INTERCOMM

COBOL PROGRAMMERS GUIDE

ISOGON CORPORATION

330 Seventh Avenue · New York, New York 10001

COBOL Programmers Guide

Publishing History

Publication	Date	Remarks
First Edition	September 1973	This manual corresponds to Intercomm Release 6.0.
Second Edition	December 1982	This manual corresponds to Intercomm Release 9.0.
Third Edition	April 1994	Updates and revisions for Releases 9 and 10.

NOTES:

The following enhancements are for Release 10 only:

- 3-byte MSGHBMN number
- INTSORT (in-core table sort) service routine
- Dynamically loaded programs above the 16M line
- DWSCHK, INDUMP and SAM parameters - SYCTTBL macro
- REJECT (of msg queued for delayed subsystem) parm - SYCTTBL
- DWSSNAP Facility (online debugging/DWS snaps)
- VSAM data set access under Dynamic File Allocation (DFA)
- Subsystem message flushing (SSFL command)
- GETDATE macro
- SCTL system control/debugging command
- FTUN/SSUP, PRTY, SPAC, TCTV subsystem control commands
- Backend initiation of a transaction on an LU6.2 link
- Table Facility
- Page Facility using Table Facility (no PAGETBLE/data sets)
- VS COBOL II support

The following are desupported under Release 10:

- AMIGOS file access method
- DISAM file access method

PREFACE

Intercomm is a state-of-the-art teleprocessing monitor system executing on the IBM System/370 and System/390 family of computers and operating under the control of IBM Operating Systems (XA and ESA). 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.

The _COBOL Programmers Guide_ explains the organization of Intercomm from the application programmer's point of view and illustrates the procedures for creating COBOL application programs and integrating them into the Intercomm environment.

Syntax used in describing the coding of JCL or application program statements is:

- { } A pair of braces indicates the presence of a choice: code elements contained within the braces represent alternatives, one of which must be chosen. The braces are not to be coded.
- [ ] A pair of brackets indicates an optional parameter which may be omitted depending on access requirements as described in the accompanying text. The brackets are not to be coded.
- A parameter consisting partially or solely of lower case letters represents the generic (Intercomm) name of the value. The programmer must substitute the actual name used for defining the data area within the specific program.

As a prerequisite to this manual, it is assumed that the user is familiar with the Intercomm _Concepts and Facilities_ Manual. The following manuals describe in further detail facilities referenced in this manual:

- _Message Mapping Utilities_
- _Utilities Users Guide_
- _Store/Fetch Facility_
- _Dynamic Data Queuing Facility_
- _Page Facility_ and _Table Facility_
- _Operating Reference Manual_: "Message Management"
  "File Management"

Note: the term COBOL refers to both OS/VS and ANS COBOL and to VS COBOL II programs. The term OS/ANS COBOL refers to all supported COBOL compilers except VS COBOL II. A mixed environment is supported except as noted in Chapter 3. A distinction is made if necessary.

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

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

Store/Fetch Facility

SNA Terminal Support Guide

Table Facility

TCAM Support Users Guide

Utilities Users Guide

EXTERNAL FEATURES MANUALS

SNA LU6.2 Support Guide

TABLE OF CONTENTS

Page

LIST OF ILLUSTRATIONS

Chapter 1

INTRODUCTORY CONCEPTS OF ON-LINE SYSTEMS

1.1 INTRODUCTION

The objective of most on-line systems is to reduce the time factor from source of input data to the results of data processing. Typical on-line systems applications in the business environment are:

- Data Collection

  Transactions may be edited partially on receipt, batch totals may be transmitted and verified, but the bulk of processing of the collected data takes place in the batch mode off-line.

- Inquiry/Update Systems

  Transactions are processed immediately to retrieve and/or update information in an on-line data base.

- Message Switching

  Transactions consist of administrative data to be rerouted to other terminals in the system.

On-line systems are characterized by a mode of operation which is nonscheduled and transaction-oriented. An operator at a terminal remote from the data processing center enters a transaction (unit of work) by transmitting a message over communication facilities. Each individual transaction is processed immediately, as opposed to batch systems, where transactions are accumulated for processing on a periodic basis (monthly, daily, etc.).

Online systems are designed to satisfy a response time requirement which is the elapsed time between a request for processing by an input message from a terminal to receipt of an acknowledgement, or response to that input message (completion of a transaction).

1.2 THE ON-LINE SYSTEM ENVIRONMENT

Typical on-line message processing application programs operate on one transaction at a time as they come in from terminals. Application programs are usually designed to process only one type of transaction, and the whole environment can be said to be transaction oriented. Input messages can be processed as received, in any order, and the files to be referenced should not be read from beginning to end for each transaction. Instead, the records in files are accessed directly, either through a specific key or some form of cross-reference look-up.

A few applications might require some sequential or list processing of a file, and while this is possible, message processing times for such applications would tend to be high.

Figure 1 shows a computer system schematic depicting a memory layout with an on-line system such as Intercomm, operating in a region or address space as a job under an operating system such as IBM's MVS. The on-line system has its own Transaction Monitor which schedules the activation of transaction processing according to the varying demands in message traffic.

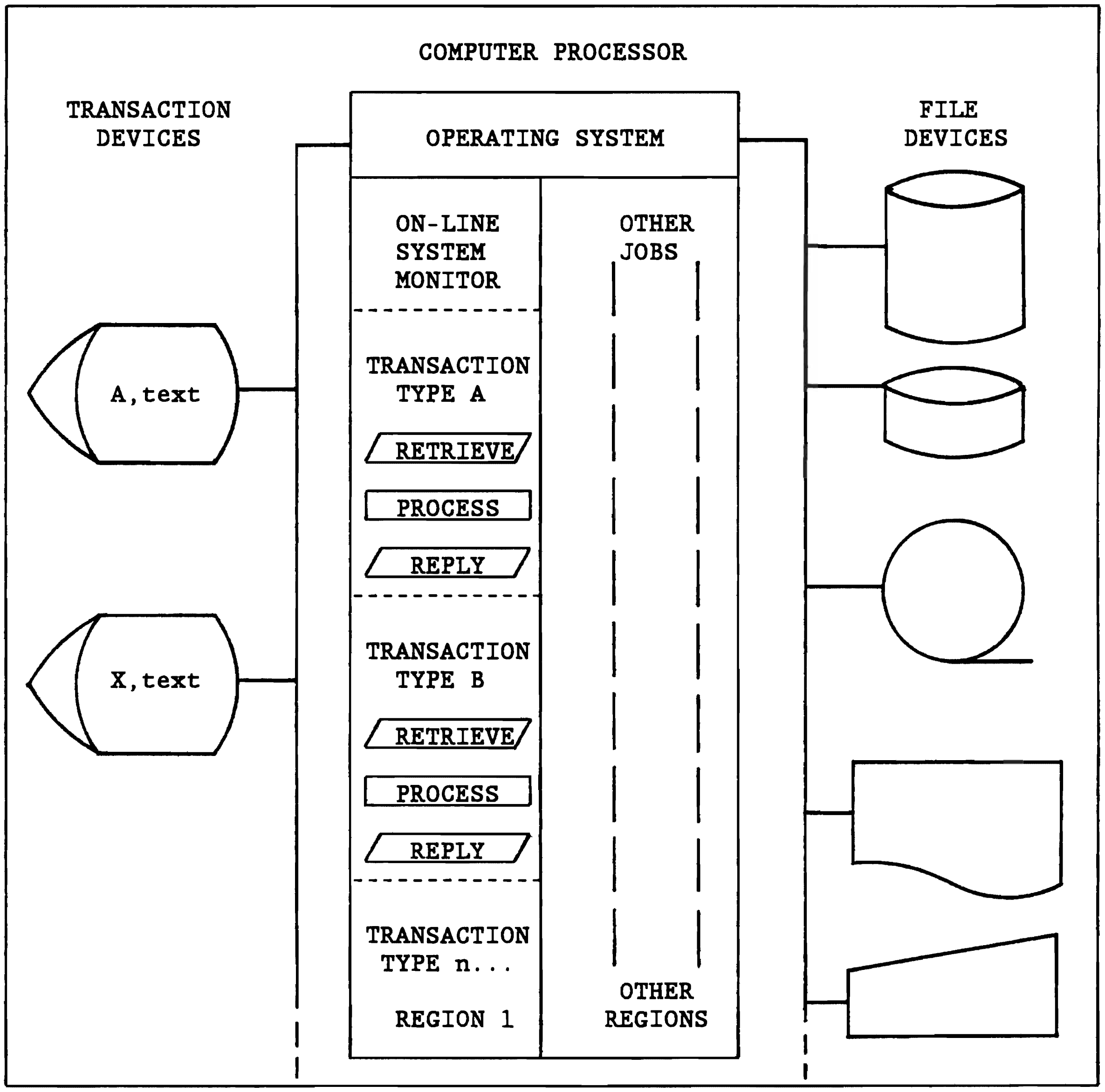


Figure 1. On-line Transaction Processing in a Multiprogramming Environment

The transaction processing programs do not conduct input or output operations with the terminals. This function is provided by the on-line system, which reads input messages from terminals and saves them (queues them) until the appropriate processing program can be activated (scheduled). The message is then retrieved from the queue and passed directly to the processing program by the Monitor. The processing program then requests the Monitor to queue its output response message, and the Monitor handles the terminal output function.

1.3 BATCH ENVIRONMENT VS. ON-LINE ENVIRONMENT

The classical batch processing system flow of input/process/output can be expanded to include message queuing and retrieving in the on-line environment. However, the typical on-line application program need only be concerned with actual transaction processing, because the on-line system does the rest. Figure 2 summarizes some of the differences between batch and on-line environments.

Batch	Online
Scheduled input	Unscheduled input
Single-application job	Multiple-application job
Delayed processing of transactions in batches by type	Immediate processing of individual transactions by type
Transaction input, processing, and output controlled by processing program logic	Terminal input/output events are asynchronous to the processing program

Figure 2. Differences Between Batch and On-line Environments

1.4 SINGLE-THREAD VS. MULTITHREAD PROCESSING

In the on-line environment, the logical path of a program in execution is called a thread. A single-thread system processes one message at a time. However, in a multiple application environment, message volume is such that all message traffic could not be adequately serviced in a single-thread mode. Large queues (waiting lines) tend to develop because messages arrive faster than they can be processed. To alleviate this problem and improve system throughput, the delay time in the processing of one message waiting for an I/O operation may be used for simultaneously processing another message. In this way, several message processing logic paths, or threads, may be active at once. This is referred to as multithreading.

Multithreading is coordinated by the Transaction Monitor, and, depending on message traffic, can occur between two or more programs or within a single program.

To illustrate this, let us assume that we have two transaction processing programs, A and B, and that three messages have arrived for processing; two A-type transactions and one B-type transaction. Programs A and B both require access to records in a file, affording an opportunity for some processing overlap or multithreading. Multithreading would occur between programs A and B if while program A is waiting for file retrieval, program B is activated by the Monitor to carry out its message processing. However, if program A were reentrant, that is, written in such a way that it could handle more than one thread at a time, then multithreading could also occur within program A. This means that while reentrant program A is waiting for a file retrieval for the processing of one message, it may be activated again to carry out the parallel processing of a second, or nth, message. Figure 3 illustrates these concepts.

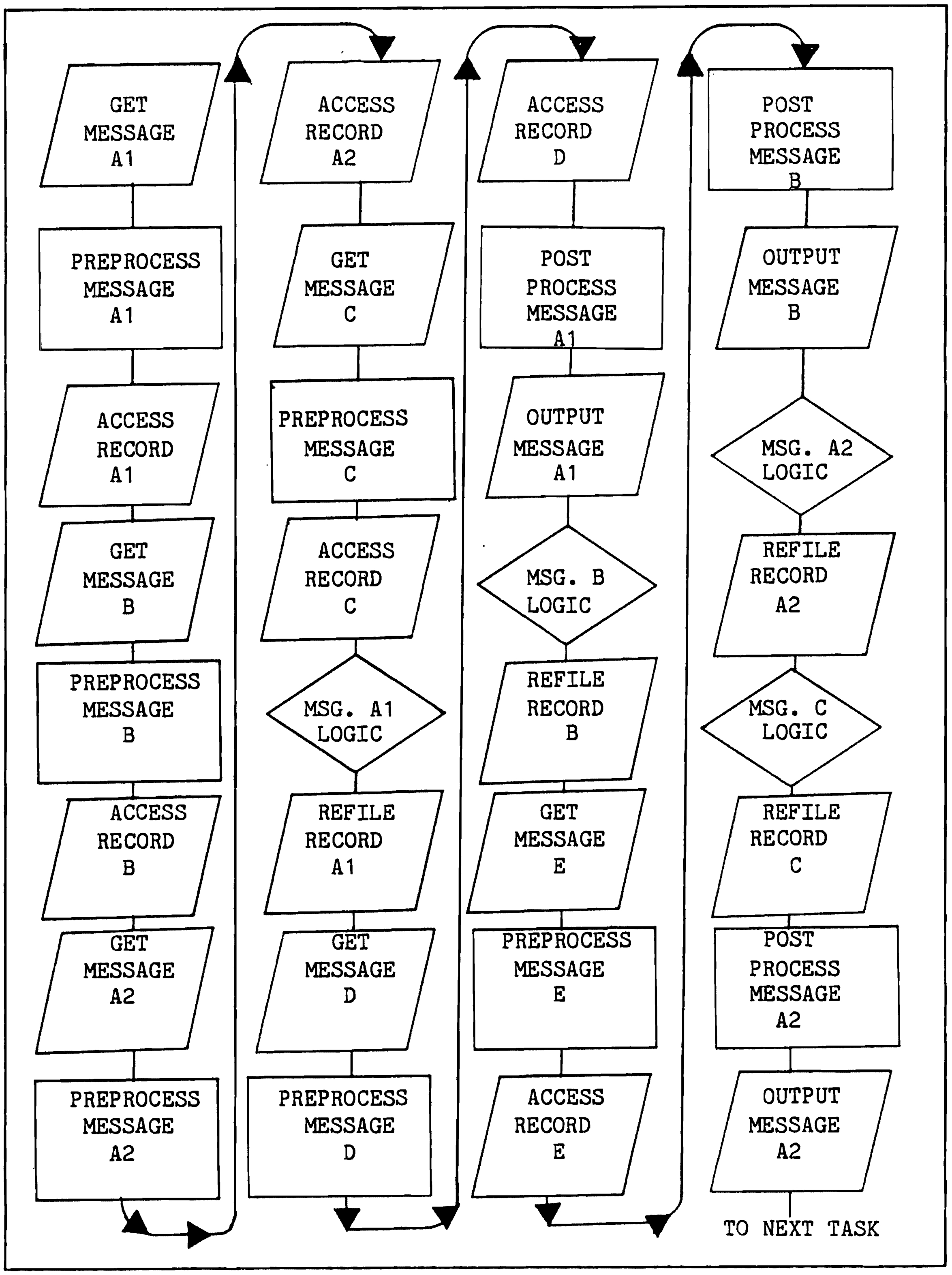


Figure 3. Multithreading in an On-line Environment

1.5 PROGRAM FUNCTIONS IN THE ON-LINE ENVIRONMENT

An on-line system consists of programs to serve four different functions:

- Line Control and Terminal Control
  - -- Servicing input requests from the various terminal types including transmission error recovery
  - -- Directing output to the various terminal types including transmission error recovery
  - -- Intercepting and storing messages to non-operational devices, and retrieval of messages when devices become operational
  - -- Translation of messages to and from terminal transmission code and EBCDIC code for processing
- Message Processing Control
  - -- Queuing new input messages until the associated message processing program is scheduled for execution
  - -- Scheduling message processing programs to obtain best system throughput for message traffic
  - -- Controlling multithread operation for concurrent processing of several messages
  - -- Centralizing data file accesses to eliminate redundant operations and provide exclusive control over records during file updates
- Systems Operation Control
  - -- Security checking functions to restrict certain transactions to specific operators and/or terminals, and to prevent access to unauthorized functions/files.
  - -- Logging (journaling) of all message traffic
  - -- Checkpointing, Message Restart, File Recovery and Backout-On-The-Fly (dynamic file backout) facilities
  - -- Cancellation of message processing programs when a program check or program loop occurs
  - -- Collect and display system statistics
  - -- Display and modify system status

- <u>Message (Transaction) Processing</u>

  -- Editing text data from terminal input, including format conversion and content editing of individual fields

  -- Retrieval and updating of data from on-line files or data bases

  -- Preparation of response (output) messages to terminals

  -- Queuing of response messages for output to terminals

1.5.1 <u>Monitor Control Functions</u>

The Intercomm System provides complete facilities for:

- Line control and terminal control
- Message processing control
- Systems operation control

1.5.2 <u>Application Processing Functions</u>

Transaction processing logic lies within the coding domain of the application programmer. Intercomm provides the following message and file handling support:

- Format conversion and editing of input fields
- Centralized control of data files
- Format conversion and placement of constant and variable information in response messages and terminal displays
- Queuing of messages (for the same or another terminal, or another application)

The installation-dependent application logic functions then need include only the following:

- Content editing of individual input message fields
- Retrieval and updating of data from on-line files
- Selection of individual fields for the output message(s)

Chapter 2

MESSAGE PROCESSING AND CONTROL UNDER INTERCOMM

2.1 THE INTERCOMM ENVIRONMENT

Intercomm operates under MVS as a job in a region or address space. The job is loaded at the beginning of on-line operations and continues to operate until the terminal network is closed down. Intercomm contains many system programs and application subsystems. Intercomm system programs include the Monitor and other subprograms to handle such things as terminal and peripheral I/O operations. Subsystems are message processing application programs activated by the Monitor. The term "subsystem" includes both application-oriented message processing programs written by users and Intercomm system command processing and utility programs. The Intercomm region contains the execution module itself plus dynamically allocated storage or work space, as illustrated in Figure 4.

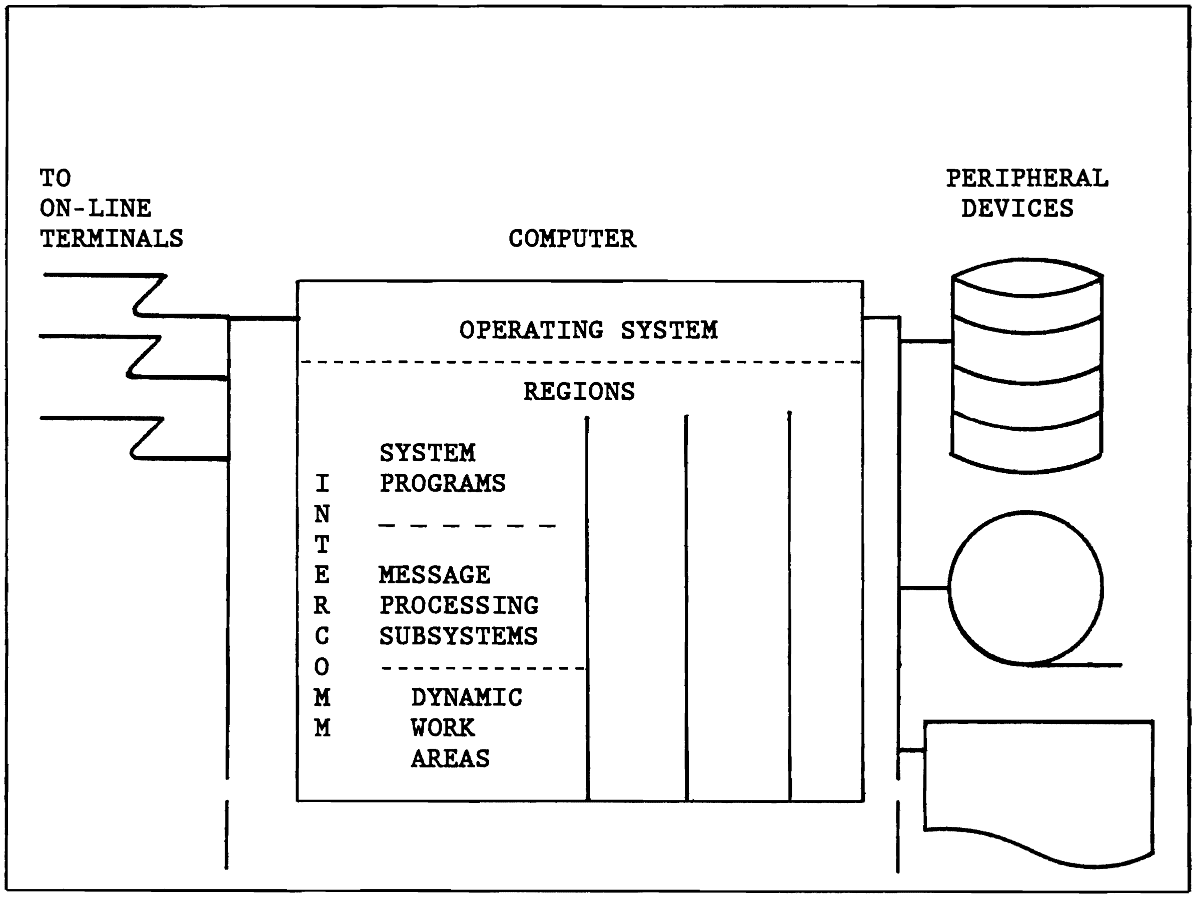


Figure 4. The Intercomm Environment

The system programs are time- or event-driven; the subsystems are message-driven. The Intercomm Monitor calls system programs to handle events and exceptional conditions as they occur, for example, terminal and peripheral I/O interrupts, time-dependent processing, excessive message traffic, and system operator commands.

A subsystem, on the other hand, is called by the system monitor when there are messages queued for it, and it has been scheduled for execution. Subsystems, while executing, can call user subroutines or call system programs to perform services, such as accessing data files and queuing messages for output or additional processing by other subsystems. Figure 5 shows that called system programs and user subroutines will always return to the calling subsystem (or subroutine), just as the subsystem itself, executing as a subroutine of Intercomm, must always return to the system monitor that originally activated it.

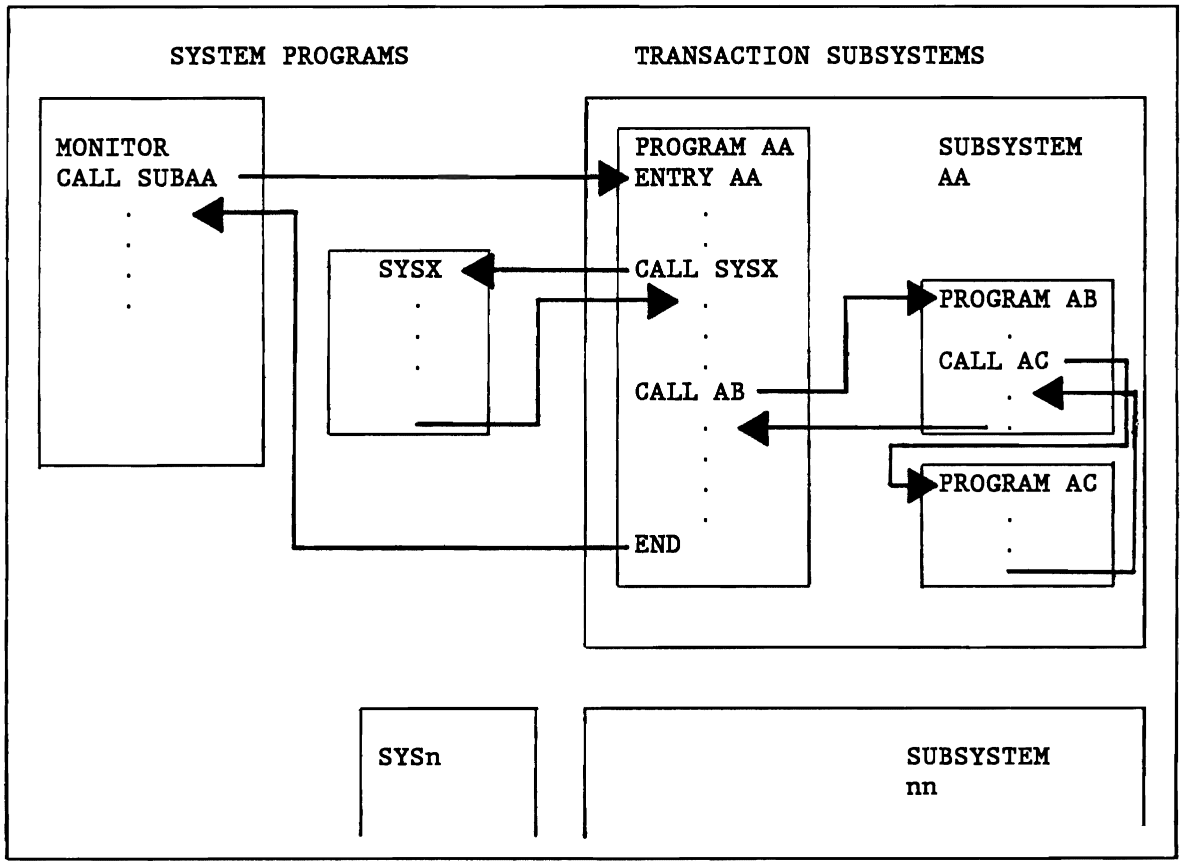


Figure 5. Intercomm Control Sequence

2.2 SYSTEM COMPONENTS

On-line system component programs are often categorized as resident or nonresident, system or user, but typical on-line terminology also distinguishes between Front End and Back End system components.

2.2.1 Front End

The Front End communicates with and monitors all terminals in the network. It receives and sends messages, checks validity, performs security checking if specified, and accomplishes appropriate code translation. The Front End communicates with the Intercomm message processing Back End via input message queuing and output message dequeuing routines. Although Intercomm has its own VTAM Front End, it can also interface with other software Front Ends such as TCAM and BTAM. The term 'terminal' refers to all supported hardware devices (such as the IBM 3270 family, PCs and workstations with 3270 emulation, etc.) and software (LU6.2 link) which can transmit input messages and/or receive output messages.

2.2.2 Back End

The Back End accomplishes all message processing control, system operation control, and processing of individual messages. It is, essentially, the "director" of the entire on-line system operation.

The Front End and the Monitor portion of the Back End are always resident, whereas message processing subsystems can be any combination of resident and loadable. (See Figure 6.) The decision to make a message processing subsystem permanently resident, or loadable, is based upon the trade-offs between response time, frequency of use, and total system core storage requirements.

2.2.3 LU6.2 Link

Support for LU6.2 sessions is an external feature to Intercomm which is available in two modes:

- Basic: (Releases 9 and 10) an upgrade to the VTAM Front End to support secondary LU6.2 sessions with IBM's CICS to receive input messages, queue them for subsystem processing, and route the responses back to CICS.
- Enhanced: (Release 10 only) an add-on to basic support plus an upgrade to the Back End to permit both receipt and initiation of transactions on LU6.2 sessions with other VTAM applications (Intercomm, CICS, etc.). Subsystems may invoke an LU6.2 transaction via the INITLU6 service routine. See SNA LU6.2 Support Guide.

2.3 SYSTEM PROGRAMS

Intercomm system programs are written in Assembler language and include the Monitor, File Handler, high-level language interface routines to maintain reentrancy, and message processing service routines.

The Monitor interfaces with the Front End via message queues and controls the processing of messages by subsystems. It is essentially a traffic director, analyzing message traffic and scheduling subsystems based upon traffic volume and priority criteria. The Monitor has four key components:

- The TP queuing interface, which communicates with the Front End to dequeue input messages or to queue output messages created by subsystems.
- The Subsystem Controller, which schedules, loads and activates the application subsystems, and performs clean up processing when the subsystem returns.
- The Dispatcher, which controls the execution of all events in the system to accomplish multithreading.
- The Resource Manager, which allocates/deallocates and controls dynamic resources (such as core storage) used by system and application programs.

The File Handler is the central Intercomm routine where all peripheral I/O service for data files is controlled. The File Handler issues OPENs, CLOSEs, GETs, PUTs, READs, and WRITEs via the operating system data management facility. Subsystems merely call an appropriate File Handler routine. Therefore, all access methods supported by Intercomm are available to any subsystem program, regardless of the programming language used. The File Handler maintains a single set of control blocks for each file defined to it via standard Job Control Language Data Definition statements, and all programs share this one set of control blocks. Intercomm can control overlapping of peripheral I/O processing, as well as provide standardized error analysis. A file is usually opened only once during an on-line session: at system startup (optional), or if not, then at the time the first I/O is requested. Since files can be accessed concurrently by different subsystems, an exclusive control feature is provided to eliminate difficulties arising when two or more subsystems (or subsystem threads) attempt to update the same record at the same time.

Language interface routines are described in Chapter 3.

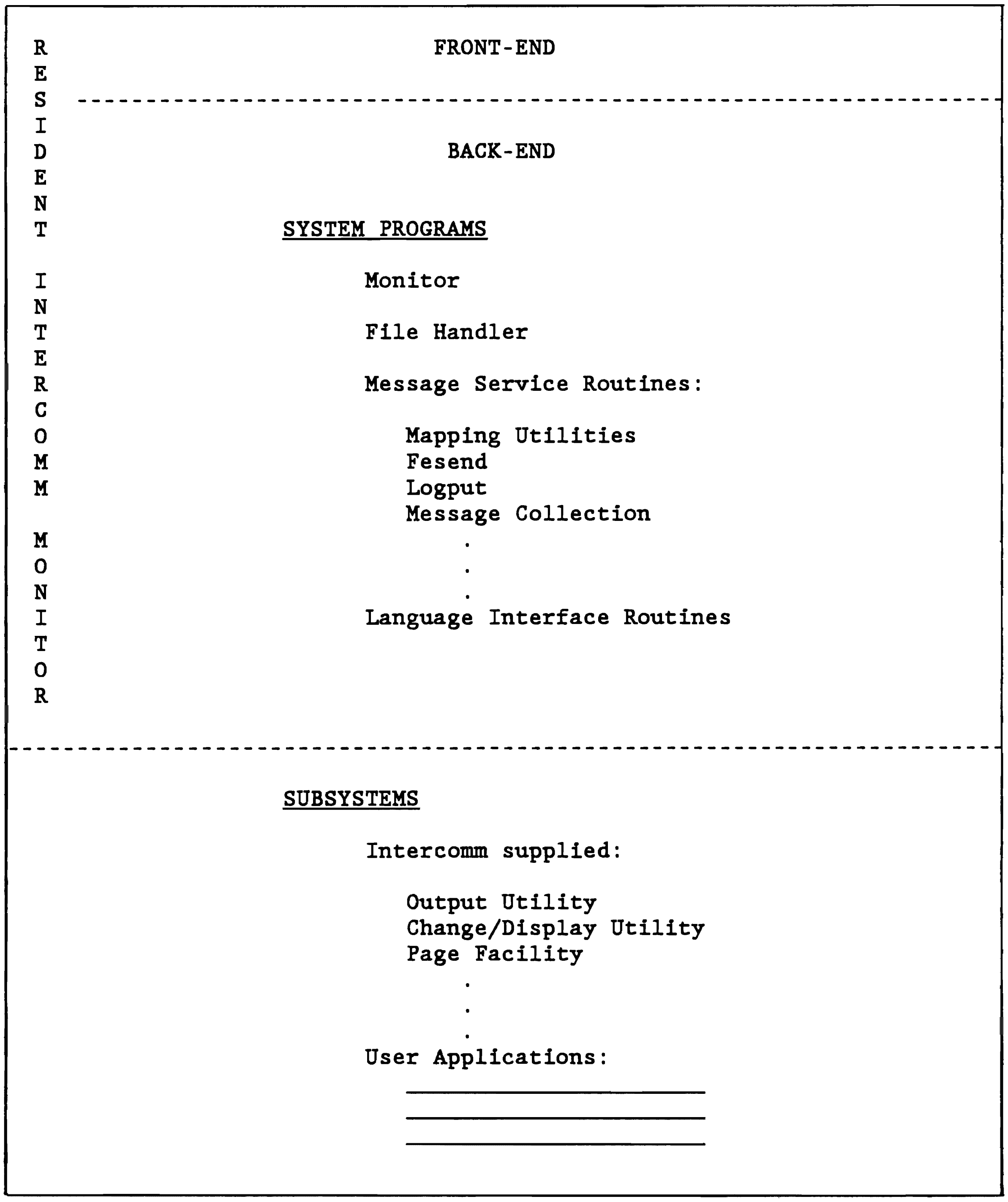


Figure 6. Intercomm System Components

The basic message processing service routines are:

- FESEND--which passes an output message to the Front End for transmission to a terminal.
- LOGPUT--which copies a message onto the system log whenever called by a system program or user subsystem.
- MESSAGE COLLECTION--which handles the queuing and dequeuing of all messages destined for subsystems.

Intercomm provides service routines to convert terminal-dependent input messages to a terminal-independent form for application processing. This transformation includes removal of terminal-dependent control characters and conversion of numeric data fields to fixed decimal or binary form, if required. Similarly, for output messages, service routines provide transformation from terminal-independent results of application subsystem processing to terminal-dependent messages for transmission. This includes insertion of terminal-dependent control characters, conversion of numeric fields to character format, if required, and inclusion of title information, if specified. Each of these routines function via user-specified descriptions (tables) of input and output message formats. These service routines are:

- Message Mapping Utilities

  This is a set of service routines called by an application program to perform the device-dependent transformations specified by the user for both input and output messages. Validity checking, conversion, justification and padding/truncation of data fields is also performed. This utility also executes output message disposition (queuing/spooling), if requested.

- Edit Utility

  This is a service routine called by the Monitor to process input messages, performing device-dependent transformations, and field validity checking, conversion and padding according to user-specified editing characteristics.

- Output Utility

  This is a service routine executing as a subsystem to process output messages by performing device-dependent transformations, and then pass the messages to the Front End.

For detailed documentation of these facilities, see Message Mapping Utilities and the Utilities Users Guide.

Other service routines of the Intercomm system for processing requests associated with special subsystem design requirements are:

- Store/Fetch

  This facility allows a subsystem to save and retrieve a temporary or permanent data string identified by a user-defined key. One or more subsystems can access each stored data string. (See Store/Fetch Facility.)

- Dynamic Data Queuing (DDQ)

  This facility allows a subsystem to save and retrieve a set of related data strings (a data queue) identified by a user-defined name. One or more subsystems can access each DDQ which may be transient or permanent. A DDQ may also be used for collecting messages destined for another subsystem, a printer, or a batch program. (See Dynamic Data Queuing.)

- Table Facility

  This facility provides for creating a temporary table with a unique user name in core storage above the 16M line. Table entry data strings may then be added, updated or retrieved by the same or another subsystem, and may have keys for sorting and retrieval as a user option. (See Table Facility.)

- CRT Page Facility

  This facility allows a subsystem to write a set of output messages to a CRT terminal-oriented Page Data Set (Release 9) or to a table via the Table Facility (Release 10). The first message of a set is also sent to the Front End automatically. The terminal operator may then enter commands processed by the Paging subsystem to retrieve and browse through the pages of an output message set. (See Page Facility.)

- Data Base Management System Support (DBMS)

  This facility consists of service routines for each supported DBMS (IDMS, ADABAS, TOTAL, DL/I) which allows access to the DBMS from Intercomm. (See Data Base Management System Users Guide.)

- Dynamic File Allocation (DFA)

  This facility allows a subsystem to create (allocate) and/or access a sequential data set, or to access a VSAM data set, specifying its DSNAME as part of subsystem logic, rather than with execution JCL. (See Dynamic File Allocation.)

- Signed-on Operator-Id Checking

  When executing under the security control of the Intercomm Extended Security System (ESS), a subsystem may call a service routine (SECUSER) to determine the user-ID of the operator at the terminal from which the transaction to be processed was entered. (See Extended Security System.)

- LU6.2 Support (See Section 2.2.3 and SNA LU6.2 Support Guide.)

2.4 SUBSYSTEMS

Intercomm-supplied subsystems are written in reentrant Assembler Language, and include the Output Utility, the Change/Display Utility, the Page Browsing Subsystem and many command processing subsystems.

The Output Utility allows a programmer to specify predefined report and display formats so that simply constructed output messages from a subsystem can be expanded, columnized, headed and subheaded, and displayed upon different types of devices without concern to the subsystem creating the message. Output Utility display formats can be changed without program modifications.

The Change/Display Utility allows simple inquiry and file maintenance via predefined keyword input messages from terminals causing access to data files defined by tables. The Display Utility is used in conjunction with the Output Utility to produce varied report or display formats.

The Page Facility processes commands from CRT-type terminals to browse through a series of output display screens created by the PAGE system program. Subsystems make use of this feature by calling the PAGE interface program during message processing. The terminal operator interacts with the Page Facility directly.

Command processing subsystems process Intercomm standard messages to accomplish the start/stop of system functions, message switching between terminals, displaying and changing the status of system control parameters, display of statistics, etc. The commands and text syntax are described in System Control Commands.

User-supplied subsystems accomplish application-dependent message processing. Each may call any Intercomm service routine or user-supplied subroutine, and may be written in COBOL, Assembler or PL/1.

2.4.1 Reentrant vs Nonreentrant Subsystems

In an interactive on-line environment, the probability is very high for more than one terminal operator to enter concurrent requests to be processed by the same subsystem. To accomplish the multithreading of concurrent requests, application subsystems should be coded as reentrant, that is, variable data is defined and processed in a dynamic working storage area (DWS) obtained for the exclusive use of one processing thread. Since COBOL does not allow the facility for dynamically obtaining a working storage area (no equivalent to Assembler GETMAIN/FREEMAIN processing), Intercomm provides an interface whereby COBOL subsystems may be coded as psuedo-reentrant so that multi-threading may be accomplished. A special interface to accomplish multi-threading in reentrant VS COBOL II programs is also provided. These interfaces and program coding requirements are described in Chapter 3.

2.5 INTERCOMM TABLES

Intercomm is a generalized on-line system monitor, requiring information about specific operating characteristics of a particular installation. This information is supplied in the form of tables generated with Intercomm macro instructions. Application programmers are usually not involved in defining the Intercomm tables, except for table specifications which pertain to their own applications. The basic tables controlling message processing are as follows:

- Front End Verb Table (BTVRBTB)

  A table listing all valid transaction identifiers (verbs), and relating them to the subsystem required for message processing. There is one entry per verb, defined via a BTVERB macro.

- Front End Network Table

  Tables describing the terminal network (relating individual devices to five-character station identifications), device hardware and operating characteristics, and output message queuing specifications.

- Back End Station Table (PMISTATB) and Device Table (PMIDEVTB)

  Tables describing terminal identifications and device-dependent characteristics to the Message Mapping Utilities and/or the Edit and Output Utilities.

- System Parameter List (SPA)

  A table describing system-wide operating characteristics. This table may be extended to include installation-defined table entries, accessible to all user subsystems and subroutines (see Chapter 8). This table is generated via the SPALIST macro.

- Data Set Control Table (DSCT)

  A table generated by the File Handler describing on-line data sets. Information in this table is derived from JCL and file control (FAR) parameters at execution startup time.

- Subsystem Control Table (SCT)

  A table listing the program properties (reentrancy, language, entry point, etc.), message queue specifications (core and/or disk queues), and scheduling (resident or loadable, concurrent message processing limits, priority, etc.) for each subsystem. There is one entry per subsystem, defined via a SYCTTBL macro.

The above listed tables are described in detail in the Operating Reference Manual. Additional tables describe detailed functions for the system programs, service routines and utilities.

2.6 INTERFACING WITH THE INTERCOMM MONITOR

Each message processed by Intercomm consists of a 42-byte header prefix, plus application-oriented message text. The message header is prefixed to each input message by the Front End and is analyzed by the System Monitor for all message processing control. The particular fields of the header which control message routing are Receiving Subsystem Code (MSGHRSC) and Receiving Subsystem Code High-Order (MSGHRSCH). This two-byte code is initialized by the teleprocessing interface when it constructs the header from the verb supplied at the beginning of the message text. The Front End Verb Table relates user verbs to their corresponding subsystem codes via coding of BTVERB macros (see Basic System Macros) in a user member USRBTVRB copied into the system BTVRBTB which contains the Intercomm system verbs.

All subsystems are defined to Intercomm by an entry in the Subsystem Control Table (SCT). There is one entry for each subsystem which defines the program's general characteristics, scheduling requirements and message queuing specifications. Each subsystem must be assigned a unique two-character subsystem code for message routing. Definition of Intercomm system subsystems for utility and command processing is provided in the released member INTSCT.

The Subsystem Control Table entry for each user subsystem is defined using the SYCTTBL macro which is coded in a user member USRSCTS copied into the system INTSCT at assembly time. A full description of the macro may be found in the Intercomm Basic System Macros manual.

Many installations assign the responsibility of coding the Subsystem Control Table entries for individual user subsystems to the application programmer. At other installations, the Intercomm System Support Manager performs this task. In either case, the SYCTTBL macros must be coded with care, as there is one table controlling all user and system subsystems in operation when Intercomm is executing.

The most significant SYCTTBL macro parameters for COBOL subsystems are:

- LANG=RCOB

  For reentrant COBOL subsystems (LANG=COB if nonreentrant).

- SBSP=xxxxxxxx or LOADNAM=xxxxxxxx (for dynamic load)

  Specifies the subsystem entry, that is, the PROGRAM-ID of the COBOL subsystem (SBSP), or the load module name (LOADNAM).

- GET=nnnnn

  Only meaningful if LANG=RCOB is coded. It specifies the amount of dynamic working storage (initialized to low-values) to be provided via the Linkage Section on entry to a reentrant COBOL subsystem. The amount specified may be up to 64K minus 308 bytes (which is used for a link/save prefix area, and for the DWS protection option described in Chapter 3).

- FREE=nnnnn

  Only meaningful if LANG=RCOB is specified. The GET parameter must be specified to use FREE. It indicates the amount of the dynamic working storage area, provided on entry (via GET) to the reentrant COBOL subsystem, which should be freed when the subsystem completes. It defaults to the value specified for GET. (See Section 9.4 for further details.)

- TCTV=nnn

  Expected maximum processing time (in seconds) in a high-volume environment before the subsystem is assumed to be looping, or in an extended wait for file or data base access, and should be timed out. Considerations for this value depend on subsystem processing such as data base access, file updates, number and type of file accesses, exclusive control for file updates, number of output messages created, enqueue lock-out possibilities, etc.

- MNCL=nn

  Specifies the maximum number of concurrent threads that can be executed through this specific subsystem during a high activity period (when more than one operator enters transactions routed to this subsystem).

- RESOURC=name

  This parameter is used to control concurrent access to a resource (file, table, data base, etc.) across several subsystems in one Intercomm region. The name is also coded for the ID parameter of a RESOURCE macro (coded before all SYCTTBLs in the SCT) which identifies the shared resource and the maximum concurrent subsystem threads that may be activated for that resource. Note that the maximum share count coded on the RESOURCE macro overrides the combined MNCL value for all the subsystems "naming" that resource. An internal enqueue is issued (no time-out). While using this feature will affect response time during peak activity, it does not affect the TCTV for a subsystem, which goes into effect after shared control of the resource is granted.

2.7 INTERCOMM MESSAGE HEADER

The Intercomm message header is constructed by the Front End for each message when it arrives from a terminal. New messages created within the subsystem must be prefixed with the standard forty-two-byte header format, which is constructed by copying the input message header to an output message area and then altering appropriate fields. Figure 7 lists the names and formats of all the fields in the message header, and describes their contents and changeability.

Field Name	Length	Description	Alter Legend*
MSGHLEN	2	Length of message including header (binary number)	Y
MSGHQPR	1	Teleprocessing segment I/O code: 02/F2=full message; 00/F0=header segment; 01/F1=intermediate segment 03/F3=final (trailer) segment	N
MSGHRSCH	1	High-order receiving subsystem code	Y
MSGHRSC	1	Low-order receiving subsystem code	Y
MSGHSSC	1	Low-order sending subsystem code	M
MSGHMMN	3	Monitor message number assigned by Message Collection (binary)	N
MSGHDAT	6	Julian date (YY.DDD)**	N
MSGHTIM	8	Time stamp (HHMMSSTH)	N
MSGHTID	5	Terminal identification (originating terminal on input messages, destination terminal on output) or Broadcast Group name	Y
MSGHFLGS	2	Message indicator flags (MSGHCON - Rel 9)	N
(MSGHPID)	2	Reserved area (MSGHFLGS - Rel 9)	N
MSGHBMN	3	Front End message number - Rel 10 (binary)	N
MSGHSSCH	1	High-order sending subsystem code	M
MSGHUSR	1	User/system processing code***	L
	2	Used for special processing by the Front End (MSGHBMN - Rel 9)	N
MSGHLOG	1	Log code (see Figure 11)	L
MSGHBLK/ MSGHRETN	1	Reserved area/ Subsystem return code (for log code X'FA' entries only)	N
MSGHVMI	1	Verb or message identifier interpreted by receiving subsystem as required, and by FESEND	Y

Figure 7. Intercomm Message Header Fields (Page 1 of 2)

* Alter Legend:

Y = Must be filled in for intersubsystem message switching and output messages passed to FESEND (MSGHVMI should be set to X'57' or X'67', as appropriate, for output messages passed directly to FESEND)

M = Should be filled in for user's own information (required by Intercomm for message restart/file recovery and Log Analysis)

N = Do Not Touch (must be copied from input to output message header area)

L = May be modified for user codes based on subsystem logic

** The period represents a one-byte message thread number (for resource management and/or message restart purposes).

***MSGHUSR is used by Intercomm modules as follows:

1. If the BTVERB macro for the input verb has HPRTY=YES coded; contains a C'P' to request priority queuing for the subsystem. The user may move a C'P' to this field to request priority queuing for output messages to a terminal (via FESEND) or to another subsystem (via Message Collection).

2. For an input message from a BTAM 3270 CRT which contains SBA sequences, has a C'F' in the 01 log record.

3. For output messages to a switched async device (Teletype, Dataspeed 40, and 2740); a C'B' requests disconnect after transmitting the output message.

4. For output messages to a switched Teletype or Dataspeed 40 device; a C'X' requests using the alternate call-list for the next input message (as described in the <u>BTAM Terminal Support Guide</u>).

5. For output messages discarded by the Front End, a C'F' indicates the message was flushed by command, a C'Z' that it was discarded by the VTAM OTQUEUE user exit (Rel 10 only).

If none of the above considerations are applicable, the subsystem may use this field for messages queued to other user subsystems, or for special logging information. The LOGPRINT utility always prints the value coded in this field (in hexadecimal).

Figure 7. Intercomm Message Header Fields (Page 2 of 2)

2.7.1 MSGHQPR and MSGHVMI Fields

In general, a COBOL application subsystem does not need to be concerned with the MSGHQPR field, unless processing long input from a Teletype or similar device where message input may be segmented. In this case, the DDQ Facility must be used to store and sequentially forward the input message segments. Otherwise, input messages from the Front End always contain a QPR of C'2'. Both MMU and the Output Utility set the QPR to X'02' for output messages unless the Output Utility finds it necessary to segment an output message, in which case a segment code is used. The various uses of the MSGHVMI field for input and output message processing may be determined from the index references to this field at the end of this manual.

2.8 INTERCOMM MESSAGE FLOW USING MESSAGE MAPPING

The interaction of Intercomm system components, tables and subsystems with the Message Mapping Utilities (MMU) is summarized in Figure 8; the path of one input message and its corresponding output message is traced, and the numbered arrows in the diagram correspond to the numbered paragraphs below.

1 The Front End reads an input message and prefixes a 42-byte control header containing routing information, time, date, originating terminal and message length. The message is then queued for subsystem processing by Message Collection.

2 The System Monitor schedules the subsystem and retrieves the message based upon the Subsystem Control Table (SCT) scheduling criteria.

3 The message is passed to the subsystem.

4 Input in terminal-dependent format is transformed to a terminal independent form by a call to a Message Mapping Utility (MMU).

5 The subsystem performs message processing logic, requesting I/O service functions from the File Handler or Data Base Manager interface.

6 The subsystem creates one or more terminal-dependent output messages by calling MMU.

7 The subsystem passes the message formatted by MMU to the Front End by a call to FESEND (unless MMU is asked to perform this function).

8 The subsystem returns control to the System Monitor, passing a return code indicating normal completion or an error condition.

In the Intercomm multithread environment, this same sequence of events is carried out concurrently for many messages.

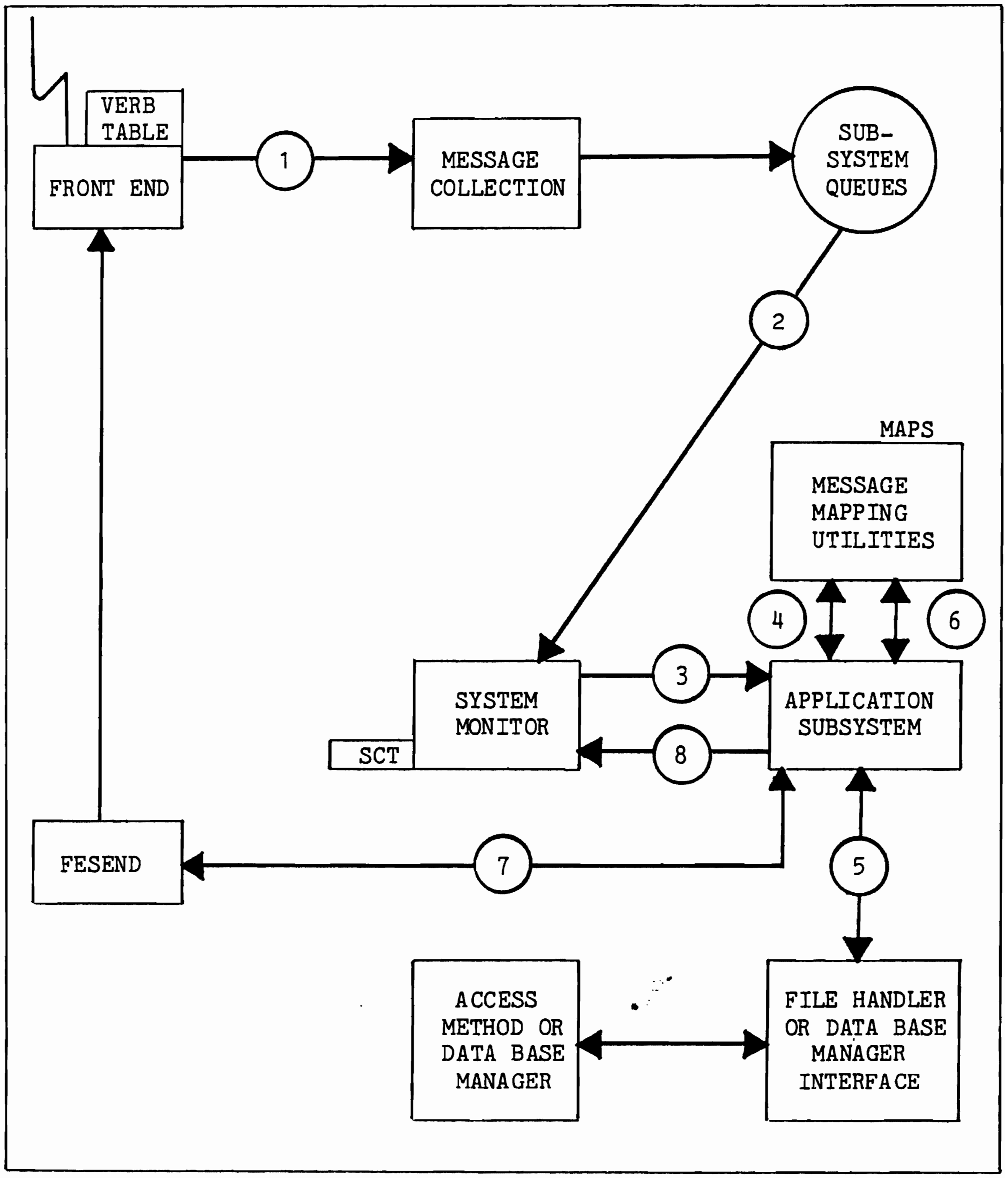


Figure 8. Intercomm Message Flow Using Message Mapping

2.9 INTERCOMM MESSAGE FLOW USING EDIT AND OUTPUT

The path of one input message and its corresponding output message is traced in Figure 9; the numbered arrows in the diagram correspond to the numbered paragraphs below.

1 The Front End reads an input message and prefixes a 42-byte control header containing routing information, time, date, originating terminal, and message length. The message is then queued for subsystem processing by Message Collection.

2 The System Monitor schedules the subsystem and retrieves the message based upon the Subsystem Control Table (SCT) scheduling criteria.

3 The Edit Utility is called (if required) and the input message is edited according to the Edit Control Table (ECT).

4 If Editing is not successful due to invalid input data, the Edit Utility optionally creates an error message for the originating terminal and queues it for the Output Utility by calling Message Collection. The subsystem is not activated.

5 If Editing is successful, the edited message is passed to the subsystem. If editing is not required, the unedited message is passed directly to the subsystem.

6 The subsystem performs message processing logic, requesting I/O service functions from the File Handler or Data Base Manager interface.

7 The subsystem creates one or more output messages and queues them for the Output Utility by calling Message Collection (COBPUT).

8 The subsystem returns control to the System Monitor, passing a return code indicating normal completion or an error condition.

9 The System Monitor schedules the Output Utility and passes the output message(s) to it for processing.

10 The Output Utility performs formatting, if specified in the message header, according to entries in the Output Format Table (OFT), finally passing the message to the Front End via a call to FESEND.

11 The Output Utility returns to the System Monitor.

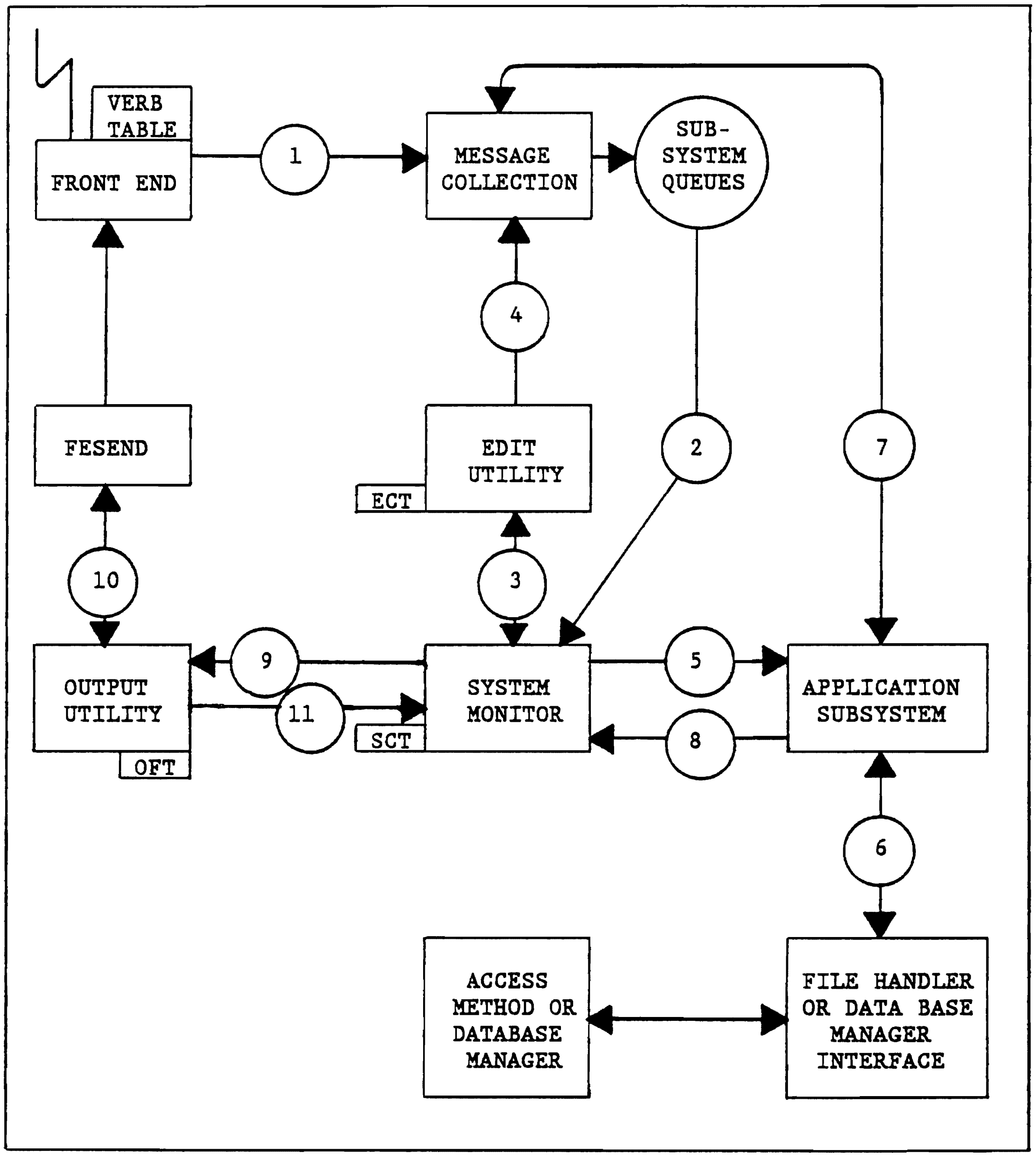


Figure 9. Intercomm Message Flow Using Edit and Output

2.10 THE INTERCOMM SYSTEM LOG

The Intercomm system log (INTERLOG) provides system journaling and maintains a historical record of all traffic within the system. Complete documentation of performance during on-line processing is thus provided, along with system control for restart/recovery.

Message traffic is recorded at the time of entry on a subsystem queue, and at the time message processing begins and ends within each subsystem. Subsystems may make user entries on the system log by calling an Intercomm system program (LOGPUT).

An installation may suppress some or all log entries, depending on its own requirements. The system log is optionally used at Intercomm system restart time to restore message traffic within the system at the time of failure. The logging entries are blocked and written to a variable-length sequential data set which may reside on disk or tape.

Log entries are in one of two formats: HT--42-byte message header and full text, as the message arrives from a terminal and is queued for a subsystem, or queued for a terminal; or HO--header-only entries, to mark progress through the system or error conditions.

Log entries are identified by a code in the MSGHLOG field of the message header. The time and date stamps (MSGHTIM and MSGHDAT) in the message header are updated for each log entry.

Progress of a message through a specific subsystem, or through the Front End, is indicated by the same Monitor Message Number (MSGHMMN) in each log record (01-30-FA or F2-F3). Complete progress of a message, from the first processing subsystem to final transmission, is indicated by the same Front End Message Number (MSGHBMN). The log may be printed completely or selectively via the Intercomm off-line utility LOGPRINT, described in the Operating Reference Manual.

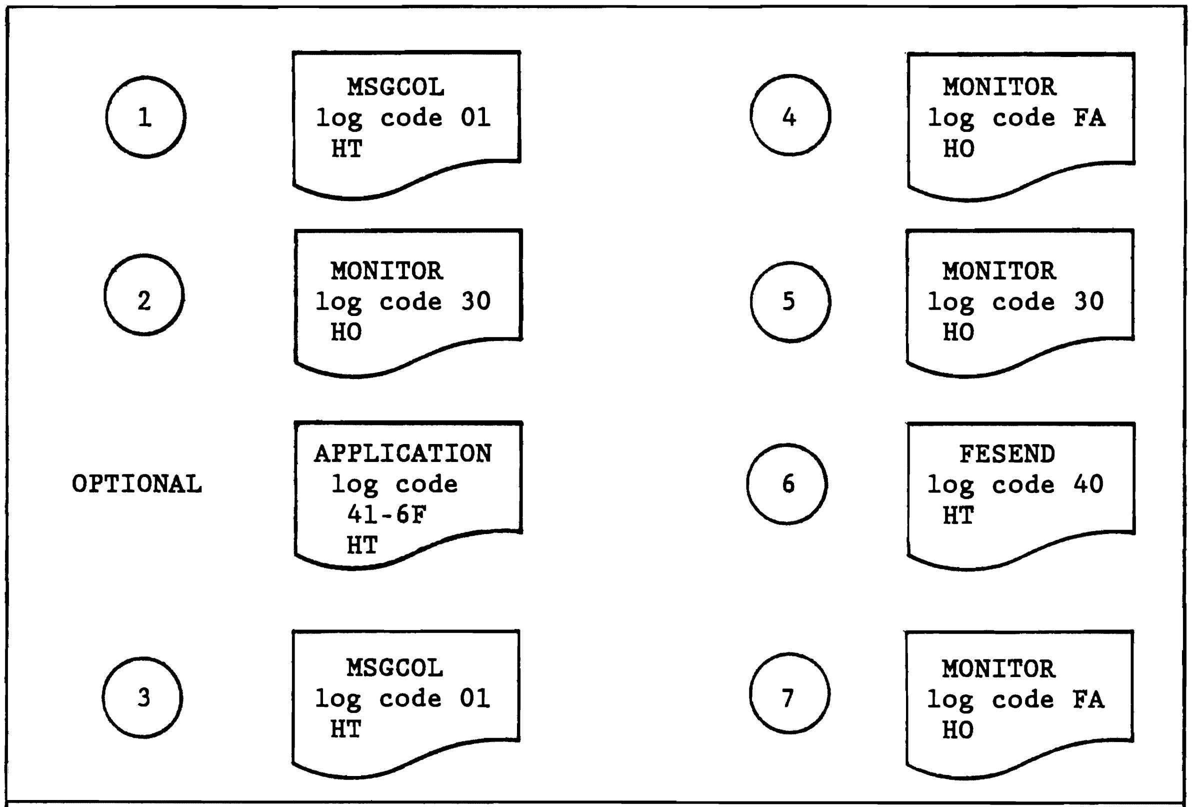
A timing analysis utility (Log Analysis), which is supplied with Intercomm, may be used off-line to produce a report of message queuing and processing time. Statistics for messages by terminal, verb, subsystem, and/or system totals are provided. See the Operating Reference Manual.

The logging entries may be input to user-written batch programs to provide performance analysis in detail, such as traffic vs. network configurations, accounting routines, etc.

Figure 10 illustrates the log entries for one input message and a corresponding output message generated via the Output Utility. Number 6 appears only if executing in Test mode, since there is no Front End.

For live or simulated mode Intercomm, two additional entries are an F2 log code (HT) when the message is queued for the Front End via FESEND (appears in place of the 40 log entry between the 30 and FA entries), and an F3 log code (HO) when the message was transmitted by the Front End. Logging of the message to be transmitted (log code F2) occurs <u>before</u> final Front End processing (idles insertion, New Line to SBA sequence conversion, etc.).

If Message Mapping is used and the message is passed to the Front End via FESEND (Figure 8), only the log entries numbered 1, 2, and 4 appear for each message processing thread, with the FESEND log entry (log code 40 or F2) appearing in place of log entry 3. Log entries 3, 5, and 7 represent the additional processing for a message passed to the Output Utility (receiving code U).



HT = Intercomm message header and message data
HO = Intercomm message header only

Figure 10. Sequence of Log Entries

Figure 11 describes all the Intercomm log codes. Note that user log entries may only use log codes in the range X'41' to X'6F'.

Internal Code	External Code	Format	Description	Origin	Restart Use
X'00'	00	HT	Checkpoint Record	Checkpoint	Yes
C'2'	01	HT	Message queued for subsystem by Front End or a subsystem	Message Collection	User
C'R'	02	HT	Message restarted through the system	LOGPROC	User
C'P'	03	HT	Message restarted--related to Data Base Recovery	LOGPROC	User
X'21-2F'	21-2F	HO/HT	See <u>SNA LU6.2 Support Guide</u>	Front End	No
C'T'	30	HO	Message passed to subsystem for processing	Subsystem Controller	User
C'Z'	40	HT	Message passed to Front End (test mode only)	FESEND	No
X'41'- X'6F'	41- 6F	HT	User called LOGPUT	Any Subsystem	No
X'80'- X'8E'	80- 8E	HT	File Recovery before-images	IXFLOG	User
X'8F'	8F	HO	Checkpoint Records indicator	IXFCHKPT	Yes
X'90'- X'9E'	90- 9E	HT	File Recovery after-images	IXFLOG	User
X'9F'	9F	HT	Intercomm Startup	LOGPUT	Yes
X'A0'	A0	HO	Message restart begun	LOGPROC	Yes
X'A1'	A1	HO	Message restart finished: all subsequent log entries produced by live Intercomm	LOGPROC	Yes
X'AA'	AA	HT	Intercomm Closedown	LOGPUT	No
X'C0'	C0	HT	Region started (Multiregion only) (Text=Region-id(s))	MRINTER	No
C'A'	C1	HT	Message successfully queued for Satellite Region	MRQMNGR CR only	User

Internal Code:	Log code in core during processing (snaps and dumps)
External Code:	Log code after translation by LOGPUT (INTERLOG printout)
Format:	HT for header and text, HO for header only
Restart Use:	Yes, No, User (specified via user-coded system macros)

Figure 11. INTERLOG Entries (Page 1 of 2)

Internal Code	External Code	Format	Description	Origin	Restart Use
C'B'	C2	HO	Message successfully passed to Satellite Region	MRQMNGR CR only	User
C'C'	C3	HO	Message lost (Region/Hold Q full) or flushed (SR/SS down)	MRQMNGR CR only	User
C'I'	C9	HT	Sign on/off processing, security violation messages	ESS	No
C'3'	FA	HO	Normal message complete	Subsystem Controller	User
C'5'	FB	HO	Unprocessed message--invalid subsystem/QPR code	Message Collection	User
C'6'	FC	HO	Unprocessed message--core and disk queue full	Message Collection	User
C'8'	FD	HO	Message cancelled--program error, time-out or I/O error; or flushed by command (Rel 10)	Subsystem Controller	User
C'9'	FE	HO	Message flushed by Retriever, used when application program does not obtain (via GETSEG) all parts of a segmented message; or message failed security check	Retriever SYCT400	No
C'1'	F1	HT	Message after verb verification	USRBTLOG (optional)	No
C'2'	F2	HT	Message queued for transmission	FESEND	User
C'3'	F3	HO	Message transmitted, discarded (MSGHUSR=Z-Rel 10), or flushed (MSGHUSR=F-Rel 10)	Front End	User
C'4'	F4	HO	3270 output message content invalid--message dropped.	BLHOT	No
C'5'-C'8'	F5-F8	HT	Transmitted DDQ msg status: see SNA Term. Support Gd.	Front End	No
X'FF'	FF	HT	Intercomm Restart Accounting	MSGAC	Yes

Figure 11. INTERLOG Entries (Page 2 of 2)

2.11 ADDITIONAL APPLICATION PROCESSING FACILITIES

In addition to the application programming facilities described in this and related manuals, the application designer should be aware of the following processing options available under Intercomm:

- Off-line batch region execution: the Intercomm File Handler, DFA, DDQ, Store/Fetch and MMU may be executed by an off-line program (coded as non-reentrant) to prepare a file, data strings, or messages for on-line access. See the associated manuals for linkedit considerations.

- Multiregion Facility batch region interface: when executing an on-line Multiregion system, any batch application region may pass a message or a FECMDDQ (see also Chapter 9) to an on-line subsystem or to the Front End via the Output Utility subsystem. See Multiregion Support Facility.

- Time controlled processing: instead of being triggered by an input terminal message, an application may be designed to execute at a particular time of day. See the Operating Reference Manual.

- Segmented input message processing via DDQ: segmented input messages, whether gathered by Intercomm from a remote device (CPU, etc.) or generated by an application program, are placed on a DDQ and may be serially passed to an application subsystem via a DDQ Facility interface. See Dynamic Data Queuing.

- Dynamic linkedit feature: dynamically loaded user subsystems and subroutines are linkedited to called Intercomm resident routines and COBOL support routines at startup, thus reducing the size of the load modules. The LOAD system control command is used to force a relinkedit of a new version of a dynamically loaded program placed on the load library while Intercomm is executing. See the Operating Reference Manual.

- User exits: various user exits for installation dependent processing are listed in the Operating Reference Manual.

- Binary table search: service routines for incore table searching are described in the Assembler Language Programmers Guide.

- IJKPRINT: service routine to write one or more print lines to SYSPRINT (SYSOUT data set). See the Operating Reference Manual.

- IJKDELAY: service routine to request a timed delay (averaging 100 milliseconds) of program processing, to allow other work (subsystem threads) to process. See the Operating Reference Manual.

Chapter 3

CODING AN INTERCOMM SUBSYSTEM IN COBOL

3.1 PROGRAM STRUCTURE

An application subsystem executing under Intercomm control is activated to process one message. The following examples typify the concerns of message processing logic:

1. Interpretation of message text to reroute administrative data to another terminal.

2. Editing of message text, creation of a record on a sequential data set for later off-line processing and preparation of an acknowledgement message to the originating terminal.

3. Editing and analysis of message text to determine file retrieval and/or update criteria, data file access, preparation of a response message for the operator at the originating terminal.

4. Analysis of an application-oriented control message and appropriate action, such as checking batch totals from example 2, above, or acting on a special request to close a file or perform some other control function.

All subsystems are called by Intercomm and execute as subroutines with standard parameters passed on entry to the program. These parameters must be defined in the Linkage Section of the COBOL subsystem in the following order:

1. The input message to be processed (42-byte header plus message text) of maximum length 4096 bytes.

2. The System Parameter Area table (a 500-byte internal table plus appended user fields, if any), of maximum length 4096 bytes. Only the user fields may be modified, if desired.

3. The Subsystem Control Table entry for the called subsystem (a 100-byte table entry). This may not be modified.

4. A fullword computational field (PIC S9(8)) into which the subsystem must place an appropriate Intercomm return code before returning control to Intercomm.

5. The dynamic working storage area acquired by Intercomm for this reentrant subsystem to use (for all non-constant user and Intercomm-required fields) while processing a particular message thread. The size of the area obtained is specified by the subsystem's Subsystem Control Table entry (GET parameter). For nonreentrant COBOL and for FORTRAN subsystems, see Appendix E.

Figures 12 and 13 illustrate a reentrant COBOL subsystem with the Linkage Section initialized with the parameters described above for the Intercomm operating environment. A precise definition in the Linkage Section of the System Parameter Area (SPA) and Subsystem Control Table entry (SCT) is only required if these table areas are referenced by the subsystem during processing. Otherwise, an elementary 01 (PIC X) to be used as a parameter save space for the Procedure Division USING clause is sufficient. Note that the DWS area passed to the subsystem is that following a 256-byte Link/Save prefix used exclusively by the Intercomm interface routines.

```
ID DIVISION.
PROGRAM-ID. EXAMPLE1.
REMARKS. THIS IS A REENTRANT INTERCOMM COBOL SUBSYSTEM PROGRAM.
ENVIRONMENT DIVISION.
DATA DIVISION.
WORKING-STORAGE SECTION.
77  CONSTANT-ITEMS        PICTURE X(8) VALUE 'CONSTANT'.
         .
         . THESE ARE NEVER-CHANGING LITERAL VALUES...
         .
LINKAGE SECTION.
01  INPUT-MESSAGE-AREA             PICTURE X(4096).
01  SPA                            PICTURE X(500).
01  SCT                            PICTURE X(100).
01  INTERCOMM-RETURN-CODE          PICTURE S9(8) COMPUTATIONAL.
01  DYNAMIC-WORK-SPACE.
    02  OUTPUT-MESSAGE-AREA        PICTURE X(2000).
    02  FILE-RECORD-AREA.
        .
    02  INDEPENDENT-ITEMS  PICTURE  S9(7)V99 COMPUTATIONAL-3.
        .
        .  ALL MODIFIABLE STORAGE MUST BE DEFINED HERE...
        .
    02  RETURN-VALUE PIC 99.
        .
        .  OTHER AREAS...
        .

PROCEDURE DIVISION USING INPUT-MESSAGE-AREA, SPA, SCT,
    INTERCOMM-RETURN-CODE, DYNAMIC-WORK-SPACE.
    .
    .                              PROGRAM PROCESSING LOGIC...
    .
    .            ...GO TO INTERCOMM.
    .
INTERCOMM.
    MOVE RETURN-VALUE TO INTERCOMM-RETURN-CODE.
    GOBACK.
```

Figure 12. Reentrant COBOL Subsystem Structure

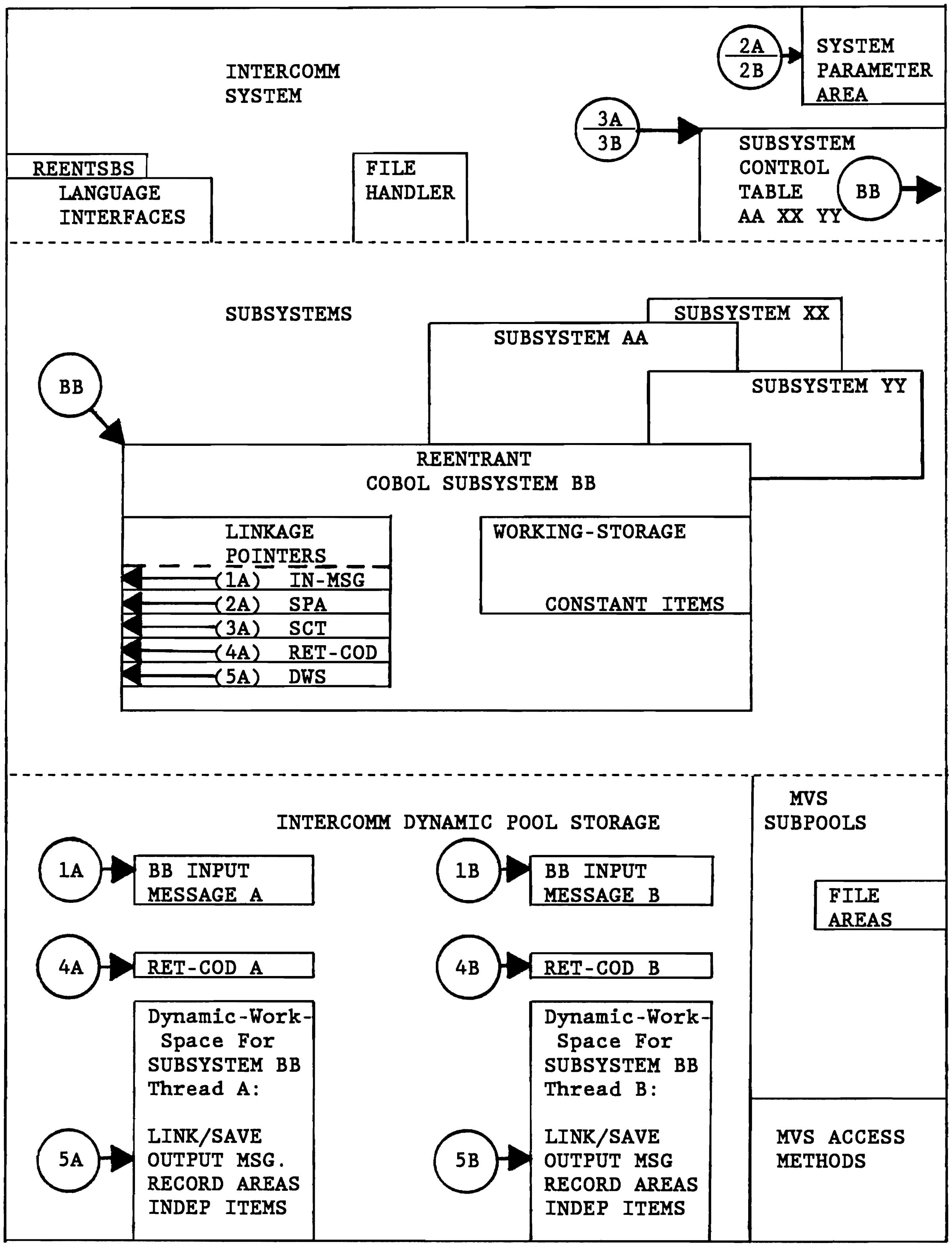


Figure 13. Reentrant Application Program Environment.

After a subsystem completes processing and returns control to the Subsystem Controller (see Chapter 2), the Intercomm return code is checked to determine whether the message should be cancelled due to an error. Then the return code is placed in the externally saved input message header in MSGHRETN (MSGHCON+1 for Rel 9), and the header is logged with an appropriate log code (see Chapter 2). Figure 14 describes Intercomm return codes. If the subsystem (or a called subroutine) program checks, or the return code is 8 or 12, USRCANC returns an appropriate error message to the terminal operator. USRCANC is a user exit provided by Intercomm under the name PMICANC, and is described in the Operating Reference Manual.

Return Code	Meaning	Subsystem Controller Error Action
0	Successful completion	None
4	Applies to Assembler Language subsystems only	
8	Unrecoverable error condition (no core, MAPEND error, etc.)	Message canceled, CALL to USRCANC
12	I/O error	Message canceled, CALL to USRCANC
16	(Reserved for internal use)	---
20-60	User codes to identify unusual condition	None
64	File or DBMS Update Subsystem, no message restart required*	None
68	File or DBMS Inquiry Subsystem, message restart required*	None
72-254	Same as 20-60	None
255	Reserved for MROTPUT	None
900**	Successful completion	None
912	Force Backout-on-the-Fly*	File updates or additions backed out

*See File Recovery Users Guide or Data Base Management System Users Guide

**Used only when a called Assembler Language subroutine (MSGCOL/FESEND) has requeued or freed the input message. If MAPIN has been called and has freed the input message, a return code of 0 must be used.

Figure 14. Intercomm System Return Codes

3.2 MESSAGE PROCESSING CONCEPTS

The application program receiving the message may analyze the Verb Message Identifier (MSGHVMI) in the header and/or message text fields to further control message processing logic. The meaning of different VMI values is dependent on the design requirements of the program receiving the message. For example, the Front End sets the VMI to X'00' to indicate to the Subsystem Controller that editing by the Edit Utility is required, based on the specification in the Front End Verb Table for a given verb (BTVERB macro, EDIT parameter). The PREPROG interface routine then analyzes the VMI to determine if the Edit Utility should be called prior to passing the message to the subsystem (if editing is successful). A VMI value of X'FF' (high-values) indicates that no processing is required by, or was performed by, the Edit Utility. Any other value in the VMI indicates that the Edit Utility has already processed the message or that a user subsystem has placed a code in the field before switching (queuing) the message to the currently processing subsystem.

An application subsystem creates an output message by building a 42-byte header and appropriate message text. This new message is either passed to the Front End via FESEND for transmission to the terminal, or is queued for later processing by the Output Utility or some other subsystem by calling the Intercomm system program COBPUT. The subsystem destined to receive this new message is determined by the receiving subsystem code fields (MSGHRSC, MSGHRSCH) in the message header. The receiving subsystem may then analyze the VMI, as appropriate. The Output Utility, for example, analyzes the VMI to determine whether or not prespecified output message formatting is to be performed. If the output message is passed directly to FESEND, MSGHRSCH and MSGHRSC should be set to binary zeros (low-values).

Subsystem logic for input message text analysis and output message text creation varies, depending on whether Message Mapping or the Edit and Output Utilities are used. Figures 15 and 16 illustrate subsystem processing logic for these two cases.

It is very important to note that the input message area (Intercomm header and message text) may only be examined (treated as a read-only area) by the application program. It may also be copied to an output message area (header only, or header and text) where it may be added to or changed, depending on program logic. Never add data to the input message text area.

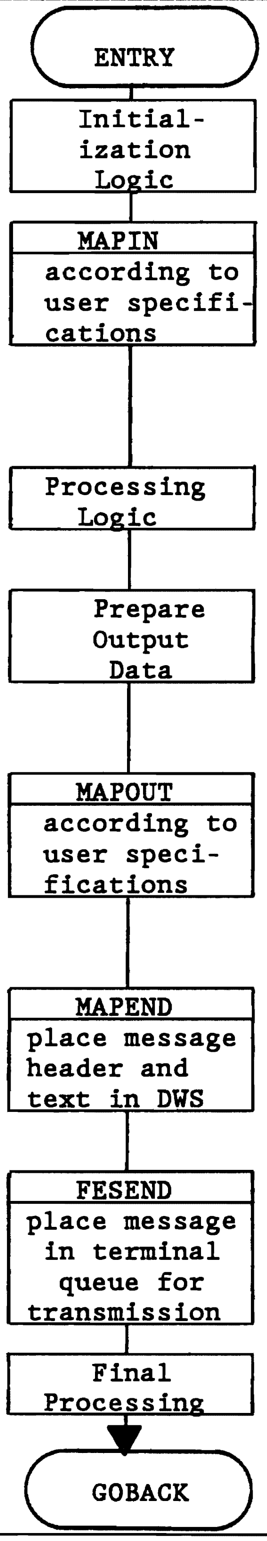
Subsystem Logic	Comments
 ENTRY Initial-ization Logic MAPIN according to user specifi-cations Processing Logic Prepare Output Data MAPOUT according to user speci-fications MAPEND place message header and text in DWS FESEND place message in terminal queue for transmission Final Processing GOBACK	The subsystem determines (perhaps based on the particular verb entered) if the input message requires mapping. MAPIN is called to convert the input message to text consisting of fixed length fields with a three-byte prefix of length (two bytes) and flag (one byte), indicating the result of field conversion. All terminal-dependent characters are removed. Processing logic is application-dependent. Output text data has a format similar to mapped input text: fixed length data fields with a three-byte prefix of length (two bytes) and attribute (one byte), indicating terminal-dependent field characteristics, if applicable. MAPOUT is called to build an output message text stream, padding, justifying and/or converting data fields from computational form, as necessary, and adding constant heading information as required. MAPEND is called to return the output message (header and text) in terminal-dependent format ready for transmission, or to dispose of the output message. FESEND is called to pass the output message to the Front End (if MAPEND has not disposed of the output message). Subsystem completes its processing and returns to Intercomm.

Figure 15. Subsystem Logic Using Message Mapping Utilities

Subsystem Logic	Comments
ENTRY	
Initial-ization Logic	If the Front End Verb Table indicates EDIT=YES, the subsystem receives an edited input message automatically. The message text consists of fixed length data fields <u>or</u> variable length data fields prefixed with a 1-byte identification and a 1-byte length code (binary values).
Processing Logic	Processing logic is application-dependent.
Prepare Output Message	The subsystem prepares an output message by creating a message header and the appropriate text. Output message text fields are either fixed length data fields or variable length fields with a prefix as described for Edit, above. Message header fields RSCH, RSC, and VMI identify the specific message text format.
COBPUT queue the message for Output	COBPUT is called to queue the output message for processing by the Output Utility subsystem.
Final Processing	Subsystem completes its processing and returns to Intercomm.
GOBACK	

Figure 16. Subsystem Logic Using Edit and Output Utilities (Page 1 of 2)

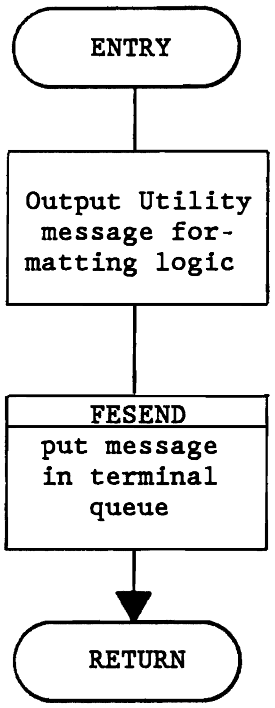
Subsystem Logic	Comments
 ENTRY Output Utility message formatting logic FESEND put message in terminal queue RETURN	The Output Utility performs message formatting according to user specifications, adding constant heading information as required. FESEND is called to pass the output message to the Front End. Output completes its processing and returns to Intercomm.

Figure 16. Subsystem Logic Using Edit and Output Utilities (Page 2 of 2)

3.3 SUBSYSTEM CODING

The language interface routines are:

- PREPROG--which interfaces the Subsystem Controller to the COBOL subsystem by initializing the reentrant (if VS COBOL II) or pseudo-reentrant (if OS/VS or ANS COBOL) environment for each subsystem processing thread. If the VMI of the input message is X'00', the Edit Utility is called to edit the message. If successful, the subsystem is activated. If unsuccessful, EDIT returns an appropriate error message to the input terminal and PREPROG returns to the Subsystem Controller (subsystem not activated). If the subsystem is loaded above the 16M line, it will receive control in 31-Amode.

- COBREENT--which maintains linkages and save areas (and performs Amode switching) for COBOL subsystem interface to Intercomm service routines and for user subroutines, thus preserving the multithreaded reentrant environment while providing standard CALL interfaces to the routines. For VS COBOL II, COBREENT saves and restores the thread's run unit environment.

- COBPUT--which is called via COBREENT to copy a message from the dynamic working storage of a COBOL program into the Intercomm-managed dynamic pool storage area before passing it to Message Collection to be queued for another subsystem.

- REENTSBS--table of Intercomm service routine and user-coded subroutine entry points, names and related characteristics.

All COBOL subsystems and subroutines interface to Intercomm service routines and user subroutines using standard CALL 'literal' statements. Dynamic call is not supported. One routine only is called: COBREENT. The first passed parameter is the name of a code defining the actual routine to which interface is desired, subsequent parameters are those required by the called routine, and should be in Dynamic Working Storage if the subsystem (subroutine) can be loaded above the 16M line (must be a 24-bit address). Coding format:

```
CALL 'COBREENT' USING routine-code, parm1[, parm2,...].
```

Subsequent chapters of this manual and of related message processing facility manuals contain detailed descriptions of applicable routine-codes and the required parameters. The Intercomm source text member ICOMSBS, listed in Appendix B, provides the definition of the halfword routine-code constants (PIC 9(4) COMP) used for calling most of the Intercomm service routines via COBREENT. To ensure that the correct code value is used, ICOMSBS should be COPYed into the Working-Storage Section of each COBOL program as follows:

```
01 COBREENT-CODES COPY ICOMSBS.
```

Code names correspond to the entry point name defined in REENTSBS, and the code itself is an index value (offset) into the REENTSBS table (see Chapter 9).

Figure 17 illustrates the basic coding required to implement an Intercomm subsystem and the definition of an input message and creation of an output message via an application to "echo" the text of an incoming message back to the originating terminal. The Message Mapping Utilities, the Edit Utility and the formatting capabilities of the Output Utility are not used.

1. The message header is created by copying the input message header to the output message header area and adjusting the following fields:

   - MSGHSSCH, MSGHSSC--Sending Subsystem Code

     Move in the original receiving subsystem code values, MSGHRSCH (to MSGHSSCH) and MSGHRSC (to MSGHSSC), to identify the current subsystem as the sending subsystem.

- MSGHRSCH, MSGHRSC--Receiving Subsystem Code

  Move in a predefined code to indicate further processing (the next subsystem) for this message (for FESEND, use low-values).

- MSGHVMI--Verb/Message Identifier

  Move in a predefined code for subsystem processing, or to indicate to FESEND that the output message is not fully formatted, use X'57'. If an output message is formatted by MMU, do not touch this field.

- MSGHLEN--Message Length

  Modified to include header and text length of output message.

- MSGHTID--Receiving Terminal Name

  If the originating terminal is to receive the response message, do not change. Otherwise, specify the receiving terminal name for the output message(s).

2. The new message text is created by copying the input message text to the output text area, and then appending the author's name and a message ending character (X'26' or X'37').

3. Queuing of the output message for the terminal is accomplished via the service routine FESEND (FESENDC).

4. The return code from the queuing routine must be analyzed to assure that the new message was actually queued, and recovery action taken if not.

5. The last logical activity in the subsystem is to move a value to the Intercomm return code field and GOBACK to the Subsystem Controller.

The program identification and entry point name must correspond to the subsystem entry point described in the Subsystem Control Table.

The input-message entry parameter defined in the Linkage Section has been further detailed to reference the 42-byte input message header and the input message text as separate entities. See Chapter 2 for a description of individual fields in the message header.

To assist the programmer in defining the message header, there are two source text members, ICOMINMG and ICOMDWS, listed in Appendix B; they may be COPYed into the appropriate portions of the Linkage Section. Additionally, the COPY member ICOMHEXC (for the Working-Storage Section) provides common hexadecimal codes.

The entry parameters for the System Parameter Area (SPA) and Subsystem Control Table (SCT) entry for the subsystem are not detailed as there is no need to reference any of their individual fields.

The entry parameter for the Intercomm return code is used to indicate the result of message processing to the Subsystem Controller.

The output message format appears as the first definitions in the Dynamic-Work-Space entry in the Linkage Section, which corresponds to the fifth entry parameter.

Constants are defined as usual in the Working-Storage Section. Independent items, that is, areas of storage modified during program execution, must be included in the Linkage Section as part of the Dynamic-Work-Space definition. Such items also include storage areas required for Intercomm service routines and passed to those routines as parameters, whether or not the subsystem references or modifies those areas. Additionally, variable areas passed as parameters to user subroutines must also be defined in the Dynamic-Work-Space. Unmodified constant values (map names, file DD names, etc.) may be defined in Working-Storage even though passed as parameter values to called routines, except if an OS/VS or ANS COBOL program is loaded above the 16M line (see Section 3.4.1). For VS COBOL II, variable items may be in Working-Storage (see Section 3.4.3).

3.3.1 Message Switching Between Subsystems

Any Intercomm subsystem may send a message to any other Intercomm subsystem. If a message is sent to some other subsystem, it is called "message switching." An application subsystem can switch a message to the Output Utility, which is another subsystem. The Change/Display Utility switches messages to the Output Utility. An application subsystem may switch (or requeue) a message to itself in the event that reprocessing or deferred processing of the message is required. An application subsystem may exceed an installation's core limitations and be broken into several subsystems. One subsystem may receive a message input from a terminal, perform partial processing and develop intermediate results in the form of a message sent to a second subsystem. The second subsystem processes the intermediate results as an input message and may complete the message processing or develop additional intermediate results in the form of messages sent or switched to any other subsystem or subsystems. Any one of these subsystems might also switch messages to the Output Utility.

