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DMS-100 Family

Modem Pooling

Installation and Maintenance Guide

BCS35 and up Standard 01.01 March 1993

northern telecom

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Contents

About this document

This document describes the procedure for installing and maintaining DMS-100 enhanced modem pools. It identifies the hardware and software components of an enhanced modem pool, provides hardware interconnection instructions, and explains how to enter the DMS datafill necessary to use and test the enhanced modem pool.

When to use this document

Northern Telecom (NT) software releases are referred to as batch change supplements (BCS) and are identified by a number, for example, BCS29. This document is written for DMS-100 Family offices that have BCS35 and up.

More than one version of this document may exist. The version and issue are indicated throughout the document, for example, 01.01. The first two digits increase by one each time the document content is changed to support new BCS-related developments. For example, the first release of a document is 01.01, and the next release of the document in a subsequent BCS is 02.01. The second two digits increase by one each time a document is revised and rereleased for the same BCS.

To determine which version of this document applies to the BCS in your office, check the release information in *DMS-100 Family Guide to Northern Telecom Publications*, 297-1001-001.

How to identify the software in your office

The *Office Feature Record (D190)* identifies the current BCS level and the NT feature packages in your switch. You can list a specific feature package or patch on the MAP (maintenance and administration position) terminal by typing

>PATCHER;INFORM LIST identifier

and pressing the Enter key.

where

identifier is the number of the feature package or patch ID

You can identify your current BCS level and print a list of all the feature packages and patches in your switch by performing the following steps. First, direct the terminal response to the desired printer by typing

>SEND printer_id

and pressing the Enter key.

where

printer_id is the number of the printer where you want to print the data

Then, print the desired information by typing

>PATCHER;INFORM LIST;LEAVE

and pressing the Enter key.

Finally, redirect the display back to the terminal by typing

>SEND PREVIOUS

and pressing the Enter key.

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.

More than one version of these documents may exist. To determine which version of a document applies to the BCS in your office, check the release information in *DMS-100 Family Guide to Northern Telecom Publications*, 297-1001-001.

Number	Title
297-1001-001	*DMS-100 Family Guide to Northern Telecom Publications*
297-1001-100	*System Description*
297-1001-300	*Basic Administration Procedures*
297-1001-451	*Customer Data Schema*
297-1001-455	*Office Parameters Reference Manual*
297-1001-594	*Lines Maintenance Guide*
297-1001-814	*Operational Measurements Reference Manual*
297-1001-840	*Log Report Reference Manual*

Number	Title
297-2101-808	*SERVORD Service Order and Query System Reference Manual*
297-2121-226	*Data Unit - Installation and Maintenance*
6 200 5218 03 004	*RM-16M-DCV-R Installation and Operation* (UDC document)
6 209 5136 09 014	*V.3224/V.3225 Modem Installation and Operation* (UDC document)
6 456 5042 03 014	*DU100 Installation and Operation* (UDC document)

What precautionary messages mean

The caution message in this document indicates potential risks. This message indicates the possibility of service interruption or degradation.

An example of the precautionary message follows:

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.

Introduction to modem pool

A modem pool is a DMS-100 Data Service. The modem pool allows DMS-100 digital users to communicate with analog modems or to communicate with analog facilities by providing the required analog/digital conversion at the switch. When required, an integrated data unit (DU) and voice frequency analog modem is inserted in the call path. This DU/modem pair is known as a modem pool member or element. The user's integrated services digital network (ISDN) terminal adapter (TA) or DU communicates with the modem pool DU. The terminating equipment communicates with the modem pool modem.

For information that is essential for an understanding of this Northern Telecom publication (NTP), see *System Description*, 297-1001-100.

Equipment configuration

A modem pool consists of a number of DU100/V.32 modem pairs that are installed in a DMS-100 office. Each pair or "element" consists of one modem directly connected to an associated DU. Each modem pool serves one or more specific user groups that require distinct transmission characteristics (for example, speed and data format). The elements within a particular modem pool are configured to meet the requirements of their specific user group.

Figure 1-1 shows the transmission path between a customer's DU or TA and a modem or analog trunk, through a single element of a modem pool (one digital unit (DU)/analog unit pair).

Figure 1-1xxx
Transmission path through a modem pool element

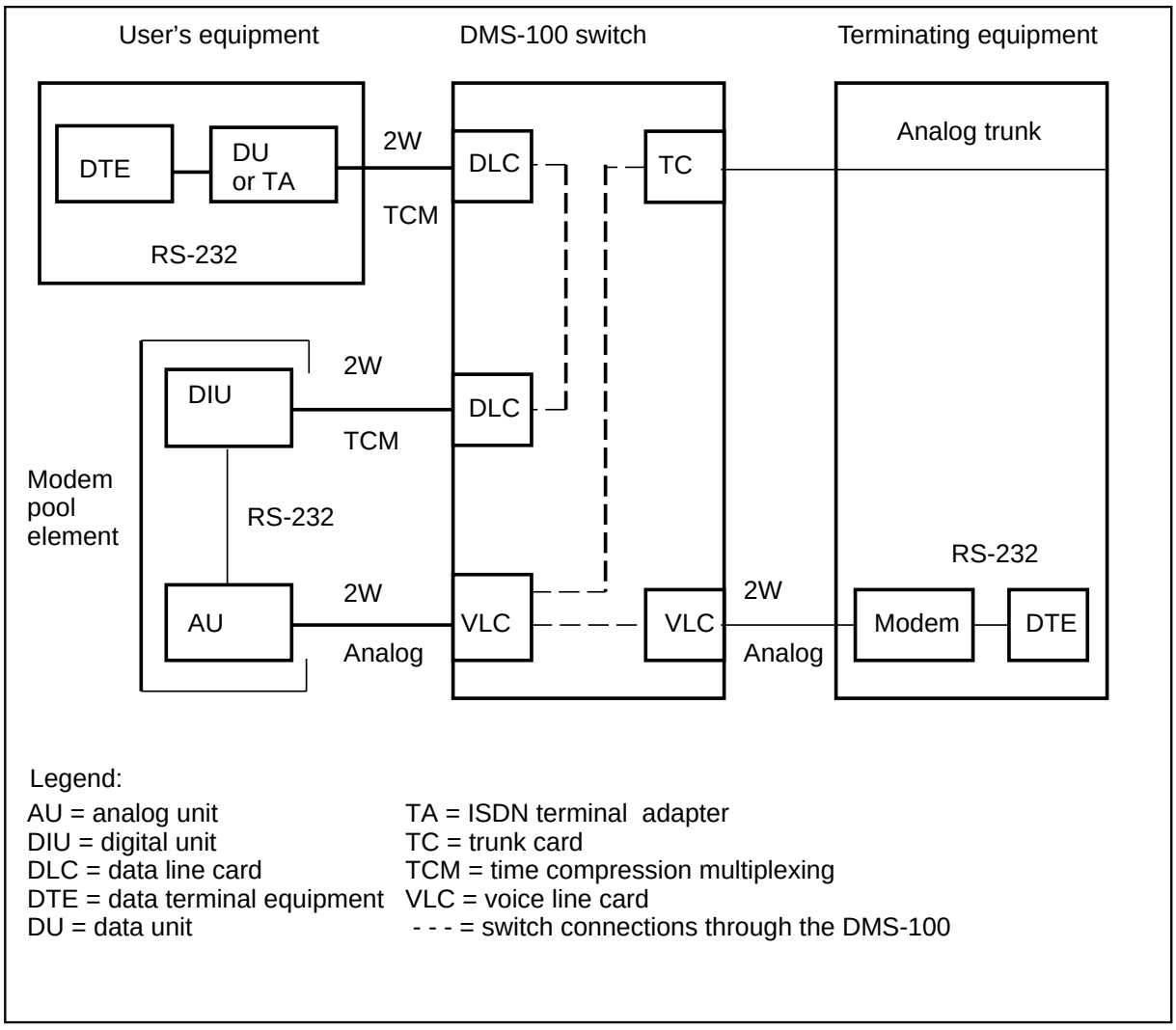
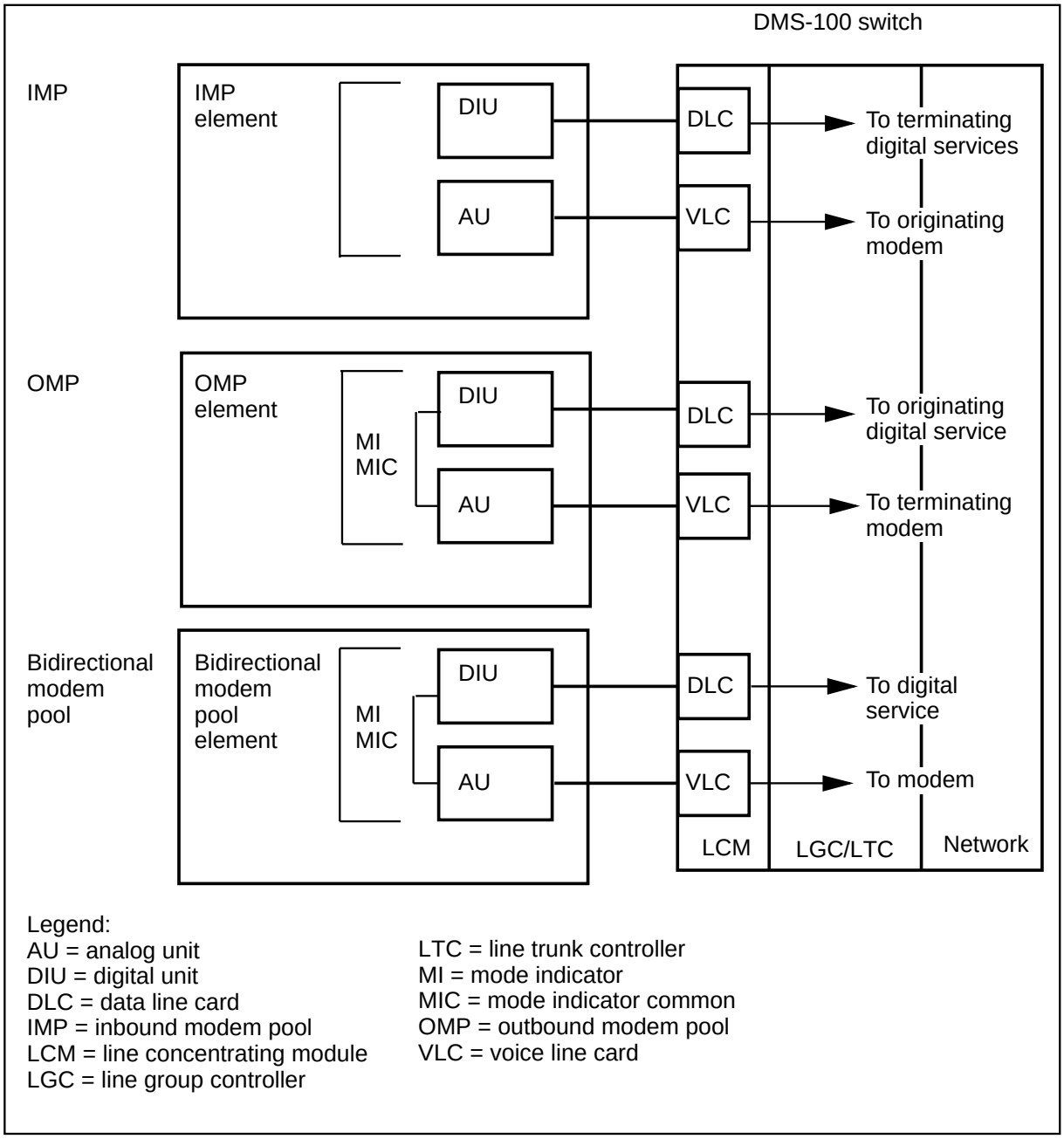


Figure 1-2 illustrates the basic function of modem pools in a DMS-100 office.

