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Meridian SL-100

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M2000 Digital Telephone Reference Manual

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NORTEL NETWORKS™

Meridian SL-100

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November, 1996

Version 08.02 MSL06. This version removes ordering information for the M2000 series telephone sets.

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Version 08.01 MSL06. Thsi version changes references of M2216ACD sets to M2216, and adds station feature Multiple Message Waiting Indication

September 1995

Version 07.01 MSL04. This version deleletes references to feature packages.

Contents

About this document

Purpose

This publication provides information on the Meridian M2000 Digital Telephones. This publication contains information specific to the M2000 Digital Telephones and does not cover in detail the interface with the Meridian SL-100 system.

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 rereleased 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 the*Defense Switched Network Master Index of Publications* , 555-4021-001, or the *Commercial Systems Master Index of Publications,* 555-4031-001.

How to identify the software in your office

The Load Content Record (LCR) lists the current software release and the Nortel features in that release. Similar information can be viewed on a MAP terminal by entering the following command:

>PATCHER;INFORM LIST;LEAVE

and pressing the Enter key.

References in this document

The following documents are referred to in this document:

- *Commercial Systems Customer Data Schema*
- *Commercial Systems Feature Description Manual*
- *Commercial Systems Translations Guide*
- *Defense Switched Network (DSN) Customer Data Schema*
- *Defense Switched Network Feature Description Manual*
- *Defense Switched Network Translations Guide*
- *Digital Line Module (DLM) Reference Manual*
- *DMS–100 Family Commands Reference Manual*
- *Intelligent Peripheral Equipment (IPE) Reference Manual*
- *Lines Maintenance Guide*

What precautionary messages mean

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

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

Examples of the precautionary messages follow.

ATTENTION - Information needed to perform a task

ATTENTION

If the unused DS-3 ports are not deprovisioned before a DS-1/VT Mapper is installed, the DS-1 traffic will not be carried through the DS-1/VT Mapper, even though the DS-1/VT Mapper is properly provisioned.

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 in this document:

Manually busy the CNTRL on the inactive plane by typing

>BSY CTRL ctrl_no

where

cntrl_no is the number of the CNTRL () 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

Integrated Voice and Data (IVD) is a service that provides simultaneous voice and data communications speeds up to 19.2 kbyte/s over a single, twisted–pair subscriber loop. This feature supports M2000 Digital Telephones. The M2000 series offers three M2000 Digital Telephones:

- M2009, with 9 programmable feature keys
- M2018, with 18 programmable feature keys
- M2112, with 11 programmable feature keys and a twelfth key for the handsfree mute function, which provides integrated handsfree service

  Note: The M2009, M2018, and M2112 sets are manufacture discontinued.

- M2317, with 11 programmable feature keys, a twelfth key for the handsfree mute function, which provides integrated handsfree service, and five additional programmable softkeys

Equipped with the Meridian Asynchronous Data Option (MADO), all M2000 Digital Telephones transmit or receive simultaneous voice and data. This means that a user can talk on a directory number loop while using an attached data terminal.

The MADO uses an RS-232-C interface for data terminal equipment and supports data speeds from 110 byte/s to 19.2 kbyte/s. The MADO has autobaud capability and is compatible with existing Meridian SL-100 DATAPATH products. MADO supports Meridian SL-100 MADO Keyboard Dialing or keyboard dialing compatible with the Hayes Smartmodem command protocol.

Note: Some of the products in this document have been manufacture discontinued. This document is to reference the use of the phones with updated or new software availability on the Meridian SL-100.

General description

M2000 Digital Telephones provide a cost-effective integrated voice and data communications capability. These telephones communicate with the Meridian SL-100 system using digital transmission over standard telephone (twisted–pair) wiring. The telephones interface with the Meridian SL-100 system through the Enhanced Digital Port Card (EDPC), which has 16 ports that support 16 M2000 telephones. No additional hardware is required in the loop circuit to provide data communications, which provides a significant cost-savings potential.

M2000 Digital Telephones connect to the Meridian SL-100 system through a two–wire loop carrying two independent 64-kbyte/s Pulse Code Modulation (PCM) channels with two associated 8-kbyte/s signaling channels. One of the two PCM channels is dedicated to voice, the other is dedicated to data.

Line cords and handset cords on all M2000 Digital Telephones have snap-in TELADAPT connectors for easy and quick connection.

Voice

Table 1 describes the four versions of the M2000 Digital Telephones.

Table 1 Meridian digital telephones (Sheet 1 of 2)

Version	Programmable keys	Fixed keys
M2009	9	Hold Release Volume control
M2018	18	Hold Release Volume control

Table 1 Meridian digital telephones (Sheet 2 of 2)

Version	Programmable keys	Fixed keys
M2112	11	Hold Release Volume control Handsfree/mute
M2317	12	Hold Release Volume control Handsfree/mute Programmable soft–keys

Versions without the Handsfree feature have a piezo-disc transducer for alerting tones and on-hook dialing. The M2112 is equipped with an integrated loudspeaker for both handsfree voice communication and alerting tones. Each programmable key has an associated Liquid Crystal Display (LCD) indicator, and all programmable keys can be assigned in any combination of loops and features.

Data

When equipped with the Meridian Asynchronous Data Option (MADO), the M2000 Digital Telephones provide data capabilities. MADO provides an RS-232-C interface to ASCII terminals and personal computers at data speeds from 110 byte/s to 19.2 kbyte/s. The firmware in the MADO serves as an interface between the user and the Meridian SL-100 system for establishing data calls. The firmware performs the following functions:

- scans for user keyboard input
- decodes and converts user inputs to appropriate key–press codes to send to the Line Group Controller (LGC)
- interprets call sequencing commands from the LGC
- generates appropriate prompt messages, based on call setup progress

SL-100 MADO Keyboard Dialing (KBD) provides user interaction with the MADO. Using KBD, provides the following information:

- command menus
- status and error information

KBD displays a menu of features on the data terminal. A user enters a number to be dialed or selects a feature from the menu. KBD prompts the user for any additional information and displays call progress messages or error condition messages, all in English phrases. Once the system establishes the data call, KBD becomes inactive. When the system disconnects the call, KBD resumes operation.

A subset of the keyboard dialing as defined by the Hayes SMARTMODEM also provides user interaction with the MADO. This capability allows the MADO to be used with personal computer software packages based on a Hayes-type keyboard dialing command protocol.

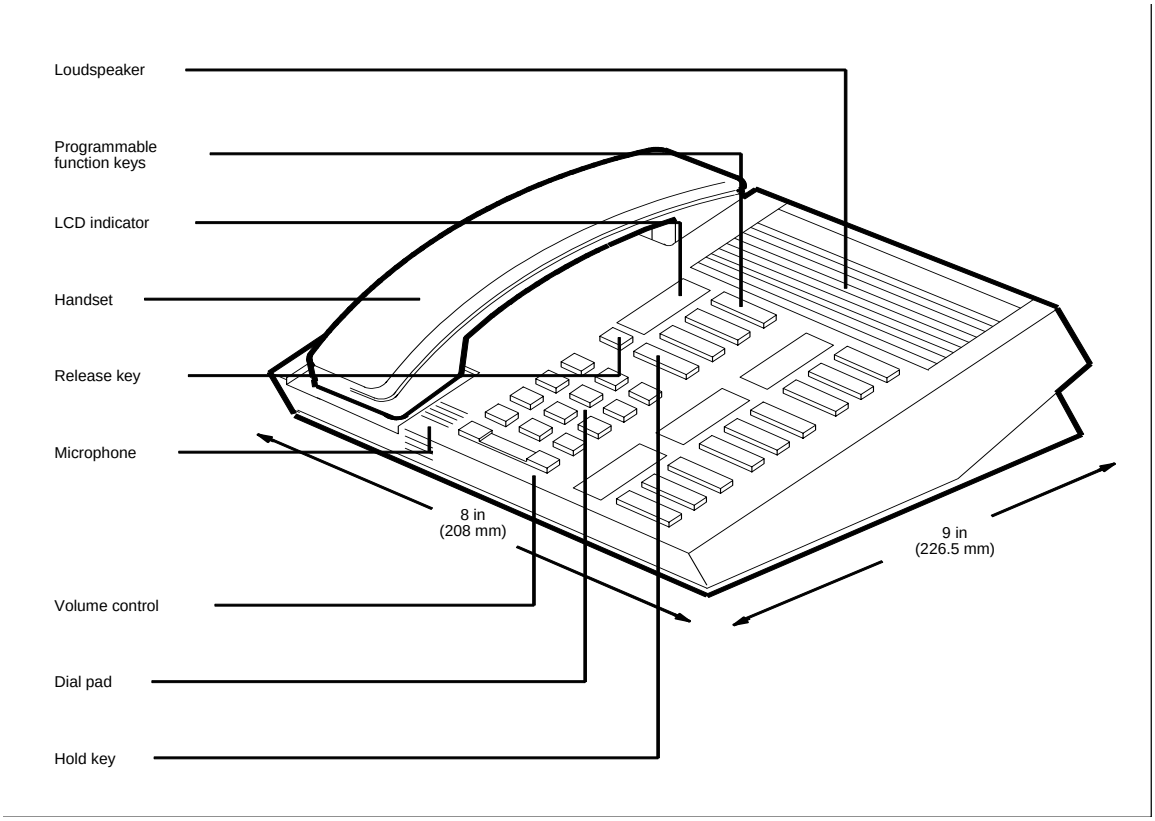
However, because Hayes Keyboard Dialing does not support call features like Speed Call and Ring Again, MADO supports both types of keyboard dialing. This support allows Hayes Keyboard Dialing to be used when use of the Hayes-type keyboard dialing command protocol is necessary. It also allows Meridian SL-100 KBD to be used in all other instances.

The escape code character, the escape code guard time, the wait time for carrier, and the auto-answer status set for Hayes Keyboard Dialing affect Meridian SL-100 KBD. The wait time for carrier (set in S-register 12) determines the timeout length for response from activated features from Meridian SL-100 KBD. (Refer to the chapter, “Keyboard dialing”.) The escape code character defaults to “+”, and the escape code guard time defaults to one second for both keyboard dialing types. These values can be modified for both dialing types in S-registers 2 and 12. Auto-answer can be set up from either keyboard dialing type.

Physical characteristics

The following figure shows the configuration and dimensions common to all versions of the fully modular M2000 Digital Telephones (M2112 shown).

Figure 1 Typical M2000 telephone configuration and dimensions



M2009

M2009 Features:

- There are nine assignable key and LCD indicator pairs
- LCD indicators support four key and LCD states, as shown in Table 2.
- A piezo-disc transducer supports alerting tones and on–hook dialing.
- The M2009 is loop-powered, but when equipped with the MADO, the phone set requires an auxiliary power supply and converter.

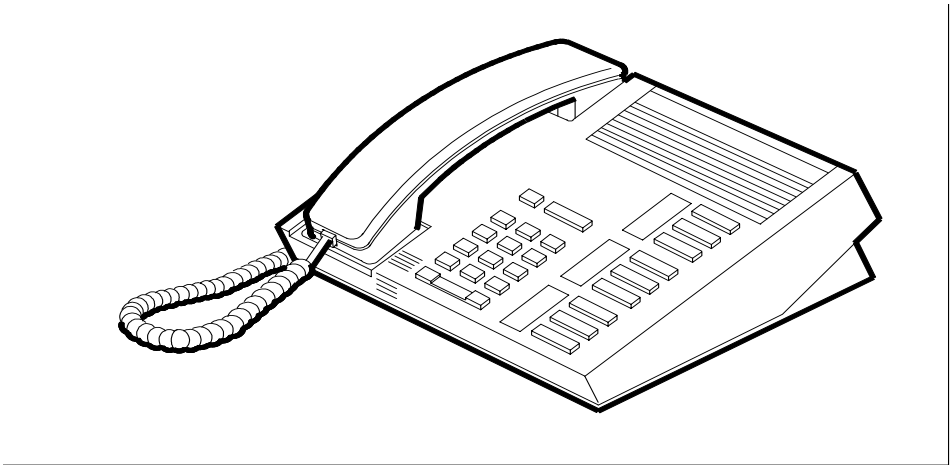
The following table shows the M2009 function and LCD indicator states:

Table 2 M2009 LCD Indicator States

Function	LCD state
Idle	Off
Ringing	Flash (60Hz)
Hold	Wink (120 Hz)
Active	On

The following figure shows the configuration and dimensions of the M2009 Digital Telephone:

Figure 2 M2009 Digital telephone



M2018

The M2018 Digital telephone (figure 3)has the following characteristics:

- There are 18 assignable key and LCD indicator pairs.
- LCD indicators support four key and LCD states, as shown in Table 3.
- A piezo-disc transducer supports alerting tones and on-hook dialing.
- The M2018 is loop–powered, but when equipped with the MADO, the phone set requires an auxiliary power supply and converter.

