297-1001-121

DMS-100 Family

Automatic Trunk Description

Maintenance Guide

TL07 and up Standard 03.03 August 2000

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- Converted document to FrameMaker + SGML and updated references in document.

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Standard Release 03.02

- This publication is reissued in BCS34 to include the following:
  - — the Digital Test Access (DTA) feature available on DMS-300
  - — general revisions to the names of Nortel Network Publications (NTP) referenced in this document
- This publication was previously reissued to include general revisions and to clarify the information in some areas.

Contents

Maintenance Guide

1 Introduction

Scope

This publication describes the Automatic Trunk Testing (ATT) feature of the DMS-100 Family. There is no unique set of hardware provided for ATT. Instructions for the performance of tests are entered through a Visual Display Unit (VDU) and keyboard at a Trunk Test Position (TTP) or Maintenance and Administration Position (MAP). The tests are performed by a common pool of test equipment mounted in a Maintenance Trunk Module (MTM). The ATT functions described in this publication are controlled by software. The TTP is described in the Trunks Maintenance Guide, 297-1001-595 and the MAP is described in 297-1001-129.

Purpose

ATT provides automatic testing of outgoing trunks, the outgoing portion of two-way trunks, and the associated facilities. Two types of tests are included: functional and diagnostic. The functional tests are conventional test line tests to distant office test lines. Test line tests ensure signaling capabilities exist and the transmission facility meets specifications required. Diagnostic tests ensure that trunk hardware, such as trunk cards, is operating properly, and can be run on any circuit having a Common Language Location Identifier (CLLI).

A procedural description of the tasks that can be performed for ATT and the user interface displays and input commands for ATT are described in 297-1001-595.

Practise Application

The information contained in this publication is applicable to offices having Batch Change Supplement (BCS) release 34 software. It is also applicable to offices having a BCS release greater than 34 unless reissued. The application of all Nortel Network Publications (NTP) editions with respect to a given BCS or PCL release is given in 297-8991-001.

Software Identification

Software applicable to a specific DMS-100 Family office is identified by a BCS or PCL release number and by Nortel Networks Product Engineering Codes (PEC).

A display of the BCS or PCL number and PEC for the NT feature packages available in a specific office can be obtained by entering the command string: DSU;INFORM LIST;LEAVE at a Maintenance and Administration Position (MAP).

References

References listed as prerequisites are essential for an understanding of this publication. Those listed as informative contain detailed information concerning other items mentioned in this publication, but are not essential. References are inserted at the appropriate places in the text.

Note: The documents listed may exist in more than one version. See 297-8991-001 to determine the release code of the version compatible with a specific release of software.

Table 1-1 Prerequisite References

Document Number	Title
297-5001-100	System Description Informative References

Table 1-2 Informative References

Document Number	Title
297-8991-001	DMS-10, DMS-100 Product Documentation Directory
297-1001-107	Maintenance and Administration Tools
297-1001-129	Input/Output System Reference Manual
297-1001-345	Device Independent Recording Package Administration Guide
297-YYYY-351	Common Customer Data Schema
297-1001-595	Trunks Maintenance Guidel
297-YYYY-840	Log Report Reference Manual

2 General Description

ATT Functions

The functions performed through the ATT process are:

- Automatic performance of tests on a scheduled basis as controlled by software tables.
- Monitoring of the scheduled test programs through a VDU or printer at a MAP or TTP.
- Manual control of scheduled tests.
- Printout of log messages related to the scheduled tests.

Automatic Tests

Table Control

The automatic performance of tests is carried out according to data entered into two ATT-associated, software data tables; ATTOPTNS and ATTSCHED (see Common Customer Data Schema). These data tables are filled, according to operating company requirements, through the Table Editor (see Servord Reference Manual).

Two other tables are involved in the processing of scheduled tests; the Immediate Test (IMTST) and the Manual (MANUAL) tables.

The ATTOPTNS table (see Common Customer Data Schema) contains the following information regarding test execution for each of the test classes: quarterly, periodic (other than quarterly) manual, ATME No.2, semi-yearly, and nonstandard.

- The type of log reports to be generated.
- Transmission limits.
- Minimum amount of time to wait for busy trunks to become available for testing.
- Whether a trunk that has failed a test is to be retested.
- Whether a trunk that has failed a test is to be removed from service.

- The maximum percentage of trunks in a trunk group that can be removed from service.
- Delay time between tests.

The ATTSCHED table (see Common Customer Data Schema) contains the following information on the trunk group to be tested:

- Common Language Location Identifier (CLLI) of the trunk group.
- Type of test to be performed: see Trunks Maintenance Guide for detailed descriptions of the available tests.
- Whether a specific test entry is to be scheduled. This information can be changed manually from the MAP (see Stop, Start commands on ATTMAN display, Trunks Maintenance Guide).
- Frequency of test and when it is to be carried out. See Figure “Scheduling Interval Mapping” in Chapter 4..
- The test class to use (table ATTOPTNS).
- The maximum time for the test.

The IMTST table contains a list of tests waiting to be completed. A test may be started within +/10 minutes of its specified starting time, depending upon when resources become available.

The MANUAL table contains a list of tests to be made as entered by means of the TestReq command through the MAP, ATT display (see Trunks Maintenance Guide).

Queues

Two queues are established to hold details on trunks not immediately available for testing; the busy queue and the deload queue.

If a trunk is call-processing busy when scheduled for testing, it is deloaded and put in the deload queue. When the call is terminated, the trunk is taken out of service temporarily until tested by ATT. The deload queue has a maximum of 15 entries. When this limit is exceeded, testing on the offending trunk group is suspended temporarily (see Chapter 3, “DETAILED TEST PROCEDURE,” Table 3-1, “ATT ACTION ACCORDING TO TRUNK STATE” and Section , “SUSPENDED TESTING”).

Trunks that are in lockout, deload, initialize, deloading, or seized conditions when scheduled for testing are placed in the busy queue. The busy queue has a maximum of 15 entries. When this limit is exceeded, testing is suspended temporarily (see the references above).

Test Equipment

The test equipment required for ATT is the common test equipment internal to the DMS-100 Family equipment. It is jointly used by ATT and the TTP (see Trunks Maintenance Guide). Two types of test equipment are used: TTT and TTU.

The Test Signal Generator card (NT1X90AA) and the PCM Level Meter card (NT2X96AA), which together comprise the test equipment group, are referred to as the Transmission Test Trunk (TTT). TTT are located in the MTM.

The TTT provides the following ATT testing functions:

- loss measuring
- noise measuring
- tone detection
- tone sending

The TTU is used for 105 and ATME test line tests.

The test equipment, when required by the ATT, is automatically selected from the common pool of test equipment before a test is started, and returned to the pool when the test is completed.

Summarized Sequence of Events

ATT is performed on a trunk group basis according to the type and frequency of test as specified in the ATTSCHED table. The trunks within a group are selected in sequential order starting with the lowest trunk number.

When a trunk group is under test, ATT steps through the group attempting to run the requested test on each trunk in succession. Whether a specific trunk is tested depends on its state. If it is idle it is tested. If a trunk is unavailable for testing, it is placed in a deload queue or a busy queue. In each of these cases, the ATT immediately proceeds to the next trunk in the group.

When the testing on a trunk is completed, it is classified as a pass or a failure and a report is logged, dependent on the test results, and the logging request specified in the ATTOPTNS table.

After each trunk test is completed, ATT checks the deload and busy queues to determine whether any trunks there are available for testing. If trunks are found available they are tested; if not, the system steps on to the next trunk.

When the testing of a group is completed, a summary report is logged and the IMTST table is checked to see if another group test is scheduled.

Monitoring of ATT

The basic tool for monitoring the running of ATT is a VDU at a MAP or TTP; a suitable printer also can be used. The Man-Machine Interface (MMI) display for ATT, ATT Manual Status Display and Menu, is illustrated and described in detail in Trunks Maintenance Guide. A continuous display, updated dynamically, is provided, and three sets of supplementary information can be called up using the ATT menu commands.

The ATT continuous display shows the following:

- The current status of ATT; running or halted.
- The number of simultaneous tests that can be run.
- The number of entries made in the MANUAL testing table.
- A summary display of trunk states. The summary display of trunks states, mentioned in the preceding list, is divided into Automatic and Manual categories and displays the numbers of trunk groups:
- In the IMTST table.
- Under test.
- Waiting for test equipment.
- For which testing has been suspended waiting for trunks in the groups to become available.

