Nortel Communication Server 1000
Nortel Communication Server 1000 Release 4.5

Communication Server 1000M and Meridian 1

Small System Maintenance

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Standard 1.00. This document is a new NTP for Succession 3.0. It was created to support a restructuring of the Documentation Library, which resulted in the merging of multiple legacy NTPs. This new document consolidates information previously contained in the following legacy documents, now retired:

- *Option 11C and 11C Mini: Fault Clearing Guide* (553-3011-500)
- *Option 11C and 11C Mini: Upgrades Procedures Guide* (553-3021-250) (Content from *Option 11C and 11C Mini: Upgrades Procedures Guide* (553-3021-250) also appears in *Communication Server 1000M and Meridian 1: Small System Upgrade Procedures* (553-3011-258).)
- *Option 11C and 11C Mini: Customer Configuration Backup and Restore Guide* (553-3011-330)
  (Content from *Option 11C and 11C Mini: Customer Configuration Backup and Restore Guide* (553-3011-330) also appears in *Communication Server 1000M and Meridian 1: Small System Installation and Configuration* (553-3011-210).)

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About this document

This document is a global document. Contact your system supplier or your Nortel representative to verify that the hardware and software described are supported in your area.

Subject

Communication Server 1000M and Meridian 1: Small System Maintenance (553-3011-500) contains information required to maintain equipment and customer data, clear faults, and replace defective components in the Small System. It includes information on:

- database management:
  - backing up customer data
  - restoring customer data
  - using the Customer Configuration Backup and Restore feature
- maintenance features for the Small System:
  - Precautions: guidelines to avoid personal injury and equipment damage
  - Communicating with the system: methods for exchanging information with the system
  - Hardware maintenance tools: descriptions of circuit card hardware, CPU controls, system alarms, and system monitor indicators

  - — Software maintenance tools: descriptions of diagnostic programs, the History File, and interactive diagnostics
  - — Customer Technical Assistance Service: Nortel Technical Assistance Centers and services

- locating and clearing faults in the Small System based on the assumption that the system is properly installed (for example, all circuit card locations, option switch settings, and cable connections are correct) and was fully operational before the fault

Note on legacy products and releases

This NTP contains information about systems, components, and features that are compatible with Nortel Communication Server 1000 Release 4.5 software. For more information on legacy products and releases, click the **Technical Documentation** link under **Support** on the Nortel home page:

http://www.nortel.com/

Applicable systems

This document applies to the following systems:

- Communication Server 1000M Chassis (CS 1000M Chassis)
- Communication Server 1000M Cabinet (CS 1000M Cabinet)
- Meridian 1 PBX 11C Chassis
- Meridian 1 PBX 11C Cabinet

  Note: When upgrading software, memory upgrades may be required on the Signaling Server, the Call Server, or both.

System migration

When particular Meridian 1 systems are upgraded to run CS 1000 Release 4.5 software and configured to include a Signaling Server, they become

CS 1000M systems. Table 1 lists each Meridian 1 system that supports an upgrade path to a CS 1000M system.

Table 1
Meridian 1 systems to CS 1000M systems

This Meridian 1 system...	Maps to this CS 1000M system
Meridian 1 PBX 11C Chassis	CS 1000M Chassis
Meridian 1 PBX 11C Cabinet	CS 1000M Cabinet

Note the following:

- When an Option 11C Mini system is upgraded to run CS 1000 Release 4.5 software, that system becomes a Meridian 1 PBX 11C Chassis.
- When an Option 11C system is upgraded to run CS 1000 Release 4.5 software, that system becomes a Meridian 1 PBX 11C Cabinet.

For more information, see *Communication Server 1000M and Meridian 1: Small System Upgrade Procedures* (553-3011-258).

Intended audience

This document is intended for individuals responsible for:

- maintaining Small System equipment and customer data
- replacing or repairing user-serviceable parts

To use this guide, you should have a basic knowledge of Small System operation and maintenance.

Conventions

Terminology

In this document, the following systems are referred to generically as "system":

- Communication Server 1000M (CS 1000M)
- Meridian 1

The following systems are referred to generically as "Small System":

- Communication Server 1000M Chassis (CS 1000M Chassis)
- Communication Server 1000M Cabinet (CS 1000M Cabinet)
- Meridian 1 PBX 11C Chassis
- Meridian 1 PBX 11C Cabinet

The following systems are referred to generically as "Chassis system":

- Communication Server 1000M Chassis (CS 1000M Chassis)
- Meridian 1 PBX 11C Chassis

The following systems are referred to generically as "Cabinet system":

- Communication Server 1000M Cabinet (CS 1000M Cabinet)
- Meridian 1 PBX 11C Cabinet

Related information

This section lists information sources that relate to this document.

NTPs

The following NTPs are referenced in this document:

- *ISDN Primary Rate Interface: Installation and Configuration* (553-3001-201)
- *ISDN Basic Rate Interface: Installation and Configuration* (553-3001-218)

- *Software Input/Output: Administration* (553-3001-311)
- *Software Input/Output: System Messages* (553-3001-411)
- *Software Input/Output: Maintenance* (553-3001-511)
- *ISDN Primary Rate Interface: Maintenance* (553-3001-517)
- *ISDN Basic Rate Interface: Maintenance* (553-3001-518)
- *Communication Server 1000M and Meridian 1: Small System Planning and Engineering* (553-3011-120)
- *Communication Server 1000M and Meridian 1: Small System Installation and Configuration* (553-3011-210)
- *Communication Server 1000M and Meridian 1: Small System Upgrade Procedures* (553-3011-258)

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www.nortel.com/

CD-ROM

To obtain Nortel documentation on CD-ROM, contact your Nortel Networks customer representative.

Managing databases

Contents

This section contains information on the following topics:

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Overview of data storage

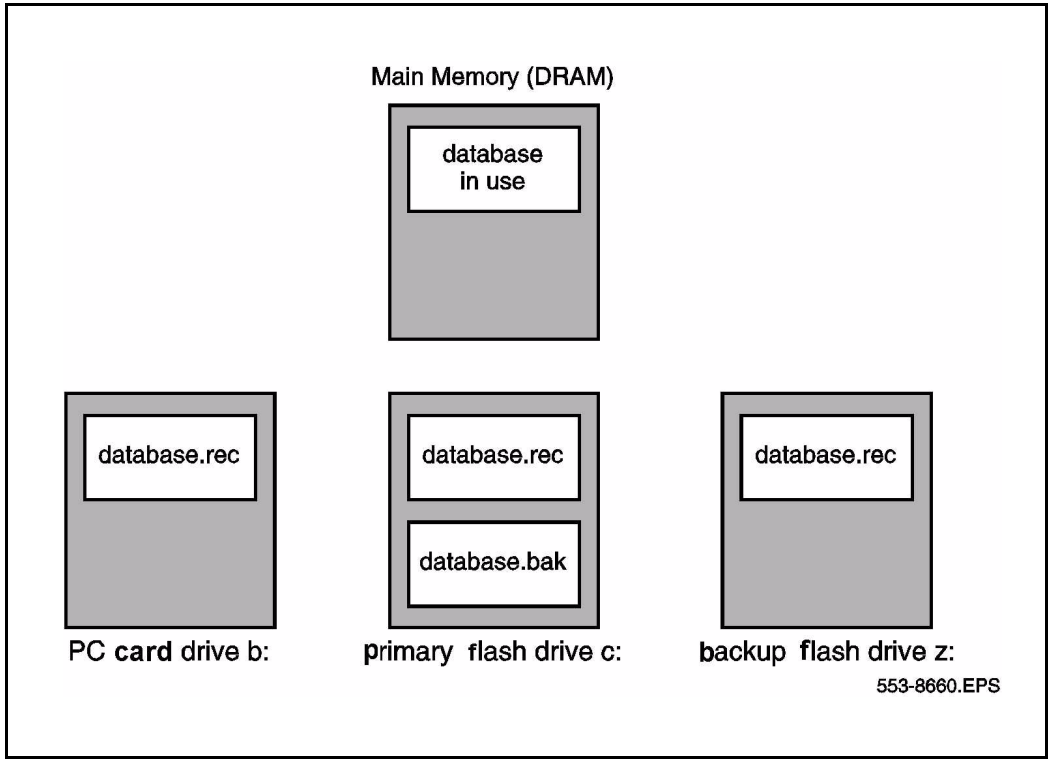
Small System software is stored in various areas of the NTDK20 Small System Controller (SSC) card.

There are four areas on the SSC card where customer data records can be stored:

- DRAM — stores and accesses the active version of customer records, system data, and overlay data. Data from the primary flash drive overwrites data in DRAM storage during a SYSLOAD (system reload).
- Primary flash drive (C:) — contains two copies of customer records (primary and backup records).
- Backup flash drive (Z:) — retains the true backup copy of the customer database.
- PC Card device (A: or B:) — allows a complete copy of the customer database to be stored on a Software Delivery card (PC Card) inserted into this device. The customer database on the PC Card can then be removed for storage away from the SSC card.

Figure 1 on page 23 illustrates the data storage options on the Small System.

Figure 1
Data storage on the NTDK20 SSC card



Backing up databases

There are four ways to back up customer data:

- EDD datadump
- BKO backup
- Archive database
- Customer Configuration Backup and Restore (CCBR) feature

Table 2 summarizes the four backup methods and the overlays and commands to initiate them.

Table 2
Database backup methods

Type of backup	Overlay	Command	Description
Datadump	LD 43	**EDD**	Data in DRAM is written to the primary and backup flash drives. ***Note:*** This type of backup should be performed on a regular basis and after all changes.
Backup	LD 43	**BKO**	Data in the primary flash drive is copied to the PC Card device.
Archive	LD 143	**UPGRADE** (**Utilities** menu)	Data is copied to the PC Card device in a format organized by the user. ***Note:*** This is the recommended method of backing up customer data in parallel with datadumps.
CCBR	LD 143	**XBK**	Data is copied to a remote PC or computer disk.

Note: The Small System automatically backs up the configuration database when the Midnight Routines run. Backups done during the Midnight Routines write only to the backup flash drive.

EDD (LD 43) datadump

The Small System datadump performed in LD 43 is the system's method of backing up configuration data to its file storage devices. By invoking one of the several datadump commands in the overlay, the user ensures that at least one backup copy of configuration data exists in a location other than DRAM. Service is not interrupted while performing an EDD or a backup procedure.

Table 3 describes the datadump commands in LD 43. Refer to *Software Input/Output: Maintenance* (553-3001-511) for a complete listing and description of LD 43 commands.

Table 3
LD 43 datadump commands

Command	Description
BKO	Customer records in the primary flash drive (C:) are copied to the PC Card device (A: or B:)
EDD	Customer data in DRAM is written to the primary and backup flash drives (C: and Z:)
EDD NBK	Same as EDD.
SWP	A swap or exchange of database records is completed between the main and secondary databases on the primary flash drive (C:)

The following procedure describes the steps to perform an EDD datadump, which copies customer data in DRAM to the primary and backup flash drives.

Procedure 1
Performing an EDD datadump in LD 43

1 Log in to the system.

2 Load LD 43. Type **LD 43** and press **<CR>**.

The system responds with EDD followed by a period (.).
Example:

```
EDD000
.
```

3 Type **EDD** and press **<CR>** to perform a datadump.

It takes approximately five minutes (depending on the size of the database) to complete a datadump. Once the data dump is completed, the system responds with:

```
Internal backup complete
All files are backed up!
DATADUMP COMPLETE
```

4 Exit the overlay. Type four asterisks (********) to exit LD 43.

End of Procedure

BKO command (LD 43)

The **BKO** command copies customer data from the primary flash drive to a PC Card. The backed up database can subsequently be used to restore customer data from an external drive (by using Restore Utilities in LD 143).

The **BKO** command copies the database files in raw form and does not organize the database backups. Refer to "Archive data using the Utilities menu (LD 143)" on page 27 for a method that also backs up to a PC Card but allows databases to be stored and organized in separate directories by name.

The following procedure describes the steps to perform a BKO backup.

Procedure 2
Performing a BKO datadump in LD 43

1 To ensure that you have the latest configuration saved to the primary flash drive before you begin the BKO datadump, first perform an EDD datadump (as described in Procedure 1 on page 25).

2 Log in to the system.

3 Ensure that the PC Card is inserted in the PC Card drive (B:).

4 Load LD 43. Type **LD 43** and press **<CR>**.

The system responds with EDD followed by a period (.).
Example:

```
EDD000
.
```

5 Type **BKO** and press **<CR>** to copy the contents of the primary flash drive to the PC Card.

The system responds with:

```
Starting database backup to PCMCIA drive b:
c:/u/db/config.rec        ok
c:/u/db/database.rec      ok
c:/u/db/inet.db           ok
c:/u/db/zone.db           ok
c:/u/db/iprem.db          ok
c:/u/db/surv.db           ok

DATABASE BACKUP COMPLETE
```

6 Exit the overlay. Type four asterisks (********) to exit LD 43.

End of Procedure

Archive data using the Utilities menu (LD 143)

Use the archive feature to do the following:

- archive a customer database on a PC Card
- list the archived databases
- remove existing archived databases

You can define the database in an off-site lab environment and save (archive) it on a PC Card until you need it. Then you can load it in the customer's system using the PC Card.

To archive a database on the PC Card, you must first define it and load it into the flash ROM on the SSC card. Make sure you define and load the required database before trying to archive it.

You can list and remove archived databases directly from the PC Card without first loading them on the SSC card.

The following procedure describes how to use the Archive feature to list, add, and remove customer databases.

Procedure 3
Using the Archive feature

1. To ensure that you have the latest configuration saved to the primary flash drive before archiving, first perform an EDD datadump (as described in Procedure 1 on page 25).
2. Log in to the system.
3. Ensure that the PC Card is inserted in the PC Card drive (A:).
4. Start the Software Installation Program using LD 143.
   a. Type **LD 143** and press **<CR>**.

      The system responds with CCBR000 followed by a period (.). Example:

      ```
      CCBR000
      .
      ```

   b. Type **UPGRADE** and press **<CR>**.
   c. Select **Main Cabinet**. The system responds with the **Software Installation Main Menu**.
5. Select Utilities from the main menu.
6. Select Archive database utilities (item 2) from the **Utilities** menu. System responds with:

   ```
   Customer Database Archives:
   1. List customer databases
   2. Remove customer database
   3. Archive a customer database
   [q]uit, [p]revious, [m]ain, [h]elp or [?]
   <cr> - redisplay

  Enter Selection:
   ```

7. Do one of the following:
   a. Enter **1 <CR>** (List customer databases), and continue with the next step, step 8.
   b. Enter **2 <CR>** (Remove customer database), and go to step 9.
   c. Enter **3 <CR>** (Archive a customer database), and go to step 10.
8. Review the list of archived databases.

Return to the **Customer Database Archives** menu and repeat step 7.

If you want to end the activity here, enter **q <CR>**.

9 If you selected the option to remove a customer database from the archive, the system responds with a list of the archived databases and the following prompt:

```
Remove database
'Name of archived database'
database?
```

Enter your selection and respond to the confirm removal prompt.

10 If you selected the option to add a customer database to the archive, the system responds with the following prompt:

```
Enter a Customer name for your customized data:
```

11 Type in text to identify the archived database for future use, and press **<CR>**. The system responds with:

```
Archive copy completed.
```

12 Verify that the database has been copied to the PC Card by selecting the option `List customer databases` on the **Customer Database Archives** menu.

End of Procedure

CCBR backup to remote PC or disk

By using LD 143 and the CCBR feature, the user can transfer customer records between the SSC card's primary flash drive and either an on-site or a remote computer system.

Table 4 summarizes the CCBR commands in LD 143. Refer to *Software Input/Output: Maintenance* (553-3001-511) for a complete listing and description of LD 143 commands.

Table 4
LD 143 CCBR commands

Command	Description
XBK	Customer database records in the primary flash drive are backed up to an external computer hard drive.
XRT	Customer database records are restored from an external computer hard drive to the backup flash drive.
XSL	The system is remotely “sysloaded” with customer records stored in the primary flash drive.
XVR	Customer files stored on an external computer are verified for validity and integrity with records in the backup flash drive.

For information on using CCBR to back up and restore databases, refer to “Customer Configuration Backup and Restore” on page 43.

Restoring a backed up database

There are four ways to restore customer data that was previously backed up:

- Restore from backup flash
- Restore from external drive (PC Card)
- Install an archived database
- Restore from remote PC or disk using CCBR

Table 5 summarizes the four restore methods. All these methods use the **Upgrade** command in LD 143 to access the Software Installation Program's **Utilities** menu.

Table 5
Database restore methods

Type of restore	Description
Restore from backup flash	The database in the backup flash drive (Z:) is written to the primary flash drive (C:).
Restore from external drive (PC Card)	Database that was backed up using the **BKO** method (LD 43) and stored on an external drive (B:) is written to the primary flash drive (C:).
Install an archived database	Database that was backed up using the archive method (**Utilities** menu) and stored on an external drive (A:) is written to the primary flash drive (C:).
CCBR restore	Database stored on a remote PC or disk is written to the primary flash drive (C:).

Note 1: In the Software Installation Program menus, all references to Option 11C cover all Small Systems (Option 11C, Option 11C Mini, Meridian 1 PBX 11C Cabinet, Meridian 1 PBX 11C Chassis, CS 1000M Cabinet, and CS 1000M Chassis).

Note 2: In the various Restore menus, the items for Option 11/11E CCBR File and Option 11/11E Software Cartridge are used only when upgrading from Option 11/11E systems.

Note 3: Before the Small System loads data from either of the flash drives, it performs a security check to make sure that the License parameters have not been changed. If the security check fails, the system still loads but will not operate (calls will not be processed) until the problem is corrected using LD 97. Security check failure is indicated by a SYSLOAD message (SYS4342, SYS4393, or SYS4399). Refer to *Software Input/Output: Administration* (553-3001-311) for a description of LD 97 and License parameters, and to *Software Input/Output: System Messages* (553-3001-411) for a description of SYS messages.

Restore from backup flash drive

The following procedure describes how to restore a database from the backup flash drive (Z:).

> ***Note:*** This is not a typical restore method and should be used only by a trained technician. This method would be used to correct problems such as corruption of the primary flash drive database.

Procedure 4
Restoring from backup flash drive

1. Log in to the system.
2. Start the Software Installation Program using LD 143.
   a. Type **`LD 143`** and press **`<CR>`**.

      The system responds with `CCBR000` followed by a period (`.`). Example:

      ```
      CCBR000
      .
      ```

   b. Type **`UPGRADE`** and press **`<CR>`**.

   c. Select **`Main Cabinet`**. The system responds with the **Software Installation Main Menu**.

3. Select `Utilities` from the main menu.

   The system responds with the **Utilities** menu:

   ```
   Utilities Menu:
   1.  Restore Backed Up Database
   2.  Archive Database Utilities
   3.  Install Archived Database
   4.  Review Upgrade Information
   5.  Clear Upgrade Information
   6.  Flash Boot ROM Utilities
   7.  Current Installation Summary
   8.  Change 3900 series set languages
   9.  IP FPGA Utilities
   [q]uit, [p]revious, [m]ain, [h]elp, or [?], <cr>-
   redisplay
   ```

4 Select `Restore Backed Up Database` (item 1) from the **Utilities** menu.

The system responds with:

```
Select Restore Database Source:
1. Backup Flash Drive
2. External Drive
3. Option 11C CCBR File
4. Option 11/11E CCBR File
5. Option 11/11E Software Cartridge
```

5 Select `Backup Flash Drive` (item 1).

The system responds with:

```
Restoring primary drive from Flash Drive...

Backup file from "Date of Backup Flash"
will be restored to the Primary Drive.
Are you sure you wish to perform the Restore?
(y/n/[a]bort)
```

6 Do one of the following:

a. To return to the main menu, type **a** (for abort) and press **<CR>**.

b. If you do not want to restore the database, type **n** (for no), press **<CR>**, and return to step 4.

c. To restore the database, type **y** (for yes) and press **<CR>**. Go to next step.

7 The system restores the backed up database and a message displays indicating if the restoration succeeded or failed.

If	Then
The restoration succeeds	The system responds with: `Restore successful.` Go to step 8. ***Note:*** Do not perform a datadump at this stage unless you want to undo the restore from backup. A datadump will write DRAM to the primary flash drive, thus overwriting the restored database.
The restoration fails	Return to step 3.

8 To complete the restore, a SYSLOAD (system reload) is required in order to load the system from the primary flash drive into DRAM. To perform a SYSLOAD:

a. For a Cabinet system, set the circuit breaker on the front of the power supply in the main cabinet to OFF and then to ON.

b. For a Chassis system, turn the power switch off and then on.

End of Procedure

Restore from external drive

Use this method to restore a database that was backed up using the BKO method (LD 43) and stored on an external drive (B:). This method writes data from the external drive to the primary flash drive (C:).

Procedure 5
Restoring from external drive

1 Log in to the system.

2 If necessary, install the PC Card containing the external drive database in the PC Card drive (B:).

3 Start the Software Installation Program using LD 143.

a. Type **LD 143** and press **<CR>**.

The system responds with CCBR000 followed by a period (.). Example:

```
CCBR000
.
```

b. Type **UPGRADE** and press **<CR>**.

c. Select **Main Cabinet**. The system responds with the **Software Installation Main Menu**.

4 Select Utilities from the main menu.

The system responds with the **Utilities** menu:

```
Utilities Menu:
1.  Restore Backed Up Database
2.  Archive Database Utilities
3.  Install Archived Database
4.  Review Upgrade Information
5.  Clear Upgrade Information
6.  Flash Boot ROM Utilities
7.  Current Installation Summary
8.  Change 3900 series set languages
9.  IP FPGA Utilities
[q]uit, [p]revious, [m]ain, [h]elp, or [?], <cr>-
redisplay
```

5 Select Restore Backed Up Database (item 1) from the **Utilities** menu.

The system responds with:

```
Select Restore Database Source:
1. Backup Flash Drive
2. External Drive
3. Option 11C CCBR File
4. Option 11/11E CCBR File
5. Option 11/11E Software Cartridge
```

6 Select `External Drive` (item 2).

The system responds with:

```
Restoring primary drive from External Drive...

Backup file from "Date of Backup Flash"
will be restored to the Primary Drive.
Are you sure you wish to perform the Restore?
(y/n/[a]bort)
```

7 Do one of the following:

a. To return to the main menu, type **a** (for abort) and press **<CR>**.

b. If you do not want to restore the database, type **n** (for no), press **<CR>**, and return to step 4.

c. To restore the database, type **y** (for yes) and press **<CR>**. Go to next step.

8 The system restores the backed up database and a message displays indicating if the restoration succeeded or failed.

If	Then
The restoration succeeds	The system responds with: `Restore successful.` Go to step 9. ***Note:*** Do not perform a datadump at this stage unless you want to undo the restore from backup. A datadump will write DRAM to the primary flash drive, thus overwriting the restored database.
The restoration fails	Return to step 3.

9 To complete the restore, a SYSLOAD (system reload) is required in order to load the system from the primary flash drive into DRAM. To perform a SYSLOAD:

a. For a Cabinet system, set the circuit breaker on the front of the power supply in the main cabinet to OFF and then to ON.

b. For a Chassis system, turn the power switch off and then on.

End of Procedure

Install an archived database

Use this method to restore or install a database that was archived for storage on an external drive. This method writes data from the external drive to the primary flash drive (C:).

Procedure 6
Installing an archived database

1 Log in to the system.

2 If necessary, install the PC Card containing the archived database in the PC Card drive (A:).

3 Start the Software Installation Program using LD 143.

a. Type **LD 143** and press **<CR>**.

The system responds with CCBR000 followed by a period (.). Example:

```
CCBR000
.
```

b. Type **UPGRADE** and press **<CR>**.

c. Select **Main Cabinet**. The system responds with the **Software Installation Main Menu**.

4 Select `Utilities` from the main menu.

The system responds with the **Utilities** menu:

```
Utilities Menu:
1.  Restore Backed Up Database
2.  Archive Database Utilities
3.  Install Archived Database
4.  Review Upgrade Information
5.  Clear Upgrade Information
6.  Flash Boot ROM Utilities
7.  Current Installation Summary
8.  Change 3900 series set languages
9.  IP FPGA Utilities
[q]uit, [p]revious, [m]ain, [h]elp, or [?], <cr>-
redisplay
```

5 Select `Install Archived Database` (item 3) from the **Utilities** menu.

The system responds with:

```
Customer Database Archives available:
1. "Name of Archive"
```

6 Select `the "Name of Archive"` database you want to install.

Note: You may have more than one archive listed, so ensure that you select the correct one to restore.

The system responds with:

```
"Name of Archive" database selected for restore?
(y/n/[a]bort)
```

7 Do one of the following:

a. To return to the main menu, type **a** (for abort) and press **<CR>**.

b. If you do not want to restore the database, type **n** (for no), press **<CR>**, and return to step 4.

c. To restore the database, type **y** (for yes) and press **<CR>**. Go to next step.

8 The system restores the backed up database and a message displays indicating if the restoration succeeded or failed.

If	Then

The restoration succeeds	The system responds with:
	`Restoring archived database to Primary drive...`
	`Restore successful.`
	`System Restart required to activate restored database.`
	Go to step 8.
	Note: Do not perform a datadump at this stage unless you want to undo the restore from backup. A datadump will write DRAM to the primary flash drive, thus overwriting the restored database.

The restoration fails	Return to step 3.

9 To complete the restore, a SYSLOAD (system reload) is required in order to load the system from the primary flash drive into DRAM. To perform a SYSLOAD:

a. For a Cabinet system, set the circuit breaker on the front of the power supply in the main cabinet to OFF and then to ON.

b. For a Chassis system, turn the power switch off and then on.

End of Procedure

Restore from remote PC or disk using CCBR

By using LD 143 and the CCBR feature, the user can restore a backed up customer database stored on either an on-site or a remote computer system.

Refer to Table 4 on page 30 for a list of the LD 143 backup and restore commands that are specific to CCBR. For information on using these CCBR commands to back up and restore databases, refer to “Customer Configuration Backup and Restore” on page 43.

The following procedure describes a method to use the Software Installation Program's **Utilities** menu to restore a CCBR database. This method writes data from the remote PC or computer disk to the system's primary flash drive (C:).

Procedure 7
Restoring from a remote PC or disk

1 Access the Small System and log in.

See "Accessing remotely" on page 48 or "Accessing from on-site" on page 49.

2 Start the Software Installation Program using LD 143.

a. Type **LD 143** and press **<CR>**.

The system responds with CCBR000 followed by a period (.). Example:

```
CCBR000
.
```

b. Type **UPGRADE** and press **<CR>**.

c. Select **Main Cabinet**. The system responds with the **Software Installation Main Menu**.

3 Select Utilities from the main menu.

The system responds with the **Utilities** menu:

```
Utilities Menu:
1.  Restore Backed Up Database
2.  Archive Database Utilities
3.  Install Archived Database
4.  Review Upgrade Information
5.  Clear Upgrade Information
6.  Flash Boot ROM Utilities
7.  Current Installation Summary
8.  Change 3900 series set languages
9.  IP FPGA Utilities
[q]uit, [p]revious, [m]ain, [h]elp, or [?], <cr>-
redisplay
```

4 Select `Restore Backed Up Database` (item 1) from the **Utilities** menu.

The system responds with:

```
Select Restore Database Source:
1. Backup Flash Drive
2. External Drive
3. Option 11C CCBR File
4. Option 11/11E CCBR File
5. Option 11/11E Software Cartridge
```

5 Select `Option 11C CCBR file` (item 3).

The system responds with:

```
Restoring primary drive from External Drive...

WARNING: You must have a CCBR file backed up.
WARNING: Your internal backup will be erased.
Are you sure you wish to perform the Restore?
(y/n/[a]bort)
```

6 Do one of the following:

a. To return to the main menu, type **a** (for abort) and press **<CR>**.

b. If you do not want to restore the database, type **n** (for no), press **<CR>**, and return to step 4.

c. To restore the database, type **y** (for yes) and press **<CR>**. Go to next step.

7 After you have confirmed that you want to restore the database, the system responds with:

```
Wait -- Erasing internal backup
R>
```

8 Using the communications software on the computer, send the backed up database file using XModem CRC protocol to the system.

Refer to the manual supplied with the communications software package provided for the computer for information about sending files.

If the transfer fails, the system responds with one of the following:

If	Then
The system responds with: `BKP0003`	This indicates that the flash ROM in use contains invalid data and data transfer will not be attempted. Corrective action: • Do an EDD to update the flash ROM in use. • Repeat the restore.
The system responds with: `BKP0008`	This indicates that the data transfer procedure was interrupted. The system may have timed out or there was a problem on the telephone line such as excessive noise. Corrective action: • Repeat the restore.

The database files are written to the associated directories in the primary flash drive. When the configuration database has been successfully transferred to the primary flash drive, the system responds with `OK`.

Note: Do not perform a datadump at this stage unless you want to undo the restore from backup. A datadump will write DRAM to the primary flash drive, thus overwriting the restored database.

9 To complete the restore, a SYSLOAD (system reload) is required in order to load the system from the primary flash drive into DRAM. To perform a SYSLOAD:

a. For a Cabinet system, set the circuit breaker on the front of the power supply in the main cabinet to OFF and then to ON.

b. For a Chassis system, turn the power switch off and then on.

End of Procedure

Customer Configuration Backup and Restore

Contents

This section contains information on the following topics:

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Feature description 44
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Operations performed. 44
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Compatible modems and protocols 47
Compatible communications software 47
Feature operations 47

Introduction

This chapter provides an overview of the Customer Configuration Backup and Restore (CCBR) feature. It also provides detailed procedures for using the CCBR feature to:

- access a Small System from a remote location
- access a Small System on-site
- back up the configuration database from the system's flash ROM to a computer disk

- restore or update the configuration database on an operating Small System
- restore or update the configuration database on a non-operating Small System

Feature description

The CCBR feature provides you with the ability to store the configuration database of the Small System on a floppy disk or hard drive using a personal computer (such as an IBM-type PC or a Macintosh computer).

The stored information is used to restore the Small System configuration database in the unlikely event of a system failure, or to update the configuration database on an existing Small System.

File transfer time

Depending on the number of records in the Small System configuration database, it can take over 30 minutes to back up or restore data at a rate of 1200 baud.

> ***Note:*** The number of records in a Small System is displayed when performing a datadump (EDD) using LD 43.

The approximate time required to transfer the data can be calculated as follows:
At 1200 bps, time to transfer = ([Number of records X 1024] + 1132) ÷ 90

> ***Note:*** If a second SDI port on the system is performing maintenance operations, the time required to transfer data may be significantly increased.

Operations performed

You can perform the following operations either remotely or on-site:

- Back up the configuration database of one or more Small Systems to a hard disk or to a floppy disk.

- Restore the configuration database after a system failure, using the information previously stored on disk.
- Bypass the login procedure on a Small System that is in continuous SYSLOAD or INI mode.
- Install a configuration database in a new Small System.

Procedures for performing these operations are described in "Feature operations" on page 47.

Equipment requirements

Remote computer access

Computer access to the Small System is established by connecting SDI port 0, 1, or 2, located on the NTDK20 SSC card (or NTDK97 MSC or NTBK45 System Core cards), to a dial-up line through an on-site modem. This allows the computer to dial directly into the system from a remote location.

On-site computer access

A computer can be connected on-site to the Small System by connecting a computer directly to SDI port 0, 1, or 2 on the SSC card.

Note: A modem is only needed when remote access is a requirement.

Major components

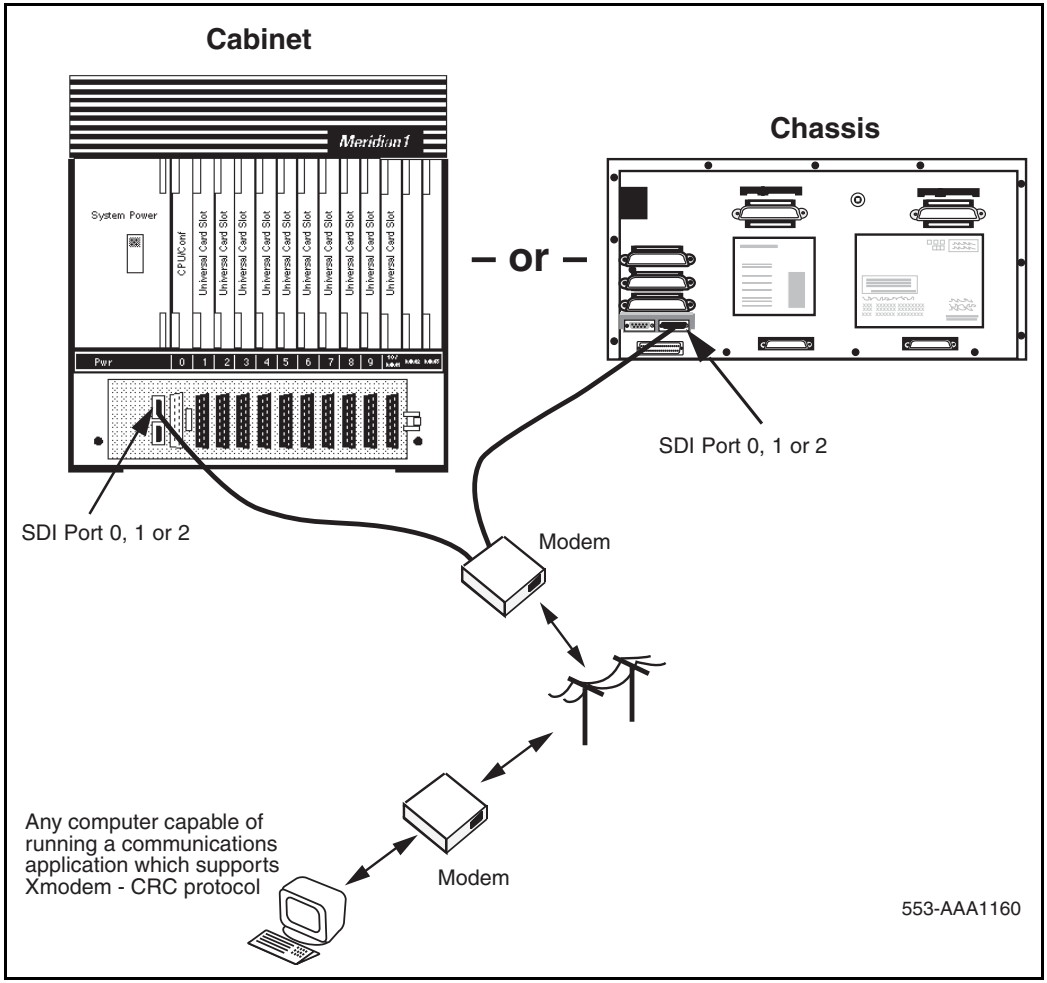
The major components consist of the following:

- a computer that supports XModem CRC communications protocol
- modems for accessing the Small System from a remote location
- telephone line for accessing the Small System from a remote location
- NTBK48 3-port cable to connect the modem or computer to the SDI port
- modem eliminator when connecting a computer on-site directly to the Small System

Note: Two modem eliminators are normally supplied with the Small System. One is equipped with a female-to-female connector; the other is equipped with a female-to-male connector.

Figure 2 shows the various components required to access the Small System remotely with a computer.

Figure 2
CCBR feature — Components for remote access



Compatible modems and protocols

Most modems capable of supporting XModem CRC protocol can be used with this feature. Refer to *Communication Server 1000M and Meridian 1: Small System Installation and Configuration* (553-3011-210) for the protocol specifications. The information is intended to assist those who wish to create a personal communications software package that is compatible with the protocols used by the SDI port in the Small System.

Compatible communications software

The CCBR feature is designed to operate with most communications software packages that support XModem CRC file transfer protocol. Refer to *Communication Server 1000M and Meridian 1: Small System Installation and Configuration* (553-3011-210) for more information.

> ***Note:*** Ensure that your communications package complies with the protocol specifications outlined in *Communication Server 1000M and Meridian 1: Small System Installation and Configuration* (553-3011-210). Not all XModem CRC protocols are identical. Some may not operate properly with the CCBR feature.

Feature operations

The following procedures describe how to use the CCBR feature:

- Procedure 8, “Accessing remotely” on page 48
- Procedure 9, “Accessing from on-site” on page 49
- Procedure 10, “Backing up the configuration database” on page 52
- Procedure 11, “Restoring or updating the configuration database (system operating)” on page 57
- Procedure 12, “Restoring or updating the configuration database (system not operating)” on page 63

Procedure 8
Accessing remotely

1 Open the communications package on the computer.

Use XModem CRC file transfer mode.

Make sure that the parameters in the communications package you are using are properly set. Refer to the instructions provided with your computer for information regarding parameter settings. Some of the parameters may be preset. All values must be set as follows to ensure proper operation:

8 Bits, 1 Stop, No Parity, Full Duplex, bps (See Note).

No Strip, Block Size 128 bytes

Note: The baud rate (bps) depends on the type of modem used and should correspond to the settings at the Small System. The only settings that can be used are 300 bps, 600 bps, 1200 bps, 2400 bps, 4800 bps, 9600 bps, and 19200 bps.

2 From the communications package on the computer, dial the telephone number assigned to the Small System modem.

The modem will answer the call and connect to SDI port 0, 1, or 2 on the Small System.

3 Press the Carriage Return <CR> or **Enter** key.

The Small System displays its present activity.
Example:

```
OVL111 44 IDLE
```

4 Set the **Caps Lock** key on your keyboard to the caps lock setting.

Type **LOGI** and press **<CR>**.

The system responds with PASS?
Example:

```
LOGI
PASS?
```

5 Type the four-digit password assigned to the Small System accessed and press **<CR>**.

The system responds with a period (.) and a caret (>).
Example:

.
>

6 The Small System is accessed and is ready to continue.

Refer to the appropriate procedure in this chapter for the operation being performed and continue.

End of Procedure

Procedure 9
Accessing from on-site

Figures 3 and 4 show the on-site connections for the Cabinet and Chassis systems, respectively. Refer to these figures while performing this procedure.