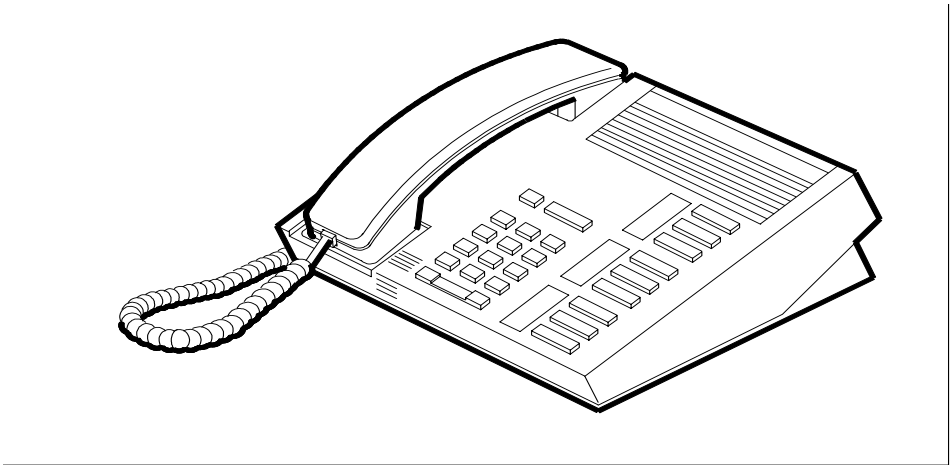
The following table shows the M2018 function and LCD indicator states:

Table 3 M2018 LCD Indicator States

Function	LCD state
Idle	Off
Ringing	Flash (60Hz)
Hold	Wink (120 Hz)
Active	On

The following figure shows the configuration and dimensions of the M2018 Digital Telephone:

Figure 3 M2018 Digital telephone



M2112

The M2112 Digital Telephone (Figure 4) has the following characteristics:

- There are 12 key and LCD indicators; 11 pairs are assignable, and 1 pair is permanently assigned for the use of an integrated handsfree and mute function.
- LCD indicators support four key and LCD states, as shown in Table 4.
- A loudspeaker provides alerting tone and provides voice reproduction during handsfree operation.
- A microphone is included.

- Loop-powering and an auxiliary power supply is required.
- When equipped with the MADO, it requires an auxiliary power supply and converter.

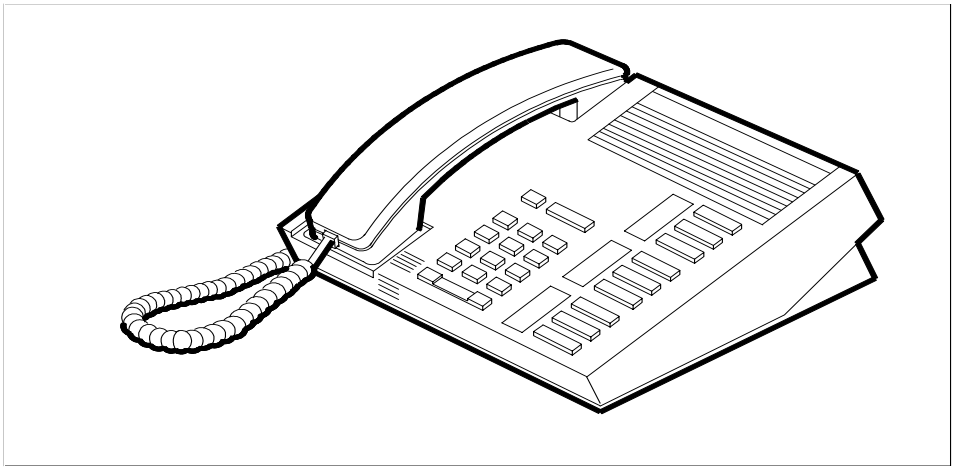
The following table shows the M2112 function and LCD indicator states:

Table 4 M2112 LCD Indicator States

Function	LCD state
Idle	Off
Ringing	Flash (60Hz)
Hold	Wink (120 Hz)
Active	On

The following figure shows the configuration and dimensions of the M2112 Digital Telephone:

Figure 4 M2112 Digital telephone



M2317

The M2317 Digital Telephone (Figure 5) has the following characteristics:

- There are 12 key and LCD indicators; 11 pairs are assignable, and 1 pair is permanently assigned for the use of an integrated handsfree and mute function.
- LCD indicators support four key and LCD states, as shown in Table 5.

- There are 5 soft keys whose functions change during call processing.
- A loudspeaker provides alerting tone and provides voice reproduction during handsfree operation.
- A microphone is included.
- Loop-powering and an auxiliary power supply is required.
- When equipped with the MADO, it requires an auxiliary power supply and converter.

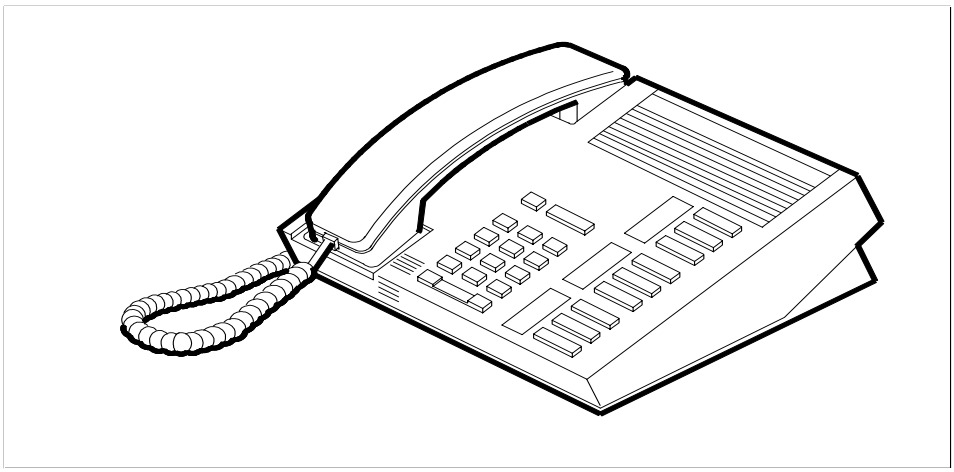
The following table shows the M2317 function and LCD indicator states:

Table 5 M2317 LCD Indicator States

Function	LCD state
Idle	Off
Ringing	Flash (60Hz)
Hold	Wink (120 Hz)
Active	On

The following figure shows the configuration and dimensions of the M2317 Digital Telephone:

Figure 5 M2317 Digital telephone



Powering Requirements

Voice

The M2000 Digital Telephones are loop–powered. Loop power uses a 30-V DC source and assumes 3500 ft. (915 m) maximum loop length of 24 AWG polyvinylchloride (PVC) (0.5 mm) standard twisted wire with no bridge taps. Cables longer than 3500 ft. could exceed the maximum 15.5 dB loss at 256 KHz. For loop lengths longer than 3500 ft., the loop should use 24 AWG or larger wire with polyolefin, polyethelene, or Teflon insulation.

The Handsfree unit, which is integrated in the M2112, requires an auxiliary power supply. The auxiliary power derives from the 20-V ac closet power supply (QUT1) or a local plug–in transformer over a separate pair of wires. The closet power supply must not be further away from the handsfree unit than the maximum allowable loop length for loop–powering.

If the auxiliary power supply fails, the handsfree feature does not operate. However, all other loop-powered functions remain operational. In case of a general ac power failure, the telephones remain operational (without the handsfree features) only if the Meridian SL-100 system uses a backup battery.

WARNING - Possibility of equipment damage

WARNING
Telephone set damage
Do not plug a M2000 Digital Telephone into a wall jack wired with -48V for 2500 telephone sets. This causes permanent damage to the M2000 telephone.

Data

An auxiliary power supply/converter is needed in addition to the power from the loop. A 60 Hz, 110-V AC or a 50 Hz, 220-V AC plug–in power supply/converter provides nominal voltages of +5 V, +12 V, and -12 V. The power supply/converter connects to the back of the telephone through a 5-pin power connector. If the power supply/converter fails, the M2112 cannot process data calls.

Alerting tone characteristics

The M2000 digital telephone series provides four alerting tones and a buzz sound. The system controls the cadence of the ringing by sending tone-ON and tone-OFF messages to the telephone. The SL-100

system provides all other telephone tones, such as dial tone or overflow and reorder tones.

The alerting tone cadences cannot be changed from the telephone, but can be altered for individual M2000 digital telephones by datafill. One application can be a separate ringing tone for each of a number of M2000 digital telephones in the same office area to facilitate identification.

The following table lists tone frequency combinations.

Table 6 Meridian digital telephones

Tone	Frequencies	Warble rate
1	640 Hz, 500 Hz	10 Hz
2	640 Hz, 500 Hz	2.5 Hz
3	320 Hz, 250 Hz	10.0 Hz
4	320 Hz, 250 Hz	2.5 Hz

Note: A 500-Hz buzz signal is provided for incoming call notification while the receiver is off-hook.

Volume control

One key with two positions controls the volume of incoming speech, the handsfree unit, and the local alerting tone. Operating the Volume Up or Volume Down section of the key incrementally increases or decreases the volume for the tone or sound currently being received. To change the volume of the ringing sound, the user must press Volume Up or Volume Down during the interval when a burst of ringing is received. The telephone set retains the volume settings for subsequent calls until new volume adjustments are made.

Note: When an M2000 digital telephone is disconnected, maintenance is performed on the loop, or a restart occurs, both the speaker volume and alerting tone levels return to default values (midpoint levels) after the telephone is reconnected.

Peripheral equipment

Digital line module

The telephone interfaces with the EDPC in the Digital Line Module (DLM) of the Meridian SL-100 system using Time Compression

Multiplex (TCM) transmission. The EDPC contains 16 Integrated Voice and Data (IVD) ports, which support 16 M2000 telephones and MADO.

Intelligent peripheral equipment

The Intelligent Peripheral Equipment (IPE) consists of a shelf that is housed in a Universal Equipment Module (UEM). The Extended Peripheral Equipment Controller (XPEC) card resides within the IPE. The IPE also houses 16 slots for analog, digital, and message waiting line cards.

The UEM is stackable in units of one to four. The UEMs rest on a pedestal base and are covered by a top cap. The UEMs, pedestal, and top cap are collectively called the Intelligent Peripheral Equipment Column (IPEC).

The IPE and the DLM support the following telephone sets and data terminals:

- Digital IVD sets
  - M2900
  - M2018
  - M2112
  - M2317
  - Meridian Asynchronous Data Option (MADO)
- Touch sets
  - M3000
  - Touch asynchronous Data Option (TADO)
- Meridian Modular Telephones (digital)
  - M2006
  - M2008
  - M2216
  - M2616
  - Meridian Communications Adapter (MCA)

In addition, the IPE supports the following telephone sets:

- 500/2500
- 500/2500 with message waiting lamp
- Attendant console - Meridian SL-100 attendant console using analog ports

Note: For more information on the IPE, refer to the *Intelligent Peripheral Equipment (IPE) Reference Manual*.