The supplementary displays contain lists of information as selected by menu commands. Only one type of display can appear at any time, and the information therein depends on the selection desired. Possible lists are as follows:

- Tests entered in the ATTSCHED table that have been stopped.
- Entries from the IMTST table.
- A combination of entries from the ATTSCHED and MANUAL tables having a specified CLLI and optionally a specified test.
- Entries from the MANUAL table.

Log reports also can be used for monitoring ATT. Log reports are discussed in this practice under LOG MESSAGES.

Manual Control of Scheduled Tests

In addition to monitoring ATT, the MAP is used to manually control scheduled tests. This facility allows a group of trunks to be scheduled on a one-shot basis by entering appropriate commands. Commands are also provided to allow ATT to be stopped and started from the MAP.

Detailed descriptions of the manual commands are contained in 297-1001-516. In summary, the actions that can be initiated from the MAP are:

- Enter a group of trunks into the MANUAL table by CLLI for immediate or scheduled testing. Only one manual test can be run at a time, but up to a maximum of 10 entries can be made in the MANUAL table.
- Delete entries from the MANUAL table. Groups currently under test are deleted at the end of the ongoing test.
- Stop or start testing on groups controlled by the ATTSCHED table as specified by CLLI and, optionally, test type. If the Stop command is used, testing in progress on groups is stopped when the current test is completed.
- Halt all ATT testing. Testing in progress on groups is stopped by group as the current trunk tests are completed. The IMTST table is cleared.
- Start ATT running; used after a Halt command to recommence scheduled ATT tests.
- Set the number of simultaneous tests that ATT can run. A maximum of 15 are allowed, including one manual test. This entry is governed by the test equipment available for use by ATT.

Log Messages

ATT logs reports on a continual basis to give a current picture of its activities. As ATT steps through scheduled trunk groups executing specified tests, it enters reports in the ATT log. By accessing the log system, the progress of the ATT can be followed in detail. A description of the log system and how to access it is contained in 297-1001-129.

The types of reports generated by ATT are:

- A start log which summarizes the testing information for a group.
- All trunk test failures.
- All trunks skipped because they were unavailable for testing.
- All trunk test results.
- A log which summarizes the results of tests.
- A list of test equipment selected by ATT for a group test.
- The reference trunk selected.

Detailed descriptions of all log reports produced for ATT, including samples, are contained in Log Report Reference Manual.

3 Detailed Test Procedure

Initial Software Checks

Every 10 minutes ATT software (scheduler) checks the ATTSCHED and MANUAL tables for tests scheduled to be started in the next 10-minute period. If such tests are found they are entered in the IMTST table. If the IMTST table is full, a report is logged and the new test is omitted.

The software also determines which of the ATT processes are active testing groups and which are idle. If an idle process if found, a message is sent to have that process start a group test. If an idle process is not found, the new test is started when a test process finishes its current tests and checks the IMTST table for additional tests to run. The process moves to an idle state if additional groups are not scheduled for testing.

All relevant data are collected from the ATTSCHED, ATTOPTNS, and MANUAL tables and a Start log report is generated. The trunk group remains in the IMTST table until testing is completed.

Test Equipment Seizure

ATT attempts to seize test equipment from the common pool. If the seizure is successful, a diagnostic test is run on the test equipment. Group testing begins if the equipment passes the diagnostic test. If the equipment does not pass the diagnostic test, it is left in a system busy state and ATT attempts to seize other test equipment.

If ATT is unable to obtain test equipment, this group test goes into a waiting-for-test-equipment state (WAIT-TE) and ATT attempts to get equipment every minute. A log report is generated every 10 minutes. After 60 minutes the group test is aborted and a log report is generated.

Dependent on the maximum time allowed for group testing, a group time-out may occur before test equipment becomes available and the test is aborted. A log report is generated to record the ATT action.

Start of Testing

When test equipment which has passed a diagnostic test is obtained, ATT steps through the trunk group from lowest to highest external trunk numbers and attempts to run the specified test on each trunk.

If trunks are not immediately available they are placed in either the busy queue or the deload queue.

When ATT has finished testing a trunk, it checks the busy and deload queues to see if any trunks are available for testing, and, if so, immediately tests them. If a trunk is not available from the queues, ATT steps to the next trunk in the group.

The current state of trunks governs whether ATT carries out a test. The state also controls the eligibility of trunks to remain in the queues. As ATT searches for trunks to test, it removes trunks from queues if they are no longer in an acceptable state for membership in the queues. Based on the state of trunks, ATT action is as detailed in Table 3-1. Trunk states are as defined in Trunks Maintenance Guide.

Table 3-1 ATT Action According to Trunk State

Trunk State	ATT Action
Idle	The trunk is seized and the test is run.
Unequipped Offline	The trunk is skipped, but a skip report is not logged.
Carrier Fail Manual Busy Network Management Busy PM Busy Remote Busy Restricted Idle System Busy	The trunk is skipped and a skip report is entered in the ATT log.
Call Processing Busy	The trunk is deloaded and placed in the deload queue. If the queue limit is exceeded, testing is suspended temporarily (see Suspended Testing).
Deload Deloading Initialize Seized	The trunk is placed in the busy queue. If the queue limit is exceeded, testing is suspended temporarily (see Suspended Lockout Testing).

Testing of Trunks

Once a test has started, it can run to completion or terminate abnormally.

If a test runs to normal completion, an analysis of the loss and noise measurements is made to determine whether to classify the test as a pass, a Q1 exception, or a Q2 failure. If the trunk passes and a reference trunk has not been chosen, the trunk is taken out of service and used as the reference trunk. In the case of a failure, a retest is carried out if requested. A report is logged depending on the test results and the logging request specified. A trunk may be taken out of service if that option is specified.

If a test is terminated abnormally, ATT action depends on the problem encountered. Possible responses are listed in Table B. All cases listed are considered as failures and are logged as such. The trunks may or may not be taken out of service.

Table 3-2 ATT Responses to Tests Terminated Abnormally

Problem	ATT Response
No Far-end Test Equipment Data Error	The group test is aborted.
Connection Fault	The trunk test is aborted. The trunk may be removed from service.
Outpulsing Trouble	The trunk is retested and may be removed from service.
A Voice or Ringing Tone is Detected	A retest is not performed. If these tones are detected twice during a group test, the group test is aborted.
Unexpected Tones are received	If a busy tone, overflow tone, reorder tone, 120 ipm, tone, or a 30 ipm tone is detected, the test is retried eight times. If the test is unsuccessful after eight times, the group test is aborted. If other tones are detected a retest is performed.
Note: Retests are performed only if this option is requested.	

Successive Failures

If five failures occur in succession, ATT tries to determine whether they are legitimate failures, a test-equipment problem, or a far-end problem.

The first step in determining the problem is a retest of the reference trunk. If a reference trunk has not been obtained, the group test is aborted.

If the reference trunk passes the retest, the failures are assumed to be legitimate and testing continues. If the reference trunk fails the retest, the test equipment is checked by a diagnostic test. If this diagnostic test is successful, a far-end problem is assumed and the test is aborted.

If the test equipment fails the diagnostic test, it is set system busy and new test equipment is selected and subjected to a diagnostic test. When test equipment is found that will pass a diagnostic test, the reference trunk is retested. If the reference trunk fails the test, the group test is aborted.

If the reference trunk passes the retest, ATT backs up and retests the last five failures before continuing. If these trunks pass the retesting, they are returned to service.

After every 100 tests, the reference trunk is retested to verify the validity of testing.

Completion of a Group Test

When the testing of a group of trunks is completed, a summary report is logged, the entry in the IMTST table is removed, and the IMTST table is checked to see whether another group test is scheduled.

Suspended Testing

If testing is suspended according to the conditions listed in Table A, the ATT process moves to the waiting-fortrunks (WAIT-TRKS) mode. The test equipment and the reference trunk are returned to service.

