DEFINITY® Communications System
Generic 1 & Generic 3i

System Reports
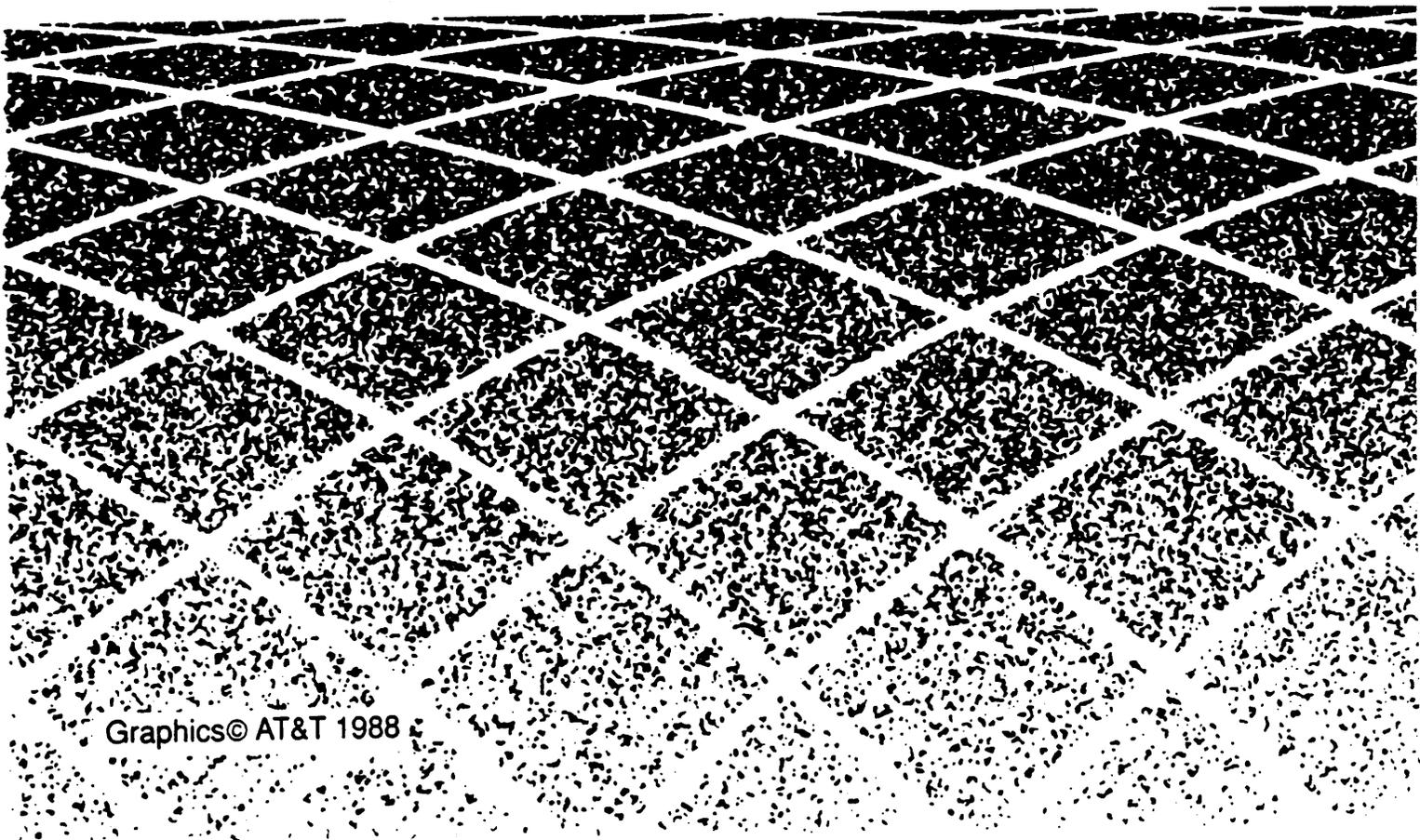
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CHAPTER 1. INTRODUCTION

This document provides a comprehensive description of the system reports that are available with the DEFINITY® Communications System Generic 1 and Generic 3i.

This document introduces and defines the concepts and terminology that relate to the various traffic measurements and their associated reports.

Purpose of System Reports

The traffic measurements and their associated reports are designed to monitor and collect traffic data (also called usage data) for trunk groups, hunt groups, the attendant group, and the queues associated with each of these groups. The system accumulates and stores the traffic data. You can display (and/or print) the traffic data, as an organized report, by issuing the appropriate identifying command from the DEFINITY Generic 3 Management Terminal (G3-MT).

The system reports and the supporting information contained within this document permit you to:

- Monitor and evaluate system performance

- Monitor security violations data which identifies illegal attempts to access the system

- Observe usage trends and recommend possible corrective actions, as needed

- Determine the source of performance degradations (for example, processor overload)

- Determine possible trunk problems (for example, blocking level too high)

- Recommend system updates and upgrades, when appropriate

Who Should Read This Document

This document is intended for:

- System   Administrators

- Communications System Managers

- Technicians who resolve certain usage-related customer complaints

- Technicians who plan system expansions and upgrades

- Personnel involved in traffic engineering.

> **Note:** A thorough knowledge of traffic theory is not required for using the information contained in this document. However, such knowledge is helpful if the desire is to perform in-depth analysis of the traffic data presented in the various reports.

How This Document is Organized

This document consists of six chapters, two appendices, a glossary, and an index.

- **Chapter 1: About This Document** describes this document.

- **Chapter 2: How To Enter Commands, Display Reports, and Print Reports** identifies (lists) each traffic command, describes the different types of commands, and describes how to enter a command to display and/or print a report.

- **Chapter 3: System Printer and Report Scheduler** describes the Report Scheduler software and how to schedule and print reports on the system printer.

- **Chapter 4: Traffic Data Analysis** describes in great detail all of the traffic measurement reports, excluding processor occupancy and security violations reports.

- **Chapter 5: Processor Occupancy Reports** describes the purpose of these four reports, when to use each report, how to interpret each reports data, and a list of "Suggested Action" that may be taken if a particular field should report data indicating an abnormal condition.

- **Chapter 6: Security Violations Reports** describes the purpose of the Security Violations reports, including any invaild login or remote access barrier code attempts detected by the measurements program.

- **Chapter 7: References** provides an abbreviated listing and description of system documents. Ordering information is also included.

- **Chapter 8: Abbreviations and Acronyms** lists the abbreviations and acronyms used in this document.

- **Appendix A. Blank Worksheets**

    - Attendant Group Data Worksheet—used for historical purposes to record the Attendant Group daily measurements for selected days.

    - ARS Pattern Data Worksheet—used for historical purposes to record the Automatic Route Selection (ARS) Pattern daily measurements for selected pattern numbers and days.

    - Hunt Group Data Worksheet—used for historical purposes to record the Hunt Group daily measurements for selected hunt groups and days.

    - Trunk Group Data Worksheet—used for historical puposes to record the Trunk Group daily measurements for selected trunk groups and days.

    - Processor Occupancy Data Worksheets—used for historical purposes to record the Processor Occupancy daily measurements for selected days.

    - General Traffic, ACD, and CallVisor™ ASAI/OCM Applications—used to calculate the BHCC for complex traffic applications.

- **Appendix B: Printer Options**

    AT&T 475 Printer Options—lists the required option switch settings for the AT&T 475 printer.

    AT&T 572 Printer Options—lists the required programmable options for the AT&T 572 serial printer.

- **Glossary** contains a list of frequently used terms and their definitions.

- **Index**

Conventions Used in This Document

This manual uses the following conventions:

- The   names of commands are shown in the following typeface:

    change system-parameters feature

- Information you type is shown in the following typeface: `EIA`

- Information displayed on the screen is shown in the following typeface: `login:`

- Keyboard keys are shown as follows: `RETURN`

- Function keys are shown as follows: `CANCEL`

Related Documents

The following documents should be consulted for additional specific subject information.

- *DEFINITY® Communications System Generic 1 and Generic 3 —System Management,* 555-230-500

- *DEFINITY® Communications System Generic 1 and Generic 3i —Feature Description,* 555-230-201

- *DEFINITY® Communications System Generic 1 and Generic 3i —System Description,* 555-230-200

- *DEFINITY® Communications System Generic 1 and Generic 3i —Maintenance,* 555-204-105

- *DEFINITY® Communications System and System 75 and System 85—DS1/DMI/ISDN-PRI Reference,* 555-025-101

- *DEFINITY® Communications System and System 75 and System 85—Traffic Theory,* 555-104-504

- *DEFINITY® Communications System and System 75 and System 85—Traffic Tables,* 555-104-503

- *DEFINITY® Communications System Generic 3i—Implementation,* 555-230-650

- *DEFINITY® Generic 1 and Generic 3 Basic Call Management System — Operations,* 555-230-703

CHAPTER 2. HOW TO ENTER COMMANDS, DISPLAY REPORTS, AND PRINT REPORTS

Entering Commands

The DEFINITY system administration terminal is the primary device for issuing commands to the system. Following a successful login procedure, the screen will display **enter command** . If known, you may enter the full and complete desired command. Alternately, you may use HELP to obtain the list of permissible commands. For example, if `monitor system` is typed on the command line and is followed by pressing HELP , the following secondary command list is displayed:

> **view1**
>
> **view2**

The command line consists of three parts. The parts are known as (1) the **ACTION** to be taken, (2) the **OBJECT** for the specified action, and (3) the **QUALIFIER** for the specified object. Table 2-A lists all of the commands that are associated with the traffic measurements.

TABLE 2-A. Traffic Measurement Commands

Commands		
Action	**Object**	**Qualifier**
list	measurements attendant-group	[print or schedule]
list	report scheduler	
change	report scheduler	
remove	report scheduler	
list	performance attendant-group	[option] [print or schedule]
list	aca-parameters	[print or schedule]
list	measurements aca	[print or schedule]
display	ars meas-selection	[print or schedule]
change	ars meas-selection	[print or schedule]
list	measurements route-pattern	[option1] [option2] [print or schedule]
list	measurements cbc-trunk-group	[option] [print or schedule]
list	measurements call-rate	[print or schedule]
list	measurements call-summary	[print or summary]
display	measurements coverage-path*	[print or schedule]
change	measured coverage-path*	[print or schedule]
list	measurements coverage-path*	[option 1] [option 2] [print or schedule]
display	measured principal*	[print or schedule]
change	measured principal*	[print or schedule]
list	measurements principal*	[option 1] [option 2] [print or schedule]
clear	measurements ds1	
list	measurements ds1	[option] [print or schedule]
list	measurements ds1-log	[option] [print or schedule]
list	measurements hunt-group	[options] [print or schedule]
list	performance hunt-group	[options] [print or schedule]
list	measurements modem-pool	[options] [print or schedule]
list	performance summary	[options] [print or schedule]
monitor	system view1	
monitor	system view2	
list	measurements tdm-usage	[print or schedule]
list	measurements tone-receiver	[options] [print or schedule]
list	measurements trunk-group	[option] [print or schedule]
list	performance trunk-group	[option] [print or schedule]
list	measurements outage-trunk	[option] [print or schedule]
list	measurements lightly-used-trunk	[option] [print or schedule]
monitor	traffic hunt-groups	[option]
monitor	traffic trunk-groups	[option]
list	measurements occupancy summary	[print or schedule]
list	measurements occupancy last-hour	[print or schedule]
list	measurements occupancy busiest-interval	[print or schedule]
list	measurements communications-links	[print or schedule]
list	measurements security-violations	[print or schedule]
clear	measurements security-violations	
monitor	security violations	[print]
clear	measurements occupancy	

* Available for the G3i switch only.

Monitor Commands

The **monitor** command is used to display real-time status reports. Whenever a status report is displayed on the system administration terminal, it is automatically updated every minute. `CANCEL` may be used to cancel the **monitor** command without logging off. If the status report consists of more than one page, `NEXT PAGE` may be used to display any subsequent pages and `PREV PAGE` maybe used to display previous pages.

If the **monitor** command is not entered correctly or if the qualifier is not applicable or cannot be measured, a descriptive error message is displayed on the message line. The message line is the bottom line on the screen. Generally, the error message descriptions provide sufficient clues as to the problem and will not require further research. However, `HELP` may be used when needed.

List Commands

The **list** command is used to obtain historical information for a list of all (or a selected range of) agents, splits, trunks, processors, systems, etc.

Display Commands

The **display** command is used to identify the parameters associated with a specific object/qualifier (for example, the parameters that are being measured).

Change Commands

The **change** command is used to alter the group of parameters that are being measured.

Clear Commands

The **clear** command is used to remove the measurement data that was generated as the result of an alarm or a system irregularity.

Displaying and Printing Reports

The commands, listed in Table 2-A, and the resulting reports are described in detail in Chapters 4,5, and 6.

Each of the **monitor** and **list** commands, depicted in Table 2-A, results in producing (displaying) a different report on the system administration terminal screen. If the command line qualifier **print** is selected-the report is immediately printed on the slave printer that is associated with the system administration terminal. Whenever the command line qualifier **schedule** is initially executed, the system defaults the report for immediate printing (on the system printer unless a day and time of day is scheduled) and generates a Job Id. The Job Id is required by the Report Scheduler feature for updating and deleting the schedule of reports. The Report Scheduler, which is described in Chapter 3, is used to administer a time/day schedule for each desired report.

Screen Format

The onscreen format for reports is as follows:

Switch Name/Date   Report Title   Page Numbers for
                                            Multi-Page Screens

```
                                                            Page 1
Switch Name:                      Date: 11:33 am TUE JUL 31, 1990
                        OCCUPANCY  SUMMARY  MEASUREMENTS
                        Peak Hour For Occupancy: 1400

Meas  Stat  CP   Sm   Idle  Total  Total  Intcom  Inc    Out    Pnet
Hour  Occ   Occ  Occ  Occ   Calls  Atmpt  Atmpt   Atmpt  Atmpt  Atmpt

1000  5     57   16   22    4410   5705   1439    1461   1510   1395
 900  5     56   15   24    5010   6499   1637    1601   1383   1878
 800  5     56   15   24    3823   4969   1644    1620   626    1079
 700  5     58   15   22    1301   1691   421     361    384    525
 600  5     57   15   23    1287   1436   359     301    223    553
 500  s     58   15   22    1108   1294   324     298    268    404
 400  s     57   15   23    1267   1601   483     384    361    373
 300  5     58   16   21    1099   1312   329     205    301    477
 200  5     57   15   23    1049   1278   319     226    281    452
 100  5     58   15   22    701    901    267     206    246    182
         press CANCEL to quit -- press NEXT PAGE to continue
```

Report Area—

Informational or
Error Messages

FIGURE 2-1. Screen Format

An error message is displayed as follows
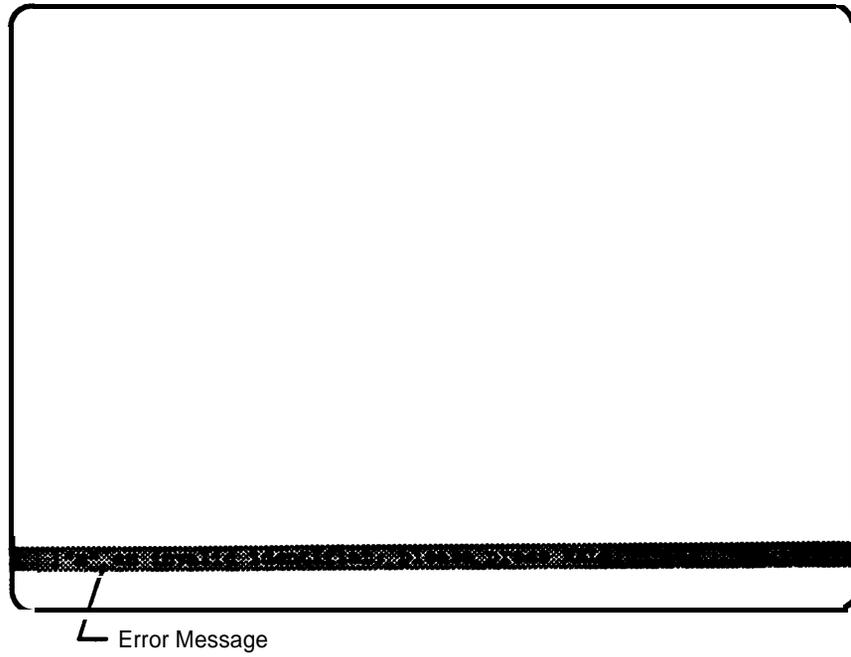
Error Message

FIGURE 2-2. Screen with Error Message

When you type a command line it appears as follows:

```
command: list measurements trunk group summary
```
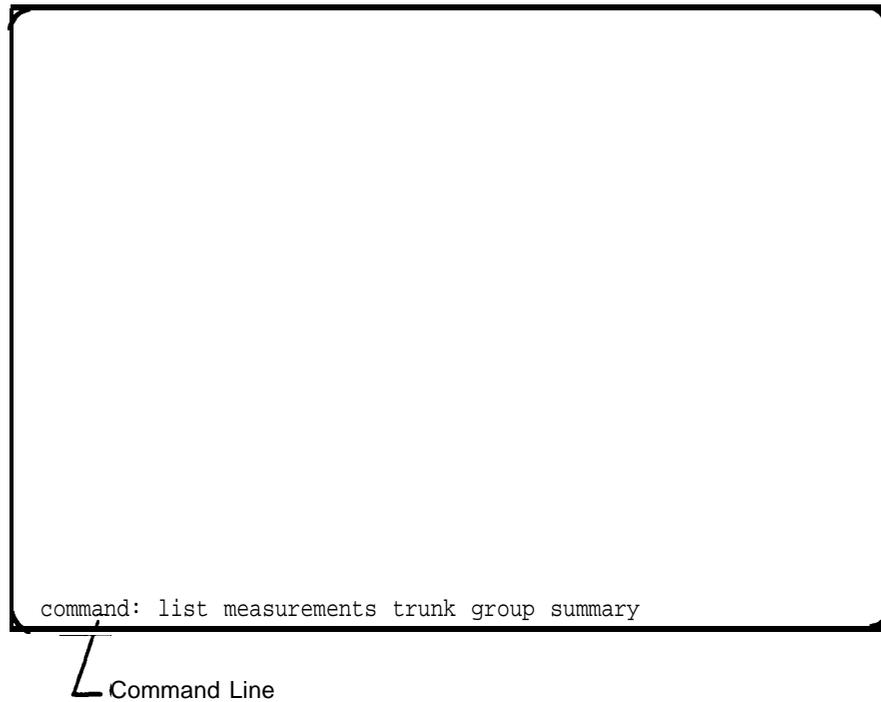
Command Line

FIGURE 2-3. Screen Showing Command Line

CHAPTER 3. SYSTEM PRINTER AND REPORT SCHEDULER

System Printer

The system printer, rather than the slave printer that is attached directly to the system administration terminal, is used to print those reports that are scheduled. However, when desired and on demand, individual reports may still be printed using the printer that is attached to the system administration terminal.

The Report Scheduler feature uses the system printer as its output device. The hardware parameters for the system printer must have been previously administered.

The customer uses Page 4 of the Feature-Related System Parameters screen to administer the hardware parameters of the system printer. The system administrator login may access this screen by entering the **change system-parameters features** command. Screen 3-1 depicts this screen. Table 3-A describes the data fields for this screen.

```
change system-parameters features                          Page 4 of 5


                       FEATURE-RELATED SYSTEM PARAMETERS


       SYSTEM PRINTER PARAMETERS
                              Printer Extension: xxxxx
                            EIA Device Bit Rate: 1200
                                 Lines Per Page: 60


       BASIC CALL MANAGEMENT PARAMETERS
                            Measurement Interval: half-hour
```

SCREEN 3-1. System Printer Hardware Administration Screen

Notes: If you do not have Basic Call Management System (BCMS) installed, the line **BASIC CALL MANAGEMENT PARAMETERS** will not appear on your screen.

Xs are used to show field length and are not displayed.

The system printer must use an Electronics Industries Association (EIA)-232 asynchronous serial interface. The AT&T 475 printer or the AT&T 572 printer (or compatible) meet these requirements and are recommended for use as the system printer. Depending upon the type/model of serial printer that is used, certain hardware option switch settings may have to be performed as a part of the installation procedure. Appendix B lists the option switch settings for the AT&T 475 printer and the programmable settings for the AT&T 572 printer.

TABLE 3-A. System Printer Hardware Administration

Field	Description
Printer Extension:	There are two possible options for the printer data link: (1) enter `EIA` if connected directly to the switch processor Data Communications Equipment (DCE) connector on the back of the DEFINITY cabinet (refer to Figure 3-1 which follows), or (2) enter the extension number if connected to a switched port. There are two different types of switched-port circuits. The TN754 circuit pack supports connections to 7400A-type data modules, while the TN726 circuit pack supports connections to the Asynchronous Data Unit (ADU)-type data module. Local requirements will determine which data link option to select.
	If the EIA connection is not available (for example, the Station Message Detail Recording [SMDR] feature is already using it), one of the switched ports must be used. If the EIA connection is used by the system printer and at a later date you want to enable the SMDR feature, then the system printer should be moved to a switched port to accommodate SMDR.
EIA Bit Device Rate:	1200 bps are recommended whenever the **Printer Extension:** field is administered as EIA. Although other speeds may be administered, 1200 bps are adequate for this application, less demanding of the switch resources, and should eliminate any potential data buffer overflow problems. Whenever a switched port circuit is used, the **EIA Bit Device Rate:** field that is administered on the Data Module screen will apply.
Lines Per Page:	The number of lines on the computer form. The range is from 24 to 132. Generally, 60 will be the appropiate selection.

DCE PORT IS SHARED

FIGURE 3-1. Rear view, single carrier cabinet.
Detail shows ports, with DCE port shaded In black.

System Printer Data Link Operation and Maintenance

Operation and maintenance of the system printer data link is significantly different from the SMDR and journal printer data links. For example, the SMDR and journal printer data links are maintained in a constant link up state, while the system printer data link is only brought up once every 15 minutes provided there are reports to be printed, or when an immediate report is scheduled.

The system printer data link has three states that identify its operational condition. The states are: (1) link up, (2) link down, and (3) maintenance busy-out. Whenever the communication path (including software processes, hardware cabling, and printer requests) functions properly and data is exchanged successfully between them, the data link is defined as being in the link up state. The link down state refers to all times except (1) whenever reports are being printed and (2) whenever maintenance personnel have disabled the link. The maintenance busy-out state is the result of executing the **busyout sp-link** command from the system administration terminal. While in the maintenance busy-out state, the switch software processes are disabled and the link retry operation is disabled.

It is assumed that all customers will monitor the operating status of the system printer and, as necessary, refill the paper bin, relieve any paper jams, verify that the printer is receiving power, etc.

> **Note:** A point of clarification is that the BCMS login cannot execute the **busyout sp-link** command. This is normally only performed via the maintenance login. Therefore, as necessary, all non-maintenance personnel should simply flip the printer power switch to the OFF position to refill the paper bin and remove jammed paper. Subsequently, the system printer can be restored on-line by turning the power switch ON.

If the system printer link generates either a warning alarm or a minor alarm, the problem should be referred to the proper maintenance personnel.

Report Scheduler

The Report Scheduler may be used with many switch features. Specifically, virtually all **list, display,** or **test** commands may be executed with the **schedule** qualifier. Therefore, the system administrator login, maintenance login, and other logins, may schedule reports.

Whenever a command containing the **schedule** option is executed, it generates a Job Id. A maximum of 50 different Job Ids (50 different reports) can be scheduled for printing. The Report Scheduler feature is used to specify the actual day(s) and time of day that each report will be printed.

Print Intervals

For purposes of printing reports, three print intervals are available:

- **immediate—** If you select this option, the report will be printed immediately.

- **scheduled—** If you select this option, the date, time, and day(s) parameters for the report, are set administratively. To change them, readministration is required.

- **deferred—** If you select this option, the report will be generated once for the date, time, and day specified.

Adding a Report to the Report Scheduler

To add a report to the Report Scheduler, enter a **list, test,** or **display** command followed by the **schedule** option. Whenever a report is initially scheduled, the print interval of **immediate** is automatically assigned as the default. Therefore, if **immediate** is not desired, the print interval must be changed to **deferred** or **scheduled** and a day and print time must still be added to the Report Scheduler. Screen 3-2 depicts this screen form with sample data. Table 3-B describes the data fields for this screen.

```
list measurements attendant-group                              Page 1

                             REPORT SCHEDULER

   Job Id: 1                          Job Status: none

   Command: list measurements attendant-group

   Print Interval: immediate
```

**SCREEN 3-2. Adding a Report With the List Measurements Attendant-Group
Schedule Command**

TABLE 3B. Report Scheduler

Field	Description
`Job Id:`	This is a display-only field. Whenever a command is executed with the qualifier **schedule,** the system responds by generating a unique Job Id number. The Job Id assigned by the system is the lowest number from 1 to 50 not already used.
`Job Status:`	This is a display-only field. It identifies the print status of the report. Since the job is not yet on the report scheduler, this field displays "none."
`Command:`	This is a display-only field. It displays the command line parameters (ACTION, OBJECT, and QUALIFIER) of the command being scheduled.
`Print Interval:`	This field has three options: **immediate, deferred,** and **scheduled.** The **immediate** option is initially assigned as a default. Thereafter this option is used whenever the administrator would like to print the report immediately. Whenever the `Print Interval:` field is changed from **immediate** to **deferred** or **scheduled,** the system responds as appropriate with the word `deferred` or `scheduled` . Furthermore, the screen changes to the format depicted in Screen 3-3 and the administrator is prompted to enter values for the `Print Time:` and the days of the week fields. **Note:** The **deferred** option is only used when you want to schedule the report for a single printing. Thereafter, the Job Id is automatically removed from the Report Scheduler. Those reports that are administered as scheduled are printed on a week-after-week basis.
`Print Time:`	Within a given hour, reports may be scheduled at 15-minute intervals (that is, xx:00, xx:15, xx:30, or xx:45). The system printer requires significant switch processor resources. Therefore, it is important that the reports be scheduled for off-peak hours. Furthermore, the reports should not all be scheduled for the same hour and time interval, but should be staggered across multiple off-peak time intervals. If, because of printing volume or other problems, a report is not printed within 4 hours of its scheduled time interval, it will not be printed until its next scheduled time interval. This is a 4-hour (non-administrable) limit. Immediate and deferred jobs would be removed from the Report Scheduler under this scenario and would require reentry to print.
Days of the Week:	For each day of the week that the report is to be printed, enter **y** (yes). Alternatively, enter **n** (no) for those days when the report should not be printed. Selecting an **n** for all seven days of the week will effectively disable a report from being printed. Days are defaulted to **n.**

```
list report scheduler                                           Page 1

                              REPORT SCHEDULER

    Job Id: 1                           Job Status: none

    Command: list report scheduler

    Print Interval: scheduled

    Print Time: xx:xx

        Sun: n   Mon: n   Tue: n   Wed: n   Thu: n   Fri: n   Sat: n
```

SCREEN 3-3. Administering a Time/Date When Adding a Scheduled Report

Other commands, such as those described in Chapter 4, are added to the Report Scheduler in a similar manner. Simply append the **schedule** qualifier to the command (for example, **list aca-parameters schedule,** etc.) and, whenever the first screen appears, change the `Print Inter-val:` field from **immediate** to **scheduled** and subsequently administer the `Print Time:` and the days of the week fields.

Summary of the Steps for Printing Reports on the System Printer

1. Execute a command with the **schedule** qualifier.

   The first screen of the Report Scheduler (for example, Screen 3-2 with the appropriate command) is displayed. It indicates that the print interval is immediate

2. Either (a) press ⌈**ENTER**⌉. —to print the report (immediately) on the system printer, or (b) since the cursor is on the word **immediate** , just type the word scheduled or deferred and then press ⌈**ENTER**⌉.

   > **Note:** If you are using a personal computer (PC) running the 513 terminal emula-tion package, your keyboard will not have an ⌈**ENTER**⌉ key. You must map a function key to serve in this capacity. (Pressing ⌈**RETURN**⌉ will not achieve the desired results.) For instructions on key mapping refer to *DEFINITY® Com-munications System Generic 1 and Generic 3—System Management,* 555-203-500.

   When the print interval is changed to **scheduled** or **deferred,** the **Print Time:** and the days of the week fields are displayed (for example, Screen 3-3 with the appropriate com-mand).

3. Type in the desired Print Time and prees ⌈**ENTER**⌉. The cursor is now on the days of the week field. For those days that you desire to print-the report, type in a y.

   Press ⌈**ENTER**⌉ to execute the command. The system responds with a prompt for the next command.

Listing Scheduled Reports

To display a list of all reports that are on the Report Scheduler, enter the list **report-scheduler** command. This command displays a list of all reports in the Report Scheduler. The order of the list is according to scheduled print time. Reports will be printed according to this list (for example, the first report on the list is the first report printed). Screen 3-4 depicts the screen form for the **list report-scheduler** command. Table 3-C describes the data fields for this screen.

```
 list  report-scheduler                                           Page 1 of x


                             Report Scheduler


      Job Id      Days (smtwtfs)        Time       User      Status      Type
            Command
        4               nynnnnn        18:45       bcms      printing    immediate
            list measurements attendant -group time 14:15
        2               nynynyn        19:00       bcms      waiting     scheduled
            list measurements call-rate time 07:00
        7               nnnnnyn        19:15       bcms      waiting     deferred
            list bcms agent 5000 time  08:00       12:00
       23               nnynnnn        19:15       bcms      waiting     scheduled
            list bcms agent 4000 day  09/11       09/15
```

SCREEN 3-4. A Typical Report Scheduler Screen

> **Note:**   In instances such as those for Job Id 4, if an immediate reporf is scheduled, the **Days** field is completed with one **y** for the current day and **n** for all the others.

All fields are display-only. If, after reviewing this report, it is determined that changes need to be made, the **change report-scheduler** command may be used to make the desired changes.

TABLE 3-C. List Report Scheduler Screen

Field	Description
Job Id	Whenever a command is executed with the **schedule** qualifier, the system responds by generating a unique Job Id number. The Job Id assigned by the system is the lowest number from 1 to 50 not already used.
Days (smtwtfs)	On a per-day basis, an n indicates that the report will not be printed that day; a y indicates that the report will be printed that day. Selecting an n for all seven days of the week will effectively disable a report from being printed.
Time	The time interval that the report is scheduled to be printed.
User	The user login that scheduled the identified report.
Status	Same as Job Status (described previously). The four possible states are: • Waiting—means that the report is not scheduled for any activity during the current 15-minute time interval. • Print-Next —means that the report is scheduled to be printed within the current 15-minute time interval. • Printing—means that the report is currently being printed. • Printed—means that the report has been successfully printed during the current 15-minute time interval.
Type	Indicates the type of print intend that is scheduled for the report.
Command	This fild displays the complete command line (excluding the schedule option) that the user entered to produce the identified report.

Change Command

The **change report-scheduler** command is used to change the schedule of a report. To display this screen form, enter the **change report-scheduler** xx command. The xx corresponds to the Job Id. Screen 3-5 depicts the Change Report Scheduler screen. Table 3-D describes the data fields for this screen.

```
change report -scheduler 23                                              Page 1

                              Report Scheduler

   Job Id: 23                          Job Status: printed

   Command: list bcms agent 4000 time start 08:00 stop 12:00
   Print Interval: scheduled
   Print Time: 19:15
    Sun: n    Mon: y    Tue: n    Wed: y    Thu: n    Fri: y    Sat: n
```

SCREEN 3-5. Change Report-Scheduler Screen

TABLE 3-D. Change Report Scheduler Screen

Field	Description
`Job Id:`	This is a display-only field It is the unique identifier for the report. The Job Id aasigned by the system is the lowest number from 1 to 50 not already used.
`Job Status:`	This is a display-only field. It identifies the print status of the report. The four possible states are: ● Waiting—means that the report is not scheduled for any activity during the current 15-minute time interval. ● Print-Next—means that the report is scheduled to be printed within the current 15-minute time intend. ● Printing—means that the report is currently being printed. ● Printed—means that the report has been Successfully printed during the current 15-minute intend. **Note:** The `Print Time:` and the days of the week fields may be changed and effect a change of the Job Status.
`Command:`	This is a display-only field. It is the command that is to be executed.
`Print Interval:`	The three possible options are immediate, scheduled, and deferred. If the print time of a report is changed so that its scheduled time now falls inside the current 15-minute time interval (that is, the Job Status field changes from waiting to print-next), the report will not be printed in the current interval. But, the report will be printed during the next scheduled time interval. As a contrast, if a report that is scheduled for some time interval (other than the current 15-minute time interval) has its print interval changed from scheduled to immediate, the report will be printed immediately.
`Print Time:`	Within a given hour, reports may be scheduled at 15-minute intervals (that is xx:00, xx:15, xx:30, xx:45). This field may be changed as desired. The system printer requires significant switch processor resources. Therefore, it is important that the reports be scheduled for off-peak hours. Furthermore, the reports should not all be scheduled for the same hour and time interval, but should be staggered across multiple off-peak time intervals. If, because of printing volume or other problems, a report is not printed within four hours of its scheduled time interval, it will not be printed until its next scheduled time intend. This is a 4-hour (non-administrable) limit.
Days of the Week	On a per-day basis, an `n` indicates that the report will not be printed for that day; a `y` indicates that the report will be printed for that day. This field may be changed as desired. Selecting an `n` for all seven days of the week will effectively disable a report.

Remove Command

The **remove report-scheduler** command is used to remove a report from the Report Scheduler. To display this screen, enter the **remove report-scheduler xx** command. The xx corresponds to the Job Id. Screen 3-6 depicts this screen. Table 3-E describes the data fields for the screen.

```
remove report -scheduler 23                                      Page 1

                              Report Scheduler

   Job Id: 23                          Job Status: printed

   Command: list bcms agent 7000 time start 08:00 stop 12:00
   Print Interval: scheduled
   Print Time: 19:15
   Sun: n    Mon: y    Tue: n    Wed: y    Thu: n    Fri: y    Sat: n
```

SCREEN 3-6. Remove Report-Scheduler Screen

Note: All fields are display-only. Once the user has verified that the identified report is the one to be removed, it is then necessary to press **[RETURN]** Following this action, the system waits for the next command.

TABLE 3-E. Remove Report Scheduler Command Screen

Field	Description
Job Id:	The unique identifier for the report. The Job Id assigned by the system is the lowest number from 1 to 50 not already used.
Job Status:	Identifies the print status of the report. The four possible states are: • Waiting—means that the report is not scheduled for any activity during the current 15-minute time interval. • Print-Next—means that the report is scheduled to be printed within the current 15-minute time interval. • Printing—means that the report is currently being printed. • Printed—means that the report has been successfully printed during the current 15-minute intend. **Note:** If the Job Status is waiting, print-next, or printed (for example, not printing), it will be removed immediately. If the report is in the printing state, not only will the command be removed but the printer communication link will be changed to the link-down state. Furthermore, the printer communication link will be brought up again if other reports are in line to be printed for this time interval, if an immediate job is scheduled, or at the beginning of the next time interval, whichever comes first.
Command:	The command associated with the Job Id that is being removed.
Print Interval:	The three possible options are immediate, scheduled, and deferred.
Print Time:	Within a given hour, reports maybe scheduled at 15-minute intends (for example, xx:00, xx:15, xx:30, xx:45).
Days of the Week	On a per-day basis, an **n** indicates that the report will not be printed for that day; a **y** indites that the report will be printed that day. Selecting an **n** for all seven days of the week will effectively disable a report from being printed.

CHAPTER 4. TRAFFIC DATA ANALYSIS

How This Chapter Is Organized

This chapter describes all of the traffic analysis reports, excluding processor occupancy and security report. Each report description includes the following elements:

- An explanation of the report

- The full form for the command used to call up the report (elements of the command may be abbreviated as long as they are unique), including a description of any options

- An illustration of a typical report screen

- A table that defines all field labels in the report and, whenever appropriate, a "Suggested Action" list is included.

The following reports are provided:

- **Attendant Group Roports.** Describes the traffic measurements and performance reports for. attendant groups and provides guidelines for the validation and analysis of the data provided in the reports.

- **Automatic Circuit Assurance Reports.** Describes the parameters and measurements reports for the ACA feature.

- **Automatic Route Selection Reports.** Describes the measurements selection form and pattern measurements report for the ARS feature and provides guidelines for the validation and analysis of the data provided in the measurements report.

- **Call Rate Report.** Describes the Call Rate measurements and summary reports available with the DEFINITY Generic 1 and Generic 3i systems.

- **Call Summary Report.** Describes the call summary measurements report.

- **Call Coverage Reports.** Describes the Principal Coverage and Coverage Path measurement reports available with DEFINITY Generic 1 and Generic 3i systems.

- **DS1 Link Performance Reports.** Describes performance measurements for DS1 links. The reports available include detailed log and summary reports.

- **Hunt Group Report.** Describes the traffic measurements, performance, and status reports for Automatic Call Distribution (ACD)/Uniform Call Distribution (UCD)/Direct Department Calling (DDC) Hunt Groups and provides guidelines for the validation and analysis of the data provided in the reports.

- **Modem Pool Group Reports.** Describes the traffic measurements report for modem pool groups.

- **Performance Summary Report.** Describes the traffic measurements Performance Summary Report.

- **System Status Reports.** Describes the System Status Reports, which provide an overall view of how the system is performing.

- **Time Division Multiplex Usage Report.** Describes the traffic measurements report for Time Division Multiplex (TDM) time slot usage.

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- **Tone Receiver Report.** Describes the Tone Receiver Measurements Report which displays traffic data for tone receivers.

- **Trunk Group Reports.** Describes the call-by-call, lightly used, outage, and traffic measurements reports, as well as the performance and status reports for Trunk Groups, and provides guidelines for the validation and analysis of the data provided in the reports.

