Meridian 1

X11 system management

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Introduction

Document overview

This publication provides an introduction to the system management facilities provided with Meridian 1, described in the following chapters:

— "System management overview" on page 3

— "Communicating with the Meridian 1" on page 11

— "Security" on page 39

— "System reporting" on page 41

— "System management applications" on page 47

Where appropriate, the reader is directed to other documents for a more detailed treatment of the topics covered here.

Conventions used in this document

1 <Pointed brackets> indicate keyboard keys to use. For example, in the following, you are to type "LD 17" and then press the Return key:

LD 17 <cr>

2 UPPER CASE indicates output from the Meridian 1 as well as input entered by the user. For example, in the following, the system prompts for a type, and the user responds with the mnemonic for configuration:

TYPE CFG

Other documentation

Other Northern Telecom Publications (NTPs) related to system management are:

— *Meridian 1 system overview* (553-3001-100)

— *Meridian 1 system installation procedures* (553-3001-210)

— *X11 system management applications* (553-3001-301)

— *X11 features and services* (553-3001-305)

— *X11 input/output guide* (553-3001-400)

— *Meridian 1 general maintenance information* (553-3001-500)

— *X11 system security management* (553-3001-302)

System management overview

As telecommunications systems expand to accommodate more users, the system administrator’ s role must expand to support new hardware and software options. To make appropriate installation decisions and complete Operations, Administration, and Maintenance (OA&M) tasks efficiently, the administrator must acquire a system-wide perspective of the Meridian 1 and its components. This document is intended to help Meridian 1 system administrators and craftspersons gain that perspective.

I/O architecture

Figure 1 identifies major elements in the Meridian 1 I/O architecture.

System architecture

X11 is the software platform for Meridian 1. This software provides call processing and feature operation, administration and system management programs, and maintenance and diagnostic programs.

X11 consists of the following elements:

— software programs

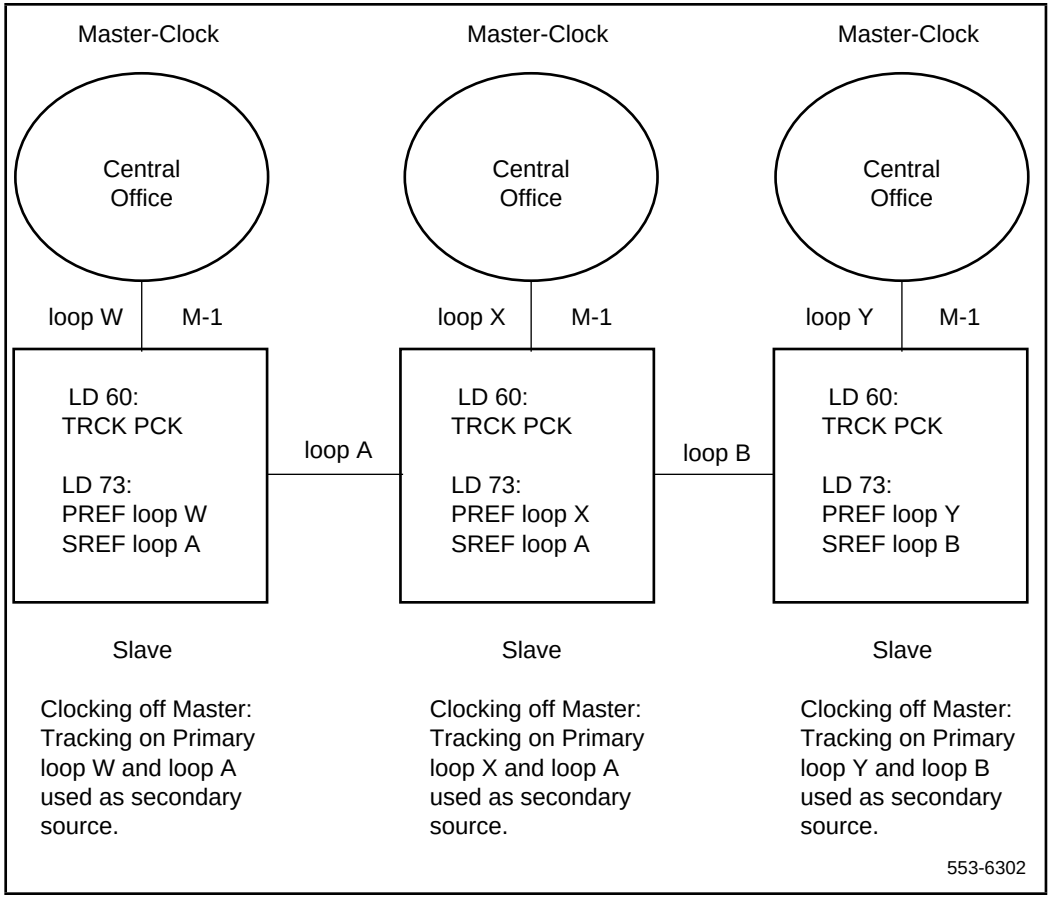
— firmware programs

— physical (hardware) components

— system configuration data

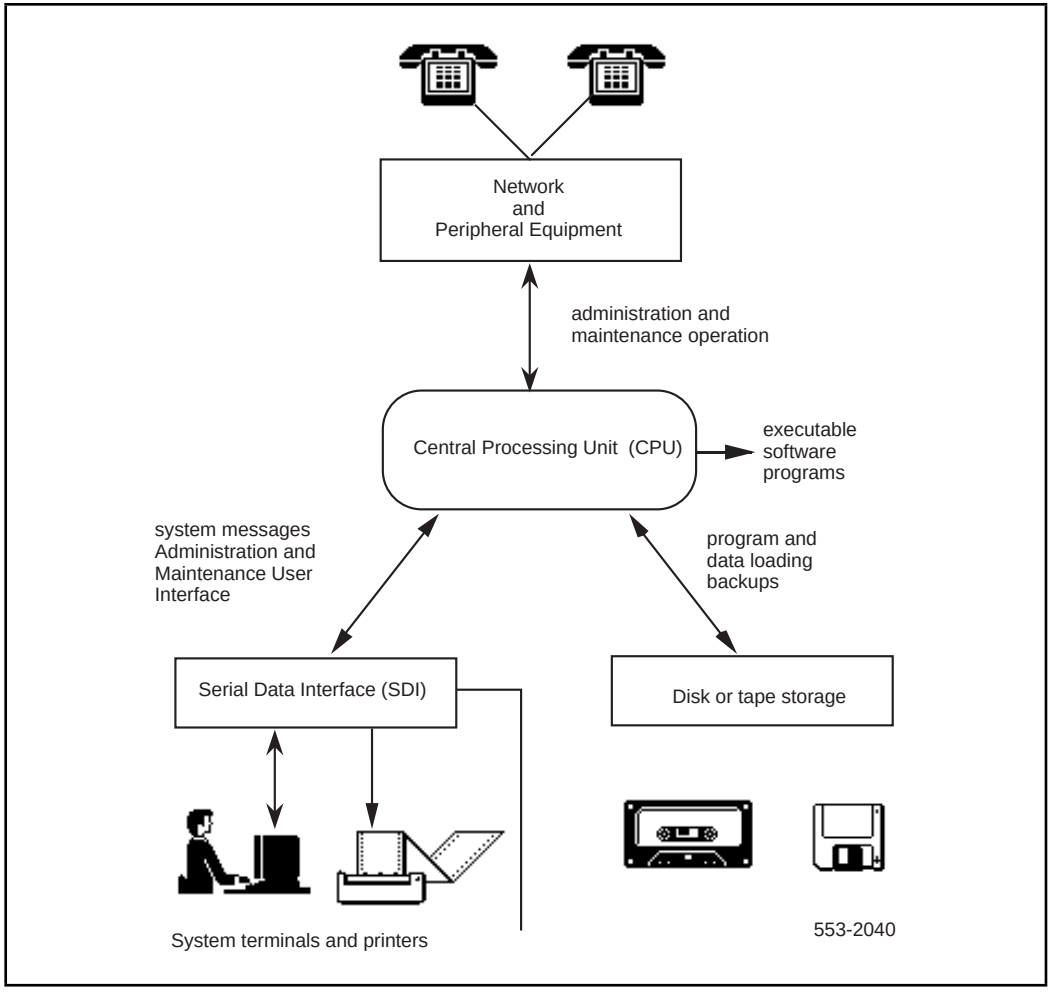
— system memory and storage

Figure 1
I/O architecture



The Meridian 1 Central Processing Unit (CPU) loads the basic X11 system software and system configuration data from disk or tape and stores them in Random Access Memory (RAM). Specific X11 programs run as needed to perform various CPU tasks, including administration and maintenance. See Figure 2.

Figure 2
System Management Architecture



System memory and storage

There are three types of system memory and storage:

— Random Access Memory (RAM)

— Read Only Memory (ROM)

— auxiliary storage

Random Access Memory

Random Access Memory (RAM) is volatile memory that resides on memory circuit cards associated with each CPU. It stores programs and data for CPU access and system operation. RAM memory is divided into four areas:

— **Program Store** contains software instructions for call processing and feature operation as well as system management tasks.

— **Protected Data Store** (P-Data) contains system configuration information, including:

- hardware configuration
- equipped features

Data administered by the craftsperson through Meridian 1 administration programs resides in Protected Data Store. Protected Data Store may be backed up or “datadumped” onto auxiliary storage. Protected data is not affected by system initialization.

— **Unprotected Data** (U-Data) contains transient call processing data, including:

- call registers maintaining the status of all calls
- TTY login status
- traffic statistics
- idle/busy and key/lamp status of all telephone sets

Unprotected data cannot be saved to auxiliary storage and is refreshed upon system initialization. Preceding each administrative task sequence, the system notifies the user of available P-Data and U-Data.

— **Overlay areas** contain administration or maintenance programs that are loaded manually by the administrator or automatically by the CPU.

If Overlay Cache Memory is implemented and the system receives a request to load a program, the system checks cache memory for the requested program. If it is in cache memory, its data portion is rapidly copied to the overlay area. A requested program that is not in cache memory is loaded from the disk into the normal overlay area and simultaneously stored into a cache memory buffer, if one is available. If one is not available, the newly requested program overwrites another in the cache memory.

Read Only Memory

Read Only Memory (ROM) is nonvolatile memory and resides on a field-replaceable board on the CPU. It includes various system control programs. X11 software releases and system types require different ROMs.

Auxiliary storage

Auxiliary storage provides permanent storage for operating programs and system data. If there is a power loss or a severe system failure resulting in a sysload, the programs and data are reloaded into RAM. Administration and maintenance programs also reside on auxiliary storage and are loaded into RAM as needed.

Auxiliary storage can reside on the following hardware:

— tape

— floppy disk

— hard disk

Note: With the exception of option 21 and ST systems, systems using X11 release 10 and later require hard disks.

Administration changes to protected data must be saved on auxiliary storage using the Data Dump Program (LD 43).

Disk Repartitioning

Starting with X11 release 21, the /p partition on the hard disk will be increased to 60 Mbytes. All the program files installed in release 21 will be stored in the new /p partition. All the files currently in the old /p partition, including database files and report files sorted in the /u partition, will not be affected. This change occurs during Software Installation, Software Upgrade, and SYNC.

If the installation program detects that the software release currently on the hard disk is less than release 21, and if the size of the /p partition is smaller than the required size, it will automatically repartition the hard disk. The following messages will display after the Installation Tool opening banner is printed on the screen:

```
A software supgrade to release 21 has been detected.
The /p will be created or repartitioned. The customer database
will NOT be erased.
>/Repartition of /p in progress.
>Creating block device /p (120000 sectors)
>Initializing device /p
>Hard disk repartition completed

The hard disk on <side #> has been repartitioned!
Now, you may continue with your installation.
```

A new entry, <c>, has been added to the existing Tools Menu to display information about the hard disk and the size of each partition.

This information can also be obtained from “pdt” during normal system operation, with the “scsiDiskStat <cmdu#>” command.

```
This is the Tools Menu for Install. You can select the tool that is
appropriate. Please select one of the options below.
Please enter:
<CR>-><a> - To set the system date and time.
<b> - To partition the hard disk.
<c> - To display the partition size of the hard disk.
<d> - To go back to the Main Menu.
Enter Choice>
```

If the need to repartition a disk is detected when SYNC is invoked from OVL 137, the hard disk will be repartitioned in the same way as at the start of Software Installation. The following messages will be displayed:

```
>SYNC
>The standby CMDU does not have the required /p partition.
The hard disk on <side #> will be repartitioned before sync'ing.
The hard disk on <side #> has been repartitioned!
```

The IDC command in Overlay 137 will display the disk drive size in megabytes in addition to the Card ID.

```
>IDC
CMDU0 NT6D64AAXXXX 03 001C SZ:124
```

If a repartitioned CMDU is used on a system that is running pre-release 21 software, it will function normally. Since the original /p partition is untouched by disk repartitioning, backwards compatibility is maintained.

Communicating with the Meridian 1

System administrators communicate with the Meridian 1 using input/output (I/O) devices such as video display terminals (VDTs), telephones, and printers (PRTs). These devices may be local (on-site) or remote. This section describes what devices are supported, how a system administrator logs in and out, and how administrative and maintenance programs operate.

