INTERCOMM

SNA TERMINAL SUPPORT GUIDE

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LICENSE: INTERCOMM TELEPROCESSING MONITOR

SNA Terminal Support Guide

Publishing History

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First Edition	April 1977	This manual corresponds to Intercomm Release 7.0.
Second Edition	June 1979	Updates and revisions, including new IBM 3270 support. This manual corresponds to Intercomm Release 8.0.
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PREFACE

Intercomm is a state-of-the-art teleprocessing monitor system executing on the IBM 360/370 family of computers and operating under the control of IBM Operating Systems (MFT, MVT, VS1, MVS). Intercomm monitors the transmission of messages to and from terminals, concurrent message processing, centralized access to I/O files, and the routine utility operations of editing input messages and formatting output messages, as required.

This manual describes Intercomm support of IBM Systems Network Architecture (SNA) terminals accessed by the Virtual Telecommunications Access Method (VTAM).

The following Intercomm publications are prerequisite to this manual:

- Operating Reference Manual
- BTAM Terminal Support Guide
- Basic System Macros
- COBOL, PL/1, or Assembler Language Programmers Guide

It is assumed throughout this manual that the reader is familiar with the appropriate IBM reference manuals describing the SNA terminal controllers and VTAM concepts.

A User Review Form is included at the back of this manual. We welcome recommendations, suggestions and reactions to this or any Intercomm publication.

INTERCOMM PUBLICATIONS

GENERAL INFORMATION MANUALS

- Concepts and Facilities
- Planning Guide

APPLICATION PROGRAMMERS MANUALS

- Assembler Language Programmers Guide
- COBOL Programmers Guide
- PL/1 Programmers Guide

SYSTEM PROGRAMMERS MANUALS

- Basic System Macros
- BTAM Terminal Support Guide
- Installation Guide
- Messages and Codes
- Operating Reference Manual
- System Control Commands

CUSTOMER INFORMATION MANUALS

- Customer Education Course Catalog
- Technical Information Bulletins
- User Contributed Program Description

FEATURE IMPLEMENTATION MANUALS

- Amigos Users Guide
- Autogen Facility
- ASMF Users Guide
- DBMS Users Guide
- Data Entry Installation Guide
- Data Entry Terminal Operators Guide
- Dynamic Data Queuing Facility
- Dynamic File Allocation
- Extended Security System
- File Recovery Users Guide
- Generalized Front End Facility
- Message Mapping Utilities
- Model System Generator
- Multiregion Support Facility
- Page Facility
- Remote Job Entry (OS)
- Store/Fetch Facility
- SNA Terminal Support Guide
- TCAM Support Users Guide
- Utilities Users Guide

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Chapter 1

INTRODUCTION

1.1 ELEMENTS OF A SYSTEM USING SNA TERMINALS WITH INTERCOMM

The new IBM telecommunication system organization is called Systems Network Architecture (SNA). SNA systems have a nodal structure with processing capabilities distributed among the nodes. Connections between the nodes may be changed without individual node involvement; network resources may be shared by many nodes. SNA defines the protocols used to communicate between nodes and the structure of the processing systems of the nodes: transmission layer, function management layer, and application layer.

The implementation of SNA uses the Virtual Telecommunications Access Method (VTAM) in the host computer node (System/370 with OS/VS). All remote telecommunication lines are serviced by the Network Control Program (NCP), executing in a 3704/3705 Communications Controller. Terminal nodes, or SNA terminals, may have processing capabilities in the SNA Cluster Controller, which executes SNA controller application programs.

There may be several different controller application programs in a single SNA Cluster Controller. The controller application program of interest here is the one associated with the logical unit (LU). The LU is the logical set of one or more physical devices (that is, printers, terminals, workstations, etc.).

(In usage, the distinction between logical unit and the controller application program is not sharp; the LU is often referred to as being programmed.)

One or more VTAM application programs are in the host computer. Intercomm is a single VTAM application program. It controls the execution of application subsystems which process transactions originating from SNA terminals. Transactions can also originate from 3270-type terminals, attached locally or accessed through BSC lines, handled by VTAM.

Intercomm can also utilize the extended, multiple-domain facilities available with the Advanced Communications Function for VTAM (ACF/VTAM).

Figure 1 summarizes these system elements.

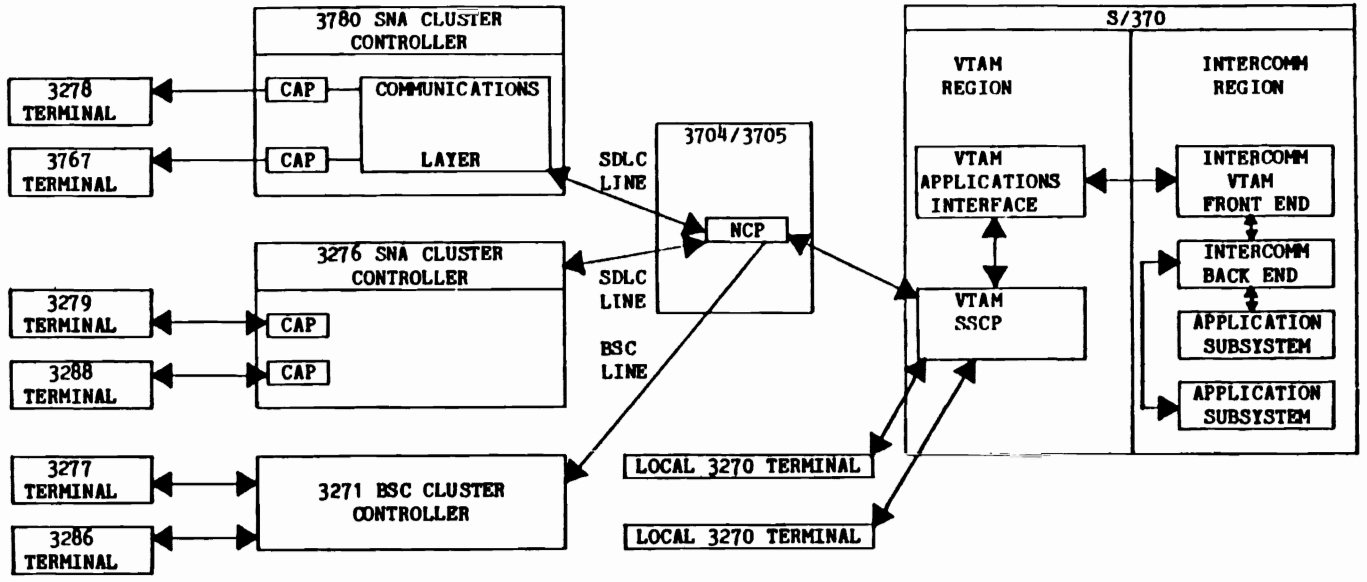


Figure 1. Elements of a Communications System Using SNA Terminals and Intercomm

TERMINALS: Device to communicate with outside world, for example, CRT and Keyboard, Printer.
Examples: 3604, 3618 (3600 System)
3277, 3767 (3790 System)
327x, 328x (BSC/SNA 3270 System)

SNA CLUSTER CONTROLLER: Special purpose small computer that executes user-written application programs that communicate with terminals, perform local processing of data, and communicate with application programs in S/370. May also be microcoded, having no user code (for example, 3276)
Examples: 3601, 3791, 3270 system.

3704/3705: Telecommunications computer that executes the Network Control Program (NCP) to manage lines between SNA controllers and VTAM.

S/370: Host computer executing VS1/MVS with regions:

VTAM Region: Virtual Telecommunications Access Method (VTAM) allocates network resources and routes data through network and to application systems.

Intercomm Region: Intercomm application system utilizes system routines to schedule Intercomm subsystems when input is received from SNA controller programs and sends output from these subsystems' back to the SNA controller programs. User-written Intercomm subsystems process the input, access the data base, and create the output.

1.2 INTERCOMM SUBSYSTEMS AND LOGICAL UNITS

The only nodes of a SNA network of interest when designing applications are:

- Intercomm- and user-written application subsystems executing under Intercomm control, together operating as a single VTAM application program.
- Logical Units--addressable units of logic in the SNA Cluster Controller. A logical unit (LU) is controlled by an executing controller application program (CAP) communicating with the VTAM application program (that is, Intercomm) using the resources of the SNA Cluster Controller--storage, processor cycles and external terminals connected to the controller.

To Intercomm, a logical unit consists of one or more logical unit components. Each component is assigned a unique Intercomm terminal identifier. The subsystem receives messages from components, processes them, and creates reply output messages, usually directed back to the originating component.

In general, for an Intercomm application subsystem communicating with logical units, the coding is independent of VTAM or SNA Controller considerations. However, the distribution of processing between the subsystem and the SNA Controller affects the design of a subsystem and the message content. Frequently, there is no editing of input messages or formatting of output messages within Intercomm or the subsystem. There is less traffic between the subsystems and logical units because only error-free input in internal format is presented to the subsystem, and because output terminal format screens are stored at the SNA Controller, with only variable data sent from the subsystems.

If a local data base or transaction batching capability is used in the SNA Controller, many transactions of the telecommunication system do not need to be processed by the host computer.

Logical units send messages to Intercomm subsystems based on transaction codes in the input transactions. The input component to be used is specified by a Function Management Header (FMH) coded in the input messages. Different components represent different physical terminals connected to the LU. Output from the subsystem can be received by the LU when it does a read operation. The destination component can also be indicated by a FMH in the messages.

1.3 VTAM/SNA FACILITIES SUPPORTED BY INTERCOMM

The following is a list of VTAM/SNA facilities supported by Intercomm:

- Connection may be initiated by the logical unit or by Intercomm. Information, such as protocol parameters and presentation space sizes, is extracted from the session parameters and inserted into Intercomm tables.
- Orderly shutdown or immediate disconnection of a logical unit can be initiated by the logical unit or by Intercomm.
- Data messages from the logical unit to Intercomm may be single-segment or chained, and may request definite, exception or no response protocol.
- Data messages from Intercomm to the logical unit may be single-segment or chained, and may request definite, exception or no response protocol.
- Data messages may optionally contain Function Management Headers whose format is defined by Intercomm.
- Message sequence numbers are always reset to zero on connection, state error or Request for Recovery (RQR) command from the logical unit. The Set and Test Sequence Number (STSN) command is not sent by Intercomm.
- Quiesce of Intercomm by the logical unit is provided.
- Logical units may send the Signal command. Intercomm invokes a user exit routine to act upon the Signal command.
- Full-duplex (FDX) or Half-duplex Flip-flop (HDFF) protocol may be used. (HDFF requires bracket protocol.)
- Bracket protocol may be used. Intercomm can be designated as first speaker or bidder. Both conditional and unconditional bracket termination are supported.
- The LUSTAT command is supported for 3270-type LUs.

Any VTAM/SNA features not listed above are not supported.

Any programmable SNA terminal that uses only this subset of VTAM/SNA facilities is supported by Intercomm. The IBM 3270 terminals are also supported.

Intercomm does not implement the SNA session restart procedure, which uses the Set and Test Sequence Numbers command to enable both

sides to determine the last message received by the other side. Intercomm always retransmits the last output message for which a definite response is lost when a session is resumed.

1.4 INTERCOMM FRONT END FACILITIES SUPPORTED BY THE VTAM FRONT END

Where appropriate, facilities of the BTAM Front End are implemented in the VTAM Front End. New facilities unique to VTAM have also been implemented. The existing and new facilities are:

- Verbs in the input data message text are delimited by the system separator character (defined in the Intercomm SPALIST macro) or end-of-message; short verbs are allowed. For 3270-type LUs, an SBA sequence also functions as a delimiter.

- A logical unit component may be locked to a verb via table coding or the LOCK system control command.

- The following BTVERB macro parameters options are supported with the same meaning as for the BTAM input:

LOCKEXE	HPRTY	AUTOLOK	CONV
RLSE	EDIT	SECUR	HDR3270
			AIDTRAN

- System control commands may be entered from a logical unit for BTAM or VTAM subject terminals.

- Fast message switch messages may be sent from a logical unit to any VTAM component or BTAM terminal.

- Input chains from a logical unit may be either queued for a subsystem as individual segments or accumulated into a single message to be sent to a subsystem.

- Each logical unit component has its own dedicated output queue, which may have main storage, disk and priority queue specifications.

- Only full messages (MSGHQPR=C'2') may be sent to components by a subsystem. Segmentation into output message chains is done within the Front End based on maximum segment size or by a user exit routine.

- A component may be defined as a CRT to obtain one output message per input message processing logic.

- Standard Intercomm message recovery is provided for output to VTAM LUs. Normally, recovery is provided only until the message is scheduled for output. However, if definite response protocol is used, recovery is provided until the LU has acknowledged the reception of the message.

- A DDQ may be passed to the VTAM Front End as a FECM Message. The DDQ may contain ordinary messages and FDBK messages; nesting of DDQs is not supported. Recovery of a FECM DDQ message is on the DDQ level. The complete DDQ is rescheduled if an exception response is received for any of the messages on the queue.

- The 3270 copy facility is supported under SNA/VTAM.

Facilities of the BTAM Front End not listed above are not supported. Refer to the BTAM Terminal Support Guide and System Control Commands for additional description of the above facilities and commands.

Chapter 2

VTAM SESSION PARAMETERS AND INTERCOMM OPERATING PARAMETERS

2.1 INTRODUCTION

VTAM session parameters are used to derive certain Intercomm operating parameters. Specifications may also be coded using the Intercomm VTLSB macro. At connection time, Intercomm uses both session parameters and coded values to derive the operating parameters for the session. The session parameters take precedence over coded values, in cases of conflict.

To direct Intercomm to the appropriate VTAM logon mode table entry, the VTLSB macro LOGMODE parameter must be coded as 0, blanks, or logon mode name. See Appendix B of this manual and the IBM VTAM Macro Language Guide for an explanation of the LOGMODE values. In addition, the user may provide his own session parameters by specifying the VTLSB macro BNDAREA parameter, giving the address of his bind area.

2.2 SESSION PARAMETERS

The following table lists session parameters used by Intercomm to derive its operating parameters, and the corresponding VTLSB macro parameters, if any:

Session Parameter	Values	VTLSB macro parameter
Response type	exception definite both none	SRESP
Bracket mode	required not required	none
Send/receive mode	full-duplex half-duplex flip-flop	none
Outbound Request Unit (RU) size	(number)	SOUTSEG
Chaining	permitted not permitted	none

2.2.1 Response Types

If the session parameters specify that responses are permitted (definite, exception, or both), the response is determined from one of several sources, as follows (a source of higher precedence overrides one of lower precedence):

Source	Precedence	Value	Response Type* Specification
FESEND call (second byte of third parameter)	1	blank or X'00'	No specification (default)
		C'D'	Definite type 1
		C'E'	Exception type 2
		C'F'	Definite type 2
		C'G'	Exception type 2
SYCTTBL macro SRESP parameter	2	NOSPEC	no specification
		(D,1)	Definite type 1
		(E,1)	Exception type 1 (default)
		(D,2)	Definite type 2
		(E,2)	Exception type 2
Component Dependent Module (CDM)	3	(Flags in MSGHFLG1 field of message header set by CDM. Used internally for definite and exception responses.)	
VTLSB macro SRESP parameter	4	NOSPEC	No specification
		(D,1)	Definite type 1
		(E,1)	Exception type 1 (default)
		(D,2)	Definite type 2
		(E,2)	Exception type 2

*In recent IBM VTAM publications, the names of the responses have been changed. FME is now type 1; RRN is now type 2.

Figure 2. Response Types

2.2.2 Bracket Mode

A session parameter specifies whether or not brackets must be used. If brackets are specified, Intercomm usually treats an entire session as a single bracket. However, if Intercomm issues a CLEAR command (as a result of an RSLU system command, or as a result of a Request Recovery (RQR) command from the LU to VTAM), the current bracket is ended.

Intercomm support of IBM 3270 logical units requires bracket mode.

If brackets are required, a session parameter specifies whether or not Intercomm is a first speaker; that is, whether or not it may begin a bracket without bidding.

2.2.3 Send/Receive Mode

A session parameter may specify a Function Management Transaction mode. Intercomm recognizes full-duplex and half-duplex flip-flop communication. The other modes (half-duplex contention and simplex) are treated as full-duplex.

When half-duplex flip-flop is specified, change direction commands are used. Another session parameter (the Contention Resolution parameter) specifies if Intercomm can begin sending output immediately after the Start Data Traffic Command, or must wait for the other side; that is, whether or not Intercomm is a first speaker.

The VTLSB macro TIMEOUT parameter specifies the maximum interval of time permitted to elapse without the LU receiving a response which includes the Change Direction indicator. The TIMEOUT parameter applies if either the terminal or the application is not conversational.

Chapter 3

SNA CONTROLLER APPLICATION PROGRAM DESIGN CONSIDERATIONS

3.1 INTRODUCTION

This chapter describes how Intercomm appears to a logical unit. It describes the VTAM facilities provided by Intercomm. The processing options and message formats for Intercomm logical units are given. This information is provided for use when designing the SNA controller application program (CAP) for a logical unit. The design process requires collaboration with the designer of Intercomm subsystems communicating with the LU. Also, the Intercomm system programmer is involved in coding the VTAM Front End tables to specify the options needed.

After establishing a session, the LU sends input messages to Intercomm, which places them on subsystem input queues. The messages are processed by the appropriate subsystem, which may generate output for the LU during its processing. As output is queued for the LU, it is sent. These three functions--input, processing, output--may all be performed concurrently. If desired, multiple messages from the same LU may be processed concurrently or only one message may be processed at a time.

To the LU, Intercomm is a standard VTAM application program that implements a subset of VTAM facilities. Intercomm places certain requirements on the format of input and output messages. It also provides several facilities that the user is free either to use or not, such as logical unit components and chained message processing options.

3.2 LOGICAL UNIT COMPONENTS AND THE FUNCTION MANAGEMENT HEADER

Intercomm provides a substructure within a logical unit called a logical unit component. An LU may be defined to consist of one or more components. To an Intercomm subsystem, each component behaves like an independent Intercomm terminal with its own output queue and processing characteristics. The CAP distinguishes among different physical terminals connected to the same logical unit, treating them as different logical unit components. If the CAP has no use for multiple components, only one is defined for the LU.

When multiple components are used, the component is identified in input and output messages by a Function Management Header (FMH) which must prefix the normal message text in a format defined by Intercomm. If the LU does not (or cannot) use an FMH in its input to Intercomm, the input is associated with the first component defined for the LU. Output messages from Intercomm include the FMH if so specified in Intercomm tables. If the output does not include a FMH, the destination component is not indicated by Intercomm. If only one component is defined, no FMH should be used.

Both input and output FMH precede normal message text in the first or only segment of a message; the FMH has the format shown in Figure 3.

Byte	Contents
0	length of FMH -- must be X'04'
1	component number, range X'01'-X'nn', where nn is the number of components defined for this LU.
2-3	reserved. Must be X'0000'

Figure 3. Function Management Header Format

The term "Function Management Header" does not appear in all SNA Controller literature. See Section 3.12 for details about specific types of controllers.

3.3 VTAM COMMANDS AND INDICATORS USED BY INTERCOMM

Figure 4 lists all VTAM commands and indicators, and shows which are sent or accepted by Intercomm. The CAP must be programmed to process all commands that Intercomm can send. The CAP can be designed to use whatever VTAM commands it needs from the set supported by Intercomm.

Class of Command or Indicator	Name of Command or Indicator	Function of Command or Indicator	Intercomm Sends to LU*	LU Sends to Intercomm
Independent of session (processed by VTAM)	Initiate Session	LU requests session with Intercomm	-	Y
	Procedure Error	Intercomm or VTAM rejects logon by LU	Y	-
	Terminate Session	LU wants immediate disconnection	-	Y
Session control	Bind	LU connection	Y	-
	Clear	Clear data from network, stop data traffic	Y	-
	Start Data Traffic (SDT)	Start data traffic after logon or clear	Y	-
	Set & Test Sequence numbers (STSN)	Message sequence number resynchronization	N	-
	Request for Recovery (RQR)	LU wants sequence number resynchronization	-	Y
	Unbind	Disconnect LU	Y	-

*Y = May be sent if desired or required by SNA protocol.
N = Permitted by SNA protocol, but not implemented.
- = Not permitted by protocol.

Figure 4. VTAM Commands and Indicators Used by Intercomm (Page 1 of 3)

Class of Command or Indicator	Name of Command or Indicator	Function of Command or Indicator	Intercomm Sends to LU*	LU Sends to Intercomm
Normal flow	Begin Bracket (BB)	Start new bracket	Y	Y
	Bid	Request permission to start new bracket	Y	-
	Ready to Receive (RTR)	Grant permission to start new bracket requested by bid.	-	Y
	End Bracket (EB)	End current bracket	Y	Y
	Cancel	Cancel current chain	Y	Y
	Chase	Determine whether receiver has more responses to send	Y	Y
	Logical Unit Status (LUS)	Inform receiver of unexpected condition	N	Y
	Quiesce Complete (QC)	Tell receiver that sender is quiesced	Y	N

*Y = May be sent if desired or required by SNA protocol.
N = Permitted by SNA protocol, but not implemented.
- = Not permitted by protocol.

Figure 4. VTAM Commands and Indicators Used by Intercomm (Page 2 of 3)

Class of Command or Indicator	Name of Command or Indicator	Function of Command or Indicator	Intercomm Sends to LU*	LU Sends to Intercomm
Expedited flow	Quiesce at end of Chain (QEC)	Tell receiver to stop sending as soon as possible	N	Y
	Release Quiesce (RELQ)	Tell receiver that quiesce is ended	N	Y
	Request Shutdown (RSHUTD)	Tell Intercomm to disconnect LU -All is finished normally	-	Y
	Shutdown Complete (SHUTC)	Tell Intercomm that shutdown preparation is complete	-	Y
	Shutdown (SHUTD)	Tell LU to prepare for shutdown	Y	-
	Signal	User-defined	N	Y

*Y = May be sent if desired or required by SNA protocol.
N = Permitted by SNA protocol, but not implemented.
- = Not permitted by protocol.

Figure 4. VTAM Commands and Indicators Used by Intercomm (Page 3 of 3)

3.4 INPUT FROM THE LOGICAL UNIT TO INTERCOMM

3.4.1 Input Requirements

Intercomm requires that input from an LU directly or indirectly specify two pieces of information: the originating component of the LU; and a verb (transaction identifier) associated with an Intercomm subsystem to process the message.