Performance Specifications

Purpose

The purpose of this document is to provide performance specifications for the M2000 Digital telephones

Environmental and safety requirements

Both the M2000 Digital telephones and the Meridian Asynchronous Data Option (MDO) meet the requirements of Electronics Industries Association (EIA) specification PN-1361.

Temperature and humidity

The following table lists temperature and humidity specifications for M2000 Digital Telephones

Table 1 Temperature and humidity

Temperature range	Relative humidity
Operating State: 32^{o} to 104^{o} F (0^{0} to 40^{o} C).	*Operating State:* 5% to 95% (noncondensing)
Storage: -58^{o} to -158^{o} F (-50^{0} to 70^{o} C).	*Storage:* 5% to 95% (noncondensing)
Note: At temperatures above 93^{o} F (34^{o} C), relative humidity is limited to 52 mbarof water vapor pressure.	

Electromagnetic Interference

The radiated and conducted magnetic interference meets the requirements of Subpart J of Part 15 of the Federal Communications Commission (FCC) rules for Class A computing devices.

Loop engineering

The M2000 Digital Telephones operate at their full potential through twisted-pair wiring where the maximum permissible loop length is less than 3000 ft (915 m) of 24 AWG (0.5 mm) standard twisted wire with no bridge taps.

The maximum loop length assumes no under-carpet cable, the maximum allowable cable must be reduced using the following equation:

LM = (14 - (UC x UL)) / 14

where

LM = loop length in ft (km)

UC = length of the under-carpet cable in ft (km)

UL = loss of the under-carpet cable in dB/ft (dB/km) at 256 kHz

Data characteristics

The MADO communicates with the Data Terminal Equipment (DTE) using the characteristics listed in the following table;

Table 2 MADO Data characteristics

Characteristic	Specification
Data type	ASCII (ANSI standard X3.4-1977)
Synchronization	Asynchronous
Number of bits	7 bits plus parity or 8 bits, no parity
Parity	None, odd, or even
Data rate	110, 150, 300, 600, 1200, 2400, 4800, or 19200 bits per second
Stop bits	1 bit for all speeds

Feature description

Purpose

The purpose of this document is to describe the features supported by the M2000 Digital telephones.

Station features

The M2000 Digital Telephones support the following station features listed in the following table:

Table 1 M2000 Digital telephone features (Sheet 1 of 2)

Station feature	Station feature
Automatic Answerback	Individual Page from Group Intercom
Automatic Dial	Intercom
Automatic Line	Last Number Redial from Station
Busy Override	Listen On Hold
Call Forward	Make Set Busy
Call Hold	Malicious Call Hold
Call Park	Message Waiting
	Multiple Station Message Waiting Indication
Call Pickup	Multiple Appearance Directory Number
Call Transfer	Multiple Appearance Directory Number Hold

Note: The TRKDISP feature is not compatible with ISDN type sets.

Table 1 M2000 Digital telephone features (Sheet 2 of 2)

Station feature	Station feature
Call Waiting	Multiple Appearance Directory Number Ring Forward
Callback Queuing	On-Hook Dialing
Conference 3	Privacy Release
Conference 6	Private Business Line
End-to-end Signaling	Ring Again
Group Intercom	Speed Calling
Handsfree Capability	Trunk Member Display (TRKDISP)
Note: The TRKDISP feature is not compatible with ISDN type sets.	

M2000 Digital Telephones support the features of the Electronic Telephone Set (ETS) and are datafilled in the same way. For information on how to datafill the data tables for each feature, refer to the *Defense Switched Network Translations,* 555-4021-350, or the *Commercial Systems Translations Guide,* 555-4031-350.

Fixed keys

The M2000 Digital Telephones provide the following fixed keys:

- Primary Directory Number (PDN)—must be the first key
- Release (Rls)
- hold
- volume up
- volume down
- handsfree/mute (M2112 only)

Handsfree operation (M2112 and M2317)

If handsfree is activated, the user can talk to the other party without lifting the handset. Activate the Handsfree feature by pressing the Handsfree/Mute key. The Handsfree/Mute Liquid Crystal Display (LCD) indicator shows the status of the handsfree unit. Deactivate handsfree by picking up the handset. If the calling party disconnects before the handsfree user hangs up, the handsfree feature remains enabled unless the user presses the Rls key.

Handsfree operates as if an off–hook operation had been performed. For example, when the telephone is idle, pressing the Handsfree/Mute key turns on the integrated handsfree unit and selects the PDN, which allows the user to make a call. When the telephone rings, pressing the Handsfree/Mute key turns on the handsfree unit and allows the user to answer the incoming (ringing) call by pressing a Directory Number (DN) key without picking up the handset.

Microphone muting (M2112 and M2317)

When the Handsfree/Mute key is pressed during a telephone conversation with the Handsfree feature activated, the microphone is turned off while the speaker remains on, which prevents the other party from overhearing local conversation. The Handsfree/Mute LCD flashes while the Handsfree feature is in the Mute mode. Pressing the Handsfree/Mute key a second time restores microphone operation, and the Handsfree/Mute indicator lights.

Soft keys (M2317 only)

The M2317 has keys 1 through 37. Keys 1 through 11 are programmable keys with associated indicators. These are the only keys to which a Directory Number (DN) can be assigned. Keys 12 through 20 are reserved for the predefined M2317 soft key features. Soft keys are assigned in the same manner as programmable keys. The following feature–to–key restrictions apply when soft key features are assigned:

Table 2 M2000 Digital telephone features

Key number	Feature
12	Call Park
13	Call pickup
14	Message waiting
15	Speed calling
16	Call forwarding
17	Conferece calling (6 port)
18	Call transfer
19	Ring again
20	Privacy release

Features can be assigned to keys 2 through 11, but these features may not be any of the features defined to the soft keys

Although there are only five soft keys, up to nine features can be associated with these keys. The features are limited to certain soft key assignments. A feature defined as a soft key feature can not be assigned to any of the fixed keys.

If a soft key feature is also identified as a code access feature, it may be assigned to Key 1 of the set instead of the assigned soft key. The soft key features that can be used as code access features are as follows:

- Call Park (PRK)
- Call Pickup (CPU)
- Speed Call Short (SCS)
- Speed Call Long (SCL)
- Speed Call User (SCU)
- Call Forwarding (CFX)
- Conference Call (CNF)

The function of the soft keys change during call processing. Call progress information describes what is happening to a call as it proceeds through the network to its destination. Call progress information includes the following types of information:

- altering the called party
- answer by the called party
- routing to treatment
- tones and announcements

This information is used to update the soft key screen of the M2317. The following soft keys are supported on the M2317:

Table 3 Keys supported on the M2317 (Sheet 1 of 2)

Station feature	Station feature
Call forward	FORWARD
Call park	PARK
Call pickup	PICKUP

Table 3 Keys supported on the M2317 (Sheet 2 of 2)

Station feature	Station feature
Call transfer	TRANSFER
Conference 6	CONFER
Message waiting	MESSAGE
Privacy release	PRIVACY
Ring again	RINGBAK
Speed/Call user	SPEED #
Controller switch parties	SWITCH
Complete call	CONNECT
Transfer complete conference	CONNECT

The following soft keys are controlled by the M2317 set:

Table 4 Soft keys controlled by the M2317

Feature	Screen text:
Last number redial	LAST #
Save the number	SAVE #
Redial saved number	SAVED #
Reset elapsed time	TIMER

When the M2317 is idle, the first line of display shows the current time and date. To initiate a call, the user does one of the following:

- presses one of the DN keys
- lifts the handset, which automatically selects the PDN
- presses the Handsfree key, which also selects the PDN
- dials digits, which selects the Predial mode
- presses the LAST# soft key
- presses the SAVED# soft key

The Predial mode allows the user to dial a number, with editing capabilities, then select a line. The entered digits display on the LCD screen while they are being entered. When the user selects a line, the second line of the display is updated to the RINGBACK, BUSY, or REORDER screen.

When using the LAST# or SAVED# soft key, the user must also select a line. When the line is selected, the screen is updated to the DIALTONE screen.

Call states (M2317 only)

Table 5 Descriptions of call processing states supported by the M2317 (Sheet 1 of 2)

Call processing state	Description
Idle	On–hook (voice and data)
Dialtone	Ready to transmit dialed digits
Intercom dialtone	Ready to transmit digits for a group intercom call
Dialing	Tansmitting dialed digits
Busy	Called party is off-hook
Reorder	Called party is unavailable
Ringback	Called party is ringing
ERWT_CBQ	Initial set of routes is not available -the user receives Expensive route Warning Tone (ERWT)
Established	Connection made
Intercom established	Connection is established in a group intercom call
CONF/XFER dialtone	Special dialtone for CONF/XFER calls
CONF/XFER dialing	After receiving a special dialtone, the user dialed digits in a CONF/XFER call

Table 5 Descriptions of call processing states supported by the M2317 (Sheet 2 of 2)

Call processing state	Description
CONF/XFER busy	CONF/XFER called party is off-hook
CONF/XFER reorder	CONF/XFER called party is unavailable
XFER ringback	Ringing called party for XFER
CONF ringback	inging called party for CONF
Consultation	Third party has answered a CONF/XFER call
Consultation hold	User is talking to the original party and the consulting party is on hold
Private line dialing	Dialed digits transmits over a private line
Private line established	Connection is made with a private line
Voice call/group call established	Connection is made using an intercom key or pre-set conference key

Table 6 Corresponding soft keys of the call processing states supported by the M2317 (Sheet 1 of 2)

Call processing state	Soft keys
Idle	RINGBAK, FORWARD, SPEED, HELD#, TIMER, MORE
Dialtone	RINGBAK, SPEED#, MESSAGE, SAVED#, LAST#, PICKUP, MORE
Intercom dialtone	SAVED#, LAST#, PICKUP
Dialing	RINGBAK

Table 6 Corresponding soft keys of the call processing states supported by the M2317 (Sheet 2 of 2)

Call processing state	Soft keys
Busy	RINGBAK, SAVE#
Rerorder	No soft keys
Ringback	SAVE#
ERWT_CBQ	RINGBAK, SAVE#
Established	CONFER, PARK, TIMER, SAVE#, TRANSFER, PRIVACY, MORE
Intercom established	TRANSFER, CONFER, TIMER, SAVE#
CONF/XFER dialtone	SPEED#, SAVED#, RINGBAK
CONF/XFER dialing	No soft keys
CONF/XFER busy	RINGBAK, SAVE#
CONF/XFER reorder	No soft keys
XFER ringback	CONNECT, SAVE#
CONF ringback	SAVE#
Consultation	CONNECT, SWITCH
Consultation hold	CONNECT, SWITCH
Private line dialing	SAVED#, LAST#
Private line established	No soft keys
Voice call/group call established	No soft keys

If the MADO has no stored data rate, the incoming call prompt transmits at 19.2 kyte/s. If the DTE is not set to that rate, garbage may display.

Data call

Incoming calls activate the most recently used KBD method. The prompts transmit at the previously connected data rate. If the data rate

of the DTE changed and no autobaud exists, the prompts transmit at an incompatible data rate.

When an M2000 Digital Telephone is equipped with the Meridian Asynchronous Data Option (MADO), the user can make a data call using Meridian SL-100 Keyboard Dialing (KBD) or Hayes Keyboard Dialing from the attached terminal. Voice and data communications can take place simultaneously without interference.

The MADO is compatible with all data terminals having the characteristics described in Chapter “Performance Specifications, Table 2, “MADO data characteristics”. An M2000 Digital Telephone equipped with MADO can originate or terminate data calls from other MADO-equipped M2000 Digital Telephones or any Meridian SL-100 DATAPATH data product

The Meridian SL-100 KBD feature provides Data Terminal Equipment (DTE) users a means to establish a switched data call to multihost sites and activate selected telephone features, such as Speed Calling, Autodial, and Ring Again. The KBD routine may vary with the data equipment being used, and reference to the user’s data terminal manual may be necessary. For a Meridian SL-100 MADO Keyboard Dialing routine, refer to the chapter, “Keyboard dialing”.

