

297-1001-109

DMS-100 Family

# **Cabinetized Miscellaneous (CMIS) Equipment Cabinet**

Planning and Engineering Guide

BCS35 and up Standard 01.02 September 1996

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# **Cabinetized Miscellaneous (CMIS) Equipment Cabinet**

## Planning and Engineering Guide

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### September 1993

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## About this document

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This document describes the cabinetized miscellaneous (CMIS) equipment cabinet, and includes a process for installing miscellaneous equipment in the CMIS. It is intended for operating company personnel involved in setting up and installing miscellaneous equipment in the CMIS.

### When to use this document

This document is written for all DMS-100 Family offices. More than one version of this document may exist. To determine whether you have the latest version of this document, check the release information in *DMS-100 Family Guide to Northern Telecom Publications*, 297-8xxx-001.

### Where to find information

The chart below lists the documents that you require to understand the content of this document, or to perform the tasks it describes. These documents are also referred to in the appropriate places in the text.

Number	Title
297-1001-156	<i>Power Distribution and Grounding Systems</i>
297-8991-805	<i>Hardware Description Manual</i>
IM925	<i>DMS-100 Family Switching Systems Installation Manual</i>

## What precautionary messages mean

Danger, warning, and caution messages in this document indicate potential risks. These messages and their meanings are listed in the following chart.

Message	Significance
DANGER	Possibility of personal injury
WARNING	Possibility of equipment damage
CAUTION	Possibility of service interruption or degradation

Examples of the precautionary messages follow.



### **DANGER**

#### **Risk of electrocution**

The inverter contains high voltage lines. Do not open the front panel of the inverter unless fuses F1, F2, and F3 have been removed first. Until these fuses are removed, the high voltage lines inside the inverter are active, and you risk being electrocuted.



### **WARNING**

#### **Damage to backplane connector pins**

Use light thumb pressure to align the card with the connectors. Next, use the levers to seat the card into the connectors. Failure to align the card first may result in bending of the backplane connector pins.



### **CAUTION**

#### **Loss of service**

Subscriber service will be lost if you accidentally remove a card from the active unit of the peripheral module (PM). Before continuing, confirm that you are removing the card from the inactive unit of the PM.



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# Understanding CMIS

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This chapter describes the function and architecture of the cabinetized miscellaneous (CMIS) cabinet. The CMIS is discussed in subsequent sections of this chapter as follows:

**Product functions** on page 1-2 describes the features of a CMIS.

**CMIS architecture** on page 1-5 describes the basic CMIS configuration and provides a typical cabinet layout.

## Product functions

The CMIS permits a customer to configure and install customer preferred equipment in the CMIS cabinet, thus optimizing the space of the central office cabinet area.

The CMIS meets global market requirements for electromagnetic compatibility (EMC) regulations, and FCC Class A or European Norms Class B compliance. Customers are responsible, however, for ensuring EMC compliance of customer preferred and installed miscellaneous equipment.

The CMIS has the following features:

- the ability to divide a single cabinet into two distinct areas: one providing EMC management facilities for installing NT-supported, non-compliant hardware, the other providing a managed space for the customer to install preferred hardware that is EMC compliant at the unit level
- space optimization and reduced cost to the customer through a 'hybrid' dual environment cabinet
- EMC separation of two cabinet areas through the development of a horizontal metal divider
- three possible ratios of EMC to open areas
- field upgradeable configuration

Hybrid cabinets, that is, cabinets with both EMC closed and EMC open areas, or cabinets that have been converted in the field to hybrid cabinets must be EMC isolated from the DMS-100C lineup enclosures by installing the lateral cabling duct end seals.

The hybrid CMIS is forward compatible only, because the lower area of the cabinet will not support lateral cabling as used by 28-inch cabinet line-ups.

**EMC closed area**

The EMC closed area consists of a cabinet area in which NT supported miscellaneous equipment, which by itself is non-EMC, is mounted and made compliant using enclosure shielding, and either cable shielding or filtering, as required at the cabinet level. This area is located above the EMC divider plate.

