GC28-0688-2
File No. S370-30

Systems

OS/VS2 MVS System Programming Library: VTAM

Virtual Telecommunications Access Method (VTAM)

VTAM Level 2

IBM

Third Edition (December 1977)

This is a major revision of GC28-0688-1 and makes that publication and its associated TNLs GN27-1538 and GN27-1578 obsolete. The changes for this edition are described in the Summary of Amendments.

This edition applies to the component release of VTAM2 for OS/VS2 MVS. Changes are periodically made to the information herein; before using this publication in connection with the operation of IBM systems, consult the *System/370 Bibliography,* GC20-0001, for the editions that are applicable and current.

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This edition, as amended by Technical Newsletter GN31-0828, applies to VTAM Level 2 for OS/VS2 MVS Release 3.7 and subsequent releases, if any, of this operating system until otherwise indicated by TNL or revision. Refer to the Summary of Amendments for a description of changes in this edition.

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Summary of Amendments (December 31, 1977) to GC28-0688-1 by Revision GC28-0688-2

VTAM Level 2 for OS/VS2 MVS Announcement of Additional 3270 Devices

New Program Features

Support of New 3270 Devices: The following summarizes the new 3270 devices that VTAM supports.

Type of Support	Treated As a Non-SNA Terminal	Treated As a SNA Terminal
Supported for Local Attachment	• 3274 Control Unit Model 1B	• 3274 Control Unit Model 1A
Supported for Remote Attachment	• 3274 Control Unit Model 1C • 3276 Control Unit Display Station Models 1, 2, 3, and 4. (Model 1 operates with VTAM only in 480-character default mode. Models 3 and 4 operate with VTAM only in 1920-character default mode.	• 3274 Control Unit Model 1C • 3276 Control Unit Display Station Models 11, 12, 13, and 14. (Model 11 operates with VTAM only in 480-character default mode. Models 13 and 14 operate with VTAM only in 1920-character default mode.

The following 3270 devices can be attached to all models of 3274 Control Units:

- 3277 Display Station Models 1 and 2
- 3278 Display Station Models 1* and 2
- 3284 Printer Models 1 and 2
- 3286 Printer Models 1 and 2
- 3287 Printer Models 1* and 2
- 3288 Line Printer Model 2
- 3289 Line Printer Models 1* and 2

*Operates with VTAM only in 480-character default mode.

The following 3270 devices can be attached to all models of 3276 Control Unit Display Stations:

- 3278 Display Station Models 1 and 2
- 3287 Printer Models 1 and 2

Changed Documentation

- The chapters have been renumbered, and text references to chapters and to figures have been corrected.
- The sections "Configuration Restart VSAM Data Sets" and "NODELST Data Sets" have been added to Chapter 2.
- In Chapter 8, the sections "Switching to a Backup Computer" and "Switching to a Backup Communications Controller" have been updated and the section "Backup and Reconfiguration for a Multiprocessor" has been added.
- The section "SNA Devices" in Appendix A has been deleted.
- A message has been added to Appendix B.
- Other minor technical and editorial corrections have been made.

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Summary of Amendments (December 15, 1978) to GC28-0688-2 by TNL GN31-0828

VTAM Level 2 for OS/VS2 MVS

Changed Documentation

- Two new appendixes have been added to the publication, containing information for the calculation of storage estimates for VTAM, along with information on buffer pool control blocks.
- A listing and description of the VTAM-only operand, CALL, in the NCP generation macro instructions GROUP and LINE has been added.
- References to other publications have been deleted or modified to reflect the current titles and form numbers of active publications.
- Other minor technical changes have been made.

Summary of Amendments (December 31, 1977) to GC28-0688-1 by Revision GC28-0688-2

VTAM Level 2 for OS/VS2 MVS Announcement of Additional 3270 Devices

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The following 3270 devices can be attached to all models of 3274 Control Units:

- 3277 Display Station Models 1 and 2
- 3278 Display Station Models I* and 2
- 3284 Printer Models 1 and 2
- 3286 Printer Models 1 and 2
- 3287 Printer Models 1* and 2
- 3288 Line Printer Model 2
- 3289 Line Printer Models 1* and 2

*Operates with VTAM only in 480-character default mode.

The following 3270 devices can be attached to all models of 3276 Control Unit Display Stations:

- 3278 Display Station Models 1 and 2
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- The section "SNA Devices" in Appendix A has been deleted.
- A message has been added to Appendix B.
- Other minor technical and editorial corrections have been made.

Preface

This publication explains how to install, tailor, tune, and maintain the Virtual Telecommunications Access Method (VTAM) in a telecommunications system. It is intended for the installation system programmer, the IBM programming service representative, and others involved in installing or maintaining VTAM in conjunction with the OS/VS2 system control program.

Before reading this book, the reader should be familiar with:

- The overall concepts of the OS/VS2 system control program.
- The basic teleprocessing concepts (such as found in *Introduction to Teleprocessing,* GC20-8095).
- The overall concepts of VTAM. The network configuration should have been planned, and the major VTAM options chosen for the telecommunications system. (This information is provided in the prerequisite publication for this book, *VTAM Concepts and Planning,* GC27-6998.)

This book does not explain how to define specific IBM subsystems (such as the IBM 3600 Finance Communication System) or IBM data base/data communication program products (such as the IBM Customer Information Control System OS/VS). Separate manuals describe how to install, tailor, and maintain those subsystems and programs that operate with VTAM.

Organization

This book is organized by user tasks, rather than by macro instructions, to reduce the need for extensive cross-referencing. Although the information in one chapter is sometimes related to information in another, the chapters have been written as separate and complete units. Each chapter contains its own introductory information (immediately following the chapter title) and describes a specific aspect of installing, tailoring, tuning, or maintaining VTAM. Special helpful information is provided at the back of this publication in several appendixes. The glossary contains VTAM terms and acronyms that are used in this publication.

Contents

This publication contains the following chapters:

- Chapter 1, "Introduction," provides a summary of VTAM and an overview about how this book is organized so that it describes how to install, tailor, and maintain VTAM with an OS/VS2 system control program and a telecommunications network.
- Chapter 2, "System Preparation," describes how to install VTAM in the OS/VS2 system control program.
- Chapter 3, "Defining the Network," describes how to define VTAM application program major nodes, local 3270 major nodes, local SNA major nodes, switched SNA major nodes, and NCP major nodes.
- Chapter 4, "Starting and Controlling the Network," describes how to define the VTAM start options, how to create configuration and start option lists, and how to put these start option and configuration lists into the VTAM definition library.
- Chapter 5, "Defining Logon Mode and USS Definition Tables," describes how to create logon mode tables and USS definition tables, and describes the IBM-supplied logon mode and USS definition tables.
- Chapter 6, "Interpret Tables and the Network Solicitor," describes how to define automatic and OS/VS2 logon, how to define interpret tables and put them into SYS1.LPALIB, and how to use and modify network solicitors and put them into SYS1.VTAMLIB.
- Chapter 7, "VTAM Services," describes how to code and install installation (authorization and accounting) exit routines and how to use the VTAM authorized path.
- Chapter 8, "VTAM RAS Facilities," describes VTAM's configuration restart facility, and the Teleprocessing Online Test Executive Program (TOLTEP).
- Chapter 9, "Tuning VTAM," describes how VTAM storage pools and VTAM packaging affect VTAM performance.

This publication contains the following appendixes:

- Appendix A: Device Considerations
- Appendix B: Terminal-User Messages Issued by VTAM
- Appendix C: Cross-Reference Coding Dependencies
- Appendix D: An Example of a Switched SNA Network

A glossary of VTAM terms and abbreviations and an index for the entire book follow the appendixes.

Prerequisite Publication

This book requires an understanding of the information in *VTAM Concepts and Planning,* GC27-6998, which describes overall VTAM concepts and provides the programming considerations for planning a VTAM teleprocessing system.

Associated Publications

The publications listed below are frequently referred to throughout this book and should be used in conjunction with this publication. (The list shows the short title used to refer to a book and provides the corresponding title and order number.)

Short Title Used in This Publication	Title	Order No.
NCP Generation Guide	*IBM 3704 and 3705 Communications Controllers Network Control Program/VS Generation and Utilities Guide and Reference Manual (for OS/VS and DOS/VS VTAM Users)*	GC30-3008
System Initialization and Tuning Guide	*OS/VS2 System Programming Library: Initialization and Tuning Guide*	GC28-0681
MVS Overview	*OS/VS2 MVS Overview*	GC28-0984

The following manuals should be available for reference when this publication is being used.

- *IBM 3704 and 3705 Program Reference Handbook,* GY30-3012.
- *Operator's Library: OS/VS2 Reference (JES2),* GC38-0210.
- *OS/VS Linkage Editor and Loader,* GC26-3813.
- *OS/VS Utilities,* GC35-0005.
- *OS/VS2 JCL,* GC28-0692.
- *OS/VS Access Method Services,* GC26-3836.
- *OS/VS2 System Programming Library: OLTEP,* GC28-0675.
- *OS/VS2 System Programming Library: Service Aids,* GC28-0674.
- *OS/VS2 System Programming Library: System Generation Reference,* GC 26-3792.
- *OS/VS2 TCAM System Programmer's Guide,* GC30-2051.
- *OS/VS2 VTAM Control Block Overview,* GX27-0031.
- *OS/VS VTAM Reference Summary,* GX27-0034.
- *OS/VS2 MVS VTAM Debugging Guide,* GC27-0023.
- *VTAM Macro Language Reference,* GC27-6995.
- *VTAM Macro Language Guide,* GC27-6994.
- *Supplement to the VTAM Macro Language Guide for the Program Operator,* GC27-0036.
- *OS/VS VTAM Network Operating Procedures,* GC27-0027.
- *DOS/VS and OS/VS TOLTEP for VTAM,* GC28-0663.

In addition, the following manuals may be used with Appendix A of this publication to determine device considerations:

- *Introduction to Programming the IBM 3270,* GC27-6999
- *IBM 3600 Finance Communication System Programming Installation Guide,* GC27-0009
- *IBM 3600 Finance Communication System Programmer's Guide and Component Description,* GC27-0004
- *IBM 3650 Retail Store System Subsystem Definition and Programmer's Guide,* GC30-3023
- *SPPS Programmer's Guide,* GC30-3024
- *IBM 3660 Supermarket System Subsystem Definition and Programmer's Guide,* GC30-3025
- *IBM 3770 Communication System Programmer's Guide,* GC30-3028
- *IBM 3790 Communication System Host System Programmer's Guide,* GC27-0026
- *IBM 3790 Programming Statements Guide,* GC27-0015
- *IBM Host Services Guide,* GC27-0017

Syntax

In this publication, in addition to the standard syntax conventions used for IBM programming publications, the following conventions are used:

- A vertical "or" bar (|) between operands or parameters indicates that one value must be coded from among the values separated by the "or" bar.
- A vertical arrow (↑) represents a pointer to or the address of an item.
- An underlined value represents the default value of the operand or parameter. VTAM or the NCP uses the default value if a value is not coded.

Note: *When specifying optional operands and/or parameters, separate them with commas when more than one is specified. Otherwise, if only one is selected, no commas are necessary.*

The rules for coding the VTAM definition statements and the VTAM and NCP macro instructions described in this book (unless otherwise noted) are those of the assembler language. They can be coded following those rules with these restrictions:

- Assembler program control instructions (such as ICTL and ISEQ) cannot be used in the NCP generation deck or in major node definition decks. Assembler listing control statements (such as PRINT, SPACE, EJECT) can be used in the NCP generation deck but cannot be used in major node definition decks. Comment statements or remarks can be used in all three types of decks.

- Some assembler features cannot be used in either the NCP decks or the major node definition decks:
  - User assembler macro instructions that generate NCP macro instructions.
  - Names generated by global variables (for example, &SYSNDX or &SYSECT).
  - Variable substitution at assembly time.
  - Reference to assembler attributes (for example, length or type).
  - Use of literals.

    Quoted strings cannot be used to make names out of keywords. For example, AUTH='BLOCK' is treated just like AUTH=BLOCK.
- Errors made in the major node definition decks stored in the VTAM definition library (SYS1.VTAMLST) result in messages during VTAM initialization to the system operator's console (rather than the SYSOUT device).

Effect of NCP Coding Format on VTAM Initialization Time: Although the major node definition decks stored in the VTAM definition library have the same format as macro instructions, no assembly is performed. During VTAM initialization, VTAM routines read the statements from the VTAM definition library and interpret the information to build RDT (resource definition table) segments.

The time required for the host CPU to build the RDT segment for an NCP major node can be minimized by using the NCP macro sequencing effect (described in Chapter 3, "Defining the Network," in this publication). Code parameters and operands at the highest level to avoid repeating the operands and parameters on numerous lower-level NCP macro instructions.

Contents

Figures

Chapter 1. Introduction

VTAM Publications

This publication is one of several VTAM publications. Figure 1-1 shows the relationship among these books and suggests the order in which they should be used. For example, before reading *OS/VS2 System Programming Library: VTAM,* read *VTAM Concepts and Planning.*

General Information

The IBM Virtual Telecommunications Access Method (VTAM) is an option of the Operating System/Virtual Storage 2 (OS/VS2) system control program (SCP). VTAM provides the following telecommunication support:

Directs transmission of data between application programs and terminals

Controls the terminals in a telecommunication network

VTAM is executed in a central computer. The central computer is the center of the telecommunication system and contains a central processing unit (referred to as a host CPU), channels, and auxiliary storage. Figure 1-2 summarizes the major elements in a VTAM telecommunication system.

A VTAM application program also is executed in the host CPU and is any program that uses VTAM and its macro instructions to communicate with a terminal. The VTAM application program can be a program that both communicates with a terminal and processes its data. The VTAM application program can also be an installation-written program that manages the I/O requests of other application programs and does not process data.

The terminals are part of the telecommunication network, which also contains communications controllers, telecommunication lines, and control units. A terminal in a VTAM telecommunication system is a point in the telecommunication network from which data can enter or leave the network. A VTAM terminal can therefore be:

- A logical unit of a teleprocessing subsystem (such as a work station of an IBM 3600 Finance Communication System)
- A start-stop or BSC (binary synchronous communications) input/output device (such as the IBM 2741 Communication Terminal)
- A CPU complex (such as a System/370 Processor Station operating as a remote station)

VTAM provides telecommunications support for locally attached terminals (connected to the host CPU by a data channel) of the IBM 3270 Information Display System, for locally attached terminals of the 3790 Communications System, and for locally attached IBM 3704 and 3705 Communications Controllers. A local 3270 terminal is a component of the 3270 display system with a locally attached cluster control unit (a 3272).

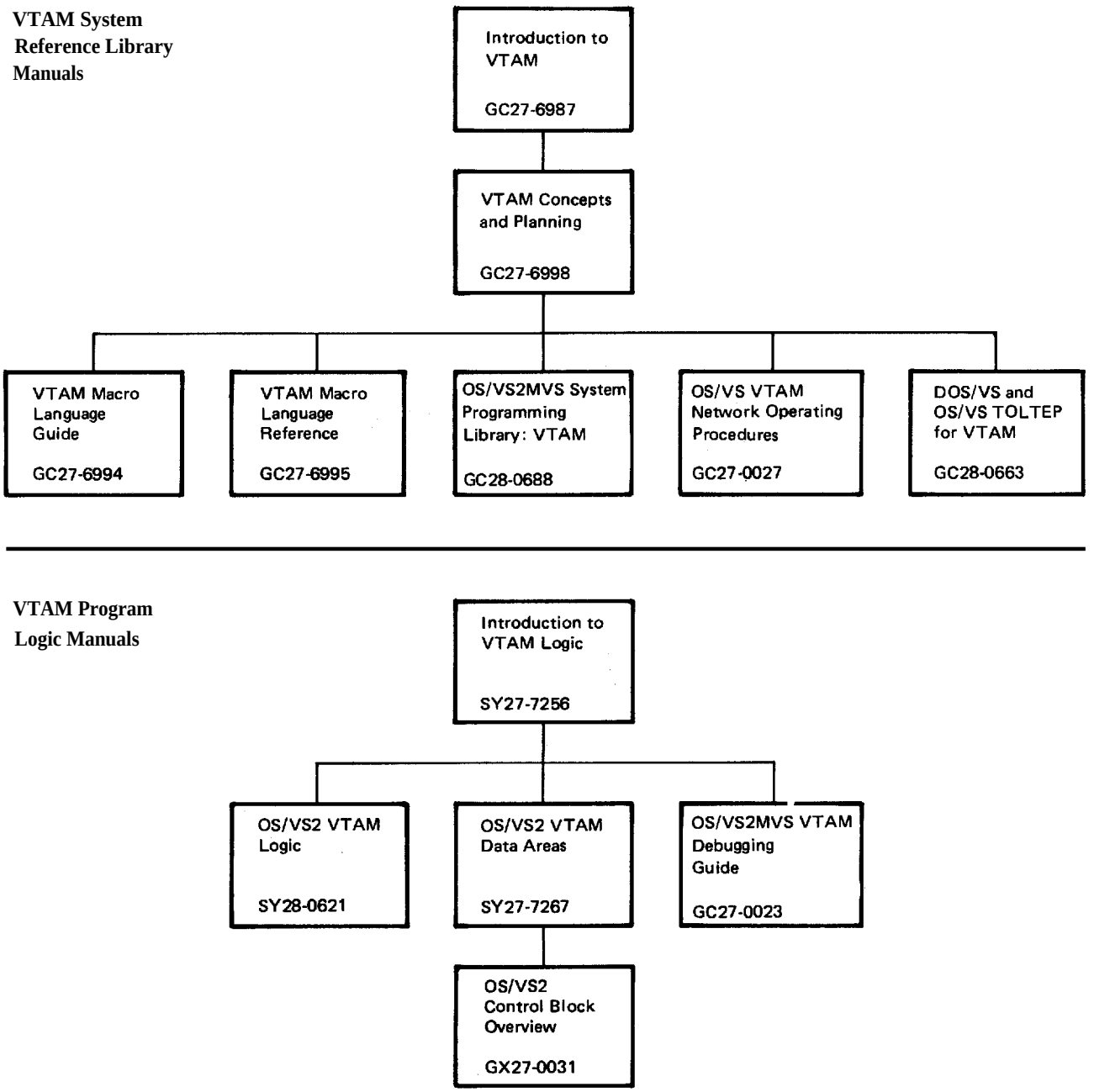


Figure 1-1. VTAM Publications for OS/VS2

Note: *The IBM 3274 Control Unit Model IB appears to VTAM as a 3272 Control Unit. In this book, all defi1Btion statement descriptions and restrictions that apply to a 3272 Control Unit apply equally to the 3274 Model 1B. The IBM 3276 Control Unit Display Station Models 1 and 2 (and Models 3 and 4 operating in 1920-character default mode) and the IBM 3274 Control Unit Model 1C (BSC) appear to VTAM as 3271 Control Units. In this book, all definition statement descriptions and restrictions that apply to the 3271 Control Unit also apply to the 3276 Models 1 and 2 (and Models 3 and 4 operating in 1920-character default mode) and to the 3274 Model 1C (BSC).*

The IBM 3274 Control Unit Models 1A and 1C (SDLC) and the IBM 3276 Control Unit Models 11 and 12 (and Models 13 and 14 operating in 1920-character default mode) appear to VTAM as 3790 terminals.

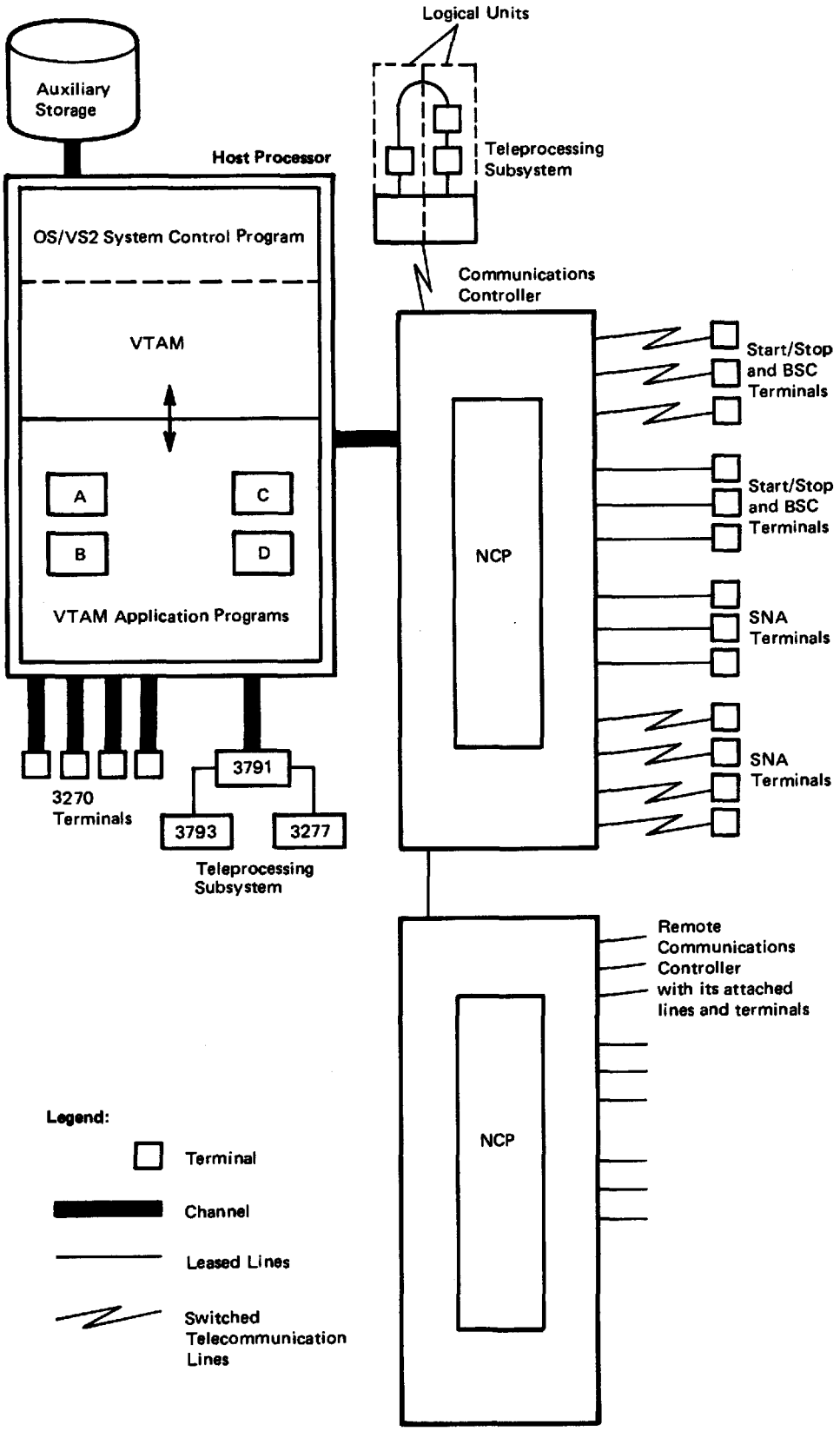


Figure 1-2. A VTAM Telecommunication System

For a more complete description of 3270 considerations, see *Introduction to Programming the IBM 3270,* GC27-6999.

VTAM also provides telecommunications support for remotely attached terminals (connected to a communications controller by a telecommunication line) that use these line disciplines:

- Synchronous data link control (SDLC)
- Start-stop
- Binary synchronous communications (BSC)

The type of line discipline used depends upon the terminal. Remote communications controllers (connected to a local communications controller by a telecommunication line), however, must be connected by using SDLC.

VTAM operates with the IBM 3704 and 3705 Communications Controllers, which link VTAM with the remote portions of the network and control the flow of information between terminals and VTAM. Each communications controller in the network contains a resident program called the network control program/virtual storage (NCP/VS, or NCP in this book). VTAM supports NCPs in network control mode and NCPs that use the partitioned emulation programming (PEP) extension (a program capable of operating in either network control mode or emulation mode). VTAM does not support emulation mode. When operated in network control mode, the communications controller allows its network resources to be shared or used by VTAM and VTAM application programs.

The only services that VTAM provides for a network operated in emulation (PEP) mode in the NCP are:

- Dumping the communications controller
- Reloading the communications controller
- Changing line assignments

With PEP, telecommunication lines can be assigned to network control mode, emulation mode, or both. If a line can be assigned to both, then VTAM manages this assignment.

BTAM, TCAM, and VTAM can operate concurrently in OS/VS2. BTAM and TCAM application programs (including the TCAM message control program, MCP) can either share the resources in a VTAM system (using communications controllers with PEP) or have a network of terminals that is separate from the VTAM network. Also, TCAM programs that use terminals attached to a communications controller in network control mode are supported through VTAM **. (Note:** *An NCP specified and generated to support a TCAM-controlled teleprocessing network must be respecified and regenerated to include VTAM in the system.)*

VTAM Node Structure

A VTAM telecommunication system can also be viewed as a network of nodes coordinated by VTAM. (Nodes are addressable points in the telecommunication system that are defined to VTAM by a symbolic name.) VTAM controls data transmission to minor nodes.

One or more minor nodes can be grouped together logically to form major nodes. The types of major nodes (each represented by a single symbolic name to VTAM) in a VTAM telecommunication system are:

Application program major nodes

Local 3270 major nodes

Local SNA major nodes

Switched SNA major nodes

NCP major nodes

A VTAM application program and a terminal can communicate with each other only through VTAM. To communicate, these nodes must be connected. Connection is the process by which VTAM establishes a path between a VTAM application program and a terminal. The path is also composed of other nodes (including telecommunication lines, communications controllers, and cluster control units) needed to transmit data between the VTAM application program and the terminal.

VTAM connects a terminal to a VTAM application program for as long as explicitly requested by the program, but VTAM allocates the other nodes only for the duration of a single data transfer operation (such as a single read or write operation). Thus, these other nodes can be available simultaneously for paths to other terminals.

By allocating network resources, VTAM removes much of the responsibility of network management from the VTAM application program. VTAM application programs thus directly control only the allocation of the following:

- Issuing requests to have terminals connected to them
- Accepting requests by terminals (logon) to be connected to a VTAM application program

Installing and Tailoring VTAM

To install VTAM, the system programmer must specify the VTAM option during OS/VS2 system generation and must define the telecommunication network (major node definitions) to VTAM after system generation but before starting VTAM. To tailor VTAM, the system programmer must select the VTAM functions to be available in the telecommunication system and otherwise tailor the system to the user's requirements. Thus, installing and tailoring VTAM is the process of:

a. Generating VTAM.
b. Defining the network.
c. Tailoring a VTAM system.

Figure 1-3 illustrates the three steps involved in installing and tailoring a VTAM system. Steps B and C in Figure 1-3 can be repeated as often as needed without requiring a repetition of step A.

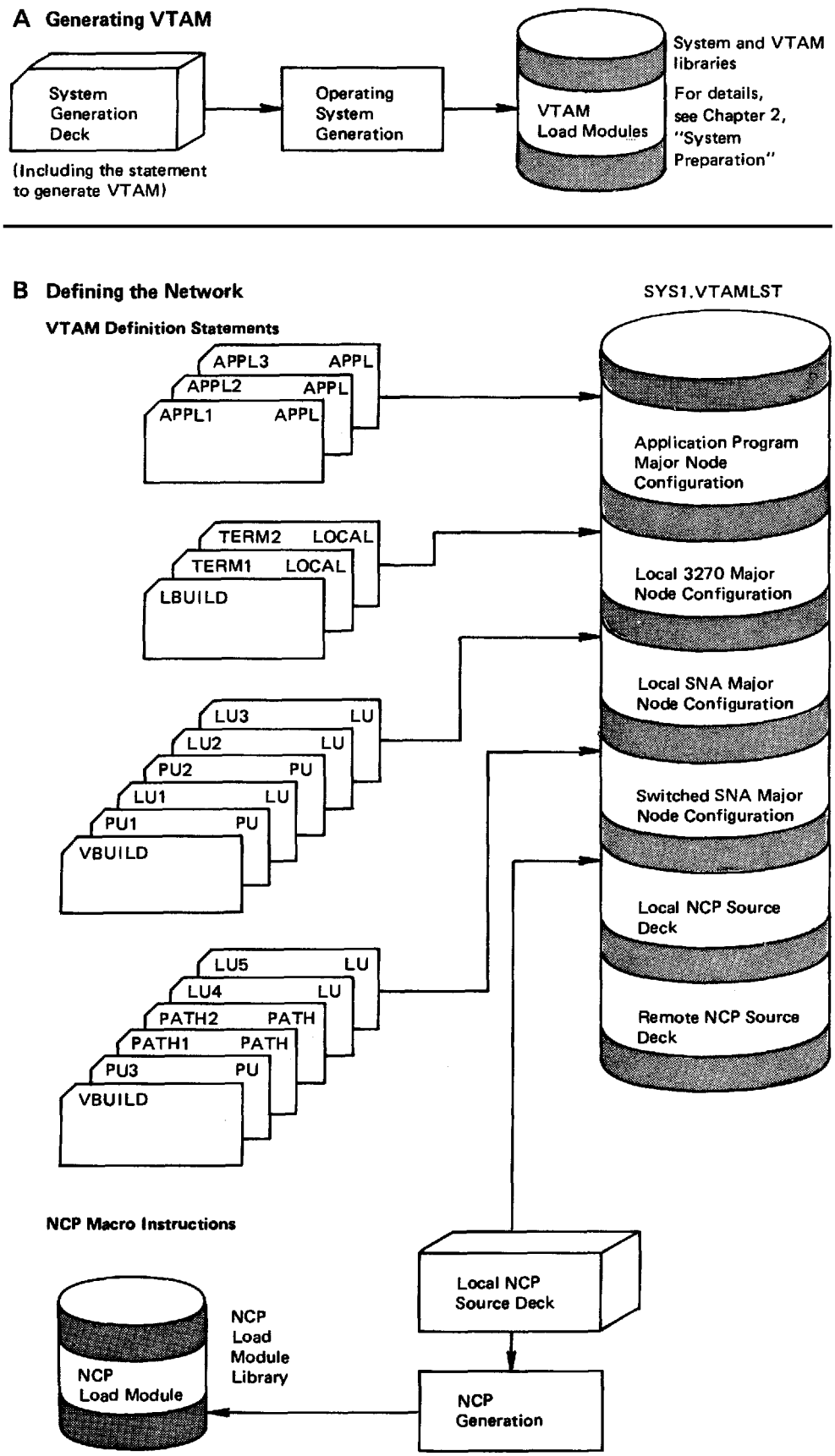


Figure 1-3 (Part 1 of 2). Defining a VTAM System

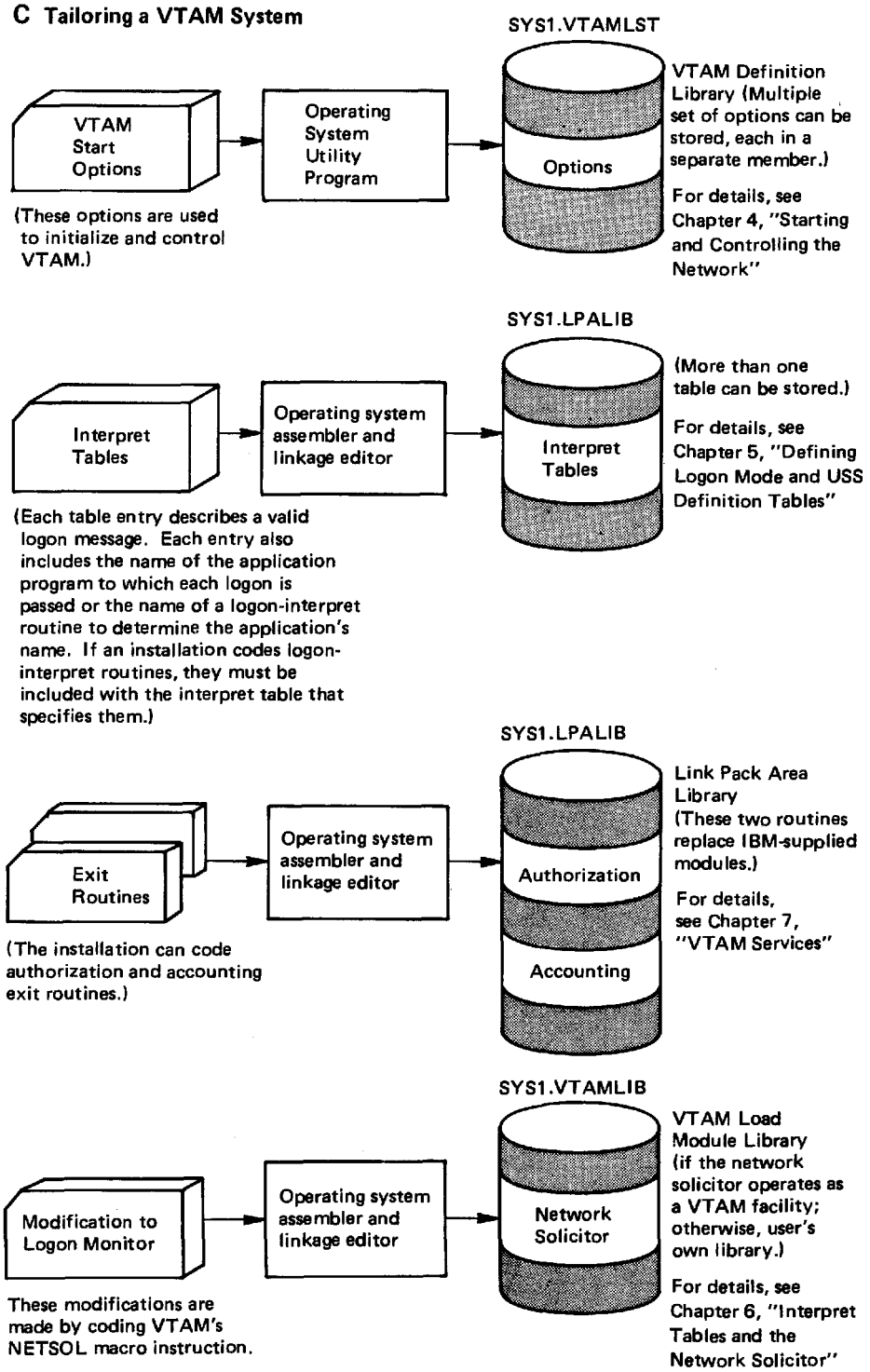


Figure 1-3 (Part 2 of 2). Defining a VTAM System

Generating VTAM

OS/VS2 system preparation for VTAM involves:

- Specifying system generation macro instructions to include the VTAM option and to specify local terminals and local communications controllers
- Creating a cataloged procedure for starting VTAM

Additional operating system support can also be included for VTAM during system generation.

After system generation, network definition, and VTAM tailoring, the VTAM network can be tested by using the VTAM installation verification procedure.

Note: *Remote devices are not specified during system generation. These devices are specified and described during network definition.*

See Chapter 2, "System Preparation," for details on operating system support.

Defining the Network

Defining the major nodes in the telecommunication network configuration to VTAM involves:

Defining VTAM application program major nodes

Defining local 3270 major nodes

Defining local SNA major nodes

Defining switched SNA major nodes

Defining an NCP major node

Putting the definitions in SYS1.VTAMLST

These definitions are coded in VTAM definition statements or NCP macro instructions, and each major node definition is put in SYS1.VTAMLST as a separate member. A major node can be defined anytime following system generation, but prior to the first use of that node by VTAM.

See Chapter 3, "Defining the Network," for details on defining the network.

Tailoring a VTAM System

Tailoring VTAM by modifying IBM-supplied VTAM facilities involves:

Defining VTAM start options: The system programmer selects specific VTAM start options to be in predefined start lists or entered by the network operator as parameters, determines the VTAM storage pool values, and puts any start option and configuration list in SYS1.VTAMLST. (See Chapter 4, "Starting and Controlling the Network," for details.)

Defining logons: Terminal-initiated logons can be provided by defining an automatic logon capability, by providing an OS/VS2 logon capability, and by defining interpret tables with logon messages and logon-interpret routines. (See Chapter 6, "Interpret Tables and the Network Solicitor," for details about these logons. See *OS/VS VTAM Network Operating Procedures* for network operator logons. See *VTAM Macro Language Reference* for VTAM application program logons.)

Modifying the network solicitor: The IBM-supplied default network solicitor can be used, modified, or replaced by one written by the installation. (See Chapter 6, "Interpret Tables and the Network Solicitor," for details.)

Coding and including installation exit routines: IBM-supplied exit routines can be replaced by one for authorizing connection, disconnection, and logon requests, and by one for collecting accounting statistics. (See Chapter 7, "VTAM Services," for details about coding the authorization and accounting exit routines.)

Using authorized path: This feature reduces the execution time for certain VTAM macro instructions that are used by VTAM application programs (record mode only) in supervisor state. (See Chapter 7, "VTAM Services," for details about authorized path.)

Maintaining a VTAM System

Maintaining VTAM in a telecommunication system involves:

Collecting error information: This information is provided by the VTAM trace facility, the VTAM formatted-dump routine, the NCP dump programs, VTAM error recording, and TOLTEP. (See Chapter 8, "VTAM RAS Facilities," for details about using these facilities.)

Keeping the network operational: VTAM's configuration restart facility attempts to reinstate the status of the network prior to the failure. (See Chapter 8, "VTAM RAS Facilities," for details about configuration restart.)

Problem determination: VTAM problem determination aids help to isolate and identify error conditions. (See *OS/VS2 MVS VTAM Debugging Guide*, for details about the problem determination aids and some VTAM debugging techniques.)

Tuning a VTAM System

Tuning VTAM performance in the host CPU involves:

VTAM storage pools

VTAM packaging

VTAM performance must also be considered in conjunction with its effect on an installation's requirements for the entire OS/VS2 system control program and the hardware configuration that it supports.

See Chapter 9, "Tuning VTAM," in this publication for details on tuning VTAM.

Chapter 2. System Preparation

When preparing to install the VTAM option in an OS/VS2 system, it is necessary to consider the interrelationships between VTAM and the other components of OS/VS2. VTAM requires its own address space and manages each function that uses VTAM (such as the VTAM network solicitor, TCAM, and VTAM application programs) as an application program contending for VTAM's resources. System preparation for VTAM involves:

- Using system generation macro instructions to include the VTAM option
- Creating a cataloged procedure for starting VTAM
- Testing the VTAM network

Note: *For general information about how to estimate the amount of real storage, virtual storage, and auxiliary storage needed, see* OS/VS2 MVS Overview, *GC28-0984, and* OS/VS2 System Programming Library: Initialization and Tuning Guide, *GC28-0681. For estimating VTAM storage requirements, see Appendix F See Chapter 9, "Tuning VTAM," for a list of the VTAM modules in the IBM-supplied, LPA pack list and for a list of the VTAM functional module groups within that pack list.*

Including VTAM during System Generation

Installing VTAM during system generation requires:

- Coding the system generation macro instructions to include VTAM
- Defining the VTAM load module library

All local devices in the VTAM network must be defined during system generation. These local devices are components of the IBM 3270 Information Display System, the 3790 Communication System, and the IBM 3704 and 3705 Communications Controllers.

Telecommunication lines and remote devices do not need to be defined during system generation if they are to be used only through VTAM. (If they are to be used by other access methods, they need to be defined according to the requirements of those access methods.) Remote devices can be defined during NCP generation and VTAM definition.

System Generation Macro Instructions

Figure 2-1 shows the system generation macro instructions required to include VTAM in OS/VS2.

Data Sets

VTAM uses NCP data sets and operating system data sets in addition to its own data sets to support the VTAM network. These data sets contain such items as VTAM modules, VTAM definition statements, NCP modules, and problem determination information. Figure 2-2 shows all the data sets used by VTAM, their VTAM contents, when the data set is created, and additional information relevant to the data set.

Cataloged Procedure for Starting VTAM

VTAM is started by naming a cataloged procedure in the START command. The system programmer must write a cataloged procedure and include it either in SYS1.PROCLIB or in a user-defined procedure library. The cataloged procedure contains DD statements that identify VTAM, system, and NCP data sets.

Macro	Parameters	Purpose
CONSOLE	ROUTCDE=8 VALDCMD=2	Required for all consoles from which VTAM commands are to be entered.
CTRLPROG	APFLIB=(SYS1.VTAMLIB, volid, NCP load module library, volid)	Required; these data sets must be included in the authorized list.
DATAMGT	ACSMETH=(VTAM)	Required to include the VTAM modules in the system.
DATASET	VTAMLIB. SPACE=(CYL, (5, 1, 5)) [for 3330] MEMBERS=(user routines) PDS=user library VOL=(volser, devtype)	Required; data set must be defined and cataloged. (Use either this macro or JCL and Access Method Services before starting system generation.)
IODEVICE	• Specify each local component of the 3270 display system. • Specify each locally attached 3790 Communications System. • Specify each local 3704 and 3705 Communications Controller. (If the communications controller has a two-channel switch, specify the second channel in the OPTCHAN parameters.) • If TCAM is also included in the system, specify each remote device that is to be referred to by both TCAM and VTAM.	

Figure 2-1. System Generation Macro Instructions for VTAM

Example of a VTAM Start Cataloged Procedure

In this example:

A local and a remote communications controller are in this VTAM network.

TOLTEP data sets are included for VTAM.

A dump data set is included for each communications controller.

The initial test routine is included for the local communications controller.

```
//net       EXEC   PGM=ISTINM01
//VTAMLIB   DD     DSN=SYS1.VTAMLIB,DISP=SHR
//VTAMLST   DD     DSN=SYS1.VTAMLST,DISP=SHR
//VTAMOBJ   DD     DSN=SYS1.VTAMOBJ,DISP=SHR
//INITEST   DD     DSN=SYS1.LINKLIB,DISP=SHR
//OLTCDSDD  DD     DSN=OLTLIB,DISP=SHR
//SYMSYM    DD     DSN=CDSLIB,DISP=SHR
//ncplibl   DD     DSN=sys1.ncplibl,DISP=SHR
//ncplibr   DD     DSN=sys1.ncplibr,DISP=SHR
//dumpl     DD     DSN=dumploc,DISP=MOD
//SYSABEND  DD     SYSOUT=A
```

Control Statements for Example

The EXEC statement specifies (1) the VTAM initialization program name (PGM= ISTINM01) and (2) the installation-assigned name of the cataloged procedure *(net* in this example).

The VTAMLIB DD statement defines the previously allocated and cataloged system data set SYS1.VTAMLIB, which contains the VTAM load modules that are to be used in VTAM's private address space. The ddname must be VTAMLIB.

Data Set/ddname VTAM Contents	When Created	Comments
	VTAM Related Data Sets	
SYS1.VTAMLIB VTAM load modules used only in VTAM's private address space IBM default network solicitor load module	System generation	Required for system generation and VTAM. Must be in the APF list.
SYS1.VTAMLST VTAM network definition statements VTAM start options	Before starting VTAM	Required for VTAM (See note 1). A DD statement with ddname VTAMLST must be in the start procedure for VTAM; dsname is user-assigned. The following DCB parameters must be specified in this DD statement: RECFM=F,LRECL=80,BLKSIZE=80
SYS1.VTAMOBJ VTAM resource definition table	Execution time of VTAM	Required (See note 2). A DD statement with ddname VTAMOBJ must be in the start procedure for VTAM; dsname is user-assigned.
NODELSTand configuration restart VSAM data sets A list of active major nodes or modifications made by the network operator to the initial status of the NCP, local 3270, local SNA, and switched SNA major nodes.	Before starting VTAM	Required if configuration restart is used. See "Configuration Restart VSAM Data Sets "In this chapter.
	Operating System Data Sets	
SYSABEND/SYSUDUMP VTAM abnormal termination dump records.	Execution time of VTAM	Required for abend dump. A DD statement with ddname SYSABEND or SYSUDUMP must be put in the input stream for each job subject to abnormal termination; dsname is user-assigned.
SYS1.DUMPxx Selected portions of storage following a VTAM error	System generation or execution time of VTAM	Required for SVC dump. xx — user-assigned number from 00 to 09. System can have more than one data set defined.
SYS1.LINKLIB VTAM initialization load module VTAM loader and dump modules Local communications controller pre-IPL testing modules	System generation NCP installation	Required. Required for communications controller to be tested; this occurs before VTAM loads the NCP into the controller. A DD statement with ddname INITEST must be in the start procedure for VTAM; dsname is user-assigned.
SYS1.LOGREC VTAM error records	System generation	Required.
SYS1.LPALIB Interpret tables Authorization exit routine Accounting exit routine VTAM load modules used in shared link pack area	System generation	Required.
SYS1.MACLIB VTAM macro definitions	System generation	Required.
SYS1.NUCLEUS Attention interruption handlers for TPIOS SVC 124	System generation	Required.

Figure 2-2 (Part 1 of 3). Data Sets Used by VTAM

Data Set/ddname VTAM Contents	When Created	Comments
SYS1.PARMLIB VTAM parameter list information	System generation	Required. EASYS00 contains a parameter list created during system generation; the parameter list can be modified. IEAAPFxx must contain the authorized data set names: SYS1.VTAMLIB and the name of the NCP load module library. IEAPAK00 contains either pack list default members IEAPAKBV (batch only with VTAM) and IEAPAKTV ITSO/batch and VTAM).
SYS1.PROCLIB VTAM start cataloged procedure	System generation	Required.
SYS1.TRACE GTF trace records	GTF start time	Required for external trace to be used.
NCP Data Sets		
NCP dump NCP dump records	VTAM start time	Required for VTAM to provide a requested dump of an NCP One data set must be provided for each NCP that is to be dumped simultaneously. The ddname of the DD statement used to refer to this data set must also be specified in the VTAM-only, NCP PCCU macro and in the start procedure for VTAM.
NCP load library NCP load module Resource resolution table load module BHSET resolution table load module	NCP generation	Required. This library must be authorized. The ddname of the DD statement used to refer to this data set must be the same as the one specified on the NCP BUILD macro in the LOADLIB and QUALIFY operands. One data set for each NCP can be created, or one data set can be created and each NCP defined as a separate member (on the NCP BUILD macro in the NEWNAME operand).

Figure 2-2 (Part 2 of 3). Data Sets Used by VTAM

Data Set/ddname VTAM Contents	When Created	Comments
	TOLTEP Data Sets	
TOLTEP CDS Configuration data sets for remote devices	Before starting VTAM	Required for TOLTEP to be executed (See note 3). A DD statement with ddname SYMSYM must be in the start procedure for VTAM; dsname is user-assigned.
TOLTEP OLTs Online terminal tests for TOLTEP Configuration data sets for local devices	Before starting VTAM	Required for TOLTEP to be executed (See note 3). A DD statement with ddname OLTCDSDD must be in the start procedure for VTAM; dsname is user-assigned.

Notes:

1. SYS1.VTAMLST is referred to as the VTAM definition library. Definition statements for each major node are put in this library. Each major node is a separate member of SYS1.VTAMLST.

   Start options are put in members under the name of either ATCSTRxx or ATCCONxx (where xx are two-digit numbers specified by the installation). ATCCONxx members contain lists of major nodes to be activated automatically when VTAM is started. ATCSTRxx members contain lists of VTAM start options to be used when initializing VTAM.

2. When a major node is activated, VTAM builds a resource definition table (RDT) describing the node from the information supplied by definition statements. When a major node is deactivated, its RDT is deleted by VTAM. These RDTs are used to maintain the current status of all minor nodes in the telecommunication system.

   To reduce the time needed to construct these RDTs, VTAM stores a copy of each RDT on SYS1.VTAMOBJ the first time each major node is activated. This copy is then used whenever the major node is again activated.

2. (continued)

   Note: A major node can be modified merely by modifying its definition statements and putting them under the same member name on SYS1.VTAMLST. If a member is changed, the copy of the corresponding RDT on SYS1.VTAMOBJ must be deleted (using an operating-systems utility program that can delete a member of a BPAM data set). If the copy is deleted, the next time the major node is activated, VTAM builds a new RDT (based on the modified definition) and stores a new copy on SYS1.VTAMOBJ.

3. This data set is allocated and cataloged by the installation by using OLTEP (online test executive program), which puts the appropriate information in the data set.

Figure 2-2 (Part 3 of 3). Data Sets Used by VTAM

The VTAMLST DD statement defines the previously allocated and cataloged VTAM definition library, named in this example SYS1.VTAMLST. The dsname SYS1.VTAMLST is installation-defined; the ddname must be VTAMLST. Also, the following DCB parameters must have been specified for this data set:

RECFM=F,LRECL=80,BLKSIZE=80

The VTAMOBJ DD statement defines the previously allocated and cataloged VTAM data set. The dsname SYS1.VTAMOBJ is installation-defined; the ddname must be VTAMOBJ.

The INITEST DD statement defines the previously allocated and cataloged system data set SYS1.LINKLIB, which contains the initial test routine for local communications controllers. The ddname must be INITEST.

The OLTCDSDD DD statement defines the previously allocated and cataloged configuration data sets for local devices and online terminal tests for TOLTEP. The dsname OLTLIB is installation-defined; the ddname must be OLTCDSDD.

The SYMSYM DD statement defines the previously allocated and cataloged configuration data sets for remote devices for TOLTEP. The dsname CDSLIB is installation-defined; the ddname must by SYMSYM.

Note: *One data set for each NCP can be created, or one data set can be created and each NCP defined as a separate member (on the NCP BUILD macro in the NEWNAME operand).*

The *ncplibl* DD statement defines the previously allocated and cataloged NCP load library for a local communications controller. This data set contains the NCP's load modules, resource resolution table load module, and BHSET resolution table load module. The ddname must be the same as the dsname specified in the LOADLIB operand of the NCP BUILD macro instruction for this NCP. The dsname *sys1.ncplibl* in this example, must be the same as the dsname specified in the LOADLIB and QUALIFY operands of the NCP BUILD macro instruction for this NCP.

The *ncplibr* DD statement defines the previously allocated and cataloged NCP load library for a remote communications controller. This data set contains the NCP load modules, resource resolution table load module, and BHSET resolution table load module. The ddname must be the same as the dsname specified in the LOADLIB operands of the NCP BUILD macro instruction for this NCP. The dsname *sys1.ncplibr* must be the same as the dsname specified in the LOADLIB and QUALIFY operands of the NCP BUILD macro instruction for this NCP.

The *dumpl* DD statement defines the previously allocated and cataloged dump data set for the local communications controller. The ddname *dumpl,* in this example, must be the same as the ddname specified in the DUMPDS operand on the VTAM-only, NCP PCCU macro instruction for this NCP. The dsname *dumploc,* in this example, is installation-defined.

The *dumpr* DD statement defines the previously allocated and cataloged dump data set for the remote communications controller. The ddname *dumpr,* in this example, must be the same as the ddname specified in the DUMPDS operand on the VTAM-only, NCP PCCU macro instruction for this NCP. The dsname *dumprem,* in this example, is installation-defined.

The SYSABEND DD statement indicates that a dump is to be taken and printed immediately if VTAM terminates abnormally.

Configuration Restart VSAM Data Sets

If the user chooses to use the configuration restart facility of VTAM, configuration restart VSAM data sets must be defined. See Chapter 8 for a discussion of configuration restart.

You can define configuration restart data sets for any of the following major nodes:

- NCP major node
- Local 3270 major node
- Local SNA major node
- Switched SNA major node

A data set can be associated with only one major node. When the definition of a major node is changed in the source statement library, you must delete and redefine the associated configuration restart data set.

A configuration restart data set must have the following characteristics:

- The data set must be indexed. Specify the INDEXED operand on the DEFINE command or allow the default value to be assumed.
- A key length of 4 and an offset of 0 are required. Specify KEYS(4 0).
- The average record and the maximum record must each have a length of 24 bytes. Specify RECORDSIZE(24 24).
- To ensure data integrity, specify 4 for SHARE options.

Space allocation is defined by specifying RECORDS(a b), where a is the number of records in the primary (initial) allocation and b is the number of records in the secondary allocation (which is used if the primary allocation is exhausted). The maximum number of records required is equal to the number of minor nodes defined in the major node. Include each PATH macro instruction in a switched major node when determining the count. Therefore, a reasonable allocation specification might be RECORDS(a b), where a is the number of minor nodes in the major node and b is a number about one-tenth the size of a.

Following is an example of defining a VSAM configuration restart data set. The DEFINE command is used to define a catalog entry and to allocate space for an indexed cluster.

```
DEFINE -
CLUSTER(NAME(LRNCKPT) -
VOL(PUBLIC) -
KEYS(4 0) -
RECORDS(200 20) -
RECORDSIZE(24 24) -
SHR(4,4)
FILE(VOL1))
```

For a complete description of how to define and delete VSAM data sets, see *OS/VS Access Method Services.*

NODELST Data Sets

You can define a NODELST data set to maintain a list of major nodes that are active at one time. The network operator specifies the name of the data set in the NODELST start option. If the user chooses to use the NODELST facility; VSAM data sets must be defined. See Chapter 8 for a discussion of the NODELST facility.

A NODELST data set must have the following characteristics:

- The data sets must be indexed. Specify the INDEXED operand on the DEFINEP command or allow the the default value to be assumed.
- A key length of 2 and an offset of 0 are required. Specify KEYS(2 0).
- The average record and the maximum record must each have a length of 10 bytes. Specify RECORDSIZE(10 10).
- To ensure data integrity, specify 4 for SHARE options.

Space allocation is defined by specifying RECORDS(a b), where a is the number of records in the primary (initial) allocation and b is the number of records in the secondary allocation (which is used if the primary allocation is exhausted). The maximum number of records that are required is equal to the number of major node activations (including reactivations of major nodes that have been deactivated) that occur from the time VTAM

is started until it is halted. A reasonable allocation specification might be RECORDS(a b), where a is about 1.2 times the number of major nodes in the network and b is about 0.20 times the number of major nodes in the network.

All other data set characteristics are ignored by VTAM.

Following is an example of defining a NODELST data set. The DEFINE command is used to define a catalog entry and to allocate space for an indexed cluster.

```
DEFINE -
CLUSTER(NAME(NODLST1) -
VOL(PUBLIC) -
KEYS(4,0) -
RECORDS(200 20)
RECORDSIZE(24 24)
SHR(4,4)
FILE(VOL1)
```

For a complete description of how to define and delete VSAM data sets, see *OS/VS Access Method Services.*

Verification of the VTAM Installation

After VTAM is installed, the following procedure can be used to test whether VTAM is operational and supports the teleprocessing configuration. This procedure does not test the entire VTAM network or provide a diagnostic or functional test of the VTAM network.

To verify that VTAM is correctly installed, carry out the following steps:

1. Before generating the OS/VS2 system:

   Mount the correct distribution libraries (DLIBs):

   SYS1.AOS24
   SYS1.AOS26

   Mount the volumes that will contain the operating system libraries:

   SYS1.VTAMLIB
   SYS1.LINKLIB
   SYS1.LPALIB
   SYS1.NUCLEUS

   Allocate space for VTAM and system data sets on direct-access storage devices by using information in *MVS Overview* and Appendix F to estimate storage requirements.

   SYS1.VTAMLIB
   SYS1.LINKLIB
   SYS1.LPALIB
   SYS1.NUCLEUS

   Code the system generation options for the VTAM network by following the requirements in *OS/VS2 System Programming Library: System Generation Reference:*

   VTAM options (see Figure 2-1)
   Local 3704/3705 communications controllers
   Local components of 3270 display systems
   Local 3791 communications controllers

2. After generating the OS/VS2 system control program, investigate all error indications from the system generation listings and make any corrections before proceeding:

   Diagnostic messages
   MNOTES
   Linkage editor Move/Copy warnings

3. Before starting VTAM:
   - Write a cataloged procedure for starting VTAM and include it either in SYS1.PROCLIB or in an installation-defined procedure library.
   - Mount volumes and allocate space for VTAM data sets that have not already been mounted and allocated (see Figure 2-2) on direct-access storage devices. (Use information in the *MVS Overview* and the *System Initialization and Tuning Guide.)*
   - Use the IEHLIST utility program or the output from the IEBUPDTE utility program to verify the contents of SYS1.VTAMLST:

     Member ATCCON00 contains VTAM major node names to be activated when starting VTAM.

     Member ATCSTR00 contains selected start options for starting VTAM.

     Separate members must be defined for each major node in VTAM network.

4. After system initialization:
   - Issue START *procname* command, where *procname* is the name of the cataloged procedure for starting VTAM. Successful VTAM initialization proceeds without error messages until message IST020I VTAM INITIALIZATION COMPLETE is issued.

     Start options defined in member ATCSTR00 are in effect.

     Major nodes named in member ATCCON00 are brought online and activated. If the major node name is for an NCP, the NCP is loaded and activated in the communications controller.
   - Activate the remaining major nodes in the VTAM network (those not listed in ATCCON00). Issue the command VARY NET,ACT,ID=nodename for each major node. *nodename* is the name of the major node in SYS1.VTAMLST.

     Major nodes in this VTAM network configuration are activated. If any major node was for an NCP, the NCP is loaded and activated in the communications controller.
   - Issue the command VARY *NET,ACT,ID=nodename,U=device address* to attempt to activate a major node that is either offline or uninstalled. *nodename* is the name of a major node that is not in SYS1.VTAMLST or is offline. *device address* is the channel unit address of the local 3270 or communications controller (local or remote) that is undefined or offline.

     If the major node is not installed, the activation request fails and produces message IST061I VARY FAILED—ID=name UNKNOWN TO VTAM.

     If the major node is offline (local 3270, local or remote communications controller), or no UCB is available (unsuccessful VTAM allocation recovery attempt), VTAM issues message IST068I SYSTEM ALLOCATION FOR NODE *name* UNSUCCESSFUL. (If the node was offline, then VTAM prompts the network operator for unit address or cancel request.)
   - Issue the command DISPLAY NET,ID=EVERY to verify the active status of all the components in the VTAM network:

     Communication controllers
     Telecommunication lines
     Terminals
     Application programs (including network solicitor)
     SDLC cluster control units

- Have GTF active, then issue the command MODIFY *procname* with TRACE options for at least one terminal or logical unit node.
- Issue the command MODIFY *procname,* TRACE,ID=VTAMBUF,TYPE=SMS to monitor VTAM storage pool usage. This command assists the installation in selecting the proper VTAM storage pool values. Using the minimum or default storage pool values for larger (than minimum) configurations and workloads can cause VTAM to put OS/VS2 into a wait state.
- If an active local or remote terminal is available, execute a test program that, for example, uses this sequence of VTAM macro instructions: OPEN, OPNDST, (with operand OPTCD=ACQUIRE), SOLICIT, READ, WRITE, CLSDST, CLOSE.
- If a communications controller is in the VTAM network, issue the command VARY NET,1NACT,ID=nepname to deactivate it.
- Issue the command HALT NET,QUICK for VTAM to close down the network.

  If any VTAM application programs are unable to disconnect themselves from VTAM within 45 seconds, VTAM sends the network operator message IST127I *application_name* STILL ACTIVE, TERMINATION WAITING. This message lists the ACB names of the VTAM application programs that are still connected. Issue the CANCEL command to disconnect those VTAM application programs.

  After all programs are disconnected, VTAM issues message IST102I VTAM INACTIVE.
- Issue the command START *procname* to verify that VTAM can reinitialize itself. After VTAM issues the message IST020I, the test procedure is completed. Save the test procedure output for reference.

Chapter 3. Defining the Network

Before VTAM can use a telecommunications network, the system programmer must define the physical configuration of the network and VTAM application programs to VTAM. These definitions represent points or nodes in the VTAM network that can be addressed and used by VTAM application programs (using VTAM macro instructions) and by the network operator (using VTAM network operator commands). Defining the network to VTAM involves:

Defining VTAM application program major nodes

Defining local 3270 major nodes

Defining local SNA major nodes

Defining switched SNA major nodes

Defining an NCP major node

Putting the definitions into SYS1.VTAMLST

Code these definitions of major and minor nodes by using VTAM definition statements or NCP macro instructions, and put the definitions into SYS1.VTAMLST as separate members (major nodes). These definition statements are treated as assembler macro statements.

Notes:

- *Missing continuation characters may cause the NCP (during NCP generation) to assume defaults that are not physically correct (for example, half-duplex lines instead of full-duplex lines).*
- *Unique names should be used in all VTAM-related definitions (For example, the name on the APPL statement cannot be the same as the member name.)*

Defining VTAM Application Program Major Nodes

Each VTAM application program must be defined to VTAM, either individually or as part of a logical set (group) of application programs. Also, the same application program can be included in more than one logical group. A VTAM APPL definition statement defines an application program to VTAM.

APPL Definition Statement

One APPL definition statement must be specified for each VTAM application program and put in SYS1.VTAMLST. If only one APPL definition statement or if a logical group of APPL definition statements is to be in a member in SYS1.VTAMLST, the system programmer must define the member name (major node) when putting the group into SYS1.VTAMLST. Code one APPL definition statement (in 80-byte card-image format) for each VTAM application program that is in the VTAM network.

Notes:

1. *If the TCAM message control program (MCP) is being defined, refer to* OS/VS2 TCAM System Programmer's Guide *for the MCP requirements when coding the APPL definition statement.*
2. *If TSO/VTAM is being defined, refer to* OS/VS2 MVS TSO/VTAM System Information, *GC27-0046, for the TSO/VTAM requirements when coding the APPL definition statement.*

The format of the APPL definition statement is:

Name	Operation	Operand
applname	APPL	[PRTCT=password] [,BUFFACT=n|1] [,AUTH=([ACQ|NOACQ] [,BLOCK|NOBLOCK] [,PASS|NOPASS] [,PPO|SPO|NOPO] [,TCAM|NOTCAM] [,TSO|NOTSO] [,VPACE|NVPACE])

applname
specifies the unique 1- to 8-alphanumeric character node name assigned to this VTAM application program. The name must begin with an alphabetic character other than $. The *applname* must be identical with the name specified in the APPLID operand of the VTAM ACB macro instruction. The ACB macro instruction is described in the *VTAM Macro Language Reference* manual. If no application program name is to be specified in the APPLID operand of the ACB macro instruction, the *applname* in the APPL statement must be the job-step name under which the application program will be started. This can be done for only one application program that will be active within a job step.

PRTCT=password
specifies a 1- to 8-EBCDIC character password. VTAM compares this password with the one in the application program's ACB (access control block) during open processing and uses it to verify the authority of this application program to run (as the program being defined by this APPL definition statement).

BUFFACT=n|1
indicates a multiplier (decimal number from 1 to 255) for calculating the maximum number of elements in the VTAM PPBUF storage pool for each terminal with which the application program will communicate.

VTAM uses this multiplier to determine the maximum number of elements in PPBUF that can be filled with data that has been read ahead from each terminal, but that has not yet been transferred into the VTAM application program's buffers. The maximum number of elements for each terminal or logical unit is the product of this BUFFACT value and the value coded in the BUFLIM operand in the other statement that defines the terminal or logical unit. (These statements are the VTAM LOCAL definition statement and the PU, LU, TERMINAL, VTERM, or COMP macro instructions.)

For example: If BUFFACT=1 (the default value) and BUFLIM=2 (the default value), then 2 becomes the maximum number of elements that can be allocated to receive input from that terminal for this VTAM application program.

Consider the following information when determining the BUFFACT value:

- Number of terminals expected to be in concurrent use
- Characteristics of the terminals (such as the terminal's hardware features, speed, and use or type of transaction it is to perform)

- Characteristics of this VTAM application program to be used with the expected terminals (such as updating or retreiving data)
- The value coded for MAXDATA in the PCCU macro instruction

Assume, for example, that an SNA 3270 issues a READ buffer operation for 1920 bytes. If the installation codes MAXDATA=256, the NCP receives data in 256 byte segments. If the BUFLIM parameter is omitted and the value of 2 is assumed, a BUFFACT value of 4 provides a maximum of 8 buffers that can be filled and, therefore, the maximum capacity of the buffers is large enough to receive the data response.

For details on calculating the values for PPBUF, see Chapter 9, "Tuning VTAM."

Notes:

- *After VTAM multiplies the BUFLIM and BUFFACT values together, the product becomes effective after the VTAM appllcation program lssues the VTAM OPNDST macro instruction.*
- *If the amount of data read in exceeds the calculated maximum capacity of the elements for basic devlces, VTAM issues a VTAM RESET macro instruction wlth the OPTCD=UNCON operand. This macro instruction cancels the I/O operation, but the excess data remains available to be read. For record mode, VTAM issues a Clear command and all data is lost, including data that is already queued. For record mode, VTAM also schedules the LOSTERM exit routine if it is available.*
- *To determine if the data was lost, the VTAM application program must check the return codes in the RPL fields for the I/O request (RTNCD and FDBK2). The RPLs to be checked are those for the READ, WRITE(OPTCD=CONV), or DO VTAM macro instructions.*

AUTH=([parameter] [,parameter...])
indicates whether this VTAM application program has the authority to use certain VTAM functions. The parameters can be specified in any order, and only one comma is needed to separate one parameter from the next. The possible parameters are:

ACQ | NOACQ
indicates whether this application program can use either the VTAM SIMLOGON macro instruction or the VTAM OPNDST macro instruction with the ACQUIRE option. (These macro instructions enable the application program to acquire a connection with a particular terminal.)

BLOCK | NOBLOCK
indicates whether this application program can request input data from start-stop or BSC terminals in blocks instead of in messages or transmissions. (This occurs for read specific or solicit operations.) This parameter does not apply to devices that use the record mode of data transfer or to the terminals in the IBM 3270 Information Display System.