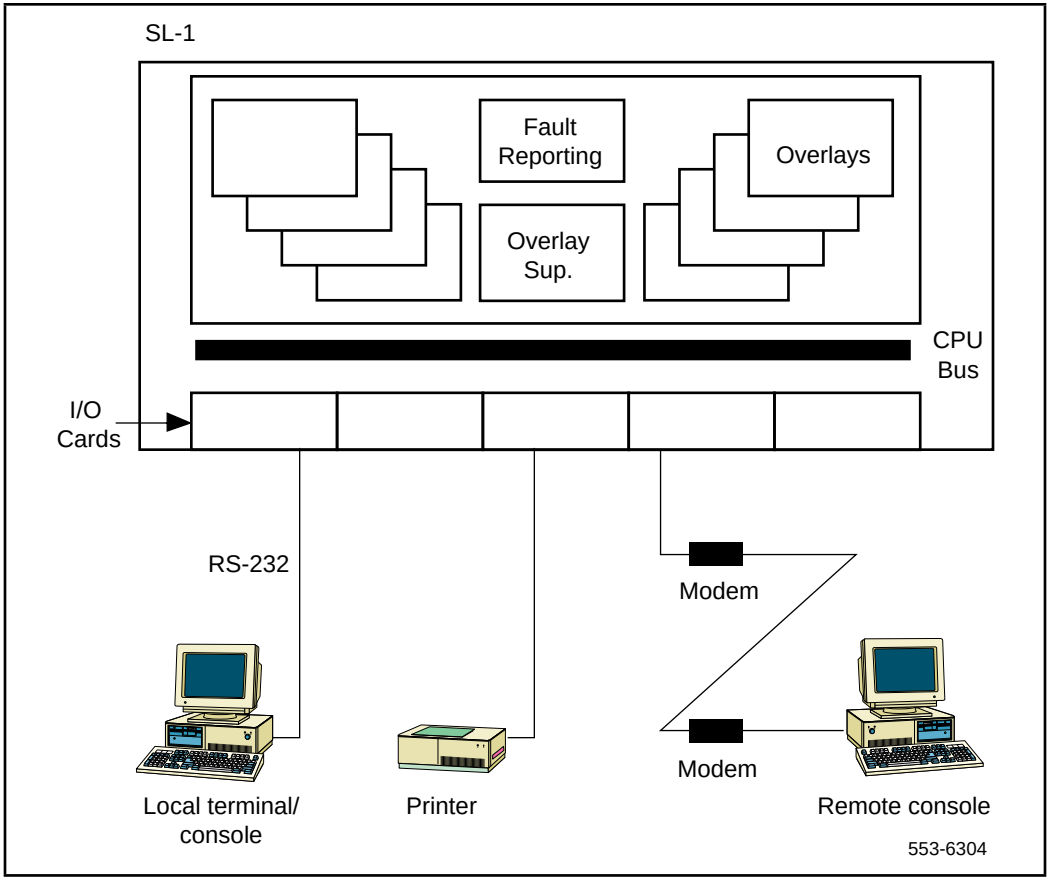
Prior to X11 release 19, only one user at a time could perform administrative and maintenance tasks. X11 release 19 provides Multi-User Login, which enables up to three users (in addition to a background routine) to perform tasks concurrently. For more information, see “Multi-user considerations” on page 33, and “Multi-User Login” on page 49. See also “Multi-User Login” in *X11 features and services* (553-3001-305).

Local and remote access

Devices used to control the Meridian 1 connect through serial data interfaces located in the central control unit. Serial data interfaces include SDI, MSDL, and ISDN D-Channel Interface Asynchronous Port.

A device located within 50 feet of the central control unit is a *local* device and connects directly to an SDI card. A device located more than 50 feet from the central control unit is a *remote* device and must be connected to the SDI card via modems and a telephone line. See Figure 3.

Figure 3
Local and remote devices



I/O port lockout

Meridian 1 software has an I/O port lockout mechanism to help prevent the TTY and PRT devices from impairing system performance. When the system detects excessive interference or a burst of invalid characters on a TTY or PRT port, the system locks the port. X11 release 19 includes an automatic recovery mechanism to re-enable the port after 4 minutes. If more than three lockouts occur within 30 minutes, the port is left disabled and a system message is issued. A craftsperson must then manually enable the port.

Communication devices

To communicate with the Meridian 1 via a system terminal requires a VDT or a teletypewriter connected directly to the Meridian 1 I/O port, or remotely via an asynchronous modem connected to the Meridian I/O port.

Device characteristics for the non-MSDL I/O port is shown in Table 1.

Table 1
Device characteristics for the non-MDSL I/O Port

Characteristic	Acceptable Value
Interface	RS-232-C
Code	ASCII
Speed	110, 150, 300, 1200, 2400, 4800, 9600 baud; also 14200 or 38400 baud if MSDL is used
Loop current	20 mA
Terminal emulation	VT220

Device characteristics for an MDSL I/O port are shown in Table 2.

Table 2
Device characteristics for the MDSL I/O Port

Characteristic	Acceptable Value
Interface	RS-232-C or RS-422
Speed	300, 1200, 2400, 4800, 9600, 19200, 38400 autobauding
Flow control	Xon/Xoff supported
Terminal emulation	VT220, 8-bit with line mode editing or STA

Supported devices include the following:

— input/output:

- an RS-232-C compatible video display terminal (VDT), referred to as a *system terminal*
- a PC with serial port
- an attendant console
- an RS-232-C compatible teletypewriter (TTY)
- a VT100 TTY type interface
- a VT220 with 7-bit or 8-bit mode with access to subsystems via STA using MDSL

— input only:

- a maintenance telephone used to provide limited access to the following overlays: LD 30, 32, 33, 34, 35, 36, 37, 38, 41, 42, 43, 45, 46, 60, 61, 62

— output only:

- An RS-232-C compatible printer (PRT)

Logging in and out

Because the Meridian 1 supports multiple users, it provides security features to help ensure system integrity. One of these features requires that a system administrator complete a login sequence to begin an online session.

Logging in requires that the administrator enter the login command (LOGI) followed by a valid password. The system administrator can change passwords using LD 17. For added security, with X11 release 19 and later, a login name may also be required.

Use Procedure 1 (following) to log into the system from a VDT. Use Procedure 2 on page 17 to log into the system from an SL-1 maintenance telephone.

Procedure 1
Using a VDT to log in, load a program, and log out

1 Press <cr>.

If the response is:	Then:
A period (.)	You can log in. Go to Step 2.
OVL111 nn IDLE	You can log in. Go to Step 2.
OVL111 nn BKGD	You can log in. Go to Step 2.
OVL111 nn TTY x	You cannot log in now. You must wait until another user logs off and then retry.
OVL111 nn SL1	You cannot log in now. You must wait until another user logs off and then retry.
OVL000 >	You are already logged in. Go to Step 4.

2 Type the following command to log into the system:

LOGI <cr>
–or–
LOGI <user name> <cr>

— If the response is PASS?, go to Step 3.

— If the response is an error message, refer to “System messages” in *X11 input/output guide* (553-3001-400).

3 Type the Level 1 or Level 2 password followed by <cr>.

— If the response is **>**, go to Step 4.

— If the response is an error message, refer to “System messages” in *X11 input/output guide* (553-3001-400).

4 Type a command in the following format to load a program:

LD xx <cr>
–or–
LD xxx <cr>
–or–
LD xx D <cr>

where xx or xxx is the number of the program; D forces a load from disk. (D applies only to non-option 81 systems running X11 release 18 or later equipped with Overlay Cache Memory.)

5 Perform the necessary tasks.

6 Type the following to end the current program:

END <cr>
–or–
**** <cr>

7 To load another program, go to Step 4.

To end the session and log out, type the following:

LOGO <cr>

Procedure 2
Using a maintenance telephone to log in, load a program, and log out

A craftsperson might use a maintenance telephone for one of the following reasons:

— The TTY port is not available or not operational.

— Access to the maintenance telephone is more convenient than access to the TTY port.

— The craftsperson wants to generate test tones.

When using a maintenance telephone, you use telephone keys that correspond to letters and numbers on a system terminal.

For example, on a system terminal you would enter:

LD 42 <cr>

On a maintenance telephone you would enter:

53#42##

Table 3 maps the keys on a system terminal keyboard to the telephone keys on a maintenance telephone.

Table 3
Keyboard-to-telephone key mapping

Keyboard				Telephone
			1	1
A	B	C	2	2
D	E	F	3	3
G	H	I	4	4
J	K	L	5	5
M	N	O	6	6
P	R	S	7	7
T	U	V	8	8
W	X	Y	9	9
			0	0
		Space or #		#
		Return		##
			*	*
Note: There is no Q or Z on a telephone.				

