

3B CALL MANAGEMENT SYSTEM

Release 2, Issue 1.4

PLANNING, CONFIGURATION, AND IMPLEMENTATION

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NOTICE

Every effort was made to ensure that the information in this document was complete and accurate at the time of printing. However, information is subject to change.

This document will be reissued periodically to incorporate changes.

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General Information

This guide was written for AT&T Account Teams, System Specialists, and anyone who needs detailed information about planning, configuring, and implementing *Release 2, Issue 1.4* of the 3B Call Management System (3B CMS) software application. Prospective customers can also use this guide to obtain a better understanding of the 3B CMS software and the computer and switch hardware that supports the 3B CMS software application.

Specifically, this guide will help you determine which AT&T 3B2 computer and associated hardware and software the customer needs in a 3B CMS application.

The 3B CMS software can reside on the following AT&T 3B2 computers:

3B2/ 400 SE computer — this computer is referenced as a 3B2/ 400 computer throughout this document.

3B2/ 522 computer

3B2/ 1000 Model 70 computer

NOTE

3B CMS can also reside on the 3B2/ 310 Package F2, 3B2/ 400 Package Q2, 3B2/ 500 Package B, and 3B2/ 600 Package A computers. However, these computers are no longer available for purchase with 3B CMS.

General Information

The 3B CMS software can communicate with the Automatic Call Distribution (ACD) feature residing on the following AT&T telecommunications switches:

AT&T DEFINITY* Communications System Generic 1

AT&T System 75, R1V3, Issue 1.1 or later

AT&T System 75 XE, R1V3, Issue 1.2 or later

AT&T DEFINITY Communications System Generic 2

AT&T DEFINITY Communications System Generic 3i

AT&T System 85, R2V4, Issue 1.0 or later

AT&T System 85, R2V3, Issue 1.1 or later

DIMENSION* 600 and 2000 System switches with Feature Package (FP) 8, Version 3.8.

NOTE

The DIMENSION 600 and 2000 System switches are not manufactured anymore and are not orderable products. However, customers who have either one of these switches can upgrade it with the ACD feature and FP 8, Version 3.8.

Customers who are currently using the AP-16 CMS application can migrate their CMS historical data to 3B CMS by purchasing a 3B2/ 400 computer, the 3B CMS software, and any other hardware and software requirements which are described throughout this guide. Also, customers who are currently using the 3B CMS application on a 3B2/ 310 or 3B2/ 4-00 may want to migrate to a 3B2/ 522 or 3B2/ 1000 Model 70 computer. Refer to the *CMS Data Migrations* section in Chapter 4 for more details.

* Registered trademark of AT&T.

3B CMS Release 2 Capabilities

Release 2, Issue 1.4 of the 3B CMS software has the following capabilities:

Running on the UNIX* System V, Release 3.2 operating system, which is available for the 3B2/ 400 computers.

Running on the UNIX System V, Release 3.2.1 operating system, which is available for the 3B2/ 522 and 3B2/ 1000 Model 70 computers.

Running on a 3B2/ 400 computer equipped with Small Computer System Interface (SCSI) based peripheral devices.

Supporting mirrored disk data storage using SCSI-based peripherals on a 3B2/ 522 or 3B2/ 1000 Model 70.

Supporting up to four connections to a 3B2/ 1000 Model 70 from the supported AT&T telecommunication switches having the Automatic Call Distribution (ACD) feature.

Providing graphic displays and printouts of real-time and historical reports.

NOTE

The Graphics feature of 3B CMS is available to the customer at an additional cost.

Supporting the Outbound Call Management feature of the Generic 1 with several 3B CMS reports.

Supporting the Call Vectoring feature of the Generic 3i, Generic 2 and System 85, R2V4 switches.

NOTE

The Vectoring feature of 3B CMS is available to the customer at an additional cost.

* Registered trademark of AT&T.

3B CMS Release 2 Capabilities

Supporting the 705 Multi-Tasking (MT) terminal, 615 (MT) terminal, 615 Color Multi-Tasking (CMT) terminal, and the 620 Multi-Tasking Graphics (MTG) terminal in addition to the 610 BCT and the DATASPEED† 4425 terminal.

Supporting the AT&T 6500 Displays (6528, 6529, 6538, and 6539).

NOTE

The customer cannot use the 6500 terminals for bar graph reports. They do not offer the necessary dim, bright, and normal attributes for effective display of the graphs.

† Registered trademark of AT&T.

Ordering Information

AT&T sales representatives can configure and order the 3B CMS application for the customer via the Delivery Operating Support System (DOSS) configurator. The 3B CMS is configured as a stand-alone product in the “CMS3B, R2” questionnaire.

Before you configure a system, you should determine the customer’s 3B CMS needs such as:

Which telecommunications switch will suit the customer’s needs?

How many agents does the customer want to support?

How many splits does the customer want to support?

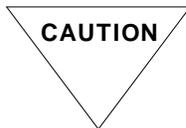
How many trunk groups will be needed?

How many trunks will be needed?

The information in Chapter 3 will answer these questions and more.

After you have selected a 3B2 computer for the customer’s CMS application by using this document or the DOSS configurator, refer to Chapter 4 for details on configuring a CMS environment. Use the worksheets in Appendix A, if needed, to list and record the particular needs of a customer. If necessary, these worksheets can be used later to complete the Sales/ Service Order forms used by most Marketing Branch Offices.

Be sure to check with National Product Scheduling (NPS) for current manufacturing schedules before placing an order.



If the customer wishes to add hardware or software not specified in this document, call the Call Center support group at the Sales and Technical Response Center for assistance at (800) 521-7872. The Technical Response Center can verify whether or not the customer’s configuration is supported.

The configurations described in this document are the recommended and supported configurations for 3B CMS. Customers who choose other non-supported configurations may be charged on a Time-and-Materials basis for installation and maintenance, even if they purchase a 3B CMS maintenance contract. See “Non-standard Hardware Configurations - AT&T Services Support” in Chapter 4 for more information.

About This Document

NOTE

Changes to the *3B CMS Planning, Configuration, and Implementation* document made since the last issue (Issue 6) are identified by change bars ().

This document is organized into five chapters and two appendices as follows:

Chapter 1— Introduction. This chapter tells you the purpose of the document, for whom it was written, and how it is organized. Information is provided for ordering CMS and where to find detailed information about the 3B2 computer and switch hardware that supports 3B CMS software.

Chapter 2— 3B CMS Description. This chapter tells you what CMS is and how it relates to the 3B2 computer and the switch. Performance guidelines are also discussed in this chapter.

Chapter 3— Planning. This chapter helps you determine the agent, trunk, and hard disk requirements for a given ACD. It also discusses the input/ output (I/ O) capacities of the AT&T 3B2 computers operating in a 3B CMS environment, the responsibilities and job requirements of the CMS administrator, customer training, and documentation for the 3B CMS application.

Chapter 4— Configuring a 3B CMS Application. This chapter contains configuration information on the AT&T 3B2 computers, identifies the software requirements, and lists the terminals and printers that can be used in the 3B CMS application. This chapter also discusses the hardware items and cables needed to connect the computer to the switch and the hardware requirements for remote terminals and printers. For customers currently using AP-16 CMS or 3B CMS, this chapter also describes the different CMS data migration methods. Examples of the DOSS configurator screens for the 3B CMS application are displayed at the end of this chapter.

Chapter 5— Implementing the 3B CMS Application. This chapter contains the switch implementation requirements, 3B CMS implementation guidelines, and the escalation procedures to be used if problems occur during or after the CMS installation.

Appendix A— Worksheets. This appendix contains worksheets that list all hardware and software items that can be ordered for a 3B CMS application. The Price Element Codes (PECs) are also listed.

Appendix B— Documentation. This appendix lists the 3B CMS documents and includes ordering information.

At the end of this document, you will find a glossary of frequently used terms and an index.

NOTE

You can help us improve the next issue of the *3B CMS Planning, Configuration, and Implementation* document by filling out the feedback form located at the front of this document.

References

While planning, configuring, or implementing a 3B CMS, you may also have to consider the planning, configuration, and implementation of Generic 1, Generic 3i, System 7-5, System 75 XE, Generic 2, and System 85 switches. The following documents can be used along with this document to determine the customer's overall 3B CMS requirements.

AT&T DEFINITY Communications System Generic 1 and 3i System Description (5-55-2-30-200)— A detailed functional description of the system. Included are descriptions of the hardware and software, definitions of the system's technical specifications and environmental requirements, lists of the system parameters, a brief discussion of the system administration

AT&T DEFINITY Communications System Generic 1 and Generic 3i Planning and Configuration (5-55-230-600)— A guide, used by the Account Team, that describes the procedures for determining the system requirements for the trunks, terminals, auxiliary equipment, and terminal adjuncts for the Generic 1 and Generic 3i switches. The guide also includes information on switch call-processing capabilities and contains the procedures and associated forms needed to translate customer-defined system requirements into properly configured, orderable system hardware.

An Introduction to AT&T System 75 (5-55-200-020)— An overview of the system. Included are detailed feature descriptions and brief definitions of the features, a description of the hardware and planning considerations, and lists of the system capacities. This document covers the R1V1, R1V2, R1V3, XE R1V2, and XE R1V3 systems.

AT&T System 75 System Description (5-55-200-200)— A detailed functional description of the system. Included are descriptions of the hardware and software, definitions of the system's technical specifications and environmental requirements, lists of the system parameters, a brief discussion of the system administration and maintenance, and brief definitions of the features.

AT&T System 75 Planning/ Configuration (5-55-200-600)— A guide, used by the Account Team, that describes the procedures for determining the system requirements for the trunks, terminals, auxiliary equipment, and terminal adjuncts for the System 75 and System 75 XE switches. The guide also includes information on switch call-processing capabilities and contains the procedures and associated forms needed to translate customer-defined system requirements into properly configured, orderable system hardware.

AT&T DEFINITY Communications System Generic 2 and System 85 System Description (5-55-104-201)— A technical description for service personnel, sales personnel, and customers who want a comprehensive overview of the product. Included are descriptions of features, a functional description, a hardware description, a software description, system administration, a maintenance plan, upgrade plans, technical specifications, environmental requirements, illustrations of components, and a list of

related publications.

AT&T System 85 Applications Engineering Manual (5-55-102-601)— A planning guide used by the Account Team and product support personnel to determine the hardware and software requirements for a System 85.

Refer to the *Business Communication Systems Publications Catalog (5-55-000-010)* for descriptions of other Generic 3i, Generic 1, System 75, System 75 XE, Generic 2, and System 85 documents that may be helpful.

References

NOTES

What Is 3B CMS

The 3B Call Management System (3B CMS) is a software product that is used by business customers who have an AT&T telecommunications switch and who receive a large volume of telephone calls that are processed through the Automatic Call Distribution (ACD) feature of the switch. The 3B CMS software and the AT&T switch communicate through a data link that allows the switch to transfer ACD information to the 3B2 computer.

The 3B CMS compiles this information, formats it into call-related categories, and stores it in a database that can be viewed on-line by the customer. The customer can monitor the real-time ACD activities to determine if the ACD should be reconfigured to provide the most efficient service possible for the calling public.

A-3B CMS environment consists of the following major components:

- 3B CMS software

- AT&T 3B2 computer and peripheral equipment

- AT&T telecommunications switch with the ACD feature

- Data link— The 3B2 computers communicate with the DEFINITY Communications System Generic 2, System 85, and DIMENSION System switches over the Data Communications Interface Unit (DCIU) and with the DEFINITY Communications System Generic 1 and Generic 3i, System 75, and System 75 XE over the Processor Interface (PI).

What Is 3B CMS

Figure 2-1 is a block diagram that shows the basic relationship between the 3B CMS software, AT&T 3B2 computer, and the AT&T switch.

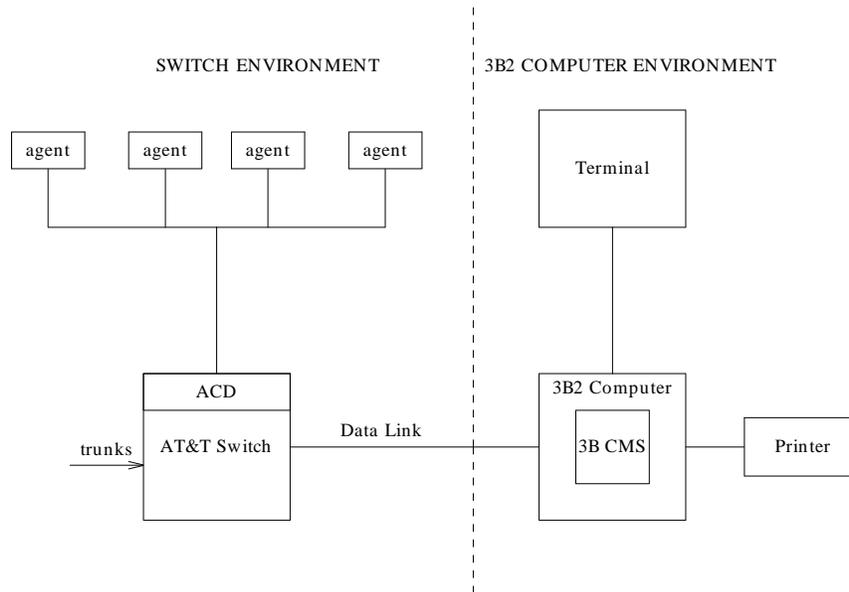


Figure 2-1 3B CMS Environment Model

Telephone calls from outside trunks are routed through the switch to the ACD feature. If all the ACD agents are busy, the ACD feature places the incoming calls into a queue and connects the first call in the queue to the first available agent. At the same time, 3B CMS is gathering data from the ACD. The data is sent to the computer over the data link and stored in one of the 3B CMS databases.

By using a terminal connected to the 3B2 computer, the CMS administrator can access a CMS database and generate reports. The reports can be either real-time or historical depending on the CMS database that was accessed. If the reports are real-time, the administrator can observe changes in traffic flow through the ACD by watching the terminal screen. If the reports are historical, the administrator can send them to a printer so they can be analyzed at a later time.

3B CMS Features

The 3B CMS main menu contains several features or subsystems. Figure 2-2 shows how the main menu is structured. At the top right of the main menu screen, the name of the switch, the status of the switch, and the current time on the computer are displayed.

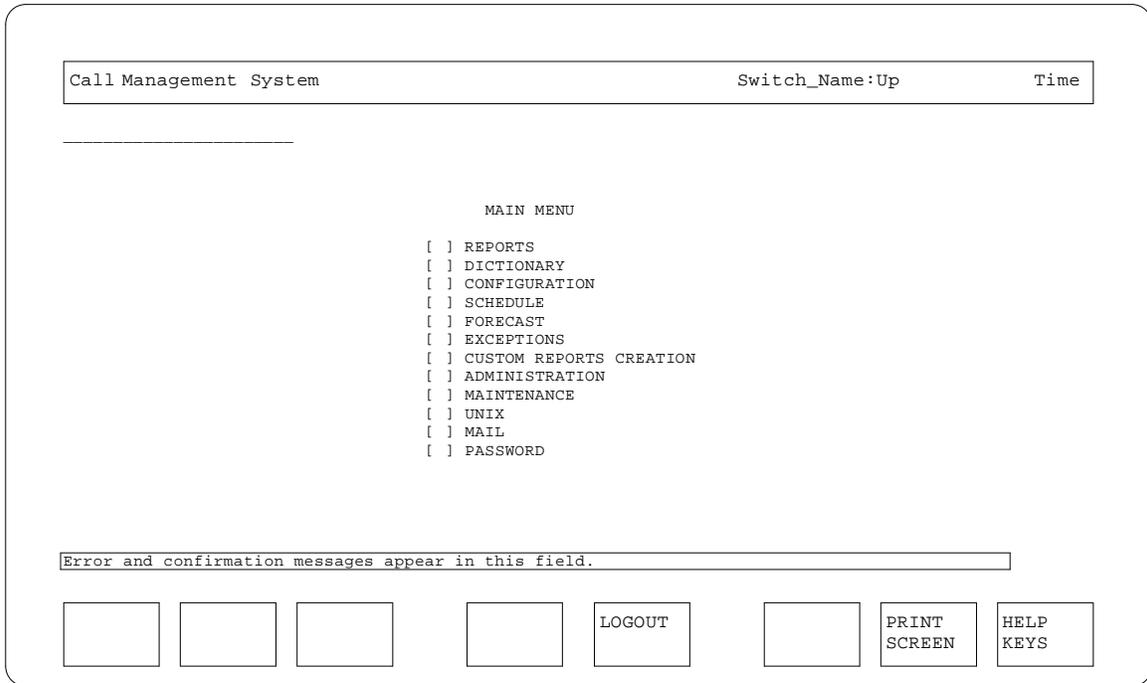


Figure 2-2 CMS Main Menu Screen

3B CMS Features

The 3B CMS subsystems or features are displayed in the center of the main menu screen and are described as follows:

Reports— The 3B CMS monitors and gathers data from the ACD feature. The data is stored in a real-time database. Another database, the historical database, is updated each half hour with information from the real-time database. Two types of reports can be generated from these databases: standard and custom. The format of a standard report has been predefined within the CMS software. Custom reports can be created by using the standard reports format as a foundation.

Real-time reports are usually viewed by the CMS administrator or by a supervisor at a terminal. The reports are updated automatically at regular intervals, which helps the CMS administrator determine the current status of the system. (More information on the refresh or update function is included at the end of this chapter.)

Historical reports can be generated to show the activity that occurred on a particular day, week, or month in the past. These reports are usually printed on the system printer but can be viewed from a terminal.

Dictionary— The dictionary feature is a CMS utility that the administrator can use to assign login identifications to agents; customize names associated with agents, splits, and trunk groups by using synonyms; and define reporting groups without regard to split assignment. Other features are available in the dictionary to help the CMS administrator understand the structure of reports and customize reports.

Configuration— The configuration feature allows the CMS administrator or a supervisor to modify configurations. Reports about agent activities can also be generated by this feature.

NOTE

CMS software does not provide *Intraflow* and *Move Trunk Groups* capabilities on the Generic 1, Generic 3i, System 75, and System 75 XE switch.

Schedule— The scheduler feature permits the CMS administrator or a supervisor to schedule certain 3B CMS activities (*Daily Data Save, Move Extensions*, etc.) to occur at specified times. Some activities, such as generating historical reports, can be scheduled to occur late at night when the system is less congested.

Forecast— The forecasting feature is used by the CMS administrator to determine how many agents or trunks will be needed in the future based on historical data and parameters set by the CMS administrator.

Exceptions— The CMS administrator can use this feature to define exceptions or out-of-tolerance conditions about events that occur in the system. The administrator can detect when an exception occurs by observing real-time reports at a terminal screen or by generating reports that summarize the exceptions.

Custom Reports Creation— This subsystem is used by the CMS administrator to create historical and real-time CMS reports that arrange the statistics in a useful way for a customer's particular location. The Custom Reports subsystem can access any of the data items that CMS collects data on.

Administration— This feature is used by the CMS administrator to set up access permissions to the system, splits, and trunk groups.

Maintenance— The maintenance feature is used by the administrator to perform certain "housekeeping" tasks such as *Data Back-Up* and *Daily Data Save*. Two troubleshooting tools, *Session Status* and *Error Log*, also located in the maintenance feature, can be used to obtain information about the data link and to record CMS errors.

UNIX System— This feature allows the administrator to switch to the UNIX operating system environment.

Mail— Some 3B CMS features send mail to the administrator, split supervisors, and other personnel after scheduled events have completed. To read their mail, the administrator, split supervisors, and other personnel access the *MAIL* feature via the CMS main menu.

Password— This feature is used by CMS users to change their passwords.

Graphics Feature of 3B CMS

The separately-purchased 3B CMS Graphics feature offers bar graph reports which can be generated from both real-time and daily historical data. In bar graph reports, data is displayed in the form of bars of variable height and intensity (or variable color if the user has a 615 CMT color terminal). These bar graph reports are most useful for quick reference and for printing visual representations of data. They are not intended to substitute for the detailed data available in regular CMS reports. Also, unlike regular reports, bar graphs may not be customized using the Custom Reports Creation subsystem.

However, bar graphs may be administered to display data according to user-defined scales and to change intensity (or color for the 615CMT terminal) based on user-defined parameters. The bars in a bar graph can be set to change to dim, normal, and bright (or green, yellow, and red for the 615CMT terminal) according to user-defined performance levels.

The user can print bar graphs on any CMS-supported printer. With most printers, each bar is built from one of three replicated ASCII characters. The character used to build the bar indicates which one of the user-defined performance levels the bar represents. However, the user can get bar graph printouts with high quality graphics characters (which use the IBM Extended Graphics character set) if one of the following CMS-supported printers is used:

AT&T 477

AT&T 570

AT&T 583.

These printers print each bar in one of three shades of gray, where each shade indicates one of the user-defined performance levels.

NOTE

Though the 583 is a color printer, it can print bars only in variable shades of the same color. It cannot be administered to use three different colors to represent the user-defined performance levels.

For more information on CMS Graphics, refer to the *3B Call Management System Graphics Administrations* (5-85-215-505) document.

Vectoring Feature of 3B CMS

The 3B CMS software provides reporting capabilities on the Call Vectoring feature that is available with the Generic 3i, Generic 2, and System 85, R2V4 switches. Also, for the Generic 2 and System 85 switches only, the 3B CMS also provides an administration interface.

Call Vectoring is a flexible and sophisticated way of routing and processing incoming calls to the Generic 3i, Generic 2 and System 85, R2V4 switches. Call Vectoring consists of user definable, multistep routing tables, or Call Vectors. These programmable call vectors are used to direct calls to specified on-network or off-network destinations, to queues in ACD splits, or to treatment such as forced first announcements, multiple recorded announcements, forced disconnect, forced busy, or delay treatment.

For Generic 2 and System 85, the 3B CMS software provides the facilities for creating, copying, editing, and deleting Call Vectors (vector tables).

For more information on the Call Vectoring feature of the Generic 2 and System 85, R2V4 switches, refer to the *AT&T DEFINITY Communications System Generic 2 and System 85 Feature Descriptions* (5-55-104-301) and the *3B CMS Vectoring Administration* (5-85-215-502) documents.

For more information on the Call Vectoring feature of the Generic 3i switch, refer to the *AT&T DEFINITY Communications System Generic 1 and 3i Feature Description* (5-55-104-301), the *Generic 3i Call Vectoring Guide* (5-55-230-520), and the *3B CMS Vectoring Administration* (5-85-215-502) documents.

Disk Mirroring With 3B CMS

Disk mirroring is supported only for the 3B2/ 522 and 3B2/ 1000 Model 70 computers. The 3B CMS mirrored disk configuration produces an extra measure of reliability. The external disk drive records (mirrors) the same information as the internal disk drive. This disk mirroring prevents data from being lost if one of the disk heads crashes.

The 3B2 disk mirroring utilities are included with the UNIX System V, Release 3.2.1 software. Disk mirroring can be used with all supported SCSI disks and disk drives described in this document.

CMS Performance Guidelines

For peak performance of the 3B CMS software, the customer should adhere to the following guidelines:

Large reports should be printed during off-peak hours.

Reports should not be scheduled to print at the same time during off-peak hours.

Forecasting should be done during off-peak hours.

Agents should not log in and out excessively during their shifts. If they do, the available disk storage space will be depleted at a rapid rate.

If possible, database backups should be scheduled to run during off-peak hours when reports are not being printed, preferably after midnight when the system is not busy.

The customer should not activate more than 20 agent traces at any given time.

For the Group Status real-time report, see the equations in the *Refresh Rates for the Group Status Real-Time Report* to determine the optimal refresh rate.

ACD agent statistics should be monitored with the minimum number of supervisor terminals sufficient for adequate and timely management of the ACD.

Minimize the number of terminals used to view real-time reports. Refer to the *Refresh Rates For Real-Time Reports* section in this chapter.

If a custom report uses “quads” to display real-time information, each quadrant in the report should be considered a terminal when determining refresh rates.

The Daily Login and Logout report for an AUDIX split will show an unusual number of logins and logouts since AUDIX ports are automatically logged in/ out each half-hour. This number of logins and logouts can use substantial amounts of disk space. Also, the AUDIX split report will show AUDIX agents not fully available. Therefore, CMS measurement of AUDIX splits is **not** recommended. In addition, if an AUDIX split is administered on the switch, the split's number should be higher than that of any measured split since CMS-measured split numbers must be in sequence starting from 1.

Processor Occupancy

Processor occupancy is a measure of the “busy-ness” of the processor with a given application. Processor occupancy ranges from 0 (or 0 percent) to 1.0 (or 100 percent), where 0 or 0 percent is completely idle, and 1.0 or 100 percent is completely busy.

The combined steady-state processor occupancy of a 3B2 computer running 3B CMS should not exceed 0.80 (80 percent). The steady-state processor occupancy for 3B CMS (that is, the occupancy attributable to the CMS-to-switch communications link, the refresh or update of terminals, and management and detection of exceptions) can be approximated with the following equations:

For the 3B2/ 400 computer:

$$\text{Processor Occupancy} = 0.075A + 0.005v + 0.016a + 0.005c + 0.015t + \min(0.055T, 0.275)$$

For the 3B2/ 522 and 3B2/ 1000 Model 70 computers:

$$\text{Processor Occupancy} = 0.04A + 0.003v + 0.008a + 0.003c + 0.008t + \min(0.025T, 0.275)$$

Where:

- A* is the number of ACDs.
- a* is the total number of agents (in all ACDs) divided by 100.
- c* is the total traffic in thousands of calls per hour.
- t* is the total number of observed trunks divided by 100.
- T* is the total number of terminals.
- v* is the number of ACDs using the Call Vectoring feature.
- min* is the smallest of its two arguments.

The half-hour data-save process may contribute as much as 0.20 to the processor occupancy. (This process is reasonably short in duration and appears to have minimal impact on the observed performance of CMS.)

However, the **Daily Data Archive** or **daily dsave** process may contribute as much as 0.35 to 0.40 to the processor occupancy. For this reason, the **Daily Data Archive** process should be scheduled to run after midnight. [Refer to the “Maintenance” chapter in the *3B CMS Administration* (5-85-215-504) document.]

Refresh Rates for Real-Time Reports

Real-time reports can be refreshed or updated from every 10 to every 300 seconds. The default refresh or update rate for any real-time report is 30 seconds. Before a CMS user can display a real-time report, the user must choose a refresh rate.

The processor occupancy of the 3B2 host computer should be considered when selecting the refresh rate for a real-time report. In other words, as the number of terminals used to display real-time reports increases, a slower refresh rate should be selected to maintain a tolerable processor occupancy. Additionally, a slower refresh rate should be selected if the customer is printing historical reports, archiving the daily data, or running any other process that increases the processor occupancy during normal working hours.

Refresh Rates on the 3B2/400 Computer

Generally, the refresh rate for real-time reports should be determined as follows:

$$p = 2 T$$

In this equation, T is the number of terminals running real-time reports, and p is the refresh rate in seconds.

Table 2-1 shows some examples of refresh rates for terminals connected to a 3B2/400 computer based on the number of terminals used to display real-time reports.

NOTE

For the maximum number of terminals supported by the 3B2/400 computer running the 3B CMS software, refer to the section *3B CMS I/O Capacities* in Chapter 3.

If a custom report containing “quads” is used to display real-time information, each quadrant in the report should be counted as a terminal when determining refresh rates.

A terminal cannot refresh faster than 10 seconds regardless of how many terminals are used to display real-time reports.

Table 2-1 Terminal Refresh Rates for 3B2/ 400 Computer

No. Terminals	Refresh Rate/ Terminal
2-10	
4-10	
6-12	
8-16	
1-0	20
1-2	24
1-4	28
1-6	32
1-8	36
2-0	40

Refresh Rates on the 3B2/522 and 3B2/1000 Model 70 Computers

Generally, the refresh rate for real-time reports should be determined as follows:

$$p = T$$

In this equation, T is the number of terminals running real-time reports, and p is the refresh rate in seconds. (Notice that $p = T$.)

Table 2-2 shows some examples of refresh rates for terminals connected to a 3B2/ 522 or 3B2/ 1000 Model 70 computer based on the number of terminals used to display real-time reports.

NOTE	For the maximum number of terminals supported by the 3B2/ 522 and 3B2/ 10-00 Model 70 computers running the 3B CMS software, refer to the section <i>3B CMS I/O Capacities</i> in Chapter 3.
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If a custom report containing “quads” is used to display real-time information, each quadrant in the report should be counted as a terminal when determining refresh rates.

A terminal cannot refresh faster than 10 seconds regardless of how many terminals are used to display real-time reports.

Table 2-2 Terminal Refresh Rates for 3B2/ 500 and 3B2/ 600 Computers

No. Terminals	Refresh Rate/ Terminal
2-10	
4-10	
6-10	
8-10	
1-0	10
1-2	12
1-4	14
1-6	16
1-8	18
2-0	20

Different Refresh Rates for Different Terminals

Some customers may want to have the data for their real-time reports refreshed at different rates for different terminals. The following equations provide the constraints on refresh rates for such customers.

For customers using a 3B2/ 400 host computer, use the following equation:

$$\sum \frac{2 T_i}{p_i} = 1$$

Where T_i is the number of terminals that request a refresh period of p_i , and the sum includes all such groups of different terminals.

For customers using a 3B2/ 522 or 3B2/ 1000 Model 70 host computer, use the following equation:

$$\sum \frac{T_i}{p_i} = 1$$

CMS Performance Guidelines

Refresh Rate Example 1:

A-3B2/ 400 CMS customer wishes to have 1 terminal refresh every 10 seconds, 2 every 20 seconds and 12 additional terminals to refresh as often as possible. How fast should the 12 terminals refresh? Inserting the known parameters into the 3B2/ 400 equation yields:

$$\frac{2 \cdot 1}{1 \cdot 0} + \frac{2 \cdot 2}{2 \cdot 0} + \frac{2 \cdot 1 \cdot 2}{r} = 1$$

Multiplying the known values gives:

$$\frac{2}{1 \cdot 0} + \frac{4}{2 \cdot 0} + \frac{2 \cdot 4}{r} = 1$$

Finding the common denominator results in:

$$\frac{1}{5} + \frac{1}{5} + \frac{2 \cdot 4}{r} = 1$$

Subtracting the known value, $\frac{2}{5}$, from both sides of the equation gives:

$$\frac{2 \cdot 4}{r} = \frac{3}{5}$$

Multiply each side of the equation by 5:

$$\frac{2 \cdot 4 \cdot 5}{r} = 3$$

Multiply each side of the equation by r :

$$2 \cdot 4 \cdot 5 \cdot r = 3 \cdot r$$

Divide by 3 to isolate r :

$$\frac{2 \cdot 4 \cdot 5}{3} = r$$

Reduce the fraction:

$$4 \cdot 0 = r$$

Express in terms of r :

$$r = 4 \cdot 0 \text{ seconds}$$

Therefore, the 12 terminals can refresh at a frequency no less than every 40 seconds.

Refresh Rate Example 2:

Can a 3B2/ 400 CMS customer refresh 1 terminal every 10 seconds, 3 terminals every 15 seconds, and 6 terminals every 25 seconds?

$$\begin{array}{cccc} 2 \cdot 1 & 2 \cdot 3 & 2 \cdot 6 & 2 \cdot 7 \\ 1-0 & 1-5 & 2-5 & 2-5 \end{array}$$

Because the result is greater than 1, this configuration is not recommended. However, this configuration would be acceptable if the 6 terminals were refreshed every 30 seconds.

NOTE	Failure to provide adequate time between refreshes will increase processor occupancy which causes the performance of the 3B CMS software to slow down.
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Refresh Rates for the Group Status Real-Time Report

The Group Status real-time report requires more processing time than any other real-time report. Therefore, the refresh rate equations in this section should be taken into consideration whenever terminals are used to monitor this real-time report.

For the 3B2/ 400 Computer:

If there are T_g terminals running the Group Status real-time report, T_o terminals running other types of real-time reports, and if both groups of terminals are refreshing with the *same* period p , the following equation should be used:

$$p \geq 2 T_o + 2 \cdot 2 T_g$$

If there are T_g terminals running the Group Status real-time report with refresh period p_g , and T_o terminals running other types of real-time reports with refresh period p_o , the following equation should be used:

$$\frac{2 T_o}{p_o} + \frac{2 \cdot 2 T_g}{p_g} \leq 1$$

If different refresh rates are used on different terminals, then the constraint becomes:

$$\sum \frac{2 T_{oi}}{p_{oi}} + \sum \frac{2 \cdot 2 T_{gi}}{p_{gi}} \leq 1$$

The second sum in this equation includes all groups of terminals running Group Status real-time report, and the first sum includes all groups of terminals running other types of real-time reports.

For the 3B2/ 522 and 3B2/ 1000 Model 70 Computers:

The equations previously described can also be used for the 3B2/ 522 and 3B2/ 1000 Model 70 computers except that the constant which multiplies the number of terminals running Group Status real-time report must be changed from 22 to 11, and the constant multiplying the number of terminals running other types of real-time reports must be changed from 2 to 1.

For example, the equation used for a 3B2/ 400 (the third equation above) becomes the following for a 3B2/ 522 computer:

$$\frac{T_{oi}}{P_{oi}} = \frac{1-1T_{gi}}{P_{gi}} + 1$$

Refresh Rate for Group Status Real-Time Report, Example 1:

A customer has three terminals running the Group Status real-time report and six terminals running other types of real-time reports. The customer wants to use the same refresh rate for each terminal. What is the smallest refresh period that should be requested?

For a 3B2/ 400 computer, use the following equation:

$$p = \frac{2(6) + 22(3)}{1} = 78 \text{ seconds}$$

For a 3B2/ 1000 Model 70 computer, use the following equation:

$$p = \frac{1(6) + 11(3)}{1} = 39 \text{ seconds}$$

Refresh Rate for Group Status Real-Time Report, Example 2:

A customer has two terminals running the Group Status real-time report, and four terminals running other types of reports. The terminals running other types of reports have a 30-second refresh rate. What should the refresh rate be for the terminals running the Group Status real-time report?

For a 3B2/ 400, use the following equation:

$$\frac{2(4)}{3-0} = \frac{2-2(2)}{p_g} + 1$$

$$p_g = 6-0 \text{ seconds}$$

For a 3B2/ 522 computer, use the following equation:

$$p_g = \frac{1(4) + 1(2)}{3 - 0} = 1$$

p_g 2-5.4seconds

(A refresh rate of at least 26 seconds should be requested on a 3B2/ 522 computer.)

Refresh Rates for 1200/2400 Baud Terminals With CMS Graphics

Terminals operating at 1200 or 2400 baud may not correctly repaint bar graph reports. This problem occurs when the refresh rate is faster than the terminal can handle. Thus, the following refresh rates are recommended when 1200 or 2400 baud terminals are displaying bar graphs:

For 2400 baud terminals, the refresh rate should be 15 seconds.

For 1200 baud terminals, the refresh rate should be 30 seconds.

NOTES

General Information

The overall purpose of this chapter is to help you determine how many agents and trunks are needed to support a given ACD, how much disk space will be required, and which AT&T 3B2 computer will meet the needs of the customer in a 3B CMS environment.

The material contained in this chapter is as follows:

- ACD Parameters

- ACD Engineering Guidelines

- Disk Memory Sizing Guidelines

- Selecting a 3B2 Computer

- Selecting a 3B CMS Administrator

- Training

- Documentation.

ACD Parameters

Table 3-1 shows the maximum values of the Automatic Call Distribution (ACD) parameters supported by the AT&T Private Branch Exchanges (PBXs), while Table 3-2 shows the maximum values of the ACD parameters supported by the 3B CMS-approved 3B2 computers.

