Meridian 1

Digital Trunk Interface/Computer-to-PBX Interface

Installation and data administration

Document Number: 553-2811-200
Document Release: Standard 6.0
Date: December 1994

© 1991, 1994
All rights reserved

Printed in the United States of America

Information is subject to change without notice. Northern Telecom reserves the right to make changes in design or components as progress in engineering and manufacturing may warrant. This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC rules.

SL-1 and Meridian 1 are trademarks of Northern Telecom.

Revision history

September 16, 1991

Standard, release 1.0. Reissued for compliance with Northern Telecom standard 164.0.

This document has been merged with *DTI/CPI wire list* (553-2811-200 Appendix 1). The information previously contained in that document is now contained in the chapter, “Wire list,” in this document.

December 1, 1991

Standard, release 2.0. This document is reissued to include technical content updates. Due to the extent of the changes, revision bars are omitted.

December 31, 1992

Standard, release 3.0. This document is issued to include technical updates. Changes are noted with revision bars in the margins.

August 1, 1993

Standard, release 4.0. This document is reissued for updates and changes resulting from X11 release 19. All updates are noted with revision bars in the margins.

October 31, 1993

Standard, release 5.0. This document has been reorganized to enhance ease of use and updated to reflect current technical information. Technical changes are noted with revision bars in the margins.

December 1994

Standard, release 6.0. Reissued to include editorial changes and indexing. Due to the extent of the changes, revision bars are not used.

Contents

Introduction **1**
Other documentation 2

DTI installation **3**
Equipment overview 3
DTI interfaces 4
QPC472 DTI specifications 4
QPC720 PRI specifications 7
Cable requirements 10
Installation procedures 11
Removing the DTI card 15
ST, STE systems 15
MS systems 18
N/NT and RT systems 20
XN/XT systems 24
21A, 21, 51, 61, 71, and 81 26
Echo Canceller interface 27
Clock Controller installation 28
Determining slots and shelves 29
Replacing a Clock Controller 32
Installing a Clock Controller 32
Starting the Clock Controller 32
Clock Controller commands 33
Installing the Clock Controller in a single group 36

Cabling requirements 40
NT8D74 Clock Controller to InterGroup cable 40
NT8D75 Clock Controller to Clock Controller cable 40
NT8D79 PRI/DTI to Clock Controller cable 41

Data administration 43

DTI data administration 44

CPI data administration 51

Acceptance tests 53

Self-test procedures 53
Automatic loop test 54
Automatic loop test procedures 54
Link diagnostic and remote loopback tests 55
Link diagnostic and remote loopback test procedures 56

Wire list 57

QCAD129/NT9J93xx 57

QCAD133/NT8D97xx 59

QCAD128/NT8D83xx 60

List of figures

Figure 1
QPC472 DTI faceplate layout 6

Figure 2
QPC720 PRI faceplate layout 9

Figure 3
ST, STE cabling arrangement 16

Figure 4
Switch settings in DTI mode 17

Figure 5
Switch settings in DTI mode 18

Figure 6
MS cabling arrangement 19

Figure 7
Switch settings in DTI mode 20

Figure 8
N/NT, 51, RT, and 61 single and half group cabling arrangement . . . 21

Figure 9
Switch settings in DTI mode 24

Figure 10
XN/XT and 71 cabling arrangement 25

Figure 11
DTI-to-Echo Canceller cabling 26

Figure 12
DTI remote loopback test and DTI link diagnostic test 56

List of tables

Table 1
QPC472 transmission equalization SW2 switch settings for DTI 5

Table 2
QPC472 DTI external connectors 5

Table 3
QPC720 transmission equalization SW2 switch settings
for PRI/DTI 7

Table 4
SW3 options for the QPC720 PRI/DTI 8

Table 5
QPC720 PRI external connectors 8

Table 6
DTI cables and cable lengths 10

Table 7
Possible card locations by system 11

Table 8
Cable connections to the Clock Controller, Network, Patch panel,
I/O panel, and Echo Canceller 12

Table 9
DTI-to-Echo Canceller pin assignments 27

Table 10
Operating parameters for the Echo Canceller 27

Table 11
Settings for the 24 channels on the Echo Canceller 28

Table 12
Clock Controller shelves and slots 29

Table 13
Clock Controller switch settings for QPC471 vintage A 29

Table 14
Clock Controller switch settings for QPC471 vintages B, C, D, E, F, and G 30

Table 15
Clock Controller switch settings for QPC471 vintage H 31

Table 16
Clock Controller switch settings for QPC775 31

Table 17
QCAD129/NT9J93xx wire list 58

Table 18
QCAD133/NT8D97xx wire list 59

Table 19
QCAD128/NT8D83xx wire list 60

Introduction

This document provides installation, data administration, and acceptance test procedures for the Digital Trunk Interface and Computer-to-PBX Interface (DTI/CPI) features.

These features are available on ST, STE, RT, MS, N, NT, XN, and XT systems and on Meridian 1 system options 21, 21E, 51, 61, 71, and 81. The DTI/CPI features are offered on the following X11 software releases:

— Release 5 and later software for N and XN systems

— Release 8 and later for M, NT, and XT systems

— Release 9 and later for ST systems

— Release 12 and later for RT systems

— Release 15 and later for system options 21, 21A, 51, 61, and 71

— Release 18 and later for system options 21E, STE, and 81

Note: Throughout this document, Meridian 1 refers to all Meridian systems unless otherwise noted.

The document includes the following sections:

— **DTI installation:** overview of DTI hardware, interfaces, and cable requirements, including installation and removal procedures for DTI cards, Echo Cancellers, and Clock Controllers.

— **Data administration:** procedures for provisioning the DTI feature and the CPI feature.

— **Acceptance tests**: acceptance test procedures for the DTI feature.

— **Wire list**: information on building external cables of nonstandard lengths for DTI interface applications.

Other documentation

Refer to the following Northern Telecom Publications for more information:

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

— *Circuit card installation and testing* (553-3001-211)

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

— *Digital Trunk Interface/Computer-to-PBX Interface maintenance* (553-2811-500)

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

— *Digital Trunk Interface/Computer-to-PBX Interface description* (553-2811-100)

DTI installation

This chapter describes the procedures for installing and removing DTI/CPI equipment and Clock Controllers in a variety of systems. The descriptions include cable requirements.

The first part of the chapter provides detailed information on the DTI card. A section on the Echo Canceller follows the DTI information. The last part of the chapter focuses on Clock Controllers.

Equipment overview

The DTI connects a Network loop to an external DS-1 interface for both voice and data transmission over 24 digital channels.

The DTI interface requires a **QPC472** DTI or **QPC720** Primary Rate Interface (PRI) card. Because this document deals with DTI functions, both cards are referred to as the "DTI" card or "DTI" hardware whenever their function is identical.

Clock Controllers synchronize the system clock rate with the clock rates of digital switching and transmission equipment over a T1 circuit. Dual CPU systems have two Clock Controllers: CC0 (associated with CPU 0) and CC1 (associated with CPU 1).

The standard Meridian 1 Clock Controller is the **QPC471**, currently available in vintages C, D, E, F, G, and H. Option 81 must use vintage H.

Customers outside the United States can use the **QPC775**. Vintage A of the QPC775 can be used with non-networked systems (systems linked directly to a central office); vintage B is appropriate for networked systems (Meridian 1 to Meridian 1 configuration). Customers with option 81 systems must use QPC775 vintage C.

Note: A system cannot use both the QPC471 and the QPC775. A system can mix Clock Controller vintages A through G. Vintage H Clock Controllers can be used only with another vintage H Clock Controller.

DTI interfaces

The DTI card provides a connection to the DS-1 channel interface directly through an office repeater or through an Echo Canceller.

In the U.S.A., FCC Part 68 regulations require Network Channel Terminating Equipment (for example, the NTQRY551 Channel Service Unit) installed at each connection point of a private system to a registered common carrier trunk.

Echo Cancellers are required only if satellite transmission is used. The DTI card provides both a T1 line interface and a control interface to link with a signal format compatible with EIA standard RS-232-C. Both the DTI and the Echo Canceller act as Data Terminal Equipment (DTE). The Echo Canceller's control protocol must conform with that of the Tellabs Model 251.

QPC472 DTI specifications

The QPC472 DTI only requires power and ground from the backplane. Power requirements are as follows:

+5 volts at 3 amperes

+12 volts at 50 milliamperes

-12 volts at 50 milliamperes

The QPC472 DTI contains five LEDs and five external connectors. Table 1 shows the QPC472 transmission equalization SW2 switch settings for DTI for all systems. Table 2 lists the external connectors located on the QPC472 DTI faceplate. Figure 1 illustrates the faceplate layout.

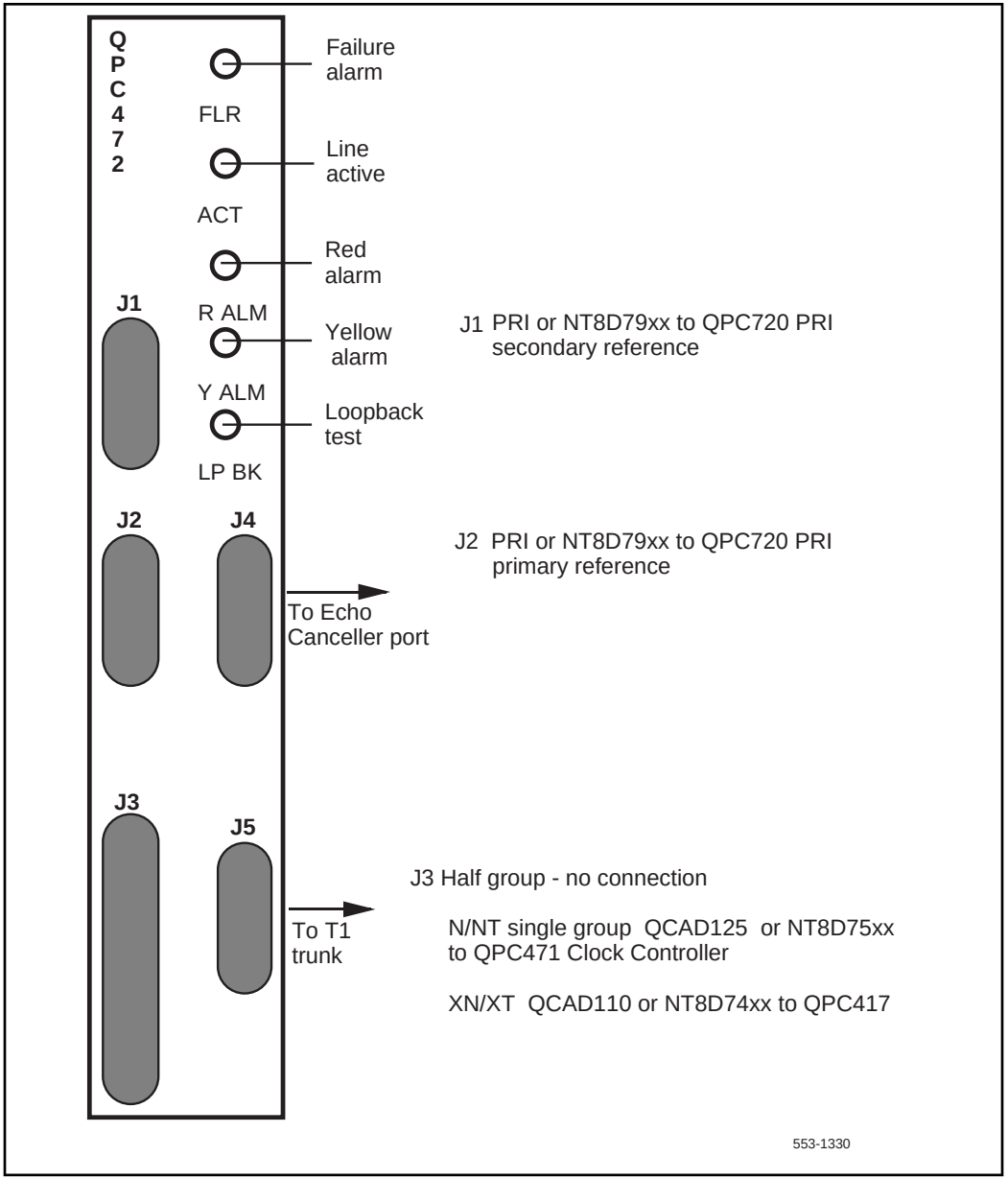
Table 1
QPC472 transmission equalization SW2 switch settings for DTI