If multiple input components are used, the FMH is required (except for BSC 3275 under VTAM) to identify which input component is in use. The FMH must be present in single segment input messages or in the first segment of a chain of input messages. All messages within a chain are always associated with the same component. When the first or only component is involved, no FMH is required.

A verb is coded as the first characters of the data portion of an input message (except for a possible SBA sequence). If message text is to follow the verb, an Intercomm system separator character must be coded between the verb and the message text. There are several classes of verbs:

1. User-defined transaction identifiers--one to four characters.

2. Intercomm-defined system control commands--four characters.

3. Fast switch terminal identifier--five-character Intercomm terminal identifier (VTAM logical unit component name or BTAM terminal name). A fast switch message is queued directly for the terminal or component specified--no subsystem processing is involved.

Fast switch terminal identifiers must be coded in the input message text. User-defined verbs and system commands may be coded in the message text or specified indirectly by locking the component to the desired verb by one of several methods:

- The locked verb is specified in Intercomm tables so that the component is locked to the verb when the LU is connected to (logs on to or is acquired by) Intercomm.

- A special message containing the LOCK system control command is sent to the Front End by the LU or by a user subsystem.

- A message containing a verb with the AUTOLOK option is entered by the LU.

The message text consists of whatever sequence of characters is required by the verb. The data from an LU can be in any format; line transmission is always in transparent mode. The text extends from the separator character following the verb (if the verb is coded in the message) to the end of the data block. No special ending character is required; the VTAM Front End appends an EBCDIC EOB (X'26') character to be consistent with other Intercomm messages.

The text of system control commands is defined by Intercomm. Fast switch message text is sent exactly as received to the destination terminal; the destination TID coded in the original input is replaced by the originating component name. For example, if the following is sent by LU001:

```
CNT01$A FAST SWITCH MESSAGE@
```

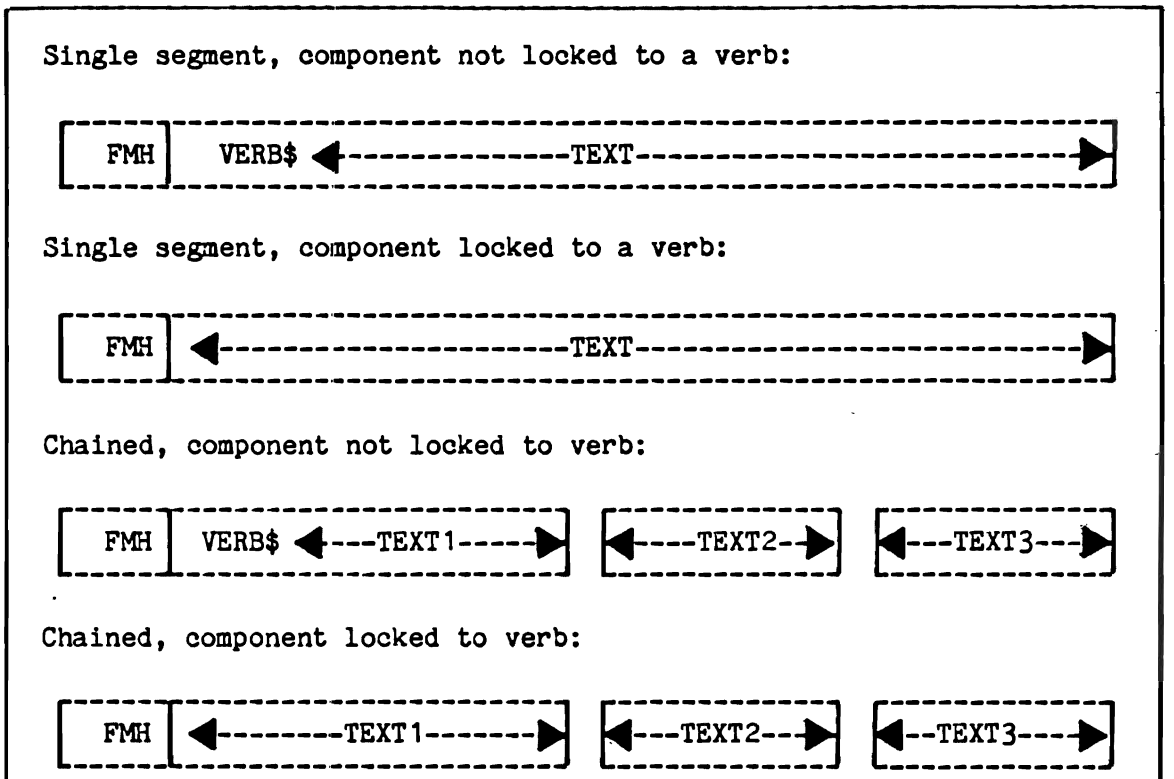
it is received at CNT01 as:

```
LU001$A FAST SWITCH MESSAGE@
```

where $ represents the system separator character and @ represents the EOB character

3.4.2 Input Formats

The allowed formats for messages sent to Intercomm are illustrated in Figure 5.



FMH - Function Management Header, specifies component--optional.

VERB - Transaction identifier or fast switch terminal identifier.

$ - System separator character--required if text is to follow verb.

TEXT - Single segment message text, if any required, as defined for this transaction.

TEXT1 - First chained segment of message text defined for this transaction.

TEXT2 - Middle chained segment of message text--there may be zero or more middle segments.

TEXT3 - Last chained segment of message text.

Figure 5. Input Formats from LU to Intercomm

3.4.3 Intercomm Responses to Logical Unit Input

The LU may request any valid response protocol for data message input to Intercomm (except both type 1 and type 2 responses).

These responses include:

- No responses
- Exception response 1 (ER1) or exception response 2 (ER2)
- Definite response 1 (DR1) or definite response 2 (DR2). DR1 or DR2 is valid only for single segment or last chain segment. First or middle segments must request ER1 or ER2 if the last segment requests DR1 or DR2. All VTAM command messages must request DR1.

Regardless of the type of data message response requested, it is always given at the same point in processing:

- An exception response is returned as soon as a condition is detected by VTAM or Intercomm that prevents queuing the message for a subsystem (normal input), queuing the message for a terminal (fast switch), or scheduling processing of a system control command. VTAM defines the sense data returned for VTAM-detected errors. Intercomm-defined sense data for Intercomm-detected errors is described in Section 3.11.
- A normal response is returned when an input message is successfully queued for a subsystem or a terminal, or when a system control command is found syntactically correct and is scheduled for processing.

When the LU is sending a chain and an exception response is received, it should cancel the chain by sending a VTAM CANCEL command. The LU may cancel a chain for any reason by sending the CANCEL command.

3.5 OUTPUT FROM INTERCOMM TO A LOGICAL UNIT

3.5.1 Output Processing by Intercomm

Messages may be queued for a logical unit component at any time. Usually they are created in reply to an input message (solicited output). Unsolicited output includes messages sent to a component via fast switch or broadcast messages. Intercomm makes no distinction between solicited and unsolicited output.

The destination component is indicated if necessary by the Function Management Header, which is added to all output messages for a logical unit based on coding of the SFMHDR option in the Intercomm Front End tables.

Output messages are always created in Intercomm subsystems as single segment messages. They are segmented by the VTAM Front End using one of the following options as specified in the VTAM Front End tables:

- Segmentation by the VTAM Front End. A maximum segment length may be specified. If the output message length (including the FMH, if present) exceeds this maximum, the message is sent as a chain: all segments, except possibly the last, are of maximum length.
- Segmentation by a user-written routine that can segment the message in whatever way is desired.
- Segmentation not performed.

Output messages are sent to the LU as soon as queued until the component queues are empty. The CRT screen protection facility may be used to limit output for a specific component.

CRT screen protection is specified in Intercomm Front End tables at the component level. It is commonly used when the component represents a CRT device. When specified, the option requires each output message (single segment or chain)--except the first output message sent after connection--to be preceded by an input message from the same component. The input requirement can be satisfied with the Intercomm system control command RLSE, which permits transmission of the next output message. The RLSE command can be used to view successive screens on a CRT device.

The VTAM logical unit quiesce facility may be used to suspend output from Intercomm to the LU. Quiesce of Intercomm by the LU can be used to suspend output temporarily. See Section 3.9 for a description.

3.5.2 Output Message Formats

Output messages are sent by Intercomm into chains as specified by the Intercomm Front End tables. Formats are shown in Figure 6.

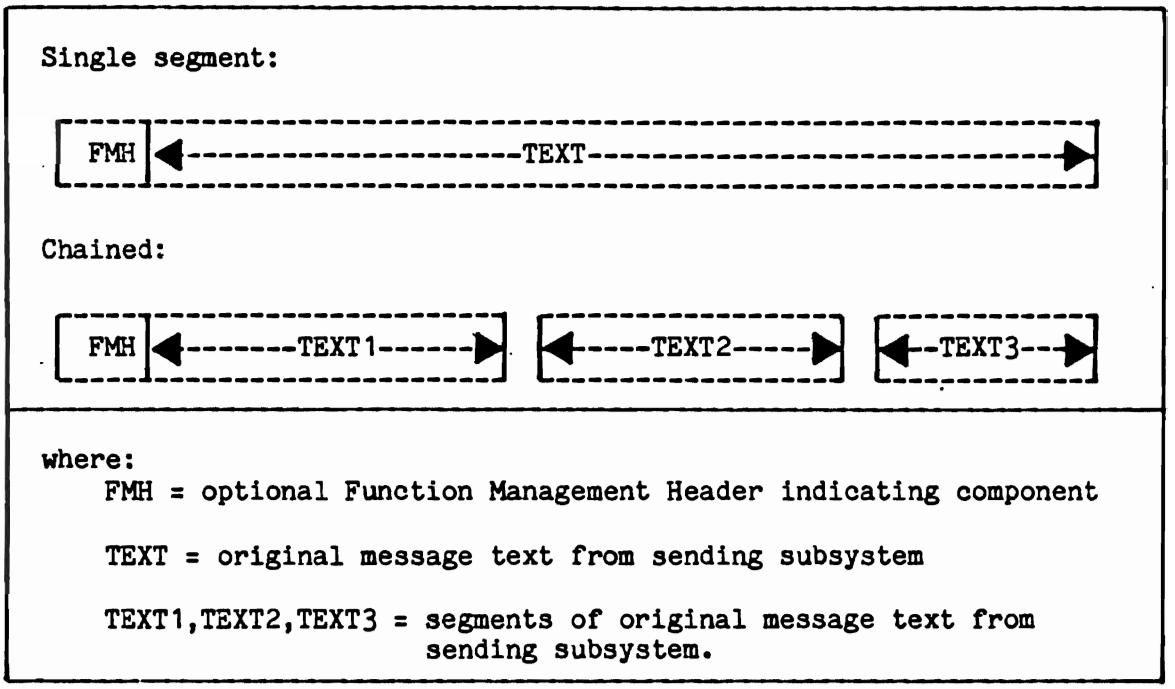


Figure 6. Output Formats from Intercomm to LU

3.5.3 Responses to Output Messages Sent by Intercomm; Chain CANCEL Command

Data messages may request definite, exception, or no response protocol. VTAM commands always request definite response 1 (DR1).

A logical unit that is to receive output message chains must be programmed to accept the VTAM CANCEL command during receipt of a chain. It must purge any segment received at the time when CANCEL is received.

3.6 SESSION INITIATION

Sessions can be started by the logical unit or by the host S/370. Host-initiated sessions can originate from the following sources:

- VTAM network startup
- VTAM network operator command
- Intercomm VTAM Front End startup
- Intercomm STLU system control command

All host initiations appear the same to the logical unit. Standard SNA protocol is used, as described in VTAM and SNA controller manuals. A logical unit must be programmed only for the types of the session initiation needed: self-initiation, host initiation, or both.

Session parameters are only partially checked by Intercomm. The session parameters from the pending logon, if any, will be sent to the logical unit. (Refer to the NIB macro LOGMODE and BNDAREA parameters in the IBM VTAM Macro Language Reference.)

After the session is established, any output currently queued for the LU will be sent immediately. The output may have been queued while the LU was not connected or remain from the last session. (If output queues were not drained before the previous session was terminated, output messages will remain queued from one session to the next.)

3.7 SESSION TERMINATION

3.7.1 Orderly Shutdown of a LU

An orderly shutdown can be requested by the LU or by Intercomm in response to one of the following:

- VTAM network shutdown
- Intercomm VTAM Front End shutdown
- Intercomm SPLU system control command to shut down an LU
- Intercomm normal closedown

Standard VTAM commands are used; figures 7 and 8 depict shutdown sequences including special options provided by Intercomm. These options, selected by Intercomm Front End table specification are:

- Shutdown time limit--for Intercomm-requested shutdown. Following the Intercomm receipt of the LU response to a SHUTD command, the LU must send a SHUTC command within a user-specified time limit. If the time limit is exceeded, the LU is disconnected immediately.

- When a SHUTC or RSHUTD command is received from the logical unit, Intercomm will send a CHASE command and disconnect immediately. If any output is queued, it will be sent at the next connection of the LU.

An LU must be programmed to process orderly shutdown initiated by Intercomm. Programming for LU-requested shutdown is optional.

3.7.2 Immediate Disconnection

A session can be terminated immediately by the LU (it sends the TERMINATE SELF command) or by Intercomm in response to one of the following:

- VTAM network halt "quick"

- Intercomm VTAM Front End halt

- Intercomm immediate closedown

- Intercomm abend--disconnection done by OS/VS task termination

- Exception response--Intercomm may disconnect an LU if an exception response is returned and sense information indicates an uncorrectable error at the LU.

Standard SNA protocol is used. Conditional and unconditional TERMINATE SELF are treated identically by Intercomm.

The LU must be programmed to process the immediate termination sequence at any time.

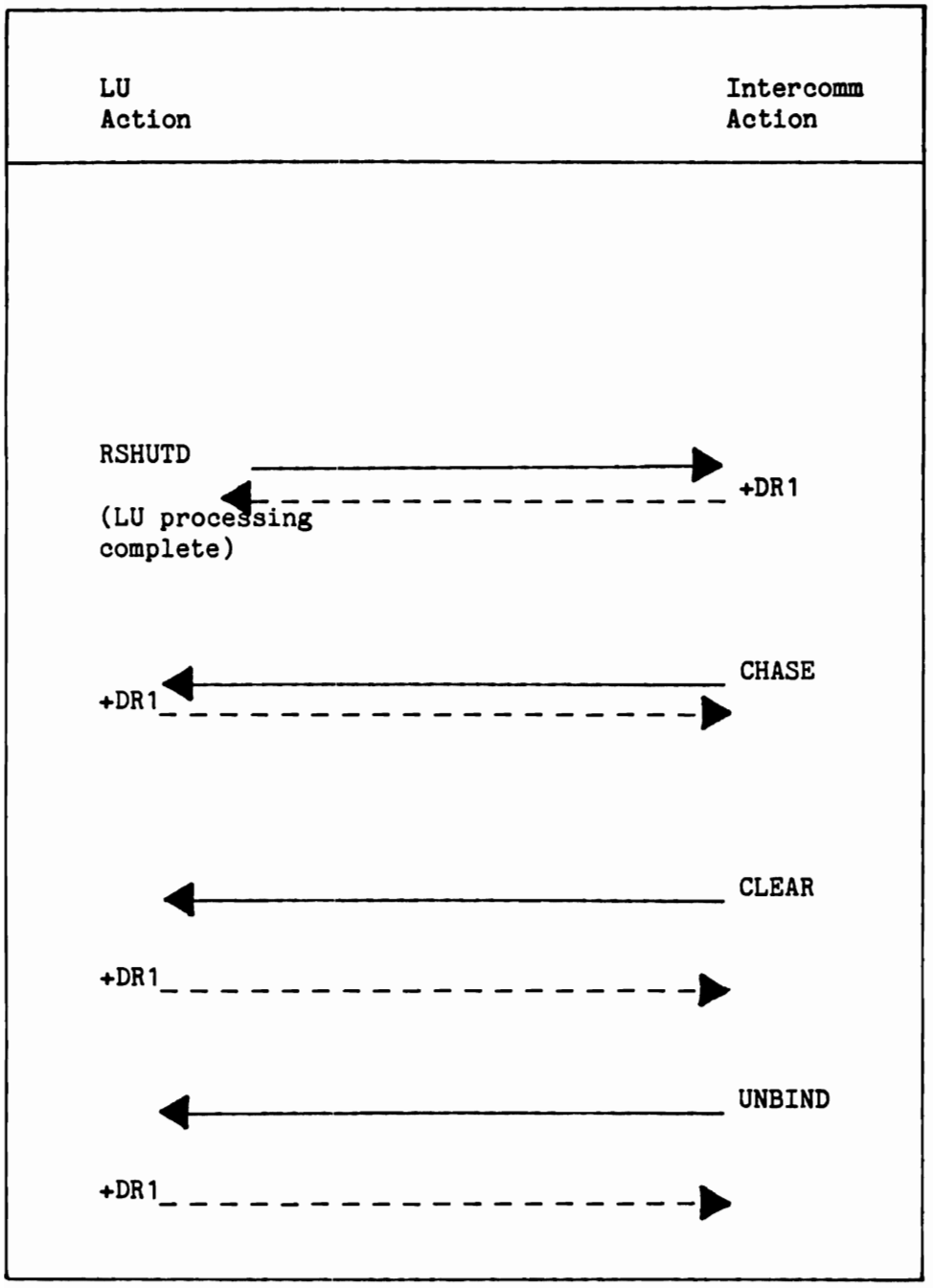


Figure 7. LU-Initiated Shutdown

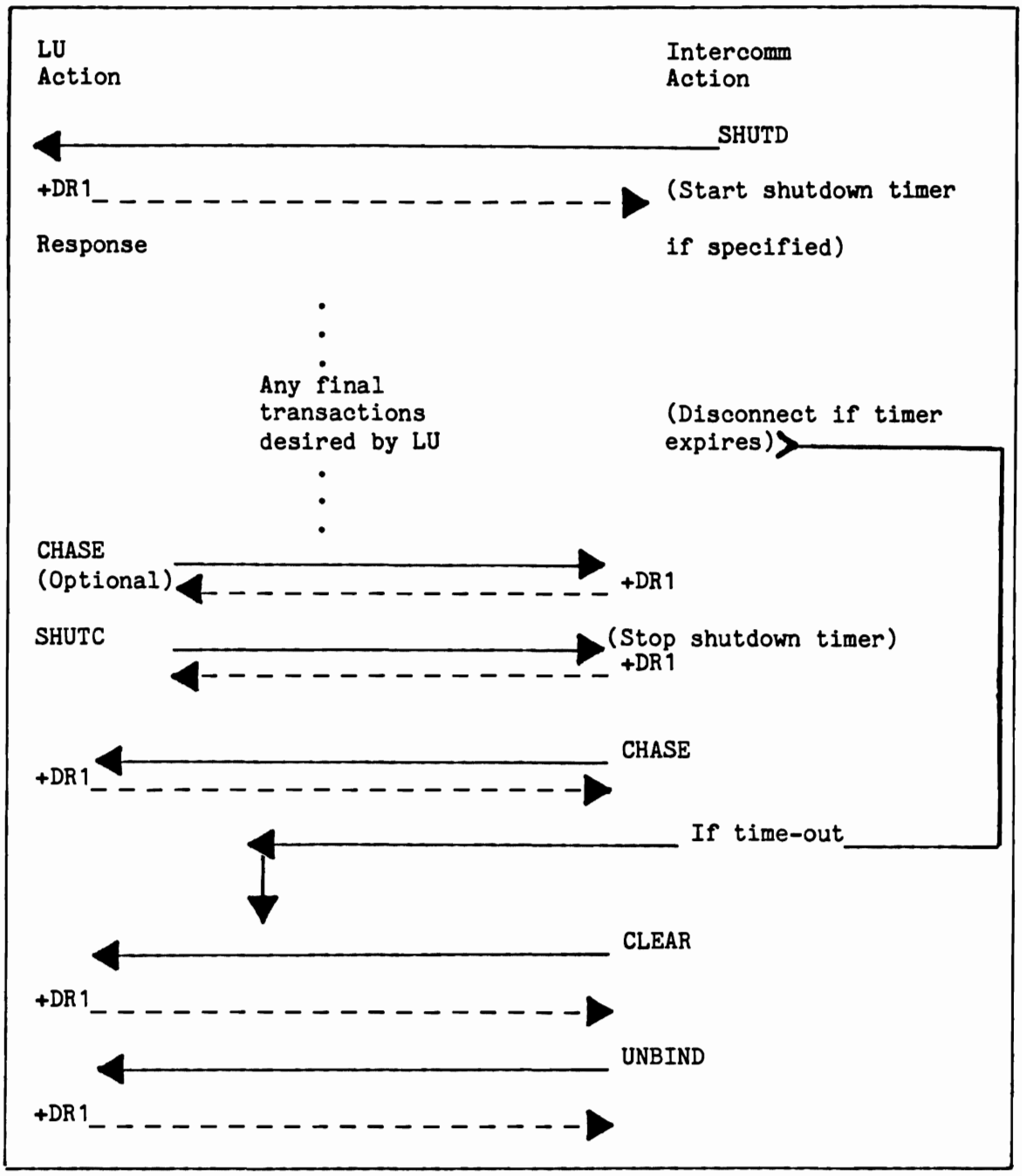


Figure 8. Intercomm-Initiated Shutdown

3.8 VTAM MESSAGE SEQUENCE NUMBERS

VTAM message sequence numbers are maintained and incremented in the standard fashion by the Front End. The VTAM input sequence number is passed to the Intercomm subsystem in the Intercomm message header; it can be returned in the text of the reply message to enable the LU to associate replies with requests when several requests are being processed concurrently.

No sequence number resynchronization is provided. At connection time, Intercomm sends BIND and SDT (Start Data Traffic) commands, and sequence numbers are reset to zero. At any time resynchronization is required, only CLEAR and SDT is sent to reset sequence numbers to zero. Resynchronization occurs with:

- State error exception input message
- RQR (Request for Recovery) command from LU
- VTAM buffer full condition
- Intercomm RSLU system control command

The LU must be programmed to accept the CLEAR/SDT sequence at any time. Optionally, the user may request use of the BTAM Sequence Number (BMN) via the SEQNO parameter of the VCT macro.

3.9 QUIESCE OF INTERCOMM BY THE LOGICAL UNIT

The LU may temporarily suspend output from Intercomm by sending the QEC (Quiesce at End of Chain) command. Intercomm finishes sending the current output chain if one is being sent at the time QEC is received. Then the QC (Quiesce Complete) command is sent by Intercomm. When the LU is ready to receive output from Intercomm again, it sends the RELQ (Release Quiesce) command.

