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Meridian SuperNode

Meridian SL-100

Meridian Communications Adapter Reference Manual

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NORTEL
NORTHERN TELECOM

Meridian SuperNode

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Publication history

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Standard release 04.02 supporting software release MSL07. Removed the M2616CT information from the introduction and about this document chapters for inclusion in the MSL08 software release.

June 1997

Preliminary release 04.01 supporting software release MSL07 which includes the M2616CT information in the introduction and about this document chapters.

November 1996

Standard release 03.02 supporting software release MSL06. Updated Data terminal installation instructions and added instructions for power board installation.

September 1996

Preliminary release 03.01 supporting software release MSL06.

May 1996

Standard release 02.03 supporting software release MSL05 and making the following changes in the Keypad dialing chapter:

- reverse synchronous Programs 44 and 45 external and internal clocks
- reverse synchronous Programs 46 and 47 off and on
- add sentence about invalid SL-100 commands on synchronous Programs 48 and 49
- reversed synchronous Programs 50 and 51 external and internal clocks
- reversed synchronous Programs 58 and 59 external and internal clocks

April 1996

Standard release 02.02 supporting software release MSL05.

January 1996

Preliminary release 02.01. This version supports software release MSL05. The following list shows the changes:

- added V.25, high level data link control format
- added request to send information supporting synchronous applications

October 1995

Version 01.02. This version adds installation procedures for the MCA.

August 1994

Version 01.01, MSL03. This version represents the initial release of this document.

Contents

About this document

When to use this document

This publication provides specific information on the Meridian Communications Adapter (MCA).

The MCA is used with the following Meridian Modular Telephone sets:

- M2006
- M2008/M2008HF
- M2016-S
- M2216ACD
- M2616

These telephone sets and their options are introduced to the Meridian SL-100 (MSL-100) central control (CC) in the areas of table control, call processing, call progress indication, and facilities maintenance.

This publication does not cover in detail the interface with the MSL-100 system.

Structure of this publication

This publication contains chapters that describe the following topics in detail:

- Chapter 1 provides an introduction to the specifications and functions of the MCA.
- Chapter 2 describes keypad dialing. Keypad dialing allows the user to originate data calls to local and remote hosts, data terminal equipment (DTE), or both from the Meridian Modular Telephone keypad.
- Chapter 3 provides detailed information on the use of Nortel keyboard dialing (Nortel KBD). Nortel KBD provides a user with the ability to originate data calls to local and remote hosts, DTE, or both using a terminal keyboard.

- Chapter 4 describes Hayes (AT) keyboard dialing. Hayes keyboard dialing, also known as AT keyboard dialing, allows the option of using commands compatible with the Hayes V-series Smartmodem 9600 to originate and answer data calls.

This publication also provides the following appendixes with reference material essential to the use and operation of the MCA:

- Appendix A describes the standard Hayes AT commands.
- Appendix B provides information on AT dialing parameter registers (S registers).
- Appendix C lists the basic AT command sets for voice and data calls.
- Appendix D describes the script file menus.

How to check the version and issue of this document

The version and issue of the document are indicated by numbers, for example, 01.01.

The first two digits indicate the version. The version number increases each time the document is updated 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 indicate the issue. The issue number increases each time the document is revised but re-released in the *same* software release cycle. For example, the second release of a document in the same software release cycle is 01.02.

To determine which version of this document applies to the software in your office and how documentation for your product is organized, check the release information in either the *Meridian SuperNode Commercial Systems Master Index of Publications*, 555-4031-001, or the *Meridian SuperNode Defense Switched Network Master Index of Publications*, 555-4021-001.

This document applies to MSL-100 offices that have MSL05 and above. Unless the document is revised, it also applies to offices with software releases greater than MSL05.

References in this document

The *Meridian Modular Telephones Reference Manual*, 555-4001-114 is referred to in this document.

What precautionary messages mean

The types of precautionary messages used in Nortel documents include danger, warning, and caution messages. Danger, warning, and caution messages indicate possible risks.

Examples of the precautionary messages follow.

DANGER Possibility of personal injury

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

WARNING Possibility of equipment damage

WARNING
Damage to the backplane connector pins
Align the card before seating it, to avoid bending the backplane connector pins. Use light thumb pressure to align the card with the connectors. Next, 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 continuing, confirm that you are removing the card from the inactive unit of the peripheral module. Subscriber service will be lost if you remove a card from the active unit.

How commands, parameters, and responses are represented

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

Input prompt (>)

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

>BSY

Commands and fixed parameters

Commands and fixed parameters that are entered at a MAP terminal are shown in uppercase letters:

>BSY CTRL

Variables

Variables are shown in lowercase letters:

>BSY CTRL ctrl_no

The letters or numbers that the variable represents must be entered. Each variable is explained in a list that follows the command string.

Responses

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

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

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

1 Manually busy the CTRL on the inactive plane by typing

>BSY CTRL ctrl_no
and pressing 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.
```

Introduction

Meridian Communications Adapter (MCA) passes asynchronous and synchronous data through Nortel's (Northern Telecom) Private Branch Exchanges (PBX). The MCA replaces the Meridian Programmable Data Adapter (MPDA) for asynchronous data applications. The MCA supports V.25 bis protocol combined with high level data link control (HDLC) data format. This allows the MCA to operate with most automatic voice and data equipment (for example, a fax). The MCA provides the following configurable data call options:

- default transmission protocol (data module-data module, T-link, and public switched data services) selection
- V.25 bis
- HDLC format
- assert ready to send (RTS)

Integrated voice and data (IVD) is a service that provides simultaneous voice and data communications at speeds up to 19.2 kbps over a single, twisted-pair subscriber loop.

Just as your telephone has a unique directory number (DN) or extension, the MCA must have its own data directory number (DDN) configured in the software of the PBX.

Your dumb terminal or personal computer (PC) can be attached to the MCA using its RS-232 serial port. The dumb terminal can talk directly to the MCA. A personal computer needs a communication software package in order to access its serial port. Serial printers may also be connected to the MCA.

After establishing a data call, you can perform data communications through the PBX to a far end service, like a mainframe, a modem pool, other PCs, or printers.

The MCA uses nonvolatile read and write memory for permanent storage of settings and configuration parameters. The PBX stores the Autodial and Speed Call numbers.

The Meridian Modular Telephone line of office products is composed of 5 telephone sets, an integrated data module (MCA), a 22-key/lamp add-on option, a display module option, and 3 different types of external power options.

The following sets support the MCA:

- M2006: a single line telephone with five programmable feature keys
- M2008: a multiline telephone with seven programmable feature keys
- M2008HF: a multiline telephone with seven programmable feature keys and integrated handsfree unit
- M2016-S: a Telephone Security Group (TSG) Class 2 Type accepted digital telephone that provides the on-hook security required for certain government contractor applications
- M2216ACD: a next generation multiline ACD IVD digital set with 15 feature keys, a factory installed M0200 display module, and two RJ-11 jacks for headsets
- M2616: a high performance multiline telephone with 15 programmable feature keys and an integrated hands-free unit

Installation

Installing the MCA

Procedure 2-1 details the instructions required to install or replace the MCA in the Meridian Modular Telephone sets.

Procedure 2-1
Installing the MCA

1 Remove the handset and place the telephone upside down on top of a level, solid work surface that is covered with soft material or paper to prevent damage to movable keys and the telephone face.

2 Disconnect all cords from the telephone.

3 Loosen and remove the two screws from the stand assembly of the telephone, and unsnap the stand assembly by grasping the plastic extension and pulling it upwards.

4

If	Do
the telephone is not already equipped with the MCA	Step 8
you are replacing an MCA	Step 5

5 Carefully disconnect one end of the 6- or 8-pin TELADAPT jack plugged into the telephone set by pressing firmly on the latch-tab and slowly lifting up to remove it.

6 Turn the telephone stand assembly over, and put it in the normal operating position.

7 Loosen and remove the two self-tapping screws that fasten the MCA to the telephone stand assembly and remove the defective MCA by pulling it outward and up. Skip Step 8, and continue with Step 9.

8 Remove the break-out section in the rear of the telephone stand assembly by tapping it with the handle of a small screwdriver.

9 Tilt the MCA circuit board up and insert the DB-25 connector socket into the breakout section, then slide the board end-first under tabs in stand assembly, and position over locating pins.

10 Position and lower completely onto telephone stand assembly. Take the two Phillips head, self-tapping screws supplied with the MCA, and install them into the mounting holes. Tighten screws firmly with a #1 Phillips screwdriver.

11 Plug one end of a 6-conductor line cord supplied with a TELADAPT adapter in the RJ-11 of the MCA (latch tab facing down), and plug the other end of the line cord into the jack of the telephone set.

12 Make certain the latch tab of each cable end is firmly snapped into place.

13 Reassemble the telephone and stand assembly sections.

14 Tighten screws, reconnect all cords, and place the telephone in normal operating position.

15 Place the label supplied with the MCA on the bottom cover of the set for tracking purposes.

16 You have successfully completed this procedure.

Data terminal installation

To connect a data terminal to the Meridian Modular Telephone, perform the steps in Procedure 2-2.

Procedure 2-2
Installing the data terminal

1 Connect the RS-232-C interface connector from the data terminal to the matching header connector in the back of the Meridian Modular Telephone. (See Figure 2-1.)

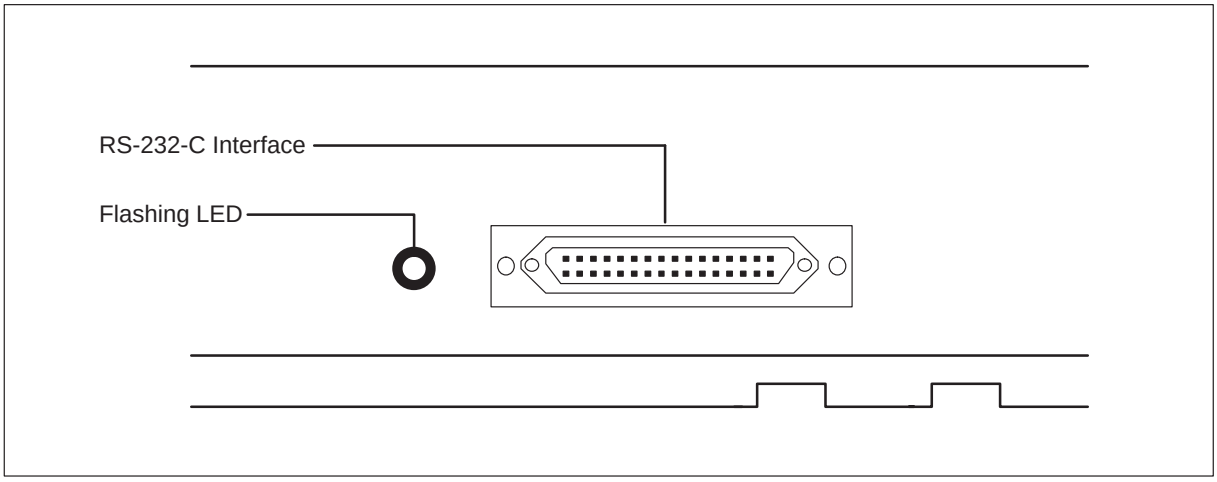
2 Insert the two captive screws in the connector body into the threaded holes in the header connector, and secure tightly to prevent accidental disconnection during data terminal operation.

3 Plug power supply/converter connector securely into power jack that is to the right of the RS-232-C connector.

4 Plug power supply/transformer into the nearest ac outlet.

5 You have successfully completed this procedure.

Figure 2-1
Data terminal and MCA power supply connections



Keypad dialing

Keypad dialing operation

The Meridian Communications Adapter (MCA) allows keypad dialing (KPD) to be used to originate data calls to local and remote hosts, data terminal equipment (DTE), or both from the Meridian Modular Telephone keypad.

The keypad controls the display prompts and information on the telephone set's display screen. The set's top right feature key functions as the local program mode key, referred to here as the program key. Pressing the program key activates the program mode. The program key controls access to the display or MCA for parameter selection. A program before any digits means press the program key and the specified digits.

KPD supports the following key features:

- automatic dial (Autodial)
- ring again
- display of caller's number

Procedure 3-1 shows how to place a KPD data call. This procedure explains the steps, action, and verification processes that occur when programming the MCA from the keypad.

Procedure 3-1
Placing data calls using keypad dialing

1 Press Program.

Response: The local program mode is activated.

2 Press Program again.

Response: The set returns to an idle state. (Time and date are shown if the set is equipped with the display module option.)

3 Press Program followed by #, *, or two digits greater than 20.

Response: If the set is equipped with the display module, the MCA controls the display.

4 Press Program#xxxx.

Response: program# emulates the data DN key with xxxx representing the data DN. After a successful call is made, the display shows:

