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Standard

NETWORK OPERATIONS SYSTEM

BUSINESS NETWORK MANAGEMENT

DNC*-500 END-USER AND DNC*-100: FEATURES DESCRIPTION

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* DNC is a trademark of Northern Telecom.

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1. INTRODUCTION

1.01 The business network management (BNM) product is a software feature package designed to collect information from switching equipment. This information is processed, by the Dynamic Network Control systems DNC-500, DNC-100, and DNC-50, to produce reports, and for the operating companies (and their customers) to make limited administrative changes to their networks.

1.02 This Northern Telecom practice (NTP) describes the features available for the BNM product, using the DNC-100 system operating with the software release NSR28, or as an end user of a DNC-500 using the software release NSR28.

Structure Of This Publication

1.03 This publication is divided into the following chapters:

Introduction: Is an introduction to this publication, it introduces BNM, and identifies the applicability of this publication.

Business Network Management: Is an overview of BNM. It also introduces the DNC-100 system used by the BNM product.

DNC Configuration For BNM: Describes the DNC-100 and the vitual DNC-500, how data is collected, and how BNM prepares the data for processing.

BNM Features: Is an overview of the features provided by BNM for use on the DNC-100 system, or as a virtual DNC-100 user.

ATT and KT Report Formats: Describes the fields in the various ATT and KT reports.

OM Report Formats: Describes the fields in the various OM reports.

BNM User Interface: Describes how the user can access the BNM features.

Abbreviations: Is a list of abbreviations used in this publication.

CHANGE HISTORY

1.04 This section lists the important changes that affect this publication. They are arranged by network software releases (NSR) in a descending order starting with the current release.

NSR28

1.05 The changes introduced by NSR28 are:

- a new feature to monitor the DNC disk and processor performance
- the introduction of support for the collection of SMDR information from other vendor switches
- an enhancement to the SMDR spooling feature to use SDM, and to support 32 simultaneous SMDR spooling ports
- an enhancement to the SMDR data collection to allow multiple collection from one DMS node
- network monitoring and analysis is not available for NSR28. The section on this feature was removed

NSR27

1.06 The changes introduced by NSR27 are:

- an increase of the SMDR storage collection up to 4M records per day
- the addition of two new reports and modifications to the IBN attendant subgroup reports
- an enhancement to existing BNM software to allow a DNC-100 to communicate with multiple DNC-500s

1.07 Commencing with NSR27, this publication was revised to divide the chapter on report formats into two chapters called ATT and KT report formats, and OM report formats.

NSR26

1.08 The changes introduced by NSR26 are:

- an enhancement to existing BNM software to allow SMDR data to be serially spooled for all nodes of a customer
- an enhancement to the existing DNC-100 BNM Tables feature to provide the ability to add, delete, and change data in the tables
- an enhancement to existing BNM software to allow DNC-100 users to use Table Merging
- introduction of the Network Monitoring and Anaysis feature
- deletion of the Links feature

Note: The following three features are available to a DNC-100 only through the remote application access feature.

- ability to change NCOS number for incoming trunk groups
- ability to display and make changes to the names of routes in the route plan
- Station Administration Enhancements (details in appendix 1 to 450-1021-102) which include:

  MADN support to 16 members of a group

  add-on units (20 and 36)

  upload of local DMS changes

1.09 This publication has been revised to also include a separate chapter for report formats, and an abbreviation list.

2. BUSINESS NETWORK MANAGEMENT

What BNM Does

2.01 BNM enables telephone operating companies using DMS-100 family of digital switches (DMS nodes) to reduce overall costs and offer better and faster information services to their MDC customers. MDC and other centrex customers need information about the calls made on their virtual private networks. Such information is essential for internal accounting and administration of communication resources. DMS nodes accumulate data and store it on hard disks as MDC features are used. The operating company normally must collect this data from each node in a network and then process it to produce tapes and printed reports to send to its customers. With a BNM system, the operating company's DNC-500 collects and processes the data and sends it on to customers.

2.02 BNM gathers data from DMS nodes and produces a variety of useful reports. The reports enable operating companies and customers to detect and locate problems quickly and to administer their virtual private networks efficiently and securely. The types of data collected and processed by BNM include:

Station Message Detail Records (SMDR)	SMDR data identifies calling and called parties over a given time period. It is useful for calling pattern analysis and cost allocation.
Automatic Trunk Tests (ATTs)	ATTs are scheduled, routine tests of trunks' transmission and signaling performance.
Killer Trunks (KTs)	KT data identifies trunks with “killer” properties -- repeated connections and low holding times. It also identifies slow-release, always-busy, and always-idle trunks.
Operational Measurements (OMs)	OMs are load and performance data for the DMS node and its peripheral modules. OM data is collected, stored, and output according to parameters defined by operating company administrators. This data is in two forms: • event counts (also called peg counts); registers are incremented every time an event occurs • usage counts; registers are incremented every time a change of state is detected on a piece of equipment

Advantages of BNM

2.03 BNM has several advantages over piecemeal data collection and custom processing systems. These advantages include:

- central, near real-time collection and processing of feature data collected from all relevant MDC nodes
- central report printing and call detail tape generation facilities
- central call tracking for planning and maintenance
- near real-time access to a wide range of MDC feature data
- the ability, through attached DNC-100s or virtual DNC-100's, to give customers* direct access to and responsibility for their own MDC reports and call detail information
- reduced tape and paper handling by operating companies and their customers
- Station administration. Station administration has been considered as a complete feature, and is described in the Appendix to this publication.

The BNM Components

2.04 The major components of a BNM system are the following applications. The DNC systems come in three forms: DNC-500, DNC-100, and DNC-50. The three systems differ only in their size and application. They are described in 450-1011-100. Their individual arrangements for the BNM applications are described in 450-1021-151, 450-1021-152, and 450-1021-153.

2.05 A basic BNM system consists of one DNC-500, located on the telco's premises. A DNC-500 is a multi-tasking communications device that collects feature data as it is generated by DMS nodes. The DNC-500 identifies the data collected and partitions the files by customer.

2.06 At pre-determined intervals, or on-demand, the operating company can obtain printed reports and/or SMDR data on behalf of one or more of the MDC customers on the nodes served by the DNC-500. The reports and/or data can then be sent to the customers by regular channels. SMDR files in ASCII format also can be spooled directly to a customer's printer or computer, or output to a 9-track tape.

2.07 For larger customers, up to four DNC-100s may be connected to the DNC-500. In this case, the DNC-500 still collects the data from the nodes; however, instead of generating reports and/or SMDR tapes, it sends the relevant data partitions to each customer-dedicated DNC-100.

* In this publication, the terms customer and MDC customer are used to mean customers of the operating company.

2.08 A DNC-100 has the same hardware and base software as a DNC-500, but it is programmed in BNM to be dedicated to a single MDC customer. A DNC-100 may be located on customer premises, or on operating company premises. The DNC-100 collects customer-specific data from the DNC-500, and analyzes this data. It generates reports and SMDR tapes for the customer.

Feature Packaging

2.09 Northern Telecom packages BNM features to allow customers to select only those capabilities that they require. The BNM features are packaged to allow customers the functionality they desire to meet their needs in such areas as data collection, station administration, and network administration.

3. DNC CONFIGURATION AND FUNCTION

3.01 The BNM application is resident on one of three DNC installations, dependant on the requirements of the telcos and their customers. The DNC equipment, consisting of shared resource units (SRUs), are housed in in cabinets to form a self-contained unit. The configuration of these SRUs determine whether the equipment is designated DNC-500, DNC-100, or DNC-50.

DNC-500

3.02 A basic BNM system (Fig. 3-1) consists of a DNC-500 on operating company premises that collects data from one or more DMS nodes. One or more terminals and printers are connected to the DNC-500. The DNC-500 processes the data it collects and can produce tapes and printed reports. The tapes and reports can then be sent to customers through manual distribution channels. For details of station administration as it applies to the DNC-100, refer to the appendix to this publication. For details on the DNC-500 system configuration, refer to 450-1021-101.

DNC-100

3.03 Large customers may have DNC-100s dedicated to their use (Fig. 3-2). In this case, the DNC-500 still collects data from switch nodes, but the nodes may consist of three categories of nodes, DMS-100s, switches other than DMS-100, and private branch exchanges (PBXs). However instead of processing the data and generating tapes and printed reports, the DNC-500 sorts the data by customer and sends customer-specific data to each DNC-100. Each DNC-100 then can produce reports and tapes for that customer. The DNC-500 can still generate reports and SMDR tapes for other customers who are not served by a DNC-100.

DNC-50

3.04 The DNC-50 used for BNM is known as the station detail server, it is a DNC-500 used only for producing reports from SMDR data, on customer's premises. For details on the DNC-50 system configuration, refer to 450-1021-103.

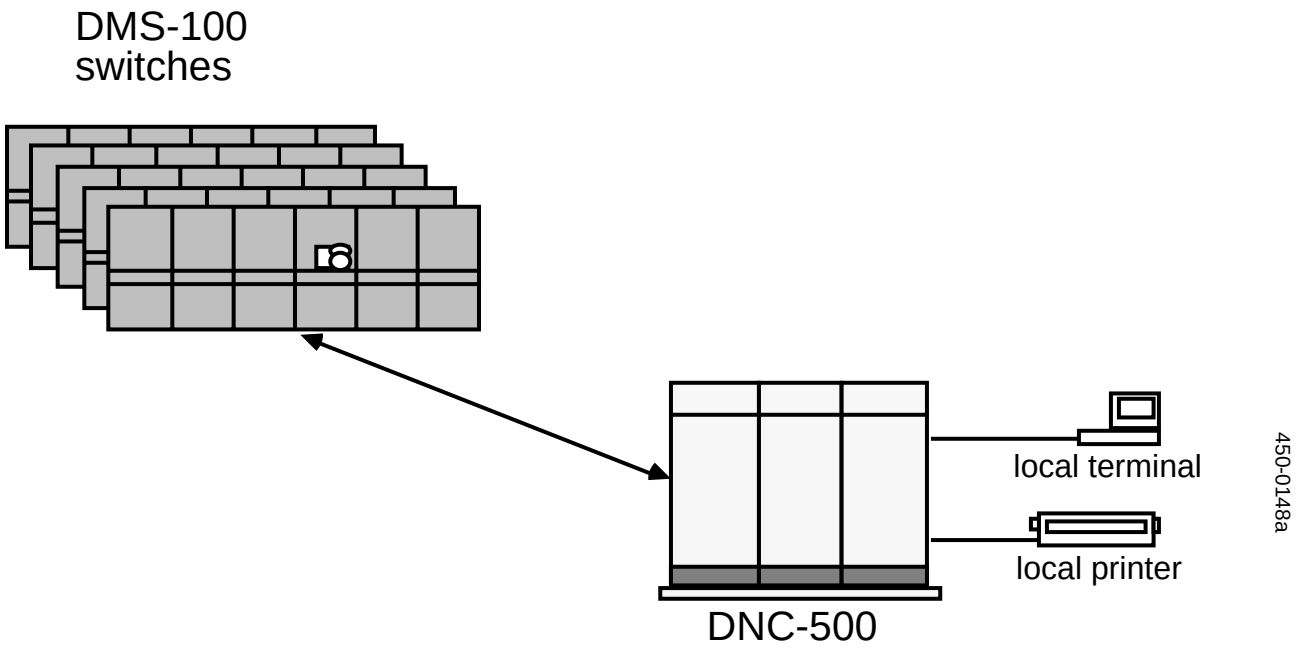


Fig. 3-1
A Basic BNM System

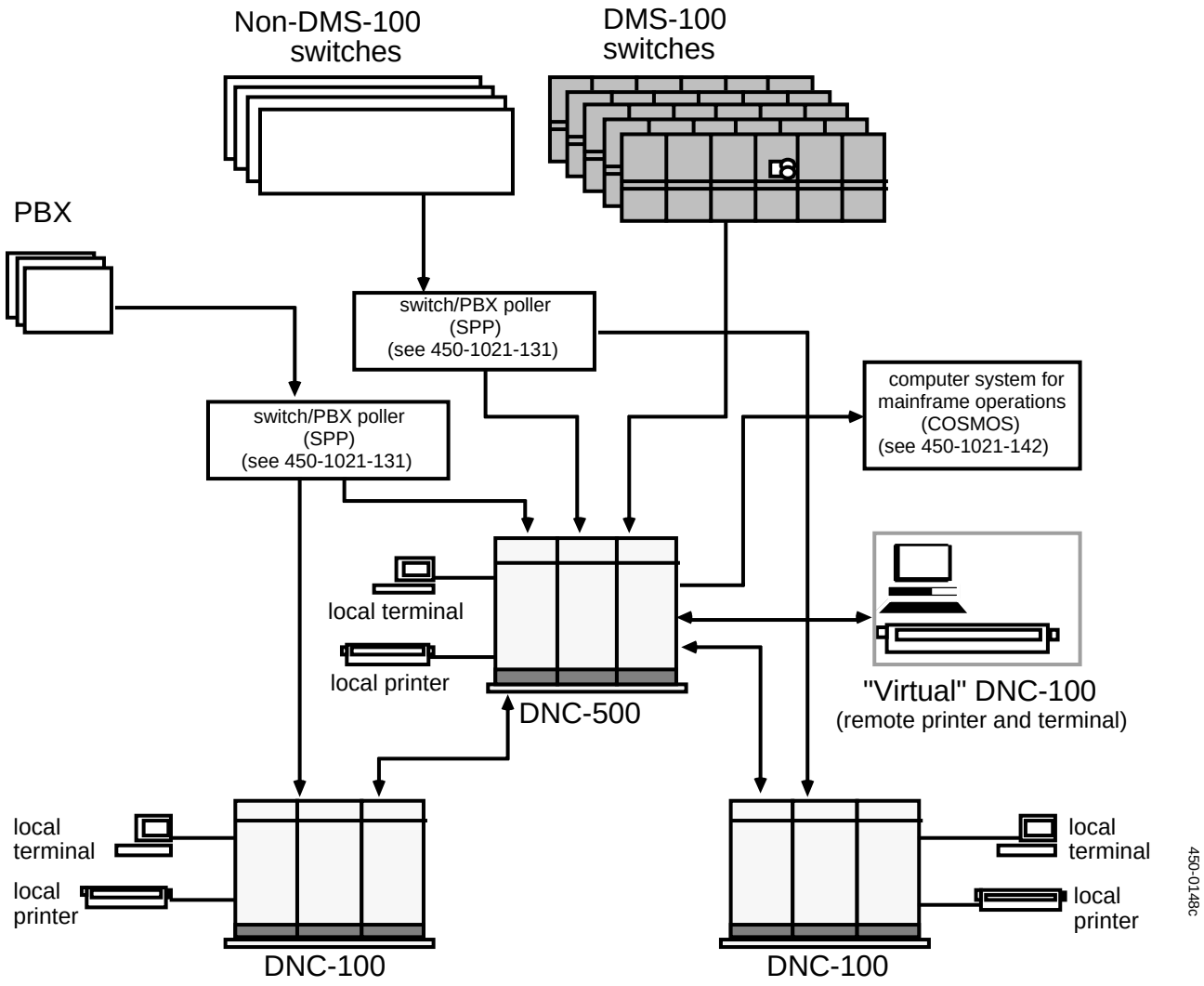


Fig. 3-2
A Large BNM System

Multi-customer Support

3.05 Multi-customer Support gives customers “virtual” DNC-100s when in fact the customers are using the operating company's DNC-500 (Fig. 3-2). The customers need only direct or dial-up links to the operating company's DNC-500 system and VT100-compatible terminals. They usually also have an additional link to the DNC-500 system for a printer or other device. These "remote" customers have access to their own data on the DNC-500 and can schedule jobs such as printing reports and spooling data.

3.06 Once properly set up and connected, a "remote" customer can sign on to the DNC-500 (using a user ID and password established by the operating company) and gain access to functions similar to those that a DNC-100 system would provide. The remote customer is presented with a limited version of the BNM main menu which contains the calls, network data files, and scheduling services options.

3.07 A virtual DNC-100 system has certain limitations for the customer compared to using an actual DNC-100 system:

- The customer does not have access to any of the administrative services (BNM or DNC base) of a real system. Thus, the operating company must set up and configure the customer's system, and make any changes such as adding users.
- A virtual DNC-100 on a DNC-500 system must share processing time and functions with other customers, and take second priority to the processing requirements of the operating company on that system. Thus, the capacity and performance of virtual DNC-100s is more limited than that of actual DNC-100s.

FUNCTIONS PERFORMED BY THE DNC-100

3.08 The DNC-100 performs a number of functions that are independent from the BNM application. These functions are described in the following paragraphs.

Data Transfer To A DNC-100

3.09 The DNC-100 displays nodes to the user; however, the data is collected from the DNC-500, not directly from the nodes. When data from one of these virtual nodes is being collected, only the records “owned” by the DNC-100 customer are actually sent to it.

3.10 The data collection modes available to a DNC-100 are continuous collection and demand transfer:

Continuous Collection Continuous collection (also known as real-time transfer) begins when a DNC-100 user or DNC-500 end-user makes a connection to a DNC-500 and requests that the DNC-500 begin transferring data. Only one data entry is shown to the customer. This entry covers all the data to which the customer has subscribed.

Demand Transfer Demand transfer is used when recovery of individual data files is required. This type of transfer is used for unusual circumstances, such as when data already received is accidently erased.

3.11 If a DNC-100 logs on to a DNC-500 and the DNC-500 is holding data that has not yet been sent to the DNC-100, the data is sent as soon as the DNC-100 starts continuous collection. The DNC-100 user does not have to do a manual recovery. This automatic recovery applies only to data collected by the DNC-500:

- within 24 hours, for ATT, KT, or OM data
- within 48 hours, for SMDR data

3.12 These recovery periods are adjustable by NT to suit customer requirements.

3.13 If data transfer to a DNC-100 is interrupted due to a faulty link, the DNC-100 recognizes the condition and tries to re-establish the connection. If unsuccessful, the system tries again after specified intervals, which are adjustable by NT to suit customer requirements. The system continues these automatic logon attempts until it brings the data link back up and re-establishes the connection, or until the message "A Communication Session has failed" is displayed. In the latter case, the user must re-establish the connection manually.

3.14 The DNC-100 user can recover files from the DNC-500 by logging on to the DNC-500 as a "Remote" DNC. The DNC-500 is listed in a terminal display along with other BNM systems to which the customer has access. The DNC-100 user can list file partitions stored on the DNC-500 (only partitions for that customer are listed) and use the feature data to create reports or SMDR tapes.

Feature Data Storage On DNC

3.15 The user can list the files stored on the DNC's internal holding disk. The files are shown in the form of partitions for each type of feature data and node. With each partition is shown its status, one of unformatted, formatted, or tape dumped. While inspecting the list of files, the user can select a partition to dump to tape, or print, or delete.

3.16 The user can select a partition and

- ***Dump to Tape:*** causes the selected partition to be formatted and dumped to tape immediately. Applies to SMDR only. The tape contains the results only for this partition.
- ***Report:*** causes the selected partition to be formatted and printed immediately. Does not apply to SMDR. The report contains the results only for this partition.

- ***Delete:*** causes the partition to be deleted from the list of file partitions.

Remote DNCs Access

3.17 REMOTES is a facility used by a DNC to:

- log onto a DNC-500 to recover files that have been collected and sent, but are required again for some reason.
- log onto another DNC-100 owned by the same customer to access its feature data. The data can be used to generate reports or tapes from data for the entire customer network of DNC-100s.
- log on to a DNC-500 for access to DNC-500 features, such as station administration, or MAP passthrough

3.18 This feature is for DNC-to DNC application access. Any DNC with this feature can log onto another DNC that also has this feature.

3.19 When a DNC user selects REMOTES, accessible remote DNCs are shown in a list. The systems are identified by operating company or customer name.

3.20 The user can select the remote DNC to be accessed, then log on to the remote DNC and list the data. Partitions are listed in the same format as for internal data. The status of each partition is "unsent" or "sent".

3.21 To access and collect the data from the remote, the DNC-100 first logs on to the virtual node (which is, in reality, the DNC-500) from which the data was collected. The DNC-100 can then access remote DNCs and use facilities to retrieve files by partition.

DNC PERFORMANCE MONITORING

3.22 The DNC performance monitoring feature provides the DNC user with information on the efficiency of disk and processor usage. The user is able to display the information using softkeys or typing commands on the keyboard of a terminal.

3.23 The feature consists of two programs: disk monitoring, and processor monitoring. Both programs are accessed from the DNC main menu under the option DNC services.

Disk Monitoring

3.24 The disk monitoring program provides the following information for each of the selected servers:

(a) the name of the server being monitored

(b) the total volume size in blocks of 1K bytes

(c) the number and percentage of blocks currently in use

(d) the number and percentage of blocks in use after the audit

(e) the date and time of the last audit

(f) the percentage and time of the last peak disk usage

(g) the time interval between disk updates

(h) the total number of files on the volume

3.25 Information on the menu items and screens available for the disk monitoring program can be found in 450-1021-311.

Processor Monitoring

3.26 The processor monitoring program provides the following information for each of the selected processors:

(a) a sequencing number that is used to sequence the processors being monitored

(b) the location of the processor being monitored

(c) the time interval between processor information updates

(d) the percentage of time the processor was busy during the last interval

(e) the amount of memory currently available

(f) the peak percentage of time the processor was busy

(g) the date and time of the peak processor usage

3.27 Information on the menu items and screens available for the processor monitoring program can be found in 450-1021-311.

4. BNM FEATURES

DATA COLLECTION

4.01 The main function of the BNM application is to collect data from nodes (DMS-100, non-DMS-100, and PBXs). Each BNM system collects one or more of the following types of data, depending on the owner's requirements:

(a) Station message detail recording (SMDR) data from all types of nodes

(b) Automatic trunk testing (ATT) data from DMS-100 nodes

(c) Killer trunk (KT) data from DMS-100 nodes

(d) Data on one or more types of Operational Measurements (OMs) from DMS-100 nodes:

- trunks (TRK)
- virtual facility groups (VFG)
- individual business network groups, feature activation, and usage (IBN)
- IBN subgroups, attendant-related measurements (IBNSG)
- subscriber line usage (SLU)
- call park measurements (PRK)

(e) Station administration (refer to Appendix 1 to 450-1021-102 for all details of station administration for the DNC-100).

4.02 Once SMDR data has been collected, it can be written to a tape (see *Tape Generation*), spooled to another location (see *Data Spooling),* and used to track calls (see *Call Tracking*). The other types of data can be used to create printed reports (see *Reports*).

