Meridian 1

ISDN Primary Rate Interface

Maintenance

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Contents

Introduction

This document provides operation and maintenance procedures for ISDN Primary Rate Interface (PRI) capability on the Meridian 1. It covers the following topics:

— PRI operations guide: presents quick references for Primary Rate Interface (PRI) and D-channel (DCH) maintenance, a PRI status check, and PRI start-up procedures.

— PRI fault clearing: gives steps for clearing alarm conditions and for handling PRI and DCH problems.

— PRI maintenance: covers PRI maintenance commands, tests, system messages, error detection, and cabling.

— D-channel maintenance: covers DCH maintenance commands, tests, system messages, and tracking information.

— Clock Controller (CC) maintenance: describes Clock Controller operation, maintenance commands, system messages, and cabling.

— ISDN Signaling Link (ISL) maintenance: covers ISL interfaces, status formats, start-up procedures, and recovery procedures.

References

Refer to the following documents for additional information.

— *ISDN Primary Rate Interface description and administration* (553-2901-100)

— *ISDN Primary Rate Interface installation* (553-2901-200)

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

— *Multi-purpose Serial Data Link description* (553-3001-195)

— *Basic and Network Alternate Route Selection description* (553-2751-100)

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

PRI operations guide

Primary Rate Interface (PRI) provides a digital connection from the Meridian 1 system to another Meridian 1 and to Central Office equipment (DMS-100 or AT&T 4ESS and 5ESS).

The Primary Rate Interface (PRI) circuit card, the QPC720, provides 24 channels to PRI equipment. Voice and data are transmitted over B-channels. Call control is supported out-of-band over a D-channel.

The B-channel is the fundamental channel in PRI. It carries user information to the far end, by means of T1 transmission, without carrying any signaling messages.

The D-channel transmits the standard signaling protocol, carrying the call set-up and feature activation information to the destination.

Each D-channel is physically connected to a QPC757 or NT6D11AB D-channel Interface (DCHI) card, or a NT6D80 Multi-purpose Serial Data Link (MSDL) card. The MSDL and DCHI cards provides the PRI link capability.

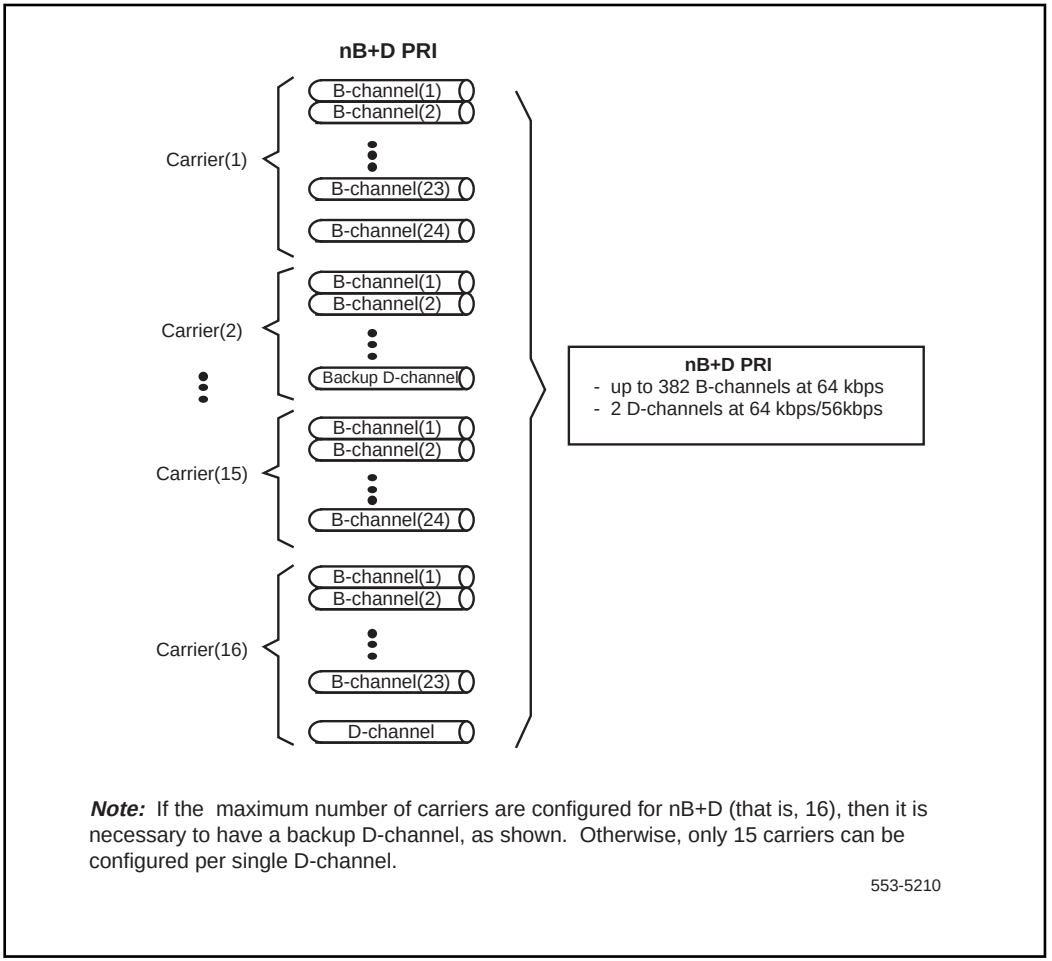
Refer to *ISDN Primary Rate Interface description and administration* (553-2901-100) for further explanation of the D-channel configuration.

PRI quick reference

The Primary Rate Interface (PRI) card provides a 24-channel digital trunk to another telephone switch.

With X11 release 15 and later, supporting nB+D capability, the D-channel interface must be configured as shown in Figure 1.

Figure 1
Meridian 1 system PRI capacity



Note: If the maximum number of carriers are configured for nB+D (that is, 16), then it is necessary to have a backup D-channel, as shown. Otherwise, only 15 carriers can be configured per single D-channel.

553-5210

PRI commands (LD 60)

This is a quick reference list of important PRI commands. See Figure 2. For a more information on PRI commands, see “PRI fault clearing” on page 35.

PRI diagnostic commands are used to maintain both PRI and clock-controller operation. See Table 1 for a list of the PRI card and channel commands in Overlay 60. The commands are organized as follows:

— PRI card and channel commands

— Alarm and counter commands

— Test commands

Table 1
PRI card and channel commands in Overlay 60 (Part 1 of 3)

Command	Description
DISI L	PRI loop L is disabled only when all the channels are idle. The network and PRI cards are then disabled and status LEDs are lit. **Channel status is set to busy.** Enter END to abort.
DISL L	Disables network and PRI circuit packs of loop L. Active calls are automatically disconnected by on-hook simulation. **All channels are disabled** and status LEDs are lit.
DSCH L CH	All channels of loop L are disabled.
ENCH L CH	All channels of loop L are enabled.
ENLL L	Enables PRI loop L. Channel CH of PRI loop L is enabled. The channel is placed into the idle state and made available for calls.
STAT	Prints the status of all digital loops.

Table 1
PRI card and channel commands in Overlay 60 (Part 2 of 3)

Command	Description
STAT loop	Get status of digital loop. Sample output: AAA TRK LOOP x - BBBB SERVICE RESTORE: YES/NO YEL ALM PROCESS: YES/NO ALARM STATUS: NO ALARM/RED(local) ALARM Where: AAA may be: 1. DTI 2. DTI2 3. PRI 4. PRI2 5. TIE 6. DID 7. DTI LINK (DTI link loop = DLI) Where: BBBB may be: 1. DSBL = Hardware of specified digital loop is disabled 2. ENBL = Hardware of specified digital loop is enabled 3. RLBK = Hardware of specified digital loop is in remote loop back mode 4. DISI PENDING = DSI command is in progress 5. TRACKING = system clock is tracked to this loop 6. IDLE = Hardware of specified digital loop is idle When AAA = TIE, IDLE ISPC indicates that the channel is an established ISPC link ready to be used by any end-users having access to the associated ISPC route. 7. SERVER RCVY = server has not recovered status of DTI LINK loop. Channels will not be allocated for call processing until this status is removed by the server 8. BUSY = Hardware of specified digital loop is busy 9. MSBY = Hardware of specified digital loop is in make busy mode

Table 1
PRI card and channel commands in Overlay 60 (Part 3 of 3)

Command	Description
	Where: SERVICE RESTORE may be: 1. YES = restore service automatically if alarm is removed 2. NO = loop can only be manually enabled Where: YEL ALARM PROCESS may be: 1. YES = yellow alarm processing is enabled 2. NO = yellow alarm processing is disabled Where: ALARM STATUS may be: 1. NO ALARM = no alarm active 2. RED = red (local) alarm active

PRI alarm commands

See Table 2 for a list of PRI alarm commands and descriptions of these commands. These commands appear in Overlay 60.

Table 2
PRI alarm commands in Overlay 60 (Part 1 of 2)

Command	Description	
CDSP	Clears the maintenance display on active CPU to 00 or blank.	
CMIN C	Clears the minor alarm indicator for customer C.	
CMIN ALL	Clears the minor alarm indicators for all customers.	
LCNT	Prints content of all alarm counters of all PRI loops.	
LCNT L	Prints content of all alarm counters of PRI loop L. The counters are:	
	BPV	Bipolar violation bit error rate counter. Indicates the number of times the loop has entered state due to excessive bipolar violations.
	FAP	Number of times the loop has entered state due to excessive frame bit errors.
	SLP	Frame slip repetition counter. The number of times the loop has entered state due to excessive frame slips.
	CRC	Cyclic Redundancy Check (CRC) bit error rate counter. The number of times the loop has entered state due to CRC frame errors.
	G2	The number of times the loop has entered state due to excessive group 2 errors.

Table 2
PRI alarm commands in Overlay 60 (Part 2 of 2)

Command	Description	
	TOTAL 24 HOUR BPV	24-hour bit error rate count
	TOTAL 24 HOUR FAP	24-hour frame bit error rate count
	TOTAL 24 HOUR SLP	24-hour slip count
	TOTAL 24 HOUR CRC	24-hour CRC error count
	TOTAL 24 HOUR G2 AIS	24-hour alarm indication signal count
	TOTAL 24 HOUR G2 LFAS	24-hour loss of frame alignment count
	TOTAL 24 HOUR G2 LMAS	24-hour loss of multiframe alignment count
	TOTAL 24 HOUR G2 RAI	24-hour remote alarm indication count
	TOTAL 24 HOUR G2 LOS	24-hour loss of signal count
RSET L CH	Resets the thresholds for PRI loop L, trunk channel CH.	
RCNT	Resets all alarm counters of all PRI loops.	
RCNT L	Resets all alarm counters of PRI loop L.	

PRI test commands

See Table 3 for a list of the PRI test commands and a corresponding description of these commands. The PRI test commands are in Overlay 60.

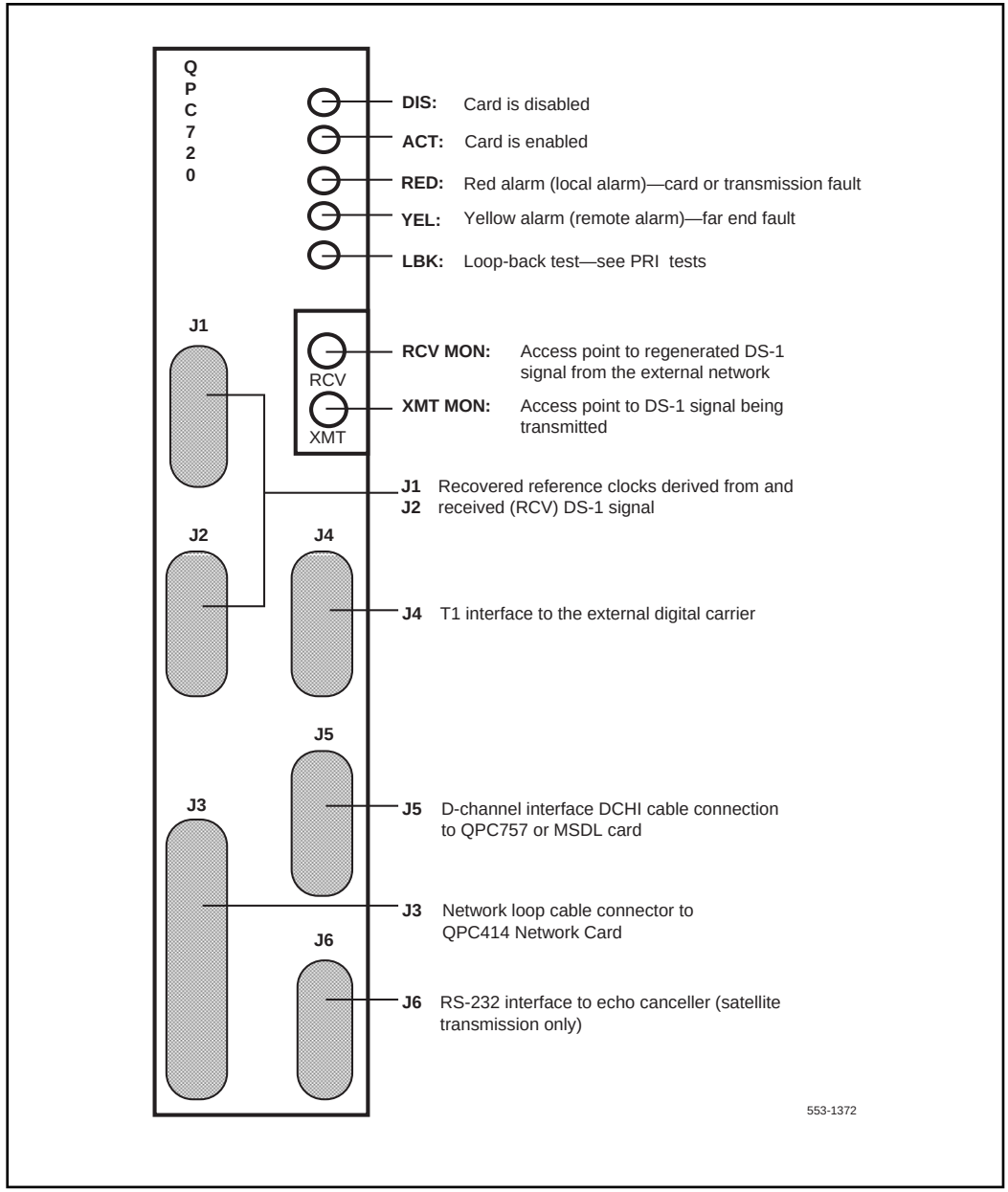
Table 3
PRI test commands in Overlay

Command	Description
ATLP (0) 1	Automatic loop test enable (= 1) or disable (= 0) default. 1 = Loop test enable; this will cause far end to raise and clear remote alarm. 0 = Run the partial loop test; there is no interaction for the far-end loop (default value).
SLFT L	Invokes PRI self-test on loop L. The loop must be disabled because the test disrupts call processing.
SLFT L CH	Invokes partial PRI hardware self-test using channel CH of loop L.
RLBK L	Closes the loop at the carrier interface point of the PRI so the far end can perform an external loop-back test. PRI loop L must be disabled because the test disrupts call processing.
DLBK L	Disables the remote loop-back test per RLBK L. The loop remains disabled.
DLBK L CH	Disables the remote loop-back test per RLBK L CH. The channel remains disabled.
RLBK L CH	Per RLBK L, but performed on channel CH. This channel must be disabled prior to issuing the request.
RMST L	Performs self-test on loop L, providing the far end is in the remote loop-back mode.
RMST L CH	Performs self-test on channel CH, providing the far end is in the remote loop-back mode.

PRI messages

PRI status and error conditions are reported with PRI messages. These messages are described at the end of this document and in the *X11 input/output guide* (553-3001-400).

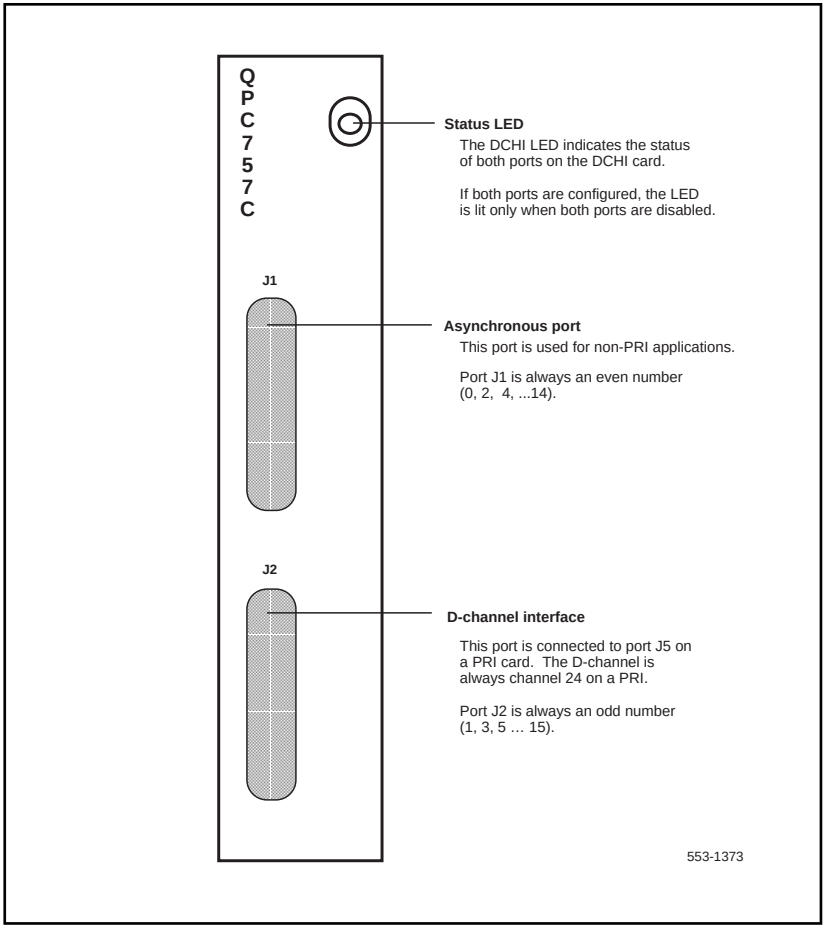
Figure 2
QPC720B PRI faceplate



DCHI quick reference

The D-channel Interface (DCHI) card provides an asynchronous port and the DCHI port. See Figure 3. The D-channel performs the call set-up and modification signaling for one or more 24-channel PRI cards. Switch settings for the DCHI port are provided in *ISDN Primary Rate Interface installation* (553-2901-200).

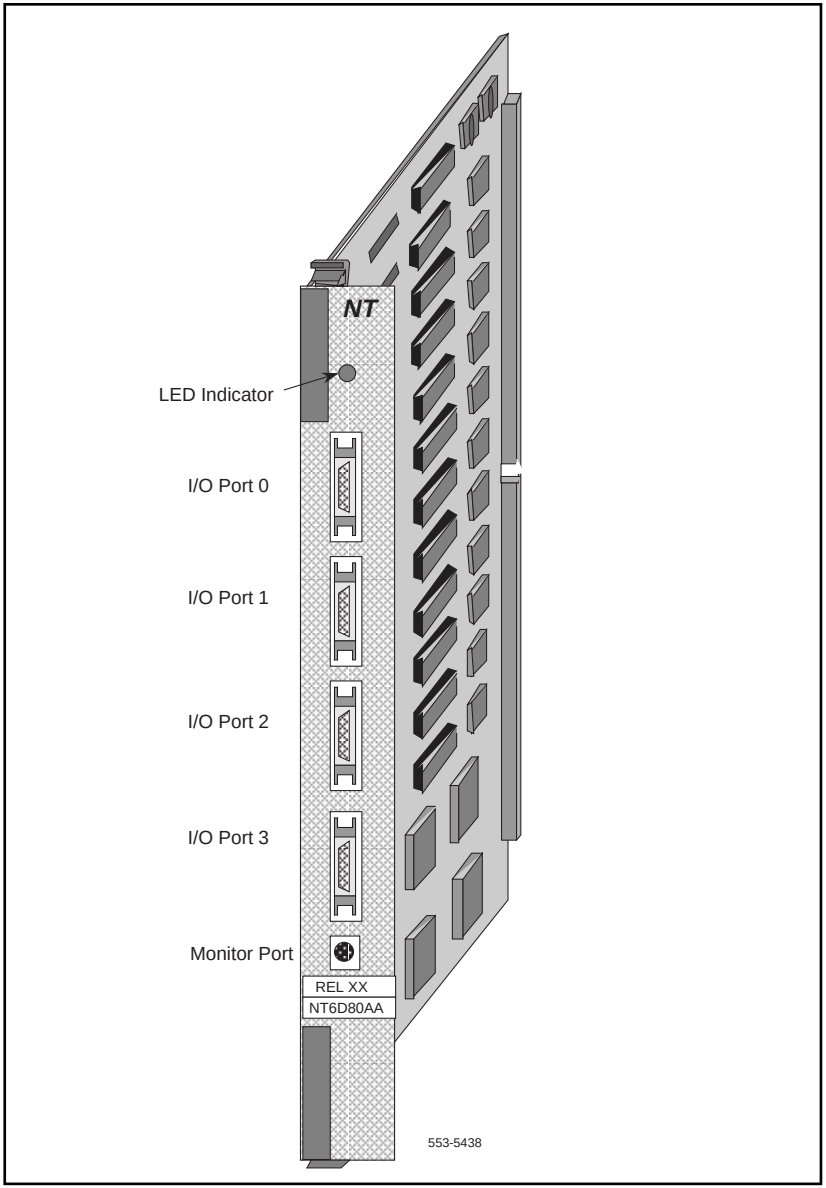
Figure 3
QPC757C DCHI faceplate



MSDL quick reference

The Multi-purpose Serial Data Link (MSDL) card provides four I/O ports in a single device. See Figure 4. Each port can be configured for asynchronous or synchronous interface, with switch settings for DTE or DCE for each port. Like the QPC757, the MSDL card performs call set-up and connections with the PRI QPC720 cards. Refer to *ISDN Primary Rate Interface installation* (553-2901-200) for information regarding the switch settings.

Figure 4
NT6D80 MSDL faceplate



D-channel commands (X11 release 17 and earlier)

This is a quick reference list of D-channel commands with X11 release 17 and earlier only. For a complete list of D-channel commands, refer to *X11 input/output guide* (553-3001-400).

Command	Action
DIS DCHI x	disable DCHI port x
ENL DCHI x	enable DCHI port x
EST DCH x	establish D-channel x
PLOG DCHI x	print D-channel statistics log x
RLS DCH x	release D-channel x
SDCH DCH x	Switch to back-up D-channel x
RST DCH x	reset D-channel x
STAT DCH (x)	print D-channel status (link status)
STAT DCHI (x)	print DCHI port status (hardware status)
TEST 100/101/200/201	see DCH tests

D-channel commands (X11 release 18 and later)

This is a quick reference list of D-channel commands for X11 release 18 and later. For a complete list of D-channel commands, refer to *X11 input/output guide* (553-3001-400).

Command	Action
DIS AUTO x	Disable automatic recovery for DCH x
DIS DCH x	Disable DCH x
ENL AUTO x	Enable automatic recovery for DCH x
ENL DCH x	Enable DCH x and attempt to establish the link
PLOG DCH x	Print error log on DCH x
RLS DCH x	Release D-channel x
RST DCH x	Reset D-channel x, inhibit signaling
SDCH DCH x	Switch to the standby D-channel x
STAT DCH (x)	Get status of one or all D-channels
TEST 100 x	Perform interrupt generation test on DCH x (QPC757 only)
TEST 101 x	Perform loopback mode test on DCH x (QPC757 only)
TEST 200 x	Perform interrupt handler test on DCH x (QPC757 only)
TEST 201 x	Test interrupt handler-to-link interface path (QPC757 only)

MSDL commands (X11 release 18 and later)

This is a quick reference list of D-channel commands for X11 release 18 and later. For a complete list of D-channel commands, refer to *X11 input/output guide* (553-3001-400).