Figure 3
Cabinet system site connections

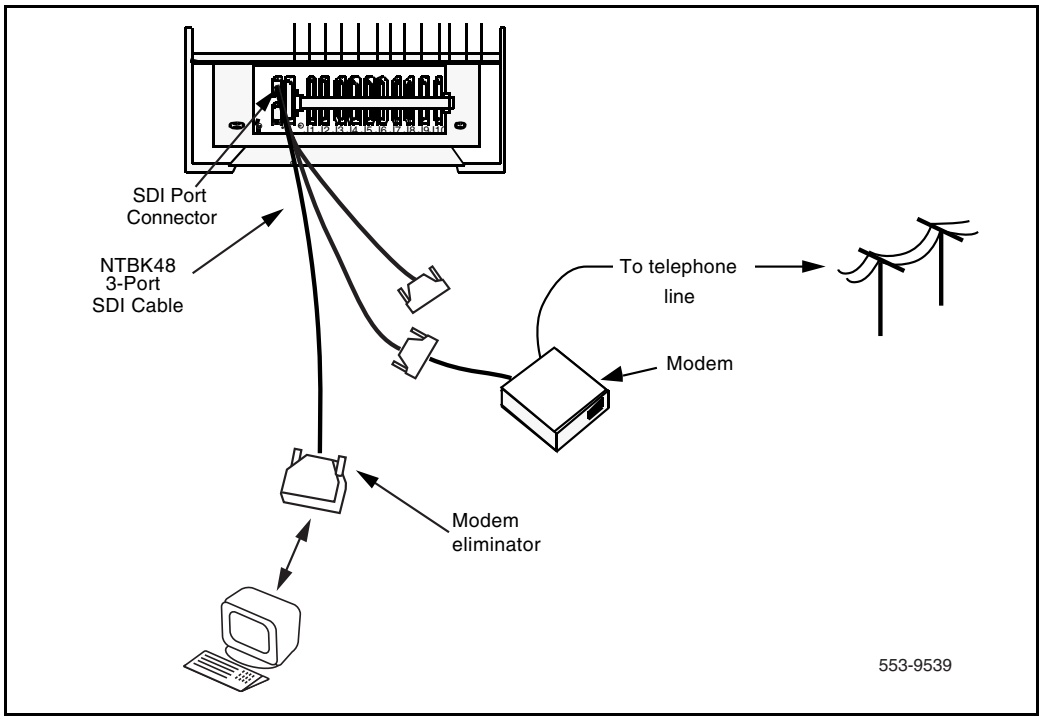
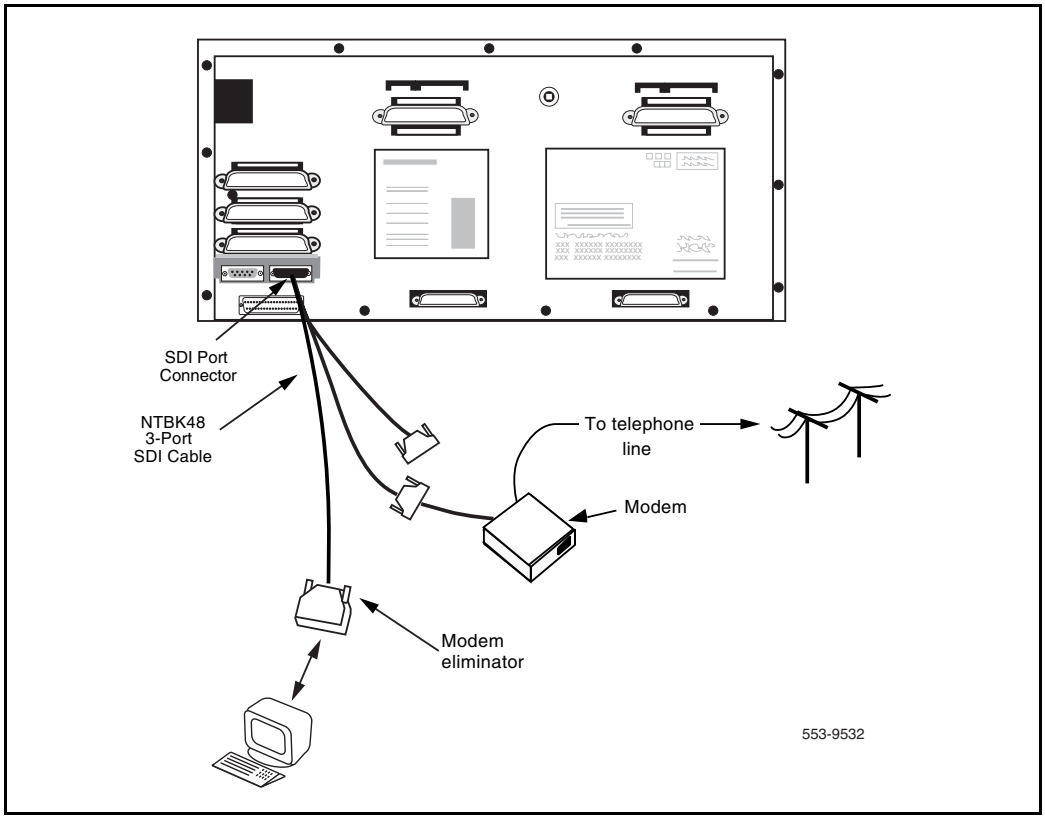


Figure 4
Chassis system site connections



1 Connect the computer to one of the three ports on the NTBK48 SDI cable.

A modem eliminator compatible with the computer is required on the cable. Refer to the instructions supplied with the computer for information about modem eliminators.

2 Open the communications package on the computer.

Use XModem CRC file transfer mode.

Make sure that the parameters in the communications package you are using are properly set. Refer to the instructions provided with your computer for information regarding parameter settings. Some of the parameters may be preset. All values must be set as follows to ensure proper operation:

8 Bits, 1 Stop, No Parity, Full Duplex, bps. (See Note)
No Strip, Block Size 128 bytes

Note: The baud rate (bps) depends on the type of modem used and should correspond to the settings on the Small System. The only settings that can be used are 300 bps, 600 bps, 1200 bps, 2400 bps, 4800 bps, 9600 bps, and 19200 bps.

3 Press the Carriage Return **<CR>** or **Enter** key.

The Small System displays its present activity.
Example:

```
OVL111 44 IDLE
TTY 00 SCH MTC BUG 23:18
```

4 Set the **Caps Lock** key on your keyboard to the caps lock setting.

Type **LOGI** and press **<CR>**.

The system responds with PASS?
Example:

```
LOGI
PASS?
```

5 Type the four-digit password assigned to the Small System accessed and press **<CR>**.

The system responds with a period (.) and a caret (>).
Example:

```
.
>
```

6 The Small System is accessed and is ready to continue.

Refer to the appropriate procedure in this chapter for the operation being performed and continue.

End of Procedure

Procedure 10
Backing up the configuration database

This procedure describes how to copy the configuration database from the system's flash ROM to a computer disk.

1 Access the Small System and log in.

See "Accessing remotely" on page 48 or "Accessing from on-site" on page 49.

2 Load LD 43. Type **LD 43** and press **<CR>**.

The system responds with EDD followed by a period (.).
Example:

```
EDD000
.
```

3 Type **EDD** and press **<CR>** to perform a datadump.

IMPORTANT!

It is extremely important that this step be completed. Its purpose is to make sure that the latest configuration database, including recent service changes, is copied from the system main memory (RAM) to the primary flash ROM. To avoid the potential corruption of data, do not attempt to interrupt power, initialize the system, or abort the overlay until it has fully completed processing the command.

4 Wait for the system to complete the datadump.

It takes approximately five minutes to complete a datadump. Once the datadump is completed, the system responds with:

```
DATADUMP COMPLETE
```

The following is an example of what may be displayed on the screen during the datadump.

```
.edd

DB SEQ NUM = 8
CONFIG
.
.
.
CHECKING

RECORD COUNT = 0006

Starting internal database backup
to internal backup drive
Synching drives
Updating internal backup
.
.
.

Internal backup complete
All files are backed up!

DATADUMP COMPLETE

.
EDD000
```

Note: Review step 5 through step 10 before proceeding. If these steps are not completed within approximately five minutes after the **XBK** command is entered, the system will time out.

5 Exit the overlay. Type four asterisks (********) to exit LD 43.

6 Load LD 143. Type **LD 143** and press **<CR>**.

The system responds with CCBR000 followed by a period (.). Example:

```
CCBR000
.
```

7 Type **XBK** and press **<CR>**.

The system responds with:

```
INFO:
```

8 Enter the text that will appear as a header on this data file.

The INFO: prompt allows the entry of up to 128 characters of text (including spaces, carriage returns, and line feeds). The text entered is added to the configuration database and serves as a header for the file.

Note: If more than 128 characters are entered, the system will exit the text entry mode and, after a few seconds, respond with R> as described in the next step. If you do not wish to enter any text, press **<CR>** as described in step 9.

9 When all the text is entered, press **<CR>**.

After a few seconds the system responds with R>, indicating that it is ready to continue.

The following is an example of what may be displayed on the screen:

```
.XBK

INFO:
CONFIGURATION DATA FROM YOUR OPTION 11C SYSTEM
JULY 7/92


R>
```

Note: The next step must be completed within two minutes or the system will time out. If a time-out occurs, return to step 8 and type the **XBK** command.

10 Using the communications software on the computer, receive the configuration database file using XModem CRC protocol. The file received will be in binary format.

Refer to the manual supplied with the communications software package provided for the computer for information about receiving files. Refer to *Communication Server 1000M and Meridian 1: Small System Installation and Configuration* (553-3011-210) for more information about the XModem CRC protocol.

The file is transferred and stored on the computer's hard disk or on floppy disk, as decided by the user.

11 Wait for the file transfer operation to complete.
File transfer may take quite some time to complete, depending on database size and baud rate.

When the file transfer has completed successfully, the system responds with `OK`.

If the file transfer fails, the system responds with one of the following:

If	Then
The system responds with: `BKP0003`	This indicates that the flash ROM in use contains invalid data, and data transfer will not be attempted. Corrective action: • Do an EDD to update the flash ROM in use. • Repeat the backup procedure using the **XBK** command.
The system responds with: `BKP0008`	This indicates that the data transfer procedure was interrupted by the system (timed out) or by a problem on the telephone line (such as excessive noise). Corrective action: • Repeat the backup procedure.

12 To verify the CCBR backup, type **XVR** and press **<CR>**. Wait for the system to respond with the `R>` prompt.

The **XVR** command is used to verify the backed up data file. It sends the backed up file back to the Small System and compares it with the configuration data stored in the system. This ensures the integrity of the backed up data file.

13 With the communications software on the computer, send the backed up data file using XModem CRC protocol to the Small System for a comparison.

Refer to the manual supplied with the communications software package provided for the computer for information about sending files.

The Small System displays the character `C` every 3 seconds until the file is sent. The file must be sent before the character `C` is displayed 20 times (approximately 1 minute) to avoid a system time-out.

The following is an example of what may be displayed on the screen:

```
.XVR
R>
CCCCCCCCCC
```

When the file is successfully verified, the system responds with `OK`.

If the file verification fails, the system responds with one of the following:

If	Then
The system responds with: `BKP0002`	This indicates a mismatch in the data file. Corrective action: • Compare the file again with the **XVR** command. • If the verification fails again, repeat the backup and then reverify using the **XVR** command. • Check your communications package parameters. Make sure that the parameters, such as Mode (should be set to BINARY) or Protocol (should be set to XModem), are correctly set. Another possible cause is that the communications package is stripping characters.
The system responds with: `BKP0003`	This indicates that the flash ROM in use contains invalid data, and data transfer will not be attempted. Corrective action: • Do an EDD to update the flash ROM in use. • Repeat the verification procedure.

If	Then
The system responds with: `BKP0008`	This indicates that a transmission error occurred. The procedure may have timed out or there was a problem on the telephone line such as excessive noise. Corrective action: • Repeat the verification procedure.

14 The configuration database backup procedure is completed.

Type four asterisks (**`****`**) to exit the overlay program. Log out of the Small System by typing **`LOGO`**.

End of Procedure

Procedure 11
Restoring or updating the configuration database (system operating)

This procedure describes how to transfer the configuration database from a computer disk to an operating Small System.

1 Access the Small System and log in.

See “Accessing remotely” on page 48 or “Accessing from on-site” on page 49.

2 Load LD 143. Type **`LD 143`** and press **`<CR>`**.
Wait for LD 143 to load.

With Small Systems, the database can also be restored or updated using the Software Installation Program. For details, refer to “Restoring a backed up database” on page 30.

3 Type **`XRT`** and press **`<CR>`** to begin the configuration database restore procedure.

The system prepares to receive the configuration database file from the computer and restores it onto the Small system Controller (SSC) card.

The system responds with `WAIT - - 2 MINUTES` followed by `R>`.
Example:

```
.XRT
WAIT - - 2 MINUTES
R>
```

WARNING

The flash ROM is erased at the start of this step. If a problem occurs during the restore procedure, DO NOT leave the system in this state. Repeat the restore procedure. If problems are still encountered, use the **EDD** command in LD 43 to datadump the current data from memory (RAM) to the flash ROM.

4 With the communications software on the computer, send the backed up data file using XModem CRC protocol to the system.

Refer to the manual supplied with the communications software package for information about sending files.

The Small System displays the character C every 3 seconds until the file is sent. The file must be sent before the character C is displayed 20 times (approximately 1 minute) to avoid a system time-out.

The data is copied from the computer to the SSC card flash ROM. The Small System site ID contained on the software cartridge on the SSC card is checked against the ID contained in the configuration database record being sent. If the IDs do not match, the data will still be restored and the Small System will operate, but the following message will appear:

```
BKP0011
```

This indicates that the site ID in the customer data being restored does not match that of the Small System data stored on the SSC card.

Note: The procedure completes normally. This message is only a warning.

Corrective action:

- If this feature is being used as an install tool, this message is normal and does not indicate an error condition. The site ID will be automatically corrected on the next datadump (EDD) and backup.
- Check the customer data file to ensure it is the correct one. You may inadvertently be restoring the wrong data file to the system. If the data file is the correct one, contact Nortel technical support.

When the file is successfully restored on the flash ROM, the system responds with OK.

If the file restore fails, the system responds with one of the following:

If	Then
The system responds with: BKP0004	This indicates a failure to erase the SSC card flash ROM. Corrective action: • Repeat the Restore procedure. • If the procedure fails again, a faulty flash ROM is the probable cause. Replace the SSC card.
The system responds with: BKP0003	This indicates that the flash ROM in use contains invalid data and the procedure failed. Corrective action: • Check the customer data file being transmitted to ensure that it is the correct one. • Repeat the Restore procedure using the **XRT** command. If it still fails, then a corrupted customer data file is a probability.
The system responds with: BKP0008	This indicates that a transmission error occurred. The procedure may have timed out or there was a problem on the telephone line such as excessive noise. Corrective action: • Repeat the procedure.

5 Type **XVR** and press **<CR>**. Wait for the system to respond with the R> prompt.

The **XVR** command is used to verify the data file sent to the Small System by comparing it with the one in the computer.

6 With the communications software on the computer, send the backed up data file using XModem CRC protocol to the Small System for a comparison.

Refer to the manual supplied with the communications software package provided for the computer for information about sending files.

The Small System displays the character C every 3 seconds until the file is sent. The file must be sent before the character C is displayed 20 times (approximately 1 minute) to avoid a system time-out.

The following is an example of what may be displayed on the screen:

```
.XVR

R>
CCCCCCCCCC
```

When the file is successfully verified, the system responds with OK.

If the file verification fails, the system responds with one of the following:

If	Then
The system responds with: BPK002	This indicates a mismatch in the data file. Corrective action: • Compare the file again with the **XVR** command. • If the verification fails again, repeat the backup or restore process, and then reverify using the **XVR** command. • Check your communications package parameters. Make sure that the parameters, such as Mode (should be set to BINARY) or Protocol (should be set to XModem), are correctly set. Another possible cause is that the communications package is stripping characters.

If	Then
The system responds with: BKP0003	This indicates that the flash ROM in use contains invalid data and the procedure failed. Corrective action: • Do an EDD to update the flash ROM in use. • Repeat the Verify procedure using the **XVR** command.
The system responds with: BKP0008	This indicates that a transmission error occurred. The procedure may have timed out or there was a problem on the telephone line such as excessive noise. Corrective action: • Repeat the procedure.

7 Type **XSL** and press **<CR>**.

This prepares the system to perform a SYSLOAD. The system responds with CONFIRM? (Y/N).

8 Type **N** if you do not wish to continue, or **Y** if you wish to continue. Then, press **<CR>**.

If you typed **Y**, the system responds with PSWD?.

9 Type the Small System reload confirmation password and press **<CR>**.

Wait for the SYSLOAD to complete. The system responds with various SYSLOAD-related messages and DONE when it is completed. Example:

```
.XSL

CONFIRM? (Y/N): Y

PSWD?:
```

Note: The password is not displayed when it is entered. HWR007 is displayed after the correct password is entered.

```
SYS000 0400 0003 0800 00
DATA FROM SYSTEM CORE EDD/UPS
DONE
```

10 Log in to the system.

11 Type **LD 2** to load LD 2. This overlay program allows the time and date to be reset in the system.

The system responds with TFC000 and a period (.)
Example:

```
TFC000
.
```

12 Type **STAD (day) (month) (year) (hour) (minute) (second)**.

This corrects the time and date in the system.
Example:

```
.STAD 08 07 1992 15 51 30
```

Type **TTAD** to check the time and date. The system responds with the updated time and date.
Example:

```
.TTAD WED 08 07 1992 15 51 32
```

13 Type four asterisks (********) to exit LD 2.

14 Type **LD 43** to load LD 43.

Type **EDD NBK** and press **<CR>**.

Wait for the datadump to complete.

The configuration database in memory (RAM) is copied to the primary flash ROM and to the backup flash ROM.

15 The configuration database restore procedure is completed.

Type four asterisks (********) to exit LD 43. Log out of the system by typing **LOGO**.

End of Procedure

Procedure 12
Restoring or updating the configuration database (system not operating)

This procedure describes how to transfer the configuration database from a computer disk to a non-operating Small System that is continuously and unsuccessfully attempting to complete a SYSLOAD or an INITIALIZE. The configuration database is copied from the computer to the primary flash ROM in the Small System.

WARNING

Do not attempt to perform this procedure unless the system is unsuccessfully attempting to complete a SYSLOAD or an INITIALIZE. Corruption of the Small System data and complete system failure may occur if this procedure is performed under any other circumstances. The backed up data being restored must have originated from this Small System.

Note: This procedure requires the presence of a technician at the Small System site to enable the login procedure bypass feature.

1 At the Small System, enable the login procedure bypass mode.

Make a note of the existing switch settings.

Enable the override mode by setting the switches on the SSC card located in slot 0 of the main cabinet/chassis. Set the switches to operate at 1200 or 2400 baud rate (depending on the modem or computer) as shown in Table 6.

Table 6
Override settings

Override setting for 1200 baud modem		
BAUD rate switch	**Switch OFF**	**Switch ON**
150	•	
300	•	
600	•	
1200		•
2400		•
4800		•
9600		•
19200		•

Override setting for 2400 baud modem		
BAUD rate switch	**Switch OFF**	**Switch ON**
150	•	
300	•	
600	•	
1200	•	
2400		•
4800		•
9600		•
19200		•

2 Access the system using port 0 on the SSC card.

See “Accessing remotely” on page 48 or “Accessing from on-site” on page 49.

Note: Do not perform the login procedure when the system is in override mode. The computer accesses the flash ROM directly.

3 Type **XRT** and press **<CR>** to begin to restore the configuration database.

The system prepares to receive the configuration database file from the computer and store it on the flash ROM.

The system responds with `WAIT - - 2 MINUTES` followed by `R>`. Example:

```
XRT
WAIT - - 2 MINUTES
R>
```

4 With the communications software on the computer, send the backed up data file using XModem CRC protocol to the system.

Refer to the manual supplied with the communications software package provided for the computer for information about sending files.

The system displays the character `C` every 3 seconds until the file is sent. The file must be sent before the character `C` is displayed 20 times (approximately 1 minute) to avoid a system time-out.

The data is copied from the computer disk to the flash ROM. The Small System site ID is checked against the ID contained in the configuration database record being sent. If the IDs do not match, the data will still be restored and the Small System will operate, but the following message will appear:

```
BKP0011
```

This indicates that the site ID in the customer data being restored does not match that of the Small System being restored.

Note: The procedure completes normally. This message is only a warning.

Corrective action:

- If this feature is being used as an install tool, this message is normal and does not indicate an error condition. The site ID will be automatically corrected on the next datadump (EDD) and backup.
- Check the customer data file to ensure it is the correct one. You may inadvertently be restoring the wrong data file to the system. If the data file is the correct one, contact Nortel technical support.

When the file is successfully restored on the flash ROM, the system responds with `OK`.

If the file restore fails, the system responds with one of the following:

If	Then
The system responds with: `BKP0004`	This indicates a failure to erase either the cartridge or the SSC card flash ROM. Corrective action: • Repeat the Restore procedure. • If the procedure fails again, a faulty flash ROM is the probable cause. Replace the SSC card.
The system responds with: `BKP0003`	This indicates that the flash ROM in use contains invalid data and the procedure failed. Corrective action: • Check the customer data file being transmitted to ensure that it is the correct one. • Repeat the Restore procedure using the **`XRT`** command. If it still fails, then a corrupted customer data file is a probability.
The system responds with: `BKP0008`	This indicates that a transmission error occurred. The procedure may have timed out or there was a problem on the telephone line such as excessive noise. Corrective action: • Repeat the procedure.

5 Disable the login procedure bypass mode.

Reset the switches on the front of the SSC card to their original setting.

> **WARNING**
>
> The override mode must be disabled for the Small System to operate. The switches on the front of the SSC card must be restored to their original settings.

6 Initiate a Small System reload (SYSLOAD) manually.

The system may SYSLOAD automatically when the override mode is disabled. If it does not, initiate a SYSLOAD:

- for a Cabinet system, by setting the circuit breaker on the front of the power supply unit in the main cabinet to OFF, then to ON
- for a Chassis system, by turning the power switch off and then on

The system will SYSLOAD from the flash ROM that was just restored. It should then operate normally.

7 Log in to the system.

8 Type **LD 2** to load LD 2. This overlay program allows the time and date to be reset in the system.

The system responds with TFC000 and a period (.)
Example:

```
TFC000
.
```

9 Type **STAD (day) (month) (year) (hour) (minute) (second)**.

This corrects the time and date in the system.
Example:

```
.STAD 08 07 1992 15 51 30
```

Type **TTAD** to check the time and date. The system responds with the updated time and date.
Example:

```
.TTAD WED 08 07 1992 15 51 32
```

10 Type four asterisks (********) to exit LD 2.

11 Type **LD 43** to load LD 43.

Type **EDD** and press **<CR>**.

Wait for the datadump to complete.

The configuration database in memory (RAM) is copied to the primary flash ROM and to the backup flash ROM.

12 The configuration database restore procedure is completed.

Type four asterisks (********) to exit LD 43. Log out of the system by typing **LOGO**.

End of Procedure

Maintenance precautions

Contents

This section contains information on the following topics:

General precautions 69
Fiber cable 70
Circuit cards 70

General precautions

Small System equipment is based on solid-state circuitry that is sensitive to static electricity and environmental conditions. Follow the precautions in this chapter to avoid personal injury and equipment damage.

DANGER OF ELECTRIC SHOCK

To avoid the danger of electric shock, be careful when working with power equipment and connections. Warning notices are displayed and should be heeded.

In the Cabinet system power supply, there are no user-serviceable parts other than the batteries. Do not disassemble a power supply under any circumstances, because there is risk of electric shock. If a power supply fails, it must be replaced.

To remove depleted batteries and replace with fully charged ones, use the procedures in this guide.

To avoid damage to circuit cards from static discharge, wear the antistatic wrist strap when you work on circuit cards. For the Cabinet system, an antistatic wrist strap is provided in the bottom of each cabinet.

For the Chassis system, the power supply is internal and not field serviceable. In addition, there is no battery backup supported in the Chassis system.

Fiber cable

Observe the following precautions when handling fiber cables:

- Do not staple.
- Avoid sharp bends.
- Use the fiber management device supplied to route the cable between cabinets or chassis.
- Always place protective caps on the fiber-optic cable connectors when the fiber cable is removed. The connectors must be kept clean.

WARNING

The fiber-optic interface product used in the Small System is considered safe. However, as a precaution do not look directly at the optical port or the end of fiber-optic cable.

Under certain conditions (such as during cable testing or under light magnification), the cable or port may expose the eye to light beyond the limits of Maximum Permissible Exposure recommended in some jurisdictions. Do not remove protective caps or plugs until ready to connect the cable.

Note: The light used is not visible, so even though you cannot see it, you should still consider it dangerous.

Circuit cards

Handle circuit cards as follows:

- Wear the antistatic wrist strap before handling circuit cards.

- Handle cards by the card stiffeners and edges only. Do not touch the contacts or components.
- Keep cards installed in the system as much as possible to avoid dirty contacts and unnecessary wear.
- Set cards on a protective antistatic bag. If an antistatic bag is not available, hold the card, or set it in a card slot unseated from the connectors.
- Unpack or handle cards away from electric motors, transformers, or similar machinery.
- Store cards in protective packing. Do not stack cards on top of each other unless they are packaged.
- Store cards in a dry, dust-free area.

During repair and maintenance procedures:

- Insert cards into compatible slots only.
- Turn off the circuit breaker or switch for a cabinet power supply before the power supply is removed or inserted. For the chassis, turn off the power switch located on the inside front panel of the chassis (the power status LED will then turn off).
- Software disable cards, if applicable, before they are removed or inserted.
- Hardware disable cards, whenever there is an enable/disable switch, before they are removed or inserted.
- Return defective or heavily contaminated cards to a repair center; do not try to repair or clean them.

Communicating with the system

Contents

This section contains information on the following topics:

Introduction 73
System terminal 73
Local and remote access 74
Maintenance telephone 77

Introduction

You can exchange information with the system through the system terminal and through the maintenance telephone. This chapter discusses these tools for communicating with the system.

System terminal

You can send maintenance commands and receive system messages by accessing the CPU through an RS-232 device, such as a video display terminal (VDT) or teletypewriter (TTY).

Through the system terminal, you can enter commands that tell the system to perform specific tasks. The system performs the tasks and sends messages back to the system terminal, indicating status or errors. System messages, along with indicators such as light-emitting diode (LED) indicators, identify faults in the system.

System messages are codes with a mnemonic and number. The mnemonic identifies the type of message. The number identifies the specific message. Table 7 gives an example of the format for a system message.

Table 7
Example of system message formats

System message: BSD0090	Interpretation
BSD0090	The program has detected a power fault indication.

See *Software Input/Output: System Messages* (553-3001-411) for all system messages.

Local and remote access

Devices can be installed at either local or remote locations.

A system terminal can be connected at the main and expansion.

> ***Note:*** For a Cabinet system, the expansion cabinets must be connected to the main cabinet with fiber-optic cable or 100BaseT/F cable. Upgraded systems that are still interconnected with copper cable do not have a system terminal capability at the expansion cabinet.

When a system terminal is installed at the main cabinet/chassis, it is connected to a Serial Data Interface (SDI) port located within the main cabinet/chassis.

When a system terminal is connected to an expansion cabinet/chassis, it is connected to an SDI port which is part of the Fiber Receiver card or Small System Controller (SSC) card in the expansion cabinet/chassis.

When a system terminal is installed at a remote location that does not have an expansion cabinet/chassis, modems and a telephone line are required between the terminal and the SDI port.

An alternate connection option, for either local or remote access, is to use the OTM 10baseT Ethernet port on the main cabinet/chassis. Figure 5 on page 76 shows typical system terminal configurations.

The SDI port is discussed in greater detail in *Communication Server 1000M and Meridian 1: Small System Planning and Engineering* (553-3011-120).

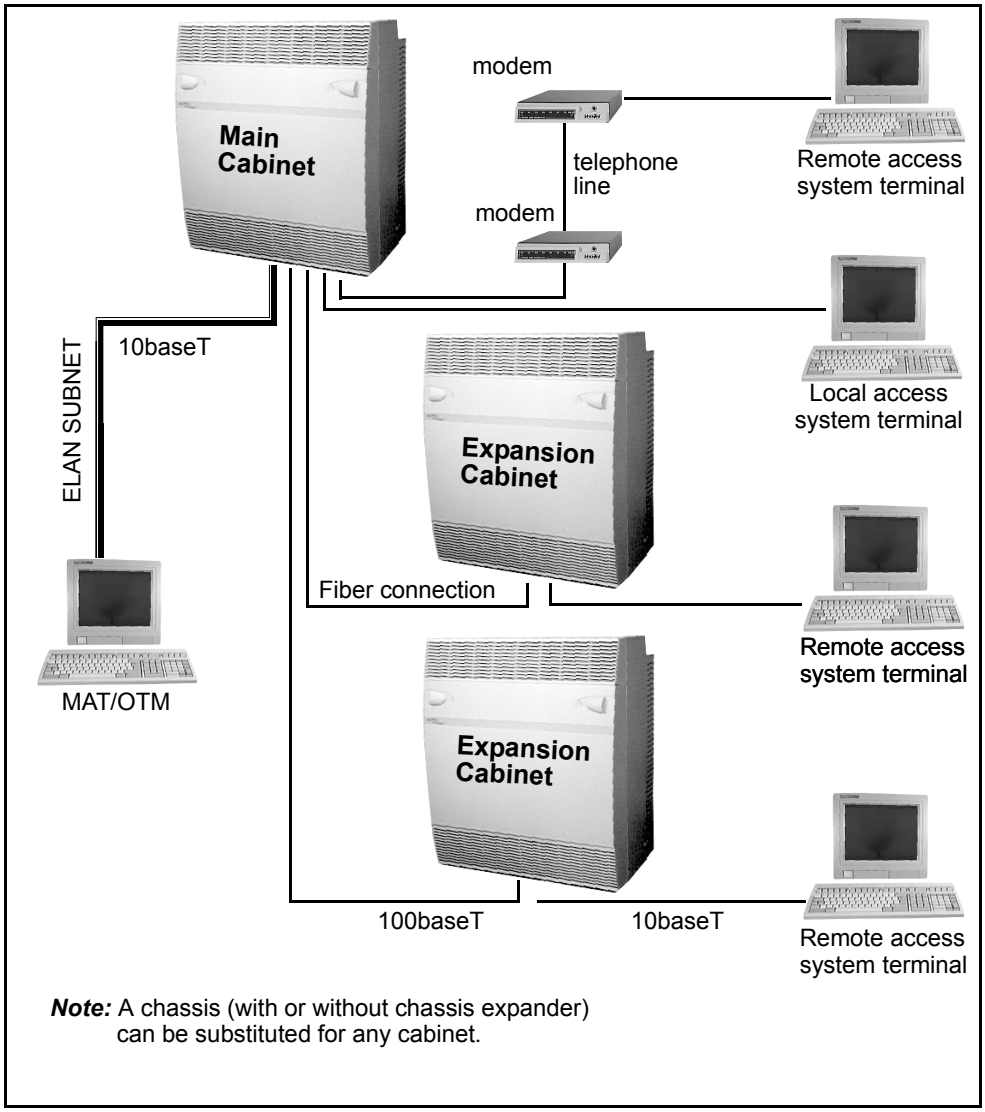
Remote TTY

The three SDI ports available on the SSC card of an IP expansion cabinet/chassis can be used as additional system TTYs. All applications supported on the SDI ports of the SSC card in the main cabinet/chassis, with the exception of LSL, are supported on the SDI ports of the IP expansion SSC cards.

The purpose of a remote TTY is to be able to access the main cabinet/chassis from an IP expansion cabinet/chassis. However, TTYs configured on the main cabinet/chassis cannot access the IP expansion cabinet/chassis.

If the IP expansion cabinet/chassis is configured to be survivable, the SDI ports of the IP expansion SSC card can be used during survival mode. In this mode, they function exactly like a TTY connected to a stand-alone Small System. However, the TTY has no access to either LD 43 or LD 143. In survival mode, the SDI ports of the IP expansion cannot be used to access the main cabinet/chassis.

Figure 5
Small System local and remote access system terminals



Note: A chassis (with or without chassis expander) can be substituted for any cabinet.

IP expansion 10BaseT port

The 10BaseT Ethernet port available on the SSC of an IP expansion cabinet/chassis is functional. However, the Ethernet port on the IP expansion cabinet/chassis does not have a default IP configuration. This means that the IP port configuration must be performed before it can be used.

It is not recommended to use the remote 10BaseT port in normal mode, as maintenance or alarm management are not available. In survival mode it assumes the system-level configuration of the main cabinet/chassis port.

Maintenance telephone

A telephone functions as a maintenance telephone when you define the Class of Service as MTA (Maintenance Allowed) in LD 11 or the telephone is assigned as a Model 99.

A maintenance telephone allows you to send commands to the system, but you can only use a subset of the commands that can be entered from a system terminal. The maintenance telephone, however, takes priority over a system terminal and will log the terminal out.

You can test tones and outpulsing through the maintenance telephone. Specific commands for tone testing are given in Tone and Digit Switch and Digitone Receiver Diagnostic (LD 34).

To enter commands on a maintenance telephone, you press the keys that correspond to the letters and numbers of the command. Refer to “Accessing the system” on page 120 for information about entering commands from a maintenance telephone.

Hardware maintenance tools

Contents

This section contains information on the following topics:

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Circuit card features 80
- Self-tests 80
- Enable and disable switches 81
- Faceplate LEDs 81
- Monitor Jacks 94
- Initialize button 94

System alarms 95
- Major alarms 95
- Minor alarms 95
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System Monitor alarms 97
- Line transfer 97
- Power loss 98
- Cabinet power supply failure 98
- Temperature alarms 99

Introduction

Fault indicators and hardware features help perform maintenance tasks (particularly identifying and clearing faults). These maintenance tools include:

- circuit card features that perform self-tests, indicate status, and minimize adverse affects on call processing
- System alarms indicators, categorized by their severity and area of impact
- System Monitor alarms indicators, which identify LAN, power, and temperature faults

Circuit card features

Circuit card features include:

- self-tests
- enable/disable switches
- LED indicators

Self-tests

A self-test checks to see that a card is working correctly. Many cards perform a self-test on power-up. The **`Disable`** and **`Enable`** software commands force a card to self-test. The results of a self-test generally show whether or not there is a problem with the card.

Self-test information for ISDN BRI cards is found in *ISDN Basic Rate Interface: Maintenance* (553-3001-518).

Self-test information for ISDN 1.5 Mb and 2 Mb DTI/PRI cards is found in *ISDN Primary Rate Interface: Maintenance* (553-3001-517).

Enable and disable switches

Some cards have a switch on the faceplate to disable the card.

When you remove a card, whenever possible disable it in software, then set the switch on the card to DIS. When you install a card, set the switch to DIS before you insert it. After the card is positioned, set the switch to ENB, then enable it in software. Software disabling and enabling of cards is described in *Software Input/Output: System Messages* (553-3001-411).

Faceplate LEDs

The following section describes the LEDs on the faceplates of the following circuit cards, Fiber Receiver cards, and daughterboards:

- "NTAK09 faceplate LEDs" on page 81
- "NTAK10 faceplate LEDs" on page 83
- "NTAK79 faceplate LEDs" on page 85
- "NTBK50 faceplate LEDs" on page 86
- "NTDK20 SSC card faceplate LEDs" on page 88
- "NTDK23, NTDK25, and NTDK80 Fiber Receiver card faceplate LEDs" on page 89
- "NTDK83, NTDK99, NTTK01, and NTTK02 IP Expansion Daughterboard LEDs" on page 91
- "NTDK97 MSC card faceplate LEDs" on page 92
- "NTRB21 faceplate LEDs" on page 92

NTAK09 faceplate LEDs

The NTAK09 1.5 Mb DTI/PRI circuit card has a total of seven faceplate LEDs. Five of the LEDs are directly associated with the operation of the NTAK09 circuit card. The remaining two LEDs are associated with the optional daughterboards. The first of these LEDs indicates the status of the NTAK20 Clock Controller daughterboard; the second LED indicates the status of the NTAK93 D-channel interface daughterboard.

Table 8 describes the LEDs on the NTAK09 DTI/PRI circuit card.

Table 8
NTAK09 LEDs (Part 1 of 2)

Affected circuit card	LED	State	Definition
NTAK09	DIS	On (Red)	NTAK09 is disabled.
		Off	NTAK09 is not disabled.
	ACT	On (Green)	NTAK09 is active. No alarm states exist, the card is not disabled, nor is it in a loopback state.
		Off	An alarm state or loopback state exists, or the card has been disabled. See other faceplate LEDs for more information.
	RED	On (Red)	A red alarm state is detected.
		Off	No red alarm.
	YEL	On (Yellow)	A yellow alarm state is detected.
		Off	No yellow alarm.
	LBK	On (Green)	NTAK09 is in loopback mode.
		Off	NTAK09 is not in loopback mode.

Table 8
NTAK09 LEDs (Part 2 of 2)

Affected circuit card	LED	State	Definition
NTAK20	CC	On (Red)	NTAK20 is equipped and disabled.
		On (Green)	NTAK20 is equipped and is either locked to a reference or is in free run mode.
		Flashing (Green)	NTAK20 is equipped and is attempting to lock (tracking mode) to a reference. If the LED flashes continuously over an extended period of time, check the CC STAT in LD 60. If the CC is tracking, this may be an acceptable state. Check for slips and related clock controller error conditions. If none exist, then this state is acceptable, and the flashing is identifying jitter on the reference.
		Off	NTAK20 is not equipped.
NTAK93/ NTBK51	DCH	On (Red)	D-channel daughterboard is equipped and disabled.
		On (Green)	D-channel daughterboard is equipped and enabled.
		Off	D-channel daughterboard is not equipped.

Note: Only one of the five NTAK09-related LEDs should be on at any one time.

NTAK10 faceplate LEDs

The NTAK10 2 Mb DTI circuit card has a total of six faceplate LEDs. Five of the LEDs are directly associated with the operation of the NTAK10 2 Mb DTI circuit card. The remaining LED is associated with the on-board clock controller.

Table 9 describes the LEDs on the NTAK10 DTI circuit card.

Table 9
NTAK10 LEDs

LED	State	Definition
DIS	On (Red)	NTAK10 is disabled.
	Off	NTAK10 is not disabled.
OOS	On (Yellow)	NTAK10 is out-of-service. No alarm states exist, the card is not disabled, nor is it in a loopback state.
	Off	NTAK10 is not out-of-service.
NEA	On (Yellow)	A near-end alarm state has been detected.
	Off	No near-end alarm.
FEA	On (Yellow)	A far-end alarm state has been detected.
	Off	No far-end alarm.
LBK	On (Yellow)	NTAK10 is in loopback mode.
	Off	NTAK10 is not in loopback mode.
CC	On (Red)	The clock controller is switched on and disabled.
	On (Green)	The clock controller is switched on and is either locked to a reference or is in free run mode.
	Flashing (Green)	The clock controller is switched on and is attempting to lock (tracking mode) to a reference. If the LED flashes continuously over an extended period of time, check the CC STAT in LD 60. If the CC is tracking, this may be an acceptable state. Check for slips and related clock controller error conditions. If none exist, then this state is acceptable, and the flashing is identifying jitter on the reference.
	Off	The clock controller is switched off.

NTAK79 faceplate LEDs

The NTAK79 2 Mb PRI circuit card has a total of seven faceplate LEDs. Five of the LEDs are directly associated with the operation of Primary Rate Interface (PRI). The remaining two LEDs are associated with the on-board clock controller and the on-board D-channel interface (DCHI).

Table 10 describes the LEDs on the NTAK79 2 Mb PRI circuit card.

Table 10
NTAK79 LEDs (Part 1 of 2)

LED	State	Definition
OOS	On (Red)	NTAK79 is either disabled or out-of-service.
	Off	NTAK79 is not disabled.
ACT	On (Green)	NTAK79 is active.
	Off	NTAK79 is not disabled. The OOS LED is red.
RED	On (Red)	A red alarm state has been detected.This represents a local alarm state of one of the following: • Loss of Carrier (LOS) • Loss of Frame (LFAS) • Loss of CRC Multi-frame (LMAS)
	Off	No red (local) alarm.
YEL	On (Yellow)	A yellow alarm state has been detected. This represents a remote alarm indication from the far end. The alarm may be either Alarm Indication (AIS) or Remote Alarm (RAI).
	Off	No yellow (remote) alarm.
LBK	On (Green)	NTAK79 is in loopback mode.
	Off	NTAK79 is not in loopback mode.

Table 10
NTAK79 LEDs (Part 2 of 2)

LED	State	Definition
CC	On (Red)	The clock controller is switched on and disabled.
	On (Green)	The clock controller is switched on and is either locked to a reference or is in free run mode.
	Flashing (Green)	The clock controller is switched on and is attempting to lock (tracking mode) to a reference. If the LED flashes continuously over an extended period of time, check the CC STAT in LD 60. If the CC is tracking, this may be an acceptable state. Check for slips and related clock controller error conditions. If none exist, then this state is acceptable, and the flashing is identifying jitter on the reference.
	Off	The clock controller is switched off.
DCH	On (Red)	DCHI is equipped and disabled.
	On (Green)	DCHI is equipped and enabled, but not necessarily established.
	Off	DCHI is switched off.

NTBK50 faceplate LEDs

The NTBK50 circuit card has a total of seven faceplate LEDs. Five of the LEDs are directly associated with the operation of the PRI. The remaining two LEDs are associated with the clock controller and DCHI/DDCH daughterboard.

Table 11 describes the LEDs on the NTBK50 circuit card.

Table 11
NTBK50 faceplate LEDs (Part 1 of 2)

LED	State	Definition
OOS	On (Red)	NTBK50 is either disabled or out-of-service. Also, the state of the card after power-up, completion of self-test, and exiting remote loopback.
	Off	NTBK50 is not disabled.
ACT	On (Green)	NTBK50 is active.
	Off	NTBK50 is not disabled. The OOS LED is red.
RED	On (Red)	A red alarm state has been detected.This represents a local alarm state of one of the following: • Loss of Carrier (LOS) • Loss of Frame (LFAS) • Loss of CRC Multi-frame (LMAS)
	Off	No red (local) alarm.
YEL	On (Yellow)	A yellow alarm state has been detected. This represents a remote alarm indication from the far end. The alarm may be either Alarm Indication (AIS) or Remote Alarm (RAI).
	Off	No yellow (remote) alarm.
LBK	On (Green)	NTBK50 is in loopback mode.
	Off	NTBK50 is not in loopback mode.

Table 11
NTBK50 faceplate LEDs (Part 2 of 2)

LED	State	Definition
CC	On (Red)	The clock controller is software disabled.
	On (Green)	The clock controller is enabled and is either locked to a reference or is in free run mode.
	Flashing (Green)	NTAK20 is equipped and is attempting to lock (tracking mode) to a reference. If the LED flashes continuously over an extended period of time, check the CC STAT in LD 60. If the CC is tracking, this may be an acceptable state. Check for slips and related clock controller error conditions. If none exist, then this state is acceptable, and the flashing is identifying jitter on the reference.
	Off	The clock controller is not equipped.
DCH	On (Red)	DCH is disabled.
	On (Green)	DCH is enabled, but not necessarily established.
	Off	DCH is not equipped.

