

297-1001-010

DMS-100 Family

## **North American DMS-100**

# Electrostatic Discharge Protection Guide

BASE03 and up Standard 02.03 April 1999

---





---

DMS-100 Family

# North American DMS-100 Electrostatic Discharge Protection Guide

---

Publication number: 297-1001-010  
Product release: BASE03 and up  
Document release: Standard 02.03  
Date: April 1999

---

© 1991, 1995, 1998, 1999 Northern Telecom  
All rights reserved

Printed in the United States of America

**NORTHERN TELECOM CONFIDENTIAL:** The information contained in this document is the property of Northern Telecom. Except as specifically authorized in writing by Northern Telecom, the holder of this document shall keep the information contained herein confidential and shall protect same in whole or in part from disclosure and dissemination to third parties and use same for evaluation, operation, and maintenance purposes only.

Information is subject to change without notice. Northern Telecom reserves the right to make changes in design or components as progress in engineering and manufacturing may warrant.

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, and the radio interference regulations of the Canadian Department of Communications. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at the user's own expense. Allowing this equipment to be operated in such a manner as to not provide for proper answer supervision is a violation of Part 68 of FCC Rules, Docket No. 89-114, 55FR46066. The SL-100 system is certified by the Canadian Standards Association (CSA) with the Nationally Recognized Testing Laboratory (NRTL). This equipment is capable of providing users with access to interstate providers of operator services through the use of equal access codes. Modifications by aggregators to alter these capabilities is a violation of the Telephone Operator Consumer Service Improvement Act of 1990 and Part 68 of the FCC Rules

DMS, DMS SuperNode, MAP, and NT are trademarks of Northern Telecom.

---



---

# Publication history

---

**1999 April**

Issue 02.03 of this document released, based on feedback from NTJI.

**1998 February**

Issue 02.02 of this document released, based on ETAS feedback.

**1995 July**

Issue 02.00 of this document released, based on ETAS feedback.

**1991 March**

First release of this document.



---

# Contents

---

|   |            |
|---|------------|
| <b>About this document</b>                          | <b>vii</b> |
| When to use this document                           | vii        |
| How to check the version and issue of this document | vii        |
| References in this document                         | vii        |
| What precautionary messages mean                    | viii       |
| Command, parameter, and response format             | ix         |
| Input prompt (>)                                    | x          |
| Commands and fixed parameters                       | x          |
| Variables   | x          |
| Responses   | x          |
| <hr/>   |            |
| <b>Card Handling</b>                                | <b>1-1</b> |
| How to handle cards                                 | 1-1        |
| How to store cards                                  | 1-3        |
| Other maintenance activities                        | 1-3        |
| <hr/>   |            |
| <b>Static control devices</b>                       | <b>2-1</b> |
| Grounding   | 2-1        |
| Wrist straps  | 2-1        |
| How to test ESD wrist straps                        | 2-1        |
| Static Control Mats                                 | 2-2        |
| Conductive Foot Straps                              | 2-2        |
| <hr/>   |            |
| <b>List of terms</b>                                | <b>3-1</b> |



---

# About this document

---

## When to use this document

This document contains guidelines for Electrostatic Discharge (ESD) precautions necessary to avoid damage and/or service disruption to DMS-100 equipment. This document describes how to apply ESD controls during installation and maintenance activities.

## How to check the version and issue of this document

The numbers, for example 01.01, indicate the version and issue of the document.

The first two digits of these numbers indicate the version. The version number increases when a document update occurs to support a new software release. For example, the first release of a document is 01.01. In the *next* software release cycle, the first release of the same document is 02.01.

The second two digits of the numbers indicate the issue. The issue number increases when a document revision and release occur in the *same* software release cycle. For example, the second release of a document in the same software release cycle is 01.02.

This document is for use in all DMS-100 Family offices. More than one version of this document can be present. Determine if you have the latest version of this document and the arrangement of the documentation for your product. To determine the version of the document and the arrangement for your product, check the release information. The *DMS-100 Family Guide to Northern Telecom Publications*, 297-1001-001 contains the release information.

## References in this document

This document refers to the following documents:

- *Product Documentation Directory*, 297-8991-001
- *Power Distribution and Grounding Systems*, 297-1001-156

## What precautionary messages mean

The ESD precautionary measures contained in this practice apply to all DMS-100 equipment. This equipment includes frames, cabinets, cables, circuit packs and other specified equipment.