The Hayes Keyboard Dialing feature provides DTE users with a means to use personal computer software packages requiring a Hayes-type keyboard dialing command protocol. For a Hayes Keyboard Dialing routine, refer to the chapter, “Keyboard dialing”. Only one type of keyboard dialing, either Meridian SL-100 KBD or Hayes Keyboard Dialing, can be active at a time.

The MADO can exist in one of four states: autobaud, Meridian SL-100 KBD, Hayes Keyboard Dialing, or data mode. When the MADO is powered up, the autobaud state is active until an acceptable autobaud character is entered. The characters used to set autobaud and autoparity determine the keyboard dialing type.

If a period (.) and a carriage return are entered, the standard Meridian SL-100 KBD is activated. If AT is entered, Hayes Keyboard Dialing is activated.

For incoming calls, the KBD specified in the profile is used. Hayes Keyboard Dialing is the default.

While in the Hayes Keyboard Dialing state, the MADO returns to the autobaud state after each command is entered or after a call is taken down. While in the Meridian SL-100 KBD state, the MADO returns to

the autobaud state at the completion of any call origination attempt or a status display. The user does not automatically return to the autobaud state following use of the Modify Menu.

Any action that causes the DTR to drop (loss of power at the DTE or disconnection of the RS-232 cable) returns the MADO to the autobaud state.

Multiple Station Message Waiting Indication

The Multiple Station Message Waiting Indication (MSMWI) feature provides a visual indication of a message waiting for a primary terminal on one or more secondary terminals. This feature is assigned through service orders (SERVORD).

A primary terminal must have one of the following features assigned to it:

- Message Waiting (MWT)
- Executive Message Waiting (EMW)

All attempts to remove MWT or EMW from the primary terminal are blocked until all MSMWI assignments associated with that primary terminal are removed from the corresponding secondary terminals.

The visual indication on the secondary terminals consists of a lit liquid–crystal display (LCD) lamp associated with the MSMWI key. When message waiting indication is turned on for the primary terminal, the LCD lamp associated with the corresponding MSMWI key on the secondary terminal(s) is turned on (lit in a steady state). When message waiting indication is turned off for the primary terminal, the LCD lamp associated with the corresponding MSMWI key on the secondary terminal is also turned off.

The MSMWI feature does not provide any means of accessing messages left against a primary terminal. It only provides a visual indication of such messages. Existing methods for accessing messages are unaffected by this feature, and may still be used.

Note: If the terminal datafilled with the MSMWI key set feature has a Light-Emitting Diode (LED), it is not used in conjunction with this feature.

The primary terminal associated with the MSMWI key set feature can be a message station. A message station is a terminal with either MWT or EMW assigned to it. Such a message station can function as a message center for a Multiple-Appearance Directory Number (MADN)

or Automatic Call Distribution/Uniform Call Distribution (ACD/UCD) group.

Compatible terminals

The following table describes thos terminals which are compatible with the MSMWI feature.

Table 7 Valid terminals for the MSMWI feature

Terminal description	Terminal type
Proprietary business sets	PSET PSET w/display
M2000 digital telephones (digital IVD sets)	M2009 M2018 M2112 M2317
Meridian modular telephones (digital)	M2006 M2008 M2008HF M2016S M2216 M2616
Meridian business sets	M5008 M5009 M5009S M5112 M5208 M5209 M5212 M5216 M5312

MSMWI feature applications

A typical application of the MSMWI feature is a help desk. Indication of messages left for a help desk is currently only provided on the help desk terminal itself. With the MSMWI feature, help desk personnel will

have a visual indication of messages left for the help desk on their individual phone sets, provided that each terminal is of a terminal type compatible with the MSMWI feature.

Another application of the MSMWI feature is for an administrative position with responsibility for several managers. The administrative position can have several instances of the MSMWI key set feature assigned (one for each manager for which the position is responsible).

Trunk Member Display

The Trunk Member Display TRKDISP feature is used with the Meridian business set (MSB)/integrated voice and data (IVD) display sets. When the TRKDISP key is depressed, the feature is activated and displays the common language location identifier (CLLI) and circuit member of the trunk to which it is connected. After depressing the same key a second time, the feature TRKDISP can display the trunk data from any trunk type.

TRKDISP is datafilled in SERVORD. The existence of this feature can be verified by the query line equipment number (QLEN), query directory number (QDN), query working line equipment number (QLENWRK), and query working directory number (QDNWRK) SERVORD commands.

The following restrictions to this feature are:

- TRKDISP connnot be assigned to any softkeys.
- TRKDISP is not compatible with any CLASS sets ofr features.
- TRKDISP is not applicable with the attendant console.
- TRKDISP is not applicable with ISDN type sets.
- TRKDISP and any Three Way Callig (3WC) or Conference feature cannot be active simultaneously.
- The Display feature cannot be deleted before the TRKDISP feature.

Installation procedures

Purpose

This document includes procedures that describes how to install an M2000 Digital telephone.

Unpacking or packing a digital telephone

Use proper care while unpacking M2000 Digital Telephones. Check for damaged containers so that appropriate claims can be made to the transport company for items damaged in transit.

If a telephone must be returned to the factory, ensure it is packed in the appropriate container to avoid damage during transit. Remember to include all loose parts in the shipment, such as cords, handset, power unit, labels, and lenses.

M2000 digital telephone installation

The step-by-step routine in Procedure 1 details the installation procedures for any M2000 Digital Telephone.

Procedure 1 M2000 digital telephone installation

1 Place telephone upside down on several sheets of soft, clean paper on a solid, level work surface to prevent damage to movable keys and telephone face plate.

2 Connect handset cord 4-conductor TELADAPT connectors to handset and to the telephone.

Response: The TELADAPT connectors have a latch-tab to ensure correct alignment and prevent cord from being pulled out inadvertently during service.

3 Ensure that this latch–tab is firmly snapped in place.

4 After connecting handset cord to the connector in the base of the telephone, turn smooth side of handset cord up (away from telephone base) before tucking it under the restraining tab.

Response: This ensures that the telephone sits level on the desk after installation is complete. See Figure 1.

If: You are installing the M2009 or M2018,

Then: Perform Steps 5-8 and Steps 14-22. Otherwise, go to Step 9.

5 Connect the line cord to telephone base.

Response: See Figure 1.

6 Tuck the line cord under the four restraining tabs.

Response: This allows the telephone to sit level on the desk.

7 Insert line cord into wall jack.

Response: The TELADAPT connectors have a latch-tab, which ensures correct alignment and prevents the cord from being pulled out inadvertently during service.

8 Ensure that this latch-tab is firmly snapped into place.

If: You are installing the M2112,

Then: Perform Steps 9 -22.

9 Connect the 6-conductor line cord to the telephone base.

Response: See Figure 1.

10 Tuck the line cord under the four restraining tabs.

Response: This allows the telephone to sit level on the desk.

11 Insert connecting block into wall jack.

12 Insert line cord into connecting block.

Response: The TELADAPT connectors have a latch-tab, which ensures correct alignment and prevents the cord from being pulled out inadvertently during service.

13 Ensure that this latch-tab is firmly snapped into place.

14 Plug electrical cord into auxiliary power supply.

15 Turn telephone right side up, and place in final position.

16 Print directory number on designation card.

17 Remove number lens by inserting the end of a paper clip into the hole at the middle of the lens and levering upwards.

18 Insert designation card.

19 Snap lens with card back in place.

20 Designate button labels for key designations.

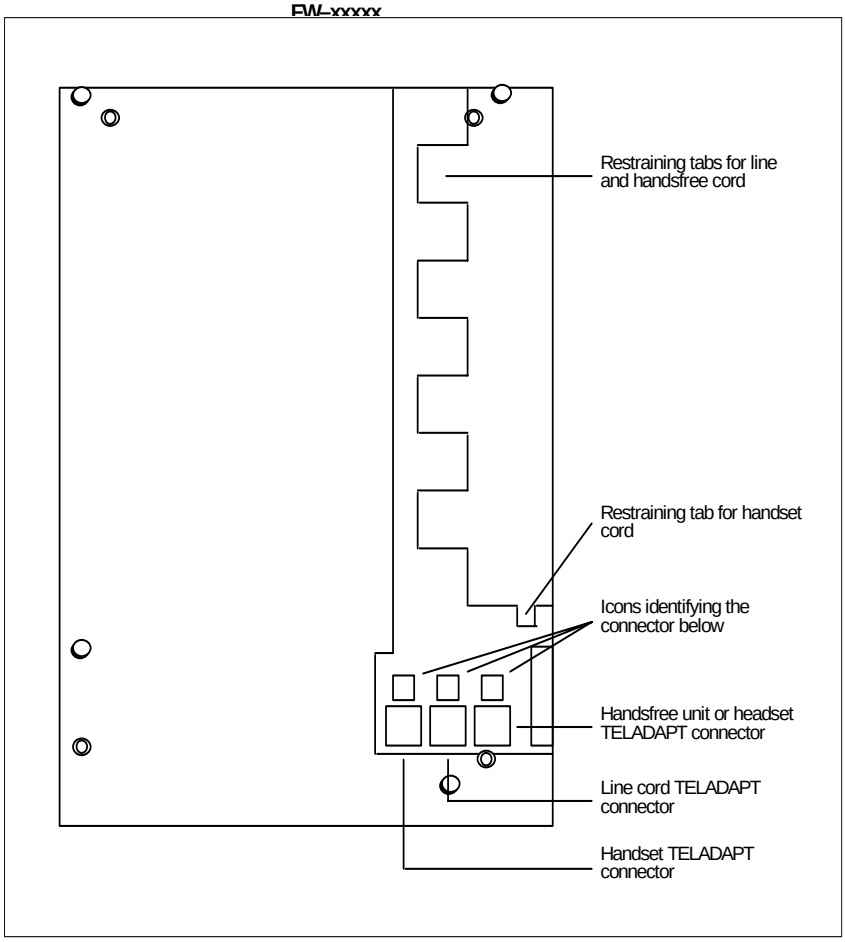
21 Fold labels, insert inside plastic button cover, and snap button cover over movable key, pressing down on key, as required.

22 Repeat Steps 20 and 21 for all keys.

Task is complete.

The following figure shows a veiw of the jacks and tabs at the base of an M2000 digital telephone:

Figure 1 View of jacks and tabs at base of telephone



Data terminal installation

To connect a data terminal to the M2000 Digital Telephone, perform the steps in Procedure 2

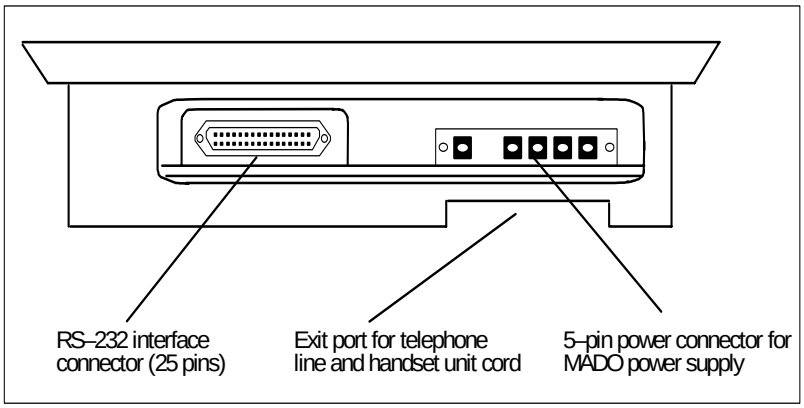
Procedure 2 Data terminal installation

1. Connect the RS-232-C interface connector from the data terminal to the matching header connector in the back of the M2000 digital telephone. (See Figure 2.)
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.

Task is complete.

The following figure shows the location of the RS-232-C and power supply/converter connectors on the back of the M2000 digital telephone:

Figure 2 Connection of the data terminal and MADO power supply to M2000 digital telephone



Testing and maintenance

Purpose

This document includes procedures to test the operation of M2000 Digital telephones.

