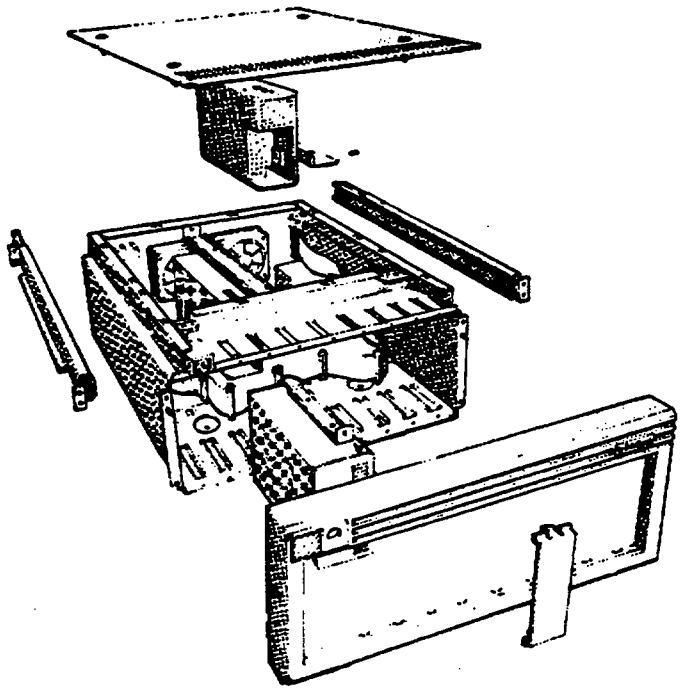
DataGeneral

Customer Documentation

Maintaining the CSS2



Maintaining the CSS2

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Notice

Maintaining the CSS2
014-002032-00

Revision History:
Original Release - August 1990

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 in which case the user will be required to correct the interference at his own expense. Testing was done with shielded cables. The use of any cable other than the shielded type means that your system will emit excess amounts of radio frequency energy, thereby increasing the likelihood of interference. Therefore, in order to comply with the FCC regulations, it is necessary that you use shielded cables with your installation.

WARNING

Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:
(1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operations.

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n' émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique édicte par le ministere des Communications du Canada.

この装置は，第一種情報装置（商工業地域において使用されるべき情報装置）
で商工業地域での電波障害防止を目的とした情報処理装置等電波障害自主規制
協議会（ＶＣＣＩ）基準に適合しております。従って，住宅地域またはその隣接した地域で使用すると，ラジオ，テレビジ
ョン受信機等に受信障害を与えることがあります。取扱説明書に従って正しい取り扱いをして下さい。

Preface

The manual provides instructions for maintaining the Combined Storage Subsystem 2 (CSS2). This rack-mounted, peripheral housing unit provides power and signal distribution for a variety of drives, including winchester fixed disk drive and removable media drives such as tape, compact disk, optical disk, and floppy diskettes. You can use the CSS2 with a variety of ECLIPSE® MV/Family or AViiON™ computer systems.

A Data General field engineer must install the CSS2, but you can easily maintain components of the units as well as expand its capacity by adding drives. You can maintain the following CSS2 components: drives, adapter printed circuit boards (PCBs), and the primary and auxiliary power supplies.

About this Manual

We have organized this manual as follows:

Chapter 1 Introduction to the CSS2

Chapter 2 Procedures for removing and replacing the top and front covers of the CSS2 and safety guidelines for working inside the unit. *Please be sure to read this chapter before attempting to work on your CSS2*

Chapter 3 Instructions for removing and replacing drives

Chapter 4 Instructions for removing and replacing adapter PCBs

Chapter 5 Instructions for removing and replacing the power supplies

Related Documentation

To complete many of the procedures in this manual you will need to locate one or more additional manuals. For example, to install a drive you will need to find the following additional manuals before you start the installation:

- The manual shipped with the drive (to help you find the location of jumpers, switches, and connectors on the drive, also to provide technical specifications for the drive)
- The manual shipped with the adapter PCB, if the drive requires one (to help you find the location of jumpers, switches, and connectors on the PCB)
- The expansion or installation manual for the computer system to which the CSS2 is connected (to find out how to configure the drive's operating parameters using its jumpers and/or switches to conform to the specifications required by the computer system)
- The operating manual or software operating system manual (and software release notices) for the computer to which the CSS2 is connected (to find out how to configure your operating system to recognize and address the drive, and how to use system commands to store and access data on the drive)

How We Use Symbols

We use the following symbols to alert you to specific types of information.

MANUALS

This icon indicates any addition manual or manuals the procedure requires. Locate these manuals before beginning the procedure.

TOOLS

This icon lists the tools you should gather before beginning the procedure.

WARNING

This icon indicates a procedure that if performed incorrectly will damage the equipment and possibly injure you.

CAUTION

This icon indicates a procedure that if performed incorrectly will damage the equipment.

NOTE

This icon alerts you to special information regarding the procedure you are about to perform.

Contacting Data General

We want to know what you like and dislike about this manual. If you have comments on this manual, please use the Comment Form at the back of this manual. If you need additional manuals, please use the enclosed TIPS order form (USA only) or contact your Data General sales representative.

If you are unable to solve a problem using this manual, and you are within the United States, contact the Data General Service Center by calling 1–800–DG–HELPS for toll–free telephone support. The center will put you in touch with a member of Data General's telephone assistance staff who can answer your questions.

Free telephone assistance is available with your warranty and with most Data General service options. Lines are open from 8:30 a.m. to 8:30 p.m., Eastern Standard Time, Monday through Friday.

For telephone assistance outside the United States, ask your Data General sales representative for the appropriate phone number.

End of Preface

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Table

Chapter 1
Introduction

The CSS2 (Combined Storage Subsystem 2) is a peripheral housing unit that provides increased data storage capacity and flexibility for your ECLIPSE® MV/Family or AViiON™ computer. The CSS2 provides central housing and power/signal distribution for single–ended or differential Small Computer System Interface (SCSI) drives. Drives with other types of interfaces may be used with an adapter printed circuit board (PCB) that converts their interface to SCSI. The CSS2 has 10 half–height slots and can accommodate up to seven devices with unique SCSI numbers. Some adapter PCBs support two devices using a single SCSI number, so the total number of drives and/or PCBs you can install varies greatly.

The controller PCB for the CSS2 itself resides in the computer system to which you connect the CSS. This design allows you flexibility in the use of available SCSI ID numbers across a system of mass storage devices. For example, you can use a straightforward assignment of one SCSI ID number to each individual drive or adapter PCB, limiting the number of units supported by the controller to seven. If however your computer system supports LUNs (Logical Unit Numbers) your controller can support many more individual storage units (of specific types).

A Data General Field Engineer installs the CSS2 in an equipment rack and connects it to your computer using a SCSI bus cable. Although a Data General Field Engineer must initially install the CSS2 in the rack and connect it to the computer, you can add drives or PCBs to the CSS2 and replace specific components. These components, referred to as customer replaceable units (CRUs) include the drives, controller PCBs, and power supplies.

The types of drives you install in the CSS2 depend in large part upon your data processing needs, and is limited by the type of system to which you connect the CSS2. Table 1–1 lists the types of drives and adapter PCBs you can install a CSS2 connected to an ECLIPSE MV/Family computer. Table 1–2 lists the drives and adapters you can install in a CSS2 connected to an AViiON computer.

Table 1-1 CSS2 Drive Matrix – ECLIPSE MV/Family Systems

Type/Capacity	Physical Form	Interface	CSS2 Adapter Required [1]
Fixed Disk Drives			
662 Mbyte	5.25", full-height	SCSI	None
179 Mbyte	5.25", half-height	SCSI	None
332 Mbyte	5.25", half-height	SCSI	None
1 Gbyte	5.25", full-height	SCSI (standard)	None
1 Gbyte	5.25", full-height	SCSI (differential)[2]	None
Removable Media Drives			
150 Mbyte .25-inch cartridge (QIC) tape	5.25", half-height	SCSI	Adapter PCB that converts SCSI QIC format to SCSI 9-TRK format
Multicapacity QIC tape	5.25", half-height	SCSI	Adapter PCB that converts SCSI QIC format to SCSI 9-TRK format
2 Gbyte helical scan tape	5.25", full-height	SCSI	None
600 Mbyte rewritable-optical disc	5.25", full-height	Optical ESDI	Adapter PCB that converts optical ESDI interface to SCSI interface
600 Mbyte read only memory (ROM) compact disc	5.25", half-height	SCSI	None

NOTE:
1 This column refers to controllers that must be installed directly in the CSS2. Some drives require controllers installed in the computer. (See your computer installation or expansion manual for more information.)
2 You cannot mix single-ended and differential SCSI drives in the same CSS2.

Table 1-2 CSS2 Drive Matrix - AViiON Systems

Type/Capacity	Physical Form	Interface	CSS2 Adapter Required [1]
Fixed Disk Drives			
662 Mbyte	5.25", full-height	SCSI	None
179 Mbyte	5.25" , half-height	SCSI	None
332 Mbyte	5.25", half-height	SCSI	None
1 Gbyte	5.25", full-height	SCSI (standard)	None
1 Gbyte	5.25", full-height	SCSI (differential)	None
Removable Media Drives			
150 Mbyte .25-inch cartridge (QIC) tape	5.25", half-height	SCSI	None
Multicapacity QIC tape	5.25", half-height	SCSI	None
2 Gbyte helical scan tape	5.25", full-height	SCSI	None
600 Mbyte rewritable-optical disc	5.25", full-height	Optical ESDI	Adapter PCB that converts optical ESDI to SCSI [2]
600 Mbyte read only memory (ROM) compact disc	5.25", half-height	SCSI	None
1.44 Mbyte diskette drive	3.5",half-height [3]	SA450	Adapter PCB that converts SA450 to SCSI [2]
	5.25", half-height		
1.2 Mbyte diskette drive		SA450	Adapter PCB that converts SA450 to SCSI [2]

NOTES:
1. This column refers to controllers that must be installed directly in the CSS2. Some drives require controllers that are installed in the computer. (See your computer installation or expansion manual for more information.)
2. This adapter PCB can support two drives.
3. This drive is smaller than half-height and requires a mounting bracket (which in most cases is already attached) to fit a half-height slot.

End of Chapter

Chapter 2
Getting Started

The cover of the CSS2 protects the components inside from damage by electrostatic discharge (ESD). Any time you remove the cover you can damage components by simplying touching them and discharging electrostatic charges that have accumulated on your body. Before beginning any expansion or repair work on your CSS2 you need to prepare a static–safe work area, then open the front and/or top covers of the CSS2, and attach the ESD wrist strap shipped with your CSS2.

Creating a Static–Safe Work Area

Follow these general guidelines for setting up a static–safe work area whenever you open the cover of the CSS2:

- Clear your worksite of nonconductive materials that build up electrostatic charge such as vinyl covered notebooks, styrofoam packaging and cups, cellophane wrappers and tape
- Disconnect the CSS2's external ac power cord from the power outlet and turn off the power switch on the front of the CSS2 as well as the circuit breaker switch on the back of the CSS2.
- Following the instructions later in the chapter, use the ESD wrist strap packaged with your CSS2 to ground yourself before unpacking an expansion or replacement component or doing any work inside the CSS2 chassis.
- Always place the component you are working with on an antistatic mat (available from Data General as part of a full ESD kit, call your Data General sales representative for additional information).
- Do not remove any replacement or expansion component from its antistatic bag until you are ready to configure and install it.
- Avoid touching the sides of the drive or printed circuit board. Always handle a drive or PCB by carefully grasping its edges.
- Gather all the materials and tools you need to complete the work before you begin. After you set up a static–safe work area and open the cover of the CSS2 try to stay in the work area, as movement outside the work area can rebuild the static charge on your body. Any time you move away from the work area or touch ungrounded surfaces you will need to follow the ESD setup procedure to eliminate the static charge.
- Replace the cover of the CSS2 as soon as possible after completing your work.

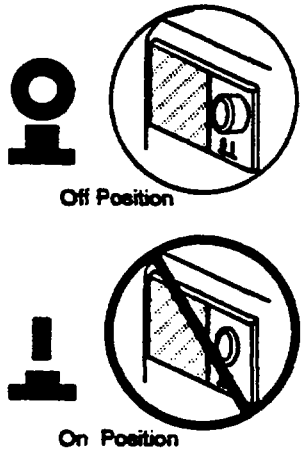
Removing the Top and Front Covers of the CSS2

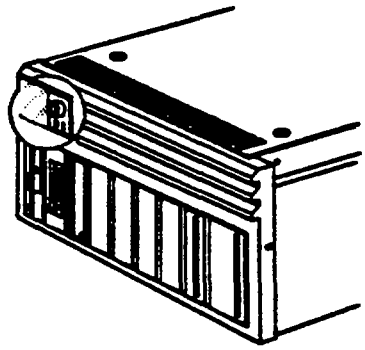
Medium Phillips screwdriver
Ball point pen or similar pointed object
Large flat blade screwdriver or large coin
ESD wrist strap

Follow these steps to remove the top and front covers of the CSS2.