Notes:

- *This parameter corresponds to the BLOCK parameter in the NIB (node initializa-tlon block) that represents the terminal. (PROC=BLOCK ln the VTAM NIB macro instructlon.)*

- *When this appllcation program issues a VTAM OPNDST macro instruction, VTAM compares this parameter on the APPL definition statement wlth the parameter in the NIB. If they correspond (both specify BLOCK), the OPNDST can be executed successfully. If they do not correspond (NOBLOCK is coded or assumed by default in the APPL statement; no value is specifled in the NIB), then OPNDST cannot be executed successfully.*

PASS|NOPASS
indicates whether this application program can pass connections to another VTAM application program. (Issue the VTAM CLSDST macro instruction with the PASS option.)

Notes:

- *This parameter should correspond to the PASS option specified ln the VTAM CLSDST macro instructlon.*
- *If PASS is not specified on the APPL definition statement, then the CLSDST macro instructlon cannot be used to request VTAM to reconnect terminals to another VTAM application program (after disconnecting the terminals from this application program).*
- *If NOPASS is specified or assumed by default on the APPL definition statement, then normal logon is not restrlcted. The CLSDST macro instruction wlth the RELEASE option can be used to pass a terminal to VTAM or to a network solicitor.*
- *If a controlling applicatlon program (other than a network solicitor) ls being used, then the CLSDST macro instruction wlth the PASS option can be used in the controlling application program to allow logon to another application program.*

PPO|SPO|NOPO
specifies the status of the application program in regard to issuing network operator commands and receiving responses and unsolicited messages. This facility is described in the *Supplement to the Macro Language Guide for the Program Operator,* GC27-0036.

If either PPO (primary program operator) or SPO (secondary program operator) is coded, the application program is authorized to issue SENDCMD and RCVCMD macro instructions (described *in VTAM Macro Language Reference).* If this paramater is omitted or if NOPO (no program operator) is coded, VTAM does not permit the application program to issue SENDCMD or RCVCMD macro instructions.

If PPO is coded, the application program receives all unsolicited messages, that is, all messages such as informational and error messages that are not replies to operator commands. If SPO is coded, all unsolicited messages are directed to the system console, or to the PPO, if active. If no PPO-designated application program is active when unsolicited messages occur, the unsolicited messages are directed to the system console.

TCAM|NOTCAM
indicates whether this application program is a TCAM MCP. If it is, code TCAM. If it is not, code NOTCAM or allow that operand to take effect by default.

TSO | NOTSO

indicates whether or not the application program is a TSO/VTAM time-sharing program (either the Terminal Control Address Space [TCAS] or a terminal that will be logged on to TSO/VTAM). If it is a TSO/VTAM time-sharing program or a user of that program, code TSO. If not, code NOTSO or allow that operand to take effect by default.

VPACE | NVPACE

specifies whether this application program is to be subject to the VPACING specifications of logical units with which the program will be in session. A specification of NVPACE is effectively the same as specifying VPACING=0 in the LU statements for all the logical units with which the application program will be in session.

VPACE is normally specified to prevent overloading buffers in the 370X with outbound messages from VTAM. However, NVPACE can be specified in two situations:

1. When the application program will send only single-element messages to any one logical unit and, after sending each message, the program will wait for a response before sending the next message.
2. When the application program will send chains containing a limited number of elements and the program either (1) after sending one chain, waits for a response before it starts sending the next chain, or (2) sends the Change Direction Command indicator in the last element of each chain. The number of elements in each chain must be no larger than the results of this formula:

   number of elements=$(2 * n_v - m_v) + (2 * n_p - m_p)$

   where:

   n_v is the smallest *n* value in the VPACING operands of the LU statements for the logical units.

   m_v is the smallest *m* value in the VPACING operands of the LU statements for the logical units.

   n_p is the *n* value in the PACING operand of the LU statements.

   m_p is the *m* value in the PACING operand of the LU statements.

   Note: *If the application program is to be in session with logical units whose VPACING operands are different from each other, the smallest VPACING values should be used in the formula.*

   As an example of the calculation, if the LU statement contained VPACING=(3,2) and PACING=(2,1), the largest number of elements that should be sent by the application program in a chain would be:

   $(2 * 3 - 2) + (2 * 2 - 1) = 7$

For information on the VPACING operand, see "LU (Local) Statement," "LU (Switched) Statement," and "Pacing Considerations" later in this chapter.

Defining Local 3270 Major Nodes

VTAM definition statements define each local 3270 terminal (a printer or display station) to VTAM, either individually or as part of a logical set (group) of local 3270s. Also, the same terminal can be included in more than one logical group (but only one logical group can be active at one time). Figure 3-1 shows the VTAM definition statements that define 3270 major nodes to VTAM.

LBUILD Definition Statement

One LBUILD definition statement (in 80-byte card-image format) must be specified for each logical group (major node) of local 3270 terminals. Define each terminal (minor node) in the group by using a LOCAL definition statement. Also, the same terminal can be included in more than one group, but only one group containing that terminal can be active at a time.

The format of the LBUILD definition statement is:

Name	Operation	Operand
[name]	LBUILD	SUBAREA=n|3 [,CONFGDS=ddname] [,CONFGPW=password]

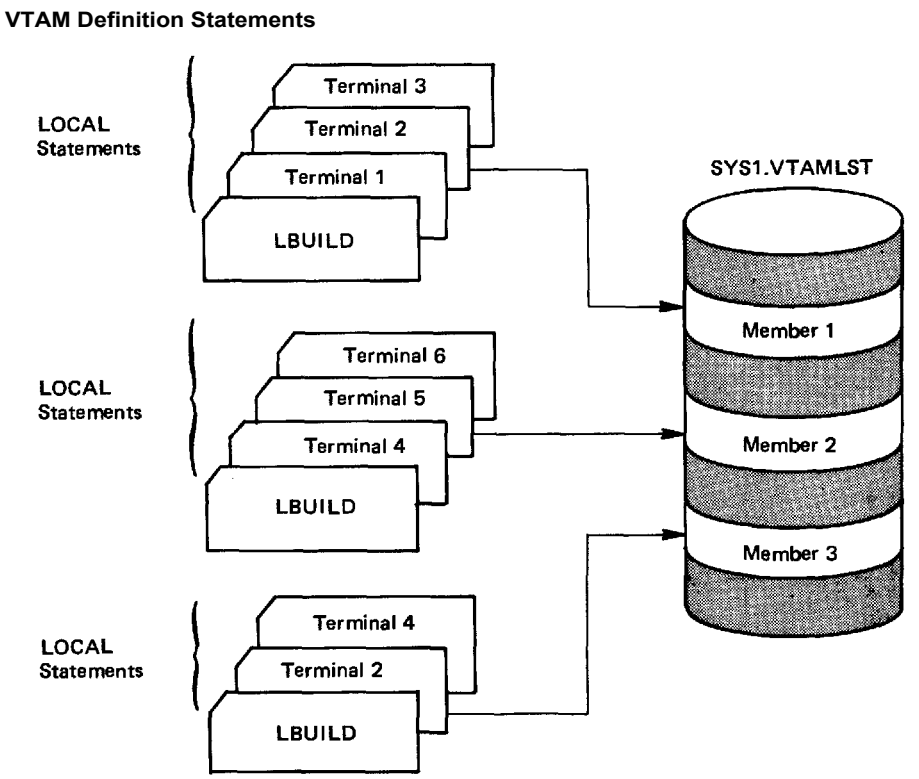


Figure 3-1. Defining Local Terminals

name
1- to 8-alphanumeric characters which must not begin with a $ character; optional.

SUBAREA=n|3
indicates a decimal number from 2 to the MAXSUBA value specified for this VTAM network configuration. Each LBUILD definition statement must have a unique SUBAREA number to represent each local 3270 major node. (If the same SUBAREA number is used for more than one local 3270 major node, then only one with that number can be active at a time.)

Notes:

- *The unique SUBAREA values (specified in the SUBAREA operands in the NCP BUILD macro instructions and the LBUILD definition statements) must correspond to the MAXSUBA value (specified in the MAXSUBA start option and the NCP BUILD macro instruction) to the extent indicated in Figure 4-2.*
- *The default value can be used for only one major node (either one group of LOCAL definition statements or one NCP BUILD macro instruction).*

CONFGDS=ddname
is a 1- to 8-character data definition name that identifies the configuration restart data set defined by the installation for this major node. Include a DD statement using this data definition name in the VTAM start procedure.

Refer to Chapter 8, "VTAM RAS Facilities," for a discussion of configuration restart.

CONFGPW=password
specifies the **1-** to 8-character password, if required, for VTAM to gain either update or full access to the configuration restart data set. If CONFGPW is not specified but is required by VSAM, VSAM prompts the network operator to provide the correct password when VTAM attempts to open the data set. This parameter may be specified only if the CONFGDS parameter is specified.

LOCAL Definition Statement

One or more LOCAL definition statements can be grouped with an LBUILD definition statement and put together in SYS1.VTAMLST. Code one LOCAL definition statement (in 80-byte card-image format) for each local 3270 terminal (printer or display station) that is in the VTAM network.

The format of the LOCAL definition statement is:

Name	Operation	Operand
name	LOCAL	CUADDR=address ,TERM= {3277 | 3284 | 3286 } [,BUFLIM=n|2] [,FEATUR2=([MODEL1 |MODEL2] [,ANKEY|NOANKEY] [,DEKEY|NODEKEY [,PFK |NOPFK] [,SELPEN|NOSELPEN])] [,ISTATUS=ACTIVE| INACTIVE] [,LOGAPPL=application program name] [,LOGTAB=interpret table name]

name
indicates the unique, 1- to 8-alphanumeric character node name assigned to the device (as specified in the CUADDR operand in this LOCAL definition statement).

CUADDR=address
indicates the CUA (physical location) for this local terminal. Note that you must not enclose the address within quotation marks or apostrophes.

TERM=3277|3284|3286
indicates the specific, local 3270 terminal (printer or display station component). Only 3277, 3284, or 3286 can be specified. For a 3278, specify 3277; for a 3287, specify 3284 or 3286 (either is valid); for a 3289, specify 3286.

BUFLIM=n| 2
indicates a multiplier (decimal number from 1 to 255) for calculating the maximum number of elements in the VTAM PPBUF storage pool for this terminal.

VTAM uses this multiplier to determine the maximum number of elements in PPBUF that can be filled with data that has been read ahead from this terminal, but that has not yet been transferred into the VTAM application program's buffers. The maximum number of elements is the product of this BUFLIM value and the value coded in the BUFFACT operand (in the VTAM APPL definition statement that defines the VTAM application program being executed).

For example: If BUFFACT=1 (the default value) and BUFLIM=2 (the default value), then 2 becomes the maximum number of elements than can be allocated to receive input from the terminal.

Consider the following information when determining the BUFLIM value:

- Number of terminals expected to be in concurrent use.
- Characteristics of the terminals (such as the terminal's hardware features, speed, and use or type of transaction it is to perform).
- Characteristics of the VTAM application programs expected to be used with the terminals (such as updating or retrieving data).

For details on calculating the values for PPBUF, see Chapter 9, "Tuning VTAM."

Notes:

- *After VTAM multiplles the BUFLIM and BUFFA CT values together, the product becomes effective after the VTAM application program issues the VTAM OPNDST macro instruction.*
- *If the amount of data read in exceeds the calculated maximum capacity of the elements, then VTAM issues a VTAM RESET macro instruction with the OPTCD=UNCON operand. This macro instruction cancels the I/O operatlon, and the excess data is lost.*
- *To determine if data was lost, VTAM application programs must check the return codes in the RPL fields for the I/O request (RTNCD and FDBK2). The RPLs to be checked are those for the READ, WRITE(OPTCD=CONV), DO, or RECEIVE macro instructions.*

FEATUR2=([parameter] [,parameter...])
indicates the machine features for a specific, local 3270 terminal (printer or display station component of the IBM 3270 Information Display System). The parameters are:

MODEL1|**MODEL2**
indicates the specific model number (Model 1 or 2) for this 3277, 3284, or 3286 component.

Note: *If TERM=3277 is specified on this LOCAL definition statement, then the following parameters can be coded:*

ANKEY |**NOANKEY**
indicates whether this terminal has a standard alphanumeric keyboard.

DEKEY |**NODEKEY**
indicates whether this terminal has the data entry keyboard.

PFK |**NOPFK**
indicates whether this terminal has the program function keys.

SELPEN |**NOSELPEN**
indicates whether this terminal has the selector pen feature.

ISTATUS=ACTIVE | INACTIVE
indicates whether this terminal (minor node) is to be initially active when the logical group (major node to which it belongs) is first activated. (Major nodes can be activated either when VTAM is started by issuing the START command or, following the start of VTAM, by issuing the VARY command.) ISTATUS *is* effective only at the start of VTAM for terminals that use the basic mode of data transfer.

When ISTATUS=ACTIVE is coded or assumed by default, automatic logon for this terminal to a VTAM application program occurs (if automatic logon has been specified for the terminal or logical unit).

When ISTATUS=INACTIVE:

- The first activation of an inactive major node (containing this terminal) leaves the terminal inactive.
- A second activation of an already active major node activates all the terminals not previously active (including the ones specified INACTIVE).

LOGAPPL=name
indicates the name of a VTAM application program in SYS1.VTAMLST (1 to 8 alphanumeric characters) to which this terminal is to be automatically logged on when it is activated. The *name* must correspond to the *applname* assigned to the application program by an APPL definition statement.

For terminals that use the basic mode of data transfer:

- If OS/VS2 logon is not used, then the LOGTAB operand must also be coded in this definition statement.
- If a network solicitor is used to monitor this terminal's logon requests, then code *name* as the name assigned to that network solicitor.

- If the terminal is a printer, then do not code *name* as the name assigned to the network solicitor. (The IBM-supplied network solicitor cannot control output-only devices.)
- If this operand is not coded, then either the VTAM application program or the network operator must initiate terminal logon requests.

LOGTAB=name
indicates the SYS1.LPALIB member name of an interpret table (1 to 8 alphanumeric characters assigned by the linkage editor).

LOGTAB permits a terminal user to initiate a logon request from this terminal and associates the specified interpret table with this terminal. If OS/VS2 logon is not used, then LOGTAB must be coded in this LOCAL definition statement.

Note: *If this terminal is to be controlled by a network solicitor, then LOGTAB must be coded in this LOCAL definition statement. This allows the selected network solicitor to use the specified interpret table (to validate the logon message before routing it to the specified VTAM application program).*

Defining Local SNA Major Nodes

A local SNA major node is defined by filing in SYS1.VTAMLST a single VBUILD statement for the major node and a separate PU or LU statement for each minor node. One VBUILD statement must be included in each member, placed before the first PU statement. The VBUILD statement assigns a subarea value to the major node for VTAM's use in assigning addresses to the minor nodes.

A PU statement is required for each physical unit (SNA controller) in the major node. An LU statement for each logical unit is placed under the associated PU statement.

The PU and LU statements used to define a local SNA major node are very similar to the PU and LU statements used to define a switched SNA major node, and to the PU and LU macro instructions used to define an NCP major node. Where possible confusion might arise, the statements used for the local SNA major node are called PU (local) and LU (local) statements.

The installation may define multiple sets of local SNA controllers. This allows the network operator to use the VARY command to selectively activate a subset of all the local SNA controllers. However, all major and minor node names known to VTAM at any one time must be unique. *Two major nodes that include the same physical unit or logical unit cannot be active at the same tlme.* Refer to *VTAM Concepts and Planning* and to *VTAM Network Operatlng Procedures* for further information.

VBUILD Statement

Code a VBUILD statement in 80-byte card-image format for each set of locally attached SNA devices.

Write the VBUILD statement as follows:

Name	Operation	Operand
[name]	VBUILD	SUBAREA=n ,TYPE=LOCAL [,CONFGDS=ddname] [,CONFGPW=password]

name
1 to 8 alphanumeric characters which must not begin with a $ character; optional.

SUBAREA=n
is a decimal number chosen by the installation to identify the major node's subarea value.

Specify *n as* an integer between 3 and the value of MAXSUBA that was specified for the VTAM network. See Chapter 4, "Starting and Controlling the Network," for a description of the MAXSUBA start parameter.

When the local SNA major node is activated, the value must be unique among the active major nodes.

TYPE=LOCAL
specifies that the VBUILD statement defines a local configuration (as opposed to a switched configuration) to VTAM. This parameter is required.

CONFGDS=ddname
identifies the configuration restart data set defined by the installation for the local SNA major node. Include a DD statement using this data definition name in the VTAM start procedure. See Chapter 8, "VTAM RAS Facilities," for a discussion of configuration restart.

CONFGPW=password
specifies the 1- to 8-character alphanumeric password, if required, for VTAM to gain either update or full access to the configuration restart data set. If CONFGPW is not specified but is required by VSAM, the network operator is prompted by VSAM to provide the correct password when VTAM attempts to open the data set. This parameter may be specified only if the CONFGDS parameter is specified.

PU (Local) Statement

Code a PU statement in 80-byte card-image format for each physical unit in the local SNA major node.

Write the PU statement as follows:

Name	Operation	Operand
name	PU	[BUFLIM=n|2] * [,CUADDR=address] [,DISCNT=YES|NO] [,ISTATUS=ACTIVE|INACTIVE] [,LOGAPPL=application program name] * [,LOGTAB=interpret table name] * [,MAXBFRU=number|1] [,MODETAB=logon mode table name] * [,PUTYPE=2] [,SSCPFM=FSS|USSSCS] * [,USSTAB=definition table name] * [,VPACING=(n [,m])|0] *

*These parameters can be specified in either the PU or the LU statement. The parameters are meaningful for logical units, and the parameters' explanations appear in the LU statement description. Coding one of these parameters in a PU statement is equivalent to coding the parameter in each of the associated LU statements. If a parameter with a different value is then coded in an LU statement, the value in the LU statement overrides (for that logical unit) the value coded in the PU statement.

name
is any valid symbol. The symbolic name provides the minor node name of the physical unit and is required.

CUADDR=address
specifies the hexadecimal channel/unit address to be used when activating the physical unit. If CUADDR is omitted, ISTATUS=INACTIVE must be specified.

The value specified must match a channel/unit address specified when the OS/VS2 system is generated. The address must not be enclosed in quotation marks or apostrophes.

DISCNT=YES |NO
specifies whether VTAM is to disconnect the physical unit when the last logical unit is disconnected by its application program (that is, when there are no more application program-logical unit communication sessions).

For a locally attached physical unit, disconnection means that the channel connection is broken (in effect, the device is set to nonoperational), and the SSCP-PU session is terminated.

DISCNT=YES
indicates that VTAM is to automatically disconnect the physical unit as soon as the last logical unit is disconnected by its application program. If any logical units request their own disconnection, VTAM ignores the part of their disconnection request that indicates whether the physical unit is to be disconnected (that is, the HOLD part of a character-coded logoff command or the LAST-NOTLAST part of a field-formatted Terminate Self command). VTAM also rejects any attempt made by the physical unit to request its own disconnection (using the Discontact command).

DISCNT=NO
indicates that VTAM is to disconnect the physical unit when one of the following conditions is met:

- VTAM receives a Discontact Immediate command from the physical unit.
- VTAM receives a Discontact Normal command from the physical unit and all logical units have been disconnected.
- All logical units have been disconnected as a result of (1) a character-coded logoff command for which HOLD=NO was specified (or inserted using a USS definition table) or (2) a Terminate Self command for which LAST was specified.

ISTATUS=ACTIVE|INACTIVE
specifies whether the physical unit is to be activated when its major node is activated following the first start of VTAM or a cold restart of VTAM (that is, a restart to initial status). ISTATUS=ACTIVE does not cause the associated logical units to be activated.

MAXBFRU=n|1
specifies the number of buffer units (elements of the IOBUF buffers) that will be used to receive data from the physical unit.

PUTYPE=2
specifies the physical unit type. (The default value is 2; since all local PU statements are for 3791 controllers, which are type 2 physical units, this parameter may be omitted.) Physical unit types are described in Appendix A.

LU (Local) Statement

Code an LU statement in 80-byte card-image format for each logical unit associated with a physical unit within a local SNA major node. The LU statement must follow the PU statement that defines the physical unit with which the logical unit is associated.

Write the LU statement as follows:

Name	Operation	Operand
name	LU	LOCADDR=n [,BUFLIM=n|2] * [,ISTATUS=ACTIVE|INACTIVE] [,LOGAPPL=application program name] * [,LOGTAB=interpret table name] * [,MODETAB=logon mode table name] * [,SSCPFM=FSS|USSSCS] * [,USSTAB=definition table name] * [,VPACING=(n[,m])|0] *

*If any of these parameters are specified in both the PU and LU statements, the values used are those in the LU statement.

As for NCP generation, LU statements must be in ascending order according to the value specified for LOCADDR.

name
is any valid symbol. The symbolic name provides the minor node name of the logical unit and is required.

LOCADDR=n
is a decimal value that specifies the logical unit's local address at the physical unit. The minimum value of *n is 1,* and the maximum value is 255.

An LU statement is not required for every possible local address, and LOCADDR values need not be consecutive. However, VTAM allocates 8 bytes of fixed storage for each skipped address. Unused local addresses smaller than the largest local address at the physical unit are assigned network resources. It is recommended, therefore, that local addresses not be skipped. For example, if only three logical units are contained in the physical unit, use values of 1, 2, and 3.

BUFLIM=n|2
specifies a multiplier that determines a limit to the number of buffers (in the PPBUF pool) that can be filled with data, incoming messages, and responses that have been received by VTAM but not yet transferred to the application program's buffers. The value specified here is multiplied by the value specified in the BUFFACT parameter of the APPL statement defining the application program that is using the logical unit; the product is the buffer limit.

The buffer limit becomes effective after OPNDST is issued by the application program. If the amount of data obtained by VTAM exceeds the calculated capacity of the buffers. VTAM issues a Clear command and all data is lost, including data queued in VTAM buffers. VTAM also schedules the LOSTERM exit routine if it is available. If there are outstanding I/O requests when the capacity of the buffers is exceeded, VTAM sends the application program an error return code. See also the description of the BUFFACT parameter of the APPL statement in this chapter.

Specify *n* as a decimal integer in the range 1 through 255.

Return Codes: The application program must check the return codes in the RTNCD and FDBK2 fields of the I/O request's RPL to determine if data was lost. RPLs to be checked are those of the SEND and RECEIVE macro instructions.

ISTATUS=ACTIVE|INACTIVE
specifies whether the logical unit is to be activated automatically when the physical unit is activated following the first start of VTAM or a cold restart of VTAM (that is, a restart to initial status).

LOGAPPL=application program name
specifies the name of an application program to which the logical unit is to be automatically logged on when the logical unit is activated following the first start of VTAM or a cold restart of VTAM (that is, a restart to initial status).

LOGTAB=interpret table name
specifies the name of an interpret table to be used by VTAM when processing logon requests originating from the logical unit. The interpret table specified by LOGTAB is used to interpret the APPLID portion of an Initiate Self or character-coded logon command, as described in Chapter 6.

MODETAB=logon mode table name
specifies the logon mode table to be used to correlate each logon mode name with a set of session parameters for the logical unit. The name specified for the MODETAB parameter must be the same name used for a logon mode table that is assembled with MODETAB, MODEENT, and MODEEND macro instructions and link-edited into SYS1.VTAMLIB as described in Chapter 5.

If a logon mode table is not specified for a logical unit by the MODETAB parameter on either the PU or the LU statement, an IBM-supplied logon mode table, ISTINCLM, is used. The installation may replace ISTINCLM in SYS1 .LPALIB.

SSCPFM=FSS|USSSCS
specifies the manner in which VTAM is to send network services (NS) procedure error requests, and responses to field-formatted commands to the logical unit, and the manner in which VTAM is to handle media control characters sent to or received from the logical unit.

If FSS (formatted system services) is coded, VTAM sends a field-formatted NS procedure error command or field-formatted response to the logical unit. If USSSCS is coded, VTAM notifies the logical unit of the error condition by sending the "SESSION NOT BOUND" message or character-coded response message.

If USSSCS (unformatted system services standard character string) is coded, media control characters are deleted from incoming character-coded logon and logoff commands, and added to outgoing error messages.

VTAM's handling of media control characters is discussed further under "Conversion of Character-Coded Commands," near the end of Chapter 5.

An NS procedure error condition occurs when either the application program rejects the logical unit's logon request or the logical unit rejects the BIND request sent as a result of the application program's acceptance of the Logon request. See MSG=7 under "USS Messages" in Appendix B for a further explanation of this error condition.

Before selecting SSCPFM=FSS over SSCPFM=USSSCS, determine whether the logical unit will "expect" to receive NS procedure error messages in the form of an SNA command (code SSCPFM=FSS) or in the form of the SESSION NOT BOUND data message (code SSCPFM=USSSCS). Some logical units may be programmed to accept either, in which case the setting of the SSCPFM parameter is immaterial.

USSTAB=definition table name
specifies the name of a USS definition table that is defined and link-edited to SYS1.VTAMLIB as described in Chapter 5.

If USSTAB is not specified, the IBM-supplied USS definition table, ISTINCDT, is searched when character-coded input is received by VTAM from a logical unit.

VPACING=(n[,m])|0
specifies the way that VTAM is to pace the flow of data from VTAM to the logical unit.

Pacing is used to minimize asking the physical unit whether it is ready to receive more data before it has finished processing the last data received. VTAM does not send a unit of data until it receives notification (in the form of a pacing response) to do so from the logical unit.

(n,m)
specifies that pacing is to be performed for the logical unit.

n
specifies the number of messages that VTAM is to send for a given application program-logical unit session (LU-LU session) before waiting for a pacing response. No further messages can be sent to the logical unit until the physical unit is ready to receive more messages.

Specify *n as* a decimal integer between 1 and 255.

m
specifies which of the *n* messages will be flagged to request a pacing response from the physical unit. VTAM sends at most *n - m* additional data requests if a pacing response is not received. If m is not coded, *n* is assumed.

Specify *m* as a decimal integer between 1 and *n.*

0
specifies that no pacing is to be performed for sessions with the logical unit.

If the VPACING parameter is omitted, the value 1 is assumed for both *n* and *m* in a local SNA major node.

Defining Switched SNA Major Nodes

A switched SNA major node is defined by filing in SYS1.VTAMLST a single VBUILD statement for the major node and separate PU, PATH, and LU statements for minor nodes. One VBUILD statement must be included in each member, placed before the first PU statement. The VBUILD statement assigns a subarea value to the major node for VTAM's use in assigning addresses to the minor nodes.

The PU and LU statements define physical units and logical units attached by switched SDLC lines. For dial-out operations, the PATH statement defines the paths to be used to establish connection between the communications controller and the physical unit.

The PU and LU statements used to define a switched SNA major node are very similar to the PU and LU statements used to define a local SNA major node, and to the PU and LU macro instructions used to define an NCP major node. Where possible confusion might arise, the statements used for the switched SNA major node are called PU (switched) and LU (switched) statements.

The installation may define multiple sets of switched SNA devices. This allows the network operator to use the VARY command to activate a selected subset of all the switched SNA devices. However, all major and minor node names known to VTAM at any one time must be unique. *Two major nodes that include the same physical unit or logical unit cannot be active at the same time.* Refer to *VTAM Concepts and Planning* and to *VTAM Network Operating Procedures* for further information.

If contact is to be established with a physical unit by means of a *dial-in* or *dial-out* operation, the unit's station identification number is specified in the PU statement. As soon as a dial-in line has been activated and placed in answer mode (during VTAM startup or by the network operator), the physical unit can dial that line's number and establish contact with VTAM.

If VTAM is to establish contact with a physical unit by means of a *dial-out* operation, PATH statements must be placed after the PU statement to define the paths over which contact can be established. (Dial-out operations occur when an application program issues OPNDST OPTCD=ACQUIRE or OPNDST OPTCD=ACCEPT to establish connection to a logical unit whose switched physical unit is not already connected to VTAM.)

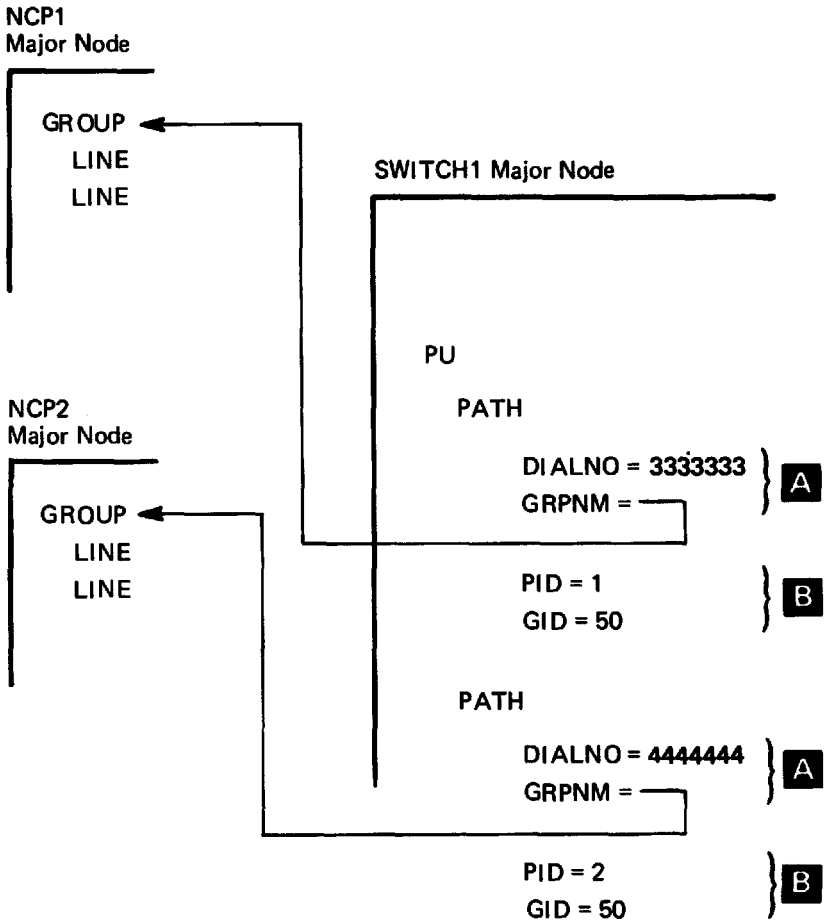
Each PATH statement tells VTAM the NCP line group and the dialing digits to be used, as shown in Figure 3-2, part A. If the line group contains more than one dial-out line, each will be tried in succession until contact is established. If contact cannot be established using that line group, VTAM tries again using the line group identified by the next PATH statement. If the line does not have auto-call capability, the network operator receives a message instructing the operator to manually dial the physical unit. The line groups identified in successive PATH statements need not be part of the same NCP.

Two additional parameters of the PATH statement, PID and GID, are used to identify each path and to associate the paths into groups of paths (Figure 3-2, part B). Both parameters are used by the network operator. The PID parameter identifies the path with respect to its associated physical unit. (In effect, the PID is the equivalent of the PATH statement's label.) By citing the physical unit name and the PID, the network operator can render that specific path usable or not usable.

The GID parameter is used to associate the path with any other path or group of paths within the same switched major node. By citing the GID, the network operator can render that path *and* all similarly identified paths usable or not usable. The criteria used to assign paths to particular groups are entirely up to the installation. One possibility is to group paths according to the type of call indicated by the dialing digits:

- Internal (extension) calls
- Local calls
- Tie-line or WATS (Wide Area Telephone Service) calls
- Long-distance calls

Appendix D contains an example showing how two switched SNA major nodes might be defined and used.



A These parameters supply the essential information needed to create a dial-out connection.

B These parameters identify the path (PID) and indicate the path group (GID) with which it is associated.

Figure 3-2. Major Elements of a PATH Statement

VBUILD Statement

Code a VBUILD statement in 80-byte card-image format for each set of switched SNA terminals.

Write the VBUILD statement as follows:

Name	Operation	Operand
[name]	VBUILD	MAXGRP=n ,MAXNO=n ,SUBAREA=n ,TYPE=SWNET [,CONFGDS=ddname] [,CONFGPW=password]

name
1 to 8 alphanumeric characters which must not begin with a $ character; optional.

MAXGRP=n
is the number of unique path groups (GROUP names) that are specified in the GRPNM parameter of all PATH statements within the switched major node. The maximum value of n is 32767.

MAXNO=n
is the number of unique telephone numbers that are specified in the DIALNO parameter of all PATH statements within the switched major node. The maximum value of *n* is 32767.

SUBAREA=n
is a decimal number chosen by the installation to identify the major node's subarea value. Specify n as an integer between 3 and the value of MAXSUBA that was specified for the VTAM network. (MAXSUBA is specified as a start parameter, as explained in Chapter 4.)

When the switched major node is activated, the SUBAREA value must be unique among the active major nodes.

TYPE=SWNET
specifies that the VBUILD statement defines a switched major node to VTAM. All physical units defined in this major node may be connected only by means of a switched link. This parameter distinguishes the VBUILD statement of a switched SNA major node from a VBUILD statement of a local SNA major node and is required.

CONFGDS=ddname
identifies the configuration restart data set defined by the installation for the switched SNA major node. Include a DD statement using this data definition name in the VTAM start procedure. Refer to Chapter 8 for a discussion of configuration restart.

CONFGPW=password
specifies the 1- to 8-character password, if required, for VTAM to gain either update or full access to the configuration restart data set. If CONFGPW is not specified but is required by VSAM, VSAM prompts the network operator to provide the correct password when VTAM attempts to open the data set. This parameter may be specified only if the CONFGDS parameter is specified.

PU (Switched) Statement

Code a PU statement in 80-byte card-image format for each physical unit in the switched major node.

Write the PU statement as follows:

Name	Operation	Operand
name	PU	ADDR=station address ,IDBLK=identification block ,IDNUM=identification number ,MAXDATA=size [,BATCH=YES|NO] * [,BUFLIM=n|2] * [,DISCNT=YES|NO] [,IRETRY=YES|NO] [,ISTATUS=ACTIVE | INACTIVE] [,LOGAPPL=application program name] * [,LOGTAB=interpret table name] * [,MAXOUT=n|1] [,MAXPATH=n|0] [,MODETAB=logon mode table name] * [,PACING=(n[,m])|0] * [,PASSLIM=n| [,PUTYPE=n|2] [,SSCPFM=FSS|USSSCS] * [,USSTAB=definition table name] * [,VPACING=(n [,m])|0] *

***These parameters can be specified in either the PU or the LU statement. The parameters are meaningful for logical units, and the parameter explanations appear only in the LU statement description. Coding one of these parameters in a PU statement is equivalent to coding the parameter in each of the associated LU statements. If a parameter with a different value is then coded in a LU statement, the value in the LU statement overrides (for that logical unit) the value coded in the PU statement.**

Note: *The PU statement is valid in the context of a switched SNA major node only if TYPE=SWNET is specified in the VBUILD statement whlch defines the major node.*

name
is any valid symbol. The symbolic name provides the minor node name of the physical unit and is required.

ADDR=station address
is the 8-bit SDLC station address for the physical unit and is required. Specify a hexadecimal address that is not enclosed in quotation marks or apostrophes. The value for this parameter must be obtained from the person who planned the installation of the device.

IDBLK=identification block
is the 12-bit binary block number assigned by IBM to the specific device and is required. Specify a hexadecimal number that is not enclosed in quotation marks or apostrophes. The value for this parameter must be obtained from the component description of the device or from the person who planned the installation of the device.

The block number occupies bits 16-27 of the 48-bit station ID constructed by VTAM for switched network operation. (See the IDNUM parameter below for a description of the station ID.)

IDNUM=identification number
is the 20-bit binary identification number assigned to the station being defined and is required. The IDNUM value must be obtained from the person who planned the installation of the device.

IDBLK and IDNUM are used by VTAM to construct a 48 bit station ID, which is unique for each station within the network *(not* just within the major node). The station ID is structured as follows:

Bits 0-3: Reserved
Bits 4-7: PUTYPE
Bits 8-15: X'00'
Bits 16-27: IDBLK
Bits 28-47: IDNUM

MAXDATA=size
specifies the maximum amount of data in bytes, including the transmission header (TH) and request/response header (RH), that the physical unit can receive *in* one segment or path information unit (PIU). The minimum value is 84, and the maximum is 65535 bytes. The value selected for MAXDATA is limited, however, by the MAXDATA value for the local NCP (as specified in the PCCU macro instruction for the local NCP major node).

DISCNT=YES|NO
specifies whether VTAM is to disconnect the physical unit when the last logical unit is disconnected by its application program (that is, when there are no more application program-logical unit sessions).

For a physical unit on a switched link, disconnection means that the dial connection is broken (in effect, the telephone is hung up, thus saving telephone charges), and the VTAM physical unit session (in SNA terms, the SSCP-PU session) is terminated. Disconnection on a *switched* link as contrasted with a *leased* link, does *not* involve the deactivation of the physical unit.

DISCNT=YES
indicates that VTAM is to automatically disconnect the physical unit as soon as the last logical unit is disconnected by its application program. If any logical units request their own disconnection, VTAM ignores the part of their disconnection request that indicates whether the physical unit is to be disconnected (that is, the HOLD part of a character-coded logoff command or the LAST-NOLAST part of a field-formatted Terminate Self command). VTAM also rejects any attempt made by the physical unit to request its own disconnection (using the Discontact command).

DISCNT=NO
indicates that VTAM is to disconnect the physical unit when one of the following conditions is met:

- VTAM receives a Discontact Immediate command from the physical unit.
- VTAM receives a Discontact Normal command from the physical unit, and all logical units have been disconnected.
- All logical units have been disconnected as a result of (1) a character-coded logoff command for which HOLDNO was specified (or inserted using a USS definition table), or (2) a Terminate Self command for which LAST was specified, or (3) VARY INACT commands.

IRETRY=YES|NO
specifies whether the boundary NCP (the NCP to which the switched physical unit will become connected) is to retry a polling operation immediately for the device if an IDLE Detect Timeout follows a polling operation.

ISTATUS=ACTIVE |INACTIVE
specifies whether the physical unit is to be activated when the switched SNA major node is activated following the first start of VTAM or a cold restart of VTAM (that is, a restart to initial status).

MAXOUT=n|1
specifies the maximum number of PIUs that the NCP will send to the physical unit before requesting a response from the physical unit. Specify n as a decimal integer from 1 through 7.

MAXPATH=n|0
specifies the number of dial-out paths to the physical unit. Specify n as a decimal integer between 0 and 256. Zero indicates that only dial-in paths to the physical unit are available.

Refer to the PATH statement for a description of defining a dial-out path to a physical unit.

PASSLIM=n|1
is the maximum number of contiguous PIUs that the NCP will send to the physical unit at one time. Specify n as a decimal integer between 1 and the value specified for MAXOUT.

PUTYPE=n|2
specifies the physical unit type of the physical unit. The physical unit type depends on the type of cluster controller (such as 3767 or 3791). To determine the physical unit type for a given device, see the component description manual for the device.

The value specified for PUTYPE occupies bits 4-7 of the 48-bit station ID constructed by VTAM for switched network operation. (See the IDNUM parameter above for a description of the station ID.)

PATH Statement

The PATH statement is used to define a dial-out path to a physical unit in a switched SNA major node. As many PATH statements as required, to a maximum of 256, may be specified for each physical unit. In the configuration deck, the PATH statement must immediately follow the PU statement which defines the associated physical unit. VTAM searches the PATH statements for an available path in the order specified in the configuration deck.

Code the statement in 80-byte card-image format. Write the PATH statement as follows:

Name	Operation	Operand
[name]	PATH	DIALNO=telephone number, GID=n, GRPNM=name, PID=n [,REDIAL=n|3] [,USE=YES|NO]

name
is any valid symbol and provides an optional name for the PATH statement.

DIALNO=telephone number
specifies (in EBCDIC) the dial characters to be used in initiating a connection with a physical unit over a switched link. A vertical bar (|) may be inserted as many times as required to indicate a dialing pause. The maximum length of the parameter is 32 characters (including vertical bars).

The communications controller sends to the modem only the four low-order blts of the digits specified in the sequence. The end-of-number bit pattern is 1100 (hexadecimal C); the separator bit pattern is 1101 (hexadecimal D). Any EBCDIC characters whose four low-order bits equal these patterns can be used (for example, *[hex 5C] for end-of-number and '[hex 7D] for separator). Example: DIALNO= (8'5799*)

GID=n
is an identifier for groupings of paths across all physical units in the switched SNA major node. Specify n as a decimal integer between 0 and 255.

Group identifiers may be assigned to regulate the use of switched network services from the operator console. For example, if GID=6 is assigned to all paths in a switched SNA major node that use direct-distance dialing, the network operator can make all the paths usable or not usable with a single command.

GRPNM=name
specifies the symbolic name of a GROUP macro instruction in an NCP definition deck that defines a group of SDLC switched links. The line group must have all the characteristics necessary to process the telephone number and must be compatible with the type of physical unit.

PID=n
is an identifier for the path being defined. This identifier is unique for a given physical unit. The operator uses this identifier to change the status of the path. Specify n as a decimal integer between 0 and 255.

REDIAL=n|3
specifies the number of times dialing is to be retried at the NCP before returning a dialing error to VTAM. The minimum value for n is 0, which indicates that dialing is not to be retried. The maximum value for n is 254.

USE=YES |NO
specifies whether VTAM is to consider the path initially usable or not usable. This attribute of the path can be modified by the network operator. The effect of USE=YES and USE=NO for a path is equivalent to the effect of ISTATUS=ACTIVE and ISTATUS=INACTIVE for a minor node.

LU (Switched) Statement

Code an LU statement in 80-byte card-image format for each logical unit associated with a physical unit within a switched SNA major node. The LU statement must follow the PU statement that defines the physical unit with which the logical unit is associated.

Write the LU statement as follows:

Name	Operation	Operand
name	LU	LOCADDR=n [,BATCH=YES|NO] [,BUFLIM=n |2] * [,ISTATUS=ACTIVE |INACTIVE] [,LOGAPPL=application program name] * [,LOGTAB=interpret table name] * [,MODETAB=logon mode table name] * [,PACING=(n[,m])|0] * [,SSCPFM=FSS |USSSCS] * [,USSTAB=definition table name] * [,VPACING=(n [,m])|0]*

*If any of these parameters are specified in both the PU and LU statements, the values used are those in the LU statement.

As for NCP generation, LU statements must be in ascending order according to the value specified for LOCADDR.

name
is any valid symbol. The symbolic name provides the name of the logical unit (minor node name) associated with the station and is required.

LOCADDR=n
is a decimal value that specifies the logical unit's local address at the physical unit.

The range of valid local addresses depends on the PUTYPE specified for the physical unit with which the logical unit is associated. PUTYPE=1 allows local addresses from 0 to 63; PUTYPE=2 allows from 1 to 255. To determine the PUTYPE and the limits on local addresses for a particular physical unit, see the component description manual for the device.

Art LU statement is not required for every possible local address, and LOCADDR values need not be consecutive. However, VTAM allocates 8 bytes of fixed storage for each skipped address. Unused local addresses smaller than the largest local address at a station are assigned network resources. It is recommended, therefore, that local addresses not be skipped. For example, if only three logical units are contained, in the physical unit, use values of 1, 2, and 3.

As for NCP generation, LU statements must be in ascending order according to the value specified for LOCADDR.

BATCH=YES|NO

specifies the processing priority that the NCP is to use for the logical unit. BATCH=NO indicates a high priority (suitable for interactive applications); BATCH=YES indicates a low priority.

BUFLIM=n|2

specifies a multiplier that determines a limit to the number of buffers (in the PPBUF pool) that can be filled with incoming messages and responses that have been received by VTAM but not yet transferred to the application program's buffers. The value specified here is multiplied by the value specified in the BUFFACT parameter of the APPL statement defining the application program that is using the logical unit; the product is the buffer limit.

The buffer limit becomes effective after OPNDST is issued by the application program. If the amount of data obtained by VTAM exceeds the calculated capacity of the buffers, VTAM issues a Clear command and all data is lost, including data queued in VTAM buffers. VTAM also schedules the LOSTERM exit routine if it is available. If there are outstanding I/O requests when the capacity of the buffers is exceeded, VTAM sends the application program an error return code. See also the description of the BUFFACT parameter in the APPL statement in this chapter.

Specify *n* as a decimal integer in the range 1 through 255.

Return Codes: The application program must check the return codes in the RTNCD and FDBK2 fields of the I/O request's RPL to determine if data was lost. RPLs to be checked are those of the SEND and RECEIVE macro instructions.

ISTATUS=ACTIVE|INACTIVE

specifies whether the logical unit is to be activated automatically when the physical unit is activated following the first start of VTAM or a cold restart of VTAM (that is, a restart to initial status).

LOGAPPL=application program name

specifies the name of an application program to which the logical unit is to be automatically logged on when the logical unit is activated following the first start of VTAM or a cold restart of VTAM (that is, a restart to initial status). For logical units that are accessible only by dial-in paths, the application program receives control after the dial-in connection is made.

LOGTAB=interpret table name

specifies the name of an interpret table to be used by VTAM when processing logon requests originating from the logical unit. The interpret table is defined and link-edited into SYS1.LPALIB as described in Chapter 6.

MODETAB=logon mode table name

specifies the logon mode table to be used to correlate each logon mode name with a set of session parameters for the logical unit. The name specified for the MODETAB parameter must be the same name used for a logon mode table that is assembled with MODETAB, MODEENT, and MODEEND macro instructions and link-edited into SYS1.LPALIB as described in Chapter 5.

If a logon mode table is not specified for a logical unit by the MODETAB parameter in either the PU or the LU statement, an IBM-supplied logon mode table, ISTINCLM, is used. The installation may replace ISTINCLM in SYS1.LPALIB.

PACING=(n[,m])|0
specifies the way that pacing is to be handled between the logical unit and the NCP to which the logical unit is connected. (In contrast, VPACING involves pacing between VTAM and the NCP.)

(n,m)
specifies that pacing is to be performed for the logical unit.

n
specifies the number of messages that the NCP is to send to the logical unit before waiting for a pacing response.

Specify *n* as a decimal integer ranging from 1 through 255, and equal to or greater than the value of n used with the NCP's corresponding PACING parameter.

m
specifies which of the n messages will be flagged to request a pacing response from the logical unit. The NCP sends at most *n* - m additional data requests if a pacing response is not received. If m is not coded, n is assumed.

Specify *m* as a decimal integer between 1 and n, and equal to or greater than the value of *m* used with the NCP's corresponding PACING parameter.

0
specifies that no pacing is to be performed for sessions with the logical unit.

If the PACING parameter is omitted, the value 1 is assumed for both n and m.

SSCPFM=FSS |USSSCS
specifies the manner in which VTAM is to send network services (NS) procedure error requests and responses to field-formatted commands to the logical unit, and the manner in which VTAM is to handle media control characters sent to or received from the logical unit.

If FSS (formatted system services) is coded, VTAM sends a field-formatted NS procedure error command or field-formatted response to the logical unit. If USSSCS is coded, VTAM notifies the logical unit of the error condition by sending the "SESSION NOT BOUND" message or character-coded response message.

If USSSCS (unformatted system services "standard character string) is coded, media control characters are deleted from incoming character-coded logon and logoff commands, and added to outgoing error messages.

VTAM's handling of media control characters is discussed further under "Conversion of Character-Coded Commands" near the end of Chapter 5.

An NS procedure error condition occurs when either the application program rejects the logical unit's logon request or the logical unit rejects the BIND request sent as a result of the application program's acceptance of the logon request. See MSG=7 under "USS Messages" in Appendix B for a further explanation of this error condition.

Before selecting SSCPFM=FSS over SSCPFM=USSSCS, determine whether the logical unit will "expect" to receive NS procedure error messages in the form of an SNA command (code SSCPFM=FSS) or in the form of the SESSION NOT BOUND data message (code SSCPFM=USSSCS). Some logical units may be programmed to accept either, in which case the setting of the SSCPFM parameter is immaterial.

USSTAB=definition table name
specifies the name of a USS definition table that is defined and link-edited to SYS1.VTAMLIB as described in Chapter 5.

If USSTAB is not specified, the VTAM-supplied USS definition table, ISTINCDT, is searched when input is received by VTAM from a logical unit.

VPACING=(n[,m]) |0
specifies the way that VTAM is to pace the flow of data from VTAM to the NCP to which the logical unit is connected.

Pacing is used to minimize asking the NCP whether it is ready to receive more data before it has finished processing the last data received. VTAM does not send a unit of data until it receives notification (in the form of a pacing response) to do so from the NCP. Pacing also is used to limit queuing of requests from VTAM in the NCP in order to conserve NCP buffer space.

(n,m)
specifies that pacing is to be performed.

n
specifies the number of messages that VTAM is to send for a given application program-logical unit session (LU-LU session) before waiting for a pacing response. No further requests can be sent to the NCP until the NCP replies with a pacing response to VTAM to indicate that the NCP is ready to receive more messages.

Specify *n as* a decimal integer between 1 and 255, and equal to or greater than the value of *n* used with the NCP's corresponding PACING parameter.

m
specifies which of the n messages will be flagged to request a pacing response from the physical unit. VTAM sends at most *n* - m additional data requests if a pacing response is not received. If m is not coded, *n* is assumed.

Specify *m* as a decimal integer between 1 and *n,* and equal to or greater than the value of m used with the NCP's corresponding PACING parameter.

0
specifies that no pacing is to be performed for sessions with the logical unit.

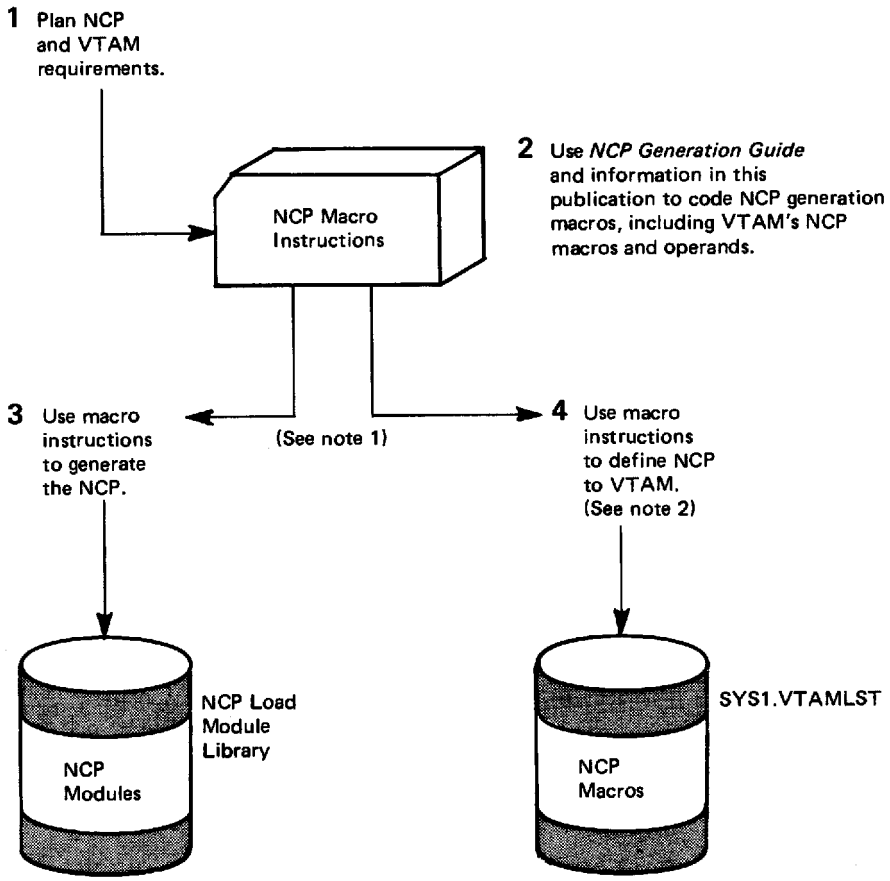
If the VPACING parameter is omitted, the values 2 (for *n)* and 1 (for m) are assumed in a switched SNA major node.

Defining VTAM Network Control Program (NCP) Major Nodes

Each NCP for a communications controller and its attached terminals must be defined to VTAM. Also, either (1) the same NCP can be used for another communications controller (although not concurrently) if the communications controller and its attached terminal configuration are identical or (2) one communications controller can have more than one NCP to define different terminal configurations for the communications controller. To generate an NCP for use in a VTAM network and to define that NCP to VTAM (Figure 3-3) involve following the detailed instructions given in the *NCP Generation Guide* and using them in conjunction with these VTAM/NCP considerations and requirements:

NCP line control

Initial test routine for local communications controller



Notes:

1. If an error is encountered in NCP generation, recode erroneous statements end regenerate the NCP unless syntax errors with an MNOTE (severity code) of 4 occur. For these, the default value has been assumed. Correct the statement, and regenerate the NCP only if the default value is not acceptable.
2. Each NCP defined to VTAM is a separate member in SYS1.VTAMLST and a major node in the VTAM network. Each group, line, port, cluster, logical unit, terminal, end component defined in each NCP is a minor node in the VTAM network. If a major node is redefined, the member of SYS1.VTAMOBJ must be deleted before the changed major node is activated.

Figure 3-3. Generating NCP Support for a VTAM Network

Identification verification for BSC and TWX (teletypewriter exchange service) devices

Pacing

Device dependencies of terminals attached to communications controllers

NCP generation procedure

NCP Line Control

VTAM supports NCPs in network control mode and NCPs that use the partitioned emulation programming (PEP) extension. VTAM does not support emulation mode.

To allow the NCP to operate communications lines in network control mode, the appropriate TYPGEN operand (TYPGEN=NCP, TYPGEN=NCP-LR, TYPGEN=NCP-R, TYPGEN=PEP, or TYPGEN=PEP-LR) must be specified in the NCP BUILD macro instruction.

If the type of NCP generation is for only network control mode (TYPGEN=NCP, TYPGEN=NCP-LR, or TYPGEN=NCP-R):

- VTAM can support the generated NCP and the terminals controlled by it.
- Only the TYPE=NCP operand can be specified in the appropriate NCP GROUP and LINE macro instructions.
- Only the USE=NCP operand can be specified in the NCP GROUP or LINE macro instruction to indicate that the lines are to operate in network control mode.
- No NCP operands or generation macro instructions can be coded that apply to emulation mode.

If the type of NCP generation is for use with PEP (TYPGEN=PEP or TYPGEN=PEP-LR), then VTAM can only support the generated NCP for the lines in network control mode. This occurs:

- If the TYPE=NCP operand is specified in the NCP GROUP and LINE macro instructions.
- If the TYPE=PEP operand is specified in the NCP GROUP and LINE macro instructions and the line is in network control mode. A PEP line can be placed in network control mode (1) by network operator command or (2) when the NCP is activated and the USE=NCP operand has been specified in that GROUP or LINE macro instruction.

However, NCP operands and generation macro instructions can be coded that apply to emulation mode.

VTAM manages the assignment of PEP lines by changing line assignments in response to activation and deactivation requests from the VTAM network operator. (Lines are assigned to network control mode when they are activated by VTAM, and they are reassigned to emulation mode when they are deactivated by VTAM.)

Caution should be used when activating lines because a request to VTAM to activate a line proceeds even if that line is currently being used by another teleprocessing access method through emulation mode.

Initial Test Routine

The NCP initial test routine is a diagnostic routine that is executed in the communications controller before the NCP is loaded. This routine tests the communications controller for any hardware malfunctions. If it does not detect any malfunctions, then VTAM loads the NCP. If it does detect a malfunction, the routine stops, the HARD STOP light on the communications controller is turned on, and the NCP is not loaded (an IBM customer engineer should be called).

Remote communications controllers perform initial testing automatically when they are started (power is turned on). However, initial testing is optional for local communications controllers. For VTAM to initiate initial testing in a local communications controller:

- The INITEST=YES operand is coded in the NCP PCCU macro instruction for the local NCP.
- A DD statement with the ddname INITEST is added to the cataloged procedure for starting VTAM. This DD statement enables VTAM to locate the initial test routine.

ID Verification for BSC and TWX Terminals

To help provide telecommunications security in a VTAM network, an installation can provide identification (ID) verification for BSC and TWX terminals on switched lines. This type of ID verification allows an installation to identify specific terminals and VTAM application programs and to control their access to privileged or sensitive data and resources.

To provide this verification authority, the terminals and their associated ID sequences are identified in the NCP VIDLIST and/or IDLIST macro instructions. Then, ID sequences for dial-up BSC and TWX terminals in a VTAM network can be verified by:

- VTAM, using the NCP VIDLIST macro instruction
- The NCP, using the NCP IDLIST macro instruction
- The VTAM application program, using the UTERM operand in the NCP TERMINAL macro instruction
- VTAM and the NCP (if ID verification authority is to be distributed)

Note: *ID verification cannot be performed either by VTAM or an NCP for a TWX terminal on a line supported by the NCP multi-terminal access (MTA) facility.*

VTAM Verification

By coding the following NCP macro instructions and operands, for example, an installation can have VTAM perform all ID verification in the host CPU:

```
.
.
.
symbol VIDLIST VIDSEQ=...
.
.
.
        LINE        VIDSEQ=symb ol [1]
        TERMINAL CTERM=YES,IDSEQ=PASS [2]
```

[1] *symbol* must correspond to *symbol* for the VIDLIST macro instruction specifying the ID sequence for terminals on this line.

[2] PASS informs the NCP that it is to pass all ID sequences it receives to the host CPU.

NCP Verification

An installation can also code the following NCP macro instructions and operands, for example, to have an NCP perform all ID verification in a communications controller:

```
.
.
.
Symbol IDLIST IDSEQ=...,NOMATCH=STOP   ...
.
.
.
        LINE
        TERMINAL CTERM=YES,IDSEQ=symbol
```

[1] STOP specifies that the NCP is to break a line connection if it does not recognize an ID sequence. The NCP checks the ID sequence only if the terminal calls the communications controller. When the NCP calls the terminal, it does not check ID sequences.

VTAM Application Program Verification

The UTERM operand (in the NCP TERMINAL macro instruction) allows VTAM to pass unidentified terminals (those with ID sequences that VTAM or an NCP could not verify or those without ID sequences) to a VTAM application program. Any further ID verification must be done by the application program's logon-interpret routine. For example: the UTERM operand is used for terminals that are to be connected to a TCAM application program. This operand causes the TCAM message control program (MCP) to receive the unidentified terminal and perform ID verification.

VTAM and NCP Verification

An installation can distribute verification authority between VTAM in the host CPU and an NCP in a communications controller. The following NCP macro instructions and operands can be coded to combine VTAM and NCP ID verification.

```
          .
          .
          .
symboll IDLIST[1] IDSEQ=...,NOMATCH=PASS[2]...
symbol2 VIDLIST   VIDSEQ=[3]...
          .
          .
    GROUP
    LINE VIDSEQ=symbol2
    TERMINAL CTERM=YES,IDSEQ=symboll
```

[1] These macro instructions must be placed in the NCP generation procedure anywhere following the NCP SYSCNTRL macro instruction, but preceding the first GROUP NCP macro.

[2] Specifies that the NCP is to pass to the host CPU an ID sequence it does not recognize as valid in the IDLIST macro instruction. This, in turn, causes VTAM to check the ID sequence against the list specified in the VIDLIST macro instruction to associate the ID sequence with a terminal name,and, possibly, a waiting VTAM application program.

[3] This operand must contain (at a minimum) all the terminals (ID sequence and associated terminal name of each terminal) that are identified in the IDSEQ operand of the NCP IDLIST macro instruction.

See the topic "Coding an NCP to Support VTAM" in this chapter for the coding requirements for the NCP VIDLIST macro instruction and for the VIDSEQ and UTERM operands. See the *NCP Generation Guide* for the coding requirements for the other NCP macro instructions and operands mentioned in the preceding examples in this topic and for more information about ID verification and ID sequences for BSC and TWX terminals on switched lines.

Pacing Considerations

Pacing enables an installation to control the rate of data flow through the network path that joins a VTAM application program and a logical unit. Pacing controls the rate of data flow by sending a limited amount of data to a logical unit on an SDLC link before requiring an acknowledgment (called a pacing response) from the logical unit that it is able to receive more data. By using pacing, an installation can prevent the needless transmission of data to a logical unit that is momentarily unable to accept it.

By specifying values (*n* and *m*) in the PACING and VPACING operands in an NCP LU macro instruction, an installation can control the rate of data flow from VTAM and an NCP. The n value indicates the number of requests to be sent (for an associated session)

before the program is to wait for a pacing response. (The VPACING operand controls the rate of data flow sent from VTAM in the host CPU to an NCP in a communications controller. The PACING operand controls the rate of data flow sent from the NCP to the logical unit.) The *m* value indicates which of the *n* data requests is to be used to request the NCP for a pacing response (PACING and VPACING operands).

The pacing values in the PACING and VPACING operands:

- Allow the host CPU and communications controller to control the rate at which data is transmitted
- Allow the communications line to transmit data at an acceptable rate to the logical unit
- Reduce buffer storage in the host CPU and communications controller by limiting the queuing of pacing responses

The main advantage obtained by using pacing is the regulation of the rate of data flowing into the network, thereby avoiding the flooding of logical units with data. Such flooding can exhaust the buffer supply in a physical unit or precipitate an NCP slowdown state.

The two main disadvantages resulting from the use of pacing are an increase in utilization of the host processor and possible throughput degradation. The first is a result of processing VPACING responses to requests for which there would otherwise be no response. The second occurs when processing for a request is suspended pending a VPACING response to a prior VPACING request. This effect can be reduced by specifying $n > m$ so that the NCP has time to send a VPACING response before VTAM sends the nth request. Other factors affecting the choice of the n and m values are discussed below.

For logical units operating primarily or exclusively in an environment of one message in and one message out, VPACING=O should be considered, since it is unlikely that a flooding condition would occur. VPACING=O should also be considered for sessions in which the logical unit sends many requests in succession to the VTAM application program, but the VTAM application program sends only one request at a time and waits for further requests from logical units.

For logical units expected to receive multiple requests, *n* and *m* values for VPACING other than 0 are probably required. Several factors should be considered in selecting *(n,m)* for each logical unit:

The amount of NCP storage available for buffers for outbound data

Pacing values for the logical unit

The number of NCP buffers likely to be required to support the PACING and VPACING values

The number of logical units (for a given communications controller) requiring pacing

The rate of data flowing to the logical unit

The rate at which the logical unit processes data and sends PACING responses

In general, if large VPACING values are specified for n and m, the host processor requires less overhead but the NCP buffer requirement increases. As *(n,m)* increases, suspension of requests (while waiting for a VPACING response) becomes less likely, but the requirement for NCP buffers increases.

See the *NCP Generation Guide* for more information about NCP pacing and for coding requirements of the PACING operand. See the topic "Coding VTAM-Only NCP Operands" in this chapter for the coding requirements of the VPACING operand. See also

the pacing guidelines in the installation publication for the appropriate IBM teleprocessing subsystem (such as the IBM 3600 Finance Communication System) in a VTAM network.

Device Considerations

Many NCP macro instructions (especially GROUP, LINE, CLUSTER, LU, PU, TERMINAL, VTERM, and COMP) contain device-dependent operands that affect both NCP generation and the VTAM application programs. Thus, before the NCP generation macro instructions are coded that are to support a VTAM network, an installation should:

- Review VTAM and NCP device dependencies in the appropriate IBM publications for each device being defined for the network

  VTAM Concepts and Planning

  VTAM Macro Language Reference

  NCP Generation Guide

  Appropriate component publications
- Have a copy of the NCP generation source code available for reference by the VTAM application programmers
- Review the information in Appendix A in this publication for devices that use the basic mode of data transfer and for MTA line considerations
- Review the device dependencies for each device that uses the record mode of data transfer, in the installation publication for the appropriate IBM teleprocessing subsystem

NCP Generation Procedure for VTAM

To define an NCP and the terminals it is to control in a VTAM network, the NCP generation procedure must specify the following information:

The capabilities of the NCP

The interface between the NCP and VTAM

The network configuration

An installation supplies this required information to VTAM and the NCP by using NCP generation macro instructions. Additional information is provided to VTAM by coding:

VTAM-only NCP macro instructions

VTAM-only NCP operands in NCP macro instructions

The VTAM-only macro instructions and operands provide no information to the NCP; however, they must appear in the NCP generation procedure that defines this NCP to VTAM. (VTAM uses them as input to its initialization process.)

Figure 3-4 lists all the NCP macro instructions in their correct coding sequence for NCP generation, the VTAM-only macro instructions and VTAM-only operands, and the NCP operands with specific VTAM requirements. The information in this figure and in the section about the VTAM-only macro instructions and VTAM-only operands should be used in conjunction with the NCP coding requirements described in the *NCP Generation Guide.*

Figure 34 can also be used to determine what procedure is required to change operands and macro instructions for an existing NCP. If VTAM-only operands and macro instructions are to be changed or replaced, no NCP generation is required. If any other NCP macro instruction or operand (other than a VTAM-only one) is changed or replaced, a partial or complete NCP generation is required.