Command	Action
DIS LLB x	Disable local loopback mode on MSDL DCH x
DIS RLB x	Disable remote loopback mode on MSDL DCH x
DIS TEST x	Disable TEST mode on MSDL DCH x
ENL LLB x	Enable local loopback mode on MSDL DCH x
ENL RLB x	Enable remote loopback mode on MSDL DCH x
ENL TEST x	Enable TEST mode on MSDL DCH x
PCON DCH x	Print configuration parameters on MSDL DCH x
PTRF DCH x	Print traffic report on MSDL DCH x
TEST LLB x	Start local loopback test on MSDL DCH x
TEST RLB x	Start remote loopback test on MSDL DCH x

D-channel messages

D-channel status and error conditions are reported DCH messages. These messages are described at the end of this document and the *X11 input/output guide* (553-3001-400).

Maintenance service messages

Service messages provide near and far end switch status. Both service and service acknowledge messages are supported on PRI B-channels and ISL channels. In addition, service and service acknowledge messages for D-channels are supported between Meridian 1 and Meridian 1 only. These messages are used for backup D-channel and D-channel sanity polling. The status may be in-service and out-of-service.

Service and service acknowledge messages for B-channels and ISL channels are supported between the following:

— Meridian 1 to Meridian 1

Service and service acknowledge messages for B-channels and PRI only are supported between the following:

— Meridian 1 to DMS-100

— Meridian 1 to DMS-250

— Meridian 1 to AT&T 4ESS and 5ESS

The following are the three channel statuses reported by the service and service acknowledge messages for B-channels and ISL channels:

— in-service

— maintenance

— out-of-service

Near end and far end subcategories are defined for each maintenance status. See Table 4 for possible combinations of near and far end status and the channel capability for each status. When the near end status and far end status do not match, the more severe maintenance status takes effect over the less severe maintenance status.

Table 4
Maintenance message status

Near end status	Far end status	B or ISL channel capability for near end
In-service	In-service	both incoming and outgoing calls allowed
In-service	Maintenance	only incoming calls allowed
In-service	Out-of-service	not allowed to use
Maintenance	n/a	not allowed to use
Out-of-service	n/a	not allowed to use

Service message function

Service messages are used to monitor the following:

— D-channel establishment

— D-channel sanity polling

— B-channel or ISL channel status change

— Channel status audit

D-channel establishment

When the D-channel establishes, the B-channel status is supported by sending service messages for each B-channel controlled by a D-channel. This allows the far end to synchronize its channel states. These service messages are sent when the D-channel is brought up automatically by the system or manually by using LD 96.

This function is supported by Meridian 1 to Meridian 1 connections only.

D-channel sanity polling

If a D-channel has been idle for 30 seconds, a service message is sent to poll the sanity of the link. The service message is sent regardless of whether the near end is configured as a master or a slave.

B-channel or ISL channel status change

Whenever there is a status change for a B-channel or an ISL channel, the new status is reported to the far end by means of a service message. Status change can occur through service change or maintenance operations, such as the addition or deletion of a channel in LD 14 or the enabling or disabling of the associated loop, shelf, card or unit in LD 30, LD 32, LD 36, LD 41, or LD 60.

Channel status audit

LD 30 is enhanced to allow channel status audit to be initiated. The channels associated with each D-channel are examined and their status is reported to the far end by means of service messages.

Service message commands

You activate the service messages in LD 96 on a per D-channel basis. These are the commands:

— ENL SERV x: Turns on the support of service and service acknowledge messages for D-channel x. The primary and backup D-channels must be disabled before enabling service messages.

— DIS SERV x: Turns off the support of service and service acknowledge messages for D-channel x.

— STAT SERV (x): Displays the current service and service acknowledge message SERV setting for individual DCH n or for all D-channels.

When configuring these messages, the SERV command should only be enabled if both switches are equipped with X11 release 15 software.

> ***Note:*** The ENL SERV and DIS SERV commands apply to both the primary and backup D-channel. With backup D-channel configured, for example LD 17 DCHI = 5 and LD 17 BCHI = 7, ENL SERV 5 enables both D-channels 5 and 7. Similarly, DIS SERV 5 disables both channels.

Two new statuses are added in X11 release 15 for maintenance messages, FE MBSY, Far end maintenance, and FE DSBL, Far end disabled. The FE MBSY, FE DSBL, and IDLE messages appear when either the B-channel or the ISL channel is idle. See “PRI fault clearing” on page 35 for more information about these responses.

PRI status check

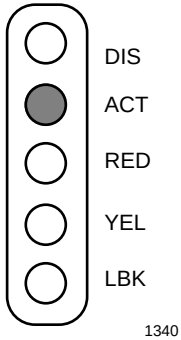
This status check is used to verify that a PRI is working normally. It assumes the PRI and DCHI/MSDL are properly installed (for example, correctly cabled) and operational. If the PRI status is not as shown in the steps below, complete the check and proceed to PRI fault clearing procedures.

Once all problems are cleared, go to PRI start-up.

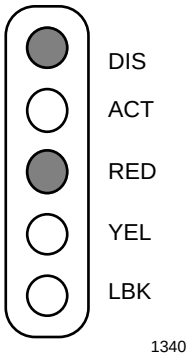
Procedure 1
PRI status check

1 Check the status LEDs on all PRI cards.

For normal operation, only the green ACT LED is lit. Note if any other LED is lit and continue with the status check



2 Check the LED on the DCHI or MSDL faceplate.



If the LED is lit, the D-channel is disabled.

Note: The DCHI LED indicates the status of both ports on the DCHI card. If both ports are configured, the LED is lit only when both ports are disabled.

Check the status of the DCH port using the following:
LD 96
STAT DCH (x)

3 Check the status of all PRI cards using the following:
LD 60
STAT (loop)

sample response:

PRI TRK LOOP L: ENBL
SERVICE RESTORE: YES
YELLOW ALARM PROCESS: YES
ALARM STATUS: NO ALARM
CH 1 IDLE DID
CH 2 BUSY TIE
.
.
CH 24 D-channel

4 List PRI alarm counters using the following:
LD 60
LCNT (loop)

(Check the out-of-service counters to determine the number of out-of-service occurrences since last execution of the midnight routines.)

response:

BVP xxxx
SLIPR xxxx
CRC xxxx
LOSFA xxxx
OS _BVP xxxx
OS_LOSF xxxx
OS_YEL xxxx

5 Check DCHI or MSDL card and D-channel (DCH) link status using the following:

LD 96
STAT DCH (x)
(x is the I/O port number)

the D-channel status should be
OPER (operational)

the DCH status should be
EST (established)

6 Check to ensure the following PRI cables are connected correctly:

— PRI to DCHI or MSDL cable

— T1 cable from QPC720B to DSX (the digital cross connect)

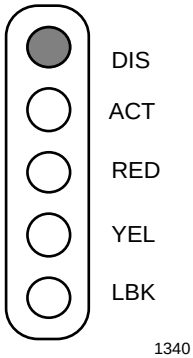
PRI start-up

This procedure shows how to take the PRI and DCH from disabled to operational.

Procedure 2
PRI start-up

1 Check the status of all PRI cards.

The PRI shown is disabled.
If any other LEDs are lit, go to PRI fault clearing.



2 Test all PRI cards using the following:
LD 60
DISL loop
SLFT loop

response:
SLFT OK

3 Enable all PRI cards using the following:
LD 60
ENLL loop

response:

PRI000	Correct version ID
DTA005	yellow alarm (remote alarm)
DTA007	yellow alarm cleared (provided the far end is up)
DTA023	PRI loop is up
DCH1010	D-channel is disabled

4 Enable the D-channel(s) using the following:
LD 96
ENL DCH x
(x is the I/O port number)

response:

DCH x EST Time and Date

D-channel is established (provided far end D-channel is OK).

If you do not get the DCH EST response, see the note in step 5.

5 Perform a PRI status check.

Note: If the status check response is RLS, establish the link at this point by entering the following command:

EST DCH x

Network Call Trace

Network Call Trace is available with X11 release 17 and later to trace a network call and to diagnose network problems. When a network call is blocked, trace data is output indicating the reason the call was blocked and the X11 software procedure responsible.

A network call can be traced by dialing a SPRE code and the NCT feature code (9912) before the network number. When this is done, call set-up and status information is output to the system terminal as the call tandems through the network. The trace information is output to all the system terminals designated in LD 17 as ADAN = TTY and USER = MTC.

NCT provides useful information such as the following:

— the route used

— the facility accessed

— the routing control imposed

— the call-blocked location

Enhanced Trace command output

With X11 Release 19 and later, a time stamp is added to the call trace output. This time stamp appears on the first line of the output.

The TN or digital trunk prints out only when there has been a change to the call register. The TN or trunk is printed only once.

Sample time stamp output which will appear on the first line:

```
.14:00:02 12/25/1992
```

There are two Network Call Trace functions: 01 and 02. They output different information as shown in the following sections.

Configuring Network Call Trace

To configure Network Call Trace on the Meridian 1, log in to the system and do the following:

— enter NCT in response to prompt RCAP in LD 17 for each D-channel (only required when the remote end is Meridian 1 with X11 release 17)

— enter CLTA in response to prompt CLS in LD 10 or LD 11 to allow a telephone to trace calls

Tracing a call

A call can be traced from any attendant console or a telephone with CLTA class of service (CLS). To trace a call dial the following:

SPRE + 9912 + xx + yyy...

where

SPRE = special function access code (defined in LD 15)
9912 = NCT feature code
xx = call trace function (01, 02)
Dial tone is provided after “xx” is dialed.
yyy... = digits normally dialed for the network call

Trace function 01

This function provides the common information related to ESN routing. It is the recommended function. The following is the call trace data for function 01:

**** NCT xx ****
<switch specific data>
--- OUT ---
<outgoing data>
--- IN ---
<incoming data>
--- STATE ---
<call state>

Where xx is the call trace ID for a traced call. The output data depends on the type of call and can be the following:

CAUSE xxxx—call reject cause
CREF xxxx—call reference number
DCH—D-channel number
DGT xxxxx...—outgoing: digits outpulsed
DGT xxxxx...—state: digits received (NODE=TBD), or digits dialed when the call is rejected (STAT=REJ)
DN xxx—DN of ringing set
ENT xx—entry in the outgoing route list
FCI x—free calling area index
FRL x—facility restriction level

IFC xxx—outgoing D-channel interface (LD 17 prompt IFC)
- D100 = Meridian DMS-100
- D250 = Meridian DMS-250
- ESS4 = AT&T ESS4
- ESS5 = AT&T ESS5
- SL1 = Meridian SL-1
- S100 = Meridian SL-100
- SS12 = Norwegian SYS-12
- AXEA = AXE-10 (Australia)
- UNKN = unknown data received

LOC xxxx—call reject software location
MODE xxx—outgoing termination
- ALOG = analog trunk
- DTI = digital trunk interface–1.5 Mb/s
- DTI2 = digital trunk interface–2.0 Mb/s
- ISL = ISDN Signaling Link
- PRI = Primary Rate Interface
- UNKN = unknown data received

NCOS xx—Network class of service
NODE xxxx—type of node
- ORIG = originating node
- TAND = intermediate node (tandem)
- TERM = terminating node
- TBD = node undetermined

RLI xxx—ESN outgoing route list index
RLS xx xx—software release, issue number of node switch
RTE xxx—incoming or outgoing route number

SID xxxx—system identification (LD 17)
STAT xxxx—call state, where xxxx can be
- ANS = call answered
- BUSY = termination busy
- DIAL = call state is dialing (mainpm)
- ERR = error detected in this message
- OPULSE = digit outpulsing
- PROC = call proceeding through this node (tandem)
- REJ = call rejected or blocked
- REOR = call state is dialing (mainpm)
- RING = call ringing
- SEIZ = trunk seized

STYP xx—terminating station type
- 500 = single line telephone (LD 10)
- BCS = multi-line telephone (LD 11)
- ATT = attendant console (LD 12)

TKTP TIE,COT,WAT...—incoming or outgoing trunk type
TKTN loop ch, l s c u—incoming or outgoing B-channel, ISL trunk TN
TN l s c u
TN of originating telephone
TOD x—time of day schedule
TYP I,E —Initial/Extended set
XLT NPA,NXX,LOC...—ESN translation type

Example 1: Successful call with trace function 01

In this example, the following digits are dialed from a telephone at TN 0 0 5 1.

1+9912++01+78+6000

where,

1 = SPRE (defined in LD 15)
9912 = NCT feature code
01 = call trace function 01
78 = PRI route access code (ACOD)
6000 = remote extension

The resulting trace information is output on the maintenance terminal:

```
**** NCT # 22 ****
NODE ORIG (SL1)
SID 0
RLS 17 53
--- OUT ---
TNS 0 0 5 1
DCH 5
IFC SL1
CREF 22
MODE PRI
RTE 24
TKTP TIE
TKTN 18 22
DGT 6000
--- STATE ---
 STAT PROC

**** NCT # 22 ****
NODE ORIG (SL1)
SID 0
RLS 17 53
--- OUT ---
DCH 5
RTE 24
TKTP TIE
TKTN 18 22
DGT 6000
--- STATE ---
STYP BCS
DN 6000
STAT RING
```

Example 2: Unsuccessful call with trace function 01

In this example, the same call is made as in example 1, but in this case the D-channel is down.

The resulting trace information is output on the maintenance terminal:

```
**** NCT # 22 ****
NODE ORIG (SL1)
SID 0
RLS 17 53
--- OUT ---
TNS 0 0 5 1
MODE UNKN
--- STATE ---
DGT 786000
STAT REJ
LOC 99
```

Trace function 02

Call trace function 02 provides the information from the active (main) call register, the incoming call state, and the outgoing call state (if any). Trace function 02 is intended as a debugging tool for system designers.

The information output by function 02 includes the following:

NODE ORIG,TAND,TERM,TBD
SID xxxx—system identifier
RLS xx xx—release of software, issue number of node
TNS l s c u—TN of the originating set
CREF xxxx—call reference number

Incoming call:

ISTATPM x—incoming state progress mark
ITRKPM x—incoming trunk progress mark
LOC xxxx—call reject software location

Outgoing call:

OSTATPM x—outgoing state progress mark
OTRKPM x—outgoing trunk progress mark
LOC xxxx—call reject software location

Main call register:

Word 0—MainPM/AuxPM
Word 1—CRlink
Word 2—Queue_In
Word 3,4—Son_Types/Processes
Word 5—Aux_CRlink
Word 6—OrigType/TerType
Word 7—TTR_TN
Word 8—OrigTN
Word 9—TerTN
Word 10—CallFwdTN
Word 11—DISA_Call/XFER_indication
Word 12,13—CR_Dialed_DN
Word 14—Digitload/Digitunload
Word 15-20—digits

Feature requirements

Network Call Trace is limited to basic ISDN PRI/ISL calls across Meridian 1 private networks.

NCT collects information only during initial call setup. It does not report on further call modification, such as Call Transfer.

Network call information is lost and the call trace ceases when any of the Meridian 1 nodes in which the call is being traced is initialized or any of the D-channels fails.

Although NCT requires PRI or ISL, calls can be traced to nodes that do not support Network Call Trace. Calls can also be traced to DTI or analog trunks. However, only the local node information is provided. These are the trunk types that are not supported: ADM, AWU, DIC, MDM, MUS, PAG, RAN, RLM, and RLR.

Call trace information is still output if the call is blocked before the trunk is seized. If queuing (Ring Again, CBQ or OHQ) is available, then the original call trace function is activated when the call is offered to the user.

When a remote Meridian 1 without NCT capability receives a Call Trace message, no call trace information is returned.

PRI fault clearing

PRI red alarm (local alarm)

A PRI red alarm (local alarm) can indicate T1 transmission problems, the PRI is disabled, or the PRI card is faulty.

Under any of these alarm conditions, all 24 channels are taken out of service as follows:

1 Meridian 1 software checks every 15 minutes to see if a Clock Controller or reference clock error has occurred.

If the 15-minute check finds the PRI in red alarm (local alarm) was a primary clock source, the software switches the Clock Controller to the secondary reference.

2 The PRI red alarm (local alarm) faceplate LED is lit.

3 Calls on the PRI are disconnected automatically.

4 The PRI card and all 24 channels are disabled.

5 After a pause of 2.5 seconds, the PRI sends a yellow alarm (remote alarm) signal to the far end.

6 The appropriate DTA message is printed and a minor alarm is raised on all attendant consoles within the same customer group.

Channel restoration

When the alarm condition improves, the PRI is restored to service as follows:

1 The Red alarm (local alarm) is cleared.

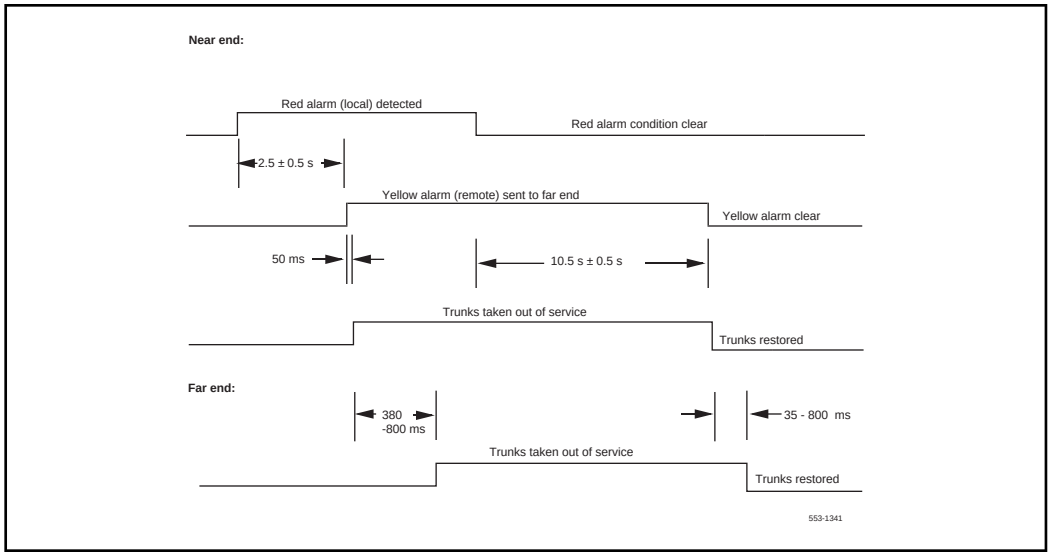
2 After 11 seconds, the PRI stops sending a yellow alarm (remote alarm) pattern to the far end.

3 With B-channel signaling (and the D-channel is established), channels are placed into the idle state and made available for calls.

With A&B bit signaling, TIE trunks are made to match the state of the far end (as presented by the T1 port).

Figure 5 shows the progression of the Meridian 1 system red and yellow (local and remote) alarm timers.

Figure 5
PRI alarm timers



Procedure 3
Red alarm status check

1 Check PRI status using the following prompts:

LD 60
STAT (loop)

2 Check PRI alarm counters using the following prompts:

LD 60
LCNT (loop)

3 See Table 5 for solutions to possible PRI problems.

PRI yellow alarm (remote alarm)

A yellow alarm on the Meridian 1 indicates a problem at the far end (the remote end). The fact that the PRI is receiving the yellow alarm pattern indicates that there is a T1 connection, but the far end is not ready.

When the PRI receives the yellow alarm (remote alarm) signal from the far end, all 24 channels are disabled.

Channel restoration

When the PRI stops receiving the yellow alarm, and the D-channel is established, the channels are placed into the idle state.

Each time a yellow alarm is generated, a counter is incremented. When the yellow alarm 24-hour threshold (prompt RALM in LD 73) is reached, the PRI must be restored to service manually.

Procedure 4
Yellow alarm status check

1 Perform a PRI status check.

2 Contact personnel at the far end to determine what action they are taking.

When the yellow alarm (remote alarm) 24-hour threshold is reached (DTA006 is printed) do the following:

1 Contact personnel at the far end to determine what action they are taking.

2 When the far end troubles are cleared, reset the alarm counters and disable, then enable, the PRI. To do this, use the following commands:

LD 60

LCNT loop	list alarm counters
RCNT loop	reset alarm counters
DISL loop	disable loop
ENLL loop	enable loop

PRI problems

The PRI can have any of the following problems. Determine the cause of the problem and follow the recommended actions provided in Table 5.

Table 5
PRI problem solving (Part 1 of 2)

Symptom	Action
No connection to far end. If the T1 cable is not physically connected to the far end, frame alignment errors occur. The channels will be disabled, but the PRI will be in red alarm (local alarm) mode.	Use the Error Counter to verify the T1 transmission from the PRI faceplate (RCV and XMT) to each connection (cross-connect, LD-1 repeater, CSU, and such equipment).
PRI fails self-test	— Reset the PRI card and network loop cable — Add a loopback plug (with pin 1 jumpered to pin 3 and pin 9 to 11) to J14 on the PRI card. — Replace the PRI card — Replace the network card
Far end problems, usually indicated by a yellow alarm (remote alarm).	Do a PRI status check and contact personnel at the far end.
PRI T1 is connected but getting bit rate or frame errors. This can be caused by the following: — a bad T1 cable connection — electrical interference — carrier problems (for example, defective repeater or cross talk)	Use the Error Counter to verify the T1 transmission from the PRI faceplate (RCV and XMT) to each connection (cross-connect, LD-1 repeater, CSU, and such equipment).
Cannot enable the PRI.	Problem due to one of the following: The far end PRI is disabled, indicated by the following: — PRI000PRI is responding — DTA005loop enabled, with yellow alarm — DCH1010DCHI is software disabled — DTI031yellow alarm (remote alarm)

Table 5
PRI problem solving (Part 2 of 2)

Symptom	Action
	There is no T1 connection, indicated by the following: — PRI000PRI is responding — DTI030loop enabled with red alarm — DTA021loss of frame alignment for 3s — DCH1010DCHI is software disabled
Meridian 1 initializes and there are no active B-channels.	When a PRI or ISL trunk interfaces with a DMS-100, Meridian SL-100, or AT&T 4ESS/5ESS and the Meridian 1 initializes, you may have to disable and then enable each B-channel.
Configuration settings do not match the far end. These problems can occur during initial start-up. They may be indicated by the following: — DTA 018, Frame slip out of service limit — DTA 021, Loss of frame alignment for 3 seconds — DCH 1003, D-channel MDL errors	See that the following Meridian 1 PRI parameters correlate to the far end: **Frame format** LD 17 prompt: DLOP response: D2, D3, D4, or ESF **Line coding** LD 17 prompt: LCMT response: B8ZS or AMI **D-channel transmission rate** LD 17 prompt: DRAT response: 56K, 64KC, or 64KI **Yellow alarm (remote alarm) method** LD 17 prompt: YALM response: FDL or DG2

D-channel problems

D-channel problems are indicated when the DCHI or MSDL releases after being enabled. This applies to both primary and backup D-channels. For example:

LD 96

ENL DCH x	protocol error
DCH 1003	link establishment error
DCH 1006	DCHI released

Procedure 5
D-channel status check

1. Check the status of the D-channel's PRI. Clear any PRI problems.
2. Contact the far end. If the far end D-channel is down, the DCH1006 message is printed.
3. Test the QPC757 DCHI (only) using tests 100, 101, 200 and 201 (the tests must be run in sequential order).
4. Print the protocol log using:
   LD 96
   PLOG DCH x
5. Check the DCHI or MSDL to PRI cable.
6. Check DCHI card jumper settings.
7. Check to see that one Meridian 1 is designated as "master" (usually the larger system), the other as "slave."

   Note: This applies only to a Meridian 1 to Meridian 1 configuration.

PRI local loopback test

This test checks the communication path between the QPC414 Network card and QPC720 PRI card. It also checks the leads for the J4. It is often performed when the PRI cannot be enabled. The PRI card must be installed and a cable connecting its J3 connector to a QPC414 Network card.

1 Disable the DCHI:

LD 96
DIS DCH x

2 Disable the PRI loop:

LD 60
DISL loop

3 Disconnect the cable connector from the QPC720 J4 (if attached). Several LEDs will light on the faceplate.

4 Attach a female 15-pin connector loopback plug to J4. The loopback plug must have pins 1 and 3 and pins 9 and 11 shorted together.