In the WAIT-TRKS mode, ATT attempts to seize a trunk in the busy queue once every minute for the duration of the time specified by the WAITTIME option. If ATT can seize a trunk, it returns to the testing mode, obtains test equipment, and starts to run tests. An attempt is made to remove the original reference trunk from service. If this cannot be done, a new reference trunk is chosen.

If a trunk cannot be seized within the WAITTIME limit, the full queue is cleared, appropriate skip log reports are made, testing is restarted, and the deload is canceled.

4 Automatic Test Trunk Reports

Description

This feature (BC1461), enables the transfer of the scheduled automatic trunk testing results to a Device Independent Recording Package (DIRP) file, so that Network Operations System (NOS) Remote Operations (RO) may poll the data.

Data Selection for DIRP

ATT results may be included or excluded from the DIRP file based on the ownership of the trunk group, and recording of the ATT results can be specified via parameter TTRF_SELECTION_OPTION of table OFCVAR to record: no data, all data, operating company data, or customer data.

Record Types

The TTRF contains a series of records in standard Variable Blocked (VB) format. The prefix contains a record type and record length.

The records fall into two major classes; System Event Records, and records containing data specific to TTR.

System Event Records provide notification that a rotate or restart occurred. A rotate record details the reason for changing DIRP files thereby notifying the downstream processor of a possible problem with the data. In the event of a restart all tests in progress are terminated.

Records containing data specific to TTR include:

- Start of test record containing all test parameters.
- Transmission test results records.
- Information records for the following reasons:
  - — Operational test PASS/FAIL indication.
  - — Transmission test failure message.

  - — Group test abort message.
  - — General information records.
- End of test record containing summary of the test.

Each record contains a unique test sequence identifier that relates all subsequent data records back to the start record. If for example, two or more tests are progressing at the same time, all data records will appear in sequence between their START and END records but may be intermixed with results from the other tests. The test sequence identifier enables downstream processing to associate the records with the appropriate tests.

Trunk Testing Result File

The Trunk Testing Result File (TTRF) contains the results from one or more ATT processes. The records in the file are created from the internal buffer of the TTR results and are output via the DIRP. A sample Block output format is shown in Figure 4-1, "Sample Block Format" on page 4-15.

TTR Record Descriptions

Block Header Record

The block header appears at the start of each block, and contains the following four bytes of information (see Figure 4-2, "Block Header Format" on page 4-16):

Table 4-1

Field	Size	Description and/or Value
Length MSB	1 byte	Defines the length of all valid data
Length LSB	1 byte	within the block, including the block and record headers. Length: 4 2048
Spare	2 Bytes	Reserved for delayed formatting

Record Header

This Header precedes each data record and contains the following four bytes of information (see Figure 4-3, "Record Header Format" on page 4-16):

Table 4-2

Field	Size	Description and/or Value
Length MSB	1 byte	Defines the length of all valid data
Length LSB	1 byte	within the record including the record header. Length: 4 2048
Spare	2 bytes	Reserved for delayed formatting

Block Information Record

This record appears as the first record in each block of data, is preceded by a record header, and is structured as follows (see Figure 4-4, "Block Information Record Format" on page 4-17.):

Table 4-3

Field	Size	Description and/or Value
Record Type	1 byte	0
Application Code	6 bits	Uniqely identifies the record.
Spare Bit	1 bit	Spare
Byte Order	1 bit	0 = byte reversed 1 = byte forward
Spare	2 bytes	Reserved for delayed formatting

System Event Record

This record provides notification that a restart or a rotate has occurred. In the event of a restart, all tests in progress are terminated. A rotate record details the reason for the changing DIRP files, thereby informing the downstream processor of a possible problem with the data. The record structure is shown

in Figure 4-5, "System Event Record Format" on page 4-17, and contains the following:

Table 4-4

Field	Size	Description and/or Value
Record Type	1 byte	Type = 1
Event Code	1 byte	0 - Time Stamp 1 - Rotate Outgoing 2 - Rotate Incoming 3 - Rotate Emergency 4 - Reserved Event 5 - Rotate Startup 6 - Restart Warm 7 - Restart Cold 8 - Stream Reset 9 - Buffer Lost
Event Time	7 bytes	Absolute Time defined as follows: Year integer 0..9999 Day integer 0..366 Hour 1 byte 0..59 Minute 1 byte 0..59 Second 1 byte 0..59
Spare	1 byte	Spare

Start Record

This record contains the test parameters defined and variable format. The record structure is shown in Figure 4-6, "Start Record Format" on page 4-18, and contains the following:

Table 4-5 (Sheet 1 of 3)

Field	Size	Description and/or Value
Record Type	1 byte	Type = 2
Test Sequence No.	1 byte	

Table 4-5 (Sheet 2 of 3)

Field	Size	Description and/or Value
Start Time	7 bytes	Absolute Time defined as follows: Year integer 0..9999 Day integer 0..366 Hour 1 byte 0..59 Minute 1 byte 0..59 Second 1 byte 0..59
Test Type	1 byte	Test Type
Trk Grp CLLI	16 bytes	ASCII Characters
Max Time Allowed	2 bytes	Value 0..999 minutes
Schedule Interval	4 bytes	MOQ 2 bits 0..2 WOM 3 bits 0..5 DOM 5 bits 1..31 DOW 3 bits 0..7 EVEN/ODD 3 bits odd even none HOUR 1 byte 0..23 MINUTE 1 byte 0..59
Note: For interpretation of this field, see Figure 4-7, "Scheduling Interval Mapping" on page 4-19.		
Delay Time	2 bits	0 = short 1 = medium 2 = long 3 = extra-long
Test Output	2 bits	0 = Q1 1 = Q2 2 = Fail 3 = All
Test Class	4 bits	See table ATTOPTNS
Max Wait Time	6 bits	0..59 minutes
Remove Failed Trunk	1 bit	Y/N

Table 4-5 (Sheet 3 of 3)

Field	Size	Description and/or Value
Remove Ratio	1 bit	Y=25%, N=50%
Milliwatt dB level	2 bytes	integer
Noise Maintenance Limit Adjust.	7 bits	0..99
Retest Option	1 bit	Y/N
Results expected	1 byte	0..99
Results Bit Map	4 bytes	
Number of Q-Limit	1 byte	0..99
Spare	1 byte	Spare
Maintenance Limit	1 byte	Q1-Limit
Immediate Limit Action	1 byte	Q2-Limit

Information Record

This record contains information with reference to the following:

- Operational test PASS/FAIL indication.
- Transmission test failure message.
- Group test abort message.

General information such as reference trunk selection. The record structure is shown in Figure 4-8, "Information Record Format" on page 4-19, and contains the following:

Table 4-6 (Sheet 1 of 3)

Field	Size	Description and/or Value
Record Type	1 byte	Value = 3
Test Sequence No.	1 byte	

Table 4-6 (Sheet 2 of 3)

Field	Size	Description and/or Value
Test Result	2 bits	0 = Test Failure 1 = Test Passed 2 = Test Aborted 3 = Member Selected as Reference
Failure Type	3 bits	0 = No Q Limit 1 = Q1 Limit Fail 2 = Q2 Limit Fail 3 = Self Check Fail 4 = Both Q Limit Fail 5 = Reference Trunk 6 = Test Equipment 7 = TLPA Reference Trunk
Log Type	3 bits	0 = Abort Record 1 = Start Record 2 = Summary Record 3 = Size Change 4 = Skip 5 = Protocall Fail 6 = Reference Log 7 = Test Equipment
Record Type	1 bit	0 = Information 1 = Transmission
Reason Set	2 bits	0 = Tone Type 1 = Test Call 2 = Diagnostic 3 = Reason
Reason Type	5 bits	Reason
Trunk Member	2 bytes	value = 0..1023
Trunk State	4 bits	State of trunk

Table 4-6 (Sheet 3 of 3)

Field	Size	Description and/or Value
Spare Nibble	4 bits	Spare
Spare	1 byte	Spare

Transmission Test Results Record

This record provides transmission test results, and is made up of a fixed field and one or more variable fields. The structure is as shown in Figure 4-9, "Transmission Test Results Record Format" on page 4-20 and consists of the following:

Fixed Fields

Table 4-7 (Sheet 1 of 2)

Field	Size	Description and/or Value
Record Type	1 byte	Value = 4
Test Sequence No.	1 byte	
Test Result	2 bits	0 = Test Failure 1 = Test Passed 2 = Test Aborted 3 = Member Selected as Reference
Failure Type	3 bits	0 = No Q Limit 1 = Q1 Limit Fail 2 = Q2 Limit Fail 3 = Self Check Fail 4 = Both Q Limit Fail 5 = Reference Trunk 6 = Test Equipment 7 = TLPA Reference Trunk

Table 4-7 (Sheet 2 of 2)

Field	Size	Description and/or Value
Log Type	3 bits	0 = Abort Record 1 = Start Record 2 = Summary Record 3 = Size Change 4 = Skip 5 = Protocall Fail 6 = Reference Log 7 = Test Equipment
Record Type	1 bit	0 = Information 1 = Transmission
Reason Set	2 bits	0 = Tone Type 1 = Test Call 2 = Diagnostic 3 = Reason
Reason Type	5 bits	Reason
Trunk Member	2 bytes	value = 0..1023
Result Data	2 bytes	Variable fields (as follows)

Variable Fields

The test results fields form the variable portion of the Trunk Test Result Record. These fields are in ascending order, the number of results expected are defined in Figure 4-9, "Transmission Test Results Record Format,", and are formatted as follows.