3.10 SIGNAL COMMAND FROM LOGICAL UNIT

The LU may send the SIGNAL expedited flow command to Intercomm at any time. Intercomm responds to the command when received and calls a user-supplied exit routine to interpret and act upon the four-byte SIGNAL data.

3.11 ERROR HANDLING CONSIDERATIONS

Errors may be detected by VTAM when receiving input, when scheduling output, or when contact with the LU is lost or broken by the

LU. Intercomm is notified by VTAM via return codes or asynchronous exit routines (LOSTERM exit). Intercomm can also encounter errors in its own processing of input messages (for example, invalid verb in message, input queue full).

Input error conditions detected by VTAM or Intercomm can be relayed to the LU by exception responses if the network path is still usable. For Intercomm-detected errors, either an exception response or an error message (as new output) is sent. Figure 9 lists Intercomm-detected error conditions, notification methods, and suggested user actions. For all input errors, processing steps taken by Intercomm are:

1. Discard current chain.

2. Send exception response if requested and path usable.

3. If path not usable, disconnect the LU.

4. If state error, reset sequence numbers to zero (send CLEAR and SDT commands).

5. If path still usable, continue receiving input.

User exits may modify action in steps 3-5. When the LU receives an exception response, it should send the CANCEL command if it is sending a chain, and should analyze the response. The message (chain or single segment) may need to be sent again or may be unacceptable as currently formatted. VTAM-defined exception responses are detailed in the IBM VTAM Macro Language Reference; Intercomm-defined exception responses are listed in Figure 9.

Output error conditions can be detected only at scheduling time (that is, when the message is given to VTAM), unless definite responses to Intercomm output are requested. In the case of a severe path error, Intercomm learns of it when scheduling later messages, or, if contact is lost, from the LOSTERM asynchronous exit routine. Output error processing steps taken by Intercomm are:

1. If a chain is being scheduled and the path is still usable, the CANCEL command is sent. The entire chain or single segment message is marked for retransmission.

2. If the path is unusable, the LU is disconnected. Any chain or single segment message being scheduled at the time of failure is marked for retransmission.

3. If the LU is still connected, or reconnects later if path failure, output message scheduling resumes at the first segment of the chain or the single segment message being scheduled when the error was detected.

If VTAUTOUP is included in the linkedit and an autoup interval is specified (UPINTV on the LUNIT macro), Intercomm will attempt to restart the LU if any of the following reasons occurred:

- OPNDST failed
- LU session has been lost
- SIMLOGON failed for STLU
- LU was stopped because of exception response.

The following conditions must be satisfied for restart:

- The LU is defined as an acquired LU
- The UPINTV in the LUB is nonzero
- VTAM is not in process of terminating
- The LU has not already been reconnected
- An active autoup thread for this LU does not already exist.

Automatic restart will also be attempted (see VTUPINV parameter of VCT macro) when the VTAM Front End fails for any of these reasons:

- Open of the VTAM ACB failed at Intercomm startup
- VTAM region communication is lost (TPEND exit).

An internal VTCN$START command is generated at expiration of the VTAM Front End autoup time interval. This feature also requires inclusion of VTAUTOUP in the Intercomm linkedit.

Error Description	Error Notification Methods*	EXCP Response Sense Data**	Recovery Action by User
Invalid Function Management header	EXR,IWTO	10000100	Correct FMH Format
No storage for input work area	EXR,IWTO	08000200	Resend message later
No verb in message	EXR,EM	10000300	Correct message format or lock component to verb
Message rejected by INQUEUE user exit	EXR	10000400	User-defined
Queuing error for message (MSGCOL)	EXR,IWTO	08000500	Resend message later or queue may be full (check error code in Intercomm WTO with Intercomm system programmer)
Syntax error in system control command	EXR,EM	10000600	Correct system control command message format or parameters.
Verb allowed from control term only	EXR,EM	10000700	User or Intercomm restricted this verb to the control termial. (Intercomm restricts IMCD and NRCD verbs.)

* EXR = Exception response sent if requested
EM = Error message sent to input component
EXR/EM = Error message sent and exception response sent if requested
IWTO = Intercomm error message sent to OS console or control terminal

** four bytes sense data SSENSE,SSENSM,USENSE

Figure 9. Intercomm-Detected Input Errors

3.12 SNA TERMINAL-DEPENDENT CONSIDERATIONS

Generally, all SNA terminals appear the same to Intercomm. The intelligent terminals use standard SNA protocol. The following subsections give terminology or restrictions peculiar to specific terminals.

3.12.1 3601 Finance Communication System Controller

The Function Management Header is not discussed in 3601 literature. However, the flag in the request header of a message that indicates an FMH can be set or tested as "data and control" in the write type field (SMSCWT) or read type field (SMSCRT), respectively.

3.12.2 3791 Communication System Controller

The 3791 literature does not discuss the Function Management Header. There does not appear to be a way to set or test for a FMH. There is no need for multiple components with the 3791 Inquiry Session, as only one physical terminal can be associated with a logical unit.

The 3270 Data Stream Compatibility feature may be used.

3.12.3 3270 BSC

No Function Management Header is permitted. Only one component per LU is permitted, except for the 3275, which may have CRT and printer.

3.12.4 3270 SNA

No Function Management Header is permitted. Only one component per LU is permitted.

3.12.5 8100 Distributed Information System

3270 Data Stream Compatibility mode (DPCX and DPPX); define as 3270S.

3790 Compatibility mode (DPCX and DPPX); define to Intercomm as 3790I.

Chapter 4

INTERCOMM SUBSYSTEM DESIGN CONSIDERATIONS

4.1 SUBSYSTEM DESIGN AND CODING--GENERAL FEATURES

The requirements for coding Intercomm subsystems that communicate with VTAM logical units are similar to requirements for communication with BTAM terminals. The design can be similar or quite different, depending upon how much use is made of the distributed processing capabilities of programmable SNA terminals.

Subsystems communicating with nonprogrammable terminals are responsible for all input message editing and validation and all output message formatting. This option is open for subsystems communicating with programmable terminals: conversions of existing applications can retain some or all centralized processing. Full exploitation of distributed processing is best done in new or extensively redesigned applications. Simple use of distributed processing includes input editing and validation and all output formatting in the remote SNA controller. More extensive use of distributed processing may utilize local data bases or off-line data collection.

An Intercomm subsystem communicating with programmable logical units receives and sends messages in the same manner as with nonprogrammable terminals. Actual coding of the subsystem and use of Intercomm facilities by the subsystem is similar for either terminal type.

4.2 LOGICAL UNIT COMPONENTS

To an Intercomm subsystem, a logical unit appears to be one or more terminals. A terminal identifier is assigned to each logical unit component. Multiple components can be used to define different device processing characteristics for the same logical unit. This feature might be used when a logical unit services several different types of physical terminals and some device-dependent processing is required in Intercomm.

Each component is associated with:

- A unique one-to-eight-character terminal identifier--the name of the first component must be either the VTAM logical unit name or its corresponding Intercomm synonym; the other

components, if any, may have one-to-five-character arbitrary names.

- A dedicated output queue--scanning for output is done in a cyclical fashion; all components have equal priority for output.

- Its own device-dependent specifications, associated with the logical unit component in Intercomm tables including:

  -- Front End--CRT screen protection, restart and logging specifications, locked verb processing, CTCHAR specification.

  -- Back End--DEVICE macro for the Edit, Output and Message Mapping Utilities; STATION macro for transaction/operator security.

4.3 INPUT FROM LOGICAL UNIT TO SUBSYSTEM

Input messages from logical unit components have a format similar to those input from BTAM terminals, as illustrated in Figure 10.

Single segment messages from an LU are treated as normal full messages. Chains can be accumulated into a single segment message or can be queued as individual segments. Accumulated chains are easier to use. The GETSEG service routine must be used to retrieve the second through last segments of a chain.

A component can be locked to a verb. This avoids coding the verb in the message text during a conversation or when only a single verb is associated with input from a particular component.

Components of logical units can be locked to a verb by any of the following techniques:

- Initial lock status--specified in Intercomm Front End tables; established any time the logical unit logs on

- LOCK message from any terminal (BTAM or VTAM) for this logical unit component

- LOCK message from subsystem to this component

- Entering a verb with the AUTOLOK option from this component (using the BTVERB macro AUTOLOK parameter)

Components can be unlocked with the UNLK message from a terminal or subsystem

LEN=
MSGHLEN--message length (including message header)

QPR=
MSGHQPR--if the message is single segment input from LU or accumulated chain, then MSGHLEN=X'F2' (full message). If the message is chained input queued as separate messages, MSGHLEN indicates position in chain:

X'F0' = first segment
X'F1' = middle segment
X'F3' = last segment

TID=
MSGHTID--component name

BMN=
MSGHBMN--BTAM or VTAM input sequence number depending on the SEQNO specification on the VCT. If BTAM is specified, this number is unique within the entire Intercomm system. If VTAM is specified this number is unique only for this LU and for this session, and reset when an RSLU command is issued (or internally generated).

Other fields in the message header are initialized as for BTAM terminals.

Message Text Fields:

VERB=
Intercomm verb from locked component or from original text sent by LU. Short verbs are padded to four characters with the character X. If segments of a chain are queued as separate messages, the verb appears in each message.

$=
System Separator Character

TEXT=
Text input from LU, including HDR3270 data and AID-translation as appropriate.

@=
EOB character (not sent by LU) added in Front End for uniformity with BTAM input message conventions.

Figure 10. Subsystem Input Message Format

4.4 OUTPUT TO LOGICAL UNIT FROM SUBSYSTEM

Output messages are sent to logical units via the Output Utility or the FESEND service routine as for BTAM output messages.

Output may be queued for a component at any time. If the associated logical unit is not connected, the output will remain queued. When the logical unit is connected, all queued output is sent.

The output message format is illustrated in Figure 11.

LEN=
MSGHLEN--message length (including message header).

QPR=
MSGHQPR--must be X'F2' or X'02' (only full messages can be sent by subsystems).

TID=
MSGHTID--destination component name.

USR=
MSGHUSR--all values ignored except C'P' (route this message to priority core queue).

BMN=
MSGHBMN--use the same value as the input message to subsystem.

VMI=
MSGHVMI--X'57' or X'67' unless Output Utility formatting is required.

Message Text Fields:

TEXT=
Exact text to be sent to LU. (FMH and CTCHAR data, if any, are supplied by Front End.)

@=
EOB character (optional) never sent to LU if present. Should be used for compatibility with other terminals serviced by Intercomm BTAM Front End, all of which require EOB.

Figure 11. Subsystem Output Message Format

Chaining of output messages is completely specified in the Front End tables--the subsystem may queue only full messages (MSGHQPR=C'2' or X'02') to LU components. Chaining is done in the Front End for the message, either on a maximum segment size basis or by a user exit routine. The specification of the chaining option is coded in the VTAM Front End table macros.

Components may be specified with CRT screen protection. Each output message must be preceded by an input message for the same component. As with Intercomm BTAM terminals, the system control command RLSE may be entered by a component to permit the next output message queued to be sent. Screen protection may be used when the component represents an actual CRT device or any time one-in one-out processing is desired.

4.5 LOGICAL UNITS AND THE INTERCOMM UTILITIES

Components of programmable SNA logical units do not have any particular device type characteristics. Programming in the CAP should obviate extensive input message editing or output message formatting within Intercomm when communicating with programmable SNA terminals.

If desired, for ease of conversion of existing applications, all Intercomm utilities may be used when communicating with logical units. The program in the SNA Controller must prepare the input messages destined for The Edit Utility or Message Mapping Utilities in correct format, (Fixed, Keyword, Positional, or Relative Position). The program should expect output messages from the Output Utility or Message Mapping Utilities to represent a "page" with NL and other control characters in the message coded as specified in the Back End Device Table entry for this component.

The Message Mapping Utilities provide a device type called "string" which may be of use when MMU is used to parse input messages or to assemble output messages in external character format with conversion, justification, padding, and the like, done by MMU. MMU support of 3270-type terminals is available under Intercomm support of SNA.

4.6 LOGGING AND MESSAGE RESTART FOR LOGICAL UNITS

Input message logging (MSGHLOG=X'01') is done by Message Collection when the input message is queued for subsystem processing. If a definite response is requested by this message or chain, it is returned to the LU after logging and queuing of the final or only segment of the message. Input message logging and restart are controlled by the subsystem SYCTTBL macro when executing single region Intercomm and by the SUBSYS macro when executing Intercomm with the Multiregion Support Facility.

Output message logging is done at two times:

- When the message is queued for the Front End by FESEND (called directly by the user or by the Output Utility)--MSGHLOG=X'F2'.
- After the message is scheduled for output by VTAM--MSGHLOG=X'F3', if no-response or exception-response protocol is used. After a definite response is received, if definite-response protocol is used.

Output message recovery with no (or exception-only) responses protects the output message only when it is on the output queue. The restart process causes unscheduled output to be discarded if the originating subsystem is itself restarted. (See the Operating Reference Manual and File Recovery Users Guide for a full explanation of the message restart process.)

Output message logging and restart specifications are specified at the component level in VTAM Front End tables.

4.7 CRT RELEASE PROCESSING

A subsystem may permit an output message to be immediately overwritten by a subsequent message, without requiring any intervening response from the operator. Under VTAM, this is accomplished using a FESEND option (rather than a subsystem generated RLSE system command or FECMRLSE.

The output message for which overwriting is to be permitted must be queued by a FESEND call from the application program. The first byte of the third FESEND parameter is set to indicate that the subsequent output message is to be released as follows:

Value	Specification
blank or X'00'	Do not release next output message (default)
C'R'	Release next output message

Figure 12. Using the FESEND Option with an Output Message

For half-duplex flip-flop protocol, a Change Direction indicator (CD) is not sent when the message using the FESEND release option is transmitted to the logical unit.

A RLSE command from a subsystem, or a FECMRLSE, will be processed by the VTAM Front End, but will not guarantee immediate transmission of the next message to be queued, particularly when half-duplex flip-flop protocol is being used and a Change Direction indicator (CD) has already been sent after transmitting the previous output message.

4.8 DDQ and FDBK FRONT END CONTROL MESSAGES

The VTAM Front End supports these FECMs in a manner similar to the BTAM Front End. No special subsystem coding is required to send FECMs to a LU component.

4.8.1 DDQ FECMs

A subsystem may queue a group of related output messages to the same component by using a DDQ FECM. The messages are placed on a semipermanent or permanent DDQ and passed to the Front End using a DDQ FECM. Each message on the DDQ is sent to the LU as a full message. FESEND release and response options are specified when the FECM itself is queued to the Front End. The FESEND options and SYCTTBL macro SRESP option apply to the last message on the DDQ only. All preceding messages are processed with the default and SYCTTBL macro SRESP options. When Intercomm retransmits messages from a DDQ due to an exception response or abnormal session termination while transmitting a DDQ, it restarts transmission from the first message on the DDQ.

This implementation allows programs to request fewer definite responses while still maintaining full message recovery. To utilize this facility, the VTLSB macro SRESP parameter for the LU must request responses. Either the SYCTTBL macro SRESP or the FESEND option is used to request a definite response for the last message of a group of messages on the DDQ.

4.8.2 FDBK FECMs

A subsystem may queue a FDBK FECM to any component of a logical unit. When the FECM is dequeued, a feedback message will be sent to the specified subsystem with the specified text. The FDBK FECM is then discarded and the next output message for that component, if any, is sent.

Chapter 5

INTERCOMM SYSTEM PROGRAMMING CONSIDERATIONS

Responsibilities of system programmers installing and maintaining SNA terminals with Intercomm are:

- Configuring the SNA Controller (for programmable SNA terminals only)
- Generating NCP/VS, describing the network in NCP tables
- Defining the network and applications (specifically Intercomm) to VTAM
- Installing and maintaining the Intercomm VTAM Front End

The first three items are documented in the appropriate IBM reference manuals. VTAM specifications peculiar to Intercomm are given in Section 5.1. Installing and maintaining the VTAM Front End is the main subject of this chapter.

5.1 VTAM DEFINITION REQUIREMENTS FOR INTERCOMM

Logical units are defined with the LU statement. If the logical unit is to be accessible to Intercomm, it must be assigned a 1-5 character name, either directly or via an entry in a table of synonyms generated using the VTIDTAB macro. (See Appendix B.)

Intercomm is defined to VTAM as a single application with the APPL statement. The name and password must match those specified (or defaulted) by the VCT macro, described in Chapter 5.3. The default application name is "INTERCOM" with no password. If Intercomm is to acquire logical units, acquisition must be authorized on the APPL statement.

There are no other special VTAM table coding requirements for logical units or the Intercomm application.

5.2 INSTALLATION AND MAINTENANCE OF VTAM FRONT END

The following are step-by-step procedures for installing the VTAM Front End, adding a new logical unit, and changing VTAM releases.

5.2.1 Initial Installation

To install the VTAM Front End for the first time:

1. Configure the SNA Controller, NCP and VTAM region tables.

2. Ensure &VTAM is set to 1 in Intercomm COPY member SETGLOBE. Set off &BTAM (to 0) if no BTAM Front End in use.

3. Assemble and linkedit the following Intercomm shared VTAM/BTAM support modules:

   OUT3270 FEMSG FECMD PMIEXTRM CLOSDWN3
   BLHSTRC TALLY

4. Assemble and linkedit the following Intercomm VTAM support modules to include the latest versions of VTAM macros and DSECTS:

VTERRMOD	VTRECVE	VTSTART	VTAMSTAT
VTEXITS	VTSEND	VTTRACEV	VTAUTOUP
VTLUCMD	VTSQRSYN	VTVREERR	VT01MOD
VTLUSCAN	VTCDM1	VTCDM2	
VTRESP	VTQMOD	VTLUDM2	

5. Code and assemble VTAM Front End tables (see Section 5.3).

6. Code and assemble Station and Device Table entries for logical unit components as required (see Section 5.4).

7. Design and code any desired user exits (see Section 5.5).

8. Generate the Intercomm linkedit deck with the ICOMLINK macro. Specify types of logical units to be used as values of the VTAM parameter. For example, code VTAM=(3600,3790I) on the ICOMLINK macro to include support for the 3600 terminal and for 3790 Inquiry sessions. VT01MOD will be automatically included if &BTAM is set to 0 in SETGLOBE.

9. Linkedit Intercomm.

10. Allocate and format VTAM disk queue dataset(s), if any.

Sample Job Control Language to assemble and linkedit an Intercomm module is:

```
//          EXEC ASMPCL,Q=LIB,NAME=membername,LMOD=membername
//ASM.SYSIN DD   DSN=INT.SYMREL(membername),DISP=SHR
```

ASMPCL is an Intercomm-supplied procedure (See Operating Reference Manual).

5.2.2 Adding A New Logical Unit

To add a new logical unit to an existing VTAM Front End installation:

1. Configure SNA controller, NCP, and VTAM region tables.
2. Add necessary entries to VTAM Front End tables and assemble.
3. Add necessary entries to Station and Device tables and assemble.
5. Design and code any new user exits.
5. Regenerate linkedit if the logical unit is a new type of terminal.
6. Linkedit Intercomm.
7. If a new disk queue data set is needed it must be allocated and formatted.

5.2.3 Changing VTAM Releases

If a new VTAM release is installed, the latest VTAM macros and Dsects must be included in the Front End modules and tables.

1. Assemble the VTAM support and interface modules listed under steps 3 and 4 of the initial installation procedure in Subsection 5.2.1.
2. Assemble VTAM Front End Network tables.
3. Linkedit Intercomm.

5.3 CODING FRONT END TABLES FOR LOGICAL UNITS

5.3.1 Summary of Table Requirements

There are four tables affected by use of the VTAM Front End to communicate with logical units:

1. Verb Table (BTVRBTB CSECT)
2. BTAM Network Configuration Table
3. VTAM Logical Unit Table
4. VTAM Terminal Identifiers Synonym Table

The Verb Table defines all transaction codes accepted by the system. The following verbs must be added to the table to define VTAM Front End system control commands: VTCN, STLU, SPLU, RSLU, VTST. These commands are described in System Control Commands.

The BTAM Network Configuration Table describes the BTAM terminal network serviced by Intercomm. Installations using the VTAM Front End may use the BTAM Front End to service the control terminal, or may use a logical unit. Typically, a mix of terminals supported by the BTAM Front End as well as VTAM components will be in use. (The BTAM Front End is used to support start/stop and binary synchronous terminals and terminals accessed by BTAM, Graphics Access Method or the Generalized Front End Facility.)

The VTAM Logical Unit Table (LUT) defines VTAM Front End operating parameters and defines all logical units (LU) that may be connected to Intercomm. LU definitions describe the type and processing characteristics of the LU and the names, processing characteristics and output queues of the LU components. The output queue specifications are coded with other component specifications in the LUT rather than in a separate table as is done for BTAM terminals.

The VTAM Terminal Identifiers Synonym Table defines one-to-five-character Intercomm terminal IDs and their one-to-eight-character VTAM equivalents, thus allowing Intercomm to recognize the longer VTAM names, making recoding unnecessary.

When the Front End tables are assembled, the BTAM and VTAM terminal tables must be assembled together to generate a combined BTAM/VTAM terminal name index for the Intercomm binary search routine. The Verb Table, often assembled with the BTAM and VTAM tables, should be assembled separately as member BTVRBTB. If the Verb Table is assembled separately, the BTAM and VTAM tables can be assembled in an arbitrarily named control section and included in the Intercomm linkedit under the assigned load module name (see ICOMLINK macro). The Intercomm macros generate required entry names.

The VTAM Terminal Identifiers Synonym Table is generated via a series of VTIDTAB macros, which may be part of the Network Table module or may be in a separate module. If the VTIDTAB macros are coded in a separate module called VTIDTABL, it will be automatically included in the Intercomm linkedit.

5.3.2 VTAM Logical Unit Table Coding

The VTAM Logical Unit Table is coded using the macros VCT, LUNIT, LCOMP, VTLSB, VTCSB and VTLVB. A schematic representation of the use and order of coding of the macros is provided by Figure 14. Following are short summaries of each macro; detailed macro parameter descriptions are located in Appendix B.