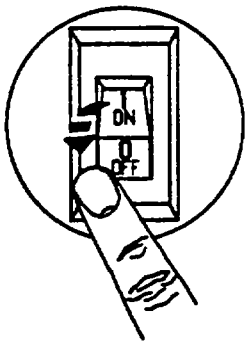
Turn off both the power switch and circuit breaker switch, then remove the ac power cable from the wall outlet. If you don't you will damage the CSS2 and injure anyone attempting to remove or replace components.

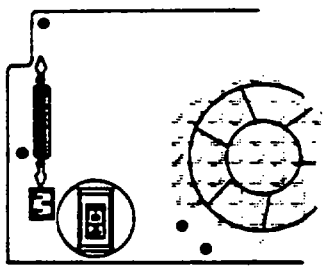
1. Press in on the CSS2 power switch to turn off the power. Remove the CSS2 power cord from the power source outlet.



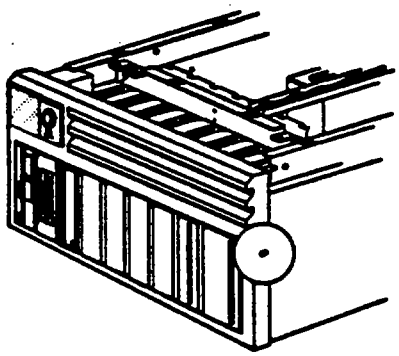


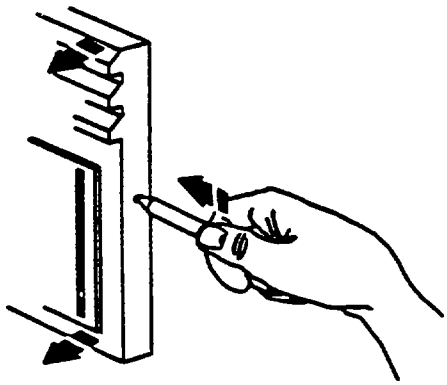
2. Open the back door of the equipment rack, and locate the circuit breaker switch on the left rear of the CSS2 chassis. Turn the circuit breaker switch off (down position).



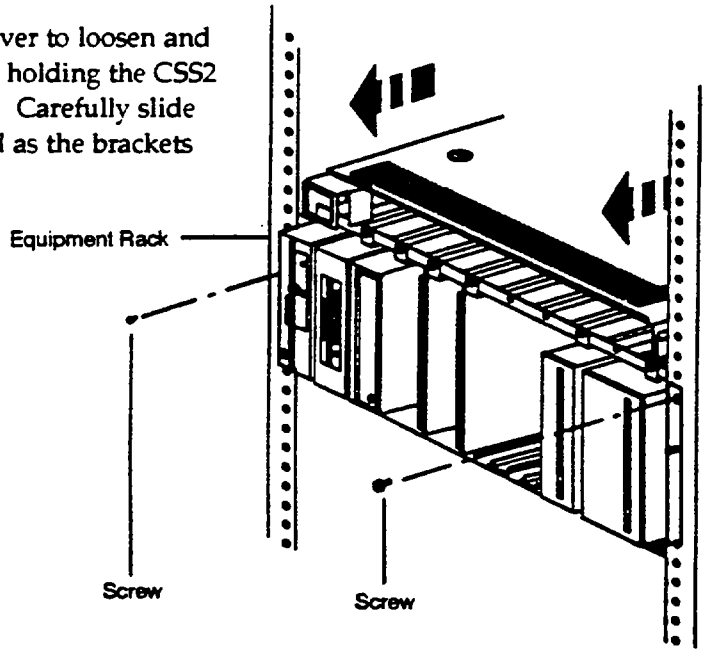


3. Press in on the tabs located on either side on the front cover with a ball point pen and pull forward on the front cover to remove.





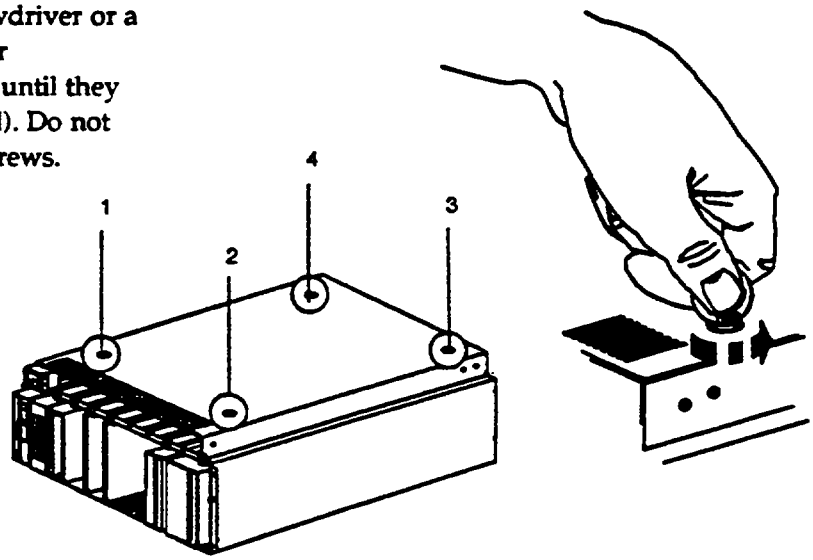
4. Use a Phillips screwdriver to loosen and remove the two screws holding the CSS2 int the equipment rack. Carefully slide the CSS2 as far forward as the brackets will allow.



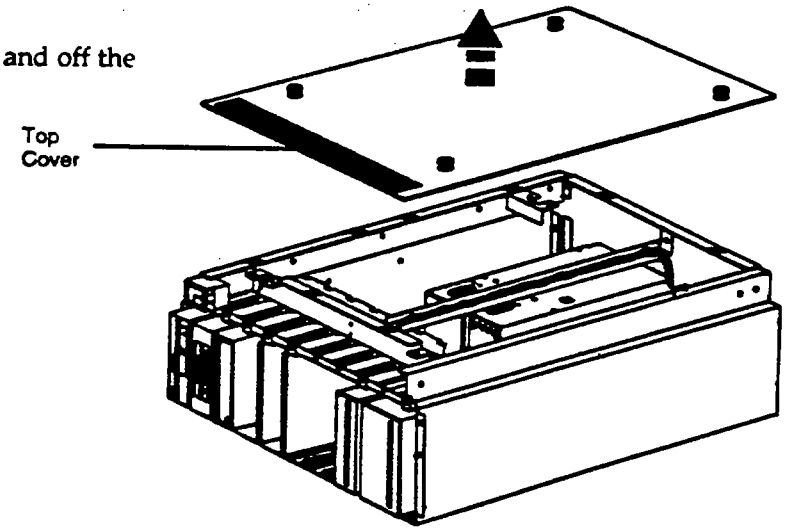
WARNING

Do not attempt to remove the CSS2 from the equipment rack. The unit weighs approximately 70 lbs when fully loaded with drives. Most of the weight is in the front of the chassis. The weight imbalance makes it easy to drop the unit, which could damage the CSS2 and injure you.

5. Using a large flat–bladed screwdriver or a large coin, turn each of the four latch–screws counterclockwise until they pop up (they are spring loaded). Do not attempt to remove the latch–screws.



6. Lift the top cover straight up and off the CSS2.

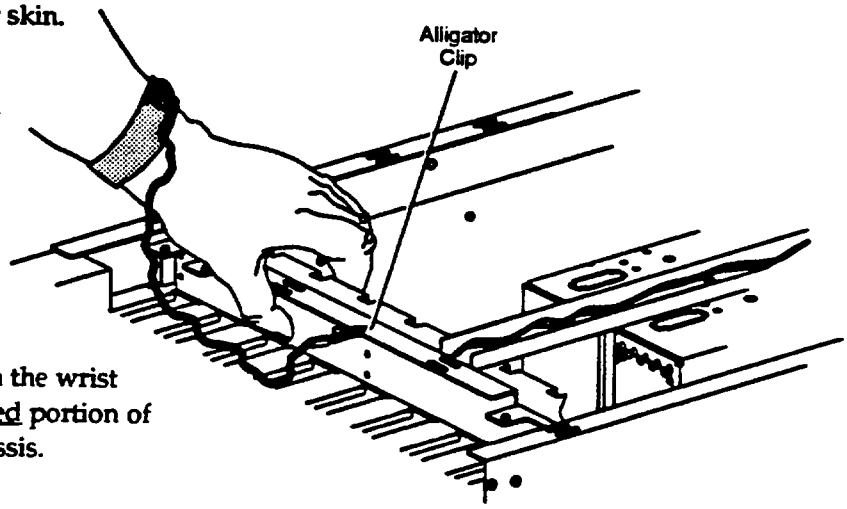


CAUTION

Do not attempt work inside the chassis of the CSS2 without using the ESD wrist strap that was shipped with your system.

7. Before you do anything else, ground yourself using an ESD wrist strap:

   a. Slip the wrist band onto your wrist with the gray side against your skin.



   b. Attach the alligator clip on the wrist strap's cord to an <u>unpainted</u> portion of the subsystem's metal chassis.

WARNING

Do not attach the alligator clip of the ESD wrist strap to any portion of the CSS2 power supplies.

Replacing the Top and Front Covers

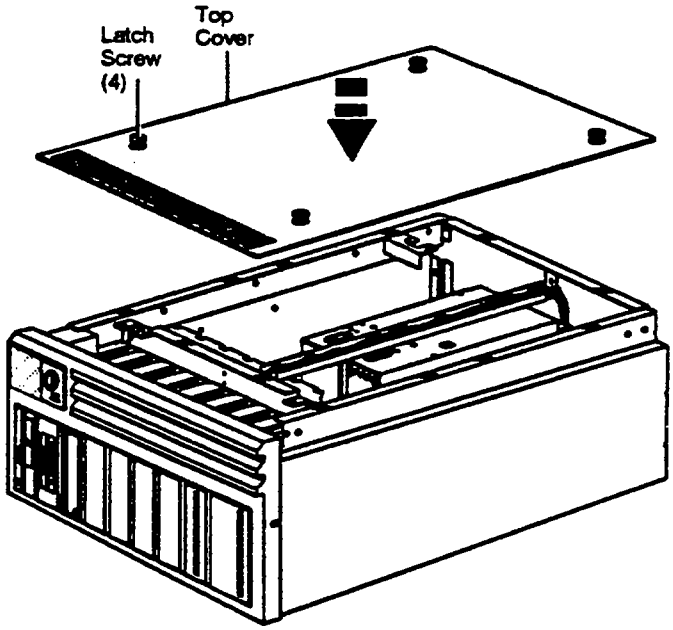
Medium Phillips screwdriver
Large flat blade screwdriver or large coin

When you have completed your work, replace the CSS2 top and front covers as follows:

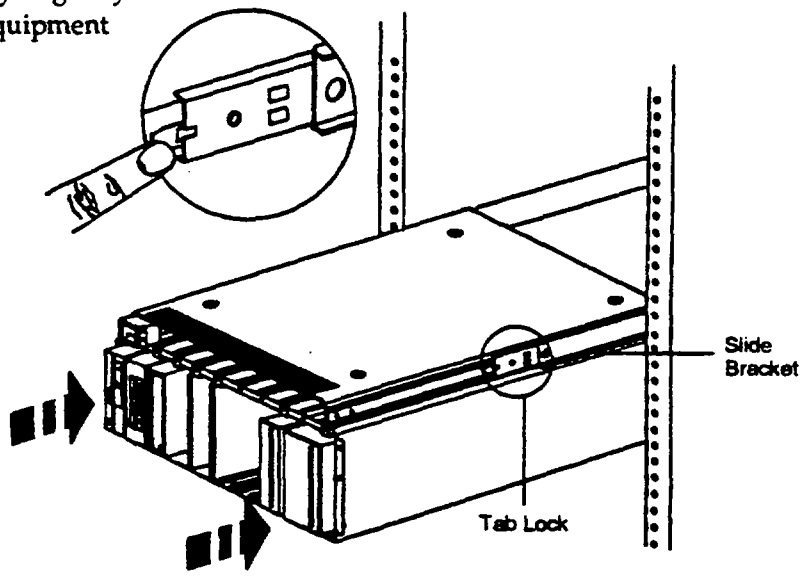
1. Detach the ESD wrist strap's alligator clip from the CSS2 chassis.