M2000 Digital Telephone testing

M2000 Digital Telephone testing consists basically of acceptance test procedures. Impulse noise, background noise, and crosstalk compatibility problems are unlikely. Examine loop length, connect the telephone, and check performance by establishing a communication path to another telephone (or data terminal) and going through the different call routines (enabled features) while observing and verifying the responses at the telephone and data terminal. Check polarity of tip and ring leads for reversals before going into more detailed follow-up tests. The M2000 Digital Telephones are polarity sensitive, and a dead loop or absence of dial tone may indicate reversed tip and ring polarities.

Key/LCD indicator tests

Some station access tests originate at the M2000 Digital Telephone by dialing a 2- or 3-digit access code, usually prefixed by a pound sign (#), and the last five digits of the Directory Number (DN). The access code is typically 797, but is defined by the customer. The number of DN digits depends on the numbering plan used for extension dialing. This access code sets the M2000 Digital Telephone to the maintenance state.

Perform the steps in Procedure 1. All responses must be as shown in the ‘‘Response” column for the digital telephone to pass the test. Each key need only be operated momentarily. The telephone passes the test if all required responses are met. Replace any telephone not meeting all test requirements.

If the last five digits of the DN are not correct for the telephone, reorder tone is received. The tester must press the RIs (Release) key to stop

the test. If the digits are correct, all the Liquid Crystal Displays (LCDs) on the telephone illuminate.

The tester has 2 minutes to perform the test. When the test completes or times-out, the telephone becomes idle with no dial tone.

This test is not valid for the Meridian Asynchronous Data Option (MADO), and the test cannot initiate from a data loop or the keyboard.

Each time an M2000 Digital Telephone is unplugged and a new one plugged in (for example, when replacing a defective telephone), a waiting period of at least 6 seconds is required before the new telephone can be tested.

Note: When testing the M2009, omit Steps 27-35 and Step 39 in Procedure 1. When testing the M2018, omit Step 39. When testing the M2112, omit Steps 29-35

Table 1

If	Then
You are installing the M2112	Perform Steps 9-22.

Procedure 1 Key/LCD indicator tests (station ringer test)

1 Dial the access code and the last five digits of the directory number.

Response: All key/LCD indicators come on.

2 Take the handset off-hook.

Response: All LCDs flash. (See note.)

3 Put handset on-hook.

Response: All LCDs wink. (See note.)

4 Take handset off-hook.

Response: All LCDs come on. (See note.)

5 Put handset on-hook.

Response: All LCDs turn off. (See note.)

6 Press Dial Pad Key 1.

Response: LCD 1 comes on.

7 Press Dial Pad Key 2.

Response: LCD 2 comes on.

8 Press Dial Pad Key 3.

Response: LCD 3 comes on.

9 Press Dial Pad Key 4.

Response: LCD 4 comes on.

10 Press Dial Pad Key 5.

Response: LCD 5 comes on.

11 Press Dial Pad Key 6.

Response: LCD 6 comes on.

12 Press Dial Pad Key 7.

Response: LCD 7comes on.

13 Press Dial Pad Key 8.

Response: LCD 8 comes on.

14 Press Dial Pad Key 9.

Response: LCD 1 and 8 come on.

15 Press Dial Pad Key 0.

Response: LCD 2 and 8 come on.

16 Press Dial Pad Key * (asterisk).

Response: All LCDs come on. (See note.)

17 Press Dial Pad Key # (pound).

Response: All LCDs turn off.

18 Press Function Key 1.

Response: LCD1 comes on.

19 Press Function Key 2.

Response: LCD 2 comes on.

20 Press Function Key 3.

Response: LCD 3 comes on.

21 Press Function Key 4.

Response: LCD 4 comes on.

22 Press Function Key 5.

Response: LCD 5 comes on.

23 Press Function Key 6.

Response: LCD 6 comes on.

24 Press Function Key 7.

Response: LCD 7 comes on.

25 Press Function Key 8.

Response: LCD 8 comes on.

26 Press Function Key 9.

Response: LCD 9 comes on.

27 Press Function Key 10.

Response: LCD 10 comes on.

28 Press Function Key 11.

Response: LCD 11 comes on.

29 Press Function Key 12.

Response: LCD 12 comes on.

30 Press Function Key 13.

Response: LCD 13 comes on.

31 Press Function Key 14.

Response: LCD 14 comes on.

32 Press Function Key 15.

Response: LCD 15 comes on.

33 Press Function Key 16.

Response: LCD 16 comes on.

34 Press Function Key 17.

Response: LCD 17 comes on.

35 Press Function Key 18.

Response: LCD 18 comes on.

36 Press HOLD key.

Response: The system provides dialtone, and LCDs 1 through 5 come on.

37 Take the handset off-hook.

Response: The system provides dialtone from the handset only, and all LCDs flash.

38 Put the handset on-hook.

Response: The system provides dialtone from the speaker, and all the LCDs turn off.

39 Press Handsfree key.

Response: LCDs 1 through 3 and the Handsfree LCDs come on.

40 Press the Rls (Release) Key.

Response: All LCDs turn off.

41 Press HOLD key.

Response: LCDs 6 through 9 come on, and the system provides buzzer tone.

42 Press HOLD key.

Response: This ends the test.

43 Press HOLD key.

Response: The telephone set rings.

Note: The LCD response does not include the Handsfree LCD on the M2112. The Handsfree LCD remains OFF during these tests.

Volume adjustment tests

The M2009 and M2018 telephones have eight adjustment positions (seven steps) for alerting and dial tones or other call progress tones. The M2112 and M2317 telephone has an eight–position (seven steps) volume control for dial tone and handsfree voice.

To check proper functioning of the volume adjustment feature, proceed with the steps as given in Procedures 6-2 and 6-3. The telephone passes the test if all required responses are received. Replace any telephone not meeting all test requirements.

Procedure 2 M2009 and M2018 volume adjustment tests

1 Press a loop key (DN).

Response: The system provides dial tone.

2 Press the volume key on the right side repeatedly.

Response: The dial tone volume increases with each operation.

3 Press the volume key on the left side repeatedly.

Response: The dial tone volume decreases with each operation.

4 Release the loop, then call the telephone to be tested from another telephone.

Response: The system provides alerting tone.

5 Repeat Steps 2 and 3 for the alerting tone.

Response: The volume of the alerting tone increases and decreases in the same manner as the dial tone.

Procedure 3 M2112 and M2317 volume adjustment tests

1 Press a loop key (DN).

Response: The system provides dial tone.

2 Press the volume key on the right side repeatedly.

Response: The dial tone volume increases with each operation.

3 Press the volume key on the left side repeatedly.

Response: The dial tone volume decreases with each operation.

4 Release the loop, then call the telephone to be tested from another telephone.

Response: The system provides alerting tone.

5 Repeat Steps 2 and 3 for the alerting tone.

Response: The volume of the alerting tone increases and decreases in the same manner as the dial tone.

6 Release the alerting tone, then press the Handsfree/Mute Key, and dial a recorded announcement DN (such as, standard time).

Response: The announcement is received over the handsfree speaker.

7 Repeat Steps 2 and 3 for the announcement.

Response: The volume of the announcement increases and decreases in the same manner as the dial tone.

MADO self test

The MADO Self Test enables a user to test the MADO circuit board, even if there is no Data Terminal Equipment (DTE) present. This test can run in response to problems with keyboard functions.

While the MADO Self Test is running, the data line and associated voice line are Call Processing Busy (CPB), causing a simultaneous test at the MAP workstation to fail.

The following restrictions and limitations apply to the MADO Self Test:

- No calls can be made or received on either the voice line or the data line of the M2000 Digital Telephone while the test is in progress.
- The test can only initiate from the voice line of an M2000 Digital Telephone equipped with MADO.
- The test cannot initiate on a voice line that is currently engaged in another feature.
- MADO Self Test only tests the MADO within the M2000 Digital Telephone that initiated the test.

The MADO Self Test may be unable to set up for the following reasons:

- A feature data block could not be allocated.
- The call is blocked in the network.
- Another feature is already in progress on the line to be used for the test. MADO Self Test cannot run on the third leg of a Conference 3 or Call Transfer call.
- A maintenance process is running on the M2000 Digital Telephone.
- The MADO line has not been datafilled.
- The MADO Self Test was initiated from a telephone other than an M2000 Digital Telephone.

Perform the following procedure to test the MADO. The access code to activate the MADO Self Test feature must be datafilled in table XLANAME and Table IBNXLA. Refer to sections “Table XLANAME” and “Table IBNXLA” in this chapter for a description of applicable fields.

Procedure 4 MADO self test

1 Press a loop (DN) key.

Response: The system provides dial tone

2 Enter the MADO Self Test access code (usually two or three digits as defined in table IBNXLA).

Response: The DN LCD flashes. MADO IS UNDER TEST appears on the DTE screen.

If the LCD does not flash, MADO IS UNDER TEST does not appear on the DTE screen, and reorder tone is received continuously, the MADO Self Test could not be set up. Check to ensure that the power source is properly connected. Replace the handset, and try the MADO Self Test again at a later time. If

repeated attempts to set up the MADO Self Test fail, contact service personnel.

If confirmation tone is received and MADO TEST IS COMPLETE appears on the DTE screen, the MADO circuit board is in working order. If there is a data communications failure, the DTE, RS-232-C interface, or cable could be faulty.

If reorder tone is received for 5 seconds and MADO TEST IS COMPLETE appears on the DTE screen, the MADO Self Test failed. The power source may be disconnected. If the power source is securely connected, contact service personnel to replace the MADO circuit board.

3 Replace the handset.

Response: MADO Self Test completes. The test is over when the handset is replaced, regardless of whether the test has been completed.

Note 1: If the HOLD key is pressed during the MADO Self Test, the test is over regardless of whether the test has been completed.

Note 2: If the MADO Self Test has been set up, and no tone is received within 15 seconds, reorder tone is given followed by normal call treatment.

Table XLANAME

Table XLANAME (Translation Name) controls the addition and deletion of translators to the IBN Translations table.

Each translator is assigned a 1-8 character name plus the default data. This default data is used for that translator name whenever an access code is not specified in table IBNXLA.

Table 1 describes the fields to enter. For more information on table XLANAME, refer to the *Defense Switched Network Customer Data*

Schema, 555-4021-851, or the *Commercial Systems Customer Data Schema*, 555-4031-350.

Table 2 Table XLANAME datafill

Step	Subfield	Explanation
KEY		*Key.* This field consists of the following subfields: XLANAME and DGLIDX.
	XLANAME	*Translator name.* Enter the 1- to 8-character alphanumeric name assigned to the customer, feature, or preliminary translato
	DGLIDIX	*Digilator index.* Enter the digit(s) assigned as the access code for the special feature.
DEFAULT		*Default data.* This field consists of the following subfields: TRSEL, ACR, SMDR, and FEATURE.
	TRSEL	Translation selector. Enter the following translation selector: FEAT
	ACR	*Account code entry.* Enter Y (Yes) when an account code entry is required for all calls to the special feature access, otherwise enter N (No) to specify that no account code entry is required.
	SMDR	*Station message detail recording.* Enter Y (Yes) when all calls to the feature are recorded for billing purposes, otherwise enter N (No).
	FEATURE	*Feature.* Enter the following feature assigned to the function code: MADO.

Trouble locating procedures

Trouble conditions are reported either by the telephone user (customer report) or by the Meridian SL–100 trouble indicating system.

In addition to diagnostic tests performed at the M2000 Digital Telephones, facility maintenance actions are invoked manually through the following levels on the MAP workstation:

- Line Test Position (LTP)
- Line Test Position Manual (LTPMAN)
- Line Test Position Line Test Access (LTPLTA)

Periodic maintenance actions are invoked on M2000 Digital Telephones through the Automatic Line Test (ALT) level of the MAP workstation. For more information on line maintenance, refer to *Lines Maintenance Guide*, 297-001-594, and *Commands Reference Manual,* 297-1001-822.