Note: If you change the time, all the hours shown on the measurements reports appear as `hh**` .

Attendant Group Reports

This section describes the traffic measurements and performance reports for attendant groups and provides guidelines for the validation and analysis of the data provided in the reports.

The measurements report displays activity for all console attendants for a specified time period, and the performance report displays the average speed of answer for the attendant group for each hour over a specified 24-hour period.

Attendant Group Measurements Report

The Attendant Group Measurements Report displays activity for all console attendants for yesterday's peak hour, today's peak hour, and the last hour. A peak hour is the hour within a 24-hour period that had the greatest usage for the specified day.

Command

To display the Attendant Group Measurements Report, enter:

list measurements attendant-group [print or schedule]

Options: There are no options for this command.

Screen

Screen 4-1 shows a typical screen for the Attendant Group Measurements Report. The time and date that the report was requested is displayed above and to the right of the name of the report.

Table 4-A describes the data fields presented in the Attendant Group Measurements Report screen.

```
 list measurements attendant-group
                                           Date: 1:14 pm MON SEP 10, 1990

                       ATTENDANT GROUP MEASUREMENTS

 Grp  Meas   ------------Calls-----------   ------Time-----  Time Speed
 size Hour   Ans. Aband Qued H-Abd Held Avail Talk Held Abnd Ans(Sec)


 2    1400   170  3     78   200   30   29    43   4    18   17    YEST PEAR
 2    1000   159  3     73   20    30   18    54   3    28   19    TODAY PEAR
 2    1200   101  12    61   5     5    30    36   1    23   18    LAST HOUR


 Command successfully completed
 enter command:
```

SCREEN 4-1. Attendant Group Measurements Report

TABLE 4-A. Attendant Group Measurements Report

Field	Description
`Grp size`	*Group Size.* The number of attendant positions (consoles) that are administered. This number may range from one through seven.
`Meas Hour`	*Measurement Hour. The* starting time (using the 24-hour clock) of the hour during which the data was recorded. The hours represented are indicated by the labels in the right-hand column (the hours of yesterday's peak activity, today's peak activity, and the last hour activity).
`Calls Ans.`	*Calls Answered.* The number of calls answered by all active attendants during the measurement hour. With Total Usage and Calls Answered, you can determine the Average Work Time (AWT), which is the time it takes an attendant to handle a call (refer to "Validating the Data" at the end of this section).
`Calls Aband`	*Calls Abandoned.* The number of calls that ring an attendant group and drop (the caller hangs up) before an attendant answers. Where applicable, the total includes calls abandoned from the attendant queue before being answered. A call abandoned after being placed on hold is not included in this measurement, because it has already been added to the calls answered measurement.
	Suggested Action: Observe times during which the calls abandoned number may be higher than desirable, and then schedule additional attendants in the group as needed during the indicated times. Also, see "Percent Occupancy," which is located under "Analyzing the Data," later in this chapter.
`Calls Queued`	*Calls Queued. The* total number of calls that were placed in the attendant queue (delayed) because no attendants were available. Calls remain in the queue:
	● Until an attendant becomes available and the call is connected.
	● Until the caller, while waiting m the queue, abandons the call (hangs up) before an attendant is available. See "Suggested Action" in the description of the `Calls Aband` field.
	● The call covers to another station in a coverage path.
	Suggested Action: If there is a high percentage of delayed calls (Calls Queued); then the `Speed Ans` and `Calls Aband` fields may also be too high. Refer to "Suggested Action" in the descriptions of the `Call Aband` and `Speed Ans` fields.
`Calls H-Abd`	*Calls Held-Abandoned.* The number of calls that abandon while the caller is in hold mode.
	Suggested Action: If this number is determined to be excessive, you should investigate and attempt to identify the reasons.

TABLE 4-A *(continued).*
Attendant Group Measurements Report

Field	Description
`Calls Hold`	*Calls Held.* The number of calls that are answered by the attendant group, and subsequently placed on hold by the attendant group.
`Time Avail`	*Time Available.* The time in hundred call seconds (CCS) during which the "pos avail" lamp is lit on all attended consoles, and the attendants are not talking on calls but are available to handle new calls. **Note:** An attendant can have calls on hold and still be available. For example, if two attendants are available for 15 minutes each during the measurement hour, the total available time would be 30 minutes or 18 CCS (0.5 hour times 38 CCS per hour). Consoles may be administered either (a) with their own unique extension number, or (b) without any extension number. For the "with extension number" ease, traffic measurements for outgoing calls are allotted to the console's extension number. For the "without" case, all traffic measurements are allotted to the attendant group. In either case, time that the console is on outgoing calls will not be included in the attendant group's `time available` measurement. Attendants are not available and do not accumulate time available when: • The position is in Night Service • The position was busied-out • The headset is unplugged • The attendant is servicing a call **Suggested Action:** 1. If the `Time Avail` plus `Time Talk` fields total to a number less than 38 CCS times the number of attendants, then some of the attendant positions were not staffed for the measurement hour. If this is a problem, then it is appropriate to staff additional positions during the busy hour(s). 2. If the `Time Avail` plus `Time Talk` fields equal 36 CCS times the number of attendants, then any time available is idle time or time not spent on calls. A large number for the `Time Avail` field indicates a low occupancy. If this is a problem, then it is appropriate to reduce the number of attendant positions that are staffed. Staffed time is referred to as the sum of the two fields, `Time Avail` and `Time Talk` .

<div align="center">

TABLE 4-A *(continued).*
Attendant Group Meassurements Roport

</div>

Field	Description
`Time Talk`	Also referred to as *Talk Time.* It is the total time, during the measurement interval, that attendant(s) were active or talking on a loop. Numbers are displayed in units of CCS. **Note:** An attendant can have up to six calls on hold at any one time. However, each attendant can only be active on one loop at a time. **Suggested Action:** If talk time is acceptable, but one or more of the other measurements are unacceptable, then all parameters should be studied in order to identify what should be changed (i.e., the number of consoles, number of attendant positions staffed, attendant's schedule, faulty trunks, etc.).
`Time Held`	Also referred to as *Held Time.* The total amount of time (measured in CCS) that the attendants have calls on hold.
`Time Abnd`	Also referred to as *Time to Abandoned.* The average amount of time (in seconds) that calls spend in queue plus ringing at the console before the callers hang up. **Note:** Time to abandoned does not include calls that overflow the attendant group queue. $$Time\ To\ Abandoned = \frac{Total\ Delay\ For\ All\ Abandoned\ Calls\ (in\ seconds)}{Total\ Number\ of\ Calls\ Abandoned}$$ **Suggested Action:** If the Time to Abandoned number is smaller than the Speed of Answer number, you will need more agents. As a contrast, if the Time to Abandoned nunber is larger than the Speed of Answer number, then the attendant group should process the calls faster. **The attendant group should be engineered so that "Time to Abandoned" approximately equals "Total Delay".** *Total Delay = (Time To Abandoned) x (# of Abandoned Calls) +* *(Speed of Answer) x (# of Calls Answered)* $$Avg\ Delay = \frac{Total\ Delay}{Calls\ Answered +\ Calls\ Aband}$$

TABLE 4-A *(continued).*
Attendant Group Measurements Report

Field	Description
Speed Ans (Sec)	*Speed of Answer* in seconds. The average elapsed time from when a call terminates at the attendant group to when the call is answered by an attendant. **Note:** Calls terminate either (1) directly on an attendant console and subsequently begin ringing, or (2) in the attendant queue when there are no attendant positions available. $$Speed\ of\ Answer = \frac{Total\ Delay\ For\ All\ Answerd\ Call\ (in\ seconds)}{Total\ Number\ of\ Calls\ Answered}$$ **Suggested Action:** If this number appears to be too high and all attendants are working at acceptable efficiency levels, consider additional training that may help the attendants complete calls more quickly. Alternatively, observe the hours during which speed of service becomes unacceptable and consider adding consoles and staffing additional attendants during those hours.

Attendant Group Performance Report

The Attendant Group Performance Report gives the console attendant group average speed of answer for each hour of a 24-hour period, for either yesterday or today.

Command

To display the Attendant Group Performance Report, enter:

list performance attendant-group [option] [print] or [schedule]

Options: Options are **today** for today's report or **yesterday** for yesterday's report.

Screen

Screens 4-2 and 4-3 show typical screens for the Attendant Group Performance Report, using the **yesterday** option. The time and date that the report was requested are displayed to the right of the name of the report.

Page 1 of the display shows hours from 0000 (midnight) through 1100 (11:00 am), and Page 2 shows hours from 1200 (noon) through 2300 (11:00 pm). Data is recorded only for hours during which the attendant consoles are active. As shown at the bottom of Page 1, press `CANCEL` to exit the Attendant Group Performance Report, or press `NEXT PAGE` to see the second page.

TabLe 4-B describes the data presented in the Attendant Group Performance Report.

```
 ╭─────────────────────────────────────────────────────────────────────╮
 │                                                                       │
 │    list performance attendant-group yesterday              Page 1     │
 │     Attendant Group Performance          Today: 1:58 pm THU MAR 29, 1990│
 │                                                                       │
 │                       ATTENDANT SPEED OF ANSWER                       │
 │                                                                       │
 │                                                                       │
 │    Meas   ------------------Speed  of  Answer  (sec)  ------------------   Speed │
 │    Hour  1  2  3  4  5  6  7  8  9  10  15  20  30  40  5O  100  200   Ans(sec) │
 │                                                                       │
 │    0                                                               0  │
 │    100                                                             0  │
 │    200                                                             0  │
 │    300                                                             0  │
 │    400                                                             0  │
 │    500                                                             0  │
 │    600                                                             0  │
 │    700   ///////                                                   3  │
 │    800   ///////////////                                           5  │
 │    900   ///////////////                                           5  │
 │    1000  ///////////////                                           5  │
 │    1100  ///////////////////                                       7  │
 │                                                                       │
 │            press CANCEL to quit --  press NEXT PAGE to continue       │
 │                                                                       │
 ╰─────────────────────────────────────────────────────────────────────╯
```

SCREEN 4-2. Attendant Group Performance Report

```
list performance attendant-group yesterday                        Page 2
 Attendant Group Performance              Today: 1:58 pm THU MAR 29, 1990
                        ATTENDANT SPEED OF ANSWER

Meas  ------------------ Speed of Answer (sec) ----------------    Speed
Hour  1  2  3  4  5  6  7  8  9  10  15  20  30  40  50  100  200   Ans(sec)

1200  ////////////////                                             6
1300  /////////////                                                5
1400  /////////////////////////////////////                       17
1500  /////////////                                                5
1600  ////////////////////////// ¯                                9
1700  ////                                                         2
1800                                                               0
1900                                                               0
2000                                                               0
2100                                                               0
2200                                                               0
2300                                                               0


Command successfully completed
enter  command:
```

SCREEN 4-3. Attendant Group Performance Report *(continued)*

TABLE 4-B. Attendant Group Performance Report

Field	Description
`Meas Hour`	*Measurement Hour.* The starting time (using the 24-hour clock) of the hour during which the data was recorded.
`Speed of Answer (sec)`	*Speed of Answer* in seconds. A graphic display of the average time required for attendants to answer calls.
`Speed Ans (sec)`	*Speed of Answer.* The average speed of answer is also displayed numerically in seconds for each hour in the report interval.
	Suggested Action: If this number appears to be too high and all attendants are working at acceptable efficiency levels, consider additional training that may help the attendants complete calls more quickly. Alternatively, observe the hours during which speed of answer becomes unacceptable and consider adding consoles and scheduling more attendants during those hours.

Validating the Data

The following guidelines show an easy method for determining whether currently reported data is acceptable or not. These guidelines represent the minimum that you should do to verify that the recorded measurement values are consistent with expected and historic values. You should perform additional checks as necessary.

To check the acceptability of hourly Attendant Group Measurements Reports, verify the following:

- The system clock or group size has not been changed during the measurement hour. If the system clock has been changed, the minutes field will display double asterisks (for example, 11 **) and all other fields (for the indited time interval) will display zero. The last hour log is not effected by a time change.

- The AWT typically ranges between 10 and 30 seconds per call (different values may be acceptable for specific applications).

Note: Time Talk (in CCS) plus Time Avail (in CCS) should not exceed 36 times the group size. For example, with two attendant positions, this should not exceed 2 x 36 = 72 CCS for data collection.

Note: The attendant can have up to six calls on hold at one time.

Analyzing the Data

To use the Attendant Group Measurements Reports to estimate the number of attendant positions for the application, you will need additional data. This additional data can be calculated using information from the reports which you have recorded on Worksheet 1. The following paragraphs describe how to use data from Worksheet 1 to evaluate Average Work Time, Staffed Time, Attendant Offered Load, Percent Occupancy, and Percent of Calls Queued.

Note: The Attendant Group Data Worksheet serves to backup the data from the reports and to provide an easy means for identifying the peak hour. The data from the identified peak hour should be used in subsequent calculations.

Average Work Time

The Average Work Time (AWT) is the average number of seconds it takes attendants to process calls. The number of calls answered and the total time the attendants are busy handling these calls (Talk Time) are used to determine the AWT.

To determine AWT, use the figures for Talk Time, Time Held (provided that time held is considered to be a part of the agent's normal work time), and Calls Answered from the measurements report in the following equation:

$$AWT = \left(\frac{Talk\ Time + Time\ Held\ CCS}{Calls\ Answered} \right) \times \left(\frac{100\ Seconds}{CCS} \right)$$

Example

The typical report screen shown earlier in this section (see Screen 4-1) lists the following data for yesterday's peak hour:

- Time Talk = 43 CCS or 4300 seconds
- Time Held = 4 CCS or 400 seconds
- Calls Answered = 170

Using these figures, the average work time is:

$$AWT = \left(\frac{43\ CCS + 4\ CCS}{170\ calls} \right) x\ 100\ Seconds = 27.6\ Seconds\ per\ call$$

Staffed Time

Staffed time is the time that the attendant positions are manned (ready for calls). If staffed time (per agent) equals 36 CCS, then all agents were plugged in for the full hour. Using Screen 4-1 as an example, staffed time per agent is:

$$Staffed\ Time\ (per\ Agent) = \frac{Time\ Available + Talk\ Time}{\#\ of\ Agents}$$

$$Staffed\ Time\ (per\ Agent) = \frac{29\ CCS\ +\ 43\ CCS}{2} = 36\ CCS$$

Attendant Offered Load

The Attendant Offered Load (AOL) is the sum of the Calls Answered plus Calls Abandoned multiplied by the AWT. You can determine the AOL with the following equation:

AOL (in seconds) = (Calls Ans + Calls Aband) x AWT in seconds

$$AOL\ (in\ CCS) = \frac{AOL\ in\ seconds}{100}$$

> **Note:** The equation assumes that if the abandoned calls had been answered, they would have taken the same time to service as call that were answered.

Example:

The typical report screen shown earlier in this section (see Screen 4-1) lists the following data for yesterday's peak hour:

- Calls Answered = 170

- Calls Abandoned = 3

And, from the calculations in the previous example:

- AWT = 27.6 seconds

Using this data, you can determine the AOL and the Percent Occupancy as follows:

AOL (in seconds) = (Calls Ans + Calls Aband) x AWT in seconds

AOL (in seconds) = (170 + 3) x 27.6 = 4774.8 seconds

$$AOL\ (in\ CCS) = \frac{4377\ seconds}{100} = 47.75\ CCS$$

Percent Occupancy

The occupancy level may be expressed as a function of (a) the total time of the measurement hour, or (b) a function of the time the positions were plugged-in and attended. Generally, it is expected that all positions will be staffed 100 percent of the time during the peak busy hour. Therefore, the measurement Percent Occupancy (total time) is sufficient in most instances.

Assuming that attendant positions are staffed 100 percent of the time, then each position can handle 36 CCS of load during the peak hour. Therefore, based upon the calculated AOL of 47.75 CCS, two attendant positions are required.

The two status reports, **monitor system view1** and **monitor system view2,** *may be used* to display status of the attendant console positions. Specifically, you can use these two reports to determine, on an instantaneous basis, how many attendant positions are activated, and the identifying number of those that are deactivated.

> **Note:** Since the **monitor system view1** *and* **view2** commands not oniy display status of the attendant consoles but also maintenance and traffic status, they are included in this chapter under the headng "System Status Reports."

For this example, the percent occupancy is calculated as follows:

$$\text{\% Occupancy (total time)} = \frac{AOL}{\text{\# of staffed positions} \times 36\ CCS} \times 100 = \frac{47.75\ CCS}{2 \times 36\ CCS} \times 100 = 61\%$$

Suggested Action: You should staff a sufficient number of positions so that the attendants are neither underworked nor overworked. If the percent occupancy is high and the time available (from the worksheet) is low, the recommendation is to staff another attendant position. If the percent occupancy is low and the time available (from the worksheet) is high , the recommendation is to staff fewer attendant positions.

> **Note:** The Percent Occupancy should not exceed 92% (even on large systems with several attendant consoles). The 92% is a human factors limitation and does not apply to hardware servers.

The formula for calculating "Percent Occupancy (attended)" is as follows:

$$\text{Percent Occupancy (attended)} = \frac{AOL}{\text{Time Avail} + \text{Time Talk}} \times 100$$

Whenever all positions of the attendant group are staffed, the equation for percent occupancy (attended) will yield the same results as the equation for percent occupancy (total time).

Percent of Calls Queued

As the percent of calls queued increases, the `speed of Ans` field will also indicate an increase. Callers are more likely to become frustrated as they are delayed and more likely to abandon their calls, thus contributing to the perception that the level of service has decreased.

Percent of Calls Queued (or delayed) is defined as follows:

$$\% \ Queued = \frac{Calls \ Queued}{Calls \ Ans + Calls \ Aband}$$

$$\% \ Queued = \frac{78 \ calls}{170 \ calls + 3 \ calls} = \frac{78 \ calls}{173 \ calls} = 45\%$$

Analyzing Customer-Supplied (Theoretical) Data

For an installed system, data obtained from the measurement reports is always recommended over theoretical data derived from traffic tables. However, it is recognized that there will be occasions when the use of traffic tables is necessary and desirable. For example, as a part of responding to a request for proposal (RFP), a potential customer may supply certain traffic data that is obtained independent of the switch, and request that the RFP include calculations indicating how well the switch will accommodate the specified traffic. It may also be desirable to use traffic tables during the system engineering and planning stage.

Note: Traffic Engineering Capacity tables such as the Erlang-C Infinite Queue, Erlang-C Finite Queue, and Retrial Capacity are used for data analysis when necessary. Traffic Engineering Capacity tables are based on mathematical models in which certain assumptions are made about call arrivals, the serving process, and the disposition of blocked calls. *DEFINITY® Communications System and System 75 and System 85— Traffic Theory,* 555-104-504, contains a list of commonly used capacity tables.

Speed of Answer

Given the appropriate variables, you can estimate the Speed of Answer. You need the following:

- Erlang-C Infinite Queue Capacity tables (found in *DEFINITY® Communications System and System 75 and System 85—Talk Tables,* 555-104-503)

- AWT

- Number of Attendant Positions Staffed (Working Servers)

- AOL, where: AOL = (Calls Ans + Calls Aband) x AWT

Example:

Given the following data, estimate the Speed of Answer:

- Time Talk = 43 CCS

- Time Held = 4 CCS

- Calls Answered =170

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- Using Time Talk, Time Held, and Calls Answered, the calculations indicate that AWT = 27.6 Seconds

- Number of Attendant Positions Staffed = 2

- Calls Abandoned = 3

- Using Calls Answered, Calls Abandoned, and AWT, the calculations indicate that AOL = 47.83 CCS

1. In the table shown in Figure 4-1, locate the row that corresponds to two attendant positions (working servers).

2. Read across to find the offered load closest to 47.83 CCS. (The closest is 46.2 CCS, when rounding up.)

3. Read up to find the Average Delay in Multiples of Average Holding Time that corresponds to 46.2 CCS (for this example, the Average Delay in Multiples of Average Holding Time is .700).

4. Estimate the theoretical Speed of Answer by multiplying the Average Delay in Multiples of Average Holding Time by AWT (that is, Speed of Answer = .7 x 27.6 seconds = 19.3 seconds).

   Note: This example implies that all calls will have an average of 27.6 seconds delay. Some of the calls are answered immediately, while the remaining calls are delayed. To find the portion of calls that experience a delay before service can be estirnated,use the table shown in Figure 4-1. The average delay of these calls can be estimated using the table shown in Figure 4-3.

WRKING SRVRS	.001	.005	.010	50	.200	.250	.300	.350	.400	.450	.500	.700	1.00	2.00	WRKING SRVRS
1	0.0	0.2	0.4	.7	6.0	7.2	8.3	9.3	10.3	11.2	12.0	16.8	18.0	24.0	1
2	2.3	5.1	7.2	.0	29.4	32.2	34.6	36.7	38.5	40.1	41.6	46.2	50.9	58.8	2
3	9.7	16.8	21.6	.2	58.8	61.9	65.1	67.8	70.1	72.2	74.1	79.7	85.3	94.2	3
4	21	33	40	83	89	93	97	100	103	106	108	114	120	130	4
5	36	52	61	14	120	126	130	134	137	1	142	149	155	165	5
47	1187	1296	1352	532	1540	1554	1568	1589	1602	1613	1621	1628	1633	1630	47
48	1218	1331	1385	567	1575	1589	1605	1624	1600	1649	1657	1663	1669	1673	48
49	1269	1363	1418	602	1610	1624	1641	1660	1674	1684	1693	1699	1706	1709	49
50	1200	1396	1452	637	1646	1660	1676	1696	1710	1720	1729	1735	1741	1745	50

AVG E (AVERAGE DELAY / AVERAGE HOLDING TIME)

AVERAGE DELAY IN MULTIPLES OF AHT THAT CORRESPONDS TO 46.2 CCS

ATTENDANT-OFFERED LOAD CLOSEST TO 43.77 CCS

FIGURE 4-1. Estimating the Speed of Answer

5. To determine the percentage of calls that experience a delay, use the Average Delay in Multiples of Average Holding Time that is closest to the expected AOL.

   a. In the Erlang-C Infinite Queue Capacity table shown in Figure 4-2, locate the row that Corresponds to two working servers.

   b. Read across until you find the value closest to the expected AOL (the value closest to 47.83 CCS is 46.2 CCS).

   c. Read up to find the Average Delay in Multiples of Average Holding Time that corresponds to 46.2 CCS (the Average Delay in Multiples of AHT is .700).

   d. In the Erlang-C Probability of Delay table shown in Figure 4-2, find the .700 column.

   e. Read down this column until it intersects the row with two servers. The value at the intersection is .502, which represents the probability of delay. This value shows that 50.2 percent of the calls experience some delay before being answered.

WORKING SERVERS	.001	.005	.010	.020		.150	.200	.250	.300	.350	.400	.450	.500	.700	1.00	2.00	WORKING SERVERS
1	.001	.005	.010	.020		.130	.167	.200	.231	.259	.286	.310	.372	.412	.500	.667	1
2	.002	.009	.018	.034		.192	.237	.276	.312	.344	.372	.399	.463	.502	.586	.734	2
3	.003	.013	.024	.045		.229	.278	.321	.358	.391	.421	.447	.471	.550	.631	.768	3
4	.003	.015	.029	.053		.255	.307	.352	.390	.424	.454	.481	.505	.582	.661	.790	4
5	.004	.018	.033	.060		.277	.331	.376	.415	.450	.480	.506	.531	.607	.683	.806	5
6	.005	.020	.036	.066		.294	.350	.395	.436	.470	.501	.527	.551	.626	.700	.819	6
47	.014	.055	.097	.158		.510	.573	.621	.659	.690	.716	.737	.756	.809	.857	.919	47
48	.014	.055	.096	.159		.512	.576	.623	.661	.692	.718	.739	.758	.811	.859	.918	48
49	.014	.056	.096	.160		.515	.578	.626	.663	.694	.720	.741	.759	.812	.861	.916	49
50	.014	.056	.097	.161		.517	.580	.628	.665	.696	.721	.743	.761	.814	.862	.914	50

AVERAGE DELAY IN MULTIPLES OF AHT (.700)

ESTIMATED PROBABILITY OF DELAY (.502)

FIGURE 4-2. Estimating the Percentage of Delayed Calls

6. To determine the Average Delay of the Delayed Calls, proceed as follows:

    a. In Figure 4-3, locate the .700 column.

    b. Read down this column until it intersects the row with two servers. (The value at the intersection is 1.40. This is the Average Delay of Delayed Calls in Multiples of Average Holding Time).

    c. To obtain the Average Delay of Delayed Calls in seconds, multiply the Average Holding Time by 1.40 (1.40 X 27.6 seconds = 38.6 seconds).

In summary, when two attendant positions are provided to accommodate 173 calls during the busy hour, the speed of answer for all calls is 27.6 seconds. While 49.8 percent of the calls are answered immediately, the remaining 50.2 percent will have an average delay of 35.42 seconds.
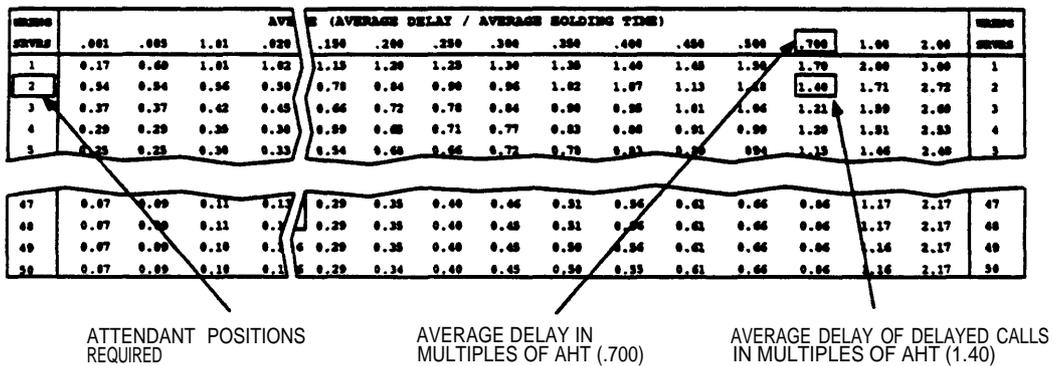

ATTENDANT POSITIONS REQUIRED

AVERAGE DELAY IN MULTIPLES OF AHT (.700)

AVERAGE DELAY OF DELAYED CALLS IN MULTIPLES OF AHT (1.40)

FIGURE 4-3. Estimating the Average Delay of Delayed Calls

Estimating the Number of Attendant Postiions Required

Given the appropriate variables, you can estimate the number of attendant positions required to achieve a desired Speed of Answer. You need the following:

- Erlang-C CCS Capacity Tables
- AW
- AOL
- Desired Speed of Answer

Example:

For this example, we will continue with the previous example's data; that is:

- AWT = 27.6 seconds
- AOL = 47.63 CCS
- Assume that the Desired speed of Answer =13 seconds.

To determine the Average Delay in Multiples of AWT:

$$\textit{Average Delay in Multiples of AWT} = \frac{\textit{Desired Speed of Answer}}{AWT} = \frac{13\ \textit{seconds}}{27.6\ \textit{seconds}} = .4710$$

1. In the table shown in Figure 4-4, Erlang-C Infinite Queue Capacity, locate the column that most closely corresponds to the objective delay of .4710 (this falls between .450 and .500, so use the .500 column).

2. Read down the column until the offered load closest to 47.83 CCS is found (this falls between 41.6 and 74.3, so use the 41.6 row).

3. Read horizontally to the left or right margin to find the number of servers required (number of servers required = 2).

COLUMN CLOSELY CORRESPONDS
TO OBJECTIVE DELAY OF .4743

ATTENDANT-OFFERED LOAD
CLOSEST TO 43.77 CCS

Figure 4-4. Estimating Attendant Position Requirements

Estimating Percent Occupancy

To determine the percent occupancy (total time) you will need the following data:

- Number of attendant positions staffed
- AOL

Example:

For this example we will continue with the previous example's data; that is:

- AOL = 47.83 CCS
- # of positions staffed = 2

Assume that the attendant positions are staffed 100 percent of the time, then each position can handle 36 CCS of load during the peak hour.

$$\% \text{ Occupancy (total time)} = \frac{AOL}{\# \text{ of staffed positions} \times 36\ CCS} \times 100 = \frac{47.83\ CCS}{2 \times 36\ CCS} \times 100 = 66\%$$

Automatic Circuit Assurance Reports

This section describes the parameters and measurements reports for the Automatic Circuit Assurance (ACA) feature. Specifically, these two reports are identified as the ACA Parameters Report and the ACA Measurements Report.

The ACA feature may be used to identify possible malfunctioning trunks by providing an alerting mechanism that monitors:

- The occurrence of an excessive number of short holding time calls
- The occurrence of calls that have an abnormally longholding time

When the number of short holding time calls exceeds the eestablished threshold, or the duration of a call exceeds the established long holding time limit, the following actions occur:

1. An entry is made on the ACA Measurements Report.

2. A referral call is placed to a designated attendant console or display-equipped voice terminal.

> **Note:** Refer to the *DEFINITY® Communications System Generic 1 and Generic 3i — Feature Description,* 555-230-201, for a more complete description of the ACA feature.

Background Information

1. To determine if ACA is enabled, execute the **display system-parameters feature** command.

2. When ACA is enabled, it may be used either on a single-system basis or in a Distributed Communications System (DCS) network. Administration of the `ACA Referral Calls` field (also displayed on the System Parameters screen) determines where referral calls are reported. For DCS networks, one switch (the primary) is administered to report the ACA measurements for all switches within the network . All other DCS nodes must be administered as remote. Furthermore, the field `ACA Remote PBX Identification` must be administered with the PBX ID of the node that is designated as primary.

   For non-DCS arrangements, the switch is administered as local.

3. The switch that delays the ACA measurements must have a valid number administered in the `ACA Referral Destination` field.

4. A valid ACA referral destination can be any of the following:

   - An individual attendant
   - The attendant group
   - A designated station that is equipped with an alphanumeric display

5. The console or voice terminal that is administered as the Referral Destination will also have a display button (ACA referral call) administered. This button is used to activate a once-through scroll of the referral calls. Calls are aanswered/displayed beginning with the oldest and ending with the rnost recent. After the calls have been answered once, the referral call history can only be displayed with the ACA Measurements Report.

    Note: The ACA display button turns the ACA Referral Call feature on and off. When the ACA button is enabled, referral calls, on a systemwide basis, are completed.

6. Those systems equipped with a Speech Synthesizer circuit pack may also provide an audio (voice synthesized) report of the referral calls.

ACA Parameters Report

The ACA Parameters Report lists all trunk groups in the system and displays the current definitions (parameters) for long and short holding times.

> **Note:** The parameters are administered on the trunk group forms.

Command

To display the ACA Paramters Report, enter:

list aca-parameters [print] or [schedule]

Options: There are no options for this command.

Screen

Screen 4-4 shows a typical screen for the ACA Parameters Report. Table 4-C describes the data fields presented in the ACA Parameters Report screen.

```
list aca-parameters


                           ACA PARAMETERS


   Group          Group    Group         ACA     Short      Short       Long
   Number  TAC    Type     Name          On?     Hold Time  Threshold   Hold Time
      41   351    tie      MARKETING      n         10         15          1
      42   352    tie      PURCHASING     n         10         15          1
      43   353    isdn-pri D5-G2 PRI Tie  n         10         15          1
      44   354    tie      FINANCE        n         10         15          1
      45   355    tie      SALES          n         10         15          1
      46   356    tie      NEW YORK       n         10         15          1
      54   373    wats     SERVICE-WATS   y         10         15          1
      55   371    tie      DATA LINK      n         10         15          1
      57   387    tie      2 WAY TIE LINE y         10         15          1
      58   386    wats     NJ-WATS        y         10         15          1
      59   385    wats     WATS-800       y         10         15          1
      60   384    did      DID            y         10         15          1
      61   383    co       WASHINGTON     y         10         15          1


Command successfully completed
enter command:
```

SCREEN 4-4.   ACA Parameters Report

TABLE 4-C.   ACA Parameters Report

Field	Description
Group Number	A unique number (assigned during administration) that identifies each trunk group. It may be any number within the range of one to the maximum number of trunk groups supported by the system. The range of possible numbers is 1 through 99 (1 through 50 whenever the Hospitality Parameter Reduction feature is used).
TAC	The Trunk Access Code (assigned during administration) for the trunk group.
Group Type	The type of trunk associated with the accumulated data. The system monitors the following trunk types: • Access (acc) • Advanced Private Line Termination (aptl) • Central Office (co) • Customer Provided Equipment (cpe) • Digital Multiplexed Interface-Bit Oriented Signaling (dmi-bos) • Direct Inward Dialing (did) • Foreign Exchange (fx) • Integrated Services Digitall Network-Primary Rate Interface (isdm-pri) • Release Link Trunk (rlt) • Tandem (tan) • Tie Trunk (tie) • Wide Area Telecommunications Service (wats) **Note:** Refer to the *DEFINITY® Communications System Generic 3i—Implementation,* 555-230-650 for a complete definition of these trunk group types.
Group Name	The trunk group identification that is administered on the Trunk Group form.

TABLE 4-C *(continued)*.
ACA Parameters Report

Field	Description
ACA On?	Indicates whether or not the trunk group is being monitored by ACA.
	Suggested Action: The decision to monitor a trunk group (field entry **y**) may depend on a complaint from a user, historical problems, or suspicious data from another report. The ACA measurements report may be used in conjunction with other measurement reports for confirmation purposes. These other reports include:
	• The list measurements lightly-used-trunk
	• The list performance trunk-group
	• The list performance summary
	• The list measurements outage-trunk
	• The list measurements trunk-group
	When you no longer have a specific reason to monitor a trunk group with ACA measurements, the field should be **n** .
Short Hold Time	The maximum number of seconds that a call will be considered a short holding time call. A holding time that is longer than this value will be considered a normal call, up until the long holding time is exceeded. The short holding time value is specified on the Trunk Group form when the trunk group is administered. The field range is from 0 to 150 seconds with 10 seconds being the default.
Short Threshold	The system maintains a running count of each call that has a duration of less than or equal to the administered short holding time. The count is increased by one for each call that meets the short holding time criteria and decreased by one for each call that does not. When this count reaches the designated threshold, an entry is made in the ACA Measurements Report, and a referral call is placed. The threshold value is specified on the Trunk Group form when the trunk group is administered. The field range is from 0 to 30 with 15 being the default.
Long Hold Time	The minimum time of seizure, in hours, that the system will consider a call as having a long holding time. This number is specified on the Trunk Group form when the trunk group is administered. The number has a range of 0 to 10 hours with one hour as the default.
	A referral call is placed as soon as a single long holding call is detected. Subsequently, a referral call is placed at the top of the hour until the problem is resolved or until the trunk becornes idle.

ACA Measurements Report

The ACA Measurements Report displays the audit trail list of short and long holding time calls that have been referred for having exceeded the esablished limits.

Command

To display the ACA Measurements Report, enter:

list measurements aca [print] or [schedule]

Options: There are no options for this command.

Screen

Screens 4-5 and 4-6 show typical screens for the ACA Measurements Report. The date and time that the report was requested are displayed to the right, following the name of the report.

This report may contain up to 64 entries on several pages. If more than 64 referrals have been entered since the last system re-initialization, the report will show the 64 most recent entries; older entries, if any, will have been overwritten. As shown in Screen 4-5, if more than 14 referrals have occurred since the last system re-initialization, press **[NEXT PAGE]** to see additional entries, or press **[CANCEL]** to exit the report.

Table 4-D describes the data fields presented m the ACA Measurements Report screen.

```
list measurements aca                                          Page  1

Automatic Circuit Assurance Measurements    Today: 2:11 pm  TUE MAY 1, 1990

Day & Time        Trunk            Trunk           Trunk       Type of
of Referral       Group No.        Access Code     Member      Referral
  29/10:00          57               387             6          Long
  28/14:00          62               382             4          Short
  27/20:00          59               385             1          Long
  27/19:00        · 59               385             1          Long
  24/15:58          59               385             2          Long
  24/10:00          63               381             1          Long
  24/09:00          63               381             1          Long
  23/11:00          61               383             9          Short
  23/09:00          61               383             9          Long
  22/13:18          63               381             5          Long
  22/11':42         62               382            12          Long
  22/06:44          57               387            11          Short
  21/13:00          62               382             5          Long
  20/21:22          61               383             1          Long

              press CANCEL to quit --  press NEXT PAGE to continue
```

SCREEN 4-5.   ACA Measurements Report

```
list measurements aca                                        Page  2

Automatic Circuit Assurance Measurements      Today: 2:11 pm  TUE MAY 1, 1990

Day & Time          Trunk            Trunk           Trunk        Type of
of Referral         Group No.        Access Code     Member       Referral
  20/15:52            63               381             3           Long
  20/13:00            60               384             8           Long
  17/16:26            63               381             2           Long
  17/13:38            63               381             3           Short
  16/22:17            60               384             7           Long
  16/12:26            57               387             5           Short
  16/12:26            54               373             2           Long
  16/11:46            60               384             7           Long

Command successfully completed
enter command:
```

SCREEN 4-6.   ACA Measurements Report *(continued)*

TABLE 4-D. ACA Measurements Report

Field	Description
Day & Time of Referral	The day and time at which either the threshold for short holding time calls was exceeded or the threshold for long holding time calls was reached and a referral call was entered (see Table 4-C for definitions of short and long holding times and short threshold). Expressed as: day of the current month/hour:minute **Note:** The report lists referral calls beginning with the most recent and continuing back in time until either all referrals are listed or the most recent 64 are listed.. Referral calls are only attempted if the referral button is enabled. A referral call is completed if the call is answered. A call that is not answered will be attempted again when a new ACA call is received.
Trunk Group No.	Number of the trunk group in which the referral occurred. **Note:** For DCS networks, the PBX ID of the remote node is prepended to the trunk group number.
Trunk Access Code	Trunk Access Code for the trunk group.
Trunk Member	One specific trunk in the group that incurred the referral. **Note:** This information can be used, with other maintenance tests, to identify the equipment location (circuit pack) of the trunk group member.
Type of Referral	Indicates whether the referrall occurred asthe result of too many *short* holding time calls or an excessively *long* holding time call. **Suggested Action:** Generally, the occurrence of a referral call should serve as a warning that potential trunk failures are possible and actual trunk failures may be occurring. Resolution of the problem should, in most cases, be the function of maintenance personnel. Depending upon local arrangements, it may be appropriate to alert maintenance personnel if they have not already been alerted.