The EMC closed area is made up of the following:

- EMC divider plate
- bulkhead mounted personality plates on the EMC side of the divider
- Schlegel gaskets at the front and rear of EMC divider plate
- metal plate near the exposed bulkhead window area
- power filter terminal block
- logic return bar filtering
- 28-inch cabinet
- cabinet doors

In general, the miscellaneous hardware associated with the CMIS is both a relatively low noise source and a low immunity risk. As a result, the EMC divider design does not attempt to shield interference greater than 600 MHz.

**EMC open area**

The EMC open area is located below the EMC divider plate. Customer preferred equipment is mounted in this area. This area does not require enclosure or filtering and shielding of input/output signals at the cabinet level. Switchboard cabling can pass through holes in the bulkhead and connect directly to the miscellaneous equipment in the open area. This area can also be used for NT equipment that is identified as EMC compliant.

Personality plates are not required on the EMC open side of the divider.

**EMC installation zones**

The space allocated to a single miscellaneous hardware unit is defined as an installation zone, and is bounded by the cabinet's width and depth, as well as the vertical height of the personality plate. The CMIS can be divided into a maximum of four installation zones.

Where space permits, any single miscellaneous hardware unit can be installed in any zone. When a single miscellaneous hardware unit is too large, the product documentation includes installation information.

The number of installation zones is subject to the location of the EMC divider plate, therefore, a fully EMC closed CMIS has the maximum four available installation zones. The EMC open areas in a fully open or hybrid CMIS are not considered installation zones, and space is allocated to miscellaneous hardware units mounted in this area on the basis of cabinet capability (as discussed in chapter 4) and the physical requirements of the hardware being installed.

Cabling that is associated with a miscellaneous hardware unit in one zone must not share the personality plate of another zone. Each zone carries a single miscellaneous hardware unit kit, consisting of the following:

- miscellaneous hardware unit
- associated cable
- personality plate

Installation zones can be amended to maximize space utilization in the following instances:

- When physical size, cabling, and thermal requirements permit, more than one of any given miscellaneous hardware type may reside in a single zone.
- When a miscellaneous hardware unit is too large for a single zone, it can be positioned to occupy two zones. In this case the personality plates associated with both zones are included in the miscellaneous hardware unit kit.

### **Power and alarm filtering**

Within the CMIS, power and alarm monitoring capabilities for miscellaneous units use the existing modular supervisory panel (MSP) (NTRX40AA). Power and alarm lines passing through the EMC divider plate are filtered through the standard power filter termination block and filtered D-subminiature (D-sub) connectors located at the EMC divider.

### **Signal filtering**

Shelf level signal cables are routed to the associated personality plate. These signal cables are either shielded or filtered at the personality plate depending on EMC requirements of the cabling.