5 Enable the PRI loop:

LD 60
ENLL loop

The green ACT LED will light in a few seconds. If so, the test passed. Continue with the following steps.

If the green ACT light does not come on, retest. Unseat the PRI card between steps 2 and 3.

If the light still does not turn on, try replacing your QPC414 or QPC720 cards or the connecting cable.

6 Remove the loopback plug from the J4 connector.

7 Replace the cable removed at Step 3.

8 Enable the loop:

LD 60
ENLL loop

9 Enable the DCHI card:

LD 96
ENL DCH x

PRI self-test

The self-test checks speech path continuity, zero code suppression, remote alarm detection, and A&B bit signaling. This test is performed manually, on a per channel or a per frame (24 channels) basis.

The DCHI and PRI must be disabled before performing the self-test or call processing is disrupted. To perform the self-test on a specific loop do the following:

1 Disable DCHI:

LD 96
DIS DCHI x

2 Disable the PRI loop and run the self-test:

LD 60
DISL loop
SLFT loop

When the system returns OK, it indicates that the hardware is operable.

3 Re-enable the PRI loop:

LD 60
ENLL loop

The D-channel will re-enable automatically.

PRI automatic loop test

The automatic loop test checks the same functions as the self-test. Unlike the self-test, it can be run automatically, as part of the midnight routines.

With the ATLP command set to one the following occurs:

— If all 23 channels are idle at midnight, the system disables the card and performs a self-test on all channels.

— If any of the 23 channels are busy at midnight, the system disables one idle channel, chosen at random, and checks it while the card is enabled.

— With the ATLP command set to zero, only one channel is tested. The channel tested is randomly selected by software; it cannot be specified.

To perform the remote loopback test, use the following:

LD 60
ATLP 1 or 0

When ATLP 1 is entered, the TTY prints out AUTO TEST ENBL. When ATLP 0 is entered, the TTY prints out AUTO TEST DSBL.

Link diagnostic and remote loopback tests

The remote loopback test and the link diagnostic test are performed manually on a per channel or a per frame (23 channels) basis.

Link diagnostic test

The link diagnostic test, also called the far end loopback test, does not test the Meridian 1 PRI. It puts the PRI in loopback mode at the far end so a remote loopback test can be performed on far end equipment. The PRI channel, loop, or frame tested must be disabled.

Remote loopback test

The remote loopback test, also called the near end loopback test, checks the integrity of the PRI from the Meridian 1 system to the far end. The far end must be put into loopback mode before this test can be performed. The PRI channel, loop, or frame tested must be disabled.

Coordinating the tests

When a technician at the far end asks for loopback mode on the Meridian 1, perform the following steps:

1 Disable the DCHI:

LD 96
DIS DCH x

2 Disable the PRI loop and activate loopback mode:

LD 60
DISL loop
RLBK loop

The QPC720 LBK LED lights.

When a technician at the far end asks for loopback mode on the Meridian 1 to be disabled, perform this step:

Disable loopback mode:

LD 60
DLBK loop

The LBK LED turns off.

When a technician at the far end asks for PRI and DCHI to be re-enabled, perform this step:

Enable the PRI loop:

LD 60
ENLL loop

OK will print out. The D-channel re-enables automatically.

To run the remote loopback test on the Meridian 1, call a technician at the far end and ask for loopback mode at that facility.

When loopback mode at the far end is confirmed, the technician at the far end follows these steps:

1 Disable the DCHI:

LD 96
DIS DCH N

2 Disable the PRI loop and run the loopback test using the following:

LD 60
DISL L
RMST L

SLFT OK prints out to indicate a successful test.

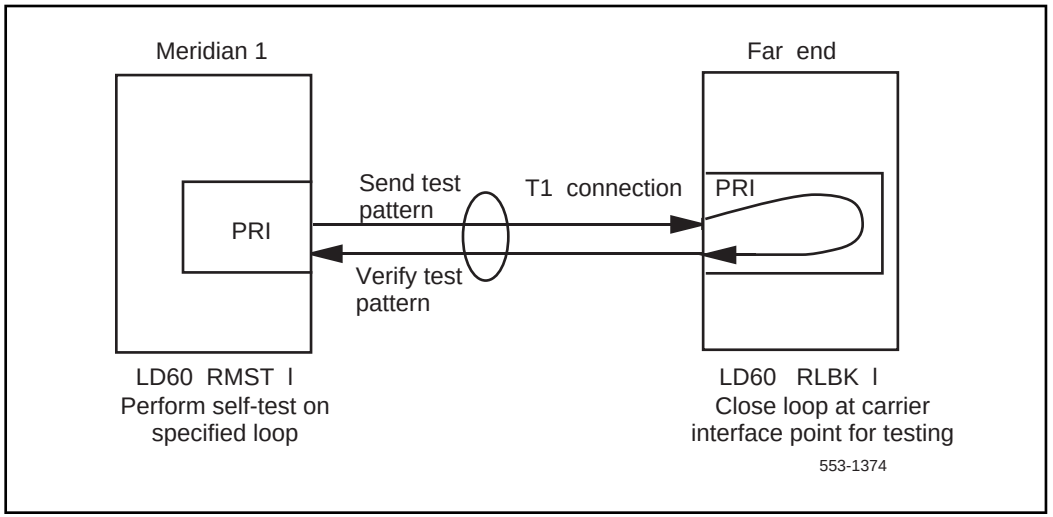
3 Call the far end technician to disable the loopback test and to re-enable the PRI and DCHI. The far end technician enables the PRI as follows:

LD 60
ENLL L

OK prints out, and the D-channel re-enables automatically.

Figure 6 shows the relationship between the remote loopback test and the link diagnostic test.

Figure 6
PRI remote loopback and link diagnostic tests



PRI commands (LD 60)

PRI diagnostic commands are used to maintain both PRI and Clock Controller operation. See LD 60 at the end of this document for a list of the PRI card and channel commands in LD 60.

PRI midnight routines

The following PRI maintenance routines should be included in midnight routines:

— LD 30: Network and signaling diagnostic

— LD 60: Digital trunk interface diagnostic

— LD 95: Automatic trunk maintenance diagnostic

— LD 48: Link diagnostic

PRI messages

There are three types of system messages—DTA messages, DTI messages, and PRI messages. These messages are provided at the end of this document.

PRI error detection

There are four types of error detection:

— Yellow (remote) alarm

— Bit error rate

— Frame alignment

— Frame slip

PRI hardware detects BPV or CRC errors. It sends an overflow (OVFL) message to the Meridian 1 CPU each time 1024 BPV or CRC errors are detected. Running the midnight routines prints the number of overflows and clears the counter.

Yellow alarm (remote alarm)

A yellow alarm indicates that the far end (the remote end) is not ready. If the PRI is receiving the yellow alarm pattern, it indicates that there is a T1 connection. When the PRI receives a yellow alarm signal from the far end, all 24 channels are disabled.

The yellow alarm method used depends on the framing format (D2, D3, D4, or ESF) selected. If D2, D3, or D4 framing formats are chosen, the Digit 2 yellow alarm is automatically selected by the software. If the ESF framing format is chosen, the yellow alarm method must be set through service change.

— Digit 2 (DG2) yellow alarm signaling is provided by external circuitry. This alarm is detected when each digit 2 in 63 contiguous channels is logic zero. Use DG2 yellow alarm signaling with D2, D3, and D4 frame formats in Canada and the U.S. Also use DG2 yellow alarm signaling with the ESF frame format in Canada, in compliance with Canadian standard CS03.

— Facility Data Link (FDL) yellow alarm signaling is a 4 Kbps channel. In the U.S., use FDL yellow alarm signaling when the ESF frame format is selected.

When the PRI stops receiving the yellow alarm, channels are placed into the idle state and made available for calls. (In comparison, tie trunks using A&B bit signaling are made to match the state of the far end, as presented by the T1 port.)

Each time a yellow alarm is generated, a counter is incremented. When the remote alarm 24-hour threshold (prompt RALM in LD 73) is reached, the PRI must be restored to service manually.

Maintenance and out-of-service thresholds are used to monitor the performance of PRI bit error rate, frame alignment, and frame slips. These thresholds are defined in LD 73. When a threshold is reached, the following actions are taken:

— Maintenance threshold: PRI warning message is output

— Out-of-service threshold:
loop placed in red alarm
yellow alarm sent to far end
PRI warning message is output
minor alarm lit at the customers' attendant consoles

Bit error rate

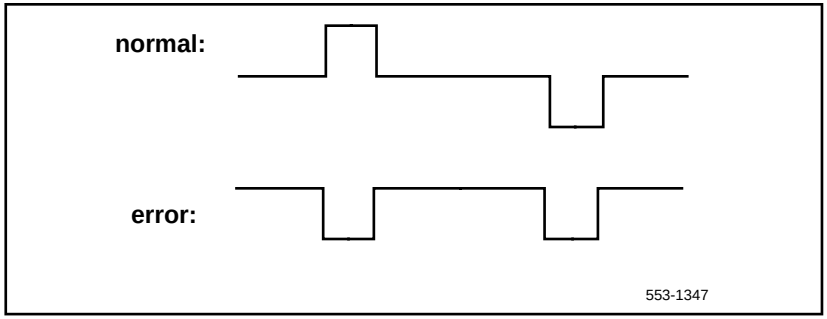
Bit error rate monitoring detects errors in transmission. See Figure 7. There are two methods of bit error rate monitoring, bipolar violation tracking and Cyclic Redundancy Check (CRC). If the D3 framing format is selected in LD 17, prompt DLOP, bipolar violation tracking is implemented. If the Extended Superframe Format (ESF) is selected, CRC is implemented.

Bipolar violation (BPV) tracking

In a bipolar pulse stream, pulses alternate in polarity. A bipolar violation has occurred if, after transmission, two pulses of the same polarity are received in succession (this could be caused by an electrical disturbance such as noise).

> ***Note:*** Some bipolar violations could result from a far end using B8ZS line coding while the near end expects AMI line coding.

Figure 7
Bipolar violations



Cyclic redundancy check (CRC)

The Extended Superframe Format (ESF) contains a checksum of all the data in the frame. The receiving side uses the checksum to verify the data.

The primary difference between BPV and CRC is that bipolar violation tracking indicates errors on the local span, while CRC indicates errors on an end-to-end span. For example, on a satellite link, BPV only detects errors in the span between the Meridian 1 and the satellite connection. Since CRC traverses the entire span, it indicates an end-to-end bit error rate.

The CRC error counter is displayed with the LCNT L command in LD 60 provided that loop L has been defined with ESF as a framing format. The framing format (D2, D3, D4, or ESF) is selected in LD 17 when the loop is configured.

Bit error rate thresholds

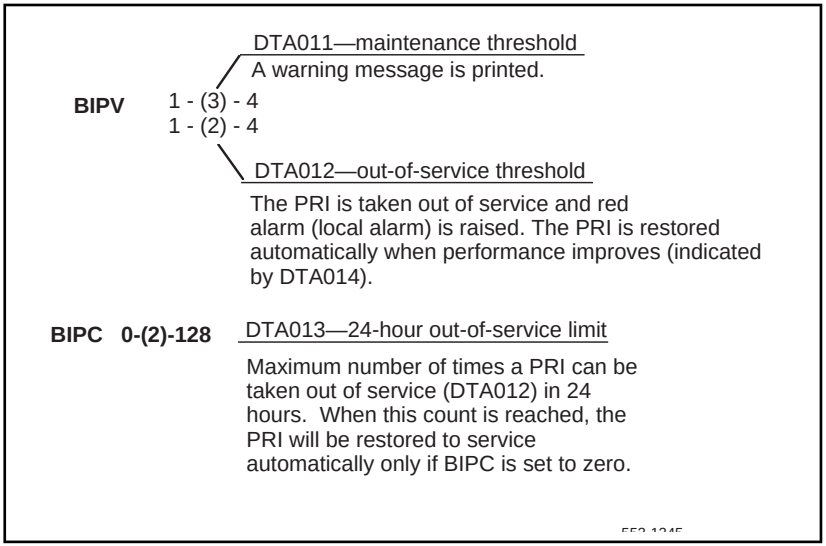
There are three bit error rate thresholds set in LD 73. When a threshold is reached, a DTA message is output. See Figure 8.

DTA011: Bit error rate maintenance threshold.

DTA012: Bit error rate out-of-service limit.

DTA013: Too many bit error rate out-of-service occurrences in 24 hours.

Figure 8
BIPV and BIPC thresholds



The BIPV thresholds are based on the number of errors in a given time. The threshold levels are shown in Table 6.

For example, if the default BIPV thresholds are used, DTA011 is output when the number of errors exceed 15.4 per second. DTA012 is output when the number of errors exceed 154 per second.

When the error rate improves two levels, the PRI is restored to service unless the 24-hour out-of-service counter was exceeded.

Table 6
BIPV thresholds

Level	Error rate	Elapsed time (seconds)	Number of BPV allowed during elapsed time
least tolerant			
1	>10-3 (1544 BPV per s)	0.6639	1025
2	>10-4 (154 BPV per s)	.639	025
3	>10-5 (15.4 BPV per s)	6.39	025
4	>10-6 (1.54 BPV per s)	663.9	1025
most tolerant			

Frame slip

Digital signals must have accurate clock synchronization for data to be interleaved into or extracted from the appropriate timeslot during multiplexing and demultiplexing operations. Frame slip monitoring detects frame deletion and repetition errors in clock synchronization. See Figure 9.

Clock synchronization can be either tracking, on the primary or secondary reference clock, or free run (non-tracking). In LD 73 (prompts PREF and SREF), one PRI may be defined as the primary clock reference. Another may be defined as the secondary clock reference. All others are defined as free run.

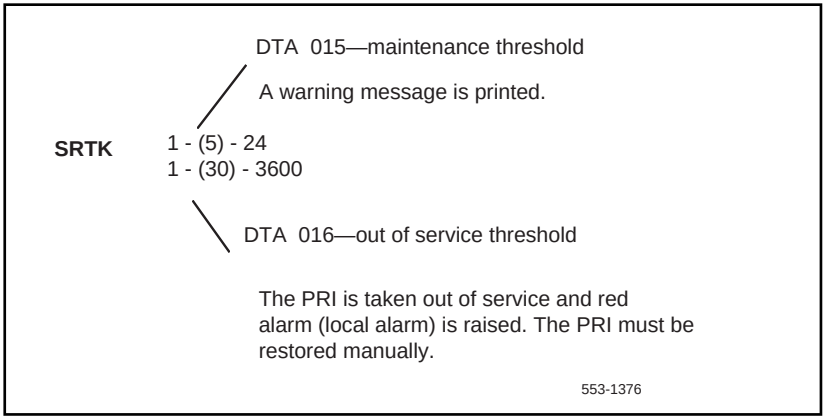
PRI hardware detects frame slips in tracking and free run modes. For tracking mode, running the midnight routines prints the number of overflows and clears the counter. For free run mode, running the midnight routines prints the number of frame deletions and repetitions and clears the counters.

Tracking mode There are two thresholds set in LD 73. When a threshold is reached, a DTA message is output as shown below.

DTA015: Maintenance limit for frame slips in tracking mode.

DTA016: Out-of-service limit for frame slips in tracking mode.

Figure 9
DTA messages



Free run (non-tracking) mode A maintenance threshold and an out-of-service threshold are set in LD 73. When these thresholds are reached, DTA messages are output. An option in LD 73 can enable automatic recovery after the out-of-service limit has been reached. Related DTA messages are described below. See Figure 10.

DTA017: Maintenance limit for frame slips in free run (non-tracking) mode. The default is 10 slips in 15 seconds.

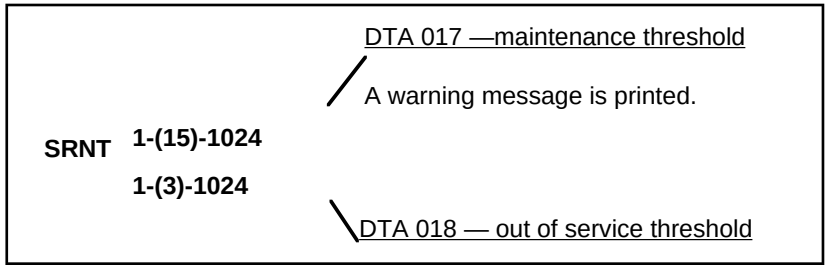
DTA018: Out-of-service limit for frame slips in free run (non-tracking) mode without automatic recovery selected. The default is 10 slips in 3 seconds.

DTA026: Non-tracking frame slip out-of-service threshold reached while monitoring frame slip rate for improvement. Trunks remain out of service. Reset improvement timer.

DTA028: Slip rate improvement criterion is met. Trunks are brought back into service. Reset improvement timer. (Duration of timer selected in LD 73.)

DTA029: Slip rate improvement criteria is met. Trunks being returned to service.

Figure 10
DTA thresholds



Automatic recovery After the tracking mode or non-tracking mode out-of-service thresholds are exceeded, the slip rate is monitored for improvement. When the slip rate has improved, the trunks are returned to service.

There are two parameters set in LD 73:

SRIM	(1) - 127	improvement timer in minutes
SRMM	1 - (2) - 127	improvement criteria

If the non-tracking mode maintenance threshold is exceeded SRMM or fewer timers in the duration of SRIM, then the trunks are returned to service. If not, the timer is restarted and monitoring continues.

Frame slippage is considered less important than alarms for loss of frame alignment persisting for 3 seconds, remote alarm, and bipolar violations exceeding the out-of-service threshold. If any of these alarms are reported while the slip rate is being monitored for improvement, then the monitoring stops. The trunks are returned to service only when the more serious alarms clear.

Frame alignment

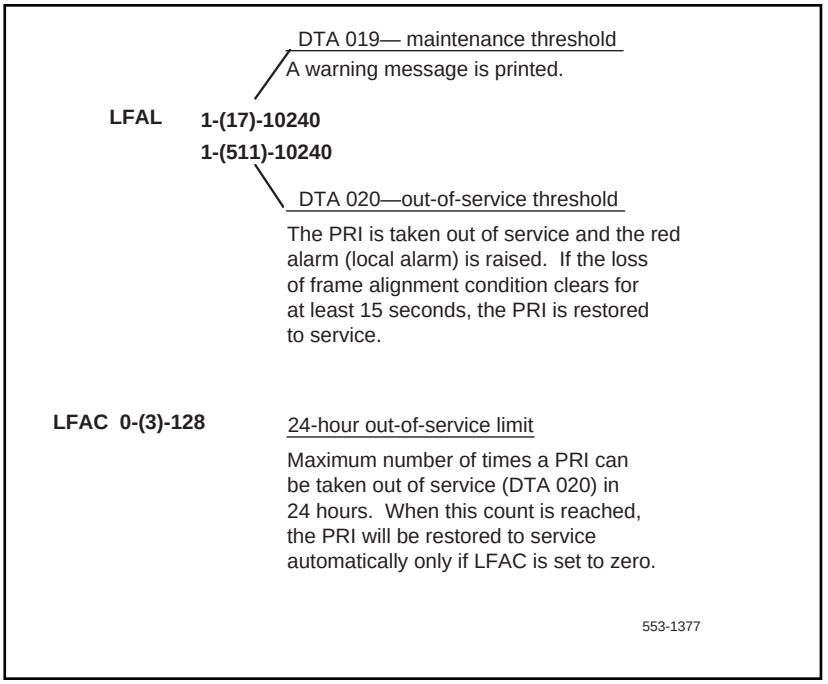
Loss of frame alignment monitoring detects out-of-frame conditions on the DS-1 bit stream. See Figure 11.

Loss of frame alignment thresholds PRI hardware detects out-of-frame conditions. Running the midnight routines prints the number of occurrences when frame alignment was lost and clears the counters.

There are three frame alignment thresholds set in LD 73. When a maintenance or out-of-service threshold is reached, a DTA message is output as shown below:

DTA019:	Frame alignment maintenance limit
DTA020:	Frame alignment out-of-service limit

Figure 11
Frame alignment

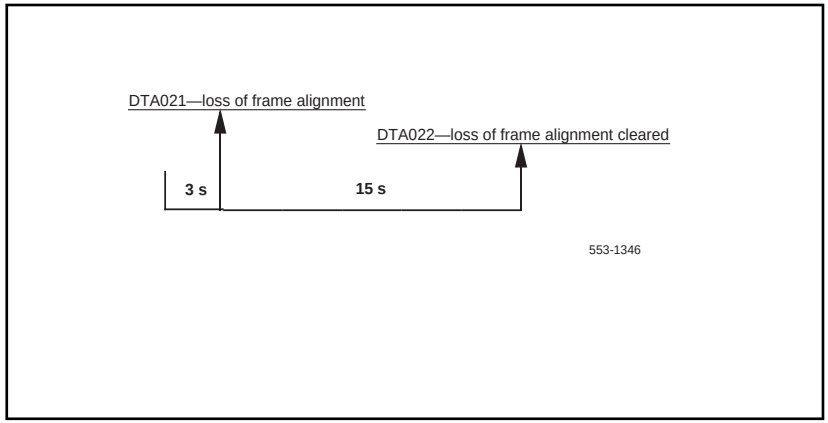


If a loss of frame alignment condition persists for three seconds, the affected PRI loop is taken out of service and a red alarm (local alarm) is raised. See Figure 12.

If the loss of frame alignment condition clears for at least 15 seconds, the PRI is automatically restored to service. The following DTA message is generated:

DTA021: Loss of frame alignment has persisted for 3 seconds.

Figure 12
Frame alignment loss



TN to channel number conversion

PRI channel numbers have an equivalent terminal number (TN). The TN is output instead of the channel number in some Meridian 1 messages. The TN to channel number translation is shown below. Note that the translation is different for the D2 framing format than formats for D3, D4 or ESF.

Terminal numbers are identified in software by Loop (L), Shelf (S), Card (C), and Unit (U) numbers. Each TN is applied to an individual channel on the PRI card. See Table 7 below.

Table 7
PRI channel numbers and equivalent terminal numbers (Part 1 of 2)

Channel number	D2 format TN (S C U)	D3, D4,E SF format TN (S C U)
1	1 4 0	0 1 0
2	1 5 0	0 2 0
3	0 1 0	0 3 0
4	2 1 0	0 4 0
5	0 5 0	0 5 0
6	2 5 0	0 6 0
7	1 1 0	0 7 0
8	1 7 0	1 8 0
9	0 3 0	1 1 0
0	2 3 0	1 2 0
1	0 7 0	1 3 0
2	2 7 0	1 4 0
3	1 3 0	1 5 0
4	1 6 0	1 6 0
5	0 2 0	1 7 0
6	2 2 0	2 8 0
7	0 6 0	2 1 0
8	2 6 0	2 2 0
9	1 2 0	2 3 0

Table 7
PRI channel numbers and equivalent terminal numbers (Part 2 of 2)

Channel number	D2 format TN (S C U)	D3, D4,E SF format TN (S C U)
0	2 8 0	2 4 0
1	0 4 0	2 5 0
2	2 4 0	2 6 0
3	1 8 0	2 7 0
4	3 8 0	3 8 0

Using the error counter

The error counter detects bipolar violations or no-signal periods. It counts, stores, and displays these occurrences to a maximum of 9999.

The PRI fault detection and isolation procedures described in this section are performed using a Thor portable test package, which consists of one each of the following items:

— the Thor TTT2028 Mini-Error Counter, plus operation instruction card

— a cord equipped with a bantam plug at one end and minihooks at the other

— a loopback plug (shorts pins 3 to 1 and 11 to 9 of a 15-pin D connector)

Procedure 6
Using the error counter

CAUTION
To prevent injury from voltage on the span, always connect the patch cord into the test set before connecting the other end to the external signal source.

1 Plug one end of a patch cord into the input jack of the test set.

2 Plug the other end of the patch cord into one of the monitor jacks (RCV and XMT) of the PRI card being tested.

3 Monitor the error counter LED indicators as described below:

Table 8
Error counter switch functions

Switch	Function
Display Enable	When held down, the switch enables the counter display and the GOOD and O/R LED displays.
Reset	Used to zero the counter.
Error/Error	Used to select error counting seconds for bipolar violations or error-seconds.