Automatic Route Selection Reports

Automatic Route Selection (ARS) is an optional feature. When used, it functions to route calls over the public network. The route selected is based on the preferred (usually least expensive) route available at the time the call is placed.

There are two measurement screens related to the ARS feature. The Measurement Selection form displays the list of patterns that are to be measured. The Pattern Measurements Report displays traffic data for the specified pattern (as a whole) as well as the distribution of traffic on the trunk groups in the pattern.

ARS Measurements Selection Form

You can select up to 20 ARS patterns for measurement from the 254 patterns available.

Commands

To display the list of ARS patterns that are to be measured, enter:

display ars meas-selection [print] or [schedule]

To change the list of ARS patterns that are to be measured, enter:

change ars meas-selection [print] or [schedule]

Options: There are no options for these commands (see Note).

Note: Routing pattern numbers are administered as a part of the system implementation process; more specifically, as a part of administering the ARS feature. This procedure is fully described in the *DEFINITY® Communications System Generic 3i— Implementation,* 555-230-650.

Screen

Screen 4-7 shows a typical ARS Measurements Selection form containing entries for the 20 patterns to be measured. Table 4-E describes the data fields presented in the ARS Measurements Selection Form.

```
change ars meas-selection

                    ARS MEASUREMENT SELECTION
                 Pattern No.              Pattern No.
                 1: 27                    11: 11
                 2: 7                     12: 1
                 3: 3                     13: 8
                 4: 74                    14: 14
                 5: 5                     15: 15
                 6: 6                     16: 16
                 7: 12                    17: 165
                 8: 218                   18: 254
                 9: 9                     19: 19
                 10: 100                  20: 29
```

SCREEN 4-7. ARS Measurements Selection Form

If the pattern number(s) you desire are not listed, you can add the desired numbers by replacing existing pattern numbers that are no longer needed. To do this, press [RETURN] until the cursor is placed on an undesired pattern number, enter the desired new number, or press [CLEAR FIELD] and enter the desired new number. Pattern numbers do not have to be in numerical order. The actual changes are made when you press [ENTER] . As always, a command can be aborted by pressing [CANCEL] .

TABLE 4-E.   ARS Measurements Selection Form

Field	Description
Pattern No.	*Pattern number.* Lists the number of the 20 patterns selected for measurement. The defaults are pattern 1 through pattern 20.

ARS Pattern Measurements Report

The ARS Pattern Measurements Report contains usage measurements for each of the 20 selected ARS patterns. Each routing pattern can contain from 1 to 6 trunk groups (routes). This report displays traffic data for the specified pattern (all trunk groups within the pattern, as a whole) as well as the distribution of traffic on each trunk group in the pattern.

Command

To display the ARS Pattern Measurements Report, enter:

list measurements route-pattern [option1 option2] [print] or [schedule]

Options: There are two options for this command. Type the number of the pattern (1 to 254) you wish to display. This number must have previously been assigned to one of the 20 numbers on the ARS Measurements Selection form. Furthermore, in order to obtain data for the pattern it must have previously been administered on the ARS forms. The options are **today** for today's total activity, **yesterday** for yesterday's total activity, or **last hour** for the activity of the most recently completed hour.

For example, to display yesterday's measurements for ARS pattern 27, enter:

list measurements route-pattern 27 yesterday

Screen

Screen 4-8 shows a typical screen for the ARS Pattern Measurements Report. The time and date that the report was requested are displayed to the right, following the name of the report. Table 4-F describes the data fields presented in the report.

```
list measurements route-pattern 27 yesterday

Automatic Route Selection Measurements        Today: 9:14 am  SAT MAY 5, 1990

  Pat.  Queue Calls    Calls    Calls    Calls    Queue
  No.   Size  Offered  Carried  Blocked  Queued   Ovflo.
  27    5     80       80       3        3        0


                    TRUNK GROUP MEASUREMENTS FOR PATTERN
                 (trunk groups are shown in order of selection)


  Grp  Grp    Grp   Grp    ------ % Calls Carried -------   %    Total
  No.  Type   Size  Dir    10 20 30 40 50 60 70 80 90 100  Calls Calls
  56   tie    24    two ///////////////////////////////    85    68
  61   co     4     out //                                   5     4
  62   co     11    two ////                                10     8


Command successfully completed
enter command:
```

SCREEN 4-8. ARS Pattern Measurements Report

TABLE 4-F.   ARS Pattern Measurements Report

Field	Description
`Pat. No.`	*Pattern number.* The ARS pattern number(from 1 through 254) being measured.
`Queue Size`	The size (length) of the queue for the first trunk group in the ARS pattern. This is commonly referred to as the ARS pattern queue size. A queue is an ordered sequence of calls waiting to be processed. For this example, a maximum of five calls maybe be in queue at any one time.
`Calls Offered`	The total number of calls offered to the ARS pattern. *Calls Offered (With Queue) = # of Calls Carried + # of Queue Overflow Calls + # of Queue Abandon Calls* *Calls Offered (Without Queue) = # of Calls Carried + # of Calls Blocked*
`Calls Carried`	The total number of seizures (for all trunk groups) in the ARS pattern.
`Calls Blocked`	The number of offered outgoing calls that found all trunk groups in the pattern busy. If the queue overflows, then the call is still blocked. Specifically, a blocked call is a call that: 1. Arrives when there are no available resources 2. Arrives and gets queued 3. Arrives when the queue is full 4. Arrives and cannot queue because the queue length is set to zero 5. Cannot queue because the Autornatic Callback (ACB) button is busy 6. Cannot queue because there is no ACB button
`Calls Queued`	The number of offered calls that found all trunk groups in the pattern busy and were placed in queue for the first trunk group (first-choice trunk group) in the pattern.
`Queue Ovflo.`	*Queue Overflow.* The number of calls that find the queue on the first trunk group full. Calls attempted while the queue is in overflow receive a busy signal. Queue overflow calls are blocked calls.

TABLE 4-F *(continued)..*
ARS Pattern Measurements Report

Field	Description
`TRUNK GROUP MEASUREMENTS FOR PATTERN`	The total number of calls carried on each trunk group in the pattern and the percentage this represents of the total calls carried on the pattern.
`Grp No.`	*Group Number.* The number, assigned via the Trunk Group form, that identifies each trunk group associated with the displayed data. Trunk groups are listed in the same order as they are assigned on the Routing Pattern form. The first trunk group listed is the first selected (preference one), second listed is the second selected (preference two), etc. A maximum of six different preferences may be displayed on this report. The range of possible trunk group numbers is system-dependent as follows: • V1—1 through 50 • V2 and XE V2—1 through 60 • V3 and XE V3—1 through 99 (1 through 50 for Hospitality Parameter Reduction) • G1—1 through 99 (1 through 50 for Hospitality Parameter Reduction)
`Grp Type`	*Group Type.* The type of trunk in the group. The following types of trunk groups can be accessed by ARS: • Local Central Office (`co`) • Foreign Exchange (`fx`) • Integrated Services Digital Network-PrimaryRate Interface (`isdn-pri`) • Tie Trunk (`tie`) • Wide Area Telecommunications Service(`wats`)
`Grp Size`	*Group Size.* The number of trunks in the group. The range of possible numbers is 1 through 99.
`Grp Dir`	*Group Direction.* Identifies whether the assigned trunk groups are outgoing only (out) or 2-way (two). **Note:** Incoming trunks cannot be ARS trunk.
`% Calls Carried`	A graphic display showing the percent of total calls carried on the pattern for each trunk group.

TABLE 4-F *(continued).*
ARS Pattern Measurements Report

Field	Description
`% Calls`	The percent of the total calls carried on the pattern for each trunk group. **Suggested Action:** The first trunk group listed in the report is the first choice trunk group. This trunk group should always carry a significantly larger percentage of the calls than any of the other trunk groups. If not, you should add more members so that the first choice trunk group has significantly more members than any other group in the pattern.
`Total  Calls`	The total number of calls carried on the pattern for eachh trunk group. For the **today** report, this field indicates the number of calls carried since the previous midnight. For the **yesterday** report, this field indicates the number of calls carried all day (24 hours) yesterday. **Note:** This column displays a cumulative number; there are no peak data measurements for the ARS reports. However, you can use the trunk group reports to display "peak" as well as other data.

Validating the Data

The following guidelines show a fast, easy method of determining whether the collected data is invalid or questionable. These guidelines represent the least that you should do for validation. You should perform additional validation as necessary.

To validate the ARS Measurements Report, verify that the following data is in order:

- Total Calls Offered to a pattern should always be equal to the sum of the columns "Calls Carried" plus "Queue Overflow" plus "Queue Abandoned" if there is a queue on the first preference.

- Total percent of all calls carried in a pattern (sum of the % Calls column for each trunk group) should never exceed 100.

Analyzing the Data

The ARS Pattern Data worksheet serves to back up the data from the reports and to provide a handy means to view overall performance of the specified route-pattern. The ARS reports/worksheet do not identify a peak hour but do total the data for the identified time period.

The ARS Pattern Measurements Report summarizes data for the specified ARS pattern. This report is intended to assist you in determining the following:

- How traffic is distributed over the trunk groups in the pattern

- Whether the Facility Restriction Levels (FRLs) are administered properly

- The proper number of trunk members and trunk groups.

Routing Patterns are administered as a part of ARS administration. If, after analyzing the data presented with this report, you determine that the Routing Pattern should be changed (for example, you need to increase the number of trunk members or trunk groups), you must go back to the ARS Routing Pattern form to make the changes. Likewise, if the FRL for the Routing Pattern is to be changed. A more likely scenario would be that the users, attempting to originate calls over the ARS pattern, will be blocked because their FRL number is lower than that assigned to the trunk group. A user can only access those trunk groups with FRL numbers the same or lower than their FRL.

A pattern may have enough trunks but may not have proper FRLs assigned to the users that attempt to originate calls with the pattern. If the report indicates a high number for the Calls Queued column and/or Queue Overflow column, but the usage on trunks in the groups following the first choice trunk group is low, consider identifyng the group of users who are attempting to originate calls but are being blocked and raise this group's FRL. This can be accomplished by accessing the Class of Restriction form and increasing the FRL number for the identified group or groups of users.

If the report indicates a high Queue Overflow rate and a high usage rate for all trunk groups in the pattern, then this probably indicates that there are not enough trunks. For this scenario a variety of solutions maybe implemented. Generally, the simplest is to increase the number of first choice trunks. Another consideration is to add more trunk groups to the pattern. Perhaps the most drastic change is to reorganize the ARS Routing Patterns.

Generally, you will want to minimize the number in the Calls Blocked column, although there may be certain users' calls that you do want to block.

Additional and somewhat related information .is available on the Performance Summary report. For example, the Performance Summary report lists the five trunk groups with the highest percent of blocking during their peak hour. Furthermore, the report lists the trunk group members that are out of service. Also listed are the trunk members, by trunk group, that were not used during the reporting period.

The Trunk Groups report provides measurement data that relates to the ARS Pattern Measurements report. For example, the total-number of calls overflow from the first choice trunk group is listed in the "Grp Ovfl" field. It should be understood that these are the calls that repetitively overflow to the other (second, third, etc.) trunk groups.

Trunk Group Call-By-Call Report

Background Information

1. In a non-Call-By-Call (CBC) Service Selection environment, a trunk group must be preassigned and provisioned for each desired service (for example, MEGACOM® telecommunications service, WATS, Software Design Network [SDN], etc.). With this arrangement, each trunk group must be designed to accommodate the peak traffic load for the intended service application. Furthermore, the time when one service application encounters peak traffic may not coincide with when another service application encounters peak traffic. As an alternative, if multiple network services are accommodated with a single trunk group (which is referred to as a CBC Trunk Group), and that trunk group is provided with allocation and scheduling controls, then significant trunking efficiencies may be realized by distributing the total traffic for all of the specified network services over the total number of available trunk members.

2. By implementing Usage Allocation Plans (UAPS) you can optimize, within certain limits, the CBC trunk group without involving any of the Inter-Exchange Carrier/Local Exchange Carrier (IXC/LEC) network services personnel. Each UAP specifies the network services/features that may be accomrnodated with the trunk group. It also speciffies the minimum number of reserved channels and maximum number of channels that each service/feature may use at a given time.

3. The free pool concept is associated with UAPS. Specifically, free pool refers to the number of trunks that have not been reserved for a specific service/feature. The free pool is calculated as:

   Free Pool = Total # of in-service Trunks - $\sum$ *of the Mins (for each S/F)*

4. Each UAP may be administered as fixed or scheduled. With the fixed method, a specified plan remains in effect continuously. With the scheduled method, two or three UAPS may be scheduled to vary by both day of week and time of day.

5. Before you can analyze the CBC Trunk Group Measurements Report, you must know the intent of the strategy for each UAP. You should have (in hand) a completed copy of the CBC Trunk Group UAP and the associated assignment schedule, which are Pages 3 and 4 of the Trunk Group Administration form. Refer to *DEFINITY® Communications System Generic 3i— Implementation,* 555-230-650, or to *DEFINITY® Communications System Generic 1— DS1/DMI/ISDN-PR/ Reference,* 555-025-101, for additional details.

Trunk Group Call-By-Call Measurements Report

The Trunk Group Call-By-Call Measurements Report displays last-hour traffic data for any speci-
fied CBC trunk group, provided that the trunk group had a UAP administered for the last hour.
You can use the report to monitor the trunk group and to determine if the UAP meets current
needs. Whenever it is determined that changes are required, you must make these changes on
the appropriate trunk group form(s).

Command

To display the Trunk Group Call-By-Call Measurements form, enter:

> **list measurements cbc-trunk-group   last-hour [option] [print or schedule].**

Options: Type the number of the trunk group for which you want to display the Trunk Group
Call-By-Call Measurements Report.

Screen

Screen 4-9 shows the Trunk Group Call-By-Call Measurements Report format.   The line just
above the report title displays the date and time for which the report was requested. Table 4-G
lists and describes the data fields in the Trunk Group Call-By-Call Measurements Report.

```
list measurements cbc-trunk-group last-hour 99


                                            Date: 2:15 pm WED MAY 9, 1990


                         CBC TRUNK GROUP MEASUREMENTS


                 Peak Hour For CBC Trunk Group 99 : 1300
Queue Size          : 40                         Usage Allocation Plan Used
Calls Queued        : 23                         Number:  1  0   0    0    0    0
Queue Overflow      : 0                          Duration: 60 0   0    0    0    0
Queue Abandonments  : 4
Out of Service      : 0


                   Min  Max Meas Total Total  Inc.  Ovf  Ovf  Ovf  %    %   %Out
Service/Feature    Chn  Chn Hour Usage Seize  Seize  TG  S/F  Max  TBM  ATB  BLK
   outwats-bnd      5   12 1300   240   333    0     0    0   23   10    2    1
   sdn              4    8 1300    40    30   22     0    0    0   62    1    0
   other            0   20 1300    70    41   36     0    0    0    0    0    0


Command successfully completed
enter command:
```

SCREEN 4-9. Trunk Group Call-By-Call Measurements Report

TABLE 4-G. Trunk Group Call-By-Call Measurements Report

Field	Description
`Queue Size`	Size of the queue for the ISDN-PRI CBC trunk group. If zero is displayed, then no queue is administered. Hence, the other queue measurements will also be zero.
	If the queue is administered, then it serves all of the network services/features that are administered for the trunk group. However, its functional operation is somewhat different than the queue used with conventional trunk groups. When a particular service/feature uses its allotted maximum number of channels, then any additional call attempts will be queued, even though not all of the trunks are currently being used. If the queue is already full, any additional call attempts will simply overflow with the caller receiving reorder tone.
	Since one service/feature generally will not experience peak traffic at the same time as another service/feature, there will bean averaging effect. Furthermore, the queue size for a CBC trunk group need not be much larger than for a non-CBC trunk group. The queue size should be larger than the trunk group size but, typically, not more than three times as large as the trunk group size.
`Calls Queued`	The total number of calls that entered the CBC trunk group queue during the peak hour. The peak hour is the hour with the greatest number of calls.
`Queue Overflow`	The total number of calls where the call was denied access to a trunk, the queue was full, and/or the caller received reorder tone.
	Suggssted Action: Generally, this field will indicate the number zero. If this field indicates a high number, then:
	(a) the queue size may be too small, or
	(b) more trunks maybe needed so that less calls will queue, or
	(c) the UAP may be too restrictive (for example, some of the `Min Chn` values may be too high, or some of the `Max Chn` values may be too low). Also, see "Suggested Action" in the `% TBM` description.

TABLE 4-G *(continued).*
Trunk Group Call-By-Call Measurements Report

Field	Description
Queue Abandonments:	The number of calls that were removed from the queue by either the system or the user. The system automatically removes calls from the queue after 30 minutes. A user may abandon his or her call by canceling the Automatic Callback feature (that was set earlier to place their call in the queue).
	Suggested Action: If the last-hour also happens to be the peak-hour, then the data may be used to make a decision regarding whether the queue size is correct. Recall that a trunk group and its associated queues are sized to accommodate peak-hour traffic loads. Typically, this field will indicate a small number. However, a large number will generally indicate that the queue size is too large and that people are abandoning calls because they have remained in queue for a long time. Consider adding more trunks so that calls will not queue as fast.
Out of Service:	The number of trunks in the trunk group that are out of service at the time the measurements are collected. An individual trunk may be taken out of service automatically by the switch whenever an excessive number of errors occur, or by maintenance personnel in order to run diagnostic tests.
	Suggested Action: If the trunks were removed from service by the switch, then the appropriate maintenance personnel should be notified. The objective is to keep all members of a trunk group in service. Generally, you should not make adjustments to the CBC trunk group because of out of service trunks, but should get those trunks returned to service.
Usage Allocation Plan Used	A list of the UAP numbers followed by a list of the respective duration (the amount of time in minutes) that each plan was in effect during the measurement interval. The **Number:** field can display up to a maximum of six plan numbers.
	A maximum of three different UAPs (that are identified by the numbers 1, 2, and 3) may be defined for each trunk group. All three plans are defined on Page 3 of the trunk group form. Page 4 of the corresponding trunk group form is where you administer plan assignments.
	Each CBC trunk group is administered with either "fixed" allocation or "scheduled" allocation. When administered as fixed, it remains in effect oontinuously. Whenever it is administered as scheduled, the designated plans are activated on a per-day and time-of-day basis that is determined by the schedule.

TABLE 4-G *(continued).*
Trunk Group Call-By-Call Measurements Report

Field	Description
Service/Feature	The names of up to 10 service/features and optionally the special iden-tifier "other" for which the associated measurements are being reported. The following service/features can be administered in a UAP: • ACCUNET® digital service • inwats • int800 • lds • MEGACOM telecommunications service • MEGACOM 800 telecommunications service • MULTIQUEST® telecommunications service • operator • outwats-bnd • sdn • sub-operator • wats-max-bnd The special identifier "othter" is used to report activity for any service or feature not specified in the current UAP. If no UAP was in effect at the measurement interval, no report is made. If public network access is to an LEC or to an IXC other than AT&T, that carrier's Integrated Services Digital Network (ISDN) services/features are listed, provided they have been administered as a user-defined service/feature.
Min Chn	*Minimum number of channels.* The minimum number of channels in the ISDN-PRI CBC trunk group allocated to the specified service/feature at the time the measurements were collected.
Max Chn	*Maximum number of channels.* The maximum number of channels in the ISDN-PRI CBC trunk group allocated to the specified service or feature at the time the measurements were collected.

TABLE 4-G *(continued).*
Trunk Group Call-By-Call Measurement Report

Field	Description
Meas Hour	*Measurement Hour.* The starting time (using the 24-hour clock) of the hour during which the data was recorded.
Total Usage	The sum of time, in CCS, for all channels that were used by the specified service/feature during the measurement interval (36 CCS or 60 minutes).
Total Seize	The total number of incoming and outgoing calls that requested the specified service/feature through the ISDN-PRI CBC trunk group.
Inc. Seize	*Incoming seize.* The total number of incoming calls that requested the specified service/feature through the ISDN-PRI CBC trunk group.
	For two-way and outgoing trunks, the number of *Outgoing Seizures* can be calculated as follows:
	Out Seize = Total Seize - In Seize
Ovf TG	*Overflow trunk group.* The number of outgoing calls that requested the specified service/feature, on the ISDN-PRI CBC trunk group, but were not carried because the calls arrived to find that no idle trunk members were available and the free pool is empty.
Ovf S/F	*Overflow services/features.* The number of calls that requested the specified service/feature but were denied because the calls arrived under the following conditions: • The specified service/feature was at or above its minimum channel allocation (no explicit reserved channels remain). • There were idle channels available in the trunk group, but they had been reserved to meet the minimum channel allocation for other services/features. **Suggested Action:** 1. Investigate the possibility of raising the **Min Chn** requirements for this service/feature. 2. Investigate the possibility of increasing the number of members for the trunk group. 3. Determine whether or not the **Min Chn** assignments for the other services/features are appropriate. For example, if the column **% TBM** displays a high number for one or more of the other services/features, then you can lower the minimums (for one or more of the other services/features). This will make more trunks available for this service/feature.

TABLE 4-G *(continued).*
Trunk Group Call-By-Call Measurements Report

Field	Description

`Ovf Max`	*Overflow maximum.* The number of calls that were not carried because the calls originated at a time when the service/feature had already used up its allotted maximum number of channels. In this case, the trunk group may still have trunk members available for the other services/features.
	
	Suggested Action:
	
	   1. Investigate the possibility of raising the number that is administered in the `Max Chn` field.
	
	      This is only possible provided that the free pool is not exceeded. To determine whether or not you have more trunks available for a S/F calculate the following:
	
	      Free Pool = Total # of in-service trunks $-\sum$ *Min for each S/F*
	
	      Max - Min (for the identified S/F) $\leq$ *Free Pool*
	
	      For example, using the data presented in Screen 4-9.
	      Free Pool = 9
	      8 - 4 *(for SDN)* $\leq$ 23 *trunks* - 9
	      4 < 14 *Therefore, you can increase the Max Chn*
	
	   2. Consider adding more trunk to the trunk group and increase the maximum for the identified service/feature.

TABLE 4-G *(continued).*
Trunk Group Call-By-Call Measurements Report

Field	Description
% **TBM**	*Percentage of trunks below minimum.* The percentage of time during the polling interval that the number of channels in use by the specified service/feature is below the specified minimum. **Suggested Action:** Lower the **Min Chn** since this maybe the cause for the Ovf S/F. **Note:** If the field % TBM is high, then you are reserving more trunk members than will be used. Determine if another service/feature needs more trunks and, if so, lower the **Min Chn** for this service/feature.
% **ATB**	*Percentage All Trunks Busy (ATB).* The percentage of time (0 to 100 percent) during the measurement interval that the specified service/feature could not get a channel because of at least one of the following reasons: ● All trunks in the ISDN-PRI CBC trunk group were busy on a call or busied-out by maintenance. ● This service/feature was above its minimum and all available trunks were reserved for other features/services that were below their minimums. ● The specified feature or service was at its maximum number of channels. **Suggested Action:** Theoretically, a high number in this field and zero in the fields **Ovf TG, Ovf S/F,** and **Ovf Max** would indicatethat everything is functioning perfectly. However, a more typical scenario would be a high number in this field and also high numbers in the **Ovf TG, Ovf S/F,** and/or **Ovf Max** fields. This would indicate a problem and necessitate one of the following corrective actions. 1. A number in the **Ovf TG** field indicates that the physical maximum number of trunks has been exhausted. If this is "Preference 1" of the routing pattern, then overflow is just to the second choice trunk group. Otherwise, the obvious choice is to add more trunks to the trunk group. 2. If the **Ovf S/F** field indicates a problem (for example, a significant number), refer to "Suggested Action" in the **Ovf S/F** description. 3. If the **Ovf Max** field indicates a problem (a significant number), refer to "Suggested Action" in the **Ovf Max** description.

TABLE 4-G *(continued).*
Trunk Group Call-By-Call Measurements Report

Field	Description
% **BLK**	*Percentage outgoing blocking.* The ratio of outgoing calls not carried for a specified service/feature to the outgoing calls offered by the service/feature. For an ISDN-PRI CBC trunk group with no queue, the calls not carried are those calls that find all facilities busy for the specified service/feature. For an ISDN-PRI CBC trunk group that has a queue, the calls not earned are those calls that find all facilities for the specified service/feature busy and cannot be queued because the queue is full. Suggested Action: 1. Look at the % **ATB** column and identify any service/feature that has a high value. Follow the "Suggested Action" in the % **ATB** description. 2. You can increase the length of the queue rather than adding more trunks. Subsequently, you should monitor the **Queue Abandonments** field to insure that it stays within reasonable limits. 3. If conditions are such that Item 1 above is not appropriate, then you may find it necessary to add more trunks.

Call Rate Report

This section describes the Call Rate Measurements Report available with DEFINITY Generic 1 systems.

Call Rate Measurements Report

The Call Rate Measurements Report provides traffic data for all calls (both incoming and outgoing) that are completed on the system during the following time intervals:

- Last hour
- Current day's peak hour
- Previous day's peak hour

The peak hours are the hours with the greatest number of calls and the hours with the busiest 36-second intervals. A 36-second interval (1 CCS, or 1 one-hurdedth of an hour) is used so the number of busy interval times 100 will give the peak call rate for the listed hour. For example, assume that you have normal traffic (not bursty) and that there were 31 calts for the peak 36-second interval of the last hour. The peak calling rate would have been 3100 CCS. Obviously, the number of calls actually completted would normally be much less than this number.

All originated calls except those directed to an announcement or those generated by maintenance are counted. For example, a facility access test call will not be counted as a completed call.

Command

To display the Call Rate Measurements Report, enter:

list measurements call-rate [print] or [schedule].

Options: There are no options for this command.

Screen

Screen 4-10 shows the Call Rate Measurements Report format. Table 4-H lists and describes the data fields in the Call Rate Measurements Report.

```
list measurements call-rate

CALL RATE MEASUREMENTS                              Date: 4:15 pm TUE MAY 8, 1990

                                      Last Hour
              ----------------------------------------------------------------
              Hour   # Compl   Busy Int. (36 sec.)   # Busy Int. Calls Compl
              1500    405           15:20:00                     31
                                      Today Peak
              ----------------------------------------------------------------
              Hour   # Compl   Busy Int. (36 sec.)   # Busy Int. Calls Compl
Busiest Hour:     1300    1005          13:30:36                     55
Busiest Interval: 1200    801           12:20:00                     90
                                    Yesterday Peak
              ----------------------------------------------------------------
              Hour   # Compl   Busy Int. (36 sec.)   # Busy Int. Calls Compl
Busiest Hour:     1300    900           13:40:36                     41
Busiest Interval: 1200    655           12:20:00                    105

Command successfully completed
enter command:
```

SCREEN 4-10.   Call Rate Measurements Report

The primary purpose of this report is to identify system-level peak calling activity and the hour
that the activity occurred. Typically, the busiest hour for peak activity (for example,1300
hours in this example) will be the same as the peak hour for all trunk groups, which is identified
on the Trunk Group Measurements report. However, conditions could be such that the two
reports indicate different hours.

> **Note:**   The call summary report, which is described next, lists the number of completed
> calls for the last 24 hours. Therefore, if you compare the Calll Rate Report with the
> Call Summary Report you should see some of the same information.

TABLE 4-H. Call Rate Measurements Report

Field	Description
`Hour`	*Measurement Hour.* The starting time (using the 24-hour clock) of the hour during which the data was recorded.
`# Compl`	*Number of Calls Completed.* The total number of calls completed, or answered (including both incoming and outgoing), during the listed hour.
`Busy Int. (36 sec.)`	*Busy Interval (36 seconds).* The 36-second interval within the listed hour that had the most calls completed.
`# Busy Int. Calls Compl`	*Number of Busy Interval Calls Completed.* The total number of calls completed in the listed busy interval.
`Busiest Hour:`	For peak listings, the row identifies the busiest hour for today's and yesterday's peak hour. This is the hour that had the largest number of completed calls.
`Busiest Interval:`	For peak listings, this row identifies the hour that contained the busiest 36-second interval for today and yesterday. The hour containing the busiest 36-second interval is not necessarily the same hour as the one reported as the busiest complete hour of the 24-hour period.

Call Summary Report

This section describes the call summary measurements report.

Call Summary Measurements Report

The Call Summary Measurements Report provides an hourly summary of the traffic data for the last 24 hours. All call completions, except those generated by maintenance, are counted. For example, a Facility Test Call will not be counted as a call completion.

Command

To display the Call Summary Measurements Report, enter:

list measurement call-summay [print or schedule]

Options: There are no options for this command.

> **Note:** Calls are counted upon initial completion. Neither conference nor transfer calls are included, except attendant console calls.

Screen

Screen 4-11 shows the Call Summary Measurements Report format. Table 4-1 lists and describes the data fields in the Call Summary Measurements Report.

```
 list measurements call-summary


                                               Date: 4:20 pm TUE MAY 8, 1990


                        CALL   SUMMARY   MEASUREMENTS
                          Summary of Last 24 Hours


            Hour    # Calls Completed        Hour    # Calls Completed
            1500         405                 0300         0
            1400         894                 0200         0
            13**                             0100         0
                         201
            1200         801                 0000         3
            1100         758                 2300        21
            1000         621                 2200        12
            0900         473                 2100        24
            0800         234                 2000        21
            0700         103                 1900        34
            0600         42                  1800        65
            0500         26                  1700        211
            0400         2                   1600        543


 Command successfully completed
 enter   command:
```

SCREEN 4-11. Call Summary Measurements Report

Data is displayed beginning from the most recently completed hour and going backward for 24 consecutive hours. For example, since the report is displayed during the 1600-hour time interval, the last completed hour is 1500. Therefore, the left hour column begins with 1500 and lists (from top to bottom) the 12 preceding hours. Subsequently, the right column lists (from top to bottom) the next 12 hours.

   Note: This report indicates that the system clock was reset during the 1300 hour interval. Therefore, the hour is displayed as **13**** .

TABLE 4-I. Call Summary Measurements Report

Field	Description
`Hour`	*Measurement Hour.* The starting time (using the 24-hour clock) of the hour during which the data was recorded.
`# of Calls Completed`	The total number of calls completed during the listed hour. Calls are counted in the hour they are answered and not in the hour they are dropped. Therefore, a call that starts in one hour and ends in another hour is counted only in the hour it originates.
	Suggested Action: To determine the types of calls during the measurement hour, use the List Occupancy Summary Report.

Call Coverage Reports

This section applies only to the G3i switch.

There are two reports that provide measurement information about call coverage.

- The Coverage Path Measurement Report describes coverage activity as it relates to the coverage paths.

- The Principal Coverage Measurement Report desscribes coverage activity as it relates to the principal extensions.

For each report, there is a selection form that lists the coverage paths or principal extensions to be measured.

These reports are used to provide information on what happens to calls that go to coverage. The reports can be used to refine and improve call coverage patterns and to manage the system's principals. The reports are used in conjunction with the **list coverage-paths** and **display coverage-paths sender-group [number].**

Terms

Typically, a principal is the party or group for which a call is originally intended. A principal may be a station user, a hunt group, a terminating extension group, or a Personal CO Line (PCOL).

Trunk Access Codes (TACs) are used to access the PCOL groups.

For further information concerning coverage, refer to *DEFINITY® Communications System Generic 1 and Generic 3i— Feature Description,* 555-230-201.

Feature Interactions

Bridged Call

A call answered by a bridge of a coverage point extension is considered answered by the coverage point. A call answered by the bridge of a principal is considered answered by the principal.

Call Pick-up

If the principal is a member of a pickup group, a call ringing at the principal and picked up by a member of the pickup group is considered answered by the principal. If the coverage point extension is a member of a pickup group, a call ringing at the coverage point and picked up by a member of the pickup group is considered answered by the coverage point.

Leave Word Calling and Automatic Callback

A call for which the calling party activates Leave Word Calling (LWC) or Automatic Callback (ACB) before the call gets redirected, and before it gets answered, is considered a call back for the principal. If LWC or ACB is activated after the call is redirected, it is considered a call back for the coverage path.

Trunks

CO trunks and other trunks that have ring-back provided by the CO will repeatedly attempt to complete the call to the principal. Each attempt is considered a new offered call and will be counted for principal or coverage as appropriate.

Data Analysis Guidelines

There is no column for answered calls for principals. Normally, you can assume that

Answered Calls = Calls Offered - [Calls Redirected + Calls Abandoned + Callback]

However, this is not always the case. A number of interactions affect the totals on the measurement reports so that the column totals will not add up to the total calls offered.

Call Fowarding

A forwarded call from the principal will be counted as offered or abandoned to the principal. If the call abandons, the call will be counted as abandoned at the principal. If the forwarded-to extension is a measured principal, the call will be counted as an offered call to the forwarded-to extension, but it will not have an "abandon" or a "redirection" associated with it and will appear as answered.

Bridging and Pickup Groups

The principal, the principal bridge, and members of their pickup group(s) all have access to a call *even if* it goes to coverage.

If one of these parties answers the call, the count wiII show the call was offered to the coverage path without a corresponding count of "answered" or "abandoned." The count will be thrown off and the columns will not add up.

Distributed Communications System (DCS)

Call Forwarding abandon interactions are different than those described above if forwarding is done off-switch. In that case, each extension is treated as a principal and calls will be counted as abandoned if the caller drops the call.

When a call is forwarded across DCS it will go to coverage based on the forwarded-to principal's path criteria rather than the principal's, unless the principal is using cover-all.

Because the one-switch appearance of DCS is achieved using more than one trunk, ACB and LWC calls are counted as abandoned.

Coverage Path Measurements Selection Form

You can select up to 100 coverage paths for measurement.

Commands

To display the list of coverage paths that are to be measured, enter:

display measured coverage-path [print or schedule]

To change the list of coverage paths that are to be measured, enter:

change measured coverage-path [print or schedule]

To see a list of all the coverage paths on your system, enter:

list coverage paths [print or schedule]

Screen

Screen 4-12 shows a typical Coverage Path Measurements Selection Form containing entries for the 100 coverage paths to be measured. Table4-J describes the data fields presented in the Coverage Path Measurements Selection Form.

```
 change measured coverage-paths

   Path No    Path No     Path No    Path No     Path No     Path No     Path No
  1: 1      17:        33:        49:        65:         81:         97:
  2: 6      18:        34:        50:        66:         82:         98:
  3: 68     19:        35:        51:        67:         83:         99:
  4:        20:        36:        52:        68:         84:        100:
  5:        21:        37:        53:        69:         85:
  6:        22:        38:        54:        70:         86:
  7:        23:        39:        55:        71:         87:
  8:        24:        40:        56:        72:         88:
  9:        25:        41:        57:        73:         89:
 10:        26:        42:        58:        74:         90:
 11:        27:        43:        59:        75:         91:
 12:        28:        44:        60:        76:         92:
 13:        29:        45:        61:        77:         93:
 14:        30:        46:        62:        78:         94:
 15:        31:        47:        63:        79:         95:
 16:        32:        48:        64:        80:         96:

  Command  successfully  completed
  enter   command:
```

SCREEN 4-12. Coverage Path Measurements Selectlon Form

To add coverage path numbers, use coverage paths with no entry or replace any existing, unneeded coverage paths. Press **[RETURN]** until the cursor highlights an unneeded path; enter the coverage path you wish to add, or press **[CLEAR FIELD]** and add the new coverage path. Coverage path numbers do not have to be in numerical order. The actual changes are made whenever **[ENTER]** is pressed. As always, a command can be aborted by pressing **[CANCEL]**.

TABLE 4-J. Coverage Path Measurements Selection Form

Field	Description
Path No	Displays the numbers of up to 100 coverage paths that are selected for measurement.

Coverage Path Measurements Report

The Coverage Path Measurements Report contains usage measurements for each of the 100 selected coverage paths from the Coverage Path Measurements Selection form.

Command

To display the Coverage Path Measurements Report, enter:

[starting path] [count (1-100)] yesterday/today/last-hour external] [print or schedule]

Required Fields and Options: There is one required field for this command, it is **last-hour/today/yesterday.** You must choose one of the latter three. If you select **last hour** the activity of the most recently completed hour will be listed. If you select **today,** the activity for today's peak hour will be listed. If you selectt **yesterday,** the activity for yesterday's peak hour will be listed. The peak hour is the hour with the greatest number of calls offered to the coverage path.

For coverage path number you must type the number of the coverage path you wish to display. This number must have been previously assigned to one of the 100 numbers on the Coverage Path Measurements Selection form.

There are three options for this command:

1. **count**

   You must provide a number between 1 and 100.

2. **external**

   This option will produce a version of the report showing incoming trunk calls only. Attendant extended calls are considered external.

3. **print** or **schedule**

   This option allows you to print the report immediately or schedule it for another time.

