NonStop™ Systems
NonStop 1+™ System

TRANSFER™ Delivery System Programming Guide

Data Management Library

82525

NOTICE

Effective with the B00/E08 software release, Tandem introduced a more formal nomenclature for its software and systems.

The term "NonStop 1+™ system" refers to the combination of NonStop 1+ processors with all software that runs on them.

The term "NonStop™ systems" refers to the combination of NonStop II™ processors, NonStop TXP™ processors, or a mixture of the two, with all software that runs on them.

Some software manuals pertain to the NonStop 1+ system only, others pertain to the NonStop systems only, and still others pertain both to the NonStop 1+ system and to the NonStop systems.

The cover and title page of each manual clearly indicate the system (or systems) to which the contents of the manual pertain.

NonStop™ Systems
NonStop 1+™ System

TRANSFER™ Delivery System Programming Guide

Abstract
This manual provides reference material and guidelines for application programmers who are writing programs that use the TRANSFER Delivery System.

Product Version
TRANSFER B00

Operating System Version
GUARDIAN A05 or later (NonStop Systems)
GUARDIAN E06 or later (NonStop 1+ System)

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PREFACE

This manual is a guide to writing application programs that use the TRANSFER delivery system for the Tandem NonStop 1+ System and NonStop Systems. Such programs cooperate with TRANSFER in moving information throughout a single computer system or a network of distributed systems. The programs typically run under the PATHWAY transaction processing system and use the services of the Transaction Monitoring Facility (TMF) to ensure transaction consistency.

This manual is intended for application programmers. The manual presents the concepts, guidelines, and detailed reference information needed to support application program interaction with TRANSFER; and also includes a description of the tools that provide access to the features and capabilities of TRANSFER.

The following manuals contain more detailed information about the Tandem NonStop 1+ System and NonStop Systems and the software products used with TRANSFER:

- Introduction to Tandem Computer Systems provides an overview of the NonStop 1+ System and NonStop Systems hardware and software.

- PATHWAY SCREEN COBOL Reference Manual describes the SCREEN COBOL programming language that is used in the development and control of online transaction processing applications.

The following manuals contain detailed information for programs that are written in a language other than SCREEN COBOL or that interface with programs written in other languages:

- COBOL Reference Manual, FORTRAN Reference Manual, and Transaction Application Language (TAL) Reference Manual describe these languages.

- GUARDIAN Operating System Programming Manual, Volumes 1 and 2 provide information about interfacing programs with the GUARDIAN operating system and accessing the hardware and software resources of the system.

This manual is a member of the TRANSFER Delivery System Manual Library. Other manuals in this library include:

- Introduction to TRANSFER Delivery System is an overview of TRANSFER.

- TRANSFER Delivery System Management and Administration Guide is a guide to managing and administering the TRANSFER Delivery System.

- TRANSFER/MAIL Users Guide is a guide to using the TRANSFER/MAIL application supplied by Tandem.

SECTION 1

A PROGRAMMER'S VIEW OF TRANSFER

The TRANSFER delivery system is a high-level software product that reliably supports communications between people, input/output devices, and processes. The product is especially useful in situations where system resources are widely distributed or intermittently available, or both.

In addition to providing a standard electronic mail application, TRANSFER/MAIL (T/MAIL), TRANSFER supports a wide spectrum of user-written applications. These are typically business applications that link interactive environments and involve such features as:

- transmittal of data to multiple destinations, such as routing survey questionnaires and newsletters, or updating distributed, replicated data bases

- communication among applications with different missions, or among components of a distributed application, such as a manufacturing system transmitting data to a purchasing system

- scheduling of transactions for future occurrence, or transactions of long duration, such as generating a report.

Figure 1-1 illustrates information delivery with TRANSFER.

TRANSFER appears as a group of processes that your programs (also running as processes) can call upon to build, maintain, and route collections of information called packages throughout your computer system or network. TRANSFER maintains a data base that describes TRANSFER users and provides them with holding areas for packages and parts of packages. All interactions between your application processes and TRANSFER take place through interprocess messages.

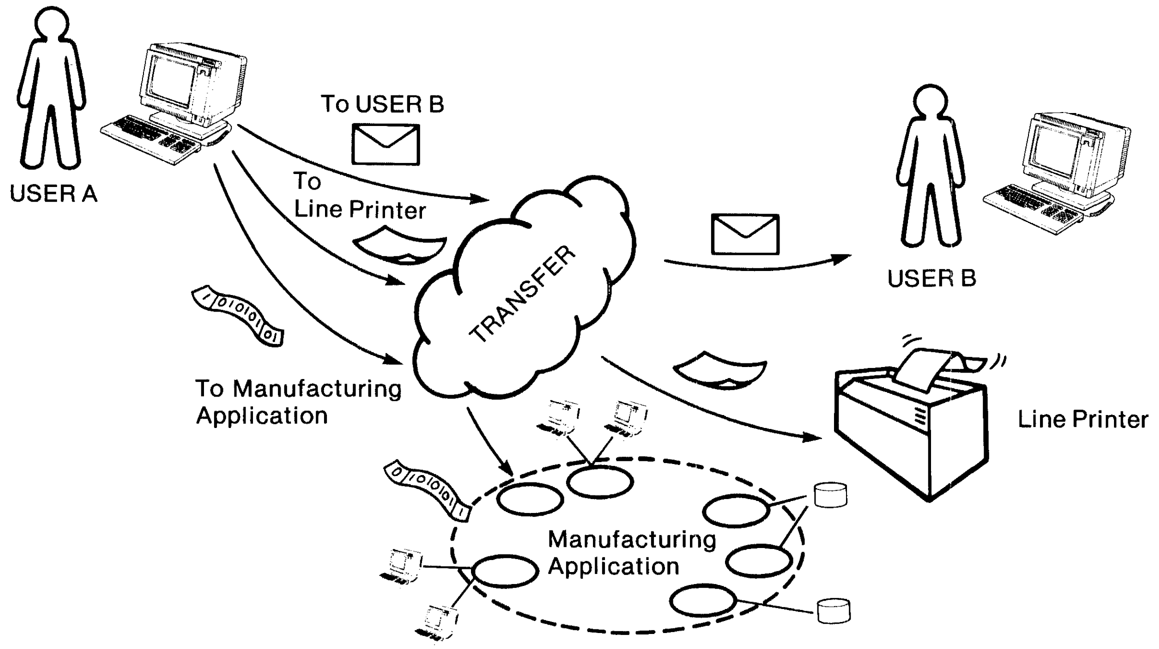

Figure 1-1. Information Delivery with TRANSFER

TRANSFER is independent of package content. Any application program can request the services of TRANSFER to create, build, request transmittal of (post), store, and access packages. Your programs make these requests via the TRANSFER programmatic interface.

An application can have interactive communication with users, or can have one process interact with another process with no human intervention. An application can contain programs written in various languages, all using TRANSFER in one way or another; for example, a PATHWAY requester written in the SCREEN COBOL language could use TRANSFER to transmit data to a statistical application written in FORTRAN.

TRANSFER APPLICATIONS

TRANSFER is suitable for many different kinds of applications that involve information transmittal. TRANSFER is particularly valuable for dealing with two basic characteristics commonly found in business transactions: end-to-end communication and extended transaction processing.

- In end-to-end communication, a correspondent, which can be a person, input/output device, or process, sends a package to one or more other correspondents. Although the sending and receiving correspondents might all exist at the same network node, the interaction often takes place between nodes and involves distributed resources. TRANSFER can send a package to multiple destinations anywhere in the network.

  As shown in Figure 1-2, a simple instance of end-to-end communication occurs when an operator at a terminal composes a memo and then sends it to a person at another terminal. A more sophisticated example might involve a manufacturing application running at one site and interacting with a purchasing application at another. If you were developing this type of application without benefit of TRANSFER, you would have to write software to take care of several contingencies--for example, what to do if a package is sent to a node that is unavailable, or to a correspondent who is either unavailable or not ready to receive the package. That software would have to monitor network availability, queue packages, and manage timing considerations; but with TRANSFER, these functions are managed for you by software supplied by Tandem.

- In extended transaction processing, a sender initiates one transaction and then proceeds immediately to a new one without waiting for work on the original transaction to be completed. Figure 1-3 illustrates extended transaction processing. This is frequently called nowait transaction processing because the application continues with another transaction without waiting for the first one to be completed.

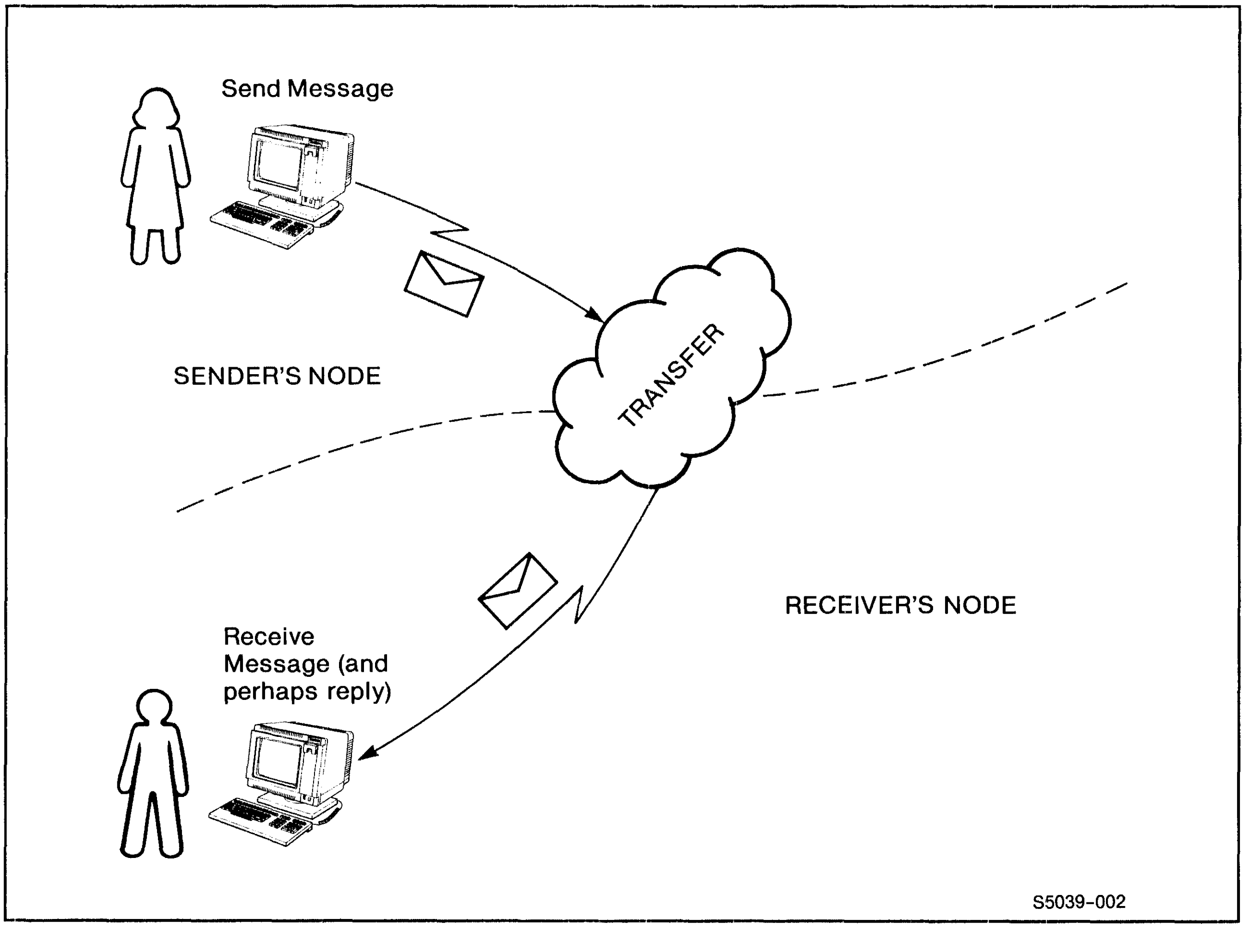

Figure 1-2. End-to-End Communication

For an example of extended transaction processing, consider an application that:

a. allows an operator to request the system to build an inventory report from various items in a data base and to print the report on a local printer that will not be free until 4:30 p.m. that afternoon

b. then, permits the operator to send memos to interactive users, announcing the pending availability of the report, while the system is gathering the data for it.

This kind of transaction processing distributes work over both time and geography. It promotes great efficiency, allowing operators and applications to move on to other work while TRANSFER completes the work they originally started.

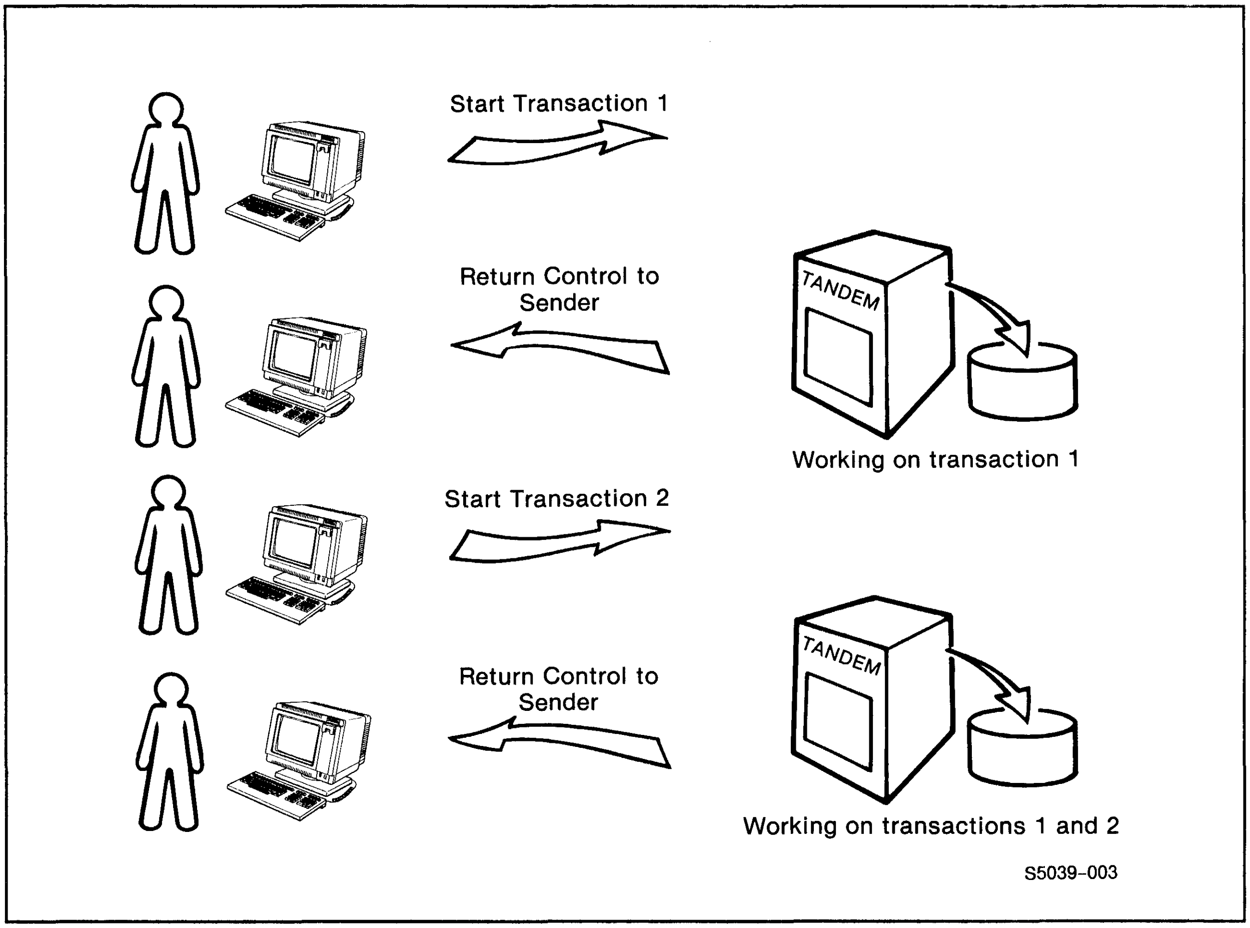

Figure 1-3. Extended (Nowait) Transaction Processing

The Advantages

TRANSFER relieves application programs of several tasks that they would otherwise have to perform. Among these are:

- delivering packages composed of multiple components
- monitoring the computer network for availability
- managing the routing of packages to multiple recipients throughout the network
- ensuring reliable package delivery, even in the event of failures, while preventing duplicate deliveries
- providing temporary storage of items and packages.

A Programmer's View of TRANSFER

An application can specify the earliest and latest times at which a package can be delivered. If the package cannot be delivered within that time window, TRANSFER returns it to the sender. An application also can specify priorities for packages so that if many packages are posted within a short time, those with the highest priorities are processed first.

Recipients of packages need not be available to receive them. If a network node is unavailable when TRANSFER attempts to deliver a package, delivery takes place as soon as the node does become available. If the recipients are unavailable, TRANSFER stores packages for those recipients, who can collect them at their own convenience.

When an application requests TRANSFER to deliver a package, that package will reach its destination exactly once. In the event of a hardware failure, TRANSFER ensures that a package is neither lost nor delivered twice to any recipient. An application also can define certification criteria by specifying, for example, that a sender is always notified in some way when all recipients have received packages that were posted.

The Limitations

Although TRANSFER is a powerful application tool, it does have some limitations:

- TRANSFER cannot ensure that any package will be delivered at a specific time, and cannot predict how much time a package will spend in transit.

- TRANSFER does not attempt to deliver packages in the same order that they are sent; your application program, however, could arrange to process packages, upon receipt, in the order in which they were transmitted.

- Although TRANSFER allows a package to contain any kind of data, TRANSFER does not interpret or process the data in the packages. That is the responsibility of your application program.

As an application programmer, you must determine:

- what constitutes a transaction and what signifies its completion

- what kinds of information a package contains, and in what arrangement

- who receives the packages

- how recipients process and respond to packages

- how correspondents are related to one another, and how packages are interrelated.

An important relationship to consider is that between two common application requirements:

the need for packages to be delivered within a narrow timeframe

the need for a certain percentage of packages to be delivered successfully.

The narrower the timeframe, the greater the chance that external factors might prevent package delivery. If an application requires both a narrow timeframe and a high percentage of delivery, you should carefully consider the overall capabilities of TRANSFER when deciding whether to use this product.

A final limitation is the fact that an application cannot control traffic on network lines. Although an application can defer delivery of packages, it cannot defer transport of those posted for remote nodes. The only way to defer transport of a package is to either avoid posting it or shut down the network. For example, if you want to defer transport until after normal working hours, you could have an operator post a triggering package for nighttime delivery, and then have an application process post the real package when it receives the trigger.

THE TRANSFER ENVIRONMENT

An application can run under the PATHWAY transaction processing system, taking advantage of the requester/server model on which all PATHWAY applications are based. In the PATHWAY environment, the application programs are requesters written in the SCREEN COBOL programming language and are used to control terminal input/output. In general, requesters for a TRANSFER application fit into the operating environment in the same way as requesters for other PATHWAY applications.

Outside the PATHWAY environment, application programs can be modules coded in COBOL, FORTRAN, or the Transaction Application Language (TAL).

TRANSFER uses the Transaction Monitoring Facility (TMF) to ensure the consistency of any files that are changed during the delivery process. If a failure occurs while a package is in transit, the delivery operation is backed out and started over again. In the event of a system failure, TMF allows you to reconstruct the files.

Types of Application Processes

A TRANSFER application consists of a set of processes that communicate with each other and with TRANSFER; they work together to perform a common task. These processes might run on different CPUs or even at different nodes in a network. The entire application includes:

- TRANSFER processes--processes that are furnished as part of TRANSFER, and processes that are provided by PATHWAY and operate in conjunction with TRANSFER

- User processes--processes for which you, the application programmer, write the code.

Basically, you are concerned with writing programs for two general kinds of user processes: clients and agents. Each type is defined by the task it performs.

- Clients are requester programs that provide the interface between correspondents and TRANSFER. Clients allow the user to build, alter, and post packages for delivery, and receive and respond to incoming packages. They also allow the user to request various administrative functions. In terms of the PATHWAY requester/server model, clients are those requesters that make requests of servers furnished as part of TRANSFER. Clients can also communicate with any number of user-defined servers.

  Most clients are written as SCREEN COBOL programs that execute in PATHWAY Terminal Control Processes (TCPs). Others are programs written in COBOL, FORTRAN, or TAL; these processes, however, cannot take advantage of PATHWAY features such as load-balancing operations, ease of coding interprocess communications and TMF requests, and resource management capabilities.

- Agents allow applications to participate in the delivery process. Agents are programs that are automatically invoked to handle packages received at a depot. A depot is that portion of the TRANSFER data base associated with a particular correspondent. When a package arrives at the depot, the agent is notified by TRANSFER. In response to this notification, the agent usually takes some kind of action, such as filing a package for later retrieval, initiating a transaction, or replying to the sender. Basically, the agent eliminates the necessity for polling to see if packages have arrived. The agent provides a facility for automatically processing incoming packages without the need for human intervention.

Agents can be written as PATHWAY requesters in SCREEN COBOL, or as server processes in COBOL, FORTRAN, or TAL. In the role of a requester of TRANSFER services, an agent can in fact be regarded as a kind of specialized client.

Clients and agents sometimes perform many of the same functions, and they are not always totally distinct. They are treated separately in this manual because they usually involve different design and coding considerations. The most fundamental distinction between these two types of processes is:

- Clients take their control information either from user processes or from other processes that are not part of TRANSFER. They direct most of their output to TRANSFER.

- Agents take their control information from TRANSFER and the received packages that trigger them. They direct output to processes or devices external to TRANSFER, or back into TRANSFER itself.

TRANSFER Objects

A TRANSFER application involves the following objects:

- correspondents that send and receive packages

- the packages themselves

- depots where packages are delivered

- distribution lists that allow packages to be sent to multiple destinations

- profiles that describe the correspondent

- folders where packages are stored.

CORRESPONDENTS. A correspondent can be a person, a process, or a device as illustrated in Figure 1-4. Each correspondent is assigned a unique name that explicitly identifies both the node where the correspondent receives packages and the specific identity of the correspondent. TRANSFER keeps track of all correspondent names in its own data base.

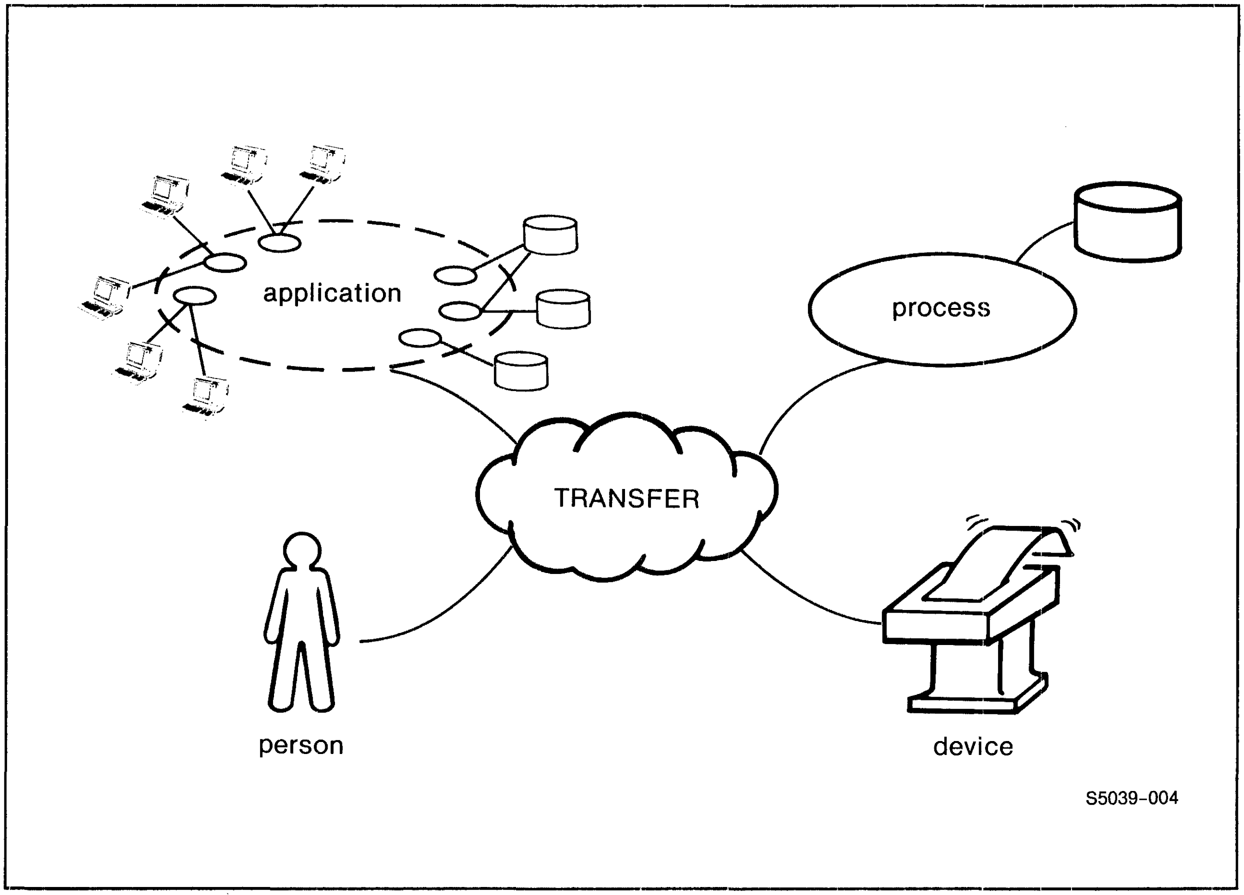

Figure 1-4. Correspondents

PACKAGES. A package is a collection of information that can be sent from one correspondent to another correspondent. A person-to-person package could be interoffice mail. A process-to-process package could be data and transaction codes needed to update a data base.

Packages are made up of discrete collections of data known as items. Each item always includes an item descriptor, which is composed of one or more records that describe the attributes and composition of the item. In addition, the item can include one or more data records. Examples of items are shown in Figure 1-5.

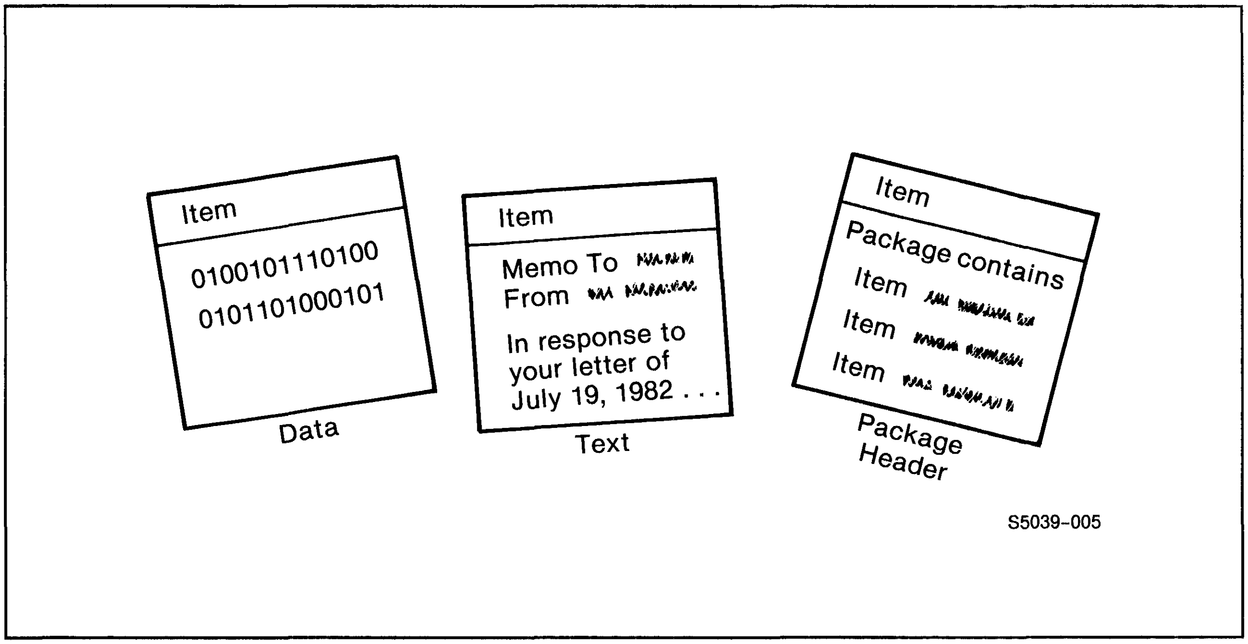

Figure 1-5. Items

An item usually contains only one kind of data whether that data is text, ASCII data, digital facsimile data, or some other type defined by your application. Each item is identified by its own unique item ID. Items can range in size from a few to many thousands of bytes and can also contain other (component) items.

Any process representing the correspondent who created an item can add, delete, examine, or change the contents of the item until it becomes part of a submitted package. For example, a process can retrieve a data record, insert records, and change their order. Similarly, a process can modify components in any list of component items that is part of the item. A process cannot, however, delete or change an item if the item is part of a package that is already posted.

In order for TRANSFER to deliver items from one correspondent to another, the items must be assembled as packages as shown in Figure 1-6.

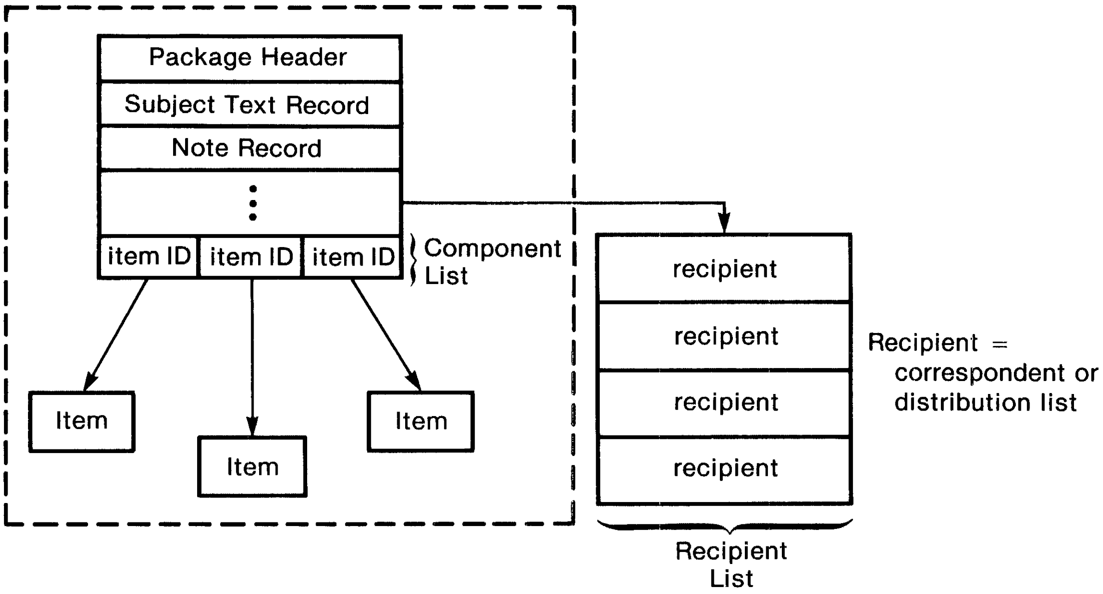

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Figure 1-6. A Package

Each package includes a package header item, perhaps one or more records or component items, and a list of recipients. The package header item is like the label on an actual mail package; it indicates who is sending the package, and to whom, when the package was posted, and what its delivery priority is. The package header might also indicate the timeframe in which the package should either be delivered or expire; it also might include a components list that contains the IDs of all items in the package. If an item in a package contains other items, those second-level items are not listed in the package header.

An application builds a package by creating the package header item and making separate requests to add recipients, component items, and delivery parameters. The package itself might be composed of different kinds of items in any arrangement. For example, a package could contain a formatted ASCII item and a digital facsimile data item, along with other package header items. If the components list of a package includes another package header item, the result is a package nested in another package, as shown in Figure 1-7. A package that contains another package is just a specific instance of the general rule that an item can contain other items.

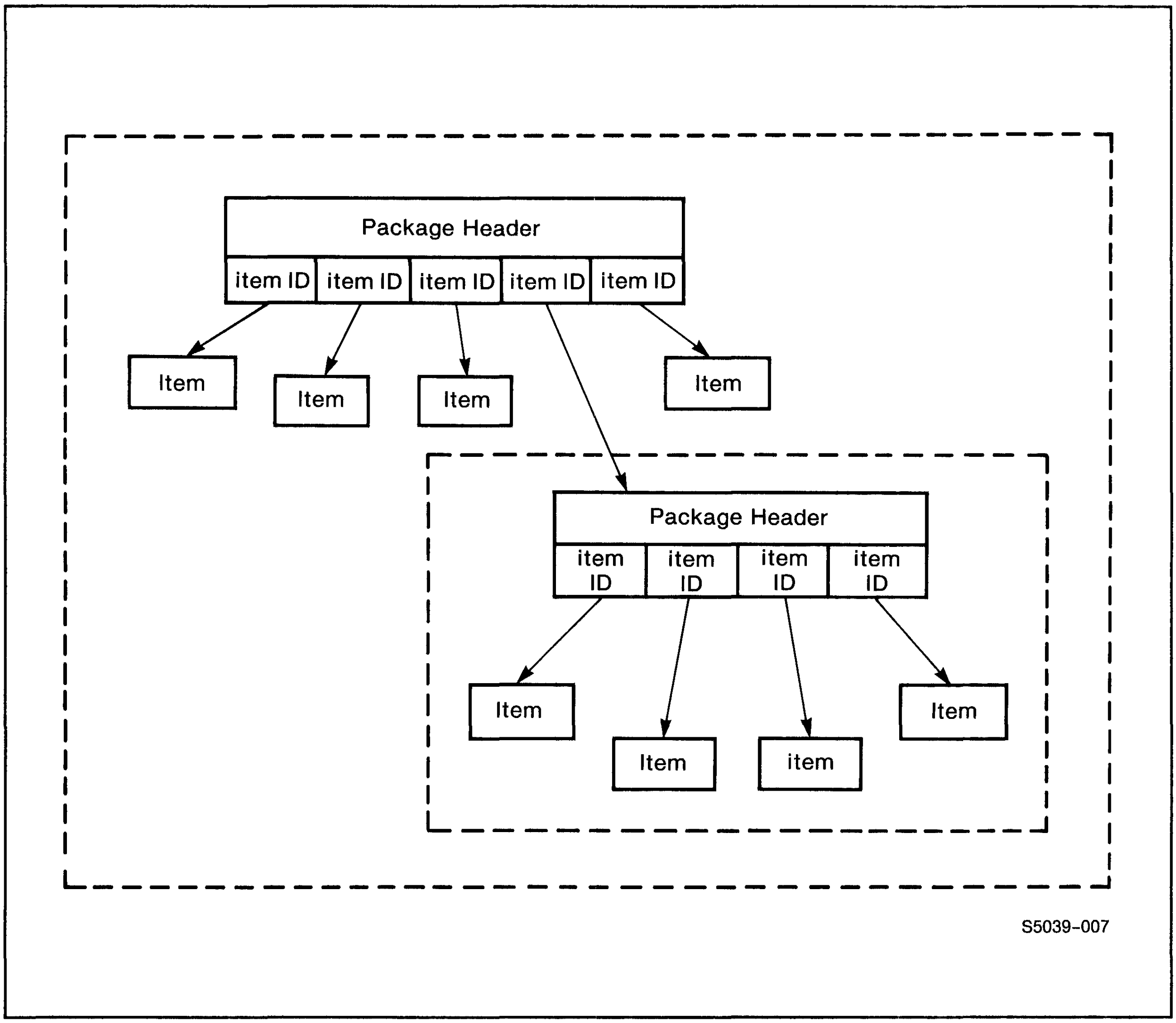

Figure 1-7. A Package within a Package

DEPOTS. A depot is that portion of a TRANSFER data base associated with a particular correspondent. The depot is established when an application registers the correspondent with TRANSFER. Every correspondent has precisely one depot and that depot has a network-unique identity, which an application references implicitly through the correspondent name. A depot principally contains distribution lists, profiles, and folders, as shown in Figure 1-8.

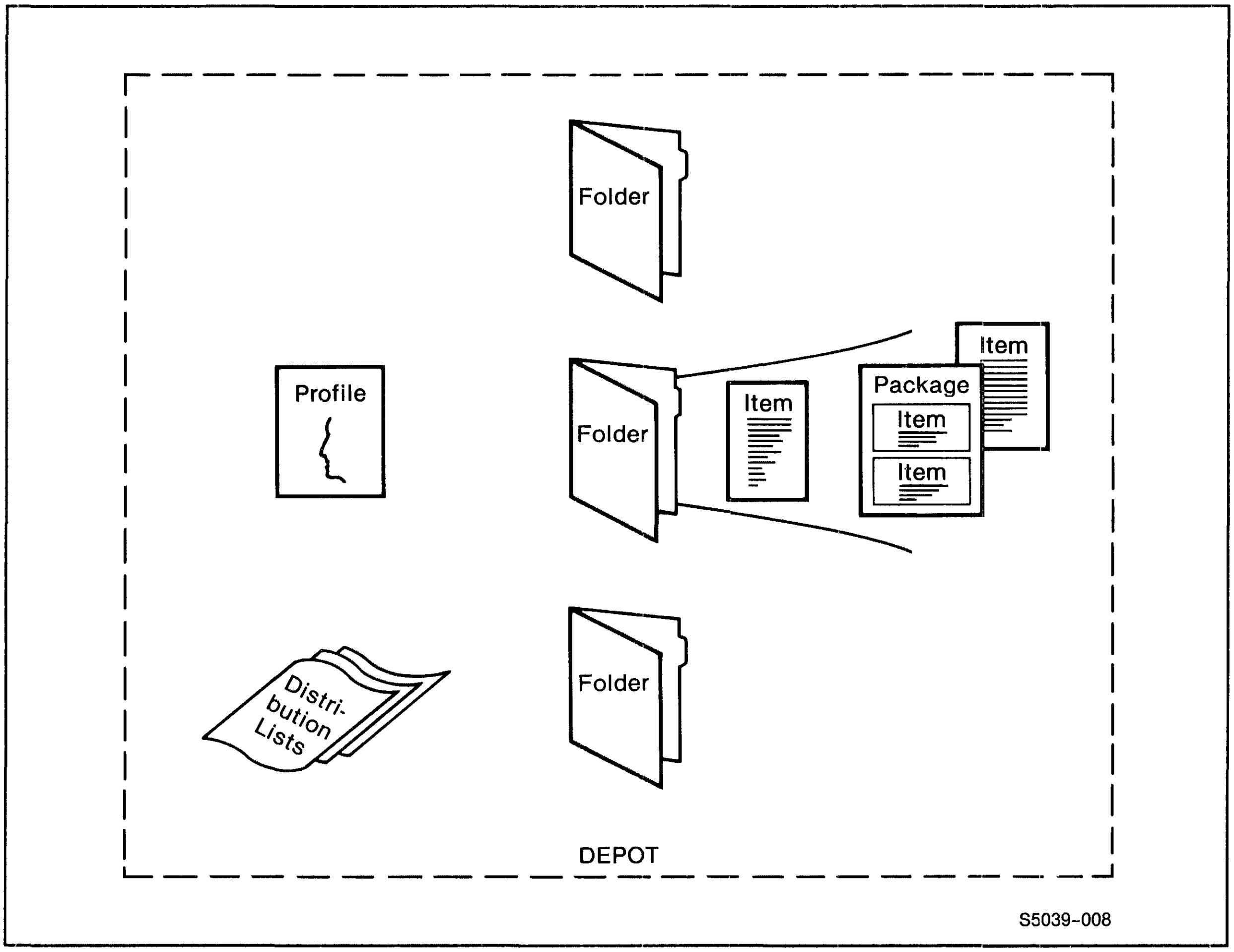

Figure 1-8. A Depot

DISTRIBUTION LISTS. A distribution list simplifies the delivery of a package to multiple correspondents. The list can contain the names of both individual correspondents as well as the names of other distribution lists. This allows an application to send packages to multiple destinations, while referencing those destinations by only one common name. As long as a correspondent knows a particular distribution list name, that correspondent can remain totally unaware of the specific names on the list.

Before a package can be delivered to the correspondents on a distribution list, that list must be expanded. To accomplish this expansion, TRANSFER replaces the referenced distribution list name with the actual names of the correspondents on the list. These correspondents are known as the members of the distribution list.

PROFILES. A profile is a set of one or more records that describe the correspondent who owns the depot. These records reside in a profile file, which contains the profiles for all correspondents registered at the node. These records are managed by TRANSFER.

A correspondent profile contains identifying data, such as the password of the correspondent and operational parameters applicable to the correspondent. The profile also indicates privileges of the correspondent and the default values for package delivery parameters, such as delivery priority and expiration time.

An agent profile specifies the agent or agents that should be invoked when a package arrives at the depot. The profile indicates the name of the agent; selection criteria for invoking the agent; and other information, such as whether the agent is a SCREEN COBOL requester program or a server.

TRANSFER also manages other profile records for each depot. These include profile records for T/MAIL and any other applications requiring storage of data applicable to the depot.

Through requests to TRANSFER, an application can examine the profile records for the correspondent that it is representing, and can alter certain fields within these records. An application that represents someone with system administrator capability can examine and change certain fields in the profile records of other correspondents at the node. A system administrator is a person who is responsible for managing the objects that TRANSFER uses in the delivery process.

FOLDERS. A folder is an area where related items and packages are stored. As an example, a correspondent might keep separate folders for packages received from different sources, separate folders for text and facsimile data, or a separate folder for packages that are to be sent in response to earlier packages. The same item or package can belong to more than one folder.

An application process can create and delete folders, add items and packages to them in a predefined ordering sequence, and examine their contents. In addition to folders created and maintained by application processes, TRANSFER maintains the following special folders:

- INBOX Folder. When a package arrives at a depot, TRANSFER saves it in a folder named INBOX. Packages remain in this folder until they are explicitly removed or until they expire, whichever event occurs first. Once TRANSFER places a package in a recipient's INBOX folder and invokes the appropriate agents, delivery of the package to that recipient is considered complete. Clients can explicitly remove packages from the INBOX. If a client never acknowledges receipt of a package, TRANSFER removes it from the INBOX and returns it to the sender when the package expiration time occurs. An application can retrieve any items from this special folder.

- WASTEBASKET Folder. A process that intends to delete an item at the end of a session can save the item in a folder named WASTEBASKET. A session is defined as the period of time during which a correspondent can submit requests to TRANSFER. When the process ends the session, the item is automatically purged from this folder. An application might use WASTEBASKET so that an operator who mistakenly deletes an item during a session can retrieve the item before the end of that session. An application can retrieve any items from this special folder.

- OUTBOX folder. This folder is not currently used by TRANSFER, but is reserved for future use. At present, it is illegal for any process to save a package in the OUTBOX.

SECTION 2

TRANSFER APPLICATION COMPONENTS

The primary processes in a TRANSFER application are:

• clients • agents • specialized servers required by clients and agents	written by the application programmer
• TRANSFER interactive server • TRANSFER asynchronous processes	supplied by TRANSFER
• processes that communicate and operate in conjunction with TRANSFER	supplied by PATHWAY

When these processes run under the PATHWAY transaction processing system, they take advantage of the requester/server model on which all PATHWAY applications are based. These processes and the way in which they interact within the framework of PATHWAY are illustrated in Figure 2-1.

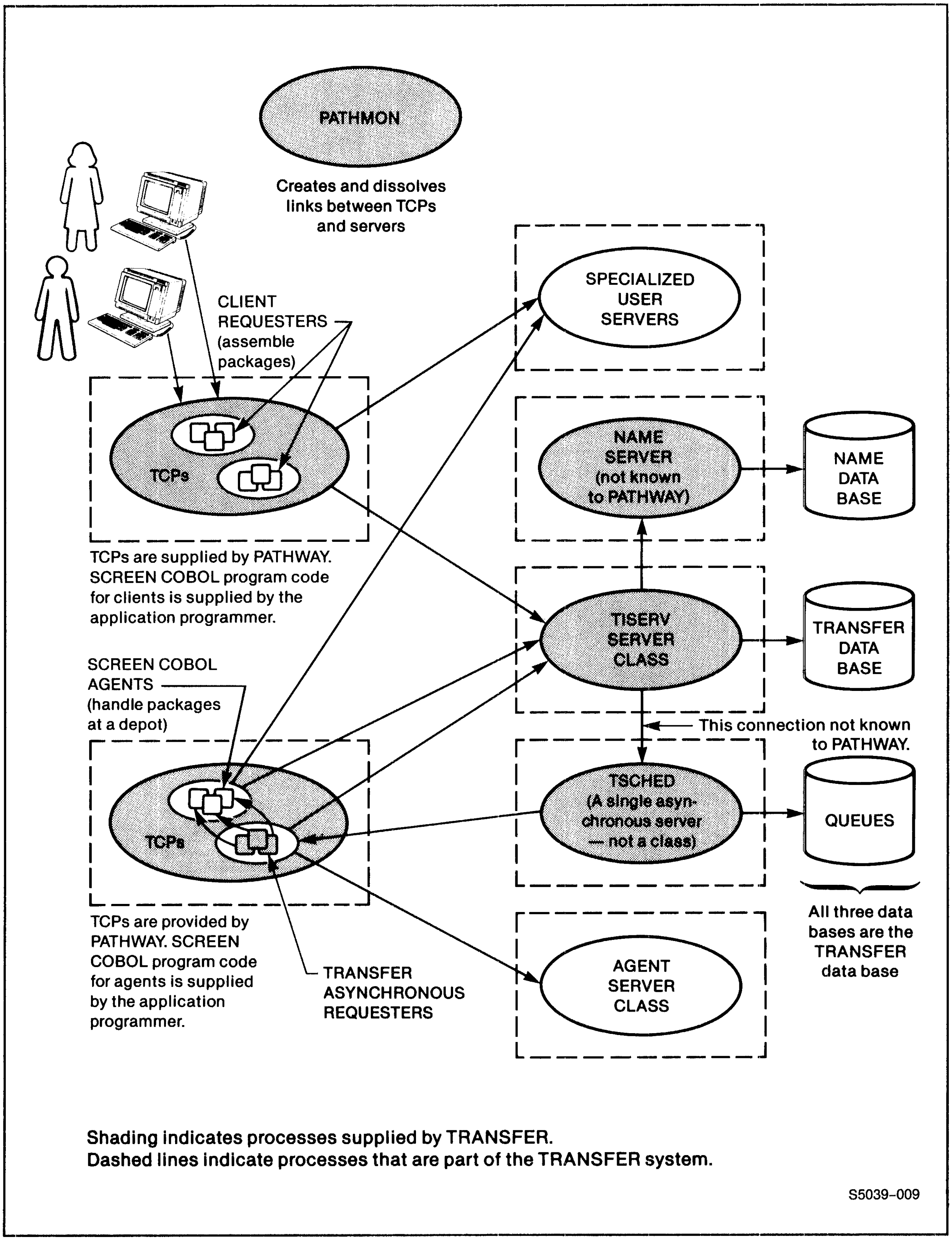
PATHMON
Creates and dissolves links between TCPs and servers
CLIENT REQUESTERS (assemble packages)
TCPs
TCPs are supplied by PATHWAY. SCREEN COBOL program code for clients is supplied by the application programmer.
SCREEN COBOL AGENTS (handle packages at a depot)
TCPs
TCPs are provided by PATHWAY. SCREEN COBOL program code for agents is supplied by the application programmer.
TRANSFER ASYNCHRONOUS REQUESTERS
SPECIALIZED USER SERVERS
NAME SERVER (not known to PATHWAY)
NAME DATA BASE
TISERV SERVER CLASS
TRANSFER DATA BASE
This connection not known to PATHWAY.
TSCHED (A single asynchronous server — not a class)
QUEUES
All three data bases are the TRANSFER data base
AGENT SERVER CLASS
Shading indicates processes supplied by TRANSFER.
Dashed lines indicate processes that are part of the TRANSFER system.
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Figure 2-1. Processes in a TRANSFER Application

CLIENTS

Clients are requester programs that provide the interface between correspondents and TRANSFER. They allow correspondents to communicate and interact with TRANSFER. A client, for example, enables a correspondent to create new items, assemble them into packages, post these packages, retrieve incoming packages, and request various administrative services. For every TRANSFER application, you must code one or more clients.

A client typically performs the following functions:

- establishes and terminates communication with TRANSFER
- manages the terminal interface on the basis of the screens you design and the code you write to accept and display data on those screens
- composes items and packages at the depot
- assigns delivery parameters, such as package priority and delivery timeframe, and posts packages for delivery
- takes certain actions based upon receipt of packages, such as presenting a message to a user at a terminal or starting another transaction
- detects and reacts to certain error conditions.

A client can represent any number of correspondents; TRANSFER recognizes a correspondent as a name with an associated depot in the TRANSFER data base.

Examples of clients in TRANSFER applications are:

- SCREEN COBOL programs operating under a PATHWAY terminal control process (TCP), where the SCREEN COBOL programs
    - represent each operator as a correspondent
    - represent each terminal as a correspondent
    - represent all terminals and operators as a single correspondent
    - represent other servers or devices handled by those servers as correspondents.
- any GUARDIAN process that makes requests of TRANSFER servers on behalf of correspondents.

Most clients are written as SCREEN COBOL programs that execute within PATHWAY TCPs. Clients can be written as FORTRAN, COBOL, or TAL programs, but they cannot take advantage of the resource management capabilities of PATHWAY.

AGENTS

Agents are SCREEN COBOL requester programs or PATHWAY server classes that are automatically invoked to handle packages received at a depot. Agents are invoked by TRANSFER asynchronous requesters (TAREQs), which are responsible for actual package delivery. An arriving package might have been sent by another correspondent. An arriving package also might have been sent by TRANSFER itself; for example, an incoming package from TRANSFER could be certifying delivery of an earlier package, or could be telling the correspondent that a package delivery time expired before a remote node became available.

The capability of defining agents is an important feature of TRANSFER. Without an agent, a correspondent must check to determine whether packages have arrived at the depot; with an agent, the package arrival can automatically trigger some action. For example, an agent can react to a package delivery by:

- informing the correspondent of the delivery
- saving the package automatically in a folder at the depot
- initiating a transaction, perhaps in response to a triggering package
- creating a new package from the package received, adding items to that package, and forwarding it to another correspondent
- arranging for packages to arrive in a certain order
- sorting packages according to type before presenting them to the receiving correspondent
- filing packages from different applications separately, with the client then allowing the correspondent to retrieve the packages selectively
- replying automatically to the sender
- displaying the package on a device
- deleting packages that are not meaningful to the receiver.

An agent is selected for execution by criteria supplied in the agent profile associated with the depot. The criteria can be established either by a client or by an operator using the ADMIN application. ADMIN is a TRANSFER application, supplied by Tandem, that provides a user interface to the administrative functions of TRANSFER.

A single agent can be associated with several depots. A single depot can have many agents, each with different selection criteria, so different types of packages and applications can be handled by different agents.

An agent can be a requester or a PATHWAY server. In general:

- An agent that makes requests of TRANSFER server classes to retrieve, save, or post packages should be a requester written in SCREEN COBOL.

- An agent that accesses an input/output device, or that performs string handling, complex computations, or tasks of long duration should be a server written in COBOL, FORTRAN, or TAL.

- An agent that handles both kinds of work should be written in SCREEN COBOL and should direct its requests to a special application-defined server class.

Agents are invoked by TAREQs according to information in the incoming package and in the recipient's profile. SCREEN COBOL agents run in the same TCPs as the TAREQs that invoke them. Communication between TAREQ and agent is program unit to program unit, not TCP to TCP.

SPECIALIZED SERVERS

Your clients and agents might require the support of specialized servers. You can write these servers in COBOL, FORTRAN, or TAL. You can also write servers in the Massachusetts General Hospital Utility Multi-Programming System (MUMPS) provided the servers require no input/output audited by the Transaction Monitoring Facility (TMF).

TRANSFER INTERACTIVE SERVER (TISERV)

Any TRANSFER application always has a TRANSFER interactive server class defined at each node. This server class is called interactive because its primary job is to receive and reply to requests from your clients. The server is usually named TISERV.

TISERV furnishes the interface between TRANSFER and your clients. This server performs the following:

- handles all the work involved in accessing the TRANSFER data base on behalf of your clients

- contacts the TRANSFER asynchronous processes when a client has posted a package for delivery.

Any application can include servers in addition to those supplied by TRANSFER, and can include its own data base as well.

TISERV receives requests from requesters, performs the services requested, and replies. These requesters include the clients and agents you write for your application, applications provided by Tandem, and the TRANSFER asynchronous processes provided by TRANSFER.

TISERV handles requests to:

- create new packages, items, and folders

- add, delete, and retrieve information from packages, items, and folders

- post packages

- change profiles and distribution lists

- add or delete correspondents

- perform administrative tasks.

TRANSFER servers are context free; thus, requests on behalf of a particular correspondent need not all go to the same server process. You indicate in the code for your requester what server class should receive the request, and PATHWAY selects a specific server process from that class. A server locks every record it updates during a transaction; still, it is possible for several server processes to perform parts of the same transaction. Every process that does work for one particular transaction uses the same TMF transaction identifier (TRANSID); thus, a lock set by one server does not prevent access to the record by another server.

TRANSFER ASYNCHRONOUS PROCESSES

TRANSFER asynchronous processes handle package delivery. They schedule packages for delivery, locate their recipients, and accomplish their transmittal. They ensure that a package is delivered within the timeframe specified by the sender; if a network node is unavailable, they ensure packages destined for the node are transported as soon as the node becomes available. They also cancel packages and arrange for their expiration.