Order of Coding of Macro Instructions	Description of Macro
VCT	Define VTAM Control Table. Contains VTAM Front End Operating parameters.
LUNIT LUNIT . . .	Define Logical Units. One LUNIT macro for each LU. Each LUNIT macro points to a VTLSB macro giving LU operating parameters.
LCOMP LCOMP	One or more LCOMP macros per LUNIT. Each LCOMP macro describes one or more components. The LCOMP macro can be generated by the LUNIT macro if all components have the same parameters. If all components do not have the same specification, individual LCOMP macros must be coded.
PMISTOP	PMISTOP must follow last LUNIT or LCOMP macro.
PCENSCT	List disk queue allocation percentages.
L1 VTLSB L2 VTLSB	Define Logical Unit Specification Block. Gives type and operating parameters of LU.
C1 VTCSB C2 VTCSB	Defines component Specification Block. Optionally coded to permit common specification of parameters for many components.
V1 VTLVB V2 VTLVB	Define LU exit routine vector. Optionally coded to define user exit routines for processing conditions related to a set of logical units.

Figure 14. Summary Descriptions and Coding Order of Logical Unit Table Generation Macros

The VCT macro is coded as the first entry of the Logical Unit Table. Parameters of the VCT macro specify VTAM Front End operating parameters, including the following:

- VTAM application name and password of Intercomm
- Number of RECEIVE OPTCD=ANY threads to be established at VTAM Front End startup and size of initial input area
- Network shutdown time limit
- Label of VTLVB macro specifying list of user exits to be called for logical units that do not specify their own VTLVB macro

The default values for many of the parameters should be acceptable to most users. The RECEIVE OPTCD=ANY input area size may need to be changed to optimize RECEIVE processing for the user's typical input.

LUNIT and LCOMP macros define logical units and logical unit components to Intercomm. One LUNIT macro must be coded for every logical unit that may connect to Intercomm. The components of the logical unit are defined with LCOMP macros.

The LUNIT macro parameters include the label of a VTLSB macro describing the logical unit. To simplify coding when all components of a logical unit have the same specification, the LUNIT macro may be coded with LCOMP macro parameters so that the LCOMP macros can be generated by the LUNIT macro.

The LCOMP macro, coded explicitly or generated by LUNIT, defines the name and operating characteristics of one or more components. The name of the first component is also the logical unit name. The operating characteristics include: CRT screen protection option, logging and restart options, locked verb at logon option, and the output queue specification.

Figure 15 gives examples of LUNIT and LCOMP coding. A PMISTOP macro, followed by a PCENSCT macro (if disk queues used), must be coded after the last LUNIT or LCOMP macro.

Note: if more than 1000 LUNIT and LCOMP (and BTERM) macros are defined, the global table (FEMACGBL) used for sorting the terminal-ids (to generate the Front End Terminal Index—FEINDEX) must have the global values increased to the appropriate number (released as 1000) required for assembly of the Front End Network Table and the Back End Station Table. This may require use of Assembler H or a very large assembly region to prevent overflow of the Global Symbol Dictionary.

LU Consists of	Coding
one component	LUNIT LSB=L1,NAME=LU001,NUMCL=1,...
two components with same specification	LUNIT LSB=L1,NAME=(LU001,LU002),CRT=YES,...
two components with different specifications	LUNIT LSB=L1 LCOMP NAME=LU001,CRT=YES,... LCOMP NAME=LU002,CRT=NO,...
three components, two with same specification	LUNIT LSB=L1 LCOMP NAME=LU001,CRT=YES,... LCOMP NAME=(LU002,LU003),CRT=NO,...

Figure 15. Coding of LUNIT and LCOMP macros

The VTLSB macro specifies the logical unit type and processing options to be used during the session. Each LUNIT macro must point to a VTLSB macro; one VTLSB macro can be referenced by several LUNIT macros. The processing options that may be specified include:

- Output chain segmentation options
- Whether or not FMH is to be inserted in output message
- Size of buffer to be allocated in output processor (VTSEND) save area for storage request optimization
- Whether or not input chains are to be accumulated into a single message
- Logical unit shutdown time limit
- Label of VTLVB macro specifying list of user exits, overrides VTLVB referenced by VCT macro, if any

The logical unit type implies defaults for all processing options. The user can override these defaults. The output buffer size is an optimization parameter that depends upon typical output message size.

The VTCSB macro describes component processing options. Its use is optional. All user-specifiable VTCSB parameters may also be coded on the LCOMP macro. When an LCOMP macro points to a VTCSB macro, the processing options are determined by using the option coded or defaulted on the VTCSB only when that option is not explicitly coded on the LCOMP macro. A VTCSB macro can be used to specify a set of common processing options used by many components without repeating the options on each LCOMP macro. If the user does not code any VTCSB macro for an LCOMP macro, a default VTCSB macro, generated by the VTLSB macro, is used.

For example, the following coding sequence

```
     LUNIT     LSB=L1,NAME=LU001                                    @
               CRT=YES,LOG=NO,LOCK=VERB,NUMCL=2
     LUNIT     LSB=L1
     LCOMP     NAME=LU002,                                          @
               CRT=YES,LOG=NO,LOCK=VERB,NUMCL=2
     LCOMP     NAME=LU003,                                          @
               CRT=YES,LOG=NO,LOCK=VERB,NUMCL=4
     PMISTOP
L1   VTLSB     LUTYPE=3600
```

can be shortened using VTCSB:

```
     LUNIT     LSB=L1,NAME=LU001,CSB=C1,NUMCL=2
     LUNIT     LSB=L1
     LCOMP     NAME=LU002,CSB=C1,NUMCL=2
     LCOMP     NAME=LU003,CSB=C1,NUMCL=4
     PMISTOP
L1   VTLSB     LUTYPE=3600
       .
       .
C1   VTCSB     COMPTYP=3600,CRT=YES,LOG=NO,LOCK=VERB
```

The VTLVB macro is used to define a list of LU-related user exit routines. The label of a VTLVB macro can be coded as a parameter on the VCT and/or a VTLSB macro. The logic used to find an exit routine address is detailed in Section 5.5. Figure 16 lists a sample VTAM Front End Network Table, as provided by the member VTSAMP on SYMREL.

5.3.3 Intercomm Control Terminal

Intercomm requires that one terminal in the system be designated as the control terminal for administrative and security functions. All administrative messages routed to the control terminal and any transactions designated as "secure" (see the BTVERB SECUR parameter) will be accepted only from that terminal. Intercomm will not operate in live mode without a control terminal.

The control terminal may be any interactive component of any LU, any leased line interactive terminal accessed via the BTAM front end (a BTAM, TCAM, GFE or GRAPHICS terminal) or the CPU console. An alternate for the control terminal should be designated so that control functions may be transferred to the alternate in the event the primary becomes disabled.

The discussion below pertains to systems using the VTAM front end, with or without the BTAM front end. If the VTAM front end is not in use, refer to the BTAM Terminal Support Guide for information regarding the control terminal in those systems. Henceforth, for the purpose of this discussion, the term "VTAM terminal" should be understood to mean any interactive terminal defined to the system with a LUNIT or LCOMP macro and "BTAM terminal" is any interactive terminal defined to the system via a BTERM macro.

As was noted earlier, the control terminal may be any VTAM terminal or any BTAM terminal. (Under previous releases of Intercomm, the control terminal had to be a BTAM terminal; this is no longer the case.) If the control terminal is a VTAM terminal and there are no BTAM terminals in the system, all of the Intercomm BTAM Front End modules may be eliminated from the linkedit. This will result in a considerable savings in virtual storage space.

The alternate to the control terminal must be of the same type as the primary. That is, if the primary is a VTAM terminal, the alternate must be also. An analogous requirement also holds for BTAM primaries. This restriction holds no matter how the alternate is assigned, via the ALT parm of LUNIT, LCOMP, or BTERM macro, or dynamically via system control commands, as discussed below.

The CPU console may be defined as either a VTAM or BTAM terminal; thus, the CPU console may always be used as an alternate terminal regardless of which type of terminal the primary is. The CPU console can be defined as a VTAM terminal to Intercomm via a special LUNIT parameter as discussed below. Methods of defining the CPU console as a BTAM terminal are discussed in the BTAM Terminal Support Guide. The CPU console should not be defined as both a VTAM and a BTAM terminal in the same Intercomm.

Defining the CPU console as a VTAM terminal to Intercomm should not be taken to mean that the console will be accessed by VTAM in any way. The CPU console is defined as a VTAM terminal to Intercomm solely to allow the system to access it without requiring the BTAM Front End modules to be present. When the CPU console is defined as a VTAM terminal, the actual I/O will be done via WTORs from the module VT01MOD. The completion of CPU console support via the VTAM Front End is discussed further below.

When the control terminal is a VTAM terminal, the following changes occur in the functioning of the VTAM Front End:

- The VTAM front end is started on Intercomm startup, regardless of the coding of the VCT START parameter. If the ACB does not open, Intercomm abends.

- Intercomm will acquire the LU designated as the control terminal, regardless of the coding of the LUNIT ACQ parameter. Therefore it must be made eligible for acquiring by Intercomm.

- When a SPLU is issued for the control terminal (either by an operator, a Back End subsystem, or a VTAM Front End module) the following action is taken:

  a) an attempt is made to transfer control functions to the designated alternate.

  b) if there is no alternate or the alternate cannot be used, a WTOR message is issued to the CPU console (regardless of whether the console was defined as a control terminal) informing the operator of the condition and giving him a choice of three actions: to ignore the SPLU, to ABEND Intercomm, or to assign an alternate control terminal dynamically via the reply. This message is described fully in Messages and Codes (see message VT030R). The alternate assigned must be a VTAM terminal.

- When the primary control terminal goes down and control functions switch to the alternate, the primary control terminal becomes the alternate control terminal. This means that if the alternate subsequently goes down, Intercomm will try to designate the original primary as the control terminal. If this cannot be done, the WTOR message described above is issued.

- If VTAM goes down or a VTCN command is entered to shut down the VTAM Front End, the following action will be taken:

  a) If the primary or alternate control terminal is the CPU console, Intercomm will shift control functions to it and continue processing.

b) If both primary and secondary control terminals are owned by VTAM, a WTOR is issued to request the CPU console operator to advise on a course of action: to ABEND, to WAIT, to CLOSE or IGNORE. If WAIT is chosen, the system will issue a second WTOR and then go into the WAIT state, waiting for a reply. By replying to the second WTOR, the operator can request Intercomm to try to restart the VTAM Front End or ABEND. If a restart is requested, a VTCN$START command is issued internally. Thus, WAIT may be chosen if, for example, VTAM goes down but is expected to be restarted shortly.

If CLOSE is chosen, a NRCD message is constructed and queued for back end processing. In this way, an orderly closedown can be effected for Intercomm in the event of a VTAM failure. If IGNORE is chosen, the VTCN command is not processed. If the VTCN was entered from a terminal, the requesting terminal and the control terminal are notified that the request was ignored. The source of a VTCN$SHUTD or VTCN$HALT will be either a terminal, the Intercomm TPEND exit, VTERRMOD, CLOSDWN3 or recursive via a previous VTCN. If the source of the VTCN is CLOSDWN3 or VTCN, the command is processed without notification. If the source is the TPEND exit or VTERRMOD, it is probable that a major error has occurred, the nature of which will be indicated by WTOs emanating from error handling modules. It is not recommended to ignore a VTCN$SHUTD or HALT when a VTAM error has occurred.

5.3.3.1 Defining the Control Terminal

To define a VTAM terminal as the primary Intercomm control terminal, code CNTRL=YES on the LCOMP macro defining the component chosen. Optionally, this may be coded on the LUNIT macro if there is only one component on the LUNIT. (See the next section "Using the CPU Console as the Control Terminal" if the CPU console is to be used as the primary or alternate control terminal.)

The control terminal name must be defined to the Back End, whether the terminal is a VTAM terminal or not, as follows:

- Update the global &CNTL in the member SETENV to the control terminal name; the default is CNT01.
- Code the SPALIST CCNID parameter and reassemble INTSPA; the default is CNT01.

To specify an alternate control terminal, code the ALT parameter for the primary control terminal. The alternate may also have the ALT parameter coded, but this does not cause the control terminal function to be transferred to the orginal alternate's alternate if both the primary and alternate control terminal go down; rather, once the primary goes down and control is shifted to the alternate, Intercomm will attempt to use the orginal primary if the alternate goes down. The alternate of the alternate control terminal is only used for non-control terminal functions, that is, when the alternate is not in use as the control terminal.

If the control terminal is a VTAM terminal and no BTAM terminals are in use in the system, the BTAM Front End modules may be excluded entirely from the linkedit. The modules that should be excluded are: BLHIN, BLHOT, BMH000, BTAMLINE, BSTAT2, BLHTRACE, BTAMSCTS, CNT01MOD, PMIBTSTR, BTSEARCH, BTVERIFY, QUEUEMOD, and TPUMSG as well as all optional modules.

5.3.3.2 Using the CPU Console as the Control Terminal

The CPU console may be defined as a primary or alternate control terminal and accessed by either the BTAM or VTAM front end. The method of defining the CPU console for access by the BTAM Front End is discussed in the BTAM Terminal Support Guide. The method of doing so for the VTAM Front End is discussed below.

To cause the CPU console to be accessed via the VTAM front end, define it to Intercomm as a logical unit with one component. The CPU console should not be defined as a component of a logical unit with other components nor should it be named as an alternate to any terminal but a primary control terminal. The CPU console should not have an alternate unless it is the primary control terminal. Finally, the CPU console should be defined only once on either a LUNIT or BTERM, but not both.

To define and use the CPU console as the primary or alternate control terminal, the following steps should be taken.

1) Code a LUNIT macro as follows:

```
(blank)   LUNIT NAME=  (five-character name)
                LSB=   (label of VTLSB macro coded as
                       discussed below)
                CNTRL= {YES} if primary control term
                       {NO } if the alternate
                ALT=   (five-character name) code this
                       parameter only if this is the
                       primary control terminal
```

The following parameters may be coded and will be processed by the system (see LUNIT macro description for details):

DFLN, LOG, LSYNCH, NUMCL, PCEN, PRYMSGS, RESTART, RLSERSP

The following parameters should not be coded for the CPU console. If coded, they may cause errors or be ignored:

LCUNO, AIDGRP, CONV, CRT, CSB, LOCK, MRPASSW, UPINTV,ACQ

2) Code a VTLSB macro, as follows:

```
(name)  VTLSB     LUTYPE=SYSCON
```

The TRSTBL parameter must be coded if optional backspacing is desired. (See note below). Translation from lower case to upper case will be effected regardless of whether this parameter is coded.

All other VTLSB parameters are meaningless for the CPU console and should not be coded. If coded they may cause errors.

3) Include the module VT01MOD in the Intercomm linkedit. Do not include CNT01MOD.

4) An optional logical backspace facility is available for use with the CPU console. It is implemented by making sure that the elected backspace character is defined to the system in the following manner:

a) Code an input translate table as follows:

```
name    DC    256AL1(*-name)    name= any valid BAL symbol
        ORG   name+C'x'         x= desired backspace char
        DC    X'BB'             cause the desired backspace
        ORG                     char to translate to X'BB'
        PMISTOP                 suppress output translation
```

Note: This translate table will translate every character to itself, except for the designated backspace character which will be translated to X'BB'. Any translate table which translates at least one input character (the designated backspace character(s)) to X'BB' can be used.

b) code the TRSTBL parameter of the VTLSB macro for the CPU console: specify the label of the translate table defined above

c) include the translate table in the module defining the Front End network and reassemble it.

5) Code STATION and DEVICE macros for the CPU console, see Section 5.4.

```
VTAM     TITLE 'VTSAMP - SAMPLE VTAM NETWORK TABLE'
VTSAMP   CSECT
*
*   DEFINE THE VTAM CONTROL TABLE
*
         VCT   SECT=CSECT,APPLID=INTERCOM,PASSWD=ICOMPASS,START=YES,  X
               SNMAX=100,RCVNO=3,RCVRSP=5,RCANYLN=200,SHUTDTL=50,     X
               MXSDTHD=50,TRACE=(ETRC,NTRC)
*
*   DEFINE THE LOGICAL UNITS AND COMPONENTS
*
*   1)   THE 3790 INQUIRY SYSTEM
*
         LUNIT NAME=LU010,LSB=LS3790I,CONV=YES,LOG=YES,RESTART=NO,    X
               DFLN=VTAMQU01,PCEN=10,NUMCL=1,MRPASSW=REGION1
*
*   2)   THE 3790 BATCH SYSTEM
*
         LUNIT NAME=LU020,LSB=LS3790B,CONV=NO,LOG=YES,                X
               RESTART=IFPOSBL,DFLN=VTAMQU02,PCEN=5,NUMCL=4,LOCK=VRB1
*
*   3)   THE 3600 BANKING SYSTEM
*
         LUNIT NAME=(LU030,LU031,LU032),ALT=(LU130,LU131,LU132),      X
               LSB=LS3600,DFLN=VTAMQU01,PCEN=5,NUMCL=3
         LUNIT NAME=(LU130,LU131,LU132),ALT=(LU030,LU031,LU032),      X
               LSB=LS3600,DFLN=VTAMQU01,PCEN=5,NUMCL=3
*
*   4)   3270 SDLC (SNA) CRTS AND PRINTER
*
         LUNIT NAME=LU040,ALT=LU041,LSB=LS3270S,CSB=CS3270SC,         X
               NUMCL=10          CRT  #1
         LUNIT NAME=LU041,ALT=LU040,LSB=LS3270S,CSB=CS3270SC,         X
               NUMCL=10          CRT  #2
         LUNIT NAME=LU042,LSB=LS3270S,CSB=CS3270SP,DFLN=VTAMQU03,     X
               PCEN=20         HARDCOPY  #1
         LUNIT NAME=LU043,LSB=LS3270SS,CSB=CS3270SP,DFLN=VTAMQU03,    X
               PCEN=20         HARDCOPY  #2 (SHARED)
*
*   5)   3270 BSC (NON-SNA) CRTS AND PRINTER
*
         LUNIT NAME=LU050,ALT=CNT01,LSB=LS3270N,CSB=CS3270NC,LCUNO=1, X
               DFLN=VTAMQU02,PCEN=5,NUMCL=2,      CRT #1              X
               CNTRL=YES  *** THIS IS PRIMARY CONTROL TERMINAL ***
         LUNIT NAME=LU051,ALT=LU050,LSB=LS3270N,CSB=CS3270NC,LCUNO=1, X
               NUMCL=10                           CRT #2
         LUNIT NAME=LU052,LSB=LS3270N,CSB=CS3270NP,LCUNO=1,           X
               DFLN=VTAMQU03,PCEN=10         HARDCOPY #1
*
*   6)   3275 BSC (NON SNA) CRT WITH PRINTER
*
         LUNIT ACQ=YES,LSB=LS3275N
         LCOMP NAME=LU053,ALT=LU050,CSB=CS3275NC,NUMCL=5 (CRT)
         LCOMP NAME=LU054,ALT=LU052,CSB=CS3275NP,DFLN=VTAMQU01,PCEN=10
*
*   7)   USER DEFINED LUNIT
*
         LUNIT NAME=(LUX01,LUX02,LUX03),LSB=LSBXXX,CSB=CSBXXX,        X
               DFLN=VTAMQUXY,PCEN=20
*
*   8)   THE SYSTEM CONSOLE (IF DEFINED HERE MUST NOT BE DEFINED IN
*                            THE BTAM FRONT END IF USED)
         LUNIT NAME=CNT01,LSB=LSBCNT01,DFLN=VTAMQUXY,PCEN=10
*
*   END OF LOGICAL UNIT AND COMPONENT DEFINITIONS
*   PMISTOP AND PCENSCT MUST FOLLOW
*
         PMISTOP
         PCENSCT
```

Figure 16. Sample VTAM Front End Network Table (Page 1 of 3)

```
*
*   DEFINE THE SPECIFICATION BLOCKS
*
*
*   1)   THE 3790 INQUIRY SYSTEM
*
LS3790I  VTLSB LUTYPE=3790I,LOGMODE=INQUIRY
*
*   2)   THE 3790 BATCH SYSTEM
*
LS3790B  VTLSB LUTYPE=3790B,LOGMODE=BATCH
*
*   3)   THE 3600 BANKING SYSTEM
*
LS3600   VTLSB LUTYPE=3600,LOGMODE=0,ULVB=ULV3600
ULV3600  VTLVB LUS=LUS3600,RCVEXCD=REX3600,SQRSYN=SQR3600,            X
               LOGON=LOG3600,SIGNAL=SIG3600    **  USER EXITS VECTOR **
*
*   4)   3270 SDLC (SNA) CRTS AND PRINTER
*
LS3270S  VTLSB LUTYPE=3270S,TRSTBL=LOWTOUP,TIMEOUT=30
LS3270SS VTLSB LUTYPE=3270S,TRSTBL=LOWTOUP,TIMEOUT=30,SRESP=(D,1),    X
               RELREQ=RELEASE,OUTQ=ACQUIRE,ULVB=SHARE     SHARED LUNIT
CS3270SC VTCSB COMPTYP=3270S,CRT=YES,AIDGRP=1,CTCHAR=F5C3114040
CS3270SP VTCSB COMPTYP=3270S,CRT=NO,CTCHAR=F54C114040
SHARE    VTLVB OTQUEUE=VTUROTX1,SNDNRM=VTURSDX1
*
*   5)   3270 BSC (NON SNA) CRTS AND PRINTER
*
LS3270N  VTLSB LUTYPE=3270N,LOGMODE=0,TRSTBL=LOWTOUP
CS3270NC VTCSB COMPTYP=3270N,CRT=YES,AIDGRP=2,CTCHAR=F5C3114040,      X
               LOCK=VRB2
CS3270NP VTCSB COMPTYP=3270N,CRT=NO,CTCHAR=F54C114040
*
*   6)   3275 BSC (NON SNA) CRT WITH PRINTER
*
LS3275N  EQU   LS3270N            ** SAME AS FOR NON-SNA 3270 **
CS3275NC EQU   CS3270NC           ** SAME AS FOR NON-SNA 3270 **
CS3275NP EQU   CS3270NP           ** SAME AS FOR NON-SNA 3270 **
*
*   7)   USER DEFINED LUNIT
*
LSBXXX   VTLSB LOGMODE=LOGXXX,ULVB=ULVXXX,SNDBUFL=512,                X
               ASRESP=(D),SRESP=(E,2),SFMHDR=YES,RFMHDR=YES,          X
               BNDAREA=BNDARXXX,SHUTD=YES,RACCHN=YES
CSBXXX   VTCSB CRT=YES,RLSERSP=NO,CTCHAR=02,LOCK=VRB3
ULVXXX   VTLVB LOGON=LOGXXX,SIGNAL=SIGXXX,LUS=LUSXXX
BNDARXXX DC    10F'0' DEFINE USER BINDAREA HERE ('ISTDBIND' DSECT)
*
*   8)   THE SYSTEM CONSOLE (IF DEFINED HERE MUST NOT BE DEFINED IN
*                            THE BTAM FRONT END IF USED)
*
LSBCNT01 VTLSB LUTYPE=SYSCON
*
*   MISCELLANEOUS TABLES TO COMPLETE DEFINITIONS
*
*
*   1)   TRANSLATION TABLES
*
LOWTOUP  EQU   *
         COPY  TRAN3270
         PMISTOP
```

Figure 16. Sample VTAM Front End Network Table (Page 2 of 3)

```
*
*   2)   AID GROUP AND AIDDATA DEFINITIONS AND TABLES
*
         AIDGRP 1,PF1=1,PF2=2,PF3=3,PF4=4,PF5=5,PF6=6,CLEAR=7,PF8=8
         AIDGRP 2,CLEAR=8,PA1=9,PA2=10,PF13=10,PF14=2,PF17=7,          X
               PF19=9,PF20=5,PF21=9,PF23=1,PF24=8
         AIDDATA 1,'E,PF1'
         AIDDATA 2,'LOCK,TPULOC01,'
         AIDDATA 3,'UNLK,TPULOC01'
         AIDDATA 4,'EE'
         AIDDATA 5,'NOVERB'
         AIDDATA 6,'G'
         AIDDATA 7,'RLSE'
         AIDDATA 8,'RLSE'
         AIDDATA 9,'LOCK,TPULOC02,EXXX'
         AIDDATA 10,'UNLK,TPULOC02'
         AIDDATA END
*
*   3)   THE VTAM - INTERCOMM SYNONYM TABLE
*
         VTIDTAB VTAMIDS=(TSOCRT01,TSOCRT02,TSOPRT01,TSOPRT02),        X
               ICOMIDS=(LU040,LU041,LU042,LU052)
         VTIDTAB VTAMIDS=(RJE0001,RJE0002),ICOMIDS=(LU010,LU020)
         VTIDTAB LAST=YES
VTSAMP   CSECT
         END
```

Figure 16. Sample VTAM Front End Network Table (Page 3 of 3)

5.4 CODING BACK END TABLES FOR LOGICAL UNITS

Station and Device table entries are required by the Output Utility, Message Mapping Utilities, and the Intercomm Security facilities.