Table 4-8

Field	Size	Description and/or Value
Result data	16 bits	Unrestricted area

Expected Measurement Field

Table 4-9

Field	Size	Description and/or Value
Result	12 bits	0..1023
Data Available	1 bit	bool
Spare	3 bits	0..7

Self Check Result Field

Each self check result field is assigned a numeric code for ease of reference. Associated with each code is a name and description.

Table 4-10

Field	Size	Description and/or Value
Self check result	12 bits	0..1023 OK Self check OK TO Test Line Time Out FE FSK Error Code Received FD FSK Decoding Error PC PCM Invalid SC Self Check Fail FC Any other error type
Data Available	1 bit	yes/no
Spare	3 bits	0..7

Loss Deviation Result Field

Table 4-11 (Sheet 1 of 2)

Field	Size	Description and/or Value
Result	12 bits	0..1023
Data Available	1 bit	yes/no

Table 4-11 (Sheet 2 of 2)

Field	Size	Description and/or Value
Q Limit Exceeded	2 bits	OK, Q1, Q2, Q9
Sign	1 bit	Positive, Negative

Noise Maintenance Limit Field

Table 4-12

Field	Size	Description and/or Value
Maintenance Level	12 bits	0..1023
Data Available	1 bit	yes/no
Spare	3 bits	0..7

Noise Result Field

Table 4-13

Field	Size	Description and/or Value
Result	12 bits	0..1023
Data Available	1 bit	bool
Q Limit Exceeded	2 bits	OK, Q1, Q2, Q9
Spare	1 bit	0..1

Return Loss Result Field

Table 4-14

Field	Size	Description and/or Value
Result	12 bits	0..1023
Data Available	1 bit	yes/no
Spare	3 bits	0..7

End of Test Record

This record is made up of a fixed field and one or more variable fields. The structure is as shown in Figure 4-10, "End of Test Record Format" on page 4-21, and consists of the following:

Fixed Fields

Table 4-15

Field	Size	Description and/or Value
Record Type	1 byte	Value = 5
Test Sequence No.	1 byte	
Start Time	7 bytes	Absolute Time defined as follows: Year integer 0..9999 Day integer 0..366 Hour 1 byte 0..59 Minute 1 byte 0..59 Second 1 byte 0..59
Test Equipment Used	1 byte	
Test Equipment CLLI	16 bytes	ASCII Characters
Test Equipment Mem.	1 byte	0..1023
Trunk Group Size	2 bytes	unsigned int.
Trunk Tested	2 bytes	unsigned int.
Trunk Failed	2 bytes	unsigned int.
Trunk Skipped	2 bytes	unsigned int.
Trunk Removed	2 bytes	unsigned int.
Reference Trunk Used	1 byte	
dB and Freq. Level	5 bits	0 to -21
Noise Deviation	1 bit	true/false
Spare	2 bits	0 to 3

Variable Fields

These test results fields form the variable portion of the End Of Test Record. These fields are optional and vary depending on the dB frequency level and

noise option, results are defined in Figure 4-10, "End of Test Record Format," and are formatted as follows.

Table 4-16

Field	Size	Description and/or Value
Loss Results	16 bits	Level Frequency
		0 dB 1004 Hz LDC
		-16 dB 404 Hz LDC
		1004 Hz LDC
		2008 Hz LDC
		LDC = Loss Deviations Counter Noise Results
Noise Counter		True Yes False NO

Test Results Printed Report Format

Following is the format of the ATT Report.

```
A U T O M A T I C T R U N K T E S T I N G R E P O R T
Owner Name: <xxxxxxxxxxx> <test performed>            Page:nnn
Trunk Group Name:xxxxxxxxxxxxxxxx Date:yy/mm/dd  Time:hh:mm
_____________________________________________________________
Trk.Loss @mmdB Q1=nn Q2=nn C=bbbbbb Return Loss Test
MEM. @404hz @1004hz @2008hz Noise ERL SRLO SRHI Result
Qlimits @1004hz Q1=nn Q2=nn
Qlimits @2008hz Q1=nn Q2=nn
nnnn EML=nn.n NML=nn NIAL=nn                          aaaa
      Far-Near sn.nq sn.nq sn.nq nnq nn.n nn.n nn.n
      Near-Far sn.nq sn.nq sn.nq nnq nn.n nn.n nn.n
      SelfCheck aa aa aa aa aa aa aa

nnnn EML=nn.n NML=nn NIAL=nn                          aaaa
       Far-Near sn.nq sn.nq sn.nq nnq nn.n nn.n nn.n
       Near-Far sn.nq sn.nq sn.nq nnq nn.n nn.n nn.n
       SelfCheck aa aa aa aa aa aa aa
_____________________________________________________________

Notes:
_____________________________________________________________
____
```

Note 1: If a n.n field is an overflow it is shown as 9.9.

Note 2: There are up to three lines of test results per trunk member, depending on the type of test and the results expected.

Note 3: Some fields are not always applicable depending on the test being run, such fields are either left blank, or the format is modified and the fields are not included.

Note 4: In the case of operational or transmission test failure the reason for the failure will be output.

Table 4-17 Legend of symbols used in above report

xxxx	optional text
mm	dB level used (-16 or 0)
bbbb	noise type (c-Notch or C-message)
a	alphanumeric
n	numeric
s	optional - sign
q	Q-limit exceeded flag, ? for Q1, * for Q2