SMDR Data

4.03 Station message detail recording (SMDR) is the Meridian Digital Centrex (MDC) feature that generates and collects information on telephone calls made by end users. SMDR records help MDC customers to control and allocate their communications costs because the individuals or departments that incur the costs are clearly identified. SMDR records can also be used to trace calls as part of call tracking.

4.04 Each node generates SMDR records for calls within the node, including the following types of network calls (internode and local node) and off-network calls:

- local (dial “9”)
- 411
- 555-1212
- dial “0”
- DDD
- IDDD
- Outwats
- Inwats
- 911

4.05 In general, calls made from the following facilities in an MDC system generate SMDR records:

- stations co-located with nodes,
- attendant consoles
- PBX/MDC access trunks
- internodal tie trunks
- virtual facility groups

4.06 Data collected from a non-DMS node or a PBX is converted into the DMS node format by a switch/PBX poller (see 450-1021-131), then input into the DNC-500. The DNC-500 processes this converted data in the same way that it processes data from a DMS node.

4.07 SMDR data is normally transferred from a node to a DNC-500, and from a DNC-500 to a DNC-100 or an end user, in continuous mode. When required, demand transfers can also be used.

ATT Data

4.08 The automatic trunk test (ATT) feature provides data collection for the results of MDC trunk testing operations. ATT on MDC is used for the automatic testing of outgoing trunks and the outgoing portions of 2-way trunks and associated facilities. Tests provided include:

- ***Functional tests*** using test lines to test trunks for proper signaling and required transmission quality
- ***Diagnostic tests*** to verify the operation of trunk hardware such as trunk cards

- ***bit error rate tests (BERT)*** to check the efficiency of trunk usage against set error rates.

4.09 If a customer wants its trunk groups tested, it requests the tests from the operating company. The operating company can then schedule the tests so as not to interfere with other traffic.

4.10 The MDC network performs the tests during nonbusy hours, and stores the results in data files. These data files are stored on the MDC holding disk. The DNC-500 normally obtains the ATT data by polling. A polling job is scheduled by a DNC-500 user to take place after all the night's ATT testing is done, but before busy hours start. The DNC-500 polls the node, receives the data, and stores the data on its own hard disk. The records are sorted into separate files for each customer, node, and date of polling. The DNC-500 sends the DNC-100 the appropriate ATT data partition.

4.11 At the DNC-100, the user datafills the ATT report printing schedule.

KT Data

4.12 A Meridian Digital Centrex network can arrange trunks to test for

- trunks with repeated seizures and low holding times (killer trunks)
- trunks with low attempt rates and high holding times (slow-release trunks)
- trunks that are always busy and have no seizure attempts (always-busy trunks)
- trunks that are always idle and have no seizure attempts (always-idle trunks)

4.13 As it receives the data, the DNC-500 partitions the data by customer and node, and stores it on the hard disk. If the BNM system includes a customer DNC-100 or virtual DNC-100, the DNC-500 sends the DNC-100 or virtual DNC-100 the appropriate KT data partition.

OM Data

4.14 Operational measurements (OMs) is a feature of MDC that measures the use of the following aspects of MDC operation:

- Trunks (TRK)
- Virtual facility groups (VFG)
- Integrated business network (IBN) groups, feature activation, and usage
- IBN subgroups, attendant-related measurements (IBNSG)

- Subscriber line usage (SLU)
- Call park measurements (PRK)

4.15 These statistics are useful in the configuring of trunks, and for studying feature usage, traffic and calling patterns, and attendant performance measurements. MDC has two major types of OMs:

- **Peg Counts** - the number of times an event occurs
- **Usage Counts** - the number of items in a particular state during the sampling period

4.16 A set of related OMs makes up an OM Group; for example, trunk measurements are grouped together in an OM group called TRK. The operating company also can create arbitrary OM groups, called OM classes, for accumulation purposes. Up to 30 such classes can be defined.

4.17 OMs are accumulated for hourly (15, 30, or 60 min.), daily, weekly, and monthly output. Separate collection and report output schedules can be defined for each class.

4.18 At each DMS node, the operating company defines the groups and classes of OMs to be collected. Any customer requests for special OMs must be submitted to the operating company.

4.19 Each DMS node accumulates usage and peg counts on registers. At the specified output schedule, OMs from the active registers are written to the DMS node holding disk, then output to the DNC-500. The data output to DNC-500 uses the same file structure as output from the DMS node.

4.20 As the DNC-500 receives the data, it partitions it into customer files for each DMS node and stores it on its own hard disk. If a customer-owned DNC-100 is logged on to the DNC-500 for continuous collection, the data pertaining to that customer is relayed to the DNC-100. The DNC-100 stores the OM data on its hard disk in a separate directory for each node.

MASKING

4.21 Specified stations can have the numbers they call masked (hidden) in SMDR data. Any SMDR records produced when calls are made from these stations will have a mask character substituted for the last four digits of all called numbers. Other call detail information remains intact, but the numbers called by the originating station cannot be identified.

4.22 The mask character is preselected to be the letter X, but can be changed by Northern Telecom personnel to suit customer preferences. Only the main terminals of the DNC-500 system can be used to specify

which stations will have called numbers masked. Mask characters are in place when SMDR records are viewed by DNC-100 users.

4.23 Even though numbers are masked for DNC-100 viewing or tape generation, the NPA-NXX- numbers are still available, so calls can still be handled by any downstream processing.

TAPE GENERATION

4.24 At scheduled intervals, or on demand, the SMDR records on a DNC-100 or DNC-500 disk can be written to a nine-track reel-to-reel tape. The tape unit is an optional part of the DNC system. Tape generation is most commonly done on DNC-100.

4.25 The tape generation schedule is defined by the user at whichever DNC system is holding the data on its disk. This schedule is created using the scheduler timetable described later in this publication.

4.26 At the specified tape generation time, the SMDR data is dumped to tape. The data dumped consists of all the SMDR data received since the last tape generation. If the user uses a DNC terminal to list the data files after the tape generation, the partitions will have changed from "Unfrmtted" (indicating not dumped) to "Tape Dmped" (indicating processed and dumped to tape).

4.27 In addition to the scheduled tape generation, the user can generate tapes on demand. The user can list the data files on the DNC's disk and select one to be dumped to tape.

4.28 The DNC-100 and DNC-500 systems write SMDR data in 1600 Characters Per Inch (CPI), 9-track magnetic tapes. The sequence of records and fields on a tape is identical to the output produced by DMS node, but in one of two formats:

- call data in BCD and xlate data in EBCDIC
- all fields in ASCII format

If the data is for more than one node, the nodes are separated by file headers on the tape.

DATA SPOOLING

4.29 A DNC-100 system running the BNM application can transfer (spool) current SMDR records to a customer's computer or printer. As with any other type of SMDR transfer, certain records in the spooled data are masked when the mask feature is used.

4.30 The data spooling feature provides an alternative to SMDR tape generation. It also can provide customers, remote from the DNC-100, with a faster and more direct access to their SMDR records.

4.31 Northern Telecom personnel can enable a customer's DNC-100 to spool the SMDR data, for one or all nodes of a customer's network, to one remote location.

4.32 The system automatically converts the data to be spooled to ASCII format. The line feed and carriage return characters are inserted after each record in the data. This allows it to be printed without further modification. A header, separated by rows of asterisks, identifies the customer, type, and time period of the data. New headers in the same transmission indicate data from different switch nodes. A trailer, also separated by asterisks, indicates the end of the transmission and the total amount of data spooled.

4.33 The system spools SMDR data from the hard disk through a LAN Interface Unit (LIU) RS-232C port (as specified in the Customer Table of a DNC-500 system; see 450-1021-312 and 450-1021-152 for details). Connection to the LIU RS-232C port can be direct if the link is less than 60 m in length. For distances of more than 60 m, appropriate modems must be used (Bell 212A model recommended). The transmission speed of the data can be 1200, 2400, 4800, 9600, or 19.2k bits per second.

4.34 Only one method of data spooling is available to the DNC-500 end user or DNC-100:

- **Interactive,** in which the customer periodically establishes a connection and signs on to request data spooling.

4.35 Two categories of DMS nodes can be spooled in a spooling job:

- spooling for a single DMS node
- spooling for all DMS nodes of a customer

4.36 System parameters may be configured to permit all spooling agents to remain active for up to 24 hours at a time. If spooling events are scheduled daily, they must include time breaks for each event to complete before the next event is scheduled to start. Otherwise, if an event is overlapped, it will be rescheduled, which would shut down spooling for up to 24 hours.

Interactive Spooling Mode

4.37 If interactive spooling is provided, personnel at the remote site can dial in and connect with the DNC-500 or DNC-100 (as appropriate) to be spooled the latest relevant SMDR records. No SPOOL job need be scheduled, because the system monitors the host SRU modem port at all times.

4.38 The customer both contacts the system and receives spooled data through the one LIU port modem link with the system. A customer who dials in must supply the correct customer identification, password,

and options in order to be recognized by the system. If the proper identification is supplied, the system assembles, formats, and transmits all SMDR records that it has not previously spooled to that customer. During the transmission, the system recognizes standard XOFF and XON flow control characters returned by the customer, and responds to an ESCAPE character by ending the session. The system also automatically breaks the connection if no data is sent or received for 5 minutes. Refer to 450-1021-312 for details of the procedure to receive spooled SMDR data from a DNC system in Interactive mode.

CALL TRACKING

4.39 The call tracking feature identifies the trunks and facilities that were used for a particular call that is no longer in progress. This feature is intended for maintenance use in tracking complaints about such things as noisy lines and cutoffs that involve faulty lines or trunks.

Note: This feature is not the same as "Call Trace", a DMS node feature that is used while the call is in progress.

4.40 Call tracking tracks calls by using the SMDR records stored on the DNC's hard disk. Most calls, including incomplete calls, generate at least one record. Using SMDR records permits calls to be tracked with information about either the originating end or the terminating end.

4.41 SMDR records are normally stored on the DNC's internal hard disk until a total of 11 million records has been reached. This retention period can be adjusted by Northern Telecom to suit customers' requirements. If tracking is required on records that are older than the retention period, a demand transfer can be done to transfer the data files from the node to the DNC-500 and then from the DNC-500 to the DNC-100.

4.42 The maximum number of instances of call tracking in progress on a BNM system at any one time is normally 2. Northern Telecom personnel can increase this maximum up to 8 concurrent instances on request.

4.43 Call tracking can be performed by both DNC-100 and DNC-500 users. The system searches for records that match criteria entered by the user, then displays the records to the user on the terminal. While there is no provision for dumping copy to the system printer, a printer can be attached to any terminal used in order to print screens. Numbers designated for masking are shown in masked form.

ROUTE PLAN

4.44 The route plan feature allows a DNC-100 user to select (from a list of predefined route plans) a routing plan for a specific destination. Each route plan and each route list is stored as a route list on the DMS node. The feature:

- provides an MMI for displaying, selecting, and renaming the current MDC route plan selections
- maintains a record of current routing plans for each route
- generates log messages for route plan changes made by the end user.

4.45 The route plan depends on the DNC-500 Nodes table, in the Installation Profile, to get customer-to-node mapping information. Each DNC-100 customer with access to BNM has a separate Route table.

4.46 Only the operating company can add or delete alternate route plans and routes for a customer. Both the operating company and the DNC-100 user can display and rename the routes and route plans. Only the operating company can change the route or route plan reference numbers.

NETWORK CLASS OF SERVICE CHANGES - TRUNKS

4.47 The Network Class Of Service (NCOS) changes feature allows a DNC-500 end user or a DNC-100 user to select (from a list of predefined NCOS numbers) a specific NCOS number for the incoming side of a DMS node MDC trunk group. The feature:

- provides an MMI for displaying, selecting, and renaming the current MDC trunk group incoming NCOS number
- maintains a record of current NCOS numbers for each MDC trunk group
- generates log messages for NCOS number changes made by the end user

4.48 The NCOS changes depend on the DNC-500 Nodes table in the Installation Profile and the Trunks Ownership table in the Facility Ownership tables to obtain customer-to-node-to-trunk group mapping information.

4.49 Only the operating company can add or delete entries in the DNC-500 Nodes table or the Trunk Ownership table.

5. ATT AND KT REPORT FORMATS

5.01 Report generation is an optional feature, since it may not be required at a DNC-500 which is collecting data only to relay it to one or more DNC-100s. This section describes and includes examples of the reports available for each type of feature data.

5.02 Reports layouts in this document are not strictly to scale (they are not 132 characters wide) in the interests of readability. Numeric output fields are denoted by n's, the number of n's being the number of printable fields. Alphanumeric characters are denoted by x's, each x standing for a position printed.

5.03 Some reports have several lines in each entry. These are identified by keys (>, =>) in the left margin. The key serves to identify the heading that applies to the line.

ATT Reports

5.04 Reports are normally obtained by scheduling a PRINT event, using the scheduler timetable described later in this publication. Reports can also be obtained on demand if required.

5.05 Each ATT test generates one ATT report. This consists of the following sections for each trunk group:

- group test initiation pages
- test details pages
- a group test termination page

5.06 Once the complete package of data has been reported on, one summary page is provided for all groups and tests.

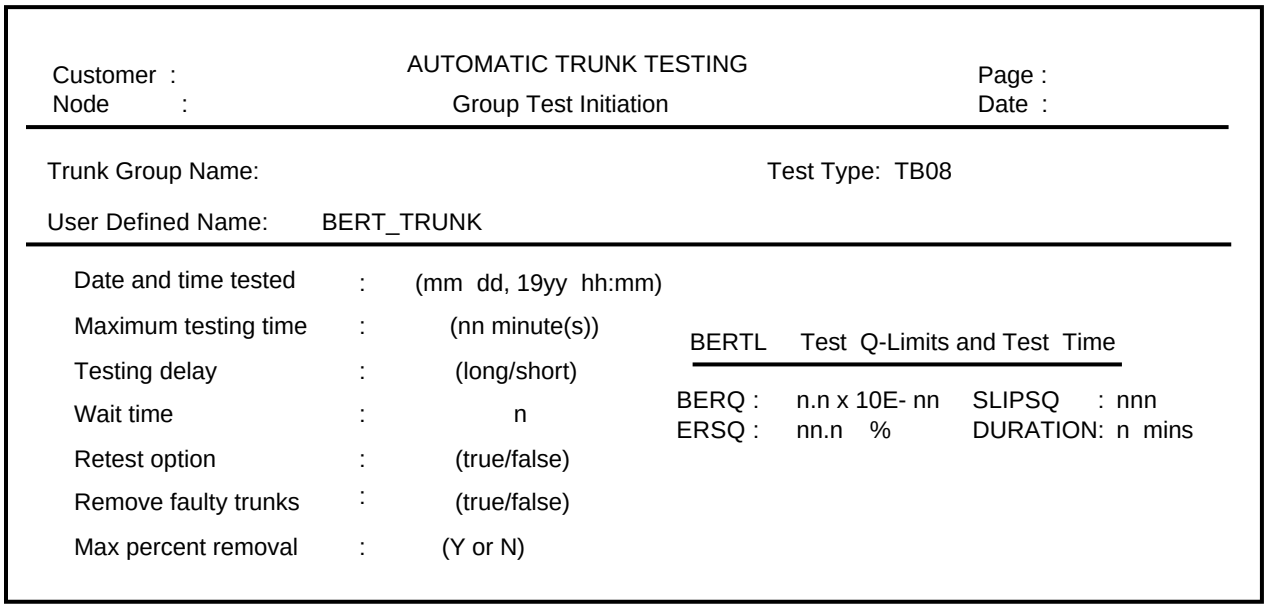


Fig. 5-1
A Group Test Initiation Page For BERT Tests

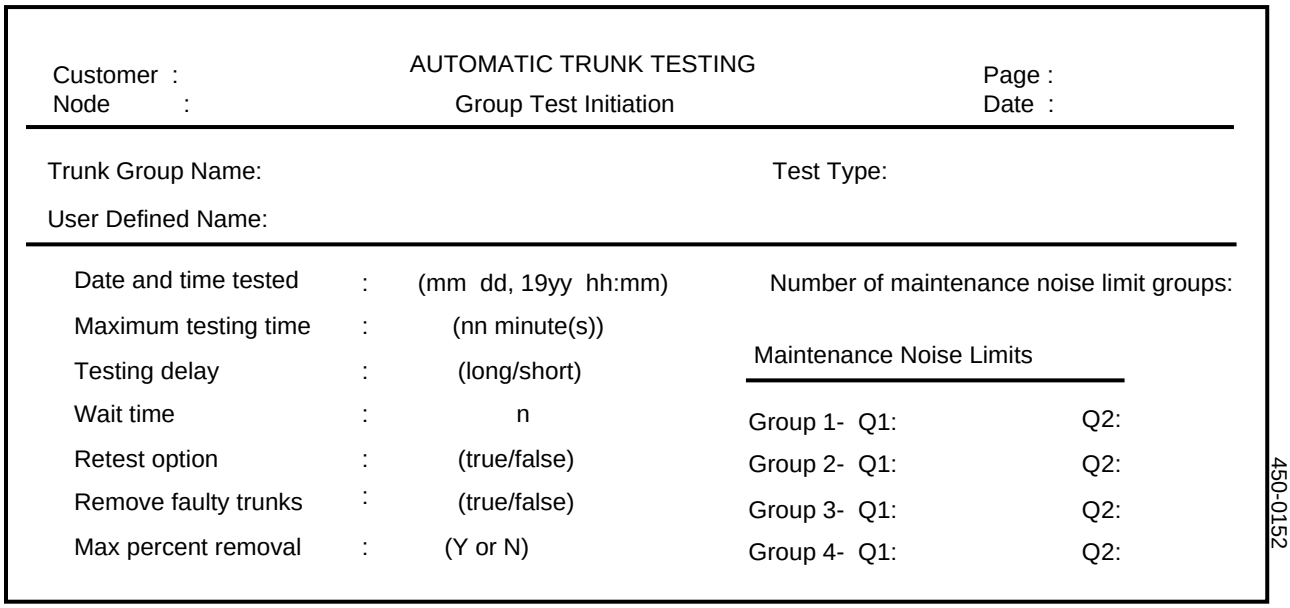


Fig. 5-2
A Group Test Initiation Page For Noise Limits

5.07 Group test initiation information (Fig. 5-1 and Fig. 5-2) is produced for each trunk group at the start of testing for the group. It outlines the options that were in force at the time of the trunk tests.

5.08 Each page begins with the following information:

(a) the title "Automatic Trunk Testing" and the name of the section of the report (initiation, details, termination, or summary)

(b) page number

(c) date on which the report was printed

(d) customer name

(e) name of the node from which the data in the report was taken

(f) name of the trunk group that was tested

(g) the "user-defined" name (customer name) for the trunk group that was tested

The Group Test Initiation Pages

5.09 Two types of group test initiation pages are available that show the name of the test, the date and time at which the test was performed, and the options that were in effect during the test. The two types, BERT tests, and noise tests may be output in the same set of ATT reports.

5.10 ***Test Type.*** This field shows the name of test that was performed. There are dozens of possible tests. Each one performs a different combination of noise and signal loss measurements.

5.11 ***Maximum Testing Time.*** This is the maximum length of time that the test was allowed to continue.

5.12 ***Testing Delay.*** This field shows the length of the delay allowed at the end of a testline test for the far end to drop. The value is one of

short	1 second
medium	6 seconds
long	9 seconds
extra long	15 seconds

5.13 ***Wait Time.*** This is the length of time, in minutes, that the ATT system was to wait for busy trunks to become available for testing when testing had been suspended because no trunks were available. The value may be between 0 and 7 minutes.

5.14 ***Retest Option.*** If this is set to true, trunks that failed the test were retested before the testing session ended.

5.15 ***Remove Faulty Trunks.*** If this is set to true, the system removed faulty trunks from service when they continued to fail the test.

5.16 ***Max Percent Removal.*** If this is set to true, the maximum percentage of trunks in the trunk group that the ATT testing feature was allowed to remove from service was 50%. If this is set to false, the maximum percentage of trunks that could be removed from service was 25%.

5.17 ***Q-Limits.*** A Q-limit is a predetermined maintenance test limit. It indicates a test measurement level fro determining whether a test is considered as successful or a failure. There are two types of limit Q1 and Q2. The Q1 limit is a "maintenance" limit, meaning that if the limit is exceeded, the trunk is not an immediate danger but should be checked by maintenance staff. The Q2 limit is an "immediate action" limit which, if exceeded, calls for immediate action.

BERT Tests

5.18 ***BERTL Test Q-limits and Test Time.*** These fields show limits that are in effect for BERT tests.