Message switching between subsystems is accomplished by moving the input message header to an output message area, changing the receiving subsystem codes in the output header, adding (or copying) message text, and then calling COBPUT. The Verb/Message Identifier (MSGHVMI) may be initialized for interpretation by the receiving subsystem. A VMI equal to X'00' indicates that the Edit Utility is to be called by PREPROG prior to activating the subsystem.

To switch messages between terminals, the destination terminal identifier (MSGHTID), and the VMI, would also have to be changed before calling COBPUT or FESEND.

```
PP 5740-CB1 RELEASE 2.4                                              IBM OS/VS COBOL


   1                              15.22.55        MAY 26,1994


00001    000010 ID DIVISION.
00002    000020 PROGRAM-ID. ECHOMSG.
00003    000030 REMARKS. THIS REENTRANT SUBSYSTEM ECHOS AN INPUT MESSAGE
00004    000040      CONTAINING UP TO 500 CHARACTERS OF TEXT BACK TO THE
00005    000050      ORIGINATING TERMINAL.
00006    000060      IT COPIES THE INPUT TO THE OUTPUT MESSAGE AREA,
00007    000070      MODIFIES THE MESSAGE HEADER, APPENDS THE AUTHOR'S NAME,
00008    000080      AND MESSAGE ENDING CHARACTER, BEFORE CALLING FESENDC TO
00009    000090      QUEUE THE MESSAGE FOR THE INPUT TERMINAL.
00010    000100 ENVIRONMENT DIVISION.
00011    000110 DATA DIVISION.
00012    000120 WORKING-STORAGE SECTION.
00013    000130 01  HEX-CODES COPY ICOMHEXC.
00014 C         01  HEX-CODES.
00015 C             05  HEX-00    PIC X  VALUE ' '.
00016 C             05  CODE-00    REDEFINES  HEX-00    PIC X.
00017 C             05  HEX-15    PIC X  VALUE ' '.
00018 C             05  CODE-21    REDEFINES  HEX-15    PIC X.
00019 C             05  HEX-37    PIC X  VALUE ' '.
00020 C             05  CODE-55    REDEFINES  HEX-37    PIC X.
00021 C             05  HEX-50    PIC X  VALUE '&'.
00022 C             05  CODE-80    REDEFINES  HEX-50    PIC X.
00023 C             05  HEX-51    PIC X  VALUE ' '.
00024 C             05  CODE-81    REDEFINES  HEX-51    PIC X.
00025 C             05  HEX-52    PIC X  VALUE ' '.
00026 C             05  CODE-82    REDEFINES  HEX-52    PIC X.
00027 C             05  HEX-53    PIC X  VALUE ' '.
00028 C             05  CODE-83    REDEFINES  HEX-53    PIC X.
00029 C             05  HEX-54    PIC X  VALUE ' '.
00030 C             05  CODE-84    REDEFINES  HEX-54    PIC X.
00031 C             05  HEX-55    PIC X  VALUE ' '.
00032 C             05  CODE-85    REDEFINES  HEX-55    PIC X.
00033 C             05  HEX-56    PIC X  VALUE ' '.
00034 C             05  CODE-86    REDEFINES  HEX-56    PIC X.
00035 C             05  HEX-57    PIC X  VALUE ' '.
00036 C             05  CODE-87    REDEFINES  HEX-57    PIC X.
00037 C             05  HEX-72    PIC X VALUE ' '.
00038 C             05  CODE-114  REDEFINES  HEX-72    PIC X.
00039 C             05  HEX-FF    PIC X  VALUE ' '.
00040 C             05  CODE-255  REDEFINES  HEX-FF    PIC X.


00042    000140 01  REENTSBS-CODES COPY ICOMSBS.
00043 C         01  REENTSBS-CODES.
00044 C           *   THESE CODES REPRESENT OFFSETS FOR ROUTINE ADDRESSES IN THE
00045 C           *   TABLE NAMED REENTSBS. ONLY THE MOST COMMONLY USED VALUES
00046 C           *   ARE INCLUDED HERE; THE USERS MANUAL HAS A COMPLETE LIST.
00047 C           *   IF OFFSET ODD, THEN TRUE OFFSET=-(OFFSET+1)
00048 C               05  INTSORTC          PIC 99   COMP VALUE 99.
```

Figure 17. Echo Message Example; Reentrant COBOL (Page 1 of 6)

```
    2         ECHOMSG         15.22.55        MAY 26,1994


00049 C            05  DWS-SNAP         PIC 99  COMP VALUE 95.
00050 C            05  MAPFREE          PIC 99  COMP VALUE 91.
00051 C            05  FECMRLSE         PIC 99  COMP VALUE 87.
00052 C            05  FESEND           PIC 99  COMP VALUE 83.
00053 C            05  FESENDC          PIC 99  COMP VALUE 79.
00054 C            05  DYN-ALLOCATE     PIC 99  COMP VALUE 75.
00055 C            05  DYN-ACCESS       PIC 99  COMP VALUE 71.
00056 C            05  MAPURGE          PIC 99  COMP VALUE 67.
00057 C            05  MAPCLR           PIC 99  COMP VALUE 63.
00058 C            05  MAPEND           PIC 99  COMP VALUE 59.
00059 C            05  MAPOUT           PIC 99  COMP VALUE 55.
00060 C            05  MAPIN            PIC 99  COMP VALUE 51.
00061 C            05  INTUNSTO         PIC 99  COMP VALUE 47.
00062 C            05  INTSTORE         PIC 99  COMP VALUE 43.
00063 C            05  INTFETCH         PIC 99  COMP VALUE 39.
00064 C            05  FECMFDBK         PIC 99  COMP VALUE 35.
00065 C            05  FECMDDQ          PIC 99  COMP VALUE 31.
00066 C            05  DQ-WRITEX        PIC 99  COMP VALUE 27.
00067 C            05  DQ-READX         PIC 99  COMP VALUE 23.
00068 C            05  DQ-WRITE         PIC 99  COMP VALUE 19.
00069 C            05  DQ-READ          PIC 99  COMP VALUE 15.
00070 C            05  DQ-CLOSE         PIC 99  COMP VALUE 11.
00071 C            05  DQ-OPEN          PIC 99  COMP VALUE 07.
00072 C            05  DQ-BUILD         PIC 99  COMP VALUE 03.
00073 C            05  FH-SELECT        PIC 99  COMP VALUE 4.
00074 C            05  FH-RELEASE       PIC 99  COMP VALUE 8.
00075 C            05  FH-READ          PIC 99  COMP VALUE 12.
00076 C            05  FH-WRITE         PIC 99  COMP VALUE 16.
00077 C            05  FH-GET           PIC 99  COMP VALUE 20.
00078 C            05  FH-PUT           PIC 99  COMP VALUE 24.
00079 C            05  FH-RELEX         PIC 99  COMP VALUE 28.
00080 C            05  FH-FEOV          PIC 99  COMP VALUE 32.
00081 C            05  COBPUT           PIC 99  COMP VALUE 68.
00082 C            05  MSGCOL           PIC 99  COMP VALUE 72.
00083 C            05  COBSTORF         PIC 99  COMP VALUE 76.
00084 C            05  CONVERSE         PIC 99  COMP VALUE 80.
00085 C            05  DBINT            PIC 99  COMP VALUE 84.
00086 C            05  LOGPUT           PIC 99  COMP VALUE 88.
00087 C            05  PAGE-FILE        PIC 99  COMP VALUE 92.
00088 C            05  FH-GETV          PIC 99  COMP VALUE 96.
00089 C            05  FH-PUTV          PIC 999 COMP VALUE 100.
00090 C        *   CODES 104 AND UP INDICATE USER ADDITIONS TO THE TABLE


00092    000150 01  AUTHORS-NAME.
00093    000160     04  OUT-NAME            PIC X(10)   VALUE ' T.ELGUERA'.
00094    000170     04  OUT-MSG REDEFINES OUT-NAME.
00095    000180         06  NAME-CHAR       PIC X           OCCURS 10 TIMES.
```

Figure 17. Echo Message Example; Reentrant COBOL (Page 2 of 6)

```
      3         ECHOMSG         15.22.55        MAY 26,1994


 00097    000190 LINKAGE SECTION.
 00098    000200 01   INPUT-MESSAGE COPY ICOMINMG.
 00099 C         01   INPUT-MESSAGE.
 00100 C              04  MESSG-HDR.
 00101 C                  06  MSGH-LENGTH              PIC S9999   COMP.
 00102 C                  06  MSGH-QPR                 PIC X.
 00103 C                  06  MSGH-RSCH                PIC X.
 00104 C                  06  MSGH-RSC                 PIC X.
 00105 C                  06  MSGH-SSC                 PIC X.
 00106 C                  06  MSGH-MMN                 PIC XXX.
 00107 C                  06  MSGH-DATE.
 00108 C                      08  MSGH-YR              PIC 99.
 00109 C                      08  MSGH-PERIOD          PIC X.
 00110 C                      08  MSGH-JULIAN-DAY      PIC 999.
 00111 C                  06  MSGH-TIME.
 00112 C                      08  MSGH-HH              PIC 99.
 00113 C                      08  MSGH-MM              PIC 99.
 00114 C                      08  MSGH-SS              PIC 99.
 00115 C                      08  MSGH-TH              PIC 99.
 00116 C                  06  MSGH-TID.
 00117 C                      08  MSGH-TI1             PIC X.
 00118 C                      08  MSGH-TI2-3           PIC XX.
 00119 C                      08  MSGH-TI4-5           PIC 99.
 00120 C                  06  MSGH-FLGS                PIC X(2).
 00121 C                  06  MSGH-PID                 PIC X(5).
 00122 C                  06  MSGH-PIDX  REDEFINES MSGH-PID.
 00123 C                      08  FILLER               PIC X(2).
 00124 C                      08  MSGH-BMN             PIC X(3).
 00125 C                  06  MSGH-SSCH                PIC X.
 00126 C                  06  MSGH-ADDR                PIC X(3).
 00127 C                  06  MSGH-ADRX  REDEFINES MSGH-ADDR.
 00128 C                      08  MSGH-USR             PIC X.
 00129 C                      08  FILLER               PIC X(2).
 00130 C                  06  MSGH-LOG                 PIC X.
 00131 C                  06  MSGH-BLK                 PIC X.
 00132 C                  06  MSGH-VMI                 PIC X.

 00134    000210      04  INPUT-MESSAGE-TEXT      PIC X        OCCURS 500 TIMES.
 00135    000220 01   SYSTEM-PARAMETER-TABLE      PIC X.
 00136    000230 01   SUBSYSTEM-CONTROL-TABLE     PIC X.
 00137    000240 01   INTERCOMM-RET-CODE          PIC S9(7)  COMPUTATIONAL.
 00138    000250 01   DYNAMIC-WORK-SPACE          COPY ICOMDWS.
 00139 C         01   DYNAMIC-WORK-SPACE.
 00140 C              02  OUTPUT-MESSAGE.
 00141 C                04  OMESSG-HDR.
 00142 C                  06  OMSGH-LENGTH             PIC S9999   COMP.
 00143 C                  06  OMSGH-QPR                PIC X.
 00144 C                  06  OMSGH-RSCH               PIC X.
 00145 C                  06  OMSGH-RSC                PIC X.
 00146 C                  06  OMSGH-SSC                PIC X.
 00147 C                  06  OMSGH-MMN                PIC XXX.
 00148 C                  06  OMSGH-DATE.
```

Figure 17. Echo Message Example; Reentrant COBOL (Page 3 of 6)

```
     4         ECHOMSG         15.22.55        MAY 26,1994


00149 C                         08  OMSGH-YR             PIC 99.
00150 C                         08  OMSGH-PERIOD         PIC X.
00151 C                         08  OMSGH-JULIAN-DAY     PIC 999.
00152 C                     06  OMSGH-TIME.
00153 C                         08  OMSGH-HH             PIC 99.
00154 C                         08  OMSGH-MM             PIC 99.
00155 C                         08  OMSGH-SS             PIC 99.
00156 C                         08  OMSGH-TH             PIC 99.
00157 C                     06  OMSGH-TID.
00158 C                         08  OMSGH-TI1            PIC X.
00159 C                         08  OMSGH-TI2-3          PIC XX.
00160 C                         08  OMSGH-TI4-5          PIC 99.
00161 C                     06  OMSGH-FLGS               PIC X(2).
00162 C                     06  OMSGH-PID                PIC X(5).
00163 C                     06  OMSGH-PIDX  REDEFINES OMSGH-PID.
00164 C                         08  FILLER               PIC X(2).
00165 C                         08  OMSGH-BMN            PIC X(3).
00166 C                     06  OMSGH-SSCH               PIC X.
00167 C                     06  OMSGH-ADDR               PIC X(3).
00168 C                     06  OMSGH-ADRX  REDEFINES OMSGH-ADDR.
00169 C                         08  OMSGH-USR            PIC X.
00170 C                         08  FILLER               PIC X(2).
00171 C                     06  OMSGH-LOG                PIC X.
00172 C                     06  OMSGH-BLK                PIC X.
00173 C                     06  OMSGH-VMI                PIC X.

00175     000260             04  OUTPUT-MESSAGE-TEXT   PIC X  OCCURS 510 TIMES.
00176     000270        02  FESENDC-RETURN-CODE    PIC 99.
00177     000280        88  QUEUED                          VALUE ZERO.
00178     000290        02  I                      PIC S9(4)  COMPUTATIONAL.
00179     000300        02  J                      PIC S9(3)  COMPUTATIONAL.
```

Figure 17. Echo Message Example; Reentrant COBOL
(Page 4 of 6)

```
    5          ECHOMSG          15.22.55         MAY 26,1994

000310 PROCEDURE DIVISION USING
000320                                   INPUT-MESSAGE
000330                                   SYSTEM-PARAMETER-TABLE
000340                                   SUBSYSTEM-CONTROL-TABLE
000350                                   INTERCOMM-RET-CODE
000360                                   DYNAMIC-WORK-SPACE.
000370      MOVE MESSG-HDR TO UMESSG-HDR.
000380      MOVE OMSGH-RSCH TO OMSGH-SSCH.
000390      MOVE OMSGH-RSC TO OMSGH-SSC.
000400      MOVE LOW-VALUES TO OMSGH-RSCH.
000410      MOVE LOW-VALUES TO OMSGH-RSC.
000420      MOVE HEX-57 TO OMSGH-VMI.
000430      PERFORM MOVE-A-CHARACTER VARYING I FROM +1 BY +1
000440              UNTIL I IS EQUAL TO MSGH-LENGTH - 42.
000450      PERFORM NAME-MOVE VARYING J FROM +1 BY +1 UNTIL J > +10.
000460      MOVE HEX-37 TO OUTPUT-MESSAGE-TEXT (I).
000470      COMPUTE OMSGH-LENGTH = I + 42.
000480      CALL 'COBREENT' USING
000490                                    FESENDC
000500                                    OUTPUT-MESSAGE
000510                                    FESENDC-RETURN-CODE.
000520      IF NOT QUEUED
000530          MOVE FESENDC-RETURN-CODE TO INTERCOMM-RET-CODE
000540      ELSE
000550          MOVE ZEROS TO INTERCOMM-RET-CODE.
000560      GOBACK.
000570 SUBROUTINE SECTION.
000580 MOVE-A-CHARACTER.
000590      MOVE INPUT-MESSAGE-TEXT (I) TO OUTPUT-MESSAGE-TEXT (I).
000600 NAME-MOVE.
000610      MOVE NAME-CHAR (J) TO OUTPUT-MESSAGE-TEXT (I).
000620      COMPUTE I = I + 1.
```

Figure 17. Echo Message Example; Reentrant COBOL
(Page 5 of 6)

```
     ECHOMSG          15.22.55         MAY 26,1994

DNM=4-459    03  MSGH-ADRX                         BLL=3    024   DNM=4-459    DS 0CL3      GROUP       R
DNM=4-481    04  MSGH-USR                          BLL=3    024   DNM=4-481    DS 1C        DISP
DNM=5-000    04  FILLER                            BLL=3    025   DNM=5-000    DS 2C        DISP
DNM=5-014    03  MSGH-LOG                          BLL=3    027   DNM=5-014    DS 1C        DISP
DNM=5-032    03  MSGH-BLK                          BLL=3    028   DNM=5-032    DS 1C        DISP
DNM=5-050    03  MSGH-VMI                          BLL=3    029   DNM=5-050    DS 1C        DISP
DNM=5-071    02  INPUT-MESSAGE-TEXT                BLL=3    02A   DNM=5-071    DS 1C        DISP              O
DNM=5-102    01  SYSTEM-PARAMETER-TABLE            BLL=4    000   DNM=5-102    DS 1C        DISP
DNM=5-134    01  SUBSYSTEM-CONTROL-TABLE           BLL=5    000   DNM=5-134    DS 1C        DISP
DNM=5-167    01  INTERCOMM-RET-CODE                BLL=6    000   DNM=5-167    DS 4C        COMP
DNM=5-198    01  DYNAMIC-WORK-SPACE                BLL=7    000   DNM=5-198    DS 0CL558    GROUP   *
DNM=5-229    02  OUTPUT-MESSAGE                    BLL=7    000   DNM=5-229    DS 0CL552    GROUP
DNM=5-256    03  OMESSG-HDR                        BLL=7    000   DNM=5-256    DS 0CL42     GROUP
DNM=5-279    04  OMSGH-LENGTH                      BLL=7    000   DNM=5-279    DS 2C        COMP
DNM=5-301    04  OMSGH-QPR                         BLL=7    002   DNM=5-301    DS 1C        DISP
DNM=5-323    04  OMSGH-RSCH                        BLL=7    003   DNM=5-323    DS 1C        DISP
DNM=5-343    04  OMSGH-RSC                         BLL=7    004   DNM=5-343    DS 1C        DISP
DNM=5-365    04  OMSGH-SSC                         BLL=7    005   DNM=5-365    DS 1C        DISP
DNM=5-384    04  OMSGH-MMN                         BLL=7    006   DNM=5-384    DS 3C        DISP
DNM=5-406    04  OMSGH-DATE                        BLL=7    009   DNM=5-406    DS 0CL6      GROUP
DNM=5-429    05  OMSGH-YR                          BLL=7    009   DNM=5-429    DS 2C        DISP-NM
DNM=5-450    05  OMSGH-PERIOD                      BLL=7    008   DNM=5-450    DS 1C        DISP
DNM=5-472    05  OMSGH-JULIAN-DAY                  BLL=7    00C   DNM=5-472    DS 3C        DISP-NM
DNM=6-000    04  OMSGH-TIME                        BLL=7    00F   DNM=6-000    DS 0CL8      GROUP
DNM=6-023    05  OMSGH-HH                          BLL=7    00F   DNM=6-023    DS 2C        DISP-NM
DNM=6-041    05  OMSGH-MM                          BLL=7    011   DNM=6-041    DS 2C        DISP-NM
DNM=6-059    05  OMSGH-SS                          BLL=7    013   DNM=6-059    DS 2C        DISP-NM
DNM=6-080    05  OMSGH-TH                          BLL=7    015   DNM=6-080    DS 2C        DISP-NM
DNM=6-098    04  OMSGH-TID                         BLL=7    017   DNM=6-098    DS 0CL5      GROUP
DNM=6-120    05  OMSGH-TI1                         BLL=7    017   DNM=6-120    DS 1C        DISP
DNM=6-139    05  OMSGH-TI2-3                       BLL=7    018   DNM=6-139    DS 2C        DISP
DNM=6-160    05  OMSGH-TI4-5                       BLL=7    01A   DNM=6-160    DS 2C        DISP-NM
DNM=6-181    04  OMSGH-FLGS                        BLL=7    01C   DNM=6-181    DS 2C        DISP
DNM=6-201    04  OMSGH-PID                         BLL=7    01E   DNM=6-201    DS 5C        DISP
DNM=6-220    04  OMSGH-PIDX                        BLL=7    01E   DNM=6-220    DS 0CL5      GROUP       R
DNM=6-246    05  FILLER                            BLL=7    01E   DNM=6-246    DS 2C        DISP
DNM=6-260    05  OMSGH-BMN                         BLL=7    020   DNM=6-260    DS 3C        DISP
DNM=6-282    04  OMSGH-SSCH                        BLL=7    023   DNM=6-282    DS 1C        DISP
DNM=6-302    04  OMSGH-ADDR                        BLL=7    024   DNM=6-302    DS 3C        DISP
DNM=6-322    04  OMSGH-ADRX                        BLL=7    024   DNM=6-322    DS 0CL3      GROUP       R
DNM=6-345    05  OMSGH-USR                         BLL=7    024   DNM=6-345    DS 1C        DISP
DNM=6-367    05  FILLER                            BLL=7    025   DNM=6-367    DS 2C        DISP
DNM=6-381    04  OMSGH-LOG                         BLL=7    027   DNM=6-381    DS 1C        DISP
DNM=6-400    04  OMSGH-BLK                         BLL=7    028   DNM=6-400    DS 1C        DISP
DNM=6-422    04  OMSGH-VMI                         BLL=7    029   DNM=6-422    DS 1C        DISP
DNM=6-441    03  OUTPUT-MESSAGE-TEXT               BLL=7    02A   DNM=6-441    DS 1C        DISP              O
DNM=6-473    02  FESENDC-RETURN-CODE               BLL=7    228   DNM=6-473    DS 2C        DISP-NM
DNM=7-000    88  QUEUED                                           DNM=7-000
DNM=7-016    02  I                                 BLL=7    22A   DNM=7-016    DS 2C        COMP
DNM=7-027    02  J                                 BLL=7    22C   DNM=7-027    DS 2C        COMP
```

*Defines amount of Dynamic-Work-Space specification in the Subsystem Control Table via GET parameter on the SYCTTBL macro.

Figure 17. Echo Message Example; Reentrant COBOL (Page 6 of 6)

3.4 REENTRANT CODING CONVENTIONS

When coding a reentrant COBOL subsystem (or subroutine), care must be taken to observe the following conventions:

1. Never use the ALTER verb.

2. Never modify the WORKING-STORAGE SECTION.

3. Define in the Linkage Section all areas modifiable during program execution as items subordinate to the fifth 01 (Dynamic-Work-Space) entry.

4. Call all system service routines, data base service routines, and user subroutines through the COBREENT interface program in order to maintain reentrancy and the multithreading environment.

5. A call to COBREENT within a PERFORM range, although permissible, must be treated as a branch (GO TO) out of the PERFORM range. This restriction is easily met if all PERFORM ranges are accessed only by PERFORM statements. Never GO TO a performed paragraph.

6. Verify that the amount of dynamic storage defined for the subsystem in the Subsystem Control Table is an exact multiple of 8 and is the same or greater than the number of characters shown in the DMAP and defined for the fifth 01 (DWS) entry in the Linkage Section (see Figure 17).

7. FDs cannot be used, nor any file access verbs (OPEN, READ, etc.).

8. Do not use the reserved COBOL data name RETURN-CODE for any Intercomm return codes. (That data name refers to the contents of general register 15, which is not used for this purpose by the interface programs.)

9. Do not forget to code GOBACK to exit to Intercomm; otherwise a User 519 abend will result.

10. Ensure numeric fields are not zero before executing a DIVIDE or COMPUTE.

3.4.1 XA/ESA Extended Storage Loading Requirements (Release 10 only)

COBOL subsystems and subroutines using Intercomm reentrant coding conventions are eligible for loading above the 16M line if these recommendations are followed:

- The module should be linkedited with the AMODE=31,RMODE=ANY and REUS (RENT if VS COBOL II) parameters (see Appendix A)

- For subsystems, the LOADNAM, LANG=RCOB, BLDL=YES (default), and REUSE=YES (default) parameters are required on the SYCTTBL macro (a loaded subsystem remains in extended storage except when necessary to delete it after a program check, time-out, or by user system control command request)

- For subroutines, the LNAME, TYPE=COBOL, BLDL=YES (default) and USAGE=REENT parameters are required on the SUBMODS macro defining the subroutine to Intercomm (see also Section 9.7)

- Ensure that the Intercomm interface routines PREPROG, COBREENT and DYNLLOAD (for loaded subroutines) were reassembled under XA or ESA (with the XA global on in the Intercomm global table SETGLOBE if at SM level 2240 or lower)

- All parameters (except the ICOMSBS code) passed via calls to COBREENT must be in 24-Amode storage (DWS). Constants (file names, map names, etc.) must be moved to the DWS before the call, except if VS COBOL II (see below).

3.4.2 Dynamic Working Storage (DWS) Protection Option

Destruction of Intercomm storage pool areas can result if the Dynamic Working Storage (DWS) acquired for a COBOL subsystem or subroutine is too small. This user option causes Intercomm to allocate extra space at the end of the DWS for each reentrant program. When the subsystem or subroutine calls COBREENT, this space is checked to see if it has been modified. If so, then the DWS is too small and the thread is terminated with a program check (Snap 126). An error message is sent to the terminal operator, and the Intercomm control terminal.

This protection option applies only to reentrant COBOL subsystems with an equal value of GET and FREE specified on the SYCTTBL macro instruction, and to all reentrant COBOL subroutines with the GET parameter specified on the SUBMODS macro. This option cannot detect the possibility of storage destruction beyond the extra DWS area. Because of the processing overhead required for this feature, it should be used only until subsystems are thoroughly tested.

The DWS protection option is requested system-wide via the DWSCHK parameter on the SPALIST macro at system generation time. The option may also be dynamically controlled system-wide by the Intercomm STRT and STOP system control commands which control activation and deactivation of various system control and debugging features. In addition under Release 10, for individual subsystems, the option may be requested via the DWSCHK parameter on the SYCTTBL macro describing the subsystem. If YES is coded, and the option is active system-wide, DWS checking will be performed. If NO is coded, then it will not be performed even though active for the system. Conversely, if not active for the system, SYCTTBL coding is ignored.

3.4.3 VS COBOL II Program Conversion and Support (Release 10 only)

- Compiler options required for Intercomm programs are:

```
RENT, RES and NODYNAM
DATA(24)
NOTEST and NOFDUMP
LIB
```

The following compiler options are recommended:

```
APOST  (single quote for literals and CALLs)
TRUNC(BIN)
COMPILE  (if not the default)
NONAME and NOTERM
SSRANGE  (if supported for Intercomm COBOL II installation)
LIST and NOOFFSET
```

All other compiler options are dependent on site standards or programmer specification, and are explained in detail in IBM's VS COBOL II Application Programming Guide For MVS. See the sample Compile JCL in Appendix A for compiler parms specification.

Note that use of the OPTIMIZE option may enhance performance, but will increase the size of the COBOL load module as all the PERFORMed paragraph code is generated inline in the object (assembler) code immediately following the PERFORM statement. If a paragraph is PERFORMed multiple times, then multiple copies of the paragraph code are generated in the object code. While this may not affect seldom executed loadable programs (or programs loaded above the 16M line), it will greatly increase the size of the Intercomm load module for resident subsystems and subroutines.

- Coding Requirements and Options:

GOBACK (not STOP RUN) must be used to return to Intercomm.

Dynamic Working Storage (GET parameter on SYCTTBL or SUBMODS) must be a minimum of 8 bytes. Under VS COBOL II, variable (modifiable) fields may be in the 'WORKING-STORAGE SECTION'. They (and VALUE fields) do not have to be copied from Working-Storage to the DWS area, even if the program is loaded above the 16M line. Due to the DATA(24) compiler option requirement, no coding changes are needed to have a reentrant program dynamically loaded above the 16M line. If loadable above the line, storage will be saved in the Intercomm Address Space, and the only requirement is the added AMODE=31,RMODE=ANY linkedit parameters (see sample Compile and Link JCL in Appendix A). VS COBOL II subroutines must also have a DWS of at least 8 bytes, and should define all variable fields in that DWS if the subroutine may be called more than once within one message processing thread (run-unit). If subroutines define variable fields in the 'WORKING-STORAGE SECTION', they need code to clear those fields (to low-values) on each entry to the subroutine if it may be called more than once within a single subsystem processing thread (run unit).

'COBREENT' must be called to interface to all Intercomm service routines and user subroutines. The REENTSBS code is still required as the first parameter in the passed parameter list.

CALL identifier (dynamic call) is <u>not</u> supported.

Nested COPY (below the 01 level) may be used: change the $$COPY for MMU symbolic maps to a standard COPY statement. The COPRE pre-compile step is no longer needed for Intercomm COPY.

Non-reentrant (do not use a DWS and do not call COBREENT) programs may <u>not</u> be converted to VS COBOL II (unless first recoded). Note that single-threading (serial execution) may be forced via coding MNCL=1 on the SYCTTBL macro.

VS COBOL II user subroutines may <u>not</u> be called by non-COBOL II subsystems (or subroutines), even if called via COBREENT by a reentrant OS/ANS COBOL program. That is, convert subsystems to VS COBOL II before converting any reentrant subroutines called by those subsystems.

Reduce the number of WORKING-STORAGE fields which have VALUE definitions by converting them to literals in the program code (for MOVE statements, for example). The literal table is not copied out to dynamic storage acquired by VS COBOL II. Conversion does not apply to values in COPY members such as ICOMSBS and COBLOGCH.

If DWS fields are moved to WORKING-STORAGE, note that every 01 level definition is forced to the next doubleword boundary, even if the previous field is less than 8 bytes. Therefore, group areas together by field size and alignment under 01 level group-names, such as FILE-AREAS, MMU-AREAS, DATA-BASE-AREAS, etc. See sample program in Chapter 13. Note that fields subordinate to 01 level names may be passed as parameters on subroutine calls.

77 level fields always start on a doubleword boundary, even if the previous field is less than 8 bytes, or not a multiple of 8 in length. Therefore, define such fields which are not 8-byte multiples in length under an appropriate 01 level group (see above).

<u>Prefix</u> programs/stubs/roots may <u>not</u> be linked with VS COBOL II programs as the first routine to receive control. See <u>Operating Reference Manual</u> for user exits (PREPROGI/E) to use for modifying the subsystem parameter list/areas.

SORT, MERGE and File I/O verbs are not supported.

READY TRACE, RESET TRACE and SERVICE RELOAD statements must be deleted (not supported by VS COBOL II).

- Only the IBM VS COBOL II (Release 3.0 and higher) compiler is supported. Installation and linkedit of the VS COBOL II environment is described in other Intercomm documentation. See also Chapter 13.

- Subsystems may be resident, in an EXGRP or OVERLAY A, or dynamically loadable (above the 16M line if possible - COBREENT provides mode conversion). They may not be in OVERLAY B, C, or D (linked with MONOVLY). Subsystems must be coded and linked as reentrant (RENT parm used on linkedit with NOCALL and LET) and if loadable, NOCALL suppresses linking in called routines (COBREENT and IGZEBST, which are in the Intercomm linkedit). The external references to entry points in the Intercomm load module will be resolved by dynamic linkedit. No programs may directly call any user subroutines which call other routines. All user subroutines which are not single-threaded (self-contained) and/or are not in the Intercomm load module must be called via COBREENT. If the subsystem is loaded above the 16M line, then all user subroutines not linked with the subsystem must be called via COBREENT (for mode conversion). On the SYCTTBL macro, LANG=RCOB and REUSE=YES are required.

- Subroutines called via COBREENT must be coded and defined as reentrant, and may be resident or loadable (above or below the 16M line) and must be defined in the REENTSBS table. See Chapter 9 on defining a DWS area for a COBOL subroutine. On the SUBMODS macro, TYPE=COBOL and USAGE=REENT are required.

- All Intercomm Facilities and features available at the user site may be accessed as currently documented, except:

  CONVERSE Facility <u>not</u> supported.
  DWS checking not applicable to fields moved to Working-Storage.
  DWSSNAP will not snap fields/areas defined in Working-Storage,
      only those in the DWS area.

- Snap facilities have been enhanced to snap VS COBOL II applicable storage for subsystem threads in indicative dumps, and to provide interface debugging snaps at critical times (see <u>Messages and Codes</u>). Note that in 118 (timeout) and 126 (program check) snaps, the save area chain contains an extra save area because the TGT save area is not removed from the chain as for OS/ANS COBOL, when a reentrant COBOL program calls COBREENT. Under the MVS SAVE AREA TRACE in the snap, there may be two consecutive listings for calls to COBREENT: the first is for the TGT save area, and the second is for the copy of the TGT save area in the DWS prefix. Only the second appears in OS/ANS COBOL snaps.

- A new snap 123 (see <u>Messages and Codes</u>) has been added which is produced (with Intercomm message MP003I) when a recoverable U10nn abend is caused by a VS COBOL II run time subroutine (such as an SSRANGE checking, invalid sign, truncation, or recursive call abend). The thread is cancelled and the subsystem is flagged inactive (NO SCHED). That is, no new messages are processed until the subsystem is corrected and reloaded via the LOAD command, or the FTUN/SSUP commands are used to reactivate the subsystem (set SCHED to YES). An indicative dump (similar to a snap 126) is produced if indicative dumps are active for the region and the subsystem. See IBM's <u>VS COBOL II Application Programming Debugging</u> for abend and error message (IGZ0nnI) explanation.

3.5 RESTARTED MESSAGES

After an Intercomm system failure (abend or operator cancel) or an operating system failure (requiring a re-IPL of the CPU), Intercomm may be brought up in Restart Mode which permits reprocessing of messages in progress at the time of failure. Additionally, previously cancelled messages (see Figure 14), and unprocessed messages (received and queued, but not started) will be requeued for processing after system startup completes. This is accomplished by retrieving the original input messages from the log created in the previous Intercomm execution as described in the Operating Reference Manual, and may be coordinated with file or database record backout as described in the File Recovery Users Guide and DBMS Users Guide.

Restarting of messages for a particular subsystem is controlled by the RESTART parameter of the SYCTTBL macro defining the subsystem in the SCT. A restarted input message (in progress at failure time) contains a log code of C'R' or C'P' (if data base update may be executed by the subsystem). All other input messages contain a log code of C'2' (see Figure 11). A subsystem may need a different processing path for a restarted message and should be careful about creating an output response message which might confuse a terminal operator.

3.6 DWSSNAP FACILITY (Release 10 only)

The DWSSNAP Facility allows a COBOL subsystem to snap data areas from its own DWS; a COBOL subroutine can snap areas from its own DWS and/or areas from the calling subsystem's DWS (data areas passed as parameters to the subroutine via Linkage). The output of the DWSSNAP request may be sent to SNAPDD (unlimited output) with snap ID=087 or may be returned to the inputting terminal (limit is one screen of output per snap, all subsequent pages of output are lost), or may be routed to another terminal, usually a printer (maximum output of 20 pages).

Parameter	Contents
SNCWname	The Snap Control Word, initialized to: 'ɃSɃɃ' (SNAP Option) for output to the system SNAPDD data set; 'ɃDɃɃ' (DISPLAY Option) for output back to the inputting terminal, 'ɃPɃɃ' (PRINTER Option) for output to terminal named in next parm.
term-id	The Intercomm terminal name where output is to be routed. Only coded if PRINTER option used.
parm-address-start	A data name in the subsystem's/subroutine's DWS which represents the start of the area to be snapped.
parm-address-end	A data name in the subsystem's/subroutine's DWS which represents the end (must be a higher address than start) of the area to be snapped.

Coding format:

```
          CALL 'COBREENT' USING DWS-SNAP, SNCWname[, term-id]
                          [, parm-address-start[, parm-address-end]].
```

The CALL to DWSSNAP can have up to 5 address pairs specified. However, no addresses need be coded if a snap of the entire DWS is desired. For example:

```
          CALL 'COBREENT' USING DWS-SNAP, SNCWname.
```

will cause the entire DWS to be snapped.

```
          CALL 'COBREENT' USING DWS-SNAP, SNCWname, parm-address-start.
```

will cause a snap of DWS from parm-address-start to the end of DWS.

When using the DWSSNAP Facility to receive output at the inputting terminal, data areas to be snapped (all inclusive) cannot exceed 300 bytes (only one page of output will be sent to the inputting terminal; all additional output will be ignored/lost) when one pair of addresses is specified. If multiple address pairs are specified then the number of bytes that can be snapped is 300 minus 48 (times the number of address pairs desired). The storage snapped will be displayed at the terminal just as it would appear in a formatted dump; hexadecimal digits (to the left) and the alphanumeric equivalent (to the right).

When calling DWSSNAP from a COBOL subroutine, the addresses passed as parms must be within the subroutine's DWS or that of the main COBOL subsystem's DWS. To pass addresses in the DWS of the subsystem from a subroutine, they must be part of the Linkage Section of the subroutine. For example:

```
LINKAGE SECTION.
01  DWS.
    02 SNCW                        PIC X(4).
      .
      .
01  RECORD-AREA.
    04 RECORD                      PIC X(166).
    04 RECORD-END                  PIC X.

PROCEDURE DIVISION USING DWS, RECORD-AREA.

      MOVE 'bDbb' TO SNCW.
      CALL 'COBREENT' USING DWS-SNAP, SNCW, RECORD, RECORD-END, DWS.
```

will cause a snap, to the inputting terminal, of the 166-byte Record-Area passed to the subroutine by the subsystem via Linkage and the entire DWS of the subroutine, provided the output does not exceed one screen (everything in excess of one screen will be lost). RECORD-END is a dummy delimiter for displaying the passed record area.

Chapter 4

USING THE MESSAGE MAPPING UTILITIES

4.1 CONCEPTS

The Message Mapping Utilities (MMU) provide an interface between the application subsystem and terminal-dependent message processing logic for both input and output messages. MMU is invoked by calls to Intercomm service routines which perform mapping functions based upon user-specified tables (MAPs). Mapping includes justification, padding, and conversion of character data to/from arithmetic format.

4.2 PROCESSING

MMU input mapping produces fixed length data fields prefixed by a two-byte length and one-byte flag (indicates errors or omissions) unless the data fields are defined in a structured (named) segment (contiguous group of fields). In this case the three-byte prefix occurs for the entire segment, not for the individual fields.

MMU output mapping operates upon data in the same format, but the flag byte becomes the field (or segment) attribute character. The mapped input text area and the unmapped output text area are called symbolic maps and are defined by special MMU $$COPY statements in the application program's Dynamic-Work-Space for OS/ANS COBOL. Under VS COBOL II, use the standard COPY statement to copy symbolic maps into either the Working-Storage Section or into the DWS area. The application program references data fields and the associated prefix by symbolic name. For example, a customer name field (CUSTMER) of twenty-five characters would appear in an MMU symbolic definition as follows:

```
06 CUSTMERL   PIC  9(4) COMP.     (length)
06 CUSTMERT   PIC  X.             (flag/attribute)
06 CUSTMER    PIC  X(25).         (data)
```

Output message disposition is determined by options passed to MMU: the formatted message(s) may be returned to the subsystem; passed to FESEND for terminal queuing; passed to the Page Facility for CRT page browsing; or spooled to a DDQ for subsequent transmission as a series of report pages for a printer.

A summary of message processing logic using MMU is shown in Figure 18. For a complete description of Message Mapping and its use by application subsystems, refer to the Intercomm Message Mapping Utilities.

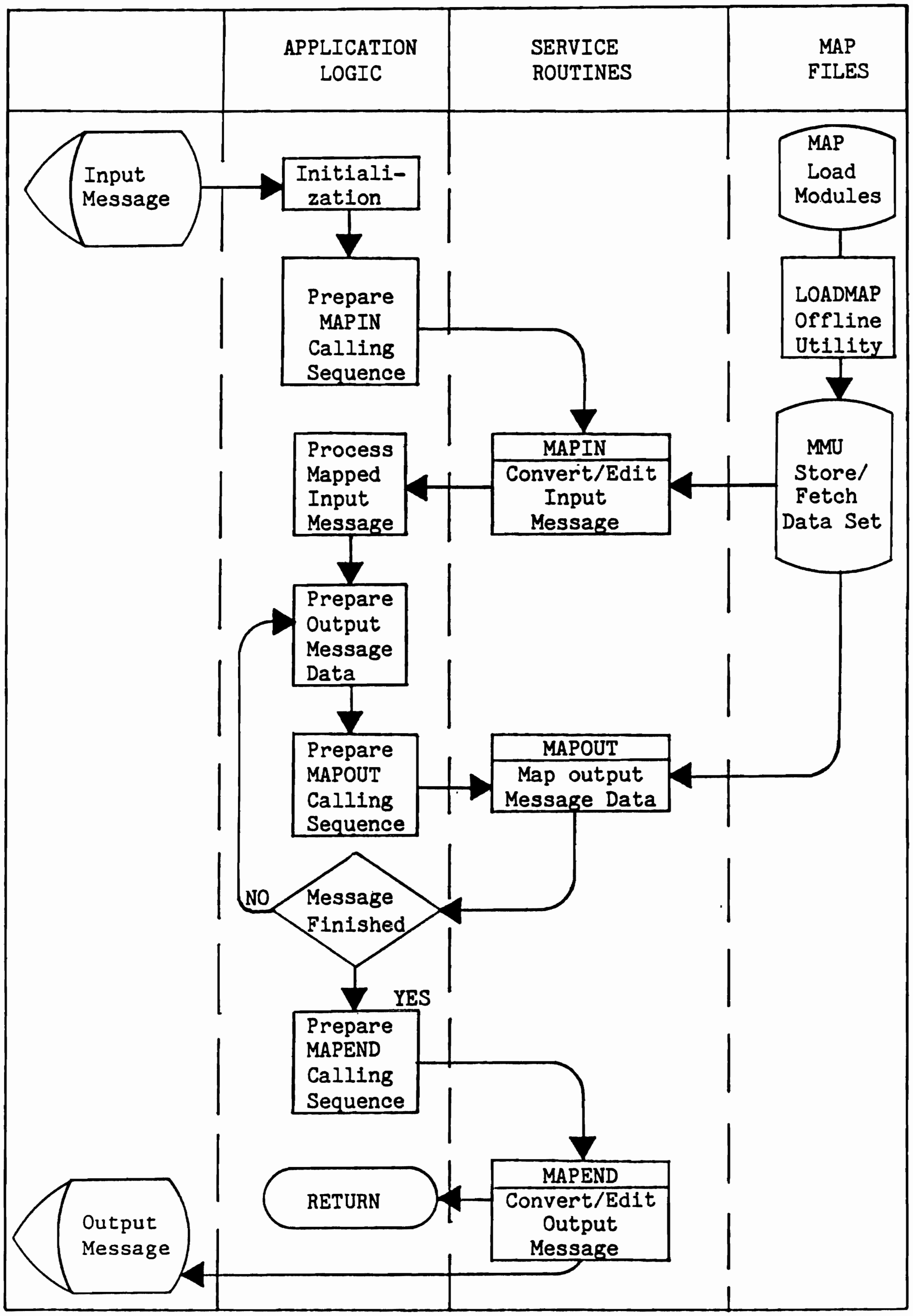

APPLICATION LOGIC
SERVICE ROUTINES
MAP FILES
Input Message
Initialization
MAP Load Modules
Prepare MAPIN Calling Sequence
LOADMAP Offline Utility
MMU Store/ Fetch Data Set
Process Mapped Input Message
MAPIN
Convert/Edit Input Message
Prepare Output Message Data
Prepare MAPOUT Calling Sequence
MAPOUT
Map output Message Data
NO
Message Finished
YES
Prepare MAPEND Calling Sequence
RETURN
MAPEND
Convert/Edit Output Message
Output Message

Figure 18. Message Processing Using MMU

Chapter 5

USING THE EDIT UTILITY

5.1 CONCEPTS

The Edit Utility may be used for input messages instead of MMU. It provides an interface to facilitate application program logic for message editing. When editing has been requested for a verb (via Front End Verb Table specification), the Intercomm PREPROG interface program calls the Edit Utility to produce edited message text from data fields entered by the terminal operator.

The edited message becomes the input message passed to the subsystem. The Edit Control routine strips the following field definition characters during the course of editing:

- The system separator character, as defined in the System Parameter List (SPA)
- 3270 CRT SBA sequences
- Dataspeed 40/1 and 2 terminal TAB characters
- New Line characters
- Carriage Return or combined Carriage Return/Line Feed
- End of Text, End of Message, End of Block, or End of Transmission characters.

All other device control characters not translated or otherwise suppressed by the Front End translation table for a particular device will be treated as text within a field.

Editing is controlled by the Edit Control Table (ECT - system table PMIVERBS), which contains all information about each message necessary to perform editing. An edit proceeds field by field based upon the user-specified ECT. Data fields may be edited by Intercomm or user-coded Edit Subroutines. For a complete description of the Edit Utility, its components and processing logic, refer to the Intercomm Utilities Users Guide. The sample program in Chapter 12 illustrates edited message processing.

5.2 PROCESSING RESULTS

The result of processing by EDIT is a message with a standard forty-two-byte message header and data fields in one of the following basic formats:

- <u>Fixed Format</u>

  Each edited field is of fixed length in a predefined sequence as follows:

HEADER	DATA 1	DATA 2	-----	DATA N

- <u>Variable Format</u>

  Each edited field may vary in length and position in the edited result. Each edited field is prefixed with a one-byte identification code, one-byte length, and possibly a one-byte occurrence number for fields defined as repetitive in the ECT:

HEADER	I	L	DATA X	I	L	DATA Y	-----	I	L	DATA Z

The Edit Utility considers a message successfully edited if there are no required fields (as specified by the Edit Control Table) in error or omitted. In the case of unsuccessful editing, Edit sends an error message to the originating terminal for each required field omitted or in error. If none of the required fields is omitted or in error, it remains the responsibility of the application program to analyze the edited result and perform recovery logic for any non-required fields in error. Figure 19 summarizes results of Edit processing for fields in error.

Field Type	Fixed Format	Variable Format
Non-Required Field Omitted	Field appears in edited result, filled with pad character associated with Edit Subroutine, that is, spaces for alphanumeric field, zero for numeric field, or user-assigned.	Field does not appear in edited result.
Non-Required Field in Error	Field appears in edited result filled with high-values (X'FF').	Field does not appear in edited result.
Required Field in Error or Omitted	Message rejected by EDIT.	Message rejected by EDIT.

Figure 19. Edit Utility Processing of Fields Omitted or in Error

Chapter 6

USING THE FILE HANDLER

6.1 GENERAL CONCEPTS

The Intercomm File Handler provides centralized control over all data file access in the on-line system. Requests for data file access are made in message processing subsystems by calling a File Handler service routine.

The correspondence between the normal COBOL file access functions and the Intercomm File Handler service routines is shown in Figure 20.

Function	COBOL Verbs	Service Routine
Prepare a file for access	OPEN	SELECT
Access logical records sequentially (QSAM,QISAM)	READ,WRITE GET,PUT	GET,PUT GET,PUT
Access logical records randomly (BISAM,BDAM)	READ,WRITE REWRITE	READ,WRITE WRITE
Access physical blocks (BSAM,BDAM)	READ,WRITE	READ,WRITE
Access VSAM files	READ,START WRITE,REWRITE	GETV PUTV
Conclude file access	CLOSE	RELEASE

Figure 20. Functions of File Handler Service Routines

A data file on-line is identified to the File Handler by the existence of a data definition (DD) statement in the execution JCL. Files must be existing (DISP=OLD or SHR) except for sequential output data sets (DISP=NEW or MOD).

DD statement requirements are illustrated in Figure 21. Additional requirements for VSAM are described in that section. Special processing definitions for particular files are defined to Intercomm at system startup by FAR (File Attribute Record) parameters. These include READONLY (prohibit output), OPEN (at startup), file duplexing, etc., and are described in the Operating Reference Manual. Additional parameters for file recovery (in case of program or system failure) are described in the File Recovery Users Guide.

```
//ddname*   DD  DSNAME=**
//                ,DISP=**
//                ,DCB=(DSORG=**
//                ,OPTCD=**                For BSAM,BDAM,BISAM only.
//                ,RECFM=                  Must be specified by existing
//                ,BLKSIZE=                data set label or explicitly
//                ,LRECL=                  in DD statement.
//                ,NCP=
//                ,LIMCT=
//                 etc.)
---------------------------------------------------------------------------
 *Name used to identify file in calls to SELECT.
**Marks those parameters which must be explicitly specified on the DD
  statement for each data set.
```

Figure 21. DD Statement Parameters for the File Handler.

In centralizing data file accesses, the File Handler provides one central set of control blocks for each file, thus reducing core requirements in individual message processing subsystems. There are no File Description entries in a COBOL-coded Intercomm program.

Furthermore, all the facilities of the following Operating System Data Management functions are accessible to any subsystem: BDAM, BSAM, QSAM, BISAM, QISAM and VSAM.

The File Handler also supports the following ISAM replacement access method available from another vendor: IAM.

Data Base interfaces supported under Intercomm (IDMS, ADABAS, TOTAL, DL/I) are described in the DBMS Users Guide and the respective vendors' manuals.

6.1.1 Subsystem Processing

In the on-line environment, several subsystems in concurrent execution may require access to the same data file. Rather than each subsystem issuing an OPEN and corresponding CLOSE for accessing a particular file, the File Handler will open a file the first time it is accessed (unless already opened at startup) and the file remains open for the duration of the on-line job in execution. A SELECT request simply establishes internal control blocks and the corresponding RELEASE request merely disconnects those internal control blocks. In each subsystem, following a SELECT for a particular file, access functions (READ, WRITE, GET, PUT, GETV, PUTV) may be called as many times as may be necessary for message processing logic. RELEASE must be called for each selected file prior to the return to the System Monitor.

Each subsystem must provide space for two File Handler control areas. The information in these areas is unique for each message thread, so they must be defined in the Dynamic-Work-Space of reentrant programs, that is, defined in the Linkage Section as a subordinate item to the fifth entry parameter. To assure that they are fullword aligned, they should be defined following an eight-digit computational item, such as 02 FILLER PICTURE S9(8) COMP SYNC. Figure 22 shows how these control areas may be defined so as to force the proper alignment.

```
02  FORCE-ALIGN  PIC  S9(8)  COMP  SYNC.
02  FHCW  REDEFINES  FORCE-ALIGN.
    04  FH-RET1  PIC  X.
        88  IOK        VALUE  0.
        88  IOERROR    VALUE  1.
        88  NOT-FOUND  VALUE  2.
        88  EOF        VALUE  2.
        88  XTO        VALUE  3.
        88  NO-DD      VALUE  9.
    04  FH-REQ1  PIC  X.
    04  FH-REQ2  PIC  X.
    04  FH-RET2  PIC  X.
02  EXTDSCT1     PIC  X(48).
02  EXTDSCT2     PIC  X(48).
```

Figure 22. Defining File Handler Control Areas

For each call to a File Handler service routine, the File Handler is passed the addresses of the two control areas. The first is an aligned 48-character area, called an External DSCT (EXTDSCT), which the File Handler uses to save control information for the subsystem processing thread, from the time that a given file is first SELECTed until it is finally RELEASEd. A unique EXTDSCT must be defined for each file concurrently accessed within the same processing thread. The other control field, called the File Handler Control Word (FHCW), is an aligned four-character field used for communication between the File Handler and the calling subsystem. Prior to each call to a service routine, the subsystem must clear the FHCW with spaces or initialize it with a predefined request code as described for each routine. A code of space (blank) is indicated in the detailed access descriptions by the lower case letter ƀ. An example of such a request would be to establish Exclusive Control during a call to READ with intent to update. The File Handler will return a completion code in this word, after servicing a request, to communicate the status of the operation back to the subsystem.

6.2 CALLING SERVICE ROUTINES

A COBOL subsystem may call the File Handler service routines through the Intercomm interface module COBREENT, and provide a routine-code name corresponding to the desired routine name, as described in the Intercomm COPY member ICOMSBS. The COBREENT prototype coding format is described in Chapter 3.

The parameters for the File Handler service routines are described in Figure 23. The specific parameters passed to a given service routine depend on file requirements and the processing options of the particular service routine called. If the calling subsystem (or subroutine) might be loaded above the 16M line, then all parameters (except the ICOMSBS code) must be in the 24-Amode DWS (may be in Working-Storage for VS COBOL II).

Parameter	Content
EXTDSCTname	A 48-character fullword-aligned area supplied by the subsystem for the File Handler's use for each file SELECTed (see Figure 22)
FHCWname	The File Handler Control Word, in which the File Handler returns a completion code to the subsystem (see Figure 22)
ddname	An eight-character constant initialized with the name of the DD statement describing the data set to Intercomm (move to the DWS for calls from 31-Amode OS/ANS COBOL programs)
Record-area	The area for data read from, or to be written to, the file
Key	The key for file access (ISAM, Keyed BDAM, VSAM-KSDS)
VSAM RBA	Four-byte Relative Byte Address number (ESDS)
VSAM RRN	Four-byte Relative Record Number (RRDS)
Block-ID	Applies only to BDAM files: • three-byte relative block number (RBN) • three-byte relative track and record number (TTR) • eight-byte actual address (MBBCCHHR)

Figure 23. File Handler Service Routine Parameters

The File Handler IAM support uses the Intercomm ISAM support routines.

On return from a File Handler service routine, the leftmost position of the FHCW area will contain a character code indicating the result of the operation, as shown in Figure 24. Additionally, for VSAM files, the rightmost position of the FHCW will contain a VSAM reason code.

Code	Meaning
0	Normal completion
1	Hardware I/O error
2	Unusual condition (EOF, invalid key, etc.)
3	Exclusive control time-out occurred
4-8	Not used
9	Invalid request (no DD statement, invalid parameter sequence, attempt to output to an input only file, etc.)

Figure 24. Outline of File Handler Return Codes

The application subsystem logic must then analyze this return code and take appropriate error recovery action. An error message might be created and queued for output to the terminal. Otherwise, the subsystem can return to the Subsystem Controller with a return code of 12, indicating that the Subsystem Controller should call the USRCANC routine which in turn will send an error message to the terminal.

6.2.1 Automatic Error Checking

If the application subsystem logic is such that special error recovery processing is not required, the File Handler will perform error checking itself and data will be returned to the subsystem only if the return code is zero. Otherwise, the File Handler will force a program check, which causes cancelling of the input message and return to the Subsystem Controller, which calls the USRCANC routine. To request this function, place a character 'C' in the first byte of the FHCW prior to calling a File Handler service routine.

6.3 SELECT, RELEASE FUNCTIONS

SELECT must be called to initialize the subsystem's EXTDSCT prior to any data access function performed by the File Handler. Prior to the call to SELECT, the subsystem's EXTDSCT must be initialized to low values.

RELEASE must be called to notify the File Handler that its pointers to the subsystem's EXTDSCT should be cleared and that all data access to a particular file within one subsystem thread is complete. There must be a RELEASE corresponding to each SELECT of a file. Multiple SELECTs of the same file using the same EXTDSCT are not permitted without intervening RELEASEs, within the same processing thread. After each RELEASE, the EXTDSCT should be cleared to low-values before being reused.

Coding format:

```
CALL 'COBREENT' USING FH-SELECT, EXTDSCTname, FHCWname, ddname.

CALL 'COBREENT' USING FH-RELEASE, EXTDSCTname, FHCWname.
```

Note: the ddname must be in the DWS if the calling program can be loaded above the 16M line (except if VS COBOL II).

Figure 25 describes the return codes for SELECT and RELEASE.

Return Codes (First Byte of FHCW)	SELECT	RELEASE
0	A reusable file (disk input) ready for access; sequential access begins at first record.	Successful release
1	A nonreusable file (SYSOUT, disk output (DISP=NEW/MOD or DISP=SHR/OLD and FAR WRITEOVER parm specified, or a data set on tape) ready for access, begins after last record previously accessed. Or empty/reused VSAM ESDS file ready for output only.	Not applicable
9	No ddname found in File Handler internal control table. (No DD statement in JCL or the file has been "locked" by the FILE control command.)	File not selected.

Figure 25. File Handler SELECT/RELEASE Return Codes

6.3.1 Closing a File

Occasionally, it is necessary to close a file, perhaps because it is to be updated by a batch job. A special form of RELEASE requests the File Handler to close a file. However, unless some external control is taken to assure that no other programs have selected the file, a close request could cause other transactions for the file to fail. Also, if new transactions are attempting to access the closed file, the File Handler will open it again and unpredictable results may occur. Intercomm provides the FILE system control command for systemwide file access control.

To close a file from an application program:

- If the file has been previously selected: first release the EXTDSCT by calling RELEASE referencing the EXTDSCTname used when the file was selected (as described above), then

- Move a character C to the second byte of the FHCW ('ƀCƀƀ') and call RELEASE supplying the ddname of the file to be closed; use the following coding format:

  ```
  CALL 'COBREENT' USING FH-RELEASE, ddname, FHCWname.
  ```

Note: the ddname must be in the DWS if the calling program can be loaded above the 16M line (except if VS COBOL II).

6.4 EXCLUSIVE CONTROL FOR NON-VSAM FILES

In a multithread environment with only inquiry applications, the fact that several message processing programs may concurrently retrieve data from the same file or files presents no operational problems. However, when more than one message processing program attempts to update or add records to a file, data integrity problems can occur. Figure 26 illustrates the problems of concurrent updates; program B's update nullifies that of program A. Exclusive control implies that while one program is operating on a record, that is, the time between a READ and a WRITE, all other requests to read or write that particular record will be delayed. A program requesting a record held during exclusive control by another program is not notified of this delay, but rather stops execution in the File Handler until exclusive control is either removed or expires so that the File Handler can then proceed with the requested function. Exclusive control, when required, must be requested separately with each call to File Handler READ or GET functions. Exclusive control for basic access methods operates at the block or record level. Exclusive control for queued access methods operates at the data set level; thus applications should be designed to avoid GET for update whenever feasible.

To obtain exclusive control over the entire data set in a QISAM file or over a physical block in a BDAM or BISAM file, move 'ƀXƀƀ' to the File Handler Control Word prior to calling GET or READ. Exclusive control does not apply to physical sequential (QSAM/BSAM) files.

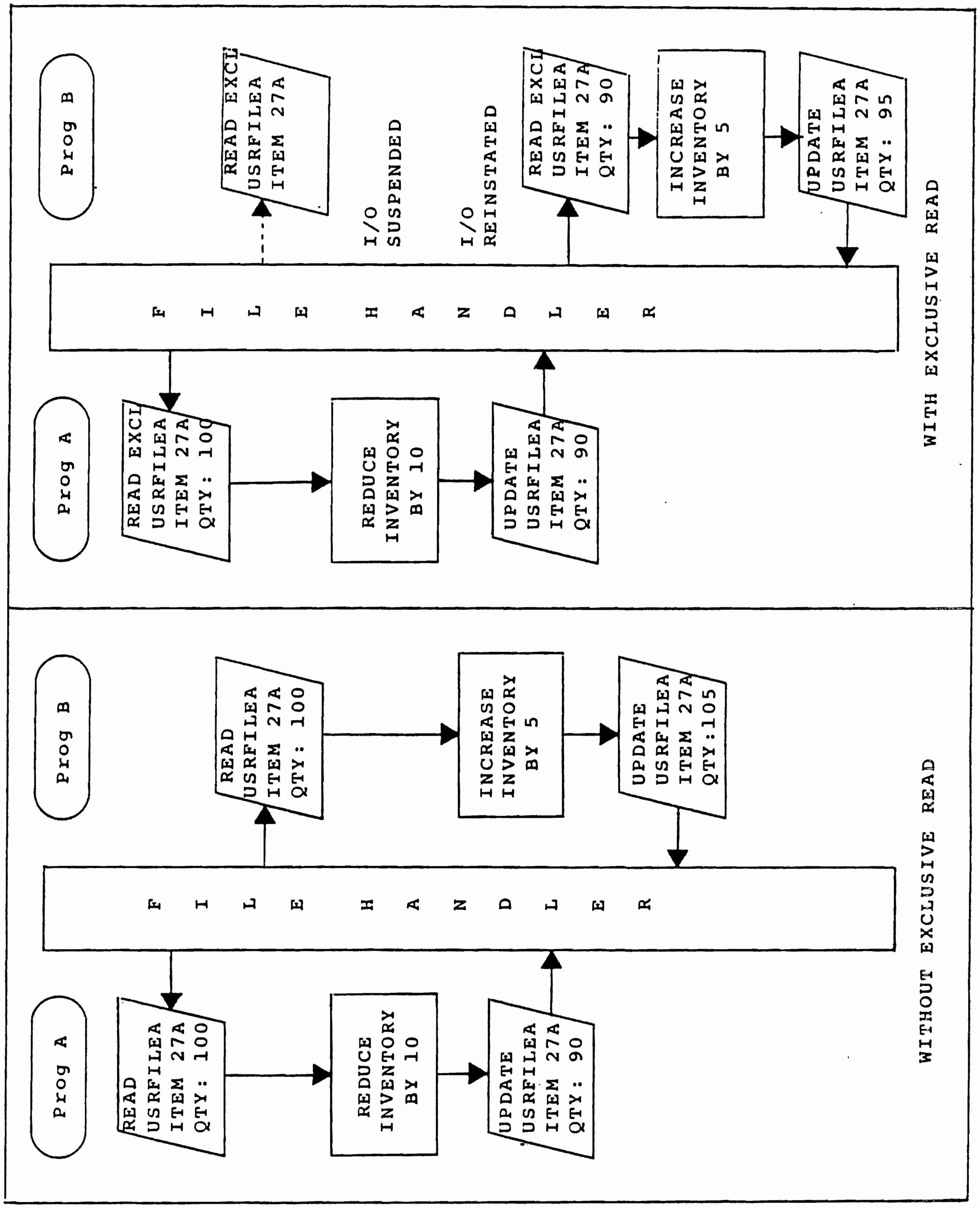

WITH EXCLUSIVE READ
Prog A
READ EXCL USRFILEA ITEM 27A QTY: 100
REDUCE INVENTORY BY 10
UPDATE USRFILEA ITEM 27A QTY: 90
FILE HANDLER
Prog B
READ EXCL USRFILEA ITEM 27A
I/O SUSPENDED
I/O REINSTATED
READ EXCL USRFILEA ITEM 27A QTY: 90
INCREASE INVENTORY BY 5
UPDATE USRFILEA ITEM 27A QTY: 95
WITHOUT EXCLUSIVE READ
Prog A
READ USRFILEA ITEM 27A QTY: 100
REDUCE INVENTORY BY 10
UPDATE USRFILEA ITEM 27A QTY: 90
FILE HANDLER
Prog B
READ USRFILEA ITEM 27A QTY: 100
INCREASE INVENTORY BY 5
UPDATE USRFILEA ITEM 27A QTY:105

Figure 26. Exclusive Control Processing

Exclusive control will be released by:

- A call to WRITE or PUT referencing the same EXTDSCTname, that is, the update of the previously acquired record, and no key or block-id specified.
- A call to WRITE referencing the same EXTDSCTname and a key and/or block-id is specified.
- A call to READ or GET referencing the same EXTDSCTname (retrieving a new record from the file).
- A call to RELEASE referencing the same EXTDSCTname.
- An elapsed time after the call to READ with Exclusive Control greater than the exclusive control time-out value of the File Handler. This is set at two minutes for any given record and a maximum of ten minutes for consecutive exclusive accesses to a QISAM file.

  NOTE: A return code of 3 after a call to WRITE or PUT to update a record held in exclusive control indicates that exclusive control timed out: the WRITE or PUT did not take place. The program should re-READ or re-GET the same record with exclusive control and WRITE or PUT again, after reprocessing the record.

- A call to RELEX, if the program logic is such that the record does not need to be updated, or additional and time-consuming activity (accessing other files) is required before resuming access to the file. Such a program could call RELEX to release exclusive control without actually RELEASEing the file until later in the program logic.

6.4.1 Release Exclusive Control--RELEX

RELEX is called to release Intercomm or VSAM exclusive control without having to read, update, time-out, or RELEASE the file.

Coding format:

```
CALL 'COBREENT' USING FH-RELEX, EXTDSCTname, FHCWname.
```

Return Code	Meaning
0	Exclusive control released
9	File not selected or invalid function

Figure 27. File Handler Release Exclusive Control (RELEX) Return Codes

6.5 SEQUENTIAL ACCESS METHOD (SAM) PROCESSING

6.5.1 File Handler Service Routines--GET, PUT (QSAM); READ, WRITE (BSAM)

GET is called to access the next sequential logical record from a file. PUT is called to write the next sequential logical record to a file. READ is called to access the next sequential physical block. WRITE is called to write the next sequential physical block. If PUT or WRITE is called referencing a disk data set, the record last accessed by a GET or READ will be updated, however, the length may not be changed. GET processing is subtasked by the File Handler in order to provide multithreading facilities; for further details, see the Operating Reference Manual.

Coding format:

```
CALL 'COBREENT'  USING FH-GET, EXTDSCTname, FHCWname,
                 record-area [,record-length].

CALL 'COBREENT'  USING FH-READ, EXTDSCTname, FHCWname,
                 record-area [,record-length].

CALL 'COBREENT'  USING FH-PUT, EXTDSCTname, FHCWname,
                 record-area [,record-length].

CALL 'COBREENT'  USING FH-WRITE, EXTDSCTname, FHCWname,
                 record-area [,record-length].
```

Return Codes	GET, READ	PUT, WRITE
0	Successful	Successful
1	I/O Error	I/O Error
2	End-of-file	(Not applicable)*
9	Not selected or invalid function; that is, using an output-only file	Not selected or invalid function; that is, using a tape input file or readonly file, or file not sequential.
* For WRITE to a disk file: indicates End-of-file (write not done)		

Figure 28. File Handler Sequential Access Method Return Codes

6.5.2 Undefined Record Format and Record Length

The record-length parameter is valid and required only when a file with an undefined record format (DCB=RECFM=U) is accessed. The record-length parameter points to a fullword containing the length of the output record before a PUT or WRITE operation, or to contain the length of the input record after a GET or READ operation. The second character of the File Handler Control Word must be set to U to utilize this feature. Do not code the DCB subparameter LRECL on the DD statement for the file in the Intercomm execution JCL. The BLKSIZE, RECFM and DSORG subparameters are required.

6.5.3 Variable-Length Record Format and Record Length

Variable-length records start with a Record Descriptor Word (RDW) which must be fullword aligned (PIC 9(8) COMP SYNC). The first two bytes of the word contain the record length in binary (+4 for the RDW); the second two bytes contain binary zeros (low values). The RDW is followed immediately by the record data, and must be recognized by the subsystem on input, and provided and initialized on output.

For blocked files, if GET or PUT are used, the access method will perform the blocking and deblocking. If READ or WRITE are used, the application program must perform the deblocking (READ) and blocking (WRITE). In this case, the block must start with a Block Descriptor Word (BDW) of four bytes (aligned); the first two bytes contain, in binary, the total block length (including 4 for the BDW), and the second two bytes contain binary zeros (low values). For JCL details, and FAR options for defining and accessing the file, see the Operating Reference Manual.

6.6 INDEXED SEQUENTIAL ACCESS METHOD (ISAM) PROCESSING

To use an ISAM file on-line under Intercomm, do not define three DD statements (INDEX/PRIME/OVERFLOW) for either the off-line creation of the ISAM data set, or the on-line execution DD statement. For creation, let the access method set up the index and overflow areas (use CYLOFL parameter on DD statement). For on-line execution, define only DISP=OLD and the data set name, volser and unit parameters if not catalogued, and the DCB parameter DSORG=IS. Optionally, the DCB parameter OPTCD may also be specified. See also the descriptions of FAR parameters applicable to ISAM data sets described in the Operating Reference Manual.

6.6.1 File Handler Service Routines--GET, PUT (QISAM); READ, WRITE (BISAM)

GET is called to access the next sequential record, or to reposition (if a key is specified) and access the next sequential record. READ is called to retrieve a specific record at random. PUT is called to update the last record retrieved by a call to GET. WRITE is called to update the last record retrieved by a call to READ, or to add a record to the file (if a key is specified). For update, exclusive control may be requested; otherwise use blanks in the FHCW.

Coding format:

to retrieve next sequential record:

```
CALL  'COBREENT' USING FH-GET, EXTDSCTname, FHCWname, record-area.
```

to reposition and retrieve record with key equal or high:

```
CALL  'COBREENT' USING FH-GET, EXTDSCTname, FHCWname, record-area,
                 key.
```

to update last GET:

```
CALL  'COBREENT' USING FH-PUT, EXTDSCTname, FHCWname, record-area.
```

to retrieve a specific record:

```
CALL  'COBREENT' USING FH-READ, EXTDSCTname, FHCWname, record-area,
                 key.
```

to update last READ:

```
CALL  'COBREENT' USING FH-WRITE, EXTDSCTname, FHCWname, record-area.
```

to add a specific record:

```
CALL  'COBREENT' USING FH-WRITE, EXTDSCTname, FHCWname, record-area,
                 key.
```

Figure 29 describes return codes for ISAM access.

QISAM Return Codes	GET w/o Key	GET w/Key	PUT
0	Next sequential record retrieved	Record with equal or next higher key retrieved	Record from previous GET updated
1	I/O error	I/O error	I/O error
2	End of File	Key out of range	N/A
3	N/A	N/A	Exclusive Control Time-out
9	File not selected or invalid function	File not selected or invalid function	File not selected or invalid function

BISAM Return Codes	WRITE w/o Key	WRITE w/Key	READ
0	Record from previous READ updated	Record with specified key added	Record with equal key retrieved
1	I/O error	I/O error	I/O error
2	N/A	Key already exists or no room to add new record	Key does not exist
3	Exclusive Control Time-out	N/A	N/A
9	File not selected or invalid function	File not selected or invalid function	File not selected or invalid function

Figure 29. File Handler ISAM Return Codes

6.7 DIRECT ACCESS METHOD (BDAM) PROCESSING

BDAM files are accessed by block-id. The form of the block-id is defined in the OPTCD subparameter of the DCB parameter of the DD statement and the same form must be used by all programs accessing the file:

- OPTCD=RF--block-id is three-byte binary RBN (relative block number) for fixed-length files only
- OPTCD=AF--block-id is eight-byte actual MBBCCHHR
- OPTCD=F--block-id is three-byte binary TTR (relative track and record number) for fixed- or variable-length files.

The F permits feedback (of block-id) requests: the form of the block-id is that requested by the OPTCD parameter. For Keyed BDAM with extended search, insert an E immediately after the = sign (that is, code OPTCD=ERF, etc.), and specify the LIMCT subparameter on the DCB parameter of the DD statement.

6.7.1 File Handler Service Routines--READ, WRITE (BDAM)

READ is called to retrieve a physical block. WRITE is called to update a block previously read, to replace an existing block in a preformatted file, or to add a new block.

Coding format:

```
     CALL 'COBREENT' USING FH-READ, EXTDSCTname, FHCWname,
                     record-area[, key], block-id.

     CALL 'COBREENT' USING FH-WRITE, EXTDSCTname, FHCWname,
                     record-area[, key][, block-id].
```

Figure 30 shows FHCW options (byte 2) for standard and keyed BDAM files, and when to use key and/or block-id fields. Figure 31 describes the corresponding return codes. When reading a keyed BDAM file, the key will be read into the key field if a key parameter is passed and the key is not used as the search argument (w/o extended search). For a keyed BDAM file, replace requires a previous read; update and replace are synonymous.

Intercomm provides two utilities for off-line preformatting of fixed-length BDAM files:

- CREATEGF for BDAM files without keys
- KEYCREAT for BDAM files with keys.

These utilities are described in the Operating Reference Manual.

1. BDAM Files Without Keys

Code	Request	Macro
ƀ	READ w/o exclusive control, w/block-id	READ DIF
X	READ w/exclusive control, w/block-id	READ DIX
ƀ	WRITE to update last READ, w/o block-id	WRITE DI/DIX
ƀ	WRITE to update/replace w/o previous READ, w/block-id	WRITE DI
A	WRITE to add a record--variable-length only (record address returned automatically in caller's block-id field)	WRITE DAF

2. BDAM Files With Keys

Code	Request	Macro
*ƀ	READ data block only w/o exclusive control (w/extended search) w/key, w/block-id	READ DKF
*X	READ data only w/exclusive control (w/extended search) w/key, w/block-id	READ DKX
J	READ key and data block w/o exclusive control w/o extended search, w/block-id (w/key)	READ DIF
I	READ key and data w/exclusive control w/o extended search, w/block-id (w/key)	READ DIX
*ƀ	WRITE to update data only w/o extended search w/key	WRITE DKF/DKX
I	WRITE to update key and data w/o extended search, w/key (w/block-id)	WRITE DI/DIX
*A	WRITE to add a record--next available space w/key, w/block-id (w/extended search)	WRITE DAF

*Feedback of record addresses may be requested for these options only by placing an F in byte 3 of the FHCW.

Figure 30. File Handler BDAM Option Codes.

NOTE: The DI form of the macros (issued in the File Handler) requires that the block-id field contains the exact address of the data record in the form specified by the OPTCD subparameter on the DD statement. With the DK form, if extended search is not specified (via E on the OPTCD subparameter), only one track is searched for a record with key matching that passed in the key field, and starting at the address specified in the block-id field. A WRITE for update of last READ does not need a block-id, as positioning is remembered internally.

1. BDAM Files Without Keys

Return Codes	READ	WRITE w/o block-id	WRITE w/block-id
0	Block retrieved	Block from previous READ updated	Specified block added/replaced
1	I/O error	I/O error	I/O error
2	Block out of range	N/A	RECFM=F... Block out of range
			RECFM=V... No space available/ block out of range
3	N/A	Exclusive Control Time-Out	N/A
9	File not selected or invalid function	File not selected or invalid function	File not selected or invalid function

2. BDAM Files With Keys

Return Codes	READ	WRITE w/o block-id	WRITE w/block-id
0	Logical record retrieved	Record from previous READ updated	Specified record added
1	I/O error	I/O error	I/O error
2	Key not found (READ w/key)	Key not found at block-id saved from previous READ (WRITE DK only)	RECFM=F... No dummy record found
			RECFM=V... No space available
3	N/A	Exclusive Control Time-Out	N/A
9	File not selected or invalid function	File not selected or invalid function	File not selected or invalid function

Figure 31. File Handler BDAM Return Codes

6.8 VIRTUAL STORAGE ACCESS METHOD (VSAM) PROCESSING

VSAM support is provided for all three file types: KSDS, ESDS, and RRDS. Subsystems designed to access VSAM files use two File Handler service routines; GETV and PUTV. SELECT and RELEASE function for VSAM as they do for OS data sets. Calls are similar to the standard File Handler format, with the File Handler Control Word (FHCW) used to specify VSAM options. DD statements for VSAM must specify AMP=(AMORG) and for fixed-length data records, 'RECFM=F' must also be specified on the AMP parameter: AMP=(AMORG,'RECFM=F'). FAR options and execution options for VSAM files such as LSR buffer pool support, empty ESDS file load or overwrite, and data set name sharing, are described in the Operating Reference Manual. Most users converting ISAM to VSAM can continue to use their current File Handler calls. Refer to "ISAM/VSAM Compatibility under Intercomm" later in this chapter for further details.

6.8.1 File Handler Service Routines--GETV, PUTV (VSAM)

A VSAM call may request either sequential or direct access and may specify access for KSDS via keys (keyed access) or for ESDS via Relative Byte Addresses (addressed access). A keyed access call for direct retrieval may provide either a generic key or a full key, and may specify a search for either an equal (generic) key or for the first greater-or-equal (generic) key.

A VSAM Relative Record Number Data Set (RRDS) may be accessed sequentially, or directly by Relative Record Number. A direct access request to a RRDS is made by suppling the Relative Record Number of the desired record instead of a key or RBA. All direct accesses to an RRDS must specify "full key, search equal." RBA access is not allowed and RRNs should not be converted to RBAs for access to an RRDS. Records may be inserted into emply slots in an RRDS but a record may not be added with a higher relative record number than the maximum allowed. This maximum is specified when the data set is defined to VSAM.

GETV calls are processed assuming that no update will be performed unless the caller so specifies. The caller may switch back and forth from direct to sequential access, provided VSAM rules are not violated, for example, keyed request against an entry-sequenced data set. The File Handler service routine GETV is called for retrieval. The File Handler service routine PUTV is called for storage or deletion.

Coding formats:

For sequential access

```
CALL 'COBREENT' USING FH-GETV, EXTDSCTname, FHCWname, record-area.
```

Coding formats (continued):

For direct access

```
CALL 'COBREENT' USING FH-GETV, EXTDSCTname, FHCWname,
                record-area, {rba}.
                             {key}
                             {rrn}
```

For update of record retrieved by preceding GETV or for sequential addition

```
CALL 'COBREENT' USING FH-PUTV, EXTDSCTname, FHCWname, record-area.
```

For direct addition of a new record

```
CALL 'COBREENT' USING FH-PUTV, EXTDSCTname, FHCWname,
                record-area, {rba}.
                             {key}
                             {rrn}
```

where:

EXTDSCTname is the standard File Handler parameter.

FHCWname is the standard File Handler parameter. Its VSAM use is to define processing options and to return completion codes to the caller (see Figures 32 and 33).

record-area is the label of the user's I/O area. For fixed length records, no length is specified and data will start in the beginning of the area. For variable length, the first four bytes of the area are used as an OS-type, fullword-aligned, variable record descriptor word (RDW), the first two bytes of which specify the appropriate length in binary (data length +4); data begins in the fifth byte. For GETV, the File Handler will return this length to the caller and for PUTV, the caller must provide the length to the File Handler.

rba is the label of an aligned fullword containing the Relative Byte Address when required for addressed access.

key is the label of a field providing a key, when required for keyed access. If a generic key is provided, then the first two bytes of this field must be the length, in binary, of the generic key which must begin in byte 3, and the field must be fullword-aligned.

rrn is the address of a fullword-aligned field providing a four-byte binary Relative Record Number whose value is 1 to n, where n is the maximum record number defined for the data set.

6.8.2 VSAM Processing Options

The following determine the mode of VSAM access to be performed:

- The preceding call

  A VSAM call is dependent upon the preceding call only in two cases: PUTV for update, or sequential GETV or PUTV calls requiring initial positioning.

  In the first case, the PUTV call must be immediately preceded by a GETV for update, which identifies the record to be updated. The PUTV for update has no fourth parameter because the key, RRN or RBA was defined by the prior GETV. In the second case, a direct call providing a key, RRN or RBA and requesting positioning must be issued in order to process sequentially starting from that point in the file. To request positioning in this manner, specify S in the second byte of the FHCW for the direct call to GETV; the first record in the sequence will be returned. For an ESDS file, a GETV call without a fourth parameter results in sequential reads from the beginning of the file; the S in the FHCW is unnecessary.

- The presence or absence of the fourth parameter

  With the exception of a PUTV for update, all calls for direct access specify a fourth parameter and all subsequent calls for sequential access specify only three parameters.

- The contents of the File Handler Control Word

  The second and third bytes of the FHCW are used to complete the definition of the options desired. Alphabetic codes are used and positive tests are made for each defined code. When no defined code is present, the default option (blank) is used.

Bytes 1 and 2 of the FHCW are utilized the same as for OS Access Methods for Return Codes (Byte 1) and Special Requests (Byte 2). The first byte of the FHCW will contain a zoned decimal digit upon return from GETV or PUTV. A nonzero value indicates an error or an exceptional condition.

Byte 2 is used in conjunction with direct access. When an S is provided in byte 2, the direct access is treated as the first of a series of sequential requests which begins at a point specified by the fourth parameter. Therefore, a VSAM POINT will be issued and sequential access will subsequently be performed for the next call.

Byte 3 is used for all VSAM calls as illustrated in Figure 32. There are five default (blank) cases:

- GETV with three parameters (subsequent sequential access)
- GETV with four parameters (search key/RRN equal, no update)
- PUTV with three parameters with no prior GETV for update (sequential add/insert)
- PUTV with three parameters and with a prior GETV for update
- PUTV with four parameters (direct key/RRN add/insert)

6.8.3 FHCW Reason Codes for VSAM

Byte 4 is used to provide VSAM reason codes (from the RPL feedback field) upon completion of a VSAM file access request. In VSAM, a distinction is made between logical and physical errors. In either case VSAM returns a supplementary reason code in hexadecimal defining the condition more precisely. Accordingly, the File Handler will return this reason code in FHCW byte 4, for the caller's use. If the File Handler was called at an ISAM entry point (GET/PUT, READ/WRITE), the code returned in FHCW byte 1 may differ from GETV/PUTV calls (in order to maintain compatibility with existing ISAM subsystems). Figure 33 summarizes VSAM and ISAM/VSAM return codes. VSAM reason codes are fully documented in IBM's VSAM Macros manual.

6.8.4 Exclusive Control for VSAM Files

VSAM automatically provides exclusive control of a control interval (physical block) whenever a GETV for update is processed if the file was defined with SHAREOPTION 1 or 2. The subsystem must release this exclusive control via a call to RELEX before another GETV is issued for the same file, unless an intervening PUTV for update or erase is issued. If no subsequent GETV will be issued, the call to RELEASE will also release exclusive control. There is no VSAM exclusive control time-out. If the VSAM file is accessed by more than one region (Intercomm and/or batch), see IBM documentation on VSAM SHAREOPTIONs, and the Intercomm Operating Reference Manual.

6.8.5 Loading an ESDS Data Set

During File Handler initialization at startup, if an ESDS file is empty or if the FAR parameter WRITEOVER is specified, the ESDS file is flagged as output-only. The first call to SELECT for the file will return a code of 1. The program receiving this code may only use a PUTV call for the file. If that (or any other) program will need to get a record from the file, it must close the file via calls to RELEASE (see Section 6.3.1), after the first PUTV. The next call to SELECT will return a code of 0, and any subsequent call to GETV or PUTV will then cause the file to be reopened for input/output and multi-thread access is then permitted. PUTV calls should be single- threaded to ensure file integrity.

6.8.6 Alternate Path Processing of Keyed VSAM Files

Base Cluster and Alternate Path processing of keyed VSAM files is supported with the following (VSAM-imposed) restrictions:

- If defined in the JCL, the DD statement for the base cluster must be before those for any related paths, and open at startup must be requested via a FAR. Also, both the base cluster and the paths must be connected to an LSR buffer pool.

- Each path to be accessed on-line must be defined in the JCL and be SELECTed with the corresponding ddname. When created, the path must be defined with the UPDATE option.

- The FAR READONLY option must be specified for all paths and the base cluster (if defined) except for the path used for updating, when Shareoption 2 is in effect for the base cluster. If updating is only via the base cluster, then READONLY must be specified for all associated paths. VSAM will not allow any accesses to a base cluster under Shareoption 1 when one path has opened it for update. A base cluster under Shareoption 3 may be accessed for reads or updates by more than one path at any time, however no exclusive control (read/write file integrity) is provided by either VSAM or Intercomm. For Intercomm-provided exclusive control for Shareoption 4, see the Operating Reference Manual.

- If multiple paths are accessed, and/or retrieval/update is done via the path(s) and the base cluster, retrieval of updated versions of the records can be ensured via the FAR DSN and LSR parameters.

- Since duplicate keys may occur in an Alternate Index, the application program is responsible for checking for duplicate keys. Sequential processing (GETV type 1) can be used after the first GETV with key (and an S in byte 2 of the FHCW) in order to retrieve subsequent records. The program can test to see if the last record under a duplicate key was retrieved by checking the VSAM reason code which will be placed in byte 4 of the FHCW. See IBM's VSAM Macros manuals for reason code values.

- The alternate index data set must be defined with the UPGRADE attribute and be built prior to Intercomm startup. An attempt to retrieve a record from an empty file will cause a program check.

- Alternate index data sets should not be defined in the JCL unless access to a data record containing the prime keys is desired, or path processing is not used. Only readonly processing should be done for an AIX and for any related paths and for the base cluster, otherwise, retrieval of the current version of a record is unpredictable.

Type	Service Routine	Access or Action	FHCW Byte 3		KEY/RRN or RBA	Comments
			Update	No Update		
1	GETV	Sequential	U	default	---	In KEY or RRN sequence
2	GETV	Sequential	A	R	---	In RBA sequence (default for ESDS)
3	GETV	Direct	U	default	Full Key or RRN	Search =
4	GETV	Direct	L	F	Full Key	Search greater or = (not valid for RRDS)
5	GETV	Direct	=	E	Generic Key	Search = (not valid for RRDS)
6	GETV	Direct	>	G	Generic Key	Search greater or = (not valid for RRDS)
7	GETV	Direct	A	R	RBA	Addressed Access
8	PUTV	Sequential Add or Insert	default		---	No prior GETV for update (insert not allowed for Addressed Access)
9	PUTV	Update	default		---	Prior GETV for update required (Addressed Access update may not change length)
10	PUTV	Erase	E		---	Prior GETV for update required (not valid for Addressed Access)
11	PUTV	Direct Add or Insert	default		Key or RRN	(no prior GETV)
12	PUTV	Add	A		RBA	Insert not valid

Figure 32. File Handler VSAM Call Summary

	FHCW		
	Byte 1 (char)		Byte 4
Condition at Completion of Operation*	VSAM	ISAM	(hexadecimal)
Successful completion (A)	0	0	04,08,0C,10,1C
Physical I/O error (A)	1	1	04,08,0C,10,14,18
End of data (1, 2)	2	2	04
No record found (3, 4, 5, 6, 7)	2	2	10
Key not within defined key ranges (3, 4, 5, 6, 7)	2	1	24
Duplicate key (8, 11)	9	2	08
Key out of ascending sequence (8)	9	2	0C
Update attempt with new key (9)	9	9	60
Key exceeds maximum (5, 6)	9	**	70
Addressed update changes length (9)	9	**	64
Invalid RBA provided (7, 12)	9	**	20
Required positioning not performed (1, 2, 8)	9	**	58
Direct or update call while loading (8) GETV for ESDS while loading (2,7)	9	9	74
Insufficient disk space (8, 9, 11, 12)	9	9	1C
Record on unmountable volume (1-7, 11, 12)	9	9	18
Invalid Relative Record Number (3,11)	9	**	C0
Invalid RBA access to a RRDS file (7,12)	9	**	C4
Invalid EXTDSCT or file unavailable or PUTV called for READONLY file	9	9	00

*Characters in parentheses reference the type(s) of VSAM Call (Figure 32) which apply. A = all cases.

**Should not occur. The File Handler will force a program check condition to terminate the message in progress.

Figure 33. File Handler VSAM Return and Feedback Codes

6.9 ISAM/VSAM COMPATIBILITY UNDER INTERCOMM

Subsystems accessing ISAM files can function with little or no modification when their files are converted to VSAM. Intercomm's ISAM/VSAM interface does not use IBM's VSAM/ISAM interface modules. See the Operating Reference Manual for steps necessary to activate the interface. When processing a VSAM data set, the File Handler uses QISAM compatible access for a GET or PUT call and BISAM compatible access for a READ or WRITE call.

An ISAM retrieval is converted to a VSAM GET for update. If a key is provided, it is, of course, treated as a full key. For GET with a key, positioning and a search for a greater or equal key is performed. For READ, a search is made for an equal key. File Handler logic will initialize the user FHCW prior to performing the VSAM function as follows:

- Byte 2 is set to 'S' to force sequential positioning.
- Byte 3 is set to 'U' or 'L' to force update mode.

ISAM delete code processing continues to function as usual via the OPTCD subparameter of AMP on the DD statement. The new OPTCD parameters (I, IL) which specify supplementary delete code processing are supported also.

The following considerations apply to ISAM users converting to VSAM and should be carefully observed:

- ISAM subsystems must already be operational for ISAM files before accessing VSAM files. Erroneous ISAM parameter lists will cause unpredictable results.
- Between a SELECT and a RELEASE, neither READ and GET nor WRITE and PUT may be intermixed.
- The caller may not provide his own DCB.
- The FHCW will be modified in order to convert the call to its VSAM equivalent.
- There is no equivalent to a QISAM physical block once the file has been converted to VSAM. All VSAM data records are equivalent to ISAM logical records. This means that users processing the file via READ in one subsubsystem and GET in another will both retrieve what would have been an ISAM logical record.

Figure 33 describes return codes when ISAM/VSAM compatibility is used.

Chapter 7

USING THE OUTPUT UTILITY

7.1 CONCEPTS

The Output Utility is a subsystem that processes messages destined for terminals operating under control of Intercomm. It is responsible for completing any device-dependent formatting requirements in a message before passing it to the teleprocessing interface (FESEND) for eventual transmission to the terminal device. It also checks the operational status of destination terminals. Should it find a destination terminal not operational, it will redirect messages to an alternate terminal, if one has been named for that particular destination terminal. Otherwise, the Front End will intercept a message to a nonoperational terminal and queue it in the output queue assigned to that terminal to await its availability. If an alternate terminal name has been provided to the Front End Network Table, and the alternate can receive output, then the Front End will dequeue the message queued for the nonoperational primary terminal and send it to the alternate as soon as possible (useful primarily for non-functional printers).

7.2 PROCESSING

An application subsystem may create four different types of output message text, identified by a value in the message header VMI field (MSGHVMI):

- Preformatted (VMI=X'57' or C'P')

  Text consists of both data and device control characters. All spacing and other formatting (titles, column headings, etc.) is included in the message text. Output processing consists merely of passing the message to the Front End via FESEND. If the destination terminal (MSGHTID) is the name of a broadcast group, rather than an individual terminal, a separate message is created for each terminal of the group. Except for broadcast terminal-ids, subsystems should use the service routine FESEND, which is more efficient than queuing via Output.

- <u>Formatting Required, Variable Text (VMI=X'50' or C'0')</u>

  Text consists of a string of character data items to be inserted into a final message format defined by an Output Format Table (OFT) entry. Each data field is prefixed with an item code and length prefix, and an occurence factor (if a repetitive field), to identify the field. The OFT defines the position and content of titles, headings, etc., and defines the position where data fields from the message text are to be inserted. Output formats the final message, adding device-dependent control characters, and performs broadcast group processing, as described above.