Table 3-1 ACD Parameters Supported by AT&T Switches

Host Switch	ACD Parameters						
	Splits	Agents	Trunk Groups	Trunks	Vectors	VDNs	Call Arrivals (Per Hour)
DIMENSION	30	512	18-255†	1,600	n/ a	n/ a	20,000
System 75	32	200	60	200	n/ a	n/ a	2,000‡
R1V3							
Generic 1, 1.1	32*	500	99	400	n/ a	n/ a	4,000** or 5,500‡
Generic 3i	99	500	99	400	256	500	7,000
System 85	30	1,024	18-255†	6,000	n/ a	n/ a	20,000
R2V3							
System 85	60	1,024	18-999†	6,000	128	32,000	25,000 (Vectoring) 32,000 (No Vectoring)
R2V4							
Generic 2.1	60	1024	18-999†	6,000	128	32,000	25,000 (Vectoring) 3-2,000 (No Vectoring)

* 99 splits are available on the Generic 1.1 Load 5.0 PBX. For earlier versions of Generic 1, the number of available splits is 32.

† The switch can have a maximum of 999 trunk groups, but CMS can only measure 2-38 trunk groups. In addition, to be measured, a trunk group must be assigned a trunk group number from 18 to 255.

** These rates assume an ideal ACD scenario in which incoming ACD calls comprise 100% of call traffic on trunks to the PBX and the calls are equally divided between two general types of splits, each with the following call flow:

For the first type of split, calls receive a forced first announcement and are then answered immediately.

For the second type of split, calls go into queue, where half of the calls receive a first announcement and are then answered immediately and the other half receive a first announcement, a second announcement, and are then answered immediately.

If other applications or other types of call flow are involved with the PBX, call arrivals will be lower.

‡The 5,500 call arrival rate on Generic 1 applies **only** to the Generic 1.1 Load 5.0 PBX. For earlier versions of the Generic 1 PBX, the call arrival rate is 4,000.

NOTE	In Table 3-1, the number of ACD agents each switch supports represents the maximum number of phones that can be logged into the ACD simultaneously.
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Table 3-2 ACD Parameters Supported by 3B CMS

ACD Parameters	3B CMS Host Computers		
	3B2/ 400*	3B2/ 522*	3B2/ 1000 Model 70*
Agents†	400	1,023	1,023**
Splits†	60	60	60**
Trunk Groups†	238‡	238‡	238**‡
Trunks†	700/ 100	1,400/ 100	1,400/ 100**
Vectors†	128	128	128**
VDNs†	255	255	255**
Call Arrivals Per Hour†	10,000	25,000	35,000**
			The maximum number of calls for all ACDs is 80,000.
Number of ACDs	1	1	4
Hr. Data (Days)	31	31	31
Daily Data (Days)	387	387	387

* The 3B2/ 310, 3B2/ 500, and 3B2/ 600, which are no longer orderable for 3B CMS, have capacities that match those of the 3B2/ 400, 3B2/ 522, and 3B2/ 1000 Model 7-0 respectively.

† The maximums of the listed parameters cannot be achieved simultaneously (refer to the sections *Disk Memory Sizing Guidelines* and *Processor Occupancy* for a description of the constraints).

** Since CMS on a 3B2/ 1000 Model 70 can handle up to 4 ACDs, these values can theoretically be multiplied by 4. These are maximum values per ACD connected to the 3B2/ 1000 and are for a Generic 2 ACD. If the customer has a different switch, these values could be lower. See Table 3-1, ACD Parameters Supported by AT&T Switches.

‡ On a System 85 R2V4/ Generic 2, CMS can measure only trunk groups numbered from 18 to 2-55.

NOTE

In Table 3-2, the number of agents each computer supports represents the maximum number of agents that CMS can simultaneously track. In actuality, CMS can keep records for as many agents as there are possible login IDs. Therefore, if a call center has three shifts of agents, with 1023 agents active per shift, CMS on a 3B2/ 1-000 Model 70 could provide data for 3069 different login IDs.

NOTE

CMS measurement of AUDIX splits is **not** recommended. The CMS Daily Login and Logout report for an AUDIX split will show an unusual number of logins and logouts since AUDIX ports are automatically logged in/ out each half-hour. This number of logins and logouts can use substantial amounts of disk space.

If an AUDIX split is administered on the switch, the split's number should be higher than that of any CMS-measured split since CMS-measured split numbers must be in sequence starting from 1.

Measured and Unmeasured Trunks

The entries for trunks under the 3B2/ 400, 3B2/ 522, and 3B2/ 1000 Model computer columns in Table 3-2 are measured and unmeasured trunks. A minimum of 100 unmeasured trunks are provided by default. This number of unmeasured trunks is required for intra-PBX calls to splits and for transferring calls (transfers seize an unmeasured trunk only until the transfer is complete). On a Generic 3i switch with Call Vectoring, additional unmeasured trunks (over and above the base of 100 unmeasured trunks) are required if calls will be queued to multiple splits simultaneously.

If more than 100 unmeasured trunks are needed for an ACD, the maximum number of measured trunks will decrease accordingly. For example, on a 3B2/ 1000 Model 70, which supports a total of 1500 measured and unmeasured trunks for the ACD, you might choose to have 300 unmeasured trunks, which will leave 1200 trunks available for measurement.

NOTE

A PBX can actually support many more unmeasured trunks than shown in Table 3-2 — **without affecting the available number of measured trunks**. However, these additional trunks can only be used for non-ACD purposes. Using additional unmeasured trunks for ACD will **always reduce** the available number of measured trunks.

Unmeasured Trunks For Multiple Split Queuing

On a Generic 3i switch with Call Vectoring, a call may queue to up to three splits simultaneously. However, after occupying a measured trunk and queuing to one split, the call will occupy an unmeasured trunk for each additional split the call queues to. Therefore, if a call is queued to three splits simultaneously, the call will occupy one measured trunk and two unmeasured trunks. When the call connects to an agent in a split, the call will continue to occupy the measured trunk, regardless of which split it is answered in, and the two unmeasured trunks become available again.

The unmeasured trunks that are used in multiple split queuing reduce on a one-to-one basis the number of measured trunks available on the Generic 3i switch. To determine how many unmeasured trunks are needed for multiple split queuing, do the following:

- 1 Estimate the maximum number of calls N_{calls} that, at any point in time, will be queued across all splits on the ACD.

If an estimate cannot be made based on historical experience, use the following formula to calculate maximum queued calls on the ACD:

$$N_{calls} = N_{agents} \frac{T_{wait}}{T_{agocc}}$$

Where:

- N_{agents} is the expected number of agents simultaneously logged in
- T_{wait} is the expected average time in seconds that a caller will wait in queue before hanging up
- T_{agocc} is the expected average time in seconds that an agent will spend on a call, including after-call-work.

- 2 Estimate the average number of splits N_{splits} that a call might queue to. This average can be determined with the following formula:

$$N_{splits} = \frac{N_{non\ msq\ calls} + (N_{msq\ calls} \cdot N_{queued})}{N_{non\ msq\ calls} + N_{msq\ calls}}$$

Where:

- $N_{non\ msq\ calls}$ is the maximum number of calls per hour that do **not** queue to multiple splits
- $N_{msq\ calls}$ is the maximum number of calls per hour that queue to multiple splits
- N_{queued} is the average number of splits a call will simultaneously queue to in a multiple split scenario

- 3 Find the number of unmeasured trunks N_{trunks} with the following equation:

$$N_{trunks} = N_{calls} \cdot (N_{splits} - 1)$$

Add this number of unmeasured trunks into one of the formulas in the following section, Measured Trunks Available On the Switch.” These formulas are used to determine the number of measured trunks available on the switch. The number of unmeasured trunks is represented in the formulas by u .

Measured Trunks Available On The Switch

The measured trunks available can be determined as follows:

For the 3B2/ 522 and 3B2/ 1000 Model 70 computers:

$$t = 1-400 \max(u - 1-00, 0)$$

For the 3B2/ 400 computer:

$$t = 7-00 \max(u - 1-00, 0)$$

Where t is the number of measured trunks and u is the number of unmeasured trunks.

For example, 3B CMS residing on a 3B2/ 400 computer is used to monitor an ACD with 150 unmeasured trunks. The maximum number of measured trunks that the 3B CMS will be able to monitor can be determined as follows:

$$t = 7-00 \max(u - 1-00, 0)$$

$$t = 7-00 \max(1-50 - 100, 0)$$

$$t = 7-00 - 50$$

$$t = 6-50$$

For this example, 3B CMS will only be able to monitor 650 measured trunks.

ACD Engineering Guidelines

Use this section to determine how many agents and trunks will be required for an ACD being monitored by 3B CMS software. Remember, do not exceed the maximum values of the ACD parameters supported by 3B CMS which are stated in Table 3-2.

NOTE

Be sure to include the customer's future growth expectations when determining the requirements for the ACD. If a growth factor is not included and the customer decides later to add agents, trunks, or splits to the system, the hard disk system on the 3B2 computer may not be able to accommodate the additional agents, trunks, splits, etc. The Delivery Operation Support Subsystem (DOSS) configurator described in Chapter 4 selects the 3B2 computer based on maximum growth projections.

When configuring a new ACD, Tables 3-3 through 3-14 should be used to determine how many agents and trunks will be required to handle a given rate of incoming calls. Each split should be designed individually for the number of agents and trunks required, subject to any pertinent switch limitations.

The number of agents and trunks required to handle the incoming calls to an ACD depends on the business being served by the ACD. For example, if a business has a captive customer base and each call represents the pay out of money, the business may want to provide fewer trunks than agents. An example might be the claims department of an insurance company. On the other hand, when each call represents a new customer and each blocked call represents potential lost income, the business will probably want to provide more trunks than agents to minimize the blocking.

The point is this: the design of the ACD should be based on how a business values a lost or blocked call.

Interpolation

Interpolation is a method of estimating tabular values of a function between two known values of that function. When using Tables 3-3 through 3-13 to determine the number of agents required and Table 3-14 to determine the number of trunks required for a given ACD, you may find that the expected number of call arrivals or the carried load lies somewhere between two entries in the tables. Therefore, the number of agents or trunks required will also lie somewhere between the two entries.

ACD Engineering Guidelines

If this is the case, the number of agents required or number of trunks needed can only be found by interpolation. Use the following equation to interpolate between tabular values:

$$y - y_0 = \left(\frac{y_1 - y_0}{x_1 - x_0} \right) (x - x_0)$$

Where:

x is the independent variable.

y is the dependent or functional variable.

x_0 is the tabular value of the independent variable that immediately precedes x .

x_1 is the tabular value of the independent variable that immediately succeeds x .

y_0 is the tabular value of the dependent variable that immediately precedes y .

y_1 is the tabular value of the dependent variable that immediately succeeds y .

Agent Engineering Guidelines

Tables 3-3 through 3-13 (later in this section) list the number of ACD agents required to handle a given incoming call load. The top rows on each of these tables show the possible delay times for a given incoming call load (*calls per hour* or *busy hour calls*), and the left-most column lists the agents required to handle the incoming call load.

NOTE

The entries in Tables 3-3 through 3-13 are in *busy-hour calls*, which are the number of calls received by the ACD during peak levels of caller activity.

The lines drawn across Tables 3-3 through 3-13 show where the maximum number of *busy-hour calls* handled by 3B CMS have been exceeded. A single line represents the 3B2/ 400 limits, a double line represents the 3B2/ 522 and 3B2/ 1000 Model 7-0 limits.

To determine how many agents will be required to handle the incoming call load of an ACD, use Tables 3-3 through 3-13 as follows:

Estimate the average service time (the time an agent spends processing a call, or talking to a caller). Tables 3-3 through 3-13 contain data that describes the following service times: 7, 15, 30, 45, 60, 90, 120, 180, 240, 300, and 600 seconds. Choose the appropriate table that represents the service time that the customer desires for the ACD.

At the top of the table, choose the closest possible delay time in seconds. A *delay* is defined as the elapsed time from when a call is routed to the ACD split until it is answered by an agent. The delay criterion states that 90 percent of the incoming calls will be answered by the agents before the specified delay has occurred.

Busy-hour calls denotes the number of calls received by the ACD during peak levels of caller activity. Based on previous experience or on suspected levels of caller activity, choose the number of *busy-hour calls*.

After choosing the appropriate table and delay column, find the entry in the table for *busy-hour calls* that is greater than or equal to the number of *busy-hour calls* chosen.

The number of agent positions required is then found in the left-most column of the respective table.

You can interpolate between the tables (for different call service times), between the columns (for different delay times), and between the rows (for different number of calls per hour).

Tables 3-3 through 3-13 were prepared by using a range of 1 to 1000 agents. For small service times, this yields high traffic rates, even for a small number of agents. Neither the switch nor the 3B CMS can support these high traffic loads. The high traffic rates are presented in the tables for completeness only.

Example 1:

The classified ads department of a major newspaper receives 400 calls per hour. The average time an agent spends on each call is 3 minutes. If most of the calls should be answered in less than 30 seconds, how many agents should be employed in this department?

Table 3-10 provides data for 180-second (3-minute) call durations. Under the column heading "30" seconds (delay time), find the first entry greater than 400 calls per hour (4-03). Follow this row left to the agents column and find 25 agents. The number of agents required to answer 4-00 calls (of 3-minute duration) per hour with 90 percent of the callers waiting less than 30 seconds is 25 agents.

For this example, consider the efficiency of the agents and the sensitivity of the parameters to changes in the call arrival rate. The efficiency of the agents is the ratio of the number of agent hours spent on the phone to the number of agent hours in an hour. The number of agent hours spent on the phone is 400 calls per hour times .05 hours (3 minutes) equals 20 agent hours. Therefore, the efficiency is $20 / 25$ (25 agents for 1 hour) equals .80 or 80 percent.

Suppose the calls per hour increased to 425 calls per hour. The efficiency is now $425 * 0.05 / 25 = 0.85$ or 85 percent. The efficiency has increased, but this added efficiency is not free of charge. The delay criterion has changed significantly from about 9.9 percent of all calls taking longer than 30 seconds for an agent to answer to about 18.0 percent (403 calls per hour yield 1-0.0 percent, but 400 calls per hour were stated). To get the delay criterion back to 9.9 percent would require a delay time of about 58.5 seconds. Another measure of what is happening with the queue is the *average* time spent waiting for service in the queue. With 400 calls per hour, the mean time spent in the queue is 7.53 seconds. With 425 calls per hour, the mean time in the queue is 16.14 seconds. The point of this example is to emphasize the sensitivity of the

time in the queue to the arrival rate. In other words, increasing the agent efficiency from 80 percent to 85 percent nearly doubles the various measures of queuing time.

NOTE	For Examples 2 and 3, the ?'s in the tables represent the unknown values you are looking for. The <i>italicized numbers</i> in the tables represent numbers that are not included in Tables 3-3 through 3-13.
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Example 2:

The reservations department for a hotel chain knows that the average call duration is 5 minutes and that most of the potential customers will not wait more than 1 minute for their call to be answered. How many agents are required to handle 5000 calls per hour? Under the 60-second column of Table 3-12, you will find the following information:

agents	60
4-00	4697
?	<i>5000</i>
4-50	5295

To find the number of agents needed to handle 5000 calls per hour, interpolate between the number of agents and calls per hour:

$$y = \text{number of agents needed}$$

$$y - y_0 = \left[\frac{(y_1 - y_0)(x - x_0)}{x_1 - x_0} \right]$$

$$y - 400 = \left[\frac{(450 - 400)(5000 - 4697)}{5295 - 4697} \right]$$

$$y - 400 = \left[50 \frac{303}{598} \right]$$

$$y = 425.335$$

Therefore, 426 agents are needed to support the reservations department.

Example 3:

The manager of a split in an ACD knows that calls average 75 seconds and that the split receives 1500 calls per hour. The manager wants most of the calls to be answered in less than 4-0 seconds. How many agents are required?

To answer this question, you must interpolate between all parameters — first, between delay time and calls per hour to obtain the number of calls per hour for a 40-second delay time. Under the 30- and 45-second columns of Tables 3-7 and 3-8, you will find:

60 Seconds Average Service Time				<i>75 Seconds</i>	90 Seconds Average Service Time			
delay times					delay times			
agents	30	40	45		agents	30	40	45
2-5	1322	?	1364		40	1435	?	1471
?		1500			?		1500	
3-0	1616	?	1661		45	1630	?	1669

Now interpolate between delay time and calls per hour in both tables to obtain calls per hour for a 40-second delay time.

y = number of calls per hour

$$y - y_0 = \frac{(y_1 - y_0)(x - x_0)}{x_1 - x_0}$$

$$y - 1322 = \frac{(1364 - 1322)(40 - 30)}{45 - 30}$$

$$y - 1322 = [42 \frac{10}{15}]$$

$$y = 1350$$

Now you can fill in the first blank: 1350 calls per hour under the 40-second delay time heading. Repeat the interpolation process three more times to come up with the figures 1646, 1459, and 1656.

60 Seconds Average Service Time				<i>75 Seconds</i>	90 Seconds Average Service Time			
delay times					delay times			
agents	30	40	45		agents	30	40	45
2-5	1322	1350	1364		40	1435	1459	1471
?		1500			?		1500	
3-0	1616	1646	1661		45	1630	1656	1669

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Next, interpolate between number of agents and the calls per minute (in both the 60-second and 90-second tables) to obtain the number of agents needed when 1500 calls per minute are expected, as follows:

y = number of agents needed when a 60-second service time is desirable

$$y - y_0 \left[\frac{(y_1 - y_0)(x - x_0)}{x_1 - x_0} \right]$$

$$y - 25 \left[\frac{(30 - 25)(1500 - 1350)}{1646 - 1350} \right]$$

$$y - 25 \left[\frac{150}{296} \right]$$

$$y = 27.5$$

So now we know that 27.5 agents would be needed when a 60-second service time is desirable. Repeat the above interpolation process once (for a 90-second service time) to come up with the result:

$$y \text{ (number of agents)} = 41.0$$

60 Seconds Average Service Time				75 Seconds	90 Seconds Average Service Time			
	delay times				delay times			
agents	30	40	45		agents	30	40	45
2-5	1322	1350	1-364		40	1435	1459	1-471
27.5		1500			41.0		1500	
3-0	1616	1646	1-661		45	1630	1656	1-669

Finally, interpolate between agents and service times to determine the number of agents needed when a 75-second service time is desirable.

y = number of agents needed when a 75-second service time is desirable

$$y - y_0 \left[\frac{(y_1 - y_0)(x - x_0)}{x_1 - x_0} \right]$$

$$y - 27.5 \left[\frac{(41 - 27.5)(75 - 60)}{90 - 60} \right]$$

$$y - 27.5 \left[\frac{13.5}{30} \right]$$

$$y = 34.25 \text{ (or } 35)$$

From exact calculations, 34 agents imply that 12.2 percent of the incoming calls will wait more than 40 seconds. Or, with 35 agents, 5.56 percent will wait more than 40 seconds. If it is desirable that anything above, say, 10 percent is undesirable, a 35th agent must be acquired.

Table 3-3 7 Seconds Average Service Time

agents	delay times								
	11	15	22	30	45	60	90	120	180
1-154	195	253	302	359	392	429	449	470	
2-575	648	736	799	865	902	942	962	984	
3-1044	1135	1237	1305	1376	1415	1455	1476	1498	
4-1531	1633	1743	1815	1888	1928	1969	1990	2012	
5-2025	2136	2251	2326	2401	2441	2483	2504	2526	
6-2525	2641	2761	2838	2914	2955	2997	3018	3040	
7-3027	3149	3272	3350	3428	3469	3511	3533	3555	
8-3532	3657	3783	3863	3941	3983	4025	4047	4069	
9-4038	4167	4295	4376	4455	4496	4539	4561	4583	
1-0	4545	4677	4808	4889	4969	5010	5053	5075	5097
1-2	5562	5699	5833	5916	5997	6039	6082	6104	6126
1-4	6581	6722	6859	6943	7025	7067	7110	7132	7155
1-6	7602	7746	7885	7971	8053	8095	8139	8161	8183
1-8	8625	8771	8912	8998	9081	9123	9167	9189	9212
2-0	9648	9797	9939	10026	10109	10152	10195	10218	10240
2-5	12208	12362	12508	12596	12680	12723	12767	12789	12812
3-0	14772	14929	15077	15166	15251	15294	15338	15360	15383
3-5	17337	17497	17647	17736	17822	17865	17909	17932	17954
4-0	19903	20065	20217	20307	20393	20436	20481	20503	20526
4-5	22470	22634	22787	22878	22964	23008	23052	23074	23097
5-0	25037	25204	25357	25449	25535	25579	25623	25646	25669
6-0	30174	30343	30499	30591	30677	30721	30766	30789	30811
7-0	35312	35483	35640	35733	35820	35864	35909	35932	35954
8-0	40451	40624	40782	40875	40963	41007	41052	41074	41097
9-0	45591	45765	45924	46018	46105	46150	46195	46217	46240
1-00	50731	50906	51066	51160	51248	51292	51337	51360	51383
1-25	63582	63760	63922	64016	64105	64149	64194	64217	64240
1-50	76435	76615	76778	76873	76961	77006	77051	77074	77097
1-75	89289	89471	89634	89730	89818	89863	89909	89931	89954
2-00	102144	102326	102491	102586	102675	102720	102766	102788	102811
2-25	114999	115182	115347	115443	115532	115577	115623	115646	115668
2-50	127854	128038	128204	128300	128389	128435	128480	128503	128526
2-75	140710	140895	141061	141157	141246	141292	141337	141360	141383
3-00	153565	153751	153917	154014	154104	154149	154194	154217	154240
3-50	179277	179464	179631	179728	179818	179863	179908	179931	179954
4-00	204990	205177	205345	205442	205532	205577	205623	205645	205668
4-50	230702	230891	231059	231156	231246	231291	231337	231360	231383
5-00	256415	256604	256773	256870	256960	257006	257051	257074	257097
5-50	282128	282318	282487	282584	282674	282720	282765	282788	282811
6-00	307842	308032	308201	308298	308389	308434	308480	308503	308525
6-50	333555	333745	333915	334013	334103	334148	334194	334217	334240
7-00	359268	359459	359629	359727	359817	359863	359908	359931	359954
7-50	384982	385173	385343	385441	385531	385577	385623	385645	385668
8-00	410696	410887	411057	411155	411246	411291	411337	411360	411383
8-50	436409	436601	436771	436869	436960	437005	437051	437074	437097
9-00	462123	462315	462485	462583	462674	462720	462765	462788	462811
9-50	487837	488029	488199	488298	488388	488434	488480	488503	488525
1-000	513551	513743	513914	514012	514103	514148	514194	514217	514240

Table 3-4 15 Seconds Average Service Time

agents	delay times								
	11	15	22	30	45	60	90	120	180
1-44	52	68	86	115	136	163	180	198	
2-196	222	261	295	339	367	399	417	437	
3-386	425	478	521	572	603	637	656	676	
4-592	640	703	752	808	840	876	896	916	
5-806	862	933	986	1045	1078	1115	1135	1156	
6-1025	1089	1165	1221	1282	1317	1355	1375	1396	
7-1248	1317	1399	1457	1521	1556	1594	1615	1636	
8-1474	1548	1634	1694	1759	1795	1834	1854	1875	
9-1702	1780	1869	1932	1998	2035	2074	2094	2115	
1-0	1931	2013	2106	2170	2237	2274	2313	2334	2355
1-2	2393	2482	2580	2646	2715	2753	2793	2814	2835
1-4	2858	2953	3055	3124	3194	3232	3273	3294	3315
1-6	3326	3425	3531	3601	3673	3712	3752	3773	3795
1-8	3796	3899	4008	4079	4152	4191	4232	4253	4275
2-0	4266	4373	4485	4558	4631	4671	4712	4733	4755
2-5	5448	5562	5679	5754	5830	5870	5911	5933	5955
3-0	6634	6753	6875	6952	7029	7069	7111	7133	7155
3-5	7823	7947	8071	8150	8228	8269	8311	8333	8355
4-0	9013	9141	9268	9349	9427	9468	9511	9533	9555
4-5	10205	10336	10466	10547	10626	10668	10711	10732	10755
5-0	11399	11532	11664	11746	11826	11868	11910	11932	11955
6-0	13787	13926	14061	14144	14225	14267	14310	14332	14355
7-0	16178	16321	16458	16543	16624	16667	16710	16732	16755
8-0	18571	18716	18856	18942	19024	19066	19110	19132	19154
9-0	20965	21113	21254	21341	21423	21466	21510	21532	21554
1-00	23359	23510	23653	23740	23823	23866	23910	23932	23954
1-25	29349	29504	29650	29738	29822	29866	29910	29932	29954
1-50	35341	35499	35648	35737	35822	35865	35909	35932	35954
1-75	41334	41496	41646	41736	41821	41865	41909	41932	41954
2-00	47329	47493	47645	47735	47821	47865	47909	47932	47954
2-25	53325	53490	53644	53735	53821	53865	53909	53932	53954
2-50	59321	59488	59643	59734	59821	59865	59909	59932	59954
2-75	65318	65487	65642	65734	65820	65864	65909	65932	65954
3-00	71315	71485	71641	71733	71820	71864	71909	71932	71954
3-50	83310	83482	83640	83733	83820	83864	83909	83931	83954
4-00	95307	95480	95639	95732	95820	95864	95909	95931	95954
4-50	107303	107478	107638	107732	107819	107864	107909	107931	107954
5-00	119301	119477	119637	119731	119819	119864	119909	119931	119954
5-50	131298	131476	131636	131731	131819	131864	131909	131931	131954
6-00	143296	143474	143636	143731	143819	143864	143909	143931	143954
6-50	155294	155473	155635	155730	155819	155864	155909	155931	155954
7-00	167293	167473	167635	167730	167819	167863	167909	167931	167954
7-50	179291	179472	179635	179730	179819	179863	179909	179931	179954
8-00	191290	191471	191634	191730	191818	191863	191909	191931	191954
8-50	203289	203470	203634	203729	203818	203863	203909	203931	203954
9-00	215287	215470	215634	215729	215818	215863	215909	215931	215954
9-50	227286	227469	227633	227729	227818	227863	227909	227931	227954
1-000	239285	239469	239633	239729	239818	239863	239908	239931	239954

Table 3-5 30 Seconds Average Service Time

agents	delay times								
	11	15	22	30	45	60	90	120	180
1-16	18	22	26	35	43	57	68	82	
2-79	86	98	111	132	147	169	183	200	
3-161	173	193	212	240	260	286	301	319	
4-252	270	296	320	353	376	404	420	438	
5-349	371	403	431	468	493	522	539	558	
6-450	476	513	544	585	611	641	659	677	
7-554	583	624	659	702	729	760	778	797	
8-660	692	737	774	819	847	880	898	917	
9-767	803	851	890	937	966	999	1017	1037	
1-0	875	914	965	1007	1055	1085	1118	1137	1157
1-2	1096	1140	1196	1241	1292	1323	1358	1376	1396
1-4	1319	1368	1429	1476	1530	1562	1597	1616	1636
1-6	1544	1597	1663	1712	1768	1801	1836	1856	1876
1-8	1772	1829	1898	1949	2007	2040	2076	2096	2116
2-0	2001	2061	2133	2186	2245	2279	2316	2335	2356
2-5	2577	2645	2724	2781	2843	2877	2915	2935	2956
3-0	3159	3232	3317	3377	3440	3476	3514	3535	3556
3-5	3743	3822	3911	3973	4039	4075	4114	4134	4155
4-0	4330	4414	4507	4571	4637	4674	4714	4734	4755
4-5	4919	5006	5103	5168	5236	5274	5313	5334	5355
5-0	5509	5600	5699	5766	5835	5873	5913	5934	5955
6-0	6692	6789	6894	6963	7034	7072	7113	7134	7155
7-0	7879	7981	8089	8160	8233	8271	8312	8333	8355
8-0	9067	9174	9285	9358	9432	9471	9512	9533	9555
9-0	10257	10368	10482	10556	10631	10670	10712	10733	10755
1-00	11449	11563	11680	11755	11830	11870	11912	11933	11955
1-25	14432	14552	14674	14752	14829	14869	14911	14933	14955
1-50	17419	17545	17670	17750	17828	17869	17911	17933	17955
1-75	20408	20538	20667	20748	20827	20868	20911	20933	20955
2-00	23399	23533	23665	23746	23826	23868	23911	23932	23955
2-25	26392	26529	26662	26745	26826	26867	26910	26932	26955
2-50	29386	29525	29661	29744	29825	29867	29910	29932	29955
2-75	32380	32522	32659	32743	32825	32867	32910	32932	32955
3-00	35375	35519	35658	35742	35824	35867	35910	35932	35954
3-50	41367	41514	41655	41741	41824	41866	41910	41932	41954
4-00	47360	47510	47653	47740	47823	47866	47910	47932	47954
4-50	53354	53507	53652	53739	53823	53866	53910	53932	53954
5-00	59349	59504	59650	59738	59822	59866	59910	59932	59954
5-50	65345	65502	65649	65738	65822	65865	65910	65932	65954
6-00	71341	71500	71648	71737	71822	71865	71909	71932	71954
6-50	77338	77498	77647	77737	77822	77865	77909	77932	77954
7-00	83335	83496	83646	83736	83821	83865	83909	83932	83954
7-50	89332	89495	89646	89736	89821	89865	89909	89932	89954
8-00	95330	95493	95645	95735	95821	95865	95909	95932	95954
8-50	101327	101492	101644	101735	101821	101865	101909	101932	101954
9-00	107325	107491	107644	107735	107821	107865	107909	107932	107954
9-50	113323	113490	113643	113735	113821	113865	113909	113932	113954
1-000	119322	119489	119643	119734	119821	119865	119909	119932	119954

Table 3-6 45 Seconds Average Service Time

agents	delay times								
	11	15	22	30	45	60	90	120	180
1-10	11	12	14	17	21	29	35	45	
2-48	52	57	63	74	83	98	109	122	
3-99	105	115	125	142	155	174	186	201	
4-157	165	179	193	213	229	251	264	280	
5-218	229	246	263	287	305	329	343	359	
6-282	296	316	335	363	382	407	422	439	
7-348	364	387	409	439	460	486	501	519	
8-416	434	460	484	516	538	565	581	598	
9-485	504	533	559	593	616	644	660	678	
1-0	555	576	607	635	671	695	723	740	758
1-2	697	722	758	788	827	852	882	899	918
1-4	841	870	909	943	984	1010	1041	1059	1077
1-6	988	1019	1062	1098	1142	1169	1200	1218	1237
1-8	1135	1170	1216	1254	1300	1327	1360	1378	1397
2-0	1284	1322	1371	1410	1458	1486	1519	1537	1557
2-5	1661	1704	1760	1803	1854	1884	1918	1937	1957
3-0	2042	2090	2151	2198	2251	2282	2317	2336	2356
3-5	2426	2479	2544	2594	2649	2681	2717	2736	2756
4-0	2812	2869	2938	2990	3047	3080	3116	3136	3156
4-5	3199	3260	3333	3387	3445	3479	3516	3535	3556
5-0	3589	3653	3729	3784	3844	3878	3915	3935	3956
6-0	4370	4440	4522	4580	4642	4677	4715	4735	4756
7-0	5154	5230	5316	5376	5440	5476	5514	5535	5556
8-0	5941	6021	6111	6173	6239	6275	6314	6334	6355
9-0	6730	6814	6907	6971	7038	7074	7114	7134	7155
1-00	7520	7607	7703	7769	7837	7874	7913	7934	7955
1-25	9499	9594	9696	9765	9835	9873	9913	9934	9955
1-50	11483	11584	11691	11761	11833	11872	11912	11933	11955
1-75	13470	13576	13686	13759	13832	13871	13912	13933	13955
2-00	15459	15569	15683	15757	15831	15870	15912	15933	15955
2-25	17449	17563	17680	17755	17830	17870	17912	17933	17955
2-50	19441	19558	19677	19754	19829	19870	19911	19933	19955
2-75	21434	21554	21675	21752	21829	21869	21911	21933	21955
3-00	23428	23550	23673	23751	23828	23869	23911	23933	23955
3-50	27417	27543	27670	27749	27827	27868	27911	27933	27955
4-00	31408	31538	31667	31748	31827	31868	31911	31933	31955
4-50	35400	35533	35665	35747	35826	35868	35911	35932	35955
5-00	39393	39530	39663	39745	39826	39867	39910	39932	39955
5-50	43387	43526	43661	43744	43825	43867	43910	43932	43955
6-00	47382	47523	47660	47744	47825	47867	47910	47932	47955
6-50	51378	51521	51658	51743	51824	51867	51910	51932	51955
7-00	55374	55518	55657	55742	55824	55867	55910	55932	55954
7-50	59370	59516	59656	59742	59824	59866	59910	59932	59954
8-00	63366	63514	63655	63741	63824	63866	63910	63932	63954
8-50	67363	67512	67654	67741	67823	67866	67910	67932	67954
9-00	71360	71511	71653	71740	71823	71866	71910	71932	71954
9-50	75358	75509	75653	75740	75823	75866	75910	75932	75954
1-000	79355	79508	79652	79739	79823	79866	79910	79932	79954

Table 3-7 60 Seconds Average Service Time

agents	delay times								
	11	15	22	30	45	60	90	120	180
1-7	7	8	9	11	13	17	22	29	
2-35	36	40	43	50	56	66	74	85	
3-72	75	81	87	97	106	120	130	143	
4-113	118	126	135	149	160	177	188	202	
5-158	164	175	186	202	216	234	246	261	
6-204	212	225	238	257	272	292	305	321	
7-253	262	277	292	313	329	351	364	380	
8-302	313	330	346	370	387	410	424	440	
9-352	365	383	401	427	445	469	483	500	
1-0	403	417	438	457	484	503	528	542	559
1-2	508	524	548	570	600	620	646	662	679
1-4	614	632	659	684	716	738	765	781	799
1-6	721	742	772	799	833	856	884	900	918
1-8	830	853	886	914	951	975	1003	1020	1038
2-0	940	965	1000	1030	1069	1093	1123	1139	1158
2-5	1218	1248	1289	1322	1364	1390	1421	1439	1457
3-0	1500	1534	1579	1616	1661	1688	1720	1738	1757
3-5	1784	1822	1872	1911	1958	1987	2019	2038	2057
4-0	2071	2112	2165	2207	2256	2285	2319	2337	2357
4-5	2358	2403	2459	2503	2554	2584	2618	2637	2657
5-0	2648	2695	2754	2800	2852	2883	2918	2937	2956
6-0	3229	3281	3346	3395	3450	3481	3517	3536	3556
7-0	3813	3870	3939	3990	4047	4080	4116	4136	4156
8-0	4399	4460	4534	4587	4646	4679	4716	4735	4756
9-0	4987	5052	5129	5184	5244	5278	5315	5335	5356
1-00	5576	5645	5725	5781	5843	5877	5915	5935	5956
1-25	7054	7130	7216	7276	7340	7376	7414	7435	7456
1-50	8536	8618	8709	8772	8838	8875	8914	8934	8955
1-75	10021	10108	10204	10269	10337	10374	10413	10434	10455
2-00	11509	11600	11700	11767	11836	11873	11913	11934	11955
2-25	12998	13094	13196	13264	13335	13373	13413	13434	13455
2-50	14489	14588	14693	14763	14834	14872	14913	14934	14955
2-75	15980	16082	16190	16261	16333	16372	16412	16433	16455
3-00	17473	17578	17688	17760	17832	17871	17912	17933	17955
3-50	20460	20570	20683	20757	20831	20871	20912	20933	20955
4-00	23450	23563	23680	23755	23830	23870	23912	23933	23955
4-50	26440	26558	26677	26754	26829	26870	26911	26933	26955
5-00	29432	29553	29675	29752	29829	29869	29911	29933	29955
5-50	32426	32549	32673	32751	32828	32869	32911	32933	32955
6-00	35419	35545	35671	35750	35828	35869	35911	35933	35955
6-50	38414	38542	38669	38749	38827	38868	38911	38933	38955
7-00	41409	41539	41667	41748	41827	41868	41911	41933	41955
7-50	44404	44536	44666	44747	44826	44868	44911	44932	44955
8-00	47400	47534	47665	47747	47826	47868	47911	47932	47955
8-50	50396	50531	50664	50746	50826	50868	50910	50932	50955
9-00	53393	53529	53663	53745	53826	53867	53910	53932	53955
9-50	56389	56527	56662	56745	56825	56867	56910	56932	56955
1-000	59386	59526	59661	59744	59825	59867	59910	59932	59955