TRANSFER provides two kinds of asynchronous processes: a scheduler and the TRANSFER asynchronous requesters (TAREQs).

User-written client requesters do not communicate directly with the asynchronous processes. To post a package, a client sends its request to TISERV; TISERV, in turn, contacts the scheduler.

The only case in which asynchronous processes communicate directly with user-written software is when TAREQs invoke agents.

Scheduler

Every node has a scheduler that runs as a fault-tolerant process pair. The scheduler, of which only one copy exists, maintains queues on disc to keep track of the following:

- packages that are ready for delivery, expiration, or cancellation

- packages that cannot be acted upon because their timestamps call for deferred action

- packages waiting for delivery, expiration, or cancellation at unavailable nodes.

Packages move to the ready queue when all conditions for delivery are met. When a network node is available, all packages that have recipients at that node are placed in the ready queue. If some recipients are at available nodes and other recipients are at unavailable nodes, only transport to the unavailable nodes is deferred; the package is considered ready for transport to all available nodes.

When a package is transported to a node, distribution lists local to that node are expanded. TRANSFER replaces the distribution list name with the actual names of the correspondents; this action might also result in transport of the package to other nodes when they are available.

TRANSFER Asynchronous Requesters (TAREQs)

A TAREQ is a collection of SCREEN COBOL programs that handle the actual delivery of a package to a depot. These programs are supplied by Tandem and run within a standard PATHWAY TCP. Every node has at least one TAREQ.

TAREQs request work assignments from the scheduler, one assignment at a time for each TAREQ. TAREQs communicate with the scheduler as though the scheduler were a group of conversational terminals; the scheduler, in other words, acts as a terminal simulator. No real terminals are associated with TAREQs.

The TAREQs locate the recipients of packages and deliver the packages to local depots by issuing requests to TISERV. They also arrange for remote deliveries by issuing requests to copies of TISERV at other nodes as shown in Figure 2-2.

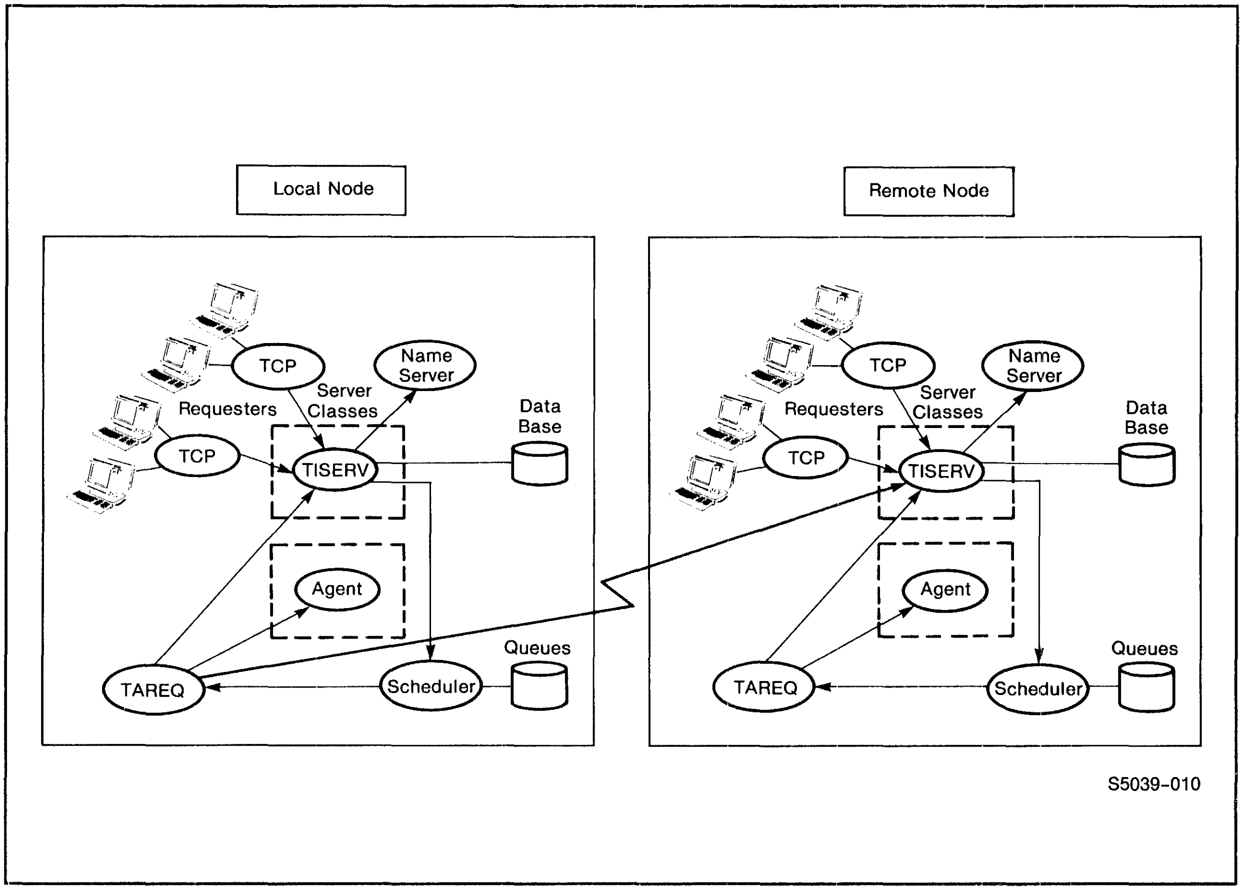


Figure 2-2. Package Delivery to a Remote Node

INTERPROCESS COMMUNICATION

Clients and agents communicate with TRANSFER processes through interprocess messages.

- A client written in SCREEN COBOL issues SEND statements to TRANSFER server classes. The same SCREEN COBOL program can communicate with other server classes also.

- A client written in COBOL, FORTRAN, or TAL makes requests by opening a TRANSFER server and issuing WRITEREAD requests to that server through the GUARDIAN operating system.

- An agent defined as a PATHWAY server class is invoked by TAREQs issuing SEND statements to the class.

- An agent defined as a requester and written in SCREEN COBOL is invoked by TAREQs issuing SCREEN COBOL CALL statements to the requester.

Agents, like clients, can issue requests to TRANSFER. Agents written in SCREEN COBOL issue requests through SEND statements; agents written in COBOL, FORTRAN, or TAL issue requests with WRITEREAD calls. The format of requests issued by your program is the same, whether the request is issued in a SEND statement or a WRITEREAD call.

To issue requests to TRANSFER, clients and agents must first initiate communication with TRANSFER by establishing a session.

TRANSFER SESSIONS

Before a requester process can access a correspondent depot to build, post, or receive packages, or do other tasks for that correspondent, the requester process must establish a session between the correspondent and TRANSFER.

To establish a session, the requester process sends a request to TISERV, supplying the name and password of the correspondent that the requester represents. TISERV must be running at the node where the correspondent is registered.

A session takes place between a correspondent and TRANSFER. As illustrated in Figure 2-3, the session includes transactions to post a package for delivery, but does not include the routing and delivery of packages to depots. Because of the TRANSFER nowait feature, neither the sender nor any recipient of a package needs to have a session in progress while the package is in transit or when it arrives at a depot. A correspondent terminates the session when services are no longer required for the depot.

When a requester initiates a session, TISERV returns a session ID to the requester. This ID, which is unique throughout the network, must occur in every later request that the requester makes for the correspondent. Eventually the process terminates the session, perhaps because the correspondent logged off, and relinquishes the session ID.

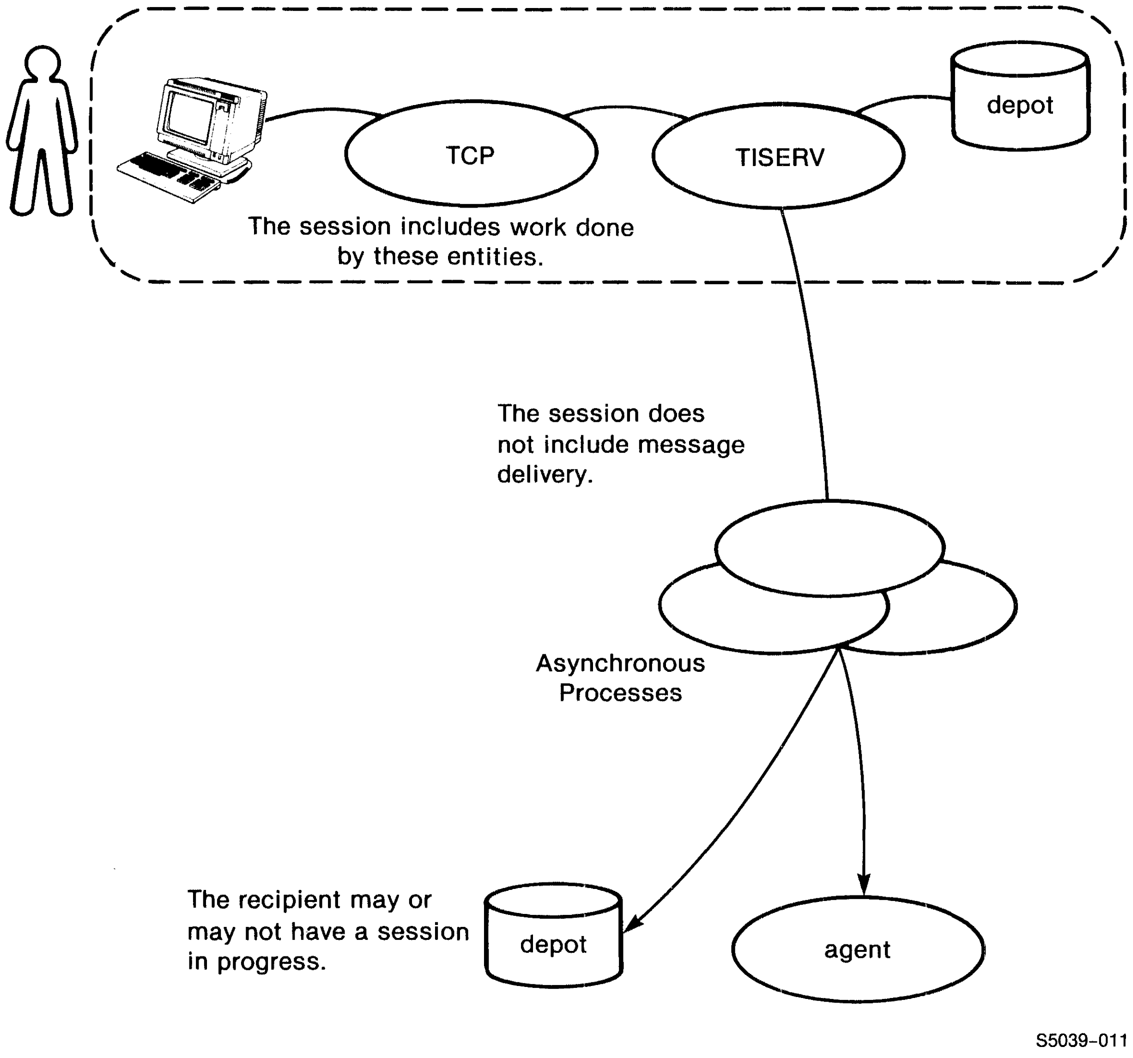

TCP
TISERV
depot
The session includes work done by these entities.
The session does not include message delivery.
Asynchronous Processes
The recipient may or may not have a session in progress.
depot
agent
S5039-011

Figure 2-3. Elements of a Session

An agent requiring access to a correspondent depot must establish a session just like any other requester, or be granted one by a TAREQ. You can set up a correspondent profile so that an agent is automatically granted a session whenever it is invoked, in which case the agent does not need to furnish the depot password.

Because session IDs are unique at the node and TRANSFER servers are context free, the following relationships can exist among requesters, servers, correspondents, and sessions:

- One requester can maintain sessions in progress for several correspondents. Requests for each correspondent carry that correspondent's session ID.
- The same requester can have more than one session for the same correspondent, with different session IDs. The same correspondent, for example, might be a user logged on at two terminals controlled by the same TCP.
- Multiple requesters can maintain sessions in progress for the same correspondent at the same time. Each requester has its own session ID for the correspondent.
- The requests issued during a session need not all go to the same server, nor even to the same server class. The session ID accompanies every TRANSFER request, and any TRANSFER server at the node can interpret it correctly.

TRANSFER OBJECT MANAGEMENT

The various elements that TRANSFER maintains and manages during package creation and transmittal are known as objects. These objects are: correspondents, packages, depots, distribution lists, profiles, and folders.

The following paragraphs describe how TRANSFER manages these objects.

Identifying Packages and Items

Every package or item is assigned an identifier (ID) that is unique throughout the network. This ID always consists of:

- a system number that defines the network node where the package or item is created and ensures uniqueness among IDs on different systems
- a local ID that distinguishes among different objects created at a particular node.

Through this ID, your application can fully identify and access any package or item anywhere in the network without any chance of ambiguity.

Resolving Object Names

Just as packages and items must be uniquely identifiable, so must correspondents, distribution lists, and folders. TRANSFER accomplishes this identification through the assignment of names for correspondents, distribution lists, and folders. When a process references one of these objects, TRANSFER must ensure that the process supplied a valid object name even though that name might be an abbreviation for some other name. Name resolution is performed as follows:

1. TRANSFER transforms the given name into one or more fully qualified names, using the name searching method described in Section 3. A fully qualified name is a name that includes the complete name of the correspondent and the network node.

2. TRANSFER validates the fully qualified name by checking the TRANSFER name directory to verify that the name is registered there and that it designates the correct object type (such as correspondent or distribution list). When a new name is registered, the validation operation ensures that the name is unique within the directory before it is added.

Name resolution takes place when:

- a user process registers (adds) a new correspondent to your application

- a user process tries to initiate communication between a correspondent and TRANSFER (called beginning a session)

- a user process supplies one or more names in a request on behalf of a correspondent

- TRANSFER expands a recipient list to deliver a package to one or more recipients.

CORRESPONDENT REGISTRATION. An application must register any new correspondent at the same node as the TISERV process through which the application requests this registration. Registration is requested by a process running on behalf of the system administrator for the node. When an application requests this registration, TRANSFER places the name of the correspondent in the name directory.

SESSION ESTABLISHMENT. To represent a correspondent, a client must first initiate a session for that correspondent; this establishes communication between the correspondent and TRANSFER. The client directs its request for a session to a TISERV server at the node where the correspondent is registered. TRANSFER checks to ensure that the correspondent name is properly registered. TRANSFER then starts the session at that node. The session cannot be passed to servers at any other node.

Agents, like clients, can initiate sessions. Agents can be configured so that when they are invoked, they are automatically granted preestablished sessions. The sessions allow them to make requests to TISERV on behalf of correspondents.

REQUESTS ON BEHALF OF A CORRESPONDENT. When a process supplies a correspondent name as an input parameter to a request, the name is resolved immediately if it is a local name. When a process supplies a correspondent name defined at a remote node, the process must include the name of the node in its request to TISERV; if the remote names are syntactically correct, resolution of the names is postponed if the request specifies deferred resolution.

When a process adds a name to a recipient list or a distribution list, the process can specify whether the name should be resolved immediately or later. The following rules apply:

- If a process requests immediate resolution of a recipient or distribution list member name, that process waits while TRANSFER performs this resolution. If a remote node is required but inaccessible, a resolution error occurs.
- If a process requests deferred resolution of a recipient or distribution list member name, TRANSFER accepts the name without further processing and resolves it later. In most cases, a process only requests deferred resolution when referencing a name defined at a remote node. For remote deferred resolution, TRANSFER still ensures that the name supplied is syntactically correct when it is entered.

If a supplied name is that of a distribution list, the names of individual members are never resolved immediately. Instead, the distribution list is expanded and the member names are resolved during package delivery at each node.

When resolving a name, TRANSFER consults internal directories. TRANSFER first determines whether the name is that of an object belonging to the correspondent represented by the requesting process. If not, TRANSFER then checks to verify that there is a correspondent with that name.

Consider a request on behalf of a correspondent named SIMMS-JASON in which the object name MANAGER appears. The object name MANAGER is resolved as follows:

1. Is there an object named MANAGER that belongs to correspondent SIMMS-JASON? MANAGER could be the name of a folder or a distribution list.
2. If not, is there a correspondent named MANAGER at this node?
3. If not, the object named MANAGER does not exist and is an illegal reference.

A programmer might find it difficult to tell at a glance whether an object name is really a correspondent name, folder name, or distribution list name. TRANSFER, however, can readily identify the object type because names are always associated with particular types in the TRANSFER name directory.

PACKAGE DELIVERY. During delivery of a package, TRANSFER processes at the sending node expand local distribution lists and resolve the names of local and remote members. If a package has recipients at remote nodes, a copy of the package is transported to each of those nodes; distribution lists are then expanded and the member names resolved by processes at those nodes as well.

Moving Packages Between Depots

To move items from one depot to another, your application must bind the items into packages. Each package includes a package header item, zero or more component items, zero or more item data records, and a list of recipients.

The package header item specifies:

- the network-unique item ID of the package
- the name of the correspondent sending the package
- timestamps to indicate when the package was posted by the sender, when it should be delivered, what the time zone difference is between the sending node and the receiving node, and when the package should expire
- other package delivery parameters, such as delivery priority and agent selection criteria.

During package delivery, a copy of the package goes to every node where a recipient for that package has a depot.

The term recipient list should not be confused with distribution list.

> A recipient list contains the names of correspondents and distribution lists that are to receive the package. The list is an attribute of the package and applies only to the package for which the recipient list is created. The list, which has no name of its own, ceases to exist when the package is deleted.
>
> A distribution list is a predefined list of recipient names; the list provides a simple method for a correspondent to send a package to multiple destinations. A member of a distribution list can be a correspondent or another distribution list. The distribution list belongs to the depot owner and exists independently of any packages.

Initially, the recipient list for a package has one entry for each name supplied by the application. As names are resolved and distribution lists expanded, new names are added to the list and control information is updated.

Once a package is created, only a process that represents the creator of that package can change its contents. Once the package is posted, the application process cannot alter its contents. After the package is posted, local names on the recipient list are validated, local distribution lists are expanded into member names, and duplicate names are eliminated. This process is repeated until all local names are resolved or found to be in error.

For local recipients, TRANSFER delivers the package by placing an entry in the INBOX folder of each recipient and notifying any appropriate agents. For remote recipients, TRANSFER moves a copy of the package to the appropriate remote nodes, and name resolution takes place again at those nodes.

TRANSFER ensures that a package is never moved to a node more than once. Even if a distribution list at a remote node adds new recipients located at the local node, TRANSFER provides delivery to the new local recipients by using the copy of the package that already exists at the local node.

INTER-OBJECT RELATIONSHIPS. The use of network-unique IDs for TRANSFER objects provides for important logical relationships among them and efficient use of disc storage space.

- When a user process sends a package to a local correspondent, TRANSFER does not make a copy of the package; instead, TRANSFER makes the INBOX folder of that correspondent point to the package.
- The profiles of all correspondents defined at a particular node are stored in the Profile file.
- The contents of folders are described in the Folder file.
- Records that describe packages and items, called item descriptors, are stored in the Item Descriptor file. The relation between an item (possibly a package) and its component items is specified in the item descriptor.
- The data records for the items are stored in the Item Data file.
- A depot itself is simply a network-unique ID that appears in records of various kinds, distributed over several TRANSFER files.

When an item is saved in multiple folders or even at multiple depots, pointers are also used to avoid duplication of data. This kind of relationship is illustrated in Figure 2-4.

According to this arrangement, several packages can include the same item. Also, several folders can include the item without necessarily including any package of which the item is a part. Finally, the folders that include the item need not all belong to the same depot.

Because each depot and item ID includes the system number of the node where the ID was assigned, it is vital for the system manager at the installation to observe the following:

CAUTION

> If you change the system number of a node where TRANSFER has been running, all system IDs stored in the TRANSFER data base must be converted--otherwise, depot and item IDs will point to the wrong depots and items.

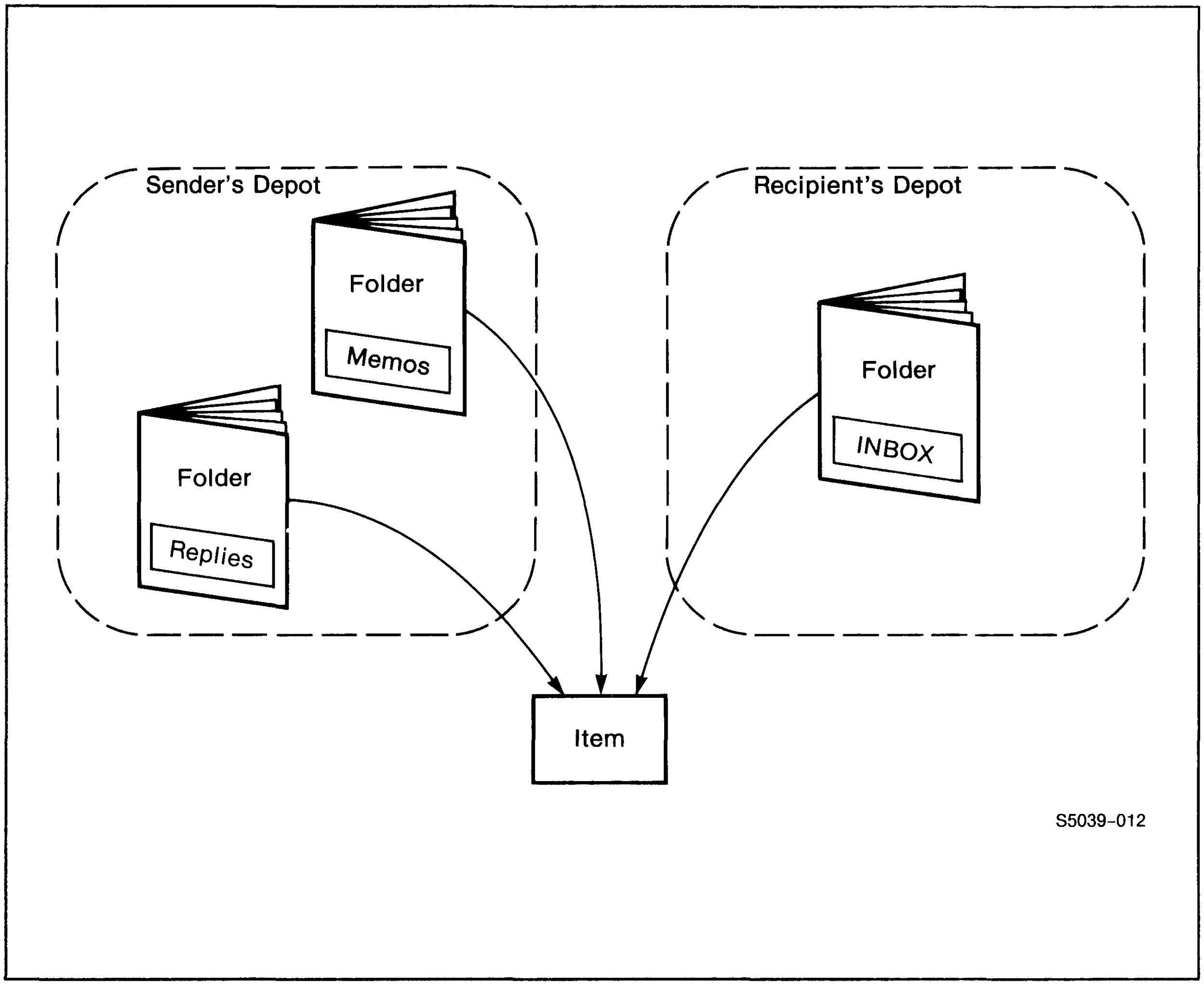


Figure 2-4. Item in Three Folders

DEPOT SECURITY. TRANSFER provides different levels of security for different correspondents to prevent unauthorized access to the information maintained by an application:

- Privileges of depot owners. The owner of a depot is, effectively, any person or process who knows the correspondent name and password for logon purposes. Depot owners can:

  - create new folders, distribution lists, items, and packages

  - make additions or changes to any of those objects that they create

  - change many elements of their own profiles.

  Depot owners are the only ones who can examine or modify the contents of folders belonging to their depot. Depot owners cannot change packages or any component items of packages that are received from other depots or that are posted for delivery. A user process, however, could create a new item that is a copy of the package or item and then change that new item.

- Privileges of system administrators. System adminstrators can register new correspondents at their node or remove them from the node. Registering a correspondent automatically creates a depot for that correspondent, and removing a correspondent deletes that depot. System administrators can also act on behalf of other correspondents. They can, for example, change the profile of another correspondent (except for selected elements that remain under TRANSFER control); create and delete folders; and create, read, modify, and delete distribution lists at any depot at their node.

- Privileges of other correspondents. Correspondents, including system administrators at other nodes, have very limited access to depots of other correspondents. A process that knows the name of a correspondent can see whether that correspondent has a depot at the node; any process can get a list of all correspondents at the node. Any correspondent can get the names of distribution lists belonging to other correspondents and use the names of the lists; however, a correspondent at one node cannot examine the members of a distribution list at another node.

  Correspondent A can use Correspondent B's mailing list without Correspondent B's knowledge; Correspondent A, however, cannot change or delete that mailing list. Correspondent A can examine the contents of Correspondent B's mailing list only if the processes used by both correspondents are running at the same node.

SECTION 3

TRANSFER NAMING CONVENTIONS

Programs written for a TRANSFER application reference various TRANSFER objects. These objects include: correspondents, depots, distribution lists, folders, items, packages, and profiles. Three of these objects are named:

correspondents

folders

distribution lists

Correspondents, folders, and distribution lists are identified by TRANSFER simple names, either alone or in combination with each other. A simple name can have a maximum of 32 characters, and can include any of the following:

- hyphen (-) and underscore (_) (usually used as separators within names)
- letters A through Z (uppercase and lowercase are equivalent)
- digits 0 through 9

No other characters are permitted in a TRANSFER simple name. Embedded blanks and periods, which are regarded as delimiters, are not allowed.

Correspondents request a TRANSFER service through a request unit-of-work (UOW). Correspondents supply required names within 80-byte or 120-byte fields. These fields can contain leading blanks, but no character in a name can occupy the last byte; the last byte must contain a null (binary zero) character or a blank. A process can terminate a name at any point in the field by entering a null character after the last character in the name, in which case TRANSFER pads the trailing portion of the field with blanks.

TRANSFER Naming Conventions

TRANSFER returns a name to a process in a response UOW. The name is returned in an 80-byte or 120-byte field that is padded on the right with blanks.

As TRANSFER simple names enter the system, they are converted to an internal format that is used by the system software to resolve these names and manage the objects they represent.

Examples of TRANSFER simple names are:

BROWN

BROWN_JOE

BROWN-JOE

The underscore or hyphen character can be used; the two characters, however, are not treated as equivalent. The underscore might be preferable when names contain hyphens. The character selected should be used consistently.

MYPROC-2

123-5

CORRESPONDENT NAMES

A process makes a correspondent known to the system by supplying the name of the correspondent in a CREATE-DEPOT UOW to the TRANSFER interactive server, TISERV. This action is known as registration. A correspondent is registered at the node where the TISERV that services the registration request is running.

Once a correspondent is registered, any process can send a package to or act on behalf of that correspondent by supplying the correspondent name with the request for the desired task.

You can reference a correspondent anywhere in your program by entering the correspondent name in the following format:

```
correspondent-name [ @ [ node ] ]
```

where

correspondent-name

is a simple name that identifies the correspondent. A suggested format for naming correspondents is:

lastname-firstname-middleinitial

⟶

@

indicates that correspondent-name is a fully qualified name. JOE @, for example, is recognized immediately as representing the correspondent named JOE at the local node.

Embedded blanks are allowed between correspondent-name and @.

If @ is omitted, TRANSFER must use a search list and scan internal directories to fully resolve the correspondent name. A standard search list is built for each depot when the depot is created.

node

is the name of the network node where the correspondent is registered. Only alphanumeric characters can be used in the node name. You must omit the backslash (\) with which the name begins in GUARDIAN/EXPAND format. The node identified as \NY, for example, would be referenced as simply NY in your application program.

Embedded blanks are allowed between @ and node.

If node is omitted, TRANSFER assumes the local node.

When a process refers to a correspondent who is registered at the same node as the node at which the process is running, the node specification can be omitted. A process running on the system named \TM, for example, could address a correspondent named Parker-Jonathan @ TM simply by referencing Parker-Jonathan in the appropriate UOW.

Examples of correspondent names are:

BRADLEY-ANNE	a person at the local node
CAMERON-ROBERT @	a person at the local node with the name fully qualified
PROCESS-A @ TM	a process at node \TM
INVENTORY @ CORPR	an application at node \CORPR
SALES-MGR @ CORPR	a person at node \CORPR

A process can address by name any correspondent in the network. A process, however, is subject to the following restrictions:

- A process can read or update only those profile records associated with the correspondent that the process presently represents.

- A process can create distribution lists or folders only for the correspondent that the process presently represents.

- A process can handle profile records for other correspondents at a node only if the process represents a correspondent with system administrator capability at that same node.

A process that adds recipients to a package or distribution list uses an extended form of correspondent name called a recipient name.

The recipient name can include a suffix enclosed in parentheses. TRANSFER carries the suffix within packages for use by agents or other subsystems in your application. The primary purpose of the suffix is to pass additional addressing information between Tandem networks and other networks.

The suffix is not considered part of the correspondent name and is not used in name resolution. The suffix does, however, determine whether a name is a duplicate; two names that differ only in their suffixes refer to the same depot, but are carried in packages as distinct names. If a package is addressed to GREEN (6634) and GREEN (6635), for example, both names are carried in the recipient list but the package is delivered only once; the package is delivered to the INBOX at the GREEN depot. Calls to agents at that depot, however, would take place once for each suffix.

A process supplies a recipient name in a 120-byte field. Leading blanks are permitted within this field. Characters in a name or suffix cannot extend beyond the 119th byte; the 120th byte must contain a null character (binary zero) or a blank. With the exception of the field length and suffix, the rules for recipient names are the same as those for other types of names.

Commas, single or double quotation marks, and nested parentheses are not allowed within the bounding parentheses of the suffix. The suffix can be separated from the correspondent name by one or more blanks. A character string must not follow the suffix.

TRANSFER stores a name containing a suffix as follows:

- converts all lowercase letters to uppercase

- removes all blanks immediately following the left parenthesis and immediately preceding the right parenthesis

- converts all other occurrences of multiple blanks into a single blank.

For example:

```
     GREEN (   a   suffix  )   is stored as  GREEN (A SUFFIX)
```

Examples of recipient names are:

```
  CONNERS-ADAM (ADMIN)

  OTHER-MAIL @ CORPR (FINANCE)

  OTHER-MAIL @ CORPR (ACC-RECEIVABLE)
```

FOLDER NAMES

In addition to the special folders INBOX, OUTBOX, and WASTEBASKET maintained by TRANSFER, a process can define other folders for a depot. Folders can be used only by the depot owner. A process can do the following for the correspondent that the process represents:

- create or delete folders at the depot
- save items and packages in folders at the depot
- establish ordering criteria for folders so items and packages can be stored and retrieved in a specific sequence
- remove items and packages from folders at the depot
- request a list of folders belonging to the depot
- examine the contents of folders belonging to the depot.

Only a correspondent with system administrator capability at a node can create folders, delete folders, or obtain a list of folders that belong to another correspondent at that same node.

A process can reference an existing folder by entering the folder name in the following format.

```
[correspondent-name.]folder-name [ @ [ node ] ]
```

where

correspondent-name

is a simple name that identifies the correspondent. If the correspondent name is omitted, TRANSFER searches for the folder at the depot of the correspondent that the process is representing.

folder-name

is a simple name that identifies the folder.

You cannot assign a folder the same name as a distribution list belonging to the same depot because folders and distribution list names are entered in the same format.

@

indicates that correspondent-name.folder-name is a fully qualified name and requires no resolution by TRANSFER.

If @ is specified, the correspondent name is required and must be included. If @ is omitted, TRANSFER is required to fully resolve the name.

node

is the name of the network node where the correspondent is registered. Only alphanumeric characters can be used in the node name. You must omit the backslash (\) with which the name begins in GUARDIAN/EXPAND format.

Embedded blanks are allowed between @ and node.

If node is omitted, TRANSFER assumes the local node.

Examples of folder names are:

LETTERS	a folder with the name LETTERS in the depot of the correspondent

WINKLER-FRANCIS-D.REPLIES @	a folder named REPLIES in the depot belonging to Francis D Winkler; a fully qualified folder name
TRACY-BILL.NEWSLETTER @ TSY	a folder named NEWSLETTER in the depot belonging to Bill Tracy at the node named \TSY; a fully qualified folder name.

DISTRIBUTION LIST NAMES

A process can define distribution lists for the correspondent that the process presently represents, and can add and delete members from those lists. A process representing a correspondent with system administrator capability can perform these operations with any lists at any depot at that correspondent's node.

A correspondent registered at a node can reference and display the contents of any distribution list at that same node. A system administrator registered at a node can create, read, alter, or delete any distribution list at that same node.

You can reference an existing distribution list in your program by entering the distribution list name in the following format:

```
[correspondent-name.]distribution-list-name  [ @ [ node ] ]
```

where

correspondent-name

is a simple name that identifies the correspondent who owns the list.

If the correspondent name is omitted, TRANSFER assumes the name of the correspondent currently represented by your process.

distribution-list-name

is a simple name that identifies the list.

You cannot assign a distribution list the same name as a folder belonging to the same depot because folders and distribution list names are entered in the same format.

⟶

@

indicates that correspondent-name.distribution-list-name is a fully qualified name that requires no resolution by TRANSFER.

If @ is specified, the correspondent name is required and must be included. If @ is omitted, TRANSFER is required to fully resolve the name.

node

is the name of the network node where the list is defined. Only alphanumeric characters can be used in the node name. You must omit the backslash (\) with which the name begins in GUARDIAN/EXPAND format.

Embedded blanks are allowed between @ and node.

If node is omitted, TRANSFER assumes the local node.

Examples of distribution list names are:

MY-LIST	a list with the simple name MY-LIST
SMITH-BOB.SALES	a list containing the correspondent names of all local salespeople originated by a correspondent identified as SMITH-BOB
JAMES-DON.SALES @ NY	a list containing the correspondent names of all salespeople working in the New York office
RAND-MARY.SALES @ CHI	a list containing the correspondent names of all salespeople working in the Chicago office

JAMES-DON.SALES @ CHI a list containing the following distribution list names:

SALES-MANAGER @ NY
JAMES-DON.SALES @ NY
RAND-MARY.SALES @ CHI

The first name is the name of an individual correspondent. The last two names are names of distribution lists, illustrating the concept of nested lists. All names are fully qualified.

Any correspondent who knows the name of a list can use that list. Notice that the members of a list need not all be located at the same node. If a list contains the names of other lists, as in the previous example, those lists need not have been created by the same correspondent.

You can use a distribution list to associate a function with a person. For example, you could establish a distribution list named LIST.MANAGER-ACCOUNTING that had exactly one member named SMITH-BOB. In this case, MANAGER-ACCOUNTING would be easier for people to remember if they knew the function, but had little or no contact with Bob Smith.

WILDCARD NAMES AND PATTERNS

In any context except the initial definition of a name, a process can place an asterisk anywhere in a simple name to indicate that any character or characters can appear. The simple name can be a correspondent name, distribution list name, or folder name as long as the abbreviated name identifies only one correspondent, distribution list, or folder. This capability is known as using wildcard characters in TRANSFER names. For example, *-Robert identifies a correspondent whose first name is Robert.

If you place an asterisk at the end of a name, the process needs to supply only enough characters to uniquely identify the name. If Benson-Jill and Benson-Jonathan are both defined, Benson-Ji* is sufficient to identify Benson-Jill unless another name also begins with Benson-Ji.

You cannot use the asterisk if the resulting expression identifies more than one name at the node; the name specified must be unique. If, for example, two correspondents are defined at the node with the last name Smith, the entry Smith-* is ambiguous and results in a resolution error.

Using an asterisk as the first part of a name results in significant performance penalties. For example, resolving the name *-MARY is more costly than resolving the name SMITH-*.

A process can request a list of correspondent names, distribution list names, or folder names by entering a pattern for the listing. A pattern is similar to a wildcard name; asterisks are used to indicate that any character or characters (zero or more) can appear in that position of the name. A pattern, however, does not have to identify a unique name.

A process requesting a list of all correspondents at the node named CHIC with the last name of Jones can use the pattern

```
JONES-* @ CHIC
```

NODE DESIGNATION

If a correspondent at a node references a TRANSFER name defined at that same node, the correspondent need not enter the node designator. Specific ramifications of this rule are as follows:

- A new correspondent must be registered at the same node as the correspondent who requests the registration; therefore, a process can omit the node designation from the new correspondent name in the CREATE-DEPOT UOW. For example, LOUIS-JAMES @ TS can register BAKER-JON @ TS simply as BAKER-JON.

- A correspondent must initiate a session at the node where that correspondent name is registered; therefore, a process can omit the node designation from the correspondent name in any request to establish a session.

- During package delivery, TRANSFER processes at each recipient node resolve names and expand distribution lists that were defined at that node; therefore, a user process adding a name to a distribution list can omit the node designation if the name is defined at the same node as the distribution list. Note, however, that the user process must include the node designation if the name is defined at a different node.

NAME LENGTH RESTRICTION

TRANSFER converts the external format of object names into an internal format to resolve the names and manage the objects that they represent. The internal format includes the name of the node where the object is defined, the name of the TRANSFER name directory that contains the definition, and all other simple names needed to uniquely identify the object. As an example, a folder identified externally as

```
   USER.FOLDER @NODE
```

would be identified internally as

```
   %\NODE.$T.CORR.USER.FOLDER
```

where $T.CORR indicates the name directory.

The internally expanded name must not exceed 79 characters.

To avoid having a simple name rejected because of a name length conflict, your application and its users should avoid excessively long names.

TRANSFER NAME DIRECTORY

The names of all correspondents, folders, and distribution lists in a TRANSFER application are defined in the TRANSFER name directory. This directory exists at each node, and identifies all named objects defined at the node. At node \NY, for example, the directory contains the names of all correspondents defined at the New York node.

The recommended name for identifying the name directory is $T.CORR, which is also the default name supplied by Tandem. This same name must be used for the name directory at each node in the network. Differing names would imply more than one directory, but a TRANSFER system cannot communicate across directories.

For application development, you can establish and use an additional TRANSFER system with a different name directory and PATHWAY control file. This additional system could run in parallel with your production TRANSFER system; its name directory would be assigned a name other than $T.CORR through the methods noted in the TRANSFER System Management and Administration Guide. Notice, however, that a TRANSFER system using one name directory name cannot send packages to, or otherwise communicate with, another TRANSFER system using a different name directory name.

NAME SEARCHING

Two levels of objects are defined in the TRANSFER name directory. Correspondents are at the higher level. Folders and distribution lists are at the lower level.

This structure means that folders and distribution lists, effectively, exist only within depots. Within a depot, names must be unique; thus, a folder and a distribution list within the same depot cannot have the same name.

During name resolution, the list of objects at the lower level is searched before the list of objects at the higher level. During this search, an object name might match entries defined at both levels in the name directory. For example, a correspondent named ANNIE can have a distribution list named JOHN while a correspondent named JOHN also exists in the system. If ANNIE sends a message to JOHN, the distribution list name will be used because it is the first exact match found.

This searching algorithm is bypassed if a name is fully qualified. An address of JOHN @SYS immediately selects the correspondent and not the distribution list. Alternatively, an address of ANNIE.JOHN @SYS selects the distribution list; an address of ANNIE.JOHN also selects the distribution list because this name is resolved only at the lower level.

The presence of the @ character specifies that a name is fully qualified; by definition, the name is unique within the system. In the previous example, no other name exists anywhere that is exactly and entirely JOHN; the name ANNIE.JOHN is a name entirely different from JOHN, and represents an entirely different object.

If a wildcard character (*) occurs in the name, TRANSFER checks to determine if the name is ambiguous. Ambiguity exists if more than one possible candidate will resolve the name during the search at a particular level. When ambiguity between names exists at different levels, the candidate at the lower level is selected. When ambiguity exists at the same level and a unique entity is required, an error occurs. Using the previous example, TRANSFER would interpret the address JO* as the distribution list JOHN, assuming no other distribution list began with the characters JO. The fact that the next entry in the search, the correspondent JOHN, also matched JO* would be irrelevant.

SECTION 4

INTERFACING WITH TRANSFER

Processes interface with TRANSFER by issuing requests to and receiving responses from the TRANSFER interactive server, TISERV.

TISERV handles requests one at a time, even when there are multiple openers, and performs the following functions:

- starts and terminates sessions

- services item and package handling requests, including those for creating, changing, and deleting items; composing, posting, and canceling packages; creating recipient lists for packages; and creating, scanning, and deleting folders

- handles administrative requests, such as those for creating and deleting depots; altering correspondent profiles and agent selection criteria for depots; and creating, altering, and deleting distribution lists.

Processes also interface with TRANSFER asynchronous requesters, TAREQs. When a package arrives at a depot, a TAREQ transmits a standard message to selected agents defined at the depot. The appropriate agents, in turn, can perform additional processing required by the application.

STARTING A TISERV PROCESS

Although most clients are written as SCREEN COBOL programs that execute within PATHWAY TCPs, clients can be written in FORTRAN, COBOL, or TAL. If you are writing a client in a language other than SCREEN COBOL, you can start a TISERV process for use by the client. You must observe the following rules.

- TISERV must run under the same GUARDIAN user ID that was used to initialize the TRANSFER data base. If your client runs under a different user ID, create a copy of the TISERV program file owned by the TRANSFER user ID with the PROGID bit set in its label.

- Before starting a TISERV process, the name server process must be running.

- Before the TISERV process can do many kinds of useful work, the TRANSFER scheduler process must be running.

- When calling the GUARDIAN procedure NEWPROCESS, you should either omit the memory pages parameter or specify a value of zero. This causes the TISERV process to be created with its default virtual memory size.

TISERV interprets the startup message as follows:

default subvolume	-	ignored
IN file name	-	ignored
OUT file name	-	used to write serious error messages; these messages usually indicate a problem in the data base or the operational environment, not in the client
parameter string	-	ignored

Table 4-1 lists the parameters that TISERV accepts at startup time; none of the parameters are required.

Table 4-1. TISERV Parameters at Startup Time

Parameter Name	Default Value	Recommended Value	Description
DEBUGLOGFORMAT	FALSE	As desired	If FALSE: the debugging log will contain binary characters suitable for writing to an entry-sequenced disc file.

Table 4-1. TISERV Parameters at Startup Time (Continued)

Parameter Name	Default Value	Recommended Value	Description
DEBUGLOGFORMAT (cont'd)			If TRUE: the debugging log will be formatted in ASCII characters suitable for writing to a terminal or printer.
DEBUGLOGLEVEL	3	As desired	If the PW-REPLY-CODE field of any response is greater than or equal to this value, the message and reply will be written to the debugging log. Specifying a value of zero causes all messages and replies to be logged.
DEBUGLOGRECSPEROPEN	20	As desired	After this many IPCs and their replies are written to the debug log, the log is closed and reopened.
HANGAROUND	FALSE	FALSE	If FALSE: TISERV stops after all requesters have closed it. If TRUE: TISERV never stops automatically.

CAUTION

When requesters and servers are both running in the PATHWAY environment, the HANGAROUND parameter for the PATHWAY server must be set to FALSE.

When a requester is running outside the PATHWAY environment and accessing a PATHWAY server, that PATHWAY server must be in its own server class so the HANGAROUND parameter can be set to TRUE; with the TRUE setting, the server remains available after it has been closed by the last opener.

Table 4-1. TISERV Parameters at Startup Time (Continued)

Parameter Name	Default Value	Recommended Value	Description
IDLESESSIONDELAY	24	24	Longest time, in hours, a session can be unused before TRANSFER automatically terminates it.
IOTIMEOUT	20	20	Longest time, in seconds, to wait for TRANSFER data base I/O requests that are blocked due to other transactions.
ITEMIDCACHE	20	20	Number of ITEM IDs TISERV allocates at one time.
MAXLINKS	8	1	Number of simultaneous openers TISERV can support.
MAXREPLY	3000	As needed	Size of largest reply TISERV can generate.
MAXREQUEST	2400	As needed	Size of largest request TISERV can accept.
NAMESPACE	$T.CORR	As needed	Name of correspondent directory; value must be the same as was specified when TRANSFER was initialized.

TISERV accepts the DEBUGLOG parameter on the ASSIGN command at initialization time. The parameter has no default value. This parameter specifies the file to which a debugging log is written. The log contains a copy of some or all of the messages received and replied to by TISERV. The filename supplied via ASSIGN DEBUGLOG must be fully qualified; the system does not supply default values.

If this parameter is omitted, no debugging log is written.

If this parameter refers to a disc file that does not exist, an entry-sequenced file will be created.

This parameter cannot refer to an EDIT file.

If the HANGAROUND parameter is FALSE, TISERV terminates normally after it is closed by all processes that opened it.

If TISERV encounters a fatal error, it attempts to write one or more messages to the OUT file (or the home terminal if the OUT file cannot be opened), and then ABENDs.

TISERV INTERFACE

Processes interface with TISERV through units-of-work (UOWs) issued within requests to TISERV. The format of requests issued by your program is the same, whether the request is issued by a SEND statement or by a WRITEREAD call. The data buffer for each request consists of the following:

- A request header that denotes the session on whose behalf the request is being made and that provides space for reply and return codes.

- One or more UOWs, each of which specifies a code for an operation plus any necessary parameters. For example, the operation ADD-RECIP would include the name of the recipient to be added.

The TISERV reply, which is written in the same format as the request to which it responds, consists of the following:

- A reply header, with reply and return codes supplied by TISERV.

- One or more response UOWs that return requested data to the correspondent. For example, the response to a CREATE-ITEM UOW request would include the item ID for the new item.

For each UOW in the request there is a corresponding response UOW in the overall reply. TISERV processes UOWs in the order in which they appear in the request. Thus, the response UOWs are returned in the same order as the corresponding UOWs in the request as illustrated in Figure 4-1.

For certain errors, however, no response UOWs are included. The number of UOWs in the reply is indicated by a field in the reply header.

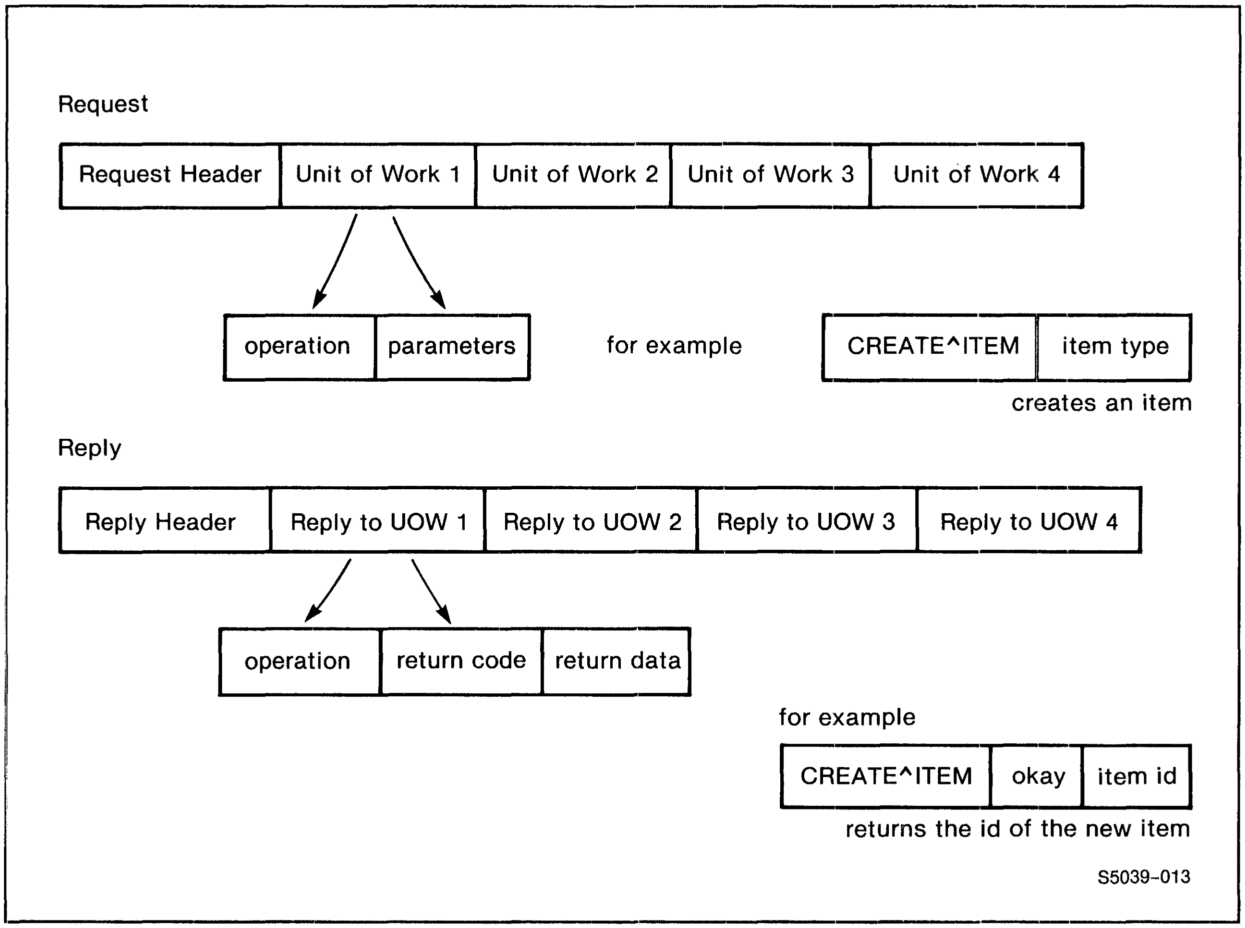


Figure 4-1. TRANSFER Requests and Replies

Each UOW has a standard header that identifies the operation requested. Each response UOW has a return code that identifies the action taken in response to the corresponding request UOW.

A single SEND statement or WRITEREAD call can request multiple services as long as all of those services are for the same session. There is only one request header to identify the session. Refer to Section 6 for guidelines on the number of UOWs to include in an IPC and the number of IPCs to include in a TMF transaction.

Complete Data Definition Language (DDL) definitions of fields and structures used in TRANSFER interprocess messages are supplied as part of the standard software. Examples of their use appear in Sections 7 and 8.

Request and Reply Headers

The format for request and reply headers is the same for all requests and replies. Within an application program, these headers are defined together as the interprocess communication (IPC) header. Your application must establish values for the IPC header fields that are transmitted in the request.

The format of the IPC header is shown by the following DDL definition:

```
DEF ipc-hdr.
  02  request-code              TYPE BINARY 16.
      88 stop-on-warning        VALUE -1.
      88 stop-on-err            VALUE -2.
      88 do-all-uows            VALUE -3.
  02  pw-reply-code             TYPE BINARY 16
                                  REDEFINES REQUEST-CODE.
      88 all-uows-ok            VALUE 0.
      88 uows-with-warning      VALUE 1.
      88 uows-with-err          VALUE 2.
      88 rqst-err               VALUE 3.
  02  filler                    PIC X.
  02  version-code.
    03  letter                  PIC A.
    03  rev-number              PIC 99.
  02  ipc-retn-code             TYPE BINARY 16 VALUE 0.
      88 ipc-ok                 VALUE 0.
      88 invalid-version-code   VALUE 1.
      88 invalid-session-id     VALUE 2.
      88 service-denied         VALUE 3.
      88 invalid-uow-header     VALUE 4.
      88 rqst-too-long          VALUE 5.
      88 reply-too-long         VALUE 6.
      88 rqst-too-short         VALUE 7.
      88 invalid-request-code   VALUE 8.
      88 e-bad-transaction      VALUE 4010.
      88 e-err-profile-file     VALUE 4902.
      88 e-err-session-file     VALUE 4904.
      88 e-err-itemdesc-file    VALUE 4906.
      88 e-err-itemdata-file    VALUE 4908.
      88 e-err-recip-file       VALUE 4910.
      88 e-err-folder-file      VALUE 4912.
      88 e-err-dlist-file       VALUE 4914.
      88 e-err-ready-file       VALUE 4916.
      88 e-err-time-file        VALUE 4918.
      88 e-err-net-file         VALUE 4920.
      88 e-err-inv-folder-file  VALUE 4922.
      88 e-err-queue-file       VALUE 4924.
      88 e-io-timeout           VALUE 4990.
```

→

```
      88 e-waitmanager-unavail  VALUE 6006
   02 ipc-retn-code-detail      TYPE BINARY 16 VALUE 0.
   02 session-id.
     03 dummy                   PIC X(18).
   02 uows-to-process           TYPE BINARY 16 UNSIGNED.
   02 uows-returned             TYPE BINARY 16 UNSIGNED
                                  VALUE 0.
   02 log-this-ipc              TYPE BOOLEAN.
   02 filler                    PIC X.
 END.
```

Individual fields in the IPC header can contain the following information:

- REQUEST-CODE

  In a request to TRANSFER, your application sets this field to indicate request processing conditions. In the request, this field always contains a value less than zero, as follows:

  STOP-ON-WARNING (-1) stops the processing if a UOW warning indication is encountered. Warnings imply successful completion of the UOW in which they occur.

  STOP-ON-ERR (-2) stops the processing if a UOW error occurs. Errors imply that the UOW was not processed successfully.

  DO-ALL-UOWS (-3) requests processing of all UOWs in the request. Processing halts only if a request error, as defined by the RQST-ERR value, or a system error external to TRANSFER occurs.