NTDK20 SSC card faceplate LEDs

The NTDK20 Small System Controller (SSC) card has three or five faceplate LEDs, depending on the version of the card. The top LED indicates the status of the NTDK20 SSC circuit card and the PC Card device. The remaining LEDs indicate the status of the Fiber or IP Expansion Daughterboards. Fbr 1, Fbr 2, Fbr 3, and Fbr 4 indicate the status of fiber link 1, 2, 3, and 4 respectively.

> ***Note:*** Depending on the version of the NTDK20 SSC card, it may be equipped with two or four Expansion Daughterboard status LEDs.

Table 12 describes the LEDs on the NTDK20 SSC card.

Table 12
NTDK20 faceplate LEDs

LED	State	Definition
Top	Yellow	SSC is disabled.
	Red (steady)	SSC self-test is being performed.
	Red (flashing three times)	Self-test passed.
	Off	SSC is in normal operating mode.
	Green (steady or flashing)	PC Card device is being accessed.
Port 1 Port 2 Port 3 Port 4	Red (steady)	Daughterboard is disabled.
	Red (flashing three times)	Self-test passed for daughterboard only. ***Note:*** IP daughterboards do not flash three times.
	Yellow	Daughterboard is enabled, link is not established.
	Green	Daughterboard is enabled, link is established.
	Off	Invalid state, hardware malfunction.

NTDK23, NTDK25, and NTDK80 Fiber Receiver card faceplate LEDs

The NTDK23 (10 m), NTDK25 (3 km Multimode), and NTDK80 (3 km Single Mode) Fiber Receiver cards have three faceplate LEDs. The top LED indicates the status of the card. The middle LED indicates the status of the Serial Data Interface (SDI) port. The bottom LED indicates the status of the fiber link.

Table 13 describes the LEDs on the NTDK23, NTDK25, and NTDK80 Fiber Receiver cards.

Table 13
NTDK23, NTDK25, and NTDK80 faceplate LEDs

LED	State	Definition
Top	On	Card is disabled.
	Off	Card is in normal operating mode.
SDI	On	SDI port is disabled.
	Off	SDI port is in normal operating mode.
Fbr	Red (steady)	Self-test in progress.
	Red (flashing three times)	Self-test passed.
	Yellow	Fiber link is not established.
	Green	Fiber link is established.
	Off	Invalid state, hardware malfunction.

NTDK83, NTDK99, NTTK01, and NTTK02 IP Expansion Daughterboard LEDs

There are three LEDs for each port on these daughterboards, as illustrated below. The LEDs indicate the line status and are intended for use during setup.

Figure 6
Faceplate LEDs on IP Expansion Daughterboards

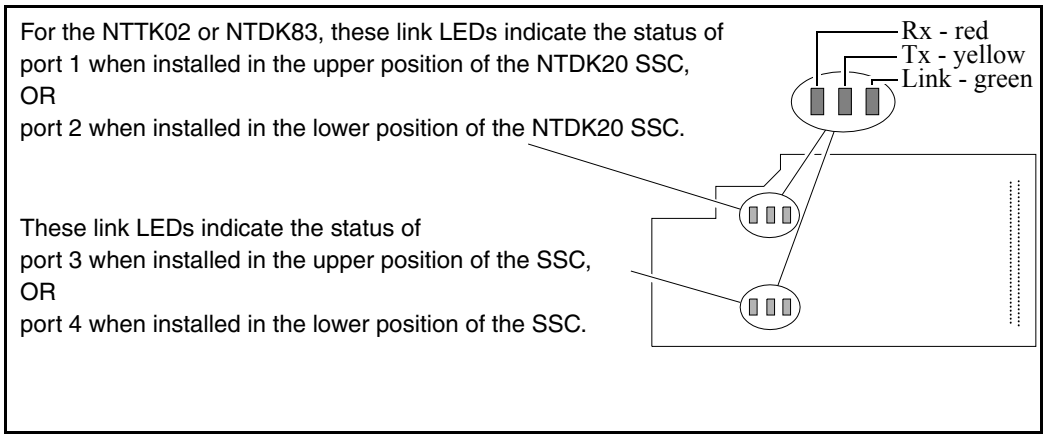

Table 14 describes the LEDs on the IP Expansion Daughterboards.

Table 14
NTDK83, NTDK99, NTTK01, and NTTK02 daughterboard LEDs

LED	State	Definition
Receive	Red	Information/data is being received.
	Off	No information/data is being received.
Transmit	Yellow	Information/data is being transmitted.
	Off	No information/data is being transmitted.
Link	Green	Physical connection exists between the card and the customer's data equipment.
	Off	No connection exists.

NTDK97 MSC card faceplate LEDs

The NTDK97 Mini System Controller (MSC) card has three faceplate LEDs. The top LED indicates the status of the NTDK97 MSC circuit card and the PC Card device. The remaining LEDs indicate the status of the Ethernet Link and Collision.

Table 15 describes the LEDs on the NTDK97 MSC card.

Table 15
NTDK97 faceplate LEDs

LED	State	Definition
Top	Yellow	MSC is disabled.
	Red (steady)	MSC self-test is being performed
	Red (flashing three times)	Self-test passed.
	Off	MSC is in normal operating mode.
	Green (steady or flashing)	PC Card device is being accessed.
Link	On	SYSLOAD in progress.
	Off	Ethernet interface is enabled (whether Ethernet is configured or not). This LED remains off during normal use.
Collision	On	Collision occurred on Ethernet connection.
	Off	No collision.

NTRB21 faceplate LEDs

The NTRB21 1.5 Mb DTI/PRI/DCH circuit card has a total of seven faceplate LEDs. Five of the LEDs are directly associated with the operation of the NTRB21 circuit card. The remaining two LEDs are associated with the optional daughterboards. The first of these LEDs is used to indicate the status of the NTAK20 Clock Controller daughterboard, the second LED indicates the status of the D-channel interface.

Table 16 describes the LEDs on the NTRB21 circuit card.

Table 16
NTRB21 faceplate LEDs (Part 1 of 2)

Affected circuit card	LED	State	Definition
NTRB21	DIS	On (Red)	NTRB21 circuit card is disabled.
		Off	NTRB21 is not disabled.
	ACT	On (Green)	NTRB21 circuit card is active. No alarm states exist, the card is not disabled, nor is it in a loopback state.
		Off	An alarm state or loopback state exists, or the card has been disabled. See other faceplate LEDs for more information.
	RED	On (Red)	A red alarm state is detected.
		Off	No red alarm.
	YEL	On (Yellow)	A yellow alarm state is detected.
		Off	No yellow alarm.
	LBK	On (Green)	NTRB21 is in loopback mode.
		Off	NTRB21 is not in loopback mode.
	DCH	On (Red)	D-channel is equipped and disabled.
		On (Green)	D-channel is equipped and enabled.
		Off	D-channel is not equipped.

Table 16
NTRB21 faceplate LEDs (Part 2 of 2)

Affected circuit card	LED	State	Definition
NTAK20	CC	On (Red)	NTAK20 is equipped and disabled.
		On (Green)	NTAK20 is equipped and is either locked to a reference or is in free run mode.
		Flashing (Green)	NTAK20 is equipped and is attempting to lock (tracking mode) to a reference. If the LED flashes continuously over an extended period of time, check the CC STAT in LD 60. If the CC is tracking, this may be an acceptable state. Check for slips and related clock controller error conditions. If none exist, then this state is acceptable, and the flashing is identifying jitter on the reference.
		Off	NTAK20 is not equipped.

Note: Only one of the five NTRB21-related LEDs should be on at any one time.

Monitor Jacks

The NTAK09, NTAK10, NTAK79, NTBK50, and NTRB21 have two bantam jacks (RCV and XMT) located on the faceplate. They may be used to monitor the performance of the carrier in the receive and transmit direction. The jacks allow the convenient connection of external T1/E1 test equipment and ISDN protocol analyzers.

Initialize button

The manual initialize button is on the faceplate of the NTDK20 SSC and NTDK97 MSC cards. Pressing the manual initialize button starts the Initialize Program, which clears Common Equipment faults then rebuilds call-dependent data and generates system messages indicating the status of

the system. This process is called an *initialization* (or INI). Call processing is briefly interrupted during an initialization.

System alarms

Major alarms

A major alarm indicates a fault that seriously interferes with call processing. Table 17 on page 96 lists the causes of major alarms.

When a Small System is equipped with a Power Failure Transfer Unit (PFTU), a major alarm causes designated analog (500/2500-type) telephones to connect directly to Central Office trunks; this is called a line transfer.

Minor alarms

A minor alarm indicates that the system hardware or software has detected a fault requiring attention. Table 17 on page 96 lists the causes of minor alarms.

A minor alarm displays an alarm on attendant consoles in customer groups affected by the fault. (A minor alarm indication on the console is an optional

feature, enabled and disabled on a customer basis through data administration procedures.)

Table 17
Causes of major and minor alarms

Alarm	Cause
Major	CPU or control bus failure
	Data cartridge failure when attempting to load the system
	System power faults
	Temperature fault (excessive heat)
Minor	Conference failure
	Digitone receiver failure
	Memory failure
	More than one fault on different line and trunk cards in one cabinet (indicated on affected customer's console only)
	Network failure (indicated on affected customer's console only)
	Peripheral signaling failure
	Serial Data Interface failure
	Tone and Digit Switch failure

Remote alarms

A remote alarm, in the context of general maintenance, is an extension of a major alarm on the Small System to another location or to an audible or visual indicator. The system generates a signal indicating that it has a major alarm condition and sends the signal to a remote location, such as a monitoring center or test center, or to an indicator, such as a light or bell.

System Monitor alarms

The System Monitor is an integral part of the Cabinet system power supply (NTAK04, NTAK05, NTDK72, NTDK70 or NTDK78 power supplies). It checks the cabinet temperature and system voltage status, and controls line transfer states accordingly.

For both the Cabinet and Chassis systems, the System Monitor performs the following functions:

- If a circuit breaker in the system trips (for example, if there is a power surge or short circuit), the System Monitor starts a line transfer and sends a remote alarm signal.
- If the temperature of the cabinet reaches 70 degrees C (158 degrees F), the System Monitor trips the main circuit breaker in the cabinet, starts a line transfer, and sends a remote alarm signal.
- If the power supply loses +5 volts, the System Monitor starts a line transfer and sends a remote alarm signal.
- If the power supply loses any voltage other than +5 volts, the System Monitor sends a major alarm indication to the CPU, and sends an external alarm signal.
- If call processing stops, the System Monitor starts a line transfer.

When major system failures occur, the System Monitor sends an alarm signal. As an option, an indicator, such as a bell or light, can be connected to indicate the alarm condition.

Line transfer

As an option, you can connect one or more PFTUs to the system. Each PFTU connects designated analog (500/2500-type) telephones to Central Office trunks. If call processing stops, those analog (500/2500-type) telephones are transferred through the PFTU to the Central Office so you still have outside connections. A line transfer occurs:

- during a SYSLOAD (system reload)
- if there is a major power failure
- if call processing stops due to a CPU failure

- if there is a loss of power to the cabinet or chassis
- if there is a loss of power to the PFTU
- if there is an over-temperature condition in a cabinet
- when the line transfer button on the attendant console is pressed (this applies on a customer basis)
- if a line transfer switch on the PFTU is turned on

Power loss

The System Monitor receives status and control signals from the external power distribution. The System Monitor then generates system messages that indicate the status of main and reserve power supplies.

Main power loss

If the main power supply is lost, the System Monitor generates a major alarm and system messages to indicate that the system is running on reserve power.

Reserve power loss

For a Cabinet system, you can connect a reserve (backup) power supply to the system, and the following equipment will be monitored by the system:

- NTAK28AA junction box breaker
- NTAK75AA reserve power supply breaker
- NTAK76AA reserve power supply breaker

Cabinet power supply failure

For a Cabinet system, there are two types of cabinet power supplies (ac/dc and dc):

- The NTAK04, NTDK70, or NTDK78 ac/dc power supply is used when the cabinet is powered by a commercial ac power source. The ac/dc power supply can also accommodate a reserve battery power supply.
- The NTAK05 or NTDK72 dc power supply is used when the cabinet is powered by a -52 V dc source.

The System Monitor handles complete or partial failures in a power supply as follows:

- If output voltage is higher than the threshold for +5 volts, the affected power supply shuts down, the major alarm is activated, and a system message is sent.
- If output voltage is higher than the threshold for other than +5 volts, power for only that voltage shuts down in the affected power supply, the major alarm is activated, and a system message is sent.
- If output voltage is lower than the threshold for any voltage, power for only that voltage shuts down in the affected power supply, the major alarm is activated, and a system message is sent.
- If input voltage is lower than the threshold, the affected power supply shuts down then recovers when the input level recovers.

Temperature alarms

If the temperature of the cabinet exceeds 70 degrees C (158 degrees F), the System Monitor trips the main circuit breaker in the cabinet to prevent further overheating.

Software maintenance tools

Contents

This section contains information on the following topics:

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Diagnostic programs 102
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Midnight and Background Routines 103
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Overload Monitor 105
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Monitoring IP Link voice Quality of Service 108
Resident Trunk Diagnostic 110
System Loader 110
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Introduction

Software maintenance tools help to identify and clear faults, and provide self-checking capabilities. Software maintenance tools are divided into the following categories:

- Diagnostic programs (p. 102), which monitor a variety of operations, detect faults, and initiate corrective action during normal call processing.
- History File (p. 110), which records maintenance-related system messages.
- Interactive diagnostics (p. 111), which test hardware, isolate faults, and verify fault clearing.

Note: For details on messages generated by the Error Monitor, see *Software Input/Output: System Messages* (553-3001-411).

Diagnostic programs

Diagnostic software programs monitor system operations, detect faults, and clear faults. Some programs run continuously, some are scheduled.

Diagnostic programs are *resident* or *nonresident* software programs. Resident programs, such as the Error Monitor and Resident Trunk Diagnostic, are always present in system memory. Nonresident programs, such as the Input/Output Diagnostic and Common Equipment Diagnostic, are used as Midnight and Background Routines or for interactive diagnostics. Nonresident programs are loaded from the system disk and are run as scheduled or upon request.

Overlays

Nonresident programs are also called overlays or loads. They are identified by a title and a number preceded by the mnemonic for load (for example, Trunk Diagnostic — LD 36).

See *Software Input/Output: Maintenance* (553-3001-511) and *Software Input/Output: System Messages* (553-3001-411) for detailed information on all diagnostic programs.

Error Monitor

The Error Monitor is a resident program that continuously tracks call processing. The Error Monitor generates system messages if it detects invalid or incorrectly formatted call processing information.

System messages generated by the Error Monitor are preceded by the mnemonic ERR, which usually indicates hardware faults, or the mnemonic BUG, which usually indicates software problems.

With prompt ERRM in the Configuration Record (LD 17), you can instruct the system to print or not print ERR or BUG messages. You should have BUG messages printed. If many similar BUG messages occur, consult your Technical Assistance Center.

Initialize Program

The Initialize Program momentarily interrupts call processing as it clears Common Equipment faults. It then rebuilds call-dependent data and generates system messages, with the mnemonic INI, which indicate the status of the system. This process is called an *initialization* (or INI).

You can activate an initialization by pressing the **Man Int** (manual initialize) button on the NTDK20 Small System Controller (SSC) card.

An initialization occurs automatically after the System Loader program runs, when a software or firmware fault is detected, or when a Common Equipment hardware fault is detected.

Midnight and Background Routines

In the Configuration Record (LD 17), you can select the nonresident software programs that will run in the Midnight Routine and Background Routine. These routines automatically perform maintenance checks. Programs included in the Midnight Routine are defined with the prompt DROL (derived from “daily routine overlay”). Programs included in the Background Routine are defined with the prompt BKGD.

The Midnight Routine runs once every 24 hours. This routine is preset to run at midnight when a system is shipped, but you may assign a different time in

the Configuration Record. When it is time for the Midnight Routine to start, the system cancels any other program.

A memory test is run once a day. The Common Equipment Diagnostic (LD 35) runs as part of the Midnight Routine, even if it is not programmed.

The Background Routine runs when no other program is loaded in the overlay area. The programs included in the Background Routine run in sequence repeatedly until there is another request to use the overlay area (for example, if you log on to check the status of a circuit card) or the Midnight Routine runs.

You may include the programs listed in Table 18 in Midnight and Background Routines. Software Audit (LD 44), and Network and Signaling Diagnostic (LD 30) should always be used in the Background Routine.

Your maintenance requirements and the configuration of your system determine the other programs you include in Midnight and Background Routines.

Table 18
Programs used in Midnight and Background Routines (Part 1 of 2)

Program number	Program function
LD 30	Network and Signaling Diagnostic
LD 33	1.5 Mb/s Remote Intelligent Peripheral Equipment (IPE) Diagnostic
LD 34	Tone and Digit Switch and Digitone Receiver
LD 35	Common Equipment Diagnostic
LD 36	Trunk Diagnostic 1
LD 37	Input/Output Diagnostic
LD 38	Conference Circuit Diagnostic
LD 40	Call Detail Recording Diagnostic
LD 41	Trunk Diagnostic 2
LD 43 (Midnight only)	Datadump

Table 18
Programs used in Midnight and Background Routines (Part 2 of 2)

Program number	Program function
LD 44	Software Audit
LD 46	Multifrequency Sender Diagnostic
LD 60 (Midnight only)	Digital Trunk Interface Diagnostic
LD 61 (Midnight only)	Message Waiting Lamp
LD 135	Option 11C Common Equipment Diagnostic
LD 137	Option 11C Input/Output Diagnostic

Overlay Loader

This resident program locates, loads, and checks all nonresident software programs. It automatically activates the Midnight and Background Routines. You can load programs manually by entering commands through the system terminal or maintenance telephone. Once the program is loaded, you see the program mnemonic (such as TRK for Trunk Diagnostic) on the system terminal.

Overload Monitor

The volume of system messages is continuously monitored by the system. If too many error messages are detected from a line or trunk card, the system activates the Overload Monitor program. The Overload Monitor disables the faulty card and generates system messages with the mnemonic OVD.

Maintenance commands for IP connectivity

The IP Link is the physical connection between the main and IP expansion cabinet(s)/chassis. Troubleshooting the IP Link is required when there is no connection or the connection is dropped between the main and IP expansion cabinet(s)/chassis. Troubleshooting procedures are provided for Point-to-Point, Layer 2, and Layer 3 connections.

Procedure 13
Troubleshooting a Point-to-Point connection

The troubleshooting procedure for a Point-to-Point connection is as follows:

1. Verify that the IP Expansion Daughterboard and cables are properly installed.
2. Verify that the green Link LED on the IP Expansion Daughterboard in the main cabinet/chassis is on (physical connection is good). If Link LED is off, there is no physical connection.
3. Use the **STAT CPU** command in LD 135 to display the type of IP Expansion Daughterboard (single or dual) installed on the CPU card.
4. Use the **STAT MAC** command in LD 135 to display the MAC address of the IP Expansion Daughterboard installed on the CPU card.
5. Use the **STAT IPL n** (n = Expansion Cabinet/Chassis 1, 2, 3 or 4) to display the status of the IP link between the main and IP expansion cabinets/chassis.
6. Use the **LLBK IP n** (n = Expansion Cabinet/Chassis 1, 2, 3 or 4) loopback command in LD 135 to test the IP Expansion Daughterboard on the main cabinet/chassis.

   Note: The expansion cabinet/chassis must be disabled using the **DISS n** (n = Expansion Cabinet/Chassis 1, 2, 3 or 4) command in LD 32.

7. Use the **PING <IP address>** command in LD 117 to verify the network connection.
8. Use the **PRT IPR** command in LD 117 to check that the MAC address for the IP Expansion Daughterboard(s) is configured correctly.

Procedure 14
Troubleshooting a Layer 2 LAN connection

The troubleshooting procedure for a Layer 2 LAN connection is as follows:

1 Verify that the IP Expansion Daughterboard and cables are properly installed.

2 Verify that the green Link LED on the IP Expansion Daughterboards in the main and IP expansion cabinet(s)/chassis is on (physical connection is good). If Link LED is off, there is no physical connection.

3 Use the **STAT CPU** command in LD 135 to display the type of IP Expansion Daughterboard (single or dual) installed on the CPU card.

4 Use the **STAT MAC** command in LD 135 to display the MAC address of the IP Expansion Daughterboard installed on the CPU card.

5 Use the **STAT IPL n** (n = Expansion Cabinet/Chassis 1, 2, 3 or 4) to display the status of the IP link between the main and IP expansion cabinets/chassis.

6 Use the **LLBK IP n** (n = Expansion Cabinet/Chassis 1, 2, 3 or 4) loopback command in LD 135 to test the IP Expansion Daughterboard on the main cabinet/chassis.

Note: The expansion cabinet/chassis must be disabled using the **DISS n** (n = Expansion Cabinet/Chassis 1, 2, 3 or 4) command in LD 32.

7 Use the **PING <IP address>** command in LD 117 to verify the network connection.

8 Use the **PRT IPR** command in LD 117 to check that the MAC address for the IP Expansion Daughterboard(s) is configured correctly.

Procedure 15
Troubleshooting a Layer 3 LAN connection

The troubleshooting procedure for a Layer 3 LAN connection is as follows:

1. Verify that the IP Expansion Daughterboard and cables are properly installed.
2. Verify that the green Link LED on the IP Expansion Daughterboards in the main and IP expansion cabinet(s)/chassis is on (physical connection is good). If Link LED is off, there is no physical connection.
3. Use the **`STAT CPU`** command in LD 135 to display the type of IP Expansion Daughterboard (single or dual) installed on the CPU card.
4. Use the **`STAT MAC`** command in LD 135 to display the MAC address of the IP Expansion Daughterboard installed on the CPU card.
5. Use the **`STAT IPL n`** (n = Expansion Cabinet/Chassis 1, 2, 3 or 4) to display the status of the IP link between the main and IP expansion cabinets/chassis.
6. Use the **`LLBK IP n`** (n = Expansion Cabinet/Chassis 1, 2, 3 or 4) loopback command in LD 135 to test the IP Expansion Daughterboard on the main cabinet/chassis.

   Note: The expansion cabinet/chassis must be disabled using the **`DISS n`** (n = Expansion Cabinet/Chassis 1, 2, 3 or 4) command in LD 32.

7. The Layer 3 connection involves a gateway connection. Use the **`PING <IP address>`** command in LD 117 to verify the gateway connection.
8. Use the **`PING <IP address>`** command in LD 117 to verify the network connection.
9. Use the **`PRT IPR`** command in LD 117 to check that the MAC address for the IP Expansion Daughterboard(s) is configured correctly.

Monitoring IP Link voice Quality of Service

Behavioral characteristics of the network are dependent on factors like Round Trip Delay (RTD), queuing delay in the intermediate nodes, packet loss, and available bandwidth.

The service level of each IP link is measured and maintained on the main for IP Expansion operation. Information for latency and packet loss is collected from the hardware and processed. Based on system-configured thresholds, level of service is derived and reported to the craftsperson with the **PRT QOS <cab#>** command in LD 117. See *Software Input/Output: Administration* (553-3001-311) and *Software Input/Output: Maintenance* (553-3001-511).

Table 19 lists the Data Network Ratings (Excellent, Good, Fair, Poor), along with the actual parameter values for network delay.

Table 19
Campus data network voice quality measurements

Data Network Rating	PDV Max 7.8 ms	PDV Min 0.5 ms	Packet loss
Excellent	< 5 ms	< 12 ms	< 0.5%
Good	5–25 ms	12–32 ms	0.5–1.0%
Fair	25–45 ms	32–52 ms	1.0–1.5 ms
Poor	> 45 ms	> 52 ms	> 1.5%

These values assume that there is no echo cancellation mechanism and no particular mechanism for recovering lost packets.

The command **PRT PDV <cab#>** in LD 117 displays both the current size of the Packet Delay Variation (PDV) buffer and the number of PDV underflows.

In addition, a warning message is printed when a parameter threshold (or combination of thresholds) is reached. These thresholds are not user configurable.

In LD 117, the **CHG PDV <port#> <delay>** command is used to set PDV buffer size for each link. The **<delay>** parameter can take values from 0.5 ms to 8.0 ms. This value should be initially tested at default settings. Increase the **<delay>** parameter value by 0.5 ms increments if an

unacceptable level of voice quality is experienced (“pops and clicks”). Decrease this value if echo is experienced. The goal is to operate with the smallest buffer possible.

The PDV buffer size for each IP connection is configured at the main and is automatically downloaded to the IP expansion cabinet/chassis.

Resident Trunk Diagnostic

This program automatically monitors all trunk calls and records apparent faults on each trunk. If the number of faults on a trunk exceeds the threshold for that trunk, the program generates a system message identifying the trunk and the type of fault.

A failure on a trunk may keep the trunk from detecting incoming calls. The threshold mechanism cannot detect such a failure, so this program also records how many days it has been since each trunk received an incoming call. If you suspect some incoming calls are not being processed, you can use the command **LMAX** in Trunk Diagnostic 1 (LD 36) to identify the trunk with the maximum idle days.

System Loader

The System Loader program loads all call processing programs and data, and starts memory-checking diagnostics. After all required programs and data have been loaded and all checks performed, the System Loader is erased from system memory, the Initialize Program runs, and normal call processing begins. This process is called a *SYSLOAD* (or *system reload*).

The System Loader operates automatically on system power-up or if a Common Equipment or power fault destroys information in the system memory.

History File

If you have a printer connected to the system, each system message is printed as it is received. If you do not have a printer connected, you can use the History File (if equipped) to store a limited number of system messages in

protected memory. The contents of the file may then be printed on demand, using LD 22.

The messages stored are specified on a system basis and can be one or more of the following types:

- customer service changes (CSC)
- maintenance messages
- service changes (SCH)
- software errors
- initialization and SYSLOAD messages
- traffic messages

For information on selecting the messages to be stored, see *Software Input/Output: Maintenance* (553-3001-511).

The contents of the History File are erased during a SYSLOAD or if you change the length of the History File. However, because the History File is located in protected data store, the contents survive an initialization.

You can change the length of the History File with the prompt `HIST` in the Configuration Record (LD 17). The maximum length of the file depends on the amount of protected data store available, which in turn depends on the number of system features that require protected data store.

If the History File is full, the earliest messages stored are replaced by incoming messages. If this happens, the system gives a "file overflow" message at the start of a printout so you know some information has been replaced by newer messages.

Interactive diagnostics

You can load nonresident software programs into memory through the system terminal or maintenance telephone. These programs, also called overlays or loads, are identified by a title and a number preceded by the mnemonic for load (for example, Trunk Diagnostic — LD 36).

The programs used in Midnight and Background Routines are also used manually as interactive diagnostic programs (see Table 18 on page 104).

Nonresident programs are used interactively with a command and response format. In this format, you enter a command that tells the system to perform a specific task; the system performs the task and sends system messages indicating status or errors back to you.

With interactive diagnostics you can:

- disable, test, and enable specific equipment
- verify that a reported fault still needs to be cleared
- verify that a repair procedure has cleared a fault

All maintenance programs, commands, and system messages are described in detail in *Software Input/Output: Maintenance* (553-3001-511) and in *Software Input/Output: System Messages* (553-3001-411).

Enhanced Maintenance

System software sometimes requires modifications, called *patches,* provided by Nortel Technical Assistance Centers. The **ISS** command in Print Routine 3 (LD 22) prints the software generic and issue. A plus sign (+) by the issue number means there is a patch in service.

The Enhanced Maintenance feature:

- allows patches to automatically survive a SYSLOAD
- permits patches on nonresident programs
- records all patches in the system
- allows data cartridges to be shipped with preloaded patches

If there is a problem with a patch, the CPU sends system messages, with the mnemonic EHM, to the system terminal or the History File.

How to clear faults

Contents

This section contains information on the following topics:

Clearing faults in an Option 11 system 114
Clearing faults in Meridian 1 and CS 1000M Small Systems. 115
Fault indicators 116
System messages 116
Visual fault indicators. 117
User reports 118
ISDN BRI faults 119
Accessing the system 120
Access through the system terminal 120
Access through the maintenance telephone 121

Introduction

This chapter describes:

- the overall process to clear faults in Small Systems
- the types of fault messages and indicators that can occur
- methods of accessing the system for maintenance and fault clearing

Clearing faults in an Option 11 system

When a fault must be cleared in the Option 11, follow these steps:

1. Observe and record all fault indicators.
2. System messages, visual fault indicators, and user reports identify many problems. If the indicators are not current or seem incomplete, you may need to print the History File for previous messages, initialize the system for information on the current status, or both.
3. Look up all system messages in *Software Input/Output: Maintenance* (553-3001-511).

   The interpretation of the message may identify faulty equipment and tell you what action to take to clear the problem. If you cannot clear the fault through information in *Software Input/Output: Maintenance* (553-3001-511), continue with the next step to isolate and clear the fault.
4. Try to enable or test disabled equipment.

CAUTION WITH ESDS DEVICES

Wear an antistatic wrist strap when handling circuit cards to prevent damage caused by static discharge. For the Cabinet system, there is an antistatic wrist strap in each cabinet.

5. You may be able to hardware reenable circuit cards by unseating and then reinstalling them. You may be able to software reenable cards by disabling then reenabling them. When the cause of a fault is not clearly evident, a software test may help you identify the problem.
6. Replace equipment as necessary (see “Replacing equipment” on page 237).

Clearing faults in Meridian 1 and CS 1000M Small Systems

To clear faults in a Small System, follow the steps below:

1. Classify the fault by the indicators present (see "Fault indicators" on page 116). When there are indications of multiple faults, clear them in the following order:
   - **a** power faults
   - **b** Common Equipment faults
   - **c** Network faults
   - **d** IPE faults
   - **e** trunk faults
   - **f** attendant console faults
   - **g** telephone faults

   Note: Always clear possible power faults then Common Equipment faults before any other type of fault.

2. Go to the chapter for clearing the type of fault identified. There is a chapter for each type of fault listed above (for example, "Clearing power faults" on page 125*)*. As closely as possible, match the problem to a symptom listed in the chapter.
3. Go through the procedure for clearing each possible cause of the problem until the fault is cleared.
4. When the fault has been corrected, follow the instructions in "Final maintenance procedure" on page 315 to completely restore normal operation.

Fault indicators

When there is a fault in the system, you may be notified by any combination of the following indicators:

- system messages
- visual fault indicators
- user reports

Each type of indicator is described below.

System messages

System messages are codes with a mnemonic and number, such as `OVD021`. The mnemonic identifies a software program or a type of message. The number identifies the specific message. Use system messages with other indicators, such as visual indicators, to identify and clear faults.

Table 20 lists the most common fault-indicating messages and the type of fault they indicate. For a complete list and interpretation of system messages, see *Software Input/Output: Maintenance* (553-3001-511).

Table 20
System message fault indicators and related fault types (Part 1 of 2)

System messages	Type of fault
BSD0090 messages	Power
CCED messages CED messages CIOD messages HWR messages INI0001, 0002, 0004, 0005, 0007 IOD0006, 0007, 0060, 0061, 0291–0297 NWS0030, 0102, 0103, 0142 SYS messages	Common Equipment

Table 20
System message fault indicators and related fault types (Part 2 of 2)

System messages	Type of fault
CNF messages DTA, DTC, DTI messages ERR0020, 0120, 4060 INI0003, 0008–0012 NWS0101, 0141, 0201–0204, 0301, 0401 OVD0021, 0022, 0023, 0031 SYS4696 TDS messages XMI messages	Network
ERR4062 NWS0301, 0401, 0501 OVD0001–0010, 0024 XMI messages	IPE
ERR0090, 0220, 0270 OVD0001–0010 TRK messages	Trunk
ERR0500 MWL0500 NWS0501 OVD0001–0010	Telephone

Visual fault indicators

There are visual indicators that can help you identify faults. These indicators include:

- major alarm display — indicates a possible power, Common Equipment, or Network fault
- circuit card Light Emitting Diode (LED) — indicates a card or a unit on a circuit card is disabled

Table 21 lists visual indicators you may see and the type of fault they might indicate for a Small System.

Table 21
Visual fault indicators and related fault types

Indicator	Type of fault
Green LED off on a power supply. Circuit breaker tripped (down). Remote alarm.	Power
Red LED lit on CE card.	Common Equipment
Minor alarm on an attendant console.	Network
Red LED lit on associated card.	IPE
Red LED lit on trunk card.	Trunk
Red LED lit on associated cards.	Attendant console
Red LED lit on associated cards.	Telephone
Sync LED on Fiber Receiver card.	Fiber Receiver card or Fiber cable
Green LED off, on 100baseT/100baseF daughterboards.	Cable connection

User reports

Many faults reported by users, such as a damaged telephone or data set, are obvious and can be fixed by replacing the damaged equipment.

Some faults are less obvious and may be caused by other equipment, such as a defective IPE circuit card. To classify the fault in these cases, check for system messages and visual fault indications. You may also have the user reproduce the problem so you can determine the sequence of events that led to the fault.

Table 22 lists typical problems reported by users and the type of fault they might indicate.

Table 22
User-reported problems and related fault types

User report	Type of fault
Major alarm reported by attendant. No ring on analog (500/2500-type) telephones.	Power
Major alarm reported by attendant.	Common Equipment
Minor alarm reported by attendant. Users cannot transfer or conference. Users cannot dial out on analog (500/2500-type) telephones.	Network
Trouble with calls on attendant console. Trouble with calls on telephones.	IPE
Users have trouble with a specific trunk. Callers report continuous ringing. Trouble with calls on console and/or telephones.	Trunk
Trouble with calls. Trouble with equipment (such as handset, headset, or display).	Attendant console
Trouble with calls. Trouble with equipment (such as handset or add-on module)	Telephone

ISDN BRI faults

Procedures to locate and clear ISDN BRI-related faults are contained in *ISDN Basic Rate Interface: Maintenance* (553-3001-518).

Accessing the system

When replacing equipment, you will send maintenance commands to the system software to disable faulty equipment and to software enable and test newly installed equipment.

You send maintenance commands to the system through the system terminal or the maintenance telephone.

Access through the system terminal

You can send maintenance commands and receive system messages by accessing the CPU through an RS-232 device, such as a video display terminal (VDT) or teletypewriter (TTY).

When you access the system through a system terminal, a login procedure is required. All system passwords are initially set as 0000, but you can change passwords through the Configuration Record (LD 17).

If a SYSLOAD (system reload) occurs before you save a new password in a datadump, the last active password remains valid.

Each system has two levels of passwords: level 1 is for general use, level 2 is for administrative use. Either password is accepted in the login procedure.

Procedure 16
Accessing the system from a system terminal

1 Press the return key.

If	Then
The response is: `OVL111 nn IDLE` or `OVL111 nn BKGD`	you are ready to log in to the system. Go to step 2.
The response is: `OVL000`	you are already logged in to the system. Go to step 4.

Responses vary with different Background Terminal packages.

2 Type:

LOGI

then press <CR>.

The normal response is:

PASS?

If there is any other response, see *Software Input/Output: Maintenance* (553-3001-511).

3 Type either the level 1 or level 2 password and press <CR>.

If the password is correct, the system responds with the prompt:

>

4 Enter:

LD xx

where “xx” represents the number of the program.

5 Perform tasks.

6 End the program by entering:

****

7 End the logged in session by entering the following command:

LOGO

End of Procedure

Access through the maintenance telephone

A telephone functions as a maintenance telephone when you define the Class of Service as MTA (Maintenance Telephone Allowed) in the Telephones program (LD 11).

A maintenance telephone allows you to send commands to the system, but you can only use a subset of the commands that can be entered from a system terminal. The maintenance telephone, however, takes priority over a system terminal and will log the terminal out.

You can test tones and outpulsing through the maintenance telephone. Specific commands for those tests are given in the Tone and Digit Switch and Digitone Receiver Diagnostic (LD 34).

You can test trunk connections through the maintenance telephone. Specific commands for those tests are given in the Trunk Diagnostic (LD 36).

No login procedure is required when you access the system through a maintenance telephone. To enter commands, press the keys that correspond to the letters and numbers of the command (for example, to enter **LD 42 <CR>**, key in **53#42##**). Table 23 shows the translation from a terminal keyboard to a telephone dial pad.

To use the maintenance telephone, the Terminal Number (TN) for that telephone must be operating.

Table 23
Translation from keyboard to dial pad

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

Procedure 17
Accessing the maintenance telephone

1 Press the prime DN key.

2 Place the telephone in maintenance mode by entering

xxxx91

where “xxxx” represents the customer Special Prefix (SPRE) number. It is defined in the Customer Data Block and can be printed using LD 21. The SPRE number is typically “1” (which means you would enter **191**).

3 Check for busy tone by entering:

******

If	Then
There is no busy tone	go to step 4.
There is a busy tone	a program is active. To end an active program and access the system, enter: ********

4 Load a program by entering:

53#xx##

where “xx” represents the number of the program.

5 Perform tasks.

6 Press the release key to return the telephone to call processing mode. Background routines are then loaded automatically.

End of Procedure

Clearing power faults

Contents

This section contains information on the following topics:

Power faults 125
BSD0090 system messages 129
Symptoms and corrective action 132
Main circuit breaker and all LEDs are off 132
Cabinet power supply circuit breaker is on but all LEDs in the cabinet or chassis are off 133
Circuit breaker on the NTAK28 Junction Box is tripped. 135
Circuit breaker on the NTAK75 or NTAK76 Battery Box is tripped 136

Power faults

A power supply located in each cabinet or chassis provides the various electrical voltages required to power the system, including ringing voltages for analog (500/2500-type) telephones and voltage to light message waiting lamps on 2500-type telephones.

For a Cabinet system, the power supply is located in the extreme left shelf position in each cabinet, as shown in Figure 7 on page 126.

For a Chassis system, the power supply is internal to the chassis. The chassis will have to be replaced in the case of power supply or fan failure.

Figure 7
Location of cabinet power supply on shelf

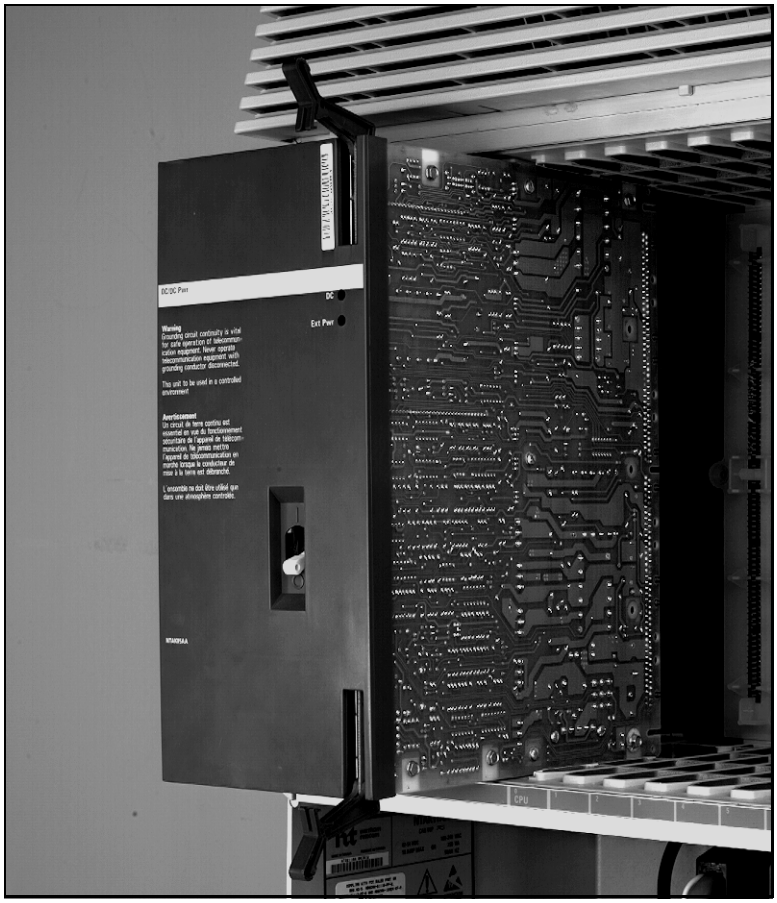

Table 24 lists common power fault indications.