Table 3-8 90 Seconds Average Service Time

agents	delay times								
	15	22	30	45	60	90	120	180	240
1-5	5	5	6	7	9	11	14	18	
2-23	24	26	29	32	37	42	49	54	
3-47	50	53	58	63	71	77	87	93	
4-75	78	83	90	96	107	115	125	132	
5-104	109	115	124	131	144	153	164	171	
6-135	141	148	159	168	181	191	204	211	
7-167	174	182	194	205	220	230	243	251	
8-199	208	217	231	242	258	269	282	290	
9-233	242	252	268	280	297	308	322	330	
1-0	267	277	288	305	318	336	347	362	370
1-2	336	348	361	380	394	414	426	441	450
1-4	406	421	435	456	471	492	505	521	529
1-6	477	494	510	532	549	571	584	600	609
1-8	549	568	585	610	627	650	664	680	689
2-0	622	642	661	687	705	729	743	760	769
2-5	807	831	852	882	902	927	942	959	968
3-0	994	1021	1045	1077	1099	1126	1141	1159	1168
3-5	1182	1213	1239	1274	1297	1324	1341	1358	1368
4-0	1373	1406	1435	1471	1495	1524	1540	1558	1568
4-5	1564	1600	1630	1669	1693	1723	1740	1758	1768
5-0	1756	1794	1826	1867	1892	1922	1939	1958	1968
6-0	2142	2185	2220	2263	2290	2321	2338	2357	2367
7-0	2530	2577	2615	2660	2688	2720	2738	2757	2767
8-0	2920	2971	3011	3058	3087	3119	3138	3157	3167
9-0	3311	3365	3407	3456	3485	3519	3537	3557	3567
1-00	3703	3760	3804	3854	3884	3918	3937	3957	3967
1-25	4687	4750	4797	4851	4882	4917	4936	4956	4967
1-50	5673	5742	5792	5848	5881	5917	5936	5956	5967
1-75	6662	6735	6788	6846	6879	6916	6936	6956	6967
2-00	7653	7729	7784	7844	7878	7915	7935	7956	7967
2-25	8645	8725	8782	8843	8878	8915	8935	8956	8967
2-50	9638	9721	9779	9842	9877	9915	9935	9956	9966
2-75	10631	10717	10777	10841	10876	10914	10935	10956	10966
3-00	11626	11714	11775	11840	11876	11914	11934	11956	11966
3-50	13616	13708	13772	13838	13875	13914	13934	13955	13966
4-00	15608	15704	15769	15837	15874	15913	15934	15955	15966
4-50	17601	17700	17767	17836	17873	17913	17934	17955	17966
5-00	19594	19697	19765	19835	19873	19913	19934	19955	19966
5-50	21589	21694	21763	21834	21872	21913	21934	21955	21966
6-00	23584	23691	23762	23833	23872	23912	23933	23955	23966
6-50	25580	25689	25760	25833	25871	25912	25933	25955	25966
7-00	27576	27687	27759	27832	27871	27912	27933	27955	27966
7-50	29573	29685	29758	29832	29871	29912	29933	29955	29966
8-00	31569	31683	31757	31831	31871	31912	31933	31955	31966
8-50	33566	33682	33756	33831	33870	33912	33933	33955	33966
9-00	35563	35680	35755	35830	35870	35912	35933	35955	35966
9-50	37561	37679	37755	37830	37870	37912	37933	37955	37966
1-000	39559	39678	39754	39830	39870	39911	39933	39955	39966

Table 3-9 120 Seconds Average Service Time

agents	delay times								
	15	22	30	45	60	90	120	180	240
1-3	4	4	4	5	6	7	9	11	
2-17	17	18	20	22	25	28	33	37	
3-34	36	37	40	43	49	53	60	65	
4-54	57	59	63	67	74	80	88	94	
5-76	79	82	88	93	101	108	117	123	
6-99	102	106	113	119	129	136	146	153	
7-122	126	131	139	146	157	165	175	182	
8-146	151	156	165	173	185	193	205	212	
9-170	176	182	192	201	213	223	234	241	
1-0	195	202	209	220	229	242	252	264	271
1-2	246	254	262	275	285	300	310	323	331
1-4	298	307	316	331	342	358	369	383	390
1-6	350	361	371	387	399	417	428	442	450
1-8	404	415	427	444	457	475	487	502	510
2-0	457	470	483	501	515	534	547	561	570
2-5	594	609	624	646	661	682	695	711	719
3-0	732	750	767	791	808	830	844	860	869
3-5	872	892	911	937	956	979	993	1010	1019
4-0	1013	1035	1056	1084	1103	1128	1143	1159	1169
4-5	1155	1179	1201	1231	1252	1277	1292	1309	1318
5-0	1297	1324	1347	1379	1400	1426	1442	1459	1468
6-0	1584	1614	1641	1675	1697	1725	1741	1758	1768
7-0	1873	1906	1935	1972	1995	2024	2040	2058	2068
8-0	2163	2199	2230	2269	2293	2323	2340	2358	2368
9-0	2454	2493	2526	2566	2592	2622	2639	2658	2668
1-00	2746	2788	2822	2864	2891	2921	2939	2958	2967
1-25	3480	3527	3565	3610	3638	3670	3688	3707	3717
1-50	4216	4268	4309	4357	4386	4419	4437	4457	4467
1-75	4954	5011	5054	5105	5135	5168	5187	5207	5217
2-00	5694	5754	5800	5853	5883	5918	5937	5957	5967
2-25	6436	6499	6547	6601	6632	6667	6686	6706	6717
2-50	7178	7244	7294	7349	7381	7417	7436	7456	7467
2-75	7921	7990	8041	8098	8130	8166	8186	8206	8217
3-00	8665	8737	8789	8847	8880	8916	8936	8956	8967
3-50	10154	10230	10285	10345	10379	10416	10435	10456	10467
4-00	11645	11725	11782	11843	11878	11915	11935	11956	11967
4-50	13137	13220	13279	13342	13377	13415	13435	13456	13466
5-00	14630	14716	14776	14840	14876	14914	14935	14956	14966
5-50	16124	16213	16274	16339	16375	16414	16434	16456	16466
6-00	17618	17710	17773	17839	17875	17914	17934	17955	17966
6-50	19113	19207	19271	19338	19374	19414	19434	19455	19466
7-00	20609	20704	20769	20837	20874	20913	20934	20955	20966
7-50	22105	22202	22268	22336	22374	22413	22434	22455	22466
8-00	23601	23700	23767	23836	23873	23913	23934	23955	23966
8-50	25097	25198	25266	25335	25373	25413	25434	25455	25466
9-00	26594	26696	26765	26835	26873	26913	26934	26955	26966
9-50	28091	28195	28264	28334	28372	28413	28434	28455	28466
1-000	29588	29693	29763	29834	29872	29913	29934	29955	29966

Table 3-10 180 Seconds Average Service Time

agents	delay times								
	15	22	30	45	60	90	120	180	240
1-2	2	2	2	3	3	3	4	5	
2-11	11	11	12	13	14	16	19	21	
3-22	23	24	25	26	29	31	35	39	
4-35	36	37	39	41	45	48	53	57	
5-49	51	52	55	57	62	66	72	76	
6-64	66	67	71	74	79	84	91	96	
7-79	81	83	87	91	97	102	110	115	
8-95	97	100	104	108	115	121	129	134	
9-111	113	116	122	126	134	140	148	154	
1-0	127	130	133	139	144	152	159	168	174
1-2	160	164	168	175	180	190	197	207	213
1-4	194	198	203	211	217	228	236	246	253
1-6	228	233	239	247	255	266	274	285	292
1-8	263	269	275	284	292	305	313	325	332
2-0	298	304	311	322	330	343	353	364	372
2-5	387	395	403	416	426	441	451	463	471
3-0	478	487	497	511	523	539	549	563	571
3-5	570	581	591	607	620	637	648	662	670
4-0	662	674	686	704	717	736	747	762	770
4-5	755	769	782	801	815	834	847	861	870
5-0	849	864	878	898	913	933	946	961	970
6-0	1038	1055	1071	1094	1110	1132	1145	1160	1169
7-0	1228	1247	1265	1290	1307	1330	1344	1360	1369
8-0	1419	1441	1460	1487	1505	1529	1543	1560	1569
9-0	1612	1635	1656	1684	1703	1728	1743	1759	1769
1-00	1804	1829	1852	1882	1902	1927	1942	1959	1968
1-25	2289	2318	2343	2377	2399	2425	2441	2459	2468
1-50	2776	2809	2837	2873	2896	2924	2940	2958	2968
1-75	3264	3301	3331	3369	3394	3423	3440	3458	3468
2-00	3755	3794	3826	3867	3892	3922	3939	3958	3968
2-25	4246	4288	4322	4365	4391	4421	4439	4458	4468
2-50	4738	4783	4819	4863	4890	4921	4938	4957	4967
2-75	5231	5278	5316	5361	5388	5420	5438	5457	5467
3-00	5724	5774	5813	5859	5887	5920	5938	5957	5967
3-50	6713	6766	6808	6857	6886	6919	6937	6957	6967
4-00	7703	7760	7804	7854	7885	7918	7937	7957	7967
4-50	8694	8754	8800	8853	8883	8918	8937	8957	8967
5-00	9686	9750	9797	9851	9882	9917	9936	9956	9967
5-50	10680	10745	10795	10850	10882	10917	10936	10956	10967
6-00	11673	11742	11792	11848	11881	11917	11936	11956	11967
6-50	12668	12738	12790	12847	12880	12916	12936	12956	12967
7-00	13662	13735	13788	13846	13880	13916	13936	13956	13967
7-50	14657	14732	14786	14845	14879	14916	14935	14956	14967
8-00	15653	15730	15785	15845	15879	15916	15935	15956	15967
8-50	16649	16727	16783	16844	16878	16915	16935	16956	16967
9-00	17645	17725	17782	17843	17878	17915	17935	17956	17967
9-50	18641	18723	18780	18842	18877	18915	18935	18956	18966
1-000	19638	19721	19779	19842	19877	19915	19935	19956	19966

Table 3-11 240 Seconds Average Service Time

agents	delay times								
	15	22	30	45	60	90	120	180	240
1-2	2	2	2	2	2	2	3	3	
2-8	8	8	9	9	10	11	12	14	
3-16	17	17	18	19	20	22	24	27	
4-26	27	27	28	30	32	34	37	40	
5-36	37	38	40	41	44	46	51	54	
6-47	48	49	51	53	57	59	64	68	
7-58	60	61	63	66	69	73	78	82	
8-70	71	73	76	78	83	87	92	97	
9-82	83	85	88	91	96	100	107	111	
1-0	94	96	98	101	104	110	114	121	126
1-2	118	121	123	127	131	137	142	150	155
1-4	143	146	149	154	158	165	171	179	185
1-6	169	172	175	181	186	194	200	208	214
1-8	195	198	202	208	213	222	229	238	244
2-0	221	225	229	235	241	251	258	267	273
2-5	287	292	297	305	312	323	331	341	348
3-0	354	360	366	376	383	395	404	415	422
3-5	422	429	436	447	456	469	478	490	497
4-0	491	499	506	518	528	542	552	564	571
4-5	561	569	577	590	601	616	626	638	646
5-0	630	639	649	663	674	689	700	713	721
6-0	771	781	792	808	820	837	849	862	870
7-0	912	924	936	954	967	986	998	1012	1020
8-0	1055	1068	1081	1101	1115	1134	1147	1161	1170
9-0	1198	1213	1227	1248	1263	1283	1296	1311	1320
1-00	1341	1358	1373	1395	1411	1432	1445	1461	1469
1-25	1702	1722	1740	1765	1782	1805	1819	1835	1844
1-50	2065	2088	2108	2136	2155	2179	2193	2210	2219
1-75	2430	2455	2477	2507	2527	2552	2567	2584	2593
2-00	2796	2823	2847	2879	2900	2926	2942	2959	2968
2-25	3162	3192	3218	3251	3273	3300	3316	3334	3343
2-50	3530	3562	3589	3624	3647	3675	3691	3708	3718
2-75	3898	3932	3961	3997	4021	4049	4065	4083	4093
3-00	4267	4302	4332	4370	4394	4423	4440	4458	4468
3-50	5005	5045	5077	5117	5142	5172	5189	5208	5218
4-00	5746	5788	5822	5865	5891	5922	5939	5958	5968
4-50	6487	6532	6568	6612	6639	6671	6688	6707	6717
5-00	7229	7277	7315	7360	7388	7420	7438	7457	7467
5-50	7972	8022	8062	8109	8137	8170	8188	8207	8217
6-00	8715	8768	8809	8857	8886	8919	8937	8957	8967
6-50	9459	9514	9557	9606	9635	9669	9687	9707	9717
7-00	10204	10261	10304	10355	10385	10418	10437	10457	10467
7-50	10949	11007	11052	11104	11134	11168	11187	11207	11217
8-00	11694	11754	11800	11853	11883	11918	11937	11957	11967
8-50	12440	12502	12549	12602	12633	12668	12686	12706	12717
9-00	13186	13249	13297	13351	13382	13417	13436	13456	13467
9-50	13932	13997	14045	14100	14132	14167	14186	14206	14217
1-000	14678	14744	14794	14849	14881	14917	14936	14956	14967

Table 3-12 300 Seconds Average Service Time

agents	delay times								
	15	22	30	45	60	90	120	180	240
1-1	1	1	1	1	2	2	2	2	2
2-6	6	7	7	7	8	8	9	10	10
3-13	13	13	14	14	15	16	18	20	20
4-21	21	21	22	23	24	26	28	30	30
5-29	29	30	31	32	34	36	39	41	41
6-37	38	39	40	41	44	46	49	52	52
7-46	47	48	50	51	54	56	60	63	63
8-56	56	57	59	61	64	67	71	75	75
9-65	66	67	69	71	75	78	83	86	86
1-0	74	76	77	79	81	85	89	94	98
1-2	94	95	97	100	102	107	111	117	121
1-4	114	116	117	121	124	129	133	140	144
1-6	134	136	138	142	145	151	156	163	168
1-8	155	157	159	164	167	174	179	186	191
2-0	175	178	181	185	189	196	202	210	215
2-5	228	231	235	240	245	253	260	268	274
3-0	281	285	289	296	302	311	318	327	333
3-5	336	340	345	352	359	369	377	387	393
4-0	390	395	401	409	416	427	435	446	453
4-5	445	451	457	466	474	486	494	505	512
5-0	501	507	513	524	532	545	554	565	572
6-0	612	620	627	639	649	662	672	684	691
7-0	725	734	742	755	766	781	791	804	811
8-0	838	848	857	872	883	899	910	923	931
9-0	952	963	973	989	1001	1018	1029	1043	1050
1-00	1067	1078	1089	1106	1119	1137	1148	1162	1170
1-25	1354	1368	1381	1401	1415	1434	1447	1461	1470
1-50	1643	1659	1675	1696	1712	1733	1746	1761	1769
1-75	1934	1952	1969	1992	2009	2031	2045	2060	2069
2-00	2225	2245	2264	2289	2307	2330	2344	2360	2369
2-25	2518	2539	2559	2586	2605	2629	2643	2660	2669
2-50	2811	2834	2855	2884	2904	2928	2943	2959	2969
2-75	3104	3129	3152	3182	3202	3227	3242	3259	3268
3-00	3398	3425	3449	3480	3501	3527	3542	3559	3568
3-50	3987	4017	4043	4076	4098	4125	4141	4159	4168
4-00	4578	4610	4638	4674	4697	4724	4741	4758	4768
4-50	5170	5204	5234	5271	5295	5324	5340	5358	5368
5-00	5762	5799	5830	5869	5894	5923	5940	5958	5968
5-50	6355	6394	6427	6467	6492	6522	6539	6558	6568
6-00	6948	6990	7024	7065	7091	7122	7139	7158	7168
6-50	7543	7586	7621	7664	7690	7721	7739	7757	7767
7-00	8137	8182	8219	8262	8290	8321	8338	8357	8367
7-50	8732	8779	8816	8861	8889	8920	8938	8957	8967
8-00	9327	9376	9414	9460	9488	9520	9538	9557	9567
8-50	9923	9973	10012	10059	10087	10120	10138	10157	10167
9-00	10518	10570	10610	10658	10687	10719	10738	10757	10767
9-50	11114	11167	11209	11257	11286	11319	11337	11357	11367
1-000	11711	11765	11807	11856	11886	11919	11937	11957	11967

Table 3-13 600 Seconds Average Service Time

agents	delay times								
	22	30	45	60	90	120	180	240	360
1-1	1	1	1	1	1	1	1	1	1
2-3	3	3	3	3	4	4	4	4	5
3-6	6	7	7	7	7	8	8	9	
4-10	10	11	11	11	11	12	13	14	
5-14	14	15	15	15	16	17	18	19	
6-19	19	19	19	20	21	22	23	25	
7-23	23	24	24	25	26	27	28	30	
8-28	28	28	29	30	30	32	33	36	
9-32	32	33	34	35	36	37	39	41	
1-0	37	37	38	38	40	41	43	44	47
1-2	47	47	48	48	50	51	53	55	58
1-4	56	57	58	59	60	62	64	67	70
1-6	66	67	68	69	71	73	76	78	81
1-8	77	77	78	80	82	84	87	89	93
2-0	87	88	89	90	93	95	98	101	105
2-5	113	114	116	117	120	123	127	130	134
3-0	140	141	143	145	148	151	156	159	164
3-5	166	168	170	172	176	179	185	188	193
4-0	194	195	198	200	205	208	214	218	223
4-5	221	223	226	228	233	237	243	247	253
5-0	248	250	254	257	262	266	272	277	282
6-0	304	306	310	314	320	324	331	336	342
7-0	360	363	367	371	378	383	390	395	402
8-0	416	419	424	429	436	442	450	455	461
9-0	473	476	482	487	495	501	509	514	521
1-00	530	533	539	545	553	560	568	574	581
1-25	672	677	684	691	700	708	717	723	731
1-50	816	822	830	837	848	856	866	873	880
1-75	961	967	977	984	996	1005	1016	1022	1030
2-00	1106	1113	1123	1132	1145	1154	1165	1172	1180
2-25	1251	1259	1270	1280	1293	1303	1314	1322	1330
2-50	1397	1405	1418	1428	1442	1452	1464	1471	1480
2-75	1543	1552	1565	1576	1591	1601	1614	1621	1630
3-00	1690	1699	1713	1724	1740	1750	1763	1771	1780
3-50	1983	1994	2010	2021	2038	2049	2063	2071	2079
4-00	2277	2289	2306	2319	2337	2348	2362	2370	2379
4-50	2572	2585	2603	2617	2636	2648	2662	2670	2679
5-00	2867	2881	2901	2915	2934	2947	2961	2970	2979
5-50	3163	3177	3198	3213	3234	3246	3261	3270	3279
6-00	3459	3474	3496	3512	3533	3546	3561	3569	3579
6-50	3755	3771	3794	3811	3832	3845	3861	3869	3879
7-00	4051	4069	4092	4109	4131	4145	4160	4169	4179
7-50	4348	4366	4391	4408	4431	4444	4460	4469	4479
8-00	4645	4664	4689	4707	4730	4744	4760	4769	4779
8-50	4942	4961	4988	5006	5029	5044	5060	5069	5079
9-00	5239	5259	5286	5305	5329	5343	5360	5369	5378
9-50	5536	5557	5585	5604	5629	5643	5660	5669	5678
1-000	5834	5855	5884	5904	5928	5943	5959	5969	5978

Trunk Engineering Guidelines

The number of trunks required for an ACD is about 1.1 to 1.7 times the number of agents (when a blocked customer represents potential lost revenue). As in the case of agents, the number of trunks required for an ACD is based on the incoming traffic to *each split*, not the ACD as a whole.

The left-most column in Table 3-14 lists the number of trunks required to service an ACD depending on the carried load in *erlangs* and the blocking probability. Blocking probability relates to the desired grade of service. The possible blocking probabilities are shown across the top of Table 3-14, and the entries under the blocking probabilities are carried loads in *erlangs*.

NOTE Lines are drawn across Table 3-14 to show where the maximum trunks supported by 3B CMS occur. A single line shows the 3B2/ 400 limits, while a double line shows the 3B2/ 522 and 3B2/ 1000 Model 70 limits.

To determine the number of trunks needed for a given split, use Table 3-14 as follows:

Estimate the average call duration: the total time a caller spends waiting for an answer, plus any time on hold (in queue), and plus the service time (the time the caller spends talking to an agent).

Estimate the number of *busy-hour calls* received by the ACD during peak levels of caller activity.

Multiply the call duration (in fractions of an hour) by the rate of *busy-hour calls* (in calls per hour). This number is the carried load in *erlangs*.

Determine the desired grade of service (the blocking probability). The blocking probability for each split is defined as the ratio of blocked calls to the total number of incoming calls.

In the column corresponding to the desired grade of service, choose the nearest bigger carried load. The number of trunks required is then read from the left-most column.

NOTE The entries in Table 3-14 are offered loads in *erlangs*.

Example 4:

An airline reservation agency has an ACD that queues calls after two ring cycles. The agency knows that the average caller spends 30 seconds waiting while queued to a split, and requires 6 minutes and 20 seconds to service. The busy-hour call arrival rate is 1980 per hour. How many trunks does the agency need to provide a service level of 99 percent?

Two ring cycles is 12 seconds. Therefore, the average call duration is:

$$\text{average call duration} = 12 + 30 + 380 + 422 \text{ seconds or } 0.11722 \text{ hours}$$

Therefore, the carried load in *erlangs* is:

$$\text{carried load} = 0.11722 * 1980 = 232.1$$

Under the 1 percent column, you will find that 250 trunks can service a carried load of 226.0 *erlangs* while 275 trunks can service 250.2 *erlangs*. Interpolate as follows:

$$y = \text{number of trunks}$$

$$y - y_0 = [(y_1 - y_0) \frac{x - x_0}{x_1 - x_0}]$$

$$y - 250 = [(275 - 250) \frac{232.1 - 226}{250.2 - 226}]$$

$$y - 250 = [25 \frac{6.1}{23.2}]$$

$$y = 256.3$$

Therefore, the agency will need 257 trunks to satisfy its customers.

Table 3-14 ACD Trunk Engineering

Trunks	Blocking Probability								
	0.01%	0.02%	0.05%	0.10%	0.20%	0.50%	1.00%	2.00%	5.00%
1	.0002	.0003	.0006	.0011	.0021	.0050	.0100	.0200	.0500
2	.0142	.0202	.0321	.0457	.0652	.1049	.1511	.2190	.3622
3	.0868	.1102	.1516	.1936	.2482	.3473	.4509	.5902	.8544
4	.2347	.2824	.3622	.4388	.5340	.6977	.8607	1.070	1.448
5	.4519	.5269	.6482	.7614	.8981	1.126	1.347	1.624	2.108
6	.7282	.8314	.9952	1.145	1.323	1.614	1.890	2.230	2.812
7-1.054	1.186	1.392	1.577	1.795	2.147	2.476	2.877	3.551	
8-1.422	1.582	1.829	2.049	2.306	2.716	3.096	3.555	4.316	
9-1.825	2.013	2.300	2.555	2.849	3.316	3.745	4.258	5.102	
1-0	2.260	2.474	2.801	3.089	3.420	3.941	4.417	4.982	5.905
1-2	3.207	3.473	3.876	4.227	4.628	5.253	5.817	6.482	7.553
1-4	4.238	4.555	5.030	5.441	5.907	6.630	7.278	8.036	9.243
1-6	5.338	5.703	6.246	6.715	7.244	8.059	8.786	9.632	10.97
1-8	6.495	6.905	7.515	8.038	8.626	9.530	10.33	11.26	12.72
2-0	7.700	8.154	8.827	9.402	10.05	11.04	11.91	12.92	14.49
2-5	10.88	11.44	12.26	12.96	13.74	14.92	15.96	17.15	18.99
3-0	14.24	14.90	15.86	16.67	17.57	18.94	20.13	21.49	23.56
3-5	17.75	18.49	19.58	20.50	21.52	23.05	24.39	25.91	28.19
4-0	21.37	22.19	23.40	24.42	25.55	27.24	28.72	30.38	32.87
4-5	25.08	25.98	27.31	28.42	29.65	31.50	33.10	34.89	37.57
5-0	28.86	29.85	31.28	32.48	33.81	35.80	37.52	39.45	42.31
6-0	36.62	37.75	39.38	40.75	42.27	44.53	46.48	48.65	51.84
7-0	44.57	45.83	47.66	49.19	50.88	53.39	55.55	57.95	61.43
8-0	52.68	54.07	56.07	57.75	59.60	62.35	64.71	67.31	71.08
9-0	60.92	62.42	64.60	66.42	68.42	71.40	73.94	76.74	80.76
1-00	69.26	70.87	73.21	75.17	77.31	80.51	83.22	86.21	90.48
1-25	90.47	92.35	95.07	97.33	99.82	103.5	106.6	110.1	114.9
1-50	112.1	114.2	117.3	119.8	122.6	126.8	130.3	134.1	139.4
1-75	134.0	136.3	139.7	142.5	145.6	150.2	154.0	158.2	163.9
2-00	156.2	158.7	162.4	165.5	168.8	173.8	177.9	182.4	188.6
2-25	178.5	181.3	185.2	188.5	192.1	197.5	201.9	206.7	213.3
2-50	201.0	203.9	208.2	211.7	215.6	221.3	226.0	231.1	238.0
2-75	223.7	226.8	231.3	235.0	239.1	245.1	250.2	255.5	262.7
3-00	246.4	249.7	254.4	258.4	262.7	269.1	274.4	280.0	287.5
4-00	338.4	342.3	347.9	352.6	357.8	365.3	371.6	378.2	386.7
5-00	431.4	435.9	442.3	447.7	453.6	462.2	469.3	476.7	486.2
6-00	525.1	530.1	537.3	543.4	549.9	559.5	567.3	575.5	585.7
7-00	619.4	624.9	632.8	639.4	646.6	657.1	665.6	674.5	685.4
8-00	714.2	720.1	728.7	735.8	743.6	754.9	764.1	773.5	785.1
9-00	809.3	815.7	824.9	832.5	840.8	852.9	862.7	872.7	884.8
1-000	904.7	911.5	921.3	929.4	938.2	951.1	961.5	972.0	984.6
1-100	1000	1008	1018	1026	1036	1049	1060	1071	1084
1-200	1096	1104	1115	1124	1134	1148	1159	1171	1184
1-300	1192	1200	1212	1221	1231	1246	1258	1270	1284
1-400	1289	1297	1309	1319	1329	1345	1357	1370	1384
1-500	1385	1394	1406	1416	1427	1444	1456	1469	1484
1-600	1482	1490	1503	1514	1526	1542	1556	1569	1584
1-700	1578	1587	1601	1612	1624	1641	1655	1668	1684

Disk Memory Sizing Guidelines

After you have determined how many agents and trunks are required for a specified ACD, you must determine the amount of hard disk space that will be needed to support the agents, splits, trunks, and trunk groups.

For the 3B2/ 400 computers, about 50 MB of disk storage is required for the UNIX system, CMS software, INFORMIX* software, X.25 network software, and the temporary and scratch files. For the 3B2/ 522 and 3B2/ 1000 Model 70 computers, about 100 MB of disk storage is required instead.

The size of the INFORMIX database is determined from the following ACD parameters:

Number of agents

Number of splits

Number of trunks

Number of trunk groups

Number of vectors

Number of Vector Directory Numbers (VDNs)

Number of days the data should be kept (up to 387 days for daily data and up to 3-1 days for half-hour data)

NOTE

The number of days that data may be retained can be different for each of the daily and half-hour files. For example, the customer may want to retain up to 300 days of data in the daily trunk file and 15 days of data in the half-hour trunk file.

Number of half-hour intervals in a working day.

* INFORMIX is a registered trademark of Informix Software, Inc.

Disk Memory Sizing Guidelines

There are five tools that you can use to approximate the disk memory required for a given 3B CMS environment, starting with the most basic (which is also the most difficult) tool to use, and moving to the most advanced (and easiest to use):

A Disk Memory Formula

A Disk Memory Calculation Form (Figure 3-1)

A Disk Memory Table (Table 3-15) which provides some disk memory estimates based on the number of agents, splits, trunks, and trunk groups and should only be used to approximate the amount of disk memory required (in megabytes)

A Disk Memory Graph (Figure 3-2) which illustrates how much disk memory is required based on the data in Table 3-15 and should only be used to approximate the amount of disk memory required (in megabytes)

The Delivery Operating Support System (DOSS) Configurator, a software program described at the end of Chapter 4. Using the DOSS configurator, if it is available, is the quickest and easiest way to determine how much disk memory will be required for a given customer.

Using the Disk Memory Formula

By using the following formula, you can calculate the amount of disk memory (in bytes) that will be required to support a specified ACD for a given number of days of data:

$$M_{disk} = A_d + g_d + s_d + t_d + v_d + V_d + a_h + g_h + s_h + t_h + v_h + V_h$$

Where:

a_h is the size of the half-hour agent file. $a_h = 1.01D_{h,a} \cdot \sum_{k=1}^S a_k(i_k, l_k)$

s_h is the size of the half-hour split file. $s_h = 1.98D_{h,s} \cdot I \cdot s$

t_h is the size of the half-hour trunk file. $t_h = 6.7D_{h,t} \cdot I \cdot t$

g_h is the size of the half-hour trunk group file. $g_h = 6.9D_{h,t} \cdot I \cdot g$

v_h is the size of the half-hour vector file. $v_h = 8.5D_{h,v} \cdot I \cdot v$

V_h is the size of the half-hour VDN file. $V_h = 9.3D_{h,v} \cdot I \cdot V$

A_d is the size of the daily agent file. $A_d = 1.42D_{d,A} \cdot A$

s_d is the size of the daily split file. $s_d = 2.78D_{d,s} \cdot s$

- t_d is the size of the daily trunk file. $t_d = 8 \cdot 5 D_d \cdot t \cdot t$
- g_d is the size of the daily trunk-group file. $g_d = 1 \cdot 25 D_{d,g} \cdot g$
- v_d is the size of the daily vector file. $v_d = 1 \cdot 0 t D_{d,v} \cdot v$
- V_d is the size of the daily VDN file. $V_d = 1 \cdot 05 D_{d,V} \cdot V$
- $D_{h,j}$ (where j is a, s, t, g, v, V) is the number of days of half-hour data for the agent, split, trunk, trunk group, vector, and VDN files respectively.
- $D_{d,j}$ (where j is A, s, t, g, v, V) is the number of days of daily data for the agent, split, trunk, trunk group, vector, and VDN files respectively.
- A is the total number of agents per day (more specifically, A is the number of agent login IDs used per day).
- g is the number of trunk groups.
- s is the number of splits.
- t is the number of trunks.
- v is the number of vectors.
- V is the number of VDNs.
- S is the number of shifts per day.
- $I = \sum_{k=1}^S i_k$ is the total number of half-hour intervals in a working day.
- i_k is the number of half-hour intervals in shift k .
- l_k is the average number of times an agent logs in or out per shift.
- a_k is the average number of agents in shift k .

The parameter A is the average, throughout the working week, of the total number of agent login IDs used per day. The parameter a_k is the average number of agent login IDs active during shift k . In other words, the parameter a_k is the sum of the number of agent login IDs in the first through the last half-hour interval of the shift k divided by the number of half-hour intervals in shift k .

Using the Disk Memory Calculation Form

The Disk Memory Calculation Form (Figure 3-1) is easier to use than the formula.

Agents (shift 1)	[1 - 1023]	a ₁ =		
Intervals (shift 1)	[1 - 48]	i ₁ =		
Logins(out s) (shift 1)		l ₁ =		
Agents (shift 2)	[1 - 1023]	a ₂ =		
Intervals (shift 2)	[1 - 48]	i ₁ =		
Logins(out s) (shift 2)		l ₂ =		
Agents (shift 3)	[1 - 1023]	a ₃ =		
Intervals (shift 3)	[1 - 48]	i ₃ =		
Logins(out s) (shift 3)		l ₃ =		
I Sum	[1 - 48]			i ₁ + i ₂ + i ₃
A	[1 - 3069]			a ₁ + a ₂ + a ₃
a				101 · [a ₁ · (i ₁ +l ₁) + a ₂ · (i ₂ +l ₂) + a ₃ · (i ₃ +l ₃)]
Half - Hour Calculations				
Agents			D _{h,a}	1-01 · D _{h,a} · a
Splits	[0 - 60]	s =	D _{h,s}	1-98 D _{h,s} · s
Trunks	[0 - 1400]	t =	D _{h,t}	6-7 D _{h,t} · t
Trunk Groups	[0 - 255]	g =	D _{h,g}	6-9 D _{h,g} · g
Vectors	[0 - 128]	v =	D _{h,v}	8-5 D _{h,v} · v
VDNs	[0 - 256]	V =	D _{h,v}	9-3 D _{h,v} · V
H Sum				101 · D _{h,a} · a + I Sum (198 · D _{h,s} · s + 67 · D _{h,t} · t + 69 · D _{h,g} · g + 85 · D _{h,v} · v + 93 · D _{h,v} · V)
Daily Calculations				
Total Agents	[1 - 3069]	A =	D _{d,A}	1-42 D _{d,A} · A
Splits	[0 - 60]	s =	D _{d,s}	2-78 D _{d,s} · s
Trunks	[0 - 1400]	t =	D _{d,t}	8-5 D _{d,t} · t
Trunk Groups	[0 - 255]	g =	D _{d,g}	1-25 D _{d,g} · g
Vectors	[0 - 128]	v =	D _{d,v}	1-01 · D _{d,v} · v
VDNs	[0 - 256]	V =	D _{d,v}	1-05 D _{d,v} · V
D Sum				142 · D _{d,A} · A + 278 · D _{d,s} · s + 85 · D _{d,t} · t + 125 · D _{d,g} · g + 101 · D _{d,v} · v + 105 · D _{d,v} · V
Subtotal				H Sum + D Sum
Total				Subtotal + 50 MB (if 3B2/400) or 100 MB (if 3B2/522/1000)

Figure 3-1 Disk Memory Calculation Form

Using the Disk Memory Table

Table 3-15 shows several examples of ACD configurations and the amount of disk memory each requires. These examples should only be used to approximate the amount of disk memory required (in megabytes).

NOTE	These tables do not take vectoring into consideration. In other words, no space is allocated for the Daily and Half-Hour vector or VDN files. However, systems with vectoring would typically require additional memory of less than 5 percent of the number shown in the <i>Total Meg</i> column of Table 3-15.
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Table 3-15 is composed as follows:

The column *Agents* represents the number of agents per shift. Each agent is assumed to login and logout each day as follows: login to start shift, logout for coffee break, login after coffee break, logout for lunch, login after lunch, logout for coffee break, login after coffee break, and logout to end shift.