For example, to display yesterday's measurements for coverage path 68, enter:

list measurements coverage-path 68 count 1 yesterday

Screen

Screen 4-13 shows a typical screen for the Coverage Path Measurements Report. The time and date that the report was requested are displayed to the right, following the name of the report. Table 4-K describes the data fields presented in the report.

```
list measurements coverage-path 68 count 1 yesterday
                                     ...
                                   Date: 3:00 pm  Fri MAY 4, 1990

                     COVERAGE PATH MEASUREMENTS

Path  Meas  Calls  ------ Criteria -------         Point1   Point2   Point3
No.   Hour  Offrd  Act  Bsy  DA  All  SAC  Cback  Ans  Abd  Ans  Abd  Ans  Abd
  68  1400  20      2    0    4    0   14     3    5    2    3    3    1    3

  Command successfully completed
  enter command:
```

SCREEN 4-13. Coverage Path Measurements Report

TABLE 4-K Coverage Path Measurements Report

Field	Description
`Path No.`	Lists the numbers of up to 100 coverage paths that are selected for measurement.
`Meas Hour`	The starting time (using the 24-hour clock) of the hour during which the greatest number of calls were offered to the coverage path unless it is the last hour.
`Calls Offrd`	The total number of calls offered to the path.
	Suggested Action: If this number is large, review the principal report and investigate why calls are not being answered. To find the principal for this coverage path, execute the **display coverage path sender-group [number]** command.
`Act Criteria`	The number of calls offered to this path due to the principal being active.
	Suggested Action: If this number is large compared to `Calls Offrd,` you should investigate. A possible reason is that the path was administered for "active" only.
`Bsy Criteria`	The number of calls offered to this path due to the principal being busy.
`DA Criteria`	The number of calls offered to this path because the principal didn't answer the call after the administered number of rings. To find the administered number of rings, execute the **display coverage-path [number]** command.
	Suggested Action: If this number is large compared to `Calls Offrd,` investigate the reason these calls are leaving the principal. A possible reason is, the path was administered for "don't answer" only.
`All Criteria`	The number of calls offered to this path due to the use of Cover All.
`SAC Criteria`	The number of calls offered to this path due to the principal's use of Send All Calls, or the calling party using Go To Coverage.
	Suggested Action: If this number, or `All Criteria,` is unusually large, you should investigate why calls are still being offered to this principal.

TABLE 4-K *(continued).*
Coverage Path Measurements Report

Field	Description
Cback	The number of calls offered to this path where the calling party used LWC or ACB before a coverage point answered the call. These cases are separated out because they are usually considered abandons but counting them as such would be misleading.
	Suggested Action: If this number appears high, verify why calls are not being answered.
Point Ans	The total number of calls answered by the specified point.
Point Abd	The total number of calls abandoned by the caller while ringing at the specified point.
	Suggested Action: If this number is high, it may be advisable to reengineer the coverage paths so less traffic is offered.

Principal Coverage Measurements Selection Form

You can select up to 100 principal extensions or TACs for measurement.

For definitions of principals and TACs, refer to page 4-57.

Commands

To display the list of principal extensions that are to be measured, enter:

display measured principal [print or schedule]

To change the list of principal stations that are to be measured, enter:

change measured principal [print or schedule]

To obtain a list of principal stations, execute:

list stations [print or schedule]

Screen

Screen 4-14 shows a typical Principal Coverage Measurements Selection Form containing entries for the 100 principal extensions or TACs to be measured. Table 4-L describes the data fields presented in the Principal Coverage Measurements Select Form.

```
        change measurements principal

                     MEASURED PRINCIPALS

     Ext/TAC    Ext/TAC    Ext/TAC    Ext/TAC    Ext/TAC    Ext/TAC    Ext/TAC
   1: 76068   17:        33:        49:        65:        81:        97:
   2: 76069   18:        34:        50:        66:        82:        98:
   3: 76075   19:        35:        51:        67:        83:        99:
   4:         20:        36:        52:        68:        84:       100:
   5:         21:        37:        53:        69:        85:
   6:         22:        38:        54:        70:        86:
   7:         23:        39:        55:        71:        87:
   8:         24:        40:        56:        72:        88:
   9:         25:        41:        57:        73:        89:
  10:         26:        42:        58:        74:        90:
  11:         27:        43:        59:        75:        91:
  12:         28:        44:        60:        76:        92:
  13:         29:        45:        61:        77:        93:
  14:         30:        46:        62:        78:        94:
  15:         31:        47:        63:        79:        95:
  16:         32:        48:        64:        80:        96:


   Command successfully completed
   enter command:
```

SCREEN 4-14. Principal Coverage Measurements Selection Form

To add extension numbers, replace any existing, unneeded extension numbers. To do this, press [RETURN] until the cursor highlights an unneeded extension number and enter the extension number you wish to add, or press [CLEAR FIELD] and add the new extension number. Extension numbers do not have to be in numerical order. The actual changes are made when you press [ENTER] . As always, a command can be aborted by pressing [CANCEL] .

TABLE 4-L. Principal Coverage Measurements Selection Form

Field	Description
Ext/TAC	Lists the extension or TAC numbers of up to 100 principals whose coverage is selected for measurement.

Principal Coverage Measurements Report

The Principal Coverage Measurements Report contains usage measurements for each of the 100 selected principal extensions or TACs from the Principal Coverage Measurements Selection form.

Command

To display the Principal Coverage Measurements Report, enter:

> **list measurements principal [Ext/TAC] [count] [last-hour/today-peak/yesterday-peak] [print or schedule]**

Required Fields and Options: There are two required fields for this command: **Ext/TAC** is the field where you enter the number of the extension or TAC you wish to display. This number must have been previously assigned to one of the 100 numbers on the Principal Coverage Measurements Selection form. The second required field is **last hour/today-peak/yesterday-peak.** You must choose one of the latter three options. If you select **last hour,** the activity of the most recently completed hour will be listed. If you select **today-peak** the activity for today's peak hour will be listed If you select **yesterday-peak,** the activity for yesterday's peak hour will be listed. The peak hour is the hour when the greatest number of calls was offered.

There is one option for this command, **count,** for which you must provide a **number.**

For example, to display yesterday's measurements for extension 75068 and the next two principals in order, enter:

> **list measurements principal 76068 count 3 yesterday**

Screen

Screen 4-15 shows a typical screen for the Principal Coverage Measurements Report. The time and date that the report was requested are displayed to the right, following the name of the report. Table 4-M describes the data fields presented in the report.

```
list measurements principal 76068 count 3 yesterday-peak


                                 Date: 9:14 am SAT MAY 5, 1990


                         Principal  Measurements


                  Meas  Calls      --------Criteria--------
Ext/TAC Hour     Offrd Aband Redir Act Bay   DA All SAC Cback Coverage-Paths
76068   1000     120      6    15  0   15    0   0   0   0       12
76069   1100      8       0     0  0    0    0   0   8   0        1
76075   1400     40       4    30  15  15    0   0   0   5        1  2    5


  Command   successfully   completed
  enter   command:
```

SCREEN 4-15. Principal Coverage Measurements Report

TABLE 4-M. Principal Coverage Measurements Report

Field	Description
`Ext/TAC`	The principal extension or PCOL group/TAC being reported.
`Hour`	*Measurement Hour:* The starting time (using the 24-hour clock) of the hour during which the data was recorded.
`Meas Calls offrd`	The total number of calls offered to the principal.
`Meas Calls Aband`	The total number of calls where the calling party hung up before the call was answered or sent to coverage. **Suggested Action:** If this number is high at the principal, you may need to redirect traffic. *The numbers of calls answered by principal =* *Calls Offered - Calls Abandoned - Calls Redirected*
`Meas Calls Redir`	The total number of calls not answered by the Ext/TAC and subsequently sent to coverage. **Suggestion Action:** If this number is large compared to `Meas Calls Offrd`, investigate the reasons.
`Act Criteria`	The number of calls sent to coverage by this principal due to the principal being active.
`Bsy Criteria`	The number of calls sent to coverage by this principal due to the principal being busy.
`DA Criteria`	The number of calls sent to coverage by this principal because the principal didn't answer the call after the administered number of rings when executing the **display coverage-path [number]** command.
`All Criteria`	The number of calls sent to coverage by this principal due to the principal's use of Cover All.
`SAC Criteria`	The number of calls sent to coverage by this principal due to the principal's use of Send All Calls, or because the calling party used the Go To Cover feature.
`Cback`	The number of calls offered to this principal where the calling party used LWC or ACB before the principal answered the call and before it went to coverage. These cases are separated out because they look like abandons and counting them as such would be misleading.
`Coverage-Paths`	The coverage paths used by this principal. To find the associated extensions, enter the **list coverage paths** command.

DS1 Link Performance Reports

This section describes performance measurements for DS1 links. It includes the DS1 Link Performance Measurements Summary Report and the DS1 Link Performance Measurements Detailed Log Report.

> **Note:** The DS1 links may be provided by either the TN722 or TN767 circuit pack. However, the measurements are only kept for the TN767 circuit pack.

Many conventional error measurements have relied on the parameter Bit Error Ratio to describe the quality of digital transmission facilities. However, with DS1 links, when errors do occur, they tend to be as error bursts rather than single-bit errors. Therefore, the Errored Second, Bursty-Errored Second, Severely-Errored Second, and Failed Second measurements more accurately describe the operational characteristics of DS1 links.

DS1 link performance is based on the number of error events counted per second. An error event is defined as any one of the following:

Misframe. An error that is detected as an erroneous bit pattern in any single frame.

Slip. An error that is detected as the deletion or repetition of a single frame.

Extended Superframe Format (ESF) CRC-6 Error. A data communications error over a DS1 link using the ESF format which is detected as a mismatch between the calculated CRC-6 (6-bit cyclic redundancy check) character appended to the transmitted data and the CRC-6 character recalculated by the receiver.

DS1 link performance is measured by the following error event counts:

Errored Second. Any second that contains one or more error events.

For a 24-hour period, the percent of Error Free Seconds (%EFS) is defined as:

$$\% EFS = \left[1 - \frac{Errored\ Seconds}{Error\ Free\ Seconds} \right] \times 100$$

$$\% EFS = \left[1 - \frac{Errored\ Seconds}{Total\ Seconds - Errored\ Seconds} \right] \times 100$$

Bursty-Errored Second. Any second that contains from 2 to 319 error events.

Severely-Errored Second. Any second that contains 320 or more error events.

Failed Second. A state that exists when 10 or more consecutive severely-errored seconds were detected. A Failed Second state is cleared when no severely-errored seconds are detected for a period of 10 consecutive seconds.

> **Note:** Such events as a Failed Second or Severely-Errored Second typically result in a serious impact on the customers' applications.

If the errors become too severe, an alarm is raised. The actual rate that the errors occurred at determines whether the alarm is minor or major. *DEFINITY® Communications System Generic 1 and Generic 3i— Maintenance,* 555-204-105, identifies the recommended procedures that maintenance personnel should perform to resolve these alarms.

The error event counters, located on each DS1 Interface circuit pack are polled every 900 seconds (15 minutes). The data is available for up to 24 hours, and measurement data older than 24 hours is overwritten by the current measurement data.

A system reboot from tape clears the error event counters. The DS1 error event oounters may also be cleared by entering the following maintenance command:

clear measurements ds1

All DS1 error event counters have a maximum range of 65535, after which they recycle and begin counting from zero again. If a TN767 circuit pack is removed, or taken out of service, data for that circuit pack is not avilable for the periods that it is removed.

DS1 Link Performance Measurements Summary Report

The DS1 Link Performance Measurements Summary Report provides an indication of the quality of a DS1 link that connects to a DS1 Interface circuit pack.

Command

To display the DS1 Link Performance Measurements Summary Report, enter:

list measurements ds1 [option] [print or schedule] .

Options: In place of [option], type the location designation for the DS1 Interface circuit pack for which you are requesting the report. The location designation has the form NCSS, where N is the port network number, C is the carrier letter designation, and SS is the slot where the DS1 inter-face circuit pack is located.

Screen

Screen 4-16 shows a typical screen (depicting a DS1 interface that is experiencing errors) for the DS1 Link Performance Measurements Summary Report. The date and time at which the report was requested are shown in the line to the right, just above the name of the report. Table 4-N describes the data fields presented in DS1 Link Performance Measurements Summary Report.

```
list measurements dsl 1A11

                                     Date: 4:58 pm TUE MAY 8, 1990

         DS-1 Link Performance Measurements Summary Report

   Counted Since: 1:45 pm SAT MAY 5, 1990
   Number of Seconds Elapsed Into Current 15-min Interval: 102
   Total of Valid 15-min Intervals in Past 24-hr Period: 96


                                      Total of     Current
                   Worst  15-Min Interval 24-Hour 15-Min Interval


      Category      Date    Time  Count     Count        Count
Errored  Sec        5/07   16:54   128       205          0
Bursty Err Sec      5/07   16:54    68        84          0
Severely Err Sec    5/07   16:54    71        41          0
Failed  Sec         5/07   16:54     4        43          0

Command  successfully  completed
enter   command:
```

SCREEN 4-16. DS1 Link Performance Measurements Summary Report

TABLE 4-N. DS1 Link Performance Measurements Summary Report

Field	Description
Counted Since:	The date and time that the counters were last cleared and restarted. The counters are set to zero and start accumulating data when the system is administered or reinitialized. The current system time appears in the field after the system clock is set. Since the **Counted since** field is calculated based on the current time, an error message is prompted back to the user if the system clock has not been set following a system reinitialization.
Number of seconds Elapsed Into Current 15-min Interval:	The number of seconds (0 to 900) that have been counted in the current 15-minute interval.
Total of Valid 15-min Intervals in Past 24-hr Period:	The total number of 15-minute intervals (zero to 96) in the past 24-hour period that have valid values. **Note:** An invalid interval is any 15-minute interval during which (a) the system clock was changed, (b) a system reinitialization occurred, or (c) the specified TN767 circuit pack was pulled from the carrier. Refer to the DS1 log report for details.
Worst 15-Min Interval	The date, ending time, and count for the 15-minute period that contained the maximum count in each error category. If there are no errors, the field will display 0 with the oldest time.
Total Of 24-Hour Count	The total count in each error category for the last 24-hour period (0 to 65535). Refer to the DS1 log report to view the last 96 intervals.
Current 15-Min Interval Count	The count-so-far in each error category for the 15-minute interval in progress when the report was requested. If no errors have occurred yet in any of the categories during the current 15-minute interval, the respective field will contain the number 0. If the system is busy performing call processing functions and cannot respond within 8 seconds, then the field will display **N/A .**

DS1 Link Performance Detailed Log Report

The DS1 Link Performance Measurements Detailed Log Report lists errored event records for the past 24 hours. The errored event records are listed for each 15-minute interval. This would show the 96 records (the number of 15-minute intervals in 24 hours) from the current 15-minute interval back to 24 hours before the current interval, beginning with the oldest record.

Command

To display the DS1 Link Performance Measurements Detailed Log Report, enter:

list measurements ds1-log [option] [print or schedule]

Options: In place of **[option],** type the location designation for the DS1 Interface circuit pack for which you are requesting the report. The location designation has the form NCSS where N is the port network number, C is the carrier letter designation, and SS is the slot where the DS1 Inter-face circuit pack is located (see screen example that follows).

Screen

Screen 4-17 shows a typical screen for the DS1 Link Performance Measurements Detailed Log Report. The date and time at which the report was requested are shown in the line to the right, just above the name of the report. Table 4-O describes the data fields presented in the DS1 Link Performance Measurements Detailed Log Report.

```
  list measurements ds1-log 1A07                                    Page 1


                                           Date: 1:58 pm MON MAY 7, 1990


          DS-1 Link Performance Measurements Detailed Log Report


     Counted Since: 1:45 pm SUN MAY 6, 1990
                      ERRORED   BURSTY    SEVERELY      FAILED    VALID


     D A T E  TIME  SECOND    ERR  SEC    ERR  SEC    SECOND  INTERVAL
       5/07   13:45   258        21          2           0         Y
       5/07   13:30    0          0          0           0         Y
       5/07   13:15    0          0          0           0         Y
       5/07   12:00   121         9          2           0         Y
       5/07   11:45    0          0          0           0         Y
       5/07   11:30    0          0          0           0         Y
       5/07   11:15    0          0          0           0         Y
       5/07   11:00    0          0          0           0         Y
       5/07   10:45    0          0          0           0         Y
       5/07   10:30    0          0          0           0         Y


            press CANCEL to quit -- press NEXT PAGE to continue
```

SCREEN 4-17. DS1 Link Performance Measurements Detailed Log Report

TABLE 4-O. DS1 Link Performance Measurements Detailed Log Report

Field	Description
Data	The date on which the event occurred will be yesterday or today.
Time	The ending times for the 15-rninute sampling intervals.
Errored Second	The nuumber of errored seconds for the specified interval (rnaximum of 900). An errored second is any second in which one or more data transmission errors occurred. N/A indicates that the count for that interval was not available, typically because there is no data.

TABLE 4-O *(continued).*
DS1 Link Performance Measurements Detailed Log Report

Field	Description
`Bursty Err Sec`	The number of bursty-errored seconds for the specified interval (maximum of 900). A bursty-errored second is any second in which 2 to 319 data transmission errors occurred. N/A indicates that the count for that interval was not available. An error count of this severity results in a minor alarm.
	Suggested Action: Resolution of the alarm should, in most cases, be the function of maintenance personnel. Depending upon local arrangements, it may be appropriate to alert maintenance personnel if they have not already been alerted.
`Severely Err Sec`	The number of severely-errored seconds for the specified interval (maximum of 900). A severely-errored second is any second in which 3200 or more data transmission errors occurred. An error count of this severity results in a major alarm. N/A indicates that the count for that interval was not available.
	Suggested Action: Resolution of the alarm should, in most cases, be the function of maintenance personnel. Depending upon local arrangements it may be appropriate to alert maintenance personnel if they have not already been alerted.
`Failed Second`	The number of failed seconds states for the specified interval (maximum of 900). A failed second state extists any time that 10 or more consecutive severely-errored seconds have occurred. An error count of this severity results in a major alarm. N/A indicates that the count for that interval was not available.
	Suggested Action: Resolution of the alarm should, in most cases, be the function of maintenance personnel. Depending upon local arrangements, it may be appropriate to alert maintenance personnel, if they have not already been alerted.
`Valid Interval`	The `Valid Interval` field indicates whether (Y for yes) or not (N for no) a valid count is provided by the DS1 Interface circuit pack. A value of Y indicates that all counts are valid for the interval.
	Note: An invalid interval is any 15-minute interval during which (a) the system clock was changed, (b) a system reinitialization occurred, or (c) the specified circuit pack was pulled from the carrier.

Hunt Group Reports

This section describes the traffic measurements, performance, and status report for ACD/UCD/DDC hunt groups and provides information so that you can determine whether your current data is acceptable or not.

For more detailed ACD measurements, the Basic Call Management System (BCMS) or Call Management System (CMS) option is recommended. Contact your AT&T Account Team.

Hunt Group Measurements Report

The Hunt Group Measurements Report assists you in monitoring and managing the DDC and UCD hunt groups, and ACD splits. These features permit incoming calls to be terminated directly to a prearranged group of answering positions.

This report shows hunt group measurements for yesterday's peak hour, today's peak hour (as of the time of day that this report is run), and the last hour. A peak hour is the hour within a 24-hour period that had the greatest usage for the specified day.

Command

To display the Hunt Group Measurements Report, enter:

> **list measurements hunt-group [options] [print] or [schedule.]**

Options: Options are **yesterday-peak** for yesterday's report, **today-peak** for today's report, or last hour for a report of the activity from the last completed measurement hour.

Screen

Screen 4-18 shows a typical screen for the Hunt Group Measurements Report, using the yesterday-peak option. The time and date that the report was requested is displayed following the name of the command.

Table 4-P describes the data fields presented in the Hunt Group Measurements Report.

```
 list   measurements   hunt-group   yesterday-peak


                                        Date: 6:09 pm THU MAR 29, 1990


                          HUNT   GROUP   MEASUREMENTS

 Grp  Grp              Grp Grp Meas Total Calls Calls Que Calls Time Speed
 No.  N a m e          Size Type Hour Usage Ans.  Aban. Size Que.  Avail Ans. (sec.)
 1    Tech Svc         3    ucd  1100  72   12    5     10   1     36   60
 2    QA Lab           2    ddc  1100  12   11    1      5   1     60   4
 3    Inside Sales 5        ddc  1400  14    5    0     10   0    166   2
 4    Counter Sales 9       ucd  1000  144  35    4     30   6    180   16
 5    customer Svc 2        ucd  1500  15    5    0     10   2     57   18
 6    Warehouse        1    ddc  0800  10    3    0      5   0     26   5
 7    Cornell          6    ucd  1000  140  25    3     10  14    112   57
 8    Chicago Branch 4      ddc  1600  120  12    2     10   6     14   14


 Command   successfully   completed
 enter   command:
```

SCREEN 4-18. Hunt Group Measurements Report

TABLE 4-P. Hunt Group Measurements Report

Field	Description
Grp No.	*Group Number.* A number from 1 through 99 that identifies each hunt group.
Grp Name	*Group Name.* Name assigned, during administration, to the hunt group.
Grp Size	*Group Size.* The number of extensions assigned to the hunt group (not necessarily staffed) may range from 1 through 200. **Note:** With the Hospitality Parameter Reduction option, the range is one through five.

TABLE 4-P *(continued).*
Hunt Group Measurements Report

Field	Description
`Grp Type`	*Group Type.* Identifies the type of hunt group, which may be one of the following: • DDC • U C D
`Meas Hour`	*Measurement Hour.* The starting time (using the 24-hour clock) of the hour during which the data was recorded. For Screen 4-18, the hours displayed are the peak hours for that particular hunt group. Obviously, depending on the time of day that this report is produced, may yield different today's peak hour data.
`Total Usage`	*Total Usage.* The sum of all times (in CCS) that the members of a hunt group are busy on hunt group calls. Total Usage is the most important parameter for this report. The maximum possible usage is: *Maximum Possible Usage* $= 36$ *CCS* x *Total # of Members* **Suggested Action:** If the Total Usage number approaches the total CCS, you may consider adding another extension to the hunt group but only staffing it during the peak hours. If the hunt group has several extensions and the Total Usage is low, this maybe acceptable if the personnel perform other duties.
`Calls Ans.`	*Calls Answered.* The total number of all hunt group calls answered by the hunt group. Calls to non-ACD hunt groups which are answered by a coverage point are recorded as calls answered.

TABLE 4-P *(continued).*
Hunt Group Measurements Report

Field	Description
`Calls Aban`	*Calls Abandoned.* The total number of calls which attempt to reach the hunt group but abandon the attempt before being answered. Calls may abandon either while in the hunt group queue or while ringing a hunt group extension. This total does not include calls answered by Call Pick Up or other hunt groups, or calls abandoned while listening to a forced first announcement. **Note:** ACD calls which are redirected to other splits within the system via the intraflow feature are not counted as abandoned calls. ACD calls which are redirected to another switch (interflow feature) are not counted as abandoned calls. **Suggested Action:** Observe times during which the Calls Abandoned number may be higher than desired. Subsequently, consider adding one or more agents to the hunt group and staffing these additional positions during the problem times. Also, see "Suggested Action" in the Total Usage description.
`Que Size`	*Queue Size.* The length of the queue assigned to the hunt group during administration. There are no specific guidlines for setting queue size. However, the following general recommendations apply. The queue size should be larger than the group size, but typically not more than three times as large as the group size. An indication that the queue size is too large would be the observance of a higher than expected number for the `Calls Aban` field. An indication that the queue size is too small would be the observance of a smaller than expected number for the `Calls Aban` field (for example, 0).
`Calls Que.`	*Calls Queued.* Total number of calls that arrive to find all members of the hunt group busy and are placed in the hunt group queue. Calls Queued includes all calls that go to average.

TABLE 4-P *(continued).*
Hunt Group Measurements Report

Field	Description
`Time Avail`	*Time Available.* The total time in CCS that the hunt group extensions are not in use but are available to receive hunt group calls during the measurement hour. Time Available is calculated only when an agent (extension) is ready to receive calls from the specific hunt group. For example, if the hunt group had four extensions and each was available for 15 minutes during the measurement hour, the total time available would be 60 minutes or 36 CCS.
`Speed Ans.`	*Speed of Answer.* The average time interval (in seconds) from when the call first enters the hunt group or hunt group queue until the call is answered by a hunt group member. This does not include the time taken by a forced first announcement.

Validating the Data

The following guidelines are intended to show an easy method for determining whether currently reported data is acceptable or not. These guidelines represent the minimum that you should do to verify that the recorded measurement values are consistent with expected and historic values. You should perform additional checks as necessary.

To check the acceptability of hourly Hunt Group Measurements Reports, verify the following:

- The system clock or group size has not been changed during the measurement hour.

- The average time agents spend working on calls is typically between 60 and 300 seconds. The actual application and specific types of work being performed may permit you to arrive at a more precise number. If your tabulated average call length is out of this range, it should be investigated.

Note: Total Usage plus Total Avail (both in CCS) should not exceed 36 times the group size. For example, with a hunt group containing two extensions, total usage measured should not exceed 2 x 36 = 72 CCS for data collection.

Analyzing the Data

The Hunt Group Data Worksheet serves to back up the data from the reports and to provide an easy means for identifying the peak hour. The data from the identified peak hour should be used in subsequent calculations.

Before analyzing data obtained from the hunt group reports, several additional considerations relating to both ACD hunt groups and non-ACD hunt groups need mentioning. These include their similarities and differences.

Note: It should be realized that data collected in a real-time environment, such as what actually happens, will virtually always deviate from the theoretically predicted data because of the asynchronous nature of processes and interactions with other events such as maintenance.

Important Considerations for Both ACD and Non-ACD Hunt Groups

1. *Total Usage:* If the extension is a member of more than one hunt group, then Total Usage will only be accumulated for groups that answer the call. Subsequently, Time Avail is decremented for all groups. For example, assume that extension x3000 belongs to hunt groups 1, 2, and 3. Furthermore, assume that a call terminates on hunt group 2 and that x3000 answers the call. The end result is that usage time is accumulated for hunt group 2 (thus increasing Total Usage for group 2 and decrementing Time Avail for groups 1, 2, and 3).

   Time (Total Usage) is not accumulated whenever a hunt group member is on an incoming or outgoing personal call.

2. *Time Avail:* If an extension is a member of more than one hunt group, then Time Avail is accumulated for each group. For example, assume that extension x3000 belongs to hunt group 1, 2, and 3. Furthermore, assume that extension x3000 is available for the full measurement hour. The end result is that 36 CCS will be added to Time Avail for hunt group 1, 2, and 3.

Time (Time Available) is not accumulated whenever a hunt group member is on an incoming or outgoing personal call.

Differences Between Non-ACD and ACD Hunt Groups

For Non-ACD Hunt Groups

1. *Call Ans:* Incoming calls that route to call coverage (or don't answer criteria) accumulate time (Total Usage and Time Avail) as if they were answered within the hunt group. Furthermore, calls to a hunt group that are picked up by a mernber of a pickup group are counted as answered within the hunt group. While the coverage point is busy answering a hunt group call, the hunt group member that initially received the call is not available to answer other calls.

2. *Calls Aband:* Incoming calls that route to call coverage (or don't answer criteria) are counted as abandoned, for the hunt group, if the caller hangs up when the call is at the ringing coverage point.

3. *Speed of Answer:* Speed of Answer includes any and all times spent in covering to other stations, but does not include the time spent for forced first announcements.

For ACD Hunt Groups

1. *Calls Aband:* If the caller hangs up when the call is in queue or while it is ringing at the agent's position, the call is counted as abandoned. If all members of an ACD split are logged out or in Aux-work mode, incoming ACD calls will not queue for the split and, therefore, are never counted as abandoned.

2. *Speed of Answer:* The Speed of Answer count is set to zero every time a call reaches a new coverage point.

   Note: Because of this difference, the Speed of Answer values for ACD hunt groups tend to be less (smaller) than for non-ACD type hunt groups.

3. *Call Ans:* Calls that go to call coverage (or don't answer criteria) and are answered at the coverage point are not included in the number displayed for this report. Unlike non-ACD hunt groups, the ACD hunt group member who initially received the call is available to answer other ACD calls while the coverage point is answering the covered call.

4. *Time Avail*— Not accumulated for ACD calls that go to coverage.

5. *Total Usage*— Not accumulated for ACD calls that go to coverage.

Total Usage

Total Usage is the sum of all times that the members of a hunt group are busy on incoming group calls.

Total Usage (in seconds) = $\sum$ *of the individual Holding Time (in sec)*

Total Usage (in seconds) = Total Holding Time (in seconds)

For demonstration purposes, we will consider hunt group #6 of Screen 4-18. This hunt group has 3 calls. Assume that the call durations were of 480, 300, and 220 seconds.

Total Usage (in seconds) = 430 + 300 + 220 *seconds*

$$Total\ Usage\ (CCS) = \frac{1000\ seconds}{100\ seconds\ per\ CCS}$$

Total Usage (CCS) = 10 *CCS*

Average Holding Time

With the number of Calls Answered and the number for Total Usage, the average length of time that the hunt group members spend answering the calls (Average Holding Time) may be calculated. The calculation is as follows:

$$Average\ Holding\ Time = \left[\cdot \frac{Total\ Usage\ CCS}{Calls\ Answered} \right] \times \frac{100\ Seconds}{CCS}$$

For demonstration purposes, we will consider hunt group #6 of Screen 4-16.

$$Average\ Holding\ Time = \left[\cdot \frac{10\ CCS}{3\ Calls} \right] \times \frac{100\ seconds}{CCS}$$

Average Holding Time = 333 *seconds (or* 5 *minutes* and 33 *seconds per call)*

Hunt Group Performance Report

The Hunt Group Performance Report gives the slowest hourly average speed of answer for each hunt group for either the previous day or the current day (yesterday or today) along with the hour the measurement occurred. The report displays the information both graphically and numerically.

> **Note:** Obviously, if you have previously generated a measurements report for yesterday (for example, **list measurements hunt group yesterdsay)** then you will want to generate a performance report with the **yesterday** option. Likewise, if you have previously generated a measurements report with the **today** option, you will want to gen erate a performance report with the **today** option. It is possible to relate the information displayed on one report to the information dislayed on the other report, provided that both reports are for the same time period, and if needed to suggest appropriate actions.

Command

To display the Hunt Group Performance Report, enter:

   list performance hunt group [options] [print] or [schedule]

Options: Options are **yesterday** for yesterday's report or **today** for today's report.

Screen

Screen 4-19 shows a typical screen for the Hunt Group Performance Report, using the **yesterday** option. The time and date that the report was requested are displayed to the right, following the name of the screen.

Table 4-Q describes the data fields presented in the Hunt Group Performance Report.

```
 list  performance  hunt  group  yesterday
 Hunt  Group  Performance              Today: 6:13 pm THU MAR 30, 1989

                 SLOWEST   HOURLY   SPEED   OF   ANSWER

Grp  Grp  Grp  ----- Slowest Speed of Answer (sec) ----  Speed    Mess Daily
No. Size Type 1  2  3  4  5  6  7  8  9  10  20  40  60  80  100  200  Ans(sec) Hour Avg.
1    3   ucd  ///                                           2      1800  1
2    2   ddc  /////////////////////                        23      1500  4
3    5   ddc  //////////////////////                       17      1100  3
4    9   ucd   ///////////////                              8      1100  4
5    2   ucd  /////////////////////                        31      1500  7
6    1   ddc  ////////////////////                         11      1600  5
7    6   ucd   /////////                                    5      1600  3
8    4   ddc ////////////////////                          10      1600  7

 Command successfully completed
 enter  command:
```

SCREEN 4-19. Hunt Group Performance Report

TABLE 4-Q. Hunt Group Performance Report

Field	Description
Grp No.	*Group Number.* A number from 1 through 99 that identifies each hunt group.
Grp Size	*Group Size.* The number of extensions assigned to the hunt group (not necessarily staffed). The range of permitted numbers is 1 through 200.
Grp Type	*Group Type.* Identifies the type of hunt group, which may be one of the following: • DDC • UCD
Slowest Speed of Answer (sec)	*Slowest Speed of Answer* in seconds. A bar graph representation of the "slowest hourly average speed of answer" for the report interval (either yesterday or today).
Speed Ans (sec)	*Speed of Answer* in seconds. The number of seconds corresponding to the "slowest hourly average speed of answer" (longest amount of time to answer) for the report interval. This time indicates queue time and ring time, but does not include the time spent on a forced first announcement.
Meas Hour	*Measurement Hour.* The starting time (using the 24-hour clock) of the hour during which the slowestt speed of service occurred.
	Suggested Action: From analyzing Screen 4-19 you can determine that hunt group #5 has the "slowest hourly speed of answer" for all of yesterday. The value was 31 seconds and the time interval was 1500 hours (3:00 p.m. to 4:00 p.m.). If this time interval just so happens to be the peak usage hour as indicated from the list measurements hunt group yesterday report (refer to Screen 4-16), then consider adding/staffing more agents during the peak hour.
Daily Avg .	*Daily Average.* The number corresponding to the 24-hour daily "average speed of answer" for each hunt group. $$\textit{Daily Average} = \frac{\sum \textit{ of the Delays For Each Answered Call}}{\textit{Total \# of Answered Calls (so far today)}}$$

Hunt Group Status Report

The Hunt Group Status Report gives an instantaneous indication of the load that is pending (number of calls waiting to be serviced) for various hunt groups. The report also indicates the length of time that the oldest call in the queue has been waiting for service.

   Note: The information on this report is updated every 60 seconds.

Command

To display the Hunt Group Status Report, enter:

   monitor traffic hunt groups [option]

Options: Type the number of the hunt group that you want to begin the list. This is referred to as the starting group number. The report displays a list of 32 consecutively numbered hunt groups. There is no second page to the report; therefore, you must specify the 32 numbered blocks that you desire. The default is to begin the report with hunt group 1.

Screen

Screen 4-20 shows a typical screen for the Hunt Group Status Report. The date and time the report was requested are displayed to the right of the screen title.

Each screen displays 32 hunt group fields, even though they may not all be administered. If the hunt group is not administered then its corresponding fields are blank. For each administered hunt group, the report displays the time that the first call in the queue has been waiting for service, the **LCIQ** field. The data on the screen is updated every minute.

Table 4-R describes the data fields presented in the Hunt Group Status Report. The abbreviated labels are also identified in a key at the bottom of the screen.

```
monitor traffic hunt groups

                        HUNT  GROUP STATUS  14:27  TUE  APR  3  1990

      #   S   A   Q  W    LCIQ          #   S  A   Q   W      L C I Q
      1   3   0   10  0    0            17
      2   2   0   20  0    0            18
      3   5   2   10  0    0            19
      4   1   0   40  0    0            20
      5   6   0   10  1    67           21
      6   1   0   10  0    0            22
      7   6   1   10  1    141          23
      8   4   0   0   0    0            24
      9                                 25
      1 0                               26
      1 1                               27
      1 2                               28
      1 3                               29
      1 4                               30
      1 5                               31
      1 6                               32

(#: Group; S: Grp Size; A: Active Members; Q: Q Length; W:  Calls  Waiting)
(LCIQ: Longest Call In Queue in seconds)
```

SCREEN 4-20. Hunt Group Status Report

TABLE 4-R. Hunt Group Status Report

Field	Description
#	*Group Number.* A number ranging from 1 through 99 that identies the hunt groups.
S	*Group Size.* The number of extensions assigned to the hunt group (not necessarily staffed). The range of permitted numbers is 1 through 200.
A	*Active Hunt Group Members.* The number of members in a group that are currently active (only) on incoming hunt group calls. **Note:** This measurement does not include individual extension type calls.
Q	*Queue Length.* The number of calls allowed to wait for an agent.
W	*Waiting Calls.* The number of callss currently waiting in the hunt group queue to be serviced by an agent.
LCIQ	*Longest Call In Queue.* Indicates the time in seconds that the oldest call in the hunt group queue has been waiting to be serviced. **Suggested Action:** 1. If the number of calls waiting (W) is too high (for example, the queue is full or approaching its maximum) it maybe desirable to increase the number of active members (A). 2. If the LCIQ field indicates that calls are having to wait in queue too long, it may be appropriate to determine if the calls can be processed faster. Alternately, it maybe appropriate to increase the number of active members (A).

Modem Pool Group Report

This section describes the traffic measurements report for Modem Pool Groups.

Modem Pool Measurements Report

The Modem Pool Group Measurements Report contains measurements for monitoring the performance of the Modem Pooling feature. The system records data for the current day's peak hour, the previous day's peak hour, and the last hour. A peak hour is the hour within a 24-hour period that had the greatest usage for the specified day.

Command

To display the Modem Pool Group Measurements Report, enter:

list measurements modem-pool [options] [print] or [schedule]

Options: Options are **yesterday-peak** for yesterday's report, **today-peak** for today's report, or **last-hour** for a report of the activity from the last completed measurement hour.