BERQ	the bit error rate Q-limit (1.0 x 10E-BERQ)
ERSQ	the errored seconds Q limit
SLIPSQ	the number of slips Q limit
TLTIME	the test time in minutes

5.19 The standard values for these limits are set in the MQLIMITS table in the DMS node. They can be changed using the standard manipulation commands in the DMS node. The standard values are repeated as follows:

BERQ	1.0 x 10E -3
ERSQ	8%
SLIPSQ	3
TLTIME	15

Noise Tests

5.20 ***Maintenance Noise Limits.*** These fields show limits that were in effect for loss measurements at -16 db. The values are in .1 db steps in the range 0 to 9.9 db. The Q1 limit is a "maintenance" limit, meaning that if the limit is exceeded, the trunk is not an immediate danger but should be checked by maintenance staff. The Q2 limit is an "immediate action" limit which, if exceeded, calls for immediate action. The groups represent the limits at different frequencies:

Group 1	the standard limits for all frequencies
Group 2	the limits at 404 hz
Group 3	the limits at 1004 hz
Group 4	the limits at 2804 hz

Customer : (customer name) AUTOMATIC TRUNK TESTING - Test Details Page: nnn
Node : (node name) Date: (mm dd, 19yy)
Trunk Group Name : (CLLI) User Defined Name : :

Trunk Member Number	BER : N.N X 10E-NN ERS : NN.N % SLIPS: NNN	DURATION : NNN seconds TIME INSYNC : NNN seconds	Q2 passed/failed FAILURE TYPE LOG TYPE
nnn	n.n nn.n nnn	nn	nnn nnn	aaaaaaaaaaaa
nnn	n.n nn.n nnn	nn	nnn nnn	aaaaaaaaaaaa
nnn	n.n nn.n nnn	nn	nnn nnn	aaaaaaaaaaaa
nnn	n.n nn.n nnn	nn	nnn nnn	aaaaaaaaaaaa
nnn	n.n nn.n nnn	nn	nnn nnn	aaaaaaaaaaaa

450-0191

Fig. 5-3
A Test Details Page For BERT Tests

Customer : (customer name) AUTOMATIC TRUNK TESTING - Test Details Page: nnn
Node : (node name) Date: (mm dd, 19yy)
Trunk Group Name : (CLLI) User Defined Name : :

>	Trunk Member Number	EML	LOSS @ 404 Hz FE SC	LOSS @ 404 Hz FN DEV	LOSS @ 404 Hz NF DEV	LOSS @ 1004 Hz FE SC	LOSS @ 1004 Hz FN DEV	LOSS @ 1004 Hz NF DEV	LOSS @ 2804 Hz FE SC	LOSS @ 2804 Hz FN DEV	LOSS @ 2804 Hz NF DEV	NOISE NML	NOISE NIAL	NOISE FE SC	NOISE FN NSE	NOISE NF NSE
>	n		n.n	n.n	n.n	n.n	n.n	n.n	n.n	n.n	n.n	nn	nn	nn	nn	nn
=>			n.n	n.n	n.n	n.n	n.n	n.n	n.n	n.n	n.n	passed		both limit		test equip
>	n		n.n	n.n	n.n	n.n	n.n	n.n	n.n	n.n	n.n	nn	nn	nn	nn	nn
=>			n.n	n.n	n.n	n.n	n.n	n.n	n.n	n.n	n.n	reference				
>	n		n.n	n.n	n.n	n.n	n.n	n.n	n.n	n.n	n.n	nn	nn	nn	nn	nn
=>			n.n	n.n	n.n	n.n	n.n	n.n	n.n	n.n	n.n	failed				
>	n		n.n	n.n	n.n	n.n	n.n	n.n	n.n	n.n	n.n	nn	nn	nn	nn	nn
=>			n.n	n.n	n.n	n.n	n.n	n.n	n.n	n.n	n.n	failed				

=>	RETURN LOSS ERL FE	ERL SC	ERL FN	ERL NF	SRL-LO FE	SRL-LO SC	SRL-LO FN	SRL-LO NF	SRL-HI FE	SRL-HI SC	SRL-HI FN	SRL-HI NF	TEST RESULT	FAILURE TYPE	LOG TYPE
	n.n	n.n	n.n	n.n	n.n	n.n	n.n	n.n	n.n	n.n	n.n	n.n	passed	both limit	test equip
	n.n	n.n	n.n	n.n	n.n	n.n	n.n	n.n	n.n	n.n	n.n	n.n	reference		
	n.n	n.n	n.n	n.n	n.n	n.n	n.n	n.n	n.n	n.n	n.n	n.n	failed		
	n.n	n.n	n.n	n.n	n.n	n.n	n.n	n.n	n.n	n.n	n.n	n.n	failed		

450-0153

Fig. 5-4
A Test Details Page For Noise Limits

Test Details Pages For BERT Limits

5.21 A test details page (Fig. 5-3) shows results of the test for individual trunks in the trunk group. There are three lines of data for each trunk. The lines do not have identification symbols.

5.22 ***Trunk Member Number.*** The member number identifies the trunk by its number within the trunk group.

5.23 Test Limits. The test limits for each test are given as part of the heading. The results of the tests are printed beneath the appropriate heading. If the limits are not exceeded, the final column will contain the word passed. If the limits are exceeded, the final column will contain the word failed , the failure type, and any log message type that was generated.

Test Details Pages For Noise Limits

5.24 A test details page (Fig. 5-4) shows results of the test for individual trunks in the trunk group. There are two lines of data for each trunk. The lines are identified by the symbols

> > first line
>
> => second line

5.25 The names of the columns in each line are shown at the beginning of the report. For example, the first line begins with trunk member number and ends with noise NF NSE. The second line begins with return loss ERL FE and ends with log type.

5.26 Since each test performs a different combination of noise and signal loss measurements, not all fields on a test details page are applicable to all tests. The fields that are not applicable to a particular test are left blank.

5.27 ***Trunk Member Number.*** The member number identifies the trunk by its number within the trunk group.

5.28 ***Loss Measurements.*** The fields under the LOSS heading show the loss measurements, in db, that were recorded at frequencies of 404 hz, 1004 hz, and 2804 hz. The abbreviations are

FE SC	Far end self check. The result is one of
	OK self check OK
	TO test line time out
	FE FSK (frequency shift keying) error code received
	FD FSK decoding error
	PC PCM (pulse code modulation) invalid
	SC self check failed
	FC other error
FN DEV	Far-to-near deviation. This is the deviation from the expected loss (set by the telephone company) measured from the far end of the trunk to the near end.
NF DEV	Near-to-far deviation. This is the deviation from the expected loss as measured from the near end to the far end.

5.29 ***Noise Measurements.*** The field under the NOISE heading show noise measurements for the trunk. The abbreviations are:

NML	Noise maintenance limit. If noise on the trunk exceeds this limit, the trunk should be examined by maintenance staff.
NIAL	Noise immediate action limit. If noise on the trunk exceeds this limit, immediate action is called for,
FE SC	Far end self check. The possible values are the same as for the previous self-check field.
NF NSE	Near-to-far noise. This is the actual noise on the trunk, in db, as measured from the far end to the near end.
NF NSE	Near-to-far noise. This is the actual noise on the trunk, in db, as measured from the near end to the far end.

5.30 ***Return Loss Measurements.*** The fields under the heading RETURN LOSS show three different types of return loss measurements

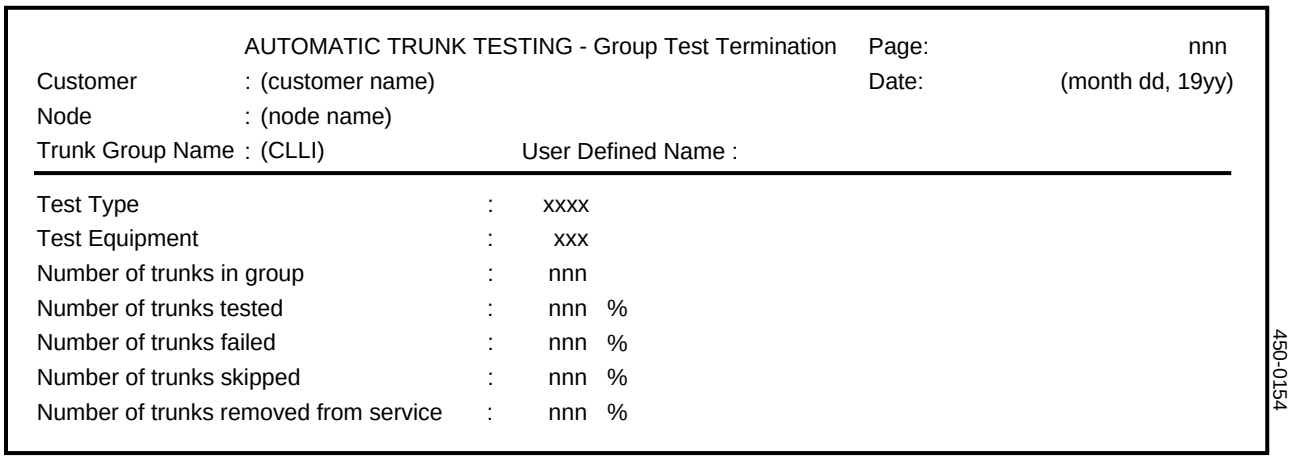
ERL	Echo return loss
SRL-LO	Singing return loss at low frequency
SRL-HI	Singing return loss at high frequency

5.31 ***Test Result.*** The test result is one of

- passed
- failed
- test aborted
- trunk selected as a reference trunk for other tests

5.32 ***Failure Type.*** Reasons for failure are:

no Q Limit	there was no limit with which to compare the results of the test
Q1 Fail	the results exceeded the maintenance (Q1) limit
Q2 Fail	the results exceeded the immediate action (Q2) limit
both limit	the results exceeded both limits
self check	the self-check failed



AUTOMATIC TRUNK TESTING - Group Test Termination Page: nnn

Customer : (customer name) Date: (month dd, 19yy)

Node : (node name)

Trunk Group Name : (CLLI) User Defined Name :

Test Type	:	xxxx
Test Equipment	:	xxx
Number of trunks in group	:	nnn
Number of trunks tested	:	nnn %
Number of trunks failed	:	nnn %
Number of trunks skipped	:	nnn %
Number of trunks removed from service	:	nnn %

450-0154

Fig. 5-5
A Group Test Termination Page of an ATT Report

The Group Test Termination Pages

5.33 A group test termination page (Fig. 5-5) gives summary information about the test. It shows how many trunks there are in the trunk group, how many of them were tested, how many failed the test, and how many were removed from service. It also shows what type of test equipment was used for the test.

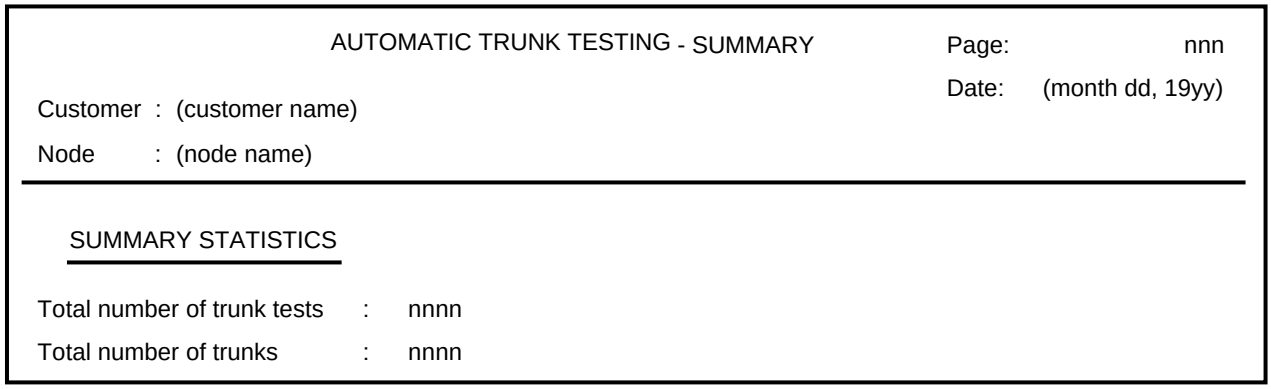


Fig. 5-6
An ATT Summary Page

The Summary Page

5.34 The summary page (Fig. 5-6) of an automatic trunk testing report shows how many tests were run on the trunk group.

5.35 Each page begins with the following information:

- the title “Automatic Trunk Testing” and the name of the section of the report (initiation, details, termination, or summary)
- page number
- date on which the report was printed
- customer name

Customer : (customer name) KILLER TRUNK REPORT Page: nnn
Node : (node name) Date: (month dd, 19yy)

TRUNK GROUP NAME		Trunk Number	Usage Count	Peg Count	Holding Time	STATUS
CLLI	User Defined Name					
xxxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxxxxx	nnn	nnnnn	nnnnn	nnnnn	Always Idle
xxxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxxxxx	nnn	nnnnn	nnnnn	nnnnn	None
xxxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxxxxx	nnn	nnnnn	nnnnn	nnnnn	Killer
xxxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxxxxx	nnn	nnnnn	nnnnn	nnnnn	Always Busy
xxxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxxxxx	nnn	nnnnn	nnnnn	nnnnn	None
:						
:						
:						

450-0156

Fig. 5-7
A Detail Page of a KT Report

KT Reports

5.36 The DNC-100 (or the DNC-500) can control the following aspects of KT report generation:

- scheduling automatic periodic printing, or printing manually on demand, or both
- adding user-defined trunk names to the trunk table, if they are required on the reports

5.37 The user can request the previous version of reports if the data is still on the DNC's hard disk.

5.38 A killer trunk report (Fig. 5-7) consists of one or more pages of detailed information followed by a summary page. A heading at the top of each page shows:

- title “Killer Trunk Report”
- page number
- date on which the report was printed
- customer name
- name of the node from which the data in the report was collected

The Detail Pages

5.39 Each line in the detailed section of a KT report shows the results of killer trunk tests for one trunk. Some reports list every trunk that was tested; others list only those that had unusual test results.

5.40 ***Trunk Group Name.*** The first two columns show the name of the trunk group to which the trunk belongs:

CLLI	Common language location identifier. This is a code that the telephone company uses to identify the trunk group.
User Defined	This is the customer name for the trunk group.

5.41 ***Trunk Number.*** This is the number of the trunk within the trunk group.

5.42 ***Usage Count.*** This column shows how long, in seconds, the trunk was busy during the testing period. To interpret this value, you need to know how long the testing period was. That value is shown in the report interval field on the summary page of the report. For example, suppose the report interval is 15 minutes. That is equivalent to 900 seconds (15 minutes * 60 seconds per minute). If the usage count is also 900 seconds, then the trunk was busy all the time during the test. The usage count is used in combination with other values to determine the status of the trunk (see *Status*).

5.43 ***Peg Count.*** This column shows how many calls "seized" the trunk during the testing period (this peg count is incremented irrespective of whether the call is completed or not completed). This value is used in combination with other values to determine the status of the trunk (see *Status*).

5.44 ***Holding Time.*** This column shows the average length of time, in seconds, that the trunk was held in the busy state for each call that it served during the testing period. The holding time is calculated from the preceding two columns as

usage count/peg count

5.45 Division by zero is not allowed. If the peg count is zero, the holding time is shown as ++++++++. The holding time is used in combination with other values to determine the status of the trunk (see *Status*).

5.46 ***Status.*** This column summarizes the status of the trunk during the testing period:

None

5.47 The KT tests did not find any problems with the trunk. (Some reports do not use this value because they list only trunks that have unusual test results).

Always Busy

5.48 The trunk had a usage count equivalent to 3600 seconds per hour (for example, 900 seconds in fifteen minutes) and a peg count of 0. It was always busy during the testing period and could not be seized by any new calls.

5.49 During a very busy period it is normal to have some trunks that are always busy. If a particular trunk is always busy over several testing periods, the trunk group to which it belongs may not contain enough trunks, or the trunk may be malfunctioning. (See the summary page of the report to find out when the data in the report was produced and how long the testing period was.)

Always Idle

5.50 The trunk had a usage count of 0 and a peg count of 0. It was not used during the testing period.

5.51 At a slow time on a slow day there may be many idle trunks. If a particular trunk is always idle during several busy periods, or the trunk is malfunctioning the count is incremented. (See the summary page of the report to find out when the data in the report was produced.)

Killer

5.52 The trunk had a low usage count and a high peg count, which produced a very low holding time. This means that the trunk served many calls, but none of them lasted very long. This often indicates that many callers hung up because of the trunk's poor transmission quality.

5.53 The specific indications of a possible killer trunk are

peg count > killer trunk peg count threshold

holding time < killer trunk holding time threshold

5.54 The threshold values are set by the telephone company. For more information about them, see *Report Options* under *The Summary Page*.

Slow Release

5.55 The trunk had a high usage count and a low peg count, which produced a very high holding time. This means that each call kept the trunk busy for an unusually long time (on average), and the trunk did not serve very many calls. This may indicate that the trunk was slow to return to the non-busy state after calls finished using it.

5.56 The specific indication of a slow release trunk is

holding time > slow release holding time threshold

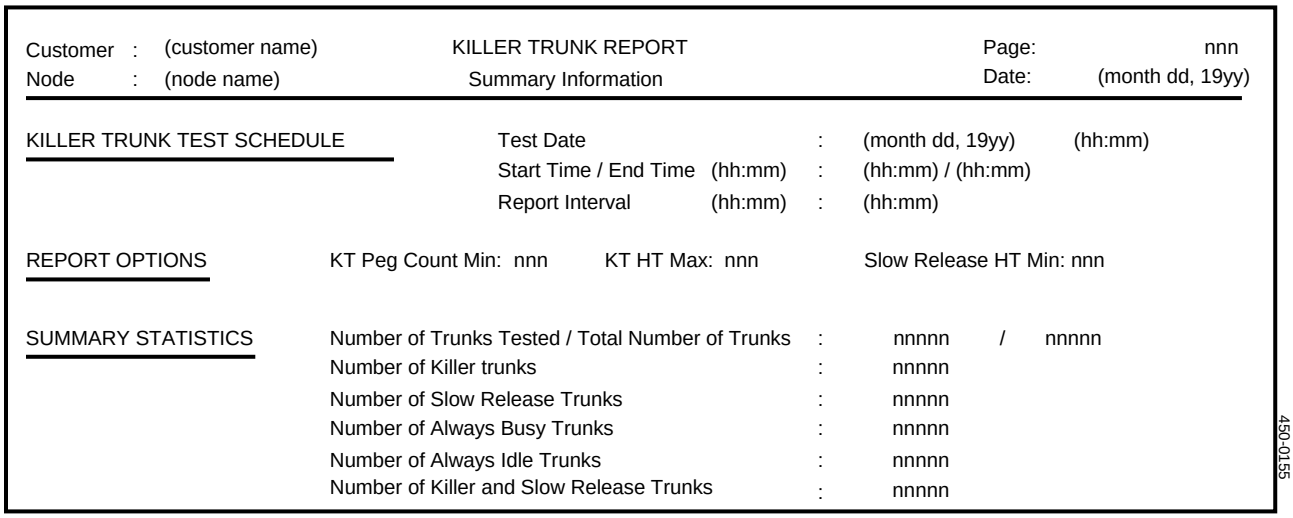
5.57 The threshold value is set by the telephone company. For more information about it, see *Report Options* under *The Summary Page*.

The Summary Page

5.58 The summary page (Fig. 5-8) at the end of a killer trunk report shows summary statistics for the report. It also shows when the data in the report was produced and what options were set at that time.

5.59 Test schedule. These fields show when the KT tests were performed and how often the results were reported.

Test Date	Shows what day and time the data in the report was produced.
Start/End Time	Shows what time testing began and ended on the test date.
Report Interval	Shows how often results were reported. All values are reset to 0 after each report interval.



Customer : (customer name) KILLER TRUNK REPORT Page: nnn
Node : (node name) Summary Information Date: (month dd, 19yy)

KILLER TRUNK TEST SCHEDULE
Test Date : (month dd, 19yy) (hh:mm)
Start Time / End Time (hh:mm) : (hh:mm) / (hh:mm)
Report Interval (hh:mm) : (hh:mm)

REPORT OPTIONS KT Peg Count Min: nnn KT HT Max: nnn Slow Release HT Min: nnn

SUMMARY STATISTICS
Number of Trunks Tested / Total Number of Trunks : nnnnn / nnnnn
Number of Killer trunks : nnnnn
Number of Slow Release Trunks : nnnnn
Number of Always Busy Trunks : nnnnn
Number of Always Idle Trunks : nnnnn
Number of Killer and Slow Release Trunks : nnnnn

450-0155

Fig. 5-8
A KT Summary Page

5.60 ***Report Options.*** These fields show the threshold values against which peg counts and holding times are compared to determine whether they are too high or too low. The threshold values are set by the telephone company.

KT Peg Count Min	Killer trunk peg count minimum. This is the minimum number of monitored calls the node requires to identify a killer trunk; this number should be at least 20.
KT HT Max	Killer trunk holding time maximum. This is the highest value that the telephone company considers to be a “killer” holding time; that is, values *below* this are “killer” values.
Slow Release HT Min	Slow release holding time minimum. This is the lowest value that the telephone company considers to be a “slow release” value; that is, values *above* this are “slow release” values.

5.61 Summary statistics. These fields summarize the results of the killer trunk tests. The first line shows how many trunks there are in the network (total number of trunks) and how many of them were tested during the reporting interval (number of trunks tested). The other lines show how many killer, slow release, always busy, and always idle trunks were found among the trunks that were tested.

6. OM REPORT FORMATS

6.01 Report generation is an optional feature, since it may not be required at a DNC-500 which is collecting data only to relay it to one or more DNC-100s. This chapter describes, and includes examples of the reports available for each type of feature data.

6.02 Reports layouts in this document are not strictly to scale (they are not 132 characters wide) in the interests of readability. Numeric output fields are denoted by n's, the number of n's being the number of printable fields. Alphanumeric characters are denoted by x's, each x standing for a position printed.

6.03 Some reports have several lines in each entry. These are identified by keys (>, =>) in the left margin. The key serves to identify the heading that applies to the line.

OM Reports

6.04 The DNC-100 (or DNC-500) user defines:

- a schedule
- the customer groups, subgroups, trunk groups, and virtual facility groups for which data is to be collected

6.05 The following OM reports are produced by DNC:

(a) Trunk group usage

- Operational measurements
- Summary information

(b) Customer group

- Operational measurements
- Summary information

(c) Attendent subgroup

- Operational measurements
- Summary information

(d) Subscriber line usage

- Operational measurements
- Summary information

(e) Attendant console

- Operational measurements
- Summary information

(f) Off-hook and call-back queueing

- Operational measurements
- Summary information

(g) IBN call park

- Operational measurements
- Summary information

(h) Virtual facility usage

- Operational measurements
- Summary information

Customer : (customer name) TRUNK GROUP USAGE Page: nnn
Node : (node name) Operational Measurements Date: (month dd, 19yy)

Data collected from : mm/dd/yyyy hh:mm until : mm/dd/yyyy hh:mm

TRUNK GROUP NAME					TOTAL				OUTGOING					INCOMING			
CLLI	User Defined Name	Trk Dir	Num Ckts	Work Ckts	Traf Usage	Maint Usage	Atmpt	Conn-ect	Atmpt	Ovflo	Fail	Glare	Conn-ect	Atmpt	Aband	Fail	Conn-ect
(clli)	(name)	nn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn
(clli)	(name)	nn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn
(clli)	(name)	nn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn
(clli)	(name)	nn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn

450-0158a

Fig. 6-1
A Detail Page of a Trunk Group Usage Report

Trunk Group Usage Reports

6.06 A trunk group usage report shows how many calls each trunk group carried during a particular time period, how long each trunk group was busy, and how many calls were unable to use each trunk group for various reasons.

6.07 Trunk group usage reports show traffic measurements for "actual" trunk groups. For measurements of traffic on "virtual" trunk groups, see the virtual facility group usage report.

The Detail Pages

6.08 Each line on a detail page (Fig. 6-1) of a trunk group usage report contains operational measurements for one trunk group.

6.09 ***Trunk Group Name.*** Each trunk group is identified by two different names:

CLLI	Common language location identifier. This is a code that the telephone company uses to identify the trunk group.
User Defined Name	This is the customer name for the trunk group.

6.10 ***Trk Dir (Trunk Direction).*** The value in this field shows whether the trunk group is incoming (IC), outgoing (OG), or two-way (2W).

6.11 ***Num Ckts (Number of Circuits).*** This value shows the total number of circuits (trunks) assigned to the trunk group, whether they are available for traffic or not. For example, the total includes trunks that the telephone company's maintenance technicians have taken "off-line" or made "installation busy".

6.12 ***Work Ckts (Working Circuits).*** This value shows how many trunks in the trunk group were available for traffic at the end of the reporting period. To find out how many trunks were not available, subtract working Circuits from number of circuits.