## CMIS architecture

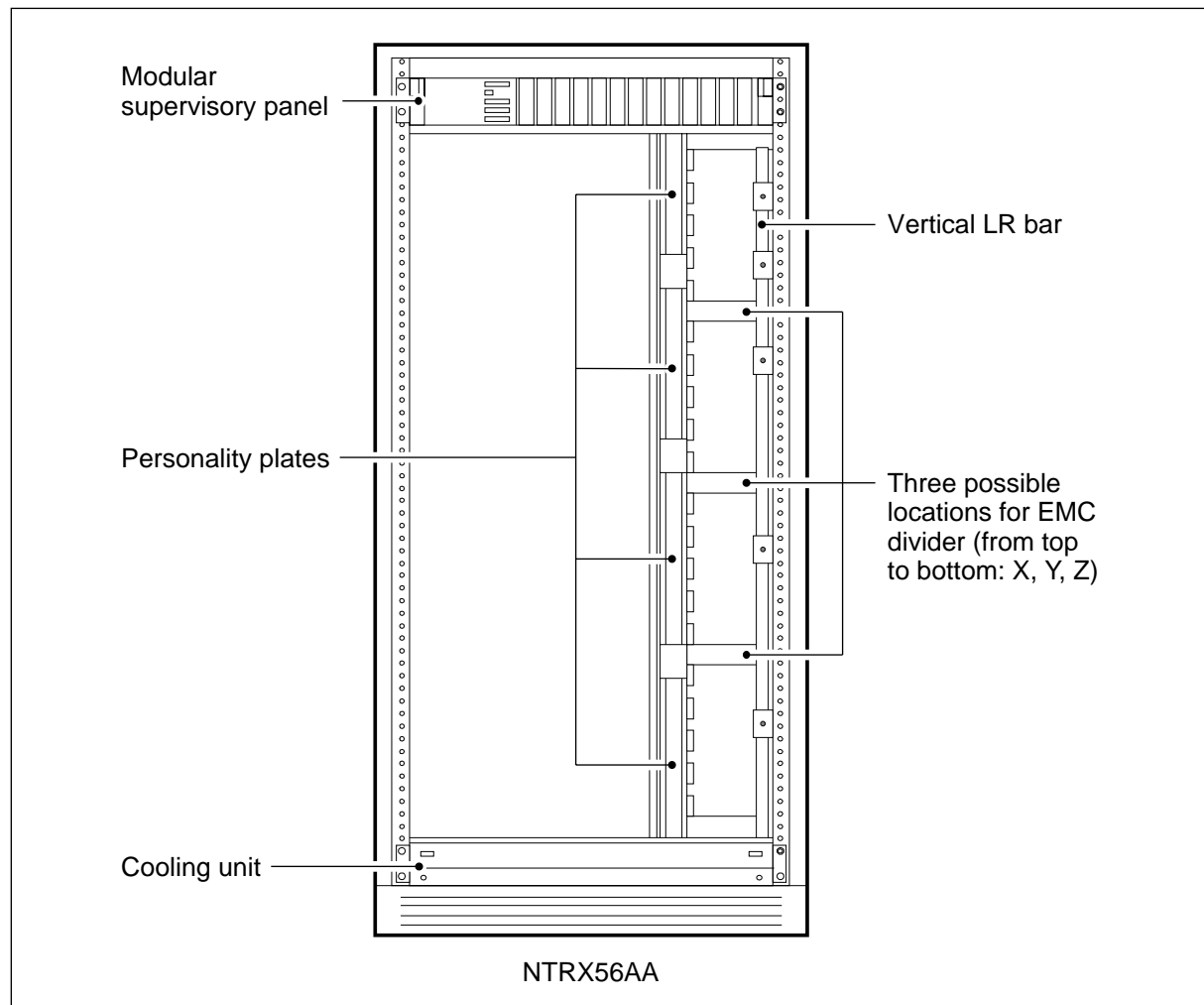
The CMIS, which is a standard DMS-100 cabinet, typically houses the following:

- MSP
- EMC divider plate
- cooling unit

The CMIS cabinet and its major components are shown in figure 1-1.

**Figure 1-1**  
**Example of a CMIS cabinet**

FW-30683



**Note:** The cabinet doors are not shown in the illustration.

### **Modular supervisory panel**

The modular supervisory panel (MSP) contains alarm circuits and power control that provide interfaces between the power distribution center and the equipment mounted in the CMIS.

The provisionable MSP Assembly Kit (NTRX40AA MSP ASSY E/W) provides the following:

- Talk Battery Filter (NTRX44AA)
- Alarm Module (NTRX41AA, NTRX4002)
- Fuse Module (NTRX43AA)
- Breaker Module 10A (NTRX42AA)
- Breaker Module 15A (NTRX42BA)
- Breaker Module 20A (NTRX42CA)
- Backplane
- Fan Power Control Module (NTRX54AA (60V), NTRX54BA (48V))

*Note:* The appropriate modules are supplied by Northern Telecom.

Fuses and designation discs are provisionable for each unit. It is the responsibility of customer engineering to ensure that the sum of fuse amperages for each fuse module does not exceed 20A for fused PDCs, and 30A for PDCs with circuit breakers. The customer is also responsible for ensuring that the load is equalized between the A-feed and the B-feed.

### **EMC divider plate**

The EMC divider plate creates an EMC barrier between the top and bottom portions of the cabinet. See page 2-3 for more information on the EMC divider plate.