Screen

Screen 4-21 shows a typical screen for the ModemPool Group Measurements Report. The time and date that the report was requested are displayed to the right, above the name of the screen. Table 4-S describes the data fields presented in the Modem Pool Group Measurements Report.

```
list measurements modem-pool yesterday-peak


                                      Date: 2:31 pm TUE MAY 8, 1990


                        MODEM   POOL   MEASUREMENTS

Meas  Pool  Pool Pool   Total Inc    Calls      Inc     Calls     Calls
Hour  No.   SizeType    Usage Usage  Carried    Calls   Blocked   Overflow
1100   1     16  integ  300   67      8         2       0         0
1100   2     16  comb   256   45      10        4       0         0
1100   3      8  comb   245   38      7         1       0         0
1100   4      9  integ  128   17      3         0       0         0


Command successfully completed
enter  command:
```

SCREEN 4-21. Modem Pool Group Measurements Report

TABLE 4-S. Modem Pool Group Measurements Report

Field	Description
Meas Hour	*Measurement Hour.* The starting time (using the 24-hour clock) of the hour during which the data was recorded.
Pool No.	*Pool Number.* A number from one through five that identifies the modem pool group. The number is assigned during administration.
Pool Size	The number of conversion resources administered in the modem pool group (up to 16 for integrated or up to 32 for combined). **Note:** Refer to *DEFINITY® Communications System Generic 1 and Generic 3i— Feature Description,* 555-230-201, for a complete description of the Modem Pool feature.
Pool Type	The type of group, either integrated of combined (integ or comb).
Total Usage	The time in CCS that the members of the modem pool group are active on calls during the polling interval. *Maximum Usage = Pool Size* x 36 *CCS*
Inc Usage	*Incoming Usage.* The usage in CCS for modem pool calls (originating from incoming or two-way trunks) that terminate on the switch. *Outgoing Usage = Total Usage - Inc Usage*
Calls Carried	The number of calls that were carried, during the pooling interval, by the identified modern pool. This includes both incoming and outgoing calls.
Inc Calls	*Incoming Calls.* The number of calls (originating from incoming or two-way trunks) that terminate on the switch. *Outgoing Calls = Calls Carried - Inc Calls*
Calls Blocked	The number of calls that are blocked due to the unavailability of a conversion resource. **Suggested Action:** 1. If this field indicates that a significant number of modem pool calls are being blocked, then, as a first resort, verify that the users have their data modules set for autobaud. 2. An alternate option is to increase the pool size.
Calls Over-flow	The number of calls directed to a modem pool group that overflow and terminate successfully in another group.

Performance Summary Report

This section describes the traffic measurements Performance Summary Report.

Performance Summary Report

The Performance Summary Report summarizes the peak hour trunk blocking, ARS traffic data, Trunks Out of Service, and Trunks Not Used. The system gives a summary report for the previous day or the current day.

Command

To display the Performance Summary Report, enter:

list performance summary [options] [print] or [schedule.]

Options: Options are **yesterday** for yesterday's report or **today** for today's report.

Screen

Screen 4-22 shows a typical screen for the Performance Summary Report. The time and date that the report was requested are displayed to the right, following the name of the report. The report displays the information both graphically and numerically. Table 4-T describes the data fields presented in the Performance Summary Report.

```
list performance summary yesterday

SUMMARY   PERFORMANCE   REPORT      Today: 4:38 pm SAT MAY 19, 1990

  PEAK   HOUR   TRUNK   BLOCKING        DAILY   ARS   CALLS   CARRIED
Grp - % Out Blocking or % ATB - Grp  Grp   - % Calls Per Group Type - %
No.  1 2 3 4 5 6 7 8 9 10 20 50 Blk  Type 1 10 20 30 40 50 60 80 100 Calls
54   ///////////////////////  42     co   ////                      15
59   //////////////////////   39     fx   /////////                 28
58   ///////////////////////  36     wats //////                    20
63   ///////////////////////  34     tie  //////                    22
61   /////////////////        10     misc ///                       15


    TRUNKS   OUT   OF   SERVICE              TRUNKS   NOT   USED
Grp Trunks Out Of Service All Day    Grp   Trunks  With  No Calls  All  Day
No. -------------------------        No.   -----------------------------
41     9 19                          55  1
73     7                            60  9
211    1 2 3 4 5 6 7 8 9 1 0         223 19 20 21 22 23
       more out of service                more out of service


Command  successfully  completed
enter   command:
```

SCREEN 4-22. Performance Summary Report

TABLE 4-T. Performance Summary Report

Field	Description
PEAK HOUR TRUNK BLOCK-ING	Lists up to a maximum of five trunk groups that have the highest percent of blockihg in a measurement hour (for example, Grp No. 54 had 42 percent blocking). For incoming trunk groups, the percent of blocking is referred to as Percent All Trunks Busy (**% ATB).** For outgoing and two-way trunk groups, the percent blocking is referred to as **% Out Blocking.** **% ATB** is the percentage of time that all trunks in the trunk group were simultaneously in use during the measurement interval. **% Out Blocking** is the percentage of calls that arrive when all trunks are busy (ATB). For trunk groups with no queue, the calls not carried are those calls that could not be carried over any trunk member. For trunk groups with queues, the calls not carried are those calls that could not be carried over any trunk member and could not be queued because the queue was full (for example, the Queue Overflow calls). **Suggested Action:** You should determine the exact reason that a trunk group is blocking calls. Refer to the **performance trunk-group** report (for the indicated trunk group) to determine if blocking is being caused by a high volume of calls. If it is because of calling volume alone, then consider the possibility of adding more members to the trunk group. The **Total Calls** field on the **list performance trunk-group** report, indicates the calling volume. If blocking is not because of calling volume, the reason must be because trunks are in the maintenance busy state. Determine whether maintenance personnel have been or should be alerted.
DAILY ARS CALLS CARRIED	The percentage of calls carried, on a per trunk type basis by the 20 ARS patterns that are selected and being measured (with the **change ars meas-selection** command). The report displays the information both graphically and numerically. This measurement is simply a summation of the Total Calls Carried on a per trunk type basis for the trunk groups listed in the measured route-patterns, divided by the systemwide Total Calls Carried for all trunk types all day. The trunk group types for which ARS performance is reported in the summary report are: co, fx, wats, tie, and misc. The tie trunk group type includes both internal and external tie, both internal and external Advanced Private Line Termination (APLT) access, and tandem trunk group types. The term misc represents all other remaining trunk group types over which ARS calls may be routed.

TABLE 4-T *(continued).*
Performance Summary Report

Field	Description
TRUNKS OUT OF SERVICE	Lists four trunk groups with out-of-service trunks over the report interval. A list of the first ten trunks that are out of service is also given. The indication **more out of service** is given if there are more than four trunk groups with out of service trunks or more than 10 members are out of service in any of the groups listed. **Note:** This measurement is a summary of the **list measurements outage-trunk** report.
TRUNKS NOT USED	Lists four trunk groups with trunks that have not been used over the report interval (yesterday or today). A list of the first five trunks, in each of the identified groups, that have not been used is also listed. The indication **more out of service** is given if there are more than four trunk groups with trunks that have not been used or whenever more than five members are not used. **Suggested Action:** You should determine the exact reason that the trunks arenotbeing used. Is the reason because (1) there are more trunks than actually needed, or (2) because there is a problem? The **list measurement lightly-used-trunk** report provides the information that can be used to answer these questions. If the identified trunk group has a large number of members and there are several trunks within that trunk group that receive few or zero calls, then the obvious conclusion is that there are more trunk members than needed for the trunk group. As a contrast, if there is only one trunk member identified for the trunk group and that member has zero calls, then the trunk probably is defective.

System Status Reports

This section describes the Monitor System Status Reports which provide an overall view of how the system is performing in real-time.

Monitor System Status Reports

The Monitor System Status commands generate dynamic one-page status reports that summarize the overall current condition of the system and last hour traffic status.

Using the Monitor System Status commands, you can generate two different status report forms. These two forms contain the following information:

> **Monitor System View1.** Includes the attendant status, maintenance status, and last hour'sl traffic data for attendant, hunt, and trunk groups. The form also shows the date and time of day at which the report was requested.

> **Monitor System View2.** Includes attendant status, maintenance status, and last hour's traffic data for attendant and trunk groups. The form also shows the date and time of the day at which the report was requested.

Data for attendant and maintenance status are updated every minute. Data for the traffic status is updated once every hour because traffic status is obtained from existing measurements that are collected on an hourly basis.

> **Note:** Requesting either of the syetem status reports should be your last request during your current logon. The screens are exited by pressing [CANCEL] , which also logs you off the system, or after a 30-minute time-out.

Commands

Enter one of the following commands to display the desired Monitor System Status Report:

> **monitor system view1**

> > or

> **monitor system   view2**

Options: There are no options for these commands.

Screen

Screen 4-23 shows the Monitor System View1 report and Screen 4-24 shows the Monitor System View2 report. Table 4-U describes the data fields presented in both reports.

```
monitor system viewl


                  ATTENDANT   STATUS            MAINTENANCE   STATUS
                      Console no.          # of alarms for trunks: 0
        Activated: 3                       # of alarms for stations: 0
      Deactivated: 1 2                     # of alarms for other res: 0
                                           INADS has been informed ? n


                             TRAFFIC   STATUS
                           Measurement Hour: 1800
             Trunk  Group  Measurement            Hunt  groups  Measurement
      (4 grps with highest % time ATB)     (4 grps with highest % of qued calls)
         Grp no:   41  12  23  221                  Grp no: 6
        Grp dir:   inc out two two             Calls qued: 2
      Calls  qued: 17  9  19   12            Calls aban: 2
      % Out blkg:   *   9  18   11                   Attendant Group Measurement
      %  Time ATB: 86  79  91  93            Calls qued: 9    Calls aban: 1
                                                    19:27   FRI MAY 18 1990


                    - press CANCEL to quit -
```

SCREEN 4-23. Monitor System View1

```
monitor  system  view2

                ATTENDANT   STATUS            MAINTENANCE   STATUS
                   Console no.           # of alarms for trunks: 0
    Activated: 3                         # of alarms for stations: 0
  Deactivated: 1 2                       # of alarms for other res: 0
                                         INADS has been informed ? n


TRAFFIC STATUS Measurement Hour: 1800
   Trunk  Group  Measurement

 (4 grps with highest % time ATB)
   Grp no:  41 12 23 221
   Grp dir:  inc out two two
Calls qued: 17  9 19  12
% Out blkg:  *  9 18  11
% Time ATB: 86 79 91  93


      Attendant  Group Measurement
Calls qued: 9     Calls aban: 1
                                              19:28 FRI MAY 18 1990
              - press CANCEL to quit -
```

SCREEN 4-24. Monitor System View2

TABLE 4-U. Monitor System View1 and View2 Reports

Field	Description
ATTENDANT STATUS	Shows the activated attendant consoles and deactivated attendant consoles. In the sample screens, console #1 and console #2 are deactivated and console #3 is activated. **Note:** Activated means that the agent's headset/handset is plugged in the console, and the console is not busied-out or set for Night Service. You can use the **display attendant-status** command to obtain other details.
Maintenance Status	Shows the number of alarms (including minor and major alarms) that may indicate problems on trunks, stations, and other resources. If any alarm exists in the system or if remote maintenance [for example, the AT&T Technical Service Center (TSC)] has acknowledged an alarm, indications are shown on the report. You can use the display alarms command to determine exactly what alarms currently exist. A **Y** indicates that the alarm has been acknowledged. An **N** indicates no acknowledgement.

TABLE 4-U *(continued).*
Monitor System View1 and View2 Reports

Field	Description
`Traffic Status`	View1 displays the call handling status for trunk, hunt, and attendant groups; View 2 displays the call handling status for trunk and attendant groups only. The reports indicate the number of queued calls and abandoned calls during the previously completed measurement interval for the identified trunk groups.
	For the trunk group measurements, only the four trunk group numbers with the highest percentage of blocking are listed. The reports also display trunk group direction (two-way, outgoing, or incoming), the number of calls queued the percentage of outgoing blocking (for outgoing and two-way trunks), and the percentage of all trunks busy (for incoming trunks).
	For outgoing and two-way trunk groups that are only experiencing a high number in the `% Time ATB` field, no action is required since this just indicates that the trunks are being used very efficiently. However, a bad condition is when both the `% Time ATB` and `% Out blkg` fields are displaying high numbers, indicating that calls are arriving and being blocked because all trunks are already being used. For incoming trunk groups that are experiencing a high number in the `% Time ATB` field, then some incoming calls are probably being blocked (see Note).
	Note: The traffic status measurements are a summary of the **performance trunk-group report.**
	Suggested Action: 1. For outgoing and two-way trunk groups that are experiencing a high number in both the `% Time ATB` and `% Out blkg` fields, you should execute the **list performance trunk-group** command and follow the suggested actions that are specified for that command. 2. For incoming trunk groups that are experiencing a high number in the `% Time ATB` field, you should execute the **list performance trunk-group** command and follow the suggested actions that are specified for that command.

Time Division Multiplex Usage Report

This section describes the Time Division Multiplex (TDW) measurements report for time slot usage.

Time Division Multiplex Usage Measurements Report

The TDM Usage Measurements Report presents usage information for TDM port network time slots. Of the 512 TDM time slots in each port network, usage measurements are only provided for the 483 time slots employed in call processing, data links, and maintenance. Usage is not reported for the remaining 29 time slots, which primarily serve system functions.

The TDM time slots are sampled at one hundred-second intervals, referred to as CCS. Any time slot in use when the sample is taken is assumed busy for the entire sampling interval and is counted as one CCS for the interval. Because there are 36 CCS in an hour and 483 reported time slots, the maximum TDM usage per port network is:

$$\textit{Maximum TDM Usage} = 483 \times 36 \ CCS = 17{,}388 \ CCS$$

It should be understood that 17,388 CCS represents the maximum calling volume that a single TDM bus can support. Any calls that attempt to exceed this maximum are blocked because there are not any time slots available. For purposes of this report, the term Port Network (PN) is defined as a collection of carriers containing port boards and service circuits connected by a single TDM bus. The Processor Port Network (PPN) is referred to as PN-1. The first Expansion Port Network (EPN) is referred to as PN-2. The second EPN is referred to as PN-3. Traffic between port networks is referred to as inter-PN traffic or inter-PN usage.

You can use this report to monitor usage of the TDM buses. If the TDM usage for a single TDM bus approaches the maximum limit you will know that a second port network is needed. Furthermore, you can monitor the inter-PN usage and determine whether or not corrective action (for example, balancing the PNs) is appropriate.

The TDM Usage Measurements Report shows activity for yesterday's peak hour, today's peak hour, and the last hour.

> **Note:** For the yesterday's peak hour and today's peak hour options, it is the hour during the specified day that has the largest total usage. For the last hour, it is the most recently completed measurement hour.

Command

To display the TDM Usage Measurements Report, enter:

list measurements tdm-usage [print or schedule]

Options: There are no options for this command.

Screen

Screen 4-25 is an example of a typical sreen for the TDM Usage Measurements Report. The
time and date that the report was requested are displayed to the right, above the title of the
report. Table 4-V describes the data fields presented in the TDM Usage Measurements Report.

```
list  measurements  tdm-usage  today-peak


                                    Date: 4:15 pm FRI OCT 5, 1990


                 T D M    U S A G E    M E A S U R E M E N T S


                     Total        Total        Peak         Total
     Hour     PN     Usage        Req          Req          Denied
     1400     1      16091        701          489          21
     1500     2      8934         313          219          0
     1300     3      4129         108          39           0


              PN        Inter-PN      Inter-PN        Inter-PN
     Hour     Pair      Usage         Req             Peak Req
     1400     1/2       3102          99              33
     1500     2/3       1143          51              22
     1300     3/1       1027          33              12


     Command  successfully  completed
     enter  command:
```

SCREEN 4-25. TDM Usage Measurements Report

TABLE 4-V. TDM Usage Measurements Report

Field	Description
`Hour`	*Measurement Hour.* The starting time (using the 24-hour clock) for which the data was recorded. The time displayed for the last hour report is the last whole hour. The time displayed for the today peak report is the beginning of the peak hour of TDM usage for each port network and port network pair so far today. For the yesterday peak report, the measurement hour is the beginning of yesterday's peak hour of total TDM usage for each port network. **Note:** The measurement hour may be different for each port network and port network pair.
`PN`	*Port Network.* The port network for which the measurements were polled. The range of numbers is from one to three. Number 1 identifies the PPN. The numbers two and three identify the EPNs.
`Total Usage`	The TDM usage (expressed in units of CCS) for each port network. $\text{Total Usage} = \sum \text{ of the Allocated TDM Time Slots}$ *(for the measurement hour)* **Suggested Action:** If total usage for one PN reaches or approaches the Maximum TDM Usage (17,388 CCS) then you should take steps to reduce traffic on that PN. Either (1) add another PN, or (2) if the switch already contains two or three PNs, then balance the traffic load (redistribute some of the load) between the existng PNs. Refer to "Suggested Action" under the description for the field, `Total Denied` .
`Total Req`	The total number of requests for TDM time slots within each port network during the specified measurement hour. **Note:** Requests generated by maintenance processes are not included.
`Peak Req`	The maximum number of simultaneous requests for TDM time slots within the identified port network during the specified measurement hour. **Note:** Requests generated by rnaintenance processes are not included.

TABLE 4-V *(contlnued).*
TDM Usage Measurements Report

Field	Description
`Total Denied`	The total number of requests for TDM time slots during the identified hour that were denied because none were available. This number represents the call attempts that were blocked. **Note:** Normally, this field should display the number 0. However, during the peak hour of business activity it is possible to block a small percentage of call attempts. **Suggested Action:** When the number of calls denied is small (for example, the specified level of blocking is not exceeded) no action is required. However, if the number of attempts denied is excessive, then some attempt should be made to correct the problem. Either redistribute some of the traffic load or add another PN.
`PN Pair`	The port network pair for the associated measurement data. The measurement of the traffic data between the PPN and EPN1 is referred to as PN Pair 1/2. The measurement of the traffic data between EPN-1 and EPN-2 is referred to as PN Pair 2/3. The measurement of the traffic data between the PPN and EPN-2 is referred to as PN Pair 1/3.
`Inter-PN Usage`	*Inter-Port Network Usage.* The TDM usage, in CCS, for inter-port network calls. This value is calculated as follows: Inter-PN Usage equals the sum of the TDM time slots that are used to carry inter-PN calls at the end of each 100-second interval during the indicated measurement hour.
`Inter-PN Req`	The total number of requests for TDM time slots, within the identified port network pair, that were used to carry inter-port network traffic during the measurement hour. The `Inter-PN Usage` field is incremented for each PN on a call.
`Inter-PN Peak Req`	The maximum peak number of simultaneous requests for TDM time slots, within the identified port network pair, that were used to carry inter-port network traffic during the specified measurement hour.

Tone Receiver Report

This section describes the Tone Reciever Measurements Report which displays data for tone receivers.

Tone Receiver Measurements Report

The Tone Receiver Measurements Report displays traffic data for each type of tone receiver.

The Tone Receiver Measurements Report provides traffic data for Dual Tone Multifrequency (DTMF), purpose receivers, and Call Classifiers (CC). DTMF receivers detect touch tones, GPTD receivers detect call progress tones. CCs can function either as Call Progress Tone Receivers (CPTRs) or touch-tone receivers. However, CC are intended for call prompting applications.

> **Note:** Tone receivers are required to support the ARS, Terminal Dialing, Abbreviated Dialing, LND, and Call Prompting features. Refer to *DEFINITY® Communications System Generic 1 and Generic 3i— System Description,* 555-230-200 for additional details.

Each TN748 provides four DTMF receivers for touch-tone reception plus two GPTD receivers for call progress tone reception and maintenance testing. Each port network always requires at least one TN748 circuit pack. The number of additional TN748 circuit packs required depends upon the traffic load. Each TN744 provides eight CCs for call prompting applications.

Reports can be requested on tone receiver activity for yesterday's peak hour, today's peak hour, or the last hour. The data in this report can be used to determine if there is a need for additonal Tone Detector or Tone Detector/Generator circuit packs.

Command

To display the Tone Receiver Measurements Report screen, enter:

list measurements tone-receiver [options] [print or schedule]

Options: Options are **yesterday-peak** for yesterday's report, **today-peak** for today's report, or

last-hour for a report of the acitivity from the last completed measurement hour.

Screen

Screens 4-26 and 4-27 depict examples of typical screens for the Tone Receiver Measurements Report. Table 4-W describes the data fields in the Tone Receiver Measurements Report. One page of data is displayed per port network.

```
list  measurements  tone-receiver  last-hour

                                     Date:  4:16  pm  TUE  OCT  17,  1990

                        TONE    RECEIVER    MEASUREMENTS

                Total Total Peak Total   Peak   Total   Peak
        Hour   Type  Avail  Req  Req  Queued Queued Denied Denied
        1400   DTMF   40    23   13    0       0      0      0
        1500   GPTD    6    94    7                   1      1
        1000   CC     24    0/2  0/1  0/0     0/0    0/0    0/0

                        PN    PN    Peak    Total     Peak
        PN      Type   Req  Alloc  Alloc   Off-PN    Off-PN
        1       DTMF    8    8      200     0          5
        1       GPTD   12   12      3       0          0
        1       C C    0/0  0/0    0/0     0/0        0/0

Call  Classifier  (CC)  -TTR/CPTR
      press CANCEL to quit -  press  NEXT  PAGE  to  continue
```

SCREEN 4-26. Tone Receiver Measurements Report

```
 list   measurements   tone-receiver   last-hour

                                    Date: 4:17 pm TUE OCT 17, 1990

                         TONE   RECEIVER   MEASUREMENTS

                Total Total Peak Total  Peak   Total   Peak
         Hour  Type  Avail Req   Reef  Queued Queued Denied Denied
         1400  DTMF   40    23   13      0       0      0      0
         1500  GPTD   6     94    7                     1      1
         1000  CC     24   0/2   0/1    0/0     0/0    0/0    0/0


                         PN    PN    Peak    Total     Peak
         PN      Type    Req  Alloc  Alloc   Off-PN   Off-PN
         2       DTMF    19    19    200      0         5
         2       GPTD    12    12     3       0         0
         2       C C    0/2   0/2    0/0     0/0       0/0

 Command   successfully   completed
 enter  command:
```

SCREEN 4-27. Tone Receiver Measurements Report *(continued)*

TABLE 4-W. Tone Receiver Measurements Report

Field	Description
Hour	*Measurement Hour.* The starting time (using the 24-hour clock) of the hour during which the greatest number of requests for tone receivers were made.
Type	*Type.* The type of tone receiver being measured. **Note:** Each TN748 circuit pack provides four DTMF ports and two GPTD ports. Each TN748 circuit pack provides four DTMF ports (for touch-tone reception) and two GPTD ports (for call progress tone reception). The TN744 Call Classifier Circuit Pack provides eight ports for call progress tone reception or touch-tone reception.
Total Avail	*Total Available.* The systemwide total number of DTMF, GPTD or CC receivers that are available and not busied-out for maintenance.
Total Req	*Total Requests.* The systemwide total number of requests, by call processing, for DTMF, GPTD, or CC receivers during the listed hour. The total number of requests is calculated by incrementing a counter for each request.
Peak Req	*Peak Requests.* The systemwide peak number of simultaneous requests for DTMF, GPTD, or CC receivers that occurred at any one time for the listed hour. The peak (or maximum) number is calculated by incrementing a counter for each request, and decreasing the counter when the request fails or a tone receiver is released. **Note:** If the **Peak Req** field indicates a number higher than listed in the **Avail** field, then certain requests were either queued or denied during the peak time interval. Denied requests fail and are given the reorder tone.

TABLE 4-W *(continued).*
Tone   Receiver   Measurements   Report

Field	Description
Total Queued	*Total Queued.* The systemwide total number of DTMF receivers that were queued during the listed hour. A DTMF receiver is queued when there are no DTMF receivers immediately available. There is no queuing for GPTD receivers. Where CCs are set as touch-tone receivers, queuing is as for DTMFs; where they are set as CPTRs, there is no queuing. **Note:** If a request for a receiver is made in one port network, and it is determined that this port network cannot make any receivers available, then the request flows to the next port network. If this next port network cannot make any recievers available, and if the request is for a DTMF receiver or a CC, then an attempt to queue the request is made. If a CC is set as a touch-tone receiver, an attempt to queue the request will be made; if a CC is set as a CPTR, queue attempts will not be made. There is no dial tone for queued call attempts until a tone receiver becomes available.
Peak Queued	*Peak Queued.* The systemwide maximum number of DTMF receivers (or CCs set as touch-tone receivers) that were queued at any one time during the listed hour. **Note:** The system has a maximum queue size of 4. Requests for GPTDs (or, for CCs set as CPTRs) cannot be queued, just those for DTMFs (or for CCs set as touch-tone receivers).
Total Denied	*Total Denied.* The systemwide total number of requests for DTMF or GPTD receivers that were denied because no receivers were available during the listed hour. For DTMF receivers (or for CCs set as touch-tone receivers), this happens only after the queue is full. Those requests that overflow are given the reorder tone and are counted as total denied.

TABLE 4-W *(continued).*
Tone Receiver Measurements Report

Field	Description
`Peak Denied`	*Peak Denied.* The systemwide peak number of requests for DTMF, GFTD, or CC receivers that were denied because no receivers were available during the listed hour.
	Suggested Action: At a minimum you should increase the number of tone receivers by the number that is displayed in the `Peak Denied` field. Furthermore, you may want to consider engineering the switch as "non-blocking" for tone receivers. This would involve increasing the number of tone receivers (the `Avail` field) so that all requests receive service immediately and no requests are queued. For example, just keep the value displayed in the `Avail` field greater than the value displayed in the `Peak Req` field.
`P N`	*Port Network.* The port network in which the circuit pack containing the type of tone receiver listed is physically located.
`Type`	*Type.* The type of tone receiver being measured: DTMF, GPTD, or CC.
`PN Req`	*Port Number Requests.*
`PN Alloc`	*Total Allocation.* The total number of DTMF, GPTD, or CC receivers located in the identified port network that were allocated for use during the listed hour.
`Peak Alloc`	*Peak Allocation.* The peak number of DTMF, GPTD, or CC receivers located in the listed port network that were used simultaneously during the listed hour.
	Suggested Action: If the `Peak Alloc` field is smaller than the number in the `Avail` field, there are too many tone receivers. You may consider moving one TN748 tone receiver circuit pack (in the case of CCs, it would be a TN744 receiver) to the other port network assuming that the other port network needs tone receivers.

TABLE 4-W *(continued).*
Tone Receiver Measurements Report

Field	Description
`Total Off-PN`	*Total Off-Port Network.* For the identifed hour and port network, this is the total number of DTMF, GPTD, or CC receivers that were allocated for use by a port on a dfferent port network, thus requiring inter-port resources. **Note:** With ideal conditions, this field will display the number 0. However, with more practical conditions, the field will display a larger number. **Suggested Action:** Locate oommunities of interest within the same port network. Provide sufficient number of tone receivers for each port network.
`Peak Off-PN`	*Peak Off-Port Network.* For the identified hour and port network, this is the peak number of DTMF, GPTD, or CC receivers that were simultaneously allocated for use by ports on a different port network. **Note:** A desirable goal is to minimize (within reason) the number displayed with this field. **Suggested Action:** Locate communities of interest within the same port network. Provide sufficient tone receivers for each port network. Perhaps you should move one TN748 circuit pack (or, if you are working with a CC, move a TN744 circuit pack) to the PN with the Off-PN counts to minimize Off-PN allocations.

Trunk Group Reports

This section describes the traffic, outage, and lightly used measurements reports, as well as the performance and status reports for Trunk Groups, and describes the validation and analysis of the data provided in the reports.

Trunk Group Measurements Report

The Trunk Group Measurements Report gives traffic measurements for all trunk groups except for PCOL Groups. By using this report, you can determine the trunk group total usage (in CCS), the total number of calls, trunk blockage, and other measurement data.

Command

To display the Trunk Group Measurements report, enter:

list measurements trunk-group [option] [print] or [schedule]

Options: Options are **yesterday-peak** for a report of yesterday's peak trunk activity, **today-peak** for a report of today's peak trunk activity, or **last-hour** for a report of the trunk activity of the most recently completed hour. A peak hour is the hour within a 24-hour period that had the greatest usage for the specified 24-hour period.

Screen

Screen 4-28 shows a typical screen for the Trunk Group Measurements Report. Table 4-X describes the data fields presented in the Trunk Group Measurements Report.

```
list measurements trunk-group yesterday

                     TRUNK GROUP MEASUREMENTS

                                       Date: 2:09 pm FRI MAY 18, 1990

                           Peak Hour For All Trunk Groups: 1300
  Grp Grp  Grp  Grp Meas Total Total Inc.  Grp  Que  Calls Que Que Out   %  %Out
  No. Size Type Dir Hour Usage Seize Seize Ovfl Size Qued  Ovf Abd Serv ATB Blk
  1   23   co   two 1300 656   280   170   6    15   6     0   1   0     2   5
  2   6    fx   inc 1300 201   70    70    0    0    0     0   0   0     93  *
  3   7    fx   out 1300 143   48    0     7    6    6     1   1   1     0   2
  4   5    wats out 1300 73    81    0     5    0    0     0   0   1     0   6
  5   7    co   inc 1300 121   51    51    0    0    0     0   0   0     0   *
  6   4    co   out 1300 61    27    0     2    0    2     0   1   0     3   0
  7   14   tie  two 1300 435   256   42    40   10   37    3   3   1     71  1

Command successfully completed
enter command:
```

SCREEN 4-28. Trunk Group Measurements Report

TABLE 4-X. Trunk Group Measurements Report

Field	Description
`Peak Hour for All Trunk Groups`	For the **yestday-peak** and **today-peak** options, it is the hour during the specified day that has the largest total usage, when summed over all trunk groups. For the **last-hour** option, it is the most recently completed measurement hour.
	Peak hour and busy hour synonymous. With conventional traffic theory data analysis, there are two methods for determining the peak hour. One is the fixed peak hour, meaning that hourly usage values are averaged across days for each hour of the day. The other is the bouncing peak hour, meaning that the highest usage is selected for each day without regard to the average across days. For the bouncing peak hour, the highest load on a given day may or may not occur during the fixed busy hour. These traffic reports and the accompanying trunk group data worksheet only use the bouncing peak hour method.
`Grp No.`	*Group Number.* A number that identifies each trunk group associated with the displayed data. The range of possible trunk group numbers is 1 through 99. **Note:** With the Hospitality Parameter Reduction option, the range is 1 through 50. Group numbers are displayed in numerical order, beginning with the lowest administered number and continuing to the highest administered number.
`Grp Size`	*Group Size.* The number of administered trunks in the trunk group. The range of possible numbers is 1 through 99.

TABLE 4-X *(continued).*
Trunk Group Measurements Report

Field	Description
`Grp Type`	*Group Type.* The type of trunk in the trunk group. The systern monitors/measures the following trunk types: • Access Tie Trunk `(acc)` • Advanced Private Line Termination `(aplt)` • Central Office `(co)` • Customer Provided Equipment `(cpe)` • Direct Inward Dialing `(did)` • Foreign Exchange `(fx)` • Integrated Services Digital Network `(isdn-pri)` • Retease Link Trunk `( rlt )` • Tandem `(tan)` • Tie Trunk `( tie )` • Wide Area Telecommunications Service `(wats)`
`Grp Dir`	*Trunk Group Direction.* Identifies whether the trunk group is incoming only `(inc)`, outgoing onty `(out)`, or two-way `(two)`.
`Meas Hour`	*Measurement Hour.* The hour (using the 24-hour clock) in which the measurementsts are taken. For the **last- hour** report, it is the last hour of measurement (each trunk group's measurement hour is identical; but not necessarily the same as the indicated peak hour for the day). For the **today-peak** report, the measurement hour is the peak hour for each trunk group thus far today (each trunk group's measurement hour could be different). For the **yesterday-peak** report, the measurement hour is the peak hour for each trunk group yesterday (each trunk group's measurement hour can be different).

TABLE 4-X *(continued).*
Trunk Group Measurements Report

Field	Description
`Total Usage`	Total usage (in CCS) for all trunks in the trunk group. Represents the total time the trunks are busy (with calls) during the one-hour measurement period.
`Total Seize`	*Total Seizures* . The number of times a trunk in the trunk group was seized. The call may or may not have been completed. The Average Holding Time, or duration of a call, can be determined as follows: $$\textit{Average Holding Time (in seconds)} \ = \ \left[\frac{\textit{Total Usage CCS}}{\textit{Total Seizures}} \right] \ \textsf{x} \ \ 100 \ secs$$
`Inc. Seize`	**Incoming Seizures.** The total number of times a trunk m the trunk group was seized in order to receive an incoming call. The call may or may not have been completed. These calls may be incoming from a one-way trunk group or may be the incoming portion of a two-way trunk group. The number of Outgoing Seizures can be calculated as follows: *Out Seize = Total Seize - In Seize*
`Grp Ovfl`	*Group Overflow.* The number of outgoing calls that are attempted when all trunks are busy. It does not include unauthorized calls that are denied service on the trunk (due to restrictions). Calls that overflow to the next trunk group in the routing pattern via the ARS or Automatic Alternate Routing (AAR) feature also show up in this field. It should be understood that on a per-trunk group basis the Group Overflow calls are actually blocked calls. A blocked call is a call that is attempted when no trunks are available. A blocked call will queue (provided that a queue is administered) or it is denied if no queue exists. The number for the Group Overflow field is calculated as follows: *Group Overflow = Calls Queued + Queue Overflow*
`Que Size`	*Trunk Group Queue Size.* A number (0 to 100) that identifies the number of slots assigned to the trunk group queue. This number represents how many calls may be held in queue by the trunk group. If 0 is displayed, then no queue is administered. Hence, the other queue measurements will also be 0. Generally, the queue size should be larger than the trunk group size; but typically not more than three times as large as the trunk group size.

TABLE 4-X *(continued).*
Trunk Group Measurements Report

Field	Description
`Calls Qued`	*Calls Queued.* The total number of calls that entered the trunk group queue after finding all trunks busy.
`Que Ovf`	*Queue Overflow.* The total number of calls that were not queued because the queue was full. These calls receive a busy signal.
	Suggested Action: Generally, this field will indicate the number 0. If this field indicates a high number, then:
	(a) The queue size may be too small, or
	(b) More trunks may need to be added to reduce the number of calls queuing.
`Que Abd`	*Queue Abandoned.* The number of calls that were removed from the queue in one of the following rnanners:
	● By the system because they have been in the queue for more than 30 minutes
	● By the user (for example, dialing the cancel code).
	Suggested Action: If the last-hour measurement report just happens to also be the peak-hour, then the data may be used to make a decision about whether the queue size is proper. Typically, this field will indicate a small number. However, a large number generally indicates that the queue size is too large and that people are abandoning because they have remained in queue for a long holding time and are giving up.
`Out Serv`	*Out of Service.* The number of trunks in the trunk group that are out of service (listed as maintenance busy) at the time data is collected. An individual trunk may be taken out of service (a) by the switch whenever an excessive number of errors occur, or (b) by maintenance personnel to run diagnostic tests.
	Suggested Action: If the trunks were removed from service by the switch, then the appropriate maintenance personnel should be notified. The objective is to keep all members of a trunk group "in service." Generally, you should not make adjustments to the trunk group because of "Out of Service" trunks. You should get those trunks returned to service.
	Refer to the Trunk Outage Measurements Report for specific details.

TABLE 4-X *(continued).*
Trunk Group Measurements Report

Field	Description
`%  ATB`	*Percentage all trunks busy.* The percentage of time that all trunks in the trunk group were simultaneously in use during the measurement interval. **Note:** In use means that the trunks were busy—either serving calls, or because they were busied-out by maintenance. **Suggested Action:** 1. If the group direction is outgoing or two-way, then a high number in the `%  ATB` field and **no** in the `Grp Ovfl` or `Que Ovf` would indicate that everything is functioning perfectly. However, a more typical scenario would be a high number in this field and also a high number in the `Grp Ovfl` field. This would indicate a possible problem that necessitates further analysis. If this is "Preference 1" of the ARS routing pattern, then overflow is just to the second choice trunk group, and the number in the `Grp  Ovfl` field is of no great significance. Otherwise, the obvious choice is to add more trunks to the trunk group. 2. If the group direction is incoming, then a high number in this field is bad. It indicates that some incoming calls are probably being blocked. Generally, you will want to add more trunks, thus lowering the % ATB and decreasing the number of calls that are being blocked.

TABLE 4-X *(continued).*
Trunk Group Measurements Report

Field	Description
`% Out Blk`	*Percentage Outgoing Blocking.* The percentage of calls that arrive when all trunks are busy. For trunk groups without a queue, the calls not carried are those calls that could not be carried over any trunk member. For this scenario the Percentage Outgoing Blocking is calculated as follows: $\% \; OutBlk = \left[\dfrac{Group \; Overflow}{Total \; Seizures} \right] \times 100$ Similarly, the equation for calculating Calls Offered is as follows: *Calls Offered = Calls Carried + Group Overflow* For trunk groups with a queue, the calls not carried are those calls that could not be carried over any trunk member and could not be queued because the queue was full (e.g., the Queue Overflow calls). For this scenario, the Percentage Outgoing blocking is calculated as follows: $\% \; OutBlk = \left[\dfrac{Queue \; Overflow}{Total \; Seizures} \right] \times 100$ Similarly, the equation for calculating Calls Offered is as follows: *Calls Offered = Calls Carried + Que Ovf + Que Abd* **Suggested Action:** 1. You can increase the length of the queue rather than adding more trunks. Subsequently, you should monitor the `Que Abd` field to insure that it stays within reasonable limits. 2. If conditions are such that Step 1 is not appropriate, then you may find it necessary to add more trunks.

Trunk Group Performance Report

The Trunk Group Performance Report gives a graphical and numerical display of the peak hour blocking for each trunk group. You can display the Trunk Group Performance Report for the previous day or the current day (yesterday or today).

Command

To display the Trunk Group Performance Report, enter:

list performance trunk-group [option] [print] or [schedule]

Options: Options are **yesterday** for a report of yesterday's trunk activity or **today** for a report of today's trunk activity.

Screen

Screen 4-29 shows a typical screen for the Trunk Group Performance Report. The time and date that the report was requested is displayed to the right, following the name of the report.
Table 4-Y describes the data fields presented in the Trunk Group Performance Report.

```
    list performance trunk-group yesterday


    Trunk Group Performance                      Today: 4:28 pm SAT MAY 19, 1990


              HIGHEST HOURLY TRUNK GROUP BLOCKING


    Grp Grp Grp Grp    --% Outgoing Blocking or % ATB-- % Out % Time Meas Total
    No. Type Dir Size  1 2 3 4 5 6 7 8 9 10 20 30 40   50   Blkg    ATB Hour Calls
    1    fx   in 6      ////////////////                     *     9    1200 876
    2    wats in 5      //////////////////////////           *     30   1400 94
    3    tie  two 14    /////////////                        7     36   1300 312
    5    ddd two 10     ////////////////////////             20    99   1300 542
    12   co   two 18    //////////////////                   9     96   1400 614
    23   tie two 7      ////////////////////                 18    81   1400 359
    41   tie two 8      ////////////////////////             26    91   1300 411
    221  tie two 5      ////////////////////                 11    77   1300 109


    Command successfully completed
    enter  command:
```

SCREEN 4-29. Trunk Group Performances Report

TABLE 4-Y. Trunk Group Performance Report

Field	Description
`Grp No.`	*Group Number.* A number that identifies the trunk group associated with the displayed data. The range of possible numbers is 1 through 99. **Note:** With the Hospitality Parameter Reduction option, the range is 1 through 50.