6.13 ***Total Traf Usage (Total Traffic Usage).*** This column shows the number of times trunks in the trunk group were busy with calls when they were scanned (sampled) at 100-second intervals. The unit of measurement is CCS, which stands for hundred call seconds. To interpret this figure, follow these steps:

(1) Determine how long a time period the report covers. This information is shown in the heading on each detail page of the report, and as part of the summary information on the last page.

(2) Calculate the hourly traffic usage. This is equal to

total traffic usage/number of hours report covers

(3) Calculate how busy each working trunk was, on average, by performing the calculation

hourly traffic usage/working circuits

(4) Consider how close the answer in step (3) is to 36 CCS, which is the maximum traffic load for one trunk for one hour.

6.14 ***Total Maint Usage (Total Maintenance Usage).*** This is the number of CCS that trunks in the trunk group were not available to carry traffic because they were being tested by the system (system busy usage) or by a technician (manual busy).

6.15 ***Total Atmpt (Total Attempts).*** This is the total number of times calls were routed to trunks in this trunk group, whether the attempts were successful or not. The most obvious relationship between total attempt and other columns in the report is

total attempts = outgoing attempts + incoming attempts

6.16 Other columns in the report divide attempts into those that were unsuccessful for various reasons and those that were successful. Note that only two-way trunks groups have both outgoing and incoming attempts; one-way trunk groups have either one or the other.

6.17 ***Total Connect (Total Connections).*** This shows how many of the attempts from the total attempt column were successful. In terms of the other columns in the report, the value is equal to

outgoing connect + incoming connect

6.18 ***Outgoing Atmpt (Outgoing Attempts).*** This shows how many times outgoing calls tried to use a trunk in this trunk group, whether the attempts were successful or not. (This field does not apply to incoming trunk groups.) The four columns that follow this one divide outgoing attempts into those that were unsuccessful for various reasons (ovflo, fail, and glare) and those that made successful connections to a trunk (connect).

6.19 ***Outgoing Ovflo (Outgoing Overflow).*** This column shows the number of times an outgoing call was routed to this trunk group but had to be redirected to another trunk group because all circuits in this group were busy. (This measurement does not apply to incoming trunk groups.)

6.20 ***Outgoing Fail (Outgoing Failures).*** This value shows how many times outgoing calls experienced problems with circuits in this trunk group. When an outgoing call experiences a problem with a circuit, it drops that circuit and tries another one in the same trunk group. If the next call is also unsuccessful, another outgoing failure is counted. (This measurement does not apply to incoming trunk groups.)

6.21 ***Outgoing Glare.*** This value shows how many times outgoing calls yielded to glare. Glare is the condition that an outgoing call encounters when it attempts to use a two-way trunk on which there is a simultaneous incoming call that has preference. The outgoing call drops the trunk and tries to select another member of the same trunk group. If all the trunks in the trunk group are unavailable, it may be routed to an alternate route or the call is sent an all-circuits-busy treatment. Glare only applies to two-way trunk groups.

6.22 ***Outgoing Connect (Outgoing Connections).*** This shows how many of the attempts from the Outgoing Atmpt column were successful. The closer the number of outgoing connections is to the number of outgoing attempts, the fewer problems there are with outgoing trunks.

6.23 ***Incoming Atmpt (Incoming Attempts).*** This value shows how many times incoming calls tried to use a trunk in this trunk group, whether the attempts were successful or not. (This measurement does not apply to outgoing trunk groups.) The three columns that follow this one divide incoming attempts into those that were abandoned (Aband) or failed (Fail) and those that made successful connections to a trunk (Connect).

6.24 ***Incoming Aband (Incoming Abandons).*** This field shows how many incoming calls that had been routed to this trunk group were abandoned (hung up) before they reached their destinations. This value includes calls that were abandoned before ringing a terminating station.

6.25 ***Incoming Fail (Incoming Failures).*** This value shows how many incoming attempts failed for reasons other than abandonment. Incoming failures indicate a possible need for maintenance of the incoming trunk group.

6.26 ***Incoming Connect (Incoming Connections).*** This shows how many of the attempts from the column Incoming Atmpt were successful. It is equivalent to

incoming attempt - incoming aband - incoming fail

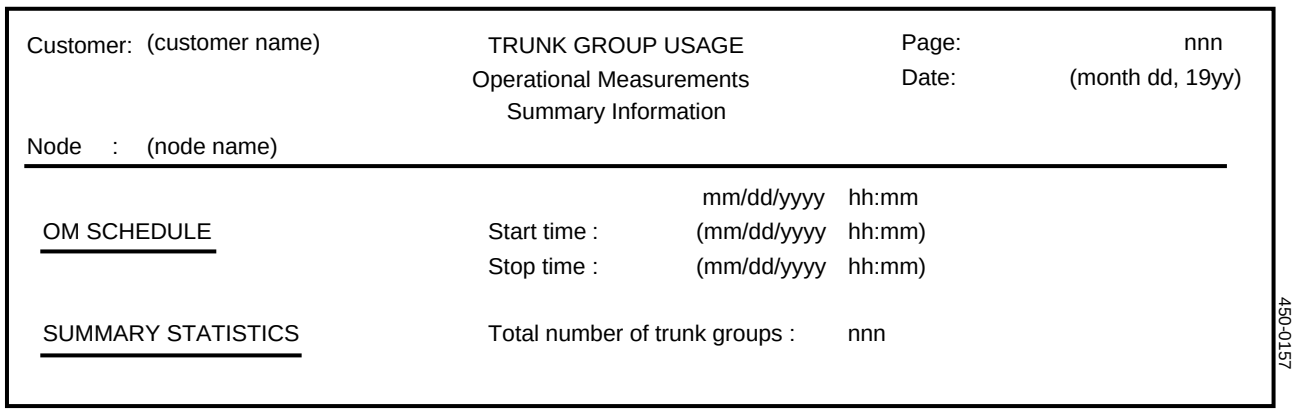


Fig. 6-2
A Trunk Group Usage Summary Page

The Summary Page

6.27 The last page (Fig. 6-2) of a trunk group usage report shows when the data in the report was gathered (start time to stop time, including the month, day, year, hour, and minute) and how many trunk groups were reported on.

Customer: (customer name) TRUNK GROUP USAGE - PEAK VALUES Page: nnn
Node : (node name) Operational Measurements Date: (month dd, 19yy)

Data collected from : mm/dd/yyyy hh:mm until : mm/dd/yyyy hh:mm

TRUNK GROUP NAME		Peak Period		Work Ckts	TOTAL				OUTGOING					INCOMING			
CLLI	Name	From Time	To Time		Traf Usage *peak*	Maint Usage	Atmpt	Conn-ect	Atmpt	Ovflo	Fail	Glare	Conn-ect	Atmpt	Aband	Fail	Conn-ect
(clli)	(name)	hh:mm	hh:mm	nnnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn
(clli)	(name)	hh:mm	hh:mm	nnnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn
(clli)	(name)	hh:mm	hh:mm	nnnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn
(clli)	(name)	hh:mm	hh:mm	nnnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn	nnnn

450-0189a

Fig. 6-3
A Detail Page of a Trunk Group Usage Peak Values Report

Peak Values Detail Pages

6.28 A trunk group usage peak values report (Fig. 6-3) shows when each trunk group had its highest (peak) value for total traffic usage, and what the peak value was. This information is recorded in the fields

Peak period from time

Peak period to time

Total traf usage *peak*

6.29 All other fields on the report are similar to the fields on a regular trunk group usage report, except that instead of showing total values for the entire testing period, they show the values for the time interval during which the peak usage was recorded.

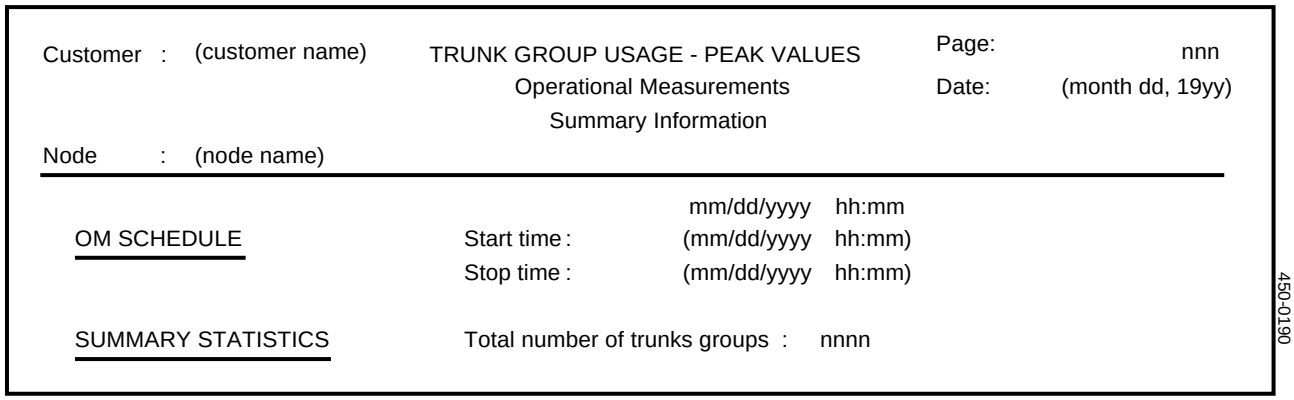


Fig. 6-4
A Trunk Group Usage Peak Values Summary Page

The Summary Page

6.30 The last page (Fig. 6-4) of a trunk group usage report or a peak trunk group usage report shows when the data in the report was gathered (start time to stop time, including the month, day, year, hour, and minute) and how many trunk groups were reported on.

Customer : (customer name) IBN CUSTOMER GROUP Page: nnn
Node : (node name) Operational Measurements Date: (month dd, 19yy)

Data collected from : mm/dd/19yy hh:mm until : mm/dd/19yy hh:mm

	======CUSTOMER GROUP NAME======					Originations	Inter-cepts	Direct in Dial	Calls Blocked
>	ID	User Defined Name							
	==========HELD CALLS==========				Direct	Intra-group	= ATTENDANT RELATED =		Other
=>	Total	Recalled	Abandoned	Resumed	Out Dial	Calls	Attempts	Transfers	Transfers
>	(id)		(user defined name)			n	n	n	n
=>	n	n	n	n	n	n	n	n	n
>	(id)		(user defined name)			n	n	n	n
=>	n	n	n	n	n	n	n	n	n
>	(id)		(user defined name)			n	n	n	n
=>	n	n	n	n	n	n	n	n	n

450-0160a

Fig. 6-5
A Detail Page of a Customer Group Report

Customer Group Reports

6.31 A customer group usage report shows what type of calls users in each customer group made and received during a particular time period and how successful the calls were.

The Detail Pages

6.32 The detail pages of a customer group usage report (see Fig. 6-5) contains two lines of data for each customer group. The lines are identified by the symbols

> first line

=> second line

6.33 The names of the data fields on each line are shown at the beginning of the report. For example, the second line begins with held calls total and ends with other transfers.

6.34 ***Customer Group Name.*** The fields under the customer group name heading show two names for the customer group:

ID — Identifier. This is a code that the telephone company uses to identify the customer group.

Name — This is the customer name for the customer group.

6.35 ***Originations.*** This column shows how many calls were made from stations and attendant consoles in the customer group, including calls that were partially dialed but not completed.

6.36 ***Intercepts.*** This field shows how many calls were blocked due to the caller's class of service and given an "intercept treatment" such as a recorded announcement. The class of service determines what types of calls the caller is allowed to make. Intercepted calls may have originated from within the local centrex lines or from incoming trunks. Also included in this column are attempts to reach stations that have the DIN (denied incoming calls) feature assigned to them.

6.37 ***Direct in Dial.*** This column shows how many calls reached stations in the customer group through direct inward dialing (DID). direct inward dialing is a feature that allows stations to receive outside calls directly, without the assistance of an attendant. Calls between different customer groups on the same switch are usually not included, but may be depending on how the telephone company sets up the switch.

6.38 ***Calls Blocked.*** This value shows how many attempted calls were not completed because they violated code restrictions. Code restrictions are limits that deny selected lines the ability to call selected area codes, office codes (exchanges), and directory numbers. For example, some lines may not be able to reach numbers outside their own area code.

6.39 ***Held Calls.*** The four fields under the held calls heading show what happened to calls that were put on hold.

6.40 When station A attempts to put station B on hold, the attempt is successful if the switch has enough software resources to accommodate the request. If A's customer group has the recall option, then A will be recalled automatically if B is still on hold after a certain period of time has elapsed. The time limit is usually 60 seconds, but can be changed by the telephone company. When A is recalled, the phone rings if the receiver is on-hook, or the receiver off-hook tone sounds if the receiver is off-hook.

Total	The number of times calls were successfully put on hold.
Recalled	The number of times stations were recalled by calls that had been left on hold too long.
Abandoned	The number of times people who had been put on hold hung up before the recall.

Resumed	The number of times held calls were successfully reconnected to their called parties. This value plus the one in the abandoned column should equal the value in the total column.

6.41 ***Direct Out Dial.*** This column shows how many times direct outward dialing was used. Direct outward dialing (DOD) is a feature that allows people to dial numbers outside the customer group without the assistance of an attendant. The value includes both successful and unsuccessful DOD calls.

6.42 ***Intragroup Calls.*** This value shows how many times one station in the customer group dialed another station in the same group. It does not include transfers or calls made by attendants.

6.43 ***Attendant Related.*** The two fields under the attendant related heading show how many times stations in the customer group called the attendant.

Attempts	The number of times a station dialed the attendant. This value includes both successful and unsuccessful calls to the attendant.
Transfers	The number of times a station tried to transfer a call to the attendant. This value includes both successful and unsuccessful transfers.

6.44 ***Other Transfers.*** This column shows how many times transfers were made to locations other than an attendant console.

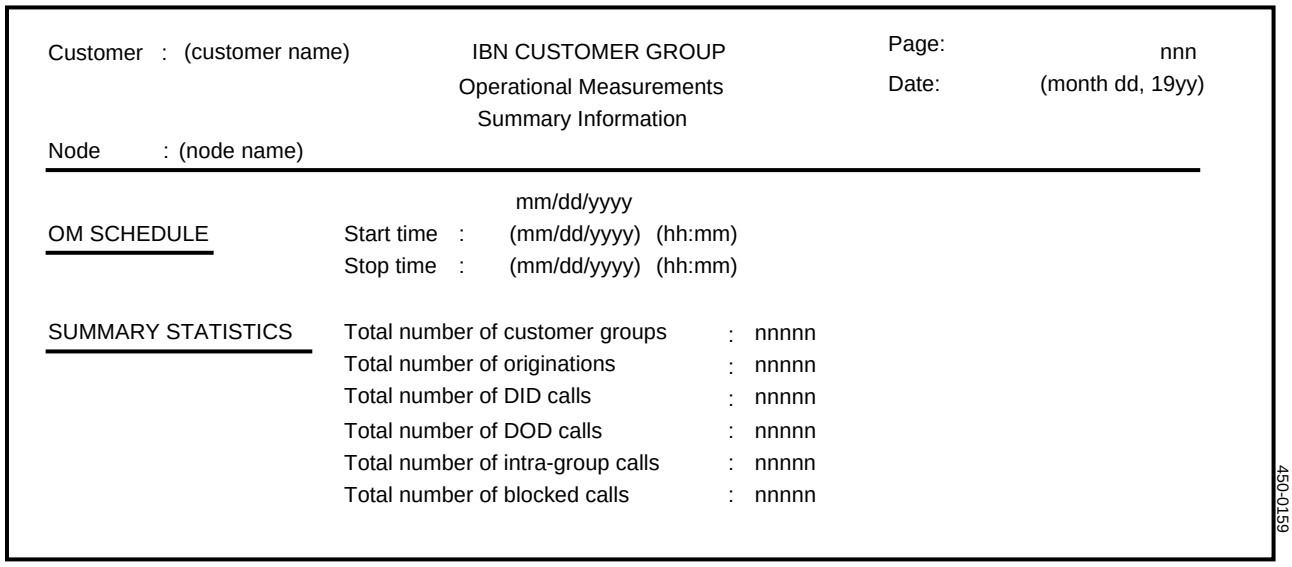
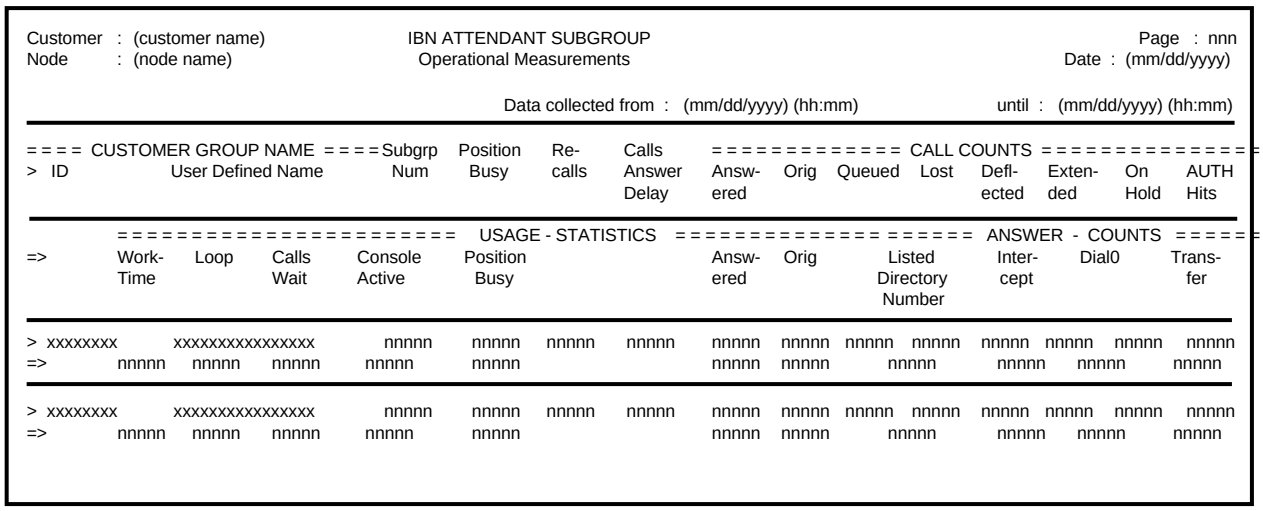


Fig. 6-6
A Customer Group Summary Page

The Summary Page

6.45 The last page (Fig. 6-6) of a customer group report shows

- when the data in the report was gathered (start time to stop time, including the month, day, year, hour, and minute)
- how many customer groups were reported on
- the total number of originations, DID calls, DOD calls, intragroup calls, and blocked calls for all customer groups



Customer : (customer name) IBN ATTENDANT SUBGROUP Page : nnn
Node : (node name) Operational Measurements Date : (mm/dd/yyyy)

Data collected from : (mm/dd/yyyy) (hh:mm) until : (mm/dd/yyyy) (hh:mm)

	CUSTOMER GROUP NAME		Subgrp	Position	Re-	Calls	CALL COUNTS							
>	ID	User Defined Name	Num	Busy	calls	Answer Delay	Answ-ered	Orig	Queued	Lost	Defl-ected	Exten-ded	On Hold	AUTH Hits

	USAGE - STATISTICS					ANSWER - COUNTS					
=>	Work-Time	Loop Calls Wait	Console Active	Position Busy		Answ-ered	Orig	Listed Directory Number	Inter-cept	Dial0	Trans-fer
>	xxxxxxxx	xxxxxxxxxxxxxxxx	nnnnn	nnnnn	nnnnn nnnnn	nnnnn	nnnnn	nnnnn nnnnn	nnnnn	nnnnn	nnnnn nnnnn
=>	nnnnn	nnnnn nnnnn	nnnnn	nnnnn	nnnnn	nnnnn	nnnnn	nnnnn	nnnnn	nnnnn	nnnnn
>	xxxxxxxx	xxxxxxxxxxxxxxxx	nnnnn	nnnnn	nnnnn nnnnn	nnnnn	nnnnn	nnnnn nnnnn	nnnnn	nnnnn	nnnnn nnnnn
=>	nnnnn	nnnnn nnnnn	nnnnn	nnnnn	nnnnn	nnnnn	nnnnn	nnnnn	nnnnn	nnnnn	nnnnn

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Fig. 6-7
A Detail Page of an Attendant Subgroup Report

Attendant Subgroup Reports

6.46 An attendant subroup report shows how busy attendant subgroups were during a particular time period and what happened to the calls that came to them.

The Detail Pages

6.47 The detail pages of an attendant subgroup report (see Fig. 6-7) contains two lines of data for each attendant subgroup. The lines are identified by the symbols

> first line

=> second line

6.48 The names of the data fields on each line are shown at the beginning of the report. For example, the first line begins with customer group name ID and ends with call counts AUTH hits.

6.49 ***Customer Group Name.*** The first two fields show the name of the customer group to which the attendant subgroup belongs:

ID	Identifier. This is a code that the operating company uses to identify the customer group.
User Defined Name	This is the name of the customer group.

6.50 ***Subgrp Num (Subgroup Number).*** This number identifies the attendant subgroup within a customer group. A customer group can have a maximum of eight attendant subgroups. The subgroups are numbered consecutively from 0 through 7. If a customer group has only one attendant subgroup, it is always numbered 0.

6.51 ***Position Busy.*** This column contains a record of the number of times the position busy key was used to put the attendant console into the position busy state.

6.52 ***Recalls.*** This column shows the total number of recalls to an attendant. Calls "recall" when they have been waiting too long to be answered elsewhere. For example, suppose an attendant extends an incoming call to a busy station that has the call waiting feature. If the call is not answered within the allowable length of time, the call may return (recall) to the attendant.

6.53 ***Calls Answer Delay.*** This value shows how many calls were answered after they had waited longer than X seconds. X is a value in the range of 4 through 60 seconds that can be set by the operating company for each subgroup.

6.54 The calculation for the percentage of calls that waited longer than X seconds in the queue is

calls answer delay / calls answered * 100

6.55 Along with the percentage value for calls lost, calls answr delay, and calls wait, this percentage can be used to create service level indexes and to determine the need for more attendants.

6.56 ***Call Counts.*** The fields under the heading call counts show eight headings

Answered	This is the number of calls that were answered by attendants in the subgroup.
Orig	This column shows how many calls were originated by an attendant. The count is incremented every time the idle loop key is depressed and dialing starts.