The EMC divider plate is provisionable at the CMIS cabinet level and may be installed during manufacture or in the field. Previously installed EMC divider plates can be relocated to one of three specific positions within the cabinet.

### **Cooling unit**

The cooling unit operates on either -48V dc or -60V dc and provides the necessary air flow for cooling purposes.

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# Configuring CMIS

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This chapter describes the features of the optimized cabinetized miscellaneous (CMIS) cabinet and the installation requirements. The configuration of the CMIS is discussed in subsequent sections of this chapter as follows:

**Standard features** on page 2–2 describes the standard features of the CMIS.

**Optional features** on page 2–2 describes the optional features of the CMIS.

**Installation** on page 2–6 describes the installation of the CMIS and retrofitting requirements.

## Standard features

The following are standard features of the CMIS:

- CMIS cabinet inverters supply all ac power (to CMIS cabinet mounted units only). ac power produced by the inverter may pass through the EMC divider provided that suitable radio frequency (RF) filtering is applied.
- modular supervisory panel (MSP) (NTRX40AA)
- 28-inch cabinet (NTRX25)
- -48V dc or -60V dc compatibility



### **WARNING**

#### **Possible damage to miscellaneous equipment**

The miscellaneous cabinet should contain only equipment requiring power from either -48V dc or -60V dc. If ac power is required it must be obtained from an inverter and never from a commercial source.

The CMIS cabinet assembly includes the following:

- NTRX25 base cabinet
- left rear bulkhead
- miscellaneous hardware

All other features are provisionable.

## Optional features

The following are optional features of the CMIS:

- 28-inch cabinet cooling unit(s) for each subassembly specification
- EMC divider plate and mounting hardware
- MSP modules
- logic return bar compatible with EMC divider concept
- cabinet external power filter