For a detailed diagnostic program description, refer to the *Digital Line Module (DLM) Reference Manual*, 555-4001-101. For a recommended trouble locating routine, refer to Procedure 6.

Procedure 5 Trouble locating procedures

1 If voice communication is normal but data communication fails, run the MADO Self Test. (Refer to Procedure 4.)

2 Check for DC output voltage at the power supply/converter connector pins or replace the power supply/converter plug–in transformer.

3 Attempt to make a data call from the terminal keyboard. (Refer to Chapter 7, “Keyboard dialing”.)

Response: If the data call is not successful, proceed with Step 4.

4 Remove the transformer from the ac receptacle.

5 Unplug the 5-pin power supply/converter connector at back of telephone.

6 Contact service personnel to replace the MADO circuit board

7 Reconnect the MADO power supply/converter.

8 Make a new attempt to start a data call.

Response: If trouble persists, continue with the Enhanced Digital Port Card failure procedure.

Procedure 6 Enhanced digital port card failure

1 Check the MAP workstation for displayed error code.

Response: MADO Self Test completes. The test is over when the handset is replaced, regardless of whether the test has been completed.

2 Replace faulty components.

Response: MADO Self Test completes. The test is over when the handset is replaced, regardless of whether the test has been completed.

3 Try to establish a call.

Response: If the call attempt is unsuccessful, go to Procedure 1.

Procedure 7 Telephone (voice or dialing) failure

1 Check the line cord and handset cord to determine if all TELADAPT connectors are firmly in place, and resecure if loose.

Response: Lift handset and listen for dial tone, or dial a directory number, or both. If unsuccessful, proceed with Step 2.

2 Lift the handset, listen for dial tone, and dial a directory number.

Response: If unsuccessful, proceed with Step 3.

3 Wiggle the line cord, handset cord, or both while listening for sounds from the handset. If crackling or ticking sounds occur, replace the cord.

4 Try to establish a call.

Response: If unsuccessful, proceed with Step 5.

5 Replace the M2000 Digital Telephone.

6 Try to establish a call.

Response: If unsuccessful, proceed with Step 7.

7 Perform Procedure 6-8. If the test fails, try another port with the same phone.

8 Try to establish a call.

Response: If unsuccessful, proceed with Step 9.

9 Check the wiring between the Enhanced Digital Port Card (EDPC), distribution panel, and telephone for breaks or loose connections. If necessary, rerun wiring.

10 Operate the M2000 Digital Telephone.

Task is complete.

Automatic set relocation

Automatic set relocation (ASR) allows a telephone user to move IVD telephone sets from one location to another without the intervention of service personnel. The ASR process involves two steps.

- The first step involves the ASR Out process. This step requires the operating company personnel to enter a special code and unplug the telephone set. Entering this code causes the switch to perform the equivalent of a CKLN service order command on the set. All directory numbers and features associated with the set are transferred from the old line equipment number (LEN) to a virtual LEN (a temporary LEN). All directory numbers and features are deleted from the old LEN, and the old LEN state is set to hardware assigned, software unassigned (HASU).
- The second step of the process, ASR In, requires the user to plug the set into any LEN in the HASU state that supports an IVD set. The user takes the telephone off-hook or presses the primary directory number (PDN) key and dials the special ASR In code. This action causes the switch to perform the equivalent of a CKLN service order command on the set again. All directory numbers and features associated with the set are transferred from the virtual LEN to its new location.

This feature provides three advantages over the previous system:

- It avoids the loss of telephone service due to telephone service being in one location and the set in another location.
- It reduces the workload of the operating company personnel.
- The service order command CKLN provides the operating company personnel the ability to complete the ASR In process.

Prior to invoking the ASR process, the following tasks must be accomplished to allow the ASR to function:

- Feature translators ASRI and ASRO must be added to tables IBNXLA and XLANAME.
- To use authorization codes, the codes must first be defined in tables AUTHCODE and AUTHPART.

- Table DNROUTE must be datafilled to accommodate up to 160 specific ASR DNs that may be added to the table.
- To enable a user to relocate a telephone set back into the system, the system must create a temporary datafill allowing the user to receive dial tone and dial the ASR In code. To accomplish this, the system must have a directory number to use, as well as having a customer group set aside for ASR In use, as follows:
  - One DN must be set aside for ASR In use only. One DN must be set aside for each set that is relocated at the same time as other sets are relocated. Up to 1023 DNs may be relocated at the same time. Therefore, up to 1023 DNs must be set aside for ASR use.
  - A special customer group must be identified for ASR In use only. Enter this customer group in the system like any other customer group. (This special ASR customer group is identified in table OFCVAR for the entry ASR_CUSTGRP.) If customer group is not identified for ASR_CUSTGRP, then no sets may perform the ASR In or ASR Out process.

    Note: It is recommended that this customer group be established such that the user may only dial the ASR In code. If the user is allowed to perform normal telephone functions with the temporary datafill, there is no incentive for the user to perform the ASR In process. If every user who performs the ASR Out process decides not to bring the set back into service by performing the ASR In process, the maximum number of sets allowed in the ASR Out state would occur very quickly.

  - The customer group identified in ASR_CUSTGRP is used for the temporary datafill in table KSETLINE along with a SUBGRP of 0 and an NCOS of 0.
- The ASR feature is assigned on a customer-group basis. Each customer group is allowed to perform ASR must have an entry in table CUSTHEAD identifying the ASR feature translator.

For a successful relocation, the new location must be equipped, and it must be datafilled with the appropriate card type (NT8X47BA) in table LNINV.

ASR procedures

To perform the ASR Out process, follow the steps in Procedure 8. To perform the ASR In process, follow the steps in Procedure 9.

If the user forgets the personal identification code in Step 5 of Procedure 6, operating company personnel may use the QUERY

command, ASRSHOW, based on the PDN of the set, to find the identification number dialed by the user

.If an error is made during the code collection, the user may press the asterisk (*) key to restart. However, if treatment has been given, pressing the asterisk does not allow the user to reenter the digits for that step. The user must hang up and try the ASR process again.

Displays associated with IVD sets are not used for any ASR processing instructions.

Neither the ASR Out nor the ASR In process is available during an image. If the user attempts to perform an ASR process, treatment is given.

If a user performs the ASR Out process and afterwards realizes that it was a mistake, only the Operating Company personnel can return the LEN to service by accessing table ASRTABLE and deleting the entry corresponding to the personal identification code entered by the user. Next, the operating company personnel must access the LTP level of the MAP workstation and BUSY the user's line before returning it to service.

Procedure 8 ASR out process

1 Take the set off-hook by pressing the PDN key.

Response: The system provides dial tone.

2 Dial the ASR Out code.

Response: The ASR Out code is datafilled in table IBNXLA. The system provides special dial tone.

Note: Attempting to dial the ASR Out code on a secondary DN of the set causes treatment to be given.

3 Dial the required ASR authorization code.

Response: The system provides special dial tone for successful authorization or provides dial tone for the first invalid code. The system gives treatment if a second invalid authorization code is dialed.

4 Dial the required Personal Authorization Code.

Response: The system provides special dial tone for successful authorization or provides dial tone for the first invalid code. The system gives treatment if a second invalid authorization code is dialed.

5 Dial the 6-digit ID code.

Response: The system provides dial tone for a duplicate ID code and disconnects the call. The system provides confirmation tone for successful authorization. The system takes the LEN associated with the set and the LEN of the associated data device out of service by setting the line states to INB. The system moves the set's datafill from the old LEN to a virtual LEN.

Note: Remember this number. It is used again in Procedure 7.

6 Unplug the telephone set.

7 Take the set to its new location.

Task is complete.

Procedure 9 ARS in process

CAUTION
Telephone set damage
If the set is not plugged into the correct jack, one of the following errors could occur:

1. If the Jack belongs to a non-IVD line card and an IVD set is plugged into this jack, damage to the digital set, line card , or both may occur.

2. If the jack does belong to an IVD line card and the line already contains datafill, the user may not receive dial tone if the jack is out of service or may receive normal dial tone if the jack is in service.

3. Plug the telephone set only into an IVD line card (NT8X47BA).

1 Plug the set into any properly equipped jack.

Response: The system recognizes the set and datafills the new LEN with temporary datafill.

2 Wait 30 seconds before proceeding to Step 3.

3 Lift the handset of the telephone set.

Note: If no dial tone is received, release the call, and try again. If dial tone is still not received, contact the system administrator.

Response: The system provides stuttered dial tone.

4 Dial the ASR In code (datafilled in table IBNXLA).

Response: The ASR In code is datafilled in table IBNXLA. The system provides special dial tone.

5 Dial the 6-digit ID code (as specified in Procedure 8).

Response: The system provides confirmation tone for successful code entry. The system provides dial tone for first invalid code and treatment for the second invalid personal ID code.

6 Wait one minute before attempting to use the telephone set or the corresponding data device

Response: The system moves the datafill for the telephone during this time from the virtual LEN to the new LEN.

Task is complete.

ASR audit

If a user performs the ASR Out process, takes the telephone set to an empty LEN, and plugs the set in, the ASR process creates the temporary datafill. If the user does not perform the ASR In process, the temporary datafill is deleted by an ASR audit that runs once a day. This audit searches table IVDINV for ASR created entries. When it finds one, it deletes the directory number and line information from the corresponding entry in table KSETLINE and then removes the ASR entry in table IVDINV.

To allow flexibility in executing this audit each day, the office parameter ASR_AUDIT_TIME in table OFCVAR is provided. It is recommended that this audit be executed during non–peak hours. It is also recommended that the ASR audit not be executed during the time of the CC REXX or XPM REXX tests. These tests may affect the audit. The default time for the audit is 1:00 a.m.

Keyboard dialing

Purpose

This document includes instruction on the following types of keyboard dialing:

- Meridian Asynchronous Data Option (MADO) Keyboard Dialing (KBD)
- Extended Hayes Keyboard Dialing.

Operation

Perform the following to prepare for operation:

- Turn the terminal power on.
- Set the terminal on–line.
- Select the desired data rate.

Two types of keyboard dialing are possible: Meridian Asynchronous Data Option (MADO) Keyboard Dialing (KBD) and Extended Hayes Keyboard Dialing. The type of keyboard dialing is determined by the characters used to set autobaud and autoparity. At the terminal keyboard, perform the following applicable action:

- to initiate MADO KBD, type a period (.) followed by a carriage return.
- to initiate Hayes Keyboard Dialing, type AT followed by a carriage return.

MADO KBD

Successful KBD initiation is indicated by a menu display on the terminal screen. A selection can be made from the menu, and a connection can be established, after responding to any prompts. Distinct prompts are provided at each stage of the call setup to enable the user to take proper action.

KBD features

KBD supports the following calling features:

- calls to a local or remote host
- Autodial
- Speed Calling
- Resource Call (modem pooling)
- Ring Again
- automatic answering of incoming calls

Other associated KBD–supported functions follow:

- updating the Autodial number and Speed Calling list
- setting and/or resetting the remote loopback status
- cancellation of a pending Ring Again request
- status and/or data query
- setting the answer mode (manual or auto answer)

These KBD features are datafilled in the same way as data units. For information on how to fill the data tables, refer to *Defense Switched Network (DSN) Translations Guide*, 555-4021-350, Commercial Systems Translations Guide, 555-4031-350, or *Digital Line Module (DLM) Reference Manual*, 555-4001-101.

Keyboard dialing menus

Main menu

The main menu is displayed when the terminal is properly set up for operation and no KBD call is in progress. This menu contains feature operation selections and instructions. Select functions by entering the letter representing the function required. For an example of the main menu format, see Figure 1.

Figure 1 Main menu

```
ENTER NUMBER TO CALL OR MENU
SELECTION THEN PRESS RETURN

A -  AUTODIAL

S -  SPEED CALL

R -  RESOURCE CALL

D -  DISPLAY FEATURES

M -  MODIFY FEATURES

AT - ENTER HAYES COMMAND MODE
```

Modify menu

The modify menu is displayed when the M (Modify features) function is selected from the main menu. For an example of the modify menu, see Figure 2.