Queued	This column shows how many calls entered the attendant subgroup's queue. Callers hear ringing while they are waiting in the queue. Calls in a queue are usually answered in order by the first free attendant, but attendants may also be able to pick out priority calls. The value for calls queued includes all calls that entered the queue, whether they are waiting for an answer or not. It is equal to calls answered + calls lost
Lost	This column shows how many times callers who were waiting in the queue hung up before an attendant answered. To determine what percentage of queued callers hung up, use the formula calls lost / calls queued * 100 This percentage can be used in conjunction with the percentage values for calls deflected, Call answr delay, and calls wait to create service level indexes and to determine the need for more attendants.
Deflected	This value shows how many calls could not enter the queue because the queue was full. (The maximum length of the queue is set by the operating company on a per-subgroup basis.) Calls that are deflected from the queue hear a busy signal or an announcement. Recalls are never deflected, regardless of the length of the queue. The percentage of calls deflected is calls deflected / (calls queued + calls deflected) * 100 Along with the percentage value for calls lost, calls answr delay, and calls wait, this percentage can be used to create service level indexes and to determine the need for more attendants.
Extended	This value is a record of the number of calls that were extended by attendants.
On Hold	This value is a record of the number of times that attendants used the hold key, or another loop key, while active on a loop.

AUTH Hits	This value is a record of the number of times attendants used the AUTH key after entering an authcode when originating or extending a call.

6.57 ***Usage Statistics.***

Work Time	This is the total of the number of times an attendant was processing a call when the attendant subgroup was "scanned" (sampled) by the switch. Subgroups are scanned once every 10 seconds. For example, if two out of three attendants were busy every time the subgroup was scanned and scanning was done twice, the Work Time value would be 4 (2 busy attendants * 2 scannings). See console active for information about using this value.
Loop	This is the total of the number of times a loop key was in use on a console when the attendant subgroup was scanned at 10-second intervals. For example, if three out of four consoles were using three loop keys every time the subgroup was scanned and scanning was done four times, the loop value would be 36 (3 loop keys * 3 consoles * 4 scannings). See console active for information about using this value.
Calls Wait	This is the total of the number of calls that were waiting in the queue each time the attendant subgroup was scanned at 10-second intervals. Once criterion for the quality of service offered to users calling attendant subgroups is the length of time the "average" user had to wait. The average waiting time, in seconds, is equal to (calls wait * 10) / calls queued (Because the calls wait value was obtained at 10-second intervals, it must be multiplied by 10 to give a value for the total number of seconds. This value is then divided by the total number of calls that entered the queue to determine an average waiting time in seconds.)
Console Active	This is the total of the number of consoles that were active each time the attendant subgroup was scanned at 10-second intervals. A console is active as long as a headset is plugged in, even if it is in "Position-Busy" or "Nite" state. This figure can be used in calculations for attendant accountability, slow time, and for busy time.

Position Busy	Is a record of the amount of time that an attendant console spent in the position busy state. The scan rate for this record is 10 seconds.
Answered	Is a record of the total time spent in the talking state of attendant-answered calls. The scan rate for this record is 10 seconds.
Orig	Is a record of the total time spent in the talking state during attendant-originated calls. The scan rate for this record is 10 seconds.

6.58 ***Answer Counts.***

Listed Directory Number	This is a record of the number of times that the attendants answered calls to listed directory numbers (LDNs). An LDN is a directory number routed to an attendant console ICI as assigned in the DMS node table WRDN (see 297-2101-451).
Intercept	This is a record of the number of times that an attendant answered an intercept call. The intercept call categories are: • station intercept • incoming intercept DID • extended private switched communications service (EPSCS) calls • calls incoming on intercept trunks from other PBX
Dial0	This is a record of the number of times that the attendant answered a dial "0" type of call. The value includes all station dial 0, regardless of station type.
Transfer	This a record of the number of times that an attendant answered calls transferred by stations to attendants by switch hook flash and dialing zero.

Attendant Accountability

6.59 To determine the average length of time, in seconds, that each attendant had the headset plugged in during the reporting period, use the formula

(console active * 10) / number of attendants

6.60 Compare the answer to the number of seconds in the reporting period to determine whether the attendants were at their consoles for the correct length of time. The reporting period's start and stop times are shown on the summary page at the end of the report. (For example, a one-hour reporting period contains 60 minutes or 3600 seconds. If the result of the preceding calculation is 3540 seconds, it means that the average attendant had the headset plugged in for 59 out of 60 minutes during the reporting period.)

Slow Time

6.61 To determine the amount of "slow time", in seconds, when attendants were available but were not servicing calls, use the formula

(consl activ - work time) * 10

6.62 Divide the result by the number of attendants to get the average number of slow time seconds per attendant. Remember to compare the values to the number of seconds in the reporting period.

Busy Time

6.63 One possible indication of business is the percentage of time attendants are using more than one loop key at a time. The calculations for this is

(loop - work time) / consl activ * 100

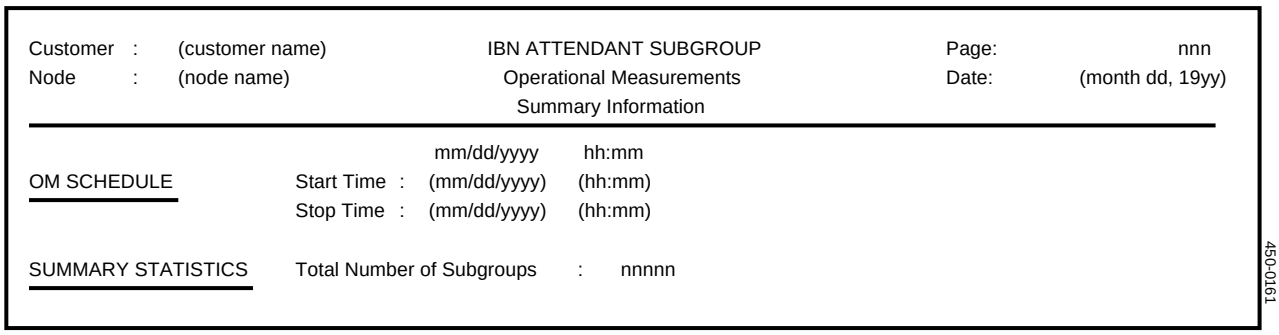

Fig. 6-8
An Attendant Subgroup Summary Page

The Summary Page

6.64 The summary page (Fig. 6-8) of an attendant subgroup report shows how many attendant subgroups were monitored and when they were monitored. The elapsed time reported here (stop time - start time) must be considered in order to interpret the other data in the report meaningfully.

```
Customer  :  (customer name)                     IBN ATTENDANT CONSOLE                                    Page  :  nnn
Node      :  (node name)                         Operational Measurements                          Date  :  (mm/dd/yyyy)

                                          Data collected from  :  (mm/dd/yyyy) (hh:mm)     until  :  (mm/dd/yyyy) (hh:mm)
------------------------------------------------------------------------------------------------------------------------
=  CONSOLE  = = = = =  CUSTOMER GROUP NAME  = = = Subgrp  Calls  Calls  Calls  Calls  AUTH  Pstn   = = = =  USAGE STATISTICS  = = = =
>   CLLI        ID            User Defined Name   Num     Answd  Orig   Extd    on    Key   Busy   Consl   Calls   Calls   Pstn
                                                                                Hold  Hits  Count  Actv    Answd   Orig    Busy
------------------------------------------------------------------------------------------------------------------------
                                                  ==========================  ANSWER - COUNTS  =======================
=>                                                Listed          Intercept  Dial0      Transfer      Recalls    Forward    Special
                                                  Directory
                                                  Number
------------------------------------------------------------------------------------------------------------------------
 >   xxxx     xxxxxxxx       xxxxxxxxxxxxxxxx  nnnnn   nnnnn  nnnnn nnnnn nnnnn  nnnnn  nnnnn nnnnn   nnnnn   nnnnn   nnnnn
 =>                                              nnnnn          nnnnn   nnnnn      nnnnnn       nnnnn      nnnnn      nnnnn
------------------------------------------------------------------------------------------------------------------------
 >   xxxx     xxxxxxxx       xxxxxxxxxxxxxxxx  nnnnn   nnnnn  nnnnn nnnnn nnnnn  nnnnn  nnnnn nnnnn   nnnnn   nnnnn   nnnnn
 =>                                              nnnnn          nnnnn   nnnnn      nnnnnn       nnnnn      nnnnn      nnnnn
------------------------------------------------------------------------------------------------------------------------
 >   xxxx     xxxxxxxx       xxxxxxxxxxxxxxxx  nnnnn   nnnnn  nnnnn nnnnn nnnnn  nnnnn  nnnnn nnnnn   nnnnn   nnnnn   nnnnn
 =>                                              nnnnn          nnnnn   nnnnn      nnnnnn       nnnnn      nnnnn      nnnnn
```

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Fig. 6-9
A Detail Page Of An IBN Attendant Console Report

Attendant Console Reports

6.65 An attendant console report shows how busy the attendant consoles were during a particular time period, and what happened to the calls routed to them.

The Detail Pages

6.66 Each line on a detail page (Fig. 6-9) of an attendant console report shows the operational measurements for one attendant console.

6.67 ***Console CLLI.*** Common language location identifier. This is a code that the operating company uses to identify the attendant console.

6.68 ***Customer Group Name.***

ID	Identifier. This is a code that the operating company uses to identify the attendant console's customer group.
User Defined Name	This is the name of the customer group.

6.69 ***Subgrp Num.*** This is the number that identifies the attendant console's host subgroup. The number will be in the range 1 to 8, as there can only be 8 subgroups in a group.

6.70 ***Calls Answd.*** This is a record of the number of calls handled by an attendant. This record is incremented each time a loop or ICI key is used.

6.71 ***Calls Orig.*** This is a record of the number of the calls that were originated by the attendant.

6.72 ***Calls Extd.*** This is a record of the number of calls that have been extended by the attendant. The record is incremented when the attendant has completed dialing the destination number.

6.73 ***Calls on Hold.*** This is a record of the number of times that the attendant has placed a call on hold. The record is incremented when the attendant is active on a loop and hits either the hold key or another loop key.

6.74 ***AUTH Key Hits.*** This a record of the number of times that the attendant used the AUTH code key after entering an authorization code.

6.75 ***Pstn Busy Count.*** This is a record of the number of times that the attendant used the position busy key to put the attendant console into the position busy state.

6.76 ***Usage Statistics.***

Consl Actv	This is a record of the time that an attendant console was occupied by an attendant. A console is considered occupied if the headset is plugged in, even if the attendant console is in the position busy or night service mode. The scan rate of this statistic is 100 seconds. Any errors that may occur, due to the large scan rate, will be reduced with time.
Calls Answd	This is a record of the time an attendant spent in the talking state of attendant-answered calls. The scan rate of this statistic is 10 seconds. At this rate the total is not accurate to the second, but over time the error should even out to give a good estimate of time spent.
Calls Orig	This is a record of the total time spent, by an attendant, in the talking state when originating calls. The scan rate of this statistic is 10 seconds. At this rate the total may not be accurate to the second for each scan, but over time the error should even out to give a good estimate of the time spent.

Pstn Busy	This is a record of the total time that an attendant console was in the position busy state. The scan rate for this statistic is 10 seconds. At this rate the total may not be accurate to the second for each scan, but over time the error should even out to give a good estimate of the time spent.

6.77 ***Answer Counts.***

Listed Directory Number	This is a record of the number of times that the attendants answered calls to listed directory numbers (LDNs). An LDN is a directory number routed to an attendant console ICI as assigned in the DMS node table WRDN (see 297-2101-451).
Intercept	This is a record of the number of times that an attendant answered an intercept call. The intercept call categories are: • station intercept • incoming intercept DID • extended private switched communications service (EPSCS) calls • calls incoming on intercept trunks from other PBX
Dial0	This is a record of the number of times that the attendant answered a dial "0" type of call. The value includes all station dial 0, regardless of station type.
Transfer	This a record of the number of times that an attendant answered calls transferred by stations to attendants by switch hook flash and dialing zero.
Recall	This is a record of the number of times that an attendant answers call waiting, camp-on, and no answer recalls.
Forward	This is a record of the number of times that an attendant answers call forward to attendant calls.
Special	This is a record of the number of times that an attendant answers calls that do not fit into any of the other attendant answered call categories.

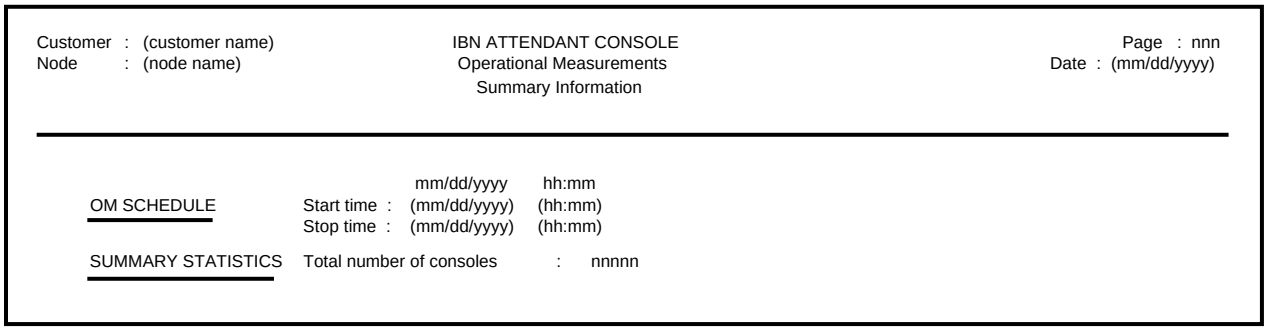
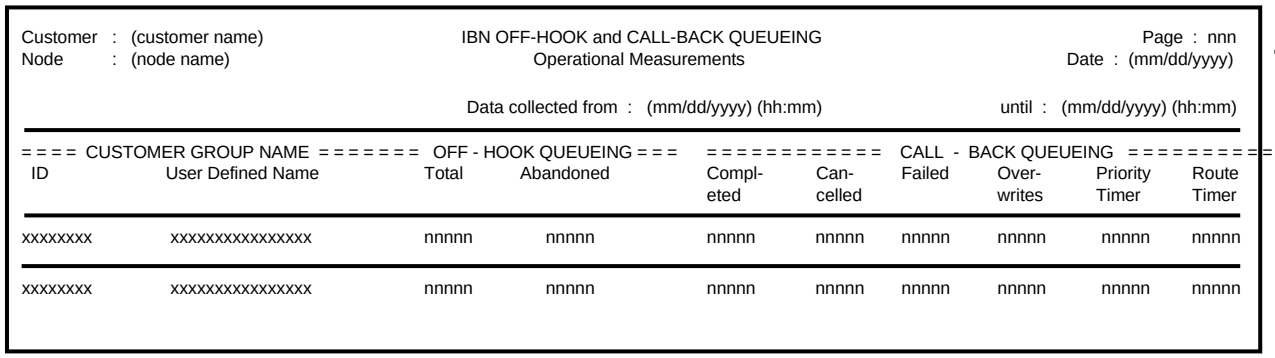


Fig. 6-10
A Summary Page Of An IBN Attendant Console Report

The Summary Page

6.78 The last page of an attendant console report, the summary page (Fig. 6-10), shows

- when the data in the report was gathered (start time to stop time, including the month, day, year, hour, and minute)
- total number of attendant consoles reported on



Customer : (customer name) IBN OFF-HOOK and CALL-BACK QUEUEING Page : nnn
Node : (node name) Operational Measurements Date : (mm/dd/yyyy)

Data collected from : (mm/dd/yyyy) (hh:mm) until : (mm/dd/yyyy) (hh:mm)

CUSTOMER GROUP NAME		OFF - HOOK QUEUEING		CALL - BACK QUEUEING					
ID	User Defined Name	Total	Abandoned	Compl-eted	Can-celled	Failed	Over-writes	Priority Timer	Route Timer
xxxxxxxx	xxxxxxxxxxxxxxxx	nnnnn	nnnnn	nnnnn	nnnnn	nnnnn	nnnnn	nnnnn	nnnnn
xxxxxxxx	xxxxxxxxxxxxxxxx	nnnnn	nnnnn	nnnnn	nnnnn	nnnnn	nnnnn	nnnnn	nnnnn

Dwg. 1021-101-003b

Fig. 6-11
A Detail Page Of An IBN Off-Hook And Call-Back Queueing Report

Off-Hook And Call-Back Report

6.79 The off-hook and call-back report provides operational measurements on traffic and usage of the DMS node IBN feature off-hook queueing (OHQ) and call back queueing (CBQ) on a customer group basis. The report provides an analysis of the queueing needs of the DMS node. If the report indicates that OHQ and CBQ are not often used (provided the option is available to the user) it may be an indication that there are too many trunks available on that route. If, on the other hand, there are a number of OHQ request blockages or CBQ deactivations or overwrites, there are probably insufficient trunks to handle the traffic.

6.80 If a call from a DMS node or from an incoming trunk cannot be completed because an idle outgoing trunk, a member of the least expensive route set, is not available, the calling party may wait off-hook for an idle trunk. The caller is given off-hook queue tone and is placed in a queue associated with the outgoing trunk group. When an idle outgoing trunk becomes available, the call will be completed.

The Detail Pages

6.81 The detail pages of an IBN off-hook and call-back queueing report (see Fig. 6-11) contains a single line of data for each customer group. The names of the data fields are shown at the beginning of the report.

6.82 *Customer Group Name.*

ID	Identifier. This is a code that the operating company uses to identify the customer group.
User Defined Name	The name of the customer group.

6.83 *Off-Hook Queueing.*

Total	This is a record of the number of times off hook queueing is offered to a user when there are no available trunks on the requested route.
Abandoned	This is a record of the number of times that the call has been abandoned before the request can be completed. A typical situation is: The call has not terminated on an idle trunk, and the OHQ wait time has not elapsed, indicating that the call has not been removed from the OH queue. The call is recorded if the calling party does one of the following: • goes on hook, thus terminating the OHQ attempt • flashes, then goes on hook to activate CBQ • activates the CBQ feature on a business set, then goes on hook

6.84 *Call-Back Queueing.*

Completed	This is a record of successful CBQ requests. It is incremented each time the originator of a call answers the recall ringback.
Cancelled	This is a record of the number of times that CBQ calls were cancelled. It is incremented when the CBQ deactivation code is dialed, or the CBQ is hit when the CBQ is active (on a Business Set).
Failed	This is a record of CBQ deletions. It is incremented when a CBQ request is deleted by: • the originator did not answer the recall • the line was removed from service • the CBQ option was cancelled

Overwrites	This is a record of calls that have been overwritten. It is incremented whenever a CBQ request is overwritten by other CBQ or RAG requests. This can occur when the user has a CBQ request pending and decides to activate CBQ on another call before the original request was completed. It is not possible to overwrite a CBQ request from a business set. A business set user must cancel any outstanding CBQ requests before activating the feature on a different call.
Priority Timer	This is a record of calls that are eligible for CBQ Priority Promotion. When a CBQ request is made it is placed in a queue and a timer started. The position in the queue is governed by the CBQ start priority of the host customer group. If the starting priority is less than the maximum priority when the timer expires, the request is eligible for priority promotion. The timer data is contained in the call back queueing priority promotion timer (CBQPPT) field, in DMS node table CUSTSTN, and the CBQ start priority data
Route Timer	This is a record of calls that were transferred to a more expensive route. A CBQ request, controlled by a timer, is initially made on an inexpensive route. When the timer expires, the CBQ request is eligible for completion on any route. The timer data is contained in the CBQ route advance timer (CBQRAT) field of DMS node table CUSTSTN (see 297-2101-451). Only stations which have the CBQRAT field set to a value between 1 and 15 will be allowed to advance requests to expensive routes.

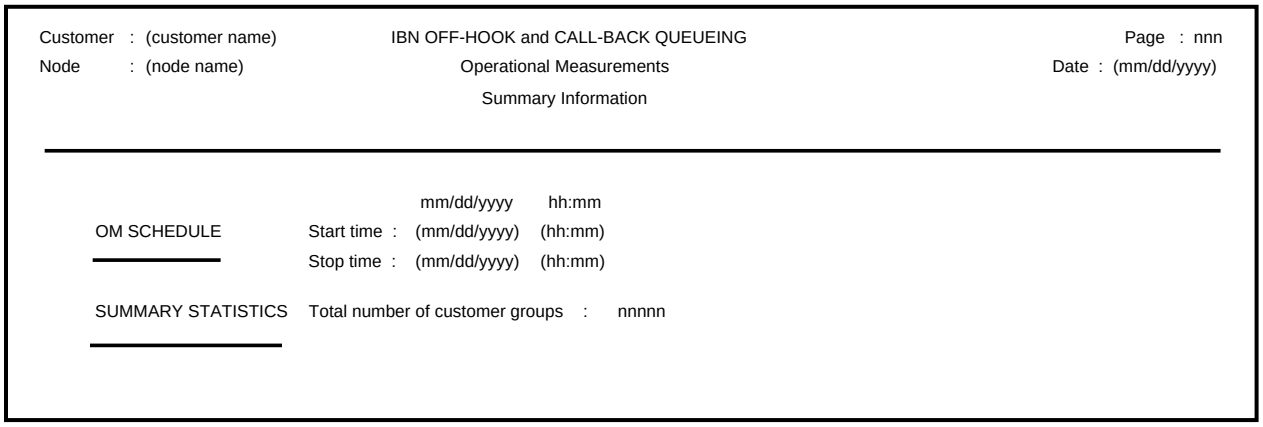
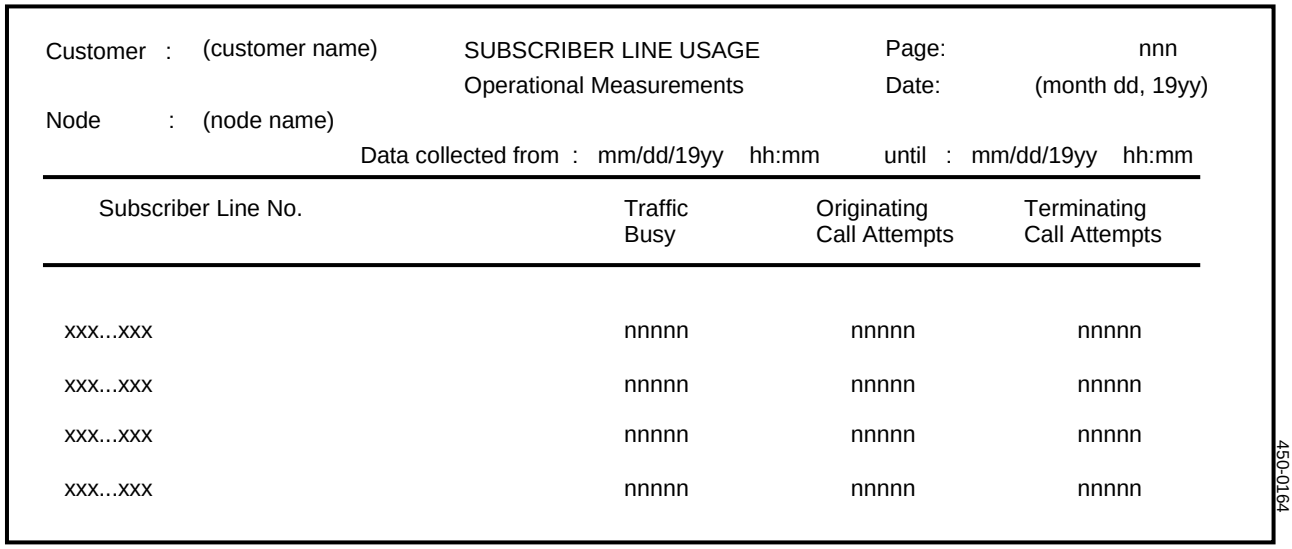


Fig. 6-12
A Summary Page Of An IBN Off-Hook And Call-Back Queueing Report

The Summary Page

6.85 The summary page (Fig. 6-12) of an off-hook and call back queueing report shows

- when the data in the report was gathered (start time to stop time, including the month, day, year, hour, and minute)
- total number of customer groups reported on



Customer : (customer name) SUBSCRIBER LINE USAGE Page: nnn
Operational Measurements Date: (month dd, 19yy)
Node : (node name)
Data collected from : mm/dd/19yy hh:mm until : mm/dd/19yy hh:mm

Subscriber Line No.	Traffic Busy	Originating Call Attempts	Terminating Call Attempts
xxx...xxx	nnnnn	nnnnn	nnnnn
xxx...xxx	nnnnn	nnnnn	nnnnn
xxx...xxx	nnnnn	nnnnn	nnnnn
xxx...xxx	nnnnn	nnnnn	nnnnn

450-0164

Fig. 6-13
A Detail Page of a Subscriber Line Usage Report

Subscriber Line Usage Reports

6.86 A subscriber line usage report shows how many calls were made and received on each subscriber line during the monitoring period and how long each line was in use.