Figure 1-2xxx
Modem pool function



The number of elements (DU/modem pairs) in a modem pool is determined by traffic requirements for that particular pool. Each modem pool can have up to 256 elements. The total number of modem pools is constrained by the

number of available common language location identifiers (CLLI). Several pools with different operating characteristics may be configured for use in different applications. Each modem pool is configured to handle inbound calls, outbound calls, or both inbound and outbound calls.

Bidirectional modem pool

Enhanced modem pooling provides the digital-to-analog and analog-to-digital conversions required for making or receiving data calls when analog modems or analog facilities are involved in the connection. The pool uses a single modem/DU shelf that can house up to eight modem pool elements.

A modem pool that is designated as both inbound and outbound (bidirectional) can handle inbound or outbound calls. With the enhanced DMS-100 modem pool, bidirectional modem pooling with adaptive or speed buffering configurations is available. Bidirectional modem pooling uses a single element to provide the function of both an inbound modem pool (IMP) element and outbound modem pool (OMP) element. It provides the required connection when a DU, ISDN TA, DIALAN user, or Integrated Voice/Data Multiplexer is calling either a modem or another DU, ISDN TA, or DIALAN user over analog facilities. It also provides the required connection when a DU, ISDN TA, or DIALAN user is called by a modem or another DU, ISDN TA, or DIALAN user over analog facilities.

Adaptive mode feature

The adaptive mode feature provides connectivity to analog modems at asynchronous speeds of 1200 to 9600 b/s. The callers set their communications software to the appropriate speed of the answering device and dial. When the call is answered, the modem pool DU synchronizes to the caller's device. This is followed by modem synchronization.

The benefits of the adaptive mode feature are as follows:

- Fewer modems are required in the pool because the V.3225 modem can adjust to a range of speeds.
- Calls can be made at any speed from 1200 to 9600 b/s because the modem pool equipment will adapt accordingly.
- End-to-end applications are improved because all devices are communicating at the same speed.

Speed buffering feature

The speed buffering feature allows the digital users to set their DU, ISDN TA, or DIALAN for 9600 b/s when using the modem pool. With speed buffering, the pool element DU and modem always communicate at 9600 b/s. The pool modem then automatically adjusts to the analog modem on the far end. Speed differences are handled by the modem pool V.3225 buffering

capability. Application to application communications should use XON/XOFF protocol or an equivalent.

The benefits of the speed buffering feature are as follows:

- Fewer modems are required in a pool because a single V.3225 modem can adjust to a range of speeds.
- Digital users of the modem pool make and receive all calls at 9600 b/s, simplifying software setup. The modem pool bridges all the differences in speed between the modems' devices.
- New users can be added easily to the pool because any modem can call any other modem.

IMP

An IMP is required when the analog modem side of the connection path originates the call or when an analog facility is used at some point in the transmission path (see Figure 1-2). The terminating digital switch activates the modem pool when it determines that the terminator is a digital service and that a modem or analog facility is used at some point in the transmission path.

OMP

An OMP is required when the subscriber DIU side of the connection path originates the call (see Figure 1-2). An analog modem is provided when the user's DU or ISDN TA calls an analog modem or when the call must go out over an analog trunk.

OMPs can be assigned network resource selector (NRS) numbers for prefixed dialing. This function is provided by the modem pooling phase II feature. Prefixed OMP selection dialing allows the user to select a specific OMP, rather than the default OMP, by dialing certain prefix digits before the normal DN digits. This capability is referred to as prefix network resource selector outbound (PNO).

Customer groups can be assigned NRS numbers to prevent an OMP from being inserted in the path of a call. This function is provided by the network resource selector override feature. Prefixed OMP override dialing allows the user to prevent an OMP from being inserted in the call path by dialing certain prefix digits before the normal directory number digits. This feature is used when the user knows that the call will be terminated at a DU, or placed over all-digital facilities. This capability is referred to as no modem pool (NMP).

Automatic modem insertion

The automatic modem insertion (AMI) is the process of automatically inserting an OMP element into the path of a digital call. With the feature package NTX251AA, AMI feature is available, on a line-by-line basis, both

for intraswitch and interswitch data calls. It uses an audio tone detector (ATD) (NT5X29AC) to detect the modem answer tone.

For every data call requiring OMP with the AMI feature active, one ATD channel is required to detect an answer tone on the terminating line. The ATD is attached to the line when the far end answers. A modem pool element is inserted automatically when the ATD detects modem answer tone. If no tone is detected, the ATD times out in 6 seconds.

The resource lamp, associated with the resource key on the user DU, flashes at 120 IPM when the ATD is monitoring the line for modem answer tone. It turns on solid as soon as the modem pool element is inserted in the call path. If the ATD is not available, or times out, the resource lamp will flash at 60 IPM. This indicates that manual insertion of the modem pool element is required. Use the resource feature key to insert the modem pool element.

In the case of keyboard dialing, if the ATD is successful, the modem pool element is inserted in the call path after the first resource prompt *&?*. If the ATD fails, a second resource prompt *&?* appears, indicating that use of the resource key for modem insertion is required.

The timing out of the ATD, or its failure to detect an answer tone for the AMI feature, is reported by the log report IBN108. For more information, refer to *Log Report Reference Manual*, 297-1001-840.

The AMI feature can be assigned either by table control, or through Service Order System (SERVORD). For information on tables affected, see *Customer Data Schema*, 297-1001-451. For information on SERVORD, see *SERVORD Service Order and Query System Reference Manual*, 297-2101-808.

ISDN OMP

OMP is available for ISDN TAs with feature package NTXE25AA. An ISDN TA uses OMP when it calls a modem or another digital device over analog facilities. A prefix code in Table IBNXLA is used to access a default modem pool group, specified in Table KSETFEAT. The modem pool is inserted automatically in the call path after the far end answers. For datafill and other information on these tables, see *Customer Data Schema*, 297-1001-451.

ISDN IMP

The ISDN IMP feature provides IMP for ISDN subscribers and is activated when a data call, originating from analog facilities (modem or analog trunk), is made to an ISDN terminal.

The detailed procedure is as follows:

- An incoming call translates to an ISDN SYNonym DN that has the IMP feature assigned.
- Information, including the actual DN of the called ISDN station, the IMP feature selector, and a prefix code specifying the modem pool name in Table KSETFEAT is obtained from Table DNROUTE.
- A modem pool member from the specified pool is inserted into the call path when an ANSWER message is received from the terminating ISDN terminal.

Maintenance modem pool

A maintenance modem pool (MMP), which is reserved for testing purposes, is optional. It is not used in normal call processing. Each MMP is designated to test the elements of one or more specific modem pools that require distinct transmission characteristics (speed and data format). The elements within a particular MMP are configured to meet the requirements of the corresponding modem pool.

MMPs allow the craftsperson to test the modem pool equipment from the MAP (maintenance and administration position) of the DMS-100 through integrated test equipment.

Figure 1-3 shows three kinds of MMPs.

Figure 1-3
MMPs (optional)

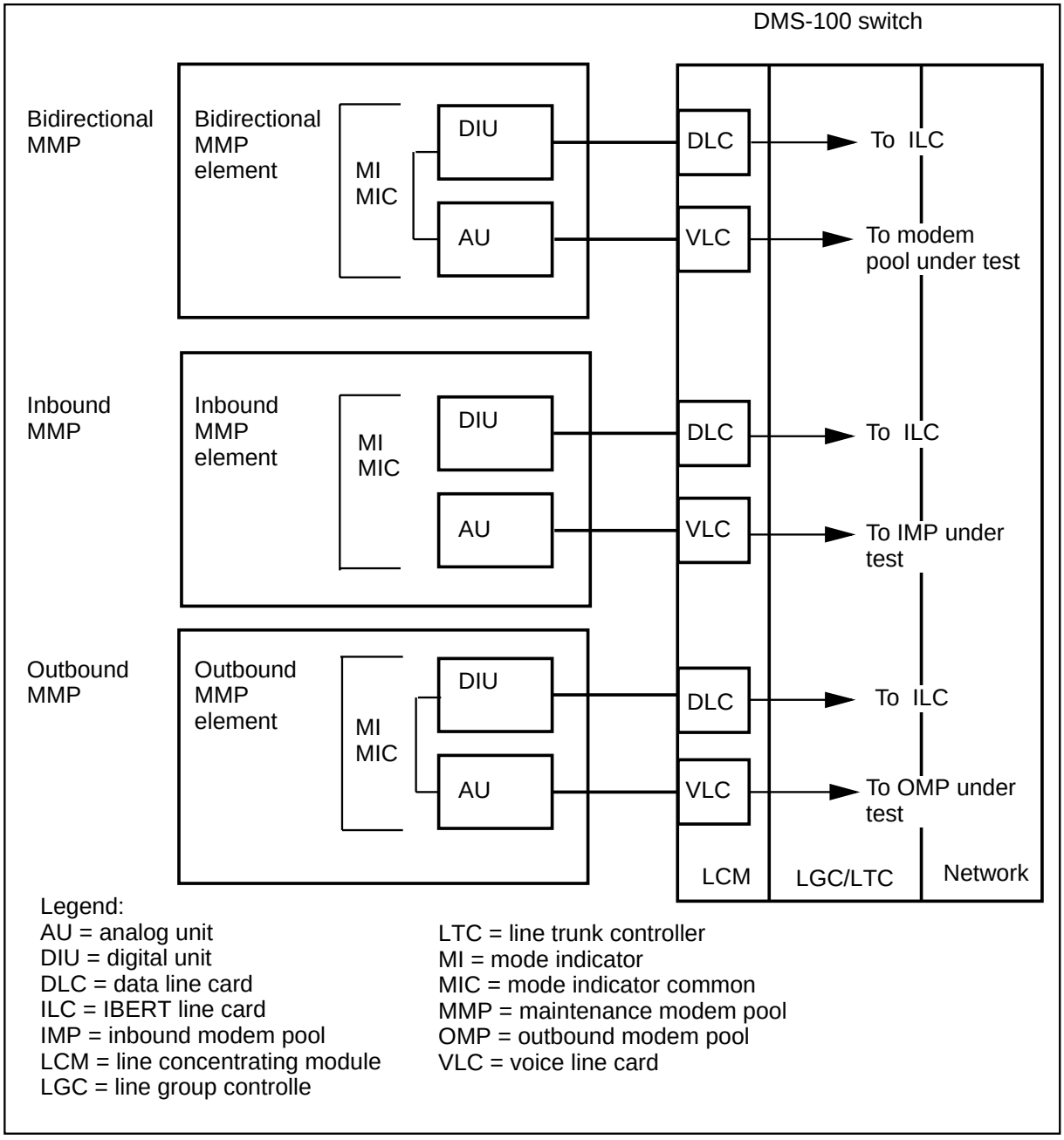
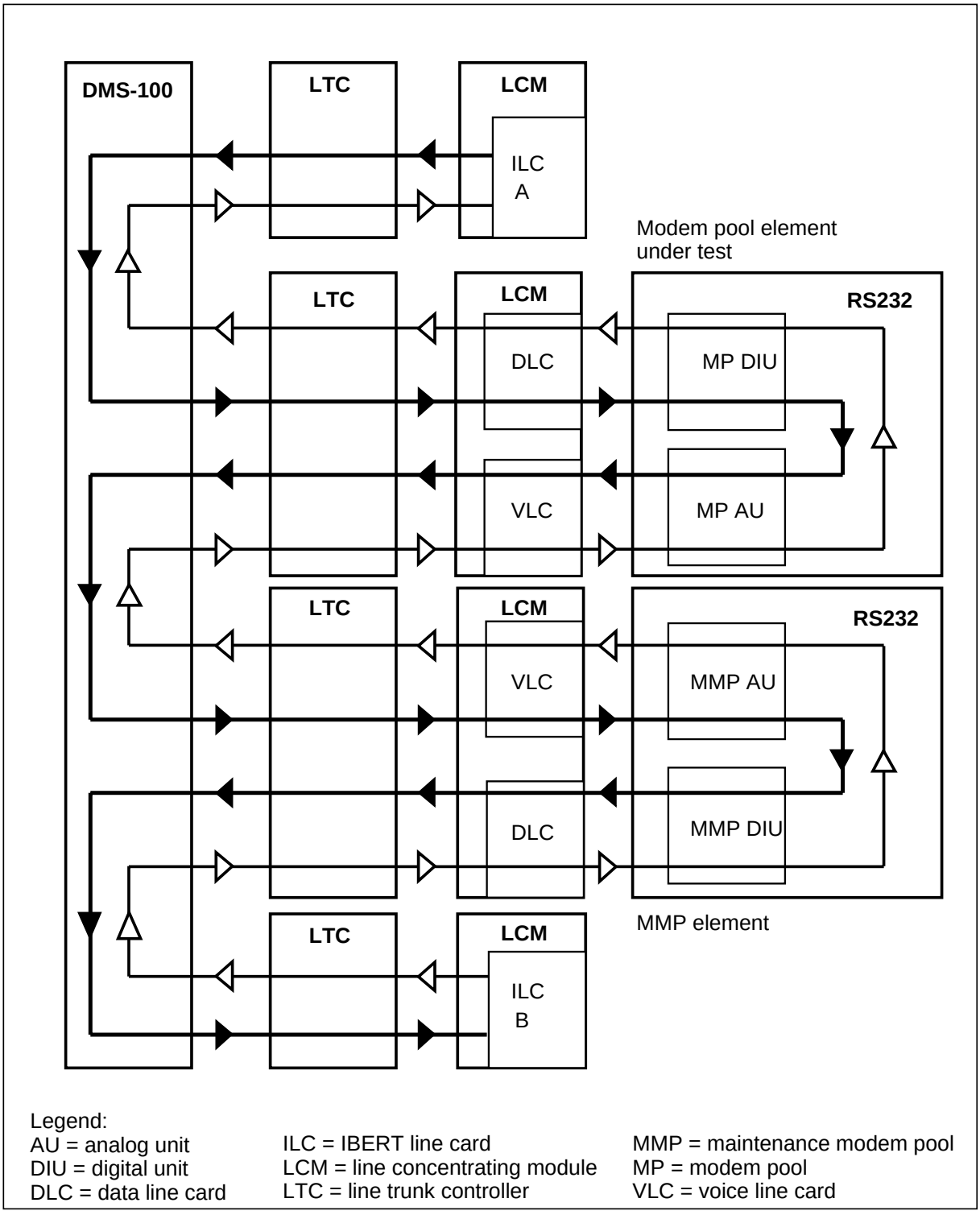