2. Place the top cover down on top of the CSS2 and align the four latch–screws with their holes.

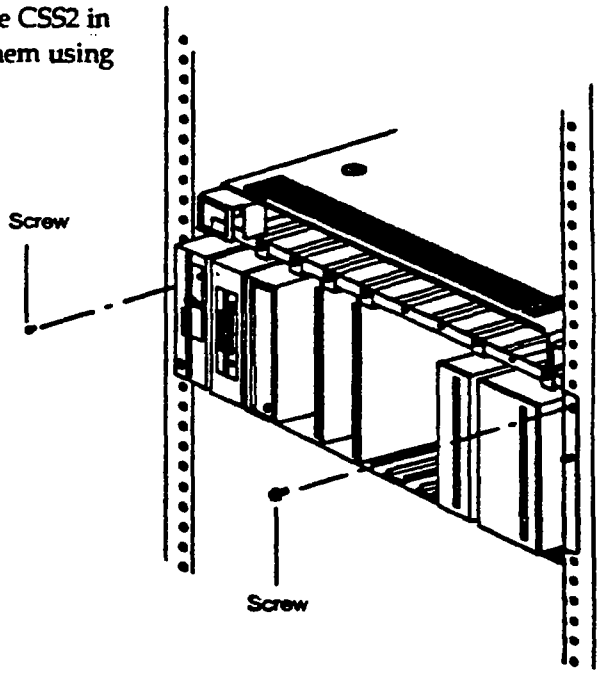
3. Using a large flat–bladed screwdriver or large coin, turn the latch–screws clockwise to tighten them securely.



4. Press in on the tabs located on the slide brackets with your fingers, as you gently push the CSS2 back into the equipment rack.

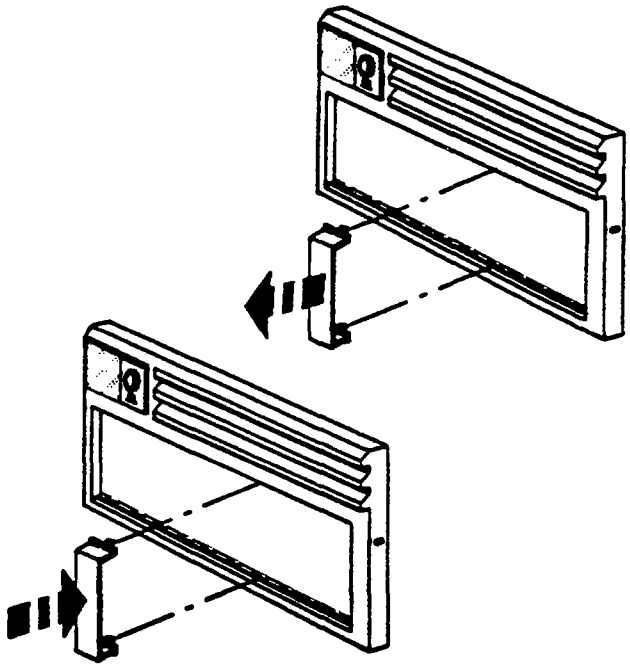


5. Insert the two screws that hold the CSS2 in the equipment rack and tighten them using a Phillips screwdriver.



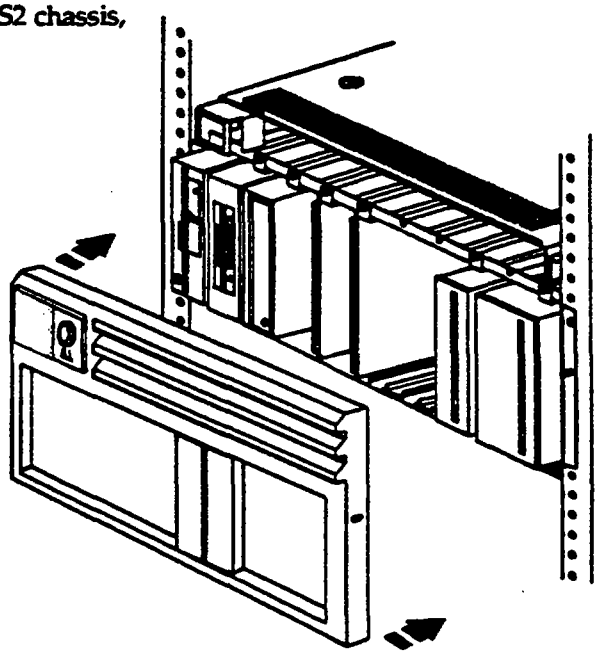
CAUTION **Do not remove a blank bezel from the front cover of the CSS2 to expose a PCB. A bezel must cover each PCB and/or empty cavity to prevent damage from ESD or dust.**

6. If you have <u>added</u> a drive to your CSS2, pop the blank bezel covering the new drive out from the front cover. Save this bezel.



If you have <u>removed</u> a drive and are not installing a replacement drive, insert a blank bezel into front cover of the CSS2 to cover the empty cavity.

7. Align the front cover with the CSS2 chassis, and press it into place.



Reapplying Power to the CSS2

Once you complete your work on the CSS2 you will need to turn on power to the unit. To do this follow the steps in the power up section of the computer's operating manual. If the LED located inside the CSS2 power switch does not light or if you do not hear the cooling fans start up, there are a few simple ways you can check your system before contacting Data General for assistance.

- Make sure the CSS2 power cord is plugged tightly into the power cord receptacle on the back of the subsystem and into the ac power outlet.
- Make sure the ac power outlet that you plug the CSS2 into is supplying power. Test the outlet by plugging a desk lamp into it to see if the desk lamp will light.
- Make sure the voltage–selection switch is in the correct position. Refer to Chapter 5 for instructions.
- Make sure that the CSS2 internal SCSI I/O cable and power cable are securely attached to the connectors on each drive or PCB. If this does not solve the problem, make sure the jumpers on the drives and PCB are set correctly.

If none of these suggestions work, contact Data General by referring to the "Contacting Data General" section in the Preface of this manual.

End of Chapter

Chapter 3
Removing and Installing Drives

This chapter provides instructions for removing and installing drives. If you are expanding your system by installing an additional drive, check the tables in Chapter 1 to verify the drive's compatibility with your system.

Removing a Drive


TOOLS

Medium Phillips screwdriver
Ball point pen or similar pointed object
Large flat blade screwdriver or large coin

Follow the steps below to remove the drive.

1. Follow the instructions in Chapter 2 to do the following:
   a. Turn off the unit's power and circuit breaker switches and unplug the ac power cord.
   b. Remove the front cover of the CSS2.
   c. Remove the screws that secure the unit in the equipment rack.
   d. Remove the top cover of the unit and attach the ESD wrist strap.

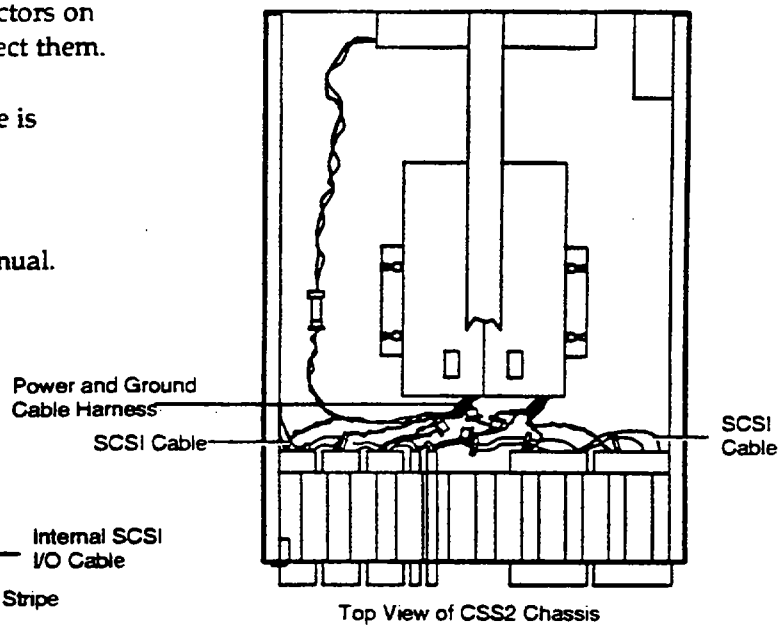

WARNING

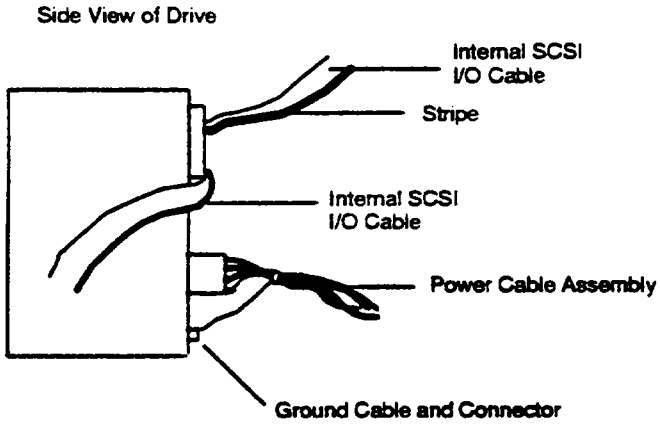
Turn off both the power switch and circuit breaker switch, then remove the ac power cable from the wall outlet. If you don't, you will damage the CSS2 and injure anyone attempting to remove or replace components.

2. Locate the SCSI and power connectors on the rear of the drive, and disconnect them.

   Disconnect the ground cable if one is connected to the rear of the drive.

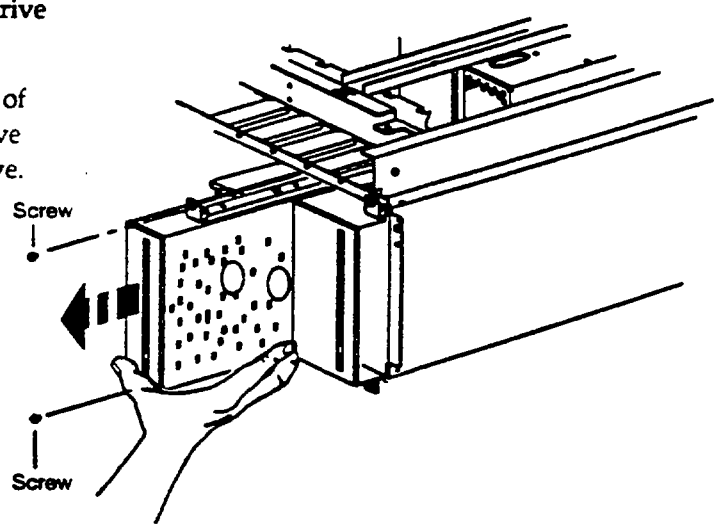
   If you have trouble locating these connectors refer to the drive's manual.





Be sure to remove drive/PCB cables by grasping the connectors and pulling gently to disengage. Never pull on the cables themselves.

3. Using a Phillips screwdriver, loosen and remove the two screws that secure the drive in the cavity.
4. Slide the drive straight forward and out of the CSS2. Be careful not to drop the drive or scrape the PCB embedded on the drive.



5. If you are not replacing the drive at this time, cover the empty cavity by inserting a blank bezel into the front cover of the CSS2. If you are replacing the drive proceed to the next section of this manual.

To prevent damage to the unit from ESD or dust, install a blank bezel in the front cover of the CSS2 to cover any empty cavity.

Installing a Drive

Table 3–1 lists each drive you can install in the CSS2, its model number, auxiliary adapter PCB (if required), and number of drive cavities required. The sections following Table 3–1 describe how to install a drive.

Table 3–1 Drive Installation Requirements

Drive	Model #	Adapter Required	Cavities Needed	Bracket Screws
Fixed Disk Drives				
179 Mbyte half–height	G 6539–G	None	1	6–32 (short)
332 Mbyte half–height	G 6662–G	None	1	6–32 (short)
662 Mbyte full–height	G 6554–G	None	2	6–32
1 Gbyte full–height single–ended SCSI	G 6685–G	None	2	6–32
1 Gbyte full–height differential SCSI	G 6740–G	None	2	6–32
Tape Drives				
150 Mbyte half–height quarter–inch cartridge (QIC) tape	G 6577–G or G 6656–G (with PCB)	SCSI QIC to SCSI 9–TRK adapter PCB	2 [1]	6–32 (flat–head)
Multicapacity half–height QIC tape	G 6677–G or G 6676–G (with PCB)	SCSI QIC to SCSI 9–TRK adapter PCB	2 [1]	M3
2 Gbyte full–height helical scan tape	G 6590–G	None	2	6–32
Removable Media Drives				
600 Mbyte full–height rewritable–optical disc	G 6627–G (with PCB) or G 6627–GX (without PCB)	Optical ESDI to SCSI adapter PCB	3 [2]	M3
600 Mbyte full–height CD–ROM	G 6629–G	None	1	6–32 (short)
1.44 Mbyte, half–height, 5.25–inch diskette drive	G 6562–G (with PCB) or G 6562–GX (without PCB)	SA450 to SCSI adapter PCB	2–3 [3]	6–32
1.2 Mbyte, half–height, 5.25–inch diskette drive	G 6563–G (with PCB) or G 6563–GX (without PCB)	SA450 to SCSI adapter PCB	2–3 [3]	6–32

1 Only one slot is needed when using the drive in a CSS2 connected to an AViiON computer system because a separate adapter PCB is not required.
2 The drive plus the adapter requires three cavities, but when installed in a CSS2 connected to an AViiON computer system you can connect two drives of the same type to the same adapter PCB. This configuration requires five cavities (two for each drive and one for the adapter PCB).
3 Diskette drives are not supported in CSS2s connected to ECLIPSE MV/Family computers. In AViiON–based systems a single adapter PCB can support two diskette drives. This configuration requires a total of three cavities (one for each drive, and one for the PCB).