NCP Macro Instruction[1]	Operands		VTAM/NCP Requirements
	VTAM-Only[2]	VTAM/NCP[3]	
PCCU[2]	AUTODMP AUTOIPL AUTOSYN CONFGDS CONFGPW CUADDR DUMPDS NITEST MAXDATA RNAME	none	
BUILD	none	ANS CHANTYP LOADLIB MAXSUBA MODEL NEWNAME OLT SUBAREA TYPGEN	Specifies data set in which NCP resides and must be identified in cataloged procedure for starting VTAM. Code MAXSUBA=2 or greater. VTAM default is NCP001 when TYPGEN=PEP or TYPGEN=PEP-LR is specified in BUILD macro. Code or assume default OLT=YES if TOLTEP is to be used on terminals connected to a communications controller. Must be unique in network when it is activated. No local terminals and NCPs (local or remote) can have same SUBAREA value. Must be NCP-R if RNAME is specified in PCCU macro. Cannot be NCP-R if CUADDR is specified in PCCU macro.
SYSCNTRL	none	OPTIONS	1. OPTION parameters always required by VTAM: BHSASSC Modify block handler set association * ENDCALL Physical disconnect (for dial-up terminals) MODE Set destination mode RCNTRL Request control mode reset RCOND Reset conditional RECMD Reset at end of command RIMM Reset immediate *If an MNOTE (severity code) 4 occurs from NCP generation because no block handlers were specified for the NCP, the user should ignore this as being an error. 2. OPTION parameters required by VTAM for certain operator control functions: NAKLIM Change line negative polling response limit SESSION Change session limit SSPAUSE Change service-seeking pause XMTLMT Change device transmission limit
HOST	none	BFRPAD MAXBFRU STATMOD UNITSZ	Specify or assume default 28 pad characters. MAXBFRU indicates the total number of READ requests in a VTAM READ channel program. Specify STATMOD=YES. UNITSZ must be equal to *bsz* value in VTAMs IOBUF start option. If more than one NCP is to be active concurrently, UNITSZ value must be same for each NCP and for IOBUF. (The value should be a number of bytes evenly divisible by 4.)
CSB	none	none	
LUPOOL	NUMBER	none	
DLIST	none	none	
VIDLIST[2]	VIDSEQ	none	
SERVICE	none	none	
MTALCST	none	ACR CODE LCTYPE	
MTALIST	none	LCTYPE	
MTAPOLL	none	none	
MTATABL	none	none	
DIALSET	none	LINES	

Figure 3-4 (Part 1 of 3). VTAM Support in NCP Macro Instructions

NCP Macro Instruction[1]	Operands		VTAM/NCP Requirements
	VTAM-Only[2]	VTAM/NCP[3]	
GROUP[4]	ANSWER BUFLIM DISCNT FEATUR2 ISTATUS LOGAPPL LOGTAB MODETAB SSCPFM USSTAB VIDSEQ VPACING	ATTN BHSET CALL CDATA CODE CUTYPE DIAL DIALSET ENDTRNS EXEC FEATURE INHIBIT ITBMODE LCST LNCTL MAXLU MTALCST PAUSE POLIMIT POLLED PT3EXEC SESSION TERM TYPE USE XMITLIM	SUBBLOCK parameter has no effect; VTAM overrides this if it is specified for any terminal that uses the basic mode of data transfer. (1) For the 3735. specify the WAIT option. (2) The NCP default of (1,NOWAIT) cannot be used with VTAM; thus this keyword must be coded with the correct options when generating an NCP to be used with VTAM. Code SESSION value equal to number of terminals on the line so that NCP can have concurrent sessions with all terminals on the line. VTAM does not support IBM 2020 and 2025 device types.
LINE[4]	ANSWER BUFLIM DISCNT FEATUR2 ISTATUS LOGAPPL LOGTAB MODETAB SSCPFM USSTAB UTERM VIDSEQ VPACING	ATTN AUTO BHSET CALL CDATA CODE CUTYPE DIALSET ENDTRNS EXEC FEATURE ITBMODE MAXLU MTALIST PAUSE POLIMIT POLLED PT3EXEC SESSION SPEED TERM TYPE USE XMITLIM	(1) For the 3735, specify the WAIT option. (2) The NCP default of (1,NOWAIT) cannot be used with VTAM; thus this keyword must be coded with the correct options when generating an NCP to be used with VTAM. Code SESSION value equal to number of terminals on the line so that NCP can have concurrent sessions with all terminals on the line. VTAM does not support IBM 2020 and 2025 device types.
INNODE	BUFLIM ISTATUS LOGAPPL LOGTAB MODETAB SSCPFM USSTAB VPACING	MAXLU	
CLUSTER[4]	BUFLIM DISCNT FEATUR2 ISTATUS LOGAPPL LOGTAB	BHSET CDATA CUTYPE EXEC FEATURE	

Figure 3-4 (Part 2 of 3). VTAM Support in NCP Macro Instructions

NCP Macro Instruction[1]	Operands		VTAM/NCP Requirements
	VTAM-Only[2]	VTAM/NCP[3]	
CLUSTER[4]	VPACING	GPOLL PT3EXEC TERM UTERM XMITLIM	VTAM does not support specific polling; it only supports general polling procedure for IBM 2980 and 3270 BSC clusters. VTAM does not support IBM 2020 and 2025 device types.
PU	BUFLIM DISCNT ISTATUS LOGAPPL LOGTAB MODETAB SSCPFM USSTAB VPACING	none	
LU	BUFLIM ISTATUS LOGAPPL LOGTAB MODETAB SSCPFM USSTAB VPACING	none	
TERMINAL[4]	BUFLIM DEVICE FEATUR2 ISTATUS LOGTAB LOGAPPL UTERM	ATTN BHSET CDATA CTERM DIALNO DIALSET ENDTRNS EXEC FEATURE INHIBIT ITBMODE LCST PT3EXEC TERM XMITLIM	SUBBLOCK parameter has no effect; VTAM overrides this if it is specified for any terminal that uses the basic mode of data transfer. VTAM does not support IBM 2020 and 2025 device types.
VTERM[2]	BUFLIM LCST LOGAPPL LOGTAB	LCST	
COMP[4]	BUFLIM DEVICE ISTATUS LOGAPPL LOGTAB	ATTN BHSET CDATA EXEC PT3EXEC XMITLIM	
STARTBH	none	node	
ENDBH	none	none	
DATETIME	none	none	
EDIT	none	none	
UBHR	none	none	
BHSET	none	none	
GENEND	none	none	

1. Macro instructions are listed in the required coding sequence for NCP generation. See *NCP Generation Guide* for detailed coding and program generation instructions.
2. Requirements for coding these VTAM-only, NCP macro instructions and operands are described in this chapter.
3. Code these VTAM and NCP operands by using the appropriate VTAM and NCP requirements in this figure in conjunction with the detailed coding instructions provided in the *NCP Generation Guide.*
4. See also Appendix A in this publication, *VTAM Concepts and Planning, VTAM Macro Language Reference,* and *NCP Generation Guide* for possible device effects when coding the operands for this macro instruction.

Figure 3.4 (Part 3 of 3). VTAM Support in NCP Macro Instructions

Notes:

- *After changing or replacing VTAM-only and VTAM/NCP operands and NCP macro instructions, a copy of the updated NCP must also be put in SYS1.VTAMLST.*
- *When a member in SYS1. VTAMLST is updated, the copy of the corresponding resource definition table (RDT) on SYS1.VTAMOBJ must be deleted (using an operating systems utility program that can delete a member of a BPAM data set). If the copy is deleted, VTAM builds (the next time the major node is activated) a new RDT (based on the modified definition) and stores a new copy on SYS1.VTAMOBJ.*
- *Although not all the information coded in the NCP macro instructions is used by both VTAM and the NCP, all the NCP macro instructions should be coded with the possible needs of both VTAM and the NCP.*

Macro Instruction Sequence

For many of the operands that are coded in the GROUP, LINE, CLUSTER, LU, PU, TERMINAL, and COMP NCP macro instructions, macro instruction sequencing is in effect if the same operand can be specified at more than one level. Thus, if an operand is coded at a high level (such as the GROUP macro instruction), then that operand does not have to be coded for all the lower levels. (Levels in the NCP generation procedure are determined by their sequence; see Figure 3-4.) An operand assumed by macro instruction sequencing, however, is overridden when a different value for that operand is coded at a lower level.

Note: *If only one parameter is coded in an operand that can have two or more parameters, that operand completely overrides an equivalent operand specified in a higher-level macro instruction. The default values are assumed for the parameters omitted at the lower level.*

Coding VTAM-Only NCP Macro Instructions

VTAM requires information that is contained in the NCP generation macro instructions. Most of the information required by VTAM is also required by the NCP, although some additional information is required only by VTAM. The VTAM-only macro instructions (PCCU and VIDLIST) convey no information to the network control program generation assembly process. If applicable, however, they must appear in the NCP generation procedure that defines this NCP to VTAM. (VTAM uses them as input to its initialization process.)

The macro instruction assembly step of the NCP generation process permits each VTAM-only macro instruction to appear in its proper sequence (see Figure 3-4). However, the assembly process does not check these macro instructions for proper sequence and syntax, or verify that any related operands are present or absent. (VTAM does this during its initialization or activation processing.)

PCCU Macro Instruction

The PCCU (programmed communications control unit) macro instruction, a required VTAM-only NCP macro instruction, identifies the communications controller into which a specific NCP is loaded. This macro instruction defines the VTAM functions that are being provided for this specific NCP. Code only one PCCU macro instruction for each NCP defined to VTAM.

Sequence in NCP Generation Procedure: The single PCCU macro instruction must be the first macro instruction in the procedure, preceding the NCP BUILD macro instruction.

The format of the PCCU macro instruction is:

Name	Operation	Operand
symbol	PCCU	,MAXDATA=size {CUADDR=local address|RNAME=remote name } [,AUTODMP=YES|NO] [,AUTOIPL=YES|NO] [,AUTOSYN=YES|NO] [,CONFGDS=ddname] [,CONFGPW=password] [,DUMPDS=ddname] [,INITEST=YES|NO]

symbol
is 1 to 8 alphanumeric characters, which must not begin with a $ character. The symbolic name identifies this macro instruction.

MAXDATA=size
specifies the maxlmum amount of data in bytes, including the transmission header (TH) and the request/response header (RH), that the NCP can receive from an application program ln one segment or path information unit (PIU). The MAXDATA size should, if possible, be equal to the size of the largest PIU the network will handle, but should not exceed the product of the IOBUF *bno* and *bsz* specifications for the product of the MAXBFRU and UNITSZ specifications for the NCP. The minimum size is 84 bytes, and the maximum is 65535.

This operand applies only to the PCCU macro of a local NCP. However, the MAX-DATA value should also not exceed the capacities of the remote NCPs. An SNA path error may result if the MAXDATA value exceeds the capacities of the remote NCPs.

CUADDR=local address |RNAME=remote name

CUADDR=local address
local address is three digits that identify the CUA of the local communications controller in which this NCP is resident.

CUADDR indicates that this PCCU macro instruction is for an NCP that is to control either a local communications controller or a local communications controller to which a remote communications controller is attached (TYPGEN=NCP, TYPGEN= NCP-LR, TYPGEN=PEP, or TYPGEN=PEP-LR operand is specified in the NCP BUILD macro instruction).

If CUADDR is not specified, the network operator must provide it as a parameter of the VARY command when activating a local communications controller.

Notes:

- *Do not specify CUADDR when the PCCU macro instruction is for an NCP that is to be loaded into a remote communicatlons controller (TYPGEN=NCP-R operand is speclfied ln the NCP BUILD macro instruction).*
- *The VARY command allows the network operator to override the address specified in the CUADDR operand in the PCCU macro instruction and to load the NCP into another communications controller. However, the two communications controllers and the terminal networks attached to them must be identical.*

- *If the channel adapter on the communications controller has a manual two-channel switch feature (8002),* local address *is the primary address for the communications controller specified in the ADDRESS operand of the IODEVICE system generation macro instruction. (See the "Configuration Restart" section of Chapter 8 for an explanation of the RAS facility for switching to a backup CPU.)*

RNAME=remote name
The *remote name* must be identical with the *symbol* specified in the NCP INNODE macro instruction for the NCP in the local communications controller. (The INNODE macro instruction specifies to the local NCP the SDLC link on which this remote communications controller is attached.)

If RNAME is not specified, it must be provided by the network operator as a parameter in the VARY command when activating a remote communications controller.

Note: *RNAME applies only to remote NCPs. VTAM ignores RNAME if it is coded for a PCCU instruction that is for a local NCP or for a local NCP to which a remote NCP is attached.*

AUTODMP=YES |NO
indicates whether, after an unrecoverable failure either in the NCP or in the communications controller, a dump of storage in the communications controller is to be taken without network operator intervention. (This occurs before VTAM reloads another copy of the same NCP into the communications controller and restarts it.) When AUTODMP=NO, VTAM prompts the network operator to specify whether a dump is to be taken.

Note: *This operand is valid only when DUMPDS=ddname is also coded in this PCCU macro instruction. Otherwise no NCP dump can be taken.*

AUTOIPL=YES |NO
indicates whether, after an unrecoverable failure either in the NCP or in the communications controller (and/or after a dump is taken), VTAM is to load another copy of the NCP into the communications controller and restart it.

Notes:

- *This operand is valid only for an NCP that is to control either a local communications controller to which a remote communications controller is attached or a remote communications controller (TYPGEN=NCP-LR or TYPGEN= NCP-R operand specified in the NCP BUILD macro instruction).*
- *When VTAM successfully reloads the communications controller, VTAM initiates its configuration restart RAS facility. Configuration restart attempts to reinstate the status of the NCP's network as it existed at the time of failure. This includes reactivating the communications controller itself reactivating links that were active at the time of failure, and restarting any remote communications controllers or SDLC cluster controllers (with their associated logical units) attached to the reloaded communications controller.*

AUTOSYN=YES|NO
When activated, the communications controller tells VTAM the name of the NCP loaded in the controller.

If AUTOSYN=YES is specified and the name returned by the controller matches that which VTAM expects, VTAM automatically synchronizes itself with the NCP without operator intervention or reloading the controller.

If AUTOSYN=NO is specified and the name returned by the controller matches that which VTAM expects, the operator is queried to determine whether:

The NCP already loaded is to be used, or

The NCP is to be refreshed with a new copy, or

A different NCP is to be loaded into the controller

After VTAM has properly reacted to the operator's direction, VTAM synchronization processing starts.

If the name returned does not match, the controller is reloaded automatically, without operator intervention.

CONFGDS=ddname
is a 1- to 8-character data definition name that identifies the configuration restart data set defined for the NCP major node. Include a DD statement using this data definition name in the VTAM start procedure.

See Chapter 8, "VTAM RAS Facilities," for a discussion of configuration restart.

CONFGPW=password
specifies the 1- to 8-character password, if required, for VTAM to gain either update or full access to the configuration restart data set. If CONFGPW is not specified but is required by VSAM, VSAM prompts the network operator to provide the correct password when VTAM attempts to open the data set.

DUMPDS=ddname
indicates the ddname of a DD statement in the cataloged procedure for starting VTAM. This DD statement defines the data set that is to contain the data from a storage dump of a communications controller.

This operand must be coded:

- If AUTODMP=YES is also specified in this PCCU macro instruction.
- If the network operator is to be given the ability to dump an NCP (when prompted by VTAM) after a failure either in the communications controller or in the NCP. (This occurs prior to reinitializing and restarting the failing communications controller.)
- If the network operator is to be given the ability to request a dump for the communications controller (using the MODIFY command).

Notes:

- *To format and print the data in the NCP dump data set, use the NCP independent utility program IFLDUMP. See the* NCP Generation Guide *for the information to run and use IFLDUMP.*
- *Before being formatted and printed, the data in an existing NCP dump data set can be overwritten by the next requested NCP dump. To avoid this, consider either (1) having a separate NCP dump data set for each communications controller in the VTAM system or (2) at least, allocating one NCP dump data set for dumping local communications controllers and another one for dumping remote communications controllers.*

INITEST=YES|NO

indicates whether VTAM is to load a diagnostic routine for a local communications controller (the initial test routine). This routine tests the communications controller for any machine malfunctions (before VTAM loads the NCP into the communications controller). If INITEST=YES is coded, a DD statement with the ddname INITEST must have been placed in the cataloged procedure for starting VTAM. This DD statement enables VTAM to locate the initial test routine.

If INITEST=YES is coded, VTAM loads the NCP every time the communications controller is activated.

Note: *INITEST applies only to local communications controllers. If INITEST=YES is coded for an NCP that is to control a remote communications controller, then VTAM ignores the operand.*

VIDLIST Macro Instruction (Basic mode only)

VIDLIST (VTAM identification list) is an optional, VTAM-only NCP macro instruction that defines a list of identification (ID) sequences. VTAM compares these ID sequences with ID sequences that are transmitted from BSC terminals or teletypewriter exchange service (TWX) terminals (when calling a communications controller over a switched line operated in network control mode). A separate VIDLIST macro instruction is coded for each group of lines with similar physical characteristics or for each line with BSC or TWX terminals.

Notes:

- *The VIDLIST macro instruction can be used wlth the NCP IDLIST macro instructlon to distribute ID verification between VTAM and an NCP. For a coding example of this method, see the section "ID Verification for BSC and TWX Terminals."*
- *Any ID sequence list defined in the VIDLIST macro instruction can be named in the VIDSEQ operand in the NCP GROUP or LINE macro instructions.*
- *ID verification cannot be performed either by VTAM or by an NCP for a TWX terminal on a line supported by the multiple terminal access (MTA) facility. See the* NCP Generation Guide *for information about the NCP MTA facility.*

Sequence in NCP Generation Procedure: VIDLIST may be placed anywhere following the NCP SYSCNTRL macro instruction, but preceding the first NCP GROUP macro instruction.

The format of the VIDLIST macro instruction is:

Name	Operation	Operand
[symbol]	VIDLIST	VIDSEQ=((chars,termname) [,(chars,termname)...])

symbol

is 1 to 8 alphanumeric characters and must not begln with a $ character. This symbol identifies the name of this macro instruction.

Note: *A* symbol *is required unless the VIDSEQ operand is being continued from an immediately preceding VIDLIST macro instruction.*

VIDSEQ=((chars,termname) [,(chars,termname)...])
indicates the ID sequence and associated terminal name of each terminal that is permitted to call into VTAM for ID verification.

Note: *A maximum of 255 characters can be coded in the VIDSEQ operand (including the beginning and ending parentheses and all commas). This limit applies regardless of the number of entries (ID sequence and associated terminal name are one entry) coded within the operand. To specify more than 255 characters:*

- *Code one or more additional VIDLIST macro instructions (omitting the* symbol *field in each) and place them directly following the first VIDLIST macro instruction.*

and

- *Code the remaining characters in the VIDSEQ operand for each VIDLIST macro instruction.*

chars
indicates one ID sequence for VTAM to recognize as valid. 1 to 40 hexadecimal digits (equivalent to 20 EBCDIC characters) can be specified for each ID sequence.

Notes:

- *All EBCDIC characters except the data link control characters (such as the hexadecimal equivalents for EOT, ETB, ETX, and STX) are valid.*
- *Do not specify any EOT (end of transmission), ENQ (enquiry), or ACK (acknowledge) characters in the ID sequence for a TWX terminal. This is because the NCP recognizes these characters as control characters and deletes them as it receives the message sequence into one of its buffers.*

termname
indicates the symbolic name (1 to 8 alphanumeric characters, which must not begin with a $ character) that identifies the terminal with which the ID sequence (coded as *chars) is* to be associated. The *termname* must be identical with the *symbol* specified in the NCP TERMINAL macro instruction that represents this terminal.

Do not specify *termname* as either (1) the name of an NCP TERMINAL macro instruction in which the CTERM=YES operand is specified or (2) the name specified in the UTERM operand in an NCP TERMINAL macro instruction.

Note: *If the name* (symbol) *of this VIDLIST macro instruction is to be specified in the VIDSEQ operand in an NCP GROUP or LINE macro instruction, all the terminals represented by* termname *must be using the same line or group of lines.*

VTERM Macro Instruction (Basic mode only)

VTERM (VTAM terminal) is an optional, VTAM-only NCP macro instruction that provides automatic logon capability for specific types of dial-up, start-stop terminals that use the MTA facility. The multiple-terminal-access (MTA) facility is an NCP option that allows the NCP to communicate in network control mode with a variety of dissimilar, start-stop terminals over the same network of switched lines. See the *NCP Generation Guide* for a complete description of the MTA facility and the terminals it supports.

Note: *The UTERM operand must be coded if a VTERM macro instruction is not coded for each different type of dial-up terminal that can be connected to a specific line supported by MTA. The UTERM operand is coded in the NCP TERMINAL macro instruction that defines those remaining types of dial-up terminals. (The UTERM operand manages all line control types defined in the NCP MTALIST macro instruction, but not defined in the VTERM macro instruction.)*

Sequence in NCP Generation Procedure: Place this macro instruction directly following the NCP TERMINAL macro instruction (with the CTERM=YES operand specified) that represents the MTA terminal. Also, this NCP TERMINAL macro instruction must follow an NCP LINE macro instruction in which either the CALL=IN or CALL=OUT operand has been specified.

The format of the VTERM macro instruction is:

Name	Operation	Operand
symbol	VTERM	LCST=mtalcstname [,BUFLIM=n|2] [,LOGAPPL=name] [,LOGTAB=name]

symbol
is 1 to 8 alphanumeric characters and must not begin with a $ character. This symbolic name identifies this as the node name assigned to the terminal (identified by the LCST operand in this VTERM macro instruction).

LCST=mtalcstname
indicates the name of the NCP MTALCST macro instruction associated with this VTERM macro instruction. The mtalcstname must be identical with the *symbol* specified in the MTALCST macro instruction. (The MTALCST macro instruction defines the specific operating parameters for the type of terminal and line control that are represented by this VTERM macro instruction.)

BUFLIM=n|2
indicates a multiplier (decimal number in the range 1 through 255) for calculating the maximum number of elements in the VTAM PPBUF storage pool for this terminal. A value of zero means that there is no limit.

VTAM uses this multiplier to determine the maximum number of elements in PPBUF that can be filled with data that has been read ahead from this terminal, but that has not yet been transferred into the VTAM application program's buffers. The maximum number of elements is the product of this BUFLIM value and the value coded in the BUFFACT operand (in the VTAM APPL definition statement that defines the VTAM application program being executed).

For example: If BUFFACT=1 (the default value) and BUFLIM=2 (the default value), then 2 becomes the maximum number of elements that can be allocated to receive input from the terminal.

The following information should be considered when determining the BUFLIM value:

- Number of terminals expected to be ln concurrent use
- Characteristics of the terminals (such as the termlnal's hardware features, speed, and use or type of transaction it is to perform)
- Characteristics of the VTAM application programs expected to be used with the terminals (such as updating or retrieving data)

For details on calculating the values for PPBUF, see Chapter 9, "Tuning VTAM."

Notes:

- *After VTAM multiplies the BUFLIM and BUFFACT values together, the product becomes effective after the VTAM application program issues the VTAM OPNDST macro instruction.*
- *If the amount of data read in exceeds the calculated maximum capacity of the elements, then VTAM issues a VTAM RESET macro instruction with the OPTCD=UNCON operand. This macro instruction cancels the I/O operation, and the excess data is lost.*
- *To determine if data was lost, VTAM application programs must check the return codes in the RPL fields for the I/O request (RTNCD and FDBK2). The RPLs to be checked are those for the READ, WRITE (OPTCD=CONV), or DO VTAM macro instructions.*

LOGAPPL=name
indicates the name (1 to 8 alphanumeric characters) of a VTAM application program (defined by an APPL statement) to which this terminal is to be automatically logged on when it is active and dial up. The *name* must correspond to the *applname* assigned to the VTAM application program by a VTAM APPL definition statement.

Note: *The LOGTAB operand must also be coded in this VTERM macro instruction if the installation does not use OS/VS2 logon. If this operand is not coded, then either the VTAM application program or the network operator must initiate logon to the terminal type.*

LOGTAB=name
indicates the SYS1.LPALIB member name of an interpret table (1 to 8 alphanumeric characters assigned by the linkage editor). LOGTAB permits a terminal user to initiate a logon request from this terminal, and associates the specified interpret table with this terminal. LOGTAB must be coded in this VTERM macro instruction if the installation does not use OS/VS2 logon.

Coding VTAM-Only NCP Operands

VTAM requires information contained in the operands in the NCP generation macro instructions. Most of the information required by VTAM is also required by the NCP, although some additional information is required only by VTAM. The VTAM-only operands convey no information to the network control program generation assembly process. However, they must appear in the NCP generation deck that defines this NCP to VTAM. (VTAM uses them as input to its initialization or activation processing.)

The macro instruction assembly step of the NCP generation process permits each VTAM-only operand to appear in the macro indicated in Figure 3-5. However, the assembly process does not check these operands for proper syntax or verify that any related operands are present or absent. VTAM does this during its initialization or activation processing.

Figure 3-5 summarizes the VTAM-only operands and the NCP macro instructions in which they can be coded. Figure 3-5 does not indicate the conditions (for example, type of line control or type of terminal) under which the operand can be used. For this information and the coding requirements, see the individual description of each VTAM-only operand that follows.

VTAM-Only Operands	GROUP	LINE	PU	LU	CLUSTER (BSC)	TERMINAL	COMP
ANSWER	•	•					
BHSET						R	
BUFLIM			•	•		•	•
CALL	•	•					
DEVICE						•	•
DISCNT	•	•	•				
FEATUR2	•	•			•	•	
GPOLL					R		
ISTATUS	•	•	•	•	•	•	•
LOGAPPL	•	•	•	•	•	•	•
LOGTAB	•	•	•	•	•	•	•
MODETAB	•	•	•	•			
POLIMIT	R	R					
SESSION	R	R					
SSCPFM	•	•	•	•			
TERM	R	R				R	
USE	R	R					
USSTAB	•	•	•	•			
UTERM						•	
VIDSEQ	•	•					
VPACING	•	•	•	•	•		

• Parameter can be coded

R Restrictions (see "Coding Restrictions" later in this chapter)

Figure 3-5. Summary of VTAM-Only NCP Operands

ANSWER=ON|OFF (GROUP and LINE macro instructions)
is valid only if the line has dial-in capability (CALL=IN or CALL=INOUT). If ANSWER=ON is specified, physical units can dial in to the NCP when the line is active. If ANSWER=OFF is specified, the physical unit cannot dial in to the NCP, regardless of the active-inactive status of the line.

BUFLIM=n|2 (basic mode only ; TERMINAL and COMP macro instructions only)
indicates a multiplier (decimal number in the range 1 through 255) for calculating the maximum number of elements in the VTAM PPBUF storage pool for this terminal. A value of zero means that there is no limit.

VTAM uses this multiplier to determine the maximum number of elements in PPBUF that can be filled with data that has been read ahead from this terminal, but that has not yet been transferred into the VTAM application program's buffers. The maximum number of elements is the product of this BUFLIM value and the value coded in the BUFFACT operand (in the VTAM APPL definition statement that defines the VTAM application program being executed).

For example: If BUFFACT=1 (the default value) and BUFLIM=2 (the default value), then 2 becomes the maximum number of elements that can be allocated to receive input from the terminal.

The following information should be considered when determining the BUFLIM value:

- Number of terminals expected to be in concurrent use
- Characteristics of the terminals (such as the terminal's hardware features, speed, and use or type of transaction it is to perform)
- Characteristics of the VTAM application programs expected to be used with the terminals (such as updating or retrieving data)

For details on calculating the values for PPBUF, see Chapter 9, "Tuning VTAM."

Notes:

- *After VTAM multiplies the BUFLIM and BUFFACT values together, the product becomes effective after the VTAM application program issues the VTAM OPNDST macro instruction.*
- *If the amount of data read in exceeds the calculated maximum capacity of the elements, then VTAM issues a VTAM RESET macro instruction with the OPTCD=UNCON operand. This macro instruction cancels the I/O operation, and the excess data is lost.*
- *To determine if data was lost, VTAM application programs must check the return codes in the RPL fields for the I/O request (RTNCD and FDBK2). The RPLs to be checked are those for the READ, WRITE (OPTCD=CONV), or DO VTAM macro instruction.*

BUFLIM=n|2 (record mode only ; PU and LU macro instructions only)
is a multiplier in the range 1 through 255 that determines the maximum number of VTAM large pageable buffers that can be filled with data that has been obtained by VTAM from a logical unit, but that has not yet been transferred into the application program's buffers. The maximum number of buffers that can be filled is the product of this BUFLIM value and the value coded for the BUFFACT parameter in the APPL statement that defines the application program being executed. If BUFFACT is omitted and the default value of 1 is assumed, BUFLIM becomes the maximum number of buffers that can be allocated to input from the terminal. A BUFLIM value of 0 means that there is no limit.

BUFLIM and BUFFACT can be used to prevent some sessions from monopolizing the pageable message storage pool. The value of BUFLIM, and therefore the calculated maximum capacity of the buffers, should be based on the number of logical units expected to be in concurrent use, the characteristics of the logical units, and the characteristics of the application programs expected to be used with the logical units. The default values for BUFLIM and BUFFACT yield a product of 2. This value may be satisfactory for interactive sessions.

If a logical unit is likely to send many messages in succession to the application program, the BUFLIM value specified for that logical unit may have to be increased. This gives priority to a particular logical unit without extending that advantage to all logical units in session with the same application program. However, if the application program obtains and processes messages promptly, the default value of BUFLIM may be satisfactory.

VTAM multiplies the two values together and the calculated value becomes effective after OPNDST is issued by the application program. If the amount of data obtained by VTAM exceeds the calculated maximum capacity of the buffers, VTAM performs a CLEAR operation and all data is lost, including data queued up for the buffers. VTAM schedules the LOSTERM exit routine if it is available.

Return Codes: To determine if data was lost, the application program must check the return codes in the RTNCD and FDBK2 fields of the I/O request's RPL for the SEND and RECEIVE macro instructions.

CALL=IN|OUT|INOUT (GROUP and LINE macro instruction, for SDLC)

The CALL operand indicates whether terminals, the host computer, or both are able to cause switched connections to be set up over the line to which this operand applies.

If the line is to be used only for terminal-initiated connections, CALL=IN must be coded on the LINE macro instruction for the line.

If the line is to be used only for connections initiated by VTAM, the network operator, or application programs, CALL OUT must be coded on the LINE macro instruction for the line.

If the line is to be used for connections initiated by terminals, in addition to connections initiated by VTAM, the network operator, or application programs, CALL=INOUT must be coded on the LINE macro instruction for the line.

This operand is valid only if DIAL=YES is coded on the GROUP macro instruction, and applies only to line operation in network control mode.

DEVICE=devicetype (TERMINAL and COMP macro instructions)

indicates the device type for a terminal component of either the IBM 1050 or 2770 Data Communication System. The valid *devicetypes are:*

1050 System Components	**2770 System Components**
1052	50
1053	545
1054	1017
1055	1018
1056	1053
1057	1255
1058	2203
1092	2213
1093	2265
	2502
	5496

DEVICE should be coded on the NCP COMP macro instruction if:

- VTAM is to be capable of establishing individual sessions with each component.
- A VTAM application program is to *be* capable of determining device type by using the VTAM INQUIRE macro instruction (OPTCD=DEVCHAR).

The DEVICE operand in the NCP COMP macro instruction can also be used in conjunction with the TERM and DEVICE operands in the NCP TERMINAL macro instruction. For example:

```
symbol1   TERMINAL   TERM=1050,DEVICE=1052,...
symbol2   COMP       DEVICE= 1054,...
symbol3   COMP       DEVICE=1056,...
```

In the preceding example, if DEVICE is not coded in the COMP macro labeled symbol2, VTAM uses the DEVICE value in the TERMINAL macro associated with this COMP macro. However, if DEVICE is not coded in the TERMINAL macro, VTAM uses the TERM value in the TERMINAL macro for this COMP macro.

DISCNT=YES |NO (GROUP, LINE, and PU macro instructions)
specifies whether VTAM is to disconnect the physical unit when the last logical unit is disconnected by its application program (that is, when there are no more sessions between an application program and a logical unit).

When DISCNT=YES is specified, the physical unit is automatically disconnected as soon as the last logical unit is disconnected by its application program. If any logical units request their own disconnection, VTAM ignores the part of their disconnection request that indicates whether the physical unit is to be disconnected (that is, the HOLD part of the character-coded logoff command or the LAST-NOT LAST part of a Terminate Self command). VTAM also rejects any attempt by the physical unit to request its own disconnection (using the Request Discontact command).

When DISCNT=NO is specified, VTAM disconnects the physical unit only when one of the following conditions is met:

- VTAM receives a Request Discontact Immediate command from the physical unit.
- VTAM receives a Request Discontact Normal command from the physical unit, and all logical units have been disconnected.
- All logical units have been disconnected as a result of (1) a character-coded logoff command for which HOLDNO was specified (or inserted using a USS definition table), or (2) a Terminate Self command for which LAST was specified, or (3) VARY INACT commands.

FEATUR2=([parameter] [,parameter...]) (GROUP, LINE, CLUSTER, and TERMINAL macro instructions)
indicates the machine features for a specific remote 3270 terminal (printer or display station component of the IBM 3270 Information Display System). The parameters are:

MODEL1 |MODEL2
indicates the specific model number (Model 1 or 2) for this 3275, 3277, 3284, or 3286 component.

PRINTR |NOPRINTR
indicates whether this terminal has an attached IBM 3284 Model 3 printer. This parameter is valid only if the TERM=3275 operand is also coded or assumed by NCP macro sequencing for this macro instruction.

Note: *The following parameters can be coded only if the TERM=3275 or TERM=3277 operand has been coded or assumed by the NCP macro instruction sequence:*

ANKEY |NOANKEY
indicates whether this terminal has a standard alphanumeric keyboard.

DEKEY |NODEKEY
indicates whether this terminal has the data entry keyboard.

PFK |NOPFK
indicates whether this terminal has the program function keys.

SELPEN |NOSELPEN
indicates whether or not this terminal has the selector pen feature.

ISTATUS=ACTIVE|INACTIVE (GROUP, LINE, CLUSTER, PU, LU, TERMINAL, and COMP macro instructions)

indicates whether this terminal (minor node) is to be initially active when the NCP major node to which it belongs is first activated. Major nodes can be activated either when VTAM is started by issuing the START command or, following the start of VTAM, by issuing the VARY command. ISTATUS is effective only at the start of VTAM for terminals that use basic mode. For logical units on SDLC links, ISTATUS is effective both when starting VTAM and when reactivating logical units.

When ISTATUS=ACTIVE is coded or assumed by NCP macro sequencing, automatic logon for this terminal to a VTAM application program occurs if automatic logon has been specified for the terminal or logical unit.

When ISTATUS=INACTIVE:

- The first activation of an inactive major node containing this terminal leaves the terminal inactive.
- A second activation of an already active major node activates all the terminals not previously active, including the ones specified INACTIVE.

Notes:

- *For terminals on BSC and start-stop lines, ISTATUS has no effect when the network operator uses the VARY command to activate and deactivate a minor node.*
- *For logical units attached to an SDLC cluster controller, the ISTATUS definition (specified in the appropriate NCP LU macro instruction) is in effect when the network operator deactivates the controller and later reactivates it.*
- *The ISTATUS operand is ignored if it is coded in an NCP LINE macro instruction that is followed by one or more NCP INNODE macro instructions.*
- *If an NCP TERMINAL macro instruction is defining a "logical connection" terminal (CTERM=YES operand is specified in this TERMINAL macro instruction), ISTATUS applies to the logical connection terminal and to the terminal defined in the UTERM operand (if this operand is also specified in this TERMINAL macro instruction). A logical connection terminal is not an actual terminal in the VTAM network; rather, the NCP uses the control fields generated by this TERMINAL macro instruction to hold control information about any dial-up terminal in the VTAM network that calls the communications controller over a switched line.*
- *Macro sequencing is valid only when ISTATUS is coded in the NCP's GROUP and LINE macro instructions. Thus, if ISTATUS is coded in the NCP's CLUSTER, PU, LU, TERMINAL, or COMP macro instruction, it refers only to the device being defined by that macro instruction and does not apply to any other macro instructions. If ISTATUS is specified in a LINE macro instruction, it applies only to the devices attached to the line and not to the line itself*

LOGAPPL=name (GROUP, LINE, CLUSTER, PU, LU, TERMINAL, and COMP macro instructions)

indicates the name of a VTAM application program in SYS1.VTAMLST (1 to 8 alphanumeric characters) to which this terminal is to be automatically logged on when it is activated. The *name* must correspond to the *applname* assigned to the VTAM application program by a VTAM APPL definition statement.

For terminals that use basic mode:

- If OS/VS logon is not used, the LOGTAB operand must also be coded in the appropriate NCP macro instructions that define this terminal.
- If a network solicitor is used to monitor this terminal's logon requests, *name* must be coded as the name assigned to that network solicitor.
- If the terminal is a printer, do not code *name* as the name assigned to a network solicitor. The IBM network solicitor cannot control output-only devices.
- If this operand is not coded, either the application program or the network operator must initiate terminal logon requests.

LOGTAB=name (GROUP, LINE, CLUSTER, PU, LU, TERMINAL, and COMP macro instructions)

indicates the SYS1.LPALIB member name of an interpret table (1 to 8 alphanumeric characters assigned by the linkage editor).

LOGTAB permits a terminal user to initiate a logon request from this terminal and associates the specified interpret table with this terminal. If OS/VS logon is not used, LOGTAB must be coded in the NCP macro instructions that define this terminal.

Note: *If this terminal is to be controlled by a network solicitor, LOGTAB must be coded in the NCP macro instructions that define this terminal. This allows the selected network solicitor to use the specified interpret table to validate the logon message before routing it to the specified application program.*

MODETAB=logon mode table name (GROUP, LINE, PU, and LU macro instructions)
specifies the module name of a logon mode table to be used for the logical unit. Logon mode tables are described in Chapter 5, "Defining Logon Mode and USS Definition Tables." If this operand is omitted, the IBM-supplied logon mode table (ISTINCLM) is used for the logical unit.

SSCPFM=FSSIUSSSCSIUSS3270 (GROUP, LINE, PU, and LU macro instructions)
specifies the manner in which VTAM is to send network services (NS) procedure error requests, and responses to field-formatted commands to the logical unit, and the manner in which VTAM is to handle media control characters sent to or received from the logical unit.

If FSS (formatted system services) is coded, VTAM sends a field-formatted NS procedure error command or field-formatted response to the logical unit. If USSSCS or USS3270 is coded, VTAM notifies the logical unit of the error condition by sending the "SESSION NOT BOUND" message or a character-coded response message.

If USSSCS (unformatted system services standard character string) is coded, media control characters are deleted from incoming character-coded logon and logoff commands, and added to outgoing error messages.

USS3270 should be coded if the logical unit is part of an SNA 3270 terminal. The effect of coding SSCPFM=USS3270 is identical with that of coding SSCPFM=USSSCS, except that the media control characters added or deleted are 3270 control characters rather than SNA "standard character string" media control characters.

VTAM's handling of media control characters is discussed further under "Conversion of Character-Coded Commands" in Chapter 5.

An NS procedure error condition occurs when either the application program rejects the logical unit's logon request or the logical unit rejects the BIND request sent as a result of the application program's acceptance of the logon request. See MSG=7 under "USS Messages" in Appendix B for a further explanation of this error condition.

Before selecting SSCPFM=FSS over SSCPFM=USSSCS, an installation should determine whether the logical unit will "expect" to receive NS procedure error messages in the form of an SNA command (code SSCPFM=FSS) or in the form of the SESSION NOT BOUND data message (code SSCPFM=USSSCS). Some logical units may be programmed to accept either, in which case the setting of the SSCPFM parameter is immaterial.

USSTAB=definition table name (GROUP, LINE, PU, and LU macro instructions)
specifies the module name of a USS definition table to be used for the logical unit. USS definition tables are described in Chapter 5, "Defining Logon Mode and USS Definition Tables." If this parameter is omitted, the IBM-supplied USS definition table (ISTINCDT) is used for the logical unit if character-coded requests are received.

UTERM=name (TERMINAL macro instruction only)
indicates the name (1 to 8 alphanumeric characters) of a dial-up terminal with which a VTAM application program can establish connection. UTERM is coded only if the CTERM=YES operand is also coded in the same NCP TERMINAL macro instruction. This terminal cannot also be specified in an NCP VIDLIST or VTERM macro instruction.

UTERM is required for these dial-up terminals:

- A BSC dial-up terminal for which no ID verification is to be performed or for which no ID verification is to be performed in the VTAM application program
- A start-stop dial-up TWX terminal for which ID verification is to be performed in the VTAM application program
- A start-stop dial-up terminal that is not on a line supported by MTA
- A start-stop dial-up terminal that is on a line supported by MTA, but which has a terminal type that VTAM is not checking

Note: *If a dial-up terminal calls in to VTAM and VTAM cannot identify it (by using the UTERM operand specified in the related TERMINAL macro instruction, the NCP VIDLIST macro instruction, or the NCP VTERM macro instruction), VTAM does not allow the terminal to establish connection.*

VIDSEQ=symbol (GROUP and LINE macro instructions)
indicates the NCP VIDLIST macro instruction that defines the ID sequence and associated terminal (BSC or TWX on a switched line) that is permitted to call into VTAM for ID verification. The *symbol* in the VIDSEQ operand must be identical to the *symbol* assigned to that VIDLIST macro instruction.

Notes:

- *This operand is valid only for BSC or TWX terminals on a switched line.*
- *If VIDSEQ is coded in an NCP GROUP macro instruction, the DIAL=YES operand must also be specified in that macro instruction.*
- *If VIDSEQ is coded in an NCP LINE macro instruction, the POLLED NO operand must also be coded or assumed by macro instruction sequencing in that macro instruction.*

VPACING[(n[,m])|0] (GROUP, LINE, CLUSTER, PU, and LU macro instructions)
indicates whether pacing is to be performed (during a session) with the logical units represented by the appropriate NCP macro instructions.

(n,m)
indicates that pacing is to be performed *(n* is a decimal number from 1 to 255; *m* is a decimal number from 1 to *n).*

n
indicates the number of data requests that VTAM is to send to an NCP (for an associated session), and then wait for a pacing response. No further requests can be sent to the NCP until the NCP replies with a pacing response to VTAM.

m
indicates which of the n data requests is to be used to request a pacing response from the NCP. If *m* is not coded, *n* is assumed.

0
indicates that no pacing is to be performed. If the VPACING parameter is omitted the values *n*=2 and *m*=1 are assumed in a switched SNA major node.

Coding Restrictions

BHSET=setname|NONE|DYNAMIC
If the TERMINAL macro instruction is used to define a port for dial-in terminals (CTERM=YES specified), an NCP block handler set can be assigned to the dial-in terminal only if BHSET=DYNAMIC is specified. If BHSET=DYNAMIC is specified, VTAM assigns a block handler in accordance with the BHSET=setname specified on the TERMINAL macro instruction for the dial-in terminal.

GPOLL=chars
GPOLL (general polling) must be specified for IBM 2980 and 3270 clusters; VTAM does not support specific polling.

POLIMIT=([n 1] [,WAIT |NOWAIT| QUEUE])
The NCP default of (1,NOWAIT) cannot be used with VTAM. Thus, this keyword must be coded with the correct options when generating an NCP to be used with VTAM.

This parameter must be coded for a polled nonswitched line. Specify QUEUE as the action to be taken by the NCP if the number (n) of negative responses is exceeded when polling any terminals except the IBM 3735. For the 3735, specify WAIT.

SESSION=1|count
This parameter establishes the session limit for the line. It should be specified equal to the number of terminals on the line so that it is possible for the NCP to have concurrent sessions with all terminals on the line.

TERM=type
Device types 2020 and 2025 are invalid.

USE=NCP|EP
USE=EP will be treated as ISTATUS=INACTIVE. Therefore, such lines must be activated with the VARY command. Activating such a line with VARY gives the line to VTAM and NCP whether or not it is in use by EP.

XMITLIM=1
must be specified for all terminals on a multipoint line.

Putting Definitions Into SYS1.VTAMLST

The major nodes that need to be defined to VTAM are:

VTAM application programs

Local 3270 terminals

Local SNA major nodes

Switched SNA major nodes

Local and remote NCPs

To define and put the definitions of these major nodes as members into SYS1.VTAMLST, follow these steps. (The steps can also be followed when making changes or additions to the definitions after they have been put into SYS1.VTAMLST.)

1. Code the appropriate VTAM definition statements or NCP macro instructions to define the major node.

   Notes:

   - If defining an NCP:
     (1) Also, follow the coding requirements for the NCP-only macro instructions and operands and use the NCP generation instructions in NCP Generation Guide.
     (2) To improve the time needed to load an NCP into a communications controller, the NCP load program attributes can be changed (see Example "Changing NCP Load Program A ttributes" in this chapter).
     (3) If changing or adding VTAM-only NCP macro instructions or operands, change the NCP source deck; however, no NCP generation is required.
     (4) If changing or adding NCP macro instructions or operands, change the NCP source deck and do a partial or complete NCP generation (as described in the NCP Generation Guide).
   - *When defining any major node, use Appendix C to also consider the coding dependencies with any related VTAM definition statements, NCP and VTAM macro instructions, and VTAM console (network operator) commands.*

2. Before starting VTAM an operating system utility program (such as the IEBUPDTE utility program) must be used to put the definitions in SYS1.VTAMLST as members.
3. When updating a member in SYS1.VTAMLST, the copy of the corresponding resource definition table (RDT) on SYS1.VTAMOBJ must be deleted (using an operating systems utility program that can delete a member of a BPAM data set). If the copy is deleted, VTAM builds (the next time that major node is activated) a new RDT (based on the modified definition) and stores a new copy on SYS1.VTAMOBJ.

   Note: *If the MAXSUBA value for a NCP member in SYS1.VTAMLST (MAXSUBA operand in the NCP BUILD macro instruction) is updated, then the tables for all local 3270 major nodes in SYS1 .VTAMOBJ (associated with the new MAXSUBA value) must also be deleted.*
4. Provide the network operator with the necessary information to enter a VARY activate command and to respond with the proper information if prompted by VTAM.

Defining Uninstalled Devices or Programs

An installation can define groups, lines, clusters, logical units, terminals, or VTAM application programs that are not available when starting VTAM. Then, after the devices or programs are installed, the VTAM definition statements of NCP macro instructions do not have to be changed. To do this, code:

- The ISTATUS=INACTIVE operand in the appropriate NCP macro instructions
- The ISTATUS=INACTIVE operand in the appropriate VTAM definition statements

The considerations when defusing a large future configuration are:

- VTAM initialization uses more time to build resource definition table entries that are not used by VTAM.
- Unused RDT entries increase virtual storage space requirements and VTAM performance time.

Example of Putting Network Definitions into SYS1.VTAMLST

In this example:

- The IEBUPDTE utility program is being used to add three members to SYS1.VTAMLST and to allocate space for the SYS1.VTAMLST data set.
- A group of VTAM application programs is assigned the major node name (and member name) Al.
- A group of local terminals is assigned the major node name (and member name) L3270A.
- A group of local 3790 terminals is assigned the major node name (and member name) L3790A.
- A group of switched SNA terminals is assigned the major node name (and member name) SW1.
- An NCP is assigned the major node name (and member name) NCPL1.

```
//UPDATLST JOB      643,SMITH,MSGLEVEL=1
//        EXEC      PGM=IEBUPDTE,PARM=MOD
//SYSPRINT DD       SYSOUT=A
//SYSUT1   DD       DSNAME=SYS1.VTAMLST,DISP=OLD
//SYSUT2   DD       DSNAME=SYS1.VTAMLST,DISP=OLD
//SYSIN    DD       DATA
./       ADD       NAME=A1,LEVEL=00,SOURCE=0,LIST=ALL
./       NUMBER    NEW1=10,INCR=10
                   .
                   .
                   .
                   (Set of APPL statements)
                   .
                   .
                   .
./       ADD       NAME=NCPL1,LEVEL=00,SOURCE=0,LIST=ALL
./       NUMBER    NEW1=10,INCR=10
                   .
                   .
                   .
                   (NCP source deck)
                   .
                   .
                   .
./       ADD       NAME=L3270A,LEVEL=00,SOURCE=0,LIST=ALL
./       NUMBER    NEW1=10,INCR=10
                   .
                   .
                   .
                   (LBUILD followed by LOCAL statements)
                   .
                   .
                   .
./       ADD       NAME=L3790A,LEVEL=00,SOURCE=0,LIST=ALL
./       NUMBER    NEW1=10,INCR=10
                   .
                   .
                   .
```

```
                (VBUILD followed by PU and LU statements)
                .
                .
                .
./              ADD             NAME=SW1,LEVEL=00,SOURCE=0,LIST=all
./              NUMBER          NEW1=10,INCR=10
                .
                .
                .
                (VBUILD followed by PU, PATH and LU statements)
                .
                .
                .
  ./            ENDUP
/*
```

Control Statements for Example

The EXEC statement specifies (1) the program name (PGM=IEBUPDTE) and (2) that the input to IEBUPDTE is from card input (PARM=MOD).

The SYSPRINT DD statment defines the output message data set (a printer is assumed).

The SYSUT2 DD statement defines the output data set SYS1.VTAMLST and allocates enough space to allow for subsequent modifications without creating a new data set to accommodate new members.

The SYSIN DD statement indicates that input in the form of utility control statements and data statements follows.

Each ADD control statement indicates (1) that records (subsequent data statements) are to be placed in a member (identified by the NAME operand) in the output data set SYS1.VTAMLST, (2) that the data statements are to be listed in the message data set, and (3) that change level 0 and source value 0 are to be recorded in the directory entry of the output member.

Each NUMBER control statement assigns sequence numbers to the data statements. (The data statements contain blank sequence numbers in columns 73 through 80.) The first record of the output member is assigned sequence number 10; subsequent record numbers are increased by 100.

The data statements to be placed in member Al indicate the records for this member. (Al becomes the major node name for this group of VTAM application programs. Each VTAM application program in this member defines a minor node in the VTAM network.)

The data statements to be placed in member NCPL1 indicate the records for this member. (NCPL1 becomes the major node name for this NCP in the VTAM network. Each group, line, port, cluster, logical unit, terminal, and component defined to this NCP become minor nodes in the VTAM network.) **Note:** *Member name NCPL1 (assigned by the IEBUPDTE utility program) must also be identical with the member name specified in the NEWNAME operand in the NCP BUILD macro instruction.*

The data statements to be placed in member L3270A indicate the records for this member. L3270A becomes the major node name for this group of local terminals in the VTAM network. Each terminal defined in this group becomes a minor node in the VTAM network.)

The data statements to be placed in member L3790A indicate the records for this member. (L3790A becomes the major node name for this group of local 3790 terminals. Each terminal defined in this group becomes a minor node in the VTAM network.)

The data statements to be placed in member SW1 indicate the records for this member. (SW1 becomes the major node name for this group of switched SNA terminals. Each terminal defined in this group becomes a minor node in the VTAM network.)

The ENDUP control statement indicates the end of SYSIN input to this job step.

Changing NCP Load Program Attributes

To reduce the time needed to load NCPs into communications controllers (especially into remote communications controllers), an installation can change the attributes for an NCP load program. Two modules, the NCP load program (IFLOADRN) and the VTAM load program interface (ISTINC05), load NCPs sequentially into communications controllers. By using the linkage editor, an installation can change the attribute of these modules from "serially reusable" to "not reusable." This attribute causes separate copies of these NCP load programs to be brought into virtual storage for each NCP that is to be loaded, reducing loading time by providing concurrent NCP loading.

Example of Changing NCP Load Program Attributes

In this example:

- The linkage editor program changes the load module attribute for the NCP load program (IFLOADRN) and the VTAM load program interface (ISTINC05) from "serially reusable" to "not reusable."

```
//CHGNCPAT    JOB     07550,SMITH
//LKED        EXEC    PGM=HEWL,PARM='XREF,LET,LIST,NCAL'
//SYSUT1      DD      UNIT=SYSDA ,SPACE=(TRK,(100,10))
//SYSPRINT    DD      SYSOUT=A
//SYSLMOD     DD      DSN=SYS1.LINKLIB,DISP=OLD
//SYSLIN      DD      *
   INCLUDE SYSLMOD(IFLOADRN)
   NAME(IFLOADRN(R)
   INCLUDE SYSLMOD(ISTINC05)
   NAME ISTINC05(R)
/*
```

Control Statements for Example

The EXEC statement specifies:

- The program name (PGM=HEWL).
- That the output modules are to be marked "not reusable" (the default value) since neither REUS nor RENT options of PARM are specified.
- That the linkage editor is to mark the output module executable (LET option) and to produce a cross-reference table of the output on the diagnostic output data set (X REF option).
- That all the control statements processed by the linkage editor are listed in card-image format on the diagnostic output data set (LIST option).
- That the linkage editor is not to call library members to resolve external references (NCAL option).

The SYSUT1 DD statement defines the space allocation for the intermediate data set.

The SYSPRINT DD statement defines the diagnostic output data set (a printer is assumed).

The SYSLMOD DD statement defines the output module library SYS1.LINKLIB (assumed to be cataloged).

The SYSLIN DD statement indicates that input in the form of linkage editor control statements follows.

The INCLUDE control statements indicate that modules IFLOADRN and ISTINC05 (on SYS1.LINKLIB) are additional input to the linkage editor.

The NAME control statements indicate (1) the names specified for the load modules (created by the linkage editor processing), and (2) that these load modules replace identically named modules in the output module library SYS1.LINKLIB.

Chapter 4. Starting and Controlling the Network

When starting VTAM, the network operator can specify start options to define the initial VTAM network configuration and to select optional VTAM facilities. These start options can be specified in one or a combination of the following ways:

- The network operator can respond to prompting messages during VTAM initialization.
- The network operator can specify parameters of the START command.
- Lists of start options can be defined and each list put in a separate member in SYS1.VTAMLST.
- The IBM-supplied default start options can be assumed (unless they were overridden in one of the preceding ways).

Once specified, the start options (except for the configuration list) remain in effect until VTAM is terminated.

To select the appropriate start options for starting and controlling a specific VTAM network configuration, consider:

- Defining specific VTAM start options
- Putting start option and configuration lists into SYS1.VTAMLST

After selecting the start options for each specific VTAM network configuration, the system programmer can include them in the appropriate start option list or provide them to the network operator.

Defining VTAM Start Options

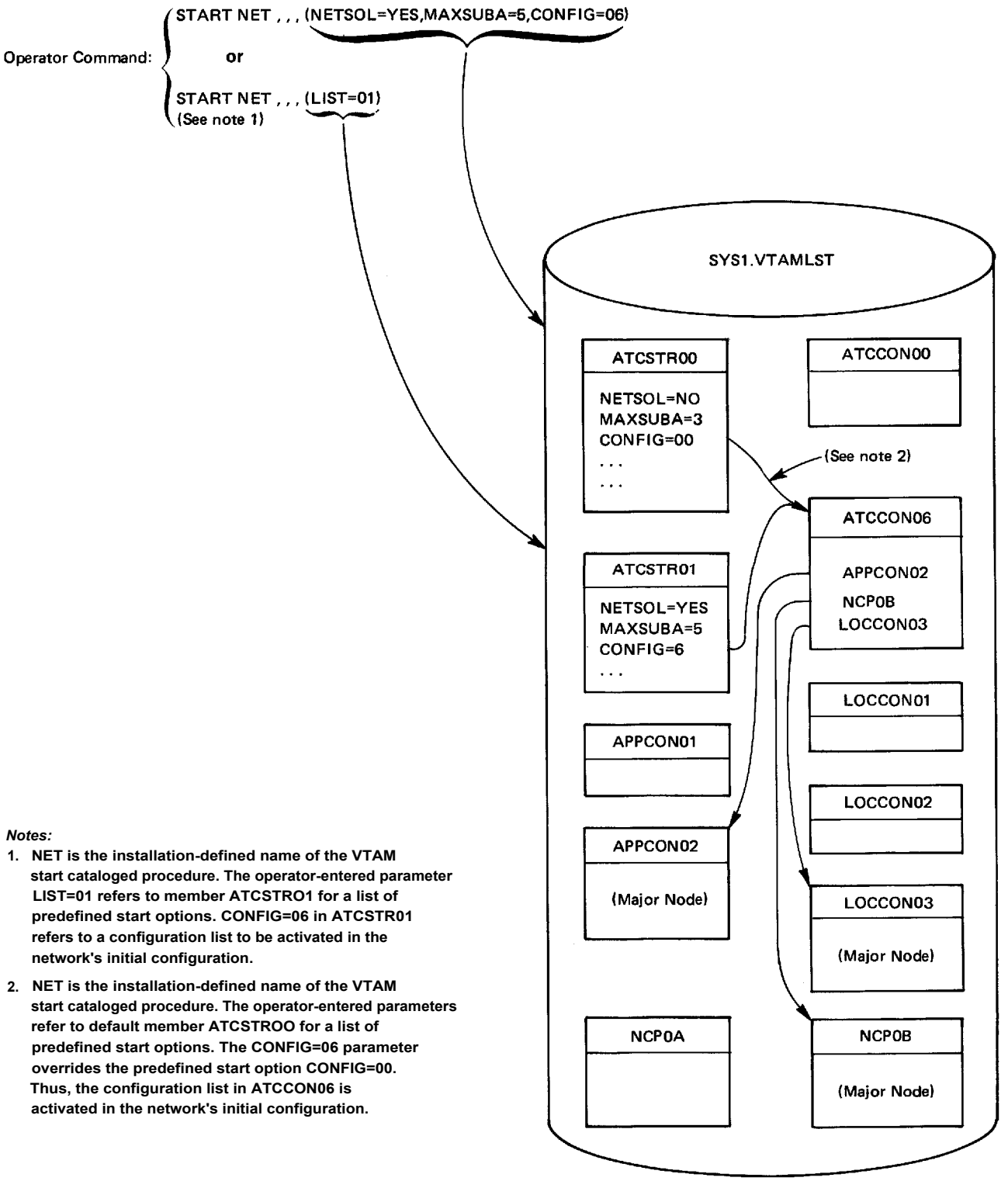
VTAM start options can be used to define how VTAM starts and controls a VTAM network. By referring to a configuration list, VTAM can activate the major nodes during VTAM initialization that are to be in the network's initial configuration. By selecting optional facilities, VTAM can start or stop VTAM traces, activate or deactivate a network solicitor, allow the network operator to be prompted, and establish the size, number, slowdown, threshold, and storage location (fixed or pageable) for each VTAM storage pool during VTAM initialization.

After selecting the start options for a VTAM network, the system programmer can then include them in start option lists, provide them to the network operator, or use them in a combination of both ways. Figure 4-1 shows how VTAM is started using a start option list and network operator parameters in the START command.

Overriding Start Options

VTAM uses the following priorities (listed from highest to lowest) to determine the start options:

Priority	Effective Start Option
Highest	Network operator replies to prompting message START command parameters (except LIST) Predefined start option list in ATCSTRyy (if LIST=yy was specified) Predefined start option list in ATCSTR00 (installation-supplied default values)
Lowest	IBM-supplied default values



Notes:

1. NET is the installation-defined name of the VTAM start cataloged procedure. The operator-entered parameter LIST=01 refers to member ATCSTRO1 for a list of predefined start options. CONFIG=06 in ATCSTR01 refers to a configuration list to be activated in the network's initial configuration.
2. NET is the installation-defined name of the VTAM start cataloged procedure. The operator-entered parameters refer to default member ATCSTROO for a list of predefined start options. The CONFIG=06 parameter overrides the predefined start option CONFIG=00. Thus, the configuration list in ATCCON06 is activated in the network's initial configuration.

Figure 4-1. Specifying VTAM Start Options

If start options conflict, the last start option that was entered overrides the previously specified one. For example, if NETSOL=YES is specified in ATCSTRyy, but NETSOL=NO is entered as a start parameter, VTAM uses NETSOL=NO.

Overriding Storage Pool Values

If only one or two values are specified for a storage pool parameter, VTAM uses the values entered and the IBM-supplied defaults for the other values. For example, if LIST=00 contains the storage pool start option PPBUF=(x,y,z) and the IBM-supplied defaults are PPBUF=(a,b ,c), then, if PPBUF=(„n) is entered as a start parameter, VTAM uses PPBUF=(a,b,n).

If one or two values of a storage pool parameter are coded or entered, the other values are taken from the IBM-supplied defaults. For example, assume LIST=00 contains the storage pool parameter PPBUF=(x,y,z), LIST=04 contains PPBUF=(r„t), and the IBM-supplied default values are PPBUF=(a,b,c). Thus, if LIST=04 was specified as a start parameter and PPBUF was not entered as a start parameter, then VTAM uses PPBUF=(r,b,t).

If the entire storage pool parameter is omitted from the START command, the storage pool values are taken from a start option list. Any values not coded there are taken from the IBM-supplied default values. For example, assume LIST=00 contains the storage pool parameter PPBUF=(x,y) and the IBM-supplied default values are PPBUF=(a,b,c). If neither LIST=yy nor PPBUF is entered as a start parameter, VTAM uses PPBUF=(x,y,c).

Creating Start Option and Configuration Lists

If a start option list is to be used, the list must have been created and put in SYS1.VTAMLST under member name ATCSTRyy. The ATCSTR00 member should contain the installation-defined defaults. Whether or not LIST=yy is entered as a parameter on the START command, VTAM attempts to locate ATCSTR00. If it does not exist, VTAM sends an error message to the network operator, followed by a message prompting the operator for start options.

If a configuration list is specified either in a start option list or by the network operator, this optional list of major node names must have been created and put in SYS1.VTAMLST under member name ATCCONxx. Also, the same major node name can be specified in more than one configuration list. For example, a group of local terminals named LOCCON01 can be in ATCCON00 and ATCCON06. However, LOCCON01 can only be activated once during VTAM initialization.

Notes:

- *The major node names in the configuration list correspond to the names assigned to the major nodes when they are defined and put into SYS1.VTAMLST using the IEBUPDTE utility program.*
- *If no configuration lists exist, the network operator must use the VARY command to activate each major node.*

VTAM Start Options

The network operator can enter VTAM start options (unless otherwise indicated in the following list of start options) as parameters in the START command or the options can be specified in a start option list. If the network operator enters the start options as parameters in the START command, the length of the entire number of parameters must not exceed the console's line length.

The format of the START command is:

START procname ,,,(parameter,parameter ,. .. ,parameter)

procname
is the name of the cataloged procedure for starting VTAM.

parameter
is one of the VTAM start options. The total number entered is limited by the line length of the console.

The format of the VTAM start options and START parameters is:

```
SSCPID=n
[COLD|WARM]
[CONFIG=xx|00|ddname]
[LIST=yy|00]    (see note 1)
[MAXSUBA=n|15]
[NETSOL=YES|NO]
[NODELST=ddname]
[PROMPT|NOPROMPT]  (see note 2)
[SUPP=NOSUP|INFO|WARN|NORM|SER]
TRACE|NOTRACE,ID= {nodename,TYPE=BUF|IO|LINE}  (see note 3)
                  {VTAMBUF,TYPE=SMS          }
[APBUF=(bno,bsz,bth[,F])]
[CRPLBUF=(bno,bsz,bth[,F])]
[IOBUF=(bno,bsz,bth)]
[LFBUF=(bno,bsz,bth)]
[LPBUF=(bno,bsz,bth[,F])]
[NPBUF=(bno,bsz,bth[,F])]    VTAM Storage Pools
[PPBUF=(bno,bsz,bth[,F])]    (see note 4)
[SFBUF=(bno,bsz,bth)]
[SPBUF=(bno,bsz,bth[,F])]
[UECBUF=(bno,bsz,bth[,F])]
[WPBUF=(bno,bsz,bth[,F])]
```

If more than one option is specified, separate them with commas (see Figure 4-1).

Notes:

1. *Only LIST=00 can be included in ATCSTR00 or ATCSTRyy. Otherwise, LIST=yy must be entered by the network operator.*
2. *The network operator cannot enter this start option. It can only be specified in a start list.*
3. *Only the network operator should enter NOTRACE after VTAM initialization. Also, VTAM accepts more than one VTAM trace start option during initialization.*
4. *More than one VTAM storage pool option can be specified for VTAM initialization.*

SSCPID=n
is a decimal number between 0 and 65535 that is part of an identifier used when a physical unit establishes contact with VTAM.

If the network configuration contains more than one locally attached communications controller whose host processors contain VTAM, the physical unit may need to verify that it has established contact with the correct VTAM. To support such physical units the installation must uniquely identify each VTAM.

VTAM uses the SSCPID value to construct a 48-bit identification sequence that is sent to the physical unit when contact is established using the ACTPU command. The identifier has the following form:

Bits 0-7:	X'05'
Bits 8-31:	X'000000'
Bits 32-47:	SSCPID value in binary

COLD|WARM

specifies the status to which the configuration restart facility of VTAM is to restore each major node in the predefined configuration list referred to by the CONFIG start parameter. See Chapter 8, "VTAM RAS Facilities," for further information about configuration restart.

COLD

instructs VTAM to restore the major node to its initial status as defined by the installation. VTAM issues VARY NET,ACT,ID=major node name,COLD for each major node identified by the CONFIG start parameter.

WARM

instructs VTAM to issue VARY NET,ACT,ID=major node name,WARM for each major node identified by the CONFIG start parameter.

VTAM uses the contents of VSAM configuration restart data sets to restore the major node to its status at the time of failure or deactivation. The installation can define a configuration restart data set to maintain a list of major nodes that are active at one time by specifying the data definition name of the data set in the NODELST start parameter. The installation defines VSAM configuration restart data sets and associates them with major nodes as described in "Delayed Configuration Restart" in Chapter 8.

When WARM is specified during VTAM startup, if a major node identified by the CONFIG start parameter does not have an associated configuration restart data set or has an associated configuration restart data set that has not been used previously by VTAM, VTAM activates the major node to its initial status. VTAM also issues an informational message.

VTAM ignores the COLD-WARM start parameter for application program major nodes and for major nodes that are not associated with configuration restart data sets. The installation can therefore restart a subset of its configuration with one command instead of issuing an individual VARY command for each major node. The VARY command fails if the network operator specifies the WARM parameter for a major node that does not have an associated configuration restart data set.

Refer to the descriptions of the activation of specific major nodes in *VTAM Network Operating Procedures* for information on the effect of the COLD-WARM parameter.