```
MDIAL XXXX
DATA CALL CONNECTED
```

If there is no terminal connected or if the DTR is off, the display shows:

```
MDIAL XXXX
CHECK TERM AND TRY AGAIN
```

If a data call is made to an unknown or undefined data DN, the display shows:

```
MDIAL XXXX
NOT IN SERVICE
```

When the DN is idled, the display shows:

```
RELEASED
```

When the station is busy, the display shows:

```
MDIAL XXXX
RING AGAIN PLACED
```

When the station becomes available, the display shows:

```
ADIAL XXXX
DATA CALL CONNECTED
```

5 Press Program.

Response: The display is no longer dedicated to the MCA.

6 Press Program followed by one of the values listed in Table 3-1.

Response: The display shows responses to the entered values as listed in Description column in Table 3-1.

Table 3-1
Program command values

Entered value	Description	Mode
20	Asynchronous mode	Asynchronous
21	Synchronous mode	Synchronous
22	Enter baud rate	
	Asynchronous	Synchronous
110	110-bps	1200
150	150-bps	2400
300	300-bps	3600
600	600-bps	4800
1200	1200-bps	7200
2400	2400-bps	9600
4800	4800-bps	14400
9600	9600-bps	38400
19200	19200-bps	40800
		48000
		56000
		64000
23	Space parity	
24	Odd parity	
25	Even parity	
26	Mark parity	
27	Host mode	
28	Terminal mode	

Note 1: The following message displays if an invalid baud rate is entered: `INVALID COMMAND/ENTRY, RE-ENTER:`

Note 2: Additional parameters can be seen, but are not supported by MSL-100. Do not set unsupported parameters.

—continued—

Table 3-1
Program command values (continued)

Entered value	Description	Mode
29	Hotline off	
30	Hotline on	
31	Virtual leased line off	
32	Virtual leased line on	
33	Forced DTR off	
34	Forced DTR on	
35	Dynamic carrier detect off	
36	Dynamic carrier detect on	
37	Remote loopback off	
38	Remote loopback on	
39	Cancel data ring again	
40	Full duplex	Synchronous
41	Half duplex	Synchronous
42	Modem mode	Synchronous
43	Network mode	Synchronous
44	Internal clock	Synchronous
45	External clock	Synchronous
46	PSDS mode off	Synchronous
47	PSDS mode on	Synchronous
48	Enable echo canceller	Synchronous
49	Disable echo canceller	Synchronous
50	Sl-1 mode	
51	Sl-1/DMS-100 mode	
54	V.25 bismode off	Synchronous

Note 1: The following message displays if an invalid baud rate is entered: `INVALID COMMAND/ENTRY, RE-ENTER:`

Note 2: Additional parameters can be seen, but are not supported by MSL-100. Do not set unsupported parameters.

—continued—

Table 3-1
Program command values (continued)

Entered value	Description	Mode
55	V.25 bis mode on	Synchronous
56	Bisync on	Synchronous
57	HDLC on	Synchronous
58	Assert RTS off	Synchronous and Asynchronous
59	Assert RTS on	Synchronous and Asynchronous
60	Autodial programming	
61	Autodial call	
62	Data parameter display	
63	EIA leads status display	
64	Incoming data call monitor	
65	Reset to default parameters	
66	Emulation selection	
67	Lock/Unlock data parameters	
68	VDN key assignment	

Note 1: The following message displays if an invalid baud rate is entered: `INVALID COMMAND/ENTRY, RE-ENTER:`

Note 2: Additional parameters can be seen, but are not supported by MSL-100. Do not set unsupported parameters.

—end—

Baud rates (Program22)

Procedure 3-2 describes how to assign a rate of speed for a data signal.

Procedure 3-2
Assigning a baud rate

1 Press Program22.

2 Enter one of the values listed in Table 3-1 to assign an allowable rate of speed to a data signal.

3 Press Program to save then exit the command.

Response: The set exits the programming mode.

Parity assignment (Program23, Program24, Program25, Program26)

Procedure 3-3 describes how to specify the self-checking method of minimizing transmission errors in received data signals. An extra binary signal is added to each character signal to make the total number of 1s or 0s even or odd for each character. This self-checking method is called parity.

Procedure 3-3
Assigning parity

1. Choose one of the following commands: Program23 (Space Parity), Program24 (Odd Parity), Program25 (Even Parity), or Program26 (Mark Parity).
2. After entering any of these commands, press Program to save then exit the command.

   Response: The set exits the programming mode.

Host or terminal mode (Program28, Program27)

Procedure 3-4 describes the commands required to determine whether or not prompts are sent to the terminal.

Procedure 3-4
Determining host or terminal receiver

1. Press Program28 to instruct the switch to send prompts to the terminal.
2. Press Program to save then exit the command.

   Response: The set exits the programming mode.
3. Press Program27 to instruct the switch to stop sending prompts to the terminal.
4. Press Program to save then exit the command.

   Response: The set exits the programming mode.

Hotline activation and deactivation (Program30, Program29)

A hotline allows the user to have keyboard dialing initiate calls to an Autodial number. A hotline call is placed when the MCA recognizes a positive transition of DTE or detects a carriage return from the keyboard. Procedure 3-5 describes the commands required to activate or deactivate a hotline.

Procedure 3-5
Activating or deactivating hotline

1. Press Program30 to turn the hotline feature on.
2. Press Program to save then exit the command.

Response: The set exits the programming mode.

3 Press Program29 to turn the Hotline feature off.

4 Press Program to save then exit the command.

Response: The set exits the programming mode.

Virtual leased line activation and deactivation (Program32, Program31)

Procedure 3-6 describes the commands required to turn a Virtual Leased Line on or off. Turning on a Virtual Leased Line gives the appearance of a dedicated line between the terminal and the far end data device. This appearance is necessary for applications that require an active data call at all times.

Note: If a power failure occurs while a Virtual Leased Line is on, the MCA automatically calls back the Auto Dial number when power returns. At the same time, default parameters such as baud rate, parity, or forced DTR, are set to those programmed by the keypad dialing functions. For example, the baud rate established by way of a carriage return in KBD is lost in the event of a power loss. To observe appropriate caution regarding the state of the download profile datafill, the user may choose to turn off the download when using this feature.

Procedure 3-6
Activating or deactivating a virtual leased line

1 Press Program32 to turn on a Virtual Leased Line.

2 Press Program to save then exit the command.

Response: The set exits the programming mode.

3 Press Program31 to turn off a Virtual Leased Line.

4 Press Program to save then exit the command.

Response: The set exits the programming mode.

Forced data terminal ready (DTR) activation and deactivation (Program34, Program33)

Procedure 3-7 describes the commands required to turn a Forced DTR on or off. This feature is useful for sending data to a printer or for PC to PC connections when neither is configured as the host.

Procedure 3-7
Activating or deactivating Forced DTR

1 Press Program34 to turn Forced DTR on.

2 Press Program to save then exit the command.

Response: The set exits the programming mode.

3 Press Program33 to turn Forced DTR off.

4 Press Program to save then exit the command.

Response: The set exits the programming mode.

Turn Dynamic Carrier Detect on and off (Program36, Program35)

Procedure 3-8 describes the commands required to turn a Dynamic Carrier Detect on or off. This feature is useful for communication software packages that require a transition of carrier detect from low (0) to high (1) in order to activate answer mode.

Procedure 3-8
Turning Dynamic Carrier Detect on and off

1 Press Program36 to turn Dynamic Carrier Detect on. Carrier detect follows the state of the call.

2 Press Program to save then exit the command.

Response: The set exits the programming mode.

3 Press Program35 to turn Dynamic Carrier Detect off. Carrier detect is always high except for 100 ms when a call is first dropped.

4 Press Program to save then exit the command.

Response: The set exits the programming mode.

Remote loopback activation and deactivation (Program37, Program38)

Procedure 3-9 describes the commands required to turn a remote loopback on or off.

Procedure 3-9
Activating or deactivating Remote Loopback

1 Press Program38 to turn Remote Loopback on. Remote Loopback is activated for the next data call only.

2 Press Program to save then exit the command.

Response: The set exits the programming mode.

3 Press Program37 to turn Remote Loopback off.

4 Press Program to save then exit the command.

Response: The set exits the programming mode.

Ring again feature cancellation (Program39)

Procedure 3-10 describes the steps required to cancel a Ring Again previously activated by a keyboard command.

Procedure 3-10
Cancelling the Ring Again feature

1 Press Program39 to cancel a previously activated Ring Again.

Response: The display shows the following information:

```
DATA RING AGAIN CANCELLED
```

2 Press Program to save the cancelation and then exit.

Response: The set exits the programming mode.

Full duplex/half duplex (synchronous) (Program40, Program41)

These two modes allow you to choose either half or full duplex data transmission while in synchronous mode. The MCA supports full duplex transmission for rates of up to 64K bps and half duplex transmission of up to 19.2K bps.

Procedure 3-11
Full duplex/half duplex feature

1 Press Program40 to choose full duplex.

2 Press Program41 to choose half duplex.

Response: The set exits the programming mode.

Modem/network (synchronous) (Program42, Program43)

When the modem is selected and you are in synchronous mode, the MCA emulates a modem. In network mode, the MCA allows clocks from a digital network to pass through.

Procedure 3-12
Modem/network feature

1 Press Program42 to choose modem mode.

2 Press Program43 to choose network mode.

Response: The set exits the programming mode.

External clock/internal clock (synchronous) (Program44, Program45)

Use the external clock if you want the Meridian 1 phone to receive and transmit the bit-timing signal from the DTE. Use the internal clock if the Meridian 1 phone is to provide the bit-timing signal.

Procedure 3-13
External clock/internal clock feature

1. Press Program44 to choose internal clock.
2. Press Program45 to choose external clock.

PSDS on/off (synchronous) (Program46, Program47)

You can use the public switched data services (PSDS) feature when it is turned on.

Procedure 3-14
PSDS on/off feature

1. Press Program46 to turn PSDS off.
2. Press Program47 to turn PSDS on.

   Response: The set exits the programming mode.

Note: If the called side is in PSDS mode, the calling side will automatically step through to PSDS mode. However the calling side will not send the 2100Hz tone, since the echo canceller is off. If the tone is required, the calling side must be programmed to be in the on state (Program48).

Echo canceller (synchronous) (Program48, Program49)

Echo canceller is available when PSDS is turned on.

Procedure 3-15
Echo canceller on/off feature

1. Press Program48 to turn echo canceller on.
2. Press Program49 to turn echo canceller off.

   Response: The set exits the programming mode.

SL-1/SL-1/DMS-100 (synchronous) (Program50, Program51)

Note: These commands are invalid on as SL-100.

Due to the differences between the MCA and the SL-1/DMS-100 data unit, when the data unit calls an MCA in synchronous mode, the MCA always enters full duplex mode. If half duplex mode is preferred, program the MCA for SL-1/DMS-100 mode. The MCA will still answer a

SL-1/DMS-100 data unit call automatically, but it will remain in half duplex mode.

Procedure 3-16
SL-1/SL-1/DMS-100 feature

1 Press Program50 to choose SL-1 mode.

2 Press Program51 to choose SL-1/DMS-100 mode.

Response: The set exits the programming mode.

V.25 bis mode (synchronous) (Program54, Program55, Program56, Program57)

This feature allows you to answer calls automatically with DTE.

Procedure 3-17
V.25 bis mode

1 Press Program54 to turn V.25 bis off.

2 Press Program55 to turn V.25 bis on.

When V.25 bis (Program55) is turned on, the MCA automatically switches to synchronous mode and forced DTR is turned off. No auto–answer is provided while in the V.25 mode.

3 Press Program56 to turn Bisync on. This is required for video equipment.

4 Press Program57 for HDLC protocol. This is required for G4 FAX.

Response: The set exits the programming mode.

RTS on/off (synchronous and asynchronous) (Program58, Program59)

When RTS is on, the MCA forces the RTS lead active and assumes the local DTE is always ready to transmit or receive data. There is no flow control.

Turning RTS off allows RTS/CTS hardware flow control handshaking. The local DTE can stop the data flow by dropping the RTS lead and the MCA will drop the CTS lead. The MCA then sends a message to the far end to drop the CTS lead. When the DTE is ready, it starts the flow by raising the RTS lead. The MCA raises the CTS lead and the data transmits again.

Using flow controls (RTS OFF) allows the MCA to operate with printers or other DTE devices that also use flow control.

Procedure 3-18
RTS on/off feature

1 Press Program58 to turn RTS off (no flow control).

2 Press Program59 to turn RTS on (active flow control).

Response: The set exits the programming mode.

Autodial programming activation (Program60, Program61)

Procedure 3-19 describes the steps required to activate automatic dial (Autodial) programming.

Procedure 3-19
Activating Autodial programming

1 Press Program60 to activate automatic dial programming.

Response: The set enters autodial programming mode and displays the following information:

```
ADIAL XXXX
ENTER DIGITS, THEN P
```

2 Enter xxxxP (the autodial number).

3 Press Program61 to activate automatic call.

Response: The set enters data monitor mode and displays the following information:

```
ADIAL XXXX
DATA CALL CONNECTED
```

4 Press Program to save and exit either command.

Activate display parameters (Program62)

Procedure 3-20 describes the steps required to activate display parameters. The display shows the established MCA parameters that can be modified through keypad dialing. The Volume Control key (<<< >>>) is used as a scroll key in Program mode.

Procedure 3-20
Activating the display parameters

1 Press Program62 to activate the display parameters.

Response: The display screen appears.

2 Scroll using the <<< >>> keys (see Procedure 3-21), or press Program to exit.

Procedure 3-21 describes how to scroll through the screens that show the data parameter settings.

Procedure 3-21
Scrolling through the parameter display screens.

1 Press Program62.

Response: Set enters Program mode, and data parameters display, as shown in Example 1.

2 Press >>>.

Response: Set scrolls forward to display Screen 2 settings, as shown in Example 2.

3 Press >>>.

Response: Set scrolls forward to display Screen 3 settings, as shown in Example 3.

4 Press >>>.

Response: Set scrolls forward to display Screen 4 settings, as shown in Example 4.

5 Press >>>.

Response: Set scrolls forward to display Screen 5 settings, as shown in Example 5.

6 Press >>>.

Response: Set scrolls forward to display Screen 1 settings (Example 1).

7 Press <<<.

Response: Set scroll backward to display Screen 5 settings (Example 5).

8 Press Program key.

Response: Set exits from Program mode.

The following are some examples of the parameter display screens. Each parameter shown in the following examples contains the maximum number of characters for that particular field.

Example 1:

```
DTR OFF BAUD RATE 9600
DCD OFF SPACE PARITY
```

Example 2:

```
VLL OFF TERMINAL MODE
RLB OFF HOTLINE OFF
```

Example 3:

```
RTS ON DEFAULT TLINK
SYNC MODE TLINK INUSE
```

Note: The SL-100 supports SYNC, TLINK, and ASYNC parameters shown in these examples. These parameters cannot be changed using keypad dialing.

Example 4:

```
HALF DPX INTERNAL CLOCK
V.25 bis OFF
```

Example 5:

```
PSDS OFF EC DISABLED
MODE MODE
```

The P62 command uses the lower half of screen 5 to show the type of modem the MCA is currently emulating. (See Example 5.) One of the following screens appears as the fifth screen of P62 where xxx represents "ON" or "OFF":

- SPEED RESTRICTION xxx
  SMARTMODEM 9600
- SPEED RESTRICTION xxx
  SMARTMODEM 2400
- SPEED RESTRICTION xxx
  SMARTMODEM 1200
- SPEED RESTRICTION xxx
  HAYES COMPATIBLE MODEM

- SPEED RESTRICTION xxx
  NT KBD DIALING

For more information about modem emulation, refer to the "Implementing the Program66 command" section in either Chapter 4, "Nortel keyboard dialing" or Chapter 5, "Hayes keyboard dialing", depending on the type of keyboard dialing you are using.

Status display (Program63)

Procedure 3-22 shows the layout of the RS-232-C leads information on the display.

Note: In this mode, the keypad can be used for voice calls.

Procedure 3-22
Displaying EIA leads status

1 Press Program63.

Response: The RS-232-C lead indicators display the following information:

```
TXD  RXD  DCD  DTR  DSR
0    0     •    •    •
```

This indicates the status of the EIA leads of the RS-232 connected to the MCA. The dark circles represent active leads. This feature is useful during troubleshooting.

2 Press Program to exit.

```
RELEASED
```

Incoming calls during programming mode (Program64)

Regardless of what state the telephone set is in, some asynchronous events can occur.

Incoming voice call

The display is controlled by the MCA; therefore, no calling party name display (CPND) information is displayed. However, you can still answer the call.

Incoming data call

The data call is answered automatically and an audible tone occurs. A data call cannot be manually answered using KPD. The Automatic Answer feature can be disabled through keyboard dialing. No prompts are displayed unless the display is in the data call monitor mode. To activate the incoming data call monitor mode on the display, press “P64”.

Incoming data call during active voice call

The data call is answered automatically and a distinctive tone occurs. No call processing messages appear on the display. The Automatic Answer feature can be disabled through keyboard dialing.

Incoming data call while making a manual data call

If a voice call comes in during call set-up from the keypad, the CPND information is not displayed. The voice call can still be answered, but is kept on hold for the completion of the manual data call.

Reset data parameters (Program65)

Procedure 3-23 describes the steps required to reset the MCA configuration to default settings. This procedure locks configuration settings so that no data parameters can be changed.

Note: Unplugging the telephone does not reset the MCA configuration.

Note: Once Program65 is done, do not change the default values to parameters that are not supported.

Procedure 3-23
Resetting data parameters

1 Press Program65.

Response: The display shows the following information:

```
DATA PARAMETERS RESET
```

2 Press Program to save the lock setting and exit.

Response: The set exits the programming mode.

Emulation selection (Program66)

Procedure 3-24 describes the steps required to select the modem type that the MCA emulates.

Note 1: Unless the emulation type is Nortel keyboard dialing, carriage return <CR> is disabled and hitting <CR> does not invoke the Main menu. Smartmodem emulation only supports Hayes (AT) commands.

Note 2: Some software packages require forced DTR to be active in order to work properly.

Note 3: If power drops while emulating Smartmodem 1200 or 2400, the selection defaults to Smartmodem 9600 upon power up. This does not apply to Nortel KBD dialing.

Procedure 3-24
Selecting modem type

1 Press Program66. Use the volume control key to scroll the telephone's display until the correct modem type appears.

2 Press Program to save and exit the emulation setting.

Response: The set exits the programming mode.

For detailed information on Program66, refer to Chapter 3 on "Nortel keyboard dialing" and Chapter 4 for "Hayes keyboard dialing" in this document.

Locking data parameters (Program67)

Procedure 3-25 describes the steps required to lock data parameters. This procedure uses the volume control key to toggle between unlocked and locked.

Procedure 3-26
Locking data parameters

1 Press Program67.

Response: The display shows the following information:

```
DATA PARAMETERS LOCKED
SCROLL <<< >>>
```

2 Press Program to save and exit.

Response: The set exits the programming mode.

Voice directory number (Program68)

Voice Directory Number (VDN) key assignment allows the user to instruct the MCA on which VDN key to make its voice call originations. Procedure 3-27 describes the steps required to make a VDN key assignment.

Procedure 3-27
Assigning a VDN key

1 Press Program68, and enter the number that corresponds to the VDN key selection.

Note: Key assignments begin with zero.

2 Press Program to save and exit.

Response: The set exits the programming mode.

In all the tables presented, the display shows the actual programmed parameters instead of the keypad inputs. The set sends the keypad information through the local communications of the MCA. The MCA decodes the local communications commands and passes them back to the telephone set's display.

Nortel keyboard dialing

Nortel (Northern Telecom) keyboard dialing (Nortel KBD) allows data calls originating at a terminal keyboard to go to local hosts, remote hosts, or data terminal equipment (DTE). Nortel supports KBD for ASCII, asynchronous, character mode, and interactive terminals equipped with Electronic Industry Association (EIA) RS-232-C interface.

Note: Nortel KBD is not supported for block mode terminals.

Nortel KBD provides the following capabilities:

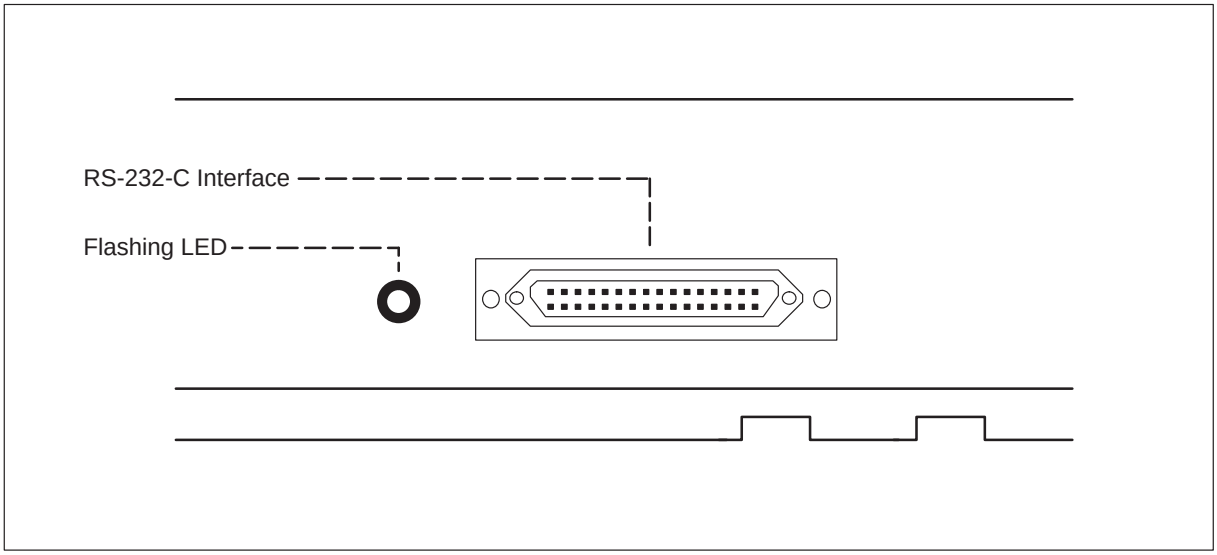
- automatic dial (Autodial)
- automatic and manual answering of incoming calls
- call origination and termination to and from local and remote data devices
- modem pooling
- programming of automatic dial numbers
- RAG
- speed calling
- speed calling programming (if designated as a controller)

Initialization

This section describes the guidelines applicable for accessing the Nortel KBD feature. Before using the Nortel KBD feature, perform the following steps:

- Turn the data terminal power on.
- Set the data terminal on-line.
- Ensure that power is connected to the telephone set.
- Ensure that the LED on the back of the MCA is flashing at a constant rate to indicate that the MCA is functioning properly. (See Figure 4-1.)

Figure 4-1
MCA flashing LED



Implementing the Program66 command

The Program66 key allows the user the flexibility of enabling and disabling Nortel keyboard dialing. The P66 command contains four scrolling screens that enable the user to select which type of modem the MCA can emulate. The product code with respect to each is automatically set up. Unless otherwise requested, the screens are presented on the set's display as shown in Table 4-1.

To select a specific emulation, press Program66. The default screen selection depends upon the Hayes KBDTYPE field of the MCA profile. Scroll through the choices. To select an emulation choice, when the emulation choice appears on the screen, press Program.

Table 4-1
Program66 command screens

Screen	Emulation Selection	Action (Scroll <<< >>>)
Screen 1	SMARTMODEM 9600	Press Program to select emulation and exit.
Screen 2	SMARTMODEM 2400	Press Program to select emulation and exit.

—continued—

Table 4-1
Program66 command screens (continued)

Screen	Emulation Selection	Action (Scroll <<< >>>)
Screen 3	SMARTMODEM 1200	Press Program to select emulation and exit.
Screen 4	NT KBD DIALING	Press Program to select emulation and exit.
	—end—	

The product codes associated with each are 960, 240, and 122, respectively, and correspond to the values that are assigned to the S52, S53, and S54 registers. For information on S registers, refer to the chapter on Hayes keyboard dialing and Appendix B, “AT dialing parameter registers”.

The user can see which Program66 state is currently active by entering the P62 command. See Procedure 3-20 in Chapter 3, “Keypad dialing” for instructions on using the Program62 command to display the current Program66 state.

Note: If the user toggles from Nortel KBD to the Hayes keyboard dialing, then Nortel KBD is disabled. The user still has access to Nortel KBD menus; however, when the user exits from the menus, the user is locked out of Nortel KBD. To return to Nortel KBD, the Program66 command must be entered, and Nortel KBD must be reselected.

MCA operational modes

While in Nortel KBD, the MCA operates in one of three modes:

- autobaud
- command
- on-line

After initializing the MCA, the autobaud mode becomes active. The user remains in the autobaud mode until an acceptable autobaud character is entered.

Nortel KBD is activated by entering a period (.) followed by a Carriage Return <CR>. When the Nortel KBD state is active, the MCA returns to the command mode at the completion of any call origination attempt. AT commands can be issued in autobaud mode to place the MCA into the Hayes keyboard dialing state. For information on Hayes keyboard dialing, refer to Chapter 5, “Hayes keyboard dialing”.

Autobaud and autoparity

The MCA uses an autobaud and autoparity feature to automatically detect the speed and parity of the attached terminal. The baud rate and parity are detected by entering AT and a CR while in Hayes keyboard dialing or entering a period (.) and CR while in Nortel KBD. The default rate is 9600 bps during power-up. After the MCA has been set to a new speed, it retains that speed until either another autobaud takes place or a power-off occurs.

The default parity is a space and may be changed when datafilling tables. The user may change the parity by entering AT and a carriage return while in the Hayes keyboard dialing or entering a period (.) and CR while in Nortel KBD. In the data transfer mode, the parity bit is padded transparently as data for 7 bit codes.

When the user is in the Nortel KBD state, the MCA returns to the autobaud mode at the completion of any call origination attempt. Also, when the user is in Nortel KBD state, an AT command can be in autobaud mode to place the MCA into Hayes keyboard dialing state. For information on Hayes keyboard dialing, refer to Chapter 5, “Hayes keyboard dialing”.

Terminal parameters

Terminal parameters, such as baud rate, can be printed on the user’s terminal. Procedure 4-1 describes the steps necessary to display the user’s terminal parameters.

Procedure 4-1
Displaying terminal parameters

1 Press the CR key. The screen displays the following information:

```
ENTER NUMBER OR H (FOR HELP):
```

A prompt appears on the screen. The only valid characters are those on the screen. Illegal characters result in the following prompt:

```
INVALID COMMAND/ENTRY, REENTER:
```

2 Enter H. The screen displays the main menu.

3 Enter Program. The screen displays the following information:

```
Engineering code = NT2K0009
Release = 01
Firmware = 3.5
Baud Rate = 19200
Parity = ODD
DTR = ON
DCD = ON
VLL = OFF
Hotline = OFF
Remote Loopback = OFF
Manual Answer = OFF
Data Directory Number = 4000
Auto Dial No. = 3600
```

Nortel KBD menus

Main menu

The main menu is displayed when the terminal is properly set up for operation and no Nortel KBD call is in progress. This menu contains feature operation selections and instructions. Functions can be selected by entering the letter representing the function required. Figure 4-2 shows an example of the main menu format.

Figure 4-2
Main menu

```
                    MAIN MENU

A – AUTODIAL                    S – SPEED CALL
C – CALL                        M – MODIFY
P – DISPLAY PARAMETERS          D – SCRIPT FILE DIRECTORY
CTRL Z TO ABORT KEYBOARD DIALING
SELECT:
```

Modify menu

The main menu displays when the modify function is selected from the main menu. This menu allows the user to update features, verify the integrity of the data and signaling channels of the data loops, set the data call answer mode, and display information about the terminal parameters. Figure 4-3 shows an example.

Figure 4-3
Modify menu

```
                    MODIFY MENU

A – AUTO NUMBER                 M – MANUAL ANSWER
S – SPEED NUMBER                F – SCRIPT FILE
R – REMOTE LOOPBACK             Q – QUIT MODIFY MENU
SELECT:
```

User input characteristics

User keyboard dialing input must conform to the following characteristics:

- All input is echoed to the terminal screen. After the call is connected, the data option is transparent to the data activity between the terminal and the host. Therefore, the host performs the echo.
- Input can be either lower or upper case followed by a carriage return <CR>.
- Input in response to prompts for numbers must be numeric.
- Invalid input results in a prompt to reenter.
- Input can be edited by using the backspace key.
- An entire input line can be deleted by using the delete key.

- The maximum number of characters allowed before a carriage return is 40. Exceeding this number of characters results in a re-prompt.
- The input session can be aborted before a data connection by entering a Ctrl-Z. (Hold down the Ctrl and Z keys simultaneously.) Refer to the "Data call disconnection" section in this chapter.

Message prompt characteristics

Message prompts have the following characteristics

- Call progress tones are not provided while initiating data calls using Nortel KBD.
- All prompts are in upper case and are preceded by a line feed.
- Prompts requiring user input are followed by a colon (**:**) and three spaces.
- Questions requiring a yes or no response are followed by a question mark (?). Possible responses to the questions are in parenthesis ( ). If a carriage return is allowed as a default, then the response is shown in brackets [ ].
- Other prompts end with a carriage return and a line feed.

Nortel KBD dialing procedures

Manual dialing

The following procedures present dialing instructions for Nortel KBD operation. The following procedure illustrates step-by-step the manual dialing instructions used for both local and remote data calls.

Procedure 4-2
Dialing manually

1 Press the CR key. The screen displays the following information:

```
ENTER NUMBER OR H (FOR HELP):
```

A prompt appears on the screen. The only valid characters are those on the screen. Illegal characters result in the following prompt:

```
INVALID COMMAND/ENTRY, REENTER:
```

2 Enter H. The screen displays the main menu.

3 Enter C. The screen displays the following information:

```
ENTER NUMBER:
```

4 Enter a directory number (DN).

```
CALLING nnnn
```

Comments: nnnn = DN. The MCA sends the digits to the switch to place the call. The host sends the dialed digits to the MCA.

Note: The digit display feature supplies both the number called and the number that answers the call. These are separated by a space. If the digit display feature is not assigned to the data option, then no digits appear after CALLING (step 4). If the user enters nnnn <CR> instead of H <CR>, skip Steps 2 and 3.

Data speed call activation

This procedure shows how to use keyboard dialing to dial a data speed call. The Meridian SL-100 (MSL-100) system does not respond to attempts to access the speed call feature that has not been datafilled for the MCA. The call is abandoned. The data option sends the prompt NOT IN SERVICE and releases the call. When the system idles the DN, the data option sends the prompt RELEASED.

Speed calling is compatible with modem pooling.

A speed call number may be modified either by programming a new number using the Modify Menu or a service change can be made to the database. Procedure 4-3 describes how to activate a data speed call.

Procedure 4-3
Activating a data speed call

1 Press the CR key. The screen displays the following information:

```
ENTER NUMBER OR H (FOR HELP):
```

A prompt appears on the screen. The only valid characters are those on the screen. Illegal characters result in the following prompt:

```
INVALID COMMAND/ENTRY, REENTER:
```

2 Enter H. The screen displays the main menu.

3 Enter S. The screen displays the following information:

```
ENTER ACCESS CODE:
```

Comments: User selects speed call feature.

4 Select the speed call feature by entering the two-digit speed call code. The screen displays the following information:

```
CALLING nn
```

Comments: The MCA sends the speed call and the entered digit to the switch to place the call. The switch places the predesignated number and sends the digits to the MCA.

Note: The digit display feature supplies both the number called and the number that answers the call. These are separated by a space. If the digit display feature is not assigned to the data option, then no digits appear after CALLING (step 4). If an excessive number of digits are entered, the system accesses the number of digits it needs and ignores the remaining digits.

Autodial call activation

This procedure initiates a data call to a previously programmed autodial number using KBD. If an attempt is made to access the autodial feature and it has not been programmed for the MCA, the MSL-100 dial tone out occurs. The call is abandoned by the system. The data option sends the prompt not in service and releases the call. When the system idles the DN, the Data Option sends the prompt RELEASED.

Autodial is compatible with modem pooling.

An autodial number may be modified with a service change to the data base. Use the modify menu to add a new autodial number. See Procedure 4-4.

Procedure 4-4
Activating an autodial call

1 Press the CR key. The screen displays the following information:

```
ENTER NUMBER OR H (FOR HELP):
```

A prompt appears on the screen. The only valid characters are those on the screen. Illegal characters result in the following prompt:

```
INVALID COMMAND/ENTRY, REENTER:
```

2 Enter H. The screen displays the main menu.

3 Enter A. The screen displays the following information:

```
CALLING nnnn
```

Comments: The MCA sends the DN and the Autodial command to the switch to place the call. The switch places the predesignated number and sends the digits to the MCA.

Data call disconnection

After establishing a data call, it may be disconnected in one of the following ways:

- Called party—disconnects the user enters the Ctrl-D command that causes the far end to disconnect the data call. The far end then drops the data terminal ready (DTR) lead to its data unit. This data unit then initiates the call disconnection.
- Terminal OFF-LINE—many terminals have an on-line switch. Setting this switch in the OFF-LINE position normally causes the DTR to drop the data option in the OFF state. This condition in turn causes the data option to release the data call.
- Terminal power OFF—if the terminal power is switched OFF, then the data call is disconnected by the data option. However, if it remains connected, the assert DTR feature is ON.
- Log off—the user exits from the host system by signing off.
- Three short breaks—if the terminal sends three successive breaks lasting longer than 100 ms within 3 sec, then the call is disconnected.

If the user wants to abandon the call during setup, then the user can release the call by executing a Ctrl-Z. (Hold down the Ctrl and Z keys simultaneously.) The data option is released. This method of releasing a call only works during call setup. After the call is established, the user must release the call as described above. This also includes the modify menu.

Calling sequence

Calls may be either local or remote. Remote calls can be placed using either digital trunks or automated modem pooling. After the call has been initiated, the call progression depends on which type of call has been placed.

Local calls

In some cases, the data call is not established.

If the call is abandoned by the switch or terminated by the user, it could be for the following reasons:

- No answer—if the called number does not answer, the user is responsible for disconnecting the call.
- Busy number—if the called number is busy, the switch sends a busy notification to the MCA. The MCA sends the prompt BUSY, RAG? (Y/N) to the user. (The RAG feature is discussed later in this chapter.)

- Incorrect number—upon receiving an incorrect number, the switch sends a message to the MCA informing it that the number was incorrect. The MCA sends the prompt NOT IN SERVICE and releases the call. When the switch idles the DN, the MCA sends the prompt RELEASED.

Procedure 4-5
Placing local calls

1 Place a local call. The screen displays the following information:

```
RINGING
ANSWERED
```

Comments: The switch sends the call state to the MCA.

2 The screen displays the following information after the called host answers.