Handling Drives

Handle the drive carefully; jolting or dropping the drive can damage the heads. All drives are sensitive to ESD. Be sure to set up a static-safe work area and use an ESD kit or ESD wrist strap. Before removing a drive from its plastic antistatic bag, hold the drive in one hand and touch a metal surface with your other hand to discharge any static charge. Then immediately remove the drive from the antistatic bag and place it, component side up, on an antistatic mat or on the antistatic bag itself.

Configuring a Drive

MANUALS

The manual shipped with the drive
The computer installation or expansion manual

TOOLS

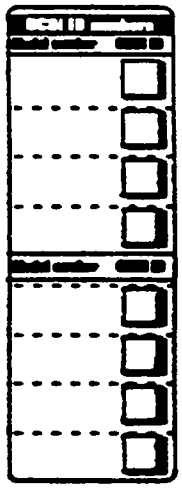
Medium Phillips screwdriver
Ball point pen or similar pointed object
Large flat blade screwdriver or large coin

You may have to reconfigure the factory settings of new or replacement drives to alter drive operating parameters such as SCSI ID number, parity, and arbitration. For example, if the computer installation or expansion guide recommends that a certain type of drive be assigned SCSI ID 4, locate the drive's SCSI ID jumpers using the drive manual. Refer to the SCSI ID table in the same manual to determine how to remove or install jumpers in order to set the drive's SCSI ID to 4.

No two devices should ever have the same SCSI ID. With seven numbers available, in most cases the number of drives you can install in the CSS2 is limited. However, some adapters can control two drives using a single SCSI ID number. This only works for AViiON computer systems.

Some CPU-based peripheral controllers use a different type of addressing scheme that supports Logical Unit Numbers (LUNs) for each drive connected to the controller. In this system a controller can potentially control up to 56 drives. For more information on LUNs check your computer system documentation or contact your Data General sales representative.

A label on the back of the CSS2 lists the SCSI ID number assigned to each drive installed by Data General. When you add a drive to the CSS2 be sure to record its SCSI ID number on this label.



Removing the SCSI Terminator Resistor

MANUALS

The manual shipped with the drive

TOOLS

Flat blade screwdriver (to pry up the terminator resistor if necessary)

Most drives are equipped with either internal or external terminator resistors. Because the CSS2 has its own terminator you must remove or deactivate the terminator on any SCSI drive. Follow the instructions in the drive manual to locate the terminator resistor and remove it.

If you are installing a floppy drive (SA450 interface) or a rewritable–optical drive, the removal of the terminator resistor depends upon whether you have two of either of these drives attached to a single adapter PCB. For example, if you install a single floppy drive, remove the terminator resistor. If, however you install a second floppy drive, connected to the same adapter PCB, remove the terminator only from the first drive on the data/signal cable.

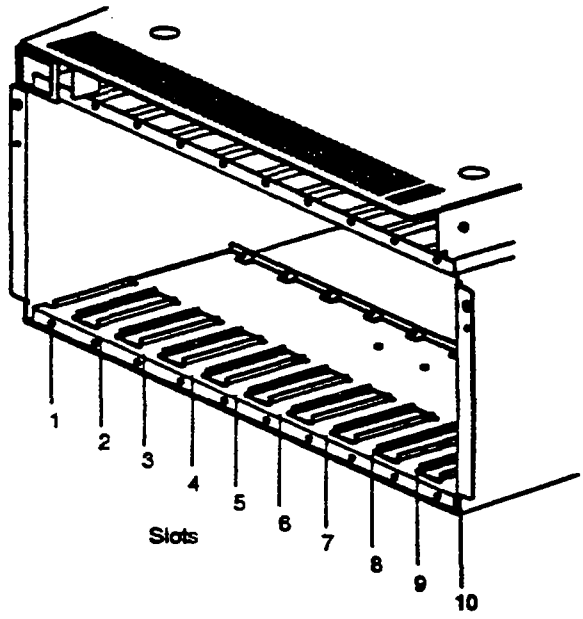
NOTE

Most drives are shipped from the factory with any external terminator resistor removed, but you should check just to be sure before you install the drive.

Selecting a Drive Cavity

Which cavity you install the drive in depends largely upon what types of drives are already installed in the CSS2. There are a few basic rules for selecting a cavity:

- Install tape drives and removable media drives in the cavities on the left side on of the CSS2.
- Group identical drives together.
- Locate an adapter PCB as close to its drive as possible (ideally next to the drive) to prevent cabling problems.
- Always install diskette drives to the immediate right of their adapter PCBs.



Attaching Mounting Brackets to a Drive

MANUALS

The manual shipped with the drive

TOOLS

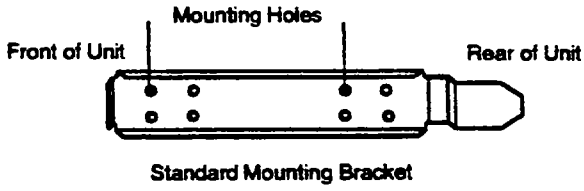
Phillips screwdriver
Bracket screws as specified in Table 3–1

Most drives use a standard mounting bracket, the only exception is the 150 Mbyte QIC tape drive. The screws required to attach the bracket to the drive may vary. If you lose the original set of screws, refer to Table 3–1 for the size requirements for replacement screws.

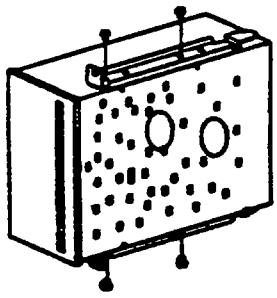
NOTE Most bracket kits are shipped with two sets of screws. These sets differ only in length. If the entry in Table 3–1 says to use 6–32 (short), select the shorter set of screws.

Using Standard Mounting Brackets

When mounting a set of standard brackets to a full–height drive, line up the top, forward–most pair of mounting holes with the holes on the side of the drive. Repeat on the other side of the drive. Make sure the edge of the bracket is more or less flush with the bottom of the drive. Check the drive manual for details on the mounting hole locations on each side of the drive.

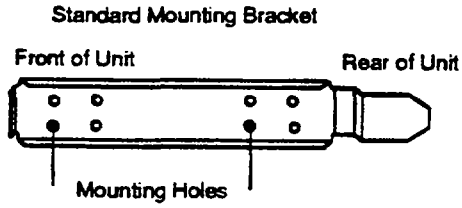


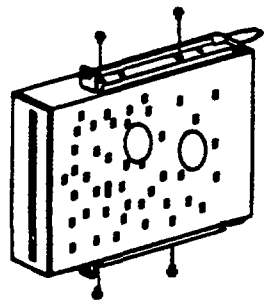
Standard Mounting Bracket



Full–Height Drive

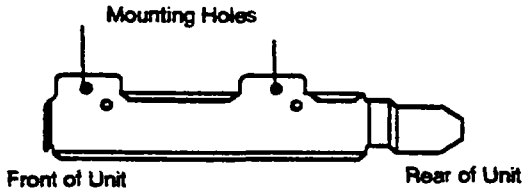
When mounting a set of standard brackets on a half-height drive line up the bottom, forward-most pair of mounting holes with the holes on side of the drive. Repeat on the other side of the drive. Make sure the edge of the bracket is more or less flush with the bottom of the drive.



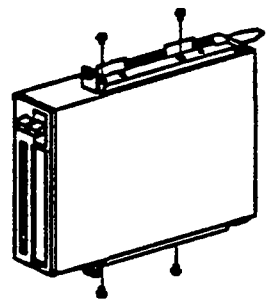


Attaching Mounting Brackets to a 150 Mbyte QIC Tape Drive

The 150 Mbyte QIC tape drive uses a nonstandard set of mounting brackets that allows you to position the drive in the CSS2 cavity with its tape eject button facing up. Align the bottom set of holes on the brackets with the holes on the side of the drive. Use flat-head screws to attach the bracket to the drive.



150 Mbyte QIC Tape Drive Mounting Bracket



Attaching Mounting Brackets to a 3.5-Inch Diskette Drive

A special adapter bracket mounted on the 3.5-inch diskette drive allows the drive to fit securely into a half-height drive cavity. Attach a standard set of brackets to this adapter the same way that you attach brackets to any half-height drive.

Installing a Drive in the CSS2 Drive Cavity

TOOLS

Phillips screwdriver
Two M3 screws

If the drive you are installing requires an adapter PCB, refer to Chapter 4 for instructions to install it. It is often easier to install the PCB *before* installing the drive. Then follow the steps below to install the drive in an open cavity.

1. Follow the instructions in Chapter 2 to do the following:
   a. Turn off the unit's power and circuit breaker switches and unplug the ac power cord.
   b. Remove the front cover of the CSS2.
   c. Remove the screws that secure the unit in the equipment rack.
   d. Remove the top cover of the unit and attach the ESD wrist strap.

WARNING

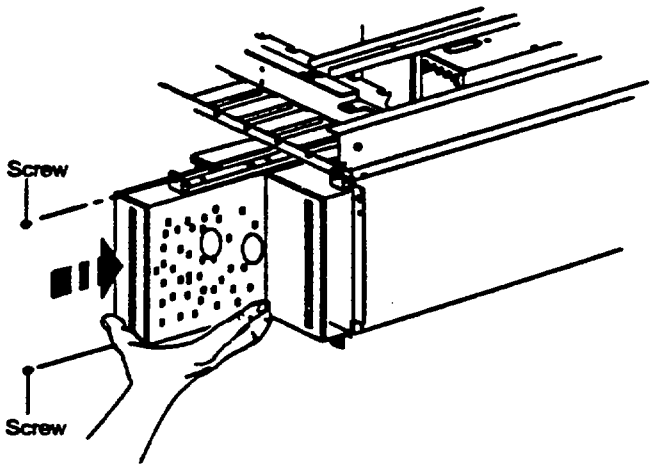
Turn off both the power switch and circuit breaker switch, then remove the ac power cable from the wall outlet. If you don't, you will damage the CSS2 and injure to anyone attempting to remove or replace components.

2. Using the drive manual, locate pin 1 on the drive's SCSI connector. You want to install the drive so that this pin is on the bottom. For most drives, stand with the front of the drive facing you; then turn it on its side so the mounting bracket is on the right. This places pin 1 on the bottom.

3. Insert the drive into the CSS2 cavity. Be sure to fit it into a cavity and not *between* two cavities.

4. Support the bottom of the drive with one hand. Slide the drive into the cavity until the tab on the end of the drive's mounting bracket fits into the slot at the back of the cavity.

5. Align the holes in the top and bottom drive mounting brackets with the holes at the top and bottom of the cavity. Insert the mounting screws (M3 screws) and tighten using a Phillips screwdriver.



Connecting the Drive Cables

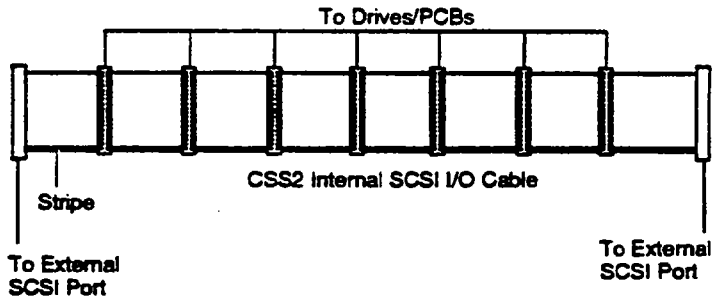
MANUALS

The manual shipped with the drive and/or drive adapter

You need to connect data/signal, power and in some cases frame ground cables to the drive in order to complete the installation. The drive or its adapter PCB receive data/signal information through the CSS2 internal SCSI I/O (input/output) cable. The drive (and the adapter if present) receives power from either the primary or auxiliary power supply. A ground cable allows you to ground the drive to the CSS2 chassis. The following sections describe how to connect these cables.

Connecting the SCSI I/O Cable

The CSS2 has an internal SCSI I/O (input/output) cable with seven connectors. You attach each drive or PCB in the CSS2 to one of these connectors. If there is more than one open connector, use the one closest to the drive or PCB you are installing. You want the shortest possible cable length between each unit.



Each type of drive (or PCB) has a 50-pin SCSI connector located on the rear of the unit. Install the drive so that pin 1 on this connector is on the bottom. Then line up the stripe on the internal SCSI I/O with Pin 1 on the drive's connector. The drive manual shows the location of pin 1 on the drive's SCSI connector.