Figure 4-1 Sample Block Format

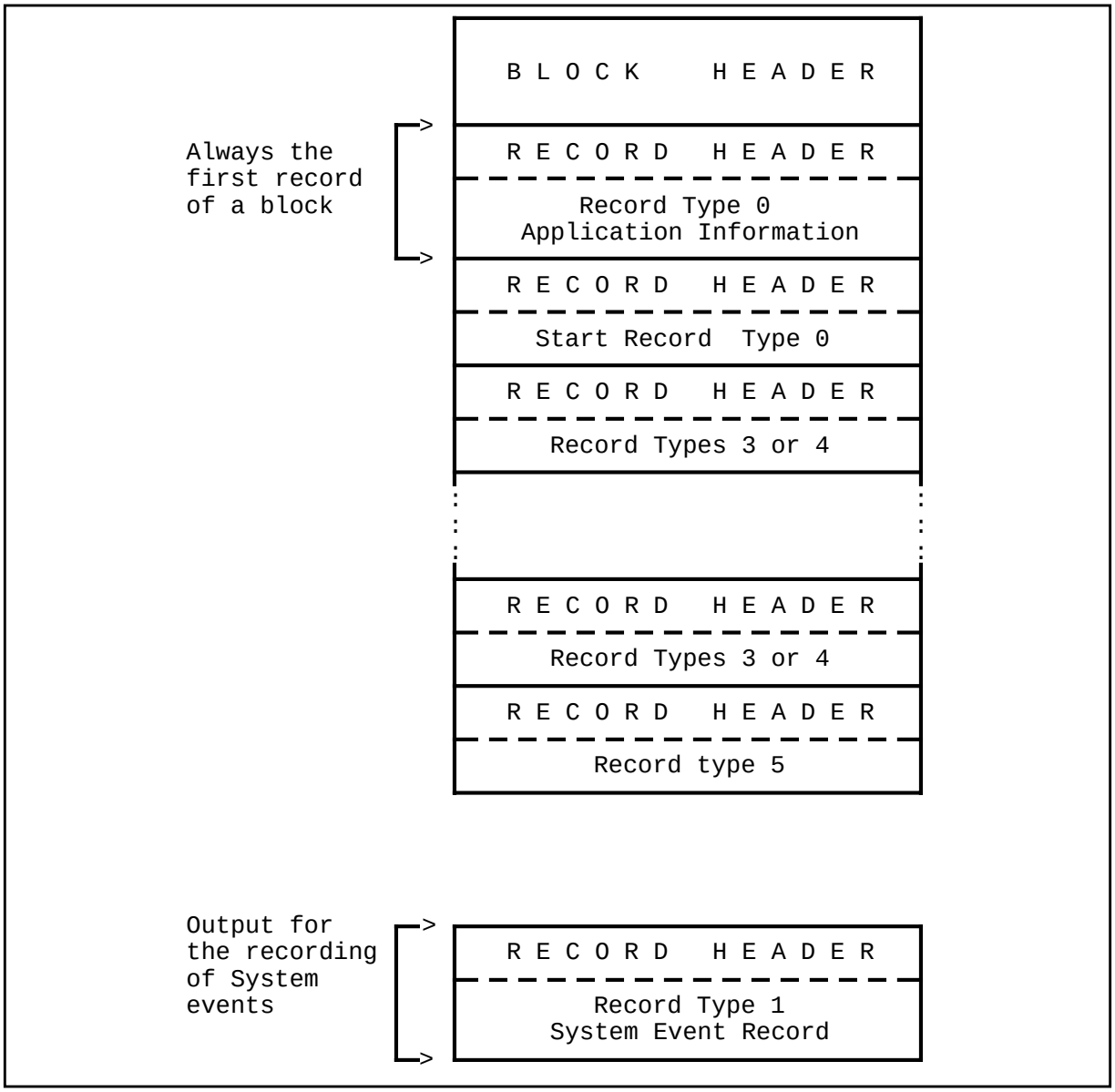
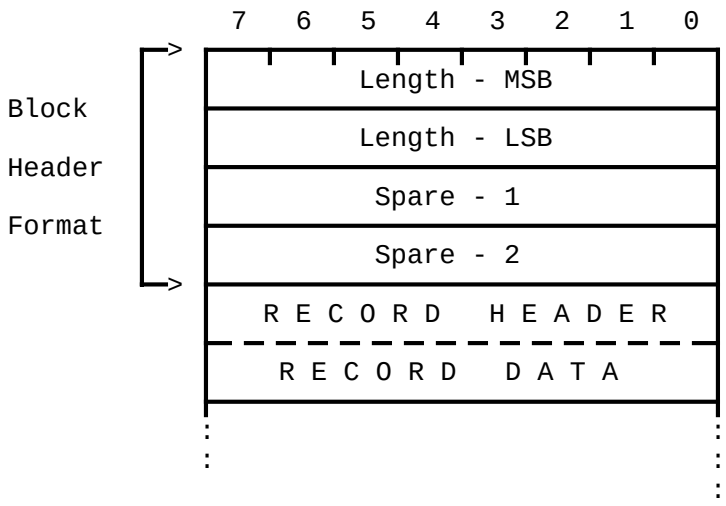
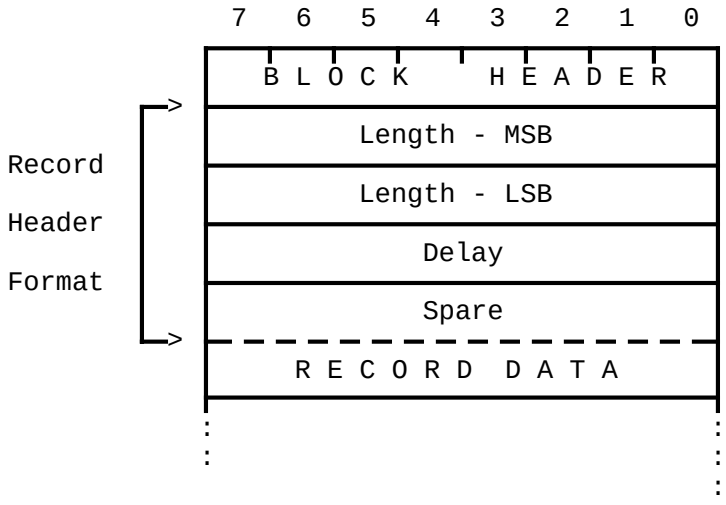


Figure 4-2 Block Header Format



Note: See text for field descriptions.