Table 9
Error counter display functions

Display	Function
GOOD	Indicates the presence of an acceptable bipolar signal. (If bipolar violations, missing pulses, or an oscillating line are detected, the indicator is off.)
ERR	Flashes when bipolar violations are detected.
W/M	Indicates no input (absence of pulse) or an oscillating line.
O/R	Over range display turns on when the counter input has exceeded 9999 (the counter resets to 0000).
CNTR	With Error/Error-Second switch in the Error position, the unit counts errors at a maximum rate of 200 per second. With Error/Error-Second switch in the Error-Second position, the unit counts error seconds at a rate of one per second.

Replacing the PRI

Procedure 7
Replacing the PRI circuit card

> **CAUTION**
> Firmly touch the metal frame of the cabinet to discharge static electricity from your body before handling circuit cards.

1 Disable the D-channel using the following:
LD 96
DIS DCH x

2 Disable the PRI loop using the following:
LD 60
DISL loop

3 Disconnect cables on PRI faceplate.

4 Remove the PRI card.

5 Make sure that the new PRI card switch settings are the same as the faulty PRI card.

6 Install the new PRI card in the appropriate slot.

7 Connect the network loop cable, the carrier interface cable, and the echo canceller cable. If the PRI card is defined as a primary or secondary clock source, connect the Clock Controller cable(s).

8 Test the PRI card using the following:
LD 60
SLFT loop If an error message results, see PRI fault clearing.

9 Enable the PRI using the following:
LD 60
ENLL loop

D-channel maintenance

There are four types of DCH tests for the QPC757 DCHI card. The MSDL card performs local and remote loopback tests.

TEST 100 N	Perform interrupt generation test on DCHI N.
TEST 101 N	Perform loopback mode test on DCHI N.
TEST 200 N	Perform interrupt handler test on DCHI N.
TEST 201 N	Perform interrupt handler-to-link interface path test

The DCH tests 100 and 101 are hardware tests, while the 200 and 201 test the DCH software.

CAUTION

The DCHI tests must be executed in sequential order.

DCH tests 100 and 101 (QPC757 DCHI card only)

DCH tests 100 and 101 are isolated hardware tests. See Figure 13. Test 100 checks interrupt generation on the DCHI. Test 101 checks the DCHI loop-back capability. If either test fails, either a faulty DCHI or a contention problem is indicated. A test failure initiates DCH error messages.

Tests 100 and 101 must be run in sequential order (tests 200 and 201 may follow). Established calls will stay up, but new calls cannot be placed.

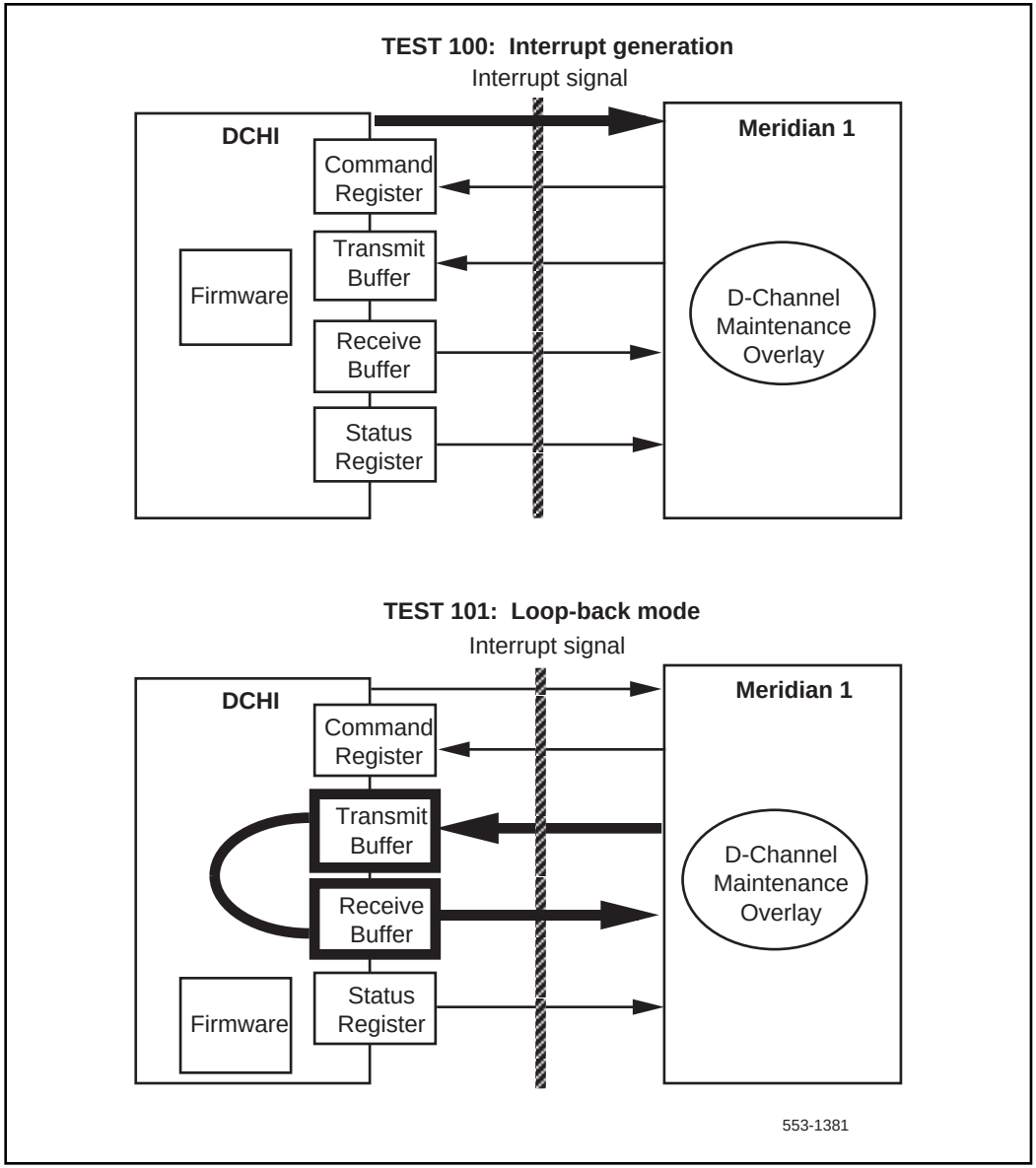
The DCH link must be in the reset state when these tests are run. The reset state can be established when the status of the D-channel is “established” (EST) or “released” (RLS) by using the following:

LD 96
STAT DCH N (responds either EST or RLS)
RST DCH N

If the DCHI is disabled, it must be enabled before reset can be established by using the following:

LD 96	
STAT DCH N	responds DSBL
ENL DCH N	if a problem caused the disabled state, RLS will occur; if the disabled state is cleared, status will be EST
RST DCH N	

Figure 13
DCH tests 100 and 101 (QPC757 DCHI card only)



DCH tests 200 and 201 (QPC757 DCHI card only)

DCH tests 200 and 201 are software tests. See Figure 14. Test 200 monitors the DCHI interrupt handler. Test 201 checks the interrupt handler-to-link interface path. If either test fails, software problems are indicated. A test failure initiates DCH error messages.

Tests 200 and 201 must be run sequentially after tests 100 and 101. Established calls will stay up, but new calls cannot be placed.

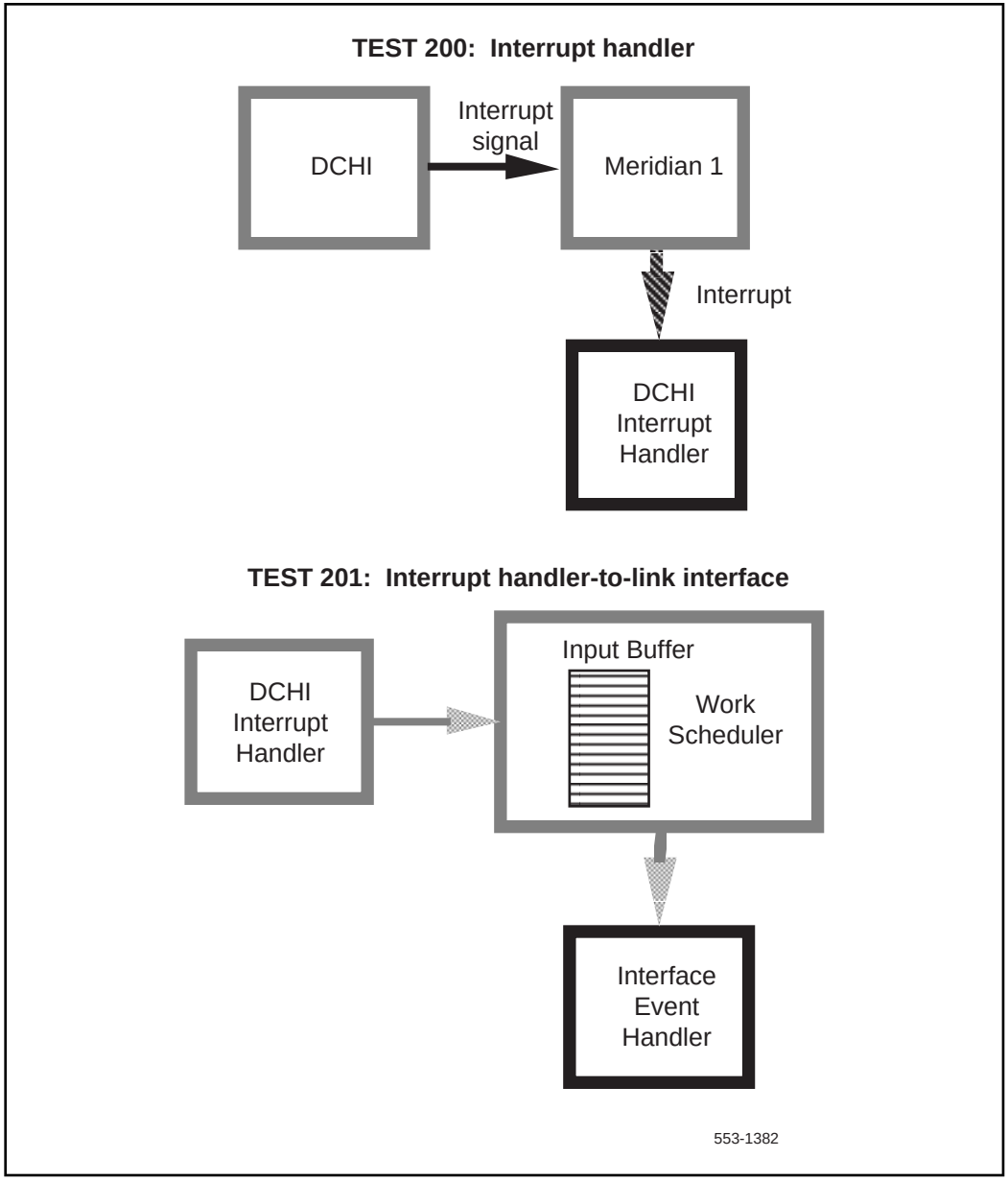
The DCH link must be in the reset state when these tests are run. Reset can be established when the status of the D-channel is established (EST) or released (RLS). Use the following:

LD 96
STAT DCH N (responds either EST or RLS)
RST DCH N

If the DCHI is disabled, it must be enabled before reset can be established. Use the following:

LD 96	
STAT DCH N	responds DSBL
ENL DCH N	if a problem caused the disable state, RLS will occur; if the disabled state is cleared, status will be EST
RST DCH N	

Figure 14
DCH tests 200 and 201 (QPC757 DCHI card only)



MSDL local loopback test (NT6D80)

See Figure 15. Before beginning this test.

1 Place the D-channel must in test state, by entering:
ENL TEST DCH x, where **x** is the logical DCH number.

2 Place the MSDL in loopback mode. Enter
ENL LLB DCH x command, where **x** is the logical DCH number.

3 Then perform the loopback test. Enter
TEST LLB DCH x command, where **x** is the logical DCH number.

The test checks both MSDL expedited and normal (ring) interfaces.

The response for the expedited interface that carries urgent signaling and maintenance messages between the Meridian 1 CPU and the MSDL MPU follows:

DCH : X XDU TEST CONFIRM TIME : <time of day>
TEST : PASS (or FAIL)

X is the DCH logical number
XDU is the expedient message sent around the loop.

The response for the ring interface that transmits operation data between the Meridian 1 CPU and the MSDL MPU follows:

DCH : X DU TEST CONFIRM TIME : <time of day>
TEST : PASS (or FAIL)

4 After completing the test, remove the D-channel from the test state:

DIS TEST DCH x.

5 If the test fails, check the status of the MSDL card, used by this DCH link, with the **STAT MSDL y FULL** command, where **y** is the physical port (DNUM) of the MSDL card.

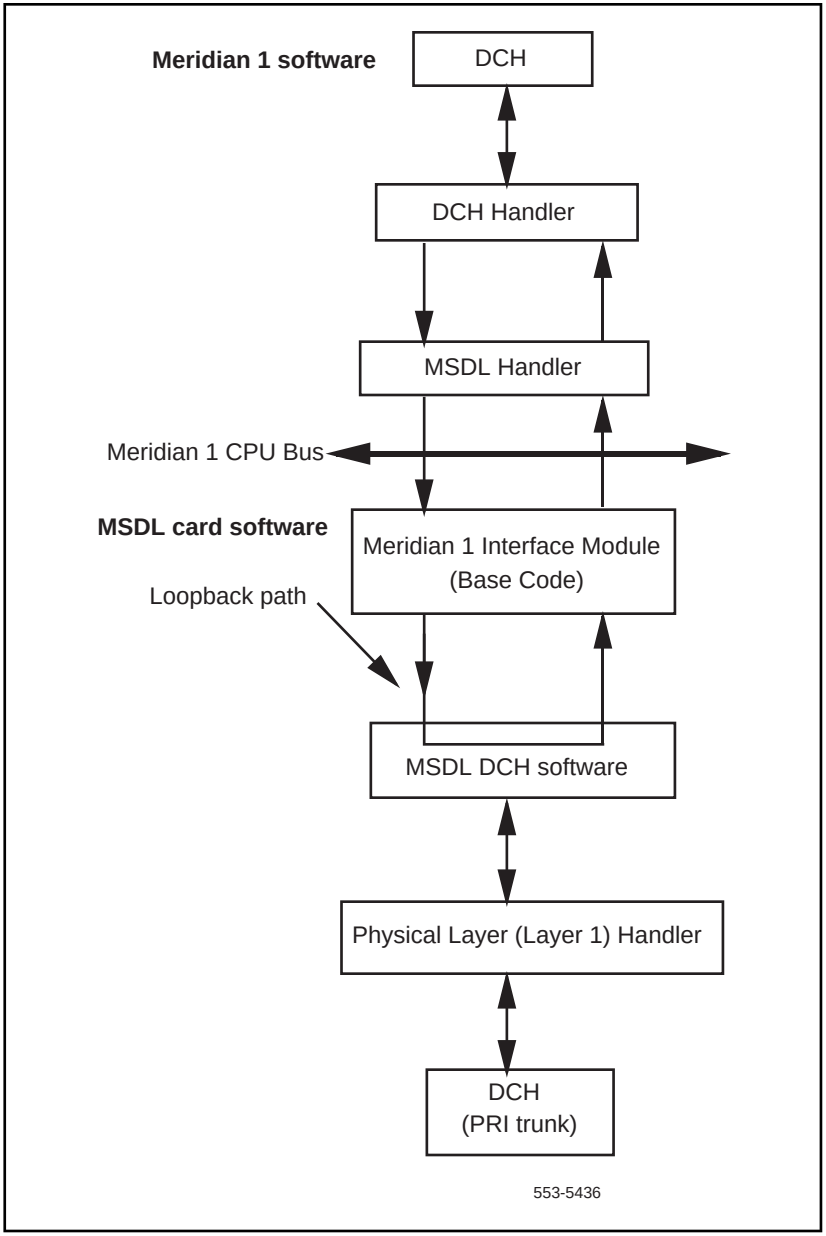
6 If the MSDL card may be faulty, disable the card and perform a reset self-test.

DIS MSDL y
RST MSDL y
SLFT MSDL x

7 If the card passed the test, the problem may lie in incompatible software.

Refer to *Multi-purpose Serial Data Link description* (553-3001-195) for more information on the MSDL card.

Figure 15
Local loopback test (NT6D80)



MSDL remote loopback tests (NT6D80)

See Figure 16. Before beginning this test, verify the following:

— D-channels on both switches are configured on MSDL cards

— DCH links on both switches are set to TEST mode

— DCH at Switch B is in remote loopback mode (RLB)

— remote capability (RCAP) is MSDL

1 Place Switch B in TEST mode. Enter **ENL TEST DCH y**.

Note: **DCH x** or **DCH y** = DCH # you want to test.

2 Place the Switch B DCH link in remote loopback state (RLB) by entering **ENL RLB DCH y**.

3 Place Switch A in TEST mode. Enter **ENL TEST DCH x**.

4 From Switch A, perform the following test:

TEST RLB x

This test starts the remote loopback test on MSDL DCH x.

The result of the remote loopback test is displayed on Switch A's console in the following format:

DCH : X RLB TEST CONFIRM TIME : <time of day>
TEST : PASS
TEST : FAIL - NO DATA RCV FAR END
TEST : FAIL - CORPT DATA RCV FAR END
TEST : FAIL - REASON UNKNOWN

TEST : FAIL may indicate a problem in the physical link between the two switches, or faulty equipment in either switch. Check the connections, and verify the status of the MSDL and PRI trunk cards used for this link.

5 Place the Switch B DCH link back to idle state with the **DIS RLB y** command.

6 After the test is complete, remove both sides from the test state:

DIS TEST DCH y
DIS TEST DCH x

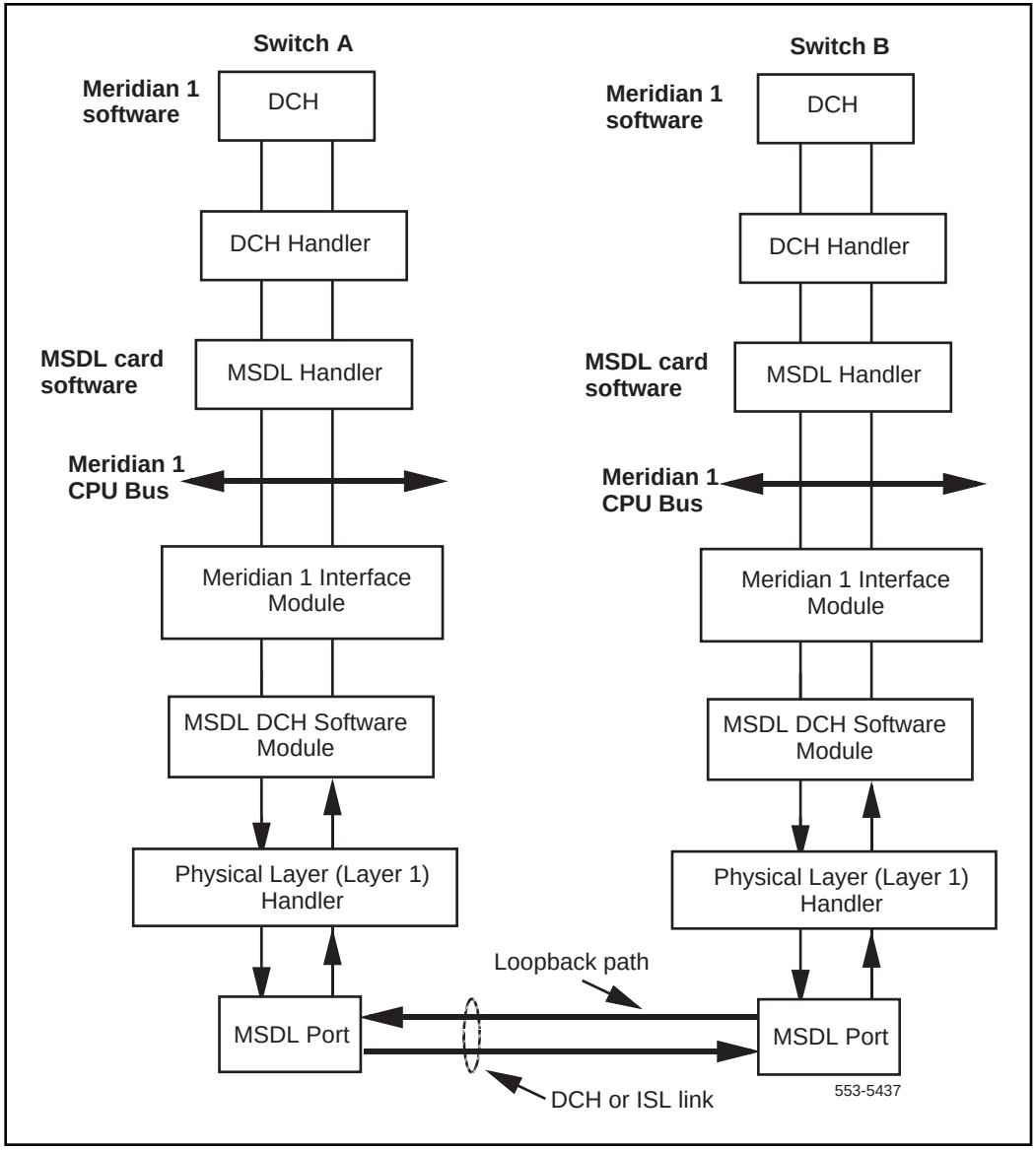
7 If you think the MSDL card used in either switch has failed, check the status of the DCH link and the status of the MSDL card by entering **STAT MSDL x FULL**.

8 If the MSDL card may be faulty, disable the card and perform a self-test:

DIS MSDL x
SLFT MSDL x

9 If the card passed the test, the problem may lie in incompatible software. Refer to *Multi-purpose Serial Data Link description* (553-3001-195).

Figure 16
Remote loopback tests (NT6D80)



Protocol Log (PLOG)

The count of D-channel errors is stored in the Protocol Log (PLOG). The PLOG is printed by using LD 96 as shown in the PLOG status check.

Protocol errors can be the result of PRI transmission problems and re-start procedures or a protocol mismatch with the far end. The PLOG counters are cleared after the PLOG is printed, or the DCHI/MSDL card is enabled.

> ***Note:*** When a protocol counter overflows, the PLOG is printed automatically and the counters are cleared.

When the PLOG has non-zero counters, check the PRI status and alarms as shown. See Table 10 for the PLOG for X11 relase 17 and earlier. See Table 11 for the PLOG for X11 release 18 and later.