Logical unit components are identified in the Station Table as required. A STATION macro must be coded for each component. The TERM parameter of the STATION macro is set to the component name.

One or more DEVICE macros must be coded in the Device Table for the logical unit components in the Station Table. If the Output Utility or Message Mapping Utilities are being used to format output messages to the component, the DEVICE macro parameters must be coded to reflect the message size desired. If the utilities are not being used, as is commonly the case with programmable SNA terminals, the DEVICE macro specifications are not important.

5.5 VTAM FRONT END USER EXITS

5.5.1 Purposes and Types of Exits

There is provision for several optional user-written exit routines in the VTAM Front End. The exit routines are used either to alter standard action or to notify the user of various conditions so that the user can perform installation-defined processing.

There are two types of user exits, defined and called as follows:

- General exit: not related to a specific logical unit. The name of the exit is fixed by Intercomm. The exit is called if included in the linkedit. An example is logon validation, user exit name VTUSLGNX.

- LU-related exit: related to a specific logical unit by coding of VTLVB macros in the Logical Unit Table. The exit is defined by coding a user-assigned entry name in a VTLVB macro and referencing the VTLVB macro by a VTLSB macro or the VCT macro. The exit will be called for a given logical unit if the VTLVB macro associated with the LU contains a nonzero address. Figure 17 describes the Intercomm logic for finding the address of an LU-related user exit. An example of this type of user exit is the OUTSEG exit which is called to perform user-defined segmentation of output messages.

User exits are summarized in Appendix C.

5.5.2 Coding Conventions for User Exits

When coding exit routines, consider the following:

- The routines must be reentrant if they (or a routine they call) may give up control to Intercomm dispatcher.

- Any Intercomm macro can be issued in an exit routine.

- A system control command (for example, SPLU or STLU) can be issued by creating a message containing the command and processing the command via FESEND. Control does not return to the user exit (FESEND caller) until the command is processed. This coding convention is the same as that used by subsystems issuing system control commands.

- VTAM macros can be issued only when indicated in the exit routine descriptions (see Appendix C). In general, VTAM macros altering the state of the logical unit cannot be issued in exit routines.

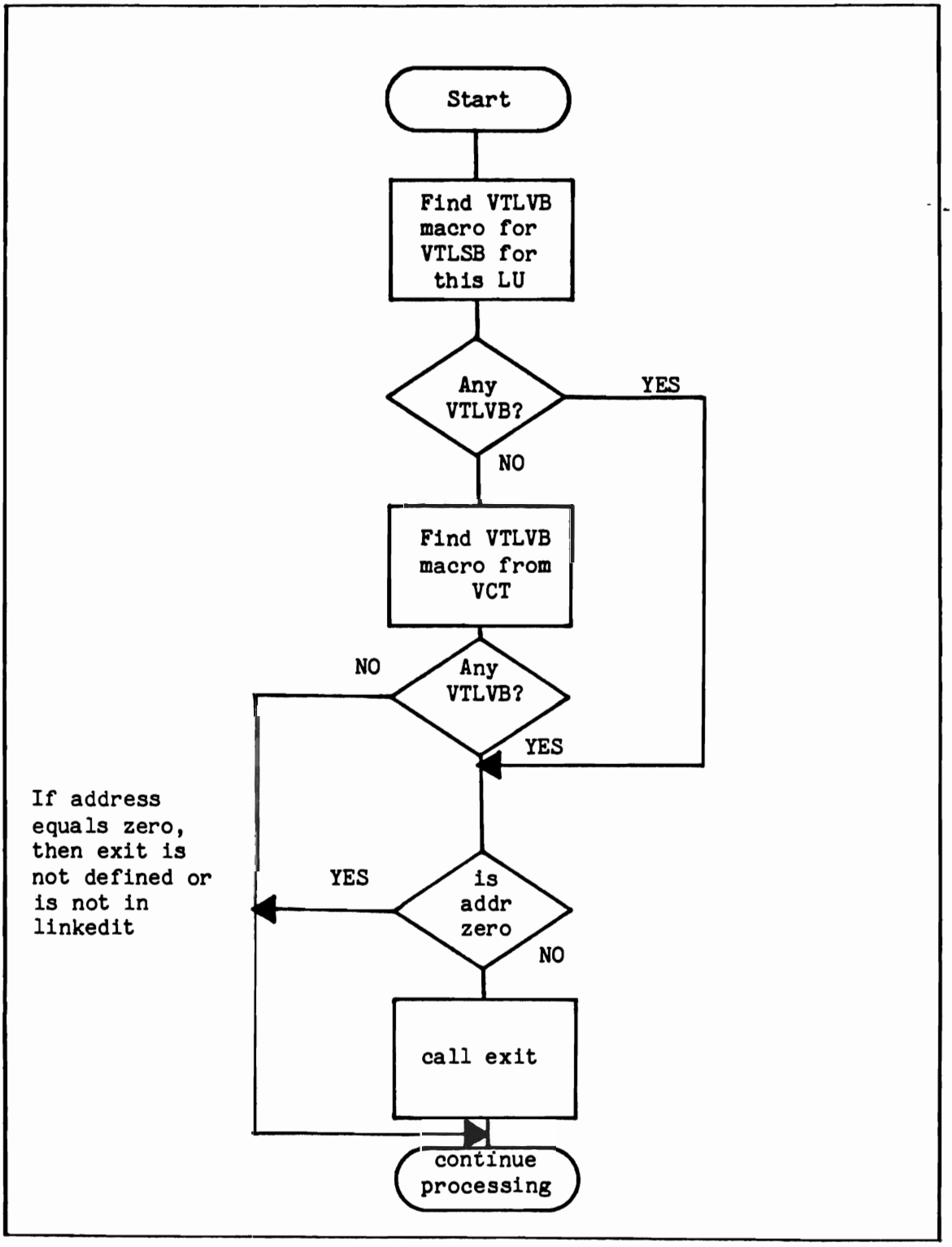


Figure 17. Finding Address of LU-Related User Exits

- The exit routines are called using standard linkage conventions for registers as follows:

Register	Contents
0	entry code for LU-related exits
1	address of parameter list
13	address of save area
14	return address
15	entry point address

The exit routine must save and restore its caller's registers.

- The parameter list may contain the addresses of one or more VTAM or Intercomm control blocks:

  — RPL--VTAM request parameter list (use VTAM macro IFGRPL for format).

  -- NIB--VTAM Node Initialization Block (use VTAM macro ISTDNIB for format).

  -- BINDAREA--VTAM session parameters area (use VTAM macro ISTDBIND for format).

  -- LUB--Intercomm Logical Unit Block--generated by LUNIT macro (use DSECT LUB within COPY code member LUDSECTS for format).

  -- Action Code Area--See field VREACTCD in DSECT IFGRPL within COPY code member VRT for format.

  -- LUC--Intercomm Logical Unit Component Block-generated by LCOMP macro (use DSECT LUC within COPY code member LUDSECTS for format).

  All control block fields are read-only, with the exception of the fullword field LUBUSER which can be used for any purpose by the user during exit routine processing. For example, LUBUSER may contain a pointer to a user-defined LU-related control block.

- All exit routines must set a return code in register 15 on exit. For exit routines that may alter Front End processing, nonstandard action is indicated by a nonzero return code and/or modification of an input parameter.

- User exits execute as subroutines of the Front End. A program check can compromise Front End integrity. If a program check does occur, it will be trapped by the Intercomm SPIEEXIT routine as usual, and that Front End thread will be purged. Recovery of the Front End thread can possibly be done by disconnecting the logical unit with the SPLU command or, if necessary, halting and restarting the VTAM Front End with the VTCN command to clear any critical flags, etc.

- A macro is available for use by user exits should it be required. The macro, VTIDCONV, is used to convert an Intercomm five-character logical unit name to the corresponding eight-character VTAM name or vice versa. The macro invokes binary search to obtain the correct entry in the VTAM/Intercomm synonym table. (See Section 5.3.1). Full details of the VTIDCONV macro are described below.

```
(symbol)     VTIDCONV     [VTAMID={(r)     }]
                          [       {address}]

                          [ICOMID={(r)     }]
                          [       {address}]

                          [,VCT={YES}]
                          [     {NO }]

                          [,NOTFND={(r)     }]
                          [        {address}]
```

ICOMID
specifies the address of the Intercomm logical unit name.

VTAMID
specifies the address of the VTAM logical unit name.

VCT
specifies whether or not addressability has been established for the VCT (base register and USING). If YES is coded then external references to the VTIDTAB and indices are taken out of the VCT via field references in the VCT DSECT. If NO is coded, then VCON literals will be used. The default is NO.

NOTFND
specifies the address to which control is to be passed should there be no synonym table, or the ID in question is not found in the table. If not coded, then control will pass to the next sequential instruction following the macro call.

NOTE: VTAMID and ICOMID are mutually exclusive parameters. One or the other must be coded. After the macro call, register 1 will contain the address of the synonym name if found.

5.5.3 Use of the OUTSEG User Exit

The OUTSEG exit is called by VTSEND to define the segments of an output message. It is called repeatedly for a message; each time it is called, the routine defines another segment of the output message. The OUTSEG exit is passed the address of the VTAM send buffer (VSB), which contains segmentation control fields. The VSB format is given in the COPY member VTBUFFER.

The segmentation control fields are:

- VSBODS--offset in bytes from label VSBTEXT to start of segment to be sent by next SEND macro.
- VSBDLS--length of segment to be sent by next SEND macro.
- VSBDLREM--number of bytes remaining to be sent at time of this call to OUTSEG.

When first called for an output message, the segmentation control fields are initialized by VTSEND as:

- VSBODS offset from VSBTEXT to beginning of message including FMH, if any.
- VSBDLS,VSBDLREM length of message.

To send the message as a single segment, the OUTSEG exit must set VSBDLREM to zero and return.

To send the message as two or more segments, the OUTSEG exit must set the VSB control fields as follows:

- First Segment: Leave VSBODS unchanged.

  Set VSBDLS to length of first segment.

  Decrement VSBDLREM by length of first segment.

- Second through last segments: Increment VSBODS by length of previous segment (VSBDLS on entry).

  Set VSBDLS to length of next segment.

  Decrement VSBDLREM by length of this segment.

VTSEND calls the OUTSEG exit until VSBDLREM becomes zero. The segmentation control fields are not changed by VTSEND. On entry to calls defining second through last segments, the fields contain the same values as set on return from the last previous call to the OUTSEG exit.

5.5.4 Intercomm Supplied User Exits for Shared LU Support

Intercomm supplies three user exits that may be used in conjunction with each other to allow the sharing of logical units between Intercomm and other VTAM applications. These user exits control the acquiring and releasing of the logical units depending on certain table specifications and the current workload.

The three supplied user exits are:

VTURLRX1 - Provided for the general user exit VTUSRLRX, to process RELREQ requests from the VTAM region. If required, an SPLU is scheduled to take place as soon as there is no further output for the logical unit.

VTUROTX1 - Provided for the LU related user exit OTQUEUE, to process the possible need to acquire the logical unit when output is queued for it. An STLU with the ACQ and Q operands is generated if required.

VTURSDX1 - Provided for the LU related user exit SNDNRM, to process pending SPLU requests initiated by the RELREQ exit, after a normal response is received for an output message.

5.5.4.1 Table Specifications to Support the Supplied User Exits

Two specifications on the Logical Unit Specification Block definition macro (VTLSB) can be used when the above user exits have been included in the system. The two specifications are RELREQ and OUTQ. The RELREQ specification indicates to the systemwide RELREQ exit (VTURLRX1), whether or not the specific logical unit should be released (an SPLU scheduled) when a RELREQ request from VTAM has been received. Code RELREQ=RELEASE, if an SPLU is to be scheduled.

The OUTQ specification indicates to the LU related OTQUEUE exit (VTUROTX1) whether or not the logical unit should be acquired (an STLU issued), if not in session already, when a message is queued for a component of the logical unit. Code OUTQ=ACQUIRE if an STLU is to be issued if needed.

A VTLVB macro must be coded containing the following specifications to support the LU related user exits: OTQUEUE=VTUROTX1,SNDNRM=VTURSDX1. This VTLVB macro may be pointed to by either the VCT or the VTLSB macros.

The three modules VTURLRX1, VTUROTX1 and VTURSDX1 described above should be included in the Intercomm linkedit. For logical units using these user exits definite responses must be requested (ASRESP and SRESP specifications of the VTLSB macro).

Chapter 6

IBM 3270 SUPPORT

6.1 LUTYPES

There are two levels of IBM 3270 support provided. The VTLSB macro, LUTYPE parameter, must indicate which level of 3270 support is required. The LU types and corresponding 3270 control units are:

LUTYPE	Support	Control Units	Line Protocols
3270N	non-SNA	3272	local
		3271	BSC & SDLC
		3275	BSC & SDLC
		3274-1B	local
		3274-1C	BSC
		3276	BSC
3270S	SNA	3274-1A	local
		3274-1C	SDLC
		3276	SDLC

6.2 COMPONENT DEFINITION

All 3270 logical units are defined as having one component (LCOMP generated via coding only the LUNIT macro) except the 3275 with printer, which is defined as having two components (two LCOMP macros coded after the LUNIT). The LCOMP or VTCSB macro CRT parameter indicates whether the component is a CRT or a printer.

6.3 INPUT MESSAGE FORMATTING SPECIFICATIONS

Input from a VTAM 3270 is processed as it is in the BTAM Front End. The AID character is translated using the AIDDATA associated with the component. The AIDGRP parameter may be coded on either the LUNIT(LCOMP) or VTCSB macro. After the AIDDATA is appended to the beginning of the 3270 input, the verb is located. If the data string begins with an SBA sequence, the SBA sequence is stripped. The verb must be found after this SBA sequence or the component must be locked to a verb.

If no response to an input message is received (Input Inhibited/system indicator not reset), the RESET (3270N) or System Request (3270S) Key may be depressed to reestablish communication for a CRT.

6.4 OUTPUT MESSAGE FORMATTING SPECIFICATIONS

Output to a VTAM 3270 is processed as for BTAM. The CTCHAR string may be coded on the VTCSB macro. If coded, and the output message does not begin with a proper write command and SBA order, the CTCHAR string is prefixed to the output message. If the output is directed to a printer component and the start print bit in the WCC is on, an EOM character is added to the end of the message (if it is not already present). If the output message MSGHVMI field is not X'67', the OUT3270 routine is called to process the message. Also, a definite response is requested if the output destination is a printer and the start print bit in the WCC is on.

6.5 BRACKETS

Both types of 3270 support require brackets. For all LUTYPE=3270N and LUTYPE=3270S CRT logical units, the entire session can be treated as a single bracket.

6.6 SNA PROTOCOLS

LUTYPE=3270S printers require a special use of brackets. Since the printer may be used locally by the control unit for copy requests, the host processor initiates a bracket to lock out local copy usage. The bracket should be ended as soon as current output is printed to allow the printer to be used for local copy again. (This type of sharing is only allowed on 3276 control units; 3274 control units lock out local copy throughout the entire session.) Intercomm starts a bracket when output is available and ends it when the output queue is empty.

LUTYPE=3270S must use half-duplex flip-flop protocol.

6.7 3270 COPY SUPPORT

6.7.1 Specifications

VTAM 3270 supports copy requests from the originating LU to another 3270 LU or a BTAM 3270 terminal. No "third-party" copy is allowed. The source may not be a BTAM 3270. The COPY command is specified as follows:

```
COPY($($)lud)@
```

where lud is the destination logical unit (or BTAM terminal), if not the logical unit originating the command. Do not use the lud parameter

to copy from the CRT to printer component of a 3275. (The second optional separator character is permitted for compatibility with the BTAM Front End, with which a three-way COPY request is permitted.) If there are no errors, the copy acknowledgement is always a reset of the input inhibited state (that is, a WRITE command with WCC-reset and no text is sent to the requesting LU). Because "third-party" copy cannot be processed, a subsystem may not generate a COPY command. Intercomm's AID processing facility may be used to equate the COPY command to a PA key via AIDGRP coding (see VTCSB macro).

6.7.2 Special Coding

To avoid the expense of a Read Full Buffer command, special processing of the 3270 control unit COPY command function can be used on the 3271, 3274-1C(BSC) and 3276(BSC) control units. Because there is no way that Intercomm can learn from VTAM whether two LUs are on the same control unit of these types, this information must be provided through Intercomm table coding. All LUs on the same 327x control unit must be assigned the same logical control unit number via the LUNIT macro, LCUNO parameter, coded with a nonzero value.

6.7.3 Copy Processing

A copy from a source LU to a destination LU is processed in one of the following ways, depending on the relationship of the LUs:

1. If both are LUTYPE=3270N and have the same LCUNO parameter, a 3270 COPY command, copying the entire buffer, is sent to the destination LU. If the user does not wish to use the COPY command (which can cause delays if the printer is busy), the LCUNO parameter can be omitted. This causes Intercomm to use a Read Full Buffer command. This facility requires that the control unit Copy feature be installed.

2. If the source LU and destination LU are two components (LCOMPS) of the same logical unit, the unit is a 3275 with printer. A WRITE command with the WCC start print bit and no text is sent to the LU to print the buffer. (The destination LU must be the printer; otherwise this command is in error.)

3. If the destination LU is given explicitly and the two cases described above do not apply, a Read Full Buffer command is sent to the source LU to obtain the buffer contents. The buffer contents are sent to the destination LU (or BTAM terminal) as a normal output message. The source LU is reset for input as soon as reading of the buffer completes.

4. If the LUTYPE of the source LU is a 3270S, a local copy can be initiated. The destination is implicit; it is not coded in the COPY command. Local copy is initiated by sending a WRITE command with the WCC start print bit on and no text to the source LU.

6.7.4 Copy Error Responses

The following error responses to an invalid COPY request are issued by VTCDM2, which processes the command.

FC060I COPY REJECTED - SYNTAX ERROR IN COPY MSG

VTAM COPY request could not be processed because the destination TID name has too many characters or is invalid (unknown).

FC061I COPY REJECTED - INVALID DESTINATION

VTAM COPY request could not be processed because destination TID is not defined as a VTAM printer on the same control unit as the source TID or the source TID is not defined as a VTAM terminal.

FC062I COPY ABORTED - INADEQUATE BUFFER SIZE

VTAM COPY request could not be processed because there was no data to copy or the buffer for the destination TID was too small for the message to be copied.

FC063I COPY ABORTED - I/O ERROR

VTAM request could not be processed because an I/O error occurred during read buffer command processing.

FC065I COPY ABORTED - DESTINATION QUEUE ERROR

VTAM COPY request could not be processed because the copied message was not successfully queued for the destination terminal through FESEND.

6.8 AID PROCESSING

3270 AID Processing is supported under SNA/VTAM at the same level it is supported under BTAM, as discussed in the BTAM Terminal Support Guide. (See also the VTCSB, BDEVICE, AIDGRP and AIDDATA macro descriptions in this manual and Basic System Macros.)

6.9 CODING BACK END TABLES FOR 3270 DEVICES

Coding of STATION, DEVICE, and DVMODIFY macro specifications for 3270 CRTs and printers in the Intercomm Back End PMISTATB and PMIDEVTB tables is described in the BTAM Terminal Support Guide. Whether the 3270 device is BSC or SDLC does not matter to Back End processing. See also Message Mapping Utilities for further considerations for defining 3270 devices.

6.10 ALTERNATE BUFFER PROCESSING

Alternate buffer support is available for 3270 logical units. The standard and alternate buffer sizes are presented to Intercomm at session initiation through the bind area. It is therefore important to code the correct parameters in the MODEENT macro in the VTAM region. Alternatively, the user may wish to code his own bind area to reflect the prime and alternate buffer (presentation) sizes. (Refer to the VTLSB macro BNDAREA parameter.)

Intercomm protects from sending messages using the Erase Write Alternate command to a 3270 logical unit that does not support alternate buffers by checking the presentation sizes given at session initiation.