```
CALL CONNECTED.
SESSION STARTs.
```

Comments: The MCA sends the connected message to the switch.

3 Follow the log-in procedure.

Comments: The host sends the prompt for login, and the data session between the terminal and the host begins.

Modem pool calls

With automated modem pooling, the switch automatically determines if the called party must be reached by way of a modem. If so, then the modem is automatically accessed for the user. If the call cannot be connected, then the user is given a message prompt stating the compatibility requirements.

Note: MSL-100 does not support prefix NRS outbound modem pooling.

Remote calls can be placed using either digital trunks or automated modem pooling. Speed calling and autodialing are compatible with modem pooling. The RAG feature is not available for remote calls on manual modem pooling.

RAG

Ring Again (RAG) is available for local calls and for queuing on trunk calls. This procedure is active until the user places a call to a busy number.

Note: RAG is not available for remote calls on manual modem pooling.

When the RAG feature is implemented, the user can activate the call by entering a CR on the terminal keyboard. If a CR is not entered within the RAG timeout period, the switch cancels the RAG and the MCA sends the prompt RELEASED.

If the user changes the speed of the terminal without re-autobauding, the prompt displayed in step 3 is meaningless.

If a data call is in progress and the called number against which RAG was placed becomes free, no prompt is sent to the user. The switch cancels the RAG after the RAG timeout. Refer to Procedure 4-6 for using the RAG feature.

Procedure 4-6
Using RAG feature

1 The screen displays one of the following messages after the user places a call to a busy number.

```
BUSY, RAG? (Y/N)
```

Note: The switch sends the call state to the MCA.

```
BUSY, PREVIOUS RAG ACTIVE, REPLACE? (Y/N)
```

Note: This prompt indicates that RAG is already active.

2 Enter Y. The screen displays the following information:

```
RAG PLACED

RELEASED
```

Comments: The MCA uses the RAG feature, or the MCA cancels the previous RAG.

When the called number becomes free:

3 The screen displays the following information:

```
DATA STATION NOW AVAILABLE.
PLACE CALL? (Y/N)
```

Comments: The MCA sends a BELL character to the terminal. A carriage return indicates a Yes reply.

4 Enter Y or a carriage return. The screen displays the following information:

```
CALLING nnnn
```

Modify

The Modify feature allows the user to manipulate the following information:

- change stored Autodial numbers
- change any of the stored Speed Call numbers
- set the MCA into the Remote Loopback mode
- select manual or auto answer
- modify Script files

Autodial number

Procedure 4-7 describes how to modify an autodial number.

Procedure 4-7
Modifying an autodial number

1 Press the CR key. The screen displays the following information:

```
ENTER NUMBER OR H (FOR HELP):
```

A prompt appears on the screen. The only valid characters are those on the screen. Illegal characters result in the following prompt:

```
INVALID COMMAND/ENTRY, REENTER:
```

2 Enter H. The screen displays the main menu.

3 Enter M to select the Modify Menu.

4 Enter A to select Auto Number. The screen displays the following information:

```
AUTO DIAL NO.:
```

5 Enter the new autodial number in the following format: nnnnnnn.

6 Enter Q.

Comments: The screen displays the main menu, and the user can activate another feature.

Note: If the user releases the call at step 5, the original autodial number is retained by the switch.

Speed call number

Procedure 4-8 describes how to modify a speed call number.

Procedure 4-8
Modifying a speed call number

1 Press the CR key. The screen displays the following information:

```
ENTER NUMBER OR H (FOR HELP):
```

A prompt appears on the screen. The only valid characters are those on the screen. Illegal characters result in the following prompt:

```
INVALID COMMAND/ENTRY, REENTER:
```

2 Enter H. The screen displays the main menu.

3 Enter M to select the Modify Menu.

4 Enter S to modify the speed call number. The screen displays the following information:

```
ENTER ACCESS CODE:
```

5 Enter the new two-digit speed call number. The screen displays the following information:

```
SPEED NUMBER:
```

6 Enter the new directory number associated with the speed call number.

Comments: The user can either modify a speed call number or enter a new number. The user can keep the number the same by entering a carriage return only.

7 Enter Q.

Comments: The screen displays the main menu, and the user can activate another feature.

Note: If the user releases the call before entering the new speed call number, the original number is retained by the switch.

Manual answer

Procedure 4-9 describes how to set manual answer.

Procedure 4-9
Setting manual answer

1 Press the CR key. The screen displays the following information:

```
ENTER NUMBER OR H (FOR HELP):
```

A prompt appears on the screen. The only valid characters are those on the screen. Illegal characters result in the following prompt:

```
INVALID COMMAND/ENTRY, REENTER:
```

2 Enter H. The screen displays the main menu.

3 Enter M to select the modify menu.

4 Enter M to select manual answer. The screen displays the following information:

```
MANUAL ANSWER (Y/N):
```

5 Enter Y or N.

Comments: The user can change manual answer by entering a Y or keep it the same by entering either N or a carriage return only.

6 Enter Q.

Comments: The screen displays the main menu, and the user can activate another feature.

Remote loopback

In the remote loopback mode, the MCA causes the called data unit to loop all the data back to the sending MCA. (This is used to test the MCA. For more information on testing, refer to the "Testing and Maintenance" chapter.) Procedure 4-10 describes how to set the remote loopback.

Procedure 4-10
Setting the remote loopback mode

1 Press the CR key. The screen displays the following information:

```
ENTER NUMBER OR H (FOR HELP):
```

A prompt appears on the screen. The only valid characters are those on the screen. Illegal characters result in the following prompt:

```
INVALID COMMAND/ENTRY, REENTER:
```

2 Enter H. The screen displays the main menu.

3 Enter M to select the modify menu.

4 Enter R to select remote loopback. The screen displays the following information:

```
REMOTE LOOPBACK (Y/N):
```

5 Enter Y or N.

Comments: The user can change remote loopback by entering a Y or keep it the same by entering either N or a carriage return only.

6 Enter Q.

Comments: The screen displays the main menu, and the user can activate another feature.

Script file

The script file feature allows users to store host/terminal dialogs in the MCA, which can be recalled and used to automatically perform log-on procedures. Procedures in this section illustrate the script file feature and associated menus. The first menu, main script menu, appears when accessing the Script File option from the Modify menu. From there, two other menus can be accessed, the learn script menu and the delete script menu.

Main script menu

The main script menu provides three possible options. The first two involve accessing the learn and delete script menus, and the third is for modifying the escape code.

Learn script menu

Script files are associated with either the autodial feature or the speed call feature. The learn script menu allows a user to learn a script file for either feature.

If the feature selected already has an existing script, the user may either delete that script or quit the learn process.

After the learn script procedure, the user must initiate an autodial or speed call for which the learn script mode has been set. If a call using the same feature specified in the learn script menu is not made, the learn script mode is canceled; a script is not created.

After initiating an autodial or speed call, the learn script mode executes and the script is saved on receipt of the escape sequence.

The learn script menu allows the user to display existing scripts saved in the MCA. The example directory in the “Accessing learn script menu procedure” shows the autodial feature distinguished from the speed call feature by the letter A in the access code field. The names, byte counts, space, bytes available, and percent space available are also shown.

Procedure 4-11
Accessing main script menu

1 Press the CR key. The screen displays the following information:

```
ENTER NUMBER OR H (FOR HELP):
```

A prompt appears on the screen. The only valid characters are those on the screen. Illegal characters result in the following prompt:

```
INVALID COMMAND/ENTRY, REENTER:
```

2 Enter H. The screen displays the main menu.

```
                        MAIN MENU
A – AUTO DIAL                   S – SPEED CALL
C – CALL                        M – MODIFY
P – DISPLAY PARAMETERS          D – SCRIPT FILE DIRECTORY
CTRL Z TO ABORT KEYBOARD DIALING
SELECT:
```

3 Enter M to select the Modify Menu.

```
                    MODIFY MENU

A – AUTO NUMBER                 M – MANUAL ANSWER
S – SPEED NUMBER                F – SCRIPT FILE
R – REMOTE LOOPBACK             Q – QUIT MODIFY MENU
SELECT:
```

4 Enter F to select Script File. The screen displays the following information:

```
L – LEARN SCRIPT      E – ESCAPE CODE
D – DELETE SCRIPT     Q – QUIT SCRIPT MENU

SELECT:
```

If	Do
you want to access the Learn Script menu,	step 5
you want to access the Delete Script menu,	step 6
you want to access the Escape Script menu,	step 7
you want to quit,	step 8

5 Enter L to select Learn Script. The screen displays the following information:

```
A – LEARN AUTO DIAL SCRIPT   D – SCRIPT FILE DIRECTORY
S – LEARN SPEED CALL SCRIPT  Q – QUIT LEARN MENU


SELECT:
```

6 Enter D to select Delete Script. The screen displays the following information:

```
A – DELETE AUTO DIAL SCRIPT S – DELETE SPEED CALL SCRIPT
D – SCRIPT FILE DIRECTORY   Q – QUIT DELETE MENU

SELECT:
```

7 Enter E to select Escape Script. The screen displays the following information:

```
ESCAPE CODE = [xxh]   MODIFY (Y/N)?
```

8 Enter Q to quit and return to the main menu. (The user can now activate another feature.)

Procedure 4-12 describes the steps needed to access the learn script menu.

Procedure 4-12
Accessing learn script menu

1 Press the CR key. The screen displays the following information:

```
ENTER NUMBER OR H (FOR HELP):
```

A prompt appears on the screen. The only valid characters are those on the screen. Illegal characters result in the following prompt:

```
INVALID COMMAND/ENTRY, REENTER:
```

2 Enter H. The screen displays the main menu.

```
                        MAIN MENU
A – AUTO DIAL                   S – SPEED CALL
C – CALL                        M – MODIFY
P – DISPLAY PARAMETERS          D – SCRIPT FILE DIRECTORY
CTRL Z TO ABORT KEYBOARD DIALING
SELECT:
```

3 Enter M to select the modify menu.

```
                       MODIFY MENU

A – AUTO NUMBER                 M – MANUAL ANSWER
S – SPEED NUMBER                F – SCRIPT FILE
R – REMOTE LOOPBACK             Q – QUIT MODIFY MENU
SELECT:
```

4 Enter F to select script file. The screen displays the following information:

```
L – LEARN SCRIPT      E – ESCAPE CODE
D – DELETE SCRIPT     Q – QUIT SCRIPT MENU

SELECT:
```

5 Enter L to select learn script. The screen displays the following information:

```
A – LEARN AUTO DIAL SCRIPT   D – SCRIPT FILE DIRECTORY
S – LEARN SPEED CALL SCRIPT  Q – QUIT LEARN MENU


SELECT:
```

If	Do
a script exists,	steps 6 and 7
a script does *not* exist,	steps 8–12

6 Enter A to select learn autodial script or S to select learn speed dial script.

Comments: The system displays a question asking if existing script should be deleted. These prompts apply for both autodial and speed call script types.

7 Enter Y to delete the script or N to retain the script.

Comments: If you enter Y, the terminal displays the appropriate delete prompt. If you enter N, the terminal displays the learn script menu.

8 Enter A to select learn autodial script or S to select learn speed dial script. The screen displays the following information:

```
xxxx of xxxx BYTES AVAILABLE FOR NEW SCRIPT.
ACTIVATE LEARN MODE (Y/N)?
```

9 Enter Y to activate learn mode. The screen displays the following information:

```
ENTER SCRIPT NAME:
```

10 Enter the script name. The screen displays the following information:

```
ESCAPE CODE = [xxh]   MODIFY (Y/N)?
```

11 Enter N to retain the escape code and display the learn script menu. Learn mode starts with autodial call and ends with escape code sequence.

12 Enter D to display the script file directory. The screen displays the following information:

```
SCRIPT FILE DIRECTORY

ACCESS     SCRIPT     LENGTH
CODE       NAME       (bytes)
---------------------------
A          COCOS      924
00         HP3000     615
01         X.25       154

xxxx of xxxx BYTES AVAILABLE FOR A NEW SCRIPT.
```

Delete script menu

The delete script menu allows the user to specify the script file to be deleted by choosing the feature that the script file has been associated with in the learn script mode. The example directory in the following procedure shows the autodial feature distinguished from the speed call feature by the letter A in the access code field. The names, byte counts, space, bytes available, and percent space available are also shown.

Procedure 4-13
Accessing delete script menu

1 Press the CR key. The screen displays the following information:

```
ENTER NUMBER OR H (FOR HELP):
```

A prompt appears on the screen. The only valid characters are those on the screen. Illegal characters result in the following prompt:

```
INVALID COMMAND/ENTRY, REENTER:
```

2 Enter H. The screen displays the main menu.