- PW-REPLY-CODE

  In a reply from TRANSFER, the REQUEST-CODE field is redefined as the PW-REPLY-CODE field. This field contains a value that indicates request processing results. In the reply, this field always contains a value of zero or greater, as follows:

  ALL-UOWS-OK (0) indicates that all UOWs in the request were processed successfully.

  UOWS-WITH-WARNING (1) indicates that TRANSFER encountered warning indications in one or more UOWs. If STOP-ON-WARNING was not specified in the REQUEST-CODE field, all UOWs in the request have a corresponding response UOW in the reply. If STOP-ON-WARNING was specified, only those UOWs preceding and including the first with a warning indication have corresponding response UOWs.

UOWS-WITH-ERR (2) indicates that TRANSFER detected errors in one or more UOWs. If neither STOP-ON-ERR nor STOP-ON-WARNING was specified in the REQUEST-CODE field, all UOWs in the request have a corresponding response UOW. If STOP-ON-ERR or STOP-ON-WARNING was specified, only those UOWs preceding and including the first with an error have corresponding response UOWs. If STOP-ON-ERR is specified in the request, the UOWs preceding the first with an error might return warning indications.

RQST-ERR (3) indicates that a request error occurred. This type of error typically indicates that something was wrong with the data in the IPC header and that the error is not specific to any particular UOW. In certain cases, the error might involve an individual UOW--for example, one with an invalid UOW header. When this error occurs, the number of response UOWs might be less than the number of UOWs in the request. For further information, your application should examine the IPC-RETN-CODE field.

CAUTION

If your application receives a value of 2 or 3 in this field, the transaction should be aborted, causing transaction backout. If the transaction is not backed out, consistency in the TRANSFER data base cannot be guaranteed.

- VERSION-CODE

In both a request to and a reply from TRANSFER, this field designates the version code for the IPC structure used. The version code is defined by Tandem and consists of a letter followed by a two-digit revision number.

The first release of TRANSFER was version code A01; new features were introduced in versions A02 and B00. If you use these new features, your application cannot run with previous versions of TRANSFER. You should set the version code in your IPC headers to the newest version of TRANSFER from which you used new features. TRANSFER will then return an INVALID-VERSION-CODE error in the IPC-RETN-CODE if you attempt to use your application with a version of TRANSFER that does not support all the new features you use.

IPCs established under the current version of TRANSFER will also be supported by subsequent versions of this product. You would not need to alter the IPCs used by your client when running under new versions of TRANSFER.

- IPC-RETN-CODE

  In a request to TRANSFER, this field is ignored. In a reply from TRANSFER, one of the following values appears:

  IPC-OK (0) indicates that TRANSFER detected no errors in the IPC header. Warning indications or errors, however, might have been present in the individual UOWs in the request.

  INVALID-VERSION-CODE (1) indicates that the request contained an IPC version code that could not be recognized by TRANSFER.

  INVALID-SESSION-ID (2) indicates that the request contained a session ID that could not be recognized by TRANSFER. For example, the IPC might have referenced a session that no longer exists.

  SERVICE-DENIED (3) is reserved for use by Tandem.

  INVALID-UOW-HDR (4) indicates that an invalid UOW header appeared in your request. This could occur if the previous UOW specified the wrong size or if you omitted the value UW from the UOW header.

  RQST-TOO-LONG (5) indicates that the request was too long; that is, the request contained more UOWs than the number specified in the UOWS-TO-PROCESS field, or contained more data than the TRANSFER buffer allowed.

  REPLY-TOO-LONG (6) indicates that the reply was too long; the buffer space allotted for the reply was insufficient.

  RQST-TOO-SHORT (7) indicates that the request was too short; that is, the request contained fewer UOWs than the number specified in the UOWS-TO-PROCESS field, or fewer bytes were sent than were expected.

  INVALID-REQUEST-CODE (8) indicates that the REQUEST-CODE field contained an invalid entry.

  E-BAD-TRANSACTION (4010) indicates that the request did not have a TMF transaction and attempted to perform an operation that required one, or that the transaction associated with the request is unusable, probably due to the failure of some component of the system or network. IPC-RETN-CODE-DETAIL contains the actual GUARDIAN file error code.

E-ERR-PROFILE-FILE (4902) through E-ERR-INV-FOLDER-FILE (4922) indicate that an unexpected GUARDIAN file error occurred on one of the TRANSFER data base files. IPC-RETN-CODE-DETAIL contains the actual GUARDIAN file error code. If you receive one of these errors and the request was issued under a TMF transaction, you must abort the TMF transaction.

E-ERR-QUEUE-FILE (4924) indicates an error occurred on the Queue file. IPC-RETN-CODE-DETAIL contains the file code of the file on which the error occurred. If you receive this error and the request was issued under a TMF transaction, you must abort the TMF transaction; you should then retry the request under a new transaction.

E-IO-TIMEOUT (4990) indicates that a timeout occurred on I/O to the TRANSFER data base. This usually indicates a deadlock with another process. IPC-RETN-CODE-DETAIL contains the file code of the TRANSFER file on which the error occurred. If you receive this error and the request was issued under a TMF transaction, you must abort the TMF transaction; you should then retry the request under a new transaction.

E-WAITMANAGER-UNAVAIL (6006) indicates an error occurred when the Entry Manager was communicating with the Wait Manager.

- IPC-RETN-CODE-DETAIL

  In a request to TRANSFER, this field is ignored. In a reply from TRANSFER, the meaning of this field depends on the value of IPC-RETN-CODE.

- SESSION-ID

  In a request to TRANSFER, this field identifies the session of the correspondent on whose behalf the request is issued. In a reply from TRANSFER, this field shows the session ID that TRANSFER has assigned to the current session. When your application requests session initiation, this field must be set to binary zeros in the request; in subsequent requests, you must move the session ID returned by TRANSFER to this field.

- UOWS-TO-PROCESS

  In a request, this field indicates the number of UOWs transmitted with the request. In a reply, TRANSFER echoes the value in the request.

- UOWS-RETURNED

  In a request, this field is ignored. In a reply, TRANSFER indicates the number of response UOWs returned to your application.

- LOG-THIS-IPC

  In a request, this field specifies whether the request and its reply are logged (Y) or not logged (N). If the field is set to N, the depot criteria or the TRANSFER software might override your request and log the IPC in some cases.

UOW Operations

Processes communicate with TISERV by issuing requests that contain UOWs. UOWs are organized into the following functional areas:

- session control
- item handling (including whole item, record handling, and item tree operations)
- package handling (including submittal preparation, recipient list definition, package delivery, and package receipt)
- folder manipulation
- TRANSFER configuration inquiry
- administration (including session, depot, distribution list, and name management)

This section presents DDL definitions that are common to various functional areas; for example, the discussion of record handling functions includes the DDL definitions for significant fields shared among the UOWs that are common to that area.

For programs that are written in languages other than COBOL and SCREEN COBOL, fields defined as PIC 9(4) COMP are limited to values in the range of 0 through 9999. In TAL, for example, this field would have a type of INT, but entering a value outside the range would return an error.

Two DDL definitions are shared among several functional areas: BOOLEAN and UPDATE-CONTROL.

- BOOLEAN - This definition is used to assign a data type of BOOLEAN to fields containing data that is either logically true (yes, represented by Y or y) or false (no, represented by N or n).

  The DDL definition for BOOLEAN is:

  ```
  DEF boolean        PIC A.
  ```

  When UOWs have OPTIONS fields defined as BOOLEAN, the BOOLEAN fields are checked for validity before any other fields in the UOW. Input UOW fields are not necessarily checked sequentially for validity. For example: if invalid values were entered in both the ORDERING-DISCIPLINE and ALLOW-DUPLICATES fields in the CREATE-FOLDER-B00 UOW, the error 4051 (E-MUST-BE-YN) for the ALLOW-DUPLICATES would be returned.

- UPDATE-CONTROL - This definition applies to a field used in UOWs that update records maintained under TRANSFER, such as those records comprising item descriptions. This definition is used to ensure that updating is accomplished in an orderly way.

  The DDL definition for UPDATE-CONTROL is:

  ```
  DEF update-control  PIC S9(4) COMP.
  ```

  When your process gains access to a record prior to updating it, you need some guarantee that another process will not modify that record before your process completes its own updating operations. To serve multiple users, TRANSFER cannot keep a record locked to prevent a multiple update; instead, TRANSFER must release the record locks as soon as it returns the record to your process. To resolve this conflict between its own needs and those of your process, TRANSFER uses the UPDATE-CONTROL field as follows.

  1. Each time TISERV completes a record update, it increments the value of an update control count in that record.

  2. When your process requests access to a record, TISERV returns the current update control count in the response UOW.

  3. When your process modifies a record and subsequently requests update to that record, TISERV checks the value in the UPDATE-CONTROL field against the current update control count of the record. If these two values match, the update is allowed to proceed. If the values do not match, this indicates that another update took place while your process was accessing the record, and TISERV returns an error indication to your process; your process should retry the access and update operations in this case.

SESSION CONTROL. Before a process can transmit requests, the process must establish communication with TISERV by initiating a session with the START-SESSION UOW. When interaction with TISERV is no longer required, the process terminates this communication by issuing an END-SESSION UOW.

These UOWs involve three fields of particular significance: SESSION-ID, CORR-NAME, and PASSWORD.

- SESSION-ID - When you issue the START-SESSION UOW, set the SESSION-ID field in the IPC header to binary zero; when TISERV responds with the response UOW, it returns in this field a session ID that uniquely identifies your session at the node. This session ID must appear in the IPC header of every subsequent request that the process makes for this session. When the process ends the session, it relinquishes the session ID.

  The DDL definition for SESSION-ID is:

  ```
  DEF session-id.
    02  dummy              PIC X(18).
  END.
  ```

  SESSION-ID will contain unprintable characters. Any attempt to display the session ID will have unpredictable results.

- CORR-NAME - The CORR-NAME field identifies the name of the correspondent that the process represents. The field contains either a fully qualified or partially qualified correspondent name.

  The DDL definition for CORR-NAME is:

  ```
  DEF corr-name    PIC X(80).
  ```

- PASSWORD - The PASSWORD field contains the password that the correspondent must supply in order to initiate a session.

  The DDL definition for PASSWORD is:

  ```
  DEF password     PIC X(16).
  ```

ITEM HANDLING. Item handling involves three general types of operations:

defining individual items (whole item operations)

appending records to and deleting records from items (record handling operations) attaching and detaching items as components of other items (item tree operations).

Whole Item Operations. Each item is made up of an item descriptor and one or more data records. These data records can contain text or other kinds of application data.

The item descriptor contains:

- a network-unique ID of the item
- a count of the number of component items pointed to by the first item; if the number is zero, a list of component items does not exist
- a list of item IDs for the component items
- various fields indicating the current status of the given item
- the current update control count for the item, the creation date, and the name of the correspondent who created the item
- an item type, which is a numeric value defined by the application; the item type should not be confused with the record type, as used in record handling operations.

If the item is a package, the item descriptor also contains:

- the date that the package was submitted for delivery
- the earliest and latest delivery dates that define the delivery window
- the optional expiration date for the package
- the package priority and delivery control information.

A complete listing of all information in the item descriptor appears in the discussion of the GET-ITEM-DESCR UOW in Section 5.

A process creates an item by issuing a CREATE-ITEM UOW. In response, TISERV assigns the item ID and records the creation date and the correspondent name, item type, and other information related specifically to this item in the item descriptor.

A process accesses all information in the item descriptor by issuing a GET-ITEM-DESCR UOW. A process can make a duplicate copy of the item, with its own unique item ID, by issuing a COPY-ITEM UOW. You might want to do this to add records to an item where the original item is unalterable.

The item ID and item type are passed to and from TISERV in the ITEM-ID and ITEM-TYPE fields.

- ITEM-ID - The ITEM-ID field identifies an item.

  The DDL definition for ITEM-ID is:

  ```
  DEF item-id.
    02  dummy              PIC X(12).
  END.
  ```

  ITEM-ID will contain unprintable characters. Any attempt to display the item ID will have unpredictable results.

- ITEM-TYPE - The ITEM-TYPE field categorizes an item.

  The DDL definition for ITEM-TYPE is:

  ```
  DEF item-type            PIC 9(4) COMP.
  ```

  ITEM-TYPE is a field that can be used by the application to categorize items by type. This field can have a value from 1000 through 9999. The values 100 through 999 are assigned for use by Tandem. Refer to Appendix B for additional information.

Record Handling Operations. A process can perform the following record handling operations:

define and add records of various types to an item (ADD-ITEM-REC UOW)

access existing records in an item (GET-ITEM-REC UOW)

delete records (DELETE-ITEM-REC UOW).

In these UOWs, the ITEM-KEY field is vitally significant. When a process accesses records in sequence, the ITEM-KEY field determines the starting point for retrieval.

- ITEM-KEY - The ITEM-KEY field identifies the item to which the record belongs or will belong, and the specific record itself.

The DDL definition for ITEM-KEY is:

```
DEF item-key.
  02  item-id.
    03  dummy           PIC X(12).
  02  rec-type          PIC 9(4) COMP.
  02  rec-seq-num       PIC 9(4) COMP.
END.
```

ITEM-ID - The ITEM-ID field specifies the item to be accessed.

REC-TYPE - The REC-TYPE field describes what kind of record is being accessed; this allows you to access records by category. This field can have a value from 0 through 9999.

The values 100 through 999 are assigned for use by Tandem application packages, such as T/MAIL. You can use these values in the REC-TYPE field, but they should have the same meaning for your application as they do for such software. These record types include subject text, forward and response text, and unformatted ASCII text; refer to Appendix B for values used in the REC-TYPE field. An item can contain records of many different types and multiple records of the same type.

REC-SEQ-NUM - The REC-SEQ-NUM field indicates the specific record to be accessed. The field provides unique key values for multiple records having the same item ID and record type.

Item Tree Operations. A process can attach one item to another in a parent-component relationship. In fact, a process can arrange for a component item to have components, each of which in turn can have components; this allows an entire tree of items to be created. The number of levels of nesting, however, can affect the performance of your application.

A process can perform the following item tree operations:

- attach one item to another (ATTACH-COMPNT-A01 UOW)

- obtain the item IDs of component items belonging to a parent (GET-ITEM-COMPNT-A01 UOW)

- detach a component from a parent (DETACH-COMPNT UOW).

The ATTACH-COMPNT-A01 UOW includes a COMPNT-TYPE field that is returned with the component by the GET-ITEM-COMPNT-A01 UOW.

- COMPNT-TYPE - The COMPNT-TYPE field is a numeric value that TRANSFER saves with a component but does not interpret.

  The DDL definition for COMPNT-TYPE is:

  ```
  DEF compnt-type         PIC 9(4) COMP.
  ```

  The COMPNT-TYPE field can be used by the application as a code to indicate why the component was attached. The field can have a value from 0 through 9999; values 100 through 999 are reserved for Tandem. Refer to Appendix B for additional information.

PACKAGE HANDLING. Package handling involves the following activities:

submittal preparation

recipient list definition

package delivery

package receiving operations

Submittal Preparation. Before items can be delivered from one correspondent to another, they must be assembled as packages. Each package includes a package header item, which consists of zero or more records or components items, and a list of recipients.

The package header is a special kind of item, designated by the IS-PKG-HDR field of a CREATE-ITEM UOW. The item descriptor of a package header item indicates who is sending the package, who is receiving the package, and when the package was posted. Since a package can only be altered or submitted by its creator, the sender of a package is always the creator.

The package header can contain text records and item IDs of components. If the components list includes another package header item, the result is a package nested in another package.

The item descriptor of a package header also contains the following information that your application can supply: timestamps, priority, agent selector, and certification.

The simplest package is a package header with no components. A package header item, like any other item, can contain data records. For example, the package header might include a data record that contains a package sequence number.

A process builds a package by creating the package header item and making separate requests to add recipients, component items, and delivery parameters.

A process can perform the following operations:

- access information in the item descriptor (GET-ITEM-DESCR UOW)

- update fields in the item descriptor (ALTER-ITEM-DESCR UOW).

Four fields of principal interest are: AGENT-SELECTOR, APPLIC-ID, PRIORITY, and DATE-TIME.

- AGENT-SELECTOR and APPLIC-ID - The AGENT-SELECTOR and APPLIC-ID fields are used as a basis for agent selection, and their contents and meaning are defined by your application. After delivering a package, TRANSFER examines these two fields to determine what agent to invoke. An agent, in fact, can be configured to react to several AGENT-SELECTOR and APPLIC-ID values.

  The definitions for AGENT-SELECTOR and APPLIC-ID are:

  ```
  DEF  agent-selector  PIC 9(4) COMP.
  DEF  applic-id       PIC 9(4) COMP.
  ```

  The following APPLIC-ID values are reserved for Tandem use:

100-499	Tandem clients; ID 100 indicates a TAREQ, and ID 111 is T/Mail.
500-999	Tandem agents; ID 500 is the VACATION agent.

- PRIORITY - The PRIORITY field determines the priority at which the package will be sent, allowing you to classify a package according to its urgency. The field contains an unsigned value ranging from 0 (lowest priority) through 199 (highest priority). Packages are sent in decreasing order of numeric priority; when two or more packages are assigned the same numeric priority, the packages are sent in order of submittal date.

  Priority overrules submission time in determining when a package is sent; a high-priority package goes before a package of low priority, even if the low-priority package was submitted earlier. Assigning a high priority to new packages might prevent older packages from being delivered within the requested timeframe.

  The DDL definition for PRIORITY is:

  ```
  DEF  priority          PIC 9(3) COMP.
  ```

- DATE-TIME - The DATE-TIME field governs the format of various dates and times that appear in the package header item.

  The DDL definition for DATE-TIME is:

  ```
  DEF  date-time.
    02  year            PIC 9(4).
    02  month           PIC 9(2).
    02  day-of-month    PIC 9(2).
    02  hour            PIC 9(2).
    02  minute          PIC 9(2).
    02  second          PIC 9(2).
  END.
  ```

  The DATE-TIME field can have values in the following ranges:

YEAR	1975 through 2099
MONTH	1 through 12
DAY-OF-MONTH	1 through 31
HOUR	0 through 23
MINUTE and SECOND	0 through 59

  In a reply, TRANSFER returns a DATE-TIME of all zeros for a time that has not been established; for example, the submission time of a package that has not been submitted.

<u>Recipient List Definition.</u> The recipient list contains the names of correspondents and distribution lists that are to receive the package. A process can perform the following operations for these lists:

- add names to a recipient list (ADD-RECIP UOW)

- obtain the names of currently defined recipients (GET-RECIP-REC UOW)

- delete recipients from a distribution list (DELETE-RECIP UOW).

The ADD-RECIP and DELETE-RECIP UOWs both transmit the RECIP-NAME field and the contents of the RECIP-TYPE field. The GET-RECIP-REC UOW transmits a RECIP-KEY field.

- RECIP-NAME - The RECIP-NAME field identifies the recipient to be added or deleted. Names of correspondents in this field can include suffixes. The resolution of names and the expansion of distribution lists appearing in this field are described under the ADD-RECIP UOW in Section 5.

  The DDL definition for RECIP-NAME is:

  ```
  DEF  recip-name         PIC X(120).
  ```

- RECIP-TYPE - THE RECIP-TYPE field is used to categorize various kinds of recipients. This field, essentially, explains why a recipient is receiving the package.

  The DDL definition for RECIP-TYPE is:

  ```
  DEF  recip-type         PIC 9(4) COMP.
  ```

  The RECIP-TYPE field can have a value from 0 through 9999. Values 100 through 999, however, are assigned for use by Tandem and might assume particular meanings when interfacing with software, such as T/MAIL, that is supplied by Tandem.

- RECIP-KEY - The RECIP-KEY field is used as a key in selecting the recipient names returned by the GET-RECIP-REC UOW. The field references both the package item and the name of one of the recipients.

  The DDL definition for RECIP-KEY is:

  ```
  DEF  recip-key.
    02  item-id.
      03  dummy           PIC X(12).
    02  recip-name        PIX X(120).
  END.
  ```

Package Delivery. A process posts a package for delivery by issuing a SUBMIT-PKG UOW. A process cancels the delivery of a package by issuing a CANCEL-PKG UOW.

Package Receiving. A process acknowledges receipt of a package by issuing an ACK-RECEIPT UOW. This operation is recommended whenever a client retrieves a package from the INBOX folder.

FOLDER MANIPULATION. Folder manipulation involves the following operations:

- save items in folders according to the ordering criteria established for the folder (SAVE-ITEM, SAVE-ITEM-B00, and SAVE-ITEM-BY-KEY UOWs)

- modify the ordering criteria for a folder (ALTER-FOLDER-ORDER UOW)

- scan the contents of a folder (SCAN-FOLDER, SCAN-FOLDER-B00, and SCAN-FOLDER-BY-KEY UOWs)

- remove an item from a folder (UNSAVE-ITEM UOW)

- determine the folders in which a particular item is saved (WHERE-SAVED UOW)

- determine the ordering criteria for a folder (GET-FOLDER-ORDER UOW).

A folder can contain both packages and individual items. Conversely, the same item or package can reside in more than one folder. An item cannot be stored in one folder more than once.

Folder manipulation UOWs either transmit or return the contents of the FOLDER-NAME field.

- FOLDER-NAME - The FOLDER-NAME field is the name of a folder.

  The DDL definition for FOLDER-NAME is:

  ```
  DEF  folder-name        PIC X(80).
  ```

  On input, you can use a partially qualified name, including wildcard characters. In the response, the fully qualified name is returned.

TRANSFER CONFIGURATION INQUIRY. A process obtains information from The TRANSFER name configuration directory by issuing a GET-CONFIG-NAME UOW.

ADMINISTRATION. A process requests various administrative operations, such as the management of depots, distribution lists, or TRANSFER names, by issuing administrative UOWs. Some of these UOWs can only be issued by processes representing correspondents with system administrator capability.

Many administrative UOWs include one or more fields that contain a correspondent name. These fields identify the correspondent that the calling process represents. In cases where the DDL for these fields includes a VALUE SPACES clause, only system administrators can enter correspondent names other than their own; users who are not system administrators must enter their own names or leave the field blank.

Session Management. A process can obtain the names of correspondents with currently active sessions by issuing a GET-NEXT-SESSION UOW. If you are writing your own administrative client, you can use this UOW in connection with terminating sessions, shutting down TRANSFER, and monitoring the load on the TRANSFER system. This UOW requires the system administrator capability.

Depot Management. A correspondent depot is established when that correspondent name is registered with TRANSFER. Every correspondent has precisely one depot and that depot has a network-unique identity. The depot contains profiles, folders, and distribution lists. Agents are also associated with depots.

A process creates a depot, and consequently registers a correspondent who owns that depot, by issuing a CREATE-DEPOT UOW. A process deletes a depot by issuing a DELETE-DEPOT UOW. Both of these UOWs require the system administrator capability.

Several UOWs pertain to the management of profiles. A process can do the following:

- obtain one or more data elements from a depot profile (GET-PROFILE-ELEM UOW)

- change data elements in a profile (ALTER-PROFILE-ELEM UOW)

- read user-maintained profile records (READ-PROFILE-REC UOW)

- write user-maintained profile records (WRITE-PROFILE-REC UOW)

- delete profile records (DELETE-PROFILE-REC UOW).

Two UOWs are involved in managing folders: the CREATE-FOLDER UOW that creates a folder, and the DELETE-FOLDER UOW that deletes a folder. A folder must be created before an item or package can be saved in it.

In the area of agents defined at a depot, the GET-AGENT-SELECT UOW returns to a process the current selection criteria for a particular agent. The ALTER-AGENT-SELECT UOW defines, alters, or deletes this criteria.

Distribution List Managment. Five UOWs are concerned with the management of distribution lists. A process can do the following:

- create a distribution list (CREATE-DLIST UOW)

- delete the distribution list (DELETE-DLIST UOW)

- add a new member to a distribution list (ADD-MEMBER UOW)

- delete a member (DELETE-MEMBER UOW)

- read a distribution list (READ-NEXT-MEMBER UOW).

A distribution list must be created before members can be added to it.

Name Management. The READ-NEXT-NAME UOW selectively reads the contents of the TRANSFER name directory, which defines all names known to TRANSFER. The READ-NEXT-NAME UOW can be used, for example, to read all folder names defined.

UOW Summary Table

All TISERV UOWs and the functions they perform are summarized in Table 4-2.

Table 4-2. TISERV UOW Summary

Session Control UOWs

These UOWs are concerned with the initiation and termination of sessions.

UOW	UOW Code	Operation
END-SESSION	102	End a session in progress on behalf of a correspondent.
START-SESSION	101	Begin a session on behalf of a correspondent.

Item Handling UOWs

The item handling UOWs are used for creating and manipulating items and their components.

- Whole Item UOWs

These UOWs are used for defining individual items.

UOW	UOW Code	Operation
COPY-ITEM	107	Make a duplicate copy of an item.
CREATE-ITEM	103	Create an item.
GET-ITEM-DESCR	122	Return descriptor fields for an item.

Table 4-2. TISERV UOW Summary (Continued)

- Record Handling UOWs

These UOWs are used for appending records to items or deleting them from items.

UOW	UOW Code	Operation
ADD-ITEM-REC	104	Add a data record to an item.
DELETE-ITEM-REC	105	Delete a data record from an item.
GET-ITEM-REC	125	Retrieve data records from an item.

- Item Tree UOWs

These UOWs are involved in attaching items as components to other items, and detaching these components as well.

UOW	UOW Code	Operation
ATTACH-COMPNT-A01	136	Attach one item as a component of another.
DETACH-COMPNT	113	Detach one item from another.
GET-ITEM-COMPNT-A01	137	Return a list of component items within an item to your application.

Package Handling UOWs

The UOWs that handle packages are divided into four categories: submittal preparation, recipient list definition, package delivery, and package receipt UOWs.

Table 4-2. TISERV UOW Summary (Continued)

- Submittal Preparation UOW

This UOW is concerned with operations that prepare packages for submittal (exclusive of the recipient list).

UOW	UOW Code	Operation
ALTER-ITEM-DESCR	116	Update application-controlled fields in an item descriptor.

- Recipient List Definition UOWs

These UOWs are concerned with defining and verifying recipients for packages.

UOW	UOW Code	Operation
ADD-RECIP	114	Add a new recipient to the recipient list for a package.
DELETE-RECIP	115	Delete a recipient from the recipient list for a package.
GET-RECIP-REC	126	Retrieve recipient records from a package recipient list.

- Package Delivery UOWs

These UOWs are concerned directly with the delivery of packages.

UOW	UOW Code	Operation
CANCEL-PKG	118	Cancel delivery of a package.
SUBMIT-PKG	117	Submit (post) a package for delivery.

Table 4-2. TISERV UOW Summary (Continued)

- Package Receipt UOW

  This UOW is concerned directly with the receipt of packages.

UOW	UOW Code	Operation
ACK-RECEIPT	131	Acknowledge receipt of a package.

Folder Manipulating UOWs

These UOWs are used for the maintenance of folders.

UOW	UOW Code	Operation
SAVE-ITEM	110	Save an item in a folder.
SAVE-ITEM-B00	141	Save an item in a folder that has any ordering discipline except APPLIC-DEFINED with an option to include an unsave time.
SAVE-ITEM-BY-KEY	139	Save an item in a folder that has an ordering discipline of APPLIC-DEFINED.
SCAN-FOLDER	120	Return the ID of items in a particular folder.
SCAN-FOLDER-B00	142	Return the ID and unsave time of items in a particular folder.

Table 4-2. TISERV UOW Summary (Continued)

Folder Manipulating UOWs (continued)

UOW	UOW Code	Operation
SCAN-FOLDER-BY-KEY	140	Return the ID, item type, unsave time, and the corresponding ordering key and key length of items saved in folders with APPLIC-DEFINED ordering.
UNSAVE-ITEM	111	Remove an item from a folder.
WHERE-SAVED	121	Return the names of folders in which a given item is saved.

TRANSFER Configuration Inquiry UOW

This UOW returns information from the TRANSFER name configuration directory.

UOW	UOW Code	Operation
GET-CONFIG-NAME	132	Return the configured name for the TRANSFER file, process, or other special entity, as recorded in the TRANSFER name directory.

Administrative UOWs

The administrative UOWs are typically used by processes to perform various administrative functions. These UOWs are divided into the following categories: session management, depot management, distribution list management, and name management UOWs. UOWs that can only be issued by processes representing users with system administrator capability are noted.

Table 4-2. TISERV UOW Summary (Continued)

- Session Management UOW

This UOW is used in connection with forcefully terminating sessions, shutting down TRANSFER, and monitoring the load on the TRANSFER system.

UOW	UOW Code	Operation
GET-NEXT-SESSION	200	Return the names of correspondents with active sessions to your application. (Requires system administrator capability.)

- Depot Management UOWs

These UOWs are concerned with the management of depots and the objects defined as essential components of depots: profiles, folders, and agents.

Depot UOWs

These UOWs are concerned with depots themselves.

UOW	UOW Code	Operation
CREATE-DEPOT	201	Create a depot. (Requires system administrator capability.)
DELETE-DEPOT	202	Delete a depot. (Requires system administrator capability.)

Table 4-2. TISERV UOW Summary (Continued)

Profile UOWs

These UOWs are concerned with profiles.

UOW	UOW Code	Operation
ALTER-PROFILE-ELEM	204	Modify one or more data elements in a profile.
DELETE-PROFILE-REC	214	Delete a record in a depot profile.
GET-PROFILE-ELEM	203	Return one or more data elements from a profile.
READ-PROFILE-REC	212	Read a record from a depot profile.
READ-PROF-REC-A02	231	Read one or more records from a depot profile.
WRITE-PROFILE-REC	213	Write or update a record in a depot profile.

Folder UOWs

These UOWs are concerned with folder management.

UOW	UOW Code	Operation
ALTER-FOLDER-ORDER	234	Modify the ordering criteria for an existing folder.
CREATE-FOLDER	227	Create a folder.
CREATE-FOLDER-B00	232	Create a folder with a specified ordering criteria.
DELETE-FOLDER	230	Delete a folder.
GET-FOLDER-ORDER	233	Retrieve the ordering criteria for a folder.

Table 4-2. TISERV UOW Summary (Continued)

Agent UOWs

These UOWs are concerned with agents.

UOW	UOW Code	Operation
ALTER-AGENT-SELECT	208	Create, alter, or delete the selection criteria for an agent.
GET-AGENT-SELECT	207	Return the selection criteria for an agent to your application.

- Distribution List Management UOWs

These UOWs are concerned with creation, deletion, and maintenance of distribution lists.

UOW	UOW Code	Operation
ADD-MEMBER	220	Add a new member to a distribution list.
CREATE-DLIST	217	Create a distribution list.
DELETE-DLIST	218	Delete a distribution list.
DELETE-MEMBER	221	Delete a member from a distribution list.
READ-NEXT-MEMBER	219	Return the names of members of a distribution list.

Table 4-2. TISERV UOW Summary (Continued)

- Name Management UOW

This UOW is concerned with management of names for depots, distribution lists, and correspondents.

UOW	UOW Code	Operation
READ-NEXT-NAME	224	Read the contents of the TRANSFER name directory.

TAREQ INTERFACE

The actual delivery of a package to a depot is handled by any of several TRANSFER asynchronous requesters (TAREQs). As part of the delivery operation, the TAREQ can optionally invoke one or more user-written agents that perform additional processing related to the delivery. TAREQs are composed of SCREEN COBOL programs and, therefore, they interface with agents that are implemented either as SCREEN COBOL requester programs or as PATHWAY servers.

Agent Selection

Upon package delivery, the responsible TAREQ can select agents for execution by matching delivery parameters that accompany the package against agent selection criteria defined in profile records at the recipient depot. The TAREQ passes the delivery parameters as part of an agent notification message. Your application establishes the agent selection criteria through the ALTER-AGENT-SELECT UOW or the TRANSFER/ADMIN client.

When the package arrives at the depot, the TAREQ selects the appropriate agents as described in the ALTER-AGENT-SELECT UOW in Section 5.

In selecting agents, the TAREQ sequentially searches the agent selection criteria in the profiles for the depot. During this search, the TAREQ invokes, in sequence, each agent whose selection criteria is satisfied by the delivery parameters in the notification message. The TAREQ continues this process until no further qualified agents are encountered or until an agent requests the TAREQ to discontinue agent selection.

If an agent selection record for a selected agent specifies that a session should be started when the agent is invoked, the TAREQ starts a session and obtains a session ID from TISERV. The TAREQ includes the session ID in the agent notification message; this allows an agent that can be invoked by more than one depot to access depots for which it is configured without knowing the password for the depot.

When more than one agent requiring a session is selected, the TAREQ assigns each agent an individual session. As each agent returns control, the TAREQ ends the session on the behalf of the agent. When two agents are involved, for example, the TAREQ might begin by starting a session for Agent A, and then invoking Agent A. When Agent A completes its operations and terminates, the TAREQ would terminate the session for Agent A, start a session for Agent B, and invoke Agent B.

Agent Notification Message

The TAREQ formats the agent notification message in accordance with the following data definition:

```
DEF  agent-link.
  02  session-id.
    03  dummy                       PIC X(18).
  02  sender-info.
    03  sender-name                 PIC X(120).
    03  sender-applic-id            PIC 9(4) COMP.
  02  recipient-info.
    03  recip-name                  PIC X(120).
  02  package-info.
    03  package-id.
      04  dummy                     PIC X(12).
    03  agent-selector              PIC 9(4) COMP.
    03  package-flags.
      04  certified                 TYPE BOOLEAN.
      04  byte                      REDEFINES CERTIFIED PIC X.
      04  reserved-1                TYPE BOOLEAN VALUE "N".
      04  reserved-2                TYPE BOOLEAN VALUE "N".
      04  reserved-3                TYPE BOOLEAN VALUE "N".
      04  reserved-4                TYPE BOOLEAN VALUE "N".
      04  reserved-5                TYPE BOOLEAN VALUE "N".
      04  reserved-6                TYPE BOOLEAN VALUE "N".
      04  reserved-7                TYPE BOOLEAN VALUE "N".
    03  subject-string              TYPE CHARACTER 140.
  02  depot-info.
    03  agent-data                  TYPE CHARACTER 80.
END.
```

In this definition, fields have the following meanings:

- SESSION-ID is the ID of the session required by the agent if the depot profile indicates that a session should be started on behalf of the agent. If no session is required, this field contains binary zeros.

- SENDER-NAME is the name of the correspondent who sent the package.

- SENDER-APPLIC-ID is the numeric application ID that identifies the client who transmitted the package with TISERV. This value is matched against the agent selection range established by APPLIC-ID-LOW and APPLIC-ID-HIGH in the depot profile records.

- RECIP-NAME is the name of the recipient to whom the package is sent.

- PACKAGE-ID is the ID of the header item for the package.

- AGENT-SELECTOR is the numeric value to be matched against the agent selection range established by AGENT-SEL-LOW and AGENT-SEL-HIGH in the depot profile records. The value used by the Tandem T/MAIL client is 0 (for DEFAULT-PKG).

- PACKAGE-FLAGS specifies the delivery control flags described as DELIV-CONTROL-FLAGS in the ALTER-ITEM-DESCR UOW in Section 5.

- SUBJECT-STRING is a data string that typically describes the contents of the package. (The MAIL client generates this string as its SUBJECT field.) If more than 140 characters are entered in this field, the additional characters are truncated.

- AGENT-DATA is an array containing data to be passed to the agent for use by the agent. This data is obtained from the Profile file. Your application establishes the data in that file through the ALTER-AGENT-SELECT UOW.

Upon receiving the notification message, the agent must respond by sending a reply to the TAREQ in accordance with the following format:

```
DEF  agent-link-reply.
  02  error-info.
    03  error-return                PIC S9999 COMP.
    03  error-msg                   TYPE CHARACTER 80.
END.
```

In this definition, fields have the following meanings:

- ERROR-RETURN notifies the TAREQ of any action it should take at this point. This field is required and must contain one of the following values:

Interpretation	Value	TAREQ Action
GO-TO-NEXT-AGENT	0	Go to the next agent in the sequence. If TAREQ started the session for this agent, TAREQ ends the session.
	100	Go to the next agent in the sequence. If TAREQ started the session for this agent, TAREQ does not end the session.
DON'T-GO-TO-NEXT-AGENT	1	Discontinue the search. If TAREQ started the session for this agent, TAREQ ends the session.
	101	Discontinue the search. If TAREQ started the session for this agent, TAREQ does not end the session.
AGENT-ERROR	2	Log the error detected by the agent and invoke the next agent. If TAREQ started the session for this agent, TAREQ ends the session.
	102	Log the error detected by the agent. If TAREQ started the session for this agent, TAREQ does not end the session.
AGENT-RESTART	3	Log the error detected by the agent and restart the current transaction.

WARNING

> To avoid degrading system performance, AGENT-RESTART (3) should be returned only for a transient problem, such as a file lock. Returning the AGENT-RESTART for a problem such as record-not-found is not useful because the problem will not go away. AGENT-RESTART might cause previously successful deliveries to be backed out and then performed again.
>
> For additional ramifications of TMF restart, refer to TAREQ Interface in Section 6.

- ERROR-MSG contains ASCII text that describes any error encountered. This field is optional. The text is written to the scheduler process log file if logging to this file is enabled.

The TAREQ calls a SCREEN COBOL agent with a CALL statement written in the following format:

```
  CALL agent-name USING AGENT-LINK, AGENT-LINK-REPLY.
```

The LINKAGE SECTION of the user-supplied SCREEN COBOL program unit must correspond to this CALL statement.

The TAREQ sends to a server class agent with a SEND statement written in the following format:

```
  SEND  AGENT-LINK
    TO  agent-name
  REPLY CODE 0,1,2 YIELDS AGENT-LINK-REPLY.
```

The user-supplied server must structure its definitions to agree with this SEND statement.

TAREQ Event Packages

When certain events occur, the TAREQ generates TAREQ event packages in accordance with certain predefined formats. In these packages, the application ID is always TAREQ (100). The agent selector value indicates the event that triggered the package. The events are listed in Table 4-3.

Table 4-3. TAREQ Events

Agent-Selector Value	Event
1	TRANSFER SYSTEM ERROR
2	RECIPIENT HAS EXAMINED CERTIFIED PACKAGE
3	PACKAGE HAS INVALID RECIPIENT
4	PACKAGE HAS DISTRIBUTION LIST WITH INVALID RECIPIENT
5	PACKAGE HAS RECIPIENT WITH INVALID AGENT
6	PACKAGE COULD NOT BE DELIVERED TO RECIPIENT IN TIME
7	RECIPIENT DID NOT EXAMINE PACKAGE BEFORE IT EXPIRED
8	RECIPIENT HAS ALREADY EXAMINED CANCELED PACKAGE
9	SENDER CANCELED PACKAGE AFTER YOU EXAMINED IT
10	PACKAGE CANNOT BE TRANSPORTED TO RECIPIENT'S SYSTEM
11	AGENT IS MISBEHAVING
12	AGENT HAS LOGGED AN ERROR

The overall package format is illustrated in Figure 4-2. The format of the text item within this package depends on the agent selector value (event), as indicated in Figure 4-3.

For those TAREQ events that reflect an error, the TAREQ might not generate an event package, depending on the ERR-PKG-SUPPRESS-FLAGS field of the sender-submitted package. These flags are set by the sender.

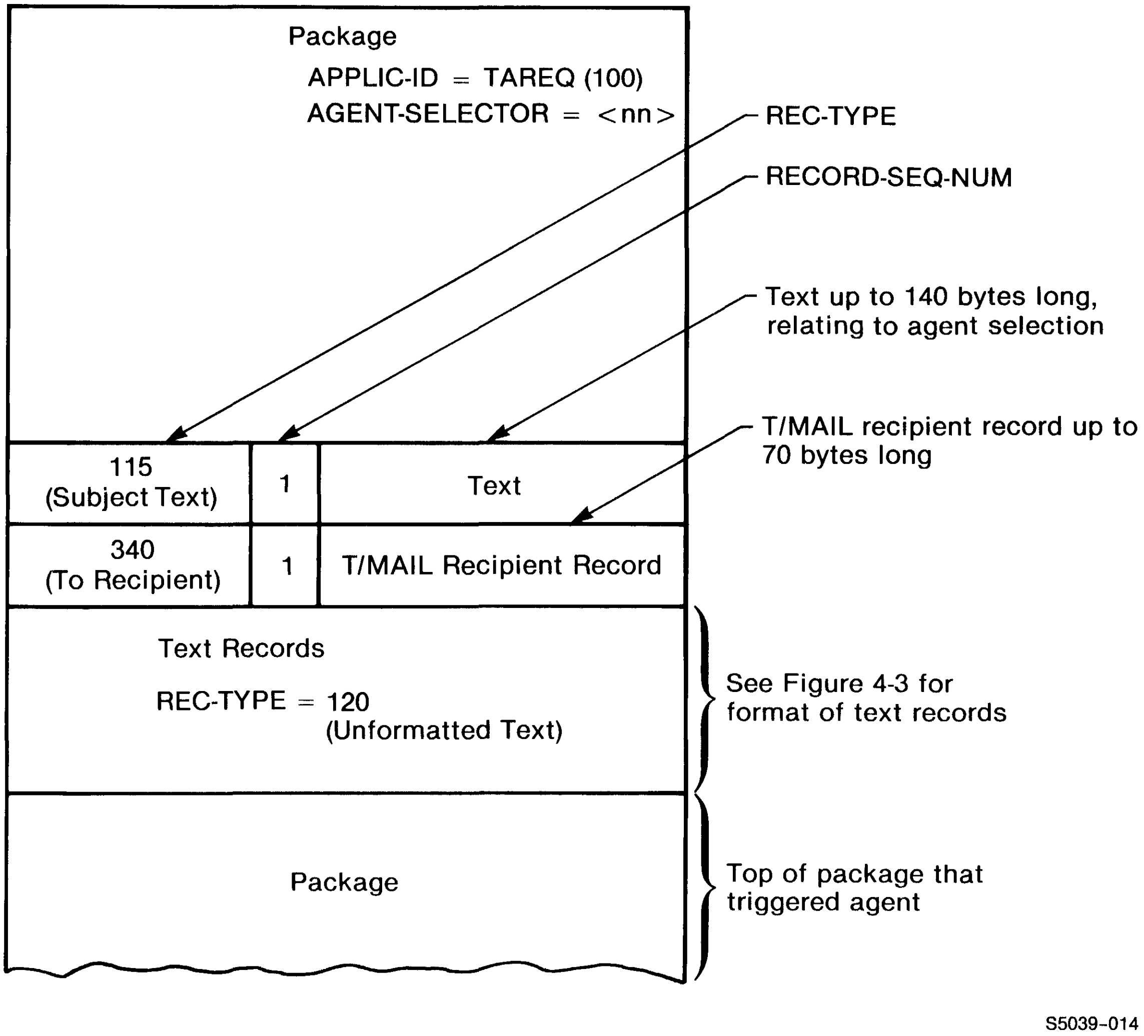

Package
APPLIC-ID = TAREQ (100)
AGENT-SELECTOR = <nn>
REC-TYPE
RECORD-SEQ-NUM
Text up to 140 bytes long, relating to agent selection
T/MAIL recipient record up to 70 bytes long
115 (Subject Text)
1
Text
340 (To Recipient)
1
T/MAIL Recipient Record
Text Records
REC-TYPE = 120 (Unformatted Text)
See Figure 4-3 for format of text records
Package
Top of package that triggered agent
S5039-014

Figure 4-2. Overall TAREQ Event Package Format

Each format has four 120-byte text records

FORMAT 1:
AGENT-SELECTOR = Event (1, 2, 3, 6, 7, 8 or 10)
(To sender)

REC-SEQ-NUM		
1	(blank)	
2	Recipient:	①
3	<recipient name>	
4	(blank)	

FORMAT 2:
AGENT-SELECTOR = Event (9)
(To recipient)

REC-SEQ-NUM		
1	(blank)	
2	Sender:	①
3	<sender name>	
4	(blank)	

FORMAT 3:
AGENT-SELECTOR = Event (4)
(To sender)

REC-SEQ-NUM		
1	Distribution List:	①
2	<distribution list name>	
3	Recipient List:	①
4	<recipient list name>	

FORMAT 4:
AGENT-SELECTOR = Event (5, 11,12)
(To recipient)

REC-SEQ-NUM	
1	Agent:
2	<agent name>
3	Sender:
4	<sender name>

① Record is intended only for output to users and need not be read by your application processes.

S5039-015

Figure 4-3. Text Portion Formats

Delivery Errors

TAREQs write delivery error indications to the recipient records involved. These error indications have the data type UOW-RETN-CODE; they can reflect almost any value returned in the RETN-CODE field by TISERV UOWs or they can reflect special delivery errors detected by TAREQs, whose values range from 4600 through 4699. A code of zero indicates that the TAREQ detected no error.

The following errors are detected by TAREQs; error explanations appear in Appendix A:

4600	W-NOT-PROCESSED-HERE	4605	E-CANCELED-UNEXAMINED
4601	W-XPORTED	4607	E-EXPIRED-UNEXAMINED
4602	E-XPORT-FAILED	4608	E-TOO-LATE-TO-DELIV
4603	E-TOO-LATE-TO-XPORT	4609	E-INCONSISTENT-RECIP
4604	W-FULLY-EXPANDED-DLIST		

Precautions about Using Agents

The use of agents can provide many advantages to your TRANSFER application. In designing your application, however, you should consider the following:

1. The amount of time that TRANSFER waits for agents can severely impact the TAREQ ability to perform other tasks. The TAREQ must wait for the agent to complete its activities, and thus cannot provide other services in the meantime. When the agent is a server rather than a SCREEN COBOL requester, you can specify time limits that the TAREQ must wait on the agent server class before aborting the transaction.

2. Multiple agents for a single recipient all operate within the same TMF transaction.

3. An agent required by a delivery is invoked only if that delivery is successful.

SECTION 5

UOW DESCRIPTIONS

This section describes the available TISERV units-of-work (UOWs). The description of each UOW includes the following elements:

- the DDL format and syntax of the request UOW and its corresponding response UOW; the letters rsp at the beginning of each response UOW stand for response
- the content, function, and constraints of the individual fields transmitted within, or returned by, the UOW
- the operations performed by TISERV in response to the UOW.

Information transmitted to TISERV by a UOW is moved into the individual fields of the UOW by your program. Information returned in a UOW response is entered in the individual fields of the response by TISERV.

FILLER fields appear in the DDL format for certain UOWs. These fields provide for the alignment of fields on word boundaries in memory or allow space for the expansion of data in a field.

You can modify array limits in standard DDL definitions that contain variable length arrays. You can have multiple definitions with different array limits for the same UOW as long as the symbolic names for the UOW are unique.

It is recommended that IPCs be issued within the framework of TMF transactions. Some UOWs, however, do not change the TRANSFER data base and do not require a TMF transaction to be in effect. You do not need to start a TMF transaction before issuing the IPC if your IPC consists solely of one or more of the following UOWs:

GET-AGENT-SELECT
GET-CONFIG-NAME
GET-FOLDER-ORDER
GET-ITEM-DESCR
GET-ITEM-REC
GET-NEXT-SESSION
GET-PROFILE-ELEM
GET-RECIP-REC
NOOP
READ-NEXT-MEMBER
READ-NEXT-NAME
READ-PROFILE-REC
READ-PROF-REC-A02
SCAN-FOLDER
SCAN-FOLDER-B00
SCAN-FOLDER-BY-KEY
WHERE-SAVED

UOW HEADER AND RETURN CODE

Each UOW transmitted to TISERV begins with a UOW header. The DDL definition for this header is:

```
DEF uow-hdr.
  02  self-ident              PIC AA VALUE "UW".
  02  uow-code                TYPE BINARY 16 UNSIGNED.
END.
```

Individual fields in the UOW header contain the following information:

- SELF-IDENT always contains the characters UW to identify the header as a UOW header.

- UOW-CODE is a code value that identifies the specific UOW request being made. For example, an ADD-ITEM-REC UOW that adds a record to an item has a UOW-CODE field that contains the value 104.

Each response UOW returned from TISERV begins with the same header as the request, followed by two fields dealing with return codes. The DDL definition for this response is:

```
DEF uow-hdr.
  02  self-ident              PIC AA VALUE "UW".
  02  uow-code                TYPE BINARY 16 UNSIGNED.
DEF uow-retn-code             TYPE BINARY 16.
DEF retn-code-detail          TYPE BINARY 16.
END.
```

Individual fields in the response UOW header contain the following additional information:

- UOW-RETN-CODE is the return code.

  - If no errors were encountered, this field is set to 0.

  - If an error occurred, this field contains a positive value ranging from 4000 through 5999; these values indicate the UOW was not processed.

  - If a warning was indicated, the field contains a negative value ranging from -5999 through -4000; these values indicate the UOW was successfully processed.

  In the RETN-CODE field for each UOW, entries that begin with E denote errors returned to your process by TISERV, and entries that begin with W denote warnings. All possible entries are listed for each UOW. These errors are listed and described in Appendix A.

- RETN-CODE-DETAIL is a code that primarily identifies an error detected by a subsystem other than TRANSFER, such as the GUARDIAN operating system or the EXPAND network software, and for which TRANSFER provides no standard handling. These errors are discussed further in Appendix A.

All request and response UOWs must be aligned on word boundaries.

SOFTWARE PROVIDED WITH THE TRANSFER DELIVERY SYSTEM

The TRANSFER software release provides three files for interfacing with TRANSFER: GCOB, GLNK, and GDDL. These files contain source code for commonly used TRANSFER elements whose field and structure definitions appear in this manual. Typical TRANSFER elements are the interprocess communication (IPC) header that initiates a request, and the unit-of-work (UOW) definitions that describe operations to be performed.

This code can be copied into a SCREEN COBOL or COBOL source program by coding the record level and then using the COPY statement

```
COPY copy-text OF "filename"
```

where

copy-text is the unique name for the definition in the named file. You determine the correct copy-text name by searching the files.

GCOB - This file contains COBOL source code for Working-Storage Section definitions.

GLNK - This file contains the same code as the GCOB file, but without the INITIAL-VALUE clauses. The GLNK file is used for Linkage Section definitions.

GCOB and GLNK have information in addition to the information produced by DDL when generating COBOL. The primary additions are prefixes for all field names, and many level 88 declarations for fields.

GDDL - This file contains DDL code that is used to create definitions for use when programming in a language other than SCREEN COBOL or COBOL.

GDDL code does not exactly match the DDL syntax shown in this manual, but it should be immediately obvious how to interpret any differences.

UOW DEFINITIONS

The remainder of this section presents the available UOWs in alphabetic order. Each definition begins with the DDL format for the UOW request and corresponding response, followed by a description of the fields and the operations performed.

For programs that are written in languages other than COBOL and SCREEN COBOL, fields defined as PIC 9(4) COMP are limited to values in the range of 0 through 9999. In TAL, for example, these fields would have a type of INT, but entering a value outside the range would return an error.

Every UOW can return the following errors:

4010	E-BAD-TRANSACTION
4990	E-IO-TIMEOUT

Most UOWs can return some of the following errors:

4902	E-ERR-PROFILE-FILE	4910	E-ERR-RECIP-FILE
4904	E-ERR-SESSION-FILE	4912	E-ERR-FOLDER-FILE
4906	E-ERR-ITEMDESC-FILE	4914	E-ERR-DLIST-FILE
4908	E-ERR-ITEMDATA-FILE	4922	E-ERR-INV-FOLDER-FILE

In all of these cases you will receive a RQST-ERR, and the IPC-RETN-CODE and IPC-RETN-CODE-DETAIL will contain copies of the UOW RETN-CODE and RETN-CODE-DETAIL.

ACK-RECEIPT (UOW Code 131)

ACK-RECEIPT acknowledges the receipt of a package. This operation is recommended whenever a client retrieves a package from the INBOX folder; for example, whenever the client displays the contents of a package on behalf of a correspondent.

```
DEF  ack-receipt-uow.
  02  hdr.
    03  self-ident              PIC AA VALUE "UW".
    03  uow-code                TYPE BINARY 16 UNSIGNED VALUE 131.
  02  item-id.
    03  dummy                   PIC X(12).
END.
```

```
DEF ack-receipt-rsp.
  02  hdr.
    03  self-ident              PIC AA VALUE "UW".
    03  uow-code                TYPE BINARY 16 UNSIGNED VALUE 131.
  02  retn-code                 TYPE BINARY 16.
  02  retn-code-detail          TYPE BINARY 16.
END.
```

<u>ACK-RECEIPT FIELDS.</u> The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 131.

- ITEM-ID is the item ID of the package header for the package that was received.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries:

0	OK		
4010	E-BAD-TRANSACTION	4080	E-PKG-NOT-RECEIVED
4035	E-ITEM-NOT-FOUND	4084	E-PKG-NOT-SUBMITTED
4042	E-ITEM-NOT-PKG-HDR	4094	E-PKG-CANCELED
4045	E-TSCHED-UNAVAIL	4095	E-PKG-EXPIRED

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

ACK-RECEIPT OPERATION. ACK-RECEIPT sets the EXAMINED flag in the correspondent's recipient record of the package identified by ITEM-ID. This has the following effect:

- If the package was flagged by the sender for certification and the ACK-RECEIPT UOW is issued against this package for the first time by this recipient, TRANSFER transmits an acknowledgement package to the sender. Refer to the ALTER-ITEM-DESCR UOW for package certification details.

- When the expiration date is reached, TRANSFER checks the EXAMINED flag:

  - If this flag is set, TRANSFER performs no action.

  - If this flag is not set, TRANSFER removes the package from the INBOX if the package is still there, and notifies the sender that the package was not examined by the recipient.