Under the column *Splits*, the number of splits is 10 percent of the number of agents.

Under the column *Trunks*, the number of trunks is 120 percent of the number of agents.

Under the column *Groups*, the number of trunk groups is 10 percent of the number of trunks.

Under the *One Shift*, *Two Shifts*, and *Three Shifts* columns, a shift is assumed to be 8 hours. Whenever there is more than one shift of agents, the same number of agents are assumed to work each shift.

The column headed by *Daily Meg* is the amount of disk storage space required for the daily files.

The column headed by *Half Hr Meg* is the amount of disk storage space required for the half-hour files.

The column headed by *Total Meg* is the total number of Megabytes required to store the daily and half-hour data on the hard disk.

In each case, 387 days of daily data are retained, and 31 days of half-hour split data are retained so that forecasting can be done.

Disk Memory Sizing Guidelines

Table 3-15 Disk Memory Table

Agents	Splits	Trunks	Groups	One Shift			Two Shifts			Three Shifts		
				Daily Meg	Half Hr Meg	Total Meg	Daily Meg	Half Hr Meg	Total Meg	Daily Meg	Half Hr Meg	Total Meg
5-0	5	60	6	6	6	12	8	10	19	11	14	25
1-00	10	120	12	11	13	24	17	20	37	22	28	50
1-50	15	180	18	17	19	36	25	31	56	33	42	75
2-00	20	240	24	22	26	48	33	41	74	44	56	100
2-50	25	300	30	28	32	60	41	51	93	55	70	125
3-00	30	360	36	33	39	72	50	61	111	66	84	150
3-50	35	420	42	39	45	84	58	71	130	77	98	175
4-00	40	480	48	44	52	96	66	82	148	88	112	200
4-50	45	540	54	50	58	108	75	92	167	99	126	225
5-00	50	600	60	55	64	120	83	102	185	110	140	250
5-50	55	660	66	61	71	132	91	112	204	121	154	275
6-00	60	720	72	67	77	144	100	122	222	133	168	300
6-50	60	780	78	72	83	155	107	132	239	143	181	324
7-00	60	840	84	77	89	166	115	142	257	154	194	348
7-50	60	900	90	82	95	177	123	152	274	164	208	372
8-00	60	960	96	87	101	188	131	161	292	175	221	396
8-50	60	1020	102	92	107	199	138	171	309	185	235	420
9-00	60	1080	108	97	113	210	146	181	327	196	248	444
9-50	60	1140	114	102	119	221	154	190	344	206	262	468
1-000	60	1200	120	107	125	232	162	200	362	217	275	492

NOTE	For a 3B2/ 400 computer, add 50 MB to the <i>Total Meg</i> column. For a 3B2/ 522 or 3B2/ 1000 Model 70 computer, add 100 MB instead.
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Using the Disk Memory Graph

The disk memory graph (Figure 3-2) utilizes the data in the ACD configuration examples shown in Table 3-15 and should only be used to approximate the amount of disk memory required (in megabytes).

NOTE This graph does not take vectoring into consideration. In other words, no space is allocated for the Daily and Half-Hour vector or VDN files. However, systems with vectoring would typically require additional memory of less than 5 percent of the disk memory required for the rest of the system.

For a 3B2/ 400 computer, locate the number of agents required and then add 50 MB to the number of MB on the y axis. For a 3B2/ 522 or 3B2/ 1000 Model 70 computer, add 100 MB instead.

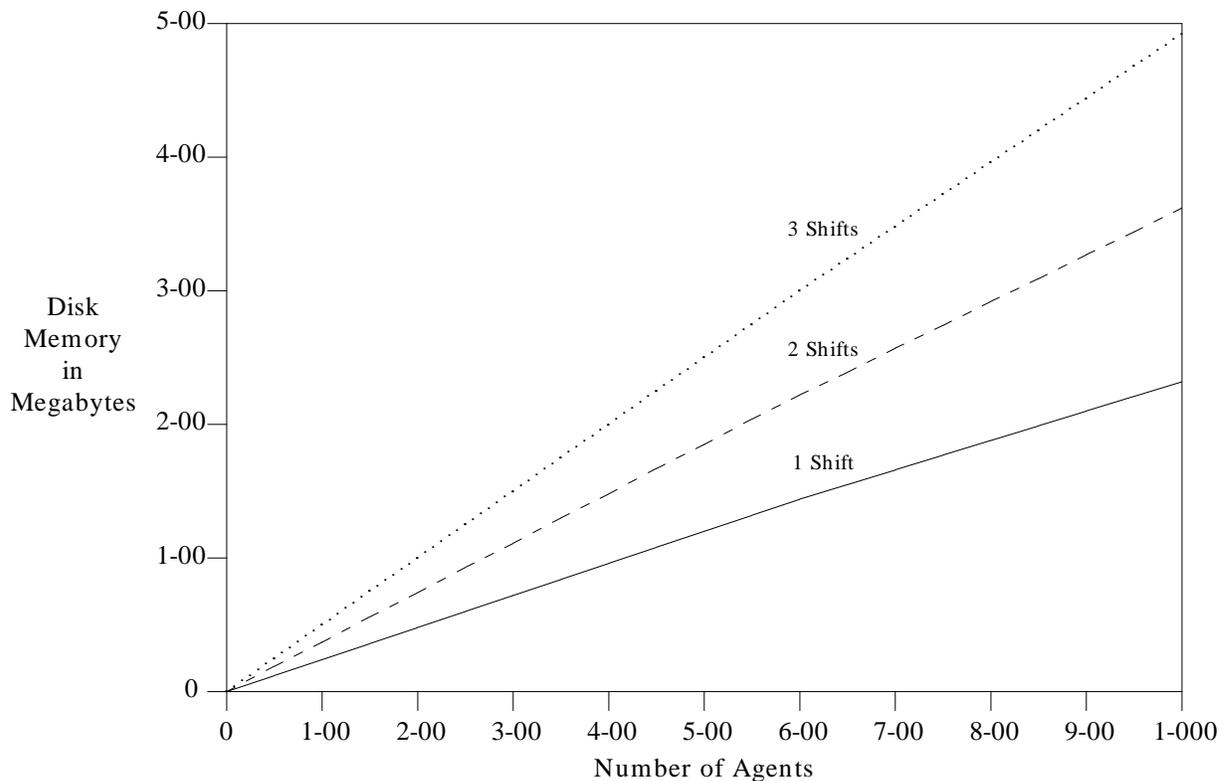


Figure 3-2 Disk Memory Graph

Selecting a 3B2 Computer

The four major factors you should use to determine which computer system will support the customer's 3B CMS needs are:

Number of agents to support

Number of trunks to support

Amount of disk space required

Number of I/ O ports (supervisor terminals and printers) needed.

You should have previously determined the agent, trunk, and disk space requirements for the customer's ACD.

Additional factors you can use to select a computer system for the customer include the following parameters:

Number of splits to support

Number of trunk groups to support.

The remainder of this section briefly describes the 3B CMS I/ O capacities.

3B CMS I/O Capacities

The I/ O ports on the 3B2 computers are used for connecting terminals and printers to the computer. The CMS administrator uses a terminal and a printer to administer CMS, to monitor activities, and to generate reports. Split supervisors and other management personnel also use terminals and printers to monitor agent activities and to generate reports. Therefore, the number of I/ O ports required will depend on the number of supervisor terminals and printers the customer wants to support.

Table 3-16 shows the maximum I/ O capacities supported by 3B CMS on the various 3B2 host computers.

Table 3-16 3B CMS I/O Capacities

I/O Ports	3B2 Computers		
	3B2/ 400	3B2/ 522	3B2/ 1000 Model 70
Console Ports	2	2	2
Serial Ports	16	32	64

NOTE The 3B2/ 500 and 3B2/ 600, which are no longer orderable with 3B CMS, have the same I/O capacities as the 3B2/ 522 and 3B2/ 1000 Model 70 respectively. The 3B2/ 310, also unorderable, can have 2 console ports and 8 serial ports.

3B2/400 Computer I/O Capacities

For the 3B CMS application, the 3B2/ 400 computer comes equipped with one Enhanced Ports card and can be configured to have up to two Enhanced Ports cards.

NOTE In addition to the ports provided by the Enhanced Ports cards, the 3B2/ 40-0 comes equipped with two standard serial I/O ports. One port is dedicated to the system console, and the other is a user port (can be used to connect to a terminal or printer). However, only 17 terminals can be used to monitor 3B CMS at any given time.

3B2/522 Computer I/O Capacities

For the 3B CMS application, the 3B2/ 522 computer comes equipped with one Enhanced Ports card and can be configured to have up to four Enhanced Ports cards.

NOTE In addition to the ports provided by the Enhanced Ports cards, the 3B2/ 52-2 comes equipped with two standard serial I/O ports. One port is dedicated to the system console, and the other is a user port (can be used to connect to a terminal or printer). However, only 33 terminals can be used to monitor 3B CMS at any given time.

Selecting a 3B2 Computer

3B2/1000 Model 70 Computer I/O Capacities

For the 3B CMS application, three Enhanced Ports cards are automatically ordered with the 3B2/ 1000 Model 70 computer. The 3B2/ 1000 Model 70 can be configured to have up to eight Enhanced Ports cards.

NOTE

In addition to the ports provided by the Enhanced Ports cards, the 3B2/ 10-00 Model 7-0 comes equipped with two standard serial I/ O ports. One port is dedicated to the system console, and the other is a user port (can be used to connect to a terminal or printer). However, only 65 terminals can be used to monitor 3B CMS at any given time.

Selecting a 3B CMS Administrator

The customer has the overall responsibility for selecting a 3B CMS administrator. The administrator plays a key role in a 3B CMS environment, and the customer may require your help in the selection process. Some prerequisites for administrator responsibilities are given in this section to aid you and the customer in the selection process.

Prerequisites

The 3B CMS administrator should have experience in the following areas to ensure satisfactory system performance:

Computer operations experience on a minicomputer with a capacity and user population equivalent to the 3B2 computer. The operations experience should include doing system reboots and shutdowns, backing up and restoring the disks, and managing printer operations.

Knowledge of computer peripherals and how they are connected to a system.

Knowledge of data communications.

Knowledge of disk architecture.

Knowledge of traffic theory.

3B CMS Administrator Responsibilities

The 3B CMS administrator will be the local expert in all matters about the operation of the 3B2 computer and the administration of the 3B CMS. This position is critical to a successful 3B CMS implementation. The administrator's responsibilities will include the following:

Interact with the switch administrator

Create agent login and user identifications

Set access permissions for supervisors

Help set system performance objectives with upper management

Enter agent login identification into Data Dictionary

Manage the schedule of CMS activities

Selecting a 3B CMS Administrator

Administer split measurements

Administer call vectors on the switch to ensure maximum ACD efficiency during different times of the day (Generic 2 and System 85, R2V4 switches only)

NOTE

On Generic 3i, call vectors must be administered using the DEFINITY Manager I administration tool. 3B CMS cannot be used to administer vectors.

Adjust the system based on varying traffic patterns.

Move agent extensions or trunk groups as needed

Set overflow conditions for splits (non-vectoring only)

Set exception conditions for agents, splits, and trunk groups

Monitor real-time events in ACD through real-time reports

Administer and schedule forecasting

Design and create custom reports

Perform maintenance functions (data backup, etc.).

Training

Training for two persons is included with the price of the 3B CMS software. The 3B CMS training courses are:

3B CMS Administration (5 days)

3B CMS Custom Reports (3 days).

The customer's CMS administrator should attend the 3B CMS Administration course before the 3B CMS application is installed. On completion of the course, the CMS administrator should be able to do the following tasks:

Set system objectives

Administer system configuration

Monitor system traffic performance

Establish login IDs and security permissions

Create and use a data dictionary

Perform database administration

Administer call vectors (Generic 3i, Generic 2, and System 85, R2V4 switches only)

Set up report schedules

Establish exception limits

Generate forecasts

Perform routine maintenance such as disk backup

Arrange for end user training on the operation of CMS.

After the CMS administrator is familiar with the overall operation of 3B CMS, the administrator should attend the 3B CMS Custom Reports course.

Other classes, available at an additional charge to the customer, that may be beneficial to the customer's CMS administrator are as follows:

UNIX System Overview (1 day)

Introduction to the UNIX System (5 days)

Training

3B2 Administration

Traffic Theory/ Data Analysis.

Refer to the *Customer/ Marketing Educator, 1988 Education Catalogue* for detailed information on the 3B CMS Administration course. Also, you should consult the *Marketing Branch Office Guide* (MBOG) for additional information.

Documentation

The following documents support the 3B CMS software application:

3B CMS Planning, Configuration, and Implementation Guide (5-85-215-601) — A guide used by Account Teams to determine the computer hardware and software requirements for a 3B CMS application.

3B2 CMS Installation and Maintenance (5-85-215-104) — This document is used by AT&T personnel to install 3B CMS software onto a 3B2 computer.

3B CMS Administration (5-85-215-504) — This document is used by the 3B CMS administrator to administer the 3B CMS software.

3B CMS Vectoring Administration (5-85-215-502) — This document is used by the 3B CMS administrator to administer the Vectoring feature of the 3B CMS software (Generic 2 and System 85, R2V4 switches only) and to get reports on the Vectoring feature (Generic 3i, Generic 2, and System 85, R2V4).

3B CMS Custom Reports (5-85-215-503) — This document is used by the 3B CMS administrator and other CMS users to create custom reports.

3B CMS Graphics Administration (5-85-215-505) — This document contains information for administering and ordering CMS Bar Graph reports.

3B CMS Quick Reference (5-85-215-704) — This document contains the most important and commonly used 3B CMS procedures.

The *3B2 CMS Installation and Maintenance* document is shipped with the 3B CMS software. The following documents are also shipped with the 3B CMS software:

3B CMS Administration

3B CMS Custom Reports

3B2 CMS Quick Reference.

If the customer purchases the Vectoring feature of 3B CMS, the *3B CMS Vectoring Administration* document will also be shipped. If the customer purchases the CMS Graphics feature, the *3B CMS Graphics Administration* document will also be shipped. The *3B CMS Planning, Configuration, and Implementation* document is ordered separately. If the customer requires additional copies of any document, refer to *Appendix B* for ordering procedures.

Documentation

NOTE

The Systems Consultant should ensure that each student attending the 3B CMS Administration course has a copy of the *3B CMS Administration*, *3B CMS Vectoring Administration*, *3B CMS Graphics Administration*, *3B CMS Custom Reports*, and the *3B CMS Quick Reference* documents.

The documentation that supports the 3B2 computer is shipped with the computer.

General Information

This chapter describes in detail the computer hardware configurations, peripherals, and software for each computer that supports 3B CMS. The hardware needed to connect the computer and switch is also described.

You can use the worksheets in Appendix A to keep track of the items to be ordered for the customer. The worksheets can be used to complete the Sales/ Service Order forms used by most Marketing Branch Offices or also as a reference to check the DOSS configurator order.

The following sections in this chapter describe in detail the hardware and software that supports the 3B CMS software application:

- 3B2 Computer Configurations
- Software
- Peripherals
- Cabling Remote Terminals and Printers
- Additional Switch Hardware and Software
- Computer-to-Switch Hardware and Cabling
- CMS Data Migrations
- CMS Hardware Migrations
- DOSS Configurator Screen Examples.

You can find more detailed information about the 3B2 hardware in the *Marketing Guides* for the 3B2 Computer.

Non-Standard Hardware Configurations — AT&T Services Support

The hardware configurations described in this document are the **only** configurations that are supported (covered by AT&T warranties and service contracts). Customers with these configurations and the proper service contract or warranty will receive, free of additional charge during normal work hours, Technical Support Center assistance for installation and AT&T Call Center Helpline assistance for system troubleshooting.

Customers who choose other non-supported configurations may be charged on a Time-and-Materials basis for installation and troubleshooting, even if they purchase a 3B CMS maintenance contract.

In addition, for the Call Center Helpline to provide assistance to customers with non-supported configurations, the customer or the customer's AT&T technical consultant must supply the Helpline with the following information:

Up-to-date engineering documents that show the physical design of the link between the switch and the 3B2 computer or between peripheral equipment and the 3B2 computer. The design must include system diagrams and a list of equipment used, including equipment options and manufacturer names.

A list of names and phone numbers of customer personnel who are responsible for supporting the equipment. This list must include a contact for after-work hours.

A list of names and phone numbers of technical support personnel for all manufacturers whose equipment is included in the configuration. This list must include a contact at each manufacturer for after-work hours.

The customer must also agree to the following conditions before the Helpline will begin work:

The customer must verify that all equipment between the 3B2 computer and the switch or peripheral equipment is working.

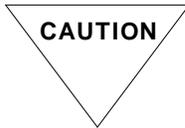
The Helpline reserves the right to troubleshoot the network between the 3B-2 and the switch/ peripheral equipment **before** replacing any 3B2, link, or switch hardware.

The customer must provide loop-around capability on all components in the non-supported configuration. In addition, any and all multiplexers must have clear channel capability.

Time and Materials charges will apply for:

- All work done outside of normal work hours.
- Troubleshooting work up to the point where the standard 3B2 hardware or switch link hardware is clearly identified as the problem.
- Any other troubleshooting work on communication between the 3B2 and a device on a non-supported configuration.

The customer must install standard configuration hardware if the Helpline cannot isolate the problem or the problem proves to be chronic. The standard configuration must be kept in place at least until the Helpline determines if the problem is in the standard 3B2 or switch link hardware.



If the customer wishes to add hardware or software not specified in this document, call the Call Center Support Group at the Sales and Technical Response Center for assistance at (800) 521-7872. This group can verify whether or not the customer's configuration is supported.

3B2 Computer Configurations

Three models of the 3B2 computer — 3B2/ 400, 3B2/ 522, and 3B2/ 1000 Model 70 — can be configured to support the 3B CMS software. The 3B2/ 400 and 3B2/ 522 computers can support only one ACD. The 3B2/ 1000 Model 70 computer can be configured to support a maximum of four ACDs.

This section describes the following hardware:

3B2/ 400 Computer Hardware

3B2/ 522 Computer Hardware

3B2/ 1000 Model 70 Computer Hardware

Additional 3B2 Hardware Required by 3B CMS

Optional Hardware for the 3B2 Computers.

NOTE

The 3B2/ 310, 3B2/ 500, and 3B2/ 600 computers also support 3B CMS. However, these computers are no longer orderable with 3B CMS.

3B2/400 Special Edition (SE) Computer

The 3B2/ 400 SE Computer (PEC 6950-CMS) includes the following hardware and software:

- One WE 32100* Microprocessor and 10 MHz Clock
- One WE 32106 MAU
- Two EPORTS Cards (each card provides eight asynchronous serial RS-232C ports)
- One 2 MB Memory Board
- Two 72 MB Hard Disk Drives
- One 720 KB Floppy Disk Drive
- One single-ended SCSI Host Adapter Card
- One Intelligent Serial Controller (ISC) Kit
- One 60 MB Cartridge Tape Drive (SCSI)
- Six 14-foot Modular RS-232C Cables
- Six Connectors
- UNIX System V, Release 3.2 operating system.

* Registered trademark of AT&T.

3B2/522 Computer Hardware

The 3B2/ 522 computer (PEC 6950-CD1) supports 3B CMS software and includes the following hardware and software:

- One WE 32100 Microprocessor and 22 MHz Clock
- One WE 32106 MAU
- One Virtual Cache Card
- One EPORTS Card (provides eight asynchronous serial RS-232C ports)
- One 4 MB Error Correction Code (ECC) Memory Card
- One 300 MB Hard Disk Drive
- One 720 KB Floppy Disk Drive
- One single-ended SCSI Host Adapter Card
- One 120 MB Cartridge Tape Drive (SCSI)
- Four 14-foot RS-232C Modular Cable
- Four 25-foot RS-232C Modular Cable
- Ten Connectors (Eight Male and Two Female)
- UNIX System V, Release 3.2.1 operating system.

3B2/1000 Model 70 Computer Hardware

The 3B2/ 1000 Model 70 computer (PEC 6950-CF1) supports 3B CMS software and includes the following hardware and software:

One WE 32200 Microprocessor and 22 MHz Clock

One WE 32206 MAU

One 16 MB ECC Memory Card

Two 300 MB Hard Disk Drives

One 720 KB Floppy Disk Drive

One single-ended SCSI Host Adapter Card

One 120 MB Cartridge Tape Drive (SCSI)

Two 7-foot RS-232C Modular Cables

Two 14-foot RS-232C Modular Cables

Two 25-foot RS-232C Modular Cables

Two 50-foot RS-232C Modular Cables

Ten Connectors (Eight Male and Two Female)

UNIX System V, Release 3.2.1 operating system.

NOTE

Three EPORTS Cards are automatically, but separately, ordered with the 3B2/ 1000 Model 70 computer. Each card (PEC 69558) provides eight asynchronous serial RS-2-32C ports.

Additional 3B2 Hardware Required by 3B CMS

This section describes the additional computer-related hardware required for the 3B2/ 400, 3B2/ 522, and 3B2/ 1000 Model 70 computers operating in a 3B CMS application.

Intelligent Serial Controller

The Intelligent Serial Controller (ISC) kit (PEC 6950-CA2) provides a wide range of synchronous communication possibilities for the 3B2 family of computers. In the 3B CMS application, the ISC is the hardware interface that links the 3B2 computer to an AT&T switch.

The ISC includes the following items:

- Hardware card
- Software diagnostics floppy
- Serial port cable.

Order one ISC card for the 3B2/ 522 or 3B2/ 1000 Model 70 computers. The ISC card is provided with the 3B2/ 400. If the host computer is a 3B2/ 1000 Model 70 computer and is to support more than two ACDs, order two ISC cards.

Remote Management

The Remote Management feature, which is required, provides 2-way communication between the 3B2 CMS at the customer site and the remote maintenance center supporting the customer. Communication takes place on a dedicated phone line **paid for by the customer**. This feature allows the 3B2 computer to be maintained from a remote location.

From the remote maintenance center, highly skilled technicians can install, upgrade, maintain, and troubleshoot the 3B2 CMS software at the customer site. During remote installations and upgrades of the software, an on-site technician must be present to install the physical medium (floppy disk or tape) that contains the software.

The Remote Management feature comprises the following components which must be ordered separately:

Remote Management Package (PEC 69556) — includes the following components:

- Alarm Interface Circuit (AIC) board

NOTE

The AIC requires the UNIX System V, Release 3.0 or later software.

- Remote Management Utilities software (one floppy disk)
- One 2-foot modular cable (used to connect the console port on the 3B2 computer to the “CONS” port on the AIC).

One 4024 modem (PEC 2224-CE0)

Remote alarm reporting unit (Silent Knight Autodialer* — Optional) (PEC 94273)
 — The Silent Knight Autodialer reports system alarms processed by the AIC to the remote maintenance center supporting the customer.

NOTE

Order the Silent Knight Autodialer option through the Custom Systems organization via the Custom Systems Automation Program (CSAP) and the appropriate switch hardware option.

Refer to Figure 4-1 and Table 4-1 when ordering the cables and connectors for the Remote Management feature.

Figure 4-1 also shows the cable and connector required to connect the Emergency Power Option of the optional Uninterruptible Power Supply (UPS).

With the Emergency Power Option, the 3B2 computer will execute the */etc/acfail* program which does graceful shutdown approximately one minute after a power outage has occurred. Refer to the *3B2 CMS Installation and Maintenance (5-85-215-104)* document for details.

Without the Emergency Power Option, the 3B2 computer will have to be manually shutdown after a power outage has occurred.

When a power outage occurs, the UPS alerts the 3B2 computer via an alarm lead. The 3B2 then does a graceful shutdown. (The Technical Support Center (TSC) can install a shell program to adjust the delay before a graceful shutdown occurs.)

* Registered trademark of Silent Knight Security Systems.

Table 4-1 3B2 Remote Management Cabling and Connector Codes

Reference to Fig. 4-1	Equipment	PEC	Description
A-3B2	Modular Cord	2-725-16G	7-foot (M-M)
		2-725-16N	14-foot (M-M)
		2-725-16S	25-foot (M-M)
		2-725-16V	50-foot (M-M)
B*	M4AS Cable	2721-03G	7-foot, 6-pin, Modular Plug-to-Spade Connector
		2-721-03S	2-5-foot, 6-pin, Modular Plug-to-Spade Connector
		2721-04G	7-foot, 8-pin, Modular Plug-to-Spade Connector
C	M4AU Cable	2-721-04S	2-5-foot, 8-pin, Modular Plug-to-Spade Connector
D†	D6AM-87 Cord	2-725-06N	14-foot, 6 conductor cord
		2-725-06S	25-foot, 6-conductor cord
E†**	Male Terminal/ Printer Connector # 232-21-25-010	2-750-C09	
F	Male Modem Connector	2750-C10	Modular-to-25-pin RS-232 adapter

Miscellaneous Requirements

You should order a minimum of six cartridge tapes (PEC 8100-000) for the 3B2 computer. These tapes are used at installation time to back up the customer's system.

* Order the M4AS cable only if the Silent Knight Autodialer is ordered.

† Order this cable and connector only if the customer wants the Emergency Power Option available with the Remote Management package and the UPS.

** This connector works only with the 1 KVA UPS. For the proper connector for the 2 KVA UPS, call the TSC at 1-8-00-344-9670.

Optional Hardware for the 3B2 Computers

This section describes the optional computer-related hardware that can be ordered for the 3B2/ 400, 3B2/ 522, and 3B2/ 1000 Model 70 computers operating in a 3B CMS application.

Main Memory Expansion

For the 3B2/ 400, 3B2/ 522, and 3B2/ 1000 computers, the *minimum* amount of main memory required by 3B CMS is based on the following equation:

$$M_{RAM} = 1.9 + 0.5A + 0.1I$$

Where:

M_{RAM} is the amount of main memory required by 3B CMS.

A is the number of ACDs supported.

I is the number of I/O devices (terminals and printers) connected to the system.

When using this equation, always round up to the next larger unit of main memory (1, 2, or 4 MB main memory boards, whichever applies).

If the customer is going to use the Historical Reports feature during the day, the amount of main memory should be increased by 2 MB, if possible. If additional memory is not installed, system performance will be adversely affected.

If the customer wants to add terminals or printers to the system later on, an inventory of the main memory equipped should be made and compared to the main memory required. If a main memory shortage exists, additional memory should be ordered and installed *before* additional terminals or printers are connected to the system.

Main Memory for the 3B2/400 Computer

For the 3B CMS application, the 3B2/ 400 computer comes equipped with 2 MB of main memory and can be expanded to contain a total of 4 MB of main memory.

Additional main memory is provided by the 1 MB (PEC 73201) and 2 MB (PEC 73241 or PEC 7-3260) circuit cards.

Main Memory for the 3B2/522 and 3B2/1000 Model 70 Computers

For the 3B CMS application, the 3B2/ 522 computer comes equipped with 4 MB of main memory. The 3B2/ 1000 Model 70 computer comes equipped with 16 MB of main memory. The 3B2/ 522 can be expanded to contain a total of 32 MB of main memory, and the 3B2/ 1000 Model 70 can be expanded to contain a total of 64 MB of main memory.

NOTE

The 3B2/ 522 computer has one additional memory card slot available for expansion while the 3B2/ 1000 Model 70 has three additional memory card slots.

Additional main memory for the 3B2/ 522 and 3B2/ 1000 Model 70 computers is provided by the 2 MB (PEC 69559), 4 MB (PEC 69560), and 4/ 16 MB (PEC 69582) circuit cards.

I/O Expansion

I/O can be expanded by ordering the Enhanced Ports (EPORTS) card (PEC 69558). Each EPORTS card provides eight RS-232C serial ports.

These I/O port cards provide additional ports for the connection of terminals and printers to the 3B2 computers.

The 3B2/ 400 SE computer comes equipped with two EPORTS cards.

NOTE

For 3B2/ 400 computers running the CMS software application, a maximum of 17 terminals can be used at any one time to monitor 3B CMS.

The 3B2/ 522 computer comes equipped with one EPORTS card. For the 3B CMS application, three additional EPORTS cards can be ordered for the 3B2/ 522 computer.

NOTE

For 3B2/ 522 computers running the CMS software application, a maximum of 33 terminals can be used at any one time to monitor 3B CMS.

Three EPORTS cards are automatically, and separately, ordered with the 3B-2/ 1000 Model 70 computer. For the 3B CMS application, five additional EPORTS cards can be ordered for the 3B2/ 1000 Model 70 computer.

NOTE

For 3B2/ 1000 Model 70 computers running the CMS software application, a maximum of 65 terminals can be used at any one time to monitor 3B CMS.

3B2 Computer Configurations

If a customer wants to use a parallel printer with CMS, an I/ O Expansion Feature Card (PEC 6-9553) must be ordered and connected to an I/ O feature card slot of the 3B2 computer. This card provides 4 asynchronous serial ports and 1 parallel port.

The following optional cables and connectors support the EPORTS cards on the 3B2/ 400, 3B2/ 522, and 3B2/ 1000 Model 70 computers and must be ordered separately:

- 7-foot EIA cable with modular connectors (PEC 2725-16G)

- 1-4-foot EIA cable with modular connectors (PEC 2725-16N)

- 2-5-foot EIA cable with modular connectors (PEC 2725-16S)

- 5-0-foot EIA cable with modular connectors (PEC 2725-16V)

- Male modem connector (PEC 2750-C10)

- Male null modem connector (PEC 2750-C11)

- Female terminal/ printer connector (PEC 2750-C12).

These cables and connectors are used to connect terminals and printers to a 3B2 computer.

SCSI Peripherals

Table 4-2 summarizes the AT&T SCSI-based peripherals supported by the AT&T 3B2 computers:

Table 4-2 SCSI-Based Peripherals

Peripheral	Characteristic	Interface	PEC
DM/ 300S	300-MB SCSI disk	single-ended	69552
DM/ 300DS	300-MB SCSI disk	differential	36206
XM/ 900S	900-MB with 3 ESDI drives	single-ended	6950-CB2
TM/ 60S	60-MB, 1/ 4-inch tape	single-ended	6950-CB5
TM/ 120S	120-MB, 1/ 4-inch tape	single-ended	6950-CB6
9-track 1600	1600-bpi 9-track tape	single-ended†	6950-CB3
9-track 6250S	1600-/ 6250-bpi 9-track tape	single-ended	6950-CB4
9-track 6250DS	1600-/ 6250-bpi 9-track tape	differential	3630-013

† The 1600-bpi tape is only offered with a single-ended interface.

3B2 Computer Configurations

Single-ended SCSI peripherals are connected to the 3B2 computer with a Single-Ended SCSI Host Adapter package (PEC 69557). SCSI peripherals with a differential interface are connected to the 3B2 computer with a Differential SCSI Host Adapter package (PEC 73282).

The SCSI Host Adapter packages provide the 3B2 computer with an interface to the SCSI interface bus. With this package, a 3B2 computer can access SCSI-based data storage peripherals.

NOTE

The 3B2/ 400, 3B2/ 522, and 3B2/ 1000 Model 70 computers come equipped with one SCSI Host Adapter as standard equipment.

For the 3B2/ 400, 3B2/ 522, and 3B2/ 1000 Model 70 computers, you must order a SCSI Connection Kit (PEC 69562) to connect additional SCSI-based peripherals to the 3B2 computer.

Disk Module/300S Package

The Disk Module/ 300S (DM/ 300S) Package (PEC 69552) consists of a cabinet that contains a single-ended 300 MB SCSI disk drive and a SCSI controller.

Disk Module/300DS Package

The Disk Module/ 300DS (DM/ 300DS) Package (PEC 36206) consists of a cabinet that contains a 300 MB differential SCSI disk drive and a SCSI controller.

Expansion Module SCSI Disk Storage

The Expansion Module/ 900S (XM/ 900S) Package (PEC 6950-CB2) provides 900 MB of formatted disk storage space.

SCSI 60 MB Cartridge Tape Drive

The SCSI 60 MB Cartridge Tape Drive (PEC 6950-CB5) consists of a cabinet that contains a single 60 MB cartridge tape drive and a SCSI controller.

SCSI 120 MB Cartridge Tape Drive

The SCSI 120 MB Cartridge Tape Drive (PEC 6950-CB6) consists of a cabinet that contains a single 120 MB cartridge tape drive and a SCSI controller.

SCSI 9-Track 1600 Tape Drive

This single-ended 9-track tape drive (PEC 6950-CB3) supports the 1600 bpi format and is housed in a 5-foot high cabinet.

SCSI 9-Track 6250S Tape Drive

This single-ended 9-track tape drive (PEC 6950-CB4) supports the 1600-/ 6250-bpi format. This tape drive has an autoloading feature and is housed in a 8 3/4-inch high by 19-inch wide by 26 1/4-inch deep cabinet.

SCSI 9-Track 6250DS Tape Drive

This differential 9-track tape drive (PEC 3630-013) supports the 1600-/ 6250-bpi format. This tape drive has an autoloading feature and is housed in a 8 3/4-inch high by 19-inch wide by 26 1/4-inch deep cabinet.

For more information about the SCSI-based data storage peripherals, refer to the *AT&T Information Systems Sales Manual (7-74-004)*.

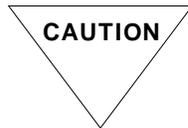
Uninterruptible Power Supply

The Uninterruptible Power Supply (UPS) provides temporary electrical supply for the 3B2 computer (and other equipment connected to the UPS). When a power failure occurs, the UPS sends an alarm to the 3B2 which then performs a graceful shutdown. For 3B CMS, the UPS can be one of the following:

1 KVA UPS (PEC 2403-201).

2 KVA UPS (PEC 2403-204).

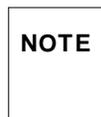
Only the 3B CMS computer, the console terminal, and the computer's 4024 modem (for the Remote Management Package) should be connected to the UPS.



AT&T warranties and service contracts do not cover any other UPS configuration with the CMS computer.

The peak draw in amperes (amps) by the hardware connected to the UPS is shown in the following table.

Computers	Amp draw	Terminals	Amp draw	Modem	Amp draw
3B2/ 310	6.0	4425	.75	4024	.25
3B2/ 400	6.0	605	1.0		
3B2/ 500	6.0	610	1.0		
3B2/ 522	7.0	615MT	1.0		
3B2/ 600	6.0	615C	1.4		
3B2/ 1000 Model 70	7.0	620	1.0		
		7-05	.75		



If a UPS is not connected to the 3B2 computer, possible file system damage may occur during a power failure. The extent of the damage could range from losing the last half-hour data save to a disk crash. (During a disk crash, the disk heads come in contact with the disk surface, thereby destroying the disk.) If a disk crash occurs, the disk drive will have to be replaced. Therefore, data would also be lost until the disk drive has been replaced.

It is up to the customer to weigh the cost of the UPS against the possibility of a disk crash.

In the recommended installation, the UPS is connected to the Remote Management Package (AIC board). When a power outage occurs, the 3B2 computer will execute the */etc/acfail* program which does graceful shutdown approximately one minute after a power outage has occurred. Refer to the *Remote Management* in this chapter and the *3B2 CMS Installation and Maintenance* (5-85-215-104) document for details.

Instead of shutting down the system, the UPS may be used to provide temporary electrical power to the 3B2 — until the UPS power runs out. However, if normal system power is not restored before UPS power runs out, the 3B2 may still lose data or suffer a disk crash.

NOTE

A UNIX System shell program is available to adjust the time before the graceful shutdown begins. The TSC must download this shell program into the */etc/acfail* program when the UPS is installed.

The UPS consists of a reserve battery, charger system, and four NEMA type 5-15R outlets for equipment connection.

Visual indicators include:

- Normal
- On battery
- Low battery overload.