1 Press the prime DN key.

2 Type the following to place the telephone in maintenance mode:

xxxx91
where xxxx is the customer's Special Prefix (SPRE) number[1]

or

Enter the appropriate FFC[2].

1. The SPRE is typically "1" (in which case you would type 191). The Customer Data Block defines the SPRE; you can print it using LD 21.
2. The Flexible Feature Code (FFC) is usually 30. See "Flexible Feature Codes" in *X11 features and services* (553-3001-305).

3 Key the following to check for a busy tone:

##

— If there is no busy tone, go to Step 3.

— If there is a busy tone, another program is active. You have two choices:

- Try again later.
- If necessary, end the active program and gain access to the system by typing:

****

4 Type a command in the following format to load a program:

53# xx##

where xx is the number of the program.

5 Perform the necessary tasks.

6 Type the following to end the current program and return the telephone to processing mode:

****

Administrative and maintenance programs

Administrative and maintenance programs reside on disk or tape and are loaded into the RAM overlay area when they are needed. To enhance performance, certain programs are loaded immediately into cache memory or system RAM. Other programs are loaded in response to an instruction from the CPU or a command from a system terminal, maintenance telephone or attendant console. Because of how they are loaded, the programs are often referred to as *overlays*.

Maintenance programs

Maintenance programs perform hardware and software diagnostics. They also enable, disable, and check hardware status.

— Background

When users are not running maintenance overlays, special maintenance programs run continuously in the background to monitor system performance. These programs detect system discrepancies before they begin to affect service. When there is sufficient CPU capacity, background routines also execute a set of overlays to ensure the integrity of the system.

— Midnight or Daily Routines

In addition, a set of maintenance programs runs automatically once a day, usually at midnight. These are called daily or midnight routines. Results of selected tests run by these routines may appear on the TTY. With X11 release 19 and later, the system prints a banner page to indicate the beginning and ending of each daily routine. The content of the banner page is as follows:

DROLXXX <Overlay Mnemonic> <LD xx> <BEGIN, END> <Time stamp>

The following is an example of the banner pages for a daily routine:

DROL000 NWS LD 30 BEGIN 00:35 23/1/92
.
.
.
DROL001 NWS LD 30 END 00:42 23/1/92

— Manually Loaded

Most other maintenance programs use a command/action/response format. The system administrator enters a command; the system performs the requested action and responds with the result. Table 4 shows an example of a command recognized by several different maintenance programs.

Refer to *X11 input/output guide* (553-3001-400) for the complete list of maintenance programs, as well as their prompt/response sequences.

Table 4
A maintenance program command

Overlay	Command	Explanation
02	STAD dd mmm yyyy hh mm ss	Set time and date
30	STAT	Check the status of network loops
135	STAT CNI	Check the status of the CNI port

Note: When the system administrator loads a maintenance program, it replaces any currently running background program except LD 44. Administrative routines (such as LDs 10 and 11) do not abort background routines.

Administration programs

Administration programs implement and modify system features, and reflect changes in system configuration. For example, the system administrator uses administration programs to make changes to directory numbers, telephones, trunks, and features.

Once loaded, administration programs use a step-by-step prompt/response format. The program issues a prompt for input; the administrator enters the appropriate response through the keyboard, followed by the Return key. The Return key signals the end of each response. Table 5 shows an example of how to use an administration program.

Table 5
Using an administration program

Prompt	Response	Explanation
REQ	CHG	The program requests input; the response indicates the need to change some data.
TYPE	CFN	The program asks what type of data to change; the response indicates that the data is in the Configuration Record.
PARM	YES	The program asks if the change is to a system parameter; the response confirms that it is.
- ALRM	YES	The program asks whether to enable the minor alarm on attendant consoles; the response confirms that the alarm is to be enabled.
REQ	****	The program prompts for more input; the response ends the program.

If the response is valid, the system program issues the next prompt. If the response is invalid, the program issues a message using the format SCHxxxx, where SCH stands for Service Change, and xxxx is the specific message identifier. See “System messages” in *X11 input/output guide* (553-3001-400) for an explanation of each SCH message.

Program loading

After logging in on a system terminal, type the following to load a program:

LD xx <cr> {for TTY}
–or–
LD xxx <cr> {for Maintenance Set}
–or–
LD xx D <cr> {for Attendant Administration}

where xx or xxx is the number of the program; D forces a load from disk. (D applies only to non-option 81 systems running X11 release 18 or later software equipped with Overlay Cache Memory.)

Overlay characteristics

This section describes some of the characteristics of the Meridian 1 administration programs.

Data groups and gateway prompts

In X11 release 18, prompts for the System Configuration Record (accessed with LD 17) are organized into logical data groups. In X11 release 19, the craftsperson can access an individual prompt via a special gateway prompt to its data group. For example, PWD is the LD 17 gateway prompt to prompts related to passwords. See sample gateway prompts in Table 6.

Data groups and gateway prompts improve administration productivity by eliminating the need to step through numerous prompts to access and modify a specific value.

By entering a gateway mnemonic in response to the TYPE prompt in LD 17, the user gains access to its data group. See the *X11 input/output guide* (553-3001-400) for further detail.

Table 6
Sample gateway prompts in LD 17

Mnemonic	Description
ADAN	All I/O devices, including D-channels
ATRN	Meridian Modular Telephone transmission parameters
CEQU	Common equipment data
OVLY	Overlay Area options
PARM	System parameters
PWD	System Password and Limited Access to Overlays Password
VAS	Value Added Server data
ALARM	Alarm filter

Note: Prompts in LD 17 not belonging to any other data group are part of the PARM data group. These prompts include CSQI, CSQO, AXQI, AXQO, FRPT, MANU, CLID, MGCR, DCUS, MAGT, MSCL.

With X11 release 19, when you exit a gateway, the updates for the data group are written to Protected Data Store. Canceling out of the program does NOT cancel the updates.

With X11 release 19 and later, the LD 22 Print Routines for the Configuration Record support printing individual data groups as well as the entire data block. The print sequence is identical to the data entry prompt sequence in LD 17.

The following table lists some data group mnemonics entered at the TYPE prompt in LD 22.

Table 7
Sample gateway prompts in LD 22

Mnemonic	Description
CFN	Print complete Configuration Record (excluding password data; see PWD below).
ADAN DCH <x>	Print one or all D-channel (and associated backup D-channel) information.
ADAN HST	Print History File.
ADAN FDK	Print floppy disk configuration.
ADAN TTY <x> ADAN PRT <x>	Print information for one or all system terminals.
ADAN AML <x>	Print one or all Application Module Links.
ADAN	Print all I/O device information.
PWD	Print System Password and Limited Access to Overlays Password (requires that the user be PWD2).
PARM	Print system parameters.
CEQU	Print common equipment data.
OVLY	Print Overlay Area options.
VAS	Print Value Added Server data.
ATRN	Print Meridian Modular Telephone transmission parameters.
ALARM	Print alarm filter tables.

Enhanced Input Processing

Enhanced Input Processing in X11 release 19 accepts up to 80 characters of input collection for selected prompts before processing. Line-oriented parsing does not pass the input characters to the overlay until either the 80-character limit is reached or a Return key is detected. In addition, a user can request a list of valid responses to a specific prompt by entering:

?<cr>

Prompts supporting this function have a colon appended as a suffix, thus:

REQ:

In X11 release 19, the user can also enter abbreviated responses. The overlay responds with the nearest match to the expected response. The user can change this response if it is incorrect.