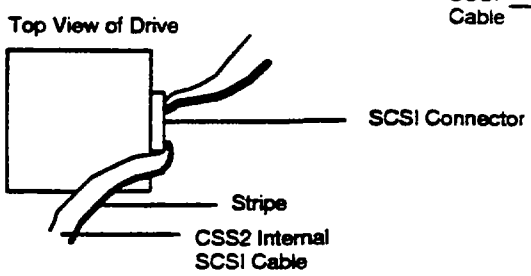
NOTE

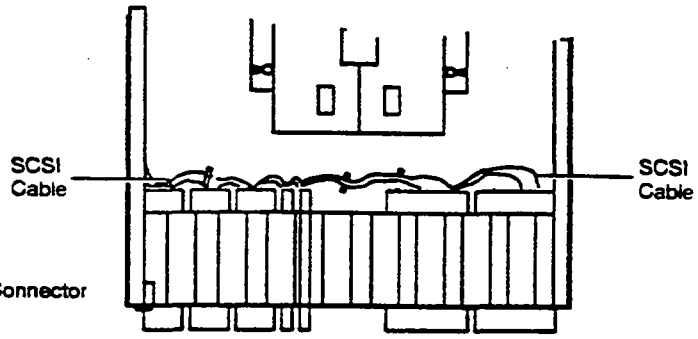
If a drive requires an adapter PCB, connect the CSS2 internal SCSI cable to the PCB, **NOT** to the drive itself. The drive and PCB have their own cable or set of cables that carry data/signal information between them. Follow the instructions in the drive or PCB manual for connecting the SCSI cables from the PCB to the drive.

1. Locate the connector on the CSS2 internal SCSI cable that is closest to your drive. Make sure that the cable is not twisted and that the stripe is on the bottom.

2. Align the cable connector with the drive connector, making sure that the cable's stripe is on the bottom.

3. Insert the cable connector into the drive connector and press firmly to secure.





Connecting the Power and Ground Cables

If you are adding a new drive to your CSS2, check the power supply matrix in Table 3–2 to determine if you need to install an auxiliary power supply before you connect power and ground cables to the drive.

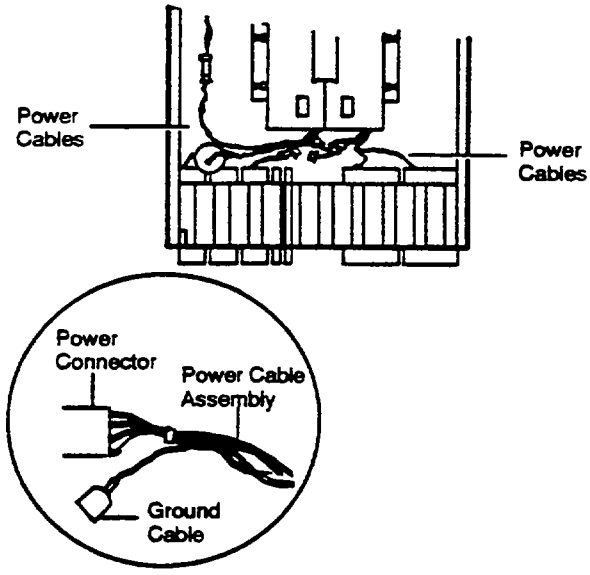
Table 3–2 CSS2 Power Supply Constraints

Drive/PCB Combinations Primary Power Supply	Auxiliary Power Supply
ECLIPSE MV/Family Computers	
Four half–height slots filled with any combination of drives or PCBs	Five half–height slots filled with any combination of drives or PCBs
AViiON Computers	
Four half–height slots filled with any combination of drives or PCBs (except QIC tape drives)	Five half–height slots filled with any combination of drives or PCBs (except QIC tape drives)
Two QIC tape drives	Three QIC tape drives

NOTE:
When adding drives to an auxiliary power supply, you are normally limited to filling five half–height slots. However, if you are using only full–height drives you can install a total of three drives using a total of six slots.

The power supply has a wiring harness with five power connectors. Each connector is labeled with a number from 1 to 5 (P1 through P5). Always connect P1 leading from the primary power supply (the power supply on the left) to the fan's power connector located to the left of the power supply. Use any of the other connectors to provide power to the drives and adapter PCBs. The connector wires are of varying length. Select a connector that will easily reach the back of your drive.

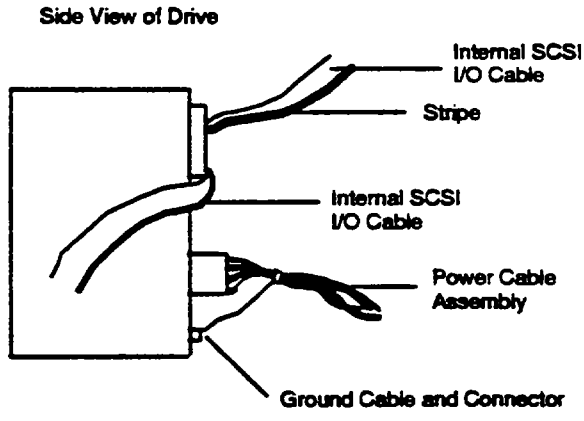
Each power connector is bundled together with a ground cable. Check the drive manual to determine if the drive must be grounded and to locate the drive's ground connector. To connect the power and ground cables follow these steps:



NOTE

Remember, always attach connector P1 leading from the primary power supply (the power supply on the left), to the fan power connector. Attach connectors P2 through P4 to any drive or PCB.

1. Select a cable that is long enough to reach the power connector on your drive, insert the connector into the power connector on the back of the drive. The power connectors are keyed so that they fit together in only one way. If they do not fit, do not force them. Turn one connector upside down and try again. Be sure that the connectors are firmly attached.
2. Connect the ground cable to the ground connector on the back of the drive (if required).



3. Follow the instructions in Chapter 2 to do the following:
   a. Remove the ESD wrist strap.
   b. Replace the top cover of the unit.
   c. Press in on the tabs on either side of the bracket to slide the CSS2 back into the equipment rack.
   d. Insert the screws that secure the unit in the equipment rack and tighten.
   e. Remove the blank bezel from the front cover of the CSS2 to create an opening for the new drive.
   f. Replace the front cover of the CSS2.
   g. Plug the unit's ac power cord back into the power source and turn on the unit's power and circuit breaker switches.

End of Chapter

Chapter 4
Removing and Installing PCBs

Table 3–1 lists the adapter PCBs required by the drives. Before installing a PCB, configure its jumpers using the manual shipped with the PCB (or the drive the PCB controls). Then attach a mounting bracket to the PCB and install it in one of the half–height cavities of the CSS2.

Removing a PCB


TOOLS

Medium Phillips screwdriver
Ball point pen or similar pointed object

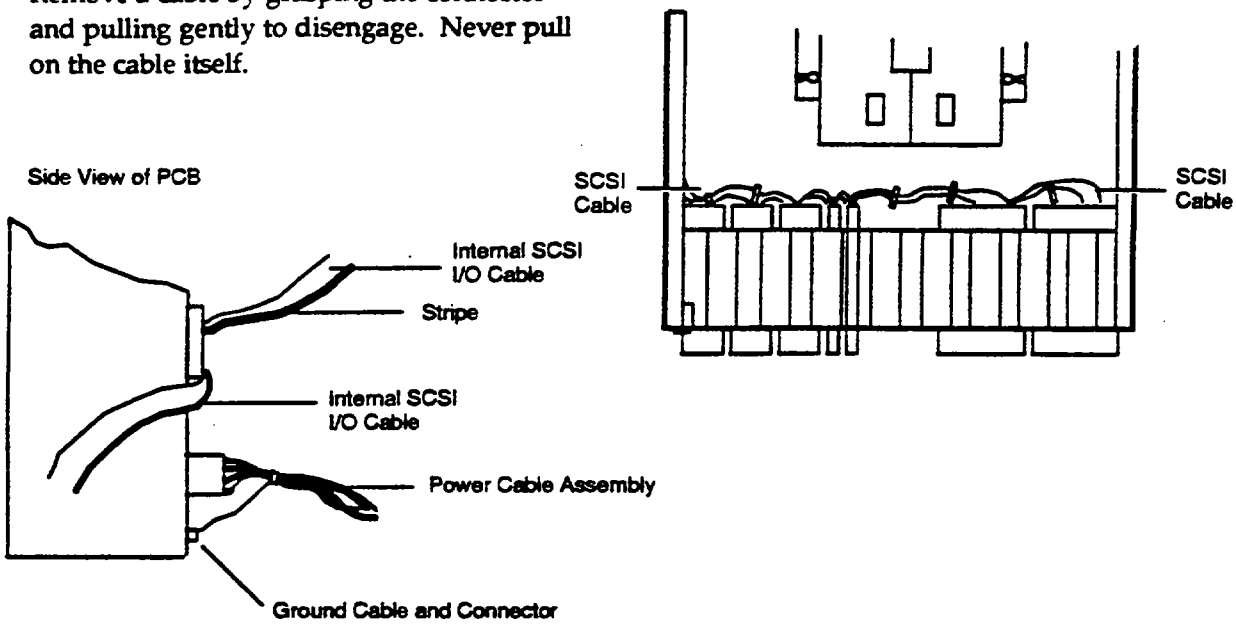
Follow the steps below to remove a PCB.

1. Follow the instructions in Chapter 2 to do the following:
   a. Turn off the unit's power and circuit breaker switches and unplug the ac power cord.
   b. Remove the front cover of the CSS2.
   c. Remove the screws that secure the unit in the equipment rack.
   d. Remove the top cover of the unit and attach the ESD wrist strap.


WARNING

Turn off both the power switch and circuit breaker switch, then remove the ac power cable from the wall outlet. If you don't you will damage the CSS2 and injure anyone attempting to remove or replace components.

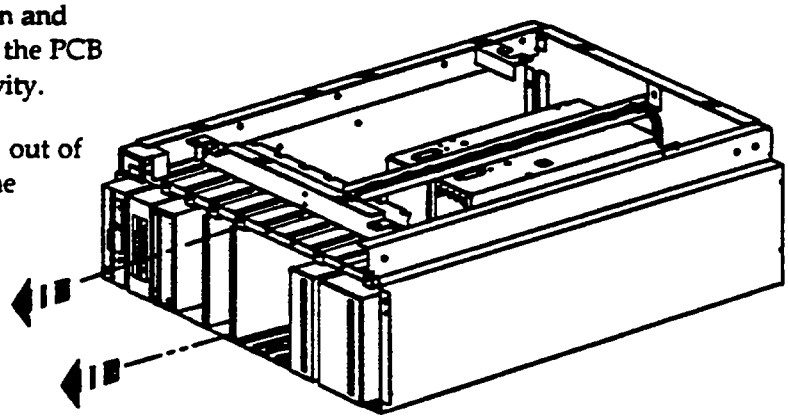
2. Disconnect the SCSI and power cable connectors from the rear of the PCB. Remove a cable by grasping the connector and pulling gently to disengage. Never pull on the cable itself.



NOTE Disconnect the signal/data cables leading from the PCB to the drive from the back of the PCB only, do not disconnect them from the back of the drive.

3. Using a Phillips screwdriver, loosen and remove the two screws that secure the PCB and its mounting bracket in the cavity.

4. Slide the PCB straight forward and out of the CSS2. Be careful not to drop the assembly or scrape the PCB.



Installing a PCB

To install a PCB you need to first configure it, select a cavity, install a mounting bracket on the PCB, install the PCB and bracket in the CSS2, and then connect data/signal, power and ground cables. Table 4–1 lists the controller PCBs, the drives controlled by each PCB, the number of drives you can connect to each PCB, and the manner in which the PCB is oriented in the CSS2.

Table 4–1 PCB Installation Information

PCB	Drives Controlled	Number of Drives Controlled	Orientation
SCSI QIC to SCSI 9–TRK adapter [1]	150 Mbyte QIC tape 320/525 QIC tape	1	PCB is mounted on the inside of the bracket then installed in the CSS2 with the PCB side of the assembly facing left
Optical ESDI to SCSI adapter	600 Mbyte rewritable–optical disc	1 or 2 [2]	PCB is mounted on the outside of the bracket then installed in the CSS2 with the PCB side of the assembly facing left
SA450 to SCSI adapter	1.44 Mbyte 3.5–inch diskette [3] 1.2 Mbyte 5.25–inch diskette	2	PCB is mounted on the inside of the bracket, then installed in the CSS2 with the PCB side of the assembly facing right

NOTES:
1. You do not need to install this PCB when the CSS2 is connected to an AViiON computer.
2. When installed in a CSS2 connected to an AViiON computer, this PCB can support one or two drives. In a CSS2 connected to an ECLIPSE MV/Family computer this PCB can support only one drive.
3. These drives are not supported by ECLIPSE MV/Family computers. When the CSS2 is connected to an AViiON computer system, this PCB can support two drives.

Handling PCBs

Handle the PCB carefully; all PCBs are extremely sensitive to ESD. Be sure to set up a static–safe work area and use the ESD wrist strap. Before removing a PCB from its plastic antistatic bag, hold it in one hand and touch a metal surface with your other hand to discharge any static charge that may have built up. Then immediately remove the PCB from the antistatic bag and place it component side up on an antistatic mat or on the antistatic bag itself. Be sure to handle the PCB only by its edges.