Audible indicators include:

- On battery
- Low battery
- Overload.

Remote indicators are provided via a Form C contact closure interface:

- Normal
- On battery
- Low battery
- Overload.

3B2 Computer Configurations

Controls include:

ON/ OFF

Alarm silence.

Life expectancy of the supplied battery is 3 years or 200 discharges, whichever comes first.

Refer to Table 4-1 and Figure 4-1 for the cable and connector PECs required to connect the UPS to the AIC.

Refer to the *Marketing Guide* on the UPS for more information.

Software

This section describes the additional software required by the 3B CMS application.

Required Software for the 3B2/400 Computer

For a 3B2/ 400 computer, you must order the following software:

3B2 CMS (PEC 1208-010, Attribute MSF13) — The Coordination Code on all 1208 orders must be 7.

NOTE

Attribute MSF13 is for SCSI-based cartridge tape drives only. For systems with a 23 MB cartridge tape drive, Attribute MSF10 should be ordered.

INFORMIX and Network Interface Version 1.1.1 software (three floppy disks) are included with the purchase of the 3B CMS software. For hardware upgrades, INFORMIX software (PEC 6950-AE1) and Network Interface software (PEC 6950-AN1 MSF14) may be ordered separately.

Required Software for the 3B2/522 Computer

For a 3B2/ 522 computer, you must order the following software:

3B2 CMS (PEC 1208-010, Attribute MSF13) — The Coordination Code on all 1208 orders must be 7.

INFORMIX and Network Interface Version 1.1.1 software (three floppy disks) are included with the purchase of the 3B CMS software. For hardware upgrades, INFORMIX software (PEC 6950-AH1) and Network Interface software (PEC 6950-AN1 MSF14) may be ordered separately.

Required Software for the 3B2/1000 Model 70 Computer

For a 3B2/ 1000 Model 70 computer, you must order the following software:

3B2 CMS (PEC 1208-011, Attribute MSF13) — The Coordination Code on all 1208 orders must be 7.

INFORMIX and Network Interface Version 1.1.1 software (three floppy disks) are included with the purchase of the 3B CMS software. For hardware upgrades, INFORMIX software (PEC 6950-AJ1) and Network Interface software (PEC 6950-AN1 MSF14) may be ordered separately.

Optional Software

3B CMS Vectoring

If the customer is ordering or has a Generic 2 or System 85 R2V4 switch with Call Vectoring (PEC 1252-CVG) or a Generic 3i with Call Vectoring (PEC 1236-CVB), the following 3B CMS software option must be ordered: 3B CMS Vectoring Feature (PEC 1208-012).

The 3B CMS Vectoring Feature can be used to administer the vectors on the Generic 2 and System 85, R2V4 switches and to generate reports about vectoring. For the Generic 3i switch, 3B CMS Vectoring can be used to generate reports about vectoring, but cannot be used to administer vectors on the Generic 3i. Instead, the Manager I must be used for vector administration.

A single purchase of the 3B CMS Vectoring Feature, when installed on a 3B2/ 1-000 Model 70 computer, allows the customer to administer up to four switches that also each have the Vectoring feature.

NOTE

The 3B2/ 600, which is no longer orderable with 3B CMS, also can support up to four Vectoring switches with a single purchase and installation of the 3B CMS Vectoring feature.

3B CMS Graphics

The 3B CMS Graphics Feature is a feature ordered separately using one of the following PEC/ Attribute codes:

PEC 1208-016, Attribute MSF99 — for new CMS customers.

PEC 1208-016, Attribute MSF10 — for existing 3B CMS customers who have a 3B2/ 310 or 3B2/ 400 with a CTC tape drive.

PEC 1208-016, Attribute MSF13 — for existing 3B CMS customers who have a 3B2/ 310, 3B2/ 400, 3B2/ 500, or 3B2/ 522 with a SCSI tape drive.

PEC 1208-016, Attribute MSF14 — for existing 3B CMS customers who have a 3B2/ 600 or 3B2/ 1000 Model 70.

A single purchase of the 3B CMS Graphics Feature, when installed on a 3B2/ 1-000 Model 70 computer, allows the customer to get bar graph reports on up to four switches connected to the computer.

NOTE

The 3B2/ 600, which is no longer orderable with 3B CMS, also can give bar graph reports on up to four switches with a single purchase and installation of the 3B CMS Graphics feature.

NOTE

The customer cannot use 6500 terminals for bar graph reports. They do not offer the necessary dim, bright, and normal attributes for effective display of the graphs.

Peripherals

This section describes the terminals and printers that can be connected to the 3B2 computer and are recommended for use with the 3B CMS application.

NOTE

For terminals and printers located more than 50 feet from the 3B2 computer, see “Cabling Remote Terminals and Printers” later in this chapter. For additional cabling, connectors, and other hardware such as modems and Asynchronous Data Units (ADUs), refer to the *AT&T Information Systems Sales Manual (7-74-004)*. You may also need to contact the Call Center Support Group at the Sales and Technical Response Center at 1-800-521-7872.

Terminals

The following AT&T terminals have been approved to support the 3B CMS application:

- 6-15 Multitasking Terminal (615 MT)
- 6-15 Color Multitasking Terminal (615 CMT)
- 6-20 Multitasking Terminal with Graphics (620 MTG)
- 7-05 Multitasking Terminal (705 MT)
- 6-500 Displays (6528, 6529, 6538, and 6539).

NOTE

The 605 BCT, 610 BCT and 4425 are also CMS approved terminals but have been manufacturer discontinued (MDed).

The computer system ordered for 3B CMS must have a system console terminal for administration of the 3B2. A wide variety of terminals can be used to administer the 3B2 as long as the chosen terminal is used solely as the system console. If the customer also wants to use the system console for the 3B CMS application, then one of the 3B CMS-approved terminals must be used as the system console.

6-15 MT

The 615 Multitasking Terminal (615 MT) is an interactive, character-at-a-time keyboard/ display terminal that has been specifically designed for UNIX System V Release 3.0 operating systems configured with the AT&T Windowing Utilities. Up to three simultaneously active windows can be created. However, the CMS application does not support windowing.

The major components for the 615 MT are as follows:

6-15 MT Controller (PEC 6950-ET1)

9-8-Key Standard Keyboard (PEC 69567)

1-4-Inch Monitor (PEC 69569)

— Amber (Attribute COL19)

— Green (Attribute COL01)

For additional information, refer to the *Marketing Guide* for the AT&T 615 MT and the *AT&T Information Systems Sales Manual* (7-74-004).

6-15 CMT

The 615 Color Multitasking Terminal (615 CMT) has, in addition to the functionality of the 615 MT, 8 user-selectable colors for both foreground and background. **The 615 CMT is the only supported color terminal for CMS Graphics.**

The major components for the 615 CMT are as follows:

6-15 CMT Controller (PEC 6950-ET5)

9-8-Key Standard Keyboard (PEC 69567)

1-4-Inch Color Monitor (PEC 69571)

For additional information, refer to the *Marketing Guide* for the AT&T 615 CMT and the *AT&T Information Systems Sales Manual* (7-74-004).

6-20 MTG

The 620 Multitasking Terminal with Graphics (620 MTG) is a full featured, ANSI 3.64-based, interactive, character-at-a-time, multitasking business graphics terminal with a bit-mapped screen. Up to six simultaneously active windows can be created. However, the CMS application does not support windowing.

Peripherals

The major components for the 620 MTG are as follows:

6-20 MTG Controller (PEC 3344-620)

9-8-Key Standard Keyboard (PEC 69567)

1-4-Inch Monitor (PEC 33411)

- Amber (Attribute COL19)
- Green (Attribute COL01)
- White (Attribute COL10) — limited availability.

For additional information, refer to the *Marketing Guide* for the AT&T 620 MTG and the *AT&T Information Systems Sales Manual (7-74-004)*.

For each 620 MTG, order the *620 MTG User's Guide (9-99-300-211IS)*.

6-500 Displays

The 3B CMS software also supports the 6528, 6529, 6538, and 6539 displays with reduced functionality. Refer to the *3B CMS Administration (5-85-215-504)* document for more information on the functionality of the 6500 display terminals. Since these displays require their own planning and implementation, the associated hardware Price Element Codes are not documented here. Refer to the *Marketing Guide* for the AT&T 6500 Displays and the *AT&T Information Systems Sales Manual (7-74-004)* for more information.

NOTE

The customer cannot use these terminals for bar graph reports. They do not offer the necessary dim, bright, and normal attributes for effective display of the graphs.

Other documents that support the 6500 displays are:

AT&T 6500 Station Cabling Guide (999-300-129IS)

AT&T 6500 Implementation Manual (999-300-130IS)

AT&T 6500 Station Manager's Guide (999-300-106IS)

AT&T 6500 Station Service Manual (999-306-030IS)

AT&T 6500 Technical Reference (999-300-131IS)

AT&T 6538/ 6539 Displays User's Guide (999-300-122IS)

AT&T 6528/ 6529 Displays User's Guide (999-300-179IS)

7-05 MT

The 705 Multitasking Terminal (705 MT) is an interactive, character-at-a-time keyboard/ display terminal that has been specifically designed to work with the AT&T 3B computers, AT&T WGS personal computers, and other UNIX System or DOS hosts. The 705 MT package (PEC 6950-ET3) includes a 102 key keyboard and a monitor as standard equipment.

The monitor for the 705 MT is available in the following colors:

Amber (Attribute COL19)

Paper White (Attribute COL10).

For additional information, refer to the *Marketing Guide* for the AT&T 705 MT and the *AT&T Information Systems Sales Manual* (7-74-004).

Printers

AT&T printers provide a wide range of speeds and three categories of print quality.

Draft Quality — gives an idea of what the final document will look like, but the copy will not reproduce well.

Near Letter Quality — output is better than draft but not as good as letter quality.

Letter Quality — gives good quality output that may be copied on a photocopier with good results or may be used directly from the printer.

Table 4-3 lists the printers that can be ordered for the CMS application and highlights the characteristics of each printer. Table 4-4 lists printers no longer orderable (discontinued) but that still support the CMS application.

Table 4-3 Orderable and Supported Printers

Printer Model	PEC	Printer Type	Printer Quality	Speed		Paper Size	Interface
				Relative	Char/ Sec**		
4-44	6950-EP2	Band	Draft	High	400 lpm*	16 inches	Parallel/ EIA
4-55	3330-455	Daisy Wheel	Letter	Low	55	15 inches	EIA
4-58	3330-458	Daisy Wheel	Letter	Low	45	16.7 inches	EIA
5-70‡	6950-EP3	Dot Matrix	Letter	Low	40	10 inches	Parallel
			NLQ	Medium	62		
			Draft	High	250		
5-72	6950-EP5	Dot Matrix	NLQ	Low	62	10 inches	EIA
			Draft	High	250		
5-73	6950-EP6	Dot Matrix	NLQ	Low	62	15.5 inches	EIA
			Draft	High	250		
5-83‡	6950-EP8	Dot Matrix	Letter	Low	66	15.5 inches	Parallel/ EIA
			NLQ	Medium	133		
			Draft	High	200		
5-93	6950-EP1	Laser	Letter	High	6 ppm†	8.5x11;8.5x14	EIA

* — lines per minute. The 444 printer speed can be increased to 650 lines per minute with the 650 LPM Upgrade Kit (PEC 69564).

† — pages per minute.

** — 10 characters per inch.

‡ — will print bar graphs with high-quality IBM Extended Graphics character set. The 583 is a color printer, though it will not print bar graphs in color.

NOTE

For any printer with a parallel interface, an I/O Expansion Feature Card (PEC 69553) must be connected to the 3B2 computer.

Table 4-4 Discontinued But Supported Printers

Printer Model	Printer		Speed		Paper Size	Interface
	Type	Quality	Relative	Char/ Sec		
4-47	Band	Draft	High	600 lpm*	16 inches	EIA
4-75	Dot Matrix	Draft	Low	120	11 inches	EIA
4-76	Dot Matrix	Draft	Low	120	11 inches	EIA
4-77‡	Dot Matrix	NLQ	High	96-288	16 inches	EIA
4-95	Laser	Letter	High	10 ppm†	8.5x11 8.5x14	EIA
5-310	Dot Matrix	Draft	High	200	9.5 inches	EIA
5-320	Dot Matrix	Draft	High	200	15 inches	EIA

* — lines per minute.

† — pages per minute.

‡ — will print with high-quality IBM Extended Graphics character set for bar graphs.

For more information about the printers, optional printer hardware, and cabling, refer to the *AT&T Information Systems Sales Manual (7-74-004)* and the *AT&T 3B2 Computer Installation Manual for AT&T Printers (Comcode 105310494, Select Code 3-05-580, Catalog Number 999-300-378IS)*.

NOTE

If the customer is purchasing CMS Graphics, printer models 477, 570, and 5-83 will give the customer superior graph printouts because these printers support the IBM Extended Graphics character set.

These printers use different shades of gray to represent the bar colors displayed on a 615C terminal. They do not print bars in color. Graph printouts on other printers will use the basic ASCII character set.

Remote and Extended Cabling of Terminals and Printers

In some cases, the customer's AT&T 3B2 computer and AT&T telecommunications switch may be separated by several miles. If this is the case, the customer may want to install CMS terminals and printers at the switch location.

The customer may remotely connect 3B CMS terminals and printers to the 3B using standard data communications configurations. Depending on the hardware used for remote terminal/ printer connections, 3B CMS supports baud rates of 1200, 2400, 4800, and 9600.

For extended on-premises, in-building distances (greater than 50 feet but less than 5,000 feet), the customer may connect a remote EIA terminal or printer to the 3B as shown in Figure 4-2.

NOTE	The configuration in Figure 4-2 requires the use of 24-gauge wire and assumes a 9600 baud rate.
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Remote and Extended Cabling of Terminals and Printers

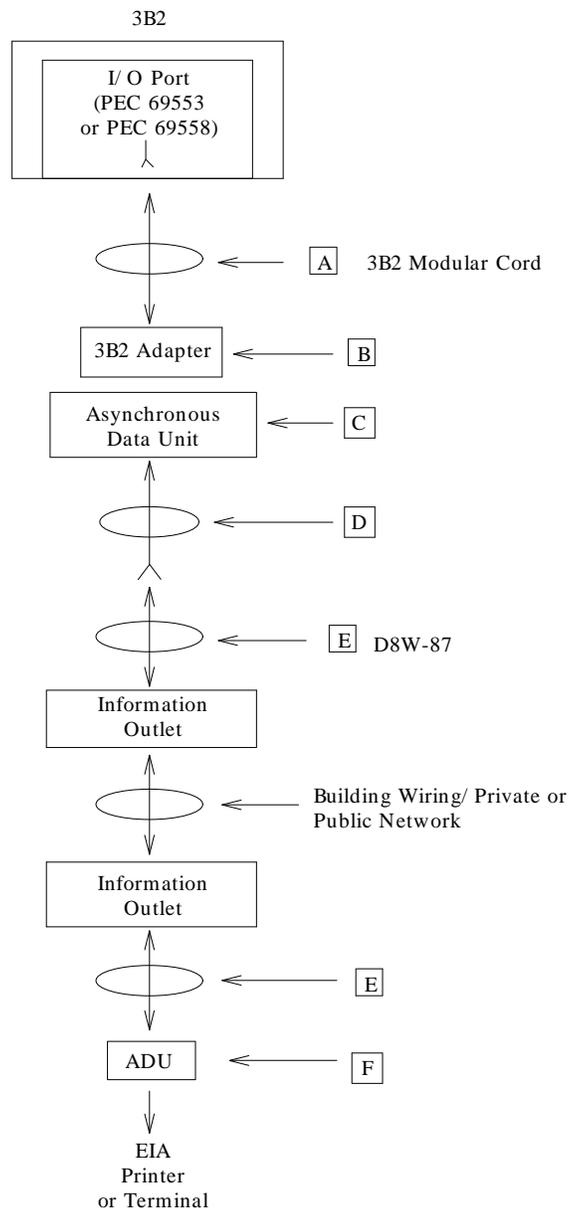


Figure 4-2 Sample Extended Cabling of EIA Terminal/ Printer

Remote and Extended Cabling of Terminals and Printers

Table 4-5 Cabling Equipment For Remote EIA Terminal/ Printer

Ref	Equipment	PEC	Attributes	Description
A	3B2 modular cord	2725-16G		7 foot (M-M)
		2-725-16N		14 foot (M-M)
		2-725-16S		25 foot (M-M)
		2-725-16V		50 foot (M-M)
B	3B2 ACU modem adapter	2-750-C10		Modular-to-25-pin RS 232C adapter (M)
C	Z3A4	2169-004		Asynchronous data unit with female EIA cord
D	D8AM-87 modular cord	6950-EA9		5-inch ADU crossover cord
E	D8W-87 modular cord	2-725-07G	COL12	7 foot (M-M)
		2-725-07N	COL18	(Ivory) 14 foot (M-M)
		2-725-07S	COL12	(Silver) 14 foot (M-M)
			COL18	(Ivory) 25 foot (M-M) (Silver) 25 foot (M-M)
F	Z3A1	2169-001		Asynchronous data unit with male EIA cord. Use with EIA terminal or printer. A printer will also require ADU power (PEC 21691).

One way to connect a remote 3B2 to the switch is by multiplexing EIA ports at the computer site over a single analog private line (supplied by the local telephone company at the customer's expense) to the switch site. At the switch site, the CMS terminals and printers are multiplexed to the incoming analog private line.

Refer to the *DATAPHONE* II Series 700 Multiplexer Configuration Guide* (9-99-100-308 IS) for detailed information on the hardware required to multiplex EIA ports on the 3B2 computer to terminals and printers at remote locations.

NOTE Using DATAPHONE II multiplexers to cable the EIA ports on the 3B2 computer to remote CMS terminals and printers is just one of many possibilities. It is not within the scope of this document to detail the hardware and cabling required for this method or any other method.

* Registered trademark of AT&T.

Additional Switch Hardware and Software

This section identifies the switches that can be connected to the 3B2 computers in a 3B CMS application. The additional switch hardware and software items required by the CMS application are also discussed.

The following AT&T telecommunications switches support the 3B CMS:

AT&T DEFINITY Communications System Generic 1

AT&T DEFINITY Communications System Generic 3i

System 75, R1V3, Issue 1.1 or later

System 75 XE, R1V3, Issue 1.2 or later

AT&T DEFINITY Communications System Generic 2.1

System 85, R2V4, Issue 1.0 or later

System 85, R2V3, Issue 1.1 or later

DIMENSION 600 and 2000 System switches with FP 8, Version 3.8.

The AT&T switches should be installed with or upgraded to the required software before the 3B CMS software application is installed.

The DIMENSION 600 and 2000 System switches are no longer orderable products. If the customer already has one of these switches in operation, these switches can be upgraded with the ACD feature and FP 8, Version 3.8, which is a requirement for 3B CMS.

Determining which switch the customer needs or wants in a 3B CMS application is a separate ordering function.

Additional Generic 3i, Generic 1, and System 75 XE Switch Hardware

If the 3B2 computer is going to be connected to the Generic 3i, Generic 1, or System 75 XE switch via the EIA connector on the Processor Interface, the following hardware must be available on the switch:

One Processor Interface (TN765)
(PEC 63153)

If the 3B2 computer is going to be connected to the Generic 3i, Generic 1, or System 75 XE switch with a Modular Processor Data Module (MPDM), the following hardware must be available on the switch:

One Processor Interface (TN765)
(PEC 63153)

Digital line (PEC 63114)

NOTE If the Generic 3i, Generic 1, or System 75 XE has duplicated common controls, a second Processor Interface is also necessary.

PEC 1236-CVB (Call Vectoring) must be included with the Generic 3i switch order if the customer orders the Vectoring feature (PEC 1208-012) of the 3B CMS software.

CAUTION If Vectoring is active on the switch but not on 3B CMS, or if Vectoring is active on 3B CMS but not on the switch, the PI link will not initialize.

If the customer wants the optional recorded announcement feature, an integrated digital announcement board or an external announcement unit should also be available on the Generic 3i, Generic 1, or System 75 XE switch. See Table 4-6 for a list of possible announcement devices.

NOTE When a system is run on AC power, one AC converter unit (PEC 65271/ A) is required for each external announcement device — Attribute ACC 01 for 1-channel devices and ACC 02 for 4- and 8-channel devices.

Table 4-6 System 75/ Generic 1/ Generic 3i Announcement Devices

1-Channel (PEC 65266/ A)	Includes 32 seconds of memory and remote recording. Requires two ports of an analog interface (PEC 63136). One of the ports is for remote recording.
1-Channel (PEC 65267/ A)	Includes 32 seconds of memory. Requires one port of an analog interface (PEC 63136).
1-Channel (PEC 65268/ A)	Includes 128 seconds of memory and remote recording. Requires two ports of an analog interface (PEC 63136). One of the ports is for remote recording.
1-Channel (PEC 65269/ A)	Includes 128 seconds of memory. Requires one port of an analog interface (PEC 63136).
4-Channel (PEC 65277/ A)	Includes 16 seconds of memory per channel and remote recording. Requires five ports of an analog interface (PECs 63136). One of the ports is for remote recording.
4-Channel (PEC 65279/ A)	Includes 16 seconds of memory per channel. Requires four ports of an analog interface (PECs 63136).
4-Channel (PEC 65282/ A)	Includes 80 seconds of memory per channel and remote recording. Requires five ports of an analog interface (PECs 63136). One of the ports is for remote recording.
4-Channel (PEC 65286/ A)	Includes 128 seconds of memory per channel. Requires four ports of an analog interface (PECs 63136).
8-Channel (PEC 65295/ A)	Includes 40 seconds of memory per channel and remote recording. Requires nine ports of an analog interface (PECs 63136). One of the ports is for remote recording.
Integrated Announcement Board (PEC 63141)	Includes 16 channels, which share 4 minutes of memory. Requires 1 slot on a carrier. Only one board may be installed on a System 75/ Generic 1/ Generic 3i switch.

NOTE

See “Connecting the 3B2 Computer to the Generic 3i, Generic 1, System 75, or System 75 XE Switch” for additional hardware requirements.

Additional System 75 Switch Hardware

If the 3B2 computer is going to be connected to the System 75 switch, the following hardware must be available on the switch:

One AP/ DCS Interface (TN716, TN719, and TN738) (PEC 63126)

Digital line (PEC 63114)

If the customer wants the optional recorded announcement feature, an integrated digital announcement board or an external announcement unit should also be available on the System 7-5 switch. See Table 4-6 for a list of possible announcement devices.

NOTE	See “Connecting the 3B2 Computer to the Generic 3i, Generic 1, System 75, or System 75 XE Switch” for additional hardware requirements.
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Additional Generic 2 and System 85 Switch Hardware and Software

If the 3B2 computer is going to be connected to the Generic 2 or System 85 switch, the following hardware must be available on the switch: one DCIU (PEC 65325).

NOTE For duplicated common controls, order two DCIUs.

PEC 1252-CVG (Call Vectoring) must be included with the Generic 2 or System 85, R2V4 switch order if the customer orders the Vectoring feature (PEC 1208-012) of the 3B CMS software.

CAUTION If Vectoring is active on the switch but not on 3B CMS, or if Vectoring is active on 3B CMS but not on the switch, the DCIU link will not initialize.

If the customer wants the optional recorded announcement feature, an external recorded announcement unit is required. See the list in Table 4-7 for possible announcement units for the Generic 2 or System 85 switch.

NOTE When a system is run on AC power, one AC converter unit (PEC 65271/ A) is required for each announcement device — Attribute ACC 01 for 1-channel and Attribute ACC 0-2 for 4- and 8-channel devices.

Table 4-7 System 85/ Generic 2 Announcement Devices

1-Channel (PEC 65266/ A)	Includes 32 seconds of memory and remote recording. Requires one port of an auxiliary trunk interface (PEC 65113 or 63118) and, for remote recording, one port of an analog interface (PECs 65347 or 63136).
1-Channel (PEC 65267/ A)	Includes 32 seconds of memory. Requires one port of an auxiliary trunk interface (PEC 65113 or 63118).
1-Channel (PEC 65268/ A)	Includes 128 seconds of memory and remote recording. Requires one port of an auxiliary trunk interface (PEC 65113 or 63118) and, for remote recording, one port of an analog interface (PECs 65347 or 63136).
1-Channel (PEC 65269/ A)	Includes 128 seconds of memory. Requires one port of an auxiliary trunk interface analog interface (PEC 65113 or 63118).
3-Channel (PEC 65276 ACC 01)	Adds three channels to an existing 1-channel announcement unit. Requires 3 more channels of an auxiliary trunk interface (PEC 65113 or 63118).
4-Channel (PEC 65278/ A)	Includes 16 seconds of memory per channel and remote recording. Requires four ports of an auxiliary trunk interface (PEC 65113 or 63118) and, for remote recording, one port of an analog interface (PEC 65347 or 63136).
4-Channel (PEC 65280/ A)	Includes 32 seconds of memory per channel and remote record capability. Requires four ports of an auxiliary trunk interface (PEC 65113 or 63118) and, for remote recording, one port of an analog interface (PEC 65347 or 63136).
4-Channel (PEC 65281/ A)	Includes 32 seconds of memory per channel. Requires four ports of an auxiliary trunk interface (PEC 65113 or 63118).
4-Channel (PEC 65283/ A)	Includes 80 seconds of memory per channel and remote recording. Requires four ports of an auxiliary trunk interface (PEC 65113 or 63118) and, for remote recording, one port of an analog interface (PEC 65347 or 63136).
4-Channel (PEC 65284/ A)	Includes 80 seconds of memory per channel. Requires four ports of an auxiliary trunk interface (PEC 65113 or 63118).
4-Channel (PEC 65285/ A)	Includes 128 seconds of memory per channel and remote recording. Requires four ports of an auxiliary trunk interface (PEC 65113 or 63118) and, for remote recording, one port of an analog interface (PEC 65347 or 63136).
4-Channel (PEC 65287/ A)	Includes 128 seconds of memory per channel. Requires four ports of an auxiliary trunk interface (PEC 65113 or 63118).

Table 4-7 System 85/ Generic 2 Announcement Devices (Contd)

8-Channel (PEC 65293/ A)	Includes 16 seconds of memory per channel and remote recording. Requires eight ports of an auxiliary trunk interface (PEC 65113 or 63118) and, for remote recording, one port of an analog interface (PEC 65347 or 63136).
8-Channel (PEC 65294/ A)	Includes 16 seconds of memory per channel. Requires eight ports of an auxiliary trunk interface (PEC 65113 or 63118).
8-Channel (PEC 65296/ A)	Includes 40 seconds of memory per channel and remote recording. Requires eight ports of an auxiliary trunk interface (PEC 65113 or 63118) and, for remote recording, one port of an analog interface (PEC 65347 or 63136).
8-Channel (PEC 65297/ A)	Includes 40 seconds of memory per channel. Requires eight ports of an auxiliary trunk interface (PEC 65113 or 63118).
8-Channel (PEC 65298/ A)	Includes 64 seconds of memory per channel and remote recording. Requires eight ports of an auxiliary trunk interface (PEC 65113 or 63118) and, for remote recording, one port of an analog interface (PEC 65347 or 63136).
8-Channel (PEC 65299/ A)	Includes 64 seconds of memory per channel. Requires eight ports of an auxiliary trunk interface (PEC 65113 or 63118).

Refer to the *AT&T Information Systems Sales Manual (7-74-004)* for a full description of recorded announcement options.

Additional DIMENSION System Switch Hardware and Software

If the 3B2 computer is going to be connected to the DIMENSION System switch, the following hardware must be available on the switch: one DCIU (PEC 64260).

NOTE For duplicated common controls, order two DCIUs.

If the customer wants the optional recorded announcement feature, an external announcement unit is required on the DIMENSION switch. See Table 4-7 for a list of announcement devices.

NOTE Substitute PEC 64012 (provides four auxiliary trunk interface ports) for PECs 6511-3 or 6-3118 (specified in Table 4-7 for a Generic 2/ System 85).

NOTE When a system is run on AC power, one AC converter unit (PEC 65271/ A) is required for each announcement device — Attribute ACC 01 for 1-channel and Attribute ACC 0-2 for 4- and 8-channel devices.

Refer to the *AT&T Information Systems Sales Manual (7-74-004)* for a full description of this recorded announcement option.

On a DIMENSION 2000 System Switch, Application-Service Software (PEC 64238) and Deluxe Voice Software for Feature Package 8 (PEC 64297) must also be available.

On a DIMENSION 600SN System Switch, Application-Service Software (PEC 64623) must be available.

Computer-to-Switch Hardware and Cabling

This section describes the hardware and cables that you must order to connect a 3B-2 computer to the following AT&T telecommunications switches:

DEFINITY Communications System Generic 3i

DEFINITY Communications System Generic 1

System 75

System 75 XE

DEFINITY Communications System Generic 2

System 85

DIMENSION System switch.

NOTE

The 3B CMS application allows for up to four telecommunication switches to be connected to the 3B2/ 1000 Model 70 computer. Several cabling configurations can be used to connect multiple switches to this computer. The cabling configurations you choose will depend on the distance between the computer and the switch. Although there may be other cabling methods that will work, only the recommended cabling configurations are shown.

Refer to the appropriate section to determine the hardware and cabling requirements:

Connecting the 3B2 computer to the Generic 3i, Generic 1, System 75, or System 75 XE Switch

Connecting the 3B2 computer to the Generic 2 or System 85 Switch

Connecting the 3B2 computer to the DIMENSION System Switch.

Connecting the 3B2 Computer to the Generic 3i, Generic 1, System 75, or System 75 XE Switch

This section describes the hardware and cables required to connect the ISC RS-232C port on the 3B2 computer to the PI on the Generic 3i, Generic 1, System 75, or System 75 XE switch.

The 3B2 computer can be connected to these by using one of the following methods:

Using a Modular Processor Data Module — If this method is used, the maximum allowable distance between the 3B2 computer and the Modular Processor Data Module (MPDM) is 50 feet, and the maximum allowable distance between the MPDM and the Generic 3i, Generic 1, System 75, or System 75 XE is 5000 feet with 2-4 gauge wire and 4000 feet with 26 gauge wire.

Using an Analog Private Line — This method is required when the distance limitations for the MPDM are exceeded.

Using the EIA Connector on the Processor Interface.

NOTE

Only the Generic 3i, Generic 1, and System 75 XE can be connected to the 3B2 computer via the EIA connector on the Processor Interface of the switch. The System 75 does not have a Processor Interface. Instead, the System 75 uses an AP/DCS Interface. The AP/DCS and the Processor Interface are sometimes called a Systems Communications Interface (SCI).

Using a Modular Processor Data Module

Order the following:

One MPDM (PEC 2161-101), which includes a D8W-87 cord.

One RS-232 interface (PEC 21611)

One stand-alone housing (PEC 21702)

One KS-23267 cable (4.5 feet in length), provided with the ISC kit.

NOTE If the KS-23267 cable is not long enough to reach the MPDM, you can order either the 12-foot (PEC 2726-03L) or the 25-foot (PEC-2726-03S) cable.

NOTE Some of the cabling in Figure 4-3 may have to be locally engineered (4-wire cable).

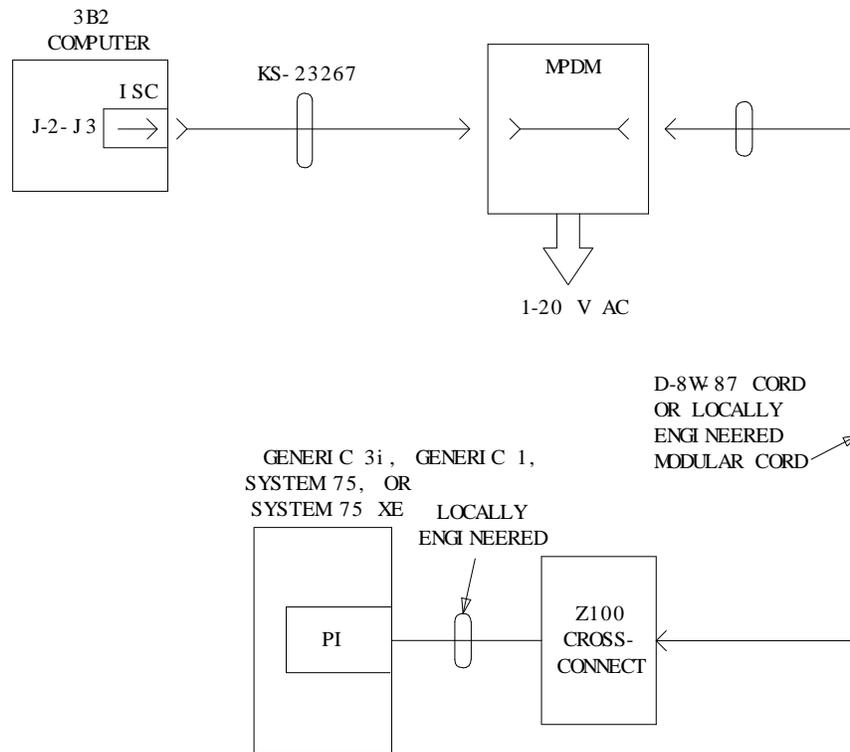


Figure 4-3 3B2 Computer to Generic 3i, Generic 1, System 75, or System 75 XE Cabling With an MPDM

Using an Analog Private Line

Order the following:

One Modular Trunk Data Module (MTDM) (PEC 2162-TDM)

One RS-232 interface (PEC 21621)

One stand-alone housing (PEC 21702)

Two DATAPHONE II modems (PEC 2201-96C)

Two stand-alone housings (PEC 22631)

Two M8K cables, 5 feet in length (PEC 2721-08E) — See Figures 4-4 and 4-5

NOTE

If the Channel Interface Unit is not available on the customer's premises, order PEC 9200-030, which is a stand alone replacement unit. This unit must be ordered through the Custom Systems organization via the Custom Systems Automation Program (CSAP).

One KS-23267 cable (4.5 feet in length), provided with the ISC kit.

NOTE

If the KS-23267 cable is not long enough to reach the KS-22636 adapter connected to the DATAPHONE II modem, you can order either the 12-foot (PEC 2726-03L) or the 25-foot (PEC 2726-03S) cable. The KS-22636 adapter is provided with the DATAPHONE II modem, and the D8W-87 Network Cord is provided with the MTDM.

One of the following M25B cables (RS-232C) (See reference "B" in Figure 4-5:

- 1-foot cable (PEC 2721-02A)
- 4-foot cable (PEC 2721-02D)
- 10-foot cable (PEC 2721-02K)
- 25-foot cable (PEC 2721-02S)
- 50-foot cable (PEC 2721-02V).

NOTE Some of the cabling in Figure 4-5 may have to be locally engineered (4-wire cable). You may also have to refer to the *AT&T Information Systems Sales Manual (7-74-004)* for further details.