Figure 1-4 shows an MMP connection.

Figure 1-4xxx
MMP connection



Hardware installation

This chapter describes the installation of the enhanced modem pool. The "Installing a rack mounted enhanced modem pool" section on page 2-4 describes the procedure for installing rack mounted data units (DU) and modems.

Rack mounted equipment

Use of rack mounted modem pooling equipment is required. Use of stand-alone DUs and modems for modem pooling is no longer supported. Because the new modem pool uses Universal Data Systems (UDS) hardware, less equipment space is required.

The modem pool shelf mounts in the NT0X02AB miscellaneous equipment frame, or for Canadian applications, in the NT0X43BA modem equipment frame.

With rack mounted equipment, connections between the DU100 and V.32 modem interface in a modem pool element are easily made because the backplane is prewired at the factory. An element consists of a DU100 and V.32 modem physically mounted together providing a plug-and-use arrangement. The modem pool element fits in a common pool shelf. This shelf supports up to eight elements (8 DUs/ 8 modems) and is powered by standard-48 V dc. The shelf has a redundant power supply and alarm capability to enhance reliability of service. Figure 2-1 shows the full shelf configuration.

If the modem pool shelf is used later for an application with external logic signals entering or leaving the shelf, the shelf will need to be electrically isolated.

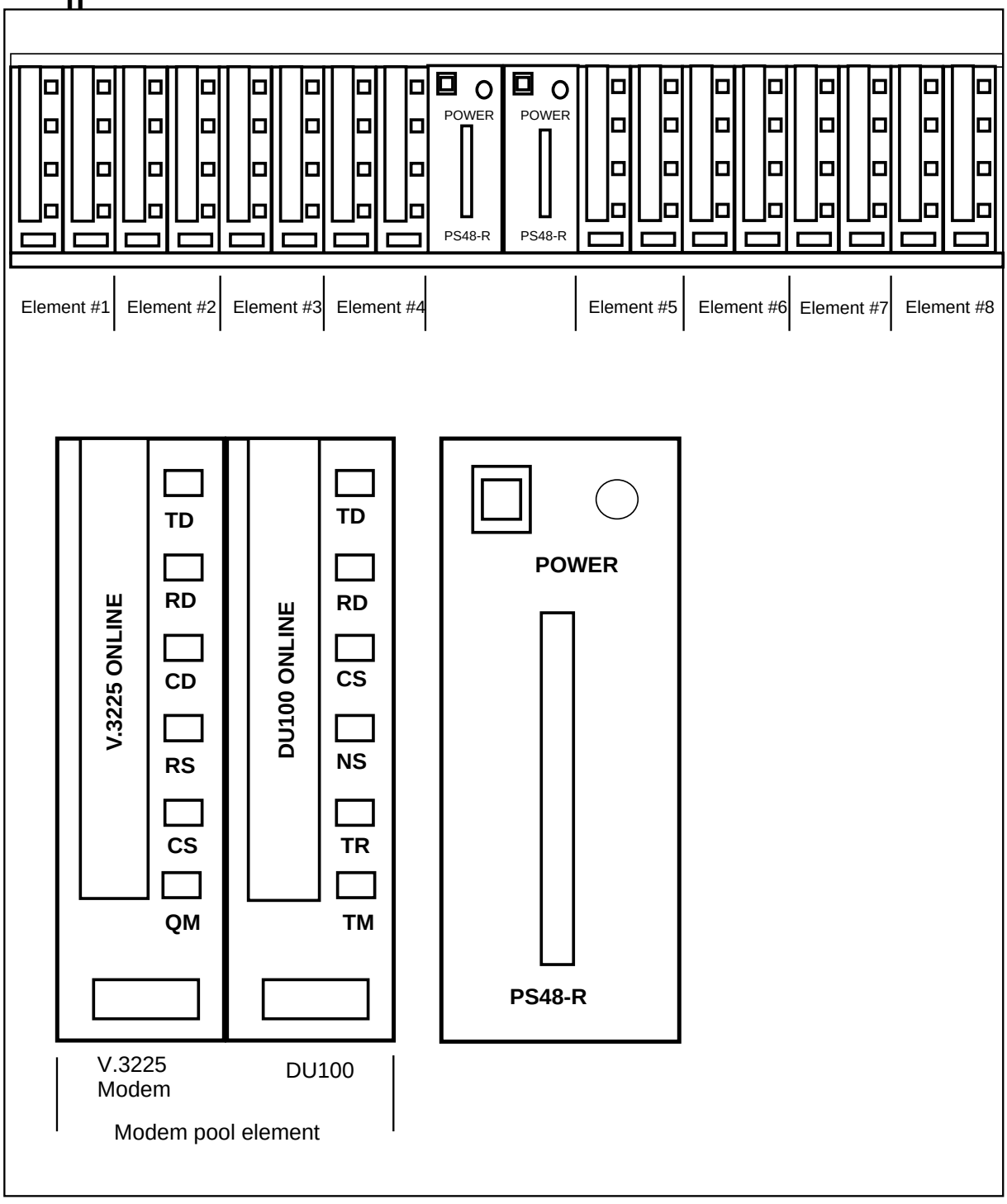
Enhanced modem pool elements

Northern Telecom (NT) has worked closely with UDS Inc., a subsidiary of Motorola, Inc. in developing a single modem pool element that can provide bidirectional communications at speeds of 1200 to 9600 b/s. This element, CPC# A0383129 (and UDS# 54565153), combines a DU100 and V.3225 modem into an integrated solution. A detailed description is in UDS documents *DU100 Installation and Operation,* 6 456 5042 03 014 and *V.3224/V.3225 Modem Installation and Operation,* 6 209 5136 09 014.

Power requirement and fusing

Each enhanced modem pool shelf draws 3.5 amps and requires a DC supply between -44 and -52 volts. Each element dissipates 14 watts, 9 watts in the modem portion and 5 watts in the DU portion. Both A and B battery feeds are required, and each feed is fused with a 5 ampere fuse at the frame supervisory panel (FSP) or the power distribution center (PDC).

Figure 2-1xxx
Enhanced modem pooling shelf, front view



Installing a rack mounted enhanced modem pool

This section describes the procedure for installing enhanced modem pools. Custom installations using other equipment require a slightly different installation procedure.

Equipment required

Enhanced rack mounted modem pool installation requires the following equipment:

- an equipment frame such as NT0X02AB miscellaneous frame, or for Canadian applications, NT0X43BA modem equipment frame
- NT0X0050 modem isolation kit (needed only if miscellaneous frame is used)
- NT0X26LN 25-pair cable to connect each shelf to the voice line cards (VLC) and data line cards (DLC) through the distribution frame (two per modem pool shelf)
- NT6X71AB DLC (one per DU)
- NT6X17AA, NT6X17AB, or NT6X17AC VLC (one per modem)
- A0383130 modem pool shelf rack
- A0383129 DU100/V.32 element (eight elements per shelf)

If the enhanced modem pool is used as a maintenance modem pool (MMP), use the NT6X99AA integrated bit error rate tester (IBERT) card as required (minimum of two) at the DMS-100.

NT0X02AB miscellaneous frame

The enhanced modem pool may be small enough to fit on one shelf in an existing miscellaneous frame. This shelf needs to be isolated from the miscellaneous frame by using the NT0X0050 modem isolation kit, which contains isolation hardware and a strap. Connect the chassis ground to the vertical logic bar.