Procedure 8
PLOG status check

1 Check the contents of the PLOG using the following:
LD 96
PLOG DCH x

Response with **X11 release 17 and earlier:**
DCH x I xxxx
yy zz 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

where:
I = incoming
xxxx = system real time (in hexadecimal)
yy = maintenance indication primitive ID
zz = maintenance indication task ID
00 00 ... = protocol error counters

Response with **X11 release 18 and later**:
DCH : XX MAINT CONFIRM TIME: <time of day>

COUNTER	VALUE
1:	12
12:	8
20:	15
N:	XX

2 If there are PRI bit rate or frame errors, assume there is a PRI problem.

3 If there is no problem with the PRI but there are a large number of protocol errors, report a protocol problem.

Table 10
Protocol log (X11 release 17 and earlier)

Format	
DCH x I xxxx yy zz 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	
Protocol counters	
1	count of missing PRI handshakes
2	count of peer initiated re-establishment link
3	count of unsuccessful retransmit N200 of SABME
4	count of unsuccessful retransmit N201 of DISC
5	count of N(R) errors
6	count of information fields with length greater than N201
7	count of undefined frames
8	count of I fields but not allowed
9	count of FRMR frames
10	count of CRC error frames
11	count of REJ frames
12	count of messages with less than 4 octets
13	count of undefined protocol discriminators
14	count of undefined message types
15	count of messages missing one or more mandatory information elements
16	count of messages with one or more undefined information elements

Table 11
Protocol log (X11 release 18 and later) (Part 1 of 3)

Format	
DCH : XX MAINT CONFIRM TIME: <time of day> COUNTERVALUE	
Protocol counters	
1	count of missing PRI handshakes
2	count of peer initiated re-establishment link
3	count of unsuccessful retransmit N200 of SABME
4	count of unsuccessful retransmit N200 of DISC
5	count of N(R) errors
6	count of information fields with length greater than N201
7	count of undefined frames
8	count of information fields that are not allowed to contain information
9	count of FRMR frames received from the far end
10	count of CRC error frames received from the far end
11	count of REJ frames received from the far end
12	count of layer 3 messages with less than 4 octets
13	dummy counter, always zero
14	count of undefined layer 3 message types
15	count of layer 3 messages missing one or more mandatory information elements
16	count of layer 3 messages missing one or more undefined information elements
17	count of layer 1 reports of no external clock being received
18	count of aborted frames
19	count of SABME frames received with incorrect C/R bit

Table 11
Protocol log (X11 release 18 and later) (Part 2 of 3)

20	count of supervisory frames received with F = 1
21	count of unsolicited DM responses with F = 1
22	count of unsolicited UA responses with F = 1
23	count of unsolicited UA responses with F = 0
24	count of DM responses with F = 0
25	count of times that no response was received from the far end after N200 transmissions retransmissions of RR or RNR
26	count of frames received with incorrect header length
27	number of times owner receiver busy condition was entered
28	number of times peer receiver busy condition was entered
29	count of messages with call reference length greater than 2
30	count of optional IEs received with invalid contents
31	count of mandatory IEs received with invalid contents
32	count of messages received with IE's not ordered correctly
33	count of IEs which were repeated in received messages, but are only allowed to appear once per message
34	count of IEs received with length exceeding the specified maximum length for the IE
35	count of layer 3 messages from far-end with invalid call reference flag value of 0
36	count of layer 3 messages from far-end with invalid call reference flag value of 1
37	count of layer 3 messages from far-end with invalid global call reference
38	count of layer 3 messages from SL-1 that are too short
39	count of layer 3 messages from SL-1 containing an undefined message type
40	count of layer 3 messages from SL-1 missing mandatory IE(s
41	count of layer 3 messages from SL-1 containing unsupported IE(s)

Table 11
Protocol log (X11 release 18 and later) (Part 3 of 3)

42	count of layer 3 messages from SL-1 containing invalid operational IE(s)
43	count of layer 3 messages from SL-1 containing invalid mandatory IE(s)
44	count of layer 3 messages from SL-1 with IE(s) out of order
45	count of layer 3 messages from SL-1 containing repeated IE(s)
46	count of layer 3 messages from far-end with an invalid call reference length
47	count of layer 3 messages from SL-1 with an invalid call reference flag value of 0
48	count of layer 3 messages from SL-1 with an invalid call reference flag value of 1
49	count of layer 3 messages from SL-1 with an invalid global call reference
50	count of unexpected layer 3 messages received from the far-end
51	count of unexpected layer 3 messages received from the SL-1
52	count of unexpected layer 3 timer expirations
53	count of protocol messages received when D-channel is not in service or waiting for a Service Acknowledge message

Replacing the DCHI or MSDL

Follow this procedure to replace the QPC757 DCHI, or NT6D80 MSDL card.

Procedure 9
Replacing the DCHI or MSDL card

> **CAUTION**
> Firmly touch the metal frame of the cabinet to discharge static electricity from your body before handling circuit cards.

1 Disable the D-channel.

LD 96
DIS DCH x

2 Disable the asynchronous port on the card (if equipped).

X11 release 18 and later
LD 37
DIS TTY x

X11 release 17 and earlier
LD 48
DIS ESDI x

3 Set the ENB/DIS switch to DIS (if equipped).

4 Disconnect cables on faceplate.

5 Remove the DCHI or MSDL from the shelf.

6 Make sure that the new card switch settings are the same as the ones on the old DCHI card.

7 Install the new card in the appropriate slot.

8 Connect the faceplate cables to the new card.

9 Set the ENB/DIS switch to ENB (if equipped).

10 Enable the D-channel.

LD 60
ENL DCH x

Clock Controller maintenance

Tracking mode

In tracking mode, the PRI loop supplies an external clock reference to a Clock Controller. See Figure 17. Two PRI loops can operate in tracking mode, with one defined as the primary reference source for clock synchronization, the other defined as the secondary reference source. The secondary reference acts as a backup to the primary reference.

As shown in Figure 17, a Meridian 1 system with dual CPUs may have two Clock Controllers (CC0 and CC1). One Clock Controller acts as a backup to the other. The Clock Controllers should be completely locked to the reference clock.

Free run (non-tracking) mode

The clock synchronization for a PRI loop may operate in free run mode if the following occurs:

— the loop is not defined as the primary or secondary clock reference

— the primary and secondary references are disabled

— the primary and secondary references are in red alarm (local alarm)

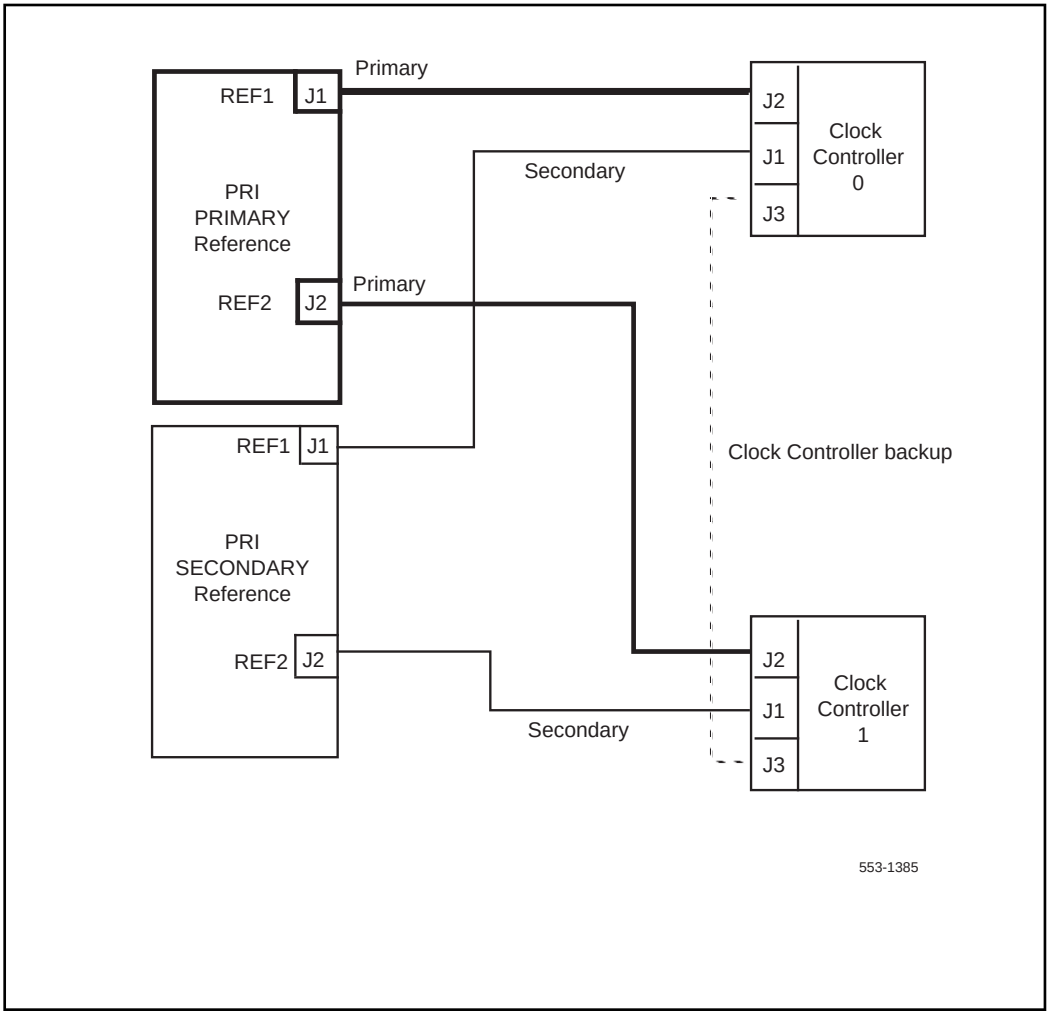
Reference clock errors

Meridian 1 software checks every 15 minutes to see if a Clock Controller or reference clock error has occurred.

In tracking mode, at any one time, there is one active Clock Controller tracking on one reference clock. If a Clock Controller error is detected, the system switches to the backup Clock Controller, without affecting which reference clock is being tracked.

A reference clock error occurs when there is a problem with the clock driver or with the reference system clock at the far end. If the Clock Controller detects a reference clock error, the reference clocks are switched.

Figure 17
Clock controller primary and secondary tracking



Automatic clock recovery

An option for automatic clock recovery can be selected in LD60 with the command EREF.

A PRI loop is disabled when it enters a red alarm (local alarm) condition. If the red alarm is cleared, the loop is enabled automatically. When the loop is enabled, clock tracking is restored in the following conditions:

— If the loop is assigned as the primary reference clock, but the Clock Controller is tracking on the secondary reference or in free run mode, the clock is restored to tracking on primary.

— If the loop is assigned as the secondary reference clock but the Clock Controller is in free run mode, it is restored to tracking on secondary.

If the 15-minute clock check indicates the system is in free run mode the following occurs:

— Tracking is restored to the primary reference clock, if defined.

— If the primary reference is disabled or in red alarm (local alarm), tracking is restored to the secondary reference clock, if defined.

Note: If the system is put into free run mode intentionally by the craftsperson, it resumes tracking on a reference clock at this time. This occurs unless the clock-switching option has been disabled (LD60, command MREF), or the reference clock has been “undefined” in the database.

Automatic clock switching

If the EREF option is selected in LD60, tracking on the primary or secondary reference clock is automatically switched in the following manner:

— If software is unable to track on the assigned primary reference clock, it switches to the secondary reference clock and sends appropriate DTC maintenance messages.

— If software is unable to track on the assigned secondary reference clock, it switches to free run mode.

QPC471, QPC775 Clock Controller Card

Clock Controller switch settings

Switch settings for the QPC471 Clock Controller (vintages A, B, C, E, F, and G) and the QPC775 Clock Controller (currently available in Canada only) are given in Table 12. Switch settings for the QPC471 Clock Controller vintage H are given in Table 13.

Table 12
Clock Controller switch settings

System/Clock Controller	SW1	SW2	SW3	SW4 (1,2)	Jumper 1	Jumper 2
QPC471 A						
N, NT, RT	n/a	ON	n/a	n/a	n/a	n/a
XN, XT	n/a	OFF	n/a	n/a	n/a	n/a
QPC471 B through G						
ST, STE, 21, 21A, 21E	ON	OFF	n/a	n/a	TP8-TP9	TP11-TP12
MS	ON	ON	n/a	n/a	TP9-TP10	TP12-TP13
N, NT, RT, 51, 61	ON	OFF	n/a	n/a	TP8-TP9	TP11-TP12
XN, XT, 71	OFF	OFF	n/a	n/a	TP8-TP9	TP11-TP12
QPC775						
N, NT, RT, ST, STE, 21, 21A, 21E, 51, 61	n/a	ON	OFF	ON	n/a	n/a
MS, SN	n/a	ON	ON	OFF	n/a	n/a
XN, XT, 71, 81	n/a	OFF	OFF	ON	n/a	n/a

Table 13
Clock Controller switch settings for QPC471 vintage H

System	SW1				SW2				SW4			
ST, STE, 21, 21A, 21E	on	on	on	on	off	off	off	off	off	off	off	off
MS, SN	on	on	on	on	on	on	on	on	off	off	off	off
N, NT, RT, 51, 61	on	on	on	on	off	off	off	off	off	on	*	*
XN, XT, 71, 81	off	off	off	off	off	off	off	off	off	on	*	*
Cable length between the J3 faceplate connectors:												
0-4.3 m (0-14 ft)											off	off
4.6-6.1 m (15-50 ft)											off	on
6.4-10.1 m (21-33 ft)											on	off
10.4-15.2 m (34-50 ft)											on	on
* If there is only one Clock Controller card in the system, set to OFF. If there are two Clock Controller cards, set to the value determined by the cable length between the J3 faceplate connectors. Determine the total cable length (no single cable can exceed 25 ft) between the J# connectors. Both cards must have the same setting.												

Replacing a Clock Controller card

Use this procedure to replace a Clock Controller (CC) card.

> ***Note:*** The QPC775 Clock Controller is used in Canadian and International applications. QPC775 and QPC471 cards may not be combined in one system.

When using the QPC471 Clock Controller, vintage H must be used with option 81 systems.

Refer to *X11 input/output guide* (553-3001-400) for a description of all maintenance commands and system messages.

WARNING

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing equipment

1 Disable the clock controller card:

- The card you are removing must be inactive. To switch the clock, do the following:

  LD 60
  SWCK

- Disable the clock controller card:

  DIS CC x "x" is the card number—0 or 1

2 Set the ENB/DIS switch to DIS on the card you are removing.

CAUTION

To avoid interrupting service, set ENB/DIS switches to DIS before disconnecting or connecting cables.

3 Tag and disconnect cables to the card you are removing.

4 Unhook the locking devices on the card; pull it out of the card cage.

Installing equipment

1 Set the ENB/DIS switch to DIS on the replacement card.

2 Set option switches on the replacement card the same as on the card you removed. To check switch settings, see *Circuit card installation and testing* (553-3001-211).

3 Insert the replacement card into the vacated slot and hook the locking devices.

4 Connect the cable to the replacement card.

5 Set the ENB/DIS switch to ENB on the replacement card.

6 Enable and test the card:

ENL CC x
SWCK

End the session in LD60:
****

If there is a problem, a DTC system message is generated and the red LED lights on the faceplate of the card.

7 Tag defective equipment with a description of the problem, and package it for return to a repair center.

ISDN Signaling Link maintenance

ISL interfaces

The ISDN Signaling Link (ISL) feature provides the capability to replace both digital and analog conventional trunk signaling with out-of-band ISDN D-channel signaling. Call-by-Call (CBC) Service, Calling Line Identification (CLID) and CLID in Call Detail Recording (CDR), Electronic Switched Network (ESN) interworking, and Network Ring Again (NRAG) applications are supported.

The ISL feature supports TIE and ISA trunk types with Meridian 1 to Meridian 1 connectivity. The TIE lines and the trunk used for the D-channel may be leased from the Central Office (CO). With leased lines, the function of the CO is simply to provide the trunk facilities between Meridian 1 systems for circuit switched connections.

There are two modes of ISL operation:

— Shared mode: In the shared mode, the DCHI or MSDL supports ISDN PRI signaling as well as ISL trunks. See Figure 18. The configuration is basically the same as the PRI D-channel, but the D-channel also supports ISL trunks (analog or DTI).

— Dedicated mode: In the dedicated mode, the DCHI or MSDL does not support ISDN PRI signaling. See Figure 19. The DCHI or MSDL is reserved for ISL use. The D-channel can communicate with the far end by means of a dedicated leased line, dial-up modem, or DTI/PRI trunk.

Figure 18
ISDN signaling link: shared mode

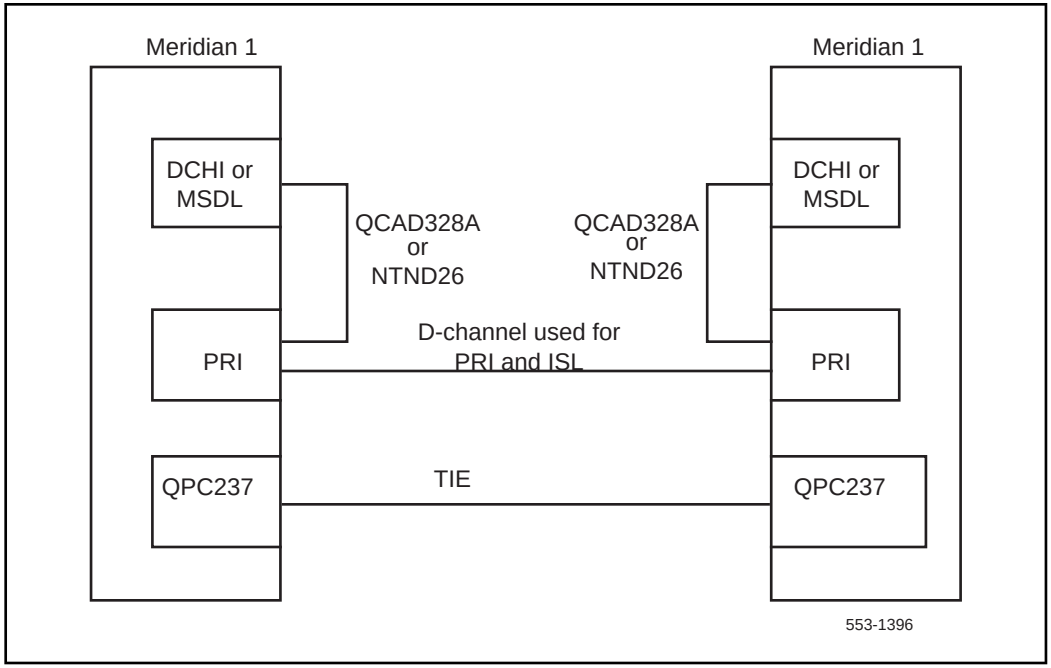
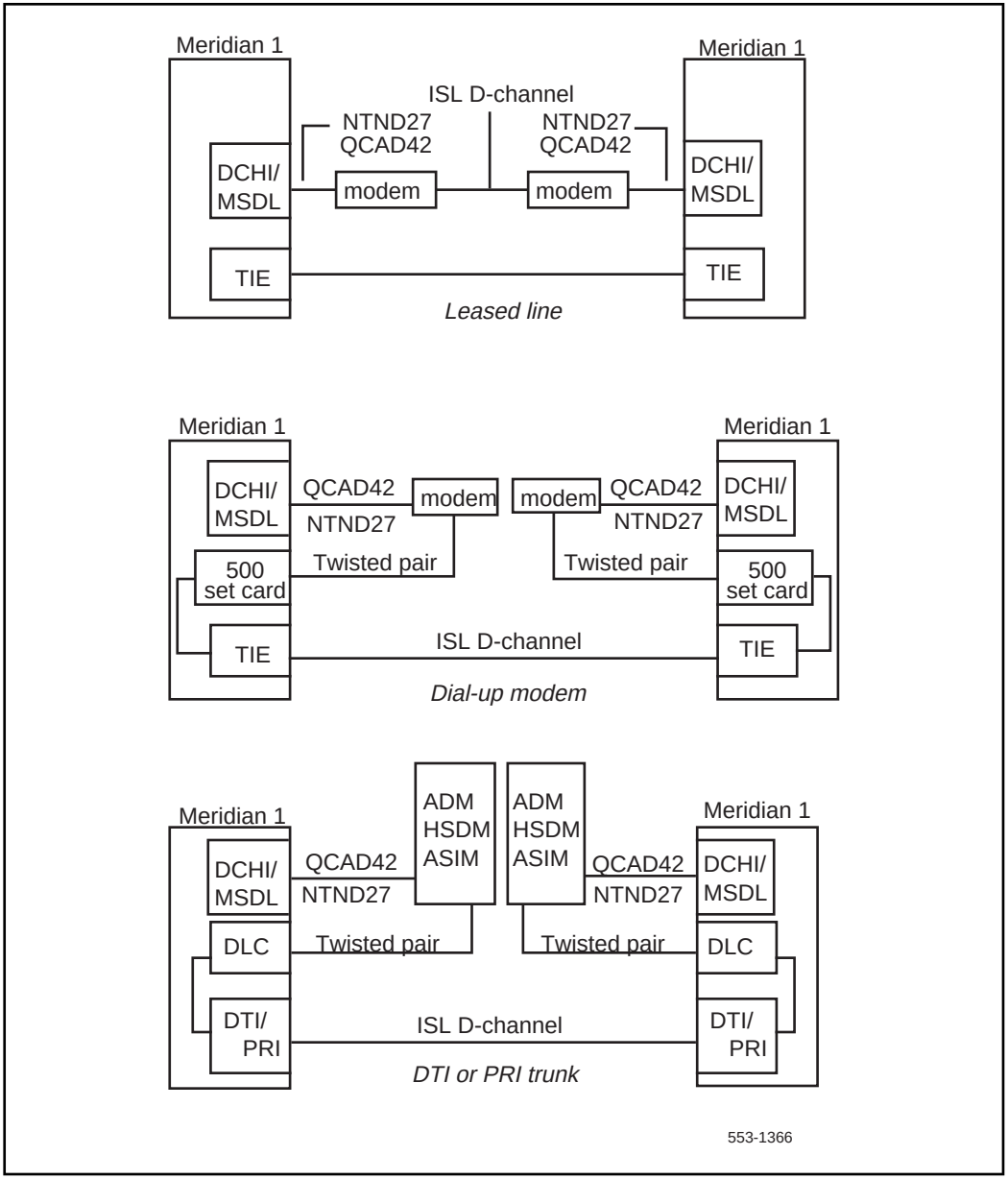


Figure 19
ISDN signaling link: dedicated mode configurations



ISL status formats

If a trunk unit is controlled by the ISL feature, the STAT commands in LD 32 and LD 36 will do the following:

— indicate the trunk is an ISL trunk, and

— display the status of the D-channel

The display format is the same for both programs. See Table 14.

Table 14
ISL status check in LD 32 and 36

Command	Response
STAT L S C	UNIT 00 = IDLE ISL TRK D-CH <ch #> <status> UNIT 01 = IDLE ISL TRK D-CH <ch #> <status>
STAT L S C U	IDLE ISL TRK D-CH <ch #> <status>

When a trunk unit is controlled by ISL, the STAT L command in LD 60 indicates the trunk is an ISL trunk. The STAT L CH command indicates the trunk is an ISL trunk and displays the status of the D-channel. The display format is shown in Table 15.

Table 15
ISL status check in LD 60

Command	Response
STAT L	CH 1 = IDLE ISL TIE CH 2 = UNEQUIP
STAT L CH	CH 1 = IDLE ISL TIE?D-ch <ch #> <status>

Print programs (LD 20-22)

Print programs LD 20, LD 21, and LD 22 (see Table 16) provide the following ISL information:

— LD 20 prints trunk information

— LD 21 prints route information

— LD 22 prints configuration record information

Table 16
ISL prompts in LD 20, LD 21, and LD 22

Program	Prompt	Description
LD 20	CHID nn	Channel ID
LD 21	MODE ISL/PRI DCHI x	ISL or PRI service route DCHI port number (printed if MODE = ISL)
LD 22	USR PRI/ISL/SHA	D-channel for PRI only, ISL D-channel for (dedicated mode), or SHA= D-channel shared between PRI and ISL
	ISLM x	maximum number of ISL trunks

LD 21 also lists the ISL trunk terminal numbers (TNs) configured in the system and counts the number of ISL trunks controlled by the DCH (see Table 17). To list ISL trunk TNs use the following prompts:

REQ PRT
TYPE ISLL

Table 17
Additional ISL information provided in LD 21

Cust #	ISL Trunk TN	Channel ID	DCH #	Route #
xx	l s c u	xxx	xx	xxx
xx	l s c u	xxx	xx	xxx

ISL start-up

In general, the procedures for bringing up the D-channel are the same as the ISDN PRI interface (see the PRI start-up section). However, some additional procedures are required when ISL is configured in the dedicated mode using DTI or PRI trunks.

Dedicated D-channel using DTI or PRI

When the D-channel is configured in the dedicated mode using a DTI or PRI trunk, an Asynchronous Data Module (ADM), an Asynchronous/ Synchronous Interface Module (ASIM), or a High Speed Data Module (HSDM) is required between the DCHI or MSDL cards and the Data Line Card (DLC).

> ***Note:*** The configuration with a DTI or PRI meets Radio Frequency Interference (RFI) requirements. The RFI filter connectors are attached to the QCAD42A cable. To install the RFI filters, see the instructions for installing the EMI filters in the system installation documents.

The following signaling sequence is required between the DCHI or MSDL cards and the ADM, HSDM, or ASIM to establish the D-channel:

1 The ADM, ASIM, or HSDM is already powered up.

2 The ADM, ASIM, or HSDM raises clear to send (CTS) and data set ready (DSR) signals to the DCHI or MSDL.

3 The DCHI or MSDL raises the data terminal ready (DTR) signal to the ADM, ASIM, or HSDM.

4 The ADM, ASIM, or HSDM makes the hotline call (the programmed auto-dial DN) to the far end switch using a DTI or PRI trunk line, depending on the DN configured.