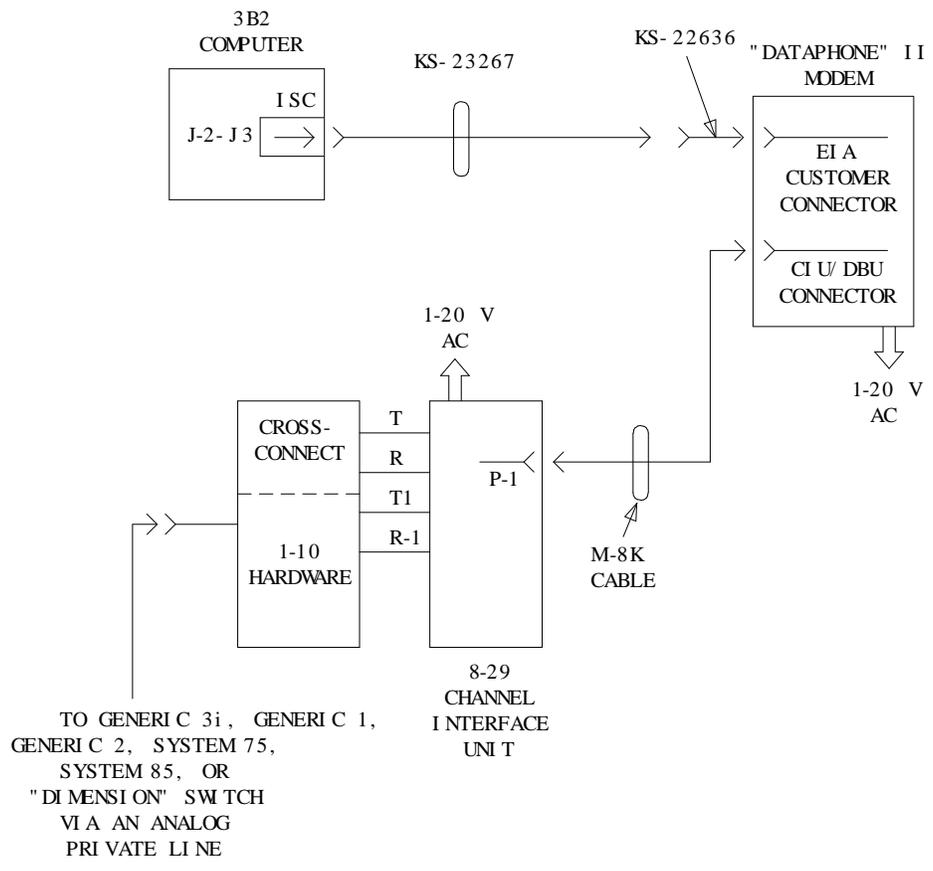


Figure 4-4 3B2 Computer Cabling to Analog Private Line

Computer-to-Switch Hardware and Cabling

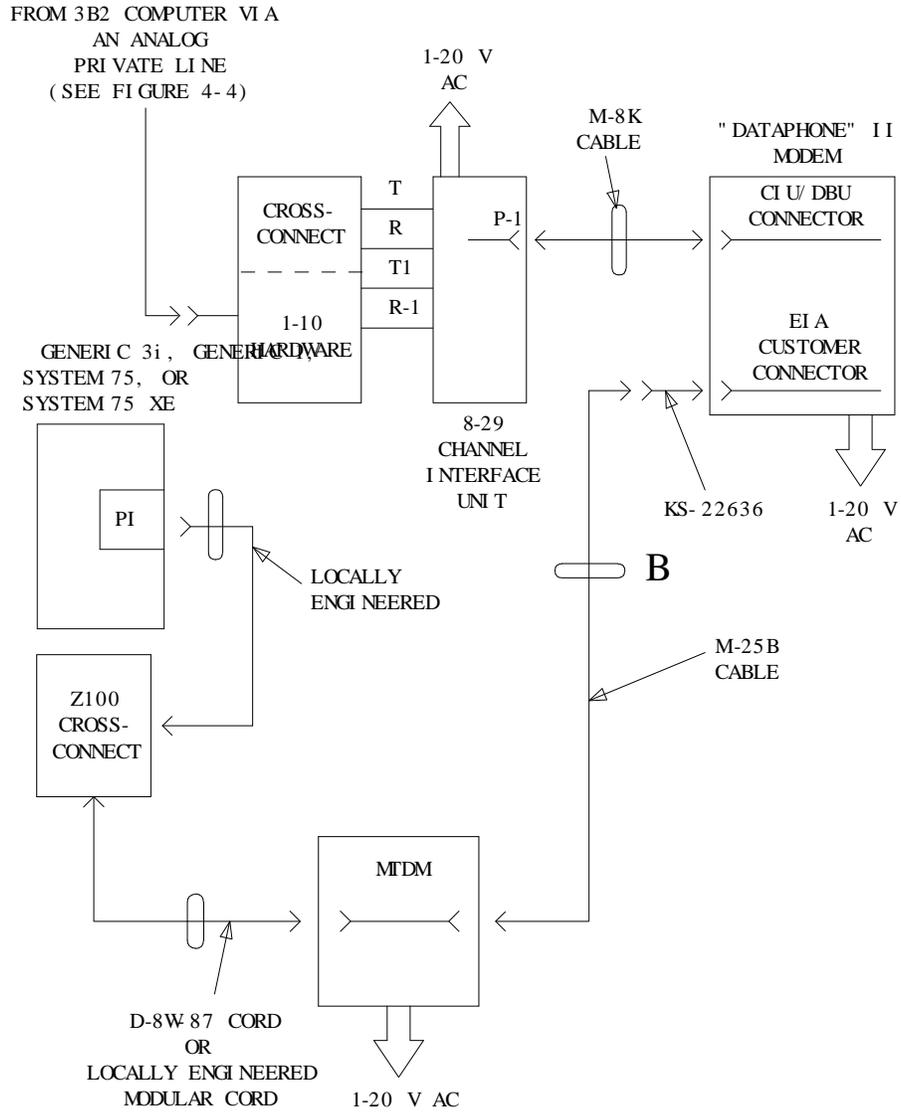


Figure 4-5 Generic 3i, Generic 1, System 75, and System 75 XE Cabling to Analog Private Line

Using the EIA Connector on the Processor Interface

This section describes the hardware and cables required to connect an ISC RS-232C port on the 3B2 computer to the EIA connector of a Processor Interface on the Generic 3i, Generic 1, or System 75 XE switch.

NOTE

For this cabling configuration, the Generic 3i, Generic 1, or System 75 XE and the 3B2 computer must not be over 50 feet apart. If the distance is greater than 50 feet, refer to the section *Connecting the 3B2 Computer to the Generic 3i, Generic 1, System 75, or System 75 XE Switch* for the proper cabling configuration and to the section *Additional Generic 3i, Generic 1, and System 75 XE Hardware* for switch hardware information.

The 3B2 computer can be connected to the EIA connector of a Processor Interface on the Generic 3i, Generic 1, or System 75 XE switch by ordering the following hardware:

One 10-foot RS-232C to RS-449 transition cable (H600-362, Group 1) (PEC 70308, Attributes LNG99, LNH01)

One Isolating Data Interface (IDI) kit (PEC 65399A, Attributes CCT01, CNN06, LNG21).

NOTE

For this configuration, the Generic 3i or Generic 1 switch must have a single common control and must be AC powered. This configuration will not work with duplicated common controls or DC power.

NOTE

A KS-23267 cable (4.5 feet long) is provided with the ISC kit. An RS-232C to RS-449 transition cable (ED-1E434-11, Group 175) is provided with the IDI kit. An RS-449 switch-to-IDI cable (Attribute LNG21) is also provided with the IDI kit. This cable must be no longer than 25 feet.

Computer-to-Switch Hardware and Cabling

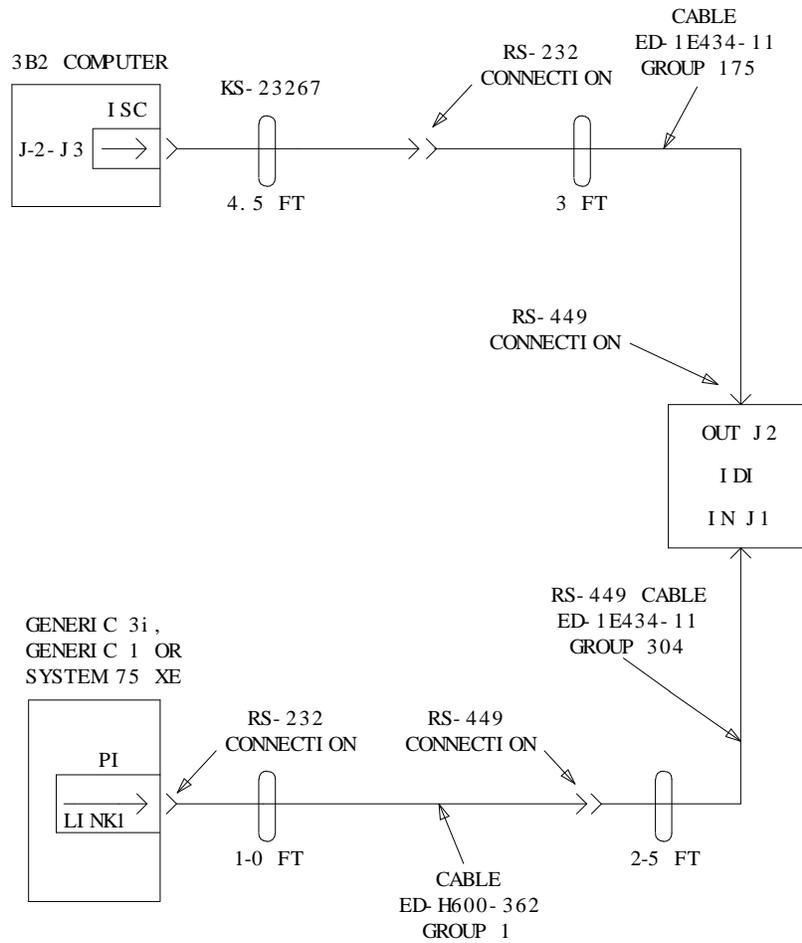


Figure 4-6 3B2 Computer to Generic 3i, Generic 1, or System 75 XE Cabling Via EIA Interface and IDI

Connecting the 3B2 Computer to the Generic 2 or System 85 Switch

This section describes the hardware and cables required to connect an ISC RS-232C port on the 3B2 computer to the Data Communications Interface Unit (DCIU) on the Generic 2 or System 8-5 switch.

The 3B2 computer can be connected to the Generic 2 or System 85 by using one of the following methods:

Using the Isolating Data Interface — For this method, the maximum allowable distance between the 3B2 computer and the Generic 2 or System 85 switch is 400 feet.

Using Local Data Service Units (DSUs) — For this method, the maximum allowable distance between the 3B2 computer and the Generic 2 or System 85 switch is 100 feet.

Using Remote Data Service Units (DSUs) — For this method, the maximum allowable distance between the 3B2 computer and the Generic 2 or System 85 switch varies depending on the gauge of the wire used to interconnect the DSUs. See Table 4-6 for distance limitations.

NOTE

For this method, 4-wire nonloaded metallic lines are required to interconnect the DSUs. When provided by the telephone company, these 4-wire nonloaded metallic lines are called Local Area Data Channels (LADC).

Refer to the *DATAPHONE II 2500-Series Data Service Units User's Manual* (9-99-100-1-88) for more information about using DSUs in a Local Area Data Set (LADS) application.

Using an Analog Private Line — This method is required when the distance limitations for the DSUs have been exceeded.

Using a Dedicated Switch Connection — This method may be used when a dedicated line exists between two switches, and either:

- One switch has an ACD, but the 3B CMS is connected to the other switch. The 3B CMS can then remotely communicate with the ACD, while split supervisors at the ACD location can also remotely communicate with 3B CMS.

Computer-to-Switch Hardware and Cabling

- Both switches have an ACD, but only one switch is in the same location as the 3B CMS. The 3B CMS can then communicate with both the local and the remote ACDs, while split supervisors at each ACD location can also communicate with 3B CMS.

Using the Isolating Data Interface

To connect the 3B2 computer to the Generic 2 or System 85 via an Isolating Data Interface (IDI), order the IDI (PEC 65399A) along with the following appropriate attributes:

One 3B2 computer-to-IDI cable (RS-232C to RS-449 transition cable) (Attribute CCN06) (Reference A in Figure 4-7)

NOTE

The IDI must be within 10 feet of the 3B2 computer, and the maximum distance between the 3B2 computer and the switch is 400 feet.

One switch-to-IDI cable (Reference B in Figure 4-7):

- 25-foot RS-449 cable (Attribute LNG21)
- 35-foot RS-449 cable (Attribute LNG10)
- 50-foot RS-449 cable (Attribute LNG11)
- 75-foot RS-449 cable (Attribute LNG12)
- 100-foot RS-449 cable (Attribute LNG13)
- 150-foot RS-449 cable (Attribute LNG15)
- 175-foot RS-449 cable (Attribute LNG16)
- 200-foot RS-449 cable (Attribute LNG17)
- 250-foot RS-449 cable (Attribute LNG47)
- 300-foot RS-449 cable (Attribute LNG48)
- 400-foot RS-449 cable (Attribute LNG49).

For single common control, include Attribute CCT01.

For duplicated common control, include Attribute CCT02 — this attribute includes cable “C” in Figure 4-7, which is designated ED-1E434-11, Group 342.

NOTE

The KS-23267 cable will be provided with the ISC kit.

Computer-to-Switch Hardware and Cabling

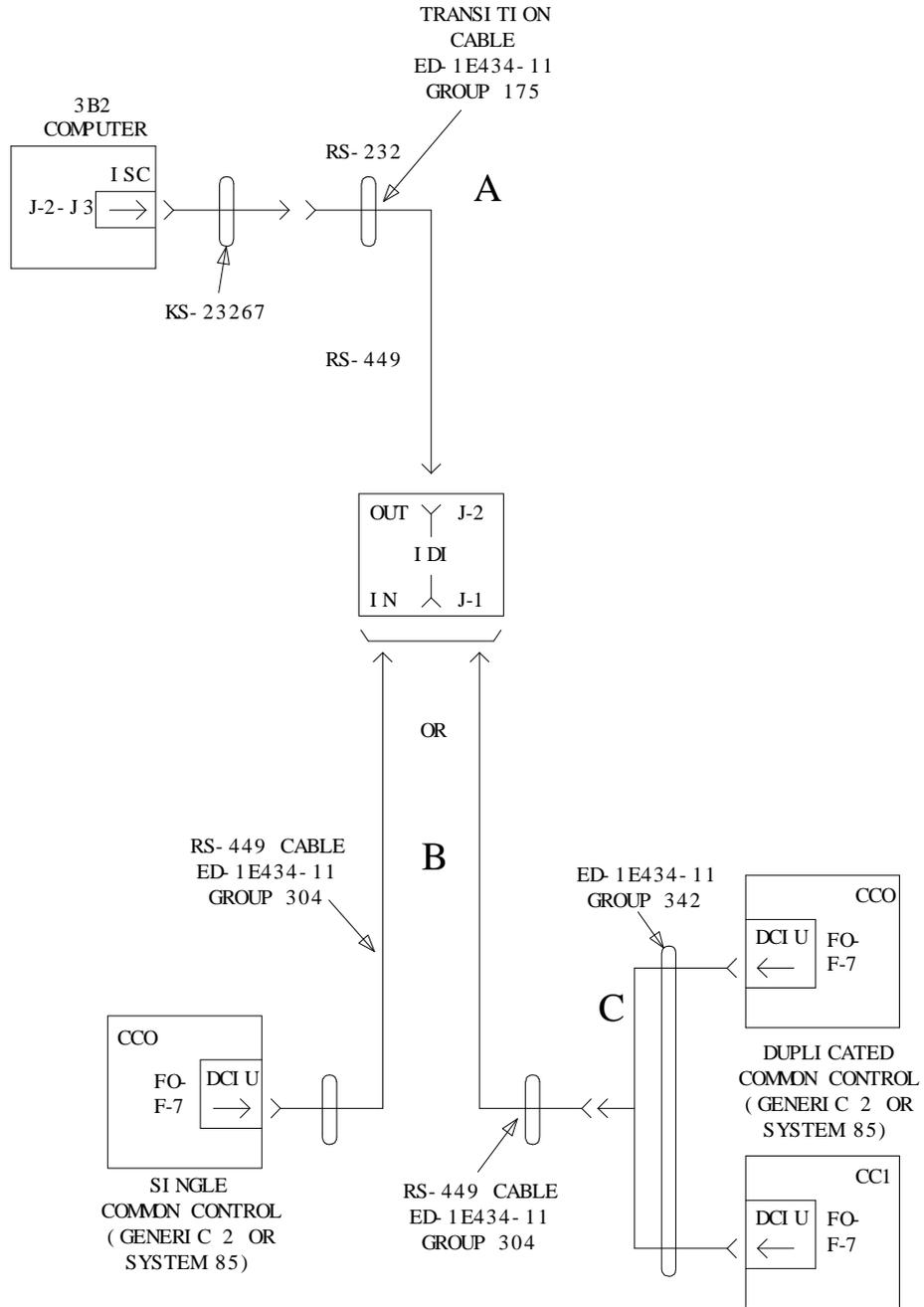


Figure 4-7 3B2 Computer to Generic 2 or System 85 Cabling Via the IDI

Using Local Data Service Units

If the 3B2 computer and Generic 2 or System 85 are not over 100 feet apart, order the following hardware and cables to connect the 3B2 computer to the Generic 2 or System 85:

Two Data Service Units (DSUs) (2 PEC 2225-96B) — each DSU includes one D8W-87 Network Cord and one Network Interface Adapter

One KS-23267 cable (4.5 feet in length), provided with the ISC kit.

NOTE

If this cable is not long enough to reach the DSU, you can order either the 1-2-foot (PEC 2726-03L) or the 25-foot (PEC 2726-03S) cable.

For single common control, order the following cable (see reference “A” in Figure 4-8):

- 50-foot cable (PEC 65254A) (Attribute CCT01) — this attribute includes cable “B” in Figure 4-8, which is designated ED-1E434-11, Group 13.

For duplicated common controls, order the following RS-449 cable (see reference “C” in Figure 4-8):

- 50-foot cable (PEC 65254A) (Attribute CCT02) — this attribute includes cables “B” and “D” in Figure 4-8, which are designated ED-1E434-11 Group 13 and ED-1E434-11 Group 342, respectively.

Computer-to-Switch Hardware and Cabling

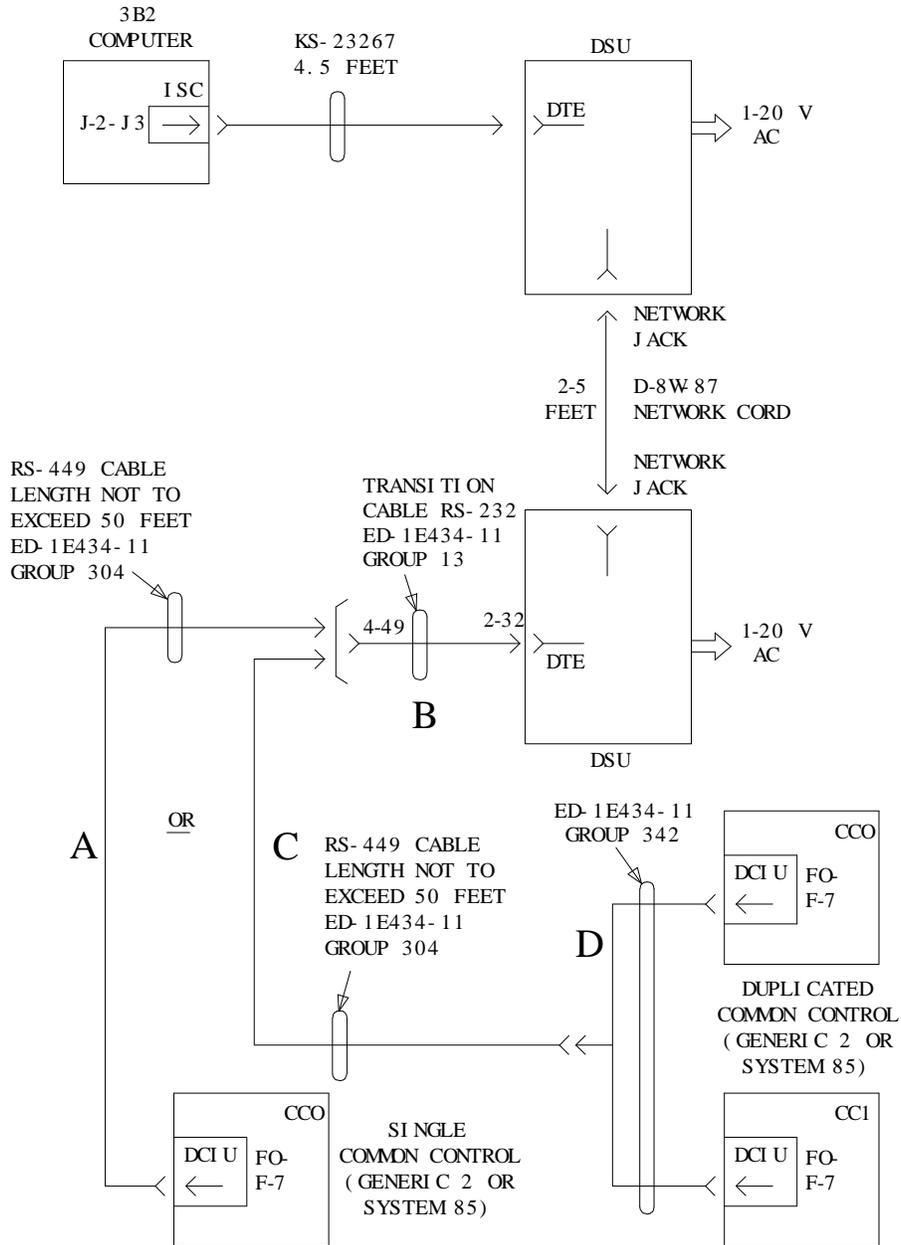


Figure 4-8 3B2 Computer to Generic 2 or System 85 Cabling With Local DSUs

Using Remote Data Service Units

If the 3B2 computer and Generic 2 or System 85 are over 100 feet apart and the LADC range requirements shown in Table 4-6 are not exceeded, order the following hardware and cables to connect the 3B2 computer to the Generic 2 or System 85 switch:

Two Data Service Units (DSUs) (2 PEC 2225-96B) — each DSU includes one D8W-87 Network Cord and one Network Interface Adapter

One KS-23267 cable (4.5 feet in length), provided with the ISC kit.

NOTE

If this cable is not long enough to reach the DSU, you can order either the 1-2-foot (PEC 2726-03L) or the 25-foot (PEC 2726-03S) cable.

For single common control, order the following RS-449 cable (see reference “B” in Figure 4-9):

- 50-foot cable (PEC 65254A) (Attribute CCT01) — this attribute includes cable “A” in Figure 4-9, which is designated ED-1E434-11, Group 13.

For duplicated common controls, order the following RS-449 cable (see reference “C” in Figure 4-9):

- 50-foot cable (PEC 65254A) (Attribute CCT02) — this attribute includes cables “A” and “D” in Figure 4-9, which are designated ED-1E434-11 Group 13 and ED-1E434-11 Group 342, respectively.

Table 4-8 LADC Ranges

Wire Gauge (AWG)	DSU Speed (kbps)	Miles	Feet
1-9	9.6	14.0	73,900
2-2	9.6	8.9	47,200
2-4	9.6	6.7	35,400
2-6	9.6	5.2	27,200

Computer-to-Switch Hardware and Cabling

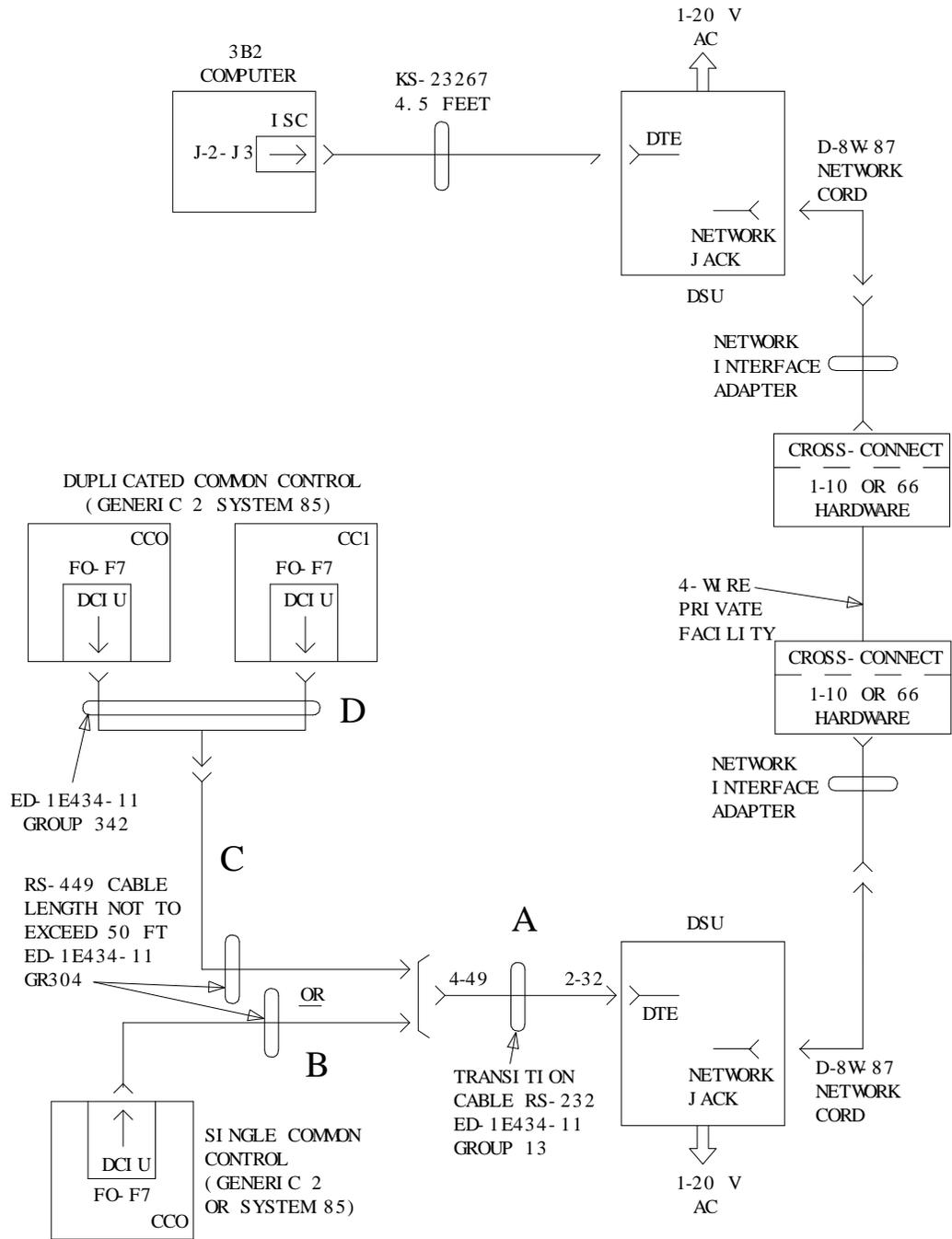


Figure 4-9 3B2 Computer to Generic 2 or System 85 Cabling With Remote DSUs

Using an Analog Private Line

If the distance between the 3B2 computer and the Generic 2 or System 85 exceed the ranges in Table 4-6, order the following hardware and cables to connect the 3B computer to the Generic 2 or System 85 switch via an analog private line:

Two DATAPHONE II modems (2 PEC 2201-96C)

Two stand-alone housings (2 PEC 22631)

Two M8K cables, 5 feet in length (PEC 2721-08E) — See Figures 4-4 and 4-11

NOTE

If the Channel Interface Unit is not available on the customer's premises, order PEC 9200-030, which is a standalone replacement unit. This unit must be ordered through the Custom Systems organization via the Custom Systems Automation Program (CSAP).

One KS-23267 cable (see Figure 4-4), provided with the ISC kit.

NOTE

If this cable is not long enough to reach the KS-22636 adapter which is connected to the DATAPHONE II modem, you can order either the 12-foot (PEC 2726-03L) or the 25-foot (PEC 2726-03S) cable.

The KS-22636 adapter (see Figure 4-4) is provided with the DATAPHONE II modem.

For single common control, order the following RS-449 cable (see reference "B" in Figure 4-10):

- 50-foot cable (PEC 65254A) (Attribute CCT01).

For duplicated common controls, order the following RS-449 cable (see reference "C" in Figure 4-10):

- 50-foot cable (PEC 65254A) (Attribute CCT02) — this attribute includes cable "D" in Figure 4-10, which is designated ED-1E434-11, Group 342.

Computer-to-Switch Hardware and Cabling

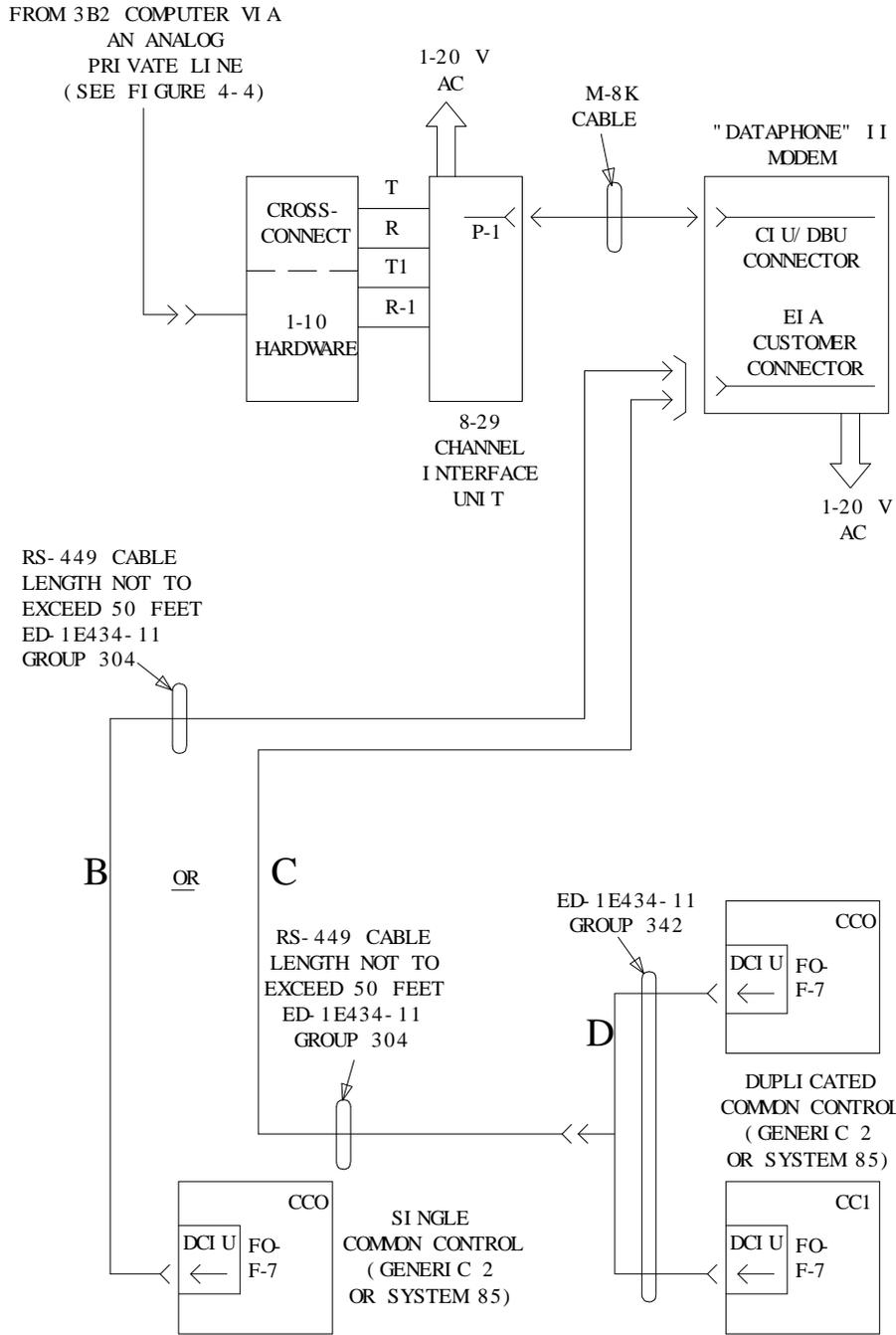


Figure 4-10 Generic 2 or System 85 Cabling to an Analog Private Line

Using a Dedicated Switch Connection

You may connect a 3B2 computer to a remote Generic 2 or System 85 ACD via a local Generic 2/ System 85 switch and a dedicated line running from the local switch to the remote switch (see Figures 4-11 and 4-12). The 3B2 cannot be over 50 feet from the MPDM. The MPDM cannot be over 5,000 feet from the local switch.

To connect the 3B2 computer using a dedicated switch connection, order the following hardware and cables:

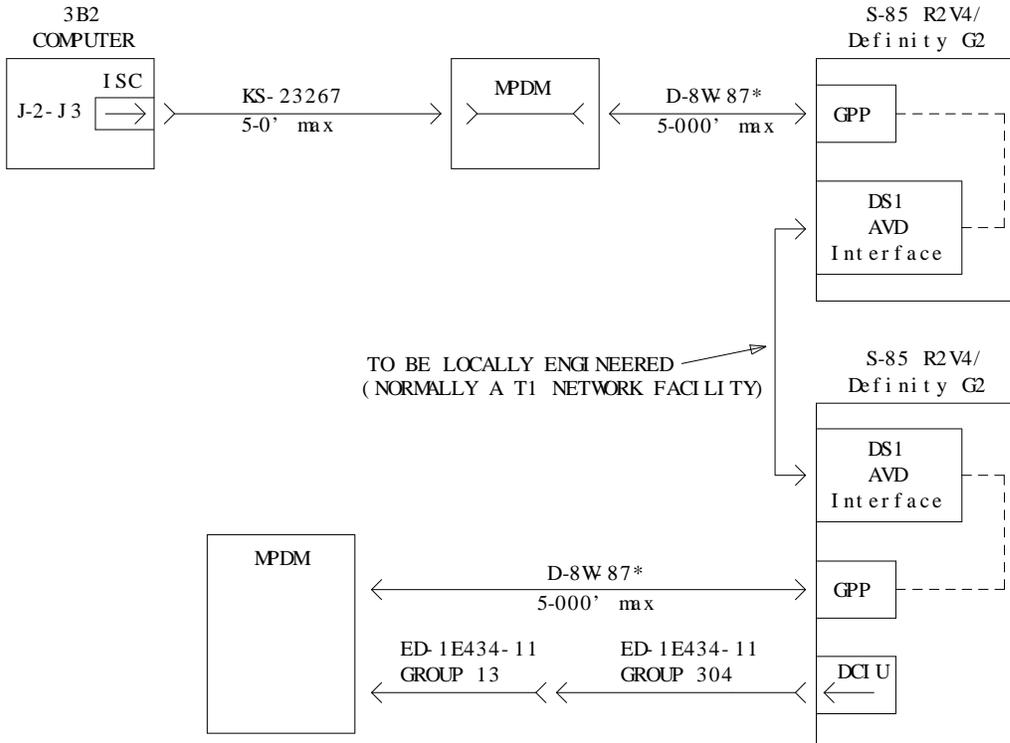
One KS-23267 cable (4.5 feet in length), provided with the ISC kit.

Two Modular Processor Data Modules (MPDM) (PEC 2161-PDM). A D8W-87 Network Cord is provided with each MPDM.