Table 24
Power fault indications

Indicator	Possible indications
System messages	BSD0090 messages
Indicator	**Possible indications**
Visual indicators	Alarms Green LED off on cabinet power supply LED lit on PFTU Circuit breaker tripped (down) Remote alarm
User reports	Difficulty reported by attendant No ring on analog (500/2500-type) telephones

To clear faults, select the symptom listed in this chapter that most resembles the fault indications, then go through the procedure for clearing each possible cause until the fault is fixed. Once the fault is corrected, disregard the remaining possible causes.

You must clear power faults before you try to clear other types of faults in the system. You must clear power faults in the main cabinet before clearing power faults in expansion cabinets.

If the fault is not cleared after you have gone through each possible cause, check the most recent fault indications. Also check “How to clear faults” on page 113 to see if another type of fault is indicated.

Equipment replacement instructions for circuit cards and power supplies are in the chapter titled “Replacing equipment” on page 237. Additional information can be found in *Communication Server 1000M and Meridian 1: Small System Installation and Configuration* (553-3011-210).

After the fault is corrected, go to “Final maintenance procedure” on page 315 to completely restore normal operation.

Candeo power systems

Candeo power systems are based upon modular building blocks (rectifiers, System Manager, DC distribution, and battery connection modules) and designed to power -48 V DC applications. There are two types of Candeo systems: Large Candeo, which uses 50 A rectifiers and has a capacity of 1000 A, and Small Candeo (SP48300), which uses 30 A rectifiers and has a capacity of 300 A. The Candeo interfaces with the system through the Candeo's System Manager alarm output ports.

The Large Candeo System Manager produces a Major Alarm for the following faults:

- High voltage shut down (HVSD)
- High voltage (HV)
- Battery on discharge (BOD)
- Low voltage (LV)
- Low voltage disconnect (LVD)
- Alarm busy supply (ABSF)
- Internal fuse alarm (INT FA)
- Fuse alarm (FA)
- Rectifier fail alarm (RFA)

The Small Candeo (SP48300) System Manager produces a Major Alarm for the following faults:

- Battery fuse alarm
- High battery temperature
- High voltage shutdown (HVSD)
- Main AC fail
- Rectifier fail major (RFA major)
- Low voltage disconnect (LVD)
- High voltage (HV)
- Fuse alarm (FA)

- Priority low voltage disconnect
- AC input overvoltage
- Rectifier AC fail
- Remote shutdown
- System Manager SP fail
- Configuration fail
- Battery on discharge (BOD)
- Low voltage (LV)
- Very high battery temperature

For information on clearing alarms on the Candeo power systems, refer to the *Candeo Power Systems User Guide* (P0914425) and *Candeo SP 48300 Power System AP6C55AA User Manual* (P7000154).

BSD0090 system messages

System messages with the mnemonic `BSD0090` contain power-related information. They identify the type of equipment generating the message.

The Chassis system reports BSD0090 Main Chassis and BSD0090 Chassis Expander power messages only.

Tables 25 and 26 show the power messages output for systems equipped with an NTDK20 Small System Controller (SSC) card.

Table 25
NTDK20 SSC BSD power messages (Part 1 of 3)

BSD0090 message	Affected equipment
BSD0090 MAIN-PWR	Power fault in the main cabinet.
BSD0090 MAIN-MAIL	Power fault with the Meridian Mail equipment in the main cabinet. (Refer to your Meridian Mail documentation to fix this problem.)

Table 25
NTDK20 SSC BSD power messages (Part 2 of 3)

BSD0090 message	Affected equipment
BSD0090 MAIN-BATT	Battery box breaker not switched on or battery cable fault in main cabinet.
BSD0090 EXPN-PWR	Power fault in the expansion cabinet. ***Note:*** This message is only output on systems using the backwards-compatible expansion daughterboard.
BSD0090 EXPANSION CABINET 1 - PWR	Power fault in Expansion Cabinet 1.
BSD0090 EXPANSION CABINET 1 - BATT	Battery box breaker not switched on or battery cable fault in Expansion Cabinet 1.
BSD0090 EXPANSION CABINET 2- PWR	Power fault in Expansion Cabinet 2.
BSD0090 EXPANSION CABINET 2- BATT	Battery box breaker not switched on or battery cable fault in Expansion Cabinet 2.
BSD0090 EXPANSION CABINET 3- PWR	Power fault in Expansion Cabinet 3.
BSD0090 EXPANSION CABINET 3- BATT	Battery box breaker not switched on or battery cable fault in Expansion Cabinet 3.
BSD0090 EXPANSION CABINET 4- PWR	Power fault in Expansion Cabinet 4.
BSD0090 EXPANSION CABINET 4- BATT	Battery box breaker not switched on or battery cable fault in Expansion Cabinet 4.
BSD POWER OK - MAIN CABINET	The power fault in the main cabinet no longer exists.
BSD POWER OK - EXPANSION CABINET 1	The power fault in Expansion Cabinet 1 no longer exists.
BSD POWER OK - EXPANSION CABINET 2	The power fault in Expansion Cabinet 2 no longer exists.

Table 25
NTDK20 SSC BSD power messages (Part 3 of 3)

BSD0090 message	Affected equipment
BSD POWER OK - EXPANSION CABINET 3	The power fault in Expansion Cabinet 3 no longer exists.
BSD POWER OK - EXPANSION CABINET 4	The power fault in Expansion Cabinet 4 no longer exists.

Table 26
NTDK20 SSC BSD power messages multiple problem format

BSD0090 message multiple problem format	Affected equipment
This format is used to indicate more than one problem, and is output for both main and expansion cabinets.	
BSD0090 MAIN-PWR MAIN-BATT MAIN-MAIL	Power fault, fault in the main cabinet junction box, the battery box or interconnecting wiring, and a Meridian Mail power fault in the main cabinet.
BSD0090 MAIN-PWR EXPN-PWR MAIN-BATT MAIN-MAIL	The main cabinet has a power fault, a fault in the main cabinet junction box, the battery box or interconnecting wiring, and a Meridian Mail power fault, while the expansion cabinet has a power fault. ***Note:*** This message indicates faults on systems using the NTDK26 Backwards Compatible Daughterboard.
BSD0090 EXPANSION CABINET 1 - PWR BATT	The expansion cabinet has a power fault, a fault in the junction box, and the battery box breaker not switched on or battery cable fault.

Symptoms and corrective action

In conjunction with the power fault indications received, look for the following symptoms in order to identify the type of corrective action required:

- "Main circuit breaker and all LEDs are off" on page 132
- "Cabinet power supply circuit breaker is on but all LEDs in the cabinet or chassis are off" on page 133
- "Circuit breaker on the NTAK28 Junction Box is tripped" on page 135
- "Circuit breaker on the NTAK75 or NTAK76 Battery Box is tripped" on page 136

Main circuit breaker and all LEDs are off

All the LEDs in the system are off and the circuit breaker on the power supply in the cabinet is tripped. High room temperature or a power surge can shut down the system. Check for these external conditions. If present, correct them then reset the breaker.

You may need to replace:

- the NTAK04, NTAK05, NTDK72, or NTDK78 power supply
- any one of the remaining circuit cards in the affected cabinet

Table 27
Main circuit breaker off and all LEDs off

Possible cause	Action
Thermal overload	Make sure nothing is blocking ventilation throughout the system. Allow the system to cool for a few minutes then reset the breaker. If the breaker trips, go to the next possible cause.
Defective circuit card in the cabinet	Unseat all the circuit cards in the cabinet except the power supply. Reset the breaker. If the breaker trips, the power supply is defective. Remove the existing power supply and install a new one. If the breaker does not trip, reinstall the circuit cards one at a time until the breaker trips.

Cabinet power supply circuit breaker is on but all LEDs in the cabinet or chassis are off

All the LEDs in the cabinet are off but the circuit breaker on the power supply unit in the cabinet is not tripped. For a Chassis system, all the LEDs are off. You may need to replace the:

- power supply (NTAK04, NTAK05, NTDK72, NTDK70 or NTDK78)
- main ac power supply cord (ac-powered cabinet without battery backup)
- main dc power supply cord on dc-powered systems (no ac power supply)

- Uninterruptible Power Supply (UPS) on an ac-powered cabinet without battery backup
- chassis for a Chassis system

Table 28
Circuit breaker on the power supply in the cabinet is on but all LEDs in the cabinet are off

Possible cause	Action
Main power cord not connected (ac- or dc-powered cabinet without battery backup)	If the main power cord for the cabinet is unplugged, plug it in. Check both ends of the cord to make sure that it is also plugged in to the power supply unit. If the power cord is already plugged in, go to the next possible cause.
WARNING **The following tests are performed on a live power connection.**	
No power at outlet (ac- or dc-powered cabinet without battery backup)	With a meter or test lamp, test for power at the outlet. If there is no power at the outlet when ac power is supplied through a UPS unit, repair or replace the UPS following the manufacturer's instructions. If there is no power at the outlet when ac power is supplied through commercial service (not through a UPS), take the necessary steps to have the commercial power restored. If there is no power at the outlet when dc power is supplied from an external source, take the necessary steps to have the dc power restored. If there is power at the outlet, go to the next possible cause.
Defective main power cord	With a meter or test lamp, test the cabinet end of the main power cord (at the bottom of the power supply unit in the cabinet) for power. If there is no power, replace the power cord. If there is power at the connections, go to the next possible cause.
Defective power supply unit	Replace the NTAK04, NTAK05, NTDK72, NTDK70 or NTDK78 Power Supply Unit or, for the Chassis system, replace the chassis.

Circuit breaker on the NTAK28 Junction Box is tripped

While operating the Cabinet system from the reserve power supply, the circuit breaker on the NTAK28 junction box is tripped. Call processing has stopped.

You may need to replace the:

- NTAK0410 Power Cable
- QBL24A1 Battery Box
- NTAK04, NTAK05, NTDK72, NTDK70 or NTDK78 Power Supply
- NTAK28 Junction Box

Table 29
Circuit breaker on the NTAK28 Junction Box is tripped

Possible cause	Action
NTAK28 terminal block wiring may be incorrect	Check the wiring according to *Communication Server 1000M and Meridian 1: Small System Installation and Configuration* (553-3011-210).
NTAK0410 Power Cable may be defective	Reset the breaker on the NTAK28 Junction Box. If it trips, replace the NTAK0410 Power Cable between the NTAK28 Junction Box and the NTAK04, NTAK05, NTDK72, NTDK70 or NTDK78 Power Supply in the cabinet. If the breaker trips when reset, go to the next possible cause.
NTAK04, NTAK05, NTDK72, NTDK70 or NTDK78 Power Supply in the cabinet may be defective	Replace the power supply in the cabinet. Reset the circuit breaker on the NTAK28 Junction Box (if equipped). If the breaker trips when reset, go to the next possible cause.
QBL24A1 Battery Box may be defective	Replace the entire battery box unit. Do not attempt to disassemble the QBL24A1. It contains no user-serviceable parts and there is risk of electric shock.
NTAK28 Junction Box may be defective	Replace the NTAK28 Junction Box.

Circuit breaker on the NTAK75 or NTAK76 Battery Box is tripped

To diagnose the cause of this circuit breaker being tripped, first verify the conditions with the battery breaker OFF, and then verify conditions with the battery breaker ON. You may need to replace the:

- NTAK0410 Power Cable
- NTAK75 or NTAK76 Batteries
- NTAK04, NTDK70 or NTDK78 Power Supply
- NTAK75 or NTAK76 Battery Box
- NTBK62 Fiber Interface Power Cable

With battery breaker OFF

The circuit breaker on the NTAK75 or NTAK76 Battery Box is tripped. With the battery breaker OFF, the following condition should exist:

- the Battery Box LED is ON
- the NTAK04, NTDK70 or NTDK78 DC LED is ON
- the NTAK04 or NTDK78 BATT LED is OFF

Table 30
Circuit breaker on the NTAK75 or NTAK76 Battery Box is tripped with battery breaker OFF (Part 1 of 2)

Possible cause	Action
Battery wiring may be incorrect	Verify the wiring according to *Communication Server 1000M and Meridian 1: Small System Installation and Configuration* (553-3011-210).
NTAK0410 connections at the cabinet power supply (NTAK04, NTDK70 or NTDK78) and Battery Box may be incorrect	Verify the connections according to *Communication Server 1000M and Meridian 1: Small System Installation and Configuration* (553-3011-210).

Table 30
Circuit breaker on the NTAK75 or NTAK76 Battery Box is tripped with battery breaker OFF (Continued) (Part 2 of 2)

Possible cause	Action
NTAK0410 Power Cable may be defective	Replace the cable if one of the following conditions exists: • the Battery Box LED is OFF, • the NTAK04, NTDK70 or NTDK78 DC LED is OFF, or • the NTAK04, NTDK70 or NTDK78 BATT LED is ON
NTBK62 Fiber Interface Power Cable may be defective	Replace the cable if one of the following conditions exists: • the Battery Box LED is OFF, • the NTAK04, NTDK70 or NTDK78 DC LED is OFF, or • the NTAK04, NTDK70 or NTDK78 BATT LED is ON
NTAK75/76 Battery Box may be defective	Replace the NTAK75/76 Battery Box if the NTAK0410 Power Cable has been replaced above, and the following conditions exist: • the Battery Box LED is OFF, • the NTAK04, NTDK70 or NTDK78 DC LED is ON, and • the NTAK04, NTDK70 or NTDK78 BATT LED is OFF.
The NTAK04, NTDK70 or NTDK78 Power Supply may be defective	Replace the Power Supply if the NTAK0410 Power Cable has been replaced above, and one of the following conditions exists: • the NTAK04, NTDK70 or NTDK78 DC LED is OFF, or • the NTAK04, NTDK70 or NTDK78 BATT LED is ON.

With battery breaker ON

The circuit breaker on the NTAK75/76 Battery Box is tripped. With the battery breaker ON, the following conditions should exist:

- the Battery Box LED is ON
- the NTAK04, NTDK70 or NTDK78 DC LED is ON
- the NTAK04, NTDK70 or NTDK78 BATT LED is ON

Table 31
Circuit breaker on the NTAK75 or NTAK76 Battery Box is tripped with battery breaker ON

Possible cause	Action
A transient fault caused the breaker to trip	Reset the breaker.
Batteries may be defective	If the breaker trips after resetting it in the step above, replace the batteries then reset the breaker.
NTAK75/76 Battery Box may be defective	If the breaker trips again after replacing the batteries in the step above, replace the NTAK75/76 Battery Box, then reset the breaker.

Clearing Common Equipment faults

Contents

This section contains information on the following topics:

Common Equipment faults 139
ISDN and DTI faults 142
Symptoms and corrective action 142
Call processing stopped on the entire system. 142
Fault indicated on the CPU circuit card, or memory fault indicated 145
Fault indicated on the Tone and Digit Switch 147
Fault indicated when trying to perform a datadump 149
OVL005 message displayed and no access to overlays 149

Common Equipment faults

Common Equipment (CE) functions perform system control and switching. Common Equipment, located on the NTDK20 Small System Controller (SSC) card, can include the following:

- CPU: Comprised of two processors. The main processor handles call processing, serial ports, and network traffic. The auxiliary processor handles card polling, power monitoring, tone generation, and control of a Digital Signal Processor (DSP) for tone detection.
- Expansion Daughterboard: Provides 16 additional conference channels per expansion cabinet/chassis and access to expansion cabinet/chassis hardware.
- Backwards Compatible Daughterboard: Provides an upgrade path for existing expansion cabinet installations.

- Software Daughterboard: Provides storage for system software.
- Ethernet controller: Provides one port between the CPU and a Local Area Network (LAN).
- Serial Data Interface: Provides three ports between the CPU and external devices.
- PC Card interface: Provides access for one Type III or two Type II PC Card drives to allow software delivery or customer data storage.
- Tone and Digit Switch: Provides 30 channels of tone generation.
- Digitone Receiver: Provides eight DTR/XTD units with an additional user-selectable eight DTR/XTD units or four MFC, MFE, MFK5, MFK6, or MFR units.
- Conference: provides 32 channels, plus:
  - — 16 with each Single-port Expansion Daughterboard equipped
  - — 32 with each Dual-port Expansion Daughterboard equipped

Common Equipment faults can disable the CPU and stop call processing. In addition, other types of equipment (such as IPE) may not operate properly while there is a CE fault in the system.

CAUTION WITH ESDS DEVICES

Wear an antistatic wrist strap when handling circuit cards to prevent damage caused by static electricity.

Table 32 lists Common Equipment fault indications.

Table 32
Common Equipment fault indications

Indicator	Possible indications
System messages	CCED messages CED messages CIOD messages HWR messages INI0001, 0002, 0004, 0005, 0007 IOD0006, 0007, 0060, 0061, 0291–0297 NWS0030, 0102, 0103, 0142 SYS messages
Visual indicators	Major alarm on attendant consoles Red LED lit on NTDK20 SSC or NTDK97 MSC circuit card
User reports	Major alarm reported by attendant

To clear faults, select the symptom listed in this chapter that most resembles the fault indications and go through the procedure for clearing each possible cause until the fault is fixed. Once the fault is corrected, disregard the remaining possible causes.

Clear any power faults before you try to clear Common Equipment faults.

If the fault is not cleared after you have gone through each possible cause, check the most recent fault indications. Also check “How to clear faults” on page 113 to see if another type of fault is indicated.

Equipment replacement instructions for circuit cards and power supplies are in the chapter titled “Replacing equipment” on page 237. Additional information can be found in the *Communication Server 1000M and Meridian 1: Small System Installation and Configuration* (553-3011-210).

After the fault is corrected, go to “Final maintenance procedure” on page 315 to completely restore normal operation.

ISDN and DTI faults

For fault locating and clearing procedures for ISDN BRI-related faults, see *ISDN Basic Rate Interface: Maintenance* (553-3001-518).

For 1.5 Mb and 2.0 Mb ISDN or DTI-related faults, see *ISDN Primary Rate Interface: Maintenance* (553-3001-517).

Symptoms and corrective action

In conjunction with the Common Equipment fault indications received, look for the following symptoms in order to identify the type of corrective action required:

- "Call processing stopped on the entire system" on page 142
- "Fault indicated on the CPU circuit card, or memory fault indicated" on page 145
- "Fault indicated on the Tone and Digit Switch" on page 147
- "Fault indicated when trying to perform a datadump" on page 149
- "OVL005 message displayed and no access to overlays" on page 149

Call processing stopped on the entire system

Call processing has stopped. Look up all system messages in *Software Input/Output: Maintenance* (553-3001-511) and follow the instructions given. If the fault does not clear, use the following procedures.

For systems equipped with the NTDK20 SSC card, you may need to replace:

- NTAK04, NTDK70 or NTDK78 Power Supply
- NTAK05 or NTDK72 Power Supply
- NTDK20 SSC card
- NTDK21 or NTDK81 Software Daughterboard
- NTDK22 or NTDK84 10 m Fiber Expansion Daughterboard
- NTDK24, NTDK79, or NTDK85 3 km Fiber Expansion Daughterboard

- NTDK26 Backwards Compatible Daughterboard
- NTDK83, NTDK99, NTTK02, or NTTK01 IP Expansion Daughterboard
- main cabinet or chassis

For systems equipped with the NTDK97 MSC card, you may need to replace:

- NTDK97 MSC card (replace with an NTDK20 SSC card)
- the chassis

Table 33
NTDK20 causes and actions (Part 1 of 3)

Possible cause	Action
Improperly installed NTDK21, NTDK81 or NTDK13 Software Daughterboard	Unseat the NTDK20 SSC card. Unseat the Software Daughterboard. Reseat the Software Daughterboard. Ensure Daughterboard connector is fully seated. Reinsert the NTDK20 SSC circuit card.
Improperly installed NTDK22, NTDK24, NTDK79, NTDK83, NTDK84, NTDK85, NTDK99, NTTK01, or NTTK02 Expansion Daughterboard	Unseat the NTDK20 SSC card. Unseat the Expansion Daughterboard. Reseat the Expansion Daughterboard. Ensure Daughterboard connector is fully seated. Reinsert the NTDK20 SSC circuit card.
Improperly installed NTDK26 Backwards Compatible Daughterboard	Unseat the NTDK20 SSC card. Unseat the Backwards Compatible Daughterboard. Reseat the Backwards Compatible Daughterboard. Ensure Daughterboard connector is fully seated. Reinsert the NTDK20 SSC circuit card.
Defective NTAK04, NTDK70 or NTDK78 or NTDK72 or NTAK05 Power Supply in the main cabinet	Make sure the green LED on the power supply in the main cabinet is lit. If it is not lit, go to “Clearing power faults” on page 125. If the power supply LED is lit, go to the next possible cause.

Table 33
NTDK20 causes and actions (Part 2 of 3)

Possible cause	Action
Initialization required	Press the manual initialize button on the faceplate of the NTDK20 SSC card. If the system initializes, check all fault indicators and clear any faults indicated. If the system does not initialize, unseat the circuit cards in the main cabinet/chassis (and in the expansion cabinet or chassis with chassis expander, if equipped) one at a time starting with slot 1. If the system initializes, replace the last circuit card you removed (it may be faulty). If the system will not initialize, go to the next possible cause.
Defective NTDK20 SSC card	Replace the NTDK20 SSC circuit card, with the original daughterboards installed on it. If the system does not recover, go to the next possible cause.
Defective NTDK26 Backwards Compatible Daughterboard	Unseat the NTDK20 SSC circuit card and replace the Backwards Compatible Daughterboard. Reinsert the NTDK20 SSC circuit card. If a SYSLOAD (system reload) occurs, check all fault indicators and clear any faults indicated. If the system will not reload, go to the next possible cause.
Defective NTDK22, NTDK24, NTDK79, NTDK83, NTDK84, NTDK85, NTDK99, NTTK01, or NTTK02 Expansion Daughterboard	Unseat the NTDK20 SSC circuit card and replace the Expansion Daughterboard. Reinsert the NTDK20 SSC circuit card. If a SYSLOAD (system reload) occurs, check all fault indicators and clear any faults indicated. If the system will not reload, go to the next possible cause.

Table 33
NTDK20 causes and actions (Part 3 of 3)

Possible cause	Action
Defective NTDK21, NTDK81 or NTDK13 Software Daughterboard	Unseat the NTDK20 SSC circuit card and replace the Software Daughterboard. Reinsert the NTDK20 SSC circuit card. Reinstall software from a PC Card as necessary. If the system will not reload, go to the next possible cause.
Defective backplane	Replace the cabinet or chassis.

Fault indicated on the CPU circuit card, or memory fault indicated

The red LED is lit on the CPU circuit card, or a memory fault is indicated. Look up all system messages in *Software Input/Output: Maintenance* (553-3001-511) and follow the instructions given. If the fault does not clear, use the following procedures.

Constantly observe and look up system messages as you perform these procedures.

For systems equipped with the NTDK20 SSC card, you may need to replace:

- NTDK20 SSC (Small System Controller) card
- NTDK21 or NTDK81 Software Daughterboard
- NTDK22 or NTDK84 10 m Fiber Expansion Daughterboard
- NTDK24 or NTDK79 or NTDK85 3 km Fiber Expansion Daughterboard
- NTDK83, NTDK99, NTTK01, or NTTK02 IP Expansion Daughterboard
- NTDK26 Backwards Compatible Daughterboard

For systems equipped with the NTDK97 MSC card, you may need to replace:

- NTDK97 MSC card

Table 34
NTDK20 causes and actions (Part 1 of 2)

Possible cause	Action
Improperly installed NTDK21, NTDK81 or NTDK13 Software Daughterboard	Power down the system and remove the NTDK20 SSC card. Unseat the Software Daughterboard and then reseat it. Reinsert the NTDK20 SSC circuit card. Power up the system.
Improperly installed NTDK26 Backwards Compatible Daughterboard	Power down the system and remove the NTDK20 SSC card. Unseat the Backwards Compatible Daughterboard and then reseat it. Reinsert the NTDK20 SSC circuit card. Power up the system.
Improperly installed NTDK22, NTDK24, NTDK79, NTDK83, NTDK84, NTDK85, NTDK99, NTTK01, or NTTK02 Expansion Daughterboard	Power down the system and remove the NTDK20 SSC card. Unseat the Expansion Daughterboard and then reseat it. Reinsert the NTDK20 SSC circuit card. Power up the system.
Defective NTDK20 SSC card	Replace the NTDK20 SSC circuit card, with the original daughterboards installed on it. Reuse all daughterboards installed on the original NTDK20 SSC circuit card. ***Note:*** Call processing on the entire system will be interrupted while the NTDK20 SSC circuit card is being replaced. If the system does not recover, go to the next possible cause.

Table 34
NTDK20 causes and actions (Part 2 of 2)

Possible cause	Action
Defective NTDK21 or NTDK81 Software Daughterboard	Unseat the NTDK20 SSC circuit card and replace the Software Daughterboard. ***Note:*** Call processing on the entire system will be interrupted while the NTDK20 SSC circuit card is unseated. Reinsert the NTDK20 SSC circuit card. If the system will not reload, go to the next possible cause.
Defective NTDK26 Backwards Compatible Daughterboard	Unseat the NTDK20 SSC circuit card and replace the Backwards Compatible Daughterboard. ***Note:*** Call processing on the entire system will be interrupted while the NTDK20 SSC circuit card is unseated. Reinsert the NTDK20 SSC circuit card. If the system will not reload, go to the next possible cause.
Defective NTDK22, NTDK24, NTDK79, NTDK83, NTDK84, NTDK85, NTDK99, NTTK01, or NTTK02 Expansion Daughterboard	Unseat the NTDK20 SSC circuit card and replace the Expansion Daughterboard. ***Note:*** Call processing on the entire system will be interrupted while the NTDK20 SSC circuit card is unseated. Reinsert the NTDK20 SSC circuit card. If the system will not reload, go to the next possible cause.

Fault indicated on the Tone and Digit Switch

The red LED is lit on the CPU circuit card, or a Tone and Digit Switch fault is indicated. Look up all system messages in *Software Input/Output: System Messages* (553-3001-411) and follow the instructions given. If the fault does not clear, use the following procedures.

Constantly observe and look up system messages as you perform these procedures.

You may need to replace:

- NTDK20 SSC card
- NTDK97 MSC card (replace with an SSC card)

Table 35
NTDK20 causes and actions

Possible cause	Action
Defective Tone and Digit Switch circuitry	Test the Tone and Digit Switch (and Digitone Receiver) on the NTDK20 SSC card by entering: **LD 34** **DISX 0** and then: **ENLX 0** and finally: **STAT 0** If the Digitone Receiver fails the test, replace the NTDK20 SSC circuit card. Reuse all daughterboards installed on the original NTDK20 SSC circuit card. ***Note:*** Call processing on the entire system will be interrupted while the NTDK20 SSC circuit card is being replaced. If the system does not recover, go to the next possible cause.

Fault indicated when trying to perform a datadump

You are able to log on to the system but you get an error message when trying to perform a datadump.

Table 36
NTDK20 causes and action

Possible cause	Action
Corrupted data on Software Daughterboard	Perform an **EDD NBK** command in LD 43 to restore the data.
Manual initialize button pressed when performing a backup using the Customer Configuration Backup and Restore (CCBR) feature	While still in remote backup mode, issue the **ENLT** command.
Security failure during an upgrade	Reenter the keycodes. ***Note:*** Up to three invalid keycodes may be entered. After the third invalid keycode, all changes are lost and the Setup Program returns to the main menu.

OVL005 message displayed and no access to overlays

This fault will occur if you press the manual initialize button on the System Core card when performing a data backup, restore, or verification using the Customer Configuration Backup and Restore (CCBR) feature.

When you log back on to the system after completing the remote backup activity, you find you are unable to access overlays and an OVL005 message is displayed.

Table 37
OVL005 message displayed and no access to overlays

Possible cause	Action
Manual initialize button pressed when using the CCBR feature	After logging on to the system, issue the **ENLT** command at the TTY.

Clearing network faults

Contents

This section contains information on the following topics:

Introduction 151
ISDN and DTI faults 153
Symptoms and corrective action 154
Disabled card indicated by OVD message 154
Card disabled without OVD message. 164
Problems with transfers, conference calls, or Music-on-Hold 171
Problems placing calls on 2500-type telephones and some trunks . 174

Introduction

Network functions in the Small System are an integral part of the NTDK20 Small System Controller (SSC) card. This card provides speech path switching, and transmit and receive signaling messages from the CPU.

For the NTDK20 SSC card (Meridian 1 and CS 1000M Small System), network functions include:

- Conference/Tone and Digit Switch: Combines the functionality of Conference by providing 32 channels of conferencing and 30 channels of tone generation. Each Expansion Daughterboard connected to the SSC provides an additional 16 Conference channels per port (16 channels with each Single-port daughterboard and 32 channels with each Dual-port daughterboard).
- SSC circuit card: Provides the digital switching and conferencing for the system.

- Tone Digit Switch/Digitone Receiver: Provides 30 channels of tone generation for the system and eight DTR/XTD units with an additional user-selectable eight DTR/XTD units or four MFC, MFE, MFK5, MFK6, or MFR units that convert multi-frequency dialing signals.
- Serial Data Interface: Provides the interface for up to three Input/Output device ports from the SSC card.
- Ethernet controller: Provides one port between the CPU and a Local Area Network (LAN).

Network faults can cause system initializations, disable conference capability, or disable all terminal connections (such as trunks and telephones) on a card. Network faults can make functional IPE seem faulty.

Manual Continuity Tests can be used to isolate Network faults and IPE faults. See LD 30 in *Software Input/Output: System Messages* (553-3001-411) for details on performing the tests.

Table 38 lists common Network fault indications.

Table 38
Network fault indicators (Part 1 of 2)

Indicator	Possible indications
System messages	CNF messages DTA, DTC, DTI messages ERR020, 120, 4060 INI0003, 0008–0012 NWS0101, 0141, 0201–0204, 0301, 0401 OVD0021, 0022, 0023, 0031 SYS messages TDS messages XCT messages XMI messages

Table 38
Network fault indicators (Part 2 of 2)

Indicator	Possible indications
Visual indicators	Minor alarm on an attendant console Red LEDs lit or flashing on circuit cards
User reports	Minor alarm reported by attendant Users cannot transfer or conference Users cannot dial out on analog (500/2500-type) telephones No dial tone at all sets; no display on digital sets

To clear faults, select the symptom listed in this chapter that most resembles the fault indications and go through the procedure for clearing each possible cause until the fault is fixed. Once the fault is corrected, disregard the remaining possible causes.

Clear any power or Common Equipment faults before you try to clear Network faults.

If the fault is not cleared after you have gone through each possible cause, check the most recent fault indications. Also check "How to clear faults" on page 113 to see if another type of fault is indicated.

Equipment replacement instructions for circuit cards and power supplies are in "Replacing equipment" on page 237. Additional information can be found in *Communication Server 1000M and Meridian 1: Small System Installation and Configuration* (553-3011-210).

After the fault is corrected, go to "Final maintenance procedure" on page 315 to completely restore normal operation.

ISDN and DTI faults

For fault locating and clearing procedures for ISDN BRI-related faults, see *ISDN Basic Rate Interface: Maintenance* (553-3001-518).

For 1.5 Mb and 2.0 Mb ISDN or DTI-related faults, see *ISDN Primary Rate Interface: Maintenance* (553-3001-517).

CAUTION WITH ESDS DEVICES

Wear an antistatic wrist strap when handling circuit cards to prevent damage caused by static electricity.

Symptoms and corrective action

In conjunction with the Network fault indications received, look for the following symptoms in order to identify the type of corrective action required:

- "Disabled card indicated by OVD message" on page 154
- "Card disabled without OVD message" on page 164
- "Problems with transfers, conference calls, or Music-on-Hold" on page 171
- "Problems placing calls on 2500-type telephones and some trunks" on page 174

Disabled card indicated by OVD message

An overload (OVD) message indicates a network (loop) disabled. The network (loop) number in the Small System corresponds to the slot number in the cabinet/chassis. All terminal connections on the loop are disabled.

Test the card by entering:

```
LD 30
TEST
```

If the card tests "OK", the problem has cleared. If an OVD message appears after a few minutes, use the following procedures.

Look up all system messages in *Software Input/Output: Maintenance* (553-3001-511) and follow the instructions given. If the fault does not clear, use the following procedures.

Manual Continuity Tests can be used to isolate Network and IPE faults. See LD 30 in *Software Input/Output: Maintenance* (553-3001-511) for details on performing the tests.

Constantly observe and look up system messages as you perform the procedures.

You may need to replace some of the following equipment:

- NTAK1204 expansion cabinet cable
- NTAK1205 expansion cabinet cable
- IPE circuit card
- Cabinet or chassis
- NTDK95 chassis expander cable
- For systems equipped with the NTDK20 SSC card:
  - A0346816 Fiber Coupler
  - A0632902 100BaseF Fiber cable (10 m)
  - A0817052 100BaseF Fiber cable (5 m)
  - NTDK8305 100BaseT STP CAT-5 Ethernet extension cable (2 m)
  - NTTK34 UTP 100BaseT CAT-5 Ethernet Cross-Over cable (2 m)
  - NTDK20 SSC card
  - NTTK13, NTDK21, or NTDK81 Software Daughterboard
  - NTDK22 or NTDK84 10 m Fiber Expansion Daughterboard
  - NTTK01 Single-port 100BaseF IP Expansion Daughterboard
  - NTTK02 Dual-port 100BaseF IP Expansion Daughterboard
  - NTDK99 Single-port 100BaseT IP Expansion Daughterboard
  - NTDK83 Dual-port 100BaseT IP Expansion Daughterboard
  - NTDK23 10 m Fiber Receiver card
  - NTDK24 or NTDK79 or NTDK85 3 km Fiber Expansion Daughterboard

- NTDK25 or NTDK80 3 km Fiber Receiver card
- NTDK26 Backwards Compatible Daughterboard

- For systems equipped with the NTDK97 MSC card:
  - NTDK97 MSC card (replace with an SSC card)

Table 39
All systems causes and actions (Part 1 of 2)

Possible cause	Action
Defective cable	Isolate the feeder cable from the system.
Defective IPE circuit card	Unseat the IPE circuit card. Enable and test the card by entering: **LD 30** **TEST** If you receive an OVD message after a few minutes, go to the next possible cause. If you do not receive an OVD message after a few minutes, install a new IPE circuit card in the slot. If an OVD message appears after the new circuit card is inserted, there is a fault on the terminal equipment (such as a telephone or console connected to the circuit card). See the appropriate chapter (such as "Clearing attendant console faults" on page 205) and fix the fault. (If the messages point to a particular TN, isolate that TN from the system.)

Table 39
All systems causes and actions (Part 2 of 2)

Possible cause	Action
Defective terminal equipment	Check terminal equipment (such as attendant consoles and telephones) on the disabled card. If you find defective terminal equipment, see the appropriate chapter (such as "Clearing attendant console faults" on page 205) to fix the fault.
Defective NTAK1204 or NTAK1205 Expansion cabinet cable if affected card is in an expansion cabinet	Disable the expansion cabinet by entering: **LD 32** **DISS 1** ***Note:*** Call processing for the expansion cabinet will be interrupted while the cabinet is disabled. Replace the cable and enable the expansion cabinet by entering: **LD 32** **ENLS 1** Test the cable continuity by entering: **LD 30** **TEST** If the problem is not fixed, go to the next possible cause.

Table 40
NTDK20 causes and actions (Part 1 of 6)

Possible cause	Action
Defective NTDK23, NTDK25, or NTDK80 Fiber Receiver card if affected card is in expansion cabinet/ chassis	Replace the NTDK23, NTDK25, or NTDK80 Fiber Receiver card. ***Note:*** Call processing for the expansion cabinet/chassis will be interrupted while the card is being replaced. Enable the fiber link by entering: **`LD 135`** **`ENL FIL 1`** if the fault is in Expansion Cabinet/Chassis 1 OR **`ENL FIL 2`** if the fault is in Expansion Cabinet/Chassis 2 OR **`ENL FIL 3`** if the fault is in Expansion Cabinet/Chassis 3 OR **`ENL FIL 4`** if the fault is in Expansion Cabinet/Chassis 4 If the fault remains and the Fiber Receiver card is: • an NTDK23, replace the fiber cable • an NTDK25 or NTDK80, have the fiber connection tested

Table 40
NTDK20 causes and actions (Part 2 of 6)

Possible cause	Action
	Enable the fiber link by entering: **LD 135** **ENL FIL 1** if the fault is in Expansion Cabinet/Chassis 1 OR **ENL FIL 2** if the fault is in Expansion Cabinet/Chassis 2 OR **ENL FIL 3** if the fault is in Expansion Cabinet/Chassis 3 OR **ENL FIL 4** if the fault is in Expansion Cabinet/Chassis 4 If the fault remains, replace the Fiber Expansion Daughterboard (NTDK22 10 m Fiber Expansion Daughterboard, or NTDK24 or NTDK79 3 km Fiber Expansion Daughterboard) on the NTDK20 SSC circuit card. ***Note:*** Reuse the Software Daughterboard and the other Fiber Expansion Daughterboard, if equipped, attached to the original NTDK20 SSC circuit card. Call processing on the entire system will be interrupted while the NTDK20 SSC circuit card is unseated.
	Enable the fiber link by entering: **LD 135** **ENL FIL 1** if the fault is in Expansion Cabinet/Chassis 1 OR **ENL FIL 2** if the fault is in Expansion Cabinet/Chassis 2 OR **ENL FIL 3** if the fault is in Expansion Cabinet/Chassis 3 OR **ENL FIL 4** if the fault is in Expansion Cabinet/Chassis 4 If the fault remains, replace the NTDK20 SSC circuit card.

Table 40
NTDK20 causes and actions (Part 3 of 6)

Possible cause	Action
Defective NTDK22, NTDK24, NTDK79, NTDK84, or NTDK85 Fiber Expansion Daughterboard	Replace the Fiber Expansion Daughterboard on the NTDK20 SSC circuit card. Reuse the Software Daughterboard and the other Fiber Expansion Daughterboard, if equipped, attached to the original NTDK20 SSC circuit card. ***Note:*** Call processing on the entire system will be interrupted while the NTDK20 SSC circuit card is unseated. If the fault remains and the daughterboard is: • an NTDK22 or NTDK84, replace the fiber cable • an NTDK24, NTDK79, or NTDK85, have the fiber connection tested
	Enable the fiber link by entering: **`LD 135`** **`ENL FIL 1`** if the fault is in Expansion Cabinet/Chassis 1 OR **`ENL FIL 2`** if the fault is in Expansion Cabinet/Chassis 2 OR **`ENL FIL 3`** if the fault is in Expansion Cabinet/Chassis 3 OR **`ENL FIL 4`** if the fault is in Expansion Cabinet/Chassis 4 If the fault remains, replace the NTDK23, NTDK25, or NTDK80 Fiber Receiver card. ***Note:*** Call processing for the fiber expansion cabinet/chassis will be interrupted while the Fiber Receiver card is being replaced. If the fault remains, replace the NTDK20 SSC circuit card.

Table 40
NTDK20 causes and actions (Part 4 of 6)

Possible cause	Action
	Enable the fiber link by entering: **LD 135** **ENL FIL 1** if the fault is in Expansion Cabinet/Chassis 1 OR **ENL FIL 2** if the fault is in Expansion Cabinet/Chassis 2 OR **ENL FIL 3** if the fault is in Expansion Cabinet/Chassis 3 OR **ENL FIL 4** if the fault is in Expansion Cabinet/Chassis 4
Defective NTDK83, NTDK99, NTTK01, or NTTK02 IP Expansion Daughterboard	Replace the IP Expansion Daughterboard on the NTDK20 SSC circuit card in the main cabinet/chassis. Reuse the Software Daughterboard and the other IP Expansion Daughterboard, if equipped, attached to the original NTDK20 SSC circuit card. ***Note:*** Call processing on the entire system will be interrupted while the NTDK20 SSC circuit card is unseated. If the fault remains, replace the cable and have the connections tested.