The types of precautionary messages used in NT documents include attention boxes and danger, warning, and caution messages.

An attention box identifies information that is necessary for the correct performance of a procedure or task. An attention box also can identify the correct explanation of information or data. Danger, warning, and caution messages indicate possible risks.

Examples of the precautionary messages are as follows:

**ATTENTION** Information needed to perform a task

### **ATTENTION**

Deprovision the DS-3 ports that are not used before you install a DS-1/VT Mapper. If you do not deprovision the ports first, the system cannot carry the DS-1 traffic through the DS-1/VT Mapper. If you provision the DS-1/VT Mapper, but do not deprovision the DS-3 ports, the system cannot carry traffic through the Mapper.

**DANGER** Possibility of personal injury



### **DANGER**

#### **Risk of electrocution**

Do not open the front panel of the inverter unless you removed fuses F1, F2, and F3. The inverter contains high-voltage lines. Until you remove the fuses, the high-voltage lines are active, and you risk electrocution.

**WARNING** Possibility of equipment damage

**WARNING****Damage to the backplane connector pins**

Do not bend the backplane connector pins. To prevent bent connector pins, align the card before you seat the card. Use light thumb pressure to align the card with the connectors. Use the levers on the card to seat the card into the connectors.

**WARNING****Damage to the backplane connector pins**

Do not bend the backplane connector pins. To prevent bent connector pins, align the card before you seat the card. Use light thumb pressure to align the card with the connectors. Use the levers on the card to seat the card into the connectors.

**CAUTION** Possibility of service interruption or degradation

**CAUTION****Possible loss of service**

Before you continue, make sure that you remove the card from the inactive unit of the peripheral module. If you remove a card from the active unit, loss of subscriber service occurs.

**CAUTION****Possible loss of service**

Before you continue, make sure that you remove the card from the inactive unit of the peripheral module. If you remove a card from the active unit, loss of subscriber service occurs.

## Command, parameter, and response format

Commands, parameters, and responses in this document conform to the following standards.

### Input prompt (>)

An input prompt (>) indicates that the information that follows is a command:

**>BSY**

### Commands and fixed parameters

Commands and fixed parameters that you enter at a MAP terminal appear in uppercase letters:

**>BSY CTRL**

### Variables

Variables appear in lowercase letters:

**>BSY CTRL ctrl\_no**

You must enter the letters or numbers that the variable represents. A list that follows the command string explains each variable.

### Responses

Responses correspond to the MAP display and appear in a different type:

```
FP 3 Busy CTRL 0: Command request has been submitted.  
FP 3 Busy CTRL 0: Command passed.
```

The following example from a procedure shows the command syntax used in this document:

- 1 To manually busy the CTRL on the inactive plane, type

**>BSY CTRL ctrl\_no**  
and press the Enter key.

*where*

ctrl\_no is the number of the CTRL (0 or 1)

*Example of a MAP response:*

```
FP 3 Busy CTRL 0: Command request has been submitted.  
FP 3 Busy CTRL 0: Command passed.
```

---

# Card Handling

---

An electrostatic charge of over 25 kV can develop on a human body. Electrostatic charges up to 5 kV can develop in central office environments. The development of an electrostatic charge is more likely when humidity is low. Because of low humidity and the associated electrostatic charges, you must follow all electrostatic discharge (ESD) precautionary measures in this document.

In this section, the term “card” refers to all DMS-100 circuit packs, paddle boards, line cards, and filler faceplates. Filler faceplates are not transported in anti-static containers. You must use the procedures that apply to other card types when you handle filler faceplates.

## How to handle cards

When you handle cards, use the following general guidelines:

- 1 Transport all cards in anti-static containers (normally an electrically conductive box or electrostatic discharge protection bag). This requirement applies to the
  - transfer of a card from storage to a frame or cabinet
  - transfer of a card from a frame or cabinet to a frame or cabinet
  - installation of a card

All anti-static containers must be in good condition, without holes or tears. Discard any damaged anti-static containers.

- 2 Store all cards in the anti-static container or a storage cabinet until you need the card.
- 3 Always wear a wrist strap connected to a ground when you handle cards that are not in an anti-static container. Test the wrist strap before you use it. Connect the wrist strap to a frame ground before you handle a card. The use of a static control mat is optional.