- <u>Formatting Required, Multiple Segments (VMI=n)</u>

  This form is used when multiple messages are to be created for the same hardcopy terminal (such as a printer) and inter-leaving of other messages for the same device is not desired. The text is variable format as described above. The VMI code for the first (or header) segment is X'51' or C'1'; for intermediate segments is X'52' or C'2' or X'5C' or C'4' depending on line types desired; and for the final seqment is X'53' or C'3'. The final segment must be queued, even if no intermediate segments are created, in order that Output may release the terminal for other messages.

- <u>Formatting Required, Fixed Text (VMI=X'72' or C'S')</u>

  Text consists of fixed length text fields in character or arithmetic format. This type of message is routed to the Change/Display Utility, where it is converted to a Variable Text message and routed to the Output Utility. The fixed text is described to Change/Display by a Format Description Record (FDR). The first twelve bytes of the fixed format text identify the particular FDR which details the fixed fields of the message. Byte 9 within this header provides the segment type (see Figure 34).

The application subsystem creates its output message (header and text) and directs the message to either the Output Utility or the Change/Display Utility by calling the service routine COBPUT. The receiving subsystem codes and VMI in the message header specify the destination subsystem and message text formatting requirements. Figure 34 summarizes message header specifications. In addition, the MSGHQPR field in the message header must be set to C'2' if the originating subsystem might process segmented input.

The sample subsystem in Chapter 12 provides examples of using the Output and Change/Display Utilities. For complete details regarding the Output Utility and Change/Display Utility, refer to the <u>Utilities Users Guide</u>.

OUTPUT Message Type	Message Header Fields: MSGHRSCH	MSGHRSC	MSGHVMI	Change/ Display Prefix
Preformatted (device-dependent)	X'00'	C'U'	X'57' or C'P'	N/A
Variable Text Formatting:			X'50' or C'0'	
Single Segment Messages: character format for item code, length (and occurrence number)	X'00' or C'0'	C'U'		N/A
binary format for item code, length (and occurrence number)	C'U'	C'U'		N/A
Multi-Segment Messages: character format first segment	X'00' or C'0'	C'V'	X'51 or C'1'	N/A
detail segment - repetitive data items			X'52' or C'2'	
detail segment - non-repetitive data items			X'5C' or C'C'	
final segment			X'53' or C'3'	
binary format first segment	C'V'	C'V'	X'51'	N/A
detail segment - repetitive items			X'52'	
detail segment -non-repetitive items			X'5C'	
final segment			X'53'	
Fixed Field Formatting:	X'00'	C'H'	X'72' or C'S'	
Single-Segment Messages:				C'0'
Multi-Segment Messages: first segment				C'1'
detail segment - repetitive items				C'2'
detail segment - non-repetitive items				C'4'
final segment				C'3'

NOTE: COBPUT converts character codes to the corresponding hexadecimal values for VMI codes, and MSGHRSCH to X'00'.

Figure 34. Message Header Specifications for the Output Utility

Chapter 8

CONVERSATIONAL SUBSYSTEMS

8.1 GENERAL CONCEPTS

Conversational subsystems are defined as one or more subsystems designed to process more than one input message to complete a transaction. They effectively carry on a dialogue with the terminal operator, receiving an input message, retaining it and/or associated results of processing, issuing a response (perhaps a prompt for additional information), receiving another input message, retaining it, etc., until the transaction is complete. At the end of the conversation, appropriate files may be updated.

8.1.1 Conversational Applications

Typical applications which lend themselves to conversational processing are:

- Operator prompting (multiscreen input)

- Batch Data collection

Prompting, or multiscreen input, applications typically consist of dialogues in which the terminal operator enters an input message, the information is analyzed by the application subsystem and the results of processing are saved; the application subsystem then sends an output message to the terminal, prompting the operator for the next piece of information required. This dialogue continues until the application subsystem has obtained all the necessary information to complete processing for the given transaction.

Batch data collection may be conversational in that even though the input data is saved for later retrieval, the collecting application may need to return an error message requesting correction of invalid input data before saving the input record, or the application may need to request the input of a different type of record (for more detailed subsidiary information, intermediate totals, etc.).

8.1.2 Conversational Transactions

Conversational transactions involve the sending and receiving of more than one message in a terminal session. Each input message may be processed by related subsystems or by the same subsystem. A two-part conversational transaction is illustrated in Figure 35.

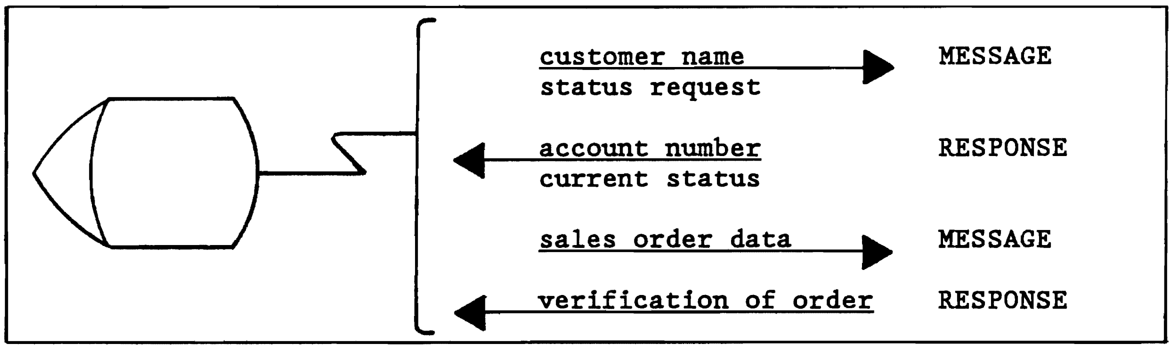


Figure 35. Typical Conversational Transactions

8.1.3 Retention of Information

Assume a conversation in which three input messages and three responses are necessary to complete the transaction. A terminal, a subsystem and a storage medium on which to save the input messages, and/or corresponding intermediate results of the processing, are necessary components in the conversational environment. In the example illustrated in Figure 36, the subsystem receives information and prompts the terminal operator for additional information until it obtains all the required data. This intermediate information is also stored either in core or on a disk data set. After the final input message is received and processed, appropriate files are updated, intermediate data is deleted, and a final response is issued.

```
Terminal XYZ        Subsystem ABC                        Storage

Input Message 1---> Receive, process and store---->   Input Message 1
                                                        + results

Output Message 1<---Prompt for additional information

Input Message 2---> Receive, access Input Message 1<--Input Message 1
                    Process                             + results
                    Also store Input Message 2----->  Input Message 2
                                                        + results

Output Message 2<---Prompt for additional information

Input Message 3---> Receive, analyze with prior <---- Input Message
                    messages and results              1 & 2 + results
                    Update files, delete prior data

Output Message 3<---Final response
```

Figure 36. Input Message Data Retention During a Conversation

8.2 IMPLEMENTING CONVERSATIONAL SUBSYSTEMS

Conversational subsystems may be implemented in several ways, each characterized by the retention of initial and subsequent input and processing results. The method of retention differs, depending upon the method of implementation chosen.

Control of the conversation, or the retention of the input messages and/or corresponding results of processing may be accomplished by using any one of the following methods of implementation:

- The User SPA (User Extension to System Parameter List)
- The Store/Fetch Facility
- The Dynamic Data Queuing Facility
- The CONVERSE Service Routine
- The Table Facility (instead of the DDQ Facility)

In addition to the retention of the input environment, conversational subsystems have design considerations with respect to file updates and control of input verbs. These design considerations are discussed following a review of the first four methods of retention of input messages/data and corresponding results of processing.

Intercomm provides Front End conversational support to ensure that duplicate input from the same terminal is not processed. This is accomplished by defining applicable verbs and interactive terminals as conversational in the Front End tables. See the Operating Reference Manual.

8.3 SAVING INFORMATION IN USERSPA

The user extension to the SPA is called USERSPA and is accessible to all Intercomm subsystems since the SPA is the second entry parameter to all subsystems. The SPA is a 500-byte core-resident table. The user extention to the SPA begins at the 501st byte and may include application-oriented areas, such as tables, counters, and switches for application subsystem use. Thus, the size of USERSPA is installation-dependent. The user portion of the SPA is optionally checkpointable and can be restored at system restart time.

A portion of USERSPA may be divided into sections associating table space for each terminal, as illustrated by Figure 37. Each terminal-oriented area might be used for control data during conversational processing, until the conversation with that terminal completes.

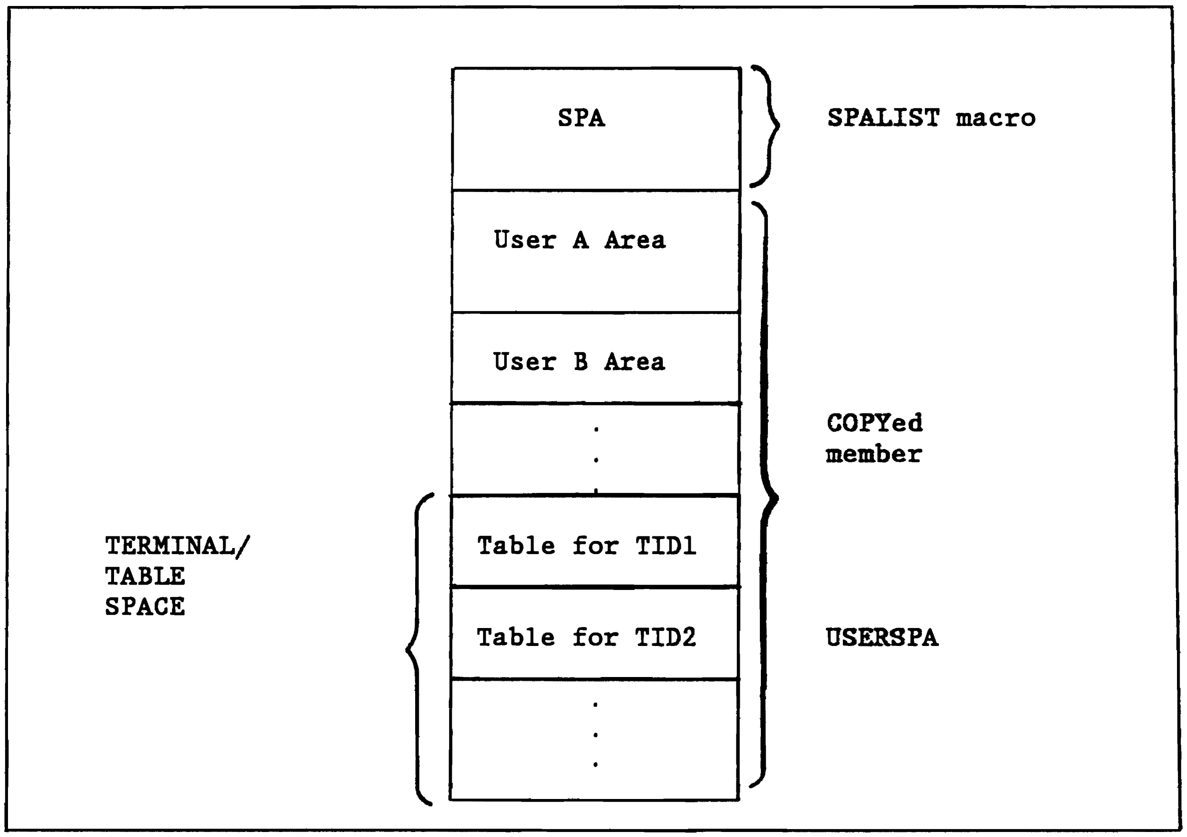


Figure 37. User and Terminal Table Space in the USERSPA

The SPA is expanded by updating the Assembler Language member USERSPA on the system release library SYMREL. The updated version should be stored on SYMUSR. When assembling INTSPA, USERSPA is copied as the last entry in the SPA Csect. Therefore, any user additions would be referenced beginning with the 501st byte. Any such additions should ordinarily be coordinated through the System Manager, as most application subsystems could be affected.

In the linkage section definition of SPA, as shown in Figure 38, three different applications have their own 50-byte areas defined: (USERA-AREA, USERB-AREA, USERC-AREA) plus a table for their common use (COMMON-TABLE). The Assembler Language member USERSPA for this example would contain a definition of an area corresponding to OURSPA. OURSPA could be defined as a systemwide COPY member for all COBOL routines, to be copied into the Linkage Section following the INTSPA statement.

```
01  SPA.
    02  INTSPA                  PICTURE X(500).
    02  OURSPA.
        .
        .
        04  COMMON-TABLE        PICTURE X(200).
        04  USERA-AREA          PICTURE X(50).
        04  USERB-AREA.
            06  COUNT-FIELD1    PICTURE S9(8) COMP.
            06  ON-OFF-SWITCH   PICTURE X.
            06  FILLER          PICTURE X(45).
        04  USERC-AREA          PICTURE X(50).
```

Figure 38. Sample USERSPA Declaration Within a Subsystem

The following chart summarizes the advantages and disadvantages of the USERSPA method of implementation of conversational processing.

<u>Advantages</u>	Information saved in Core; no I/O overhead. Accessed easily. Checkpointable and restorable at restart.
<u>Disadvantages</u>	The entire USERSPA is accessible to all Intercomm subsystems. Therefore a problem of control develops with respect to the possiblity of destruction of data by another subsystem, or security problems. Updating and maintenance of USERSPA may require recompiling all subsytems which reference it. A potentially large area of storage must be allocated. Addressability, if area larger than 3596 bytes.

8.4 SAVING INFORMATION WITH STORE/FETCH

Conversational information may be stored and later retrieved (either in storage or on a disk data set) by the Store/Fetch Facility. Information is retained via the STORE function, and retrieved via the FETCH function. The storage space may be released via the UNSTORE function. Saved information may also be updated.

An operator prompting type of conversation involving one terminal and one or more application subsystem(s) could use Store/Fetch very efficiently for retaining information. Store/Fetch performs its function upon data strings. Data strings are logical entities of information (input messages to be retained or whatever other data the user intends to save), which are identified by unique user-defined keys. The information is accessible only to those subsystems which call a Store/Fetch service routine naming the data string by its unique key, which could include the current terminal-ID from the input message header. Therefore, there is more control over the information than there would be if it were to be saved in the USERSPA. The data strings are classified as either transient, semipermanent or permanent. The differences between these classifications are as follows:

Disposition	Availability	Storage Medium
Transient	Not available across restart	Core or disk
Semipermanent	Available across restart	Disk
Permanent	Available across every system start until explicitly unstored	Disk

In conversational processing, permanent data strings should not be used. As to whether to use transient or semipermanent strings, the user must decide whether the information is critical enough to be preserved across system restart. If so, the data strings would be classified as semipermanent and would reside on disk. At restart time, the operator could then resume a conversation at the point of failure if subsystem logic can determine when the conversation was interrupted. If stored data is specified as transient, data is eligible to reside in core. Processing would thus be speeded up, as I/O overhead would be eliminated. At restart time, the operator would then start the conversation from the beginning.

Detailed information on Store/Fetch, including the interface between application subsystems and the Store/Fetch service routines, may be found in Store/Fetch Facility. Application subsystem logic must determine whether the input message in progress is initial, intermediate or final. This determination is necessary to assure that the proper calls to Store/Fetch are issued when data is to be saved or retrieved. Once the determination is made, Store/Fetch may be used to manage the conversational information as shown in Figure 39.

<u>Initial Input</u>:

STORE--create a new data string

<u>Intermediate Input</u>:

FETCH--retrieve existing data string

STORE--update string: new information merged with existing data

<u>Final Input</u>:

FETCH--retrieve existing data string

Process input and merge final information with existing data

Update necessary files and create final output message

UNSTORE--free data string storage

Figure 39.   Conversational Processing Using Store/Fetch

Subsystem processing logic can be simplified by using one or more of the following techniques:

- A 'string-not-found' return code from a FETCH request indicates intial input (no intermediate data stored).
- A FETCH with the Delete option forces restart of the conversation from the beginning if the system fails, or the subsystem times out or program checks before the STORE of the intermediate data can be done. This technique also saves Store/Fetch and core storage resource overhead.
- The STORE of the intermediate data should be done after the output message is processed.
- File record(s) should not be updated until all intermediate data is collected. At this time the record(s) should be retrieved for update (exclusive control) and checked for external updates by unrelated processing since the conversation began.
- Do not send the final confirmation output message until successfully updating the file(s).

8.5 SAVING INFORMATION ON A DYNAMIC DATA QUEUE

The Dynamic Data Queuing Facility (DDQ) is a Special Feature available to Intercomm users. Detailed specifications on using DDQ may be found in Dynamic Data Queuing Facility. A DDQ provides the application subsystem with the ability to dynamically create, retrieve and delete logical data sets (or queues) of records on a BDAM data set. As illustrated in Figure 40, more calls are required to interface with the DDQ routines than are required to interface with Store/Fetch to obtain the same functions. However, a DDQ provides the ability to save several related data strings as a type of sequential file. The entire DDQ can then be processed by another subsystem or postponed for batch processing. A DDQ is most effectively used, not as a means for temporary storage of data during a conversation, but as a means for accumulating conversational results for subsequent processing, that is, for data collection. This facility can also be used for collecting data from related conversations with more than one terminal.

The data queues may be either transient, single-retrieval transient, semipermanent or permanent. Single-retrieval transient queues cannot be read more than once. This type of DDQ, therefore, would not be suitable for conversational processing. The other queue types are distinguished by the following characteristics:

Queue Type	Characteristics
Transient	Must be passed to another subsystem or freed. Cannot be retrieved later. Not preserved across restart or normal startup.
Semipermanent	Retrieved at a later point in time via a user-provided Queue Identifier (QID). Extra I/O overhead is involved in saving the queue. Can be freed by user request. Queue must be completed (closed) in order to be preserved across restart. Existing semipermanent queues freed at normal startup.
Permanent	Same characteristics as semipermanent except that permanent queues are always preserved across any Intercomm start, warm or cold, if closed at least once.

Figure 40 illustrates typical use of DDQ facilities in conversational processing. The application subsystem logic must determine whether input is initial, intermediate, or final. Final input, in this example, causes the queue to be closed and passed to another subsystem for asynchronous or postponed file updating. Thus, the terminal operator, upon receipt of the final output message, can begin another conversation without waiting for file updates to occur. This technique is particularly useful for files which do not require up-to-date inquiry response such as order entry, personnel, etc.

```
Initial Input:

    QBUILD  -- Create a new queue

    QWRITE  -- Save input message and related data

    QCLOSE  -- Save the DDQ
--------------------------------------------------------------------------
 Intermediate Input:

    QOPEN   -- Open the queue

    QREADX  -- Read the record              or QWRITE to add
               with intent to update        to the queue

    QWRITEX -- Update the record

    QCLOSE  -- Save the DDQ
--------------------------------------------------------------------------
 Final Input:

    QOPEN   -- Open the queue

    QREADX  -- Retrieve the record          or QWRITE to add
                                            to the queue
    QWRITEX -- Update the record

    QCLOSE  -- Pass the DDQ to another subsystem which will update
               files and free the queue.

    Issue final output message.
```

Figure 40. Conversational Processing Using Dynamic Data Queuing

8.6 SAVING INFORMATION VIA THE CONVERSE SERVICE ROUTINE

The final method of retaining information for a conversation is to use the Intercomm system service routine CONVERSE. The CONVERSE routine is called by an application subsystem when input from the same terminal is required to continue processing a transaction. The application subsystem thread stops processing until the next input message is received from that terminal. Control is returned to the next sequential instruction following the call to CONVERSE.

Application subsystems are designed more easily with CONVERSE, as it is simpler to control the sequential order of the messages. However, the use of CONVERSE is not encouraged, as it ties up Intercomm resources. Dynamic working storage associated with the initial and subsequent input messages is retained during the call to CONVERSE. Storage requirements for subsystems would be greater than when other conversational techniques are used, because one subsystem contains logic for all message types of a conversational transaction. It is far more efficient to design conversational subsystems which retain control only for the amount of time necessary to process one message than to tie up system resources while each input message in the conversation is in turn received, kept, analyzed and responded to in one execution of one application subsystem. When CONVERSE is used, dynamically loaded subsystems remain in storage until all "conversations in progress" have terminated. Intercomm restart processing of such subsystems restarts the conversation from the beginning. All intermediate messages are discarded.

The saving of information in the USERSPA or in a Store/Fetch data set or in a DDQ or Table Facility table does not require an application subsystem to contain logic for time-outs. The use of CONVERSE does. If the next input message is not received in the time limit specified by the user, a time-out occurs, which must be handled by subsystem logic.

An example of the use of CONVERSE in a two-part conversation is illustrated in Figure 41.

NOTE: CONVERSE is not supported for VS COBOL II, nor for OS/ANS COBOL subsystems loaded above the 16M.

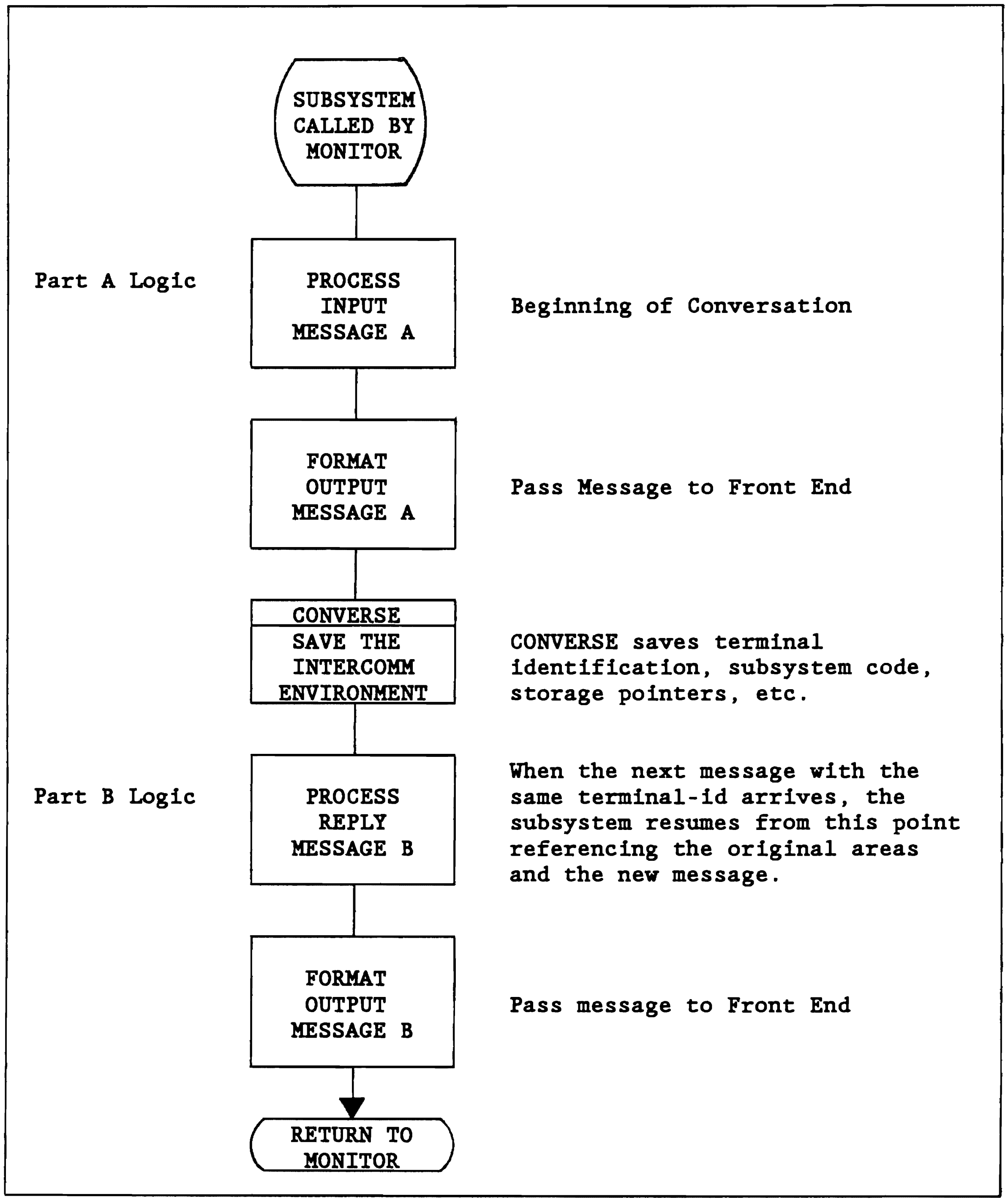

SUBSYSTEM CALLED BY MONITOR
Part A Logic
PROCESS INPUT MESSAGE A
Beginning of Conversation
FORMAT OUTPUT MESSAGE A
Pass Message to Front End
CONVERSE
SAVE THE INTERCOMM ENVIRONMENT
CONVERSE saves terminal identification, subsystem code, storage pointers, etc.
Part B Logic
PROCESS REPLY MESSAGE B
When the next message with the same terminal-id arrives, the subsystem resumes from this point referencing the original areas and the new message.
FORMAT OUTPUT MESSAGE B
Pass message to Front End
RETURN TO MONITOR

Figure 41. Conversational Subsystem Logic Using Converse

8.6.1 Subsystem Design Using CONVERSE

The Intercomm system service routine CONVERSE is called when awaiting additional input in response to some prompting message. Since any interval may elapse before the next message is received, CONVERSE will save information in its own control table for each conversation and return to the Subsystem Controller while waiting for the response.

The call to CONVERSE specifies a time limit within which a reply message should be received. If it is not received during the specified interval, then the subsystem is entered at the next instruction following the call to CONVERSE and its message parameter is adjusted to point to a time-out message supplied by CONVERSE. That message (header plus text) could then be switched to the Output Utility or FESEND. The terminal identification in the header is that of the non-responding terminal. A zero value for the time limit will bypass the automatic time-out feature.

Coding format:

```
          CALL 'COBREENT' USING CONVERSE, word, time.
```

where:

word
: is the name of an <u>aligned</u> fullword (PIC 9(8) COMP SYNC) in the subsystem's DWS required by CONVERSE for work space.

time
: is the name of an aligned fullword binary value indicating a limit (in seconds) within which a subsequent message is anticipated.

When processing resumes following the call to CONVERSE, the environment appears as it was before the call--except the input message parameter (unless there was a time-out) now points to the most recent message from the terminal. It will have been edited if specified for the verb's definition in the Front End Verb Table. The Intercomm return code area will contain a binary value in the low-order byte indicating the condition for return from CONVERSE (see Figure 42).

The CONVERSE program keeps track of conversational requests by terminal and subsystem, and separates messages accordingly. Hence, each unique subsystem thread may be in conversation with a different terminal.

It is the subsystem's responsibility to verify that the message received following the call to CONVERSE is actually the appropriate message expected in the logical sequence of the conversation.

Note that the CONVERSE routine may only be called from a 24-Amode OS/VS or ANS COBOL subsystem. Due to complications arising in reestablishing COBOL internal tables on return from the call to CONVERSE, it may not be called by a COBOL subroutine of the subsystem.

For example:

- Monitor calls COBOL Subsystem AA which calls CONVERSE (valid sequence of program logic).

- Monitor calls COBOL Subsystem BB which calls Assembler Language subroutine B1 which calls CONVERSE (valid sequence of program logic). However, if the new input message processed by the Assembler Language subroutine on return from the call to CONVERSE is freed by the subroutine or passed by it to another subsystem or FESEND, then the subroutine must zero the first word in the parameter list passed to it (see Assembler Language Programmer's Guide), and under Release 10, it must also zero the first word of the original parameter list passed by PREPROG to a reentrant COBOL subsystem. PREPROG's parameter list address is stored in the field ITCBPMSS in the Intercomm Thread Control Block (ITCB) whose address is obtained via the INTTCB macro with OPT=S (see Basic System Macros). The calling COBOL subsystem may then not reference the input message area or any of its data fields (except for data fields in its DWS passed as parameters to the BAL subroutine for storing message data and/or a copy of the new message header for the next output message). Note that the BAL subroutine may use the new return code address parameter to pass a code back to the COBOL subsystem, or the COBOL subsystem may test it for the CONVERSE return code on return from the BAL subroutine.

- Monitor calls COBOL Subsystem CC which calls COBOL subroutine C1 which calls CONVERSE (invalid sequence of program logic).

The COBOL subsystem may not use an old copy of the message header for a new output message. If the subsystem calling CONVERSE is compiled with the ANS4 or a VS compiler, the Intercomm input-message and return-code parameters may not be addressable after the call. Use the IBM SERVICE RELOAD verb immediately following the CONVERSE call to solve this problem.

Conversational subsystem logic must be designed with care regarding file access. Selected files should be released prior to the call to CONVERSE. If not, other subsystems accessing the same files or other messages in process in the same subsystem may "time out." This may occur because an operating system control block is associated with the access to the file and is not "freed" until the file is released. If a file is accessed prior to the call to CONVERSE and released after the call to CONVERSE a "lock out" situation may occur.

Return Codes	Meaning
0 (X'00')	Normal return: the entry parameter input-message reflects the address of the new input message. The message will have been edited successfully if the Front End Verb Table shows editing required. (If editing is unsuccessful, error messages will be sent to the terminal, and the subsystem is not reactivated until either a subsequent input message is edited successfully or an automatic time-out occurs.) CAUTION: The CONVERSE automatic time-out is not extended if a message is found in error by the Edit Utility.
17 (X'11')	No core available for CONVERSE control blocks; conversational mode not initiated.
18 (X'12')	Time-out expired. The entry parameter input-message reflects the address of an error message generated by CONVERSE. The message header contains the appropriate terminal identification. The message text is: *PMI*CONVERSE*ANTICIPATED MESSAGE NOT RECEIVED WITHIN USER SPECIFIED TIME INTERVAL

Figure 42. CONVERSE Return Codes

Control of the conversational program environment is accomplished by Intercomm in different ways, depending on the subsystem's residency:

- Resident

  The dynamic-work-space (DWS) for one message from a terminal is retained pending arrival of the next message from that terminal; the subsystem will continue to process messages from other terminals.

- Overlay Loaded

  Same as above, except the loaded overlay region may contain other subsystems to process other messages during (and after) "CONVERSE time."

- Dynamically Loaded

  Same as above, except the subsystem remains in core until all "conversations in progress" have terminated.

8.7 DESIGN CONSIDERATIONS IN CONVERSATIONAL PROCESSING

In order to ensure file integrity, conversational subsystems performing file and/or data base updates should be designed to perform the updates for the last message in the conversation. Alternatively, control may be passed (via message queuing) to a non-conversational subsystem to perform the updates.

8.7.1 Control of the Input to Conversations

Conversational subsystems expect ordered input. They must be designed to analyze input messages and to determine which message in the sequence has been received. Control of the input may be exercised by the terminal operator or by the application subsystem(s).

The terminal operator may be given a specific sequential list of messages to input at the terminal for a given verb or verbs. This method would probably be used for data collection applications, in which more messages are sent to the application subsystem than are received at the terminal. It could also be used for any conversational application in which the order of input is fixed.

The application subsystem may control the input sequence by analyzing an input message, processing it, and issuing a response informing the operator about the content or format of the next input message. The response may direct the operator to input another verb (that of a related subsystem). Subsystem-controlled input is good for conversations in which the "next" desired piece of information may vary depending upon the contents of a file record, or a table, or the setting of a switch in the area saved between subsystem activations.

8.7.2 Assigning a Verb to a Terminal

To eliminate the requirement for an operator to key in a verb with each input message, the operator may enter a system control command message to LOCK a specific terminal to a particular verb. The Front End then prefixes that verb to each input message from that terminal. The operator may enter another control message, UNLK, to unlock the terminal from the verb. See <u>System Control Commands</u>.

The LOCK/UNLK commands processed by the Front End can also be issued by a subsystem. When a LOCK is in effect, all subsequent messages from the specified terminal will be automatically prefixed by the verb specified in the LOCK command. This LOCK remains in effect until UNLK is issued. With LOCK in effect, some advantages are:

- The terminal operator does not have to keep reentering the same verb.

- A new verb cannot be entered during the conversation.

Either the subsystem or the operator may control the input sequence by locking and unlocking the terminal to different verbs at different points in, or at the end of, the conversation.

Optionally, the Intercomm AUTOLOK feature may be defined for the verb in the Front End Verb Table, which dictates that when that verb is input from the terminal, the terminal is to be automatically locked to that verb. Subsequently, the terminal is to remain locked until specifically UNLKed by the operator or processing subsystem.

The format for the LOCK/UNLK commands (message text) is as follows:

```
LOCK$TPUxxxxx$vvvv@
UNLK$TPUxxxxx@
```

where:

xxxxx
: is the five-character terminal identification

vvvv
: is the four-character verb

@
: is the end-of-transmission character (X'26')

$
: is the system separator character as defined for the installation.

The preformatted message constructed by a subsystem must be prefixed with the standard message header for FESEND (MSGHRSCH=X'00',MSGHRSC=X'00',VMI=X'57'). This message is passed to the Front End via FESENDC (see Chapter 9) and the LOCK or UNLK takes place. No response message is sent to the terminal when such processing is requested by a subsystem.

Chapter 9

USING INTERCOMM SERVICE ROUTINES AND FACILITIES

9.1 REENTRANT COBOL INTERFACE ROUTINE (COBREENT)

COBREENT is the interface routine called by all COBOL subsystems in order to maintain reentrancy during execution of a subroutine which potentially causes an I/O operation or gives up processing control to the Intercomm Dispatcher. The application program calls COBREENT specifying which subroutine is to be called (system program or user routine) and the appropriate parameters to pass to it. COBREENT saves registers, chains save areas, saves the program's Task Global Table (if OS/ANS COBOL) or it's THDCOM (if VS COBOL II) in a dynamic storage area, saves the COBOL save area, and saves the entry parameters for the called program. COBREENT then calls the specified subroutine. On return from that subroutine, COBREENT restores the environment and returns to the calling program. Coding format:

```
CALL 'COBREENT' USING routine-code, parameters.
```

where:

routine-code indicates the routine entry to be called.

parameters is the actual parameter list to be passed to the called routine. A maximum of ten parameters is recommended. Intercomm service routines require less than ten parameters; user subroutines should be designed with this limit in mind. The limit on the number of parameters passed by VS COBOL II programs is 64. If the calling subsystem (or subroutine) may be loaded above the 16M line, then all referenced parameters must be in the caller's DWS (have a 24-Amode address), except they may be in the Working-Storage Section if the caller is VS COBOL II.

Routine-codes name halfword offset values into the REENTSBS table of routine addresses. Offsets 0 through 100 are reserved for Intercomm system routines. Offsets 104 and up may be used for user subroutines. Figure 43 lists the routine-codes assigned as identifiers for Intercomm service routines in the released REENTSBS table. The COPY member (of routine-codes) for COBOL subsystems and subroutines is named ICOMSBS and is illustrated in Appendix B. See also Chapter 3 for sample coding using the ICOMSBS table. The hard-coded (with a VALUE clause) routine-code may be in the caller's Working-Storage Section of all COBOL programs.

Specifications and coding criteria for user subroutines are described in Section 7 of this chapter.

```
REENTSB1 CSECT
*  NEGATIVE OFFSETS ARE USED BY SPECIFYING AN OFFSET ENDING IN B'11',
*  WHICH IS INCREMENTED BY 1 AND COMPLEMENTED TO OBTAIN TRUE OFFSET
*  BY COBREENT AND PMIPL1.
         SUBMODS NAME=INITLU6      OFFSET -104,CODED AS 103
         SUBMODS NAME=INTSORTC     OFFSET -100,CODED AS 99
         SUBMODS NAME=DWSSNAP      OFFSET -96,CODED AS 95
         SUBMODS NAME=MAPFREE      OFFSET -92,CODED AS 91
         SUBMODS NAME=FECMRLSE     OFFSET -88,CODED AS 87
         SUBMODS NAME=FESEND       OFFSET -84,CODED AS 83
         SUBMODS NAME=FESENDC      OFFSET -80,CODED AS 79
         SUBMODS NAME=ALLOCATE     OFFSET -76,CODED AS 75
         SUBMODS NAME=ACCESS       OFFSET -72,CODED AS 71
         SUBMODS NAME=MAPURGE      OFFSET -68,CODED AS 67
         SUBMODS NAME=MAPCLR       OFFSET -64,CODED AS 63
         SUBMODS NAME=MAPEND       OFFSET -60,CODED AS 59
         SUBMODS NAME=MAPOUT       OFFEST -56,CODED AS 55
         SUBMODS NAME=MAPIN        OFFSET -52,CODED AS 51
         SUBMODS NAME=INTUNSTO     OFFSET -48,CODED AS 47
         SUBMODS NAME=INTSTORE     OFFSET -44,CODED AS 43
         SUBMODS NAME=INTFETCH     OFFSET -40,CODED AS 39
         SUBMODS NAME=FECMFDBK     OFFSET -36,CODED AS 35
         SUBMODS NAME=FECMDDQ      OFFSET -32,CODED AS 31
         SUBMODS NAME=QWRITEX      OFFSET -28,CODED AS 27
         SUBMODS NAME=QREADX       OFFSET -24,CODED AS 23
         SUBMODS NAME=QWRITE       OFFSET -20,CODED AS 19
         SUBMODS NAME=QREAD        OFFSET -16,CODED AS 15
         SUBMODS NAME=QCLOSE       OFFSET -12,CODED AS 11
         SUBMODS NAME=QOPEN        OFFSET -8,CODED AS 7
         SUBMODS NAME=QBUILD       OFFSET -4,CODED AS 3
         ENTRY REENTSBS
REENTSBS DS    0A                  ALLOW FOR NEGATIVE OFFSETS
         DC    A(REENTEND-REENTSBS-4)       REQUIRED
         SUBMODS NAME=SELECT       CODE 4-  FILE SELECT
         SUBMODS NAME=RELEASE      CODE 8-  FILE RELEASE
         SUBMODS NAME=READ         CODE 12- FILE READ
         SUBMODS NAME=WRITE        CODE 16- FILE WRITE
         SUBMODS NAME=GET          CODE 20- FILE GET
         SUBMODS NAME=PUT          CODE 24- FILE PUT
         SUBMODS NAME=RELEX        CODE 28- RELEASE EXCL. CONTROL
         SUBMODS NAME=FEOV         CODE 32- FILE FEOV
         SUBMODS NAME=TABUILD      CODE 36- TABLE BUILD
         SUBMODS NAME=TABOPEN      CODE 40- TABLE OPEN
         SUBMODS NAME=TABPUT       CODE 44- TABLE PUT
         SUBMODS NAME=TABGET       CODE 48- TABLE GET
         SUBMODS NAME=TABSORT      CODE 52- TABLE SORT
         SUBMODS NAME=TABEND       CODE 56- TABLE END
                .                        .          (Codes 60-64
                .                        .           are reserved)
```

Figure 43. COBREENT Routine Pointers (REENTSBS) (Page 1 of 2)

```
          SUBMODS NAME=COBPUT       CODE 68- COBOL MESSAGE SWITCHING
          SUBMODS NAME=MSGCOL       CODE 72- MESSAGE COLLECTION
          SUBMODS NAME=COBSTORF     CODE 76- COBOL STORFREE
          SUBMODS NAME=CONVERSE     CODE 80- CONVERSE
          SUBMODS NAME=DBINT        CODE 84- DATA BASE REQUEST
          SUBMODS NAME=LOGPUT       CODE 88- LOGPUT
          SUBMODS NAME=PAGE         CODE 92- PAGE ROUTINE
          SUBMODS NAME=GETV         CODE 96- VSAM GET
          SUBMODS NAME=PUTV         CODE 100-VSAM PUT
*************************************************************************
**        INSERT   USER   SUBMODS   MACROS   HERE                      **
*************************************************************************
          COPY  USRSUBS
REENTEND  EQU   *                   REQUIRED AFTER LAST SUBMODS
          ENTRY REENTEND
REENTSB1  CSECT
          END
```

Figure 43. COBREENT Routine Pointers (REENTSBS) (Page 2 of 2)

9.2 INTERSUBSYSTEM QUEUING (COBPUT)

COBPUT is called to queue a message for a user or Intercomm subsystem. Queuing is controlled by the Receiving Subsystem Code fields in the message header. If segmented input messages may be processed, set the MSGHQPR field in the header to C'2' before calling COBPUT. If the Edit Utility is used in the system, ensure the VMI field (MSGHVMI) is non-zero so that an attempt to edit the message for/by the receiving subsystem is not made.

Coding format:

```
CALL 'COBREENT' USING COBPUT, message, return-code.
```

where:

<u>message</u> is the label of the first position of the message (header + text) to be queued

<u>return-code</u> is the label of a two-byte character field where COBPUT will place a return code.

COBPUT <u>copies</u> the message to be queued to a new area of dynamic storage, converting variable character format message text and header fields as necessary if the Receiving Subsystem Code is for the Output Utility (see Figure 34). COBPUT then calls Message Collection (MSGCOL) to accomplish the queuing of the message. Figure 44 lists COBPUT return codes.

The original message remains in the calling program's Dynamic Working Storage. If the message has not been processed or queued successfully, the subsystem may attempt to recover, or simply return to the Subsystem Controller with a return code of 8 or 12. Figure 45 lists various alternatives.

Return Code	Meaning
00	Message queued successfully NOTE: For Multiregion Facility users sending a message to another region, this return code signifies that the message was queued for sending to that region.
02	Item code, length, or line number greater than 255 in variable character data item prefix (Output Utility)
04	No room on subsystem queue, or (Rel 10) msg rejected for delayed subsystem--an entry was made on the system log (MSGHLOG=X'FC')
06	Nonnumeric item code (Output Utility)
08	No core for disk queue I/O area, or to copy message
10	N or R omitted in variable character data item prefix
12	I/O error on disk queue
14	COBPUT has detected a message length too short to convert character item codes and lengths
16	Invalid subsystem code--an entry was made on the system log (MSGHLOG=X'FB')
28	DVASN system routine could not reserve a device (on first segment of multi-segmented messages only)
NOTE:	A non-zero return code means the message was neither queued nor processed.

Figure 44. COBPUT Return Codes

Return Code	Alternative Action
02, 06, 10, 14, 16	Program error: no recovery action. Correct the invalid fields and recompile program.
04, 08	Requeue the original input message for reprocessing by the currently executing subsystem via calling COBPUT referencing the input message and the currently executing subsystem, or follow action for Return Code 28.
12	No recovery action: return to Subsystem Controller with return code 12.
28	Attempt a time delay and call COBPUT to attempt queuing of the message again.

Figure 45. Recovery From COBPUT Errors

9.3 INPUT MESSAGE SWITCHING (MSGCOL)

COBPUT is called to queue an output message to activate another subsystem. It copies the message from the Dynamic Working Storage area of the calling subsystem to a new dynamic area and calls Message Collection. Thus, the output message area within the dynamic-work-space of a subsystem is reusable upon return from COBPUT.

The logic of an application subsystem might be such that the input message is modified within its dynamic area to become an output message to switch to another subsystem. To do this, the length of the input message may not be increased (data may not be added). If the length is shortened by 8 bytes or more, see the next section on freeing the remainder, and adjusting MSGHLEN in the header. Queuing the message for the next subsystem is then done by calling Message Collection (MSGCOL), instead of COBPUT; Message Collection then owns and is responsible for the management of the message area. All queuing is controlled by the receiving subsystem code fields (MSGHRSCH and MSGHRSC) in the message header. When returning to the System Monitor, the subsystem return code must be set to 900 (see Figure 14).

Coding format:

```
     CALL 'COBREENT' USING MSGCOL, message, SPA-addr, return-code.
```

where:

<u>message</u> is the label of the input message to be queued.

<u>SPA-addr</u> is the second entry parameter in the Linkage Section.

<u>return-code</u> is a fullword computational field where COBREENT will place the return code from MSGCOL.

MSGCOL return codes indicate the result of the queuing. The return code is fullword binary and can therefore use the same field as the Intercomm return code. (See Figure 46.) Regardless of the result, <u>the calling program no longer has any control over the area of dynamic storage occupied by the input message and must return a code of 900</u>.

Return Code	Meaning
0	Message queued successfully
4	No room on queue (entry made on system log), or message rejected for delayed subsystem (Rel 10)
8	No core for disk queue I/O area
12	I/O error on disk queue
16	Invalid subsystem code (entry made on system log)

Figure 46. Message Collection Return Codes

Recovery action for unsuccessful queuing might be to return to the System Monitor with a return code of 8 or 12. A message would then be sent to the terminal that originated the input message being processed, if USRCANC (PMICANC) is included in the Intercomm linkedit.

9.4 FREE DYNAMIC (MESSAGE AREA) STORAGE (COBSTORF)

COBSTORF may be called to free an area of dynamic-work-space not utilized for a message passed to another subsystem and not to be freed by the Subsystem Controller when the subsystem returns (see Section 9.4.1). COBSTORF may also be used to free the end of an input message area when the message text is shortened before being queued for another subsystem (see previous section).

Coding format:

```
CALL 'COBREENT' USING COBSTORF, area, length.
```

where:

area is the name defining the first (leftmost) position of the area to be freed.

length is the name of an aligned fullword containing a binary value indicating the number of bytes to free.

CAUTION: Dynamic storage is managed as doublewords. The area specified should be aligned on a doubleword boundary (COBSTORF will round up the address if not). The length specified should be a multiple of 8 (COBSTORF will round down the length if not). See also SYCTTBL macro, GET and FREE parameters, defining the DWS obtained and freed by the Subsystem Controller as described in Chapter 2. Note also that COBSTORF calls may not be used to free part of the DWS if DWS overflow checking is desired. When freeing part of an input message, only the rightmost portion may be freed and the remaining length must be stored in the first two bytes (MSGHLEN) of the message header before calling MSGCOL.

9.4.1 INTERSUBSYSTEM MESSAGE QUEUING VIA MESSAGE COLLECTION (MSGCOL)

Since a message created by a reentrant subsystem resides in dynamic-work-space, it is not a requirement that COBPUT be used to copy a message to be queued to another subsystem. Message Collection may be called directly, depending on the SCT specification for the subsystem (GET and FREE parameters of the SYCTTBL macro). This feature may not be used if DWS checking is in effect (see Chapter 3), nor if the message is in a VS COBOL II program's Working-Storage Section. For the coding format and return codes, see Section 9.3.

The SCT entry specifies the amount of core for dynamic-work-space obtained upon entry to a reentrant subsystem and also, the amount of core to be freed when that subsystem returns to the Monitor. They need not be equal. If unequal, the area of core remaining to be freed is the "leftmost" or first portion of the area obtained. The application programmer is then responsible for the "rightmost" area of dynamic-work-space. A new message may be created in that area (must start on a doubleword boundary) and queued for any other subsystem by calling MSGCOL. MSGCOL then owns and is responsible for that amount of core specified in the message header length field. Any remaining area of dynamic-work-space beyond (to the right of) the message area must be freed by the application subsystem by calling COBSTORF before returning (GOBACK) to the Monitor.

For example, consider two reentrant subsystems:

- Subsystem XX - SCT specifies:

  -- 1024 bytes of dynamic-work-space obtained

  -- 1024 bytes freed on return to the System Monitor

  Must use COBPUT to queue any messages for other subsystems, that is, OUTPUT, etc.

- Subsystem YY - SCT specifies:

  -- 1024 bytes of dynamic-work-space obtained

  -- 512 bytes freed on return to the System Monitor

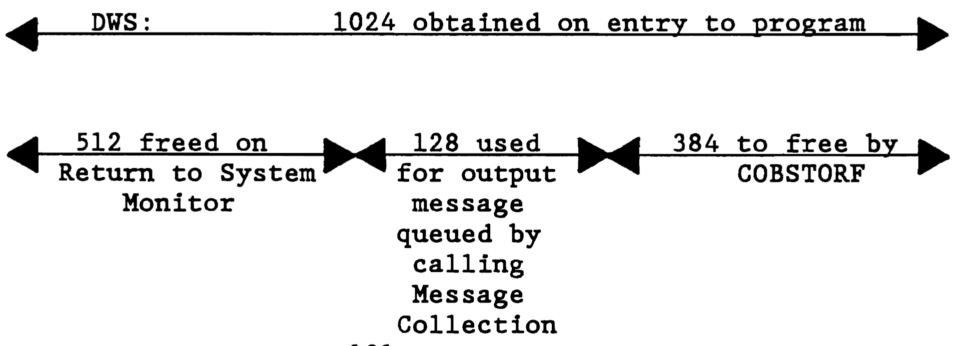
  May use MSGCOL to queue a message for another subsystem if defined in last 512 bytes of the dynamic-work-space (DWS); or

  May use COBPUT instead.

  Must use COBSTORF to free any part of DWS not freed on return to System Monitor and not referenced by a call to MSGCOL.

  To illustrate:

  If subsystem YY queued a message for Output with MSGHLEN=128, subsystem YY is responsible for freeing the remaining 384 bytes of the 512 not freed by the System Monitor.


DWS: 1024 obtained on entry to program
512 freed on Return to System Monitor
128 used for output message queued by calling Message Collection
384 to free by COBSTORF

9.5 SEND MESSAGE TO FRONT END (FESEND)

FESEND is called to pass a message to the Intercomm Front End for transmission to a terminal. The message header field MSGHTID specifies the destination terminal or broadcast group name. The entry point FESENDC of FESEND is used by high-level language subsystems. FESENDC copies (from the caller's DWS) the message to be passed to the Front End to a new area of storage and proceeds via logic in the program FESEND. FESEND then requests queuing of the message on the associated terminal queue. If a broadcast group is specified, FESEND creates an individual message for each terminal of the group and requests queuing for each of those messages. All terminals in the broadcast group must be of the same type, as defined in the Back End Station and Device tables (see Chapter 2).

FESEND accepts two types of messages: preformatted (VMI=X'57') message text, which contains the control characters and data for transmission to the terminal except for start-of-text sequence(s) to be added by the Front End; and fully-formatted (VMI=X'67') message text, which contains all control characters and data ready for transmission to the terminal. (MMU produces fully-formatted messages.) If segmented input messages may be processed, set MSGHQPR to C'2' before calling FESENDC. If passing the message to the Front End is for any reason unsuccessful, the subsystem is notified by a return code, and recovery action may be taken.

FESEND tests whether messages sent to the Front End might be system commands or for control purposes. Such messages control Front End operation and generally cause no output to a terminal. Front End Control Messages (FECMs) are described later in this chapter. All system control commands and message text contents are documented in System Control Commands.

Coding format:

```
    CALL 'COBREENT' USING FESENDC, message, return-code[, option-codes].
```

where:

message is the label of the output message (header and text) to be passed to the terminal queue.

return-code is the name of a two-byte character field where FESENDC will place a return code indicating whether or not processing was successfully completed.

option-codes is the name of an optional four-byte character field containing Front End processing codes as follows:

Byte 1: CRT Release option code:
- blank or X'00'--do not release (prevent screen overlay) next message (default)
- C'R'--release (allow overlay) next message to CRT
- C'C'--release next message, but do not cancel Front End conversational time-out

Byte 2: VTAM Response option code (overrides Front End Network Table definition for terminal):
- blank or X'00'--no override (default)
- C'D'--D1 response
- C'E'--E1 response
- C'F'--D2 response
- C'G'--E2 response

Bytes 3 and 4: Not used (set to blanks or binary zeros).

FESENDC return codes and possible recovery actions are listed in Figure 47. A nonzero return code means the message was not queued for the Front End. Return codes 16-24 should only occur during subsystem testing.

Return Code	Meaning
00	Message queued successfully.
04	Queue-full condition encountered; attempt a retry by invoking FESEND again.
08	Low-core condition encountered; attempt a retry by invoking FESEND again or return to Intercomm. (See Figure 14.)
12	I/O error (see Figure 14) encountered on disk queue; return to Intercomm.
16	Invalid terminal-ID; no recovery action required. Check with System Manager to verify terminal/ broadcast group named in MSGHTID field.
20	Invalid VMI or syntax error in Front End control or command message text.
24	Invalid message header; return to Intercomm. See also error message MG602I and Snap 51.

Figure 47. FESENDC Return Codes

9.6 USER LOG ENTRIES (LOGPUT)

An application subsystem may require entries on the system log for many different situations:

- Application-dependent security violation or other error recording.
- Log entries rather than snaps used to trace the progress of a message while testing.
- Any application-oriented requirement for a record on the system log.
- Before- and/or after-image records of file updates (if not using the Intercomm File Recovery special feature).

User log entries are identified by unique codes in the message header log code field (MSGHLOG) and hence can be recognized by any batch program processing the log off-line. Messages to be logged consist of a standard 42-byte header and message text. The log code field (MSGHLOG) in the message header must be set to any value from X'41' to X'6F'. Logging is performed by calling the Intercomm system service routine LOGPUT. The date and time stamp in the message header (MSGHDAT and MSGHTIM) will be updated by LOGPUT prior to writing to the log. Log entries may subsequently be suppressed for later Intercomm executions by modifying the LOGTROUT translate table in the LOGPUT routine. Any message having a log code in the header which translates to X'FF' will not be logged.

The length of the record on the log is controlled by the value of MSGHLEN in the message header and must be at least 42. LOGPUT will not write out messages longer than the logical record size of the log (see INTERLOG JCL description in the Operating Reference Manual).

Coding format:

```
CALL 'COBREENT' USING LOGPUT, message.
```

where:

message is the label of the message (header plus text) to be logged.

There is no return code from LOGPUT.

9.7 CALLING USER SUBROUTINES FROM REENTANT COBOL SUBSYSTEMS

All subroutines called by an application subsystem must be called via COBREENT. Passed parameter values must be in 24-Amode storage (such as the caller's DWS), except they may be in the Working-Storage of a VS COBOL II caller. No other special conventions need be followed in order to call:

- An Intercomm system service routine.
- A user-coded Assembler Language (BAL) subroutine.
- A user-coded COBOL subroutine.
- A data base interface routine.

9.7.1 Defining User Subroutines to Intercomm

A user-coded subroutine (Assembler Language or COBOL) must be defined to Intercomm via coding of a SUBMODS macro in a user member USRSUBS which is copied at the end of the subroutine table REENTSBS (before REENTEND) at assembly time (see Figure 43). Resident, reentrant Assembler Language subroutines are defined by the NAME parameter of SUBMODS, all others via the LNAME parameter, plus additional parameters defining language, residency, etc. Additionally, the routine's reference name and corresponding index code should be added to ICOMSBS (see Appendix B) for easy access by subsystems when calling COBREENT. The SUBMODS macro is described in Basic System Macros.

9.7.2 Interfacing to User-Coded Assembler Language Subroutines

Assembler Language subroutines must be coded as reentrant if they may give up control to the Intercomm Dispatcher (via I/O requests, MMU requests, message queuing, etc.). When called from a COBOL program via COBREENT, standard linkage conventions are used. COBREENT issues a MODCNTRL macro to link to non-resident Assembler subroutines. At entry, register 13 points to the beginning of a 256-byte link/save area which precedes the DWS acquired for the COBOL program. Therefore, the caller's registers must be saved on entry to the Assembler subroutine, and reloaded before return, and save area chaining must be done. The COBOL link/save area may not otherwise be used by a called subroutine. An Assembler subroutine may not call a COBOL subroutine.

9.7.3 Interfacing to User-coded COBOL Subroutines

A reentrant COBOL subroutine is coded like a COBOL subsystem in that it uses a Linkage Section and a Dynamic Working Storage area, and it calls COBREENT to interface to Intercomm service routines and other user subroutines. Non-resident reentrant COBOL subroutines loaded above the 16M line under Release 10 must use the coding conventions described in Chapter 3. Subroutine calls may be nested, but must return to the caller, as illustrated previously in Figure 5.

The Linkage Section may optionally contain definitions for the input message (if not previously freed via a MAPIN call), the SPA, the SCT (SYCTTBL entry for the calling subsystem), and the Intercomm return code system parameter areas. Any, or all, of these parameters (in the above order) are requested via the SUBMODS macro definition of the subroutine. These must be the first 01 level definitions in the Linkage Section. The required Dynamic Working Storage area is defined via the GET parameter of the SUBMODS macro. The 01 level definition for the dynamic working storage area is coded <u>after</u> the system parameters (if requested) and <u>before</u> the 01 level definitions for parameters passed by the caller.

The Intercomm return code area may be used to pass a return code back to the calling COBOL subsystem because both the subroutine and the subsystem are referencing the same area via Linkage Section definitions. The subsystem may pass that return code back to the Intercomm Monitor (if standard Intercomm return code conventions are used by the subroutine) or may take action based on the return code and then change the passed value in the return code area to a standard Intercomm return code value. See the sample programs in Chapter 10. Coding conventions for subroutine interfaces prior to Intercomm Release 9.0 are defined in Appendix D.

9.8 FRONT END CONTROL MESSAGES

The Front End Control Message (FECM) facility provides three types of Front End control messages which may be used by application subsystems for:

- Front End data queuing (FECMDDQ)
- Front End feedback messages (FECMFDBK)
- Front End queue release (FECMRLSE)

A FECM is generated by an application program call to a service routine. The generated FECM message text is complete. The header field MSGHLEN has been set; bytes 3-42 are not modified. If the user has copied a valid header to the FECM message area prior to the call, only the sending subsystem codes (SSCH,SSC) and the VMI (X'57') must be set. The generated FECM must then be passed to the Front End by a call to FESENDC in the application program.

After a call to any Front End Control Message facility, a return code is placed in the first byte of the status word:

Return Code Value	Meaning
C'0'	FECM successfully created
C'8'	No storage for FECM processing (Assembler only)

9.8.1 Front End Data Queuing

Front End data queuing (FECMDDQ) works in conjunction with the Dynamic Data Queuing Facility. It provides the user with a more efficient way of handling groups of related output messages. An application may pass a Dynamic Data Queue (DDQ) to the Front End via a FECM. The DDQ contains messages to be sent to a terminal. This is a more efficient design approach than sending one message at a time to the Front End via FESEND, and prevents interleaving of unsolicited messages with those on the DDQ. This feature is particularly useful for printed reports. The messages on the DDQ must be preformatted (VMI=X'57') or fully formatted (VMI=X'67'). The Dynamic Data Queuing Facility manual contains detailed information on DDQ concepts, facilities and implementation, and specific design considerations for Front End Data Queuing. MMU uses this facility (FECMDDQ), when requested for multipage printer output. Coding format:

```
CALL 'COBREENT' USING FECMDDQ, status-word, fecm-area,
                ddq-id[, ddq-disp].
```

where:

status-word is a 4-byte (fullword aligned) area required by the facility.

fecm-area is a 112-byte area to contain the FECM (header and text). The user should initialize the header prior to the call, probably by copying the input message header to this area.

ddq-id is the sixteen (16) byte DDQ identifier.

ddq-disp is a one-byte code indicating DDQ disposition after all messages are transmitted:

C'S' means SAVE the DDQ (required if MSGHTID is a broadcast group name)

C'F' means FREE the DDQ (default)

NOTE: The ddq-disp parameter may be omitted if the DDQ is to be freed after all the messages are transmitted (default). All of the above parameters must be in the DWS if the calling program is loaded above the 16M line.

9.8.2 Front End Feedback Messages

This type of FECM (FECMFDBK) is used by an application to determine that all prior messages queued for a terminal (before the FECM) have been transmitted. In this way, an application subsystem can be notified that certain critical messages have indeed been successfully transmitted.

Subsystem logic creates all normal output messages and passes them to the Front End (via FESEND, MMU, or by queuing messages for Output). Generation of a feedback message is then requested by a call to a FECM service routine. The feedback message is then processed in the same way as the other messages for the terminal (queued via FESENDC or the Output Utility). When the Front End retrieves the feedback message, it is routed to the subsystem specified when the feedback message was generated rather than to the destination terminal.

Feedback messages may also be used in conjunction with Front End Data Queuing. A feedback message could be an intermediate, or the last, message on a DDQ passed to the Front End. If the DDQ was created via MMU (a MAPEND call option), then the feedback FECM must be created and queued by the subsystem on return from the MAPEND call. Coding format:

```
CALL 'COBREENT' USING FECMFDBK, status-word, fecm-area,
                fecm-rsc, fecm-text.
```

where:

status-word is a 4-byte (fullword aligned) area required by the facility.

fecm-area is a 78-byte area to contain the FECM (header and text). The user should initialize the header area prior to the call, probably by copying the input message header to this area.

fecm-rsc is a two-byte receiving subsystem code (high/low) to specify the feedback message destination subsystem.

fecm-text is a 16-byte area containing the desired feedback message text.

9.8.3 Front End Queue Release

This type of FECM (FECMRLSE) allows the subsystem to override the normal Front End Logic for CRTs, which requires a one-for-one correspondence between input and output messages. When the release FECM is processed by the Front End, it causes a subsequent response message queued for the same terminal (as identified by MSGHTID in the FECMRLSE message header) to be transmitted immediately, rather than waiting for input (RLSE command) from the terminal operator. Because of protocol restrictions (HDFF) on VTAM Front End IBM SDLC 3270 CRT processing, the CRT release option for the first call to FESEND should be used (see Section 9.5) as a release; because if the terminal is already in send mode, it is necessary to turn the line around before sending the released message, which may confuse the terminal operator. The CRT release option locks the terminal in receive mode, preventing new input by the operator.

A release FECM might be used if a subsystem queues more than one output message to the CRT terminal due to a considerable amount of processing (file/data base I/O) being necessary between messages. The first message might be an immediate response to the terminal operator indicating the input request is being processed, but allowing new input by the operator. Then, the second message (following the release FECM) is the ultimate result of the requested processing. A release FECM could also be used to force immediate transmission of a critical message to another CRT (other than the input terminal). Such processing should be used with caution because unsolicited messages can cause confusion for the terminal operator and may clear an existing screen format or displayed message. Coding format:

```
CALL 'COBREENT' USING FECMRLSE, status-word, fecm-area.
```

where:

<u>status-word</u> is a 4-byte (fullword aligned) area required by the facility.

<u>fecm-area</u> is a 60-byte area to contain the FECM (header and text). The user should initialize the header area prior to the call, probably by copying the input message header to this area.

9.9 <u>IN-CORE TABLE SORT FACILITY (INTSORT)</u> (Release 10 only)

If the Table Facility is not used to create an in-core table, then to sort a user in-core table, the INTSORT Facility (entry point INTSORTC for COBOL) is provided. Such a table might contain data stored in Store/Fetch strings or file data record via online transactions or offline processing. The table can have any number of fixed-length entries, and each entry can have a total size of 1 to 32767 bytes. The key to be sorted on can be anywhere <u>within</u> the first 256 bytes of the entry, but must be in the same place, and of the same length, in each entry. Coding format:

```
CALL 'COBREENT' USING INTSORTC, entries, entry-length, table,
                      key-offset, key-length, return-code.
```

where:

<u>entries</u> is a 4-byte (fullword aligned) area containing the number of table entries in binary format.

<u>entry-length</u> is a 4-byte (fullword aligned) area containing the size of each entry (up to 32767) in binary format.

<u>table</u> is the name of the area containing the table to be sorted.

<u>key-offset</u> is a 4-byte (fullword aligned) area containing the offset (-1) in binary format of the key within each entry (value must be 0 if key at the beginning of the table entry; 1 if it starts in the second position of the table entry, etc.). May be 0 to 255.

<u>key-length</u> is a 4-byte (fullword aligned) area containing the length in binary format of the key (to be sorted on) of each entry (can be the same as entry-length). Length may be 1 to 256 depending on key-offset (key-offset+key-length must be less than 257).

return-code is a 4-byte (fullword aligned) area to contain the return code (in binary in the low-order byte) from INTSORTC, as follows:

Return Code	Meaning
X'00	INTSORT completed successfully (no duplicate keys)
X'04'	Number of entries less than 1 or table size greater than 16M-1
X'08'	Length of an entry is less than 1 or greater than 32767
X'12'	No Table name (address) supplied
X'16'	Key-offset greater than 255
X'20'	Key-length plus key-offset exceeds 256 bytes
X'24'	Successfully sorted table contains duplicate keys (entries).

For all non-zero return codes except 24, the sort is not executed.

9.10 OTHER INTERCOMM SERVICE FACILITIES

The following service routines for application programs are accessed via the following subroutine entry names listed in REENTSBS:

- MMU (MAPIN, MAPOUT, MAPEND, MAPCLR, MAPURGE, MAPFREE)
- Store/Fetch (INTSTORE, INTFETCH, INTUNSTO)
- DDQ (QBUILD, QOPEN, QREAD, QREADX, QWRITE, QWRITEX, QCLOSE)
- Page Facility (PAGE)
- DBMS (DBINT) - data base interfacing
- Dynamic File Allocation (ALLOCATE, ACCESS)
- Table Facility (TABUILD, TABOPEN, TABPUT, TABGET, TABSORT, TABEND)
- LU6.2 transaction invocation (INITLU6)

Code names for all routines are provided in the COPY member ICOMSBS (see Appendix B). Detailed documentation for use of the above facilities is provided in separate manuals (see Chapter 2). Special coding and call conventions for specific data base support are described in Data Base Management System Users Guide and vendor manuals.

Other service routines described at the end of Chapter 2 and in the Assembler Language Programmers Guide such as binary table search, ESS user-id search, dispatcher related routines, and data field search routines (when Edit and Output Utilities used), can be accessed by adding the entry name to USRSUBS with a SUBMODS macro (use NAME parameter only) and adding the name and offset code to ICOMSBS.

9.10.1 Features Accessible via Assembler Macros

Several Intercomm facilities are accessible only via a call to an assembler-coded subroutine which issues an Intercomm macro to use the facility. Such features include:

- Enqueue/Dequeue--to request exclusive or shared control of a resource (INTENQ, INTDEQ)
- Start/Stop--function control or status test (SSSTART, SSSTOP, SSTEST)
- Write-to-operator--to issue a message to the CPU console (PMIWTO, PMIWTOR)
- Snap--to issue a snap of the passed program areas for debugging if DWSSNAP not used (Release 10 - see Chapter 3) (PMISNAP)
- Timed wait--to request a timed delay of subsystem processing if IJKDELAY not used (see Chapter 2) (INTWAIT)
- Asynchronous processing--dispatch a time-delayed routine, post or wait on an asynchronous processing routine (DISPATCH, INTPOST, INTWAIT)
- Acquire current time and/or date (INTTIME, GETDATE)
- Acquire device-dependent information about a terminal (EXTERM)
- Track user accounting information for SAM (USRTRACK)
- Convert hexadecimal fields to printable character (LAYOUT, HEXCON)
- Format subsystem codes for printing (SSCONV)
- Test authority of the currently signed-on (under ESS) user to use a logical function, such as Data Base access (SECTEST).

Note that use of most of these facilities will add to subsystem processing time (increase TCTV). Further documentation may be found in the Assembler Language Programmers Guide and Basic System Macros. GETDATE macro may only be used under Release 10.

Chapter 10

SAMPLE PROCESSING PROGRAMS

The sample program SQCOBOLA, shown in Figure 48, demonstrates coding of an OS/ANS COBOL subsystem which is either resident or dynamically loadable below the 16M line. To be eligible for loading above the 16M line, the MMU map group and map names would have to be copied to fields added to the DWS, and those new fields referenced for MMU calls which need those names in the passed parameter list.

The program processes an inquiry transaction (MURQ) containing a part number and a warehouse number for a stock status display. MMU is used to transform the incoming message into a fixed field format. The part number is transformed into a RBN for accessing a BDAM part description file (PARTFILE). The RBN and a part description record area are passed as parameters to a called (via COBREENT) COBOL subroutine SQCOBOLB, illustrated in Figure 49, which is eligible for residence anywhere. The subroutine retrieves the requested record from PARTFILE and passes back the File Handler return code to the calling subsystem via the Intercomm return code field.

Together, the part number and warehouse number provide a VSAM key for accessing a stock status file (STOKFILE). The File Handler is used for accessing both files. MMU is used for formatting an output display. Error messages, for conditions such as non-existent or erroneous warehouse or part numbers, or file I/O errors, are built within the program and formatted by MMU using an error map area.

The ICOMSBS, ICOMINMG and ICOMDWS basic Release 10 (see Appendix B) source text members defining the service routine pointers and Intercomm message header fields are COPY'd by the COBOL compiler. The COBLOGCH source text member used for terminal attribute and command override for MMU processing, and the symbolic map areas, are also copied into the program.

All required table entries, JCL, sample input messages and testing procedures, plus sample execution output, are illustrated in Chapter 11, "Subsystem Testing." The subsystem code used in the SYCTTBL macro to identify the sample subsystem is RQ. Intercomm's BTAM simulator is used for testing. Test messages are included to test as many error combinations as possible.

Chapter 12 illustrates a similar subsystem (without the COBOL subroutine) coded for the same purpose but using the Edit and Output Utilities, a COBPUT call, and Test Mode for testing. Chapter 13 illustrates SQCOBOLA redesigned for the VS COBOL II compiler (DWS fields moved to Working-Storage), and defines changes to Chapter 11 for testing in the VS COBOL II environment.

```
PP 5740-CB1 RELEASE 2.4                                           IBM OS/VS COBOL



00001    000100 IDENTIFICATION DIVISION.                                                  00010000
00002    000200 PROGRAM-ID. SOCOBOLA.                                                     00020000
00003    000300 ENVIRONMENT DIVISION.                                                     00030000
00004    000400 DATA DIVISION.                                                            00040000
00005    000500 WORKING-STORAGE SECTION.                                                  00050000
00006    000600 77  SLASH               PIC X      VALUE '/'.                             00060000
00007    000700 77  BDAM-READ-GOOD      PIC X      VALUE 'D'.                             00070000
00008    000800 77  VSAM-READ-GOOD      PIC X      VALUE 'V'.                             00080000
00009    000900 77  DD-STOCK            PIC X(8)   VALUE 'STOKFILE'.                      00090000
00010    001000 77  DD-PART             PIC X(8)   VALUE 'PARTFILE'.                      00100000
00011    001100 01  IO-GROUP-NAME       PIC X(8)   VALUE 'STKSTAT'.                       00110000
00012    001200 01  IO-MAP-NAME         PIC X(8)   VALUE 'MAP1'.                          00120000
00013    001300 01  ERR-MAP-NAME        PIC X(8)   VALUE 'ERRMAP'.                        00130000
00014    001400 01  MESSAGE-TABLE.                                                        00140000
00015    001500     04  MSG-A           PIC X(12)  VALUE 'PART NUMBER '.                  00150000
00016    001600     04  MSG-B           PIC X(11)  VALUE ' NOT FOUND.'.                   00160000
00017    001700     04  MSG-C           PIC X(5)   VALUE 'PART '.                         00170000
00018    001800     04  MSG-D           PIC X(24)  VALUE                                  00180000
00019    001900                                        ' NOT FOUND IN WAREHOUSE '.        00190000
00020    002000     04  MSG-E           PIC X(20)  VALUE '. MESSAGE CANCELLED.'.          00200000
00021    002100     04  MSG-F           PIC X(17)  VALUE 'MAP ERROR MCW IS '.             00210000
00022    002200     04  MSG-G           PIC X(36)  VALUE                                  00220000
00023    002300               'INVALID DATA: PARTNO MUST BE NUMERIC'.                     00230000
00024    002400     04  MSG-H           PIC X(35)  VALUE                                  00240000
00025    002500               'INVALID DATA: WHSNO MUST BE NUMERIC'.                      00250000
00026    002600     04  MSG-I           PIC X(46)  VALUE                                  00260000
00027    002700               'INVALID DATA: PARTNC AND WHSNO MUST BE NUMERIC'.           00270000
00028    002800 01  LOGICAL-DEVICE-DESCRIPTION COPY COBLOGCH.                             00280000
00029 C         01  LOGICAL-DEVICE-DESCRIPTION.
00030 C         02  UAN PICTURE X VALUE ' '.
00031 C         02  UANMDT PICTURE X VALUE ' '.
00032 C         02  UANSEL PICTURE X VALUE ' '.
00033 C         02  UANMDSEL PICTURE X VALUE ' '.
00034 C         02  UAHSEL PICTURE X VALUE ' '.
00035 C         02  UAHMDSEL PICTURE X VALUE ' '.
00036 C         02  UAX PICTURE X VALUE ' '.
00037 C         02  UAXMDT PICTURE X VALUE ' '.
00038 C         02  UNN PICTURE X VALUE ' '.
00039 C         02  UNNMDT PICTURE X VALUE ' '.
00040 C         02  UNNSEL PICTURE X VALUE ' '.
00041 C         02  UNNMDSEL PICTURE X VALUE ' '.
00042 C         02  UNHSEL PICTURE X VALUE ' '.
00043 C         02  UNHMDSEL PICTURE X VALUE ' '.
00044 C         02  UNX PICTURE X VALUE ' '.
00045 C         02  UNXMDT PICTURE X VALUE ' '.
00046 C         02  PAN PICTURE X VALUE ' '.
00047 C         02  PANMDT PICTURE X VALUE ' '.
00048 C         02  PANSEL PICTURE X VALUE ' '.
00049 C         02  PANMDSEL PICTURE X VALUE ' '.
00050 C         02  PAHSEL PICTURE X VALUE ' '.
00051 C         02  PAHMDSEL PICTURE X VALUE ' '.
00052 C         02  PAX PICTURE X VALUE ' '.
00053 C         02  PAXMDT PICTURE X VALUE ' '.
00054 C         02  PSN PICTURE X VALUE ' '.
```

Figure 48. Sample Reentrant Subsystem (IBM ANS COBOL) (Page 1 of 14)

```
C        02   PSNMDT PICTURE X VALUE ' '.
C        02   PSNSEL PICTURE X VALUE ! '.
C        02   PSNMDSEL PICTURE X VALUE ' '.
C        02   PSHSEL PICTURE X VALUE ' '.
C        02   PSHMDSEL PICTURE X VALUE ' '.
C        02   PSX PICTURE X VALUE ' '.
C        02   PSXMDT PICTURE X VALUE ' '.
C        02   SUPR PICTURE X VALUE ' '.
C        02   WRITE1 PICTURE X VALUE ' '.
C        02   ERASWRIT PICTURE X VALUE ' '.
C        02   ERASWRAL PICTURE X VALUE ' '.
C        02   RMDT PICTURE X VALUE ' '.
C        02   RKEYBD PICTURE X VALUE ' '.
C        02   RMDTKEYB PICTURE X VALUE ' '.
C        02   ALARM PICTURE X VALUE ' '.
C        02   ALRMRMDT PICTURE X VALUE ' '.
C        02   ALRMRKEY PICTURE X VALUE ' '.
C        02   ALRMRMKY PICTURE X VALUE ' '.
C        02   PRNTNL PICTURE X VALUE ' '.
C        02   PRNT40 PICTURE X VALUE ' '.
C        02   PRNT64 PICTURE X VALUE ' '.
C        02   PRNT80 PICTURE X VALUE ' '.
C        02   PRNLRMDT PICTURE X VALUE ' '.
C        02   PR40RMDT PICTURE X VALUE ' '.
C        02   PR64RMDT PICTURE X VALUE ' '.
C        02   PR80RMDT PICTURE X VALUE ' '.
C        02   PRNLRKEY PICTURE X VALUE ' '.
C        02   PR40RKEY PICTURE X VALUE ' '.
C        02   PR64RKEY PICTURE X VALUE ' '.
C        02   PR80RKEY PICTURE X VALUE ' '.
C        02   PRNLRMKY PICTURE X VALUE ' '.
C        02   PR40RMKY PICTURE X VALUE ' '.
C        02   PR64RMKY PICTURE X VALUE ' '.
C        02   PR80RMKY PICTURE X VALUE ' '.
C        02   PRNLALRM PICTURE X VALUE ' '.
C        02   PR40ALRM PICTURE X VALUE ' '.
C        02   PR64ALRM PICTURE X VALUE ' '.
C        02   PR80ALRM PICTURE X VALUE ' '.
C        02   PRNLARMD PICTURE X VALUE ' '.
C        02   PR40ARMD PICTURE X VALUE ' '.
C        02   PR64ARMD PICTURE X VALUE ' '.
C        02   PR80ARMD PICTURE X VALUE ' '.
C        02   PRNLARKY PICTURE X VALUE ' '.
C        02   PR40ARKY PICTURE X VALUE ' '.
C        02   PR64ARKY PICTURE X VALUE ' '.
C        02   PR80ARKY PICTURE X VALUE ' '.
C        02   PRNLAMKY PICTURE X VALUE ' '.
C        02   PR40AMKY PICTURE X VALUE ' '.
C        02   PR64AMKY PICTURE X VALUE ' '.
C        02   PR80AMKY PICTURE X VALUE ' '.
C       *02   NULL PICTURE X VALUE ' '.
C        02   NL PICTURE X VALUE ' '.
C        02   FF PICTURE X VALUE ' '.
C        02   CR PICTURE X VALUE ' '.
C        02   SI PICTURE X VALUE ' '.
```

Figure 48. Sample Reentrant Subsystem (IBM ANS COBOL) (Page 2 of 14)

```
      002900 01  COBREENT-CODES COPY ICOMSBS.                               00290000
C            01  COBREENT-CODES.                                            00001000
C           *   THESE CODES REPRESENT OFFSETS FOR ROUTINE ADDRESSES IN THE  00002000
C           *   TABLE NAMED REENTSBS. ONLY THE MOST COMMONLY USED VALUES    00003000
C           *   ARE INCLUDED HERE; THE USERS MANUAL HAS A COMPLETE LIST.    00004000
C           *   IF OFFSET ODD, THEN TRUE OFFSET=-(OFFSET+1)                 00005000
C                05  INTSORTC        PIC 99  COMP VALUE 99.                 00005300
C                05  DWS-SNAP        PIC 99  COMP VALUE 95.                 00005400
C                05  MAPFREE         PIC 99  COMP VALUE 91.                 00005500
C                05  FECMRLSE        PIC 99  COMP VALUE 87.                 00006000
C                05  FESEND          PIC 99  COMP VALUE 83.                 00007000
C                05  FESENDC         PIC 99  COMP VALUE 79.                 00008000
C                05  DYN-ALLOCATE    PIC 99  COMP VALUE 75.                 00009000
C                05  DYN-ACCESS      PIC 99  COMP VALUE 71.                 00010000
C                05  MAPURGE         PIC 99  COMP VALUE 67.                 00011000
C                05  MAPCLR          PIC 99  COMP VALUE 63.                 00012000
C                05  MAPEND          PIC 99  COMP VALUE 59.                 00013000
C                05  MAPOUT          PIC 99  COMP VALUE 55.                 00014000
C                05  MAPIN           PIC 99  COMP VALUE 51.                 00015000
C                05  INTUNSTO        PIC 99  COMP VALUE 47.                 00016000
C                05  INTSTORE        PIC 99  COMP VALUE 43.                 00017000
C                05  INTFETCH        PIC 99  COMP VALUE 39.                 00018000
C                05  FECMFDBK        PIC 99  COMP VALUE 35.                 00019000
C                05  FECMDDQ         PIC 99  COMP VALUE 31.                 00020000
C                05  DQ-WRITEX       PIC 99  COMP VALUE 27.                 00021000
C                05  DQ-READX        PIC 99  COMP VALUE 23.                 00022000
C                05  DQ-WRITE        PIC 99  COMP VALUE 19.                 00023000
C                05  DQ-READ         PIC 99  COMP VALUE 15.                 00024000
C                05  DQ-CLOSE        PIC 99  COMP VALUE 11.                 00025000
C                05  DQ-OPEN         PIC 99  COMP VALUE 07.                 00026000
C                05  DQ-BUILD        PIC 99  COMP VALUE 03.                 00027000
C                05  FH-SELECT       PIC 99  COMP VALUE 4.                  00028000
C                05  FH-RELEASE      PIC 99  COMP VALUE 8.                  00029000
C                05  FH-READ         PIC 99  COMP VALUE 12.                 00030000
C                05  FH-WRITE        PIC 99  COMP VALUE 16.                 00031000
C                05  FH-GET          PIC 99  COMP VALUE 20.                 00032000
C                05  FH-PUT          PIC 99  COMP VALUE 24.                 00033000
C                05  FH-RELEX        PIC 99  COMP VALUE 28.                 00034000
C                05  FH-FEOV         PIC 99  COMP VALUE 32.                 00035000
C                05  COBPUT          PIC 99  COMP VALUE 68.                 00036000
C                05  MSGCOL          PIC 99  COMP VALUE 72.                 00037000
C                05  COBSTORF        PIC 99  COMP VALUE 76.                 00038000
C                05  CONVERSE        PIC 99  COMP VALUE 80.                 00039000
C                05  DBINT           PIC 99  COMP VALUE 84.                 00040000
C                05  LOGPUT          PIC 99  COMP VALUE 88.                 00041000
C                05  PAGE-FILE       PIC 99  COMP VALUE 92.                 00042000
C                05  FH-GETV         PIC 99  COMP VALUE 96.                 00043000
C                05  FH-PUTV         PIC 999 COMP VALUE 100.                00044000
C           *   CODES 104 AND UP INDICATE USER ADDITIONS TO THE TABLE       00045000


      003000     05  SOCOBOLB        PIC 999 COMP VALUE 104.                00300000
      003100 01  FILLER             PIC X(22)  VALUE                        00310000
      003200                                  'END OF WORKING STORAGE'.     00320000
```

Figure 48. Sample Reentrant Subsystem (IBM ANS COBOL) (Page 3 of 14)

```
00165    003300 LINKAGE SECTION.                                                    00330000
00166    003400 01   INPUT-MESSAGE COPY ICOMINMG.                                   00340000
00167 C         01   INPUT-MESSAGE.                                                 00000100
00168 C              04  MESSG-HDR.                                                 00000200
00169 C                  06  MSGH-LENGTH              PIC S9999  COMP.              00000300
0017C C                  06  MSGH-OPR                 PIC X.                        00000400
00171 C                  06  MSGH-RSCH                PIC X.                        00000500
00172 C                  06  MSGH-RSC                 PIC X.                        00000600
00173 C                  06  MSGH-SSC                 PIC X.                        00000700
00174 C                  06  MSGH-MMN                 PIC XXX.                      00000800
00175 C                  06  MSGH-DATE.                                             00000900
00176 C                      08  MSGH-YR              PIC 99.                       00001000
00177 C                      08  MSGH-PERIOD          PIC X.                        00001100
00178 C                      08  MSGH-JULIAN-DAY      PIC 999.                      00001200
00179 C                  06  MSGH-TIME.                                             00001300
00180 C                      08  MSGH-HH              PIC 99.                       00001400
00181 C                      08  MSGH-MM              PIC 99.                       00001500
00182 C                      08  MSGH-SS              PIC 99.                       00001600
00183 C                      08  MSGH-TH              PIC 99.                       00001700
00184 C                  06  MSGH-TID.                                              00001800
00185 C                      08  MSGH-TI1             PIC X.                        00001900
00186 C                      08  MSGH-TI2-3           PIC XX.                       00002000
00187 C                      08  MSGH-TI4-5           PIC 99.                       00002100
00188 C                  06  MSGH-CON                 PIC S9999  COMP.              00002200
00189 C                  06  MSGH-FLGS                PIC X(2).                     00002300
0C190 C                  06  MSGH-BMN                 PIC X(3).                     00002350
00191 C                  06  MSGH-SSCH                PIC X.                        00002400
00192 C                  06  MSGH-USR                 PIC X.                        00002500
00193 C                  06  MSGH-ADDR                PIC XX.                       00002600
00194 C                  06  MSGH-LOG                 PIC X.                        00002700
00195 C                  06  MSGH-BLK                 PIC X.                        00002750
00196 C                  06  MSGH-VMI                 PIC X.                        00002800

00198    003500          02  INPUT-TEXT.                                            00350000
00199    003600            04  INPUT-VERB     PIC X(4).                             00360000
0020C    003700 01       ICOM-SPA             PIC X(500).                           00370000
00201    003800 01       ICOM-SCT             PIC X(100).                           00380000
00202    003900 01       ICOM-RETURN          PIC S9(7) COMP.                       00390000
00203    004000 01       DYNAMIC-WORK-SPACE COPY ICOMDWS.                           00400000
00204 C         01       DYNAMIC-WORK-SPACE.                                        00000100
00205 C                  02  OUTPUT-MESSAGE.                                        00000200
00206 C                    04  OMESSG-HDR.                                          00000300
00207 C                      06  OMSGH-LENGTH         PIC S9999  COMP.              00000400
00208 C                      06  OMSGH-OPR            PIC X.                        00000500
00209 C                      06  OMSGH-RSCH           PIC X.                        00000600
00210 C                      06  OMSGH-RSC            PIC X.                        00000700
00211 C                      06  OMSGH-SSC            PIC X.                        00000800
00212 C                      06  OMSGH-MMN            PIC XXX.                      00000900
00213 C                      06  OMSGH-DATE.                                        00001000
00214 C                          08  OMSGH-YR         PIC 99.                       00001100
00215 C                          08  OMSGH-PERIOD     PIC X.                        00001200
00216 C                          08  OMSGH-JULIAN-DAY PIC 999.                      00001300
00217 C                      06  OMSGH-TIME.                                        00001400
00218 C                          08  OMSGH-HH         PIC 99.                       00001500
00219 C                          08  OMSGH-MM         PIC 99.                       00001600
0022C C                          08  OMSGH-SS         PIC 99.                       00001700
00221 C                          08  OMSGH-TH         PIC 99.                       00001800
```

Figure 48. Sample Reentrant Subsystem (IBM ANS COBOL) (Page 4 of 14)

```
00222 C                06  OMSGH-TID.                                             00001900
00223 C                    08  OMSGH-TI1            PIC X.                         00002000
00224 C                    08  OMSGH-TI2-3          PIC XX.                        00002100
00225 C                    08  OMSGH-TI4-5          PIC 99.                        00002200
00226 C                06  OMSGH-CON                PIC S9999  COMP.               00002300
00227 C                06  OMSGH-FLGS               PIC X(2).                      00002400
00228 C                06  OMSGH-BMN                PIC X(3).                      00002450
00229 C                06  OMSGH-SSCH               PIC X.                         00002500
0023C C                06  OMSGH-USR                PIC X.                         00002600
00231 C                06  OMSGH-ADDR               PIC XX.                        00002700
00232 C                06  OMSGH-LOG                PIC X.                         00002750
00233 C                06  OMSGH-BLK                PIC X.                         00002800
00234 C                06  OMSGH-VMI                PIC X.                         00002900

00236    004100   02  SYMBOLIC-MAP.                                               00410000
00237    004200*$COPY STKSTATS                                                    00420000
00238    004300       03  MAP1.                                                   00430000
00239    004400               05  VERBF.                                          00440000
00240    004500                   06  VERBL     PIC 9(4) COMP.                    00450000
00241    004600                   06  VERBT     PIC X.                            00460000
00242    004700                   06  VERB      PIC X(4).                         00470000
00243    004800           04  PARTNOF.                                            00480000
00244    004900               05  PARTNOL  PIC 9(4) COMP.                         00490000
00245    005000               05  PARTNOT  PIC X.                                 00500000
00246    005100               05  PARTNC.                                         00510000
00247    005200                   06  FILLER    PIC S9(4).                        00520000
00248    005300                   06  RBNBYTE   PIC S9.                           00530000
00249    005400           04  USEG1.                                              00540000
0025C    005500               05  WHSNOF.                                         00550000
00251    0C5600                   06  WHSNOL    PIC 9(4) COMP.                    00560000
00252    005700                   06  WHSNOT    PIC X.                            00570000
00253    005800                   06  WHSNO     PIC S999.                         00580000
00254    005900               05  PRTDATAF.                                       00590000
00255    006000                   06  PRTDATAL PIC 9(4) COMP.                     00600000
00256    006100                   06  PRTDATAT PIC X.                             00610000
00257    006200                   06  PRTDATA  PIC X(54).                         00620000
00258    006300               05  ORDUNTF.                                        00630000
0025S    006400                   06  ORDUNTL   PIC 9(4) COMP.                    0064000Q
00260    C06500                   06  ORDUNTT   PIC X.                            00650000
00261    006600                   06  ORDUNT    PIC X(5).                         00660000
00262    006700               05  PRTPRCF.                                        00670000
00263    006800                   06  PRTPRCL   PIC 9(4) COMP.                    00680000
00264    006900                   06  PRTPRCT   PIC X.                            00690000
00265    007000                   06  PRTPRC    PIC S999V9(4) COMP-3.             00700000
00266    007100               05  WHSLOCF.                                        00710000
0C267    007200                   06  WHSLOCL   PIC 9(4) COMP.                    00720000
00268    C07300                   06  WHSLOCT   PIC X.                            00730000
00269    007400                   06  WHSLOC    PIC X(23).                        00740000
00270    007500               05  STKLEVF.                                        007500C0
00271    007600                   06  STKLEVL   PIC 9(4) COMP.                    00760000
00272    007700                   06  STKLEVT   PIC X.                            00770000
00273    CC7800                   06  STKLEV    PIC S9(7) COMP-3.                 00780000
00274    007900               05  LEVDATEF.                                       00790000
00275    008000                   06  LEVDATEL PIC 9(4) COMP.                     00800000
00276    008100                   06  LEVDATET PIC X.                             00810000
00277    008200                   06  LEVDATE  PIC X(8).                          00820000
0C278    008300               05  STKCRDF.                                        00830000
```