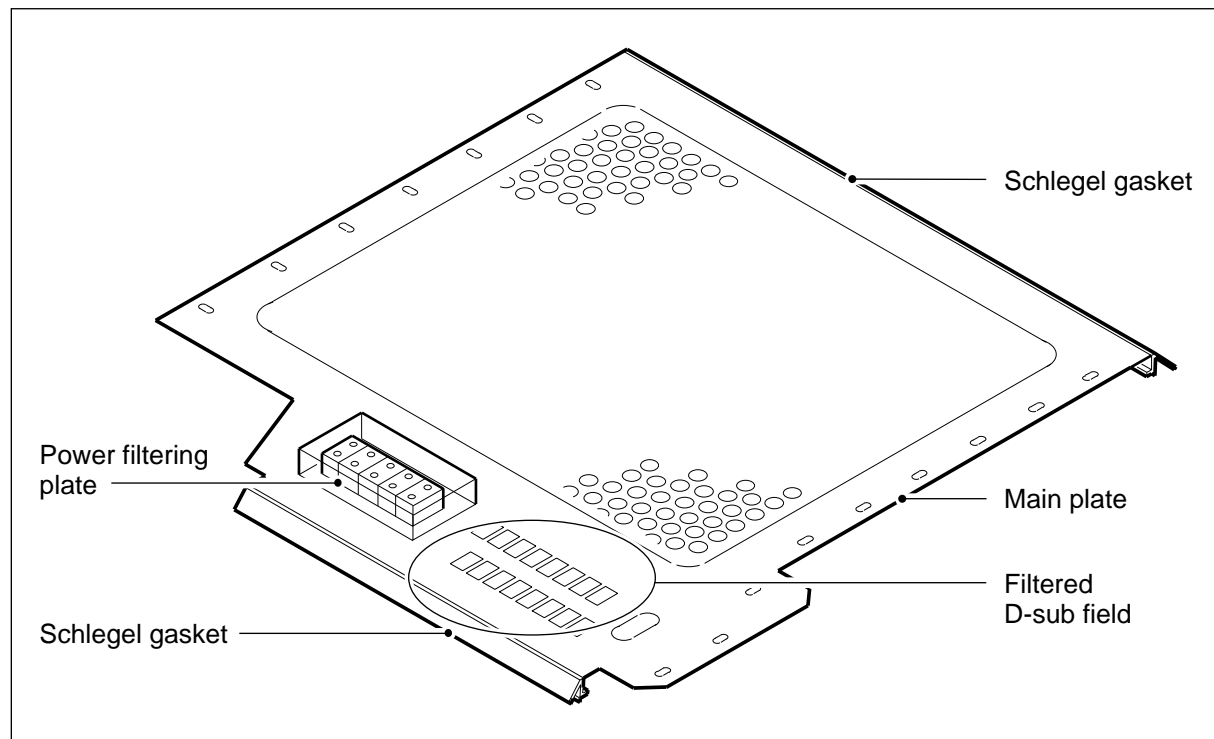
### EMC divider plate

The EMC divider plate, shown in figure 2-1, separates the cabinet horizontally into two sections, and meets the following criteria:

- provides a complete peripheral EMC seal with cabinet doors closed
- causes no significant reduction in air flow (minimum 60% air flow)
- allows for the passage of -48V dc or -60V dc, battery return, alarm cables and logic return with appropriate EMC filtering
- occupies no more than 25 mm (1 in.) vertical mounting space
- allows for the retention of existing cabinet mounting zones and personality plate zones with a minimum of readjustment to avoid redesign of existing personality plates and unit to bulkhead cables
- can be installed into one of three design specific locations
- can be retrofitted in the field

Figure 2-1  
EMC divider plate

FW-30874



The EMC divider plate is made up of the following:

- main plate
- main plate width adjustment plate
- power filter mounting plate
- Schlegel gaskets
- bulkhead hole filler plate

With the exception of the lateral cabling duct openings, the 28-inch cabinet can provide EMI containment as a stand alone product. As a stand alone product it is possible to create an upper EMC chamber solely with the addition of the horizontal metal divider plate and supporting brackets.

The EMC divider plate is designed to fit between the 28-inch cabinet standard equipment mounting positions and the personality plate locations. A universal plate covers the exposed portion of the personality plate bulkhead hole. The same plate can be used for each of the three EMC divider mounting locations. The personality plate is illustrated in figure 1-1 on page 1-5 and figure 2-2 on page 2-5.