ADD-ITEM-REC (UOW Code 104)

ADD-ITEM-REC adds a data record to an item.

```
DEF  add-item-rec-uow.
  02  hdr.
    03  self-ident          PIC AA VALUE "UW".
    03  uow-code            TYPE BINARY 16 UNSIGNED VALUE 104.
  02  item-key.
    03  item-id.
      04  dummy             PIC X(12).
    03  rec-type            PIC 9(4) COMP.
    03  rec-seq-num         PIC 9(4) COMP.
  02  data-byte-count       TYPE BINARY 16 UNSIGNED.
  02  client-data.
    03  element             PIC X OCCURS 0 TO 2000
                              TIMES DEPENDING ON
                              data-byte-count.
END.
```

```
DEF add-item-rec-rsp.
  02  hdr.
    03  self-ident          PIC AA VALUE "UW".
    03  uow-code            TYPE BINARY 16 UNSIGNED VALUE 104.
  02  retn-code             TYPE BINARY 16.
  02  retn-code-detail      TYPE BINARY 16.
  02  rec-seq-num           PIC 9(4) COMP.
END.
```

ADD-ITEM-REC FIELDS. The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 104.
- ITEM-KEY identifies the item to which the record will be added.
- ITEM-ID is the item ID of the item to which the record will be added.
- REC-TYPE is the type assigned to the record by your application.

  Values 100 through 999 - reserved for use by Tandem

  Values 1000 through 9999 - available for customer use

REC-TYPE is not interpreted by TRANSFER, but is stored with the item record and is returned by the GET-ITEM-REC UOW. Records are stored first in increasing order by REC-TYPE, and within each REC-TYPE, in increasing order by REC-SEQ-NUM.

- REC-SEQ-NUM is the sequence number to be assigned to the record. The number can range from 1 through 9999; the value 0 is invalid for this field.

  To assign the next highest unused sequence number within the record type specified, set REC-SEQ-NUM to -1. In the response, the sequence number that TISERV assigned to the record is returned. If the item contains no records, TISERV assigns the sequence number 1 to the new record.

- DATA-BYTE-COUNT is the length, in bytes, of the record to be added. This must be a value ranging from 0 through 2000.

- CLIENT-DATA is the data record to be added. The length of this data must be consistent with DATA-BYTE-COUNT.

NOTE

UOWs must start on word boundaries. If DATA-BYTE-COUNT contains an odd value and other UOWs follow this one in the request, you must append a one-byte FILLER to CLIENT-DATA.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries:

0	OK	4046	E-INVALID-REC-TYPE
4010	E-BAD-TRANSACTION	4049	E-REC-ALREADY-EXISTS
4035	E-ITEM-NOT-FOUND	4058	E-INVALID-REC-SEQ-NUM
4041	E-ITEM-UNALTERABLE	4085	E-DATA-TOO-LONG

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

ADD-ITEM-REC OPERATION. ADD-ITEM-REC adds the data record identified by DATA-BYTE-COUNT and CLIENT-DATA to the item identified by ITEM-KEY. TISERV assigns the sequence number indicated by REC-SEQ-NUM to this record. If you set REC-SEQ-NUM to -1, TISERV assigns the next highest unused sequence number within the record type specified.

Adding a record to an item is illustrated in Figure 5-1.

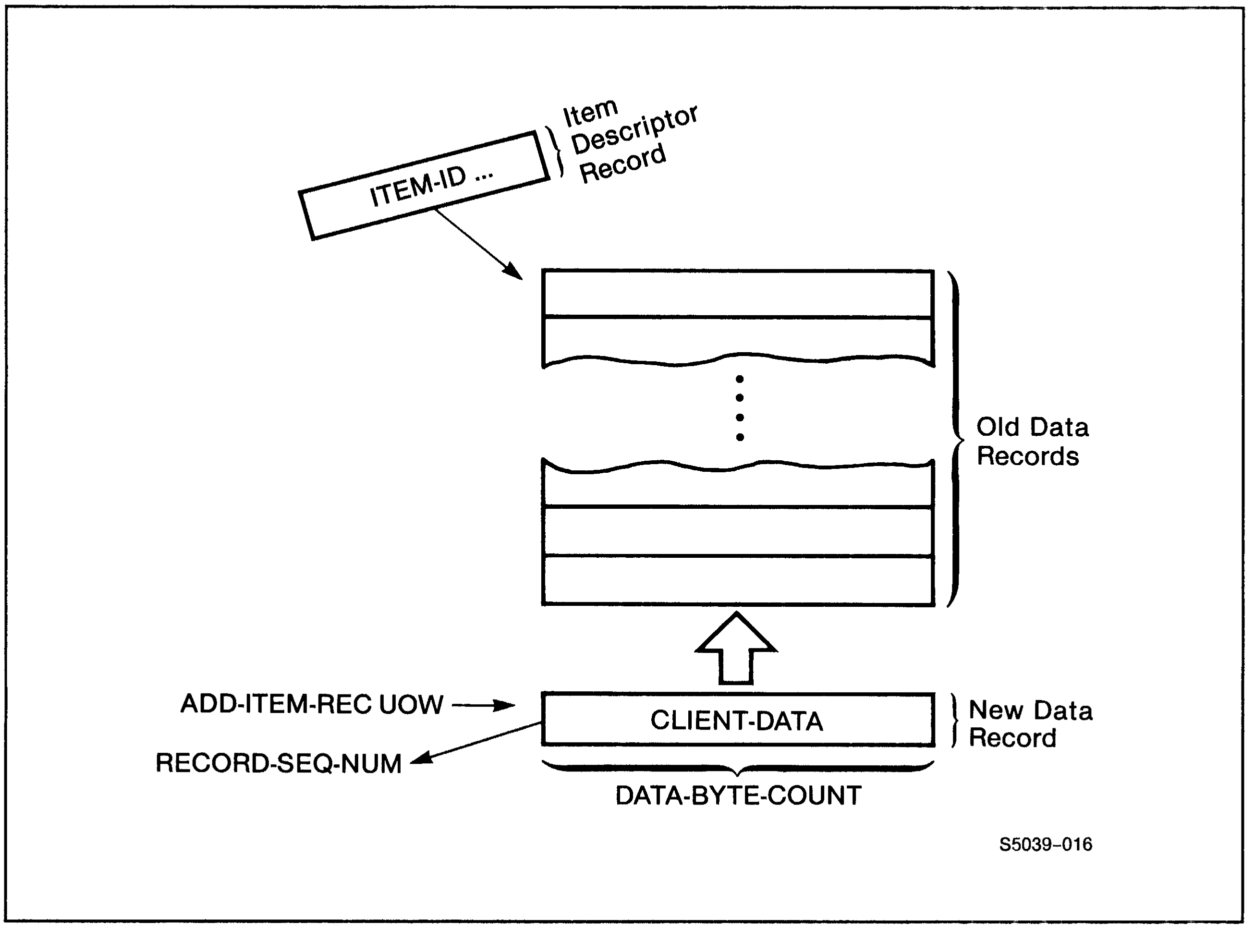


Figure 5-1. Adding a Record to an Item

ADD-MEMBER (UOW Code 220)

ADD-MEMBER adds one or more members to a distribution list. These members can be correspondents, distribution lists, or both.

```
DEF  add-member-uow.
  02  hdr.
    03  self-ident          PIC AA VALUE "UW".
    03  uow-code            TYPE BINARY 16 UNSIGNED VALUE 220.
  02  corr-name             PIC X(80) VALUE SPACES.
  02  dlist-name            PIC X(80).
  02  num-wanted            TYPE BINARY 16 UNSIGNED VALUE 1.
  02  member-name           PIC X(120)
                              OCCURS 0 TO 5 TIMES
                              DEPENDING ON num-wanted.
END.
```

```
DEF  add-member-rsp.
  02  hdr.
    03  self-ident          PIC AA VALUE "UW".
    03  uow-code            TYPE BINARY 16 UNSIGNED VALUE 220.
  02  retn-code             TYPE BINARY 16.
  02  retn-code-detail      TYPE BINARY 16.
  02  corr-name             PIC X(80).
  02  dlist-name            PIC X(80).
  02  num-returned          TYPE BINARY 16 UNSIGNED.
  02  mbr-retn-code         OCCURS 0 TO 5 TIMES
                              DEPENDING ON num-returned
                              TYPE BINARY 16.
END.
```

ADD-MEMBER FIELDS. The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 220.

- CORR-NAME is the name of the correspondent represented by the calling process. Only system administrators can enter correspondent names other than their own in this field; correspondents without system administrator privileges must enter their own names or leave the field blank. On input, you can use a partially qualified name, including wildcard characters. In the response, the fully qualified name is returned.

- DLIST-NAME is the name of the distribution list to which the new member is added. This can be a partially qualified name, including wildcard characters. In the response, the fully qualified name is returned.

- NUM-WANTED is the number of members to be added to the distribution list. You can specify any number of members, restricted only by the length of the entire IPC that contains this UOW. The maximum IPC length is defined during TRANSFER system configuration.

- MEMBER-NAME is the name of the correspondent or distribution list to be added to the list identified by DLIST-NAME. This can be a partially qualified name provided local name resolution is not deferred in the depot profile. The name can include wildcard characters and a suffix. In the OCCURS DEPENDING ON clause, the value 5 is an arbitrary value suitable for most applications; you can reset it to any other value. You can have as many member names as specified by NUM-WANTED, which must be consistent with your DDL definition.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries.

To indicate successful addition of all members:

0	OK

To indicate problems with the correspondent name:

5600	E-CORR-NSRV-ERR	5607	E-CORR-NSRV-DOWN
5601	E-CORR-NOT-FOUND	5611	E-CORR-NET-DOWN
5602	E-CORR-BAD-NAME	5622	E-CORR-NOT-SAME-NODE
5604	E-CORR-NO-SUCH-NODE	5623	E-CORR-AMBIGUOUS-NAME
5606	E-CORR-NSRV-NOT-FOUND		

To indicate problems with the distribution list name:

5625	E-DLIST-NSRV-ERR	5632	E-DLIST-NSRV-DOWN
5626	E-DLIST-NOT-FOUND	5636	E-DLIST-NET-DOWN
5627	E-DLIST-BAD-NAME	5647	E-DLIST-NOT-SAME-NODE
5629	E-DLIST-NO-SUCH-NODE	5648	E-DLIST-AMBIGUOUS-NAME
5631	E-DLIST-NSRV-NOT-FOUND		

To indicate at least one of the members was not added:

4227	W-ERR-ON-MEMBER

To indicate other problems:

4010	E-BAD-TRANSACTION	4902	E-ERR-PROFILE-FILE
4093	E-SECURITY-VIOLATION	4914	E-ERR-DLIST-FILE
4201	E-CONTEXT-ERR		

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

- NUM-RETURNED is the number of members added to the list. There will be a member return code for each member that you attempted to add.

- MBR-RETURN-CODE is a code that indicates the status of each member the UOW attempted to add. The message OK indicates that the member was successfully added.

0	OK		
4067	W-REMOTE-NAME-ACCEPTED	5656	E-MBR-NSRV-NOT-FOUND
4069	W-NODE-NAME-UNKNOWN	5657	E-MBR-NSRV-DOWN
5650	E-MBR-NSRV-ERR	5661	E-MBR-NET-DOWN
5651	E-MBR-NOT-FOUND	5662	E-MBR-ALREADY-EXISTS
5652	E-MBR-BAD-NAME	5673	E-MBR-AMBIGUOUS-NAME
5654	E-MBR-NO-SUCH-NODE	5674	E-MBR-BAD-SUFFIX

ADD-MEMBER OPERATION. ADD-MEMBER adds the new members identified by MEMBER-NAME to the distribution list identified by DLIST-NAME. You can specify any number of new members even though the DDL format shows only 5, restricted only by the limit specified in the OCCURS clause and the length of the entire IPC that contains this UOW. The maximum IPC length is defined during TRANSFER system configuration.

The names of the new distribution list members are fully resolved as specified by flags in the depot profile. If remote name resolution is specified in the profile and you add many names to one or more remote systems, the resulting network traffic might slow your application appreciably.

If the depot profile specifies that local name resolution is deferred, the new member names must be fully qualified and syntactically correct.

If the depot profile specifies that remote resolution is deferred, a new member name that specifies a remote node will be added with a warning error:

W-REMOTE-NAME-ACCEPTED   if the node name is recognized

W-NODE-NAME-UNKNOWN   if the node name is not currently known to EXPAND

A member name can include a suffix. If the name is resolved to be that of another distribution list or that of a correspondent whose depot profile indicates the depot currently does not accept suffixes, the suffix is discarded without notice.

ADD-RECIP (UOW Code 114)

ADD-RECIP adds a recipient to a package recipient list.

```
DEF  add-recipient-uow.
  02  hdr.
    03  self-ident                  PIC AA VALUE "UW".
    03  uow-code                    TYPE BINARY 16 UNSIGNED
                                      VALUE 114.
  02  item-id.
    03  dummy                       PIC X(12).
  02  recip-name                    PIC X(120).
  02  recip-type                    PIC 9(4) COMP.
  02  options.
    03  use-depot-resol-flags       TYPE BOOLEAN.
    03  defer-local-resolution      TYPE BOOLEAN.
    03  defer-remote-resolution     TYPE BOOLEAN.
    03  derived-from-dlist          TYPE BOOLEAN.
    03  reserved-4                  TYPE BOOLEAN VALUE "N".
    03  reserved-5                  TYPE BOOLEAN VALUE "N".
    03  reserved-6                  TYPE BOOLEAN VALUE "N".
    03  reserved-7                  TYPE BOOLEAN VALUE "N".
END.
```

```
DEF add-recipient-rsp.
  02 hdr.
    03  self-ident                  PIC AA VALUE "UW".
    03  uow-code                    TYPE BINARY 16 UNSIGNED
                                      VALUE 114.
  02 retn-code                      TYPE BINARY 16.
  02 retn-code-detail               TYPE BINARY 16.
  02 accepted-name                  PIC X(120).
END.
```

ADD-RECIP FIELDS. The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 114.
- ITEM-ID identifies the package whose recipient list is to be modified. This is the item ID of the header for that package.

- RECIP-NAME is the name of the recipient to be added to the recipient list. The name can identify either a correspondent or a distribution list. This can be a partially qualified name provided local and remote name resolution is not deferred in the depot profile. The name can include wildcard characters and a suffix.

  If the name is resolved to be that of a distribution list or that of a correspondent whose depot profile indicates the depot currently does not accept suffixes, the suffix is discarded without notice.

- RECIP-TYPE is the recipient type by which your application categorizes the recipients of packages, as described in Appendix B. This field is not interpreted by TRANSFER, but is returned by the GET-RECIP-REC UOW.

- OPTIONS includes the following fields:

  USE-DEPOT-RESOL-FLAGS

  Y = TRANSFER resolves the recipient name by using the depot service flags pertaining to name resolution and defined at the depot with the ALTER-PROFILE-ELEMENT UOW, and ignores the DEFER-LOCAL-RESOLUTION and DEFER-REMOTE-RESOLUTION fields.

  N = TRANSFER ignores those depot service flags and uses the DEFER-LOCAL-RESOLUTION and DEFER-REMOTE-RESOLUTION fields as name resolving criteria.

  DEFER-LOCAL-RESOLUTION

  Y = TRANSFER defers the resolution of locally defined names.

  N = TRANSFER immediately resolves these names.

  DEFER-REMOTE-RESOLUTION

  Y = TRANSFER defers the resolution of remotely defined names.

  N = TRANSFER immediately resolves these names.

  DERIVED-FROM-DLIST is used only by TAREQs; this field must be set to N.

  RESERVED-4 through RESERVED-7 are reserved for use by Tandem; these fields must be set to N.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries.

  To indicate successful addition of the recipient:

0	OK

  To indicate problems with the recipient name:

5750	E-RECIP-NSRV-ERR	5756	E-RECIP-NSRV-NOT-FOUND
5751	E-RECIP-NOT-FOUND	5757	E-RECIP-NSRV-DOWN
5752	E-RECIP-BAD-NAME	5761	E-RECIP-NET-DOWN
5754	E-RECIP-NO-SUCH-NODE	5773	E-RECIP-AMBIGUOUS-NAME
5755	E-RECIP-SECURITY	5774	E-RECIP-BAD-SUFFIX

  To indicate other problems:

4010	E-BAD-TRANSACTION	4051	E-MUST-BE-YN
4035	E-ITEM-NOT-FOUND	4052	E-RESERVED-MUST-BE-N
4041	E-ITEM-UNALTERABLE	4065	E-INVALID-RECIP-TYPE
4042	E-ITEM-NOT-PKG-HDR	4067	W-REMOTE-NAME-ACCEPTED
4049	W-REC-ALREADY-EXISTS	4069	W-NODE-NAME-UNKNOWN

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

- ACCEPTED-NAME is the recipient name returned by TRANSFER, resolved as fully as possible at this time.

ADD-RECIP OPERATION. ADD-RECIP adds the name identified by RECIP-NAME to the recipient list for the package identified by ITEM-ID.

You can request TRANSFER to defer resolution of local or remote recipient names with the DEFER-LOCAL-RESOLUTION or DEFER-REMOTE-RESOLUTION fields, respectively. If resolution deferral is requested for either a local or remote name, that name must be supplied as a fully qualified name in the RECIPIENT-NAME field; in this case, the name will be interactively checked for correct syntax only.

Distribution list names are always expanded asynchronously.

ALTER-AGENT-SELECT (UOW Code 208)

ALTER-AGENT-SELECT changes agent selection criteria for a depot. Typically, this UOW is issued after a GET-AGENT-SELECT UOW.

```
DEF alter-agent-select-uow.
  02  hdr.
    03  self-ident                    PIC AA VALUE "UW".
    03  uow-code                      TYPE BINARY 16 UNSIGNED
                                        VALUE 208.
  02  filler                          TYPE CHARACTER 4.
  02  corr-name                       PIC X(80)
                                        VALUE SPACES.
  02  filler                          TYPE CHARACTER 1.
  02  action                          TYPE CHARACTER 1.
  02  agent-rec-num                   TYPE BINARY 16 UNSIGNED.
  02  agent-name                      TYPE CHARACTER 80.
  02  agent-type                      TYPE CHARACTER 1.
  02  agent-flag                      TYPE CHARACTER 1.
  02  applic-id-for-logon             PIC 9(4) COMP.
  02  applic-id-low                   PIC 9(4) COMP.
  02  applic-id-high                  PIC 9(4) COMP.
  02  agent-sel-low                   PIC 9(4) COMP.
  02  agent-sel-high                  PIC 9(4) COMP.
  02  agent-data                      TYPE CHARACTER 80.
END.
```

```
DEF alter-agent-select-rsp.
  02  hdr.
    03  self-ident                    PIC AA VALUE "UW".
    03  uow-code                      TYPE BINARY 16 UNSIGNED
                                        VALUE 208.
  02  retn-code                       TYPE BINARY 16.
  02  retn-code-detail                TYPE BINARY 16.
  02  agent-rec-num                   TYPE BINARY 16 UNSIGNED.
  02  corr-name                       PIC X(80).
END.
```

ALTER-AGENT-SELECT FIELDS. The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 208.

- CORR-NAME is the name of the correspondent represented by the calling process. Only system administrators can enter correspondent names other than their own in this field; correspondents without system administrator privileges must enter their own names or leave the field blank. On input, you can use a partially qualified name, including wildcard characters. In the response, the fully qualified name is returned.

- ACTION specifies the type of updating to be performed, as follows:

Entry	Meaning
INSERT-AFTER-REC (I)	Insert the selection criteria defined by UOW fields AGENT-NAME through AGENT-DATA. Place this criteria in the agent list after the record identified by AGENT-REC-NUM. To insert the record at the beginning of the list, set AGENT-REC-NUM to 0.
REWRITE-REC (W)	Update the agent specified by AGENT-REC-NUM.
DELETE-REC (D)	Delete the agent specified by AGENT-REC-NUM.

- AGENT-REC-NUM is the position of the record that defines the agent in the agent list for the depot. To get the position number, you can issue a GET-AGENT-SELECT UOW and perform a read-after with AGENT-REC-NUM set to 0.

  In the response, TISERV sets this field as follows:

  - For insert (I action), the field is set to the record number where the selection criteria was inserted.

  - For update (W action), the field is set to the same record number entered on input.

  - For delete (D action), the field is set to 0 if no agent exists after the one just deleted; or the field is set to the number of the next remaining agent, which is a value equal to that provided in the delete request.

- AGENT-NAME is the name of the SCREEN COBOL program or server class that operates as the agent. You determine whether this name identifies a SCREEN COBOL program or a server class with the AGENT-TYPE field.

- AGENT-TYPE determines whether the program denoted by AGENT-NAME is a SCREEN COBOL program or a server class name.

  Y = SCREEN COBOL program

  N = server class name

- AGENT-FLAG determines whether the agent requires the associated TAREQ to begin a session on its behalf before the agent can run. If the agent issues UOWs to a TRANSFER process, a session must be started for the agent before the agent can execute.

  Y = initiate session

  N = do not initiate session

- APPLIC-ID-FOR-LOGON is the application ID to be used in the START-SESSION UOW when the AGENT-FLAG field is set to Y, meaning that a session will be started before invoking the agent.

- APPLIC-ID-LOW, APPLIC-ID-HIGH, AGENT-SEL-LOW, and AGENT-SEL-HIGH define numeric ranges used to select the agent. These fields can contain values ranging from 0 through 9999. Agent selection is as follows:

  1. TAREQ examines the list of agents for a depot and compares the APPLIC-ID submitted with the package against the range defined by APPLIC-ID-LOW and APPLIC-ID-HIGH in the agent selection criteria. If the submitted APPLIC-ID falls within this range, TAREQ continues to Step 2; otherwise, the agent is not selected for execution.

     In these fields, the values 100 through 999 are reserved for Tandem.

  2. If the APPLIC-ID submitted with the package falls within the range defined by APPLIC-ID-LOW and APPLIC-ID-HIGH, TAREQ compares the AGENT-SEL field submitted with the package against the range defined by AGENT-SEL-LOW and AGENT-SEL-HIGH. If the submitted AGENT-SEL falls within this range, TAREQ invokes the agent.

- AGENT-DATA is data that your application passes to the agent; its use is defined by the agent itself.

NOTE

> The default agent configuration screen allows for viewing and modifying only the first 78 characters of the 80-character AGENT-DATA field. If you are providing an agent that requires 79 or 80 characters of agent data, you must also provide a SCREEN COBOL program for configuring such agents.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries.

  To indicate successful alteration of the agent selection criteria:

0	OK

  To indicate problems with the correspondent name:

5600	E-CORR-NSRV-ERR	5607	E-CORR-NSRV-DOWN
5601	E-CORR-NOT-FOUND	5611	E-CORR-NET-DOWN
5602	E-CORR-BAD-NAME	5622	E-CORR-NOT-SAME-NODE
5604	E-CORR-NO-SUCH-NODE	5623	E-CORR-AMBIGUOUS-NAME
5606	E-CORR-NSRV-NOT-FOUND		

  To indicate other problems:

4010	E-BAD-TRANSACTION	4201	E-CONTEXT-ERR
4047	E-REC-NOT-FOUND	4214	E-INVALID-AGENT-NAME
4054	E-INVALID-AGENT-SEL	4230	E-MUST-BE-IWD
4055	E-INVALID-APPLIC-ID	4231	E-INVALID-AGENT-FLAG
4058	E-INVALID-REC-SEQ-NUM	4232	E-INVALID-AGENT-TYPE
4093	E-SECURITY-VIOLATION	4902	E-ERR-PROFILE-FILE

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

ALTER-AGENT-SELECT OPERATION. ALTER-AGENT-SELECT creates, deletes, or updates the requested agent selection entry recorded in the depot profile file. The agent is identified by AGENT-REC-NUM. The selection entry is contained in fields AGENT-NAME through AGENT-DATA.

The list of agents for a depot is ordered by agent record number (AGENT-REC-NUM field). Existing agents can have AGENT-REC-NUM values in the range of 1 through 500.

The AGENT-REC-NUM values are numbered consecutively. Deleting an agent causes the AGENT-REC-NUM of all subsequent agents to decrease by one. Inserting an agent causes the AGENT-REC-NUM of all later agents to increase by one.

To insert a new agent after an existing agent, set the ACTION field to I and the AGENT-REC-NUM field to the record number of the existing agent.

To insert an agent at the beginning of the agent list, set the ACTION field to I and the AGENT-REC-NUM field to 0.

A write operation returns the AGENT-REC-NUM of the agent just written. Thus, an insert operation returns the record number of the agent just inserted; the number is one greater than the number you provided in the insert request. To add the next agent to the end of the list, you should use this record number in a subsequent ALTER-AGENT-SELECT UOW.

A delete operation returns either of the following:

- zero if no agent exists after the one just deleted
- the number of the next remaining agent, which is a value equal to that provided in the delete request.

ALTER-FOLDER-ORDER (UOW Code 234)

ALTER-FOLDER-ORDER modifies the ordering criteria for an existing folder. The folder must be empty.

```
DEF  alter-folder-order-uow.
  02  hdr.
    03  self-ident               PIC AA VALUE "UW".
    03  uow-code                 TYPE BINARY 16 UNSIGNED
                                   VALUE 234.
  02  corr-name                  PIC X(80) VALUE SPACES.
  02  folder-name                PIC X(80).
  02  ordering-discipline        TYPE CHARACTER 1.
    88  time-saved               VALUE "T".
    88  creator-name             VALUE "C".
    88  earliest-deliv-date      VALUE "E".
    88  applic-defined           VALUE "A".
  02  filler                     PIC X(1) VALUE SPACES.
  02  applic-order-type          PIC 9(4) COMP.
  02  options.
    03  ascending-sequence       TYPE BOOLEAN.
    03  allow-duplicates         TYPE BOOLEAN.
    03  reserved-2               TYPE BOOLEAN VALUE "N".
    03  reserved-3               TYPE BOOLEAN VALUE "N".
    03  reserved-4               TYPE BOOLEAN VALUE "N".
    03  reserved-5               TYPE BOOLEAN VALUE "N".
    03  reserved-6               TYPE BOOLEAN VALUE "N".
    03  reserved-7               TYPE BOOLEAN VALUE "N".
END.
```

```
DEF alter-folder-order-rsp.
  02  hdr.
    03  self-ident               PIC AA VALUE "UW".
    03  uow-code                 TYPE BINARY 16 UNSIGNED
                                   VALUE 234.
  02  retn-code                  TYPE BINARY 16.
  02  retn-code-detail           TYPE BINARY 16.
  02  corr-name                  PIC X(80).
  02  folder-name                PIC X(80).
END.
```

ALTER-FOLDER-ORDER FIELDS. The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 234.

- CORR-NAME is the name of the correspondent represented by the calling process. Only system administrators can enter correspondent names other than their own in this field; correspondents without system administrator privileges must enter their own names or leave the field blank. On input, you can use a partially qualified name, including wild card characters. In the response, the fully qualified correspondent name is returned.

- FOLDER-NAME is the name of an existing folder that is empty.

  Special folder names INBOX and WASTEBASKET can be entered provided the special folders are empty.

  - These special folders cannot have APPLIC-DEFINED (A) ordering discipline. An attempt to use APPLIC-DEFINED ordering for these folders returns the error E-SPECIAL-FLD.

  - These special folders must allow duplicates. An attempt to set the ALLOW-DUPLICATES option to N for these folders returns the error E-SPECIAL-FLD.

- ORDERING-DISCIPLINE specifies what information TISERV should use as the ordering key when saving items in the folder as follows:

Entry	Meaning
TIME-SAVED (T)	Save items in chronological order of the time a SAVE-ITEM UOW is executed for the items. TRANSFER A01/A02 uses the TIME-SAVED ordering discipline exclusively. Folders created by either TRANSFER A01 or A02 are ordered in ascending sequence by time saved unless the ordering criteria is subsequently altered.
CREATOR-NAME (C)	Save items in alphabetic order by creator name.
EARLIEST-DELIV-DATE (E)	Save items that are package headers and are unalterable by earliest delivery date; save items that are not package headers or are package headers and are alterable by creation date.

APPLIC-DEFINED (A) Save items in order of the ordering key specified by the application in the SAVE-ITEM-BY-KEY UOW.

An application can specify the same ordering key for multiple items if duplicates are allowed; if duplicates are not allowed, the application is responsible for ensuring the uniqueness of the key.

If this field contains a character other than T, C, E, or A, TISERV returns the error E-INVALID-ORD-DISCIPLN.

- APPLIC-ORDER-TYPE is meaningful only if ORDERING-DISCIPLINE is APPLIC-DEFINED (A). If ORDERING-DISCIPLINE is not APPLIC-DEFINED, the field is ignored.

  This field is not interpreted by TRANSFER, but is stored as part of the folder's ordering criteria and is returned by the GET-FOLDER-ORDER UOW. This enables a TRANSFER application to have several types of APPLIC-DEFINED ordering; the APPLIC-ORDER-TYPE can be used to distinguish between types.

  The field can have a value from 0 through 9999; values 100 through 999 are reserved for Tandem. If a number outside this range is specified, TISERV returns the error E-INVALID-APP-ORD-TYPE.

- OPTIONS provides additional criteria for saving items. Two options are provided.

  ASCENDING-SEQUENCE determines whether items are saved within the folder in ascending or descending key order.

  Y = Save items in ascending key order.

  N = Save items in descending key order.

  Variable length APPLIC-DEFINED keys that are used with descending key order will not collate in the correct order unless the application pads the key with enough bytes to make it a constant length for all entries in the folder.

A folder ordered by CREATOR-NAME in descending sequence is an example of a field that is variable length and is automatically padded to be 120 bytes. For a folder ordered by CREATOR-NAME in ascending sequence, the amount of disc space used corresponds directly to the length of creator names and the number of items saved in a folder. Considering creator names of a maximum of 20 characters, the cost of descending sequence over ascending sequence in terms of disc space is approximately 100 bytes per item saved in a folder ordered by CREATOR-NAME.

ALLOW-DUPLICATES determines whether or not multiple items with the same ordering key can be saved in a folder.

Y = Duplicate ordering keys are allowed.

N = Duplicate ordering keys are not allowed. This field has no effect if the ORDERING-DISCIPLINE is TIME-SAVED (T); TIME-SAVED ordering already ensures a unique key. This option is illegal for special folders INBOX and WASTEBASKET.

RESERVED-2 through RESERVED-7 are reserved for use by Tandem; these fields must be set to N.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries.

To indicate successful ordering of the folder:

0 OK

To indicate problems with the correspondent name:

5600	E-CORR-NSVR-ERR	5607	E-CORR-NSRV-DOWN
5601	E-CORR-NOT-FOUND	5611	E-CORR-NET-DOWN
5602	E-CORR-BAD-NAME	5622	E-CORR-NOT-SAME-NODE
5604	E-CORR-NO SUCH NODE	5623	E-CORR-AMBIGUOUS-NAME
5606	E-CORR-NSRV-NOT-FOUND		

To indicate problems with the folder name:

5675	E-FLD-NSRV-ERR	5682	E-FLD-NSRV-DOWN
5676	E-FLD-NOT-FOUND	5683	E-FLD-NO-PARENT
5677	E-FLD-BAD-NAME	5686	E-FLD-NET-DOWN
5679	E-FLD-NO-SUCH-NODE	5697	E-FLD-NOT-SAME-NODE
5681	E-FLD-NSRV-NOT-FOUND	5698	E-FLD-AMBIGUOUS-NAME

To indicate other problems:

4010	E-BAD-TRANSACTION	4265	E-INVALID-ORD-DISCIPLN
4051	E-MUST-BE-YN	4266	E-INVALID-APP-ORD-TYPE
4052	E-RESERVED-MUST-BE-N	4267	E-ITEMS-IN-FLD
4093	E-SECURITY-VIOLATION	4968	E-SPECIAL-FLD
4105	E-CONCURRNT-FLD-UPDATE	4902	E-ERR-PROFILE-FILE
4201	E-CONTEXT-ERR	4912	E-ERR-FOLDER-FILE

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

ALTER-FOLDER-ORDER OPERATION. ALTER-FOLDER-ORDER updates the ordering criteria for the specified folder. Field values in this UOW indicate the new ordering criteria.

Folder order affects the sequence in which items are saved and subsequently referenced. Each item saved in a folder has an associated ordering key. The ordering key can be information associated with the item, such as the name of the item's creator, or information provided by the TRANSFER application. Every folder is ordered by the value of the ordering key associated with each item stored in the folder.

SCAN-FOLDER, SCAN-FOLDER-B00, and SCAN-FOLDER-BY-KEY UOWs retrieve item IDs in ordering key sequence. The SCAN-FOLDER-BY-KEY UOW, however, is restricted to folders with an APPLIC-DEFINED ordering discipline.

A folder must be empty before the ordering criteria can be altered. If an ALTER-FOLDER-ORDER UOW is issued for a folder that contains items, TISERV returns the error E-ITEMS-IN-FLD.

ALTER-ITEM-DESCR (UOW Code 116)

ALTER-ITEM-DESCR updates fields in an item descriptor. The descriptor can apply to either a package or a non-package item. This UOW is used primarily to set a number of attributes for a package prior to submission of that package for delivery.

Typically, this UOW is issued after a GET-ITEM-DESCR UOW.

```
DEF  alter-item-descr-uow.
  02  hdr.
    03  self-ident                PIC AA VALUE "UW".
    03  uow-code                  TYPE BINARY 16 UNSIGNED
                                    VALUE 116.
  02  item-id.
    03  dummy                     PIC X(12).
  02  update-control              PIC S9(4) COMP.
  02  fields-to-alter.
    03  item-type                 TYPE BOOLEAN.
    03  earliest-deliv-date       TYPE BOOLEAN.
    03  latest-deliv-date         TYPE BOOLEAN.
    03  expiration-date           TYPE BOOLEAN.
    03  priority                  TYPE BOOLEAN.
    03  agent-selector            TYPE BOOLEAN.
    03  reserved-6                TYPE BOOLEAN VALUE "N".
    03  reserved-7                TYPE BOOLEAN VALUE "N".
    03  deliv-control-flags.
      04  certified               TYPE BOOLEAN.
      04  byte                    REDEFINES CERTIFIED PIC X.
      04  reserved-1              TYPE BOOLEAN VALUE "N".
      04  reserved-2              TYPE BOOLEAN VALUE "N".
      04  reserved-3              TYPE BOOLEAN VALUE "N".
      04  reserved-4              TYPE BOOLEAN VALUE "N".
      04  reserved-5              TYPE BOOLEAN VALUE "N".
      04  reserved-6              TYPE BOOLEAN VALUE "N".
      04  reserved-7              TYPE BOOLEAN VALUE "N".
    03  err-pkg-suppress-flags.
      04  invalid-recip           TYPE BOOLEAN.
      04  byte                    REDEFINES INVALID-RECIP PIC X.
      04  invalid-dlist           TYPE BOOLEAN.
      04  reserved-2              TYPE BOOLEAN VALUE "N".
      04  too-late-to-deliver     TYPE BOOLEAN.
      04  expired-unexamined      TYPE BOOLEAN.
      04  reserved-5              TYPE BOOLEAN VALUE "N".
      04  reserved-6              TYPE BOOLEAN VALUE "N".
      04  reserved-7              TYPE BOOLEAN VALUE "N".
```

→

```
02 alterable-fields.
  03  item-type                PIC 9(4) COMP.
  03  rel-date-earliest        TYPE BOOLEAN.
  03  rel-date-latest          TYPE BOOLEAN.
  03  rel-date-expiration      TYPE BOOLEAN.
  03  reserved-3               TYPE BOOLEAN VALUE "N".
  03  earliest-deliv-date.
    04  date-time.
      05  year                 PIC 9(4).
      05  month                PIC 9(2).
      05  day-of-month         PIC 9(2).
      05  hour                 PIC 9(2).
      05  minute               PIC 9(2).
      05  second               PIC 9(2).
    04  delta-time             REDEFINES DATE-TIME.
      05  quantity             PIC 9(4) COMP.
      05  units                PIC A.
      05  filler               PIC X.
  03  latest-deliv-date.
    04  date-time.
      05  year                 PIC 9(4).
      05  month                PIC 9(2).
      05  day-of-month         PIC 9(2).
      05  hour                 PIC 9(2).
      05  minute               PIC 9(2).
      05  second               PIC 9(2).
    04  delta-time             REDEFINES DATE-TIME.
      05  quantity             PIC 9(4) COMP.
      05  units                PIC A.
      05  filler               PIC X.
  03  expiration-date.
    04  date-time.
      05  year                 PIC 9(4).
      05  month                PIC 9(2).
      05  day-of-month         PIC 9(2).
      05  hour                 PIC 9(2).
      05  minute               PIC 9(2).
      05  second               PIC 9(2).
    04  delta-time             REDEFINES DATE-TIME.
      05  quantity             PIC 9(4) COMP.
      05  units                PIC A.
      05  filler               PIC X.
  03  priority                 PIC 9(3) COMP.
  03  agent-selector           PIC 9(4) COMP.
  03  deliv-control-flags.
    04  certified              TYPE BOOLEAN.
    04  byte                   REDEFINES CERTIFIED PIC X.
```

→

```
      04  reserved-1            TYPE BOOLEAN VALUE "N".
      04  reserved-2            TYPE BOOLEAN VALUE "N".
      04  reserved-3            TYPE BOOLEAN VALUE "N".
      04  reserved-4            TYPE BOOLEAN VALUE "N".
      04  reserved-5            TYPE BOOLEAN VALUE "N".
      04  reserved-6            TYPE BOOLEAN VALUE "N".
      04  reserved-7            TYPE BOOLEAN VALUE "N".
    03  err-pkg-suppress-flags.
      04  invalid-recip         TYPE BOOLEAN.
      04  byte                  REDEFINES INVALID-RECIP PIC X.
      04  invalid-dlist         TYPE BOOLEAN.
      04  reserved-2            TYPE BOOLEAN VALUE "N".
      04  too-late-to-deliver   TYPE BOOLEAN.
      04  expired-unexamined    TYPE BOOLEAN.
      04  reserved-5            TYPE BOOLEAN VALUE "N".
      04  reserved-6            TYPE BOOLEAN VALUE "N".
      04  reserved-7            TYPE BOOLEAN VALUE "N".
END.
```

```
DEF  alter-item-descr-rsp.
  02  hdr.
    03  self-ident              PIC AA VALUE "UW".
    03  uow-code                TYPE BINARY 16 UNSIGNED
                                  VALUE 116.
  02  retn-code                 TYPE BINARY 16.
  02  retn-code-detail          TYPE BINARY 16.
END.
```

<u>ALTER-ITEM-DESCR FIELDS.</u> The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 116.

- ITEM-ID identifies the item whose descriptor record is to be changed.

- UPDATE-CONTROL is the counter used to control concurrent update operations.

  Enter the value returned by the GET-ITEM-DESCR UOW. If the UPDATE-CONTROL field is greater than 0, it must match the update control value stored in the data base for the update to succeed. If you set the UPDATE-CONTROL field to -1, TRANSFER does not check this field against the value stored in the data base. UPDATE-CONTROL values of 0 or less than -1 are invalid.

- FIELDS-TO-ALTER lets you select the fields to be altered within the item descriptor.

  Y = Select the field for alteration.

  N = Disable the field from alteration.

  The meaning of each item descriptor field that can be accessed by your process is discussed under ALTERABLE-FIELDS. All of these fields can be retrieved through the GET-ITEM-DESCR UOW.

  RESERVED-6 and RESERVED-7 are reserved for use by Tandem; these fields must be set to N.

  The alterable fields do not require system administrator capability for alteration; if the item is alterable, the fields can be modified by any correspondent who has access to the item.

- DELIV-CONTROL-FLAGS specifies whether or not the package is certified. Fields within DELIV-CONTROL-FLAGS are as follows:

  CERTIFIED specifies whether the package is certified; that is, whether a certification package is returned to the sender whenever a recipient acknowledges receipt of a package via the ACK-RECEIPT UOW.

  Y = Flag the package for certification.

  N = Do not flag the package for certification.

  RESERVED-1 through RESERVED-7 are reserved for use by Tandem; these fields must be set to N.

- ERR-PKG-SUPPRESS-FLAGS lets you suppress the effects of specific asynchronous errors. Fields within ERR-PKG-SUPPRESS-FLAGS are as follows:

  The flags INVALID-RECIP through EXPIRED-UNEXAMINED denote asynchronous errors detected by TRANSFER. If one of these errors occurs and error reporting is not suppressed, TRANSFER transmits a package reporting the error to the sender.

  Y = Suppress the error-reporting package.

  N = Do not suppress the error-reporting package.

  The fields RESERVED-2 and RESERVED-5 through RESERVED-7 are reserved for use by Tandem; these fields must be set to N.

- ALTERABLE-FIELDS lets you indicate what updating should be done to the fields for which Y was specified under FIELDS-TO-ALTER. These fields and their allowable entries are defined as follows:

  ITEM-TYPE indicates the type of the item, as defined by the application.

  REL-DATE-EARLIEST, REL-DATE-LATEST, and REL-DATE-EXPIRATION determine whether the entries you specify in the EARLIEST-DELIV-DATE, LATEST-DELIV-DATE, and EXPIRATION-DATE fields are relative to the dates with respect to particular delivery milestones, or absolute calendar dates.

  Y = relative dates

  N = absolute dates

  RESERVED-3 is reserved for use by Tandem; this field must be set to N.

  EARLIEST-DELIV-DATE is the earliest date at which the package can be delivered, specified either as an absolute calendar date or as a number of time units from submission time. An absolute or relative date is indicated by the REL-DATE-EARLIEST field.

  EARLIEST-DELIV-DATE and LATEST-DELIV-DATE together define the delivery window within which TRANSFER must deliver the package, as illustrated in Figure 5-2. If TRANSFER is unable to deliver the package to one or more recipients during the delivery window, it returns the package to the sender with an explanation and discontinues further delivery attempts. Under no circumstances is a package delivered sooner than its EARLIEST-DELIV-DATE. You can regard the EARLIEST-DELIV-DATE as the effective submission date of the package--in other words, as the postmark.

  In DELTA-TIME, UNITS is the unit of time denoted in QUANTITY. UNITS can be set to D (for days), H (for hours), and M (for minutes). To specify one day, for example, set QUANTITY to 1 and UNITS to D.

  LATEST-DELIV-DATE is the latest date at which TRANSFER can deliver the package, specified either as an absolute calendar date or as a number of time units from EARLIEST-DELIVERY-DATE. An absolute or relative date is indicated by the REL-DATE-LATEST field.

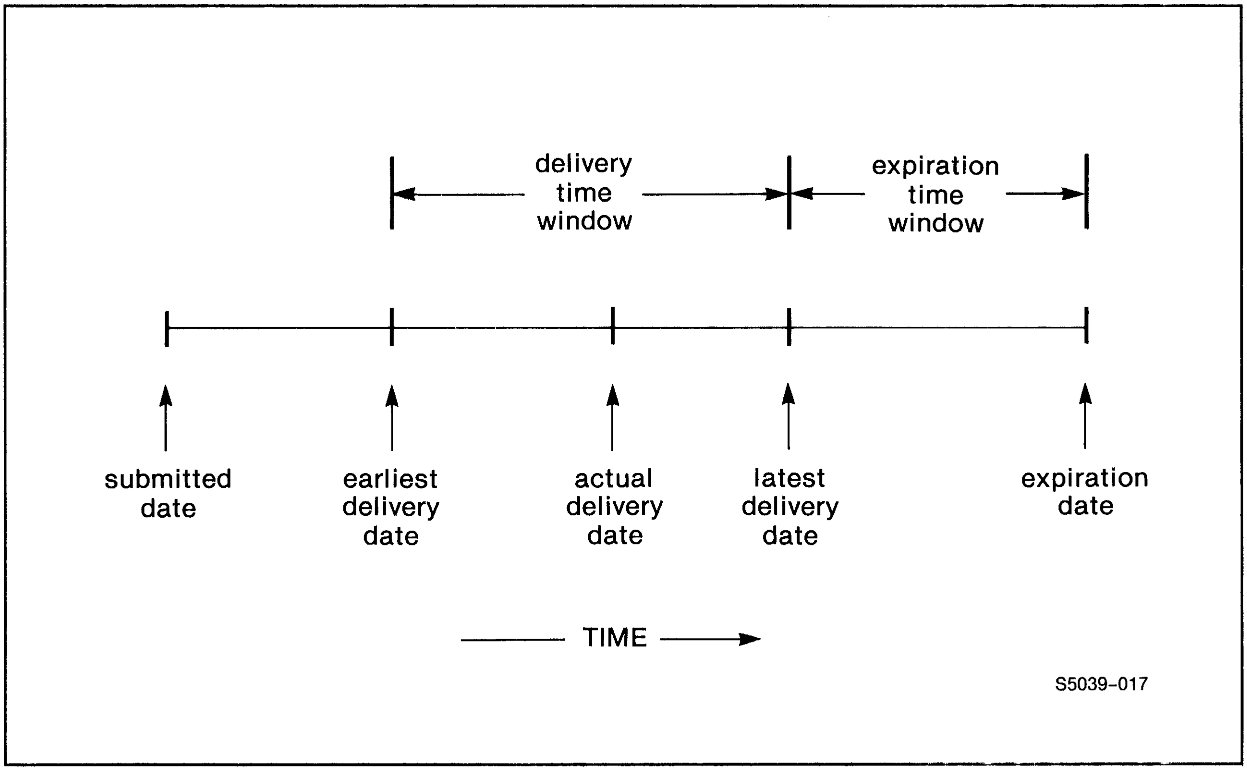


Figure 5-2. Package Delivery Time Milestones

EXPIRATION-DATE is the date on which the package expires. On this date, the package is automatically removed from the INBOX of any recipient who has not already acknowledged its receipt through the ACK-RECEIPT UOW. Packages that either are acknowledged or are in other folders are not affected by expiration. Any copy of the package kept by the sender must be explicitly discarded by the sender. A relative date of value 0 M means no expiration.

If a package expires and the recipient has not acknowledged its receipt, TRANSFER removes the package from the INBOX and notifies the sender. Packages that are acknowledged by the recipient are never removed from the INBOX by TRANSFER; they must be explicitly removed by the recipient.

By initial system default, TRANSFER packages do not expire. You can specify that a given package should eventually expire by including a nonzero absolute or relative expiration date/time in the package header. You can change the default for your depot by specifying a nonzero relative expiration time in your correspondent profile. This value must be within the maximum lifespan as indicated by a TRANSFER system control parameter; each package submitted with a nonzero expiration field will have that field increased, as necessary, so that it exceeds the system minimum.

The interval between the LATEST-DELIV-DATE and EXPIRATION-DATE is the package expiration time window. You can specify the EXPIRATION-DATE as an absolute calendar date or a number of time units from LATEST-DELIV-DATE. An absolute or relative date is indicated by the REL-DATE-EXPIRATION field.

PRIORITY is the package priority. The field can have a value from 0 (lowest priority) to 199 (highest priority).

AGENT-SELECTOR is the agent selector criteria, as created by the ALTER-AGENT-SELECT UOW. This is a number that is stored with the package to determine which agents are invoked when the package is delivered. Refer to the ALTER-AGENT-SELECT UOW.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries:

0	OK		
4010	E-BAD-TRANSACTION	4056	E-INVALID-ITEM-TYPE
4035	E-ITEM-NOT-FOUND	4072	E-UNITS-MUST-BE-DHM
4041	E-ITEM-UNALTERABLE	4073	E-INVALID-DATE-TIME
4042	E-ITEM-NOT-PKG-HDR	4074	E-INVALID-REL-TIME-QTY
4050	E-UPDATE-MISMATCH	4078	E-INVALID-PRIORITY
4051	E-MUST-BE-YN	4906	E-ERR-ITEMDESC-FILE
4052	E-RESERVED-MUST-BE-N	4912	E-ERR-FOLDER-FILE
4054	E-INVALID-AGENT-SEL	4922	E-ERR-INV-FOLDER-FILE

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

ALTER-ITEM-DESCR OPERATION. ALTER-ITEM-DESCR alters the fields in an item descriptor. This UOW selects for alteration those fields chosen in FIELDS-TO-ALTER, and modifies them in accordance with the information supplied in ALTERABLE-FIELDS.

If you do not issue this UOW for a package, the package will be delivered by TRANSFER in accordance with default values assumed at package creation.

If the item descriptor is not a package header item, ITEM-TYPE is the only field that can be altered.

If the UOW requests updates of multiple fields and one of the alterations is illegal and fails, none of the requested fields are updated.

ALTER-PROFILE-ELEM (UOW Code 204)

ALTER-PROFILE-ELEM alters data elements in a depot profile record. Typically, this UOW is issued after a GET-PROFILE-ELEM UOW.

Definition I (a DDL skeleton format to which definitions can be added; for general applications use):

```
DEF  alter-profile-elem-usk.
  02  hdr.
    03  self-ident                PIC AA VALUE "UW".
    03  uow-code                  TYPE BINARY 16 UNSIGNED
                                    VALUE 204.
  02  filler                      TYPE CHARACTER 4.
  02  corr-name                   PIC X(80) VALUE SPACES.
  02  num-returned                TYPE BINARY 16 UNSIGNED.
END.
```

```
DEF  alter-profile-elem-rsk.
  02  hdr.
    03  self-ident                PIC AA VALUE "UW".
    03  uow-code                  TYPE BINARY 16 UNSIGNED
                                    VALUE 204.
  02  retn-code                   TYPE BINARY 16.
  02  retn-code-detail            TYPE BINARY 16.
  02  corr-name                   PIC X(80).
  02  num-returned                TYPE BINARY 16.
END.
```

Definition II (for TAL programs):

```
DEF  alter-profile-elem-uow.
  02  hdr.
    03  self-ident                PIC AA VALUE "UW".
    03  uow-code                  TYPE BINARY 16 UNSIGNED
                                    VALUE 204.
  02  filler                      TYPE CHARACTER 4.
  02  corr-name                   PIC X(80) VALUE SPACES.
  02  num-returned                TYPE BINARY 16 UNSIGNED.
  02  elem-data-block             TYPE PROFILE-ELEM-SHORT
                                    OCCURS 0 TO 10 TIMES
                                    DEPENDING ON num-returned.
END.
```

→

See GET-PROFILE-ELEM for Operational Details

```
DEF  alter-profile-elem-rsp.
  02  hdr.
    03  self-ident                PIC AA VALUE "UW".
    03  uow-code                  TYPE BINARY 16 UNSIGNED
                                    VALUE 204.
  02  retn-code                   TYPE BINARY 16.
  02  retn-code-detail            TYPE BINARY 16.
  02  corr-name                   PIC X(80).
  02  num-returned                TYPE BINARY 16 UNSIGNED.
  02  elem-retn-code              TYPE BINARY 16
                                    OCCURS 0 TO 10 TIMES
                                    DEPENDING ON num-returned.
END.
```

ALTER-PROFILE-ELEM FIELDS. The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 204.

- CORR-NAME is the name of the correspondent whose depot profile will be altered. This is also the correspondent represented by the calling process. Only system administrators can enter correspondent names other than their own in this field; correspondents without system administrator privileges must enter their own names or leave the field blank. On input, you can use a partially qualified name, including wildcard characters. In the response, the fully qualified name is returned.

- NUM-RETURNED is the number of data elements that you will alter. You can specify any number of elements, restricted only by the length of the entire IPC that contains this UOW. In the response, this field contains:

  - the number actually altered if no serious errors are detected

  - zero if serious errors are detected

- ELEM-DATA-BLOCK (used in Definition II only) represents specific fields to be altered, and is either 36 or 84 bytes long. The format of the ELEM-DATA-BLOCK field is the same as the format in which this field is returned by the GET-PROFILE-ELEM UOW. Refer to the discussion of the GET-PROFILE-ELEM UOW for details.

See GET-PROFILE-ELEM for Operational Details

You can specify several element blocks in one ALTER-PROFILE-ELEM UOW. Long and short element blocks can, in fact, be mixed; TISERV accepts a mixture of block lengths in one occurrence of this UOW.

For general applications (Definition I), you typically construct an ALTER-PROFILE-ELEM UOW by specifying all fields up to and including NUM-RETURNED, and then specifying separate definitions for each particular element. Alternatively, you can define the element block as a DEPENDING ON construction, using either PROFILE-ELEMENT-SHORT or PROFILE-ELEMENT-LONG; notice, however, that this type of construction does not permit mixing both long and short blocks. An example of an element block construction is:

```
DEF  my-special-request         TYPE ALTER-PROFILE-ELEMENT-UOW.
  02  data-depot-priorities     TYPE *.
  02  data-depot-mail-flags     TYPE *.
  02  data-depot-mail-filename TYPE *.
END.
```

For this example, NUM-RETURNED would be set to 3.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries.

  To indicate successful record alteration:

0	OK

  To indicate problems with the correspondent name:

5600	E-CORR-NSRV-ERR	5607	E-CORR-NSRV-DOWN
5601	E-CORR-NOT-FOUND	5611	E-CORR-NET-DOWN
5602	E-CORR-BAD-NAME	5622	E-CORR-NOT-SAME-NODE
5604	E-CORR-NO-SUCH-NODE	5623	E-CORR-AMBIGUOUS-NAME
5606	E-CORR-NSRV-NOT-FOUND		

  To indicate other problems:

4010	E-BAD-TRANSACTION	4210	W-IDENTIFIER-ERRS
4093	E-SECURITY-VIOLATION	4902	E-ERR-PROFILE-FILE
4201	E-CONTEXT-ERR		

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

- ELEM-RETN-CODE (used in Definition II only) supplies return codes for specific data elements. The response contains the same number of return codes as the number of elements for which alteration was requested.

See GET-PROFILE-ELEM for Operational Details

To indicate successful alteration of the element:

0 OK

To indicate errors encountered with the element, see the discussion of the GET-PROFILE-ELEM UOW.

ALTER-PROFILE-ELEM OPERATION. The ALTER-PROFILE-ELEM UOW and the GET-PROFILE-ELEM UOW complement each other. Because these two UOWs are closely involved with one another and because they share common field definitions, the details of their operation are discussed in a common area of this manual, under the description of the GET-PROFILE-ELEM UOW. Refer to that description for further information about the ALTER-PROFILE-ELEM UOW.