NT0X43BA modem equipment frame

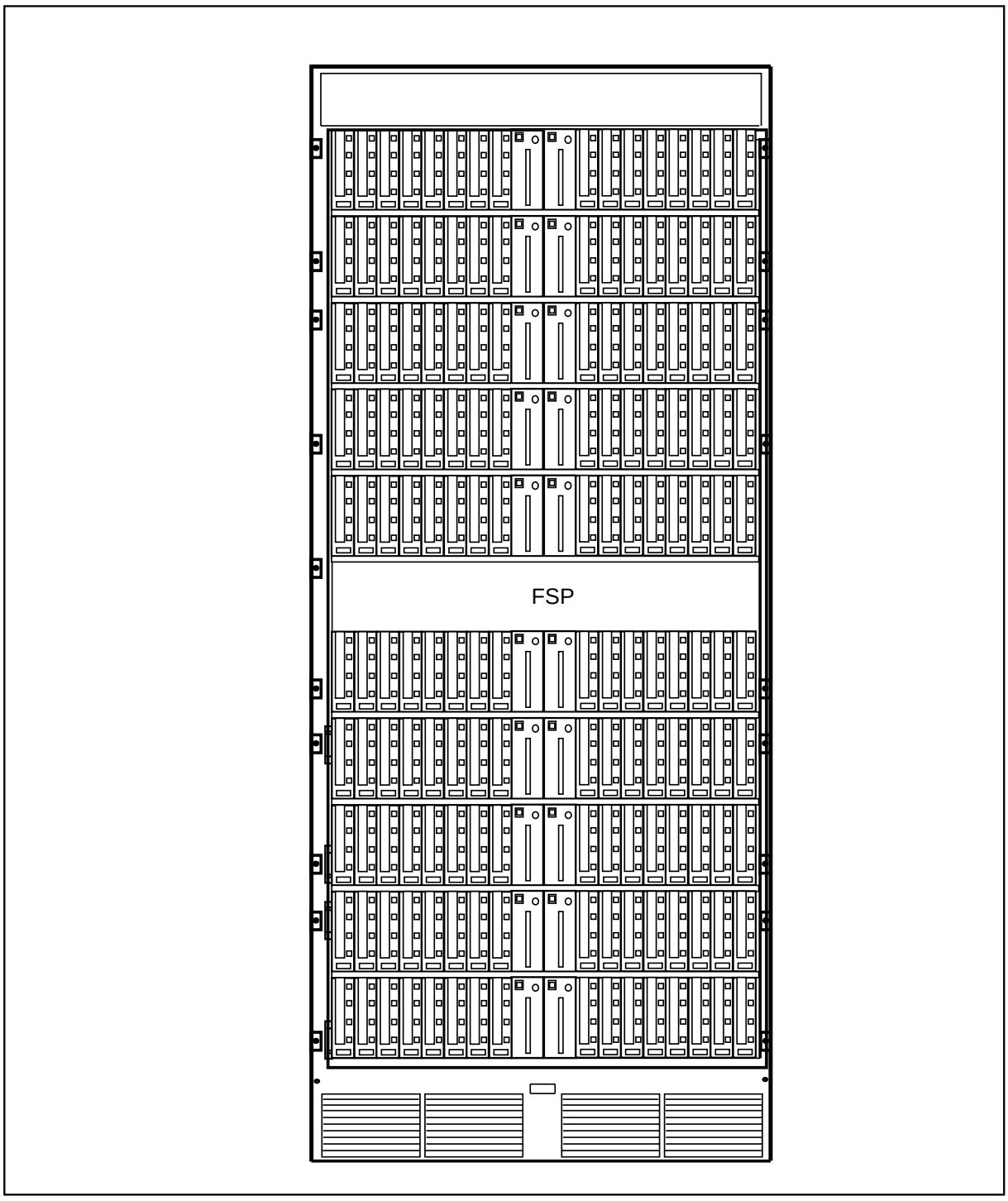
The NT0X43BA frame, for Canadian applications, houses the modem pool shelves and equipment and includes

- ten shelves (A0383130)
- eighty modem pool elements (A0383129)

The A0383130 shelf holds up to 8 elements. Because there are no external logic connections to the shelf due to the cross-over cables, it is electrically isolated from the frame. The frame ground is provided by the screws securing the shelf to the frame. The printed circuit ground (PC GND) lug on the backplane is not used. The shelf is equipped with its own power supply that converts -48 V dc station battery power to +15 V dc and distributes it to

the elements. See Figure 2-2 for an NT0X43BA modem equipment frame for Canadian application.

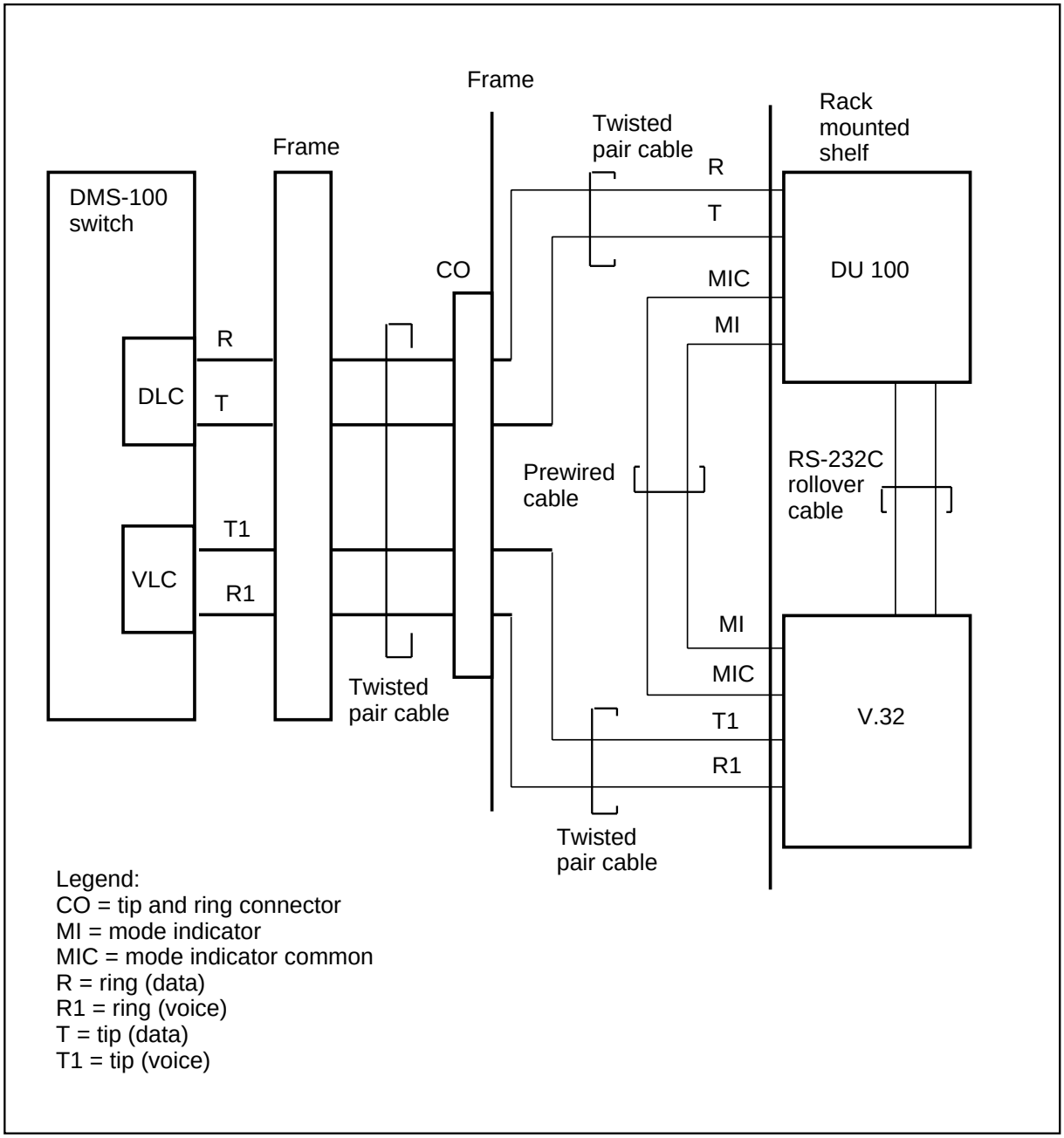
Figure 2-2xxx
NT0X43BA modem equipment frame (for Canadian applications)



Cabling

The NT0X26LN 25-pair cable is used to connect the modem pool shelf elements to their respective line cards. The DUs connect to DLCs and the modems connect to VLCs, as illustrated in Figure 2-3. Only 16 of the 25 pairs are used. The cable is terminated with a 50-pin male Amphenol connector (NT part # A0293170) on one end.

Figure 2-3xxx
Enhanced modem pool connections for rack mounted units



Installation procedure for rack mounted modem pool

This section outlines the procedure for installing one modem pool element in a modem pool using rack mounted equipment.

CAUTION

Some devices on the circuit packs can be damaged by electrostatic discharge. Make sure that your hands and tools are properly grounded before you touch the circuit packs.

Be sure the modem pool frame is installed and power is available before beginning the modem pool element install process. The following sequence is used for installing the element:

1 Install each modem pool shelf into the frame and attach required power as described in UDS document *RM-16M-DCV-R Installation and Operation*, 6 200 5218 03 004. Figure 2-4 shows two jumpers connecting the TS2 and TS1 terminals at the rear of the modem pooling shelf. These two jumpers are installed by UDS at the factory and need to be removed.

2 For each modem pool shelf, plug the Amphenol connector that terminates the 25-pair cable into the shelf and secure it using the two safety clasps. Do not connect this cable to the distribution frame at this time.

3 Slide the modem pool element into the two positions on the shelf starting on the left-hand side. The liquid crystal display (LCD) is located on the left-hand side when inserting the element. Secure the element in place.

4 The DU and modem in the element will display NO SIGNAL at this time. The Power, RTD, and DSR lights will be illuminated.

5 Configure the DU in the element per UDS document *DU100 Installation and Operation*, 6 456 5042 03 014. The values to be assigned are:

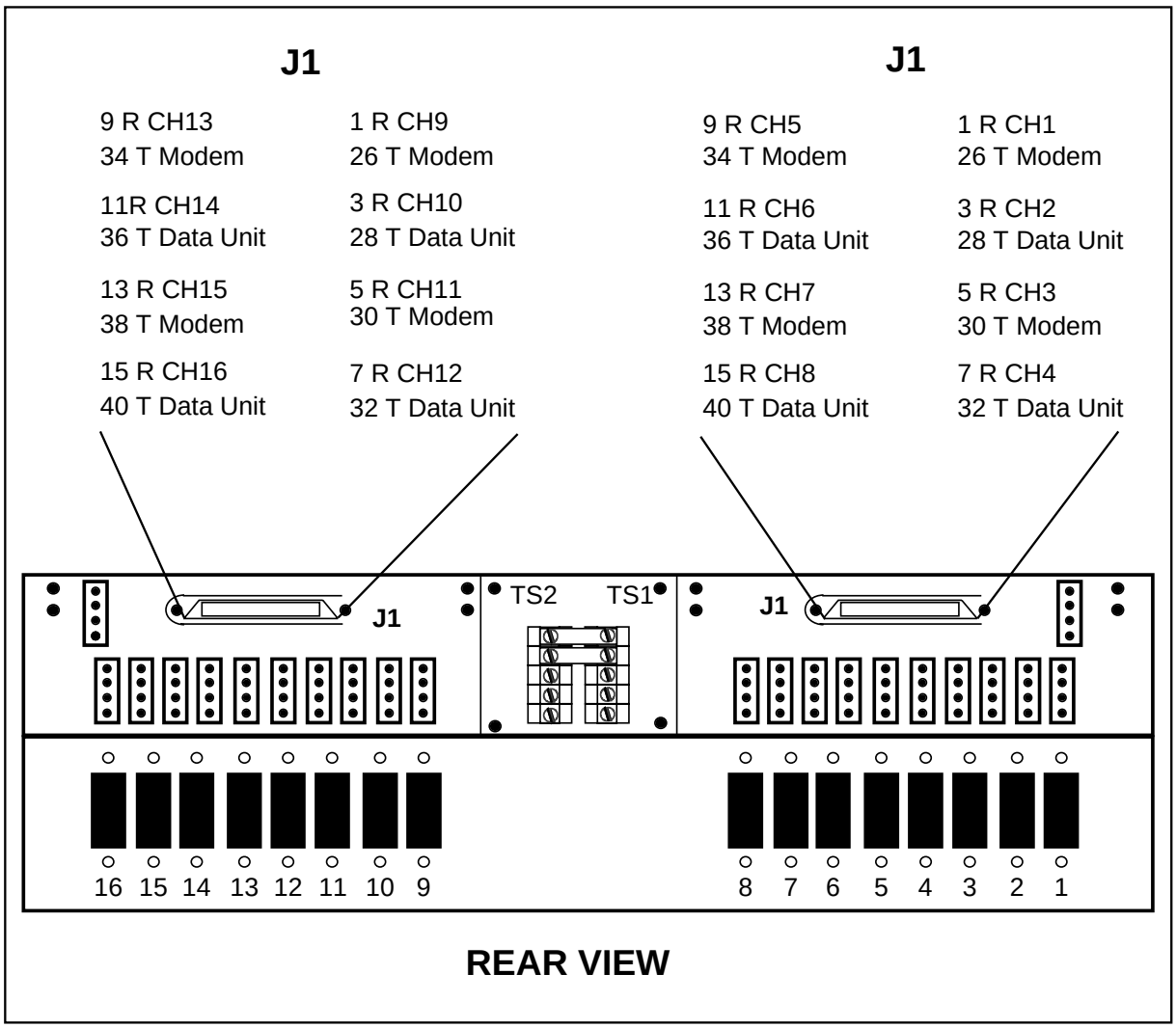
```
DTE OPTS
--------
TIMING     = INTERNAL
RATE       = 9600
SYNC/ASYNC = ASYNC
BITS/WD    = 8 BTS WD
STOP BTS   = 1 S.B.
PARITY     = N
RTS COUNT  = NORMAL
DSR OPT    = NORMAL
DCD OPT    = NORMAL
CTS OPT    = NORMAL
DTR OPT    = Asserted


DU OPTS
-------
AUTO ANSW   = ENABLED
KBD DIAL    = ENABLED (after DU setup)
ADAPT       = ENABLED
AUTO LINE   = DISABLED
VL LINE     = DISABLED
RETRY CNT   = 0
AUTO ORIG   = DISABLED
MIMIC       = PULSED
PULSE LEN   = 0.16 SEC
RING  ALERT = DISABLED
```

6 Decide whether the modem will be configured in ADAPTED mode or SPEED BUFFERING mode. When powered up, the modem defaults to the ADAPTED mode. To use SPEED BUFFERING mode, select factory setting OPTION #2 as described in UDS document *V.3224/V.3225 Modem Installation and Operation*, 6 209 5136 09 014.

7 Connect the appropriate pairs from the 25-pair cable connected to the backplane of the modem pool shelf to the distribution frame in order to connect to the associated DLC and VLC. The backplane wiring is illustrated in Figure 2-4.

Figure 2-4xxx
NT0X26LN cable, backplane wiring



8 Verify that both units in the pool element have signal from their line card.

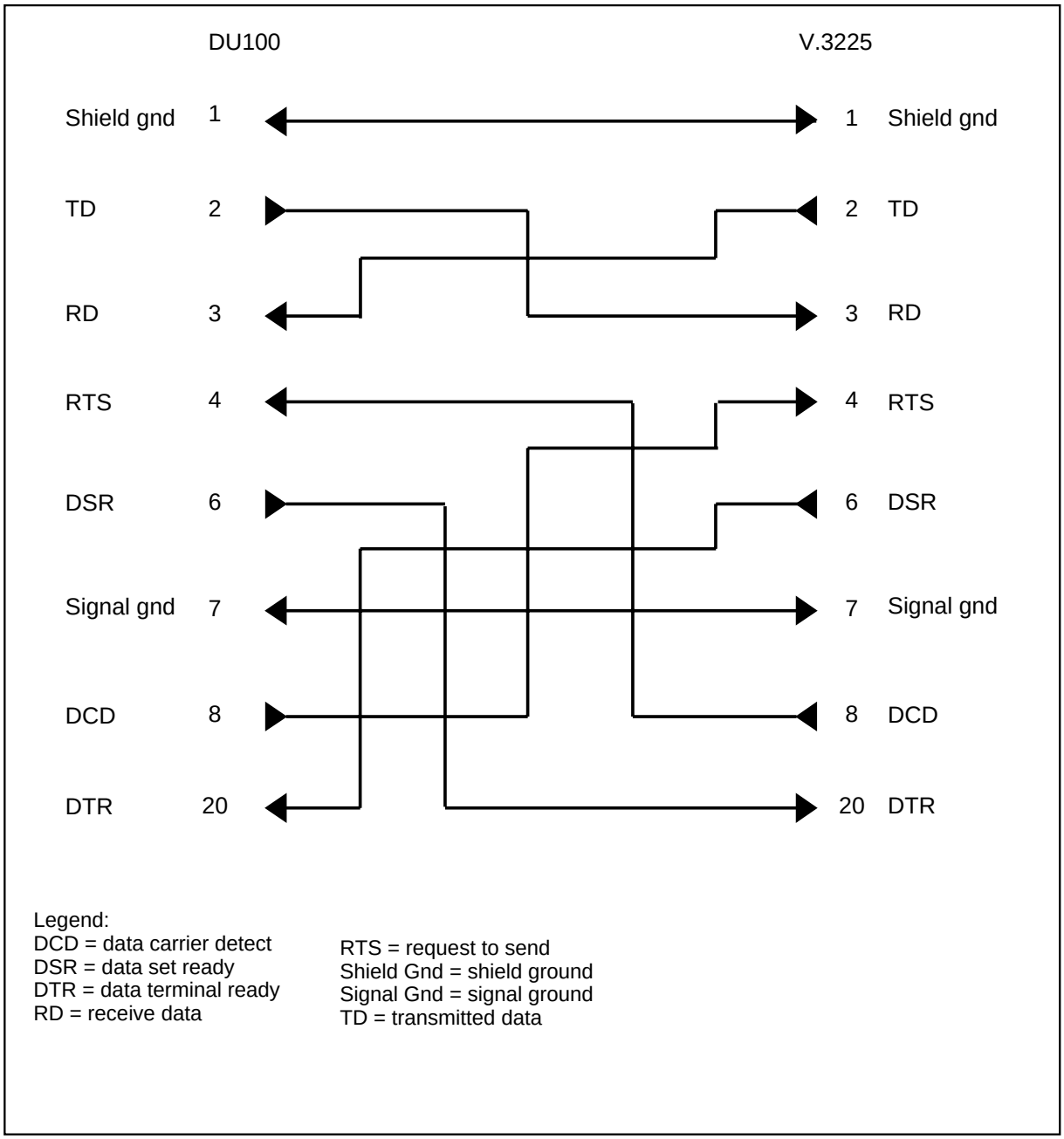
9 Perform acceptance testing on the element. See “Acceptance testing of additional modem pool elements” on page 4-3.

Repeat the above 9 steps for each modem pool element. If any slots of the modem pooling shelf remain unused, use blank faceplates to fill them.

Rollover cable

Figure 2-5 shows the pin assignments for the standard modem pool rollover cable. The rollover cable performs the function of a null terminal connector to speed up the throughput of the CTS signal.

Figure 2-5xxx
RS-232C rollover cable pin assignments



Data assignment

This chapter describes the data fill that is required for modem pools and for data units (DU) that use modem pools.

Office parameters

When a DMS-100 is provided with the enhanced modem pooling feature, the office parameters listed in Table 3-1 must be defined in their respective tables.

Table 3-1xxx
Office parameters used by enhanced modem pooling

Parameter	Explanation and action
OFCOPT NRS_MP	Usually left at default value
OFCENG NRS_AUD_DELAY	Usually left at default value
OFCENG IMP_DELAY	Usually left at default value

Note: Refer to *Office Parameters Reference Manual*, 297-1001-455, for a complete description of these tables and their fields.

Data entry for modem pool elements

The DU in a modem pool must be configured with the same operating characteristics as the subscriber DUs that will have access to the pool. DUs can be configured by profile downloading. If you use profile downloading to configure the DUs, it is recommended that you also configure the DUs using the on-board direct in-line position (DIP) switches or light-emitting diode (LED) to provide a backup for the profile download. For a description of the DU option settings see page 2-9.

Depending on the features selected, some or all of the following 11 tables are used to configure a modem pool and its elements:

- **LNINV**
  Table LNINV (Line Inventory) lists the information for the line card slot used for voice line cards (VLC) or data line cards (DLC). It is recommended that both the VLC and DLC (associated with the modem and DU respectively) of the same modem pool element be located in the same line concentrating module (LCM).
- **CLLI**
  Table CLLI (Common Language Location Identifier) is primarily used to identify trunk groups going to or coming from other offices. A CLLI name is assigned to each modem pool in the office. The modem pool CLLI name is used in other tables to identify a particular modem pool.
- **RESGROUP**
  Table RESGROUP (Resource Group) contains data that is common to all members of a single modem pool. One entry is required for each defined group.
- **RESINV**
  Table RESINV (Resource Inventory) lists the line equipment number (LEN) of all modem pool resources and indicates what type of resource they are: modems or DUs. The actual input required for the table is the first two fields (RESKEY and RESSEL) followed by the value *N* in field DETSEL. The remaining fields are filled automatically by the switch when the Table RESMEM is completed.
- **RESMEM**
  Table RESMEM (Resource Member) contains the data specific to each element of a modem pool. It associates a modem and a DU with a particular modem pool and element number. One entry is required for each modem pool element.
- **DPROFILE**
  Table DPROFILE (Data Unit Profile) contains the operating characteristics of each modem pool DU. This data can be downloaded to the DU to override the option settings selected on the DU.
- **DIGMAN**
  Table DIGMAN (Digit Manipulation) contains information about the dialing plan used by each customer group for their private communication network. This option allows subscribers served by the switch to dial a fixed number of digits to reach a called party, regardless of the number of digits required to make the connection.

- **DNROUTE**
  Table DNROUTE (Directory Number Route) contains only the directory numbers (DN) not associated with a LEN, and is obtained from operating company input. The maximum size of Table DNROUTE is equal to or less than Table DNINV, as they both reference the same physical store.
- **IBNRTE**
  Table IBNRTE (Integrated Business Network Route) contains customer group route lists. Each route list is identified by a route reference number. A route list comprises from 1 to 8 elements that are linked together: element 1 to element 2 to element 3, and so on. In the majority of cases, the final termination of a route element is a DN or a trunk group, from which an idle trunk is to be selected. If the directory number is busy or no idle trunk is available, the system advances to the next element in the list. If the end of the list is reached and no idle trunk or idle DN is found, the system indicates, then applies an appropriate response such as reorder tone.
- **KSETFEAT**
  Table KSETFEAT (Business Set and Data Unit Line Feature) lists the line features assigned to business sets listed in the Tables KSETLINE and IVDINV, and DUs listed in the Table KSETLINE. DUs include Meridian asynchronous data option (MADO) and touch asynchronous data option (TADO).
- **IBNXLA**
  Table IBNXLA (Integrated Business Network Digit Translation) stores the data for the digit translation of calls from an Integrated Business Network (IBN) station, attendant console, and incoming or incoming side of a two-way IBN trunk group.