5 The call is established and the CONNECT lamp on the ADM, ASIM, or HSDM is lit.

6 The D-channel is established.

ISL recovery

The D-channel will go down if the following occurs:

— the modem, ADM, ASIM, or HSDM power is off

— the hotline call between the Meridian 1 and the modem, ADM, ASIM, or HSDM is dropped

The Meridian 1 system handles these possibilities in the following way:

1 The Meridian 1 CPU schedules a data link diagnostics program, which runs in background mode.

2 If this program finds that the link is not established, it requests the maintenance program to reestablish the data link by reinitializing the hotline connection.

3 The hotline call is brought up as it is during installation.

The ASIM can automatically reinitiate the hotline call with the Forced DTR option set to ON.

A modem with auto-dial capability is required to automatically bring up the D-channel in the configuration below.

Note: The Radio Frequency Interference (RFI) filter connectors are attached to the QCAD42 cable. To install the RFI filters, see the instructions for installing the EMI filters in the system installation documents.

Digital Trunk/Primary Rate Interface (LD 60)

LD 60 is used to maintain the following:

— QPC471/775 Clock Controller

— QPC472 1.5 Mb/s Digital Trunk Interface (DTI)

— QPC536 2.0 Mb/s Digital Trunk Interface (DTI2)

— QPC720 Primary Rate Interface (PRI)

This diagnostic program can be can be run in midnight routines or loaded manually to enter commands. The following lists describe the commands available with LD 60.

DTI and PRI commands

ATLP (0), 1	Disable (0) or enable (1) daily routine auto loop test
CDSP	Clear maintenance display on the active CPU
CMIN ALL	Clear minor alarm indication on all attendant consoles
CMIN c	Clear minor alarm indication on attendant consoles for customer c
DISI loop	Disable DTI/PRI loop when all channels are idle
DISL loop	Disable network loop (LD 17 DLOP) and associated DTI/PRI cards
DLBK loop	Disable remote loopback test previously set by RLBK loop command
DLBK loop ch	Disable remote loopback test previously set by RLBK loop ch command
DSCH loop ch	Disable channel ch of DTI/PRI loop
ENCH loop ch	Enable channel ch of DTI/PRI loop
ENCH loop	Enable all channels on loop (DTI2 only)
ENLL loop	Enable network loop (LD 17 DLOP) and associated DTI/PRI cards
LCNT (loop)	List contents of alarm counters on one or all DTI/PRI loops
LOVF c r	List threshold overflows for customer c (0-99) and route r (0-511)
RCNT	Reset alarm counters of all DTI/PRI loops
RCNT loop	Reset alarm counter of DTI/PRI loop
RMST loop	Perform self-test on specified loop
RMST loop ch	Perform self-test on specified channel (DTI2 only)
RLBK loop	Close loop at carrier interface point for testing
RLBK loop ch	Close channel at carrier interface point

RSET loop ch	Reset thresholds for channel ch
SLFT loop	Invoke DTI/PRI hardware self-test on loop
SLFT loop ch	Invoke partial hardware self-test on channel ch
STAT	Get status of all PRI loops
STAT loop	Get status of PRI loop
STAT loop ch	Get status of channel ch

Clock Controller commands

DIS CC 0, 1	Disable system Clock Controller 0 or 1
DSYL loop	Disable yellow alarm processing for specified loop
ENL CC 0, 1	Enable system Clock Controller 0 or 1
ENYL loop	Enable yellow alarm processing for specified loop
EREF	Enable automatic switchover of system clocks
MREF	Disable switchover of system clocks
SSCK 0, 1	Get status of system clock 0 or 1
SWCK	Switch system clock from active to standby
TRCK aaa	Set Clock Controller tracking to primary, secondary or free run

D-channel diagnostic (LD 96)

The D-channel diagnostic program is used to test and maintain D-channel links and the QPC757 or NT6D11AB D-channel Interface (DCHI) card.

With X11 release 18, D-channels can also reside on Meridian Serial Data Link (MSDL) cards. A new set of LD 96 commands are provided to support MSDL cards.

Monitoring

D-channel message monitoring is used to analyze the Layer 3 protocol messages traveling between the near and far end D-channels.

Up to and including X11 release 16, message monitoring can be performed only on a per D-channel basis using LD 96. That is, once the message monitor is turned on, all messages are output for that D-channel. The messages output might be excessive.

X11 release 17 provided additional commands in LD 96 that allows selective message monitoring based on the following:

— the D-channel

— the B- or ISL channel

— the message types for a specific feature

— any specific message

The following sections describe the various command formats.

Note 1: During high traffic some of the monitored messages may be lost.

Note 2: To get the D-channel monitor messages to display, the system terminal must have LD 17 prompt USER defined as MTC (X11 release 17).

D-channels

All message types, features, and channels associated with a particular D-channel can be monitored. Up to and including X11 release 16, only one D-channel can be monitored for outgoing messages and one for incoming messages. X11 release 17 allows the monitoring of multiple D-channels for both incoming and outgoing messages.

The LD 96 commands to enable or disable monitoring of all incoming or outgoing messages on a D-channel are listed here:

ENL MSGI x—enable monitoring of incoming messages
ENL MSGO x—enable monitoring of outgoing messages
DIS MSGI x—disable monitoring of incoming messages
DIS MSGO x—disable monitoring of outgoing messages

Where x is the DCHI or MSDL port address (I/O address). For example, to enable monitoring of incoming messages on D-channel 5, enter this command:

ENL MSGI 5

The output includes all messages, features, and channels for D-channel 5.

All monitor commands in LD 96 require a primary D-channel to be defined. If a backup D-channel number is entered for monitor definitions, an error is given and the command is aborted. Once the monitoring options are configured for the primary D-channel, they apply to the backup as well. For example, if a D-channel switchover takes place, and the backup becomes active, the monitor option set for the primary is effective for the backup.

B-channels and ISL channels

You can monitor up to 5 ISL or B-channels for each direction. If there is no specific channel selected, all channels are monitored. The commands are listed below:

For B-channels:

ENL MSGI x CH loop channel
ENL MSGO x CH loop channel
DIS MSGI x CH loop channel
DIS MSGO x CH loop channel

For ISL channels:

ENL MSGI x CH l s c u
ENL MSGO x CH l s c u
DIS MSGI x CH l s c u
DIS MSGO x CH l s c u

Where

ENL = enable monitoring
DIS = disable monitoring
MSGI = incoming messages
MSGO = outgoing messages

ISDN features

You can select specific ISDN applications, such as Network Ring Again, for message monitoring. Only one or all ISDN applications can be monitored per D-channel at one time. The LD 96 commands are listed below, where x is the D-channel (DCHI or MSDL) port number:

ENL MSGI x FEAT feature
ENL MSGO x FEAT feature
DIS MSGI x FEAT feature
DIS MSGO x FEAT feature

Where “feature” can be

NCT = Network Call Trace
NRAG = Network Ring Again
NACD = Network Automatic Call Distribution
TRO = Trunk Optimization
NMS = Network Message Services
CPNW = Call Pickup Network Wide
NITC = Network Intercom

Message types

You can select specific types of messages to be monitored on a D-channel. The LD 96 commands are listed below, where x is the D-channel (DCHI or MSDL) port number.

ENL MSGI x MSG msg1 msg2 msg3
ENL MSGO x MSG msg1 msg2 msg3
DIS MSGI x MSG msg1 msg2 msg3
DIS MSGO x MSG msg1 msg2 msg3

Up to three message types (msg1, msg2, msg3) can be entered per command. The default is "ALL," which is all message types except SVC and SVCA. The message types are as follows:

ALER = alerting
ALL = all primitives and all messages except SVC and SVCA
CAPR = call proceeding
CON = connect
CONA = connect ack
DISC = disconnect
FAC = facility
FACA = facility ack
FACR = facility reject
INFO = information
NOTF = notify
PRIM = all primitives (such as release indication)
PROC = call proceeding
PROG = progress
RLS = release
RLSC = release complete
RST = restart
RSTA = restart ack
STAT = status
STEN = status enquiry
STP = setup
STPA = setup ack
SVC = service
SVCA = service ack
UI = user information

Setting output format levels

There are three levels (0-2) of message decoding. The level determines the format of the data output to the system terminal. To set the output level enter the following:

SET MSGI x MON (0)-2
SET MSGO x MON (0)-2

Level 0 outputs the message as shown below:

DCH x y MSG msgtype REF xxxxxxx CH zzzz TOD hh:mm:ss
<more data>

Where,

x = D-channel number
y = "I" for incoming messages, "O" for outgoing messages
xxxxxxxx = the call reference number
zzzz = the loop and channel number (or TN for ISL channels)
<more data> = additional lines of information, such as
CALLED # = called number
CALLING # = calling number of originator
CAUSE = reason for action taken (for example, unassigned number)
CONNECT # = connected number
FEAT = feature (such as Network Ring Again)
NUM PLAN = Numbering plan used (such as private)
PROGRESS = call progress description
REDIR REASON = reason the call was re-directed
REDN # = call redirection number
STATE = call state
STATUS = channel status
TYPE = type of channel

Level 1 outputs the raw data (as was done in X11 release 16). The format is as follows:

DCH x y MSG msgtype REF xxxxxxxx TN zzzzzz CH# x CK x
<more data in hexadecimal>

Level 2 output identifies the individual Information Elements (IE) in the messages and their hexadecimal values.

BCAP = bearer capability
CAST = call state
CHGA = charge advice
CHID = channel ID
CHST = change status
CLED = called number
CLES = called party subaddress
CLNG = calling number
CLNS = calling party subaddress
CNS5 = codeset 5 connected number subaddress
CON# = connect number
CON5 = codeset 5 connected number
CSE = cause
DES6 = codeset 6 Destination IE
DISP = display
FAC = facility IE for codeset 0
FAC6 = codeset 6 facility IE
FIND = feature Indication
HLYR = higher layer compatibility
INFO = information request
KYPD = keypad
LLYR = low layer compatibility
LS5 = locking Shift to codeset 5
LS6 = locking shift to codeset 6
LS7 = locking Shift to codeset 7
NLS5 = codeset 5 non-locking shift
NLS6 = codeset 6 non-locking shift
NLSO = non-locking shift to codeset 0
NOTI = notify indicator
NSF = network specific facility
ORG# = originating called number
ORG6 = codeset 6 Originating IE
PROG = progress indicator
RDG6 = codeset 6 redirecting number

REDG = redirecting number
REDN = redirection number
RETR = codeset 6 reason for return
RSTI = restart indicator
SHFT = shift
SIGN = signal
TACG = codeset 6 TTC advice charge
TNS = transit network selection
UNKN = unknown
UUI = user-user information

Deactivate monitor from a maintenance telephone

Once the system has been tied up or flooded with the monitored messages, it is very difficult, if not impossible, to use LD 96 to disable the monitors. In this case, a maintenance telephone with MTA class of service can be used to deactivate the monitor.

To activate or deactivate the monitor from a maintenance telephone, simply dial the following:

SPRE 9913 x 01

Where,

SPRE = special function access code (defined in LD 15)
9913 = feature code to activate or deactivate the monitor
x = 0 to deactivate, 1 to activate
01 = DCH monitor ID

Note 1: Dial tone is provided if successful.

Note 2: Use RST MON to reactivate the monitor from LD 96.

Note 3: Deactivating the monitor by the maintenance telephone does not disable the monitor, but simply halts the output. If the monitor is deactivated and not disabled using the DIS MSGI and DIS MSGO commands, then the monitor becomes re-activated after a data dump and sysload.

Get monitor status

To determine the current status of the D-channel monitor, enter the following command, where x is the D-channel (DCHI or MSDL) port number:

STAT MON x

Output format:

***DCH MSGI x LEVEL y ACTV (where, y = format level)
MSG - msg1 msg2…
FEAT - feat
CH - loop channel (or l s c u for ISL)

***DCH MSGO x LEVEL y ACTV
MSG - msg1 msg2…
FEAT - feat
CH - loop channel (or l s c u for ISL)

Note: If the monitor has been deactivated by the maintenance telephone, INACTV is output instead of ACTV.

D-channel command summary

The following commands are used to enable, disable, test and get the status of a D-channel. Refer to the LD 96 introduction for details on the use of these commands.

In X11 release 18 all commands use DCH instead of DCHI. For example, use ENL DCH x instead of ENL DCHI x. The STAT DCH and STAT DCHI commands have been combined to STAT DCH.

DIS AUTO x	Disable automatic recovery for DCH x.
DIS DCH x	Disable DCH x.
DIS MSGI x (options)	Disable the monitoring of incoming messages on D-channel x.
DIS MSGO x (options)	Disable the monitoring of outgoing messages on D-channel x.
DIS SERV x	Disable service messages on D-channel x.
DWNL DCH x (t)	Down load layer 3 message configuration table t and LAPD parameters from DCH x.
ENL AUTO x	Enable automatic recovery for DCH x.
ENL DCH x	Enable DCH x and attempt to establish the link.
ENL MSGI x (options)	Enable the monitoring of incoming messages on D-channel x.
ENL MSGO x (options)	Enable the monitoring of outgoing messages on D-channel x.
ENL SERV x	Enable service messages on D-channel x.
EST DCH x	Establish multiple frame operation on D-channel x.
MAP DCH x	Get physical address and switch settings for D-channels.
PLOG DCH x	Print protocol error log on DCH x.
PTAB DCH x (t)	Display layer 3 message configuration table t and LAPD parameters from DCH x.
RLS DCH x	Release D-channel x.
RST DCH x	Reset D-channel x, inhibit signaling.
RST MON	Reactivate monitoring on D-channels.
SDCH DCH x	Switch to the standby D-channel x.
STAT DCH (x)	Get status of one or all D-channels.
STAT MON (x)	Display the incoming and outgoing monitoring status of one or all D-channel.

STAT SERV (x)	Get the status of services messages for one or all D-channels.
TEST 100 x	Perform interrupt generation test on DCH x.
TEST 101 x	Perform loopback mode test on DCH x.
TEST 200 x	Perform interrupt handler test on DCH x.
TEST 201 x	Test interrupt handler-to-link interface path.

Multi-purpose Serial Data Link (MSDL) commands

The NT6D80 MSDL card provides 4 ports for ISDN Primary Rate D-channel (DCH) and Application Module Link (AML).

The MSDL commands are listed below, where x is the MSDL device number (defined by prompt DNUM in LD 17). These are provided in Link Diagnostic (LD 48) and D-channel Maintenance (LD 96) and I/O Diagnostic (LD 37).

DIS MSDL x (ALL)—Disable MSDL card.
ENL MSDL x (FDL, ALL)—Enable MSDL card.
RST MSDL x—Reset MSDL card.
STAT MSDL [x (FULL)]—Get MSDL status.
SLFT MSDL x—Execute a self-test on MSDL card x.

These commands are provided in Link Diagnostic (LD 48) and D-channel Maintenance (LD 96), and I/O Diagnostic (LD 37). See *X11 input/output guide* (553-3001-400) for a complete description of these commands.

MSDL D-channel command summary

The following commands are available only for D-channels on MSDL ports:

DIS LLB x	Disable local loopback mode on MSDL DCH x.
DIS RLB x	Disable remote loopback mode on MSDL DCH x.

DIS TEST x	Disable TEST mode on MSDL DCH x.
ENL LLB x	Enable local loopback mode on MSDL DCH x.
ENL RLB x	Enable remote loopback mode on MSDL DCH x.
ENL TEST x	Enable TEST mode on MSDL DCH x.
MAP DCH x	Get physical address and switch settings for D-channels.
PCON DCH x	Print configuration parameters on MSDL DCH x.
PMES DCH x	Print incoming layer 3 messages on MSDL DCH x.
PTRF DCH x	Print traffic report on MSDL DCH x.
TEST LLB x	Start local loopback test on MSDL DCH x.
TEST RLB x	Start remote loopback test on MSDL DCH x.

Alphabetical list of commands

The following is an alphabetical list and brief description of all the commands found in LD 96. For complete discussions refer to *X11 input/output guide* (553-3001-400).

DIS AUTO x	Disable automatic recovery for DCH x.
DIS DCH x	Disable DCH x. (X11 release 17 and earlier uses the following command format: ENL DCHI x.)
DIS LLB x	Disable local loopback mode on MSDL DCH x.
DIS MSGI x (options)	Disable the monitoring of incoming messages on D-channel x.
DIS MSGO x (options)	Disable the monitoring of outgoing messages on D-channel x.
DIS RLB x	Disable remote loopback mode on MSDL DCH x.
DIS SERV x	Disable service messages on D-channel x.
DIS TEST x	Disable TEST mode on MSDL DCH x.
ENL AUTO x	Enable automatic recovery for DCH x.
ENL DCH x (FDL)	Enable DCH x and attempt to establish the link. FDL (optional) and force downloads D-channel loadware to MSDL card. X11 release 17 and earlier uses the following command format: ENL DCHI x.
ENL LLB x	Enable local loopback mode on MSDL DCH x.
ENL MSGI x (options)	Enable the monitoring of incoming messages on D-channel x.

ENL MSGO x (options)	Enable the monitoring of outgoing messages on D-channel x.
ENL RLB x	Enable remote loopback mode on MSDL DCH x.
ENL SERV x	Enable service messages on D-channel x.
ENL TEST x	Enable TEST mode on MSDL DCH x.
EST DCH x	Establish multiple frame operation on D-channel x. X11 release 17 and earlier uses the following command format: EST DCHI x.
MAP DCH (x)	Get physical address and switch settings for D-channels.
PCON DCH x	Print configuration parameters on MSDL DCH x.
PLOG DCH x	Print protocol error log on DCH x. X11 release 17 and earlier uses the following command format: PLOG DCHI x.
PMES DCH x	Print incoming layer 3 messages on MSDL DCH x.
PTRF DCH x	Print traffic report on MSDL DCH x.
RLS DCH x	Release D-channel x. X11 release 17 and earlier uses the following command format: RLS DCHI x.
RST DCH x	Reset D-channel x, inhibit signaling. X11 release 17 and earlier uses the following command format: RST DCHI x.
RST MON	Reset or reactivate monitoring on D-channels with enabled monitors.
SDCH DCH x	Switch to the standby D-channel x. X11 release 17 and earlier uses the following command format: SDCH DCHI x.
SET MSGI x MON (0)-2	Set monitor output format level for incoming messages.

SET MSGO x MON (0)-2	Set monitor output format level for outgoing messages.
STAT DCH (x)	Get status of one or all D-channels. X11 release 17 and earlier uses STAT DCHI to get the status
STAT MON (x)	Display the monitoring status of one or all D-channels.
STAT SERV (x)	Get the status of services messages for one or all D-channels.
TEST 100 x	Perform interrupt generation test on DCH x.
TEST 101 x	Perform loopback mode test on DCH x.
TEST 200 x	Perform interrupt handler test on DCH x.
TEST 201 x	Test interrupt handler-to-link interface path.
TEST LLB x	Start local loopback test on MSDL DCH x.
TEST RLB x	Start remote loopback test on MSDL DCH x.

DCH messages

The following report format is output when the D-channel is released or established.

```
DCH x   EST   hh:mm:ss    mm/dd/yyyy
DCH x   RLS   hh:mm:ss    mm/dd/yyyy
```

Where x is the D-channel number and RLS or EST indicates if the channel was released or established. The time and date is also output.

X11 release 17 introduces enhanced D-channel reports.

Note: Complete operation of enhanced reporting requires X11 release 17 or later and QPC757 vintage E and later.

The format of this report is as follows:

```
DCH x   EST REASON   hh:mm:ss    mm/dd/yyyy
DCH x   RLS REASON   hh:mm:ss    mm/dd/yyyy
```

The REASON indicates why the D-channel was released or re-established. The following reasons may be output when the D-channel is released:

— CONFIRM = Released a D-channel because of a request from SL-1 software.

— CTS DOWN = Released a D-channel because a Clear To Send signal from the DCE interface has dropped. Check the DCE interface (PRI or modem) and associated cables.

— NO EXT CLK = No external clock received from the DCE interface. Check the DCE interface (PRI or modem) and associated cables.

— NO RESPONSE = No response from far end after N200 transmissions. No action required. Problem is at the far end.

— RED ALRM = Red (local) alarm has occurred. Check the PRI loop.

— REMOTE = Release was initiated by the far end. No action required. Problem is at the far end.

— SABME WDM = Far end responded to SABME with DM. No action required. Problem is at the far end (X11 release 18).

— TEST MODE = Release before entering test mode (X11 release 18).

— WRONG MODE = Release a D-channel because of an incorrect master/slave configuration (see prompt SIDE in LD17).

— YEL ALRM = Yellow (remote) alarm has occurred.

The following reasons may be output when the D-channel is re-established:

— AUTO REC = Re-established a D-channel because of auto-recovery.

— CONFIRM = Established a D-channel because of a request from SL-1 software.

— DMFO FRAME REC = Re-established a D-channel after receiving a DM frame in the timer recovery state (X11 release 18).

— FRAME REC = Re-established a D-channel after receiving an undefined frame from the far end.

— FRMR REC = Re-established a D-channel after receiving a Frame reject from the far end.

— INDICATION = Established a D-channel.

— INFO FRAME REC = Re-established a D-channel after receiving a frame type with an information field not allowed (X11 release 18).

— N(R) REC = Re-established a D-channel after receiving a bad N(R) from the far end.

— N201 REC = Re-established a D-channel after receiving a frame with an information field longer than N201 from the far end.

— N2X4 RNR REC = Re-established a D-channel after receiving a N2X4 consecutive RNR frames (X11 release 18).

— TIMER REC = Re-established a D-channel because of timer recovery.

— WRONG HDRL REC = Re-established receiving a frame with a incorrect header length (X11 release 18).

With MSDL D-channels the layer 2 can respond with a reason for link reset or disable condition. The output is as follows:

DCH : xx I PRIMI : RESET_IND TIME: hh:mm:ss
RESET_IND - rrrrrrr

DCH : xx I PRIMI : DSBL_IND TIME: hh:mm:ss
DSBL_IND - rrrrrrr

Where, rrrrrr is the reason for the reset or disable as follows:

NO RESOURCES—Reset the MSDL and try again. If the NO RESOURCES reason is still received, then configure the D-channel on a different card.

DTE/DCE or RS232/R422—Check switch settings on the MSDL card and far end.

LAYER 2 ERROR—Disable the DCH and enable with the force download option.

The following is a brief discussion of the messages relating to D-Channel operation. For a complete discussion, refer to *X11 input/output guide* (553-3001-400).

DCH001 ISDN package is not equipped.

DCH002 Command not allowed.

DCH003 DCHI is disabled.

DCH004 Before X11 release 17, only one link can be monitored at one time.

DCH005 Undefined link/DCHI state. There is a software/hardware mismatch. Action:

1. Disable and re-enable the DCHI card.

2. Check DCHI status.

DCH006 DCHI not responding. Action:

1. Disable and re-enable the DCHI card.

2. Check DCHI status.

DCH007 Command invalid at this state.

DCH008 Invalid source to the overlay.

DCH009 Invalid command entered.

DCH010 Invalid parameter #1.

DCH011 Invalid number of parameters.

DCH012 DCHI is not configured.

DCH013 Invalid message type.

DCH014 Invalid IE type.

DCH015 Invalid link monitor status.

DCH016 Invalid link/DCHI number.

DCH017 Invalid key entered.

DCH018 Invalid total keys entered.

DCH019 Invalid table number.

DCH020 Transmit buffer is not empty.

DCH021 Receive buffer not ready. Action: Check DCHI status.

DCH022 Invalid Octet number.

DCH023 Unexpected loop input.

DCH024 Backup DCH is not configured.

DCH025 DCH is already active. When using the SDCH DCH x command, be sure to enter the standby D-channel number.