The Detail Pages

6.87 Each line on a detail page (Fig. 6-13) of a subscriber line usage report shows operational measurements for one subscriber line.

6.88 ***Subscriber Line No.*** This column identifies a subscriber line by its directory number (the number a caller dials to reach the line) or its line equipment number (a code that the telephone company uses to identify the line).

6.89 ***Traffic Busy.*** This column shows how many times the line was in use when it was scanned at 100-second intervals.

6.90 ***Originating Call Attempts.*** This column shows how many times the line was used to make a call. The value includes both successful calls and all calls that were started but not completed. The network counts a call attempt as soon as someone picks up a receiver and receives dial tone on the line.

6.91 ***Terminating Call Attempts.*** This value shows how many calls the line received. The calls may or may not have been answered. The network counts a terminating call attempt when the line begins ringing in response to an incoming call.

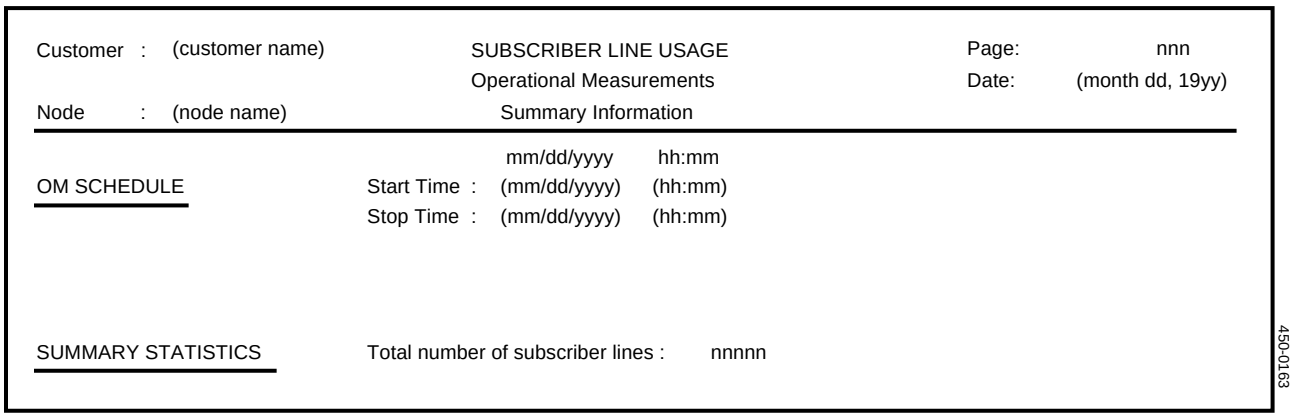


Fig. 6-14
A Subscriber Line Usage Summary Page

The Summary Page

6.92 The summary page (Fig. 6-14) of a subscriber line usage report shows how many subscriber lines were monitored and when they were monitored.

Customer : (customer name) IBN CALL PARK Page: nnn
Node : (node name) Operational Measurements Date: (month dd, 19yy)
Data collected from: mm/dd/19nn hh:mm until : mm/dd/19nn hh:mm

	======CUSTOMER GROUP NAME======		========== PARKED CALLS ==========			
>	ID	User Defined Name	Successes	Fails	Recalls	Abandons
>	(id)	(name)	nnn	n	nn	nn
>	(id)	(name)	nnn	n	nn	nn
>	(id)	(name)	nnn	n	nn	nn
>	(id)	(name)	nnn	n	nn	nn

450-0180a

Fig. 6-15
A Detail Page of a Call Park Report

Call Park Reports

6.93 A call park report shows how often the call park feature was used by each customer group during a particular time period and how well it worked.

The Detail Pages

6.94 Each line on a detail page (Fig. 6-15) of a call park report shows measurements for one customer group.

6.95 ***Customer Group Name.*** Each customer group is identified by two different names:

ID	Identifier. This is a code that the telephone company uses to identify the customer group.
User Defined Name	This is the customer name for the customer group.

6.96 ***Parked Calls.*** The number of attempts to park a call is equal to

Successes + Fails

Successes

6.97 The Successes column shows how many attempts to park a call were successful.

Fails

6.98 This column shows how many attempts to park a call failed because the limit to the number of calls allowed to be parked at one time had been reached. The limit is set by the telephone company. The percentage of failed attempts is equal to

Fails / (Successes + Fails) * 100

6.99 If the percentage of failures is consistently high, the limit to the number of allowed call parks may need to be increased.

Recalls

6.100 This value shows how many times a parked call recalled the parker before it was retrieved. A parked call recalls the parker automatically when it has been "forgotten" (parked longer than a certain length of time). The time limit is set by the telephone company. The percentage of recalls is equal to

Recalls / Successes * 100

6.101 If the percentage of recalls is consistently high, it may indicate a need for the parking time limit to be lengthened or for telephone users to be trained to retrieve parked calls.

Abandons

6.102 This column shows how many times people whose calls had been parked hung up before their calls were retrieved. The percentage of calls that were hung up is

Abandons / Successes * 100

6.103 If the percentage of abandoned calls is consistently high, it may indicate a need for the parking time limit to be shortened or for telephone users to be trained to retrieve parked calls.

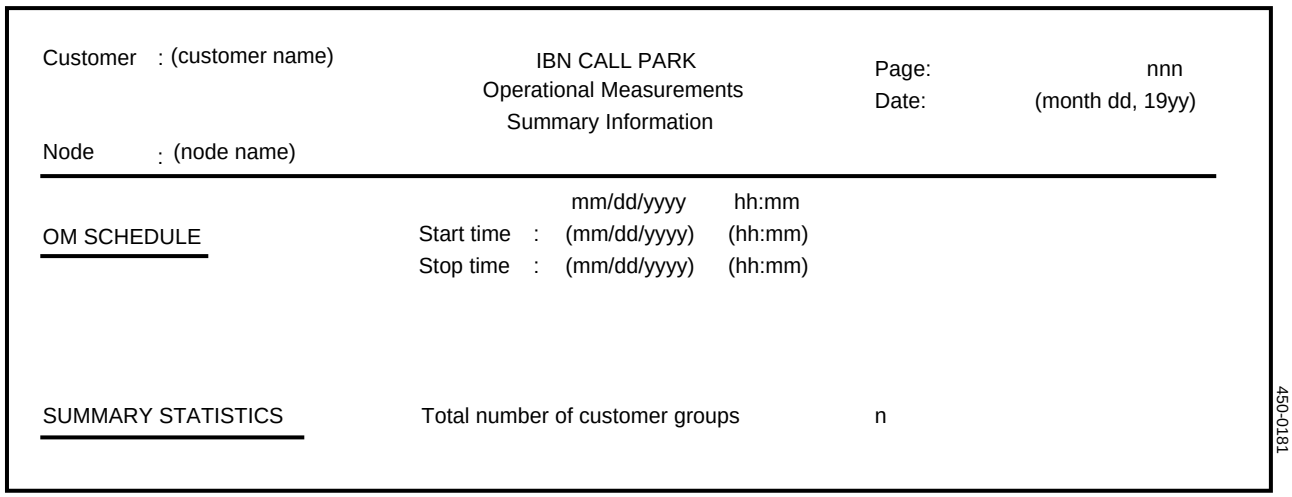


Fig. 6-16
A Call Park Summary Page

The Summary Page

6.104 The summary page (Fig. 6-16) of a Call Park report shows how many customer groups were monitored and when they were monitored.

Customer : (customer name) VIRTUAL FACILITY USAGE Page: nnn

Node : (node name) Operational Measurements Date: (month dd, 19yy)

Data collected from : mm/dd/19yy hh:mm until : mm/dd/19yy hh:mm

VIRTUAL FACILITY GROUP NAME					CALLS BLOCKED			
Clli	User Defined Name	Origination Attempts	VFG Usage	Num Members	Lack of Resources	Code Block	Total	% Blocked
xxxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxxxxxx	nnnnn	nnnnn	nnnnn	nnnnn	nnnnn	nnnnn	nn
xxxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxxxxxx	nnnnn	nnnnn	nnnnn	nnnnn	nnnnn	nnnnn	nn
xxxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxxxxxx	nnnnn	nnnnn	nnnnn	nnnnn	nnnnn	nnnnn	nn
xxxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxxxxxx	nnnnn	nnnnn	nnnnn	nnnnn	nnnnn	nnnnn	nn

450-0166a

Fig. 6-17
A Detail Page of a Virtual Facility Group Usage Report

Virtual Facility Group Usage Reports

6.105 A virtual facility group usage report shows how busy each virtual facility group (VFG) was during a particular time period and how many calls that attempted to use it were blocked. Some of the operational measurements for virtual facility groups are similar to corresponding measurements for trunk groups.

The Detail Pages

6.106 Each line on a detail page (Fig. 6-17) of a virtual facility group report shows operational measurements for one virtual facility group.

6.107 ***Virtual Facility Group Name.*** Each virtual facility group is identified by two different names:

CLLI	Common language location identifier. This is a code that the telephone company uses to identify the customer group.
Name	This is the customer name for the customer group.

6.108 ***Origination Attempts.*** This value shows how many calls tried to use the virtual facility group, whether the attempts were successful or not. The number of successful attempts is equal to

Origination Attempts - Total Calls Blocked

6.109 Other columns in the report show why some calls were blocked.

6.110 ***VFG Usage.*** This column shows the number of times members of the virtual facility group were busy when they were scanned at 100-second intervals. The unit of measurement is CCS, which stands for "Centum Call Seconds" or "Hundred Call Seconds". To interpret this figure, follow these steps:

(1) Determine how long a time period the report covers. This information is shown as part of the summary information on the last page of the report.

(2) Calculate the hourly traffic usage. This is equal to

VFG Usage/ number of hours report covers

(3) Calculate how busy each member of the virtual facility group was, on average, by performing the calculation

hourly traffic usage / number of members in VFG

(4) Consider how close the answer in step 3 is to 36 CCS, which is the maximum traffic load for one VFG member for one hour.

6.111 This value provides an indication of whether the group has too many or too few members. A high or low level of utilization over an extended period of time may indicate the need to increase or decrease the number of members.

6.112 ***Num Members.*** This column lists the number of members in a virtual facility group.

6.113 ***Calls Blocked - Lack of Resources.*** This column shows how many calls were blocked because all members of the virtual facility group were busy. To determine the percentage of call blocked due to lack of facilities, use the formula.

(Calls Blocked - Lack of Resources) / Origination Attempts

6.114 If there are consistently large percentages of blocked calls, the number of facilities in the group should probably be increased.

6.115 ***Calls Blocked - Code Block.*** This value shows how many calls were blocked by line screening code restrictions.

6.116 ***Calls Blocked - Total.*** This column is the total of the preceding two columns.

6.117 ***Calls Blocked - % Blocked.*** This column shows what percentage of calls that attempted to use the virtual facility group were blocked. The calculation is

Total Calls Blocked / Origination Attempts * 100

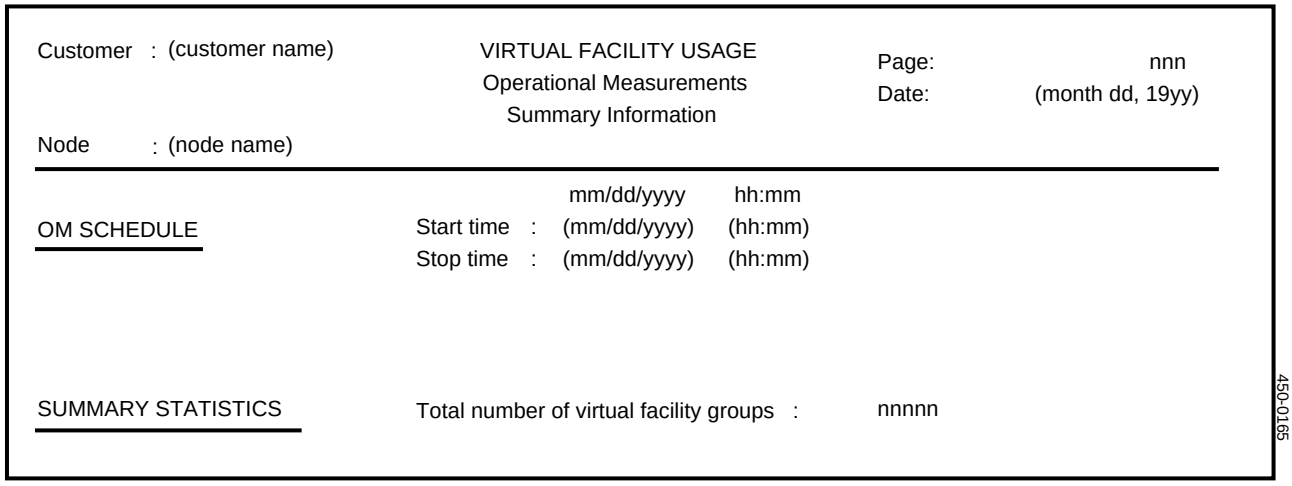


Fig. 6-18
A Virtual Facility Group Usage Summary Page

The Summary Page

6.118 The summary page (Fig. 6-18) of a virtual facility group usage report shows how many virtual facility groups were monitored and when they were monitored.

Customer : (customer name) PEAK VIRTUAL FACILITY USAGE Page: nnn

Operational Measurements Date: (month dd, 19yy)

VIRTUAL FACILITY GROUP NAME		Peak Period					CALLS BLOCKED			
Clli	User Defined Name	From	To	Origination Attempts	VFG Usage *peak*	Num Members	Lack of Resources	Code Block	Total	% Blocked
xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxxxxx	hh:mm	hh:mm	nnnnn	nnnnn	nnnnn	nnnnn	nnnnn	nnnnn	nn
xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxxxxx	hh:mm	hh:mm	nnnnn	nnnnn	nnnnn	nnnnn	nnnnn	nnnnn	nn
xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxxxxx	hh:mm	hh:mm	nnnnn	nnnnn	nnnnn	nnnnn	nnnnn	nnnnn	nn
xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxxxxx	hh:mm	hh:mm	nnnnn	nnnnn	nnnnn	nnnnn	nnnnn	nnnnn	nn

450-0185a

Fig. 6-19
A Detail Page of a Peak Virtual Facility Usage Report

Peak Values Detail Pages

6.119 A peak virtual facility usage report (Fig. 6-19) shows when each virtual facility group had its highest (peak) value for VFG usage, and what the peak value was. This information is recorded in the fields

Peak Period From

Peak Period To

VFG Usage *peak*

6.120 All other fields on the report are similar to the fields on a regular virtual facility group Usage report, except that instead of showing total values for the entire testing period, they show the values for the time interval during which the peak usage was recorded.

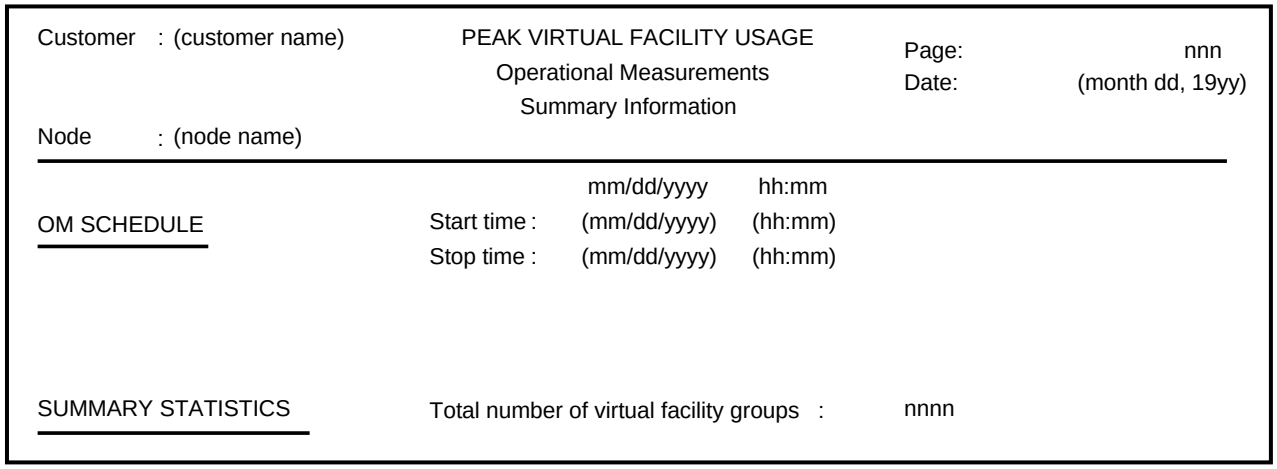


Fig. 6-20
A Peak Virtual Facility Group Usage Summary Page

The Summary Page

6.121 The summary page (Fig. 6-20) of a peak virtual facility group usage report shows how many virtual facilities were monitored and when they were monitored.

7. BNM USER INTERFACE

TERMINALS

7.01 Two kinds of terminals can be used to communicate with a DNC system:

- M4000-series terminals
- VT100 or compatible ASCII-type terminals

7.02 The standard terminals for DNC-100 and DNC-500 systems are the Northern Telecom M4000-series. These terminals come in two forms:

- M4010 terminals
- M4020 terminals (BNM does not support the voice features of these terminals. However, the M4020 terminal is required if an audible alarm signal is desired.)

7.03 ASCII-type terminals compatible with Digital Equipment Corporation's VT100 are somewhat restricted in screen size and keyboard functions compared with the M4000-series terminals. Both types of terminals provide output in the form of a display screen, with graphics capabilities for highlighting text. Input to both types of terminals is via a keyboard.

Connecting the Terminal

7.04 Terminals must be connected to the appropriate LANlink ports, according to the installation job work sheets and procedures explained in 450-1011-201. After system installation, the initialization must be completed as detailed in 450-1011-301. Following initialization, a terminal is ready for use.

Turning a Terminal On and Off

7.05 The M4000-series terminal is not turned on in the conventional sense. When it is receiving power in the idle state, the terminal screen is dark. To activate the screen, press any hardkey (preferably the SHIFT key). The screen is also activated if the system sends messages to the terminal.

7.06 The M4000-series terminal is not powered down. The terminal screen automatically darkens after a period of inactivity to extend the life of the screen.

7.07 VT100-type terminals are provided with power switches to turn them on and off.

Key Types

7.08 The terminals used with the system have different keyboards. Figure 7-1 shows the features of the M4000 terminal, including the keyboard, and Figure 7-2 shows the layout of a VT100 keyboard.