Switch S2 settings	To repeatered facility	To cross-connect point
5 ON	0 - 45 m (0 - 150 ft.)	0 - 15 m (0 - 100 ft.)
2, 4, 6 ON	46 - 135 m (151 - 450 ft.)	16 - 100 m (101 - 355 ft.)
1, 3, 7 ON	136 - 225 m (451 - 750 ft.)	101 - 200 m (356 - 655 ft.)

Table 2
QPC472 DTI external connectors

Faceplate designations	Type
J1	9-pin female, D-connector
J2	9-pin female, D-connector
J3	36-pin connector
J4	15-pin female, D-connector
J5	15-pin male, D-connector

Figure 1
QPC472 DTI faceplate layout



QPC720 PRI specifications

The QPC720 PRI card can replace the QPC472 DTI. The two cards are compatible using X11 release 5 and later software.

The QPC720 PRI requires power and ground from the backplane only. Power requirements are as follows:

+5 volts at 6 amperes

+12 volts at 50 milliamperes

-12 volts at 50 milliamperes

The QPC720 PRI contains five LEDs and six external connectors. Table 3 shows the transmission equalization SW2 switch settings and Table 4 shows SW3 options. Table 5 lists the external connectors located on the QPC720 PRI faceplate and Figure 2 shows the faceplate layout.

Table 3
QPC720 transmission equalization SW2 switch settings for PRI/DTI

Switch S2 settings	To repeatered facility	To cross-connect point
5 ON	0 - 45 m (0 - 150 ft)	0 - 30 m (0 - 100 ft)
2, 4, 6 ON	46 - 135 m (151 - 450 ft)	31 - 100 m (101 - 355 ft)
1, 3, 7 ON	136 - 225 m (451 - 750 ft)	101 - 200 m (356 - 655 ft)

Table 4
SW3 options for the QPC720 PRI/DTI

Switch 3 options for PRI/DTI mode			
SW3-1	ON OFF	= =	extended superframe format (ESF) superframe format (SF)
SW3-2	ON OFF	= =	B8ZS line encoding (required for 64 kbs) AMI line encoding
SW3-3	ON OFF	= =	facility data link (FDL) yellow alarm method (cannot be used in Canada) Digit 2 yellow alarm method

Note 1: All switch positions for S2 (location B22) are OFF except as shown under the column labeled "Switch S2 settings." The switch positions of the 8-pole SW3 (location E37) are OFF for DTI mode. For PRI mode, set SW3 positions as configured in LD 17.

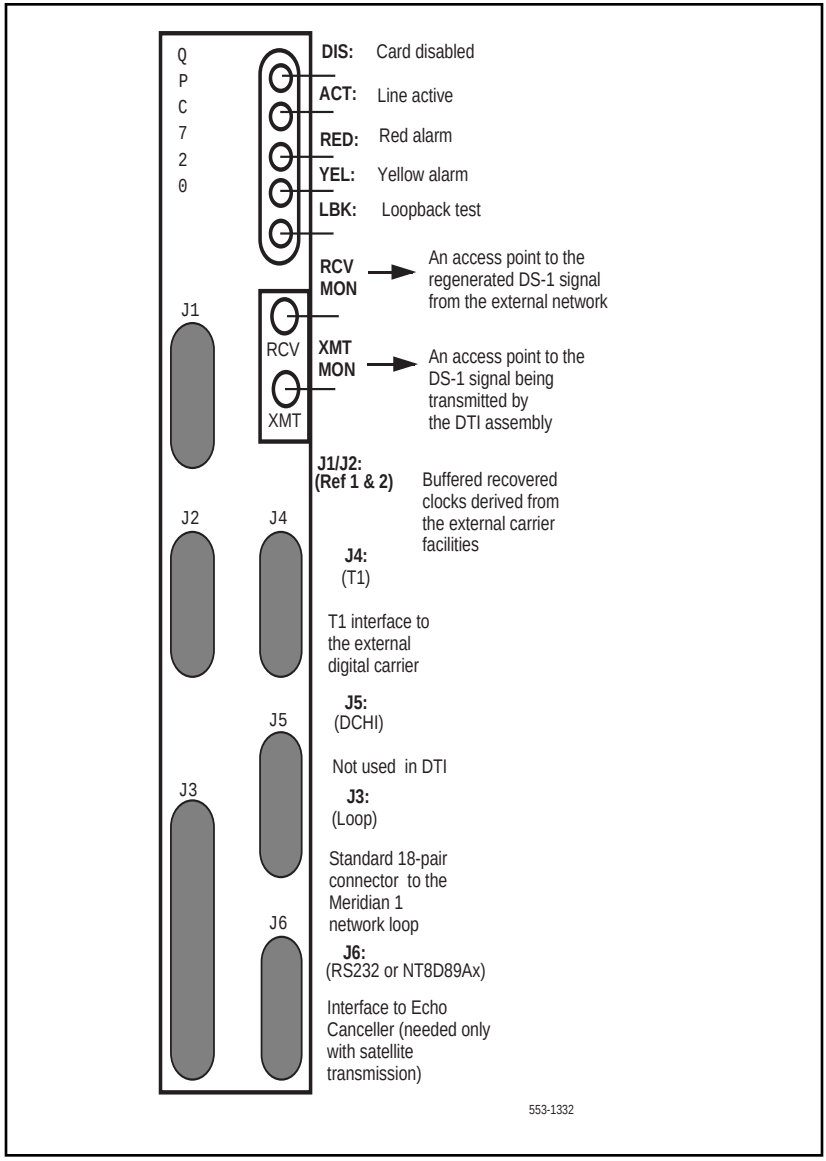
Note 2: For D2, D3, or D4 framing formats (superframe formats), set all SW3 options to OFF.

Note 3: ESF and B8ZS applies only to the 1.5 Mbps DTI. DTI2/PRI2 is not supported.

Table 5
QPC720 PRI external connectors

Faceplate designation	Type
J1	9-pin female, D-connector
J2	9-pin female, D-connector
J3	36-pin connector
J4	15-pin male, D-connector
J5	15-pin male, D-connector
J6	15-pin female, D-connector
RCV MON	Miniature bantam jack
XMT MON	Miniature bantam jack

Figure 2
QPC720 PRI faceplate layout



Cable requirements

Shielded 22 AWG (0.644 mm) cable is recommended for connecting the DTI to the cross-connect point (or a CPI to CPI connection). This cable consists of two shielded twisted-pair conductors and two shields.

The transmit and receive pairs must be individually shielded and enclosed in a polyvinyl jacket. This type of cable is commonly referred to as "6-conductor" cable. T1 cable shielding should be grounded at the cross-connect point.

To install a private T1 transmission cable, consult the Northern Telecom Transmission Division. To manufacture cables of different lengths than the standard cables provided, see "Wire list" on page 57. Table 6 lists the types of cable used and the lengths required for internal and external DTI connections.

Table 6
DTI cables and cable lengths

Cable type	From	To	Maximum length (feet)	Maximum length (meters)
QCAD130 NT8D79xx	QPC472 QPC720	QPC471 QPC775 (CC-0)	10	3.04
QCAD130 NT8D79xx	QPC472 QPC720	QPC471 QPC775 (CC-1)	10	3.04
QCAD124 NT8D85xx	QPC472 QPC720	QPC414 Network	45	13.71
QCAD128 NT8D83xx	QPC472 QPC720	Bulkhead I/O panels	25	7.62
RS-232 NT8D89Ax	QPC472 QPC720	Echo Canceller	50	15.25
22AWG	Echo Canceller	DSX-1	655	199.64
NT8D97xx	I/O panel	T1 I/O	50	15.25

Installation procedures

The DTI/PRI card occupies two adjacent slots on a shelf. Locations vary as shown in Table 7.

Table 7
Possible card locations by system

System	Shelf/Module	Slot
ST, STE	CE DTI expansion	5-12 2-8
MS	CE CE expansion	5-12 2-9, 11-12, 12-13
N/NT/RT	Network (LH) Network (RH) DTI expansion (RT only)	5-12 2-10 2-8
XN/XT	Network (LH) Network (RH)	4-10 5-11
Option 21A	CE/PE	Net: 4-8
Option 21	CE/PE	Net: 4-8 RPE: 1, 11-12
Options 51,61	CPU/Net	1-8 RPE:1, 11,12
Option 71	CPU	15-16 Net: 2, 5-9, 13-14 RPE: 1, 11-12

Table 8 shows the cable connections for the different systems. Not all cables apply to every system; read the Comments section carefully.

Table 8
Cable connections to the Clock Controller, Network, Patch panel, I/O panel, and Echo Canceller (Part 1 of 2)

Cable type	From	CON	To	DES	CON	Comments
QCAD130 NT8D79xx	QPC720/ QPC472	J1 J1	QPC471 QPC775	CC-0	J2	Run only when DTI is primary reference clock source
QCAD130 NT8D79xx	QPC720/ QPC472	J1	QPC471	CC-0	J1	Run only when DTI is secondary reference clock source.
QCAD130 NT8D79xx	QPC720	J2	QPC471	CC-1	J2	Only when primary clock source. For RT in Single-Group mode only; not for ST, STE, or MS.
QCAD130 NT8D79xx	QPC720	J2	QPC471	CC-1	J1	Only when secondary clock source. For N/NT/RT in Single-Group mode only; not for ST, STE, or MS.
QCAD110 NT8D74xx	QPC471 QPC775	J3	QPC417	SCG0 SCG1		Applies only to XN/XT
QCAD125 NT8D75xx	QPC471	J3	QPC471	CC-1	J3	Applies only to N/NT/RT Single-Group mode.
QCAD124 NT8D85xx	QPC720/ QPC472	J3	Network			Run to connector on associated Network card. (For Half-Group mode only for the MS; for Single-Group mode only for the N/NT/RT).
QCAD124 NT8D85xx	QPC720/ QPC472	J3	Network			Run to connector on associated Network card. Applies only to N/NT/RT Half-Group mode.