DCH026	Specified DCH is not established. DCH must be in established state before switch command can be carried out.
DCH027	DCH already established.
DCH028	Command only valid for D-channels on MSDL card.
DCH029	DCH has to be enabled first.
DCH030	DCH has to be in Test Mode first.
DCH031	Unable to enable the local loopback sub state because the sub state is not idle.
DCH032	Unable to disable the local loopback sub state because it is not in the local loopback sub state.
DCH033	Unable to enable the remote loopback sub state because the sub state is not idle.
DCH034	Unable to disable the remote loopback sub state because it is not in the remote loopback sub state.
DCH035	Unable to run the local loopback test because the link is not in a local loopback sub state.
DCH036	Unable to run the remote loopback test because the link is not in a idle sub state.
DCH038	Invalid DCH number for ENL command.
DCH039	Invalid DCH state for enabling the link.
DCH040	Wrong number of input parameters for the enable command.
DCH041	Input enable command not recognized.
DCH042	MSDL card has to be in operational state.
DCH043	Invalid DCH number.
DCH044	Test or DCH maintenance command is not supported for D-channels configured on the MSDL card.
DCH045	MSDL card is disabled.
DCH046	Invalid maintenance request for DCH link.
DCH300	Test 200, interrupt handler interface, failed. Action: If test continues to fail, report software problem.
DCH301	Test 201, interrupt handler-to-link interface, failed. Action: If test continues to fail, report software problem.
DCH302	DCHI test 101 failed. No interrupt, but good data. Action: Replace DCHI.
DCH303	DCHI test 101 failed. There is interrupt, but bad data. Action: Replace DCHI.
DCH304	DCH test 101 failed. No interrupt and bad data. Action: Replace DCHI.
DCH305	DCHI test 100 failed. Stuck interrupt. Action: Replace DCHI.
DCH401	That command is not allowed. This is a single octet information element.
DCH402	Only three message types can be specified in one command.

DCH403 Only one feature can be monitored at one time.

DCH404 Invalid TN or no TN was entered.

DCH405 Only five TNs can be specified for incoming or outgoing messages.

DCH406 This TN has been specified already.

DCH407 TN does not associate with the selected D-channel.

DCH408 Backup D-channel is not allowed; primary D-channel should be used.

DCH410 The ENL SERV command cannot be executed when the primary D-channel and, if equipped, the backup D-channel are in the established state. Disable both D-channels before entering the ENL SERV command.

DCH411 SDCH command is allowed only when IFC= SL1 and RCVP = No in LD17.

DCH1001 Invalid primitive-ID. Action: Check DCHI status.

DCH1002 Unexpected primitive. Action: Check DCHI status.

DCH1003 Protocol error. Action:
1. If the error continues, check DCHI card status.
2. If the problem still continues, report it.

DCH1004 PRI is out of service.

DCH1005 Link release error. Action:
1. Check DCHI status
2. Check the PRI-to-DCHI cable
3. Check PRI status

DCH1006 Link establishment error. Action:
1. Check DCHI status
2. Check the PRI-to-DCHI cable
3. Check PRI status

DCH1007 Interrupt was lost. Action: If more than 10 times per day, run DCHI tests 200 and 201.

DCH1008 Output request buffer overflow. Action: If more than five times per day, reset D-channel output buffer size in LD17, using prompt OTBF.

DCH1009 PRI reported DCHI is out of service. Action:
1. Check DCHI status
2. Check PRI status
3. Check the PRI-to-DCHI cable

DCH1010 DCHI is software disabled.

DCH1011 Late link establishment. Action:
1. If the far end is disabled, no action needed
2. If the far end is active, increase the timer threshold in LD17, using prompt T200

DCH1012 Late link release. Action:
1. If the far end is disabled, no action needed
2. If the far end is active, increase the timer threshold in LD17, using prompt T200

DCH1013 Invalid DCHI status because of software/hardware mismatch. Action:
1. Disable and re-enable the DCHI card
2. Check DCHI status

DCH1014 Invalid DCHI status because of software/hardware mismatch. Action:
1. Disable and re-enable the DCHI card
2. Check DCHI status

DCH1015 Receive buffer full. Action: If more than five times per day, disable and re-enable DCHI.

DCH1016 Transmit buffer full. Action: Check the DCHI card.

DCH1017 No end-of-message. Action: Definitely a DCHI problem. Check the DCHI card.

DCH1018 No transmit buffer available. Action:
1. Check PRI to DCHI cable
2. Check PRI status
3. Check DCHI status

DCH1019 DCHI is hardware disabled.

DCH1024 The DCH port on the MSDL card could not be enabled because the MSDL card is not in an operational state.

DCH1025 Did not receive a confirmation from Layer 2 for a MSDL DCH test state event, therefore, a timeout has occurred.

DCH1026 An invalid timeout occurred for the DCH test state. No further action is required for this event.

DCH1027 A invalid test confirmation was received from layer 2. No further action is required for this event.

DCH1028 The DCH has to be on the MSDL card for the maintenance task requested.

DCH1029 Resynchronization of the flow control counters failed when a flow control condition was detected by the MSDL DCH Handler application.

DCH1030 Output request buffer overflow for D channels on the MSDL card. Increase the size of the output request buffer.

DCH4283 Both D-channels have been released. Action: Establish the D channel.

DTA messages

These messages relate to the commands used in LD60. They support the following hardware:

— QPC472 Digital Trunk Interface (DTI)

— QPC536 2.0 Mb/s Digital Trunk Interface (DTI)

— QPC720 Primary Rate Interface (PRI)

— QPC471 and QPC775—Clock Controller

— QPC785 2.0 Mb/s Digital Trunk Interface (DTI)

The following is a brief discussion of the messages relating to DTA. For a complete discussion, refer to *X11 input/output guide* (553-3001-400).

DTA001 loop — Define the datablock threshold in LD73.

DTA002 loop — Message received with wrong chip field.

DTA003 loop — Power up message received.

DTA004 loop — Phase lock loop (PLL) clear message is received without phase lock loop alarm.

DTA005 loop — Yellow alarm (remote alarm) has occurred.

DTA006 loop — Yellow alarm (remote alarm) 24-hour threshold has been exceeded. Manual intervention is required.

DTA007 loop — Yellow alarm (remote alarm) is cleared.

DTA008 loop — Yellow alarm (remote alarm) is disabled.

DTA009 loop — Phase lock loop alarm has occurred.

DTA010 loop — Phase lock loop alarm has cleared.

DTA011 loop — Bit error rate warning threshold reached.

DTA012 loop — Bit error rate out-of-service limit reached.

DTA013 loop — Too many bit error rate out-of-service occurrences in 24 hours.

DTA014 loop — Bit error rate alarm has cleared.

DTA015 loop — Frame slip—tracking—maintenance limit.

DTA016 loop — Frame slip—tracking—out-of-service limit.

DTA017 loop — Frame slip—free run (non-tracking)—maintenance limit.

DTA018 loop — Frame slip—free run (non-tracking)—out-of-service limit.

DTA019 loop — Frame alignment maintenance limit.

DTA020 loop — Frame alignment out-of-service limit.

DTA021 loop — Frame alignment alarm persisted for 3 seconds.

DTA022 loop — Frame alignment alarm has cleared for at least 15 seconds.

DTA023 loop — PRI loop is up.

DTA024 loop — System initiated (automatic, LD45 or LD60) self-test on PRI loop failed. All channels are disabled, loop is put into red alarm (local alarm).

DTA025 loop — System initiated (automatic, LD45 or LD60) self-test on PRI loop L passed. Channels were previously disabled because of self-test fault or a loop-level self-test. Channels are enabled and red alarm (local alarm) is removed.

DTA026 loop	Non-tracking frame slip out-of-service limit is reached while monitoring frame slip improvement. Trunks remain out of service and the improvement timer (prompt SRIM in LD73) is restarted.
DTA027	The non-tracking frame slip guard timer has expired. The trunks affected are kept out of service. Software is checking for slip rate improvement. The improvement criterion is the number of maintenance messages the system gets during the guard time.
DTA028 loop	Slip rate improvement criterion is not met. Trunks remain out of service; improvement timer is reset (prompt SRIM in LD73).
DTA029 loop	Non-tracking frame slip rate improvement criterion is met. Trunks being returned to service.
DTA100 l s c u	Far-end hardware corresponding to Virtual Terminal l s c u is disabled.
DTA101 l s c u	Far-end hardware corresponding to Virtual Terminal l s c u is enabled.
DTA102 loop	Power is up on the PRI2 board.
DTA103 loop	Problem in loop or channel message of PRI2.
DTA104 loop	Channel self-test report for PRI2.
DTA105 loop	Loop self-test report for PRI2.
DTA106 loop	PRI2 Loop is in acceptable state.
DTA107 loop	PRI2 Loop is in G1 MNT state.
DTA108 loop	PRI2 Loop is in G1 NNC state.
DTA109 loop	PRI2 Loop is in G1 OOS state.
DTA110 loop	PRI2 Loop is in G2 MNT state.
DTA111 loop	PRI2 Loop is in G2 NNC state.
DTA112 loop	PRI2 Loop is in G2 OOS state.
DTA113 loop	PRI2 Loop is in OOS state with no auto-start.
DTA114 loop	PRI2 loop is disabled, and message received is not power up.
DTA115 loop	Unsolicited PRI2 message received.
DTA116 loop	PRI2 loop is in G1 NNDC state.
DTA117 loop	PRI2 loop is in G2 NNDC state.
DTA200 loop	The DTI2 (NI and CI-1) firmware has initialized.
DTA201 loop	The Carrier Interface (CI-1) firmware has initialized.
DTA202 loop	The Network Interface (NI) firmware has initialized.
DTA203 loop e	A Group 2 error was detected by the DTI card. Error (e) = 0 to 1F (HEX).
DTA204 loop e	The NI firmware has encountered a problem. Refer to DTI009 for NI microprocessor error codes (e).

DTA205 loop e	The CI-1 firmware has encountered a problem. Refer to DTI009 for CI-1 microprocessor error codes (e).
DTA206 loop	Response to channel status poll has timed out. The channel was disabled.
DTA207 loop s c	An invalid signal has been received from the DTI, where, s = ABCD signal received from DTI; c = channel.
DTA208 loop s c	An invalid signal has been requested to be sent to the DTI, c = channel s = signal type requested.
DTA209 loop	DTI loop is in acceptable state.
DTA210 loop e	DTI loop is in Group 1 MNT state, where error (e) is one or more of the following: BV–Bipolar Violation FV–Frame Alignment Violation SV–Slip Violation
DTA211 loop e	DTI loop is in Group 1 NNC state, where error (e) is one or more of the following: BV–Bipolar Violation FV–Frame Alignment Violation SV–Slip Violation
DTA212 loop e	DTI loop L is in Group 1 OOS state, where error (e) is one or more of the following: BV–Bipolar Violation FV–Frame Alignment Violation SV–Slip Violation
DTA213 loop e	DTI loop is in Group 2 MNT state, where error (e) is one or more of the following: C3–B3 TSO non-FAS (far-end out of service) C6–B6 TS16 frame 0 (far-end lost MFA signal) AS–64-Kbit Alarm indication signal AI–Alarm Indication signal LM–Loss of Multi-frame alignment LF–Loss of Frame alignment
DTA214 loop e	DTI loop is in voice Group 2 NNC state, where error (e) is one or more of the following: C3–B3 TSO non-FAS (far-end out of service) C6–B6 TS16 frame 0 (far-end lost MFA signal) AS–64-Kbit Alarm indication signal AI–Alarm Indication signal LM–Loss of Multi-frame alignment LF–Loss of Frame alignment

DTA215 loop e	DTI loop is in Group 2 OOS state, where error (e) is one or more of the following: C3–B3 TSO non-FAS (far-end out of service) C6–B6 TS16 frame 0 (far-end lost MFA signal) AS–64-Kbit Alarm indication signal AI–Alarm Indication signal LM–Loss of Multi-frame alignment LF–Loss of Frame alignment
DTA216 loop e	DTI loop is in Group 1 MNT state, where error (e) is one or more of the following: BV–Bipolar Violation FV–Frame Alignment Violation SV–Slip Violation
DTA217 loop e	DTI loop is in Group 1 NNC state, where error (e) is one or more of the following: BV–Bipolar Violation FV–Frame Alignment Violation SV–Slip Violation
DTA218 loop	DTI loop is in Group 1 data OOS.
DTA219 loop e	DTI loop is in Group 2 MNT state, where error (e) is one or more of the following: C3–B3 TSO non-FAS (far-end out of service) C6–B6 TS16 frame 0 (far-end lost MFA signal) AS–64-Kbit Alarm indication signal AI–Alarm Indication signal LM–Loss of Multi-frame alignment LF–Loss of Frame alignment
DTA220 loop e	DTI loop is in Group 2 NNC state, where error (e) is one or more of the following: C3–B3 TSO non-FAS (far-end out of service) C6–B6 TS16 frame 0 (far-end lost MFA signal) AS–64-Kbit Alarm indication signal AI–Alarm Indication signal LM–Loss of Multi-frame alignment LF–Loss of Frame alignment
DTA221 loop	DTI loop is in G2 data OOS.
DTA222 loop	DTI loop is in OOS state with no auto-start.
DTA223 loop s ch	An invalid signal has been received from the DTI. It matches CCITT fault signal. Far end may be disabled. c = channel, s = ABCD signal received from DTI.

DTA224 loop ch	DTI loop audit has found channel (ch) to be in an invalid HALFDISCONNECT state (trunk lock-up). A disconnect attempt is being made on the CHNL.
DTA225 loop	DTI loop is in G1 NNDC state.
DTA226 loop	DTI loop is in G2 NNDC state.
DTA300 loop	A slip repetition has occurred on PRI2 loop.
DTA301 loop	A slip deletion has occurred on PRI2 loop.
DTA302 loop	A slip repetition overflow has occurred on PRI2 loop.
DTA303 loop	A slip deletion overflow has occurred on PRI2 loop.
DTA304 loop	A BPV unavailable condition has occurred on PRI2 loop.
DTA305 loop	A CRC unavailable condition has occurred on PRI2 loop.
DTA306 loop	A FAP unavailable condition has occurred on PRI2 loop.
DTA307 loop	A BPV no-new-calls condition exists on PRI2 loop.
DTA308 loop	A CRC no-new-calls condition exists on PRI2 loop.
DTA309 loop	A FAP no-new-calls condition exists on PRI2 loop.
DTA310 loop	A BPV maintenance condition has occurred on PRI2 loop.
DTA311 loop	A CRC maintenance condition exists on PRI2 loop.
DTA312 loop	A FAP maintenance condition exists on PRI2 loop.
DTA320 loop	DTI loop error reporting was disabled because of an overload of input messages.
DTA321 loop	Error reporting reenabled on DTI loop after being disabled by an input overload (DTA320).

DTC messages

The following is a brief discussion of the messages relating to DTC. For a complete discussion, refer to *X11 input/output guide* (553-3001-400).

DTC001	Clock Controller tracking on primary source loop.
DTC002	Clock Controller tracking on secondary source loop.
DTC003	Clock Controller cannot be accessed.
DTC004	Clock Controller indicates clock aging error (not locked on in 5 seconds).
DTC005	Reference clock switched to secondary source from primary.
DTC006	Reference clock switched to free run mode from secondary or primary.
DTC007	Active reference clock is set to retrack primary.
DTC008	Active reference is free run or the Clock Controller cannot be accessed.
DTC009	Clock controller has been switched.
DTC010	UART error is detected. Active CC cannot contact other CC.
DTC011	Clock Controller self-test failed; error exists.
DTC012	Clock Controller has reference clock problem.
DTC013	Clock Controller has tracking problem.
DTC014	Clock Controller set to free run.
DTC015	Clock Controller set to secondary.
DTC016	Clock Controller restored from free run or secondary to tracking on primary.
DTC017	Clock Controller restored from free run to tracking on secondary.
DTC018	Cannot switch or restore to a reference clock because automatic reference clock switching option is disabled.
DTC100	An invalid error message was received from the Clock Controller.
DTC101	You can only disable the secondary clock reference.
DTC102	You can only enable the secondary clock reference.
DTC103	System is locked to primary clock reference.
DTC104	System is locked to secondary clock reference.

DTC105	System is locked to free run.
DTC106	Supposed to free run but hardware is tracking to primary.
DTC107	Supposed to free run but hardware is tracking to secondary.
DTC108	Supposed to track on primary but hardware is tracking to secondary.
DTC109	Supposed to track on secondary but hardware is locked to primary reference clock.
DTC110	Supposed to track on secondary but hardware is tracking to primary.

DTI messages

The following is a brief discussion of the messages relating to DTI. For a complete discussion, refer to *X11 input/output guide* (553-3001-400).

DTI000	LD60 identifier.
DTI001	Invalid input character.
DTI002	Invalid command.
DTI003	Incorrect number of parameters.
DTI004	Incorrect customer number.
DTI005	Invalid parameter.
DTI006	Loop specified is not a DTI/PRI loop.
DTI007	DISI request already active.
DTI008	DISI command is completed.
DTI009 loop ch	DTI/PRI channel failed hardware self-test. For DTI009 L M E, the output data is as follows: L = loop M = N for NI microprocessor. See Table 1 in *X11 input/output guide* (553-3001-400). M = C for CI microprocessor. See Table 2 in *X11 input/output guide* (553-3001-400). E = error code for debug purposes.
DTI010 loop c	System clock c cannot be switched in to replace active clock; or another loop is already in loopback mode.
DTI011 c	System clock c cannot be switched in because loss of service will result to the peripheral signaling pack listed.
DTI012 loop	Network card does not respond from IOTEST; loop is disabled.
DTI013 loop	No channel is available on loop for diagnostic test. No self-test is performed on this loop.
DTI014 loop	Loop is in remote loopback mode; command not allowed.
DTI015 loop	Loop is not specified as primary or secondary clock reference source.

DTI016	The DTI package is restricted; LD60 is not allowed to load.
DTI017	Previous command in progress; enter END to abort.
DTI018 loop	DISI command aborted.
DTI019	The loop/channel is not disabled for self-test or it is already in the requested set/reset loopback mode.
DTI020 loop	Loop is already disabled. No action is taken.
DTI021	Attempt was made to disable input TTY loop.
DTI022 loop	Loop is already enabled or the Peripheral Signaling card is disabled.
DTI023 loop ch	Cannot disable/enable the specified channel.
DTI024	Loop is enabled but no response from hardware.
DTI025 loop ch	Terminal is not equipped.
DTI026 c r	Invalid input parameter to LOVF command for customer c, route r.
DTI027 loop	Loop is not in loopback test mode.
DTI028 loop ch	No test result received before timeout from the specified loop or channel.
DTI029 loop	Loop is enabled but red (local) and yellow (remote) alarms exist.
DTI030 loop	Loop is enabled but red alarm (local alarm) exists.
DTI031 loop	Loop is enabled but yellow alarm (remote alarm) exists.
DTI032 loop	Loop is in yellow alarm (remote alarm) state or is waiting for “yellow alarm sending ceased” message from hardware. Do not perform automatic self-test.
DTI033 loop	Loop is in red/yellow/audit state. Command not allowed.
DTI034 loop	Switching of Clock Controller is not allowed for this machine type.
DTI034 loop m	Loop microprocessor m failed echo message self-test; m = N for NI microprocessor, m = C for CI microprocessor.
DTI035	Clock Controller does not exist.
DTI035 loop ts	Network map in software indicates that timeslot ts of network loop is idle, but the connection memory word for that slot on network pack is not idle. Probably a software fault.
DTI036 loop	Continuity checker on loop is faulty. Network pack probably faulty.
DTI037 loop	Unable to read partial alarm counts from DTI hardware on loop. Following alarm counts are not complete.
DTI038 loop	No channel is available on loop for diagnostic. Self-test was not performed.
DTI038 loop	Loop not responding. Check enable switch on Network card (P1).
DTI039 loop	Continuity test failed on loop.
DTI040 loop ch	Loopback test failed on loop and channel.

DTI041 loop	Network memory test failed. Replace network pack.
DTI042 loop ch	No timeslots available for loopback test. Loopback test not tested on channel. If loop level test, all channels greater than and including channel ch not tested.
DTI043	Another channel already in loopback mode.
DTI044 loop	Loop enabled by midnight routine.
DTI045 loop	Self-test not performed on loop because loop was disabled manually.
DTI046 loop	Self-test not performed on loop because unable to access the loop.
DTI047 loop	Self-test not performed on loop since loop in remote loopback mode.
DTI050 loop	Continuity checker on loop is faulty. The network pack is probably faulty.
DTI051	Data link is not defined.
DTI052	Tracking rejected. Reference primary is not specified.
DTI053	Unable to track on primary.
DTI054	Tracking rejected. Reference secondary is not specified.
DTI055	Unable to track on secondary.
DTI056	Unable to access Clock Controller.
DTI057	Unable to free run.
DTI058	Supposed to free run but hardware is tracking on primary.
DTI059	Supposed to free run but hardware is tracking on secondary.
DTI060	Supposed to track on primary but hardware is tracking on secondary.
DTI061	Supposed to track on primary but hardware is free run.
DTI062	Supposed to track on secondary but hardware is tracking on primary.
DTI063	Supposed to track on secondary but hardware is free run.
DTI064	Cannot determine which CPU is in use.
DTI065	System clock must be switched before proceeding.
DTI066	Idle CPU must be switched in for active CPU before proceeding.
DTI067 c	System clock generator specified is already enabled.
DTI068 c	System clock generator specified is not responding.
DTI069 loop	Unable to track on loop.
DTI070	Clock cannot be switched. Unable to track the reference loop.
DTI071	The ENCH L C command is not allowed here because the channel is busy.
DTI072	The ENCH L C command is not allowed because the associated D-channel is not established.

DTI073 loop	If loop is a QPC720, then the pack is not responding. If loop is a QPC472, then ignore this message.
DTI081	B-Channel cannot be enabled until a DCH Link is established.
DTI098	Command entered applies to 1.5 Mb DTI only.
DTI099	Command entered applies to 2.0 Mb DTI only.
DTI100 loop	DTI link loop is associated with an indirect command and Status Link. This loop cannot be disabled until the CSL is disabled.
DTI101	Server using channel for maintenance, cannot Remove Link.
DTI200	Warning: There is an active Clock Controller on board of the digital trunk card. If you intend to remove the card from the shelf, please disable the Clock Controller before removing the card from the shelf.
DTI4130	Incompatible protocol between the interfaces. If this error continues, report it.
DTI4131	Incompatible protocol between the interfaces. If this error continues, report it.
DTI4132	ENCH L C command is not allowed because the associated D channel is not established.

MSDL messages

The MSDL provides 4 ports for applications such as the following:

— ISDN Primary Rate D-channel (DCH)

— Application Module Link (AML)

— Input/Output devices (TTY)

The MSDL messages report problems with the MSDL card and its applications. The MSDL commands are provided in LD 37, LD 48, and LD 96.

The following is a brief discussion of the messages relating to MSDL. For a complete discussion, refer to *X11 input/output guide* (553-3001-400).

MSDL001	The number of parameters for the MSDL command is incorrect.
MSDL002	The card number in the command is out of range or invalid.
MSDL003	Since this command is only valid for use on the MSDL card in this overlay, the first parameter must be MSDL.
MSDL004	Cannot reset the card (or execute self-tests) right now because the card is not in Manually Disabled state (MAN DSBL).
MSDL005	Failed to reset; could not write command to card. Card is probably not present, or the switch settings on the card do not agree with the database.
MSDL006	Cannot enable the card unless it is in Manually Disabled (MAN DSBL) state.
MSDL007	Cannot disable card unless it is in the ENBL state.
MSDL008	Cannot reset the card (or execute self-tests) on the card right now since the device enabled bit is set, meaning a message response is currently pending.
MSDL011	No response received to the enable card command.
MSDL012	The response message from the card to the overlay indicates failure to enable/disable.