For more information on these tables, see 297-1001-451, *Customer Data Schema*.

Modem pool data assignment

To configure a modem pool and its elements, begin by establishing a modem pool. Once you have established a modem pool, add modem pool elements to it.

To delete a modem pool and its elements, begin by deleting the individual elements in the pool. Once you have deleted all the elements in the pool, delete the modem pool.

To establish a modem pool

To establish a modem pool, enter the appropriate data in the following tables, in the order indicated:

1 CLLI

2 RESGROUP

To add a modem pool element to a modem pool

To add a modem pool element to an existing modem pool, enter the appropriate data in the following tables, in the order indicated:

1 LNINV

2 RESINV

3 RESMEM

4 DPROFILE

Once you have completed the datafill for a new modem pool element, post the element and place it in the installation busy (INB) state using the BUSY_INB command from the LTP level of the MAP (maintenance and administration position. This prevents the customer from accessing it until acceptance tests are completed.

To remove an element from a modem pool

To remove a modem pool element from an existing modem pool, post the element and place it in the INB state using the BUSY_INB command from the LTP level of the MAP. Then delete the desired tuple from the following data tables, in the order indicated:

1 DPROFILE

2 RESMEM

3 RESINV

4 LNINV

Use the DELETE command on the MAP command line to delete a tuple.

To remove a modem pool

To remove an entire modem pool, first delete each element in the pool, then delete the desired tuple from the following data tables, in the order indicated:

1 RESGROUP

2 CLLI

Make sure you have deleted all the elements in the modem pool before you delete the pool itself.

Use the DELETE command on the MAP command line to delete a tuple.

Assigning network resource selector numbers for prefixed dialing

Prefixed outbound modem pool (OMP) dialing consists of manual selection dialing, override dialing, or dialing for ISDN terminals.

Prefixed OMP manual selection dialing

An OMP can be assigned network resource selector (NRS) prefix digits that can be dialed directly from a subscriber's DU. This arrangement allows the user to select manually a specific OMP, rather than the default pool assigned by the DMS-100.

Table IBNXLA is used to assign feature translations type for prefixed network resource selector outbound (PNO) dialing.

Prefixed OMP override dialing

Customer groups can be assigned NRS numbers to prevent the DMS-100 from inserting an OMP in a call path. If a call will be routed to a DU or over all-digital facilities, OMP override allows the user to dial prefix digits before the DN to prevent an OMP from being inserted in the call path. The prefix digits are identified as no modem pool (NMP).

Table IBNXLA is used to assign feature translation type for prefixed OMP override, NMP dialing.

Prefixed OMP dialing for ISDN terminals

In the case of ISDN terminals, an OMP element is inserted automatically when Tables KSETFEAT and IBNXLA are datafilled appropriately for the NRS feature. The NRS feature is assigned to DN keys of an ISDN logical terminal identifier (LTID). The DNs are identified by a key list in Table KSETFEAT. The prefix network resource selector default (PND) option in Table IBNXLA allows access to a default group of OMP.

Assigning DUs access to modem pools

To make use of modem pools that have been installed, a customer's DU must be assigned the NRS option. This option allows the customer's DU to use inbound modem pooling (IMP), OMP, or both IMP and OMP. It also defines which pool is normally used for each type of call. With this option, customers can determine which of their DUs are to have access to modem pools and which modem pool they are to use. The NRS option is not assigned to DUs that are part of a modem pool; it is assigned to customer DUs that use modem pools.

The NRS option is assigned to a DU using the Service Order System (SERVORD). It can be assigned either when the line is first installed or it can be added to an existing line by using the ADO option.

Automatic modem insertion

The automatic modem insertion (AMI) feature can be assigned either by table control (Table KSETFEAT) or through SERVORD.

The AMI feature is activated through SERVORD by entering *Y* to the AMI prompt. The switch must be equipped with automatic tone detector (ATD) to activate this feature.

Datafilling Table KSETFEAT

When datafilling Table KSETFEAT for OMP, enter either *Y* or *N* in the AMI field.

IMP

The IMP feature affects two tables: DNROUTE and KSETFEAT.

Two fields in Table DNROUTE, SYNFEAT and IMPGRP, allow the assignment of the IMP feature selector and feature data. Entering IMP in the field SYNFEAT indicates the IMP feature is activated. Entering *$* indicates the feature is not assigned.

The field IMPGRP is prompted only if IMP has been entered in field SYNFEAT. This field specifies a modem pool name or has *$* entered. A *$* indicates a default modem pool group is to be used.

When field NDI of Table KSETFEAT is set to *Y*, a modem pool group name must be datafilled in field NDIGROUP.

Testing and maintenance

This chapter describes procedures for testing modem pools to verify their operation. In addition to the tests described here, you can perform self-tests on the data unit (DU) and modem to verify that they are functioning properly. For information on the DU.100 self-test, see UDS document *DU100 Installation and Operation*, 6 456 5042 03 014. For information on the modem self-test, see Universal Data Systems (UDS) document *V.3224/V.3225 Modem Installation and Operation*, 6 209 5136 09 014.

Establishing a first working maintenance modem pool pair

To establish a first working maintenance modem pool pair that can be used to test other modem pool elements, perform the following steps:

1 Verify the datafill information by using the QLEN command to check the two halves of the modem pool element. Any discrepancies from the following two typical outputs should be corrected by referring to the corresponding portion of the previous chapter.

QLEN OUTPUT FOR A MODEM POOL MODEM

LEN: HOST 02 1 12 10
TYPE: NETWORK RESOURCE LINE
RESOURCE TYPE: MPMD
GROUP OMP9600A MEMBER 0 GROUPTYPE MP TMODE FULL SPEED 9600
MATE RESOURCE: MPDU HOST 02 1 12 09
CARDCNODE: 6X17ACQLEN OUTPUT FOR A MODEM POOL MODEM
LEN: HOST 02 1 12 10
TYPE: NETWORK RESOURCE LINE
RESOURCE TYPE: MPMD
GROUP OMP1200A MEMBER 0 GROUPTYPE MP TMODE FULL SPEED 1200
MATE RESOURCE: MPDU HOST 02 1 12 09
CARDCNODE: 6X17AC GND: N PADGRP: STDLN BNV: NL MNO: N
PM NODE NUMBER: 192
PM TERMINAL NUMBER: 486

QLEN OUTPUT FOR A MODEM POOL DATA UNIT

LEN: HOST 02 1 12 09
TYPE: NETWORK RESOURCE LINE
RESOURCE TYPE: MPDU
GROUP OMP9600A MEMBER 0 GROUPTYPE MP TMODE FULL SPEED 9600
MATE RESOURCE: MPMD HOST 02 1 12 10
DATA UNIT PROFILE:
CLASSDU: MP MIMIC: PI DOWNLOAD: Y
CONFIG: DTE DTEIF: RS232C
SYNCHRO: A DATARATE: 9600 CHARLEN: 8 PARITY: N STOPBIT:1
DUPLEX: F
SAC: N
DPOPTS: AUTOANS
CARDCODE: 6X71AB GND: N PADGRP: NPDGP BNV: NL MNO: N
PM NODE NUMBER: 192
PM TERMINAL NUMBER: 485

2 Post the maintenance modem pool (MMP) element and perform diagnostics (DIAG) from the LTP level of the MAP (maintenance and administration position). The DIAG command performs an integrity test and a self-test on the data line card (DLC), and tests communication with the associated DU. It then performs an integrity test and a self-test on the voice line card (VLC).

3 Post the MMP DU, set the RS-232 loopback, and perform a bit error rate test (BERT) from the LTPDATA level of the MAP.

4 Repeat steps 1 through 3 for a second MMP element.

5 Post each element and place it in service using the return to service (RTS) command from the LTP level of the MAP.

6 Perform an MMP BERT on each of the modem pool elements. For this test you need two MMPs, or one MMP and a regular modem pool. See “Maintenance modem pool bit error rate testing” on page 4-3 for information on the MMP BERT. If the BERT detects errors, repeat steps 7 through 11 for each MMP element. This process will help you isolate the problem to one modem pool element.

7 Check the cable connections between the DU, the modem, and the VLS and DLCs.

8 Check the sanity of the IBERT line cards (ILC) (see *Lines Maintenance Guide*, 297-1001-594).

9 Invoke a self-test on the DU (see *Data Unit - Installation and Maintenance*, 297-2121-226).

10 Invoke a self-test on the modem (see the manufacturer’s documentation).

11 Perform a second MMP BERT on each of the modem pool elements (see "Maintenance modem pool bit error rate testing" on page 4-3). If the BERT detects errors again, datafill one MMP element as a regular modem pool element (see "Data entry for modem pool elements" on page 3-1) and place a call through it. To perform this test you must place all the other elements in the pool in the busy state.

Acceptance testing of additional modem pool elements

Once the physical hardware installation is complete and the required datafill has been input to the switch, verify that the modem pool element is working correctly and place it in service by performing the following five steps:

1 Verify the datafill information by using the QLEN command to check the two halves of the modem pool element. Any discrepancies from the two typical outputs beginning on page 4-1 should be corrected by referring to the corresponding portion of the previous chapter.

2 Post the modem pool element and perform diagnostics (DIAG) from the LTP level of the MAP. The DIAG command performs an integrity test and a self-test on the DLC, and tests communication with the associated DU. It then performs an integrity test and a self-test on the VLC.

3 Post the modem pool DU, set the RS-232 loopback, and perform a BERT from the LTPDATA level of the MAP. If you have MMPs and have already established one working pool, perform an MMP BERT for more complete testing. See "Maintenance modem pool bit error rate testing" on page 4-3 for information on the MMP BERT.