Table 8
Cable connections to the Clock Controller, Network, Patch panel, I/O panel, and Echo Canceller (Part 2 of 2)

Cable type	From	CON	To	DES	CON	Comments
QCAD133 NT8D83xx	I/O Panel		Patch panel			Run via cabinet I/O panel to cross-connect terminal or Echo Canceller from shielded system.
QCAD133 NT8D83xx	QPC720/ QPC472	J4 J5	Patch panel			Run via cabinet I/O panel to cross-connect terminal or Echo Canceller from non-shielded system.
QCAD129 NT9J93xx	QPC720/ QPC472	J6 J4	I/O Panel			Run via cabinet I/O panel to cross-connect terminal or Echo Canceller from shielded system.
RS232 NT8D89xx	I/O Panel		Echo Canceller			Run via cabinet I/O panel to cross-connect terminal or Echo Canceller from shielded system.
RS232 NT8D89xx	QPC720/ QPC472	J6 J4	Echo Canceller			Run to cross-connect terminal or Echo Canceller from shielded system.

Follow the steps below to install the card:

1. Determine the cabinet and shelf location of the card to be installed.
2. Unpack and inspect cards.
3. Set option switches on the QPC472 as shown in Table 1. For the QPC720, refer to the switch and connector information in Table 3 and Table 4.
4. Install the card into the appropriate slot as shown in Table 7, “Possible card locations by system,” on page 11.
5. Install Network card.
6. If required, install I/O adapters in I/O panel.

7 Attach cables. Refer to "Cable requirements" on page 10 for general cable information. Table 6 lists the cables required and Table 8 describes cable connections. Illustrations of the cabling arrangement for specific systems appear in the figures in each section.

Note: The figures in each section show cabling arrangements for the QPC720 card. The equivalent connections on the DTI card are as follows:

QPC720 J4 = QPC472 J5
QPC720 J6 = QPC472 J4

8 If required, install connecting blocks at MDF or wall mounted cross-connect terminal.

9 If required, designate connecting blocks at MDF or wall mounted cross-connect terminal.

10 If required, install Network Channel Terminating Equipment (NCTE).

11 Cross-connect DTI circuits.

12 Run DTI acceptance/verification tests.

13 Add related office data into system memory. Refer to the work order and "Data administration" on page 43.

Removing the DTI card

1. Disable Network Loop using DTI Maintenance LD 60. The command is DISL loop.
2. Remove data from memory.
3. Determine the cabinet and shelf location of the cards to be removed.
4. Remove cross connections at MDF to wall-mounted cross-connect terminal.
5. Disconnect DTI cables at Echo Canceller and at carrier interface (for example, Office Repeater, NCTE equipment).
6. Tag and disconnect cables from card. Rearrange Clock Controller card cables if required.
7. Remove DTI and Network cards.

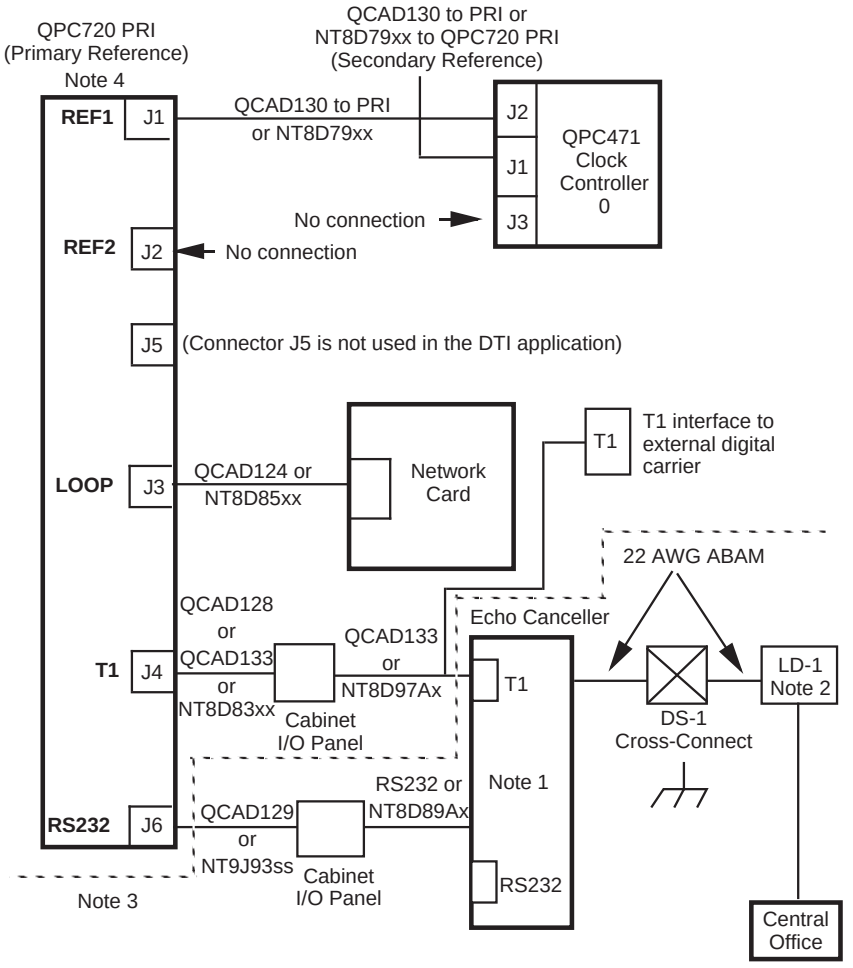
   Note: In a dual system, if the other circuit of the dual Network card is in use, ignore Step 7 for the Network card.

8. Pack and store card.
9. Close cabinet doors.

ST, STE systems

For basic information on installing a DTI card, refer to "Installation procedures" on page 11. See Figure 3 for DTI cabling arrangement in these systems. Figure 4 shows switch settings in DTI mode.

Figure 3
ST, STE cabling arrangement



Note 1: Maximum cable distance from DTI circuit packs to DS-1 cross-connect is 655 ft.

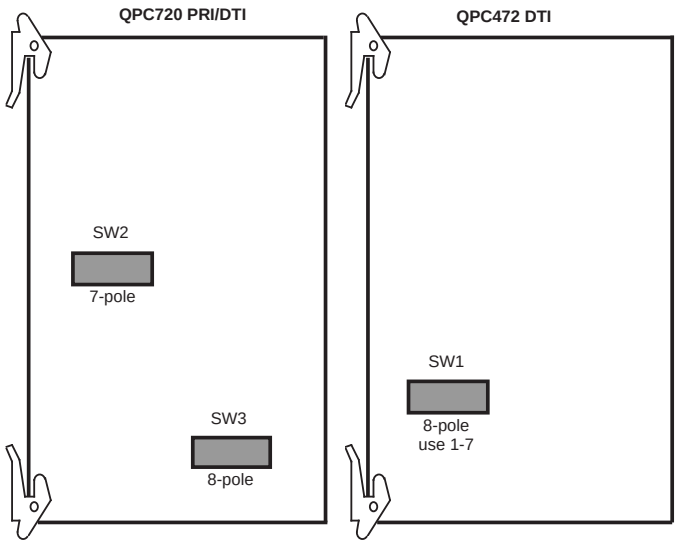
Note 2: Maximum cable distance from DTI circuit packs to LD-1 is 750 ft.

Note 3: Connections below the dotted line are used only with an Echo Canceller.

Note 4: QPC720 does not interface with NT8D04 Superloop Network Card.

553-1334

Figure 4
Switch settings in DTI mode



Note: See tables on switch settings for PRI/DTI transmission equalization.

553-1335

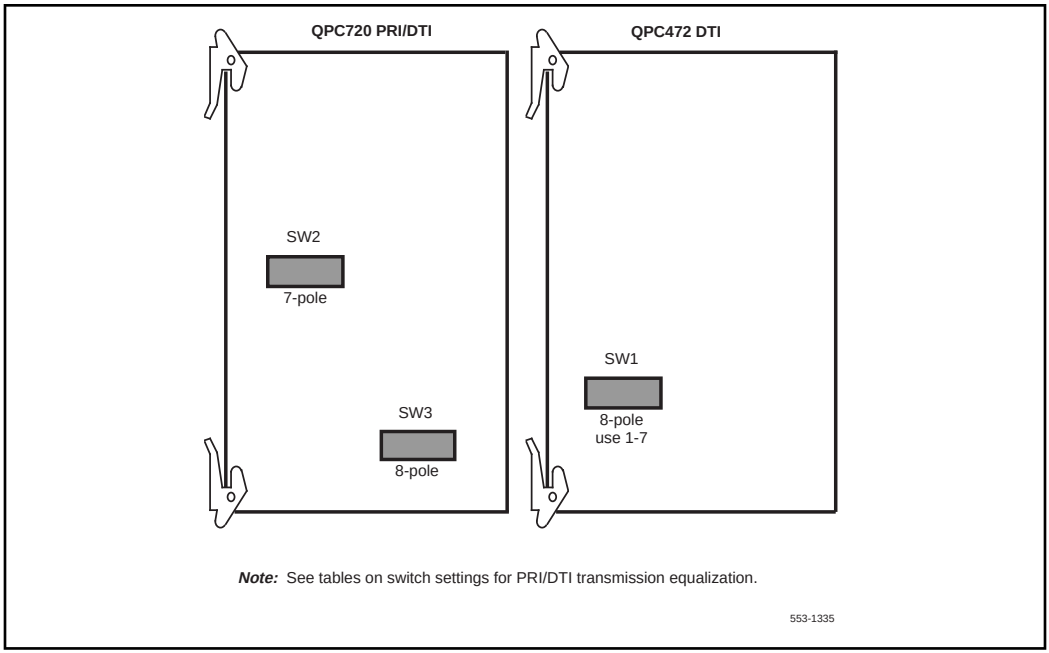
MS systems

For basic information on installing a DTI card, refer to "Installation procedures" on page 11. Figure 5 illustrates switch settings. See Figure 6 for DTI cabling arrangement in MS systems.

When no vacant positions are available to install DTI cards, additional Network shelves can replace Peripheral Equipment shelves located on the rear of the Common Equipment, Tape, or Disk shelves.