To ensure that correct processing takes place within Message Mapping, and/or the Output Utility, if used, the DEVICE and DVMODIFY macros should reflect the same information as that coded in the VTAM region for the terminal.

6.11 THE IBM SYSTEM 34 WITH ICF

The IBM System 34 system using ICF and with the 3270 emulation package can be supported using the Intercomm VTAM Front End 3270S support. The following points should be noted however:

- In the VTAM region code a MODEENT macro as follows:

```
MODEENT         FMPROF=X'03',
                TSPROF=X'03',
                PRIPROT=X'A1',
                SECPROT=X'A0',
                COMPROT=X'3080',
                RUSIZES=X'8585',
                PSERVIC=X'020000000000000000000200'
```

- In the Intercomm tables, define the System 34 as LU type 3270S, and specify SRESP=(D,1) and ASRESP=D on the VTLSB macro.

6.12 Support for SCS Printers

SCS printers can be supported under LUTYPE 3270S, when using the datastream compatibility feature (DSC). A bindarea should be provided when coding the VTLSB macro for such printers, as follows:

```
BINDDSC     DS      0CL36
            DC      X'01'           FORMAT TYPE
            DC      X'03'           FM PROFILE
            DC      X'03'           TS PROFILE
            DC      X'B1'           PRIMARY PROTOCOL
            DC      X'90'           SECONDARY PROTOCOL
            DC      X'3080'         COMMON PROTOCOL
            DC      2X'00'
            DC      X'8585'         RU SIZES
            DC      2X'00'
            DC      X'03'           LU TYPE (IMPLIES DSC)
            DC      5X'00'
            DC      X'00'           'BUFFER SIZE'
            DC      X'0000'         ALTERNATE ROW/COL
            DC      X'00'           BASE LU
            DC      13X'00'
```

In the above list, it is assumed that 'BUFFER SIZE' and ALTERNATE ROW/COL are passed from the VTAM region at LOGON time.

6.13 RLSE Command Processing

Entering a RLSE command from a 3270 CRT will result in receipt of the next queued message as for the BTAM Front End. Special considerations apply for Back End (subsystem) release requests as described in Section 4.7 (due to use of half-duplex flip-flop protocol).

Chapter 7

EXECUTION AND OPERATION OF THE VTAM FRONT END

7.1 JCL REQUIREMENTS

The only OS/VS Job Control Language statements required for operation of the VTAM Front End are the DD statement(s) for the VTAM disk queue data set(s). They are coded as for other disk queue data sets. Before use, the data sets must be formatted with the CREATEGF off-line utility. (For documentation on disk queue data sets and CREATEGF, see the BTAM Terminal Support Guide and Operating Reference Manual.)

7.2 VTAM FRONT END CONTROL

This section describes startup and closedown of the VTAM Front End. The use of the VTCN command is outlined. The VTCN command is also described in System Control Commands.

During Intercomm startup, the VTAM Front End is activated if either START=YES is coded on the VCT or the Control Terminal is a VTAM logical unit. If it cannot complete initialization processing (because, for example, the VTAM region is not active) Intercomm will abend or continue depending on whether or not the Control Terminal is a VTAM logical unit. If it is a VTAM logical unit then Intercomm will abend. If it is not, then an error message is issued and Intercomm startup completes without the VTAM Front End. BTAM/GFE terminals will be usable if defined. Later, the Intercomm VTAM Front End startup can be reattempted by entering the system control command

VTCN$START@

where $ represents the system separator character and @ the EOB character. The command can be entered from a BTAM/GFE terminal or the CPU console. If the VTAM startup is successful this time, the VTAM logical units may now be connected to Intercomm.

If START=NO is coded on the VCT and the Control Terminal is not a VTAM logical unit, then initiation of the Intercomm VTAM Front End is not attempted until entry of the VTCN system control command just described. Please refer to section 5.3.3 for further discussions on the use of a VTAM Control Terminal.

An orderly closedown of the VTAM Front End is performed when one of the following occurs:

- Intercomm normal closedown is initiated by the NRCD system control command.
- An orderly closedown of the entire VTAM network is initiated by the VTAM network operator (via a VTAM HALT command entered from the system console).

- The Intercomm system control command

  VTCN$SHUTD@

  is entered from a BTAM or VTAM terminal.

During an orderly closedown of the VTAM Front End, an orderly closedown of each connected logical unit is done. When the last logical unit is disconnected, the ACB is closed, completing the shutdown. Optionally, a time limit for the entire closedown may be specified. If the time limit is exceeded, the remaining logical units are disconnected immediately and the ACB closed.

A quick closedown or halt of the VTAM Front End is performed under one of the following conditions.

- Intercomm immediate closedown is started by the IMCD system control command.
- A quick closedown of the entire VTAM network is started by the VTAM network operator (via a VTAM HALT QUICK command entered from the system console).
- The Intercomm system control command

  VTCN$HALT@

  is entered from a BTAM or VTAM terminal.

During a halt of the VTAM Front End, all connected logical units are disconnected (via CLSDST requests issued in parallel) and then the ACB is closed.

If VTAM abnormally terminates, Intercomm is notified. It does an abbreviated form of halt processing. Control block fields are cleared and the ACB is closed.

To restart the VTAM Front End while Intercomm is executing, enter

VTCN$START@

from a BTAM terminal.

7.3 LOGICAL UNIT CONTROL

This section describes use of Intercomm SPLU, STLU and RSLU commands. The interaction of the VTAM VARY command and Intercomm is described. SPLU, STLU and RSLU are also described in the System Control Commands.

The orderly closedown or the immediate disconnection (HALT) of a logical unit may be specified by the SPLU system control command. A logical unit may be acquired by Intercomm with the STLU command.

To assist in logical unit control, there is an activation status associated with a logical unit maintained in Intercomm tables. When a logical unit is deactivated to Intercomm via an optional parameter on the SPLU command, its attempt to connect to Intercomm is rejected. Subsequently, the logical unit can be activated to Intercomm via the STLU command to allow connection to Intercomm. This activation status is unrelated to the VTAM node activity status set by the VTAM VARY command. Intercomm activation status provides a mechanism for locking out logical units from Intercomm while they still remain active to VTAM.

The SPLU commands are coded as follows:

```
SPLU$TPUccccc$SHUTD@

SPLU$TPUccccc$HALT@
```

to close down or halt a logical unit, respectively, where ccccc is any component of the logical unit. To deactivate the logical unit to Intercomm, enter either of the following to close down and deactivate or halt and deactivate the logical unit, respectively:

```
SPLU$TPUccccc$SHUTD$DEACT@

SPLU$TPUccccc$HALT$DEACT@
```

A time limit may be specified for the orderly closedown of a logical unit. If the time limit is exceeded, the logical unit is disconnected immediately.

To close down the logical unit (component) from which the command is entered (effecting a VTAM 'logoff'), the command can be entered without parameters as follows:

```
SPLU@
```

To activate a deactivated logical unit, enter:

```
STLU$TPUccccc@
```

If the logical unit was acquired by Intercomm originally, then STLU will cause it to be acquired again. To activate and acquire any logical unit, use the command:

```
STLU$TPUccccc$ACQ@
```

This form of STLU will fail if the LU is not immediately available. To create a pending acquisition, and to cause the RELREQ exit of the current owner to be invoked, use the following form:

```
STLU$TPUccccc$ACQ,Q@
```

(The logical unit must be programmed to process acquisition, otherwise this command hangs. See below for corrective action.)

The following command may be entered at any time to initiate a VTAM sequence number resynchronization:

RSLU$TPUccccc@

This command might be used during debugging of the SNA controller application program when the logical unit is hung for some reason (for example, due to a program error, it is awaiting an unrequested response).

The VTAM network operator VARY command also controls logical units. To set a logical unit node inactive immediately to VTAM, enter the VTAM command:

VARY NET,INACT,I,ID=xxxxxxxx

where xxxxxxxx is the logical unit name. This command causes Intercomm to disconnect the logical unit in a manner similar to the SPLU command with the HALT option.

If the logical unit does not or cannot respond properly during the disconnection protocol, it may hang. To complete the disconnection of the logical unit from Intercomm for this or other protocol errors, use the VTAM force inactive command:

VARY NET,INACT,F,ID=xxxxx

This completes the disconnection of the LU from Intercomm without further SNA command exchange between the logical unit and Intercomm or VTAM. The SNA controller program must be reinitialized after this command.

7.4 3270 COPY FACILITY

See Chapter 6 for a detailed description of the COPY command for 3270 terminals under VTAM.

7.5. Status Commands for VTAM Terminals

As described in System Control Commands, the VTST system control command may be used to display status and other information for one or more VTAM logical units (and components). The TALY$FE command may be used to display the status of all BTAM and VTAM terminals. In a multiregion environment with RAP implemented, the MRS COMM command may be used to display the status of terminals locked to a particular region.

Appendix A

A SAMPLE 3601 APPLICATION PROGRAM

The following excerpts from a 3601 application program for a point-of-sale credit card authorization show communication with Intercomm using the 3600 communication macros.

The program starts a session on the first write to Intercomm and waits for a reply. The session remains active until shut down by Intercomm.

```
LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                ASM 0200 11.42 09/08/76

                                 454 * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * 00364000
                                 455 *                                                                       * 00365000
                                 456 *          C O M M U N I C A T I O N     M A C R O S                    * 00366000
                                 457 *       D E F I N E   C O N S T A N T S   A N D   W O R K   A R E A S   * 00367000
                                 458 *                                                                       * 00368000
                                 459 * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * 00369000

                                 460          DEFLINK                                                        X00372000
                                                   OUT=SEG4,          DATA SEGMENT TO BE SENT TO CPU        X00373000
                                                   IN=SEG4,           DATA SEGMENT TO RECEIVE MSG           X00374000
                                                   WKSEG=SEG5,        COMMUNICATION MACROS WORK SEG         X00375000
                                                   LKREG=R9,          COMM MACRO LINKAGE REGISTER           X00376000
                                                   WKREG=R10,         COMM MACRO WORK REGISTER              X00377000
                                                   DREG=R11           COMM MACRO TRACE REGISTER              00378000
                                 461+*************************************************************************  24200000
                                 462+*                                                                       * 24400000
                                 463+**         EQUATES REQUIRED FOR TELECOMMUNICATIONS MACROS               * 24600000
                                 464+*                                                                       * 24800000
                                 465+*************************************************************************  25000000

                                 466+**         INPUT PARAMETERS AND DEFAULTS                                25400000

                  00289  467+BUBEOUT  EQUATE 4
                  00289  468+BUBEIN   EQUATE 4
                  00289  469+BUBELK   EQUATE 9
                  00289  470+BUBEWK   EQUATE 10
                  00289  471+BUBDREG  EQUATE 11
                  00289  472+BUBESEG  EQUATE 5
                  00289  473+BUBEDSP  EQUATE 0

                                 474+**         CONTROL FIELD FLAGS                                          28200000

                  00100  475+BUBEFME  EQU   X'0100'   FME REQUEST                                           28600000
                  00200  476+BUBERRN  EQU   X'0200'   RRN REQUEST                                           29000000
                  00400  477+BUBEEXC  EQU   X'0400'   EXCEPTION REQUEST                                     29000000
                  04000  478+BUBECD   EQU   X'4000'   CHANGE DIRECTION                                      29200000
                  02000  479+BUBEBB   EQU   X'2000'   BEGIN BRACKET                                         29400000
                  01000  480+BUBEEB   EQU   X'1000'   END BRACKET                                           29600000
                  00010  481+BUBEEB1  EQU   X'10'     END BRACKET (ONE BYTE)                               29800000

                                 482+**         LINK STATUS FLAGS                                            30200000
```

```
LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                ASM 0200 11.42 09/08/76
                                 1592 * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * 01303000
                                 1593 *                                                                         * 01304000
                                 1594 *        P O S   H O S T   C O M M U N I C A T I O N S   R T N          * 01305000
                                 1595 *                                                                         * 01306000
                                 1596 * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * 01307000

                          00E10  1597 CPUWRITE EQUATE  *                                                        01310000
000E10 181A0000                  1598         SETFPL  SEG1,0,0          RESET TO SRART OF SMS FOR I/O        01311000
000E14 232E01001089              1599         CCFXD   SMG2CPUS,INITSTAT IS WORK STATION READY FOR OPEN       01312000
000E1A A1000E48                  1600         BRAN    EQ,INITSESS       YES - TRY TO ESTABLISH SESSION       01313000
000E1F 232E0100108B              1601 SESESTCK CCFXD  SMG2CPUS,SESSESTB IS A SESSION ESTB WITH HOST          01314000
000E24 A6001432                  1602         BRAN    NE,OFFLINE        NO - DO OFFLINE PROCESSING           01315000
                                 1603         LSEND                                                         X01316000
                                              RESP=NO,                  NO RESPONSE REQUESTED                X01317000
                                              DATA=NORM,                MESSAGE TYPE EQ DATA ONLY            X01318000
                                              BRCKT=NORM                NO BRACKET PROTOCOL                   01319000
000E28 250510160000              1604+        INORI   BUBPAR1,AL1(0+0+0+0+0)
000E2E BF901714                  1605+        BRANL   BUB0003,BUBELK
000E32 C201                      1606         JUMP    ST,WRTERROR       ERROR ON WRITE TO CPU                01320000
                          00E34  1607 WRTERROR EQUATE  *                 LET MESSAGE TIME OUT                 01321000
000E34 BF801548                  1608         BRANL   COMMEXIT,R8       WRITE OK - NORMAL EXIT               01322000
```

```
   LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                ASM 0200 11.42 09/09/76

                                    1610 * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * 01325000
                                    1611 *                                                                         * 01326000
                                    1612 *          C O M M U N I C A T I O N     M A C R O S                  * 01327000
                                    1613 *        I N I T I A T E   A   S E S S I O N   W I T H   H O S T        * 01328000
                                    1614 *                                                                         * 01329000
                                    1615 * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * 01330000

                             00E38  1616 POSTRTUP EQUATE  *                    POS START UP ENTRY OPEN SESSION 01332000
000E38 212E01001092                 1617          MVFXD   SMG2CPUS,STRTOPEN   SET CPU STATUS TO START UP REQT 01332200
000E3E CF04                         1618          JUMP    SESSIO             DO OPEN SESSION FOR LOGICAL UNT 01332300
                             00E40  1619 ADVICER  EQUATE  *                    ADVICE HANDLER OPEN SESSION     01332500
000E40 212E01001093                 1620          MVFXD   SMG2CPUS,ADVCOPEN  SET CPU STATUS TO START UP REQT 01332600
000E46 CF06                         1621          JUMP    SESSIO             DO OPEN SESSION FOR LOGICAL UNT 01332700
                             00E48  1622 INITSESS EQUATE  *                                                    01333000
000E48 212E0100108A                 1623          MVFXD   SMG2CPUS,TRYESTCM  SET STATUS TO TRY AND INIT SESS. 01334000
000E4E 0B05204E                     1624          STFLD   R0,SEG5,78,2       SAVE OFFSET TO BUFFER FOR TGU   01334500
                             00E52  1625 SESSIO   EQUATE  *                    DO THE I/O NEEDED TO OPEN SESSN 01334700
                                    1626          OPENSESS                                                    X01335000
                                                        SESSID=RESOURID,      RESOURCE ID LOCATION            X01336000
                                                        TYPE=LU               INITIATE SESSION BY WS TO CPU   01337000
000E52 250510160100                 1627+         INORI BUBPAR1,AL1(BUBFLG1+0)
000E58 215E08017094                 1628+         MVFXD BUBPAR2,RESOURID
                             00E5E  1629+BUB05381 EQUATE 8
000E5E 181F0008                     1630+         SETFPL BUBESMS,BUB05381
000E62 BF9015CE                     1631+         BRANL BUB0001,BUBELK
000E66 BF801548                     1632          BRANL   COMMEXIT,R8        EXIT                            01338000

                             00E6A  1633 ESTBSESS EQUATE  *                    BUBUSE INDICATES SESSION ESTB.  01343000
000E6A 232E01001092                 1634          CCFXD   SMG2CPUS,STRTOPEN   WAS SESSION ESTB FOR POS STRTUP 01343200
000E70 C116                         1635          JUMP    EQ,SESSRTOK        YES                             01343400
000E72 232E01001093                 1636          CCFXD   SMG2CPUS,ADVCOPEN  WAS SESSION ESTB FOR ADV STRTUP 01343600
000E78 C117                         1637          JUMP    EQ,ADVOPNUP        YES                             01343800
000E7A 232E0100108A                 1638          CCFXD   SMG2CPUS,TRYESTCM  WAS THIS AFTER A OPENSESS        01344000
000E80 C60A                         1639          JUMP    NE,ESTBSCHK        NO                              01345000
000E82 212E01001088                 1640          MVFXD   SMG2CPUS,SESSESTB  SET CPU STATE TO UP WITH HOST   01346000
000E88 0505204E                     1641          LDFLD   R0,SEG5,78,2       RESTORE BUFFER ADDR AFTER OPEN  01345300
000E8C BFF00CA6                     1642          BRANL   FORMATP1,R15       RESTORE P1 MSG TO GO TO HOST    01346600
000E90 AF000E1E                     1643          BRAN    SESESTOK           CONTINUE TO PROCESS MESSAGE     01347000
000E94 232E01001090                 1644 ESTBSCHK CCFXD   SMG2CPUS,LOFCNTST  DID WE JUST HAVE A LOSS OF CONT 01348000
000E9A C604                         1645          JUMP    NE,BADESTBS        NO                              01349000
000E9C 212F01001088                 1646 SESSRTOK MVFXD   SMG2CPUS,SESSESTB  SET CPU STATE TO IN SESSION     01350000
000EA2 BF801548                     1647 BADESTBS BRANL   COMMEXIT,R8        NORMAL EXIT                     01350100
                             00EA6  1648 ADVOPNUP EQUATE  *                    ADVICE HANDLER OPEN SESSION     01350200
000EA6 212F01001080                 1649          MVFXD   SMG2CPUS,SESSESTB  SET CPU TO UP WITH HOST        01350400
000EAC AF000480                     1650          BRAN    ADVICEHD           RETURN TO ADVICER               01350600
                             00EB0  1651 FAILINIT EQUATE  *                    BUBUSE INDICATES SESS INIT FAIL 01352000
000EB0 232E01001092                 1652          CCFXD   SMG2CPUS,STRTOPEN  WAS THIS AFTER A POS OPEN      01352200
```

```
                        1669 * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * 01363000
                        1670 *                                                                               * 01364000
                        1671 *          C O M M U N I C A T I O N     M A C R O S                            * 01365000
                        1672 *      C E N T R A L   P R O C E S S O R   R E A D   R O U T I N E S            * 01366000
                        1673 *                                                                               * 01367000
                        1674 * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * 01368000

                        1675 CENTPROC DEFASEP                      CPU ASYNC ENTRY POINT                     01371000
000FE2 CF03             1676+         JUMP *+6
000FE4 2505200F2000     1677+CENTPROC INORI BUBFLG,AL2(BUBFLAC)
000FEA BF000FE4         1678          BRANL   CLEARS4              INITIALIZE SEG 4 TO BINARY ZERO           01372000
                        1679          LRECEIVE                                                               X01373000
                                          CANCEL=YES               IF 3604 CPU COMM, ALLOW KB INTR           01374000
000FEE BF9017F4         1680+         BRANL BUB0C04,BUBELK
000F02 C122             1681          JUMP    OK,DATAREAD                                                    01375000

                  000F04 1682 NODATA  EQUATE  *                    NO DATA MESSAGE READ                      01378000
000F04 185A0002         1683          SETFPL  BUBUSE               POINT TO COMM MACRO STATUS FLD            01379000
000F08 40050F10         1684          LSEEK   SEG5,NODATATB        DETERMINE TYPE OF NON DATA MSG            01380000
000F0C BF801548         1685          BRANL   COMMEXIT,R8          UNKOWN - NORMAL EXIT                      01381000

                        1686 * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * 01384000
                        1687 *                                                                               * 01385000
                        1688 *    COMM MACROS (BUBUSE) TEST TABLE FOR NON DATA AFTER LRECEIVE                * 01386000
                        1689 *                                                                               * 01387000
                        1690 * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * 01388000
                        1691 NODATATB TABLE (X'8000',ESTBSESS),    SESSION ESTBL SUCCESSFULLY               X01389000
                                           (X'4000',TERMSESS),     SESSION TERMINATED SUCCESSFULLY          X01390000
                                           (X'2000',SUSPDATA),     DATA TRANSFER SUSPENDED                  X01391000
                                           (X'1000',RESMDATA),     DATA TRANSFER RESUMED                    X01392000
                                           (X'0800',CANCELRC),     CANCEL RECEIVED                          X01393000
                                           (X'0400',SHUTDOWN),     SHUTDOWN RECEIVED                        X01394000
                                           (X'0200',NEGRESRC),     NEGATIVE RESPONSE RECEIVED               X01395000
                                           (X'0100',LMSNOTRC),     LAST MSG SENT NOT RECEIVED               X01396000
                                           (X'0080',DATALSTS),     DATA LOST PREVIOUS SESSION               X01397000
                                           (X'0040',FAILINIT),     SESSION INITIATION FAILED                X01398000
                                           (X'0020',LR3604AT),     LRECEIVE BROKEN BY 3604 ATTNT            X01399000
                                           LNG=2                                                            01400000
000F10 0008
000F12 FF02
000F14 001C
000F16 8000
000F18 4000
000F1A 2000
000F1C 1000
000F1E 0800
```

```
   LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                    ASM 0200 11.42 09/08/76
000F20 0400
000F22 0200
000F24 0100
000F26 0080
000F28 0040
000F2A 0020
000F2C 0F6A
000F2E 0FA0
000F30 0F42
000F32 0F42
000F34 0F42
000F36 0F78
000F38 0F42
000F3A 0F42
000F3C 0F42
000F3E 0FB0
000F40 0F42
                     00F42  1692 SUSPDATA EQUATE  *                          01401000
                     00F42  1693 RESMDATA EQUATE  *                          01402000
                     00F42  1694 CANCELRC EQUATE  *                          01403000
                     00F42  1695 NEGRESRC EQUATE  *                          01404000
                     00F42  1696 LMSNOTRC EQUATE  *                          01405000
                     00F42  1697 DATALSTS EQUATE  *                          01406000
                     00F42  1698 LR3604AT EQUATE  *                          01407000
000F42 BF801548             1699         BRANL   COMMEXIT,R8   STATUS NOT ALLOWED 01408000
```

```
                        00F46  1701 DATAREAD EQUATE  *                                                    01411000
000F46 272510000200            1702          TSTMSKI BUBUSE,X'02'        IS INPUT SEGMENT TO SMALL      01412000
000F4C BC801548                1703          BRANL   MO,COMMEXIT,R8      YES BUT SHOULD NEVER HAPPEN    01413000
000F50 25452000F000            1704          ANDI    BUBUSE,X'F000'                                     01414000
000F56 185A0002                1705          SETEPL  BUBUSE                                             01415000
000F5A 40050F62                1706          LSEEK   SEG5,DATATBL        PROCESS ONLY VALID MSG FRCM HS1 01416000
000F5E BF801548                1707          BRANL   COMMEXIT,R8                                        01417000

                               1708 * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * 01420000
                               1709 *                                                                     * 01421000
                               1710 *    COMM MACROS (BUBUSE) TEST TABLE FOR DATA RECEIVED AFTER LRECEIVE * 01422000
                               1711 *                                                                     * 01423000
                               1712 * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * 01424000
                               1713 DATATBL  TABLE (X'80',DATARECD),      DATA RECEIVED                  X01425000
                                                  (X'40',DATCNTRD),      DATA AND CONTROL RECEIVED      X01426000
                                                  (X'20',FMERRNDT),      FME OR RRN RECEIVED            X01427000
                                                  (X'10',LOSSLMSG),      LAST MESSAGE SENT LOST         X01428000
                                                  LNG=1                                                 01429000
000F62 0004
000F64 FF01
000F66 000A
000F68 80
000F69 40
000F6A 20
000F6B 10
000F6C 1024
000F6E 0F74
000F70 0F74
000F72 0F74

                        00F74  1714 DATCNTRD EQUATE  *                 DATA AND CONTROL RECEIVED      01432000
                        00F74  1715 FMERRNDT EQUATE  *                 FME OR RRN RECEIVED            01433000
                        00F74  1716 LOSSLMSG EQUATE  *                 LAST MSG LOST RECEIVED         01434000
000F74 BF801548                1717          BRANL   COMMEXIT,R8                                        01435000
```

```
LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                    ASM 0200 11.42 09/08/76

                                 1719 * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * 01438000
                                 1720 *                                                               * 01439000
                                 1721 *          C O M M U N I C A T I O N    M A C R O S             * 01440000
                                 1722 *       S H U T D O W N   R E C E I V E D   F R O M   H O S T   * 01441000
                                 1723 *                                                               * 01442000
                                 1724 * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * 01443000

                          00F78  1725 SHUTDOWN EQUATE *                    SHUTDOWN REQUESTED FROM HOST  01446000
000F78 212E01001091              1726         MVFXD   SMG2CPUS,SHUTDOWNS  SET CPU STATUS                01447000
                                 1727         CLOSSESS                                                  X01448000
                                              TYPE=HOST                   SESSION TERMINATION RECEIVED  01449000
000F7F 250510160000              1728+        INORI BUBPAR1,AL1(0+0)
000F84 BF201678                  1729+        BRANL BUB0002,BUBELK
000F88 BF801548                  1730         BRANL   COMMEXIT,R8         NORMAL EXIT                   01450000
```

```
LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                ASM 0200 11.42 09/09/76

                                 1732 * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * 01453000
                                 1733 *                                                                         * 01454000
                                 1734 *          C O M M U N I C A T I O N     M A C R O S                      * 01455000
                                 1735 *        L O S S   O F   C O N T A C T   H A S   O C C U R E D            * 01456000
                                 1736 *                                                                         * 01457000
                                 1737 * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * 01458000

                          00F8C  1738 LOSSCNCT EQUATE  *                                                        01461000
000F8C 212E01001090              1739         MVFXD   SMG2CPUS,LOFCNTST     SET CPU TO LOSS OF CONTACT       01462000
                                 1740         CLOSSESS                                                         X0146 000
                                              TYPE=TERM                     IMMEDIATE SHUTDOWN OF HOST LINK  0146 000
000F92 250510160200              1741+        INORI BUBPAR1,AL1(0+BUBFLG2)
000F98 BF901678                  1742+        BRANL BUB0002,BUBELK
000F9C BF801548                  1743         BRANL   COMMEXIT,R8           NORMAL EXIT                      01465000
```

```
LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                ASM 0200 11.42 09/08/76

                                 2281 * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * 02059000
                                 2282 *                                                                         * 02060000
                                 2283 *          C O M M U N I C A T I O N    M A C R O S                       * 02061000
                                 2284 *      G E N E R A T E   M A C R O   P R O C E S S I N G   C O D E         * 02062000
                                 2285 *                                                                         * 02063000
                                 2286 * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * 02064000

                                 2287          PRINTI  ON                                                       02067000
                                 2288          DEFCODE                                                          X02068000
                                                     LOCF=LOSSCNCT,          LOSS OF CONTACT ROUTINE            X02069000
                                                     LOCD=TRACE              DEBUGGING CPU TRACE ROUTINE          02070000
                                 2289+*************************************************************************** 01100000
                                 2290+*                                                                         * 01200000
                                 2291+*          THIS SECTION CONTAINS THE CODE REQUIRED TO PROCESS THE         * 01300000
                                 2292+*          TELECOMMUNICATIONS MACROS.                                     * 01400000
                                 2293+*                                                                         * 01500000
                                 2294+*************************************************************************** 01600000

                                 2295+*************************************************************************** 01800000
                                 2296+*                                                                         * 01900000
                                 2297+*          NAME --- OPEN SESSION SUBROUTINE                               * 02000000
                                 2298+*          CALLED - OPENSESS MACRO AND READY COMMAND PROCESSING           * 02100000
                                 2299+*          EXIT --  COMMON EXIT ROUTINE (BUB990)                          * 02200000
                                 2300+*                                                                         * 02300000
                                 2301+*************************************************************************** 02400000

0015CE BFA01E60                  2302+BUB0C01  BRANL BUB SAV1,BUBEWK
001502 535502000000              2303+         EXOR BUBUSE,BUBUSE
001508 2725200F8000              2304+         TSTMSKI BUBFLG,AL2(BUBFLOS)
0015DE C848                      2305+         JUMP MO,BUB101
0015EC 2505200F8000              2306+         INORI BUBFLG,AL2(BUBFLOS)
0015E6 215E0A0252A6              2307+         MVFXD BUBHED,BUBCND
0015FC 1EA1                      2308+         LDLN BUBEWK,BUBESMS
0015EE 08A5102F                  2309+         STFLD BUBEWK,BUBLID
0015F2 235508030017              2310+         CCFXD BUBSID,BUBPAR2
0015F8 C104                      2311+         JUMP EQ,BUB110
0015FA 2545200FFFF7              2312+         ANDI BUBFLG,AL2(X'FFFF'-BUBFLIP)
001600 215508030017              2313+BUB11C   MVFXD BUBSID,BUBPAR2
001606 272510160200              2314+         TSTMSKI BUBPAR1,AL1(BUBFLG2)
00160C C104                      2315+         JUMP MZ,BUB112
00160E 2505200F0100              2316+         INORI BUBFLG,AL2(BUBFLFM)
001614 272510160100              2317+BUB112   TSTMSKI BUBPAR1,AL1(BUBFLG1)
00161A C120                      2318+         JUMP MZ,BUB101
00161C 2505200F0200              2319+         INORI BUBFLG,AL2(BUBFLJC)
```