Figure 48. Sample Reentrant Subsystem (IBM ANS COBOL) (Page 5 of 14)

```
008400                   06  STKORDL  PIC 9(4) COMP.                      00840000
008500                   06  STKORDT  PIC X.                              00850000
008600                   06  STKORD   PIC S9(7) COMP-3.                   00860000
008700               05  ORDDATEF.                                        00870000
008800                   06  ORDDATEL PIC 9(4) COMP.                      00880000
008900                   06  ORDDATET PIC X.                              00890000
009000                   06  ORDDATE  PIC X(8).                           00900000
009100           04  FILLER    PIC X(7).                                  00910000
009200       03  ERRMAP.                                                  00920000
009300               05  ERRMSGF.                                         00930000
009400                   06  ERRMSGL  PIC 9(4) COMP.                      00940000
009500                   06  ERRMSGT  PIC X.                              00950000
009600                   06  ERRMSG   PIC X(50).                          00960000
009700           04  FILLER    PIC X(7).                                  00970000
009800       02  RECORD-AREA.                                             00980000
009900         04  PART-RECORD.                                           00990000
010000*            NOTE 100 CHARACTER BDAM RECORD WITHOUT KEYS.           01000000
010100           06  P-REC-PART-DATA.                                     01010000
010200             08  P-REC-PIN          PIC  X(5).                      01020000
010300             08  P-REC-DES          PIC  X(54).                     01030000
010400             08  P-REC-UNT          PIC  X(5).                      01040000
010500           06  P-REC-PRC            PIC  99V9(4)      COMP-3.       01050000
010600           06  P-REC-MFR-NUM        PIC  X(15).                     01060000
010700           06  FILLER               PIC  X(17).                     01070000
010800         04  STOCK-RECORD.                                          01080000
010900*            NOTE 80 CHARACTER VSAM RECORD.                         01090000
011000           06  DELETE-CHARACTER     PIC X.                          01100000
011100           06  S-REC-KEY-FIELD.                                     01110000
011200             08  S-REC-WHS          PIC 9(3).                       01120000
011300             08  S-REC-PNO          PIC 9(5).                       01130000
011400           06  FILLER               PIC X(28).                      01140000
011500           06  S-REC-STOCK-DATA.                                    01150000
011600             08  S-REC-WLC          PIC X(23).                      01160000
011700             08  S-REC-LEV          PIC 9(7)        COMP-3.         01170000
011800*                NOTE S-REC-LEV IS 4 CHARACTERS LONG.               01180000
011900             08  S-REC-LDT          PIC X(6).                       01190000
012000             08  S-REC-ORD          PIC 9(7)        COMP-3.         01200000
012100*                NOTE S-REC-ORD IS 4 CHARACTERS LONG.               01210000
012200             08  S-REC-ODT          PIC X(6).                       01220000
```

Figure 48. Sample Reentrant Subsystem (IBM ANS COBOL) (Page 6 of 14)

```
012300     02  STATWD                    PIC S9(7)       COMP SYNC.       01230000
012400*        NOTE THIS PUTS US ONTO A FULLWORD BOUNDARY ALIGNMENT.      01240000
012500     02  FH-STATUS REDEFINES STATWD.                                01250000
012600       04  FH-STAT1                PIC X.                           01260000
012700               88  IOK                           VALUE 0.           01270000
012800               88  IOERROR                       VALUE 1.           01280000
012900               88  NOT-FOUND                     VALUE 2.           01290000
013000               88  NO-DD                         VALUE 9.           01300000
013100       04  F-H-STAT2               PIC X.                           01310000
013200       04  FILLER                  PIC X(2).                        01320000
013300     02  EXTDSCT                   PIC X(48).                       01330000
013400*        NOTE WE ARE STILL ALIGNED HERE.                            01340000
013500     02  RBN-WORD                  PIC S9(7)            COMP.       01350000
013600     02  RBN-FILLER REDEFINES RBN-WORD.                             01360000
013700       04  FILLER                  PIC X.                           01370000
013800       04  RBN                     PIC X(3).                        01380000
013900     02  CURRENT-FILE              PIC X(8).                        01390000
014000     02  MCW                       PIC 9(8)             COMP SYNC.  01400000
014100     02  MCW-CODE-BYTES REDEFINES MCW.                              01410000
014200       04  MCW-RETURN-CODE         PIC X.                           01420000
014300           88  MAPPING-OK                        VALUE ZERO.        01430000
014400           88  MAPEND-SUCCESSFUL                 VALUE '8'.         01440000
014500       04  MCW-OPTION-2            PIC X.                           01450000
014600       04  MCW-OPTION-3            PIC X.                           01460000
014700       04  MCW-OPTION-4            PIC X.                           01470000
014800     02  MCW-CODES-PART REDEFINES MCW.                              01480000
014900       04 MCW-CODES1-2             PIC X(2).                        01490000
015000       04 FILLER                   PIC X(2).                        01500000
015100     02  MCB                       PIC X(48).                       01510000
015200     02  KEY-FIELD                 PIC 9(8).                        01520000
015300     02  DATE-EDIT.                                                 01530000
015400       04  D-E-MO                  PIC X(2).                        01540000
015500       04  D-E-DAY                 PIC X(2).                        01550000
015600       04  D-E-YEAR                PIC X(2).                        01560000
015700     02  DATE-MOVE.                                                 01570000
015800       04  D-M-MO                  PIC X(2).                        01580000
015900       04  SLASH2                  PIC X.                           01590000
016000       04  D-M-DAY                 PIC X(2).                        01600000
016100       04  SLASH1                  PIC X.                           01610000
016200       04  D-M-YEAR                PIC X(2).                        01620000
```

Figure 48. Sample Reentrant Subsystem (IBM ANS COBOL) (Page 7 of 14)

```
02  INVALID-INPUT-MESSAGE.
  04  MSG-7                 PIC X(50).
02  NO-PART-MESSAGE REDEFINES INVALID-INPUT-MESSAGE.
  04  MSG-1                 PIC X(12).
  04  NOPART-PNO            PIC X(5).
  04  MSG-2                 PIC X(11).
02  NOWARES-MESSAGE REDEFINES INVALID-INPUT-MESSAGE.
  04  MSG-3                 PIC X(5).
  04  NOWARES-PNO           PIC X(5).
  04  MSG-4                 PIC X(24).
  04  NOWARES-WHS           PIC X(3).
02  CANCEL-MESSAGE REDEFINES INVALID-INPUT-MESSAGE.
  04  CAN-CODE              PIC X(15)  JUST RIGHT.
  04  CAN-FILE-NAME         PIC X(8).
  04  MSG-5                 PIC X(20).
02  MAPPING-ERR-MESSAGE REDEFINES INVALID-INPUT-MESSAGE.
  04  MSG-6                 PIC X(17).
  04  ERROR-TAG             PIC X(4).
02  MAP-FLAG                PIC X.
    88  MAP-GOOD                       VALUE 'G'.
    88  MAP-ERR                        VALUE 'E'.
    88  MAP-OUT-ABORT                  VALUE 'A'.
02  FH-READ-FLAG            PIC X.
    88  BDAM-READ-OK                   VALUE 'D'.
    88  VSAM-READ-OK                   VALUE 'V'.
```

Figure 48. Sample Reentrant Subsystem (IBM ANS COBOL) (Page 8 of 14)

```
00386   018900 PROCEDURE DIVISION USING INPUT-MESSAGE                                    01890000
00387   019000                          ICOM-SPA                                         01900000
00388   019100                          ICOM-SCT                                         01910000
00389   019200                          ICOM-RETURN                                      01920000
00390   019300                          DYNAMIC-WORK-SPACE.                              01930000

00392   019500 0100-MAIN-LINE.                                                           01950000
00393   019600     PERFORM 1000-HOUSEKEEPING.                                            01960000
00394   019700     PERFORM 2000-HEADER-MOVE.                                             01970000
00395   019800     PERFORM 3000-MAP-IN.                                                  01980000
00396   019900     MOVE LOW-VALUES TO VERB.                                              01990000
00397   020000     IF PARTNOT NOT EQUAL TO LOW-VALUES                                    02000000
00398   020100      OR WHSNOT NOT EQUAL TO LOW-VALUES                                    02010000
00399   020200        PERFORM 8900-INVALID-INPUT-RTN                                     02020000
00400   020300     ELSE                                                                  02030000
00401   020400     IF NOT MAPPING-OK                                                     02040000
00402   020500        PERFORM 8850-MAPPING-ERR-RTN                                       02050000
00403   020600     ELSE                                                                  02060000
00404   020700       PERFORM 3500-MAP-CLEAR-RTN                                          02070000
00405   020800       PERFORM 4000-READ-PART-FILE                                         02080000
00406   020900       PERFORM 5000-FH-BDAM-READ                                           02090000
00407   021000       IF BDAM-READ-OK                                                     02100000
00408   021100           PERFORM 6000-READ-STOCK-FILE                                    02110000
00409   021200           PERFORM 7000-FH-VSAM-READ                                       02120000
00410   021300           IF VSAM-READ-OK                                                 02130000
00411   021400             PERFORM 8000-MAP-OUT                                          02140000
00412   021500             IF NOT MAPPING-OK                                             02150000
00413   021600               PERFORM 8850-MAPPING-ERR-RTN.                               02160000
00414   021700     IF MAP-GOOD                                                           02170000
00415   021800       PERFORM 8500-GOOD-MAP-END                                           02180000
00416   021900     ELSE                                                                  02190000
00417   022000     IF MAP-ERR                                                            02200000
00418   022100       PERFORM 8600-ERR-MAP-END.                                           02210000
00419   022200     GOBACK.                                                               02220000


00421   022400 1000-HOUSEKEEPING.                                                        02240000
00422   022500     MOVE +0 TO ICOM-RETURN.                                               02250000
00423   022600     MOVE 'G' TO MAP-FLAG.                                                 02260000

00425   022800 2000-HEADER-MOVE.                                                         02280000
00426   022900     MOVE MESSG-HDR TO OMESSG-HDR.                                         02290000

00428   023100 3000-MAP-IN.                                                              02310000
00429   023200     MOVE SPACES TO MCW-CODE-BYTES.                                        02320000
00430   023300     CALL 'COBREENT' USING MAPIN                                           02330000
00431   023400                           MCB                                             02340000
00432   023500                           IO-GROUP-NAME                                   02350000
00433   023600                           IO-MAP-NAME                                     02360000
00434   023700                           INPUT-MESSAGE                                   02370000
00435   023800                           MCW                                             02380000
00436   023900                           MAP1.                                           02390000
```

Figure 48. Sample Reentrant Subsystem (IBM ANS COBOL) (Page 9 of 14)

```
3500-MAP-CLEAR-RTN.
    MOVE SPACES TO MCW-CODE-BYTES.
    MOVE 'A' TO MCW-OPTION-4.
    CALL 'COBREENT' USING MAPCLR
                          MCW
                          IO-GROUP-NAME
                          IO-MAP-NAME
                          MAP1
                          OMSGH-TID.

4000-READ-PART-FILE.
    MOVE RBNBYTE TO RBN-WORD.
    MOVE DD-PART TO CURRENT-FILE.

5000-FH-BDAM-READ.
    CALL 'COBREENT' USING SQCOBOLB
                          PART-RECORD
                          RBN.
    IF ICOM-RETURN EQUAL 1
        PERFORM 9600-IO-ERROR-ROUTINE
    ELSE
    IF ICOM-RETURN EQUAL 2
        PERFORM 9700-NOT-FOUND-RTN
    ELSE
    IF ICOM-RETURN EQUAL 9
        PERFORM 9500-NO-DD-ROUTINE
    ELSE
    IF P-REC-PIN NOT EQUAL PARTNO
        PERFORM 9700-NOT-FOUND-RTN
    ELSE
        MOVE P-REC-DES TO PRTDATA
        MOVE P-REC-UNT TO ORDUNT
        MOVE P-REC-PRC TO PRTPRC
        MOVE BDAM-READ-GOOD TO FH-READ-FLAG.

6000-READ-STOCK-FILE.
    MOVE DD-STOCK TO CURRENT-FILE.
    MOVE WHSNO TO S-REC-WHS.
    MOVE PARTNO TO S-REC-PNO.
    MOVE S-REC-KEY-FIELD TO KEY-FIELD.
```

Figure 48. Sample Reentrant Subsystem (IBM ANS COBOL) (Page 10 of 14)

```
002270 7000-FH-VSAM-READ.                                              00028300
002280     MOVE ZERO TO FH-READ-FLAG.                                  00028400
002290     MOVE LOW-VALUES TO EXTDSCT.                                 00028500
002300     PERFORM 7400-FH-SELECT-ROUTINE.                             00028600
002310     IF NO-DD                                                    00028700
002320        PERFORM 9500-NO-DD-ROUTINE                               00028800
002330     ELSE                                                        00028900
002340        PERFORM 7200-FH-VSAM-READ-CONTINUE                       00029000
002350        IF IOERROR                                               00029100
002360           PERFORM 9600-IO-ERROR-ROUTINE                         00029200
002370        ELSE                                                     00029300
002380        IF NOT-FOUND                                             00029400
002390           MOVE MSG-C TO MSG-3                                   00029500
002400           MOVE MSG-D TO MSG-4                                   00029600
002410           MOVE PARTNO TO NOWARES-PNO                            00029700
002420           MOVE WHSNO TO NOWARES-WHS                             00029800
002430           MOVE NOWARES-MESSAGE TO ERRMSG                        00029900
002440           PERFORM 9800-SEND-ERROR-MESSAGE                       00030000
002450        ELSE                                                     00030100
002460           MOVE VSAM-READ-GOOD TO FH-READ-FLAG                   00030200
002470           MOVE S-REC-WLC TO WHSLOC                              00030300
002480           MOVE S-REC-LEV TO STKLEV                              00030400
002490           MOVE S-REC-LDT TO DATE-EDIT                           00030500
002500           PERFORM 7300-DATE-EDITING                             00030600
002510           MOVE DATE-MOVE TO LEVDATE                             00030700
002520           MOVE S-REC-ORD TO STKORD                              00030800
002530           MOVE S-REC-ODT TO DATE-EDIT                           00030900
002540           PERFORM 7300-DATE-EDITING                             00031000
002550           MOVE DATE-MOVE TO ORDDATE.                            00031100
002560     PERFORM 7500-FH-RELEASE-ROUTINE.                            00031200

002580 7200-FH-VSAM-READ-CONTINUE.                                     00031400
002590     MOVE SPACES TO FH-STATUS.                                   00031500
002600     CALL 'COBREENT' USING FH-GETV                               00031600
002610                           EXTDSCT                               00031700
002620                           FH-STATUS                             00031800
002630                           STOCK-RECORD                          00031900
002640                           KEY-FIELD.                            00032000
```

Figure 48. Sample Reentrant Subsystem (IBM ANS COBOL) (Page 11 of 14)

```
00529   033200 7300-DATE-EDITING.                                                03320000
00530   033300     MOVE D-E-YEAR TO D-M-YEAR.                                    03330000
00531   033400     MOVE SLASH TO SLASH1.                                         03340000
00532   033500     MOVE D-E-DAY TO D-M-DAY.                                      03350000
00533   033600     MOVE SLASH TO SLASH2.                                         03360000
00534   033700     MOVE D-E-MO TO D-M-MO.                                        03370000

00536   033900 7400-FH-SELECT-ROUTINE.                                           03390000
00537   034000     MOVE SPACES TO FH-STATUS.                                     03400000
00538   034100     CALL 'COBREENT' USING FH-SELECT                               03410000
00539   034200                           EXTDSCT                                 03420000
00540   034300                           FH-STATUS                               03430000
00541   034400                           CURRENT-FILE.                           03440000

00543   034600 7500-FH-RELEASE-ROUTINE.                                          03460000
00544   034700     MOVE SPACES TO FH-STATUS.                                     03470000
00545   034800     CALL 'COBREENT' USING FH-RELEASE                              03480000
00546   034900                           EXTDSCT                                 03490000
00547   035000                           FH-STATUS.                              03500000

00549   035200 8000-MAP-OUT.                                                     03520000
00550   035300     MOVE SPACES TO MCW-CODE-BYTES.                                03530000
00551   035400     CALL 'COBREENT' USING MAPOUT                                  03540000
00552   035500                           MCB                                     03550000
00553   035600                           IO-GROUP-NAME                           03560000
00554   035700                           IO-MAP-NAME                             03570000
00555   035800                           MAP1                                    03580000
00556   035900                           MCW                                     03590000
00557   036000                           OMSGH-TID.                              03600000

00559   036200 8500-GOOD-MAP-END.                                                03620000
00560   036300     MOVE ' Q  ' TO MCW-CODE-BYTES.                                03630000
00561   036400     PERFORM 8700-CALL-MAP-END.                                    03640000
00562   036500     IF NOT MAPEND-SUCCESSFUL                                      03650000
00563   036600        PERFORM 8800-MAP-PURGE-RTN                                 03660000
00564   036700        PERFORM 8850-MAPPING-ERR-RTN                               03670000
00565   036800        PERFORM 8600-ERR-MAP-END.                                  03680000

00567   037000 8600-ERR-MAP-END.                                                 03700000
00568   037100     MOVE ' Q  ' TO MCW-CODE-BYTES.                                03710000
00569   037200     MOVE WRITE1 TO MCW-OPTION-3.                                  03720000
00570   037300     PERFORM 8700-CALL-MAP-END.                                    03730000
00571   037400     IF NOT MAPEND-SUCCESSFUL                                      03740000
00572   037500        PERFORM 8800-MAP-PURGE-RTN                                 03750000
00573   037600        MOVE +8 TO ICOM-RETURN.                                    03760000

00575   037800 8700-CALL-MAP-END.                                                03780000
00576   037900     CALL 'COBREENT' USING MAPEND                                  03790000
00577   038000                           MCB                                     03800000
00578   038100                           OUTPUT-MESSAGE                          03810000
00579   038200                           MCW.                                    03820000

00581   038400 8800-MAP-PURGE-RTN.                                               03840000
00582   038500     CALL 'COBREENT' USING MAPURGE                                 03850000
00583   038600                           MCB.                                    03860000
```

Figure 48. Sample Reentrant Subsystem (IBM ANS COBOL) (Page 12 of 14)

```
8850-MAPPING-ERR-RTN.
    MOVE MSG-F TO MSG-6.
    MOVE MCW-CODES1-2 TO ERROR-TAG.
    MOVE MAPPING-ERR-MESSAGE TO ERRMSG.
    PERFORM 9800-SEND-ERROR-MESSAGE.

8900-INVALID-INPUT-RTN.
    IF PARTNOT NOT EQUAL TO LOW-VALUES
      IF WHSNOT NOT ECUAL TO LOW-VALUES
              MOVE MSG-I TO MSG-7
      ELSE
              MOVE MSG-G TO MSG-7
    ELSE
    IF WHSNCT NOT EQUAL TO LOW-VALUES
              MOVE MSG-H TO MSG-7.
    MOVE INVALID-INPUT-MESSAGE TO ERRMSG.
    PERFORM 9800-SEND-ERROR-MESSAGE.

9500-NO-DD-ROUTINE.
    MOVE MSG-E TO MSG-5.
    MOVE 'NO DD FOR FILE ' TO CAN-CODE.
    MOVE CURRENT-FILE TO CAN-FILE-NAME.
    MOVE CANCEL-MESSAGE TO ERRMSG.
    MOVE +0 TO ICOM-RETURN.
    PERFORM 9800-SEND-ERROR-MESSAGE.

9600-IO-ERROR-ROUTINE.
    MOVE MSG-E TO MSG-5.
    MOVE 'IO ERROR ON ' TO CAN-CODE.
    MOVE CURRENT-FILE TO CAN-FILE-NAME.
    MOVE CANCEL-MESSAGE TO ERRMSG.
    MOVE +0 TO ICOM-RETURN.
    PERFORM 9800-SEND-ERROR-MESSAGE.

9700-NOT-FOUND-RTN.
    MOVE +0 TO ICOM-RETURN.
    MOVE MSG-A TO MSG-1.
    MOVE MSG-B TO MSG-2.
    MOVE PARTNO TO NOPART-PNO.
    MOVE NO-PART-MESSAGE TO ERRMSG.
    PERFORM 9800-SEND-ERROR-MESSAGE.

9800-SEND-ERROR-MESSAGE.
    MOVE SPACES TO MCW-CODE-BYTES.
    MOVE 'E' TO MAP-FLAG.
    CALL 'COBREENT' USING MAPOUT
                          MCB
                          IO-GROUP-NAME
                          ERR-MAP-NAME
                          ERRMAP
                          MCW
                          OMSGH-TID.
    IF NOT MAPPING-OK
      MOVE +8 TO ICOM-RETURN
      MOVE 'A' TO MAP-FLAG.
```

Figure 48. Sample Reentrant Subsystem (IBM ANS COBOL) (Page 13 of 14)

```
DNM=8-194    03  MSGH-ADDR                  BLL=3   025  DNM=8-194    DS 2C       DISP
DNM=8-213    03  MSGH-LOG                   BLL=3   027  DNM=8-213    DS 1C       DISP
DNM=8-234    03  MSGH-BLK                   BLL=3   028  DNM=8-234    DS 1C       DISP
DNM=8-252    03  MSGH-VMI                   BLL=3   029  DNM=8-252    DS 1C       DISP
DNM=8-273    02  INPUT-TEXT                 BLL=3   02A  DNM=8-273    DS OCL4     GROUP
DNM=8-299    03  INPUT-VERB                 BLL=3   02A  DNM=8-299    DS 4C       DISP
DNM=8-319    01  ICOM-SPA                   BLL=4   000  DNM=8-319    DS 500C     DISP
DNM=8-337    01  ICOM-SCT                   BLL=5   000  DNM=8-337    DS 100C     DISP
DNM=8-355    01  ICOM-RETURN                BLL=6   000  DNM=8-355    DS 4C       COMP
DNM=8-376    01  DYNAMIC-WORK-SPACE         BLL=7   000  DNM=8-376    DS OCL634   GROUP
DNM=8-407    02  OUTPUT-MESSAGE             BLL=7   000  DNM=8-407    DS OCL42    GROUP
DNM=8-434    03  OMESSG-HDR                 BLL=7   000  DNM=8-434    DS OCL42    GROUP
DNM=8-457    04  OPSGH-LENGTH               BLL=7   000  DNM=8-457    DS 2C       COMP
DNM=8-479    04  OPSGH-CPR                  BLL=7   002  DNM=8-479    DS 1C       DISP
DNM=9-000    04  OMSGH-RSCH                 BLL=7   003  DNM=9-000    DS 1C       DISP
DNM=9-020    04  OMSGH-RSC                  BLL=7   004  DNM=9-020    DS 1C       DISP
DNM=9-042    04  OMSGH-SSC                  BLL=7   005  DNM=9-042    DS 1C       DISP
DNM=9-061    04  OMSGH-MMN                  BLL=7   006  DNM=9-061    DS 3C       DISP
DNM=9-083    04  OPSGH-DATE                 BLL=7   009  DNM=9-083    DS OCL6     GROUP
DNM=9-109    05  OMSGH-YR                   BLL=7   009  DNM=9-109    DS 2C       DISP-NM
DNM=9-127    05  OPSGH-PERIOD               BLL=7   00B  DNM=9-127    DS 1C       DISP
DNM=9-152    05  OMSGH-JULIAN-DAY           BLL=7   00C  DNM=9-152    DS 3C       DISP-NM
DNM=9-178    04  OMSGH-TIME                 BLL=7   00F  DNM=9-178    DS OCL8     GROUP
DNM=9-201    05  OPSGH-HH                   BLL=7   00F  DNM=9-201    DS 2C       DISP-NM
DNM=9-219    05  OPSGH-MM                   BLL=7   011  DNM=9-219    DS 2C       DISP-NM
DNM=9-237    05  OMSGH-SS                   BLL=7   013  DNM=9-237    DS 2C       DISP-NM
DNM=9-255    05  OMSGH-TH                   BLL=7   015  DNM=9-255    DS 2C       DISP-NM
DNM=9-273    04  OPSGH-TID                  BLL=7   017  DNM=9-273    DS OCL5     GROUP
DNM=9-295    05  OMSGH-T11                  BLL=7   017  DNM=9-295    DS 1C       DISP
DNM=9-314    05  OPSGH-T12-3                BLL=7   018  DNM=9-314    DS 2C       DISP
DNM=9-335    05  OMSGH-T14-5                BLL=7   01A  DNM=9-335    DS 2C       DISP-NM
DNM=9-359    04  OMSGH-CON                  BLL=7   01C  DNM=9-359    DS 2C       COMP
DNM=9-381    04  OPSGH-FLGS                 BLL=7   01E  DNM=9-381    DS 2C       DISP
DNM=9-401    04  OPSGH-BMN                  BLL=7   020  DNM=9-401    DS 3C       DISP
DNM=9-420    04  OMSGH-SSCH                 BLL=7   023  DNM=9-420    DS 1C       DISP
DNM=9-443    04  OMSGH-USR                  BLL=7   024  DNM=9-443    DS 1C       DISP
DNM=9-465    04  OMSGH-ADDR                 BLL=7   025  DNM=9-465    DS 2C       DISP
DNM=9-488    04  OPSGH-LOG                  BLL=7   027  DNM=9-488    DS 1C       DISP
DNM=10-000   04  OPSGH-BLK                  BLL=7   028  DNM=10-000   DS 1C       DISP
DNM=10-022   04  OPSGH-VMI                  BLL=7   029  DNM=10-022   DS 1C       DISP
DNM=10-041   02  SYMBOLIC-MAP               BLL=7   02A  DNM=10-041   DS OCL222   GROUP
DNM=10-069   03  MAP1                       BLL=7   02A  DNM=10-069   DS OCL162   GROUP
DNM=10-086   04  VERBF                      BLL=7   02A  DNM=10-086   DS OCL7     GROUP
DNM=10-104   05  VERBL                      BLL=7   02A  DNM=10-104   DS 2C       COMP
DNM=10-122   05  VERBT                      BLL=7   02C  DNM=10-122   DS 1C       DISP
DNM=10-137   05  VERB                       BLL=7   02D  DNM=10-137   DS 4C       DISP
DNM=10-151   04  PARTNOF                    BLL=7   031  DNM=10-151   DS OCL8     GROUP
DNM=10-174   05  PARTNOL                    BLL=7   031  DNM=10-174   DS 2C       COMP
DNM=10-194   05  PARTNOT                    BLL=7   033  DNM=10-194   DS 1C       DISP
DNM=10-214   05  PARTNO                     BLL=7   034  DNM=10-214   DS OCL5     GROUP
DNM=10-233   06  FILLER                     BLL=7   034  DNM=10-233   DS 4C       DISP-NM
DNM=10-247   06  RBNBYTE                    BLL=7   038  DNM=10-247   DS 1C       DISP-NM
DNM=10-264   04  USEG1                      BLL=7   039  DNM=10-264   DS OCL140   GROUP
DNM=10-285   05  WHSNOF                     BLL=7   039  DNM=10-285   DS OCL6     GROUP
DNM=10-304   06  WHSNOL                     BLL=7   039  DNM=10-304   DS 2C       COMP
DNM=10-320   06  WHSNCT                     BLL=7   03B  DNM=10-320   DS 1C       DISP
DNM=10-336   06  WHSNC                      BLL=7   03C  DNM=10-336   DS 3C       DISP-NM
```

Figure 48. Sample Reentrant Subsystem (IBM ANS COBOL) (Page 14 of 14)

```
PP 5740-CB1 RELEASE 2.4                                  IBM CS/VS COBOL

   1

00001    000010 IDENTIFICATION DIVISION.
00002    000020 PROGRAM-ID. SOCOBCLB
00003    000030 ENVIRONMENT DIVISION.
00004    000040 DATA DIVISION.
00005    000050 WORKING-STORAGE SECTION.
00006    000060 77  DD-PART                    PIC X(8)     VALUE 'PARTFILE'.
00007    000070 01  COBREENT-CODES COPY ICOPSBS.
00008 C         01  COBREENT-CODES.                                          00001000
00009 C       *   THESE CODES REPRESENT OFFSETS FOR ROUTINE ADDRESSES IN THE  00002000
00010 C       *   TABLE NAMED REENTSBS. ONLY THE MOST COMMONLY USED VALUES    00003000
00011 C       *   ARE INCLUDED HERE; THE USERS MANUAL HAS A COMPLETE LIST.    00004000
00012 C       *   IF OFFSET ODD, THEN TRUE OFFSET=-(OFFSET+1)                 00005000
00013 C             05  INTSORTC         PIC 99  COMP VALUE 99.                00005300
00014 C             05  DMS-SNAP         PIC 99  COMP VALUE 95.                00005400
00015 C             05  MAPFREE          PIC 99  COMP VALUE 91.                00005500
00016 C             05  FECPRLSE         PIC 99  COMP VALUE 87.                00006000
00017 C             05  FESEND           PIC 99  COMP VALUE 83.                00007000
00018 C             05  FESENDC          PIC 99  COMP VALUE 79.                00008000
00019 C             05  DYN-ALLOCATE     PIC 99  COMP VALUE 75.                00009000
00020 C             05  DYN-ACCESS       PIC 99  COMP VALUE 71.                00010000
00021 C             05  MAPURGE          PIC 99  COMP VALUE 67.                00011000
00022 C             05  MAPCLR           PIC 99  COMP VALUE 63.                00012000
00023 C             05  MAPEND           PIC 99  COMP VALUE 59.                00013000
00024 C             05  MAPCUT           PIC 99  COMP VALUE 55.                00014000
00025 C             05  MAPIN            PIC 99  COMP VALUE 51.                00015000
00026 C             05  INTUNSTC         PIC 99  COMP VALUE 47.                00016000
00027 C             05  INTSTORE         PIC 99  COMP VALUE 43.                00017000
00028 C             05  INTFETCH         PIC 99  COMP VALUE 39.                00018000
00029 C             05  FECPFDBK         PIC 99  COMP VALUE 35.                00019000
00030 C             05  FECPOCC          PIC 99  COMP VALUE 31.                00020000
00031 C             05  DQ-WRITEX        PIC 99  COMP VALUE 27.                00021000
00032 C             05  DQ-READX         PIC 99  COMP VALUE 23.                00022000
00033 C             05  DQ-WRITE         PIC 99  COMP VALUE 19.                00023000
00034 C             05  DQ-READ          PIC 99  COMP VALUE 15.                00024000
00035 C             05  DQ-CLOSE         PIC 99  COMP VALUE 11.                00025000
00036 C             05  DQ-OPEN          PIC 99  COMP VALUE 07.                00026000
00037 C             05  DQ-BUILD         PIC 99  COMP VALUE 03.                00027000
00038 C             05  FH-SELECT        PIC 99  COMP VALUE 4.                 00028000
00039 C             05  FH-RELEASE       PIC 99  COMP VALUE 8.                 00029000
00040 C             05  FH-READ          PIC 99  COMP VALUE 12.                00030000
00041 C             05  FH-WRITE         PIC 99  COMP VALUE 16.                00031000
00042 C             05  FH-GET           PIC 99  COMP VALUE 20.                00032000
00043 C             05  FH-PUT           PIC 99  COMP VALUE 24.                00033000
00044 C             05  FH-RELEX         PIC 99  COMP VALUE 28.                00034000
00045 C             05  FH-FEOV          PIC 99  COMP VALUE 32.                00035000
00046 C             05  COBPUT           PIC 99  COMP VALUE 68.                00036000
00047 C             05  MSGCOL           PIC 99  COMP VALUE 72.                00037000
00048 C             05  COBSTORF         PIC 99  COMP VALUE 76.                00038000
00049 C             05  CONVERSE         PIC 99  COMP VALUE 80.                00039000
00050 C             05  DBINT            PIC 99  COMP VALUE 84.                00040000
00051 C             05  LOGPUT           PIC 99  COMP VALUE 88.                00041000
00052 C             05  PAGE-FILE        PIC 99  COMP VALUE 92.                00042000
00053 C             05  FH-GETV          PIC 99  COMP VALUE 96.                00043000
00054 C             05  FH-PUTV          PIC 999 COMP VALUE 100.               00044000
```

Figure 49. Sample COBOL Subroutine (Page 1 of 3)

```
  2

00055 C       *   CODES 104 AND UP INDICATE USER ADDITIONS TO THE TABLE         000450C0

00057   000080 LINKAGE SECTION.
00058   000090 01  ICOM-RETURN               PIC S9(7)               COMP.
00059   000100 01  DYNAMIC-WORKING-SPACE.
00060   000110     02  STATWD                PIC S9(7)               COMP SYNC.
00061   000120     02  FH-STATUS REDEFINES STATWD.
00062   000130       04  FH-STAT1            PIC X.
00063   000140             88   IO-ERROR                  VALUE 1.
00064   000150             88   NOT-FOUND                 VALUE 2.
00065   000160             88   NO-DD                     VALUE 9.
00066   000170       04  FILLER              PIC X(3).
00067   000180     02  EXTDSCT               PIC X(48).
00068   000185     02  DD-NAME               PIC X(8).
00069   000190 01  PART-RECORD               PIC X(100).
00070   000200 01  RBN                       PIC X(3).


00072   000220 PROCEDURE DIVISION USING ICOM-RETURN
00073   000230                              DYNAMIC-WORKING-SPACE
00074   000240                              PART-RECORD
00075   000250                              RBN.
00076   000260     MOVE SPACES TO FH-STATUS.
00077   000265     MOVE DD-PART TO DD-NAME.
00078   000270     CALL 'COBREENT' USING FH-SELECT
00079   000280                               EXTDSCT
00080   000290                               FH-STATUS
00081   000300                               DD-NAME.
00082   000310     IF NO-DD
00083   000320         MOVE 9 TO ICOM-RETURN
00084   000330     ELSE
00085   000340         MOVE SPACES TO FH-STATUS
00086   000350         PERFORM FH-READ-RTN
00087   000360         IF IO-ERROR
00088   000370             MOVE 1 TO ICOM-RETURN
00089   000380         ELSE
00090   000390         IF NOT-FOUND
00091   000400             MOVE 2 TO ICOM-RETURN.
00092   000410     IF ICOM-RETURN NOT EQUAL TO 9
00093   000420         MOVE SPACES TO FH-STATUS
00094   000430         CALL 'COBREENT' USING FH-RELEASE
00095   000440                               EXTDSCT
00096   000450                               FH-STATUS.
00097   000460     GOBACK.
00098   000470 FH-READ-RTN.
00099   000480         CALL 'COBREENT' USING FH-READ
00100   000490                               EXTDSCT
00101   000500                               FH-STATUS
00102   000510                               PART-RECORD
00103   000520                               RBN.
```

Figure 49. Sample COBOL Subroutine (Page 2 of 3)

```
INTRNL NAME  LVL  SOURCE NAME                BASE   DISPL  INTRNL NAME  DEFINITION  USAGE   R  O  Q  M
DNM=1-050    77   DC-PART                    BL=1   00C    DNM=1-050    DS 8C       DISP
DNM=1-067    01   COBREENT-CODES             BL=1   008    DNM=1-067    DS 0CL84    GROUP
DNM=1-094    02   INTSCRTC                   BL=1   008    DNM=1-094    DS 2C       COMP
DNM=1-112    02   DWS-SNAP                   BL=1   00A    DNM=1-112    DS 2C       COMP
DNM=1-130    02   MAPFREE                    BL=1   00C    DNM=1-130    DS 2C       COMP
DNM=1-147    02   FECMRLSE                   BL=1   00E    DNM=1-147    DS 2C       COMP
DNM=1-165    02   FESEND                     BL=1   010    DNM=1-165    DS 2C       COMP
DNM=1-181    02   FESENDC                    BL=1   012    DNM=1-181    DS 2C       COMP
DNM=1-198    02   DYN-ALLOCATE               BL=1   014    DNM=1-198    DS 2C       COMP
DNM=1-220    02   DYN-ACCESS                 BL=1   016    DNM=1-220    DS 2C       COMP
DNM=1-240    02   MAPURGE                    BL=1   018    DNM=1-240    DS 2C       COMP
DNM=1-257    02   MAPCLR                     BL=1   01A    DNM=1-257    DS 2C       COMP
DNM=1-273    02   MAPEND                     BL=1   01C    DNM=1-273    DS 2C       COMP
DNM=1-289    02   MAPCUT                     BL=1   01E    DNM=1-289    DS 2C       COMP
DNM=1-305    02   MAPIN                      BL=1   020    DNM=1-305    DS 2C       COMP
DNM=1-320    02   INTUNSTO                   BL=1   022    DNM=1-320    DS 2C       COMP
DNM=1-338    02   INTSTORE                   BL=1   024    DNM=1-338    DS 2C       COMP
DNM=1-356    02   INTFETCH                   BL=1   026    DNM=1-356    DS 2C       COMP
DNM=1-374    02   FECMFDBK                   BL=1   028    DNM=1-374    DS 2C       COMP
DNM=1-392    02   FECMDDQ                    BL=1   02A    DNM=1-392    DS 2C       COMP
DNM=1-409    02   DC-WRITEX                  BL=1   02C    DNM=1-409    DS 2C       COMP
DNM=1-431    02   DC-READX                   BL=1   02E    DNM=1-431    DS 2C       COMP
DNM=1-449    02   DC-WRITE                   BL=1   030    DNM=1-449    DS 2C       COMP
DNM=1-467    02   DC-READ                    BL=1   032    DNM=1-467    DS 2C       COMP
DNM=1-484    02   DC-CLOSE                   BL=1   034    DNM=1-484    DS 2C       COMP
DNM=2-000    02   DC-OPEN                    BL=1   036    DNM=2-000    DS 2C       COMP
DNM=2-017    02   DC-BUILD                   BL=1   038    DNM=2-017    DS 2C       COMP
DNM=2-035    02   FH-SELECT                  BL=1   03A    DNM=2-035    DS 2C       COMP
DNM=2-054    02   FH-RELEASE                 BL=1   03C    DNM=2-054    DS 2C       COMP
DNM=2-074    02   FH-READ                    BL=1   03E    DNM=2-074    DS 2C       COMP
DNM=2-091    02   FH-WRITE                   BL=1   040    DNM=2-091    DS 2C       COMP
DNM=2-109    02   FH-GET                     BL=1   042    DNM=2-109    DS 2C       COMP
DNM=2-125    02   FH-PUT                     BL=1   044    DNM=2-125    DS 2C       COMP
DNM=2-141    02   FH-RELEX                   BL=1   046    DNM=2-141    DS 2C       COMP
DNM=2-159    02   FH-FEOV                    BL=1   048    DNM=2-159    DS 2C       COMP
DNM=2-176    02   COBPUT                     BL=1   04A    DNM=2-176    DS 2C       COMP
DNM=2-192    02   MSGCCL                     BL=1   04C    DNM=2-192    DS 2C       COMP
DNM=2-211    02   CCBSTORF                   BL=1   04E    DNM=2-211    DS 2C       COMP
DNM=2-229    02   CONVERSE                   BL=1   050    DNM=2-229    DS 2C       COMP
DNM=2-247    02   DBINT                      BL=1   052    DNM=2-247    DS 2C       COMP
DNM=2-262    02   LCGPUT                     BL=1   054    DNM=2-262    DS 2C       COMP
DNM=2-278    02   PAGE-FILE                  BL=1   056    DNM=2-278    DS 2C       COMP
DNM=2-297    02   FH-GETV                    BL=1   058    DNM=2-297    DS 2C       COMP
DNM=2-314    02   FH-PUTV                    BL=1   05A    DNM=2-314    DS 2C       COMP
DNM=2-331    01   ICOM-RETURN                BLL=3  000    DNM=2-331    DS 4C       COMP
DNM=2-352    01   DYNAMIC-WORKING-SPACE      BLL=4  000    DNM=2-352    DS 0CL60    GROUP
DNM=2-389    02   STATWD                     BLL=4  000    DNM=2-389    DS 1F       COMP
DNM=2-405    02   FH-STATUS                  BLL=4  000    DNM=2-405    DS 0CL4     GROUP   R
DNM=2-427    03   FH-STAT1                   BLL=4  000    DNM=2-427    DS 1C       DISP
DNM=2-448    88   IO-ERROR                                 DNM=2-448
DNM=2-469    88   NOT-FOUND                                DNM=2-469
DNM=2-491    88   NC-CD                                    DNM=2-491
```

Figure 49. Sample COBOL Subroutine (Page 3 of 3)

Chapter 11

SUBSYSTEM TESTING

11.1 INTRODUCTION

After a new subsystem has been thoroughly desk-checked and compiles cleanly, it becomes necessary to test the subsystem's execution under the control of Intercomm. Three methods of testing are available:

- Simulated--batch execution of Intercomm with a simulated BTAM Front End. Message input streams are created via the CREATSIM utility program. Additionally, 3270 terminal input and output screen, or output printer, images are formatted if the SIM3270 utility is implemented for the simulation mode execution. Illustration of this mode of testing is provided in this Chapter, and is particularly useful for testing messages processed via the Message Mapping Utilities.

- Test Mode--batch execution of a Back End Intercomm with message input from a card-image data set, as described in Chapter 12.

- On-line Testing--an on-line system is necessary for final testing of all error conditions, multithread processing, etc. and can be either a single region system, or a satellite region used primarily for testing within a Multiregion production system.

11.2 DEBUGGING APPLICATION PROGRAM PROBLEMS

Text and descriptions of error messages issued by Intercomm as a result of invalid program logic paths, along with descriptions of general debugging techniques for accompanying snaps and abends are available in Messages and Codes. Additional debugging facilities such as dispatcher trace reports, thread dumps and indicative dumps are also described in the Operating Reference Manual.

11.3 TESTING A SUBSYSTEM WITH THE FRONT END SIMULATOR

As described in the Operating Reference Manual, a test execution with a simulated Front End is very useful to determine Front End message interface problems that may be harder to debug when using an on-line test system. Although the simulation is of certain BTAM devices, including a local 3270, the access method interfaces required for a remote 3270 or a TCAM or VTAM Front End are essentially transparent to the application programmer as the interface dependent code is handled by Intercomm.

This chapter illustrates testing of the subsystem and subroutine described in Chapter 10 using the BTAM simulator for 3270 CRT messages processed via maps defined for the Message Mapping Utilities.

To test an application system in a simulated Intercomm environment, do the following:

NOTE: Steps preceded by an asterisk (*) may often be performed for the application programmer by an installation's Intercomm System Manager. Appendix C summarizes the Intercomm Table entries.

1. Compile and linkedit the user subsystem(s) and subroutine(s), if any. Appendix A describes Intercomm-supplied COBOL JCL procedures.

*2. Create or add to a USRSCTS member on a user test library to contain a Subsystem Control Table Entry (SYCTTBL macro) which describes the subsystem. Reassemble and link INTSCT which copies the USRSCTS member from the test library (see Figure 50).

*3. Define input message verbs in the copy member USRBTVRB via BTVERB macros and reassemble and link the Front End Verb Table BTVRBTB (see Figure 50).

*4. Code a SUBMODS macro addition to the COPY member USRSUBS to define the COBOL subroutine and reassemble and linkedit REENTSBS which copies USRSUBS (see Figure 50).

5. Assemble and linkedit MMU maps (Map Group STKSTAT--see Figure 51) to the MMU load module library. Load maps to the appropriate Store/Fetch data set. See Message Mapping Utilities.

6. Prepare input test message data set(s) using the CREATSIM utility as illustrated in Figure 52. Note that the first message turns on the DWS protection option described in Chapter 3. The next message generates, via the MMU command MMUC, the screen template to be used for entering an inquiry transaction. All subsequent input messages are for testing the COBOL subsystem and subroutine, including input error conditions handled by the application program.

*7. Add control cards to the linkedit deck for the user programs, unless the routines are dynamically loadable (see Figure 53).

*8. Add INCLUDE statements for the simulator (BTAMSIM) and 3270 display formatter (SIM3270) to an Intercomm linkedit deck which was created for the BTAM Front End (see Figure 53).

*9. Linkedit to create a new Intercomm load module (see Figure 53).

10. Add DD statements to the Intercomm execution JCL for the printed SIM3270 output and the input message data set(s) (see Figure 53).

11. Create test data sets and add DD statements for them to the execution JCL (see Figure 53). Note that if a VSAM data set is used with a user catalog, place the STEPCAT DD statement <u>after</u> the //PMISTOP DD statement (see Figure 53); do not use a JOBCAT DD statement. STEPCAT should be omitted if using ICF catalogs.

*12. Execute in simulation mode:

   a. Single-thread test all subsystems; to test a reentrant subsystem, specify MNCL=1 in the subsystem's SYCTTBL macro.

   b. Multithread test reentrant subsystems (change MNCL) using several test message input data sets or use a single data set as input from more than one terminal.

   The parameter 'STARTUP' must be coded on the Intercomm EXEC statement. Figure 53 illustrates a sample execution deck with test message input (DD statement TEST1) for the sample inquiry program and JCL to print the system log.

   The resulting SIM3270 printouts for the simulated execution of the sample inquiry subsystem are illustrated in Figure 54. Note that the underlined positions on each screen display indicate attribute byte positions; codes are described under the display. On an actual terminal, the attribute byte position appears as a blank to the terminal operator. See <u>Message Mapping Utilities</u> and IBM documentation on programming for the 3270 CRT for further information on attribute codes.

   The Intercomm Log printed after the simulated execution of the sample inquiry subsystem is shown in Figure 55.

13. Test the subsystem concurrently with other application subsystems.

```
//TABLES        JOB
//*
//*                   DEFINE SYCTTBL FOR SUBSYTEM
//*
//STEP1         EXEC  LIBELINK,Q=TEST,NAME=INTSCT,LMOD=INTSCT
//LIB.SYSIN     DD    *
./ ADD NAME=USRSCTS
./ NUMBER       NEW1=100,INCR=100
USRSCTS         DS    0H
RQ              SYCTTBL SUBH=R,SUBC=Q,SBSP=SQCOBOLA,LANG=RCOB,OVLY=0,      X
                      NUMCL=10,MNCL=2,TCTV=60,GET=640
/*
//ASM.SYSIN     DD    DSN=INT.SYMREL(INTSCT),DISP=SHR
//*
//*                   DEFINE BTVERB FOR SUBSYSTEM
//*
//STEP2         EXEC  LIBELINK,Q=TEST,NAME=BTVRBTB,LMOD=BTVRBTB
//LIB.SYSIN     DD    *
./ ADD  NAME=USRBTVRB
./ NUMBER       NEW1=100,INCR=100
USRBTVRB        DS    0H
                BTVERB VERB=MURQ,SSCH=R,SSC=Q,CONV=18000
/*
//ASM.SYSIN     DD    DSN=INT.SYMREL(BTVRBTB),DISP=SHR
//*
//*                   DEFINE SUBMODS FOR SUBROUTINE
//*
//STEP3         EXEC  LIBELINK,Q=TEST,NAME=REENTSBS,LMOD=REENTSBS
//LIB.SYSIN     DD    *
./ ADD  NAME=USRSUBS
./ NUMBER       NEW1=100,INCR=100
USRSUBS         DS    0H
                SUBMODS LNAME=SQCOBOLB,TYPE=COBOL,DELTIME=30,PARM=RC,      X
                      GET=60
/*
//ASM.SYSIN     DD    DSN=INT.SYMREL(REENTSBS),DISP=SHR
//
```

Figure 50.   Table Updates to Implement Simulation Mode Testing

```
STKSTAT  MAPGROUP MODE=I/O,DEVICE=IBM3270                                00000010
MAP1     MAP    SIZE=(20,80),START=(1,1)                                 00000020
VERB     FIELD RELPOS=VERB                                               00000030
         FIELD RELPOS=(1,7),INITIAL='ENTER TRANSACTION CODE',ATTRIB=PSN  00000040
         FIELD RELPOS=(3,23),INITIAL='ENTER DATA:',ATTRIB=PSN            00000050
         FIELD RELPOS=(5,7),INITIAL='PART NO:',ATTRIB=PAHSEL             00000060
PARTNO   SEGMENT                                                         00000065
FILLER   FIELD RELPOS=(5,16),FORMAT=(4,,ZD),ATTRIB=UNN                   00000070
RBNBYTE  FIELD RELPOS=(5,20),FORMAT=(1,,ZD)                              00000075
         SEGMENT                                                         00000077
         FIELD RELPOS=(5,22),FORMAT=1,ATTRIB=PSN                         00000080
         FIELD RELPOS=(6,7),INITIAL='WHS NO:',ATTRIB=PAHSEL              00000090
WHSNO    FIELD RELPOS=(6,15),FORMAT=(3,,ZD),ATTRIB=UNN                   00000100
         FIELD RELPOS=(6,19),FORMAT=1,ATTRIB=PSN                         00000110
         FIELD RELPOS=(8,23),INITIAL='STOCK STATUS:',ATTRIB=PSN          00000120
         FIELD RELPOS=(10,7),INITIAL='DESCRIPTION:',ATTRIB=PSN           00000130
PRTDATA  FIELD RELPOS=(10,20),FORMAT=54,ATTRIB=UAN                       00000140
         FIELD RELPOS=(10,76),FORMAT=1,ATTRIB=PSN                        00000150
         FIELD RELPOS=(11,7),INITIAL='ORDER UNITS:',ATTRIB=PSN           00000160
ORDUNT   FIELD RELPOS=(11,20),FORMAT=5,ATTRIB=UAN                        00000170
         FIELD RELPOS=(11,26),FORMAT=1,ATTRIB=PSN                        00000180
         FIELD RELPOS=(11,40),INITIAL='PRICE:',ATTRIB=PSN                00000190
PRTPRC   FIELD RELPOS=(11,47),FORMAT=(9,4,$PDS4),ATTRIB=UAN              00000200
         FIELD RELPOS=(11,57),FORMAT=1,ATTRIB=PSN                        00000210
         FIELD RELPOS=(13,23),INITIAL='STOCK STATUS AT WAREHOUSE:',     X00000220
               ATTRIB=PSN                                                00000230
         FIELD RELPOS=(15,7),INITIAL='LOCATION:',ATTRIB=PSN              00000240
WHSLOC   FIELD RELPOS=(15,17),FORMAT=23,ATTRIB=UAN                       00000250
         FIELD RELPOS=(15,41),FORMAT=1,ATTRIB=PSN                        00000260
         FIELD RELPOS=(16,7),INITIAL='ON HAND:',ATTRIB=PSN               00000270
STKLEV   FIELD RELPOS=(16,16),FORMAT=(7,4,PD),ATTRIB=UAN                 00000280
         FIELD RELPOS=(16,24),FORMAT=1,ATTRIB=PSN                        00000290
         FIELD RELPOS=(16,40),INITIAL='AS OF:',ATTRIB=PSN                00000300
LEVDATE  FIELD RELPOS=(16,47),FORMAT=8,ATTRIB=UAN                        00000310
         FIELD RELPOS=(16,56),FORMAT=1,ATTRIB=PSN                        00000320
         FIELD RELPOS=(17,7),INITIAL='ON ORDER:',ATTRIB=PSN              00000330
STKORD   FIELD RELPOS=(17,17),FORMAT=(7,4,PD),ATTRIB=UAN                 00000340
         FIELD RELPOS=(17,25),FORMAT=1,ATTRIB=PSN                        00000350
         FIELD RELPOS=(17,40),INITIAL='AS OF:',ATTRIB=PSN                00000360
ORDDATE  FIELD RELPOS=(17,47),FORMAT=8,ATTRIB=UAN                        00000370
         FIELD RELPOS=(17,56),FORMAT=1,ATTRIB=PSN                        00000380
ERRMAP   MAP    SIZE=(15,80),START=(10,1)                                00000390
         FIELD RELPOS=(1,1),ATTRIB=SUPR,INITIAL=X'125B5F'                00000400
***  ABOVE CLEARS STOCK STATUS INFO. WHEN ERROR MESSAGE APPEARS  ***     00000410
         FIELD RELPOS=(14,33),INITIAL='ERROR MESSAGE:',ATTRIB=PAHSEL     00000420
ERRMSG   FIELD RELPOS=(15,10),FORMAT=50,ATTRIB=UAHSEL                    00000430
         FIELD RELPOS=(15,61),FORMAT=1,ATTRIB=PSN                        00000440
         ENDGROUP                                                        00000450
         END                                                             00000460
```

Figure 51.   MMU Maps Used by Sample Subsystem

```
//CREATSIM JOB
//CRS       PROC  T=
//*   SCRATCH OLD TEST INPUT DATA SET (IF ANY)
//S         EXEC  PGM=IEFBR14
//SCR       DD    DSN=INT.T&T,DISP=(OLD,DELETE)
//CRS       EXEC  PGM=CREATSIM
//*   CREATE NEW TEST INPUT DATA STREAM FOR 3270 DEVICE
//STEPLIB   DD    DSN=INT.MODLIB,DISP=SHR
//          DD    DSN=INT.MODREL,DISP=SHR
//SYSPRINT  DD    SYSOUT=A
//SYSUT2    DD    DSN=INT.T&T,DISP=(,CATLG,CATLG),UNIT=3350,
//             VOL=SER=INT001,SPACE=(TRK,(1,1))
//DUMP      EXEC  PGM=IEBPTPCH
//*   PRINT MESSAGES GENERATED ON TEST INPUT DATA SET
//SYSPRINT  DD    SYSOUT=A
//SYSUT1    DD    DSN=*.CRS.SYSUT2,DISP=OLD
//SYSUT2    DD    SYSOUT=A
//          PEND
//*  FOR THIS EXECUTION OF CREATSIM, THE END-OF-CARD CHARACTER IS A
//*   SEMI-COLON, (USE ALSO AFTER THE VERB-FRONT END SEES THE SBA),
//*   THE MESSAGE END CHARACTER IS AN EXCLAMATION POINT (EOB).
//EXECCRS EXEC CRS,T=TEST1
//CRS.SYSIN  DD  *
GRAPHIC,ADD,;FF                  CONTINUATION CODE
GRAPHIC,ADD,<7D                  ENTER KEY
SBA,M2                           USING MODEL 2 SCREEN SIZE
<  STRT,DWSCK!
<  MMUC,SHOW,(STKSTAT,MAP1)!
<  ;
SBA,0102;
MURQ;
SBA,0516;
12345;
SBA,0615;
200!
<  ;
SBA,0102;
MURQ;
SBA,0516;
55555;
SBA,0615;
200!
<  ;
SBA,0102;
MURQ;
SBA,0516;
12348;
SBA,0615;
300!
```

Figure 52. Input Test Messages Generated via CREATSIM (Page 1 of 2)

```
<  ;                                                                    00005000
SBA,0102;                                                               00005100
MURQ;                                                                   00005200
SBA,0516;                                                               00005300
12341;                                                                  00005400
SBA,0615;                                                               00005500
600!                                                                    00005600
<  ;                                                                    00005700
SBA,0102;                                                               00005800
MURQ;                                                                   00005900
SBA,0516;                                                               00006000
A2345;                                                                  00006100
SBA,0615;                                                               00006200
200!                                                                    00006300
<  ;                                                                    00006400
SBA,0102;                                                               00006500
MURQ;                                                                   00006600
SBA,0516;                                                               00006700
12345;                                                                  00006800
SBA,0615;                                                               00006900
900!                                                                    00007000
<  ;                                                                    00007100
SBA,0102;                                                               00007200
MURQ;                                                                   00007300
SBA,0516;                                                               00007400
1234X;                                                                  00007500
SBA,0615;                                                               00007600
20Y!                                                                    00007700
<  ;                                                                    00007800
SBA,0102;                                                               00007900
MURQ;                                                                   00008000
SBA,0516;                                                               00008100
12349;                                                                  00008200
SBA,0615;                                                               00008300
100!                                                                    00008400
<  ;                                                                    00008500
SBA,0102;                                                               00008600
MURQ;                                                                   00008700
SBA,0516;                                                               00008800
12342;                                                                  00008900
SBA,0615;                                                               00009000
100!                                                                    00009100
//DUMP.SYSIN DD *                                                       00009200
  PRINT TYPORG=PS,TOTCONV=XE,CNTRL=2                                    00009300
//                                                                      00009400
```

Figure 52.   Input Test Messages Generated via CREATSIM (Page 2 of 2)

```
//EXECTEST JOB (ICOMTEST,,,20),'COBOL TEST',CLASS=A,
//   RESTART=(GENLINK.ASM)
//PROCLIB DD DSN=INT.PROCLIB,DISP=SHR          (AS NEEDED)
//***********************************************************************
//*  THE RESTART PARM IN THE JOB STATEMENT RESTARTS THE TEST AT THE     *
//*  BEGINNING.  IF YOU WISH TO RESTART AT A DIFFERENT STEP, CODE       *
//*  RESTART=STEPNAME  OR  RESTART=STEPNAME.PROCSTEPNAME                *
//*                                                                     *
//*  NOTE: WHEN USING A VSAM FILE, IT MAY BE NECESSARY TO EXECUTE       *
//*        IDCAMS TO VERIFY THE FILE IF A PREVIOUS EXECUTION ABENDED.   *
//***********************************************************************
//*
//***********************************************************************
//*  STEP GENLINK GENERATES A STANDARD BTAM FRONT END LINKEDIT DECK     *
//*  VIA ASSEMBLY OF THE ICOMLINK MACRO. IF ONLY A VTAM FRONT END IS    *
//*  USED ON-LINE, A SETGLOBE WITH THE BTAM GLOBAL SET TO 1 MUST BE     *
//*  IN THE LIBRARY SPECIFIED BY THE Q= PARM. ADD OR CHANGE PARMS FOR   *
//*  THE ICOMLINK MACRO BASED ON INTERCOMM FACILITIES USED.             *
//*  THE GENERATED DECK (SIMLINK) IS PLACED ON INT.SYMTEST.             *
//*  NOTE: THE SPECIFIED FRONT END NETWORK TABLE (FENETWRK) THAT IS     *
//*        ON MODREL CONTAINS A DEFINITION FOR THE TEST TERMINAL        *
//*        TEST1 AS A LOCAL BTAM 3270 CRT. (COPY TO MODTEST)            *
//*  STEP NUM NUMBERS GENERATED LINK DECK IN INCREMENTS OF 1000         *
//*       FOR ADDING INCLUDE STATEMENTS IN GENINCL STEP.                *
//***********************************************************************
//GENLINK  EXEC  ASMPC,DECK=DECK,Q=TEST
//ASM.SYSIN DD *
         ICOMLINK MMU=YES,FETABLE=FENETWRK,COBOL=YES,RECOBOL=YES
         END
//SYSPUNCH DD DSN=INT.SYMTEST(SIMLINK),DISP=SHR
//*                                     NUMBER GENERATED LINKEDIT DECK
//NUM      EXEC  LIBE,Q=TEST
//LIB.SYSIN DD *
./ CHANGE NAME=SIMLINK
./ NUMBER NEW1=1000,INCR=1000
//*
//***********************************************************************
//*  STEPS SCRSCR AND ALLOCSCR DELETE AND RE-ALLOCATE THE LOAD          *
//*   MODULE LIBRARY USED IN THE TEST (ALSO USED FOR DYNLLIB)           *
//***********************************************************************
//SCRSCR   EXEC PGM=IEFBR14
//FILE1    DD DSN=INT.MODSCR,DISP=(OLD,DELETE)
//ALLOCSCR EXEC PGM=IEFBR14
//A        DD DSN=INT.MODSCR,DISP=(,CATLG),UNIT=SYSDA,
//   DCB=INT.MODREL,VOL=SER=INT001,
//   SPACE=(TRK,(30,,7))            7 RECORDS PER TRK/3380
```

Figure 53. Linkedit and Execution JCL for Simulation Mode (Page 1 of 3)

```
//*********************************************************************
//*  STEP GENINCL CREATES INCLUDE DECK USED BY THE LINK EDIT STEP:    *
//*  THE ADDED INCLUDE STATEMENTS ARE FOR THE SAMPLE SUBSYSTEM        *
//*         (ASSUMED TO HAVE BEEN LINKED TO MODTEST),                 *
//*      AND THE REQUIRED SIMULATION MODE MODULES.                    *
//*  IF THE TEST1 TERMINAL IS NOT IN THE SYSTEM PMISTATB TABLE, USE:  *
//*         INCLUDE MODREL(PMISTATB)                                  *.
//*         INCLUDE MODREL(PMIDEVTB)                                  *
//*         INCLUDE MODREL(PMIBROAD)                                  *
//*     THE ABOVE ASSUMES THE CONTROL TERMINAL IS NAMED CNT01.        *
//*********************************************************************
//GENINCL  EXEC PGM=IEBUPDTE
//SYSPRINT DD SYSOUT=A                          TO PRINT CHANGES
//SYSUT1   DD DSN=INT.SYMTEST,DISP=SHR
//SYSUT2 DD DSN=&&INCL,DISP=(,PASS),UNIT=SYSDA,SPACE=(TRK,(8,1,1)),
//    DCB=(BLKSIZE=80,LRECL=80)
//SYSIN    DD *
./  CHANGE NAME=SIMLINK,LIST=ALL
        INCLUDE SYSLIB(SQCOBOLA)      TEST SUBSYSTEM                  00000010
        INCLUDE SYSLIB(BTAMSIM)       BTAM SIMULATOR                  00000020
        INCLUDE SYSLIB(SIM3270)       SCREEN PRINTING                 00000030
/*
//*********************************************************************
//*   LINK EDIT THE TEST INTERCOMM SYSTEM.                            *
//*   NOTE THAT THE INTERCOMM LKEDT PROC PLACES THE LOAD MODULE ON    *
//*        THE MODSCR LOAD LIBRARY CREATED ABOVE.                     *
//*   IT IS NOT NECESSARY TO RE-DO THE WHOLE LINK TO REPLACE 1 MODULE *
//*   IN THIS CASE, ALL YOU SHOULD DO IS:                             *
//*    1)  REASSEMBLE OR RECOMPILE THE CHANGED NEW MODULE INTO A      *
//*        SEPARATE LOAD LIBRARY                                      *
//*    2)  CHANGE THE SYSIN DD STATEMENT TO //SYSIN DD *              *
//*        FOLLOW IT WITH INCLUDE CARDS                               *
//*        FOR THE MODULES YOU WISH TO REPLACE                        *
//*    3)  FOLLOW THOSE INCLUDES WITH THE FOLLOWING 3 CARDS:          *
//*             INCLUDE SYSLMOD(SIMICOM)                              *
//*             ENTRY   PMISTUP                                       *
//*             NAME    SIMICOM(R)                                    *
//*     4) INSERT A DD STATEMENT FOR THE LOAD LIBRARY ON WHICH THE    *
//*        REPLACEMENT MODULES RESIDE                                 *
//*     5)  CHANGE THE RESTART PARM ON THE JOB STATEMENT              *
//*         TO POINT TO THE LKED.LKED STEP.                           *
//*********************************************************************
//LKED      EXEC LKEDT,Q=TEST,LMOD=SIMICOM,
//        PARM.LKED='LIST,LET,XREF,NCAL,SIZE=(250K,100K)'
//SYSIN     DD DSN=&&INCL(SIMLINK),DISP=(OLD,PASS)
//MODREL    DD DSN=INT.MODREL,DISP=SHR
//*********************************************************************
//*    LINKEDIT THE DYNAMICALLY LOADABLE SUBROUTINE                   *
//*        FROM MODTEST (Q= POINTS TO IT) TO MODSCR                   *
//*********************************************************************
//LINKSQB  EXEC LKEDT,Q=TEST,LMOD=SQCOBOLB
//SYSIN    DD    *
           INCLUDE SYSLIB(SQCOBOLB)
```

Figure 53.   Linkedit and Execution JCL for Simulation Mode (Page 2 of 3)

```
//****************************************************************************
//*    EXECUTE INTERCOMM IN SIMULATION MODE                                  *
//****************************************************************************
//GO      EXEC PGM=SIMICOM,PARM='STARTUP',TIME=(,30)
//STEPLIB  DD DSN=INT.MODSCR,DISP=(OLD,PASS)
//         DD DSN=INT.MODLIB,DISP=SHR
//         DD DSN=INT.MODREL,DISP=SHR
//         DD DSN=SYS1.COBLIB,DISP=SHR        COBOL LOAD LIBRARY
//INTERLOG DD DSN=&&INTLOG,DISP=(NEW,PASS),
//  DCB=(DSORG=PS,RECFM=VB,BLKSIZE=4096,LRECL=4092,NCP=8,OPTCD=C),
//  SPACE=(TRK,(10,5)),VOL=SER=INT100,UNIT=SYSDA
//SMLOG    DD SYSOUT=A,DCB=(DSORG=PS,BLKSIZE=120,RECFM=FA)
//STSLOG   DD SYSOUT=A,DCB=(DSORG=PS,BLKSIZE=120,RECFM=FA)
//SYSPRINT DD SYSOUT=A,DCB=(DSORG=PS,BLKSIZE=141,LRECL=137,RECFM=VA)
//RCT000   DD DSN=INT.RCT000,DISP=SHR,DCB=(DSORG=DA,OPTCD=RF)
//PMIQUE   DD DSN=INT.PMIQUE,DCB=(DSORG=DA,OPTCD=R),DISP=SHR
//BTAMQ    DD DSN=INT.BTAMQ,DCB=(DSORG=DA,OPTCD=R),DISP=SHR
//INTSTOR2 DD DSN=INTSTOR2,DCB=(DSORG=DA,OPTCD=EF,LIMCT=3),DISP=SHR
//INTSTOR3 DD DSN=INTSTOR3,DCB=(DSORG=DA,OPTCD=EF,LIMCT=3),DISP=SHR
//*       TEST  DATA  SETS  FOR  SAMPLE  SUBSYSTEM
//STOKFILE DD DSN=VSAMSD1.STCKFILE.CLUSTER,DISP=OLD,
//    AMP=(AMORG,'RECFM=F')
//PARTFILE DD DSN=INT.BETA.PARTFILE,DISP=OLD,
//    DCB=(DSORG=DA,OPTCD=R)
//*       DATA  SETS  FOR  SIMULATED  TERMINAL -- TEST1
//TEST1    DD DSN=INT.TTEST1,DCB=DSORG=PS,DISP=OLD
//SCRTEST1 DD SYSOUT=A,DCB=(DSORG=PS,RECFM=FA,BLKSIZE=121)
//SIMCARDS DD *
TEST1,002
//PMISTOP  DD DUMMY                 DELIMIT INTERCOMM FILES
//*       FAR PARAMETERS
//*           (TO USE, CHANGE ICOMIN TO DD *, FOLLOW WITH FARS INLINE)
//ICOMIN   DD DUMMY
//*       DYNAMIC LINKEDIT DATA SETS            (IF NEEDED)
//DYNLLIB  DD DSN=INT.MODSCR,DISP=(OLD,PASS)
//DYNLPRNT DD SYSOUT=A
//DYNLWORK DD UNIT=SYSDA,SPACE=(CYL,(1,1)),DISP=(,PASS)  (REL 9 ONLY)
//*
//STEPCAT  DD DSN=VSAMSD1,DISP=SHR              (IF NEEDED)
//SNAPDD   DD SYSOUT=A,SPACE=(CYL,5),FREE=CLOSE
//SYSUDUMP DD SYSOUT=A
//*
//ABNLIGNR DD DUMMY  FORCE ABEND-AID TO IGNORE DUMP (PRODUCE IBM DUMP)
//****************************************************************************
//*        PRINT INTERCOMM LOG GENERATED BY THE TEST                        *
//****************************************************************************
//INTERLOG EXEC PGM=LOGPRINT,COND=EVEN
//STEPLIB  DD DSN=INT.MODREL,DISP=SHR
//SYSPRINT DD SYSOUT=A,DCB=(DSORG=PS,BLKSIZE=121)
//INTERLOG DD DSN=&&INTLOG,DISP=OLD,DCB=BLKSIZE=5000
//SYSIN    DD DUMMY
//
```

Figure 53. Linkedit and Execution JCL for Simulation Mode (Page 3 of 3)

```
TEST1  INPUT                    18.07.05  083026

0000 000D  7D4040E2 E3D9E36B C4E6E2C3 D2000000                       ..  STRT,DWSCK           .

                                                                       AID=7D CURSOR=4040 (01,01)
     ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8
01  .STRT,DWSCK                                                                       .
02  .                                                                                 .
03  .                                                                                 .
04  .                                                                                 .
05  .                                                                                 .
06  .                                                                                 .
07  .                                                                                 .
08  .                                                                                 .
09  .                                                                                 .
10  .                                                                                 .
11  .                                                                                 .
12  .                                                                                 .
13  .                                                                                 .
14  .                                                                                 .
15  .                                                                                 .
16  .                                                                                 .
17  .                                                                                 .
18  .                                                                                 .
19  .                                                                                 .
20  .                                                                                 .
21  .                                                                                 .
22  .                                                                                 .
23  .                                                                                 .
24  .                                                                                 .
     ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8
```

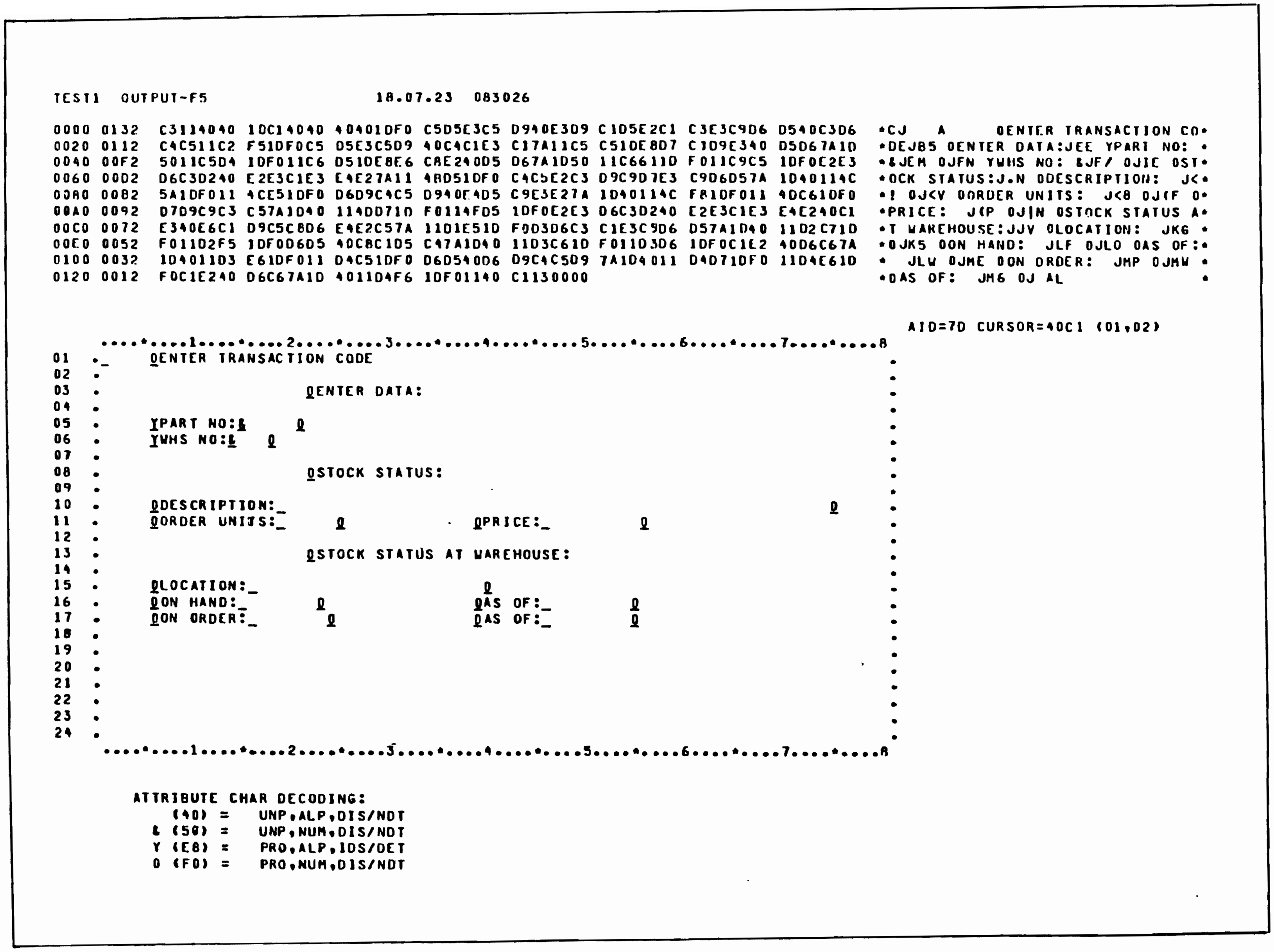
Figure 54. SIM3270 Printout from Simulation Mode Execution (Page 1 of 22)

```
TEST1  OUTPUT-F5                  18.07.10  083026

0000 0023  C7114040 E2E3D9E3 40C3D6D4 D4C1D5C4 40C3D6D4 D7D3C5E3 C5C440D5 D6D9D4C1  *GJ  STRT COMMAND COMPLETED NORMA*
0020 0003  D3D3E800                                                                  *LLY                              *

                                                                                       AID=7D CURSOR=4040 (01,01)
     ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8
01  .STRT COMMAND COMPLETED NORMALLY                                                 
02  .                                                                                .
03  .                                                                                .
04  .                                                                                .
05  .                                                                                .
06  .                                                                                .
07  .                                                                                .
08  .                                                                                .
09  .                                                                                .
10  .                                                                                .
11  .                                                                                .
12  .                                                                                .
13  .                                                                                .
14  .                                                                                .
15  .                                                                                .
16  .                                                                                .
17  .                                                                                .
18  .                                                                                .
19  .                                                                                .
20  .                                                                                .
21  .                                                                                .
22  .                                                                                .
23  .                                                                                .
24  .                                                                                .
     ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8
```

Figure 54. SIM3270 Printout from Simulation Mode Execution (Page 2 of 22)

```
TEST1   INPUT                        18.07.14  083026

0000 001B  7D4040D4 D4E4C36B E2C8D6E6 6B4DE2E3 D2E2E3C1 E36BD4C1 D7F15D00          *' MMUC,SHOW,(STKSTAT,MAP1)     *

                                                                                     AID=7D CURSOR=4040 (01,01)
      ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*...8
01   .MMUC,SHOW,(STKSTAT,MAP1)                                                       .
02   .                                                                                .
03   .                                                                                .
04   .                                                                                .
05   .                                                                                .
06   .                                                                                .
07   .                                                                                .
08   .                                                                                .
09   .                                                                                .
10   .                                                                                .
11   .                                                                                .
12   .                                                                                .
13   .                                                                                .
14   .                                                                                .
15   .                                                                                .
16   .                                                                                .
17   .                                                                                .
18   .                                                                                .
19   .                                                                                .
20   .                                                                                .
21   .                                                                                .
22   .                                                                                .
23   .                                                                                .
24   .                                                                                .
      ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8
```

Figure 54. SIM3270 Printout from Simulation Mode Execution (Page 3 of 22)



```
TEST1  OUTPUT-F5                    18.07.23  083026

0000 0132  C3114040 10C14040 40401DF0 C5D5E3C5 D940E3D9 C1D5E2C1 C3E3C9D6 D540C3D6   *CJ    A      0ENTER TRANSACTION CO*
0020 0112  C4C511C2 F51DF0C5 D5E3C5D9 40C4C1E3 C17A11C5 C51DE8D7 C1D9E340 D5D67A1D   *DEJB5 0ENTER DATA:JEE YPART NO: *
0040 00F2  5011C5D4 1DF011C6 D51DE8E6 C8E240D5 D67A1D50 11C6611D F011C9C5 1DF0E2E3   *&JEM 0JFN YWHS NO: &JF/ 0JIE 0ST*
0060 00D2  D6C3D240 E2E3C1E3 E4E27A11 4BD51DF0 C4C5E2C3 D9C9D7E3 C9D6D57A 1D40114C   *OCK STATUS:J.N 0DESCRIPTION:  J<*
0080 00B2  5A1DF011 4CE51DF0 D6D9C4C5 D940E4D5 C9E3E27A 1D40114C F81DF011 4DC61DF0   *! 0J<V 0ORDER UNITS:  J<8 0J(F 0*
00A0 0092  D7D9C9C3 C57A1D40 114DD71D F0114FD5 1DF0E2E3 D6C3D240 E2E3C1E3 E4E240C1   *PRICE:  J(P 0J|N 0STOCK STATUS A*
00C0 0072  E340E6C1 D9C5C8D6 E4E2C57A 11D1E51D F0D3D6C3 C1E3C9D6 D57A1D40 11D2C71D   *T WAREHOUSE:JJV 0LOCATION:  JKG *
00E0 0052  F011D2F5 1DF0D6D5 40C8C1D5 C47A1D40 11D3C61D F011D3D6 1DF0C1E2 40D6C67A   *0JK5 0ON HAND:  JLF 0JLO 0AS OF:*
0100 0032  1D4011D3 E61DF011 D4C51DF0 D6D540D6 D9C4C5D9 7A1D4011 D4D71DF0 11D4E61D   *  JLW 0JME 0ON ORDER:  JMP 0JMW *
0120 0012  F0C1E240 D6C67A1D 4011D4F6 1DF01140 C1130000                              *0AS OF:  JM6 0J AL              *

                                                                                       AID=7D CURSOR=40C1 (01,02)
     ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8
01   ._   0ENTER TRANSACTION CODE                                                    .
02   .                                                                               .
03   .                   0ENTER DATA:                                                .
04   .                                                                               .
05   .    YPART NO:&      0                                                          .
06   .    YWHS NO:&   0                                                              .
07   .                                                                               .
08   .                   0STOCK STATUS:                                              .
09   .                                                                               .
10   .    0DESCRIPTION:_                                                      0      .
11   .    0ORDER UNITS:_      0              0PRICE:_          0                     .
12   .                                                                               .
13   .                   0STOCK STATUS AT WAREHOUSE:                                 .
14   .                                                                               .
15   .    0LOCATION:_                         0                                      .
16   .    0ON HAND:_        0                0AS OF:_          0                     .
17   .    0ON ORDER:_        0               0AS OF:_          0                     .
18   .                                                                               .
19   .                                                                               .
20   .                                                                               .
21   .                                                                               .
22   .                                                                               .
23   .                                                                               .
24   .                                                                               .
     ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8

        ATTRIBUTE CHAR DECODING:
             (40) =    UNP,ALP,DIS/NDT
           & (50) =    UNP,NUM,DIS/NDT
           Y (E8) =    PRO,ALP,IDS/DET
           0 (F0) =    PRO,NUM,DIS/NDT
```

Figure 54. SIM3270 Printout from Simulation Mode Execution (Page 4 of 22)

```
TEST1  INPUT                     18.07.27  083026

0000 0018  7D404011 40C1D4E4 D9D811C5 4FF1F2F3 F4F511C6 5EF2F0F0                  *•  J AMURQJE|12345JF:200        •

                                                                                     AID=7D CURSOR=4040 (01,01)
      ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8
01   •AMURQ0ENTER TRANSACTION CODE                                                     •
02   •                                                                                 •
03   •                    0ENTER DATA:                                                 •
04   •                                                                                 •
05   •     YPART NO:J123450                                                            •
06   •     YWHS NO:J2000                                                               •
07   •                                                                                 •
08   •                    0STOCK STATUS:                                               •
09   •                                                                                 •
10   •     0DESCRIPTION:_                                                      0       •
11   •     0ORDER UNITS:_     0               0PRICE:_         0                       •
12   •                                                                                 •
13   •                    0STOCK STATUS AT WAREHOUSE:                                  •
14   •                                                                                 •
15   •     0LOCATION:_                        0                                        •
16   •     0ON HAND:_       0                 0AS OF:_         0                       •
17   •     0ON ORDER:_       0                0AS OF:_         0                       •
18   •                                                                                 •
19   •                                                                                 •
20   •                                                                                 •
21   •                                                                                 •
22   •                                                                                 •
23   •                                                                                 •
24   •                                                                                 •
      ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8


        ATTRIBUTE CHAR DECODING:
            (40) =    UNP,ALP,DIS/NDT
          A (C1) =    UNP,ALP,DIS/NDT,MDT
          J (D1) =    UNP,NUM,DIS/NDT,MDT
          Y (E8) =    PRO,ALP,IDS/DET
          0 (F0) =    PRO,NUM,DIS/NDT
```

Figure 54. SIM3270 Printout from Simulation Mode Execution (Page 5 of 22)

```
TEST1  OUTPUT-F5                 18.07.36  083026

0000 0171  C3114040 1DC14040 40401DF0 C5D5E3C5 D940E3D9 C1D5E2C1 C3E3C9D6 D540C3D6   *CJ   A      0ENTER TRANSACTION CO*
0020 0151  C4C511C2 F51DF0C5 D5E3C5D9 40C4C1E3 C17A11C5 C51DEA07 C1D9C340 D5D67A1D   *DEJB5 0ENTER DATA:JEE YPART NO: *
0040 0131  50F1F2F3 F4F51DF0 11C6D51D E8E6C8E2 40D5D67A 1D50F2F0 F01DF011 C9C51DF0   *&12345 0JFN YWHS NO: &200 0JIE 0*
0060 0111  E2E3D6C3 D240E2E3 C1E3E4E2 7A114BD5 1DF0C4C5 E2C3D9C9 D7E3C9D6 D57A1D40   *STOCK STATUS:J.N 0DESCRIPTION:  *
0080 00F1  F161F240 C9D540E2 E3C5C5D3 40E6C1E2 C8C5D93C 4CD94011 4C5A1DF0 114CE51D   *1/2 IN STEEL WASHER <R J<! 0J<V *
00A0 00D1  F0D609C4 C5D940E4 D5C9E3E2.7A1D40C7 D9E24040 1DF0114D C61DF0D7 D9C9C3C5   *0ORDER UNITS:  GRS   0J(F 0PRICE*
00C0 00B1  7A1D405B F5F0F54B F0F5F0F7 1DF0114F D51DF0E2 E3D6C3D2 40E2E3C1 E3E4E240   *:  $505.0507 0J|N 0STOCK STATUS *
00E0 0091  C1E340E6 C1D9C5C8 D6E4E2C5 7A11D1E5 1DF0D3D6 C3C1E3C9 D6D57A1D 40D4C9C1   *AT WAREHOUSE:JJV 0LOCATION:  MIA*
0100 0071  D4C96B40 C6D3C14B 3CD2C740 1DF011D2 F51DF0D6 D540C8C1 D5C47A1D 40F6F1F6   *MI, FLA. KG  0JK5 0ON HAND:  616*
0120 0051  F1F5F0F6 1DF011D3 D61DF0C1 E240D6C6 7A1D40F0 F361F0F5 61F8F21D F011D4C5   *1506 0JLO 0AS OF:  03/05/82 0JME*
0140 0031 .1DF0D6D5 40D6D9C4 C5D97A1D 40F4F0F4 F0F6F1F7 1DF011D4 E61DF0C1 E240D6C6   * 0ON ORDER:  4040617 0JMW 0AS OF*
0160 0011  7A1D40F1 F061F1F1 61F8F21D F01140C1 13000000                              *:  10/11/82 0J AL              *

                                                                                        AID=7D CURSOR=40C1 (01,02)
       ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8
01    ._    0ENTER TRANSACTION CODE                                                   .
02    .                                                                               .
03    .                0ENTER DATA:                                                   .
04    .                                                                               .
05    .     YPART NO:&123450                                                          .
06    .     YWHS NO:&2800                                                             .
07    .                                                                               .
08    .                0STOCK STATUS:                                                 .
09    .                                                                               .
10    .     0DESCRIPTION:_1/2 IN STEEL WASHER                                  0      .
11    .     0ORDER UNITS:_GRS  0          0PRICE:_$505.05070                          .
12    .                                                                               .
13    .                0STOCK STATUS AT WAREHOUSE:                                    .
14    .                                                                               .
15    .     0LOCATION:_MIAMI, FLA.           0                                        .
16    .     0ON HAND:_61615060               0AS OF:_03/05/820                        .
17    .     0ON ORDER:_40406170              0AS OF:_10/11/820                        .
18    .                                                                               .
19    .                                                                               .
20    .                                                                               .
21    .                                                                               .
22    .                                                                               .
23    .                                                                               .
24    .                                                                               .
       ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8

        ATTRIBUTE CHAR DECODING:
             (40) =   UNP,ALP,DIS/NDT
           & (50) =   UNP,NUM,DIS/NDT
           Y (E8) =   PRO,ALP,IDS/DET
           0 (F0) =   PRO,NUM,DIS/NDT
```

Figure 54. SIM3270 Printout from Simulation Mode Execution (Page 6 of 22)

```
TEST1  INPUT                       18.07.41  083026

0000 0018  7D404011 40C1D4E4 D9D811C5 4FF5F5F5 F5F511C6 5EF2F0F0                    .'  J AMURQJE|55555JF;200        .

                                                                                       AID=7D CURSOR=4040 (01,01)
     ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8
01  .AMURQ0ENTER TRANSACTION CODE                                                     .
02  .                                                                                  .
03  .                    0ENTER DATA:                                                  .
04  .                                                                                  .
05  .     YPART NO:J555550                                                             .
06  .     YWHS NO:J20800                                                               .
07  .                                                                                  .
08  .                    0STOCK STATUS:                                                .
09  .                                                                                  .
10  .     0DESCRIPTION:_1/2 IN STEEL WASHER                                  0          .
11  .     0ORDER UNITS:_GRS  0           0PRICE:_$505.05070                            .
12  .                                                                                  .
13  .                    0STOCK STATUS AT WAREHOUSE:                                   .
14  .                                                                                  .
15  .     0LOCATION:_MIAMI, FLA.           0                                           .
16  .     0ON HAND:_61615060               0AS OF:_03/05/820                           .
17  .     0ON ORDER:_40406170              0AS OF:_10/11/820                           .
18  .                                                                                  .
19  .                                                                                  .
20  .                                                                                  .
21  .                                                                                  .
22  .                                                                                  .
23  .                                                                                  .
24  .                                                                                  .
     ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8

        ATTRIBUTE CHAR DECODING:
            (40) =    UNP,ALP,DIS/NDT
          A (C1) =    UNP,ALP,DIS/NDT,MDT
          J (D1) =    UNP,NUM,DIS/NDT,MDT
          Y (E8) =    PRO,ALP,IDS/DET
          0 (F0) =    PRO,NUM,DIS/NDT
```

Figure 54. SIM3270 Printout from Simulation Mode Execution (Page 7 of 22)

```
TEST1  OUTPUT-F1                  18.07.46  083026

0000 0044  C3114850 125B5F11 5B7F1DE8 C5D9D9D6 D940D4C5 E2E2C1C7 C57A115C F81DC8D7  *CJ.&K$-J$" YERROR MESSAGE:J* 8 HP*
0020 0024  C1D9E340 D5E4D4C2 C5D9403C 5D4AF540 D5D6E340 C6D6E4D5 C44B3C5D 6B401DF0  *ART NUMBER  )¢5 NOT FOUND. ),  0*
0040 0004  115CF913                                                                  *J*9L                              *

                                                                                     AID=7D CURSOR=5CF9 (24,10)
      ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8
01   ._MURQ0ENTER TRANSACTION CODE                                                     .
02   .                                                                                 .
03   .                    0ENTER DATA:                                                 .
04   .                                                                                 .
05   .     YPART NO:&555550                                                            .
06   .     YWHS NO:&20000                                                              .
07   .                                                                                 .
08   .                    0STOCK STATUS:                                               .
09   .                                                                                 .
10   .     0DESCRIPTION:_                                                    0         .
11   .     0ORDER UNITS:_    0                0PRICE:_        0                        .
12   .                                                                                 .
13   .                    0STOCK STATUS AT WAREHOUSE:                                  .
14   .                                                                                 .
15   .     0LOCATION:_                       0                                         .
16   .     0ON HAND:_       0                0AS OF:_        0                         .
17   .     0ON ORDER:_       0               0AS OF:_        0                         .
18   .                                                                                 .
19   .                                                                                 .
20   .                                                                                 .
21   .                                                                                 .
22   .                                                                                 .
23   .                               YERROR MESSAGE:                                   .
24   .        HPART NUMBER 55555 NOT FOUND.                        0                   .
      ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8

     ATTRIBUTE CHAR DECODING:
         (40) =   UNP,ALP,DIS/NDT
       H (C8) =   UNP,ALP,IDS/DET
       & (50) =   UNP,NUM,DIS/NDT
       Y (E8) =   PRO,ALP,IDS/DET
       0 (F0) =   PRO,NUM,DIS/NDT
```

Figure 54. SIM3270 Printout from Simulation Mode Execution (Page 8 of 22)

```
TEST1  INPUT                        18.07.50  083026

0000 0018  7D404011 40C1D4E4 D9D811C5 4FF1F2F3 F4F811C6 5EF3F0F0                 •*  J AMURQJE|12348JF;300        *

                                                                                   AID=7D CURSOR=4040 (01,01)
       ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8
01    .AMURQQENTER TRANSACTION CODE                                                     .
02    .                                                                                 .
03    .                    QENTER DATA:                                                 .
04    .                                                                                 .
05    .     YPART NO:J12348Q                                                            .
06    .     YWHS NO:J300Q                                                               .
07    .                                                                                 .
08    .                    QSTOCK STATUS:                                               .
09    .                                                                                 .
10    .     QDESCRIPTION:_                                                      Q       .
11    .     QORDER UNITS:_    Q               QPRICE:_        Q                         .
12    .                                                                                 .
13    .                    QSTOCK STATUS AT WAREHOUSE:                                  .
14    .                                                                                 .
15    .     QLOCATION:_                       Q                                         .
16    .     QON HAND:_      Q                 QAS OF:_        Q                         .
17    .     QON ORDER:_      Q                QAS OF:_        Q                         .
18    .                                                                                 .
19    .                                                                                 .
20    .                                                                                 .
21    .                                                                                 .
22    .                                                                                 .
23    .                              YERROR MESSAGE:                                    .
24    .        HPART NUMBER 55555 NOT FOUND.                   Q                        .
       ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8

        ATTRIBUTE CHAR DECODING:
            (40) =   UNP,ALP,DIS/NDT
          A (C1) =   UNP,ALP,DIS/NDT,MDT
          M (C8) =   UNP,ALP,IDS/DET
          J (D1) =   UNP,NUM,DIS/NDT,MDT
          Y (E8) =   PRO,ALP,IDS/DET
          0 (F0) =   PRO,NUM,DIS/NDT
```