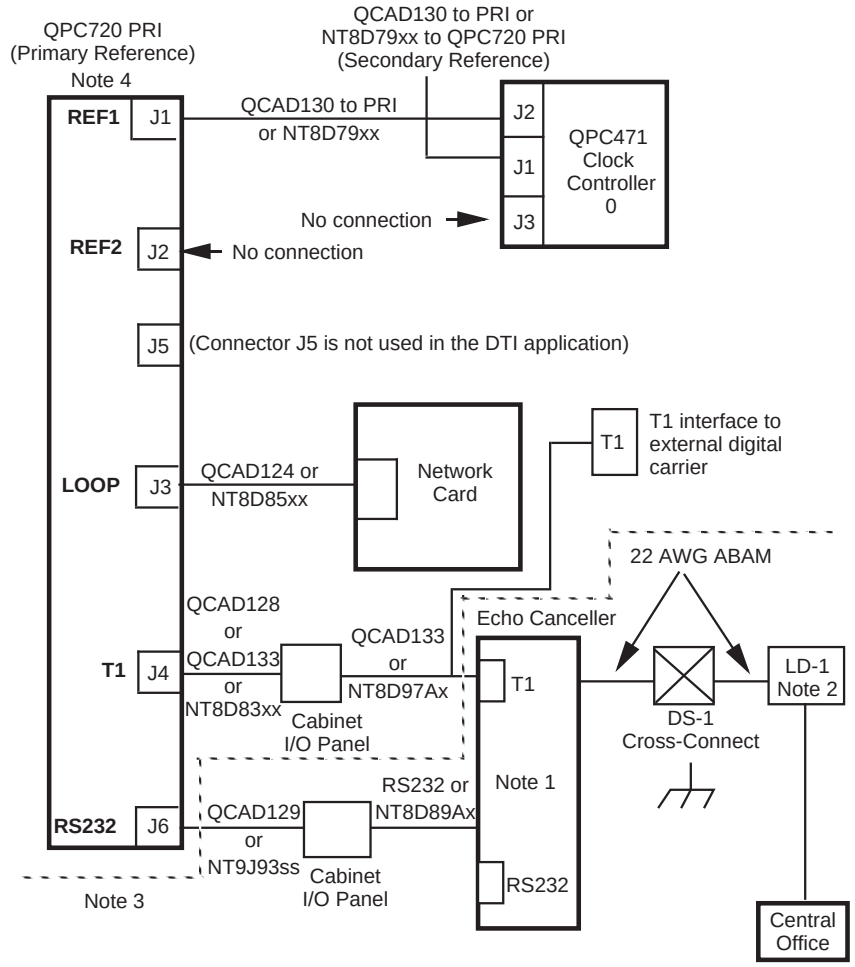
If an additional cabinet is required to install more Network shelves, use a QCA109 cabinet.

Figure 5
Switch settings in DTI mode



Note: See tables on switch settings for PRI/DTI transmission equalization.

Figure 6
MS cabling arrangement



Note 1: Maximum cable distance from DTI circuit packs to DS-1 cross-connect is 655 ft.

Note 2: Maximum cable distance from DTI circuit packs to LD-1 is 750 ft.

Note 3: Connections below the dotted line are used only with an Echo Canceller.

Note 4: QPC720 does not interface with NT8D04 Superloop Network Card.

553-1334

N/NT and RT systems

For basic information on installing a DTI card, refer to "Installation procedures" on page 11. As many as three cards can be plugged into an empty Network shelf, along with a Power Converter card.

When no vacant positions are available to install DTI cards, additional Network shelves can replace Peripheral Equipment shelves located on the rear of the Common Equipment, Tape, or Disk shelves. Refer to "Installing an additional Network shelf on the N/NT" on page 22 for details.

If an additional cabinet is required to install more Network shelves, use a QPC58 cabinet.

Figure 7 shows switch settings in DTI mode. See Figure 8 for DTI cabling arrangement in N/NT, RT, and 61 single and half group systems.

Figure 7
Switch settings in DTI mode

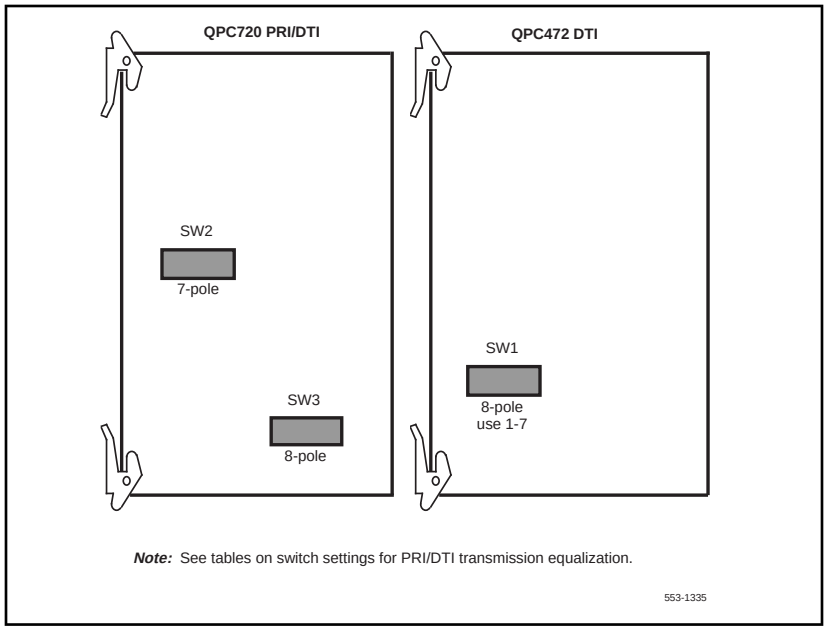
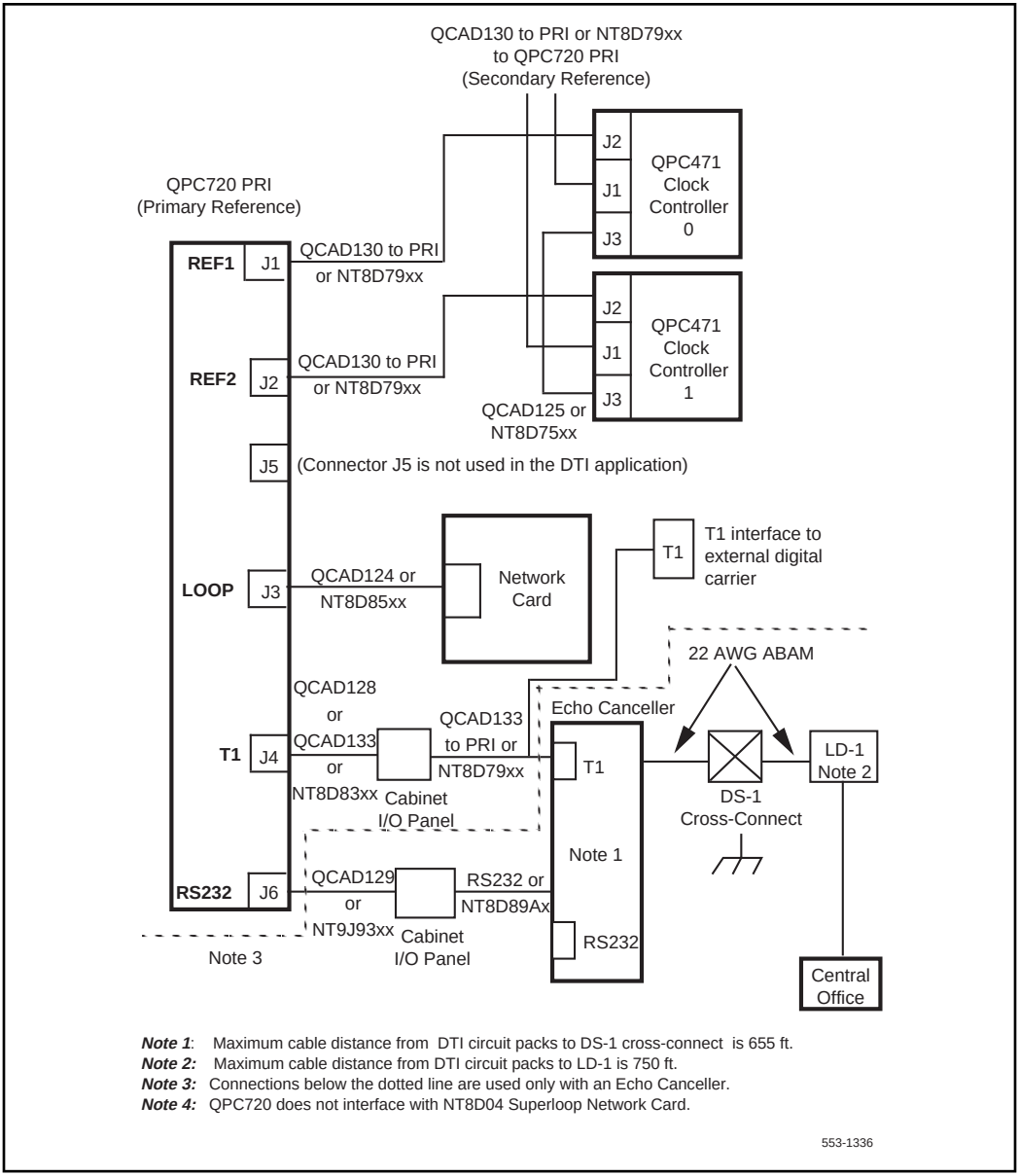


Figure 8
N/NT, 51, RT, and 61 single and half group cabling arrangement



Note 1: Maximum cable distance from DTI circuit packs to DS-1 cross-connect is 655 ft.
Note 2: Maximum cable distance from DTI circuit packs to LD-1 is 750 ft.
Note 3: Connections below the dotted line are used only with an Echo Canceller.
Note 4: QPC720 does not interface with NT8D04 Superloop Network Card.

553-1336

Installing an additional Network shelf on the N/NT

CAUTION
The maximum number of DTI cards must not exceed three per shelf because the Network shelf cable harness shares the power breaker associated with each CPU.

This procedure is used when additional shelf space is required for DTI cards in N or NT, 51, and 61 systems. A QUD15 cooling unit is required for each additional shelf installed. When an additional shelf space is required, it may be necessary to install a QCA108 network expansion cabinet to provide the additional space.

1 Determine the cabinet and shelf location of the cards to be removed.

Note: There are only two locations possible. They should be listed behind the MSU and CPU.

2 Unpack and inspect the shelf.

3 Remove the existing left or right rear PE shelf (if required).

4 Install the additional Network shelf in the PE location. See Step 3

5 Install a QUD15 cooling unit directly below the Network shelf and secure with four mounting screws.

6 Install and connect the QCAD172A power cable to the added QUD15 cooling unit as follows:

7 If the added QUD15 is located below the ***left*** Network shelf, unplug the C11 connector from the QCAD111 power harness that connects to the existing left side QUD15.

8 Plug the C11 connector into the single-ended connector of the QCAD172A power cable.

9 Plug one of the two connectors at the other end of the C11 connector that was removed.

10 Plug the remaining connector of the QCAD172A power cable into the added QUD15.

11 If the added QUD15 is located below the ***right*** Network shelf, use the C21 connector from the QCAD111 power harness instead of the C11. Otherwise, the procedure is identical.

12 At the QCAD111 power wiring harness, untie and then connect the C17 connectorized power connection cable to the right rear Network shelf (connect the C19 connectorized cable to the left rear Network shelf).

CAUTION

Do not place the cards in the shelf until Step 12 is completed.

13 Install DTI trunks and enter related shelf and DTI office data into system memory.

XN/XT systems

For basic information on installing a DTI card, refer to "Installation procedures" on page 11. As many as three cards can be plugged into an empty Network shelf along with a Power Converter card.

When no vacant positions are available to install DTI cards, additional Network shelves can replace Peripheral Equipment shelves located on the rear of the Common Equipment, Tape, or Disk shelves.