One ED-1R434-11, Group 304 (RS-449) cable (PEC 65254A), and:

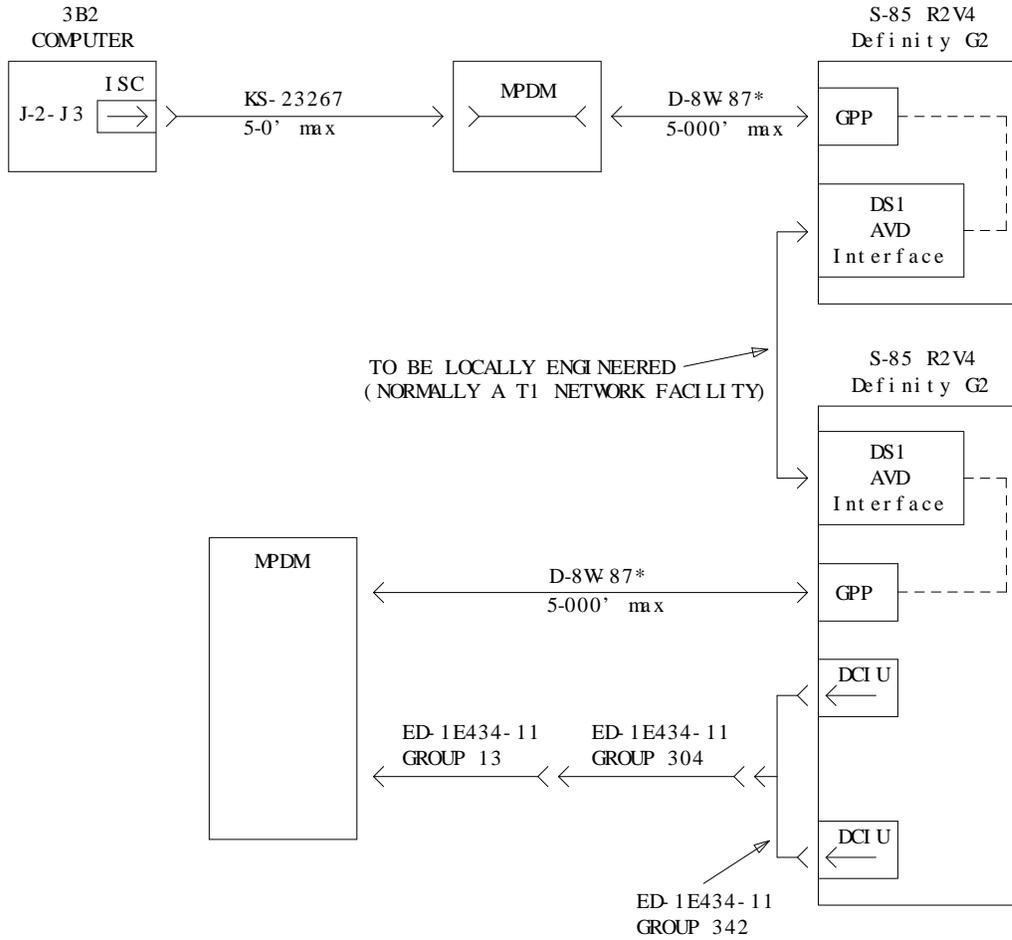
- For a single common control (Figure 4-11), Attribute CCT01, which includes the ED-1E434-11, Group 13 (RS-449 to RS-232) cable.
- For duplicated common controls (Figure 4-12), Attribute CCT02, which includes the ED-1E434-11, Group 13 (RS-449 to RS-232) cable and the ED-1E434-11, Group 342 cable.

Computer-to-Switch Hardware and Cabling



* D8W 87 CORD OR LOCALLY ENGINEERED MODULAR CORD

Figure 4-11 3B2 Computer to Generic 2/ System 85 Dedicated Switch (Single Common Control)



* D8W 87 CORD OR LOCALLY ENGINEERED MODULAR CORD

Figure 4-12 3B2 Computer to Generic 2/ System 85 Dedicated Switch (Duplicated Common Control)

Connecting the 3B2 Computer to the DIMENSION System Switch

This section describes the hardware and cables required to connect an ISC RS-232C port on the 3B2 computer to the Data Communications Interface Unit (DCIU) on the DIMENSION System switch.

The 3B2 computer can be connected to the DIMENSION System switch by using one of the following methods:

Using Local Data Service Units (DSUs) — For this method, the maximum allowable distance between the 3B2 computer and the DIMENSION System switch is 100 feet.

Using Remote Data Service Units (DSUs) — For this method, the maximum allowable distance between the 3B2 computer and the DIMENSION System switch varies depending on the gauge of the wire used to interconnect the DSUs. Refer to Table 4-6 for maximum distance based on wire size.

NOTE

For this method, 4-wire nonloaded metallic lines are required to interconnect the DSUs. When provided by the Telephone Company, these 4-wire nonloaded metallic lines are called Local Area Data Channels (LADC).

Refer to *DATAPHONE II 2500-Series Data Service Units User's Manual* (9-99-100-188) for more information about using DSUs in a Local Area Data Set (LADS) application.

Using an Analog Private Line — This method is required when the distance limitations for the DSUs have been exceeded.

Using Local Data Service Units

If the 3B2 computer and DIMENSION System switch are not over 100 feet apart and the LADC range requirements in Table 4-6 are not exceeded, order the following hardware and cables to connect the 3B2 computer to the DIMENSION System switch:

Two Data Service Units (DSUs) (2 PEC 2225-96B) — each DSU includes one D8W-87 Network Cord and one Network Interface Adapter

One KS-23267 cable (4.5 feet in length), provided with the ISC kit.

NOTE

If this cable is not long enough to reach the DSU, you can order either the 1-2-foot (PEC 2726-03L) or the 25-foot (PEC 2726-03S) cable.

For single common control, order one of the following RS-449 cables (see reference “A” in Figure 4-13):

- 16-foot cable (PEC 64625) (Attribute CBL03)
- 29-foot cable (PEC 64625) (Attribute CBL04)
- 49-foot cable (PEC 64625) (Attribute CBL05).

For duplicated common control, order one of the following RS-449 cables (see reference “C” in Figure 4-13):

- 7-foot cable (PEC 64626) (Attribute CBL06)
- 20-foot cable (PEC 64626) (Attribute CBL07)
- 40-foot cable (PEC 64626) (Attribute CBL08).

NOTE

The cables referenced as “B” and “D” in Figure 4-13 are provided with PEC 64626.

Computer-to-Switch Hardware and Cabling

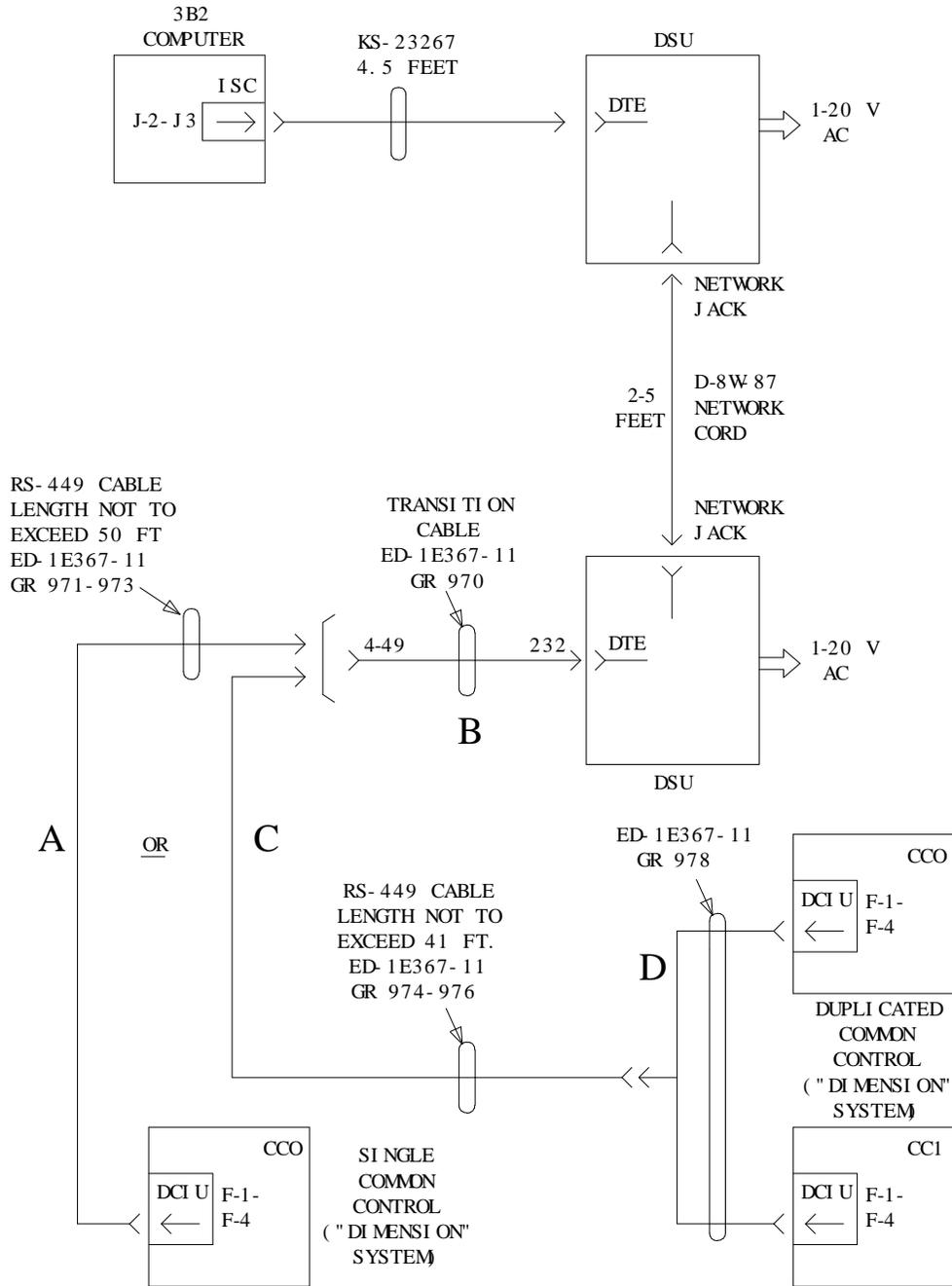


Figure 4-13 3B2 Computer to DIMENSION System Switch With Local DSUs

Using Remote Data Service Units

If the distance between the 3B2 computer and the DIMENSION System switch exceed the ranges in Table 4-6, order the following hardware and cables to connect the 3B2 computer to the DIMENSION System switch:

Two DSUs (2 PEC 2225-96B)

One KS-23267 cable (4.5 feet in length), provided with the ISC kit.

NOTE

If this cable is not long enough to reach the DSU, you can order either the 1-2-foot (PEC 2726-03L) or the 25-foot (PEC 2726-03S) cable.

For single common control, order one of the following RS-449 cables (see reference “B” in Figure 4-14):

- 16-foot cable (PEC 64625) (Attribute CBL03)
- 29-foot cable (PEC 64625) (Attribute CBL04)
- 49-foot cable (PEC 64625) (Attribute CBL05).

The cable referenced as “A” in Figure 4-14 is provided with PEC 64625.

For duplicated common controls, order one of the following RS-449 cables (see reference “C” in Figure 4-14):

- 7-foot cable (PEC 64626) (Attribute CBL06)
- 20-foot cable (PEC 64626) (Attribute CBL07)
- 40-foot cable (PEC 64626) (Attribute CBL08).

The cables referenced as “A” and “D” in Figure 4-14 are provided with PEC 64626.

Computer-to-Switch Hardware and Cabling

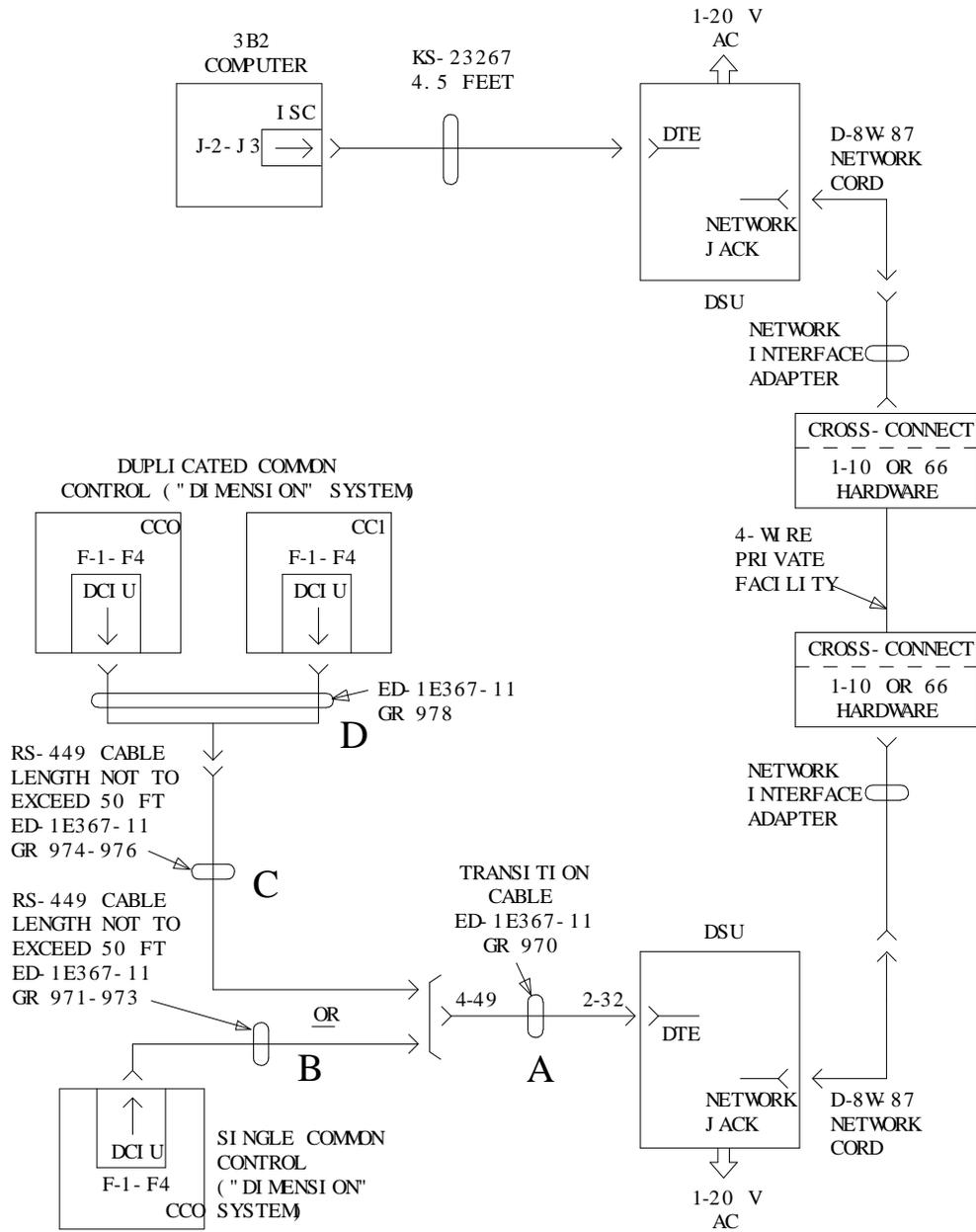


Figure 4-14 3B2 Computer to DIMENSION System Switch Cabling With Remote DSUs

Using an Analog Private Line

If the 3B2 computer and DIMENSION System switch are over 5 miles apart, order the following hardware and cables to connect the 3B2 computer to the DIMENSION System switch via an analog private line:

Two DATAPHONE II modems (2 PEC 2201-96C)

Two stand-alone housings (2 PEC 22631)

Two M8K cables, 5 feet in length (PEC 2721-08E) — See Figures 4-4 and 4-16

NOTE

If the Channel Interface Unit is not available on the customer's premises, order PEC 9200-030, which is a standalone replacement unit. This unit must be ordered through the Custom Systems organization via the Custom Systems Automation Program (CSAP).

One KS-23267 cable (4.5 feet in length), provided with the ISC kit.

NOTE

If this cable is not long enough to reach the KS-22636 adapter connected to the DATAPHONE II modem, you can order either the 12-foot (PEC 2-726-03L) or the 25-foot (PEC 2726-03S) cable. The KS-22636 adapter is provided with the DATAPHONE II modem.

For single common control, order one of the following RS-449 cables (see reference "B" in Figure 4-15):

- 16-foot cable (PEC 64625) (Attribute CBL03)
- 29-foot cable (PEC 64625) (Attribute CBL04)
- 49-foot cable (PEC 64625) (Attribute CBL05).

Computer-to-Switch Hardware and Cabling

For duplicated common controls, order one of the following RS-449 cables (see reference “C” in Figure 4-15):

- 7-foot cable (PEC 64626) (Attribute CBL06)
- 20-foot cable (PEC 64626) (Attribute CBL07)
- 40-foot cable (PEC 64626) (Attribute CBL08).

NOTE

The cable referenced as “D” in Figure 4-15 is provided with PEC 64626.

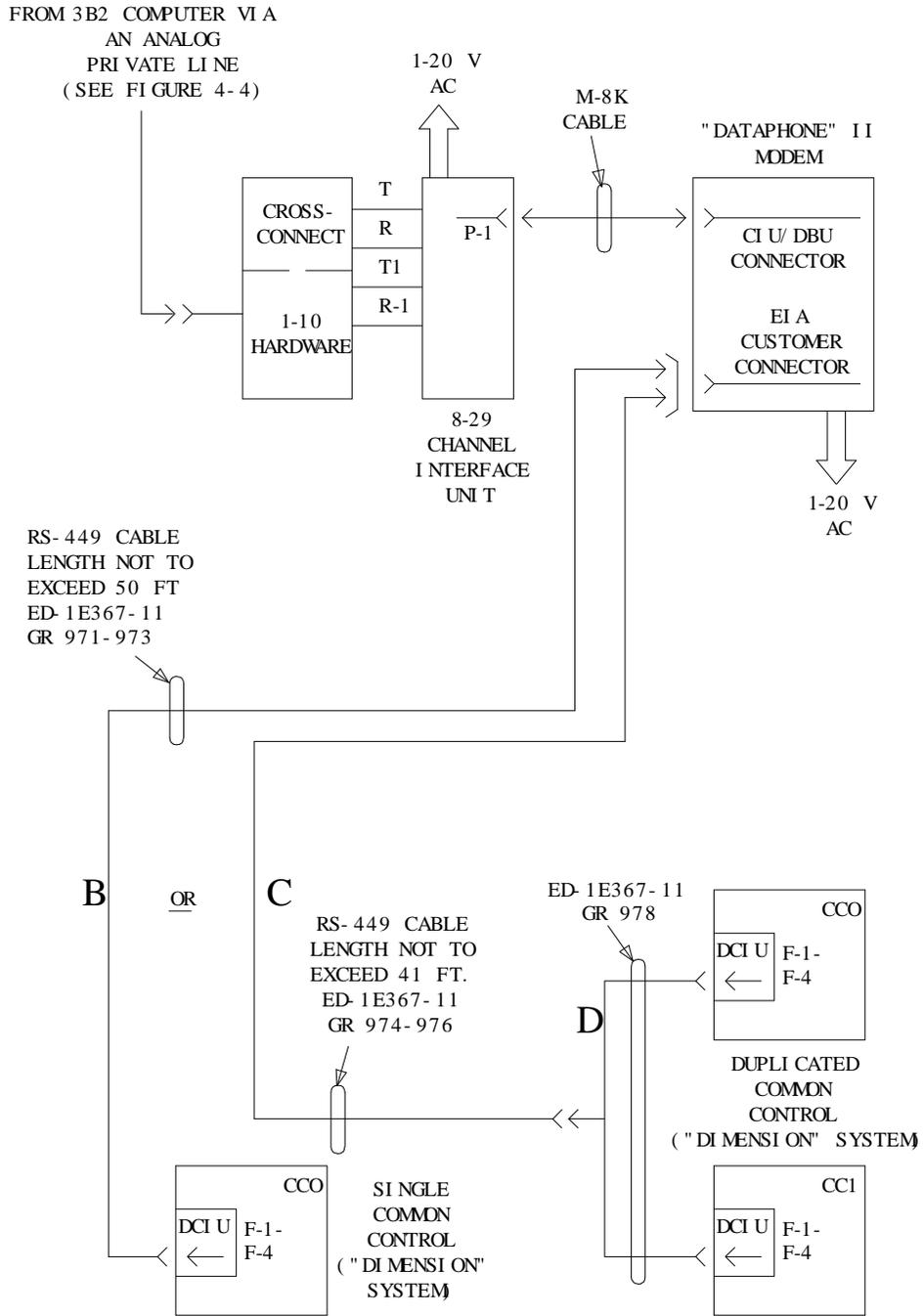


Figure 4-15 DIMENSION System Switch to Analog Private Line Cabling

CMS Data Migrations

Customers who are currently using the CMS software application (AP-16 CMS or 3B CMS) can migrate their CMS historical data as follows:

From AP-16 CMS to 3B2/ 400 CMS (Time and Materials)

From 3B2/ 310/ 400 CMS to 3B2/ 522 CMS (PEC 1208-013, Attribute MSF13)

From 3B2/ 310/ 400 CMS to 3B2/ 1000 Model 70 CMS (PEC 1208-014, Attribute MSF13)

NOTE

The CMS historical data on up to four 3B2/ 400 computers running the 3B CMS software application can migrate to a 3B2/ 1000 Model 70 computer.

NOTE

The PECs include the 3B CMS software and installation costs but do not include the costs for migrating the customer's CMS historical data which will be based on time and materials. For information on hardware/ software that can be reused when upgrading the customer's computer, see "CMS Hardware Migrations" later in this chapter.

The process of migrating the CMS historical data from one host computer to another is described as follows:

- 1 The customer saves the CMS historical data on the current host computer onto magnetic tapes no later than 4 to 6 days before the 3B CMS software is to be installed on the new 3B2 host computer.

NOTE

The CMS historical data for the current day will not be completely migrated.

- 2 The customer sends the tapes to the Technical Support Center (TSC) via overnight delivery.
- 3 The TSC migrates the data on the tapes to a format compatible with the new 3B-2 host computer and sends the appropriate magnetic tapes (cartridge or nine-track, whichever applies) containing the migrated data back to the customer.

- 4 An on-site technician and a technician at the TSC will install the data on the migration tape when the 3B CMS software is installed on the new 3B2 host computer.

To save the CMS historical data, the customer should do one of the following procedures depending on which host computer the customer is migrating from:

- a *How to Save the AP-16 CMS Historical Data*
- b *How to Save the 3B2/ 310/ 400 CMS Historical Data*

How to Save the AP-16 CMS Historical Data

The CMS historical data on the AP-16 has to be saved in order to migrate from AP-16 CMS to 3B2/ 400 CMS.

To save the CMS historical data located on an AP-16, the customer should do the following steps at the AP-16.

NOTE

For more information about doing CMS “Saves” on an AP-16, refer to the *AP-16 Call Management System Administration Guide* (9-99-200-230 IS).

- 1 Obtain three formatted HCMR tapes.
- 2 Insert a formatted tape into the HCMR 0 tape drive.
- 3 Log into the AP-16 by using a valid CMS login ID and password.
- 4 Using the Command/ Path Line, execute the “**cms cms-administration cmssave**” command.
- 5 When the screen appears, enter “0” for the tape drive number.
- 6 Move the cursor to the selection box ([]) in front of “Save files containing half-hour data,” and press the key. The screen will change to the Half-Hour Records Selection Screen.
- 7 Place an “x” in each of the selection boxes ([]). Press the screen-labeled key.
- 8 Press the screen-labeled key.
- 9 When the “Save” has finished, remove the tape from the tape drive and mark the tape with “half” and “car”.

CMS Data Migrations

- 10 Insert another formatted tape into the HCMR 0 tape drive.
- 11 Using the Command/ Path Line, execute the “**cms cms-administration cmssave**” command again.
- 12 When the screen appears, enter “0” for the tape drive number.
- 13 Move the cursor to the selection box ([]) in front of “Save files containing daily data,” and press the key. The screen will change to the Daily Records Selection Screen.
- 14 Place an “x” in each of the selection boxes ([]).
- 15 Press the screen-labeled key.
- 16 When the “Save” has finished, remove the tape from the tape drive and mark the tape with “daily” and “car”.
- 17 Insert the last formatted tape into the HCMR 0 tape drive and do the following:
 - a Log in as *root* on the AP-16 and execute the following commands:

```
# cd /sav/acd/acd1/parms  
# car c alias groups
```

- b Execute the following commands:

```
# cd /sav/acd/acd1/display  
# car r disfmts/*
```

- c Execute the following commands:

```
# cd /sav/acd/acdl/report  
# car r rptfmts/*
```

NOTE

If the **car** command fails for *disfmts* or *rptfmts*, no custom displays or reports exist depending on which **car** command fails.

NOTE

Additional customer files may be ported over by changing to the directory where the files are stored and executing the **car r file name** command.

- d Remove the tape from the tape drive and mark the tape as follows:
“(customer name).car”.
- 18 Label each tape with the following additional information:
- Customer’s name and address
 - AP-16 CMS to 3B2/ 400 CMS Migration.
- 19 Send the tape(s) to the TSC. Refer to the section *Where to Send the CMS Historical Data* in this chapter for instructions.

How to Save the 3B2/310/400 CMS Historical Data

The CMS historical data on the 3B2/ 310 or 3B2/ 400 computer has to be saved in order to migrate to a 3B2/ 522 or 3B2/ 1000 Model 70 computer.

To save the CMS historical data, the customer should do the following steps:

- 1 Log into the computer as the CMS administrator (*acd1*).
- 2 Back up the CMS historical data bases by going to the MAINTENANCE **Data-Backup** screen and following the displayed instructions. Refer to the *Maintenance* chapter of the *3B CMS Administration* document for detailed instructions.
- 3 Label each tape with following information:

Customer's name and address

3B2/ 310/ 400 CMS to 3B2/ 522 CMS Migration

or

3B2/ 310/ 400 CMS to 3B2/ 1000 Model 70 CMS Migration

3B CMS Release (for example, Release 2, Load 2.14).

NOTE

If the 3B CMS historical data from more than one (up to four) 3B2/ 310 or 3B2/ 400 computer is migrating to a 3B2/ 1000 Model 70 computer, include the target name for the ACD. For example, if the CMS historical data on two 3B2/ 400 computers are migrating to a 3B2/ 1000 Model 70 computer, one of the ACDs will retain the name *acd1* and the other ACD will have to be renamed to *acd2*. The renaming process, if required, will be done by technicians at the TSC.

- 4 Send the tapes to the TSC. Refer to the section *Where to Send the CMS Historical Data* in this chapter for instructions.

Where to Send the CMS Historical Data

The magnetic tapes (for each ACD) that contain the CMS historical data should be sent via overnight express delivery service to:

AT&T Information Systems
TSC CMS Migrations
Room 110
8-200 East Maplewood Ave.
Englewood, Colorado 80111

After the TSC receives the cartridge tapes containing the customer's CMS historical data, the tapes containing the migrated data will be mailed back to the customer within 2 to 4 business days. Therefore, the customer will lose a minimum of 4 days worth of data (2 to 4 days for processing and 2 days for shipping).

CMS Hardware Migrations

For customers migrating from 3B2/ 310/ 400 CMS to 3B2/ 522/ 1000 Model 70 CMS, the following hardware and software can be migrated to the 3B2/ 522 and 3B2/ 1-000 Model 70 computers:

Intelligent Serial Controller (ISC) board

DCIU/ PI interface hardware (computer-to-switch hardware and cabling)

Remote Management Package (including modem, cables, and connectors)

Silent Knight Autodialer (including cables)

Uninterruptible Power Supply (UPS) (including cable and connector)

X.25 Network Interface Software

EPORTS cards

Terminals (3B CMS approved terminals only)

Printers (3B CMS approved printers only)

Cartridge tapes

Vectoring software.

NOTE

For a complete description of the 3B CMS hardware and software requirements for the 3B2/ 522 and 3B2/ 1000 Model 70 computers, refer to the *3B2 Computer Configurations* and the *Software* sections in this chapter.

Example of DOSS Configurator Screen

This section contains examples of the 3B CMS Delivery Operating Support System (DOSS) configurator forms.

NOTE The DOSS configurator calculates disk space but does not calculate how many agents or trunks are needed for a given ACD. You must use the *ACD Engineering Guidelines* section in Chapter 3 to determine how many agents and trunks will be required for the customer's ACD.

ZDO2CMA1	CUTOVER INFO	CMS CUTOVER INFO	RESPONSE 1	RESPONSE 2	RESPONSE 3
GROUP NO	QUESTIONS		=====	=====	=====
=====	=====		=====	=====	=====
0001	CUTOVER INFO FOR:.....		ACD #	*	
0001	# OF AGENTS/SHIFT.....		SHIFT #1	SHIFT #2	SHIFT #3
0001	# OF HALF-HOUR INTERVALS/SHIFT....		SHIFT #1	SHIFT #2	SHIFT #3
0001	# OF LOGINS-OUTS/AGENT/SHIFT.....		SHIFT #1	SHIFT #2	SHIFT #3
0001	# OF SPLITS SUPPORTED.....		TOTAL #		
0001	TRUNKING SUPPORTED.....		# TRUNKS	#TRK GPS	BH CALLS
0001	VECTORING SUPPORTED.....		#VECTORS	# VDN'S	
0001	# OF DAYS DAILY DATA STORED.....		AGT-TRK	VECTORS	
0001	# OF DAYS HALF-HOURLY DATA STORED.		AGT-TRK	VECTORS	
0001	# OF SUPERVISOR CRT'S/PRINTERS....		CRT'S	PRINTERS	

Figure 4-16 Example of Inputs to DOSS Configurator Screen (Part 1 of 4)

Example of DOSS Configurator Screen

ZDO2CMA2	CAPACITY INFO	CMS MAX CAPACITY INFO		
GROUP NO	QUESTIONS	RESPONSE 1	RESPONSE 2	RESPONSE 3
=====	=====	=====	=====	=====
0001	MAXIMUM CAPACITY INFO FOR:.....	ACD #	*	
0001	# OF AGENTS/SHIFT.....	SHIFT #1	SHIFT #2	SHIFT #3
0001	# OF HALF-HOUR INTERVALS/SHIFT....	SHIFT #1	SHIFT #2	SHIFT #3
0001	# OF LOGINS-OUTS/AGENT/SHIFT.....	SHIFT #1	SHIFT #2	SHIFT #3
0001	# OF SPLITS SUPPORTED.....	TOTAL #		
0001	TRUNKING SUPPORTED.....	# TRUNKS	#TRK GPS	BH CALLS
0001	VECTORING SUPPORTED.....	#VECTORS	# VDN's	
0001	# OF DAYS DAILY DATA STORED.....	AGT-TRK	VECTORS	
0001	# OF DAYS HALF-HOURLY DATA STORED.	AGT-TRK	VECTORS	
0001	# OF SUPERVISOR CRT'S/PRINTERS....	CRT'S	PRINTERS	
0001	SERVING SWITCH.....	SW TYPE	RELEASE	DUPL CC
0001	MAXIMUM & CUTOVER CAPACITIES SAME?	YES/NO		

Figure 4-16 Example of Inputs to DOSS Configuration Screen (Part 2 of 4)

ZDO2CMB1	CRT'S/PRINTERS	TERMINALS/PRINTERS		
GROUP NO	QUESTIONS	RESPONSE 1	RESPONSE 2	RESPONSE 3
=====	=====	=====	=====	=====
	# 615CMT TERMINALS ORDERED FOR CMS	#	#	
	# 615MT TERMINALS ORDERED FOR CMS	# AMBER	# WHITE	# GREEN
	# 620MTG TERMINALS ORDERED FOR CMS	# AMBER	# WHITE	# GREEN
	# 705MT TERMINALS ORDERED FOR CMS	# AMBER	# WHITE	# GREEN
	# PRINTERS ORDERED FOR CMS.....	573 PTR	570 PTR	
	572 PTR	444 PTR	593 PTR
	583 PTR		
	ADDITIONAL EIA CABLES.....	7 FEET	14 FEET	
	25 FEET	50 FEET	

Figure 4-16 Example of Inputs to DOSS Configurator Screen (Part 3 of 4)

Example of DOSS Configurator Screen

ZDO2CMC1	SYS ADMIN	SYSTEM ADMINISTRATION	RESPONSE 1	RESPONSE 2	RESPONSE 3
GROUP NO	QUESTIONS		=====	=====	=====
	PROVIDE OPTIONAL BACKUP MEDIA.....		120M DR	9 TRACK	*
	# BACKUP CARTRIDGES.....		TOTAL #		
	ADDITIONAL DISK SPACE REQ'D.....		# MB		
	TYPE SYSTEM CONSOLE PROVIDED.....		TYPE		
	PROVIDE UNINTERRUPTIBLE POWER SYS.		YES/NO	VOLTAGE	
	OVERRIDE CONFIGURED COMPUTER TO...		COMPUTER		

Figure 4-16 Example of Inputs to DOSS Configurator Screen (Part 4 of 4)

Example of DOSS Configurator Screen

NOTES

General Information

This chapter provides you with an implementation checklist, an overview of the documents that support the implementation of the 3B CMS application, and the escalation procedures that should be followed if a problem arises during or after the installation. It contains the following information:

- Switch Implementation Requirements

- An implementation checklist

- A means of escalating to the appropriate level of the AT&T services organization to solve specific 3B CMS related problems.

Switch Implementation Requirements

After a contract has been signed and a DOSS order for the CMS software and switch hardware has been issued, the MBO Sales Team should turn the CMS account over to a CMS Project Manager and the switch account over to a System Implementation Manager (SIM).

The CMS Project Manager is responsible for the implementation and installation of the 3B CMS application.

The System Implementation Manager supervises the Services Implementation Team that is responsible for installing, testing, and putting the switch into service.

Generic 3i, Generic 1, System 75, and System 75 XE Administration

The Generic 3i, Generic 1, System 75, and System 75 XE administration is done by the customer or the Services Implementation Team via a System Access Terminal (SAT) or Manager I.

The following switch administration must be done before the 3B CMS software is installed on the 3B2 computer:

PI Link Administration (CMS Interface)

ACD/ CMS Feature Administration.

Measured splits should be numbered sequentially from 1 through 32 on System 75 and System 7-5 XE and from 1 through 60 on Generic 1 or Generic 3i.

NOTE	Though Generic 1 and 3i can have up to 99 splits, 3B CMS can measure only up to 6-0.
-------------	--

Generic 2 and System 85 Administration

To begin the Generic 2 or System 85 Software Tape Provisioning Process, the Systems Consultant (SC), Project Manager, or the SIM must call the Software Technical Support (STS) at 1-303-538-6339 and request software planning information.

The following switch administration must be done before the 3B CMS software is installed on the 3B2 computer:

DCIU Link Administration

ACD/ CMS Feature Administration.

Measured splits on the switch should be numbered sequentially as follows:

1 through 30 (R2V3)

1 through 60 (Generic 2 and R2V4).

DIMENSION 600/2000 System Switch Administration

The following DIMENSION 600/ 2000 System switch administration must be done before the 3B CMS software is installed on the 3B2 computer:

DCIU Link Administration

ACD/ CMS Feature Administration.

Measured splits on the DIMENSION 600/ 2000 System switch should be numbered sequentially from 1 through 30.

3B CMS Implementation

Use the following checklists as a guide to implement the 3B CMS software application.

Design Checklist

- 1 The Systems Consultant (SC) configures the 3B CMS order by using the DOSS configurator. (Use this document as a reference.)

NOTE

The DOSS configurator selects the 3B2 computer based on maximum growth projections.

Memory and disk sizes are configured based on the cutover configuration for the installation. Additional memory and disk may be needed later as the customer's system grows.