CONFIG=XX|00|ddname

specifies a list of major nodes to be activated when VTAM is started. This parameter can be specified:

- Within a predefined list of start parameters named by the LIST start parameter
- By the network operator when starting VTAM

xx
is any 2 alphanumeric characters that identify the member of the VTAM definition library that contains a list of major nodes to be activated when VTAM is started. The installation can file the list of major nodes in SYS1.VTAMLST under the member name ATCCONxx as described in this chapter under "Putting Start Option and Configuration Lists into SYS1.VTAMLST." More than one list of major nodes can be filed to give the installation a choice of configurations and to avoid having to issue a separate VARY command to activate each major node.

00
is the default value for the CONFIG start parameter. A user-defined configuration list of major nodes can be filed under the member name ATCCON00. VTAM uses this predefined list if the network operator does not specify the CONFIG parameter in the START command or if the CONFIG parameter is omitted from the set of LIST start parameters. If a default configuration list does not exist when VTAM is started, an error message is sent to the network operator. VTAM initialization continues without the configuration list.

ddname
specifies the 3- to 8-character data definition name of a configuration restart VSAM data set containing a list of major nodes that are active at the time of failure or deactivation. VTAM must have previously used the data set to record a list of active major nodes; that is, the name of the data set must have been specified in the NODELST parameter when VTAM was previously started.

The installation must include a DD statement using this data definition name in the VTAM start procedure.

If the data set is empty, VTAM does not activate any major nodes during startup. The network operator is prompted for an authorization code if a password is required for VTAM to gain either update or full access to the data set.

Notes:

- *VTAM uses the default configuration list (ATCCON00): (1) if the network operator does not enter the CONFIG option in the START command, or (2) if the predefined list of start options (in ATCSTRyy) does not specify the CONFIG option.*
- *If VTAM attempts to locate the default configuration list (ATCCON00) and one does not exist, VTAM sends an error message to the network operator. VTAM initialization continues without a configuration list.*

LIST=yy|00
indicates which list of predefined start options (identified by the last two alphanumeric digits in the member named ATCSTRyy) is used to initialize a specific VTAM network. Each ATCSTRyy member is a list in SYS1.VTAMLST, and the installation can specify any two alphanumeric digits (for yy) to identify installation-defined lists of start options. If 00 is specified for yy, VTAM uses member ATCSTR00 for the default list of start options.

Notes:

- *Only LIST=00 can be included in ATCSTR00 and ATCSTRyy. Otherwise, LIST=yy must be entered by the network operator when starting VTAM. LIST=00, identifying the default start list ATCSTR00 , cannot be entered by the network operator.*

- *If the network operator enters more than one LIST option, VTAM processes only the last LIST option that was entered.*

MAXSUBA=n| 15

indicates a decimal number 3 to 255. The number specifies, for the network configuration being activated, (1) the highest SUBAREA value that can be assigned to a major node ID, and (2) the maximum number of NCP and local 3270 major nodes that can be active at one time.

The following example illustrates how to select a MAXSUBA value. Assume that the installation is installing these major nodes:

- Two local 3270 major nodes
  LBUILD SUBAREA=2
  LBUILD SUBAREA=3
- Two local SNA major nodes
  VBUILD SUBAREA=4
  VBUILD SUBAREA=5
- Two switched SNA major nodes
  VBUILD SUBAREA=6
  VBUILD SUBAREA=7
- A local NCP
  BUILD SUBAREA=8
- Two remote NCPs
  BUILD SUBAREA=9
  BUILD SUBAREA=10

In this configuration, nine major nodes have SUBAREA values. A MAXSUBA value of at least 10 is required, because the highest SUBAREA value is 10.

If the SUBAREA value of one of the major nodes is arbitrarily set to 50, a minimum MAXSUBA value of 50 is required. Selecting a MAXSUBA value greatly in excess of the required minimum severely limits the number of minor nodes that can be contained in each major node. The number of minor nodes permitted in each major node is governed by the MAXSUBA value, as shown in Figure 4-2. (For this figure, a minor node is any node represented by a PU, LU, CLUSTER, TERMINAL, COMP, or LOCAL statement.) A glance at the third column of Figure 4-2 shows that, as the value of MAXSUBA increases, the number of minor nodes in each major node decreases.

On the other hand, if the value of MAXSUBA is too low (such as the absolute minimum of 10, in this example), the MAXSUBA value must be increased if the installation adds more major nodes. The MAXSUBA start parameter must be changed, and all the NCPs containing the MAXSUBA value have to be changed and regenerated.

The MAXSUBA value may be selected as follows:

1. Determine the minimum required MAXSUBA value (in this example, 10).
2. Locate the row in Figure 4-2 that contains this MAXSUBA value (in this example, the third row contains the MAXSUBA range of 8-15, which encompasses the MAXSUBA value of 10).
3. Use the *highest* MAXSUBA value *of the next row (in* this example, 31).

Range of MAXSUBA Values	Range of SUBAREA Values	Maximum Number of Minor Nodes for Each Major Node*	Maximum Number of Possible Major Nodes
2-3	2-3	16,381	2
4-7	2-7	8,089	6
8-15	2-15	4,093	14
16-31	2-31	2,045	30
32-63	2-63	1,021	62
64-127	2-127	509	123
128-255	2-255	253	254

* These limits apply if the network contains both SDLC terminals and BSC or start-stop terminals. If the network contains only SDLC or only BSC and start-stop terminals, add 1 to each limit.

Figure 4-2. MAXSUBA Values

The value selected for MAXSUBA is also specified for the MAXSUBA parameter of each NCP's BUILD macro instruction. These MAXSUBA values need not necessarily be identical, but they must all be within the same MAXSUBA range (as shown in the first column of Figure 4-2) and they must all be at least equal to the highest SUBAREA value in the network.

The MAXSUBA relationship is due to VTAM's internal addressing structure. VTAM uses a 16-bit field to form the address of each minor node. The field has two parts. The first part identifies the major node and is formed directly from the binary SUBAREA value selected for that major node; the second part identifies the minor node and is a binary value derived from the relative position of the minor node's definition statement. The sizes of the two parts are not fixed (although the total is always 16 bits).

If MAXSUBA=3, meaning that only 2 bits are required for the major node part, the remaining 14 bits are available for the minor node part - over 16,000 minor nodes can be represented for each major node. Because a higher MAXSUBA value requires more bits, fewer bits are available to represent minor nodes. Note that the ranges shown in the first column of Figure 4-2 correspond to the values represented by a given number of bits.

Figure 4-2 shows (1) the valid values that can be assigned to the MAXSUBA start option, (2) the range of valid SUBAREA values (that represent NCP and local 3270 major nodes), and (3) the number of minor nodes that can be defined to each major node.

Notes:

- *The value specified in the MAXSUBA operand (in the NCP BUILD macro instruction) and the SUBAREA values (specified in the SUBAREA operands in the NCP BUILD macro instructions and the VTAM LBUILD definition statements) must correspond to the value in the MAXSUBA start option to the extent indicated in Figure 4-2.*
- *If the MAXSUBA value is changed and a previously defined NCP or local 3270 major node (created when the old value was in effect) is used with the new MAXSUBA value, its RDT must be deleted from SYS1. VTAMOBJ before the node is activated so that a new RDT can be created with the correct values in it.*

- *For each NCP that is active at the same time, the value specified in the MAXSUBA operand (in the NCP BUILD macro instruction) must be the same and must correspond to the value in the MAXSUBA start option.*
- *The value in the MAXSUBA start option is a power of two, minus one, (3,7,15,31,63,127,255) within the range 3-255. Thus, if the value assigned to MAXSUBA is not one listed in Figure 4-2, VTAM rounds the specified value to the next higher such value. (For example, any value specified from 16 to 30 is rounded to 31.)*
- *A minor node (in Figure 4-2) attached to an NCP is defined by each COMP, LINE, TERMINAL, LU, and CLUSTER (but not GROUP) NCP macro instruction; a minor node (terminal) for a local terminal configuration is defined by each VTAM LOCAL definition statement.*

NETSOL=YES|NO
indicates whether the VTAM logon monitor facility (referred to as the network solicitor), for devices that use basic mode, is to be attached as a VTAM subtask when VTAM is started.

YES
indicates that VTAM is to attach either the IBM default network solicitor or a modified network solicitor during VTAM initialization.

Notes:

- *For this command to apply to a modified network solicitor, the modified one must be named NETSOL and link-edited as load module ISTNSC00 in SYS1 . VTAMLIB (replacing the IBM default network solicitor).*
- *The command MODIFY NETSOL=YES or NETSOL=NO can also be used to start and stop either the IBM default network solicitor or a modified network solicitor.*

NO
indicates that VTAM is not to attach a network solicitor during VTAM initialization.

NODELST=ddname
specifies the data definition name of a configuration restart VSAM data set in which VTAM maintains a list of all major nodes that are active at one time.

After deactivation or a failure of the host operating system, the host CPU, or VTAM, the installation can activate major nodes that were active at the time of deactivation or failure by specifying

```
START VTAM,CONFIG=ddname
```

The data definition name must be specified in the NODELST parameter when VTAM is started.

The network operator is prompted for an authorization code if a password is required for VTAM to gain either update or full access to the data set.

If NODELST and CONFIG specify the same data definition name when VTAM is restarted, VTAM activates the major nodes listed in the configuration restart data set. The data set is updated when major nodes are activated or deactivated, or if an attempted activation of a major node to its prior status fails.

If the data definition name specified in NODELST is different from the data definition name specified in CONFIG when VTAM is restarted, the data set identified by NODELST is erased during startup before any major nodes are activated.

PROMPT|**NOPROMPT**

indicates whether prompting messages are to be sent to the network operator for start options.

PROMPT

indicates that a prompting message for start options (IST051A ENTER VTAM START PARAMETERS) is to be sent to the network operator.

Notes:

- *The network operator cannot enter this start option. It can be specified only in start list ATCSTR00. A specification of NOPROMPT* cannot *be overridden by specifying PROMPT in the start command or another start list.*
- *If VTAM encounters an error during VTAM initialization, VTAM also prompts the network operator.*

NOPROMPT

indicates that no prompting messages are to be sent to the network operator.

SUPP=NOSUP|**INFO**|**WARN**|**NORM**|**SER**

specifies the highest class of VTAM error messages for which VTAM suppresses printing at the network operator console. After VTAM has been started, the network operator can use the SUPP parameter of the MODIFY command to suppress messages. The SUPP start parameter and the SUPP parameter of MODIFY are identical in form and effect:

NOSUP

specifies that all VTAM messages are to be printed at the console (NOSUP indicates "no suppression").

INFO

specifies that *informational* messages are to be suppressed. Informational messages are those that may tell the operator something about system activity but have little or no effect if omitted.

WARN

specifies that *warning* messages (as well as informational messages) are to be suppressed. Warning messages are usually diagnostic messages that could reveal some symptom of which the operator should be aware. Warning messages, like informational messages, usually indicate that VTAM is proceeding as instructed.

NORM

specifies that *normal* error messages (as well as informational and warning messages) are to be suppressed. Normal error messages are generally issued when VTAM rejects a network operator command (for improper syntax, for example) and seldom indicate that an abnormal situation exists other than the invalid command itself. Most VTAM messages are normal error messages.

SER

specifies that *serious* error messages (as well as informational, warning, and normal error messages) are to be suppressed. Serious error messages usually involve an impending abnormal termination of a user task.

Error messages that indicate an even more serious situation, such as the abnormal termination of a user task or of VTAM itself, cannot be suppressed. Messages that are generated in response to an operator request (such as the DISPLAY command) and messages that require a response (prompting messages) also cannot be suppressed.

The following messages are *not suppressible:*

IST015A	IST125A	IST209A
IST043I	IST134I	IST272A
IST051A	IST135I	IST278A
IST056A	IST136I	IST282A
IST0661	IST140I	IST284A
IST075I	IST146I	IST290A
IST076I	IST147I	IST330I
IST077I	IST148I	IST340I
IST0791	IST1491	IST341I
IST080I	IST151I	IST650I
IST081I	IST167I	IST651I
IST0821	IST168I	IST654I
IST083I	IST170I	IST679I
IST084I	IST171I	IST802I
IST089I	IST183A	IST803I
IST095A	IST201I	IST852I

The following messages are *informational* messages:

IST093I	IST184I	IST409I
IST097I	IST185I	IST410I
IST105I	IST186I	IST412I
IST109I	IST187I	IST413I
IST110I	IST188I	IST415I
IST120I	IST189I	IST416I
IST133I	IST190I	IST417I
IST141I	IST268I	IST420I
IST143I	IST270I	IST421I
IST144I	IST285I	IST512I
IST145I	IST400I	IST513I
IST169I	IST405I	IST670I
IST180I	IST406I	IST676I
IST181I	IST407I	IST690I
IST182I	IST408I	

The following messages are *warning* messages:

IST138I	IST419I	IST693I
IST174I	IST671I	IST694I
IST401I	IST672I	IST695I
IST414I	IST680I	IST800I
IST418I	IST689I	IST801I

The following messages are *serious* error messages:

IST003I
IST040I
IST137I
IST142I
IST681A
IST683I
IST684I

All other VTAM operator messages are *normal* error messages. See *OS/VS Message Library: VS2 System Messages,* GC38-1002, for a description of the above messages.

```
TRACE|NOTRACE,ID=  { nodename,TYPE=BUF|IO|LINE }
                   { VTAMBUF,TYPE=SMS          }
```

TRACE
indicates that VTAM is to start a specific type of VTAM trace for a specific node or for monitoring the usage of all the VTAM storage pools. Once started, the trace remains in effect until it is stopped either by stopping VTAM or by the network operator's entering the MODIFY command with the NOTRACE parameter. More than one VTAM trace can be in effect at the same time; however, a separate trace option must be specified to start each type of trace for each specific node or for tracing VTAM storage pool usage.

NOTRACE
indicates that VTAM is to stop the trace specified in the ID and TYPE parameters.

ID=nodename
indicates the specific node for which a VTAM trace is to be started or stopped. If it is a buffer or I/O trace (TYPE=BUF or TYPE=IO respectively), then *nodename* corresponds to the name assigned to a terminal or logical unit (when the major and minor nodes were put in SYS1.VTAMLST by the IEBUPDTE utility program). If it is a line trace (TYPE=LINE), then *nodename* corresponds to the *symbol* on the NCP LINE macro instruction that represents the same line.

Note: *Each terminal or logical unit to be traced must be explicitly specified in a TRACE start option.*

TYPE=BUF |IO |LINE
indicates the specific type of VTAM trace that is to be started or stopped for a node. Only one type of VTAM trace can be specified in each TRACE start option (whether specified by the network operator or predefined in a list of start options). In the TYPE parameter, BUF is specified for a VTAM buffer trace, IO for a VTAM I/O trace, or LINE for an NCP line trace.

ID=VTAMBUF,TYPE=SMS
indicates that VTAM is to monitor the number of VTAM requests to obtain elements in the VTAM storage pools. (When a specified number of requests occurs, the trace creates a record to show how the pools were being used at that time.) When specifying TYPE=SMS, ID=VTAMBUF must also be specified.

Note: *If GTF (with USR trace option) is active and VTAM queues a request for a storage pool element, VTAM creates a storage pool record (whether or not the storage pool trace has been started).*

poolname=(bno,bsz,bth[,F])
indicates the name, values, and attributes for a specific VTAM storage pool. VTAM dynamically allocates and deallocates space from both fixed and pageable storage pools for its control blocks, I/O buffers, and channel programs.

poolname
indicates the name of a specific VTAM storage pool:

APBUF
CRPLBUF
IOBUF
LFBUF
LPBUF
NPBUF
PPBUF
SFBUF
SPBUF
UECBUF
WPBUF

(bno,bsz,bth [,F])
indicates the values and attributes for each VTAM storage pool:

bno
Maximum number of elements that are to be in a pool

bsz
Size in bytes of each element in a pool

bth
Threshold value for the number of elements in a pool

F
A pageable storage pool is to be fixed in storage

Note: *The term* F *attribute applies only to storage pools that are in pageable storage. If the attribute is specified for a storage pool that has a default location in fixed storage, VTAM ignores it.*

To determine the appropriate values for each storage pool, consult the VTAM storage pool information in Chapter 9, "Tuning VTAM."

Storage Pool Defaults

The *bno, bsz,* and *bth* values for each storage pool start option are positional. If not all the values are coded or entered in an option, VTAM uses the values provided and the IBM-supplied defaults for the other values. If an entire start option is not coded or entered in the START command, VTAM uses the storage pool values from a start option list. Any values not coded there are taken from the IBM defaults.

For example, if IOBUF=(15,,13) is specified in LIST=01, then the start option IOBUF=(15,84,13) is in effect during VTAM initialization because 84 is the IBM *bsz* default value for IOBUF. Also, using this same example, if IOBUF is not specified in the START command, LIST 30, or LIST=01, then the 1BM default values for IOBUF are in effect [IOBUF(100,84,81)] .

Putting Start Option and Configuration Lists into SYS1.VTAMLST

To put a list of predefined start options or a configuration list of major nodes into SYS1.VTAMLST, follow these steps:

1. Code the start options for the start list or the major node names for the configuration list in 80 byte card-image format as follows:

Card Column 1	Card Column 71
[b..] item [,item...]	...

[b..]
indicates that one or more blanks can precede the first *item;* optional.

item
indicates either (1) a major node name for a configuration list or (2) a start option for a start list.

If *item* is a major node name for a configuration list:

- List the major node names for VTAM application programs first. This allows VTAM to activate them first and prevents VTAM from issuing messages to the network operator that these programs are inactive.
- If any *item* is the name of a remote NCP, that major node name must follow the local NCP major node name to which it is attached.

Notes:

- *Separate each* item *in a list with a comma; no intervening blanks are permitted.*
- *Column 72 is reserved for the continuation indicator. Do not use columns 73 through 80.*
- *To continue a list of* items *onto another record: (1) place a comma after the last item in the current record, (2) enter a non-blank character in column 72 of the current record, and (3) start the next item in any column of the new record.*
- *Continuation characters must not be omitted, or no further records will be read for that member.*

2. Use the IEBUPDTE utility program (1) to assign a member name in SYS1.VTAMLST to each list and (2) to put the lists into SYS1.VTAMLST.

Notes:

- *Configuration lists must be assigned a member name of ATCCONxx (where xx is* two *alphanumeric digits defined by the installation to identify the list).*
- *Start option lists must be assigned a member name of ATCSTRyy (where yy is two alphanumeric digits defined by the installation to identify the list).*
- *Code a separate ADD, REPLACE, DELETE, or CHANGE utility control statement for each member being stored or changed in SYS1.VTAMLST.*
- *When using IEBUPDTE to put lists into SYS1.VTAMLST, VTAM definition members can also be put into SYS1.VTAMLST during the same execution of IEBUPDTE.*

Figure 4-3 shows priorities of the various ways in which start parameters can be entered.

Overriding Priorities of Start Parameters	Permissible Combinations (Arranged by Column)				
1. Parameters reentered by the network operator if VTAM detects a previous error in item 3, 4, or 5 below	X	X	X	X	X
2. Parameters entered by the network operator when prompted, in the same priority as items 4 and 5 below		X			
3. Parameters other than LIST entered by the network operator with the START command			X		X
4. Parameters in member ATCSTRyy when the network operator enters the LIST parameter of the START command				X	X
5. Parameters predefined by the installation and filed in member ATCSTR00 *	X	X	X	X	X
6. IBM-supplied values	X	X	X	X	X
* Member ATCSTR00 must be filed even if it contains no start parameters					

Figure 4-3. Overriding Priorities and Permissible Conbinations of VTAM Start Parameters

Example of Putting Start Option and Configuration Lists into SYS1.VTAMLST

In this example:

- A default configuration list and an alternate configuration list are put into SYS1.VTAMLST using the IEBUPDTE utility program.
- A default configuration list and an alternate start option list are put into SYS1.VTAMLST using the IEBUPDTE utility program.

```
//ADDLISTS    JOB     09#660,SMITH
//STEP1       EXEC    PGM=IEBUPDTE,PARM=MOD
//SYSPRINT    DD      SYSOUT=A
//SYSUT1      DD      DSNAME=SYS1.VTAMLST,DISP=OLD
//SYSUT2      DD      DSNAME=SYS1.VTAMLST,DISP=MOD
//SYSIN       DD      *
./              ADD     NAME=ATCCON00,LIST=ALL,LEVEL=01,SOURCE=0
./            NUMBER    NEW1=10,INCR=100
          APPCON01,NCP0A,LOCCON01
./              ADD     NAME=ATCCON06,LIST=ALL,LEVEL=01,SOURCE=0
./            NUMBER    NEW1=10,INCR=100
         APPCON02,NCP0B,NCPREM0A,LOCCON01,LOCCON03
./              ADD     NAME=ATCSTR00,LIST=ALL,LEVEL=01,SOURCE=0
./            NUMBER    NEW1=10,INCR=100
./             NETSOL=YES,IOBUF=(50,124,45)
                ADD     NAME=ATCSTR01,LIST=ALL,LEVEL=01,SOURCE=0
./            NUMBER    NEW1=10,INCR=100
              CONFIG=06,MAXSUBA=5,NETSOL=YES
./              ENDUP
/*
```

The EXEC statement specifies (1) the program name (PGM=IEBUPDTE) and (2) that the input to IEBUPDTE is from card input and the input data set (PARM=MOD).

The SYSPRINT DD statement defines the output message data set (a printer is assumed).

The SYSUT1 DD statement defines the input data set SYS1.VTAMLST (it is assumed to be cataloged).

The SYSUT2 DD statement defines the output data set SYS1.VTAMLST (it is assumed to be cataloged and to have enough space originally allocated to accommodate these new members).

The SYSIN DD statement indicates that input follows in the form of utility control statements and data statements.

Each ADD control statement indicates (1) that records (subsequent data statements) are to be placed in a member (identified by the NAME operand) in the output data set SYS1.VTAMLST,(2) that the data statements are to be listed in the message data set, and (3) that change level 01 and source value 0 are to be recorded in the directory entry of the output member.

Each NUMBER control statement assigns sequence numbers to the data statements. The data statements contain blank sequence numbers in columns 73 through 80. The first record of the output member is assigned sequence number 10; subsequent record numbers are increased by 100.

The data statement to be placed in member ATCCON00 indicates the default configuration. If the network operator does not override this start option when starting VTAM, VTAM activates the following major nodes: a group of VTAM application programs named APPCON01, a local NCP named NCP0A, and a group of local terminals named LOCCON01. (These major node names correspond to the names assigned to the major nodes when they were defined and put into SYS1.VTAMLST using IEBUPDTE.)

The data statement to be placed in member ATCCON06 indicates an alternate configuration. If the network operator or a predefined list of start options specifies CONFIG=06, VTAM activates the following major nodes: a group of VTAM application programs named APPCON02 , a local NCP named NCP0B, a remote NCP attached to NCPOB and named NCPREM0A, and two groups of local terminals named LOCCON01 and LOCCON03. These major node names correspond to the names assigned to the major nodes when they were defined and put into SYS1.VTAMLST using IEBUPDTE.

The data statement to be placed in member ATCSTR00 indicates the default list of start options. If the network operator does not override these start options when starting VTAM or in response to a prompting message during VTAM initialization, VTAM is initialized with these start options in effect: CONFIG=00, MAXSUBA=15, NETSOL=YES,PROMPT,IOBUF=(50,84,45), no VTAM traces started, and the IBM-supplied values for the remaining VTAM storage pools.

The data statement to be placed in member ATCSTR01 indicates an alternate list of start options. If the network operator does not override these start options when starting VTAM or in response to a prompting message during VTAM initialization, VTAM is initialized with these start options in effect: CONFIG=06 (as defined in this input job stream), MAXSUBA=5, NETSOL=YES,PROMPT, no VTAM traces started, and the IBM-supplied values for the VTAM storage pools.

The ENDUP control statement indicates the end of SYSIN input to this job step.

Chapter 5. Defining Logon Mode and USS Definition Tables

The different types of logons provide varying degrees of resource sharing and of installation control over the network. They also require varying degrees of installation preparation and application program involvement, The system programmer must:

- Decide on the type or types of logon for each terminal (including logical units)
- Carry out the system definition and installation preparations required for each type of logon
- Inform application programmers of the logon facilities available for their use and the requirements for using the facilities

Before an application program and a terminal can communicate with each other, a *connection* must be established between them. Connection is the process by which VTAM establishes an association between the internal control blocks that represent a terminal and an application program. The existence of a connection means that a physical path is available for the transfer of data between the application program and the terminal and that VTAM is ready to handle the transfer. For terminals attached by switched lines, for example, connection includes a dial-in or dial-out operation. For SNA terminals, connection includes an exchange of commands between VTAM and the physical and logical units (in SNA terms, SSCP-physical unit, SSCP-logical unit, and logical unit-logical unit sessions are established).

A request by or on behalf of a terminal to be connected to an application program is called a *logon request.* Four types of logon requests are defined and explained in *VTAM Concepts and Planning* in terms of the source of the logon request:

Automatic logon, in which VTAM automatically logs a terminal on to an application program (the terminal's definition statements indicate whether this is to be done)

Terminal-initiated logon, in which the terminal enters a message that causes it to be logged on to a selected application program. (See Chapter 6, "Interpret Tables and the Network Solicitor.")

Application program logon, in which one application program passes a terminal (that is already connected to it) to another application program

Network operator logon, in which the network operator can cause a specified terminal to be logged on to a specified application program

The network operator VARY command overrides any automatic logon designation for a terminal. The new automatic logon specification remains in effect until overridden by another VARY ACT command with the LOGON option, or until the major node containing the terminal is deactivated and reactivated with the COLD option specified. That is, if the terminal is deactivated and then reactivated (no intervening deactivation of the major node), the new logon specification is still in effect. If a *major node* is deactivated and later reactivated with the COLD option specified, the automatic logon conditions specified at VTAM definition are in effect.

Logon Modes and Session Parameters

The immediate effect of a logon request is to notify the application program that a terminal is "waiting" for the application program to establish connection and begin communicating with it. When an application program establishes connection with a logical unit (as contrasted with a BSC or start-stop terminal, discussed later), the application program tells VTAM and the logical unit how the communication session is to be conducted.

The information about the communication session is contained in a 24-byte field whose bit positions represent *session parameters.* These parameters have meanings such as "the application program will send chained data" or "the logical unit will not send end-of-bracket commands to the application program." Session parameters are described in detail later in this chapter.

The installation can define a single name that the logical unit and the application program can use to represent the entire 24-byte sequence of session parameters. This name is known as the *logon mode name.* Typically, VTAM receives a logon mode name as part of the logon request and returns a set of session parameters (specified by the application program) as part of the connection process.

To associate a logon mode name with a particular set of session parameters, the installation builds a *logon mode table* with MODETAB, MODEENT, and MODEEND macro instructions that are assembled and link-edited into SYS1.LPALIB (Figure 5-1). The name of the logon mode table is the name supplied as an operand in the linkage editor NAME statement when the table is link-edited into SYS1.LPALIB.

To associate a logon mode table with a logical unit, the name of the table is included in the LOGMODE operand of the logical unit's LU statement (or a higher level PU statement, or in a GROUP or LINE macro instruction).

If the installation has not designated a logon mode table for a logical unit, an IBM-supplied logon mode table ISTINCLM is used. ISTINCLM may be replaced in SYS1.LPALIB with an installation-written default table. If a blank logon mode is specified, the session parameters are those taken from the first entry of the logon mode table being used.

The source of the logon mode name during program execution is not necessarily the logical unit, but depends on the source of the logon request itself. A logon mode name also can be supplied by the network operator, by VTAM (as part of the automatic logon process), or by another application program.

Regardless of the source of the logon request, the disposition of the logon mode name is up to the application program. The application program can issue an INQUIRE macro instruction (1) to obtain the session parameters associated with the logon mode name supplied to it, or (2) to submit a logon mode name of its own selection and obtain the session parameters that are associated with that name in the logon mode table for that logical unit. When the application program issues an OPNDST macro instruction to establish connection with the logical unit, the application program indicates the logon mode name or the session parameters to be used during the communication session. Specifically, the application program issuing OPNDST can:

- Supply a logon mode name whose session parameters are known
- Directly supply the session parameters to be used

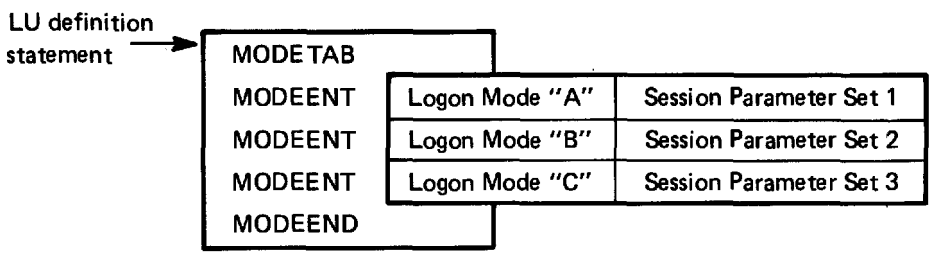


Figure 5-1. Logon Mode Table Macro Instructions

- Use the logon mode name that has been submitted to it (with or without having examined the name)
- Use the default session parameters that the installation has established for the logical unit

The *VTAM Macro Language Guide*, GC27-6994, and *VTAM Macro Language Reference*, GC27-6995, describe how the application program handles session parameters.

For information on particular session parameters required by logical units and application programs, see the component description manuals for devices or the documentation of particular programs that run as application programs.

MODETAB Macro Instruction

The MODETAB macro instruction indicates the beginning of a logon mode table and is coded as follows:

Name	Operation	Operand
[name]	MODETAB	

name
if coded, is used as a CSECT name for the logon mode table to be generated.

MODEENT Macro Instruction

A MODEENT macro instruction associates a logon mode name with a set of session parameters. The session parameters cited in this macro description are defined in Appendix J of the *VTAM Macro Language Reference.* It is coded as shown below and follows a MODETAB or another MODEENT macro.

Name	Operation	Operand
[name]	MODEENT	[LOGMODE=name] [,FMPROF=value] [,TSPROF=value] [,PRIPROT=value] [,SECPROT=value] [,COMPROT=value] [,RUSIZES=value] [,PSERVIC=value]

To determine which values should be coded for the FMPROF, TSPROF, PRIPROT, SECPROT, COMPROT, RUSIZES, and PSERVIC operands, a programmer must first be familiar with the features that are available on the devices in his or her network, and the programmer must have decided how he or she wants to use those features. To find information on the features available for a particular device, the programmer should see the appropriate system programmer's guide or component description for a device. This information will help in deciding which session parameters should be used. Then the programmer should refer to Appendix J in the *VTAM Macro Language Reference.* This appendix will tell the programmer what bits must be set to obtain the desired session parameters. (If the *VTAM Macro Language Reference* identifies a bit as being "reserved," that bit should be set to 0.)

name
may be coded if desired. It has no function in the specification of a logon mode table.

LOGMODE=name
is a 1- to 8-character symbol that specifies the logon mode to be used as a key for the session parameters in this table entry. The default value is eight blanks, but blanks for the name are valid only in the first entry in the table. This name is known as the *logon mode name.*

FMPROF=value
represents the function manager profile (byte 1 in the session-parameter field) for this logon mode. Any hexadecimal number in the range 00 to FF (or its equivalent decimal value) may be specified for *value.* Values 2, 3, and 4 have defined meanings, which are described in *VTAM Macro Language Reference.* The default value is 0.

TSPROF=value
represents the transmission services profile (byte 2 in the session-parameter field) for this logon mode. Any hexadecimal number in the range 0 to FF (or its equivalent decimal value) may be specified for *value.* Values 2, 3, and 4 have defined meanings, which are described in *VTAM Macro Language Reference.* The default value is 0.

PRIPROT=value
represents the primary logical-unit protocol (byte 3 in the session-parameter field) for this logon mode. Any hexadecimal number in the range 0 to FF may be specified for *value.* The default value is 0.

SECPROT=value
represents the secondary logical-unit protocol (byte 4 in the session-parameter field) for this logon mode. Any hexadecimal number in the range 0 to FF may be specified for *value.* The default value is 0.

COMPROT=value
represents the common logical-unit protocols (bytes 5 and 6 in the session-parameter field) for this logon mode. Any hexadecimal number in the range 0 to FFFF may be specified for *value.* The default value is 0.

RUSIZES=value
represents the transmission services usage field (bytes 9 and 10 in the session-parameter field) for this logon mode; it specifies the maximum length of data (a request unit) in bytes that can be sent by the application program (primary LU) and the logical units (secondary LUs) with which the application program can communicate.

Specify RUSIZES as 4 hexadecimal digits. The leftmost 2 digits describe the secondary LU and the rightmost 2 digits describe the primary LU. The format is the same for both sets of digits. The first digit is the mantissa (m) and the second digit is the exponent (n) in the formula m * 2", from which VTAM calculates the maximum length of data that can be sent by the primary or secondary LU.

For example, RUSIZES=X'96A8' specifies that the secondary LU can send a maximum length of $9 * 2^6$ (or 576) bytes and the primary LU can send a maximum of $10 * 2^8$ (or 2560) bytes.

The digit representing the mantissa should be in the range 8 to F, while the digit representing the exponent should be in the range 0 to F. If both the mantissa and exponent are set to 0, or if RUSIZES is not specified, the maximum length of data is not defined.

PSERVIC=value
represents the logical-unit presentation services profile (bytes 13 through 24 in the session-parameter field) for this logon mode. Code a 24-digit hexadecimal number as the *value,* using the bit settings described in *VTAM Macro Language Reference* as a guide. If the PSERVIC operand is not coded, a *value* of 0 is assumed.

MODEEND Macro Instruction

The MODEEND macro instruction indicates the end of the logon mode table. It follows a MODEENT macro instruction and is coded as follows:

Name	Operation	Operand
[name]	MODEEND	

name
may be coded if desired

The IBM-Supplied Logon Mode Table (ISTINCLM)

ISTINCLM must be present in SYS1.LPALIB when VTAM is started. Otherwise VTAM cannot be started. Figure 5-2 shows the macro instructions that form this table.

Logon and Logoff Commands

When a logical unit is ready to establish connection with a particular application program, it sends a logon request to VTAM specifying the application program's name and (optionally) a logon mode name and some additional user data.

The logon request can be sent as an Initiate Self command whose format is fixed. Some SNA terminals (specifically the 3600, 3650, 3660, and 3790 physical units) can automatically reform their logical unit's logon requests into Initiate Self commands. VTAM, however, allows any logical unit to send a logon request in a variable form. Similarly, a logoff request can be sent as a Terminate Self command, to cause the application program to break the connection between itself and the logical unit. VTAM also allows any logical unit to send a logoff request in a variable form. The "variable" logon or logoff request is called an unformatted, or *character-coded* command.

```
ISTINCLM  MODETAB
IBM3767   MODEENT  LOGMODE=INTERACT,FMPROF=X'03',TSPROF=X'03',PRIPROT=X'B1',SECPROT=X'A0',COMPROT=X'3040'
IBM3770   MODEENT  LOGMODE=BATCH,FMPROF=X'03',TSPROF=X'03',PRIPROT=X'A3',SECPROT=X'A3',COMPROT=X'7080'
IBMS3270  MODEENT  LOGMODE=S3270,FMPROF=X'02',TSPROF=X'02',PRIPROT=X'71',SECPROT=X'40',COMPROT=X'2000'
IBM3600   MODEENT  LOGMODE=IBM3600,FMPROF=X'04',TSPROF=X'04',PRIPROT=X'F1',SECPROT=X'F1',COMPROT=X'7000'
IBM3650I  MODEENT  LOGMODE=INTRACT,FMPROF=X'00',TSPROF=X'04',PRIPRDT=X'B1',SECPROT=X'90',COMPROT=X'6000'
IBM3650U  MODEENT  LOGMODE=INTRUSER,FMPROF=X'00',TSPROF=X'04',PRIPROT=X'31',SECPROT=X'30',COMPROT=X'6000'
IBMS3650  MODEENT  LOGMODE=IBMS3650,FMPROF=X'00',TSPROF=X'04',PRIPROT=X'B0',SECPROT=X'90',COMPROT=X'4000'
IBM3650P  MODEENT  LOGMODE=PIPELINE,FMPROF=X'00',TSPROF=X'03',PRIPROT=X'30',SECPROT=X'10',COMPROT=X'0000'
IBM3660   MODEENT  LOGMODE=SMAPPL,FMPROF=X'03',TSPROF=X'03',PRIPROT=X'A0',SECPROT=X'A0',COMPROT=X'0081'
IBM3660A  MODEENT  LOGMODE=SMSNA100,FMPROF=X'00',TSPROF=X'00',PRIPROT=X'00',SECPROT=X'00',COMPROT=X'0000'
          MODEEND
```

Figure 5-2. LOGMODE Entries in the IBM-Supplied Logon Mode Table

For logical units that are sources of character-coded commands, the installation can associate the logical unit's definition statement with a *USS definition table* that converts the command into either a logon or a logoff command of the following format:

LOGON [APPLID(name)] [LOGMODE(name)] [DATA(user data)]

APPLID(name)
specifies the name of the application program with which a session is to be established.

LOGMODE(name)
is used to select a set of session parameters for the session to be established.

DATA(user data)
specifies user data to be made available to the application program's LOGON exit.

LOGOFF [APPLID(name)] [TYPE(COND | UNCOND)] [HOLD(YES | NO)]

APPLID(name)
specifies the name of the application program with which a session is to be terminated. If omitted, the application program with which a current session exists is assumed.

TYPE(COND| UNCOND)
specifies whether conditional or unconditional termination of the active session between the logical unit and the application program is requested. If conditional termination is requested, the logical unit is disconnected at the discretion of the application program.

HOLD(YES| NO)
specifies the action the logical unit expects VTAM to take in regard to disconnecting the physical unit after the logical unit has itself been disconnected. A HOLD value of YES corresponds to a "NOT LAST" indicator on a Terminate Self command. The effect of HOLD depends on the setting of the DISCNT parameter specified on the PU statement. The relationship between HOLD and DISCNT is described in the DISCNT parameter of the PU (local) and PU (switched) statements in Chapter 3, "Defining the Network," and in the PU macro instruction description in the NCP generation manual.

The installation creates the USS definition table, like the logon mode table, by assembling and link-editing macro instructions into SYS1.VTAMLIB. USSTAB, USSCMD, USSPARM, USSMSG, and USSEND macro instructions are used to build the tables (see Figure 5-3). The name of the USS definition table is the name supplied as an operand in the linkage-editor NAME statement when the table is link-edited into SYS1.VTAMLIB.

To associate a USS definition table with a logical unit, the name of the table (the label of the USSTAB macro) is included in the logical unit's definition statement.

USS returns messages to the logical unit if the logon or logoff commands are invalid. For example, USS informs the logical unit if the logical unit's input sequence is not translatable by the USS definition table.

An IBM-written USS definition table is supplied as part of VTAM. This table, ISTINCDT, is described later in this chapter. If this table is suitable for all logical units, the installation need not build any USS definition tables. In this situation, the logical unit must send its character-coded logon and logoff commands to VTAM in the format described above. If ISTINCDT is not suitable for a particular logical unit, USS macro instructions must be employed to create a new table for that logical unit.

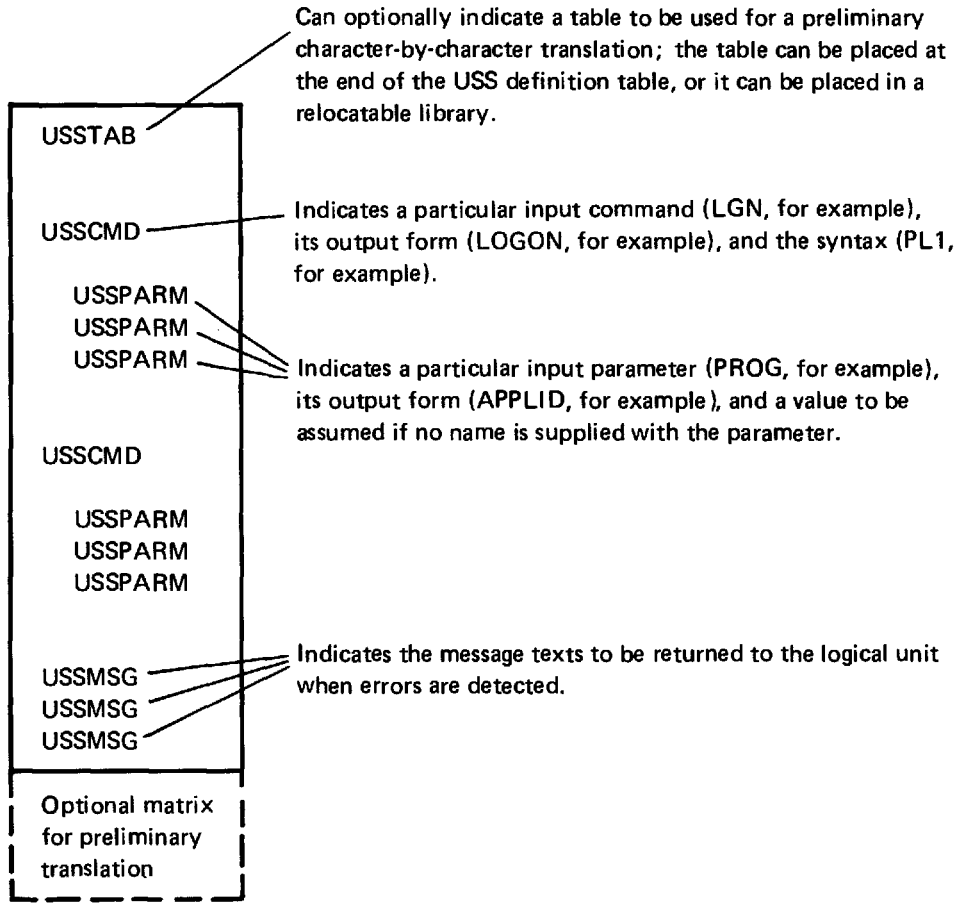


Figure 5-3. USS Definition Table Macro Instructions

Tailoring the USS Definition Table

The IBM-supplied USS definition table, ISTINCDT, may be replaced, or additional modules may be link-edited into SYS1.VTAMLIB. Character translation, command translation, command format (PL/I or assembler language), and USS message text can be defined by the USS definition table associated with a logical unit.

To create a USS definition table, assemble a USSTAB macro instruction followed by a USSCMD macro instruction and its associated USSPARM macro instructions for each command to be defined. Code a USSMSG macro for each message text to be defined. If a character translation table is to be specified, code the table using assembler DC statements. If the table is to be part of another module, code an EXTRN statement for the table name. Follow this with a USSEND macro instruction to indicate the end of the table definition.

Link-edit the resultant object deck into SYS1.VTAMLIB and specify the module name in the USSTAB parameter of the LU definition statement for each logical unit to be supported by this definition table.

The following macro instructions define a USS definition table. A description of ISTINCDT, an explanation of the command conversion process (including examples), and a description of character-coded command syntax appear at the end of the chapter following these macro instructions.

USSTAB Macro Instruction

The USSTAB macro instruction indicates the beginning of a USS definition table to be generated. It may optionally specify the table to be used for character translation. See "Conversion of Character-Coded Commands" later in this chapter for a description of the character translation process.

Name	Operation	Operand
[name]	USSTAB	[TABLE=name]

name
is used as a CSECT name for the USS definition table to be generated.

TABLE=name
specifies a definition table containing a translation table to be used by VTAM to translate each character-coded command received from a logical unit. If the table is not part of the module containing USSTAB, an EXTRN statement should be coded for the specified name.

If no translation table is specified, VTAM uses the translation table associated with ISTINCDT, the IBM-supplied USS definition table.

USSCMD Macro Instruction

USSCMD identifies a set of definition statements to be associated with a verb entered by a logical unit. It may also specify the syntax of the user-entered character-coded command.

Name	Operation	Operand
[name]	USSCMD	CMD=name [,REP=name] [,FORMAT=PL1| BAL]

name
is any valid symbol and is optional.

CMD=name
specifies the user-entered verb to select this alternative command definition.

Note: *No two CMD parameters should specify the same verb for a single USS definition table.*

REP=name
specifies the valid command (LOGON or LOGOFF) to replace the user-entered verb specified by the CMD parameter. If REP is not coded, the user-entered verb is not changed (CMD must then specify LOGON or LOGOFF in this case).

FORMAT=PL1| BAL
indicates the syntax of the user-entered command. If FORMAT is not specified or is specified incorrectly, FORMAT=PL1 is used. See "Character-Coded Command Syntax" for a description of the syntax, the input character set, and PL/I and Assembler Language value restrictions.

USSPARM Macro Instruction

The USSPARM macro instruction identifies a keyword or positional parameter that may be coded in a command. The command is associated with the verb identified by the previous USSCMD definition. A keyword to identify the positional or keyword value in the converted command and a default for the value may be specified.

Name	Operation	Operand
[name]	USSPARM	PARM=Pn|name [,REP=name] [,DEFAULT=value]

name
is any valid symbol and is optional.

PARM=Pn
identifies a positional parameter. n is a decimal number between 1 and the maximum number of positional parameters for the command. Pn indicates for which positional parameter in the user-entered command the alternative parameter applies.

PARM=name
specifies the keyword that identifies the parameter to which the alternative parameter applies.

Note: *The same PARM parameter should not be coded more than once for a single command.*

REP=name
specifies a keyword in the converted command. The value of the keyword is taken from the parameter specified by PARM. If PARM specifies a keyword parameter, this value is a replacement for that keyword. If PARM specifies a positional parameter, this is the keyword for which that positional parameter is a value.

If REP is not coded, the user-entered keyword is used in the converted command.

Such positional parameters as P1, P2,... may also be used as keywords. For multiple specifications of the same parameter, the last value specified is used (as shown in Example C at the end of this chapter).

DEFAULT=value
specifies a default value to be used for the parameter identified by the PARM parameter if the parameter is omitted. Single quotation marks in the default value must be specified as in the assembler DC statement for character (C-type) constants.

If a keyword parameter or a positional parameter is not entered for a character-coded command, the DEFAULT value from USSPARM is used; if DEFAULT is not specified, a null value is used.

For assembler language, if a keyword is specified without any value (KWD=" or KWD=, for example), a null value is used. If " is specified for a positional parameter, a null value is used.

For PL/I, a keyword is specified without any value (KWD( )or KWD, for example), a null value is used. If (") is specified for a positional parameter, a null value is used.

USSMSG Macro Instruction

The USSMSG macro instruction defines an alternate message text for a USS message. To determine under what circumstances a message is issued, refer to Appendix B.

Name	Operation	Operand
[name]	USSMSG	MSG=n | (n1,n2, ...),TEXT='message text'

name
is any valid symbol and is optional.

MSG=n | (n1 ,n2, ...)
indicates the USS messages to be redefined. Enter decimal numbers between 1 and 9. The numbers correspond to the USS messages below (these messages are explained in Appendix B):

MSG=1 corresponds to message 'INVALID COMMAND SYNTAX'
MSG=2 corresponds to message 'verb COMMAND UNRECOGNIZED'
MSG=3 corresponds to message 'parameter PARAMETER UNRECOGNIZED'
MSG=4 corresponds to message 'parameter PARAMETER INVALID'
MSG=5 corresponds to message 'UNSUPPORTED FUNCTION'
MSG=6 corresponds to message 'SEQUENCE ERROR'
MSG=7 corresponds to message 'SESSION NOT BOUND'
MSG=8 corresponds to message 'INSUFFICIENT STORAGE'
MSG=9 corresponds to message 'MAGNETIC CARD DATA ERROR'

TEXT='message text'
specifies the text to replace the USS messages identified by the MSG parameter.

Single quotation marks in the message text must be specified as in the assembler DC statement for character (C-type) constants.

Variable data in the replacement text of a message is indicated by a percent sign, "%". A percent sign in message 3 or 4 is replaced by the keyword used to enter an erroneous keyword parameter or by Pn. n is a decimal number corresponding to the sequential position of an erroneous positional parameter value. In any other messages, the percent sign is replaced by the verb entered by the user (if possible) or is deleted from the message text if the entered verb cannot be ascertained.

If more than one percent sign is contained in a message prototype, all such percent signs are replaced by the same character string.

The maximum length of a message after replacement of any percent signs is 255 characters. If a message exceeds 255 characters, only the first 255 characters are sent to a terminal.

The following characters may be used for USS messages:

26	uppercase letters	A-Z
3	national characters:	$, [, @,
10	numeric digits:	0-9
12	special characters:	b ' = ( ) , + - * . / &
1	control character:	New line (NL = X'15')

National characters (and any graphic or control characters not listed above) are sent to a terminal user only if present in installation-specified message replacements or in user-supplied variable data.

USSEND Macro Instruction

The USSEND macro instruction indicates the end of a USS definition table.

Name	Operation	Operand
[name]	USSEND	

name
is any valid symbol and is optional.

This macro instruction has no parameters.

The IBM-Supplied USS Definition Table (ISTINCDT)

When VTAM receives a character-coded command from a logical unit, VTAM first searches the user-specified definition table. If the input command is not located, or if no table has been defined for that logical unit, USS searches the IBM-supplied definition table ISTINCDT. An installation can tailor the definition of USS commands and messages by simply replacing the module ISTINCDT in SYS1.VTAMLIB with an installation-modified table field as ISTINCDT. Note, however, that such a replacement module could require future modification since new USS commands and messages may be added in future releases. ISTINCDT must be present in SYS1.VTAMLIB when VTAM is started. Otherwise, VTAM cannot be started.

The hierarchy of table use is as follows:

For a translate table:

Use the table specified by the TABLE parameter of the USSTAB macro instruction associated with the logical unit if one exists; otherwise, use the table associated with ISTINCDT if it exists; otherwise, do no translation.

For a verb:

Search the user-defined USS definition table and, if found, use it; otherwise, search ISTINCDT for the verb and, if found, use it; otherwise, use the verb as entered.

For parameters:

Search parameters defined for USSCMD found above. If no USSCMD is found, or if the parameter is not found, use the parameter as entered.

For messages:

Search the user-written table, and, if the message is found, use it; otherwise search ISTINCDT and, if found, use it; otherwise, use "MESSAGE NOT DEFINED."

Figure 5-4 shows the ISTINCDT macro instructions and assembler constants.

```
ISTINCDT    USSTAB      TABLE=STDTRANS
LOGON       USSCMD      CMD=LOGON,FORMAT=PL1
            USSPARM     PARM=APPLID
            USSPARM     PARM=LOGMODE
            USSPARM     PARM=DATA
LOGOFF      USSCMD      CMD=LOGOFF,FORMAT=PL1
            USSPARM     PARM=APPLID
            USSPARM     PARM=TYPE,DEFAULT=UNCOND
            USSPARM     PARM=HOLD,DEFAULT=NO
MESSAGES    USSMSG      MSG=1,TEXT='INVALID COMMAND SYNTAX'
            USSMSG      MSG=2,TEXT='% COMMAND UNRECOGNIZED'
            USSMSG      MSG=3,TEXT='% PARAMETER UNRECOGNIZED
            USSMSG      MSG=4,TEXT='% PARAMETER INVALID'
            USSMSG      MSG=5,TEXT='UNSUPPORTED FUNCTION'
            USSMSG      MSG=6,TEXT='SEQUENCE ERROR'
            USSMSG      MSG=7,TEXT='SESSION NOT BOUND'
            USSMSG      MSG=8,TEXT='INSUFFICIENT STORAGE'
            USSMSG      MSG=9,TEXT='MAGNETIC CARD DATA ERROR'
STDTRANS    DC          X'000102030440060708090A0B0C0D0E0F'
            DC          X'101112131415161718191A1B1C1D1E1F'
            DC          X'202122232425262728292A2B2C2D2E2F'
            DC          X'303132333435363738393A3B3C3D3E3F'
            DC          X'404142434445464748494A4B4C4D4E4F'
            DC          X'505152535455565758595A5B5C5D5E5F'
            DC          X'606162636465666768696A6B6C6D6E6F'
            DC          X'707172737475767778797A7B7C7D7E7F'
            DC          X'80C1C2C3C4C5C6C7C8C98A8B8C8D8E8F'
            DC          X'90D1D2D3D4D5D6D7D8D99A9B9C9D9E9F'
            DC          X'A0A1E2E3E4E5E6E7E8E9AAABACADAEAF'
            DC          X'B0B1B2B3B4B5B6B7B8B9BABBBCBDBEBF'
            DC          X'C0C1C2C3C4C5C6C7C8C9CACBCCCDCECF'
            DC          X'D0D1D2D3D4D5D6D7D8D9DADBDCDDDEDF'
            DC          X'E0E1E2E3E4E5E6E7E8E9EAEBECEDEEEF'
            DC          X'F0F1F2F3F4F5F6F7F8F9FAFBFCFDFEFF'
END         USSEND
```

Figure 5-4. The IBM-Supplied USS Definition Table (ISTINCDT)

Conversion of Character-Coded Commands

As illustrated in Figure 5-5, when VTAM receives a character-coded command from a logical unit, (1) media control characters (cursor address, set buffer address characters, magnetic card reader longitudinal redundancy characters for 3270 device control, and new line characters for SCS device control) are deleted from the command; then (2) the character string is translated according to the translation table specified by the TABLE= parameter of the USSTAB macro instruction for that logical unit. If no USS table is specified for the logical unit, or if no translation table is specified for the USS table, then VTAM uses the IBM-supplied default translation table ISTINCDT. If ISTINCDT has been replaced by an installation-written table and TABLE= has been omitted, translation is not performed. If ISTINCDT is used, lowercase letters from a to z are replaced with the corresponding uppercase letters, horizontal tab characters are replaced with blanks, and all other characters remain unchanged.

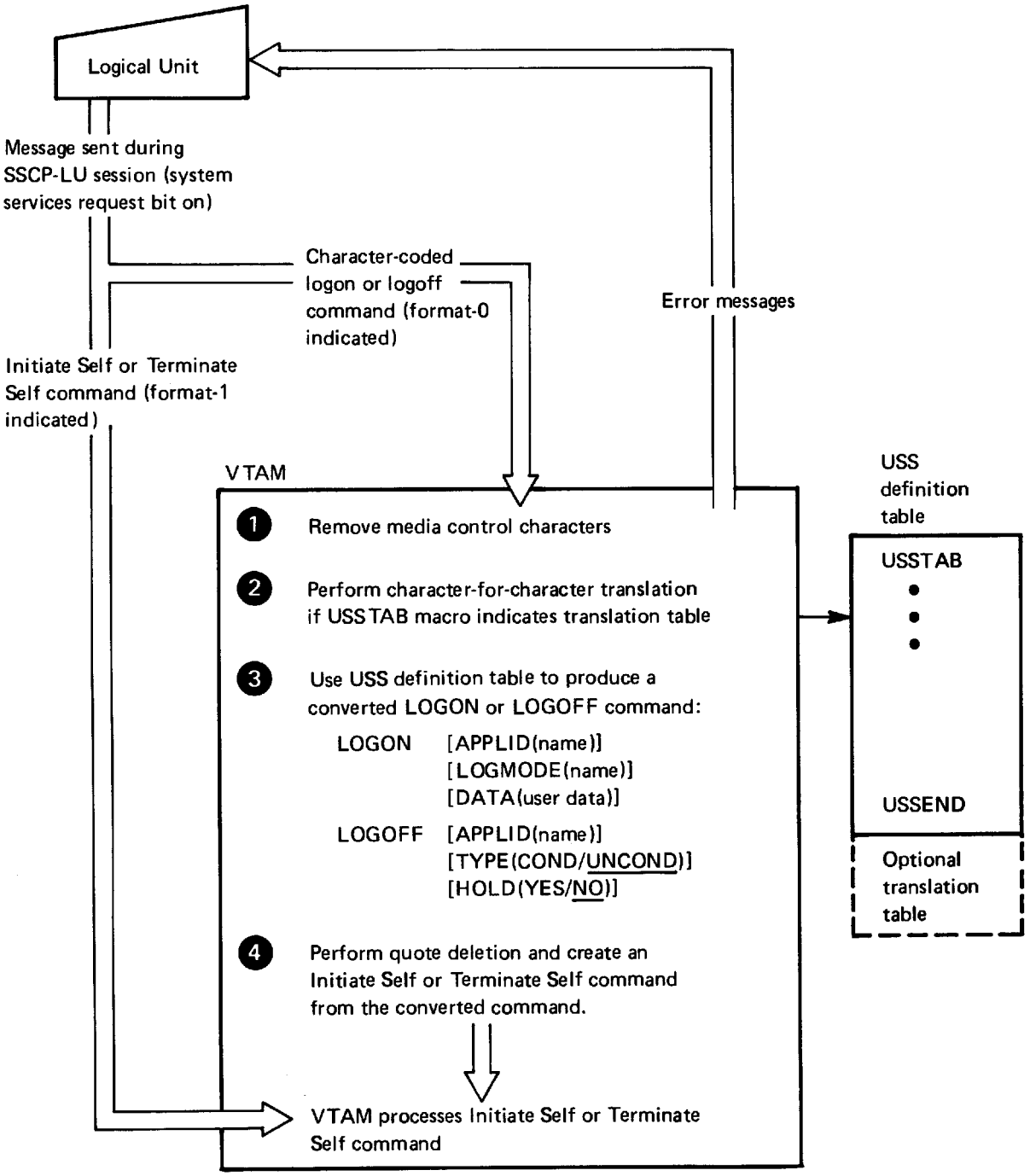


Figure 5-5. Translation and Conversion of Character-Coded Commands

Characters located between paired quotation marks are not translated. Characters entered by using an operator ID card are not translated. Single quotation marks are located before character string translation and, therefore, cannot be translated or replaced. However, other characters may be translated into single quotation marks (if not between quotation marks). Care should be taken to prevent unpaired quotation marks resulting in the converted commands.

VTAM uses the translated character string to construct a standard format USS command. It does this by (3) first using the verb (the first field) of the translated string to search the USS definition table for the associated entry built by the USSCMD macro. If a replacement verb was specified on USSCMD, that verb is placed in the converted standard command being constructed.

Parameters in the character-coded command are replaced using information supplied by the USSPARM macro instructions associated with the USSCMD macro instruction. If a parameter was not supplied and a default was given on USSPARM, the default value is placed in the converted command; otherwise, the value on the character-coded command is used. If a parameter is specified more than once, the last specification of the parameter is used.

(4) VTAM deletes quotation marks in converted commands, but only if both the first and last characters in a value are quotation marks and all intervening single quotation marks are paired (two adjacent single quotation marks). The first and last single quotation marks are deleted and each sequence of two adjacent single quotation marks is replaced by a single quotation mark. For example:

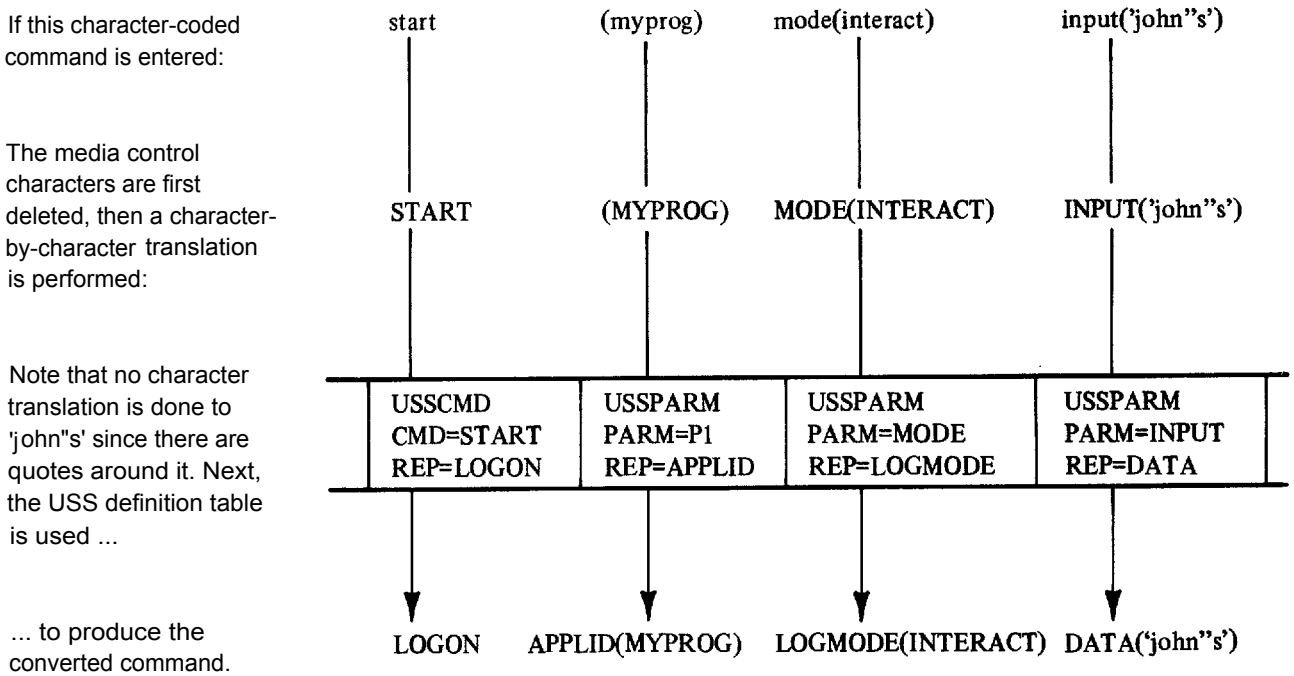
'Don''t tread on me!'	would result in	Don't tread on me!
X'a4' (X'3f)	would remain	X'a4' (X'3f)

Examples of Command Conversion

Example 1: The example in Figure 5-6 of USS command conversion **uses** this sample USS definition table:

```
        USSTAB
*
*       THE START COMMAND
*
        USSCMD      CMD=START,REP=LOGON,FORMAT=PLI
        USSPARM     PARM=P 1,REP=APPLID,DEFAULT=SYSPROG
        USSPARM     PARM=MODE,REP=LOGMODE,DEFAULT=BATCH
        USSPARM     PARM=INPUT,REP=DATA,DEFAULT=XYZ
        USSEND
```

In this example, MYPROG is a positional parameter which becomes a value when the command is converted. MODE is a keyword parameter which becomes LOGMODE after conversion.



The USS command processors change the data stream 'john''s' to john's.

Figure 5-6. Example of Command Conversion

The next two examples use the following USS definition table:

```
         USSTAB
*
*        THE RUN COMMAND
*
         USSCMD    CMD=RUN,REP=LOGON,FORMAT=BAL
         USSPARM   PARM=P1,REP=APPLID,DEFAULT=SYSPROG
         USSPARM   PARM=P2,REP=LOGMODE,DEFAULT=BATCH
         USSPARM   PARM3=P3,REP=DATA
         USSEND
```

Example 2: All parameters are omitted and, therefore, the default values are assumed during conversion. The command

```
RUN
```

results in a converted command of the form

```
LOGON APPLID(SYSPROG) LOGMODE(BATCH) DATA()
```

Example 3: Parameter P2 is defined as both a positional and a keyword parameter. The command

```
RUN A,B,C,P2=Z
```

results in a converted command of the form

```
LOGON APPLID(A) LOGMODE(Z) DATA(C)
```

Note that, since P2=Z was the last P2 specified, the value Z was used for the LOGMODE value.

The next two examples use the following USS definition table:

```
         USSTAB
*
* THE LOFF COMMAND
  *
         USSCMD    CMD=LOFF,REP=LOGOFF,FORMAT=PL1
         USSPARM   PARM=P1,REP=APPLID
         USSPARM   PARM=T,REP=TYPE,DEFAULT=COND
         USSEND
```

Example 4: This example demonstrates the use of positional and keyword parameters when FORMAT=PL1. The command

```
Loff (PRog) T(coND);
```

results in a converted command of the form

```
LOGOFF APPLID(PROG) TYPE(COND)
```

Example 5: A null value is taken instead of a default value. The command

```
LOFF (PGM) TO
```

results in a converted command of the form

```
LOGOFF APPLID(PGM) TYPE()
```

Note that, because T was coded, the default value specified in the definition table was not used. If there had been no T, TYPE(COND) would have resulted. TYPEO causes unconditional termination by system default.

The next example uses the following USS definition table:

```
         USSTAB
*
*     THE LON COMMAND
*
         USSCMD    CMD=LON,REP=LOGON,FORMAT=BAL
         USSPARM   PARM=P1,REP=APPLID,DEFAULT=TESTPROG
         USSPARM   PARM=MODE,REP=LOGMODE,DEFAULT='PROMPT'
         USSPARM   PARM=IN,REP=DATA
         USSEND
```

Example 6: This example demonstrates the positional and keyword parameters when FORMAT=BAL. The command

```
LON PROGRAM,IN='7,3,JOhn'
```

results in a converted command of the form

```
LOGON APPLID(PROGRAM) LOGMODE(PROMPT) DATA('7,3,JOhn')
```

Note that no character translation was performed on JOhn since there were single quotation marks around it. Note also that the single quotation marks around PROMPT in the default declaration have been deleted.

The next example uses the following USS definition table:

```
*       USSTAB
        USSTAB
*
*       THE ON COMMAND
*
        USSCMD      CMD=ON,REP=LOGON,FORMAT=BAL
        USSPARM     PARM=P 1,REP=APPLID
        USSPARM     PARM=LMOD,REP=LOGMODE
        USSEND
```

Example 7: This example uses a parameter (INPUT) that is not defined on the USS definition table above. The command

```
ON PGM76,LMOD=MODE,INPUT=(A,B,C)
```

results in a converted command of the form

```
LOGON APPLID(PGM76) LOGMODE(MODE) INPUT(A,B,C)
```

Note that, since INPUT is not defined on a USSPARM macro in the table above, the keyword was not changed during conversion. Note also that INPUT is not a valid parameter for the LOGON command and that this command is rejected (message 3: "INPUT PARAMETER UNRECOGNIZED"—or its replacement is written).