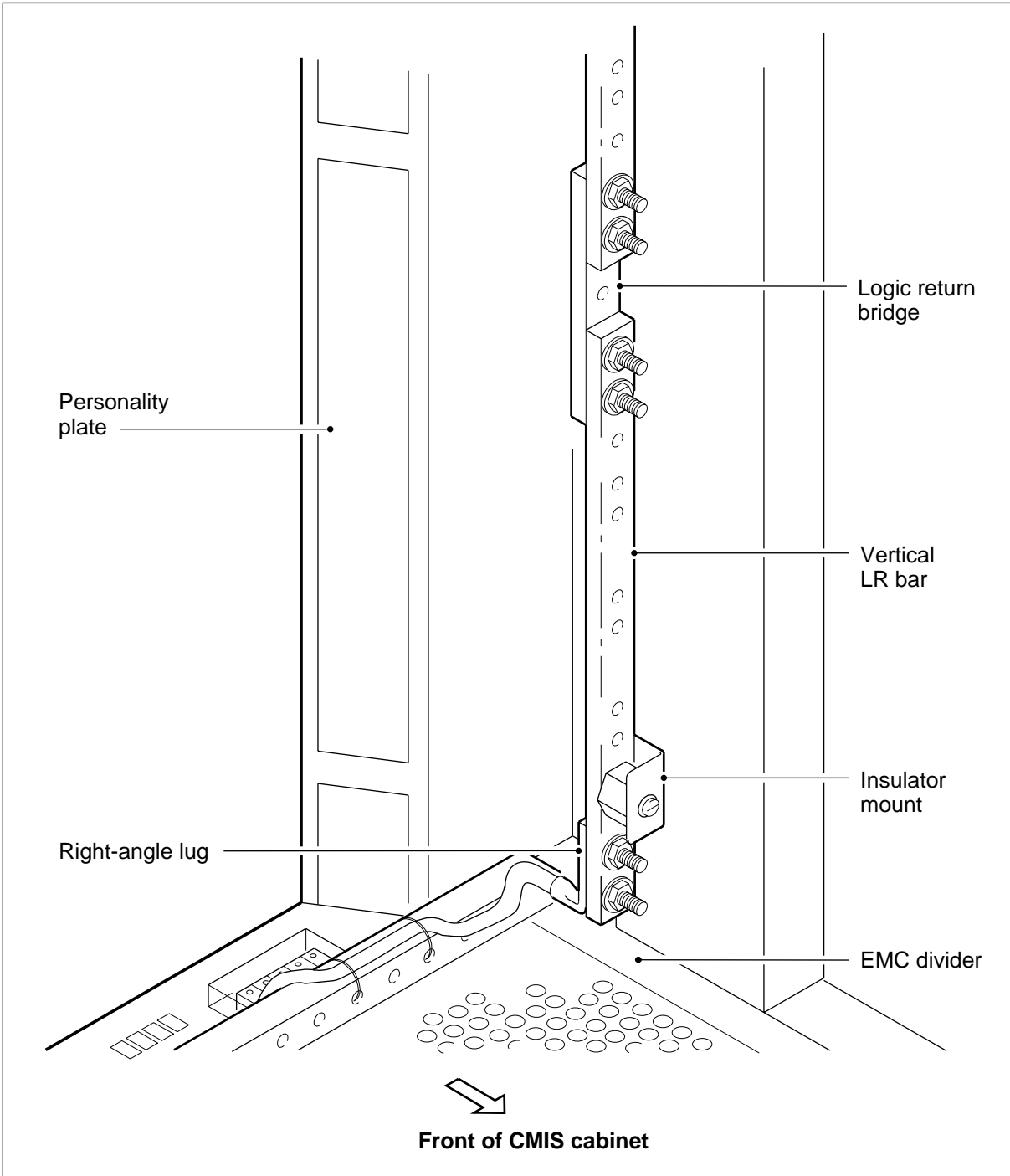
The EMC divider plate can be positioned at the one quarter, one half, or three quarter positions, using self tapping screws. The divider can either be installed or moved to a different position in the field. For in the field adjustments, it may be necessary to remove and replace a miscellaneous hardware unit to access securing screws. The EMC divider plate is RF grounded by the securing hardware.

### **Logic return**

The vertical LR bar, shown in figure 2-2, can be split at one of three logic return bridge locations to accommodate the EMC divider plate, and can be upgraded in the field. This bus accommodates two-hole lug cable terminations and RF filtering needs when passing through the EMC divider plate. The logic return is fed through the EMC divider plate at the power filtering plate.

**Figure 2-2**  
**Logic return bar assembly and personality plate**

FW-30875



## Installation

The optimized CMIS cabinet is installed in the same way as other DMS-100 cabinets. For information on DMS-100 family cabinet installation, refer to *Power Distribution and Grounding Systems*, 297-1001-156 and *DMS-100 Family Switching Systems Installation Manual*, IM925.

Field installation of the EMC divider plate may require additional changes during the reformatting of the CMIS to the optimized format, or relocation of the EMC divider plate, as follows:

- removal of adjacent miscellaneous hardware units to facilitate securing screw access (reformat and relocation)
- addition of power filter block to EMC divider plate (reformat only)
- installation of new vertical LR bar (reformat only)
- reconfiguration of vertical LR bar (relocation only)

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## Installing hardware in CMIS

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This chapter describes the grounding methods used to mount equipment in the CMIS, methods to test the grounding of the miscellaneous equipment, and alternate methods to supply power from a DMS-embedded inverter. Installing hardware in the CMIS is discussed in subsequent sections of this chapter as follows:

**Pre-installation hardware testing** on page 3-2 describes the ground testing of miscellaneous equipment.

**AC power for printers and terminals** on page 3-4 describes the recommended methods of supplying ac power to printers and terminals.