`Grp Type`	*Group Type.* The type of trunk associated with the accumulated data. The system monitors the following trunk types (see the *DEFINITY® Communications System Generic 1 and Generic 3i—Feature Description,* 555-230-201):
	
	   • Access `(acc)`
	   • Advanced Private Line Termination `(aplt)`
	   • Central Office `(co)`
	   • Customer Provided Equipment `(cpe)`
	   • Direct Inward Dialing `(did)`
	   • Foreign Exchange `(fx)`
	   • Integrated Services Digital Network `(isdn-pri)`
	   • Release Link Trunk `(rlt)`
	   • Tandem `(tan)`
	   • Tie Trunk `(tie)`
	   • Wide Area Telecommunications Service `(wats)`

`Grp Dir`	*Trunk Group Direction.* Identifies whether the trunk group is incoming only `(inc)`, outgoing only `(out)`, or two-way `(two)`.
`Grp Size`	*Group Size.* The number of trunks in the trunk group. The range of possible numbers is 1 through 99.

TABLE 4-Y *(continued).*
Trunk Group Performance Report

Field	Description
`% Outgoing Blocking or % ATB`	*Percent Outgoing Blocking or Percent All Trunks Busy.* A graphical representation which is equivalent to the numerical value of calls offered but not carried. For two-way and outgoing trunk groups, peak hour blocking is the largest % Outgoing Blocking. For incoming trunks, peak hour is the largest % ATB. Since % Outgoing Blocking is meaningless for incoming trunks, it is displayed as * in that column. For trunk groups without a queue, calls not carried are those calls that could not be carried over any trunk member. For trunk groups with a queue, calls not carried are calls that could not be earned over any trunk member and could not be queued because the queue was full.
	Suggested Action: If a trunk group has a higher percent of blocking than desired, you should determine the exact reason that the trunk group is blocking calls.
	1. The `Total Calls` field indicates the calling volume. If excessive blocking is because of calling volume alone, then consider the possibility of adding more members to the trunk group.
	2. If excessive blocking is not because of calling volume, the reason must be because trunks are in the maintenance busy state. You can use the Trunk Outage Report (which is described next) to identify those trunks that are determined to be out of service. Furthermore, and as required, you can use the ACA feature to monitor any trunk group that is still experiencing unexplained excessive blockage.
	3. For identified problems, determine whether maintenance has been or should be alerted.
`% Out Blkg`	*Percentage Outgoing Blocking.* The percentage of calls that arrive when all trunks are busy.
`% Time ATB`	*Percent of Time All Trunks Busy.* The percent of time that all trunks in the trunk group were simultaneously in use during the measurement interval.
	Note: In use means that the trunks were busy—either serving calls, or because they were busied-out by maintenance.
`Meas Hour`	*Measurement Hour.* The starting time (using the 24-hour clock) of the hour during which the data was recorded.
`Total Calls`	The total number of calls (seizures) for the trunk group during the peak hour of blocking.

Trunk Outage Measurements Report

The Trunk Outage Measurements Report lists up to a maximum of five trunks (in each trunk group) that were out of serice when sampled. The number of times the trunks were out of service when sampled is also given. The trunk outage data is kept for the current day, the previous day, and the last hour.

Command

To display the Trunk Outage Measurements Report, enter:

list measurements outage-trunk [option] [print] or [schedule]

Options: Options are **yesterday** for a report of yesterday's trunk activity, **today** for a report of today's trunk activity, or **last-hour** for a report of the trunk activity of the most recentty completed hour.

Screen

The Trunk Outage Measurements Report screen is shown in Screen 4-30. The time and date that the report was requested is displayed to the right, above the name of the command. Table 4-Z describes the data fields presented in the Trunk Outage Measurements Report.

```
     list measurements outage-trunk yesterday


   Trunk Outage Report                 Today :   4:01 pm SAT MAY 19, 1990


                   TRUNK OUT OF SERVICE REPORT


       (trunks sampled for "out of service" condition once each hour)
       Grp       Grp     Grp     Grp     Grp       #Sampled
       No.       Type    Dir     Size    Mbr#      Outages
       1         co      two     20      2         1
       1         co      two     20      4         8
       1         co      two     20      5         3
       1         co      two     20      6         2
       4         wats    out     10      2         5
       4         wats    out     10      4         3
       4         wats    out     10      9         2
       4         wats    out     10      10        1


   Command successfully completed
   enter command:
```

SCREEN 4-30. Trunk Outage Measurements Report

TABLE 4-Z. Trunk Outage Measurements Report

Field	Description
`Grp No.`	*Group Number. A* number that identifies each trunk group associated with the displayed data. The range of possible numbers is 1 through 99. **Note:** With the Hospitality Parameter Reduction option, the range is 1 through 50.

`Grp Type`	*Group Type.* The type of trunk associated with the accumulated data. The system monitors the following trunk types (see *DEFINITY® Communications System Generic 1 and Generic 3i —Feature Description,* 555-230-201):
	
	    • Access `(acc)`
	    • Advanced Private Line Termination `(aplt)`
	    • Central Office `(co)` or Public Network Service
	    • Customer Provided Equipment `(cpe)`
	    • Direct Inward Dialing `(did)`
	    • Foreign Exchange `(fx)`
	    • Integrated Services Digital Network `(isdn-pri)`
	    • Release Link Trunk `(rlt)`
	    • Tandem `(tan)`
	    • Tie Trunk `(tie)`
	    • Wide Area Telecommunications Service `(wats)`

`Grp Dir`	*Group Direction.* Identifies whether the trunk group is incoming only `(inc)`, outgoing only `(out)`, or two-way `(two)`.
`Grp Size`	*Group Size.* The number of trunks in the trunk group. The range of possible numbers is 1 through 99.
`Grp Mbr #`	*Group Member Number.* The number that identifies a specific trunk member (in the group) that is out of service.

TABLE 4-Z *(continued).*
Trunk Outage Measurements Report

Field	Description
# Sampled Outages	*Number of Sampled Outages.* The number of times the group member is sampled as out of service over the period covered by the report (yesterday, today, or last hour). Yesterday includes the 24 hours beginning at midnight and ending at midnight. Today includes those hours from midnight to the most recently completed hour. Last hour only includes the most recently completed hour. **Note:** If there are no outages, then no data is displayed. **Suggested Action:** 1. The sampling period is once per hour. Therefore, if the report covers several hours (for example, the yesterday or today report) but the column only indicates a small number of outages, then the trunk member may be providing intermittent service. You should use the Facility Test Calls feature to determine whether a specific trunk member is functioning. 2. If a trunk is just suspected of causing problems, you should use the ACA feature to monitor the particular trunk group. 3. If a trunk member is totally out of service, then (depending on local arrangements) you may choose to refer the problem to maintenance personnel.

Trunk Lightly Used Measurements Report

The Trunk Lightly Used Measurements Report lists the five trunk members with the lowest number of calls carried for each trunk group. The trunk lightly used data is kept for the current day, the previous day, and the last hour.

Command

To display the Trunk Lightly Used Measurements Report, enter:

list measurements lightly-used-trunk [option] [print] or [schedule]

Options: Options are **yesterday** for a report of yesterday's trunk activity, **today** for a report of today's trunk activity, or **last-hour** for a report of the trunk activity of the most recently completed hour.

Screen

Screen 4-31 shows a typical screen for the Trunk Lightly Used Measurements Report. The time and date that the report was requested is displayed to the right, above the name of the report. Table 4-AA lists and describes the data fields in the Trunk Lightly Used Measurements Report.

```
 list measurements lightly-used-trunk yesterday


Trunk Lightly Used Report                    Today : 4:03 pm SAT MAY 19, 1990


                       TRUNK LIGHTLY USED REPORT


            (five trunks with lowest number of calls carried)
   Grp      Grp    Grp    Grp    Grp    Calls
   No.      Type   Dir    Size   Mbr#   Carried
   1        co     two    20     10     0
   1        co     two    20     15     3
   1        co     two    20     18     7
   1        co     two    20     19     8
   1        co     two    20     6      10
   4        wats   out    10     2      6
   4        wats   out    10     12     6
   4        wats   out    10     9      7
   4        wats   out    10     4      12
   4        wats   out    10     20     13


Command successfully completed
enter  command:
```

SCREEN 4-31. Trunk Lightly Used Measurements Report

TABLE 4-AA. Trunk Lightly Used Measurements Report

Field	Description
`Grp  No.`	*Group Number.* A number that identifies the trunk group associated with the displayed data. The range of possible numbers is 1 through 99. **Note:** With the Hospitality Parameter Reduction option, the range is 1 through 50.
`Grp Type`	*Group Type.* The type of trunk associated with the accumulated data. The system monitors the following trunk type (see *DEFINITY® Communications System Generic 1 and Generic 3i —Feature Description,* 555-230-201): ● Access `(acc)` ● Advanced Private Line Termination `(splt)` ● Central Office `(co)` or Public Network Service ● Customer Provided Equipment `(cpe)` ● Direct Inward Dialing `(did)` ● Foreign Exchange `(fx)` ● Integrated Services Digital Network `(isdn-pri)` ● Release Link Trunk `(rlt)` ● Tandem `(tan)` ● Tie Trunk `(tie)` ● Wide Area Telecommunications Service `(wats)`
`Grp  Dir`	*Group Direction.* Identifies whether the trunk group is incoming only `(inc)`, outgoing only `(out)`, or two-way(`two)`.
`Grp Size`	*Group Size.* The number of administered trunks in a specified trunk group. The range of possible numbers is 1 through 99. Refer to *DEFINITY® Communications System Generic 1 and Generic 3i —System Description,* 555-230-200 for additional details.
`Grp Mbr #`	*Group Member Number.* The number that identifies a specific trunk member (in the group number).

TABLE 4-AA *(continued).*
Trunk Lightly Used Measurements Report

Field	Description
`Calls Carried`	The number of calls carried on the trunk member over the report interval (yesterday, today, or last hour). **Suggested Action:** 1. If the identified trunk member has zero or a very small number of calls (seizures) in comparison to other listed trunk members, then you should use the Facility Test Calls feature to determine whether a specific trunk member is functioning. 2. If a trunk is just suspected of causing problems, you should use the ACA feature to monitor the particular trunk group.

Trunk Group Status Report

The Trunk Group Status Report gives a current indication of the load on various trunk groups in terms of the number of calls waiting to be serviced.

For each trunk group, the Trunk Group Status Report displays the number of calls in the queue waiting to be serviced. For comparative analysis, the trunk members in the group that are active on calls are also displayed. With this data, it is possible to manange the members in the groups to provide load balancing. For example, if one group shows a higher number of calls waiting in the queue and the size of the group is too small, more members can be added to that group.

Command

To display the Trunk Group Status Report, enter:

monitor traffic trunk-groups [option]

Options: Typing the command without an option will produce a display of the first 60 administered trunk groups (the possible range is 1 through 99). To display higher-numbered trunk groups, type the number of the first group of the 60 trunk groups to display the report in place of [option]. Only those trunk groups that are administered are shown on the report.

Screen

Screen 4-32 shows a typical screen for the Trunk Group Status Report. If the system has less than 60 groups administered, some of the right-hand columns will be displayed with blanks. The date and time at which the report was requested are displayed to the right of the screen title. Table 4-AB describes the data fields presented in the Trunk Group Status Report.

The data on the screen is updated every minute. If the values of any of the fields for the given trunk group are changed, all the fields for that trunk group are updated.

```
 monitor traffic trunk-groups


                                   TRUNK GROUP STATUS      19:03 SAT MAY 19 1990
    #   S   A   Q   W     #   S   A   Q   W     #    S   A   Q   W    #  S  A  Q  W
    1   20  10  0   0     16  14  3   0   0     59   9   1   0   0
    2   21  21  20  10    23  4   6   8   0     60   8   1   18  0
    3   31  12  0   0     25  5   0   0   0     61   2   0  ˙0   0
    4   10  5   10  8     27  12  2   18  0     62   4   1   8   0
    5   9   5   10  0     30  7   2   14  0     63   6   1   15  0
    6   10  8   10  0     41  5   1   0   0     73   6   0   8   0
    7   4   1   8   0     42  12  4   20  0     211  22  2   0   0
    8   4   4   8   2     43  6   3   0   0
    9   5   2   10  0     44  16  6   18  0
   10   7   3   14  0     45  8   0   0   0
   11   6   2   12  0     46  8   3   18  0
   12   5   2   10  0     54  9   2   0   0
   13   4   1   0   0     55  6   6   12  3
   14   5   4   8   0     57  8   4   10  0
   15   5   3   9   0     58  4   1   0   0


 (#: Group; S: Grp Size; A: Active Members; Q: Q length; W: Call Waiting.)
```

SCREEN 4-32. Trunk Group Status Report

TABLE 4-AB. Trunk Group Status Report

Field	Description
#	*Group Number.* A number from 1 to 99 that identifies each trunk group.
S	*Group Size.* The number of trunks that are administered for the trunk group. The range of possible numbers is 1 through 99.
A	*Active Group Members.* The number of trunk members in the group that are active on a call. Busied-out trunks are not active.
Q	*Queue Length.* The length of the queue administered for the group.
W	*Waiting Calls.* The number of calls waiting in the group queue.

Validating the Data

The following guidelines are intended to show an easy and fast method of determining whether the collected data is invalid or questionable. These guidelines represent the least that you should do for validation. You should perform additional validation as necessary.

You can use the list performance trunk-group report to obtain an overall indication of those trunk groups that may be providing poor service. The five trunk groups with the highest percentage of blocking are listed in the list summary performance report. However, this report (summary) has the following limitations:

- The Group Blocking shown on this report is the percentage of blocking for outgoing and two-way trunk groups. For incoming trunk groups, the Group Blocking value is the percentage of all trunks busy (ATB). A high value for either % ATB or the % Out Blocking is an indication of possible traffic load problems.

- A two-way trunk group with undesirable incoming blocking will not show any problems on this report, since only outgoing blocking is measured on two-way trunks.

You can use data from the Trunk Group Measurements Report for a more accurate estimate of service levels on incoming and two-way trunk groups. To validate the Trunk Group Measurements Report, verify that the following data is in order.

- Total Usage in CCS should not exceed 36 times group size. For example, with two trunks, the total usage measured should not exceed 2 x 36 = 72 CCS.

- On incoming trunks, total seizures should be equal to total incoming seizures.

- Incoming trunk groups should have a queue length of zero.

- The number of incoming calls should never be greater than the total number of calls carried by all trunks in the group.

- For incoming trunk groups the column `% ATB` should never indicate a value higher than 100.

- For outgoing trunk groups the `% Out Blk` should never indicate a value higher than 100.

- Outgoing trunk groups should indicate zero as their number of incoming calls.

- Out-of-service trunks should never be greater than group size.

- For trunk groups that have a queue, the two fields (Calls Queued and Queue Overflow) should total the number displayed in the Group Overflow field.

- The Queue Overflow field is incremented whenever a call finds the all trunks busy condition.

     Note: The number in the Group Overflow field represents the actual number of Blocked Calls.

- If the Percent Outgoing Blocking field shows a value greater than zero, the Queue Overflow and Group Overflow fields should also have values greater than zero.

- Measurement hour data reported in the System Status Report (for example, system view1 or monitor system view2) should Correspond to those shown on the hourly trunk group measurements and performance reports.

Analyzing the Data

The Trunk Group Measurements Report may be used to determine:

- Average Holding Time

- Trunk Blockage

- Number of trunks required for a specified Grade of Service

Note: It should be realized that data collected in a real-time environment will virtually always deviate from the theoretically predicted data because of the asynchronous nature of processes and interactions with other events such as maintenance.

Determining Average Holding Time

You can determine the Average Holding Time (in seconds) of a trunk group by dividing the Total Usage CCS by Calls Answered and multiplying the result by 100. A short holding time could indicate trouble.

Example:

Assume the following data is reported for a one-way trunk group:

- Total Usage CCS = 656 CCS

- Total Seizures = 280

You can determine the Average Holding Time as follows:

$$Average\ Holding\ Time = \left[\frac{\cdot Total\ Usage\ CCS}{Calls\ Seized} \right] x \ \frac{100\ Seconds}{CCS}$$

$$Average\ Holding\ Time = \left[\frac{656\ CCS}{280} \right] x \ \frac{100\ seconds}{CCS}$$

Average Holding Time = 280 *seconds (or four minutes* and 40 *seconds)*

Determining Trunk Group Blockage

Generally, you should use either the list measurements trunk-group or list performance trunk-group report for determining trunk group blockage. All of the appropriate tabulations are performed by the system and the results are displayed via the reports. However, a matter of completeness, the equations and an example are included.

To determine the Percent Blocking for one-way outgoing and two-way trunk groups, respectively, use the following equations:

One-Way Trunk Group (outgoing)

$$Percent\ Blocking = \left\{ \frac{Group\ Overflow*}{Total\ Seizures + Group\ Overflow} \right\} \ x \ 100\%$$

Two-Way Trunk Group

$$Percent\ Blocking\ =\ \left[\frac{Group\ Overflow\ *}{Total\ Seizures\ -\ Seizures\ +\ Group\ Overflow} \right] \ x\ \ 100\%$$

Example:

With the following data, determine the Percent Blocking of a two-way CO trunk group (refer to the Trunk Group Measurements Report, Screen 4-32, for details regarding trunk group number 1):

- Total Seizures = 280

- Incoming Seizures = 170

- Group Overflow = 6

Using the equation for two-way trunk groups, you can estimate average Percent Blocking as follows:

$$Percent\ Blocking\ =\ \left[\frac{6}{(280\ -\ 170)\ +\ 6} \right] \ x\ \ 100\ \ =\ 5.2\%$$

Determining the Number of Trunks Required for a Specified Grade of Service

For both stand-alone and last-choice trunk groups, you can use the trunk group peak traffic reports to determine the number of trunks that are required to provide a specified Grade of Service. The number of trunks required strictly depends on the Grade of Service that you want to provide.

> **Note:** Stand-alone and last-choice trunk groups do not reroute their blocked calls. As a contrast, Alternate Routing trunks do reroute their blocked calls.

The procedure for determining the optimal number of trunk members for a particular trunk group requires that you initially generate the appropriate reports and subsequently record the data on the Trunk Group Data Worksheets. What you are attempting to accomplish is to identify the peak hour and the traffic data for that hour. The **list measurements trunk-group yesterday scheduled** command will result in generating all of the necessary data on a daily basis. You can enter 20 weekdays of data on each Trunk Group Data Worksheet. Subsequently, you need only scan the worksheet in order to identify which measurement hour occurs most frequently. The most frequent is considered the peak hour. You should use the data for the identified peak hour that has the highest total usage to calculate the required number of trunks.

Example 1:

Assumptions

1. You have been obtaining data (daily) and recording that data on appropriately identified Trunk Group Data Worksheets.

2. 1300 is the hour listed most frequently, thus it is the peak hour (or, bouncing peak hour).

3. Screen 4-32 represents the data for the identified peak hour that had the highest total usage.

4. Trunk Group 1 has consistently shown a high percentage of outgoing blockage and is suspected of not providing the desired Grade of Service.

For two-way trunk groups, the equation for determining Calls Carried is as follows:

Calls Carried = Total Seize

Calls Carried = 280

For Trunk Groups Without a Queue

Calls Offered = Calls Carried + Group Overflow

For Trunk Groups With a Queue

Calls Offered = Calls Carried + Queue Overflow + Queue Abandoned

Since Trunk Group 1 has a queue, the equation for Calls Offered is as follows:

Calls Offered = Calls Carried + Queue Overflow + Queue Abandoned

Calls Offered = 280 + 0 + 1

Calls Offered = 281

The Average Holding Time is determined as follows:

$$Average\ Holding\ Time\ (in\ seconds) = \left[\frac{Total\ Usage\ (in\ CCS)}{Total\ Seizures} \right] \times 100$$

$$Average\ Holding\ Time\ (in\ seconds) = \left[\frac{656\ CCS}{280\ seizures} \right] \times 100$$

Average Holding Time (in seconds) = 234.29 seconds

Offered Load is defined as the number of calls that would have been in progress if there had been no blocking or delay. The Offered Load can be calculated as follows:

Offered Load = Average Holding Time (in seconds) x Calls Offered

$$Offered\ Load\ (in\ CCS) = \frac{234.29\ (in\ seconds)\ \times\ 281\ calls}{100\ seconds\ per\ CCS}$$

Offered Load (in CCS) = 658.35 CCS or 658 CCS

The calculated Offered Load is used with the Retrial Capacity tables to determine the number of trunks that are required to provide a specified Grade of Service. *DEFINITY® Communications System and System 75 and System 85— Traffic Theory,* 555-104-504, includes a chapter that contains the retrial tables.

The desired Grade of Service is dependent on the particular trunk type (e.g., CO, did, tie, FX, WATS, etc.) and the nature of the business that the trunk type supports. Generally, those trunk types that are least expensive (for example, CO) will be engineered for a 1 percent (P.01) Grade of Service. Those trunk types that are more expensive are engineered to provide from 2 percent to 5 percent (P.02 to P.05) Grade of Service.

> **Note:** A 1 percent Grade of Service means that the fraction of calls blocked during the identified bouncing peak hour, for stand-alone and last-choice trunk groups, should not exceed 1 percent.

Assuming that we desire a P.01 Grade of Service on Trunk Group 1, for the calculated Offered Load of 658 CCS, the Retrial Capacity tables in the *DEFINITY® Communications System and System 75 and System 85— Traffic Theory,* 555-104-504 indicate (under the column heading GROUP SIZE) that 29 trunks are required.

The number of currently functioning (or in service) trunks is calculated as follows:

# of In-Service Trunks = Trunk Group Size - Out of Service Trunks

# of In-Service Trunks = 23 - 0

# of In-Service Trunks = 23

Therefore, since 29 trunks are required but only 23 are currently in service, six additional trunks must be added to obtain the desired Grade of Service.

> **Example 2:**

> **Assumptions**
> 1. You have been obtaining data (daily) and recording that data on appropriately identified Trunk Group Data Worksheets.
> 2. 1300 is the hour listed most frequently, thus it is the peak hour (or, bouncing peak hour).
> 3. Screen 4-32 represents the data for the identified peak hour that had the highest total usage.
> 4. Trunk Group 4 indicates a higher than desired percentage of outgoing blockage.

For one-way outgoing trunk groups, the equation for determining Calls Carried is as follows:

Calls Carried = Total Seize

Calls Carried = 81

Since Trunk Group 4 does not have a queue, the equation for Calls Offered is as follows:

Calls Offered = *Calls Carried* + *Group Overflow*

Calls Offered = 81 + 5

Calls Offered = 86

The Average Holding Time is determined as follows:

$$\text{Average Holding Time (in seconds)} = \left[\frac{\text{Total Usage (in CCS)}}{\text{Total Calls}} \right] \times \frac{100 \text{ seconds}}{CCS}$$

$$\text{Average Holding Time (in seconds)} = \left[\frac{73 \text{ CCS}}{81 \text{ calls}} \right] \times \frac{100 \text{ seconds}}{CCS}$$

Average Holding Time (in seconds) =

Offered Load is defined as the number of calls that would have been in progress if there had been no blocking or delay. The Offered Load can be calculated as follows:

Offered Load = *Average Holding Time (in seconds) x Calls Offered*

$$\text{Offered Load (in CCS)} = \frac{90.12 \text{ (in seconds)} \times 86 \text{ calls}}{100}$$

Offered Load (in CCS) = 77.50 *CCS or* 78 *CCS*

The calculated Offered Load is used, with the Retrial Capacity tables to determine the number of trunks that are required to provide a specified Grade of Service.

Assuming that we desire a P.03 Grade of Service on Trunk Group 4, then for the calculated Offered Load of 78 CCS the Retrial Capacity tables in the *DEFINITY® Communications System and System 75 and System 85— Traffic Theory,* 555-104-504 indicate (under the column heading GROUP SIZE) that six trunks are required. The number of currently functioning (or in-service) trunks is as follows:

# of In-Service Trunks = *Trunk Group Size* - *Out of Service Trunks*

# of In-Service Trunks = 5 - 1

# of In-Service Trunks = 4

Therefore, since six trunks are required but only four are currently in-service, two additional trunks are needed to obtain the desired Grade of Service. The obvious options are (a) have the out-of-service trunk repaired and just add one new trunk, or (b) add two new trunks.

Example 3:

Assumptions

1. You have been obtainlng data (daily) and recording that data on appropriately identified Trunk Group Data worksheets.

2. 1300 is the hour listed most frequently, thus it is the peak hour (or, bouncing peak hour).

3. Screen 4-32 represents the data for the identified peak hour that had the highest total usage.

4. That Trunk Group 2 indicates a higher % ATB than desired.

Incoming trunk groups do not have queues. Therefore, from the switch perspective you cannot determine the number of calls that are blocked. But, in this case Total Usage is actually the Carried CCS. You can use the Carried CCS with the Retrial Capacity tables to determine the number of trunks that are required to provide a specified Grade of Service.

Assuming that you desire a P.05 Grade of Service on trunk group #2, then for a Carried CCS of 201 CCS the Retrial Capacity tables in the *DEFINITY® Communications System and System 75 and System 85— Traffic Theory,* 555-104-504 indicates (under the coIumn heading GROUP SIZE) that 10 trunks are required. The number of currently functioning (or in-service) trunks is as follows:

# of In-Service Trunks = Trunk Group Size - Out of Service Trunks

# of In-Service Trunks = 6 - 0

# of In-Service Trunks = 6

Therefore, since 10 trunks are required but only six are currently in service, four additional trunks are needed to obtain the desired Grade of Service. The solution is to add four trunk members to the trunk group.

CHAPTER 5. PROCESSOR OCCUPANCY REPORTS

The term Processor Occupancy (which is also referred to as just Occupancy) is defined as the percentage of time that the switch processor is busy performing call processing tasks, maintenance tasks, administration tasks, and the operating system support for each of these tasks. As a contrast, the percentage of time that the processorr is not used is referred to as Idle Occupancy.

The primary objectives of the processor occupancy reports are:

- To provide a summary of customer usage data so that processor occupancy and available capacity can be determined.

- To display, on a per time interval basis, the processor occupancy and associated calling rates. This facilitates the isolation of certain customer reported problems

There are four different processor occupancy commands. These commands are:

- **list   measurements   occupancy   summary**
- **list   measurements   occupancy   last-hour**
- **list   measurements   occupancy   busiest-intervals**
- **list   measurements   communications-links**

The first three commands provide processor occupancy data and associated call traffic for different measurement intervals. The last command provides a picture of the traffic data that is generated on each processor interface link.

The processor occupancy commands may be executed from all user logins. However, for most systems, the two primary users will be the customers' telecommunications manager and the service technician.

The type of traffic application can significantly affect processor occupancy. Therefore, for purposes of determining processor occupancy, the customers' calling traffic is defined as one of the following applications:

- General Business— the majority of applications. It does not include the impact of the Inbound Call Management (lCM)/Call Management System (CMS) or Adjunct Switch Applications Interface (ASAI)/Outbound Call Management (OCM) applications.

- lCM/CMS— only includes the impact due to the ICM traffic (using the ACD, Call Vectoring, ASAI, and CMS features).

- ASAI/OCM— only includes the impact due to ASAI/OCM applications.

   Note: A particular switch may have a traffic load that consists of any combination of the three defined applications.

Depending on the customers' specific application, the calling traffic may be as simple as a single switch with only CO trunks and analog sets or as complex as a switch in a multinode private network that uses both DCS and ISDN features and is configured with digital sets. In order to describe this wide range of traffic, four call categories are defined. The call catagories are:

- Intercom (INTCOM)— locally made and completed station-to-station calls.

- Incoming (INC)— calls which come into the switch over trunks from a CO. The following trunk types are considered public network incoming (CO, DID, FX, WATS, and ISDN-PRI calls that have a public network service type).

- Outgoing (OUT)— which exit the switch on trunks that terminate in a CO. The following trunk types are considered public network outgoing (CO, WATS, FX, and ISDN-PRI calls that have a public network service type).

- Private Network (PNET)— incoming and outgoing calls that are made over private network trunks. The following trunk types are considered private network (Access, CPE, DMI-BOS, RLT, Tandem, Tie, APLT, and ISDN-PRI that have a private network service type).

A customer's Usage Profile is defined as the percent mix of traffic from each of the four call categories. An example of one Customer Usage Profile would be: INTCOM = 34%, INC= 33%, OUT = 33%, and PNET = 0%. Obviously, many other different combinations are also possible.

Once the traffic application, usage profile, and certain feature use loading factors have been determined, it is then possible to calculate the Busy Hour Call Capacity (BHCC). The BHCC is a measure of the switch's capacity and is defined as the maximum number of completed calls the switch can support in an hour without degradation of service.

It should also be understood that, as a part of the RFP process, AT&T Marketing, when given a description of the customer's usage profile, traffic application, and certain feature use loading factors for the proposed switch, can calculate the theoretical maximum BHCC for the specified application. This enables the determination of whether the proposed switch will accommodate the traffic load. This number, the theoretical maximum BHCC, is an estimate and is referred to as the predicted maximum BHCC.

The Summary Command

This section describes the Summary Command and the Processor Occupancy Summary Report.

When to Use the Summary Command

The main-function of this command is to answer the question, "How much of the system is being used?". More specifically, this command should be used whenever you want to:

- Monitor resource usage

- Validate the customer's usage profile (for example, once the switch is installed and calling traffic is normal, you can use the summary reports to determine if the actual usage profile is the same as the estimated usage profile)

- Determine the idle occupancy and how much is available for growing the switch

- Determine the processor occupancy and call levels on an hourly basis for the last 24 hours

Processor Occupancy Summary Report

Command

To display the Processor Occupancy Summary Report, enter:

list measurements occupancy summary [print or schedule]

Options: There are no options for this command.

Screen

Screens 5-1, 5-2, and 5-3 show typical output for the Porcessor Occupancy Summary Report. The time and date that the report was requested are displayed above and to the right of the name of the report.

Table 5-A describes the data fields presented in the Processor Occupancy Summary Report.

```
  list measurements occupancy summary                          Page 1
                                            Date: 11:33 am TUE JUL 31, 1990

                    OCCUPANCY SUMMARY MEASUREMENTS

                    Peak Hour For Occupancy: 1400

  Meas   Stat   CP     Sm     Idle   Total   Total   Intcom  Inc     Out    Pnet
  Hour   Occ    Occ    Occ    Occ    Calls   Atmpt   Atmpt   Atmpt  Atmpt  Atmpt

  1000   5      57     16     22     4410    5705    1439    1461    1510   1395
  900    5      56     15     24     5010    6499    1637    1601    1383   1878
  800    5      56     15     24     3823    4969    1644    1620    626    1079
  700    5      58     15     22     1301    1691    421     361     384    525
  600    5      57     15     23     1287    1436    359     301     223    553
  500    5      58     15     22     1108    1294    324     298     268    404
  400    5      57     15     23     1267    1601    483     384     361    373
  300    5      58     16     21     1099    1312    329     205     301    477
  200    5      57     15     23     1049    1278    319     226     281    452
  100    5      58     15     22     701     901     267     206     246    182

                 press CANCEL to quit -- press NEXT PAGE to continue
```

SCREEN 5-1. Processor Occupancy Summary Report

```
 list measurements occupancy summary                          Page 2
                                          Date: 11:33 am TUE JUL 31, 1990

                    OCCUPANCY   SUMMARY   MEASUREMENTS

                    Peak Hour For Occupancy: 1400

 Mess   Stat   CP     Sm    Idle    Total   Total   Intcom Inc    Out    Pnet
 Hour   Occ    Occ    Occ   Occ     Calls   Atmpt   Atmpt  Atmpt  Atmpt  Atmpt

 0      5      58     15    22      761     989     247    193    251    298
 2300   5      58     16    21      1032    1341    335    371    301    334
 2200   5      57     16    22      1442    1875    468    451    421    535
 2100   5      58     15    22      2301    2991    747    710    753    781
 2000   5      57     15    22      2769    3509    877    932    748    952
 1900   5      58     15    22      2959    3846    961    991    928    966
 1800   5      57     15    23      2997    3896    974    1021   900    1001
 1700   5      59     15    21      4221    5487    1371   1520   745    1851
 1600   5      59     15    21      5001    6501    1625   2000   1223   1653
 1500   4      59     13    24      5241    6813    1703   2066   1165   1879

               press CANCEL to quit -- press NEXT PAGE to continue
```

SCREEN 5-2.   Processor Occupancy Summary Report *(continued)*

```
list measurements occupancy summary                              Page 3
                                           Date: 11:33 am TUE JUL 31, 1990

                       OCCUPANCY  SUMMARY  MEASUREMENTS

                       Peak Hour For Occupancy: 1400

Meas    Stat    CP      Sm      Idle    Total   Total   Intcom  Inc     Out     Pnet
Hour    Occ     Occ     Occ     Occ     Calls   Atmpt   Atmpt   Atmpt   Atmpt   Atmpt

1400    5       65      12      18      5392    7011    1752    2045    1203    2011
1300    5       64      14      17      5364    6973    1743    20S6    1283    1891
1200    5       58      15      22      5423    7049    1762    2070    1346    1871
1100    6       60      17      17      4399    5719    1430    2195    569     1525




Command  successfully  completed
enter   command:
```

SCREEN 5-3. Processor Occupancy Summary Report *(continued)*

TABLE 5-A. Processor Occupancy Summary Report

Field	Description
`Meas Hour`	*Measurement Hour.* The starting time (using the 24-hour clock) of the hour during which the data was recorded. Data is listed beginning with the most recently completed hour and preceding back for 24-hour intervals. Refer to the *DEFINITY® Communications System Generic 1 and Generic 3i— System Description,* 555-230-200 for additional details.
`Stat Occ`	*Static Occupancy.* The amount of time taken by high priority background processes in support of call processing, maintenance, and administration functions. Examples of this activity are high level sanity checks, system timing, polling of adjuncts, and operating system support. This also includes some call processing occupancy for BX.25 and ISDN-PRI traffic. **Note:** Static Occupancy remains fairly consistent in an idle switch. However, it increases as traffic is introduced into the system.
`CP Occ`	*Call Processing Occupancy.* The amount of time taken by call processing level processes. The processing of SMDR, DCS, ISDN, and other adjunct interfaces is also included in this level. Note that some occupancy due to BX.25 and ISDN-PRI call traffic is counted as static occupancy instead of call processing occupancy. **Note:** It is not desirable for any system to function at 100 percent Processor Occupancy. Rather, the `CP Occ` and `Stat Occ` fields should total no more than a maximum of 70 percent. By maintaining this 70 percent maximum limit, other system functions can be performed and bursts of caller activity can also be accommodated. **Suggested Action:** If the 70 percent maximum limit is exceeded, then you should take one or more of the following steps to lower Call Processing Occupancy: 1. If the users do not get a dial tone immediately, they should be encouraged to wait 10 to 15 seconds before going on-hook and off-hook again. 2. If the switch is part of a private network and is receiving a large amount of traffic from another switch in the private network, then investigate the possibility of reconfiguring the network. 3. Check the administration translation and verify that all digital sets, which are administered with display modules, actually have display modules. For those sets that do not have display modules, you should change the administration translations to indicate that the digital set does not have a display module. 4. Check the hardware error log for high levels of maintenance activity.

TABLE 5-A *(continued).*
Processor Occupancy Summary Report

Field	Description
`Sm Occ`	*System Management Occupancy.* The amount of time taken by lower priority activities such as administration and maintenance command processing, maintenance activity, error logging, and Light-Emitting Diode (LED) audits. Refer to the *DEFINITY® Communications System Generic 1 and Generic 3i— System Description,* 555-230-200 for additional details.
`Idle Occ`	*Idle Occupancy.* The amount of time that the processor is unused. Care must be taken in using this number. As extensions are added and as features are enabled, the amount of system maintenance required also increases. Therefore, not all of the idle occupancy can be allocated to call processing. But, a certain capacity must be held in reserve so that the switch can accommodate bursts of calling activity. **Specifically, the AT&T recommendation is that Idle Occupancy should not go below 15 percent for a sustained period.**
`Total Calls`	*Total Calls.* The total number of calls completed during the listed hour. Calls are counted in the time interval they are answered and not in the time interval they are dropped. Therefore, a call that starts in one time interval and ends in another is counted only in the time interval where it originates.
`Total Atmpt`	*Total Attempts.* The number of call attempts made during the measurement interval. The following occurrences count as an attempt: • A user lifts the station handset and hangs up before dialing any digits (off-hooks). • A user lifts the station handset, dials the destination number, the far end rings but does not answer, and the user hangs up (no answer). • A user lifts the station handset, dials the destination number, and the fa rend is busy. • A user places a call that is answered by the dialed number. • A user conferences a second party onto the call. • An incoming trunk seizure occurs. • Maintenance requests that an outgoing trunk be seized. **Note:** Mathematically, the `Total Atmpt` field is the total of the Intcom, Inc, Out and Pnet attempts.