- 4 Wear a wrist strip connected to a ground and contact only
  - a. card edges
  - b. faceplates
  - c. locking latches
  - d. card pullers
- 5 To prevent damage to cards, do not
  - a. drop cards
  - b. stack the cards on top of or against each other
  - c. touch any components or tracks on the card
  - d. handle a card without a wrist strap connected to a ground
  - e. use a wrist strap that you did not test
  - f. use a wrist strap that you did not connect to frame ground
  - g. use a grounded wrist strap connected to logic ground.
  - h. store a card in a location other than the ESD protective container or storage cabinet.
  - i. transport a card without an ESD protective container.
  - j. hang a card on a frame or cabinet by the locking latches

### **Card installation procedure**

Use the following procedure to install a card.

- 1 Test the wrist strap.
- 2 Transport the card to the installation location in an ESD protective container.
- 3 Connect the wrist strap to frame ground at the installation location.
- 4 Remove the card from the ESD protective container.
- 5 Hold the card by the faceplate and slide the card into the guides on the shelf. If the card does not have a faceplate, handle the the card by the edges. Push the card all the way into the slot on the shelf.

### **Card removal procedure**

Use the following procedure to remove a card.

- 1 Test the wrist strap.
- 2 Connect the wrist strap to frame ground at the removal location.
- 3 Unseat and remove the card from the shelf slot.

- 4 Place the card you removed in an ESD protective container for transportation.

### How to store cards

Store all cards in the ESD protective container or a storage cabinet until you need the cards. Test the wrist strap and connect the wrist strap to frame ground before you insert or remove cards in the storage cabinet.

### Other maintenance activities

Use the following guidelines when you perform the indicated maintenance action.

| Maintenance Activity  | Guideline  |
|---|--|
| Connect interface cables to the frame or cabinet backplane or bulkhead. | <p>Wear a wrist strap while you connect the interface cable. If possible, touch the conductors or pins of the interface cable before you connect the interface cable.</p> <p>If possible, do not connect an interface cable to a pack inserted into a backplane.</p> |
| Perform wiring changes on backplanes, FSP and MSP Supervisory panels.   | Wear a wrist strap during these activities.  |
| Insert or remove magnetic tapes   | Wear a wrist strap during these activities.  |



---

## Static control devices

---

Static control devices make sure that an electrostatic charge does not develop. Static control devices also make sure charges generated dissipate safely to ground.

### Grounding

The performance of static control devices like wrist straps and conductive mats depends on a good connection to frame ground. Install all DMS-100 equipment according to 297–1001–156, *Power Distribution and Grounding Systems*.

### Wrist straps

A wrist strap is a strip of conductive material worn in contact with the skin around the wrist. The strip has a flexible ground wire cord that contains a resistor. This resistor provides a controlled impedance path to a jack or clip at the end of the wire. The jack or clip connects to frame ground in the work area.

You must test the electrostatic discharge (ESD) wrist straps before you use the wrist straps during any maintenance activities.

You must use the ESD wrist straps when you handle all DMS-100 cards, and other equipment as specified.

#### How to test ESD wrist straps

You must verify that ESD wrist straps perform within specifications before you handle any cards, or other DMS-100 equipment as specified. One way to test a wrist strap is to use a Go/No-Go type wrist strap tester if available. This type of tester provides an audible and visual indication of the wrist strap condition.

You can use a Volt-Ohm meter (VOM) to make sure that the impedance measured is reliable and between 0.8 and 10 M $\Omega$ . The impedance is through the wrist strap and through the body. First, perform this measurement with the wrist strap not attached to the body. Next, perform this measurement with the wrist strap secured to the wrist.

When you test a wrist strap, stress the wrist strap cord from side to side and pull on the ends of the cord. This type of the test detects bad electrical contact and openings in the wire.

### **Static Control Mats**

A static control mat contains anti-static material and has a flexible ground wire cord. The ground wire cord can contain a resistor. This resistor provides a controlled impedance path to a jack or clip at the end of the ground wire cord. The jack or clip connects to frame ground in the work area. Use static control mats as a work surface during repair or modifications to cards in the field. Place static control mats on the floor in the work area. Use conductive foot straps with static control mats. **Always use a wrist strap in addition to the static control mats.**

If you use static control mats, you must test the mats before you use them during any maintenance activities. You can use a Volt-Ohm meter (VOM) to make sure that the impedance measured is reliable and between 0.8 and 10 M $\Omega$ . This impedance is from the static control mat to the ground wire jack/clip.