```
                    MAIN MENU
A – AUTO DIAL                 S – SPEED CALL
C – CALL                      M – MODIFY
P – DISPLAY PARAMETERS        D – SCRIPT FILE DIRECTORY
CTRL Z TO ABORT KEYBOARD DIALING
SELECT:
```

3 Enter M to select the modify menu.

```
                    MODIFY MENU

A – AUTO NUMBER                  M – MANUAL ANSWER
S – SPEED NUMBER                 F – SCRIPT FILE
R – REMOTE LOOPBACK              Q – QUIT MODIFY MENU
SELECT:
```

4 Enter F to select script file. The screen displays the following information:

```
L – LEARN SCRIPT   E – ESCAPE SCRIPT
D – DELETE SCRIPT  Q – QUIT SCRIPT MENU


SELECT:
```

5 Enter D to display the delete script file menu. The screen displays the following information:

```
A – DELETE AUTODIAL SCRIPT  S – DELETE SPEED DIAL SCRIPT
D – SCRIPT FILE DIRECTORY  Q – QUIT DELETE MENU

SELECT:
```

If	Do
you want to delete the autodial script,	steps 6 and 7
you want to delete the speed dial script,	steps 8 and 9

6 Enter A to select autodial script deletion. The screen displays the following information:

```
AUTO DIAL SCRIPT [script name] EXISTS.
DELETE (Y/N)?
```

7 Enter Y to delete the autodial script, or enter N to retain the autodial script.

Comments: If Y is entered, the screen displays the following information:

```
DELETING
```

Comments: If N is entered, the screen displays the following information:

```
SCRIPT NOT DELETED
```

Note: If the script does not exist, the system returns the user to the delete script file menu.

8 Enter S to select speed dial script deletion. The screen displays the following information:

```
DELETE EXISTING SPEED SCRIPT FOR ACCESS CODE xx
[script name] (Y/N)?
```

9 Enter Y to delete the speed dial script, or enter N to retain the speed dial script.

Comments: If Y is entered, the screen displays the following information:

```
SPEED SCRIPT DELETED FOR ACCESS CODE xx [script name]
```

Comments: If N is entered, the screen displays the following information:

```
SCRIPT NOT DELETED
```

Note: If the script does not exist, the system returns the user to the delete script file menu.

Example script

Table 4-2 shows an example script file.

Table 4-2
Example script file

Prompt	User input
Tag (Access Code):	**Autodial**
Name:	**Cocos**
Actual Script:	
HOST PROMPT:	**X25 >**
DTE RESPONSE:	**C000004630100 <CR>**
HOST PROMPT:	**Password**
DTE RESPONSE:	**Meridian <CR>**
HOST PROMPT:	**Data Transfer mode**
PAUSE	
DTE RESPONSE:	**V**
HOST PROMPT:	**UserID**
DTE RESPONSE:	**SLLEA01**
HOST PROMPT:	**Password**
PRIVACY MODE	
END SCRIPT	

—end—

Escape sequences

The escape code can be modified at either the main script menu or just before activating the learn mode in the learn script menu.

After establishing a call in the learn mode, the escape sequence performs one of the following tasks:

- If the MCA receives one escape character, it inserts one pause (lasting 1 second) into the script file. The user may enter as many consecutive pauses as needed.
- If the MCA receives two escape characters, it puts the user into the privacy mode. This mode is used for password protection because any additional characters entered by the user are not stored in the script. The privacy mode is terminated by a carriage return from the user.

- A sequence of three escape characters saves the script to the MCA's EEPROM. The user is not interrupted, and the data call continues without losing data.

Incoming calls

Manual answer

Use Procedure 4-14 when the user's answer mode is set for manual answer and an incoming data call occurs. If the user changes the speed of the terminal without re-autobauding, the data displayed on the screen at step 1 is meaningless. If the call is released at step 1, the prompt RELEASED is displayed. If the digit display feature is not assigned to the MCA, the calling number is not displayed at step 1.

Procedure 4-14
Answering incoming calls manually

1 The user receives an incoming call, and the screen displays the following information:

```
INCOMING CALL. ANSWER? (Y/N)
```

Comments: The MCA sends a BELL character to the terminal. The screen displays the calling number. Entering a <CR> only is taken as a Yes reply.

2 Enter either Y or a carriage return only to answer the incoming call.

Comments: If the data call is established, the screen displays the following information:

```
ANSWERED
INCOMING CALL CONNECTED
```

Comments: If the calling party requests the MCA to loopback data, the screen displays the following information:

```
ANSWERED
UNDER TEST
```

Comments: If the incoming data call connection failed because of a mismatch in baud rate or an unsupported data pattern, the screen displays the following information:

```
ANSWERED
INCOMPATIBLE COMMUNICATION PARAMETERS

[parameter]
RELEASED
```

Auto answer

This procedure is used when the user's answer mode is set for Automatic Answer and an incoming data call occurs. If the user changes the speed of the terminal without re-autobauding, the data displayed on the screen at step 1 is meaningless. If the Digit Display feature is not assigned to the MCA, the calling number is not displayed at step 1. Procedure 4-15 describes how to establish Auto Answer.

Procedure 4-15
Answering incoming calls automatically

1 The user receives an incoming call, and the screen displays the following information:

Comments: If the data call is established, the screen displays the following information:

```
ANSWERED
INCOMING CALL CONNECTED
```

Comments: If the calling party requests the MCA to loopback data, the screen displays the following information:

```
ANSWERED
UNDER TEST
```

Comments: If the incoming data call connection failed because of a mismatch in baud rate or an unsupported data pattern, the screen displays the following information:

```
ANSWERED
INCOMPATIBLE COMMUNICATION PARAMETERS

[parameter]
RELEASED
```

Hayes keyboard dialing

Hayes keyboard dialing (KBD) allows you the option of using commands compatible with the Hayes V-series Smartmodem 9600 to originate and answer data calls. This allows the Meridian SL-100 (MSL-100) Communications Adapter (MCA) to be used with the following software packages that also support the Hayes protocol:

- Smartcom II V2.0
- Smartcom II V2.1
- Smartcom III V1.0
- Crosstalk V3.6
- Direct Access From Citibank (proprietary)

Hayes KBD or AT dialing provides you with the following capabilities:

- call origination to local and remote hosts
- modem pooling

  Note: MSL-100 does not support Prefix NRS outbound modem pooling.

- automatic and manual answering of incoming calls

Initialization

Before using the Hayes KBD feature, make sure you have performed the following steps:

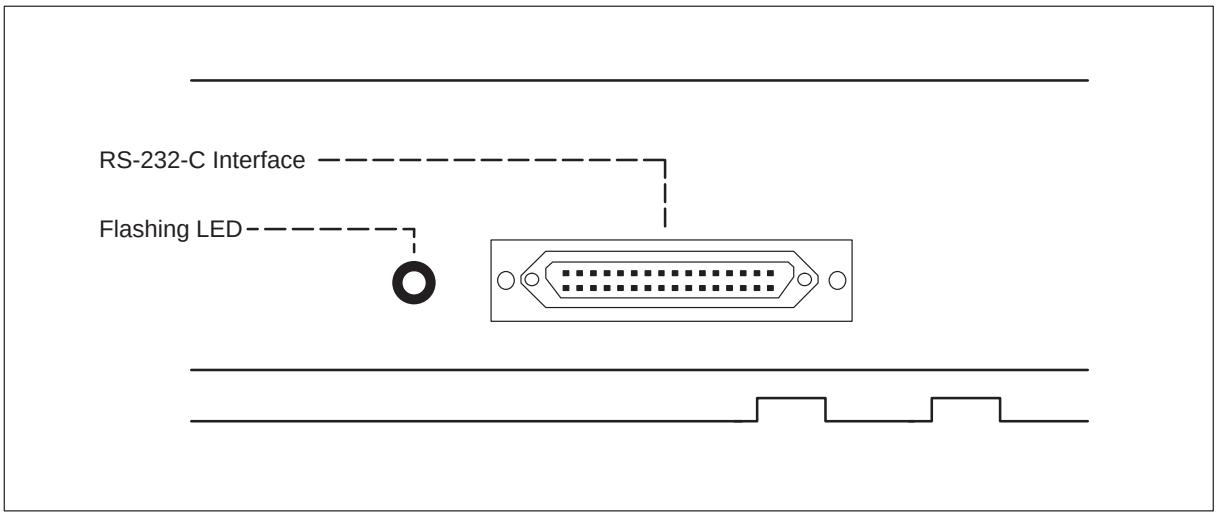
- Turn on the data terminal power
- Set the data terminal on-line
- Turn on MCA power
- the LED on the back of the MCA flashes at a constant rate indicating the MCA is functioning properly (See Figure 5-1)

The MCA operates in one of two modes: command or on-line. After initializing the MCA, the command mode becomes active. The command mode continues until an acceptable autobaud character is entered. To activate Hayes KBD, enter AT. AT must be either AT or at. At and aT are

not recognized. The S66 register determines the default keyboard version when no autobaud character is entered.

Hayes commands can be issued only when the MCA is in this state. When you are in the Hayes KBD state, the MCA returns to the command state after each command line is entered and after a call is completed.

Figure 5-1
MCA flashing LED



Autobaud and autoparity

The parameter, S66 register, determines how autobaud and autoparity characters are interpreted. S66 allows Hayes compatible software packages to execute without inadvertently entering the Nortel KBD state. The S66 default setting (the state which is active each time the autobaud state resumes) is originally determined by the KBDTYPE field within the MCA operating parameter download. Selecting Hayes in the download clears the S66 register while selecting KBD sets it. This register can also be manipulated with regular AT commands or with the P66 command from the keypad.

Note: A change made with the P66 command changes the default setting while a change made with AT commands does not.

Parameter S66 register (nonzero)

If the S66 register contains a nonzero value (Nortel KBD), the autobauding operates as follows:

- If a carriage return (0DH) is entered followed by a period (2EH) and another carriage return (0DH), the Nortel KBD becomes active. Autobaud and autoparity are performed.

- If only a carriage return (0DH) is entered, the Nortel KBD becomes active with only an autobaud performed. For more information about Nortel KBD, refer to the section on Nortel keyboard dialing (KBD).
- If AT, or at, or A/, or a/ is entered, Hayes KBD becomes active with an autobaud and autoparity performed. All other characters are ignored within the autobaud state.

Parameter S66 register (zero)

If the S66 register contains a zero value (Hayes KBD), the autobauding operates as follows:

- If a carriage return (0DH) is entered, it is echoed to the DTE.

  Note: An autobaud is performed with the carriage return, but the system remains in the command state.

- If AT, or at, or A/, or a/ is entered, Hayes KBD becomes active with an autobaud and autoparity performed. All other characters are ignored within the command state.

Incoming calls activate the most recently used keyboard dialing method. The prompts are transmitted at the previously detected data (baud) rate. At that time, the proper incoming call prompt is displayed. If the data rate of the DTE is changed but no autobaud has occurred between the time the DTE changes and the arrival of the incoming call message, the prompts are transmitted at an incompatible data rate.

The MCA does not have a previous data rate if it has not been autobauded since power up or since the line had maintenance performed on it. If the MCA has no previous data rate stored, the incoming call prompt is transmitted at the baud rate sent in the operating parameter download. Change this rate by using the Program22 command. This action saves your desired baud rate in the event of power loss. If the DTE is not set to that data rate, garbage could be displayed.

Implementing the Program66 command

The Program66 key allows the user the flexibility of issuing Hayes commands while in Nortel KBD or exiting Nortel KBD and entering Hayes keyboard dialing. The Program66 command contains four scrolling screens that enable the user to select which type of modem the MCA can emulate. The product code with respect to each modem emulation is automatically set up. Unless otherwise requested, the screens are presented on the set's display as shown in Table 5-1.

To select a specific emulation, press Program66. The default screen selection depends upon the Hayes KBDTYPE field of the MCA profile.

Scroll through the choices. To select an emulation choice, when the emulation choice appears on the screen, press Program.

Table 5-1
P66 command screens

Screen	Emulation selection	Action (scroll <<< >>>)
Screen 1	Emulate Smartmodem 9600	Press Program to select emulation and exit.
Screen 2	Emulate Smartmodem 2400	Press Program to select emulation and exit.
Screen 3	Emulate Smartmodem 1200	Press Program to select emulation and exit.
Screen 4	Nortel KBD Dialing	Press Program to select emulation and exit.

The product codes associated with each are 960, 240, and 122, respectively and correspond to the values that are assigned to the S52, S53, and S54 registers.

The user can see which Program66 state is currently active by entering the Program62 command. See Procedure 3-20 in Chapter 3, “Keypad dialing” for instructions on using the Program62 command to display the current Program66 state.

To return to the Hayes keyboard dialing from Nortel keyboard dialing, enter the Program66 command and reselect one of the Hayes KBD Dialing options or enter an AT command from the Nortel KBD state.

The HAYES COMPATIBLE MODEM prompt appears when the S66 register is zero (modem emulation), but the values in registers S52, S53, and S54 do not match one of the standard Hayes product codes previously mentioned. To emulate a modem with a product code not mentioned in the previous paragraphs, select any one of the emulation screens from the P66 menu. (This is done to cause the S66 register to be zero. The S66 register can also be set to zero manually). Then, manually assign a different product code to the S52, S53 and S54 registers.

As an example, if screen 1 of the P66 command is chosen, the registers contain the following values:

- S52 = 57
  Hayes = 9 (39h ASCII value)

- S53 = 54
  Hayes = 6 (36h ASCII value)
- S54 = 48
  Hayes = 0 (30h ASCII value)

The values in the registers are not straightforward. The value of 57 in the S52 register is obtained by first taking the ASCII value of the desired number, 9" = 39h, and converting this 39h to the decimal value of 57. This conversion is necessary for two reasons. First, letter assignments are not allowed as part of the product code where the ASCII chart shows numeric values for letters as well as numbers; secondly, ASCII codes can not be entered directly into the registers because all S registers must contain decimal values only.

Therefore, to change the value of the S52 register to number 5, first realize that the ASCII value for a 5 is 35h; then convert the ASCII value to the decimal value, 53. With this value known, then the S52=53 command is used to assign the value to the register.

Note: This allows the technician the capability to assign any ASCII character (letters included) to any of the S52, S53, and S54 registers as needed for product codes.

S registers

The S-Registers (S0 to S69) may be used to program various call setup parameters. To query the value of a particular S-register, enter the command as follows:

Sr?

where r equals 1 to 69.

For the S-Registers and their associated values used by the MCA, refer to Appendix B. Some registers defined in the Hayes keyboard dialing implementation are not applicable to the MCA and are ignored.

To reset registers S0 through S49 to their default values, the software reset commands, Z, Z1, &F, &Y, and &Y1, may be used. Registers S50 through S69 are reset to their default values only upon power up.

Register S0—ring to answer ON

S0 sets the ring for the MCA to automatically answer a call. Setting S0 = 0 disables auto-answer.

Register S1—ring count

The MCA automatically tracks the number of rings, incrementing and writing the value in S1.

Register S2—escape sequence character

S2 holds the ASCII value of the escape sequence character.

Register S3—carriage return character

S3 holds the ASCII value of the carriage return character.

Register S4—line feed character

S4 holds the ASCII value of the line feed character.

Register S5—backspace character

S5 holds the ASCII value of the backspace character.

Register S7—wait time for carrier

Calls can fail to complete the T-Link handshake successfully because of incompatible parameters or a noisy data path. Register S7 specifies the maximum time to wait for the handshake to complete. If data synchronization is not found in this amount of time, the call is released and a NO CARRIER prompt is displayed.

Register S12—escape sequence guard time

S12 holds the value of the delay required prior to and following the escape sequence. The guard time also dictates how quickly the escape sequence characters must be entered, since the interval between entry of each of the three characters must be of shorter duration than that specified for the guard time.

Register S36—baud rate adapting

When an attempt to make a connection fails due to incompatible baud rates, the MCA reads this register to determine whether to terminate the connection or to adapt to the far end baud rate. If S36 is set to 0, the MCA hangs up if the baud rates are incompatible. If S36 is set to 1 and the MCA is the answering party, then the MCA adapts to the calling party's baud rate.

Register S51—delay until modem pool activation

S51 holds the value of delay before outbound modem pool activation. Each decimal increment of S51 represents a .25 second delay. This register is not altered by the software reset commands.

Register S52 through S54—product code response

These three registers contain the Product Identification Code and are output in response to the I0” command. The default is 960” (Smartmodem V-series 960 modem). Other possible values are: 124” (Smartmodem 1200), 240” (Smartmodem 2400 or Smartmodem V-series 2400). These registers are not altered by the software reset commands.

Register S66—Hayes/keyboard dialing autobaud interpretation

S66 defaults to the value sent in the operating parameters. If no download of operating parameters occurs, the default value is zero (Hayes keyboard dialing).

Hayes keyboard dialing command syntax

All Hayes commands are prefixed by AT and followed by a carriage return. The carriage return executes the AT command. The repeat previous command (A/) is the only exception to the command line structure; it is sent without the AT prefix and must appear on a line by itself. The MCA examines the AT prefix and automatically determines the baud rate and parity settings of the data terminal equipment. Both letters of the AT prefix must be entered using all upper case or all lower case (at or AT). The MCA does not recognize an upper case A and a lower case t (At) or the reverse combination (aT).

Each command line can contain a number of commands concatenated together, however, each line is limited to a maximum of 40 characters (excluding the AT). Some commands must be entered on a line by themselves as they prevent other commands on the same line from being processed. Most AT commands have selectable numeric parameters. For example, E0” turns off character echo while E1” turns it on. Punctuation characters (- ,) are allowed for readability but take up space in the 40-character command line buffer. A space (ASCII 20H) can also be used but does not take up space in the buffer.

User input characteristics

When you enter data for AT Dialing, it must conform to the following characteristics:

- Each command line must begin with the letters AT or at and end with a carriage return. If the MCA is in autobaud mode, AT is used to set autobaud and autoparity. Processing of the command line is not performed until the carriage return is received.
- You may enter data in either upper or lower case, but not mixed.
- You may edit each character on each command using the Backspace and Delete codes.

- Each command line can contain several commands without delimiters. Each line is limited to 40 characters, excluding the AT command.
- Punctuation characters, like commas or parentheses, are allowed but are included in the character count of the command line. A space can also be used, but it is not counted in the character count.
- Commands entered without a numerical parameter are assumed to be 0. For example, if you entered ATE", it is interpreted as ATE0 and disables the echoing of keyboard dialing commands.
- Call setup parameters may be programmed using a register set called the S-registers. (Refer to Appendix B and the section on S-registers for detailed information).

A range check is not made on the value assigned to an S-register. The range in Procedure 4-1 describes only those values that give the expected results. Any other values may or may not function as desired and are not flagged as an error when the command is processed. For more information on S-registers, refer to the *Meridian Modular Telephones Reference Manual*..

The MCA remains in or enters the command state:

- when the MCA is powered up
- when no carrier, no dialtone, or busy is detected while originating or answering a call
- when a carrier signal from the remote modem is lost
- when the &D1, &D2, or &D3 option is selected and the MCA detects an on-to-off transition of DTR
- when a semicolon ; is entered at the end of the dial D command to return the MCA to the command state
- when the escape sequence +++ is entered while the MCA is on-line
- when a call is dropped using a valid break sequence

Procedure 5-1
Using the Hayes keyboard dialing escape sequence

1 Wait at least one second after previous entry.

2 Enter +++ with each character spaced less than 1 second apart.

3 Wait at least 1 second before next entry.

The MCA returns to the command state, and the screen displays the following prompt: OK.

In the Hayes command state, your input is interpreted as call setup information. When the call is established (indicated by the CONNECT prompt), the MCA enters the online state and transmits all data on the RS-232-C interface transparently across the network to the far end MCA. The MCA attempts to go on-line in the following situations:

- the dial command D is issued
- the on-line command O0 or O1 is issued
- the answer command A is issued
- the ring count (value of register S1) equals the numbers of rings to answer on (value of register S0)

In this state, the MCA acts as a full duplex device and it is the responsibility of the DTE connected to the far end MCA to respond to your input.

The return from on-line state to the command state may be performed by using an escape code sequence. The default escape sequence consists of a minimum of 1 second of no data followed by 3 plus signs +++ with less than 1 second between each adjacent +, followed by a minimum of 1 second of no data. It is extremely unlikely that such a sequence would be executed accidentally while in the on-line state.

To return to the command state while also dropping the call, execute an escape sequence of three breaks". This is not a conventional Hayes command sequence, but proves to be very useful. Both the escape guard time (one second) and escape character + are programmable using Registers S12 and S2. A typical example of the escape sequence is described in Using the Hayes keyboard dialing escape sequence".

After returning to the command state, you may, for example, release the call using the H command. Or you may re-enter the on-line state using the O command.

Hayes AT commands

Appendix A lists the AT commands supported by the MCA. See the *Meridian Modular Telephones Reference Manual* for more information on the Hayes commands.

If you enter commands without a numerical parameter, the parameter is assumed to be zero. For example, if you enter ATE, it is interpreted as ATE0 and disables the echoing of the keyboard dialing commands.

Result codes and message prompts

The MCA provides responses to commands in the form of result codes. Result codes are used as message prompts. These codes are either a numeric

code or word code, depending upon the value of the V parameter. Unless disabled with the Q1 command, a result code is displayed after a command is entered. Table 5-2 describes the Hayes KBD result codes.

Table 5-2
Result codes

Digit code	Word code	Meaning
0	OK	command line processed without error
1	CONNECT	data connection established
2	RING	incoming call
3	NO CARRIER	data synchronization lost or never found
4	ERROR	command line error
5	CONNECT 1200	data connection established at 1200 baud
7	BUSY	called number busy
10	CONNECT 2400	data connection established at 2400 baud
11	CONNECT 4800	data connection established at 4800 baud
12	CONNECT 9600	data connection established at 9600 baud
14	CONNECT 19200	data connection established at 19200 baud

Keyboard feature operation

Table 5-3 and the following sections illustrate the dialing procedures for AT keyboard dialing.

Dialing modifiers

Dial modifiers are special parameters used to communicate to the MCA how to dial the telephone number. Table 5-3 describes the dialing modifiers.

Table 5-3
Dial modifiers

Dial modifier	Description
0 –9	digits for dialing
A, B, C, or D	characters for dialing

—continued—

Table 5-3
Dial modifiers (continued)

Dial modifier	Description
#	If used in the MSL-100 dialing phase, this character instructs the PBX to begin dialing the digits entered up to this point (ATD9974500#). If used after the MSL-100 dialing phase, this character is outpulsed as a tone (ATD9974500,,,,1234#).
*	This character cannot be used in the MSL-100 dialing phase. If used after the MSL-100 dialing phase, this character is outpulsed as a tone (ATD9974500,,,,1234*).
,	This character delays processing the next character by 1 second (ATD4500,1234). This delay is fixed at 1 second and may not be altered by Register S0.
;	This character returns the MCA to the command state after dialing (ATD9974500;).
! or @	These characters can be used in the dialing string, but have no affect on the dialing sequence.
P, R, T, or W	These characters can be used in the dialing string, but have no affect on the dialing sequence.
—end—	

Establishing a Hayes keyboard call

Enter the command ATDnnnn to establish a Hayes KBD call. The MCA then sends the digits once the carriage return is received. Once the network and data connections are established, the screen displays the following message: CONNECT [baudrate].

Incomplete Hayes keyboard call

Calls can fail to complete the T-Link handshake because of incompatible parameters or a noisy data path. You must maintain synchronization. If it is not attained, the call is released. The S7 register specifies the maximum time to wait for the handshake to complete. If data synchronization is not found in this amount of time, the call is released. The screen displays the following message: NO CARRIER.

Auto answer

Incoming calls are answered automatically if register S0 is set to any value between 1 and 255. This value is the number of rings before the incoming call is answered by the MCA.

The MCA detects an incoming call, and the screen displays the following message: RING. The MCA then counts the number of rings up to the value of register S0 and answers the call. Once the MCA establishes the data connection, the screen displays the following message: CONNECT [baudrate].

Manual answer

If register S0 contains 0, the MCA does not answer automatically, and a data call must be answered using the ATA command. After this command is entered, the MCA answers the call and establishes a data connection. The screen displays the following message: CONNECT [baudrate].

Note: No audible ringing is provided by the MCA. The RI lead of the RS-232-C connection is high for two seconds and low for four seconds. This cycle is counted like physical ringing.

Incoming calls

Incoming calls activate the most recently used keyboard dialing type. The prompts are transmitted at the previously detected data rate.

If you have not set the autobaud, the MCA acts as though the autobaud is 19.2 kbps. If the terminal connected to the MCA is at any speed other than 19.2 kbps, then the display may be unreadable because of the incompatibility of the baud rates. Autobaud the MCA immediately following any MCA installation or maintenance.

If the data rate of the DTE changes and the autobaud has not been set, an incoming call is transmitted at an incompatible data rate.

Call disconnection

If a number has been dialed but a connection has not been established, the MCA is still in the command state. The call may be released by sending any character from the DTE to the MCA (an S7 time out) or by entering a valid break sequence.

If a data connection has been established, a call may be released by returning to the command state using the release sequence previously described followed by the H command. Alternatively, a call may be released by dropping DTR provided the MCA is datafilled with the &D2 or &D3 commands.

Appendix A
Hayes standard AT commands

Table 6-1 describes the standard Hayes AT commands. Each command must be preceded by AT or at when entered on a separate line. If the AT command is concatenated, then the AT is only used at the beginning of the command with a maximum of 40 characters.

Note: An asterisk (*) indicates default settings.

Table 6-1
Standard Hayes keyboard dialing commands

Command	Description
A/	Re-execute previous command line; not preceded with the letters AT nor followed by a carriage return.
A	Go into answer mode and attempt to go into the on-line state.
AT (CR)	Command line syntax
D	Go into originate mode; dial the number that follows; and attempt to go into the on-line state.
E0	Disable character echo in the command state.
E1*	Enable character echo in the command state.
H0	Go on-hook.
I0	Request product identification code and output contents of S registers S39–S41. Values are: 960 (Smartmodem V-series 9600), 124 (Smartmodem 1200), 240 (Smartmodem 2400 or Smartmodem V-series 2400).
I1	Returns a 2s compliment checksum of MCA ROM
I4	Displays a037800c004420 b100000000 (same value as Smartmodem V-series 9600 returns)
O	Go into the on-line state

—continued—

Table 6-1
Standard Hayes keyboard dialing commands (continued)

Command	Description
O1	Go into the on-line state
Q0*	MCA returns result codes.
Q1	MCA does not return result codes.
Sr	Set point to Register r.
Sr=n	Set Register r to Value n.
Sr?	Display value stored in Register r.
V0	Display result codes in numeric form.
V1*	Display result codes in verbose form (as words).
X0	Enable result codes 0–4.
X1	Enable result codes 0–5, 10–12, and 14.
X2	Enable result codes 0–5, 10–12, and 14.
X3*	Enable result codes 0–5, 7, 10–12, and 14.
X4*	Enable result codes 0–5, 7, 10–12, and 14.
&C0	Assume data carrier always present. This command asserts the control lead CD. This command is the default if ASERTCD DPOPT is datafilled for the MCA.
&C1	CD tracks far-end RTS. This command is the default if ASERTCD DPOPT is not datafilled for the MCA.
&D0	Ignore DTR. This command is the default if ASERTDTR DPOPT is datafilled for the MCA.
&D1	Assume command state when on-to-off transition of DTR occurs.
&D2	Hang up when on-to-off transition of DTR occurs. This command is the default if ASERTDTR DPOPT is not datafilled for the MCA.
&D3	Hang up and reset to default settings (like the MCA profile configuration).
&Q0*	Disable baud rate ADAPTING. MCA attempts to connect at the speed of last autobaud command. This command is the default if ADAPTING is disabled in the MCA profile. This command is displayed by SMARTCOM III if the V-SERIES ERROR CONTROL option is set to N. ***Note:*** The V-SERIES ERROR CONTROL option can be reached through the CONNECT SETTINGS menu of SMARTCOM III.

—continued—

Table 6-1
Standard Hayes keyboard dialing commands (continued)

Command	Description
&Q5	Enable baud rate ADAPTING. MCA attempts connection at baud rate of far end. This command is the default if ADAPTING is disabled in the MCA profile. This command is displayed by SMARTCOM III if the V-SERIES ERROR CONTROL option is set to Y or H. ***Note:*** The V-SERIES ERROR CONTROL option can be reached through the CONNECT SETTINGS menu of SMARTCOM III.
&R0	CTS and DSR tracks far-end DTR or CD. (Near-end RTS maps to far-end CD, which maps back to near-end CTS.) This command is the default if ASERTCD DPOPT is not datafilled for the MCA.
&R1	Assume CTS and DSR are always present. This command asserts the EIA control leads CTS and DSR. This command is the default if ASERTRTS DPOPT is datafilled for the MCA.
&S0	Assume CTS and DSR are always present. This command asserts the EIA control leads CTS and DSR. This command is the default if ASERTRTS DPOPT is datafilled for the MCA.
&S1	CTS and DSR tracks far-end DTR or CD. (Near-end RTS maps to far-end CD, which maps back to near-end CTS.) This command is the default if ASERTCD DPOPT is not datafilled for the MCA.
Z0	Reset MCA to default settings.
Z1	Reset MCA to default settings.
&F	Reset MCA to default settings.
&Y0	Reset MCA to default settings.
&Y1	Reset MCA to default settings.
	—end—

Table 6-2 lists other commands that are supported. However, they are not executed, and no error messages are returned.

Table 6-2
Supported commands not executed (no error messages

B0	B1	C0	C1	F0	F1	H1	I2	L0	L1	L2	L3	M0
M1	M2	M3	N0	N1	W0	W1	Y0	&G0	&G1	&G2	&J0	&J1
&K0	&K1	&K2	&K3	&K4	&K5	&L0	&L1	&M0	&P0	&P1	&T0	&W0
&W1												
—end—												

Appendix B
AT dialing parameter registers

The software reset command Z may be used to reset all the registers to their default values. Table 7-1 describes the Hayes keyboard dialing parameter registers.

Note 1: All values are in decimal form.

Note 2: The firmware does not perform a range check on the value assigned to an S register. The range in Table 7-1 only indicates those values that give the expected results. Any other values may or may not function as desired and are not flagged as an error when the command is processed. Valid ASCII codes range from 0 to 127. Values larger than 127 can disable the function associated with that S register. Values larger than 255 are accepted without an error, but are stored in module 256.

Table 7-1
Hayes keyboard dialing parameter registers

Register	Range	Default	Description
S0	0–255 rings	0	Number of rings before answer
S1	0–255 rings	0	Counts number of rings
S2	Any valid ASCII code	43	Escape code character
S3	Any valid character used for carriage return	13	ASCII code return
S4	any valid ASCII code	0	Character used for line feed
S5	0–32, 127 ASCII codes	8	Character used for Backspace
S7			Wait time for carrier
S8	0–255 sec	2	Pause time for comma (,) (not supported)
S10	1–255 x (0.1) sec	7	Loss of carrier timeout (not used)

—continued—

Table 7-1
Hayes keyboard dialing parameter registers (continued)

Register	Range	Default	Description
S12	20–255 x (0.02) sec	50	Escape sequence guard time
S21			RESERVED
S22			RESERVED
S36	0, 1	0	0 = No adapting 1 = Adapting
S37–S50	0–255	0	NOT USED
S51	0–255 x (0.25) sec	16	Delay until modem pool activation
S52	Any valid ASCII code	39	Most significant product code character
S53	Any valid ASCII code	36	Middle character of product code
S54	Any valid ASCII code	30	Least significant product code character
S55–S65	0–255	0	NOT USED
S66	0, 1	0	Hayes keyboard autobaud interpretation (Download value overrides the default.)
S67–S69	0–255	0	NOT USED

—end—

Appendix C
Basic AT command sets

Basic AT command sets for data calls

Table 8-1 describes the AT command sets for data calls.

Table 8-1
AT command sets for data calls

Command	Parameter	Result
A		Answer calls manually
Cn	n = 0 or 1	0 = Carrier defect asserted
		1 = Carrier detect not asserted
Dnnnn or DTnnnn	n= 0–9	Dial the data number (nnnn)
En	n = 0 or 1	0 = Your commands are not echoed on the terminal screen
		1 = Your commands are echoed on the terminal screen
Qn	n = 0 or 1	0 = Prompts are sent to the terminal (default)
		1 = Prompts are not sent to the terminal screen
S0=n	n = 0–99	0 = Manual answer
		1–99 = Auto answer (default = 1)
Vn	n = 0 or 1	0 = Number prompts are sent
		1 = Word prompts are sent (default)
z	None	All parameters are reset to the default values.

Basic AT command sets for voice calls

Table 8-2 describes the AT command sets for voice calls.

Table 8-2
AT command sets for voice calls

Command	Parameter	Result
+++		AT attention key for switching between data or voice transmission mode to AT command mode
A		Manual answer for handsfree and on-hook dialing
DPnnnn	n = 0–99	Voice call origination command for dialing the data number (nnnn)
Fn	n = 0–2	0 = Handsfree mute (ON/OFF toggle)
		1 = Voice call on hold
		2 = Select voice call on hold
HP		Release a voice call
TSP!		Transparent mode—Using a PC with the application software for requesting Keymap download, originating voice call, and disconnection.
?		AT HELP command display

Appendix D
Script file menus

The following figures show access to the various script file menus:

- Figure 9-1—Main Menu
- Figure 9-2—Modify Menu
- Figure 9-3—Script File Menu
- Figure 9-4—Learn Script Menu

Figure 9-1
Main menu