Character-Coded Command Syntax

The following characters may be used in a character-coded command entered by a logical unit:

All graphics characters (≥X'40')

BS (backspace: X'16')

HT (horizontal tab: X'05')

SSR (Start Secure Reader String: X'0450')

IRS (interchange record separator: X'1E')

NL (new line—X'15'); deleted from the character-string before translation

3270 SBA (Set Buffer Address: X'11'; deleted from the character string before translation)

3270 AID (Attention Identifier, deleted from the character string before translation)

In character-coded commands, parameter values cannot contain blanks, horizontal tabs, or unpaired parentheses except between paired single quotation marks. A parameter value cannot contain an odd number of single quotation marks.

After translation, verbs may contain from 1 to 8 alphanumeric characters, the first of which must be alphabetic (A-Z, $, [, or @). Keywords may contain from 1 to 7 alphanumeric characters, the first of which must be alphabetic.

Values may contain any of the following characters:

All graphics characters (≥'40')

BS (backspace: X'16')

HT (horizontal tab: X'05')

Data entered from a magnetic card reader

Magnetic card data from an SNA 3270 device is supported only if the card data is used as the *last* data in a value within quotation marks for the *last* parameter of a command. The CLEAR key should be pressed before the entry of a character-coded command containing magnetic card reader data.

If FORMAT=PL1 is specified or assumed in the USSCMD macro instruction, the following syntax for a character-coded command should be specified:

verb [(p1,p2, ...)] [keyword [(value)]] [keyword [(value)]] [...] [;]

verb
identifies the command. It is followed by one or more blanks or by a left parenthesis (that is, positional parameters).

(pl,p2,...)
is used to enter one or more positional parameters. Note that, if used, the parentheses must be coded.

keyword [(value)]
is used to enter each keyword parameter. Each keyword must be followed by one or more blanks or by a value enclosed in parentheses.

Note: *If FORMAT=PL1, coded values cannot contain semicolons except between paired single quotation marks. A positional parameter value may not contain commas except between paired single quotation marks or parentheses.*

If FORMAT=BAL is specified, the unformatted command has the following syntax:

verb [01,02, ...] [keyword= [value]] [,keyword= [value]] [...]

verb
identifies the command. It is followed by one or more blanks.

pl ,p2,...
is used to enter one or more positional parameters. Each parameter (unless it is the last in the command) is followed by a comma.

keyword=[value]
is used to enter each keyword parameter. Each parameter (unless it is the last in a command) is followed by a comma.

Note: Blanks or horizontal tab characters are not permitted in a BAL command except between the verb and the fast parameter or between paired single quotation marks. Values cannot contain commas except between paired parentheses or single quotation marks. A positional parameter may not contain equal signs except between paired parentheses or single quotation marks.

Chapter 6. Interpret Tables and the Network Solicitor

An installation can tailor VTAM to perform *automatlc* logon and to manage *terminal-initiated* logon requests for VTAM application programs. An automatic logon request causes VTAM to generate the logon request for a terminal to a specific VTAM application program. (An installation also needs automatic logon to permit terminal-initiated logons for devices that use basic mode.) A terminal-initiated logon request causes VTAM to use the logon message (entered by a logical unit or terminal user) to establish connection with a specific VTAM application program.

To provide terminal-initiated logons, consider these steps:

- Defining automatic logon capability (for terminals that use either record or basic mode).
- Providing standard logon capability (when no interpret table represents a terminal that uses basic mode).
- Defining interpret tables to contain valid logon messages (for terminals that use either record or basic mode).
- Providing a VTAM logon monitor (network solicitor) facility (an option for terminals that use basic mode).

Automatic Logon

An installation can specify that VTAM generate a logon request for a terminal to a specific VTAM application program. This occurs whenever that terminal is active and not connected or queued for connection to another VTAM application program.

For VTAM to perform an automatic logon, the name of the VTAM application program is specified in the LOGAPPL operand. If it is a local terminal, the program's name is coded in the LOGAPPL operand of the VTAM LOCAL definition statement that represents this terminal. If it is a remote terminal, the program's name is coded in the LOGAPPL operand of the NCP macro instructions (GROUP, LINE, CLUSTER, VTERM, TERMINAL, LU, or COMP) that represent this terminal.

The name in the LOGAPPL operand can be either of the following:

- The name assigned to the VTAM application program (by a VTAM APPL definition statement in SYS1.VTAMLST)
- NETSOL, if the installation is using the IBM-supplied network solicitor

Note: *Do not specify NETSOL in an NCP LU macro instruction, because the IBM-supplied network solicitor does not monitor loglcal units.*

OS/VS2 Logon

VTAM provides a logon message format that can be used in place of logon messages specified in interpret tables. This OS/VS2 format is available to terminals (interactive or input-only) that use basic mode. It is not available to terminals that use record mode.

If OS/VS2 logon is used, it can lessen the security of the VTAM network by allowing a terminal to request connection to any VTAM application program and not just to those specified in an interpret table. To help solve this problem, an installation can add data, such as a password, to the standard LOGON message for use by one or both of these routines:

- A logon-interpret routine in a VTAM application program that allows this program to determine whether to accept or reject the connection request
- The installation-written, authorization exit routine that determines whether to accept or reject the connection request

To enter the OS/VS2 logon, the terminal is assigned to the network solicitor, but an interpret table is not specified for the terminal. NETSOL is coded in the LOGAPPL operand, and the LOGTAB operand is not coded in the NCP macro instructions (GROUP, LINE, CLUSTER, TERMINAL, VTERM, and COMP) and VTAM LOCAL definition statements that are to represent this terminal. Thus, if the network solicitor encounters a logon message from a terminal that does not have an interpret table specified, it assumes that the message is an OS/VS2 logon message.

Note: *When an OS/VS2 logon message is entered from a 3275 or 3277 terminal, the terminal's control unit inserts leading device control characters into the message. Since the IBM-supplied network solicitor deletes any leading (and trailing) device control characters from these logon messages, VTAM application programs should not expect these characters to be part of the standard logon message format.*

The format of the OS/VS2 logon message is:

```
LOGON
   or
LOGON {b} [other-data {b} ] APPLID(applname) [{b} other data ]
      {,}            {,}                     {,}
```

LOGON
indicates that this is an OS/VS2 logon message. LOGON is required and must be the fast word of the logon message.

other-data
indicates optional, installation-defined information that can be made available to a VTAM application program.

APPLID(applname)
indicates the name of the VTAM application program to which the terminal is to be connected; this parameter is optional.

If *APPLID(applname)* is specified, then *applname* must be a 1- to 8-alphanumeric character name of a VTAM application program. (The *applname* must also correspond to the name assigned to the VTAM application program by a VTAM APPL definition statement in SYS1.VTAMLST.)

other-data
indicates optional, installation-defined information that can be made available to a VTAM application program, such as accounting or security information that identifies the terminal user.

If only LOGON or LOGON is specified, then TCAM is the default application name assigned. To pass other-data to TCAM, the full logon sequence must be used.

Interpret Tables

Interpret tables define valid terminal-initiated logon messages to VTAM and indicate which VTAM application programs are to be notified of the connection request for each valid logon message. Interpret tables can be used for terminal-initiated logons from logical units and from start-stop and BSC terminals (in record and basic mode). The installation codes the interpret tables and includes them in SYS1.LPALIB when it is tailoring VTAM.

An interpret table is constructed with three VTAM macro instructions:

INTAB: Defines the name of the interpret table

LOGCHAR: Defines a single logon message and either the name of the VTAM application program or the name of a logon-interpret routine

ENDINTAB: Defines the end of the interpret table

The INTAB and ENDINTAB macro instructions specify a group of logon messages and each message defined by a LOGCHAR macro instruction. A group of these macro instructions is called an interpret table. Each interpret table must be assembled and link-edited into SYS1.LPALIB.

If the LOGCHAR macro instruction specifies the name of a logon-interpret routine, then the installation must write that routine. The routine must determine the appropriate VTAM application program that is to be notified of the connection request (for a valid logon message).

All logon-interpret routines specified in an interpret table must also be assembled and link-edited with that interpret table into SYS1.LPALIB.

INTAB Macro Instruction

The INTAB (interpret table) macro instruction defines an interpret table that lists the VTAM application programs (including ISTOLTEP for TOLTEP) to which one or more terminals can establish connection. One INTAB macro instruction defines the name of the interpret table and a group of logon message definitions.

The format of the INTAB macro instruction is:

Name	Operation
name	INTAB

name
is 1 to 8 alphanumeric characters and must not begin with a $ character.

Notes:

- *Each name should be unique to identify the interpret table to the VTAM network.*
- *When the INTAB, LOGCHAR, and ENDINTAB macro instructions are assembled, this name is the entry point to the interpret table CSECT.*
- *When using the linkage editor to put the intepret table into SYS1.LPALIB, this name can also be assigned to the member in SYS1.LPALIB for this interpret table. This assignment prevents different names for the same interpret table (one for the entry point to the interpret table CSECT, and another as the name in the LOGTAB operand that otherNCP macro instructions and VTAM definition statements use to refer to this interpret table).*

- *The same name coded in the INTAB macro instruction should also be used as the operand for the assembler language END statement.*
- *Specify name in the LOGTAB operand as the name assigned to the interpret table when it was put into SYS1.LPALIB by the linkage editor. (LOGTAB permits a terminal to initiate a logon request and associates the specified interpret table with this terminal. LOGTAB can be specified in the VTAM LOCAL definition statement and in the GROUP, LINE, CLUSTER, LU, TERMINAL, VTERM, and COMP NCP macro instructions.)*

LOGCHAR Macro Instruction

Each LOGCHAR (logon characteristics) macro instruction defines a single logon message and either the name of a VTAM application program or the name of a logon-interpret routine. More than one LOGCHAR macro instruction can be included in an interpret table.

Sequence of LOGCHAR Macro Instructions: VTAM compares the logon message (character by character) with successive entries in the specified interpret table. If all the characters in the logon message correspond to characters in an entry in the interpret table, VTAM accepts the logon message as valid (even though the logon message can be longer than the corresponding entry in the interpret table). If the first character or characters of a logon message are identical, the LOGCHAR macro instructions should be arranged so that the logon sequences for the logon messages are from most restrictive to least restrictive. An example of this is:

```
SEQ1 LOGCHAR APPLID=(APPLICID,AP2),SEQNCE='LOG2'
SEQ2 LOGCHAR APPLID=(APPLICID,AP1),SEQNCE='LOG'
```

Otherwise, in the preceding example, if sequence LOG had preceded LOG2 in the interpret table, both logon messages LOG and LOG2 would be valid logon requests to VTAM application program API.

The format of the LOGCHAR macro instruction is:

Name	Operation	Operand
[label]	LOGCHAR	APPLID= { (APPLICID,name) / (ROUTINE,routinename) } (SEQNCE='characters')

label
is 1 to 8 alphanumeric characters and must not begin with a $ character; it is optional.

APPLID=[(APPLICID,name) I (ROUTINE ,routinename)]
indicates either (1) the name of the VTAM application program, or (2) the name of a logon-interpret routine.

(APPLICID,name)
indicates the *name* of the VTAM application program, and is identical with the *name* assigned to the VTAM application program by a VTAM APPL definition statement.

(ROUTINE ,routinename)
indicates the *routinename* of the associated logon interpret routine.

Note: *All logon-interpret routines specified in an interpret table must be assembled and link-edited with that interpret table.*

SEQNCE='characters'
indicates (1) the required part of a terminal logon message or (2) a logon request from a Program Attention key on a terminal component of the IBM 3270 display system.

If *characters* is a logon message:

- Optional information, which is not specified in the LOGCHAR macro instruction, can be used by the logon-interpret routine (if the ROUTINE parameter is specified), or by a VTAM application program's LOGON exit routine.
- To continue the character string to another record in the SEQNCE operand, enter a nonblank character in column 72 and start the character string in column 16.
- To specify an apostrophe or an ampersand within the logon message, code a double apostrophe or a double ampersand within the character string.
- Do not specify a one-character logon message that corresponds to an IBM 3270 AID (attention identification) character except to identify a logon message initiated by a 3270 Program Attemtion key. The AID characters are: the numbers (1 to 9), the characters: [@ = - Y ' — % >, and the comma.
- To allow a terminal user to use lowercase letters in the logon message, the character string must be recoded (as by multipunching) using the lowercase EBCDIC codes.
- Do not specify blanks as the first characters of a logon message because VTAM deletes leading blanks from logon messages entered by a terminal user. Thus the logon message would not correspond to the logon message specified in the SEQNCE operand.
- Do not specify leading and trailing device control characters within a character string that is to be validated by the IBM network solicitor, which deletes these characters.
- Do not specify device control characters within a character string that is to be validated by the IBM network solicitor, which changes these characters in a logon message to blanks. Code a blank within the character string to represent each embedded device control character.
- For non-SNA terminals, the length of the entire logon message (required information plus optional information) is limited to the number of characters that can be accommodated on one line of the terminal being logged on to a maximum of 255. For SNA terminals, the length is limited to 255 characters. (VTAM deletes new line [NL] characters before the INTRPRET macro instruction is completed.)

If *characters* is a logon message from one of the 3270 Program Attention keys (the Program Function (PF) keys and the Program Access (PA) keys), the character string is the one-character AID (Attention identifier) character that corresponds to the appropriate PF or PA key pressed by the terminal user. The AID characters are: the numbers (1 to 9), the characters: [@ = - Y ' — % >, and the comma.

Note: *If SEQNCE is not coded in one LOGCHAR macro instruction and if a logon message does not correspond to the character string of the SEQNCD operand in a preceding LOGCHAR macro instruction in the interpret table, VTAM accepts this logon message and requests logon for this terminal to the VTAM application program specified in the LOGCHAR macro instruction (the one in which SEQNCE is not coded). Thus, do not place a LOGCHAR macro instruction at the beginning of the interpret table (immediately following the INTAB macro instruction) without coding the SEQNCE operand. Otherwise, the remaining logon messages in the interpret table are not compared with the logon message entered by the terminal user.*

ENDINTAB Macro Instruction

The ENDINTAB (end interpret table) macro instruction defines the end of an interpret table. Code one ENDINTAB macro instruction after one or more LOGCHAR macro instructions to define the end of an interpret table. The ENDINTAB macro instruction can also be followed by an assembler language END statement or by CSECTs containing one or more installation-written logon-interpret routines.

The format of the ENDINTAB macro instruction is:

Name	Operation
label	ENDINTAB

label
is 1 to 8 alphanumeric characters and must not begin with a $ character.

If an assembler-language END statement is coded, it should be in the form:

END name

where *name is* the label of the INTAB macro instruction and specifies the main entry point.

Coding Logon-Interpret Routines

The installation can code logon-interpret routines that validate logon requests and determine the name of the VTAM application program to receive the logon requests. VTAM initiates the logon-interpret routine if the interpret table that VTAM is using specifies the name of the logon-interpret routine. The routine's name must correspond to the *routinename* specified in the APPLID=(ROUTINE,routinename) operand in the LOGCHAR macro instruction.

Notes:

- *All logon-interpret routines specified in an interpret table must be assembled and link-edited with that interpret table.*
- *Since the logon-interpret routine receives the logon message as input from a terminal, the logon message can contain more data that is specified in the interpret table (the character string specified in the SEQNCE operand of the appropriate LOGCHAR macro instruction). This additional data can contain the name of the VTAM application program that is to receive the logon request or a password for the logon-interpret routine to verify.*

  For example, if SEQNCE='CREDIT STATUS' is specified in the interpret table, and a terminal user enters logon message:

  CREDIT STATUS MYID=KMG01

  CREDIT STATUS is the logon message to initiate connection to the VTAM application (determined by the logon-interpret routine). MYID=KMG01 is additional data that can be a password for the logon-interpret routine or VTAM application program to verify.

Logon-Interpret Routine Requirements

Entry From: VTAM to entry point *routinename*.

Registers at Entry:

Register	Contents
0	Length of logon message
1	↑ first byte of logon message
13	↑ save area provided by VTAM
14	Return address
15	↑ entry point of this routine

Operation: The logon interpret routine is executed synchronously under the control of VTAM and not under the control of a VTAM application program. For the VTAM application program to receive the logon request, this routine must validate the logon request, obtain the symbolic name of the application program to receive control, and provide this name to VTAM. Otherwise, the routine specifies that the logon request is invalid or that the name of the program was not found.

The logon-interpret routine must also do the following:

- Save and restore the contents of registers 2 through 14 when receiving and passing control
- Use reenterable code (the routine must not modify itself during execution)
- Perform no I/O operations; otherwise, an I/O request causes the routine to abnormally terminate.

Data Areas Defined: Installation-defined

Data Areas Referred to: Installation-defined

Data Areas Updated: Installation-defined

Routines Called: Installation-defined

Size: Installation-defined

Registers at Exit: 0 and 1 contain the name of application program (in EBCDIC characters) to which requested terminal is to be connected.

Register	Contents	
0	First 4 characters of name (left justified).	
1	Last 4 characters of name (left justified).	
2-14	Restored same as at entry	
15	Return code:	
	00	Application program is found and the name placed in registers 0 and 1
	Nonzero	Application program is not found and the name is not placed in registers 0 and 1

Note: *If the name of the application program contains fewer than 8 characters, use blanks to provide a name with 8 characters.*

Putting Interpret Tables into SYS1.LPALIB

To put interpret tables and any logon-interpret routines referred to by the interpret table into SYS1.LPALIB, follow the steps shown in Figure 6-1. The steps describe how to define interpret tables and put them into SYS1.LPALIB, and also how, with some changes to these steps, to change logon messages, logon-interpret routines, and interpret table names after the interpret tables are in SYS1.LPALIB.

Example of Defining an Interpret Table With Logon-Interpret Routines

In this example:

- An interpret table and its two associated logon-interpret routines are defined (coded), assembled, and link-edited to SYS1.LPALIB member TABLE07.
- Assembly and link-editing are done using IBM cataloged procedures.
- Five logon messages are defined in the interpret table for four VTAM application programs.
- Two logon messages that refer to two logon-interpret routines are defined in the interpret table.

Note: *The terminal that refers to any of the entries in interpret table TABLE07 has the operand LOGTAB=TABLE07 specified in the appropriate VTAM definition statement or NCP macro instruction.*

```
/INTABASM       JOB       10#990,SMITH,MSGLEVEL=1
//ASMSTEP       EXEC      ASMFC
//SYSIN         DD        *
TABLE07         INTAB
MSG1            LOGCHAR   APPLIC=(APPLICID,APPL1),SEQNCE='NEW ORDER'
MSG2            LOGCHAR   APPLID=(APPLICID,APPL2),SEQNCE='ORDER INQUIRY'
MSG3            LOGCHAR   APPLID=(APPLICID,APPL1),SEQNCE='CHANGE ORDER'
MSG4            LOGCHAR   APPLID=(ROUTINE,CHKLOGON),SEQNCE='CREDIT STATUS'
MSG5            LOGCHAR   APPLID=(ROUTINE,UPDCRDIT),SEQNCE='UPDATE CREDIT'
TABLE07         ENDINTAB
CHKLOGON        CSECT
                .
                .
                .
(instructions in routine)
                .
                .
                .
UPDCRDIT        CSECT
                .
                .
                .
(instructions in routine)
                END TABLE07
/*
//INTABLKD      JOB       10#990,SMITH,MSGLEVEL=1
//LKEDSTEP      EXEC      LKED,PARM='XREF,LIST,LET,NCAL'
//LKED.SYSLMOD  DD        DSN=SYS1.LPALIB(TABLE07),DISP=SHR
//SYSIN         DD        *
                .
                .
                .
(object deck from assembly job step)
                .
                .
                .
/*
```

Activity to Perform	Changes to Steps (listed below)
Define interpret table and any associated logon-interpret routines.	None.
Change interpret table logon messages.	**Step 1:** Add or replace LOGCHAR macro instructions in the source program. **Step 4:** Use linkage editor to replace previous member in SYS1.LPALIB.
Change logon-interpret routine.	**Step 1:** Change LOGCHAR macros in source program to correspond to the changed name of the routine. **Step 4:** Use the linkage editor to replace changed CSECTs when replacing the entire load module in SYS1.LPALI B. When changing only one CSECT in a load module containing more than one CSECT, use a linkage editor ENTRY statement to specify the entry point of a new load module.
Change interpret table name.	**Step 1:** Change the name in the INTAB macro instruction in the source program. **Steps 2-5:** Change the appropriate statements to correspond to changed name of the interpret table.

Steps

1. Code the VTAM INTAB, LOGCHAR, and ENDINTAB macro instructions for the interpret table. Then code any logon-interpret routines referred to by the VTAM LOGCHAR macro instructions.
2. Add an assembler language END statement as the last statement in the source program. (The source program contains the VTAM macro instructions for the interpret table and any logon-interpret routines referred to by the interpret table.)
3. Assemble the source program.
4. Use the linkage editor to put the assembled interpret table and its associated logon interpret routines in SYS1.LPALIB.

   Notes:

   - After making changes to SYS1.LPALIB, OS/VS2 must be reinitialized.
   - Assign a member name that corresponds to the name of the interpret table specified in the VTAM INTAB macro instruction. This avoids having different names for the same interpret table — one for the entry point to the interpret table CSECT, and the other as the parameter in the LOGTAB operand (which other NCP macro instructions end a VTAM definition statement use to refer to this interpret table).

5. Use the SYS1.LPALIB member name for the interpret table, assigned by the linkage editor, when specifying the LOGTAB operand. LOGTAB permits a terminal to initiate a logon request and associates the specified interpret table with this terminal.

   Notes:

   - The LOGTAB operand can be specified in the VTAM LOCAL definition statement and in the GROUP, LINE, CLUSTER, LU, TERMINAL, VTERM, and COMP NCP macro instructions.
   - After changing the interpret table name in the LOGTAB operand, the IEBUPDTE utility program can be used to put the changed NCP source program macro instructions and VTAM LOCAL definition statements in SYS1.VTAMLST. These macro instructions replace the previous NCP source program macro instructions and appropriate VTAM LOCAL definition statements. It is not necessary to do either a complete or partial NCP generation because LOGTAB is used only by VTAM.
   - When a member is updated, the copy of the corresponding resource definition table (RDT) on SYS1.VTAMOBJ must be deleted (using an operating-systems utility program that can delete a member of a BPAM data set). If the copy is deleted, VTAM builds (the next time the major node is activated) a new RDT (based on the modified definition) and stores a new copy on SYS1.VTAMOBJ.

Figure 6-1. Putting Interpret Tables into SYS1.LPALIB

The VTAM INTAB macro instruction defines the interpret table. The name of the macro instruction (TABLE07) represents (1) the name of the interpret table, (2) the name of the interpret table CSECT, and (3) the main entry point to the interpret table.

The VTAM LOGCHAR macro instruction, MSG1, defines the terminal logon message NEW ORDER to initiate connection to VTAM application program APPL1.

The VTAM LOGCHAR macro instruction, MSG2, defines the terminal logon message ORDER INQUIRY to initiate connection to VTAM application program APPL2.

The VTAM LOGCHAR macro instruction, MSG3, defines the terminal logon message CHANGE ORDER to also initiate connection to VTAM application program APPL1.

The VTAM LOGCHAR macro instruction, MSG4, defines the terminal logon message CREDIT STATUS to initiate connection to the VTAM application program determined by logon-interpret routine CHKLOGON.

The VTAM LOGCHAR macro instruction, MSG5, defines the terminal logon message UPDATE CREDIT to initiate connection to the VTAM application determined by logon-interpret routine UPDCRDIT.

The VTAM ENDINTAB macro instruction defines the end of interpret table TABLE07.

The logon-interpret routine CHKLOGON CSECT assembler language statement identifies the name of this logon-interpret routine and indicates that the following instructions are part of this control section.

The logon-interpret routine UPDCRDIT CSECT assembler language statement identifies the name of this logon-interpret routine and indicates that the following instructions are part of this control section.

The assembler language END statement is the last statement in the interpret table source program named TABLE07. (Note: The assembler produces an object module and an END statement for the module. The assembler-produced END statement contains an entry point only if the source language END statement contained one.)

The Network Solicitor

The VTAM network solicitor is a logon monitor facility for interactive start-stop and BSC terminals (including 3270s). An installation can use the network solicitor to permit terminal-initiated logons for these devices. Thus, if a terminal is assigned to the network solicitor, is active, and is not connected or queued for connection to a VTAM application program, the network solicitor can accept the terminal's logon request. After accepting the logon request, the network solicitor uses either an interpret table or standard logon to validate the logon message and pass it to the appropriate VTAM application program.

Notes:

- *The LOGON sequence can be all uppercase, all lowercase, or a combination of the two.*
- *The IBM network solicitor can be used to monitor any non-SNA terminal. This includes 3270s logging onto application programs that use record mode, but the terminal must be generated in basic mode.*

- *If the IBM-supplied network solicitor is monitoring a terminal and detects a hardware I/O error for the terminal, it issues a message to the network operator and stops monitoring the terminal (by issuing a VTAM CLSDST macro instruction with the RELEASE processing option specified to disconnect the terminal from the VTAM application program).*

Figure 6-2 shows how the network solicitor processes a terminal-initiated logon message.

An installation requiring a network solicitor has these choices:

- Use the IBM supplied-network solicitor
- Use the VTAM NETSOL macro instruction to generate a modified network solicitor
- Write its own program to perform network solicitor functions

IBM-Supplied Network Solicitor

When an installation includes VTAM during system generation, VTAM contains the IBM-supplied network solicitor. This network solicitor has the following values in effect, which are default values of parameters of the VTAM NETSOL macro instruction:

- NETSOL is the name.
- MSGCSECT is the name of the IBM-supplied message CSECT with its network solicitor messages.
- VTAM application programs can acquire terminals from the network solicitor by using the VTAM SIMLOGON macro instruction or the VTAM OPNDST macro instruction with the ACQUIRE option.
- No passwords can be verified by this network solicitor.
- The maximum allowable logon sequence to NETSOL is 80 characters, including device control characters.

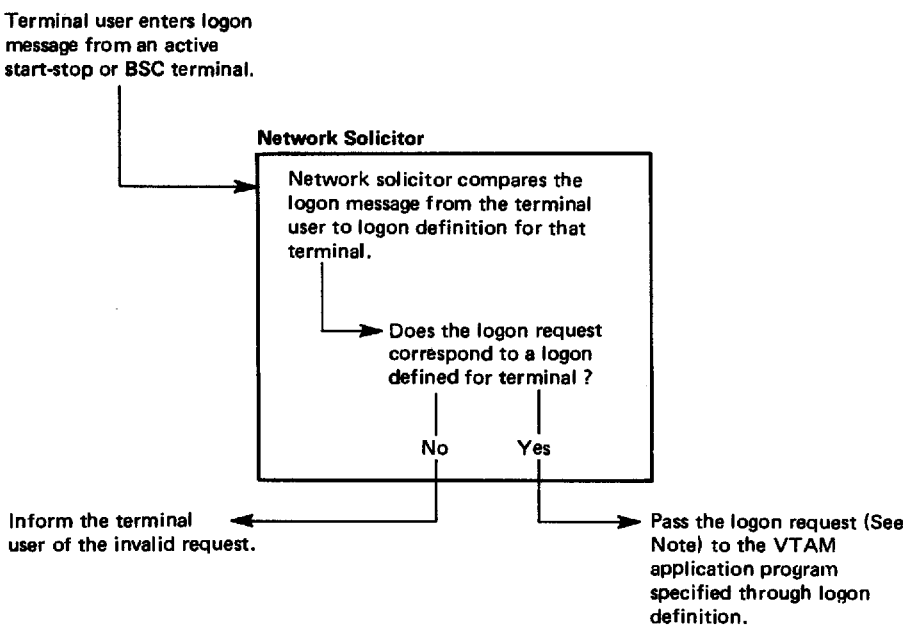


Figure 6-2. Network Solicitor Functions

To use the IBM-supplied network solicitor the installation must:

- Specify the VTAM start option NETSOL=YES to load the network solicitor when starting VTAM or use the MODIFY command with NETSOL=YES to start the network solicitor after VTAM has been started.
- Specify NETSOL in the LOGAPPL operand in all the NCP macro instructions (GROUP, LINE, CLUSTER, TERMINAL, VTERM, and COMP) and VTAM LOCAL definition statements that define the devices to be controlled by this network solicitor.
- Code the appropriate interpret tables and put them into SYS1.LPALIB (unless standard logon is to be used). Then specify the LOGTAB operand with the appropriate interpret table name (SYS1.LPALIB member name) in all the NCP macro instructions (GROUP, LINE, CLUSTER, TERMINAL, VTERM, and COMP) and VTAM LOCAL definition statements that define the devices using this interpret table.

Generating a Modified Network Solicitor

If an installation does not want to use the IBM-supplied network solicitor, it can generate a modified network solicitor by coding, assembling, and link-editing the VTAM NETSOL macro instruction. The modified network solicitor can either replace or be used in addition to the IBM-supplied network solicitor. If the modified network solicitor is a replacement, it must be link-edited into SYS1.VTAMLIB. If the modified network solicitor is to be executed concurrently with the IBM-supplied network solicitor, it can be link-edited into an installation-defined data set.

Optionally, the installation can change or replace the CSECT name and message texts issued by the IBM network solicitor.

NETSOL Macro Instruction

The NETSOL (network solicitor) macro instruction generates a network solicitor that can have a name, messages, release request, and password different from those in the IBM-supplied network solicitor. One NETSOL macro instruction is coded and assembled to define each modified network solicitor. If the modified network solicitor is a replacement, the linkage editor is used to replace the IBM-supplied network solicitor's load module (ISTNSC00) in SYS1.VTAMLIB; otherwise, the IBM-supplied network solicitor remains available for use.

The format of the NETSOL macro instruction is:

Name	Operation	Operand
[NETSOL | label]	NETSOL	[ACQUIRE=YES|NO] [,MESSAGE=csectname] [,PRTCT=password] [,STRPCNL=YES|NO]

NETSOL | label
indicates the name of this network solicitor. The default name NETSOL is coded or assumed if this network solicitor is to replace the IBM-supplied network solicitor. If this network solicitor is to be used in addition to the IBM-supplied network solicitor, *label* is coded as any symbol valid in assembler language.

Notes:

- *Only the network solicitor named NETSOL (specified with NETSOL=YES during VTAM startup) can be started and stopped by using the VTAM start options and the MODIFY command.*
- *Only the network solicitor that is executed in the VTAM private address space can use the name NETSOL.*
- ***If*** label *is the name of the network solicitor, VTAM manages it as a VTAM application program. (1) The network solicitor must be executed in its own private address space, (2)* label *must correspond to the name of a VTAM APPL definition statement in SYS1.VTAMLST defining this network solicitor to VTAM, and (3) the network solicitor must be started and stopped like a VTAM application program.*
- *If the installation has more than one network solicitor, only one can be named NETSOL.*

ACQUIRE=YES | NO

indicates whether the network solicitor is to release terminals it is monitoring when requested by a VTAM application program that issues either (1) the VTAM SIMLOGON macro instruction with the RELQ option or (2) the VTAM OPNDST macro instruction with the ACQUIRE and RELQ options.

If ACQUIRE=YES is coded or assumed by default, the network solicitor contains a RELREQ (release request) exit routine. When this exit routine is scheduled, the network solicitor releases the requested terminal (unless a logon message is being processed). If a logon message is being processed, another request is either queued or not, depending upon whether the Q or NQ parameter in the OPTCD operand was specified (in either the VTAM SIMLOGON or VTAM OPNDST macro instruction).

If ACQUIRE=NO is coded, the network solicitor's RELREQ exit routine is not scheduled when a VTAM application program attempts to acquire a terminal.

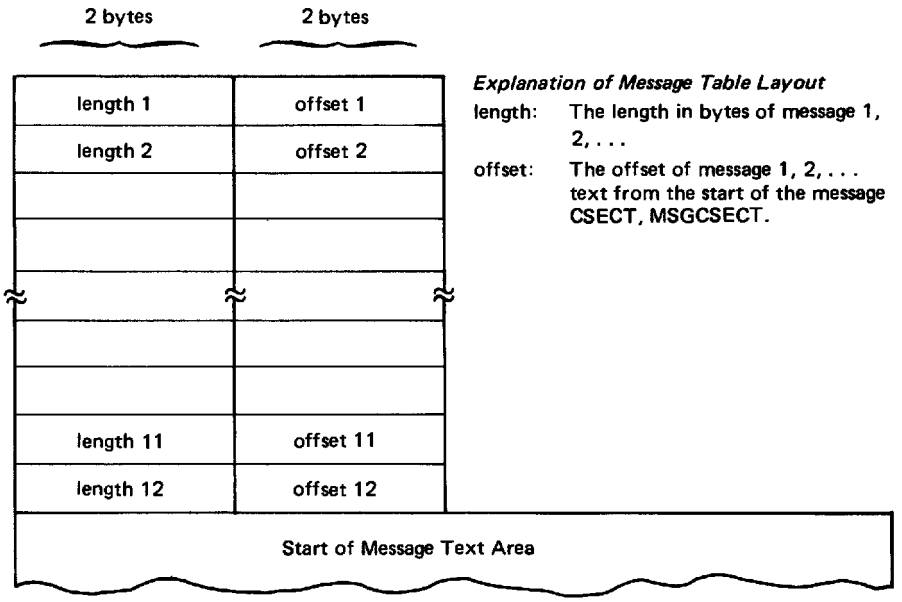
MESSAGE=csectname

indicates the name of the CSECT in the network solicitor load module that contains error messages. These error messages are sent to the terminal user when the network solicitor detects certain error conditions.

If MESSAGE is not coded, the IBM-supplied CSECT (MSGCSECT) is assembled with this network solicitor. (Figure 6-3 lists the IBM-supplied message texts in MSGCSECT; refer to the 12 DC statements labeled AMSG01 through AMSG12. See also Appendix B for an explanation of the error messages sent to the terminal user by the network solicitor.)

If MESSAGE is coded, *csectname is* specified as the CSECT name of the control section written by the installation. This CSECT replaces the IBM-supplied CSECT (MSGCSECT).

Note: *If the IBM-supplied CSECT, MSGCSECT, is used (and not replaced), MESSAGE=IBMMSG can also be coded. (This creates a V-type address constant for MSGCSECT when the NETSOL macro instruction is assembled.)*



The control section that defines the standard IBM-supplied message texts is shown below:

```
MSGCSECT  CSECT
          DC    AL2(L'AMSG01,AMSG01-MSGCSECT)
          DC    AL2(L'AMSG02,AMSG02-MSGCSECT)
          DC    AL2(L'AMSG03,AMSG03-MSGCSECT)
          DC    AL2(L'AMSG04,AMSG04-MSGCSECT)
          DC    AL2(L'AMSG05,AMSG05-MSGCSECT)
          DC    AL2(L'AMSG06,AMSG06-MSGCSECT)
          DC    AL2(L'AMSG07,AMSG07-MSGCSECT)
          DC    AL2(L'AMSG08,AMSG08-MSGCSECT)
          DC    AL2(L'AMSG09,AMSG09-MSGCSECT)
          DC    AL2(L'AMSG10,AMSG10-MSGCSECT)
          DC    AL2(L'AMSG11,AMSG11-MSGCSECT)
          DC    AL2(L'AMSG12,AMSG12-MSGCSECT)
AMSG01    DC    C'ERROR WHEN READING LOGON MESSAGE'
AMSG02    DC    C'INPUT NOT RECOGNIZED
AMSG03    DC    C'NO INTERPRET TABLE'
AMSG04    DC    C'NO ROUTINE TO RECOGNIZE APPLICATION'
AMSG05    DC    C'USER UNAUTHORIZED FOR THIS APPLICATION'
AMSG06    DC    C'APPLICATION UNKNOWN TO VTAM'
AMSG07    DC    C'APPLICATION DEACTIVATED BY NETWORK OPERATOR'
AMSG08    DC    C'APPLICATION IS INACTIVE'
AMSG09    DC    C'APPLICATION IS CLOSING DOWN'
AMSG10    DC    C'APPLICATION NEVER ACCEPTS LOGONS'
AMSG11    DC    C'APPLICATION IS NOT ACCEPTING LOGONS'
AMSG12    DC    C'THIS TERMINAL IS LOGGED ON TO THE NETWORK SOLICITOR'
          END
```

Figure 6-3. IBM-Supplied Message CSECT for the Network Solicitor

PRTCT=password

indicates a 1- to 8-character EBCDIC password for a network solicitor that has been defined by a VTAM APPL definition statement. This *password* corresponds to the *password* in the PRTCT operand of the VTAM APPL definition statement in SYS1.VTAMLST that defines this modified network solicitor. PRTCT requires that the modified network solicitor have a VTAM APPL definition statement with a password specified in the PRTCT operand.

Note: *If the network solicitor is named NETSOL, do not code PRTCT.*

STRPCNL=YES|NO

indicates whether or not the network solicitor is to strip device-control characters from logon messages before it passes the messages to the application programs.

STRPCNL=NO is useful when all the application programs being handled by the network solicitor need the device-control characters as, for example, TCAM does.

Changing the Message CSECT

The IBM-supplied message CSECT, MSGCSECT, (Figure 6-3) contains a message table with the addresses and lengths of all the messages that the network solicitor can send to a terminal user, followed by the text of each message. (See also Appendix B for an explanation of the IBM-supplied terminal user messages in MSGCSECT.) When changing or replacing the CSECT name or message texts issued by the network solicitor, follow these guidelines:

- Use any valid assembler language name for the CSECT or MSGCSECT in the *csectname* parameter in the MESSAGE operand of the NETSOL macro instruction.
- Code the table with the addresses and lengths of all the messages (instruction for instruction) as shown in Figure 6-3.
- Code each message statement label as shown in Figure 6-3; however, the message text can be shortened, expanded, or translated. The maximum message length within the single quotation marks is 130 characters; but the length of the message must not exceed the terminal's line length.
- Assemble the replacement control section along with the NETSOL macro instruction; then link-edit the resulting object module to SYS1.VTAMLIB.

Putting Modified Network Solicitors into SYS1.VTAMLIB

A modified network solicitor can either replace or be used in addition to the IBM-supplied network solicitor. To put a replacement or additional network solicitor into SYS1.VTAMLIB, follow the steps in Figure 6.4.

Steps	Follow Step To ADD/REPLACE (see key) Network Solicitor
1. Code the VTAM NETSOL macro instruction with a replacement message CSECT (if one was coded).	ADD/REPLACE
2. Assemble the VTAM NETSOL macro instruction with the replacement message CSECT (if one was coded).	ADD/REPLACE
3. Use the linkage editor to put the assembled NETSOL macro instruction (with its replacement message CSECT) in SYS1.VTAMLIB under module name ISTNSC00. (This replaces the default network solicitor load module.)	REPLACE
or	
Use the linkage editor to put the assembled NETSOL macro instruction (with its replacement message CSECT) in SYS1.VTAMLIB and assign a load module name which must not be ISTNSC00.	ADD
Note: Make these changes to SYS1.VTAMLIB before starting VTAM.	
4. Use the SYS1.VTAMLIB member name for the network solicitor (assigned by the linkage editor) when specifying the LOGAPPL operand. (LOGAPPL defines the VTAM application program, the network solicitor in this case, to which terminals are to be logged on automatically when the terminal is active.)	ADD/REPLACE
Notes: • The LOGAPPL operand can be specified in the VTAM LOCAL definition statement and in the GROUP, LINE, CLUSTER, LU, TERMINAL, VTERM, and COMP NCP macro instructions. • After changing the network solicitor name in the LOGAPPL operand, the I EBUPDTE utility program can be used to put the changed NCP source program macro instructions and VTAM LOCAL definition statements in SYS1.VTAMLST. This replaces the previous NCP source program macro instructions and appropriate VTAM LOCAL definition statements. However, it is not necessary to do either a complete or partial NCP generation because LOGAPPL is used only by VTAM. • When a member Is updated, the copy of the corresponding resource definition table (ROT) on SYS1.VTAMOBJ must be deleted (using an operating systems utility program that can delete a member of a BPAM data set). If the copy is deleted, then VTAM builds (the next time the major node is activated) a new ROT (based on the modified definition) and stores a new copy on SYS1.VTAMOBJ.	

Figure 6.4 (Part 1 of 2). Putting Modified Network Solicitors into SYS1.VTAMLIB

Steps	Follow Step To ADD/REPLACE (see key) Network Solicitor
5. Code a VTAM APPL definition statement that defines the additional network solicitor with the following characteristics: • The password in the PRTCT operand corresponds to the password in the PRTCT operand in the NETSOL macro instruction. • AUTH=(PASS,ACQ) operand is coded. (Code the ACQ parameter only if ACQUIRE=YES is specified in the NETSOL macro instruction.) Put the APPL definition statement in SYS1.VTAMLST following the steps described in the chapter *"Defining the Network"* in this publication.	ADD
6. Code an interpret table and put it into SYS1.LPALIB (unless standard logon is to be used), following the steps described previously in this chapter under the topic *"Putting Interpret Tables Into SYS1.LPALIB".*	ADD/REPLACE
7. Code or assume the default start option, NETSOL=NO. Notes: • Only the network solicitor named NETSOL can be started and stopped using the MODIFY command. Those with different names are managed by VTAM as VTAM application programs. • The VTAM APPL definition statement defining the added network solicitor must be contained in a major node that has been activated. Start and stop this network solicitor as a VTAM application program and not by using the VTAM start options and MODIFY command.	
Key **ADD:** Follow this step when adding a modified network solicitor to SYS1.VTAMLIB. **REPLACE:** Follow this step when replacing the IBM-Supplied network solicitor in SYS1.VTAMLIB with a modified network solicitor.	

Figure 64 (Part 2 of 2). Putting Modified Network Solicitors into SYS1.VTAMLIB

Example of Adding a Network Solicitor to SYS1.VTAMLIB

In this example, IBM-supplied cataloged procedures are used to assemble and link-edit the additional network solicitor into SYS1.VTAMLIB (as load module MYNETSOL).

```
//ADDSOL          JOB       12#567,JONES,MSGLEVEL=1
//ASMSTEP         EXEC      ASMFC
//SYSUT1          DD        UNIT=SYSDA
//SYSUT2          DD        UNIT=SYSDA
//SYSUT3          DD        UNIT=SYSDA
//SYSIN           DD        *
MYNETSOL          NETSOL    MESSAGE=IBMMSG
/*
//LKEDSOL         JOB       12#567,JONES,MSGLEVEL=1
//LKEDSTEP        EXEC      LKED,PARM='XREF,LIST,LET,NCAL'
//LKED.SYSLMOD    DD        DSN=SYS1.VTAMLIB(MYNETSOL),DISP=OLD,...
//SYSIN           DD        *
                  .
                  .
                  .
(object deck from assembly job)
                  .
                  .
                  .
/*
```

Control Statements for Example

The VTAM NETSOL macro instruction (1) defines the name of the additional network solicitor (MYNETSOL), (2) specifies that the IBM-supplied CSECT (MSGCSECT) is to be used, creating a V-type address constant to MSGCSECT, and (3) indicates by default that the network solicitor contains a RELREQ exit routine.

Chapter 7. VTAM Services

VTAM provides services that allow an installation to execute the following as part of VTAM:

- Installation exit routines: To provide interfaces to user-written authorization and accounting exit routines
- Authorized path: To reduce the execution time for certain VTAM macro instructions issued by VTAM application programs using record mode.

Installation Exit Routines

VTAM provides an exit for one authorization exit routine that should accept or reject all connection, disconnection, and logon requests. VTAM also provides an exit for one accounting exit routine that can collect accounting statistics. If the installation does not replace the IBM-supplied routines with its own exit routines, VTAM uses the IBM-supplied exit routines. However, the IBM-supplied authorization exit routine accepts all connection, disconnection, and logon requests as valid, and the IBM-supplied accounting exit routine does not collect any accounting statistics. The installation should code its own exit routines to replace the IBM-supplied ones when tailoring VTAM to the installation's specifications.

Authorization Exit Routine

The authorization exit routine (ISTAUCAT) receives control from VTAM and is executed as a synchronous VTAM subroutine to authorize connection, disconnection, and logon requests. The authorization performed by this exit routine is in addition to that performed by VTAM. The authorization exit routine should follow the installation's specifications to accept or reject each request for connection, disconnection, or queuing a logon request to a terminal. The authorization exit routine receives control during the processing of the following VTAM macro instructions that are issued by VTAM application programs:

OPNDST to request connection

CLSDST to request disconnection

SIMLOGON to request logon

The following VTAM or network operator actions (during their processing) can also result in the authorization exit routine's receiving control:

- There is an automatic logon in which VTAM, as specified during VTAM definition, requests logon for a specified terminal (when it is activated) to a selected VTAM application program.
- The network operator requests logon.
- The network operator uses the VARY deactivate command for one or more nodes.
- TOLTEP issues the VTAM OPNDST macro instruction with the ACQUIRE processing option to request connection to a terminal.

Upon entry from VTAM, the authorization exit routine receives the following information from VTAM in a parameter list (Figure 7-1), pointed to by register 1:

- The type of I/O request (connection, disconnection, logon)
- The names of the terminal and the VTAM application program to be connected, disconnected, or queued by logon

Offset Dec Hex	Size (bytes) Alignment (bits)	Description
0 (0)	1	Reserved.
1 (1)	1	Contains a decimal number from 1 through 7 that identifies a request.
	Number:	
	1	SIMLOGON macro instruction or OPNDST macro instruction with ACQUIRE processing option. (See offsets 2 and 3 to determine if CONALL or CONANY option was also specified.)
	2	Release and reallocation of a terminal. Releasing application program is issuing CLSDST macro instruction without PASS processing option. (Valid if offset 4 contains address of application program.) or Reallocation for dial-up terminal. (Valid if offset 4 is 0.)
	3	OPNDST macro instruction with ACCEPT processing option. (See offset 2 to determine if ANY option was also specified.)
	4	Logon request initiated by network operator issuing a VARY activate command or a VARY command with LOGON option. (See offset 8 for name of application program for which logon is requested.)
	5	CLSDST macro instruction with PASS processing option. (See offset 4 for how to obtain name of application program issuing request and offset 8 for how to obtain name of application program for which logon is requested.)
	6	Reserved.
	7	Disconnection request. (Offset 4 is 0.)
		Reserved.
2 (2)	1	
	1...	If offset 1 is 1, CONALL or CONANY option is specified in either OPNDST macro instruction with ACQUIRE processing option or SIMLOGON macro instruction. (See offset 12 for list of terminals associated with request.) or If offset 1 is 3, ANY option is specified on OPNDST macro instruction with ACCEPT processing option.
	.x..	Reserved.
	..1.	If offset 1 is 1, SIMLOGON macro instruction request.
	...x xxxx	Reserved.
3 (3)	1	
	x...	Reserved.
		If offset 1 is 1, CONALL option, not CONANY option, is specified in either OPNDST macro instruction with ACQUIRE processing option or SIMLOGON macro instruction. (See offset 2 to determine which macro instruction is specified.)
	.. xx xxxx	Reserved.
4 (4)	4	0 or address of doubleword with name of application program that issued request. (Not applicable if offset 1 is 4 or 7.)
8 (8)	4	0 or address of doubleword with name of application program for logon requests. (Valid logon request if offset 1 is 1 (SIMLOGON macro instruction), 4, or 5.)
12 (C)	4	Identifies terminals associated with request: • If field is 0, request is from OPNDST macro instruction with ACCEPT and ANY options; no terminals associated with this request. • If bit 0=1 at offset 2, request is associated with more than one terminal. This field contains address of a list of addresses, each having address of a terminal name. (List of addresses has a contiguous fullword format, but terminal names are in sequential — not alphanumeric — order.) See offset 16 for number of terminals associated with this request. • If field is not 0, or if bit 0#1 at offset 2, this field contains address of doubleword with a terminal name.
16 (10)	2	Hexadecimal number of terminals in multi-terminal request at offset 12.

Figure 7-1. Parameter List for Authorization Exit Routine

The format of the parameter list is:

Offset Dec Hex	Size (bytes) Alignment (bits)	Description
Offset		The numeric address of the field relative to the beginning of the data area.
Dec Hex		The first number is the offset in decimal, followed by the hexadecimal equivalent in parentheses. Example: 16 (10)
Size		The field size in bytes.
Alignment		This column also shows the bit settings of switch fields; the alignment or state of the bits in a byte is as follows: . . . . The eight bit positions (0-7) in a byte. For ease of scanning, the high order (left-hand) 4 bits are separated from the low-order 4 bits. x. . . . . . . A reference to bit 0. 1. . . . . . . Bit 0 is on. 0. . . . . . . Bit 0 is off. . . . . . . xx A reference to bits 6 and 7. Significant bit settings are shown and described. Reserved bits describe bit settings that are not significant for this release. (Users should not use the reserved bits because the program may use them in future releases.)
Description		The use of a field. If the field's use relates directly to a value coded by a user, the coded value is shown. If the hexadecimal code for a particular bit setting is helpful, it is shown separated from the rest of the description.
Note:		VTAM does not supply any names (symbols) to identify the fields. If field names are to be used to identify or refer to the fields, the installation must supply them.

The installation can use the information in the parameter list as a basis for determining its authorization standards for accepting or rejecting each request. For example, an installation-written authorization exit routine can compare each request against a predefined, installation-specified table of valid logical connections. The exit routine then returns the results of this comparison to VTAM. If the request is valid, VTAM completes it. If the request is invalid, VTAM rejects it.

Routine Requirements

Entry From: VTAM to entry point ISTAUCAT.

Registers at Entry:

Register	Contents
1	↑parameter list
13	↑save area for this routine
14	Return address
15	↑entry point of this routine

Operation: The authorization exit routine is executed synchronously as a VTAM subroutine that is enabled and in pageable storage, at the dispatching priority of the calling program's TCB, in supervisor state, and in storage protection key 6. Because of these requirements, this routine must not issue any VTAM macro instructions.

The routine must do the following:

- Leave the parameter list pointed to by register 1 unmodified, and not modify any field pointed to from the parameter list.
- Supply a return code to VTAM in register 15. A return code of 0 authorizes connection. Any nonzero return code means that the request is not authorized, and VTAM informs the application program by supplying these values in the RPL (request parameter list) fields:

RPL Field	Value (Hex)
RTNCD	14
FDBK2	55

Data Areas Defined: Installation-defined

Data Areas Referred to: Installation-defined

Data Areas Updated: Installation-defined

Routines Called: Installation-defined

Size: Installation-defined

Exit: Returns to VTAM

Registers at Exit:

Register	Contents	
0-14	restored same as at entry	
15	return code:	
	00	Request authorized
	Nonzero	Request not authorized

Authorization Exit Routine Guidelines

An installation that is planning and coding the authorization exit routine should consider these guidelines:

- The exit routine gains control in supervisor state and in storage protection key 6; security violations could occur if this routine were designed or coded by unauthorized persons, since they would have access to VTAM's private address space. Errors within the routine could cause damage to control blocks (VTAM or system) and to routines (VTAM or system).
- The exit routine operates as a synchronous VTAM subroutine; system waits and implied waits for I/O operations should be avoided to reduce processing time.
- The exit routine operates as a synchronous VTAM subroutine; the longer this routine takes to process a request, the greater the delay before VTAM can process (1) the next connection or disconnection request from a VTAM application program or (2) any requests that involve the VARY command for VTAM.
- Because the exit routine operates at the dispatching priority of the calling program's TCB, the exit routine is terminated if the calling program terminates abnormally (for example, when cancelled by the network or system operator).

- The exit routine operates at the dispatching priority of the calling program's TCB and possibly under a VTAM lock. The routine should avoid having portions of some tasks dependent on the completion of events in other tasks. (VTAM locks serialize programs that update resources, while system locks serialize resources.)
- VTAM initiates the authorization exit routine to handle TOLTEP terminal connection requests. TOLTEP should be authorized to provide a diagnostic capability for terminals in a VTAM network.
- VTAM initiates the exit routine for terminal requests by a network solicitor (if used by the installation). The routine should recognize and authorize this type of request from the parameter list. The requests from the network solicitor are:

Pass Requests: The network solicitor uses the VTAM CLSDST macro instruction with the PASS processing option to pass valid terminal-initiated logon messages to active VTAM application programs.

Acquire Requests: If ACQUIRE=YES is specified in the VTAM NETSOL macro instruction, the network solicitor can release (upon request by VTAM application programs) the terminals that it is monitoring. The authorization exit routine should authorize the network solicitor to issue a VTAM CLSDST macro instruction with the RELEASE processing option.

- VTAM initiates this exit routine before processing each request for connection and disconnection. The exit routine can be used twice before a connection is made. For example:
  - A VTAM SIMLOGON macro instruction can be issued, followed by a VTAM OPNDST macro instruction with the ACCEPT processing option.
  - One VTAM application program can issue a VTAM CLSDST macro instruction with the PASS processing option, and another VTAM application program can issue a VTAM OPNDST macro instruction with the ACCEPT processing option.
- VTAM can initiate this routine for VARY command requests (logon or deactivate) from the network operator; authorization should be given to allow the commands to be completed (because VARY commands in progress cannot be canceled).

Accounting Exit Routine

The accounting exit routine (ISTAUCAG) is executed as a synchronous VTAM subroutine that can be used to record the time at which connection or disconnection occurs. VTAM initiates the accounting exit routine each time a VTAM application program requests connection (by issuing a VTAM OPNDST macro instruction) or disconnection (by issuing a VTAM CLSDST macro instruction). By recording the time at which connection and disconnection occurs for a specific terminal and a specific VTAM application program, the difference between these two times can provide the approximate connection time for the terminal and VTAM application program. This information can be used by the accounting exit routine to record these request times and to make cost calculations and reports. To minimize the effect on VTAM performance, the accounting exit routine can record these request times and supply them to an installation-written program (that executes asynchronously) to make the cost calculations and reports.

Routine Requirements

Entry From: VTAM to entry point ISTAUCAG

Registers at Entry:

Register	Content
0	positive value if connection has been made or negative value if disconnection has occurred
7	↑application program name (doubleword)
11	↑terminal name (doubleword)
13	↑save area for this routine
14	Return address
15	↑entry point of this routine

Operation: The accounting exit routine is executed synchronously as a VTAM subroutine that is enabled and in pageable storage, at the dispatching priority of the calling program's TCB, in supervisor state, and in storage protection key 6. Because of these requirements, this routine must not issue any VTAM macro instructions.

Data Areas Defined: Installation-defined

Data Areas Referenced: Installation-defined

Data Areas Updated: Installation-defined

Routines Called: Installation-defined

Size: Installation-defined

Exit: Returns to VTAM

Registers at Exit:

Register	Content
0-14	restored same as at entry
15	return code not examined by VTAM

Accounting Exit Routine Guidelines

An installation that is planning and coding the accounting exit routine should consider these guidelines:

- The exit routine gains control in supervisor state and in storage protection key 6; errors within the routine damage VTAM or system control blocks and routines.
- The exit routine operates as a synchronous VTAM subroutine; the longer this routine takes to process a request, the greater the delay before VTAM can process (1) the next connection or disconnection request from a VTAM application program or (2) any requests that involve the VARY command for VTAM. System waits and implied waits for I/O operations should be avoided to reduce processing time.
- By being initiated by VTAM for connection and disconnection requests for terminals and certain routines (TOLTEP, the network solicitor, the port solicitor which supports switched networks, and the interface to TCAM), this accounting routine could also record these request times and/or supply them to an installation-written program used for making cost calculations or reports.

- Because the exit routine is executed under the dispatching priority of the calling program's TCB, the exit routine is terminated if the calling program terminates abnormally (for example, when canceled by the network or system operator).
- The exit routine operates at the dispatching priority of the calling program's TCB and possibly under a VTAM lock. The routine should avoid having portions of some tasks dependent on the completion of events in other tasks. (VTAM locks serialize programs that update resources; system locks serialize resources.)
- To perform disk I/O in an accounting exit routine, it is necessary to allocate storage, issue OPEN, WRITE, and CLOSE macro instructions, and deallocate storage each time the exit is entered. As a result, VTAM performance is degraded. The following alternatives are suggested:
  - Write a user record to the SMF data set with the SMFWTM macro instruction.
  - Set up a separate job to do I/O and use cross-memory POST.

Note: *The SMFWTM macro instruction can result in a wait state for SVC 83, which delays VTAM. Also, the second alternative suggested requires the use of the user field of the CVT for cross-address space communication, and the writer job must be authorized to run in supervisor state with a key of 0. The SMFWTM macro instruction is documented in* OS/VS System Management Facilities (SMF), *GC35-0004. Cross-memory POST is documented in* OS/VS2 Supervisor Services and Macro Instructions, *GC28-0683.*

Putting Exit Routines Into SYS1.LPALIB

An installation can put an authorization or accounting exit routine into SYS1.LPALIB by following these steps:

1. Code the installation-written routine with the same name as the IBM-supplied routine which it is going to replace.

Name	Routine
ISTAUCAT	Authorization exit routine
ISTAUCAG	Accounting exit routine

2. Assemble the routine.
3. Use the linkage editor to put the routine in SYS1.LPALIB, replacing the IBM-supplied routine. Either of the following methods may be used:
   - Specify the replace function with the NAME control statement, for example:
     NAME ISTAUCAT(R)
   - Specify the disposition field of the SYSLMOD DD statement as OLD; for example:
     //SYSLMOD DD DSNAME=SYS1.LPALIB(ISTAUCAT),DISP=OLD,...

Authorized Path

The authorized path through VTAM reduces the execution time for certain VTAM macro instructions (SEND, RECEIVE, RESETSR, SESSIONC) that are used for record mode. To use the authorized path, a VTAM application program must be authorized for execution in supervisor state and must use the SEND, RECEIVE, or RESETSR VTAM macro instruction. The authorized path supports the EXECRPL macro instruction as long as the request code in the RPL is for SEND, RECEIVE, RESETSR, or SESSIONC.

Assigning APF Authorization

Execution of VTAM application programs in supervisor state is authorized by assigning APF (authorized program facility) authorization and by coding the supervisor MODESET macro instruction in the VTAM application program to change its operating system status. This requires the following for each VTAM application program:

1. The linkage editor is used to assign APF authorization to the program.
2. The program is put in an authorized library.
3. A supervisor MODESET macro instruction is coded in the program to change from problem program to supervisor state (MODE=SUP).

See *OS/VS2 System Programming Library: Supervisor* for a complete description of how to assign APF authorization to VTAM application programs and how to code the MODESET macro instruction.

Specifying Authorized Path Macro Instructions

The VTAM authorized path macro instructions can be executed asynchronously or synchronously and under control of an SRB (service request block) or a TCB (task control block). Figure 7-2 shows the coding requirements for the VTAM authorized path, including the VTAM authorized path macro instructions and the supervisor macro instructions needed to execute the authorized path through VTAM. Consult *OS/VS2 System Programming Library: Supervisor* for the information to code the supervisor macro instructions described in Figure 7-2.

When a VTAM application program is executed under the control of an SRB, the application program cannot issue a WAIT macro instruction or any other SVC. VTAM also does any suspension and resumption of processing for the application program without using WAIT or POST macro instructions.

Notes:

- *A CHECK macro instruction can be issued if asynchronous ECB mode is used, but it can only be issued under the control of a TCB. A CHECK macro instruction cannot be issued under an SRB unless an exit routine has been scheduled.*
- *To ensure that VTAM serializes its references to VTAM control blocks, VTAM authorized users should not execute the SEND, RECEIVE, RESETSR macro instructions while a VTAM CLSDST macro instruction to the same terminal is in process.*
- *For authorized installation-written programs that are executed in supervisor state, key 0, and hold OS/VS2 system locks, the programs should release those locks before using VTAM, to avoid conflict with VTAM's use of these system locks. Otherwise, if a conflict occurs, OS/VS2 abnormally terminates the VTAM function being processed for that program.*

Coding Considerations for Authorized Path

- When an application executes two or more asynchronous authorized path macro instructions for the same terminal, the requests may not be satisfied by VTAM in the order that the macro instructions are issued:

  Example A

  If two SEND POST=RESP, OPTCD=ASY macro instructions are executed to a given terminal without an intervening CHECK, the second message could arrive at the terminal before the first. To ensure that VTAM processes the requests in the order that the macro instructions are issued, either wait until one macro is posted complete before executing the next or use the synchronous form of the macro instructions.

Method of Dispatching	Method of Program Execution (OPTCD=ASY | SYN operand specified on VTAM RPL, SEND, RECEIVE, RESETSR macros)	
	Synchronous	Asynchronous
TCB	1. MODESET MODE=SUP 2. BRANCH=YES operand on authorized path macro (Note 1)	1. MODESET MODE=SUP 2. BRANCH=YES operand on authorized path macro (Note 1) 3. EXIT or ECB operand on VTAM RPL or other VTAM RPL-based macro (Note 2)
SRB	1. MODESET MODE=SUP,KEY=ZERO 2. SCHEDULE with operands 3. SETFRR with operands (Note 3)	1. MODESET MODE=SUP,KEY=ZERO 2. SCHEDULE with operands 3. SETFRR with operands 4. EXIT or ECB operand on VTAM RPL or other VTAM RPL-based macro (Note 2)

Notes:

1. Specifying the BRANCH=YES operand on an authorized path macro causes a switch to be turned on in the RPL (request parameter list). If this switch (RPLBRANC) is on, a program logic error occurs when a non-authorized macro (except CHECK) specifies the same RPL. To avoid this error, turn the switch off by doing one of the following:
   - Coding BRANCH=NO operand on a non-authorized path, RPL-based macro.
   - Using the MODCB macro.
   - Coding an assembler language instruction such as:

     ```
     NI   MYRPL+RPLEXTDS-IFGRPL,X'FF'-RPLBRANC
     ```

     (This assembler language instruction requires an RPL named MYRPL and the RPL DSECT.)
2. If the EXIT operand is specified in the VTAM RPL macro or in the VTAM macro that was the last to modify the RPL, then the exit routine is not entered with the standard VTAM exit parameter list after an authorized path macro. Instead, the registers at entry contain:

   Register 1 — ↑ RPL.

   Register 13 — *does not* contain a save area address (none is provided).

   Register 14 — return point to OS/VS2 dispatcher.

   Register 15 — ↑ entry point of exit.

   The exit routine is dispatched under an SRB, in supervisor state, and in key 0. Since the exit routine is executing under the control of an SRB, it should establish a functional recovery routine (FRR) by using the supervisor macro SETFRR.
3. For VTAM application programs executing under an SRB with synchronous request handling and issuing authorized path macros, VTAM deletes the entire group of FRRs associated with that application program. To save any pertinent recovery information, the application program must do it prior to issuing the authorized path macro and must reissue the supervisor SETFRR macro as the next sequential instruction after the authorized path macro.

Figure 7-2. Coding Requirements for Authorized Path

Example B

Two or more RECEIVE OPTCD=(ANY, ASY, CA) macro instructions are executed and the RECEIVEs are satisfied by input from the same terminal. The RECEIVE RPLs may not be posted in the order that the macro instructions were executed. That is, when message 1 is received by VTAM, RPL 2 might be posted. Then, when message 2 arrives, RPL 1 might be posted. For this case, the solution is to change the macro instruction form to RECEIVE OPTCD=(ANY, ASY, CS).

- VTAM exits (RPL- and EXLST-type exits) are scheduled under the application program's TCB except for exits related to authorized path requests. For authorized path users of the SEND, RECEIVE, RESETSR, and CHECK macro instructions, three exit routines (the RPL, SYNAD, and LERAD exits) may be scheduled under SRBs as described below:
  - RPL exits for authorized path users of the SEND, RECEIVE, and RESETSR macro instructions are always scheduled under SRBs, even if the authorized path macro instruction was invoked under a TCB.
  - SYNAD and LERAD exits are scheduled under the same TCB or SRB as the program that issued the VTAM macro instruction giving control to the exit. Note that, for asynchronous requests, the SYNAD or LERAD exit may be taken when the SEND, RECEIVE, or RESETSR macro instruction is issued or when CHECK is issued.

Rules relating to the reenterability of VTAM exit routines are described in *VTAM Macro Language Guide*. When the RPL, SYNAD, and LERAD exit routines are scheduled as a result of authorized path SEND, RECEIVE, RESETSR, and CHECK macros being issued, the following two additional rules apply:

- RPL exit routines must be reenterable because VTAM schedules RPL exits in parallel under SRBs. If the RPL exit routine invokes any SEND, RECEIVE, RESETSR, or CHECK macro instructions, the SYNAD and LERAD exit routines must also be reenterable.
- If the application program itself schedules parallel processing under SRBs, and if these SRBs invoke any SEND, RECEIVE, RESETSR or CHECK macro instructions, the SYNAD and LERAD exit routines must be reenterable.

See *VTAM Concepts and Planning* for an example that uses VTAM authorized path macro instructions; see *VTAM Macro Language Guide* for a coding example of a VTAM application program that uses VTAM authorized path macro instructions.

Chapter 8. VTAM RAS Facilities

Configuration Restart

Configuration restart is a VTAM facility that reactivates the network after it is deactivated or a failure occurs in it. Configuration restart can be immediate or delayed. Immediate configuration restart automatically reestablishes the status of:

- A local or remote NCP when restart requires reloading the NCP after a failure occurs
- A physical unit (and its associated logical units) when it loses contact with VTAM

Delayed configuration restart is begun by a network operator command after:

- A VTAM failure
- A host operating system or host computer failure
- A communications controller or an NCP failure from which VTAM did not immediately recover
- Deactivation of the network (or any part of it) by the network operator

Figure 8-1 illustrates how VTAM records changes to the network configuration. When the host operating system is generated, VTAM definition statements are filed in SYS1.VTAMLST. The first time a major node is activated, activation information is recorded in the resource definition table (RDT) and in the NODELST data set, if one exists. Any further activations or deactivations of major nodes are also recorded in the RDT and in the NODELST data set (if any). Every time a minor node is activated or deactivated, the change is recorded in the RDT and (optionally) in a configuration restart data set.