Use static control mats during field repair or modifications of all DMS-100 cards, and other equipment as specified.

### **Conductive Foot Straps**

Use conductive foot straps with a conductive floor or a static control mat. These straps provide a low impedance path from the ankles to the conductive floor or mat. This low impedance path bypasses nonconductive shoes.

You must test conductive foot straps before you use the foot straps during any maintenance activities.

---

## List of terms

---

**DMS**

Digital Multiplex System

**ESD**

electrostatic discharge

**FSP**

frame supervisory panel

**MSP**

modular supervisory panel

**NTP**

Nortel (Northern Telecom) publication

**VOM**

Volt-Ohm meter



---

# Nortel (Northern Telecom) Publications Customer Feedback Form

---

This form provides you with a means of communicating comments and concerns about Northern Telecom publications (NTP). Please return your comments to the address shown on the reverse and include your name and address. For urgent documentation-related issues, use the Documentation Hotlines: 1-800-684-2273 (U.S. only) or 905-452-4588 (Canada/International). To fax comments and supporting information, use the Documentation Hotline fax numbers: 919-481-5854 (U.S. only) or 905-452-5423 (Canada/International).

Please identify this NTP's medium: *Paper* \_\_\_\_\_ *CD* \_\_\_\_\_

*Number:* 297-1001-010 02.03 *Date:* April 1999 *BCS/Release:* BASE03 and up

Use this space for your comments, concerns, or problems encountered  
For specific problems, please identify the appropriate page and volume numbers.

If you would like a reply,  
please provide:

Your name: \_\_\_\_\_

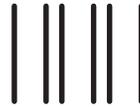
Address: \_\_\_\_\_

City, State/  
Province: \_\_\_\_\_ ZIP/  
Postal code: \_\_\_\_\_

Phone no.: \_\_\_\_\_ Ext.: \_\_\_\_\_

*If you care to send us a letter, please do so. We always appreciate your comments.*

Please fold along dotted lines and tape closed.

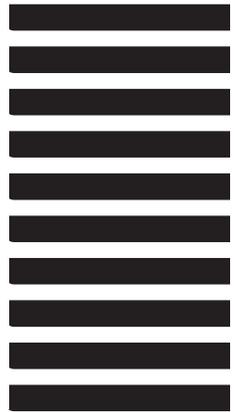


NO POSTAGE  
NECESSARY  
IF MAILED  
IN THE  
UNITED STATES

**BUSINESS REPLY MAIL**  
FIRST CLASS PERMIT NO. 1024 DURHAM, NC

POSTAGE WILL BE PAID BY ADDRESSEE

Northern Telecom Inc.  
Product Documentation  
Department 3423 / 200 PPK  
P. O. Box 13010  
Research Triangle Park, NC 27709





DMS-100 Family  
**North American DMS-100**  
Electrostatic Discharge Protection Guide

Product Documentation—Dept 3423  
Northern Telecom  
P.O. Box 13010  
RTP, NC 27709-3010  
1-800-684-2273  
(1-800-NTI-CARE)

© 1991, 1995, 1998, 1999 Northern Telecom  
All rights reserved

**NORTHERN TELECOM CONFIDENTIAL:** The information contained in this document is the property of Northern Telecom. Except as specifically authorized in writing by Northern Telecom, the holder of this document shall keep the information contained herein confidential and shall protect same in whole or in part from disclosure and dissemination to third parties and use same for evaluation, operation, and maintenance purposes only.

Information is subject to change without notice. Northern Telecom reserves the right to make changes in design or components as progress in engineering and manufacturing may warrant. 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, and the radio interference regulations of the Canadian Department of Communications. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at the user's own expense. Allowing this equipment to be operated in such a manner as to not provide for proper answer supervision is a violation of Part 68 of FCC Rules, Docket No. 89-114, 55FR46066. The SL-100 system is certified by the Canadian Standards Association (CSA) with the Nationally Recognized Testing Laboratory (NRTL). This equipment is capable of providing users with access to interstate providers of operator services through the use of equal access codes. Modifications by aggregators to alter these capabilities is a violation of the Telephone Operator Consumer Service Improvement Act of 1990 and Part 68 of the FCC Rules

DMS, DMS SuperNode, MAP, and NT are trademarks of Northern Telecom.

Publication number: 297-1001-010

Product release: BASE03 and up

Document release: Standard 02.03

Date: April 1999

Printed in the United States of America