The GET-PROFILE-ELEM response has exactly the same format as the ALTER-PROFILE-ELEM request. To use the same definition for both UOWs, you only need to change the UOW code value.

See GET-PROFILE-ELEM for Operational Details

ATTACH-COMPNT-A01 (UOW Code 136)

ATTACH-COMPNT-A01 attaches a component item to a parent.

```
DEF  attach-compnt-a01-uow.
    02  hdr.
      03  self-ident            PIC AA VALUE "UW".
      03  uow-code              TYPE BINARY 16 UNSIGNED
                                  VALUE 136.
    02  parent-item-id.
      03  dummy                 PIC X(12).
    02  compnt-id.
      03  dummy                 PIC X(12).
    02  rel-position            TYPE BINARY 16.
    02  compnt-type             PIC 9(4) COMP.
END.
```

```
DEF  attach-compnt-a01-rsp.
   02  hdr.
     03  self-ident             PIC AA VALUE "UW".
     03  uow-code               TYPE BINARY 16 UNSIGNED
                                  VALUE 136.
   02  retn-code                TYPE BINARY 16.
   02  retn-code-detail         TYPE BINARY 16.
   02  inserted-position        TYPE BINARY 16.
END.
```

ATTACH-COMPNT-A01 FIELDS. The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 136.
- PARENT-ITEM-ID is the parent item.
- COMPNT-ID is the component item.
- REL-POSITION is the position that the component item will occupy in the parent item component list. Unless this is the last position, the entry previously occupying this position and all entries following it are shifted to the next higher position. The first component item occupies relative position 1. The value 0 is illegal in this field.

If the relative position of the last component is unknown, you can reference this position by setting the REL-POSITION field to -1. The value -1 means the last position of the list. Suppose, for example, that the list contained 30 components. If you issued the ATTACH-COMPNT-A01 UOW to attach a new component to the item and used the value -1 in REL-POSITION, that new component would occupy the 31st position in the list, as illustrated in Figure 5-3.

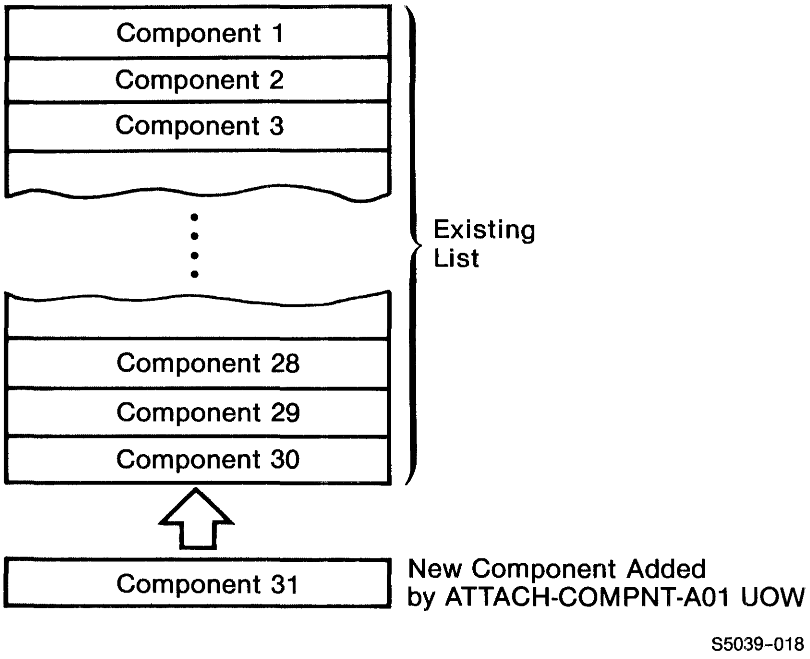


Figure 5-3. Attaching a New Component to a Parent Item

- COMPNT-TYPE is a numeric value that TRANSFER will save with the component. The value can range from 0 through 9999; values 100 through 999 are reserved for Tandem. You can use this field to indicate why the component was attached. This field is returned with the component by the GET-ITEM-COMPNT-A01 UOW. The field is not interpreted by TRANSFER.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries:

0	OK	4039	E-COMPNT-NOT-FOUND
4010	E-BAD-TRANSACTION	4040	E-BAD-ITEM-DESCR
4036	E-ITEM-TOO-COMPLEX	4041	E-ITEM-UNALTERABLE
4037	E-PARENT-NOT-FOUND	4057	E-INVALID-REL-POSITION
4038	E-COMPNT-CYCLE	4096	E-INVALID-COMPNT-TYPE

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

- INSERTED-POSITION is the position actually occupied by the new item after insertion into the components list.

ATTACH-COMPNT-A01 OPERATION. ATTACH-COMPNT-A01 attaches one item as a component of another. TISERV records the item IDs of components in components list records that are treated as part of the parent item. If this operation is successful, the component count in the parent item descriptor, and the parent count in the component item descriptor are both incremented by 1.

A component item can contain its own components, each of which can also have components; thus, you can create an entire tree of items. The parent item cannot itself be in its own tree of components; this is known as a component cycle as described in Section 6.

CANCEL-PKG (UOW Code 118)

CANCEL-PKG cancels a package. A package can only be canceled by its sender.

```
DEF  cancel-pkg-uow.
  02  hdr.
    03  self-ident                    PIC AA VALUE "UW".
    03  uow-code                      TYPE BINARY 16 UNSIGNED
                                        VALUE 118.
  02  item-id.
    03  dummy                         PIC X(12).
END.
```

```
DEF  cancel-pkg-rsp.
  02  hdr.
    03  self-ident                    PIC AA VALUE "UW".
    03  uow-code                      TYPE BINARY 16 UNSIGNED
                                        VALUE 118.
  02  retn-code                       TYPE BINARY 16.
  02  retn-code-detail                TYPE BINARY 16.
END.
```

<u>CANCEL-PKG FIELDS.</u> The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 118.

- ITEM-ID is the item ID of the package header for the package to be canceled.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries:

0	OK		
4010	E-BAD-TRANSACTION	4045	E-TSCHED-UNAVAIL
4035	E-ITEM-NOT-FOUND	4081	W-DELIV-IN-PROGRESS
4042	E-ITEM-NOT-PKG-HDR	4083	E-NOT-CREATED-BY-YOU
4044	E-PREVIOUSLY-CANCELED	4084	E-PKG-NOT-SUBMITTED

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

CANCEL-PKG OPERATION. CANCEL-PKG cancels delivery of the package indicated by ITEM-ID. TRANSFER removes this package from the INBOX folder of those recipients that have not acknowledged receipt. The CANCEL-PKG UOW also prevents any future deliveries of the package.

TRANSFER sends a cancellation notification package to any recipients who have already examined the package with the ACK-RECEIPT UOW. In addition, TRANSFER notifies the sender of any recipient who has examined the canceled package.

NOTE

> Cancellation of packages after their delivery has been initiated might create inconsistencies at the application level, and might not fully eliminate all traces of the package in the system or network.

COPY-ITEM (UOW Code 107)

COPY-ITEM makes a copy of an existing item.

```
DEF  copy-item-uow.
  02  hdr.
    03  self-ident               PIC AA VALUE "UW".
    03  uow-code                 TYPE BINARY 16 UNSIGNED
                                   VALUE 107.
  02  item-id.
    03  dummy                    PIC X(12).
  02  options.
    03  copy-data                TYPE BOOLEAN.
    03  copy-recips              TYPE BOOLEAN.
    03  copy-compnts             TYPE BOOLEAN.
    03  reserved-3               TYPE BOOLEAN VALUE "N".
END.
```

```
DEF  copy-item-rsp.
  02  hdr.
    03  self-ident               PIC AA VALUE "UW".
    03  uow-code                 TYPE BINARY 16 UNSIGNED
                                   VALUE 107.
  02  retn-code                  TYPE BINARY 16.
  02  retn-code-detail           TYPE BINARY 16.
  02  new-item-id.
    03  dummy                    PIC X(12).
END.
```

COPY-ITEM FIELDS. The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 107.
- ITEM-ID is the item to be copied (the source item).
- OPTIONS allow you to specify what is included in the copying operation by entering Y (for yes) or N (for no):

  COPY-DATA - copy all data records associated with the item.

  COPY-RECIPS - copy all recipients associated with the item if the item is a package header item.

COPY-COMPNTS - attach all components of the original item to the new copy of the item.

RESERVED-3 - reserved for use by Tandem; this field must be set to N.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries:

0	OK		
4010	E-BAD-TRANSACTION	4051	E-MUST-BE-YN
4035	E-ITEM-NOT-FOUND	4052	E-RESERVED-MUST-BE-N

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

- NEW-ITEM-ID is the ID of the new item created by the copy operation.

COPY-ITEM OPERATION. COPY-ITEM makes a copy of an existing item. This creates a new item. If the COPY-DATA field is set to Y, the new item contains the same client data as the item specified by ITEM-ID. This operation is equivalent to issuing a CREATE-ITEM request, followed by one ADD-ITEM-REC request for each client record in the original item. The new item is identified by the ID returned in NEW-ITEM-ID.

If the item is a package header, TRANSFER copies into the new item descriptor those fields that can be modified by your client; these are the fields that can be specified in the ALTER-ITEM-DESCR UOW. All other descriptor fields in the copy operation contain default values assigned by TRANSFER.

If COPY-RECIPS = Y TRANSFER copies all recipients associated with the item if the item is a package header item.

If COPY-COMPNTS = Y TRANSFER attaches all components of the original item to the copied item, and increments the parent count of each component by 1.

If you must retain access to the new item beyond the end of the current session, you must either save that item in a folder or attach the item to another item. The new item is saved in an internal temporary folder upon creation and is removed from that folder when the session is terminated.

CREATE-DEPOT (UOW Code 201)

CREATE-DEPOT creates a new correspondent and depot. This UOW can be issued only by correspondents with system administrator capability.

```
DEF  create-depot-uow.
  02  hdr.
    03  self-ident                  PIC AA VALUE "UW".
    03  uow-code                    TYPE BINARY 16 UNSIGNED
                                      VALUE 201.
  02  new-corr                      PIC X(80).
  02  model-name                    PIC X(80) VALUE SPACES.
END.
```

```
DEF  create-depot-rsp.
  02  hdr.
    03  self-ident                  PIC AA VALUE "UW".
    03  uow-code                    TYPE BINARY 16 UNSIGNED
                                      VALUE 201.
  02  retn-code                     TYPE BINARY 16.
  02  retn-code-detail              TYPE BINARY 16.
END.
```

CREATE-DEPOT FIELDS. The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 201.
- NEW-CORR is the name of the new correspondent.
- MODEL-NAME is the name of an existing correspondent whose depot will be used as a model depot. The profile and the special folders for the model depot are used as a model to construct the profile and the special folders for the new depot. TRANSFER copies the attributes (all profile records and special folder ordering criteria) of the model depot into the depot for the new correspondent. If you do not specify a model name in this field, TRANSFER uses the default model depot.
- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries.

To indicate successful creation of the new correspondent and depot:

0	OK

To indicate problems with the new correspondent name:

4208	E-CORR-BLANK	5607	E-CORR-NSRV-DOWN
5600	E-CORR-NSRV-ERR	5612	E-CORR-ALREADY-EXISTS
5602	E-CORR-BAD-NAME	5622	E-CORR-NOT-SAME-NODE
5606	E-CORR-NSRV-NOT-FOUND		

To indicate problems with the model name:

4205	E-MODEL-DEPOT-ABSENT	5731	E-MODEL-NSRV-NOT-FOUND
5725	E-MODEL-NSRV-ERR	5732	E-MODEL-NSRV-DOWN
5726	E-MODEL-NOT-FOUND	5736	E-MODEL-NET-DOWN
5727	E-MODEL-BAD-NAME	5747	E-MODEL-NOT-SAME-NODE
5729	E-MODEL-NO-SUCH-NODE	5748	E-MODEL-AMBIGUOUS-NAME

To indicate other problems:

4010	E-BAD-TRANSACTION	4201	E-CONTEXT-ERR
4093	E-SECURITY-VIOLATION	4902	E-ERR-PROFILE-FILE

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

CREATE-DEPOT OPERATION. The CREATE-DEPOT UOW adds a new correspondent to the system by entering the correspondent name in the TRANSFER name directory, and creates a depot for that correspondent. The depot is created on the same node as the copy of TISERV accessed by this UOW.

If a depot already exists for the correspondent identified by NEW-CORR or if certain other errors occur, TRANSFER does not create the depot.

If you specify a model depot in the MODEL-NAME field, TRANSFER copies all profiles, including any agents, from the model depot to the new depot profile. TRANSFER uses the ordering criteria that was specified for the special folders in the model depot for the special folders in the new depot. If you do not specify a model depot, TRANSFER uses the default model depot.

CREATE-DLIST (UOW Code 217)

CREATE-DLIST creates a distribution list.

```
DEF  create-dlist-uow.
  02  hdr.
    03  self-ident                   PIC AA VALUE "UW".
    03  uow-code                     TYPE BINARY 16 UNSIGNED
                                       VALUE 217.
  02  corr-name                      PIC X(80) VALUE SPACES.
  02  dlist-name                     PIC X(80).
END.
```

```
DEF  create-dlist-rsp.
  02  hdr.
    03  self-ident                   PIC AA VALUE "UW".
    03  uow-code                     TYPE BINARY 16 UNSIGNED
                                       VALUE 217.
  02  retn-code                      TYPE BINARY 16.
  02  retn-code-detail               TYPE BINARY 16.
  02  corr-name                      PIC X(80).
END.
```

CREATE-DLIST FIELDS. The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 217.

- CORR-NAME is the name of the correspondent represented by the calling process. Only system administrators can enter correspondent names other than their own in this field; correspondents without system administrator privileges must enter their own names or leave the field blank. On input, you can use a partially qualified name, including wildcard characters. In the response, the fully qualified name is returned.

- DLIST-NAME is the name to be assigned to the new distribution list. The name must be either a TRANSFER simple name or a fully qualified name.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries.

  To indicate successful creation of the distribution list:

  0 OK

To indicate problems with the correspondent name:

5600	E-CORR-NSRV-ERR	5607	E-CORR-NSRV-DOWN
5601	E-CORR-NOT-FOUND	5611	E-CORR-NET-DOWN
5602	E-CORR-BAD-NAME	5622	E-CORR-NOT-SAME-NODE
5604	E-CORR-NO-SUCH-NODE	5623	E-CORR-AMBIGUOUS-NAME
5606	E-CORR-NSRV-NOT-FOUND		

To indicate problems with the distribution list name:

5625	E-DLIST-NSRV-ERR	5633	E-DLIST-NO-PARENT
5627	E-DLIST-BAD-NAME	5636	E-DLIST-NET-DOWN
5629	E-DLIST-NO-SUCH-NODE	5637	E-DLIST-ALREADY-EXISTS
5631	E-DLIST-NSRV-NOT-FOUND	5647	E-DLIST-NOT-SAME-NODE
5632	E-DLIST-NSRV-DOWN	5648	E-DLIST-AMBIGUOUS-NAME

To indicate other problems:

4010	E-BAD-TRANSACTION	4201	E-CONTEXT-ERR
4093	E-SECURITY-VIOLATION	4902	E-ERR-PROFILE-FILE

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

CREATE-DLIST OPERATION. CREATE-DLIST creates a new distribution list with the name assigned in DLIST-NAME.

CREATE-FOLDER (UOW Code 227)

CREATE-FOLDER creates a new folder. This UOW is maintained for version compatibility only. CREATE-FOLDER-B00 is the recommended UOW.

```
DEF  create-folder-uow.
  02  hdr.
    03  self-ident                 PIC AA VALUE "UW".
    03  uow-code                   TYPE BINARY 16 UNSIGNED
                                     VALUE 227.
  02  corr-name                    PIC X(80) VALUE SPACES.
  02  folder-name                  PIC X(80).
END.
```

```
DEF  create-folder-rsp.
  02  hdr.
    03  self-ident                 PIC AA VALUE "UW".
    03  uow-code                   TYPE BINARY 16 UNSIGNED
                                     VALUE 227.
  02  retn-code                    TYPE BINARY 16.
  02  retn-code-detail             TYPE BINARY 16.
  02  corr-name                    PIC X(80).
END.
```

CREATE-FOLDER FIELDS. The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 227.

- CORR-NAME is the name of the correspondent represented by the calling process. Only system administrators can enter correspondent names other than their own in this field; correspondents without system administrator privileges must enter their own names or leave the field blank. On input, you can use a partially qualified name, including wildcard characters. In the response, the fully qualified correspondent name is returned.

- FOLDER-NAME is the name to be assigned to the new folder. The name must be either a TRANSFER simple name or a fully qualified name.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries.

To indicate successful creation of the folder:

0 OK

To indicate problems with the correspondent name:

5600	E-CORR-NSRV-ERR	5607	E-CORR-NSRV-DOWN
5601	E-CORR-NOT-FOUND	5611	E-CORR-NET-DOWN
5602	E-CORR-BAD-NAME	5622	E-CORR-NOT-SAME-NODE
5604	E-CORR-NO-SUCH-NODE	5623	E-CORR-AMBIGUOUS-NAME
5606	E-CORR-NSRV-NOT-FOUND		

To indicate problems with the folder name:

5675	E-FLD-NSRV-ERR	5683	E-FLD-NO-PARENT
5677	E-FLD-BAD-NAME	5686	E-FLD-NET-DOWN
5679	E-FLD-NO-SUCH-NODE	5687	E-FLD-ALREADY-EXISTS
5681	E-FLD-NSRV-NOT-FOUND	5697	E-FLD-NOT-SAME-NODE
5682	E-FLD-NSRV-DOWN	5698	E-FLD-AMBIGUOUS-NAME

To indicate other problems:

4010	E-BAD-TRANSACTION	4201	E-CONTEXT-ERR
4093	E-SECURITY-VIOLATION	4902	E-ERR-PROFILE-FILE

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

CREATE-FOLDER OPERATION. CREATE-FOLDER creates a new folder with the name assigned in FOLDER-NAME. The folder is created in ascending sequence by time saved, which is the ordering criteria used by TRANSFER A01/A02.

CREATE-FOLDER-B00 (UOW Code 232)

CREATE-FOLDER-B00 creates a new folder and establishes the ordering criteria by which items will be stored in the folder.

```
DEF  create-folder-b00-uow.
  02  hdr.
    03  self-ident                  PIC AA VALUE "UW".
    03  uow-code                    TYPE BINARY 16 UNSIGNED
                                      VALUE 232.
  02  corr-name                     PIC X(80) VALUE SPACES.
  02  folder-name                   PIC X(80).
  02  ordering-discipline           TYPE CHARACTER 1.
    88  time-saved                  VALUE "T".
    88  creator-name                VALUE "C".
    88  earliest-deliv-date         VALUE "E".
    88  applic-defined              VALUE "A".
  02  filler                        PIC X(1) VALUE SPACES.
  02  applic-order-type             PIC 9(4) COMP.
  02  options.
    03  ascending-sequence          TYPE BOOLEAN.
    03  allow-duplicates            TYPE BOOLEAN.
    03  reserved-2                  TYPE BOOLEAN VALUE "N".
    03  reserved-3                  TYPE BOOLEAN VALUE "N".
    03  reserved-4                  TYPE BOOLEAN VALUE "N".
    03  reserved-5                  TYPE BOOLEAN VALUE "N".
    03  reserved-6                  TYPE BOOLEAN VALUE "N".
    03  reserved-7                  TYPE BOOLEAN VALUE "N".
END.
```

```
DEF  create-folder-b00-rsp.
  02  hdr.
    03  self-ident                  PIC AA VALUE "UW".
    03  uow-code                    TYPE BINARY 16 UNSIGNED
                                      VALUE 232.
  02  retn-code                     TYPE BINARY 16.
  02  retn-code-detail              TYPE BINARY 16.
  02  corr-name                     PIC X(80).
END.
```

<u>CREATE-FOLDER-B00 FIELDS.</u> The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 232.

- CORR-NAME is the name of the correspondent represented by the calling process. Only system administrators can enter correspondent names other than their own in this field; correspondents without system administrator privileges must enter their own names or leave the field blank. On input, you can use a partially qualified name, including wildcard characters. In the response, the fully qualified correspondent name is returned.

- FOLDER-NAME is the name to be assigned to the new folder. The name must be either a TRANSFER simple name or a fully qualified name.

- ORDERING-DISCIPLINE specifies what information TISERV should use as the ordering key when saving items in the folder as follows:

Entry	Meaning
TIME-SAVED (T)	Save items in chronological order of the time a SAVE-ITEM UOW is executed for the items.
CREATOR-NAME (C)	Save items in alphabetic order by creator name.
EARLIEST-DELIV-DATE (E)	Save items that are package headers and are unalterable by earliest delivery date; save items that are not package headers or are package headers and are alterable by creation date.
APPLIC-DEFINED (A)	Save items in order of the ordering key specified by the application in the SAVE-ITEM-BY-KEY UOW. An application can specify the same ordering key for multiple items if duplicates are allowed; if duplicates are not allowed, the application is responsible for ensuring the uniqueness of the key.

If this field contains a character other than T, C, E, or A, TISERV returns the error E-INVALID-ORD-DISCIPLN.

- APPLIC-ORDER-TYPE is meaningful only if ORDERING-DISCIPLINE is APPLIC-DEFINED (A). If ORDERING-DISCIPLINE is not APPLIC-DEFINED, the field is ignored.

  This field is not interpreted by TRANSFER, but is stored as part of the folder's ordering criteria and is returned by the GET-FOLDER-ORDER UOW. This enables a TRANSFER application to have several types of APPLIC-DEFINED ordering; the APPLIC-ORDER-TYPE can be used to distinguish between types.

  The field can have a value from 0 through 9999; values 100 through 999 are reserved for Tandem. If a number outside this range is specified, TISERV returns the error E-INVALID-APP-ORD-TYPE.

- OPTIONS provides additional criteria for saving items. Two options are provided.

  ASCENDING-SEQUENCE determines whether items are saved within the folder in ascending or descending key order.

  Y = Save items in ascending key order.

  N = Save items in descending key order.

  Variable length APPLIC-DEFINED keys that are used with descending key order will not collate in the correct order unless the application pads the key with enough bytes to make it a constant length for all entries in the folder.

  A folder ordered by CREATOR-NAME in descending sequence is an example of a field that is variable length and is automatically padded to be 120 bytes. For a folder ordered by CREATOR-NAME in ascending sequence, the amount of disc space used corresponds directly to the length of creator names and the number of items saved in a folder. Considering creator names of a maximum of 20 characters, the cost of descending sequence over ascending sequence in terms of disc space is approximately 100 bytes per item saved in a folder ordered by CREATOR-NAME.

  ALLOW-DUPLICATES determines whether or not multiple items with the same ordering key can be saved in a folder.

  Y = Duplicate ordering keys are allowed.

  N = Duplicate ordering keys are not allowed. This field has no effect if the ORDERING-DISCIPLINE is TIME-SAVED (T); TIME-SAVED ordering already ensures a unique key.

RESERVED-2 through RESERVED-7 are reserved for use by Tandem; these fields must be set to N.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries.

To indicate successful creation of the folder:

0	OK

To indicate problems with the correspondent name:

5600	E-CORR-NSRV-ERR	5607	E-CORR-NSRV-DOWN
5601	E-CORR-NOT-FOUND	5611	E-CORR-NET-DOWN
5602	E-CORR-BAD-NAME	5622	E-CORR-NOT-SAME-NODE
5604	E-CORR-NO-SUCH-NODE	5623	E-CORR-AMBIGUOUS-NAME
5606	E-CORR-NSRV-NOT-FOUND		

To indicate problems with the folder name:

5675	E-FLD-NSRV-ERR	5683	E-FLD-NO-PARENT
5677	E-FLD-BAD-NAME	5686	E-FLD-NET-DOWN
5679	E-FLD-NO-SUCH-NODE	5687	E-FLD-ALREADY-EXISTS
5681	E-FLD-NSRV-NOT-FOUND	5697	E-FLD-NOT-SAME-NODE
5682	E-FLD-NSRV-DOWN	5698	E-FLD-AMBIGUOUS-NAME

To indicate other problems:

4010	E-BAD-TRANSACTION	4265	E-INVALID-ORD-DISCIPLN
4051	E-MUST-BE-YN	4266	E-INVALID-APP-ORD-TYPE
4052	E-RESERVED-MUST-BE-N	4902	E-ERR-PROFILE-FILE
4093	E-SECURITY-VIOLATION	4904	E-ERR-SESSION-FILE
4201	E-CONTEXT-ERR		

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

CREATE-FOLDER-B00 OPERATION. CREATE-FOLDER-B00 creates a new folder with the specified ordering criteria.

Folder order affects the order in which items are saved and subsequently referenced. SCAN-FOLDER, SCAN-FOLDER-B00, and SCAN-FOLDER-BY-KEY UOWs return items according to the ordering key by which items are saved in the folder.

CREATE-ITEM (UOW Code 103)

CREATE-ITEM creates an item.

```
DEF  create-item-uow.
  02  hdr.
    03  self-ident              PIC AA VALUE "UW".
    03  uow-code                TYPE BINARY 16 UNSIGNED
                                  VALUE 103.
  02  item-type                 PIC 9(4) COMP.
  02  is-pkg-hdr                TYPE BOOLEAN.
  02  reserved-1                TYPE BOOLEAN VALUE "N".
END.
```

```
DEF  create-item-rsp.
  02  hdr                       TYPE UOW-HDR.
    03  self-ident              PIC AA VALUE "UW".
    03  uow-code                TYPE BINARY 16 UNSIGNED
                                  VALUE 103.
  02  retn-code                 TYPE BINARY 16.
  02  retn-code-detail          TYPE BINARY 16.
  02  item-id.
    03  dummy                   PIC X(12).
END.
```

<u>CREATE-ITEM FIELDS.</u> The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 103.

- ITEM-TYPE is a numeric value that lets you categorize items by type. Its meaning is defined by your application. The value must be in the range of 0-9999; values 100 through 999 are reserved for use by Tandem.

  NOTE

  ITEM-TYPE should not be confused with RECORD-TYPE, which has a totally different meaning.

- IS-PKG-HDR determines whether the new item is a package header.

  Y = The item is a package header.

  N = The item is not a package header.

- RESERVED-1 is reserved for use by Tandem; this field must be set to N.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries:

0	OK		
4010	E-BAD-TRANSACTION	4052	E-RESERVED-MUST-BE-N
4051	E-MUST-BE-YN	4056	E-INVALID-ITEM-TYPE

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

- ITEM-ID is the ID assigned to the new item and returned by TRANSFER.

CREATE-ITEM OPERATION. CREATE-ITEM creates a new item and returns the ID in the ITEM-ID field. If the item is to be a package header, as specied in the IS-PKG-HDR field, TRANSFER appends default package header information to the item descriptor.

When the item is created, it is saved in an internal temporary folder and is removed from that folder when the session is terminated. If you must retain access to the new item beyond the end of the current session, you must either save the item in a folder or attach the item to another item.

DELETE-DEPOT (UOW Code 202)

DELETE-DEPOT deletes a correspondent and depot. This UOW can be issued only by correspondents with system administrator write privileges.

```
DEF  delete-depot-uow.
  02  hdr.
    03  self-ident                  PIC AA VALUE "UW".
    03  uow-code                    TYPE BINARY 16 UNSIGNED
                                      VALUE 202.
  02  corr-name                     PIC X(80).
  02  force-flag                    TYPE CHARACTER 1.
    88  forced-deletion             VALUE "Y".
    88  do-not-force                VALUE "N".
  02  filler                        TYPE CHARACTER 1 VALUE SPACES.
END.

DEF  delete-depot-rsp.
  02  hdr                           TYPE UOW-HDR.
    03  self-ident                  PIC AA VALUE "UW".
    03  uow-code                    TYPE BINARY 16 UNSIGNED
                                      VALUE 202.
  02  retn-code                     TYPE BINARY 16.
  02  retn-code-detail              TYPE BINARY 16.
  02  corr-name                     PIC X(80).
END.
```

DELETE-DEPOT FIELDS. The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 202.

- CORR-NAME is the name of the correspondent whose depot is to be deleted. You can use a partially qualified name, including wildcard characters. In the response, the fully qualified name is returned.

- FORCE-FLAG determines whether TISERV forces deletion even if the depot folders contain items or packages or if any distribution lists defined for the depot contain members.

  Y = Force deletion.

  N = Do not force deletion. If the depot folders contain items or packages or if any depot distribution lists contain members, the depot is not deleted, an error indication is returned, and you should abort the transaction. If distribution lists and folders are all empty, TISERV deletes the depot.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries.

To indicate successful record alteration:

0	OK

To indicate problems with the correspondent name:

5600	E-CORR-NSRV-ERR	5607	E-CORR-NSRV-DOWN
5601	E-CORR-NOT-FOUND	5611	E-CORR-NET-DOWN
5602	E-CORR-BAD-NAME	5622	E-CORR-NOT-SAME-NODE
5604	E-CORR-NO-SUCH-NODE	5623	E-CORR-AMBIGUOUS-NAME
5606	E-CORR-NSRV-NOT-FOUND		

NOTE

Objects belonging to correspondents are also deleted; therefore, a similar set of error messages for folders and distribution lists can be received. Messages for folders begin with E-FLD- and messages for distribution lists begin with E-DLIST-.

To indicate other problems:

4010	E-BAD-TRANSACTION	4219	E-SESSION-ACTIVE
4051	E-MUST-BE-YN	4225	E-MEMBERS-EXIST
4093	E-SECURITY-VIOLATION	4902	E-ERR-PROFILE-FILE
4201	E-CONTEXT-ERR	4912	E-ERR-FOLDER-FILE
4213	E-ITEMS-EXIST	4914	E-ERR-DLIST-FILE

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

DELETE-DEPOT OPERATION. DELETE-DEPOT removes all profile records relating to the correspondent identified by CORR-NAME, and also removes the correspondent name from the TRANSFER name directory; this effectively deletes the depot of the correspondent. In addition, TRANSFER removes any distribution lists and folders relating to the depot.

NOTE

Deletion does not occur if a session is active at the depot when this UOW is issued.

DELETE-DLIST (UOW Code 218)

DELETE-DLIST deletes a distribution list.

```
DEF  delete-dlist-uow.
  02  hdr.
    03  self-ident                 PIC AA VALUE "UW".
    03  uow-code                   TYPE BINARY 16 UNSIGNED
                                     VALUE 218.
  02  corr-name                    PIC X(80) VALUE SPACES.
  02  dlist-name                   PIC X(80).
  02  force-flag                   TYPE CHARACTER 1.
    88  forced-deletion            VALUE "Y".
    88  do-not-force               VALUE "N".
  02  filler                       TYPE CHARACTER 1.
END.
```

```
DEF  delete-dlist-rsp.
  02  hdr                          TYPE UOW-HDR.
    03  self-ident                 PIC AA VALUE "UW".
    03  uow-code                   TYPE BINARY 16 UNSIGNED
                                     VALUE 218.
  02  retn-code                    TYPE BINARY 16.
  02  retn-code-detail             TYPE BINARY 16.
  02  corr-name                    PIC X(80).
  02  dlist-name                   PIC X(80).
END.
```

DELETE-DLIST FIELDS. The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 218.

- CORR-NAME is the name of the correspondent represented by the calling process. Only system administrators can enter correspondent names other than their own in this field; correspondents without system administrator privileges must enter their own names or leave the field blank. You can use a partially qualified name, including wildcard characters. In the response, the fully qualified name is returned.

- DLIST-NAME is the name of the distribution list to be deleted. This can be a partially qualified name, including wildcard characters. In the response, the fully qualified name is returned.

- FORCE-FLAG determines whether TISERV forces deletion even if the distribution list contains members.

  Y = Force deletion.

  N = Do not force deletion. If the distribution list contains members, the distribution list is not deleted; an error indication is returned, and you should abort the transaction.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries.

  To indicate successful deletion:

  0 OK

  To indicate problems with the correspondent name:

5600	E-CORR-NSRV-ERR	5607	E-CORR-NSRV-DOWN
5601	E-CORR-NOT-FOUND	5611	E-CORR-NET-DOWN
5602	E-CORR-BAD-NAME	5622	E-CORR-NOT-SAME-NODE
5604	E-CORR-NO-SUCH-NODE	5623	E-CORR-AMBIGUOUS-NAME
5606	E-CORR-NSRV-NOT-FOUND		

  To indicate problems with the distribution list name:

5625	E-DLIST-NSRV-ERR	5632	E-DLIST-NSRV-DOWN
5626	E-DLIST-NOT-FOUND	5636	E-DLIST-NET-DOWN
5627	E-DLIST-BAD-NAME	5647	E-DLIST-NOT-SAME-NODE
5629	E-DLIST-NO-SUCH-NODE	5648	E-DLIST-AMBIGUOUS-NAME
5631	E-DLIST-NSRV-NOT-FOUND		

  To indicate other problems:

4010	E-BAD-TRANSACTION	4225	E-MEMBERS-EXIST
4051	E-MUST-BE-YN	4902	E-ERR-PROFILE-FILE
4093	E-SECURITY-VIOLATION	4914	E-ERR-DLIST-FILE
4201	E-CONTEXT-ERR		

- RETN-CODE-DETAIL is an error number returned by a subsystem. other than TRANSFER or is a further qualification of an error detected by TRANSFER.

DELETE-DLIST OPERATION. DELETE-DLIST deletes a distribution list by first deleting all members from the list (if FORCE-FLAG is set to Y), and then removing the list name from the TRANSFER name directory.

Any pointers from existing lists to a deleted distribution list remain in the system, but have no meaning. To provide good housekeeping, you should purge these pointers.

DELETE-FOLDER (UOW Code 230)

DELETE-FOLDER deletes a folder.

```
DEF  delete-folder-uow.
  02  hdr.
    03  self-ident                PIC AA VALUE "UW".
    03  uow-code                  TYPE BINARY 16 UNSIGNED
                                    VALUE 230.
  02  corr-name                   PIC X(80) VALUE SPACES.
  02  folder-name                 PIC X(80).
  02  force-flag                  TYPE CHARACTER 1.
    88  forced-deletion           VALUE "Y".
    88  do-not-force              VALUE "N".
  02  filler                      TYPE CHARACTER 1 VALUE SPACES.
END.
```

```
DEF  delete-folder-rsp.
  02  hdr.
    03  self-ident                PIC AA VALUE "UW".
    03  uow-code                  TYPE BINARY 16 UNSIGNED
                                    VALUE 230.
  02  retn-code                   TYPE BINARY 16.
  02  retn-code-detail            TYPE BINARY 16.
  02  corr-name                   PIC X(80).
  02  folder-name                 PIC X(80).
END.
```

DELETE-FOLDER FIELDS. The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 230.

- CORR-NAME is the name of the correspondent represented by the calling process. Only system administrators can enter correspondent names other than their own in this field; correspondents without system administrator privileges must enter their own names or leave the field blank. On input, you can use a partially qualified name, including wildcard characters. In the response, the fully qualified name is returned.

- FOLDER-NAME is the name of the folder to be deleted. This can be a partially qualified name, including wildcard characters. In the response, the fully qualified name is returned.

- FORCE-FLAG determines whether TISERV forces the deletion even if the folder contains packages or items.

  Y = Force deletion.

  N = Do not force deletion. If the folder contains packages or items, the folder is not deleted; an error indication is returned, and you should abort the transaction.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries.

  To indicate successful deletion:

  0 OK

  To indicate problems with the correspondent name:

5600	E-CORR-NSRV-ERR	5607	E-CORR-NSRV-DOWN
5601	E-CORR-NOT-FOUND	5611	E-CORR-NET-DOWN
5602	E-CORR-BAD-NAME	5622	E-CORR-NOT-SAME-NODE
5604	E-CORR-NO-SUCH-NODE	5623	E-CORR-AMBIGUOUS-NAME
5606	E-CORR-NSRV-NOT-FOUND		

  To indicate problems with the folder name:

5675	E-FLD-NSRV-ERR	5682	E-FLD-NSRV-DOWN
5676	E-FLD-NOT-FOUND	5686	E-FLD-NET-DOWN
5677	E-FLD-BAD-NAME	5697	E-FLD-NOT-SAME-NODE
5679	E-FLD-NO-SUCH-NODE	5698	E-FLD-AMBIGUOUS-NAME
5681	E-FLD-NSRV-NOT-FOUND		

  To indicate other problems:

4010	E-BAD-TRANSACTION	4213	E-ITEMS-EXIST
4051	E-MUST-BE-YN	4218	W-CONTENTS-PURGED
4093	E-SECURITY-VIOLATION	4902	E-ERR-PROFILE-FILE
4105	E-CONCURRNT-FLD-UPDATE	4912	E-ERR-FOLDER-FILE
4201	E-CONTEXT-ERR	4922	E-ERR-INV-FOLDER-FILE

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

DELETE-FOLDER OPERATION. DELETE-FOLDER deletes the folder identified by FOLDER-NAME. TISERV removes all items saved in the folder (if FORCE-FLAG is set to Y) and removes the folder name from the TRANSFER name directory.

If your application requests deletion of the special folders INBOX and WASTEBASKET, these folders are emptied but the folder names remain in the system; the RETN-CODE field is set to W-CONTENTS-PURGED. The contents of WASTEBASKET can be deleted only by the logged-on correspondent.

DELETE-ITEM-REC (UOW Code 105)

DELETE-ITEM-REC deletes a data record from an item.

```
DEF  delete-item-rec-uow.
  02  hdr.
    03  self-ident                  PIC AA VALUE "UW".
    03  uow-code                    TYPE BINARY 16 UNSIGNED
                                      VALUE 105.
  02  item-key.
    03  item-id.
      04  dummy                     PIC X(12).
    03  rec-type                    PIC 9(4) COMP.
    03  rec-seq-num                 PIC 9(4) COMP.
END.
```

```
DEF  delete-item-rec-rsp.
  02  hdr.
    03  self-ident                  PIC AA VALUE "UW".
    03  uow-code                    TYPE BINARY 16 UNSIGNED
                                      VALUE 105.
  02  retn-code                     TYPE BINARY 16.
  02  retn-code-detail              TYPE BINARY 16.
END.
```

<u>DELETE-ITEM-REC FIELDS.</u> The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 105.

- ITEM-KEY identifies the item to be deleted.

  ITEM-ID is the item ID of the record to be deleted.

  REC-TYPE is the type assigned to the record by your application.

  REC-SEQ-NUM is the sequence number assigned to the record.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries:

0	OK		
4010	E-BAD-TRANSACTION	4041	E-ITEM-UNALTERABLE
4035	E-ITEM-NOT-FOUND	4047	E-REC-NOT-FOUND

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

DELETE-ITEM-REC OPERATION. DELETE-ITEM-REC deletes the record identified by REC-TYPE and REC-SEQ-NUM from the item identified by ITEM-ID.

DELETE-MEMBER (UOW Code 221)

DELETE-MEMBER deletes one or more members from a distribution list. Members can be correspondents, distribution lists, or both.

```
DEF  delete-member-uow.
  02  hdr.
    03  self-ident                   PIC AA VALUE "UW".
    03  uow-code                     TYPE BINARY 16 UNSIGNED
                                       VALUE 221.
  02  corr-name                      PIC X(80) VALUE SPACES.
  02  dlist-name                     PIC X(80).
  02  num-wanted                     TYPE BINARY 16 UNSIGNED.
  02  member-name                    OCCURS 0 TO 5 TIMES
                                       DEPENDING ON num-wanted
                                       TYPE RECIP-NAME.
END.
```

```
DEF  delete-member-rsp.
  02  hdr.
    03  self-ident                   PIC AA VALUE "UW".
    03  uow-code                     TYPE BINARY 16 UNSIGNED
                                       VALUE 221.
  02  retn-code                      TYPE BINARY 16.
  02  retn-code-detail               TYPE BINARY 16.
  02  corr-name                      PIC X(80).
  02  dlist-name                     PIC X(80).
  02  num-returned                   TYPE BINARY 16 UNSIGNED.
  02  mbr-retn-code                  OCCURS 0 TO 5 TIMES
                                       DEPENDING ON num-returned
                                       TYPE BINARY 16.
END.
```

<u>DELETE-MEMBER FIELDS.</u> The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 221.

- CORR-NAME is the name of the correspondent represented by the calling process. Only system administrators can enter correspondent names other than their own in this field; correspondents without system administrator privileges must enter their own names or leave the field blank. On input, you can use a partially qualified name, including wildcard characters. In the response, the fully qualified name is returned.

- DLIST-NAME is the name of the distribution list from which the new member is deleted. This can be a partially qualified name, including wildcard characters. In the response, the fully qualified name is returned.

- NUM-WANTED is the number of members to be removed from the distribution list. You can specify any number of members, restricted only by the length of the entire IPC that contains this UOW. The maximum IPC length is defined during TRANSFER system configuration.

- MEMBER-NAME is the name of the correspondent or distribution list to be deleted from the list identified by DLIST-NAME. This must be a fully qualified name and must exactly match a name in the distribution list, including the suffix. In the OCCURS DEPENDING ON clause, the value 5 is an arbitrary value suitable for most applications; you can reset it to any other value. You can have as many member names as specified by NUM-WANTED.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries.

  To indicate successful deletion:

0	OK

  To indicate problems with the correspondent name:

5600	E-CORR-NSRV-ERR	5607	E-CORR-NSRV-DOWN
5601	E-CORR-NOT-FOUND	5611	E-CORR-NET-DOWN
5602	E-CORR-BAD-NAME	5622	E-CORR-NOT-SAME-NODE
5604	E-CORR-NO-SUCH-NODE	5623	E-CORR-AMBIGUOUS-NAME
5606	E-CORR-NSRV-NOT-FOUND		

  To indicate problems with the distribution list name:

5625	E-DLIST-NSRV-ERR	5632	E-DLIST-NSRV-DOWN
5626	E-DLIST-NOT-FOUND	5636	E-DLIST-NET-DOWN
5627	E-DLIST-BAD-NAME	5647	E-DLIST-NOT-SAME-NODE
5629	E-DLIST-NO-SUCH-NODE	5648	E-DLIST-AMBIGUOUS-NAME
5631	E-DLIST-NSRV-NOT-FOUND		

  To indicate other problems:

4010	E-BAD-TRANSACTION	4227	W-ERR-ON-MEMBER
4093	E-SECURITY-VIOLATION	4902	E-ERR-PROFILE-FILE
4201	E-CONTEXT-ERR	4914	E-ERR-DLIST-FILE

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

- NUM-RETURNED is the number of members deleted from the list. There will be a member return code for each member that you attempted to delete.

- MBR-RETN-CODE is a code to indicate the status of each member the UOW attempted to delete. The message OK indicates that the member was successfully deleted.

0	OK	5652	E-MBR-BAD-NAME
5651	E-MBR-NOT-FOUND	5674	E-MBR-BAD-SUFFIX

DELETE-MEMBER OPERATION. The DELETE-MEMBER UOW deletes members identified by MEMBER-NAME from the distribution list identified by DLIST-NAME.

DELETE-PROFILE-REC (UOW Code 214)

DELETE-PROFILE-REC deletes a profile record from a depot.

```
DEF  delete-profile-rec-uow.
  02  hdr.
    03  self-ident                PIC AA VALUE "UW".
    03  uow-code                  TYPE BINARY 16 UNSIGNED
                                    VALUE 214.
  02  corr-name                   PIC X(80) VALUE SPACES.
  02  rec-type                    PIC 9(4) COMP.
  02  rec-seq-num                 PIC 9(4) COMP.
  02  depot-flag                  TYPE BOOLEAN VALUE "Y".
  02  filler                      TYPE CHARACTER 1.
END.
```

```
DEF  delete-profile-rec-rsp.
  02  hdr.
    03  self-ident                PIC AA VALUE "UW".
    03  uow-code                  TYPE BINARY 16 UNSIGNED
                                    VALUE 214.
  02  retn-code                   TYPE BINARY 16.
  02  retn-code-detail            TYPE BINARY 16.
  02  corr-name                   PIC X(80).
END.
```

DELETE-PROFILE-REC FIELDS. The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 214.
- CORR-NAME is the name of the correspondent for whom the depot profile record will be deleted. This is also the correspondent represented by the calling process. Only system administrators can enter correspondent names other than their own in this field; correspondents without system administrator privileges must enter their own names or leave the field blank. On input, you can use a partially qualified name, including wildcard characters. In the response, the fully qualified name is returned.
- REC-TYPE is the type assigned to the record to be deleted, as defined by your application.
- REC-SEQ-NUM indicates the specific record to be deleted.

- DEPOT-FLAG determines whether the UOW references a depot profile record or a system control record.

  Y = a depot profile record, as indicated by CORR-NAME

  N = a system control record

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries.

  To indicate successful deletion:

  0 OK

  To indicate problems with the correspondent name:

5600	E-CORR-NSRV-ERR	5607	E-CORR-NSRV-DOWN
5601	E-CORR-NOT-FOUND	5611	E-CORR-NET-DOWN
5602	E-CORR-BAD-NAME	5622	E-CORR-NOT-SAME-NODE
5604	E-CORR-NO-SUCH-NODE	5623	E-CORR-AMBIGUOUS-NAME
5606	E-CORR-NSRV-NOT-FOUND		

  To indicate other problems:

4010	E-BAD-TRANSACTION	4093	E-SECURITY-VIOLATION
4046	E-INVALID-REC-TYPE	4201	E-CONTEXT-ERR
4047	E-REC-NOT-FOUND	4902	E-ERR-PROFILE-FILE
4051	E-MUST-BE-YN		

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

DELETE-PROFILE-REC OPERATION. DELETE-PROFILE-REC deletes from the depot Profile file the record indicated by REC-TYPE and REC-SEQ-NUM.

DELETE-RECIP (UOW Code 115)

DELETE-RECIP deletes a recipient from a package recipient list.

```
DEF  delete-recipient-uow.
  02  hdr.
    03  self-ident                   PIC AA VALUE "UW".
    03  uow-code                     TYPE BINARY 16 UNSIGNED
                                       VALUE 115.
  02  item-id.
    03  dummy                        PIC X(12).
  02  recip-name                     PIC X(120).
END.
```

```
DEF  delete-recipient-name-rsp.
  02  hdr.
    03  self-ident                   PIC AA VALUE "UW".
    03  uow-code                     TYPE BINARY 16 UNSIGNED
                                       VALUE 115.
  02  retn-code                      TYPE BINARY 16.
  02  retn-code-detail               TYPE BINARY 16.
END.
```

DELETE-RECIP FIELDS. The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 115.

- ITEM-ID identifies the package from whose recipient list the recipient is to be deleted. This is the item ID of the header for that package.

- RECIP-NAME is the name of the recipient to be deleted. This field must match exactly the recipient name as stored in the list.

  If the name was added by the ADD-RECIP UOW with deferred resolution, the stored name can contain wildcard characters; in this case, you must specify exactly that pattern, including wildcard characters. Wildcard characters in RECIP-NAME are not expanded; instead, they are treated as any other characters in determining whether RECIP-NAME matched a name in the list.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries:

0	OK	4042	E-ITEM-NOT-PKG-HDR
4010	E-BAD-TRANSACTION	5751	E-RECIP-NOT-FOUND
4035	E-ITEM-NOT-FOUND	5752	E-RECIP-BAD-NAME
4041	E-ITEM-UNALTERABLE	5774	E-RECIP-BAD-SUFFIX

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

DELETE-RECIP OPERATION. DELETE-RECIP deletes the name identified by RECIP-NAME from the recipient list for the package identified by ITEM-ID.

DETACH-COMPNT (UOW Code 113)

DETACH-COMPNT detaches a component item from a parent.

```
DEF  detach-compnt-uow.
  02  hdr.
    03  self-ident                   PIC AA VALUE "UW".
    03  uow-code                     TYPE BINARY 16 UNSIGNED
                                       VALUE 113.
  02  parent-item-id.
    03  dummy                        PIC X(12).
  02  rel-position                   TYPE BINARY 16.
  02  compnt-id.
    03  dummy                        PIC X(12).
END.
```

```
DEF  detach-compnt-rsp.
  02  hdr.
    03  self-ident                   PIC AA VALUE "UW".
    03  uow-code                     TYPE BINARY 16 UNSIGNED
                                       VALUE 113.
  02  retn-code                      TYPE BINARY 16.
  02  retn-code-detail               TYPE BINARY 16.
  02  detached-position              TYPE BINARY 16.
  02  detached-compnt.
    03  dummy                        PIC X(12).
END.
```

DETACH-COMPNT FIELDS. The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 113.
- PARENT-ITEM-ID identifies the parent item.
- REL-POSITION is the position that the component occupies in the component list. This record can also be addressed through the COMPNT-ID field, but REL-POSITION provides faster access. If you use the COMPNT-ID field you must set the REL-POSITION field to zero.
- COMPNT-ID is the ID of the component item, but provides slower access to the record than a reference through REL-POSITION. You can use COMPNT-ID only if you set REL-POSITION to zero.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries:

0	OK		
4010	E-BAD-TRANSACTION	4040	E-BAD-ITEM-DESCR
4037	E-PARENT-NOT-FOUND	4041	E-ITEM-UNALTERABLE
4039	E-COMPNT-NOT-FOUND	4057	E-INVALID-REL-POSITION

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

- DETACHED-POSITION is the position previously occupied in the components list by the detached component.

- DETACHED-COMPNT is the item ID of the detached component.

DETACH-COMPNT OPERATION. DETACH-COMPNT detaches a component item from its parent item by removing it from the parent components list. You can reference this record in the UOW either by its relative position within the components list (with the REL-POSITION field) or by its item ID (with the COMPNT-ID field).

If this deletion is successful, the component count in the parent item descriptor and the parent count in the component item descriptor are both decremented by 1; the relative position of all succeeding items in the components list is also decremented by 1. If component 2 is detached, for example, component 3 becomes component 2.

END-SESSION (UOW Code 102)

END-SESSION terminates a session.

```
DEF  end-session-uow.
  02  hdr.
    03  self-ident                   PIC AA VALUE "UW".
    03  uow-code                     TYPE BINARY 16 UNSIGNED
                                       VALUE 102.
END.
```

```
DEF  end-session-rsp.
  02  hdr.
    03  self-ident                   PIC AA VALUE "UW".
    03  uow-code                     TYPE BINARY 16 UNSIGNED
                                       VALUE 102.
  02  retn-code                      TYPE BINARY 16.
  02  retn-code-detail               TYPE BINARY 16.
END.
```

END-SESSION FIELDS. The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 102.
- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries:

0	OK
4010	E-BAD-TRANSACTION

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

END-SESSION OPERATION. END-SESSION terminates the current session and removes any items residing in the WASTEBASKET folder and in the internal temporary folder.

A successful execution sets the session ID in the returned IPC header to zero. This sets up the IPC header automatically for a new START-SESSION UOW.

GET-AGENT-SELECT (UOW Code 207)

GET-AGENT-SELECT retrieves agent selection criteria for a depot.

```
DEF  get-agent-select-uow.
  02  hdr.
    03  self-ident                    PIC AA VALUE "UW".
    03  uow-code                      TYPE BINARY 16 UNSIGNED
                                        VALUE 207.
  02  corr-name                       PIC X(80) VALUE SPACES.
  02  agent-rec-num                   TYPE BINARY 16 UNSIGNED.
  02  action                          TYPE CHARACTER 1.
  02  filler                          TYPE CHARACTER 1.
END.
```

```
DEF  get-agent-select-rsp.
  02  hdr.
    03  self-ident                    PIC AA VALUE "UW".
    03  uow-code                      TYPE BINARY 16 UNSIGNED
                                        VALUE 207.
  02  retn-code                       TYPE BINARY 16.
  02  retn-code-detail                TYPE BINARY 16.
  02  corr-name                       PIC X(80).
  02  filler                          TYPE CHARACTER 1.
  02  action                          TYPE CHARACTER 1.
  02  agent-rec-num                   TYPE BINARY 16 UNSIGNED.
  02  agent-name                      TYPE CHARACTER 80.
  02  agent-type                      TYPE CHARACTER 1.
  02  agent-flag                      TYPE CHARACTER 1.
  02  applic-id-for-logon             PIC 9(4) COMP.
  02  applic-id-low                   PIC 9(4) COMP.
  02  applic-id-high                  PIC 9(4) COMP.
  02  agent-sel-low                   PIC 9(4) COMP.
  02  agent-sel-high                  PIC 9(4) COMP.
  02  agent-data                      TYPE CHARACTER 80.
END.
```

GET-AGENT-SELECT FIELDS. The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 207.

- CORR-NAME is the name of the correspondent represented by the calling process. Only system administrators can enter correspondent names other than their own in this field; correspondents without system administrator privileges must enter their own names or leave the field blank. On input, you can use a partially qualified name, including wildcard characters. In the response, the fully qualified name is returned.

- AGENT-REC-NUM is the position of the record that defines the agent in the agent list for the depot. This field is used in conjunction with the ACTION field. In the response, the number of the record accessed is returned.

- ACTION specifies which record should be read, relative to the value supplied in AGENT-REC-NUM.

  E = read the record denoted by AGENT-REC-NUM

  A = read the record following the record denoted by AGENT-REC-NUM

  If the record indicated by AGENT-REC-NUM does not exist, the warning W-EOF is returned in the RETN-CODE field.

  Typically, an application reads selection criteria for several agents.

  To read the criteria for the first agent (record) in the agent list, set

  AGENT-REC-NUM = 0

  ACTION = A

  To read the criteria for the next agent, set

  AGENT-REC-NUM = the value returned on the previous call

  ACTION = A

  In the response, no data is returned in this field. The field is included only to simplify the use of the GET-AGENT-SELECT UOW response as an ALTER-AGENT-SELECT request.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries.