Figure 4-3 Record Header Format



Note: See text for field descriptions

Figure 4-4 Block Information Record Format

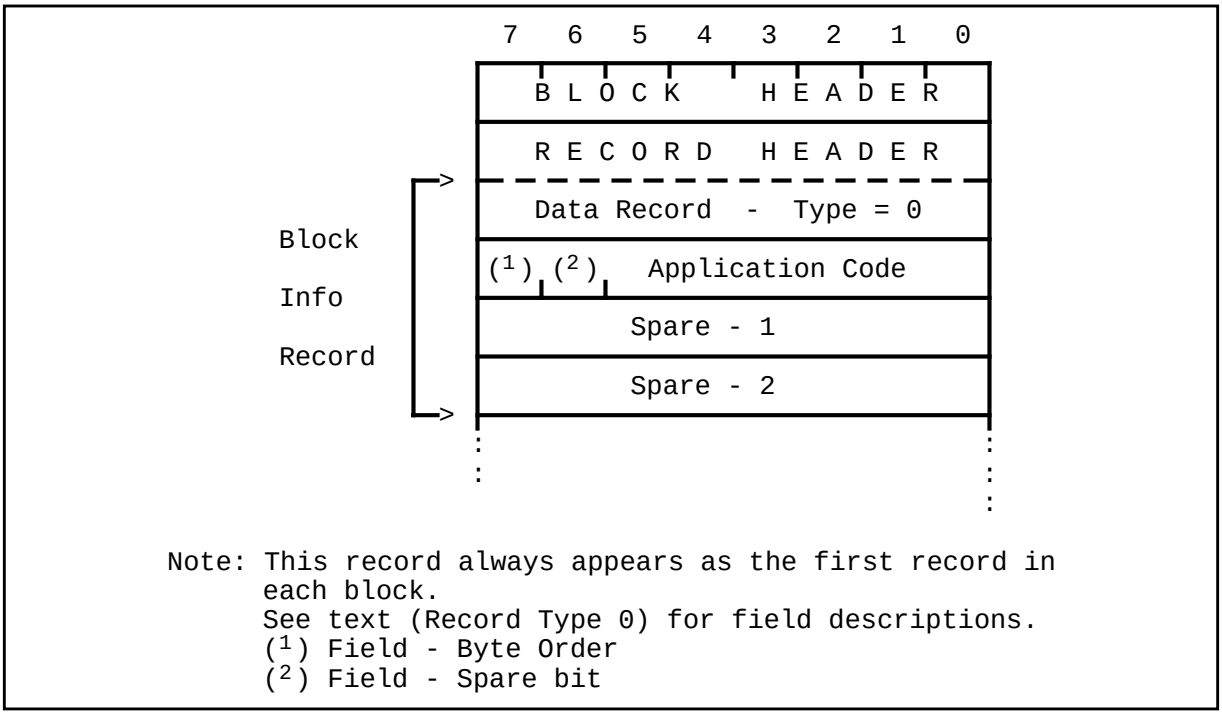


Figure 4-5 System Event Record Format

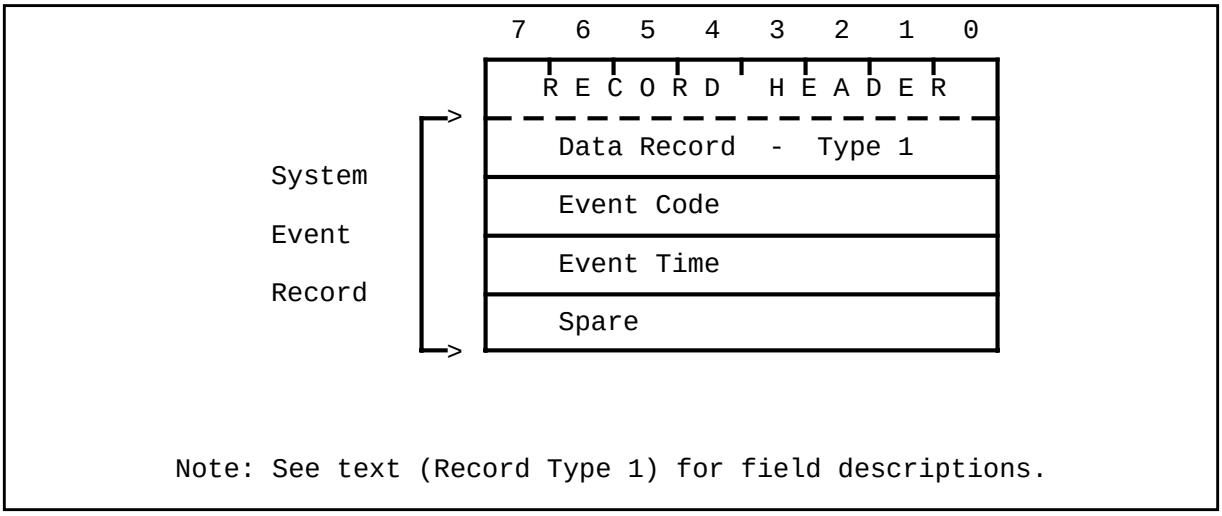
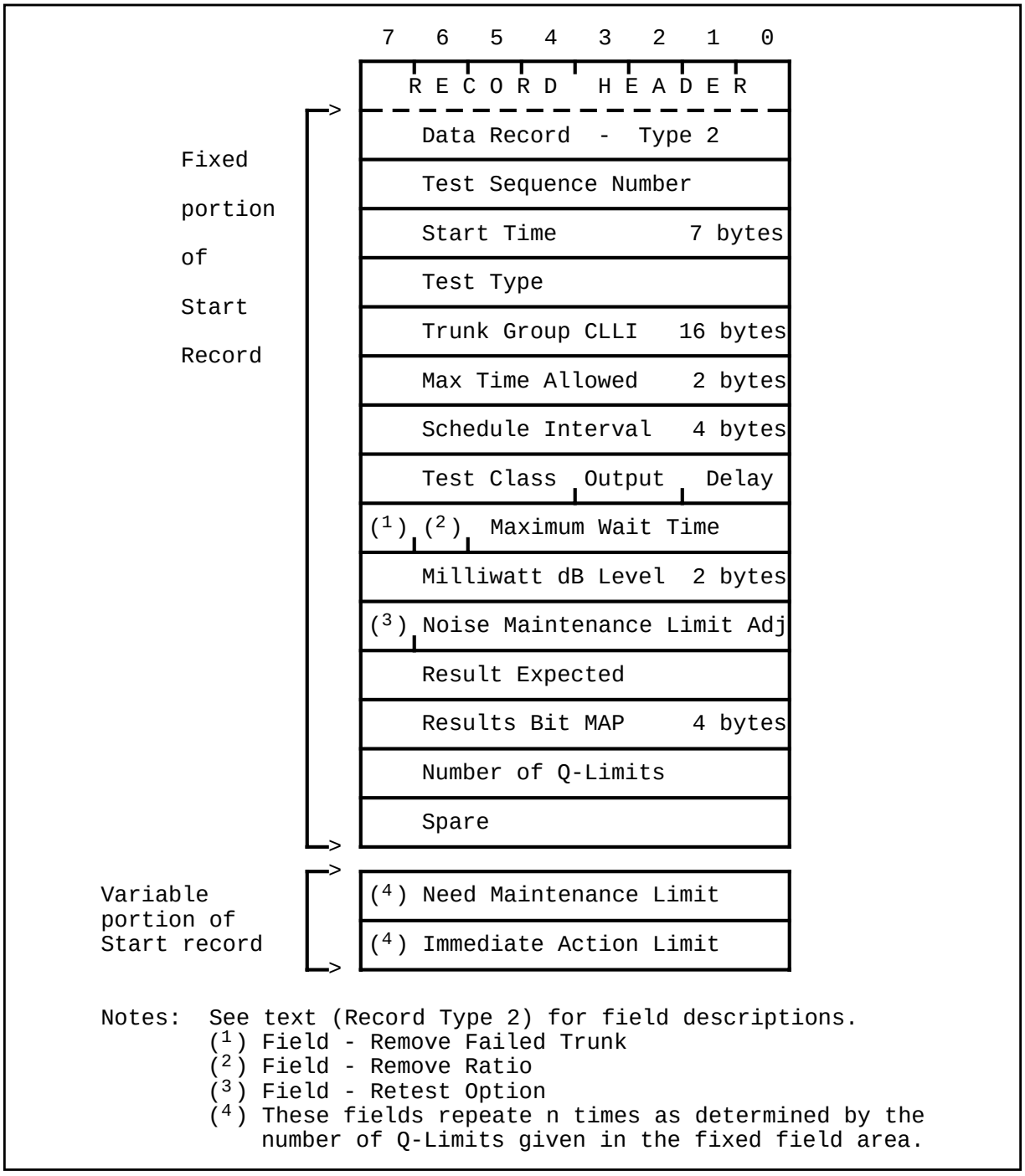


Figure 4-6 Start Record Format



Notes: See text (Record Type 2) for field descriptions.
(1) Field - Remove Failed Trunk
(2) Field - Remove Ratio
(3) Field - Retest Option
(4) These fields repeate n times as determined by the number of Q-Limits given in the fixed field area.