If an additional cabinet is required to install more Network shelves, use a QPC108 cabinet with XN or XT and 71 systems.

Figure 9 illustrates switch settings. See Figure 10 for a diagram of the XN/XT/71 DTI cabling arrangement.

Figure 9
Switch settings in DTI mode

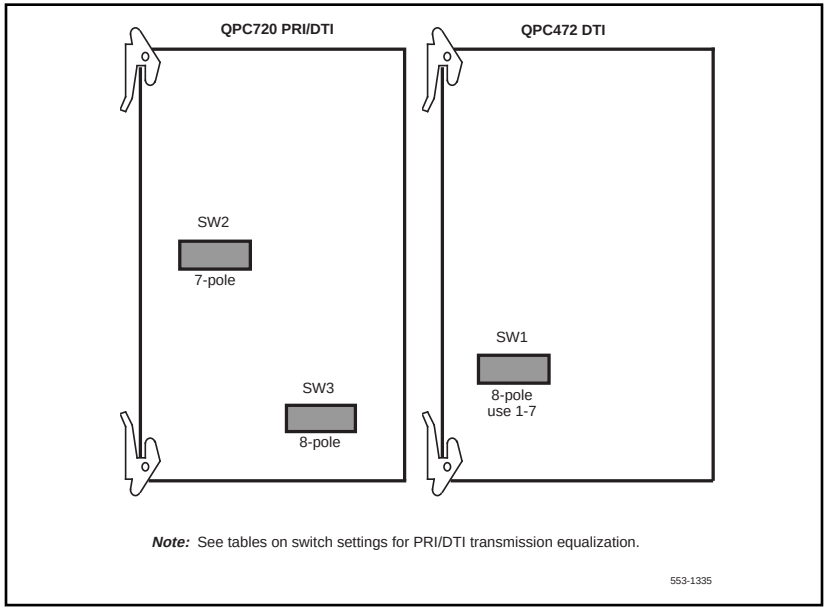
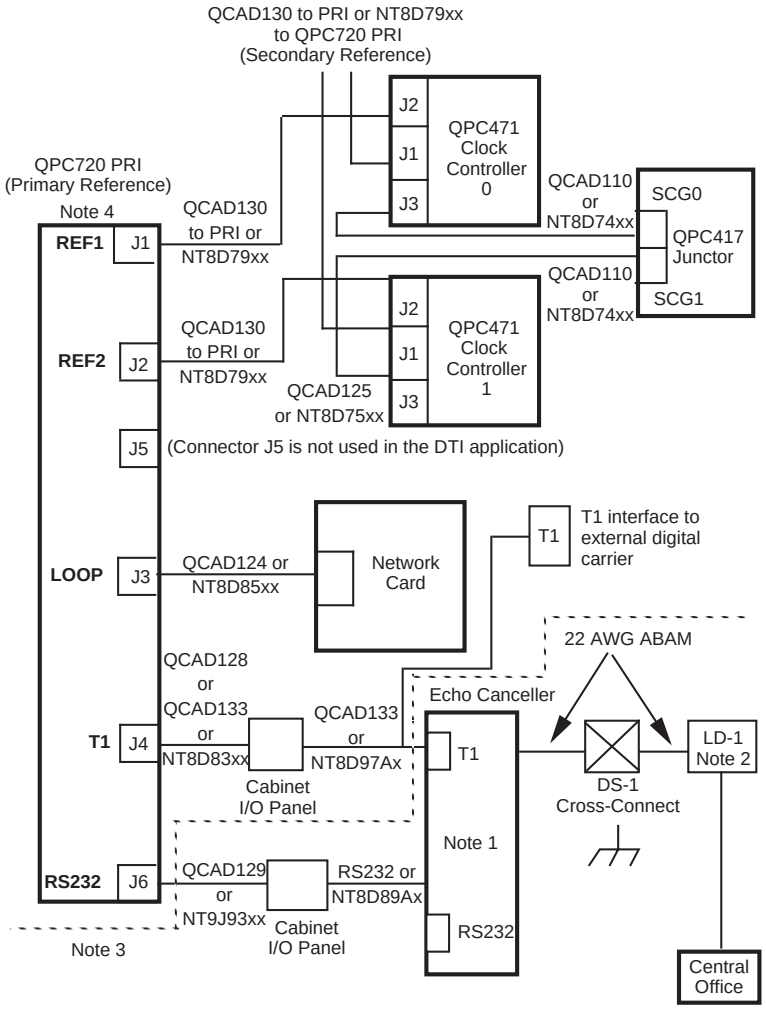


Figure 10
XN/XT and 71 cabling arrangement



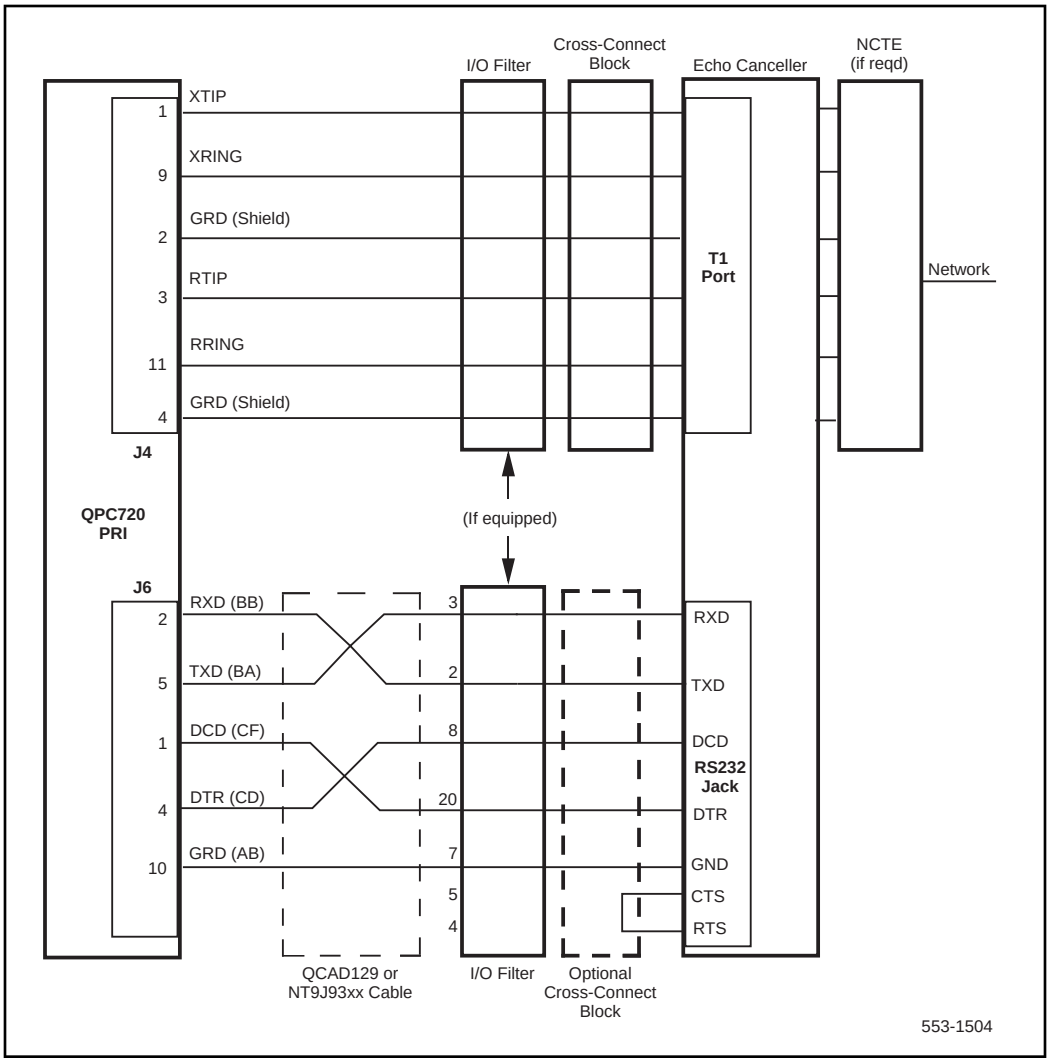
Note 1: Maximum cable distance from DTI circuit packs to DS-1 cross-connect is 655 ft.
Note 2: Maximum cable distance from DTI circuit packs to LD-1 is 750 ft.
Note 3: Connections below the dotted line are used only with an Echo Canceller.
Note 4: QPC720 does not interface with NT8D04 Superloop Network Card.

553-1337

21A, 21, 51, 61, 71, and 81

For basic information on installing a DTI card, refer to "Installation procedures" on page 11. For DTI cabling arrangements, refer to Figure 11.

Figure 11
DTI-to-Echo Canceller cabling



Echo Canceller interface

An Echo Canceller is used in conjunction with a Meridian 1 system for satellite transmission. Refer to “Cable requirements” on page 10 for general cabling information. The Echo Canceller is controlled by an RS-232 port on the DTI card. Tables 9, 10, and 11 give the Echo Canceller pin assignments, operating parameters, and initialization procedures.

Table 9
DTI-to-Echo Canceller pin assignments

Signal	EIA RS232-C circuit designation	DTI pin	Echo Canceller pin
Transmitted Data (TXD)	BA	5	2
Received Data (RXD)	BB	2	3
Request to Send (RTS)	CC	-	4
Clear to Send (CTS)	CB	-	5
Signal Ground (common return)	AB	10	7
Received Line Signal Detector (DCD)	CF	1	8
Data Terminal Ready (DTR)	CD	4	20

Table 10
Operating parameters for the Echo Canceller

Data Transfer Rate	4800 baud
System Unit Number	1
Display Timeout	active
Failures Before Alarm	3

Table 11
Settings for the 24 channels on the Echo Canceller

Bypass	OFF
Off-Hook	ON
Canceller Only	OFF
H Reset	OFF
H Hold	OFF

Clock Controller installation

There are three steps to installing a Clock Controller:

1 Determining the location of the Clock Controller card (shelf and slot).

2 Setting the switches on the card.

3 Inserting the card and connecting the cables. Refer to "Cable requirements" on page 10 for general cabling information. This step may also entail removing an old card.

The remaining sections of this chapter describe the details of this process.

CAUTION
Do not deviate from the procedures described in this section, as deviation stops call processing.

Determining slots and shelves

The Clock Controller card installation site varies from system to system. Table 12 shows the systems, the shelves used, and the available slot or slots.

Table 12
Clock Controller shelves and slots

System	Shelf	Slot(s)
ST, STE	CE	5-12
MS	CE	9
RT	network	13
N, NT, 51	QSD39 network (LH) QSD40 network (RH)	13 2
XN	QSD17 CPU	14
XT	QSD62	15
21, 21E	NT8D11 CE	4-5
61	NT6D39 CPU/NET	9
71	NT8D34 CE Cube	14
81	core	6

Before installing a Clock Controller, set the switches as shown in Tables 13, 14, 15, and 16 below. The first three tables display the settings for different vintages of the QPC471. Table 16 shows the settings for the QPC775.