4 Post the element and place it in service using the RTS command from the LTP level of the MAP.

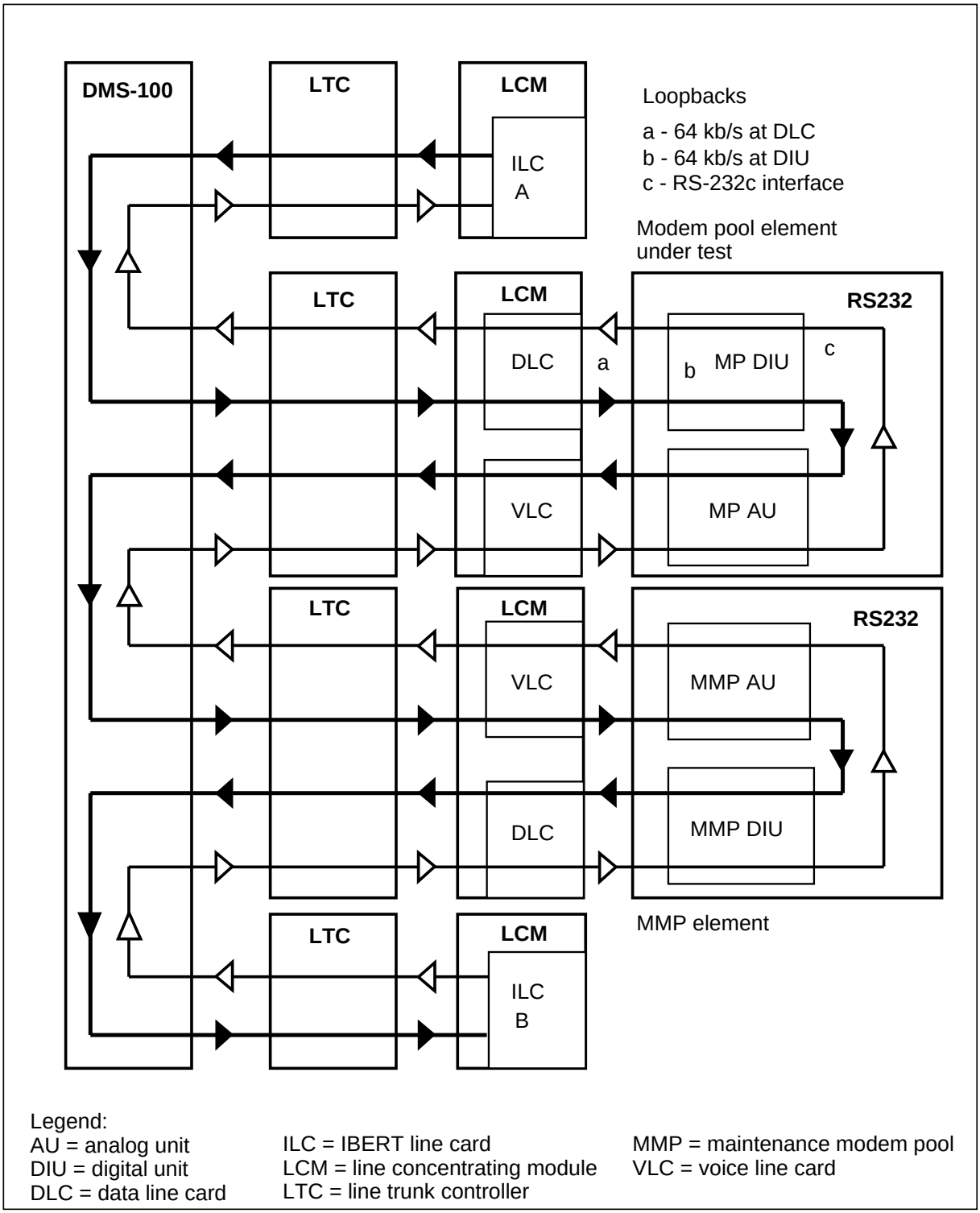
5 Place a call using the modem pool element. To perform this test you must place all the other elements in the pool in the busy state. For this reason, this test should be performed during a low traffic period.

For details on how to invoke these tests and interpret the results, see *Lines Maintenance Guide*, 297-1001-594.

Maintenance modem pool bit error rate testing

You can test the transmission quality of a modem pool element from the MAP by connecting the element back-to-back with an MMP element and performing a BERT. The test uses two IBERT cards to transmit a known bit pattern through the modem pool. Figure 4-1 shows the BERT configuration and the loopback points you can use. This test can be performed only on modem pool elements that use NT4X25CH or NT4X25AF DUs.

Figure 4-1 xxx
Maintenance modem pool configuration



You can perform up to 32 individual BERTs at the same time (subject to IBERT card availability).

You can perform a BERT on any modem pool that is

- installation busy (INB)
- man-busy (MB)
- locked out (LO)
- idle (IDL)

To verify that your MMP elements are operating properly, perform the test steps described in “Acceptance testing of additional modem pool elements” on page 4-3. For details on how to invoke a BERT and interpret the results, see *Lines Maintenance Guide*, 297-1001-594.

Performing an end-to-end bit error rate test

To perform an end-to-end BERT, post the desired element and enter the BERT START command from the LTPDATA level of the MAP. The state of the element displayed on the MAP changes to man-busy and a dot (.) appears under the element’s seized indicator.

The MAP displays the following information about the BERT in the upper left corner of the display:

- the number of blocks sent
- the number of bit errors detected
- the bit error ratio
- the sync status of the IBERT cards

Because two IBERT cards and two DUs are used in a BERT, there are two sets of BERT results. The MAP, however, can display only one of the following sets of results while the BERT is running:

- The displayed *number of blocks sent* is the larger value from the two IBERT cards.
- The displayed *number of bit errors detected* is the larger value from the two IBERT cards.
- The displayed *bit error ratio* is computed from the displayed values for the number of blocks sent and the number of bit errors. The smallest ratio allowed is 0.
- The displayed *sync status* is either LOST, WAITING, or INSYNC. When you begin the BERT, the sync status is WAITING. Once the IBERT cards have established synchronization with each other, the status is INSYNC. The IBERT cards begin to transmit a known bit pattern (either 511 or 2047). If synchronization is lost, the status displayed is LOST. The MAP displays the sync status of the IBERT card with the worst status.

To display the information for both IBERT cards, use the BERT QUERY command. Following are samples of what the BERT QUERY display looks like while a BERT is running and after the BERT has stopped.

While a BERT is running:

```
MP Member/MMP Member    : OMP9600B      1  MAINT9600    1
IBERTs used for test    : HOST 02 1 05 00  HOST 03 0 01 01
Number of blocks rcvd   : 120             72
Number of bit errors    : 29              7
Number of sync slips    : 1               1
Bit Error Ratio         : 1.1*10E-4       4.7*10E-5
IBERT sync status       : INSYNC          INSYNC
IBERT Tx/Rx speed (bps) : 9600            9600
IBERT transmission mode : ASYNCHRONOUS    ASYNCHRONOUS
Direction of the test is OUTBOUND
The bit pattern length used is 2047 bits
The test was started at : 1986/12/19 14:29:16.200 FRI.
```

After the BERT has stopped:

```
MP Member/MMP Member    : OMP9600B      1  MAINT9600    1
Number of blocks rcvd   : 128             80
Number of bit errors    : 29              0
Number of sync slips    : 1               1
Bit Error Ratio         : 1.1*10E-4       0
Error Free Seconds      : 146             148
Total time in sync      : 152             154
Total test time         : 165             167
The test was run at 1200 bps.
Transmission mode was ASYNCHRONOUS
Direction of the test was OUTBOUND
The bit pattern length used was 2047 bits
The test was started at : 1986/12/19 14:29:16.200 FRI.
The test was stopped at : 1986/12/19 14:33:10.300 FRI.
```

The MAP display is refreshed once every second. The BERT results for the posted modem pool are refreshed approximately every 5 seconds. This delay results because the IBERT cards must be queried for their current test results each time. The delay increases with the number of BERTs running at the same time.

Once a BERT is started, it continues running until a BERT STOP command is issued or until the BERT AUDIT process times it out. You can, therefore,

start a BERT, logoff the MAP and then return, logon, and display the BERT results.

Test results

If the status of IBERT A is INSYNC and the status for IBERT B is WAITING or LOST, the transmit path from IBERT A through the modem pool element is faulty.

If the status of IBERT A is WAITING or LOST and the status for IBERT B is INSYNC, the receive path from IBERT A through the modem pool element is faulty.

If the status of both IBERT A and IBERT B is WAITING or LOST, both the transmit and receive paths from IBERT A through the modem pool element are faulty. The RS-232C connection between the DU and modem may be faulty.

If a fault is detected by the end-to-end BERT, perform an individual BERT (loopback) on the DU element of the modem pool to isolate the problem.

Performing a loopback bit error rate test

If a fault is detected by the end-to-end BERT, perform an individual BERT (loopback) on the DU element of the modem pool to isolate the problem. You can perform a loopback at three different points: 64 kb/s at the DLC, 64 kb/s at the DU, and the RS-232 connection.

To perform a loopback BERT

1 POST the modem pool element you want to test from the LTPDATA level of the MAP.

2 Enter the BERT START command at the MAP to perform an end-to-end BERT.

3 HOLD the modem pool element.

4 While the end-to-end BERT is running, POST the modem pool DU and activate the loopback BERT at the RS-232 connection using the LOOPBK RS232 command. The loopback remains intact, even if the modem pool element is reposted.

With the loopback set, the IBERT receives back the test pattern that it sent out. Because only one IBERT is sending and receiving a test pattern, the BERT QUERY command displays only one set of results (from the modem pool DU).

5 Enter the BERT RESET command to clear the test results and any errors that have been recorded.

6 Once the test has run for the desired length of time, enter the LOOPBK RESET command to reset the loopback.

7 POST the modem pool element and enter the BERT STOP command to terminate the BERT.

Test results

If the end-to-end BERT detects errors but the loopback BERT does not, the modem portion of the element is faulty. Initiate a self-test on the modem (see the manufacturer's documentation). Check the connection between the modem and DU.

If both the end-to-end and loopback BERTs detect errors, the DU portion of the element is faulty. To isolate the problem further, perform additional loopback BERTs at the DU 64 kb/s or the DLC 64 kb/s loopback points.

For details on how to invoke these tests and interpret the results, see the *Lines Maintenance Guide*, 297-1001-594.

Scheduled maintenance

Because of the trunk-type usage pattern of modem pool elements, schedule regular maintenance to detect problems before they seriously affect customer performance. Automatic diagnostics can be arranged to run on the DLC, the VLC, the data line, and the modem line using the automatic line test (ALT) level of the MAP. Details on the commands required to implement these tests are found in *Lines Maintenance Guide*, 297-1001-594. Reports from these tests allow you to perform required maintenance before the customer generates a trouble report.

Network resource selector audits

An audit system has been developed specifically for the network resource selector (NRS) system. The audit periodically checks the sanity of the NRS system and corrects any problems that may be encountered.

The activation of the NRS audit system is controlled by a variable office parameter NRS_AUD_DELAY. This parameter determines the time between successive audit cycles and can range from 0 to 60 minutes (0 disables the audits).

Operational measurements

Description of operational measurements

Operational measurements (OM) is a system of monitoring events in a switching machine. It allows you to make calculations that assist in the administration and maintenance of the machine. Counts are kept of events or of the number of pieces of equipment found in a specified state by a cyclical scanning procedure. The results of the counts can be printed, displayed on a MAP (maintenance and administration position), or stored on a disc or tape.

All OM registers are organized into groups and given appropriate names. Naming is usually based on some association, such as all measurements related to a specific subsection of the switch. For modem pooling, the group name is network resource selector (NRS).

As events occur, the counts are stored in registers (memory locations) referred to as the active registers. For information on classes and reports, see *Basic Administration Procedures*, 297-1001-300 and *Operational Measurements Reference Manual*, 297-1001-814.

The NRS OM group contains data on the operation of all resource groups in a DMS office. Some of the information held in the NRS OM group is useful for maintenance. Other information pertains to traffic. You can obtain data for each modem pool or maintenance modem pool (MMP) as a whole, but not for individual elements within the pools.

The key field for a modem pool group indicates the common language location identifier (CLLI) of the modem pool. The information field lists the registers described in Table 5-1.

For more information on the OM registers, see *Operational Measurements Reference Manual*, 297-1001-814.

Table 5-1
Register Descriptions

Register	Description
COMMON LANGUAGE NAME	*Key Field* The resource CLLI
NRS OMINFO	*Information Field* RESTYPE (Resource Type) MP = Modem Pool MMP = Maintenance Modem Pool
NRSRES	*NRS Successful Reservations* Incremented each time a successful attempt is made to reserve a member of the NRS group. A modem pool or MMP element is reserved when it is taken off a queue of idle modem pool elements.
NRSFRES	*NRS Failed Reservations* Incremented each time an unsuccessful attempt is made to reserve a member of the NRS group. A failure is registered when a modem pool or MMP fails to be removed from the queue of idle modem pool elements when it is reserved. (This register is useful for maintenance because it indicates the number of times the user encountered an all elements busy condition.)
NRSCON	*NRS Successful Connections* Incremented each time a successful connection is made to a member of the NRS group. Modem pools are connected when a call process is set up. MMPs are connected when the network connection between the MMP and the modem pool under test is established.