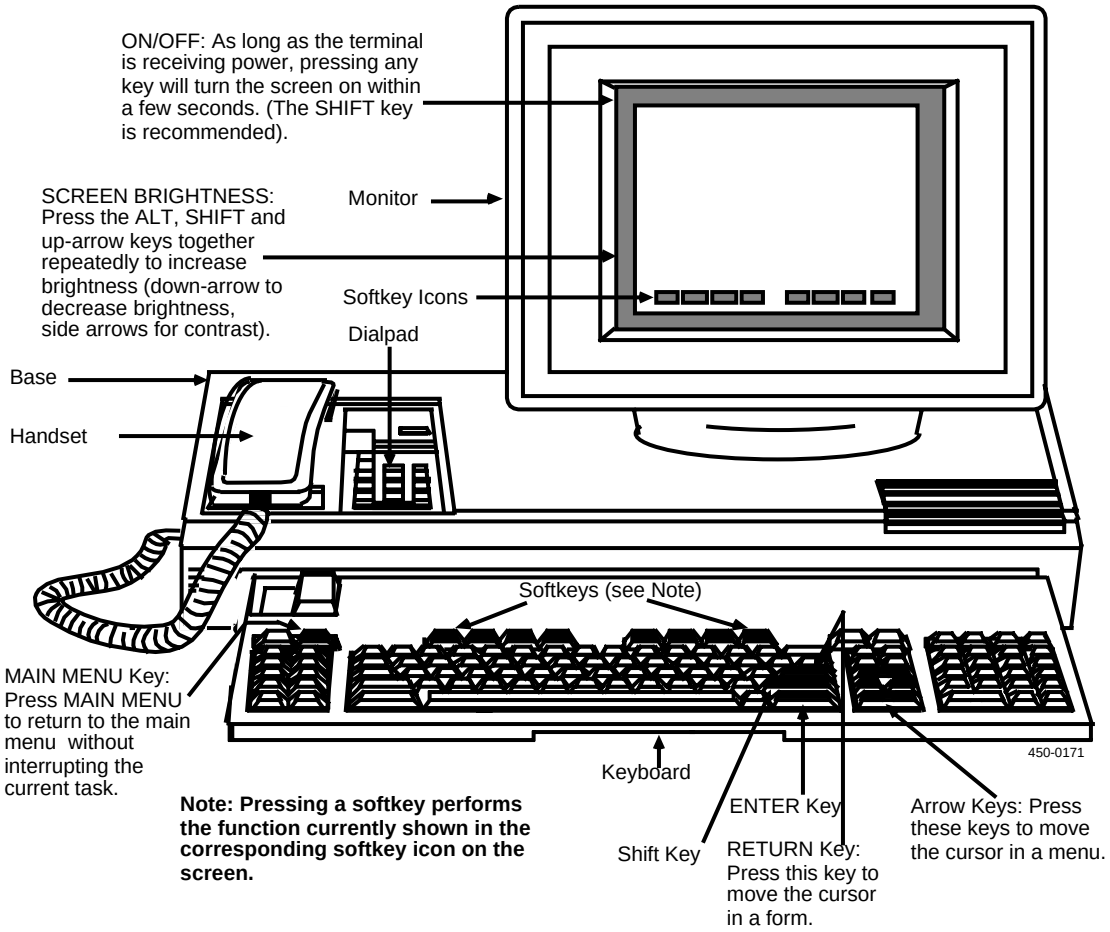


Fig. 7-1
The Components of an M4020 Terminal

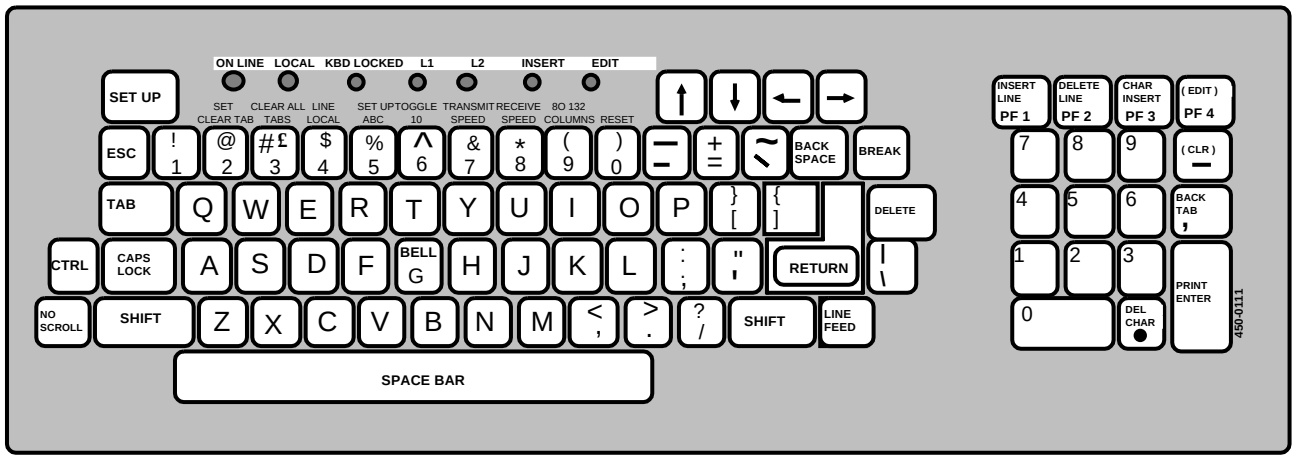


Fig. 7-2
The VT100 Keyboard

7.09 The keys used to operate the system are grouped into two types:

Hardkeys These keys are the commonly used keyboard keys. Their function does not vary and their name is usually designated on the key. Examples are ENTER and RETURN. (In this publication, hardkey names are given in UPPERCASE.)

Softkeys The system uses eight softkeys. Their function depends on which display is currently on the terminal screen, therefore, they have no designations on the keys themselves. Their current designations are shown by a row of eight box icons at the bottom of the screen display. (The softkeys on the M4000-series terminals are in a row directly below the screen.) The name in each box indicates the function of the corresponding softkey on the keyboard. (In this publication, the designated name is given in mixed case, and bracketed by the less-than and greater-than symbols; for example, <Exit Service>.)

7.10 Most hardkeys are appropriately labeled on M4000 terminals, and special keys are provided for the softkey functions. VT100 terminals, however do not have many of these hardkeys and softkeys. See 450-1021-312 for detailed instructions concerning the keys and key combinations required on the VT100 to use the system's hardkey and softkey functions.

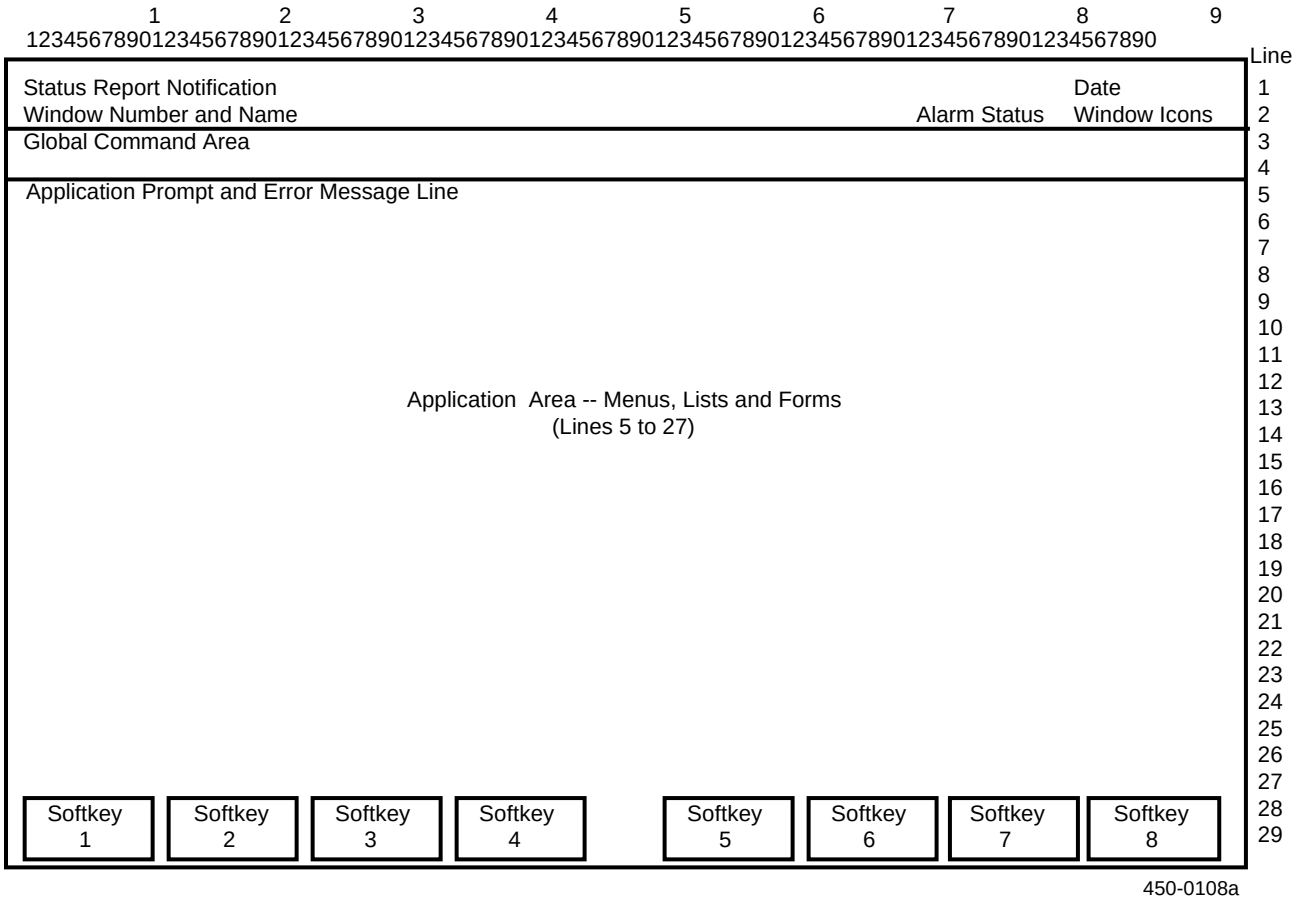


Fig. 7-3
The Screen Layout of an M4000-series Terminal

Screen Layouts

Note: The screen layout for M4000-series consoles is based on a screen size of 29 lines by 90 columns, while the size of a VT100 screen is 24 lines by 80 columns.

7.11 The terminal screen is divided into several areas that show different types of information (see Figs. 6-3 and 6-4):

(a) Notification Area. Lines 1 and 2. Contains the following:

- Status Report Notification (notification of changes in status of network components).

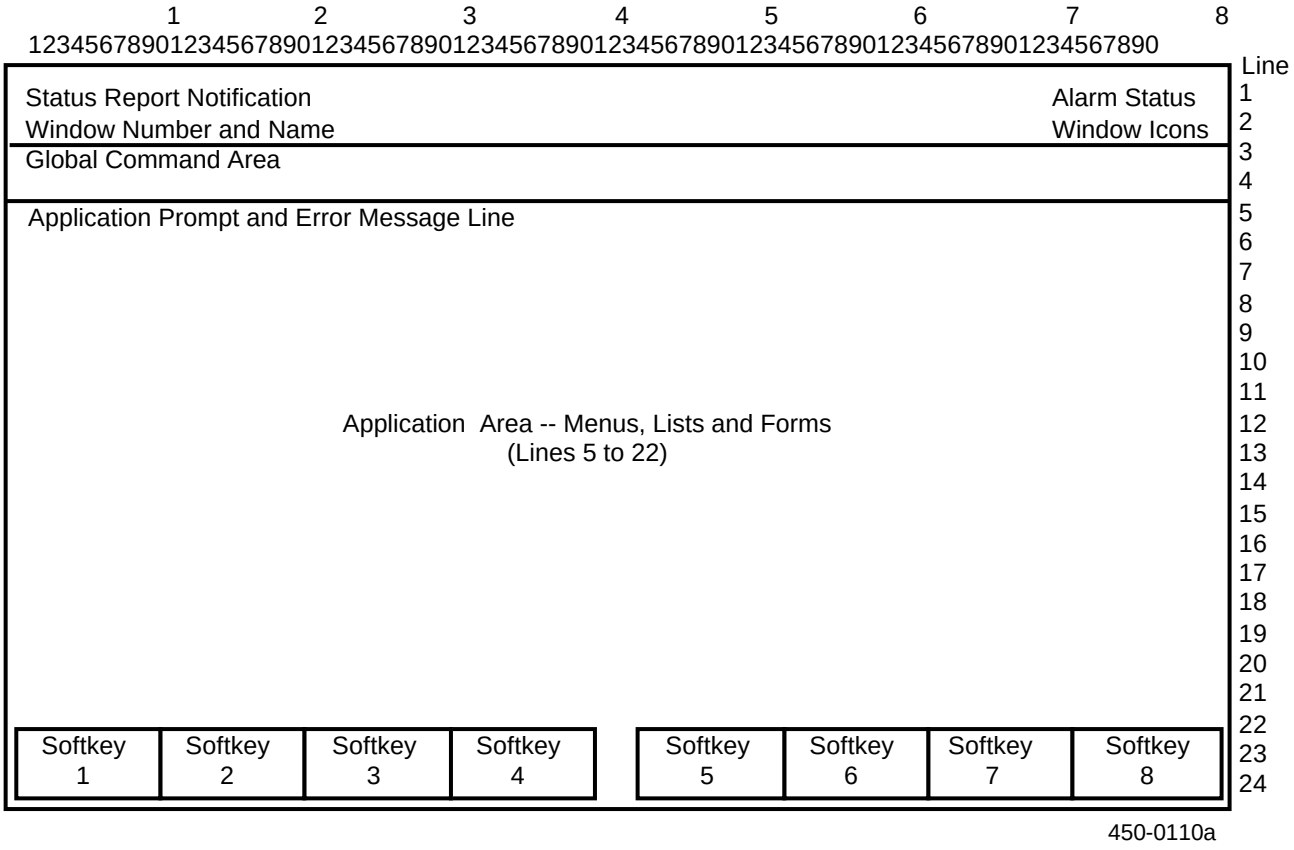


Fig. 7-4
The Screen Layout of a VT100 Terminal

- Window Number and Name (the activity name as it appears on the main menu and a number that indicates when the window was opened in relation to other open windows; that is, 1 for the first window opened, 2 for the second, and so on)
- Date and Time
- Alarm Status (the number of currently outstanding alarms, displayed in the form CnMnMn. The number after the C shows the number of Critical alarms, the number after the first M shows the number of Major alarms, and the last number shows the number of Minor alarms).
- Window Icons (one number for each currently open window).

(b) Global Command Area . Lines 3 and 4. The cursor is positioned at line 4 when the Command hardkey is pressed with a command request displayed on Line 3. A command can then be entered to return to a suspended activity window.

(c) Application Window Area. Lines 5 to 27 (and 80 columns in width) on the M4000-series terminals; lines 5 to 22 on the VT100. Presents information relating to an application, such as the following:

- **Application prompt and error response area (line 5).** Suggests an action the operator may take at that point or displays an error message in response to an inappropriate action.
- **Menu, list or form display.** The main body of the screen contains a menu, list or form. These three screen types form a hierarchy of screens. Items selected from menus open to submenus or lists. List items open to a form display designed to record the attributes of the selected item.

(d) Softkey Area. Lines 28 and 29 on the M4000-series terminals; lines 23 and 24 on the VT100. Presents a simulation of the eight softkeys at the top of the console keyboard. The softkey displays are labeled according to functions available to the operator at a given point. The softkey functions change as the operator progresses through the menu levels and performs different operations.

SOFTKEYS

7.12 Softkey functions are displayed in the icons at the bottom of the screen. The softkeys simplify command entry by relieving the user from typing each command.

7.13 The following basic softkey functions are performed the same way for all features:

(a) <***Sign Off***> allows the user to sign off.

(b) <***Show Next***> ***and*** <***Show Previous***> are displayed if there are more list items than can be displayed on one screen. These softkeys provide forward and backward page-by-page scrolling. When adding items to a list of less than one page, new items may not be displayed until <***Show Previous***> is pressed. This is because items are listed in alphabetical order and the list is constructed using the first line as a reference point. For example, if a component is assigned a name beginning with the letter A, but the first item in the list has a name beginning with the letter B, the newly added item is displayed by paging backwards using <***Show Previous***>**.**

(c) **<*Add*>** is displayed with lists when the user is allowed to create items of the type belonging to that list. When the form is completed and saved, a new item is added to the list.

(d) **<*Change*>,** when available, is displayed with lists when the user is allowed to change the list entry that has been selected. When the form showing the existing information is overwritten and saved, the changed item is substituted for the existing item in the list.

(e) **<*Done*>** saves the information just entered or changed on the form. The user can then fill in the form again for another entry.

(f) **<*Delete*>** is used to delete an item from the database. The item is selected (highlighted) on the relevant list and **<*Delete*>** is pressed. The system deletes the highlighted item, or (in certain tables) requests confirmation of the deletion request. In the latter case, **<*Delete*>** must be pressed a second time before the item is deleted. To abort the delete request, press the ENTER key or any other functional softkey when delete confirmation is requested.

(g) **<*Exit*>** is displayed with all screens except the main menu to allow the user to leave the current screen and return to the immediately previous screen. When used with an “Add” form **<*Exit*>** aborts the addition of the form. When used with a "Change" form, it aborts any changes made to the form.

WINDOWS

7.14 In a typical network operations environment, each user normally carries out one activity while waiting for another activity to be completed.

- ***Example:*** A user might be involved in setting up a schedule for reports to be printed during the week. During this operation, the user might want to switch to Logs to view the last few messages. The user would like to leave the report schedule in its current partially-modified state and go to Logs. Then, the user wants to come back to the report schedule and continue where the activity was left off.

7.15 Thus, the operating environment of the typical network user might be characterized as follows:

- the user has many activities under control at one time
- the user is currently involved with one activity
- the rest of the activities are also active
- the user wants to start new activities on demand without sacrificing or stopping what is currently being done

- the user wants to switch at will from one activity to another without putting them on hold
- any activity can be terminated in the normal way

7.16 The windowing feature of BNM is designed to facilitate this type of operation. Up to six activities can be active at once at a terminal that is being used with the BNM system.

7.17 When an activity is started, such as accessing a menu item for viewing or changing, the system creates a "window" for that activity. This window amounts to a separate "terminal" devoted to that activity. If several activities are happening on a terminal, the user can switch between them, displaying them one at a time, to see how they are progressing or to work with them. The window remains in existence (even after an activity is completed) until the user exits to the main menu using the <Exit> softkey.

7.18 A user engaged in a terminal activity can create a new window by pressing the MAIN MENU hardkey. The system returns to the main menu, but does not interrupt the activity. When the user selects an item from the main menu, a new window is created showing the new activity. Each new window is assigned a number in the order in which it is created. All the window numbers appear at the top right hand corner of the screen, and the window number of the activity currently shown is highlighted.

7.19 Pressing the WINDOW hardkey clears the current screen display and displays the window that is next in numerical sequence. Pressing the SHIFT and WINDOW hardkeys simultaneously will display a menu list of all existing windows, from which any window can be selected.

7.20 When an activity is terminated by returning to the main menu, and one or more other windows still exist, the softkey <Return To Window> is displayed. Pressing the softkey will display the next activity window in the set of windows still open.

MENUS

7.21 Input and output for BNM is done by means of the menus and softkeys that are displayed on the terminal screen. Menus are lists of items or "objects" that are displayed together on the screen. Objects may be other menus, (DMS or DNC) nodes, certain system data files or tables, or system jobs.

7.22 Selecting Objects from Menus. An object must be selected before a function can be performed on it. The selected object is highlighted to identify it to the terminal user. The user can select another object by pressing arrow keys to change the object that is

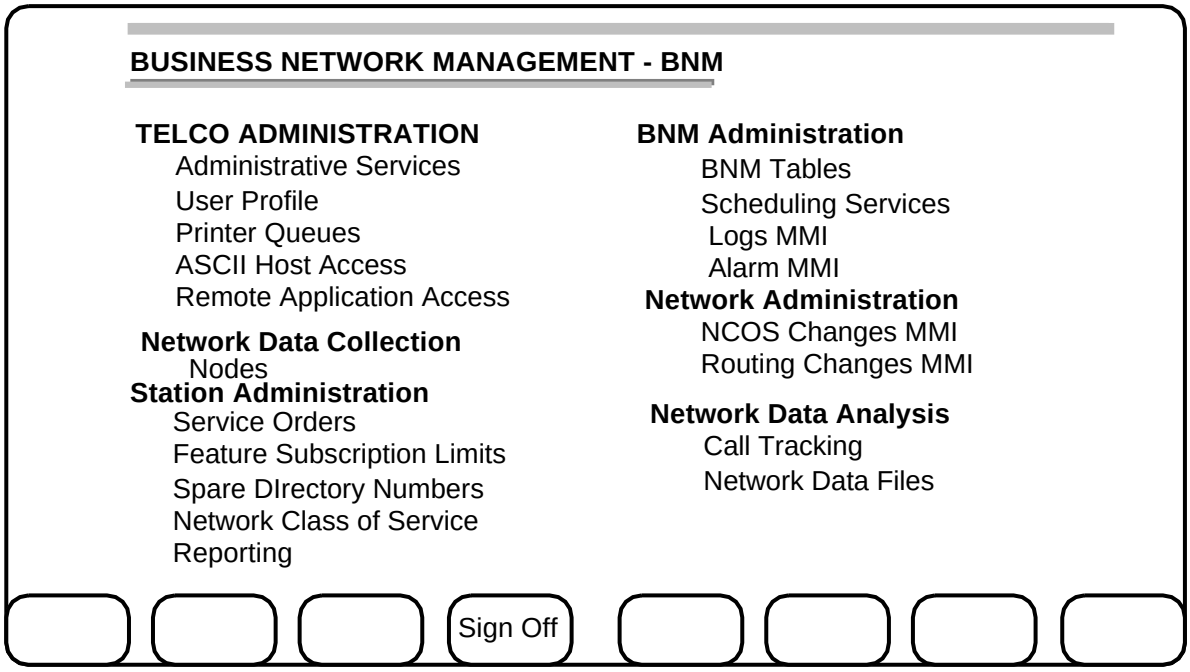


Fig. 7-5
A Sample BNM Main Menu

highlighted. Pressing the up-arrow key moves the highlighting to the object above the currently highlighted object, pressing the right -arrow key moves the highlighting to the object to the right of the currently highlighted object, and so on.

7.23 Performing Functions on Objects. Once an object has been selected, the user can press either the ENTER hardkey or a softkey to perform a function on the object.

7.24 List Menus. A list menu shows each entry of a table in a row, with the fields of the entry arranged in columns. The user can select an entry by pressing arrow keys to move the highlight up or down. If a list is long enough to extend over several pages, <Show Next> and <Show Previous> softkeys are displayed. When the entry is selected, a softkey can be pressed to act on the selected entry.

7.25 Menu Levels. Two types of menus are used on a DNC system: fixed menus and table or list menus. Fixed menus lead directly to a predetermined set of objects. Table menus provide variable lists of objects.

7.26 The first, or "top" menu of available services for BNM is the BNM main menu, an example of which is shown in Fig. 7-5. The BNM main menu can be configured in many forms to suit the user's needs. It introduces a fixed set of major objects, or groups of objects, that can be selected. These objects are mainly other BNM menus, which are usually

divided into the following groups on the main menu:

- BNM administration
- Network administration
- Network data analysis
- Network data collection
- OSS Services (not shown in Fig.7-5)
- Station administration

7.27 Each of the menus in these groups steps the user through a particular activity beginning at the broadest level of interest and progressing to a specific task.

BNM Administration

7.28 BNM Tables: The BNM Tables menus provide windows for reviewing and updating:

(a) Installation Tables: Maintaining the DNC datafill for BNM.

(b) Facility Ownership: Maintaining ownership assignments for Trunks, Customer Groups, Virtual Facility Trunks, Subscriber Line Usage, and Attendant Subgroups.

7.29 Scheduling Services: scheduling the one-time or regularly repeated automatic performance of certain jobs on the system.

7.30 Alarm MMI: The Alarm MMI (Man-Machine Interface) provides windows for viewing major, minor, and critical system alarms. This basic feature of the DNC is explained in 450-1011-301.

7.31 Logs MMI: The Log MMI provides windows for viewing system log messages. This basic feature of the DNC is explained in 450-1011-301.

Network Administration

7.32 The network administration group includes menus and screens that provide the following functions:

(a) NCOS Changes MMI: for making changes to the NCOS files.

(b) Routing Changes MMI: for making changes to the routing plan.

Network Data Analysis

7.33 The Network Data Analysis group includes menus and screens that provide the following functions:

(a) Call Tracking: tracking the trunks used for particular calls in order to isolate them, or repair them, or both.

(b) Network Data Files: listing and retrieving data files at this and other DNCs.