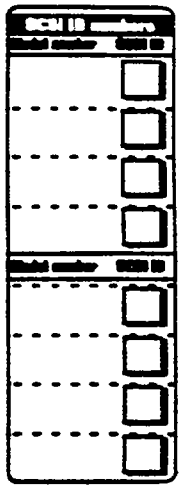
Configuring a PCB

Manual shipped with the drive/PCB

Needle–nose pliers
(to remove and replace jumpers)

You may have to reconfigure the factory settings of new or replacement PCBs before installing them in the CSS2. For example, say the computer installation or expansion manual recommends that a certain type of drive use SCSI ID 4. Since the drive is controlled by the PCB, configure the PCB, *not* the drive. Refer to the manual shipped with the drive or PCB to locate the the correct jumpers, then find the SCSI ID table in the same manual to determine how to set the SCSI ID to 4.

A label on the back of the CSS2 lists the SCSI ID number assigned to each PCB installed by Data General. When you add a PCB to the CSS2 be sure to record its SCSI ID number on this label.



Removing the Terminator Resistor

Manual shipped with the drive/PCB

A flat–blade screwdriver
(to pry up terminator resistor if necessary)

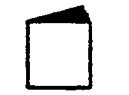
Most PCBs are equipped with either internal or external terminator resistors. Because the CSS2 has its own terminator, you must remove or deactivate the terminator on any SCSI drive. Follow the instructions in the drive manual to locate the terminator resistor and remove it.

Selecting a Cavity

There are a few basic rules for selecting a cavity for a PCB:

- Locate the PCB in a cavity next to the drive or drives it is controlling. Use the shortest possible length of cable between the PCB and it drive(s).
- When installing a SCSI QIC to SCSI 9–TRK adapter PCB, install the PCB, connect the CSS2's internal SCSI cable to the PCB, then connect the PCB's data/signal cables to the PCB **BEFORE** you install the drive itself. This will ensure you have enough room to work inside the CSS2.
- When installing an SA450 to SCSI adapter PCB, **ALWAYS** place it in the cavity to the immediate left of the drive to avoid cabling problems.
- Do not install an optical ESDI to SCSI adapter PCB in the first cavity (the cavity on the far left) of the CSS2.

Attaching Mounting Brackets and Installing a PCB

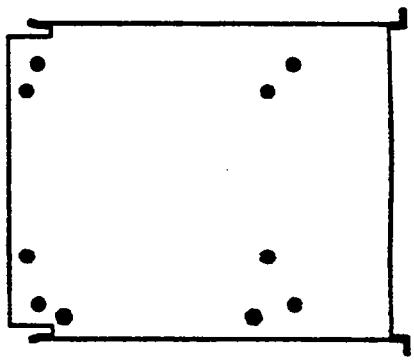


The manual shipped with the drive/PCB

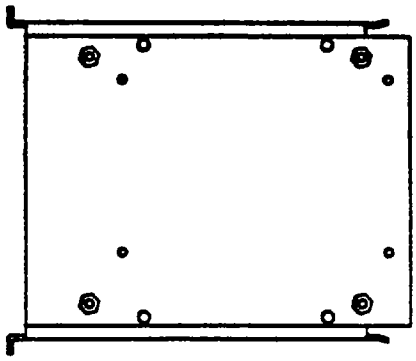
Phillips screwdriver
Six M3 screws

Attach the bracket to the PCB and install the PCB *before* installing the drive to give you plenty of room to connect cables to the PCB.

All three types of adapter PCBs use the same type of mounting bracket, but you mount them on a different sides of the bracket. Each PCB fits on the bracket only one way. Refer to the manual shipped with the drive/PCB for the exact location of the mounting holes on the PCB.



Outside of mounting bracket



Inside of mounting bracket

To install a PCB, first:

1. Turn off the unit's power and circuit breaker switches and unplug the ac power cord.
2. Remove the front cover of the CSS2.
3. Remove the screws that secure the unit in the equipment rack.
4. Remove the top cover of the unit and attach the ESD wrist strap.

WARNING

Turn off both the power switch and circuit breaker switch, then remove the ac power cable from the wall outlet. If you don't you will damage the CSS2 and injure anyone attempting to remove or replace components.

5. Then attach the mounting bracket to the PCB and install the PCB as described in the following sections:

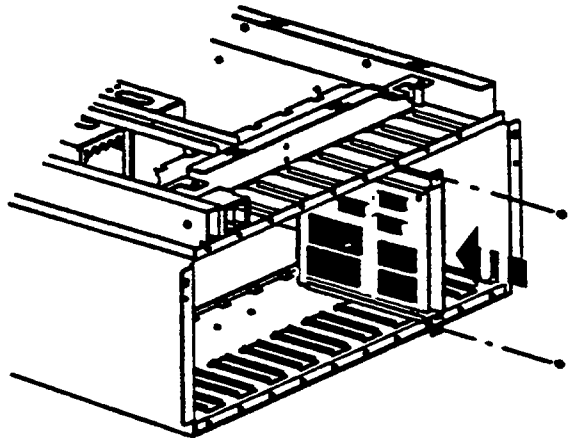
Attaching a Bracket to the SCSI QIC to SCSI 9-TRK Adapter PCB

Line up the four mounting holes on the PCB with the matching holes on the *inside* of the bracket. Insert four screws and tighten, using a Phillips screwdriver. Be sure not to overtighten the screws.

Turn the PCB/bracket assembly so the PCB faces *left*.

Insert the assembly into the CSS2 cavity and slide it all the way back until the end of the bracket fits in the slot at the back of the cavity.

Align the holes in the top and bottom PCB mounting brackets with the holes at the top and bottom of the cavity. Insert the two mounting screws and tighten using a Phillips screwdriver.



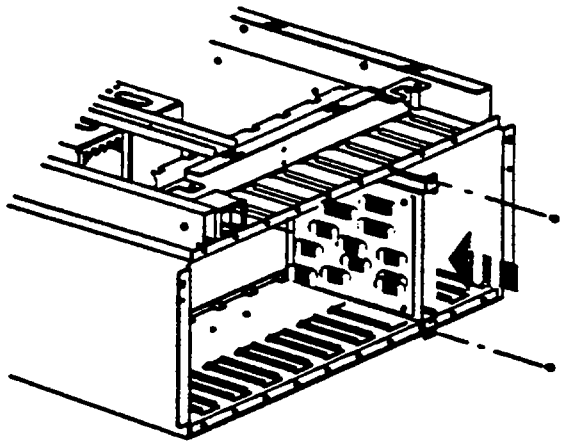
Attaching a Bracket to the Optical ESDI to SCSI Adapter PCB

Line up the four mounting holes on the PCB with the matching holes on the *outside* of the bracket. Insert four screws and tighten, using a Phillips screwdriver. Be sure not to overtighten the screws.

Turn the PCB/bracket assembly so the PCB faces *left*.

Insert the assembly into the CSS2 cavity and slide it all the way back until the end of the bracket fits in the slot at the back of the cavity.

Align the holes in the top and bottom PCB mounting brackets with the holes at the top and bottom of the cavity. Insert the two mounting screws and tighten using a Phillips screwdriver.



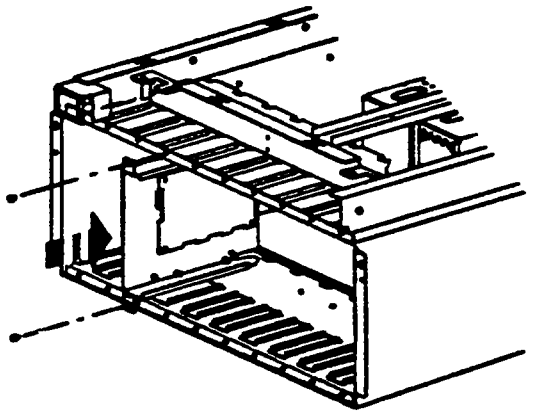
Attaching a Bracket to the SA450 to SCSI Adapter PCB

Line up the four mounting holes on the PCB with the matching holes on the *inside* of the bracket. Insert four screws and tighten, using a Phillips screwdriver. Be sure not to overtighten the screws.

Turn the PCB/bracket assembly so the PCB faces *right*.

Insert the assembly into the CSS2 cavity and slide it all the way back until the end of the bracket fits in the slot at the back of the cavity.

Align the holes in the top and bottom PCB mounting brackets with the holes at the top and bottom of the cavity. Insert the two mounting screws and tighten using a Phillips screwdriver.



Connecting the PCB Cables

MANUALS

The manual shipped with the drive/PCB

TOOLS

dc power adapter cable (if installing a SA450 to SCSI adapter PCB)

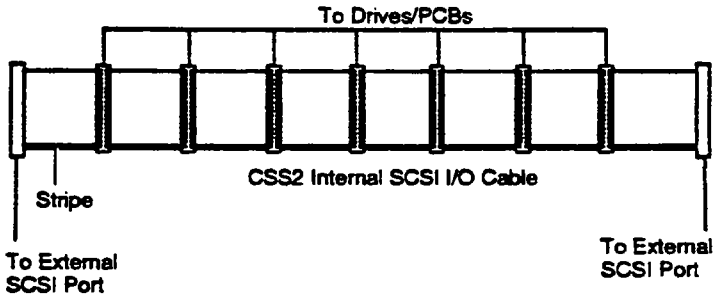
You need to connect data/signal, power and in some cases frame ground cables to the PCB in order to complete the installation. The PCB receives data/signal information through the CSS2 internal SCSI I/O (input/output) cable. This information is relayed to the drive through another set of data/signal cables unique to that drive/PCB combination. The PCB receives power from either the primary or auxiliary power supply. A ground cable allows you to ground the PCB to the CSS2 chassis (if required). The following sections describe how to connect these cables.

NOTE

The drive/PCB manual describes how to connect the cables between the PCB and the drive.

Connecting the SCSI I/O Cable

The CSS2 has an internal SCSI I/O cable with seven connectors. Attach each adapter PCB to one of these connectors. If there is more than one open connector, use the one closest to the PCB. Use the shortest possible cable length between each unit in the CSS2.



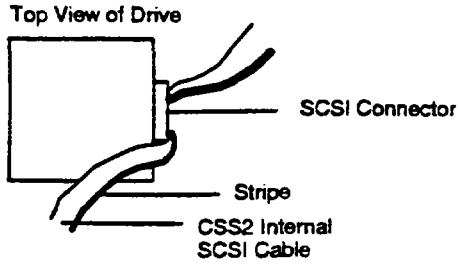
Each type of PCB has a 50-pin SCSI connector located on the rear of the unit. Line up the strip on the internal SCSI I/O cable with pin 1 of this connector (see the drive/PCB manual for the location of pin 1 on the PCB connector).

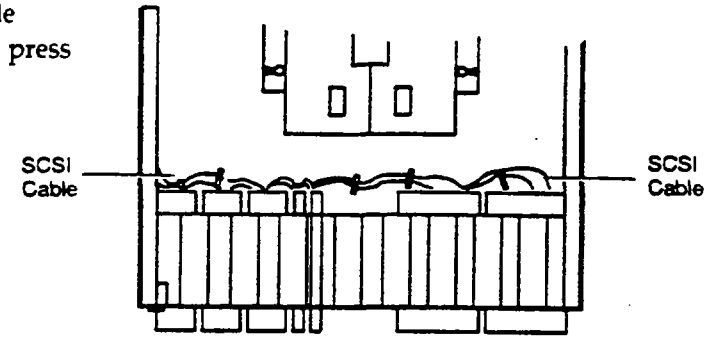
NOTE

If a drive requires an adapter PCB, connect the CSS2 internal SCSI cable to the PCB, **NOT** to the drive itself. The drive and PCB have their own cable or set of cables that carry data/signal information between them. Follow the instructions in the drive/PCB manual to connect the SCSI cables between the drive and the adapter PC.

1. Locate the connector on the CSS2 internal SCSI I/O cable that is closest to your PCB.
2. Make sure that the cable is not twisted, the stripe is on the bottom, and the connector faces the front of the chassis.

3. Align the cable connector with the PCB connector making sure that the stripe on the cable is on the bottom. Insert the cable connector into the PCB connector and press firmly to secure.



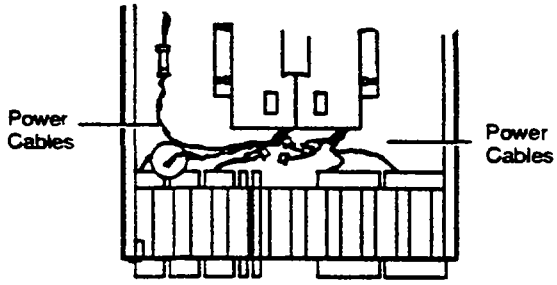


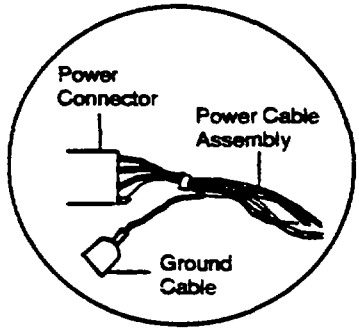
Connecting the Power and Ground Cables

Before you connect the power and ground cables to the drive check the power supply matrix in Table 3–2 to determine if you need to install an auxiliary power supply.