MSDL014	No response received to the disable card command. The card is set to the Manually Disabled (MAN DSBL) state anyway.
MSDL015	The command that was entered requires that a message be sent to the MSDL. The Meridian 1 was unable to build the message since the buffer was not free. Try again later.
MSDL016	Failed enable attempt. If this message is not accompanied by any other error message, the card may be in the process of performing self-tests or the self-tests may have already failed. Wait a few minutes, then execute the self-tests with the SLFT MSDL x command. If self-tests pass, try to enable the card again.
MSDL017	At least one of the ports on the MSDL is currently enabled. Disabling the card is disallowed when ports are enabled unless the DIS MSDL x ALL command is used.
MSDL018	The fourth parameter of the command is unrecognized or unimplemented.
MSDL019	The command entered required that information be read from the MSDL. The specified MSDL is not present in the system, and the information could not be read.
MSDL020	The command entered required that the application information block on the MSDL be read by the Meridian 1. The block is currently being updated by the MSDL, and the system could not read the block. Try again.
MSDL021	Began to download the MSDL basecode but stopped before finishing. There should be an SDL error message; refer to the information on that message as to the reason for the failure.
MSDL022	The rest of the information output in response to this command is resident on the card. The card is not enabled, and the information cannot be read.
MSDL024	The Meridian 1 began to download an MSDL application but stopped before finishing. There should be an SDL error message; refer to the information on that message as to the reason for the failure.
MSDL025	There is currently maintenance activity on the application in question. Wait a few minutes and try again.
MSDL026	Disabling the MSDL when the active TTY is supported by it is not allowed.
MSDL027	Time out waiting for the self-tests to complete. Wait at least five minutes, then try again. ***Note:*** Under certain unusual circumstances, self-tests can take approximately five minutes, but this should only occur when the flash EPROM on the card is new or has been completely erased.
MSDL028	Unable to enable the card as it is not present in the system. If the card in question is believed to be present, check if the switch settings on the card agree with the device number entered in this command.

MSDL029	Incorrect password entered in response to the ENL MSDL x DBG command.
MSDL030	The debug option for this card has already been turned on.
MSDL031	The ENL MSDL x ALL command is only valid when the MSDL is in the ENBL or MAN DSBL state.
MSDL032	The MSDL card was removed from its slot, or the card reset itself during the self-tests. If the card was removed, execute the self-tests again and do not remove the card from its slot until the tests are complete. If the card was not removed, execute the self-tests again. If this message appears more than twice, replace the MSDL card.
MSDL100 x	The CSTAT and CSUBSTAT fields on MSDL x indicate the card is Manually Disabled. The Meridian 1 believes the card is Enabled. The card is placed in the System Disabled - Selftests Passed state, and within the next few minutes, the Meridian 1 will attempt to enable the card.
MSDL101 x	The CSTAT field on MSDL x indicates the card is no longer Enabled. The Meridian 1 will attempt to return the card to an Enabled state within a few minutes. Under certain conditions, this message is output at the same time as MSDL302.
MSDL102 x	No response was received from MSDL x to a background polling message sent periodically to each MSDL card. The purpose of this message is to ensure that the card is capable of receiving and sending messages.
MSDL103 x	An overlay was waiting for a message from MSDL x. Most likely, the overlay is no longer loaded. The message the overlay was waiting for was never received.
MSDL104 x	The MSDL background audit sent a message to MSDL x and did not receive a response.
MSDL105	The CSTAT value read from the MSDL is invalid. This indicated one of two error conditions: — The card has encountered a severe hardware fault so that it is unable to report the error to the Meridian 1. — There may be multiple cards in the system with the same device number (switch settings) as the MSDL. When the CSTST is read from the MSDL, it may not be the MSDL card that is responding. Be sure no other cards in the system share the device number. If so, change the device numbers. If not, replace the card.
MSDL106 x appl	The MSDL audit detected that there was no response to a maintenance message originated by application “appl” on MSDL x.
MSDL107 x appl	The Meridian 1 was unable to determine if downloading was necessary. Three fields accompany this message, including the MSDL card number and the application name. The third field contains a value for internal use only.

MSDL108 x appl	Application “appl” on MSDL x needs to be downloaded to the card. Downloading begins as soon as there is no overlay loaded.
MSDL112 x	MSDL x has been reset to begin automatic recovery. Immediately following this message, the card is executing self-tests. When they are finished, provided they pass, the Meridian 1 will attempt to enable the card.
MSDL201 x appl	MSDL x sent a message to the Meridian 1 indicating application “appl” data space has been corrupted.
MSDL202 x appl	MSDL x sent a message to the Meridian 1 indicating that application “appl” on the card unexpectedly disabled itself (performed a “close”).
MSDL204 x appl	The Meridian 1 searched the system disk to find a version of an application “appl” for MSDL x and found none.
MSDL205 x appl	An error was encountered when searching the system disk to find a version of application “appl” for MSDL x. Refer to an accompanying SDL error message for the exact error reason. This message indicates that Meridian 1 attempts to enable the application in question if a version exists on the card.
MSDL206 x appl y z	An error was encountered when comparing a version of application “appl” on the system disk with a version on MSDL x. Refer to an accompanying SDL error message for the exact error reason. This message indicates that the Meridian 1 will attempt to enable the application in question if a version exists on the card.
MSDL207 x appl y z	An error was encountered when downloading application “appl” to MSDL x. Refer to an accompanying SDL error message for the exact error reason. The entire enable sequence has been aborted.
MSDL208 x	When preparing to download the base software to MSDL x the card indicated that some kind of fatal error was encountered. Execute self-tests before attempting any other action regarding this card.
MSDL209 x y z	Some memory was reclaimed for from the MSDL for future use. An application on MSDL x requested that a buffer pool be freed. When this occurred, there was at least one outstanding buffer. The Basecode waited for the buffer(s) to be returned to the pool before freeing it, but it never returned. The buffer pool was forcibly freed by the Basecode.
MSDL210	Failed to enable the MSDL for one of the following reasons: — The card in question is not an MSDL card. For example, there may be a card in the system with switch settings that correspond to the MSDL, but in fact it is not an MSDL card. — There is at least one other card in the system with switch settings identical to the MSDL’s. Remove the card with the same device number as the MSDL.

MSDL300 data	The MSDL background audit has changed the card state. In the cases where the card was previously enabled and now is no longer enabled, another MSDL message will indicate the reason for the state change. When making a state transition because of a fatal error on the card, the reason for the fatal error is displayed in this message. This is an informational message and requires no action by the craftsperson.
MSDL301 x y z	An expedited data unit was received. The Meridian 1 is not expecting MSDL x to generate any messages in its current state. Following transition to disabled state, a pending message may cause this message to be displayed.
MSDL302 x y	Access to the memory space shared by the Meridian 1 CPU and the MSDL (Shared RAM) has been momentarily suspended by MSDL x. There is no specific action to be taken as a result of this message, however it indicates that message transfer between the Meridian 1 and the card ceased momentarily.
MSDL303 x y	The Meridian 1 detected corruption in either the receive ring, transmit ring, or both, causing access to the memory space shared by the Meridian 1 CPU and MSDL x (Shared RAM) to be momentarily suspended. Take no action because of this message; however, it indicates that message transfer between the Meridian 1 and the card ceased momentarily.
MSDL305 x y	The Meridian 1 has received 50 or more messages from the MSDL x within two seconds. At this level of message transfer, the overall system performance may be affected. The level of message transfer does not warrant removing the card from service. Y indicates the rate of message transfer from the card to the Meridian 1 (in terms of messages per second).
MSDL306 x y	The Meridian 1 has received 50 or more messages from MSDL x within two seconds. At this level of message transfer, the overall system performance may be affected. The level of message transfer warrants removing the card from service. Y indicates the rate of message transfer from the card to the Meridian 1 (in terms of messages per second).
MSDL307 x data	MSDL x encountered a fatal error. The output data is information read from the card regarding the error and is intended for internal use only.
MSDL308 x y appl data	MSDL x reported that it received a message with an invalid (bad) Socket ID (y). “Appl” is the application name, and data is up to 8 words of hex data representing the message sent.

PRI messages

PRI messages are provided for and give information concerning the following:

— responses to commands entered in LD 60

— database errors relevant to PRI interfaces

— protocol errors associated with a PRI link

The following is a brief discussion of the messages relating to PRI. For a complete discussion, refer to *X11 input/output guide* (553-3001-400).

PRI000 loop v	No problem. Correct version ID (s) was received from PRI loop.
PRI001 loop	No problem. DCHI ready to transmit; PRI ready to receive.
PRI002 loop	PRI channel 24 not ready to receive. Action: 1 Check PRI status. 2 Check PRI to DCHI cable.
PRI003 loop	DCHI not ready to transmit. Action: 1 Check PRI status. 2 Check PRI to DCHI cable. 3 Check the DCHI status.
PRI004 loop	PRI not ready and DCHI not ready.
PRI005 loop v	Incorrect version ID (v) was received from PRI loop. The X11 software release is not compatible with the PRI hardware vintage.
PRI006 loop	Response timeout; no version ID received. Action: 1 Be sure QPC720 is being used, not QPC472. 2 Be sure PRI hardware and software are correctly installed. 3 Check PRI status.
PRI010 loop	Disabling of this loop not allowed. Associated DCHI must be disabled first.

PRI011 loop	DCH port number mismatch between PDCH block and PPRI loop block. Action: This is a software problem. Report it to the technical assistance center.
PRI100 loop ch	The B-channel indicated in the outgoing SETUP is locked out because the far-end is using an alternate B-channel.
PRI101 loop ch c	The B-channel (ch) is locked out because a RELCOMP or RELEASE message has been received with one of the following cause (c) values: 82 = channel does not exist 44 = requested channel is not available 6 = alternate channel acceptable
PRI200	Protocol Error: A Global CREF number is needed for any service message. Format: DCH: x DATA: y x = D-channel number y = Message type Action: Report problem if condition persists.
PRI201	Protocol Error: Invalid maintenance state in the service message. Output data: DCH: x DATA: y x = D-channel number y = Message type Action: Report problem if condition persists.
PRI202	Protocol Error: Incorrect value for extension bit. Output data: DCH: x DATA: y z x = D-channel number y = Message type z = Information Element (IE) Action: Report problem if condition persists.
PRI203	Protocol Error: Mandatory Notification description invalid. Output data: DCH: x DATA: y z x = D-channel number y = Message type z = Information Element (IE) Action: Report problem if condition persists.
PRI204	Database Error: Feature is not allowed for this interface. Output data: DCH: x DATA: y z x = D-channel number y = D-channel interface ID z = ESL or ISA Action: Verify data is correct in the configuration record and the route data block.

PRI205	Protocol Error: NSF IE is missing from the SETUP message received from the far end. Output data: DCH: x DATA: y x = D-channel number y = Message type Action: Check the database in the far end switch to ensure the NSF IE is included as part of the call origination.
PRI206	Protocol Error: The length of the incoming call reference value was incorrect. The length allowed in North America is 1 or 2. For some other interfaces only a length of 2 is allowed. There may be a compatibility problem with the far end. Output data: DCH: x DATA: y x = D-channel number y = Call reference length Action: Report problem if condition persists.
PRI207	Protocol Error: Wrong message type. Output data: DCH: x DATA: y x = D-channel number y = Message type Action: Report problem if condition persists.
PRI208	Protocol Error: Wrong information element (IE) for message type. Output data: DCH: x DATA: y x = D-channel number y = Message type Action: Report problem if condition persists.
PRI209	Protocol Error: Undefined information element (IE) for message type. Output data: DCH: x DATA: y x = D-channel number y = Message type Action: Report problem if condition persists.
PRI210	Protocol Error: Wrong coding standard. Output data: DCH: x DATA: y x = D-channel number y = Coding standard Action: Report problem if condition persists.
PRI211	Protocol Error: Incorrect extension bit. Output data: DCH: x DATA: y x = D-channel number y = Message type Action: Report problem if condition persists.

PRI212 Protocol Error: Bearer capability (BC)—Information transfer not supported.
Output data: DCH: x DATA: y
x = D-channel number
y = Transfer capability
Action: Report problem if condition persists.

PRI213 Protocol Error: Bearer capability (BC)—Information transfer rate/mode not supported.
Output data: DCH: x DATA: y
x = D-channel number
y = Transfer rate
Action: Report problem if condition persists.

PRI214 Protocol Error: Bearer capability (BC)—Layer 1 protocol ID not correct.
Output data: DCH: x DATA: y
x = D-channel number
y = Protocol ID
Action: Report problem if condition persists.

PRI215 Protocol Error: Bearer capability (BC)—Rate is not correct.
Output data: DCH: x DATA: y
x = D-channel number
y = Message type
Action: Report problem if condition persists.

PRI216 Protocol Error: Bearer capability (BC)—Rate is not correct.
Output data: DCH: x DATA: y
x = D-channel number
y = Rate
Action: Report problem if condition persists.

PRI217 Protocol Error: General location not supported.
Output data: DCH: x DATA: y
x = D-channel number
y = General location number
Action: Report problem if condition persists.

PRI218 Protocol Error: Cause value not supported.
Output data: DCH: x DATA: y
x = D-channel number
y = Cause information element (IE)
Action: Report problem if condition persists.

PRI219	Protocol Error: Channel ID octet 3 error. Output data: DCH: x DATA: y x = D-channel number y = Octet 3 Action: Report problem if condition persists.
PRI220	Protocol Error: Channel ID octet 5 error. Output data: DCH: x DATA: y x = D-channel number y = Message type Action: Report problem if condition persists.
PRI221	Protocol Error: Channel ID octet 5 error. Incorrect BCH standard. Output data: DCH: x DATA: y x = D-channel number y = B-channel standard Action: Report problem if condition persists.
PRI222	Protocol Error: Channel number does not exist. Output data: DCH: x DATA: y x = D-channel number y = B-channel number Action: Report problem if condition persists.
PRI223	Protocol Error: CREF flag in SETUP message is incorrect. Output data: DCH: x DATA: y x = D-channel number y = Call reference number Action: Report problem if condition persists.
PRI224	Protocol Error: State message error, protocol violation. The state IE is not appropriate for the current state. Output data: DCH: x DATA: a b c d e x = D-channel number a = Pointer to PRI message call register b = UTN c = StatePM d = Message type e = Call reference number Action: Report problem if condition persists.
PRI225	Protocol Error: State message error, protocol violation. Release complete. Received in U11 or U31 state. Output data: DCH: x DATA: y x = D-channel number y = Message type Action: Report problem if condition persists.

PRI226 Protocol Error: No RESTart ACK message received.
Output data: DCH: x DATA: y
x = D-channel number
y = UTN
Action: Report problem if condition persists.

PRI227 Protocol Error: Message received in NULL state.
Output data: DCH: x DATA: y
x = D-channel number
y = Message type
Action: Report problem if condition persists.

PRI228 Protocol Error: Mandatory Channel ID missing in ALERTing.
Output data: DCH: x DATA: y
x = D-channel number
y = NONE
Action: Report problem if condition persists.

PRI229 Protocol Error: Mandatory Channel ID missing in incoming CONNect message.
Output data: DCH: x DATA: y
x = D-channel number
y = NONE
Action: Report problem if condition persists.

PRI230 Protocol Error: Incoming NSF contains a mismatch between the route defined by the SID and the call type defined for that route.
Output data: DCH: x DATA: a b c
x = D-channel number
a = Facility value
b = ISA service type
c = Route number
Action: Report problem if condition persists.

PRI231 Database Error: NSF error. Invalid service or feature type.
Output data: DCH: x DATA: y
x = D-channel number
y = Message type
Action: Coordinate fields with far end switch.

PRI232 Protocol Error: PROGRESS INDICATOR not supported.
Output data: DCH: x DATA: y
x = D-channel number
y = Message type
Action: Report problem if condition persists.

PRI233	Protocol Error: ZERO length for mandatory information element (IE). Output data: DCH: x DATA: y x = D-channel number y = Information element (IE) identifier Action: Report problem if condition persists.
PRI234	Protocol Error: ZERO length for optional information element (IE). Output data: DCH: x DATA: y x = D-channel number y = Information element (IE) identifier Action: Report problem if condition persists.
PRI235	Protocol Error: Bearer capability (BC)—Layer ID is not correct. Output data: DCH: x DATA: y x = D-channel number y = Layer ID Action: Report problem if condition persists.
PRI236	Protocol Error: Incorrect Transit Network Selection (TNS) Network ID Output data: DCH: x DATA: y x = D-channel number y = Message type Action: Report problem if condition persists.
PRI237	Protocol Error: Message length exceeds buffer size. Output data: DCH: x DATA: y x = D-channel number y = Message type Action: Report problem if condition persists.
PRI238	Protocol Error: Protocol discriminator is not compatible with the message received. Output data: DCH: x DATA: y x = D-channel number y = Protocol discriminator Action: Report problem if condition persists.
PRI239	Protocol Error: Maintenance message is not allowed for this DCH interface. Output data: DCH: x DATA: y x = D-channel number y = Message type Action: Report problem if condition persists.

PRI240 Protocol Error: No service ack message received.
Output data: DCH: x DATA: y
x = D-channel number
y = UTN
Action: Report problem if condition persists.

PRI241 Protocol Error: No response from far end to this PRI call.
Output data: DCH: x DATA: y
x = D-channel number
y = B-channel number
Action: Report problem if condition persists.

PRI242 Protocol Error: Received a PRI message with an unsupported service identifier.
Output data: DCH: x DATA: y
x = D-channel number
y = Service identifier
Action: Report problem if condition persists.

PRI243 Protocol Error: Service discriminator is not supported by PRI.
Output data: DCH: x DATA: y
x = D-channel number
y = Service discriminator
Action: Report problem if condition persists.

PRI244 Protocol/Database Error: Facility reject message received.
Output data: DCH: x DATA: a b c d e
x = D-channel number
a = Originating PNI
b = Originating number
c = Destination PNI
d = Destination number
e = Reason
Action: Verify that the PNI values are correct in the customer and route data blocks and are consistent with the switch on the other end of the link.

PRI245 Database Error: Missing PNI number in the customer data block.
Output data: DCH: x DATA: y z
x = D-channel number
y = Customer number
z = Service ID
Action: Look into the customer data block to configure the PNI.

PRI246
Protocol Error: Received bad facility information element (IE).
Output data: DCH: x DATA: y
x = D-channel number
y = Error indication
Action: Report problem if condition persists.

PRI247
Database Error: PNI missing in Route Data Block.
Output data: DCH: x DATA: y
x = D-channel number
y = Service identifier
Action: Configure the PNI in the route data block.

PRI248
Protocol Error: ROSE component sent is being rejected.
Output data: DCH: x DATA: y
x = D-channel number
y = Service identifier
Action: Report problem if condition persists.

PRI249
Protocol Error: ISDN: Received a Status message with CAUSE = 30. This is normally received in response to a Status Enquiry, but the Meridian 1 did not send out a Status Enquiry message. The Status message is ignored.
Output data: DCH: x DATA: y
x = D-channel number
y = D-channel interface ID
Action: Report problem if condition persists.

PRI250
Protocol Error: Received information element (IE) in the wrong codeset.
Output data: DCH: x DATA: y
x = D-channel number
y = Information element (IE) identifier
Action: Report problem if condition persists.

PRI251
Protocol Error: The Presentation Method of Protocol Profile (PMPP) is wrong in the High Layer Compatibility IE.
Output data: DCH: x DATA: y
x = D-channel number
y = High Layer Compatibility PMPP
Action: Report problem if condition persists.

PRI252
Protocol Error: The Interpretation of High Layer Characteristics ID is wrong in the High Layer Compatibility IE.
Output data: DCH: x DATA: y
x = D-channel number
y = High Layer Compatibility INTERPRT
Action: Report problem if condition persists.

PRI253
Protocol Error: The High Layer Characteristic ID is wrong in the High Layer Compatibility IE.
Output data: DCH: x DATA: y
x = D-channel number
y = High Layer Compatibility CHAR ID
Action: Report problem if condition persists.

PRI254
Database Error: The DCH is interfacing with a software issue not supported by the application.
Output data: DCH: x DATA: y z
x = D-channel number
y = Release ID
z = Service identifier
Action: Verify that the release ID in the configuration record is the same as the software release running on the far end switch.

PRI255
Protocol Error: Information request type is not supported. A message error or a protocol error will be generated depending on whether the I.E. is mandatory or not.
Output data: DCH: x DATA: y z
x = D-channel number
y = Message type
z = Information element (IE) identifier
Action: Report problem if condition persists.

PRI256
Protocol Error: Wrong length for information request I.E. The length on the received I.E. is beyond the range. A message error or a protocol error will be generated depending on whether the I.E. is mandatory or not.
Output data: DCH: x DATA: y z
x = D-channel number
y = Message type
z = Information element (IE) identifier
Action: Report problem if condition persists.

PRI257
Protocol Error: Information request specific is not supported. A message error or a protocol error will be generated depending on whether the I.E. is mandatory or not.
Output data: DCH: x DATA: y z
x = D-channel number
y = Message type
z = Information element (IE) identifier
Action: Report problem if condition persists.

PRI258
Protocol/Database Error: An attempt is being made to insert more that 8 digits in the calling party number for a call originating or tandeming through this switch. Only 8 digits can be included in the calling party number, or the digits are truncated to the right (AXE-10 Australia interface only).
Output data: DCH: x DATA: TANDEM or ORIG
x = D-channel number
Action: For originating calls, modify LD 15 PFX1 and PFX2 so that PFX1+PFX2+DN is less than 8 digits. For tandeming calls, notify far end of incoming trunk that more than 8 digits are being sent.

PRI261
Database Error: The D-channel interface for routing Network Message Service (NMS) facility messages is not a Meridian 1 interface.
Output data: DCH: x DATA: a b c d
x = D-channel number
a = Operation code for TCAP protocol
b = Originating digits
c = Terminating digits
d = Customer number
Action: Verify database configuration.

PRI262
Protocol Error: Invalid value for the interface identifier field of channel ID information element from an incoming message.
Output data: DCH: x DATA: y
x = D-channel number
y = Message type
Action: Report problem if condition persists.

PRI263
Protocol Error: Invalid value for the class field of restart indicator information element from an incoming message.
Output data: DCH: x DATA: y
x = D-channel number
y = Message type
Action: Report problem if condition persists.

PRI264
Protocol Error: Received an invalid call reference from far-end switch.
Output data: DCH: x DATA: y
x = D-channel number
y = Message type
Action: Report problem if condition persists.

PRI265 Database Error: A Facility Reject message was received. Destination digits cannot be translated.
Output data: DCH: x DATA: a b c d e
x = D-channel number
a = TCAP package type
b = Problem (NOXLAN/NONMS)
c = Originating digits
d = Destination digits
e = Customer number
Action: Verify numbering plan databases are consistent between the near and far end switches.

PRI266 Protocol Error: TCAP Package type is not recognized by Network Message Center (NMC) feature.
Output data: DCH: x DATA: a b c d e f
x = D-channel number
a = TCAP package type
b = TCAP component type
c = Problem
d = Originating digits
e = Destination digits
f = Customer number
Action: Report problem if condition persists.

PRI267 Protocol Error: TCAP Package type is not recognized by Network Message Center (NMC) feature.
Output data: DCH: x DATA: a b c d
x = D-channel number
a = TCAP package type
b = Originating digits
c = Destination digits
d = Customer number
Action: Report problem if condition persists.

PRI268 Protocol Error: TCAP Component is not recognized by Network Message Center (NMC) feature.
Output data: DCH: x DATA: a b c d e
x = D-channel number
a = TCAP package type
b = TCAP component type
c = Originating digits
d = Destination digits
e = Customer number
Action: Report problem if condition persists.

PRI269	Protocol Error: TCAP Operation is not recognized by Network Message Center (NMC) feature. Output data: DCH: x DATA: a b c d e f x = D-channel number a = TCAP package type b = TCAP component type c = Operation d = Originating digits e = Destination digits f = Customer number Action: Report problem if condition persists.
PRI270	Protocol Error: TCAP parameter is not recognized by Network Message Center (NMC) feature. Output data: DCH: x DATA: a b c d e f g x = D-channel number a = TCAP package type b = TCAP component type c = Operation d = Parameter e = Originating digits f = Destination digits g = Customer number Action: Report problem if condition persists.
PRI271	Database Error: LDN0 must be defined for the customer for ISDN DID calls to determine the number of digits expected for successful call termination. Output data: DCH: x DATA: y x = D-channel number y = Customer number Action: Configure LDN0 in the customer data block.
PRI272	Message is ping-pong between 2 nodes.

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Meridian 1

ISDN Primary Rate Interface

Maintenance

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