-continued-

Table 5-1
Register Descriptions (continued)

Register	Description
NRSFCON	*NRS Failed Connections* Incremented each time an unsuccessful attempt is made to connect to members of an NRS group. A failure is registered when modem pools fail to connect during call setup and when an MMP fails to connect to a modem pool under test. (This register is useful for maintenance because it usually indicates a hardware problem with a modem pool element.)
NRSOVFL	*NRS Overflow* Incremented each time an NRS group has no free members and an overflow to another group is required to attempt to find a free member.
NRSRESU	*NRS Reservation Usage* Usage count of the number of members of an NRS group that are in a reserved state. Scan rate: every 10 seconds Modem pools are reserved when they are taken off a queue of idle modem pool elements to be used for call processing. MMPs are reserved when they are taken off a queue of idle MMP elements to be used for maintenance.
NRSCONU	*NRS Connection Usage* Usage count of the number of members of an NRS group that are in a connected state. Scan rate: every 100 seconds Modem pools are connected when a call is in progress. MMPs are connected when the network connection between the MMP and the modem pool under test is established and a bit error rate test (BERT) is running.

-continued-

Table 5-1
Register Descriptions (continued)

Register	Description
NRSMBU	*NRS Man Busy Usage* Usage count of the number of members of an NRS group that are in a man-busy state by use of the BUSY command at the MAP. Scan rate: every 100 seconds This count does not include an MMP that is man-busy while performing a BERT on another modem pool.
NRSSBU	*NRS System-Busy Usage* Usage count of the number of members of an NRS group that are in a system-busy state. Scan rate: every 100 seconds
NMSNMP	*NRS No Modem Pool* Incremented each time a member of a customer user group with the NRS override feature dials the outbound modem pool (OMP) override prefix digits. The NRS no modem pool feature is used when a member of a customer user group knows that a data call will be terminated at a DU or placed over all-digital facilities. The user dials the OMP override prefix digits to prevent an OMP from being inserted in the call path.
End	

MAP display of operational measurements data

You can display OM data on a Map using the OMSHOW command. For example:

OMSHOW NRS ACTIVE
or
OMSHOW NRS HOLDING

The output from this command provides information on the modem pool(s) specified and contains the following fields:

NRS: (group name)

CLASS: class name
(ACTIVE or HOLDING)

START: date time day_of_week
(of the beginning of the sampling period)

STOP: date time day_of_week
(of the end of the sampling period)

SLOWSAMPLES: nnnn
(The total number of slow-scan samples made in the period. A slow scan is done every 100 seconds.)

FASTSAMPLES: nnnn
(The total number of fast-scan samples made in the period. A fast scan is done every 10 seconds.)

KEY: nn CLLI
CLLI = modem pool or maintenance modem pool
(Identifies each modem pool by a number and by its CLLI.)

INFO: Provides the nine items of data for each modem pool:
NRSRES NRSFRES NRSCON NRSFCON
NRSOVFL NRSRESU NRSCONU NRSMBU
NRSSBU NRMNMP

More information on the OMSHOW command can be found in *Operational Measurements Reference Manual*, 297-1001-814.

List of terms

ALT

Automatic line test

AMI

Automatic modem insertion

ATD

Audio tone detector

AU

Analog unit

audio tone detector (ATD)

A card that contains 16 ATD circuits and resides in the maintenance trunk module (MTM). The ATD is used to provide call progress tones to the subscriber for calls that originate on loop extensions.

automatic line testing (ALT)

Testing of both line circuits and the attached loops. In most situations, ALT is run on a large group of lines during a low-traffic period.

batch change supplement (BCS)

A DMS-100 Family software release.

BCS

Batch change supplement

BERT

Bit error rate test

bit error rate test (BERT)

A test that is used to measure the transmission quality of a loop. The BERT transmits a known bit pattern over a line and compares the reflected signal against the initial pattern.

CLLI

Common language location identifier

common language location identifier (CLLI)

A standard identification method for trunk groups in the form:

aaaa bb xx yyyy

Where:

aaaa=City code
bb=Province or state code
xx=Trunk group identifier
yyyy=Trunk number

data line card (DLC)

The line card that connects a Datapath loop to a data unit. The DLC is part of a line subgroup (LSG) in a line concentrating module (LCM).

data terminal equipment (DTE)

Equipment consisting of digital end instruments that convert user information into data signals for transmission or reconvert the received data signals into user information.

data terminal ready (DTR)

A signal sent from a terminal device indicating to the host device its readiness to communicate.

data unit (DU)

Equipment that is used as a data interface, allowing data terminal equipment (DTE) to access the DMS-100 switch network. A DU can be configured as a desktop unit or as a rack-mounted component of the switch.

DCD

Data carrier detect

DIAG

Diagnostics

Digital Multiplex System (DMS)

A central office (CO) switching system in which all external signals are converted to digital data and stored in assigned time slots. Switching is performed by reassigning the original time slots.

DIP

Direct in-line position

directory number (DN)

The full complement of digits required to designate a subscriber's station within one numbering plan area (NPA)-usually a three-digit central office (CO) code followed by a four-digit station number.

DIU

Digital unit

DLC

Data line card

DMS

Digital Multiplex System

DN

Directory number

DSR

Data set ready

DTE

Data terminal equipment

DTR

Data terminal ready

DU

Data unit

frame supervisory panel (FSP)

A facility that accepts the frame battery feed and ground return from the power distribution center (PDC). The FSP 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 FSP also contains alarm circuits.

FSP

Frame supervisory panel

IBERT

Integrated bit error rate tester

IBN

Integrated Business Network

IDL

Idle

ILC

IBERT line card

IMP

Inbound modem pool(ing)

impulses per minute (IPM)

Interruption rate for call progress tones or supervisory lamps.

INB

Installation busy

installation busy (INB)

A status assigned to a line under specified conditions in which call processing cannot take place but tests can be performed.

integrated bit error rate test (IBERT)

A test that a MAP operator runs using an IBERT card to test the transmission quality of a selected data line. The card resides in the line drawer of a line concentrating module (LCM) and generates the bit stream for an IBERT. An IBERT can be used to test most types of lines connected to the DMS switch if the lines support the T-link protocol.

Integrated Business Network (IBN)

See Meridian Digital Centrex.

integrated services digital network (ISDN)

A set of standards proposed by the CCITT to establish compatibility between the telephone network and various data terminals and devices. ISDN is a fully digital network, in general evolving from a telephone integrated digital network. It provides end-to-end connectivity to support a wide range of services, including circuit-switched voice, circuit-switched data, and packet-switched data over the same local facility.

IPM

Impulses per minute

ISDN

Integrated services digital network

LCD

Liquid crystal display

LCM

Line concentrating module

LED

Light-emitting diode

LEN

Line equipment number

LGC

Line group controller

light-emitting diode (LED)

A solid-state device which emits light when the appropriate voltage is applied to it. The LEDs are used in the DMS-100 switch components as front panel indicators, and they are usually off when equipment status is normal.

line concentrating module (LCM)

A peripheral module (PM) that connects the line trunk controller (LTC) or line group controller (LGC) and up to 640 subscriber lines using two to six DS30A links.

line equipment number (LEN)

A seven-digit functional reference that identifies line circuits (LC). The LEN provides physical location information on equipment such as site, frame number, unit number, line subgroup (shelf), and circuit pack.

line group controller (LGC)

A peripheral module (PM) that connects DS30 links from the network to line concentrating modules (LCM).

line trunk controller (LTC)

A peripheral module (PM) that is a combination of the line group controller (LGC) and the digital trunk controller (DTC) and provides all the services offered by both. It supports line concentrating module (LCM) and AB trunks.

liquid crystal display (LCD) lamp

An LCD located beside seven of eight feature keys on an Automatic Call Distribution (ACD) set. The display can show a black diamond indicator (lamp) against each feature key. The indicator has four states: off, on, flashing (60 times per minute), and winking (120 times per minute).

LO

Locked out

logical terminal identifier (LTID)

The unique identifier assigned to a logical terminal when it is datafilled in the ISDN access termination.

LTC

Line trunk controller

LTID

Logical terminal identifier

MADO

Meridian asynchronous data option

maintenance and administration position

See MAP.

maintenance modem pool (MMP)

A modem pool reserved for testing only. MMPs allow the operator to test the modem pool equipment from MAP terminals of the DMS-100 Family switch through integrated test equipment.

MAP

Maintenance and administration position. A group of components that provides a user interface between operating company personnel and the DMS-100 Family switches. The interface consists of a visual display unit (VDU) and keyboard, a voice communications module, test facilities, and special furniture.

MB

Man busy

MDC

Meridian Digital Centrex

Meridian Digital Centrex (MDC)

A special DMS business services package that uses the data-handling capabilities of DMS-100 Family offices to provide a centralized telephone exchange service. Formerly known as Integrated Business Network (IBN).

MI

Mode indicator

MIC

Mode indicator common

MMP

Maintenance modem pool

modem pool (MP)

A group of hardware devices that converts digital data signals to analog signals and analog signals to digital data signals. The MP converts these signals for transmission along cable pairs or carrier channels. An MP consists of a data line card (DLC), a data unit (DU), a modem, and a voice line card (VLC).

MP

Modem pool

NMP

No modem pool

Northern Telecom (NT)

A part of the tricorporate structure consisting of Bell-Northern Research, Bell Canada, and Northern Telecom.

Northern Telecom publication (NTP)

A document that contains descriptive information about Northern Telecom hardware or software modules and performance-oriented practices (POP) for installing, testing, or maintaining the system. This document is often supplied as part of the standard documentation package provided to an operating company.

NRS

Network resource selector

NT

Northern Telecom

NTP

Northern Telecom publication

OMP

Outbound modem pool

PC GND

Printed circuit ground

PDC

Power distribution center

peripheral module (PM)

A generic term referring to all hardware modules in the DMS-100 Family switches that provide interfaces with external line, trunk, or service facilities. A PM contains peripheral processors (PP), which perform local routines, thus relieving the load on the CPU.

PM

Peripheral module

PND

Prefix network resource selector default

PNO

Prefix NRS outbound

power distribution center (PDC)

The frame containing the components for distributing office battery feeds to equipment frames of the DMS-100 Family switches. The PDC accepts A and B cables from the office battery and provides protected subsidiary feeds to each frame or shelf. It also contains noise suppression and alarm circuits and provides a dedicated feed for the alarm battery supply.

RD

Receive data

return to service (RTS)

An action that allows an out-of-service unit or piece of equipment to process calls.

RTS

Ready to send, return to service

Service Order System (SERVORD)

A user interface consisting of commands used to change, add, or delete subscriber lines. The format used for commands in the SERVORD comply with the standard telephone industry command format; for example, 3WC is three-way calling, ADO is add option, DEL is delete, and CWT is call waiting.

SERVORD

Service Order System

TA

Terminal adapter

TADO

Touch asynchronous data option

TC

Trunk card

TCM

Time compression multiplexing

TD

Transmitted data

UDS

Universal Data Systems

VLC

Voice line card

voice line card (VLC)

A card equivalent to a line card. The term is used to contrast with data line card (DLC) when both cards are present in a hardware configuration.

DMS-100 Family

Modem Pooling

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