Overlay Restructuring (LD 15/21)

Starting with X11 release 21, LD 15 and LD 21 have been restructured to make them easier to use.

Operating parameters

Direct Gateway Access is available by entering its mnemonic at the TYPE prompt. The user can still enter CDB in response to TYPE and receive a YES/NO gate opener prompt for each of the 25 gateways.

The user can enter DEFAULT at TYPE to create a new data block. This enables the user to create a default CDB without going through many prompts, and is only prompted when a default is not available.

Table 8
LD 15 Creating (NEW) a Customer Data Block

Prompt	Response	Description
REQ:	NEW	Add new
TYPE:	CDB	Customer Data Block
CUST	0-99	Customer number
AML_DATA	(NO) YES	Change Application Module Link OPtions
ANI_DATA		Automatic Number Identification has two prompts which require entry when adding a new customer. The user automatically enters the ANI prompt sequence.
ANAT	xxx...x	ANI billing number for attendants making ANI calls
ANLD	xxxxx	ANI Listed DN
ATT_DATA	(NO) YES	Change Attendant Consoles options
AWU_DATA	(NO) YES	Change Automatic Wake Up options
CAS_DATA	(NO) YES	Change Centralized Attendant Service options
CCS_DATA	(NO) YES	Change Controlled Class of Service options
CDR_DATA	(NO) YES	Change CDR and Change Account options
FCR_DATA	(NO) YES	Change New Flexible Code Restriction options
FFC_DATA	(NO) YES	Change Flexible Feature Codes options
FTR_DATA	(NO) YES	Change features and options
HSP_DATA	(NO) YES	Change Hospitality Management options
ICP_DATA	(NO) YES	Change Intercept Computer Update
IMS_DATA	(NO) YES	Change Integrated Message Service options
INT_DATA	(NO) YES	Change Intercept treatment options
LDN_DATA	(NO) YES	Change Departmental Listed Directory Numbers options
MPO_DATA	(NO) YES	Change Multi-Party Operations
NET_DATA	(NO) YES	Change ISDN and ESN networking options
NIT_DATA	(NO) YES	Change Night Service options
OAS_DATA	(NO) YES	Change Off-Hook Alarm Security options
PPM_DATA	(NO) YES	Change Periodic Pulse Metering
PWD_DATA	(NO) YES	Customer Related Passwords
RDR_DATA	(NO) YES	Change Call Redirection options
ROA_DATA	(NO) YES	Change Recorded Overflow Announcement options
TIM_DATA	(NO) YES	Change Timers
TST_DATA	(NO) YES	Change Test lines

Table 9
LD 15—Creating (NEW) a Default Customer Data Block

Prompt	Response	Description
REQ:	NEW	Add new
TYPE:	DEF	Default Customer Data Block
CUST	0-99	Customer number
ANI_DATA		Automatic Number Identification has two prompts which require entry when adding a new customer. The user automatically enters the ANI prompt sequence.
ANAT	xxx...x	ANI billing number for attendants making ANI calls
ANLD	xxxxx	ANI Listed DN

Table 10
Changing (CHG) a Customer Data Block

Prompt	Response	Description
TYPE:	CDB	Customer Data Block
CUST	0-99	Customer number
AML_DATA	(NO) YES	Change Application Module Link OPtions
ANI_DATA		Automatic Number Identification has two prompts which require entry when adding a new customer. The user automatically enters the ANI prompt sequence.
ANAT	xxx...x	ANI billing number for attendants making ANI calls
ANLD	xxxxx	ANI Listed DN
ATT_DATA	(NO) YES	Change Attendant Consoles options
AWU_DATA	(NO) YES	Change Automatic Wake Up options
CAS_DATA	(NO) YES	Change Centralized Attendant Service options
CCS_DATA	(NO) YES	Change Controlled Class of Service options
CDR_DATA	(NO) YES	Change CDR and Change Account options
FCR_DATA	(NO) YES	Change New Flexible Code Restriction options
FFC_DATA	(NO) YES	Change Flexible Feature Codes options
FTR_DATA	(NO) YES	Change features and options
HSP_DATA	(NO) YES	Change Hospitality Management options
ICP_DATA	(NO) YES	Change Intercept Computer Update
IMS_DATA	(NO) YES	Change Integrated Message Service options
INT_DATA	(NO) YES	Change Intercept treatment options
LDN_DATA	(NO) YES	Change Departmental Listed Directory Numbers options
MPO_DATA	(NO) YES	Change Multi-Party Operations
NET_DATA	(NO) YES	Change ISDN and ESN networking options
NIT_DATA	(NO) YES	Change Night Service options
OAS_DATA	(NO) YES	Change Off-Hook Alarm Security options
PPM_DATA	(NO) YES	Change Periodic Pulse Metering
PWD_DATA	(NO) YES	Customer Related Passwords
RDR_DATA	(NO) YES	Change Call Redirection options
ROA_DATA	(NO) YES	Change Recorded Overflow Announcement options
TIM_DATA	(NO) YES	Change Timers
TST_DATA	(NO) YES	Change Test lines

Table 11
Overlay 21—PRT a Customer Data Block

Prompt	Response	Description
REQ:	PRT	Print
TYPE:	CDB	Print all of the Customer Data Block except PWD_DATA which can only be printed as an individual Gateway.
	AML_DATA	Print Application Module Link OPtions
	ANI_DATA	Automatic Number Identification has two prompts which require entry when adding a new customer. The user automatically enters the ANI prompt sequence.
	ATT_DATA	Print Attendant Consoles options
	AWU_DATA	Print Automatic Wake Up options
	CAS_DATA	Print Centralized Attendant Service options
	CCS_DATA	Print Controlled Class of Service options
	CDR_DATA	Print CDR and Print Account options
	FCR_DATA	Print New Flexible Code Restriction options
	FFC_DATA	Print Flexible Feature Codes options
	NIT_DATA	Print Night Service options
	OAS_DATA	Print Off-Hook Alarm Security options
	PPM_DATA	Print Periodic Pulse Metering
	PWD_DATA	Print Customer Related Passwords
	RDR_DATA	Print Call Redirection options
	ROA_DATA	Print Recorded Overflow Announcement options
	TIM_DATA	Print Timers
	TST_DATA	Print Test lines

Overlay Supervisor

The Overlay Area is an area of program store (approximately 20K words in size) reserved for Operations, Administration, and Maintenance (OA&M) programs. These programs, identified by a two- or three-digit number, reside on the system mass storage (hard disk, floppies, or tape). The Overlay Supervisor handles the loading and execution of the overlays, accepting requests from a TTY, predefined BCS pad, or the system itself.

The two types of input that affect the Overlay Supervisor are loop input (peripheral signaling) from maintenance busy equipment and teletype input.

The Overlay Supervisor performs the following functions:

— Controls all devices that are executing overlays.

— Monitors TTY activity and disables any TTYs that appear to be faulty.

— Translates TTY input and SL-1 maintenance telephone input to appear identical to the Operator and Task processes.

— Controls session if Multi-User Login is turned on.

The Operator process handles Overlay Supervisor commands such as LOGI. The Task process monitors executing overlays.

— Routes input to the appropriate destination, either the Login process, Operator process or the Task process.