Table 40
NTDK20 causes and actions (Part 5 of 6)

Possible cause	Action
	Enable the IP link by entering: **LD 135** **ENL FIL 1** if the fault is in Expansion Cabinet/Chassis 1 OR **ENL FIL 2** if the fault is in Expansion Cabinet/Chassis 2 OR **ENL FIL 3** if the fault is in Expansion Cabinet/Chassis 3 OR **ENL FIL 4** if the fault is in Expansion Cabinet/Chassis 4 If the fault remains, replace the IP Expansion Daughterboard in the expansion cabinet/chassis. ***Note:*** Call processing for the IP expansion cabinet/chassis will be interrupted while the IP Expansion Daughterboard is being replaced. If the fault remains, replace the NTDK20 SSC circuit card(s).
	Enable the IP link by entering: **LD 135** **ENL FIL 1** if the fault is in Expansion Cabinet/Chassis 1 OR **ENL FIL 2** if the fault is in Expansion Cabinet/Chassis 2 OR **ENL FIL 3** if the fault is in Expansion Cabinet/Chassis 3 OR **ENL FIL 4** if the fault is in Expansion Cabinet/Chassis 4

Table 40
NTDK20 causes and actions (Part 6 of 6)

Possible cause	Action
Defective NTDK26 Backwards Compatible Daughterboard if affected card is in expansion cabinet/ chassis	Replace the NTDK26 Backwards Compatible Daughterboard. ***Note:*** Call processing on the entire system will be interrupted while the NTDK20 SSC circuit card is unseated. Enable and test the card by entering: **LD 30** **TEST** If the problem persists, replace the NTDK20 SSC circuit card.
Defective NTDK20 SSC card	Install a new NTDK20 SSC card. Reuse the daughterboards attached to the original NTDK20 SSC circuit card. ***Note:*** Call processing on the entire system will be interrupted while the NTDK20 SSC circuit card is being replaced. Enable and test the card by entering: **LD 30** **TEST** Wait for an OVD message. If the card tests “OK”, the NTDK20 SSC circuit card was defective. If you receive an OVD message after a few minutes, and this system is not equipped with an expansion cabinet/chassis, the shelf backplane is defective. Replace the main cabinet. If this system is equipped with an expansion cabinet/chassis, go to the next possible cause.
Defective expansion cabinet/chassis	Replace the cabinet or chassis. Enable and test the card by entering: **LD 30** **TEST** If the problem persists, replace the main cabinet/chassis.

Table 41
NTDK97 causes and actions

Possible cause	Action
Defective NTDK97 MSC card	Replace the NTDK97 MSC card with a new NTDK20 SSC card. ***Note:*** Call processing on the entire system will be interrupted while the NTDK97 MSC circuit card is being replaced. Enable and test the card by entering: **LD 30** **TEST** Wait for an OVD message. If the card tests "OK", the NTDK97 MSC circuit card was defective. If you receive an OVD message after a few minutes, and this system is not equipped with a chassis expander, the backplane is defective. Replace the chassis. If this system is equipped with a chassis expander, go to the next possible cause.
Defective chassis expander	Replace the chassis expander. Enable and test the card by entering: **LD 30** **TEST** If the problem persists, replace the chassis.

Card disabled without OVD message

There is a system message indicating that one or more cards are defective or disabled, but there is no overload (OVD) message indicating disabled equipment. Look up all system messages in *Software Input/Output: Maintenance* (553-3001-511) and follow the instructions given. If the fault does not clear, use the following procedures.

Constantly observe and look up system messages as you perform these procedures.

You may need to replace:

- NTAK1204 expansion cabinet cable (for a Cabinet system)
- NTAK1205 expansion cabinet cable
- NTDK95 chassis expander cable (for a Chassis system)
- IPE circuit card
- shelf backplane and cabinet
- For systems equipped with the NTDK20 SSC card:
  - A0346816 Fiber Coupler
  - A0632902 100BaseF Fiber cable (10 m)
  - A0817052 100BaseF Fiber cable (5 m)
  - NTDK8305 100BaseT STP CAT-5 Ethernet extension cable (2 m)
  - NTTK34 UTP 100BaseT CAT-5 Ethernet Cross-over cable (2 m)
  - NTDK20 SSC card
  - NTTK13, NTDK21, or NTDK81 Software Daughterboard
  - NTDK22 or NTDK84 10 m Fiber Expansion Daughterboard
  - NTTK01 Single-port 100BaseF IP Expansion Daughterboard
  - NTTK02 Dual-port 100BaseF IP Expansion Daughterboard
  - NTDK99 Single-port 100BaseT IP Expansion Daughterboard
  - NTDK83 Dual-port 100BaseT IP Expansion Daughterboard
  - NTDK23 10 m Fiber Receiver card
  - NTDK24, NTDK79, or NTDK85 3 km Fiber Expansion Daughterboard
  - NTDK25 or NTDK80 3 km Fiber Receiver card
  - NTDK26 Backwards Compatible Daughterboard

- For systems using IP expansion and equipped with the NTDK20 SSC card and IP daughterboards:
  - — NTDK83, NTDK99, NTTK01, or NTTK02 IP Expansion Daughterboard
  - — NTDK57DA IP expansion cabinet security device
  - — AO817052 or AO817055 CAT-5 Ethernet extension cable
  - — AO346816 ST fiber coupler

Table 42
All systems causes and actions

Possible cause	Action
IPE card circuitry latched	Disable card, reseat card and enable the card. If the fault persists, go to the next possible cause.
Defective IPE circuit card	Replace the IPE circuit card. Enable and test the card by entering: **LD 30** **TEST** If the fault persists, go to the next possible cause.
Defective terminal equipment	Check all terminals (such as telephones or trunks) connected to the IPE circuit card. Enable and test the card by entering: **LD 30** **TEST** If the fault is not located, go to the next possible cause.
Defective NTAK1204, NTAK1205, A0817052, NTDK8305, NTTK34, A0346816, A0632902, or A0817052 OR Defective NTDK95 chassis expander cable	Replace the cable or coupler between the main and expansion or chassis expander. Call processing for the expansion cabinet/chassis or chassis expander will be interrupted while the cable is replaced. Enable and test the card by entering: **LD 30** **TEST** If the fault persists, go to the next possible cause.
Twenty-five pair cable seating	Check for obstructions, clear if any, and reseat cable. If the fault persists, go to the next possible cause.

Table 43
NTDK20 causes and actions (Part 1 of 5)

Possible cause	Action
Defective NTDK23, NTDK25, or NTDK80 Fiber Receiver card if affected card is in expansion cabinet/ chassis	Replace the NTDK23, NTDK25, or NTDK80 Fiber Receiver card. ***Note:*** Call processing for the expansion cabinet/chassis will be interrupted while the Fiber Receive card is being replaced. Enable the fiber link by entering: **LD 135** **ENL FIL 1** if the fault is in Expansion Cabinet/Chassis 1 OR **ENL FIL 2** if the fault is in Expansion Cabinet/Chassis 2 OR **ENL FIL 3** if the fault is in Expansion Cabinet/Chassis 3 OR **ENL FIL 4** if the fault is in Expansion Cabinet/Chassis 4 If the fault remains and the Fiber Receiver card is: • an NTDK23, replace the fiber cable • an NTDK25 or NTDK80, have the fiber connection tested Enable the fiber link by entering: **LD 135** **ENL FIL 1** if the fault is in Expansion Cabinet/Chassis 1 OR **ENL FIL 2** if the fault is in Expansion Cabinet/Chassis 2 OR **ENL FIL 3** if the fault is in Expansion Cabinet/Chassis 3 OR **ENL FIL 4** if the fault is in Expansion Cabinet/Chassis 4 If the fault remains, replace the Fiber Expansion Daughterboard (NTDK22 10 m Fiber Expansion Daughterboard, or NTDK24 or NTDK79 3 km Fiber Expansion Daughterboard) on the NTDK20 SSC circuit card.

Table 43
NTDK20 causes and actions (Part 2 of 5)

Possible cause	Action
	Reuse the Software Daughterboard and the other Fiber Expansion Daughterboard, if equipped, attached to the original NTDK20 SSC circuit card. ***Note:*** Call processing on the entire system will be interrupted while the NTDK20 SSC circuit card is unseated.
Defective NTDK22, NTDK24, NTDK79, NTDK84, or NTDK85	Replace the Fiber Expansion Daughterboard on the NTDK20 SSC circuit card. Reuse the Software Daughterboard and the other Fiber Expansion Daughterboard, if equipped, attached to the original NTDK20 SSC circuit card. ***Note:*** Call processing on the entire system will be interrupted while the NTDK20 SSC circuit card is unseated. If the fault remains and the daughterboard is: • an NTDK22 or NTDK84, replace the fiber cable • an NTDK24, NTDK79, or NTDK85, have the fiber connection tested
	Enable the fiber link by entering: **LD 135** **ENL FIL 1** if the fault is in Expansion Cabinet/Chassis 1 OR **ENL FIL 2** if the fault is in Expansion Cabinet/Chassis 2 OR **ENL FIL 3** if the fault is in Expansion Cabinet/Chassis 3 OR **ENL FIL 4** if the fault is in Expansion Cabinet/Chassis 4

Table 43
NTDK20 causes and actions (Part 3 of 5)

Possible cause	Action
	If the fault remains, replace the NTDK23, NTDK25, or NTDK80 Fiber Receiver card. ***Note:*** Call processing for the expansion cabinet/chassis will be interrupted while the Fiber Receiver card is being replaced. If the fault remains, replace the NTDK20 SSC circuit card.
Defective NTDK83, NTDK99, NTTK01, or NTTK02 IP Expansion Daughterboard if affected card is in an expansion cabinet/ chassis	Replace the IP Expansion Daughterboard on the NTDK20 SSC circuit card in the main cabinet/chassis. Reuse the Software Daughterboard and the other IP Expansion Daughterboard, if equipped, attached to the original NTDK20 SSC circuit card. ***Note:*** Call processing on the entire system will be interrupted while the NTDK20 SSC circuit card is unseated. If the fault remains, replace the cable and have the connections tested. Enable the IP link by entering: **`LD 135`** **`ENL FIL 1`** if the fault is in Expansion Cabinet/Chassis 1 OR **`ENL FIL 2`** if the fault is in Expansion Cabinet/Chassis 2 OR **`ENL FIL 3`** if the fault is in Expansion Cabinet/Chassis 3 OR **`ENL FIL 4`** if the fault is in Expansion Cabinet/Chassis 4 If the fault remains, replace the IP Expansion Daughterboard in the expansion cabinet/chassis. ***Note:*** Call processing for the expansion cabinet/chassis will be interrupted while the IP Expansion Daughterboard is being replaced. If the fault remains, replace the NTDK20 SSC circuit card(s).

Table 43
NTDK20 causes and actions (Part 4 of 5)

Possible cause	Action
	Enable the IP link by entering: **LD 135** **ENL FIL 1** if the fault is in Expansion Cabinet/Chassis 1 OR **ENL FIL 2** if the fault is in Expansion Cabinet/Chassis 2 OR **ENL FIL 3** if the fault is in Expansion Cabinet/Chassis 3 OR **ENL FIL 4** if the fault is in Expansion Cabinet/Chassis 4
Defective NTDK26 Backwards Compatible Daughterboard	Replace the NTDK26 Backwards Compatible Daughterboard. ***Note:*** Call processing on the entire system will be interrupted while the NTDK20 SSC circuit card is unseated. Enable and test the card by entering: **LD 30** **TEST** If the problem persists, replace the NTDK20 SSC circuit card.
Defective NTDK20 SSC card	Install a new NTDK20 SSC card. Reuse the daughterboards attached to the original NTDK20 SSC circuit card. ***Note:*** Call processing on the entire system will be interrupted while the NTDK20 SSC circuit card is being replaced. Enable and test the card by entering: **LD 30** **TEST**

Table 43
NTDK20 causes and actions (Part 5 of 5)

Possible cause	Action
	If the card tests “OK”, the NTDK20 SSC circuit card was defective. If the problem recurs after a few minutes, and this system is not equipped with an expansion cabinet/chassis, the shelf backplane is defective. Replace the main cabinet. If this system is equipped with an expansion cabinet/chassis, go to the next possible cause.
Defective expansion cabinet/chassis	Replace the cabinet/chassis if the affected IPE card is in this cabinet/chassis. Enable and test the card by entering: **LD 30** **TEST** If the problem persists, go to the next possible cause.
Defective main cabinet/ chassis	Replace the cabinet/chassis.

Problems with transfers, conference calls, or Music-on-Hold

Several users cannot transfer or place conference calls, or calls do not receive Music-on-Hold. A circuit card that provides conference capability may be disabled. Look up all system messages in *Software Input/Output: Maintenance* (553-3001-511) and follow the instructions given. If the fault does not clear, use the following procedures.

Constantly observe and look up system messages as you perform these procedures.

You may need to replace:

- NTDK20 SSC card
- NTDK22 or NTDK84 10 m Fiber Expansion Daughterboard
- NTDK24, NTDK79, or NTDK85 3 km Fiber Expansion Daughterboard

- NTTK01 Single-port 100BaseF IP Expansion Daughterboard
- NTTK02 Dual-port 100BaseF IP Expansion Daughterboard
- NTDK99 Single-port 100BaseT IP Expansion Daughterboard
- NTDK83 Dual-port 100BaseT IP Expansion Daughterboard
- NTDK26 Backwards Compatible Daughterboard
- telephone

Table 44
NTDK20 causes and actions (Part 1 of 2)

Possible cause	Action
Defective NTDK26 Backwards Compatible Daughterboard	If a fault is indicated on conference loop 31, replace the Backwards Compatible Daughterboard. ***Note:*** Call processing on the entire system will be interrupted while the NTDK20 SSC circuit card is unseated.
Defective NTDK22, NTDK24, NTDK79, NTDK83, NTDK84, NTDK85, NTDK99, NTTK01, or NTTK02 Expansion Daughterboard	If a fault is indicated on conference loop 31, replace the Expansion Daughterboard for Expansion Cabinet /Chassis 1. If a fault is indicated on conference loop 62, replace the Expansion Daughterboard for Expansion Cabinet /Chassis 2. If a fault is indicated on conference loop, replace the Expansion Daughterboard for Expansion Cabinet /Chassis 3. If a fault is indicated on conference loop, replace the Expansion Daughterboard for Expansion Cabinet /Chassis 4. ***Note:*** Call processing on the entire system will be interrupted while the NTDK20 SSC circuit card is unseated.

Table 44
NTDK20 causes and actions (Part 2 of 2)

Possible cause	Action
Defective NTDK20 SSC card	If there are no messages indicating a fault on any conference loop, test each conference loop in the system by entering: **LD 38** **CNFC loop** where “loop” represents the conference loop number 29, 30, 31, or 62. If the conference loop is disabled, try to enable it by entering: **LD 38** **ENLL loop** where “loop” represents the conference loop number 29, 30, 31, or 62. If a fault is indicated on conference loop 31, replace the Backwards Compatible Daughterboard or the Fiber Expansion Daughterboard for Expansion Cabinet/Chassis 1. If a fault is indicated on conference loop 62, replace the Fiber Expansion Daughterboard for Expansion Cabinet/Chassis 2. If a fault is indicated on conference loop 29 or 30, replace the NTDK20 SSC circuit card. Reuse the Daughterboards installed on the original NTDK20 SSC circuit card. ***Note:*** Call processing on the entire system will be interrupted while the NTDK20 SSC circuit card is being replaced. If no faults are detected on any conference loop, go to the next possible cause.
Defective telephone	Check the telephone with this problem. Make sure that the feature is properly assigned to the telephone and the telephone is not defective.

Table 45
NTDK97 causes and actions

Possible cause	Action
Defective NTDK97 MSC card	If there are no messages indicating a fault on conference loop 29, test the conference loop in the system by entering: **LD 38** **CNFC 29** If the conference loop is disabled, try to enable it by entering: **LD 38** **ENLL 29** If a fault is indicated on conference loop 29, replace the NTDK97 MSC circuit card. ***Note:*** Call processing on the entire system will be interrupted while the NTDK97 MSC circuit card is being replaced. If no faults are detected on the conference loop, go to the next possible cause.
Defective telephone	Check the telephone with this problem. Make sure that the feature is properly assigned to the telephone and the telephone is not defective.

Problems placing calls on 2500-type telephones and some trunks

Several users of 2500-type telephones report trouble placing calls. Other users may report trouble dialing on certain trunks. A Digitone Receiver or a circuit card that provides Tone and Digit Switch capability may be disabled. Look up all system messages in *Software Input/Output: System Messages* (553-3001-411) and follow the instructions given. If the fault does not clear, use the following procedures.

Constantly observe and look up system messages as you perform these procedures.

You may need to replace:

- NTAK03 TDS/DTR circuit card
- NTDK20 SSC card
- NTDK97 MSC card (replace with an SSC card)

Table 46
Problems placing calls on 2500-type telephones and some trunks (Part 1 of 2)

Possible cause	Action
Disabled Digitone Receiver	Check for disabled Digitone Receiver TNs by entering: **LD 34** **STAT** If any are disabled, try to enable them by entering: **ENLX c u** where “c u” represent card and unit number. If the Digitone Receiver will not enable, go to the next possible cause.
Defective Digitone Receiver	Test the Digitone Receiver on the NTAK03 TDS/DTR by entering: **DTR c u** Test the (Tone and Digit Switch and) Digitone Receiver on the NTDK20 SSC, NTDK97 MSC, or NTBK45 System Core card by entering: **DISX 0** and then: **ENLX 0** If the Digitone Receiver fails the test, replace the SSC, MSC, or System Core circuit card or, if applicable, the NTAK03 TDS/DTR circuit card. If the Digitone Receiver passes the test, go to the next possible cause.

Table 46
Problems placing calls on 2500-type telephones and some trunks (Part 2 of 2)

Possible cause	Action
Digitone Receiver not configured or hardware missing	Check for Digitone Receiver TNs by entering: **LD 20** **LTN** **DTR** If no Digitone Receiver is configured, use: **LD 13** If the Digitone Receiver is configured, check to see if the DTR card is installed. Install the card if necessary. If the problem persists, go to the next possible cause.
Telephone problem	Check the telephone with this problem. Make sure that the DTN Class of Service is properly assigned to the telephone and the telephone is not defective.

Clearing Intelligent Peripheral Equipment faults

Contents

This section contains information on the following topics:

Introduction 177
ISDN and DTI faults 180
Symptoms and corrective action 180
Disabled IPE circuit card 180
More than one IPE circuit card disabled 185

Introduction

Intelligent Peripheral Equipment (IPE) provides the interface between Network switching and terminal equipment (such as trunks, telephones, data sets, and attendant consoles). IPE faults can disable network and terminal equipment.

Manual Continuity Tests can be used to isolate IPE faults.

System messages with the mnemonic `BSD0665` are output for systems equipped with the NTDK20 Small System Controller (SSC) card and one or more of the following:

- NTDK22 or NTDK84 10 m Fiber Expansion Daughterboard and NTDK23 10 m Fiber Receiver card
- NTDK24, NTDK79, or NTDK85 3 km Fiber Expansion Daughterboard and NTDK25 or NTDK80 3 km Fiber Receiver card
- NTDK83, NTDK99, NTTK01, or NTTK02 IP Expansion Daughterboard

The messages contain information related to the fiber interface. They identify the link and its state. Table 47 explains the meaning of the Fiber Interface messages output.

Table 47
Fiber Interface messages (Part 1 of 2)

BSD0665 message	Problem
BSD0665 FIBER 1 LINK DOWN	Expansion Cabinet/Chassis 1 Fiber Interface Link is down.
BSD0665 FIBER 1 LINK ESTABLISHED	Expansion Cabinet/Chassis 1 Fiber Interface Link is reestablished.
BSD0665 FIBER 2 LINK DOWN	Expansion Cabinet/Chassis 2 Fiber Interface Link is down.
BSD0665 FIBER 2 LINK ESTABLISHED	Expansion Cabinet/Chassis 2 Fiber Interface Link is reestablished.
BSD0665 FIBER 3 LINK DOWN	Expansion Cabinet/Chassis 3 Fiber Interface Link is down.
BSD0665 FIBER 3 LINK ESTABLISHED	Expansion Cabinet/Chassis 3 Fiber Interface Link is reestablished.

Table 47
Fiber Interface messages (Part 2 of 2)

BSD0665 message	Problem
BSD0665 FIBER 4 LINK DOWN	Expansion Cabinet/Chassis 4 Fiber Interface Link is down.
BSD0665 FIBER 4 LINK ESTABLISHED	Expansion Cabinet/Chassis 4 Fiber Interface Link is reestablished.

Table 48 lists common IPE fault indications (many other system messages may be generated).

Table 48
IPE fault indicators

Indicator	Possible indications
Sample system messages	BSD0665 FIBER 1 LINK DOWN BSD0665 FIBER 2 LINK DOWN BSD0665 FIBER 3 LINK DOWN BSD0665 FIBER 4 LINK DOWN ERR4062 NWS0301, 0401, 0501 OVD0001–0010, 0024 XMI messages
Visual indicators	Red LEDs lit on circuit cards
User reports	Trouble with calls on attendant console Trouble with calls on telephones

To clear faults, select the symptom listed in this chapter that most resembles the fault indications and go through the procedure for clearing each possible cause until the fault is fixed. Once the fault is corrected, disregard the remaining possible causes.

Clear any power or Common Equipment faults before you try to clear IPE faults.

If the fault is not cleared after you have gone through each possible cause, check the most recent fault indications. Also check "How to clear faults" on page 113 to see if another type of fault is indicated.

Equipment replacement instructions for circuit cards and power supplies are described in "Replacing equipment" on page 237. Additional information can be found in *Communication Server 1000M and Meridian 1: Small System Installation and Configuration* (553-3011-210).

After the fault is corrected, go to "Final maintenance procedure" on page 315 to completely restore normal operation.

CAUTION WITH ESDS DEVICES

Wear an antistatic wrist strap when handling circuit cards to prevent damage caused by static electricity.

ISDN and DTI faults

For fault locating and clearing procedures for ISDN BRI-related faults, see *ISDN Basic Rate Interface: Maintenance* (553-3001-518).

For 1.5 Mb and 2.0 Mb ISDN or DTI-related faults, see *ISDN Primary Rate Interface: Maintenance* (553-3001-517).

Symptoms and corrective action

In conjunction with the IPE fault indications received, look for the following symptoms in order to identify the type of corrective action required:

- "Disabled IPE circuit card" on page 180
- "More than one IPE circuit card disabled" on page 185

Disabled IPE circuit card

A IPE circuit card is disabled, the red LED on the IPE circuit card is lit, or two or more units on a circuit card are disabled. There is a system message

indicating that the circuit card or units on it are disabled. Only one IPE circuit card is affected.

Look up all system messages in *Software Input/Output: System Messages* (553-3001-411) and follow the instructions given. If the fault does not clear, use the following procedures.

Constantly observe and look up system messages as you perform these procedures procedure.

You may need to replace:

- NTAK1204 expansion cabinet cable
- NTAK1205 expansion cabinet cable
- A0817072, NTTK34, or NTDK8305 IP expansion cabinet cables
- NTDK95 chassis expander cable
- IPE circuit card
- For systems equipped with the NTDK20 Small System Controller (SSC) card:
  - NTDK20 SSC card
  - NTDK22 or NTDK84 10 m Fiber Expansion Daughterboard
  - NTDK23 10 m Fiber Receiver card
  - NTDK24, NTDK79, or NTDK85 3 km Fiber Expansion Daughterboard
  - NTDK25 or NTDK80 3 km Fiber Receiver card
  - NTTK01 Single-port 100BaseF IP Expansion Daughterboard
  - NTTK02 Dual-port 100BaseF IP Expansion Daughterboard
  - NTDK99 Single-port 100BaseT IP Expansion Daughterboard
  - NTDK83 Dual-port 100BaseT IP Expansion Daughterboard

- For systems equipped with the NTDK97 Mini System Controller (MSC) card:
  - — NTDK97 MSC card (replace with an SSC card)

Table 49
All systems causes and actions (Part 1 of 2)

Possible cause	Action
Defective IPE circuit card	Replace the affected circuit card. Enable the circuit card by entering: **LD 32** **ENLC c** where “c” represents the card number. Test the card by entering: **LD 30** **UNTT c** where “c” represents the card number.
Defective NTAK1204, NTAK1205, A0817052, NTDK8305, NTTK34, A0346816, A0632902 or A0817052 OR Defective NTDK95 chassis expander cable	***Note:*** Call processing for the expansion cabinet/chassis will be interrupted while the expansion cabinet/chassis cable or coupler is being replaced. Disable the expansion cabinet/chassis by entering: **LD 32** **DISS x** where “x” is the number for Expansion Cabinet/Chassis 1–4. Enable the expansion cabinet/chassis by entering: **LD 32** **ENLS x** where “x” is the number for Expansion Cabinet/Chassis 1–4. Test the circuit card by entering: **LD 30** **TEST** (The **TEST** command ensures that all circuit cards are reenabled in the expansion cabinet/chassis.)

Table 49
All systems causes and actions (Part 2 of 2)

Possible cause	Action
Defective NTDK95 chassis expander cable	If the affected card is in the chassis expander, replace the NTDK95 cable connecting the DS 30x connectors.

Table 50
NTDK20 causes and actions (Part 1 of 3)

Possible cause	Action
Defective NTDK23, NTDK25, or NTDK80 Fiber Receiver card if affected card is in expansion cabinet/ chassis	***Note:*** Call processing for the expansion cabinet/chassis will be interrupted while the Fiber Receiver card is being replaced. Disable the expansion cabinet/chassis by entering: **LD 32** **DISS x** where “x” is the number for Expansion Cabinet/Chassis 1–4. Disable the Fiber Link by entering: **LD 135** **DIS FIL x** where “x” is the number for Expansion Cabinet/Chassis 1–4. Replace the Fiber Receiver card.

Table 50
NTDK20 causes and actions (Part 2 of 3)

Possible cause	Action
	Perform Local and Remote Loop-back tests on the link by entering: **LD 135** **LLBK FIL x** **RLBK FIL x** where “x” is the number for Expansion Cabinet/Chassis 1–4. Enable the Fiber Link by entering: **LD 135** **ENL FIL x** where “x” is the number for Expansion Cabinet/Chassis 1–4. Enable the expansion cabinet/chassis by entering: **LD 32** **ENLS x** where “x” is the number for Expansion Cabinet/Chassis 1–4.
Defective NTDK22, NTDK24, NTDK79, NTDK83, NTDK84, NTDK85, NTDK99, NTTK01, or NTTK02 Expansion Daughterboard	Replace the Expansion Daughterboard on the NTDK20 SSC circuit card. ***Note:*** Call processing for the entire system will be interrupted while the NTDK20 SSC circuit card is unseated. Reuse the Software Daughterboard and the other Expansion Daughterboard, if equipped, attached to the original NTDK20 SSC circuit card.

Table 50
NTDK20 causes and actions (Part 3 of 3)

Possible cause	Action
	Enable the circuit card by entering: **LD 32** **ENLC c** where “c” represents the card number. Test the circuit card by entering: **LD 30** **TEST** (The **TEST** command ensures that all circuit cards are reenabled in the cabinet/chassis.)
Defective NTDK20 SSC card	Replace the NTDK20 SSC card. ***Note:*** Call processing for the entire system will be interrupted while the NTDK20 SSC circuit card is being replaced. Reuse the Software Daughterboard and the other Fiber Expansion Daughterboard, if equipped, attached to the original NTDK20 SSC circuit card. Test the circuit card by entering: **LD 30** **UNTT c** where “c” represents the card number.

More than one IPE circuit card disabled

More than one IPE circuit card, or two or more units on different circuit cards, are disabled in the same cabinet/chassis. There is a system message indicating that the circuit cards or units on the circuit cards are disabled. Look up all system messages in *Software Input/Output: Maintenance* (553-3001-511) and follow the instructions given. If the fault does not clear, use the following procedures.

Manual Continuity Tests can be used to isolate Intelligent IPE faults. See LD 30 in *Software Input/Output: Maintenance* (553-3001-511) for details on performing the tests.

Constantly observe and look up system messages as you perform these procedures.

You may need to replace:

- A0632902 Fiber Cable (10 m) Plastic
- NTDK20 SSC card
- NTDK22 or NTDK84 10 m Fiber Expansion Daughterboard
- NTDK23 10 m Fiber Receiver card
- NTDK24, NTDK79, or NTDK85 3 km Fiber Expansion Daughterboard
- NTDK25 or NTDK80 3 km Fiber Receiver card
- NTDK26 Backwards Compatible Daughterboard
- NTDK83, NTDK99, NTTK01, or NTTK02 IP Expansion Daughterboard

Table 51
NTDK20 causes and actions (Part 1 of 4)

Possible cause	Action
If the IPE circuit card is in an expansion cabinet/ chassis, the NTAK1204 or NTAK1205 copper cable may be defective	***Note:*** Call processing for the expansion cabinet/chassis will be interrupted while the cable is being replaced. Disable the expansion cabinet/chassis by entering: **LD 32** **DISS x** where “x” is the number for Expansion Cabinet/Chassis 1–4. Replace the fiber cable. Enable the expansion cabinet/chassis by entering: **LD 32** **ENLS x** where “x” is the number for Expansion Cabinet/Chassis 1–4. Test the circuit cards by entering: **LD 30** **TEST** (The **TEST** command ensures that all circuit cards are reenabled in the expansion cabinet/chassis.)

Table 51
NTDK20 causes and actions (Part 2 of 4)

Possible cause	Action
If the IPE circuit card is in an expansion cabinet/ chassis, the fiber cable may be defective	***Note:*** Call processing for the expansion cabinet/chassis will be interrupted while the fiber cable is being replaced. Disable the expansion cabinet/chassis by entering: **LD 32** **DISS x** where "x" is the number for Expansion Cabinet/Chassis 1–4. Disable the Fiber Link by entering: **LD 135** **DIS FIL x** where "x" is the number for Expansion Cabinet/Chassis 1–4. Replace the fiber cable. Perform Local and Remote Loop-back tests on the link by entering: **LD 135** **LLBK FIL x** **RLBK FIL x** where "x" is the number for Expansion Cabinet/Chassis 1–4. Enable the Fiber Link by entering: **LD 135** **ENL FIL x** where "x" is the number for Expansion Cabinet/Chassis 1–4. Enable the Expansion cabinet by entering: **LD 32** **ENLS x** where "x" is the number for Expansion Cabinet/Chassis 1–4.

Table 51
NTDK20 causes and actions (Part 3 of 4)

Possible cause	Action
	Enable the circuit card by entering: **LD 32** **ENLC c** where “c” represents the card number. Test the circuit card by entering: **LD 30** **TEST** (The **TEST** command ensures that all circuit cards are reenabled in the expansion cabinet/chassis.)
Fiber link problems	Replace the Fiber Receiver card or Fiber Expansion Daughterboard, especially if BSD0665 messages have been output indicating that there is a problem.
Defective IPE circuit card	Replace the affected circuit cards. Enable the circuit card by entering: **LD 32** **ENLS x** where “x” represents the shelf number (0 for the main cabinet/chassis, 1 for the first expansion cabinet/chassis, 2 for the second expansion cabinet/chassis, 3 for the third expansion cabinet/chassis, and 4 for the fourth expansion cabinet/chassis). Test the circuit card by entering: **LD 30** **TEST**

Table 51
NTDK20 causes and actions (Part 4 of 4)

Possible cause	Action
Keyword is invalid	To input the proper keyword, use: **LD 97** **REQ** **TYPE** **License** **KEY 1** **KEY 1** **KEY 1** Enable the circuit cards by entering: **LD 32** **ENLC c** where “c” represents the card number. Test the circuit cards by entering: **LD 30** **TEST** (The **TEST** command ensures that all circuit cards are reenabled in the expansion cabinet/chassis.)
Defective NTDK20 SSC circuit card	Replace the NTDK20 SSC circuit card. ***Note:*** Call processing for the entire system will be interrupted while the NTDK20 SSC circuit card is being replaced. Reuse the daughterboards attached to the original NTDK20 SSC circuit card. Test the circuit cards by entering: **LD 30** **TEST**

Table 52
NTDK97 causes and actions (Part 1 of 2)

Possible cause	Action
If the IPE circuit card is in a chassis expander, the NTDK95 copper cable may be defective	Replace the NTDK95 cable connecting the DS 30x connectors. ***Note:*** Call processing for the entire system will be interrupted while the NTDK95 chassis expander cable is being replaced.
Defective IPE circuit card	Replace the affected circuit cards. Enable the circuit card by entering: **LD 32** **ENLS 1** Test the circuit card by entering: **LD 30** **TEST**

Table 52
NTDK97 causes and actions (Part 2 of 2)

Possible cause	Action
Keyword is invalid	To input the proper keyword, use: **LD 97** **REQ** **TYPE** **License** **KEY 1** **KEY 1** **KEY 1** Enable the circuit cards by entering: **LD 32** **ENLC c** where “c” represents the card number. Test the circuit cards by entering: **LD 30** **TEST** (The **TEST** command ensures that all circuit cards are reenabled in the chassis expander.)
Defective NTDK97 MSC circuit card	Replace the NTDK97 MSC circuit card. ***Note:*** Call processing for the entire system will be interrupted while the NTDK97 MSC circuit card is being replaced. Test the circuit cards by entering: **LD 30** **TEST**

Clearing CCBR faults

Contents

This section contains information on the following topics:

Introduction 193
Symptoms and corrective action 193
Connection to Small System is interrupted 194
Connected to Small System but unable to establish communication 194
Unable to access overlays and an OVL0005 message is displayed . 194

Introduction

This chapter describes fault indications associated with the Customer Configuration Backup and Restore (CCBR) feature and what corrective action, if any, is required.

Symptoms and corrective action

In conjunction with any fault indications received, look for the following symptoms in order to identify the type of corrective action required:

- "Connection to Small System is interrupted" on page 194
- "Connected to Small System but unable to establish communication" on page 194
- "Unable to access overlays and an OVL0005 message is displayed" on page 194

Connection to Small System is interrupted

This indicates that the CCBR procedure was interrupted.

Corrective action

Check the modem settings and set them correctly. Reaccess the Small System and start over again.

> ***Note:*** The SDI port may have been disabled during the interruption. It will be automatically enabled after five minutes.

Connected to Small System but unable to establish communication

The SDI port is probably temporarily disabled.

Corrective action

Do not disconnect from the Small System. The SDI port should automatically enable after approximately five minutes.

Unable to access overlays and an OVL0005 message is displayed

The manual initialization button on the Small System Controller (SSC) card may have accidentally been pressed while using the CCBR feature.

Corrective action

After logging in at the TTY, issue the **ENLT** command.

Clearing trunk faults

Contents

This section contains information on the following topics:

Introduction 195
ISDN and DTI faults 197
Symptoms and corrective action 198
Trunk cannot make or receive calls (OVD message received) 198
Trunk cannot make or receive calls (no OVD message) 201

Introduction

Trunk circuit cards provide the interface between the system and Central Office (CO) trunks, or between PBXs. The maintenance telephone can be used to test trunks. This chapter considers two types of trunk cards:

- E&M Trunk: provides four trunk units, each of which can be connected to a trunk configured to operate as one of the following:
  - E&M signaling trunk
  - Two-wire TIE trunk
  - Four-wire TIE trunk
  - Paging trunk

- Universal Trunk: provides eight trunk units, each of which can be connected to a trunk configured to operate as one of the following:
  - — Central Office trunk
  - — Direct Inward Dialing (DID) trunk
  - — Two-way TIE, Dial Repeating (2DR)
  - — Two-way TIE, Outgoing Automatic Incoming Dial (OAID) trunk
  - — Recorded Announcement (RAN) trunk
  - — Music trunk
  - — Paging trunk

Trunk faults can cause problems (such as noise) on outside calls and can keep calls from entering or leaving the Small System.

Manual Continuity Tests can be used to isolate Network and IPE faults. See LD 30 in *Software Input/Output: Maintenance* (553-3001-511) for details on performing the tests.

Table 53 lists common trunk fault indications.

Table 53
Trunk fault indicators

Indicator	Possible indications
System messages	ERR090, 220, 270 OVD0001–0010 TRK messages
Visual indicators	Red LED lit on trunk circuit card
User reports	Users have trouble with a specific trunk Callers report continuous ringing Trouble with calls on console and/or telephones

To clear faults, select the symptom listed in this chapter that most resembles the fault indications and go through the procedure for clearing each possible

cause until the fault is fixed. Once the fault is corrected, disregard the remaining possible causes.

Clear any power or Common Equipment faults before you try to clear trunk faults.

If the fault is not cleared after you have gone through each possible cause, check the most recent fault indications. Also check "How to clear faults" on page 113 to see if another type of fault is indicated.

Equipment replacement instructions for circuit cards are in the chapter titled "Replacing equipment" on page 237. Additional information can be found in *Communication Server 1000M and Meridian 1: Small System Installation and Configuration* (553-3011-210).

After the fault is corrected, go to "Final maintenance procedure" on page 315 to completely restore normal operation.

CAUTION WITH ESDS DEVICES

Wear an antistatic wrist strap when handling circuit cards to prevent damage caused by static electricity.

ISDN and DTI faults

For fault locating and clearing procedures for ISDN BRI-related faults, see *ISDN Basic Rate Interface: Maintenance* (553-3001-518).

For 1.5 Mb and 2.0 Mb ISDN or DTI-related faults, see *ISDN Primary Rate Interface: Maintenance* (553-3001-517).

Symptoms and corrective action

In conjunction with the trunk fault indications received, look for the following symptoms in order to identify the type of corrective action required:

- "Trunk cannot make or receive calls (OVD message received)" on page 198
- "Trunk cannot make or receive calls (no OVD message)" on page 201

Trunk cannot make or receive calls (OVD message received)

You cannot make or receive calls over a trunk and an overload (OVD) system message is received. The message indicates only that this trunk has been disabled. Look up all system messages in *Software Input/Output: Maintenance* (553-3001-511) and follow the instructions given. If the fault does not clear, use the following procedures.

Manual Continuity Tests can be used to isolate faults to Intelligent Peripheral Equipment, such as E&M and Universal Trunk circuit cards. See LD 30 in *Software Input/Output: Maintenance* (553-3001-511) for details on performing the tests.

Constantly observe and look up system messages as you perform these procedures.

You may need to replace:

- E&M Trunk circuit card: NT8D15
- Universal Trunk circuit card: NT8D14
- Any other trunk circuit card
- NTAK03 TDS/DTR circuit card
- NTDK20 Small System Controller (SSC) card
- NTDK97 Mini System Controller (MSC) card
- Trunk equipment (such as music source or paging equipment)

Table 54
Trunk cannot make or receive calls (OVD message received) (Part 1 of 2)

Possible cause	Action
Defective trunk circuit card	If the indicated circuit card is an E&M or Universal Trunk circuit card, hardware disable then reenable the circuit card to initiate a self-test. If the test fails, replace the circuit card. If the test passes, follow the procedure below. Disconnect the wiring between the circuit card and the cross-connect terminal. Enable the TN by entering: **LD 32** **ENLU c u** where “c u” represent card and unit numbers. Wait for an OVD message. If you receive an OVD message, replace the circuit card. If you do not receive an OVD message, reconnect the wiring and go to the next possible cause.
Defective wiring	At the main cross-connect terminal, disconnect the wiring to the CO or other trunk equipment (such as a music source or paging equipment). Enable the TN and wait for an OVD message. If you receive an OVD message, repair or replace the wiring to the IPE shelf. If there is no OVD message, repair or replace the wiring from the cross-connect terminal to the telephone. If the trunk circuit card still will not enable or there is still a trunk problem, reconnect the wiring and go to the next possible cause.

Table 54
Trunk cannot make or receive calls (OVD message received) (Part 2 of 2)

Possible cause	Action
	Enable the TN by entering: **LD 32** **ENLU c u** where “c u” represent card and unit numbers. Wait for an OVD message. If you receive an OVD message, replace the circuit card. If you do not receive an OVD message, reconnect the wiring and go to the next possible cause.
Defective trunk equipment	Make sure the CO equipment or other trunk equipment is not defective. If there is no problem with this equipment, go to the next possible cause.
Defective DTR, TDS, MFS, or System Core circuit card	Use the attendant console to seize trunks and audibly test for dial tone and outpulsing, or use a maintenance telephone and enter: **LD 36** **TRK c u** where “c u” represent card and unit numbers. ***Note:*** See *Software Input/Output: Maintenance* (553-3001-511) for information on using this test. If you do not hear outpulsing, the Digitone Receiver, Tone and Digit Switch, or Multi-Frequency Sender may not be sending or receiving digits and the fault will affect more than one trunk. See the procedures for clearing faults on this equipment. If there is no problem with this equipment, go to the next possible cause.

Trunk cannot make or receive calls (no OVD message)

You cannot make or receive calls over a trunk, but there is no overload (OVD) or other system message showing that the TN for this trunk is defective or has been disabled. Look up all system messages in *Software Input/Output: Maintenance* (553-3001-511) and follow the instructions given. If the fault does not clear, use the following procedures.

Manual Continuity Tests can be used to isolate faults to Intelligent Peripheral Equipment, such as E&M and Universal Trunk circuit cards. See LD 30 in *Software Input/Output: Maintenance* (553-3001-511) for details on performing the tests.

Trunk connections from the main frame to the IPE can be checked with a butt-set or test set. Check the trunk wiring at the entry point for dial tone and progress toward the IPE.

Constantly observe and look up system messages as you perform these procedures.