Figure 4-7 Scheduling Interval Mapping

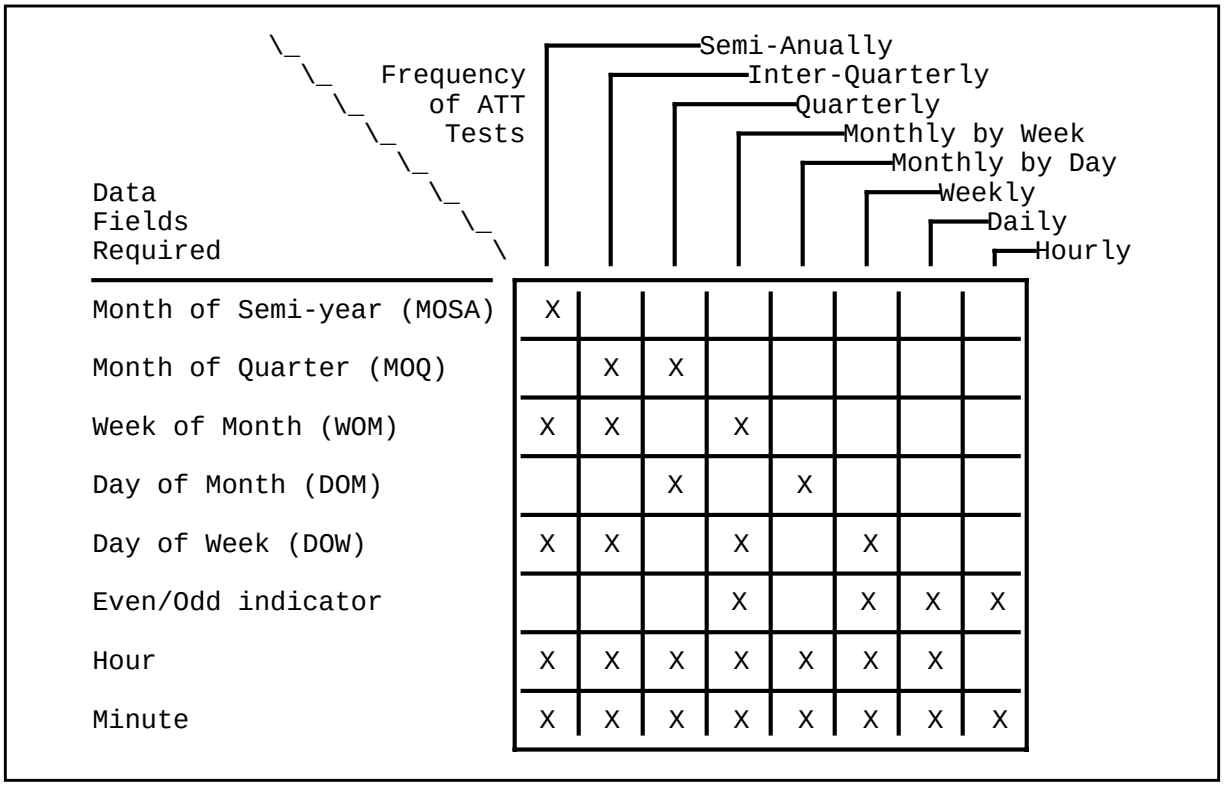


Figure 4-8 Information Record Format

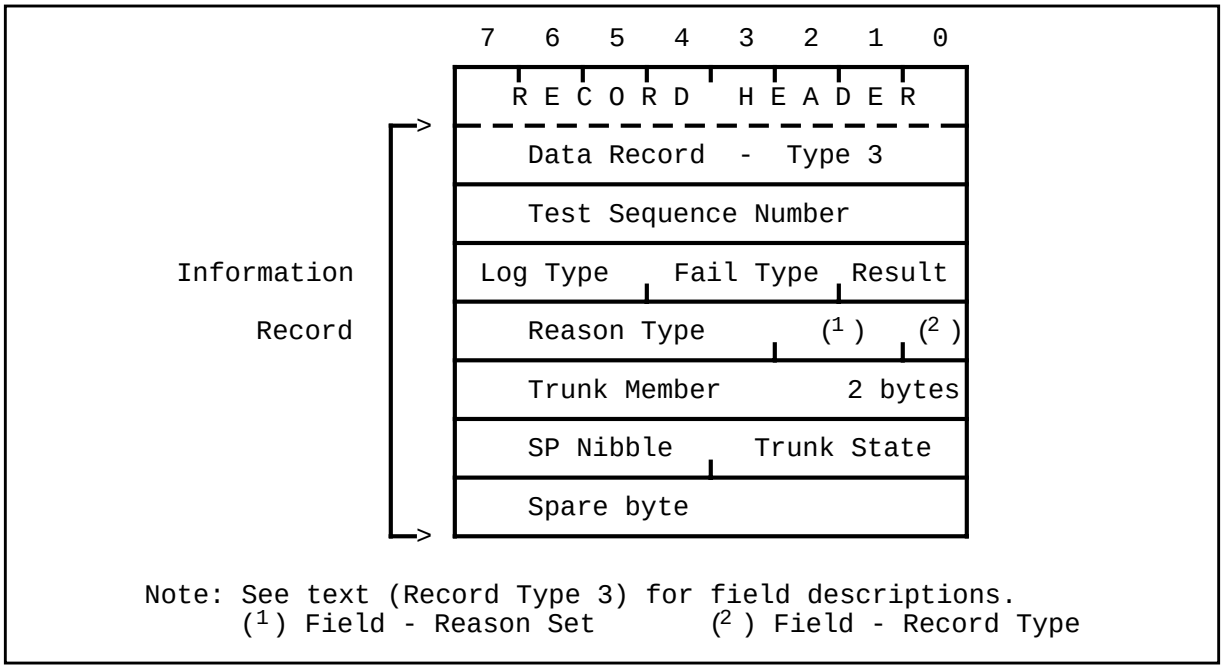


Figure 4-9 Transmission Test Results Record Format

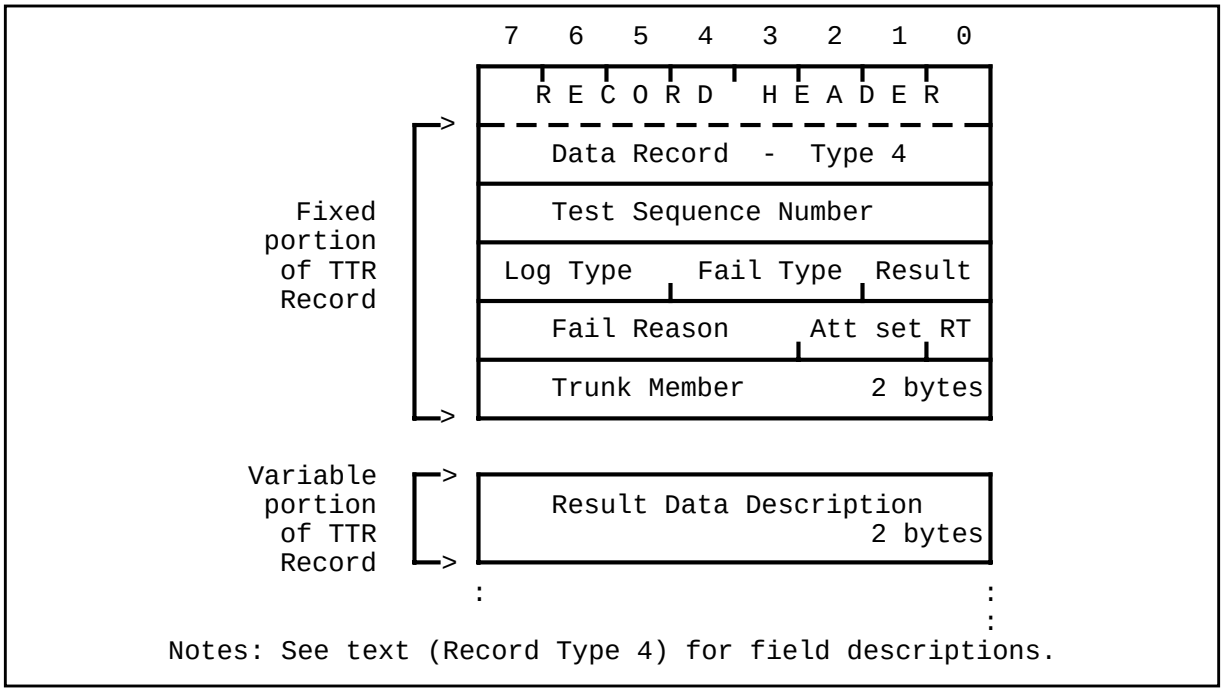
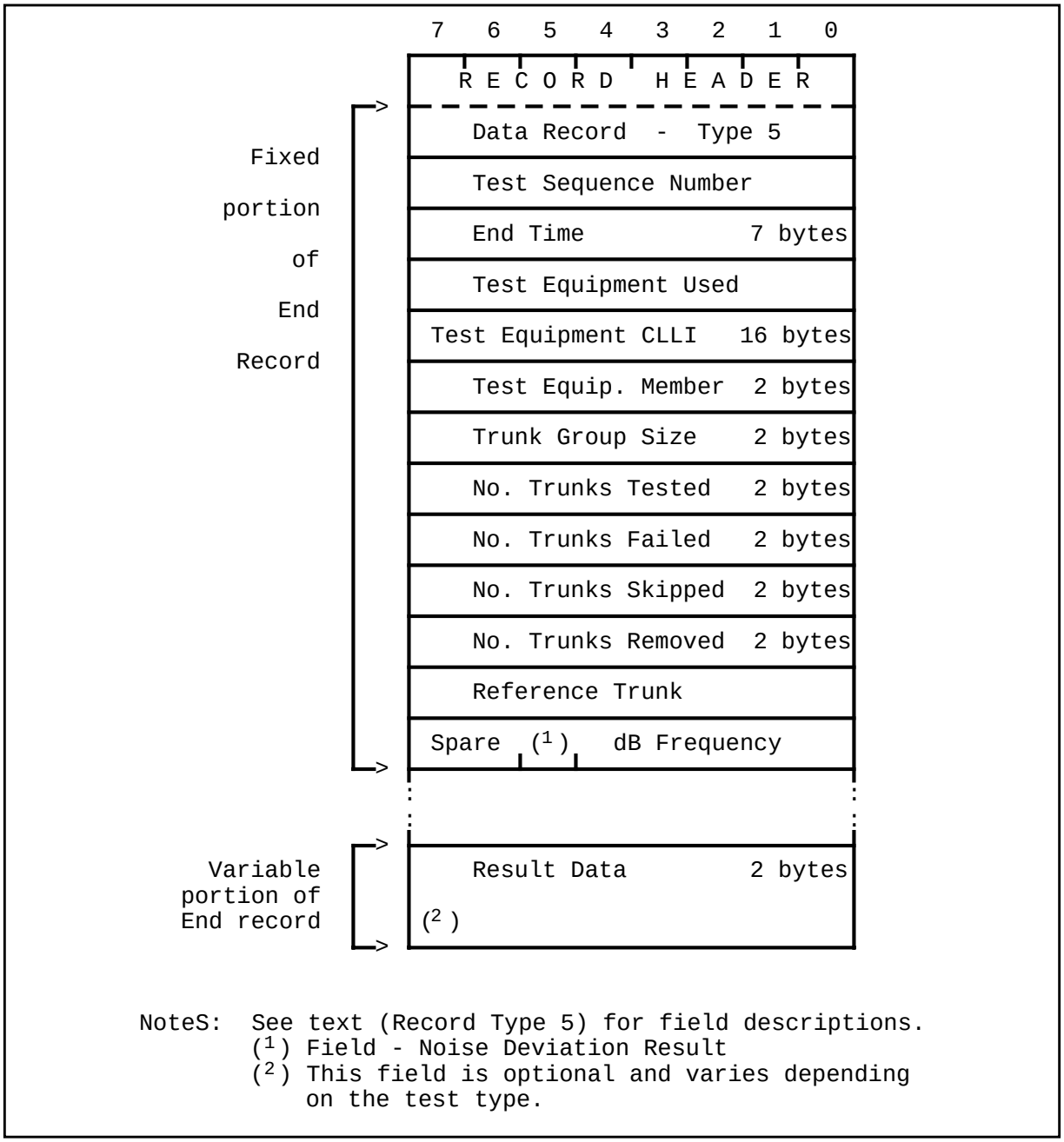