Timeout

For X11 release 19 if a user is logged into a session, each keystroke on the terminal will reset the timeout back to 30 minutes. If long reports are being output by an overlay the overlay will reset the timeout back to 30 minutes after each timeslice. Only after the terminal is idle for 30 minutes, will the user be logged off.

Cache memory

With Overlay Cache Memory (X11 release 18 and later) implemented, when an LD xx command is received, the system checks cache memory to determine if it contains the requested overlay. If so, the system rapidly copies the overlay data portion to a regular overlay area, and executes the overlay from the cache memory area.

If the specified overlay is not in cache memory, the system loads it from dis into a regular overlay area. At the same time, it is also loaded into one of the 32 cache memory areas.

The craftsperson can ensure that an overlay is loaded from disk by using the LD xx D command. If the overlay also resides in cache memory, the newly loaded copy overwrites the existing copy. From X11 release 19 and later, the message “Please wait – loading from disk” and/or the blinking disk LEDs confirm that the overlay is being loaded from disk.

Linked programs

To further simplify program access, a mechanism in X11 release 19 links several overlays and permits the user to move between them. This mechanism accepts commands entered in one program and directs them to the appropriate linked program, eliminating the need to explicitly exit one program and invoke another. Table 12 shows some examples of the linked programs in X11 release 19.

Table 12
Examples of Linked overlays in X11 release 19

Overlay	Linked overlay
LD 10/11	LD 20 with PRT, LUC, LUU, or LTN command; return to LD 10/11 with NEW or CHG command
LD 10/11	LD 32 with ENLL or DISL command; return to LD 10/11 with NEW or CHG command
LD 20	LD 10/11 with NEW or CHG command; LD 32 with any valid LD 32 command

System Message Lookup Utility

The System Message Lookup Utility is available on all C processor systems (options 11C, 51C, 61C, 81 and 81C) as of X11 release 21. This utility supports on-line lookups of Meridian 1 alarm messages. The utility accepts Meridian 1 alarm mnemonics and provides a descriptive explanation of the event. It supports Lookup Last Error and Lookup Any System Message. For more information, see “Meridian 1 Fault Management” in *X11 system management applications* (553-3001-301).

Multi-user considerations

Multi-User Login allows up to three users and a background or midnight routine to execute overlays concurrently. Special software prevents conflicting overlays from executing at the same time. Multiple copies of certain overlays can execute at the same time. These include administrative overlays 10 and 11. Also multiple copies of print overlays 20, 21, 22 can also execute concurrently

Multi-User Login also provides directed I/O: input and output during a user's session appears only on that user's TTY.

For more information, refer to "Multi-User Login" and "Single Terminal Access" in *X11 system management applications* (553-3001-301).

Using programs

Special characters

The characters shown in the following table have a special meaning to the Meridian 1 software.

Table 13
Special characters and their meaning

Character	Meaning
**	Repeat current prompt
*	Return to REQ prompt
****	End the current program.
Prompt:	Help implemented, use question mark "?" to list valid responses
!	From within an executing overlay, invoke and execute the system command that immediately follows the exclamation point: !WHO See "Multi-User Login" in *X11 system management applications* (553-3001-301) for a list of these system commands.

Line mode editing

For MSDL/SDI with line mode editing, the user can enter and review an entire line before transmitting it to the Meridian 1. This function is only supported for VT220-type terminals running EM200 emulation mode. Refer to *X11 system management applications* (553-3001-301) for more information

Printing

Table 14 lists the print programs and the type of data they can print.

Table 14
Meridian 1 print programs and data

LD	Type of Data
20	Data Access Card Dial Intercom Group Directory Numbers Feature Group D Hot Line list Hunting pattern Multifrequency receivers Multifrequency versatile units Pretranslation data Speed Call lists Templates Terminal Number blocks Unused cards Unused units
21	ATM routes ATM schedules CAS key Code Restriction data Customer Data Block Route data Set relocation data Trunk members
22	Audit trail for Limited Access to Overlays Configuration Record Code inventory for option 81 Directory Numbers History File IMS message attendant and software limits X11 issue and release identifiers Equipped package list Passwords Peripherals software versions Read Only Memory (ROM) System loop limit Tape ID
81	List or count telephones with selected features Date of last service change
82	Telephone hunt patterns Multiple Appearance groups

For information on using gateways, see "Overlay characteristics" on page 23.

For information on messages that may appear during program execution, see "System messages" on page 42.

New LD 117 in Release 22

For Release 22, a new overlay is introduced with a new command format for both administration and maintenance operations. LD 117 allows the system administrator to:

1. configure the Release 22 Alarm Management feature
2. identify all Meridian 1 alarms
3. configure IP network interface addresses
4. perform all IP network related maintenance and diagnostic functions

LD 117 uses a new command line input interface (input parser) which has the following general structure (where "=>" is the command prompt):

=> COMMAND OBJECT [(FIELD1 value) (FIELD 2 value)... (FIELDx value)]

LD 117 offers the administrator the following configuration features:

1 **Context Sensitive Help** - Help is offered when "?" is entered. The Help context is determined by the position of the "?" entry in the command line. If you enter "?" in the COMMAND position, Help text will appear which presents all applicable command options. If you enter "?" in the OBJECT position, HELP text will appear which presents all applicable OBJECT options.

2 **Abbreviated Inputs** - The new input parser will recognize abbreviated commands, objects and object fields. For example, "N" can be entered for "NEW" or "SEV" can be entered for "Severity".

3 **Optional Fields** - Object fields with default values can be bypassed by the user on the command line. For example, to configure an object which consists of fields with default values, enter the command, enter the object name, press <return>, and the object will be configured with default values. All object fields do not have to be specified.

4 **Selective Change** - Instead of searching for a prompt within a lengthy prompt-response sequence, "Selective Change" empowers the administrator to directly access the object field to be changed.

5 **Service Change Error Message Consistency** - The parser simplifies usage of service change error messages. LD 117 displays only SCH0099

and SCH0105.

Release 22 Alarm Management Capability

With the Release 22 Alarm Management feature, all *processor-based system events* are processed and logged into a new disk-based System Event List (SEL). Events which are generated as a result of administration activities, such as SCH or ESN error messages, *are not* logged into the SEL. Events which are generated as a result of maintenance or system activities, like BUG and ERR error messages, *are* logged into the SEL. Unlike the previous System History File, this new System Event List survives Sysload, Initialization and power failures.

The Event Collector

The Event Collector captures and maintains a list of all processor-based system events. The Event Collector also routes critical events to FIL TTY ports and lights the attendant console minor alarm lamp as appropriate. The System Event List (SEL) can be printed or browsed.

The Event Server

The *Event Server* consists of two components:

1. **Event Default Table (EDT)**: This table associates events with a default severity. By using the CHG EDT command in LD 117, the EDT can be overridden so that all events default to a severity of either INFO or MINOR. The EDT can be viewed in LD 117.

Sample Event Default Table (EDT)

Error Code	Severity
ERR220	Critical
IOD6	Critical
BUG4001	MInor

Note: Error codes which do not appear in the EDT will be assigned a default severity of MINOR.

2. Event Preference Table (EPT): This table contains site-specific preferences for event severities as well as criteria for severity escalation

and alarm suppression. The administrator can configure the EPT to:

a override the default event severity assigned by the default table

b escalate event severity of frequently occurring minor or major alarms

Sample Event Preference Table (EPT)

Error Code	Severity	Escalate Threshold (events/60 sec.) (see Note 2)
ERR??? (see Note 1)	Critical	5
INI???	Default	7
BUG1??	Minor	0
HWI363	Major	3

Note 1: The"?" is a wildcard. See section below for explanation of wildcard entries.