## Pre-installation hardware testing

Any equipment intended for use in the CMIS should isolate the battery return (BR), and logic return (LR) from the frame ground (FG).

Perform the grounding tests with an insulation tester that measures resistance at 500 V dc to determine how a particular unit should be grounded before installation in the CMIS, observing the following:

- verify from manufacturers data that the unit can withstand 500 V dc
- place the unit to be tested on a non-conductive surface or work bench to allow access to the unit's terminal strips
- ensure that units with power packs or modem cards provisioned are inserted into the unit before testing. There should be no external wires connected to the unit when testing.

*Note 1:* A unit may consist of multiple shelves.

*Note 2:* Some units do not have an external logic return connection.

### Method of testing

Verify the dc resistance at 500 V dc between the following points:

- LR and FG
- BR and FG
- LR and BR

If the hardware unit is equipped with a logic return, refer to table 3-1. If a logic return is not equipped, refer to table 3-2.

Install the unit using the process shown in table 3-3.

### Testing dc-fed equipment

Use the following tables to determine which installation method to use on your CMIS-mounted unit.

*Note:* Short =  $0 \Omega \leq R \leq 2 \text{ M}\Omega$   
Open =  $R > 2 \text{ M}\Omega$  at 500 V dc

<b>Table 3-1 Testing dc-fed equipment with an external logic return</b>			
<b>LR to FG</b>	<b>BR to FG</b>	<b>LR to BR</b>	<b>Installation method</b>
Open	Open	Open	A
		Short	B
Short	Short	Open	C
	Open	Open	D
	Short	Short	E

<b>Table 3-2 Testing dc-fed equipment without an external logic return</b>	
<b>BR to FG</b>	<b>Installation method</b>
Open	B
Short	E

### Installation methods

Tables 3-1 and 3-2 refer to the installation methods shown in table 3-3.

<b>Table 3-3 Installation methods for dc equipment</b>	
<b>Installation method</b>	<b>Process</b>
A	Chassis bonded to cabinet according to standard procedure. Logic terminal bonded to vertical LR bar according to standard procedure.
B	Chassis bonded to cabinet according to standard procedure.
C	Chassis isolated from cabinet according to standard procedure. Logic terminal bonded to vertical LR bar according to standard procedure.
D	Chassis isolated from cabinet according to standard procedure. Chassis bonded to vertical LR bar according to standard procedure.
E	Chassis isolated from cabinet according to standard procedure.

### Testing ac-fed equipment

Since ac powered equipment that is part of the DMS system must be fed from an inverter located within the cabinet, the equipment, including the inverter, can be tested as one dc-fed unit. The inverter and the equipment are then each installed according to the method indicated by the test.

## AC power for printers and terminals

The preferred method of powering printers, VDU terminals, and their collocated modems is to locate these devices in a common bonding network (CBN) and use commercial ac power. When located in the CBN and connected to commercial power the modems provide isolation to interface with the host switch. For short links to a local host located in an IBN, optical modems powered from the terminal are also a recommended option.

The host modems will usually be located in the CMIS. The preferred method is to use a dc powered modem shelf. In an IBN, any ac powered devices, including modems, must be located in the CMIS, and power must be obtained from a dc to ac inverter, also located in the CMIS.

An exception to this is allowed for RSC-S sites, but only when the use of a CMIS is impractical. For more information, refer to *Power Distribution and Grounding Systems*, 297-1001-156.



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## Site requirements for CMIS

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This chapter describes the physical requirements and power requirements for the miscellaneous (CMIS) cabinet. Site requirements for CMIS are discussed in subsequent sections of this chapter as follows:

**Physical requirements** on page 4-2 describes CMIS floor loading requirements, cabinet line-up compatibility information, and earthquake information.

**Power requirements** on page 4-3 describes the power dissipation and thermal profile of the CMIS.

## **Physical requirements**

Floor loading specifications, earthquake information, and cabinet line-up compatibility are discussed in the following sections.

### **Floor loading**

The CMIS cabinet must not exceed a maximum floor load of 1100 pounds. If floor loading exceeds 1100 pounds, seismic verification according to TR-NWT-000063 may be required.