You may need to replace:

- E&M Trunk circuit card: NT8D15
- Universal Trunk circuit card: NT8D14
- Any other trunk circuit card
- NTAK03 TDS/DTR circuit card
- NTDK20 SSC card
- NTDK97 MSC card
- Trunk equipment (such as music source or paging equipment)

Table 55
Trunk cannot make or receive calls (no OVD message) (Part 1 of 2)

Possible cause	Action
Defective trunk equipment	Make sure the CO equipment or other trunk equipment is not defective. If there is no problem with this equipment, go to the next possible cause.
Disabled or defective TN	Test the TN by entering: **LD 30** **UNTT c u** where “c u” represent card and unit numbers. Test other TNs by entering: **TEST** If the test fails, replace the indicated item and test again.
Defective trunk circuit card	If the circuit card is an E&M or Universal Trunk circuit card, hardware disable then reenable the circuit card to initiate a self-test. If the test fails, replace the circuit card. If the test passes, go to the next possible cause.
Defective wiring	At the main cross-connect terminal, disconnect the wiring to the CO or other trunk equipment. Enable the TN and wait for an OVD message. If you receive an OVD message, repair or replace the wiring to the IPE shelf. If there is no OVD message, repair or replace the wiring from the cross-connect terminal to the telephone. If the trunk circuit card still will not enable or there is still a trunk problem, reconnect the wiring and go to the next possible cause.

Table 55
Trunk cannot make or receive calls (no OVD message) (Part 2 of 2)

Possible cause	Action
Defective DTR, TDS, MFS or System Core circuit card	Use the attendant console Barge-in to seize trunks and audibly test for dial tone and outpulsing, or use a maintenance telephone and enter: **LD 36** **TRK c u** where "c u" represent card and unit numbers. ***Note:*** See *Software Input/Output: Maintenance* (553-3001-511) for information on using this test. If you do not hear outpulsing, the Digitone Receiver, Tone and Digit Switch, or Multi-Frequency Sender may not be sending or receiving digits and the fault will affect more than one trunk. See the procedures for clearing faults on this equipment. If there is no problem with this equipment, go to the next possible cause.
Excessive traffic in the system	Additional trunk circuit cards may be required to handle the traffic in the system.

Clearing attendant console faults

Contents

This section contains information on the following topics:

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ISDN and DTI faults 207
Symptoms and corrective action 207
Console cannot make or receive calls (OVD message received) . . . 207
Console cannot make or receive calls (no OVD message). 209
Indicator or digit display not functioning properly 211
Operator cannot hear or be heard properly. 212

Introduction

Components that can cause an attendant console fault are the:

- console itself or add-on units
- console power supply
- building wiring
- cross-connect from the console to the line circuit
- unit on the peripheral line circuit card
- peripheral line circuit card
- ringing generator
- cabinet or chassis power supply

If more than one attendant console is affected, look for connections such as:

- they are on the same line circuit card
- there is a problem with ringing or tones

Use the following software programs to isolate attendant console faults:

- LD 31 to test sets and consoles
- LD 30 to perform signaling and continuity tests

Table 56 lists common attendant console fault indications.

Table 56
Common attendant console fault indicators

Indicator	Possible indications
System messages	Software and hardware faults
Visual indicators	Red LED lit on associated circuit cards
User reports	Trouble with calls Trouble with equipment (such as handset, headset, or display)

To clear faults, select the symptom listed in this chapter that most resembles the fault indications and go through the procedure for clearing each possible cause until the fault is fixed. Once the fault is corrected, disregard the remaining possible causes.

Clear any power or Common Equipment faults before you try to clear attendant console faults.

If the fault is not cleared after you have gone through each possible cause, check the most recent fault indications. Also check “How to clear faults” on page 113 to see if another type of fault is indicated.

Equipment replacement instructions for circuit cards are in “Replacing equipment” on page 237. Additional information can be found in *Communication Server 1000M and Meridian 1: Small System Installation and Configuration* (553-3011-210).

After the fault is corrected, go to "Final maintenance procedure" on page 315 to completely restore normal operation.

CAUTION WITH ESDS DEVICES

Wear an antistatic wrist strap when handling circuit cards to prevent damage caused by static electricity.

ISDN and DTI faults

For fault locating and clearing procedures for ISDN BRI-related faults, see *ISDN Basic Rate Interface: Maintenance* (553-3001-518).

For 1.5 Mb and 2.0 Mb ISDN or DTI-related faults, see *ISDN Primary Rate Interface: Maintenance* (553-3001-517).

Symptoms and corrective action

In conjunction with the attendant console fault indications received, look for the following symptoms in order to identify the type of corrective action required:

- "Console cannot make or receive calls (OVD message received)" on page 207
- "Console cannot make or receive calls (no OVD message)" on page 209
- "Indicator or digit display not functioning properly" on page 211
- "Operator cannot hear or be heard properly" on page 212

Console cannot make or receive calls (OVD message received)

The attendant console cannot make or receive calls. There is an OVD message indicating that a TN for the attendant console has been disabled. Look up all system messages in *Software Input/Output: Maintenance* (553-3001-511) and follow the instructions given. If the fault does not clear, use the following procedures.

Constantly observe and look up system messages as you perform these procedures.

You may need to replace:

- attendant console
- IPE circuit card associated with the console
- Common/Intelligent Peripheral Equipment, Intelligent Peripheral Equipment

Table 57
Console cannot make or receive calls (OVD message received) (Part 1 of 2)

Possible cause	Action
IPE card circuitry latched	Disable the card, reseat the card, and enable the card. If the fault persists, go to the next possible cause.
Defective IPE circuit card	Software disable the TN indicated by the OVD message by entering: **LD 32** **DISU c u** where "c u" represent card and unit numbers. Disconnect the wiring between the IPE circuit card and the cross-connect terminal. Reenable the TN by entering: **ENLU c u** where "c u" represent card and unit numbers. Wait for an OVD message. If you receive a message indicating a problem with the circuit card or unit, replace the circuit card. If you do not receive a message indicating a problem with the circuit card or unit, reconnect the wiring and go to the next possible cause.

Table 57
Console cannot make or receive calls (OVD message received) (Part 2 of 2)

Possible cause	Action
Defective console	Disable the TN. Disconnect the wiring from the console to the jack. Reenable the TN and wait for an OVD message. If you do not receive an OVD message, replace the console. If you receive an OVD message, reconnect the wiring and go to the next possible cause.
Defective wiring	Disable the TN. Disconnect the wiring between the console and the cross-connect terminal. Refer to *Communication Server 1000M and Meridian 1: Small System Installation and Configuration* (553-3011-210) for wiring connections. Reenable the TN and wait for an OVD message. If you do not receive an OVD message, replace or repair the wiring between the console and the cross-connect terminal. If you receive an OVD message, replace or repair the wiring between the IPE shelf and the cross-connect terminal.

Console cannot make or receive calls (no OVD message)

The attendant console cannot make or receive calls. There is no OVD message. There may be other system messages indicating that the TN for this console is defective or has been disabled. Look up all system messages in *Software Input/Output: Maintenance* (553-3001-511) and follow the instructions given. If the fault does not clear, use the following procedures.

Constantly observe and look up messages as you perform these procedures.

Table 58
Console cannot make or receive calls (no OVD message)

Possible cause	Action
No power to console	Check the power supply and wiring to see that the console is powered up. Refer to *Communication Server 1000M and Meridian 1: Small System Installation and Configuration* (553-3011-210) for wiring connections. If there is a power supply problem, correct it. If there is no power problem, go to the next possible cause.
Defective console	Test the console by entering: **`LD 31`** (See *Software Input/Output: Maintenance* (553-3001-511) for information on testing consoles with LD 31.) If the console fails the test, replace it. If the console passes the test, go to the next possible cause.
Console connected to wrong TNs	Check the cross-connect terminal to make sure the console is connected to the correct TNs. If the console is not connected correctly, fix the wiring. If the console is connected correctly, go to the next possible cause.
Defective wiring	Make sure wiring is properly connected and wires are not interchanged, crossed, or grounded. Check the wiring between the console and the cross-connect terminal. Check the wiring between the IPE shelf and the cross-connect terminal. If there is a wiring problem, correct it.

Indicator or digit display not functioning properly

The attendant console operates, but some LCD indicators or digit displays are not functioning properly. Look up all system messages in *Software Input/ Output: Maintenance* (553-3001-511) and follow the instructions given. If the fault does not clear, use the following procedures.

Constantly observe and look up system messages as you perform these procedures.

Table 59
Indicator or digit display not functioning properly (Part 1 of 2)

Possible cause	Action
Disconnected or defective power supply	Make sure the required power supplies to the attendant console are connected and are not defective. Refer to *Communication Server 1000M and Meridian 1: Small System Installation and Configuration* (553-3011-210) for wiring connections. If there is still a console problem, go to the next possible cause.
Disabled TN	Software disable then reenable each TN by entering: **LD 32** **DISU c u** **ENLU c u** where “c u” represent card and unit numbers. Test other TNs by entering: **LD 30** **UNTT c u** where “c u” represent card and unit numbers. Test other TNs by entering: **TEST** If there is still a console problem, go to the next possible cause.

Table 59
Indicator or digit display not functioning properly (Part 2 of 2)

Possible cause	Action
Feature not assigned	Make sure the feature or the indicator is assigned in software. (See *Software Input/Output: Administration* (553-3001-311) and *Software Input/Output: Maintenance* (553-3001-511).) If there is still a console problem, go to the next possible cause.
Defective console	Test the console by entering: **`LD 31`** (See *Software Input/Output: Maintenance* (553-3001-511) for information on testing consoles with LD 31.) If the console fails the test, replace it.

Operator cannot hear or be heard properly

The attendant console operates, but the user cannot hear or be heard properly. Look up all system messages in *Software Input/Output: Maintenance* (553-3001-511) and follow the instructions given. If the fault does not clear, use the following procedures.

Constantly observe and look up system messages as you perform these procedures.

Table 60
Operator cannot hear or be heard properly (Part 1 of 2)

Possible cause	Action
Defective headset or handset	Make sure the handset or headset is plugged into the correct jack on the console. Try another handset or headset. If the test equipment works, replace the equipment. If there is still a console problem, go to the next possible cause.
Defective console	Test the console by entering: **LD 31** (See *Software Input/Output: Maintenance* (553-3001-511) for information on testing consoles with LD 31.) If the console fails the test, replace it. If the console passes the test, go to the next possible cause.

Table 60
Operator cannot hear or be heard properly (Part 2 of 2)

Possible cause	Action
Defective IPE circuit card	Software disable each TN by entering: **LD 32** **DISU c u** where “c u” represent card and unit numbers. Disconnect the wiring between the IPE circuit card and the cross-connect terminal. Reenable and test each TN by entering: **ENLU c u** Wait for an OVD message. If you receive a message indicating a problem with the circuit card or unit, replace the circuit card. If you do not receive a message indicating a problem with the circuit card or unit, reconnect the wiring and go to the next possible cause.
Defective wiring to console	Make sure wiring is properly connected and wires are not interchanged, crossed, or grounded. Check the wiring between the console and the cross-connect terminal. Check the wiring between the IPE shelf and the cross-connect terminal. If there is a wiring problem, correct it.

Clearing telephone faults

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Introduction

Components that can cause a telephone fault are the:

- telephone itself or add-on units
- telephone power supply
- building wiring
- cross-connect from the telephone to the line circuit
- unit on the peripheral line circuit card

- peripheral line circuit card
- ringing generator
- cabinet or chassis power supply

If more than one telephone is affected, look for a connection such as:

- they are on the same line circuit card
- there is a problem with ringing or tones

Use the following software programs and tests to isolate telephone faults:

- LD 30 to perform signaling tests
- LD 31 to test sets and consoles

Table 61 lists common telephone fault indications.

Table 61
Telephone fault indicators

Indicator	Possible indications
System messages	ERR0500 MWL0500 NWS0501 OVD0001–0010 XMI messages
Visual indicators	Red LED lit on associated circuit cards
User reports	Trouble with calls Trouble with equipment (such as handset or add-on module)

To clear faults, select the symptom listed in this chapter that most resembles the fault indications and go through the procedure for clearing each possible cause until the fault is fixed. Once the fault is corrected, disregard the remaining possible causes.

Clear any power or Common Equipment faults before you try to clear telephone faults.

If the fault is not cleared after you have gone through each possible cause, check the most recent fault indications. Also check "How to clear faults" on page 113 to see if another type of fault is indicated.

Equipment replacement instructions for circuit cards are in "Replacing equipment" on page 237. Additional information can be found in *Communication Server 1000M and Meridian 1: Small System Installation and Configuration* (553-3011-210).

After the fault is corrected, go to "Final maintenance procedure" on page 315 to completely restore normal operation.

CAUTION WITH ESDS DEVICES

Wear an antistatic wrist strap when handling circuit cards to prevent damage caused by static electricity.

ISDN and DTI faults

For fault locating and clearing procedures for ISDN BRI-related faults, see *ISDN Basic Rate Interface: Maintenance* (553-3001-518).

For 1.5 Mb and 2.0 Mb ISDN or DTI-related faults, see *ISDN Primary Rate Interface: Maintenance* (553-3001-517).

Symptoms and corrective action

In conjunction with the telephone fault indications received, look for the following symptoms in order to identify the type of corrective action required:

- "Telephone cannot make or receive calls (OVD message received)" on page 218
- "Telephone cannot make or receive calls (no OVD message)" on page 220
- "One end cannot hear or cannot be heard" on page 223
- "Noise or low volume on all calls" on page 225

- "Defective indicator, digit display, or component" on page 228
- "Defective feature" on page 229
- "Defective add-on module" on page 230
- "Cannot dial from 2500-type telephone" on page 231
- "No ring on 500- and 2500-type telephones" on page 234

Telephone cannot make or receive calls (OVD message received)

The telephone cannot make or receive calls. There is an OVD message indicating that the TN for only this telephone has been disabled. Look up all system messages in *Software Input/Output: Maintenance* (553-3001-511) and follow the instructions given. If the fault does not clear, use this procedure.

Constantly observe and look up system messages as you perform these procedures.

You may need to replace the:

- Intelligent Peripheral Equipment (IPE) circuit card
- telephone
- wiring between the cross-connect terminal and the telephone
- wiring between the IPE shelf and the telephone

Table 62
Telephone cannot make or receive calls (OVD message received) (Part 1 of 2)

Possible cause	Action
Defective IPE circuit card	Software disable the TN indicated by the OVD message by entering: **LD 32** **DISU c u** where “c u” represent card and unit numbers. Disconnect the wiring between the IPE circuit card and the cross-connect terminal. Reenable the TN by entering: **ENLU c u** Wait for an OVD message. If you receive a message indicating a problem with the circuit card or unit, replace the circuit card. If you do not receive a message indicating a problem with the circuit card or unit, reconnect the wiring and go to the next possible cause.
Defective telephone	If the telephone is a Meridian Digital Telephone, enter: **LD 32** **IDU c u** where “c u” represent card and unit numbers. If there is no response, replace the telephone. If there is an appropriate response, continue this procedure. Disable the telephone TN. Disconnect the wiring from the telephone to the jack. Reenable the TN and wait for an OVD message. If you do not receive an OVD message, replace the telephone. If you receive an OVD message, reconnect the wiring and go to the next possible cause.

Table 62 (Continued)
Telephone cannot make or receive calls (OVD message received) (Part 2 of 2)

Possible cause	Action
Defective wiring	Disable the TN. Disconnect the wiring between the telephone and the cross-connect terminal. Refer to *Communication Server 1000M and Meridian 1: Small System Installation and Configuration* (553-3011-210) for wiring connections. Reenable the TN and wait for an OVD message. If you do not receive an OVD message, replace or repair the wiring between the telephone and the cross-connect terminal. If there is still a telephone problem, reconnect all wiring and go to the next possible cause.
Defective backplane	Disable the TN. Unseat the affected IPE circuit card. Reenable the TN and wait for an OVD message. If you receive an OVD message, replace the cabinet or chassis.

Telephone cannot make or receive calls (no OVD message)

The telephone cannot make or receive calls. There is no OVD message or other system message indicating that the TN for this telephone is defective or disabled. There may or may not be dial tone when the handset is unhooked. Look up all system messages in *Software Input/Output: Maintenance* (553-3001-511) and follow the instructions given. If the fault does not clear, use the following procedures.

Constantly observe and look up system messages as you perform these procedures.

Table 63
Telephone cannot make or receive calls (no OVD message) (Part 1 of 3)

Possible cause	Action
No power to digital telephone	Check the power supply (if one is required) and make sure it is not defective. If there is a power supply problem, correct it. If there is no problem with the power supply, go to the next possible cause.
Failed NTAK92 protector	If the telephone is an off-premises 2500-type and is protected by the NTAK92, refer to “Replacing equipment” on page 237 for the replacement procedure for that protector.
Telephone connected to wrong TNs	Check the cross-connect terminal to make sure the telephone is connected to the correct TN. Refer to *Communication Server 1000M and Meridian 1: Small System Installation and Configuration* (553-3011-210) for wiring connections. If the telephone is not connected correctly, fix the wiring. If the telephone is connected correctly, go to the next possible cause.

Table 63
Telephone cannot make or receive calls (no OVD message) (Part 2 of 3)

Possible cause	Action
Disabled TN	Software disable then reenable the telephone TN by entering: **LD 32** **DISU c u** **ENLU c u** where “c u” represent card and unit numbers. Test other TNs by entering: **LD 30** **UNTT c u** where “c u” represent card and unit numbers. Test other TNs by entering: **TEST** If there is still a telephone problem, go to the next possible cause.
Defective telephone	Disconnect the telephone from the jack. Plug in another telephone of the same type. If the replacement telephone works, replace the telephone you removed. If the replacement telephone does not work, reconnect the original telephone and go to the next possible cause. ***Note:*** If the telephone is a Meridian Digital Telephone, enter: **LD 32** **IDU c u** where “c u” represent card and unit numbers. If there is no response, replace the telephone.

Table 63
Telephone cannot make or receive calls (no OVD message) (Part 3 of 3)

Possible cause	Action
Defective wiring	Make sure wiring is properly connected and wires are not interchanged, crossed, or grounded. Refer to *Communication Server 1000M and Meridian 1: Small System Installation and Configuration* (553-3011-210) for wiring connections. Check the wiring between the telephone and the cross-connect terminal. Check the wiring between the IPE shelf and the cross-connect terminal. If there is a wiring problem, correct it.

One end cannot hear or cannot be heard

Users at the far end can hear you but you cannot hear them or users at the far end cannot hear you but you can hear them. Look up all system messages in *Software Input/Output: Maintenance* (553-3001-511) and follow the instructions given. If the fault does not clear, use the following procedures.

Constantly observe and look up system messages as you perform these procedures.

You may need to replace the:

- Intelligent Peripheral Equipment (IPE) circuit card
- telephone handset
- telephone
- wiring to the telephone

Table 64
One end cannot hear or cannot be heard (Part 1 of 2)

Possible cause	Action
Fault on other equipment	Check with the user to determine if the fault is present only on: • certain types of calls (such as on a paging trunk or a Tie trunk) • calls to a specific location • calls to a specific telephone or other piece of equipment (such as a modem or fax machine) If the fault occurs only with certain calls, take the appropriate action. If the fault occurs on all calls, go to the next possible cause.
Defective handset	Check the receiver or transmitter in the handset. If one is defective, replace the handset or, if necessary, the telephone.
Defective telephone	Disconnect the telephone from the jack. Plug in another telephone of the same type. If the replacement telephone works, replace the telephone you removed. If the replacement telephone does not work, reconnect the original telephone and go to the next possible cause. ***Note:*** If the telephone is a Meridian Digital Telephone, enter: **`LD 32`** **`IDU c u`** where “c u” represent card and unit numbers. If there is no response, replace the telephone.

Table 64
One end cannot hear or cannot be heard (Part 2 of 2)

Possible cause	Action
Defective IPE circuit card	Software disable the telephone TN by entering: **LD 32** **DISU c u** where “c u” represent card and unit numbers. Disconnect the wiring between the IPE circuit card and the cross-connect terminal. Reenable and test the TN by entering: **ENLU c u** where “c u” represent card and unit numbers. Wait for an OVD message. If you receive a message indicating a problem with the circuit card or unit, replace the circuit card. If you do not receive a message indicating a problem with the circuit card or unit, reconnect the wiring and go to the next possible cause.
Defective wiring to telephone	Make sure wiring is properly connected and wires are not interchanged, crossed, or grounded. Refer to *Communication Server 1000M and Meridian 1: Small System Installation and Configuration* (553-3011-210) for wiring connections. Check the wiring between the telephone and the cross-connect terminal. Check the wiring between the IPE shelf and the cross-connect terminal. If there is a wiring problem, correct it.

Noise or low volume on all calls

There is noise on the line on all calls or the volume is lower than usual on all calls. Look up all system messages in *Software Input/Output: Maintenance* (553-3001-511) and follow the instructions given. If the fault does not clear, use the following procedures.

Constantly observe and look up system messages as you perform these procedures.

You may need to replace the:

- Intelligent Peripheral Equipment (IPE) circuit card
- telephone
- wiring to the telephone

Table 65
Noise or low volume on all calls (Part 1 of 2)

Possible cause	Action
Defective handset	Replace the handset. If the problem persists, go to the next possible cause.
Defective wiring	Make sure wiring is properly connected and wires are not interchanged, crossed, or grounded. Refer to *Communication Server 1000M and Meridian 1: Small System Installation and Configuration* (553-3011-210) for wiring connections. Check the wiring between the telephone and the cross-connect terminal. Check the wiring between the IPE shelf and the cross-connect terminal. If there is a wiring problem, correct it. If there is no problem with the wiring, go to the next possible cause.

Table 65
Noise or low volume on all calls (Part 2 of 2)

Possible cause	Action
Defective telephone	Disconnect the telephone from the jack. Plug in another telephone of the same type. If the replacement telephone works, replace the telephone you removed. If the replacement telephone does not work, reconnect the original telephone and go to the next possible cause. If the telephone is a Meridian Digital Telephone, enter: **LD 32** **IDU c u** where “c u” represent card and unit numbers. If there is no response, replace the telephone.
Defective IPE circuit card	Software disable the telephone TN by entering: **LD 32** **DISU c u** where “c u” represent card and unit numbers. Disconnect the wiring between the IPE circuit card and the cross-connect terminal. Reenable and test the TN by entering: **ENLU c u** where “c u” represent card and unit numbers. Wait for an OVD message. If you receive a message indicating a problem with the circuit card or unit, replace the circuit card. If you do not receive a message indicating a problem with the circuit card or unit, reconnect the wiring and go to the next possible cause.

Defective indicator, digit display, or component

The telephone can place and receive calls, but one or more LED or LCD indicator, a digit display, or a component (such as a handsfree unit) is not working. Look up all system messages in *Software Input/Output: Maintenance* (553-3001-511) and follow the instructions given. If the fault does not clear, use the following procedures.

Constantly observe and look up system messages as you perform these procedures.

You may need to replace the:

- power supply to telephone
- Intelligent Peripheral Equipment (IPE) circuit card
- telephone

Table 66
Defective indicator, digit display, or component (Part 1 of 2)

Possible cause	Action
Telephone has incorrect software parameters	Disconnect then reconnect power to the telephone to force a reset and parameter download. If the fault is not cleared, go to the next possible cause.
No power to digital telephone	Check the power supply (if one is required) and make sure it is not defective. If there is a power supply problem, correct it. If there is no problem with the power supply, go to the next possible cause.

Table 66
Defective indicator, digit display, or component (Part 2 of 2)

Possible cause	Action
Defective telephone	Disconnect the telephone from the jack. Plug in another telephone of the same type. If the replacement telephone works, replace the telephone you removed. If the replacement telephone does not work, reconnect the original telephone and go to the next possible cause. If the telephone is a Meridian Digital Telephone, enter: **LD 32** **IDU c u** where “c u” represent card and unit numbers. If there is no response, replace the telephone.
Feature not assigned	Make sure the feature or the indicator is assigned in software. See *Software Input/Output: Maintenance* (553-3001-511). If there is still a telephone problem, go to the next possible cause.

Defective feature

The telephone can make and receive calls, but one or more of its features (such as call transfer or ring again) is not working. Look up all system messages in *Software Input/Output: Maintenance* (553-3001-511) and follow the instructions given. If the fault does not clear, use the following procedures.

Constantly observe and look up system messages as you perform these procedures.

Table 67
Defective feature

Possible cause	Action
Feature not assigned	Make sure the feature or the indicator is assigned in software. See *Software Input/Output: Maintenance* (553-3001-511) and *Software Input/Output: Administration* (553-3001-311). If there is still a console problem, go to the next possible cause.
Defective telephone	Disconnect the telephone from the jack. Plug in another telephone of the same type. If the replacement telephone works, replace the telephone you removed. If the replacement telephone does not work, reconnect the original telephone and go to the next possible cause. If the telephone is a Meridian Digital Telephone, enter: **LD 32** **IDU c u** where “c u” represent card and unit numbers. If there is no response, replace the telephone.

Defective add-on module

The telephone can make and receive calls, but an add-on module connected to it is not working. Look up all system messages in *Software Input/Output: Maintenance* (553-3001-511) and follow the instructions given. If the fault does not clear, use the following procedures.

Constantly observe and look up system messages as you perform these procedures.

You may need to replace the:

- add-on module
- data option circuit card
- power supply for add-on module

Table 68
Defective add-on module

Possible cause	Action
Defective power supply for add-on module	If the add-on module requires a separate power supply, make sure it is properly connected. If there is still a telephone problem, go to the next possible cause.
Defective add-on module	Replace the add-on module.
Defective data option circuit card	If the fault is with a data add-on module, replace the data option circuit card.

Cannot dial from 2500-type telephone

A user cannot dial from a 2500-type telephone. The condition may exist on more than one telephone and may be intermittent. The telephone may occasionally experience a “no dial tone” condition. Calls from other types of sets are not affected. Look up all system messages in *Software Input/Output: Maintenance* (553-3001-511) and follow the instructions given. If the fault does not clear, use the following procedures.

Constantly observe and look up system messages as you perform these procedures.

You may need to replace the:

- NTDK20 Small System Controller (SSC) card
- NTAK03 TDS/DTR circuit card

- telephone
- wiring to the telephone

Table 69
Cannot dial from 2500-type telephone (Part 1 of 2)

Possible cause	Action
Incorrectly programmed	To determine the correct Class of Service use: **LD 20** **PRT** If the Class of Service is DIP, use LD 10 to change to DTN.
Defective telephone	If only one telephone is affected, replace it. If there is still a telephone problem, go to the next possible cause.
Defective IPE circuit card	Replace the affected circuit cards. Enable the circuit card by entering: **LD 32** **ENLS s** where “s” represents the shelf number (0 for the main cabinet/chassis, 1 for the first expansion cabinet/chassis, 2 for the second expansion cabinet/chassis, 3 for the third expansion cabinet/chassis, and 4 for the fourth expansion cabinet/chassis). Test the circuit card by entering: **LD 30** **TEST**

Table 69
Cannot dial from 2500-type telephone (Part 2 of 2)

Possible cause	Action
Defective wiring	If only one telephone is affected, make sure the wiring is properly connected and wires are not interchanged, crossed, or grounded. Check the wiring between the telephone and the cross-connect terminal. Check the wiring between the IPE shelf and the cross-connect terminal. If there is a wiring problem, correct it. If there is still a telephone problem, go to the next possible cause.
Defective Digitone Receiver	If the condition is intermittent or more than one telephone is affected, test the Digitone Receivers in the NTDK20 SSC card or NTDK97 MSC card by entering: **LD 34** **DIS 0** and **ENL 0** Replace any units that fail the test. Test Digitone Receivers in the NTAK03 TDS/DTR by entering: **LD 34** **DTR c u** where “c u” represent the card and unit number of the DTR. If there is still a telephone problem, go to the next possible cause.
Excessive Digitone traffic	Additional Digitone Receivers may be required to handle the traffic in the system. Refer to *Communication Server 1000M and Meridian 1: Small System Planning and Engineering* (553-3011-120).

No ring on 500- and 2500-type telephones

Both 500- and 2500-type telephones do not ring. One or several sets in the same cabinet/chassis are experiencing the problem. Look up all system messages in *Software Input/Output: Maintenance* (553-3001-511) and follow the instructions given. If the fault does not clear, use the following procedures.

Constantly observe and look up system messages as you perform these procedures.

You may need to replace the:

- Ringing Generator: NTAK04, NTAK05, NTDK72, NTDK70, or NTDK78 power supply
- chassis or chassis expander (Verify the DIP switch settings prior to replacement.)
- Intelligent Peripheral Equipment (IPE) circuit card
- telephone
- wiring to the telephone

Table 70
No ring on 500- and 2500-type telephones (Part 1 of 2)

Possible cause	Action
Defective telephone	If only one telephone is affected, replace it. If there is still a telephone problem, go to the next possible cause.
Defective wiring	If only one telephone is affected, make sure wiring is properly connected and wires are not interchanged, crossed, or grounded. Check the wiring between the telephone and the cross-connect terminal. Check the wiring between the IPE shelf and the cross-connect terminal. If there is a wiring problem, correct it. If there is still a telephone problem, go to the next possible cause.

Table 70
No ring on 500- and 2500-type telephones (Part 2 of 2)

Possible cause	Action
Defective IPE circuit card	Software disable the telephone TN by entering: **LD 32** **DISU c u** where “c u” represent card and unit numbers. Disconnect wiring between the IPE circuit card and the cross-connect terminal. Reenable and test the TN by entering: **ENLU c u** where “c u” represent card and unit numbers. Wait for an OVD message. If you receive a message indicating a problem with the circuit card or unit, replace the circuit card. If you do not receive a message indicating a problem with the circuit card or unit, reconnect the wiring and go to the next possible cause.
Defective Ringing Generator for the Cabinet system	If several sets on different circuit cards in the same cabinet are affected, replace the NTAK04, NTAK05, NTDK72, NTDK70, or NTDK78 power supply, whichever is equipped in the cabinet.
Wrong Ring Generator setting for the Chassis system	Be sure that the DIP switch selecting the ring frequency is set correctly. This switch is located on the front top plate inside the chassis.
Defective Ringing Generator for the Chassis system	If several sets on different circuit cards in the same chassis are affected, replace the chassis.

Replacing equipment

Contents

This section contains information on the following topics:

Summary of procedures 237

Summary of procedures

The following are the most common equipment replacement procedures that may be required in connection with system maintenance:

- Procedure 18, “Removing cabinet covers” on page 239
- Procedure 19, “Removing the chassis cover” on page 240
- Procedure 20, “Replacing the chassis faceplate” on page 240
- Procedure 21, “Replacing the chassis” on page 240
- Procedure 22, “Replacing the ac/dc power supply in a cabinet” on page 241
- Procedure 23, “Replacing the dc power supply in a cabinet” on page 244
- Procedure 24, “Replacing the NTAK02 SDI/DCH circuit card” on page 245
- Procedure 25, “Replacing the NTAK03 TDS/DTR circuit card” on page 246
- Procedure 26, “Replacing the PRI circuit cards” on page 246
- Procedure 27, “Removing daughterboards from the NTAK09 or NTBK50 circuit card” on page 248

- Procedure 28, “Mounting daughterboards on the NTAK09 or NTBK50 circuit card” on page 248
- Procedure 29, “Replacing the NTAK10, NTAK09, or NTRB21 circuit cards (DTI applications)” on page 249
- Procedure 30, “Replacing the NT8D02, NT8D03, NT8D09, NT8D14, NT8D15, NTDK16, or NT8D16 IPE cards” on page 250
- Procedure 31, “Replacing the NT5K21 Peripheral Equipment card” on page 251
- Procedure 32, “Replacing the NTAG26 Peripheral Equipment card” on page 252
- Procedure 33, “Replacing NTBK22, NT6D70, and NT6D71 circuit cards” on page 252
- Procedure 34, “Replacing the NTAK92 Off-Premise Protection Module” on page 255
- Procedure 35, “Replacing batteries in the NTAK75 battery box” on page 257
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- Procedure 37, “Replacing the NTDK20 Small System Controller (SSC) card” on page 262
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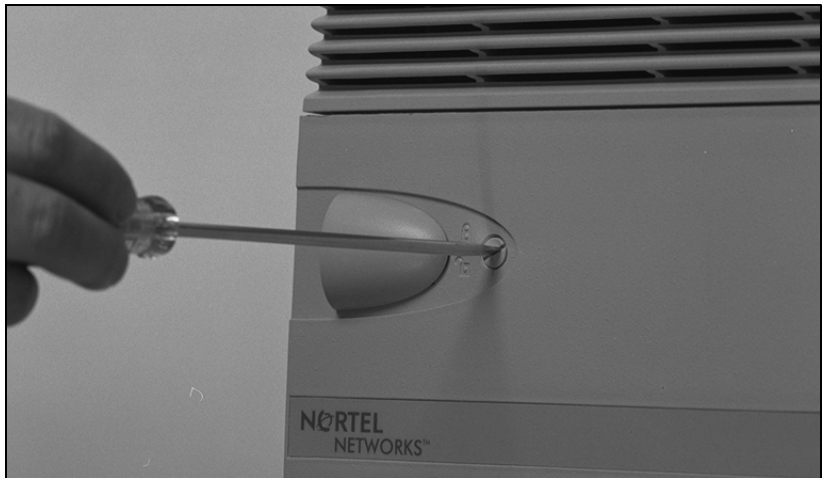
- Procedure 39, “Replacing the NTDK21, NTDK81, NTTK13, and NTTK25 Software Daughterboards” on page 265
- Procedure 40, “Replacing Expansion Daughterboards” on page 269
- Procedure 41, “Replacing the NTDK26 Backwards Compatible Daughterboard” on page 270

Procedure 18
Removing cabinet covers

1 If the front cover lock latches are in their locked position, use a screwdriver and turn the lug on each latch 90 degrees to the unlocked position (refer to Figure 8).

Figure 8
Locking latch on the cabinet cover



2 Simultaneously slide both latches in towards the center of the cabinet.

3 Grasp the sides of the cover and pull the top outwards, then lift it upward to remove it from the cabinet.

Note: The bottom of the front cover is supported on but not secured to the cabinet. Be careful not to drop it.

End of Procedure

Procedure 19
Removing the chassis cover

1 Loosen the quick-release screws on the faceplate of the chassis.

2 Lift the faceplate up.

3 Remove the faceplate.

> **WARNING**
>
> The chassis door is heavy.

End of Procedure

Procedure 20
Replacing the chassis faceplate

1 Fit the clips at the bottom of the faceplate into the raised edge at the bottom of the chassis, and slightly to the left.

2 Move faceplate down so that the clips fit over the raised edge at the bottom of the chassis.

3 Slide the faceplate to the right.

4 Tighten the quick-release screws into the two holes at the top of the chassis.

End of Procedure

Procedure 21
Replacing the chassis

1 Prepare for the replacement by:

   a. informing all users that the system will be taken out-of-service, and making provisions as required

   b. having all required tools available

2 Turn off the power switch.

3 Disconnect all cables, making note of their existing connections.

4 Move the new chassis into position.

5 Reconnect all cables, as well as the strain relief strap for the power cable.

6 Remove the faceplate (refer to Procedure 19 on page 240).

7 Attach a grounding strap between your wrist and an unpainted surface on the chassis.

8 Transfer all cards from the old system to the new chassis.

9 Remove the grounding strap.

10 Replace the faceplate (refer to Procedure 20 on page 240).

11 Turn on the power switch.

End of Procedure

Procedure 22
Replacing the ac/dc power supply in a cabinet

This procedure describes how to replace the NTAK04, NTDK70, or NTDK78 ac/dc power supply in your Cabinet system.

DANGER OF ELECTRIC SHOCK

Wait at least five minutes after power to the unit is switched off before removing the ac/dc power supply from the cabinet. Make sure that the power cord is disconnected.

1 Make sure that the breaker on the faceplate of the ac/dc power supply is in the OFF position.

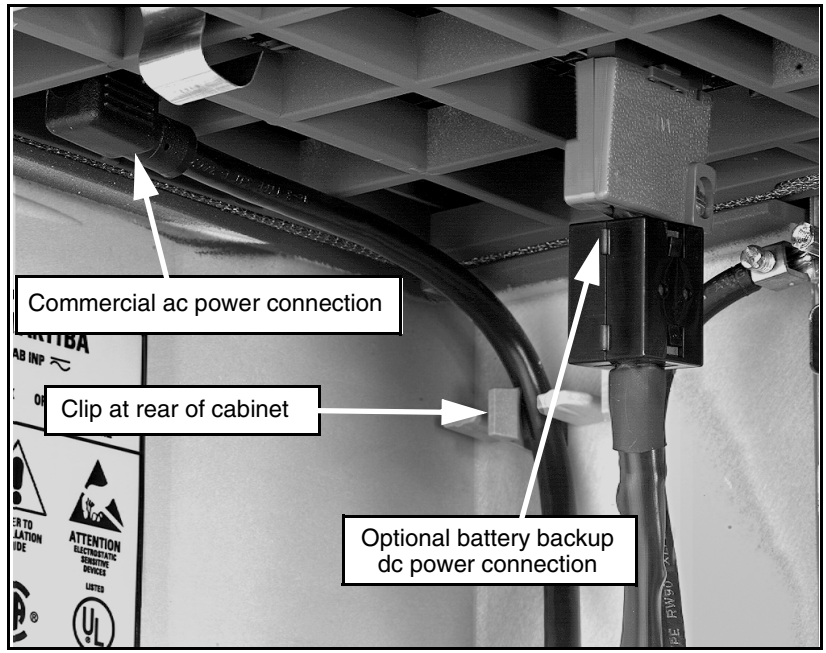
2 Disconnect the ac power cord from the bottom left side of the power supply.

3 If the system is equipped with a battery backup system, set the breaker on the NTAK28 Junction Box to the OFF position and disconnect the dc power cord. This cord is located on the bottom right side of the power supply.

4 If the system is equipped with expansion cabinet(s), disconnect the NTBK62 (A0373953) Fiber Interface Power cable. This cable is located on the bottom right side of the power supply.

5. After five minutes, unlock the latches of the NTAK04, NTDK70, or NTDK78 ac/dc power supply circuit card and remove the power supply from the cabinet.
6. Make sure that the ac breaker on the front of the replacement ac/dc power supply is in the OFF position.
7. Make sure that the option switches on the ac/dc power supply are properly set.
8. Insert the ac/dc power supply into the first slot labeled “PWR” on the left side of the card shelf of either the main or expansion cabinet (refer to Figure 9 on page 243).
9. Lock the ac/dc power supply into place with the card tabs.
10. Connect the power cord to the connector on the bottom left side of the ac/dc power supply.
11. If the system is equipped with a battery backup system, connect the dc power cord to the connector on the bottom right side of the dc power supply (refer to Figure 9 on page 243).
12. If the system is equipped with expansion cabinet(s), connect the NTBK62 (A0373953) Fiber Interface Power cable to the connector on the bottom right side of the dc power supply.
13. Set the breaker on the ac/dc power supply to the ON position.
14. If the system also supports a battery back up system, set the breakers on the NTAK28 Junction Box and battery system to the ON position.

Figure 9
AC power cable connection



End of Procedure

Procedure 23
Replacing the dc power supply in a cabinet

This procedure describes how to replace the NTAK05 or NTDK72 dc power supply in your Cabinet system.

> **DANGER OF ELECTRIC SHOCK**
>
> Wait at least five minutes after power to the unit is switched off before removing the dc power supply from the cabinet. Make sure that the power cord is disconnected.

1. Make sure that the breaker on the faceplate of the dc power supply is in the OFF position.
2. Disconnect the dc power cord or the NTBK62 (A0373953) Fiber Interface Power cable from the dc power supply. The cord is located on the bottom right side of the power supply.
3. After five minutes, unhook the lock latches on the dc power circuit card, and remove the power supply from the cabinet.
4. Place the power pack in an antistatic bag. If you are storing it, place it in the shipping container in which it was originally packaged.
5. Slide the replacement dc power supply into its slot in the cabinet.

> **DANGER OF ELECTRIC SHOCK**
>
> Make sure the circuit breaker on the faceplate of the power supply is set to OFF before you continue.

6. Lock the dc power supply into place with the card tabs.
7. Connect the dc power cord or the Fiber Interface Power cable to the connector on the right side of the dc power supply.
8. Make sure that the other end of the dc power cable is connected to the NTAK28 Junction Box. If it is not, ensure that the breaker on the junction box is in the OFF position, and connect the dc power cable to the junction box.