Network Data Collection

7.34 Nodes: The Nodes feature provides an interface to the DMS nodes. It can be used to

(a) establish a logical data link to a node and set up a transaction channel for communication between the node and the DNC

(b) start and stop continuous data collection from a node or another DNC

(c) perform a demand transfer of a data file from a node or another DNC (available on DNC-500 systems only).

OSS Services

7.35 The optional OSS services functions, available only to DNC-500 systems, are described in the following publications:

- ISDN LMOS (through CRAS) interface 450-1021-141. This publication describes the interface, between the DNC-500 and the Cable Repair Administration System (CRAS), for transfering maintenance data. CRAS is then used to transfer the data to the Loop Maintenance Operating System (LMOS) for use by maintenance personnel.
- OSS automatic station administration change update 450-1021-142. This publication describes the interface, between the DNC-500 and the computer system for mainframe operations (COSMOS). COSMOS is used to collect data from the station administration recent changes (SARC) files.

Station Administration

7.36 The optional station administration functions are described in detail in the appendix to this document (Appendix 1 to 450-1021-102).

BNM FORMS AND DATAFILL

7.37 From a menu, some softkeys (such as <Add>) result in the display of a form. A form shows the various fields for possible entries in the related list and, in some cases, contains fields not shown in the list. The fields in a form show an entry as currently defined, and the user can type new information over the old. In the case of new entries, the form fields are initialized with blanks.

7.38 As in a menu, softkeys are used to perform any actions within a form.

7.39 In some cases, the system displays a “query” form before listing the entries in a table. Filling in this form allows the user to narrow down the listing to only those items of particular interest, such as records from a particular node, or of a certain type. The Query Form can generally be left blank if all entries in the table are to be listed.

THE NODES OPTION

7.40 The Nodes option on the BNM main menu allows a DNC-100 user to collect SMDR, ATT, KT, and OM data that is generated by the DMS nodes in the user's network. The telephone company's DNC-500 collects the data directly from the nodes, then the DNC-100 collects it from the DNC-500. The DNC-100 has two ways to collect the data from the DNC-500:

Continuous Collection (Real-time Transfer) — This is the normal method of operation. When the user requests continuous collection, the DNC-100 begins collecting all types of data files from the DNC-500 as they become available.

If the DNC-100 starts continuous collection while the DNC-500 is not collecting from a node, the DNC-100 goes into a "wait" state. When the DNC-500 starts collecting from a node, the DNC-100 starts collecting from the DNC-500.

Demand Transfer — This is generally used to request old, archived data or to recover data that was received through continuous collection but was accidently erased. The user can request a particular file or list the available files and select one.

7.41 A demand transfer request cannot be made during continuous collection and continuous collection cannot be started until all demand transfers have finished.

Operation

7.42 When a DNC-100 user selects the Nodes option from the BNM main menu, the next display shows a list of the nodes from which data is available. The user must then select a node and press the <Logon> softkey. Although it appears that the DNC-100 is logging on to the node, actually the DNC-100 is logging on to the DNC-500 and requesting data that came from a particular node. The DNC-100 then displays a screen that shows the status of the communication channels between it and the DNC-500. There are two channels:

(a) ***Administration Channel*** This is the channel that the DNC-100 uses to communicate with the DNC-500. Its status can be one of:

Available	The channel is open and ready for use. Data collection can be started if the data channel is available.
Unavailable	The channel is not available. Data cannot be collected because the DNC-100 is unable to communicate with the DNC-500.

(b) ***Network Data Channel*** This is the channel that the DNC-100 uses to collect all types of data files (SMDR, ATT, KT, and OM) from the DNC-500. The channel's status can be one of four values:

Available	The channel is available. Data is not being sent at this time, but can be sent if requested.
Unavailable	The channel is not available, so data cannot be collected at this time.
Collect	Continuous collection of data is in progress. The DNC-500 is transferring relevant data files to the DNC-100 as it receives data from DMS nodes. At any given time, the type of data being transferred may be SMDR, ATT, KT, or OM.
Demand Transfer	A demand transfer is in progress. One file is being transferred from the DNC-500 to the DNC-100. This screen does not show what type of data that file contains.
Recovery	The system is attempting to re-establish data collection on this channel after an interrupt.
Not Enabled	This channel is not enabled because a minimum session logic is in effect, and there are no customers who require this type of data from this node (according to the installation profile tables).

7.43 The user can use the following softkeys to administer the channels:

- **<*Start Collect*>** For the data channel, this softkey starts continuous collection of data from the DNC-500. This softkey is not valid for the administration channel. Continuous collection continues until the user stops it, or until something goes wrong. The DNC-100 recognizes and informs the user of faulty data and failures in the communications links. It stops data transfer if it encounters faulty data. If a link fails, the DNC-100 automatically logs off from the DNC-500. The user can recover any lost data by performing a demand transfer (see Remotes later in this publication).
- **<*Stop Collect*>** For the data channel, this softkey stops continuous collection of data. <Stop Collect> cannot be accepted until <Start Collect> has been fully processed and set up by the DNC. <Stop Collect> is not valid for the administration channel.
- **<*Disable Feature*>** For the data channel, this softkey is equivalent to <Stop Collect> and <Log off>. For the administration channel, it makes the channel unavailable.
- **<*Enable Feature*>** This softkey reopens the channel after <Disable Feature> has been used.

7.44 Once data collection has started, the window for the activity need not be kept open. Activity windows are required only for starting and stopping data collection, and for querying the status of data collection.

THE BNM TABLES OPTION

7.45 The BNM Tables option on the BNM main menu gives a DNC-100 user access to the DNC-100's BNM data tables. These tables record such things as the names of the trunks and the nodes in the user's telephone network. The DNC-100 uses this information to communicate with the DNC-500 and to process the data it receives.

7.46 The DNC-100's data tables are set up by the telephone operating company when the DNC-100 is installed. Users can display these tables for the following:

- add, change, or delete entries in a table
- change the password that is registered in the DNC Owner Profile table

Facility Ownership

7.47 The Facility Ownership Tables identify to the DNC which facilities on DMS nodes are used by the customer's network. They show both the DMS node names for the facilities and their owner-defined names. There are five facility ownership tables on a DNC-100:

(1) Attendant Subgroups Table

(2) Customer Groups Table

(3) Subscriber Line Usage Table

(4) Trunk Ownership Table

(5) Virtual Facility Trunks Table

Installation Profiles

7.48 The Installation Profile tables register information about the customer who owns the DNC and identify to the DNC which nodes and features the customer's network uses. There are five installation profile tables:

DNC Owner Profile	This table registers the owner of the DNC-100. The owner has access to all functions of the DNC-100 and to the data transferred to that DNC-100 from the operating company's DNC-500. The owner can change the password that is recorded in this table for access to the DNC-500.
Feature Profile	This table registers the types of feature data (such as SMDR or ATT) that the DNC-100 collects from each node. Each combination of feature and node requires a separate entry in this table.
Masks	The Mask table is a list of telephone numbers. These numbers identify stations for which called numbers are masked on Station Message Detail (SMDR) records. The entries are shown as ten-digit numbers that include an area code. The DNC-100 user can use the Mask table to view current entries and to check whether a particular entry is in the table. The telephone operating company can also add and delete entries.
Node	This table identifies the nodes on which the customer's network has dedicated facilities, and lists the attributes of those nodes.
Other DNC	This table identifies the DNC-500 to which this DNC-100 is connected. It also lists the DNC-100 itself.

THE CALL TRACKING OPTION

7.49 The Call Tracking option (this feature is not the same as the "Call Trace", a DMS feature) on the BNM main menu allows the user to perform Call Tracking. Call Tracking is used to identify the trunks and facilities that were used for a particular call that is no longer in progress. This feature is intended for maintenance use in tracking complaints about such things as noisy lines and cutoffs that involve faulty lines or trunks.

7.50 Call Tracking tracks calls by using the SMDR records stored on the DNC's hard disk. Most calls, including incomplete calls, generate at least one record. Using SMDR records permits calls to be tracked with information about either the originating end or the terminating end.

7.51 SMDR records are normally stored on the DNC's internal hard disk for three business days. This retention period can be adjusted by Northern Telecom to suit customers' requirements. If tracking is required on records that are older than the retention period, a demand transfer can be done to transfer the data files from the node to the DNC-500 and then from the DNC-500 to the DNC-100.

7.52 The maximum number of instances of Call Tracking in progress on a BNM system at any one time is normally 2. Northern Telecom personnel can increase this maximum up to 8 concurrent instances on request.

7.53 Call Tracking can be performed by both DNC-100 and DNC-500 users. The system searches for records that match criteria entered by the user, then displays the records to the user on the terminal. While there is no provision for dumping copy to the system printer, a printer can be attached to any terminal used in order to print screens. Numbers designated for masking are shown in masked form.

Operation

7.54 To operate call tracking, the user selects "Call Tracking" on the BNM main menu, then fills in a form with as much information as possible about the call that is to be tracked. This information includes the following:

(1) the approximate terminating date and time of the call (Call Tracking can track calls that extend over midnight or a new month or year)

(2) the DMS node that tracking is to begin on. Help is available at this stage from a <Show Nodes> softkey.

(3) a time “window” (in minutes, up to 480). This time window is evenly divided around the terminating time. The window allows the DNC to widen the search around the terminating time in 15 minute intervals as required until the window limit is reached.

(4) either an originating identifier or a terminating identifier. Identifiers can be in the form of:

- the 10-digit number of either the calling or the called telephone
- the trunk information, if known, which includes the trunk group's CLLI identifier and the 5-digit member number, if known

7.55 When this data has been entered, the DNC searches through its SMDR data files for matching records. All such records are displayed on the screen, and the user can identify the one which most closely matches the trouble ticket. The user can then examine details of the selected record to identify facilities used in the call.

Continuing to Other Nodes and Backtracking

7.56 If a tracked call terminates on a trunk that connects to another DMS node within the same network, the user can extend Call Tracking into that node.

7.57 The user selects the record which most closely matches the trouble ticket and presses the <Continue Tracking> softkey. The DNC uses its own data tables to translate the trunk appearance from the first node to an appearance at the new node, and continues tracking at the new node. This can be repeated over several nodes.

7.58 If the user wishes to go back to a previous stage in the tracking process, he or she may press the <Back Track> softkey. The system reverses the tracking process and displays matched records at the previous node again. The user then may make another selection and continue tracking, or may backtrack again to the results of an even earlier stage. Pressing the <Cancel Track> softkey brings the user back to the original screen at which he or she may change the parameters for the track from the original DMS node.

Feature Interactions

7.59 Call Forward. As an example of the advantages of tracking across multiple nodes, assume that set A calls set B, but set B is "Call Forwarded" to set C. If Tracking is started on set A, Call Tracking will display the record from A to B but not the one from B to C. To find the record from B to C, tracking would have to be started on set B, using the node information for B identified in the original track. When the second tracking process is finished, the records from B to A or B to C would be displayed, depending on which is entered as the originating or terminating number.

7.60 Special Billing. If a track is done using an originating DN which has a Special Billing DN, the track will show the Special Bill number, not the actual DN from which the call was made.

7.61 Conference Calls. Since conference call SMDR records from the node have the numbers masked out by the letter "A", Call Tracking will not find such records.

7.62 Dialing versus Outpulsing. If the number outpulsed is different from the number dialed, the user should enter the number dialed, since this is the number that is tracked.

THE REMOTE DNCS OPTION

7.63 The "Remote DNCs" option, accessed by selecting Network Data Files on the main menu, enables a DNC-100 user to

- log onto a DNC-500 to recover files that have already been collected but are required again for some reason
- log onto another DNC-100 owned by the same customer to access its feature data and use the data in the generation of reports or tapes for the entire customer network of DNC-100s

7.64 If a DNC-100 user wants to retrieve files from a remote DNC, the DNC-100 must first be logged-on to the node from which data was collected.

7.65 When a DNC user then selects the item Remote DNCs, the system responds by displaying a list of the accessible remote DNCs. The systems are identified by the operating company or customer name.

7.66 The user can select the remote DNC to be accessed, then press the ENTER key to log onto the remote and access data. File partitions are listed in the same format as for Feature Data.

7.67 The user can select a file partition and press <Retrieve>. The data is copied to the user's DNC holding disk, but is left undisturbed on the other disk.

THE SCHEDULING SERVICES OPTION

7.68 The Scheduling Services option on the BNM main menu leads to a DNC Scheduling Services menu that provides the following options:

Jobs Timetable	This option is used to schedule, list, and make changes to routine jobs that take place automatically on a daily, weekly, or monthly basis. For example, a daily job might be scheduled to start every 180 minutes between 0800 and 1559, and every 360 minutes between 1600 and 2400. The job is automatically carried out at these times every day.
Jobs Scheduled	This option is used to examine and make changes to the job queue. The job queue shows the next scheduled occurrence of each job in the timetable. A change to the job queue affects only one instance of a scheduled job. For example, if the 0800 occurrence of the job in the preceding example is cancelled, the 1100 occurrence (180 minutes later) and all occurrences after that will still take place.

Jobs Timetable

7.69 The types of jobs that can be scheduled in the jobs timetable are:

PRINT A PRINT job produces a printed report. The user defines the type of data to be reported and the DMS node that it is to be taken from. When the job runs, all data accumulated since the last printing is used to compile the report. Printed reports can be produced for ATT, KT, and OM data, but are not available for SMDR data.

TAPE A TAPE job generates a tape of SMDR data from a specified DMS node. The tape contains all SMDR data from the specified node that has accumulated on the DNC since the last time the job ran.

ADMIN The ADMIN job deletes old data from the DNC's disk after the retention period has passed. For example, if the retention period is 2 days, the ADMIN job deletes any data that is more than two days old. The default retention period is 3 days, but this can be changed by Northern Telecom on a per-datatype basis to suit customers' requirements.

The ADMIN job also creates new directories on the DNC's disk for the data that is to be collected the following day.

The ADMIN job should be scheduled to run once every day some time before the disk audit that takes place automatically at 3 AM. The disk audit reclaims the space used by the data that the ADMIN job has deleted.

PEAK A PEAK job produces a printed report of peak values for trunk group (TRK) or virtual facility group (VFG) operational measurements data collected during the current day. The system scans the TRK or VFG data for the day and produces a report that shows the point of peak traffic on each trunk during that day.

SPOOL A SPOOL job transfers (spools) SMDR data from the DNC to a printer or computer. Data is spooled over a dedicated modem link which must be connected to an RS-232C port on the DNC and must be available at all times.

SOP A service order processor (SOP) job processes service orders that have been entered through the station administration feature. (See Appendix 1 to 450-1021-101 for a description of station administration.)

SADBSYNC This type of job schedules station administration database synchronization (SADBSYNC), an incremental database upload discussed in Appendix 1 to 450-1021-311. Synchronization uploads all the customer groups of a given customer and node. Synchronization opens the database in exclusive mode, so it should not be scheduled to conflict with any other job that needs to open the database.

DiskMon A DiskMon job commences a monitor function of disk consumption levels. The levels are contained in the two tables DMOP and DMUDF. Log reports are generated, and alarms sounded whenever disk consumption exceeds the defined levels.

7.70 One further job that is listed in the jobs timetable is the OMFA. This job cannot be scheduled by the user.

OMFA The OMFA job is scheduled automatically, at 2.00 in the morning, by the job scheduler. This job is an audit of the OM files to delete the previous days collection of OM data. The job scheduler can be inspected to verify that the OMFA job has been scheduled. If the OMFA job is not listed, reboot the JS PRU.

7.71 When Jobs Timetable is selected, a Query screen is displayed. There the user can fill in fields to specify which existing jobs are to be listed on the next screen, or leave the fields blank and move immediately to the next screen. The next screen, the Scheduler Timetable, displays all jobs that correspond to the entries made on the Query screen. The user can press <Add> to add a new job to the schedule.

7.72 The information that is displayed about existing jobs and that must be entered to add a new job includes:

Job Type The type of job, such as PRINT or SPOOL. There can be only one function for each job.

Node The name of the DMS node, as defined in the DNC's Node Table, from which data is collected for the job. This field is left blank for ADMIN jobs.

Data Type The type (and, for OMs, the subtype) of data that the job collects. This field is left blank for ADMIN jobs.

Frequency The frequency with which the job is carried out by the system: daily, weekly, or monthly.

Daily A daily job is carried out one or more times a day, and adheres to the same schedule every day, 7 days a week.

Weekly A weekly job is carried out one or more times a week, and adheres to the same schedule every week, 52 weeks a year.

Monthly A monthly job is carried out one or more times a month, and adheres to the same schedule every month, 12 months a year.

Timespecs

7.73 Associated with each job in the DNC Scheduler Timetable is a table of "timespecs". The timespecs show when the job starts, how often it runs, and when it stops each day. Multiple timespecs (up to eight) allow the schedule of the job to be varied at different times of the day and on different days of the week or month. Different timespecs may not overlap each other's start and end times.

Note: Start times and periods of repetition should be calculated so that at no time will more than three jobs start on the system at the same instant.

7.74 The format of the timespecs depends on the frequency that is selected for the job:

(a) ***Daily:*** For a daily job, each timespec defines a start time, an end time, and the number of minutes between repetitions of the job. Every day the DNC automatically performs the job at the start time, then performs it again every so many minutes until the end time is reached.

Example: If a daily tape generation job has the timespecs

(1) From 0800 to 1559 every 180 minutes (3 hours)

(2) From 1600 to 2400 every 360 minutes (6 hours)

the DNC generates a tape at 0800 using all unformatted data currently stored on the hard disk. A second tape is generated at 1100 (180 minutes later) containing records for all unformatted data received since 0800. The third tape is generated at 1400 (180 minutes later) containing records for all unformatted data received since 1100. The fourth tape is generated at 1600 (start of second timespec) containing records for all unformatted data received since 1400. The fifth is generated at 2200 (360 minutes later) containing records for all unformatted data received since 1600. The end of the time period, 2400, occurs before another tape is generated, so the next tape is not produced until 0800 the next day.

(b) ***Weekly:*** For weekly jobs, each timespec defines a start day (Sun-Sat), end day, start time, end time, and time period. The start day and start time determine the first occurrence of the job. The time period determines the time until the next occurrence of the job, and subsequent occurrences after that, until the end day and end time are reached.

Example: If SMDR data is to be spooled

(1) Mon-Fri from 0800 to 1600 every 180 minutes

(2) Sat-Sun from 0800 to 2400 every 360 minutes

the DNC spools on Monday at 0800 all relevant SMDR data currently stored on the hard disk. The next spooling occurs at 1100 (180 minutes later) containing records for all SMDR data received since 0800. The next set of SMDR data is spooled at 1400 (180 minutes later). The 1600 end time occurs before the next scheduled event, so the next data is spooled at 0800 the next morning, and so on. This continues until Friday at 1600. Data is spooled again on Saturday at 0800 (start of second timespec) containing all relevant SMDR records received since 1400 on Friday. The next spoolings occur at 1400 and 2000 (360 minutes later in each case) containing all SMDR records received since the last spooling. The end of the time period, 2400, occurs before the next spooling, so the next data spooling will occur at 0800 on Sunday, and so on until Monday morning.

(c) ***Monthly:*** For monthly jobs, each entry in the timespec table defines a start date and end date (e.g. 1-31), a start time, an end time, and a time period. The start date and start time determine the first occurrence of the job. The time period determines the time until the next occurrence of the job, and subsequent occurrences after that, until the end day and end time are reached.

Example: If a monthly tape generation is to be carried out

(1) 1-20 from 0800 to 1600 every 180 minutes

(2) 21-31 from 0800 to 2400 every 360 minutes

the DNC generates a tape on the 1st of the month at 0800 with all unformatted data currently stored on the hard disk. The next tape is generated at 1100 (180 minutes later) containing records for all unformatted data received since 0800. The next tape is generated at 1400 (180 minutes later) containing records for all unformatted data received since 1100. The 1600 end time occurs before the next tape is generated, so the next tape is generated at 0800 the next morning, and so on. This continues until the 20th at 1600. The next tape is generated on the 21st at 0800 (start of second timespec) containing records for all unformatted data received since 1400 on the 20th. The next tape is generated at 1400 (360 minutes later) containing records for all unformatted data received since 0800. The next tape is generated at 2000 (360 minutes later) containing records for all unformatted data received since 1400. The end of the time period, 2400, occurs before the next tape is generated, so the next tape is not produced until 0800 on the 22nd. Another tape appears at 1400 on the 22nd, and so on until the 31st (or when the month expires, if sooner), then the first timespec comes into effect again on the morning of the 1st of the next month, and so on.

Jobs Scheduled

7.75 The Jobs Scheduled option on the Scheduling Services menu is used to examine and make changes to the job queue. The job queue shows the next scheduled occurrence of each job that is defined in the timetable.

Example: if the current time is 0800 and a PRINT job has been scheduled in the timetable to run every 60 minutes from 0900 to 1159, then there will be an entry in the job queue showing that that job will run next at 0900. (The job queue may also contain entries that show the next occurrences of other PRINT jobs and other types of jobs.)

7.76 Each entry in the queue can be removed from the queue or set to take place at a new time. Such a change in setting affects only one occurrence of the job; other occurrences will still be put into the queue and performed at their scheduled times.

Example: if a user deletes or reschedules the 0900 occurrence of a job that is supposed to run every 60 minutes from 0900 to 1159, the 1000 and 1100 occurrences will still run as scheduled.

7.77 When Jobs Scheduled is selected from the Scheduling Services menu, the system presents a Query screen that allows the user to narrow down the list of scheduled events to be displayed. As with the Scheduler Timetable, fields in this table can be left blank if the user wants to list all entries. The Scheduled Job Queue List screen is displayed when <Done> is pressed.

8. ABBREVIATIONS

8.01 The following abbreviations are used in this publication:

ASCII	American standard code for information interchange
ATT	Automatic trunk test
BNM	Business network management
CLLI	Common language location identifier
DDD	Direct distance dialing
DIRP	Device independent recording package
DMS node	A member of the DMS-100 family of digital switches. Only the variant DMS-100 is used for BNM
DNC	Dynamic Network Control System
EML	Expected measured loss
FE	Far-end
FN	Far-to-near
IBN	Individual business network
ID	Identification
IDDD	International direct distance dialing
KT	Killer trunks
LAN	Local area network
LIU	LAN interface unit
MAP	Maintenance and administration position
MDC	Meridian Digital Centrex
MMI	Man-machine interface
NCOS	Network class of service
NF	Near-to-far
NIAL	Noiseimmediate action limit (dB below 0)
NOP	Network operation protocol
NT	Northern Telecom
NTP	Northern Telecom practice

OM	Operational measurement
PBX	Private branch exchange
SLU	Subscriber line usage
SMDR	Station message detail recording
SOP	Service order processor
VFG	Virtual facility groups