Appendix B

VTAM FRONT END TABLE MACRO DESCRIPTIONS

This appendix provides detailed parameter descriptions for the macros:

LCOMP--Define VTAM Logical Unit Component

LUNIT--Define VTAM Logical Unit

VCT--Define VTAM Control Table

VTCSB--Define VTAM Logical Unit Component Specification Block

VTIDTAB--Define VTAM/Intercomm ID synonyms.

VTLSB--Define VTAM Logical Unit Specification Block

VTLVB--Define VTAM Logical Unit Exit Routine Vector

LCOMP--Define VTAM Logical Unit Component

The LCOMP macro is optionally used in conjunction with the LUNIT macro to define one or more components of a logical unit. The LCOMP macro need not be coded explicitly when only one component is defined or several components with identical specifications are defined for a logical unit. In these cases, the LCOMP macro parameters can be coded on the LUNIT macro, and the LCOMP macro(s) is then generated by the LUNIT macro--required for defining CPU console in VTAM Network Table as a primary or secondary control terminal.

The LCOMP macro should be coded when components having different specifications are required for the same logical unit. When coding this form, some LCOMPs can be generated by the LUNIT, and the remainder by succeeding LCOMP macros. The end of the components for a logical unit is indicated by the next LUNIT macro or by the PMISTOP macro which ends the logical unit definitions. The name of the first component is also the VTAM logical unit name.

Many parameters can be coded on either the LCOMP (or the LUNIT generating the LCOMP) or VTCSB macro, with the LCOMP taking precedence. This allows specification of common LCOMP parameters on one VTCSB macro, rather than on many LCOMP macros.

The form of the LCOMP macro is as follows:

```
(blank)    LCOMP   NAME={component-name                          }
                         {(component name[,...,component-name])}

                   [,ALT={alternate-component-name          }]
                   [     {(alternate-name[,....,alter-name)}]

                   [,CNTRL={YES}]
                   [       {NO }]

                   [,CSB=label-of-VTCSB-macro]

                   parameters specified on LCOMP or VTCSB:

                   [,AIDGRP={number}]
                   [        {0     }]

                   [,CONV={YES}]
                   [      {NO }]

                   [,CRT={YES}]
                   [     {NO }]

                   [,LOCK=verb]
```

(continued)

```
[,LOG={NO }]
[     {YES}]

[,LSYNCH={YES}]
[        {NO }]

[,RESTART={NO     }]
[         {IFPOSBL}]
[         {YES    }]

[,RLSERSP={NO }]
[         {YES}]

queue specification parameters:

(,DFLN=disk-queue-ddname)

[,NUMCL={number-of-entries-in-core-q}]
[       {0                          }]

[,PCEN={hundreds        }]
[      {(units,hundreds)}]
[      {100             }]

[,PRYMSGS={number-of-entries-in-priority-core-q}]
[         {0                                   }]

multiregion parameter:

(,MRPASSW=password)
```

ALT

specifies an alternate component name, or a list of names, to which output messages are to be routed if the primary component (logical unit) is inactive. No more than a one for one correspondence may be coded between the NAME and ALT parameters.

CSB

is the optional label of a VTSCB macro. If used, a VTCSB simplifies coding for several LCOMP macros with identical specifications. Those LCOMP macros can point to a VTCSB macro coded with the common specifications.

CNTRL

indicates whether or not this component is to act as the primary control terminal. Code YES if it is, NO if not. The default is NO. The LCOMP macro may not be used to define the CPU console. Use only the LUNIT instead.

MRPASSW

corresponds to the password value (one to eight alphameric characters) of the P parameter in the MRPASWRD macro used by the Multiregion Support Facility. Its function is to allow access only to the region specified via the corresponding R parameter in the associated MRPASWRD macro. For further information, see Multiregion Support Facility.

NAME

is the component name or a list of component names. Code component names as 1-5 alphameric characters. If a list is coded, then a LCOMP macro is generated for each name in the list. All other parameters for the generated LCOMP macros are identical. If this is the first component for the logical unit, then NAME also becomes the VTAM logical unit name; otherwise, component names are arbitrary. This is a required parameter.

The parameters listed below can be coded on either the LCOMP or the VTCSB macro. The default value applies if the parameter is not coded on either the LCOMP macro or the VTCSB macro. If a parameter is specified on the LCOMP macro, it overrides the corresponding specification on the VTCSB macro for that logical unit only. If a parameter is not specified on the LCOMP macro, the VTCSB macro specification (or default) is used.

AIDGRP

specifies the number of an AIDGRP macro within the Attention Identification Table (ATTIDTBL). Code as a decimal value, 1 to 255. Valid for IBM 3270s only. The default is 0 (no ATTIDTBL entry desired).

CONV

specifies whether or not the terminal is to be considered a conversational terminal. See the BTAM Terminal Support Users Guide for a description of conversational processing. Code YES if the terminal is to be considered conversational. The default is NO.

CRT

specifies whether or not the component is to be treated as a CRT. If YES is coded, each message sent to the component must be preceded by an input message, effectively forcing interactive mode. NO places no restriction on successive output messages. The default is NO. YES is required for 3270 CRTs (SDLC and BSC).

LOCK

indicates that the component is to be locked to a particular verb every time the logical unit logs on. The verb specified is prefixed to each incoming message for this component when a component is locked to a verb. Code as one of the four-character verbs defined in the BTVRBTB via BTVERB macros. This parameter has the same effect as a LOCK command, and can be overridden by the LOCK or UNLK system control commands for the duration of the current session only.

LOG

specifies whether or not System Log (INTERLOG) entries are to be made for message traffic associated with this component. The default is YES.

LSYNCH

specifies whether or not log entries associated with this component are critical, that is, must be added to the current buffer and written to INTERLOG immediately. If not critical, log entries will accumulate until the log buffer is full. YES specifies write immediately; NO specifies add to the current log buffer. The default is NO.

RESTART

specifies criteria for output message recovery for this component. NO specifies no recovery is to be performed. YES indicates that the message will be requeued for rescheduling if it had not yet been scheduled for output by VTAM. IFPOSBL indicates message recovery is not critical, but should be performed if the message is encountered when reading the system log backwards. This specification can be overridden if an unscheduled output message came from a subsystem that is itself being restarted. In this case, unscheduled (previously queued) output is discarded. The default is YES. Coding YES or IFPOSBL requires LOG=YES.

RLSERSP

indicates whether or not a response is required to entry of the RLSE command when no messages are queued for this component. Code NO if no response is desired. The default is YES, which causes the response "NO OUTPUT QUEUED".

The following queue specification parameters are included as specification to a SYCTTBL macro generated by the LCOMP macro:

DFLN,NUMCL,PCEN,PRYMSGS

Although all but DFLN have defaults, at least NUMCL and/or DFLN and PCEN must be coded for a valid queue specification. Refer to the SYCTTBL macro description in Basic System Macros. The generated Csect is VTAMSCTS.

LUNIT--Define VTAM Logical Unit

The LUNIT macro is required to define a logical unit to Intercomm. A minimal definition must reference a VTLSB macro and define at least one component via an LCOMP macro. The LCOMP macro may be either generated by the LUNIT macro (required if CPU Console defined in Network Table as a primary or secondary control terminal), or coded explicitly after the LUNIT macro. The LUNIT and LCOMP macros must be grouped together before other VTAM table macros and followed by a PMISTOP macro.

Most parameters on the LUNIT macro are included as specification to one or more generated LCOMP macros. If necessary, additional LCOMP macros can be coded after the LUNIT to generate additional component definitions. The logical unit definition extends from one LUNIT macro to the next LUNIT macro or to a PMISTOP macro.

The form of the LUNIT macro is:

```
(blank)   LUNIT   LSB=label-of-VTLSB-macro

                 {,ACQ={YES}}
                 {     {NO }}

                 {,LCUNO={number}}
                 {       {0     }}

                 if LCOMP macro(s) is to be generated by this LUNIT,
                 code the following parameters as needed:

                 {,AIDGRP={number}}
                 {        {0     }}

                 [,ALT={alternate-component-name       }]
                       {alternate-name(....,alter-name)}

                 {,CNTRL={YES}}
                 {       {NO }}

                 {,CONV={YES}}
                 {      {NO }}

                 {,CRT={YES}}
                 {     {NO }}

                 [,CSB=label-of-VTCSB-macro]

                 [,DFLN=disk-queue-ddname]

                 [,LOCK=verb]
```

(continued)

```
[,LOG={NO }]
[     {YES}]

[,LSYNCH={YES}]
[        {NO }]

[,MRPASSW=password]

[,NAME={component-name                          }]
[      {(component-name(,...,component-name))}]

[,NUMCL={number-of-entries-in-core-q}]
[       {0                          }]

[,PCEN={hundreds        }]
[      {(units,hundreds)}]
[      {100             }]

[,PRYMSGS={num-of-entries-in-priority-core-q}]
[         {0                                }]

[,RESTART={NO     }]
[         {IFPOSBL}]
[         {YES    }]

[,RLSERSP={NO }]
[         {YES}]

[,UPINTV={autoup-intvl}]
[        {0           }]
```

ACQ

indicates whether or not the logical unit is to be acquired by Intercomm when the VTAM Front End is started; that is, the terminal is dedicated to Intercomm. Code as YES or NO. The default is NO, indicating a LOGON will be issued at the terminal.

CNTRL

indicates whether or not this LUNIT is to act as the primary control terminal. The default is NO. This parameter may be coded only in the following circumstances:

1) When there is only one component on this LUNIT, or

2) When the CPU console is being defined by this LUNIT as the primary control terminal.

At all other times, a separate LCOMP must be used to define the control terminal, even if all other specification are the same.

LSB

specifies the label of a VTLSB macro. The VTLSB describes the logical unit to Intercomm. This parameter is required.

LCUNO

is the user-defined logical 327x control unit number. Other logical units referencing the same control unit must be given the same number. This is applicable only to 3270 BSC LUs and is used for COPY command processing (see Chapter 6).

UPINTV

specifies the time interval, in minutes up to 255, before a restart for a failing LU is attempted. If not coded, a zero value is assumed and no restart will be made. (See also Section 3.11.) A SPLU command overrides autoup processing and marks the LU permanently disconnected until a STLU is issued.

The following parameters are used to generate LCOMP macros for this logical unit definition:

AIDGRP	LSYNCH
ALT	MRPASSW
CONV	NAME
CRT	NUMCL
CSB	PCEN
DFLN	PRYMSGS
LOCK	RESTART
LOG	RLSERSP

See the LCOMP macro description for parameter descriptions and requirements.

VCT--Define VTAM Control Table

The VCT macro generates a table containing global parameters and storage areas used by the VTAM Front End. One VCT macro must be coded when the VTAM Front End tables are coded. It must be assembled with the other VTAM Front End table macros. Verify that the &VTAM global in SETGLOBE has been set to 1 before assembly.

VCT generates a CSECT named VCT containing the VTAM ACB and EXLST macros. If a new VTAM release is installed after the Intercomm tables are coded, then the VCT must be reassembled to obtain the latest version of VTAM macros. The CSECT current when VCT is encountered is resumed by the VCT macro after the VCT CSECT is generated.

The form of the VCT macro is as follows:

```
(blank)   VCT   SECT=C

              [,APPLID={VTAM-application-name}]
              [        {0                    }]
              [        {INTERCOM             }]

              [,MXSDTHD={maximum-number-of-shutdown/halt-threads}]
              [         {25                                     }]

              [,PASSWD={VTAM-APPL-password}]
              [        {0                 }]

              [,RCVNO={number-of-RECEIVE-ANY-normal-flow-threads}]
              [       {2                                        }]

              [,RCVRSP={number-of-RECEIVE-ANY-response-threads}]
              [        {2                                     }]

              [,RCANYLN={size-of-RECEIVE-ANY-normal-flow-buffer}]
              [         {104                                   }]

              [,SEQNO={BTAM}]
              [       {VTAM}]

              [,SHUTDTL={VTAM-F.E.-shutdown-time-limit-seconds}]
              [         {60                                   }]

              [,SNMAX={maximum-number-of-sessions}]
              [       {0                         }]

              [,START={NO }]
              [       {YES}]
```

(continued)

```
(TRACE={((EWTO),(ETRC)(,NTRC))})
       {(EWTO,ETRC)          }

(,ULVB=label-of-VTLVB-macro)

(,VTUPINV=autoup-intvl)
```

APPLID

is the VTAM application name of the Intercomm system, that is, the label of an APPL statement in the VTAM definition library. Code as 1-8 alphameric characters or 0. If 0, then the APPLID is taken from the label of the Intercomm EXEC statement in the JCL. This conforms to the ACB macro, omitted APPLID specification, in VTAM Macro Language Reference. The default is INTERCOM.

MXSDTHD

is the maximum number of concurrent SEND CONTROL=command or CLSDST requests permitted during VTAM Front End shutdown or halt. If more requests are to be scheduled when the limit is reached, they are delayed until earlier ones complete. This technique reduces the resource contention in Intercomm when a large network is shut down or halted. Code as a decimal value of 0. If 0, no limit is imposed. The default limit is 25 requests.

PASSWD

is the password coded on the APPL statement in the VTAM definition library for Intercomm. Code 1-8 alphameric characters. The default is 0, indicating that no password is specified on the APPL statement.

RCANYLN

is the length of the initial input area used by the RECEIVE OPTCD=ANY,RTYP=DFSYN macros. The value coded is rounded to a multiple of 8. Usually a value is selected that accommodates most input messages to avoid the need for issuing RECEIVE OPTCD=SPEC macros to obtain the remainder of the input. Code as a value greater than or equal to the maximum input FMH length. (See Chapter 2.) The default value is 104.

RCVNO

is the number of RECEIVE OPTCD=ANY,RTYP=DFSYN threads to be established when the VTAM Front End is started. RCVNO determines the number of input messages that may be concurrently received from VTAM. A high volume system may benefit from a value larger than the default value. Code as a decimal number. The default is 2 threads.

RCVRSP

is the number of RECEIVE OPTCD=ANY,RTYP=RESP threads to be established when the VTAM Front End is started. Code as a decimal number. The default is 2 threads. (If coded as 0, then only output should be sent which does not require a response.)

SECT=C

must be coded as shown to generate the VCT CSECT. This is a required parameter.

SEQNO

specifies whether the BTAM Message Number (BTAM) or each LU session sequence number (VTAM) is to be placed in the MSGHBMN field in the input message header. BTAM is recommended if Log Analysis is used (see the Operating Reference Manual). If SEQNO=BTAM is coded and BTAM is not present in the system (indicated by &BTAM=0 in SETGLOBE) than a BTSPA will be generated by the VCT macro. This BTSPA will not contain external references to BTAM-only routines and tables. The default is VTAM, whereby VTAM resequencing is used, that is, the BMN starts at 1 for each new session of the input component.

SHUTDTL

is the VTAM Front End shutdown time limit in seconds. If the time from shutdown start (VTCN$SHUTD or NRCD system control command; VTAM HALT command) to completion exceeds this value, the shutdown is converted to a VTAM Front End halt to disconnect all remaining logical units immediately. Code as a decimal number in the range 0 through 32767. If 0, no time limit is imposed. The default is 60 (seconds).