Figure 54. SIM3270 Printout from Simulation Mode Execution (Page 9 of 22)

```
TEST1  OUTPUT-F5                 18.07.59  083026

0000 016F  C3114040 1CC14040 40401DF0 C5D5E3C5 D940E3D9 C1D5E2C1 C3E3C9D6 D540C3D6  *CJ    A      0ENTER TRANSACTION CO*
0020 014F  C4C511C2 F51DF0C5 D5E3C5D9 40C4C1E3 C17A11C5 C51DE8D7 C1D9E340 D5D67A1D  *DEJB5 0ENTER DATA:JEE YPART NO: *
0040 012F  50F1F2F3 F4F81DF0 11C6D51D E8E6C8E2 40D5D67A 1D50F3F0 F01DF011 C9C51DF0  *&12348 0JFN YWHS NO: &300 0JIE 0*
0060 010F  E2E3D6C3 D240E2E3 C1E3E4E2 7A114BD5 1DF0C4C5 E2C3D9C9 D7E3C9D6 D57A1D40  *STOCK STATUS:J.N 0DESCRIPTION: *
0080 00EF  F340C6E3 40C1D3D3 E4D440E2 C3C1D3C5 3C4CD940 114C5A1D F0114CE5 1DF0D6D9  *3 FT ALLUM SCALE <R J<! 0J<V 0OR*
00A0 00CF  C4C5D940 E4D5C9E3 E27A1D40 C5C1C3C8 401DF011 4DC61DF0 D7D9C9C3 C57A1D40  *DER UNITS:  EACH  0J(F 0PRICE: *
00C0 00AF  5BF5F0F5 4BF0F5F0 F61DF011 4FD51DF0 E2E3D6C3 D240E2E3 C1E3E4E2 40C1E340  *$505.0506 0J|N 0STOCK STATUS AT *
00E0 008F  E6C1D9C5 C8D6E4E2 C57A11D1 E51DF0D3 D6C3C1E3 C9D6D57A 1D40C4C5 D5E5C5D9  *WAREHOUSE:JJV 0LOCATION:  DENVER*
0100 006F  6B40C3D6 D34B3CD2 C7401DF0 11D2F51D F0D6D540 C8C1D5C4 7A1D40F5 F0F5F0F5  *, COL. KG  0JK5 0ON HAND:  50505*
0120 004F  F0F71DF0 11D3D61D F0C1E240 D6C67A1D 40F0F361 F0F561F8 F21DF011 D4C51DF0  *07 0JLO 0AS OF:  03/05/82 0JME 0*
0140 002F  D6D540D6 D9C4C5D9 7A1D40F5 F0F5F0F5 F0F61DF0 11D4E61D F0C1E240 D6C67A1D  *ON ORDER:  5050506 0JMW 0AS OF: *
0160 000F  40F1F061 F1F161F8 F21DF011 40C11300                                      * 10/11/82 0J AL                  *

                                                                                      AID=7D CURSOR=40C1 (01,02)
     ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8
01  ._    0ENTER TRANSACTION CODE                                                    .
02  .                                                                                .
03  .                    0ENTER DATA:                                                .
04  .                                                                                .
05  .     YPART NO:&123480                                                           .
06  .     YWHS NO:&3000                                                              .
07  .                                                                                .
08  .                    0STOCK STATUS:                                              .
09  .                                                                                .
10  .     0DESCRIPTION:_3 FT ALLUM SCALE                                       0     .
11  .     0ORDER UNITS:_EACH 0             0PRICE:_$505.05060                        .
12  .                                                                                .
13  .                    0STOCK STATUS AT WAREHOUSE:                                 .
14  .                                                                                .
15  .     0LOCATION:_DENVER, COL.          0                                         .
16  .     0ON HAND:_50505070               0AS OF:_03/05/820                         .
17  .     0ON ORDER:_50505060              0AS OF:_10/11/820                         .
18  .                                                                                .
19  .                                                                                .
20  .                                                                                .
21  .                                                                                .
22  .                                                                                .
23  .                                                                                .
24  .                                                                                .
     ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8

       ATTRIBUTE CHAR DECODING:
           (40) =    UNP,ALP,DIS/NDT
         & (50) =    UNP,NUM,DIS/NDT
         Y (E8) =    PRO,ALP,IDS/DET
         0 (F0) =    PRO,NUM,DIS/NDT
```

Figure 54. SIM3270 Printout from Simulation Mode Execution (Page 10 of 22)

```
TEST1  INPUT                          18.08.04  083026

0000 0018  70404011 40C1D4E4 D9D811C5 4FF1F2F3 F4F111C6 5EF6F0F0                      .•  J AMURQJE|12341JF;600        •

                                                                                          AID=7D CURSOR=4040 (01,01)
      ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8
01   .AMURQ0ENTER TRANSACTION CODE                                                     .
02   .                                                                                 .
03   .                   0ENTER DATA:                                                  .
04   .                                                                                 .
05   .     YPART NO:J123410                                                            .
06   .     YWHS NO:J6000                                                               .
07   .                                                                                 .
08   .                   0STOCK STATUS:                                                .
09   .                                                                                 .
10   .    .0DESCRIPTION:_3 FT ALLUM SCALE                                        0     .
11   .     0ORDER UNITS:_EACH 0              0PRICE:_$505.05060                        .
12   .                                                                                 .
13   .                   0STOCK STATUS AT WAREHOUSE:                                   .
14   .                                                                                 .
15   .     0LOCATION:_DENVER, COL.           0                                         .
16   .     0ON HAND:_50505070                0AS OF:_03/05/820                         .
17   .     0ON ORDER:_50505060               0AS OF:_10/11/820                         .
18   .                                                                                 .
19   .                                                                                 .
20   .                                                                                 .
21   .                                                                                 .
22   .                                                                                 .
23   .                                                                                 .
24   .                                                                                 .
      ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8


        ATTRIBUTE CHAR DECODING:
            (40) =    UNP,ALP,DIS/NDT
          A (C1) =    UNP,ALP,DIS/NDT,MDT
          J (D1) =    UNP,NUM,DIS/NDT,MDT
          Y (E8) =    PRO,ALP,IDS/DET
          0 (F0) =    PRO,NUM,DIS/NDT
```

Figure 54. SIM3270 Printout from Simulation Mode Execution (Page 11 of 22)

```
TEST1  OUTPUT-F1                    18.08.09  083026

0000 004E  C3114B50 125B5F11 5B7F1DE8 C5D9D9D6 D940D4C5 E2E2C1C7 C57A115C F81DC8D7  •CJ.&K$¬J$" YERROR MESSAGE:J•8 HP•
0020 002E  C1D9E340 F1F2F3F4 F140D5D6 E340C6D6 E4D5C440 C9D540E6 C1D9C5C8 D6E4E2C5  •ART 12341 NOT FOUND IN WAREHOUSE•
0040 000E  40F6F0F0 3C5D6B40 1DF0115C F9130000                                      • 600 ),  0J•9L                  •

                                                                                        AID=7D CURSOR=5CF9 (24,10)
      ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8
01   •_MURO0ENTER TRANSACTION CODE                                                    •
02   •                                                                                •
03   •                    0ENTER DATA:                                                •
04   •                                                                                •
05   •    YPART NO:&123410                                                            •
06   •    YWHS NO:&6000                                                               •
07   •                                                                                •
08   •                    0STOCK STATUS:                                              •
09   •                                                                                •
10   •    0DESCRIPTION:_                                                          0   •
11   •    0ORDER UNITS:_     0                0PRICE:_          0                     •
12   •                                                                                •
13   •                    0STOCK STATUS AT WAREHOUSE:                                 •
14   •                                                                                •
15   •    0LOCATION:_                          0                                      •
16   •    0ON HAND:_       0                0AS OF:_         0                        •
17   •    0ON ORDER:_       0               0AS OF:_         0                        •
18   •                                                                                •
19   •                                                                                •
20   •                                                                                •
21   •                                                                                •
22   •                                                                                •
23   •                              YERROR MESSAGE:                                   •
24   •       HPART 12341 NOT FOUND IN WAREHOUSE 600          0                        •
      ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8

        ATTRIBUTE CHAR DECODING:
            (40) =    UNP,ALP,DIS/NDT
          H (C8) =    UNP,ALP,IDS/DET
          & (50) =    UNP,NUM,DIS/NDT
          Y (E8) =    PRO,ALP,IDS/DET
          0 (F0) =    PRO,NUM,DIS/NDT
```

Figure 54. SIM3270 Printout from Simulation Mode Execution (Page 12 of 22)

```
TEST1  INPUT                        18.08.13  083026

0000 0018  7D404011 40C1D4E4 D9D811C5 4FC1F2F3 F4F511C6 5EF2F0F0                    ** J AMURQJE|A2345JF|200        *

                                                                                     AID=7D CURSOR=4040 (01,01)
      ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8
01   .AMURQENTER TRANSACTION CODE
02   .                                                                              .
03   .                   QENTER DATA:                                               .
04   .                                                                              .
05   .     YPART NO:JA2345Q                                                         .
06   .     YWHS NO:J200Q                                                            .
07   .                                                                              .
08   .                   QSTOCK STATUS:                                             .
09   .                                                                              .
10   .     QDESCRIPTION:_                                                      Q    .
11   .     QORDER UNITS:_     Q              QPRICE:_         Q                     .
12   .                                                                              .
13   .                   QSTOCK STATUS AT WAREHOUSE:                                .
14   .                                                                              .
15   .     QLOCATION:_                        Q                                     .
16   .     QON HAND:_       Q                QAS OF:_        Q                      .
17   .     QON ORDER:_       Q               QAS OF:_        Q                      .
18   .                                                                              .
19   .                                                                              .
20   .                                                                              .
21   .                                                                              .
22   .                                                                              .
23   .                               YERROR MESSAGE:                                .
24   .        HPART 12341 NOT FOUND IN WAREHOUSE 600             Q                  .
      ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8

         ATTRIBUTE CHAR DECODING:
             (40) =    UNP,ALP,DIS/NDT
           A (C1) =    UNP,ALP,DIS/NDT,MDT
           H (C8) =    UNP,ALP,IDS/DET
           J (D1) =    UNP,NUM,DIS/NDT,MDT
           Y (E8) =    PRO,ALP,IDS/DET
           0 (F0) =    PRO,NUM,DIS/NDT
```

Figure 54. SIM3270 Printout from Simulation Mode Execution (Page 13 of 22)

```
TEST1   OUTPUT-F1                    18.08.19  083026

0000 004D  C3114B50 125B5F11 5B7F1DEA C5D9D9D6 D940D4C5 E2E2C1C7 C57A115C F81DC8C9  *CJ.&K$-J$" YERROR MESSAGE:J*8 HI*
0020 002D  D5E5C1D3 C9C440C4 C1E3C17A 40D7C1D9 E3D5D640 D4E4E2E3 40C2C540 D5E4D4C5  *NVALID DATA: PARTNO MUST BE NUME*
0040 000D  D9C9C33C 5D6B401D F0115CF9 13000000                                      *RIC ), 0J*9L                    *

                                                                                       AID=7D CURSOR=5CF9 (24,10)
      ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8
01   ._MURQ0ENTER TRANSACTION CODE                                                    .
02   .                                                                                .
03   .                    0ENTER DATA:                                                .
04   .                                                                                .
05   .    YPART NO:&A23450                                                            .
06   .    YWHS NO:&2000                                                               .
07   .                                                                                .
08   .                    0STOCK STATUS:                                              .
09   .                                                                                .
10   .    0DESCRIPTION:_                                                      0       .
11   .    0ORDER UNITS:_      0             0PRICE:_          0                       .
12   .                                                                                .
13   .                    0STOCK STATUS AT WAREHOUSE:                                 .
14   .                                                                                .
15   .    0LOCATION:_                        0                                        .
16   .    0ON HAND:_        0               0AS OF:_         0                        .
17   .    0ON ORDER:_        0              0AS OF:_         0                        .
18   .                                                                                .
19   .                                                                                .
20   .                                                                                .
21   .                                                                                .
22   .                                                                                .
23   .                              YERROR MESSAGE:                                   .
24   .       HINVALID DATA: PARTNO MUST BE NUMERIC                   0                .
      ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8


        ATTRIBUTE CHAR DECODING:
            (40) =    UNP,ALP,DIS/NDT
          H (C8) =    UNP,ALP,IDS/DET
          & (50) =    UNP,NUM,DIS/NDT
          Y (E8) =    PRO,ALP,IDS/DET
          0 (F0) =    PRO,NUM,DIS/NDT
```

Figure 54. SIM3270 Printout from Simulation Mode Execution (Page 14 of 22)

```
TEST1  INPUT                        18.08.23  083026

0000 001A  7D404011 40C1D4E4 D9D811C5 4FF1F2F3 F4F511C6 5EC2F0F0                    .'  J AMURQJE|12345JF;B00      .

                                                                                  AID=7D CURSOR=4040 (01,01)
      ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8
01    .AMURQ0ENTER TRANSACTION CODE                                                   .
02    .                                                                               .
03    .                        0ENTER DATA:                                           .
04    .                                                                               .
05    .     YPART NO:J123450                                                          .
06    .     YWHS NO:JB000                                                             .
07    .                                                                               .
08    .                        0STOCK STATUS:                                         .
09    .                                                                               .
10    .     0DESCRIPTION:_                                                  0         .
11    .     0ORDER UNITS:_      0               0PRICE:_         0                    .
12    .                                                                               .
13    .                        0STOCK STATUS AT WAREHOUSE:                            .
14    .                                                                               .
15    .     0LOCATION:_                          0                                    .
16    .     0ON HAND:_         0                0AS OF:_         0                    .
17    .     0ON ORDER:_         0               0AS OF:_         0                    .
18    .                                                                               .
19    .                                                                               .
20    .                                                                               .
21    .                                                                               .
22    .                                                                               .
23    .                               YERROR MESSAGE:                                 .
24    .        HINVALID DATA: PARTNO MUST BE NUMERIC            0                     .
      ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8

         ATTRIBUTE CHAR DECODING:
               (40) =    UNP,ALP,DIS/NDT
             A (C1) =    UNP,ALP,DIS/NDT,MDT
             H (C8) =    UNP,ALP,IDS/DET
             J (D1) =    UNP,NUM,DIS/NDT,MDT
             Y (E8) =    PRO,ALP,IDS/DET
             0 (F0) =    PRO,NUM,DIS/NDT
```

Figure 54. SIM3270 Printout from Simulation Mode Execution (Page 15 of 22)

```
TEST1  OUTPUT-F1                  18.08.28  083026

0000 004C  C3114B50 125B5F11 5B7F1DE8 C5D9D9D6 D940D4C5 E2E2C1C7 C57A115C F81DC8C9  *CJ.&KS¬J$" YERROR MESSAGE:J*8 HI*
0020 002C  D5E5C1D3 C9C440C4 C1E3C17A 40E6C8E2 D5D640D4 E4E2E340 C2C540D5 E4D4C5D9  *NVALID DATA: WHSNO MUST BE NUMER*
0040 000C  C9C33C5D 6B401DF0 115CF913                                               *IC ),  0J*9L                    *

                                                                                     AID=7D CURSOR=5CF9 (24,10)
     ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8
01   ._MURQQENTER TRANSACTION CODE                                                    .
02   .                                                                                .
03   .                   QENTER DATA:                                                 .
04   .                                                                                .
05   .    YPART NO:&123450                                                            .
06   .    YWHS NO:&B000                                                               .
07   .                                                                                .
08   .                   QSTOCK STATUS:                                               .
09   .                                                                                .
10   .    QDESCRIPTION:_                                                       Q      .
11   .    QORDER UNITS:_     Q             QPRICE:_         Q                         .
12   .                                                                                .
13   .                   QSTOCK STATUS AT WAREHOUSE:                                  .
14   .                                                                                .
15   .    QLOCATION:_                      Q                                          .
16   .    QON HAND:_        Q              QAS OF:_        Q                          .
17   .    QON ORDER:_        Q             QAS OF:_        Q                          .
18   .                                                                                .
19   .                                                                                .
20   .                                                                                .
21   .                                                                                .
22   .                                                                                .
23   .                             YERROR MESSAGE:                                    .
24   .       HINVALID DATA: WHSNO MUST BE NUMERIC              Q                      .
     ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8
                                     -
        ATTRIBUTE CHAR DECODING:
            (40) =    UNP,ALP,DIS/NDT
          H (C8) =    UNP,ALP,IDS/DET
          & (50) =    UNP,NUM,DIS/NDT
          Y (E8) =    PRO,ALP,IDS/DET
          0 (F0) =    PRO,NUM,DIS/NDT
```

Figure 54. SIM3270 Printout from Simulation Mode Execution (Page 16 of 22)

```
TEST1   INPUT                   18.08.32  083026

0000 0018  7D404011 40C1D4E4 D9D811C5 4FF1F2F3 F4E711C6 5EF2F0E8                   **  J AMURQJE|1234XJF;20Y            *

                                                                                      AID=7D CURSOR=4040 (01,01)
      ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8
01   .AMURQ0ENTER TRANSACTION CODE                                                    .
02   .                                                                                .
03   .                    0ENTER DATA:                                                .
04   .                                                                                .
05   .     YPART NO:J1234X0                                                           .
06   .     YWHS NO:J20Y0                                                              .
07   .                                                                                .
08   .                    0STOCK STATUS:                                              .
09   .                                                                                .
10   .     0DESCRIPTION:_                                                      0      .
11   .     0ORDER UNITS:_     0            0PRICE:_         0                         .
12   .                                                                                .
13   .                    0STOCK STATUS AT WAREHOUSE:                                 .
14   .                                                                                .
15   .     0LOCATION:_                       0                                        .
16   .     0ON HAND:_       0              0AS OF:_        0                          .
17   .     0ON ORDER:_       0             0AS OF:_        0                          .
18   .                                                                                .
19   .                                                                                .
20   .                                                                                .
21   .                                                                                .
22   .                                                                                .
23   .                              YERROR MESSAGE:                                   .
24   .        HINVALID DATA: WHSNO MUST BE NUMERIC               0                    .
      ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8

        ATTRIBUTE CHAR DECODING:
            (40) =    UNP,ALP,DIS/NDT
          A (C1) =    UNP,ALP,DIS/NDT,MDT
          H (C8) =    UNP,ALP,IDS/DET
          J (D1) =    UNP,NUM,DIS/NDT,MDT
          Y (E8) =    PRO,ALP,IDS/DET
          0 (F0) =    PRO,NUM,DIS/NDT
```

Figure 54. SIM3270 Printout from Simulation Mode Execution (Page 17 of 22)

```
TEST1  OUTPUT-F1                  18.08.38  083026

0000 0057  C3114B50 125B5F11 5B7F1DE8 C5D9D9D6 D940D4C5 E2E2C1C7 C57A115C F81DC8C9   *CJ.&K$¬J$" YERROR MESSAGE:J*8 HI*
0020 0037  D5E5C1D3 C9C440C4 C1E3C17A 40D7C1D9 E3D5D640 C1D5C440 E6C8E2D5 D640D4E4   *NVALID DATA: PARTNO AND WHSNO MU*
0040 0017  E2E340C2 C540D5E4 D4C5D9C9 C3404040 401DF011 5CF91300                     *ST BE NUMERIC      0J*9L       *

                                                                                      AID=7D CURSOR=5CF9 (24,10)
     ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8
01   ._MUR0ENTER TRANSACTION CODE                                                    .
02   .                                                                               .
03   .                     0ENTER DATA:                                              .
04   .                                                                               .
05   .    YPART NO:&1234X0                                                           .
06   .    YWHS NO:&20Y0                                                              .
07   .                                                                               .
08   .                     0STOCK STATUS:                                            .
09   .                                                                               .
10   .    0DESCRIPTION:_                                                       0     .
11   .    0ORDER UNITS:_    0                0PRICE:_        0                       .
12   .                                                                               .
13   .                     0STOCK STATUS AT WAREHOUSE:                               .
14   .                                                                               .
15   .    0LOCATION:_                     0                                          .
16   .    0ON HAND:_       0              0AS OF:_        0                          .
17   .    0ON ORDER:_       0             0AS OF:_        0                          .
18   .                                                                               .
19   .                                                                               .
20   .                                                                               .
21   .                                                                               .
22   .                                                                               .
23   .                                 YERROR MESSAGE:                               .
24   .       HINVALID DATA: PARTNO AND WHSNO MUST BE NUMERIC    0                    .
     ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8

       ATTRIBUTE CHAR DECODING:
           (40) =   UNP,ALP,DIS/NDT
         H (C8) =   UNP,ALP,IDS/DET
         & (50) =   UNP,NUM,DIS/NDT
         Y (E8) =   PRO,ALP,IDS/DET
         0 (F0) =   PRO,NUM,DIS/NDT
```

Figure 54. SIM3270 Printout from Simulation Mode Execution (Page 18 of 22)

```
TEST1  INPUT                       18.08.42  083026

0000 0018  7D404011 40C1D4E4 D9D811C5 4FF1F2F3 F4F911C6 5EF1F0F0                  .*  J AMURQJE|12349JF|100        *

                                                                                       AID=7D CURSOR=4040 (01,01)
     ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8
01   .AMURQ0ENTER TRANSACTION CODE                                                    .
02   .                                                                                .
03   .                    0ENTER DATA:                                                .
04   .                                                                                .
05   .     YPART NO:J123490                                                           .
06   .     YWHS NO:J1000                                                              .
07   .                                                                                .
08   .                    0STOCK STATUS:                                              .
09   .                                                                                .
10   .     0DESCRIPTION:_                                                       0     .
11   .     0ORDER UNITS:_     0                0PRICE:_        0                      .
12   .                                                                                .
13   .                    0STOCK STATUS AT WAREHOUSE:                                 .
14   .                                                                                .
15   .     0LOCATION:_                       0                                        .
16   .     0ON HAND:_       0                0AS OF:_        0                        .
17   .     0ON ORDER:_       0               0AS OF:_        0                        .
18   .                                                                                .
19   .                                                                                .
20   .                                                                                .
21   .                                                                                .
22   .                                                                                .
23   .                              YERROR MESSAGE:                                   .
24   .        HINVALID DATA: PARTNO AND WHSNO MUST BE NUMERIC    0                    .
     ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8

        ATTRIBUTE CHAR DECODING:
            (40) =    UNP,ALP,DIS/NDT
          A (C1) =    UNP,ALP,DIS/NDT,MDT
          H (C8) =    UNP,ALP,IDS/DET
          J (D1) =    UNP,NUM,DIS/NDT,MDT
          Y (E8) =    PRO,ALP,IDS/DET
          0 (F0) =    PRO,NUM,DIS/NDT
```

Figure 54. SIM3270 Printout from Simulation Mode Execution (Page 19 of 22)

```
TEST1  OUTPUT-F1                  18.08.47  083026

0000 0045  C3114B50 125B5F11 5B7F1DE8 C5D9D9D6 D940D4C5 E2E2C1C7 C57A115C F81DC8D7  *CJ.&K$¬J$" YERROR MESSAGE:J*8 HP*
0020 0025  C1D9E340 D5E4D4C2 C5D940F1 F2F3F4F9 40D5D6E3 40C6D6E4 D5C44B3C 5D6B401D  *ART NUMBER 12349 NOT FOUND. ),  *
0040 0005  F0115CF9 13000000                                                       *0J*9L                           *

                                                                                        AID=7D CURSOR=5CF9 (24,10)
    ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8
01  ._MURQ0ENTER TRANSACTION CODE                                                   .
02  .                                                                               .
03  .                    0ENTER DATA:                                               .
04  .                                                                               .
05  .     YPART NO:&123490                                                          .
06  .     YWHS NO:&1000                                                             .
07  .                                                                               .
08  .                    0STOCK STATUS:                                             .
09  .                                                                               .
10  .     0DESCRIPTION:_                  ..                               0        .
11  .     0ORDER UNITS:_    0               0PRICE:_         0                      .
12  .                                                                               .
13  .                    0STOCK STATUS AT WAREHOUSE:                                .
14  .                                                                               .
15  .     0LOCATION:_                     . 0                                       .
16  .     0ON HAND:_      0                 0AS OF:_         0                      .
17  .     0ON ORDER:_      0                0AS OF:_         0                      .
18  .                                                                               .
19  .                                                                               .
20  .                                                                               .
21  .                                                                               .
22  .                                                                               .
23  .                                 YERROR MESSAGE:                               .
24  .        MPART NUMBER 12349 NOT FOUND.                       0                  .
    ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8


      ATTRIBUTE CHAR DECODING:
           (40) =    UNP,ALP,DIS/NDT
         M (C8) =    UNP,ALP,IDS/DET
         & (50) =    UNP,NUM,DIS/NDT
         Y (E8) =    PRO,ALP,IDS/DET
         0 (F0) =    PRO,NUM,DIS/NDT
```

Figure 54. SIM3270 Printout from Simulation Mode Execution (Page 20 of 22)

```
TEST1  INPUT                      18.08.52  083026

0000 0018  7D404011 40C1D4E4 D9D811C5 4FF1F2F3 F4F211C6 5FF1F0F0              .*  J AMURQJE|12342JF;100        *

                                                                                  AID=7D CURSOR=4040 (01,01)
     ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8
01  .AMURQQENTER TRANSACTION CODE                                                    .
02  .                                                                                .
03  .                     QENTER DATA:                                               .
04  .                                                                                .
05  .     YPART NO:J123420                                                           .
06  .     YWHS NO:J1000                                                              .
07  .                                                                                .
08  .                     QSTOCK STATUS:                                             .
09  .                                                                                .
10  .     QDESCRIPTION:_                                                       Q     .
11  .     QORDER UNITS:_    Q             QPRICE:_          Q                        .
12  .                                                                                .
13  .                     QSTOCK STATUS AT WAREHOUSE:                                .
14  .                                                                                .
15  .     QLOCATION:_                       Q                                        .
16  .     QON HAND:_       Q              QAS OF:_         Q                         .
17  .     QON ORDER:_       Q             QAS OF:_         Q                         .
18  .                                                                                .
19  .                                                                                .
20  .                                                                                .
21  .                                                                                .
22  .                                                                                .
23  .                               YERROR MESSAGE:                                  .
24  .        HPART NUMBER 12349 NOT FOUND.                       Q                   .
     ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8


        ATTRIBUTE CHAR DECODING:
             (40) =   UNP,ALP,DIS/NDT
           A (C1) =   UNP,ALP,DIS/NDT,MDT
           H (C8) =   UNP,ALP,IDS/DET
           J (D1) =   UNP,NUM,DIS/NDT,MDT
           Y (E8) =   PRO,ALP,IDS/DET
           0 (F0) =   PRO,NUM,DIS/NDT
```

Figure 54. SIM3270 Printout from Simulation Mode Execution (Page 21 of 22)

```
TEST1  OUTPUT-F5                  18.09.01  083026

0000 0182  C3114040 1DC14040 40401DF0 C5D5E3C5 D940E3D9 C1D5E2C1 C3E3C9D6 D540C3D6  *CJ   A      0ENTER TRANSACTION CO*
0020 0162  C4C511C2 F51DF0C5 D5E3C5D9 40C4C1E3 C17A11C5 C51DE8D7 C1D9E340 D5D67A1D  *DEJB5 0ENTER DATA:JEE YPART NO: *
0040 0142  50F1F2F3 F4F21DF0 11C6D51D E8E6C8E2 40D5D67A 1D50F1F0 F01DF011 C9C51DF0  *&12342 0JFN YWHS NO: &100 0JIE 0*
0060 0122  E2E3D6C3 D240E2E3 C1E3E4E2 7A114BD5 1DF0C4C5 E2C3D9C9 D7E3C9D6 D57A1D40  *STOCK STATUS:J.N 0DESCRIPTION:  *
0080 0102  F361F840 C9D540C6 D3C1E340 C8C5C1C4 40C2D3C1 C3D240C3 C1D9D9C9 C1C7C540  *3/8 IN FLAT HEAD BLACK CARRIAGE *
00A0 00E2  C2D6D3E3 3C4CD940 114C5A1D F0114CE5 1DF0D6D9 C4C5D940 E4D5C9E3 E27A1D40  *BOLT <R J<! 0J<V 0ORDER UNITS:  *
00C0 00C2  C4D6E940 401DF011 4DC61DF0 D7D9C9C3 C57A1D40 5BF5F0F6 4BF1F6F1 F61DF011  *DOZ    0J(F 0PRICE:  $506.1616 0J*
00E0 00A2  4FD51DF0 E2E3D6C3 D240E2E3 C1E3E4E2 40C1E340 E6C1D9C5 C8D6E4E2 C57A11D1  *|N 0STOCK STATUS AT WAREHOUSE:JJ*
0100 0082  E51DF0D3 D6C3C1E3 C9D6D57A 1D40D4C9 C1D4C96B 40C6D3C1 4B3CD2C7 401DF011  *V 0LOCATION:  MIAMI, FLA. KG  0J*
0120 0062  D2F51DF0 D6D540C8 C1D5C47A 1D40F6F1 F5F0F6F1 F41DF011 D3D61DF0 C1E240D6  *K5 0ON HAND:  6150614 0JL0 0AS O*
0140 0042  C67A1D40 F0F361F0 F561F8F2 1DF011D4 C51DF0D6 D540D6D9 C4C5D97A 1D40F5F0  *F:  03/05/82 0JME 0ON ORDER:  50*
0160 0022  F4F0F4F0 F41DF011 D4E61DF0 C1E240D6 C67A1D40 F1F061F1 F161F8F2 1DF01140  *40404 0JMW 0AS OF:  10/11/82 0J *
0180 0002  C1130000                                                                   *AL                              *

                                                                                   AID=7D CURSOR=40C1 (01,02)
        ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8
   01   ._   0ENTER TRANSACTION CODE                                                  .
   02   .                                                                             .
   03   .                       0ENTER DATA:                                          .
   04   .                                                                             .
   05   .    YPART NO:&123420                                                         .
   06   .    YWHS NO:&1000                                                            .
   07   .                                                                             .
   08   .                       0STOCK STATUS:                                        .
   09   .                                                                             .
   10   .    0DESCRIPTION:_3/8 IN FLAT HEAD BLACK CARRIAGE BOLT                  0    .
   11   .    0ORDER UNITS:_DOZ  0              0PRICE:_$506.16160                     .
   12   .                                                                             .
   13   .                       0STOCK STATUS AT WAREHOUSE:                           .
   14   .                                                                             .
   15   .    0LOCATION:_MIAMI, FLA.            0                                      .
   16   .    0ON HAND:_61506140                0AS OF:_03/05/820                      .
   17   .    0ON ORDER:_50404040               0AS OF:_10/11/820                      .
   18   .                                                                             .
   19   .                                                                             .
   20   .                                                                             .
   21   .                                                                             .
   22   .                                                                             .
   23   .                                                                             .
   24   .                                                                             .
        ....*....1....*....2....*....3....*....4....*....5....*....6....*....7....*....8

      ATTRIBUTE CHAR DECODING:
          (40) =    UNP,ALP,DIS/NDT
        & (50) =    UNP,NUM,DIS/NDT
        Y (E8) =    PRO,ALP,IDS/DET
        0 (F0) =    PRO,NUM,DIS/NDT
```

Figure 54. SIM3270 Printout from Simulation Mode Execution (Page 22 of 22)

```
DATE 83.026    TIME 18.24.20          **** I N T E R C O M M   L O G   D I S P L A Y ****                  PAGE     1

MSGLEN  THREAD   QPR   RSC      SSC         MMN    DATE        TIME        TID   PID    CO    USR    BMN  LOG BLK  VMI
-------------------------------------------------------------------------------------------------------------------------
    78      0     02  ../0000  ../0000        1    83.026     18.06.5637   TOALL .....  0001   00       0   9F  00   00
000000   C9D5E3C5 D9C3D6D4 D440E2E3 C1D9E3E4    D740D4C5 E2E2C1C7 C5406040 E6E2C4C3   *INTERCOMM STARTUP MESSAGE - WSDC*
000032   E5C8E7E7                                                                     *VHXX                            *
-------------------------------------------------------------------------------------------------------------------------
   108      0     02  .U/00E4  ../0000        1    83.026     18.06.5637   TOALL .....  0001   00       0   01  00   50
000000   FF02002D 013C5C5C 5C40C7D6 D6C440C5    E5C5D5C9 D5C7405C 5C5C4040 C9D5E3C5   *........*** GOOD EVENING ***  INTE*
000032   D9C3D6D4 D440C9E2 40D9C5C1 C4E8407A    404040F0 F160F2F6 60F8F340 40F1F84B   *RCOMM IS READY :   01-26-83  18.*
000064   F0F6                                                                         *06                              *
-------------------------------------------------------------------------------------------------------------------------
    42      1     02  .U/00E4  ../0000        1    83.026     18.06.5646   TOALL .....  0000   00       0   30  00   50
-------------------------------------------------------------------------------------------------------------------------
   104      1     02  ../0000  .U/00E4        2    83.026     18.06.5646   CNT01 .....  0001   00       0   F2  00   50
000000   5C5C5C40 C7D6D6C4 40C5E5C5 D5C9D5C7    405C5C5C 4040C9D5 E3C5D9C3 D6D4D440   **** GOOD EVENING ***  INTERCOMM *
000032   C9E240D9 C5C1C4E8 407A4040 40F0F160    F2F660F8 F34040F1 F84BF0F6 2637       *IS READY :   01-26-83  18.06..  *
-------------------------------------------------------------------------------------------------------------------------
   103      1     02  ../0000  .U/00E4        3    83.026     18.06.5651   TEST1 .....  0001   00       0   F2  00   50
000000   5C5C5C40 C7D6D6C4 40C5E5C5 D5C9D5C7    405C5C5C 4040C9D5 E3C5D9C3 D6D4D440   **** GOOD EVENING ***  INTERCOMM *
000032   C9E240D9 C5C1C4E8 407A4040 40F0F160    F2F660F8 F34040F1 F84BF0F6 37         *IS READY :   01-26-83  18.06.   *
-------------------------------------------------------------------------------------------------------------------------
    88      1     02  .U/00E4  ../0000        1    83.026     18.06.5651   TOALL .....  0000   00       0   FA  00   50
000000   00000000 00000000 000B0000 12780000    00240000 00020000 00020000 00000000   *................................*
000032   00000000 00000000 00000000 0000                                              *..............                  *
-------------------------------------------------------------------------------------------------------------------------
    42      1     02  ../0000  .U/00E4        2    83.026     18.06.5799   CNT01 .....  0001   00       0   F3  00   50
-------------------------------------------------------------------------------------------------------------------------
    42      1     02  ../0000  .U/00E4        3    83.026     18.07.0168   TEST1 .....  0001   00       0   F3  00   50
-------------------------------------------------------------------------------------------------------------------------
    74      1     F2  .N/00D5  ../0000        5    83.026     18.07.0610   TEST1 .....  0001   00       1   01  00   57
000000   E2E3D9E3 40C3D6D4 D4C1D5C4 40C3D6D4    D7D3C5E3 C5C440D5 D6D9D4C1 D3D3E826   *STRT COMMAND COMPLETED NORMALLY.*
-------------------------------------------------------------------------------------------------------------------------
    42      1     F2  .N/00D5  ../0000        5    83.026     18.07.0610   TEST1 .....  0000   00       1   30  00   57
-------------------------------------------------------------------------------------------------------------------------
    74      1     02  ../0000  .U/00E4        6    83.026     18.07.0610   TEST1 .....  0001   00       1   F2  00   57
000000   E2E3D9E3 40C3D6D4 D4C1D5C4 40C3D6D4    D7D3C5E3 C5C440D5 D6D9D4C1 D3D3E826   *STRT COMMAND COMPLETED NORMALLY.*
-------------------------------------------------------------------------------------------------------------------------
    88      1     F2  .N/00D5  ../0000        5    83.026     18.07.0610   TEST1 .....  0000   00       1   FA  00   57
000000   00000000 00000000 00020000 07A80000    00130000 00010000 00010000 00000000   *................................*
000032   00000000 00000000 00000000 0000                                              *..............                  *
-------------------------------------------------------------------------------------------------------------------------
    42      1     02  ../0000  .U/00E4        6    83.026     18.07.1080   TEST1 .....  0001   00       1   F3  00   57
-------------------------------------------------------------------------------------------------------------------------
    67      0     F2  MM/D4D4  ../0000        7    83.026     18.07.1515   TEST1 .....  0001   00       2   01  00   FF
000000   D4D4E4C3 6BE2C8D6 E66B4DE2 E3D2E2E3    C1E36BD4 C1D7F15D 26                  *MMUC,SHOW,(STKSTAT,MAP1).       *
-------------------------------------------------------------------------------------------------------------------------
    42      1     F2  MM/D4D4  ../0000        7    83.026     18.07.1515   TEST1 .....  0000   00       2   30  00   FF
-------------------------------------------------------------------------------------------------------------------------
   350      1     02  ../0000  MM/D4D4        8    83.026     18.07.1542   TEST1 .....  0000   00       2   F2  00   67
000000   F5C31140 401DC140 4040401D F0C5D5E3    C5D940E3 D9C1D5E2 C1C3E3C9 D6D540C3   *5C.  .A     .0ENTER TRANSACTION C*
000032   D6C4C511 C2F51DF0 C5D5E3C5 D940C4C1    E3C17A11 C5C51DE8 D7C1D9E3 40D5D67A   *ODE.B5.0ENTER DATA:.EE.YPART NO:*
000064   1D5011C5 D41DF011 C6D51DE8 E6C8E240    D5D67A1D 5011C661 1DF011C9 C51DF0E2   *.&.EM.0.FN.YWHS NO:.&.F/.0.IE.0S*
000096   E3D6C3D2 40E2E3C1 E3E4E27A 114BD51D    F0C4C5E2 C3D9C9D7 E3C9D6D5 7A1D4011   *TOCK STATUS:..N.0DESCRIPTION:. .*

MSGLEN  THREAD   QPR   RSC      SSC         MMN    DATE        TIME        TID   PID    CO    USR    BMN  LOG BLK  VMI
```

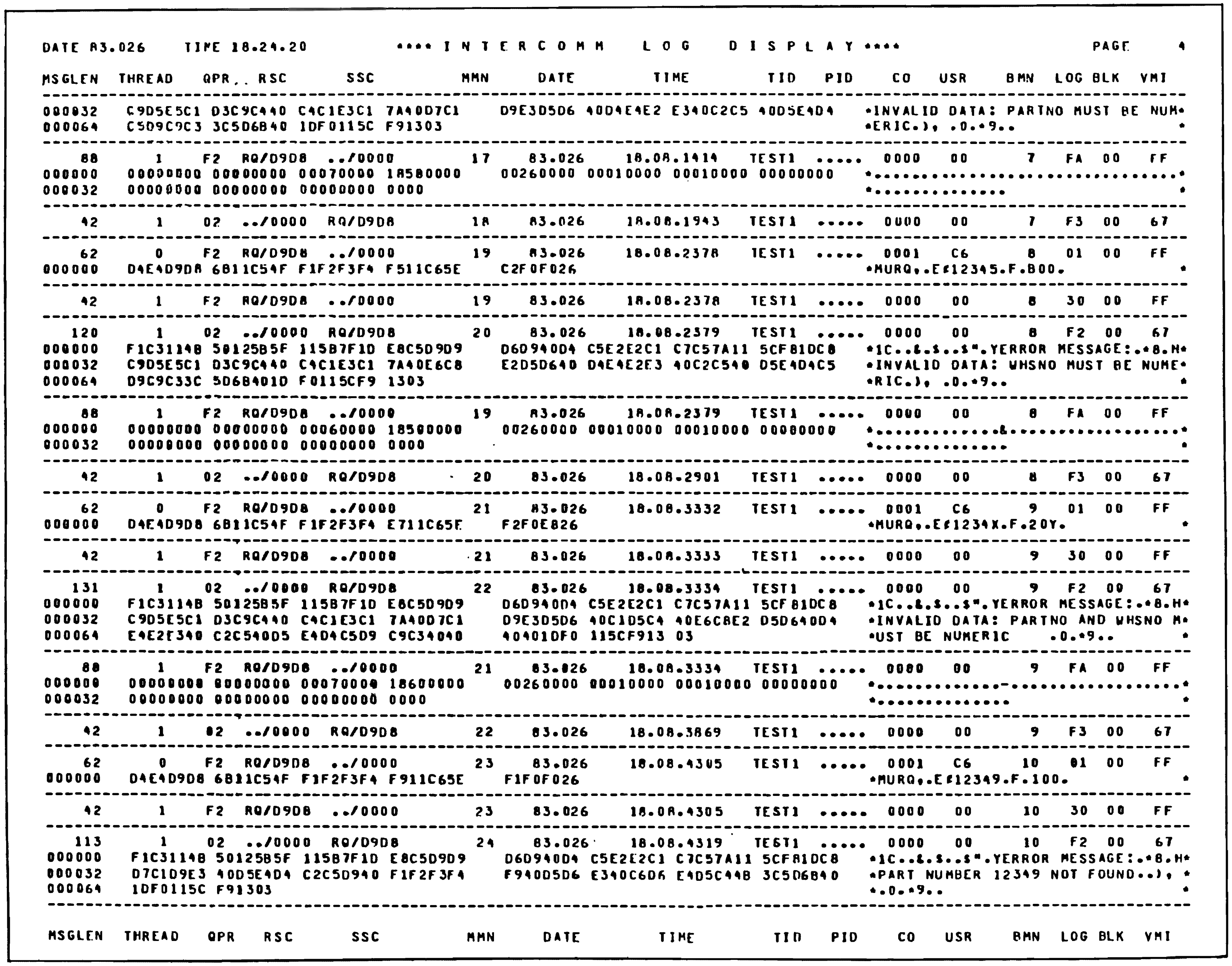
Figure 55. Simulation Mode Execution Log Printout (Page 1 of 6)

```
DATE 83.026    TIME 18.24.20        **** I N T E R C O M M   L O G   D I S P L A Y ****                    PAGE    2

MSGLEN  THREAD   QPR  RSC      SSC          MMN    DATE         TIME        TID    PID     CO    USR     BMN  LOG BLK  VMI
------------------------------------------------------------------------------------------------------------------------------
000128   4C5A1DF0 114CE51D F0D6D9C4 C5D940E4    D5C9E3E2 7A1D4011 4CF81DF0 114DC61D   *<..0.<V.0ORDER UNITS:. .<8.0.(F.*
000160   F0D7D9C9 C3C57A1D 40114DD7 1DF0114F    D51DF0E2 E3D6C3D2 40E2E3C1 E3E4E240   *0PRICE:. .(P.0.fN.0STOCK STATUS *
000192   C1E340E6 C1D9C5C8 D6E4E2C5 7A11D1E5    1DF0D3D6 C3C1E3C9 D6D57A1D 4011D2C7   *AT WAREHOUSE:.JV.0LOCATION:. .KG*
000224   1DF011D2 F51DF0D6 D540C8C1 D5C47A1D    4011D3C6 1DF011D3 D61DF0C1 E240D6C6   *.0.K5.0ON HAND:. .LF.0.LO.0AS OF*
000256   7A1D4011 D3E61DF0 11D4C51D F0D6D540    D6D9C4C5 D97A1D40 11D4D71D F011D4E6   *:. .LW.0.ME.0ON ORDER:. .MP.0.MW*
000288   1DF0C1E2 40D6C67A 1D4011D4 F61DF011    40C11303                              *.0AS OF:. .M6.0. A..            *
------------------------------------------------------------------------------------------------------------------------------
    88     1     F2  MM/D4D4  ../0000       7    83.026     18.07.1542   TEST1  .....  0000   00       2  FA  00    FF
000000   00000000 00020000 00130000 22B80000    002D0000 00010000 00010000 00010000   *................................*
000032   00000000 00000000 00000000 0000                                              *..............                  *
------------------------------------------------------------------------------------------------------------------------------
    42     1     02  ../0000  MM/D4D4       8    83.026     18.07.2351   TEST1  .....  0000   00       2  F3  00    67
------------------------------------------------------------------------------------------------------------------------------
    62     0     F2  RQ/D9D8  ../0000       9    83.026     18.07.2794   TEST1  .....  0001   C6       3  01  00    FF
000000   D4E4D9D8 6B11C54F F1F2F3F4 F511C65E    F2F0F026                              *MURQ,.E£12345.F.200.            *
------------------------------------------------------------------------------------------------------------------------------
    42     1     F2  RQ/D9D8  ../0000       9    83.026     18.07.2794   TEST1  .....  0000   00       3  30  00    FF
------------------------------------------------------------------------------------------------------------------------------
   413     1     02  ../0000  RQ/D9D8      10    83.026     18.07.2856   TEST1  .....  0000   00       3  F2  00    67
000000   F5C31140 401DC140 40404010 F0C5D5E3    C5D940E3 D9C1D5E2 C1C3E3C9 D6D540C3   *5C.  .A    .0ENTER TRANSACTION C*
000032   D6C4C511 C2F51DF0 C5D5E3C5 D940C4C1    E3C17A11 C5C51DE8 D7C1D9E3 40D5D67A   *ODE.B5.0ENTER DATA:.EE.YPART NO:*
000064   1D50F1F2 F3F4F51D F011C6D5 1DE8E6C8    E240D5D6 7A1D50F2 F0F01DF0 11C9C51D   *.&12345.0.FN.YWHS NO:.&200.0.IE.*
000096   F0E2E3D6 C3D240E2 E3C1E3E4 E27A114B    D51DF0C4 C5E2C3D9 C9D7E3C9 D6D57A1D   *0STOCK STATUS:..N.0DESCRIPTION:.*
000128   40F161F2 40C9D540 E2E3C5C5 D340E6C1    E2C8C5D9 3C4CD940 114C5A1D F0114CE5   * 1/2 IN STEEL WASHER.<R .<..0.<V*
000160   1DF0D6D9 C4C5D940 E4D5C9E3 E27A1D40    C7D9E240 401DF011 4DC61DF0 D7D9C9C3   *.0ORDER UNITS:. GRS  .0.(F.0PRIC*
000192   C57A1D40 5BF5F0F5 4BF0F5F0 F71DF011    4FD51DF0 E2E3D6C3 D240E2E3 C1E3E4E2   *E:. $505.0507.0.fN.0STOCK STATUS*
000224   40C1E340 E6C1D9C5 C8D6E4E2 C57A11D1    E51DF0D3 D6C3C1E3 C9D6D57A 1D40D4C9   * AT WAREHOUSE:.JV.0LOCATION:. MI*
000256   C1D4C96B 40C6D3C1 4B3CD2C7 401DF011    D2F51DF0 D6D540C8 C1D5C47A 1D40F6F1   *AMI, FLA..KG .0.K5.0ON HAND:. 61*
000288   F6F1F5F0 F61DF011 D3D61DF0 C1E24006    C67A1D40 F0F361F0 F561F8F2 1DF011D4   *61506.0.LO.0AS OF:. 03/05/82.0.M*
000320   C51DF0D6 D540D6D9 C4C5D97A 1D40F4F0    F4F0F6F1 F71DF011 D4E61DF0 C1E240D6   *E.0ON ORDER:. 4040617.0.MW.0AS O*
000352   C67A1D40 F1F061F1 F161F8F2 1DF01140    C11303                                *F:. 10/11/82.0. A..             *
------------------------------------------------------------------------------------------------------------------------------
    88     1     F2  RQ/D9D8  ../0000       9    83.026     18.07.2857   TEST1  .....  0000   00       3  FA  00    FF
000000   00000000 00010000 00560080 1AD80000    006A0000 00010000 00060000 00010000   *.............Q..................*
000032   00000000 00000000 00000000 0000                                              *..............                  *
------------------------------------------------------------------------------------------------------------------------------
    42     1     02  ../0000  RQ/D9D8      10    83.026     18.07.3714   TEST1  .....  0000   00       3  F3  00    67
------------------------------------------------------------------------------------------------------------------------------
    62     0     F2  RQ/D9D8  ../0000      11    83.026     18.07.4146   TEST1  .....  0001   C6       4  01  00    FF
000000   D4E4D9D8 6B11C54F F5F5F5F5 F511C65E    F2F0F026                              *MURQ,.E£55555.F.200.            *
------------------------------------------------------------------------------------------------------------------------------
    42     1     F2  RQ/D9D8  ../0000      11    83.026     18.07.4146   TEST1  .....  0000   00       4  30  00    FF
------------------------------------------------------------------------------------------------------------------------------
   112     1     02  ../0000  RQ/D9D8      12    83.026     18.07.4158   TEST1  .....  0000   00       4  F2  00    67
000000   F1C3114B 50125B5F 115B7F1D E8C5D9D9    D6D940D4 C5E2E2C1 C7C57A11 5CF81DC8   *1C..&.$..$".YERROR MESSAGE:.*8.H*
000032   D7C1D9E3 40D5E4D4 C2C5D940 3C5D4AF5    40D5D6E3 40C6D6E4 D5C44B3C 5D6B401D   *PART NUMBER .).5 NOT FOUND..), .*
000064   F0115CF9 1303                                                                *0.*9..                          *
------------------------------------------------------------------------------------------------------------------------------
    88     1     F2  RQ/D9D8  ../0000      11    83.026     18.07.4158   TEST1  .....  0000   00       4  FA  00    FF
000000   00000000 00020000 000D0000 19180000    00420000 00010000 00030000 00000000   *................................*
000032   00000000 00000000 00000000 0000                                              *..............                  *

MSGLEN  THREAD   QPR  RSC      SSC          MMN    DATE         TIME        TID    PID     CO    USR     BMN  LOG BLK  VMI
```

Figure 55. Simulation Mode Execution Log Printout (Page 2 of 6)

```
DATE 83.026    TIME 18.24.20        **** I N T E R C O M M   L O G   D I S P L A Y ****            PAGE    3

MSGLEN  THREAD   QPR   RSC       SSC          MMN      DATE        TIME        TID    PID     CO    USR     BMN  LOG BLK  VMI
---------------------------------------------------------------------------------------------------------------------------
---------------------------------------------------------------------------------------------------------------------------
    42       1    02  ../0000  RQ/D9D8         12     83.026     18.07.4663   TEST1  .....  0000    00       4    F3  00   67
---------------------------------------------------------------------------------------------------------------------------
    62       0    F2  RQ/D9D8  ../0000         13     83.026     18.07.5101   TEST1  .....  0001    C6       5    01  00   FF
000000    D4E4D9D8 6B11C54F F1F2F3F4 F811C65E    F3F0F026                             *MURQ,.E#12348.F.300.               *
---------------------------------------------------------------------------------------------------------------------------
    42       1    F2  RQ/D9D8  ../0000         13     83.026     18.07.5101   TEST1  .....  0000    00       5    30  00   FF
---------------------------------------------------------------------------------------------------------------------------
   411       1    02  ../0000  RQ/D9D8         14     83.026     18.07.5122   TEST1  .....  0000    00       5    F2  00   67
000000    F5C31140 401DC140 4040401D F0C5D5E3    C5D940E3 D9C1D5E2 C1C3E3C9 D6D540C3  *5C.  .A     .0ENTER TRANSACTION C*
000032    D6C4C511 C2F51DF0 C5D5E3C5 D940C4C1    E3C17A11 C5C51DE8 D7C1D9E3 40D5D67A  *ODE.B5.0ENTER DATA:.EE.YPART NO:*
000064    1D50F1F2 F3F4F81D F011C6D5 1DE8E6C8    E240D5D6 7A1D50F3 F0F01DF0 11C9C51D  *.&12348.0.FN.YWHS NO:.&300.0.IE.*
000096    F0E2E3D6 C3D240E2 E3C1E3E4 E27A114B    D51DF0C4 C5E2C3D9 C9D7E3C9 D6D57A1D  *0STOCK STATUS:..N.0DESCRIPTION:.*
000128    40F340C6 E340C1D3 D3E4D440 E2C3C1D3    C53C4CD9 40114C5A 1DF0114C E51DF0D6  * 3 FT ALLUM SCALE.<R .<..0.<V.0O*
000160    D9C4C5D9 40E4D5C9 E3E27A1D 40C5C1C3    C8401DF0 114DC61D F0D7D9C9 C3C57A1D  *RDER UNITS:. EACH .0.(F.0PRICE:.*
000192    405BF5F0 F54BF0F5 F0F61DF0 114FD51D    F0E2E3D6 C3D240E2 E3C1E3E4 E240C1E3  * $505.0506.0.|N.0STOCK STATUS AT*
000224    40E6C1D9 C5C8D6E4 E2C57A11 D1E51DF0    D3D6C3C1 E3C9D6D5 7A1D40C4 C5D5E5C5  * WAREHOUSE:.JV.0LOCATION:. DENVE*
000256    D96B40C3 D6D34B3C D2C74D1D F011D2F5    1DF0D6D5 40C8C1D5 C47A1D40 F5F0F5F0  *R, COL..KG .0.K5.0ON HAND:. 5050*
000288    F5F0F71D F011D3D6 1DF0C1E2 40D6C67A    1D40F0F3 61F0F561 F8F21DF0 11D4C51D  *507.0.LO.0AS OF:. 03/05/82.0.ME.*
000320    F0D6D540 D6D9C4C5 D97A1D40 F5F0F5F0    F5F0F61D F011D4E6 1DF0C1E2 40D6C67A  *0ON ORDER:. 505050 6.0.MW.0AS OF:*
000352    1D40F1F0 61F1F161 F8F21DF0 1140C113    03                                   *. 10/11/82.0. A..               *
---------------------------------------------------------------------------------------------------------------------------
    88       1    F2  RQ/D9D8  ../0000         13     83.026     18.07.5122   TEST1  .....  0000    00       5    FA  00   FF
000000    00000000 00010000 00110000 19F00000    00630000 00010000 00050000 00000000  *..............0.................*
000032    00000000 00000000 00000000 0000 .                                           *.............                  *
---------------------------------------------------------------------------------------------------------------------------
    42       1    02  ../0000  RQ/D9D8         14     83.026     18.08.0012   TEST1  .....  0000    00       5    F3  00   67
---------------------------------------------------------------------------------------------------------------------------
    62       0    F2  RQ/D9D8  ../0000         15     83.026     18.08.0454   TEST1  .....  0001    C6       6    01  00   FF
000000    D4E4D9D8 6B11C54F F1F2F3F4 F111C65E    F6F0F026                             *MURQ,.E#12341.F.600.               *
---------------------------------------------------------------------------------------------------------------------------
    42       1    F2  RQ/D9D8  ../0000         15     83.026     18.08.0454   TEST1  .....  0000    00       6    30  00   FF
---------------------------------------------------------------------------------------------------------------------------
   122       1    02  ../0000  RQ/D9D8         16     83.026     18.08.0475   TEST1  .....  0000    00       6    F2  00   67
000000    F1C3114B 50125B5F 115B7F1D E8C5D9D9    D6D940D4 C5E2E2C1 C7C57A11 5CF81DC8  *1C..&.$..$".YERROR MESSAGE:.*8.H*
000032    D7C1D9E3 40F1F2F3 F4F140D5 D6E340C6    D6E4D5C4 40C9D540 E6C1D9C5 C8D6E4E2  *PART 12341 NOT FOUND IN WAREHOUS*
000064    C540F6F0 F03C5D6B 401DF011 5CF91303                                         *E 600.), .0.*9..                 *
---------------------------------------------------------------------------------------------------------------------------
    88       1    F2  RQ/D9D8  ../0000         15     83.026     18.08.0475   TEST1  .....  0000    00       6    FA  00   FF
000000    00000000 00010000 000E0000 1A580000    004D0000 00010000 00050000 00000000  *.................(..............*
000032    00000000 00000000 00000000 0000                                             *.............                  *
---------------------------------------------------------------------------------------------------------------------------
    42       1    02  ../0000  RQ/D9D8         16     83.026     18.08.0983   TEST1  .....  0000    00       6    F3  00   67
---------------------------------------------------------------------------------------------------------------------------
    62       0    F2  RQ/D9D8  ../0000         17     83.026     18.08.1413   TEST1  .....  0001    C6       7    01  00   FF
000000    D4E4D9D8 6B11C54F C1F2F3F4 F511C65E    F2F0F026                             *MURQ,.E#A2345.F.200.               *
---------------------------------------------------------------------------------------------------------------------------
    42       1    F2  RQ/D9D8  ../0000         17     83.026     18.08.1414   TEST1  .....  0000    00       7    30  00   FF
---------------------------------------------------------------------------------------------------------------------------
   121       1    02  ../0000  RQ/D9D8         18     83.026     18.08.1414   TEST1  .....  0000    00       7    F2  00   67
000000    F1C3114B 50125B5F 115B7F1D E8C5D9D9    D6D940D4 C5E2E2C1 C7C57A11 5CF81DC8  *1C..&.$..$".YERROR MESSAGE:.*8.H*

MSGLEN  THREAD   QPR   RSC       SSC          MMN      DATE        TIME        TID    PID     CO    USR     BMN  LOG BLK  VMI
```

Figure 55. Simulation Mode Execution Log Printout (Page 3 of 6)



```
DATE 83.026    TIME 18.24.20        **** I N T E R C O M M   L O G   D I S P L A Y ****                PAGE    4

MSGLEN  THREAD   QPR,. RSC       SSC          MMN     DATE         TIME          TID   PID    CO   USR    BMN  LOG BLK  VMI
-------------------------------------------------------------------------------------------------------------------------
000032  C9D5E5C1 D3C9C440 C4C1E3C1 7A40D7C1     D9E3D5D6 40D4E4E2 E340C2C5 40D5E4D4   *INVALID DATA: PARTNO MUST BE NUM*
000064  C5D9C9C3 3C5D6B40 1DF0115C F91303                                             *ERIC.), .0.*9..                 *
-------------------------------------------------------------------------------------------------------------------------
   88      1     F2  RQ/D9D8  ../0000         17     83.026     18.08.1414   TEST1 .....  0000   00       7   FA   00   FF
000000  00000000 00000000 00070000 18580000     00260000 00010000 00010000 00000000   *................................*
000032  00000000 00000000 00000000 0000                                               *..............                  *
-------------------------------------------------------------------------------------------------------------------------
   42      1     02  ../0000  RQ/D9D8         18     83.026     18.08.1943   TEST1 .....  0000   00       7   F3   00   67
-------------------------------------------------------------------------------------------------------------------------
   62      0     F2  RQ/D9D8  ../0000         19     83.026     18.08.2378   TEST1 .....  0001   C6       8   01   00   FF
000000  D4E4D9D8 6B11C54F F1F2F3F4 F511C65E     C2F0F026                              *MURQ,.E£12345.F.B00.            *
-------------------------------------------------------------------------------------------------------------------------
   42      1     F2  RQ/D9D8  ../0000         19     83.026     18.08.2378   TEST1 .....  0000   00       8   30   00   FF
-------------------------------------------------------------------------------------------------------------------------
  120      1     02  ../0000  RQ/D9D8         20     83.026     18.08.2379   TEST1 .....  0000   00       8   F2   00   67
000000  F1C3114B 50125B5F 115B7F1D E8C5D9D9     D6D940D4 C5E2E2C1 C7C57A11 5CF81DC8   *1C..&.$..$".YERROR MESSAGE:.*8.H*
000032  C9D5E5C1 D3C9C440 C4C1E3C1 7A40E6C8     E2D5D640 D4E4E2E3 40C2C540 D5E4D4C5   *INVALID DATA: WHSNO MUST BE NUME*
000064  D9C9C33C 5D6B401D F0115CF9 1303                                               *RIC.), .0.*9..                  *
-------------------------------------------------------------------------------------------------------------------------
   88      1     F2  RQ/D9D8  ../0000         19     83.026     18.08.2379   TEST1 .....  0000   00       8   FA   00   FF
000000  00000000 00000000 00060000 18580000     00260000 00010000 00010000 00080000   *.............&..................*
000032  00000000 00000000 00000000 0000                                               *..............                  *
-------------------------------------------------------------------------------------------------------------------------
   42      1     02  ../0000  RQ/D9D8         20     83.026     18.08.2901   TEST1 .....  0000   00       8   F3   00   67
-------------------------------------------------------------------------------------------------------------------------
   62      0     F2  RQ/D9D8  ../0000         21     83.026     18.08.3332   TEST1 .....  0001   C6       9   01   00   FF
000000  D4E4D9D8 6B11C54F F1F2F3F4 E711C65E     F2F0E826                              *MURQ,.E£1234X.F.20Y.            *
-------------------------------------------------------------------------------------------------------------------------
   42      1     F2  RQ/D9D8  ../0000         21     83.026     18.08.3333   TEST1 .....  0000   00       9   30   00   FF
-------------------------------------------------------------------------------------------------------------------------
  131      1     02  ../0000  RQ/D9D8         22     83.026     18.08.3334   TEST1 .....  0000   00       9   F2   00   67
000000  F1C3114B 50125B5F 115B7F1D E8C5D9D9     D6D940D4 C5E2E2C1 C7C57A11 5CF81DC8   *1C..&.$..$".YERROR MESSAGE:.*8.H*
000032  C9D5E5C1 D3C9C440 C4C1E3C1 7A40D7C1     D9E3D5D6 40C1D5C4 40E6C8E2 D5D640D4   *INVALID DATA: PARTNO AND WHSNO M*
000064  E4E2E340 C2C540D5 E4D4C5D9 C9C34040     40401DF0 115CF913 03                  *UST BE NUMERIC    .0.*9..       *
-------------------------------------------------------------------------------------------------------------------------
   88      1     F2  RQ/D9D8  ../0000         21     83.026     18.08.3334   TEST1 .....  0000   00       9   FA   00   FF
000000  00000000 00000000 00070000 18600000     00260000 00010000 00010000 00000000   *.............-..................*
000032  00000000 00000000 00000000 0000                                               *..............                  *
-------------------------------------------------------------------------------------------------------------------------
   42      1     02  ../0000  RQ/D9D8         22     83.026     18.08.3869   TEST1 .....  0000   00       9   F3   00   67
-------------------------------------------------------------------------------------------------------------------------
   62      0     F2  RQ/D9D8  ../0000         23     83.026     18.08.4305   TEST1 .....  0001   C6      10   01   00   FF
000000  D4E4D9D8 6B11C54F F1F2F3F4 F911C65E     F1F0F026                              *MURQ,.E£12349.F.100.            *
-------------------------------------------------------------------------------------------------------------------------
   42      1     F2  RQ/D9D8  ../0000         23     83.026     18.08.4305   TEST1 .....  0000   00      10   30   00   FF
-------------------------------------------------------------------------------------------------------------------------
  113      1     02  ../0000  RQ/D9D8         24     83.026     18.08.4319   TEST1 .....  0000   00      10   F2   00   67
000000  F1C3114B 50125B5F 115B7F1D E8C5D9D9     D6D940D4 C5E2E2C1 C7C57A11 5CF81DC8   *1C..&.$..$".YERROR MESSAGE:.*8.H*
000032  D7C1D9E3 40D5E4D4 C2C5D940 F1F2F3F4     F940D5D6 E340C6D6 E4D5C44B 3C5D6B40   *PART NUMBER 12349 NOT FOUND..), *
000064  1DF0115C F91303                                                               *.0.*9..                         *
-------------------------------------------------------------------------------------------------------------------------

MSGLEN  THREAD   QPR   RSC       SSC          MMN     DATE         TIME          TID   PID    CO   USR    BMN  LOG BLK  VMI
```

Figure 55. Simulation Mode Execution Log Printout (Page 4 of 6)

```
DATE 83.026   TIME 18.24.20        **** I N T E R C O M M   L O G   D I S P L A Y ****               PAGE    5

MSGLEN  THREAD   QPR  RSC       SSC          MMN    DATE        TIME        TID   PID    CO    USR    BMN  LOG BLK  VMI
-------------------------------------------------------------------------------------------------------------------------
    88      1    F2  RQ/D9D8  ../0000        23    83.026    18.08.4319   TEST1 .....  0000   00     10   FA  00   FF
000000   00000000 00010000 000C0000 18500000   00410000 00010000 00040000 00000000   *.............£.................*
000032   00000000 00000000 00000000 0000                                              *.............                  *
-------------------------------------------------------------------------------------------------------------------------
    42      1    02  ../0000  RQ/D9D8        24    83.026    18.08.4819   TEST1 .....  0000   00     10   F3  00   67
-------------------------------------------------------------------------------------------------------------------------
    62      0    F2  RQ/D9D8  ../0000        25    83.026    18.08.5251   TEST1 .....  0001   C6     11   01  00   FF
000000   D4E4D9D8 6B11C54F F1F2F3F4 F211C65E   F1F0F026                              *MURQ,.E£12342.F.100.            *
-------------------------------------------------------------------------------------------------------------------------
    42      1    F2  RQ/D9D8  ../0000        25    83.026    18.08.5251   TEST1 .....  0000   00     11   30  00   FF
-------------------------------------------------------------------------------------------------------------------------
   430      1    02  ../0000  RQ/D9D8        26    83.026    18.08.5262   TEST1 .....  0000   00     11   F2  00   67
000000   F5C31140 401DC140 4040401D F0C5D5E3   C5D940F3 D9C1D5E2 C1C3E3C9 D6D540C3   *5C.  .A    .0ENTER TRANSACTION C*
000032   D6C4C511 C2F51DF0 C5D5E3C5 D940C4C1   E3C17A11 C5C51DE8 D7C1D9E3 40D5D67A   *ODE.B5.0ENTER DATA:.EE.YPART NO:*
000064   1D50F1F2 F3F4F21D F011C6D5 1DE8E6C8   E240D5D6 7A1D50F1 F0F01DF0 11C9C51D   *.&12342.0.FN.YWHS NO:.&100.0.IE.*
000096   F0E2E3D6 C3D240E2 E3C1E3E4 E27A114B   D51DF0C4 C5E2C3D9 C9D7E3C9 D6D57A1D   *0STOCK STATUS:..N.0DESCRIPTION:.*
000128   40F361F8 40C9D540 C6D3C1E3 40C8C5C1   C440C2D3 C1C3D240 C3C1D9D9 C9C1C7C5   * 3/8 IN FLAT HEAD BLACK CARRIAGE*
000160   40C2D6D3 E33C4CD9 40114C5A 1DF0114C   E51DF0D6 D9C4C5D9 40E4D5C9 E3E27A1D   * BOLT.<R .<..0.<V.0ORDER UNITS:.*
000192   40C4D6E9 40401DF0 114DC61D F0D7D9C9   C3C57A1D 4058F5F0 F64BF1F6 F1F61DF0   * DOZ  .0.(F.0PRICE:. $506.1616.0*
000224   114FD51D F0E2E3D6 C3D240E2 E3C1E3E4   E240C1E3 40E6C1D9 C5C8D6E4 E2C57A11   *.£N.0STOCK STATUS AT WAREHOUSE:.*
000256   D1E51DF0 D3D6C3C1 E3C9D6D5 7A1D40D4   C9C1D4C9 6B40C6D3 C14B3CD2 C7401DF0   *JV.0LOCATION:. MIAMI, FLA..KG .0*
000288   11D2F51D F0D6D540 C8C1D5C4 7A1D40F6   F1F5F0F6 F1F41DF0 11D3D61D F0C1E240   *.K5.0ON HAND:. 6150614.0.LO.0AS *
000320   D6C67A1D 40F0F361 F0F561F8 F21DF011   D4C51DF0 D6D540D6 D9C4C5D9 7A1D40F5   *UF:. 03/05/82.0.ME.0ON ORDER:. 5*
000352   F0F4F0F4 F0F41DF0 11D4E61D F0C1E240   D6C67A1D 40F1F061 F1F161F8 F21DF011   *040404.0.MW.0AS OF:. 10/11/82.0.*
000384   40C11303                                                                     * A..                            *
-------------------------------------------------------------------------------------------------------------------------
    88      1    F2  RQ/D9D8  ../0000        25    83.026    18.08.5262   TEST1 .....  0000   00     11   FA  00   FF
000000   00000000 00010000 00110000 1A000000   00630000 00010000 00050000 00000000   *................................*
000032   00000000 00000000 00000000 0000                                              *..............                  *
-------------------------------------------------------------------------------------------------------------------------
    42      1    02  ../0000  RQ/D9D8        26    83.026    18.09.0193   TEST1 .....  0000   00     11   F3  00   67
-------------------------------------------------------------------------------------------------------------------------
    47      0    F2  .J/00D1  ../0000        27    83.026    18.09.0662   CNT01 .....  0001   00     12   01  00   FF
000000   D5D9C3C4 26                                                                  *NRCD.                           *
-------------------------------------------------------------------------------------------------------------------------
    42      1    F2  .J/00D1  ../0000        27    83.026    18.09.0662   CNT01 .....  0000   00     12   30  00   FF
-------------------------------------------------------------------------------------------------------------------------
   108      1    02  .U/00E4  ../0000        28    83.026    18.09.0662   TOALL .....  0001   00      0   01  00   50
000000   FF02002D 013C5C5C 5C40C7D6 D6C440C5   E5C5D5C9 D5C7405C 5C5C4040 C9D5E3C5   *.......*** GOOD EVENING ***  INTE*
000032   D9C3D6D4 D440C9E2 40C3D3D6 E2C5C47A   404040F0 F160F2F6 60F8F340 40F1F84B   *RCOMM IS CLOSED:    01-26-83  18.*
000064   F0F9                                                                         *09                              *
-------------------------------------------------------------------------------------------------------------------------
    88      1    F2  .J/00D1  ../0000        27    83.026    18.09.0662   CNT01 .....  00C0   00     12   FA  00   FF
000000   00000000 00000000 00010000 02F00000   00060000 00010000 00000000 00000000   *.............0..................*
000032   00000000 00000000 00000000 0000                                              *..............                  *
-------------------------------------------------------------------------------------------------------------------------
    42      1    02  .U/00E4  ../0000        28    83.026    18.09.0662   TOALL .....  0000   00      0   30  00   50
-------------------------------------------------------------------------------------------------------------------------
   104      1    02  ../0000  .U/00E4        29    83.026    18.09.0663   CNT01 .....  0001   00      0   F2  00   50
000000   5C5C5C40 C7D6D6C4 40C5E5C5 D5C9D5C7   405C5C5C 4040C9D5 E3C5D9C3 D6D4D440   **** GOOD EVENING ***  INTERCOMM *
000032   C9E240C3 D3D6E2C5 C47A4040 40F0F160   F2F660F8 F34040F1 F84BF0F9 2637       *IS CLOSED:    01-26-83  18.09.. *

MSGLEN  THREAD   QPR  RSC       SSC          MMN    DATE        TIME        TID   PID    CO    USR    BMN  LOG BLK  VMI
```

Figure 55. Simulation Mode Execution Log Printout (Page 5 of 6)

```
DATE 83.026    TIME 18.24.20        **** I N T E R C O M M   L O G   D I S P L A Y ****                 PAGE    6
MSGLEN  THREAD  GPR  RSC      SSC          MMN     DATE        TIME        TID    PID    CO   USR    BMN  LOG BLK  VMI
-------------------------------------------------------------------------------------------------------------------------
-------------------------------------------------------------------------------------------------------------------------
   103      1    02  ../0000  .U/00E4       30    83.026    18.09.0668  TEST1  .....  0001  00      0   F2  00   50
000000   5C5C5C40 C7D6D6C4 40C5E5C5 D5C9D5C7   405C5C5C 4040C9D5 E3C5D9C3 D6D4D440   **** GOOD EVENING ***  INTERCOMM *
000032   C9E240C3 D3D6E2C5 C47A4040 40F0F160   F2F660F8 F34040F1 F840F0F9 37          *IS CLOSED:   01-26-83  18.09.  *
-------------------------------------------------------------------------------------------------------------------------
    88      1    02  .U/00E4  ../0000       28    83.026    18.09.0668  TOALL  .....  0000  00      0   FA  00   50
000000   00000000 00000000 000B0000 12780000   00240000 00020000 00020000 00000000   *................................*
000032   00000000 00000000 00000000 0000                                              *..............                  *
-------------------------------------------------------------------------------------------------------------------------
    42      1    02  ../0000  .U/00E4       29    83.026    18.09.0786  CNT01  .....  0001  00      0   F3  00   50
-------------------------------------------------------------------------------------------------------------------------
    47      0    F2  .J/0001  ../0000       31    83.026    18.09.1056  CNT01  .....  0001  00     12   01  00   FC
000000   D5D9C3C4 26                                                                  *NRCD.                           *
-------------------------------------------------------------------------------------------------------------------------
    42      1    F2  .J/00D1  ../0000       31    83.026    18.09.1056  CNT01  .....  0000  00     12   30  00   FC
-------------------------------------------------------------------------------------------------------------------------
    42      1    02  ../0000  .U/00E4       30    83.026    18.09.1503  TEST1  .....  0001  00      0   F3  00   50
-------------------------------------------------------------------------------------------------------------------------
    78      0    00  ../0000  ../0000        0    83.026    18.09.5060  .....  .....  0000  00      0   AA  00   00
000000   C9D5E3C5 D9C3D6D4 D440C3D3 D6E2C5C4   D6E6D540 D4C5E2E2 C1C7C540 E6E2C4C3   *INTERCOMM CLOSEDOWN MESSAGE WSDC*
000032   E5C8E7E7                                                                     *VHXX                            *
-------------------------------------------------------------------------------------------------------------------------
```

Figure 55. Simulation Mode Execution Log Printout (Page 6 of 6)

Chapter 12

SUBSYSTEM TESTING IN TEST MODE

12.1 INTRODUCTION

All of the testing functions may be performed using the Intercomm Test Mode of operation without a Front End defined. Rather than receiving messages from a terminal, the Test Monitor reads messages into the system from a card-image data set. Snaps of input (snap id=15) and output (snap id=20) messages constitute a history of Test Mode execution. Essentially, the Front End is replaced by the Test Monitor (PMITEST) to drive the Back End as usual. In this way, subsystem testing can be going on in one or more regions or address spaces without affecting the on-line system. Figure 56 illustrates a sample reentrant COBOL subsystem (SQCOBOL) designed for the same purpose as SQCOBOLA, but using the Edit, Output and Change/Display Utilities. Note that SQCOBOL was compiled using the Release 9 version of COPY members (see Appendix B).

12.2 TESTING A SUBSYSTEM IN TEST MODE

To add and test an application subsystem in Test Mode, do the following:

NOTE: Steps preceded by an asterisk (*) may often be performed for the application programmer by an installation's Intercomm System Manager. Appendix C summarizes the Intercomm Table entries.

1. Compile and linkedit the application program. Appendix A describes Intercomm-supplied COBOL JCL procedures.

*2. Create or add to a USRSCTS member on a user test library to contain a Subsystem Control Table Entry (SYCTTBL macro) which describe the subsystem. Reassemble and link INTSCT which copies the USRSCTS member from the test library (see Figure 57).

*3. Create or add to a USRVERBS member on the user test library to contain an Edit Control Table (VERBTBL) entry for editing of input test messages by the Edit Utility. Reassemble and link PMIVERBS which copies the USRVERBS member from the test library (see Figure 57).

*4. If a Fixed Format output message (VMI=X'72') is created for processing by the Change/Display Utility, code an entry for the CHNGTB (see Figure 57) to define the DES000 data set entry number for the File Description Record (DES00001--see Figure 58). The PMIEXLD utility must be used to load the FDR to the DES000 file (see the <u>Utilities Users Guide</u> and the <u>Operating Reference Manual</u>).

5. Code, assemble and link and add an INCLUDE statement for the OFT load module RPTnnnnn (RPT00100 and RPT00501--see Figure 58) to the Output Format Table (PMIRCNTB) in the Test Mode Intercomm linkedit for output message formatting by the Output Utility.

6. Prepare test messages via the SIMCRTA utility or as direct card-image input data (SYSIN data set). An input test message consists of a header card, detail cards, and a trailer card, grouped together as illustrated in Figure 60. Figure 59 details the required card formats. The message area in the Test Monitor will accomodate a message text up to 958 bytes long. Longer messages would require a modification to the Test Monitor (PMITEST), as described in the Operating Reference Manual.

*7. Add control cards to the linkedit deck for the user program, unless the subsystem is dynamically loadable (see Figure 61).

*8. Linkedit to create an Intercomm Test Mode load module (see Figure 61).

9. Create test data sets and add DD statements for them to the execution JCL.

10. Execute in Test Mode with test messages in card-image format:

    a. Single-thread test the subsystem; to test a reentrant subsystem, initially specify MNCL=1 in the subsystem's SYCTTBL macro.

    b. Multithread test a reentrant subsystem (change MNCL) using several test messages.

    Test Mode execution is activated by the parameter 'TEST' on the Intercomm EXEC statement. Figure 61 illustrates a sample execution deck with test message input (DD statement SYSIN) for the sample inquiry program and JCL to print the system log.

    The resulting snaps for the test mode execution of the sample inquiry subsystem are illustrated in Figure 62.

    The System Log printed after executing in Test Mode with the sample inquiry subsystem is shown in Figure 63.