9 Set the breakers on the NTAK28 Junction Box and on the dc power supply to the ON position.

End of Procedure

Procedure 24
Replacing the NTAK02 SDI/DCH circuit card

1 If the following ports are configured, disable them in their corresponding overlays:

SDI or EDSI	LD 48
DCHI	LD 96
DPNSS	LD 75

The system may initialize if you do not perform this step.

2 Hold the SDI/DCH circuit card by the lock latches, unlock the latches, and slide the circuit card out of the cabinet or chassis.

3 Verify the settings of the switches and jumper plugs on the replacement circuit card and correct any settings that need to be changed.

The settings should be the same as the existing circuit card. For information about settings, refer to *Communication Server 1000M and Meridian 1: Small System Installation and Configuration* (553-3011-210).

4 Hold the SDI/DCH circuit card by the lock latches and slide it into its assigned slot until it connects with the backplane.

5 Secure the lock latches on the circuit card.

6 If the following ports have been previously disabled, enable them in their corresponding overlays:

SDI or EDSI	LD 48
DCHI	LD 96
DPNSS	LD 75

End of Procedure

Procedure 25
Replacing the NTAK03 TDS/DTR circuit card

1 Disable the SDI ports, and the DTR and TDS capabilities using the following overlays:

SDI ports	LD 48
TDS and DTR	LD 34

The system may initialize if you do not perform this step.

2 Hold the TDS/DTR circuit card by the lock latches, unlock the latches, and slide the circuit card out of the cabinet or chassis.

3 Hold the replacement TDS/DTR circuit card by the lock latches and slide it into its assigned slot until it connects with the backplane.

4 Secure the lock latches on the circuit card.

5 Enable the SDI ports, TDS channels, and Digitone Receivers in their corresponding overlays:

SDI ports	LD 48
TDS and DTR	LD 34

End of Procedure

Procedure 26
Replacing the PRI circuit cards

This procedure describes how to replace:

- the NTAK09 1.5 Mb DTI/PRI card when configured as a PRI
- the NTBK50 2.0 Mb PRI card

1 If the NTAK93 DCHI daughterboard is attached to the card, disable the associated D-channel using the following overlay and commands:

```
LD 96
DIS DCH X
```

If the NTBK51 DDCH daughterboard is attached to the card, disable the associated downloadable D-channel using the following overlay and commands:

```
LD 96
DIS DCH X
DIS MSDL X
```

2 Disable the clock controller (if on PRI) as follows:

```
LD 60
DIS CC 0
```

3 Disable the PRI pack using these commands:

```
LD 60
DISL X
```

Note: The LEDs on the front of the PRI card change from green (enabled) to red (disabled). In order for this to happen, the **DIS MSDL** command has to be used, as in step 1.

4 Hold the circuit card by the lock latches, unlock the latches, and slide the circuit card out of the cabinet or chassis. If required, remove any daughterboards which may be attached. See Procedure 27 on page 248.

5 On the replacement PRI circuit card, set any switches and install any daughterboards as required. Hold the card by the lock latches and slide it into its assigned slot until it connects with the backplane.

6 Enable the clock controller (if on the PRI) and the PRI in their corresponding overlays:

```
LD 60
ENL CC 0
ENLL X
```

The associated DCHI/DDCH will automatically enable.

7 Check the tracking of the clock controller with the following overlay:

```
LD 60
SSCK 0
```

If it is not tracking or is not locked, use the following instruction to track:

```
LD 60
TRCK PCK/SCLK
```

End of Procedure

Procedure 27
Removing daughterboards from the NTAK09 or NTBK50 circuit card

Use these guidelines to remove the NTAK20 and NTAK93/NTBK51 from the NTAK09 or NTBK50 card. Because of the physical layout of the motherboard and daughterboards, the NTAK20 should be removed before the NTAK93/NTBK51.

1 Starting at the two corners opposite the connector, gently lift each corner out of the locking groove of the standoff.

2 At the two corners adjacent to the connector, gently lift the entire side until the mounting holes are clear of the locking groove of the standoff.

3 To remove the connector pins, grasp the edge of the board adjacent to the connector and lift gently.

Note: If more than one NTAK09 or NTBK50 card is installed, the additional cards may not carry daughterboards, depending on the system configuration. At least one NTAK20 (per system) is always required.

End of Procedure

Procedure 28
Mounting daughterboards on the NTAK09 or NTBK50 circuit card

Note: Install the NTAK93/NTBK51 daughterboard before the NTAK20 daughterboard. Work on a flat surface when mounting or removing daughterboards.

1 Visually inspect the connector pins on the underside of the daughterboard. Any pins that are bent should be realigned prior to mounting.

2 Place the NTAK09 or NTBK50 down flat on an antistatic pad.

3 From an overhead viewpoint, with the daughterboard parallel above the NTAK09 or NTBK50 and the connector pins aligned over the connector sockets, line up the mounting holes on the daughterboard with the tops of the standoffs on the NTAK09 or NTBK50.

4 Slowly lower the daughterboard towards the NTAK09 or NTBK50, keeping the standoffs in line with all four holes, until the holes are resting on the tops of the four standoffs.

If more than a very slight amount of pressure is required at this point, the connector pins may not be aligned with the connector socket. If so, lift the daughterboard off the NTAK09 or NTBK50 and return to step 2.

5 Gently apply pressure along the edge of the board where the connector is located until the standoffs at the two corners adjacent to the connector snap into a locked position. Press down on the two corners on the opposite side until they also are locked into place.

End of Procedure

Procedure 29
Replacing the NTAK10, NTAK09, or NTRB21 circuit cards (DTI applications)

This procedure describes how to replace the NTAK10, NTAK09, and NTRB21 when configured as a DTI.

1 Disable the clock controller as follows:

```
LD 60
DIS CC 0
```

2 Disable the DTI pack using these commands:

```
LD 60
DISL X
```

3 Hold the circuit card by the lock latches, unlock the latches, and slide the circuit card out of the cabinet or chassis. If required, remove any daughterboards that may be attached to the NTAK09.

4 On the replacement DTI circuit card, set any switches and install any daughterboards as required. Hold the replacement DTI circuit card by the lock latches and slide it into its assigned slot until it connects with the backplane.

5 Enable the clock controller (if on the DTI) and the DTI in their corresponding overlays:

```
LD 60
ENL CC 0
ENLL X
```

6 Check the tracking of the clock controller with the following overlay:

```
LD 60
SSCK 0
```

If it is not tracking or is not locked, use the following instruction to start tracking:

```
LD 60
TRCK PCK/SCLK
```

End of Procedure

Procedure 30
Replacing the NT8D02, NT8D03, NT8D09, NT8D14, NT8D15, NTDK16, or NT8D16 IPE cards

Use this procedure to replace the following Peripheral Equipment cards:

- NT8D02 Digital Line Card
- NT8D03 Analog Line Card
- NT8D09 Analog Message Waiting Line Card
- NT8D14 Universal Trunk Card
- NT8D15 E&M Trunk Card
- NT8D16 Digitone Receiver Card
- NTDK16 Digital Line Card

See *Software Input/Output: System Messages* (553-3001-411) for a description of all maintenance commands and system messages.

1 Software disable the card:

```
LD 32
DISC c
```

where “c” is the card number.

Note: For the Chassis system, you must disable Cards 4, 5, and 6.

2 Unhook the locking devices on the card and pull it out of the card cage.

3 On the following replacement cards, set option switches or jumper plugs to the same settings as on the card you removed:

NT8D14 Universal Trunk Card
NT8D15 E&M Trunk Card

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

When cards are installed, the red LED on the faceplate flashes as a self-test runs. If the self-test completes successfully, the card is automatically enabled (if it is configured in software) and the LED goes out. If the self-test fails, the LED lights steadily and remains lit.

Note: The NTDK16AA has one LED. This LED shows the status of Card 4. The NTDK16BA has three LEDs. These LEDs show the status of Cards 4, 5, and 6.

5 Software enable the card:

```
ENLC c
```

When the process is complete, you will receive a system response. End the session:

```
****
```

End of Procedure

Procedure 31
Replacing the NT5K21 Peripheral Equipment card

Use this procedure to replace the NT5K21 XMFC/MFE Peripheral Equipment card.

See *Software Input/Output: Maintenance* (553-3001-511) for a description of all maintenance commands and system messages.

1 Software disable the card:

```
LD 54
DISC c
```
where “c” is the card number.

2 Unhook the locking devices on the card and pull it out of the card cage.

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

When cards are installed, the red LED on the faceplate flashes as a self-test runs. If the self-test completes successfully, the card is automatically enabled (if it is configured in software) and the LED goes out. If the self-test fails, the LED lights steadily and remains lit.

4 Software enable the card:

```
ENLC c
```

When the process is complete, you will receive a system response. End the session:

```
****
```

End of Procedure

Procedure 32
Replacing the NTAG26 Peripheral Equipment card

Use this procedure to replace the NTAG26 XMFR Peripheral Equipment card.

See *Software Input/Output: Maintenance* (553-3001-511) for a description of all maintenance commands and system messages.

1 Software disable the card:

```
LD 34
DISC c
```

where “c” is the card number.

2 Unhook the locking devices on the card and pull it out of the card cage.

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

When cards are installed, the red LED on the faceplate flashes as a self-test runs. If the self-test completes successfully, the card is automatically enabled (if it is configured in software) and the LED goes out. If the self-test fails, the LED lights steadily and remains lit.

4 Software enable the card:

```
ENLC c
```

When the process is complete, you will receive a system response. End the session:

```
****
```

End of Procedure

Procedure 33
Replacing NTBK22, NT6D70, and NT6D71 circuit cards

The following procedures describe how to remove and replace defective ISDN BRI-related circuit cards.

Removing and replacing the NTBK22 MISP

The MISP can be removed and inserted without turning off the power. This allows the system to continue processing calls not associated with the defective MISP.

Note: A clock controller is required for ISDN PRI, DTI, or BRI trunk applications. If the MISP being removed is providing the clock function, the clock must be reassigned to another location. Refer to the chapter on ISDN BRI trunk implementation in *ISDN Basic Rate Interface: Installation and Configuration* (553-3001-218) for more information.

1 Log in on the maintenance terminal or telephone and load LD 32. Check the status of the MISP by entering **`STAT c`**, where "c" is the card slot number of the MISP.

Note: Make sure the MISP is idle before proceeding with the next step to avoid interrupting active calls.

2 When the MISP is idle, type **`DISC c`**, where "c" is the card slot number of the MISP, and press the **Enter** key to disable the MISP.

3 Remove the MISP.

Remove the clock controller if there is one.

Place the discarded MISP in an antistatic bag away from the work area.

4 Insert and secure the replacement MISP in its card slot.

Install the clock controller if one is required.

The MISP automatically starts a self-test.

Observe the Dis LED on the front of the MISP. It is lit during the test. If it flashes three times and stays lit, the MISP has passed the test. If it does not flash three times and then stays lit, the MISP has failed the test.

5 At the > prompt in LD 32, type **`ENLC c`** and press the **Enter** key to enable the MISP. If the Dis LED on the MISP extinguishes, the MISP is functioning correctly and is ready to process calls.

Removing and replacing the NT6D70 SILC or NT6D71 UILC

The SILCs and UILCs can be removed and inserted without turning off the power.

Note: In the case where an ISDN BRI trunk connected to the card is providing a reference clock source to the system clock controller, the reference source must be reassigned to another location. Refer to *ISDN Basic Rate Interface: Installation and Configuration* (553-3001-218) for more information about the clock controller source.

1 Log in and load LD 32.

Note: Make sure the MISP is idle before proceeding with the next step to avoid interrupting active calls.

2 Type **`DISI c`**, where "c" is the MISP card slot number, and press the **Enter** key to disable the SILC or UILC.

Note: The **`DISI`** command waits until all units on the card are idle before disabling it. You may also use the **`DISC`** command, but all calls associated with the card will be disconnected.

3 Remove the card.

Place it in an antistatic bag away from the work area.

4 Insert and secure the replacement card in its card slot.

The card automatically starts a self-test.

Observe the red LED on the front of the card. It is lit during the test. If it flashes three times and stays lit, the replacement card has passed the test. Go to step 5. If it does not flash three times and then stay lit, the card has failed the test.

5 At the > prompt in LD 32, type **`ENLC c`** and press the **Enter** key to enable the card.

6 If the red LED on the card turns off, it is functioning correctly and is ready to process calls.

Verifying operation of the SILC or UILC card

1. Place an outgoing voice, data, or packet data call, as appropriate, on an ISDN BRI terminal or trunk connected to a previously faulty card or DSL to verify the outgoing transmission and signaling channels.
2. Place an outgoing voice or data call on an ISDN BRI terminal to the ISDN BRI terminal or trunk in step 1 to verify the incoming transmission and signaling channels.
3. Repeat these two steps for other previously faulty cards and DSLs.

Verifying operation of a MISP

1. Place an outgoing voice, data, or packet data call, as appropriate, on an ISDN BRI terminal or trunk connected to a DSL associated with a previously faulty MISP to verify its ability to process the signaling information received on D-channels.
2. Disconnect the call after you determine that the connection was successful.

End of Procedure

Procedure 34
Replacing the NTAK92 Off-Premise Protection Module

A lightning strike may cause failure of the NTAK92. The first indication of such failure is a dead telephone. Use either of the following procedures to check for and replace failed protectors.

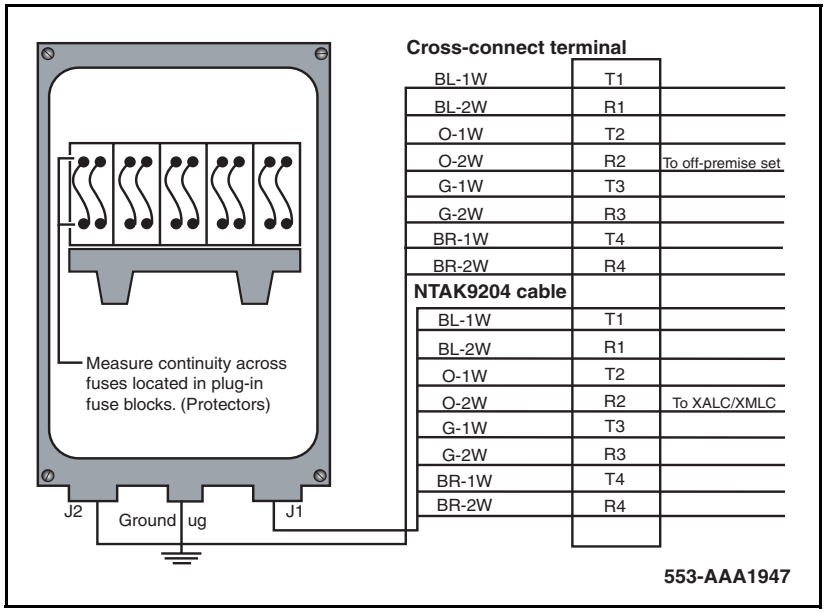
Loop-closure test method

1. Test for dial tone across cable pairs on J1 and J2, using standard loop closure test equipment (for example, butt-in). If a protector has failed, go to step 2. If not, go to the appropriate chapter in this guide.
2. Remove the protection module cover plate.
3. Remove the faulty protector.
4. Install a new protector in the same position as the faulty protector.
5. Replace the cover plate.
6. Test the set for proper operation.

Continuity test method

1. Remove the cover plate from the protection module.
2. Using an ohmmeter, measure continuity across the protectors (see Figure 10 on page 256). If a protector has failed, go to step 3. If not, go to the appropriate chapter in this guide.
3. Remove the faulty protector.
4. Install a new protector in the same position as the faulty protector.
5. Replace the cover plate.
6. Test the set for proper operation.

Figure 10
Wiring diagram for NTAK92AA Off-Premise Protection Module



End of Procedure

Procedure 35
Replacing batteries in the NTAK75 battery box

Batteries should be checked periodically by measuring the battery voltage of both open circuit and float voltages. The batteries supplied with the NTAK75 have an average useful life of four years, meaning the batteries are depleted to 80% of capacity, and backup time is diminished. After four years, the batteries should be replaced. For more information, refer to step 14, and also consult with the battery manufacturer.

This procedure describes how to replace batteries in the NTAK75 battery box in your Cabinet system.

1 Remove the NTAK75 cover.

2 Set the breakers on the NTAK75 and on the NTAK04, NTDK70, or NTDK78 to OFF.

3 Locate and disconnect the four black/red jumper cables that connect the positive and negative battery terminals to the connectors J1–J4.

4 Remove the existing batteries.

5 Unpack the new batteries and check the dates on them. The same dates should appear on all batteries.

DANGER OF ELECTRIC SHOCK

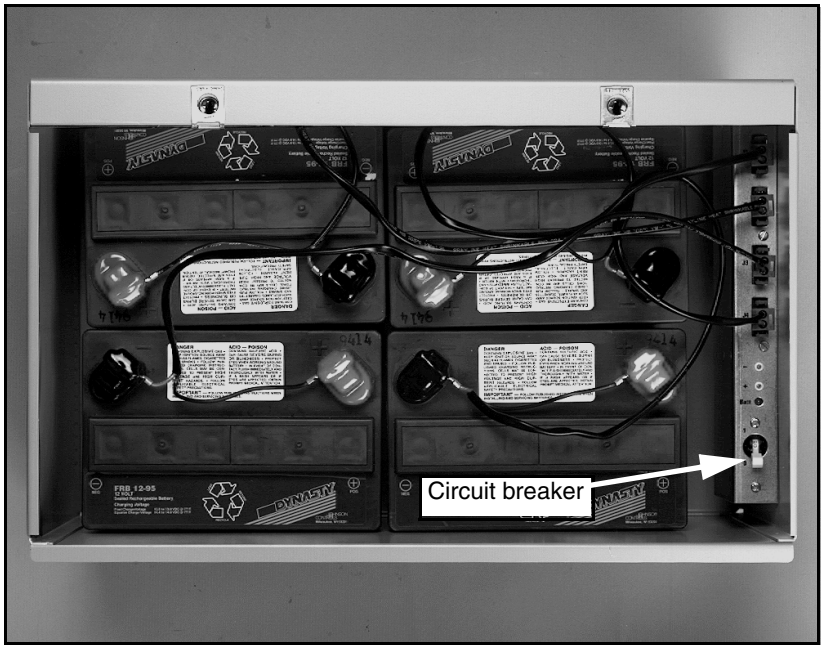
The battery cells can deliver high currents when short circuited. Make sure that you do not inadvertently short circuit the terminals of the batteries.

6 Place the individual batteries into the battery box (see Figure 11 on page 258).

7 Reconnect the four black/red jumper cables disconnected in step 3. The four black and red jumper cables connect between the positive and negative terminals of one battery pack to the connectors marked “J1 - J4”. Any of the batteries may be attached to any connector J1–J4 (see Figure 11).

8 Ensure the jumper wires are securely fastened by pulling out on the tabs of the connector.

Figure 11
NTAK75 Battery Backup — top view



9 Set the breaker on the NTAK75 to ON to test for correct battery wiring.

The NTAK75 green LED (BATT) should switch on. If it does not, check the battery wiring.

10 Set the breaker on the NTAK75 to OFF.

11 Set the breaker on the NTAK04, NTDK70, or NTDK78 to ON. The BATT LED on the NTAK04, NTDK70, or NTDK78 remains off, indicating that the battery box breaker is off. The LED on the NTAK75 lights, indicating that the NTAK0410 cable and connections are correct.

12 Turn the breaker on the NTAK75 to ON. The BATT LED on the NTAK04, NTDK70, or NTDK78 will light.

The NTAK04, NTDK70, or NTDK78 ac/dc power supply cannot power up on battery alone. AC power must be available.

13 Install the cover on the NTAK75.

14 As an optional step, the dc voltage can be measured. Make this measurement after the batteries have been charged for 24 hours, to obtain accurate readings.

DC voltage can be measured between test points whenever the green BATT LED is lit on the NTAK75. The test points are protected by high resistance: it is impossible to damage the battery unit by short-circuiting the test points to each other or to the metal case. Three different voltage readings can be made:

- Open circuit battery voltage when the NTAK04, NTDK70, or NTDK78 circuit breaker is off and the NTAK75 circuit breaker is on. This voltage should be less than -46 V dc.
- NTAK04, NTDK70, or NTDK78 dc output when the NTAK04, NTDK70, or NTDK78 circuit breaker is on and the NTAK75 circuit breaker is off. This voltage should be between -52.95 V dc and -54.5 V dc.
- NTAK04, NTDK70, or NTDK78 float charge voltage when the NTAK04, NTDK70, or NTDK78 breaker is on and the NTAK75 circuit breaker is on. This voltage should be between -52.95 V dc and -54.5 V dc.

End of Procedure

Procedure 36
Replacing batteries in the NTAK76 battery box

Batteries should be checked periodically by measuring the battery voltage of both open circuit and float voltages. The batteries supplied with the NTAK75 have an average useful life of four years, meaning the batteries are depleted to 80% of capacity, and backup time is diminished. After four years, the batteries should be replaced. For more information refer to step 14 and also consult with the battery manufacturer.

This procedure describes how to replace batteries in the NTAK76 battery box in your Cabinet system.

1 Remove the NTAK76 cover.

2 Set the breakers on the NTAK76 and on the NTAK04, NTDK70, or NTDK78 to OFF.

3 Locate and disconnect the black, red, and white jumper cables that connect the positive and negative battery terminals to connector J1.

4 Remove the existing batteries.

5 Unpack the new batteries and check the dates on them. The same dates should appear on all batteries.

> **DANGER OF ELECTRIC SHOCK**
>
> The battery cells can deliver high currents when short circuited. Make sure that you do not inadvertently short circuit the terminals of the batteries.

6 Place the individual batteries into the battery box with the terminal end down. Hold the batteries in place with the restraining bar.

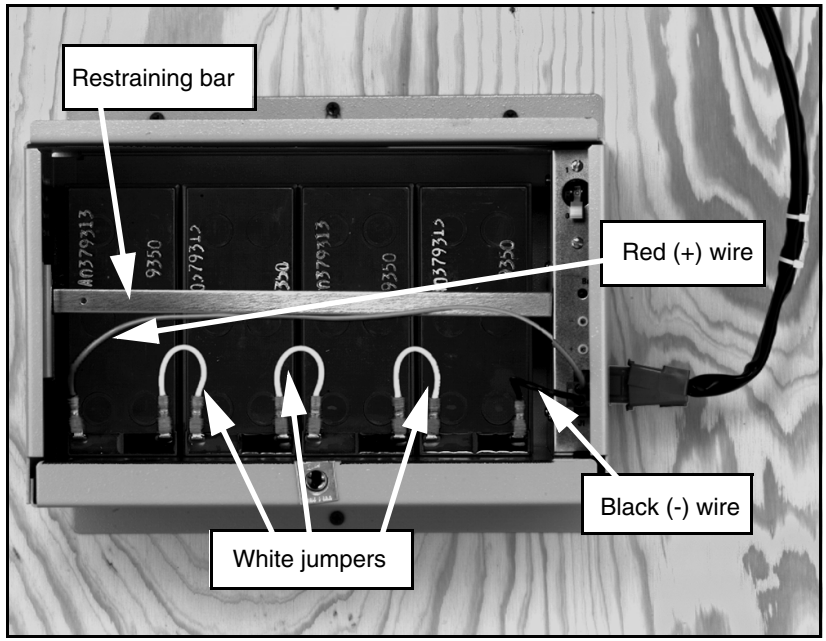
7 Reconnect the three white jumper wires and the red and black jumper cables disconnected in step 3. The battery packs are connected in series by the white jumper wires between the positive (red) terminal of one battery pack to the negative (black) terminal of the next battery pack (see Figure 12 on page 261).

8 Connect the remaining red and black jumper cable to red and black terminals of the first and fourth battery pack. Connect the jumper cable to the NTAK76 breaker panel, marked J1 (see Figure 12 on page 261).

The red positive (+) wire connects to the red (+) post of Battery 1. The black negative (-) wire connects to the black post (-) of Battery 4.

Ensure all connections are secure.

Figure 12
Jumper connections



9 Set the breaker on the NTAK76 to ON to test for correct battery wiring.

The NTAK76 green LED (BATT) should switch on. If it does not, check the battery wiring.

10 Set the breaker on the NTAK76 to OFF.

11 Set the breaker on the NTAK04, NTDK70, or NTDK78 to ON. The BATT LED on the NTAK04, NTDK70, or NTDK78 remains off, indicating that the battery box breaker is off. The LED on the NTAK76 lights, indicating that the NTAK0410 cable and connections are correct.

12 Set the breaker on the NTAK76 to ON. The BATT LED on the NTAK04, NTDK70, or NTDK78 will light.

The NTAK04, NTDK70, or NTDK78 ac/dc power supply cannot power up on battery alone. AC power must be available.

13 Install the cover on the NTAK76.

14 As an optional step the dc voltage can be measured. Make this measurement after the batteries have been charged for 24 hours, to obtain accurate readings.

DC voltage can be measured between test points whenever the green BATT LED is lit on the NTAK76. The test points are protected by high resistance: it is impossible to damage the battery unit by short-circuiting the test points to each other or to the metal case. Three different voltage readings can be made:

- Open circuit battery voltage when the NTAK04, NTDK70, or NTDK78 circuit breaker is off and the NTAK76 circuit breaker is on. This voltage should be less than -46 V dc.
- NTAK04, NTDK70, or NTDK78 dc output when the NTAK04, NTDK70, or NTDK78 circuit breaker is on and the NTAK76 circuit breaker is off. This voltage should be between -52.95 V dc and -54.5 V dc.
- NTAK04, NTDK70, or NTDK78 float charge voltage when the NTAK04, NTDK70, or NTDK78 breaker is on and the NTAK76 circuit breaker is on. This voltage should be between -52.95 V dc and -54.5 V dc.

End of Procedure

Procedure 37
Replacing the NTDK20 Small System Controller (SSC) card

This procedure describes how to replace the Small System Controller (SSC) card on a Cabinet or Chassis system.

If the system is equipped with an NTDK81 Software Daughterboard, the replacement NTDK20 SSC card must support REL 09 or higher version boot code. If the replacement SSC card is Rlse 11 or higher (as indicated on its faceplate), the boot code version is at least REL 09 and is capable of supporting an NTDK81 Software Daughterboard.

Earlier versions of NTDK20 SSC cards (Rlse 10 or lower) can be updated to Boot Code REL 09 (or higher).

Ensure that the replacement NTDK20 SSC card is either Rlse 11 or later, or one that has had the boot code updated to REL 09 or higher.

Note: It is not possible to update the boot code as part of the replacement procedure.

1 Perform an **EDD** backup in LD 43.

2 Power down the system.

3 Hold the NTDK20 SSC circuit card by the lock latches, unlock the latches, and slide the circuit card out of the cabinet or chassis.

4 Remove the Software Daughterboard, and install it on the replacement NTDK20 SSC circuit card. (Refer to Procedure 39, “Replacing the NTDK21, NTDK81, NTTK13, and NTTK25 Software Daughterboards” on page 265.)

5 If you have a NTDK26 Backwards Compatible Daughterboard, transfer it to the replacement NTDK20 SSC circuit card. (Refer to Procedure 41, “Replacing the NTDK26 Backwards Compatible Daughterboard” on page 270.)

6 If your system has one or more of the following Fiber or IP Expansion Daughterboards:

- NTDK22
- NTDK24
- NTDK79
- NTDK83
- NTDK84
- NTDK85
- NTDK99
- NTTK01
- NTTK02

transfer it to the replacement NTDK20 SSC circuit card. (Refer to Procedure 40, “Replacing Expansion Daughterboards” on page 269.)

7 Hold the replacement NTDK20 SSC circuit card by the lock latches and slide it into slot 0 (the slot labeled “CPU”) in the main cabinet or chassis until it connects with the backplane.

8 Secure the lock latches on the circuit card.

9 Power up the system.

End of Procedure

Procedure 38
Replacing the NTDK97 Mini System Controller (MSC) card

This procedure describes how to replace the NTDK97 Mini System Controller (MSC) card on an older Option 11C Mini.

For the NTDK97 MSC card, the boot code version is at least NTDK34FA REL 04.

1 Perform a datadump in LD 43. Save the data to an external backup medium, by doing one of the following:

   a. using the **BKO** command in LD 43 to save the data to a PC Card

   b. using the **XBK** command in LD 143 to save the data to a computer

2 Turn off the power switch.

3 Hold the NTDK97 MSC circuit card by the lock latches, unlock the latches, and slide the circuit card out of the chassis.

4 Remove the security device from the old NTDK97 and install it on the new NTDK97.

5 Hold the replacement NTDK97 MSC circuit card by the lock latches and slide it into slot 0 (the slot labeled “CPU”) in the chassis until it connects with the backplane.

6 Secure the lock latches on the circuit card.

7 Power up the system.

8 Reinstall the software on the new NTDK97 using the procedure outlined in *Communication Server 1000M and Meridian 1: Small System Installation and Configuration* (553-3011-210).

9 Restore the data from the external source that you saved in step 1 by doing one of the following:

a. using the **RES** command in LD 43 to restore data from a PC Card

b. using the **XRT** command in LD 143 to restore data from a computer

End of Procedure

Procedure 39
Replacing the NTDK21, NTDK81, NTTK13, and NTTK25 Software Daughterboards

This procedure is equivalent to a new system installation. It requires:

- a PC or external PC Card drive to back up the configuration files, the current keycodes, feature set, License parameters
- a Software Delivery card (PC Card) with the current version of software

SSC card, boot code, and Software Daughterboard compatibility

The compatibility requirements between the four types of Software Daughterboards are as follows:

- The NTDK81 can be used to replace the NTDK21 if the following requirements are met:
  - — the system software is X11/23.30 or a later version
  - — the boot code on the NTDK20 SSC card is REL 09 or higher version
- The NTDK21 can be used to replace an existing NTDK81 for all Release 22 and 23 software issues.
- The NTTK13 and NTTK25 can be used to replace the NTDK81 and NTDK21 if the following requirements are met:
  - — the system software is X11/25 software or a later version
  - — the boot code on the NTDK20 SSC card is NTDK34FA REL 07 or higher version

The boot code on the system will be REL 09 if:

- the Rlse number on the faceplate of the NTDK20 SSC is at least Rlse 11
- the boot code on the SSC has previously been updated to REL 09

  Example:
  The NTDK20 SSC may have been updated to REL 09 as part of the installation of X11 Rel 23.30 software. If the NTDK81 is already installed, then the boot code will already be at least REL 09.

Scheduled replacement of a Software Daughterboard

1. Log in and back up configuration files.
2. If required, update the boot code on the SSC card to REL 09 or higher from a PC Card. See the procedure to upgrade the Flash Boot ROM in *Communication Server 1000M and Meridian 1: Small System Upgrade Procedures* (553-3011-258) for instructions.
3. Power down the system.
4. Remove the NTDK20 SSC card from the cabinet or chassis.
5. Lift the Software Daughterboard up and off of the NTDK20 SSC circuit card until it is clear of the connector assembly.
6. Position the replacement Software Daughterboard.
7. Seat the Software Daughterboard on the NTDK20 SSC circuit card.
8. Reinstall the NTDK20 SSC circuit card in slot 0 of the main cabinet or chassis.
9. Power up the system.
10. Complete the steps required to perform a new system installation. See *Communication Server 1000M and Meridian 1: Small System Installation and Configuration* (553-3011-210).
11. Restore the backup configuration files.

Unscheduled replacement of a Software Daughterboard

The following procedure describes how to replace a failed Software Daughterboard.

Note: Configuration files will only be as current as the last datadump (EDD).

1 If the system is down, go to step 5. If the system is operating, go to step 2.

2 Perform a datadump in LD 143:

```
LD 143
EDD
```

3 Disable all DCH using LD 60.

4 Disable all AML links using LD 48.

5 Change the Software Daughterboard:

a. Power down the system.

b. Remove the SSC from the cabinet or chassis.

c. Remove the Software Daughterboard from the SSC card and replace it with a replacement software daughterboard of the same family.

d. Reinstall the NTDK20 SSC circuit card in slot 0 of the main cabinet or chassis.

e. Power up the system.

If the new card is not the same vintage but the same base board (NTDK21, NTDK81, NTTK13, or NTTK25), you will need to use a Software Delivery card (PC Card) to complete the installation. Proceed to step 7 after system power-up.

6 If the new Software Daughterboard is the same vintage as the old one, a Software Delivery card (PC Card) is not needed for the install. After power-up, the card will come up in the main menu of the Software Installation Program.

From the main menu of the Software Installation Program, select the first option:

```
1. New Install or Upgrade from Option 11/11E - From
Software Daughterboard.
```

Proceed to step 9.

7 If an NTDK81, NTDK21, NTTK13, NTTK25 or programmed daughterboard of a different vintage is being used, insert a Software Delivery card (PC Card) with the same release and issue of software as is being replaced into Slot A of the SSC card, then log in to the system.

8 From the main menu of the Software Installation Program, select item 4:

```
4. New System Installation - From Software Delivery
Card
```

9 Proceed with the software installation as described in the chapter on installing software in the Small System in *Communication Server 1000M and Meridian 1: Small System Installation and Configuration* (553-3011-210) with the following exception:

When prompted for the choice of database, select item 2:

```
2. Basic Configuration
```

Note: It is important to choose `Basic Configuration`, otherwise the system may invoke an EDD after loading the new software, and this may overwrite the customer data stored on the CPU.

10 After you install the software and reboot the system, you must restore the customer's backup configuration files.

a. Log in and load LD 143 to access the Main Menu.

b. Select "`Utilities`" (item 3).

c. Select "`Restore`" (item 1).

d. Select "`Backup Flash Drive`" (item 1).

e. Confirm "`Restore Database from the Backup Flash Drive`."

f. Reboot the system by powering down and then up.

End of Procedure

Procedure 40
Replacing Expansion Daughterboards

The following procedure describes how to remove and install the NTDK22, NTDK24, NTDK79, NTDK83, NTDK84, NTDK85, NTDK99, NTTK01, or NTTK02 Expansion Daughterboard.

1 Power down the system.
For a Cabinet system, set the breaker on the cabinet power supply and reserve power to the OFF position.

2 Remove the cable from the routing guide to allow enough slack in the cable to unplug the NTDK20 SSC circuit card.

3 For 100baseT daughterboards (NTDK83 and NTDK99):

- for the Cabinet system, loosen the EMC grounding clip
- for the Chassis system, undo (and save) the wirewrap

4 Disconnect the cable from the Expansion Daughterboard (and LED connector if used).

5 Remove the NTDK20 SSC or Fiber Receiver card from the system.

6 With the NTDK20 SSC circuit card on a flat surface, detach the Expansion Daughterboard.

7 Position the replacement daughterboard.

8 Seat the daughterboard on the NTDK20 SSC circuit card.

9 Remove the rubber plugs or caps from the connectors on the replacement daughterboard and install them on the original daughterboard.

10 Reconnect the cable. Ensure that the cable is fully inserted into the connector. A click should be heard when the cable is fully engaged.

11 Reconnect the LED connector if used.

12 Reinstall the NTDK20 SSC circuit card in slot 0.

13 For 100baseT daughterboards (NTDK83 and NTDK99), ensure that the cable is grounded with the EMC grounding clip. For the Chassis system, wirewrap the cable to the chassis.

14 Route the fiber cable twice around the routing guide. This is not required for the NTDK83 and NTDK99 100baseT daughterboards.

15 Power up the system.

End of Procedure

Procedure 41
Replacing the NTDK26 Backwards Compatible Daughterboard

1 Turn off all power.

2 Remove the NTDK20 SSC card from the system.

3 Detach the Backwards Compatible Daughterboard from the NTDK20 SSC circuit card.

4 Position the replacement Backwards Compatible Daughterboard.

5 Seat the Backwards Compatible Daughterboard on the NTDK20 SSC circuit card.

6 Reinstall the NTDK20 SSC circuit card in slot 0 of the main cabinet.

7 Power up the system.

Simple Network Management Protocol

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Introduction

MIBs

In typical IP network devices, the operator requires a large amount of management information to properly run the device. This information is kept on the system and can be made available to network management systems through Simple Network Management Protocol (SNMP). The information itself is kept on the device (conceptually) in a database, referred to as a Management Information Base (MIB). The network management system can query the MIB through SNMP query commands (called **gets**), and in some cases can write into the MIB through SNMP **set** commands.

For the Network Management System (NMS) to communicate with the agent on a managed device, the NMS must have a description of all manageable objects the agent knows about. Therefore, each type of agent has an associated document, called a MIB Module, which contains these descriptions. MIB Module files are loaded into the NMS. MIB Modules are frequently referred to as “MIBs”. The primary purpose of the MIB module is to provide a name, structure and a description for each of the manageable objects a particular agent knows about.

The NMS uses two kinds of MIB modules:

- a generic MIB Module that describes the structure of the data that can be retrieved by the NMS
- a trap MIB Module that describes the structure of the data sent by the device agent as an SNMP trap

MIB data is arranged in a tree structure. Each object (each item of data) on the tree has an identifier, called an Object ID (OID), which uniquely identifies the variable. To prevent naming conflicts and provide organization, all major device vendors, as well as certain organizations, are assigned a branch of this tree structure (referred to as the “MIB Tree”). The MIB Tree is managed by the Internet Assigned Numbers Authority (IANA). Each object on the MIB Tree has a number and a name, and the complete path from the top of the tree down to the point of interest forms the name.

An SNMP MIB must be written in Abstract Notation One (ASN.1) format to conform with the SNMP standards.

SNMP Overview

CS 1000 Release 4.5 software introduces the following Simple Network Management Protocol (SNMP) features:

- Support of standard MIBs on the Call Server. See “Supported MIBs” on page 276.
- Support of the Entity MIB on the Call Server. See “Supported MIBs” on page 276.
- Configurable system group MIB values for the Call Server and synchronization of those values to the Signaling Servers and Media Cards when a data dump is performed. See “Configuration of system group MIB parameters” on page 277.
- Accessibility of Quality of Service (QoS) data through an SNMP MIB. See “Traffic MIB” on page 281.
- Configurable community name strings on the Call Server which are synchronized to the Signaling Servers and Media Cards when a data dump is performed. See “Community name strings” on page 282.
- An alarm test utility, providing the ability to manually send out a test SNMP trap from the Call Server to confirm the SNMP configuration is correct. See “Test Alarm utility” on page 284.
- The ability to import/export the EPT from the Call Server to removable media, and from the removable media back to the Call Server. See “EDT and EPT” on page 286.

CS 1000 Release 4.5 also provides enhancements to the following SNMP features:

- An increase in the number of entries allowed in the Event Preference Table (EPT) from 200 to 500. See“EDT and EPT” on page 286.
- The ability to reload the EPT from disk using an overlay command. See “EDT and EPT” on page 286.

- New LD 117 commands to print the Event Default Table (EDT) or EPT entries, based on the severity of the system message. See "EDT and EPT" on page 286.
- Removal of community name strings from the config.ini file. See "Config.ini file" on page 281.
- Modifications to LD 143 and LD 43 for the backup/restore of the Call Server's SNMP configuration files. See "Backup and restore" on page 287.

Configuration

Different tools, such as the Command Line Interface (CLI), Element Manager, and Optivity Telephony Manager (OTM) are used to configure SNMP elements for a system, depending on the system platform (CS 1000E, CS 1000S, CS 1000M, or Meridian 1) and the network device. See Table 71.

Table 71
SNMP elements and where they are configured (Part 1 of 2)

SNMP configuration of.....	CLI	Element Manager	OTM
Call Server			
Community name strings (Note 1)	Yes	Yes	Yes
Trap destinations	Yes	No	No
sysgroup MIB info	Yes	Yes	Yes
EDT/EPT edits	Yes	No	Yes
Signaling Server			
Community name strings	See Note 1.	See Note 1.	See Note 1.
Trap destinations	No	Yes	No

Table 71
SNMP elements and where they are configured (Part 2 of 2)

SNMP configuration of.....	CLI	Element Manager	OTM
sysgroup MIB info	No	Yes	No
Media Cards			
Community name strings	See Note 1.	See Note 1.	See Note 1.
Trap destinations	No	Yes	See Note 2.
sysgroup MIB info	No	Yes	See Note 2. See Note 3.

Note 1: Propagated to the Signaling Server and Media Cards on EDD.

Note 2: On a Meridian 1 (no Signaling Server), OTM is used to provision the Media Cards and other ITG devices.

Note 3: For the Meridian 1 (no Signaling Server), OTM can use the same values as for the Call Server.

Supported MIBs

Table 72 lists the standard and enterprise-specific MIBs supported in CS 1000 Release 4.5 for each device.