TABLE 5-A *(continued).*
Processor Occupancy Summary Report

Field	Description
`Intcom Atmpt`	*Intercom Attempts.* This field includes the sum of two types of calls. The first type is extension-to-extension calls on the same switch. The second type is partially completed calls where a local extension goes off-hook and then hangs up before the call is answered. This includes both busy and no-answer calls.
`Inc  Atmpt`	*Incoming Attempts.* The number of incoming trunk seizures from public network facilities.
`Out  Atmpt`	*Outgoing Attempts.* The number of outgoing trunk seizures that are made over public network facilities.
`Pnet  Atmpt`	*Private Network Attempts.* The number of incoming and outgoing seizures that are made over private network facilities. Note that a tandem call is counted as two private network attempts, since it includes both incoming and outgoing trunk seizures. **Note:** The determination of whether a call is over public network or over private network facilities depends on the trunk type (for ISDN-PRI facilities it is also dependent on the service type).

The Last-Hour Command

This section describes the Last-Hour Command and the Processor Occupancy Last-Hour Measurements Report.

When to Use the Last-Hour Command

The main function of the **last-hour** command is to:

- Provide a detailed view of the occupancy levels for the last hour
- Identify potential load-related problems that may have occured during the last hour

Processor Occupancy Last-Hour Measurements Report

Command

To display the Processor Occupancy Last-Hour Report, enter:

list measurements occupancy last-hour [print or schedule]

Options: There are no options for this command.

Screen

Screens 5-4 and 5-5 show typical output for the Processor Occupancy Last-Hour Measurements Report. The time and date that the report was requested are displayed above and to the right of the name of the report.

```
  list measurements occupancy last-hour                           Page 1
                                             Date:   1:08 pm TUE JUL 31, 1990


                        OCCUPANCY LAST-HOUR MEASUREMENTS



  Meas   Stat   CP    Sm    Idle   Total   Total   Intcom  Inc    Out    Pnet
  Min    Occ    Occ   Occ   Occ    Calls   Atmpt   Atmpt   Atmpt  Atmpt  Atmpt

  13:06  4      57    11    28     215     279     69      77     74     59
  13:03  4      57    13    26     224     291     75      78     74     64
  13:00  4      54    13    29     217     282     68      79     79     57
  12:57  4      53    14    29     219     284     71      80     75     58
  12:54  4      55    13    28     228     296     74      73     64     85
  12:51  5      57    16    22     232     301     75      79     60     87
  12:48  6      61    15    18     227     295     73      78     65     79
  12:45  6      65    15    14     219     284     71      71     64     78
  12:42  6      61    17    16     240     312     78      82     69     83
  12:38  5      57    16    22     239     310     77      79     66     88
  12:35  6      60    15    19     241     313     78      81     64     90
  12:32  6      59    16    19     223     281     72      75     64     70


            press CANCEL to quit -- press NEXT PAGE to continue
```

SCREEN 5-4. Processor Occupancy Last-Hour Measurements Report

```
list measurements occupancy last-hour                           Page 2
                                      Date:   1:08 pm TUE JUL 31, 1990


                   OCCUPANCY  LAST-HOUR  MEASUREMENTS

Meas    Stat   CP     Sm    Idle    Total   Total   Intcom Inc     Out    Pnet
Min     Occ    Occ    Occ   Occ     Calls   Atmpt   Atmpt  Atmpt  Atmpt  Atmpt


12:29 6        57     15    22      191     248     62     66      64     56
12:26 5        59     15    21      187     243     60     54      56     73
12:23 4        57     14    25      177     230     57     61      54     58
12:21 6        69     14    11      221     287     71     75      67     74
12:18 5        66     14    15      225     292     73     77      74     68
12:15 5        63     14    18      224     291     72     76      76     67
12:12 5        57     15    23      219     284     71     76      64     73
12:09 5        57     13    25      223     289     72     74      64     79


Command successfully completed
enter  command:
```

SCREENS 5-5. Processor Occupancy Last-Hour Measurements Report *(continued)*

Note: The fields on this report are the same as the summary report, but the data is calcu-
lated over a 3-minute time interval. The **Meas Min** field represents the end of the
time interval.

Using the Last-Hour Report to Resolve Problems

The following list identifies some areas that may be pursued when investigating a problem that is believed to be processor occupancy (load) related.

1. For the identified 3-minute time interval (the time when the problem occurred), multiply the number in the **Total Calls** field by 20. If the product exceeds the advertised BHCC of the switch, then it is the load for this time interval that is causing the problem. If the product does not exceed the BHCC for the switch, then this load is not the problem.

2. For the identified 3-minute time interval (the time when the problem occurred), compare the number in the **Total Atmpt** field with the **Total Calls** field. If the number of attempts is significantly greater than the number of calls, then a significant percent of the occupancy is due to processing off-hook and on-hook stimuli that do not result in a completed call.

3. Examine the hardware error log for an excessive amount of maintenance activity (for example, a high number of errors).

4. Refer to the **list measurements communications-links** report to determine if any of the links are receiving an abnormal amount of traffic.

5. Check with the users to determine if a certain feature(s) was being used heavily during the identifed time interval.

6. Refer the problem to maintenance personnel with the suggestion that they check the software error log.

The Busiest-Interval Command

This section describes the Busiest-Interval command and the Processor Occupancy Busiest-Interval Measurement Report.

When to Use the Busiest-Interval Command

The main function of the **busiest-interval** command is to provide a long-term history report of potential performance-related problems.

> **Note:** This report provides a collection of the 20 busiest 3-minute intervals within the last two months. Therefore, this command is most useful to the service technician for investigating habitual performance problems or those problems that are not reported exactly when they happen.

Processor Occupancy Busiest-Interval Measurements Report

Command

To display the Processor Occupancy Busiest-Interval Measurements Report, enter:

list measurements occupancy busiest-interval [print or schedule]

Options: There are no options for this command.

Screen

Screen 5-6 and 5-7 shows typical output for the Processor Occupancy Busiest-Interval Measurements Report. The time and date that the report was requested are displayed above and to the right of the name of the report. The `Date of Occur` field identifies the month, day, and time of day for 20 of the busiest intervals (that is, the sum of **Stat Occ + CP Occ).** All other fields are described in Table 5-A.

```
list measurements occupancy busiest-interval                      Page 1
                                      Date:   1:28 pm TUE JUL 31, 1990


            OCCUPANCY   BUSIEST   3-MINUTE   INTERVALS   MEASUREMENTS


Date of       Stat   CP    Sm    Idle   Total   Total   Intcom  Inc    Out    Pnet
Occur         Occ    Occ   Occ   Occ    Calls   Atmpt   Atmpt   Atmpt  Atmpt  Atmpt


07/20/19:13 11      73    15    1      306     382     95      97     82     108
07/20/21:54 10      75    15    0      315     409     102     109    94     104
07/20/23:22 13      72    15    0      310     403     100     110    92     101
07/21/00:41 12      72    15    1      314     408     102     108    99     99
07/21/01:05 13      71    16    0      313     406     100     111    105    90
07/21/02:11 13      71    16    0      308     400     101     116    91     92
07/21/03:24 13      71    16    0      307     381     99      105    90     87
07/21/06:05 10      75    15    0      313     406     100     107    92     107
07/21/10:10 12      71    15    0      310     403     95      106    104    98
07/21/21:03 13      71    16    0      329     422     100     111    107    104
07/21/22:24 12      71    17    0      314     408     96      117    97     98
07/21/23:49 13      70    17    0      311     391     94      105    100    92


            press CANCEL to quit -- press NEXT PAGE to continue
```

SCREEN 5-6. Processor Occupancy Busiest-Interval Measurements Report

```
list measurements occupancy busiest-interval                    Page 2
                                       Date:  1:29 pm TUE JUL 31, 1990

            OCCUPANCY  BUSIEST  3-MINUTE  INTERVALS  MEASUREMENTS

Date of      Stat   CP    Sm    Idle   Total  Total   Intcom Inc   Out   Pnet
Occur        Occ    Occ   Occ   Occ    Calls  Atmpt   Atmpt  Atmpt Atmpt Atmpt

07/22/01:14 13      70    17    0      308    400     101    106   91    102
07/22/05:20 12      72    16    0      309    405     102    111   94    98
07/20/07:12 13      72    15    0      307    401     100    110   98    93
07/21/08:06 13      71    16    0      310    407     101    191   91    116
07/21/10:53 11      73    15    1      315    409     101    112   97    99
07/21/20:02 4       81    12    3      321    435     108    1112  96    119
07/21/14:52 9       79    12    0      323    421     92     118   105   106
07/21/11:19 8       80    12    0      211    274     94     93    51    36


Command successfully completed
enter  command:
```

SCREENS 5-7. Processor Occupancy Busiest-Interval Measurements Report *(continued)*

Note: The fields on this report are the same as on the summary report. However, the data
is calculated over 3-minute intervals rather than 1-hour intervals.

Using the Busiest-Interval Report to Resolve Problems

The following list identifies some areas that may be pursued when investigating a problem that is believed to be processor occupancy (load) related.

1. For the identified 3-minute time interval (the time when the problem occurred), multiply the number in the **Total Calls** field by 20. If the product exceeds the advertised BHCC of the switch, then it is the load for this time interval that is causing the problem. If the product does not exceed the BHCC for the switch, then this load is not the problem.

2. For the identified 3-minute time interval (the time when the problem occurred), compare the number in the **Total Atmpt** field with the **Total Calls** field. If the number of attempts is significantly greater than the number of calls, then a significant percent of the occupancy is due to processing off-hook and on-hook stimuli that do not result in a completed call.

3. Examine the hardware error log for an excessive amount of maintenance activity (for example, a high number of errors).

4. Refer to the **list measurements communications-links** report to determine if any of the links are receiving an abnormal amount of traffic.

5. Check with the users to determine if a certain feature(s) was being used heavily during the identified time interval.

6. Refer the problem to maintenance personnel with the suggestion that they check the software error log.

After a serious performance problem has been detected and corrected, you can execute the **clear measurements occupancy busiest-intervals** command and clear the log of busiest entries. This allows attention to be focused on any current performance problems.

> **Note:** The **clear measurements occupancy busiest-intervals** command should only be used to clear out data from received problems.

The Communications-Links Command

This section describes the Communications-Links Command and the Processor Occupancy Communications Link Measurements Report.

When to Use the Communications-Links Command

The main function of the **communications-links** command is to:

- Obtain a report that facilitates the monitoring of link traffic

- Determine if it is necessary to perform load balancing

- Identify defective processor interface link(s)

Note: The three processor occupancy commands described earlier may (depending upon the application) indicate that the switch is running at capacity, in keeping with user perceptions. However, these commands, with the exception of pointing to a call overload, do not provide any extra information as to why it is running at capacity. This command provides additional insight into how the processor interface links affect occupancy (for example, link overload, link transmission problems, etc.).

Processor Occupancy Communications Link Measurements Report

Command

To display the Processor Occupancy Communications Links Measurements Report, enter:

list measurements communications-links [print or schedule]

Options: There are no options for this command.

Screen

Screens 5-8 and 5-9 show typical output for the Pocessor Occupancy Communications Links Measurement Report. The time and date that the report was requested are displayed above and to the right of the name of the report. Table 5-B describes the data fields presented in Screens 5-8 and 5-9.

```
  list   measurements   communications-links                    Page 1
                                          Date:   1:55 pm TUE JUL 31, 1990


                        COMMUNICATIONS   LINK   MEASUREMENTS


   Meas      Link      Link      Link      Link      Link      Link      Link      Link
   Hour      1         2         3         4         5         6         7         8


   1200      10471     576       24        4         0         40        2         0
   1100      13764     612       24        14        0         313       4         0
   1000      12217     550       24        4         0         36        9         0
   900       12365     601       26        4         0         32        2         0
   800       12630     559       28        4         0         36        4         0
   700       12714     412       24        4         0         36        4         0
   600       12531     299       24        4         0         40        4         0
   500       12407     352       24        4         0         42        2         0
   400       12173     311       34        4         0         32        2         0
   300       12121     301       24        4         0         36        4         0
   200       12561     412       24        4         0         36        4         0
   100       12501     478       24        4         0         36        2         0


               press CANCEL to quit -- press NEXT PAGE to continue
```

SCREEN 5-8. Processor Occupancy Communications Link Measurements Report

```
list measurements communications-links                          Page 2
                                            Date:   1:55 pm TUE JUL 31, 1990


                    COMMUNICATIONS   LINK   MEASUREMENTS


Meas      Link      Link      Link      Link      Link      Link      Link      Link
Hour      1         2         3         4         5         6         7         8


0         12460     345       28        4         0         44        4         0
2300      12413     301       28        4         0         44        4         0
2200      12313     267       24        4         0         26        4         0
2100      12526     472       26        4         0         32        4         0
2000      12297     376       71        4         0         36        4         0
1900      12330     321       24        13        0         32        4         0
1800      12210     283       24        4         0         36        2         0
1700      12549     356       24        4         0         40        2         0
1600      12361     519       34        4         0         23        2         0
1500      12384     494       24        4         0         29        2         0
1400      12422     0         24        4         0         16        2         0
1300      12318     0         26        4         0         32        2         0


Command successfully completed
enter   command:
```

SCREEN 5-9. Processor Occupancy Communications Link Measurements Report *(continued)*

It should be realized that the Processor Occupancy Communications Link Measurements Reports for each customer application will vary significantly since a particular link on one switch may serve a different function than the same link for another switch. Furthermore, what is considered to be normal link traffic for one service (for example, DCS) may vary widely from what is considered to be normal link traffic for another service (for example, CMS). Therefore, it is recommended that the customer obtain a printed report of what is deemed to be normal traffic (for each switch) and use that report for comparison purposes.

This report is of significant value in determining the long term impact that processor link traffic has on processor occupancy. The report can also be used to identify certain types of link failure (for example, total failure at 1400 hours on link 2 of Page 2). However, since the report summarizes data at 1-hour time intervals, some types of intermittent problems are not easily recognized with this report. Intermittent transmission problems maybe more easily identified by reviewing the software error log.

TABLE 5-B. Communication Link Measurements Report

Field	Description
`Meas Hour`	*Measurement Hour.* The starting time (using the 24-hour clock) of the hour during which the data was recorded. Data is listed beginning with the most recently completed hour and preceding back for 24-hour intervals.
`Link #`	The links are identified by numbers one through eight. The numbers in each column represent the number of messages traversing the link Once a link is established and traffic begins flowing over it, the messages are counted automatically: no command is required.

Mapping Links to Applications

Command

To see what applications are running on the links, enter:

display communications-interface links

Screen

Screen 5-10 shows he applications used by each link for a sample configuration in which BX25 is using links 1,2,3, and 8.

For a detailed explanation of this screen, refer to the *DEFINITY® Communications System Generic 3i— Implementation,* 555-230-650.

```
display communication-interface links          5/13/91 Page 1 of 1    SPE A
                         INTERFACE    LINKS

              Est    PI               Destination    DTE/
Link   Enable  Conn    Ext  Prot       Digits    Brd    DCE Identification
1:       n      Y     200  BX25        160               DTE
2:       n      Y     201  BX25        276               DTE cms link
3:       Y      n     10   BX25        101               DTE
4:       Y      Y     211  ISDN                  2B10        conn to v4d3
5:       Y      Y     216  ISDN                  2B14        conn to v4d3
6:       Y      Y     217  ISDN                  2B15        conn to v4d3
7:       Y      Y     218  ISDN                  2B05        dcs trnk 2 v5d1
8:       Y      Y     219  BX25                  2BO5   DCE dcs link 2 v5d1
```

SCREEN 5-10. Interface Links Report

Data Analysis

Validating the Data

The following guidelines are intended to show an easy method for determining whether currently reported data is acceptable or not. These guidelines represent the minimum that you should do to verify that the recorded measurement values are consistent with expected and historic values. You should perform additional checks as necessary.

To check the acceptability of hourly data, verify that the system clock has not been changed during the measurement hour. If the system clock has been changed, the **Minutes** field will display double asterisks (for example, **11:****) and all other fields (for the indicated time interval) will display **0** .

During a partial system reset (for example, Warm, Cold 1, or Cold 2) the measurement data is retained for the affected time interval. However, during a full system reset (for example, 4 or 5) the measurement data is not retained for the affected time interval.

Analyzing the Data

In order to calculate the measured BHCC, you should use the summary report to collect measurement data. Subsequently, you should record data for the identified peak hour on Worksheet 5. After recording four weeks of data, you should calculate the column averages and record the averages in the appropriate row and column at the bottom of Worksheet 5.

> **Note:** Before recording each day's data you should review the whole day in order to ensure that the peak hour is not the result of an abnormality (for example, caused by a snow storm, etc.). If you determine that the peak hour is the result of an abnormality, then you should disregard that day's data. Additionally, the weeks that you select to record data from should NOT be times of slack business activity. Furthermore, the weeks should NOT be four consecutive weeks; but should be the weeks from two or more months of normal business activity.

Worksheet 5 in Appendix A provides space to record seven-day-per-week data. If the customer's application is a five-day operation, then data should only be recorded for the five days (Monday through Friday). When averaging the data, care should be exercised to only divide by the number of days that data was actually recorded (for example, 20 or 28).

Procedures for Calculating Processor Occupancy

Step 1.   Is there available sufficient Processor Occupancy to grow the switch? If the sum of Call Processing Occupancy plus Static Opccupancy is greater than 70 percent, there is no room to grow and no need to complete Steps 2 through 7. However, if the sum of Call Processing Occupancy plus Static Occupancy is less than 70 percent, continue with the following steps.

Step 2.   Calculate the Usage Profile.

Use the four-week average data (which is obtained from your completed copy of Worksheet 5) to solve the following equations.

$$\% \ INTCOM = \frac{Int \ \ Atmpt}{Total \ \ Atmpt} \quad x \quad 100$$

$$\% \ INC = \frac{Inc \ \ Atmpt}{Total \ \ Atmpt} \quad x \quad 100$$

$$\% \ OUT = \frac{Out \ \ Atmpt}{Total \ \ Atmpt} \quad x \quad 100$$

$$\% \ PNET = \frac{Pnet \ \ Atmpt \ - \ Tand \ \ Calls}{Total \ \ Atmpt} \quad x \quad 100$$

> **Note:** Tand Calls is the number of Private Network tandem calls. This value is not provided on the report and should be estimated.

Step 3.   Determine the Traffic Application.

Is the traffic application ICM/CMS or ASAI/OCM?

You can make this determination based on the type of business that is served by the switch, the percentages of incoming and outgoing traffic, and personal knowledge of which features are being used. For example, a General Business application will have a more even (in terms of incoming, outgoing, and intercom) distribution of traffic. An ICM/CMS application will have a high percentage of incoming calls and also provide those features which are specific to ACD or Call Vectoring. Some of thse include agent and trunk tracking capability (for example, CMS or BCMS), recurring announcements, etc.

If the switch supports more than one traffic application (for example, ICM/CMS as the primary and General Business as the secondary), then the processor occupancy required for the primary application must be determined first and the remainder is available for the secondary application.

Note: This document describes the method for calculating the BHCC for a simple General Business traffic application. Those switches that provide the DCS, CMS, BCMS, and/or ISDN-PRI feature(s) are termed complex and the Design Center must be consulted in order to calculate their BHCC. All ICM (ACD and Call Vectoring), ASAI/OCM, and vectoring and interflow/traffic applications are also termed complex and currently are only evaluated by the National Engineering Center (NEC). The NEC requires certain input parameters (which are identified on Worksheet 6) before it can perform any evaluation.

Step 4. Determine the maximum number of calls the switch should be able to complete in one hour.

In order to make this determination, you should select the best match for the actual usage profile (the four percentage numbers that were calculated in Step 1) with the associated percentage provided under "Usage Profile" in Table 5-C. Once the best match has been determined, you can read across to the BHCC columns. Notice that the three columns under the BHCC heading correspond to different mixes of loading factors. Select the appropriate column and BHCC number.

Note: The values for BHCC represent the maximum number of calls that the switch should be able to complete provided that the switch is used in the normal manner. The normal manner assumes that the users are not heavy feature users, that most attempted calls result in a completed call, and that calls complete in the same proportion as call attempts are made.

Step 5. Determine the normal calling rate for the given level of occupancy.

(a) First, calculate how many completed calls the switch should be making for the given level of occupancy. This number is referred to as Calls Predicted.

$$Calls\ Predicted\ =\ \frac{Stat\ Occ\ +\ CP\ Occ}{70}\ \times\ BHCC$$

Notes: 1) The divisor number, 70, is the constant from Step 1 and refers to the percentage of the processor used by call processing.

2) The number for BHCC is the number that is obtained from Table 5-C (see Step 4).

(b) Second, compare the Calls Predicted number to the four-week aver-
age Total Calls field on Worksheet 5.

$$Calls\ Predicted\ <\ Total\ Calls$$
$$or$$
$$Calls\ Predicted\ >\ Total\ Calls$$

If the Calls Predicted number is less than the Total Calls number, then
either the customer has a low feature usage rate or is completing
more than 170 percent of calls. Therefore, if additional capacity is used
in the same way, the following predictions should provide reliable
results.

If the Calls Predicted number is greater than the Total Calls number,
then either the customer has a high feature usage rate or is complet-
ing less than 70 percent of calls. Therefore, care must be taken in
predicting how many additional calls can be supported.

> **Note:** If the Calls Predicted number equals or approximately
> equals the Total Calls number then the customer is using
> the switch in a typical manner.

Step 6. Determine how many additional calls the switch can complete.

The number of additional calls can be calculated with the following equation.

$$Number\ of\ Additional\ Calls\ =\ \frac{Total\ Calls\ (4\ Week\ Avg)}{Stat\ Occ\ +\ CP\ Occ}\ x\ (Idle\ Occ\ -\ 15)$$

Step 7. Determine how many additional extensions can be added.

$$Additional\ Extensions\ =\ \frac{Number\ of\ Additional\ Calls}{Average\ Number\ of\ Calls\ per\ Extension}$$

> **Note:** The Average Number of Calls per Extension depends on the
> traffic application and other customer-specific operating tech-
> niques. If this measurement is not known, then you may use 4.05
> (which is a typical figure for a General Business traffic applica-
> tion).

TABLE 5-C. Maximum BHCC for Several User Configurations

Usage Profile				BHCC		
% INTCOM	% INC	% OUT	% PNET	No Loading Factors	SMDR	SMDR & AUDIX
34	33	33	0	10000	9100	7300
10	10	00	0	9400	8100	7600
10	80	10	0	11000	9700	7300
25	25	25	25	10600	9300	7600
16	17	17	50	11100	9600	8000
10	10	10	70	11600	9800	8200

The maximum usage configurations depicted in Table 5-C and listed in order are:

- Standard usage without private networking (for example, 34% INTCOM, 33% INC, 33% OUT, O% PNET)

- Heavy outgoing usage without private networking

- Heavy incoming wage without private networking

- Standard usage with light private networking

- Standard usage with medium private networking

- Standard usage with heavy private networking

> **Note:** This mix assumes usage of 40 percent analog stations, 20 percent Digital Communications Protocol (DCP) non-display stations, and 40 percent DCP display stations.

CHAPTER 6. SECURITY VIOLATIONS REPORTS

This section applies only to the G3i switch. It describes the Security Violations Measurement Report and the Security Violations Status Report. These reports show any invalid login or remote access barrier code attempts.

Background Information

Information about invalid login attempts is collected at two levels:

- On an immediate basis, when an invalid login attempt or remote access barrier code attempt is made, the Security Violations Notification (SVN) feature can be used to send a priority call to a designated referral point (attendant console or station equipped with a display module) so that there is some chance of apprehending the violator during the attempted violation. Upon notification, the security administrator can request the Security Violations Status Report which will show details of the last sixteen security violations of each type.

- On a historical basis, the number of security violations of each type are collected and reported in the Security Violations Measurements Report. This report shows summary information since the last time that the counters were reset by the **clear measurements security-violations** command or since system initialization. It does not show details of the individual security violations.

The Security Violations Status Report and the Security Violations Measurement Report (historical) are available in all systems without special prerequisites.

Security Violations Measurements Report

The system generates a Security Violations Measurements Report that identifies the ports from which invalid attempts and invalid barrier code attempts are made. This is a historical report showing summary information since the last time that the counters were reset. The system monitors the following ports:

- System administration terminals or G3-MT connected within 50 feet of the system cabinet

- AT&T TSC

- Network control dial-up ports, which are the data channels associated with the network control circuit pack. These data channels can be used for an on-premises remote terminal that is more than 50 feet away from the system cabinet.

Commands

Commands are available for displaying and clearing the Security Violations Report. To display the report, enter:

list measurements security-violations [print] or [schedule]

To reset all counters of the Security Violations Measurements Report to zero, enter:

clear measurements security-violations

> **Note:** Security measurements are accumulated until they are cleared.

Options: The options **print** and **schedule** apply to this report.

Screen

Screen 6-1 is a typical screen for the Security Violations Measurements Report. The date and time the report was requested are displayed to the right, above the title of the report. Table 6-A describes the data fields presented in the Security Violations Measurements Report.

```
list measurements security-violations                          SPE A

                                     Date: 4:25 pm FRI MAY 18, 1990

                  SECURITY   VIOLATIONS   MEASUREMENTS

          Number of Invalid Login Attempts
                        Maintenance EIA Port: 0
                     Maintenance Dial-up Port: 1
                 Network Control Dial-up Ports: 5

          Number of Invalid Barrier Codes: 5

              Counted Since: 8:35 am MON MAY 14, 1990


Command successfully completed
enter command:
```

SCREENS 6-1. Security Violations Measurements Report

TABLE 6-A.   Security Violations Measurements Report

Field	Description
`Number of Invalid Login Attempts`	Identifies the number of failed login attempts measured by the system. The number of failed attempts is given for each of the following device ports: • Maintenance EIA Port (a terminal within 50 feet of the switch; for example, a system administration terminal or G3-MT) **Suggested Action:** 1. Generally, the maintenance EIA port will only be accessed from a terminal that is physically located within the switch equipment room. This room should have restricted access. Therefore, this type of security violation should not be a problem. If the report indicates that unexplained invalid login attempts have occurred on this port, then consider the existing key and lock arrangement compromised and have the lock changed. 2. You should change the password for the maintenance login. • Maintenance Dial-up Port (AT&T access, for example, INADS or TSC) **Suggested Action:** If the report indicates that unexplained invalid login attempts have occurred on this port, then you should change the password for the maintenance login. • Network Control Dial-up Ports (remote terminal greater than 50 feet from the switch) **Background Information:** The Network Control channels may be configured with data modules and accessed remotely. The dia-in number is referred to as the Remote Access Extension Number. Each Remote Access Extension Number can be administered with a Barrier Code. Both are unpublished and must be kept confidential. If they are improperly disclosed, the potential for abuse exists. **Suggested Action:** If the report indicates invalid login attempts for the Network Control Dial-up Ports, then you should immediately change both the Remote Access Extension Number and Barrier Code number. Furthermore, whenever distributing the new numbers, you should reemphasize the confidential nature of these numbers.

TABLE 6-A *(continued).*
Security Violation Measurements Report

Field	Description
`Number of Invalid Bar-rier Codes:`	Identifies the number of invalid barrier codes dialed when attempting to access the system via the Remote Access feature. **Suggested Action:** Refer to the "Suggested Action" for Network Control Dial-up Ports and to the *DEFINITY® Communications System Generic 1 and Generic 3i— Feature Description,* 555-230-201.
`Counted Since:/System Initializa-tion:`	Identifies the time the security violation measurements were last cleared with the **clear measurements security-violation** command. If the system has been initialized and the **clear measurements security-violation** command has not been executed, the words `System Initialization` will appear instead of `Counted Since.` When the system is reset, rebooted, or goes through any form of re-initialization, the reports are automatically cleared and start accumulating new data.

Security Violations Status Report

The Security Violations Status Report provides current status information for invalid system administration terminal or G3-MT login or Remote Access (barrier code) attempts. Invalid system administration terminal or G3-MT login attempts will log the time the violation occurred, the login entered, the port that was accessed during the failed login attempt, and the extension assigned to the port (if available). Invalid barrier code attempts will log the time the violation occurred, the number of the trunk group that was accessed, the trunk group member number, and the Remote Access extension. A total of 16 entries will be maintained for each type of invalid access (login or remote access). The data displayed by the monitor command is refreshed every 30 seconds.

For further information, refer to the *DEFINITY® Communications System Generic 3i— Implementation,* 555-230-650.

Command

To display the Security Violations Status Report, enter:

monitor security-violations [print]

Options: There is one option for this command: **print.** If you enter this option, the Security Violations Status Report will be printed.

Screen

Screen 6-2 is a typical screen for the Security Violations Status Report. The date and time the report was requested are displayed to the right, above the title of the report. Table 6-B describes the data fields presented in the Security Violations Status Report.

```
monitor security-violations                                        SPE A


                                       Date: 4:25   FRI  MAY 18 1990


                        SECURITY VIOLATIONS STATUS
                                         .

    SYSTEM MANAGEMENT VIOLATIONS          REMOTE ACCESS VIOLATIONS
Time           Login     Port      Ext  Time           TG No   Mbr Ext

05/04 15:22 testid     NET- 1     85453 05/03  21:14   3       SO 81111
05/04 15:23 testit     NET- 1     85453 05/04 22:10 21         43 83333
05/04 15:25 testx      NET-1      85453 05/04 22:13 21         43 83333
05/05 04:30 aaaaaaaa   NET-2      85454 05/04 22:15 21         43 83333
05/05 04:31 aaaaaaab   NET-2      85454
05/05 04:33 aaaaaaac   NET-2      85454
05/05 10:21 root       EPN
05/05 10:22 root       EPN
05/05 10:23 root       EPN
05/05 11:45 init       MGR1
05/05 11:46 init       MGR1
05/05 11:48 init       MGR1



Command successfully completed
enter  command:
```

SCREENS 6-2. Security Violations Status Report

TABLE 6-B. Security Violations Status Report

Field	Description
Date: and Time	The date and time of the invalid login attempt.
Login	The login ID used in the invalid login attempt. The failure may have been due to an invalid password, but the login (valid or not) is listed.
Port	The port on which the invalid loginn attempt was made. The following abbreviations are used:
	MGR1— The dedicated system administration terminal connection (the EIA connection to the Maintenance board)
	NET-n— The network controller dial-up ports
	EPN— The EPN maintenance EIA port
	INADS— The Initialization and Administration System (INADS) port
Ext	**EIA—** Other EIA ports The extension associated with the network controller dial-up ports. This field will otherwise be blank.
Date: and Time	The date and time of the remote access attempt.
TG No	The trunk group number associated with the trunk used in the invalid remote access attempt.
Mbr	The trunk group member number of the trunk used in the invalid remote access attempt.
Ext	The Remote Access extension.
	Suggested Action: 1. For login security violations where the port is known, busy it out to restrict access. If if can be determined to which login access is being attempted, change the password for that login. 2. For Remote Access violations, change the remote access barrier code and the remote access extension.

CHAPTER 7. REFERENCES

The following is an abbreviated listing of Generic 1 and Generic 3 documents. Included is a brief description of each document in the list. User instructions are also available for all terminals used with the systems.

To order copies of any of these documents, refer to the address on the back of the title page.

Business Communications Systems Publications Catalog   **555-000-010**
Provides a list of publications that support AT&T business communications systems. Also provides a brief description of each publication listed.

DEFINITY® Communications System and System 75 and System 85—   **555-015-201**
Terminals and Adjuncts—Reference
Provides concise physical and functional descriptions of the peripheral equipment that can be used with DEFINITY Generic 1, DEFINITY Generic 2, System 75, and System 85. It is intended as an aid for both AT&T and customer personnel in selecting appropriate components for these systems and in training and management.

DEFINITY® Communications System and System 75 and System 85—   **555-025-101**
DS1/DMI/SDN-PRI—Reference
Provides a broad, but detailed, description of the DS1 Tie Trunk Service, DMI, and ISDN-PRI features. Introduces and defines concepts and terminology unique to DS1, DMI, and ISDN-PRI. Also includes applications, engineering procedures and considerations, cabling and connection arrangements, administration requirements, restrictions and limitations, etc.

DEFINITY® Communications System Generic 1 and Generic 3—Feature   **555-230-201**
Description
Provides a technical description of the system features and parameters. For each feature, the following information is provided:

- Limitations/considerations

- Feature interactions

- Administration requirements

- Hardware and software requirements

DEFINITY® Communications System Generic 1 and Generic 3—Console   **555-230-700**
Operations
Provides "how-to-operate" instructions for the attendant console. Serves as a reference when defining the console control keys and Incoming Call Identification requirements.

DEFINITY® Communications System Generic 1 and Generic 3—   **555-230-701**
Voice Terminal Operations
Describes all the voice features and provides the "how-to-operate" instructions for each voice terminal. Serves as a training guide for system users.

DEFINITY® Communications System Voice Terminal DocuMaster Kit   555-230-750
A multi-element kit for end users to provide them with the information they need to use their voice terminals. The kit includes:

- A "how-to-use" booklet with procedural instructions plus sample applications

- PC Phone Facts, an enhanced version of the Feature Facts programs available for other phone systems. This is a PC-based program compatible with MS-DOS® personal computers. It contains descriptions of all end-user features, operations of all features by type of terminal, and a file for customizing feature access codes.

- Selected sample copies of traditional voice terminal user guides

- A list of all available user guides, plus ordering information, for Generic 1 and Generic 3

- A camera-ready Quick Reference Card the customer can have reproduced which briefly outlines operation of the Hold, Conference, Transfer, and Drop features

- Line drawings of currentty available terminals which the customer can reproduce

- A registration card which the customer can send to the Customer Information Center to receive future program updates

DEFINITY® Communications System Generic 1 and Generic 3—   555-230-722
Automatic Call Distribution— Agent Instructions
Provides information for use by agents after training is completed. The various ACD features are described and the procedures for using them are provided in this document.

DEFINITY® Communications System Generic 1 and Generic 3—   555-230-724
Automatic Call Distribution— Supervisor Instructions
Provides information for use by supervisors after training is completed. The various ACD features are described and the procedures for using them are provided in this document.

DEFINITY® Communications System Generic 1 and Generic 3—   555-230-723
User's Guide— Hospitality Operations
Contains procedures for using the Hospitality Service of DEFINITY Generic 1 and Generic 3i. These services include a group of system-based features that support the lodging and health industries.

DEFINITY® Communcations System Genoric 1 and Generic 3—   555-230-104
Installation and Test
Provides the information necessary to perform the tasks of installing and testing the system's common equipment. Includes a description of the necessary tools and equipment.

DEFINITY® Communcations System Generic 1 and Generic 3i—   555-204-105
Maintenance
Provides the information necessary for monitoring, testing, and maintaining DEFINITY Generic 1 and Generic 3i. It is intended to cover many of the faults and troubles that can occur in the system.

DEFINITY® Communications System Generic 1 and Generic 3i—   **555-204-106**
Upgrades and Additions
Provides procedures and information required to upgrade from an earlier system to a DEFINITY
Generic 3i system and to make additions to an existing G3i system after the initial switch installa-
tion.

DEFINITY® Communications System Generic 1 and Generic 3— System   **555-230-200**
Description   .
Provides a technical description of the system and its hardware, environmental and space
requirements, and parameters.

DEFINITY® Communications System Generic 3i—   **555-230-650/650B**
Implementation
Provides the procedures and associated forms for collecting system and terminal software infor-
mation for G3i systems. This information is used to initialize the system using the DEFINITY
G3-MT. Customers automatically receive the *Blank Forms Package* (555-230-650B) with the
Implemenation Manual. The Blank Forms Package may also be ordered separately.

DEFINITY® Communications System Generic 1 and Generic 3—   **555-230-703**
Basic Call Management Operations
Describes all the features and provides "how-to-operate" instructions for the Basic Call Manage-
ment System (BCMS) feature.

DEFINITY® Communications System Generic 1 and Generic 3—   **555-230-500**
System Management
Describes administration terminal types, function keys, and other administration operations. Also
describes various administrative tasks such as logon/logoff, changing of password, remote
administration, etc.

DEFINITY® Communications System Generic 3— Call Vectoring Guide   **585-230-520**
The Call Vectoring Guide discusses how to write, use, and troubleshoot vectors, which are com-
mand sequences that process telephone calls in an Automatic Call Distribution (ACD) environ-
ment. The guide is organized into two parts: a step-by-step tutorial that illustrates how to write
and implement a basic vector; and a reference with detailed descriptions of the Call Vectoring
features, vector management, vector administration, adjunct routing, troubleshooting, and
interactions with management information systems (including the Call Management System).

DEFINITY® Communications System CallVisor™ ASAI—   **555-230-220**
Technical Reference
This manual is intended for applications designers to use in building and programming custom
applications and features using the Adjunct/Switch Application Interface.

DEFINITY® Communications System CallVisor™ ASAI—   **555-230-221**
Protocol Reference
This manual describes the layer 3 protocol by providing an understanding of the ISDN messages,
Facility Information Elements, and Information Elements. It is designed for the library or driver
programmer of an adjunct computer to use in creating the library of commands used by the appli-
cations programmer.

DEFINITY® Communications System Generic 3 Management   **585-229-201**
Applications—Station Provisioning
This manual includes procedures for setting up the PC, loading Generic 3 Management Applications software, and step-by-step bulk station administration procedures. It provides details on creating models and station detail record, auditing the data residing on the PC, and generating merged data from the PC to a System 75 R1V3, Generic 1, or Generic 3 System.

DEFINITY® Communications System Generic 3 Management   **585-229-202**
Applications—Operations
This manual includes initial PC setup procedures as well as detailed steps for the management of switch data for ongoing administration. Data management procedures include gathering switch data for custom reports or for exporting to other systems, making global changes, and preprocessing switch transactions.

DEFINITY® Communication System and System 75 and System 85—   **555-104-503**
Traffic Tables.
A compilation of the traffic tables and procedures used by traffic engineers and administrators to size trunk groups, ACD groups, and systems.