11. Test the subsystem concurrently with other application subsystems.

Note: to implement the sample subsystem for on-line execution, it would be necessary to code a BTVERB macro (in USRBTVRB--see Chapter 11) as follows:

```
BTVERB VERB=RTRQ,SSCH=R,SSC=Q,CONV=18000,EDIT=YES
```

```
PP 5734-CB2 V4 RELEASE 1.5 10NOV77        IBM OS AMERICAN NATIONAL STANDARD COBOL


   1


00001    000100 IDENTIFICATION DIVISION.
00002    000200 PROGRAM-ID. SQCOBOL.
00003    000300 REMARKS. SUBSYSTEM CODE IS 'RQ', VERB IS 'RTRQ'.
00004    000400 ENVIRONMENT DIVISION.
00005    000500 DATA DIVISION.
00006    000600 WORKING-STORAGE SECTION.
00007    000700 77  FIXED-FORMAT-NAME   PIC X(12)  VALUE 'SSRQ00010    '.
00008    000800 77  SLASH               PIC X      VALUE '/'.
00009    000900 77  BDAM-READ-VALUE     PIC X      VALUE 'D'.
00010    001000 77  DD-PART             PIC X(8)   VALUE 'PARTFILE'.
00011    001100 77  DD-STOCK            PIC X(8)   VALUE 'STOKFILE'.
00012    001200 01  ERROR-FORMAT.
00013    001300         05  FILLER    PIC X(7)  VALUE '255003N'.
00014    001400         05  FILLER    PIC S9(3) VALUE +501 COMP.
00015    001500         05  FILLER    PIC X(7)  VALUE '249051N'.
00016    001600 01  MESSAGE-TABLE.
00017    001700         04  MSG-A     PIC X(12) VALUE 'PART NUMBER '.
00018    001800         04  MSG-B     PIC X(11) VALUE ' NOT FOUND.'.
00019    001900         04  MSG-C     PIC X(5)  VALUE 'PART '.
00020    002000         04  MSG-D     PIC X(24) VALUE ' NOT FOUND IN WAREHOUSE '.
00021    002100         04  MSG-E     PIC X(20) VALUE '. MESSAGE CANCELLED.'.
00022    002200 01  HEXCODES COPY ICOMHEXC.
00023 C         01  HEXCODES.                                                   00000100
00024 C             05  HEX-00    PIC X  VALUE ' '.                             00000200
00025 C             05  CODE-00    REDEFINES  HEX-00   PIC X.                   00000300
00026 C             05  HEX-15    PIC X  VALUE 'N'.                             00000400
00027 C             05  CODE-21    REDEFINES  HEX-15   PIC X.                   00000500
00028 C             05  HEX-37    PIC X  VALUE ' '.                             00000600
00029 C             05  CODE-55    REDEFINES  HEX-37   PIC X.                   00000700
00030 C             05  HEX-50    PIC X  VALUE '$'.                             00000800
00031 C             05  CODE-80    REDEFINES  HEX-50   PIC X.                   00000900
00032 C             05  HEX-51    PIC X  VALUE 'J'.                             00001000
00033 C             05  CODE-81    REDEFINES  HEX-51   PIC X.                   00001100
00034 C             05  HEX-52    PIC X  VALUE 'K'.                             00001200
00035 C             05  CODE-82    REDEFINES  HEX-52   PIC X.                   00001300
00036 C             05  HEX-53    PIC X  VALUE 'L'.                             00001400
00037 C             05  CODE-83    REDEFINES  HEX-53   PIC X.                   00001500
00038 C             05  HEX-54    PIC X  VALUE 'M'.                             00001600
00039 C             05  CODE-84    REDEFINES  HEX-54   PIC X.                   00001700
00040 C             05  HEX-55    PIC X  VALUE 'N'.                             00001800
00041 C             05  CODE-85    REDEFINES  HEX-55   PIC X.                   00001900
00042 C             05  HEX-56    PIC X  VALUE 'O'.                             00002000
00043 C             05  CODE-86    REDEFINES  HEX-56   PIC X.                   00002100
00044 C             05  HEX-57    PIC X  VALUE 'P'.                             00002200
00045 C             05  CODE-87    REDEFINES  HEX-57   PIC X.                   00002300
00046 C             05  HEX-72    PIC X VALUE '2'.                              00002350
00047 C             05  CODE-114   REDEFINES  HEX-72   PIC X.                   00002352
00048 C             05  HEX-FF    PIC X  VALUE '"'.                             00002400
00049 C             05  CODE-255   REDEFINES  HEX-FF   PIC X.                   00002500
```

Figure 56. Sample Inquiry Subsystem; Reentrant (IBM ANS COBOL) (Page 1 of 11)

```
  2


00051   002300 01  COBREENT-CODES COPY ICOMSBS.
00052 C         01  COBREENT-CODES.                                          00001000
00053 C       *    THESE CODES REPRESENT OFFSETS FOR ROUTINE ADDRESSES IN THE   00002000
00054 C       *    TABLE NAMED REENTSBS. ONLY THE MOST COMMONLY USED VALUES     00003000
00055 C       *    ARE INCLUDED HERE; THE USERS MANUAL HAS A COMPLETE LIST.     00004000
00056 C       *    IF OFFSET ODD, THEN TRUE OFFSET=-(OFFSET+1)                  00005000
00057 C             05  MAPFREE         PIC 99  COMP VALUE 91.                00005500
00058 C             05  FECMRLSE        PIC 99  COMP VALUE 87.                00006000
00059 C             05  FESEND          PIC 99  COMP VALUE 83.                00007000
00060 C             05  FESENDC         PIC 99  COMP VALUE 79.                00008000
00061 C             05  DYN-ALLOCATE    PIC 99  COMP VALUE 75.                00009000
00062 C             05  DYN-ACCESS      PIC 99  COMP VALUE 71.                00010000
00063 C             05  MAPURGE         PIC 99  COMP VALUE 67.                00011000
00064 C             05  MAPCLR          PIC 99  COMP VALUE 63.                00012000
00065 C             05  MAPEND          PIC 99  COMP VALUE 59.                00013000
00066 C             05  MAPOUT          PIC 99  COMP VALUE 55.                00014000
00067 C             05  MAPIN           PIC 99  COMP VALUE 51.                00015000
00068 C             05  INTUNSTO        PIC 99  COMP VALUE 47.                00016000
00069 C             05  INTSTORE        PIC 99  COMP VALUE 43.                00017000
00070 C             05  INTFETCH        PIC 99  COMP VALUE 39.                00018000
00071 C             05  FECMFDBK        PIC 99  COMP VALUE 35.                00019000
00072 C             05  FECMDDQ         PIC 99  COMP VALUE 31.                00020000
00073 C             05  DQ-WRITEX       PIC 99  COMP VALUE 27.                00021000
00074 C             05  DQ-READX        PIC 99  COMP VALUE 23.                00022000
00075 C             05  DQ-WRITE        PIC 99  COMP VALUE 19.                00023000
00076 C             05  DQ-READ         PIC 99  COMP VALUE 15.                00024000
00077 C             05  DQ-CLOSE        PIC 99  COMP VALUE 11.                00025000
00078 C             05  DQ-OPEN         PIC 99  COMP VALUE 07.                00026000
00079 C             05  DQ-BUILD        PIC 99  COMP VALUE 03.                00027000
00080 C             05  FH-SELECT       PIC 99  COMP VALUE 4.                 00028000
00081 C             05  FH-RELEASE      PIC 99  COMP VALUE 8.                 00029000
00082 C             05  FH-READ         PIC 99  COMP VALUE 12.                00030000
00083 C             05  FH-WRITE        PIC 99  COMP VALUE 16.                00031000
00084 C             05  FH-GET          PIC 99  COMP VALUE 20.                00032000
00085 C             05  FH-PUT          PIC 99  COMP VALUE 24.                00033000
00086 C             05  FH-RELEX        PIC 99  COMP VALUE 28.                00034000
00087 C             05  FH-FEOV         PIC 99  COMP VALUE 32.                00035000
00088 C             05  COBPUT          PIC 99  COMP VALUE 68.                00036000
00089 C             05  MSGCOL          PIC 99  COMP VALUE 72.                00037000
00090 C             05  COBSTORF        PIC 99  COMP VALUE 76.                00038000
00091 C             05  CONVERSE        PIC 99  COMP VALUE 80.                00039000
00092 C             05  DBINT           PIC 99  COMP VALUE 84.                00040000
00093 C             05  LOGPUT          PIC 99  COMP VALUE 88.                00041000
00094 C             05  PAGE-FILE       PIC 99  COMP VALUE 92.                00042000
00095 C             05  FH-GETV         PIC 99  COMP VALUE 96.                00043000
00096 C             05  FH-PUTV         PIC 999 COMP VALUE 100.               00044000
00097 C       *    CODES 104 AND UP INDICATE USER ADDITIONS TO THE TABLE        00045000


00099   002400 01  FILLER         PIC X(22) VALUE 'END OF WORKING STORAGE'.
```

Figure 56. Sample Inquiry Subsystem; Reentrant (IBM ANS COBOL) (Page 2 of 11)

```
  3

00100    002500 LINKAGE SECTION.
00101    002600 01   INPUT-MESSAGE COPY ICOMINMG.
00102 C         01   INPUT-MESSAGE.                                                     00000100
00103 C              04  MESSG-HDR.                                                     00000200
00104 C                  06  MSGH-LENGTH                PIC S9999   COMP.               00000300
00105 C                  06  MSGH-QPR                   PIC X.                          00000400
00106 C                  06  MSGH-RSCH                  PIC X.                          00000500
00107 C                  06  MSGH-RSC                   PIC X.                          00000600
00108 C                  06  MSGH-SSC                   PIC X.                          00000700
00109 C                  06  MSGH-MMN                   PIC XXX.                        00000800
00110 C                  06  MSGH-DATE.                                                 00000900
00111 C                      08  MSGH-YR                PIC 99.                         00001000
00112 C                      08  MSGH-PERIOD            PIC X.                          00001100
00113 C                      08  MSGH-JULIAN-DAY        PIC 999.                        00001200
00114 C                  06  MSGH-TIME.                                                 00001300
00115 C                      08  MSGH-HH                PIC 99.                         00001400
00116 C                      08  MSGH-MM                PIC 99.                         00001500
00117 C                      08  MSGH-SS                PIC 99.                         00001600
00118 C                      08  MSGH-TH                PIC 99.                         00001700
00119 C                  06  MSGH-TIO.                                                  00001800
00120 C                      08  MSGH-TI1               PIC X.                          00001900
00121 C                      08  MSGH-TI2-3             PIC XX.                         00002000
00122 C                      08  MSGH-TI4-5             PIC 99.                         00002100
00123 C                  06  MSGH-CON                   PIC S9999   COMP.               00002200
00124 C                  06  MSGH-PID                   PIC X(5).                       00002300
00125 C                  06  MSGH-SSCH                  PIC X.                          00002400
00126 C                  06  MSGH-USR                   PIC X.                          00002500
00127 C                  06  MSGH-RMN                   PIC XX.                         00002600
00128 C                  06  MSGH-LOG                   PIC X.                          00002700
00129 C                  06  MSGH-BLK                   PIC X.                          00002750
00130 C                  06  MSGH-VMI                   PIC X.                          00002800

00132    002700      02  INPUT-TEXT-EDITED.
00133    002800          05  PNO-IN   PIC X(5).
00134    002900          05  WHS-IN   PIC 9(3).
00135    003000 01   SPA-ADDR     PIC X(4).
00136    003100 01   SCT-ADDR     PIC X(4).
00137    003200 01   ICOM-RETURN PIC S9(7) COMP.
00138    003300 01   DYNAMIC-WORK-SPACE COPY ICOMDWS.
00139 C         01   DYNAMIC-WORK-SPACE.                                                00000100
00140 C              02  OUTPUT-MESSAGE.                                                00000200
00141 C                04  OMESSG-HDR.                                                  00000300
00142 C                  06  OMSGH-LENGTH               PIC S9999   COMP.               00000400
00143 C                  06  OMSGH-QPR                  PIC X.                          00000500
00144 C                  06  OMSGH-RSCH                 PIC X.                          00000600
00145 C                  06  OMSGH-RSC                  PIC X.                          00000700
00146 C                  06  OMSGH-SSC                  PIC X.                          00000800
00147 C                  06  OMSGH-MMN                  PIC XXX.                        00000900
00148 C                  06  OMSGH-DATE.                                                00001000
00149 C                      08  OMSGH-YR               PIC 99.                         00001100
00150 C                      08  OMSGH-PERIOD           PIC X.                          00001200
00151 C                      08  OMSGH-JULIAN-DAY       PIC 999.                        00001300
```

Figure 56. Sample Inquiry Subsystem; Reentrant (IBM ANS COBOL) (Page 3 of 11)

```
      C               06  OMSGH-TIME.                                                      00001400
      C                   08  OMSGH-HH            PIC 99.                                  00001500
      C                   08  OMSGH-MM            PIC 99.                                  00001600
      C                   08  OMSGH-SS            PIC 99.                                  00001700
      C                   08  OMSGH-TH            PIC 99.                                  00001800
      C               06  OMSGH-TID.                                                       00001900
      C                   08  OMSGH-TI1           PIC X.                                   00002000
      C                   08  OMSGH-TI2-3         PIC XX.                                  00002100
      C                   08  OMSGH-TI4-5         PIC 99.                                  00002200
      C               06  OMSGH-CON               PIC S9999  COMP.                         00002300
      C               06  OMSGH-PID               PIC X(5).                                00002400
      C               06  OMSGH-SSCH              PIC X.                                   00002500
      C               06  OMSGH-USR               PIC X.                                   00002600
      C               06  OMSGH-PMN               PIC XX.                                  00002700
      C               06  OMSGH-LOG               PIC X.                                   00002750
      C               06  OMSGH-BLK               PIC X.                                   00002800
      C               06  OMSGH-VMI               PIC X.                                   00002900

        003400           04  TEXT-OUT            PIC   X(150).
        003500         02  FIXED-TEXT.
        003600           04  FIXED-FORMAT-DATA PIC   X(12).
        003700           04  OUT-PART-DATA     PIC   X(64).
        003800           04  OUT-PART-PRC      PIC   $$9.9999.
        003900           04  WHS-OUT           PIC   ZZZZ9.
        004000           04  OUT-STOCK-DATA.
        004100             06  OUT-STOCK-WLC   PIC   X(23).
        004200             06  OUT-STOCK-LEV   PIC   Z,ZZZ,999.
        004300             06  OUT-STOCK-LDT   PIC   X(8).
        004400             06  OUT-STOCK-ORD   PIC   Z,ZZZ,999.
        004500             06  OUT-STOCK-ODT   PIC   X(8).
        004600         02  ERROR-TEXT.
        004700           04  ERROR-MSG-FORMAT-ID PIC X(16).
        004800           04  ERROR-MESSAGE     PIC   X(50).
        004900         02  RECORD-AREA.
        005000           04  PART-RECORD.
        005100*              NOTE 100 CHARACTER BDAM RECORD WITHOUT KEYS.
        005200             06  P-REC-PART-DATA.
        005300               08  P-REC-PIN     PIC   X(5).
        005400               08  P-REC-DES     PIC   X(54).
        005500               08  P-REC-UNT     PIC   X(5).
        005600             06  P-REC-PRC       PIC   99V9(4)       COMP-3.
        005700             06  P-REC-MFR-NUM   PIC   X(15).
        005800             06  FILLER          PIC   X(17).
        005900           04  STOCK-RECORD.
        006000*              NOTE 80 CHARACTER VSAM RECORD.
        006100             06  DELETE-CHARACTER PIC X.
        006200             06  S-REC-KEY-FIELD.
        006300               08  S-REC-WHS     PIC 9(3).
        006400               08  S-REC-PNO     PIC 9(5).
        006500             06  FILLER          PIC X(28).
        006600             06  S-REC-STOCK-DATA.
        006700               08  S-REC-WLC     PIC X(23).
```

Figure 56. Sample Inquiry Subsystem; Reentrant (IBM ANS COBOL) (Page 4 of 11)

```
      5

00204  006800          08  S-REC-LEV      PIC 9(7)        COMP-3.
00205  006900*             NOTE S-REC-LEV IS 4 CHARACTERS LONG.
00206  007000          08  S-REC-LDT      PIC X(6).
00207  007100          08  S-REC-ORD      PIC 9(7)        COMP-3.
00208  007200*             NOTE S-REC-ORD IS 4 CHARACTERS LONG.
00209  007300          08  S-REC-ODT      PIC X(6).
00210  007400*
00211  007500      02  STATWD             PIC S9(7)       COMP SYNC.
00212  007600*         NOTE THIS PUTS US ONTO A FULLWORD BOUNDARY ALIGNMENT.
00213  007700      02  FH-STATUS REDEFINES STATWD.
00214  007800        04  FH-STAT1         PIC X.
00215  007900              88  IOK                    VALUE 0.
00216  008000              88  IOERROR                VALUE 1.
00217  008100              88  NOT-FOUND              VALUE 2.
00218  008200              88  NO-DD                  VALUE 9.
00219  008300        04  F-H-STAT2        PIC X.
00220  008400        04  FILLER           PIC X(2).
00221  008500      02  EXTDSCT            PIC X(48).
00222  008600*         NOTE WE ARE STILL ALIGNED HERE.
00223  008700      02  RBN-WORD           PIC S9(7)                   COMP.
00224  008800      02  RBN-FILLER REDEFINES RBN-WORD.
00225  008900        04  FILLER           PIC X.
00226  009000        04  RBN              PIC X(3).
00227  009100      02  CP-RETURN          PIC 9(2).
00228  009200          88  SUCCESSFUL-COBPUT          VALUE 0.
00229  009300      02  CURRENT-FILE       PIC X(8).
00230  009400      02  WORD               PIC S9(7)                   COMP SYNC.
00231  009500      02  FHR-STATUS REDEFINES WORD.
00232  009600        04  FHR-STAT1        PIC X.
00233  009700            88  NO-DDR                   VALUE 9.
00234  009800        04  FILLER           PIC X(3).
00235  009900      02  FH-READ-FLAG       PIC X.
00236  010000          88  BDAM                       VALUE 'D'.
00237  010100      02  KEY-FIELD          PIC 9(8).
00238  010200      02  PARTNUMBER.
00239  010300        04  FILLER           PIC 9(4).
00240  010400        04  P-DIGIT          PIC 9.
00241  010500      02  DATE-EDIT.
00242  010600        04  D-E-MO           PIC X(2).
00243  010700        04  D-E-DAY          PIC X(2).
00244  010800        04  D-E-YEAR         PIC X(2).
00245  010900        04  FILLER           PIC X(2).
00246  011000      02  DATE-MOVE.
00247  011100        04  D-M-MO           PIC X(2).
00248  011200        04  SLASH2           PIC X.
00249  011300        04  D-M-DAY          PIC X(2).
00250  011400        04  SLASH1           PIC X.
00251  011500        04  D-M-YEAR         PIC X(2).
00252  011600      02  NO-PART-MESSAGE.
00253  011700        04  MSG-1            PIC X(12).
00254  011800        04  NOPART-PNO       PIC X(5).
00255  011900        04  MSG-2            PIC X(11).
```

Figure 56. Sample Inquiry Subsystem; Reentrant (IBM ANS COBOL) (Page 5 of 11)

```
   6

00256   012000      02  NOWARES-MESSAGE.
00257   012100        04  MSG-3                PIC X(5).
00258   012200        04  NOWARES-PNO          PIC X(5).
00259   012300        04  MSG-4                PIC X(24).
00260   012400        04  NOWARES-WHS          PIC X(3).
00261   012500      02  CANCEL-MESSAGE.
00262   012600        04  CAN-CODE             PIC X(13)  JUST RIGHT.
00263   012700        04  CAN-FILE-NAME        PIC X(8).
00264   012800        04  MSG-5                PIC X(20).
```

Figure 56.   Sample Inquiry Subsystem; Reentrant (IBM ANS COBOL) (Page 6 of 11)

```
7

PROCEDURE DIVISION USING INPUT-MESSAGE
                         SPA-ADDR
                         SCT-ADDR
                         ICOM-RETURN
                         DYNAMIC-WORK-SPACE.

0100-MAIN-LINE.
    MOVE +0 TO ICOM-RETURN.
    MOVE MESSG-HDR TO OMESSG-HDR.
    MOVE OMSGH-RSCH TO OMSGH-SSCH.
    MOVE OMSGH-RSC TO OMSGH-SSC.
    PERFORM 1000-READ-PART-FILE.
    PERFORM 1100-FH-BDAM-READ.
    IF IOK
      AND NOT NO-DDR
      AND P-REC-PIN EQUAL PNO-IN
        PERFORM 2000-READ-STOCK-FILE
        PERFORM 2100-FH-VSAM-READ
        IF IOK AND NOT NO-DDR
            PERFORM 4000-SEND-REPLY-MESSAGE.
    PERFORM 4100-COBPUT-CALL.
    GOBACK.

1000-READ-PART-FILE.
    MOVE PNO-IN TO PARTNUMBER.
    MOVE P-DIGIT TO RBN-WORD.
    MOVE DD-PART TO CURRENT-FILE.

1100-FH-BDAM-READ.
    MOVE BDAM-READ-VALUE TO FH-READ-FLAG.
    PERFORM 3000-FH-SELECT-ROUTINE.
    IF NO-DD
        PERFORM 9900-NO-DD-ROUTINE
    ELSE
        PERFORM 1200-FH-BDAM-READ-CONTINUE
        IF NO-DDR
             PERFORM 9000-NO-DD-ROUTINE
        ELSE
        IF IOERROR
            PERFORM 9100-IO-ERROR-ROUTINE
        ELSE
        IF NOT-FOUND
           PERFORM 9150-NOT-FOUND-RTN
        ELSE
        IF P-REC-PIN NOT EQUAL PNO-IN
           PERFORM 9150-NOT-FOUND-RTN
        ELSE
            MOVE P-REC-PART-DATA TO OUT-PART-DATA
            MOVE P-REC-PRC TO OUT-PART-PRC.
```

Figure 56. Sample Inquiry Subsystem; Reentrant (IBM ANS COBOL) (Page 7 of 11)

```
 8

1200-FH-BDAM-READ-CONTINUE.
    MOVE SPACES TO FH-STATUS.
    CALL 'COBREENT' USING FH-READ
                          EXTDSCT
                          FH-STATUS
                          PART-RECORD
                          RBN.
    PERFORM 3100-FH-RELEASE-ROUTINE.


2000-READ-STOCK-FILE.
    MOVE DD-STOCK TO CURRENT-FILE.
    MOVE WHS-IN TO S-REC-WHS.
    MOVE PNO-IN TO S-REC-PNO.
    MOVE S-REC-KEY-FIELD TO KEY-FIELD.

2100-FH-VSAM-READ.
    MOVE ZERO TO FH-READ-FLAG.
    MOVE LOW-VALUES TO EXTDSCT.
    PERFORM 3000-FH-SELECT-ROUTINE.
    IF NO-DD
       PERFORM 9000-NO-DD-ROUTINE
    ELSE
       PERFORM 2200-FH-VSAM-READ-CONTINUE
       IF NO-DDR
          PERFORM 9000-NO-DD-ROUTINE
       ELSE
       IF IOERROR
          PERFORM 9100-IO-ERROR-ROUTINE
       ELSE
       IF NOT-FOUND
          MOVE MSG-C TO MSG-3
          MOVE MSG-D TO MSG-4
          MOVE PNO-IN TO NOWARES-PNO
          MOVE WHS-IN TO NOWARES-WHS
          MOVE NOWARES-MESSAGE TO ERROR-MESSAGE
          PERFORM 9200-SEND-ERROR-MESSAGE
       ELSE
          MOVE S-REC-WLC TO OUT-STOCK-WLC
          MOVE S-REC-LEV TO OUT-STOCK-LEV
          MOVE S-REC-LDT TO DATE-EDIT
          PERFORM 2300-DATE-EDITING
          MOVE DATE-MOVE TO OUT-STOCK-LDT
          MOVE S-REC-ORD TO OUT-STOCK-ORD
          MOVE S-REC-ODT TO DATE-EDIT
          PERFORM 2300-DATE-EDITING
          MOVE DATE-MOVE TO OUT-STOCK-ODT.
```

Figure 56. Sample Inquiry Subsystem; Reentrant (IBM ANS COBOL) (Page 8 of 11)

```
    9

022700 2200-FH-VSAM-READ-CONTINUE.
022800     MOVE SPACES TO FH-STATUS.
022900     CALL 'COBREENT' USING FH-GETV
023000                           EXTDSCT
023100                           FH-STATUS
023200                           STOCK-RECORD
023300                           KEY-FIELD.
023400     PERFORM 3100-FH-RELEASE-ROUTINE.

023600 2300-DATE-EDITING.
023700     MOVE D-E-YEAR TO D-M-YEAR.
023800     MOVE SLASH TO SLASH1.
023900     MOVE D-E-DAY TO D-M-DAY.
024000     MOVE SLASH TO SLASH2.
024100     MOVE D-E-MO TO D-M-MO.



024300 3000-FH-SELECT-ROUTINE.
024400     MOVE SPACES TO FH-STATUS.
024500     CALL 'COBREENT' USING FH-SELECT
024600                           EXTDSCT
024700                           FH-STATUS
024800                           CURRENT-FILE.

025000 3100-FH-RELEASE-ROUTINE.
025100     MOVE SPACES TO FHR-STATUS.
025200     CALL 'COBREENT' USING FH-RELEASE
025300                           EXTDSCT
025400                           FHR-STATUS.



025600 4000-SEND-REPLY-MESSAGE.
025700     MOVE WHS-IN TO WHS-OUT.
025800     MOVE FIXED-FORMAT-NAME TO FIXED-FORMAT-DATA.
025900     MOVE +192 TO OMSGH-LENGTH.
026000     MOVE HEX-00 TO OMSGH-RSCH.
026100     MOVE 'H' TO OMSGH-RSC.
026200     MOVE HEX-72 TO OMSGH-VMI.
026300     MOVE FIXED-TEXT TO TEXT-OUT.

026500 4100-COBPUT-CALL.
026600     CALL 'COBREENT' USING COBPUT
026700                           OUTPUT-MESSAGE
026800                           CP-RETURN.
026900     IF SUCCESSFUL-COBPUT
027000         NEXT SENTENCE
027100     ELSE
027200         MOVE CP-RETURN TO ICOM-RETURN.
```

Figure 56. Sample Inquiry Subsystem; Reentrant (IBM ANS COBOL) (Page 9 of 11)

```
10

027400 9000-NO-DD-ROUTINE.
027500     MOVE MSG-E TO MSG-5.
027600     MOVE 'CODE 9 ON ' TO CAN-CODE.
027700     MOVE CURRENT-FILE TO CAN-FILE-NAME.
027800     MOVE CANCEL-MESSAGE TO ERROR-MESSAGE.
027900* NOTE THIS RETURN CODE CAN CANCEL THE SUBSYSTEM TO SUBSEQUENT
028000*     MESSAGES IF SYCTTBL CANC=STOP.
028100     PERFORM 9200-SEND-ERROR-MESSAGE.

028300 9100-IO-ERROR-ROUTINE.
028400     MOVE MSG-E TO MSG-5.
028500     MOVE 'IO ERROR ON ' TO CAN-CODE.
028600     MOVE CURRENT-FILE TO CAN-FILE-NAME.
028700     MOVE CANCEL-MESSAGE TO ERROR-MESSAGE.
028800     PERFORM 9200-SEND-ERROR-MESSAGE.

029000 9150-NOT-FOUND-RTN.
029100     MOVE MSG-A TO MSG-1.
029200     MOVE MSG-B TO MSG-2.
029300     MOVE PNO-IN TO NOPART-PNO.
029400     MOVE NO-PART-MESSAGE TO ERROR-MESSAGE.
029500     PERFORM 9200-SEND-ERROR-MESSAGE.

029700 9200-SEND-ERROR-MESSAGE.
029800     MOVE +108 TO OMSGH-LENGTH.
029900     MOVE HEX-00 TO OMSGH-RSCH.
030000     MOVE 'U' TO OMSGH-RSC.
030100     MOVE HEX-50 TO OMSGH-VMI.
030200     MOVE ERROR-FORMAT TO ERROR-MSG-FORMAT-ID.
030300     MOVE ERROR-TEXT TO TEXT-OUT.
```

Figure 56. Sample Inquiry Subsystem; Reentrant (IBM ANS COBOL) (Page 10 of 11)

```
DNM=5-336   04  MSGH-TI1                    BLL=3   017  DNM=5-336   DS 1C       DISP
DNM=5-354   04  MSGH-TI2-3                  BLL=3   018  DNM=5-354   DS 2C       DISP
DNM=5-374   04  MSGH-TI4-5                  BLL=3   01A  DNM=5-374   DS 2C       DISP-NM
DNM=5-397   03  MSGH-CON                    BLL=3   01C  DNM=5-397   DS 2C       COMP
DNM=5-415   03  MSGH-PID                    BLL=3   01E  DNM=5-415   DS 5C       DISP
DNM=5-433   03  MSGH-SSCH                   BLL=3   023  DNM=5-433   DS 1C       DISP
DNM=5-452   03  MSCH-USR                    BLL=3   024  DNM=5-452   DS 1C       DISP
DNM=5-473   03  MSGH-RMN                    BLL=3   025  DNM=5-473   DS 2C       DISP
DNM=5-491   03  MSGH-LOG                    BLL=3   027  DNM=5-491   DS 1C       DISP
DNM=6-000   03  MSGH-BLK                    BLL=3   028  DNM=6-000   DS 1C       DISP
DNM=6-018   03  MSGH-VMI                    BLL=3   029  DNM=6-018   DS 1C       DISP
DNM=6-039   02  INPUT-TEXT-EDITED           BLL=3   02A  DNM=6-039   DS 0CL8     GROUP
DNM=6-069   03  PND-IN                      BLL=3   02A  DNM=6-069   DS 5C       DISP
DNM=6-085   03  WHS-IN                      BLL=3   02F  DNM=6-085   DS 3C       DISP-NM
DNM=6-101   01  SPA-ADDR                    BLL=4   000  DNM=6-101   DS 4C       DISP
DNM=6-119   01  SCT-ADDR                    BLL=5   000  DNM=6-119   DS 4C       DISP
DNM=6-140   01  ICOM-RETURN                 BLL=6   000  DNM=6-140   DS 4C       COMP
DNM=6-161   01  DYNAMIC-WORK-SPACE          BLL=7   000  DNM=6-161   DS 0CL792   GROUP
DNM=6-192   02  OUTPUT-MESSAGE              BLL=7   000  DNM=6-192   DS 0CL192   GROUP
DNM=6-219   03  OMESSG-HDR                  BLL=7   000  DNM=6-219   DS 0CL42    GROUP
DNM=6-242   04  OMSGH-LENGTH                BLL=7   000  DNM=6-242   DS 2C       COMP
DNM=6-267   04  OMSGH-QPR                   BLL=7   002  DNM=6-267   DS 1C       DISP
DNM=6-289   04  OMSGH-RSCH                  BLL=7   003  DNM=6-289   DS 1C       DISP
DNM=6-309   04  OMSGH-RSC                   BLL=7   004  DNM=6-309   DS 1C       DISP
DNM=6-331   04  OMSGH-SSC                   BLL=7   005  DNM=6-331   DS 1C       DISP
DNM=6-350   04  OMSGH-MMN                   BLL=7   006  DNM=6-350   DS 3C       DISP
DNM=6-372   04  OMSGH-DATE                  BLL=7   009  DNM=6-372   DS 0CL6     GROUP
DNM=6-398   05  OMSGH-YR                    BLL=7   009  DNM=6-398   DS 2C       DISP-NM
DNM=6-419   05  OMSGH-PERIOD                BLL=7   00B  DNM=6-419   DS 1C       DISP
DNM=6-441   05  OMSGH-JULIAN-DAY            BLL=7   00C  DNM=6-441   DS 3C       DISP-NM
DNM=6-467   04  OMSGH-TIME                  BLL=7   00F  DNM=6-467   DS 0CL8     GROUP
DNM=6-490   05  OMSGH-HH                    BLL=7   00F  DNM=6-490   DS 2C       DISP-NM
DNM=7-000   05  OMSGH-MM                    BLL=7   011  DNM=7-000   DS 2C       DISP-NM
DNM=7-018   05  OMSGH-SS                    BLL=7   013  DNM=7-018   DS 2C       DISP-NM
DNM=7-036   05  OMSGH-TH                    BLL=7   015  DNM=7-036   DS 2C       DISP-NM
DNM=7-054   04  OMSGH-TID                   BLL=7   017  DNM=7-054   DS 0CL5     GROUP
DNM=7-076   05  OMSGH-TI1                   BLL=7   017  DNM=7-076   DS 1C       DISP
DNM=7-095   05  OMSGH-TI2-3                 BLL=7   018  DNM=7-095   DS 2C       DISP
DNM=7-116   05  OMSGH-TI4-5                 BLL=7   01A  DNM=7-116   DS 2C       DISP-NM
DNM=7-137   04  OMSGH-CON                   BLL=7   01C  DNM=7-137   DS 2C       COMP
DNM=7-159   04  OMSGH-PID                   BLL=7   01E  DNM=7-159   DS 5C       DISP
DNM=7-178   04  OMSGH-SSCH                  BLL=7   023  DNM=7-178   DS 1C       DISP
DNM=7-198   04  OMSGH-USR                   BLL=7   024  DNM=7-198   DS 1C       DISP
DNM=7-220   04  OMSGH-RMN                   BLL=7   025  DNM=7-220   DS 2C       DISP
DNM=7-242   04  OMSGH-LOG                   BLL=7   027  DNM=7-242   DS 1C       DISP
DNM=7-261   04  OMSGH-BLK                   BLL=7   028  DNM=7-261   DS 1C       DISP
DNM=7-283   04  OMSGH-VMI                   BLL=7   029  DNM=7-283   DS 1C       DISP
DNM=7-302   03  TEXT-OUT                    BLL=7   02A  DNM=7-302   DS 150C     DISP
DNM=7-320   02  FIXED-TEXT                  BLL=7   0C0  DNM=7-320   DS 0CL146   GROUP
DNM=7-343   03  FIXED-FORMAT-DATA           BLL=7   0C0  DNM=7-343   DS 12C      DISP
DNM=7-370   03  OUT-PART-DATA               BLL=7   0CC  DNM=7-370   DS 64C      DISP
DNM=7-393   03  OUT-PART-PRC                BLL=7   10C  DNM=7-393   DS 8C       NM-EDIT
```

Figure 56. Sample Inquiry Subsystem; Reentrant (IBM ANS COBOL) (Page 11 of 11)

```
//TABLES        JOB
//*
//*                   DEFINE SYCTTBL FOR SUBSYSTEM
//*
//STEP1         EXEC  LIBELINK,Q=TEST,NAME=INTSCT,LMOD=INTSCT
//LIB.SYSIN     DD    *
./ ADD NAME=USRSCTS
./ NUMBER       NEW1=100,INCR=100
USRSCTS         DS    0H
RQ              SYCTTBL SUBH=R,SUBC=Q,SBSP=SQCOBOL,LANG=RCOB,OVLY=0,      X
                      NUMCL=10,MNCL=1,TCTV=60,GET=792
/*
//ASM.SYSIN     DD    DSN=INT.SYMREL(INTSCT),DISP=SHR
//*
//*                   DEFINE EDIT CONTROL TABLE ENTRY
//*
//STEP2         EXEC  LIBELINK,Q=TEST,NAME=PMIVERBS,LMOD=PMIVERBS
//LIB.SYSIN     DD    *
./ ADD  NAME=USRVERBS
./ NUMBER       NEW1=100,INCR=100
USRVERBS        DS    0H
RTRQECT         VERB  RTRQ,D9,256,2,FIX=YES
                PARM  P/N,1,7,5,10000111
                PARM  WHS,2,7,3,10000111
/*
//ASM.SYSIN     DD    DSN=INT.SYMREL(PMIVERBS),DISP=SHR
//*
//*                   DEFINE CHANGE/DISPLAY TABLE
//*
//STEP3         EXEC  LIBELINK,Q=TEST,NAME=CHNGTB,LMOD=CHNGTB
//LIB.SYSIN     DD    *
./ ADD  NAME=CHNGTB
./ NUMBER       NEW1=100,INCR=100
CHTB            TITLE 'CHNGTB - FIXED FORMAT OUTPUT-DESCRIPTOR NAME TABLE'
CHNGTB          CSECT
                DC    CL8'SSRQ0001' USED ONLY TO TEST COBOL PGM. GUIDE S/S
                DC    F'0'
                PMISTOP
                END
//
```

Figure 57. Table Updates to Implement Test Mode Testing

```
* OUTPUT FORMAT TABLE FOR SAMPLE INQUIRY SUBSYSTEM                          00000100
*                                                                           00000200
OFT100   REPORT NUM=100,LINES=8                                             00000300
         LINE   NUM=1,ITEMS=1                                               00000400
         ITEM   CODE=255,DATA='STOCK STATUS REQUEST',FROM=6,TO=25           00000500
         LINE   NUM=2,ITEMS=2                                               00000600
         ITEM   CODE=255,DATA='PART NUMBER',FROM=1,TO=11                    00000700
C12PNO   ITEM   CODE=12,FROM=13,TO=17                                       00000800
         LINE   NUM=3,ITEMS=2                                               00000900
         ITEM   CODE=255,DATA='DESCRIPTION',FROM=1,TO=11                    00001000
C21DES   ITEM   CODE=21,FROM=13,TO=66                                       00001100
         LINE   NUM=4,ITEMS=4                                               00001200
         ITEM   CODE=255,DATA='ORDER UNITS',FROM=1,TO=11                    00001300
C18UNT   ITEM   CODE=18,FROM=13,TO=17                                       00001400
         ITEM   CODE=255,DATA='PRICE',FROM=19,TO=23                         00001500
C19PRC   ITEM   CODE=19,FROM=25,TO=32                                       00001600
         LINE   NUM=5,ITEMS=2                                               00001700
         ITEM   CODE=255,DATA='STOCK STATUS AT WAREHOUSE',FROM=1,TO=25      00001800
C8WHS    ITEM   CODE=8,FROM=27,TO=31                                        00001900
         LINE   NUM=6,ITEMS=2                                               00002000
         ITEM   CODE=255,DATA='LOCATION',FROM=4,TO=11                       00002100
C10WLC   ITEM   CODE=10,FROM=13,TO=35                                       00002200
         LINE   NUM=7,ITEMS=4                                               00002300
         ITEM   CODE=255,DATA='ON HAND',FROM=6,TO=12                        00002400
C13LEV   ITEM   CODE=13,FROM=15,TO=23                                       00002500
C14LDT   ITEM   CODE=14,FROM=38,TO=45                                       00002600
         ITEM   CODE=255,DATA='AS OF',FROM=31,TO=35                         00002700
         LINE   NUM=8,ITEMS=4                                               00002800
         ITEM   CODE=255,DATA='ON ORDER',FROM=6,TO=13                       00002900
C15ORD   ITEM   CODE=15,FROM=15,TO=23                                       00003000
         ITEM   CODE=255,DATA='AS OF',FROM=31,TO=35                         00003100
C16OAT   ITEM   CODE=16,FROM=38,TO=45                                       00003200
         END                                                                00003300
```

Figure 58. Utilities Table Coding for Test Mode Subsystem (Page 1 of 2)

```
* OUTPUT FORMAT TABLE FOR ERROR MESSAGES FROM INQUIRY SUBSYSTEM          00000100
*                                                                         00000200
OFT501   REPORT NUM=501,LINES=1                                           00000300
         LINE NUM=1,ITEMS=2                                               00000400
         ITEM CODE=255,FROM=1,TO=10,DATA='**ERROR** '                     00000500
         ITEM CODE=249,FROM=12,TO=62                                      00000600
         END                                                              00000700
```

```
* FILE DESCRIPTION RECORD FOR FIXED FORMAT OUTPUT                         00000100
*                FROM SAMPLE INQUIRY SUBSYSTEM                            00000200
DES00001 CSECT                                                            00000300
SSRQ100  FDHDR NAME=SSRQ0001,RPTNO=100,FIELDS=10                          00000400
PNO12    FDETL OFSET=0,LEN=5,NAME=P/NXX,CODE=12                           00000500
DES21    FDETL OFSET=5,LEN=54,NAME=DESXX,CODE=21                          00000600
UNT18    FDETL OFSET=59,LEN=5,NAME=UNTXX,CODE=18                          00000700
PRC19    FDETL OFSET=64,LEN=8,NAME=PRCXX,CODE=19                          00000800
WHS08    FDETL OFSET=72,LEN=5,NAME=WHSXX,CODE=8                           00000900
WLC10    FDETL OFSET=77,LEN=23,NAME=WLCXX,CODE=10                         00001000
LEV13    FDETL OFSET=100,LEN=9,NAME=LEVXX,CODE=13                         00001100
LDT14    FDETL OFSET=109,LEN=8,NAME=LDTXX,CODE=14                         00001200
ORD15    FDETL OFSET=117,LEN=9,NAME=ORDXX,CODE=15                         00001300
ODT16    FDETL OFSET=126,LEN=8,NAME=ODTXX,CODE=16                         00001400
         END                                                              00001500
```

Figure 58. Utilities Table Coding for Test Mode Subsystem (Page 2 of 2)

Card		Contents
HEADER	1-3	MSG
	*6-8	Low-order byte of S/S code (MSGHRSC) (or 8)
	*9-11	Hi-order byte of S/S code (MSGHRSCH) (or 11)
	20-24	Sending terminal ID (MSGHTID)
	50-53	Front-end Message Number (MSGHBMN)
	*55-57	VMI value (MSGHVMI); leave blank if EDIT required; code 255 if no editing by Edit Utility (or 57).
DETAIL(s)	1-64**	Data for one line of input message. If VMI in header card is left blank, a new line character is inserted at end of text on every card except last one. If the last non-blank character is a $ sign (X'5B'), it will be replaced by a NL; the preceding character (usually a blank) is kept as part of the input. All NL's are suppressed if editing is not required.
TRAILER	1-3	Generates End of Transmission character following the last non-blank character of the previous detail card. Contents of Card / Ending Character EMS — EOT (X'37') EOT — EOT (X'37') ETX — ETX (X'03') ETB — ETB (X'26')

*3-digit integer values (from 000 to 255) or a corresponding single alphnumeric character in the low-order field position.

**64 is default maximum. See the Operating Reference Manual if necessary to alter this specification.

Figure 59. Test Mode Message Card Formats

```
MSG      Q   R          TEST1                         0001
RTRQ
P/N 12345
WHS 200
EMS
MSG      Q   R          TEST1                         0002
RTRQ
P/N 55555
WHS 200
EMS
MSG      Q   R          TEST1                         0003
RTRQ
P/N 12345
WHS 300
EMS
MSG      Q   R          TEST1                         0004
RTRQ
P/N 12349
WHS 200
EMS
MSG      Q   R          TEST1                         0005
RTRQ
P/N 12341
WHS 100
EMS
MSG      Q   R          TEST1                         0006
RTRQ
P/N A2345
WHS 400
EMS
```

Figure 60. Sample Input Test Messages for Test Mode

```
//EXECTEST JOB (ICOMTEST,,,20),'ICOM TEST SQCOBOL',CLASS=A,
//   RESTART=(GENLINK.ASM)
//PROCLIB DD DSN=INT.PROCLIB,DISP=SHR        (AS NEEDED)
//**********************************************************************
//*  THE RESTART PARM IN THE JOB STATEMENT RESTARTS THE TEST AT THE    *
//*  BEGINNING.  IF YOU WISH TO RESTART AT A DIFFERENT STEP, CODE      *
//*  RESTART=STEPNAME  OR  RESTART=STEPNAME.PROCSTEPNAME               *
//*                                                                    *
//*  NOTE: WHEN USING A VSAM FILE, IT MAY BE NECESSARY TO EXECUTE      *
//*        IDCAMS TO VERIFY THE FILE IF A PREVIOUS EXECUTION ABENDED.  *
//**********************************************************************
//*
//**********************************************************************
//*  STEP GENLINK GENERATES A STANDARD TEST MODE LINKEDIT DECK         *
//*   VIA ASSEMBLY OF THE ICOMLINK MACRO.                              *
//*  THE GENERATED DECK (TESTLINK) IS PLACED ON INT.SYMTEST.           *
//**********************************************************************
//GENLINK  EXEC  ASMPC,Q=LIB,U=REL,DECK=DECK
//ASM.SYSIN DD *
         ICOMLINK TEST=YES,MMU=NO,STORFCH=NO,COBOL=YES,RECOBOL=YES
         END
//SYSPUNCH DD DSN=INT.SYMTEST(TESTLINK),DISP=SHR
//*
//**********************************************************************
//*  STEPS SCRSCR AND ALLOCSCR DELETE AND RE-ALLOCATE THE LOAD         *
//*   MODULE LIBRARY USED IN THE TEST   (ALSO USED FOR DYNLLIB)        *
//**********************************************************************
//SCRSCR   EXEC PGM=IEFBR14
//FILE1    DD   DSN=INT.MODSCR,DISP=(OLD,DELETE)
//ALLOCSCR EXEC PGM=IEFBR14
//A        DD   DSN=INT.MODSCR,DISP=(,CATLG),UNIT=SYSDA,
//    DCB=INT.MODREL,VOL=SER=INT001,SPACE=(CYL,(3,,7))
```

NOTE: JCL requirements vary by installation requirements. The above example illustrates representative JCL. The installation System Manager should verify JCL to use.

Figure 61. Linkedit and Execution JCL for Test Mode (Page 1 of 3)

```
//*********************************************************************
//*  STEP GENINCL CREATES INCLUDE CARDS USED BY THE LINK EDIT STEP    *
//*  THE ADDED INCLUDE STATEMENTS ARE FOR THE SAMPLE SUBSYSTEM AND    *
//*      THE REFERENCED OFTS (INCLUDE AFTER PMIRCNTB).                *
//*  IF THE TEST1 TERMINAL IS NOT IN THE SYSTEM PMISTATB TABLE, USE:  *
//*      INCLUDE MODREL(PMISTATB)                                     *
//*      INCLUDE MODREL(PMIDEVTB)                                     *
//*      INCLUDE MODREL(PMIBROAD)                                     *
//*     THE ABOVE ASSUMES THE CONTROL TERMINAL IS NAMED CNT01.        *
//* *** BEFORE THIS STEP, SEQUENCE NUMBER THE TESTLINK SOURCE. *****  *
//*********************************************************************
//GENINCL  EXEC PGM=IEBUPDTE
//SYSPRINT DD   SYSOUT=A
//SYSUT1   DD   DSN=INT.SYMTEST,DISP=SHR
//SYSUT2 DD DSN=&&INCL,DISP=(,PASS),UNIT=SYSDA,SPACE=(CYL,(1,1,1)),
//    DCB=(BLKSIZE=80,LRECL=80)
//SYSIN    DD   *
./  CHANGE NAME=TESTLINK,LIST=ALL
         INCLUDE SYSLIB(SQCOBOL)          SAMPLE SUBSYSTEM              00000010
         INCLUDE SYSLIB(RPT00100)         DISPLAY OFT FOR SUBSYSTEM     01981000
         INCLUDE SYSLIB(RPT00501)         ERROR MESSAGES OFT            01982000
//*********************************************************************
//*   LINK EDIT THE TEST INTERCOMM SYSTEM                             *
//*   NOTE: THE INTERCOMM PROC 'LKEDT' LINKEDITS MODULES FROM THE     *
//*         SYSLIB CONCATENATION STREAM AS FOLLOWS -                  *
//*         THE LOAD LIBRARY SPECIFIED BY THE Q= PARAMETER,           *
//*         FOLLOWED BY MODULES FOUND IN MODUSR, MODLIB, THEN MODREL. *
//*         THEN, SYS1.COBLIB (FOR OS/VS COBOL).                     *
//*         THE INTERCOMM LOAD MODULE IS PLACED ON INT.MODSCR.        *
//*   IT IS NOT NECESSARY TO RE-DO THE WHOLE LINK TO REPLACE 1 MODULE *
//*   IN THIS CASE, ALL YOU SHOULD DO IS:                             *
//*    1)  REASSEMBLE OR RECOMPILE THE CHANGED/NEW MODULE INTO A      *
//*        SEPARATE LOAD LIBRARY                                      *
//*    2)  OVERRIDE THE SYSLIN DD STMT TO //LKED.SYSLIN DD *          *
//*        FOLLOW IT WITH INCLUDE CARDS                               *
//*        FOR THE MODULES YOU WISH TO REPLACE                        *
//*    3)  FOLLOW THOSE INCLUDES WITH THE FOLLOWING 3 CARDS:          *
//*            INCLUDE SYSLMOD(TESTICOM)                              *
//*            ENTRY   PMISTUP                                        *
//*            NAME    TESTICOM(R)                                    *
//*     4) INSERT A DD STMT FOR THE LOAD LIBRARY ON WHICH THE         *
//*        REPLACEMENT MODULES RESIDE                                 *
//*     5) CHANGE THE RESTART PARM ON THE JOB STATEMENT               *
//*         TO POINT TO THE LKED STEP                                 *
//*********************************************************************
//LKED     EXEC LKEDT,LMOD=TESTICOM,Q=TEST,
//      PARM.LKED='LIST,LET,XREF,NCAL,SIZE=(250K,100K)'
//LKED.SYSLIN DD DSN=&&INCL(TESTLINK),DISP=(OLD,PASS)
//MODREL   DD   DSN=INT.MODREL,DISP=SHR
```

Figure 61. Linkedit and Execution JCL for Test Mode (Page 2 of 3)

```
//************************************************************************
//*    EXECUTE INTERCOMM IN TESTMODE                                     *
//************************************************************************
//GO        EXEC PGM=TESTICOM,PARM='TEST',TIME=(,30)
//STEPLIB   DD   DSN=INT.MODSCR,DISP=(OLD,PASS)          (DYNLLIB)
//          DD   DSN=INT.MODUSR,DISP=SHR        (USER LOAD LIBRARY)
//          DD   DSN=INT.MODLIB,DISP=SHR        (SYSTEM UPDATE LIBRARY)
//          DD   DSN=INT.MODREL,DISP=SHR        (SYSTEM RELEASE LIBRARY)
//          DD   DSN=SYS1.COBLIB,DISP=SHR       (COBOL LOAD LIBRARY)
//INTERLOG DD    DSN=&&INTLOG,DISP=(NEW,PASS),
//  SPACE=(TRK,(10,5)),VOL=SER=INT001,UNIT=SYSDA,
//  DCB=(DSORG=PS,RECFM=VB,BLKSIZE=4096,LRECL=4092,NCP=8,OPTCD=C)
//STSLOG    DD SYSOUT=A,DCB=(DSORG=PS,BLKSIZE=120,RECFM=FA)
//SMLOG     DD SYSOUT=A,DCB=(DSORG=PS,BLKSIZE=120,RECFM=FA)
//SYSPRINT DD SYSOUT=A,DCB=(DSORG=PS,RECFM=VA,BLKSIZE=141,LRECL=137)
//RCT000    DD DSN=INT.RCT000,DISP=SHR,
//             DCB=(DSORG=DA,OPTCD=RF)           OUTPUT FORMATS
//PMIQUE    DD DISP=OLD,DSN=INT.PMIQUE,
//             DCB=(DSORG=DA,OPTCD=R)            SUBSYSTEM DISK QUEUE
//STOKFILE DD DSN=VSAMSD1.STCKFILE.CLUSTER,DISP=OLD,
//             AMP=(AMORG,'RECFM=F')             VSAM TEST FILE
//PARTFILE DD DSN=INT.TEST.PARTFILE,DISP=OLD,
//             DCB=(DSORG=DA,OPTCD=R)            BDAM TEST FILE
//DES000    DD DSN=INT.DES000,DISP=SHR,
//             DCB=(DSORG=DA,OPTCD=RF)      FILE DESCRIPTION RECORDS
//SYSIN     DD DSN=INT.SYMTEST(TESTMSGS),DISP=SHR,
//             DCB=DSORG=PS                 TEST MODE INPUT MESSAGES
//PMISTOP   DD DUMMY
//ICOMIN    DD DUMMY                       (ADD FAR PARMS IF DESIRED)
//*
//STEPCAT   DD DSN=VSAMSD1,DISP=SHR         VSAM CATALOG (IF NEEDED)
//*         DYNAMIC LINKEDIT DATA SETS                   (IF NEEDED)
//DYNLPRNT DD SYSOUT=A
//DYNLLIB   DD DSN=INT.MODSCR,DISP=(OLD,PASS)
//DYNLWORK DD UNIT=SYSDA,SPACE=(CYL,(1,1)),DISP=(,PASS)  (REL 9 ONLY)
//*
//SNAPDD    DD SYSOUT=A
//SYSSNAP   DD SYSOUT=A                   SNAP INPUT TEST MESSAGES
//SYSSNAP2 DD SYSOUT=A                    SNAP OUTPUT TEST MESSAGES
//SYSUDUMP DD SYSOUT=A
//*
//ABNLIGNR DD DUMMY  FORCE ABEND-AID TO IGNORE DUMP (PRODUCE IBM DUMP)
//************************************************************************
//*   PRINT INTERCOMM LOG FROM TEST MODE RUN                             *
//************************************************************************
//INTERLOG EXEC PGM=LOGPRINT,COND=EVEN
//STEPLIB   DD   DSN=INT.MODREL,DISP=SHR
//SYSPRINT DD    SYSOUT=A,DCB=(DSORG=PS,BLKSIZE=121)
//INTERLOG DD    DSN=&&INTLOG,DISP=SHR,DCB=BLKSIZE=5000
//SYSIN     DD   DUMMY,DCB=BLKSIZE=80
//
```

Figure 61.   Linkedit and Execution JCL for Test Mode (Page 3 of 3)

```
JOB WSDCVHTT          STEP GO              TIME 174531   DATE 83032    ID = 015    CPUID = 000204333033       PAGE 0001
-STORAGE

1173E0                                                                     004102D9 D8000000   *                            ...RQ...*
117400   00000000 00000000 00000000 000000E3    C5E2E3F1 00010000 00000000 00000100   *...............TEST1............*
117420   0000D9E3 D9D815D7 61D540F1 F2F3F4F5    15E6C8E2 40F2F0F0 37000000            *..RTRQ.P.N 12345.WHS 200.....   *


-STORAGE

1173E0                                                                     004102D9 D8000000   *                            ...RQ...*
117400   00000000 00000000 00000000 000000E3    C5E2E3F1 00010000 00000000 00000200   *...............TEST1............*
117420   0000D9E3 D9D815D7 61D540F5 F5F5F5F5    15E6C8E2 40F2F0F0 37000000            *..RTRQ.P.N 55555.WHS 200.....   *


-STORAGE

1173E0                                                                     004102D9 D8000000   *                            ...RQ...*
117400   00000000 00000000 00000000 000000E3    C5E2E3F1 00010000 00000000 00000300   *...............TEST1............*
117420   0000D9E3 D9D815D7 61D540F1 F2F3F4F5    15E6C8E2 40F3F0F0 37000000            *..RTRQ.P.N 12345.WHS 300.....   *


-STORAGE

1173E0                                                                     004102D9 D8000000   *                            ...RQ...*
117400   00000000 00000000 00000000 000000E3    C5E2E3F1 00010000 00000000 00000400   *...............TEST1............*
117420   0000D9E3 D9D815D7 61D540F1 F2F3F4F9    15E6C8E2 40F2F0F0 37000000            *..RTRQ.P.N 12349.WHS 200.....   *


-STORAGE

1173E0                                                                     004102D9 D8000000   *                            ...RQ...*
117400   00000000 00000000 00000000 000000E3    C5E2E3F1 00010000 00000000 00000500   *...............TEST1............*
117420   0000D9E3 D9D815D7 61D540F1 F2F3F4F1    15E6C8E2 40F1F0F0 37000000            *..RTRQ.P.N 12341.WHS 100.....   *


-STORAGE

1173E0                                                                     004102D9 D8000000   *                            ...RQ...*
117400   00000000 00000000 00000000 000000E3    C5E2E3F1 00010000 00000000 00000600   *...............TEST1............*
117420   0000D9E3 D9D815D7 61D540C1 F2F3F4F5    15E6C8E2 40F4F0F0 37000000            *..RTRQ.P.N A2345.WHS 400.....   *
```

Figure 62. Sample Test Mode Execution Snaps (Page 1 of 3)

```
JOB WSDCVHIT           STEP GO              TIME 174553   DATE 83032    ID = 020    CPUID = 000204333033      PAGE 0001

-STORAGE

149720                                                        00680200 E4000000   *                       ....U...*
149740    07F8F300 F0F3F2F1 F7F4F5F5 F3F6F5C3   D5E3F0F1 00010000 00000000 000000F2   *.83.03217455365CNT01...........2*
149760    00505C5C 5C40C7D6 D6C440C1 C6E3C5D9   D5D6D6D5 5C5C4040 C9D5E3C5 D9C3D6D4   *..... GOOD AFTERNOON..  INTERCOM*
149780    D440C9E2 40D9C5C1 C4E8407A 404040F0   F260F0F1 60F8F340 40F1F74B F4F52637   *M IS READY .   02.01.83  17.45..*
1497A0    40404040                                                                    *                                *

-STORAGE

14CCA0                                          00670200 E4000000 07F8F300 F0F3F2F1   *               ....U....83.0321*
14CCC0    F7F4F5F5 F3F6F5E3 C5E2E3F1 00010000   00000000 000000F2 00505C5C 5C40C7D6   *7455365TEST1............2..... GO*
14CCE0    D6C440C1 C6E3C5D9 D5D6D6D5 5C5C4040   C9D5E3C5 D9C3D6D4 D440C9F2 40D9C5C1   *OD AFTERNOON..  INTERCOMM IS REA*
14CD00    C4E8407A 404040F0 F260F0F1 60F8F340   40F1F74D F4F53740                     *DY .   02.01.83  17.45.         *

-STORAGE

14CCA0                                          01290200 E4C80000 09F8F301 F0F3F2F1   *               ....UH...83.0321*
14CCC0    F7F4F5F5 F4F2F4E3 C5E2E3F1 00010000   00000000 000001F2 00504040 404040E2   *7455424TEST1...........2..     S*
14CCE0    E3D6C3D2 40E2E3C1 E3E4E240 D9C5D8E4   C5E2E315 D7C1D9E3 40D5E4D4 C2C5D940   *TOCK STATUS REQUEST.PART NUMBER *
14CD00    F1F2F3F4 F515C4C5 E2C3D9C9 D7E3C9D6   D540F161 F240C9D5 40E2E3C5 C5D340E6   *12345.DESCRIPTION 1.2 IN STEEL W*
14CD20    C1E2C8C5 D915D6D9 C4C5D940 E4D5C9E3   E240C7D9 E2404040 D7D9C9C3 C5405BF0   *ASHER.ORDER UNITS GRS   PRICE .0*
14CD40    F54BF0F5 F0F715E2 E3D6C3D2 40E2E3C1   E3E4E240 C1E340E6 C1D9C5C8 D6E4E2C5   *5.0507.STOCK STATUS AT WAREHOUSE*
14CD60    40F2F0F0 15404040 D3D6C3C1 E3C9D6D5   40D4C9C1 D4C96B40 C6D3C14B 15404040   * 200.   LOCATION MIAMI. FLA..   *
14CD80    4040D6D5 40C8C1D5 C44040F6 6BF1F6F1   6BF5F0F6 40404040 404040C1 E240D6C6   *  ON HAND  6.161.506        AS OF*
14CDA0    4040F0F3 61F0F561 F8F21540 40404040   D6D540D6 D9C4C5D9 40F46BF0 F4F06BF6   *  03.05.82.      ON ORDER 4.040.6*
14CDC0    F1F74040 40404040 40C1E240 D6C64040   F1F061F1 F161F8F2 37404040            *17         AS OF  10.11.82.     *

-STORAGE

14CCA0                                          00520200 E4D80000 0AF8F302 F0F3F2F1   *               ....UQ...83.0321*
14CCC0    F7F4F5F5 F4F3F2E3 C5E2E3F1 00010000   00000009 000002F2 00505C5C C5D9D9D6   *7455432TEST1.......R...2....ERRO*
14CCE0    D95C5C40 40D7C1D9 E340D5E4 D4C2C5D9   40F5F5F5 F5F540D5 D6E340C6 D6E4D5C4   *R..  PART NUMBER 55555 NOT FOUND*
14CD00    4B374040                                                                    *..                              *

-STORAGE

14CCA0                                          005B0200 E4D80000 0BF8F301 F0F3F2F1   *               ....UQ...83.0321*
14CCC0    F7F4F5F5 F4F3F6E3 C5E2E3F1 00010000   00000009 000003F2 00505C5C C5D9D9D6   *7455436TEST1.......R...2....ERRO*
14CCE0    D95C5C40 40D7C1D9 E340F1F2 F3F4F540   D5D6E340 C6D6E4D5 C440C9D5 40E6C1D9   *R..  PART 12345 NOT FOUND IN WAR*
14CD00    C5C8D6E4 E2C540F3 F0F03740                                                  *EHOUSE 300.                     *

-STORAGE

14CCA0                                          00520200 E4D80000 0CF8F301 F0F3F2F1   *               ....UQ...83.0321*
14CCC0    F7F4F5F5 F4F4F5E3 C5E2E3F1 00010000   00000009 000004F2 00505C5C C5D9D9D6   *7455445TEST1.......R...2....ERRO*
14CCE0    D95C5C40 40D7C1D9 E340D5E4 D4C2C5D9   40F1F2F3 F4F940D5 D6E340C6 D6E4D5C4   *R..  PART NUMBER 12349 NOT FOUND*
14CD00    4B374040                                                                    *..                              *
```

Figure 62. Sample Test Mode Execution Snaps (Page 2 of 3)

```
JOB WSDCVHTT          STEP GO                TIME 174554   DATE 83032    ID = 020    CPUID = 000204333033      PAGE 0001

-STORAGE

14CCA0                                                  00B50200 D5E80000 0EF8F302 F0F3F2F1   *                    ....NY...83.0321*
14CCC0   F7F4F5F5 F4F4F9E3 C5E2E3F1 00010000   00000000 000006F2 0050F0F0 C5F840F0   *7455449TEST1............2..00E8 0*
14CCE0   F0F0F2F9 15D5D6D5 60D5E4D4 C5D9C9C3   40C3C8C1 D9C1C3E3 C5D940C7 C9E5C5D5   *0029.NON.NUMERIC CHARACTER GIVEN*
14CD00   40D6D540 D761D540 D7C1D9C1 D4C5E3C5   D940C6D6 D940D9E3 D9D840E5 C5D9C24B   * ON P.N PARAMETER FOR RTRQ VERB.*
14CD20   40C1D3D3 40C3C8C1 D9C1C3E3 C5D9E240   E2C8D6E4 D3C440C2 C540D5E4 D4C5D9C9   * ALL CHARACTERS SHOULD BE NUMERI*
14CD40   C34B1540 D4C5E2E2 C1C7C540 D5D64B40   F0F0F0F6 40C6D9D6 D440E3D7 E440E3C5   *C.. MESSAGE NO. 0006 FROM TPU TE*
14CD60   E2E3F14B 37404040                                                             *ST1..                           *

-STORAGE

14CCA0                                                  00B20200 D5E80000 0FF8F302 F0F3F2F1   *                    ....NY...83.0321*
14CCC0   F7F4F5F5 F4F4F9E3 C5E2E3F1 00010000   00000000 000006F2 0050F0F0 C5F840F0   *7455449TEST1............2..00E8 0*
14CCE0   F0F0F2F2 15D9C5D8 E4C9D9C5 C440D7C1   D9C1D4C5 E3C5D940 D761D540 E6C1E240   *0022.REQUIRED PARAMETER P.N WAS *
14CD00   D6D4C9E3 E3C5C44D D6D940C7 C9E5C5D5   40C9D540 C5D9D9D6 D95DD6D5 40E3C8C5   *OMITTED.OR GIVEN IN ERROR.ON THE*
14CD20   4040D9E3 D9D840E5 C5D9C24B 40E5C5D9   C240E6C1 E240C3C1 D5C3C5D3 D3C5C415   *  RTRQ VERB. VERB WAS CANCELLED.*
14CD40   40D4C5E2 E2C1C7C5 40D5D64B 40F0F0F0   F640C6D9 D6D440E3 D7E440E3 C5E2E3F1   * MESSAGE NO. 0006 FROM TPU TEST1*
14CD60   4B374040                                                                       *..                              *

-STORAGE

14CCA0                                                  01300200 E4CA0000 10F8F301 F0F3F2F1   *                    ....UH...83.0321*
14CCC0   F7F4F5F5 F4F6F4E3 C5E2E3F1 00010000   00000000 000005F2 00504040 404040E2   *7455464TEST1............2..      S*
14CCE0   E3D6C3D2 40E2E3C1 E3E4E240 D9C5D8E4   C5E2E315 D7C1D9E3 40D5E4D4 C2C5D940   *TOCK STATUS REQUEST.PART NUMBER *
14CD00   F1F2F3F4 F115C4C5 E2C3D9C9 D7E3C9D6   D540F161 F440C9D5 40C3C8D9 D6D4C540   *12341.DESCRIPTION 1.4 IN CHROME *
14CD20   C3C5D9D9 C1E3C5C4 40D3D6C3 D240D5E4   E315D6D9 C4C5D940 E4D5C9E3 E240C4D6   *CERRATED LOCK NUT.ORDER UNITS DO*
14CD40   E9404040 D7D9C9C3 C5405DF1 F64BF1F6   F1F615E2 E3D6C3D2 40E2E3C1 E3E4E240   *Z   PRICE .16.1616.STOCK STATUS *
14CD60   C1E340E6 C1D9C5C8 D6E4E2C5 40F1F0F0   15404040 D3D6C3C1 E3C9D6D5 40D5C5E6   *AT WAREHOUSE 100.   LOCATION NEW*
14CD80   40E8D6D9 D240C3C9 E3E86B40 D54BE84B   15404040 4040D6D5 40C8C1D5 C44040F5   * YORK CITY, N.Y..      ON HAND  5*
14CDA0   6BF0F5F0 6BF5F0F4 40404040 404040C1   E240D6C6 4040F0F3 61F0F561 F8F21540   *.050.504         AS OF  03.05.82. *
14CDC0   40404040 D6D540D6 D9C4C5D9 40F56BF0   F5F06BF5 F0F44040 40404040 40C1E240   *     ON ORDER 5.050.504        AS *
14CDE0   D6C64040 F1F061F1 F161F8F2 37404040                                             *OF  10.11.82.                   *

-STORAGE

149720                                                                    00680200 E4000000   *                          ....U...*
149740   12F8F301 F0F3F2F1 F7F4F5F5 F9F0F5C3   D5E3F0F1 00010000 00000000 000000F2   *.83.03217455905CNT01............2*
149760   00505C5C 5C40C7D6 D6C440C1 C6E3C5D9   D5D6D6D5 5C5C4040 C9D5E3C5 D9C3D6D4   *..... GOOD AFTERNOON..  INTERCOM*
149780   D440C9E2 40C3D3D6 E2C5C47A 404040F0   F260F0F1 60F8F340 40F1F74B F4F52637   *M IS CLOSED.   02.01.83  17.45..*
1497A0   40404040                                                                       *                                *

-STORAGE

14CCA0                                                  00670200 E4000000 12F8F301 F0F3F2F1   *                  ....U....83.0321*
14CCC0   F7F4F5F5 F9F0F5E3 C5E2E3F1 00010000   00000000 000000F2 00505C5C 5C40C7D6   *7455905TEST1............2..... GO*
14CCE0   D6C440C1 C6E3C5D9 D5D6D6D5 5C5C4040   C9D5E3C5 D9C3D6D4 D440C9E2 40C3D3D6   *OD AFTERNOON..  INTERCOMM IS CLO*
14CD00   E2C5C47A 404040F0 F260F0F1 60F8F340   40F1F74B F4F53740                     *SED.    02.01.83  17.45.          *
```

Figure 62.   Sample Test Mode Execution Snaps (Page 3 of 3)

```
DATE 83.032    TIME 18.01.27         **** I N T E R C O M M   L O G   D I S P L A Y ****              PAGE     1

MSGLEN  THREAD  QPR  RSC       SSC          MMN    DATE        TIME         TID   PID     CO   USR      BMN  LOG BLK  VMI
----------------------------------------------------------------------------------------------------------------------
    78       0   02  ../0000   ../0000        1    83.032     17.45.3149   TEST1 .....  0001   00         1   9F  00   00
000000  C9D5E3C5 D9C3D6D4 D440E2E3 C1D9E3E4   D740D4C5 F2E2C1C7 C5406040 E6E2C4C3   *INTERCOMM STARTUP MESSAGE - WSDC*
000032  E5C8E3E3                                                                    *VHTT                            *
----------------------------------------------------------------------------------------------------------------------
    65       0   02  RQ/D9D8   ../0000        1    83.032     17.45.3149   TEST1 .....  0001   00         1   01  00   00
000000  D9E3D9D8 15D761D5 40F1F2F3 F4F515E6 . C8E240F2 F0F037                       *RTRQ.P/N 12345.WHS 200.         *
----------------------------------------------------------------------------------------------------------------------
    65       0   02  RQ/D9D8   ../0000        2    83.032     17.45.3150   TEST1 .....  0001   00         2   01  00   00
000000  D9E3D9D8 15D761D5 40F5F5F5 F5F515E6   C8E240F2 F0F037                       *RTRQ.P/N 55555.WHS 200.         *
----------------------------------------------------------------------------------------------------------------------
    65       0   02  RQ/D9D8   ../0000        3    83.032     17.45.3153   TEST1 .....  0001   00         3   01  00   00
000000  D9E3D9D8 15D761D5 40F1F2F3 F4F515E6   C8E240F3 F0F037                       *RTRQ.P/N 12345.WHS 300.         *
----------------------------------------------------------------------------------------------------------------------
    65       0   02  RQ/D9D8   ../0000        4    83.032     17.45.3153   TEST1 .....  0001   00         4   01  00   00
000000  D9E3D9D8 15D761D5 40F1F2F3 F4F915E6   C8E240F2 F0F037                       *RTRQ.P/N 12349.WHS 200.         *
----------------------------------------------------------------------------------------------------------------------
    65       0   02  RQ/D9D8   ../0000        5    83.032     17.45.3154   TEST1 .....  0001   00         5   01  00   00
000000  D9E3D9D8 15D761D5 40F1F2F3 F4F115E6   C8E240F1 F0F037                       *RTRQ.P/N 12341.WHS 100.         *
----------------------------------------------------------------------------------------------------------------------
    65       0   02  RQ/D9D8   ../0000        6    83.032     17.45.3154   TEST1 .....  0001   00         6   01  00   00
000000  D9E3D9D8 15D761D5 40C1F2F3 F4F515E6   C8E240F4 F0F037                       *RTRQ.P/N A2345.WHS 400.         *
----------------------------------------------------------------------------------------------------------------------
   108       0   02  .U/00E4   ../0000        7    83.032     17.45.5365   TOALL .....  0001   00         0   01  00   50
000000  FF02002D 013C5C5C 5C40C7D6 D6C440C1   C6E3C5D9 D5D6D6D5 5C5C4040 C9D5E3C5   *.......*** GOOD AFTERNOON**  INTE*
000032  D9C3D6D4 D440C9E2 40D9C5C1 C4E8407A   404040F0 F260F0F1 60F8F340 40F1F74B   *RCOMM IS READY :    02-01-83  17.*
000064  F4F5                                                                        *45                              *
----------------------------------------------------------------------------------------------------------------------
    42       1   02  .U/00E4   ../0000        7    83.032     17.45.5380   TOALL .....  0000   00         0   30  00   50
----------------------------------------------------------------------------------------------------------------------
   104       1   02  .U/00E4   ../0000        7    83.032     17.45.5397   CNT01 .....  0001   00         0   40  00   50
000000  5C5C5C40 C7D6D6C4 40C1C6E3 C5D9D5D6   D6D55C5C 4040C9D5 E3C5D9C3 D6D4D440   **** GOOD AFTERNOON**  INTERCOMM *
000032  C9E240D9 C5C1C4E8 407A4040 40F0F260   F0F160F8 F34040F1 F74BF4F5 2637       *IS READY :    02-01-83  17.45..  *
----------------------------------------------------------------------------------------------------------------------
   103       1   02  .U/00E4   ../0000        7    83.032     17.45.5398   TEST1 .....  0001   00         0   40  00   50
000000  5C5C5C40 C7D6D6C4 40C1C6E3 C5D9D5D6   D6D55C5C 4040C9D5 E3C5D9C3 D6D4D440   **** GOOD AFTERNOON**  INTERCOMM *
000032  C9E240D9 C5C1C4E8 407A4040 40F0F260   F0F160F8 F34040F1 F74BF4F5 37         *IS READY :    02-01-83  17.45.   *
----------------------------------------------------------------------------------------------------------------------
    88       1   02  .U/00E4   ../0000        7    83.032     17.45.5398   TOALL .....  0000   00         0   FA  00   50
000000  00000000 00000000 00180000 0F580000   00070000 00000000 00020000 00000000   *................................*
000032  00000000 00000000 00000000 0000                                             *..............                  *
----------------------------------------------------------------------------------------------------------------------
    42       1   02  RQ/D9D8   ../0000        1    83.032     17.45.5398   TEST1 .....  0000   00         1   30  00   00
----------------------------------------------------------------------------------------------------------------------
   192       1   02  .H/00C8   RQ/D9D8        8    83.032     17.45.5412   TEST1 .....  0001   00         1   01  00   72
000000  E2E2D9D8 F0F0F0F1 F0404040 F1F2F3F4   F540F161 F240C9D5 40E2E3C5 C5D340E6   *SSRQ00010    12345 1/2 IN STEEL W*
000032  C1E2C8C5 D9404040 40404040 40404040   40404040 40404040 40404040 40404040   *ASHER                           *
000064  40404040 404040C7 D9E24040 5BF0F54B   F0F5F0F7 4040F2F0 F0D4C9C1 D4C96B40   *       GRS  $05.0507  200MIAMI, *
000096  C6D3C14B 40404040 40404040 40404040   F66DF1F6 F16BF5F0 F6F0F361 F0F561F8   *FLA.               6,161,50603/05/8*
000128  F2F46BF0 F4F06BF6 F1F7F1F0 61F1F161   F8F24040 4040                         *24,040,61710/11/82              *
----------------------------------------------------------------------------------------------------------------------
    88       1   02  RQ/D9D8   ../0000        1    83.032     17.45.5412   TEST1 .....  0000   00         1   FA  00   00

MSGLEN  THREAD  QPR  RSC       SSC          MMN    DATE        TIME         TID   PID     CO   USR      BMN  LOG BLK  VMI
```

Figure 63. Test Mode Execution Log Printout (Page 1 of 6)

```
DATE 83.032    TIME 18.01.27        **** I N T E R C O M M   L O G   D I S P L A Y ****                 PAGE     2

MSGLEN  THREAD   QPR   RSC       SSC         MMN     DATE        TIME         TID    PID    CO    USR    BMN  LOG BLK. VMI
-------------------------------------------------------------------------------------------------------------------------
000000  00000000 00010000 000E0000 0A100000   00190000 00010000 00000000 00010000   *................................*
000032  00000000 00000000 00000000 0000                                              *.............                  *
-------------------------------------------------------------------------------------------------------------------------
   42      1     02  .H/00CA  RQ/D9D8        8     83.032     17.45.5412    TEST1  .....  0000    00      1   30  00    72
-------------------------------------------------------------------------------------------------------------------------
   42      2     02  RQ/D9D8  ../0000        2     83.032     17.45.5421    TEST1  .....  0000    00      2   30  00    00
-------------------------------------------------------------------------------------------------------------------------
  200      1     02  .U/00E4  .H/00CA        9     83.032     17.45.5424    TEST1  .....  0001    00      1   01  00    50
000000  0C05F1F2 F3F4F515 35F161F2 40C9D540   E2E3C5C5 D340E6C1 E2C8C5D9 40404040   *..12345..1/2 IN STEEL WASHER    *
000032  40404040 40404040 40404040 40404040   40404040 40404040 40404040 40401205   *                              ..*
000064  C7D9E240 40130058 F0F548F0 F5F0F708   03F2F0F0 0A17D4C9 C1D4C96B 40C6D3C1   *GRS   ..$05.0507..200..MIAMI, FLA*
000096  4B404040 40404040 40404040 400D09F6   6BF1F6F1 6BF5F0F6 0E08F0F3 61F0F561   *.              ..6,161,506..03/05/*
000128  F8F20F09 F46BF0F4 F06BF6F1 F7100BF1   F061F1F1 61F8F2FF 02006408 0000       *82..4,040,617..10/11/82.......  *
-------------------------------------------------------------------------------------------------------------------------
   88      1     02  .H/00CA  RQ/D9D8        8     83.032     17.45.5424    TEST1  .....  0000    00      1   FA  00    72
000000  00000000 00010000 000B0000 0E880000   000B0000 00010000 00010000 00010000   *................................*
000032  00000000 00000000 00000000 0000                                              *.............                  *
-------------------------------------------------------------------------------------------------------------------------
   42      1     02  .U/00E4  .H/00CA        9     83.032     17.45.5424    TEST1  .....  0000    00      1   30  00    50
-------------------------------------------------------------------------------------------------------------------------
  297      1     02  .U/00E4  .H/00C8        9     83.032     17.45.5425    TEST1  .....  0001    00      1   40  00    50
000000  40404040 40E2E3D6 C3D240E2 E3C1E3E4   E240D9C5 D8E4C5E2 E315D7C1 D9E340D5   *     STOCK STATUS REQUEST.PART N*
000032  E4D4C2C5 D940F1F2 F3F4F515 C4C5E2C3   D9C9D7E3 C9D6D540 F161F240 C9D540E2   *UMBER 12345.DESCRIPTION 1/2 IN S*
000064  E3C5C5D3 40E6C1E2 C8C5D915 D6D9C4C5   D940E4D5 C9E3E248 C7D9E240 4040D7D9   *TEEL WASHER.ORDER UNITS GRS   PR*
000096  C9C3C540 5BF0F54B F0F5F0F7 15E2E3D6   C3D240E2 E3C1E3E4 E240C1E3 40E6C1D9   *ICE $05.0507.STOCK STATUS AT WAR*
000128  C5C8D6E4 E2C540F2 F0F01540 4040D3D6   C3C1E3C9 D6D540D4 C9C1D4C9 6B40C6D3   *EHOUSE 200.   LOCATION MIAMI, FL*
000160  C14B1540 40404040 D6D540C8 C1D5C440   40F66DF1 F6F16BF5 F0F64040 40404040   *A..      ON HAND  6,161,506     *
000192  40C1E240 D6C64040 F0F361F0 F561F8F2   15404040 4040D6D5 40D6D9C4 C5D940F4   * AS OF  03/05/82.     ON ORDER 4*
000224  6BF0F4F0 6BF6F1F7 40404040 404040C1   E240D6C6 4040F1F0 61F1F161 F8F237     *,040,617        AS OF  10/11/82. *
-------------------------------------------------------------------------------------------------------------------------
   88      1     02  .U/00E4  .H/00CA        9     83.032     17.45.5426    TEST1  .....  0000    00      1   FA  00    50
000000  00000000 00000000 00080000 0EE80000   00040000 00000000 00010000 80000000   *.............Y..................*
000032  00000000 00000000 00000000 0000                                              *.............                  *
-------------------------------------------------------------------------------------------------------------------------
  104      2     02  .U/00E4  RQ/D9D8       10     83.032     17.45.5432    TEST1  .....  0001    00      2   01  00    50
000000  FF0201F5 F93207C1 D9E340D5 E4D4C2C5   D940F5F5 F5F5F540 D5D6E340 C6D6E4D5   *...59.PART NUMBER 55555 NOT FOUN*
000032  C44B4040 40404040 40404040 40404040   40404040 40404040 00000000 0000       *D.                       ......  *
-------------------------------------------------------------------------------------------------------------------------
   88      2     02  RQ/D9D8  ../0000        2     83.032     17.45.5432    TEST1  .....  0000    00      2   FA  00    00
000000  00000000 00010000 00030000 08D80000   00110000 00010000 00000000 00000000   *.............Q..................*
000032  00000000 00000000 00000000 0000                                              *.............                  *
-------------------------------------------------------------------------------------------------------------------------
   42      1     02  .U/00E4  RQ/D9D8       10     83.032     17.45.5433    TEST1  .....  0000    00      2   30  00    50
-------------------------------------------------------------------------------------------------------------------------
   82      1     02  .U/00E4  RQ/D9D8       10     83.032     17.45.5433    TEST1  .....  0001    00      2   40  00    50
000000  5C5C C5D9 D9D6D95C 5C4040D7 C1D9E340   D5E4D4C2 C5D940F5 F5F5F5F5 40D5D6E3   ***ERROR**  PART NUMBER 55555 NOT*
000032  40C6D6E4 D5C44B37                                                            * FOUND..                        *
-------------------------------------------------------------------------------------------------------------------------
   88      1     02  .U/00E4  RQ/D9D8       10     83.032     17.45.5433    TEST1  .....  0000    00      2   FA  00    50
000000  00000000 00000000 00070000 0EE80000   00040000 00000000 00010000 00000000   *.............Y..................*
000032  00000000 00000000 00000000 0000                                              *.............                  *

MSGLEN  THREAD   QPR   RSC       SSC         MMN     DATE        TIME         TID    PID    CO    USR    BMN  LOG BLK  VMI
```

Figure 63. Test Mode Execution Log Printout (Page 2 of 6)

```
DATE 83.032    TIME 18.01.27         **** I N T E R C O M M   L O G   D I S P L A Y ****                  PAGE     3

MSGLEN  THREAD  QPR   RSC      SSC          MMN     DATE        TIME        TID   PID    CO   USR    BMN  LOG BLK  VMI
------------------------------------------------------------------------------------------------------------------------
------------------------------------------------------------------------------------------------------------------------
    42      1    02  RQ/D9D8  ../0000         3    83.032    17.45.5434   TEST1  .....  0000   00      3   30  00   00
------------------------------------------------------------------------------------------------------------------------
   104      1    02  .U/00E4  RQ/D9D8        11    83.032    17.45.5436   TEST1  .....  0001   00      3   01  00   50
000000   FF0201F5 F932D7C1 D9E340F1 F2F3F4F5   40D5D6E3 40C6D6E4 D5C440C9 D540E6C1   *...59.PART 12345 NOT FOUND IN WA*
000032   D9C5C8D6 E4E2C540 F3F0F040 40404040   40404040 40404040 00000000 0000       *REHOUSE 300            ......  *
------------------------------------------------------------------------------------------------------------------------
    88      1    02  RQ/D9D8  ../0000         3    83.032    17.45.5436   TEST1  .....  0000   00      3   FA  00   00
000000   00000000 00010000 00040000 09880000   00180000 00010000 00000000 00000000   *................................*
000032   00000000 00000000 00000000 0000                                             *..............                  *
------------------------------------------------------------------------------------------------------------------------
    42      1    02  .U/00F4  RQ/D9D8        11    83.032    17.45.5438   TEST1  .....  0000   00      3   30  00   50
------------------------------------------------------------------------------------------------------------------------
    91      1    02  .U/00E4  RQ/D9D8        11    83.032    17.45.5439   TEST1  .....  0001   00      3   40  00   50
000000   5C5CC5D9 D9D6D95C 5C4040D7 C1D9E340   F1F2F3F4 F540D5D6 E340C6D6 E4D5C440   ***ERROR**  PART 12345 NOT FOUND *
000032   C9D540E6 C1D9C5C8 D6E4E2C5 40F3F0F0   37                                    *IN WAREHOUSE 300.               *
------------------------------------------------------------------------------------------------------------------------
    88      1    02  .U/00E4  RQ/D9D8        11    83.032    17.45.5439   TEST1  .....  0000   00      3   FA  00   50
000000   00000000 00000000 00060000 0EE80000   00040000 00000000 00010000 00000000   *.............Y..................*
000032   00000000 00000000 00000000 0000                                             *..............                  *
------------------------------------------------------------------------------------------------------------------------
    42      1    02  RQ/D9D8  ../0000         4    83.032    17.45.5439   TEST1  .....  0000   00      4   30  00   00
------------------------------------------------------------------------------------------------------------------------
   104      1    02  .U/00E4  RQ/D9D8        12    83.032    17.45.5445   TEST1  .....  0001   00      4   01  00   50
000000   FF0201F5 F932D7C1 D9E340D5 E4D4C2C5   D940F1F2 F3F4F940 D5D6E340 C6D6E4D5   *...59.PART NUMBER 12349 NOT FOUN*
000032   C44B4040 40404040 40404040 40404040   40404040 40404040 00000000 0000       *D.                     ......  *
------------------------------------------------------------------------------------------------------------------------
    88      1    02  RQ/D9D8  ../0000         4    83.032    17.45.5445   TEST1  .....  0000   00      4   FA  00   00
000000   00000000 00010000 00030000 08D80000   00110000 00010000 00000000 00000000   *.............Q..................*
000032   00000000 00000000 00000000 0000                                             *..............                  *
------------------------------------------------------------------------------------------------------------------------
    42      1    02  .U/00E4  RQ/D9D8        12    83.032    17.45.5445   TEST1  .....  0000   00      4   30  00   50
------------------------------------------------------------------------------------------------------------------------
    82      1    02  .U/00E4  RQ/D9D8        12    83.032    17.45.5445   TEST1  .....  0001   00      4   40  00   50
000000   5C5CC5D9 D9D6D95C 5C4040D7 C1D9E340   D5E4D4C2 C5D940F1 F2F3F4F9 40D5D6E3   ***ERROR**  PART NUMBER 12349 NOT*
000032   40C6D6E4 D5C44B37                                                           * FOUND..                        *
------------------------------------------------------------------------------------------------------------------------
    88      1    02  .U/00E4  RQ/D9D8        12    83.032    17.45.5445   TEST1  .....  0000   00      4   FA  00   50
000000   00000000 00000000 00060000 0EE80000   00040000 00000000 00010000 00000000   *.............Y..................*
000032   00000000 00000000 00000000 0000                                             *..............                  *
------------------------------------------------------------------------------------------------------------------------
    42      1    02  RQ/D9D8  ../0000         5    83.032    17.45.5446   TEST1  .....  0000   00      5   30  00   00
------------------------------------------------------------------------------------------------------------------------
   192      1    02  .M/00C8  RQ/D9D8        13    83.032    17.45.5448   TEST1  .....  0001   00      5   01  00   72
000000   E2E2D9D8 F0F0F0F1 F0404040 F1F2F3F4   F140F161 F440C9D5 40C3C8D9 D6D4C540   *SSRQ00010    12341 1/4 IN CHROME *
000032   C3C5D9D9 C1E3C5C4 40D3D6C3 D240D5E4   E3404040 40404040 40404040 40404040   *CERRATED LOCK NUT               *
000064   40404040 404040C4 D6E94040 5BF1F64B   F1F6F1F6 4040F1F0 F0D5C5E6 40E8D6D9   *       DOZ  $16.1616  100NEW YOR*
000096   D240C3C9 E3E86B40 D54BE84B 40404040   F56BF0F5 F06BF5F0 F4F0F361 F0F561F8   *K CITY, N.Y.     5,050,50403/05/8*
000128   F2F56BF0 F5F06BF5 F0F4F1F0 61F1F161   F8F24040 4040                         *25,050,50410/11/82              *
------------------------------------------------------------------------------------------------------------------------
    88      1    02  RQ/D9D8  ../0000         5    83.032    17.45.5448   TEST1  .....  0000   00      5   FA  00   00

MSGLEN  THREAD  QPR   RSC      SSC          MMN     DATE        TIME        TID   PID    CO   USR    BMN  LOG BLK  VMI
```

Figure 63. Test Mode Execution Log Printout (Page 3 of 6)

```
DATE 83.032    TIME 18.01.27        **** I N T E R C O M M   L O G   D I S P L A Y ****                  PAGE     4

MSGLEN  THREAD   QPR   RSC       SSC          MMN      DATE         TIME         TID    PID     CO    USR     RMN  LOG BLK  VMI
---------------------------------------------------------------------------------------------------------------------------------
000000   00000000 00010000 00040000 09880000    00170000 00010000 00000000 00000000   *................................*
000032   00000000 00000000 00000000 0000                                              *..............                  *
---------------------------------------------------------------------------------------------------------------------------------
    42       1     02  .H/00C8  RQ/D9D8         13     83.032     17.45.5448   TEST1  .....  0000   00       5   30  00    72
---------------------------------------------------------------------------------------------------------------------------------
    42       2     02  RQ/D9D8  ../0000          6     83.032     17.45.5449   TEST1  .....  0000   00       6   30  00    00
---------------------------------------------------------------------------------------------------------------------------------
    77       2     02  .N/00D5  .Y/00E8         14     83.032     17.45.5449   TEST1  .....  0001   00       6   01  00    50
000000   0505C1F2 F3F4F504 03D761D5 0304D9E3    D9D80105 E3C5E2E3 F1FF0200 1D0204F0   *..A2345..P/N..RTRQ..TEST1......0*
000032   F0F0F6                                                                       *006                             *
---------------------------------------------------------------------------------------------------------------------------------
    70       2     02  .N/00D5  .Y/00E8         15     83.032     17.45.5449   TEST1  .....  0001   00       6   01  00    50
000000   0403D761 D50304D9 E3D9D801 05E3C5E2    E3F1FF02 00160204 F0F0F0F6            *..P/N..RTRQ..TEST1......0006    *
---------------------------------------------------------------------------------------------------------------------------------
    88       2     02  RQ/D9D8  ../0000          6     83.032     17.45.5449   TEST1  .....  0004   00       6   FA  00    00
000000   00000000 00000000 00010000 06F80000    00060000 00020000 00000000 00000000   *.............8..................*
000032   00000000 00000000 00000000 0000                                              *..............                  *
---------------------------------------------------------------------------------------------------------------------------------
    42       2     02  .N/00D5  .Y/00E8         14     83.032     17.45.5449   TEST1  .....  0000   00       5   30  00    50
---------------------------------------------------------------------------------------------------------------------------------
    42       3     02  .N/00D5  .Y/00E8         15     83.032     17.45.5462   TEST1  .....  0080   00       6   30  00    50
---------------------------------------------------------------------------------------------------------------------------------
   200       1     02  .U/00E4  .H/00C8         16     83.032     17.45.5464   TEST1  .....  0001   00       5   01  00    50
000000   0C05F1F2 F3F4F115 35F161F4 40C9D540    C3C8D9D6 D4C540C3 C5D9D9C1 E3C5C440   *..12341..1/4 IN CHROME CERRATED *
000032   D3D6C3D2 40D5E4E3 40404040 40404040    40404040 40404040 40404040 40401205   *LOCK NUT                      ..*
000064   C4D6E940 4013085B F1F64BF1 F6F1F608    03F1F0F0 0A17D5C5 E640E8D6 D9D240C3   *DOZ  ..$16.1616..100..NEW YORK C*
000096   C9E3E86B 40D54BE8 4B404040 400D09F5    6BF0F5F0 6BF5F0F4 0E0EF0F3 61F0F561   *ITY, N.Y.    ..5,050,504..03/05/*
000128   F8F20F09 F56BF0F5 F06BF5F0 F4100BF1    F061F1F1 61F8F2FF 02006400 0000       *82..5,050,504..10/11/82.......  *
---------------------------------------------------------------------------------------------------------------------------------
    88       1     02  .H/00C8  RQ/D9D8         13     83.032     17.45.5464   TEST1  .....  0000   00       5   FA  00    72
000000   00000000 00010000 00040000 0E000000    000B0000 00010000 00010000 00000000   *................................*
000032   00000000 00000000 00000000 0000                                              *..............                  *
---------------------------------------------------------------------------------------------------------------------------------
    42       1     02  .U/00E4  .H/00C8         16     83.032     17.45.5464   TEST1  .....  0000   00       5   30  00    50
---------------------------------------------------------------------------------------------------------------------------------
   181       2     02  .N/00D5  .Y/00E8         14     83.032     17.45.5466   TEST1  .....  0001   00       6   40  00    50
000000   F0F0C5F8 40F0F0F0 F2F915D5 D6D560D5    E4D4C5D9 C9C340C3 C8C1D9C1 C3E3C5D9   *00E8 00029.NON-NUMERIC CHARACTER*
000032   40C7C9E5 C5D540D6 D5400761 D540D7C1    D9C1D4C5 E3C5D940 C6D6D940 D9E3D9D8   * GIVEN ON P/N PARAMETER FOR RTRQ*
000064   40E5C5D9 C24B40C1 D3D340C3 C8C1D9C1    C3E3C5D9 E240E2C8 D6E4D3C4 40C2C540   * VERB. ALL CHARACTERS SHOULD BE *
000096   D5E4D4C5 D9C9C34B 1540D4C5 E2E2C1C7    C540D5D6 4B40F0F0 F0F640C6 D9D6D440   *NUMERIC.. MESSAGE NO. 0006 FROM *
000128   E3D7E440 E3C5E2E3 F14B37                                                     *TPU TEST1..                     *
---------------------------------------------------------------------------------------------------------------------------------
    88       2     02  .N/00D5  .Y/00E8         14     83.032     17.45.5466   TEST1  .....  0000   00       6   FA  00    50
000000   00000000 00010000 00120000 15D00000    000C0000 00000000 00010000 00010000   *................................*
000032   00000000 00000000 00000000 0000                                              *..............                  *
---------------------------------------------------------------------------------------------------------------------------------
   178       3     02  .N/00D5  .Y/00E8         15     83.032     17.45.5473   TEST1  .....  0001   00       6   40  00    50
000000   F0F0C5F8 40F0F0F0 F2F215D9 C5D8E4C9    D9C5C440 D7C1D9C1 D4C5E3C5 D940D761   *00E8 00022.REQUIRED PARAMETER P/*
000032   D540E6C1 E240D6D4 C9E3E3C5 C44DD6D9    40C7C9E5 C5D540C9 D540C5D9 D9D6D95D   *N WAS OMITTED(OR GIVEN IN ERROR)*
000064   D6D540E3 C8C54040 D9E3D9D8 40E5C5D9    C24B40E5 C5D9C240 E6C1E240 C3C1D5C3   *ON THE  RTRQ VERB. VERB WAS CANC*
000096   C5D3D3C5 C44B40D4 C5E2E2C1 C7C540D5    D64B40F0 F0F0F640 C6D9D6D4 40E3D7E4   *ELLED. MESSAGE NO. 0006 FROM TPU*

MSGLEN  THREAD   QPR   RSC       SSC          MMN      DATE         TIME         TID    PID     CO    USR     RMN  LOG BLK  VMI
```

Figure 63. Test Mode Execution Log Printout (Page 4 of 6)

```
DATE 83.032    TIME 18.01.27        **** I N T E R C O M M   L O G   D I S P L A Y ****               PAGE     5

MSGLEN  THREAD   QPR  RSC      SSC         MMN     DATE        TIME        TID   PID    CO   USR    BMV  LOG BLK  VMI
--------------------------------------------------------------------------------------------------------------------
000128   40E3C5E2 E3F14B37                                                          * TEST1..                         *
--------------------------------------------------------------------------------------------------------------------
    88       3    02  .N/00D5  .Y/00E8       15    83.032    17.45.5473   TEST1 .....  0000   00      6  FA  00   50
000000   00000000 00010000 00080000 14800000   00080000 00000000 00010000 00000000  *................................*
000032   00000000 00000000 00000000 0000                                              *..............                  *
--------------------------------------------------------------------------------------------------------------------
   317       1    02  .U/00E4  .H/00C8       16    83.032    17.45.5473   TEST1 .....  0001   00      5  40  00   50
000000   40404040 40E2E3D6 C3D240E2 E3C1E3E4   E240D9C5 D8E4C5E2 E315D7C1 D9E340D5  *     STOCK STATUS REQUEST.PART N*
000032   E4D4C2C5 D940F1F2 F3F4F115 C4C5E2C3   D9C9D7E3 C9D6D540 F161F440 C9D540C3  *UMBER 12341.DESCRIPTION 1/4 IN C*
000064   C8D9D6D4 C540C3C5 D9D9C1E3 C5C440D3   D6C3D240 D5E4E315 D6D9C4C5 D940E4D5  *HROME CERRATED LOCK NUT.ORDER UN*
000096   C9E3E240 C4D6E940 4040D7D9 C9C3C540   5BF1F64B F1F6F1F6 15E2E3D6 C3D240E2  *ITS DOZ   PRICE $16.1616.STOCK S*
000128   E3C1E3E4 E240C1E3 40E6C1D9 C5C8D6E4   E2C540F1 F0F01540 4040D3D6 C3C1E3C9  *TATUS AT WAREHOUSE 100.   LOCATI*
000160   D6D540D5 C5E640E8 D6D9D240 C3C9E3E8   6B40D54B E84B1540 40404040 D6D540C8  *ON NEW YORK CITY, N.Y..     ON H*
000192   C1D5C440 40F56BF0 F5F06BF5 F0F44040   40404040 40C1E240 D6C64040 F0F361F0  *AND  5,050,504         AS OF  03/0*
000224   F561F8F2 15404040 4040D6D5 40D6D9C4   C5D940F5 6BF0F5F0 6BF5F0F4 40404040  *5/82.      ON ORDER 5,050,504    *
000256   404040C1 E240D6C6 4040F1F0 61F1F161   F8F237                                *   AS OF  10/11/82.              *
--------------------------------------------------------------------------------------------------------------------
    88       1    02  .U/00E4  .H/00C8       16    83.032    17.45.5473   TEST1 .....  0000   00      5  FA  00   50
000000   00000000 00000000 00070000 0EA00000   00040000 00000000 00010000 00000000  *................................*
000032   00000000 00000000 00000000 0000                                              *..............                  *
--------------------------------------------------------------------------------------------------------------------
    47       0    02  .J/00D1  ../0000       17    83.032    17.45.5905   CNT01 .....  0000   00      0  01  00   FF
000000   D5D9C3C4 37                                                                  *NRCD.                           *
--------------------------------------------------------------------------------------------------------------------
    42       1    02  .J/00D1  ../0000       17    83.032    17.45.5905   CNT01 .....  0000   00      0  30  00   FF
--------------------------------------------------------------------------------------------------------------------
   108       1    02  .U/00E4  ../0000       18    83.032    17.45.5905   TOALL .....  0001   00      0  01  00   50
000000   FF02002D 013C5C5C 5C40C7D6 D6C440C1   C6E3C5D9 D5D6D6D5 5C5C4040 C9D5E3C5  *.......*** GOOD AFTERNOON**  INTE*
000032   D9C3D6D4 D440C9E2 40C3D3D6 E2C5C47A   404040F0 F260F0F1 60F8F340 40F1F74B  *RCOMM IS CLOSED:    02-01-83  17.*
000064   F4F5                                                                         *45                              *
--------------------------------------------------------------------------------------------------------------------
    88       1    02  .J/00D1  ../0000       17    83.032    17.45.5905   CNT01 .....  00C0   00      0  FA  00   FF
000000   00000000 00000000 00000000 01580000   00040000 00010000 00000000 00000000  *................................*
000032   00000008 00000000 00000000 0000                                              *..............                  *
--------------------------------------------------------------------------------------------------------------------
    42       1    02  .U/00E4  ../0000       18    83.032    17.45.5905   TOALL .....  0000   00      0  30  00   50
--------------------------------------------------------------------------------------------------------------------
   104       1    02  .U/00E4  ../0000       18    83.032    17.45.5907   CNT01 .....  0001   00      0  40  00   50
000000   5C5C5C40 C7D6D6C4 40C1C6E3 C5D9D5D6   D6D55C5C 4040C9D5 E3C5D9C3 D6D4D440  **** GOOD AFTERNOON**  INTERCOMM *
000032   C9E240C3 D3D6E2C5 C47A4040 40F0F260   F0F160F8 F34040F1 F74BF4F5 2637       *IS CLOSED:    02-01-83  17.45.. *
--------------------------------------------------------------------------------------------------------------------
   103       1    02  .U/00E4  ../0000       18    83.032    17.45.5910   TEST1 .....  0001   00      0  40  00   50
000000   5C5C5C40 C7D6D6C4 40C1C6E3 C5D9D5D6   D6D55C5C 4040C9D5 E3C5D9C3 D6D4D440  **** GOOD AFTERNOON**  INTERCOMM *
000032   C9E240C3 D3D6E2C5 C47A4040 40F0F260   F0F160F8 F34040F1 F74BF4F5 37         *IS CLOSED:    02-01-83  17.45.  *
--------------------------------------------------------------------------------------------------------------------
    88       1    02  .U/00E4  ../0000       18    83.032    17.45.5910   TOALL .....  0000   00      0  FA  00   50
000000   00000000 00000000 00130000 0EE80000   00060000 00000000 00020000 00000000  *..............Y.................*
000032   00000000 00000000 00000000 0000                                              *..............                  *
--------------------------------------------------------------------------------------------------------------------
    47       0    02  .J/00D1  ../0000       19    83.032    17.46.0003   CNT01 .....  0000   00      0  01  00   FC
000000   D5D9C3C4 37                                                                  *NRCD.                           *

MSGLEN  THREAD   QPR  RSC      SSC         MMN     DATE        TIME        TID   PID    CO   USR    BMN  LOG BLK  VMI
```

Figure 63.   Test Mode Execution Log Printout (Page 5 of 6)

```
DATE 83.032    TIME 18.01.27        **** I N T E R C O M M   L O G   D I S P L A Y ****              PAGE     6

MSGLEN  THREAD   GPR   RSC      SSC          MMN      DATE         TIME        TID    PID     CO    USR    BMN  LOG BLK  VMI
--------------------------------------------------------------------------------------------------------------------------
--------------------------------------------------------------------------------------------------------------------------
    42       1    02  .J/00D1  ../0000        19    83.032    17.46.0003   CNT01  .....  0000    00       0   30  00   FC
--------------------------------------------------------------------------------------------------------------------------
    78       0    00  ../0000  ../0000         0    83.032    17.46.0008   .....  .....  0000    00       0   AA  00   00
000000   C9D5E3C5 D9C3D6D4 D440C3D3 D6E2C5C4   D6E6D540 D4C5E2E2 C1C7C540 E6E2C4C3   *INTERCOMM CLOSEDOWN MESSAGE WSDC*
000032   E5C8E3E3                                                                     *VHTT                            *
--------------------------------------------------------------------------------------------------------------------------
```

Figure 63. Test Mode Execution Log Printout (Page 6 of 6)

Chapter 13

VS COBOL II TESTING

This chapter illustrates testing of a VS COBOL II subsystem under Release 10 and using the BTAM simulator, as previously described in Chapter 11.