Table 72
Supported MIBs (Part 1 of 2)

Component	Standard MIB	Enterprise-specific MIB
Call Server	• System group (RFC 1213) • Interface group (RFC 2863) • IP group (RFC 2011) • UDP group (RFC 2013) • TCP group (RFC 2012) • ICMP group (RFC 2011) • SNMP group (RFC 3418) • Entity group (RFC 2737) (only the following two sub-groups) - Physical - General	• Trap group – Rel 4_0 Call Server trap.mib

Table 72
Supported MIBs (Part 2 of 2)

Component	Standard MIB	Enterprise-specific MIB
Signaling Server	• System group (RFC 1213) • Interface group (RFC 2863) • IP group (RFC 2011) • UDP group (RFC 2013) • TCP group (RFC 2012) • ICMP group (RFC 2011) • SNMP group (RFC 3418)	• Trap group – Rel 4_0 Sig Server trap.mib • Zonetrafficrpt group – zonetrafficrpt.mib
Media Card	• System group (RFC 1213) • Interface group (RFC 2863) • IP group (RFC 2011) • UDP group (RFC 2013) • TCP group (RFC 2012) • ICMP group (RFC 2011) • SNMP group (RFC 3418)	• Trap group – Rel 4_0 IP Line trap.mib

MIB security

For security purposes, read and write community name strings are used to control access to all MIB data.

Configuration of system group MIB parameters

Commands have been added to LD 117 to modify the parameters for MIB groups. This includes the parameters needed for the system group MIB (1.3.6.1.2.1.1). The system group provides the basic information about the identity of the system such as system name, system location, and system contact. By default, a set of variables are defined for the system group MIB,

but they are also configurable in LD 117 using the commands listed in Table 73.

Both the standard MIB read-only community name string and the enterprise-specific MIB community name strings (public, admingroup2, and admingroup3) are defined by default. However, they can also be configured in LD 117.

The system group MIB parameters and the community name strings are configured on the Call Server and synchronized to the Signaling Server and the Media Cards when a data dump is performed. As well, they are synchronized when a link is established between a Signaling Server or Media Card and the Call Server.

Table 73
LD 117 - Configure system group MIB parameters (Part 1 of 3)

=> Command	Description
CHG NAV_SITE aa... a	Change the navigation site name (for example, MyCity) where: • aa...a = a string with maximum length of 32 characters • default = Navigation Site Name ***Note:*** Use a single X to clear the field.
CHG NAV_SYSTEM aa... a	Change the navigation site name (for example, Station Switch) where: • aa...a = a string with a maximum length of 32 characters • default = Navigation Site Name ***Note:*** Use a single X to clear the field.

Table 73
LD 117 - Configure system group MIB parameters (Part 2 of 3)

=> **Command**	**Description**
CHG SNMP_SYSCONTACT aa... a	Change the contact person name for this machine where: • aa...a = a string with a maximum length of 100 characters • default = System Contact Use a single X to clear the field.
CHG SNMP_SYSLOC aa...a	Change the defined physical location for this machine where: • aa...a = a string with a maximum length of 100 characters • default = System Location Use a single X to clear the field.
CHG SNMP_SYSNAME aa...a	Change the name assigned to this machine where: • aa...a = a string with a maximum length of 100 characters Default = Navigation Site Name: Navigation System Name : Hostname Use a single X to clear the field.
CHG SNMP_SYSNAME NAV	Revert the name assigned to this machine to the default name. The default name is comprised of the currently configured <NAV_SITE> : <NAV_SYSTEM> : <HOSTNAME>.

Table 73
LD 117 - Configure system group MIB parameters (Part 3 of 3)

=> **Command**	**Description**
CHG ADMIN_COMM n aa...a	Change the admin groups community name string, where: • n = a number from 1 to 32 • aa...a = a string with a maximum length of 32 characters Default(1) = public Default(2) = admingroup2 Default(3) = admingroup3 These communities are used for accessing different SNMP objects on the Call Server, Signaling Servers, and Media Cards.
CHG SYSMGMT_RD_COMM aa...a	Change the system management read-only community name string where: aa...a = a string with a maximum length of 32 characters
CHG SYSMGMT_WR_COMM aa...a	Change the system management read/write community name string where: aa...a = a string with a maximum length of 32 characters

IMPORTANT!

Changes made to the NAV_SITE, NAV_SYSTEM, and HOSTNAME are not automatically propagated to the SNMP_SYSNAME.
The CHG SNMP_SYSNAME NAV command **must** be used.

Note: The data dump (EDD) command saves the configurable system group MIB parameters and community name strings to a file called syscfg.db, which is saved at c:/u/db (Small Systems) or /u/db (Large Systems).

Print commands

Printing the system group MIB parameters and community name strings is done through LD 117. See Table 74.

Table 74
LD 117 - Print system group MIB parameters and community name strings

=> Command	Description
PRT NAV_SITE	Print the navigation site name.
PRT NAV_SYSTEM	Print the navigation system name.
PRT SNMP_SYSGRP	Print all parameters of the MIB system group.
PRT ADMIN_COMM	Print the administration group read-only community name strings.
PRT SYSMGMT_COMM	Print the system management community name strings

Config.ini file

Since the community name strings are synchronized when a link is established between a Signaling Server/Media Card and the Call Server, the IP Telephony devices no longer read the config.ini file to retrieve the community strings. Therefore the community name strings have been removed from the config.ini file.

Traffic MIB

The Zonetrafficrpt MIB on the Signaling Server handles traffic report parameters generated on the Call Server. The SNMP manager sends an SNMP query to the Signaling Server to retrieve the Zonetrafficrpt

parameters. The Signaling Server communicates with the Call Server to retrieve the information from the traffic report and respond to the SNMP query. The SNMP agent on the Signaling Server incorporates the Zonetrafficrpt MIB and handles SNMP queries to the Zonetrafficrpt MIB. The Zonetrafficrpt parameter values from the Call Server are transferred to the Signaling Server. On the Call Server, the Zonetrafficrpt parameters are accessed through LD 2 and LD 117.

The Zonetrafficrpt MIB consists of traffic parameters for a zone provisioned on the Call Server. The two sets of parameters are intra-zone parameters and inter-zone parameters. Each parameter is assigned an object ID in the MIB. For further information about the Zonetrafficrpt traffic parameters that are available, refer to *Simple Network Management Protocol: Description and Maintenance* (553-3001-519).

Community name strings

Read-only and read/write community name strings control access to all MIB data. A community name string is defined by default to access standard MIBs. A set of administrator community name strings is supported with read-only privileges, with the default strings of “public”, “admingroup2”, and “admingroup3”. The first and third community name strings provide access to system group MIB variables, while the second community name string provides access to all MIBs.

New commands are created in LD 117 to configure MIB community name strings for read-only access to Call Server MIBs (system group MIB objects) and for read/write access to Signaling Server/Media Card MIBs. Table 75 on page 283 lists the Call Server community name strings. Table 76 on page 284 lists the Signaling Server/Media Card community name strings.

Table 75
Call Server community name strings

Community Name (User group)	Access privileges	Interface	View	Where configured
ADMIN_COMM(1) (public)	read	ELAN Network	system group MIB	LD 117
ADMIN_COMM(2) (admingroup2)	read	ELAN Network	All MIBs	LD 117
ADMIN_COMM(3) (admingroup3)	read	ELAN Network	system group MIB	LD 117
SYSMGMT_RD_COMM (otm123)	read	ELAN Network	All MIBs	LD 117
SYSMGMT_WR_COMM (otm321)	read/write	ELAN Network	CorpDir MIB	LD 117

Table 76
Signaling Server/Media Cards community name strings

Community Name (User group)	Access privileges	Interface	View	Where configured
ADMIN_COMM(1) (public)	read	ELAN Network	system group MIB	LD 117
ADMIN_COMM(2) (admingroup2)	read	ELAN Network	All MIBs	LD 117
ADMIN_COMM(3) (admingroup3)	read	ELAN Network	Zonetrafficrpt MIB (Signaling Server only) system group MIB (Media Cards only)	LD 117

The community name strings used by the Signaling Server and Media Cards are synchronized from the Call Server to the Signaling Server and Media Cards when a data dump is performed. As well, they are synchronized when a link is established between a Signaling Server or Media Card and the Call Server.

Test Alarm utility

A diagnostic utility has been added to the Call Server to be used for alarm testing by entering a command in LD 117. The Test Alarm utility simulates an alarm to verify that the alarms are generated correctly and sent to their configured destinations. The alarm is sent to the trap destination list configured on the system, using LD 117 and the Open Alarm feature.

The TEST ALARM command creates and sends an open_alarm (trap type 10) to the trap destination list and displays a message on the console. The alarm test utility sends a trap for any parameter specified.

The flow of the message travels through the following:

- Event Default Table (EDT) to assign correct severity if system message is valid; otherwise, system message is assigned a severity of **Info**
- Event Preference table (EPT) to modify severity or suppress system message based on threshold

If the Test Alarm utility uses a valid system message and correctly sends a trap to the trap destination, the same system message, if it occurs on the system, is not guaranteed to be sent as a trap. Some system messages currently do not generate a trap. The LD 117 TEST ALARM command is described in Table 77.

Table 77
LD 117 - Test alarm command

=> **Command**	**Description**
TEST ALARM aaaa nnnn	Generate an alarm where: **aaaa** = any character sequence. However, to test how an existing system message category (for example, BUG, ERR, INI) would appear in an alarm browser, use an existing system message. **nnnnn** = any numeric sequence (for example, 3458) and is optional, defaulting to 0000 The actual output on the TTY is the system message passed as the parameter; for example: BUG1234 The actual trap sent to the trap destination list is trap type 10 with the following details: operator description = ‘This is a test’ operator data = ‘This is a test’ error code = aaaannnn The rest of the binding variables are NULL.

EDT and EPT

The Event Default Table (EDT) and Event Preference Table (EPT) are repositories on the Call Server for storing system event information.

The EDT contains a list of system events that are generated on the system. Each event contains an event code, a description, and severity information. The EPT is used to override the severity of an event assigned in the EDT. The EPT can also be used to set escalation thresholds and suppression thresholds for certain event severities.

The number of entries allowed in the EPT has been increased from 200 to 500.

Additional commands are added to LD 117 to import and export an EPT file from/to removable media, to load an updated EPT file into memory, and to print the entries in the EDT and EPT. See Table 78.

Table 78
LD 117 - EDT and EPT commands

=> **Command**	**Description**
EXPORT EPT	The EPT file stored on the hard disk (/u/db/ smpserv.db) is copied to the floppy / PC Card drive (a:/smpserv.db).
IMPORT EPT	The EPT file stored on the floppy / PC Card (a:/smpserv.db) drive is copied to the hard drive (/u/db/smpserv.db).
RELOAD EPT	The new/modified EPT file is loaded into memory from disk (/u/db/smpserv.db).
PRTS EPT severity <eventID> <eventID>	The entries in the EPT can be listed based on the severity field for all entries or the specified range of entries.
PRTS EDT severity <eventID> <eventID>	The entries in the EDT can be listed based on the severity field for all entries or the specified range of entries.

Error messages are issued if the import or export of the EPT file was not successful.

Backup and restore

LD 43

The LD 43 commands listed in Table 79 have been modified to enable a backup and restore of the Call Server system group MIB variables, System Navigation variables, and community name strings.

Table 79
LD 43 - Backup and restore commands

Command	Description
EDD	The Call Server system group MIB variables, System Navigation variables, and community name strings are dumped to disk as a file when this command is executed. As well, this file is backed up to the A: drive floppy (Large Systems) or to the internal Z: drive (Small Systems).
BKO	The new file created to store the system group MIB variables, System Navigation variables, and community name strings is copied from the primary device to the backup (external storage) device.
RES	The new file created to store the system group MIB variables, System Navigation variables, and community name strings is restored from the backup (external storage) device to the primary device.
RIB (Small Systems only)	The new file created to store the system group MIB variables, System Navigation variables, and community name strings is restored from the internal backup device to the primary device.

LD 143

Small systems

The commands listed in Table 80 are part of the LD 143 Small System Upgrade Utilities menu. Select Option 2 to archive (backup) the system group MIB variables, System Navigation variables, and community name strings file to a PC Card.

Table 80
Small System backup and restore commands using a PC Card

Menu choices	Description
2. Archive Customer-defined databases.	The new file created to store the system group MIB variables, System Navigation variables, and community name strings is archived on the PC Card.
3. Install Archived database.	The new file created to store the system group MIB variables, System Navigation variables, and community name strings is installed from an archive on the PC Card.

More information

For more detailed information on SNMP, refer to *Simple Network Management Protocol: Description and Maintenance* (553-3001-519).

Proactive Voice-quality Management

Contents

This section contains information on the following topics:

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Feature packaging 293
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LD 117 - Configure voice-quality sampling (polling) 296
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LD 117 - Print zone alarm-notification levels 302
New voice-quality alarms 302
Diagnosing and isolating voice-quality problems 303
SNMP interface 304
Heterogeneous environments 304

Introduction

Proactive Voice quality Management (PVQM) includes the following enhancements for CS 1000 Release 4.5:

- Monitoring of voice-quality metrics (for example, latency, jitter, packet loss, and R-Value) for the IP Phone and voice gateway endpoints.
- Threshold configuration (for example, Warning and Unacceptable) of voice-quality metrics in Overlay 117. Thresholds are used to classify system performance as good, poor, and unacceptable.
- SNMP alarm generation when voice-quality metric thresholds are violated on a per-call or bandwidth zone basis.
- Voice quality related SNMP alarm control, on a zone basis, by configuring Alarm Notification Levels in Overlay 117. Alarm control assists in isolating voice-quality problems and reducing network traffic.
- Recording of voice-quality metric threshold violations in Traffic Report 16. Traffic Report 16 is now accessible in Overlay 2 and SNMP MIB.
- Retrieval of Operational Measurement (OM) reports containing hourly summations of the voice-quality metrics and endpoint registration activity. R-Value information is now available in OM reports.
- Network diagnostic utilities to identify, isolate, and report network problems affecting voice quality. The diagnostic utilities are available by using the CLI or IP Phones with Phase 2 software. The utilities include Traceroute, Ping, Ethernet statistics, IP Network statistics, UNIStim/ Reliable User Data Protocol (RUDP) statistics, Real-Time Control Protocol (RTCP) statistics, and Dynamic Host Control Protocol (DHCP) data.

These enhancements assist network administrators and craft persons to:

- Make informed decisions for capacity planning and Quality of Service (QoS) network engineering.
- Monitor the performance of their systems.
- Diagnose, isolate, and correct networking problems that cause deterioration in voice quality.

How voice quality monitoring works

The PVQM feature monitors voice quality by polling IP endpoints during a call, and at the end of a call, to sample the following voice-quality metrics:

- **Latency** - the length of time needed for information to travel through the network, value expressed in seconds
- **Jitter** - the variability in latency, value expressed in seconds
- **Packet Loss** - the number of packets lost during transmission, value expressed in percentage
- **R-Value** - measurement of audio quality using ITU E-Model

The sampled metrics are compared to user-configured thresholds in order to determine system performance. When sampled metrics exceed configured thresholds, statistics are generated on the system.

> ***Note:*** For details on configuring metric thresholds, refer to "LD 117 - Configure voice-quality metric thresholds" on page 294.

Statistics for each metric are collected on the Signaling Server or Voice Gateway Media Card to create a Quality Detail Report (QDR). The QDR summarizes metric threshold violations into one of the following categories:

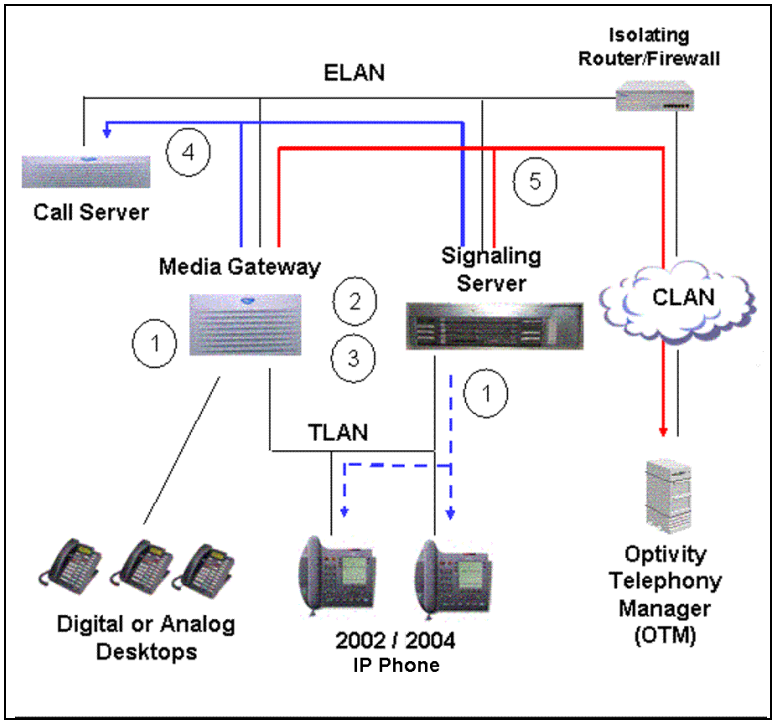
- Warning
- Unacceptable

Each summarized QDR record is added to the IP Phone Zone Traffic Report 16. The enhanced traffic report summarizes the voice quality over the reporting period on a zone-by-zone basis to allow the administrator to view the overall voice quality.

An SNMP alarm is generated when a voice-quality metric threshold exceeds Warning or Unacceptable status. For details on controlling the number of SNMP alarms generated, refer to "LD 117 - Configure zone alarm-notification levels" on page 297.

Figure 13 on page 292 illustrates PVQM within the Voice over IP (VoIP) system.

Figure 13
Voice-quality monitoring flow diagram



Legend

1 IP Phones and endpoints are polled during a call, and at the end of a call, to extract voice-quality statistics.

2 Statistics for each metric are collected on the Signaling Server or Voice Gateway Media Card.

3 Voice-quality statistics are compared to threshold settings and a QDR is created.

4 The QDR is forwarded to the Call Server for reporting purposes.

5 An SNMP alarm is generated when voice-quality metric exceeds the Warning or Unacceptable threshold.

Feature packaging

Monitoring of all other voice-quality metrics is available with base CS 1000 Release 4.5 software. To enable monitoring of the R-Value audio quality metric, the Proactive Voice quality Management (PVQM) package 401 is required.

Supported system types

PVQM is supported by CS 1000 Release 4.5 and Meridian 1 systems equipped with Voice Gateway Media Cards running IP Line 4.0.

Feature implementation

The system implements this feature during an installation or upgrade to the PVQM_401 software package, available from Feature Service Level 2 - Enhanced Business Services.

Task summary list

The following is a summary of the tasks in this section:

1 LD 117 - Configure voice-quality metric thresholds.

2 LD 117 - Print voice-quality metric thresholds.

3 LD 117 - Configure voice-quality sampling (polling).

4 LD 117 - Configure zone alarm-notification levels.

5 LD 117 - Print zone alarm-notification levels.

LD 117 - Configure voice-quality metric thresholds

New commands have been added to LD 117 to configure voice-quality metric thresholds on a per-call or zone basis. See Table 81.

To configure voice-quality metric thresholds using Element Manager, select: **Configuration > IP Telephony > Quality of Service**

Table 81
LD 117 - Configure voice-quality metric thresholds (Part 1 of 2)

=> Command	Description
CHG CQWTH <WarnJitter> <WarnLatency> <WarnPacketLoss> <WarnRFactor>	Change voice-quality Warning thresholds on a per-call basis Where: <WarnJitter> = 5-(20)-200 msec <WarnLatency> = 5-(20)-200 msec <WarnPacketLoss> = 0-(1)-10% <WarnRFactor> = 1-(3)-5 ***Note:*** Changes to threshold values are not propagated to the Signaling Server or the Voice Gateway Media card until a data dump is performed.
CHG CQUTH <UnacpJitter> <UnacpLatency> <UnacpPacketLoss> <UnacpRFactor>	Change voice-quality Unacceptable thresholds on a per-call basis Where: <UnacpJitter> = 5-(40)-500 msec <UnacpLatency> = 5-(40)-500 msec <UnacpPacketLoss> = 0-(3)-25% <UnacpRFactor> = 1-(3)-5 ***Note:*** Changes to threshold values are not propagated to the Signaling Server or the Voice Gateway Media card until a data dump is performed.

Table 81
LD 117 - Configure voice-quality metric thresholds (Part 2 of 2)

=> **Command**	**Description**
CHG ZQWTH <WarnJitter> <WarnLatency> <WarnPacketLoss> <WarnRFactor>	Change voice-quality Warning thresholds on a zone basis Where: <WarnJitter> = 0-(20)-100% <WarnLatency> = 0-(20)-100% <WarnPacketLoss> = 0-(20)-100% <WarnRFactor> = 0-(20)-100% ***Note:*** Changes to threshold values are not propagated to the Signaling Server or the Voice Gateway Media card until a data dump is performed.
CHG ZQUTH <UnacpJitter> <UnacpLatency> <UnacpPacketLoss> <UnacpRFactor>	Change voice-quality Unacceptable thresholds on a zone basis Where: <UnacpJitter> = 0-(2)-100% <UnacpLatency> = 0-(2)-100% <UnacpPacketLoss> = 0-(2)-100% <UnacpRFactor> = 0-(2)-100% ***Note:*** Changes to threshold values are not propagated to the Signaling Server or the Voice Gateway Media card until a data dump is performed.

LD 117 - Print voice-quality metric thresholds

A new command has been added to LD 117 to print voice-quality metric thresholds. See Table 82.

Table 82
LD 117 - Print voice-quality metric thresholds

=> Command	Description
PRT QSTHS	Print all voice-quality thresholds

LD 117 - Configure voice-quality sampling (polling)

The following command has been added to LD 117 to configure the sampling (polling) period, zone alarm-rate collection window, and the minimum number of samples to collect during the window.

To configure voice-quality sampling using Element Manager, select:
Configuration > IP Telephony > Quality of Service

Table 83
LD 117 - Configure voice-quality sampling (polling)

=> Command	Description
CHG SQOS <SamplePeriod> <SampleRateWindow> <MinSampleCnt>	Change voice-quality sampling parameters Where: <SamplePeriod> = 5-(30)-60 <SampleRateWindow> = 60-(300)-3600 seconds <MinSampleCnt> = 50-(100)-1000

LD 117 - Configure zone alarm-notification levels

Systems that process a large number of calls potentially generate a significant number of SNMP alarms. Controlling the number of alarms by configuring zone alarm-notification levels assists in isolating voice-quality problems and reducing network traffic.

Voice-quality threshold alarms are examined for their severity relative to the alarm notification level settings. If the voice-quality threshold alarm severity exceeds the configured notification level, it generates an SNMP alarm. Otherwise it is suppressed.

Voice-quality threshold alarm notification levels can be set on a zone-by-zone basis so that some bandwidth zones can be monitored for all alarms and other zones report only serious voice-quality problems. Alarm notification levels are defined in Table 84: “Voice-quality threshold alarm notification levels” on page 297.

Table 84
Voice-quality threshold alarm notification levels (Part 1 of 4)

Level	Description	Alarms
0	All voice-quality alarms are suppressed	None
1	Allow zone-based Unacceptable alarms	QOS0017 QOS0018 QOS0019 QOS0020 QOS0021

Table 84
Voice-quality threshold alarm notification levels (Part 2 of 4)

Level	Description	Alarms
2	Allow all of the above PLUS zone-based Warning alarms	All of the above PLUS QOS0012 QOS0013 QOS0014 QOS0015 QOS0016

Table 84
Voice-quality threshold alarm notification levels (Part 3 of 4)

Level	Description	Alarms
3	Allow all of the above PLUS per-call Unacceptable alarms	All of the above PLUS QOS0007 QOS0008 QOS0009 QOS0010 QOS0011 QOS0021 QOS0032 QOS0033 QOS0036 QOS0037

Table 84
Voice-quality threshold alarm notification levels (Part 4 of 4)

Level	Description	Alarms
4	Allow all of the above PLUS per-call Warning alarms	All of the above PLUS QOS0001 QOS0002 QOS0003 QOS0005 QOS0006 QOS0018 QOS0019 QOS0022 QOS0023 QOS0024 QOS0025 QOS0026 QOS0027

The craft person controls the number of alarms generated by the system using the following new alarm notification level configuration command in LD 117. See Table 85.

To configure zone alarm-notification levels using Element Manager, select: **System Status > Call Server > IP Telephony Quality of Service Diagnostic**

Table 85
LD 117 - Configure zone alarm-notification levels

=> Command	Description
CHG ZQNL <ZoneNumber> <level>	Change the Notification Level for the specified zone Where: <ZoneNumber> = 0-255 <level> = 0-(2)-4

LD 117 - Print zone alarm-notification levels

The following command has been added to LD 117 to print zone alarm-notification levels. See Table 85.

Table 86
LD 117 - Print zone alarm-notification levels

=> Command	Description
PRT ZQNL <ZoneNumber>	Print the Notification Level for the specified zone Where: <ZoneNumber> = 0-255

New voice-quality alarms

This feature introduces new Warning and Unacceptable voice-quality alarms. The alarms are defined on a per-call basis or zone basis. For detailed information on QoS alarms, see *What's New for Communication Server 1000 Release 4.5* (553-3001-015).

Diagnosing and isolating voice-quality problems

New network diagnostic utilities are accessible on IP Phones to isolate voice-quality problems. The diagnostic utilities can be run directly from the IP Phone itself, or remotely through a CLI.

Ping and Traceroute

The administrator can execute the Ping or Traceroute command from a specific endpoint with any arbitrary destination, typically another endpoint or Signaling Server.

IP Networking statistics

The administrator can view information on the packets sent, packets received, broadcast packets received, multicast packets received, incoming packets discarded, and outgoing packets discarded.

Ethernet statistics

The administrator can view ethernet statistics (for example, number of collisions, VLAN ID, speed and duplex) for the IP Phone on a particular endpoint. The exact statistics will depend on what is available from the IP Phone for the specific endpoint.

UNISTIM/RUDP statistics

The administrator can view RUDP statistics (for example, number of messages sent, received, retries, resets, and uptime) for the IP Phones.

Real time Transport Protocol statistics

The administrator can view RTP/RTCP QoS metrics (for example, packet loss, jitter, and so on) while a call is in progress.

DHCP

The administrator can view DHCP settings (for example, IP address, S1, S2, and S4 addresses) for each IP Phone.

For detailed information on network diagnostic utilities, refer to *IP Phones: Description, Installation, and Operation* (553-3001-368)

SNMP interface

A new SNMP interface has been added to the traffic reporting system so that OTM, or any third-party system, can have a simple, standards-based interface into the system traffic reports.

For details on the new SNMP interface, refer to *Simple Network Management Protocol: Description and Maintenance* (553-3001-519).

Heterogeneous environments

In a heterogeneous environment, with a mixture of Nortel equipment and third-party equipment, voice-quality monitoring, detection, and alarming are performed only on IP endpoints that have voice-quality monitoring capabilities.

For information on IP endpoints and their voice-quality capabilities in the system, refer to Table 87.

Table 87
IP Endpoint and voice-quality capabilities (Part 1 of 2)

Endpoint type	Voice-quality monitoring operation
Phase 0/1 IP Phones	Detects jitter, packet loss, and latency (when the far end is RTCP-compliant) threshold violations. Threshold violations are detected by polling.
Phase 2 IP Phones without PVQM package	Detects jitter, packet loss, and latency (when the far end is RTCP-compliant) threshold violations. Threshold violations are detected asynchronously by the IP Phone.

Table 87
IP Endpoint and voice-quality capabilities (Part 2 of 2)

Endpoint type	Voice-quality monitoring operation
Phase 2 IP Phones with PVQM package	Detects jitter, packet loss, and latency (when the far end is RTCP-compliant) and R-Value threshold violations. Threshold violations are detected asynchronously by the IP Phone.
IP Softphone 2050	Detects jitter, packet loss, and latency (when the far end is RTCP-Compliant) threshold violations. Threshold violations are detected by polling.
CS 1000 and Meridian 1 systems with Voice Gateway Media Cards running IP Line 4.0	Detects jitter and packet loss threshold violations. Threshold violations are detected by polling.
Third-party Gateway	Not supported

pbxLink connection failure detection and status reporting enhancement

Contents

This section contains information on the following topics:

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pbxLink connection failure detection 308
Displaying pbxLink information 308
LD 117 STAT SERV enhancement 308
pbxLink information. 309
Application information 309

Introduction

The pbxLink connection failure detection and status reporting enhancement provides the following functionality:

- The pbxLink connection failure detection provides a means of detecting the link status of Signaling Servers and Voice Gateway Media Cards. An alarm is generated if the pbxLink is not detected after a warm or cold start of the Call Server.
- The status reporting enhancement applies to the STAT SERV command in LD 117. This command has been enhanced to display the link status of the Signaling Server and Voice Gateway Media Cards that were configured to connect to the system. As well, the display provides information about the applications running on the Signaling Server and Voice Gateway Media Cards.

pbxLink connection failure detection

The Call Server monitors the pbxLink.

The Call Server maintains a list of all known registered elements (Signaling Servers and Voice Gateway Media Cards). When a Call Server is booted, it has a 5-minute delay to enable these known elements to re-establish contact with the Call Server.

If a known element fails to register with the Call Server, an ELAN0028 alarm is generated.

If an unknown Signaling Server or Voice Gateway Media Card registers with the Call Server, an ELAN0029 alarm is generated.

Displaying pbxLink information

Element Manager

For a CS 1000S And CS 1000M, use the Element Manager **System Status > Call Server > IP Telephony Services Management** page to display the pbxLink information.

CLI

For a Meridian 1 system, use the LD 117 STAT SERV command at the CLI of the Call Server to display the pbxLink information.

LD 117 STAT SERV enhancement

The suite of STAT SERV (Stat Services) commands enables a technician to display link status information for elements that are registered to a Call Server.

STAT SERV can provide consolidated link status information by application type, IP address, host name, and IP Telephony node ID.

Prior to CS 1000 Release 4.5, STAT SERV status information included the following:

- node ID
- host name
- IP address
- element role
- platform type
- enabled applications
- registered/unregistered endpoints, such as IP Phones and Voice Gateway Media Cards

In CS 1000 Release 4.5, the STAT SERV command has been enhanced to provide information about the pbxLink and enabled applications.

pbxLink information

The STAT SERV command provides the following pbxLink information:

- the time the pbxLink was last established
- the time the pbxLink was lost, if previously established
- the time the pbxLink last attempted to establish a connection, if the pbxLink failed to establish

Application information

If an active link to an element is established, the Call Server obtains information about the applications running on the element.

Table 88 lists the applications and describes the information obtained about those applications.

Table 88
Queried information in STAT SERV

Application/element	Information provided
LTPS application	number of registered IP Phone number of busy IP Phones
VTRK application	number of registered VTRKs number of busy VTRKs
Voice Gateway Media Cards	number of registered Voice Gateway Media Cards number of busy Voice Gateway Media Cards
Signaling Servers and Voice Gateway Media Cards	time that the element established its link with the Call Server elements that failed to register or lost their link

Figure 14 on page 311 shows an example of LD 117 STAT SERV output.

Figure 14
Sample LD 117 STAT SERV output

Commands

STAT SERV	IP	xx.xx.xx.xx xx.xx.xx xx.xx xx
	TYPE	SRV
	APP	APPS
	NAME	HOSTNAME
	NODE	NODE_ID

Response

```
NODE  HOSTNAME          ELANIP          LDR   SRV     APPS     PBXLINK     PBXLINK      PBXLINK     CONNECTID
ID                                                             STATE       DATE         TIME
909   vxTarget          47.11.216.126   YES   SMC     LTPS     LINK UP     5/06/2003    22:51:06    0x200a2128

      sets: [reg - 0002] [busy - 0000]      vgws: [reg - 0020] [busy - 0002]

999   IPService         47.11.216.141   N/A   SS      LTPS     LINK UP     5/06/2003    22:51:06    0x200a2128
                                                     VTRK

      Sets: [reg - 0302] [busy - 0056]
      VTRK: [reg - 0050] [busy - 0015]

999   IPService         47.11.216.141   YES   SS      LTPS     LINK UP     5/06/2003    22:51:06    0x200a2128
                                                     VTRK

      Sets: [reg - 0302] [busy - 0056]       VTRK: [reg - 0050] [busy - 0015]


999   vxTarget          47.11.216.143   NO    ITGP    LTPS     INV CONN       5/06/2003     23:18:08    0x0


999   vxTarget          47.11.216.144   NO    ITGP    LTPS     FAILED      5/06/2003    22:51:06    0x0
```

Table 89 lists the descriptions for the fields in the STAT SERV response.

Table 89
STAT SERV response fields and description (Part 1 of 3)

STAT SERV response field	Description
NODE ID	Identifies the related node. Value is a number from 0 – 9999.
HOSTNAME	Identifies the alias that the host has been given by the system. Value is a string.
ELANIP	Identifies the ELAN network interface IP address of the element connected to the Call Server. Value is an IP address.
LDR	Specifies if the element is the Leader for the related node. Value is YES or NO.
SRV	Specifies the element type. Values are: • SMC – Media Card 32-port card • ITGP – ITG-P 24-port card • SS – Signaling Server
APPS	Specifies the application running on the element. Values are: • LTPS • VTRK

Table 89
STAT SERV response fields and description (Part 2 of 3)

STAT SERV response field	Description
PBXLINK STATE	Specifies the element's current pbxLink state. Values are: • LINK UP • LOST • FAILED • INV CONN (element is connected, but its configuration was not found on the Call Server, indicating that this element might be connected to the wrong Call Server)
PBXLINK DATE/TIME	Specifies when the element's pbxLink state last changed.
CONNECTED	Specifies the element's connection ID.
sets	Values are: • reg – the number of IP Phones registered to the element • busy – the number of IP Phones that are currently busy

Table 89
STAT SERV response fields and description (Part 3 of 3)

STAT SERV response field	Description
vgws	Values are: • reg – how many voice gateways (DSP resources) are configured on the element • busy – how many voice gateways (DSP resources) are active/busy on the element
VTRK	Values are: • reg – how many VTRK channels are configured on the element • busy – how many VTRK channels are active/busy on the element

Final maintenance procedure

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This section contains information on the following topics:

Verifying system operation 315

Verifying system operation

Perform the final maintenance procedure to verify that the Small System is operating properly and there are no remaining faults.

CAUTION WITH ESDS DEVICES

Wear an antistatic wrist strap when handling circuit cards to prevent damage caused by static electricity.

Procedure 42
Final maintenance procedure

1. Make sure all circuit cards that may have been removed are reinserted in their assigned location and enabled.
2. Make sure all wiring and connectors that may have been disconnected are reconnected.
3. Make sure all circuit cards and units that should be enabled are enabled.

Digital telephones on a circuit card that was disabled may not be restored when the card is enabled. Each telephone should be individually disabled and reenabled. Use:

```
LD 32
DISU c u to disable
ENLU c u to enable
```
where “c u” are the circuit card and unit numbers.

Service may also be restored by disconnecting and reconnecting the telephone line cord.

4 Make sure all circuit breakers are set to ON and any fuses (in power panels or auxiliary equipment) are inserted.

5 For systems equipped with the NTDK20 SSC circuit card, clear fault indicators by using LD 135:

a. To clear a major alarm indication and restore Power Failure Transfer Units (PFTUs) to normal operation, enter:

```
LD 135
CMAJ
```

b. To clear all minor alarm indications, enter:

```
LD 135
CMIN ALL
```

6 Set the Midnight Routine to run after you log out of the system by entering:

```
MIDN
```

End the session in LD 35 or LD 135 and log out of the system:

```
****
LOGO
```

The Midnight Routine will now run.

7 Check system messages produced when the Midnight Routine runs. Clear any faults indicated.

8 If there was a SYSLOAD (system reload) while you were clearing a fault, reset the correct time and date by entering:

```
LD 2
STAD (day) (month) (year) (hour) (minute) (second)
```

Check the time and date you entered:

```
TTAD
```

End the session in LD 2 and log out of the system:

```
****
LOGO
```

9 Replace any covers that were removed.

10 Tag defective equipment with a description of the fault and return it to a repair center.

End of Procedure

Technical Assistance service

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This section contains information on the following topics:

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Nortel Technical Assistance Centers

To help customers obtain maximum benefit, reliability, and satisfaction from their CS 1000E systems, Nortel provides technical assistance in resolving system problems. Table 90 lists the centers that provide this service.

Table 90
Customer Technical Services (Part 1 of 3)

Location	Contact
Nortel Global Enterprise Technical Support (GETS) PO Box 833858 2370 Performance Drive Richardson, TX 75083 USA	North America Telephone: 1 800 4NORTEL

Table 90
Customer Technical Services (Part 2 of 3)

Location	Contact
Nortel Corp. P.O. Box 4000 250 Sydney Street Belleville, Ontario K8N 5B7 Canada	North America Telephone: 1 800 4NORTEL
Nortel Service Center - EMEA	EMEA Telephone: 00 800 8008 9009 or +44 (0)870 907 9009 E-mail: emeahelp@nortel.com
Nortel 1500 Concord Terrace Sunrise, Florida 33323 USA	Brazil Telephone: 5519 3705 7600 E-mail: entcts@nortel.com English Caribbean Telephone: 1 800 4NORTEL Spanish Caribbean Telephone: 1 954 858 7777 Latin America Telephone: 5255 5480 2170

Table 90
Customer Technical Services (Part 3 of 3)

Location	Contact
Network Technical Support (NTS)	Asia Pacific Telephone: +61 28 870 8800 Australia Telephone:1800NORTEL (1800 667835) or +61 2 8870 8800 E-mail: asia_support@nortel.com People's Republic of China Telephone: 800 810 5000 E-mail: chinatsc@nortel.com Japan Telephone: 010 6510 7770 E-mail: supportj@nortel.com Hong Kong Telephone: 800 96 4199 E-mail: chinatsc@nortel.com Taiwan Telephone: 0800 810 500 E-mail: chinatsc@nortel.com Indonesia Telephone: 0018 036 1004 Malaysia Telephone: 1 800 805 380 New Zealand Telephone: 0 800 449 716 Philippines Telephone: 1 800 1611 0063 or 632 917 4420 Singapore Telephone: 800 616 2004 South Korea Telephone: 0079 8611 2001 Thailand: Telephone: 001 800 611 3007

Services available

Services available through the Technical Assistance Centers include:

- diagnosing and resolving software problems not covered by support documentation
- diagnosing and resolving hardware problems not covered by support documentation
- assisting in diagnosing and resolving problems caused by local conditions

There are several classes of service available. Emergency requests (Class E1 and E2) receive an immediate response. Service for emergency requests is continuous until normal system operation is restored. Non-emergency

requests (Class S1, S2, and NS) are serviced during normal working hours. Tables 91 and 92 describe the service classifications.

Table 91
Technical service emergency classifications

Class	Degree of failure	Symptoms
E1	Major failure causing system degradation or outage	System out-of-service with complete loss of call-processing capability. Loss of total attendant console capability. Loss of incoming or outgoing call capability. Loss of auxiliary Call Detail Reporting (CDR) in resale application. Call processing degraded for reasons such as trunk group out-of-service: • 10% or more lines out-of-service • frequent initializations (seven per day or more) • inability to recover from initialization or SYSLOAD • consistently slow dial tone (eight seconds or more delay)
E2	Major failure causing potential system degradation or outage	Standby CPU out-of-service. Frequent initializations (one per day or more). Disk drive failure. Two sets of disks inoperative.

Table 92
Technical services non-emergency classifications

Class	Degree of failure	Symptoms
S1	Failure that affects service	Software or hardware trouble directly and continuously affecting user's service or customer's ability to collect revenue. Problem that will seriously affect service at in-service or cut-over date.
S2	Intermittent failure that affects service	Software or hardware faults that only intermittently affect service. System-related documentation errors that directly result in or lead to impaired service.
NS	Failure that does not affect service	Documentation errors. Software inconsistencies that do not affect service. Hardware diagnostic failures (not defined above) that cannot be corrected by resident skills. Test equipment failures for which a backup or manual alternative can be used. Any questions concerning products.

Except as excluded by the provisions of warranty or other agreements with Nortel, a fee for technical assistance may be charged, at rates established by Nortel. Information on rates and conditions for services are available through Nortel sales representatives.

Requesting assistance

Collect the information listed in Table 93 before you call for service.

Table 93
Checklist for service requests

Name of person requesting service	
Company represented	
Telephone number	
System number/identification	
Installed software generic and issue (located on data disk)	
Modem telephone number and password (if applicable)	
Seriousness of request (see Tables 91 and 92)	
Description of assistance required	

Nortel Communication Server 1000

Communication Server 1000M and Meridian 1

Small System Maintenance

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