Figure 2 Modify menu

```
SELECT MENU ITEM;THEN PRESS
RETURN.

A -  AUTODIAL UPDATE

S -  SPEED CALL UPDATE

C -  CANCEL RING AGAIN

R -  REMOTE LOOPBACK

M -  MANUAL ANSWER

X - EXIT TO MAIN MENU
```

User input characteristics

User KBD input must conform to the following characteristics:

- Input can be in upper or lower case. All input is echoed to the terminal (appears on the screen)
- Input in response to prompts for numbers must be numeric.
- Invalid input results in a prompt asking the user to re–enter the input.
- Input can be edited by using the Backspace key (ASCII 08) or the @ key
- The Delete key can be used to delete the entire input line.
- The maximum number of characters allowed before a carriage return is 40. Exceeding this number of characters results in a re–prompt.
- Input of more than one menu selection on a line is not allowed. A terminal beep sounds and a backspace results if this occurs.
- The input session can be aborted by using a Control- and Z- key combination (CTRL-Z).

Prompt message characteristics

Prompt messages have the following characteristics:

- All prompts are in upper case.
- All prompts are preceded by a line feed.
- Prompts requiring user input are followed by a colon (:) and three spaces.
- Other prompts end with a carriage return and a line feed.

Call disconnection

During call setup, a KBD call attempt can be aborted by using CTRL–Z. A prompt message is displayed to confirm the aborted call attempt.

After a call is established and KBD is not in operation, a data call can be disconnected by one of the following actions:

- Enter three plus signs (+++) in succession (no spaces). The three plus signs must be preceded and followed by at least one second of no data entry. The time between entry of successive plus signs must not exceed one second.
- Log off from the host.
- Place the on/off–line switch in the OFF position.
- Power off the terminal.

Keyboard feature operation

Procedures 1 through 14 present dialing procedures for KBD operation.

Note: (CR) indicates a carriage return in the following procedures.

Use Procedure 1 for both local and remote data calls.

Procedure 1 Place local or remote data call

1 Type:

nnnnn

(CR)

Computer responds: `Calling (nnnnn)`

Response: User enters directory number (DN), 24 digits maximum.

Screen display from Main Menu: `CONNECTION IN PROGRESS`

System response: Ringing occurs at the local set or termination occurs on an outgoing trunk.

Use Procedure 2 for modem pool calls. Modem pool feature activation codes are assigned locally and designate the type and speed of modem used.

Procedure 2 Place a resource cell

1 To select resource cell, type:

R

(CR)

Computer responds: `TYPE PREFIX THEN PRESS RETURN.`

2 For modem pool feature activation code, type:

PP

(CR)

Screen display from Main Menu: `MODEM RESERVED, TYPE NUMBER THEN PRESS RETURN.`

Response: The modem pool member is reserved, but not yet connected.

3 Type the directory number (DN):

nnnnn

(CR)

Computer responds:

```
CALL CONNECTED. SESSION STARTS.
```

Response: System establishes data call.

Use Procedure 3 to activate Ring Again (RAG). When a local data call is dialed and the destination is busy, the prompt shown in Step 1 displays.

Procedure 3 Activate ring again

1 Screen display from Main Menu:

```
BUSY. DO YOU WISH TO RING AGAIN?  TYPE Y/N.
```

Response: The destination is busy.

or

Screen display from Main Menu:

```
BUSY. PREVIOUS RING AGAIN ACTIVE, REPLACE?  TYPE
Y or N.
```

Response: RAG has previously been activated against this number.

2 Type:

Y

(CR)

Screen display from Main Menu:

```
RING AGAIN PLACED, CALL RELEASED.
```

Response: User activates RAG, and the call is released.

or

Type:

N

(CR)

Screen display from Main Menu:

```
CALL RELEASED.
```

Response: RAG is not activated.

3 Screen Display from Main Menu:

```
MAIN MENU
```

Response: System displays the Main Menu.

Use Procedure 4 to recall a previously busy station with RAG activated against that station. The prompt shown in Step 1 displays when the called station becomes idle.

Procedure 4 Recall ring again

1 Screen Display from Main Menu: `DATA STATION NOW AVAILABLE. PLACE CALL? TYPE Y or N.`

Response: Both stations are idle, and RAG has been activated. A terminal beep also sounds to alert the activating station user.

2 Type:

N

(CR)

Screen Display from Main Menu:

```
MAIN MENU
```

Response: Rag times out.

or

3 Type:

Y

(CR)

Screen Display:

```
CALLING nnnnn
```

Response: nnnnn = called RAG station

Screen Display:

```
CONNECTION IN PROGRESS.
```

Response: Local data call is being placed.

Screen Display:

```
System establishes data call.
```

Use Procedure 5 to cancel a pending RAG request.

Procedure 5 Cancel ring again

1 Type:

M

(CR)

Screen Display from Main Menu:

```
Modify menu
```

Response: System displays Modify Menu.

2 Type:

C

(CR)

Screen Display from Main Menu:

```
RING AGAIN CANCELLED.
```

Response: System returns to main menu.

Use Procedure 6 to initiate a data call to a previously programmed Autodial number using KBD. (Autodial is compatible with modem pooling.)

Procedure 6 Update autodial number

1 Type:

A

(CR)

Response: User selects autodial feature.

2 Screen Display from Main Menu:

```
CONNECTION IN PROGRESS.
```

Response: System establishes data call.

Use Procedure 7 to program or update the data Autodial number using KBD.

Procedure 7 Update autodial number

1 Type:

M

(CR)

Screen Display from Main Menu:

```
Modify menu
```

Response: System displays Modify Menu

2 Type:

A

(CR)

Screen Display from Main Menu:

```
TYPE AUTODIAL NUMBER THEN PRESS RETURN
```

Response: User selects Autodial Update feature.

3 Type:

nnnnn

(CR)

Response: User enters Autodial directory number (DN), 24 digits maximum.

4 Screen Display from Main Menu:

```
Modify menu
```

Response: System returns to Modify Menu

Use Procedure 8 to dial a data Speed Call through KBD. (Speed Calling is compatible with modem pooling.)

Procedure 8 Activate speed call

1 Type:

S

(CR)

Screen Display from Main Menu:

```
TYPE ACCESS CODE THEN PRESS RETURN.
```

Response: User selects Speed Call feature.

2 Type:

nn

(CR)

Screen Display from Main Menu:

```
CONNECTION IN PROGRESS.
```

Response: User enters 1– or 2–digit Speed Call access code (nn).

Response: Ringing occurs at the local set or termination occurs on an outgoing trunk.

3 Screen Display from Main Menu:

```
CALL CONNECTED. SESSION STARTS.
```

Response: System establishes data call.

Use Procedure 9 to add or update the Speed Call list for data calls. Either 1- or 2-digit access codes can be used

Procedure 9 Update speed call list

1 Type:

M

(CR)

Screen Display from Main Menu:

```
Modify menu
```

Response: System displays Modify Menu.

2 Type:

S

(CR)

Screen Display from Main Menu:

```
TYPE ACCESS CODE THEN PRESS RETURN.
```

Response: User selects Speed Call Update feature.

3 Type:

nn

(CR)

Response: User enters 1- or 2-digit access code.

4 Screen Display from Main Menu:

```
TYPE SPEED NUMBER THEN PRESS RETURN.
```

5 Type:

nnnnn

(CR)

Response: User enters Speed Call directory number.

6 Screen Display from Main Menu:

```
Main menu
```

Response: System returns to Main Menu.

Use Procedure 10 to verify the integrity of the data and signaling channels of the data loop. When the user activates Remote Loopback (RLB), the user's data loops through the called data device's RS-232-C interface back to the user's Data Terminal Equipment (DTE). After RLB is set, the user's next data call character input echoes back to the user's screen, which verifies proper operation of the data loop.

Loopback tests can be made over digital trunks, but cannot be used with modem pooling. RLB must be set before the data call is placed.

Procedure 10 Set or reset remote loopback operation

1 Type:

M

(CR)

Screen Display from Main Menu:

```
Modify menu
```

Response: System displays Modify Menu.

2 Type:

R

(CR)

Screen Display from Main Menu:

```
REMOTE LOOPBACK? TYPE Y or N.
```

Response: User selects Remote Loopback feature.

3 Type:

Y

(CR)

Response: User sets RLB.

or

Type:

N

(CR)

Response: User clears RLB

4 Screen Display from Main Menu:

```
Modify menu
```

Response: System displays Modify Menu.

5 Type:

X

(CR)

Screen Display from Main Menu:

```
Main menu
```

Response: System exits to Main Menu.

Procedure 11 Display status information

1 Type:

D

(CR)

Screen Display from Main Menu:

```
BAUD RATE: nnnn
REMOTE/LOOPBACK: TYPE Y/N
AUTO ANSWER: TYPE Y/N
RING AGAIN: TYPE Y/N
```

2 Screen Display from Main Menu:

```
Main menu
```

Response: System returns to Main Menu.

Use Procedure 12 to allow a user to set the data call answer mode. Answer modes can be manual or automatic.

Procedure 12 Update answer mode

1 Type:

M

(CR)

Screen Display from Main Menu:

```
 Modify menu
```

Response: System displays Modify Menu.

2 Type:

M

(CR)

Screen Display from Main Menu:

```
Manual Answer? TYPEY or N.
```

Response: User selects Answer Mode feature.

3 Type:

Y

(CR)

Response: User sets answer mode to manual.

or

Type:

N

(CR)

Response: User sets answer mode to automatic.

4 Screen Display from Main Menu:

```
Modify menu
```

Response: System displays Modify Menu.

Use Procedure 13 when the user's answer mode is set for manual answer and an incoming data call occurs.

Procedure 13 Answer data call manually

1 Screen Display:

```
INCOMING CALL ANSWER: TYPE Y or N.
```

The DTE detects an incoming call, which is not yet connected. A terminal beep also sounds to alert the user.

or

Screen Display:

```
UNDER TEST
```

Response: The calling party is testing Remote Loopback on the incoming data call loop. The MADO auto–answers the call.

2 Type:

Y

(CR)

Screen Display:

```
INCOMING CALL CONNECTED.
```

Response: Both terminals are compatible. System establishes data call.

or

Screen Display:

```
INCOMPATIBLE INCOMING CALL.
CALL RELEASED (incompatible parameter
displayed)
```

Response: incoming data call connection fails because of mismatch in terminal parameters. A terminal beep also sounds to alert the user.

or

N

(CR)

Screen Display:

```
CALL RELEASED.
```

Response: User elects not to receive incoming data call.

3 Screen Display:

```
Main menu
```

Response: System returns to Main Menu.

Use Procedure 14 when the user's answer mode is set for Automatic Answer and an incoming data call occurs.

Procedure 14 Answer data call automatically

1 Screen Display:

```
INCOMING CALL CONNECTED.
```

Response: Both terminals are compatible. System establishes data call.

or

Screen Display:

```
UNDER TEST
```

Response: The calling party is testing Remote Loopback on the incoming data loop

or

Screen Display:

```
INCOMPATIBLE INCOMING CALL.
CALL RELEASED (incompatible parameter
displayed)
```

Response: Incoming data call connection fails because of mismatch in terminal parameters. A terminal beep also sounds to alert the user.

Keyboard dialing exceptions

Table 1contains exceptions to normal KBD operating procedures including suggested corrective actions. (The Break key refers to the Control-Z sequence.