The power supply has a wiring harness with five power connectors. Each connector is labeled with a number from 1 to 5 (P1 through P5). Always connect P1 leading from the primary power supply (the power supply on the left) to the fan's power connector located to the left of the power supply. Use any of the other connectors to provide power to the adapter PCB. The length of the connector wires varies; select a connector that will easily reach the back of your drive.

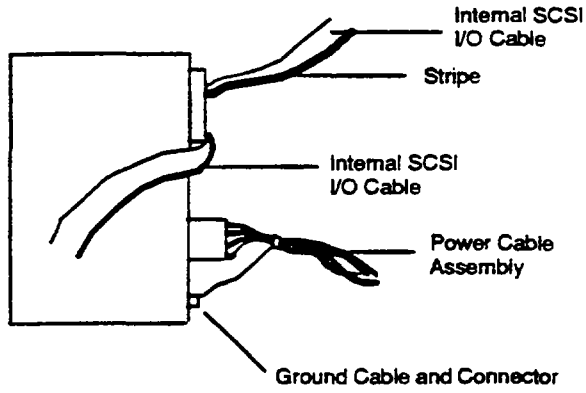
Each power connector assembly (except the one that provides power to the fan) is bundled together with a ground cable. Check the PCB or drive manual to determine if the drive must be grounded and to locate the drive's ground connector.





NOTE Always attach connector P1 leading from the primary power supply (the power supply on the left), to the fan power connector. Attach connectors P2 through P4 to any drive or PCB.

1. Select a cable that is long enough to reach the power connector on your PCB. Insert the connector into the power connector on the back of the PCB. The connectors are keyed so that they fit together in only one way. If they do not fit, do not force them. Turn one connector upside down and try again. Be sure that the connectors are firmly attached.
2. Connect the ground cable to the ground post or connector on the back of the PCB (if required).



3. Remove the ESD wrist strap. Replace the top cover of the CSS2 as described in Chapter 2.
4. Slide the CSS2 back into the equipment rack and secure with the screws provided (see Chapter 2).
5. Reinstall the front cover as described in Chapter 2.

CAUTION **Do not remove a blank bezel from the front cover of the CSS2 to expose a PCB.**

End of Chapter

Chapter 5
Removing and Replacing the Power Supply

The primary power supply (the power supply installed on the left side of the chassis) provides power for the cooling fans and a variety of peripherals. Table 3–2 provides a matrix of drive/PCB usage per power supply.

Removing a Power Supply


TOOLS

Medium Phillips screwdriver
Ball point pen or similar pointed object
#7 metric nut driver (for M4 nut)

Follow the steps below to remove a power supply.

1. Follow the instructions in Chapter 2 to do the following:
   a. Turn off the unit's power and circuit breaker switches and unplug the ac power cord.
   b. Remove the front cover of the CSS2.
   c. Remove the screws that secure the unit in the equipment rack.
   d. Remove the top cover of the unit and attach the ESD wrist strap.

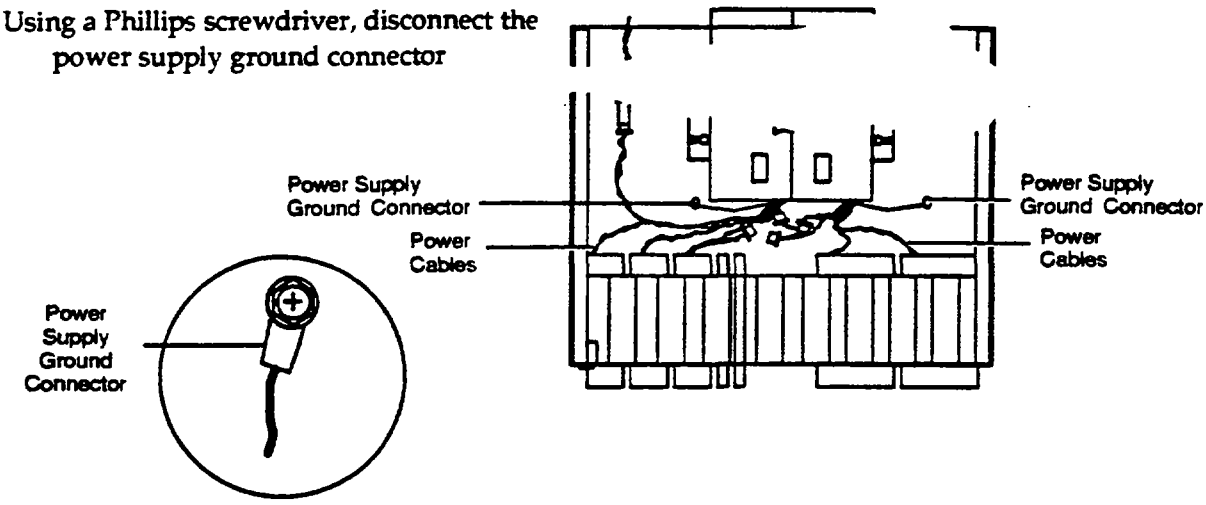

WARNING

Turn off both the power switch and circuit breaker switch, then remove the ac power cable from the wall outlet. If you don't, you will damage the CSS2 and injure anyone attempting to remove or replace components.

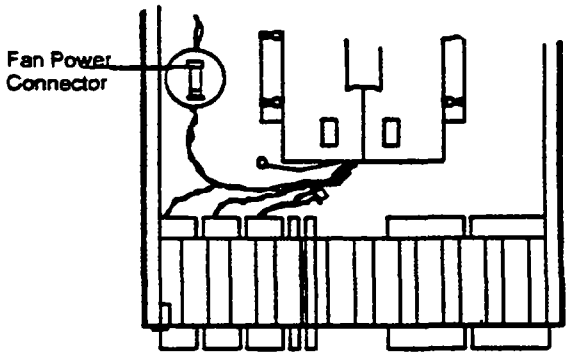
2. Disconnect the power connectors on the rear of each drive/PCB.

   Disconnect each drive/PCB ground connector if attached.

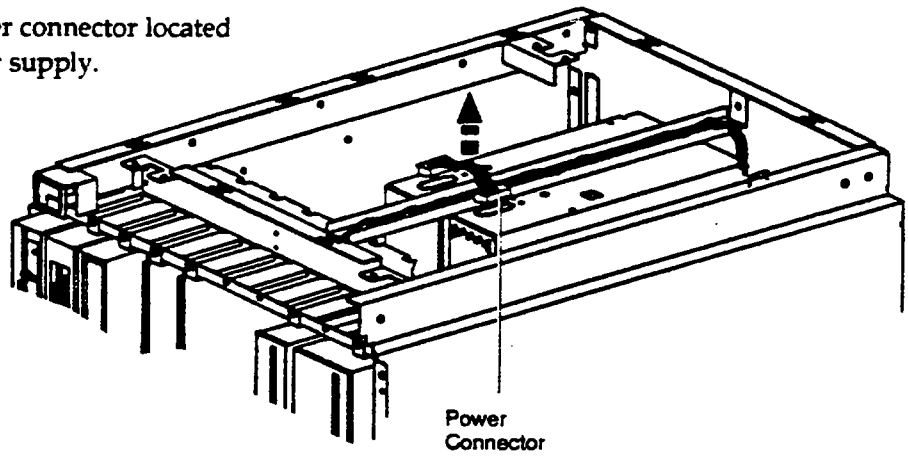
   Using a Phillips screwdriver, disconnect the power supply ground connector



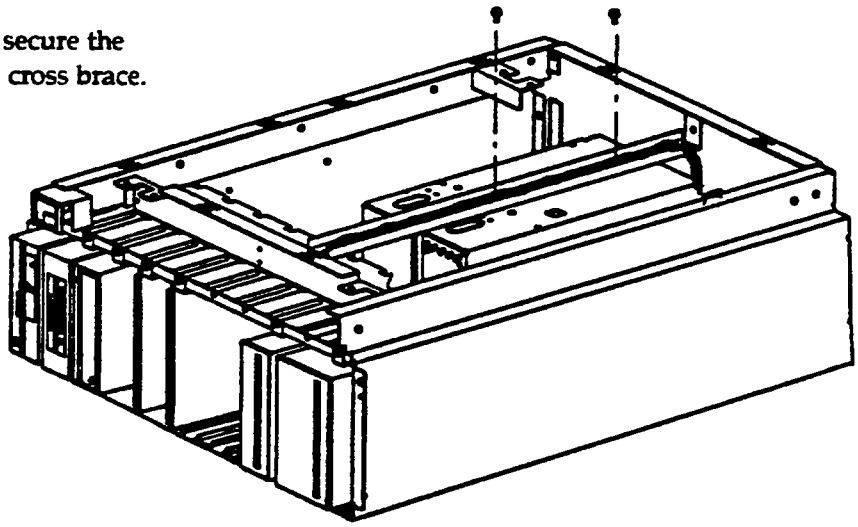
3. If you are removing the primary power supply (the one on the left), disconnect the fan's power cable located between the power supply and the outer wall of the CSS2 chassis.



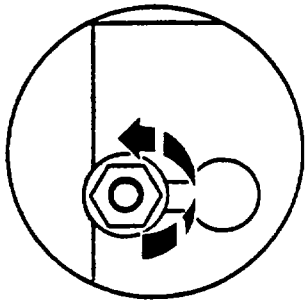
4. Disconnect the ac power connector located on the top of the power supply.

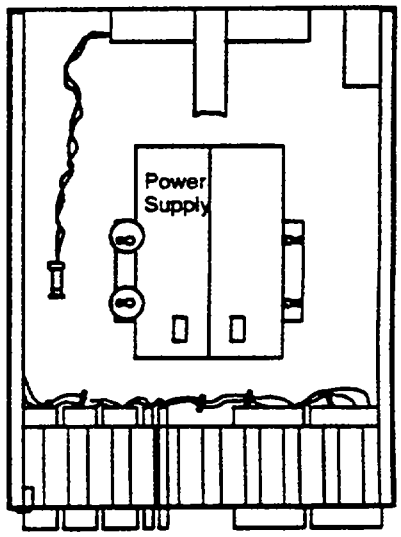


5. Remove the two screws that secure the power supply to the internal cross brace.

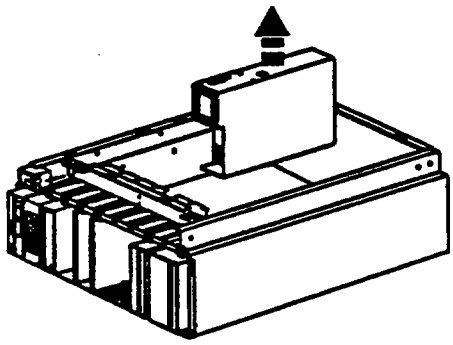


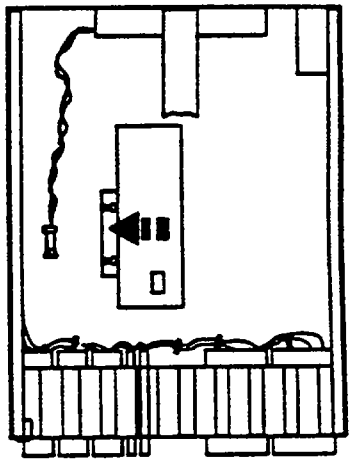
6. Using a nut driver, loosen the two nuts that hold the power supply bracket in place.





7. Disengage the bracket nuts by grasping the power supply with both hands, then sliding it out towards the outer edge of the chassis. Pull the power supply up and out of the chassis.





Installing a Power Supply


TOOLS

Medium Phillips screwdriver
Ball point pen or similar pointed object
#7 metric nut driver (for M4 nut)

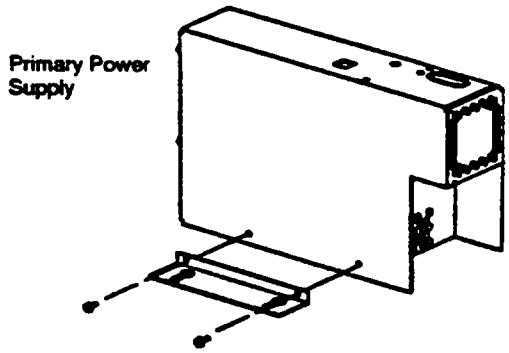
Follow the steps below to install a power supply.

1. Follow the instructions in Chapter 2 to do the following:
   a. Turn off the unit's power and circuit breaker switches and unplug the ac power cord.
   b. Remove the front cover of the CSS2.
   c. Remove the screws that secure the unit in the equipment rack.
   d. Remove the top cover of the unit and attach the ESD wrist strap.