Note 2: The window timer length defaults to 60 seconds. However, this value can be changed by the Administrator. Read "Global Window Timer Length" on page 38 for more information.

Wildcards

The special wildcard character "?" can be entered for the numeric segment of an error code entry in the EPT to represent a range of events. All events in the range indicated by the wildcard entry can then be assigned a particular severity or escalation threshold.

For example, if "ERR????" is entered and assigned a MAJOR severity in the EPT, all events from ERR0000 to ERR9999 are assigned MAJOR severity. If "BUG3?" is entered and assigned an escalation threshold of 5, the severity of all events from BUG0030 to BUG0039 will be escalated to the next higher severity if their occurrence rate exceeds 5 per time window.

Escalation and Suppression Thresholds

The escalation threshold specifies a number of events per window timer length that when exceeded, will cause the event severity to be escalated up one level. The window timer length is set to 1 minute by default. Escalation occurs only for minor or major alarms. Escalation threshold values must be less than the universal suppression threshold value.

A suppression threshold suppresses events that flood the system and applies to all events. It is set to 15 events per minute by default.

Global Window Timer Length

Both the escalation and suppression thresholds are measured within a global window timer length. The window timer length is set to 1 minute by default. However, the window timer length can be changed by using the CHG TIMER command in LD 117.

Ethernet

LD 117 may be used to configure and manage an IP network interface. The Meridian 1 is hardware-equipped for this advance with an Ethernet controller on the I/O processor (IOP) card. Each IOP card is equipped with a Local Area Network Controller for Ethernet (LANCE) which is preconfigured with an unique Ethernet address.

An Ethernet address is a unique 48-bit long physical address assigned to the Ethernet controller on the IOP. On a single CPU M1 system, there is only one IOP which contains one Ethernet interface and an IP address which must be configured. Single CPU systems use only a Primary IP address.

On a redundant or dual CPU M1 system, two IP addresses must be specified: Primary and Secondary. A dual CPU M1 system operating normally will use the Primary IP address (PIPA). A dual CPU M1 system operating in split mode (the mode used only when upgrading software or hardware) will use the Secondary IP address (SIPA).

Remote Access

Remote access to Meridian 1 switches is made possible with Point-to-Point Protocol (PPP). LD 117 may be used to configure IP addresses for Point-to-Point Protocol. For more information, refer to LD 117 in the *Maintenance input/output guide*.

Security

Most telecommunications systems provide protection from unauthorized and fraudulent use. Systems control access to features and functions, as well as provide audit trails of user sessions. In addition, administrators and users establish and adhere to security practices appropriate to each unique system.

Meridian 1 provides extensive system-wide security features to help detect and prevent possible unauthorized access to the Meridian 1 and Meridian Mail. For a comprehensive treatment of Meridian 1 security, please refer to *X11 system security management* (553-3001-302).

Session security

With X11 release 19 and later, the System History File provides a complete audit trail of all user sessions, including the following data:

— TTY number and (optionally) user name

— login and logout times

— periodic time stamps

— a list of overlays accessed

— session duration

In addition, the search facilities provided through the VHST command (added with X11 release 19) facilitate locating relevant messages in a large file.

With the Multi-User Login feature implemented (available in X11 release 19 and later), the system administrator can direct TTY session information to separate TTY log files. This is particularly useful to segregate system error messages from routine informational messages. In addition, it lets the system administrator track sessions on a TTY where unusual login activities have occurred.

Basic passwords

Meridian 1 system software provides two types of passwords that allow access to database configuration and maintenance programs:

— Level 1 passwords (PWD1)
These passwords provide general access to the system so that service personnel can perform administrative and maintenance tasks.

— Level 2 passwords (PWD2)
These passwords provide restricted access to the System Configuration Record so that system administrators can change passwords and perform other tasks related to system.

The system administrator uses LD 17 to enter or change passwords. Good security practices include changing all passwords regularly. Valid passwords must:

— contain 4 to 16 characters

— be composed of digits 0 through 9, and with X11 release 16 and later, characters A through Z

Beginning with X11 release 19, an administrator (who must be logged in with PWD2) can associate a user name with PWD1, PWD2, and the 100 limited access passwords. The user name can be up to 11 alphanumeric characters. The LNAME_OPTION in Overlay 17, which defaults to NO, must be set to YES to indicate that login names are required.

Limited access passwords

With the Limited Access to Overlays feature implemented, the system administrator can restrict user access to specific programs and data. You use LD 17 to define up to 100 login passwords in the configuration record, each with its own set of access restrictions. For more information, see "Limited Access to Overlays" on page 47 and in *X11 system management applications* (553-3001-301).

Secure Data Password

This password limits the service change of Authcodes in LD 88.

System reporting

The Meridian 1 provides comprehensive information to help monitor the system and diagnose problems. This section describes the more prominent mechanisms that enhance communication between the system and the administrator or craftsperson.

Faceplate displays

The faceplates on some circuit cards include LEDs or maintenance displays. These devices provide hardware status and fault information.

LEDs

Many circuit cards have one or more LEDs on the faceplate. The LED gives a visual indication of the status of the card or of a unit on the card.

When a green LED is steadily lit, it indicates the card is operating normally. When a green LED is off, it indicates the card is disabled or faulty. When a red LED is steadily lit, it indicates the card or a unit on the card is disabled or faulty. When a red LED is off and power is available to the card, it indicates the card is operating normally.

For more information, see “LED” in *Meridian 1 general maintenance information* (553-3001-500).

Maintenance displays

Maintenance displays on Meridian 1 circuit cards present hexadecimal or text (option 81) codes that indicate sysload status, component faults, or self-test codes. The particular codes presented vary by circuit card.

All codes received on common equipment displays are recorded in the System History File. The most recent 16 codes displayed on a controller card remain in memory, where you can view them via LD 30. On an option 81, the most recent 64 codes displayed on a CP card remain in memory, where you can view them via LD 135.

To interpret maintenance display codes, refer to "HEX" in the *X11 input/output guide* (553-3001-400).

System messages

System messages include status, error, and informational messages. These messages appear on appropriately configured VDT and TTY devices. You can configure your system in LD 17 to tailor the volume and type of system messages that appear on a VDT or TTY.

System messages use one of the following formats:

AAAxxx
AAAAxxxx

AAA or AAAA are mnemonics that identify the program issuing the message or the message type. Typical message types include Service Change (SCH), maintenance (such as AML and ATM), traffic (such as TFS), and Call Detail Recording (CDR). The xxx or xxxx identifies the specific message.

In the following message:

PWR0014

PWR indicates a problem with system power or temperature; 0014 specifically indicates that the system monitor failed a self-test.

System messages have two formats depending on the Alarm-Format prompt in LD 17 for X11 release 19 and later. Regardless of the formatting, the message identifiers are described above.

Table 15 shows the types of messages that go to TTYs configured in LD 17 with specific user types:

Table 15
User types and related message types

User Mnemonic	Description
AML	Application Module Link (X11 release 18 and later)
BDCH	Backup primary D-channel (X11 release 18 and later)
DCH	Primary D-channel (X11 release 18 and later)
FDK	Floppy disk unit
FIL	Filtered alarm output (X11 release 19 or later)
HDK	Hard disk unit
HST	History File
PRT	Printer port number
TAP	Tape unit (X11 release 17 and earlier)
TTY	Teletype port number

For a description of all system messages, refer to the *X11 input/output guide* (553-3001-400).