Information from configuration restart and NODELST data sets is used for a delayed configuration restart. Information from the RDT is used for an immediate configuration restart.

Immediate Configuration Restart

Status information for an immediate restart of the NCP, physical unit, and logical unit is available in the RDT.

Immediate Restart of the NCP

When the NCP is first activated, VTAM builds the RDT from the NCP generation parameters to represent the NCP's configuration. As the network operator changes the NCP's configuration, VTAM records the new status in the RDT.

For an NCP or communications controller failure:

- If the error is not a channel (link) error and if AUTODMP=YES was specified on the PCCU macro instruction, or if the network operator requests a dump, VTAM dumps the contents of the communications controller.
- If AUTOIPL=YES was specified on the PCCU macro instruction, or if the network operator requests a reloading of the NCP, VTAM loads a fresh copy of the NCP into the communications controller.

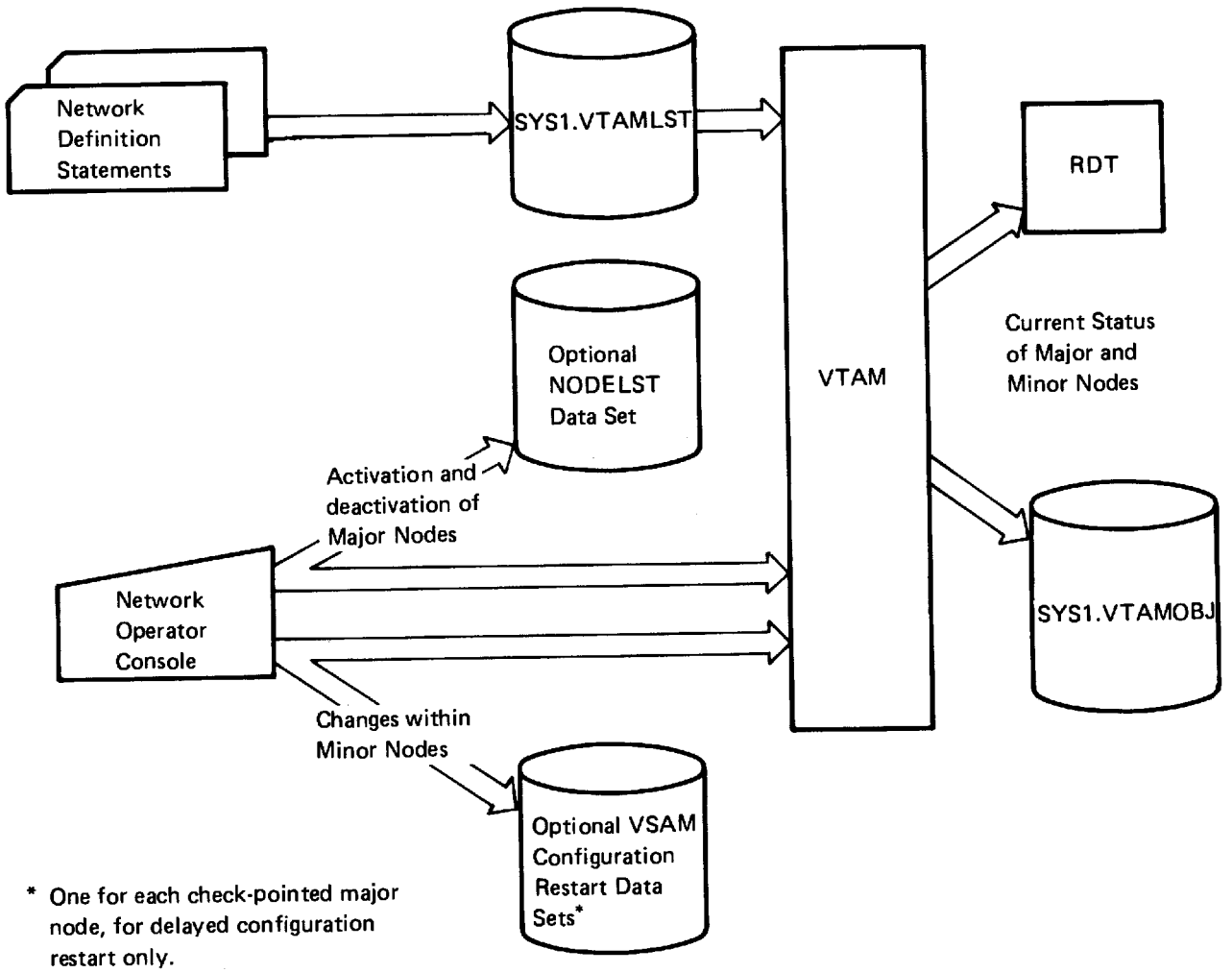


Figure 8-1. Recording Changes to the Network Configuration

If the communications controller is successfully reloaded, VTAM:

- Reactivates links that were active at the time of failure.
- Restarts any remote BSC cluster controllers or physical units attached to the communications controller. A remote communications controller is restarted, but is not reloaded unless it also failed.
- Determines whether the network operator has used MODIFY commands to change any of the line-scheduling parameters from the system definition status. For polled and non-switched non-SDLC links, VTAM resets values that existed when the NCP failed. The MODIFY command is explained in *OS/VS VTAM Network Operating Procedures.*
- Resets the date and time of day in the communications controller.
- Allocates PEP lines to the partition with which they were associated at the time of the failure.

The VTAM I/O trace and data buffer trace are reestablished, but the NCP line trace is not. The buffer pool utilization trace is not affected. If TYPGEN=PEP was specified in the NCP BUILD macro instruction, VTAM redistributes the lines between NCP and EP modes as they were at the time of the failure.

Uncompleted data-transfer requests for start-stop and BSC terminals are returned to the application programs with notification of the status of the communications controller. If the restart is successful, the data-transfer requests can be retried. See "Immediate Restart of the Physical Unit" below for a description of how VTAM notifies application programs in session with logical units about data-transfer requests.

After a communications controller failure, the network operator is notified of configuration restart processing. If the attempt to reload the communications controller fails, VTAM deactivates the failing part of the network.

Immediate Restart of a Physical Unit

Although VTAM attempts to reactivate physical units and logical units that were active at the time of failure, it does not reload the physical unit. Application programs in session with logical units are notified through their LOSTERM exit routines when a loss of contact with VTAM occurs.

If the physical unit is successfully restarted, the application program is notified, and it must reestablish its session with the logical unit by issuing CLSDST and OPNDST macro instructions.

If a logical unit is restarted and if that logical unit's definition statement contains a LOGAPPL operand, VTAM automatically generates a logon for that logical unit to the application program named the LOGAPPL operand, whether or not the logical unit was connected to that application program when the failure occurred in the network. See "The LOCAL Statement" in Chapter 3 for a description of the LOGAPPL operand.

Switched physical units and locally attached 3791 s are not reconnected until a request is issued for a session between logical units. If the restart is unsuccessful or is not attempted because of a channel or SDLC link failure, the physical unit is deactivated. Application programs can issue a CLSDST macro instruction for the affected sessions and can continue processing with the sessions that were not affected. The network operator is informed of the status of the physical unit.

Delayed Configuration Restart

After a failure or deactivation in the network, the operator should use the VERIFY command (see *OS/VS Access Method Services)* to ensure that the VSAM configuration restart data sets are updated and closed. The operator can then use the VSAM data sets to restore the network configuration (as shown in Figure 8-2). The status to which the network configuration is restored depends on whether NODELST and configuration restart data sets were defined and on how the network operator uses the CONFIG operand and the optional COLD or WARM operand when restarting the network.

Configuration Restart Data Sets and NODELST Data Sets

The user can define VSAM configuration restart data sets for the NCP major nodes, local SNA major nodes, switched SNA major nodes, and 3270 major nodes in the network. VTAM uses these VSAM data sets to record changes to the minor nodes within these major nodes. If the VSAM data sets are defined, the network operator can specify how VTAM is to use the data sets for a delayed configuration restart.

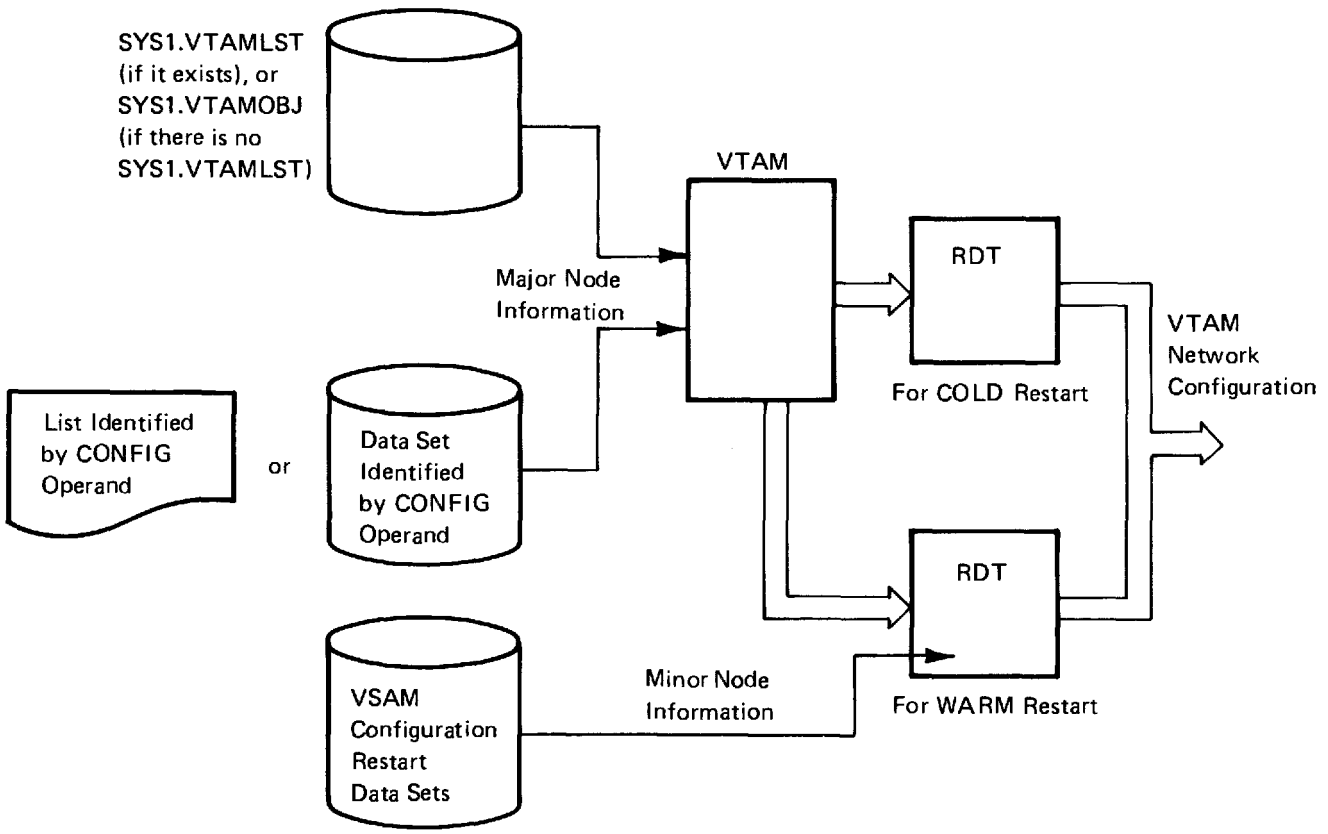


Figure 8-2. Delayed Configuration Restart

To associate VSAM configuration restart data sets with individual major nodes, the CONFGDS parameter is coded on:

- The PCCU macro instruction for the NCP major node
- The LBUILD definition statement for a local 3270 major node (see Chapter 3)
- The VBUILD definition statement for a local SNA or switched SNA major node (see Chapter 3)

NODELST data sets are used to record changes to the major nodes in the network. A NODELST data set is specified with the optional NODELST start parameter. See Chapter 4 in this book and *OS/VS VTAM Network Operating Procedures* for more information on specifying a NODELST data set. The network operator can use either or both of these data set types when starting a delayed configuration restart.

If the installation defines configuration restart data sets, VTAM provides two additional forms of recovery: manual switching to a backup CPU and manual switching to a backup communications controller.

The CONFIG operand specifies the major nodes to be reactivated and the COLD or WARM operand specifies the minor nodes to be restored. For a delayed configuration restart, VTAM builds a new RDT from data in SYS1.VTAMLST and in the list or VSAM data set specified in the CONFIG operand. If a NODELST data set was specified when the network was last started, then the major nodes that were active when the failure or deactivation occurred can be reactivated by specifying that same data set with the CONFIG operand. The major nodes that were initially active can be reactivated by

specifying (with the CONFIG operand) the list or VSAM data set that was specified in the CONFIG operand when the network was last started.

If the COLD operand is specified or assumed by default, VTAM restores the minor nodes of each major node specified by the CONFIG operand to their initial status. The records in any configuration restart data sets for these major nodes are deleted. If the WARM option is specified, VTAM restores each major node specified by the CONFIG operand to the status recorded for it in the configuration restart data set (provided a configuration restart data set is defined for it). The data in this VSAM data set is used to update the RDT entry for each minor node within that major node.

The following information is recorded for an NCP major node:

- The channel-unit address (if local) or the RNAME (if remote).
- For each line, whether it is active or inactive, and its line scheduling parameters; and for dial SDLC lines, the Answer Mode (whether the line is dial-in or not).
- For each nonswitched non-SNA device, its device transmission limit, the name specified in the LOGAPPL operand, and whether it is active or inactive.
- For each UTERM entry, the name specified in the LOGAPPL operand and whether it is active or inactive.
- For each BSC or start-stop port, whether it is active or inactive.
- For each BSC general-poll cluster, whether it is active or inactive.
- For each logical unit, the names specified in the LOGAPPL and LOGMODE operands and whether it is active or inactive.
- For each physical unit, whether it is active or inactive.

The following information is recorded for a local SNA major node:

- For each channel-attached controller, its channel-unit address and whether it is active or inactive.
- For each logical unit, the names specified in the LOGAPPL and LOGMODE operands and whether it is active or inactive.
- For each physical unit, whether it is active or inactive.

The following information is recorded for a switched SNA major node:

- For each logical unit, the names specified in the LOGAPPL and LOGMODE operands and whether it is active or inactive.
- For each physical unit, whether it is active or inactive.
- For a physical unit with dial-out capability, the PATH=USE | NOUSE setting.

The following information is recorded for a local non-SNA major node:

- For each minor node, its LOGAPPL operand value and whether it is active or inactive.

If a major node's configuration restart data set is empty or if the major node has no configuration restart data set, the minor node status information for that major node is set to the initial status. (This applies only when WARM is specified in the start procedure. If WARM is specified in a VARY command to activate a major node that has no configuration restart data set or has an empty data set, ACF/VTAM rejects the VARY command.)

Restart to Initial Status: VTAM restores the configuration to its initial status as defined by the installation if the network operator specifies the COLD parameter or allows the COLD parameter to be assumed when using the start procedure or when issuing a VARY ACT command for each major node.

For an NCP Version 4.1 generated with the automatic network shutdown feature (ANS=YES in the NCP BUILD macro instruction), the NCP is not reloaded if the communications controller already contains the correct NCP. A communications controller can be reactivated more quickly if configuration restart data sets are defined and associated with the NCP major node, because the NCP is not reloaded. If configuration restart data sets are not defined for an NCP, the network operator reissues the network operator commands to restore the configuration to the desired state.

Restart to Status Before Failure or Deactivation: If the network operator specifies the WARM parameter in the start procedure or in a VARY ACT command for a major node for which there is an associated configuration restart data set, VTAM updates its RDT from activation information in the configuration restart data sets. VTAM then restores the configuration to its status prior to the failure or deactivation. Switched physical units and locally attached 3791s are not reconnected until an application program issues a request for a session with their logical units.

If the network operator specifies the WARM parameter when starting VTAM, any major node identified in the CONFIG parameter that does not have an associated configuration restart data set or that has an unused configuration restart data set is reactivated to its initial status. An informational message is issued to the network operator.

The VARY ACT command fails if the network operator specifies the WARM parameter for a major node that does not have an associated configuration restart data set or that has an empty configuration restart data set. For an example of how NODELST and configuration restart data sets are used, see Figure 8-3.

Restart Considerations: Because the status of any VTAM commands being processed at the time of failure cannot be predicted, the network operator should use the DISPLAY and VARY commands to restore the network configuration to its status prior to failure or deactivation. Refer to *OS/VS VTAM Network Operating Procedures* for a discussion of the DISPLAY and VARY commands. After a failure in VTAM, the host computer, or the host operating system, and the subsequent restart of the network, communication may not be possible with lines or terminals associated with the NCP that were being tested with online test programs (OLTs) when the failure occurred. After the status of the network is reestablished, TOLTEP should be run again for those lines or terminals.

If a logical unit is restarted and if that logical unit's definition statement contains a LOGAPPL operand, VTAM automatically generates a logon for that logical unit to the application program named by the LOGAPPL operand, whether or not the logical unit was connected to that application program when the failure occurred in the network. See "The LOCAL Statement" in Chapter 4 for a description of the LOGAPPL operand.

In this example, major nodes A, B, and C have configuration restart data sets (CONFGA for major node A, CONFGB for major node B, and so on). Each major node comprises 4 minor nodes (for example, major node A comprises the minor nodes A1, A2, A3, and A4). When the minor nodes are defined, the initial status (active or inactive, for example) can be specified. In this case, the minor nodes B3 and B4 are to be initially active and the other minor nodes inactive. This configuration can be represented as follows:

	Major Node A	Major Node B	Major Node C
Minor Nodes	A1 A2 A3 A4	B1 B2 B3* B4*	C1 C2 C3 C4

*Defined as initially active

Configuration Restart Data Sets

CONFGA	CONFGB	CONFGC
empty	empty	empty

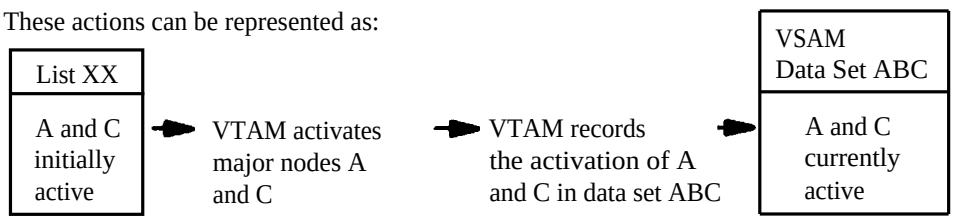
When VTAM is started, the network operator can enter start options. In this example, the network operator uses the CONFIG operand to specify the list XX, which lists major nodes A and C as initially active. The operator uses the NODELST operand to specify that the VSAM data set ABC is to be used to record which major nodes are active in the network:

```
CONFIG=XX,NODELST=ABC
```

Because of these start options:

VTAM activates major nodes A and C.
VTAM records the activation of major nodes A and C in data set ABC.

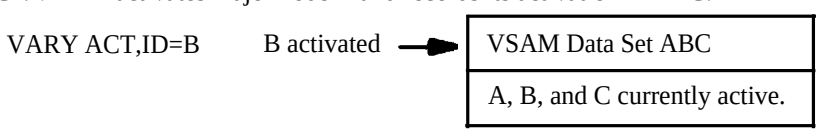
These actions can be represented as:



Then, to activate major node B, the operator enters:

```
VARY ACT,ID=B
```

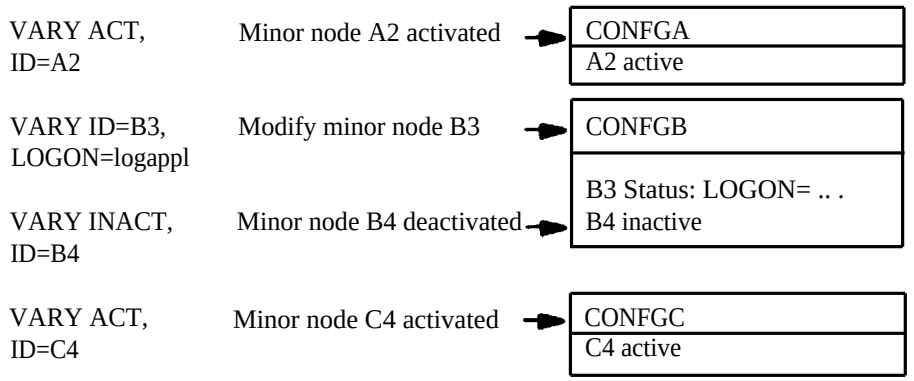
ACF/VTAM activates major node B and records its activation in ABC:



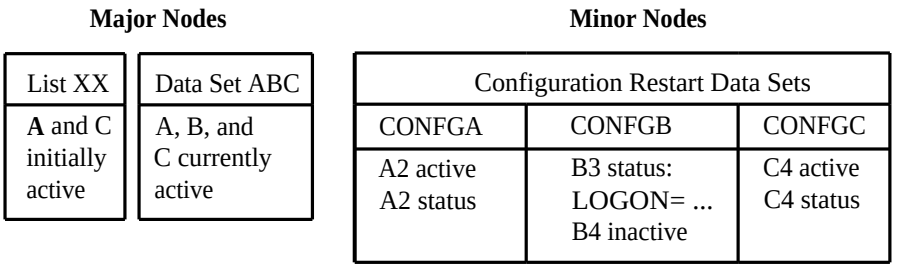
VTAM activates minor nodes B3 and B4 because B3 and B4 are indicated as initially active in the definition statements for major node B. Because B3 and B4 are defined as initially active, VTAM does *not* record the activation of B3 and B4 in CONFGB.

Figure 8-3 (Part 1 of 2). Example of How NODELST and Configuration Restart Data Sets Are Used

After the major nodes are active, the operator activates, deactivates, or modifies the status of minor nodes with VARY commands. Every time VTAM activates, deactivates, or modifies the status of a minor node, it records that action in the configuration restart data set (if one exists) for the major node of which the minor node is a part.



The status information stored in the configuration restart data sets can be represented as:



If the network is now halted or if failure occurs in it, VTAM deactivates all the active major and minor nodes and closes the configuration restart data sets. The information needed to restore the network is in the VTAM definition statements and these data sets. When the network operator restarts the network, start options can again be entered.

If the operator enters the start options below	These major nodes are restarted	These minor nodes are restarted
CONFIG=XX,COLD	A and C	None
CONFIG=XX,WARM	A and C	A2 and C4
CONFIG=ABC,COLD	A, B, and C	B3 and B4
CONFIG=ABC,WARM	A, B, and C	A2, B3, and C4

Specifying CONFIG=XX,COLD restores the network to its initial status, while CONFIG=ABC,WARM restores the network to the status it had when it failed or was deactivated. Specifying only CONFIG=XX is the same as specifying CONFIG=XX,COLD because if neither COLD nor WARM is coded, COLD is assumed.

The operator can also specify another NODELST data set:

CONFIG=ABC,WARM,NODELST=QRS

Or, the operator can continue using the one used before:

CONFIG=ABC,WARM,NODELST=ABC

Figure 8-3 (Part 2 of 2). Example of How NODELST and Configuration Restart Data Sets Are Used

Switching to a Backup Computer

If configuration restart data sets are defined, VTAM provides some support for switching one or more major nodes to a backup computer. This kind of backup involves moving the VSAM configuration restart data set for each major node to be switched. The primary and backup computers must meet these conditions:

- The same levels of VTAM and VSAM must be installed on both systems, although they need not have the same operating system.
- The VTAM major node definitions and their corresponding hardware configurations must be the same in both systems. (Physically switching the hardware connections from one system to another would satisfy the requirement for matching hardware configurations.)
- The MAXSUBA value must be the same in both VTAM systems.

The actual moving of the VSAM data sets is done by creating the data sets and a user catalog on the primary system and then using the VSAM Access Method Services to 'IMPORT CONNECT' the user catalog (and all its cataloged data sets) in the backup system. (For details of VSAM catalog and data set portability, see *OS/VS Access Method Services User's Guide.)* The backup system can then gain access to the primary system's configuration restart data sets either through a shared DASD arrangement or by physically moving the VSAM volume containing the user catalog and data sets.

If VTAM is restarted in the backup system after the VSAM volume is moved, the appropriate job control language for the VSAM user catalog and data sets can be included in the VTAM start procedure at that time. If, however, one or more major nodes are to be switched without restarting VTAM in the backup system, the job control language must be included when VTAM *is* started, sometime before the switch is made.

Switching to a Backup Communications Controller

VTAM uses configuration restart data sets to reconstruct the NCP's configuration when the network operator reactivates an NCP in a communications controller. This occurs when:

- The channel to a local communications controller fails, and the network operator switches to an alternate channel. If an NCP is equipped with a type 3 channel adapter, the switch to an alternate channel is automatically completed.
- A failure occurs in a local or remote communications controller, and the network operator switches the outboard lines of the communications controller to an alternate communications controller.
- A failure occurs in a local communications controller, and the network operator switches the link connecting the local communications controller with a remote communications controller to a backup local communications controller.

The network operator then issues the VARY ACT command, specifying the WARM operand and either:

- A new channel-unit address for the U operand if the communications controller is local
- An alternate name for the RNAME operand if the communications controller is remote

VTAM restores the network configuration to its prefailure status. If the network operator reactivates a remote NCP after switching a local NCP to an alternate communications controller, VTAM ensures that the status of the remote NCP network configuration is synchronized with the local NCP.

Backup and Reconfiguration for a Multiprocessor

If configuration restart data sets are defined, backup and reconfiguration are accomplished for a multiprocessor by the procedures described below. In most cases, recovery for symmetric devices (those attached to both processing units in a multiprocessor) is provided automatically. Asymmetric devices (those attached to only one processing unit in a multiprocessor) should be equipped with a switch to allow backup to an alternate processing unit. These procedures are provided as guidelines and might require modifications, depending on specific installation considerations.

For a symmetric 3705 Communications Controller equipped with a type 3 channel adapter, use the system VARY command to bring the paths offline from the alternate processing unit that has been reconfigured. No further action is required.

For a non-SNA device or a local SNA physical unit, each equipped with a 2-channel switch:

- If necessary, use the VTAM VARY INACT command with the I (immediate) operand to deactivate each physical unit or 3270 major node, or the entire major node.
- Switch the device to the alternate processor.
- Use the system VARY command to bring the paths for each device online and, if necessary, to bring previous channel paths offline.
- Use the VTAM VARY ACT command with the WARM operand to activate each minor node or the entire major node. This step reestablishes the network to its status at the time of deactivation.
- Restart user sessions as appropriate.

For a communications controller with a 2-channel switch:

- If necessary, use the VTAM VARY INACT command with the I (immediate) operand to deactivate the NCP.
- Switch the communications controller to the alternate processing unit.
- Use the system VARY command to bring the channel paths for each device online and, if necessary, to bring previous paths offline.
- Use the VTAM VARY ACT command with the WARM operand to activate the NCP. This step reestablishes the network to its status at the time of deactivation.
- Restart user sessions as appropriate.

Teleprocessing Online Test Executive Program (TOLTEP)

TOLTEP operates with the online test (OLT) programs and VTAM. TOLTEP controls the selection and execution of the OLTs used for testing the teleprocessing terminals supported by VTAM. An installation can use the OLT programs to:

Perform preventive maintenance

Perform problem determination

Diagnose I/O errors

Verify device repairs and engineering changes

IBM Field Engineering supplies the online test programs and uses the online test executive program (OLTEP) to install them in the appropriate system data sets. IBM Field Engineering also supplies the descriptions of the OLTs.

See *DDS/VS and OS/VS TOLTEP for VTAM* for a complete description of how a terminal user can run TOLTEP, which terminals are supported by TOLTEP, and the messages and replies to TOLTEP messages.

TOLTEP is automatically included in OS/VS2 when VTAM is specified during system generation. TOLTEP runs as a VTAM task and resides in the VTAM private address space. More than one terminal user can use TOLTEP concurrently, and TOLTEP runs concurrently with other tasks in the system. TOLTEP can be run concurrently with OLTEP (which performs the same testing functions as TOLTEP, but for devices that are not in the VTAM network).

VTAM, when started, initializes TOLTEP, which can be started from a terminal or from the VTAM network operator's console. TOLTEP can be started and run from any terminal (with alphanumeric input/output capability) that is allocated to VTAM and uses basic mode. This terminal becomes the control terminal.

After TOLTEP is started, the terminal user can enter a test definition that executes the OLTs to test terminals, or the terminal user can enter a TOLTEP verb that processes one of the TOLTEP verb functions. When a test definition or verb function is completed, another test definition or verb can be entered. TOLTEP also issues messages during the testing that inform the terminal user of the status of the testing.

Note: *Performance of the entire VTAM network can be affected by running TOLTEP because the terminals that TOLTEP is using for testing are unavailable to the VTAM network for processing work.*

Preparing for TOLTEP

Before installing VTAM, IBM Field Engineering consults with users to make preparations for running TOLTEP. IBM Field Engineering uses configuration information to prepare input to OLTEP. Then, using OLTEP, IBM Field Engineering creates the OLT and configuration data sets (CDSs) for the devices to be tested and catalogs the data sets into the appropriate libraries. (These data sets are described in *OS/VS2 System Programming Library: OLTEP.)* CDSs are also required for SNA devices that are to be used as control terminals or alternate printers.

TOLTEP Requirements

Storage Requirements: TOLTEP requires 89K bytes of virtual storage. For each terminal user that initiates TOLTEP, including the first terminal user, an additional 34K bytes of virtual storage are required for the OLT and a work area. TOLTEP also uses approximately 89K bytes of the VTAM space in the system libraries, plus space for the OLT and CDS libraries.

System Requirements: To include and run TOLTEP with VTAM:

- Add a DD statement with the ddname SYMSYM in the cataloged procedure for starting VTAM. SYMSYM defines the symbolic configuration data set modules for remote devices.
- Add a DD statement with the ddname OLTCDSDD in the cataloged procedure for starting VTAM. OLTCDSDD defines the OLTs and configuration data set modules for local devices.

- Specify symbolic names for the CDS entries to correspond with the names assigned to the VTAM nodes during NCP generation and VTAM system definition. This is necessary because TOLTEP associates the terminal to be tested with the CDS entry.
- Define valid logon messages to TOLTEP in an interpret table if terminal logon messages are to be monitored by a network solicitor and are to be used to initiate TOLTEP. Standard logon cannot be used to initiate TOLTEP if an interpret table is associated with the terminal.

Note: *The VTAM name for TOLTEP is ISTOLTEP.*

To include and run TOLTEP with an NCP:

- Specify or assume the default OLT=YES operand on the NCP BUILD macro instruction. (One NCP BUILD macro instruction is specified for each NCP that is defined for the VTAM network.)
- Specify the FEATURE=(ATTN) operand in the NCP GROUP, LINE, or TERMINAL macro instructions that represent a terminal that is to be tested by TOLTEP. (This operand allows the terminal user to interrupt testing by pressing the attention key.)

VTAM Application Program Requirements: Select terminals for TOLTEP use only when they are not connected to a VTAM application program. A VTAM application program can disconnect a terminal for TOLTEP use by:

Defining its own logoff procedure

Using a LOSTERM exit routine

Logoff Procedure: If the VTAM application program contains its own logoff procedure, that procedure should be used to free a terminal for TOLTEP use. The logoff procedure should detect the logoff request, provide for an orderly disconnection, and then use the CLSDST macro instruction to disconnect the VTAM application program from a specific terminal.

LOSTERM Exit Routine: If a terminal is connected to a VTAM application program and a logoff procedure has not been defined and made available, then the standard procedures for disconnecting the terminal are one of the following:

- Pressing the RFT key
- Entering a TRM (the terminal user enters either SOH%/ from a BSC terminal or 99999 from a start-stop terminal)
- Issuing a VARY INACT immediate command from the network operator's console

VTAM responds by first scheduling the VTAM application program's LOSTERM exit routine (if one has been coded) and then scheduling the input request sent by the VTAM application program. Then VTAM notifies the program that contact with the terminal has been lost. VTAM uses return codes to indicate that the I/O request has either been canceled or completed by the TRM.

If no LOSTERM exit routine has been scheduled, the application program should recognize the VTAM general return code in the FDBK2 (feedback) field of the RPL (request parameter list) and issue a VTAM CLSDST macro instruction (with the OPTCD=RELEASE option) to disconnect the terminal from the VTAM application program. After the terminal is disconnected, TOLTEP can log on to the terminal.

To code a LOSTERM exit routine, specify the LOSTERM exit routine on the VTAM EXLST macro instruction and write the installation-defined procedures for the routine to follow. See *VTAM Macro Language Reference* for further information about the LOSTERM exit routine and the RFT/TRM return codes.

Network Operator Requirements: If TOLTEP is initiated from a control terminal other than the operator's console, the network operator must grant permission (determined by the workload and the installation procedures) for the TOLTEP user to use the requested terminals. The network operator grants permission by responding to a prompting message from TOLTEP. The network operator can also confirm whether a terminal is available to TOLTEP by using the DISPLAY command.

For example, if the requested terminals are not available or if the VTAM application program has no procedure for disconnecting the terminals, the network operator should not grant permission for TOLTEP to use the requested terminals.

Chapter 9. Tuning VTAM

An installation can tune VTAM to meet its requirements using information described in this chapter:

- VTAM storage pools: Explains the structure and content of the various pools and how an installation can use the default storage pool values or calculate their own values, tune these values, and put selected pools in fixed storage.
- VTAM packaging: Explains the IBM-supplied module packaging and provides guidelines on how an installation can repackage modules that reside in the pageable link pack area (PLPA) and do LPA page-fixing.

When tuning VTAM, an installation must also consider its effect on an installation's requirements for all of OS/VS2 and the hardware configuration it supports. For details on tuning OS/VS2, refer to *OS/VS2 System Programming Library: Initialization and Tuning Guide.*

VTAM Storage Pools

VTAM has 11 storage pools to control the buffering of data. VTAM dynamically allocates and deallocates space in these storage pools for the VTAM control blocks, I/O buffers, and channel programs that control the transmitting of this data. For the contents of each storage pool, see *OS/VS2 VTAM Debugging Guide,* GC27-0023.

VTAM and OS/VS2 system performance can be affected by the VTAM storage pool sizes. Pools that are too large can increase fixed real storage requirements and can therefore affect paging activity. Pools that are too small can prevent VTAM from starting or can affect VTAM response time (queuing requests for pool elements can cause delays).

A procedure for tailoring the VTAM storage pool values is to (1) initially operate VTAM using the IBM-supplied or user-calculated storage pool values, (2) activate the VTAM storage pool trace facility, and (3) adjust the storage pool values as indicated by the trace data. To do this, consider:

Calculating storage pool values

Tuning storage pool values

Fixing storage pools

To tailor the VTAM storage pools, determine the following values for each VTAM storage pool:

bno: indicates the maximum number of elements in a pool

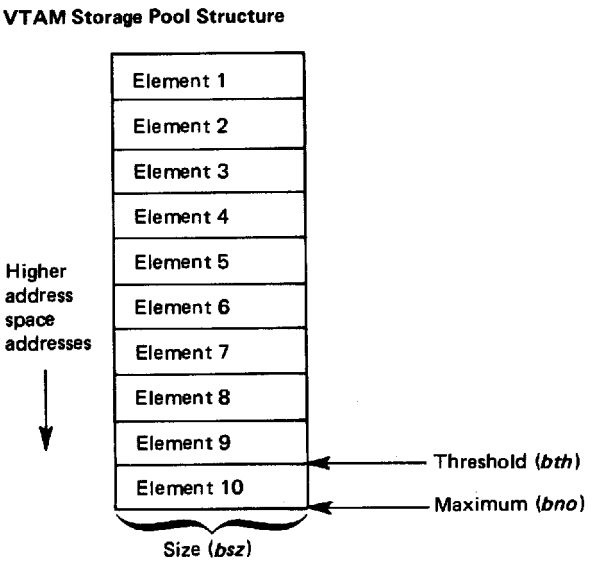
bsz: indicates the size of each element (in bytes) in a pool

bth: indicates a threshold number of elements for a pool

F: indicates that a pageable storage pool is fixed in storage

See *OS/VS2 VTAM Debugging Guide,* GC27-0023 for the contents of the VTAM storage pools.

Figure 9-1 shows the structure of a VTAM storage pool.



This example shows a storage pool start option specified as *poolname* = (10, *bsz*, 9). Thus, the maximum number of elements in the pool would be 10 (bno=10), the threshold is set at 9 (bth=9), and the *bsz* is the length (in bytes) for each element in the pool.

Figure 9-1. VTAM Storage Pool Structure

Threshold Value Effect

If the number of elements in use in a specific pool is below the threshold value *(bth),* VTAM can allocate additional elements for a VTAM request even if the requested number of elements causes the element allocation to be greater than the threshold. However, when the number of elements in use is equal to or greater than *bth,* the storage pool enters slowdown processing. During slowdown processing, elements are allocated only for priority requests. Non-priority requests are queued. (Priority requests are those VTAM storage allocation requests that have been predefined with a priority that causes VTAM to allocate elements in a storage pool to them during slowdown processing. For more details about priority and non-priority requests, refer to *OS/VS2 VTAM Logic.*) Figure 9-2 summarizes the threshold effect for VTAM storage pools.

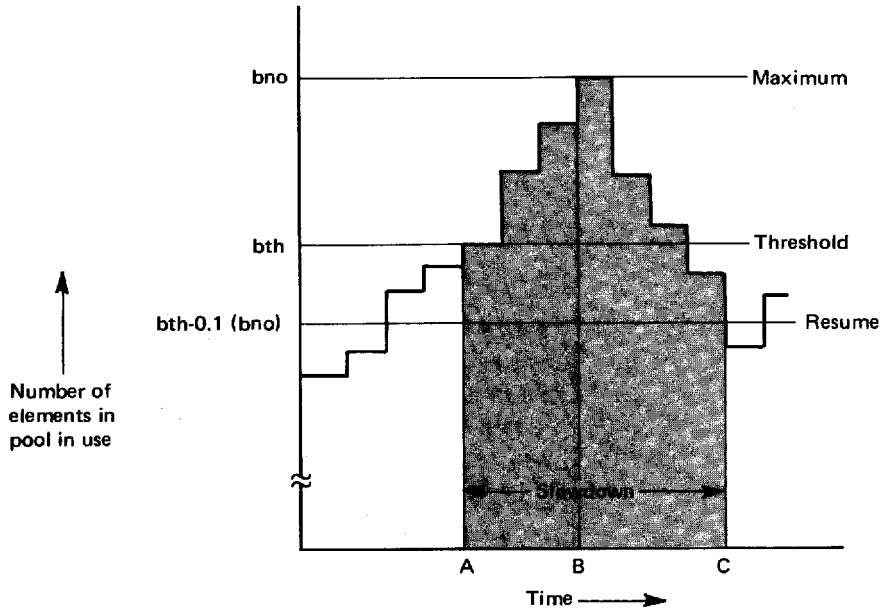
Using Storage Pool Default Values

The IBM-supplied default values (Figure 9-3) for the VTAM storage pools should be large enough to meet the network configuration requirements and workload of many installations. These values should help eliminate installation problems caused by inadequate storage pool sizes. However, if these defaults are inadequate or inappropriate, an installation can calculate its own storage pool values.

Calculating Storage Pool Values

An installation can calculate its own storage pool values if the IBM-supplied values are either inadequate or inappropriate. Figure 9-4 shows how to calculate the threshold *(bth)* value for a specific storage pool; Figure 9-5 shows how to calculate the *bno* and *bsz* values for specific storage pools.

Note: *Although the general formulas in Figures 9-4 and 9-5 usually yield values that exceed an installation's requirements, exceptions can occur. Thus, if a value for a specific storage pool is too low, it may be adjusted by using the information in the topic "Tuning Storage Pool Values" in this chapter.*



A Pool enters slowdown processing when the number of elements in use equals or exceeds ***bth.*** Elements are allocated only to priority requests while in slowdown processing (shaded area).

B When ***bno*** is reached because of additional priority requests, all the elements are in use and both priority and non-priority requests are queued.

C Normal operation resumes when the number of elements in use equals ***bth*** minus 10% of ***bno*** and no requests are queued for the storage pool. For example, if ***bno*** is 90 and ***bth*** is 70, normal operation resumes when the number of elements in use equals 61.

Note: All requests to LFBUF, LPBUF, SFBUF, SPBUF, and WPBUF are managed as priority requests. For these storage pools the same value must be specified for ***bno*** as for ***bth.***

Figure 9-2. Threshold Effect on VTAM Storage Pools

Storage Pool Name	IBM-Supplied Values		
	bno	bsz	bth
APBUF	129	44	116
CRPLBUF	208	116	193
IOBUF	100	64•	81
LFBUF	104	112	104
LPBUF	64	932	64
NPBUF	192	280	176
PPBUF	175	64•	157
SFBUF	163	72	163
SPBUF	3	100	3
UECBUF	34	112	30
WPBUF	78	280	78

• This value must be overridden to equal the value specified for the UNITSZ operand in the NCP HOST macro instruction.

Figure 9-3. Default VTAM Storage Pool Values

Storage Pool Name	Slowdown Threshold (bth) Formula [1] (The minimum bth value is 1.)
APBUF	NLU + NSSTERM + NBSCTERM + NLOC3270
CRPLBUF [2,3,4]	(21 * NACB) + (6 * NTRANX) + NCOMMANDS + 25
IOBUF	(See Figures 8-6 and 8-7)
LFBUF	NPORT+ NSSTERM + NBSCTERM + (4 * NTOLTEP) + NLOC3270
LPBUF [2,5]	(5 * NACB) + (2 * N ETSOL) + N370X + NSDLCCLUS + NCOMMANDS + NBSCCLUS + NLOC3270 + N LOC3790 + NPORT
NPBUF	N370X + NSDLCCLUS + NLU + NPORT + $_{NBSCCLUS}$ + NLOC3270 + NLOC3790+ NTOLTEP
PPBUF [6]	2 * (NLU + NSSTERM + NBSCTERM + NLOC3270)
SFBUF [3]	NSDLCCLUS + NLU + (20 * NACB) + (3 * NTRANX) + 40
SPBUF	N ACB
UECBUF [7]	2 * (NSSTERM + NLU + NBSCTERM + NLOC3270)
WPBUF	NLU + NSSTERM + NBSCTERM + NLOC3270 + (2 * NTRACE)

Variables (in alphabetic order):

NACB— Number of open ACBs (VTAM access method control blocks).

NBSCCLUS— Number of remote 3271, 3275, and 2972 clusters on BSC lines.

NBSCTERM— Number of remote terminals on BSC lines (that is, the total of all NCP TERMINAL and COMP macro instructions associated with BSC lines).

NCOMMANDS— Number of concurrent operator commands.

NETSOL— 1, if NETSOL=YES is specified as a VTAM start option.
0, if NETSOL=NO.

NLOC3270— Number of local 3270 terminals (count each printer and display station separately).

NLOC3790— Number of channels for local 3790s (that is, the number of PU macro instructions for local 3790s).

NLU— Maximum number of logical units that can be active at one time.

NPORT— Number of dial-up ports (switched lines).

NSDLCCLUS— Number of remote communication controllers (SDLC cluster controllers such as 3601s or 3791s) on SDLC lines.

NSSTERM— Number of remote start-stop terminals (that is, the total of all TERMINAL and COMP macro instructions associated with start-stop lines).

NTOLTEP— Number of concurrent TOLTEP users.

NTRACE— Number of terminals and logical units for which a VTAM buffer trace (TYPE=BUF) will be started.

NTRANX— Number of transactions per second (where a transaction is one inbound message and one outbound message) between the host and the involved devices.

N370X— Number of IBM 3704 and 3705 Communications Controllers (local or remote).

[1] These formulas are designed to give somewhat high estimates to get the installation running. After the installation is running, the installation may want to tune the values downward. In special cases, some of the values may have to be tuned upward.

[2] Assumes the maximum number of concurrent OPNDST and CLSDST macro instructions is 25. If the number of concurrent OPNDST and CLSDST macro instructions exceeds 25, processing of those macro instructions may be slowed down.

[3] For TCAM, do not include the NTRANX factor in the formula.

[4] For TCAM, add .5 * (NBSCTERM + $_{NSSTERM}$ + NLU).

[5] The VARY ACT command for a 370X causes VTAM to generate VARY ACT commands for all devices controlled by the 370X that have been specified as ISTATUS=ACTIVE. These additional commands put an increased demand on LPBUF pool.

[6] The multiplier "2" in this formula represents the default product of BUFF ACT * BUFLIM. For batch operations, that value may be low. The entire formula can be replaced by the sum of all BUFFACT * BUFLIM products.

[7] A value of 32 or higher should be specified.

Figure 9-4. Calculations for the Slowdown Threshold *(bth)* Values

Storage Pool Name	Values (• Do not code a comma within any number. • Round fractions to next largest integer.)		
	bno[1,2,3]	bsz[4]	bth[2,3,5]
APBUF	bth/.95	48	
CRPLBUF	bth/.95	120	
IOBUF	(See Figures 8-6 and 8-7)		
LFBUF	value of bth	112	
LPBUF	value of bth	936	
NPBUF	bth/.95	280	
PPBUF	bth/.95	equal IOBUF's bsz	
SFBUF	value of bth	88	
SPBUF	value of bth	64	
UECBUF	bth/.95	112	
WPBUF	value of bth	280	

1. The maximum *bno* value is 32767.
2. The minimum *bno* and *bth* value is 1.
3. The *bno* and *bth* values for LFBUF, LPBUF, SFBUF, SPBUF, and WPBUF must be equal. When one value is specified, both must be specified.
4. These default values (except for IOBUF and PPBUF) are constant and should not be changed by the user. Otherwise, allocated storage can be unused, or VTAM might not be able to allocate some VTAM control blocks.
5. Use values calculated from Figure 9-4.

Figure 9-5. Calculations for *bno* and *bsz* Values

Calculating IOBUF Values

VTAM allocates I/O buffers from the IOBUF storage pool. To calculate the initial values for this pool, Figure 9-6 may be used to determine the appropriate *bsz* value, and then Figure 9-7 may be used to determine the appropriate *bth* and *bno* values.

Tuning Storage Pool Values

An installation can use the VTAM storage pool trace to adjust the VTAM storage pool values to accurately represent the installation's requirements (such as private address spaces for VTAM application programs, network configuration, and maximum transaction rate). One procedure for doing this is to (1) initially operate VTAM using the IBM-supplied or the installation-calculated storage pool values, (2) fix additional and optional pageable pools (if any) in storage, (3) activate the VTAM storage pool trace, and (4) adjust the storage pool values as indicated by the trace data.

Using the VTAM Storage Pool Trace

The VTAM storage pool trace records the usage of all VTAM storage pools. When both GTF (USR trace option) and the VTAM storage pool trace are active, the storage pool trace information is collected on every 1000th VTAM request (if using the IBM-supplied value) to obtain a storage pool element.

Device Support	*bsz* Calculations
3704/3705	Must be greater than or equal to 88 and less than or equal to 4016. This volume must be equal to the value in UNITSZ operand of the NCP HOST macro. If more than one NCP is to be active concurrently, the UNITSZ value must be the same for each NCP.
Local 3790s Only	For large batch transmission, *bsz* = 1992. For normal transmission, *bsz* = 300.
370X with 3790 Local	If 370X is given priority, *bsz* is the same as the *bsz* calculated for 3704/3705. If the local 3790 is given priority, *bsz* = 1992 for large batch transmission = 300 for all normal transmission
Local 3270s Only	If the installation has only local 3270s, calculate *bsz* proportional to the average message length for the 3277 display stations. (This value can also be calculated in conjunction with the maximum IOBUF sizes shown in the table below.) See *IBM 3270 Information Display System Component Description*, GA27-2749, for a description of the data records that VTAM reads and writes for 3270s. (VTAM reads using the READ MODIFIED command and writes using the WRITE command.)

Maximum IOBUF Sizes (*bsz* value)/Elements Per Page

Max *bsz* Value	Elements/ Page	Max *bsz* Value	Elements/ Page	Max *bsz* Value	Elements/ Page
		152	18	376	9
		168	17	432	8
88	25	176	16	512	7
96	24	200	15	608	6
104	23	216	14	744	5
112	22	240	13	944	4
120	21	264	12	1288	3
128	20	296	11	1968	2
136	19	336	10	4016	1

Note: Select the first IOBUF size from these values that is greater than or equal to the *bsz* value calculated for local 3270s.

Figure 9-6. IOBUF *bsz* Calculations

The VTAM storage pool trace collects the following information for each of the VTAM storage pools:

Storage pool name

The maximum number of elements allocated from the pool at any one time since the last trace record was written

The maximum number of queued requests for buffers at any one time since the last trace record was written

Number of currently unallocated elements in the pool

Date and time, if TIME=YES was specified in the GTF START command

By keeping the storage pool trace active throughout the VTAM session, an installation can collect trace records that show the time periods when requests for elements in the storage pools are low, moderate, and high (as determined by the installation).

Value	Formula
bth	bth = $(NTRANX_{L370X} * MAXBFRU_{L370X} + EMAXBFRU_{L370X}) +$ $(NTRANX_{L3270} * NBUFMSG_{L3270}) +$ $(NTRANX_{L3790} * AVGMAXBFRU_{L3790} + EMAXBFRU_{L3790}) +$ TSOATUSR + 1 For installations with local 3270s, the minimum recommended *bth* value for starting VTAM is 50. For installations with no local 3270s, the minimum recommended *bth* value for starting VTAM is 30. **Note:** This formula assumes that each MAXBFRU is greater than or equal to the maximum number of elements required by VTAM to read a single message from a remote terminal.
bno	bno = *bth* + 2 * $(EMAXBFRU_{L370X} + EMAXBFRU_{L3790} + NBUFMSG_{L3270})$ **Note:** To eliminate unused space in the last page of the IOBUF storage pool, adjust the values calculated for *bno* and *bth* using the elements per page values in Figure 8-6. The *bno* value should be a multiple of the number of elements per page.

Variable for SU13:

TSOATUSR	If SU13 (TSO/VTAM) is present, this is the maximum number of possible active TSO sessions at any given time.

Variables for Local 370X:

$MAXBFRU_{L370X}$	The MAXBFRU value as specified in the NCP HOST macro instruction.
$EMAXBFRU_{L370X}$	The sum of the MAXBFRU values for all concurrently active local 370Xs. If only one local 370X is active, use the MAXBFRU value for that 370X.
$NTRANX_{L370X}$	Number of transactions per second received by VTAM from 370Xs. (A transaction is one inbound message and one outbound message.)

Variables for Local 3270 Terminals:

$NBUFMSG_{L3270}$ Number of elements required to read the full screen of a 3277 display station. Use IOBUF *bsz* value (previously calculated in Figure 8-6) to select NBUFMG from one of the two tables below. Index into the table to the *bsz* value closest in value to IOBUF *bsz*.

Read Full, 3277 Model 1	
bsz Value	NBUFMSG (elements/message)
104	4
240	2
512	1
These values assume: 507 data bytes transferred to host CPU.	

Read Full, 3277 Model 2	
bsz Value	NBUFMSG (elements/message)
96	16
216	8
512	4
1288	2
1968	1
These values assume: 1971 data bytes transferred to host CPU.	

Note: If installation has both local 3277 Model 1's and local 3277 Model 2's in the same network, then select NBUFMSG from the values for "Read Full, 3277 Model 2".

$NTRANX_{L3270}$ Number of transactions per second received by VTAM from local 3270s. (A transaction is one inbound message and one outbound message.)

Variables for Local 3790s:

$AVGMAXBFRU_{L3790}$	The average of the MAXBFRU values (specified in local PU statements for all concurrently active local 3791 controllers. If only one local 3791 is active, use the MAXBFRU value for that 3791.
$EMAXBFRU_{L3790}$	The sum of the MAXBFRU values for all concurrently active local 3791 controllers. If only one local 3791 is active, use the MAXBFRU value for that 3791.
$NTRANX_{L3790}$	Number of transactions per second received by VTAM from local 3791s. (A transaction is one inbound message and one outbound message.)

Figure 9-7. IOBUF *bth* and *bno* Calculations

Note: *To change the IBM-supplied number used to monitor the number of VTAM requests to obtain elements in the VTAM storage pools, redefine the number in VTAM module ISTORFPO (label GTRNO). The IBM value (1000 decimal) produces a record for approximately every 250 transactions. A transaction is defined here as one inbound message and one outbound message. By modifying the value to 1, some trace output is certain. Once a high transaction rate is reached, the count should be increased in order to reduce system overhead. Unpredictable results may occur when VTAM runs out of buffers.*

See Chapter 4, "Starting and Controlling the Network," for details on starting and stopping the VTAM storage pool trace. See Chapter 8, "VTAM RAS Facilities," for details about printing the VTAM storage pool trace records. See *OS/VS2 VTAM Debugging Guide,* GC27-0023, for an explanation of the VTAM storage pool trace record format and the contents of each pool.

Guidelines for Tuning Storage Pool Values

When analyzing the VTAM storage pool trace data and adjusting the storage pool values, consider these guidelines:

- VTAM should be operated using the installation's requirements for VTAM application programs and workload, for the number of private address spaces for VTAM application programs, for the network configuration, and for the maximum transaction rate.
- If a specific pool often exceeds its *bth* value or reaches its *bno* limit, that pool's *bth* and *bno* value should be increased.
- If a storage pool has a low number of requests, storage may be saved by reducing its *bth* and *bno* values.
- In general, the allocation of elements from pageable storage pools should be kept below *bth.*
- For IOBUF, NPBUF, PPBUF, and UECBUF, the *bno* value should be a multiple of the number of elements for each page.
- The values for PPBUF should not be reduced when using values calculated by the installation. If a VTAM application program stops accepting input data, PPBUF must be large enough to hold all the data that VTAM may receive from the terminals and logical units connected to the application program (until the program begins accepting input data again). Thus, do not assume that any low utilization figures (from the storage pool trace) indicate a need to reduce the *bth* and *bno* values for PPBUF.
- The size of PPBUF uses these assumptions:
  - BUFFACT=1 for all VTAM application programs (VTAM APPL definition statements) and BUFLIM=2 for all basic mode terminals (VTAM LOCAL definition statements and NCP TERMINAL, VTERM, or COMP macro instructions). Thus, the *bno* value should allow two elements for each basic mode terminal.
  - The application program blocks (APBs) in an SDLC cluster controller process transactions sequentially. Thus, VTAM can receive no more than two concurrent messages from the same logical unit.

Fixing Pageable Storage Pools

By using the *F* operand (value) for VTAM storage pools, you can selectively fix pageable pools in storage. This can help meet response time requirements. (For example, the transaction rate may be so small that pageable pool elements are paged out between transactions.) Fixing one or more storage pools can also reduce the required number of elements in each pool that supports a specific network configuration or transaction rate.

Figure 9-8 shows the default storage locations for each VTAM storage pool.

VTAM also uses MVS storage pools. Figure 9-9 identifies the subpools and gives their attributes.

Storage Pool	
Name	**Location**
APBUF (ACE storage pool)	Subpool 231 Pageable storage
CRPLBUF (copy RPL storage pool)	Subpool 231 Pageable storage
IOBUF (fixed input/output storage pool)	Subpool 231 (F)* Fixed storage
LFBUF (large fixed storage pool)	Subpool 231 (F) Fixed storage
LPBUF (large pageable storage pool)	Subpool 231 Pageable storage
NPBUF (non-working set FMCB storage pool)	Subpool 231 Pageable storage
PPBUF (pageable input/output storage pool)	Subpool 231 Pageable storage
SFBUF (small fixed storage pool)	Subpool 231 (F) Fixed storage
SPBUF (small pageable storage pool)	Subpool 231 Pageable storage
UECBUF (User exit control block storage pool)	Subpool 241 Pageable storage
WPBUF (working set FMCB storage pool)	Subpool 231 Pageable storage

* The F operand (attribute) applies only to storage pools in pageable storage.

Figure 9-8. Default VTAM Storage Pool Locations

Subpool Number	Attributes
227	Allocated from the top of common service area (CSA) Fixed storage Storage in user's key Must be explicitly freed at termination Fetch-protected
228	Same as 227 but not fetch-protected
229	Allocated from the top of the private memory Pageable storage Storage in user's key Freed automatically at task termination Fetch-protected
230	Same as 229 but not fetch-protected
231	Allocated in CSA Pageable storage Storage in user's key Must be explicitly freed at termination Fetch-protected
241	Same as 231 but not fetch-protected

Figure 9-9. MVS Storage Pools Used by VTAM

Guidelines for Fixing Storage Pools

When assigning the *F* operand to VTAM storage pools, these guidelines can be used:

- The *F* operand can be used to fix the WPBUF storage pool because it contains terminal-related control blocks (one for each terminal). Although the pages containing these control blocks are probably not referred to often enough by OS/VS2 to remain fixed in storage, VTAM frequently refers to them when processing transactions from that terminal.
- The *F* operand can be used to fix the CRPLBUF and LPBUF storage pools (containing transaction-related control blocks) if the transaction rate is minimal or if OS/VS2 is processing a large amount of batch work. Otherwise, if VTAM is processing many transactions, the transaction rate may be large enough for OS/VS2 to keep the pages in real storage.
- The APBUF, NPBUF, and SPBUF storage pools should not be fixed unless there are a large number of logons, logoffs, VARY commands, and OPNDST requests. These pools contain control blocks that VTAM does not refer to when processing transactions.

Packaging Considerations

VTAM modules for the pageable link pack area (PLPA) are packaged by functional groups in the order named in the LPA pack list (IEAPAK00 member in SYS1.PARMLIB). The VTAM modules are packaged in two members: IEAPAKBV (batch only with VTAM) and IEAPAKTV (TSO and batch with VTAM). During VTAM generation, the contents of either IEAPAKBV or IEAPAKTV are put into IEAPAK00. (Refer to *OS/VS2 System Programming Library: Initialization and Tuning Guide,* for a complete description of the PLPA and IEAPAK00.)

The IBM-supplied packaging gives priority to record mode devices and affects VTAM performance by:

Minimizing page faults

Minimizing page fixes

Making efficient use of the PLPA

An installation may determine that repackaging these modules can reduce the total number of system resources dedicated to VTAM processing, especially for installations with basic mode devices. An installation may also decide to place pages in the fixed LPA to help meet their response time requireinents.

Repackaging

By modifying the contents of the VTAM portion of the LPA pack lists, an installation can repackage the modules in different groups to help meet its requirements for device support (record or basic mode in the network configuration) and for the type of application programs to be executed (such as TCAM).

The IBM-supplied VTAM packaging gives priority to record mode devices (including the 3270s), as shown in Figures 9-10 and 9-11. Figure 9-10 lists the contents of the VTAM portion of IEAPAKEV and IEAPAKTV. Figure 9-11 shows the device support provided by the functional groups, and whether the groups are fixed or pageable. These figures may help determine any repackaging requirements. (See also *MVS Overview* and *System Initialization and Tuning Guide.)*

(1) (ISTRCC21,ISTESC02,ISTAICPT), (2) (ISTZIFID,ISTZIF1B,ISTRCFY0), (3) (ISTZBF0B,ISTAPC33,ISTAPC36),
(4) (ISTDCC25,ISTZAF1B), (5) (ISTZBFID,ISTAPC57,ISTAPC58), (6) (ISTAPC23,ISTAPC35,ISTAPC31,ISTSDCCR,ISTESC01),
(7) (ISTAICIR,ISTSDCCF,ISTAPC59), (8) (ISTRCC51,ISTRCC30,ISTRCC52), (9) (ISTDCC00,ISTDCC60),
(10) (ISTDCC02,ISTDCC32), (11) (ISTRCC22,ISTRCC63,ISTRCC65), (12) (ISTZPSVB), (13) (ISTDCC50),
(14) (ISTDCC20,ISTDCC22,ISTDCC30,ISTDCC61), (15) (ISTZIF0B,ISTZIFEB), (16) (ISTZIFCB,ISTZBFBB),
(17) (ISTZIFMB,ISTZBFAB), (18) (ISTZAF0B,ISTZIFLB,ISTZKFCB), (19) (ISTAPC41,ISTAPC51,ISTAPC52,ISTAPC54),
(20) (ISTZCEAB,ISTORFBA, ISTORFBD,ISTORFID,ISTSDCCN),
(21) (ISTZFSVB,ISTAPC32,ISTAPM69,ISTPATCH,ISTZRM01,ISTZDFJ0,ISTAPC37,ISTAPC38), (22) (ISTZFMV0),
(23) (ISTZLFVA,ISTZFM0A), (24) (ISTZFMV1), (25) (ISTZBF0L,ISTZAF0A), (26) (ISTZCF1A,ISTZIFOA),
(27) (ISTZCFBI,ISTZDFWR), (28) (ISTZGF0A,ISTZBFBA,ISTZCFCI,ISTZBFBR), (29) (ISTZIFCI,ISTZIFKB,ISTZBFAI),
(30) (ISTZBFAA,ISTZBF0A), (31) (ISTZBFBI,ISTZCF0B), (32) (ISTAPC25,ISTAICTN),
(33) (ISTAPC55,ISTZIFAA,ISTZCF0A,ISTZCFAI,ISTZDFWB,ISTZBFAM), (34) (ISTZIFNB,ISTZBFFB, ISTAPC34),
(35) (ISTZGFBB,ISTZIFTB,ISTZIFWB,ISTZIFAB), (36) (ISTAPC53,ISTAPC56,ISTAPC83,ISTAPC84),
(37) (ISTAPC61,ISTAPC62,ISTAPC63,ISTAPC66), (38) (ISTAPC11,ISTAPC12), (39) (ISTCSCMR),
(40) (ISTNMCCB,ISTNMCCF,ISTNMCCI,ISTNMCCO,ISTNMCCR,ISTNMCCS,ISTNMCCT,ISTNMCCZ), (41) (ISTNMC1S,ISTNMC5S),
(42) (ISTNMC3S,ISTNMC4P,ISTNMC6S), (43) (ISTNMC4S,ISTNMC5P,ISTNMC9P), (44) (ISTOCCRT),
(45) (ISTNMC2S,ISTNMC6P,ISTNMC7P,ISTNMC7S,ISTNMC8P), (46) (IFG0200U,ISTOCCCB,IFG0192F,ISTOCCSA),
(47) (ISTOCCOB), (48) (ISTNMCCA,ISTOCCDF,ISTOCMDC,ISTORFBQ,ISTORFSR,ISTAUCAG,ISTAUCAT),
(49) (ISTSDCAL,ISTSDCCA,ISTSDCCD,ISTSDCOD,ISTCFMTM,ISTCFCMM), (50) (ISTRAMA2,ISTRAMA1),
(51) (ISTRACTB,ISTRAFTP,ISTRACCA), (52) (ISTRAFD1), (53) (ISTDVCBA,ISTYCLUS),
(54) (ISTDVCRC,ISTYPSOL,ISTYSSCP), (55) (ISTYTCM3), (56) (ISTYTCM1), (57) (ISTYCONT,ISTYTCM2),
(58) (ISTZAF1R,ISTZBFAL,ISTZBFAR,ISTZBFDR), (59) (ISTZDFE0,ISTZDFKA,ISTZDFKB,ISTZDFL0,ISTZIMQA,ISTZBFXA),
(60) (ISTZAF1A,ISTZBFHA,ISTZBFIA,ISTZBMJA,ISTZBFGA), (61) (ISTZGF1A,ISTZIFNA,ISTZBFFA),
(62) (ISTZBFDI,ISTZIFBI), (63) (ISTZBFAE,ISTZKFBB,ISTZKFBN,ISTZKFCN), (64) (ISTZBFAG,ISTZBFNE,ISTZHFAN),
(65) (ISTZIFKG,ISTZIFOE), (66) (ISTZIFX0,ISTZBFGB,ISTZBFIB,ISTZIFBB), (67) (ISTZIFSB,ISTZIFUB,ISTZIFVB),
(68) (ISTZIFSC,ISTZIFIB,ISTZBFHB,ISTZBFNB), (69) (ISTZIFOB,ISTZGFAB,ISTZIFJB,ISTZIFHB),
(70) (ISTZBFCB,ISTZJFCB,ISTAPC64,ISTZBFEB), (71) (ISTZIFGB,ISTZIFDB,ISTZJF0B),
(72) (ISTZJFBB,ISTZJFAB,ISTZBFX0,ISTZBFND), (73) (ISTZGF0B,ISTZBFPB), (74) (ISTZCF1B,ISTZBFSC),
(75) (ISTSEC01,ISTSEC10,ISTSEC51), (76) (ISTSEC21,ISTSEC30,ISTSEC40),
(77) (ISTRCC23,ISTRCC26,ISTRCC53,ISTRCC54,ISTRCC80,ISTRCC81), (78) (ISTDCC10,ISTDCC13,ISTDCC11),
(79) (ISTDCC12,ISTDCC31), (80) (ISTDCC40,ISTDCC41,ISTDCC42), (81) (ISTDCC35,ISTDCC24,ISTDCC23),
(82) (ISTDCCB1,ISTDCC80,ISTZLPVA), (83) (ISTDCC21,ISTDCC51,ISTDCC85), (84) (IGE0010F,IGE0004)*

Note: The circled numbers are used as references to the functional module groups listed in Figure 9-11 and can be used as references if any repackaging is being done. These numbers are *not* contained in the pack list itself.