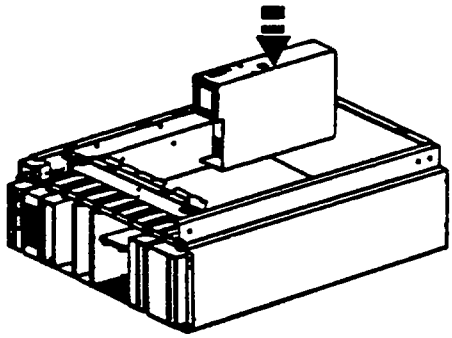

WARNING

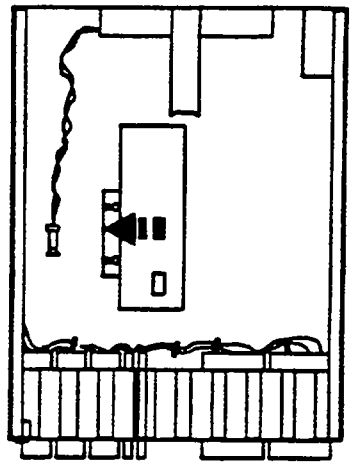
Turn off both the power switch and circuit breaker switch, then remove the ac power cable from the wall outlet. If you don't, you will damage the CSS2 and injure anyone attempting to remove or replace components.

2. Attach the mounting bracket to the power supply.
   a. If you are installing a primary power supply, attach the bracket to the left side of the power supply. (The connector on the power supply should be facing forward.)
   b. If you are installing an auxiliary power supply, attach the bracket to the right side of the power supply. (The connector on the power supply should be facing forward.)

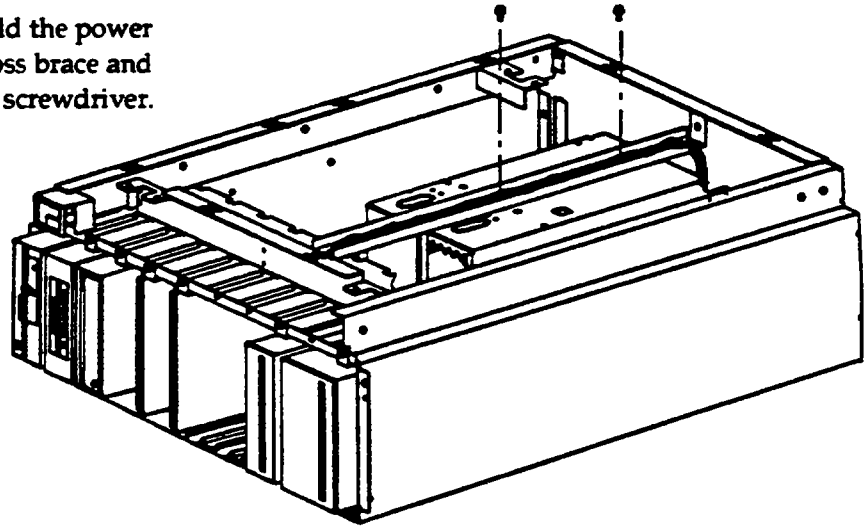


3. Align the holes in the new power supply mounting bracket with the retaining nuts in the bottom of the CSS2 chassis. Slide the power supply in towards the inside of the chassis to fully engage the nuts. Tighten both nuts with a nut driver.

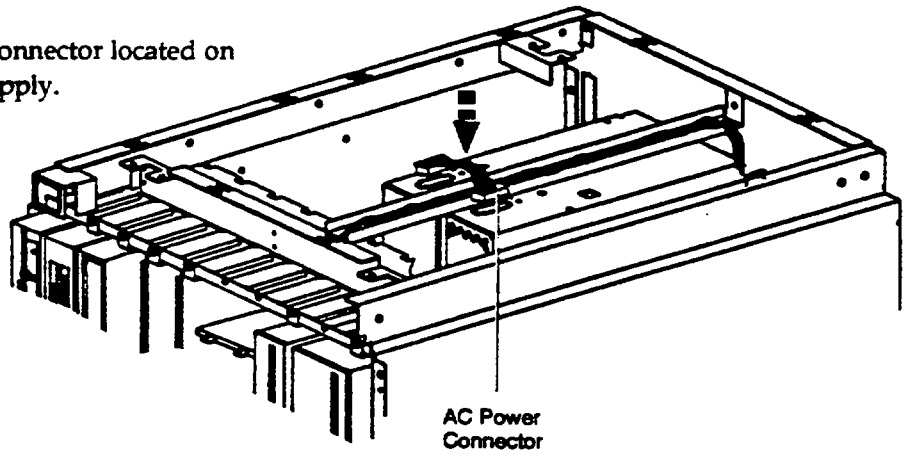




4. Insert the two screws that hold the power supply in place under the cross brace and tighten them using a Phillips screwdriver.



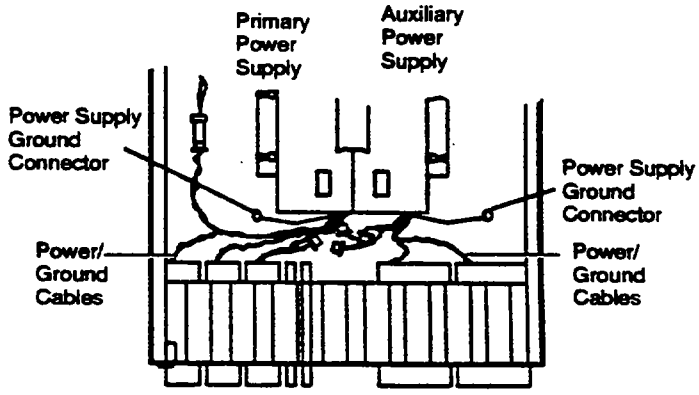
5. Connect the ac power connector located on the top of the power supply.



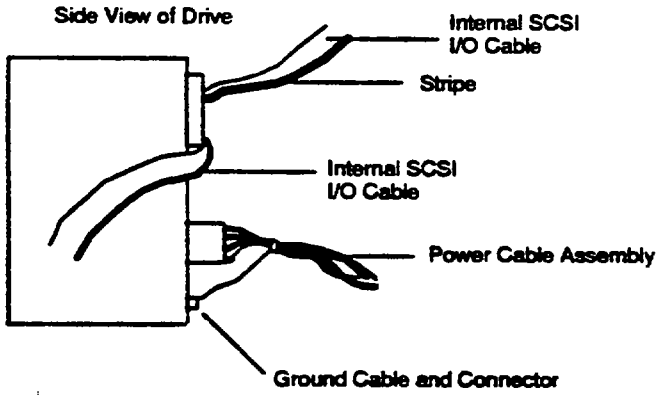
6. Connect the five connectors on the power supply's wiring harness as follows:

   a. If you are replacing a primary power supply, insert connector P1 into the fan's power connector located between the power supply and the outer wall of the chassis. Insert connectors P2 through P5 into the power connectors on the rear of the drives/PCBs installed on the left side of the CSS2.

   b. If you are installing an auxiliary power supply, insert connectors P1 through P5 leading from this power supply into the power connectors of the drives/PCBs on the right side of the CSS2.



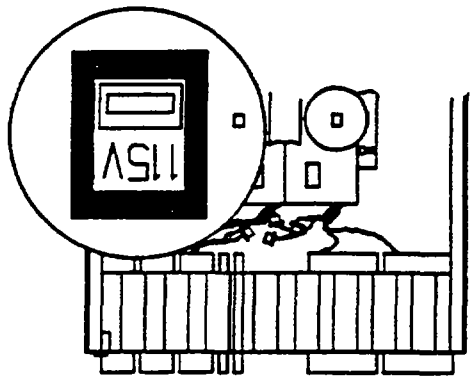
7. Connect the power supply and drive/PCB ground cables.



8. Located on the top of both the primary and auxiliary power supply is a recessed voltage selection switch. This switch enables your CSS2 to operate on either 100/120 V ac or 220/240 V ac. The voltage selection must be compatible with the power available at your site.

   a. If you have 100/120 V ac power, set the switch position so that "115V" is visable.

   b. If you have 220 V or 240 V power, set the switch position so that "230V" is visable.



You must check the setting of the voltage selection switch located on the top of the PCB you are installing. An incorrect switch setting will damage the CSS2.

9. Plug in the CSS2's external power cable and turn on the circuit breaker and power switches. Check the LED on the top of the power supply. If it is lit the supply is working properly. If the LED does not light, contact Data General.

10. Remove the ESD wrist strap and replace the top and front covers of the CSS2 as described in Chapter 2.

End of Chapter

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TIPS ORDERING PROCEDURES

TO ORDER

1. An order can be placed with the TIPS group in two ways:
   a) MAIL ORDER - Use the order form on the opposite page and fill in all requested information. Be sure to include shipping charges and local sales tax. If applicable, write in your tax exempt number in the space provided on the order form.

      Send your order form with payment to:

      Data General Corporation
      ATTN: Educational Services/TIPS G155
      4400 Computer Drive
      Westboro, MA 01581-9973

   b) TELEPHONE - Call TIPS at (508) 870-1600 for all orders that will be charged by credit card or paid for by purchase orders over $50.00. Operators are available from 8:30 AM to 5:00 PM EST.

METHOD OF PAYMENT

2. As a customer, you have several payment options:
   a) Purchase Order - Minimum of $50. If ordering by mail, a hard copy of the purchase order must accompany order.
   b) Check or Money Order - Make payable to Data General Corporation.
   c) Credit Card - A minimum order of $20 is required for Mastercard or Visa orders.

SHIPPING

3. To determine the charge for UPS shipping and handling, check the total quantity of units in your order and refer to the following chart:

Total Quantity	Shipping & Handling Charge
1-4 Units	$5.00
5-10 Units	$8.00
11-40 Units	$10.00
41-200 Units	$30.00
Over 200 Units	$100.00

If overnight or second day shipment is desired, this information should be indicated on the order form. A separate charge will be determined at time of shipment and added to your bill.

VOLUME DISCOUNTS

4. The TIPS discount schedule is based upon the total value of the order.

Order Amount	Discount
$1-$149.99	0%
$150-$499.99	10%
Over $500	20%

TERMS AND CONDITIONS

5. Read the TIPS terms and conditions on the reverse side of the order form carefully. These must be adhered to at all times.

DELIVERY

6. Allow at least two weeks for delivery.

RETURNS

7. Items ordered through the TIPS catalog may not be returned for credit.
8. Order discrepancies must be reported within 15 days of shipment date. Contact your TIPS Administrator at (508) 870-1600 to notify the TIPS department of any problems.

INTERNATIONAL ORDERS

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TIPS ORDER FORM

Mail To: Data General Corporation
Attn: Educational Services/TIPS G155
4400 Computer Drive
Westboro, MA 01581 - 9973

BILL TO:	SHIP TO: (No P.O. Boxes - Complete Only If Different Address)
COMPANY NAME	COMPANY NAME
ATTN:	ATTN:
ADDRESS	ADDRESS (NO PO BOXES)
CITY	CITY
STATE ZIP	STATE ZIP

Priority Code _____ (See label on back of catalog)

Authorized Signature of Buyer (Agrees to terms & conditions on reverse side) | Title | Date | Phone (Area Code) | Ext.

ORDER #	QTY	DESCRIPTION	UNIT PRICE	TOTAL PRICE

A SHIPPING & HANDLING

☐ UPS	ADD
1-4 Items	$ 5.00
5-10 Items	$ 8.00
11-40 Items	$ 10.00
41-200 Items	$ 30.00
200+ Items	$100.00

Check for faster delivery

Additional charge to be determined at time of shipment and added to your bill.

☐ UPS Blue Label (2 day shipping)
☐ Red Label (overnight shipping)

B VOLUME DISCOUNTS

Order Amount	Save
$0 – $149.99	0%
$150 – $499.99	10%
Over $500.00	20%

Tax Exempt # or Sales Tax (if applicable) _____

ORDER TOTAL	
Less Discount – See B	–
SUB TOTAL	
Your local* sales tax	+
Shipping and handling – See A	+
TOTAL – See C	

C PAYMENT METHOD

☐ Purchase Order Attached ($50 minimum)
P.O. number is _____. (Include hardcopy P.O.)
☐ Check or Money Order Enclosed
☐ Visa ☐ MasterCard ($20 minimum on credit cards)

Account Number | Expiration Date

Authorized Signature
(Credit card orders without signature and expiration date cannot be processed.)

THANK YOU FOR YOUR ORDER

PRICES SUBJECT TO CHANGE WITHOUT PRIOR NOTICE.
PLEASE ALLOW 2 WEEKS FOR DELIVERY.
NO REFUNDS NO RETURNS.

* Data General is required by law to collect applicable sales or use tax on all purchases shipped to states where DG maintains a place of business, which covers all 50 states. Please include your local taxes when determining the total value of your order. If you are uncertain about the correct tax amount, please call 508-870-1600.

Form 702
Rev. 8/87

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