### **Cabinet line-up compatibility**

Compatibility between the CMIS and a laterally-cabled 28-inch cabinet line-up is maintained only through a fully EMC closed CMIS. A fully EMC closed CMIS can be positioned at any point in a 28-inch cabinet line-up, either between two other cabinets, or on either side of the other cabinets on an end. Lateral cables may pass through the CMIS. If a fully EMC closed CMIS is converted to a non-EMC CMIS or a hybrid CMIS, the following restriction applies.

Non-EMC CMIS and hybrid CMIS retrofitted to existing 28-inch line-ups must be considered EMC stand-alone, must be powered vertically, and must have their lateral cabling duct access sealed using the duct end-plate. No laterally routed cables may pass into or through this area, unless appropriately filtered.

Any CMIS that contains non-EMC compliant areas is considered to be EMC stand-alone. Stand-alone cabinets may not compromise part of the cabinet line-up Faraday cage.

### **Earthquake information**

The CMIS cabinet and NT provided equipment is compliant to Bellcore seismic requirements for zone 4. Customer provided equipment should be verified to ensure compliance to zone 4 requirements.

## Power requirements

Power dissipation and the thermal profile of the CMIS are discussed in the following sections.

### Power dissipation

All outside equipment manufactured (OEM) must limit power dissipation based on module height to ensure compliance with TR-NWT-000063, issue 4. The maximum power allocated for independently forced air cooled modules is 35W/in. of internal cabinet height. Independently forced units have their own integral cooling fan. The maximum power allocated for natural convection cooled modules is 25W/in. of internal cabinet height.

*Note:* The power dissipation figures are averages that identify cabinet design intent. If individual CMIS units exceed these figures an amortization of power dissipation over cabinet-assigned vertical space relative to actual unit vertical space occupied is assumed.

If the CMIS requires forced air thermal enhancement, the unit must be collocated with the lower cabinet cooling unit.

### Thermal profile

The power dissipation for forced air cooling should not exceed 1600W for each CMIS cabinet. If equipment requiring more than 1600W is installed in the CMIS, additional cooling is the responsibility of the customer. The entire heat dissipation of the CMIS cabinet should meet the requirements of table 4.2-2 in TR-NWT-000063.



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## List of terms

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**ac**

alternating current

**cabinetized miscellaneous equipment (CMIS)**

The cabinet housing miscellaneous DMS-100 common systems and the hardware for a wide variety of equipment, some of which is not manufactured by Northern Telecom.

**CBN**

*See* common bonding network (CBN).

**CMIS**

*See* cabinetized miscellaneous equipment (CMIS).

**common bonding network (CBN)**

The principal means for effecting bonding and grounding inside a telecommunication building. It is the set of metallic components that are intentionally or incidentally interconnected to form the principal bonding network in a building. These components include: structural steel or reinforcing rods, metallic plumbing, ac power conduit, ac equipment grounding conductors, bonding conductors, and cable racks. The CBN is a mesh topology and is connected to the building grounding electrode system.

**isolated system grounding (ISG)**

The DMS grounding arrangement in which the equipment logic returns are connected to a plane that is separated internally from the framework ground.

**ISG**

*See* isolated system grounding (ISG).

**logic return**

A logic return is the common ground reference for circuits.

**logic return bar (LRB)**

An isolated copper bar used in DMS isolated system grounding frame-based systems.

**LR**

*See* logic return.

**LRB**

*See* logic return bar.

**MSP**

*See* Modular Supervisory Panel.

**Modular Supervisory Panel**

A facility that accepts the frame battery feed and ground return from the cabinetized power distribution center (CPDC). The MSP distributes the battery feed, by means of subsidiary fuses and feeds, to the shelves of the frame or bay in which it is mounted. The MSP also contains alarm circuits.

**original equipment manufacturer (OEM)**

The maker of equipment that is marketed by a vendor other than Northern Telecom.

**rf**

radio frequency

**vertical LR bar**

An isolated copper bar mounted vertically inside several types of DMS frames and used to reference the logic return to the LRB.



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