*When repackaging this module, the blank represents X'C0' or a 12-0 multipunch.

Figure 9-10. VTAM Portion of IEAPAKBV and IEAPAKTV Pack Lists

Device Support	Functional Module Groups[1]
Record Mode Devices [2]	
Excluding 3270s	1-12,20-22
Local 3270s	1-12,20-21,23,25,26,28
Remote 3270s	1-12,15,17-18,20-22,26-29
Basic Mode Devices [3]	
Excluding 3270s	1,3-7,9-22
Local 3270s	1,3-7,9-14,19-21,23,25,30
Remote 3270s	1,3-7,9-15,17-22,29,31

Notes:

[1] **Use these groups in conjunction with Figure 9-10. VTAM fixes groups 22-24 in storage, and uses groups 32-81 for other VTAM functions.**

[2] **VTAM packaging for record mode devices assumes that VTAM is supporting these VTAM macro instructions and their associated operands and parameters:**

RECEIVE	OPTCD=(ASY,CA,ANY,Q),RTYPE=(DFSYN),ECB=addr
SEND	OPTCD=(SYN,CA),POST=SCHED,STYPE=REQ, RESPOND=(EX,FME,NRRN)

[3] **VTAM packaging for basic mode devices assumes that VTAM is supporting these VTAM macro instructions and their associated operands and parameters:**

SOLICIT	OPTCD=(SYN,SPEC,CA)
READ	ECB=addr,OPTCD=(ASY,ANY,CA)
WRITE	EXIT=addr,OPTCD=(ASY,CA)

Figure 9-11. Functional Contents of VTAM Default Packaging

Repackaging may be helpful:

- If an installation has only basic mode devices. It may be helpful to remove the modules for record mode-only devices. Modules common to both basic and record mode functions can be repackaged with the basic mode-only modules.
- If an installation has only 3270s. It may be helpful to remove the record mode-only modules that do not support 3270s.
- If an installation has only TCAM applications, then it may be helpful to remove the modules (listed in Figure 9-11) with a DC, RC, or AI (as the fourth and fifth digits in the module name).

Note: *The VTAM IBM-supplied default pack lists, IEAPAKBV and IEAPAKTV, are extended versions of IEAPAKBA and IEAPAKTS, respectively, with the addition of the VTAM modules. IEAPAKBA and IEAPAKTS, along with guidelines for repackaging their contents, are described in* OS/VS2 System Programming Library: Initialization and Tuning Guide.

LPA Page-Fixing

Because fixed modules are not paged, I/O time and paging operations for page faults can be reduced by placing VTAM modules from SYS1.LPALIB in the fixed LPA, using the IEAFIXxx member in SYS1.PARMLIB. This placement can help the installation that needs response characteristics inconsistent with its workload. (For example, the transaction rate could be so minimal that pageable processing modules are paged out between transactions.)

See *OS/VS2 System Programming Library: Initialization and Tuning Guide* for a complete description of IEAFIXxx and LPA considerations that affect OS/VS2 system performance. See *OS/VS2 Storage Estimates* for a complete list of the VTAM modules in SYS1.LPALIB.

Appendix A. Device Considerations

This appendix lists MTA line considerations and device-dependent information that affects the basic-mode devices that are assigned to VTAM and the NCP. Some of the dependencies affect the coding of the VTAM macro instructions used by VTAM application programs, and some of the dependencies affect the coding of NCP macro instructions used by the NCP and VTAM.

Note: *For devices that use record mode, the device dependencies in the installation publication for the appropriate IBM teleprocessing subsystem should be reviewed.*

The device considerations for a specific device type in this appendix should be reviewed before coding the NCP or VTAM macro instructions that also affect that device type; then this appendix should be used in conjunction with the device considerations provided in the *VTAM Macro Language Reference* for VTAM macro instructions, and in the *NCP Generation Guide* for NCP macro instructions.

Non-SNA Terminals

IBM 1050 Data Communications System

Translation from lowercase to uppercase characters is not provided by either the NCP or VTAM.

TERMINAL and COMP NCP Macro Instructions

- If only one input and one output component are attached to the 1050 system, or if all components are used in group mode, one NCP TERMINAL macro instruction can be used to define the 1050 system. Also, NCP COMP macro instructions can be used for components with different characteristics, or for a 1050 system that uses specific polling or addressing characters.
- If a 1050 system is on a switched line, the VTAM application program must insert the appropriate component selection character in the data transmitted to the terminal.
- If a 1050 system is on a nonswitched line, the component selection character must be defined in the ADDR operand of the COMP macro instruction that represents each 1050 component. This definition allows the VTAM application program to establish connection and to transmit data to the terminal without having to insert a component selection character.
- If COMP is used, the VTAM application program should issue a VTAM OPNDST macro instruction for each component and for the symbolic name representing the entire 1050 system, to prevent another application program from doing I/O with these 1050 components.
- The VTAM-only, NCP DEVICE operand on the TERMINAL and COMP NCP macro instructions should be coded to allow a VTAM application program to use the VTAM INQUIRE macro instruction with OPTCD=DEVCHAR. INQUIRE can then obtain the device characteristics for a particular 1050 component.
- If CONV=YES is coded for output data to be sent in response to input from the terminal, the VTAM application program should initiate simultaneous WRITE requests without waiting for the pending READ to complete.

IBM 2740 Communication Terminal Models 1 and 2

Translation from lowercase to uppercase characters is not provided by either the NCP or VTAM.

Model 2 only: Leading graphics are not translated but are returned to the VTAM application program as the image of the expected bit positions.

Terminal and COMP NCP Macro Instructions

- If CONV=YES is coded for output data to be sent in response to input from the terminal, the VTAM application program should initiate simultaneous WRITE requests without waiting for the pending READ to complete.
- If only one output and one input component are attached to the 2740 terminal or if all components are used in group mode, one NCP TERMINAL macro instruction can be used to define the 2740 terminal. NCP COMP macro instructions can be used for components with different characteristics, or for a 2740 terminal that uses specific polling or addressing characters. If COMP is used, the VTAM application program should issue a VTAM OPNDST macro instruction for each component and for the symbolic name representing the entire 2740 system to prevent another application program from doing I/O with these 2740 components.

IBM World Trade Teletypewriter Terminals (WTTY)

Identification characters cannot be verified by either the NCP or VTAM.

NCP Group Macro Instruction

- If a VTAM application program specifies a VTAM NIB macro instruction with PROC=MSG, the WTTYEOB operand in the GROUP macro instruction must define the end-of-block sequence (if read-ahead is not desired for input operations).
- If a VTAM application specifies a VTAM NIB macro instruction with PROC=TRANS (the default value), the WTTYEOT operand in the GROUP macro instruction must define the end-of-transmission sequence. This sequence should not contain the FIGS or LTRS character if a WTT Adapter is attached.

NCP Terminal Macro Instruction

If the terminal is equipped to send who-are-you sequences (WRU), the WRU sequence (any valid character except FIGS or LTRS) should be specified in the ADDR operand.

AT&T 83B3 Selective Calling Station and Western Union Plan 115A Outstation

If the terminal is used in group mode, one NCP TERMINAL macro instruction can be used to define the group. NCP COMP macro instructions can be used if the terminals are to be used in specific mode. If COMP is used, the VTAM application program should issue a VTAM OPNDST macro instruction for each component and for the symbolic name representing the entire AT&T 83B3 or Western Union Plan 115A system to prevent another application program from doing I/O with these components.

CPT/TWX (Model 33135) Line Control Type

For VTAM to verify the ID sequence received from a dial-up TWX terminal, the VTAM-only, NCP VIDLIST macro instruction should be coded. For the NCP to verify the ID sequence, the NCP IDLIST macro instruction should be coded.

Multiple-Terminal-Access (MTA) Line Considerations

The VTAM-only, NCP VTERM macro instruction can be used to permit independent connection to a dial-up terminal on an MTA line.

IBM 2770 Data Communication System

- If a 2770 system is on a switched line and has more than one component, one NCP TERMINAL macro instruction can be used to define the 2770 system. NCP COMP macro instructions cannot be used to define the components. The VTAM application program must insert the appropriate component selection character in the data transmitted to the terminal.
- If a 2770 system is on a nonswitched line and has more than one component, one TERMINAL macro instruction can be used to define the 2770 system. COMP macro instructions can be used to define each component. The ADDR operand of each COMP macro instruction defines the component selection character for each component. This definition allows the VTAM application program to establish connection and to transmit data to the terminal without having to insert a component selection character.

IBM 2972 Station Control Unit Models 8 and 11

The NCP CLUSTER macro instruction is coded if the 2972 is on a line that is a nonswitched multipoint line.

NCP TERMINAL Macro Instruction

The NCP assigns a name to the terminal that corresponds to the *symbol* on the TERMINAL macro instruction representing the same terminal. The NCP also uses this assigned name to refer to the printer/keyboard. VTAM assigns a symbolic name to refer to the passbook printer or auditor key to allow connection to a passbook printer on a 2980 Model 1 or 4 Teller Station or an auditor key on a 2980 Model 2 Administrative Station. The name is formed by placing a dollar sign ($) to the left of the specified name and by deleting the last character. For example:

```
A2980TRM TERMINAL ADDR=(818140,8181F4),TERM=2980 ....
```

A2980TRM is the NCP-assigned name for the printer/keyboard, and $A2980TR is the VTAM-assigned name for the passbook printer or auditor key.

In the example above, only one session is allowed to each primary/secondary ADDR. Application programs must perform OPNDST/CLSDST operations to communicate with each.

Another method is to define each ADDR as a unique terminal.

Note: *The installation must ensure that the VTAM-assigned name of the passbook printer or auditor key is unique.*

IBM 3270 Information Display System (BSC and Locally Attached)

SNA 3270 information is contained at the beginning of this appendix. Guidelines for replacing BSC and locally attached 3270s with SNA 3270s appear at the end of this appendix.

The NCP CLUSTER macro instruction is coded if the 3271 or 3275 (or their equivalent) is on a line that is a nonswitched multipoint line.

IBM 3735 Programmable Buffered Terminal

VTAM can use the V TAM-only NCP VIDLIST macro instruction to verily IDs.

NCP IDLIST Macro Instruction

If the NCP does not verify IDs using the IDLIST macro instruction, the BHSET and processing options (defined at NCP generation) are not associated with the first block of input received from a dial-up terminal.

- The WAIT option is specified in the POLIMIT operand when defining a line to which a 3735 is attached.
- Nonswitched 3735s can coexist with other 3735s on a multipoint line. However, 3735s cannot coexist with other BSC terminals on a multipoint line because the POLIMIT requirements for 3735s is different from those for other BSC terminals.

IBM 3740 Data Entry System

- VTAM can use the VTAM-only, NCP VIDLIST macro instruction to verify IDs.
- If the NCP does not verify IDs using the NCP IDLIST macro instruction, the BHSET and processing options (defined at NCP generation) are not associated with the first block of input received from a dial-up terminal.
- If a CPU ID sequence is to be sent to a 3740 system on a switched line from the NCP, the sequence is specified in the CUID operand (in the NCP BUILD macro instruction) and in the CUIDLEN operand (in the NCP TERMINAL macro instruction).

IBM System/3 CPU, IBM System/32, or IBM System/370 CPU

If the System/3, IBM System/32, or System/370 CPU is to be the primary station on a nonswitched, point-to-point (contention) line, the NCP LINE macro instruction is coded with the POLLED=NO, TADDR=NONE, and YIELD=YES operands. This coding makes the communications controller the secondary station and yields control to the primary station when contention occurs on the line.

Appendix B. Terminal-User Messages Issued by VTAM

This appendix describes the messages that may be displayed or printed at a terminal operated by one of the installation's teleprocessing users (as opposed to the system operator or network operator). The first half of Appendix B consists of the messages VTAM issues in response to LOGON or LOGOFF commands issued by logical units. The balance of Appendix B consists of the messages issued by the IBM-supplied network solicitor (NETSOL).

USS Messages

VTAM writes the messages described below in response to a character-coded logon or logoff command sent by the logical unit. Each message shown indicates an error condition; no message shown is issued when the command has been successfully processed.

The texts of the messages shown below are those contained in the IBM-supplied USS definition table, ISTINCDT. The description of the USSMSG macro instruction in Chapter 5 describes how the MSG=n parameter is used to replace the texts of these messages. The messages are arranged in the order in which they are designated by the MSG=n parameter.

The description of the MSG=n parameter in Chapter 5 indicates that nine messages can be replaced, but 10 messages are described below. The tenth message, "MESSAGE NOT DEFINED," cannot be modified because it is issued only if the USS definition table has been improperly constructed or modified by the installation.

The issuance of any of these messages means that the command just entered has been ignored. Except where otherwise noted, the proper terminal operator response is to reenter the command.

MSG=1

INVALID COMMAND SYNTAX

Explanation: Some element of the command violates the rules described under "Character-coded Command Syntax" in Chapter 5.

System Action: The command is ignored.

Terminal-User Response: Determine the correct form and reenter the command.

MSG=2

verb COMMAND UNRECOGNIZED

Explanation: The entered verb (or its replacement) is neither LOGON nor LOGOFF.

System Action: The command is ignored.

Terminal-User Response: Determine the correct verb and reenter the command.

MSG=3

parameter PARAMETER UNRECOGNIZED

Explanation: The entered parameter (or its replacement) is not valid for the command with which it is entered. If the parameter is a keyword parameter, the *keyword parameter* appears in the message text; if the parameter is a positional parameter, that parameter's *position* appears in the message text (for example, P3 PARAMETER UNRECOGNIZED).

System Action: The command is ignored.

Terminal User Response: Determine the correct parameter and reenter the command.

MSG=4

parameter PARAMETER INVALID

Explanation: The variable value associated with a parameter is invalid. Either (1) VTAM cannot find the application program name (as defined by the symbolic name of the application program's APPL statement), (2) VTAM cannot find the logon mode name (as defined by the LOGMODE parameter in the logical unit's logon mode table), or (3) either the TYPE parameter (for LOGOFF) is neither COND nor UNCOND, or the HOLD parameter is neither YES nor NO.

System Action: The command is ignored.

Terminal User Response: Determine the correct value (name) for the parameter and reenter the command.

MSG=5

UNSUPPORTED FUNCTION

Explanation: The logical unit sent the command to VTAM in an improper manner. A 3270 logical unit can only issue Clear, System Request, or magnetic card reader data. A logical unit other than a 3270 must *not* issue a Clear, Cancel, or Signal command; nor can it send a zero-length command. All logical units must send the character-coded command as a single-element chain.

System Action: The command is ignored.

Terminal User Response: Reenter the command. Some of the invalid commands mentioned above are sent when program function keys are pressed; avoid pressing these keys.

MSG=6

SEQUENCE ERROR

Explanation: If the command just entered is a logon command, this message means that a VTAM application program is already connected to the logical unit. If the command just entered is a logoff command, this message means that no VTAM application program is currently connected to the logical unit.

System Action: The command is ignored.

Terminal User Response: None. The command is already in effect.

MSG=7

SESSION NOT BOUND

Explanation: A valid logon request has been entered and forwarded by VTAM to the application program, but either the application program has rejected the logon request (by issuing a CLSDST instead of an OPNDST macro instruction) or the logical unit has rejected the application program's OPNDST macro instruction (by returning a negative response to the Bind command sent by OPNDST). This message is also written if the interpret table recognizes an error involving a logon command. The logon command, as entered, cannot be used to establish a connection with the application program.

System Action: The command is ignored and no session is established between the application program and the logical unit.

Terminal User Response: It is possible that the application program cannot accept the logon mode name implied in the logon command and the logical unit cannot accept the application program's substituted logon mode name; in this situation, a logon command implying a different logon mode name might work. This message is generally evidence of improper design of the VTAM application program, the USS definition table, or the logical unit's application program.

MSG=8

INSUFFICIENT STORAGE

Explanation: VTAM was unable to obtain enough storage to service the request. If the installation has allocated an optimum partition size for VTAM (see OS/VS2 *Storage Estimates),* this condition is temporary and rare. If too little storage has been allocated, this condition occurs frequently and can be corrected only by increasing the size of the VTAM partition. (An identical situation occurs when application programs issue VTAM requests; see the description of error return codes in *VTAM Macro Language Reference.)*

System Action: The command is ignored.

Terminal User Response: Reissue the command.

MSG=9

MAGNETIC CARD DATA ERROR

Explanation: A character-coded command from a 3270 logical unit contains invalid magnetic card data. Either the card was entered into a field that was too small, or a parity error occurred.

System Action: The command is ignored.

Terminal User Repsonse: Reenter the command. If the magnetic card has been entered into a field that was too small, press the CLEAR key and reenter the command, entering the card into a larger field. If parity errors are suspected, notify IBM maintenance personnel.

Undefined Message

MESSAGE NOT DEFINED

Explanation: An error condition associated with one of the preceding nine messages occurred, but VTAM cannot find a USSMSG macro in the logical unit's USS definition table that corresponds to the error condition. For example, an insufficient storage condition occurred, but neither the logical unit's USS definition table nor the IBM-supplied table contains a USSMSG macro with MSG=8 specified. (Since the IBM-supplied table defines all messages, the installation has deleted the message.) This message is evidence that the installation has improperly defined or installed the USS definition tables.

System Action: The command is ignored.

Terminal-User Response: Check the command for any obvious errors and reissue the command. There is no way to determine which of the above nine error conditions apply.

Network Solicitor Messages

The messages described below may be issued to any BSC or start-stop terminal serviced by the network solicitor. The message texts as shown here are those issued by the IBM-supplied network solicitor.

The messages from the network solicitor do not contain identifying numbers or message identifiers. The text of the messages can be shortened, extended, or translated by the procedures in Chapter 6, "Tables and the Network Solicitor."

The installation should make the information in this appendix available to the terminal users who can receive the messages and to the network operator. However, before issuing this information, consider these guidelines:

- Rewrite the message text if it was changed when generating a network solicitor besides the IBM-supplied network solicitor.
- Change "Terminal-User Response" to reflect procedures or policies of the installation.
- Delete "Programmer Response" for each message. This information can assist an application or system programmer (not the terminal user or network operator) to recognize the programming considerations that cause the message to be issued.

The messages are listed alphabetically below.

APPLICATION DEACTIVATED BY NETWORK OPERATOR

Explanation: The network operator has issued a command to deactivate the VTAM application program that you require. Your logon request is ignored.

System Action: VTAM does not accept the logon request.

Terminal-User Response: Tell the network operator which VTAM application program you want to use. When the network operator tells you that the application program is active, reenter your logon request.

Programmer Response: The VTAM application program appeared to be active and accepting logon requests; however, the network solicitor issued a VTAM CLSDST macro instruction (with OPTCD=PASS), which failed. This occurred because the network

operator deactivated the VTAM application program after the network solicitor issued the VTAM INQUIRE macro instruction (with OPTCD=APPSTAT), but before the network solicitor issued the VTAM CLSDST macro instruction (with OPTCD=PASS).

APPLICATION IS CLOSING DOWN

Explanation: The VTAM application program you requested is disconnecting itself from VTAM. Your logon request is not accepted.

System Action: VTAM does not accept the logon request.

Terminal User Response: Tell the network operator which VTAM application program you want to use. When the network operator tells you that the application program is active, reenter your logon request.

Programmer Response: The VTAM application program has issued a VTAM SETLOGON macro instruction (with OPTCD=QUIESCE). The application program's logon request queue is permanently closed (the application program is in the process of closing its ACB).

APPLICATION IS INACTIVE

Explanation: The VTAM application program you requested is not currently active. Your logon request is ignored.

System Action: VTAM does not accept the logon request.

Terminal User Response: Tell the network operator which VTAM application program you want to use. When the network operator tells you that the application program is active, reenter your logon request.

Programmer Response: The VTAM application program's ACB is not open.

APPLICATION IS NOT ACCEPTING LOGONS

Explanation: The VTAM application program you requested is not accepting logon requests. The condition probably is temporary. Your logon request is not accepted.

System Action: VTAM does not accept the logon request.

Terminal User Response: Wait a while and try again to logon. The VTAM application program has probably reached the installation-defined number of logon requests that it can accept.

Programmer Response: The VTAM application program has issued a VTAM SETLOGON macro instruction (with OPTCD=STOP), which implies that the condition is temporary. The application program should issue a VTAM SETLOGON macro instruction (with OPTCD=START) as soon as it can accept another logon request.

APPLICATION NEVER ACCEPTS LOGONS

Explanation: The VTAM application program you requested can only acquire terminals; it does not accept logon requests from the network solicitor. Your logon request is not accepted.

System Action: VTAM does not accept the logon request.

Terminal-User Response: Ensure that this is the VTAM application program you really require. If not, enter another logon request, specifying the correct application program. If it is the correct program, consult your installation system programmer for assistance.

Programmer Response: The VTAM application program indicates that it does not accept logon requests (that is, the application program's ACB was opened with MACRF= NLOGON specified). For the application program to accept logon requests, add a VTAM OPEN macro instruction with MACRF=LOGON, followed by a VTAM SETLOGON macro instruction. Then, recompile, link-edit, and assemble the application program.

APPLICATION UNKNOWN TO VTAM

Explanation: VTAM does not recognize the VTAM application program name that corresponds to the logon message you specified. Your logon request is ignored.

System Action: VTAM does not accept the logon request.

Terminal-User Response: Ensure that you specified the correct logon message. If not, enter the correct logon message. If it is the correct message, consult your installation system programmer for assistance.

Programmer Response: (1) The VTAM application program name has been incorrectly specified in the VTAM LOGCHAR macro instruction that defines the application program name in the interpret table, (2) the VTAM application program name has been incorrectly specified in the VTAM APPL definition statement, (3) the VTAM configuration being used at this time does not have a VTAM APPL definition statement defining the application program, or (4) the application program has not been activated.

ERROR WHEN READING LOGON MESSAGE

Explanation: An I/O error (hardware) was detected in the logon message, or the logon message contained no data. Your logon message is ignored.

System Action: VTAM does not accept the logon request.

Terminal-User Response: Reenter the logon message.

Programmer Response: If the error persists, call maintenance personnel.

INPUT NOT RECOGNIZED

Explanation: You entered a logon message that the network solicitor has compared against the interpret table and found invalid. The logon request is not accepted.

System Action: VTAM does not accept the logon request.

Terminal-User Response: Enter a valid logon message (installation-defined), or, if you believe the logon message is valid, consult your installation system programmer for assistance.

Programmer Response: Ensure that the correct logon messages were given to the terminal users. Otherwise, either the logon message defined in the interpret table by the VTAM LOGCHAR macro instruction is incorrect or the terminal user did not use the correct logon message.

NO INTERPRET TABLE

Explanation: Your logon message was not in OS/VS2 logon format, and no interpret table exists for your terminal. Your request is ignored.

System Action: Your logon request was ignored, but VTAM resolicits your terminal so that logon can be performed using OS/VS2 logon format.

Terminal-User Response: (1) Repeat the logon request in OS/VS2 format: LOGON APPLID (applname) where *applname* is the VTAM application program to which logon is desired. **(Note:** *The VTAM application program can require additional text entered with the logon message to fully authorize you to use this application program.)* (2) You can also ask the network operator to log you on by using the VARY command if you cannot use standard logon. (3) You can also ask your installation system programmer to consider specifying an interpret table or logon message in an interpret table for your terminal.

Programmer Response: No action is required.

NO ROUTINE TO RECOGNIZE APPLICATION

Explanation: VTAM could not recognize the VTAM application program you requested because the installation-supplied logon-interpret routine to do this has not been loaded. Your request is ignored.

System Action: VTAM does not accept the logon request.

Terminal-User Response: Have the network operator check that the interpret table defined for your terminal is available to VTAM.

Programmer Response: The installation-supplied routine referred to by this message is the logon-interpret routine. The interpret table used by this terminal is specified in the LOGTAB operand (in the appropriate NCP TERMINAL macro instruction). The interpret table and any installation-supplied, logon-interpret routines (referred to by the interpret table) should have been assembled together and link-edited to SYS1.LPALIB using the name of the interpret table (in the VTAM INTAB macro instruction).

USER UNAUTHORIZED FOR THIS APPLICATION

Explanation: The installation-defined authorization specifications have not recognized your request and therefore have not allowed you to be connected to the VTAM application program. Your request is ignored.

System Action: VTAM does not accept the logon request.

Terminal-User Response: You must arrange with the installation system programmer for the necessary authorization to use this VTAM application program.

Programmer Response: The logon-interpret routine referred to by the terminal's interpret table did not authorize the logon request. If the terminal user is authorized, provide the additional information to allow the terminal user's logon message to be recognized by the logon-interpret routine.

THIS TERMINAL IS LOGGED ON TO THE NETWORK SOLICITOR

Explanation: The network solicitor issues this message when it receives control of the terminal (whether through a network operator command or as a result of another application program releasing the terminal at the end of a session) and successfully establishes a session with it.

System Action: The terminal remains in session with the network solicitor until another application program requests control of it or until the network solicitor requests that the terminal be logged on to another application program.

Terminal-User Response: You can now log on to an application program.

Programmer Response: None.

Appendix C. Cross-Reference Coding Dependencies

This publication describes VTAM definition statements, VTAM macro instructions, NCP macro instructions, and VTAM console commands and their operands. Some of these statements and operands have coding dependencies or are used in conjunction with other statements and their operands (whether or not this publication describes the associated statement and its operand).

The following diagram lists these statements and their operands, and shows the associated statements and operands that have dependencies. For example, when coding the LOCAL statement and its BUFLIM operand, you must also consider the coding dependencies or relationships with the APPL statement and its BUFFACT operand and with the START statement and its IOBUF and PPBUF operands.

Statement Dependencies			
Statement	Operand	Associated Statement	Operand
APPL	applname	ACB	APPLID
APPL	BUFFACT	COMP	BUFLIM
		LOCAL	BUFLIM
		LU	BUFLIM
		PU	BUFLIM
		TERMINAL	BUFLIM
		VTERM	BUFLIM
		START	IOBUF
		START	PPBUF
APPL	AUTH	CLSDST	PASS
		NIB	PROC
APPL	PRTCT	ACB	PASSWD
CLUSTER	LOGAPPL	APPL	applname
		NETSOL	label
COMP	LOGAPPL	APPL	applname
		NETSOL	label
GROUP	LOGAPPL	APPL	applname
		NETSOL	label
GROUP	VIDSEQ	VIDLIST	symbol
INTAB	name	ENDINTAB	label
LBUILD	SUBAREA	BUILD	MAXSUBA
		START	MAXSUBA
LINE	LOGAPPL	APPL	applname
		NETSOL	label
LINE	VIDSEQ	VIDLIST	symbol
LOCAL	BUFLIM	APPL	BUFFACT
		START	IOBUF
		START	PPBUF
LOCAL	LOGAPPL	APPL	applname
		NETSOL	label
LOGCHAR	APPLID	APPL	applname
LU	BUFLIM	APPL	BUFFACT
		START	IOBUF
		START	PPBUF

Statement Dependencies			
Statement	Operand	Associated Statement	Operand
LU	LOGAPPL	APPL	applname
NETSOL	label	APPL	applname
NETSOL	PRTCT	APPL	PRTCT
PCCU	CUADDR	VARY	NET
PCCU	RNAME	INNODE	symbol
PU	BUFLIM	APPL	BUFFACT
		START	IOBUF
		START	PPBUF
PU	LOGAPPL	APPL	applname
START	IOBUF	APPL	BUFFACT
		HOST	UNITSZ
		HOST	MAXBFRU
		LOCAL	BUFLIM
		LU	BUFLIM
		PU	BUFLIM
START	MAXSUBA	BUILD	MAXSUBA
		BUILD	SUBAREA
		LBUILD	SUBAREA
		VBUILD	SUBAREA
START	PPBUF	APPL	BUFFACT
		HOST	UNITSZ
		LOCAL	BUFLIM
		LU	BUFLIM
		PU	BUFLIM
TERMINAL	BUFLIM	APPL	BUFFACT
TERMINAL	LOGAPPL	APPL	applname
		NETSOL	label
VBUILD	SUBAREA	BUILD	MAXSUBA
		START	MAXSUBA
VIDLIST	VIDSEQ	TERMINAL	symbol
VTERM	BUFLIM	APPL	BUFFACT
VTERM	LCST	MTALCST	symbol
VTERM	LOGAPPL	APPL	applname

[1] **Note:** If an associated statement and its operand is not described in this publication, then consult:

Statement	Publication
VTAM macro instructions	*VTAM Macro Language Reference*
NCP macro instructions	*NCP Generation Guide*
VTAM console commands	*VTAM Network Operating Procedures*

Figure C-1. Statement Dependencies

Appendix D. An Example of a Switched SNA Network

This example shows how to:

- Use SDLC links in a switched network.
- Define the network to VTAM and to the NCP.
- Operate the network by use of dial-out and dial-in operations. In the dial-out operation, alternate paths are used to establish connection when attempts on previous paths are unsuccessful.

The Customer

XYZ is an insurance company with corporate offices in New York City and branch offices throughout the country. XYZ has installed 3790 systems at the corporate office in New York and in its east coast and midwest branch offices. A central data base is maintained at the host system in New York. Periodically during the day, data base is searched (for example, regarding the status of a particular policy) and modified (for example, after a new policy has been sold) by means of dial-in operations from the various branch offices. Such inquiries and updates require dial-in operations. At the end of the business day, an analysis of the company's new policies, of new claims, and of running totals is sent to the corporate office over switched lines and requires a dial-out operation from the host computer.

The Configuration

Figure D-1 shows XYZ's switched network configuration. There are 10 east coast offices (including the corporate office) and 10 midwest offices. Each office has a 3791 controller (identified to VTAM as a physical unit) with a switched network telephone number. Each 3791 can have up to 16 active terminal operator stations, each of which VTAM views as a logical unit. In addition, each 3791 controller has one logical unit dedicated to the controller's batch function. Each logical unit has a network address. A maximum of 17 logical units (16 terminal operator stations, plus batch function) is possible.

Typically, a terminal operator station consists of a 3277 display, a 3793 keyboard printer, or a 2741 communication terminal. To invoke the batch function of the controller, the operator conducts administrative procedures at the controller. The batch function handles transmission to the host system of batch data accumulated by the 3790 program. It also handles transmission of data from the host system to data sets in the controller.

Rather than have the midwest offices call the central computer directly, XYZ has determined that it is less expensive to have these offices call a communications controller that is attached remotely to the central (host) CPU. The remote communications controller then "concentrates" messages between connected branch offices and the host CPU on a single nonswitched line.

In looking at Figure D-1, note that there is no fixed relationship between any particular dial link at one of the communications controllers and any particular branch office's physical units. Each physical unit can dial into any of the dial line ports, provided its telephone number is known; conversely, any dial line port chosen by the communications controller program (NCP) can dial out to any physical unit (in any east coast or midwest branch office) for which a telephone number is available. In practice, XYZ can restrict communications at the local communications controller to only those physical units

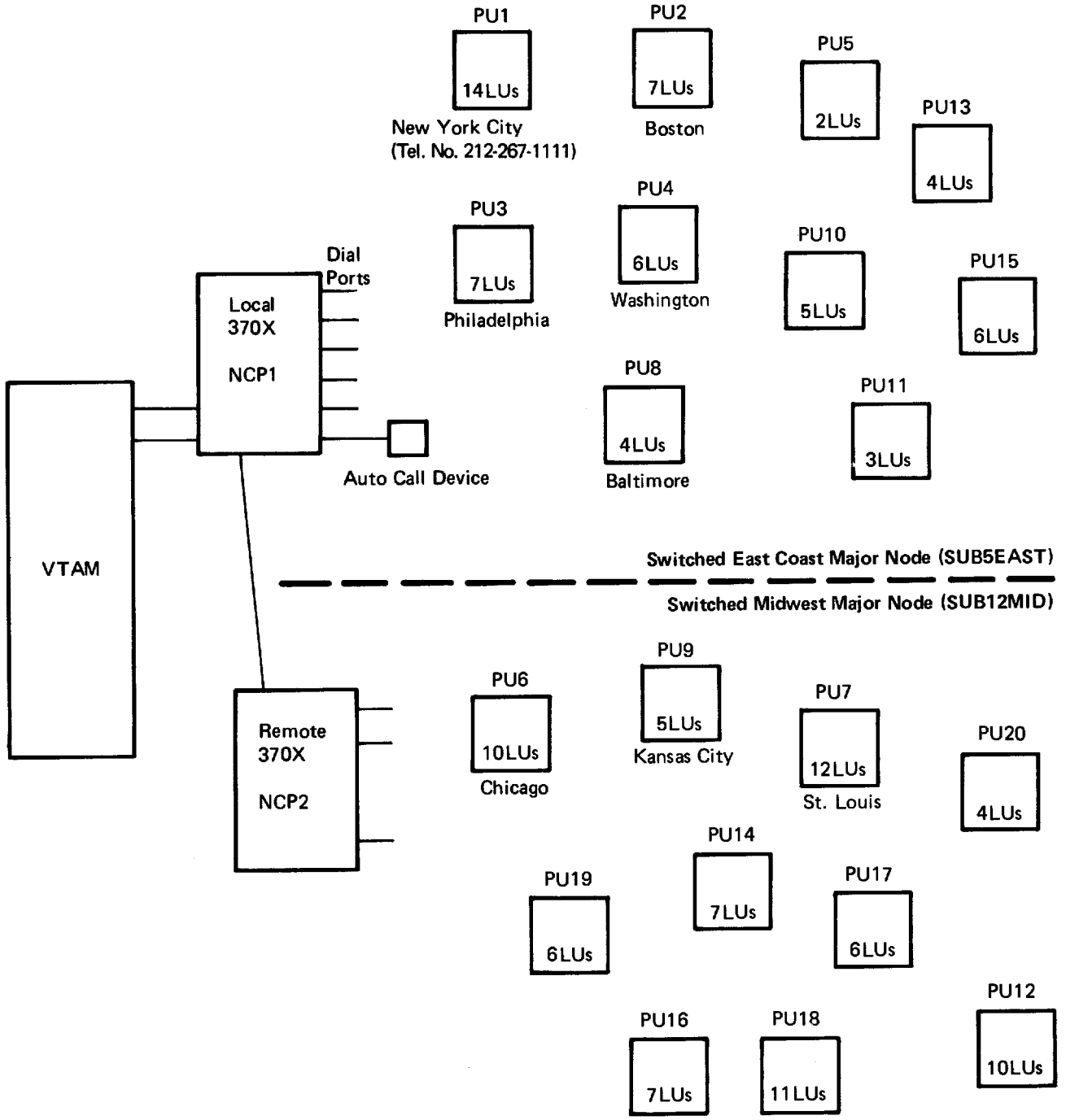


Figure D-1. XYZ's Network Configuration

located in the east coast area, by withholding the phone number of the remote communications controller's dial lines to the east coast offices. XYZ can similarly restrict midwest offices with respect to the local communications controller's lines.

Defining the Switched Network

The system programmer at XYZ must define to VTAM the maximum number of network elements that can be activated. The system programmer must also define and generate each NCP that can be made active and loaded into a communications controller. In looking at Figure D-1, note that any telecommunications control program in the host CPU (in this case, VTAM) requires a "view" of each major network element that can be_ added or subtracted from the network. Thus, VTAM must be aware of the lines or dial ports defined in each NCP (in this case, the New York NCP and the Chicago NCP) and each switched major node. Although VTAM is aware of the total possible network, in operation it actually views only the major nodes of the network that are active. The NCP that is generated need be aware of its own lines and have a general description of the type of physical unit that each line can serve. During the time that a connection exists between a given line and a given physical unit, VTAM provides the NCP with the information it needs to communicate with that particular physical unit.

Figure D-2 shows the set of macro instructions that XYZ uses to generate the NCPs and to define the NCPs to VTAM. (If the configuration in this example contained BSC or start-stop terminals or nonswitched physical units, these would also be defined in the NCP major nodes.)

NCP Generation

NCP generation includes defining a group of SDLC links for dial-out, dial-in, or dial-in/dial-out operations for switched network support.

- LUPOOL is used to state the total number of logical units that can be supported by the group of switched lines being defined.
- GROUP defines the start of a group of lines, the line control (such as SDLC), and whether the lines have dial support.
- LINE describes whether the line has automatic or manual dial support and the line's function (dial-out, dial-in, or dial-inout capability).
- PU defines what type of physical unit can be supported on each (for example, the maximum number of logical units a physical unit can support on this particular line).

The entire deck of NCP generation macro instructions (input to stage 1 of the NCP generation) is placed in SYS1.VTAMLST. When the operator activates the major node (in this case, the NCP), all groups and lines become known to VTAM.

VTAM Definition

Figures D-3 and D-4 show the sets of statements that define the switched major nodes to VTAM.

VBUILD, PU, PATH, and LU definition statements define the switched major node:

- VBUILD supplies the subarea identifier for the major node and states its limitations (for example, the maximum number of unique telephone numbers used in the PATH statements for this particular subarea).
- PU identifies a specific physical unit (from the ID operands), the maximum number of paths taken to support it (for dial-out only), and whether VTAM is to automatically disconnect the physical unit when it determines that all its logical units have terminated their sessions (DISCNT parameter).

NCP GENERATION FOR A LOCAL NCP

NAME	OPERATION	OPERANDS	COMMENTS
POOL1	LUPOOL	NUMBER=60	TOTAL NUMBER OF LOGICAL UNITS AVAILABLE FOR SWITCHED CONNECTION
G1	GROUP	DIAL=YES,LNCTL=SDLC	INDICATES DIAL SUPPORT UNDER SDLC FOR ALL THE LINES DEFINED IN THIS GROUP
LINE1	LINE	CALL=OUT,AUTO=020	DEFINES AN AUTO CALL DIAL-OUT LINE
PUZ	PU	MAXLU=16	A PU WITH UP TO 16 LUs CAN BE SUPPORTED ON THIS LINE (PUZ IS NOT AN ACTUAL PHYSICAL UNIT)
LINE2	LINE	CALL=INOUT,AUTO=020	DEFINES DIAL-IN OR AUTO CALL DIAL-OUT LINES
PUQ	PU	MAXLU=14	A PU CAN SUPPORT UP TO 14 LUs

NCP GENERATION FOR A REMOTE NCP

NAME	OPERATION	OPERANDS	COMMENTS
POOL2	LUPOOL	NUMBER=80	SAME AS ABOVE LUPOOL STATEMENT
G2	GROUP	DIAL=YES,LNCTL=SDLC	SAME AS ABOVE GROUP STATEMENT
LINE3	LINE	CALL=IN	DEFINES DIAL-IN LINE
PUX	PU	MAXLU=10	PU WITH UP TO 10 LUs CAN BE SUPPORTED (PUX IS NOT AN ACTUAL PHYSICAL UNIT)
LINE4	LINE	CALL=INOUT	DEFINES DIAL-IN OR DIAL-OUT LINE
PUY	PU	MAXLU=15	PU CAN SUPPORT UP TO 15 LUs

Figure D-2. The Macros Used to Define the Switched Network When Generating the NCPs

- PATH describes such information as the telephone number to be used (DIALNO parameter), the line group name (GRPNM parameter), the name of the path (PID parameter), and the group of paths with which this path is to be associated (GID parameter). Path and path group identities are explained below. The paths are grouped according to this scheme: GID=1 groups all internal calls together, GID=2 groups all lcoal calls together, and GID=5 groups all long-distance direct dial calls together.
- LU states specific characteristics of each logical unit supported by the physical unit.

Each switched major node must be defined in a separate VTAM definition and placed in SYS1.VTAMLST.

VTAM DEFINITION FOR EAST COAST OFFICES (SUB5EAST SWITCHED MAJOR NODE)

NAME	OPERATION	OPERANDS	COMMENTS
SUB5EAST	VBUILD	TYPE=SWNET,SUBAREA=5, MAXNO=50,MAXGRP=2	DEFINES THE START AND LIMITATIONS OF SUBAREA 5
PU1	PU	MAXPATH=3, ID=1D INFORMATION, DISCNT=YES	IDENTIFIES A PARTICULAR 3791 CONTROLLER FOR N. Y. C. WITH AUTOMATIC CALL TERMINATION
	PATH	DIALNO=1111,PID=1, GID=1,GRPNM=G1, REDIAL=10	INTERNAL TIE LINE PATH FOR DIAL-OUT PROCEDURE TO CORP. HQ
	PATH	DIALNO=9|2671111, PI D=2, GI D=2, GRPNM=G1,REDIAL=5	LOCAL CALL DIAL-OUT PROCEDURE TO CORP. HQ
	PATH	DIALNO=17|12122671111, PID=3,GID=4, GRPNM=G2	WATS LINE DIAL-OUT PATH FROM REMOTE 370X TO CORP. HQ
LU11	LU		
LU12	LU		
•		SPECIAL CHARACTERISTICS OF LU	
•			
•			
LU114	LU		
PU2	PU	ID=ID INFORMATION	IDENTIFIES A PARTICULAR 3791 CONTROLLER IN BOSTON
LU21	LU		
LU22	LU		
•		SPECIAL CHARACTERISTICS OF LU	
•			
•			
LU27	LU		
PU3	PU	MAXPATH=1, ID=ID INFORMATION	I DENTIFIES3791 CONTROLLER IN PHILA.
	PATH	DIALNO=9112155552222, PID=1,GID=5, GRPNM=G1	LONG DISTANCE DIRECT DIAL-OUT PATH TO PHILA. BRANCH OFFICE
LU31	LU		
LU32	LU		
•		SPECIAL CHARACTERISITCS OF LU	
•			
•			
LU37	LU		

Figure D-3. The VTAM Definition Statements for the East Coast Subarea

VTAM DEFINITION FOR MIDWEST BRANCH OFFICES (SUB12MID SWITCHED MAJOR NODE)

NAME	OPERATION	OPERANDS	COMMENTS
SUB12MID	VBUILD	TYPE=SWNET,SUBAREA=12, MAXNO=80,MAXGRP=2	DEFINES THE START AND LIMITATIONS OF SUBAREA 12
PU6	PU	MAXPATH=3, ID=ID INFORMATION, DISCNT=YES	IDENTIFIES A3791 CONTROLLER IN CHICAGO WITH AUTOMATIC CALL TERMINATION
	PATH	DIALNO=9999,PID=1, GID=1,GRPNM=G2	INTERNAL TIE LINE PATH FOR DIAL-OUT TO CHICAGO BRANCH OFFICE
	PATH	DIALNO=9|9999999, PID=2,GID=2, GRPNM=G2	LOCAL CALL DIAL-OUT PROCEDURE TO CHICAGO BRANCH OFFICE
	PATH	DIALNO=9|13129999999, PID=3,GID=5, GRPMN=G1	LONG DISTANCE DIRECT DIAL-OUT TO CHICAGO USED IF G2 LINES ARE DOWN OR BUSY OR IF THE REMOTE 370X IS DOWN
LU61	LU		
LU62	LU		
•		SPECIAL CHARACTERISTICS OF LU	
•			
•			
LU610	LU		
PU19	PU	ID=ID INFORMATION	DIAL-IN FOR ST.PAUL BRANCH OFFICE
LU191	LU		
LU192	LU		
•		SPECIAL CHARACTERISTICS OF LU	
•			
•			
LU196	LU		

Figure D-4. The VTAM Definition Statements for the Midwest Subarea

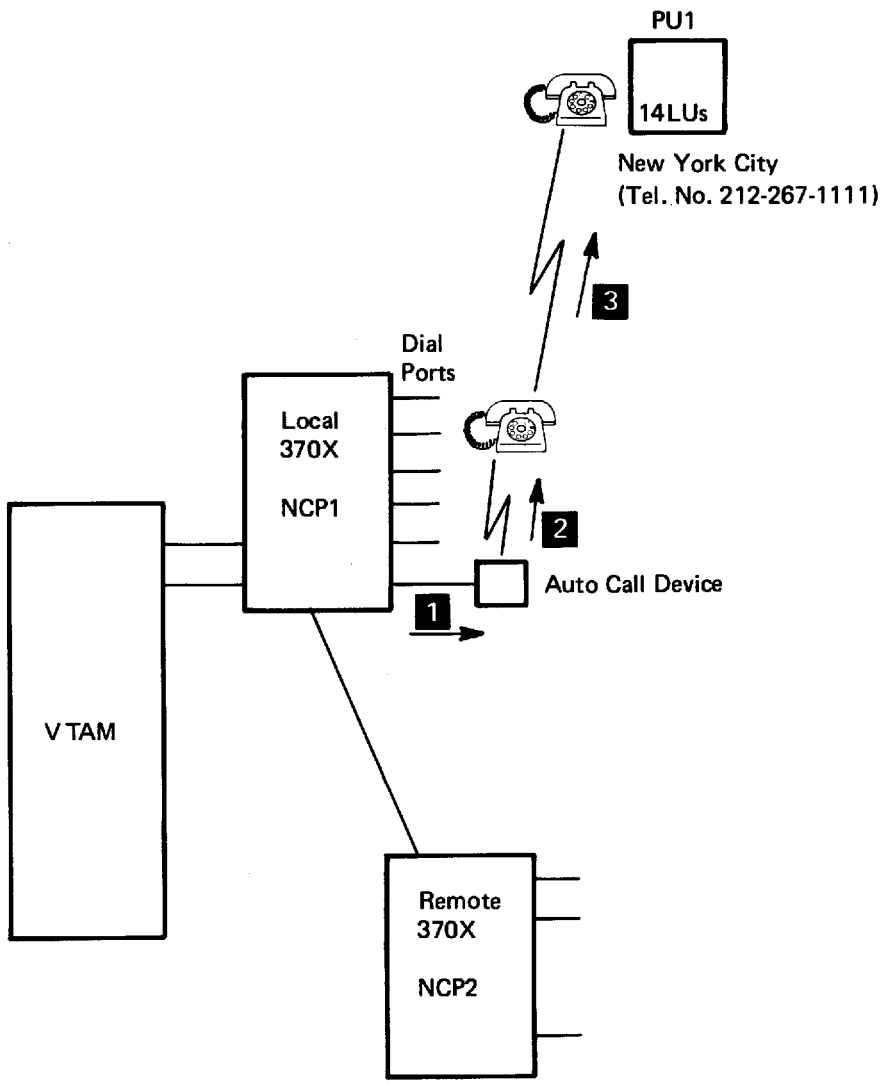
A Dial-Out Operation

Each day, XYZ Company's host computer sends an analysis of the business day's activities to the company's corporate office, where it is printed for use the following morning. In this example, it is assumed that the major nodes for subarea 5 (the ease coast major node, of which the corporate office is a part) and subarea 12 (the midwest major node) are presently active. It is also assumed that the groups of switched lines in the communications controllers that may be used for this operation have also been activated.

The following steps describe this operation:

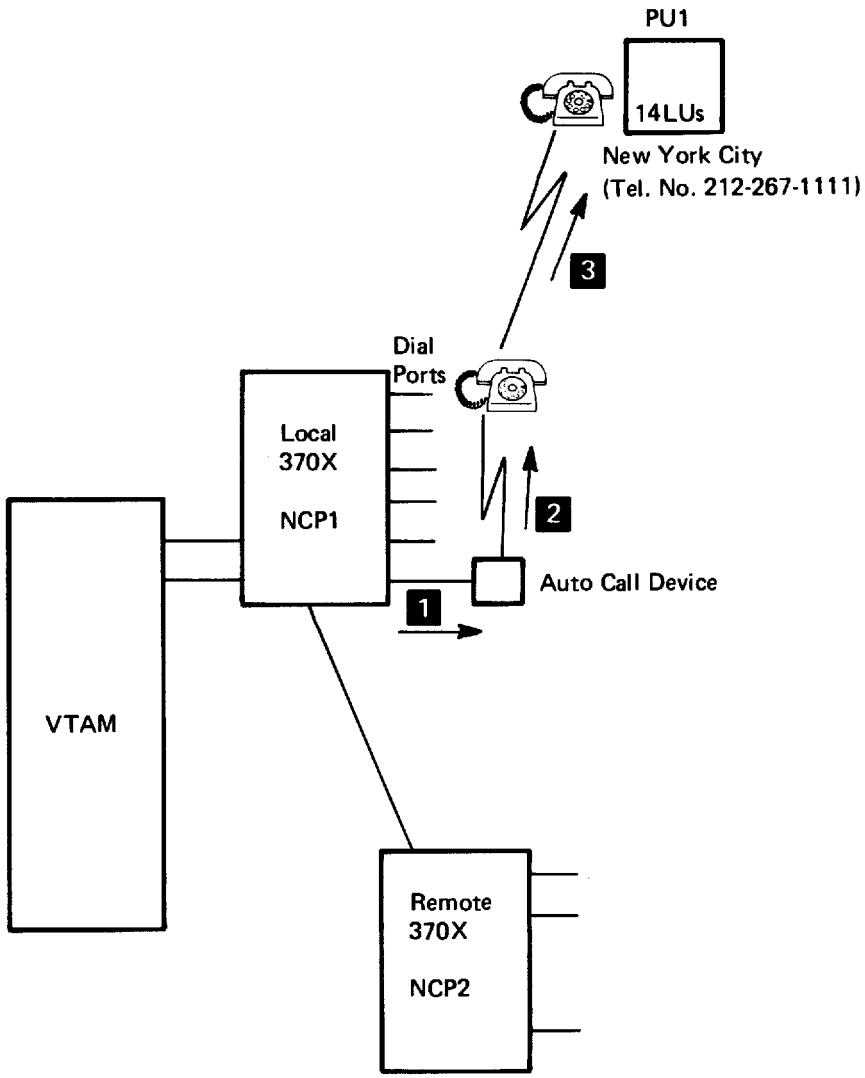
1. At 4 p.m., the data base is closed for updating (but remains open for inquiries), and the analysis data set is prepared. At 5 p.m., the analysis is sent to the corporate office by activating the VTAM application program designed for this purpose. The program is activated by the network operator or by a time-of-day routine.
2. The VTAM application program, after opening an ACB, issues an OPNDST (with OPTCD=ACQUIRE) to connect the logical unit that is to receive the report. (The logical unit name specified is the name of an LU statement for a batch function following the PU statement for PU1 in the VTAM definition of the SUB12MID major node.)
3. The OPNDST causes VTAM to connect the physical unit associated with the logical unit. First, VTAM searches the specified line group for an available dialout or inout line that can support the maximum number of logical units defined for that physical unit; VTAM compares the MAXLU value of the PU macro instruction of the line group generated with the number of logical units the physical unit can potentially support. In this example, 14 logical units have been defined to VTAM for PU1, and the MAXLU value for group 1 (G1) line 1 (LINE) is 16, so LINE1 can therefore be used.
4. When a usable line is located, VTAM sends a request to the local NCP to dial out to PU1. It provides the NCP with the path information to use in dialing: the phone number (dial digits) for PU1, the line to be used, and the number of times to try to make connection on that line (redial count). Information is provided to the NCP one line at a time; if the first path is unsuccessful, VTAM furnishes the NCP with information on the next line. An automatic dial-out operation is performed using the auto call device connected to network address 020 (AUTO =020 on the LINE macro).
5. If that line receives a busy signal for the number of times specified in the redial count, or if the selected line becomes unavailable because of calling, VTAM picks the next line in the group. This process continues until a successful connection is made or all lines have been tried in that group (and thus in that path).
6. If the first path is unsuccessful, VTAM tries subsequent paths until a connection is made or all paths have been tried unsuccessfully. Figures D-5 through D-7 show the three paths defined as possible for dialing out to PU1. In addition, Figures D-8 through D-9 show three paths defined for dial-out to a midwest branch office physical unit.

   If all paths are tried unsuccessfully, VTAM sends a return code to the VTAM application program indicating that the OPNDST failed because the resource was not available. The VTAM application program can retry later. (However, in this particular example, busy lines might be interpreted as a condition that should not occur since most other network operations should have previously ceased. The analysis output program would thus interpret busy lines as an environmental error situation, send messages to the system operator, and terminate.)
7. After VTAM determines that the physical unit's ID is valid, the dial-out operation is completed and a session between the VTAM application program and the logical unit is next established.
8. Having successfully established a session, the VTAM application program issues a SEND macro instruction to transfer the report to the logical unit representing the batch function. (The batch function stores the report in the print data set, and the control operator can print the data at any time.)



1. A signal is sent from the 370X to the auto call device.
2. The auto call device dials New York City, using an internal extension number (1111).
3. Dial-out is carried down line 1 or 2 to New York City. Connection is tried ten times, using each available line in the group for this path.

Figure D-5. Path 1 for Dial-Out to Corporate Headquarters

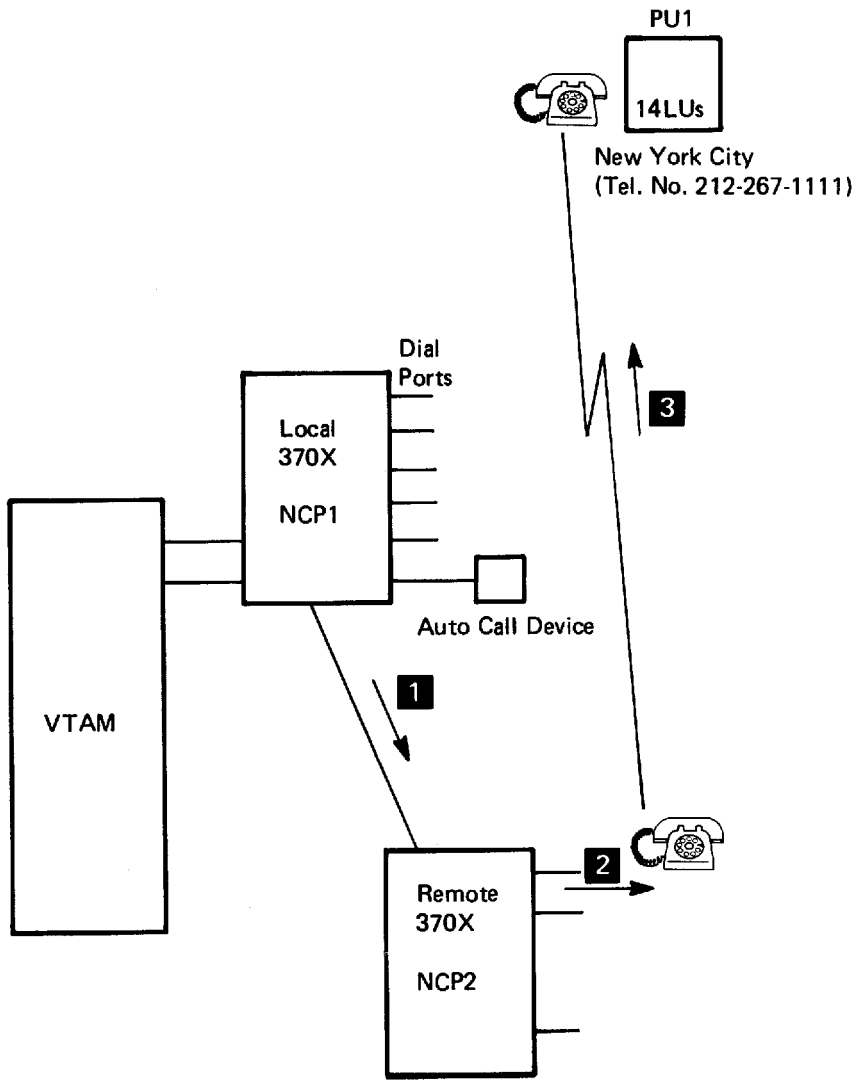


1 A signal is sent to the auto call device.

2 The auto call device dials New York City, using local call procedures (dials 9|2671111).

3 Dial-out is carried down line 1 or 2 to New York City. Connection is tried five times using each available line in the group for this path.

Figure D-6. Path 2 for Dial-Out to Corporate Headquarters



1 The dial-out responsibilities are passed to the remote 370X.

2 A manual dial operation is performed. Line 4 is selected because it has call inout ability.

3 Line 4 carries the message to N. Y. C. This is the last possible path to N. Y. C. If it can't be taken, the request is dropped until a later time.

Figure D-7. Path 3 for Dial-Out to Corporate Headquarters

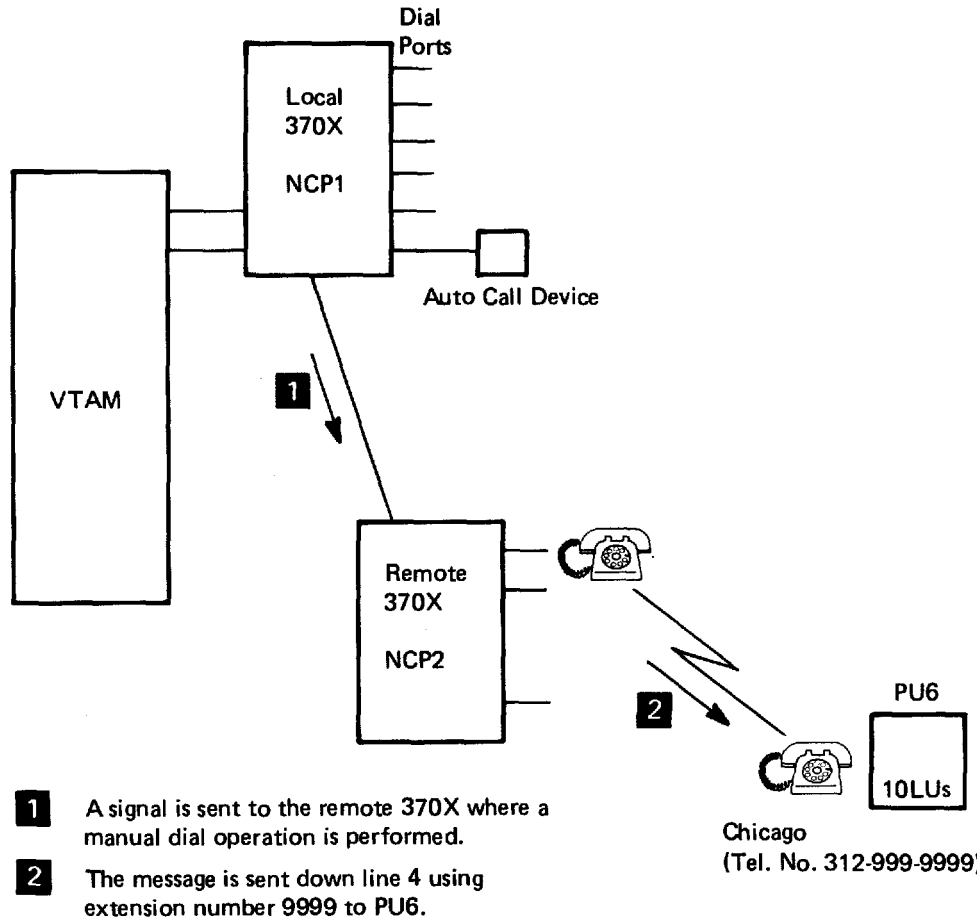


Figure D-8. Path 1 for Dial-Out to a Branch Office

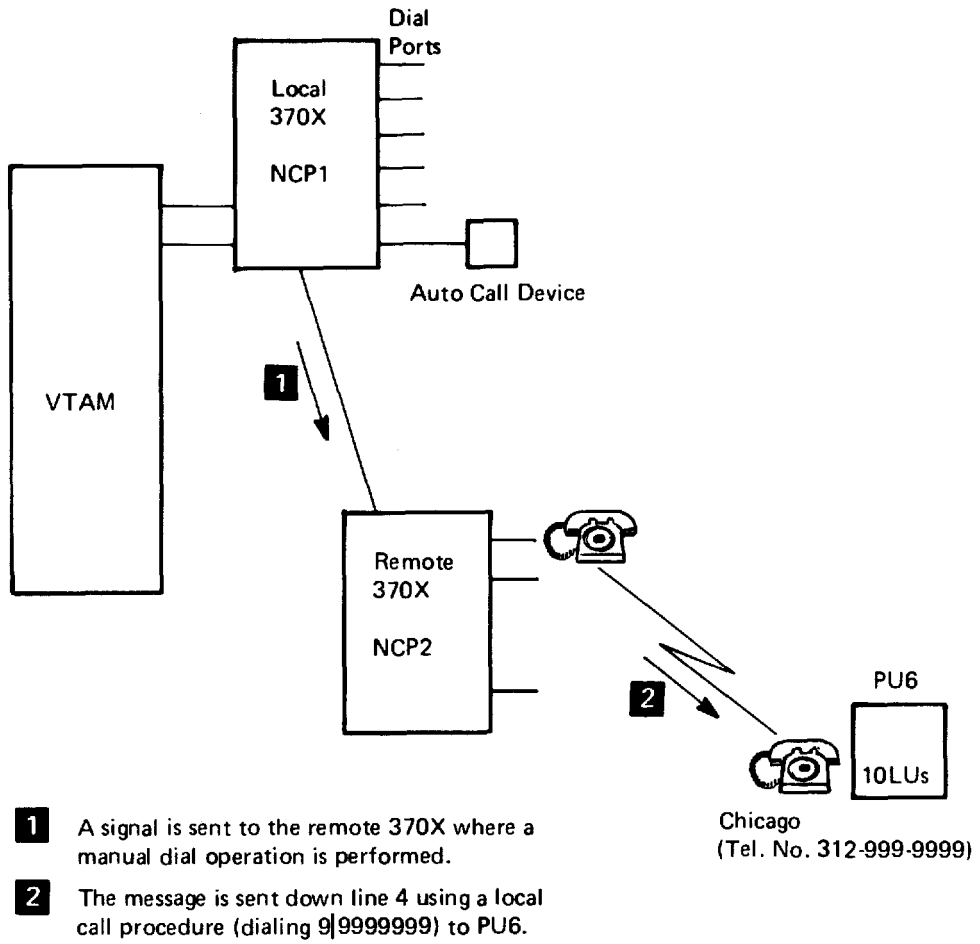


Figure D-9. Path 2 for Dial-Out to a Branch Office

9. When the VTAM application program determines that the report has been completely sent (perhaps after a series of SENDS), it issues a CLSDST macro instruction or a CLOSE macro instruction, either of which terminates the session between the VTAM application and the logical unit. VTAM frees the line because it was the only logical unit session in progress and automatic call termination was specified on the PU macro (DISCNT=YES) during VTAM definition.
10. If no further teleprocessing activity is expected, the network operator can deactivate the SUB5EAST major node and close down the network.

A Dial-In Operation

Each business day, XYZ begins operations at its host computer and makes a data base available for updating and inquiries from online branch offices and the corporate office. These offices use the data base periodically rather than continuously; they obtain connection by calling in to the NCP that is connected to the host computer. The following steps describe a call or dial-in operation:

1. The network operator (who is probably the system operator) starts the VTAM network. The operator defines the initial configuration with a combination of predefined start procedures and network operator involvement. Each major node must be activated, including each subarea and each local or remote NCP. XYZ, in this case, chooses to have the network operator activate the local NCP and SUB5EAST (the east coast major node) at 9 a.m. eastern time and activate the remote NCP in Chicago and SUB12MID (the midwest major node subarea) at 9 a.m. central time.
2. The network operator then activates the VTAM application program that handles the inquiries and updates from branch offices. In this example, the program has a LOGON exit-routine that handles the initial request from a terminal operator associated with a logical unit. The LOGON exit-routine issues an OPNDST macro (OPTCD=ACCEPT) to connect to the logical unit requesting it. Note that the program could also use an asynchronous OPNDST with OPTCD=ACCEPT and an RPL exit-routine specified if the macro instruction were issued for each possible logical unit that might want connection.
3. Before a transaction can be entered at a 3790 terminal, a 3790 program must be connected to a VTAM application program. An operator at the 3791 controller can dial a number of a line at the communications controller nearest the branch office to attempt connection with VTAM. If the line is busy, the number can be dialed again or the number of another line can be tried. If all lines are busy, a 3790 program can tell the terminal operator to try again later. (Note that the dial-in procedure is not required if a switched connection already exists because one or more other logical units associated with the 3791 controller are in communication with the VTAM application program.)
4. As soon as the NCP line that has been dialed answers the call, the application program's LOGON exit-routine is scheduled. If the LOGON exit-routine issues an OPNDST, VTAM sends a Bind command. (If the LOGON exit-routine issues a CLSDST command) following OPNDST, the VTAM application program and the terminal operator can now communicate (see Figure D-9).
5. When communication is completed, the terminal operator notifies the VTAM application program. The program then issues a CLSDST, causing VTAM to send an Unbind Command. If no other logical units are active on that line, VTAM frees the line for use by other physical units and logical units.

Controlling the Switched Network

The network operator can activate or deactivate the switched major nodes by the VARY command.

For example, a network operator on the east coast starts VTAM at 9:00 a.m., and thus activates the east coast major node. At 10:00 a.m., eastern standard time, the network operator activates the midwest major node. By using the VARY activate command, specifying the name of the Midwest switched major node, the network operator can activate the midwest switched major node (see Figure D4):

```
VARY NET,ACT,ID=SUB12MID
```

SUB! 2MID is the major node name (that is, the member name by which the major node definition statements have been filed in SYS1.VTAMLST).

After all transactions are completed for the day, the network operator uses the VARY INACT command to start the orderly shutdown of the midwest switched major node:

```
VARY NET,INACT,ID=SUB12MID
```

During the day, the network operator may be required to quickly deactivate the midwest switched major node. When this situation occurs, the network operator enters:

```
VARY NET,INACT,I,ID=SUB12MID
```

Controlling Dial-In Connections

Dial-in and dial-in-dial-out SDLC links can respond to a dial-in request. The ability to answer dial-in requests can be turned on or off with a VARY command. When the capability to answer dial-in requests is turned off, dial-in links will not respond to a dial-in request, and dial-in-dial-out links are logically treated as dial-out links. To turn dial-in and dial-in-dial-out links on and off, the network operator enters:

```
VARY NET,ID=LINE2,ANS= {ON | OFF }
```

If the answer capability is turned on, LINE2 has dial-in-dial-out ability; if the answer capability is turned off, LINE2 had dial-out capability only (see Figure D-2).