Table 1 KBD operation exceptions

Problem	System response	Corrective action
Attempt to activate unassigned feature failed, or call attempt failed.	`NO SYSTEM RESPONSE. RESELECT:`	Key in a new selection from the appropriate menu.
Incoming or outgoing call failed because of communications incompatibility.	`INCOMPATIBLE COMMUNICATIONS PARAMETER. CALL RELEASED.`	Reenter appropriate selection or proper DN.
Dialing aborted by pressing Break key (Control Z).	`ABORTED`	No corrective action necessary. Main Menu redisplays.
User pressed CR only when prompted for number input.	`ABORTED`	No corrective action necessary. Main Menu redisplays.
User input errors committed.	`INVALID COMMAND/ENTRY. REENTER:`	Reenter appropriate selection or proper DN.
DN input times-out, or RAG activation times-out.	`CALL RELEASED`	No corrective action necessary. Main Menu redisplays.
RAG recall timeout occurs.	`RING AGAIN CANCELLED`	No corrective action necessary. Main Menu redisplays.

Extended Hayes keyboard dialing

User input characteristics

Hayes Keyboard Dialing input must conform to the following characteristics:

- Each command line must begin with the letters AT and end with a carriage return. If the MADO is in autobaud mode, AT is used to set

autobaud and autoparity. Processing of the command line is not done until the carriage return is received.

- Input may be in either upper or lower case, but not mixed.
- Simple character editing may be done on each command using the ASCII backspace.
- Each command line can contain several commands. Each line is limited to 40 characters, excluding AT.
- 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.
- Call setup parameters may be programmed through a register set called the S–registers. (Refer to Table 2.)

The firmware does not perform a range check on the value assigned to an S register. The range in Table 2 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 may disable the function associated with that S register. Values larger than 255 are accepted without an error, but are stored modulo 256.

The following table contains Hayes keyboard dialing parameter registers:

Table 2 Hayes Keyboard Dialing parameter registers (Sheet 1 of 2)

Problem	User Input	Default	Description
S0	0-255 rings	1	number of rings before answer
S1	0-255 rings	0	Counts number of rings
S2	0-127 valid ASCII code	43	escape code character
S3	1-127 valid ASCII code	13	carriage return character
S4	0-127 valid ASCII code	10	line feed character
S5	0-32, 127 ASCII codes	8	backspace character
S7	1-255 s	30	wait time for carrier
S8	0-255 s	2	pause time for comma (,) (not supported)

Table 2 Hayes Keyboard Dialing parameter registers (Sheet 2 of 2)

Problem	User Input	Default	Description
S10	1-255 x (0.1) s	7	loss of carrier timeout
S12	20-255 x (0.02) s	50	escape sequence guard time
S21			RESERVED
S22			RESERVED
S36	0, 1	0	0: no adapting 1: adaption
S37	0-3, 5-7, 9	0	Select maximum connect speed: 0: Connect at last AT command 1-3: connect at 300 baud 5: connect at 1200 baud 6: connect at 2400 baud 7: connect at 4800 baud 9: connect at 9600 baud
S51	0-255 x (0.25) s	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

Prompt message characteristics

Table 3 lists Hayes keyboard dialing prompts. Prompt messages are either a numeric code or word code, depending upon the value of the V parameter. (Refer to Table 4.)

Table 3 Hayes Keyboard Dialing prompts

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	CONNECT19200	data connection established at 19,200 baud

Hayes keyboard dialing commands

The following table provides a complete list of Hayes commands supported by the MADO.

Note: If the commands are input without a numerical parameter, it is assumed to be 0. For example, user input of ATE is interpreted as ATE0, which disables the echoing of the keyboard dialing commands.

Table 4 Hayes Keyboard Dialing commands (Sheet 1 of 3)

Command	Meaning
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 number that follows; and attempt to go into the online state.
E0	Disable character echo in the command state.
E1	Enable character echo in the command state (default setting).
H0	Go on–hook.
I0	Request product identification code; and output contents of S registers S52-S54. Values are: 960 (Smartmodem V-series 9600) (default value) 124 (Smartmodem 1200) 240 (Smartmodem 2400 or Smartmodem V-series 2400)
I1	Returns a 2s complement checksum of MADO ROM
I4	Displays a037800c004420 b100000000 (same value as Smartmodem V-series 9600 returns)
N1	MADO ignores S37; connection is attempted at the speed of the last autobaud command.
O	Go into the on-line state

Table 4 Hayes Keyboard Dialing commands (Sheet 2 of 3)

Command	Meaning
O1	Go into the on-line state
Q0	MADO returns result codes (default setting).
Q0	MADO does not return result codes.
Sr	Set pointer 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) (default setting).
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 (default setting).
X4	Enable result codes 0-5, 7, 10-12, and 14 (default setting).
&CO	Assume data carrier is always present. This command asserts the three EIA control leads CD, CTS, and DSR. This command is the default if ASSERTRTS DPOPT is datafilled for MADO.
&C1	CTS, DC, and DSR track far–end RTS. This command is the default if ASSERTRTS DPOPT is not datafilled for MADO.
&D0	Ignore DTR. This command is the default if ASSERTDTR DPOPT is datafilled for MADO.
&D1	Assume command state when the on-to-off transition of DTR occurs.

Table 4 Hayes Keyboard Dialing commands (Sheet 3 of 3)

Command	Meaning
&D2	Go on–hook when the on–to–off transition of DTR occurs. This command is the default if ASSERTDTR DPOPT is not datafilled for MADO.
&D3	Go on–hook and reset to default settings (such as, MADO profile configuration)
&Q0	MADO ignores S37; connection is attempted at the speed of the last autobaud command.
&Q5	MADO attempts to connect at baud rate selected by S37.
&R0	CTS, CD, and DSR track far-end RTS. This command is the default if ASSERTRTS DPOPT is not datafilled for MADO.
&R1	Assume CTS is always present. This command asserts the EIA control leads CTS, CD, and DSR. This command is the default if ASSERTRTS DPOPT is datafilled for MADO.
&S0	Assume DSR is present. This command asserts the EIA control leads CTS, CD, and DSR. This command is the default if ASSERTRTS DPOPT is datafilled for MADO.
&S1	CTS, CD, and DSR track far-end RTS. This command is the default if ASSERTRTS DPOPT is not datafilled for MADO.
Z0	Reset MADO to default settings.
Z1	Reset MADO to default settings.
&F	Reset MADO to default settings.
&Y0	Reset MADO to default settings.
&Y1	Reset MADO to default settings.

Hayes keyboard dialing feature operation

Procedures 15 through 19 present dialing procedures for Hayes Keyboard Dialing (KBD) operation.

Note: (CR) indicates a carriage return in the following procedures.

Use Procedure 15 to establish a Hayes KBD data call

Procedure 15 Establish a Hayes KBD data call

1 Type:

`ATD nnnn`

(CR).

Response: MADO send digits when (CR) is received.

2 Response: System establishes network connection.

3 Screen Display:

`CONNECT`

Response: System establishes data connection.

Procedure 16 describes an incomplete call while using Hayes KBD. Calls can fail to complete because of incompatible parameters or a noisy data path. Register S7 contains the maximum time to wait for the call to complete. If synchronization is not attained in this amount of time, the call is released.

Procedure 16 Incomplete call with Hayes KBD

1 Type:

`ATD nnnn`

Response: MADO sends digits when (CR) is received.

(CR).

2 Response: System establishes network connection.

3 Response: Data connection fails.

4 Screen Display:

`NO CARRIER`

Response: System establishes data connection.

Response: System releases the call.

Procedure 17 describes auto-answering a Hayes KBD data call. 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 MADO.

Note: No audible ringing is provided by the MADO for manual or auto-answering. The RI lead of the RS-232-C connection is high for 2 seconds and low for 4 seconds. This cycle is counted like physical ringing.

Procedure 17 Answer a Hayes KBD data call automatically

1 Screen Display:

`RING`

2 Response: MADO detects the incoming call.

3 Response: MADO counts rings up to the value of Register SO.

4 Screen Display:

`CONNECT`

Response: System establishes data connection.

Use Procedure 18 to answer a Hayes KBD data call manually. If Register S0 contains 0, the MADO does not answer automatically, and the data call must be answered using the ATA command.

Procedure 18 Answer a Hayes KBD data call manually

1 Screen Display:

`RING`

2 Response: MADO detects the incoming call.

3 Response: MADO counts rings up to the value of Register SO.

4 Type:

`ATA`

(CR).

5 Screen Display:

`CONNECT`

Response: System establishes data connection.

Use Procedure 19 for an escape sequence for Hayes KBD. When configured for Hayes KBD, the MADO operation consists of two states: the command state and the on–line (or transparent) data state. After the call is established, the MADO enters the on–line state. To return from the on–line state to the command state, use the escape code sequence in Procedure 19.

Procedure 19 Escape Hayes KBD

1 Response: Wait at least one second after previous entry.

2 Type:

+++

Response: Space each plus-sign entry less than one second apart.

3 Response: Wait at least one second before next entry.

Ordering information

Purpose

This document contains a stocklist of replacement parts for the M2000 Digital telephones

Replacement parts

The M2000 Digital Telephones have few parts that can be replaced in the field. The handset, handset cord, line cord (both equipped with TELADAPT connectors), power supply/converter, key lenses, and labels can be changed. Table 1 lists the available replacement parts.

If an M2000 Digital Telephone fails to function properly, or if mechanical breakage occurs, do not attempt repairs in the field. Return the unit to the manufacturer. For proper packing procedures, refer to the chapter, “Installation procedures”.

Table 1 M2000 digital telephone stocklist (Sheet 1 of 2)

Description	CPC	PEC
M2317 INTELLIGENT TELEPHONE, black	A0370342	NT1F21AE-03
M2317 INTELLIGENT TELEPHONE, ash	A0370343	T1F21AE-35
M2317 INTELLIGENT TELEPHONE, gray	A0370344	NT1F21AE-93
M2317 INTELLIGENT TELEPHONE W/DATA, black	A0372290	NT1F21ME-03
M2317 INTELLIGENT TELEPHONE W/DATA, ash	A0372291	NT1F21ME-35

Table 1 M2000 digital telephone stocklist (Sheet 2 of 2)

Description	CPC	PEC
M2317 INTELLIGENT TELEPHONE W/DATA, gray	A0372292	NT1F21ME-93
Note: Controlled release, PLM approval required		

Note: The M2009, M2018, and M2112 sets are manufacture discontinued.

Refer to the *Meridian Modular Telephones Reference Manual* to order Meridian 2000 series telephones.

List of terms

ac
alternating current

ACD
Automatic Call Distribution

ALT
automatic line test

ANSI
American National Standards Institute

ASCII
American Standard Code for Information Interchange

ASR
automatic set relocation

AWG
American wire gauge

BCS
Batch Change Supplement

CC
Central controller

CFX
Call Forwarding

CNF
Conference Call

CODEC
coder/decoder

CPB
Call Processing Busy

CPU
Call Pickup

CR
carriage return

dc
direct current

DLM
digital line module

DN
Directory Number

DTE
data terminal equipment

DTR
data terminal ready

EDPC
enhanced digital port card

EIA
Electronic Industries Association

ERWT
expensive route warning tone

ETS
electronic telephone set

FCC
Federal Communications Commission

HASU Set
Hardware Asigned, Software Unassigned

ID
Identification

IPE
intelligent peripheral equipment

IPEC
intelligent peripheral equipment column

IVD
integrated voice and data

KBD
keyboard dialing

LCD
Liquid Crystal Display

LEN
line equipment number

LGC
Line Group Controller

LTP
line test position

LTPMAN
line test position manual

LTPLATA
line test position test access

MADO
Meridian

MAP
maintenance and administration position

MDC
Meridian digital centrex

MPDA
Meridian programmable data adapter

PCM
pulse code modulation

PDN
primary directory number

PRK
call park

PVC
polyvinylcholoride

RAG
Ring again

RLB
remote loopback

RIs
release

ROM
read-only memory

SCL
Speed Call Long

SCS
Speed Call Short

SCU
Speed Call User

TADO
Touch Asynchronous Data Option

TCM
time compression multiplex

TRKDISP
Trunk Member Display

XALC
extended analog line card

XDLC
extended digital line card

XMLC
extended message waiting line card

XPEC
extended peripheral equipment controller

XPM
XSM–based peripheral module

Meridian SL-100

Meridian SL-100

M2000 Digital Telephone Reference Manual

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