SNMAX

is the maximum number of concurrent sessions permitted. The value specified also determines the size of the RPL pool. Code a number from 0 to the number of logical units defined. The default is 0, specifying that no limit is set, but the RPL pool is of maximum size.

START

specifies whether or not the VTAM Front End should be started at Intercomm startup. If coded as NO, a VTCN$START command is required to start the VTAM Front End unless the control terminal is defined as a VTAM logical unit component, in which case the VTAM Front End will always be started at Intercomm startup, regardless of this specification. The default is YES.

TRACE

specifies global error message (EWTO) and trace options for the Intercomm VTAM Front End. The parameters are positional and coded as a list. EWTO specifies that the message VTAM ERROR CONDITION... (VT025I) shall be issued whenever an abnormal condition occurs in communications with the VTAM system region. ETRC specifies that a snap 26 be issued when an unexpected condition occurs (such as LOGON from an undefined unit). NTRC allows a 'line trace' to be taken (snap 26) and is internally forced on if an LTRC command is issued to trace activity for a specific logical unit. The default is (EWTO,ETRC).

ULVB

is the label of a VTLVB macro specifying LU-related user exits to be called for all LUs that do not specify their own VTLVB macro. If omitted, no general exits are defined.

VTUPINV

specifies the time interval, in minutes up to 255, before a restart for the VTAM Front End is attempted after an abnormal shutdown, or if startup failed. If not coded, a zero value is assumed and no automatic restart is attempted (a VTCN$START command must be issued). Restart is not attempted if the VTAM Front End is put down by a VTCN command.

VTCSB--Define VTAM Logical Unit Component Specification Block

The VTCSB can optionally be used to simplify coding of parameters that appear on many components. A set of parameters may be coded on either the LCOMP (or LUNIT generating LCOMP) or the VTCSB macro. Specifications on a LCOMP macro override any on the VTCSB, if used. To specify identical component parameters on many components, all LCOMP macros (for the same logical unit type) should reference one VTCSB macro coded with the common specifications. The VTCSB macro must be coded after the PMISTOP ending the LUNIT and LCOMP macros.

The form of the VTCSB macro is as follows:

```
(symbol)  VTCSB   COMPTYP=component-type-code

                  (,AIDGRP={number})
                  (        {0     })

                  (,CONV={YES})
                  (      {NO })

                  (,CRT={YES})
                  (     {NO })

                  (,CTCHAR=hexadecimal-string)

                  (,LOCK=verb)

                  (,LOG={NO })
                  (     {YES})

                  (,LSYNCH={YES})
                  (        {NO })

                  (,RESTART={NO     })
                  (         {IFPOSBL})
                  (         {YES    })

                  (,RLSERSP={NO })
                  (         {YES})
```

COMPTYP

is the component type code. Code the same as the corresponding LUTYPE code in the VTLSB macro (for example, for a 3600, code 3600 for both macros).

CTCHAR

specifies in EBCDIC the terminal-oriented control characters that are to precede those messages destined for the device that are generated only by Intercomm's Front End. If this parameter is not coded, it is assumed that no control characters need be interpolated. Code in hexadecimal.

3270 terminals only: The specified characters are appended before any message where the first three characters are not:

1. A valid 3270 remote write command (X'F1', X'F5' or X'7E'), followed by

2. A write control character (WCC), followed by

3. A set buffer address (SBA) order (X'11').

The following parameters are described under the LCOMP macro:

AIDGRP	LOG
CONV	LSYNCH
CRT	RESTART
LOCK	RLSERSP

VTIDTAB--Define VTAM/Intercomm ID Synonyms

The VTIDTAB macro creates entries in a table defining correspondences between one-to-eight-character VTAM logical unit component names and one-to-five-character Intercomm terminal names, thus allowing Intercomm to recognize VTAM component names without requiring them to conform to Intercomm's five-character limit.

VTIDTABs may be coded in the same module as the Network Configuration Table, or in a separate module. If the VTIDTABs are coded in a separate module, it must be included in the Intercomm linkedit.

As many VTIDTAB macros may be coded as are necessary to give Intercomm synonyms for all the VTAM names. The last VTIDTAB must be coded with LAST=YES. This may be coded in a VTIDTAB macro by itself, without the VTAMIDS and ICOMIDS parameters.

When LAST=YES is specified, two indices for binary search are produced. Each index is in its own control section. The control sections are:

- VTIDINDX--where the index entries are sorted by VTAMID
- ICIDINDX--where the index entries are sorted by ICOMID

Because the Intercomm and VTAM names are used to generate labels within the table, two restrictions are implied. They are:

- Each Intercomm and VTAM name must be unique
- The VTAM names must be such that they can form valid Assembler Language labels.

A macro, VTIDCONV, is used to convert an Intercomm name to a VTAM name, or vice versa and uses the generated indices for calls to the binary search routine. See Section 5.5.2 for a full discussion of the VTIDCONV macro.

The form of the VTIDTAB macro is as follows:

```
(blank)  VTIDTAB    VTAMIDS=(vname1,vname2,...,vnamen),
                    ICOMIDS=(iname1,iname2,...,inamen)
                    [,LAST={YES}]
                    [      {NO }]
```

VTAMIDS
: gives a list of one- to eight-character VTAM component names, enclosed in parentheses and separated by commas.

ICOMIDS
: gives the one- to five-character Intercomm synonyms for the VTAM names specified in VTAMIDS, in the same order.

LAST
: specifies whether to end the table, or whether another VTIDTAB macro follows this one. YES indicates that the table ends, and no further VTIDTAB macros occur. The default is NO.

VTLSB--VTAM Logical Unit Specification Block

The VTLSB macro specifies all constant information about a logical unit session. Each LUNIT macro references a VTLSB macro, but more than one LUNIT may reference the same VTLSB macro. The VTLSB macro must be coded after the PMISTOP ending the LUNIT and LCOMP macros.

The VTLSB macro specifies the type of logical unit and specifies parameters used by Intercomm during the session to control processing.

Only the LUTYPE parameter is required; all others may default based on the LUTYPE. Refer to Figure B-1 for details.

The form of the VTLSB macro is as follows:

```
(blank)  VTLSB    LUTYPE={3600  }
                         {3790I }
                         {3790B }
                         {3270N }
                         {3270S }
                         {SYSCON}

                  LOGON options:

                  [,BNDAREA={bind-area-address}]
                  [         {0                }]

                  [,LOGMODE={C' '         }]
                  [         {logmode-name}]
                  [         {0            }]

                  SEND options:

                  [,ASRESP={NOSPEC      }]
                  [        {({D}[,{1}])}]
                  [        { {E}  {2}   }]

                  [,SFMHDR={YES}]
                  [        {NO }]

                  [,SNDBUFL={size-of-internal-SEND-buffer}]
                  [         {0                           }]
```

(continued)

```
[,SOUTSEG={maximum-segment-length}]
          {USER                   }
          {0                      }

[,SRESP={({D},{1})}]
        { {E} {2} }
        {NOSPEC   }
```

RECEIVE options:

```
[,RACCHN={NO }]
         {YES}

[,RFMHDR={YES}]
         {NO }
         {MSG}

[,TIMEOUT={nnn}]
          {60 }
```

Miscellaneous options:

```
[,SHUTCTL={time-limit-for-receipt-of-SHUTC}]
          {0                               }

(,TRSTBL=label-of-input-translate-table)

(,ULVB=label-of-VTLVB-macro)

[,RELREQ={RELEASE}]
         {IGNORE }

[,OUTQ={ACQUIRE}]
       {IGNORE }
```

ASRESP
: specifies the allowable response types for the logical unit type. If only a letter is specified, both responses of that type are permitted. (For example, D indicates that both DR1 and DR2 are allowable.)

BNDAREA
: specifies the address of a user-coded bind area containing the desired session parameters for the LU, if necessary to override those coded in the VTAM region. See the IBM VTAM Macro Language Reference.

LOGMODE

specifies the VTAM log mode name to be used when initiating a session with the LU. See the IBM VTAM Macro Language Reference. The default is 0.

LUTYPE

is the logical unit type code. This parameter must be coded; all other parameters default as stated in Figure B-1. SYSCON is a special code to indicate that this VTLSB is defining a CPU console that will be accessed as a primary or secondary control terminal. If this option is coded, all other parameters except TRSTBL (for backspace feature) are invalid.

	LU Code				
Parameter Name	3600	3790I	3790B	3270N	3270S
ASRESP	D	D	D	(D,1)	(D,1)
LOGMODE	0	0	0	0	0
RACCHN	YES	YES	YES	YES	YES
RFM HDR	MSG	MSG	MSG	NO	NO
SFMHDR	NO	NO	NO	NO	NO
SHUTCTL	0	0	0	0	0
SNDBUFL	104	104	104	264	264
SOUTSEG	0	0	0	0	0
SRESP	NOSPEC	NOSPEC	NOSPEC	NOSPEC	NOSPEC
TRSTBL	*	*	*	*	*
ULVB	*	*	*	*	*

* No default.

Figure B-1. VTLSB Parameter Defaults by LUTYPE

OUTQ

indicates to the Intercomm supplied user exit VTUROTX1, if included and applicable for this VTLSB specification, what action is required when an output message is queued. Code ACQUIRE, if a STLU,TPUxxxxx,ACQ,Q is to be generated when an output message is queued while the logical unit is not in session. The default is IGNORE, meaning no action is taken by the user exit.

RACCHN

indicates whether or not a chain of input messages is to be accumulated into a single full Intercomm message. Code NO for each segment queued separately (MSGHQPR is set from chain position--0=first, 1=middle, 3=last). The default is YES, for one full message (MSGHQPR=2).

RELREQ

indicates to the Intercomm supplied user exit VTURLRX1, if included, what action is required when Intercomm receives a RELREQ request from VTAM for the logical unit. Code RELEASE, if an SPLU is to be scheduled when there is no more output for the logical unit. The default is IGNORE, meaning that no action is taken by the user exit.

RFMHDR

specifies whether FMH may be present in the input messages from this LU. Code as MSG to permit some messages to have FMH, and some not.

SFMHDR

indicates whether output messages are to have Function Management Headers prefixed to them by the Front End. If so, code as YES. FMHs are required (except for 3270N) if the logical unit is to identify the destination component. The default is NO.

SHUTCTL

specifies a time limit to be imposed by Intercomm during orderly shutdown. Code a decimal value 0-255. If a nonzero value is coded, timing of the interval between receipt of positive response from the LU to Intercomm's SHUTD command and the receipt of the SHUTC command by Intercomm from the LU is done. If the limit in seconds is exceeded before the SHUTC is received, an immediate disconnection is done. The default is 0, for no timing.

SNDBUFL

specifies the size of an interval buffer area for the VTSEND routine. VTSEND needs an area to build the final message (sent as one or more segments). As an optimization aid, a buffer of size SNDBUFL bytes can be allocated at the end of the VTSEND save area that will be used if large enough. If not, a new area is allocated for this message only. If the save area buffer can be used, a STORAGE and STORFREE is saved and locality of reference

may be improved. Code as a decimal value, which is rounded to a multiple of eight. To be optimized, the value chosen should accommodate the maximum message size plus the FMH length. If 0 is coded, no optimization is done.

SOUTSEG

indicates whether or not automatic segmentation of output messages is to occur. If coded as a decimal integer greater than zero, this is the maximum segment size. A longer message is sent as a chain of segments--all segments are of maximum size except possibly the last, which may be shorter. If coded as USER, the OUTSEG exit specified in the VTLVB macro referenced by the ULVB parameter of the VTLSB macro or of the VCT macro is called to perform segmentation. If coded as USER, but the user exit module is not included in the linkedit, no segmentation is done. The default is 0, specifying that no segmentation is to occur. Output segmentation must be permitted in session parameters for SOUTSEG to be effective.

SRESP

specifies the type of response to be requested for output to the LU. The session parameters must allow for both E and D for this specification to be effective. The default is NOSPEC, specifying that this information is taken from other sources (either as defined when a message is sent to FESEND, or as specified in the SYCTTBL entry for the subsystem).

TIMEOUT

specifies the maximum time interval (in seconds up to 32767) that may elapse without an input/output LU receiving a reply including a Change Direction indicator. If this time interval elapses, the message 'NO PROGRAM RESPONSE TO LAST MESSAGE' is sent automatically, freeing the LU to send another message. Applies only to HDFF protocol (3270 CRTs). Default is 60 seconds. If 0 (zero) is specified, only a response message, a message switched to the LU, or an RSLU command will reset the device, unless a conversational time-out (CONV=YES on LU and CONV=time for input BTVERB) is in effect. If the conversational time-out expires, the message described above (FC009I) is sent to the LU.

TRSTBL

supplies the label identifying the beginning of the input translation table to be associated with the logical unit(s). The input table must be immediately followed by an output table, or a PMISTOP macro to indicate the absence of an output table.

ULVB

is the label of a VTLVB macro specifying LU-related user exits. This specification completely overrides the global VTLVB that may be specified on the VCT macro. If omitted, the global VTLVB is used.

VTLVB--Define VTAM Logical Unit Exit Routine Vector

VTLVB generates a table of exit routine addresses to be called by Intercomm when various conditions related to a specific logical unit occur. Either the VTLSB macro or VCT macro, or both, can reference VTLVB macros. The VTLVB referenced by the VTLSB takes precedence over the one referenced by the VCT. Precedence applies to routines not defined as well as those defined, that is, if a routine is not defined in the VTLSB-referenced VTLVB, it is not called, even if the VCT-referenced VTLVB defines the particular exit. If a routine is defined but not included in the linkedit, it is treated as not defined.

The exit routine calling sequences, return codes, and coding conventions are defined in the System Programming Considerations section of this manual.

The form of the VTLVB macro instruction is as follows:

```
(symbol) VTLVB      (,HALT=symbol)
                    (,INQUEUE=symbol)
                    (,LOGON=symbol)
                    (,LUS=symbol)
                    (,OTQUEUE=symbol)
                    (,OUTSEG=symbol)
                    (,RCVEXCD=symbol)
                    (,SHUTD=symbol)
                    (,SIGNAL=symbol)
                    (,SNDABT=symbol)
                    (,SNDNRM=symbol)
                    (,SNDEXR=symbol)
```

Each parameter represents the external name of an exit routine called when a particular condition is detected. The same routine can be used for more than one exit. The symbol specified will be assembled into a V-type address constant.

HALT
: name of exit routine to be called when a logical unit halt (that is, disconnect) is to be done.

INQUEUE
: name of exit routine called before an input message is queued to the Back End. It may inspect, modify, or reject the message, or it may process the message itself.

LOGON
: name of exit routine called when a logical unit logs on successfully.

LUS
: name of exit routine called when a LUSTAT message is received from a LU.

OTQUEUE
: name of exit routine called when an output message is queued for a logical unit component. It may inspect, modify, or reject the message.

OUTSEG
: name of exit routine called to segment an output message for chaining. It is called repeatedly to define each segment.

RCVEXCD
: name of exit routine to be called when an exceptional condition return code is returned by VTAM to a RECEIVE macro (exception message, data damage or environment error). The exit routine may override standard action taken by Intercomm.

SHUTD
: name of exit routine to be called when a logical unit orderly shutdown is to be started.

SIGNAL
: name of exit routine to be called to act upon a SIGNAL expedited flow command received from a logical unit.

SNDABT
: name of exit routine to be called when VTAM aborts scheduling of an output message.

SNDEXR
: name of exit routine to be called when an output message receives an exception response.

SNDNRM
: name of exit routine to be called when an output message specifying DR1/DR2 (definite response type 1 or 2) has been successfully sent.

Appendix C

USER EXITS

Following are two figures that summarize all exit routines. Appendix C.1 describes general user exits; Appendix C.2 describes LU-related user exits. The columns in the tables are:

- NAME--for general user exits, this must be the entry point name of the routine.
- NAME & ENTRY CODE--for LU-related user exits, NAME is the name of the VTLVB macro parameter that the user must code to define the exit. The entry point name is chosen by the user. ENTRY CODE is the decimal value set in register zero on entry to all LU-related user exits. This code can be used to differentiate exit routine calls when the same entry name is specified for more than one exit.
- WHEN CALLED--describes the point in processing when the exit is called.
- CALLER--name of VTAM Front End Module calling this exit. (The VTLUCALL macro is used by the Intercomm VTAM Front End modules to call a LU related user exit).
- PARAMETER LIST--format of list whose address is passed in register 1.
- RETURN CODES AND MEANINGS--List of return codes the exit may set in register 15 on exit, and their meanings.
- REMARKS--usage or coding suggestions.

Name	When Called	Caller	Parameter List (Address in Register 1)	Return Code Values (Set in Register 15)	Remarks
VTUSLGNX	Final Validation of Logon request (acceptance or acquisition), immediately prior to OPNDST macro.	VTEXITS	Address of VTAM NIB with LU name; Address of BINDAREA.	0--Logon ok 4--Reject Logon	VTAM INQUIRE macro ok in exit.
VTUSVSDX	VTCN$SHUTD command (internal or external) being processed--user exit may perform any general processing, such as send good-night message.	VTLUCMD	None.	0--Completed (notification only)	May be executed as nonzero thread.
VTUSRLRX	VTAM RELREQ exit scheduled--user exit may take whatever action is desired.	VTEXITS	Address of LUNIT macro (LUB) for this LU.	0--Completed	Use SPLU command to shut down or disconnect LU. (See Section 5.5.4)
USRBTLOG	After any input message (valid or invalid) is received. An invalid input message is incompletely formatted.	VTRECVE	Address of message; Header Fields: MSGHBMN, MSGHTID, and MSGHLEN are set.	0--Completed	Identical to BTAM exit routine called by BTSEARCH. The message must not be altered in any way.

General User Exits

Name	When Called	Caller	Parameter List (Address in Register 1)	Return Code Values (Set in Register 15)	Remarks
INQUEUE 0	Before message is queued for Back End subsystem. User exit may inspect, modify, reject, or process the message in its final form to send to the Back End. All header and text fields are complete. Note: if verb is changed, also change receiving subsystem codes in the message header. Characteristics of original verb still apply: EDIT, LOCKEXE, CONV, LOCK, etc. (parameters of BTVERB macros).	VTRECVE	Address of input message to be passed to Back End; address of LUB; address of LUC.	0--Continue normally; exit may modify or reallocate message in new address area. Address of new/ modified/unchanged message is returned in parm list first word. 4--Message processed by exit routine. VTRECVE continues as if message is queued ok, returns normal response to LU, if requested, etc. 8--Message rejected by exit routine. Exit routine must free message. VTRECVE returns exception response if original input requested it.	Any header or text field can be modified except the originating component. If the message is processed by the exit routine (return code 4), then the originating component may also be changed.

LU-Related User Exits (Page 1 of 5)

Name	When Called	Caller	Parameter List (Address in Register 1)	Return Code Values (Set in Register 15)	Remarks
OTQUEUE 4	Before the message is put on the component queue. User exit may inspect, modify, or reject the message.	VTQMOD	Address of output message from FESEND; address of LUB; address of LUC	0--Continue normally; user exit may modify or reallocate in new area. Address of new/modified/ unchanged message is returned in parm list first word; free old message if new created. 8--No storage to reallocate message-- user exit must free original message.	Usually executed with nonzero thread number. The destination component may not be changed. (See Section 5.5.4)
OUTSEG 8	When VTLSB macro specifies SOUTSEG=USER. User exit may specify next segment of output message sent as a chain.	VTSEND	Address of VTAM send buffer (VSB): segmentation control fields in header; address of LUB; address of LUC.	0--Segment available; fields in VSB header define it.	See Subsection 5.5.3 for use of OUTSEG routine
LOGON 12	After OPNDST macro has completed, LUB and LUC initialized; before sequence numbers resynchronized and SDT command sent to LU.	VTEXITS	Address of LUB.	0--Completed	notification only

LU-Related User Exits (Page 2 of 5)

Name	When Called	Caller	Parameter List (Address in Register 1)	Return Code Values (Set in Register 15)	Remarks
SHUTD 16	SPLU$TPUxxxxx$SHUTD processing--immediately after sending shutdown started message (FC123I). (SPLU command may be internal or external.)	VTLUCMD	Address of LUB.	0--Completed (notification only)	May be executed with nonzero thread number.
HALT 20	SPLU$TPUxxxxx$HALT processing--first step is to call HALT user exit. (SPLU command may be internal or external.)	VTLUCMD	Address of LUB.	0--Completed (notification only)	May be executed with nonzero thread number.
LUS 24	LUS Received.	VTRECVE	Address of full-word with sense data; address of LUB.	0--continue 4--disconnect all	
SIGNAL 28	Signal Expedited Flow command received.	VTEXITS	Address of full-word w/signal data from LU; address of LUB.	0--Signal processing complete	User assigns meaning to Signal data. Exit routine must act upon Signal data received.

LU-Related User Exits (Page 3 of 5)

Name	When Called	Caller	Parameter List (Address in Register 1)	Return Code Values (Set in Register 15)	Remarks
RCVEXCD 32	Exception condition during processing of input message detected by VTAM (such as path error) or by Intercomm (such as no verb in message). Exit is called before exception response, if any, is sent and error recovery performed.	VTRECVE	Address of RPL; if bit X'40' of action code is on, sense to be sent to LU if requested in RPLSSEO, RPLSSNO, RPLUSNO (for Intercomm-detected errors, RPL return codes indicate normal completion and user sense set); address of 1-byte action code. The only bits that can be examined or set by the exit routine are: X'40'--Send exception response to LU. If 1, sense set in RPL; otherwise RPL return codes indicate error. X'10'--Disconnect LU. X'04'--Resynchronize LU sequence numbers; address of LUB; address of LUC if known or zero.	0--Continue with error processing as directed by action code. User can modify action code.	On entry, RPL return codes, RPL output sense data and code are set. Exit routine can alter recovery action by modifying action code.

LU-Related User Exits (Page 4 of 5)

Name	When Called	Caller	Parameter List (Address in Register 1)	Return Code Values (Set in Register 15)	Remarks
SNDABT 36	A SEND macro completed with an error indicating operation aborted.	VTSEND	Address of RPL; return codes indicate error; address of LUB; address of LUC.	0--Completed (notify only)	SNDABT cannot alter recovery action.
SNDEXR 40	Negative response received.	VTRESP	Address of RPL and address of Action Code (See RCVEXCD); address of LUB; address of LUC.	0--Completed	May modify Action Code.
SNDNRM 44	Positive response received.	VTRESP	Address of RPL; address of LUB; address of LUC.	0--Completed	Notification only. (See Section 5.5.4)

LU-Related User Exits (Page 5 of 5)