Controlling Dial-Out Connections

Each physical unit defined in a switched major node with dial-out capability has paths that VTAM selects to perform the dial-out operation.

The network operator can use the VARY command to mark a path as usable or not usable for a dial-out operation to a specific physical unit:

```
VARY NET,PATH={USE | NOUSE},PID=1,ID =PU1
```

This command marks the first path for PU1 in the east coast major node usable or not usable (see Figure D-3).

The GID parameter is coded in a PATH statement and groups the paths for a switched subarea major node. The network operator can issue the VARY command to make a group of paths usable or not usable for dial-out operations within the switched major node:

```
VARY NET,PATH= {USE | NOUSE},GID=4,ID=SUBSEAST
```

This command marks all paths that use WATS lines as usable or not usable in the east coast switched major node (see Figure D-3).

Controlling Dial-Out Connections by Manual Dial Support

VTAM requests the network operator to perform a manual dial-out operation when auto call is not specified on the LINE macro in the NCP generation (see Figures D-9, D-10, and D-11). If VTAM picks a line that does not have an autodial modem attached, a message is sent to the network specifying which link to use and the telephone number to dial. If the network operator is unable to complete the connection (because, for example, of broken telephone or no answer), a VARY command is issued by the network operator to inform VTAM that the link is inoperative:

```
VARY NET,INOP,ID=LINE4[,END]
```

This command tells VTAM that LINE4 is inoperative and the connection cannot be made. If END is not specified, VTAM selects the next available link until connection made or all eligible links have been tried. If END is specified, VTAM immediately cancel the application program's OPNDST request (which started the dial-out process) without attempting to find another link.

Displaying Path Information for Phsyical Units in a Switched Major Node

The network operator uses a DISPLAY command to obtain dial-out path information fc a particular physical unit:

```
DISPLAY NET,ID=PU3,PATHS
```

This command displays path information for a physical unit that services Philadelphia (see Figure D-3) and tells the network operator:

The line group name (in this example, G1)

The telephone number (912155552222)

The PID (1)

The GID (5, a long-distance direct dial number)

The path status (whether the path is usable or not usable by VTAM)

Whether the path is manual or autodial (in this example, autodial)

The redial count (3)

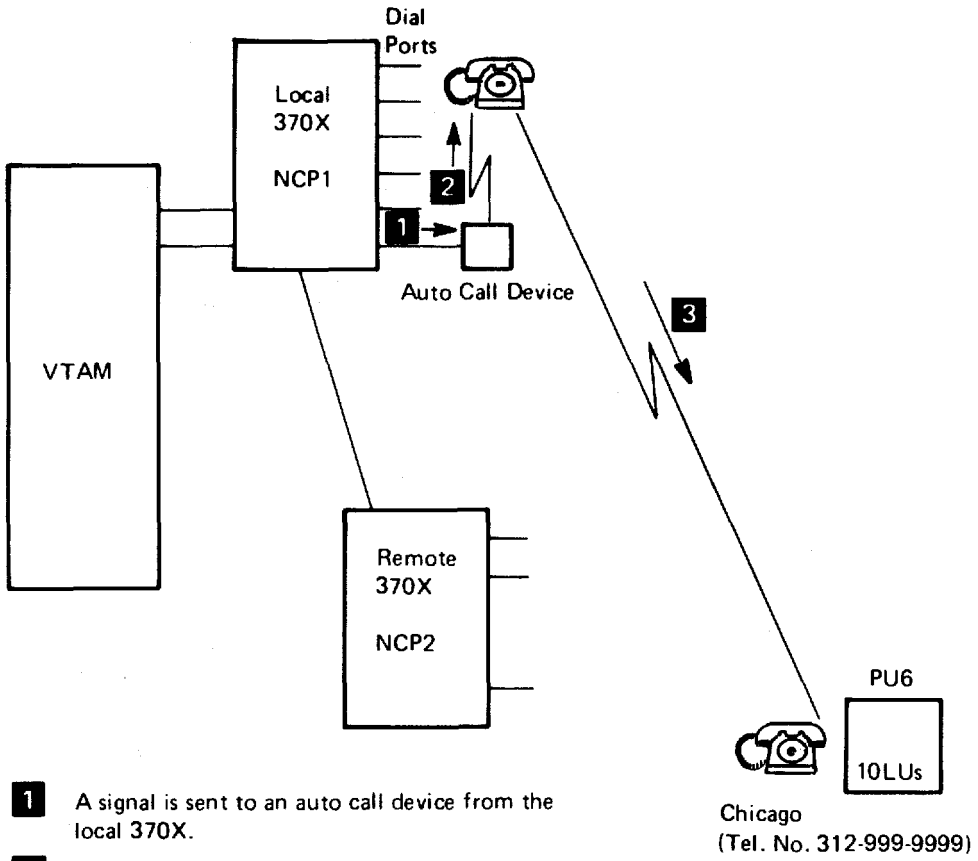
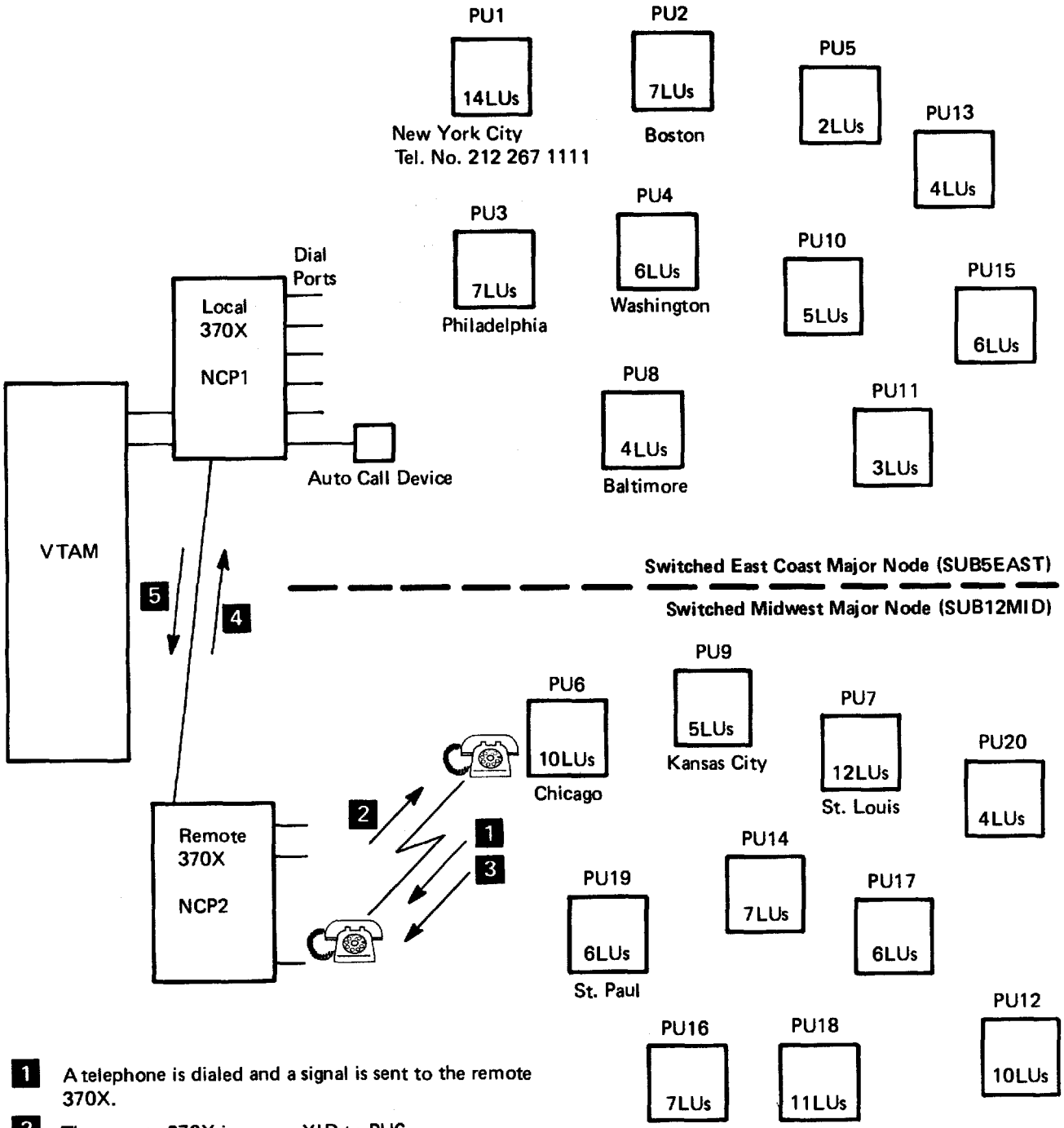


Figure D-10. Path 3 for Dial Out to a Branch Office



1. A telephone is dialed and a signal is sent to the remote 370X.
2. The remote 370X issues an XID to PU6.
3. PU6 responds with its ID to be checked.
4. The remote 370X sends a message to VTAM which contains the PU ID to be checked.
5. VTAM checks the ID and returns information pertaining to PU6.

Figure D-11. Dial-In From a Branch Office

Appendix E. Coding Conventions for Macro Instructions, Definition Statements, and Commands

This appendix describes the conventions used in this book to explain the syntax of macro instructions, definition statements, and commands, and the rules used to code them.

Coding Rules

The rules for coding the statements, macro instructions, and commands described in this book are those of the assembler language. The following is a summary of these rules.

System definition macro instructions and statements have the following format:

Name	Operation	Operand
Symbolic name	Operation code of the macro instruction or statement	Required and optional parameters

The *Name* field symbolically identifies the macro instruction, definition statement, or minor node. If a symbolic name is provided in the field, it can contain from one to eight alphanumeric characters, the first of which must be alphabetic or the national character @ or #. The name must begin in the first position of the macro instruction or statement and must be followed by one or more blanks.

The *Operation* field identifies the macro instruction or statement. It must be preceded and followed by one or more blanks.

The *Operand* field contains parameters coded in any order and separated by commas. The operand field ends with one or more blanks placed after the last parameter. When the syntax of a macro instruction or statement is shown in this book, any parameters that are always required appear first, followed by the optional or conditional parameters. In most macro instructions or statements, keyword parameters are used in the operand field. Keyword parameters are often followed by an equal sign (=) and the keyword value. The keyword value may be a single value or a list of values. If it is a list of values, the values must be separated by commas and the list must be enclosed in parentheses.

Comments can be written after the operand field, but they must be separated from the last parameter of the operand field by one or more blanks. An entire card can be used for a comment by placing an asterisk in the first column of the card. A macro instruction that has no parameters cannot have comments on the same card as the operation code.

System definition statements and macro instructions are coded in columns 1 through 71 of a card. A statement or macro instruction that exceeds 71 columns can be continued on one or more additional cards by placing a nonblank character in column 72 to indicate continuation. The parameters can be interrupted either at column 71 or after any comma that separates parameters. If the operand field ends with a comma, leave at least one blank before column 72. The continued portion must begin in column 16 of the following card. Comments may appear on every card of a continued statement. Columns 73 through 80 can be used to code identification and/or statement sequence characters.

Restrictions on Use of Assembler Features

The NCP generation macro instructions and the definition statements are coded in standard operating system macro instruction format, as just described, with the following restrictions.

- Assembler program control instructions (such as ICTL, ISEQ) may not be used in major node definition decks. Assembler listing control statements (such as PRINT, SPACE, EJECT) can be used in the NCP generation deck but may not be used in definition decks for the other four types of major nodes. Comments statements or remarks can be used in decks for all five types of major nodes.
- Some assembler features may not be used in a major node definition deck:
  - User assembler macro instructions that generate NCP macro instructions are not permitted.

    Names generated by global variables (for example, &SYSNDX or &SYSECT) cannot be used.
  - Variable substitution at assembly time is not permitted.
  - References to assembler attributes (length, type, etc.) are not permitted.
  - Use of literals is not permitted.
  - Quoted strings cannot be used to make names out of keywords. For example, AUTH='BLOCK' is treated just like AUTH=BLOCK.
- Errors made in the major node definition decks filed in the VTAM definition library result in messages to the system operator's console during VTAM initialization or VARY ACT processing, rather than to the SYSOUT device.

Effect of NCP Coding Format on VTAM Initialization Time

Although the major node definition decks filed in the VTAM definition library have the same format as macro instructions, they are not assembled. During VTAM initialization, VTAM routines read the statements from the VTAM definition library and interpret the information to build RDT segments.

The time required for VTAM to build the RDT segment for an NCP major node can be minimized by following these recommendations:

- Take advantage of the sift-down effect described in Chapter 3 and later in this appendix under "Sift-Down' Effect in NCP Macro Instructions." Code parameters at the highest level to avoid repeating the parameters in numerous lower-level NCP macro instructions.
- Minimize continuation lines by placing as many parameters as possible on each card and limiting or eliminating comments. By packing parameters and eliminating comments, as much as 70% of the time VTAM needs to process the cards can be saved.

Describing Macro Instructions and Definition Statements

This section lists the conventions used in this publication to illustrate the format and coding of macro instructions and definition statements.

- Capital letters represent values that are coded directly, without change. Brackets [ ] , braces {} , "or" bar | , ellipses ... , and subscripts are never coded.
- Small letters represent parameters for which a value or name must be supplied.

- Brackets [ ] enclose parameters or symbols that are either optional or conditional. Conversely, the lack of brackets indicates than an item or group of items must be coded.

  An *optional* parameter is one that may be coded or omitted independently of other parameters that are coded or omitted. Depending on the parameter, omitting it may cause the corresponding feature or function to be omitted or included, or omitting it may cause a specific value (the default value) to be assigned.

  A *conditional* parameter is one that may be coded or omitted depending on how other parameters are coded (or omitted) in the same macro instruction or statement, or in a different one. For each conditional parameter, the conditions under which it should be coded or omitted are indicated.
- Braces { } indicate that a parameter must be given one of the values shown within the braces.
- A vertical "or" bar (|) between paremeters indicates that one parameter must be coded from among the values separated by the "or" bar.
- An ellipsis (...) indicates that a series of values can be coded in the same format that precedes the ellipsis.
- Parentheses and commas are coded as shown.
- An underlined value represents the value that VTAM or the NCP uses if the parameter is omitted.
- Symbols coded in the name field of a macro instruction or definition statement must not begin with a $ character.
- Single quotation marks or ampersands in character strings must be coded as two adjacent single quotation marks or two ampersands.

"Sift-Down" Effect in NCP Macro Instructions

The "sift-down" effect applies to many of the keyword parameters in the NCP configuration macro instructions. This means that, if a parameter is coded at a high level, there is no need to code that same parameter for all lower levels at which the same value is desired. Note that, for such parameters:

- If a keyword parameter is specified in a higher-level macro instruction, the IBM-supplied value is available in a lower-level macro instruction only by coding the default value.
- If a parameter is coded in a lower-level macro instruction, its values completely override the values of the same parameter specified in a higher-level macro instruction. If one of the subparameters is missing, the default value of the subparameter is used, not the sift-down value from a higher-level macro instruction.

The time required for VTAM initialization is reduced by taking advantage of the sift-down effect. Refer to the NCP generation publication for information about macro instruction sequencing and the sift-down level for each NCP parameter.

Appendix F. Storage Estimates and Buffer Pool Calculations

This appendix provides formulas for buffer pool calculations and work sheets for storage estimates for VTAM Level 2 in OS/VS2 MVS.

Calculation of Buffer Pool Values

Buffer pool usage depends upon several factors that are installation dependent. These factors are:

- Physical network configuration
- Network operating procedures
- Types of application programs being run
- Network through-put required
- CPU capability

Because of these factors, the buffer pool formulas in Figure F-1 should be used to calculate starting values to be used only until a buffer pool trace can be run to determine the appropriate values for your specific network and application programs.

A buffer pool trace should be used to evaluate buffer pool usage when installing VTAM and when changes are made to the network. The buffer trace should be run for all operating conditions (for example, network activation and error recovery procedures). The number of buffers must cover peak load conditions.

Figure 9-3 in Chapter 9 shows all IBM-supplied buffer pool values. These values are assumed by default if you do not specify your own values.

Note: *The superscripts in the following formulas are not exponents, but refer to the notes that follow the formulas.*

Buffer Pool Name	Formula for Calculating the Number of Buffers
APBUF	2 (NRECORDSES + NBASICSES) [1] + NQDSIMLOG + NLTSO + A [2]
CRPLBUF	2 (NRECORDSES + NBASICSES) [3] + 4(NTSO) + NBSCCLUS + 25
IOBUF [14]	N LINES + NLOCTERM + (NRECORDSES + NBASICSES) [4] + 2NRTSO + NLTSO + 4MAXBFRUave [16]
LFBUF	NTERM + NPORT
LPBUF	2 (NACB + 4) + max (NPU + BNSCCLUS [5] I NRECORDSES + NBASICSES [6]) + 10
NPBUF [7]	N3704/3705 + NLU + NPU + NPORT + NBSCCLUS + NTERM + NLTSO + NRTSO
PPBUF	max [(NRECORDSES + NBASICSES) [8] I NRECORDSES [9] I (BUFFACT X BUFLIMsum) sum] [10] +NQDSIMLOG [15]
SFBUF	NACB + 4 + NLU + NPU + (NRECORDSES + NBASICSES) [11] + 8
SPBUF	5+C [12]
UECBUF [13]	2 (NRECORDSES + NBASICSES)
WPBUF	NRECORDSES + NBASICSES

Notes:

1. 2 (NRECORDSES + NBASICSES) assumes all CLSDST macro instructions are concurrent, or CLOSE ACB is used. This expression can be replaced by (NRECORDSES + NBASICSES) + C, where C is the number of concurrent CLSDST macro instructions. In addition to network deactivation, concurrent CLSDST macro instructions for ERP conditions should be considered.
2. This factor is for feedback processing. That is where responses are requested on an output operation (for example, SEND) by the VTAM application program. This is the number of queued responses that have not been satisfied by a READ or RECEIVE or internally processed by VTAM in the case of POST=RESP.
3. This assumes all OPNDST or CLSDST macro instructions are concurrent. If not, the expression 2 (NRECORDSES + NBASICSES) may be replaced by (2C), where C is the maximum of the number of OPNDSTs, CLSDSTs, or other concurrent VTAM macros.
4. The expression (NRECORDSES + NBASICSES) assumes all CLSDSTs are concurrent or CLOSE ACB is used. This expression can be replaced by C, where C is the maximum number of concurrent CLSDSTs.
5. This number may be too high for large BSC networks. Validate the correct number by using the SMS buffer pool trace.
6. This expression may be replaced by the maximum number of concurrent OPNDST or CLSDST macro instructions.
7. In some flows, if the attempt to allocate a NCSPL from the VTAM private area fails, a request for a NCSPL is issued from this pool. This can be remedied by increasing the size for the REGION parameter on the start VTAM procedure. VTAM abend processing requests NCSPLs from this pool.
8. The expression assumes automatic logon with user data. If user data is not passed, the term is zero.
9. The term assumes all CLSDSTs are concurrent. The term may be replaced by the maximum number of concurrent CLSDSTs.
10. The term may be much lower if the application program has outstanding READ or RECEIVE macro instructions to handle inbound data. The second sum in the formula applies to multiple application programs.
11. The number of elements in this term depend upon the CPU's processing speed and real storage. In most cases, the number of elements will be less than indicated by the formula.
12. C is the maximum number of concurrent input/output operations by TCAMl. One page (4K) or 56 elements should suffice.
13. This value assumes that there is one NCP and that the LOSTERM exit routine is driven twice for failures. This value may be reduced for multiple NCPs. For large networks, it may be possible to reduce the number of elements because of page faults during VTAM processing. During a page fault, the user exit routine may be dispatched, freeing UECBs.
14. Blocked data from BSC 3270s is collected in the IOBUF until the message is received. The minimum requirements for IOBUF for the local 3704/3705s is four times the sum of the MAXBFRU value.
15. This value is zero if user LOGON data is not passed.
16. This value applies to local 3790s only, and is four times the average of all MAXBFRU values when more than one local 3790 is involved.

Figure F-1 (Part 1 of 2). Formulas for Calculating *bno* Values

Variables for Formulas

BUFFACT and BUFLIMsum	Two decimal integers whose product is used to determine the maximum number of buffers that can be filled with data that has been obtained by VTAM but has not yet been transferred to the application program's buffers.
MAXBFRUave	This applies to local 3790s only, and is the average of all MAXBFRU values if more than one local 3790 is involved.
NACB	Number of OPEN ACBs. (Include the number of TSO users.)
NAPPLSES	Number of application program-to-application program sessions.
NBASICSES	Maximum number of concurrent active basic-mode sessions. (Include TOLTEP, 3270 BSC basic-mode sessions, and NETSOL.)
NBSCCLUS	Number of remotely attached 3271, 3275, and 2972 cluster controllers on BSC (PU=NO) lines.
NBUFMSG	Number of buffers required to read the full screen of a locally attached 3277 display station. If both Models 1 and 2 are attached, use the Model 2 table. *VTAM Concepts and Planning* lists the devices supported as 3277 Models 1 or 2.

Read Full 3277 Model 1		Read Full 3277 Model 2	
bufsize	NBUFMSG	bufsize	NBUFMSG
104	4	96	16
256	2	216	8
632	1	632	4
		960	2
		1952	1

NLINES	Number of communication lines on the local 3704/3705s.
NLOCTERM	Number of local non-SNA devices.
NLTSO	Number of directly-attached TSO users.
NLU	Number of logical units (number of LU statements). (Include local SNA devices.)
NPU	Number of PU statements (include local SNA controllers).
NQDSIMLOG	Number of contending session-establishment requests (SIMLOGON) that have been issued with the Q option. (This occurs when one or more application programs request the same logical unit or terminal when the resource is not available, and the application programs are willing to wait until the resource is available.)
NRECORDSES	Maximum number of concurrent active record-mode sessions. (Include 3270 BSC record-mode sessions, and the number of TSO users.)
NRTSO	Number of TSO users through an NCP.
NTERM	Total number of locally-attached non-SNA terminals; count each printer and display station; plus the number of remotely attached terminals on BSC and start-stop lines (number of TERMINAL and COMP macro instructions on BSC and start-stop lines).
NTRACE	Number of terminals, lines, or logical units for which a VTAM buffer content trace (TYPE=BUF) will be started.
NTSO	Number of TSO users.

Figure F-1 (Part 2 of 2). Formulas for Calculating *bno* Values

Calculating Storage Required for Paged Pools

Figure F-2 illustrates how to calculate VTAM storage required for paged pools.

For each pool below, get the *bno* value for that pool from Figure F-1 and insert it in the appropriate equation below:

	number of elements per page	multiplier[1]		bno[2]		product[3]
APBUF	73	56	X	_____	=	_____
CRPLBUF	32	128	X	_____	=	_____
LPBUF	4	1024	X	_____	=	_____
NPBUF	14	292	X	_____	=	_____
PPBUF	--	(UNITSZ+28)	X	_____	=	_____
SPBUF	56	73	X	_____	=	_____
WPBUF	14	292	X	_____	=	_____
UECBUF	34	120	X	_____	=	_____

Total storage for OS/VS2 MVS paged pools = _____

[1] This is the effective size of the control block. This includes an 8-byte header plus a packaging factor determined by the number of elements that will fit on one page.
[2] The *bno* and *bth* values for LFBUF, SFBUF, SPBUF, and WPBUF must be equal. When one value is specified, both must be specified. The minimum *bno* and *bth* value is 1.
[3] Round the individual products to a full page (multiple of 4096).

Figure F-2. Calculating Storage Required for Paged Pools in OS/VS2 MVS

Calculating Storage Required for Fixed Pools

Figure F-3 illustrates how to calculate VTAM storage required in fixed pools.

For each pool below, get the *bno* value for that pool from Figure F-1 and insert it in the appropriate equation below:

	number of elements per page	multiplier[1]		bno[2]		product[3]
SFBUF	51	80	X	_____	=	_____
LFBUF	34	120	X	_____	=	_____
IOBUF	--	(UNITZ+72)	X	_____	=	_____

Total storage for OS/VS2 MVS fixed pools = _____

[1] This is the effective size of the control block. This includes an 8-byte header plus a packaging factor determined by the number of elements that will fit on one page.
[2] The *bno* and *bth* values for LFBUF, SFBUF, SPBUF, and WPBUF must be equal. When one value is specified, both must be specified. The minimum *bno* and *bth* value is 1.
[3] Round the individual products to a full page (multiple of 4096).

Figure F-3. Calculating Storage Required for Fixed Pools in OS/VS2 MVS

VTAM Level 2 Storage Requirements

This section is organized so that the following four totals will be developed:

- Common storage requirements
- Real storage requirements
- VTAM private area requirements
- User private area requirements

Notes:

1. *The actual storage used may exceed these calculations because of the dynamic nature of the VTAM GETMAINs. Short-life control blocks may be included on the same pages as long-life control blocks. This packaging factor has not been included in the calculations.*
2. *An asterisk (*) is used to indicate that a particular number developed or total developed will be used for the Real Storage Requirement calculation.*

The common storage requirements and the VTAM private area requirements are grouped into the following six major categories:

- VTAM in system, but not started
- VTAM started, major node not activated
- Major node activated, ISTATUS=INACTIVE on minor nodes
- Network activation
- Session establishment
- Other storage requirements

Where applicable under the major headings, the storage is further categorized as a constant requirement or a dynamic requirement. The dynamic requirement is a transient condition. That is, after the operation is completed the storage shown is no longer a requirement.

If more than one category occurs simultaneously, the dynamic requirement must be added. For example, if ISTATUS=ACTIVE is defined for the minor nodes, then the dynamic requirement for "Major Node Activated" and "Network Activation" must be added.

Throughout this appendix, the actual control blocks are indicated by control block acronyms, for example, (MNT) in first entry under "Common Storage Requirement, VTAM Started, Major Node Not Activated." The size shown may differ from that indicated in the *OS/VS2 MVS VTAM Data Areas* publication, because of 8-byte boundaries, headers, and packaging factors.

Common Storage Requirements

Figures F-4 through F-9 illustrate how to estimate VTAM common storage requirements.

VTAM in System, Not Started

Nucleus[1]	2,388*
PLPA[2]	589,824
LPDEs	10,600
User MODETAB Interpret Tables and Interpret Table exit routines	
Total for VTAM in System, Not Started	

[1] The nucleus is actually considered as part of user private area.

[2] All pages in which VTAM Level 2 modules reside have been counted. The actual requirement for VTAM is less because MVS puts modules from the other components on some of the remaining space in these pages. The actual byte count is 472,108. The size given above assumes the recommended LPA pack list in this section. The sizes used for these modules were the sizes as originally shipped, and do not reflect changes that may result from any PTFs. Some of the modules are fixed. They will also be counted in the real storage estimates.

Figure F-4. Estimating CommoNucleus1 e for VTAM in System, Not Started

VTAM Started, Major Node Not Activated

SQA[1]		
(MAXSUBA+1) parameter value from NCP generation deck (MNT) _____ X 8 + 16 =	_____	
VTAM address space (MPST)	232	
VTAM tasks with open ACBs (PST) 3[3] X 152 =	456	
VTAM tasks with open ACBs (DCE) 3[3] X 32 =	96	
VTAM tasks with open ACBs (ACDEB) 3[3] X 224 =	672	
Fixed CSA		
IOBUF[2]	_____	
LFBUF[2]	_____	
SFBUF[2]	_____	
VTAM Internal SNTs(4) X 8 + 8 =	40	
ATCVT	1,584	
AVT	48	
BPDTY (includes 12 BPENTs, 39 CBIDs, 12 BPCBs, and SMS1 (0 length)	2,000	
TPIOS work areas	240	
Fixed SQA/CSA Total		*
Pageable CSA		
APBUF[2]	_____	
CRPLBUF[2]	_____	
LPBUF[2]	_____	
NPBUF[2]	_____	
PPBUF[2]	_____	
SPBUF[2]	_____	
UECBUF[2]	_____	
WPBUF[2]	_____	
SRT directory	4,096	
VTAM internal SRTs 18 X 40 =	720	
CONFT	1,392	
Skeleton DVTs	27,148	
QABs	280	
VTAM tasks with open ACBs (DYPABs) 3[3] X 148 =	144	
Total Pageable CSA		
Total for VTAM Started, Major Node Not Activated		

[1] This storage is actually obtained from CSA (SP-227).
[2] See buffer pool formulas, Figure F-2.
[3] Specify 4 if NETSOL=YES.

Figure F-5. Estimating Common Storage for VTAM Started, Major Node Not Activated

Major Node Activated, ISTATUS=INACTIVE on Minor Nodes

Constant Requirements

SQA (Subpool 227)

Number of concurrently active, local, directly-attached SNA controllers, for example 3704/3705s, 3790s SDLC 3270s (ICNCB)_____ X 712 = _____

Number of concurrently active, directly-attached non-SNA terminals (LDNCB)_____ X 600 = _____

Fixed CSA

SNTs the number of addressable nodes (that is, the number of names specified in the name fields of the following macros in each NCP definition deck) LINE, TERMINAL, VTERM, COMP, INNODE, PU, LU, LUPOOL, and CLUSTER_____ X 8 = _____

For each local SNA subarea, enter the total number of names specified in the name fields of the followng macros:

PU macros _____ X 2 = _____

LU macros _____

\+ 2

_____ X 8 = _____

For each local non-SNA area, enter the total number of names specified in the name fields of the following macros:

LOCAL macros X 2 = _____

\+ 2

_____ X 8 = _____

For each switched subarea, enter the total number of names specified in the name field of the following macros:

PU macros = _____

LU macros = _____

\+ 2

_____ X 8 = _____

*

Total Fixed SQA/CSA _____

Figure F-6 (Part 1 of 2). Estimating Common Storage for Major Node Activated, ISTATUS=INACTIVE on Minor Nodes

Pageable CSA

RDTs — 3704/3705 Communications Controller major node. The number of instances of each macro listed below times the indicated size. Once for each activated 3704/3705.

PCCU (RRN) _____ X 256 =	_____	
GROUP (RGP) _____ X 92 =	_____	
DIALSET (ADS) _____ X 80 =	_____	
LINE (RLN) _____ X 116 =	_____	
TERMINAL (RTR) _____ X 212 =	_____	
COMP (RTR) _____ X 212 =	_____	
VTERM (RTR) _____ X 212 =	_____	
CLUSTER (RCL) _____ X 96 =	_____	
PU (RCC or RPX) _____ X 148 =	_____	
LU (RLU) _____ X 176 =	_____	
LUPOOL (RLX) _____ X 84 =	_____	
INNODE (RIN) _____ X 160 =	_____	
Total		_____

RDTs — local 3270

LBUILD (RDT) _____ X 136 =	_____	
LOCAL (RLC + RTR) _____ X 312 =	_____	
Total		_____

RDTs — local SNA subarea

VBUILD (RLS) _____ X 144 =	_____	
PU (RDA + RCC) _____ X 236 =	_____	
LU (R LC) _____ X 84 =	_____	
Total		_____

RDTs — switched subarea

VBUILD (RSW) _____ X 156 =	_____	
PU (RCC) _____ X 148 =	_____	
LU (RLU) _____ X 176 =	_____	
Total		_____

RDTs — application program major node

APPL (RAP) _____ X 120 =		_____

Note: *The largest total of the major nodes will be used later in a calculation for VTAM private area.*

EPT entries and real DVTs (ISTYSSCP and ISTYCONT)	2,604
Total number of names specified in the name fields of the NCPs and VTAM definition deck (SRTs) _____ X 40 =	_____
Total Pageable CSA	_____
Total Constant Requirements	_____

Dynamic Requirements

Pageable CSA

For each minor node activated (CSCB, OCW, DYPAB, POWE)

_____ X 1392 = _____

Total Dynamic Requirements	_____
Total for Major Node Activated, ISTATUS=INACTIVE on Minor Nodes	_____

Figure F-6 (Part 2 of 2). Estimating Common Storage for Major Node Activated, ISTATUS=INACTIVE on Minor Nodes

Network Activation

Constant Requirements

SQA (Subpool 227)
- Number of Remote BSC controllers (HCNCB) _____ X 136 = _____ *

Pageable CSA
- Number of local devices, includes 3270s, 3704/3705s, and 3790s (4 DYPABS plus a header) _____ X 144 = _____
- Number of remote PUs (3 DYPABs plus a header) _____ X 112 = _____

Dynamic Requirement

Pageable CSA

CSB	1 X 176 =	176
OCW	1 X 864 =	864
DYPAB	1 X 48 =	48
POWE (No. of PUs) _____	X 304 =	_____

Total for Network Activation _____

Figure F-7. Estimating Common Storage for Network Activation

Session Establishment • Includes OPEN ACB

Constant Requirements

SQA (Subpool 227)
- Number of application address spaces (MPST) _____ X 232 = _____
- Number of tasks with OPEN ACBs (PST) _____ X 152 = _____
- Number of OPEN ACBs (DCE) _____ X 32 = _____ *

Total SQA _____

Pageable CSA

Real DVTs
- If record mode, add 4416, otherwise 0 _____ *
- If basic mode, add 4872, otherwise 0 _____
- If dial mode, add 2212, otherwise 0 _____ *
- If TCAM I, add 7476, otherwise 0 _____ *
- If remote BSC 3270, add 1848, otherwise 0 _____

Number of OPEN ACBs (DYPAB) _____ X 48 = _____

Number of OPEN ACBs (ACDEB) _____ X 224 = _____ *

Total Constant Requirements _____

Dynamic Requirements

Pageable CSA

Number of concurrent OPNDST or CLSDST macros (DYPAB) _____ X 48 = _____

Number of concurrent OPNDST or CLSDST macros (OCW) _____ X 864 = _____

Total Dynamic Requirements _____

Total for Session Establishment _____

Figure F-8. Estimating Common Storage for Session Establishment

Other Common Storage Requirements

Number of lines of VTAM messages queued, but not displayed for the operators console (POWE) _____ X 304 = _____

Number of lines of VTAM messages queued for a POI application (POWE, POMCB) _____ X 464 = _____

Number of VTAM messages queued for a POI application requiring replies (PORCB) _____ X 176 = _____

Total for Other Common Storage _____

Figure F-9. Estimating Other Common Storage Requirements

Real Storage Requirements

Figure F-10 illustrates how to estimate the real storage requirements for VTAM Level 2.

Real Storage Requirement	
Nucleus	2,388
Fixed SQA and CSA Totals	
Pageable Buffer Pools	
CRPLBUF[1]	8,192
LPBUF[1]	8,192
WPBUF total	
APBUF[1] — If basic mode or requesting responses add 4096, otherwise 0	
PPBUF (data for which READ or RECEIVE not outstanding or segmented; messages are collected here until entire message is received)	
EPT	4,096
DVTs and ACDEBs (see Figure F-8)	
Sum and round up to a full page	
PLPA	
Fixed Modules — Base	16,384
If 3704/3705 add 8,192, otherwise 0	
If local 3270s add 12,288, otherwise 0	
If 3790 LCA add 8,192, otherwise 0	
Pageable modules[2] — Base	45,056
If record mode (SNA devices) add 8,192, otherwise 0	
If basic mode add 28,672, otherwise 0	
If 3270 BSC only, add 20K	
If 3270 BSC and SNA, add 16K	
If 3270 local, add 4K	
If no basic, add 12K	
If no 3270 BSC, add 16K	
LSQA for VTAM Private Area	24,576
Sum of swapped in LSOAs and user working set modules and control blocks for VTAM application program private areas	
Total for Real Storage Requirement (for VTAM and the VTAM application programs working set)	

[1] This is an estimated value. The actual value depends on the transaction rate and should be determined by tracing.

[2] Assumes the recommended LPA pack list given in Figure 9-10.

Figure F-10. Estimating the Real Storage Requirement

VTAM Private Area Requirements

Figures F-11 through F-16 illustrate how to estimate VTAM private area storage requirements.

VTAM in System, but Not Started
* NONE *

Figure F-11. Private Area Storage for VTAM in System, Not Started

VTAM Started, Major Node Not Activated	
LSQA[1]	24,576*
System Region[1]	20,480
SWA, subpools229/230[1]	98,304
Modules	
Base	393,216
NETSOL	12,160
Total for VTAM Started, Major Node Not Activated	_____

[1] The values were obtained from a dump

Figure F-12. Estimating Private Area Storage for VTAM Started, Major Node Not Activated

Major Node Activated, ISTATUS=INACTIVE on Minor Nodes	
Constant Requirements	
Sum of sizes of all unique user-specified USSTAB interpret tables	_____
Resource resolution Tables (RRTs) The total number of names specified in the name fields of the NCP and VTAM definition decks _____ X 12 + 56 =	_____
Dynamic Requirements	
Largest major node total for RDTs _____ + 11,180 =	_____
Number of major nodes activated _____ X 2312 =	_____
Work area for skeleton DVTs	4,564
Total for Major Node Activated, ISTATUS=INACTIVE on Minor Nodes	_____

Figure F-13. Estimating VTAM Private Storage for Major Node Activated, ISTATUS=INACTIVE on Minor Nodes

Network Activation	
* NO CONSTANT REQUIREMENTS *	
Dynamic Requirements	
Number of 3704/3705s and PUs concurrently activated (NCSPL and work area) —	
(2 X PU + 3704/3705) X 2312 =	_____
Work area for skeleton DVT	
If record mode, add 4,564	_____
If basic mode, add 5,236	_____
Total for Network Activation	_____

Figure F-14. Estimating VTAM Private Storage for Network Activation

Session Establishment • Includes OPEN ACB		
Constant Requirement		
Number of OPEN ACBs (OCW) 3[1] X 848 =		2,544
Dynamic Requirements		
Skeleton DVTs		
If record sessions, add 4564, otherwise 0	_____	
If basic sessions, add 5236, otherwise 0	_____	
Total for Session Establishment	_____	

[1] Specify 4 if NETSOL=YES.

Figure F-15. Estimating VTAM Private Area Storage for Session Establishment

Other VTAM Private Area Requirements		
Number of concurrent TOLTEP users		
(TOLTWKA) _____ X 34,816 =	_____	
Total for Other VTAM Private Area Requirements		_____

Figure F-16. Estimating Other VTAM Private Area Storage Requirements

User Private Area Requirements

Figure F-17 applies to each private area that contains a VTAM application program. For TSO/VTAM, it applies to each user.

LSQA[1] (Fixed when region swapped in)	*		
System Region	20,480		
SWA, Subpools 229/230			
User modules, control blocks (RPLs, NIBS, etc.) and work spaces			
Number of open ACBs (OCW)_____ X 864 =			
Total			
Round to a segment boundary (multiple of 64K)			
Total for User Private Areas			

[1] An estimated value is 28,672 bytes.

Figure F-17. Estimating User Private Area Requirements

Appendix G. VTAM Level 2 Buffer Pool Control Blocks

Figure G-1 contains information that can be of assistance when allocating storage for VTAM buffer pools.

Buffer Pool[1]	Associated Control Blocks	Subpool	Fetch Protected Storage	Fixed Storage
APBUF	ACE, ICE, CSP, FSB, FDB, LSCB	231	Yes	Optional[2]
SFBUF	CCNCB, LUNCB, SRB, MPLT, MQL	231	Yes	Yes
SPBUF	PLCPB, LCPB	231	Yes	Optional[2]
LFBUF	DNCB, HCNCB, PST	231	Yes	Yes
LPBUF	CRA	231	Yes	Optional[2]
UECBUF	UECB, VRPL	241	No	Optional[2]
WPBUF	FMCB	231	Yes	Optional[2]
NPBUF	FM LB, TCCW, NCSPL, GPD	231	Yes	Optional[2]
CRPLBUF	CRPL, RPH, DCLCP, NMLPB	231	Yes	Optional[2]
PPBUF	Input Data (Buffered), TLB, Logon data	231	Yes	Optional[2]
IOBUF	Input/Output data	231	Yes	Yes

[1] All buffer pools are located in CSA.
[2] User may specify fixed storage by using the (,F) start option

Figure G-1. VTAM Buffer Pool Control Blocks for OS/VS2 MVS

Glossary

This glossary defines VTAM terms and abbreviations, including those used in this manual. It does not include all terms previously established for the IBM OS operating systems and for the network control program (NCP). Additional terms can be found by referring to the index of this book, to prerequisite and corequisite publications, and to the *IBM Data Processing Glossary,* GC20-1699.

Note: *Terms marked (SNA)—for example, SSCP-LU session—(SNA) are defined in the Systems Network Architecture (SNA) publications. The definitions in this glossary explain the terms in a VTAM context.*

A

ACB: *Access method control block.*

accept: To connect a terminal to an application program in response to a logon request from that terminal, a connection request from the network operator or from another applicaton program, or as the result of an automatic logon request. In these cases, a terminal is accepted by issuing OPNDST (OPTCD=ACCEPT) macro instruction.

access method control block (ACB): In VTAM a control block that links a VTAM application program to VTAM.

accounting exit routine: An installation-coded routine invoked by VTAM to collect statistics for each connection and disconnection request.

acquire: To connect a terminal to a VTAM application program in the absence of a logon request from the terminal. The application program acquires a terminal by issuing an OPNDST (OPTCD= ACQUIRE) macro instruction or by issuing a SIMLOGON macro instruction followed by an OPNDST (OPTCD=ACQUIRE) macro instruction.

Activate Logical Unit command: (SNA) The command sent by VTAM to a logical unit that begins the SSCP-LU session.

Activate Physical Unit command: (SNA) The command sent by VTAM to a physical unit that begins the SSCP-PU session.

active: Pertaining to a major node that is known to VTAM and is available for use in the network or pertaining to a minor node that is connected to, or is available for connection to a VTAM application program. Contrast with *inactive.*

ACTLU command: (SNA) See *Activate Logical Unit command.*

ACTPU command: (SNA) See *Activate Physical Unit command.*

application program: See *VTAM application program.*

application program logon request: A logon request issued by aVTAM application program on behalf of a terminal. A VTAM application program must be authorized during VTAM definition to issue this type of logon request.

application program major node: The major node whose constituent minor nodes are VTAM application programs. An application program major node is defined by one or more APPL statements.

APPLID routine: An installation-coded *exit* routine that assists in the translation of an argument for an interpret table. The routine may provide another level of authorization that has to be passed by a logon request.

ASI: Automated system initialization.

authorization exit routine: An installation-coded routine that VTAM invokes for *each* connection and disconnection request to determine whether the request should be processed.

authorized path: A VTAM facility that enables an authorized VTAM application program to specify that a given SEND, RECEIVE, RESETSR, or SESSIONC macro instruction be executed in a faster manner than is usual.

automatic logon request: A request for connection to a specified VTAM application program that is generated by VTAM (rather than by the terminal itself) when the terminal becomes available for connection and the application program has opened its ACB and issued SETLOGON (OPTCD=START). The installation specifies automatic logon requests during VTAM definition. A network operator-initiated logon request can modify the requests.

B

basic mode: The facilities (including the macro instructions needed to use them) that enable a VTAM application program to communicate with local 3270, start-stop, and BSC terminals. READ, WRITE, SOLICIT, RESET, DO, and LDO macro instructions are basic-mode macro instructions.

BB: See *Begin Bracket indicator.*

Begin Bracket indicator: A specification or indication in a VTAM application program RPL that establishes a bracket.

Bind command: The command sent by VTAM to a logical unit that begins a session between a VTAM application program and a logical unit.

block: In the basic mode of VTAM, the smallest unit of data that can be transmitted between a VTAM application program and a terminal. The maximum size of a block is determined by the characteristics of the device that is sending or receiving the data. For start-stop devices, a block is a unit of data between an EOA or EOB character and an EOT or EOB character; for BSC devices, a block is a unit of data between an STX or SOH character and an ETB or ETX character. Contrast with *message* (2) and *transmission.*

BSC: Binary synchronous communication.

BSC cluster controller: A 3271, 3275, or 2972 control unit.

C

character-coded: (SNA) Pertaining to a logon or logoff command usually entered by a terminal operator from a keyboard and sent by a logical unit in character form. The character-coded command must be in the syntax defined in the installation USS definition table. Contrast with *field-formatted.*

closedown: The process of deactivating VTAM and the telecommunication network. See also *quick closedown* and *orderly closedown.*

cluster controller: See *physical unit, SDLC cluster controller* and *BSC cluster controller.*

command: (SNA) In data communication, that part of a message that controls the exchange of other messages. For example, a Quiesce command tells the receiver to stop sending messages until notified to resume. When a VTAM application program sends a message containing a command, VTAM sets the RU type indicator in the request header to indicate data flow control or session control (as appropriate) and puts a request code (for example, X'80'; for a Quiesce at End of Chain command) in the request unit. In addition to commands, other control information can be sent in messages by specifying certain indicators, such as change-direction or bracket indicators.

communication line: Any physical link, such as a wire or a telephone circuit, that connects one or more remote terminals (or a remote computer) to a communications controller, or connects one communication controller to another.

communications controller: A type of communication control unit whose operations are controlled by a program stored and executed in the unit. Examples are the IBM 3704 and 3705 Communications Controllers.

configuration: In VTAM, one or more major nodes and the hierarchy of associated minor nodes. See also *network configuration.*

configuration restart: In VTAM, the facility fo reloading an NCP automatically, following deactivation or a failure in an NCP or in the communications controller containing that NCP, and the facility for reestablishing contact with a physical unit after contact has been lost. Configuration restart includes the ability to restore the network to its status just prior to the deactivation or failure.

connection: In VTAM, in response to a request (OPNDST) from a VTAM application program, the linking of VTAM control blocks in such a way that the program can communicate with a particular terminal. The connection process includes establishing and preparing the network path between the program and the terminal. Also see *queued for logon.*

converted command: An intermediate form of a character-coded LOGON or LOGOFF command produced by VTAM through use of a USS definition table. The format of a converted logon or logoff command is fixed; the USS definition table must be constructed in such a manner that the character-coded command (as entered by a logical unit) is converted into the predefined converted command format. If an unmodified IBM-supplied USS definition table is used or if no table is used, the character-coded command must be entered in the converted command form. By modifying the USS definition table, the installation permits variations in the character-coded command formats. VTAM changes the converted command into an Initiate Self or Terminate Self command.

D

DACTLU command: (SNA) See *Deactivate Logical Unit command.*

DACTPU command: (SNA) See *Deactivate Physical Unit command*

data transfer: See *data transmission.*

data transmission: In data communications, the sending of data from a sender to a receiver.

Deactivate Logical Unit command: (SNA) The command sent by VTAM to a logical unit that terminates the SSCP-LU session.

Deactivate Physical Unit command: (SNA) The command sent by VTAM to a physical unit that terminates the SSCP-PU session.

definition statement: The means of describing an element of the telecommunication system to VTAM.

device-dependent: A characteristic of VTAM such that the application program is reponsible for controlling the terminal to which it is connected. The application program is not responsible for controlling the use of the line by which the terminal is attached.

disconnection: In VTAM, the disassociation of VTAM control blocks in such a way as to end a session between a VTAM application program and a connected terminal. The disconnection process includes suspending the use of the network path between the program and the temrinal. Disconnection is accomplished by a VTAM application program and issuing a macro instruction.

E

EB: See *End Bracket indicator.*

EBCDIC: Extended binary-coded decimal interchange code.

emulation mode: The function of an NCP that enables it to direct a communications controller to perform the activities equivalent to those performed by the IBM 2701, 2702, or 2703 Transmission Control Unit.

End Bracket indicator: A specification or indication in a VTAM application program RPL that a bracket be terminated.

ERP: Error recovery procedure.

exit list (EXLST): In VTAM, a control block that contains the address of exit routines that receive control when specified events occur during VTAM execution. Exit routines handle events such as logon processing and I/O errors.

exit list routine: A routine whose address has been placed in an exit list (EXLST) control block. The addresses are placed there with the EXLST macro instruction.

EXLST: Exit list.

F

field-formatted: (SNA) Pertaining to a LOGON or LOGOFF command from an SNA terminal format of an Initiate Self or Terminate Self command. This format allows the logon or logoff request information to be in a specified format, such as binary codes, bit-significant flags, and symbolic names in defined fields. Contrast with *character-coded.*

H

host CPU: The central processor for a VTAM telecommunication system. VTAM resides in the host CPU.

I

ID: Identification.

identification (ID) verification: The process of checking a sequence of characters transmitted by a BSC or TWX dial-in terminal to verify that the terminal is approved to communicate over a particular switched line operating in network control mode. The sequence of characters can be checked against a list of approved sequences by VTAM by the NCP, by the application program, or by the combination of the NCP and VTAM. If the sequence of characters is not recognized, the line connection is broken.

inactive: Pertaining to a major node that is unknown to VTAM and is unavailable for use in the network, or pertaining to a minor node that is not connected to, nor available for connection to a VTAM application program. Contrast with *active.*

Initiate Self command (SNA): A command that is sent by a logical unit to VTAM (during the SSCP-LU session) requesting a session between the logical unit and a VTAM application program.

interpret table: In VTAM, an installation-defined correlation list that translates an argument into a string of 8 characters. Interpret tables can be used to translate a logon message into the name of a VTAM application program for which the logon request is intended.

IPL: Initial program load.

L

local: Pertaining to the attachment of devices directly by channels to a host CPU. Contrast with *remote.*

local 3270 major node: The major node whose minor nodes are locally attached 3270 terminals. A 3270 major node is defined by one LBUILD statement and one or more LOCAL statements.

local SNA major node: The major node whose minor nodes are locally attached physical and logical units of one or more 3790 Communication Systems. A local SNA major node is defined by one VBUILD statement (TYPE=LOCAL), one or more PU (local) statements, and one ore more LU (local) statements for each PU statement.

logical connection terminal: For an NCP in network control mode, a description of a start-stop or BSC terminal (provided by a TERMINAL statement) to be used for a dial-in terminal whose identity is not known by the NCP when the terminal calls the communications controller.

logical unit: (SNA) The end point of an SNA terminal product with which a VTAM application program communicates.

logoff: See *logoff request.*

logoff command: A request by a logical unit to be the VTAM application program to which it it connected; that is, to terminate the session between the VTAM application program-LU session. Logoff commands occur either as field-formatted Terminate Self commands or as character-coded logoff commands. Either type of logoff command normally causes (1) the application program's LOSTERM exit routine to be scheduled, (2) the application program to issue CLSDST, and (3) VTAM to send an Unbind command to terminate the VTAM application program to LU sessin.

logoff request: A request from a terminal to be disconnected from a VTAM application program.

logon: See *logon request.*

LOGON command: A request by alogical unit to be connected to an application program that is, to begin a session between a VTAM application program-LU session. Logon commands occur either as field-formatted Initiate Self commands or as character-coded logon commands. Either type of logon command normally causes (1) the application program's logon exit routine to be scheduled, (2) the application program to issue OPNDST, and(3) VTAM to send a Bind command to initiate the session between the VTAM application program and the logical unit.

logon data: In VTAM, the data that can accompany a logon request received by the VTAM application program to which the request is directed. A VTAM application program, before connecting to the terminal with the OPNDST macro instruction, can use the INQUIRE macro instruction to obtain the logon data.

logon-interpret routine: See *APPLID routine.*

logon message: See *logon data.*

logon mode: A set of session parameters.

logon mode name: A 1- to 8-byte representation of a logon mod (set of session parameters). A logical unit can use a logon mod name by including it in the LOGMODE portion of a logo] command, and an application program can use a logon mode name by including it in the LOGMODE operand of an OPDNST o INQUIRE macro instruction. A LOGMODE may be establishes during system definition or by the network operator.

logon mode table: A table of constants (generated by macro instructions) that associates a logon mode name with a set of sessioi parameters. A logon mode table is created with MODETAB MODEENT, and MODEEND macro instructions, or an IBM-supplies logon mode table can be used.

logon request: A request by a terminal to be connected to ai application program. For local 3270, BSC, and start-stop terminal (that is, for all non-SNA terminals), a logon request takes the form of an ordinary data message read by a network solicitor program For SNA terminals, a logon request takes the form of a logos command (either an Initiate Self command or a character-coded logon command). Regardless of the type of terminal, the normal result of the logon request is (1) the scheduling of the applicatioi program's LOGON exit routine and (2) the issuing of an OPNDST macro instruction by the application program to establish connect-tion with the terminal

LU-LU session: (SNA) See VTAM application program-to-LU

M

major node: A set of minor nodes that can be activated, deacti-vated, and displayed as a group. Major nodes must consist entirely of one of the following types of minor nodes: application programs locally attached 3270 terminals, locally attached 3790 terminals remotely attached SNA terminals on switched links, a termina defined to an NCP (SDLC terminals on leased links, BSC terminals and start-stop terminals). The minor node definition statements tha form the major node are filed together as a member of a VTAM definition data set; the name of the major node is the name used is file the definition statements and to activate and deactivate the major node.

message: (1) in VTAM, a single transmission of information between VTAM or a VTAM appliation program and an SNA terminal A message contains data, information that controls the exchange of messages and responses, for both data and control information. VTAM processes a message as a request header and request unit, which together make a basic information unit (BIU) To a VTAM application program, a message is sent by specifying parameters and a data area in a SEND macro instruction am received by issuing a RECEIVE macro instruction and examining fields of an RPL after the RECEIVE is executed. (2) for BSC terminals, the unit of information between an STX character and ai ETX character. For start-stop terminals, the unit of information that ends with an EOT character (thus, a message is the same as transmission).

minor node: In VTAM, and element of the telecommunication network that can be activated or deactivated by the VARY command. Included among minor nodes are: locally attached 3270 terminals, locally attached units, remotely attached physical units logical units, BSC terminals and start-stop terminals, application programs, NCP lines and line groups. Each minor node is defined by

a definition statement or macro instructions, and the name of each minor node is the label of the definiton statement or macro instruciton.

multiple terminal access (MTA): A feature of the network control program that permits it of communicate with a variety of dissimilar, commonly used start-stop terminals over the same switched network connection.

MTA: Multiple terminal access.

N

NCP: Same as NCP/VS. See *network control program.*

NCP/VS: Network control program/virtual storage. See *network control program.*

NCP generation: See *network control program generation.*

NCP major node: The major node whose minor nodes are defined as part of NCP generation; specifically, lines and line groups, physical and logical units attached by leased SDLC links, BSC and start-stop terminals, and minor nodes defined by CLUSTER, **INNODE,** VTERM, and COMP macro instructions.

network configuration: The physcial network of major and minor nodes and the application programs represented by the network definiton. See also network definition.

network control mode: The functions of an NCP that enable it to direct a communications controller to perform telecommuncation activitiies such as polling, device addressing, dialing, and answering. Contrast with *emulatlon mode.*

network control program (NCP): A program, transmitted to and stored in a communications controller, that controls the operation of the communications controller.

network control program generation: The process, performed in a host CPU, of assembling and link-editing a macro, instruction program to produce a network control program.

network definition: The process of defining to VTAM the identities and characteristics of each node in the telecommunication system and the arrangement of the nodes in the network.

network operator: The person responsible for controlling the telecommunication network.

network operator command: A command used by the network operator to monitor or control the telecommunication network.

network operator console: A system console or a terminal on a network from which a network operator controls a telecommunication network.

network operator logon: A logon requested by a network operator command in behalf of a terminal.

NIB: Node initialization block.

node: in VTAM, a major node, a minor node, or either.

node initialization block (NIB): A control block associated with each terminal at the time it is connnected. The node initialization block contains information used by a VTAM application program to identify the terminal and to indicate to VTAM how communication with the terminal is to be done.

node name: In VTAM, the symbolic name assigned to a specific major or minor node during network definition.

non-SNA terminal: Locally attached 3270 devices, or devices supported by VTAM that utilize either start-stop or BSC line discipline to transmit data in a telecommunication system.

O

operator command: See *network operator command.*

orderly closedown: The orderly deactivation of VTAM and the telecommunication network. An orderly closedown does not take effect until all application programs have been disconnected from VTAM. Until then, all data transfer operations continue. Contrast with *quick closedown.*

P

partitioned emulation programming extension (PEP): A function of the NCP that enables a communications controller to operate some communication lines in network control mode while simultaneously operating others in emulation mode.

path information unit (PIU): A unit of data and control information that is routed between path control elements in a telecommunication network. It consists of headers that contain control and routing information, and the data that is being transmitted.

PEP: Partitioned emulation programming extension.

physical unit: (SNA) (1) The control unit or cluster controller of an SNA terminal (for example, the 3601 Finance Communication Controller of a 3600 Finance Communication System, or the control unit of a 3767 Communication Terminal). (2) The part of the control unit or cluster controller that fulfils the role of a physical unit as defined by System Network Architecture (for example, the part of the cluster controller that controls *SSCP-LU sessions* or that handles recovery and resynchronization after a failure of a data link).

PIU: Path information unit.

Q

queued for connection: In VTAM, the state of a terminal that has logged on to an application program but has not yet been accepted for connection by that application program. Synonymous with *queued for logon.* Contrast with *connection.*

queued for logon: In VTAM, the state of a terminal that has logged on to an application program but has not yet been accepted for connection by that application program. Synonymous with *queued for connection.* Contrast with *connection.*

quick closedown: In VTAM, a closedown in which current data transfer operations are completed, while new connection and data transfer requests are canceled. Contrast with *orderly closedown.*

R

RDT: Resource definition table.

record: The unit of data transmission for record mode. A record represents whatever amount of data the transmitting node chooses to send.

record mode: The facilities (and the macro instructions needed to use them) that enable the application program to communicate with logical units or with locally or remotely attached 3270 Information Display System terminals. SEND, RECEIVE, RESETSR, and SESSIONC are record mode macro instructions.

remote: Pertaining to terminals and communications control units that are attached to a central computer through a communications control unit. Contrast with *local.*

request parameter list (RPL): A control block that contains the parameters necessary for processing a request for data transfer or a request for connecting or disconnecting a terminal or other operation.

request unit: (SNA) The unit of information (data or control information) that is sent or received by VTAM on behalf of a VTAM application program. Contrast with *response unit.*

resource definition table (RDT): In VTAM, a table that describes the characteristics of each node available to VTAM, and associates each node with an address. The resource definition table is built during VTAM definition with APPL, LINE, GROUP, LU, and TERMINAL macro instructions, but it can be modified by the network operator while VTAM is running.

response unit: (SNA) The unit of information that is sent in response to a request unit specifically for the purpose of describing whether or not a request unit arrived successfully. Bracket and change-direction control information can also be included in a response unit.

restart: In VTAM, the functions performed by VTAM's configuration restart component. See *configuration restart.*

RPL: Request parameter list.

S

SDLC: Synchronous data link control.

SDLC cluster controller: A physical unit.

sequence number: A number assigned to each message exchanged between a VTAM application program and a logical unit. The value increases by one throughout the life of the connection unless reset by the VTAM application program with a Set and Test Sequence Number command or Clear command.

session: (SNA) A state during which no two elements of the network can communicate with each other. See also *SSCP-PU session, SSCP-LU session,* and *VTAM application program LU session.*

session parameter: (SNA) One of the set of characteristics, rules, or protocols that is specified when beginning a session (with the Bind command) between a VTAM application program and an SNA terminal (a VTAM *application program LU session).* Session parameters determine such things as (1) what kinds of responses are allowable to messages that are sent, (2) whether a change-direction half-duplex protocol is to be used to take turns sending and receiving, and (3) whether one message must be responded to before another message can be sent. A logon request can specify a set of session parameters (a logon mode) that are to be adhered to, or a VTAM application program can select the set of session parameters. The set of session parmaeters that is established is sent as part of the Bind command that results from an OPNDST macro instruction. Also see *logon mode name* and *session.*

SNA terminal: In VTAM: (1) A SNA physical unit or a SNA logical unit. (2) A terminal designed to be compatible with Systems Network Architecture (SNA). For example, the 3790 Communication System is a product whose terminals (relative to VTAM) are compatible with SNA. In addition to SNA terminals, VTAM also supports local 3270, BSC and start-stop terminals.

SSCP-LU session: (SNA) A state during which the system services control point (SSCP) portion of VTAM, and the logical unit (LU) can communicate. The SSCP-LU session is initiated with the Activate Logical Unit command and is terminated with the Deactivate Logical Unit command. Among the commands that can be exchanged during the SSCP-LU session are the Initiate Self and Terminate Self commands, which request the initiation and termination of a VTAM application program-to-LU session.

SSCP-PU session: (SNA) A state during which VTAM the systems services control point (SSCP) portion of VTAM and the physical unit (PU) can communicate. The SSCP-PU session is initiated with the *Activate Physical Unit command* (ACTPU command) and terminated with the *Deactivate Physical Unit command* (DACTPU command). After initiating an SSCP-PU session, the Activate Logical Unit command (ACTLU command) and Deactivate Logical Unit command (DACTLU command) can be used to initiate and terminate an *SSCP-LU session.*

start options: The installation-specified (or defaulted) options that determine certain conditions that are to exist during the time that a VTAM system is operating. These options include: the size of VTAM storage pools, which major or minor nodes are to be traced by the VTAM trace facility, and which major nodes are to be made initially active. Start options can be predefined or specified by the network operator when VTAM is started.

subarea: A unique numerical value assigned by the installation to each major node (except VTAM application program major nodes) that VTAM uses to create addresses for all of the minor nodes within that major node. A subarea value is assigned to each major node using the SUBAREA operand of the major node's BUILD macro instruction.

switched SNA major node: The major node whose minor nodes are physical and logical units attached by switched SDLC links. A switched SNA major node is defined by one VBUILD statement and one or more PU, PATH, and LU statements.

synchronous data link control (SDLC): A discipline for the management of information transfer over a communications channel. Transmission exchanges may be full-duplex or half-duplex; the communications channel configuration may be point-to-point, multipoint, or loop. SDLC includes comprehensive detection and recovery procedures, at the data link level, for transmission errors that may be introduced by the communication channel.

T

TCAM: Telecommunications Access Method.

telecommunication network: In a telecommunication system, the combination of all terminals and other telecommunication devices, and the lines that connect them.

telecommunication system: In a teleprocessing system, those devices and functions concerned with the transmission of data between the central processing system and the remotely located users. In VTAM, the telecommunication system includes the host CPU, VTAM application programs, VTAM, the telecommunication network, and the channels that link the host CPU and the network.

teleprocessing subsystem: In VTAM, a secondary or subordinate network (and set of programs) that is part of a larger teleprocessing system; for example, the combination consisting of a programmable controller, its stored program, and its attached input/output devices. An example of a teleprocessing subsystem is the IBM 3600 Finance Communication System.

teleprocessing system: The devices and functions of a data processing system that give users at remote locations access to the data processing capabilities of a centrally located computer. A teleprocessing system has two major functions: the transmission of data between the central computer and the remote locations (performed by the telecommunication system) and the actual processing of the data in the central computer.

terminal: (1) To VTAM, an end point in a telecommunications network; that is, a physical unit, a logical unit or a local 3270, start-stop, or BSC device. (2) Relative to a VTAM application program, a logical unit or a local 3270, BSC, or start stop device.

terminal component: A separately addressable part of a terminal that performs an input or output function.

terminal-initiated logon request: A logon request that originates from the terminal.

Terminate Self command: (SNA) A command that is sent by a logical unit to VTAM (during the SSCP-LU session) requesting the termination of the session between the VTAM application program and the logical unit.

transmission: In data communication with start-stop and BSC terminals, a logical group of one or more blocks or messages. A transmission is terminated by an EOT (end-of-transmission) character. See also *block* and *message.*

transmission control unit: A type of communication control unit whose operations are controlled solely by programmed instructions from the system to which the unit is attached; no program is stored or executed in the unit. Contrast with *communications controller.*

U

Unbind command: (SNA) The command sent by VTAM to a logical unit (for example, the IBM 2701) that terminates a VTAM *application program-to-LU session.*

USS: See *unformatted system services.*

USS definition table: A table of constants (generated by macro instructions) that enables VTAM to convert a character-coded LOGON or LOGOFF command, into a converted command, and then into a field-formatted Initiate Self or Terminate Self command. The installation uses the USSTAB, USSCMD, USSPARM, USSMSG, and USSSEND macro instructions to generate a USS definiton table.

unformatted system services: (SNA) A function of VTAM, defined by SNA, that converts character-coded LOGON or LOGOFF commands into field-formatted Initiate Self or Terminate Self commands.

V

Virtual Telecommunications Access Method: An IBM program that controls communication between terminals and application programs running under DOS/VS, OS/VS 1, and OS/VS2.

VTAM: Virtual Telecommunications Access Method.

VTAM application program: (1) To VTAM, the requests and control blocks that refer to a given *ACB,* or are pointed to by that ACB. (2) To the programmer, the set of instructions that perform a given function, including the processing of input and output data. One set of instructions may refer to more than one ACB.

VTAM application program-to-LU session: A state during which a VTAM application program and a particular logical unit can communicate. A VTAM application program-to-LU session is initiated with the Bind command (sent by VTAM when the program issues an OPNDST macro instruction) and terminated with the Unbind command (sent by VTAM when the program issues a CLSDST macro instruction).

VTAM definition: The process of defining the teleprocessing network to VTAM and modifying the IBM-defined VTAM characteristics to suit the needs of the installation. The installation defines VTAM with definition statements and macro instructions that are filed in a special data set or file.

VTAM definition library: The data set or file that contains the VTAM definition statements and VTAM start options filed during VTAM definition.

VTAM load module library: The system library containing the VTAM load modules.

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