  To indicate successful retrieval:

  0 OK

To indicate problems with the correspondent name:

5600	E-CORR-NSRV-ERR	5607	E-CORR-NSRV-DOWN
5601	E-CORR-NOT-FOUND	5611	E-CORR-NET-DOWN
5602	E-CORR-BAD-NAME	5622	E-CORR-NOT-SAME-NODE
5604	E-CORR-NO-SUCH-NODE	5623	E-CORR-AMBIGUOUS-NAME
5606	E-CORR-NSRV-NOT-FOUND		

To indicate other problems:

4001	W-EOF	4201	E-CONTEXT-ERR
4010	E-BAD-TRANSACTION	4229	E-MUST-BE-EA
4093	E-SECURITY-VIOLATION	4902	E-ERR-PROFILE-FILE

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

- AGENT-NAME is the name of the SCREEN COBOL program or server class that operates as the agent. You determine whether this name identifies a SCREEN COBOL program or a server class with the AGENT-TYPE field.

- AGENT-TYPE determines whether the program denoted by AGENT-NAME is a SCREEN COBOL program or a server class name.

  Y = a SCREEN COBOL program

  N = a server class name

- AGENT-FLAG determines whether the agent requires the associated TAREQ to begin a session on its behalf before the agent can run.

  Y = session initiation is required

  N = session initiation is not required

- APPLIC-ID-FOR-LOGON is the application ID to be used in establishing the session when the AGENT-FLAG is set to Y.

- APPLIC-ID-LOW, APPLIC-ID-HIGH, AGENT-SEL-LOW, and AGENT-SEL-HIGH define numeric ranges used to select the agent. These fields are used as noted in the discussion of the ALTER-AGENT-SELECT UOW.

- AGENT-DATA is data that your application passes to the agent; its use is defined by the agent itself.

NOTE

> The default agent configuration screen allows for viewing and modifying only the first 78 characters of the 80-character AGENT-DATA field. If you are providing an agent that requires 79 or 80 characters of agent data, you must also provide a SCREEN COBOL program for configuring such agents.

GET-AGENT-SELECT OPERATION. GET-AGENT-SELECT retrieves the requested agent selection entry from the depot Profile file. The agent is identified by AGENT-REC-NUM. The list of agents for the depot is arranged by agent record number. Existing agents can have AGENT-REC-NUM values from 1 through 500. A value of zero can be used for the read-after operation specified by A in the ACTION field. A read operation returns the AGENT-REC-NUM of the agent just read.

To read the list of agents in order, set AGENT-REC-NUM to zero and then perform read-after operations, using the most recently returned AGENT-REC-NUM until W-EOF occurs in the RETN-CODE field.

For further information about agent selection criteria, see the discussion of the ALTER-AGENT-SELECT UOW.

GET-CONFIG-NAME (UOW Code 132)

GET-CONFIG-NAME retrieves the configured name for a TRANSFER file, process, or other special entity.

```
DEF  get-config-name-uow.
  02  hdr.
    03  self-ident                     PIC AA VALUE "UW".
    03  uow-code                       TYPE BINARY 16 UNSIGNED
                                         VALUE 132.
  02  network-node-name                PIC X(32).
  02  entity-name                      PIC X(32).
END.
```

```
DEF  get-config-name-rsp.
  02  hdr.
    03  self-ident                     PIC AA VALUE "UW".
    03  uow-code                       TYPE BINARY 16 UNSIGNED
                                         VALUE 132.
  02  retn-code                        TYPE BINARY 16.
  02  retn-code-detail                 TYPE BINARY 16.
  02  configured-name                  PIC X(80).
END.
```

GET-CONFIG-NAME FIELDS. The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 132.

- NETWORK-NODE-NAME is the name of the network node at which the TRANSFER entity is defined. This node name should include the \ at the beginning of the name. To indicate the local node, you can enter blanks. This is a TRANSFER simple name.

- ENTITY-NAME is the name of the TRANSFER entity for which your application requests the fully qualified name configured in the system. This name is defined in the TRANSFER name configuration directory. The following entries in this field are meaningful:

  DEFAULT-MODEL-DEPOT
  PATHMON-PROCESS
  TISERV-SERVER-CLASS
  INBOX-FOLDER
  WASTEBASKET-FOLDER

Other entries, though legal, should not be used in this field. They are intended for internal use only by Tandem analysts and support personnel.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following:

0	OK		
4201	E-CONTEXT-ERR	5704	E-ALIAS-NO-SUCH-NODE
5700	E-ALIAS-NSRV-ERR	5705	E-ALIAS-SECURITY
5701	E-ALIAS-NOT-FOUND	5706	E-ALIAS-NSRV-NOT-FOUND
5702	E-ALIAS-BAD-NAME	5707	E-ALIAS-NSRV-DOWN
5703	E-ALIAS-BAD-TYPE	5711	E-ALIAS-NET-DOWN

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

- CONFIGURED-NAME is the fully qualified configured name of the requested entity.

GET-CONFIG-NAME OPERATION. GET-CONFIG-NAME retrieves the configured name for the entity identified by ENTITY-NAME. This name, which is stored in the TRANSFER name configuration directory, is returned in the CONFIGURED-NAME field.

NOTE

> This UOW does not require establishment of a session for its execution.

Names in the name configuration directory, which is part of the TRANSFER name directory, must correspond to real entities in order for TRANSFER to operate properly. This directory contains the names of all entities required by TRANSFER in its running environment. If names do not correspond, problems arise, some of which are not immediately obvious. For example, if PATHMON is running with a process name other than the one specified in the name configuration directory, your application might not discover this until it tries (and fails) to transmit packages across the network. These names are established during the initialization of TRANSFER through the XBEGIN and NALOAD modules, as described in the *TRANSFER Delivery System Management and Admininstration Guide*.

The configured name for TISERV-SERVER-CLASS is usually "TISERV". If you are using a server class name other than TISERV, you must still have a TISERV server class defined. The application can then perform the following:

1. At initialization time, send a GET-CONFIG-NAME request to the server class named "TISERV", asking for the name of the TISERV-SERVER-CLASS.

2. Send all future TISERV requests to the server class whose name was returned in step 1.

GET-FOLDER-ORDER (UOW Code 233)

GET-FOLDER-ORDER retrieves the ordering criteria for a folder.

```
DEF  get-folder-order-uow.
  02  hdr.
    03  self-ident                  PIC AA VALUE "UW".
    03  uow-code                    TYPE BINARY 16 UNSIGNED
                                      VALUE 233.
  02  corr-name                     PIC X(80) VALUE SPACES.
  02  folder-name                   PIC X(80).
END.
```

```
DEF  get-folder-order-rsp.
  02  hdr.
    03  self-ident                  PIC AA VALUE "UW".
    03  uow-code                    TYPE BINARY 16 UNSIGNED
                                      VALUE 233.
  02  retn-code                     TYPE BINARY 16.
  02  retn-code-detail              TYPE BINARY 16.
  02  corr-name                     PIC X(80).
  02  folder-name                   PIC X(80).
  02  ordering-discipline           TYPE CHARACTER 1.
    88  time-saved                  VALUE "T".
    88  creator-name                VALUE "C".
    88  earliest-deliv-date         VALUE "E".
    88  applic-defined              VALUE "A".
  02  filler                        PIC X(1) VALUE SPACES.
  02  applic-order-type             PIC 9(4) COMP.
  02  options.
    88  ascending-sequence          TYPE BOOLEAN.
    88  allow-duplicates            TYPE BOOLEAN.
    88  reserved-2                  TYPE BOOLEAN VALUE "N".
    88  reserved-3                  TYPE BOOLEAN VALUE "N".
    88  reserved-4                  TYPE BOOLEAN VALUE "N".
    88  reserved-5                  TYPE BOOLEAN VALUE "N".
    88  reserved-6                  TYPE BOOLEAN VALUE "N".
    88  reserved-7                  TYPE BOOLEAN VALUE "N".
END.
```

GET-FOLDER-ORDER FIELDS. The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 233.

- CORR-NAME is the name of the correspondent represented by the calling process. Only system administrators can enter correspondent names other than their own in this field; correspondents without system administrator privileges must enter their own names or leave the field blank. On input, you can use a partially qualified name, including wildcard characters. In the response, the fully qualified correspondent name is returned.

- FOLDER-NAME is the name of the folder to be retrieved. The name must be either a TRANSFER simple name or a fully qualified name.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries.

  To indicate successful retrieval of the folder:

0	OK

  To indicate problems with the correspondent name:

5600	E-CORR-NSRV-ERR	5607	E-CORR-NSRV-DOWN
5601	E-CORR-NOT-FOUND	5611	E-CORR-NET-DOWN
5602	E-CORR-BAD-NAME	5622	E-CORR-NOT-SAME-NODE
5604	E-CORR-NO-SUCH-NODE	5623	E-CORR-AMBIGUOUS-NAME
5606	E-CORR-NSRV-NOT-FOUND		

  To indicate problems with the folder name:

5675	E-FLD-NSRV-ERR	5682	E-FLD-NSRV-DOWN
5676	E-FLD-NOT-FOUND	5686	E-FLD-NET-DOWN
5677	E-FLD-BAD-NAME	5697	E-FLD-NOT-SAME-NODE
5679	E-FLD-NO-SUCH-NODE	5698	E-FLD-AMBIGUOUS-NAME
5681	E-FLD-NSRV-NOT-FOUND		

  To indicate other problems:

4010	E-BAD-TRANSACTION	4201	E-CONTEXT-ERR
4093	E-SECURITY-VIOLATION	4902	E-ERR-PROFILE-FILE
4105	E-CONCURRNT-FLD-UPDATE		
4106	E-BAD-ORD-CRITERIA		

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

- ORDERING-DISCIPLINE specifies what information TISERV uses as the ordering key when saving items in the folder as follows.

Entry	Meaning
TIME-SAVED (T)	Items are saved in chronological order of the time a SAVE-ITEM UOW is executed for the items.
CREATOR-NAME (C)	Items are saved in alphabetic order by creator name.
EARLIEST-DELIV-DATE (E)	Items that are package headers are saved by earliest delivery date; items that are not package headers are saved by earliest creation date.
APPLIC-DEFINED (A)	Items are saved in order of the ordering key specified by the application in the SAVE-ITEM-BY-KEY UOW.

- APPLIC-ORDER-TYPE is meaningful only if ORDERING-DISCIPLINE is APPLIC-DEFINED (A).

  This field is not interpreted by TRANSFER, but is stored as part of the folder's ordering criteria. This field enables a TRANSFER application to have several types of APPLIC-DEFINED ordering; the APPLIC-ORDER-TYPE can be used to distinguish between types.

  This field is set to 0 if the ORDERING-DISCIPLINE is not APPLIC-DEFINED.

- OPTIONS are the additional criteria for saving items. Two options are provided.

  ASCENDING-SEQUENCE indicates whether items are saved within the folder in ascending or descending key order.

  Y = Items are saved in ascending key order.

  N = Items are saved in descending key order.

  ALLOW-DUPLICATES indicates whether or not duplicate keys are allowed.

  Y = Duplicate ordering keys are allowed.

  N = Duplicate ordering keys are not allowed. This field has no effect if the ORDERING-DISCIPLINE is TIME-SAVED (T); TIME-SAVED ordering already ensures a unique key.

RESERVED-2 through RESERVED-7 are reserved for use by Tandem; these fields are always set to N.

GET-FOLDER-ORDER OPERATION. GET-FOLDER-ORDER retrieves the ordering criteria for the name assigned in FOLDER-NAME.

GET-ITEM-COMPNT-A01 (UOW Code 137)

GET-ITEM-COMPNT-A01 retrieves one or more component items in a parent item.

```
DEF  get-item-compnt-a01-uow.
  02  hdr.
    03  self-ident                  PIC AA VALUE "UW".
    03  uow-code                    TYPE BINARY 16 UNSIGNED
                                      VALUE 137.
  02  item-id.
    03  dummy                       PIC X(12).
  02  start-position                TYPE BINARY 16.
  02  options.
    03  filter-by-item-type         TYPE BOOLEAN.
    03  filter-by-compnt-type       TYPE BOOLEAN.
  02  filter-values.
    03  item-type                   PIC 9(4) COMP.
    03  compnt-type                 PIC 9(4) COMP.
  02  num-requested                 TYPE BINARY 16 UNSIGNED
                                      VALUE 10.
END.
```

```
DEF  get-item-compnt-a01-rsp.
  02  hdr.
    03  self-ident                  PIC AA VALUE "UW".
    03  uow-code                    TYPE BINARY 16 UNSIGNED
                                      VALUE 137.
  02  retn-code                     TYPE BINARY 16.
  02  retn-code-detail              TYPE BINARY 16.
  02  num-returned                  TYPE BINARY 16 UNSIGNED.
  02  compnt-entry                  OCCURS 0 TO !num-requested!
                                      10 TIMES DEPENDING ON
                                      num-returned.
    03  item-id.
      04  dummy                     PIC X(12).
    03  rel-position                TYPE BINARY 16.
    03  item-type                   PIC 9(4) COMP.
    03  compnt-type                 PIC 9(4) COMP.
END.
```

<u>GET-ITEM-COMPNT-A01 FIELDS.</u> The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 137.

- ITEM-ID identifies the parent item to which the components belong.

- START-POSITION is the relative position in the components list of the first item for which data is to be returned.

- OPTIONS provides criteria for selecting component items by ITEM-TYPE or by COMPNT-TYPE. ITEM-TYPE is a numeric value that the application defines and then assigns to the item through the CREATE-ITEM UOW. COMPNT-TYPE is a numeric value that TRANSFER saves with the component when the component item is attached to the parent through the ATTACH-COMPNT-A01 UOW.

  In these options, the entry Y selects the option, while the entry N suppresses the option.

  - To select filtering by item type:

    FILTER-BY-ITEM-TYPE = Y

    ITEM-TYPE = the item type to be retrieved

  - To select filtering by component type:

    FILTER-BY-COMPNT-TYPE = Y

    COMPNT-TYPE = the component type to be retrieved

- NUM-REQUESTED is the total number of component items for which data is to be returned, starting with the item indicated by START-POSITION. As an example, to return 10 components beginning with the component at relative position 6, you would set START-POSITION to 6 and NUM-REQUESTED to 10. The NUM-REQUESTED field can contain values ranging from 1 through 400; the value in this field directly affects the size of the response.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries:

0	OK		
4001	W-EOF	4051	E-MUST-BE-YN
4035	E-ITEM-NOT-FOUND	4057	E-INVALID-REL-POSITION
4040	E-BAD-ITEM-DESCR	4092	E-INVALID-NUM-RQSTD

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

- NUM-RETURNED is the number of components for which TISERV returned data in the response.

- COMPNT-ENTRY contains the item ID (in the ITEM-ID field), the relative position (in the REL-POSITION field), the item type (in the ITEM-TYPE field), and the component type (in the COMPNT-TYPE field) of each component, as returned by TISERV. The size of this array must be declared consistently with the length of the data requested by START-POSITION and NUM-REQUESTED.

GET-ITEM-COMPNT-A01 OPERATION. GET-ITEM-COMPNT-A01 returns, in COMPNT-ENTRY, the item ID and item type of each component item requested by ITEM-ID, START-POSITION, and NUM-REQUESTED. TRANSFER lets you access the associated component items directly at any time during the current session.

If filtering by item type or component type is requested, any component whose item type or component type does not match the specified filter values is ignored and is not returned.

If TISERV reaches the end of the components list before retrieving all specified components, the number of entries returned is less than the total number requested. In this case, the warning W-EOF is returned in the RETN-CODE field.

GET-ITEM-DESCR (UOW Code 122)

GET-ITEM-DESCR retrieves fields from an item descriptor.

```
DEF  get-item-descr-uow.
  02  hdr.
    03  self-ident                PIC AA VALUE "UW".
    03  uow-code                  TYPE BINARY 16 UNSIGNED
                                    VALUE 122.
  02  item-id.
    03  dummy                     PIC X(12).
END.
```

```
DEF  get-item-descr-rsp.
  02  hdr.
    03  self-ident                PIC AA VALUE "UW".
    03  uow-code                  TYPE BINARY 16 UNSIGNED
                                    VALUE 122.
  02  retn-code                   TYPE BINARY 16.
  02  retn-code-detail            TYPE BINARY 16.
  02  update-control              PIC S9(4) COMP.
  02  item-type                   PIC 9(4) COMP.
  02  parent-count                TYPE BINARY 16 UNSIGNED.
  02  compnt-count                TYPE BINARY 16 UNSIGNED.
  02  item-descr-flags.
    03  is-pkg-hdr                TYPE BOOLEAN.
    03  byte                      REDEFINES IS-PKG-HDR PIC X.
    03  unalterable               TYPE BOOLEAN.
    03  submitted                 TYPE BOOLEAN.
    03  cancelled                 TYPE BOOLEAN.
    03  cloned                    TYPE BOOLEAN.
    03  rel-date-earliest         TYPE BOOLEAN.
    03  rel-date-latest           TYPE BOOLEAN.
    03  rel-date-expiration       TYPE BOOLEAN.
    03  reserved-8                TYPE BOOLEAN VALUE "N".
    03  reserved-9                TYPE BOOLEAN VALUE "N".
    03  reserved-10               TYPE BOOLEAN VALUE "N".
    03  reserved-11               TYPE BOOLEAN VALUE "N".
    03  reserved-12               TYPE BOOLEAN VALUE "N".
    03  reserved-13               TYPE BOOLEAN VALUE "N".
    03  reserved-14               TYPE BOOLEAN VALUE "N".
    03  reserved-15               TYPE BOOLEAN VALUE "N".
  02  creation-date.
    03  year                      PIC 9(4).
    03  month                     PIC 9(2).
    03  day-of-month              PIC 9(2).
    03  hour                      PIC 9(2).
```

→

```
  03  minute                   PIC 9(2).
  03  second                   PIC 9(2).
02  creator-name               PIC X(120).
02  submitted-date.
  03  year                     PIC 9(4).
  03  month                    PIC 9(2).
  03  day-of-month             PIC 9(2).
  03  hour                     PIC 9(2).
  03  minute                   PIC 9(2).
  03  second                   PIC 9(2).
02  earliest-deliv-date.
  03  date-time.
    04  year                   PIC 9(4).
    04  month                  PIC 9(2).
    04  day-of-month           PIC 9(2).
    04  hour                   PIC 9(2).
    04  minute                 PIC 9(2).
    04  second                 PIC 9(2).
  03  delta-time               REDEFINES DATE-TIME.
    04  quantity               PIC 9(4) COMP.
    04  units                  PIC A.
    04  filler                 PIC X.
02  latest-deliv-date.
  03  date-time.
    04  year                   PIC 9(4).
    04  month                  PIC 9(2).
    04  day-of-month           PIC 9(2).
    04  hour                   PIC 9(2).
    04  minute                 PIC 9(2).
    04  second                 PIC 9(2).
  03  delta-time               REDEFINES DATE-TIME.
    04  quantity               PIC 9(4) COMP.
    04  units                  PIC A.
    04  filler                 PIC X.
02  expiration-date.
  03  date-time.
    04  year                   PIC 9(4).
    04  month                  PIC 9(2).
    04  day-of-month           PIC 9(2).
    04  hour                   PIC 9(2).
    04  minute                 PIC 9(2).
    04  second                 PIC 9(2).
  03  delta-time               REDEFINES DATE-TIME.
    04  quantity               PIC 9(4) COMP.
    04  units                  PIC A.
    04  filler                 PIC X.
02  sender-zone-offset         PIC S9(4) COMP.
02  priority                   PIC 9(3) COMP.
```

→

```
    02  applic-id                         PIC 9(4) COMP.
    02  agent-selector                    PIC 9(4) COMP.
    02  deliv-control-flags.
      03  certified                       TYPE BOOLEAN.
      03  byte                            REDEFINES CERTIFIED PIC X.
      03  reserved-1                      TYPE BOOLEAN VALUE "N".
      03  reserved-2                      TYPE BOOLEAN VALUE "N".
      03  reserved-3                      TYPE BOOLEAN VALUE "N".
      03  reserved-4                      TYPE BOOLEAN VALUE "N".
      03  reserved-5                      TYPE BOOLEAN VALUE "N".
      03  reserved-6                      TYPE BOOLEAN VALUE "N".
      03  reserved-7                      TYPE BOOLEAN VALUE "N".
    02  err-pkg-suppress-flags.
      03  invalid-recip                   TYPE BOOLEAN.
      03  byte                            REDEFINES INVALID-RECIP PIC X.
      03  invalid-dlist                   TYPE BOOLEAN.
      03  reserved-2                      TYPE BOOLEAN VALUE "N".
      03  too-late-to-deliver             TYPE BOOLEAN.
      03  expired-unexamined              TYPE BOOLEAN.
      03  reserved-5                      TYPE BOOLEAN VALUE "N".
      03  reserved-6                      TYPE BOOLEAN VALUE "N".
      03  reserved-7                      TYPE BOOLEAN VALUE "N".
    02  filler                            PIC X(40).
END.
```

<u>GET-ITEM-DESCR FIELDS.</u> The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 122.

- ITEM-ID identifies the item whose descriptor record is to be retrieved.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries:

0	OK
4035	E-ITEM-NOT-FOUND

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

- UPDATE-CONTROL is the current update control count. This field will contain the value 1 if the descriptor has never been altered.

- ITEM-TYPE is the type of item, as defined by the application.

- PARENT-COUNT is the number of parents that identify this item as a component.

- COMPNT-COUNT is the number of component items listed in the components list for this item.

- ITEM-DESCR-FLAGS describe miscellaneous flags that appear in the item descriptor.

  The fields within ITEM-DESCR-FLAGS are as follows:

  IS-PKG-HDR indicates whether the item is a package header.

  UNALTERABLE indicates whether the item is unalterable. If this field is set to Y, the entire item is unalterable; and the item descriptor, components list, and data records cannot be changed.

  SUBMITTED indicates whether the package has been posted.

  CANCELLED indicates whether the package, if posted, was canceled.

  CLONED indicates whether the package is a copy of a package that was transported from another node.

  REL-DATE-EARLIEST, REL-DATE-LATEST, and REL-DATE-EXPIRATION determine whether the entries specified in the EARLIEST-DELIV-DATE, LATEST-DELIV-DATE, and EXPIRATION-DATE fields are relative dates with respect to particular delivery milestones, or absolute calendar dates.

  Y = relative dates

  N = absolute dates

  RESERVED-8 through RESERVED-15 are reserved for use by Tandem.

- CREATION-DATE is the date that the item was created.

- CREATOR-NAME is the name of the correspondent who created the item.

NOTE

If the item is not a package header, the following fields will contain binary zeros.

- SUBMITTED-DATE is the date and time at which the package was posted. If the package has never been submitted, this field contains zeros.

- EARLIEST-DELIV-DATE is the earliest date at which the package can be delivered, specified as either an absolute calendar date or as a number of time units from submission time. An absolute or relative date is indicated by N or Y, respectively, in the REL-DATE-EARLIEST field, as described under ITEM-DESCR-FLAGS.

NOTE

When a package is submitted, all relative dates in the EARLIEST-DELIV-DATE field and the LATEST-DELIV-DATE and EXPIRATION-DATE fields are automatically changed to absolute calendar dates.

- LATEST-DELIV-DATE is the latest date at which TRANSFER can deliver the package, specified either as an absolute calendar date or as a number of time units from EARLIEST-DELIV-DATE.

- EXPIRATION-DATE is the date and time at which the package expires, specified either as an absolute calendar date or as a number of time units from LATEST-DELIV-DATE. If expiration has not been requested, this field contains zeros.

- SENDER-ZONE-OFFSET is the difference, in minutes, between the time at the sender node and the time local to the current session.

- PRIORITY is the package priority. The field can have a value from 0 (lowest priority) to 199 (highest priority).

- APPLIC-ID is the numeric application ID associated with the session during which the item was created. This value is used as agent selection criteria at recipient depots. Refer to the START-SESSION and ALTER-AGENT-SELECT UOWs.

- AGENT-SELECTOR is the agent selector criteria, as created by the ALTER-AGENT-SELECT UOW. This is a number that is stored with the package to determine which agents are invoked when the package is delivered. Refer to the ALTER-AGENT-SELECT UOW.

- DELIV-CONTROL-FLAGS specifies whether or not the package is certified. Refer to the ALTER-ITEM-DESCR UOW.

- ERR-PKG-SUPPRESS-FLAGS specifies whether or not error reporting is suppressed. Refer to the ALTER-ITEM-DESCR UOW.

GET-ITEM-DESCR OPERATION. GET-ITEM-DESCR returns the item descriptor fields for the item identified by ITEM-ID.

GET-ITEM-REC (UOW Code 125)

GET-ITEM-REC retrieves one or more data records from an item.

```
DEF  get-item-rec-uow.
  02  hdr.
    03  self-ident              PIC AA VALUE "UW".
    03  uow-code                TYPE BINARY 16 UNSIGNED
                                  VALUE 125.
  02  starting-key.
    03  item-id.
      04  dummy                 PIC X(12).
    03  rec-type                PIC S9(4) COMP.
    03  rec-seq-num             PIC S9(4) COMP.
  02  options.
    03  skip-exact              TYPE BOOLEAN.
    03  any-rec-type            TYPE BOOLEAN.
    03  any-seq-num             TYPE BOOLEAN.
    03  reserved-3              TYPE BOOLEAN VALUE "N".
  02  num-requested             TYPE BINARY 16 UNSIGNED
                                  VALUE 20.
  02  max-datasize              TYPE BINARY 16 UNSIGNED.
  02  pad-char                  PIC X.
  02  filler                    PIC X.
END.
```

```
DEF  get-item-rec-rsp.
  02  hdr.
    03  self-ident              PIC AA VALUE "UW".
    03  uow-code                TYPE BINARY 16 UNSIGNED
                                  VALUE 125.
  02  retn-code                 TYPE BINARY 16.
  02  retn-code-detail          TYPE BINARY 16.
  02  num-returned              TYPE BINARY 16 UNSIGNED.
  02  recs-returned             OCCURS 0 TO !num-requested!
                                  20 TIMES DEPENDING ON
                                  num-returned.
    03  rec-type                PIC 9(4) COMP.
    03  rec-seq-num             PIC 9(4) COMP.
    03  data-len                TYPE BINARY 16 UNSIGNED.
    03  data-string             PIC !X(max-datasize)! X(80).
END.
```

GET-ITEM-REC FIELDS. The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 125.

- STARTING-KEY identifies the first possible item data record that can be retrieved. The record is determined by the ITEM-ID, REC-TYPE, and REC-SEQ-NUM specified.

- OPTIONS provides criteria for selecting the item data records.

  SKIP-EXACT determines whether TISERV begins its retrieval with the record specified, or the record after the one specified.

  Y = Begin retrieval with the record after the record specified.

  N = Begin retrieval with the record specified.

  If the beginning record (specified by STARTING-KEY) is not present in the file, the record after the one specified is retrieved regardless of the setting of SKIP-EXACT.

  ANY-REC-TYPE determines whether records not having the record type specified in STARTING-KEY also can be returned.

  Y = Records of record type greater than REC-TYPE also can be returned. ANY-SEQ-NUM is ignored; TRANSFER retrieves up to NUM-REQUESTED records of type REC-TYPE with a record sequence number greater than or equal to REC-SEQ-NUM or with type greater than REC-TYPE and any sequence number.

  N = Only records of type REC-TYPE will be returned.

  ANY-SEQ-NUM is meaningful only if ANY-REC-TYPE is set to N.

  ANY-REC-TYPE = N and ANY-SEQ-NUM = N

  One record at most will be returned; the record will match exactly the REC-TYPE and REC-SEQ-NUM specified in STARTING-KEY provided the SKIP-EXACT field is set to N.

  ANY-REC-TYPE = N and ANY-SEQ-NUM = Y

  Up to NUM-REQUESTED records of type REC-TYPE with sequence numbers greater than or equal to REC-SEQ-NUM will be returned.

  RESERVED-3 is reserved for use by Tandem; this field must be set to N.

- NUM-REQUESTED specifies the number of records to be returned. this value directly affects the length of the response.

  The records are returned starting with the lowest record type and lowest sequence number matching the STARTING-KEY and OPTIONS selected. All records within a record type are returned in sequence number order before records of the next higher record type.

  For example, if GET-ITEM-REC with

  REC-TYPE = 2
  REC-SEQ-NUM = 0
  SKIP-EXACT = N
  ANY-REC-TYPE = N
  ANY-SEQ-NUM = Y
  NUM-REQUESTED = 6

  were specified, the records returned might be as illustrated in Figure 5-4.

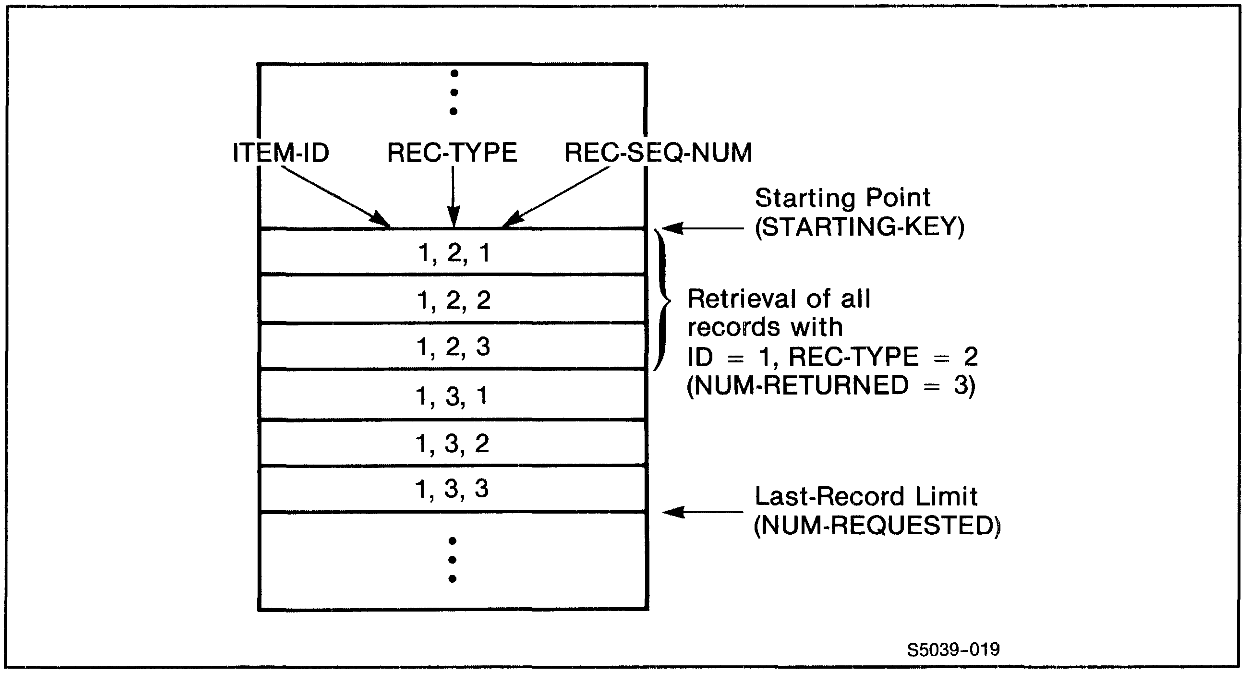


Figure 5-4. Record Retrieval by GET-ITEM-REC

- MAX-DATASIZE refers to the data portion of each record; this value is the maximum number of bytes that can be retrieved. Records that are shorter than this length are automatically padded with the padding character specified by PAD-CHAR. Records that are longer than this length are truncated, but the length returned by DATA-LEN is the actual length prior to truncation.

You should specify an even-numbered maximum length so that all elements of the returned array are word aligned; but if you specify an odd-numbered maximum length, TRANSFER automatically increments this value by 1. MAX-DATASIZE, like NUM-REQUESTED, directly affects the length of the response.

- PAD-CHAR is the character used to pad returned records that are shorter than the maximum length specified by MAX-DATASIZE.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries.

0	OK		
4001	W-EOF	4086	W-DATASIZE-ADJUSTED
4035	E-ITEM-NOT-FOUND	4087	E-INVALID-MAX-DATASIZE
4051	E-MUST-BE-YN	4089	W-DATA-TRUNCATED
4052	E-RESERVED-MUST-BE-N	4092	E-INVALID-NUM-RQSTD

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

- NUM-RETURNED is the number of records returned by TRANSFER in the response.

- RECS-RETURNED is the data array that contains the records retrieved. For this array, you must define limits and element sizes that are consistent with the records requested in the UOW. Within this structure:

  REC-TYPE contains the record type.

  REC-SEQ-NUM contains the record sequence number.

  DATA-LEN contains the length of the data (non-key) portion of the record prior to retrieval, regardless of the value specified by MAX-DATASIZE.

  DATA-STRING contains the data portion of the record. The length of the data in DATA-STRING can be modified, but should be consistent with the value in MAX-DATASIZE.

GET-ITEM-REC OPERATION. GET-ITEM-REC retrieves one or more data records from the item identified by STARTING-KEY, and places them in the array named RECS-RETURNED. The values supplied in OPTIONS and NUM-REQUESTED determine which records are retrieved. Because of SCREEN COBOL restrictions that prohibit multivarying arrays, you must deal with records of fixed length, as specified in MAX-DATASIZE.

The combination of OPTIONS selected determines which portion of the record key (consisting of item ID, record type, and sequence number) is used in selecting the record, as illustrated in Figure 5-5. Regardless of the OPTIONS selected, however, TRANSFER never retrieves a record whose key is less than STARTING-KEY considered in its entirety.

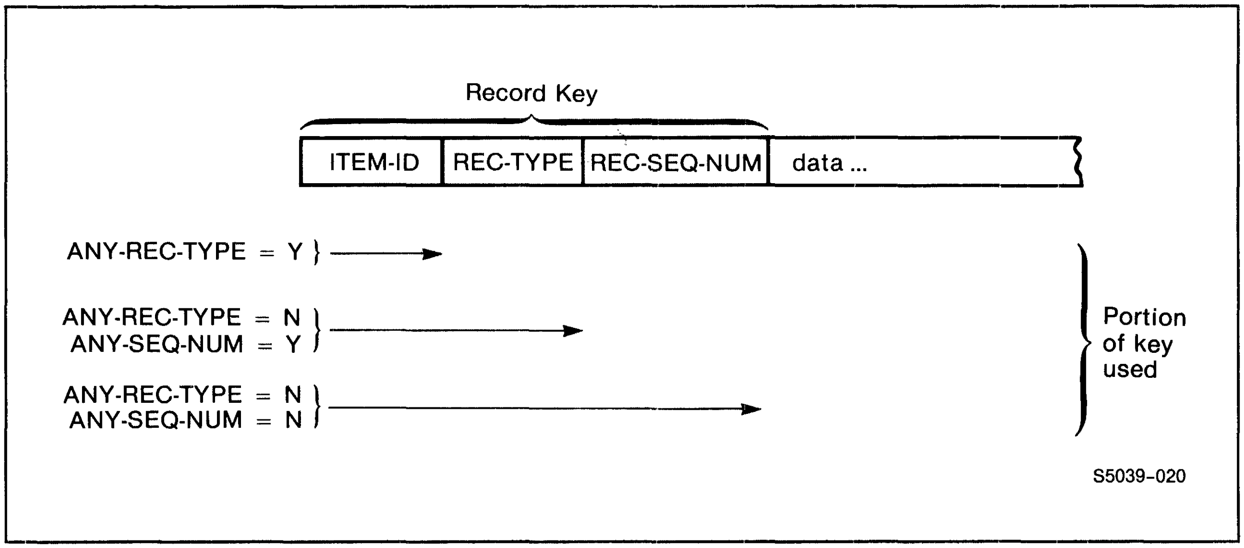


Figure 5-5. Record Key Use

If there are fewer records than specified by NUM-REQUESTED, the number of records retrieved is less than the number requested. In this case, the warning W-EOF is returned in the RETN-CODE field.

TRANSFER does not retrieve records for different items in a single UOW--in other words, retrievals cannot cross item boundaries.

GET-NEXT-SESSION (UOW Code 200)

GET-NEXT-SESSION returns names of correspondents with active sessions. This UOW can only be issued by correspondents with system administrator privileges.

```
DEF  get-next-session-uow.
  02  hdr.
    03  self-ident                    PIC AA VALUE "UW".
    03  uow-code                      TYPE BINARY 16 UNSIGNED
                                        VALUE 200.
  02  filler                          TYPE BINARY 32.
  02  start-session-id.
    03  dummy                         PIC X(18).
  02  num-wanted                      TYPE BINARY 16 UNSIGNED.
  02  filler                          TYPE BINARY 16 UNSIGNED.
END.
```

```
DEF  get-next-session-rsp.
  02  hdr.
    03  self-ident                    PIC AA VALUE "UW".
    03  uow-code                      TYPE BINARY 16 UNSIGNED
                                        VALUE 200.
  02  retn-code                       TYPE BINARY 16.
  02  retn-code-detail                TYPE BINARY 16.
  02  start-session-id.
    03  dummy                         PIC X(18).
  02  num-wanted                      TYPE BINARY 16 UNSIGNED.
  02  num-returned                    TYPE BINARY 16 UNSIGNED
                                        VALUE 0.
  02  session-data                    OCCURS 0 TO 15 TIMES
                                        DEPENDING ON num-returned.
    03  corr-name                     PIC X(80).
    03  session-id.
      04  dummy                       PIC X(18).
END.
```

<u>GET-NEXT-SESSION FIELDS.</u> The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 200.

- START-SESSION-ID selects the session for which information is to be returned by TISERV. On the first call, you should set START-SESSION-ID to zero to read the information for the first session, as recorded in the Session file. On successive calls, the START-SESSION-ID returned in the response should be specified to retrieve the information for the next session in the file. On input, you can supply a session ID for a nonexistent session, with the result that the next record is read.

- NUM-WANTED is the number of sessions for which information is to be returned. In the response, this field is unchanged.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries:

0	OK		
4001	W-EOF	4093	E-SECURITY-VIOLATION
4010	E-BAD-TRANSACTION	4904	E-ERR-SESSION-FILE

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

- NUM-RETURNED is the number of sessions for which TRANSFER actually returns information.

- SESSION-DATA contains the correspondent name (CORR-NAME) and session ID (SESSION-ID) for the selected sessions. If the correspondent represented by your process has only read security privilege (and not write privilege), TISERV returns zero to the session ID field.

GET-NEXT-SESSION OPERATION. GET-NEXT-SESSION returns the names of correspondents with active sessions.

If the number of elements remaining in the list is less than or equal to the number requested, or if no active sessions were found, the warning W-EOF is returned in the RETN-CODE field.

A system administrator with write privilege at a node can terminate any session at that node by:

1. obtaining the session ID through the GET-NEXT-SESSION UOW

2. using this session ID in the IPC header and transmitting the END-SESSION UOW in the IPC message.

GET-PROFILE-ELEM (UOW Code 203)

GET-PROFILE-ELEM retrieves data elements from a depot Profile file. Typically, this UOW is issued before an ALTER-PROFILE-ELEM UOW.

DEFINITION I (a DDL skeleton format to which definitions can be added; for general applications use)

```
DEF  get-profile-elem-usk.
  02  hdr.
    03  self-ident                PIC AA VALUE "UW".
    03  uow-code                  TYPE BINARY 16 UNSIGNED
                                    VALUE 203.
  02  corr-name                   TYPE PIC X(80) VALUE SPACES.
END.
```

```
DEF  get-profile-elem-rsk.
  02  hdr.
    03  self-ident                PIC AA VALUE "UW".
    03  uow-code                  TYPE BINARY 16 UNSIGNED
                                    VALUE 203.
  02  retn-code                   TYPE BINARY 16.
  02  retn-code-detail            TYPE BINARY 16.
  02  corr-name                   TYPE PIC X(80).
  02  num-returned                TYPE BINARY 16.
END.
```

DEFINITION II (for TAL programs)

```
DEF  get-profile-elem-uow.
  02  hdr.
    03  self-ident                PIC AA VALUE "UW".
    03  uow-code                  TYPE BINARY 16 UNSIGNED
                                    VALUE 203.
  02  corr-name                   TYPE PIC X(80) VALUE SPACES.
  02  num-returned                TYPE BINARY 16 UNSIGNED.
  02  elem-identifier             TYPE BINARY 16
                                    OCCURS 0 TO 10 TIMES
                                    DEPENDING ON num-returned.
END.
```

→

```
DEF  get-profile-elem-rsp.
  02  hdr.
    03  self-ident                PIC AA VALUE "UW".
    03  uow-code                  TYPE BINARY 16 UNSIGNED
                                    VALUE 203.
  02  retn-code                   TYPE BINARY 16.
  02  retn-code-detail            TYPE BINARY 16.
  02  corr-name                   TYPE PIC X(80).
  02  num-returned                TYPE BINARY 16 UNSIGNED.
  02  elem-data-block             TYPE PROFILE-ELEM-SHORT
                                    OCCURS 0 TO 10 TIMES
                                    DEPENDING ON num-returned.
END.
```

GET-PROFILE-ELEM FIELDS. The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 203.

- CORR-NAME is the name of the correspondent whose depot profile will be retrieved. This is also the correspondent represented by the calling process. Only system administrators can enter correspondent names other than their own in this field; correspondents without system administrator privileges must enter their own names or leave the field blank. On input, you can use a partially qualified name, including wildcard characters. In the response, the fully qualified name is returned.

- NUM-RETURNED is the number of elements actually retrieved. This field contains:

  the number retrieved - if no serious errors occurred

  zero - if serious errors occurred

- ELEM-IDENTIFIER (used in Definition II only) specifies one or more element identifier numbers that indicate which data elements you wish to retrieve. You can specify any number, restricted only by the length of the entire IPC that contains this UOW. The maximum IPC length is defined during TRANSFER system configuration. The value 10 in the DDL noted for this field is not a limit.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries.

To indicate successful retrieval:

0	OK

To indicate problems with the correspondent name:

5600	E-CORR-NSRV-ERR	5607	E-CORR-NSRV-DOWN
5601	E-CORR-NOT-FOUND	5611	E-CORR-NET-DOWN
5602	E-CORR-BAD-NAME	5622	E-CORR-NOT-SAME-NODE
5604	E-CORR-NO-SUCH-NODE	5623	E-CORR-AMBIGUOUS-NAME
5606	E-CORR-NSRV-NOT-FOUND		

To indicate other problems:

4010	E-BAD-TRANSACTION	4210	W-IDENTIFIER-ERRS
4093	E-SECURITY-VIOLATION	4902	E-ERR-PROFILE-FILE
4201	E-CONTEXT-ERR		

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

- ELEM-DATA-BLOCK (used in Definition II only) contains the specific fields retrieved, and is either 36 or 84 bytes long. The formats for blocks of these two lengths are:

  - For the short (36-byte) block

```
DEF  profile-elem-short.
  02  elem-identifier           TYPE BINARY 16.
  02  elem-retn-code            TYPE BINARY 16.
  02  elem-data                 TYPE CHARACTER 32.
END.
```

  - For the long (84-byte) block

```
DEF  profile-elem-long.
  05  elem-identifier           TYPE BINARY 16.
  05  elem-retn-code            TYPE BINARY 16.
  05  elem-data                 TYPE CHARACTER 80.
END.
```

In a single UOW, you can specify identifiers that return several element blocks. Long and short element blocks can be mixed.

Element blocks have the same format whether they appear in the GET-PROFILE-ELEM UOW or in the ALTER-PROFILE-ELEM UOW.

GET-PROFILE-ELEM OPERATION. GET-PROFILE-ELEM retrieves one or more specific data elements from the Profile file. This UOW can be used by itself or in conjunction with the ALTER-PROFILE-ELEM UOW, which alters the data elements retrieved by GET-PROFILE-ELEM. Typically, you retrieve the data elements with the GET-PROFILE-ELEM UOW and then modify some or all of them with the ALTER-PROFILE-ELEM UOW. You can use the response from GET-PROFILE-ELEM as a request to ALTER-PROFILE-ELEM simply by changing the UOW code. These UOWs operate only on profile records controlled by TRANSFER, that is, those records with a REC-TYPE value less than 1000.

NOTE

> Because these two UOWs are closely associated and because they share common fields, the operational details of both UOWs are discussed together in the following paragraphs. The structure of the ALTER-PROFILE-ELEM UOW, however, is presented earlier in this section.

Both the GET-PROFILE-ELEM and the ALTER-PROFILE-ELEM UOWs can be specified in either of two possible DDL definitions. Both of these definitions are discussed in the following paragraphs.

Definition I (for General Applications Use). The data structure provided by Definition I is convenient for most applications, and is simpler to use than Definition II. You typically construct a GET-PROFILE-ELEM UOW by specifying all fields up to and including NUM-RETURNED, and then specifying separate definitions for each particular element. Alternatively, you can define the element block as a DEPENDING ON construction using either PROFILE-ELEMENT-SHORT or PROFILE-ELEMENT-LONG; notice, however, that this type of construction does not permit mixing both long and short blocks.

When using either the GET-PROFILE-ELEM or ALTER-PROFILE-ELEM UOW, you specify those elements in the Profile file that you wish to retrieve or alter. For each element, the GET-PROFILE-ELEM UOW returns a block containing the unique numeric identifier of the element, a return code, and the data contained in the element.

In general, the GET-PROFILE-ELEM UOW and ALTER-PROFILE-ELEM UOW are used together in this way:

1. The GET-PROFILE-ELEM UOW returns data elements.

2. You can specify these same elements when calling the ALTER-PROFILE-ELEM UOW to alter the profile.

The coding involved is illustrated by the following examples:

Example 1

A GET-PROFILE-ELEM request and response is written to retrieve three elements: the depot privilege flags (ID 7), the current correspondent name (ID 1011), and the time the last session ended (ID 9). The ID numbers refer to the DDL data definitions for the Profile file data elements; these IDs and definitions are listed in a table that follows the GET-PROFILE-ELEM UOW discussion.

The COBOL coding would be:

```
01  myget-prof-elem-uow.
  copy get-profile-elem-usk of gcob.
   05  num-wanted            PIC 9999 COMP VALUE 3.
  copy id-depot-privilege-flags of gcob.
  copy id-session-corr of gcob.
  copy id-depot-session-ended of gcob.


01  myget-prof-elem-rsp.
  copy get-profile-elem-rsk of gcob.
  copy data-depot-privilege-flags of gcob.
  copy data-session-corr of gcob.
  copy data-depot-session-ended of gcob.
```

The DDL equivalent would be:

```
DEF myget-profile-elem-uow.
  05  get-profile-elem-usk     TYPE *.
  05  num-wanted               TYPE BINARY 16 UNSIGNED VALUE 3.
  05  id-depot-privilege-flags TYPE *.
  05  id-session-corr          TYPE *.
  05  id-depot-session-ended   TYPE *.
END.


DEF myget-profile-elem-rsp.
  05  get-profile-elem-rsk          TYPE *.
  05  data-depot-privilege-flags    TYPE *.
  05  data-session-corr             TYPE *.
  05  data-depot-session-ended      TYPE *.
END.
```

Notice that a response from GET-PROFILE-ELEM has exactly the same structure as a request to ALTER-PROFILE-ELEM, as discussed in the next example. To change the response into a request, simply alter the UOW number in the UOW header.

Example 2

An ALTER-PROFILE-ELEM request and response is written for the same three elements specified in Example 1.

The COBOL coding would be:

```
01  myalter-prof-elem-uow.
  copy alter-profile-elem-usk of gcob.
  copy data-depot-privilege-flags of gcob.
  copy data-session-corr of gcob.
  copy data-depot-session-ended of gcob.


01  myalter-prof-elem-rsp.
  copy alter-profile-elem-rsk of gcob.        \  contain rsp return
  copy rtn-depot-privilege-flags of gcob.     |  codes for each
  copy rtn-session-corr of gcob.              |  altered identifier
  copy rtn-depot-session-ended of gcob.       /
```

The DDL equivalent would be:

```
DEF myalter-prof-elem-uow.
  05  alter-profile-elem-usk        TYPE *.
  05  data-depot-privilege-flags.   TYPE *.
  05  data-session-corr.            TYPE *.
  05  data-depot-session-ended.     TYPE *.
END.


DEF myalter-prof-elem-rsp.
  05  alter-profile-elem-rsk        TYPE *.
  05  rtn-depot-privilege-flags     TYPE *.
  05  rtn-session-corr.             TYPE *.
  05  rtn-depot-session-ended       TYPE *.
END.
```

The storage layout for examples 1 and 2 is illustrated in Figure 5-6.

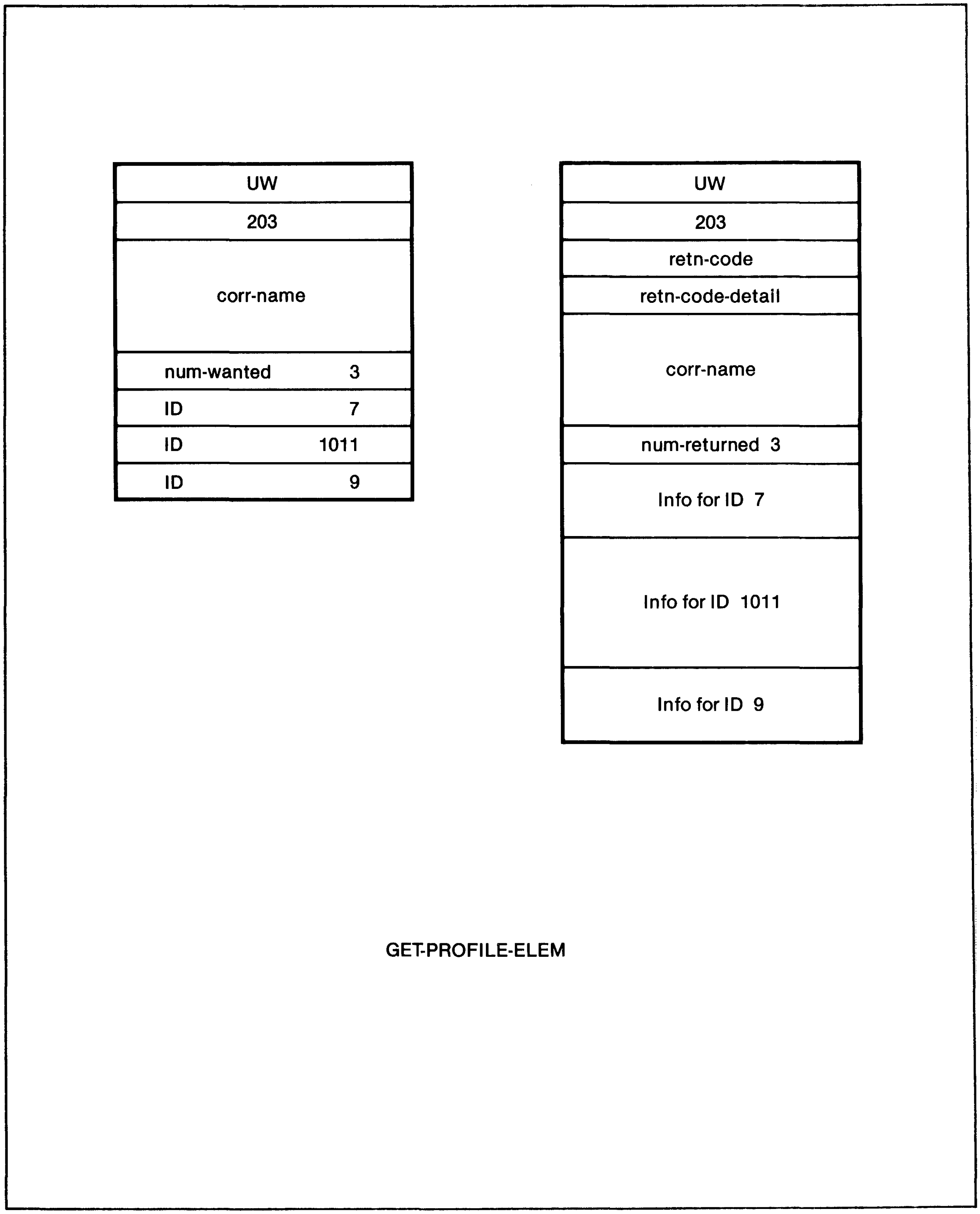


Figure 5-6. Storage Layout for GET-PROFILE-ELEM and ALTER-PROFILE-ELEM

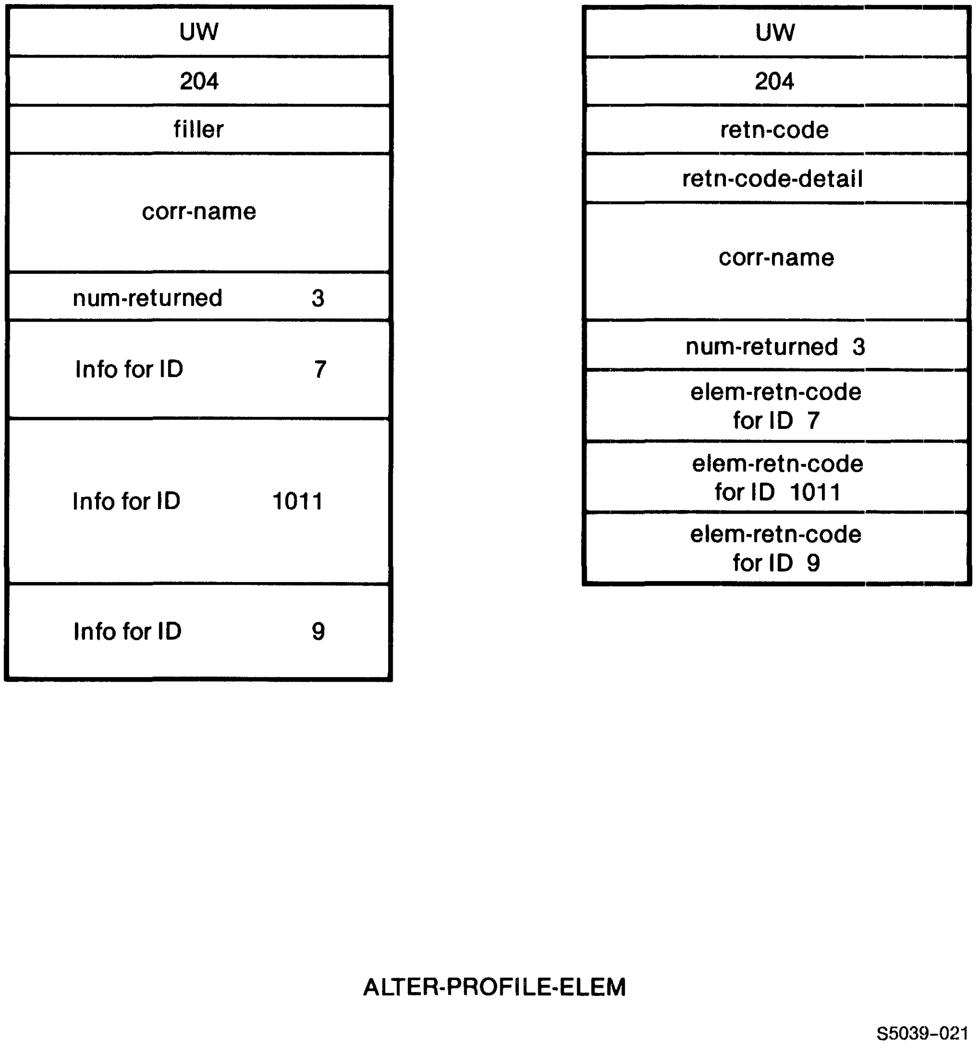


Figure 5-6. Storage Layout for GET-PROFILE-ELEM and ALTER-PROFILE-ELEM (Continued)

Definition II (for TAL Programs). The data structure provided by Definition II is primarily intended for use in TAL programs.