```
                    MAIN MENU

A – AUTODIAL                S – SPEED CALL
C – CALL                    M – MODIFY
P – DISPLAY PARAMETERS      D – SCRIPT FILE DIRECTORY
CTRL Z TO ABORT KEYBOARD DIALING
SELECT:
```

Figure 9-2
Modify menu

```
                   MODIFY MENU

A – AUTO NUMBER                 M – MANUAL ANSWER
S – SPEED NUMBER                F – SCRIPT FILE
R – REMOTE LOOPBACK             Q – QUIT MODIFY MENU
SELECT:
```

Figure 9-3
Script file menu

```
                  SCRIPT FILE MENU

L – LEARN SCRIPT   E – ESCAPE CODE
D – DELETE SCRIPT  Q – QUIT SCRIPT MENU


SELECT:
```

Figure 9-4
Learn script menu

```
                 LEARN SCRIPT MENU

A – LEARN AUTODIAL SCRIPT  D – SCRIPT FILE DIRECTORY
S – LEARN SPEED SCRIPT     Q – QUIT LEARN MODE


SELECT:
```

The following procedure shows an example procedure of how to access and learn the autodial script after moving through the menus as shown in Figure 9-1 through Figure 9-4.

Learning the autodial script

1 Enter “A”. The following message displays if a script already exists.

```
AUTO DIAL SCRIPT [script name] EXISTS
DELETE [Y/N]?
```

2 Enter “Y”. The following message displays.

```
DELETING.
xxxx OF xxxx BYTES AVAILABLE FOR A NEW SCRIPT
ACTIVATE LEARN MODE (Y/N)?
```

3 Enter “Y”. The following message displays. (“xxxx” represents the script name entered by the user.)

```
ENTER SCRIPT NAME: xxxx
ESCAPE CODE = [xxh]  MODIFY (Y/N)?
```

4 Enter “N”. (“YES” starts with autodial call; “NO” starts with access code xx speed call.)

```
LEARN MODE STARTS WITH AUTO DIAL CALL.
ENDS WITH ESCAPE CODE SEQUENCE
```

5 Press **Ctrl-X**. After entering the escape code, the program exits the learn mode and returns to the Modify Menu, and the MCA no longer recognizes this escape code.

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