The VS COBOL II subsystem, SQCOBOLV (see Figure 64) is a reorganized version of SQCOBOLA (see Figure 48 in Chapter 10), in that all the DWS fields (except the output message header area) have been moved to, and reorganized in, the VS COBOL II subsystem's Working-Storage Section. The one-character 77 level fields were changed to literals in program MOVE instructions, and the field areas were organized into 01 level groups. Note that the COBOL COPY members are at the post SM level 2240 of Release 10 (see Appendix B).

To test this subsystem, the same MMU map definitions (see Figure 51), symbolic MMU maps (copied directly into Working-Storage), and test input messages (see Figure 52) are used. However, the STRT$DWSCK command is omitted as DWS overflow checking is not needed. Also the (recompiled under VS COBOL II) subroutine SQCOBOLB (see Figure 49 in Chapter 10) is called via COBREENT, as before. The test setup described in Section 11.3 is the same except that: Figure 65 replaces the table additions illustrated in Figure 50 (note that there are no COBOL II parameters to add, the only changes are the subsystem name and its DWS size to 48); and Figure 66 replaces Figure 53 to illustrate execution JCL in the VS COBOL II environment. The SIM3270 output printout from the test would look the same as in Figure 54. A Release 10 log printout is provided in Figure 67.

```
PP 5668-958 IBM VS COBOL II Release 3.0 09/13/88                SQCOBOLV  Date 05/26/94
  LineID  PL SL  ----+-*A-1-B--+----2----+----3----+----4----+----5----+----6----+----7-

  000001**             IDENTIFICATION DIVISION.
  000002**             PROGRAM-ID. SQCOBOLV.
  000003**             ENVIRONMENT DIVISION.
  000004**             DATA DIVISION.
  000005**             WORKING-STORAGE SECTION.
  000006**             77  DD-STOCK            PIC X(8)   VALUE 'STOKFILE'.
  000007**             77  DD-PART             PIC X(8)   VALUE 'PARTFILE'.
  000008**             01  IO-GROUP-NAME       PIC X(8)   VALUE 'STKSTAT'.
  000009**             01  IO-MAP-NAME         PIC X(8)   VALUE 'MAP1'.
  000010**             01  ERR-MAP-NAME        PIC X(8)   VALUE 'ERRMAP'.
  000011**             01  MESSAGE-TABLE.
  000012**                 04  MSG-A           PIC X(12)  VALUE 'PART NUMBER '.
  000013**                 04  MSG-B           PIC X(11)  VALUE ' NOT FOUND.'.
  000014**                 04  MSG-C           PIC X(5)   VALUE 'PART '.
  000015**                 04  MSG-D           PIC X(24)  VALUE
  000016**                                                  ' NOT FOUND IN WAREHOUSE '.
  000017**                 04  MSG-E           PIC X(20)  VALUE '. MESSAGE CANCELLED.'.
  000018**                 04  MSG-F           PIC X(17)  VALUE 'MAP ERROR MCW IS '.
  000019**                 04  MSG-G           PIC X(36)  VALUE
  000020**                           'INVALID DATA: PARTNO MUST BE NUMERIC'.
  000021**                 04  MSG-H           PIC X(35)  VALUE
  000022**                           'INVALID DATA: WHSNO MUST BE NUMERIC'.
  000023**                 04  MSG-I           PIC X(46)  VALUE
  000024**                           'INVALID DATA: PARTNO AND WHSNO MUST BE NUMERIC'.
  000025**             01  INVALID-INPUT-MESSAGE.
  000026**                   04  MSG-7               PIC X(50).
  000027**             01  NO-PART-MESSAGE REDEFINES INVALID-INPUT-MESSAGE.
  000028**                   04  MSG-1               PIC X(12).
  000029**                   04  NOPART-PNO          PIC X(5).
  000030**                   04  MSG-2               PIC X(11).
  000031**             01  NOWARES-MESSAGE REDEFINES INVALID-INPUT-MESSAGE.
  000032**                   04  MSG-3               PIC X(5).
  000033**                   04  NOWARES-PNO         PIC X(5).
  000034**                   04  MSG-4               PIC X(24).
  000035**                   04  NOWARES-WHS         PIC X(3).
  000036**             01  CANCEL-MESSAGE REDEFINES INVALID-INPUT-MESSAGE.
  000037**                   04  CAN-CODE            PIC X(15)  JUST RIGHT.
  000038**                   04  CAN-FILE-NAME       PIC X(8).
  000039**                   04  MSG-5               PIC X(20).
  000040**             01  MAPPING-ERR-MESSAGE REDEFINES INVALID-INPUT-MESSAGE.
  000041**                   04  MSG-6               PIC X(17).
  000042**                   04  ERROR-TAG           PIC X(4).
```

Figure 64. Sample VS COBOL II Subsystem (Page 1 of 16)

```
PP 5668-958 IBM VS COBOL II Release 3.0 09/13/88                SQCOBOLV  Date 05/26/94
  LineID  PL SL  ----+-*A-1-B--+----2----+----3----+----4----+----5----+----6----+----7-
  000044**                01  RECORD-AREA.
  000045**                      04  PART-RECORD.
  000046**               *          NOTE 100 CHARACTER BDAM RECORD WITHOUT KEYS.
  000047**                        06  P-REC-PART-DATA.
  000048**                          08  P-REC-PIN          PIC  X(5).
  000049**                          08  P-REC-DES          PIC  X(54).
  000050**                          08  P-REC-UNT          PIC  X(5).
  000051**                        06  P-REC-PRC            PIC  99V9(4)     COMP-3.
  000052**                        06  P-REC-MFR-NUM        PIC  X(15).
  000053**                        06  FILLER               PIC  X(17).
  000054**                      04  STOCK-RECORD.
  000055**               *          NOTE 80 CHARACTER VSAM RECORD.
  000056**                        06  DELETE-CHARACTER     PIC X.
  000057**                        06  S-REC-KEY-FIELD.
  000058**                          08  S-REC-WHS          PIC 9(3).
  000059**                          08  S-REC-PNO          PIC 9(5).
  000060**                        06  FILLER               PIC X(28).
  000061**                        06  S-REC-STOCK-DATA.
  000062**                          08  S-REC-WLC          PIC X(23).
  000063**                          08  S-REC-LEV          PIC 9(7)        COMP-3.
  000064**               *              NOTE S-REC-LEV IS 4 CHARACTERS LONG.
  000065**                          08  S-REC-LDT          PIC X(6).
  000066**                          08  S-REC-ORD          PIC 9(7)        COMP-3.
  000067**               *              NOTE S-REC-ORD IS 4 CHARACTERS LONG.
  000068**                          08  S-REC-ODT          PIC X(6).


  000070**                01  FILE-AREAS.
  000071**                    02  STATWD                   PIC S9(7)       COMP SYNC.
  000072**               *        NOTE THIS PUTS US ONTO A FULLWORD BOUNDARY ALIGNMENT.
  000073**                    02  FH-STATUS REDEFINES STATWD.
  000074**                      04  FH-STAT1           PIC X.
  000075**                             88  IOK                           VALUE '0'.
  000076**                             88  IOERROR                       VALUE '1'.
  000077**                             88  NOT-FOUND                     VALUE '2'.
  000078**                             88  NO-OD                         VALUE '9'.
  000079**                      04  F-H-STAT2          PIC X.
  000080**                      04  FILLER             PIC X(2).
  000081**                    02  EXTDSCT              PIC X(48).
  000082**               *        NOTE WE ARE STILL ALIGNED HERE.
  000083**                    02  RBN-WORD             PIC S9(7)              COMP.
  000084**                    02  RBN-FILLER REDEFINES RBN-WORD.
  000085**                      04  FILLER             PIC X.
  000086**                      04  RBN                PIC X(3).
  000087**                    02  CURRENT-FILE         PIC X(8).
```

Figure 64.   Sample VS COBOL II Subsystem (Page 2 of 16)

```
PP 5668-958 IBM VS COBOL II Release 3.0 09/13/88                   SQCOBOLV  Date 05/26/94
  LineID  PL SL  ----+-*A-1-B--+----2----+----3----+----4----+----5----+----6----+----7-|
  000089**                  01  SYMBOLIC-MAP.
  000090**                  COPY STKSTATS.
  000091C*                      03  MAP1.
  000092C*                              05  VERBF.
  000093C*                                  06  VERBL     PIC 9(4) COMP.
  000094C*                                  06  VERBT     PIC X.
  000095C*                                  06  VERB      PIC X(4).
  000096C*                          04  PARTNUF.
  000097C*                              05  PARTNOL  PIC 9(4) COMP.
  000098C*                              05  PARTNOT  PIC X.
  000099C*                              05  PARTNO.
  000100C*                                  06  FILLER    PIC S9(4).
  000101C*                                  06  RBNBYTE   PIC S9.
  000102C*                          04  USEG1.
  000103C*                              05  WHSNOF.
  000104C*                                  06  WHSNOL    PIC 9(4) COMP.
  000105C*                                  06  WHSNOT    PIC X.
  000106C*                                  06  WHSNO     PIC S999.
  000107C*                              05  PRTDATAF.
  000108C*                                  06  PRTDATAL  PIC 9(4) COMP.
  000109C*                                  06  PRTDATAT  PIC X.
  000110C*                                  06  PRTDATA   PIC X(54).
  000111C*                              05  ORDUNTF.
  000112C*                                  06  ORDUNTL   PIC 9(4) COMP.
  000113C*                                  06  ORDUNTT   PIC X.
  000114C*                                  06  ORDUNT    PIC X(5).
  000115C*                              05  PRTPRCF.
  000116C*                                  06  PRTPRCL   PIC 9(4) COMP.
  000117C*                                  06  PRTPRCT   PIC X.
  000118C*                                  06  PRTPRC    PIC S999V9(4) COMP-3.
  000119C*                              05  WHSLOCF.
  000120C*                                  06  WHSLOCL   PIC 9(4) COMP.
  000121C*                                  06  WHSLOCT   PIC X.
  000122C*                                  06  WHSLOC    PIC X(23).
  000123C*                              05  STKLEVF.
  000124C*                                  06  STKLEVL   PIC 9(4) COMP.
  000125C*                                  06  STKLEVT   PIC X.
  000126C*                                  06  STKLEV    PIC S9(7) COMP-3.
  000127C*                              05  LEVDATEF.
  000128C*                                  06  LEVDATEL  PIC 9(4) COMP.
  000129C*                                  06  LEVDATET  PIC X.
  000130C*                                  06  LEVDATE   PIC X(8).
  000131C*                              05  STKORDF.
  000132C*                                  06  STKORDL   PIC 9(4) COMP.
  000133C*                                  06  STKORDT   PIC X.
  000134C*                                  06  STKORD    PIC S9(7) COMP-3.
  000135C*                              05  ORDDATEF.
  000136C*                                  06  ORDDATEL  PIC 9(4) COMP.
  000137C*                                  06  ORDDATET  PIC X.
  000138C*                                  06  ORDDATE   PIC X(8).
  000139C*                          04  FILLER    PIC X(7).
  000140C*                      03  ERRMAP.
  000141C*                              05  ERRMSGF.
```

Figure 64. Sample VS COBOL II Subsystem (Page 3 of 16)

```
PP 5668-958 IBM VS COBOL II Release 3.0 09/13/88                    SQCOBOLV  Date 05/26/94
  LineID  PL SL  ----+-*A-1-B--+----2----+----3----+----4----+----5----+----6----+----7-

  000142C*                            06  ERRMSGL  PIC 9(4) COMP.
  000143C*                            06  ERRMSGT  PIC X.
  000144C*                            06  ERRMSG   PIC X(50).
  000145C*                        04  FILLER    PIC X(7).

  000147**                01  MMU-AREAS.
  000148**                    02  MCW                    PIC 9(8)      COMP SYNC.
  000149**                    02  MCW-CODE-BYTES REDEFINES MCW.
  000150**                      04  MCW-RETURN-CODE      PIC X.
  000151**                          88  MAPPING-OK                      VALUE ZERO.
  000152**                          88  MAPEND-SUCCESSFUL               VALUE '8'.
  000153**                      04  MCW-OPTION-2         PIC X.
  000154**                      04  MCW-OPTION-3         PIC X.
  000155**                      04  MCW-OPTION-4         PIC X.
  000156**                    02  MCW-CODES-PART REDEFINES MCW.
  000157**                      04 MCW-CODES1-2          PIC X(2).
  000158**                      04 FILLER                PIC X(2).
  000159**                    02  MCB                    PIC X(48).
  000160**                    02  KEY-FIELD              PIC 9(8).

  000162**                01  DATE-EDIT-AND-FLAGS.
  000163**                    02  DATE-HOLD.
  000164**                      04  D-E-MO               PIC X(2).
  000165**                      04  D-E-DAY              PIC X(2).
  000166**                      04  D-E-YEAR             PIC X(2).
  000167**                    02  DATE-MOVE.
  000168**                      04  D-M-MO               PIC X(2).
  000169**                      04  SLASH2               PIC X.
  000170**                      04  D-M-DAY              PIC X(2).
  000171**                      04  SLASH1               PIC X.
  000172**                      04  D-M-YEAR             PIC X(2).
  000173**                    02  MAP-FLAG               PIC X.
  000174**                        88  MAP-GOOD                      VALUE 'G'.
  000175**                        88  MAP-ERR                       VALUE 'E'.
  000176**                        88  MAP-OUT-ABORT                 VALUE 'A'.
  000177**                    02  FH-READ-FLAG           PIC X.
  000178**                        88  BDAM-READ-OK                  VALUE 'D'.
  000179**                        88  VSAM-READ-OK                  VALUE 'V'.
```

Figure 64.   Sample VS COBOL II Subsystem (Page 4 of 16)

```
PP 5668-958 IBM VS COBOL II Release 3.0 09/13/88                SQCOBOLV   Date 05/26/94
  LineID  PL SL  ----+-*A-1-B--+----2----+----3----+----4----+----5----+----6----+----7-
  000181**                 COPY COBLOGCH.
  000182C*                 01  COBLOGCH.
  000183C*                 02  UAN PICTURE X VALUE ' '.
  000184C*                 02  UANMDT PICTURE X VALUE ' '.
  000185C*                 02  UANSEL PICTURE X VALUE ' '.
  000186C*                 02  UANMDSEL PICTURE X VALUE ' '.
  000187C*                 02  UAHSEL PICTURE X VALUE ' '.
  000188C*                 02  UAHMDSEL PICTURE X VALUE ' '.
  000189C*                 02  UAX PICTURE X VALUE ' '.
  000190C*                 02  UAXMDT PICTURE X VALUE ' '.
  000191C*                 02  UNN PICTURE X VALUE ' '.
  000192C*                 02  UNNMDT PICTURE X VALUE ' '.
  000193C*                 02  UNNSEL PICTURE X VALUE ' '.
  000194C*                 02  UNNMDSEL PICTURE X VALUE ' '.
  000195C*                 02  UNHSEL PICTURE X VALUE ' '.
  000196C*                 02  UNHMDSEL PICTURE X VALUE ' '.
  000197C*                 02  UNX PICTURE X VALUE ' '.
  000198C*                 02  UNXMDT PICTURE X VALUE ' '.
  000199C*                 02  PAN PICTURE X VALUE ' '.
  000200C*                 02  PANMDT PICTURE X VALUE ' '.
  000201C*                 02  PANSEL PICTURE X VALUE ' '.
  000202C*                 02  PANMDSEL PICTURE X VALUE ' '.
  000203C*                 02  PAHSEL PICTURE X VALUE ' '.
  000204C*                 02  PAHMDSEL PICTURE X VALUE ' '.
  000205C*                 02  PAX PICTURE X VALUE ' '.
  000206C*                 02  PAXMDT PICTURE X VALUE ' '.
  000207C*                 02  PSN PICTURE X VALUE ' '.
  000208C*                 02  PSNMDT PICTURE X VALUE ' '.
  000209C*                 02  PSNSEL PICTURE X VALUE ' '.
  000210C*                 02  PSNMDSEL PICTURE X VALUE ' '.
  000211C*                 02  PSHSEL PICTURE X VALUE ' '.
  000212C*                 02  PSHMDSEL PICTURE X VALUE ' '.
  000213C*                 02  PSX PICTURE X VALUE ' '.
  000214C*                 02  PSXMDT PICTURE X VALUE ' '.
  000215C*                 02  SUPR PICTURE X VALUE ' '.
  000216C*                 02  WRITE1 PICTURE X VALUE ' '.
  000217C*                 02  ERASWRIT PICTURE X VALUE ' '.
  000218C*                 02  ERASWRAL PICTURE X VALUE ' '.
  000219C*                 02  RMDT PICTURE X VALUE ' '.
  000220C*                 02  RKEYBD PICTURE X VALUE ' '.
  000221C*                 02  RMDTKEYB PICTURE X VALUE ' '.
  000222C*                 02  ALARM PICTURE X VALUE ' '.
  000223C*                 02  ALRMRMDT PICTURE X VALUE ' '.
  000224C*                 02  ALRMRKEY PICTURE X VALUE ' '.
  000225C*                 02  ALRMRMKY PICTURE X VALUE ' '.
  000226C*                 02  PRNTNL PICTURE X VALUE ' '.
  000227C*                 02  PRNT40 PICTURE X VALUE ' '.
  000228C*                 02  PRNT64 PICTURE X VALUE ' '.
  000229C*                 02  PRNT80 PICTURE X VALUE ' '.
  000230C*                 02  PRNLRMDT PICTURE X VALUE ' '.
  000231C*                 02  PR40RMDT PICTURE X VALUE ' '.
  000232C*                 02  PR64RMDT PICTURE X VALUE ' '.
  000233C*                 02  PR80RMDT PICTURE X VALUE ' '.
```

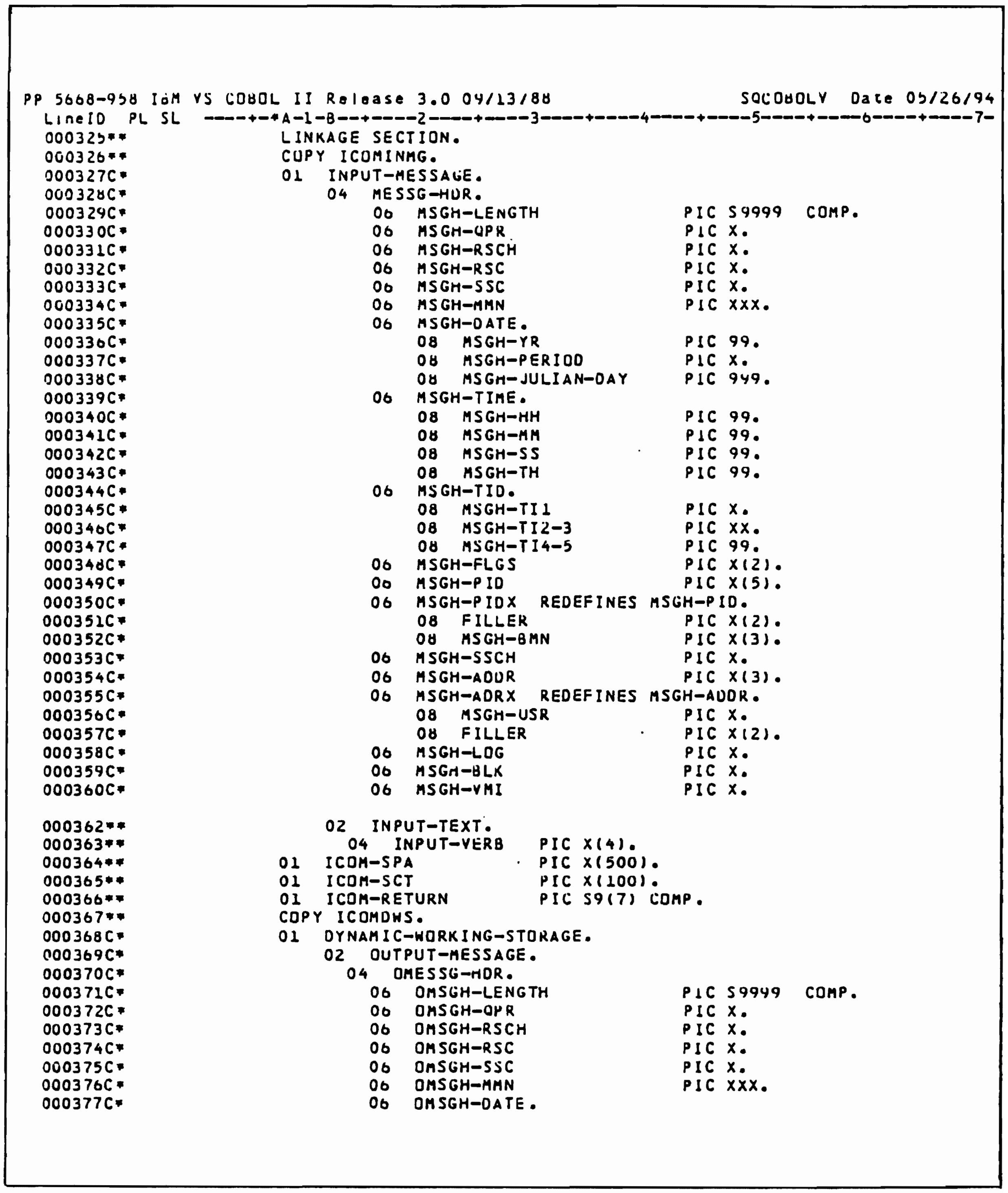
Figure 64.   Sample VS COBOL II Subsystem (Page 5 of 16)

```
PP 5668-958 IBM VS COBOL II Release 3.0 09/13/88                    SQCOBOLV  Date 05/26/94
  LineID  PL SL  ----+-*A-1-B--+----2----+----3----+----4----+----5----+----6----+----7-

 000234C*               02  PRNLRKEY PICTURE X VALUE ' '.
 000235C*               02  PR40RKEY PICTURE X VALUE ' '.
 000236C*               02  PR64RKEY PICTURE X VALUE ' '.
 000237C*               02  PR80RKEY PICTURE X VALUE ' '.
 000238C*               02  PRNLRMKY PICTURE X VALUE ' '.
 000239C*               02  PR40RMKY PICTURE X VALUE ' '.
 000240C*               02  PR64RMKY PICTURE X VALUE ' '.
 000241C*               02  PR80RMKY PICTURE X VALUE ' '.
 000242C*               02  PRNLALRM PICTURE X VALUE ' '.
 000243C*               02  PR40ALRM PICTURE X VALUE ' '.
 000244C*               02  PR64ALRM PICTURE X VALUE ' '.
 000245C*               02  PR80ALRM PICTURE X VALUE ' '.
 000246C*               02  PRNLARMD PICTURE X VALUE ' '.
 000247C*               02  PR40ARMD PICTURE X VALUE ' '.
 000248C*               02  PR64ARMD PICTURE X VALUE ' '.
 000249C*               02  PR80ARMD PICTURE X VALUE ' '.
 000250C*               02  PRNLARKY PICTURE X VALUE ' '.
 000251C*               02  PR40ARKY PICTURE X VALUE ' '.
 000252C*               02  PR64ARKY PICTURE X VALUE ' '.
 000253C*               02  PR80ARKY PICTURE X VALUE ' '.
 000254C*               02  PRNLAMKY PICTURE X VALUE ' '.
 000255C*               02  PR40AMKY PICTURE X VALUE ' '.
 000256C*               02  PR64AMKY PICTURE X VALUE ' '.
 000257C*               02  PR80AMKY PICTURE X VALUE ' '.
 000258C*              *02  NULL PICTURE X VALUE ' '.
 000259C*               02  NL PICTURE X VALUE ' '.
 000260C*               02  FF PICTURE X VALUE ' '.
 000261C*               02  CR PICTURE X VALUE ' '.
 000262C*               02  SI PICTURE X VALUE ' '.


 000264**               COPY ICOMSBS.
 000265C*               01  REENTSBS-CODES.
 000266C*              *   THESE CODES REPRESENT OFFSETS FOR ROUTINE ADDRESSES IN THE
 000267C*              *   TABLE NAMED REENTSBS. ONLY THE MOST COMMONLY USED VALUES
 000268C*              *   ARE INCLUDED HERE; THE USERS MANUAL HAS A COMPLETE LIST.
 000269C*              *   IF OFFSET ODD, THEN TRUE OFFSET=-(OFFSET+1)
 000270C*                   05  INITLU6         PIC 999 COMP VALUE 103.
 000271C*                   05  INTSORTC        PIC 99  COMP VALUE 99.
 000272C*                   05  DWS-SNAP        PIC 99  COMP VALUE 95.
 000273C*                   05  MAPFREE         PIC 99  COMP VALUE 91.
 000274C*                   05  FECMRLSE        PIC 99  COMP VALUE 87.
 000275C*                   05  FESEND          PIC 99  COMP VALUE 83.
 000276C*                   05  FESENDC         PIC 99  COMP VALUE 79.
 000277C*                   05  DYN-ALLOCATE    PIC 99  COMP VALUE 75.
 000278C*                   05  DYN-ACCESS      PIC 99  COMP VALUE 71.
 000279C*                   05  MAPURGE         PIC 99  COMP VALUE 67.
 000280C*                   05  MAPCLR          PIC 99  COMP VALUE 63.
 000281C*                   05  MAPEND          PIC 99  COMP VALUE 59.
 000282C*                   05  MAPOUT          PIC 99  COMP VALUE 55.
 000283C*                   05  MAPIN           PIC 99  COMP VALUE 51.
 000284C*                   05  INTUNSTO        PIC 99  COMP VALUE 47.
```

Figure 64.   Sample VS COBOL II Subsystem (Page 6 of 16)

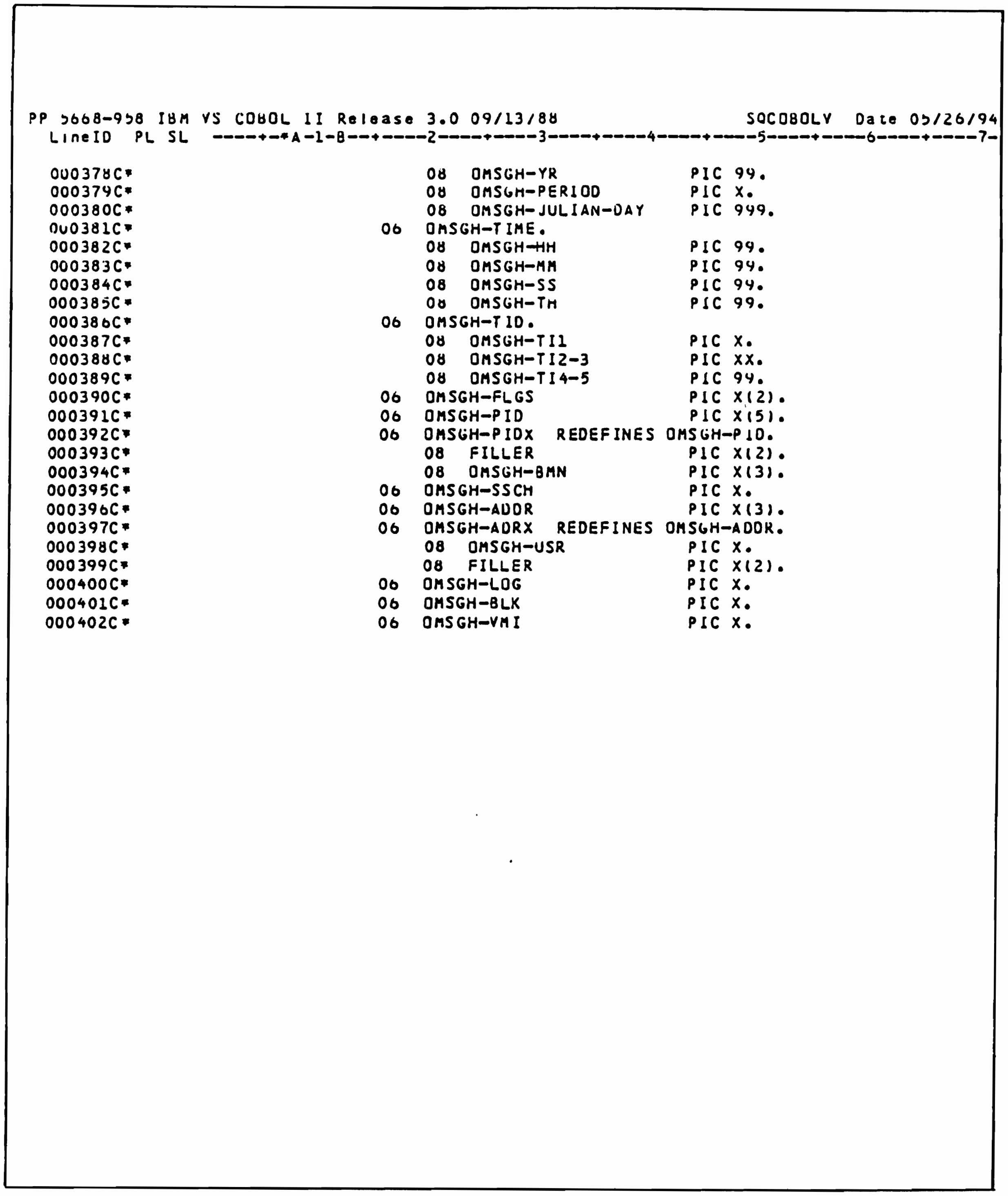
```
PP 5668-958 IBM VS COBOL II Release 3.0 09/13/88                 SQCOBOLV  Date 05/26/94
  LineID  PL SL  ----+-*A-1-B--+----2----+----3----+----4----+----5----+----6----+----7-

  000285C*                   05  INTSTORE         PIC 99  COMP VALUE 43.
  000286C*                   05  INTFETCH         PIC 99  COMP VALUE 39.
  000287C*                   05  FECMFDBK         PIC 99  COMP VALUE 35.
  000288C*                   05  FECMDDQ          PIC 99  COMP VALUE 31.
  000289C*                   05  DQ-WRITEX        PIC 99  COMP VALUE 27.
  000290C*                   05  DQ-READX         PIC 99  COMP VALUE 23.
  000291C*                   05  DQ-WRITE         PIC 99  COMP VALUE 19.
  000292C*                   05  DQ-READ          PIC 99  COMP VALUE 15.
  000293C*                   05  DQ-CLOSE         PIC 99  COMP VALUE 11.
  000294C*                   05  DQ-OPEN          PIC 99  COMP VALUE 07.
  000295C*                   05  DQ-BUILD         PIC 99  COMP VALUE 03.
  000296C*                   05  FH-SELECT        PIC 99  COMP VALUE 4.
  000297C*                   05  FH-RELEASE       PIC 99  COMP VALUE 8.
  000298C*                   05  FH-READ          PIC 99  COMP VALUE 12.
  000299C*                   05  FH-WRITE         PIC 99  COMP VALUE 16.
  000300C*                   05  FH-GET           PIC 99  COMP VALUE 20.
  000301C*                   05  FH-PUT           PIC 99  COMP VALUE 24.
  000302C*                   05  FH-RELEX         PIC 99  COMP VALUE 28.
  000303C*                   05  FH-FEOV          PIC 99  COMP VALUE 32.
  000304C*                   05  TABUILD          PIC 99  COMP VALUE 36.
  000305C*                   05  TABOPEN          PIC 99  COMP VALUE 40.
  000306C*                   05  TABPUT           PIC 99  COMP VALUE 44.
  000307C*                   05  TABGET           PIC 99  COMP VALUE 48.
  000308C*                   05  TABSORT          PIC 99  COMP VALUE 52.
  000309C*                   05  TABEND           PIC 99  COMP VALUE 56.
  000310C*                   05  COBPUT           PIC 99  COMP VALUE 68.
  000311C*                   05  MSGCOL           PIC 99  COMP VALUE 72.
  000312C*                   05  COBSTORF         PIC 99  COMP VALUE 76.
  000313C*                   05  CONVERSE         PIC 99  COMP VALUE 80.
  000314C*                   05  DBINT            PIC 99  COMP VALUE 84.
  000315C*                   05  LOGPUT           PIC 99  COMP VALUE 88.
  000316C*                   05  PAGE-FILE        PIC 99  COMP VALUE 92.
  000317C*                   05  FH-GETV          PIC 99  COMP VALUE 96.
  000318C*                   05  FH-PUTV          PIC 999 COMP VALUE 100.
  000319C*                *  CODES 104 AND UP INDICATE USER ADDITIONS TO THE TABLE


  000321**                       05  SQCOBOLB         PIC 999 COMP VALUE 104.
  000322**                   02  FILLER             PIC X(22)  VALUE
  000323**                                                'END OF WORKING STORAGE'.
```

Figure 64. Sample VS COBOL II Subsystem (Page 7 of 16)



```
PP 5668-958 IBM VS COBOL II Release 3.0 09/13/88              SQCOBOLV  Date 05/26/94
  LineID  PL SL  ----+-*A-1-B--+----2----+----3----+----4----+----5----+----6----+----7-
  000325**               LINKAGE SECTION.
  000326**               COPY ICOMINMG.
  000327C*               01  INPUT-MESSAGE.
  000328C*                   04  MESSG-HDR.
  000329C*                       06  MSGH-LENGTH              PIC S9999  COMP.
  000330C*                       06  MSGH-QPR                 PIC X.
  000331C*                       06  MSGH-RSCH                PIC X.
  000332C*                       06  MSGH-RSC                 PIC X.
  000333C*                       06  MSGH-SSC                 PIC X.
  000334C*                       06  MSGH-MMN                 PIC XXX.
  000335C*                       06  MSGH-DATE.
  000336C*                           08  MSGH-YR              PIC 99.
  000337C*                           08  MSGH-PERIOD          PIC X.
  000338C*                           08  MSGH-JULIAN-DAY      PIC 999.
  000339C*                       06  MSGH-TIME.
  000340C*                           08  MSGH-HH              PIC 99.
  000341C*                           08  MSGH-MM              PIC 99.
  000342C*                           08  MSGH-SS              PIC 99.
  000343C*                           08  MSGH-TH              PIC 99.
  000344C*                       06  MSGH-TID.
  000345C*                           08  MSGH-TI1             PIC X.
  000346C*                           08  MSGH-TI2-3           PIC XX.
  000347C*                           08  MSGH-TI4-5           PIC 99.
  000348C*                       06  MSGH-FLGS                PIC X(2).
  000349C*                       06  MSGH-PID                 PIC X(5).
  000350C*                       06  MSGH-PIDX  REDEFINES MSGH-PID.
  000351C*                           08  FILLER               PIC X(2).
  000352C*                           08  MSGH-BMN             PIC X(3).
  000353C*                       06  MSGH-SSCH                PIC X.
  000354C*                       06  MSGH-ADDR                PIC X(3).
  000355C*                       06  MSGH-ADRX  REDEFINES MSGH-ADDR.
  000356C*                           08  MSGH-USR             PIC X.
  000357C*                           08  FILLER               PIC X(2).
  000358C*                       06  MSGH-LOG                 PIC X.
  000359C*                       06  MSGH-BLK                 PIC X.
  000360C*                       06  MSGH-VMI                 PIC X.

  000362**                   02  INPUT-TEXT.
  000363**                     04  INPUT-VERB     PIC X(4).
  000364**               01  ICOM-SPA           PIC X(500).
  000365**               01  ICOM-SCT           PIC X(100).
  000366**               01  ICOM-RETURN        PIC S9(7) COMP.
  000367**               COPY ICOMDWS.
  000368C*               01  DYNAMIC-WORKING-STORAGE.
  000369C*                   02  OUTPUT-MESSAGE.
  000370C*                     04  OMESSG-HDR.
  000371C*                       06  OMSGH-LENGTH             PIC S9999  COMP.
  000372C*                       06  OMSGH-QPR                PIC X.
  000373C*                       06  OMSGH-RSCH               PIC X.
  000374C*                       06  OMSGH-RSC                PIC X.
  000375C*                       06  OMSGH-SSC                PIC X.
  000376C*                       06  OMSGH-MMN                PIC XXX.
  000377C*                       06  OMSGH-DATE.
```

Figure 64. Sample VS COBOL II Subsystem (Page 8 of 16)



```
PP 5668-958 IBM VS COBOL II Release 3.0 09/13/88             SQCOBOLV  Date 05/26/94
  LineID  PL SL  ----+-*A-1-B--+----2----+----3----+----4----+----5----+----6----+----7-

  000378C*                         08  OMSGH-YR            PIC 99.
  000379C*                         08  OMSGH-PERIOD        PIC X.
  000380C*                         08  OMSGH-JULIAN-DAY    PIC 999.
  000381C*                      06 OMSGH-TIME.
  000382C*                         08  OMSGH-HH            PIC 99.
  000383C*                         08  OMSGH-MM            PIC 99.
  000384C*                         08  OMSGH-SS            PIC 99.
  000385C*                         08  OMSGH-TH            PIC 99.
  000386C*                      06 OMSGH-TID.
  000387C*                         08  OMSGH-TI1           PIC X.
  000388C*                         08  OMSGH-TI2-3         PIC XX.
  000389C*                         08  OMSGH-TI4-5         PIC 99.
  000390C*                      06 OMSGH-FLGS              PIC X(2).
  000391C*                      06 OMSGH-PID               PIC X(5).
  000392C*                      06 OMSGH-PIDX  REDEFINES OMSGH-PID.
  000393C*                         08  FILLER              PIC X(2).
  000394C*                         08  OMSGH-BMN           PIC X(3).
  000395C*                      06 OMSGH-SSCH              PIC X.
  000396C*                      06 OMSGH-ADDR              PIC X(3).
  000397C*                      06 OMSGH-ADRX  REDEFINES OMSGH-ADDR.
  000398C*                         08  OMSGH-USR           PIC X.
  000399C*                         08  FILLER              PIC X(2).
  000400C*                      06 OMSGH-LOG               PIC X.
  000401C*                      06 OMSGH-BLK               PIC X.
  000402C*                      06 OMSGH-VMI               PIC X.
```

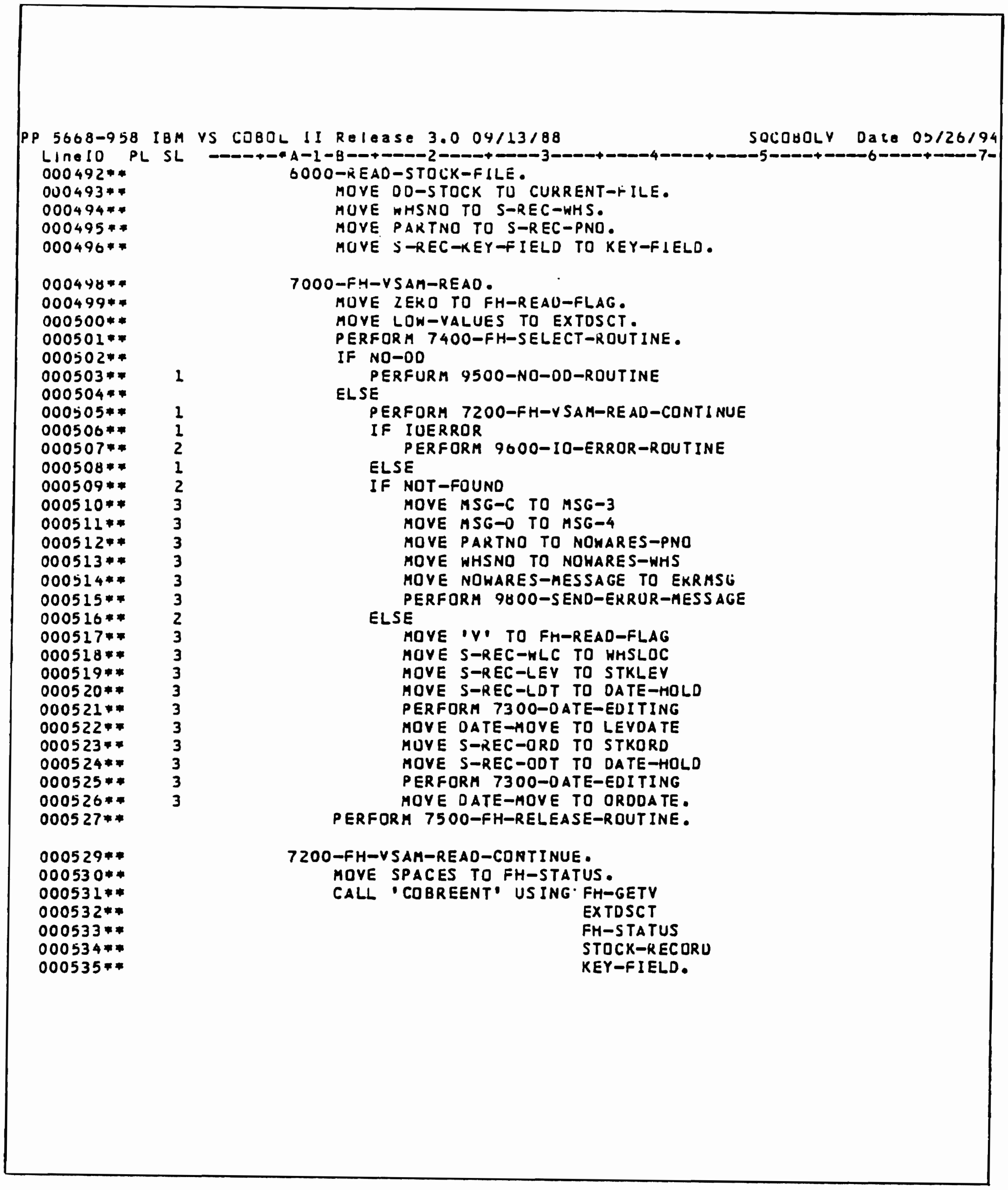
Figure 64. Sample VS COBOL II Subsystem (Page 9 of 16)

```
PP 5668-958 IBM VS COBOL II Release 3.0 09/13/88                  SQCOBOLV  Date 05/26/94
  LineID  PL SL  ----+-*A-1-B--+----2----+----3----+----4----+----5----+----6----+----7-
  000405**              PROCEDURE DIVISION USING INPUT-MESSAGE
  000406**                                       ICOM-SPA
  000407**                                       ICOM-SCT
  000408**                                       ICOM-RETURN
  000409**                                       DYNAMIC-WORKING-STORAGE.

  000411**              0100-MAIN-LINE.
  000412**                  PERFORM 1000-HOUSEKEEPING.
  000413**                  PERFORM 2000-HEADER-MOVE.
  000414**                  PERFORM 3000-MAP-IN.
  000415**                  MOVE LOW-VALUES TO VERB.
  000416**                  IF PARTNOT NOT EQUAL TO LOW-VALUES
  000417**                   OR WHSNOT NOT EQUAL TO LOW-VALUES
  000418**    1                PERFORM 8900-INVALID-INPUT-RTN
  000419**                  ELSE
  000420**    1             IF NOT MAPPING-OK
  000421**    2                PERFORM 8850-MAPPING-ERR-RTN
  000422**    1             ELSE
  000423**    2               PERFORM 3500-MAP-CLEAR-RTN
  000424**    2               PERFORM 4000-READ-PART-FILE
  000425**    2               PERFORM 5000-FH-BDAM-READ
  000426**    2               IF BDAM-READ-OK
  000427**    3                   PERFORM 6000-READ-STOCK-FILE
  000428**    3                   PERFORM 7000-FH-VSAM-READ
  000429**    3                   IF VSAM-READ-OK
  000430**    4                     PERFORM 8000-MAP-OUT
  000431**    4                     IF NOT MAPPING-OK
  000432**    5                       PERFORM 8850-MAPPING-ERR-RTN.
  000433**                  IF MAP-GOOD
  000434**    1               PERFORM 8500-GOOD-MAP-END
  000435**                  ELSE
  000436**    1             IF MAP-ERR
  000437**    2               PERFORM 8600-ERR-MAP-END.
  000438**                  GOBACK.
```

Figure 64. Sample VS COBOL II Subsystem (Page 10 of 16)

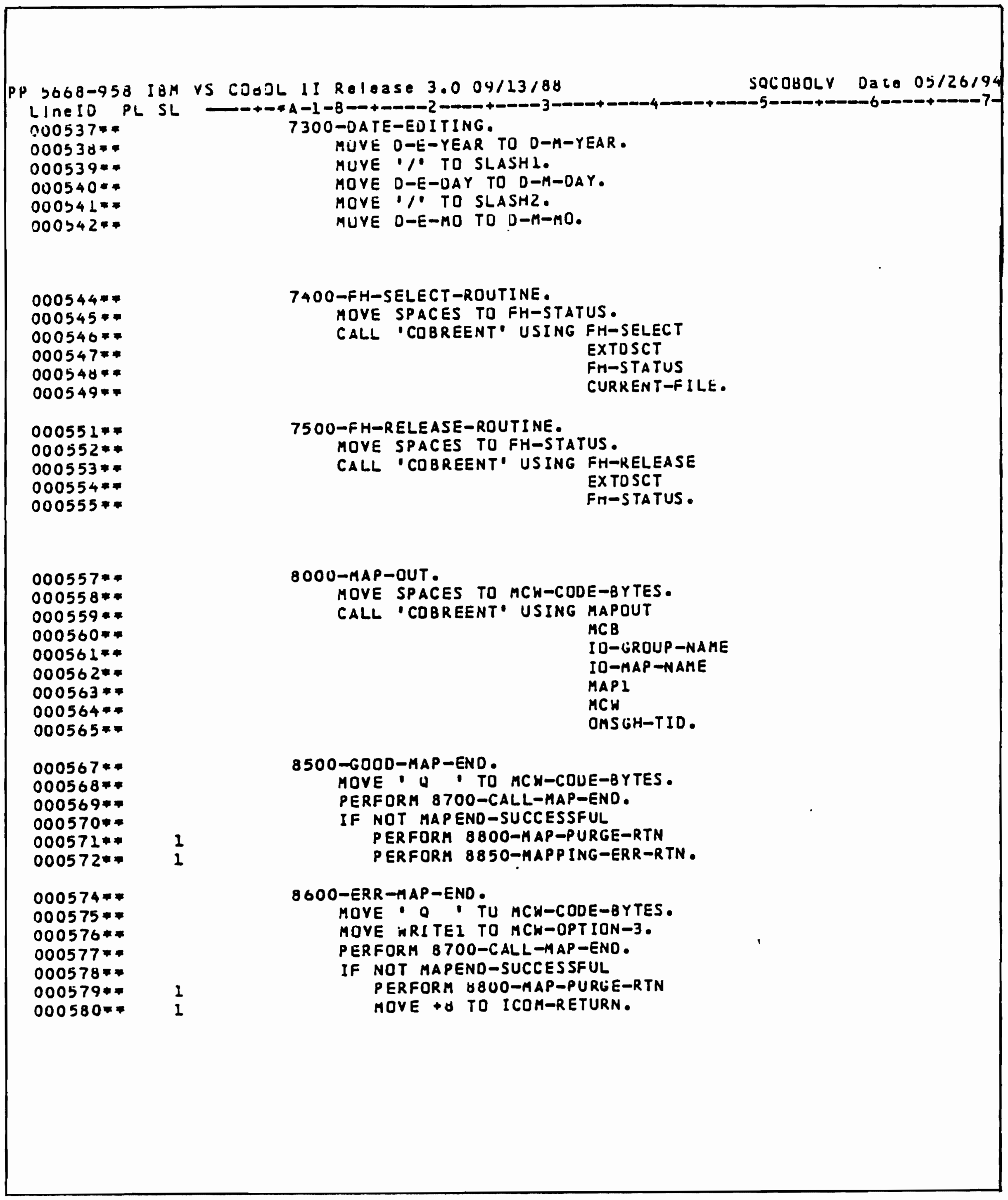
```
PP 5668-958 IBM VS COBOL II Release 3.0 09/13/88              SQCOBOLV  Date 05/26/94
  LineID  PL SL  ----+-*A-1-B--+----2----+----3----+----4----+----5----+----6----+----7-
 000440**               1000-HOUSEKEEPING.
 000441**                   MOVE +0 TO ICOM-RETURN.
 000442**                   MOVE 'G' TO MAP-FLAG.

 000444**               2000-HEADER-MOVE.
 000445**                   MOVE MESSG-HDR TO OMESSG-HDR.

 000447**               3000-MAP-IN.
 000448**                   MOVE SPACES TO MCW-CODE-BYTES.
 000449**                   CALL 'COBREENT' USING MAPIN
 000450**                                         MCB
 000451**                                         IO-GROUP-NAME
 000452**                                         IO-MAP-NAME
 000453**                                         INPUT-MESSAGE
 000454**                                         MCW
 000455**                                         MAP1.

 000457**               3500-MAP-CLEAR-RTN.
 000458**                   MOVE SPACES TO MCW-CODE-BYTES.
 000459**                   MOVE 'A' TO MCW-OPTION-4.
 000460**                   CALL 'COBREENT' USING MAPCLR
 000461**                                         MCW
 000462**                                         IO-GROUP-NAME
 000463**                                         IO-MAP-NAME
 000464**                                         MAP1
 000465**                                         OMSGH-TID.

 000467**               4000-READ-PART-FILE.
 000468**                   MOVE RBNBYTE TO RBN-WORD.
 000469**                   MOVE DD-PART TO CURRENT-FILE.

 000471**               5000-FH-BDAM-READ.
 000472**                   CALL 'COBREENT' USING SQCOBOLB
 000473**                                         PART-RECORD
 000474**                                         RBN.
 000475**                   IF ICOM-RETURN EQUAL 1
 000476**     1                 PERFORM 9600-IO-ERROR-ROUTINE
 000477**                   ELSE
 000478**     1             IF ICOM-RETURN EQUAL 2
 000479**     2                 PERFORM 9700-NOT-FOUND-RTN
 000480**     1             ELSE
 000481**     2             IF ICOM-RETURN EQUAL 9
 000482**     3                 PERFORM 9500-NO-DD-ROUTINE
 000483**     2             ELSE
 000484**     3             IF P-REC-PIN NOT EQUAL PARTNO
 000485**     4                 PERFORM 9700-NOT-FOUND-RTN
 000486**     3             ELSE
 000487**     4                 MOVE P-REC-DES TO PRTDATA
 000488**     4                 MOVE P-REC-UNT TO ORDUNT
 000489**     4                 MOVE P-REC-PRC TO PRTPRC
 000490**     4                 MOVE 'D' TO FH-READ-FLAG.
```

Figure 64. Sample VS COBOL II Subsystem (Page 11 of 16)



```
PP 5668-958 IBM VS COBOL II Release 3.0 09/13/88              SQCOBOLV  Date 05/26/94
  LineID  PL SL  ----+-*A-1-B--+----2----+----3----+----4----+----5----+----6----+----7-
  000492**              6000-READ-STOCK-FILE.
  000493**                  MOVE DD-STOCK TO CURRENT-FILE.
  000494**                  MOVE WHSNO TO S-REC-WHS.
  000495**                  MOVE PARTNO TO S-REC-PNO.
  000496**                  MOVE S-REC-KEY-FIELD TO KEY-FIELD.

  000498**              7000-FH-VSAM-READ.
  000499**                  MOVE ZERO TO FH-READ-FLAG.
  000500**                  MOVE LOW-VALUES TO EXTDSCT.
  000501**                  PERFORM 7400-FH-SELECT-ROUTINE.
  000502**                  IF NO-DD
  000503**     1                PERFURM 9500-NO-DD-ROUTINE
  000504**                  ELSE
  000505**     1                PERFORM 7200-FH-VSAM-READ-CONTINUE
  000506**     1                IF IOERROR
  000507**     2                    PERFORM 9600-IO-ERROR-ROUTINE
  000508**     1                ELSE
  000509**     2                IF NOT-FOUND
  000510**     3                    MOVE MSG-C TO MSG-3
  000511**     3                    MOVE MSG-D TO MSG-4
  000512**     3                    MOVE PARTNO TO NOWARES-PNO
  000513**     3                    MOVE WHSNO TO NOWARES-WHS
  000514**     3                    MOVE NOWARES-MESSAGE TO ERRMSG
  000515**     3                    PERFORM 9800-SEND-ERROR-MESSAGE
  000516**     2                ELSE
  000517**     3                    MOVE 'V' TO FH-READ-FLAG
  000518**     3                    MOVE S-REC-WLC TO WHSLOC
  000519**     3                    MOVE S-REC-LEV TO STKLEV
  000520**     3                    MOVE S-REC-LDT TO DATE-HOLD
  000521**     3                    PERFORM 7300-DATE-EDITING
  000522**     3                    MOVE DATE-MOVE TO LEVDATE
  000523**     3                    MOVE S-REC-ORD TO STKORD
  000524**     3                    MOVE S-REC-ODT TO DATE-HOLD
  000525**     3                    PERFORM 7300-DATE-EDITING
  000526**     3                    MOVE DATE-MOVE TO ORDDATE.
  000527**                  PERFORM 7500-FH-RELEASE-ROUTINE.

  000529**              7200-FH-VSAM-READ-CONTINUE.
  000530**                  MOVE SPACES TO FH-STATUS.
  000531**                  CALL 'COBREENT' USING FH-GETV
  000532**                                        EXTDSCT
  000533**                                        FH-STATUS
  000534**                                        STOCK-RECORD
  000535**                                        KEY-FIELD.
```

Figure 64. Sample VS COBOL II Subsystem (Page 12 of 16)



```
PP 5668-958 IBM VS COBOL II Release 3.0 09/13/88              SQCOBOLV  Date 05/26/94
  LineID  PL SL  ----+-*A-1-B--+----2----+----3----+----4----+----5----+----6----+----7-
 000537**               7300-DATE-EDITING.
 000538**                   MOVE D-E-YEAR TO D-M-YEAR.
 000539**                   MOVE '/' TO SLASH1.
 000540**                   MOVE D-E-DAY TO D-M-DAY.
 000541**                   MOVE '/' TO SLASH2.
 000542**                   MOVE D-E-MO TO D-M-MO.


 000544**               7400-FH-SELECT-ROUTINE.
 000545**                   MOVE SPACES TO FH-STATUS.
 000546**                   CALL 'COBREENT' USING FH-SELECT
 000547**                                         EXTDSCT
 000548**                                         FH-STATUS
 000549**                                         CURRENT-FILE.

 000551**               7500-FH-RELEASE-ROUTINE.
 000552**                   MOVE SPACES TO FH-STATUS.
 000553**                   CALL 'COBREENT' USING FH-RELEASE
 000554**                                         EXTDSCT
 000555**                                         FH-STATUS.


 000557**               8000-MAP-OUT.
 000558**                   MOVE SPACES TO MCW-CODE-BYTES.
 000559**                   CALL 'COBREENT' USING MAPOUT
 000560**                                         MCB
 000561**                                         IO-GROUP-NAME
 000562**                                         IO-MAP-NAME
 000563**                                         MAP1
 000564**                                         MCW
 000565**                                         OMSGH-TID.

 000567**               8500-GOOD-MAP-END.
 000568**                   MOVE ' Q  ' TO MCW-CODE-BYTES.
 000569**                   PERFORM 8700-CALL-MAP-END.
 000570**                   IF NOT MAPEND-SUCCESSFUL
 000571**     1                PERFORM 8800-MAP-PURGE-RTN
 000572**     1                PERFORM 8850-MAPPING-ERR-RTN.

 000574**               8600-ERR-MAP-END.
 000575**                   MOVE ' Q  ' TO MCW-CODE-BYTES.
 000576**                   MOVE WRITE1 TO MCW-OPTION-3.
 000577**                   PERFORM 8700-CALL-MAP-END.
 000578**                   IF NOT MAPEND-SUCCESSFUL
 000579**     1                PERFORM 8800-MAP-PURGE-RTN
 000580**     1                MOVE +8 TO ICOM-RETURN.
```

Figure 64. Sample VS COBOL II Subsystem (Page 13 of 16)

```
PP 5668-958 IBM VS COBOL II Release 3.0 09/13/88                SQCOBOLV  Date 05/26/94
  LineID  PL SL  ----+-*A-1-B--+----2----+----3----+----4----+----5----+----6----+----7-
  000582**               8700-CALL-MAP-END.
  000583**                   CALL 'COBREENT' USING MAPEND
  000584**                                         MCB
  000585**                                         OUTPUT-MESSAGE
  000586**                                         MCW.

  000588**               8800-MAP-PURGE-RTN.
  000589**                   CALL 'COBREENT' USING MAPURGE
  000590**                                         MCB.

  000592**               8850-MAPPING-ERR-RTN.
  000593**                   MOVE MSG-F TO MSG-6.
  000594**                   MOVE MCW-CODES1-2 TO ERROR-TAG.
  000595**                   MOVE MAPPING-ERR-MESSAGE TO ERRMSG.
  000596**                   PERFORM 9800-SEND-ERROR-MESSAGE.

  000598**               8900-INVALID-INPUT-RTN.
  000599**                   IF PARTNOT NOT EQUAL TO LOW-VALUES
  000600**     1               IF WHSNOT NOT EQUAL TO LOW-VALUES
  000601**     2                       MOVE MSG-I TO MSG-7
  000602**     1               ELSE
  000603**     2                       MOVE MSG-G TO MSG-7
  000604**                   ELSE
  000605**     1             IF WHSNOT NOT EQUAL TO LOW-VALUES
  000606**     2                       MOVE MSG-H TO MSG-7.
  000607**                   MOVE INVALID-INPUT-MESSAGE TO ERRMSG.
  000608**                   PERFORM 9800-SEND-ERROR-MESSAGE.

  000610**               9500-NO-DD-ROUTINE.
  000611**                   MOVE MSG-E TO MSG-5.
  000612**                   MOVE 'NO DD FOR FILE ' TO CAN-CODE.
  000613**                   MOVE CURRENT-FILE TO CAN-FILE-NAME.
  000614**                   MOVE CANCEL-MESSAGE TO ERRMSG.
  000615**                   MOVE +0 TO ICOM-RETURN.
  000616**                   PERFORM 9800-SEND-ERROR-MESSAGE.

  000618**               9600-IO-ERROR-ROUTINE.
  000619**                   MOVE MSG-E TO MSG-5.
  000620**                   MOVE 'IO ERROR ON ' TO CAN-CODE.
  000621**                   MOVE CURRENT-FILE TO CAN-FILE-NAME.
  000622**                   MOVE CANCEL-MESSAGE TO ERRMSG.
  000623**                   MOVE +0 TO ICOM-RETURN.
  000624**                   PERFORM 9800-SEND-ERROR-MESSAGE.

  000626**               9700-NOT-FOUND-RTN.
  000627**                   MOVE +0 TO ICOM-RETURN.
  000628**                   MOVE MSG-A TO MSG-1.
  000629**                   MOVE MSG-B TO MSG-2.
  000630**                   MOVE PARTNO TO NOPART-PNO.
  000631**                   MOVE NO-PART-MESSAGE TO ERRMSG.
  000632**                   PERFORM 9800-SEND-ERROR-MESSAGE.
```

Figure 64. Sample VS COBOL II Subsystem (Page 14 of 16)

```
 5668-958 IBM VS COBOL II Release 3.0 09/13/88                SQCOBOLV  Date 05/26/94
LineID  PL SL  ----+-*A-1-B--+----2----+----3----+----4----+----5----+----6----+----7-
000634**               9800-SEND-ERROR-MESSAGE.
000635**                   MOVE SPACES TO MCW-CODE-BYTES.
000636**                   MOVE 'E' TO MAP-FLAG.
000637**                   CALL 'COBREENT' USING MAPOUT
000638**                                         MCB
000639**                                         IO-GROUP-NAME
000640**                                         ERR-MAP-NAME
000641**                                         ERRMAP
000642**                                         MCW
000643**                                         OMSGH-TIO.
000644**                   IF NOT MAPPING-OK
000645**        1            MOVE +8 TO ICOM-RETURN
000646**        1            MOVE 'A' TO MAP-FLAG.
```

Figure 64. Sample VS COBOL II Subsystem (Page 15 of 16)

```
PP 5668-958 IBM VS COBOL II Release 3.0 09/13/88              SOCOBOLV  Date 05/26/94  Time 14:39:38   Page    33

Source   Hierarchy and                                   Base       Hex-Displacement  Asmblr Data                    Data Def
LineID   Data Name                                       Locator    Blk   Structure   Definition    Data Type        Attributes
  334        03 MSGH-MMN. . . . . . . . . . . . . . . . . BLL=0001   006   0 000 006   DS 3C         Display
  335        03 MSGH-DATE . . . . . . . . . . . . . . . . BLL=0001   009   0 000 009   DS OCL6       Group
  336          04 MSGH-YR . . . . . . . . . . . . . . . . BLL=0001   009   0 000 009   DS 2C         Disp-Num
  337          04 MSGH-PERIOD . . . . . . . . . . . . . . BLL=0001   008   0 000 008   DS 1C         Display
  338          04 MSGH-JULIAN-DAY . . . . . . . . . . . . BLL=0001   00C   0 000 00C   DS 3C         Disp-Num
  339        03 MSGH-TIME . . . . . . . . . . . . . . . . BLL=0001   00F   0 000 00F   DS OCL8       Group
  340          04 MSGH-HH . . . . . . . . . . . . . . . . BLL=0001   00F   0 000 00F   DS 2C         Disp-Num
  341          04 MSGH-MM . . . . . . . . . . . . . . . . BLL=0001   011   0 000 011   DS 2C         Disp-Num
  342          04 MSGH-SS . . . . . . . . . . . . . . . . BLL=0001   013   0 000 013   DS 2C         Disp-Num
  343          04 MSGH-TH . . . . . . . . . . . . . . . . BLL=0001   015   0 000 015   DS 2C         Disp-Num
  344        03 MSGH-TID. . . . . . . . . . . . . . . . . BLL=0001   017   0 000 017   DS OCL5       Group
  345          04 MSGH-TI1. . . . . . . . . . . . . . . . BLL=0001   017   0 000 017   DS 1C         Display
  346          04 MSGH-TI2-3. . . . . . . . . . . . . . . BLL=0001   018   0 000 018   DS 2C         Display
  347          04 MSGH-TI4-5. . . . . . . . . . . . . . . BLL=0001   01A   0 000 01A   DS 2C         Disp-Num
  348        03 MSGH-FLGS . . . . . . . . . . . . . . . . BLL=0001   01C   0 000 01C   DS 2C         Display
  349        03 MSGH-PID. . . . . . . . . . . . . . . . . BLL=0001   01E   0 000 01E   DS 5C         Display
  350        03 MSGH-PIDX . . . . . . . . . . . . . . . . BLL=0001   01E   0 000 01E   DS OCL5       Group            R
  351          04 FILLER. . . . . . . . . . . . . . . . . BLL=0001   01E   0 000 01E   DS 2C         Display
  352          04 MSGH-BMN. . . . . . . . . . . . . . . . BLL=0001   020   0 000 020   DS 3C         Display
  353        03 MSGH-SSCH . . . . . . . . . . . . . . . . BLL=0001   023   0 000 023   DS 1C         Display
  354        03 MSGH-ADDR . . . . . . . . . . . . . . . . BLL=0001   024   0 000 024   DS 3C         Display
  355        03 MSGH-ADRX . . . . . . . . . . . . . . . . BLL=0001   024   0 000 024   DS OCL3       Group            R
  356          04 MSGH-USR. . . . . . . . . . . . . . . . BLL=0001   024   0 000 024   DS 1C         Display
  357          04 FILLER. . . . . . . . . . . . . . . . . BLL=0001   025   0 000 025   DS 2C         Display
  358        03 MSGH-LOG. . . . . . . . . . . . . . . . . BLL=0001   027   0 000 027   DS 1C         Display
  359        03 MSGH-BLK. . . . . . . . . . . . . . . . . BLL=0001   028   0 000 028   DS 1C         Display
  360        03 MSGH-VMI. . . . . . . . . . . . . . . . . BLL=0001   029   0 000 029   DS 1C         Display
  362      02 INPUT-TEXT. . . . . . . . . . . . . . . . . BLL=0001   02A   0 000 02A   DS OCL4       Group
  363        03 INPUT-VERB. . . . . . . . . . . . . . . . BLL=0001   02A   0 000 02A   DS 4C         Display
  364    01 ICOM-SPA. . . . . . . . . . . . . . . . . . . BLL=0002   000               DS 500C       Display
  365    01 ICOM-SCT. . . . . . . . . . . . . . . . . . . BLL=0003   000               DS 100C       Display
  366    01 ICOM-RETURN . . . . . . . . . . . . . . . . . BLL=0004   000               DS 4C         Binary
  368    01 DYNAMIC-WORKING-STORAGE . . . . . . . . . . . BLL=0005   000               DS OCL42      Group
  369      02 OUTPUT-MESSAGE. . . . . . . . . . . . . . . BLL=0005   000   0 000 000   DS OCL42      Group
  370        03 OMESSG-HDR. . . . . . . . . . . . . . . . BLL=0005   000   0 000 000   DS OCL42      Group
  371          04 OMSGH-LENGTH. . . . . . . . . . . . . . BLL=0005   000   0 000 000   DS 2C         Binary
  372          04 OMSGH-QPR . . . . . . . . . . . . . . . BLL=0005   002   0 000 002   DS 1C         Display
  373          04 OMSGH-RSCH. . . . . . . . . . . . . . . BLL=0005   003   0 000 003   DS 1C         Display
  374          04 OMSGH-RSC . . . . . . . . . . . . . . . BLL=0005   004   0 000 004   DS 1C         Display
  375          04 OMSGH-SSC . . . . . . . . . . . . . . . BLL=0005   005   0 000 005   DS 1C         Display
  376          04 OMSGH-MMN . . . . . . . . . . . . . . . BLL=0005   006   0 000 006   DS 3C         Display
  377          04 OMSGH-DATE. . . . . . . . . . . . . . . BLL=0005   009   0 000 009   DS OCL6       Group
  378            05 OMSGH-YR. . . . . . . . . . . . . . . BLL=0005   009   0 000 009   DS 2C         Disp-Num
  379            05 OMSGH-PERIOD. . . . . . . . . . . . . BLL=0005   008   0 000 008   DS 1C         Display
  380            05 OMSGH-JULIAN-DAY. . . . . . . . . . . BLL=0005   00C   0 000 00C   DS 3C         Disp-Num
  381          04 OMSGH-TIME. . . . . . . . . . . . . . . BLL=0005   00F   0 000 00F   DS OCL8       Group
  382            05 OMSGH-HH. . . . . . . . . . . . . . . BLL=0005   00F   0 000 00F   DS 2C         Disp-Num
  383            05 OMSGH-MM. . . . . . . . . . . . . . . BLL=0005   011   0 000 011   DS 2C         Disp-Num
  384            05 OMSGH-SS. . . . . . . . . . . . . . . BLL=0005   013   0 000 013   DS 2C         Disp-Num
  385            05 OMSGH-TH. . . . . . . . . . . . . . . BLL=0005   015   0 000 015   DS 2C         Disp-Num
  386          04 OMSGH-TID . . . . . . . . . . . . . . . BLL=0005   017   0 000 017   DS OCL5       Group
```

Figure 64.   Sample VS COBOL II Subsystem (Page 16 of 16)

```
//TABLES        JOB
//*
//*                   DEFINE SYCTTBL FOR SUBSYTEM
//*
//STEP1         EXEC  LIBELINK,Q=TEST,NAME=INTSCT,LMOD=INTSCT
//LIB.SYSIN     DD    *
./ ADD NAME=USRSCTS
./ NUMBER       NEW1=100,INCR=100
USRSCTS         DS    0H
RQ              SYCTTBL SUBH=R,SUBC=Q,SBSP=SQCOBOLV,LANG=RCOB,OVLY=0,      X
                      NUMCL=10,MNCL=2,TCTV=60,GET=48
/*
//ASM.SYSIN     DD    DSN=INT.SYMREL(INTSCT),DISP=SHR
//*
//*                   DEFINE BTVERB FOR SUBSYSTEM
//*
//STEP2         EXEC  LIBELINK,Q=TEST,NAME=BTVRBTB,LMOD=BTVRBTB
//LIB.SYSIN     DD    *
./ ADD  NAME=USRBTVRB
./ NUMBER       NEW1=100,INCR=100
USRBTVRB        DS    0H
                BTVERB VERB=MURQ,SSCH=R,SSC=Q,CONV=18000
/*
//ASM.SYSIN     DD    DSN=INT.SYMREL(BTVRBTB),DISP=SHR
//*
//*                   DEFINE SUBMODS FOR SUBROUTINE
//*
//STEP3         EXEC  LIBELINK,Q=TEST,NAME=REENTSBS,LMOD=REENTSBS
//LIB.SYSIN     DD    *
./ ADD  NAME=USRSUBS
./ NUMBER       NEW1=100,INCR=100
USRSUBS         DS    0H
                SUBMODS LNAME=SQCOBOLB,TYPE=COBOL,DELTIME=30,PARM=RC,      X
                      GET=60
/*
//ASM.SYSIN     DD    DSN=INT.SYMREL(REENTSBS),DISP=SHR
//
```

Figure 65. Table Updates for Simulation Mode Testing

```
//EXECTEST JOB (ICOMTEST,,,20),'VS COBOL 2 TEST',CLASS=A,
//   RESTART=(GENLINK.ASM)
//PROCLIB DD DSN=INT.PROCLIB,DISP=SHR          (AS NEEDED)
//*********************************************************************
//*  THE RESTART PARM IN THE JOB STATEMENT RESTARTS THE TEST AT THE   *
//*  BEGINNING.  IF YOU WISH TO RESTART AT A DIFFERENT STEP, CODE     *
//*  RESTART=STEPNAME  OR  RESTART=STEPNAME.PROCSTEPNAME              *
//*                                                                   *
//*  NOTE: WHEN USING A VSAM FILE, IT MAY BE NECESSARY TO EXECUTE     *
//*        IDCAMS TO VERIFY THE FILE IF A PREVIOUS EXECUTION ABENDED. *
//*********************************************************************
//*
//*********************************************************************
//*  STEP GENLINK GENERATES A STANDARD BTAM FRONT END LINKEDIT DECK   *
//*  VIA ASSEMBLY OF THE ICOMLINK MACRO. IF ONLY A VTAM FRONT END IS  *
//*  USED ON-LINE, A SETGLOBE WITH THE BTAM GLOBAL SET TO 1 MUST BE   *
//*  IN THE LIBRARY SPECIFIED BY THE Q= PARM. ADD OR CHANGE PARMS FOR *
//*  THE ICOMLINK MACRO BASED ON INTERCOMM FACILITIES USED.           *
//*  NOTE: COBOL2=YES GENERATES INCLUDE STATEMENTS FOR VS COBOL II    *
//*                  SUPPORT - IGZEBST, IGZEOPT, DUMVCOB2, STVSCOB2;  *
//*        RECOBOL=NO SUPPRESSES INCLUDES FOR ILBO... MODULES.        *
//*  THE GENERATED DECK (SIMLINKV) IS PLACED ON INT.SYMTEST.          *
//*  NOTE: THE SPECIFIED FRONT END NETWORK TABLE (FENETWRK) THAT IS   *
//*        ON MODREL CONTAINS A DEFINITION FOR THE TEST TERMINAL      *
//*        TEST1 AS A LOCAL BTAM 3270 CRT. (COPY TO MODTEST)          *
//*  STEP NUM NUMBERS GENERATED LINK DECK IN INCREMENTS OF 1000       *
//*       FOR ADDING INCLUDE STATEMENTS IN GENINCL STEP.              *
//*********************************************************************
//GENLINK  EXEC  ASMPC,DECK=DECK,Q=TEST
//ASM.SYSIN DD *
        ICOMLINK MMU=YES,FETABLE=FENETWRK,RECOBOL=NO,COBOL2=YES
        END
//SYSPUNCH DD DSN=INT.SYMTEST(SIMLINKV),DISP=SHR
//*                                  NUMBER GENERATED LINKEDIT DECK
//NUM      EXEC  LIBE,Q=TEST
//LIB.SYSIN DD *
./ CHANGE NAME=SIMLINKV
./ NUMBER NEW1=1000,INCR=1000
//*
//*********************************************************************
//*  STEPS SCRSCR AND ALLOCSCR DELETE AND RE-ALLOCATE THE LOAD        *
//*   MODULE LIBRARY USED IN THE TEST (ALSO USED FOR DYNLLIB)         *
//*********************************************************************
//SCRSCR   EXEC PGM=IEFBR14
//FILE1    DD DSN=INT.MODSCR,DISP=(OLD,DELETE)
//ALLOCSCR EXEC PGM=IEFBR14
//A        DD DSN=INT.MODSCR,DISP=(,CATLG),UNIT=SYSDA,
//   DCB=INT.MODREL,VOL=SER=INT001,
//   SPACE=(TRK,(30,,7))           7 RECORDS PER TRK/3380
```

Figure 66.   Simulation Mode Linkedit and Execution JCL (Page 1 of 3)

```
//*********************************************************************
//*  STEP GENINCL CREATES INCLUDE DECK USED BY THE LINK EDIT STEP:    *
//*  THE ADDED INCLUDE STATEMENTS ARE FOR THE SAMPLE SUBSYSTEM        *
//*        (ASSUMED TO HAVE BEEN LINKED TO MODTEST),                  *
//*      AND THE REQUIRED SIMULATION MODE MODULES.                    *
//*  IF THE TEST1 TERMINAL IS NOT IN THE SYSTEM PMISTATB TABLE, USE:  *
//*         INCLUDE MODREL(PMISTATB)                                  *
//*         INCLUDE MODREL(PMIDEVTB)                                  *
//*         INCLUDE MODREL(PMIBROAD)                                  *
//*     THE ABOVE ASSUMES THE CONTROL TERMINAL IS NAMED CNT01.        *
//*********************************************************************
//GENINCL  EXEC PGM=IEBUPDTE
//SYSPRINT DD SYSOUT=A                          TO PRINT CHANGES
//SYSUT1   DD DSN=INT.SYMTEST,DISP=SHR
//SYSUT2 DD DSN=&&INCL,DISP=(,PASS),UNIT=SYSDA,SPACE=(TRK,(8,1,1)),
//    DCB=(BLKSIZE=80,LRECL=80)
//SYSIN    DD *
./  CHANGE NAME=SIMLINKV,LIST=ALL
        INCLUDE SYSLIB(SQCOBOLV)       TEST SUBSYSTEM                   00000010
        INCLUDE SYSLIB(BTAMSIM)        BTAM SIMULATOR                   00000020
        INCLUDE SYSLIB(SIM3270)        SCREEN PRINTING                  00000030
        INCLUDE SYSLIB(IGZETUN)   VS COBOL2 TUNING TABLE (IF NEEDED)    00000040
/*
//*********************************************************************
//*   LINK EDIT THE TEST INTERCOMM SYSTEM.                            *
//*   NOTE THAT THE INTERCOMM LKEDT PROC PLACES THE LOAD MODULE ON    *
//*        THE MODSCR LOAD LIBRARY CREATED ABOVE.                     *
//*********************************************************************
//LKED     EXEC LKEDT,Q=TEST,LMOD=SIMICOM,
//        PARM.LKED='LIST,LET,XREF,NCAL,SIZE=(250K,100K)'
//LKED.SYSLIB DD
//             DD
//             DD
//             DD
//             DD  DSN=SYS1.COB2LIB,DISP=SHR     (OVERRIDE SYS1.COBLIB)
//SYSIN    DD DSN=&&INCL(SIMLINKV),DISP=(OLD,PASS)
//MODREL   DD DSN=INT.MODREL,DISP=SHR
//*********************************************************************
//*    LINKEDIT THE DYNAMICALLY LOADABLE SUBROUTINE                   *
//*        FROM MODTEST (Q= POINTS TO IT) TO MODSCR                   *
//*********************************************************************
//LINKSQB  EXEC LKEDT,Q=TEST,LMOD=SQCOBOLB
//SYSIN    DD   *
         INCLUDE SYSLIB(SQCOBOLB)
/*
//*
//*********************************************************************
//**   ENSURE THE INTERCOMM VERSIONS OF VS COBOL II COBPACKS         **
//**          IGZCPCO    AND   IGZCPAC                               **
//**   ARE ON ONE OF THE STEPLIB LIBRARIES BEFORE SYS1.COB2LIB       **
//**       FOR THE GO STEP (OTHERWISE RELINK THEM TO MODSCR).        **
//*********************************************************************
```

Figure 66. Simulation Mode Linkedit and Execution JCL (Page 2 of 3)

```
//************************************************************************
//*    EXECUTE INTERCOMM IN SIMULATION MODE                              *
//************************************************************************
//GO       EXEC PGM=SIMICOM,PARM='STARTUP',TIME=(,30)
//STEPLIB  DD DSN=INT.MODSCR,DISP=(OLD,PASS)
//         DD DSN=INT.MODLIB,DISP=SHR
//         DD DSN=INT.MODREL,DISP=SHR
//         DD DSN=SYS1.COB2LIB,DISP=SHR     VS COBOL II LOAD LIBRARY
//INTERLOG DD DSN=&&INTLOG,DISP=(NEW,PASS),
//  DCB=(DSORG=PS,RECFM=VB,BLKSIZE=4096,LRECL=4092,NCP=8,OPTCD=C),
//  SPACE=(TRK,(10,5)),VOL=SER=INT100,UNIT=SYSDA
//SMLOG    DD SYSOUT=A,DCB=(DSORG=PS,BLKSIZE=120,RECFM=FA)
//STSLOG   DD SYSOUT=A,DCB=(DSORG=PS,BLKSIZE=120,RECFM=FA)
//SYSPRINT DD SYSOUT=A,DCB=(DSORG=PS,BLKSIZE=141,LRECL=137,RECFM=VA)
//RCT000   DD DSN=INT.RCT000,DISP=SHR,DCB=(DSORG=DA,OPTCD=RF)
//PMIQUE   DD DSN=INT.PMIQUE,DCB=(DSORG=DA,OPTCD=R),DISP=SHR
//BTAMQ    DD DSN=INT.BTAMQ,DCB=(DSORG=DA,OPTCD=R),DISP=SHR
//INTSTOR2 DD DSN=INTSTOR2,DCB=(DSORG=DA,OPTCD=EF,LIMCT=3),DISP=SHR
//INTSTOR3 DD DSN=INTSTOR3,DCB=(DSORG=DA,OPTCD=EF,LIMCT=3),DISP=SHR
//*       TEST  DATA  SETS  FOR  SAMPLE  SUBSYSTEM
//STOKFILE DD DSN=VSAMSD1.STCKFILE.CLUSTER,DISP=OLD,
//    AMP=(AMORG,'RECFM=F')
//PARTFILE DD DSN=INT.BETA.PARTFILE,DISP=OLD,
//    DCB=(DSORG=DA,OPTCD=R)
//*       DATA  SETS  FOR  SIMULATED  TERMINAL -- TEST1
//TEST1    DD DSN=INT.TTEST1,DCB=DSORG=PS,DISP=OLD
//SCRTEST1 DD SYSOUT=A,DCB=(DSORG=PS,RECFM=FA,BLKSIZE=121)
//SIMCARDS DD *
TEST1,002
//PMISTOP  DD DUMMY                 DELIMIT INTERCOMM FILES
//*       FAR PARAMETERS
//*           (TO USE, CHANGE ICOMIN TO DD *, FOLLOW WITH FARS INLINE)
//ICOMIN   DD DUMMY
//*       DYNAMIC LINKEDIT DATA SETS
//DYNLLIB  DD DSN=INT.MODSCR,DISP=(OLD,PASS)
//DYNLPRNT DD SYSOUT=A
//*
//SNAPDD   DD SYSOUT=A,SPACE=(CYL,5),FREE=CLOSE
//SYSUDUMP DD SYSOUT=A
//SYSOUT   DD SYSOUT=A                       FOR  DISPLAY  VERB OUTPUT
//*
//ABNLIGNR DD DUMMY  FORCE ABEND-AID TO IGNORE DUMP (PRODUCE IBM DUMP)
//***********************************************************************
//*        PRINT INTERCOMM LOG GENERATED BY THE TEST                    *
//***********************************************************************
//INTERLOG EXEC PGM=LOGPRINT,COND=EVEN
//STEPLIB  DD DSN=INT.MODREL,DISP=SHR
//SYSPRINT DD SYSOUT=A,DCB=(DSORG=PS,BLKSIZE=121)
//INTERLOG DD DSN=&&INTLOG,DISP=OLD,DCB=BLKSIZE=5000
//SYSIN    DD DUMMY
//
```

Figure 66.   Simulation Mode Linkedit and Execution JCL (Page 3 of 3)

```
DATE 94.146    TIME 15.30.24        **** I N T E R C O M M   L O G   D I S P L A Y ****                 PAGE    1

MSGLEN  THREAD  QPR   RSC       SSC          MMN     DATE        TIME        TID     FLGS  USR              BMN  LOG BLK  VMI
--------------------------------------------------------------------------------------------------------------------------------
    78      0    02  ../0000  ../0000         1    94.146    15.29.1062   TOALL   0000   00                0   9F  00   00
000000  C9D5E3C5 D9C3D6D4 D440E2E3 C1D9E3E4    D74OD4C5 E2E2C1C7 C5406040 C9D5E3E3   *INTERCOMM STARTUP MESSAGE - INTT*
000032  F0F0F1E7                                                                     *001X                            *
--------------------------------------------------------------------------------------------------------------------------------
   108      0    02  .U/00E4  ../0000         1    94.146    15.29.1062   TOALL   0000   00                0   01  00   50
000000  FF02002D 013C5C5C 5C40C7D6 D6C440C1    C6E3C5D9 D5D6D6D5 5C5C4040 C9D5E3C5   *.......*** GOOD AFTERNOON**  INTE*
000032  D9C3D6D4 D440C9E2 40D9C5C1 C4E8407A    404040F0 F560F2F6 60F9F440 40F1F548   *RCOMM IS READY :   05-26-94  15.*
000064  F2F9                                                                         *29                              *
--------------------------------------------------------------------------------------------------------------------------------
    42      1    02  .U/00E4  ../0000         1    94.146    15.29.1062   TOALL   0000   00                0   30  00   50
--------------------------------------------------------------------------------------------------------------------------------
    42      1    02  .U/00E4  ../0000         1    94.146    15.29.1062   TOALL   0000   00                0   FA  00   50
--------------------------------------------------------------------------------------------------------------------------------
   108      0    02  .U/00E4  ../0000         2    94.146    15.29.1062   CNT01   0000   00                0   01  00   50
000000  FF02002D 013C5C5C 5C40C7D6 D6C440C1    C6E3C5D9 D5D6D6D5 5C5C4040 C9D5E3C5   *.......*** GOOD AFTERNOON**  INTE*
000032  D9C3D6D4 D440C9E2 40D9C5C1 C4E8407A    404040F0 F560F2F6 60F9F440 40F1F548   *RCOMM IS READY :   05-26-94  15.*
000064  F2F9                                                                         *29                              *
--------------------------------------------------------------------------------------------------------------------------------
    42      1    02  .U/00E4  ../0000         2    94.146    15.29.1062   CNT01   0000   00                0   30  00   50
--------------------------------------------------------------------------------------------------------------------------------
   105      1    02  ../0000  .U/00E4         3    94.146    15.29.1063   CNT01   0000   00                0   F2  00   50
000000  155C5C5C 40C7D6D6 C440C1C6 E3C5D9D5    D6D6D55C 5C4040C9 D5E3C5D9 C3D6D4D4   *.*** GOOD AFTERNOON**  INTERCOMM*
000032  40C9E240 D9C5C1C4 E8407A40 4040F0F5    60F2F660 F9F44040 F1F548F2 F91526     * IS READY :   05-26-94  15.29.. *
--------------------------------------------------------------------------------------------------------------------------------
    42      1    02  .U/00E4  ../0000         2    94.146    15.29.1063   CNT01   0000   00                0   FA  00   50
--------------------------------------------------------------------------------------------------------------------------------
    42      1    02  ../0000  .U/00E4         3    94.146    15.29.1094   CNT01   0000   00                0   F3  00   50
--------------------------------------------------------------------------------------------------------------------------------
   108      0    02  .U/00E4  ../0000         4    94.146    15.29.1123   TEST1   0000   00                0   01  00   50
000000  FF02002D 013C5C5C 5C40C7D6 D6C440C1    C6E3C5D9 D5D6D6D5 5C5C4040 C9D5E3C5   *.......*** GOOD AFTERNOON**  INTE*
000032  D9C3D6D4 D440C9E2 40D9C5C1 C4E8407A    404040F0 F560F2F6 60F9F440 40F1F548   *RCOMM IS READY :   05-26-94  15.*
000064  F2F9                                                                         *29                              *
--------------------------------------------------------------------------------------------------------------------------------
    42      1    02  .U/00E4  ../0000         4    94.146    15.29.1123   TEST1   0000   00                0   30  00   50
--------------------------------------------------------------------------------------------------------------------------------
   103      1    02  ../0000  .U/00E4         5    94.146    15.29.1124   TEST1   0000   00                0   F2  00   50
000000  5C5C5C40 C7D6D6C4 40C1C6E3 C5D9D5D6    D6D55C5C 4040C9D5 E3C5D9C3 D6D4D440   **** GOOD AFTERNOON**  INTERCOMM *
000032  C9E240D9 C5C1C4E8 407A4040 40F0F560    F2F660F9 F44040F1 F548F2F9 37         *IS READY :   05-26-94  15.29.   *
--------------------------------------------------------------------------------------------------------------------------------
    42      1    02  .U/00E4  ../0000         4    94.146    15.29.1124   TEST1   0000   00                0   FA  00   50
--------------------------------------------------------------------------------------------------------------------------------
    42      1    02  ../0000  .U/00E4         5    94.146    15.29.1236   TEST1   0000   00                0   F3  00   50
--------------------------------------------------------------------------------------------------------------------------------
    67      0    F2  MM/D4D4  ../0000         6    94.146    15.29.1548   TEST1   0000   00                1   01  00   FF
000000  D4D4E4C3 6BE2C8D6 E66B4DE2 E3D2E2E3    C1E368D4 C1D7F15D 26                  *MMUC,SHOW,(STKSTAT,MAP1).       *
--------------------------------------------------------------------------------------------------------------------------------
    42      1    F2  MM/D4D4  ../0000         6    94.146    15.29.1548   TEST1   0000   00                1   30  00   FF
--------------------------------------------------------------------------------------------------------------------------------
   350      1    02  ../0000  MM/D4D4         7    94.146    15.29.1562   TEST1   0000   00                1   F2  00   67
000000  F5C31140 401DC140 4040401D F0C5D5E3    C5D940E3 D9C1D5E2 C1C3E3C9 D6D540C3   *5C.  .A    .0ENTER TRANSACTION C*
000032  D6C4C511 C2F51DF0 C5D5E3C5 D940C4C1    E3C17A11 C5C51DE8 D7C1D9E3 40D5D67A   *ODE.B5.0ENTER DATA:.EE.YPART NO:*

MSGLEN  THREAD  QPR   RSC       SSC          MMN     DATE        TIME        TID     FLGS  USR              BMN  LOG BLK  VMI
```