When using either the GET-PROFILE-ELEM UOW or ALTER-PROFILE-ELEM UOW with Definition II, your application specifies a list of element identifiers. These codes identify the exact data elements wanted from the profile. For each identifier, the GET-PROFILE-ELEM UOW returns a block (defined in the ELEM-DATA-BLOCK field) containing the identifier, a return code, and the data requested. That data block is either 36 or 84 bytes long. Identifiers numbered less than 1000 use 36-byte blocks, while identifiers numbered 1000 or greater use 84-byte blocks.

Basically, the GET-PROFILE-ELEM UOW and ALTER-PROFILE-ELEM UOW are used together in this way:

1. The GET-PROFILE-ELEM UOW returns data elements in the ELEM-DATA-BLOCK field.

2. You can include this same ELEM-DATA-BLOCK field when calling the ALTER-PROFILE-ELEM UOW to alter the same data elements.

As previously noted, the format of ELEM-DATA-BLOCK, which really consists of individual definitions for each data element, is the same for both the GET-PROFILE-ELEM response UOW and the ALTER-PROFILE-ELEM UOW.

When the ALTER-PROFILE-ELEM UOW is invoked, TRANSFER first validates all modifications. If these modifications are valid, TRANSFER then performs them. The elem-data section of a modification group can be 32 or 80 bytes long, as implied by the particular identifier. The use of these two lengths simplifies COBOL record definition, as it allows the OCCURS DEPENDING ON construction. Note, however, that short and long data blocks cannot be mixed when you use the OCCURS DEPENDING ON construction. If the value requires fewer bytes than the reserved space, the value is placed at the left side of the field and the balance of the field is declared with a FILLER.

Depot Profile File Elements and Access Privileges. A list of the individual data elements in the depot Profile file appears in Table 5-1. This table gives the element identifier number as entered in ELEM-IDENTIFIER, the contents of the element, and the access privilege required for the GET-PROFILE-ELEM or ALTER-PROFILE-ELEM UOWs.

The following terms that appear in the table have the following definitions:

no one - The element cannot be accessed or updated.

anyone - The element can be accessed by anyone.

owner - The element can be accessed only by the correspondent who owns the current session (in the case of a human correspondent, the logged-on user) or by a system administrator.

sys admin - For GET-PROFILE-ELEM, the element can be accessed only by a correspondent who has system administrator read-only privilege or write privilege. For ALTER-PROFILE-ELEM, the element can be accessed only by a correspondent who has system administrator write privilege.

automatic - The element is maintained automatically by TRANSFER. No one can alter the element, and the element identifier is invalid if used.

Table 5-1. Depot Profile File Elements and Access Privileges

Ident. No.	Content	GET-PROFILE-ELEM Privilege	ALTER-PROFILE-ELEM Privilege
1	Depot password: old and new password	no one	owner, sys admin
2	Depot delta times: default delivery window for depot	owner, sys admin	owner, sys admin
3	Default package priority for depot	owner, sys admin	owner sys admin
	Maximum priority for depot	owner, sys admin	sys admin
4	Depot service flags: logon restriction, concurrent sessions, remote and local name resolution deferral; acceptance of suffixes	owner, sys admin	owner, sys admin (logon restricted flag modifiable by sys admin only, but sys admin cannot set the logon flag for own depot; thus, sys admin cannot disable self, leaving system without a sys admin)
5	Depot log flags: diagnostic logging	owner, sys admin	owner, sys admin

Table 5-1. Depot Profile File Elements and Access Privileges (Continued)

Ident. No.	Content	GET-PROFILE-ELEM Privilege	ALTER-PROFILE-ELEM Privilege
7	Depot privilege flags: system administrator capabilities	owner, sys admin	sys admin (but only for a depot other than own, so that sys admin cannot disable self and leave system without a sys admin)
8	Depot GUARDIAN ID: user name and password	owner, sys admin	owner, sys admin (plus matching password or group manager capability) If GUARDIAN ID and password same as that under which TISERV is running, any password is accepted; password is verified when access to given GUARDIAN ID actually required
9	Last session ended: last session end/ last session start times	owner, sys admin	automatic
10	Time that depot was created	owner, sys admin	automatic

Table 5-1. Depot Profile File Elements and Access Privileges (Continued)

Ident. No.	Content	GET-PROFILE-ELEM Privilege	ALTER-PROFILE-ELEM Privilege
11	Time that depot was last updated by an ALTER-PROFILE-ELEM UOW	owner sys admin	automatic
12	Version code for depot Profile file	sys admin	automatic
13	System time window limits: maximum package lifespan, minimum delivery duration, and minimum time until expiration	anyone	sys admin
16	T/MAIL depot print-control flags: new page indication, and page indent	owner, sys admin	owner, sys admin
17	T/MAIL client operation flags: read-sequence determination, reply indicator, date of presentation criteria, and Virtual Screen use indicator	owner, sys admin	owner, sys admin
19	Default volume and subvolume for T/MAIL client	owner, sys admin	owner, sys admin
20	T/MAIL client system priority values	owner, anyone	sys admin

Table 5-1. Depot Profile File Elements and Access Privileges (Continued)

Ident. No.	Content	GET-PROFILE-ELEM Privilege	ALTER-PROFILE-ELEM Privilege
26	Current administrator privileges: system administrator read and write privileges, and user-owner relation	logged-on correspondent	automatic
27	Dummy definition used for short ELEMENT-BLOCK	anyone	anyone
1003	T/MAIL client output file name	owner, sys admin	owner, sys admin
1005	FAX default destination	owner, sys admin	owner, sys admin
1006	FAX depot default folder	owner, sys admin	owner, sys admin
1011	Name of correspondent associated with current session	logged-on correspondent	automatic
1012	Dummy definition used for long ELEMENT-BLOCK	anyone	anyone
1013	Name of correspondent who last updated profile	owner, sys admin	automatic

Table 5-1. Depot Profile File Elements and Access Privileges (Continued)

Ident. No.	Content	GET-PROFILE-ELEM Privilege	ALTER-PROFILE-ELEM Privilege
1014	T/MAIL depot device option	owner, sys admin	owner, sys admin
1015	T/MAIL depot editor file name	owner, sys admin	owner, sys admin

Data Element DDL and Return Codes. The DDL definitions for each specific data element, as contained in ELEM-DATA-BLOCK, and the return codes supplied by the GET-PROFILE-ELEM UOW appear in Table 5-2.

The ALTER-PROFILE-ELEM UOW does not supply return codes within the ELEM-DATA-BLOCK field. Instead, this UOW provides its return codes in the ELEM-RETN-CODE field of its response UOW. These return codes are listed in Table 5-3.

Table 5-2. DDL Data Definitions for Profile File Data Elements with GET-PROFILE-ELEM Return Codes

```
Ident.
 No.   Definition and Field Descriptions

   1   DEF  data-depot-password.
          02  elem-identifier           TYPE BINARY 16 VALUE 1.
          02  dd-password-rtn           TYPE BINARY 16.
          02  old-password              TYPE CHARACTER 16.
          02  new-password              TYPE CHARACTER 16.
       END.
```

FIELDS

- ELEM-IDENTIFIER is 1.
- DD-PASSWORD-RTN is E-INVALID-IDENTIFIER.
- OLD-PASSWORD is the password prior to the invoking of ALTER-PROFILE-ELEM. System administrators can modify their own passwords and those of other users.
- NEW-PASSWORD is the new password assigned by ALTER-PROFILE-ELEM. If both the old password and the new password are specified as blanks, the depot password is not changed.
  - Depot owners can change their passwords by setting the OLD-PASSWORD field to the correct password of the depot and setting the NEW-PASSWORD field to the desired new password.
  - System administrators can change the password of any depot other than their own by setting the OLD-PASSWORD field to blanks and the NEW-PASSWORD field to the desired new password.

Table 5-2. DDL Data Definitions for Profile File Data Elements with GET-PROFILE-ELEM Return Codes (Continued)

Ident.
No. Definition and Field Descriptions

```
    2  DEF  data-depot-deltas.
          02  elem-identifier            TYPE BINARY 16 VALUE 2.
          02  dd-deltas-rtn              TYPE BINARY 16.
          02  deliv-start-delta.
            03  quantity                 PIC 9(4) COMP.
            03  units                    PIC A.
            03  filler                   PIC X.
          02  deliv-end-delta.
            03  quantity                 PIC 9(4) COMP.
            03  units                    PIC A.
            03  filler                   PIC X.
          02  expiration-delta.
            03  quantity                 PIC 9(4) COMP.
            03  units                    PIC A.
            03  filler                   PIC X.
          02  filler                     TYPE CHARACTER 20
                                           VALUE SPACES.
       END.
```

FIELDS

- ELEM-IDENTIFIER is 2.

- DELTAS-RTN is one of the following:

0	OK
4238	E-TFER-PROFILE-ABSENT

- DELIV-START-DELTA is the default period between package submittal and the earliest time that delivery can begin.

- QUANTITY is a numeric increment of the time unit specified by UNITS, which can be D (for days), H (for hours), or M (for minutes).

Table 5-2. DDL Data Definitions for Profile File Data Elements with GET-PROFILE-ELEM Return Codes (Continued)

Ident. No. **Definition and Field Descriptions**

2 cont'd The UOW always returns the largest time unit, while still retaining whole quantities of those units. For example:

An update of 60 M returns 1 H.

An update of 75 M returns 75 M.

- DELIV-END-DELTA is the default time period between initiation of delivery and latest permitted delivery time.
- EXPIRATION-DELTA is the default time period between delivery end and the time when the package expires.

```
3  DEF  data-depot-priorities.
      02  elem-identifier          TYPE BINARY 16 VALUE 3.
      02  dd-priorities-rtn        TYPE BINARY 16.
      02  default-priority         PIC 9(3) COMP.
      02  maximum-priority         PIC 9(3) COMP.
      02  filler                   TYPE CHARACTER 28
                                     VALUE SPACES.
   END.
```

FIELDS

- ELEMENT-IDENTIFIER is 3.
- DD-PRIORITIES-RTN is one of the following:

0	OK
4238	E-TFER-PROFILE-ABSENT

- DEFAULT-PRIORITY is the default priority assigned to packages submitted from the depot. (T/MAIL has its own default priority; see Identifier 20.)

Table 5-2. DDL Data Definitions for Profile File Data Elements with GET-PROFILE-ELEM Return Codes (Continued)

Ident. No. Definition and Field Descriptions

3 cont'd

- MAXIMUM-PRIORITY is the maximum priority that can be assigned to packages submitted from the depot. Only a system administrator can change this field.

4

```
DEF  data-depot-service-flags.
   02  element-identifier        TYPE BINARY 16 VALUE 4.
   02  dd-service-flags-retn     TYPE BINARY 16.
   02  logon-restricted-flag     TYPE BOOLEAN.
   02  reserved-flag2            TYPE BOOLEAN VALUE "N".
   02  concurrent-session-flag   TYPE BOOLEAN.
   02  defer-remote-flag         TYPE BOOLEAN.
   02  defer-local-flag          TYPE BOOLEAN.
   02  suffixes-accepted-flag    TYPE BOOLEAN.
   02  reserved-flag7            TYPE BOOLEAN VALUE "N".
   02  reserved-flag8            TYPE BOOLEAN VALUE "N".
   02  filler                    TYPE CHARACTER 24
                                   VALUE SPACES.
END.
```

FIELDS

- ELEMENT-IDENTIFIER is 4.

- DD-SERVICE-FLAGS-RTN is one of the following:

0	OK
4238	E-TFER-PROFILE-ABSENT

- LOGON-RESTRICTED-FLAG determines whether anyone can logon at the depot.

  N = prohibit logon

  Y = permit logon

  This field can only be altered by system administrators, and only for a depot other than their own.

- RESERVED-FLAG2 is reserved for use by Tandem; you must set this field to N.

Table 5-2. DDL Data Definitions for Profile File Data Elements with GET-PROFILE-ELEM Return Codes (Continued)

Ident. No.	Definition and Field Descriptions
4 cont'd	● CONCURRENT-SESSION-FLAG determines whether more than one session can be conducted simultaneously at the depot. Y = permit concurrent sessions N = prohibit concurrent sessions When TRANSFER checks for concurrent sessions, sessions created for agents are not counted in this verification. ● DEFER-REMOTE-FLAG determines whether the resolution of remote names is deferred at the depot. Y = defer resolution N = permit immediate resolution This flag is used during the processing of the ADD-RECIP and ADD-MEMBER UOWs. ● DEFER-LOCAL-FLAG determines whether the resolution of local names is deferred at the depot. Y = defer resolution N = permit immediate resolution This flag is used in special cases where a client wishes to add a recipient name or member name even if that name does not exist. WARNING The DEFER-LOCAL-FLAG is normally set to N. You should change this setting only after consultation with your Tandem system analyst.

Table 5-2. DDL Data Definitions for Profile File Data Elements with GET-PROFILE-ELEM Return Codes (Continued)

Ident. No.	Definition and Field Descriptions
4 cont'd	• SUFFIXES-ACCEPTED-FLAG determines whether the depot recognizes suffixes on incoming packages. N = ignore suffixes. Any suffixes in recipient lists or distribution lists that reference this correspondent will be ignored; and any packages will be delivered to this depot only once and need to be acknowledged by this depot only once. Y = allow suffixes. Packages will be delivered to this depot once for each different suffix used in recipient lists or distribution lists that reference this depot. For each delivery, TRANSFER will save a package in the depot INBOX, but only if the package is not already there, and invoke any appropriate agents. Similarly, the package must be acknowledged for each different suffix that was used in recipient lists or distribution lists. • RESERVED-FLAG7 and RESERVED-FLAG8 are reserved for use by Tandem; you must set these fields to N.
5	DEF data-depot-log-flags. 02 element-identifier TYPE BINARY 16 VALUE 5. 02 dd-log-flags-rtn TYPE BINARY 16. 02 diagnostic-log-flag TYPE BOOLEAN. 02 reserved-flag2 TYPE BOOLEAN VALUE "N". 02 reserved-flag3 TYPE BOOLEAN VALUE "N". 02 reserved-flag4 TYPE BOOLEAN VALUE "N". 02 reserved-flag5 TYPE BOOLEAN VALUE "N". 02 reserved-flag6 TYPE BOOLEAN VALUE "N". 02 reserved-flag7 TYPE BOOLEAN VALUE "N". 02 reserved-flag8 TYPE BOOLEAN VALUE "N". 02 filler TYPE CHARACTER 24 VALUE SPACES. END.

Table 5-2. DDL Data Definitions for Profile File Data Elements with GET-PROFILE-ELEM Return Codes (Continued)

Ident. No.	Definition and Field Descriptions
5 cont'd	FIELDS • ELEM-IDENTIFIER is 5. • DD-LOG-FLAGS-RTN is one of the following: 0 OK 4238 E-TFER-PROFILE-ABSENT • DIAGNOSTIC-LOG-FLAG determines whether diagnostic logging of IPCs takes place. Y = enables logging even if systemwide logging is not enabled N = disables logging, unless systemwide logging is enabled • RESERVED-FLAG2 through RESERVED-FLAG8 are reserved for use by Tandem. You must set these fields to N.
7	DEF data-depot-privilege-flags. 02 elem-identifier TYPE BINARY 16 VALUE 7. 02 dd-privilege-flags-rtn TYPE BINARY 16. 02 sys-admin-flag TYPE CHARACTER 1. 02 filler TYPE CHARACTER 31 VALUE SPACES. END. FIELDS • ELEM-IDENTIFIER is 7. • DD-PRIVILEGE-FLAGS-RTN is one of the following: 0 OK 4238 E-TFER-PROFILE-ABSENT

Table 5-2. DDL Data Definitions for Profile File Data Elements with GET-PROFILE-ELEM Return Codes (Continued)

Ident. No.	Definition and Field Descriptions
7 cont'd	• SYS-ADMIN-FLAG determines what, if any, system administrator privileges the correspondent has. W = write privileges R = read privileges N = the correspondent is not a system administrator If system administrators attempt to modify their own flags, a security violation results.
8	DEF data-depot-guardian-id. 02 elem-identifier TYPE BINARY 16 VALUE 8. 02 dd-guardian-id-rtn TYPE BINARY 16. 02 guardian-user-name TYPE CHARACTER 17. 02 guardian-password TYPE CHARACTER 8. 02 filler TYPE CHARACTER 7 VALUE SPACES. END. FIELDS • ELEM-IDENTIFIER is 8. • DD-GUARDIAN-ID-RTN is one of the following: 0 OK 4238 E-TFER-PROFILE-ABSENT • GUARDIAN-USER-NAME is the correspondent user name as defined to the GUARDIAN operating system. If no GUARDIAN user name is associated with the depot, the entry NONE is returned in this field.

Table 5-2. DDL Data Definitions for Profile File Data Elements with GET-PROFILE-ELEM Return Codes (Continued)

Ident. No.	Definition and Field Descriptions
8 cont'd	• GUARDIAN-PASSWORD is the correspondent logon password required for validation of an altered GUARDIAN ID. If the GUARDIAN user name is being changed, the GUARDIAN password must be supplied. Under the following conditions, the password is accepted without verification: - if the depot requesting the change has a GUARDIAN user ID of group.MANAGER, where group is the group of the new GUARDIAN ID being assigned to the depot - if the depot requesting the change has a GUARDIAN user ID of SUPER.SUPER. This simulates the validation performed by the GUARDIAN operating system. GUARDIAN-PASSWORD is used only by the ALTER-PROFILE-ELEM UOW; blanks are returned in this field for GET-PROFILE-ELEM. If GUARDIAN-USER-NAME is not being changed, the password is ignored. To change a depot GUARDIAN password, first change the GUARDIAN-USER-NAME to NONE with blanks in the password; then change GUARDIAN-USER-NAME to the original user name with the new password.

Table 5-2. DDL Data Definitions for Profile File Data Elements with GET-PROFILE-ELEM Return Codes (Continued)

```
Ident.
 No.   Definition and Field Descriptions

    9  DEF  data-depot-session-ended.
         02  elem-identifier           TYPE BINARY 16 VALUE 9.
         02  dd-session-ended-rtn      TYPE BINARY 16.
         02  session-ended.
           03  year                    PIC 9(4).
           03  month                   PIC 9(2).
           03  day-of-month            PIC 9(2).
           03  hour                    PIC 9(2).
           03  minute                  PIC 9(2).
           03  second                  PIC 9(2).
         02  session-started.
           03  year                    PIC 9(4).
           03  month                   PIC 9(2).
           03  day-of-month            PIC 9(2).
           03  hour                    PIC 9(2).
           03  minute                  PIC 9(2).
           03  second                  PIC 9(2).
         02  filler                    TYPE CHARACTER 4
                                         VALUE SPACES.
       END.
```

FIELDS

- ELEM-IDENTIFIER is 9.

- DD-SESSION-ENDED-RETN is one of the following:

0	OK
4238	E-TFER-PROFILE-ABSENT

- SESSION-ENDED contains the date and time that the last session for the depot ended. This excludes sessions automatically initiated by TRANSFER for an agent.

- SESSION-STARTED contains the date and time that the last session began.

Table 5-2. DDL Data Definitions for Profile File Data Elements with GET-PROFILE-ELEM Return Codes (Continued)

Ident. No.	Definition and Field Descriptions

```
  10  DEF  data-depot-created-time.
        02  elem-identifier             TYPE BINARY 16 VALUE 10.
        02  dd-created-time-rtn         TYPE BINARY 16.
        02  depot-created.
          03  year                      PIC 9(4).
          03  month                     PIC 9(2).
          03  day-of-month              PIC 9(2).
          03  hour                      PIC 9(2).
          03  minute                    PIC 9(2).
          03  second                    PIC 9(2).
        02  version-created.
          03  letter                    PIC A.
          03  rev-number                PIC 99.
        02  filler                      TYPE CHARACTER 15
                                          VALUE SPACES.
      END.
```

FIELDS

- ELEM-IDENTIFIER is 10.
- DD-CREATED-TIME-RTN is one of the following:

```
     0  OK
  4238  E-TFER-PROFILE-ABSENT
```

- DEPOT-CREATED is the date and time of the depot creation.
- VERSION-CREATED is the version of TRANSFER that created the depot. For the first release of the product, LETTER is A and REV-NUMBER is 01.

Table 5-2. DDL Data Definitions for Profile File Data Elements with GET-PROFILE-ELEM Return Codes (Continued)

```
Ident.
 No.    Definition and Field Descriptions
```

```
   11   DEF  data-depot-updated-time.
          02  elem-identifier             TYPE BINARY 16 VALUE 11.
          02  dd-updated-time-rtn         TYPE BINARY 16.
          02  depot-updated.
            03  year                      PIC 9(4).
            03  month                     PIC 9(2).
            03  day-of-month              PIC 9(2).
            03  hour                      PIC 9(2).
            03  minute                    PIC 9(2).
            03  second                    PIC 9(2).
          02  filler                      TYPE CHARACTER 18
                                            VALUE SPACES.
        END.
```

FIELDS

- ELEM-IDENTIFER is 11.
- DD-UPDATED-TIME-RTN is one of the following:

0	OK
4238	E-TFER-PROFILE-ABSENT

- DEPOT-UPDATED is the date and time that the depot was last updated with the ALTER-PROFILE-ELEM UOW.

```
   12   DEF  data-sys-file-version.
          02  elem-identifier             TYPE BINARY 16 VALUE 12.
          02  ds-file-version-rtn         TYPE BINARY 16.
          02  version-code.
            03  letter                    PIC A.
            03  rev-number                PIC 99.
          02  filler                      TYPE CHARACTER 29
                                            VALUE SPACES.
        END.
```

FIELDS

- ELEM-IDENTIFIER is 12.

Table 5-2. DDL Data Definitions for Profile File Data Elements with GET-PROFILE-ELEM Return Codes (Continued)

Ident.
No. Definition and Field Descriptions

12
cont'd

- DS-FILE-VERSION-RTN is one of the following:

0	OK
4241	E-TFER-CTL-REC-ABSENT

- VERSION-CODE is the current version code for the Profile file.

  For the first release of the product, LETTER is A and REV-NUMBER is 01.

13

```
DEF data-sys-window-limits.
  02  elem-identifier          TYPE BINARY 16 VALUE 13.
  02  ds-window-limits-rtn     TYPE BINARY 16.
  02  max-lifespan.
    03  quantity               PIC 9(4) COMP.
    03  units                  PIC A.
    03  filler                 PIC X.
  02  min-deliv.
    03  quantity               PIC 9(4) COMP.
    03  units                  PIC A.
    03  filler                 PIC X.
  02  min-expire.
    03  quantity               PIC 9(4) COMP.
    03  units                  PIC A.
    03  filler                 PIC X.
  02  filler                   TYPE CHARACTER 20
                                 VALUE SPACES.
END.
```

FIELDS

- ELEM-IDENTIFIER is 13.

- DS-WINDOW-LIMITS-RTN is one of the following:

0	OK
4241	E-TFER-CTL-REC-ABSENT

Table 5-2. DDL Data Definitions for Profile File Data Elements with GET-PROFILE-ELEM Return Codes (Continued)

Ident. No. — Definition and Field Descriptions

13 cont'd

- MAX-LIFESPAN is the maximum lifespan of packages submitted from any depot at the node.
- MIN-DELIV is the minimum delivery window (END-DELIV-TIME minus START-DELIV-TIME) that is allowed for a package.
- MIN-EXPIRE is the minimum period allowed between the latest delivery time and the expiration time for a package.

  A submitted package that violates these last two limits is adjusted to conform to these limits and is not rejected.

Updates to these fields will not affect any sessions currently in progress.

16

```
DEF  data-depot-mail-print-ctl.
   02  elem-identifier         TYPE BINARY 16 VALUE 16.
   02  ddm-print-ctl-rtn       TYPE BINARY 16.
   02  page-flag               TYPE BOOLEAN.
   02  filler                  TYPE CHARACTER 1
                                 VALUE SPACES.
   02  page-indent-columns     PIC 9(4) COMP.
   02  filler                  TYPE CHARACTER 28
                                 VALUE SPACES.
END.
```

FIELDS

- ELEM-IDENTIFIER is 16.
- DDM-PRINT-CTL-RTN is one of the following:

0	OK
4239	E-MAIL-PROFILE-ABSENT

Table 5-2. DDL Data Definitions for Profile File Data Elements with GET-PROFILE-ELEM Return Codes (Continued)

Ident. No. — Definition and Field Descriptions

16 cont'd

- PAGE-FLAG indicates whether each package is displayed by the T/MAIL client on a new page when the Print function key is pressed.

  Y = new page

  N = no new page

- PAGE-INDENT-COLUMNS indicates the number of columns to the right that T/MAIL indents the page.

17

```
DEF  data-depot-mail-flags.
   02  elem-identifier          TYPE BINARY 16 VALUE 17.
   02  ddm-flags-rtn            TYPE BINARY 16.
   02  read-sequence-flag       TYPE CHARACTER 1.
   02  reply-default-flag       TYPE CHARACTER 1.
   02  date-presentation-flag   TYPE CHARACTER 1.
   02  edit-flag                TYPE BOOLEAN.
   02  filler                   TYPE CHARACTER 28
                                  VALUE SPACES.
END.
```

FIELDS

- ELEM-IDENTIFIER is 17.

- DDM-FLAGS-RTN is one of the following:

0	OK
4239	E-MAIL-PROFILE-ABSENT

- READ-SEQUENCE-FLAG indicates how packages sent to T/MAIL are to be read upon receipt.

  S = read in the order transmitted by the sender

  L = read the latest package delivered first

  T = read the earliest package delivered first

Table 5-2. DDL Data Definitions for Profile File Data Elements with GET-PROFILE-ELEM Return Codes (Continued)

Ident. No.	Definition and Field Descriptions
17 cont'd	NOTE For TRANSFER B00, the READ-SEQUENCE-FLAG field has become obsolete for the TRANSFER ADMIN screen interface and T/MAIL. For downward compatibility, the TISERV UOW interface will continue to support this field. • REPLY-DEFAULT-FLAG indicates whom T/MAIL should place in the recipient list in response to the Reply function key. T = the original package's To: recipients C = all recipients copied N = no one except the original package sender • DATE-PRESENTATION indicates the format in which the date presented on packages sent from the depot should be displayed. D = world format (dd/mm/yy) M = USA format (mm/dd/yy) • EDIT-FLAG indicates whether Edit VS (Virtual Screen) is automatically invoked if EDIT is being used. Y = automatically invoke Edit VS N = do not automatically invoke Edit VS
19	DEF data-depot-mail-volumes. 02 elem-identifier TYPE BINARY 16 VALUE 19. 02 ddm-volumes-rtn TYPE BINARY 16. 02 node TYPE CHARACTER 8. 02 volume-subvolume TYPE CHARACTER 17. 02 filler TYPE CHARACTER 7. VALUE SPACES. END.

Table 5-2. DDL Data Definitions for Profile File Data Elements with GET-PROFILE-ELEM Return Codes (Continued)

Ident. No.	Definition and Field Descriptions
19 cont'd	FIELDS • ELEM-IDENTIFIER is 19. • DDM-VOLUME-RTN is one of the following: 0 OK 4239 E-MAIL-PROFILE-ABSENT • NODE is the name of the node at which the T/MAIL client's default volume is defined. This entry is written in the GUARDIAN/EXPAND format, where the node name begins with a backslash (\). • VOLUME-SUBVOLUME is the volume and subvolume that is to be the T/MAIL client's default volume.subvolume. If either the volume or subvolume, or both, are omitted, the servers use the defaults for the GUARDIAN ID. If the system name is omitted, the servers use the GUARDIAN default system.
20	DEF data-sys-mail-priority. 02 elem-identifier TYPE BINARY 16 VALUE 20. 02 dsm-priority-rtn TYPE BINARY 16. 02 low-priority PIC 9(3) COMP. 02 normal-priority PIC 9(3) COMP. 02 urgent-priority PIC 9(3) COMP. 02 filler TYPE CHARACTER 26 VALUE SPACES. END. FIELDS • ELEM-IDENTIFIER is 20. • DSM-PRIORITY-RTN is one of the following: 0 OK 4239 E-MAIL-PROFILE-ABSENT

Table 5-2. DDL Data Definitions for Profile File Data Elements with GET-PROFILE-ELEM Return Codes (Continued)

Ident. No. — Definition and Field Descriptions

20 cont'd

- LOW-PRIORITY is a numeric value that represents low priority for the T/MAIL client.

- NORMAL-PRIORITY is a numeric value that represents normal priority for the T/MAIL client.

- URGENT-PRIORITY is a numeric value that represents urgent priority for the T/MAIL client. This value cannot exceed the maximum priority for the depot.

LOW-PRIORITY, NORMAL-PRIORITY, and URGENT-PRIORITY can have the same values.

26

```
DEF data-session-privileges.
   02  elem-identifier          TYPE BINARY 16 VALUE 26.
   02  ds-privileges-rtn        TYPE BINARY 16.
   02  syst-admin-flag          TYPE CHARACTER 1.
   02  user-owner-flag          TYPE BOOLEAN.
   02  filler                   TYPE CHARACTER 30
                                  VALUE SPACES.
END.
```

FIELDS

- ELEMENT-IDENTIFIER is 26.

- DS-PRIVILEGES-RTN is OK.

- SYSTEM-ADMIN-FLAG indicates the correspondent's system administrator privileges.

  W = write and read privileges

  R = read privileges

  N = no system administrator privileges

Table 5-2. DDL Data Definitions for Profile File Data Elements with GET-PROFILE-ELEM Return Codes (Continued)

Ident. No.	Definition and Field Descriptions
26 cont'd	• USER-OWNER-FLAG indicates whether the current user is the owner of the depot. Y = the user is the owner N = the user is not the owner
27	DEF data-dummy-short. 02 elem-identifier TYPE BINARY 16 VALUE 27. 02 dd-short-rtn TYPE BINARY 16. 02 filler TYPE CHARACTER 32 VALUE 27. END. FIELDS • ELEM-IDENTIFIER is 27. • DD-SHORT-RTN is OK.
1003	DEF data-depot-mail-filename. 02 elem-identifier TYPE BINARY 16 VALUE 1003. 02 ddm-filename-retn TYPE BINARY 16. 02 mail-output-filename PIC X(80). END. FIELDS • ELEM-IDENTIFIER is 1003. • DDM-FILENAME-RETN is one of the following: 0 OK 4239 E-MAIL-PROFILE-ABSENT • MAIL-OUTPUT-FILENAME is the GUARDIAN file name of the output file used by the T/MAIL client.

Table 5-2. DDL Data Definitions for Profile File Data Elements with GET-PROFILE-ELEM Return Codes (Continued)

Ident. No.	Definition and Field Descriptions

1005	DEF data-depot-fax-routing.
	  02 elem-identifier TYPE BINARY 16 VALUE 1005.
	  02 ddf-routing-rtn TYPE BINARY 16.
	  02 default-fax-routing TYPE CHARACTER 80.
	FIELDS
	• ELEM-IDENTIFIER is 1005.
	• DDF-ROUTING-RTN is one of the following:
	  0 OK
	  4240 E-FAX-PROFILE-ABSENT
	• DEFAULT-FAX-ROUTING is used to maintain a default destination (a correspondent or distribution list name), for facsimile items without a destination address.

1006	DEF data-depot-fax-folder1.
	  02 elem-identifier TYPE BINARY 16 VALUE 1006.
	  02 ddf-folder-rtn TYPE BINARY 16.
	  02 default-fax-folder1 TYPE CHARACTER 80.
	FIELDS
	• ELEM-IDENTIFIER is 1006.
	• DDF-FOLDER-RTN is one of the following:
	  0 OK
	  4240 E-FAX-PROFILE-ABSENT
	• DEFAULT-FAX-FOLDER1 is used to maintain the name of the default folder into which facsimile items without destination addresses can be saved.

Table 5-2. DDL Data Definitions for Profile File Data Elements with GET-PROFILE-ELEM Return Codes (Continued)

Ident. No. Definition and Field Descriptions

```
1011  DEF  data-session-corr.
        02  elem-identifier            TYPE BINARY 16
                                         VALUE 1011.
        02  ds-corr-rtn                TYPE BINARY 16.
        02  session-corr-name          PIC X(80).
      END.
```

FIELDS

- ELEM-IDENTIFIER is 1011.
- DS-CORR-RTN is OK.
- SESSION-CORR-NAME is the fully qualified name of the logged-on correspondent.

```
1012  DEF dummy-long.
        02  elem-identifier            TYPE BINARY 16
                                         VALUE 1012.
        02  dd-long-rtn                TYPE BINARY 16.
        02  filler                     TYPE CHARACTER 80
                                         VALUE SPACES.
      END.
```

FIELDS

- ELEM-IDENTIFER is 1012.
- DD-LONG-RETN is OK.

```
1013  DEF  data-depot-updated-by.
        02  elem-identifier            TYPE BINARY 16
                                         VALUE 1013.
        02  dd-updated by-rtn          TYPE BINARY 16.
        02  updated-by-corr-name       PIC X(80).
      END.
```

Table 5-2. DDL Data Definitions for Profile File Data Elements with GET-PROFILE-ELEM Return Codes (Continued)

Ident. No. Definition and Field Descriptions

1013 cont'd FIELDS

- ELEM-IDENTIFIER is 1013.

- DD-UPDATED-BY-RTN is one of the following:

```
   0  OK
4238  E-TFER-PROFILE-ABSENT
```

- UPDATED-BY-CORR-NAME is the logged-on CORR-NAME of the correspondent who last issued an ALTER-PROFILE-ELEM UOW for this profile.

```
1014  DEF  data-depot-device-option.
        02  elem-identifier           TYPE BINARY 16
                                        VALUE 1014.
        02  ddd-option-rtn            TYPE BINARY 16.
        02  default-device-option     TYPE CHARACTER 50.
        02  filler                    TYPE CHARACTER 30
                                        VALUE SPACES.
      END.
```

FIELDS

- ELEM-IDENTIFIER is 1014.

- DDD-OPTION-RTN is one of the following:

```
   0  OK
4239  E-MAIL-PROFILE-ABSENT
```

- DEFAULT-DEVICE-OPTION is used by the T/MAIL client to maintain additional parameters associated with the default device. The file name of the device is stored in the mail-output-filename field of Ident. No. 1003.

Table 5-2. DDL Data Definitions for Profile File Data Elements with GET-PROFILE-ELEM Return Codes (Continued)

Ident. No.	Definition and Field Descriptions
1015	DEF data-depot-editor-name. 02 elem-identifier TYPE BINARY 16 VALUE 1015. 02 dde-filename-rtn TYPE BINARY 16. 02 mail-editor-name TYPE CHARACTER 36. 02 filler TYPE CHARACTER 44 VALUE SPACES. END. FIELDS • ELEM-IDENTIFIER is 1015. • DDE-FILENAME-RTN is one of the following: 0 OK 4239 E-MAIL-PROFILE-ABSENT • MAIL-EDITOR-NAME is used by the T/MAIL client to maintain the program file name of the text editor to invoke on the correspondent's behalf.

Table 5-3. ALTER-PROFILE-ELEM Return Codes

Ident. No.	Definition and Content		
1	DEF rtn-depot-password		TYPE BINARY 16.
	0	OK	
	4238	E-TFER-PROFILE-ABSENT	
	4300	E-PASSWORD-MATCH-FAIL	
2	DEF rtn-depot-deltas		TYPE BINARY 16.
	0	OK	
	4072	E-UNITS-MUST-BE-DHM	
	4074	E-INVALID-REL-TIME-QTY	
	4238	E-TFER-PROFILE-ABSENT	
	4303	E-WINDOW-TOO-LARGE	
3	DEF rtn-depot-priorities		TYPE BINARY 16.
	0	OK	
	4078	E-INVALID-PRIORITY	
	4093	E-SECURITY-VIOLATION	
	4310	E-PRIORITY-SEQUENCE	
	4238	E-TFER-PROFILE-ABSENT	
4	DEF rtn-depot-service-flags		TYPE BINARY 16.
	0	OK	
	4051	E-MUST-BE-YN	
	4052	E-RESERVED-MUST-BE-N	
	4093	E-SECURITY-VIOLATION	
	4238	E-TFER-PROFILE-ABSENT	
5	DEF rtn-depot-log-flags		TYPE BINARY 16.
	0	OK	
	4051	E-MUST-BE-YN	
	4052	E-RESERVED-MUST-BE-N	
	4238	E-TFER-PROFILE-ABSENT	

Table 5-3. ALTER-PROFILE-ELEM Return Codes (Continued)

Ident. No.	Definition and Content	
7	DEF rtn-depot-privilege-flags	TYPE BINARY 16.
	0 OK	
	4093 E-SECURITY-VIOLATION	
	4238 E-TFER-PROFILE-ABSENT	
	4388 E-PRIV-MUST-BE-RWN	
8	DEF rtn-depot-guardian-id	TYPE BINARY 16.
	0 OK	
	4238 E-TFER-PROFILE-ABSENT	
	4304 E-INVALID-GUARDIAN-ID	
9	DEF rtn-depot-session-ended	TYPE BINARY 16.
	4302 E-NOT-UPDATABLE	
10	DEF rtn-depot-created-time	TYPE BINARY 16.
	4302 E-NOT-UPDATABLE	
11	DEF rtn-depot-updated-time	TYPE BINARY 16.
	4302 E-NOT-UPDATABLE	
12	DEF rtn-sys-file-version	TYPE BINARY 16.
	4302 E-NOT-UPDATABLE	
13	DEF rtn-sys-window-limits	TYPE BINARY 16.
	0 OK	
	4072 E-UNITS-MUST-BE-DHM	
	4074 E-INVALID-REL-TIME-QTY	
	4093 E-SECURITY-VIOLATION	
	4241 E-TFER-CTL-REC-ABSENT	
	4303 E-WINDOW-TOO-LARGE	

Table 5-3. ALTER-PROFILE-ELEM Return Codes (Continued)

Ident. No.	Definition and Content
16	DEF rtn-depot-mail-print-ctl TYPE BINARY 16. 0 OK 4051 E-MUST-BE-YN 4239 E-MAIL-PROFILE-ABSENT 4395 E-INVALID-INDENT
17	DEF rtn-depot-mail-flags TYPE BINARY 16. 0 OK 4239 E-MAIL-PROFILE-ABSENT 4051 E-MUST-BE-YN 4382 E-MUST-BE-SLT 4383 E-MUST-BE-TCN 4384 E-MUST-BE-MD
19	DEF rtn-depot-mail-volumes TYPE BINARY 16. 0 OK 4239 E-MAIL-PROFILE-ABSENT 4306 E-BAD-VOL-SUBVOL 4308 E-INVALID-NODE
20	DEF rtn-sys-mail-priority TYPE BINARY 16. 0 OK 4078 E-INVALID-PRIORITY 4093 E-SECURITY-VIOLATION 4242 E-MAIL-CTL-REC-ABSENT 4310 E-PRIORITY-SEQUENCE
26	DEF rtn-session-privileges TYPE BINARY 16. 4302 E-NOT-UPDATABLE
27	DEF rtn-dummy-short TYPE BINARY 16. 0 OK

Table 5-3. ALTER-PROFILE-ELEM Return Codes (Continued)

Ident. No.	Definition and Content
1003	DEF rtn-depot-mail-filename TYPE BINARY 16. 0 OK 4239 E-MAIL-PROFILE-ABSENT 4305 E-INVALID-FILENAME
1005	DEF rtn-depot-fax-routing TYPE BINARY 16. 0 OK 4240 E-FAX-PROFILE-ABSENT 5751 E-RECIP-NOT-FOUND 5752 E-RECIP-BAD-NAME
1006	DEF rtn-depot-fax-folderl TYPE BINARY 16. 0 OK 4240 E-FAX-PROFILE-ABSENT 5676 E-FLD-NOT-FOUND 5677 E-FLD-BAD-NAME
1011	DEF rtn-session-corr TYPE BINARY 16. 4302 E-NOT-UPDATABLE
1012	DEF rtn-dummy-long TYPE BINARY 16. 0 OK
1013	DEF rtn-depot-updated-by TYPE BINARY 16. 4302 E-NOT-UPDATABLE
1014	DEF rtn-depot-device-option TYPE BINARY 16. 0 OK 4239 E-MAIL-PROFILE-ABSENT

Table 5-3. ALTER-PROFILE-ELEM Return Codes (Continued)

Ident. No.	Definition and Content	
1015	DEF rtn-depot-editor-name	TYPE BINARY 16.
	0 OK 4239 E-MAIL-PROFILE-ABSENT 4305 E-INVALID-FILENAME 4306 E-BAD-VOL-SUBVOL 4308 E-INVALID-NODE 4311 E-INVALID-EDITOR	

GET-RECIP-REC (UOW Code 126)

GET-RECIP-REC retrieves recipient records for a package.

```
DEF  get-recip-rec-uow.
  02  hdr                           TYPE UOW-HDR.
    03  self-ident                  PIC AA VALUE "UW".
    03  uow-code                    TYPE BINARY 16 UNSIGNED
                                      VALUE 126.
  02  recip-key.
    03  item-id.
      04  dummy                     PIC X(12).
    03  recip-name                  PIC X(120).
  02  options.
    03  get-exact                   TYPE BOOLEAN.
    03  generic-suffix              TYPE BOOLEAN.
    03  skip-exact                  TYPE BOOLEAN.
    03  strip-local-node-name       TYPE BOOLEAN.
    03  reserved-4                  TYPE BOOLEAN VALUE "N".
    03  reserved-5                  TYPE BOOLEAN VALUE "N".
    03  reserved-6                  TYPE BOOLEAN VALUE "N".
    03  filter-by-recip-type        TYPE BOOLEAN.
    03  filter-by-status-flag.
      04  delivered                 TYPE BOOLEAN.
      04  byte                      REDEFINES DELIVERED PIC X.
      04  examined                  TYPE BOOLEAN.
      04  certification-acked       TYPE BOOLEAN.
      04  canceled                  TYPE BOOLEAN.
      04  expired                   TYPE BOOLEAN.
      04  async-resolved            TYPE BOOLEAN.
      04  reserved-6                TYPE BOOLEAN VALUE "N".
      04  reserved-7                TYPE BOOLEAN VALUE "N".
      04  is-original-recip         TYPE BOOLEAN.
      04  is-local-dlist            TYPE BOOLEAN.
      04  is-local-corr             TYPE BOOLEAN.
      04  is-remote-recip           TYPE BOOLEAN.
      04  reserved-12               TYPE BOOLEAN VALUE "N".
      04  reserved-13               TYPE BOOLEAN VALUE "N".
      04  reserved-14               TYPE BOOLEAN VALUE "N".
      04  reserved-15               TYPE BOOLEAN VALUE "N".
  02  filter-values.
    03  recip-type                  PIC 9(4) COMP.
    03  status-flags.
      04  delivered                 TYPE BOOLEAN.
      04  byte                      REDEFINES DELIVERED PIC X.
      04  examined                  TYPE BOOLEAN.
      04  certification-acked       TYPE BOOLEAN.
      04  canceled                  TYPE BOOLEAN.
      04  expired                   TYPE BOOLEAN.
```

→

```
      04  async-resolved            TYPE BOOLEAN.
      04  reserved-6                TYPE BOOLEAN VALUE "N".
      04  reserved-7                TYPE BOOLEAN VALUE "N".
      04  is-original-recip         TYPE BOOLEAN.
      04  is-local-dlist            TYPE BOOLEAN.
      04  is-local-corr             TYPE BOOLEAN.
      04  is-remote-recip           TYPE BOOLEAN.
      04  reserved-12               TYPE BOOLEAN VALUE "N".
      04  reserved-13               TYPE BOOLEAN VALUE "N".
      04  reserved-14               TYPE BOOLEAN VALUE "N".
      04  reserved-15               TYPE BOOLEAN VALUE "N".
  02  num-requested                 TYPE BINARY 16 UNSIGNED
                                      VALUE 10.
END.
```

```
DEF  get-recip-rec-rsp.
  02  hdr.
    03  self-ident                  PIC AA VALUE "UW".
    03  uow-code                    TYPE BINARY 16 UNSIGNED
                                       VALUE 126.
  02  retn-code                     TYPE BINARY 16.
  02  retn-code-detail              TYPE BINARY 16.
  02  num-returned                  TYPE BINARY 16 UNSIGNED.
  02  recips-returned               OCCURS 0 TO !num-requested!
                                      10 TIMES DEPENDING ON
                                      num-returned.
    03  recip-name                  PIC X(120).
    03  recip-type                  PIC 9(4) COMP.
    03  deliv-err                   TYPE BINARY 16.
    03  deliv-status-flags.
      04  delivered                 TYPE BOOLEAN.
      04  byte                      REDEFINES DELIVERED PIC X.
      04  examined                  TYPE BOOLEAN.
      04  certification-acked       TYPE BOOLEAN.
      04  canceled                  TYPE BOOLEAN.
      04  expired                   TYPE BOOLEAN.
      04  async-resolved            TYPE BOOLEAN.
      04  reserved-6                TYPE BOOLEAN VALUE "N".
      04  reserved-7                TYPE BOOLEAN VALUE "N".
      04  is-original-recip         TYPE BOOLEAN.
      04  is-local-dlist            TYPE BOOLEAN.
      04  is-local-corr             TYPE BOOLEAN.
      04  is-remote-recip           TYPE BOOLEAN.
      04  reserved-12               TYPE BOOLEAN VALUE "N".
      04  reserved-13               TYPE BOOLEAN VALUE "N".
```

→

```
      04  reserved-14                     TYPE BOOLEAN VALUE "N".
      04  reserved-15                     TYPE BOOLEAN VALUE "N".
    03  date-delivered.
      04  year                            PIC 9(4).
      04  month                           PIC 9(2).
      04  day-of-month                    PIC 9(2).
      04  hour                            PIC 9(2).
      04  minute                          PIC 9(2).
      04  second                          PIC 9(2).
END.
```

<u>GET-RECIP-REC FIELDS.</u> The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 126.

- RECIP-KEY identifies the item ID of the package header to which the recipient list applies, and the name of the recipient at which the retrieval should begin in the recipient list.

- OPTIONS establishes criteria for selectively retrieving records. Six options are provided. In these options, the entry Y selects the option, while the entry N suppresses it.

  GET-EXACT retrieves the recipient record that exactly matches the name specified in RECIP-KEY.

  GENERIC-SUFFIX retrieves all recipient records for the recipient specified in RECIP-KEY, regardless of whatever suffix might be appended to the recipient name. If GET-EXACT is set to Y, GENERIC-SUFFIX is ignored.

  SKIP-EXACT indicates whether TISERV begins its retrieval with the record specified in RECIP-KEY, or with the next record in the recipient file.

  Y = start retrieval with the first record following the one specified in RECIP-KEY, whether or not the specified record actually exists.

  N = start retrieval with the exact record specified in RECIP-KEY (if that record is present), or with the first record following that one (if the exact record is not present).

STRIP-LOCAL-NODE-NAME omits the node name from the returned recipient names if the recipients are local. Remote node names are always included, regardless of the setting of this field.

RESERVED-4 through RESERVED-6 are reserved for use by Tandem; these fields must be set to N.

FILTER-BY-RECIP-TYPE selects only those records identified by the value of the RECIP-TYPE field in FILTER-VALUES, beginning with the record identified by RECIP-KEY.

FILTER-BY-STATUS-FLAG selects the status flags by which you wish to filter the records for retrieval. The status flags are explained in the STATUS-FLAGS field of FILTER-VALUES.

- FILTER-VALUES defines the filter by which records are selected for retrieval. This field applies only if FILTER-BY-RECIP-TYPE or FILTER-BY-STATUS-FLAG is selected in the OPTIONS field. FILTER-VALUES includes the following:

RECIP-TYPE specifies a recipient type and determines that only records of this type will be retrieved. FILTER-BY-RECIP-TYPE must be set to Y.

STATUS-FLAGS specifies that only recipient records whose status flag matches this input value will be retrieved. FILTER-BY-STATUS-FLAG must be set to Y.

The status flags maintained by TRANSFER contain status information about the delivery of a package with respect to a particular recipient. These flags are set by the TAREQ that delivers the package to the recipient.

The status flags denote the following information:

DELIVERED indicates whether the package was delivered to the recipient by the TAREQ.

EXAMINED indicates whether the recipient issued the ACK-RECEIPT UOW for the package.

CERTIFICATION-ACKED indicates whether the TAREQ transmitted a certification package to the sender.

CANCELED indicates whether delivery of the package to this recipient was canceled by the sender.

EXPIRED indicates whether the package has been removed from the recipient INBOX because of expiration.

ASYNC-RESOLVED indicates for a distribution list whether the list has been expanded by the TAREQ; or indicates for a remote recipient whether the package has been transported by the TAREQ.

RESERVED-6 through RESERVED-15 are reserved for use by Tandem; these fields are always set to N.

IS-ORIGINAL-RECIP indicates whether this recipient was an original recipient of the package, or whether the recipient name was derived from a distribution list.

IS-LOCAL-DLIST indicates whether the recipient is a local distribution list.

IS-LOCAL-CORR indicates whether the recipient is a local correspondent.

IS-REMOTE-RECIP indicates whether the recipient is defined at a local or remote node.

NOTE

Except for the DELIVERED, IS-ORIGINAL-RECIP, and EXAMINED flags, the internal status flags contain information about rapidly changing events; they might not always provide an up-to-the-minute reflection of actual status.

- NUM-REQUESTED is the number of records to be retrieved. The value directly influences the size of the response.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries:

0	OK		
4001	W-EOF	4052	E-RESERVED-MUST-BE-N
4035	E-ITEM-NOT-FOUND	4092	E-INVALID-NUM-RQSTD
4042	E-ITEM-NOT-PKG-HDR	5752	E-RECIP-BAD-NAME
4051	E-MUST-BE-YN	5774	E-RECIP-BAD-SUFFIX

- RETN-CODE DETAIL is an error number returned by a subsystem other than TRANSFER, or is a further qualification of an error detected by TRANSFER.

- NUM-RETURNED is the number of records returned in the response.

- RECIPS-RETURNED contains the records returned, and includes for each record fields that indicate:

  the recipient name and type (RECIP-NAME and RECIP-TYPE)

  delivery error and status flags set by the TAREQs that delivered the package (DELIV-ERR and DELIV-STATUS-FLAGS)

  the time and date at the recipient node when the package was delivered (DATE-DELIVERED).

<u>GET-RECIP-REC OPERATION.</u> GET-RECIP-REC retrieves local recipient records for the package identified by RECIP-KEY. The records are placed in the array named RECIPS-RETURNED in ascending order by system name.

The retrieval can begin with the exact recipient name specified in RECIP-KEY if such a recipient name exists; or with the next one depending on the value of the SKIP-EXACT field in the OPTIONS structure.

> To reference the first recipient in the recipient list, specify an empty RECIP-NAME field:
>
> RECIP-NAME = all blanks, or begin the field with a null character.
>
> To retrieve a recipient list beginning with the first recipient in the list, set
>
> SKIP-EXACT = Y
>
> GET-EXACT = N
>
> GENERIC-SUFFIX = N

When you specify filtering criteria in OPTIONS and FILTER-VALUES, only recipient records that meet all of these criteria are returned.

The number of recipient records retrieved might be less than the number requested if there are fewer recipients than meet the request criteria. In this case, the warning W-EOF is returned in the RETN-CODE field.

The recipients for the local copy of any package include:

- all recipients explicitly added by a client, regardless of the nodes at which the recipients are registered

- those local recipients that were derived from distribution lists, if TRANSFER has already attempted delivery to the recipient

- possibly some, but not necessarily all, local recipients that were derived from distribution lists, if TRANSFER has not yet attempted delivery to those recipients

- possibly some, but not necessarily all, remote recipients that were derived from distribution lists, whether or not TRANSFER has already attempted to deliver the package to those recipients.