Table 13
Clock Controller switch settings for QPC471 vintage A

System	Switch	Setting
N, NT, RT	SW2	ON
XN, XT	SW2	OFF
Vintage A applies only to these systems		

Table 14
Clock Controller switch settings for QPC471 vintages B, C, D, E, F, and G

System	Switch	Setting
ST, STE, 21, 21A, 21E	SW1	ON
	SW2	OFF
	Jumper Plug J1	TP8-9
	Jumper Plug J2	TP11-TP12
MS	SW1	ON
	SW2	ON
	Jumper Plug J1	TP9-TP10
	Jumper Plug J2	TP12-TP13
N, NT, RT, 51, 61	SW1	ON
	SW2	OFF
	Jumper Plug J1	TP8-TP9
	Jumper Plug J2	TP11-TP12
XN, XT, 71	SW1	OFF
	SW2	OFF
	Jumper Plug J1	TP8-TP9
	Jumper Plug J2	TP11-TP12

Table 15
Clock Controller switch settings for QPC471 vintage H

System	SW1				SW2				SW4			
ST, STE, 21A, 21, 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
RT, N, NT, 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
4.6–6.1m (15–50 ft)											off	on
6.4–10.1m (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 match the cable length between the J3 faceplate connectors. Determine the total cable length (no single cable can exceed 25 ft.) between the J3 connectors. Both cards must have the same setting.

Table 16
Clock Controller switch settings for QPC775

System	SW2	SW3	SW4
N, NT, RT, ST, STE, 21, 21A, 21E, 51, 61	ON	OFF	ON
MS, SN	ON	ON	OFF
XN, XT, 71, 81	OFF	OFF	ON

Replacing a Clock Controller

Step 2 in the following procedures (“Installing a Clock Controller”) explains how to replace a card.

Do not disable an active clock or a clock associated with an active CPU.

Installing a Clock Controller

Be sure to inspect the Clock Controller card before installing it. Refer to the tables earlier in this chapter for shelf, slot, and switch setting information. Remember not to use both the QPC471 and the QPC775 on a single system. QPC471 vintage H cards cannot be mixed with cards of an earlier vintage.

Starting the Clock Controller

The Clock Controller, when first enabled, is in free run mode. It stays in this mode for several minutes before being switched to tracking mode. Manual intervention via LD 60 can force the Clock Controller to remain in a particular mode.

For the earlier QPC471 vintages, up to 20 minutes may pass before the clock actually locks and tracks. The QPC471 vintage G and H cards begin tracking within five minutes.

Clock Controller commands

During the installation procedure, you will use some of the Clock Controller commands available in LD 60. In the list of commands below, “x” refers to the Clock Controller number 0 for the card associated with the CPU0 and 1 for the card associated with CPU1.

— DIS CC x: Disable system Clock Controller x

— DSCK loop: Disable clock for specified loop

— DSYL loop: Disable yellow alarm processing for loop

— ENCK loop: Enable clock for specified loop

— ENL CC x: Enable system Clock Controller x

— ENYL loop: Enable yellow alarm processing for loop

— EREF: Enable automatic switchover of system clocks

— SSCK x: Obtain status of system clock x

— SWCK: Switch system clock between active and standby

— TRCK aaa: Set Clock Controller track where aaa can be PCK (the primary DTI/PRI reference), SCLK (the secondary DTI/PRI reference) or FRUN (free running)

Procedure 1
Installing the Clock Controller in the ST, STE, 21, 21E, MS, N, RT, 51, and NT half group

Note: Refer to the tables in this section to be sure you are using the correct vintage.

1 Set the ENL/DIS toggle switch to DIS (disable) on the new circuit card.

2 If replacing an existing card:

— Perform a status check on the clock with the SSCK command in LD 60. The new controller should have the same status.

— Disable the old card using LD 60.

Note: ERR20 messages may be generated. These can usually be ignored. However, excessive clock switching should be avoided, especially when counters are near the maintenance or out-of-service thresholds. Excessive switching could generate threshold-exceeded messages or cause the PRI to be automatically disabled. Check the counters in LD 60. If necessary, reset the counters using the RCNT command.

— Set the old card's faceplate ENL/DIS switch to DIS.

3 Disconnect cables from the old Clock Controller card and remove it from the shelf.

CAUTION
The QCAD130 cable connecting the Clock Controller and DTI card must NOT be routed through the center of the cabinet past the power harness. Instead, it should be routed around the outside of the equipment shelves.

Note: The Clock Controller status display in this mode indicates NO UART (no universal async receiver transmitter). Do not perform a clock status check when receiving this code.

4 Install the new Clock Controller in the selected slot.

5 Connect the c3ables to the new card.

— Connect the Primary reference to J2.

— If applicable, connect the Secondary reference to J1.

6 Set the faceplate ENL/DIS switch to ENL (enable).

7 Set the error detection thresholds and clock synchronization control in LD 73 (optional if replacing card; required with a new installation).

8 Enable the Clock Controller by entering ENL CCx in LD 60.

9 To track on a Primary or Secondary reference clock, use LD 60. The command follows:

TRCK	PCK	(for Primary)
	SCLK	(for Secondary)
	FRUN	(for free-run)

10 Issue the SSCK command to check controller status.

Installing the Clock Controller in a single group

Procedure 2
Installing the Clock Controller in the NT, 61

1 Set faceplate ENL/DIS switch to DIS (disable) on the new circuit card.

2 If replacing an existing card, do the following:

— Perform a status check on the clock with the SSCK command. The new card should have the same status.

— Disable the old card using LD 60. Only a card in a standby mode associated with the standby CPU can be software-disabled.

Note: ERR20 messages may be generated. These can usually be ignored. However, excessive clock switching should be avoided, especially when counters are near the maintenance or out-of-service thresholds. Excessive switching could generate threshold-exceeded messages or cause the PRI to be automatically disabled. Check the counters in LD 60. If necessary, reset the counters using the RCNT command.

— Set the old card's faceplate ENL/DIS switch to DIS.

— Disconnect the cables from the old Clock Controller card and remove it from the shelf.

Note: The Clock Controller status display in this mode indicates NO UART (no universal async receiver transmitter). Do not perform a clock status check when receiving this code.

3 If the 3PE switches have not been modified to recognize the Clock Controller card, adjust them as follows:

QSD39 (left-hand side) SW1 OFF (Option 61 shelf 0)
SW2 ON
SW4 OFF

QSD40 (right-hand side) SW1 OFF (Option 61 shelf 1)
SW2 ON
SW4 OFF
SW8 OFF

4 Set faceplate ENL/DIS switch to DIS (disable).

5 Install Clock Controller in the selected slot.

6 Run and connect cables.

— Connect the Primary reference to J2.

— If available, connect the Secondary reference to J1.

— Connect the cable between the two clocks to J3 on each controller card.

7 Set the faceplate ENL/DIS switch to ENL (enable).

8 Enable the Clock Controller by entering ENL CC x in LD 60.

9 Set the error detection thresholds and clock synchronization controls in LD 73 (optional if replacing card; required with new installation).

10 To track on a Primary or Secondary reference clock, use LD 60. The command follows:

```
TRCK  PCK   (for Primary)
      SCLK  (for Secondary)
      FRUN  (for free-run)
```

11 Issue the status check command, SSCK.

12 Optionally activate the new Clock Controller with the LD 60 SWCK command.

13 Repeat, if necessary, for the second Clock Controller.

Procedure 3
Installing the Clock Controller in the XN, XT, 71, and 81

Note: The option 81 system requires a vintage H Clock Controller.

1 Set faceplate ENL/DIS switch to DIS on new circuit card.

2 If replacing an existing card, do the following:

— Perform a status check on the clock with the SSCK command. The new card should have the same status.

— Disable it using LD 60. (Only a card in standby state associated with the standby CPU may be disabled using software.)

Note: ERR20 messages may be generated. These can usually be ignored. However, excessive clock switching should be avoided, especially when counters are near the maintenance or out-of-service thresholds. Excessive switching could generate threshold-exceeded messages or cause the PRI to be automatically disabled. Check the counters in LD 60. If necessary, reset the counters using the RCNT command.

— Set the old card's faceplate ENL/DIS switch to DIS (disable).

— Disconnect the cables from the old Clock Controller card and remove it from the shelf.

Note: The Clock Controller status display in this mode indicates NO UART (no universal async receiver transmitter). Do not perform a clock status check when receiving this code.

3 Set the faceplate ENL/DIS switch to DIS (disable).

4 Install the Clock Controller in the selected slot.

5 Run and connect the cables.

— Connect the Primary reference to J2.

— If available, connect the Secondary reference to J1.

— Connect the cable between the two clocks to J3 on each controller card.

6 Set the faceplate ENL/DIS switch to ENL (enable).

7 Enable the Clock Controller by entering ENL CC x in LD 60.

8 Set the error detection thresholds and clock synchronization controls in LD 73 (optional with card replacement; required with new installation).

9 To track on a Primary or Secondary reference clock, use LD 60. The command follows:

TRCK PCK (for Primary)
SCLK (for Secondary)
FRUN (for free-run)

10 Issue the status check command, SSCK.

11 (Optional) Activate the newly installed Clock Controller with the LD 60 SWCK command.

12 Repeat, if necessary, for the second Clock Controller.

Cabling requirements

Clock Controllers can require three different kinds of cable connections.

— In a single controller system, cable QCAD130/NT8D79xx connects QPC720/QPC472 (PRI or DTI card) to QPC471/QPC775 at J2 when DTI/PRI is the Primary reference clock source.

— In a single controller system, cable QCAD130/NT8D79xx connects QPC720/QPC472 to QPC471/QPC775 at J1 when DTI/PRI is the Secondary reference clock source.

— With dual controllers, cable QCAD125/NT8D75xx connects the Clock Controller cards to each other at J3 in single-group mode.

NT8D74 Clock Controller to InterGroup cable

This cable connects the QPC471/QPC775 Clock Controller card to the NT8D36 InterGroup Module. It is available in the following lengths:

— NT8D74AC 1.2 m (4 ft)

— NT8D74AD 1.8 m (6 ft)

— NT8D74AE 2.4 m (8 ft)

— NT8D74AF (QCAD110B) 3 m (10 ft)

— NT8D74AJ 4.8 m (16 ft)

NT8D75 Clock Controller to Clock Controller cable

This cable connects QPC471 Clock Controller cards to each other. It is available in the following lengths:

— NT8D75AC 1.2 m (4 ft)

— NT8D75AD 1.8 m (6 ft)

— QCAD125 3 m (10 ft)

NT8D79 PRI/DTI to Clock Controller cable

This cable connects the PRI/DTI card to the QPC471 Clock Controller card. It is available in the following lengths:

— NT8D79AB 0.6 m (2 ft)

— NT8D79AC 1.2 m (4 ft)

— NT8D79AD 1.8 m (6 ft)

— NT8D79AE 2.4 m (8 ft)

— NT8D79AF (QCAD130) 3 m (10 ft)

Data administration

This chapter describes the data administration procedures for the DTI feature. These include adding, changing, removing, and querying

— the DTI feature

— the CPI application of DTI

The information presented here assumes the reader is familiar with the general principles of data administration on the Meridian 1 as described in *X11 software management* (553-3001-300).