DEFINITY® Communications System and System 75 and System 85—   **555-104-504**
Traffic Theory
A description of traffic theory fundamentals for switching systems. Provides detailed technical traffic engineering methods for estimating the number of traffic sensitive facilities required in a system.

CHAPTER 8. ABBREVIATIONS AND ACRONYMS

AAR	Automatic Alternate Routing
AC	Alternating Current
ACA	Automatic Circuit Assurance
ACB	Automatic Callback
ACD	Automatic Call Distribution
ACU	Automatic Call Unit
ACW	After Call Work
AD	Abbreviated Dialing
ADU	Asynchronous Data unit
AE	Access Endpoint
AIM	Asynchronous Interface Module
ALM-ACK	Alarm Acknowledge
AMW	Automatic Message Waiting
AN	Analog
ANI	Automatic Number Identification
AOL	Attendant Offered Load
AP	Applications Processor
APLT	Advanced Private Line Termination
ARS	Automatic Route Selection
ASCII	American Standard Code for Information Interchange
ASAI	Adjunct Switch Applications Interface
ATB	All Trunks Busy
ATD	Attention Dial
AUDIX	Audio Information Exchange
AVD	Alternate Voice Data
AWT	Average Work Time
BCC	Bearer Capability Class
BCMS	Basic Call Management System
BCT	Business Communications Terminal
BHCC	Busy Hour Call Completions
BLF	Busy Lamp Field
BOS	Bit Oriented Signaling
BRI	Basic Rate Interface
BTU	British Thermal Unit
CACR	Cancellation of Authorization Code Request
CAG	Coverage Answer Group
CAMA	Centralized Automatic Message Accounting
CARR-POW	Carrier Port and Power Unit for AC Powered Systems
CA-TSC	Call Associated Temporary Signaling Connection
CAS	Centralized Attendant Service
CBC	Call-by-Call
CC	Country Code
CCIS	Common Channel Interoffice Signaling
CCITT	Consultative Committee for International Telephone and Telegraph
CCMS	Common Channel Message Set

CCS	Hundred Call Seconds
CCSA	Common Control Switching Arrangement
CDM	Channel Division Multiplexing
CDOS	Customer-Dialed and Operator Serviced
CDRR	Call Detail Recording and Reporting
CDRU	Call Detail Recording Utility
CEM	Channel Expansion Multiplex
CI	Clock Input
CMDR	Centralized Message Detail Recorder
CMS	Call Management System
CO	Central Office
COR	Class of Restriction
COS	Class of Service
CP	Circuit Pack
CPE	Customer Provided Equipment
CPN/BN	Calling Party Number/Billing Number
CPTR	Call Progress Tone Receiver
CRC	Cyclical Redundancy Checking
CSA	Canadian Safety Association
CSD	Customer Service Document
CSM	Centralized System Management
CSU	Channel Service Unit
CTS	Clear to Send
CWC	Call Work Codes
DAC	Direct Agent Calling
DC	Direct Current
DCE	Data Communications Equipment
DCP	Digital Communications Protocol
DCS	Distributed Communications System
DDC	Direct Department Calling
DDD	Direct Distance Dialed
DID	Direct Inward Dialed
DIOD	Direct Inward and Outward Dialing
DLC	Data Line Circuit
DLDM	Data Line Data Module
DMI	Digital Multiplexed Interface
DND	Do Not Disturb
DNIS	Dialed Number Identification Service
DOD	Direct Outward Dialed
DOSS	Delivery Operations Support System
DOT	Duplication Option Terminal
DPR	Dual Port RAM
DS1	Data Services Level 1
DSI	Digital Service Interface
DSU	Data Service Unit
DTDM	Digital Terminal Data Module
DTE	Data Terminal Euipment
DTGS	Direct Trunk Group Select
DTMF	Dual Tone Multifrequency

DTMR	Dual Tone Multi-Frequency Receiver
DXS	Direct Extension Selection
E&M	Ear and Mouth (Receive and Transmit)
EBCDIC	Extended Binary Coded Decimal Interexchange Code
ECC	Error Correct Code
EI	Expansion Interface
EIA	Electronic Industries Association
EMI	Electro-Magnetic Interference
EFP	Electronic Power Feed
EPN	Expansion Port Network
EPROM	Erasable Programmable Read Only Memory
EPSCS	Enhanced Private Switched Communications Services
ESF	Extended Superframe Format
ETN	Electronic Tandem Network
FAC	Feature Access Code
FAS	Facility Associated Signaling
FAT	Facility Access Trunk
FCC	Federal Communications Commission
FEAC	Forced Entry of Account Codes
FIC	Facility Interface Codes
FNPA	Foreign Numbering Plan Area
FRL	Facility Restriction Level
FX	Foreign Exchange
GPTR	General Purpose Tone Receiver
GRS	Generalized Route Selection
HNPA	Home Numbering Plan Area Code
IAS	Inter-PBX Attendant Service
IC	Inter-Cabinet
ICC	Inter-Carrier Cable
ICDOS	International Customer Dialed Operator Serviced
ICHT	Incoming Call Handling Table
ICI	Incoming Call Identifier
ICM	Inbound Call Management
IDDD	International Direct Distance Dialing
IE	Information Element
INADS	Initialization and Administration System
INS	ISDN Network Service
INWATS	Inward Wide Area Telephone Service
ISDN	Integrated Services Digital Network
ISN	Information Systems Network
ITP	Installation Test Procedures
IXC	Inter-Exchange Carrier
KBPS	Kilo-Bits Per Second

LAN	Local Area Network
LAPD	Link Access Procedure Data
LATA	Local Access and Transport Area
LDN	Listed Directory Number
LOS	Long Distance Service
LEC	Local Exchange Carrier
LED	Light-Emitting Diode
LSU	Local Storage Units
LWC	Leave Word Calling
MAP	Maintenance Action Process
MA-UUI	Message Associated User-to-User Signaling
M-Bus	Memory Bus
MBPS	Mega-Bits Per Second
MCC	Multi-Carrier Cabinet
MCS	Message Center Service
MDM	Modular Data Module
MDR	Message Detail Record
MET	Multibutton Electronic Telephone
MIM	Management Information Message
MIS	Management Information System
MISCID	Miscellaneous Identification
MMS	Material Management Services
MOS	Message Oriented Signaling
MS	Message Server
MSA	Message Servicing Adjunct
MPDM	Modular Processor Data Module
MTDM	Modular Trunk Data Module
MTP	Maintenance Tape Processor
MTT	Multi-Tasking Terminal
MWL	Message Waiting Lamp
NANP	North American Numbering Plan
NAU	Network Access Unit
NCA/TSC	Non-Call Associate/Temporary Signaling Connection
NCOSS	Network Control Operations Support Center
NCSO	National Customer Support Organization
NEC	National Engineering Center
NFAS	Non-Facility Associated Signaling
NID	Network Inward Dialing
NN	National Number
NPA	Numbering Plan Area
NPE	Network Processing Element
NQC	Number of Queued Calls
NSE	Night Service Extension
NSU	Network Sharing Unit
NXX	Public Network Office Code
OA	Operator Assisted
OCM	Outbound Call Management

OPS	Off-Premises Station
OQT	Oldest Queued Time
OSHA	Occupational Safety and Health Act
OSS	Operations Support System
OTQ	Outgoing Trunk Queuing
PBX	Private Branch Exchange
PC	Personal Computer
PCOL	Personal Central Office Line
PCOLG	Personal Central Office Line Group
PCM	Pulse Code Modulated
PCS	Permanent Switched Calls
PDM	Processor Data Module
PDS	Premises Distribution System
PE	Processing Element
PEC	Price Element Codes
PEI	Processor Element Interchange
PGN	Partitioned Group Number
PI	Processor Interface
PIB	Processor Interface Board
PL	Private Line
PMS	Property Management System
PN	Port Network
PPN	Processor Port Network
PRI	Primary Rate Interface
PSC	Premises Service Consultant
PSDN	Packet Switch Public Data Network
PT	Personal Terminal
PTC	Positive Temperature Coefficient
RAM	Random Access Memory
RBS	Robbed-Bit Signaling
RCL	Restricted Call List
RFP	Request For Proposal
RHNPA	Remote Home Numbering Plan Area
RLT	Release Link Trunk
RNX	Private Network Office Code
ROM	Read Only Memory
RPN	Routing Plan Number
RSC	Regional Support Center
SABM	Set Asynchronous Balance Mode
SAKI	Sanity and Control Interface
SAT	System Access Terminal
SCC	Single Carrier Cabinet
SCI	Switch Communications Interface
SCO	System Control Office
SDN	Software Defined Network
SDDN	Software Defined Data Network
SID	Station Identification Number

SIT	Special Information Tones
SMDR	Station Message Detail Recording
SPE	Switch Processing Element
SPID	Service Profile Identifier
SSI	Standard Serial Interface
ST3	Stratum 3 Clock Board
STARLAN	Star-based Local Area Network
SVN	Security Violation Notification
SXS	Step-by-Step
TAAS	Trunk Answer From Any Station
TAC	Trunk Access Code
TC	Technical Consultant
TCM	Traveling Class Mark
TDM	Time Division Multiplex
TDR	Time of Day Routing
TEG	Terminating Extension Group
TEI	Terminal Endpoint Identifier
TOD	Time of Day
TOP	Transaction Oriented Protocol
TSC	Technical Service Center
TTR	Touch Tone Receiver
TTT	Terminating Trunk Transmission
TTTN	Tandem Tie Trunk Network
TTY	Teletypewriter
UAP	Usage Allocation Plan
UART	Universal Asynchronous Transmitter
UCD	Uniform Call Distribution
UCL	Unrestricted Call List
UDP	Uniform Dial Plan
UL	Underwriter Laboratories
UNP	Uniform Numbering Plan
UPS	Uninterruptible Power Supply
USOP	User Service Order Profile
VDN	Vector Directory Number
VLSI	Very Large Scale Integration
VM	Voltmeter
WATS	Wide Area Telecommunications Service
WSA	Waiting Session Accept
ZCS	Zero Code Suppression

APPENDIX A. BLANK WORKSHEETS

Worksheets serve as the suggested means for collecting data for historical comparison purposes. Refer to the heading "Validating the Data" for the corresponding measurements report in Chapter 4 or 5 to obtain information on how to use these forms. Make as many copies of these forms as you need for your data collection and analysis.

WORKSHEET 1

ATTENDANT GROUP DATA WORKSHEET													
System ID: Location: Group Size:													
Day of Week	Report Type *	Meas Hour	Calls Ans	Calls Aband	Calls Queued	Calls H-Abd	Calls Held	Time Avail	Time Talk	Time Held	Time Abd	Speed of Answer	Week No. and Date
M													
T													
W													
T													
F													
S													
S													
M													
T													
W													
T													
F													
S													
S													
M													
T													
W													
T													
F													
S													
S													
M													
T													
W													
T													
F													
S													
S													

* Report Type: LH for last hour, TP for today's peak, or YP for yesterday's peak

WORKSHEET 2

ARS PATTERN DATA WORKSHEET											

System ID: **Location:**   **Report Type = Yesterday ***
Route-Pattern No: **Queue Size:**

Day of Week	Total Calls Offered	Calls Carried	Calls Blocked	Calls Queued	Queue Overflow	% of Calls Carried						and Date
						Pref 1	Pref 2	Pref 3	Pref 4	Pref 5	Pref 6	
M												
T												
W												
T												
F												
S												
S												
M												
T												
W												
T												
F												
S												
S												
M												
T												
W												
T												
F												
S												
S												
M												
T												
W												
T												
F												
S												
S												

* Use "Yesterday's report" for the full day route-pattern measurement.

WORKSHEET 3

HUNT GROUP DATA WORKSHEET								
System ID: Group ID:			Location: Group Size: Queue Size:				Group Name: Group Type:	
Day of Week	Report Type *	Meas Hour	Total Usage	Calls Answered	Calls Abandoned	Calls Queued	Speed of Answer	Week No. and Date
M								
T								
W								
T								
F								
S								
S								
M								
T								
W								
T								
F								
S								
S								
M								
T								
W								
T								
F								
S								
S								
M								
T								
W								
T								
F								
S								
S								

* **Report Type: LH for last hour, TP for today's peak, or YP for yesterday's peak**

WORKSHEET 4

TRUNK GROUP DATA WORKSHEET

System ID: Location: Group Type:

Group No: Group Size: Group Dir:

                                      Oueue Size:

Day of Week	Report Type *	Meas Hour	Total Usage	Total Seize	Inc. Seize	Grp Ovfl	Calls Qued	Que Ovfl	Que Abd	Out Serv	% ATB	% Out Blk	Week No. and Date
M													
T													
W													
T													
F													
S													
S													
M													
T													
W													
T													
F													
S													
S													
M													
T													
W													
T													
F													
S													
S													
M													
T													
W													
T													
F													
S													
S													

* Report Type: LH for last hour, TP for today's peak, or YP for yesterday's peak.

WORKSHEET 5

PROCESSOR OCCUPANCY SUMMARY DATA WORKSHEET												
System ID:				Location:								
Day of Week	Peak Hour	Stat Occ	CP Occ	SM Occ	Idle Occ	Total Calls	Total ATMPT	INTCOM ATMPT	INC ATMPT	OUT ATMPT	PNET ATMPT	Week No. and Date
M												
T												
W												
T												
F												
S												
S												
M												
T												
W												
T												
F												
S												
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M												
T												
W												
T												
F												
S												
S												
M												
T												
W												
T												
F												
S												
S												
4 Week Avg	N A											

"NA" means that the field (box) should not be calculated. It is not applicable.

WORKSHEET 6   1 of 10

The Call Center Operations worksheet allows AT&T personnel to assess the status and capacity of your DEFINITY Generic 3r switch. The information collected helps AT&T determine the impact of the proposed configuration on your switch.

The worksheet contains four general sections: General Business, Incoming Call Management (for example, ACD), Outgoing Call Management, and Call Flows. The general business section provides the general business (non ICM/OCM) call traffic mix expected for the switch. The Incoming Call Management (ICM) section provides general information about inbound telemarketing operations. The Outgoing Call Management (OCM) section provides general information about outbound telemarketing operations. The Call Flows section provides a list of important items to include in the customer call flows and several examples of appropriate call flows.

The accuracy of the information provided determines whether realistic and achievable switch capacity estimates can be obtained. Therefore, it is STRONGLY recommended that the information provided is as accurate as possible and is reviewed by the customer and the appropriate

AT&T   representative.

General Business

1. Indicate how much of the general business traffic (non-ICM/OCM) in your system fits into each of the following categories. Use percentages. The five categories must add to 100%.

Traffic Type	Percentage
Intercom	
Incoming	
Outgoing	
Private Network (ETN, UDP, DCS)	
Vectoring General Business (see the note below)	
TOTAL	100%

> **Note:** Vectoring General Business applies to incoming calls that use Call Vectoring and terminate to destinations other than ACD splits.

2. Indicate the call characteristics for each of the categories above. Again, each category (intercom, incoming, outgoing, private networking) must add to 100%.

Intercom	Answered	
	Coverage (See Note 1)	
	Auto Call Back	
	TOTAL	100%
Incoming	DID Answered	
	DID Coverage (See Note 1)	
	Attendant Answered (See Note 2)	
	Attendant Extended (See Note 3)	
	TOTAL	100%
Outgoing	DOD 7/8 Digit Calls	
	DOD 10/11 Digit Calls	
	TOTAL	100%
Private Networking	Incoming Answered	
	Incoming Coverage (See Note 1)	
	Outgoing	
	Tandem	
	TOTAL	100%

Notes:

1. Coverage means that the call goes to coverage without being answered at the original destination.

2. Attendant answered means that an attendant answers a call, handles the caller's request, and disconnects.

3. Attendant extended means that an attendant answers a call and extends the call to a station that answers.

3. For the general business traffic (non-ICM/OCM), specify the percentage (%) of clls that fit into the following categories. Percentages do not need to add up to 100%.

DCS Calls on Private Network

ISDN-PRI on Private Network

ISDN-PRI on Incoming Calls

ISDN-PRI on Outgoing Calls

ISDN-PRI on Vectoring General Business

4. Specify the number of SMDR ports used (maximum 2)

5. Specify the percentage of calls on Intra-Switch SMDR

    Note that a maximum of 200 stations can simultaneously use the Intra-Switch SMDR feature.

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6. Specify the percentage of total business traffic that terminates and originates at each of the following types of stations. Percentages must add up to 100%.

   Analog Stations   _____

   DCP Non-display   _____

   DCP with Display   _____

   ISDN BRI   _____

   TOTAL   100%

7. For the general business traffic, indicate how coverage calls are handled. The total of the percentages below cannot exceed 100%.

   - Specify the percentage of all coverage calls that go to   _____
     AUDIX™ Voice Power™ Voice Messaging System.

   1. Specify the percentage of all coverage calls that go to an   _____
      ASAI Messaging Service that sets the Message Waiting Indi-
      cator (Set Value - Message Waiting Indicator)

8. Specify the percentage of general business calls that involve an   _____
   ASAI monitored/controlled station (3rd Party Domain control)

9. Specify the percentage of the domain controlled calls (from 8 above)   _____
   that are initiated via ASAI (3rd Party Auto Dial)

10. Provide the appropriate call flow for call vectoring, if any, as specified in the Call Flow Section.

Incoming Call Management (ICM)

1. Specify the percentage of your system's inbound ICM traffic that fits into the following Categories:

   ICM Calls using ISDN PRI facilities   _____

   ICM Calls using SMDR   _____

2. Indicate in minutes per hour the expected agent efficiency   _____
   (that is, in a typical hour how many minutes is an agent
   active on ACD Calls or available to receive ACD calls?)

   Note: Agents in After Call Work (ACW) and Auxillary (AUX) work modes are not available to receive calls.

3. Specify the maximum number of inbound ACD agents   _____
    (exclude Voice Response Unit ports) on the system

4. Specify the percentages of ICM traffic that terminates at each of the following station
    types (this is not the administered number of ACD stations, but the actual station mix
    used to answer calls. Percentages must add up to 100%.

    Analog Stations   _____

    DCP Non-display   _____

    DCP with Display   _____

    ISDN BRI   _____

    TOTAL   100%

5. Provide the appropriate call flows as specified in the Call Flow Section.

Outgoing Call Management (OCM)

1. Specify the percentage of your system's outbound OCM traffic that fits into the following
    categories:

    OCM Calls using ISDN trunks   _____

    OCM calls using SMDR   _____

2. Specify the average number of rings for calls that are never   _____
    answered

3. Specify the average number of rings for calls that are answered   _____

4. Indicate in minutes per hour the expected agent efficiency (that is in   _____
    a typical hour how many minutes is an agent active on outbound
    calls or available to initiate outbound OCM calls?)

    Note: Agents in After Call Work (ACW) and Auxiliary (AUX) work modes are not available
          to receive calls.

5 . Specify the maximum number of outbound ACD agents (exclude Voice   _____
    Response Unit ports) on the system

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6 . Specify the station type mix (in percentages) used by active ACD agents (this is not the administered number but the actual mix used by agents in the outbound calling center). Percentages must add up to 100%.

Analog Stations	_____
DCP Non-display	_____
DCP with Display	_____
ISDN BRI	_____
TOTAL	100%

7 . Is CMS/BCMS used to monitor and measure the outbound ACD calls?   _____

8 . Provide the appropriate call flows as specified in the Call Flow Section.

Call Flows

Using Figures A-1, A-2, A-3, and A-4 as examples, specify a call flow, complete with percentages, that best depicts the call center operations during the busy hour. As a minimum, call flows should be provided for general business call vectoring, Incoming Call Management, and Outgoing Call Management areas. If there are several different call flows within each area, draw a call flow for each and give the percentages of the overall traffic that each call flow represents. Table 1 shows the most important items to include in the call flow for each of the call center categories: General Business (Call Vectoring), ICM, and OCM.

TABLE A-A.   Items to Include in Call Flow Diagrams

Items	General Business Call Vectoring	ICM	OCM
Call Vectoring Commands Executed	X	X	
– Announcement	X	X	
– Wait	X	X	
– Collect Digit	X	X	
– Total Digits Collected	X	X	
– Available Agent Conditional Checks		X	
– Conditional Checks (Goto, Route to, and Check Backup) other than Available Agents	X	X	
– Unconditional Route to	X	X	
– Successful Queue Commands		X	
– Messaging (AUDIX Messaging System only)	X	X	
– ASAI Adjunct Routing		X	
– Look Ahead Interflow Successes		X	
– Look Ahead Interflow Failures		X	

TABLE A-A. *(continued)*
Items to Include in Call Flow Diagrams

Items	General Business Call Vectoring	ICM	OCM
ACD Split Actions		X	X
– Announcements (Forced First/Recurring)		X	X
– Queued		X	X
– Intraflow		X	
– Voice Response Unit (VRU) Transfers		X	
– AUDIX as Automated Attendant		X	
CallVisor Related Actions		X	X
– ISDN Gateway (IG) Event Reporting		X	
– ASAI Event Reporting (Event Notification)		X	
– ASAI Transfers/Conferences (3rd Party Merge)		X	X
– ASAI Change Work Modes (Request Feature)		X	X
– ASAI Queries (Value Queries) for Agents, Splits, and Trunk Status		X	X
– ASAI Call Termination (3rd Party Drop/Clear Call)			X
– User/Switch Classified 3rd Party Make Calls			X
Other	X	X	X
– Call Holding Time Per Agent		X	X
– VRU Usage		X	X
– Call Transfers/Conferences		X	X
– Digits Dialed (7 or 10 Digits)			X
– Call Classification Outcomes			X
– Coverage Usage	X		
– Attendant Extended Calls	X		

Information sources for developing an accurate call flow can be obtained from:

1. BCMS Historical Reports—Daily and Hourly Split and System Reports

2. CMS Historical Reports—Split and System Reports

3. Hunt Group Measurements Report

Calls to VRU Transferred to Agent Split

This call flow includes:

  – CMS Reporting

  – CallVisor ASAI Event Reporting on All Splits (VRU and Agent Splits)

  – Non-ISDN Trunks

  – CONVERSANT® VIS, VRU

  – VRU Transfers via Switch-Hook Flashes.

100% Incoming to VRU

75% Queue for VRU &
Hear 1st Annc.

25% Answered Immediately
by VRU without Queuing

50% Answered by VRU
after 1st Annc.

50% Answered by VRU
after 2nd Annc.

100% of Calls Transferred by VRU to Agent Split
(All switch-hook flash transfers)

75% Queue &
Hear 1st Annc.

25% Answered Immediately
without Queuing
(2 Minutes Average
Holding Time)

40% Answered
after 1st Annc.
(2 Minutes Average
Holding Time)

60% Answered
after 2nd Annc.
(2 Minutes Average
Holding Time)

FIGURE A-1. Sample ACD- ICM Call Flow

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Calls to Vector Application - Call Vector Not Defined

The following call flow presents a call vectoring application before the call vector has been
defined. The following items are used with the call flow:

– All calls provide ASAI Event Reporting

– 50% of the calls use ISDN trunks

– All transfers are done manually by the agents at their voice terminals

– A performance objective that no more than 0.2% of the calls would listen to a second
announcement while in queue and no calls should receive busy signal

100% Calls to Vector (50% ISDN,
ASAI Event Reporting)

Weekends and Off-hours -
Play   Announcement

Normal Business Hours

Queue to Main Split

Too many calls queued-
Provide Busy Signal

15% Queued to Backup Split
if calls in queue < X

85% Answered
Immediately

33% Answered By
Backup Spilt

67% Receive
Announcement

2% Get Another
Announcement

25% Answered By
Backup Split

73% Answered by
Main Split

Answered by Backup Spilt

Answered by Main Split

70% Cleared by Adjunct
(2 Minutes Average
Holding Time)

30% ASAI Transferred
to Another Agent
(cleared by Adjunct,
25 Minutes Average
Holding Time)

90% Cleared by Adjunct
(2 Minutes Average
Holding Time)

10% ASAI Transferred
to Another Agent
(Cleared by Adjunct,
2.5 Minutes Average
Holding Time)

FIGURE A-2.   Sample Call Vectoring Call Flow

Calls to Vector Application - Call Vector Defined

The following call flow presents a call vectoring application after the call vector has been defined. The sample call vector below is used:

1.   Go to Step 3 if time-of-day is sat 00:00 to sun 23:59
2.   Go to Step 5 if time-of-day is all 6:30 to all 16:45
3.   Wait 2 secs hearing ringback
4.   Disconnect after announcement extension 7000
5.   Go to Step 13 if calls-queued in split 7 is > 9 priority top
6.   Queue to main split 7 priority top
7.   Check backup split 9 priority top if available-agents > 0
8.   Wait time 4 secs hearing ringback
9.   Announcement 7010
10. Wait time 30 secs hearing music
11. Announcement 7020
12. Go to Step 10 if unconditionally
13. Busy

Note that since the busy hour is being analyzed, all calls get to Step 5. In addition, we know that 90% of the calls are answered in 10 seconds or less and that the remaining 10% of the calls are answered within 30 seconds or less.

100% Calls to Vector (All ISDN, ASAI Event Reporting)

90% of Calls Execute the Following Vector Commands

3 Conditional Checks
1 Avail Agent Conditional Check
1 Queue to Main
1 Wait Time
1 Announcement

10% of Calls Execute the Folllowing Vector Commands

3 Conditional Checks
1 Avail Agent Conditional Check
1 Queue to Main
2 Wait Time
1 Announcement

90% Cleared by Adjunct (2 Minutes Average Holding Time)

10% ASAI Transferred to Another Agent (Cleared by Adjunct, 2.5 Minutes Average Holding Time)

10% ASAI Transferred to Another Agent (Cleared by Adjunct, 2.5 Minutes Average Holding Time)

90% Cleared by Adjunct (2 Minutes Average Holding Time)

FIGURE A-3. Sample ICM Call Vectoring Call Flow

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ASAI Switch Classified Calls

The ASAI adjunct originates all calls via the 3rd Party Make Call capability and uses the switch's call classifier board.

```
            100% Switch Classified Calls (Non-ISDN)

    84% 7/8 Digits Calls                    16% 10/11 Digits Calls

         35% Not                   60% Answered          40% Not Answered
         Answered                  (3 Minute Average        or Busy
                  5% Busy          Holding Time)         (Dropped Automatically
                                                          by the Switch)
    60% Answered

22% Uses ASAI Transfers,      78% with 2 Minutes
Change Work Modes,            Average Holding Time and
1st Annc. and 1 Minute        Cleared by ASAI Adjunct
Holding Time
```
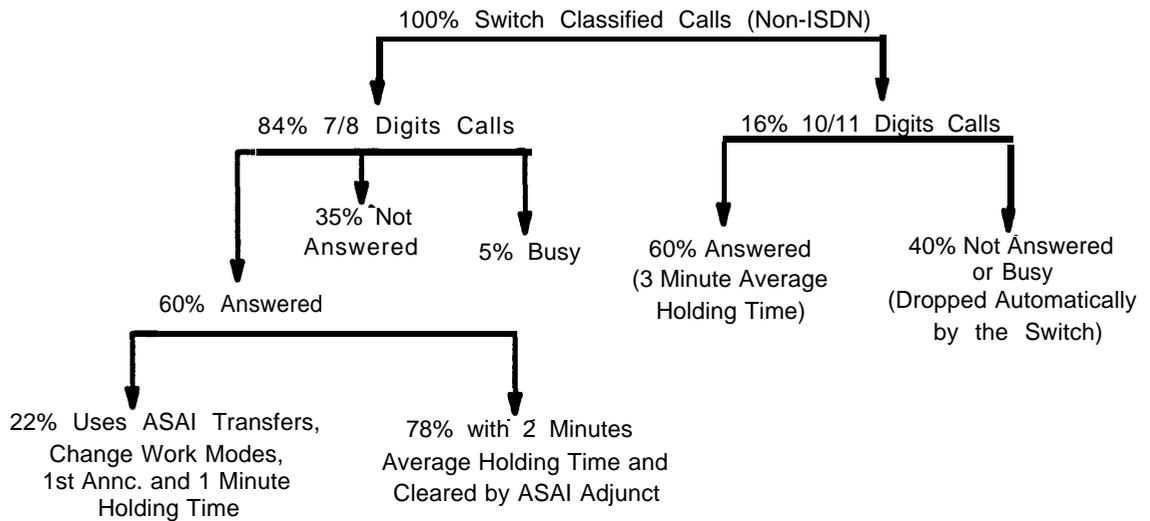
FIGURE A-4. Sample OCM Call Flow

APPENDIX B. PRINTER OPTIONS

AT&T 475 Printer Options

The AT&T 475 printer, when used for the System Printer application, requires the following option switch settings.

Switch 1	Switch 2	Switch 21
1-closed	1-open	1-open
2-closed	2-open	2-open
3-open	3-open	3-open
4-closed	4-open	4-open
5-closed	5-open	5-closed
6-open	6-open	6-closed
7-open	7-closed	7-open
8-closed	8-open	8-closed

Switch 22	Switch 23	Switch 24
1-open	1-closed	1-closed
2-closed	2-open	2-closed
3-closed	3-open	3-open
4-open	4-open	4-closed
	5-closed	5-closed
	6-open	6-open
		7-open
		8-closed

AT&T 572 Printer Options

The AT&T 572 printer, when used for the System Printer application, requires the following pro-grammable options.

	Function Number	Menu Number	Status
01	FORM LENGTH	09	11
02	LPI	01	6
03	CPI	01	10
04	LQ OR NLQ	01	LQ
05	BUZZER	01	ON
06	FONT	02	FONTCART
07	RESOLUTION	01	144
11	BUFFER	02	ON-LINE
13	PW ON MODE	01	ON-LINE
14	DIRECTION	01	BI-DIR.1
15	BUF. FULL	02	LF + CR
16	P.E.	01	ACTIVE
17	AUTO OR	01	CR + LF
18	ZERO	01	0
22	AUTO LF	01	CR ONLY
31	1" SKIP	01	OFF
32	CHAR. SET	02	USA
33	CHAR. SET	01	UK
34	CHAR. SET	03	GE
35	CHAR. SET	07	LINE DRAWING
81	OFF-LINE	07	ALL RECEIVE
82	DSR	02	OFF
83	RTS	TIMING	01
84	CD	02	OFF
85	CTS	02	OFF
91	OVER RUN	02	256
92	DATA BIT	02	8
93	PROTOCOL	03	XON/XOFF
94	STOP BIT	01	1
95	PARITY	01	NON
96	BPS	01	9600

GLOSSARY

A

Abandoned Call

An incoming call where the caller hangs up before being answered.

ACD

See Automatic Call Distribution.

ACD Calls

The number of ACD calls that are processed during the current reporting period for the specified ACD agent. A status parameter that identifies the number of ACD calls that a particular agent processed during the current reporting period.

ACD Split (or Split)

A group of extensions that are staffed by agents trained to handle a certain type of incoming call. Valid split numbers range from 1 through 99. Each number identifies a unique grouping of ACD agent positions. (Also referred to as an ACD hunt group or just a hunt group.)

Agent (or ACD Agent)

An answering position who receives calls that are directed to a split. A member of an ACD hunt group (ACD split).

Attendant Group

All of the administered attendant positions.

Attendant Offered Load

The total quantity of traffic that is presented to the attendant group.

Auto-In Trunk Groups

Those trunk groups where the Central Office (CO) processes all of the digits for the incoming call. Whenever the DEFINITY Generic 1 switch determines that the CO has seized a trunk from an Auto-in trunk group, it automatically (without processing any digits) connects the trunk to the destination. The destination will typically be a queue in which the callers wait to be answered in the order in which they were received.

Automatic Call Distribution (ACD)

A communications control system that automatically distributes incoming calls to one or more groups of agents. Each unique grouping of agents is referred to as a split.

Auxiliary Work (Aux-Work) Mode

In this mode, agents are unavailable to receive ACD calls. Agents should enter Aux-Work mode when involved in non-ACD activities such as taking a break, going to lunch, or placing an outgoing call.

Note: When agents log in, they are automatically placed in the Aux-Work mode. They can then use the Auto-in or Manual-in feature to answer the first call. Also, the last available agent in a split cannot enter the Aux-Work mode if any ACD calls are remaining in the queue. If the last available agent attempts to enter Aux-Work mode, the following occurs:

- New calls to the hunt group receive a busy tone or are redirected to coverage.
- Calls already in the queue are routed to the agent until the queue is empty.
- If the last available agent has an Aux-Work button, the light next to the button flashes until all calls in the queue are answered. When the last call is answered, the light next to the button goes on steadily, and the agent can then enter Aux-Work mode.

Available (Avail)

Indicates that the agent/server group is available and ready to receive the call.

Average Holding Time

The average length of time, in seconds, a facility (such as trunk) is used to serve a call.

Average Answer Speed

The average time, in seconds, that it takes before a call is answered. This average includes both queue time and time ringing at the servers' terminal.

B

Busy Hour Call Capacity (BHCC)

The maximum number of completed calls the switch processor can support in an hour without degradation of service.

Blocked Call

The condition encountered whenever a call seeks to use a particular trunk group but is blocked. Typically the reason that the call is blocked will be because all trunks within the group are busy; however, other reasons are also possible (for example, the facilities are maintenance busy).

C

Call-by-Call (CBC) Service Selection

A feature that allows a communications system to request, on a call-by-call basis, services and/or features for a particular call on an ISDN-PRI facility. CBC allows various voice and data services to be integrated onto a single transmission facility with flexible assignment of trunks to services. *See also* **Usage Allocation Plan.**

Call Classifier (CC)

CCs are devices which monitor outbound calls from inception to a state in which their outcome is known. Call classifiers are intended for call prompting applications. There are two types of call classifiers:

- **Touch Tone Receivers (TTR)** detect touch tones and are similar to Dual-Tone Multi-Frequency (DTMF) receivers. TTRs can be queued up to four deep, systemwide.

- **Call Progress Tone Receivers (CPTR)** detect call progress tones such as dialtone and answer tones.

TN744 Call Classifier circuit packs can be set for either call classification or touch-tone reception. They have eight ports.

Carried Load

The amount of traffic actually served by traffic-sensitive facilities during a given interval.

CCS or Hundred Call Seconds

A standard telecommunications industry traffic measurement term meaning hundred call seconds. It is employed to determine usage. In order to determine usage for a facility, it is scanned every 100 seconds. If the facility is found busy, it is assumed to have been busy for the entire scan interval. There are 3600 seconds per hour. The roman numeral for 100 is the capital letter "C". The abbreviation for call seconds is CS. Therefore, 100 call seconds is abbreviated as CCS. If a facility is busy for an entire hour, then it is said to have been busy for 36 CCS. *See also* **Erlang.**

Communications System Manager

The customer representative who maintains overall responsibility for the switch and its day-to-day functions.

E

Erlang

A unit of traffic intensity, or load, used to express the amount of traffic it takes to keep one facility busy for one hour. One Erlang is equal to 36 CCS. *See also* **Hundred Call Seconds.**

Erlang-C

A traffic theory that assumes calls will be delayed (that is, queued) if they arrive when all circuits are busy. *See also* **Erlang.**

Erlang-C Finite Queue

An Erlang-C traffic theory that further assumes a limited length queue list. *See also* **Erlang-C.**

Erlang-C Infinite Queue

An Erlang-C traffic theory that further assumes the queue contains enough slots so that it is "essentially" infinite and can hold all requests for service while they are delayed. *See also* **Erlang-C.**

Errored Second

A second in which at least one bit error occurs.

G

Grade of Service

The number of call attempts that fail to receive service immediately. Grade of service is also expressed as the quantity of all calls that are blocked or delayed.

H

Holding Time

The total length of time in minutes and seconds that a facility is used during a call.

Hunt Group

A group of agents which receives a high volume of calls. Hunting is accomplished through the ACD feature. It minimizes call completion time. If all members of a group are active, the call can route to another. *See also* **ACD Split.**

M

Manager I Terminal

The terminal that is used by the system administrator to administer the DEFINITY Generic 1 system. The terminal is also used to execute traffic measurement commands.

Measurement Hour

The starting time (using the 24-hour clock) of the hour during which data was recorded.

O

Offererd Load

The traffic that would be generated by all the requests for service occurring within a monitored interval, usually one hour.

P

Peak Hour

The hour, either yesterday or today, during which the largest number of reported events occurred. (Also referred to as Busy Hour.)

Q

Queue

Places incoming calls in an order (first-in, first-out) when attempting to reach a facility and all members/servers are busy.

R

Report Scheduler

Software that is used in conjunction with the system printer for the purpose of scheduling the days of the week and the time of day that the desired reports are to be printed.

S

Speed of Answer

See also **Average Answer Speed.**

Split

A group of extensions, which are also known as a hunt group, that directly receives calls from one or more trunk groups.

Station Message Detail Recording (SMDR)

A switch feature that utilizes software and hardware to record call data.

System Administrator

The designated individual who maintains overall customer responsibility for system administration. Generally, all administration functions are performed from the Manager I terminal. The switch requires a special login, referred to as the system administrator login, in order to gain access to the system administration capabilities.

System Printer

An optional printer that may be used to print scheduled reports via the Report Scheduler.

T

Talk Time

The total time that the servers (attendants) were active or talking during the measurement interval.

Time Division Multiplexer (TDM)

Time Division Multiplexer (TDM) has 512 64KB time slots.

Time Interval

The period of one hour during which traffic measurements are collected for a report(s). Also referred to as Measurement Interval.

Trunk

A communication channel that connects two or more switching systems. A trunk also connects the switch to the public network.

Trunk Group

A grouping of several communication channels that all have the same functional characteristics (for example, all trunks are one-way incoming, all trunks are one-way outgoing, all trunks permit two-way seizure, etc.).

U

Usage Allocation Plan (UAP)

A defined strategy for dynamically allocating the ISDN-PRI trunking facilities to the competing network services/features.

Usage

The time, typically expressed in CCS, during which resources are in use. This is also called the Traffic Load.

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