

The Model 3092 is operational.

Chapter 6 **Contacting PATTON for assistance**

Chapter contents

- Introduction66
- Contact information66
- Warranty Service and Returned Merchandise Authorizations (RMAs)66
 - Warranty coverage66
 - Out-of-warranty service66
 - Returns for credit66
 - Return for credit policy67
 - RMA numbers67
 - Shipping instructions67

Introduction

This chapter contains the following information:

- “Contact information”—describes how to contact PATTON technical support for assistance.
- “Warranty Service and Returned Merchandise Authorizations (RMAs)”—contains information about the RAS warranty and obtaining a return merchandise authorization (RMA).

Contact information

Patton Electronics offers a wide array of free technical services. If you have questions about any of our other products we recommend you begin your search for answers by using our technical knowledge base. Here, we have gathered together many of the more commonly asked questions and compiled them into a searchable database to help you quickly solve your problems.

- Online support—available at www.patton.com.
- E-mail support—e-mail sent to support@patton.com will be answered within 1 business day
- Telephone support—standard telephone support is available 5 days a week, from 8:00am to 5:00pm EST by calling +1 (301) 975-1007

Warranty Service and Returned Merchandise Authorizations (RMAs)

Patton Electronics is an ISO-9001 certified manufacturer and our products are carefully tested before shipment. All of our products are backed by a comprehensive warranty program.

Note If you purchased your equipment from a Patton Electronics reseller, ask your reseller how you should proceed with warranty service. It is often more convenient for you to work with your local reseller to obtain a replacement. Patton services our products no matter how you acquired them.

Warranty coverage

Our products are under warranty to be free from defects, and we will, at our option, repair or replace the product should it fail within one year from the first date of shipment. Our warranty is limited to defects in workmanship or materials, and does not cover customer damage, lightning or power surge damage, abuse, or unauthorized modification.

Out-of-warranty service

Patton services what we sell, no matter how you acquired it, including malfunctioning products that are no longer under warranty. Our products have a flat fee for repairs. Units damaged by lightning or other catastrophes may require replacement.

Returns for credit

Customer satisfaction is important to us, therefore any product may be returned with authorization within 30 days from the shipment date for a full credit of the purchase price. If you have ordered the wrong equipment or you are dissatisfied in any way, please contact us to request an RMA number to accept your return. Patton is not responsible for equipment returned without a Return Authorization.

Return for credit policy

- Less than 30 days: No Charge. Your credit will be issued upon receipt and inspection of the equipment.
- 30 to 60 days: We will add a 20% restocking charge (crediting your account with 80% of the purchase price).
- Over 60 days: Products will be accepted for repairs only.

RMA numbers

RMA numbers are required for all product returns. You can obtain an RMA by doing one of the following:

- Completing a request on the RMA Request page in the *Support* section at www.patton.com
- By calling +1 (301) 975-1000 and speaking to a Technical Support Engineer
- By sending an e-mail to returns@patton.com

All returned units must have the RMA number clearly visible on the outside of the shipping container. Please use the original packing material that the device came in or pack the unit securely to avoid damage during shipping.

Shipping instructions

The RMA number should be clearly visible on the address label. Our shipping address is as follows:

Patton Electronics Company

RMA#: xxxx

7622 Rickenbacker Dr.

Gaithersburg, MD 20879-4773 USA

Patton will ship the equipment back to you in the same manner you ship it to us. Patton will pay the return shipping costs.

Appendix A **RJ-21X Wiring Color Chart**

Chapter contents

Introduction70

Introduction

Table 5 contains the band-marked color codes for the RJ-21X connector. The Pair Number matches the port number on the DS0 Mapping Management page.

Table 5. Band Marked Color Code

Wire/Color Code	Tip and Ring	Pair Number	50 Pin Positions
White/Blue	Tip 1	Pair 1	26
Blue/White	Ring 1		1
White/Orange	Tip 2	Pair 2	27
Orange/White	Ring 2		2
White/Green	Tip 3	Pair 3	28
Green/White	Ring 3		3
White/Brown	Tip 4	Pair 4	29
Brown/White	Ring 4		4
White/Slate	Tip 5	Pair 5	30
Slate/White	Ring 5		5
Red/Blue	Tip 6	Pair 6	31
Blue/Red	Ring 6		6
Red/Orange	Tip 7	Pair 7	32
Orange/Red	Ring 7		7
Red/Green	Tip 8	Pair 8	33
Green/Red	Ring 8		8
Red/Brown	Tip 9	Pair 9	34
Brown/Red	Ring 9		9
Red/Slate	Tip 10	Pair 10	35
Slate/Red	Ring 10		10
Black/Blue	Tip 11	Pair 11	36
Blue/Black	Ring 11		11
Black/Orange	Tip 12	Pair 12	37
Orange/Black	Ring 12		12
Black/Green	Tip 13	Pair 13	38
Green/Black	Ring 13		13
Black/Brown	Tip 14	Pair 14	39
Brown/Black	Ring 14		14
Black/Slate	Tip 15	Pair 15	40
Slate/Black	Ring 15		15
Yellow/Blue	Tip 16	Pair 16	41
Blue/Yellow	Ring 16		16
Yellow/Orange	Tip 17	Pair 17	42
Orange/Yellow	Ring 17		17

Table 5. Band Marked Color Code (Continued)

Wire/Color Code	Tip and Ring	Pair Number	50 Pin Positions
Yellow/Green	Tip 18	Pair 18	43
Green/Yellow	Ring 18		18
Yellow/Brown	Tip 19	Pair 19	44
Brown/Yellow	Ring 19		19
Yellow/Slate	Tip 20	Pair 20	45
Slate/Yellow	Ring 20		20
Violet/Blue	Tip 21	Pair 21	46
Blue/Violet	Ring 21		21
Violet/Orange	Tip 22	Pair 22	47
Orange/Violet	Ring 22		22
Violet/Green	Tip 23	Pair 23	48
Green/Violet	Ring 23		23
Violet/Brown	Tip 24	Pair 24	49
Brown/Violet	Ring 24		24
Violet/Slate	Not Used	Pair 25 (Not Used)	50
Slate/Violet	Not Used		25