- 2 For multiple ACD configurations on a 3B2/ 1000 Model 70, each ACD should be included in the initial configuration of the customer's 3B CMS, and the required disk drives should be purchased with the initial order.
- 3 Order any additional switch hardware that is required by 3B CMS.
- 4 Customers who have a Generic 2 or System 85, R2V4 switch or who are upgrading to Generic 2 or R2V4 and request the Vectoring feature of 3B CMS must purchase the Call Vectoring feature (PEC 1252-CVG) for the switch and the 3B CMS Vectoring feature (PEC 1208-012) for the 3B2 computer. (A single purchase of the 3B CMS Vectoring feature enables the 3B2 to work with up to four vectoring switches.)
- 5 The SC documents ACD and DCIU/ PI translations which are used by the Software Technical Support (STS) Group or the Services Organization. For Generic 3i, Generic 1, or System 75 translations, SAT/ Manager I screens should be used. For Generic 2 or System 85 translations, Translation Recovery, Additions, and Conversions System (TRACS) forms should be used. For DIMENSION PBX translations, Initialization and Administration System (INADS) forms should be used.

The *3B2 CMS Installation and Maintenance* (5-85-215-104) document can be used as a reference.

System Assurance Checklist

- 1 The 3B CMS configuration must be approved by the Regional Customer Response Center (RCRC). If the 3B CMS host computer has a processor occupancy greater than 75 percent for the 3B CMS growth configuration, the DOSS Design Support group at the Design Center must approve the configuration.
- 2 Multiple-ACD or off-site switch configurations must be reviewed by the RCRC and the DOSS Design Support group for data-passing integrity.

Ordering Checklist

- 1 The Marketing Branch Office (MBO) transmits the DOSS order.
- 2 When a DOSS order is placed for installing the 3B CMS application, make sure that the coordination code is 7. This order will be forwarded to the Technical Support Center (TSC).
- 3 For customers who want the remote alarming capability, the SC should order the Silent Knight Autodialer* (PEC 94273) through the Custom Systems Group in Denver via the DOSS S-order and forms 1041 and 1152A. Any ordering difficulties should be worked through the Custom Systems Group Hot-Line on 1-303-538-2-830.

NOTE

The Silent Knight Autodialer is an optional hardware item for a 3B2 computer configuration.

- 4 Order six backup tapes. The 3B2 computer uses cartridge tapes (PEC 8100-000).
- 5 If the Initialization and Administration System (INADS) group is required to enter or modify the switch translations, a service order must be placed.

* Registered trademark of Silent Knight Security Systems.

NOTE

An open service order must be on-site and available to the TSC or to someone who can modify the switch translations during the CMS installation.

- 6 The 3B CMS software tapes are delivered with one copy each of the following documents:

3B CMS Administration (5-85-215-504)

3B CMS Custom Reports (5-85-215-503)

3B CMS Quick Reference (5-85-215-704)

3B2 CMS Installation and Maintenance (5-85-215-104)

If the customer orders the Vectoring feature of CMS (PEC 1208-012), the *3B CMS Vectoring Administration* (5-85-215-502) document will be included. If the customer orders the Graphics feature of CMS (PEC 1208-016), the *3B CMS Graphics Administration* (5-85-215-505) document will be included.

One of the following switch documents may also be useful during the installation:

AT&T DEFINITY Communications System Generic 1 Implementation (5-55-2-04-654)

AT&T System 75, Release 1 Version 3 Implementation (5-55-200-652)

AT&T DEFINITY Communications System Generic 2 Administration of Features and Hardware (5-55-104-507)

AT&T System 85, Release 2 Version 4 Feature Translation Service Manual (5-85-103-107)

AT&T System 85, Release 2 Version 3 Feature Translation Service Manual (5-85-102-107)

DIMENSION System 400E/ 600/ 600SN/ 2000 Administration and Maintenance (5-54-010-257).

- 7 Order a phone line for the remote access port. This line is required by AT&T and is paid for by the customer.

Scheduling Checklist

- 1 The SC schedules the CMS training for the customer through the regional Technical Education Center (TEC). The CMS training consists of 5 days of 3B CMS Administration and 3 days of Custom Report training.

If a qualified CMS instructor is not available at the TEC, the TEC is responsible for obtaining one.

Other classes, available at an additional charge to the customer, that may be beneficial to the customer's CMS administrator are as follows:

UNIX System Overview (1 day)

Introduction to the UNIX System (5 days)

3B Administration

Traffic Theory/ Data Analysis.

- 2 The SC submits a Project Request Worksheet to the Project Determination Group (PDG) to ensure that a Project Manager or System Implementation Manager (SIM) is assigned to coordinate the CMS installation. Someone should be assigned within 3 days. (See *Marketing Methods 8346* which is dated 2/ 2/ 88.)

- 3 The SC should schedule a Project Implementation meeting with the assigned Project Manager or SIM to hand off the following documentation associated with the customer's order:

Copy of the sales contract

Copy of the maintenance contract

DOSS order information

Business assurance information

ACD design and translations information.

Project Implementation Checklist

- 1 At this point, a Project Implementation meeting should be held by the Project Team to verify that all items in the preceding checklists have been addressed and that all project documentation has been turned over to the Project Manager or SIM.
- 2 The Project Manager or SIM should call Technical Support Center (TSC) Administration on 1-800-344-9670 two weeks in advance to schedule the remote installation of the CMS software. Since slots get booked in advance, schedule a realistic date. The installations are scheduled on a first-come, first-served basis; if the scheduled date is missed, the installation will be rescheduled by the TSC to the next available slot (which may be several weeks later). Any conflicts should be resolved by the Marketing organization on a regional basis.

NOTE

If the installation is scheduled after normal working hours (8:00 a.m. to 5:00 p.m., Monday through Friday), the customer will be charged a premium for the installation.

- 3 Fill out the CMS Initialization Form and the appropriate ACD Information Form at the end of this section and send them to the TSC as follows:

For mail delivery:

AT&T Business Communications Systems
TSC 3B CMS Installations
Room 110
8-200 East Maplewood Ave.
Englewood, Colorado 80111

For facsimile delivery:

1-303-850-8716

Verification Checklist

- 1 The on-site technician or the SIM must verify that the switch contains a software load that supports the CMS application. Refer to the following list:

DEFINITY Communications System Generic 3i

DEFINITY Communications System Generic 1

System 75, R1V3 — Issue 1.1 or later

System 75 XE, R1V3 — Issue 1.2 or later

DEFINITY Communications System Generic 2

System 85, R2V4 — Issue 1.0 or later

System 85, R2V3 — Issue 1.1 or later

DIMENSION System Feature Package (FP) 8, Version 3.8.

- 2 The on-site technician or the SIM should refer to the appropriate appendix in the *3B2 CMS Installation and Maintenance* document (585-215-104) along with the appropriate switch documentation to verify that the following have been administered on the switch:

DCIU/ PI link

Measured splits (in consecutive order)

Measured trunks (including encodes)

Trunk Groups.

- 3 The on-site technician should verify that the required data hardware and software is on-site at the customer's location and that the following hardware and software, whichever is applicable, has been shipped:

3B2

3B CMS software tape

INFORMIX 3.3

Remote Management Package

- Alarm Interface Circuit (AIC) card
- Remote Management Utilities

Intelligent Serial Controller (ISC) card

3B2 X.25 Network Interface Software (COMMKIT) Version 1.1.1

Uninterruptible Power Supply (UPS)

Modems, cables, connectors, etc.

- 4 The Project Manager or SIM reconfirms the installation date with TSC.
- 5 If the customer's CMS historical data is migrating, the customer's CMS administrator must perform a backup as described in Chapter 4 of this document. As indicated in Chapter 4, mark the tapes and ship them to the TSC. (The TSC's address is also provided in Chapter 4.)

3B CMS Environmental Checklist

The customer is responsible for ensuring that the physical environment for the 3B2 computer meets the following requirements.

All ductwork (optional) is installed.

The relative humidity range is 10 to 80 percent (noncondensing).

The temperature is between 65 and 85 F (18 to 29 C).

The air is free of air contaminants and highly corrosive, explosive, or flammable atmospheres.

Earthquake protection is provided if local codes require it.

The area has no radio transmitters, commutator motors, or industrial RF heating equipment and welders.

The area is not susceptible to flooding.

The area is connected to the building's general heating and ventilating systems.

The area will **not** expose equipment to excessive vibration or possible collision by moving equipment such as hand trucks or transporters.

Installation Checklist

- 1 The on-site technician uses the *3B2 CMS Installation and Maintenance* document (5-85-215-104) as a reference to do the following:
 - a Install the 3B2 computer and associated hardware.
 - b Install the display terminals and printers.
 - c Install the Intelligent Serial Controller (ISC) hardware card.
 - d Install the Alarm Interface Circuit (AIC) hardware card.
 - e Install the UNIX operating system (Release 3.2 for the 3B2/ 400 computer and Release 3.2.1 for the 3B2/ 522 and 3B2/ 1000 Model 70 computers) and create the file systems required by the 3B CMS software by using the instructions in the *3B2 CMS Installation and Maintenance* document (585-215-104).

NOTE

The hard disks on the 3B2 computer should be partitioned as documented in Chapter 4 of the *3B2 CMS Installation and Maintenance* document (585-215-104).

Install the INFORMIX, Remote Management Package, and X.25 Network Interface software.

- 2 The on-site technician installs the hardware connection between the 3B2 computer and the switch.
- 3 Prior to installing the Silent Knight Autodialer (optional), the on-site technician should call the TSC Administration (1-800-248-1111) so that the customer information can be entered into the INADS data base. The TSC will give the AT&T technician the phone number and the customer account number to be programmed into the autodialer.
- 4 The on-site technician connects the 3B2 computer to the Remote Maintenance Center.

- 5 After the switch has been translated for the CMS application and the 3B2 computer is ready for the CMS software installation, the SIM calls the TSC and provides them with the information outlined at the end of Chapter 4 in the *3B2 CMS Installation and Maintenance* document (585-215-104) (such things as measured splits, agents, trunks, and trunk groups, etc.). This should be done to verify that the ACD information previously sent to the TSC is correct.

NOTE

If the DCIU/ PI link has not been administered at this time, the TSC will reschedule the installation to the next available slot, which may be several weeks later. It would be very helpful for the on-site technician and the TSC to have current copies of the ACD-related switch translations at the time of installation. These are available to the on-site technician through detailed Customer System Document (CSD) records or from the INADS group in Denver.

NOTE

For installations where the 3B2 computer is remote to the switch, technicians should be on-site at both locations when a technician at the TSC installs the CMS software.

- 6 With support from the on-site technician, a technician at the TSC installs the CMS software and initializes the link between the 3B2 computer and the switch.

NOTE

If the customer has a Generic 3i, Generic 2 or System 85, R2V4 with Call Vectoring, the TSC technician will turn on the Vectoring feature of CMS during the installation or upgrade.

If the customer orders the CMS Graphics feature with a new installation or upgrade of 3B CMS, the TSC technician will turn on the Graphics feature during the installation or upgrade process. If the customer already has 3B CMS Issue 1.1 or 1.2 and only orders the Graphics feature, the TSC and field technicians will install the Graphics software from floppy disks.

- 7 The TSC technician does the Acceptance Test in Chapter 7 of the *3B2 CMS Installation and Maintenance* document (585-215-104).
- 8 The TSC and on-site technicians must backup the system before turning the 3B CMS application over to the customer.

3B CMS Implementation

- 9 The on-site technician provides the customer with the passwords that were assigned to the ACD and system login IDs.
- 10 The customer administers agent login IDs and CMS supervisor login IDs by using the *3B CMS Administration* (5-85-215-504) document.
- 11 The SIM provides the customer with the IL number from the CMS DOSS order and reviews the maintenance process. (Refer to Chapter 8 of the *3B2 CMS Installation and Maintenance* document.)
- 12 If a problem occurs after the 3B CMS application has been turned over to the customer, the customer should call AT&T Call Center Helpline at 1-800-344-9670 to file a trouble ticket (refer to the *Escalation Procedures* section in this chapter), or the technician can report a problem by calling TSC Maintenance, also at 1-800-3-44-9670. The IL number from the CMS DOSS order should be given to the call receipt agent so that the trouble is directed to the CMS support organization.

Adding an ACD to an Existing 3B CMS

If the customer wants to connect an additional ACD to their CMS on a 3B2/ 100-0 Model 70, and CMS has already been installed, the TSC will remotely log into the customer's computer and set up the software to accommodate the new ACD.

To schedule the addition of an ACD to a customer's CMS, the Project Manager should:

- 1 Send the TSC information on how the ACD will be configured (how many agents, splits, trunks, and so on).
- 2 Initiate, if necessary, a DOSS order for the Vectoring feature of CMS.
- 3 Call the TSC provisioning group at 1-800-344-9670 to schedule a time for the TSC to reconfigure the customer's system for the new ACD. The TSC will not charge the customer for this work if the customer has a maintenance contract.

NOTE

The customer's 3B CMS system will be down for at least 45 minutes while the TSC adds the ACD. Additional down time may be required if problems arise in establishing a link between 3B CMS and the new ACD.

ACD Information Form for the 3B2/ 400 Computer

ACD Variables	ACD1	Maximum
Switch Name		
Switch Type		
Switch Release		
Time Zone Offset		
Link		
Port		
Splits		60
Agents		400
Trunk Groups		255
Trunks		700
Unmeasured Facilities		100
VDNs		256

ACD Information Form for the 3B2/ 522 Computer

ACD Variables	ACD1	Maximum
Switch Name		
Switch Type		
Switch Release		
Time Zone Offset		
Link		
Port		
Splits		60
Agents		1023
Trunk Groups		255
Trunks		1400
Unmeasured Facilities		100
VDNs		256

ACD Information Form for the 3B2/ 1000 Model 70 Computer

ACD Variables	ACD1	ACD2	ACD3	ACD4	Maximum
Switch Name					
Switch Type					
Switch Release					
Time Zone Offset					
Link					
Port					
Splits					240
Agents					4092
Trunk Groups					1020
Trunks					5600
Unmeasured Facilities					400
VDNs					1024

NOTE

The sum of the ACD1, ACD2, ACD3, and ACD4 variables (splits, agents, trunk groups, trunks, and unmeasured facilities) cannot exceed the maximum values.

Escalation Procedures

This section contains the escalation procedures that an AT&T service technician should use when a problem arises during or after the 3B CMS installation. Escalation procedures that should be followed by the customer are also included.

How a Technician Escalates a Problem During or After the Installation

If the technician encounters a hardware or software problem during or after the 3B CMS installation, the technician should do the following:

- 1 Try to fix the problem immediately.
- 2 If the technician cannot solve the problem, the problem should be escalated by calling the Technical Support Center (TSC) at 1-800-248-1234.
- 3 The technician should provide the technical support personnel at the TSC with the customer's name, the password for the *root* login ID on the customer's 3B2 computer, the phone number of the customer's dial-in port, and a description of the problem.

If the technicians at the TSC cannot solve the customer's problem, they will escalate the problem to a Tier 4 technician in the Field Support Organization of the AT&T Bell Laboratories.

How the Customer Escalates a Problem After Installation

After the installation, the customer can escalate an ACD switch feature, 3B2 hardware, or 3B CMS software problem **by calling the AT&T Call Center Helpline at 1-800-344-9670** to report the problem and by obtaining a trouble ticket number so the problem can be escalated through the services organization.

NOTE

The customer will be prompted to identify the type of problem (ACD, 3B2 hardware, or 3B CMS) and will be connected to the appropriate service organization.

If a customer feels that the problem is not being resolved in a timely manner, the customer should contact the Systems Consultant (SC) who will then escalate the problem through the Marketing Branch Office (MBO) or the Services Organization.

Appendix A: Worksheets

Table A-1 3B2/ 400 Computer Worksheet

COMPONENT	PEC	QTY	PRICE	TOTAL PRICE
3B2/ 400 SE	6950-CMS			
1 MB Memory Board	73201			
2 MB Memory Board	73241			
2 MB Memory Board	69555			
I/ O Exp. Card	69553			
3B2 Modular Cable, 7-foot	2725-16G			
3B2 Modular Cable, 14-foot	2725-16N			
3B2 Modular Cable, 25-foot	2725-16S			
3B2 Modular Cable, 50-foot	2725-16V			
Terminal/ Printer Adapter	2750-C09			
Male Modem Connector	2750-C10			
Male Null Modem Connector	2750-C11			
Female Terminal/ Printer Adapter	2750-C12			
Cartridge Tapes	8100-000	6		

TOTAL

Table A-2 3B2/ 522 and 3B2/ 1000 Model 70 Computer Worksheet

COMPONENT	PEC	QTY	PRICE	TOTAL PRICE
3B2/ 522	6950-CD1			
3B2/ 1000 Model 70	6950-CF1			
ISC Kit	6950-CA2			
2 MB Memory Board	69559			
4 MB Memory Board	69560			
1-6 MB Memory Board	69582			
EPORTS Card	69558			
3B2 Modular Cable, 7-foot	2725-16G			
3B2 Modular Cable, 14-foot	2725-16N			
3B2 Modular Cable, 25-foot	2725-16S			
3B2 Modular Cable, 50-foot	2725-16V			
Terminal/ Printer Adapter	2750-C09			
Male Modem Connector	2750-C10			
Male Null Modem Connector	2750-C11			
Female Terminal/ Printer Adapter	2750-C12			
Cartridge Tapes	8100-000	6		
			TOTAL	

Table A-3 Small Computer System Interface Peripherals Worksheet

COMPONENT	PEC	QTY	PRICE	TOTAL PRICE
Differential Host Adapter	73282			
Single-ended Host Adapter	69557			
SCSI Connection Kit	69562			
Disk Controller Module/ 4E	6950-CB1			
Disk Module/ 147E	69550			
Disk Module/ 300E	69551			
Disk Module/ 300S	69552			
Disk Module/ 300DS	36206			
XM/ 900S	6950-CB2			
6-0 MB	6950-CB5			
Cartridge Tape Drive				
1-20 MB	6950-CB6			
Cartridge Tape Drive				
9-Track 1600	6950-CB3			
9-Track 6250S	6950-CB4			
9-Track 6250DS	3630-013			

TOTAL

Table A-4 Remote Maintenance Worksheet for the 3B2 Computer

COMPONENT	PEC	QTY	PRICE	TOTAL PRICE
Remote Management Package	69556			
3B2 Modular Cable, 7-foot	2725-16G			
3B2 Modular Cable, 14-foot	2725-16N			
3B2 Modular Cable, 25-foot	2725-16S			
3B2 Modular Cable, 50-foot	2725-16V			
Terminal/ Printer Adapter	2750-C09			
4-024 Modem	2224-CE0			
M-4AU Cable, 7-foot (Optional)	2721-04G			
M-4AU Cable, 25-foot (Optional)	2721-04S			
ACU Modem Adapter (Male)	2750-C10			
Remote Alarm Reporting Unit (Optional)	94273			
M-4AS Cable, 7-foot	2721-03G			
M-4AS Cable, 25-foot	2721-03S			

TOTAL

Table A-5 Uninterruptible Power Supply Worksheet for the 3B2 Computer

COMPONENT	PEC	QTY	PRICE	TOTAL PRICE
1 KVA UPS	2403-201			
2 KVA UPS	2403-204			
D6AP-87 Cord, 14-foot	2725-06N			
D6AP-87 Cord, 25-foot	2725-06S			
Terminal/ Printer Adapter*	2750-C09			

TOTAL

* This connector works only with the 1 KVA UPS. For the proper connector for the 2 KVA UPS, call the TSC at 1-8-00-344-9670.

Table A-6 3B CMS Software Worksheet

COMPUTER	SOFTWARE	PEC/ ATT	QTY	PRICE	TOTAL PRICE
3B2/ 400†	3B2 CMS	1208-010/ MSF13*			
	Graphics				
	w/ new CMS	1208-016/ MSF99			
	Upgrade (CTC)	1208-016/ MSF10			
	Upgrade (SCSI)	1208-016/ MSF13			
3B2/ 522**	Vectoring	1208-012			
	3B2 CMS	1208-010/ MSF13*			
	Graphics				
	w/ new CMS	1208-016/ MSF99			
	Upgrade	1208-016/ MSF13			
3B2/ 1000‡	Vectoring	1208-012			
	3B2 CMS	1208-011/ MSF13*			
Model 70	Graphics				
	w/ new CMS	1208-016/ MSF99			
	Upgrade	1208-016/ MSF14			
	Vectoring	1208-012			
TOTAL					

Table A-7 Software Worksheet For Hardware Upgrades

COMPUTER	SOFTWARE	PEC/ ATT	QTY	PRICE	TOTAL PRICE
3B2/ 400	INFORMIX	6950-AE1			
	COMMKIT	6950-AN1/ MSF14			
3B2/ 522	INFORMIX	6950-AH1			
	COMMKIT	6950-AN1/ MSF14			
3B2/ 1000	INFORMIX	6950-AJ1			
Model 70	COMMKIT	6950-AN1/ MSF14			

* The 3B2 CMS PEC includes INFORMIX and X.25 software.

† These PECs also apply to the 3B2/ 310, which is no longer orderable for 3B CMS.

** These PECs also apply to the 3B2/ 500, which is no longer orderable for 3B CMS.

‡ These PECs also apply to the 3B2/ 600, which is no longer orderable for 3B CMS.

Table A-8 615 MT Worksheet

COMPONENT	PEC/ ATTRIBUTE	QTY	PRICE	TOTAL PRICE
Base	6950-ET1			
Green Monitor	69569-COL01			
Amber Monitor	69569-COL19			
9-8-Key Standard Keyboard	69568			
				TOTAL

Table A-9 615 CMT Worksheet

COMPONENT	PEC/ ATTRIBUTE	QTY	PRICE	TOTAL PRICE
Base	6950-ET5			
9-8-Key Standard Keyboard	69567			
				TOTAL

Table A-10 620 MTG Worksheet

COMPONENT	PEC/ ATTRIBUTE	QTY	PRICE	TOTAL PRICE
Base	3344-620			
Green Monitor	33411-COL01			
White Monitor	33411-COL10			
Amber Monitor	33411-COL19			
9-8-Key Standard Keyboard	69567			
				TOTAL

Table A-11 705 BCT Worksheet

COMPONENT	PEC/ ATTRIBUTE	QTY	PRICE	TOTAL PRICE
7-05 MT	6950-ET3			
White Monitor	6950-ET3 COL10			
Amber Monitor	6950-ET3 COL19			

TOTAL

Table A-12 3B2 Modular Cables and Connectors Worksheet

COMPONENT	PEC/ ATTRIBUTE	QTY	PRICE	TOTAL PRICE
7-foot Modular Cord	2725-16G			
1-4-foot Modular Cord	2725-16N			
2-5-foot Modular Cord	2725-16S			
5-0-foot Modular Cord	2725-16V			
6-foot Null Modem Cable	2724-92G			
Modem Eliminator	91049			
Adaptor Connector	2750-C09			

TOTAL

Table A-13 Printer Worksheet

MODEL	PEC	QTY	PRICE	TOTAL PRICE
4-44	6950-EP2			
6-50 LPM Upgrade Kit	69564			
4-55	3330-455			
4-58	3330-458			
5-70	6950-EP3			
5-72	6950-EP5			
5-73	6950-EP6			
5-83	6950-EP8			
5-93	6950-EP1			

TOTAL

Table A-14 Additional Generic 2/ System 85 Switch Hardware Worksheet

COMPONENT	PEC	QTY	PRICE	TOTAL PRICE
DCIU	65325			
Announcements				
1-Channel — 32 secs/ channel; remote record	6-5266/ A			
1-Channel — 32 secs/ channel;	65267/ A			
1-Channel — 128 secs/ channel; remote record	6-5268/ A			
1-Channel — 128 secs/ channel	65269/ A			
4-Channel — 16 secs/ channel; remote record	6-5278/ A			
4-Channel — 32 secs/ channel remote record	6-5280/ A			
4-Channel — 32 secs/ channel	65281/ A			
4-Channel — 80 secs/ channel; remote record	6-5283/ A			
4-Channel — 80 secs/ channel	65284/ A			
4-Channel — 128 secs/ channel; remote record	6-5285/ A			
4-Channel — 128 secs/ channel	65287/ A			
8-Channel — 16 secs/ channel; remote record	6-5293/ A			
8-Channel — 16 secs/ channel	65294/ A			
8-Channel — 40 secs/ channel; remote record	6-5296/ A			
8-Channel — 40 secs/ channel	65297/ A			
8-Channel — 64 secs/ channel; remote record	6-5298/ A			
8-Channel — 64 secs/ channel	65299/ A			
Auxiliary Trunk Interface	65113			
Auxiliary Trunk Interface	63118			
Analog Interface	65347			
Analog Interface	63136			

TOTAL

Table A-15 Additional Generic 1/ System 75 Switch Hardware Worksheet

COMPONENT	PEC	QTY	PRICE	TOTAL PRICE
System 75 PI (AP/ DCS Interface)	6-3126			
Generic 1/ System 75 XE PI (Processor Interface)	6-3153			
Announcements				
1-Channel 3-2 seconds/ channel; remote record	6-5266/ A			
1-Channel 3-2 seconds/ channel	6-5267/ A			
1-Channel 1-28 seconds/ channel; remote record	6-5268/ A			
1-Channel 1-28 seconds/ channel	6-5269/ A			
3-Channel Adder	6-5268 ACC 01			
4-Channel 1-6 seconds/ channel; remote record	6-5277/ A			
4-Channel 1-6 seconds/ channel	6-5279/ A			
4-Channel 8-0 seconds/ channel; remote record	6-5282/ A			
4-Channel 1-28 seconds/ channel	6-5286/ A			
4-Channel 4-0 seconds/ channel; remote record	6-5295/ A			

TOTAL

Table A-16 Additional DIMENSION System Switch Hardware Worksheet

COMPONENT	PEC	QTY	PRICE	TOTAL PRICE
DCIU	65325			
1-3A Announcement Board*	64966			
Auxiliary Trunk Interface	64012			
L-40 24 SEC Pack*	64967			

TOTAL

Table A-17 Additional Switch Software Worksheet

SWITCH	SOFTWARE	PEC	QTY	PRICE	TOTAL PRICE
Generic 2 or System 85, R2V4	Vectoring	1252-CVG			
DIMENSION 2000 System Switch	AP-Service Software	64238			
	Deluxe Voice Software	64297			
DIMENSION 600 System Switch	AP-Service Software	64623			

TOTAL

* This equipment is in Limited Availability status.

Table A-18 IDI Worksheet for System 75XE, Generic 1, Generic 3i, and System 85

COMPONENT	PEC/ ATT	QTY	PRICE	TOTAL PRICE
IDI	65399A			
Transition Cable	7-0308/ LNG99 LNH01 (Generic 1/ 3i/ 75XE only)			

TOTAL

Attributes for the IDI:

Single Common Control CCT01

Duplicated Common Control CCT02 (System 85 only)

Transition Cable CCN06

Switch to IDI Cable:

- 25-foot LNG21
- 35-foot LNG10
- 50-foot LNG11
- 75-foot LNG12
- 100-foot LNG13
- 150-foot LNG15
- 175-foot LNG16
- 200-foot LNG17
- 250-foot LNG47
- 300-foot LNG48
- 400-foot LNG49.

Table A-19 Modems and Data Modules Worksheet for Computer to Switch Connection

TYPE	COMPONENT	PEC	QTY	PRICE	TOTAL PRICE
DSU	Single Modem	2225-96B			
DATAPHONE II	9600 bps	2201-96C			
Modem	Stand-Alone Housing	22631			
	8-29 Channel Interface	9200-030			
	Unit Replacement				
MPDM	Modular PDM — CMS	2161-101			
MTDM	Modular Trunk	2162-TDM			
	Data Module				
	RS-232 Interface	21621			
	Stand-Alone Housing	21702			
TOTAL					

Table A-20 3B2 Computer to System 85 Cabling Worksheet

CABLE LENGTH	PEC/ ATT	QTY	PRICE	TOTAL PRICE
1-2 Feet	2726-03L			
2-5 Feet	2726-03S			
5-0 Feet	2726-03V			
5-0 Feet	65254A/ CCT01			
5-0 Feet	65254A/ CCT02			
M-8K, 5 Feet	2721-08E			
TOTAL				

Table A-21 3B2 Computer to DIMENSION System Switch Cabling Worksheet

CABLE LENGTH	PEC/ ATT	QTY	PRICE	TOTAL PRICE
1-2 Feet	2726-03L			
2-5 Feet	2726-03S			
5-0 Feet	2726-03V			
1-6 Feet	64625-CBL03			
2-9 Feet	64625-CBL04			
4-9 Feet	64625-CBL05			
7 Feet	64626-CBL06			
2-0 Feet	64626-CBL07			
4-0 Feet	64626-CBL08			
5-0 Feet	65254A-CCT01			
5-0 Feet	65254A-CCT02			
M-8K, 5 Feet	2721-08E			

TOTAL

Table A-22 3B2 Computer to System 75 Cabling Worksheet

CABLE LENGTH	PEC/ ATT	QTY	PRICE	TOTAL PRICE
1-2 Feet	2726-03L			
2-5 Feet	2726-03S			
5-0 Feet	2726-03V			
M-8K, 5 Feet	2721-08E			

TOTAL

PEC Code Replacements

The following table lists obsolete Computer System (CS) PEC codes and their replacements — Business Communication System (BCS) PEC codes. Any orders using the DOSS Configurator must use the new BCS PEC codes.

Table A-23 BCS/ CS PEC Cross-Reference

CS PEC/ Attribute	Description	BCS PEC/ Attribute
1-041-008 MSF34	ATTIS Utility Pkg.	6950-AB1 MSF34
1-041-L10 REL02	INFORMIX - 3B2/ 400	6950-AE1 REL02
1-041-L88 MSF14	INFORMIX - 3B2/ 522	6950-AH1 MSF14
1-071-L10 AJ172	INFORMIX - 3B2/ 1000	6950-AJ1 MSF14
1-274-XBO MSF14	X.25 Comm. Kit	6950-AN1 MSF14
3-332-444	444 Band Printer	6950-EP2
3-333-570	570 Dot Matrix Printer	6950-EP3
3-333-572	572 Dot Matrix Printer	6950-EP5
3-333-573	573 Dot Matrix Printer	6950-EP6
3-333-583	583 Dot Matrix Printer	6950-EP8
3-3300	650 LPM Upgrade Kit	69564
3-331-593	593 Laser Printer	6950-EP1
3-333-570	570 Dot Matrix Printer	6950-EP3
3-3415 COL01	615 MT Terminal - Green	6-9569 COL01
3-3415 COL19	615 MT Terminal - Amber	6-9569 COL19
3-3416	615 CMT Terminal	69571
3-344-615	615 Terminal Controller	6950-ET1
3-344-CMT	615 CMT Controller	6950-ET5
3-344-705 COL10	705 MT Terminal - White	6-950-ET3 COL10

Table A-23 BCS/ CS PEC Cross-Reference (Contd)

CS PEC/ Attribute	Description	BCS PEC/ Attribute
3-344-705 COL19	705 MT Terminal - Amber	6-950-ET3 COL19
33401	9-8-key Keyboard	69567
3-3402	9-8-Key Standard Keyboard	69568
3-620-010	Disk Controller Module/ 4E	6-950-CB1
36203	Disk Module/ 147E	69550
36204	Disk Module/ 300E	69551
36205	Disk Module/ 300S	69552
3621-011	XM/ 900S	6950-CB2
3630-012	9-Track 6250S	6950-CB4
3-631-010	6-0 MB Cartridge Tape Drive	6950-CB5
3-631-011	1-20 MB Cartridge Tape Drive	6950-CB6
73202	I/ O Expansion Card	69553
7-3220P	ISC Kit	6950-CA2
7-324-CMS	3B2/ 400 Pkg. Q2	6950-CMS
7-325-AMB MSF27	3B2/ 500 Pkg. B	6950-CD2
7-326-AMA MSF27	3B2/ 600 Pkg. A	6950-CE1
73260	2 MB Memory Board	69555
7-3262	Remote Management Package	69556
7-3263	Single-ended Host Adapter	69557
73271	Enhanced Ports Card	69558
73272	2 MB Memory Board	69559
73273	4 MB Memory Board	69560
73277	SCSI Connection Kit	69562

PEC Code Replacements

NOTES

Appendix B: Documentation

This appendix lists the 3B CMS documents that support the 3B CMS software application. Ordering information is also provided.

The 3B CMS software is shipped with one volume of the 3B CMS documentation. Refer to *Chapter 2* for a list of the documents shipped with the software.

3B CMS Documents

<i>Order Number</i>	<i>Title</i>
5-85-215-104	<i>3B2 CMS Installation and Maintenance</i>
5-85-215-502	<i>3B CMS Vectoring Administration</i>
5-85-215-503	<i>3B CMS Custom Reports</i>
5-85-215-504	<i>3B CMS Administration</i>
5-85-215-505	<i>3B CMS Graphics Administration</i>
5-85-215-601	<i>3B CMS Planning, Configuration, and Implementation</i>
5-85-215-704	<i>3B CMS Quick Reference</i>
9-99-803-015 IS	<i>INFORMIX Relational Database Management System</i>

Ordering Information

Additional documents required by the customer, ordered by the Account Team

Call: AT&T Customer Information Center
1-800-432-6600

Supply: Document Number
Name of Account Executive
Customer Name and Address

Documents for AT&T Employees

Call: AT&T Customer Information Center
1-800-432-6600

Supply: Your Name and Address
Document Number
Your Organization Code (Department)
Your Location Code
Your Account Number
Method of Delivery:

Air Mail Delivery

Surface Mail

Glossary

Automatic Call Distribution (ACD)

A communications control system designed to evenly and automatically distribute incoming calls among a group of individuals (agents) for processing.

ACD Call

A call directed toward an ACD split using an associated extension number (or a published number). Since these calls enter the split's queue, ACD calls differ from calls to an agent's individual extension number which do not enter the queue.

ACD Split

A group of agents in an ACD operation capable of handling the same calls. The split is the basic subunit of an ACD operation and is the primary group among which a set of ACD calls is automatically distributed.

Agent (or ACD Agent)

A person who is responsible for answering ACD calls.

Data Communications Interface Unit (DCIU)

A hardware device on the System 85 and DIMENSION System switch that sends and receives messages to and from other switches or to and from adjunct minicomputers such as the 3B2 computer.

Erlang

A unit of traffic measurement corresponding to the continuous occupancy of one traffic path.

Queue

An ordered sequence of items (e.g., outgoing trunk calls, incoming ACD calls, or ACD agent positions) waiting to be processed.

System Communications Interface (SCI)

A device on the System 75 switch that is similar to the DCIU on the System 85 or DIMENSION System switch.

Acronyms

<i>Acronym</i>	<i>Meaning</i>
ACD	Automatic Call Distribution
ADLI	Asynchronous Data Link Interface
AIC	Alarm Interface Circuit
AP	Applications Processor
BCT	Business Communication Terminal
bpi	Bits per inch
CMS	Call Management System
CRC	Customer Response Center
CSAP	Custom Systems Automation Program
DCIU	Data Communications Interface Unit
DCS	Distributed Communications System
DOSS	Delivery Operations Support System
DSU	Data Service Unit
FP	Feature Package

FSO	Field Services Operation
IDI	Isolating Data Interface
INADS	Initialization and Administration System
I/O	Input/ Output
IOA	Input/ Output Accelerator
ISC	Intelligent Serial Controller
ISCN	Information Systems Change Notice
KB	Kilobyte(s)
LADC	Local Area Data Channels
MPDM	Modular Processor Data Module
MASA	Main Storage Array
MAU	Math Accelerator Unit
MB	Megabyte(s)
MBO	Marketing Branch Office
MHz	Megahertz
MINOS	Minimum Operating System
NPS	National Product Scheduling
PEC	Price Element Code
RAM	Random Access Memory
STS	Software Technical Support
SIM	Switch Implementation Manager
SC	Systems Consultant
SCI	System Communication Interface
SDLI	Synchronous Data Link Interface
STRC	Sales and Technical Response Center

TEC	Technical Education Center
TMC	Technical Marketing Center
TSC	Technical Support Center
UPS	Uninterruptible Power Supply

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