DTI has an impact on the following Service Change and Print programs. For a complete description of these programs, see the *X11 input/output guide* (553-3001-400).

LD 11	SL-1 Telephones
LD 14	Trunks
LD 16	Route
LD 17	Configuration
LD 20	Print Routine 1
LD 21	Print Routine 2
LD 22	Print Routine 3
LD 25	Move Data Blocks
LD 73	Digital Trunk Interface
LD 81	Features/Stations Print

DTI data administration

A more detailed explanation of maintenance and out-of-service thresholds is located in *Digital Trunk Interface/Computer-to-PBX Interface maintenance* (553-2811-500). Also, refer to the *X11 input/output guide* (553-3001-400) for a complete listing and description of software programs.

Prompt	Response	Comments
Step 1	Gather data for the DTI thresholds and counters. Response to the following prompts in **LD 73** is required. Defaults are in parentheses.	
REQ	NEW, CHG, PRT, OUT, END	Action Request (create, modify, print, remove data, or terminate program).
TYPE	DDB	Digital data block.
CEQT	Yes, No	Clock Controller equipped. Prompted for MS, ST, RT, N, NT, XN, or XT. Defaults to NO if response to REQ = NEW. Otherwise, defaults to previous value.
PREF	0-159	Primary reference source for clock synchronization controller. Use <cr> for free-running mode.
SREF	0-159	Secondary reference source for clock synchronization controller. Prompted only if PREF is not free-run. Use <cr> for free-running mode.
TRSH	0-15	Create, change, or remove a DTI threshold telephone. This number is entered in LD 17 when defining the DTI loop. Use Xxx to remove TRSH (LD 17 DLOP/TRSH associated with this TRSH must be removed first). See Step 2.
RALM	1-(3)-128	Yellow (remote) alarm/clear threshold. This is the number of “remote alarm clear” signals received in 24 hours. If the threshold is reached, the DTI/PRI must be restored to service manually.
BIPC	0-(2)-128	24-hour bit rate violation threshold. If 0 is entered, there is no limit on number of times trunk can be taken out and automatically restored to service. See the *X11 input/output guide* (553-3001-400).

Note: Automatic restoration is available only with Release 12 and later software.

Prompt	Response	Comments
LFAC	0-(3)-128	24-hour loss of frame alignment threshold. If 0 is entered, trunks will be restored to service automatically.
BIPV		Bit error rate (bipolar violation and CRC) monitoring limits.
	1-(3)-4,	Maintenance threshold.
	1-(2)-4	Out-of-service threshold.
SRTK		Frame slip/tracking/monitoring limits.
	1-(5)-24,	Maintenance threshold, the minimum time, in hours, between slips.
	1-(30)-3600	Out-of-service threshold, the maximum number of slips per hour.
SRNT		Frame slip/free run (non-tracking)/monitoring limits
	1-(15)-1024,	Maintenance threshold, the minimum time, in seconds, between 10 consecutive slips. When the threshold is reached, warnings are output to the maintenance TTY.
	1-(3)-1024	Out-of-service threshold, the minimum time, in seconds, between 10 consecutive slips. When the threshold is reached, the DTI loop is taken out of service and a minor alarm is raised.

Note: Automatic restoration is available only with Release 12 and later software.See *Digital Trunk Interface/Computer-to-PBX Interface maintenance* (553-2811-500) for a description.

SRIM	1-127	Improvement timer in minutes.
SRMM	1-(2)-127	Improvement criteria. If non-tracking mode maintenance threshold is exceeded SRMM or fewer times in duration of SRIM, trunks are returned to service. If not, timer is restarted and monitoring continues.
LFAL	1-(17)-10240	Loss of frame alignment monitoring limits.
	1-(511)-1024	Maintenance threshold.
	0	Out-of-service threshold, the number of frame losses in 24 hours.
Step 2	Gather data to add, modify, or remove a digital trunk loop. The following prompts in **LD 17** require a response. Defaults are in parentheses.	
REQ	ADD, CHG, OUT	Action Request (add, change, or remove data).
TYPE	CFN	Configuration data block.
CEQU	Yes, (No)	Change CE parameters.
DLOP	lll dd ff	Digital Trunk loop options. lll = network loop number 0-159. dd = number of data calls 0-(24). ff = frame format D2, D3, D4, or ESF. The default for frame format (ff) is ESF if prompt MODE is set to PRI; D3 if MODE is set to DTI or LINK.

Prompt	Response	Comments
Note: ESF can be specified for the QPC720 using X11 release 12 and later software.		
MODE	TRK, LINK	The mode in which the DTI hardware will be used. TRK = Digital Trunk mode, LINK = Digital Link mode.
LCMT	B8S, AMI	The line coding method. B8S = B8ZS binary 8 zero code substitution. AMI = B7 zero substitution. The default is B8S if the frame format is ESF; otherwise, the default is AMI.
YALM	DG2, FDL	The Yellow Alarm Pattern. DG2 = Digit 2. FDL = Facility Data Link. The default is FDL if the frame format is ESF; otherwise, the default is DG2.
TRSH	0-15	Digital Trunk threshold telephone. Enter the threshold telephone defined in LD 73.
DTIC	0-159	The starting network loop slot occupied by the DTI card. It marks, as occupied, the loop slots taken up by the DTI card. On non-network loops, enter <cr> and ignore the message SCH 2035.
OVLY	Yes, (No)	Change overlay area options.
SID	xxxx	System ID number. The SID is used for polling a Meridian 1 for ACD, CDR, and Traffic reports.
DROL	60	Include DTI Hardware diagnostic in daily routines (LD 60).

Prompt	Response	Comments
Step 3	Gather data to add, change, or remove a Digital Trunk route. Response to the following prompts in **LD 16** is required. Defaults are in parentheses.	
REQ	NEW, CHG, OUT	Action Request (create, modify, or remove data).
TYPE	RDB	Route date block.
CUST	0-99	Customer number.
ROUTE	0-511	Route number.
	0-511^{14+}, 0-127^{14+}	For System Options NT, RT, XN, ST, 51, 61, and 71 (R14). For all other machine types.
TKTP	aaa	Trunk route type.
	COT FEX WAT DID TIE	Central Office trunk route. Foreign Exchange trunk route. Wide Area Trunk route. Direct Inward Dialing trunk route. TIE trunk route.
SAT	Yes, (No)	Trunk route via Earth orbiting satellite transmission. This prompt has no relation to the trunk route function connecting a main PBX to a satellite PBX.
DTRK	Yes, (No)	Digital trunk route; (must be Yes).
DSEL		Digital trunk route selection. Prompted if response to TKTP is TIE and DTRK is YES.
	DTA, VCE, TDN, (VOD)	Data only, Voice only, Transparent Data Networking, (Voice or Data route).

Prompt	Response	Comments
PTYP		Port type at far end.
	Analog Tie trunk routes	
	AST	Analog satellite PBX TIE trunk or ESN satellite PBX TIE trunk.
	(ATT)	Analog Tie trunks.
	AOT	Analog Tie trunk, used instead of “ATT” whenever the PBX has one or more satellite trunk routes (DST) to any digital satellite PBX that includes OPX telephones.
	Digital Tie trunk routes	
	DCT	Combination satellite PBX TIE trunk.
	DST	Digital satellite PBX Tie trunk.
	(DTT)	Digital or combination Tie trunk.
	Analog CO trunk routes	
	(ACO)	Analog CO trunk.
	ATO	Analog Toll Office trunk.
	Digital CO trunk routes	
	(DCO)	Digital or combination CO trunk.
	DTO	Digital or combination Toll Office trunk.
AUTO	Yes, (No)	Auto-terminate must be NO if response to DSEL was VOD.
SIGO	aaa	ESN signaling arrangement. Prompted if the network signaling package is equipped, voice channels are configured VOD, and response to TKTP was TIE. The allowed values are as follows:
	STD	Standard signaling arrangement.
	ESN2	Supports NCOS, TCOS, and CCBQ call types.
	ESN3	Supports Network Call Transfer, Satellite Link Control, and all ESN2 call types.
	ESN5	Supports DTI data calls plus all other call types; not allowed if response to AUTO is Yes.
	EN19	Supports Transparent Data Networking and all ESN5 call types.
	ETN	Provides Electronic Tie network signaling arrangement.
STYP	SDAT, STDN	If Standard signaling arrangement (SIGO=STD). Uses Standard Data Signaling or Transparent Data Networking Signaling.
MANO	Yes, (No)	Manual outgoing trunk route. Must be NO if response to DSEL was VOD or if response to SIGO was ESN5. Define the manual DN in LD 14 (prompt MNDN).

Prompt	Response	Comments
Step 4	Gather data to add, change, move, or remove a Digital Trunk. Response is required to the following prompts in **LD 14.** Defaults are in parentheses.	
REQ	NEW, CHG, MOV, OUT, END	Action Request (create, modify, move TN, remove data block, or terminate LD 14).
TYPE	aaa	Trunk type.
	COT FEX WAT DID TIE	Central Office Trunk data block. Foreign Exchange trunk data block. WATS trunk data block. Direct Inward Dialing trunk data block. TIE trunk data block. See the *X11 input/output guide* (553-3001-400) for more options.
TN	0-511, 1-24	Network loop, DTI channel.
SFEX	Yes, (No)	Special digital FEX trunk (prompted only for digital FEX trunks).
TOTN	0-150, 1-24	Network loop, unassigned DTI channel; move to an unassigned channel on the same Network loop.
RTMB	0-127, 1-254	Route number (cannot be 31), member number.
ATDN	xxxx	Auto-terminate DN at which the trunk is to automatically terminate. If response to DSEL in LD 16 is VOD any valid DN is acceptable. If response is VCE, the DN must be a voice station (telephone or attendant). If response is DTA, the DN must be a data terminal.
MNDN	xxxx	Manual Directory Number. If response to DSEL in LD 16 is VOD, any valid DN is acceptable. If response is VCE, the DN must be a voice station (telephone or attendant). If response is DTA, the DN must be a data terminal.
SIGL	aaa	Trunk signaling for TIE or PAG trunks.
	DX2, DX4, EAM, EM4, GRD, LDR, LOP, OAD	2-Wire and 4-Wire duplex. E&M 2-Wire and E&M 4-Wire. Ground Start, Loop Dial Repeating. Loop Start, Outgoing Automatic Incoming Dial.
STRI	aaa	Incoming start arrangement.
	DDL, IMM, OWK, WNK	Delayed dial, Immediate dial. Off-hook Wink, Wink.

Prompt	Response	Comments
STRO	aaa	Outgoing start arrangement.
	DDL, IMM, OWK, WNK	Delayed dial, Immediate dial. Off-hook Wink, Wink.
SUPN	Yes, (No)	Answer and disconnect supervision required.
CLS		Class of service.
	DTN, (DIP)	Digitone, (Dial Pulse).
Step 5	Gather data for each Meridian 1 telephone that is to be a data call telephone. Response is required to the following prompts in **LD 11**. Defaults are in parentheses.	
REQ	aaa	Action request.
	CHG, CPY 1-32 END, MOV, MOV PAIR NEW, OUT	Modify existing data. Copy a telephone template to add 1-32 new telephones. Exit LD 11; Move from one TN to another. Move voice and data TNs. Add new data to the system; Remove data block.
TYPE	SL1	Define a Meridian 1 telephone or M11909 telephone.
TN	lll s cc u	Terminal number: loop (0-159), shelf (0-3), card (1-10), unit (0-15) See prompt SFMT when using the copy command.
TOTN	lll s cc u	Destination TN. New loop, shelf, card, and unit when telephone data is to be moved to a new TN.
CLS	DTA, (VCE)	Data terminal, (Voice terminal). The default is DTA if a digital telephone is defined and TN unit is 8-15. The default is VCE if a digital telephone is defined and TN unit is 0-7.