Figure 4-10 End of Test Record Format



NoteS: See text (Record Type 5) for field descriptions.
(1) Field - Noise Deviation Result
(2) This field is optional and varies depending on the test type.

5 Digital Test Access(DTA)

Description

The Digital Test Access (DTA) feature is applicable to a DMS-300 office using PCM30 digital links in a digital network environment. This feature allows digital trunks on PCM30 links to be tested with digital test equipment.

DTA provides the following:

- digital jack-ended trunks for digital test equipment
- an enhanced JACK command at the MAP that provides a DMS network connection between the trunk under test and the digital jack-ended trunk, as well as supporting the existing analog jack trunks

DTA provides a single mode of operation, known as the Connection Mode of Digital Test Access. In the Connection Mode, separate transmit and receive paths are provided at the digital jack-ended trunk.

The feature also provides bit transparency between the trunk under test and the test equipment. To ensure this bit transparency, no network attenuators are inserted in the network connection. DS0 LINE CARD

DTA is provided via digital jack-ended trunks, located at the MAP, that are connected to PCM30 digital trunk controllers (PDTC) by digital links that terminate on the DS0 line card, NT6X55BA.

DTA provides the provision of maintenance software in the central control (CC) and the PDTC to support the DS0 line card and DS0 links in PDTCs. It also provides the same maintenance functionality for DS0 line cards and links in PDTCs as currently exists for DS0 in digital trunk controllers (DTC).

Datafill

The DTA feature requires datafill of a DS0 link for each digital jack-ended trunk. The following restrictions are imposed by software:

- PDTCs must be provisioned with NT6X55BA to support DS0 links
- DS0 links cannot be used as REMOTE, TIMING or PROTLINE links

When datafilling a DS0 link on a PDTC, the following steps are required:

- 1. Datafill the PDTC in the inventory table (table LTCINV)
- 2. Datafill a tuple to specify the DS0 link characteristics in the carrier maintenance table (table CARRMTC) under PDTC.
- 3. Datafill the link in the P-Side inventory table (table LTCPSINV) using the carrier template name in the CARRMTC table and the P-Side link type DS0.

Analog jack-ended trunks are datafilled in tables TRKGRP, TRKSGRP, and TRKMEM under the trunk group specified by CLLI 'JACK'. The datafill for analog jack trunks in trunk subgroup zero of table TRKSGRP is automatically produced by table control software from the trunk group data in table TRKGRP. Each trunk group can have up to two sub-groups associated with it. Therefore, the new digital jack trunks required by the DTA feature are datafilled under the existing trunk group 'JACK' in subgroup one while retaining the analog jack trunks in sub-group zero.

Note: For further information on datafilling tables LTCINV, CARRMTC, LTCPSINV, TRKGRP, TRKSGRP, and TRKMEM refer to Common Customer Data Schema. DS0 CARRIER MAINTENANCE

DS0 carrier maintenance is performed at the CARRIER level of the MAP. The following commands are used with DS0 links:

- Quit
- Tst
- Bsy
- RTS
- OffL
- DispOpt
- Disp
- Next
- Detail

The following commands are also supported for DS0 links:

- Post
- Loop

Post

The post command with the DS0LNK option, allows all DS0 links to be posted.

Loop

One of the main features of the DS0 line card is its ability to handle network requested remote loops. To enable this function, the carrier for the line requested remote loops must first by busied and enabled. Enabling the carrier for the line requested remote loops is referred to as Enabling RLB. Enabling RLB does not set up a loop, but conditions the DS0 interface card to accept loop requests from the network.

The DS0 card supports options to loop the carrier towards the DMS network, a local loop, and away from the DMS network, a remote loop. Remote loops are either requested from the MAP, or by special control codes received on the network. The MAP may also be used to clear loops.

The Loop command options and their abbreviations are as follows:

- Local Loop (LOCAL/L)
- Remote Loop (REMOTE/R)
- Enable RLB (ENARLB/E)
- Disable RLB (DISRLB/D)
- Clear Loop (CLEAR/C)

Digital Jack Trunk Description

The trunk on a DS0 link is maintained from the TTP level of the MAP. Commands for DS0 trunks include:

- Post
- RTS
- Bsy
- Seize
- CktLoc
- Next
- Hold
- Rls
- Level

The TST option only supports diagnostic testing of the DS0 line card.

Enhanced Jack Command

The JACK command at the MANUAL level of the TTP MAP level is enhanced to support the requirements of DTA.

The trunk to be tested is first posted and placed in the control position. The status of this trunk is monitored and a decision is made whether to continue with the test. If the trunk under test is call processing busy, either a force release command (FRLS) or a busy command (BSY) places the trunk in a busy pending state. When the trunk is released, the system places the trunk in the busy state and the test is then continued.

The JACK command and a specified jack trunk with external test equipment to be used for the test are entered at the MAP.

Before a network connection is made, the DMS requests confirmation. A network connection between the trunk under test and the selected jack trunk indicates successful execution of the JACK command. Once a connection is made, the trunk is placed in the siezed state (SZD) to avoid intereference from call processing.

The release command (RLS) releases the trunk under test.

In the case of a severe failure, a power failure on the DS0 card for example, the system clears the network connection.

In the event of a warm restart, connections already made remain connected. However, all connections are cleared for cold restarts.

Note 1: For further information on the JACK command, refer to Trunks Maintenance Guide.

Note 2: For further information on CARRIER and TTP commands, refer to Trunks Maintenance Guide.

Abbreviations

ATT
Automatic Trunk Testing

CC
Central Control

CLLI
Common Language Location Identifier

DIRP
Device Independent Recording Package

DMS
Digital Multiplex System

DTA
Digital Test Access

IMTST
Immediate Test

MAP
Maintenance and Administration Position

MMI
Man-Machine Interface (replaced by User Interface)

MTM
Maintenance Trunk Module

NOS
Network Operations System

PCM
Pulse Code Modulation

PDTC
PCM30 Digital Trunk Controller

POP
Performance Oriented Practice

RLB
Remote Loopback

TNOS
Telephone Operating Company NOS

TTP
Trunk Test Position

TTR
Trunk Testing Results (Automatic)

TTRF
TTR File

TTRR
TTR Report

TTT
Transmission Test Trunk

TTU
Transmission Test Unit

UI
User Interface (replaces Man-Machine Interface)

VB
Variable Blocked

VDU
Visual Display Unit

DMS-100 Family

Automatic Trunk Description

Maintenance Guide

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