System messages can be written to the System History File, Traffic Log File, or TTY Log File, each of which is described below. These files provide an audit trail of system activity for later review and analysis.

System History File

The Meridian 1 History File is a file to which the system writes messages, thus reducing the need for on-site TTY facilities. The contents of the file, which survive a sysload, are available for problem diagnosis and can be printed at any time. Printed History File messages are prefixed by a percent sign (%) to differentiate them from normal TTY printed output.

With X11 release 19 and later, LD 22 supports View History File (VHST) for selectively viewing and/or printing System History File (and Traffic Log File) contents. VHST provides a comprehensive set of commands for this purpose.

The types of messages stored in the System History File are specified on a system basis in LD 17 and can include the following:

— maintenance messages, such as those for a disk/tape unit enable/disable

— TTY logins and logouts (with X11 release 19 and later)

— regular hourly time stamps (with X11 release 19 and later)

— service change messages, including LD commands and SCH messages

— customer service change messages, including Attendant Administration and Automatic Set Relocation

— traffic reports and messages (unless traffic messages are directed to a separate Traffic Log File)

— software error messages

One History File can be specified per system. It is a circular file: When the file is full, the system “wraps” to the beginning of the file, overwriting the oldest entry.

With X11 release 19 or later, a Multi-User Login feature introduces a TTY log file that can be used to distinguish archived TTY interactions for a particular user. With X11 release 19 and later, a Traffic Log File can be configured to store traffic reports only. Messages recorded in one of these files are not written to the History File. LD 17 establishes the destination of different message types.

TTY Log File

With the Multi-User Login feature enabled, the log files associated with system TTY terminals record messages relating to service changes, user invoked Maintenance operations, traffic (user requested reports via LD 2), CDR activity, software bugs, and so forth. Messages recorded in a TTY Log File are not written to the History File.

System messages will not appear in this log, but they will appear in the System History File. This file will be lost upon sysload.

System Event List in Release 22

With the Release 22 Alarm Management feature, all *processor-based system events* are processed and logged into a new disk-based System Event List (SEL). Events which are generated as a result of administration activities, such as SCH or ESN error messages, *are not* logged into the SEL. Events which are generated as a result of maintenance or system activities, like BUG and ERR error messages, *are* logged into the SEL. Unlike the previous System History File, this new System Event List survives Sysload, Initialization and power failures.

For more information on the new disk-based System Event List, refer to the section titiled "New LD 117 in Release 22" on page 35.

Traffic Log File

With X11 release 19 and later, one Traffic Log File can be specified per system. All system-generated traffic reports are recorded in that file rather than the History File, making these reports more accessible. The VHST command provides access to the Traffic Log File. The contents of this file survive a sysload.

"%" can be wired off while viewing the Traffic Log File so that off-line traffic report processing programs can use the output without stripping the "%" character.

LAPW Audit Trail

If LAPW is configured, this is a file that can be viewed to show Logins, Logouts, and Overlay loading.

System management applications

This section provides a brief description of each Meridian 1 system management application. For an in-depth discussion of these applications, refer to *X11 system management applications* (553-3001-301).

System History File

The Meridian 1 system writes messages to a System History File to reduce the need for on-site TTY facilities. The View History File (VHST) capability in LD 22 (with X11 release 19 and later) supports selective viewing and/or printing of History File and Traffic Log File content. More information on this application appears on page 43.

Limited Access to Overlays

Limited Access to Overlays lets the administrator restrict user access to specific programs and data. The administrator can define up to 100 login passwords in the Configuration Record (LD 17), each with its own set of access restrictions. For each of these Limited Access Passwords (LAPW), the restrictions can include:

- access to specific overlays
- modification of specific customer data
- access to specific tenant numbers
- access to Speed Call lists via the print routines in Overlay 20
- defined access to the Configuration Record (CFN) in Overlay 17
- defined access via the Print Only option

Only the user of the highest level password—PWD2—can configure or change access restrictions for other passwords. This password should be reserved for system administrators.

MSDL Serial Data Interface

With X11 release 19 and later, a serial data interface (SDI) extends the I/O capability of the Multi-purpose Serial Data Link (MSDL) card by providing an asynchronous serial data interface. The SDI is composed of software components that reside on the Meridian 1 and the MSDL.

The MSDL SDI supports three asynchronous serial data applications: TTY, PRT, and STA. In addition to the data transmission parameters supported for an MSDL SDI port, a set of functions can be specified for the port. The functions include the following:

— Autobauding

— Line Mode Editing (LME) for VT220 terminals

— XON/XOFF handling for printer interfaces

— Character screening to avoid system lockup on invalid characters

— Smart and dumb modem support

— DTR/CTS detection

— Serial Data Application auto-recovery

The following capabilities, available on other cards that support SDI, are also available on the MSDL SDI:

— Interfaces to TTYs, printers, modems, and VDTs

— High Speed Link (HSL) for ACD

— Auxiliary Processor Link (APL) for ACD

— ACD Package C displays and reports

— CDR TTY

— System terminal

— Bug and error messages

— Overlay 2 and Traffic Measurements

— Filtered alarms

— Data administration

Meridian 1 Fault Management Prior to X11 Release 22

Meridian 1 Fault management helps simplify the task of maintaining a Meridian 1 system and its application processors. X11 release 19 enhancements assist the craftsperson in timely and accurate problem determination and resolution. These enhancements are:

— alarm filtering

— system message lookup utility

Please refer to *X11 system management applications* (553-3001-301) for more information.

Meridian 1 Fault Management for X11 Release 22

Meridian 1 Fault management adminstration and maintenance is conducted in new LD 117 for X11 Release 22. This new overlay is described earlier in this NTP on page 35. A more detailed description of this new overlay can be found in the *X11 System management applications* NTP.

Multi-User Login

Meridian-1 Multi-User Login enables up to three users to log in, load, and execute overlays simultaneously. These three users are in addition to an attendant console or maintenance terminal. The multi-user capability increases the efficiency of craftspersons by enabling them to perform tasks in parallel. To facilitate this operating environment, Multi-User Login includes the following functionalities:

— database conflict prevention

— additional user commands

— TTY Log Files

— TTY directed I/O

Please refer to *X11 system management applications* (553-3001-301) for more information.

Single Terminal Access

Single Terminal Access (STA), available with X11 release 19 and later, provides integrated access to Operations, Administration, and Management (OA&M) functions for the systems it monitors, thus reducing the number of physical devices needed to administer a Meridian 1 system and its subsystems.

The STA application can co-reside with other MSDL applications to ensure flexible utilization of MSDL port resources. Please refer to *X11 system management applications* (553-3001-301) for more information.

Set-Based Administration

Meridian 1 Option 11 systems featured Set-Based Administration that simplified system installation and administration by enabling a set to be used to perform several administrative and maintenance procedures. Starting with X11 release 21, Set-Based Administration is available for all system types, including additional feature enhancements. Please refer to the *System Management Applications* NTP for more information.

Meridian 1

X11 system management

Information is subject to change without notice. Northern Telecom reserves the right to make changes in design or components as progress in engineering and manufacturing may warrant. This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC rules, and the radio interference regulations of Industry Canada. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at this own expense.

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