CPI data administration

CPI is frequently connected to a computer by a direct cable. To restore service automatically with a direct connection, set all maintenance thresholds to their least sensitive values:

RALM — 128
BIPC — 128
LFAC — 128
BIPV — 1
SRTK — 1
SRNT — 1
LFAL — 10240

Note 1: If CPI uses a carrier facility requiring an NCTE or Clock Controller, follow the DTI instructions for NCTEs and Clock Controllers.

Note 2: For detailed information on setting Error Thresholds, refer to LD 73 in the *X11 input/output guide* (553-3001-400).

Prompt	Response	Comments
1	Gather data to add, change, or remove a CPI Digital Trunk Loop. Response to the following prompts in **LD 17** is required. Defaults are in parentheses.	
REQ	NEW, OUT, CHG, END	Add data, remove data, change data, or end LD 17.
TYPE	CFN	Configuration data block.
CEQU	Yes	Change CE parameters.
DLOP	lll dd ff	Digital Trunk loop options. lll = network loop number 0-159. dd = number of data calls 0-(24). ff = frame format D2, D3, D4, or ESF. The default for frame format (ff) is ESF if prompt MODE is set to PRI; D3 if MODE is set to DTI or LINK.
DTIC	0-159	The starting network loop slot occupied by the DTI card. It marks, as occupied, the loop slots taken up by the DTI card. On non-network loops, enter <cr> and ignore the message SCH 2035.
OVLY	Yes	Change overlay area options.
SID	xxxx	System ID number. The SID is used for polling a Meridian 1 for ACD, CDR, and Traffic reports.
DROL	60	Include DTI Hardware diagnostic in daily routines.

Acceptance tests

This chapter describes the acceptance test procedure for the DTI feature. This test verifies the operation of the system hardware.

The DTI card must be disabled before performing the self test or call processing will be disrupted.

Self-test procedures

Follow the steps below to activate the initial test procedure:

1. Log into the overlay area.
2. Enter **LD 60**.
3. Enter **STAT L** to receive a status of the DTI card for Loop L.
4. Enter **DISL L** to disable DTI card for Loop L.
5. Enter **SLFT L** to test DTI card for Loop L.
6. If the system response is not appropriate, refer to *Digital Trunk Interface/Computer-to-PBX Interface maintenance* (553-2811-500) to analyze the message.
7. Enter **ENLL L** to enable the DTI card for Loop L.
8. Enter ******** to abort LD 60.

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.

Set the ATLP command to 1 as follows:

— If all 24 channels are idle at midnight, Meridian 1 software disables the card and performs a self test on all channels.

— If any of the 24 channels are busy at midnight, software disables one idle channel, chosen at random, and checks it while the card is enabled.

With the ATLP command set to 0, only one channel is tested. The channel tested is randomly selected by software, and it cannot be specified.

Automatic loop test procedures

Activate automatic loop test procedures with the following steps:

1 Log into the overlay area.

2 Enter **LD 60.**

3 Find an idle channel on the DTI loop by using the STAT command. Enter **STAT L**.

4 If all 24 channels are indicated BUSY by the response of the STAT command, this test cannot be run. Otherwise, select an idle channel and disable it. Enter **DSCH L C**.

5 Enter **ATLP 0** *or* **ATLP 1**.

6 If the system response is not appropriate, refer to *Digital Trunk Interface/Computer-to-PBX Interface maintenance* (553-2811-500) to analyze the message.

7 Enter **ENLL L C** to enable DTI channel C.

8 Enter ******** to abort LD 60.

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 (24 channels) basis.

Link diagnostic test The link diagnostic test, also called the far end loopback test, does not test the Meridian 1 DTI. It puts the DTI in loopback mode so a remote loopback test can be performed on equipment at the far end.

The DTI channel or frame being tested must be disabled before performing the link diagnostic test or call processing will be disrupted.

Remote loopback test The remote loopback test, also called the near end loopback test, checks the integrity of the DTI link from the Meridian 1 to the far end. The far end must be in loopback mode before this test can be performed.

The DTI channel or frame being tested must be disabled before performing the remote loopback test or call processing will be disrupted.

Coordinating the tests When a technician at the far end asks for loopback mode on the Meridian 1, enter the following:

LD 60
DISL loop
RLBK loop

To run the remote loopback test on the Meridian 1:

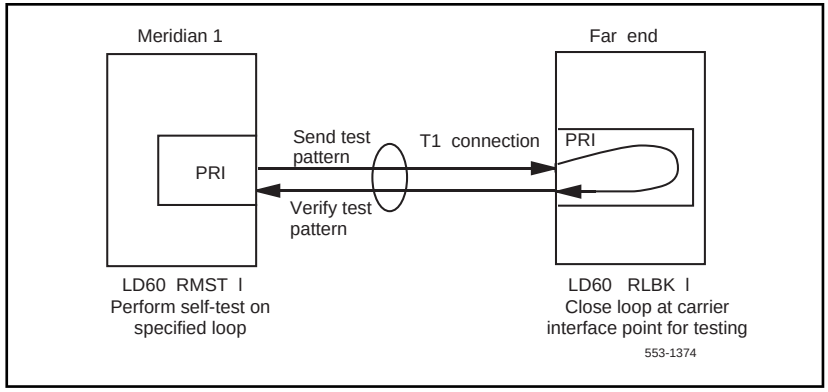
1. Call a technician at the far end. Ask for loopback mode at that facility.
2. When loopback mode at the far end is confirmed, enter the following:

   LD 60
   DISL loop
   RMST loop

Figure 12 shows the relationship between the remote loopback test and the link diagnostic test.

The procedure below is for performing a remote link diagnostic test on the DTI hardware when the DTI loop is disabled. This procedure assumes that the testing is being run from a local DTI to a collocated DTI.

Figure 12
DTI remote loopback test and DTI link diagnostic test



Link diagnostic and remote loopback test procedures

1 Log into the overlay area for both the local and collocated Meridian 1 systems.

2 Enter **LD 60**.

3 Enter **DISL loop** to disable the DTI card on the local Meridian 1 on Loop L. Enter **DISL loop** to disable the DTI card on the collocated Meridian 1 on Loop L.

4 On the collocated Meridian 1, enter **RLBK loop** to place this DTI in the remote loopback mode.

5 On the local Meridian 1, enter **RMST loop** to test the physical link between the local and the collocated DTIs.

6 If the system response is not appropriate, refer to *Digital Trunk Interface/Computer-to-PBX Interface maintenance* (553-2811-500) to analyze the message.

7 On the collocated Meridian 1, enter **DLBK loop** to disable the remote loopback mode.

8 Enter **ENLL loop** to enable the DTI card on the local Meridian 1 on Loop L. Enter **ENLL loop** to enable the DTI card on the collocated Meridian 1 on Loop L.

9 Enter ******** on both the local and collocated Meridian 1 systems to abort LD 60.

Wire list

This chapter provides information required to build cables of nonstandard lengths for Digital Trunk Interface (DTI) applications. For installation of a private T1 transmission cable, consult Northern Telecom's Transmission Division.

The following pages contain lists and descriptions applying to Digital Trunk Interface (DTI) cables external to the Meridian 1 cabinet.

QCAD129/NT9J93xx

This cable is used to connect the RS-232-C interface for an Echo Canceller to the DTI card. Table 17 contains the QCAD129/NT9J93xx wire list.

Standard length	7 ft (2.1 m)
Construction	22 AWG (0.644 mm), stranded
P1 Connector	15-pin, male, subminiature D, with jack-screws
P2 connector	25-pin, male, subminiature D, with jack-screws

Table 17
QCAD129/NT9J93xx wire list

DTI signal	From	To	Echo Canceller signal
DCD	P1-1	P2-20	DTR
RXD	P1-2	P2-2	TXD
DTR	P1-4	P2-8	DCD
TXD	P1-5	P2-3	RXD
GND	P1-10	P2-7	GND
RTS	P1-12	P2-4	
CTS	P1-9	P2-5	
TPENB	P1-15	nc	

Note: TPENB = Test Port Enable Bar.

QCAD133/NT8D97xx

This cable is used to transport the T1 signal from the I/O filter assembly at the cabinet bulkhead to the Network Channel Terminating Equipment (NCTE) telephone company interface. For cabinets without an I/O filter assembly, this cable is used to transport the T1 signal from the QPC720 to the NCTE telephone company interface. Table 18 contains the wire list for the QCAD133/NT8D97xx.

Standard length	50 ft (15.3 m)
Construction	Individually foil shielded, twisted pairs, 24 AWG (0.511 mm), stranded
P1 Connector	15-pin, female, subminiature D, with jack-screws
P2 Connector	15-pin, male, subminiature D, with slide-latch. Optional spring-latch loose-packed with cable assembly.

Table 18
QCAD133/NT8D97xx wire list

Color	From	To	DTI signal
WHITE	P1-1	P2-1	XTIP to telephone company
BLACK	P1-9	P2-9	XRING to telephone company
GRN SHLD	P1-2	nc	GND
RED	P1-3	P2-3	RTIP from telephone company
BLACK	P1-11	P2-11	RRING from telephone company
RED SHLD	P1-4	nc	GND

QCAD128/NT8D83xx

This cable transports the T1 signal from the DTI card to the I/O assembly at the cabinet bulkhead. Table 19 shows the QCAD128/NT8D83xx wire list.

Standard length	10 ft (3.05 m)
Construction	15-conducter ribbon, 28 AWG (0.321 mm), stranded
P1 Connector	15-pin, male, subminiature D, with jack-screws
P2 Connector	15-pin, male, subminiature D, with jack-screws

Table 19
QCAD128/NT8D83xx wire list

From	To	Signal
P1-1	P2-1	XTIP to telephone company
P1-2	P2-2	GND
P1-3	P2-3	RTIP from telephone company
P1-4	P2-4	GND
P1-5	P2-5	
P1-6	P2-6	
P1-7	P2-7	
P1-8	P2-8	
P1-9	P2-9	XRING to telephone company
P1-10	P2-10	
P1-11	P2-11	RRING from telephone company
P1-12	P2-12	
P1-13	P2-13	
P1-14	P2-14	
P1-15	P2-15	

Copyright Statement

© 1998 Northern Telecom
All rights reserved
Information is subject to change without notice. Northern Telecom reserves the right to make changes in design or components as progress in engineering and manufacturing may warrant. This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC rules, and the radio interference regulations of Industry Canada. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.
SL-1 and Meridian 1 are trademarks of Northern Telecom.

NORTEL
NORTHERN TELECOM