Figure 67. Release 10 Simulation Mode Log Print (Page 1 of 6)

```
DATE 94.146     TIME 15.30.24         **** I N T E R C O M M    L O G    D I S P L A Y ****                     PAGE     2

MSGLEN  THREAD   UPK  RSC        SSC           MMN    DATE          TIME        TID      FLGS  USR              BMN  LOG BLK  VMI
-------------------------------------------------------------------------------------------------------------------------------
000064    1D5011C5 D41DF011 C6D51DE8 E6C6E240    D5D67A1D 5011C661 1DF011C9 C51DF0E2   *.&.EM.O.FN.YWHS NO:.&.F/.O.IE.OS*
000096    E3D6C3D2 40E2E3C1 E3E4E27A 114BD51D    F0C4C5E2 C3D9C9D7 E3C9D6D5 7A1D4011   *TOCK STATUS:..N.ODESCRIPTION:. .*
000128    4C5A1DF0 114CE51D F0D6D9C4 C5D940E4    D5C9E3E2 7A1D4011 4CF81DF0 1140C61D   *<..O.<V.OORDER UNITS:. .<8.O.(F.*
000160    F0D7D9C9 C3C57A1D 40114D07 1DF0114F    D51DF0E2 E3D6C3D2 40E2E3C1 E3E4E240   *OPRICE:. .(P.O.?N.OSTOCK STATUS *
000192    C1E340E6 C1D9C5C8 D6E4E2C5 7A11D1E5    1DF0D3D6 C3C1E3C9 D6D57A1D 4011D2C7   *AT WAREHOUSE:.JV.OLOCATION:. .KG*
000224    1DF011D2 F51DF0D6 D540C8C1 D5C47A1D    4011D3C6 1DF011D3 D61DF0C1 E240D6C6   *.O.K5.OON HAND:. .LF.O.LO.OAS OF*
000256    7A1D4011 D3E61DF0 11D4C51D F0D6D540    D6D9C4C5 D97A1D40 11D4D71D F011D4E6   *:. .LW.O.ME.OON ORDER:. .MP.O.MW*
000288    1DF0C1E2 40D6C67A 1D4011D4 F61DF011    40C11303                              *.OAS OF:. .M6.O. A..            *
-------------------------------------------------------------------------------------------------------------------------------
    42       1     F2  MM/D4D4   ../0000        6     94.146     15.29.1562    TEST1    0000   00                1   FA   00   FF
-------------------------------------------------------------------------------------------------------------------------------
    42       1     02  ../0000   MM/D4D4        7     94.146     15.29.1759    TEST1    0000   00                1   F3   00   67
-------------------------------------------------------------------------------------------------------------------------------
    62       0     F2  RQ/D9D8   ../0000        8     94.146     15.29.2066    TEST1    0000   C6                2   01   00   FF
000000    D4E4D908 6811C54F F1F2F3F4 F511C65E    F2F0F026                              *MURQ,.E?12345.F.200.            *
-------------------------------------------------------------------------------------------------------------------------------
    42       1     F2  RQ/D9D8   ../0000        8     94.146     15.29.2066    TEST1    0000   00                2   30   00   FF
-------------------------------------------------------------------------------------------------------------------------------
   413       1     02  ../0000   RQ/D9D8        9     94.146     15.29.2135    TEST1    0000   00                2   F2   00   67
000000    F5C31140 401DC140 4040401D F0C5D5E3    C5D940E3 D9C1D5E2 C1C3E3C9 D6D540C3   *5C.  .A    .OENTER TRANSACTION C*
000032    D6C4C511 C2F51DF0 C5D5E3C5 D940C4C1    E3C17A11 C5C51DE8 D7C1D9E3 40D5D67A   *ODE.B5.OENTER DATA:.EE.YPART NU:*
000064    1D50F1F2 F3F4F51D F011C6D5 1DE8E6C8    E240D5D6 7A1D50F2 F0F01DF0 11C9C51D   *.&12345.O.FN.YWHS NO:.&200.O.IE.*
000096    F0E2E3D6 C3D240E2 E3C1E3E4 E27A114B    D51DF0C4 C5E2C3D9 C9D7E3C9 D6D57A1D   *OSTOCK STATUS:..N.ODESCRIPTION:.*
000128    40F161F2 40C9D540 E2E3C5C5 D340E6C1    E2C8C5D9 3C4CD940 114C5A1D F0114CE5   * 1/2 IN STEEL WASHER.<R .<..O.<V*
000160    1DF0D6D9 C4C5D940 E4D5C9E3 E27A1D40    C7D9E240 401DF011 4DC61DF0 D7D9C9C3   *.OORDER UNITS:. GRS  .O.(F.OPRIC*
000192    C57A1D40 5BF5F0F5 4BF0F5F0 F71DF011    4FD51DF0 E2E3D6C3 D240E2E3 C1E3E4E2   *E:. $505.0507.O.?N.OSTOCK STATUS*
000224    40C1E340 E6C1D9C5 C8D6E4E2 C57A11D1    E51DF0D3 D6C3C1E3 C9D6D57A 1D4004C9   * AT WAREHOUSE:.JV.OLOCATION:. MI*
000256    C1D4C968 40C6D3C1 4B3CD2C7 401DF011    D2F51DF0 D6D540C8 C1D5C47A 1D40F6F1   *AMI, FLA..KG .O.K5.OON HAND:. 61*
000288    F6F1F5F0 F61DF011 D3D61DF0 C1E240D6    C67A1D40 F0F361F0 F561F8F2 1DF011D4   *61506.O.LO.OAS OF:. 03/05/82.O.M*
000320    C51DF0D6 D540D6D9 C4C5D97A 1D40F4F0    F4F0F6F1 F71DF011 D4E61DF0 C1E240D6   *E.OON ORDER:. 4040617.O.MW.OAS O*
000352    C67A1D40 F1F061F1 F161F8F2 1DF01140    C11303                                *F:. 10/11/82.O. A..             *
-------------------------------------------------------------------------------------------------------------------------------
    42       1     F2  RQ/D9D8   ../0000        8     94.146     15.29.2149    TEST1    0000   00                2   FA   00   FF
-------------------------------------------------------------------------------------------------------------------------------
    42       1     02  ../0000   RQ/D9D8        9     94.146     15.29.2319    TEST1    0000   00                2   F3   00   67
-------------------------------------------------------------------------------------------------------------------------------
    62       0     F2  RQ/D9D8   ../0000       10     94.146     15.29.2529    TEST1    0000   C6                3   01   00   FF
000000    D4E4D9D8 6811C54F F5F5F5F5 F511C65E    F2F0F026                              *MURQ,.E?55555.F.200.            *
-------------------------------------------------------------------------------------------------------------------------------
    42       1     F2  RQ/D9D8   ../0000       10     94.146     15.29.2529    TEST1    0000   00                3   30   00   FF
-------------------------------------------------------------------------------------------------------------------------------
   112       1     02  ../0000   RQ/D9D8       11     94.146     15.29.2537    TEST1    0000   00                3   F2   00   67
000000    F1C3114B 50125B5F 115B7F1D E6C5D9D9    D6D940D4 C5E2E2C1 C7C57A11 5CF81DC8   *1C..&.$..$".YERROR MESSAGE:.*8.H*
000032    D7C1D9E3 40D5E4D4 C2C5D940 3C5D4AF5    40D5D6E3 40C6D6E4 D5C44B3C 5D68401D   *PART NUMBER .).5 NOT FOUND..), .*
000064    F0115CF9 1303                                                                *0.*9..                          *
-------------------------------------------------------------------------------------------------------------------------------
    42       1     F2  RQ/D9D8   ../0000       10     94.146     15.29.2537    TEST1    0000   00                3   FA   00   FF
-------------------------------------------------------------------------------------------------------------------------------
    42       1     02  ../0000   RQ/D9D8       11     94.146     15.29.2664    TEST1    0000   00                3   F3   00   67
-------------------------------------------------------------------------------------------------------------------------------
    62       0     F2  RQ/D9D8   ../0000       12     94.146     15.29.2878    TEST1    0000   C6                4   01   00   FF

MSGLEN  THREAD   UPK  RSC        SSC           MMN    DATE          TIME        TID      FLGS  USR              BMN  LOG BLK  VMI
```

Figure 67. Release 10 Simulation Mode Log Print (Page 2 of 6)

```
DATE 94.146    TIME 15.30.24          **** I N T E R C O M M   L O G   D I S P L A Y ****                  PAGE    3

MSGLEN  THREAD   QPK   RSC        SSC          MMN     DATE          TIME         TID     FLGS  USR            BMN  LOG BLK  VMI
------------------------------------------------------------------------------------------------------------------------------
000000   D4E4D9D8 6811C54F F1F2F3F4 F811C65E    F3F0F026                                 *MURQ,.E712348.F.300.             *
------------------------------------------------------------------------------------------------------------------------------
    42       1    F2   RQ/D9D8   ../0000      12     94.146      15.29.2878    TEST1   0000  00                4   30  00   FF
------------------------------------------------------------------------------------------------------------------------------
   411       1    02   ../0000   RQ/D9D8      13     94.146      15.29.2881    TEST1   0000  00                4   F2  00   67
000000   F5C31140 401DC140 4040401D F0C5D5E3    C5D940E3 D9C1D5E2 C1C3E3C9 D6D540C3     *5C.  .A    .0ENTER TRANSACTION C*
000032   D6C4C511 C2F51DF0 C5D5E3C5 D940C4C1    E3C17A11 C5C51DE8 D7C1D9E3 40D5D67A     *ODE.B5.0ENTER DATA:.EE.YPART NO:*
000064   1D50F1F2 F3F4F81D F011C6D5 1DE8E6C8    E240D5D6 7A1D50F3 F0F01DF0 11C9C51D     *.&12348.0.FN.YWHS NO:.&300.0.IE.*
000096   F0E2E3D6 C3D240E2 E3C1E3E4 E27A1148    D51DF0C4 C5E2C3D9 C9D7E3C9 D6D57A1D     *0STOCK STATUS:..N.0DESCRIPTION:.*
000128   40F340C6 E340C1D3 D3E4D440 E2C3C1D3    C53C4CD9 40114C5A 1DF0114C E51DF0D6     * 3 FT ALLUM SCALE.<R .<..0.<V.0O*
000160   D9C4C5D9 40E4D5C9 E3E27A1D 40C5C1C3    C8401DF0 114DC61D F0D7D9C9 C3C57A1D     *RDER UNITS:. EACH .0.(F.0PRICE:.*
000192   405BF5F0 F548F0F5 F0F61DF0 114FD51D    F0E2E3D6 C3D240E2 E3C1E3E4 E240C1E3     * $505.0506.0.?N.0STOCK STATUS AT*
000224   40E6C1D9 C5C8D6E4 E2C57A11 D1E51DF0    D3D6C3C1 E3C9D6D5 7A1D40C4 C5D5E5C5     * WAREHOUSE:.JV.0LOCATION:. DENVE*
000256   D96B40C3 D6D34B3C D2C7401D F011D2F5    1DF0D6D5 40C8C1D5 C47A1D40 F5F0F5F0     *R, COL..KG .0.K5.0ON HAND:. 5050*
000288   F5F0F71D F011D3D6 1DF0C1E2 40D6C67A    1D40F0F3 61F0F561 F8F21DF0 11D4C51D     *507.0.LO.0AS OF:. 03/05/82.0.ME.*
000320   F0D6D540 D6D9C4C5 D97A1D40 F5F0F5F0    F5F0F61D F011D4E6 1DF0C1E2 40D6C67A     *0ON ORDER:. 5050506.0.MW.0AS OF:*
000352   1D40F1F0 61F1F161 F8F21DF0 1140C113    03                                      *. 10/11/82.0. A..                *
------------------------------------------------------------------------------------------------------------------------------
    42       1    F2   RQ/D9D8   ../0000      12     94.146      15.29.2881    TEST1   0000  00                4   FA  00   FF
------------------------------------------------------------------------------------------------------------------------------
    42       1    02   ../0000   RQ/D9D8      13     94.146      15.29.3107    TEST1   0000  00                4   F3  00   67
------------------------------------------------------------------------------------------------------------------------------
    62       0    F2   RQ/D9D8   ../0000      14     94.146      15.29.3395    TEST1   0000  C6                5   01  00   FF
000000   D4E4D9D8 6811C54F F1F2F3F4 F111C65E    F6F0F026                                 *MURQ,.E712341.F.600.             *
------------------------------------------------------------------------------------------------------------------------------
    42       1    F2   RQ/D9D8   ../0000      14     94.146      15.29.3395    TEST1   0000  00                5   30  00   FF
------------------------------------------------------------------------------------------------------------------------------
   122       1    02   ../0000   RQ/D9D8      15     94.146      15.29.3402    TEST1   0000  00                5   F2  00   67
000000   F1C3114B 50125B5F 115B7F1D E8C5D9D9    D6D940D4 C5E2E2C1 C7C57A11 5CF81DC8     *1C..&.$..$".YERROR MESSAGE:.*8.H*
000032   D7C1D9E3 40F1F2F3 F4F140D5 D6E340C6    D6E4D5C4 40C9D540 E6C1D9C5 C8D6E4E2     *PART 12341 NOT FOUND IN WAREHOUS*
000064   C540F6F0 F03C5D68 401DF011 5CF91303                                            *E 600.), .0.*9..                 *
------------------------------------------------------------------------------------------------------------------------------
    42       1    F2   RQ/D9D8   ../0000      14     94.146      15.29.3402    TEST1   0000  00                5   FA  00   FF
------------------------------------------------------------------------------------------------------------------------------
    42       1    02   ../0000   RQ/D9D8      15     94.146      15.29.3533    TEST1   0000  00                5   F3  00   67
------------------------------------------------------------------------------------------------------------------------------
    62       0    F2   RQ/D9D8   ../0000      16     94.146      15.29.3856    TEST1   0000  C6                6   01  00   FF
000000   D4E4D9D8 6811C54F C1F2F3F4 F511C65E    F2F0F026                                 *MURQ,.E7A2345.F.200.             *
------------------------------------------------------------------------------------------------------------------------------
    42       1    F2   RQ/D9D8   ../0000      16     94.146      15.29.3856    TEST1   0000  00                6   30  00   FF
------------------------------------------------------------------------------------------------------------------------------
   121       1    02   ../0000   RQ/D9D8      17     94.146      15.29.3857    TEST1   0000  00                6   F2  00   67
000000   F1C3114B 50125B5F 115B7F1D E8C5D9D9    D6D940D4 C5E2E2C1 C7C57A11 5CF81DC8     *1C..&.$..$".YERROR MESSAGE:.*8.H*
000032   C9D5E5C1 D3C9C440 C4C1E3C1 7A40D7C1    D9E3D5D6 40D4E4E2 E340C2C5 40D5E4D4     *INVALID DATA: PARTNO MUST BE NUM*
000064   C5D9C9C3 3C5D5B40 1DF0115C F91303                                              *ERIC.), .0.*9..                  *
------------------------------------------------------------------------------------------------------------------------------
    42       1    F2   RQ/D9D8   ../0000      16     94.146      15.29.3857    TEST1   0000  00                6   FA  00   FF
------------------------------------------------------------------------------------------------------------------------------
    42       1    02   ../0000   RQ/D9D8      17     94.146      15.29.3991    TEST1   0000  00                6   F3  00   67
------------------------------------------------------------------------------------------------------------------------------
    62       0    F2   RQ/D9D8   ../0000      18     94.146      15.29.4296    TEST1   0000  C6                7   01  00   FF

MSGLEN  THREAD   QPK   RSC        SSC          MMN     DATE          TIME         TID     FLGS  USR            BMN  LOG BLK  VMI
```

Figure 67. Release 10 Simulation Mode Log Print (Page 3 of 6)

```
DATE 94.146    TIME 15.30.24          **** I N T E R C O M M    L O G    D I S P L A Y ****                   PAGE      4

MSGLEN  THREAD   QPR   RSC       SSC          MMN      DATE          TIME         TID      FLGS  USR             BMN  LOG BLK  VMI
-----------------------------------------------------------------------------------------------------------------------------------
000000    D4E4D9D8 6811C54F F1F2F3F4 F511C65E     C2F0F026                                   *MURQ,.E?12345.F.800.              *
-----------------------------------------------------------------------------------------------------------------------------------
    42       1     F2  RQ/D9D8  ../0000          18     94.146     15.29.4296   TEST1    0000   00                 7   30   00   FF
-----------------------------------------------------------------------------------------------------------------------------------
   120       1     02  ../0000  RQ/D9D8          19     94.146     15.29.4296   TEST1    0000   00                 7   F2   00   67
000000    F1C3114B 501258 5F 11587F1D E6C5D9D9    D6D94004 C5E2E2C1 C7C57A11 5CF81DC8   *1C..&.$..$".YERROR MESSAGE:.*8.H*
000032    C9D5E5C1 D3C9C440 C4C1E3C1 7A40E6C8     E2D5D640 D4E4E2E3 40C2C540 D5E4D4C5   *INVALID DATA: WHSNO MUST BE NUME*
000064    D9C9C33C 5D68401D F0115CF9 1303                                                *RIC.), .0.*9..                   *
-----------------------------------------------------------------------------------------------------------------------------------
    42       1     F2  RQ/D9D8  ../0000          18     94.146     15.29.4296   TEST1    0000   00                 7   FA   00   FF
-----------------------------------------------------------------------------------------------------------------------------------
    42       1     02  ../0000  RQ/D9D8          19     94.146     15.29.4430   TEST1    0000   00                 7   F3   00   67
-----------------------------------------------------------------------------------------------------------------------------------
    62       0     F2  RQ/D9D8  ../0000          20     94.146     15.29.4663   TEST1    0000   C6                 8   01   00   FF
000000    D4E4D9D8 6811C54F F1F2F3F4 E711C65E     F2F0E826                                   *MURQ,.E?1234X.F.20Y.              *
-----------------------------------------------------------------------------------------------------------------------------------
    42       1     F2  RQ/D9D8  ../0000          20     94.146     15.29.4663   TEST1    0000   00                 8   30   00   FF
-----------------------------------------------------------------------------------------------------------------------------------
   131       1     02  ../0000  RQ/D9D8          21     94.146     15.29.4663   TEST1    0000   00                 8   F2   00   67
000000    F1C3114B 50125B5F 11587F1D E8C5D9D9     D6D94004 C5E2E2C1 C7C57A11 5CF81DC8   *1C..&.$..$".YERROR MESSAGE:.*8.H*
000032    C9D5E5C1 D3C9C440 C4C1E3C1 7A40D7C1     D9E3D5D6 40C1D5C4 40E6C8E2 D5D640D4   *INVALID DATA: PARTNO AND WHSNO M*
000064    E4E2E340 C2C540D5 E4D4C509 C9C34040     40401DF0 115CF913 03                  *UST BE NUMERIC     .0.*9..       *
-----------------------------------------------------------------------------------------------------------------------------------
    42       1     F2  RQ/D9D8  ../0000          20     94.146     15.29.4663   TEST1    0000   00                 8   FA   00   FF
-----------------------------------------------------------------------------------------------------------------------------------
    42       1     02  ../0000  RQ/D9D8          21     94.146     15.29.4809   TEST1    0000   00                 8   F3   00   67
-----------------------------------------------------------------------------------------------------------------------------------
    62       0     F2  RQ/D9D8  ../0000          22     94.146     15.29.5133   TEST1    0000   C6                 9   01   00   FF
000000    D4E4D9D8 6811C54F F1F2F3F4 F911C65E     F1F0F026                                   *MURQ,.E?12349.F.100.              *
-----------------------------------------------------------------------------------------------------------------------------------
    42       1     F2  RQ/D9D8  ../0000          22     94.146     15.29.5134   TEST1    0000   00                 9   30   00   FF
-----------------------------------------------------------------------------------------------------------------------------------
   113       1     02  ../0000  RQ/D9D8          23     94.146     15.29.5137   TEST1    0000   00                 9   F2   00   67
000000    F1C3114B 50125B5F 11587F1D E8C5D9D9     D6D94004 C5E2E2C1 C7C57A11 5CF81DC8   *1C..&.$..$".YERROR MESSAGE:.*8.H*
000032    D7C1D9E3 40D5E4D4 C2C5D940 F1F2F3F4     F940D5D6 E340C6D6 E4D5C44B 3C5D6B40   *PART NUMBER 12349 NOT FOUND..), *
000064    1DF0115C F91303                                                                *.0.*9..                          *
-----------------------------------------------------------------------------------------------------------------------------------
    42       1     F2  RQ/D9D8  ../0000          22     94.146     15.29.5137   TEST1    0000   00                 9   FA   00   FF
-----------------------------------------------------------------------------------------------------------------------------------
    42       1     02  ../0000  RQ/D9D8          23     94.146     15.29.5268   TEST1    0000   00                 9   F3   00   67
-----------------------------------------------------------------------------------------------------------------------------------
    62       0     F2  RQ/D9D8  ../0000          24     94.146     15.29.5489   TEST1    0000   C6                10   01   00   FF
000000    D4E4D9D8 6811C54F F1F2F3F4 F211C65E     F1F0F026                                   *MURQ,.E?12342.F.100.              *
-----------------------------------------------------------------------------------------------------------------------------------
    42       1     F2  RQ/D9D8  ../0000          24     94.146     15.29.5489   TEST1    0000   00                10   30   00   FF
-----------------------------------------------------------------------------------------------------------------------------------
   430       1     02  ../0000  RQ/D9D8          25     94.146     15.29.5491   TEST1    0000   00                10   F2   00   67
000000    F5C31140 401DC140 4040401D F0C5D5E3     C5D940E3 D9C1D5E2 C1C3E3C9 D6D540C3   *5C.  .A    .0ENTER TRANSACTION C*
000032    D6C4C511 C2F51DF0 C5D5E3C5 D940C4C1     E3C17A11 C5C51DE8 D7C1D9E3 40D5D67A   *ODE.B5.0ENTER DATA:.EE.YPART NO:*
000064    1D50F1F2 F3F4F21D F011C6D5 1DE8E6C8     E240D5D6 7A1D50F1 F0F01DF0 11C9C51D   *.&12342.0.FN.YWHS NO:.&100.0.IE.*
000096    F0E2E3D6 C3D240E2 E3C1E3E4 E27A114B     D51DF0C4 C5E2C3D9 C9D7E3C9 D6D57A1D   *0STOCK STATUS:..N.0DESCRIPTION:.*

MSGLEN  THREAD   QPR   RSC       SSC          MMN      DATE          TIME         TID      FLGS  USR             BMN  LOG BLK  VMI
```

Figure 67.   Release 10 Simulation Mode Log Print (Page 4 of 6)

```
DATE 94.146    TIME 15.30.24        **** I N T E R C O M M   L O G   D I S P L A Y ****                PAGE     5

MSGLEN  THREAD   UPR   RSC       SSC          MMN     DATE          TIME        TID      FLGS  USR              BMN  LOG BLK  VMI
-----------------------------------------------------------------------------------------------------------------------------
000128    40F361F8 40C9D540 C6D3C1E3 40C8C5C1     C440C2D3 C1C3D240 C3C1D9D9 C9C1C7C5   * 3/8 IN FLAT HEAD BLACK CARRIAGE*
000160    40C2D6D3 E33C4CD9 40114C5A 1DF0114C     E51DF0D6 D9C4C5D9 40E4D5C9 E3E27A1D   * BOLT.<R .<..0.<V.OORDER UNITS:.*
000192    40C4D6E9 40401DF0 114DC61D F0D7D9C9     C3C57A1D 4058F5F0 F648F1F6 F1F61DF0   * DOZ  .0.(F.OPRICE:. $506.1616.0*
000224    114FD51D F0E2E3D6 C3D240E2 E3C1E3E4     E240C1E3 40E6C1D9 C5C8D6E4 E2C57A11   *.?N.OSTOCK STATUS AT WAREHOUSE:.*
000256    D1E51DF0 D3D6C3C1 E3C9D6D5 7A1D40D4     C9C1D4C9 6840C6D3 C14B3CD2 C7401DF0   *JV.OLOCATION:. MIAMI, FLA..KG .0*
000288    11D2F51D F0D6D540 C8C1D5C4 7A1D40F6     F1F5F0F6 F1F41DF0 11D3D61D F0C1E240   *.K5.OON HAND:. 6150614.0.LO.OAS *
000320    D6C67A1D 40F0F361 F0F561F8 F21DF011     D4C51DF0 D6D540D6 D9C4C5D9 7A1D40F5   *OF:. 03/05/82.0.ME.OON ORDER:. 5*
000352    F0F4F0F4 F0F41DF0 11D4E61D F0C1E240     D6C67A1D 40F1F061 F1F161F8 F21DF011   *040404.0.MW.OAS OF:. 10/11/82.0.*
000384    40C11303                                                                       * A..                            *
-----------------------------------------------------------------------------------------------------------------------------
    42       1     F2  RQ/D9D8   ../0000       24     94.146     15.29.5491     TEST1   0000   00             10   FA   00   FF
-----------------------------------------------------------------------------------------------------------------------------
    42       1     02  ../0000   RQ/D9D8       25     94.146     15.29.5738     TEST1   0000   00             10   F3   00   67
-----------------------------------------------------------------------------------------------------------------------------
    47       0     00  .J/00D1   ../0000       26     94.146     15.30.0053     CNT01   0000   00              0   01   00   57
000000    D509C3C4 26                                                                    *NRCD.                           *
-----------------------------------------------------------------------------------------------------------------------------
    42       1     00  .J/00D1   ../0000       26     94.146     15.30.0054     CNT01   0000   00              0   30   00   57
-----------------------------------------------------------------------------------------------------------------------------
   108       1     00  .U/00E4   .J/00D1       27     94.146     15.30.0054     TOALL   0000   00              0   01   00   50
000000    FF02002D 013C5C5C 5C40C7D6 D6C440C1     C6E3C5D9 D5D6D6D5 5C5C4040 C9D5E3C5   *......*** GOOD AFTERNOON**   INTE*
000032    D9C3D6D4 D440C9E2 40C3D3D6 E2C5C47A     404040F0 F560F2F6 60F9F440 40F1F54B   *RCOMM IS CLOSED:    05-26-94   15.*
000064    F3F0                                                                           *30                              *
-----------------------------------------------------------------------------------------------------------------------------
    42       1     00  .J/00D1   ../0000       26     94.146     15.30.0054     CNT01   0000   00              0   FA   00   57
-----------------------------------------------------------------------------------------------------------------------------
    42       1     00  .U/00E4   .J/00D1       27     94.146     15.30.0054     TOALL   0000   00              0   30   00   50
-----------------------------------------------------------------------------------------------------------------------------
    42       1     00  .U/00E4   .J/00D1       27     94.146     15.30.0054     TOALL   0000   00              0   FA   00   50
-----------------------------------------------------------------------------------------------------------------------------
   108       0     00  .U/00E4   .J/00D1       28     94.146     15.30.0054     CNT01   0000   00              0   01   00   50
000000    FF02002D 013C5C5C 5C40C7D6 D6C440C1     C6E3C5D9 D5D6D6D5 5C5C4040 C9D5E3C5   *......*** GOOD AFTERNOON**   INTE*
000032    D9C3D6D4 D440C9E2 40C3D3D6 E2C5C47A     404040F0 F560F2F6 60F9F440 40F1F54B   *RCOMM IS CLOSED:    05-26-94   15.*
000064    F3F0                                                                           *30                              *
-----------------------------------------------------------------------------------------------------------------------------
    42       1     00  .U/00E4   .J/00D1       28     94.146     15.30.0054     CNT01   0000   00              0   30   00   50
-----------------------------------------------------------------------------------------------------------------------------
   105       1     02  ../0000   .U/00E4       29     94.146     15.30.0054     CNT01   0000   00              0   F2   00   50
000000    155C5C5C 40C7D6D6 C440C1C6 E3C5D9D5     D6D6D55C 5C4040C9 D5E3C5D9 C3D6D4D4   *.*** GOOD AFTERNOON**  INTERCOMM*
000032    40C9E240 C3D3D6E2 C5C47A40 4040F0F5     60F2F660 F9F44040 F1F548F3 F01526      * IS CLOSED:    05-26-94  15.30.. *
-----------------------------------------------------------------------------------------------------------------------------
    42       1     00  .U/00E4   .J/00D1       28     94.146     15.30.0055     CNT01   0000   00              0   FA   00   50
-----------------------------------------------------------------------------------------------------------------------------
    42       1     02  ../0000   .U/00E4       29     94.146     15.30.0057     CNT01   0000   00              0   F3   00   50
-----------------------------------------------------------------------------------------------------------------------------
   108       0     00  .U/00E4   .J/00D1       30     94.146     15.30.0106     TEST1   0000   00              0   01   00   50
000000    FF02002D 013C5C5C 5C40C7D6 D6C440C1     C6E3C5D9 D5D6D6D5 5C5C4040 C9D5E3C5   *......*** GOOD AFTERNOON**   INTE*
000032    D9C3D6D4 D440C9E2 40C3D3D6 E2C5C47A     404040F0 F560F2F6 60F9F440 40F1F54B   *RCOMM IS CLOSED:    05-26-94   15.*
000064    F3F0                                                                           *30                              *
-----------------------------------------------------------------------------------------------------------------------------
    42       1     00  .U/00E4   .J/00D1       30     94.146     15.30.0107     TEST1   0000   00              0   30   00   50
-----------------------------------------------------------------------------------------------------------------------------

MSGLEN  THREAD   UPR   RSC       SSC          MMN     DATE          TIME        TID      FLGS  USR              BMN  LOG BLK  VMI
```

Figure 67. Release 10 Simulation Mode Log Print (Page 5 of 6)

```
DATE 94.146    TIME 15.30.24         **** I N T E R C O M M   L O G   D I S P L A Y ****               PAGE     6

MSGLEN  THREAD   QPK   RSC       SSC          MMN     DATE        TIME       TID     FLGS  USR             BMN  LOG BLK  VMI
-----------------------------------------------------------------------------------------------------------------------------
   103      1    02  ../0000  .U/00E4         31     94.146    15.30.0107  TEST1   0000   00                0  F2   00   50
000000   5C5C5C40 C7D6D6C4 40C1C6E3 C5D9D5D6   D6D55C5C 4040C9D5 E3C5D9C3 D6D4D440  **** GOOD AFTERNOON**  INTERCOMM *
000032   C9E240C3 D3D6E2C5 C47A4040 40F0F560   F2F660F9 F44040F1 F548F3F0 37        *IS CLOSED:   05-26-94  15.30.   *
-----------------------------------------------------------------------------------------------------------------------------
    42      1    00  .U/00E4  .J/0001         30     94.146    15.30.0107  TEST1   0000   00                0  FA   00   50
-----------------------------------------------------------------------------------------------------------------------------
    47      0    00  .J/0001  ../0000         32     94.146    15.30.0155  CNT01   0000   00                0  01   00   FC
000000   D5D9C3C4 26                                                                *NRCD.                           *
-----------------------------------------------------------------------------------------------------------------------------
    42      1    00  .J/0001  ../0000         32     94.146    15.30.0155  CNT01   0000   00                0  30   00   FC
-----------------------------------------------------------------------------------------------------------------------------
    42      1    02  ../0000  .U/00E4         31     94.146    15.30.0291  TEST1   0000   00                0  F3   00   50
-----------------------------------------------------------------------------------------------------------------------------
    78      0    00  ../0000  ../0000          0     94.146    15.30.1161  .....   0000   00                0  AA   00   00
000000   C9D5E3C5 D9C3D6D4 D440C3D3 D6E2C5C4   D6E6D540 D4C5E2E2 C1C7C540 C9D5E3E3  *INTERCOMM CLOSEDOWN MESSAGE INTT*
000032   F0F0F1E7                                                                   *001X                            *
-----------------------------------------------------------------------------------------------------------------------------
```

Figure 67. Release 10 Simulation Mode Log Print (Page 6 of 6)

Appendix A

COBOL JCL PROCEDURES

A.1 OS/VS and ANS COBOL COMPILE AND LINK JCL

The following JCL procedures are supplied on the Intercomm release library, SYMREL. Check with your System Manager before using them to ensure they reside on your installation's system procedure library (SYS1.PROCLIB) and to verify parameters to code. When appropriate, SYSLIB references Intercomm libraries.

COBUPC:	COBOL compile
<u>Example:</u>	`// EXEC COBUPC,Q=TEST,NAME=COBPROG`
COBUPCL:	COBOL compile and linkedit for a resident program, or a dynamically loaded program which will be dynamically linkedited at Intercomm startup (the linkedit step PARM overrides AMODE=31 and RMODE=ANY cause the program to be loaded above the 16M line).

<u>Example:</u>	`// EXEC COBUPCL,Q=TEST,NAME=COBPROG,LMOD=COBPROG`
	`// PARM.LKED='LIST,XREF,LET,NCAL,REUS,AMODE=31,RMODE=ANY'`

LIBECOB:	IEBUPDTE step, followed by COBOL compilation producing object module only: add //LIB.SYSIN to specify IEBUPDTE control and change cards.
<u>Example:</u>	`// EXEC LIBECOB,Q=TEST,NAME=COBPROG,OMOD=COBPROG`
LIBECOBL:	IEBUPDTE step, followed by same JCL as COBUPCL.
<u>Note</u>;	LKED override parms for 31 Amode, as in COBUPCL, may be used.

Figure A-1. Intercomm-supplied COBOL JCL Procedures

Refer to the Intercomm <u>Operating Reference Manual</u> for further details on JCL parameter requirements, and other COBOL procedures for COBOL-F and a dynamically loaded non-reentrant (does not call COBREENT) program which is not dynamically linkedited (linked with INTLOAD).

<u>NOTES</u>: if not using Intercomm-supplied JCL, ensure NCAL option used on linkedit step parms:
if program written as psuedo-reentrant (uses DWS and only calls COBREENT), add REUS to linkedit parms;
NODYNAM is a required compiler option - add it to compile step PARM= parameters if the system default is DYNAM.

A.2 VS COBOL II COMPILE and LINK JCL

```
//COB2PC PROC   NAME=MISSING,Q=XYZ,P=INT,L=LIB,U=USR
//COB    EXEC   PGM=IGYCRCTL,
//  PARM=(LIST,MAP,NOFDUMP,NOTEST,RENT,XREF,'DATA(24)',RES,NODYNAM,
//           'TRUNC(BIN)',NOOBJECT,NUM,NOVBREF,LIB,'LINECOUNT(55)')
//STEPLIB  DD   DSN=SYS1.COB2COMP,DISP=SHR    COBOL II COMPILER LIBRARY
//SYSLIB   DD   DSN=&P..SYM&Q,DISP=SHR           USER PROGRAMS
//         DD   DSN=&P..SYM&U,DISP=SHR           USER MAPS/COPY MEMBERS
//         DD   DSN=&P..SYM&L,DISP=SHR             SYMLIB
//         DD   DSN=&P..SYMREL,DISP=SHR            SYMREL
//SYSUT1   DD   UNIT=SYSDA,SPACE=(CYL,(1,1))
//SYSUT2   DD   UNIT=SYSDA,SPACE=(CYL,(1,1))
//SYSUT3   DD   UNIT=SYSDA,SPACE=(CYL,(1,1))
//SYSUT4   DD   UNIT=SYSDA,SPACE=(CYL,(1,1))
//SYSUT5   DD   UNIT=SYSDA,SPACE=(CYL,(1,1))
//SYSUT6   DD   UNIT=SYSDA,SPACE=(CYL,(1,1))
//SYSUT7   DD   UNIT=SYSDA,SPACE=(CYL,(1,1))
//SYSPRINT DD   SYSOUT=A
//SYSLIN   DD   DUMMY
//SYSIN    DD   DSN=&P..SYM&Q.(&NAME),DISP=SHR
```

Figure A-2. VS COBOL II JCL to Compile a Program

This PROC should be placed on the Intercomm PROCLIB. To use this PROC code:

```
//COMPILE  EXEC COB2PC,NAME=program,Q=program-library-suffix,
//         P=Intercomm-libraries-prefix
```

Note that the P parameter may be hard-coded in the PROC (replace the value INT with the desired library-prefix-name).

```
//COB2PCL PROC   NAME=MISSING,Q=XYZ,P=INT,L=LIB,U=USR,LMOD=GO,AM=24,RM=24
//COB      EXEC  PGM=IGYCRCTL,
//  PARM=(LIST,MAP,NOFDUMP,NOTEST,RENT,XREF,'DATA(24)',RES,NODYNAM,
//        'TRUNC(BIN)',OBJECT,NUM,NOVBREF,LIB,'LINECOUNT(55)')
//STEPLIB  DD  DSN=SYS1.COB2COMP,DISP=SHR    COBOL II COMPILER LIBRARY
//SYSLIB   DD  DSN=&P..SYM&Q,DISP=SHR           USER PROGRAMS
//         DD  DSN=&P..SYM&U,DISP=SHR           USER MAPS/COPY MEMBERS
//         DD  DSN=&P..SYM&L,DISP=SHR             SYMLIB
//         DD  DSN=&P..SYMREL,DISP=SHR            SYMREL
//SYSUT1   DD  UNIT=SYSDA,SPACE=(CYL,(1,1))
//SYSUT2   DD  UNIT=SYSDA,SPACE=(CYL,(1,1))
//SYSUT3   DD  UNIT=SYSDA,SPACE=(CYL,(1,1))
//SYSUT4   DD  UNIT=SYSDA,SPACE=(CYL,(1,1))
//SYSUT5   DD  UNIT=SYSDA,SPACE=(CYL,(1,1))
//SYSUT6   DD  UNIT=SYSDA,SPACE=(CYL,(1,1))
//SYSUT7   DD  UNIT=SYSDA,SPACE=(CYL,(1,1))
//SYSPRINT DD  SYSOUT=A
//SYSIN    DD  DSN=&P..SYM&Q.(&NAME),DISP=SHR
//SYSLIN   DD  DSNAME=&&LOADSET,DISP=(MOD,PASS),UNIT=SYSDA,
//             SPACE=(TRK,(3,3)),DCB=(BLKSIZE=80,LRECL=80,RECFM=FB)
//LKED     EXEC PGM=IEWL,
//       PARM='LIST,XREF,MAP,LET,NOCALL,RENT,AMODE=&AM,RMODE=&RM',
//             COND=(5,LT,COB)
//SYSLIB   DD  DSN=SYS1.COB2LIB,DISP=SHR
//         DD  DSN=&P..MOD&Q,DISP=SHR
//         DD  DSN=&P..MODLIB,DISP=SHR
//         DD  DSN=&P..MODREL,DISP=SHR
//SYSLMOD  DD  DSN=&P..MOD&Q.(&LMOD),DISP=SHR
//SYSPRINT DD  SYSOUT=A
//SYSLIN   DD  DSNAME=&&LOADSET,DISP=(OLD,DELETE)
//         DD  DDNAME=SYSIN
//SYSUT1   DD  UNIT=SYSDA,SPACE=(CYL,(1,1))
//SYSIN    DD  DUMMY
```

Figure A-3. VS COBOL II JCL to Compile and Link a Program

This PROC should be placed on the Intercomm PROCLIB. To use this PROC code:

```
//COMPLINK EXEC COB2PCL,NAME=source-program,LMOD=load-name,
//          Q=program-library-suffix,P=Intercomm-libraries-prefix
```

Note: the parameters AM and RM are used to specify to the Linkage Editor the execution time AMODE and RMODE if the program is dynamically loaded (not in Intercomm linkedit). Add AM=31,RM=ANY to the EXEC statement to cause a program to be loaded above the 16M line.

The linkedit parameters RENT, NOCALL and LET are required.

Appendix B

SOURCE STATEMENT LIBRARY COPY MEMBERS

The following members in the Intercomm SYMREL source library contain source statement code which can be inserted in a COBOL subsystem procedure simply by coding COPY member-name at the desired source line. SYMREL must be named in the DD statement concatenation for the SYSLIB data set for compilations (automatic if Intercomm-supplied COBOL procedures used).

NOTE: The block size of SYMREL is 6160 as released.

ICOMHEXC

The ICOMHEXC member defines a series of commonly used one-byte codes. Many are defined by multi-punches, hence the VALUE printed may not reflect the actual hexadecimal code; to be COPYed into Working-Storage Section.

```
01  HEX-CODES.
    05  HEX-00    PIC X VALUE ' '.
    05  CODE-00    REDEFINES  HEX-00   PIC X.
    05  HEX-15    PIC X VALUE 'N'.
    05  CODE-21    REDEFINES  HEX-15   PIC X.
    05  HEX-37    PIC X VALUE '7'.
    05  CODE-55    REDEFINES  HEX-37   PIC X.
    05  HEX-50    PIC X VALUE '&'.
    05  CODE-80    REDEFINES  HEX-50   PIC X.
    05  HEX-51    PIC X VALUE 'J'.
    05  CODE-81    REDEFINES  HEX-51   PIC X.
    05  HEX-52    PIC X VALUE 'K'.
    05  CODE-82    REDEFINES  HEX-52   PIC X.
    05  HEX-53    PIC X VALUE 'L'.
    05  CODE-83    REDEFINES  HEX-53   PIC X.
    05  HEX-54    PIC X VALUE 'M'.
    05  CODE-84    REDEFINES  HEX-54   PIC X.
    05  HEX-55    PIC X VALUE 'N'.
    05  CODE-85    REDEFINES  HEX-55   PIC X.
    05  HEX-56    PIC X VALUE 'O'.
    05  CODE-86    REDEFINES  HEX-56   PIC X.
    05  HEX-57    PIC X VALUE 'P'.
    05  CODE-87    REDEFINES  HEX-57   PIC X.
    05  HEX-72    PIC X VALUE '2'.
    05  CODE-114   REDEFINES  HEX-72   PIC X.
    05  HEX-FF    PIC X VALUE '"'.
    05  CODE-225   REDEFINES  HEX-FF   PIC X.
```

Figure B-1. ICOMHEXC COPY Member

ICOMINMG

The ICOMINMG member provides an input message header definition for use in the Linkage Section (first 01 level). Figures B-2, B-3, and B-4 describe various system level versions of ICOMINMG.

```
01  INPUT-MESSAGE.
    04  MESSG-HDR.
        06  MSGH-LENGTH               PIC S9999   COMP.
        06  MSGH-QPR                  PIC X.
        06  MSGH-RSCH                 PIC X.
        06  MSGH-RSC                  PIC X.
        06  MSGH-SSC                  PIC X.
        06  MSGH-MMN                  PIC XXX.
        06  MSGH-DATE.
            08  MSGH-YR               PIC 99.
            08  MSGH-PERIOD           PIC X.
            08  MSGH-JULIAN-DAY       PIC 999.
        06  MSGH-TIME.
            08  MSGH-HH               PIC 99.
            08  MSGH-MM               PIC 99.
            08  MSGH-SS               PIC 99.
            08  MSGH-TH               PIC 99.
        06  MSGH-TID.
            08  MSGH-TI1              PIC X.
            08  MSGH-TI2-3            PIC XX.
            08  MSGH-TI4-5            PIC 99.
        06  MSGH-FLGS                 PIC X(2).
        06  MSGH-PID                  PIC X(5).
        06  MSGH-PIDX REDEFINES MSGH-PID.
            08  FILLER                PIC X(2).
            08  MSGH-BMN              PIC X(3).
        06  MSGH-SSCH                 PIC X.
        06  MSGH-ADDR                 PIC X(3).
        06  MSGH-ADRX REDEFINES MSGH-ADDR.
            08  MSGH-USR              PIC X.
            08  FILLER                PIC X(2).
        06  MSGH-LOG                  PIC X.
        06  MSGH-BLK                  PIC X.
        06  MSGH-VMI                  PIC X.
```

Figure B-2. New Release 10 ICOMINMG COPY Member
(post SM Level 2240)

ICOMINMG con't.

```
01  INPUT-MESSAGE.
    04  MESSG-HDR.
        06  MSGH-LENGTH                       PIC S9999    COMP.
        06  MSGH-QPR                          PIC X.
        06  MSGH-RSCH                         PIC X.
        06  MSGH-RSC                          PIC X.
        06  MSGH-SSC                          PIC X.
        06  MSGH-MMN                          PIC XXX.
        06  MSGH-DATE.
            08  MSGH-YR                       PIC 99.
            08  MSGH-PERIOD                   PIC X.
            08  MSGH-JULIAN-DAY               PIC 999.
        06  MSGH-TIME.
            08  MSGH-HH                       PIC 99.
            08  MSGH-MM                       PIC 99.
            08  MSGH-SS                       PIC 99.
            08  MSGH-TH                       PIC 99.
        06  MSGH-TID.
            08  MSGH-TI1                      PIC X.
            08  MSGH-TI2-3                    PIC XX.
            08  MSGH-TI4-5                    PIC 99.
        06  MSGH-CON                          PIC S9999    COMP.
        06  MSGH-FLGS                         PIC X(2).
        06  MSGH-BMN                          PIC X(3).
        06  MSGH-SSCH                         PIC X.
        06  MSGH-USR                          PIC X.
        06  MSGH-ADDR                         PIC XX.
        06  MSGH-LOG                          PIC X.
        06  MSGH-BLK                          PIC X.
        06  MSGH-VMI                          PIC X.
```

Figure B-3. Basic Release 10 ICOMINMG COPY Member

ICOMINMG con't.

```
01  INPUT-MESSAGE.
    04  MESSG-HDR.
        06  MSGH-LENGTH                    PIC S9999   COMP.
        06  MSGH-QPR                       PIC X.
        06  MSGH-RSCH                      PIC X.
        06  MSGH-RSC                       PIC X.
        06  MSGH-SSC                       PIC X.
        06  MSGH-MMN                       PIC XXX.
        06  MSGH-DATE.
            08  MSGH-YR                    PIC 99.
            08  MSGH-PERIOD                PIC X.
            08  MSGH-JULIAN-DAY            PIC 999.
        06  MSGH-TIME.
            08  MSGH-HH                    PIC 99.
            08  MSGH-MM                    PIC 99.
            08  MSGH-SS                    PIC 99.
            08  MSGH-TH                    PIC 99.
        06  MSGH-TID.
            08  MSGH-TI1                   PIC X.
            08  MSGH-TI2-3                 PIC XX.
            08  MSGH-TI4-5                 PIC 99.
        06  MSGH-CON                       PIC S9999   COMP.
        06  MSGH-PID                       PIC X(5).
        06  MSGH-SSCH                      PIC X.
        06  MSGH-USR                       PIC X.
        06  MSGH-BMN                       PIC XX.
        06  MSGH-LOG                       PIC X.
        06  MSGH-BLK                       PIC X.
        06  MSGH-VMI                       PIC X.
```

Figure B-4. Release 9 ICOMINMG COPY Member

ICOMDWS

The ICOMDWS member provides a Dynamic-Work-Space definition with an output message header for use in the Linkage Section (fifth 01 level) of reentrant subsystems. (It can also be used in the Working-Storage Section of nonreentrant or VS COBOL II subsystems). Figures B-5, B-6, and B-7 describe various system level versions of ICOMDWS.

```
01  DYNAMIC-WORKING-STORAGE.
    02  OUTPUT-MESSAGE.
      04  OMESSG-HDR.
        06  OMSGH-LENGTH                 PIC S9999   COMP.
        06  OMSGH-QPR                    PIC X.
        06  OMSGH-RSCH                   PIC X.
        06  OMSGH-RSC                    PIC X.
        06  OMSGH-SSC                    PIC X.
        06  OMSGH-MMN                    PIC XXX.
        06  OMSGH-DATE.
            08  OMSGH-YR                 PIC 99.
            08  OMSGH-PERIOD             PIC X.
            08  OMSGH-JULIAN-DAY         PIC 999.
        06  OMSGH-TIME.
            08  OMSGH-HH                 PIC 99.
            08  OMSGH-MM                 PIC 99.
            08  OMSGH-SS                 PIC 99.
            08  OMSGH-TH                 PIC 99.
        06  OMSGH-TID.
            08  OMSGH-TI1                PIC X.
            08  OMSGH-TI2-3              PIC XX.
            08  OMSGH-TI4-5              PIC 99.
        06  OMSGH-FLGS                   PIC X(2).
        06  OMSGH-PID                    PIC X(5).
        06  OMSGH-PIDX REDEFINES OMSGH-PID.
            08  FILLER                   PIC X(2).
            08  OMSGH-BMN                PIC X(3).
        06  OMSGH-SSCH                   PIC X.
        06  OMSGH-ADDR                   PIC X(3).
        06  OMSGH-ADRX REDEFINES OMSGH-ADDR.
            08  OMSGH-USR                PIC X.
            08  FILLER                   PIC X(2).
        06  OMSGH-LOG                    PIC X.
        06  OMSGH-BLK                    PIC X.
        06  OMSGH-VMI                    PIC X.
```

Figure B-5. New Release 10 ICOMDWS COPY Member
(post SM Level 2240)

<u>ICOMDWS</u> con't.

```
01  DYNAMIC-WORKING-STORAGE.
    02  OUTPUT-MESSAGE.
      04  OMESSG-HDR.
        06  OMSGH-LENGTH                 PIC S9999   COMP.
        06  OMSGH-QPR                    PIC X.
        06  OMSGH-RSCH                   PIC X.
        06  OMSGH-RSC                    PIC X.
        06  OMSGH-SSC                    PIC X.
        06  OMSGH-MMN                    PIC XXX.
        06  OMSGH-DATE.
            08  OMSGH-YR                 PIC 99.
            08  OMSGH-PERIOD             PIC X.
            08  OMSGH-JULIAN-DAY         PIC 999.
        06  OMSGH-TIME.
            08  OMSGH-HH                 PIC 99.
            08  OMSGH-MM                 PIC 99.
            08  OMSGH-SS                 PIC 99.
            08  OMSGH-TH                 PIC 99.
        06  OMSGH-TID.
            08  OMSGH-TI1                PIC X.
            08  OMSGH-TI2-3              PIC XX.
            08  OMSGH-TI4-5              PIC 99.
        06  OMSGH-CON                    PIC S9999   COMP.
        06  OMSGH-FLGS                   PIC X(2).
        06  OMSGH-BMN                    PIC X(3).
        06  OMSGH-SSCH                   PIC X.
        06  OMSGH-USR                    PIC X.
        06  OMSGH-ADDR                   PIC XX.
        06  OMSGH-LOG                    PIC X.
        06  OMSGH-BLK                    PIC X.
        06  OMSGH-VMI                    PIC X.
```

Figure B-6. Basic Release 10 ICOMDWS COPY Member

ICOMDWS con't.

```
01  DYNAMIC-WORKING-STORAGE.
    02  OUTPUT-MESSAGE.
      04  OMESSG-HDR.
        06  OMSGH-LENGTH                   PIC S9999    COMP.
        06  OMSGH-QPR                      PIC X.
        06  OMSGH-RSCH                     PIC X.
        06  OMSGH-RSC                      PIC X.
        06  OMSGH-SSC                      PIC X.
        06  OMSGH-MMN                      PIC XXX.
        06  OMSGH-DATE.
            08  OMSGH-YR                   PIC 99.
            08  OMSGH-PERIOD               PIC X.
            08  OMSGH-JULIAN-DAY           PIC 999.
        06  OMSGH-TIME.
            08  OMSGH-HH                   PIC 99.
            08  OMSGH-MM                   PIC 99.
            08  OMSGH-SS                   PIC 99.
            08  OMSGH-TH                   PIC 99.
        06  OMSGH-TID.
            08  OMSGH-TI1                  PIC X.
            08  OMSGH-TI2-3                PIC XX.
            08  OMSGH-TI4-5                PIC 99.
        06  OMSGH-CON                      PIC S9999    COMP.
        06  OMSGH-PID                      PIC X(5).
        06  OMSGH-SSCH                     PIC X.
        06  OMSGH-USR                      PIC X.
        06  OMSGH-BMN                      PIC XX.
        06  OMSGH-LOG                      PIC X.
        06  OMSGH-BLK                      PIC X.
        06  OMSGH-VMI                      PIC X.
```

Figure B-7. Release 9 ICOMDWS COPY Member

<u>ICOMSBS</u>

The ICOMSBS member defines the computational halfword constants used by reentrant COBOL subsystems and subroutines in calls through COBREENT to the named Intercomm system service routines and to user subroutines, if added.

```
 01  REENTSBS-CODES.
*   THESE CODES REPRESENT OFFSETS FOR ROUTINE ADDRESSES IN THE
*   TABLE NAMED REENTSBS. ONLY THE MOST COMMONLY USED VALUES
*   ARE INCLUDED HERE; THE USERS MANUAL HAS A COMPLETE LIST.
*   IF OFFSET ODD, THEN TRUE OFFSET=-(OFFSET+1)
     05  INITLU6          PIC 9(4) COMP VALUE 103.
     05  INTSORTC         PIC 9(4) COMP VALUE 99.
     05  DWS-SNAP         PIC 9(4) COMP VALUE 95.
     05  MAPFREE          PIC 9(4) COMP VALUE 91.
     05  FECMRLSE         PIC 9(4) COMP VALUE 87.
     05  FESEND           PIC 9(4) COMP VALUE 83.
     05  FESENDC          PIC 9(4) COMP VALUE 79.
     05  DYN-ALLOCATE     PIC 9(4) COMP VALUE 75.
     05  DYN-ACCESS       PIC 9(4) COMP VALUE 71.
     05  MAPURGE          PIC 9(4) COMP VALUE 67.
     05  MAPCLR           PIC 9(4) COMP VALUE 63.
     05  MAPEND           PIC 9(4) COMP VALUE 59.
     05  MAPOUT           PIC 9(4) COMP VALUE 55.
     05  MAPIN            PIC 9(4) COMP VALUE 51.
     05  INTUNSTO         PIC 9(4) COMP VALUE 47.
     05  INTSTORE         PIC 9(4) COMP VALUE 43.
     05  INTFETCH         PIC 9(4) COMP VALUE 39.
     05  FECMFDBK         PIC 9(4) COMP VALUE 35.
     05  FECMDDQ          PIC 9(4) COMP VALUE 31.
     05  DQ-WRITEX        PIC 9(4) COMP VALUE 27.
     05  DQ-READX         PIC 9(4) COMP VALUE 23.
     05  DQ-WRITE         PIC 9(4) COMP VALUE 19.
     05  DQ-READ          PIC 9(4) COMP VALUE 15.
     05  DQ-CLOSE         PIC 9(4) COMP VALUE 11.
     05  DQ-OPEN          PIC 9(4) COMP VALUE 07.
     05  DQ-BUILD         PIC 9(4) COMP VALUE 03.
     05  FH-SELECT        PIC 9(4) COMP VALUE 4.
     05  FH-RELEASE       PIC 9(4) COMP VALUE 8.
     05  FH-READ          PIC 9(4) COMP VALUE 12.
     05  FH-WRITE         PIC 9(4) COMP VALUE 16.
     05  FH-GET           PIC 9(4) COMP VALUE 20.
     05  FH-PUT           PIC 9(4) COMP VALUE 24.
     05  FH-RELEX         PIC 9(4) COMP VALUE 28.
     05  FH-FEOV          PIC 9(4) COMP VALUE 32.
     05  TABUILD          PIC 9(4) COMP VALUE 36.
     05  TABOPEN          PIC 9(4) COMP VALUE 40.
     05  TABPUT           PIC 9(4) COMP VALUE 44.
     05  TABGET           PIC 9(4) COMP VALUE 48.
     05  TABSORT          PIC 9(4) COMP VALUE 52.
     05  TABEND           PIC 9(4) COMP VALUE 56.
```

Figure B-8. ICOMSBS COPY Member (Page 1 of 2)

```
     05  COBPUT          PIC 9(4) COMP VALUE 68.
     05  MSGCOL          PIC 9(4) COMP VALUE 72.
     05  COBSTORF        PIC 9(4) COMP VALUE 76.
     05  CONVERSE        PIC 9(4) COMP VALUE 80.
     05  DBINT           PIC 9(4) COMP VALUE 84.
     05  LOGPUT          PIC 9(4) COMP VALUE 88.
     05  PAGE-FILE       PIC 9(4) COMP VALUE 92.
     05  FH-GETV         PIC 9(4) COMP VALUE 96.
     05  FH-PUTV         PIC 9(4) COMP VALUE 100.
 *   CODES 104 AND UP INDICATE USER ADDITIONS TO THE TABLE
```

Figure B-8. ICOMSBS COPY Member (Page 2 of 2)

NOTE: INITLU6 and TABUILD through TABEND are not supported below SM level 2241. INTSORTC and DWS-SNAP are not supported for Release 9.

Appendix C

INTERCOMM TABLE SUMMARY

Basic tables are included in the Intercomm release library (SYMREL) and must be modified (added to) for each installation. An asterisk (*) indicates optional tables which may be generated individually at each installation according to application program requirements.

TABLE or CSECT Name	Description	Created by	SYMREL and MODREL Member Name
BROADCST	*Output Broadcast Table	BCGROUP macro	PMIBROAD
BTAMSCTS	Front End Queue Table (BTAM/TCAM/GFE only)	SYCTTBL macro	BTAMSCTS
BTVRBTB	Front End Verb Table	BTVERB macro	BTVRBTB
(User-name)	Front End Network Configuration Table	LINEGRP, BLINE BTERM macros, etc. VCT, LUNIT, LCOMP macros, etc.	FENETWRK (BTSAMP) (VTSAMP)
CHNGTB	*Change Table for Change/Display Utilities	DC's	None
File Description Records (DESnnnnn)	*File Descriptions Data Set (DES000); generated by file load utility PMIEXLD (for Change/ Display Utility)	FDHDR, FDETL macros	None
IXFDSCTn	File Handler Data Set Control Table	IXFDSCTA macro	IXFDSCT1 (50 DDs) IXFDSCT2 (100 DDs) IXFDSCT3 (200 DDs)
KEYTABLE	*Display Utility Key Transformation Routing Table	DC's	None
PADDTBLE	*Edit Utility Pad Table	PADD macro	PADDTBLE

Figure C-1. Table Names and Associated Macro Instructions (Page 1 of 2)

TABLE or CSECT Name	Description	Created by	SYMREL and MODREL Member Name
PAGETBL	*Page Facility Table (obsolete - Rel 10)	PAGETBL macro	PAGETBLE
PMIALTRP	*Output Utility Alternate Format Table	PMIALTRN macro	None
PMIDEVTB	Back End Device Table	DEVICE macro	PMIDEVTB
PMIFILET	*Change/Display File Table	GENFTBLE macro	PMIFILET
PMIRCNTB	*Output Utility Format Table (OFT)	CSECT	PMIRCNTB
		REPORT, LINE ITEM macros	RPTnnnnn
		PMISTOP macro	PMIRCEND
PMIRPTAB	*Output Utility Company/ Report/Terminal Table	DC's	None
PMISTATB	Back End Station Table	STATION macro	PMISTATB
PTRNTBLE	*Display Utility Symbol Edit Pattern Table	PATRN macro	None
REENTSBS	Subroutine Entries List	SUBMODS macro	REENTSBS
REPTAPE	*Output Utility Batch Report Table	DC's	None
SPA/SPAEXT	System Parameter Table (SPA)	SPALIST macro	INTSPA
SCT	Subsystem Control Table (SCT)	SYCTTBL macro	INTSCT
TUNERTBL	Fine Tuner Subsystem Commands (obsolete - Rel 10)	DC's	none
VERBTBL	*Edit Control Table (ECT)	VERBGEN, VERB, PARM, PMIELIN macros	PMIVERBS

Figure C-1. Table Names and Associated Macro Instructions (Page 2 of 2)

Component Name	Tables Used
Change/Display Utility	CHNGTB File Description Records KEYTABLE PMIFILET PTRNTBLE
Edit Utility	PADDTBLE PMIFILET PMIVERBS PMIDEVTB PMISTATB
File Handler	IXFDSCTn FAR statements
Front/End TP Interface	BTVRBTB Front End Network Table BTAMSCTS (BTAM only)
Message Mapping Utilities	MMUVTBL LOGCHARS PMIDEVTB PMISTATB User-coded Maps
Monitor	REENTSBS INTSPA INTSCT BROADCST TUNERTBL (obsolete - Rel 10)
Output Utility	PMIALTRP PMIDEVTB PMIFILET PMIRCNTB PMIRPTAB PMISTATB REPTAPE RPTnnnnn (user-coded OFTs)
Page Facility	PAGETBLE (obsolete - Rel 10)

Figure C-2. Components and Associated Table Names

Appendix D

CALLING USER SUBROUTINES FROM REENTRANT SUBSYSTEMS

COBOL programs created under Intercomm Release 8.0 (and lower) needed certain coding conventions followed for calling user-coded COBOL subroutines which themselves contain calls to COBREENT.

COBREENT saves registers, parameter lists, and other program specifications prior to calling the requested subroutine and restores these values for return to the calling program. An area of dynamic storage is therefore required by COBREENT.

There is a 256-byte save area utilized by COBREENT which is prefixed to the Dynamic-Work-Space associated with message processing for a reentrant COBOL subsystem. This area is transparent to the user. However, a subsystem which calls a COBOL subroutine in turn calling COBREENT must provide a 256-byte save area prefix as part of the passed Dynamic-Work-Space to be used by the subroutine. The address +256 of this area is passed as the fifth parameter to the called subroutine.

For example, Subsystem A may require 72 bytes of Dynamic-Work-Space for message processing. An additional 120 bytes of Dynamic-Work-Space will be utilized by Subroutine X which is called by Subsystem A via COBREENT. Subroutine X also calls COBREENT. The DWS definition in Subsystem A must include 256 bytes (aligned) to be used as a save area by COBREENT when called by Subroutine X. When Subsystem A is activated, the GET parameter of the SYCTTBL must specify 448 bytes of storage to be obtained (72 bytes for Subsystem A plus 256 bytes for COBREENT save area for Subroutine X plus 120 bytes for Subroutine X Dynamic-Work-Space). See Figures D-1 and D-2.

Figures D-3 and D-4 illustrate this example. The corresponding COBOL coding for Subsystem A is shown in Figure D-3, for Subroutine X in Figure D-4.

Subroutines called by the reentrant COBOL subsystem may not be passed any parameter defined to be longer than 4095 bytes if the subroutine in turn calls COBREENT using that same parameter. This is a COBOL compiler restriction on BLL cell addressability for passed parameters.

The called subroutine may not in turn call COBREENT to call another user COBOL subroutine; only Intercomm service routines or Assembler subroutines may be called from the subroutine. The subroutine-code of the SUBMODS entry in USRSUBS (COPY'd into REENTSBS) defining the subroutine must be added to ICOMSBS, or may be defined in the 77-level WORKING-STORAGE of the subsystem as illustrated in Figure D-3.

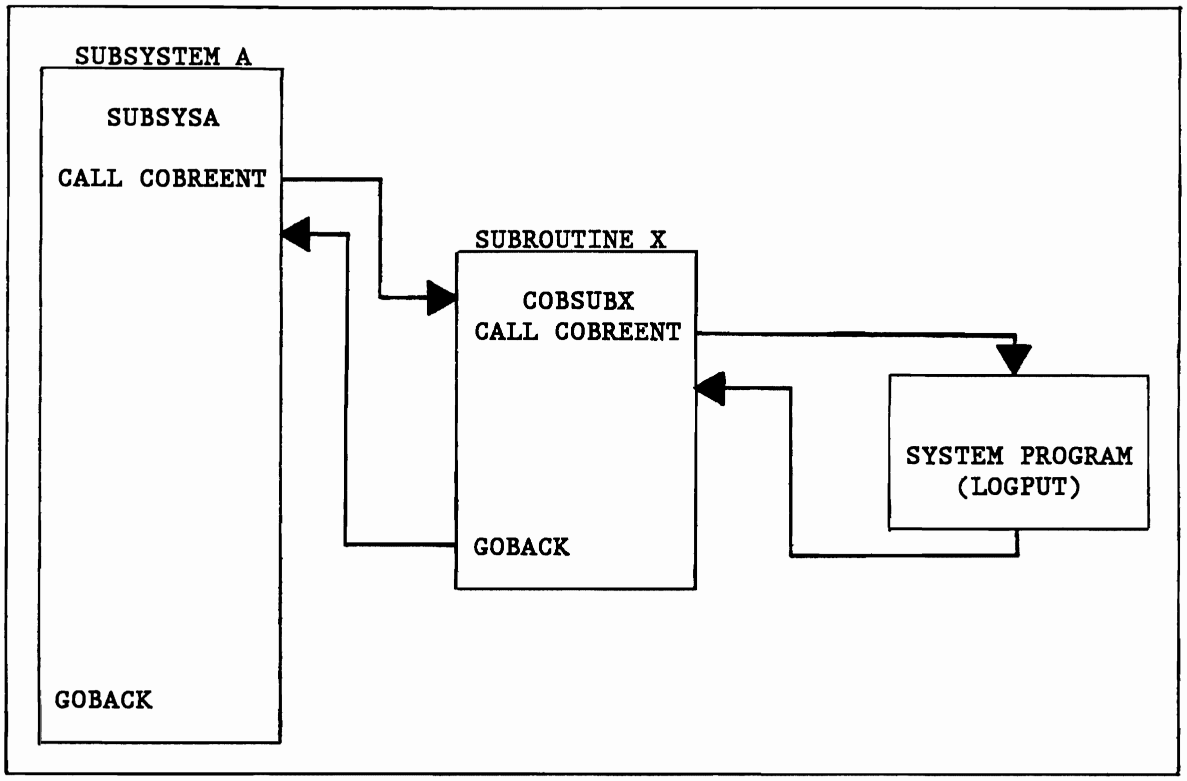


Figure D-1. COBOL Subsystem/Subroutine Nested Calls

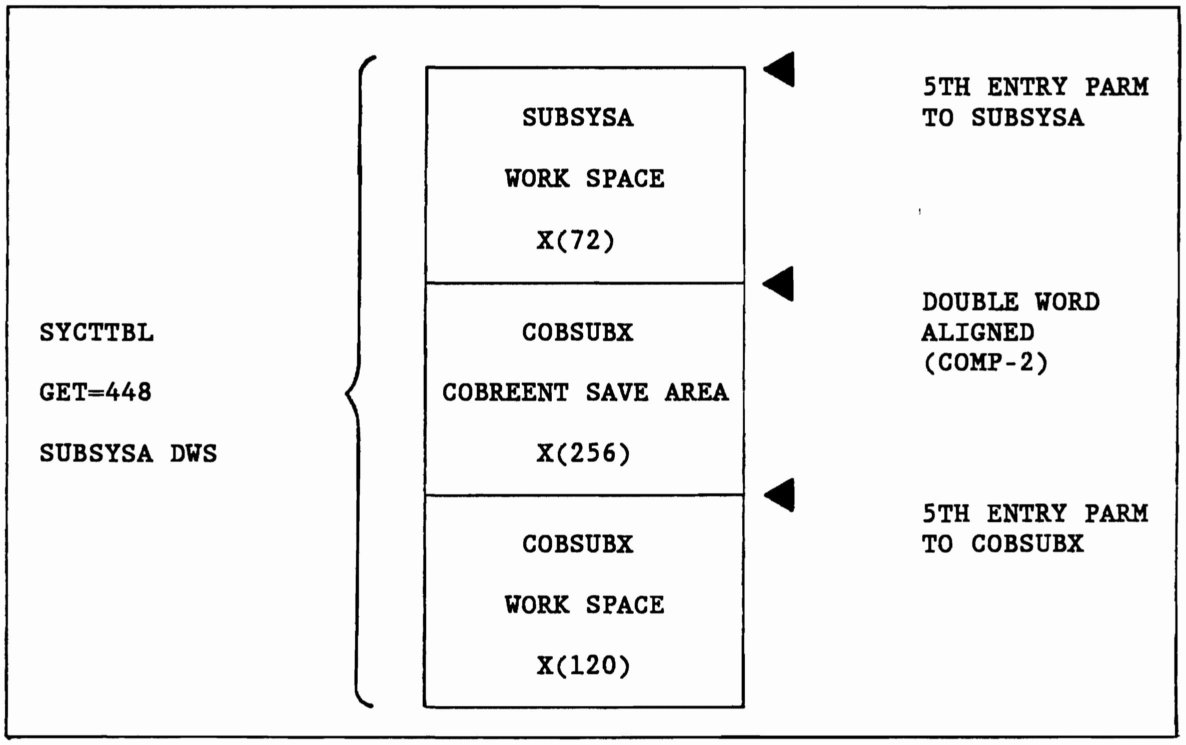


Figure D-2. COBREENT Save Areas

```
WORKING-STORAGE SECTION.                                          SUBSYSA
77  COBSUBX-POINTER     PICTURE S9(4)  COMP VALUE +104.           SUBSYSA
* THIS IS THE LOCATION IN REENTSBS OF THE COBSUBX VCON.           SUBSYSA
LINKAGE-SECTION.                                                  SUBSYSA
01  INPUT-MESSAGE           PIC X(500).                           SUBSYSA
01  SPA                     PIC X(500).                           SUBSYSA
01  SCT                     PIC X(100).                           SUBSYSA
01  R-CODE                  PIC S9(7) COMP.                       SUBSYSA
01  DWS.                                                          SUBSYSA
    02  SUBSYSA-WORK-AREAS.                                       SUBSYSA
        05  MISCELLANEOUS-AREAS         PIC X(56).                SUBSYSA
        05  CODE-FIELD                  PIC 99.                   SUBSYSA
        05  PARM-ALIGNMENT              PIC S9(7) COMP.           SUBSYSA
        05  LOGIC-PARM-FOR-COBSUBX      PIC 99.                   SUBSYSA
    02  FORCE-DOUBLE-WORD               COMP-2 SYNC.              SUBSYSA
    02  COBREENT-SAVE-AREA-FOR-COBSUBX  PIC X(256).               SUBSYSA
    02  COBSUBX-DWS                     PIC X(120).               SUBSYSA
PROCEDURE DIVISION                                                SUBSYSA
    USING INPUT-MESSAGE, SPA, SCT, R-CODE, DWS.                   SUBSYSA
      .                                                           SUBSYSA
      .                                                           SUBSYSA
      .                                                           SUBSYSA
    CALL 'COBREENT'                                               SUBSYSA
        USING COBSUBX-POINTER, INPUT-MESSAGE, SPA, SCT,           SUBSYSA
        R-CODE, COBSUBX-DWS, LOGIC-PARM-FOR-COBSUBX.              SUBSYSA
      .                                                           SUBSYSA
      .                                                           SUBSYSA
      .                                                           SUBSYSA
    MOVE CODE-FIELD TO R-CODE.                                    SUBSYSA
    GOBACK.
```

Figure D-3. Reentrant Subsystem Sample Coding.

```
WORKING-STORAGE SECTION.                                        COBSUBX
77  CONSTANT-ITEMS PIC X9(8) VALUE  'CONSTANT'.                 COBSUBX
77  LOGPUT-POINTER-88 PIC S9(4) COMP VALUE +88.                 COBSUBX
LINKAGE-SECTION                                                 COBSUBX
01  P1  PIC X.                                                  COBSUBX
01  P2  PIC X.                                                  COBSUBX
01  P3  PIC X.                                                  COBSUBX
01  P4  PIC X.                                                  COBSUBX
01  DYNAMIC-WORK-SPACE                                          COBSUBX
    02  MISCELLANEOUS-WORK-AREAS PIC X(120).                    COBSUBX
      .                                                         COBSUBX
      .                                                         COBSUBX
01  MY-FIRST-SUBROUTINE-PARAMETER  PIC 99.                      COBSUBX
PROCEDURE DIVISION                                              COBSUBX
    USING P1, P2, P3, P4, DYNAMIC-WORK-SPACE,                   COBSUBX
            MY-FIRST-SUBROUTINE-PARAMETER.                      COBSUBX
      .                                                         COBSUBX
      .                                                         COBSUBX
    GO TO ERROR1, ERROR2, ERROR3, ETC.                          COBSUBX
        DEPENDING ON MY-FIRST-SUBROUTINE-PARAMETER.             COBSUBX
      .                                                         COBSUBX
      .                                                         COBSUBX
ERROR1.                                                         COBSUBX
ERROR2.                                                         COBSUBX
ERROR3.                                                         COBSUBX
ETC.                                                            COBSUBX
      .                                                         COBSUBX
      .                                                         COBSUBX
    CALL 'COBREENT' USING LOGPUT-POINTER-88, P1.                COBSUBX
    GOBACK.                                                     COBSUBX
```

Figure D-4.   Reentrant Subroutine Sample Coding.

Appendix E

NONREENTRANT SUBSYSTEMS

E.1 INTRODUCTION

Nonreentrant OS/VS or ANS COBOL subsystems do not use a Dynamic Working Storage area in the Linkage Section. Instead, as illustrated in Figure E-1, both constant and variable data areas are defined in the Working-Storage Section. Therefore, nonreentrant subsystems are always single-threaded; each input message is processed to completion and the subsystem returns to the Monitor before a new message can be processed by the subsystem. On the SYCTTBL macro for the subsystem, MNCL=1 and LANG=COB _must_ be coded. For FORTRAN, code LANG=FORT. The GET (and FREE) parameters are _not_ coded. Obviously, if messages might be input to the subsystem from more than one terminal concurrently, response time for each message queued after the first will be increasingly slower. Thus, it is recommended that COBOL subsystems always be coded as reentrant. Loading above the 16M line and VS COBOL II are not supported for non-reentrant programs.

To call a user subroutine (must be coded as nonreentrant if COBOL) or an Intercomm service routine, COBREENT is _not_ used. Instead, the subsystem calls the routine directly as illustrated by the COBPUT call in the sample subsystem in Figure E-2. For calls to File Handler routines, use only the routine name such as GET or WRITE; omit the FH-prefix. For the Dynamic File Allocation, Page and DDQ special features, see the respective manuals for routine names. User subroutines must be resident in the Intercomm load module or in the same overlay segment as the subsystem; they are not defined in REENTSBS. The Intercomm environment for a nonreentrant subsystem is illustrated in Figure E-3.

E.2 CONSIDERATIONS FOR USING CONVERSE

Control of a conversational program environment is accomplished by Intercomm in different ways depending on the subsystem's residency:

- _Resident_

  A copy of the subsystem load module is rolled out to a disk data set during "CONVERSE time", that is, the time between the call to CONVERSE and scheduling the next message from the same terminal. Subsequently, the load module is rolled in to process that next message.

- _Overlay Loaded_

  Same as above, except the loaded overlay region may contain other subsystems to process other messages during (and after) "CONVERSE time."

- _Dynamically Loaded_

  Same as above, _except_ the subsystem _remains in core_ until all "conversations in progress" have terminated.

The CONVERSE "rollout" file is a BDAM data set preformatted via the Intercomm utility CREATEGF (see Operating Reference Manual). The record format is fixed unblocked, with a block size of 1024. For on-line execution, a DD statement must be added to the Intercomm execution JCL, as follows:

```
//CONVSFIL  DD  DSN=INT.CONVSFIL,DISP=OLD,DCB=(DSORG=DA,OPTCD=R)
```

```
IDENTIFICATION DIVISION.
PROGRAM-ID. EXAMPLE1.
REMARKS.  THIS IS A NON-REENTRANT INTERCOMM COBOL SUBSYSTEM PROGRAM.
ENVIRONMENT DIVISION.
DATA DIVISION.
WORKING-STORAGE SECTION.
77  CONSTANT-ITEMS              PICTURE X(8) VALUE 'CONSTANT'.
        .
        . THESE ARE NEVER-CHANGING LITERAL VALUES...
        .
77  INDEPENDENT-ITEMS           PICTURE S9(6)V99 VALUE ZERO COMP-3.
        .
        . THESE ARE ACCUMULATORS, SAVE AREAS, FLAGS, ETC...
        .
77  RETURN-VALUE                PIC 99 VALUE 0.
        .
01  OUTPUT-MESSAGE-AREA         PICTURE X(...).
01  FILE-RECORD-AREA            PICTURE X(....).
        .
        . ADDITIONAL AREAS...
        .
LINKAGE SECTION.
01  INPUT-MESSAGE-AREA COPY ICOMINMG.
    02  INPUT-TEXT              PICTURE X(...).
01  SPA                         PICTURE X.
01  SCT                         PICTURE X.
01  INTERCOMM-RETURN-CODE       PICTURE S9(8) COMP.

PROCEDURE DIVISION USING INPUT-MESSAGE-AREA,SPA,SCT,
    INTERCOMM-RETURN-CODE.
        .
        .   PROGRAM PROCESSING LOGIC...
        .
        .            ...GO TO INTERCOMM.
        .
INTERCOMM.
    MOVE RETURN-VALUE TO INTERCOMM-RETURN-CODE.
    GOBACK.
```

Figure E-1. Nonreentrant COBOL Subsystem Structure

```
PP 5740-CB1 RELEASE 2.4                                    IBM OS/VS COBOL

   1

00001    000010 ID DIVISION.                                                          00000010
00002    000020 PROGRAM-ID. ECHOMSG.                                                  00000020
00003    000030 REMARKS. THIS NON-REENTRANT SUBSYSTEM ECHOS AN INPUT MESSAGE          00000030
00004    000040        CONTAINING UP TO 500 CHARACTERS OF TEXT BACK TO THE            00000040
00005    000050        ORIGINATING TERMINAL, USING THE OUTPUT UTILITY.                00000050
00006    000060        IT COPIES THE INPUT TO THE OUTPUT MESSAGE AREA,                00000060
00007    000070        MODIFIES THE MESSAGE HEADER, APPENDS THE AUTHOR'S NAME,        00000070
00008    000080        AND MESSAGE ENDING CHARACTER, BEFORE CALLING COBPUT TO         00000080
00009    000090        QUEUE THE MESSAGE FOR THE INPUT TERMINAL.                      00000090
00010    000100 ENVIRONMENT DIVISION.                                                 00000100
00011    000110 DATA DIVISION.                                                        00000110
00012    000120 WORKING-STORAGE SECTION.                                              00000120
00013    000130 01  HEX-CODES COPY ICCMHEXC.                                          00000130
00014 C         01  HEX-CODES.                                                        00000100
00015 C             05  HEX-00   PIC X  VALUE ' '.                                    00000200
00016 C             05  CODE-00    REDEFINES  HEX-00    PIC X.                        00000300
00017 C             05  HEX-15   PIC X  VALUE ' '.                                    00000400
00018 C             05  CODE-21    REDEFINES  HEX-15    PIC X.                        00000500
00019 C             05  HEX-37   PIC X  VALUE ' '.                                    00000600
00020 C             05  CODE-55    REDEFINES  HEX-37    PIC X.                        00000700
00021 C             05  HEX-50   PIC X  VALUE '&'.                                    00000800
00022 C             05  CODE-80    REDEFINES  HEX-50    PIC X.                        00000900
00023 C             05  HEX-51   PIC X  VALUE ' '.                                    00001000
00024 C             05  CODE-81    REDEFINES  HEX-51    PIC X.                        00001100
00025 C             05  HEX-52   PIC X  VALUE ' '.                                    00001200
00026 C             05  CODE-82    REDEFINES  HEX-52    PIC X.                        00001300
00027 C             05  HEX-53   PIC X  VALUE ' '.                                    00001400
00028 C             05  CODE-83    REDEFINES  HEX-53    PIC X.                        00001500
00029 C             05  HEX-54   PIC X  VALUE ' '.                                    00001600
00030 C             05  CODE-84    REDEFINES  HEX-54    PIC X.                        00001700
00031 C             05  HEX-55   PIC X  VALUE ' '.                                    00001800
00032 C             05  CODE-85    REDEFINES  HEX-55    PIC X.                        00001900
00033 C             05  HEX-56   PIC X  VALUE ' '.                                    00002000
00034 C             05  CODE-86    REDEFINES  HEX-56    PIC X.                        00002100
00035 C             05  HEX-57   PIC X  VALUE ' '.                                    00002200
00036 C             05  CODE-87    REDEFINES  HEX-57    PIC X.                        00002300
00037 C             05  HEX-72   PIC X VALUE ' '.                                     00002350
00038 C             05  CODE-114  REDEFINES  HEX-72    PIC X.                        00002352
00039 C             05  HEX-FF   PIC X  VALUE ' '.                                    00002400
00040 C             05  CODE-255  REDEFINES  HEX-FF    PIC X.                        00002500


00042    000150 01  AUTHORS-NAME.                                                     00000150
00043    000160     02  OUT-NAME          PIC X(10)    VALUE ' T.ELGUERA'.            00000160
00044    000170     02  OUT-MSG REDEFINES OUT-NAME.                                   00000170
00045    000180         04  NAME-CHAR      PIC X        OCCURS 10 TIMES.              00000180
00046    000250 01  WORK-SPACE          COPY ICCMCWS.                                 00000181
00047 C         01  WORK-SPACE.                                                       00000100
00048 C             02  OUTPUT-MESSAGE.                                               00000200
00049 C               04  OMESSG-HDR.                                                 00000300
00050 C                 06  OMSGH-LENGTH             PIC S9999  COMP.               00000400
00051 C                 06  OMSGH-CPR                PIC X.                         00000500
00052 C                 06  OMSGH-RSCH               PIC X.                         00000600
00053 C                 06  OMSGH-RSC                PIC X.                         00000700
```

Figure E-2. Echo Message Example; Nonreentrant COBOL (Page 1 of 3)

```
   2

00054 C                  06  OMSGH-SSC             PIC X.                          00000800
00055 C                  06  OMSGH-MMN             PIC XXX.                        00000900
00056 C                  06  OMSGH-DATE.                                           00001000
00057 C                      08  OMSGH-YR          PIC 99.                         00001100
00058 C                      08  OMSGH-PERIOD      PIC X.                          00001200
00059 C                      08  OMSGH-JULIAN-DAY  PIC 999.                        00001300
00060 C                  06  OMSGH-TIME.                                           00001400
00061 C                      08  OMSGH-HH          PIC 99.                         00001500
00062 C                      08  OMSGH-MM          PIC 99.                         00001600
00063 C                      08  OMSGH-SS          PIC 99.                         00001700
00064 C                      08  OMSGH-TH          PIC 99.                         00001800
00065 C                  06  OMSGH-TID.                                            00001900
00066 C                      08  OMSGH-TI1         PIC X.                          00002000
00067 C                      08  OMSGH-TI2-3       PIC XX.                         00002100
00068 C                      08  OMSGH-TI4-5       PIC 99.                         00002200
00069 C                  06  OMSGH-CON             PIC S9999  COMP.                00002300
00070 C                  06  OMSGH-FLGS            PIC X(2).                       00002400
00071 C                  06  OMSGH-BMN             PIC X(3).                       00002450
00072 C                  06  OMSGH-SSCH            PIC X.                          00002500
00073 C                  06  OMSGH-USR             PIC X.                          00002600
00074 C                  06  OMSGH-ADDR            PIC XX.                         00002700
00075 C                  06  OMSGH-LOG             PIC X.                          00002750
00076 C                  06  OMSGH-BLK             PIC X.                          00002800
00077 C                  06  OMSGH-VPI             PIC X.                          00002900

00079   000260            04  OUTPUT-MESSAGE-TEXT  PIC X        OCCURS 510 TIMES.00000182
00080   000270        02  COBPUT-RETURN-CODE       PIC 99.                         00000183
00081   000280            88  QUEUED               VALUE ZERO.                     00000184
00082   000290        02  I                        PIC S9(4)  COMP.                00000185
00083   000300        02  J                        PIC S9(3)  COMP.                00000186
00084   000190  LINKAGE SECTION.                                                   00000190
00085   000200  01  INPUT-MESSAGE COPY ICOMINMG.                                   00000200
00086 C         01  INPUT-MESSAGE.                                                 00000100
00087 C             04  MESSG-HDR.                                                 00000200
00088 C                  06  MSGH-LENGTH           PIC S9999  COMP.                00000300
00089 C                  06  MSGH-CPR              PIC X.                          00000400
00090 C                  06  MSGH-RSCH             PIC X.                          00000500
00091 C                  06  MSGH-RSC              PIC X.                          00000600
00092 C                  06  MSGH-SSC              PIC X.                          00000700
00093 C                  06  MSGH-MMN              PIC XXX.                        00000800
00094 C                  06  MSGH-DATE.                                            00000900
00095 C                      08  MSGH-YR           PIC 99.                         00001000
00096 C                      08  MSGH-PERIOD       PIC X.                          00001100
00097 C                      08  MSGH-JULIAN-DAY   PIC 999.                        00001200
00098 C                  06  MSGH-TIME.                                            00001300
00099 C                      08  MSGH-HH           PIC 99.                         00001400
00100 C                      08  MSGH-MM           PIC 99.                         00001500
00101 C                      08  MSGH-SS           PIC 99.                         00001600
00102 C                      08  MSGH-TH           PIC 99.                         00001700
00103 C                  06  MSGH-TID.                                             00001800
00104 C                      08  MSGH-TI1          PIC X.                          00001900
00105 C                      08  MSGH-TI2-3        PIC XX.                         00002000
00106 C                      08  MSGH-TI4-5        PIC 99.                         00002100
00107 C                  06  MSGH-CON              PIC S9999  COMP.                00002200
00108 C                  06  MSGH-FLGS             PIC X(2).                       00002300
00109 C                  06  MSGH-BMN              PIC X(3).                       00002350
00110 C                  06  MSGH-SSCH             PIC X.                          00002400
```

Figure E-2.   Echo Message Example; Nonreentrant COBOL (Page 2 of 3)

```
   3

00111 C               06  MSGH-USR                PIC X.                                00002500
00112 C               06  MSGH-ADDR               PIC XX.                               00002600
00113 C               06  MSGH-LOG                PIC X.                                00002700
00114 C               06  MSGH-BLK                PIC X.                                00002750
00115 C               06  MSGH-VMI                PIC X.                                00002800

00117    000210     04  INPUT-MESSAGE-TEXT     PIC X        OCCURS 500 TIMES.           00000210
00118    000220 01  SYSTEM-PARAMETER-TABLE     PIC X.                                   00000220
00119    000230 01  SUBSYSTEM-CONTROL-TABLE    PIC X.                                   00000230
00120    000240 01  INTERCOMM-RET-CODE         PIC S9(7)             COMPUTATIONAL.00000240
00121    000310 PROCEDURE DIVISION USING                                                00000310
00122    000320                              INPUT-MESSAGE                              00000320
00123    000330                              SYSTEM-PARAMETER-TABLE                     00000330
00124    000340                              SUBSYSTEM-CONTROL-TABLE                    00000340
00125    000350                              INTERCOMM-RET-CODE.                        00000350
00126    000370     MOVE MESSG-HDR TO OMESSG-HDR.                                       00000370
00127    000380     MOVE OMSGH-RSCH TO OMSGH-SSCH.                                      00000380
00128    000390     MOVE OMSGH-RSC TO OMSGH-SSC.                                        00000390
00129    000400     MOVE LOW-VALUES TO OMSGH-RSCH.                                      00000400
00130    000410     MOVE LOW-VALUES TO OMSGH-RSC.                                       00000410
00131    000420     MOVE HEX-57 TO OMSGH-VMI.                                           00000420
00132    000430     PERFORM MOVE-A-CHARACTER VARYING I FROM +1 BY +1                    00000430
00133    000440              UNTIL I IS EQUAL TO MSGH-LENGTH - 42.                      00000440
00134    000450     PERFORM NAME-MOVE VARYING J FROM +1 BY +1 UNTIL J > +10.            00000450
00135    000460     MOVE HEX-37 TO OUTPUT-MESSAGE-TEXT (I).                             00000460
00136    000470     COMPUTE OMSGH-LENGTH = I + 42.                                      00000470
00137    000480     CALL 'COBPUT' USING   OUTPUT-MESSAGE                                00000480
00138    000510                           COBPUT-RETURN-CODE.                           00000510
00139    000520     IF NOT QUEUED                                                       00000520
00140    000530          MOVE COBPUT-RETURN-CODE TO INTERCOMM-RET-CODE                  00000530
00141    000540     ELSE                                                                00000540
00142    000550          MOVE ZEROS TO INTERCOMM-RET-CODE.                              00000550
00143    000560     GOBACK.                                                             00000560
00144    000570 SUBROUTINE SECTION.                                                     00000570
00145    000580 MOVE-A-CHARACTER.                                                       00000580
00146    000590     MOVE INPUT-MESSAGE-TEXT (I) TO OUTPUT-MESSAGE-TEXT (I).             00000590
00147    000600 NAME-MOVE.                                                              00000600
00148    000610     MOVE NAME-CHAR (J) TO OUTPUT-MESSAGE-TEXT (I).                      00000610
00149    000620     COMPUTE I = I + 1.                                                  00000620
```

Figure E-2.   Echo Message Example; Nonreentrant COBOL (Page 3 of 3)

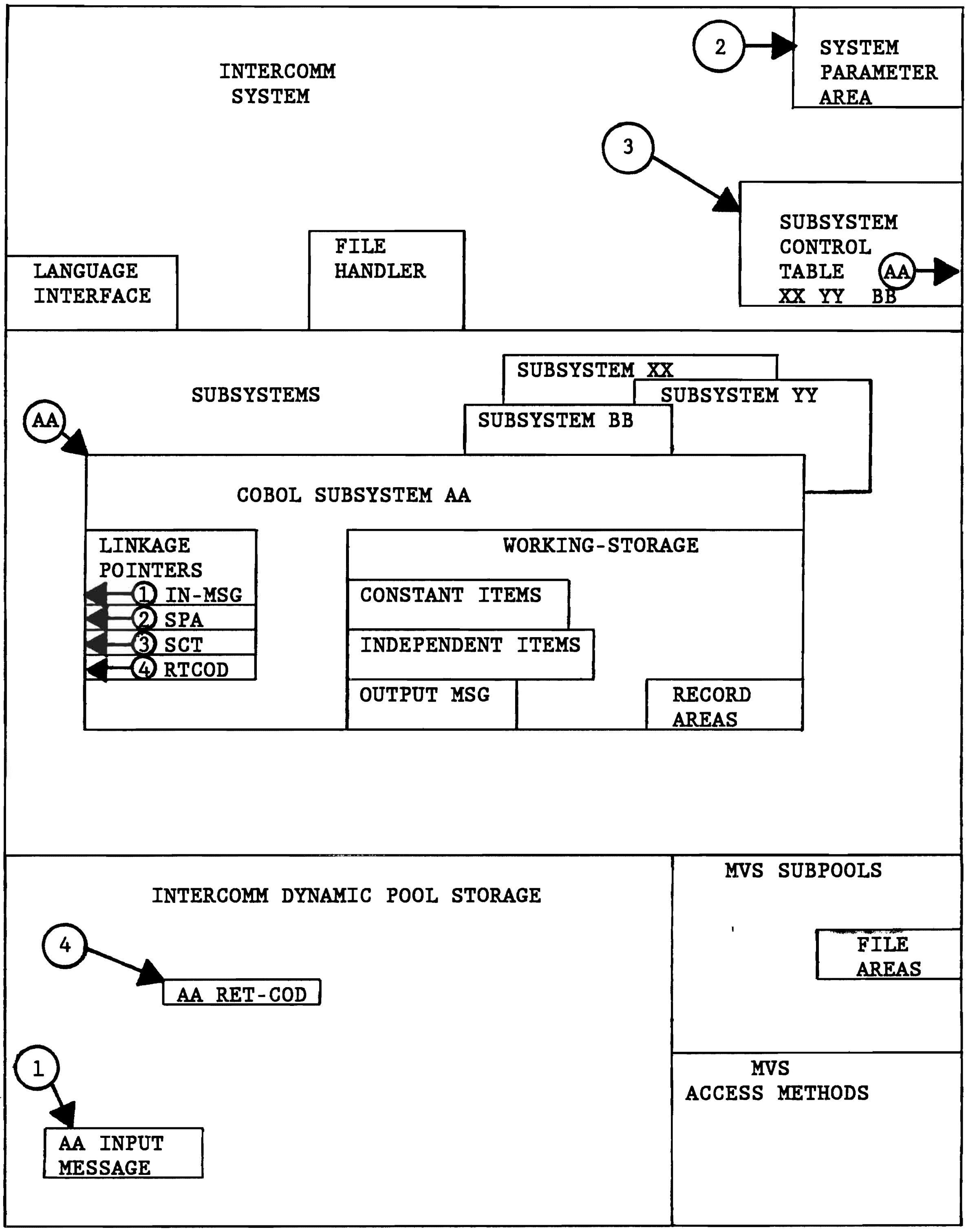


Figure E-3. Nonreentrant Application Program Environment

INDEX