Local records concerning remote recipients do not necessarily contain up-to-date status information; therefore, you should obtain status information for remote recipients from the corresponding remote copy of TISERV. To obtain status information, do the following:

1. Send a pair of GET-CONFIG-NAME UOWs to your local TISERV to retrieve the names of the PATHMON and TISERV on the remote system.

2. Start a session with the remote TISERV (you must have a depot on the remote system).

3. Send the GET-RECIP-REC request to the remote system.

NOOP (UOW Code 0)

NOOP transmits a dummy UOW to TISERV. This UOW does not require the establishment of a session.

```
DEF  noop-uow.
  02  hdr.
    03  self-ident                     PIC AA VALUE "UW".
    03  uow-code                       TYPE BINARY 16 UNSIGNED
                                         VALUE 0.
  02  retn-code                        TYPE BINARY 16.
  02  retn-code-detail                 TYPE BINARY 16.
  02  data-size                        TYPE BINARY 16 UNSIGNED.
  02  noop-data                        PIC X OCCURS 0 TO !N!
                                         1000 TIMES DEPENDING ON
                                         data-size.
END.
```

```
DEF noop-rsp.
  02  hdr.
    03  self-ident                     PIC AA VALUE "UW".
    03  uow-code                       TYPE BINARY 16 UNSIGNED
                                         VALUE 0.
  02  retn-code                        TYPE BINARY 16.
  02  retn-code-detail                 TYPE BINARY 16.
  02  data-size                        TYPE BINARY 16 UNSIGNED.
  02  noop-data                        PIC X OCCURS 0 TO !N!
                                         1000 TIMES DEPENDING ON
                                         data-size.
END.
```

NOOP FIELDS. The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 0.
- RETN-CODE contains a zero.
- RETN-CODE-DETAIL contains a zero.
- DATA-SIZE is the length of the data transmitted and returned, specified in bytes.
- NOOP-DATA is an array that contains the data itself. In the OCCURS clause of the DDL definition for this structure, N is any value less than 2000.

NOTE

> If the value of DATA-SIZE is an odd number and additional UOWs follow this one, append a one-byte FILLER after the NOOP-DATA structure.

NOOP OPERATION. NOOP lets you transmit a dummy UOW to TISERV and receive a dummy response. The data transmitted in the UOW is returned without modification in the response.

To help identify all IPC messages that are logged, you can use the NOOP UOW to include, after every IPC header, client data that identifies the source of the transaction.

As an example, you can replace the NOOP-DATA structure with the following DDL definition; upon receipt by TISERV, this optional data will be echoed back to your application:

```
02 client-info.
  03 application                PIC X !(N)!.
  03 module                     PIC X !(N)!.
  03 func-code                  PIC X !(N)!.
  03 term-id                    PIC X (15).
  03 filler                     PIC X.
```

This definition provides the following tracking information:

APPLICATION contains information that helps identify your application.

MODULE is the SCREEN COBOL program unit code name.

FUNC-CODE is the related transaction (function key) code.

TERM-ID is the terminal ID of the correspondent.

READ-NEXT-MEMBER (UOW Code 219)

READ-NEXT-MEMBER retrieves members of a distribution list.

```
DEF  read-next-member-uow.
  02  hdr.
    03  self-ident             PIC AA VALUE "UW".
    03  uow-code               TYPE BINARY 16 UNSIGNED
                                 VALUE 219.
  02  filler                   TYPE BINARY 16.
  02  filler                   TYPE BINARY 16.
  02  corr-name                TYPE PIC X(80) VALUE SPACES.
  02  dlist-name               TYPE PIC X(80).
  02  start-member             PIC X(120) VALUE SPACES.
  02  start-type               TYPE CHARACTER 1 VALUE "A".
  02  filler                   TYPE BOOLEAN.
  02  name-format              TYPE BINARY 16 VALUE 1.
  02  num-wanted               TYPE BINARY 16 UNSIGNED.
  02  filler                   TYPE BINARY 16 UNSIGNED VALUE 0.
END.
```

```
DEF  read-next-member-rsp.
  02  hdr.
    03  self-ident             PIC AA VALUE "UW".
    03  uow-code               TYPE BINARY 16 UNSIGNED
                                 VALUE 219.
  02  retn-code                TYPE BINARY 16.
  02  retn-code-detail         TYPE BINARY 16.
  02  corr-name                TYPE PIC X(80) VALUE SPACES.
  02  dlist-name               TYPE PIC X(80).
  02  start-member             PIC X(120) VALUE SPACES.
  02  start-type               TYPE CHARACTER 1 VALUE "A".
  02  update-flag              TYPE BOOLEAN.
  02  name-format              TYPE BINARY 16 VALUE 1.
  02  num-wanted               TYPE BINARY 16 UNSIGNED
                                 VALUE 14.
  02  num-returned             TYPE BINARY 16 UNSIGNED VALUE 0.
  02  member-name              OCCURS 0 TO 14 TIMES
                                 DEPENDING ON num-returned
                                 PIC X(120).
END.
```

<u>READ-NEXT-MEMBER FIELDS.</u> The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 219.

- CORR-NAME is the name of the correspondent represented by the calling process. Only system administrators can enter correspondent names other than their own in this field; correspondents without system administrator privileges must enter their own names or leave the field blank. On input, you can use a partially qualified name, including wildcard characters. In the response, the fully qualified name is returned.

- DLIST-NAME is the name of the distribution list from which the members are retrieved. This can be a partially qualified name, including wildcard characters. In the response, the fully qualified name is returned.

- START-MEMBER is the distribution list member with which the retrieval should start. To start at the beginning of the distribution list, set this field to spaces or null characters. In the response, the fully qualified name to be transmitted in the next call to this UOW is returned.

- START-TYPE indicates whether the retrieval should begin with the exact record specified in START-MEMBER, or with the next record following that record.

  E (START-EXACT) = the exact record

  A (START-AFTER) = the next record

  If the request is successful, TRANSFER returns the value A in the response, which is appropriate for the next request to continue getting members from the distribution list.

- NAME-FORMAT indicates the format in which the name is to be returned, as follows:

	Setting	Meaning
NODE-OPTIONAL	0	The name is returned in system-optional format, which omits the node designation if the name is defined at the same node as the logged-on correspondent.
FULL-QUALIFICATION	1	The name is returned in fully qualified format, which is the TRANSFER name in its full form: name[.name] @system

	Setting	Meaning
PRE-SEARCH-LIST	2	Names belonging to CORR-NAME are returned as simple names; for example, the name SYS-ADMIN.DLIST @TM is returned simply as DLIST if the correspondent requesting the name is SYS-ADMIN @TM. Names belonging to other correspondents at this node are returned as name[.name]. Names belonging to correspondents at other nodes are returned as fully qualified.

- NUM-WANTED is the number of members requested. NUM-WANTED and the number of occurrences of MEMBER-NAME are limited only by the maximum size of the IPC in your TRANSFER configuration. In the response, the input to this field is echoed as output.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries.

  To indicate successful retrieval:

0	OK

  To indicate problems with the correspondent name:

5600	E-CORR-NSRV-ERR	5607	E-CORR-NSRV-DOWN
5601	E-CORR-NOT-FOUND	5611	E-CORR-NET-DOWN
5602	E-CORR-BAD-NAME	5622	E-CORR-NOT-SAME-NODE
5604	E-CORR-NO-SUCH-NODE	5623	E-CORR-AMBIGUOUS-NAME
5606	E-CORR-NSRV-NOT-FOUND		

  To indicate problems with the distribution list name:

5625	E-DLIST-NSRV-ERR	5632	E-DLIST-NSRV-DOWN
5626	E-DLIST-NOT-FOUND	5636	E-DLIST-NET-DOWN
5627	E-DLIST-BAD-NAME	5647	E-DLIST-NOT-SAME-NODE
5629	E-DLIST-NO-SUCH-NODE	5648	E-DLIST-AMBIGUOUS-NAME
5631	E-DLIST-NSRV-NOT-FOUND		

  To indicate other problems:

4001	W-EOF	4229	E-MUST-BE-EA
4010	E-BAD-TRANSACTION	4902	E-ERR-PROFILE-FILE
4093	E-SECURITY-VIOLATION	4914	E-ERR-DLIST-FILE
4201	E-CONTEXT-ERR		

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detectd by TRANSFER.

- UPDATE-FLAG indicates whether an update of the distribution list is permitted by the logged-on correspondent:

  ```
  Y (UPDATE-ALLOWED)     = updating is allowed
  N (UPDATE-NOT-ALLOWED) = updating is not allowed
  ```

- NUM-RETURNED is the number of members actually retrieved.

- MEMBER-NAME is an array containing the distribution list member names retrieved.

READ-NEXT-MEMBER OPERATION. The READ-NEXT-MEMBER UOW retrieves from the distribution list identified by DLIST-NAME, the names of members in the range identified by START-MEMBER and NUM-WANTED. To begin a retrieval with the first member on the list, set the START-MEMBER field to spaces. The names of the retrieved members are stored in the array MEMBER-NAME.

The response is constructed so that it can also act as a request. To use a response in this way, set NUM-RETURNED to zero and retransmit the UOW. The START-MEMBER and START-TYPE fields are set up to cause proper action on the next call; thus, you need not alter these fields after the first call. Because of this two-way feature, those fields that contain only return values are specified as FILLER fields in the request.

If the number of elements remaining in the list is less than or equal to the number requested, or if no names were found, the warning W-EOF is returned in the RETN-CODE field.

READ-NEXT-NAME (UOW Code 224)

READ-NEXT-NAME retrieves correspondent, distribution list, or folder names defined in TRANSFER.

```
DEF  read-next-name-uow.
  02  hdr.
    03  self-ident                 PIC AA VALUE "UW".
    03  uow-code                   TYPE BINARY 16 UNSIGNED
                                     VALUE 224.
  02  filler                       TYPE BINARY 16.
  02  filler                       TYPE BINARY 16.
  02  corr-name                    PIC X(80) VALUE SPACES.
  02  partial                      PIC X(80) VALUE SPACES.
  02  name-type                    PIC X(32).
  02  kind                         TYPE BINARY 16.
  02  restriction-flag             TYPE BINARY 16 VALUE 2.
  02  alias-action-flag            TYPE BINARY 16 VALUE 2.
  02  name-format                  TYPE BINARY 16 VALUE 1.
  02  num-wanted                   TYPE BINARY 16 UNSIGNED.
  02  matcher                      PIC X(80).
  02  dir-no                       TYPE BINARY 16.
  02  filler                       TYPE BINARY 16 UNSIGNED
                                     VALUE 0.
END.
```

```
DEF  read-next-name-rsp.
  02  hdr.
    03  self-ident                 PIC AA VALUE "UW".
    03  uow-code                   TYPE BINARY 16 UNSIGNED
                                     VALUE 224.
  02  retn-code                    TYPE BINARY 16.
  02  retn-code-detail             TYPE BINARY 16.
  02  corr-name                    PIC X(80) VALUE SPACES.
  02  partial                      PIC X(80) VALUE SPACES.
  02  name-type                    PIC X(32).
  02  kind                         TYPE BINARY 16.
  02  restriction-flag             TYPE BINARY 16 VALUE 2.
  02  alias-action-flag            TYPE BINARY 16 VALUE 2.
  02  name-format                  TYPE BINARY 16 VALUE 1.
  02  num-wanted                   TYPE BINARY 16 UNSIGNED.
  02  matcher                      PIC X(80).
  02  dir-no                       TYPE BINARY 16.
  02  num-returned                 TYPE BINARY 16 UNSIGNED
                                     VALUE 0.
```

→

```
  02  name-group                  OCCURS 0 TO 14 TIMES
                                    DEPENDING ON num-returned.
    03  name                      PIC X(80).
    03  alias-type                TYPE CHARACTER 1.
    03  filler                    TYPE CHARACTER 1.
END.
```

<u>READ-NEXT-NAME FIELDS.</u> The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 224.
- CORR-NAME is the name of the correspondent represented by the calling process. Only system administrators can enter correspondent names other than their own in this field; correspondents without system administrator privileges must enter their own names or leave the field blank. On input, you can use a partially qualified name, including wildcard characters. In the response, the fully qualified name is returned.

  Only system administrators can retrieve folder names for depots other than their own; to do this, they must enter in CORR-NAME the name of the correspondent who owns the folders. Anyone can retrieve names for distribution lists or correspondents defined at any depot.
- PARTIAL is the partially qualified name or pattern of the names to be retrieved from the TRANSFER name directory. This name can include wildcard characters. In the response, the input to this field is echoed as output.
- NAME-TYPE is the type of object for which the names are to be retrieved. This can be:

  CORR (for correspondent) DLIST (for distribution list)
  FOLDER (for folder) blank (for any type)

  In the response, the input to this field is echoed as output.
- KIND is the kind of search used for the names, as follows.

Setting	Meaning
FIRST-CALL (0)	Searches for the first names encountered that match the contents of the PARTIAL field. In the response, this value is converted to RECALL (2) if at least one name is returned.
RECALL (2)	Continues the previous search from the point specified by the contents of MATCHER and DIR-NO, which were returned on a previous call.
SKIP (3)	Reserved for use by Tandem.

- RESTRICTION-FLAG restricts the name search. Settings are as follows:

Setting	Meaning
RESTRICT-TO-WDIR (0)	Restrict the search to names belonging to the CORR-NAME depot.
PART-RESTRICT-TO-WDIR (1)	If PARTIAL contains a period or a node name, first search the CORR-NAME depot, and then search the entire name directory; this latter search will only find objects if PARTIAL includes a correspondent name, which might include wildcard characters. If PARTIAL does not contain a period and is not fully qualified, restrict the search to the CORR-NAME depot.
UNRESTRICTED-DIR (2)	First, search the CORR-NAME depot; then search the entire name directory. This latter search will only find objects if PARTIAL includes a correspondent name, which might include wildcard characters.

In the response, the input to this field is echoed as output.

- ALIAS-ACTION-FLAG is reserved for use by Tandem.

In the response, the input to this field is echoed as output.

- NAME-FORMAT indicates the format in which the names are to be returned, as follows:

Setting	Meaning
NODE-OPTIONAL (0)	The name is returned in system-optional format, which omits the node designation if a name is defined at the same node as the logged-on correspondent.
FULL-QUALIFICATION (1)	The name is returned in full qualification format, which returns the TRANSFER name in its full form: name[.name] @system
PRE-SEARCH-LIST (2)	Names belonging to CORR.NAME are returned as simple names. For example, the name SYS-ADMIN.FOLDER1 @TM is returned simply as FOLDER1 if the correspondent requesting the name is SYS-ADMIN @TM. Names belonging to other correspondents at the node are returned as name[.name]. Names belonging to correspondents at other nodes are returned as fully qualified.

  The default value for this field is 1. In the response, the input to this field is echoed as output.

- NUM-WANTED is the number of names to be retrieved. In the response, the input to this field is echoed as output. NUM-WANTED and the NAME-GROUP array size are limited only by the maximum size of the IPC in your TRANSFER configuration.

- MATCHER and DIR-NO are internal restart pointers that are returned in the first call with this UOW; they must be used in subsequent READ-NEXT-NAME requests where the KIND field is set to RECALL (2). These values are ignored if the KIND field is set to FIRST-CALL (0).

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries.

  To indicate a successful retrieval:

  0 OK

  To indicate problems with the correspondent name or with names that are designated as any type.

5600	E-CORR-NSRV-ERR	5606	E-CORR-NSRV-NOT-FOUND
5601	E-CORR-NOT-FOUND	5607	E-CORR-NSRV-DOWN
5602	E-CORR-BAD-NAME	5611	E-CORR-NET-DOWN
5603	E-CORR-BAD-TYPE	5622	E-CORR-NOT-SAME-NODE
5604	E-CORR-NO-SUCH-NODE	5623	E-CORR-AMBIGUOUS-NAME

To indicate problems with other names, similar error messages are returned. These depend on the contents of the NAME-TYPE field.

To indicate other problems:

4001	W-EOF	4201	E-CONTEXT-ERR
4010	E-BAD-TRANSACTION	4902	E-ERR-PROFILE-FILE

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

- NUM-RETURNED is the number of names returned.

- NAME-GROUP is an array that contains the name returned in the NAME field. You can specify any number of occurrences, restricted only by the length of the entire IPC that contains this UOW.

  ALIAS-TYPE has no significance in this version of TRANSFER.

READ-NEXT-NAME OPERATION. READ-NEXT-NAME scans the TRANSFER name directory and returns the next name or group of names encountered on each call. You can use this UOW to display lists of folder names, distribution list names, or correspondent names. In selecting names for retrieval, this UOW supports wildcard matching of names.

If the number of elements remaining in the list is less than or equal to the number requested, or if no elements matching the searching criteria were found, the warning W-EOF is returned in the RETN-CODE field.

In SCREEN COBOL programs, it is recommended that the response definition be used as the definition for the UOW request. You accomplish this by setting the NUM-RETURNED field to zero before transmitting each request. This ensures that the length of the response is the same as the length of the UOW.

If a name returned by this UOW is given back to TRANSFER, only the fully qualified form of this name is guaranteed to refer to the same object. If any other NAME-FORMAT is specified, the name might cause a different object to be identified.

READ-PROFILE-REC (UOW Code 212)

READ-PROFILE-REC reads a user-maintained depot profile record. This UOW is maintained for version compatibility only. READ-PROF-REC-A02 is the recommended UOW.

```
DEF  read-profile-rec-uow.
  02  hdr.
    03  self-ident                 PIC AA VALUE "UW".
    03  uow-code                   TYPE BINARY 16 UNSIGNED
                                     VALUE 212.
  02  corr-name                    PIC X(80) VALUE SPACES.
  02  rec-type                     PIC 9(4) COMP.
  02  rec-seq-num                  PIC 9(4) COMP.
  02  depot-flag                   TYPE BOOLEAN VALUE "Y".
  02  filler                       TYPE CHARACTER 1.
  02  approximate-flag             TYPE BINARY 16.
END.
```

```
DEF  read-profile-rec-rsp.
  02  hdr.
    03  self-ident                 PIC AA VALUE "UW".
    03  uow-code                   TYPE BINARY 16 UNSIGNED
                                     VALUE 212.
  02  retn-code                    TYPE BINARY 16.
  02  retn-code-detail             TYPE BINARY 16.
  02  corr-name                    PIC X(80).
  02  rec-type                     PIC 9(4) COMP.
  02  rec-seq-num                  PIC 9(4) COMP.
  02  update-control               PIC S9(4) COMP.
  02  num-data                     TYPE BINARY 16 UNSIGNED.
  02  profile-data.
    03  byte                       PIC X
                                     OCCURS 0 TO 1000 TIMES
                                     DEPENDING ON num-data.
END.
```

READ-PROFILE-REC FIELDS. The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 212.

- CORR-NAME is the name of the correspondent whose depot profile record is to be read. This is also the name of the correspondent represented by the calling process. Only system administrators can enter correspondent names other than their own in this field; correspondents without system administrator privileges must enter their own names or leave the field blank. On input, you can use a partially qualified name, including wildcard characters. In the response, the fully qualified name is returned.

- REC-TYPE is the type assigned to the record by your application. In the response, the type of the record accessed for retrieval is returned.

- REC-SEQ-NUM is the sequence number assigned to the record. In the response, the sequence number of the record retrieved is returned.

- DEPOT-FLAG determines whether the UOW references a depot profile record or a system control record.

  Y = a depot profile record, as indicated by CORR-NAME

  N = a system control record

  If you make no entry in this field, Y is assumed.

- APPROXIMATE-FLAG is the type of record positioning preferred, as follows:

Setting	Meaning
EXACT-POS (2)	Requests exact record positioning, in which TISERV reads the exact user profile record specified by REC-TYPE and REC-SEQ-NUM.
APPROXIMATE-POS (0)	Requests approximate record positioning, in which TISERV reads the next user profile record at or past the record specified by REC-TYPE and REC-SEQ-NUM. This option does not permit reading beyond the end of the depot.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries.

  To indicate successful record retrieval:

  0 OK

  To indicate problems with the correspondent name:

5600	E-CORR-NSRV-ERR	5607	E-CORR-NSRV-DOWN
5601	E-CORR-NOT-FOUND	5611	E-CORR-NET-DOWN
5602	E-CORR-BAD-NAME	5622	E-CORR-NOT-SAME-NODE
5603	E-CORR-BAD-TYPE	5623	E-CORR-AMBIGUOUS-NAME
5606	E-CORR-NSRV-NOT-FOUND		

To indicate other problems:

4001	W-EOF	4201	E-CONTEXT-ERR
4010	E-BAD-TRANSACTION	4220	W-EXACT-REC-READ
4046	E-INVALID-REC-TYPE	4221	W-NEXT-REC-READ
4051	E-MUST-BE-YN	4902	E-ERR-PROFILE-FILE
4093	E-SECURITY-VIOLATION		

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

- UPDATE-CONTROL is the counter used to control concurrent updates of the profile record. You must pass this key to the WRITE-PROFILE-REC to assure that no other process has changed the record between the read and write operations.

- NUM-DATA is the number of bytes read by TISERV.

- PROFILE-DATA is the array that contains the record read by TISERV. You can modify the array size within the system limitation of 1500 bytes.

READ-PROFILE-REC OPERATION. READ-PROFILE-REC reads a user-maintained record from the depot Profile file and returns the data portion of the record. Although the profile record header is not returned, the record type and sequence number from this header are made available as separate fields (REC-TYPE and REC-SEQ-NUM).

The UOW must start on a word boundary. Each response UOW consumes a whole number of words of the IPC reply; thus, TRANSFER automatically includes a padding byte .if the returned record is an odd number of bytes long.

The record is read from the depot (correspondent) identified by CORR-NAME, and is selected in accordance with REC-TYPE, REC-SEQ-NUM, and APPROXIMATE-FLAG. If the DEPOT-FLAG was set to indicate a system control record, the single copy of this record in the system was read. The record is returned to the array named PROFILE-DATA.

If approximate positioning is requested, a warning is returned specifying whether or not the exactly matching record was found. The W-EOF warning is returned if the requested record does not exist.

READ-PROF-REC-A02 (UOW Code 231)

READ-PROF-REC-A02 reads a user-maintained depot profile record.

```
DEF  read-prof-rec-a02-uow.
  02  hdr.
    03  self-ident                 PIC AA VALUE "UW".
    03  uow-code                   TYPE BINARY 16 UNSIGNED
                                     VALUE 231.

  02  corr-name                    PIC X(80) VALUE SPACES.
  02  rec-type                     PIC 9(4) COMP.
  02  rec-seq-num                  PIC 9(4) COMP.
  02  options.
    03  skip-exact                 TYPE BOOLEAN.
    03  any-rec-type               TYPE BOOLEAN.
    03  any-seq-num                TYPE BOOLEAN.
    03  depot-flag                 TYPE BOOLEAN.
  02  num-requested                TYPE BINARY 16 UNSIGNED
                                     VALUE 1.

  02  max-datasize                 TYPE BINARY 16 UNSIGNED
                                     VALUE 80.

  02  pad-char                     PIC X VALUE SPACE.
  02  filler                       PIC X VALUE SPACE.
END.
```

```
DEF  read-prof-rec-a02-rsp.
  02  hdr.
    03  self-ident                 PIC AA VALUE "UW".
    03  uow-code                   TYPE BINARY 16 UNSIGNED
                                     VALUE 231.

  02  retn-code                    TYPE BINARY 16.
  02  retn-code-detail             TYPE BINARY 16.
  02  corr-name                    PIC X(80).
  02  num-returned                 TYPE BINARY 16 UNSIGNED.
  02  recs-returned                OCCURS 0 TO !num-requested!
                                     1 TIMES DEPENDING ON
                                     num-returned.

    03  rec-type                   PIC 9(4) COMP.
    03  rec-seq-num                PIC S9(4) COMP.
    03  update-control             TYPE BINARY 16.
    03  data-len                   TYPE BINARY 16.
    03  data-string                PIC !X(max-datasize)! X(80).
END.
```

READ-PROF-REC-A02 FIELDS. The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 231.

- CORR-NAME is the name of the correspondent whose depot profile record is to be read. This is also the name of the correspondent represented by the calling process. Only system administrators can enter correspondent names other than their own in this field; correspondents without system administrator privileges must enter their own names or leave the field blank. On input, you can use a partially qualified name, including wildcard characters. In the response, the fully qualified name is returned.

- REC-TYPE is the type assigned to the record by your application. In the response, the type of the record accessed for the retrieval is returned.

- REC-SEQ-NUM is the sequence number assigned to the starting record. In the response, the sequence number of the record retrieved is returned.

- OPTIONS provides criteria for selecting the profile records.

  SKIP-EXACT determines whether TISERV begins its retrieval with the record specified or with the record after the one specified.

  Y = TISERV begins its retrieval with the record after the one specified; the record exactly matching the specified REC-TYPE and REC-SEQ-NUM is not returned.

  N = TISERV begins its retrieval with the record specified.

  ANY-REC-TYPE determines whether records not having the record type specified in REC-TYPE also can be returned.

  Y = All profile records can be returned; ANY-SEQ-NUM is ignored.

  N = The result depends on the setting of ANY-SEQ-NUM.

  ANY-SEQ-NUM is meaningful only if ANY-REC-TYPE is set to N.

  ANY-REC-TYPE = N and ANY-SEQ-NUM = Y: any subsequent profile records whose REC-TYPE field matches the given REC-TYPE field can be returned.

  ANY-REC-TYPE = N and ANY-SEQ-NUM = N: at most one record whose REC-TYPE and REC-SEQ-NUM match the given values is returned.

  DEPOT-FLAG determines whether the UOW references a depot profile record or a system control record.

Y = a depot profile record, as indicated by CORR-NAME

N = a system control record

If you make no entry in this field, Y is assumed.

- NUM-REQUESTED specifies the number of records to be returned. This value directly affects the length of the response.

  The records are returned starting with the lowest record type and lowest sequence number matching the OPTIONS selected. All records within a record type are returned in sequence number order before records of the next higher record type.

- MAX-DATASIZE refers to the data portion of each record; this value is the maximum number of bytes that can be retrieved. Records that are shorter than this length are automatically padded with the padding character specified by PAD-CHAR. Records that are longer than this length are truncated, but the length returned by DATA-LEN is the actual length prior to truncation. You should specify an even-numbered maximum length so that all elements of the returned array are word aligned; but if you specify an odd-numbered maximum length, TRANSFER automatically increments this value by 1. MAX-DATASIZE, like NUM-REQUESTED, directly affects the length of the response.

  The maximum value of MAX-DATASIZE is 1500 bytes.

- PAD-CHAR is the character used to pad returned records that are shorter than the maximum length specified by MAX-DATASIZE. The PAD-CHAR is usually a space.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries.

  To indicate successful record retrieval:

  0 OK

  To indicate problems with the correspondent name:

5600	E-CORR-NSRV-ERR	5607	E-CORR-NSRV-DOWN
5601	E-CORR-NOT-FOUND	5611	E-CORR-NET-DOWN
5602	E-CORR-BAD-NAME	5622	E-CORR-NOT-SAME-NODE
5604	E-CORR-NO-SUCH-NODE	5623	E-CORR-AMBIGUOUS-NAME
5606	E-CORR-NSRV-NOT-FOUND		

To indicate other problems:

4001	W-EOF	4089	W-DATA-TRUNCATED
4046	E-INVALID-REC-TYPE	4092	E-INVALID-NUM-RQSTD
4051	E-MUST-BE-YN	4093	E-SECURITY-VIOLATION
4086	W-DATASIZE-ADJUSTED	4201	E-CONTEXT-ERR
4087	E-INVALID-MAX-DATASIZE		

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

- NUM-RETURNED is the number of records returned by TISERV in the response.

- RECS-RETURNED is the data array that contains the records retrieved. For this array, you must define limits and element sizes that are consistent with the records requested in the UOW. Within this structure:

  REC-TYPE contains the record type.

  REC-SEQ-NUM contains the record sequence number.

  UPDATE-CONTROL is the counter used to control concurrent updates of the profile record. If you are planning to update or delete a profile record, you must pass the UPDATE-CONTROL field returned by this UOW to the WRITE-PROFILE-REC or DELETE-PROFILE-REC UOW.

  DATA-LEN contains the length of the data (non-key) portion of the record prior to retrieval, regardless of the value specified by MAX-DATASIZE.

  DATA-STRING contains the data portion of the record. The length of the data in DATA-STRING can be modified, but should be consistent with the value in MAX-DATASIZE.

READ-PROF-REC-A02 OPERATION. READ-PROF-REC-A02 reads a user-maintained record from the depot Profile file and returns the data portion of the record. Although the profile record header is not returned, the record type and sequence number from this header are made available as separate fields (REC-TYPE and REC-SEQ-NUM).

Each record is padded or truncated to a fixed length before it is returned. The length of the DATA-STRING in the response is the value specified by MAX-DATASIZE in the request, rounded up to an even number.

The record is read from the depot (correspondent) identified by CORR-NAME, and is selected in accordance with REC-TYPE, REC-SEQ-NUM, and specified OPTIONS. If the DEPOT-FLAG was set to indicate a system control record, the single copy of this record in the system was read. The record is returned to the array named RECS-RETURNED.

The following warning conditions can occur:

W-EOF — The number of records satisfying the search criteria is less than or equal to NUM-REQUESTED. All records satisfying the search criteria are returned.

W-DATA-TRUNCATED — At least one record returned was longer than MAX-DATASIZE. A truncated version of that record was returned.

W-DATASIZE-ADJUSTED — An odd number was specified for MAX-DATASIZE. TRANSFER used a value that is one more than that specified.

If more than one warning condition occurs, the warning message that appears first in the preceding list is returned. If W-DATA-TRUNCATED and W-DATASIZE-ADJUSTED both occur, the message W-DATA-TRUNCATED is returned.

SAVE-ITEM (UOW Code 110)

SAVE-ITEM saves an item in a folder that has any ordering discipline except APPLIC-DEFINED; the SAVE-ITEM-BY-KEY UOW must be used to save items in folders with APPLIC-DEFINED ordering.

SAVE-ITEM can still be used to save items in folders created by TRANSFER A01/A02. SAVE-ITEM differs from the SAVE-ITEM-B00 UOW in that it does not have an unsave option to have items automatically removed at a specified time; with SAVE-ITEM, you must use the UNSAVE-ITEM UOW to remove items from a folder.

```
DEF  save-item-uow.
  02  hdr.
    03  self-ident                    PIC AA VALUE "UW".
    03  uow-code                      TYPE BINARY 16 UNSIGNED
                                        VALUE 110.
  02  item-id.
    03  dummy                         PIC S(12).
  02  folder-name                     PIC X(80).
END.
```

```
DEF  save-item-rsp.
  02  hdr.
    03  self-ident                    PIC AA VALUE "UW".
    03  uow-code                      TYPE BINARY 16 UNSIGNED
                                        VALUE 110.
  02  retn-code                       TYPE BINARY 16.
  02  retn-code-detail                TYPE BINARY 16.
END.
```

<u>SAVE-ITEM FIELDS.</u> The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 110.

- ITEM-ID identifies the item to be saved.

- FOLDER-NAME is the name of the folder in which the item is to be saved. Special folders INBOX and WASTEBASKET can be entered in this field.

You can save items in the special folder named WASTEBASKET; TRANSFER automatically removes the items from this folder when the correspondent's session terminates. You can save items in the INBOX folder, but this is not recommended because TRANSFER already saves items in this folder when appropriate; clients can automatically remove packages from the INBOX folder when saving them elsewhere by including an UNSAVE-ITEM UOW in the interprocess message.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries.

  To indicate successful saving of the item:

  0 OK

  To indicate problems with the folder name:

5675	E-FLD-NSRV-ERR	5681	E-FLD-NSRV-NOT-FOUND
5676	E-FLD-NOT-FOUND	5682	E-FLD-NSRV-DOWN
5677	E-FLD-BAD-NAME	5686	E-FLD-NET-DOWN
5678	E-FLD-BAD-TYPE	5697	E-FLD-NOT-SAME-NODE
5679	E-FLD-NO-SUCH-NODE	5698	E-FLD-AMBIGUOUS-NAME

  To indicate other problems:

4010	E-BAD-TRANSACTION	4105	E-CONCURRNT-FLD-UPDATE
4035	E-ITEM-NOT-FOUND	4106	E-BAD-ORD-CRITERIA
4049	W-REC-ALREADY-EXISTS	4906	E-ERR-ITEMDESC-FILE
4103	E-INCORRECT-FLD-ORDER	4912	E-ERR-FOLDER-FILE
4104	E-DUP-ORDERING-KEY	4922	E-ERR-INV-FOLDER-FILE

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

SAVE-ITEM OPERATION. SAVE-ITEM saves the item identified by ITEM-ID in the folder identified by FOLDER-NAME at the correspondent depot. The saved item remains in the folder until you explicitly unsave it with the UNSAVE-ITEM UOW in this or a later session.

Items are stored according to the folder's ordering criteria. Saving operations are as follows.

Folders ordered by	Saving Operations
TIME-SAVED (T)	The item is saved in chronological order.
CREATOR-NAME (C)	The item is saved in alphabetic order by creator name.
EARLIEST-DELIV-DATE (E)	A package header item that is unalterable is saved in earliest delivery date order. An item that is not a package header or is a package header and is alterable is saved in creation date order.

The following rules apply to SAVE-ITEM:

1. If a folder has an APPLIC-DEFINED ordering discipline, items must be saved with the SAVE-ITEM-BY-KEY UOW. If a SAVE-ITEM is issued on a folder with APPLIC-DEFINED ordering, the error E-INCORRECT-FLD-ORDER is returned.

2. If a folder was created by TRANSFER A01/A02, items are ordered in ascending sequence by TIME-SAVED (T), unless the folder ordering criteria was subsequently altered by the ALTER-FOLDER-ORDER UOW.

3. If a folder does not allow duplicate ordering keys, any attempt to save more than one item with the same ordering key returns the error E-DUP-ORDERING-KEY.

4. If a SAVE-ITEM UOW is issued concurrently with the ALTER-FOLDER-ORDER UOW, the error E-CONCURRNT-FLD-UPDATE is returned. This prevents an item from being saved with an incorrect ordering key.

5. If a SAVE-ITEM UOW is issued concurrently with the DELETE-FOLDER UOW, the error E-CONCURRNT-FLD-UPDATE is returned. This prevents an application from saving an item in a folder that is concurrently being deleted.

SAVE-ITEM-B00 (UOW Code 141)

SAVE-ITEM-B00 saves an item in a folder that has any ordering discipline except APPLIC-DEFINED; the SAVE-ITEM-BY-KEY UOW must be used to save items in folders with APPLIC-DEFINED ordering. SAVE-ITEM-B00 includes an unsave option to have items automatically removed from the folder at a specified time.

```
DEF  save-item-b00-uow.
  02  hdr.
    03  self-ident             PIC AA VALUE "UW".
    03  uow-code               TYPE BINARY 16 UNSIGNED
                                 VALUE 141.
  02  item-id.
    03  dummy                  PIC X(12).
  02  folder-name              PIC X(80).
  02  flags.
    03  date-is-rel            TYPE BOOLEAN.
    03  reserved-1             TYPE BOOLEAN VALUE "N".
    03  reserved-2             TYPE BOOLEAN VALUE "N".
    03  reserved-3             TYPE BOOLEAN VALUE "N".
    03  reserved-4             TYPE BOOLEAN VALUE "N".
    03  reserved-5             TYPE BOOLEAN VALUE "N".
    03  reserved-6             TYPE BOOLEAN VALUE "N".
    03  reserved-7             TYPE BOOLEAN VALUE "N".
  02  unsave-time.
    03  date-time.
      04  year                 PIC 9(4).
      04  month                PIC 9(2).
      04  day-of-month         PIC 9(2).
      04  hour                 PIC 9(2).
      04  minute               PIC 9(2).
      04  second               PIC 9(2).
    03  delta-time             REDEFINES DATE-TIME.
      04  quantity             PIC 9(4) COMP.
      04  units                PIC A.
      04  filler               PIC X.
END.
```

```
DEF  save-item-b00-rsp.
  02  hdr.
    03  self-ident             PIC AA VALUE "UW".
    03  uow-code               TYPE BINARY 16 UNSIGNED
                                 VALUE 141.
  02  retn-code                TYPE BINARY 16.
  02  retn-code-detail         TYPE BINARY 16.
END.
```

SAVE-ITEM-B00 FIELDS. The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 141.

- ITEM-ID identifies the item to be saved.

- FOLDER-NAME is the name of the folder, with an ordering discipline other than APPLIC-DEFINED, in which the item is to be saved. Special folders INBOX and WASTEBASKET can be entered in this field.

  You can save items in the special folder named WASTEBASKET; TRANSFER automatically removes the items from this folder when the session terminates. You can save items in the INBOX folder, but this is not recommended because TRANSFER already saves items in this folder when appropriate; clients can automatically remove packages from the INBOX folder when saving them elsewhere by including an UNSAVE-ITEM UOW in the interprocess message.

- FLAGS describes miscellaneous flags that are used by the SAVE-ITEM-B00 UOW.

  DATE-IS-REL is a flag that indicates whether the given date is relative or absolute.

  Y = relative

  N = absolute

  RESERVED-1 through RESERVED-7 are reserved for use by Tandem; these fields must be set to N.

- UNSAVE-TIME is the time when the item will be automatically removed from the folder. This date can be relative or absolute, depending on the DATE-IS-REL flag.

  In DELTA-TIME, UNITS is the unit of time denoted in QUANTITY. UNITS can be set to D (for days), H (for hours), and M (for minutes). The date must be sometime in the future. If the date is in the past, the error E-PAST-DATE-TIME will be returned.

  To save the item in the folder and not have the item automatically unsaved, set

  DATE-IS-REL = Y

  UNITS = 0

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries.

To indicate successful saving of the item:

0	OK

To indicate problems with the folder name:

5675	E-FLD-NSRV-ERR	5681	E-FLD-NSRV-NOT-FOUND
5676	E-FLD-NOT-FOUND	5682	E-FLD-NSRV-DOWN
5677	E-FLD-BAD-NAME	5686	E-FLD-NET-DOWN
5678	E-FLD-BAD-TYPE	5697	E-FLD-NOT-SAME-NODE
5679	E-FLD-NO-SUCH-NODE	5698	E-FLD-AMBIGUOUS-NAME

To indicate other problems:

4010	E-BAD-TRANSACTION	4074	E-INVALID-REL-TIME-QTY
4035	E-ITEM-NOT-FOUND	4103	E-INCORRECT-FLD-ORDER
4045	E-TSCHED-UNAVAIL	4104	E-DUP-ORDERING-KEY
4049	W-REC-ALREADY-EXISTS	4105	E-CONCURRNT-FLD-UPDATE
4051	E-MUST-BE-YN	4106	E-BAD-ORD-CRITERIA
4071	E-PAST-DATE-TIME	4906	E-ERR-ITEMDESC-FILE
4072	E-UNITS-MUST-BE-DHM	4912	E-ERR-FOLDER-FILE
4073	E-INVALID-DATE-TIME	4922	E-ERR-INV-FOLDER-FILE

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

SAVE-ITEM-B00 OPERATION. SAVE-ITEM-B00 saves the item identified by ITEM-ID in the folder identified by FOLDER-NAME at the correspondent depot.

The following rules apply to SAVE-ITEM-B00:

1. The folder in which an item is being saved must not have an ordering discipline of APPLIC-DEFINED. If a SAVE-ITEM-B00 is issued on a folder that has APPLIC-DEFINED ordering discipline, the error E-INCORRECT-FLD-ORDER is returned.

2. An item cannot be saved in the same folder more than once. If an application tries to save the same item in a folder where the item has already been saved, the warning W-REC-ALREADY-EXISTS is returned; if the item was previously saved, the unsave time specified in a second request or in additional requests is disregarded.

3. To change an unsave time once the time has been set in a folder, you must:

   a. save the item in another folder; this is to prevent the item from being deleted immediately after the unsave, but before the resave

   b. resave the item in the desired folder with the new time

   c. unsave the item from the first folder, if desired.

4. If the folder does not allow duplicate ordering keys and an application attempts to save more than one item with the same ordering key, the error E-DUP-ORDERING-KEY is returned.

5. If the RETN-CODE is E-TSCHED-UNAVAIL, the item is not saved in the folder. The unsave could not be scheduled, so no saving was performed. To save the item, you must either wait for TSCHED to become available or save the item without an unsave date and time specified.

6. If a SAVE-ITEM-B00 UOW is issued concurrently with the ALTER-FOLDER-ORDER UOW, the error E-CONCURRNT-FLD-UPDATE is returned. This prevents an item from being saved with an incorrect ordering key.

7. If a SAVE-ITEM-B00 UOW is issued concurrently with the DELETE-FOLDER UOW, the error E-CONCURRNT-FLD-UPDATE is returned. This prevents an application from saving an item in a folder that is currently being deleted.

SAVE-ITEM-BY-KEY (UOW Code 139)

SAVE-ITEM-BY-KEY saves an item in a folder that has an ordering discipline of APPLIC-DEFINED. The ordering key used to save the item is supplied by the application.

```
DEF  save-item-by-key-uow.
  02  hdr.
    03  self-ident                 PIC AA VALUE "UW".
    03  uow-code                   TYPE BINARY 16 UNSIGNED
                                     VALUE 139.
  02  item-id.
    03  dummy                      PIC X(12).
  02  folder-name                  PIC X(80).
  02  flags.
    03  date-is-rel                TYPE BOOLEAN.
    03  reserved-1                 TYPE BOOLEAN VALUE "N".
    03  reserved-2                 TYPE BOOLEAN VALUE "N".
    03  reserved-3                 TYPE BOOLEAN VALUE "N".
    03  reserved-4                 TYPE BOOLEAN VALUE "N".
    03  reserved-5                 TYPE BOOLEAN VALUE "N".
    03  reserved-6                 TYPE BOOLEAN VALUE "N".
    03  reserved-7                 TYPE BOOLEAN VALUE "N".
  02  unsave-time.
    03  date-time.
      04  year                     PIC 9(4).
      04  month                    PIC 9(2).
      04  day-of-month             PIC 9(2).
      04  hour                     PIC 9(2).
      04  minute                   PIC 9(2).
      04  second                   PIC 9(2).
    03  delta-time                 REDEFINES DATE-TIME.
      04  quantity                 PIC 9(4) COMP.
      04  units                    PIC A.
      04  filler                   PIC X.
  02  applic-key-len               TYPE BINARY 16 UNSIGNED.
  02  applic-key.
    03  element                    PIC X
                                     OCCURS 0 TO 200 TIMES
                                     DEPENDING ON applic-key-len.
END.
```

→

```
DEF  save-item-by-key-rsp.
  02  hdr.
    03  self-ident                PIC AA VALUE "UW".
    03  uow-code                  TYPE BINARY 16 UNSIGNED
                                    VALUE 139.
  02  retn-code                   TYPE BINARY 16.
  02  retn-code-detail            TYPE BINARY 16.
END.
```

SAVE-ITEM-BY-KEY FIELDS. The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 139.

- ITEM-ID identifies the item to be saved.

- FOLDER-NAME is the name of the folder, with an ordering discipline of APPLIC-DEFINED, in which the item is to be saved. Special folders INBOX and WASTEBASKET cannot be entered in this field.

- FLAGS describes miscellaneous flags that are used by the SAVE-ITEM-BY-KEY UOW.

  DATE-IS-REL is a flag that indicates whether the given date is relative or absolute.

  Y = relative

  N = absolute

  RESERVED-1 through RESERVED-7 are reserved for use by Tandem; these fields must be set to N.

- UNSAVE-TIME is the time when the item will be automatically removed from the folder. This date can be relative or absolute, depending on the DATE-IS-REL flag.

In DELTA-TIME, UNITS is the unit of time denoted in QUANTITY. UNITS can be set to D (for days), H (for hours), and M (for minutes). The date must be sometime in the future. If the date is in the past, the error E-PAST-DATE-TIME will be returned.

To save the item in the folder and not have the item automatically unsaved, set

```
DATE-IS-REL = Y

UNITS       = 0
```

- APPLIC-KEY-LEN is the length, in bytes, of the ordering key by which items are stored in the folder. The length must be a constant from 0 through 200 and must be consistent with the APPLIC-KEY field.

  If variable APPLIC-KEY-LENs are used to save items within the same folder, ordering anomalies can exist in folders that are ordered in descending sequence or that allow duplicates; therefore, APPLIC-KEY-LEN should be fixed length for a given folder. The application should pad short keys with an application specific pad character.

  If APPLIC-KEY-LEN is < 0 or > 200, the error E-INVALID-KEY-LEN is returned.

- APPLIC-KEY is the ordering key of the item. This key is supplied by the application. The length of this data must be consistent with APPLIC-KEY-LEN.

NOTE

UOWs must start on word boundaries. If APPLIC-KEY-LEN contains an odd value and other UOWs follow this one in the request, you must append a one-byte FILLER to APPLIC-KEY.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries.

  To indicate successful saving of the item:

  0 OK

To indicate problems with the folder:

5675	E-FLD-NSRV-ERR	5681	E-FLD-NSRV-NOT-FOUND
5676	E-FLD-NOT-FOUND	5682	E-FLD-NSRV-DOWN
5677	E-FLD-BAD-NAME	5686	E-FLD-NET-DOWN
5678	E-FLD-BAD-TYPE	5697	E-FLD-NOT-SAME-NODE
5679	E-FLD-NO-SUCH-NODE	5698	E-FLD-AMBIGUOUS-NAME
5680	E-FLD-SECURITY		

To indicate other problems:

4010	E-BAD-TRANSACTION	4104	E-DUP-ORDERING-KEY
4035	E-ITEM-NOT-FOUND	4105	E-CONCURRNT-FLD-UPDATE
4045	E-TSCHED-UNAVAIL	4106	E-BAD-ORD-CRITERIA
4049	W-REC-ALREADY-EXISTS	4906	E-ERR-ITEMDESC-FILE
4071	E-PAST-DATE-TIME	4912	E-ERR-FOLDER-FILE
4102	E-INVALID-KEY-LEN	4922	E-ERR-INV-FOLDER-FILE
4103	E-INCORRECT-FLD-ORDER		

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

SAVE-ITEM-BY-KEY OPERATION. SAVE-ITEM-BY-KEY saves the item identified by ITEM-ID in the folder identified by FOLDER-NAME at the correspondent depot.

The following rules apply to SAVE-ITEM-BY-KEY:

1. The folder in which is item is being saved must have an ordering discipline of APPLIC-DEFINED. If a SAVE-ITEM-BY-KEY UOW is issued on a folder with an ordering discipline other than APPLIC-DEFINED, the error E-INCORRECT-FLD-ORDER is returned.

2. An item cannot be saved in the same folder more than once. If an application tries to save the same item in a folder where the item has already been saved, the warning W-REC-ALREADY-EXISTS is returned. This applies even if APPLIC-KEY has a different value.

   If the item was previously saved, the unsave time specified in a second request or in additional requests is disregarded.

3. If the folder does not allow duplicate ordering keys and an application attempts to save more than one item with the same ordering key, the error E-DUP-ORDERING-KEY is returned. For two ordering keys to be duplicates, they must be exactly the same length (APPLIC-KEY-LEN) and each character must match exactly.

4. If a SAVE-ITEM-BY-KEY UOW is issued concurrently with the ALTER-FOLDER-ORDER UOW, the error E-CONCURRNT-FLD-UPDATE is returned. This prevents an item from being saved with an incorrect ordering key.

5. If a SAVE-ITEM-BY-KEY UOW is issued concurrently with the DELETE-FOLDER UOW, the error E-CONCURRNT-FLD-UPDATE is returned. This prevents an application from saving an item in a folder that is currently being deleted.

6. If the RETN-CODE is E-TSCHED-UNAVAIL, the item is not saved in the folder. The unsave could not be scheduled, so no saving was performed. To save the item, you must either wait for TSCHED to become available or save the item without an unsave date and time specified.

7. To change an unsave time once the time has been set in a folder, you must:

   a. save the item in another folder; this is to prevent the item from being deleted immediately after the unsave, but before the resave

   b. resave the item in the desired folder with the new time

   c. unsave the item from the first folder, if desired.

SCAN-FOLDER (UOW Code 120)

SCAN-FOLDER scans the contents of a folder and retrieves the IDs of items in the folder. SCAN-FOLDER returns item IDs according to the ordering key by which items were saved in the folder. If an application scans a folder that is in APPLIC-DEFINED order and requires the ordering key of each item, the SCAN-FOLDER-BY-KEY UOW must be used.

SCAN-FOLDER differs from the SCAN-FOLDER-B00 UOW in that it does not return the unsave time of the item; you must use the SCAN-FOLDER-B00 UOW to have the unsave time returned.

```
DEF  scan-folder-uow.
  02  hdr.
    03  self-ident                PIC AA VALUE "UW".
    03  uow-code                  TYPE BINARY 16 UNSIGNED
                                    VALUE 120.
  02  folder-name                 PIC X(80).
  02  item-id.
    03  dummy                     PIC X(12).
  02  options.
    03  filter-by-item-type       TYPE BOOLEAN.
    03  reserved-1                TYPE BOOLEAN VALUE "N".
    03  item-type                 PIC 9(4) COMP.
  02  num-requested               TYPE BINARY 16 UNSIGNED
                                    VALUE 20.
END.
```

```
DEF  scan-folder-rsp.
  02  hdr.
    03  self-ident                PIC AA VALUE "UW".
    03  uow-code                  TYPE BINARY 16 UNSIGNED
                                    VALUE 120.
  02  retn-code                   TYPE BINARY 16.
  02  retn-code-detail            TYPE BINARY 16.
  02  num-returned                TYPE BINARY 16 UNSIGNED.
  02  items-returned.
    03  item-id.
      04  dummy                   PIC X(12)
                                    OCCURS 0 TO !num-requested!
                                    20 TIMES DEPENDING ON
                                    num-returned.
END.
```

SCAN-FOLDER FIELDS. The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 120.

- FOLDER-NAME is the name of the folder whose contents are to be scanned.

- ITEM-ID identifies the item in the folder following which the retrieval is to start. You can begin with the first item in the folder by setting this field to binary zeros. If the starting ITEM-ID is nonzero, it must be the item ID of an item that is stored in the folder.

- OPTIONS allows you to filter the scan by selecting only items of a given type from the folder, as follows:

  1. To select this filtering, set FILTER-BY-ITEM-TYPE to Y. To suppress filtering, set this field to N.

  2. If you have selected filtering, specify the item type to be retrieved in ITEM-TYPE.

  The RESERVED-1 field in the OPTIONS structure is reserved for use by Tandem; this field must be set to N.

- NUM-REQUESTED is the number of items to be retrieved from the folder. The suggested maximum is 200. Based on a maximum IPC size of 3000 bytes containing the reply for a single SCAN-FOLDER UOW, about 200 items can be contained in the SCAN-FOLDER response; this estimate includes IPC and UOW response overhead with the result rounded down. The maximum size for an IPC is application dependent, although 3000 bytes is a reasonable upper bound.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries.

  To indicate successful scanning of the folder:

  0 OK

  To indicate problems with the folder name:

5675	E-FLD-NSRV-ERR	5681	E-FLD-NSRV-NOT-FOUND
5676	E-FLD-NOT-FOUND	5682	E-FLD-NSRV-DOWN
5677	E-FLD-BAD-NAME	5683	E-FLD-NO-PARENT
5678	E-FLD-BAD-TYPE	5686	E-FLD-NET-DOWN
5679	E-FLD-NO-SUCH-NODE	5697	E-FLD-NOT-SAME-NODE
5680	E-FLD-SECURITY	5698	E-FLD-AMBIGUOUS-NAME

To indicate other errors:

4001	W-EOF	4092	E-INVALID-NUM-RQSTD
4047	E-REC-NOT-FOUND	4105	E-CONCURRNT-FLD-UPDATE
4051	E-MUST-BE-YN	4912	E-ERR-FOLDER-FILE
4052	E-RESERVED-MUST-BE-N	4922	E-ERR-INV-FOLDER-FILE
4056	E-INVALID-ITEM-TYPE		

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

- NUM-RETURNED is the number of items retrieved from the folder by TRANSFER.

- ITEMS-RETURNED is an array that contains the IDs of the items retrieved from the folder. The size of this array must be consistent with the number of items requested, as defined in NUM-REQUESTED.

SCAN-FOLDER OPERATION. SCAN-FOLDER retrieves the IDs of the items in the range denoted by ITEM-ID and NUM-REQUESTED and places these IDs in the array named ITEMS-RETURNED. Items are returned in the order that they are saved in a folder.

The OPTIONS structure allows you to selectively retrieve only items of a particular type.

The number of items returned might be smaller than the number requested because the folder contains fewer items than specified in NUM-REQUESTED; in this case, the W-EOF warning is returned in the RETN-CODE field.

You can use the last item ID returned in ITEMS-RETURNED as input in ITEM-ID for the next request.

SCAN-FOLDER-B00 (UOW Code 142)

SCAN-FOLDER-B00 scans the contents of a folder and retrieves the IDs and unsave time of items in the folder. SCAN-FOLDER-B00 returns item IDs according to the ordering key by which items were saved in the folder. If an application scans a folder that is in APPLIC-DEFINED order and requires the ordering key of each item, the SCAN-FOLDER-BY-KEY UOW must be used.

```
DEF  scan-folder-b00-uow.
  02  hdr.
    03  self-ident                PIC AA VALUE "UW".
    03  uow-code                  TYPE BINARY 16 UNSIGNED
                                    VALUE 142.
  02  folder-name                 PIC X(80).
  02  item-id.
    03  dummy                     PIC X(12).
  02  options.
    03  filter-by-item-type       TYPE BOOLEAN.
    03  reserved-1                TYPE BOOLEAN VALUE "N".
    03  item-type                 PIC 9(4) COMP.
  02  num-requested               TYPE BINARY 16 UNSIGNED
                                    VALUE 20.
END.
```

```
DEF  scan-folder-b00-rsp.
  02  hdr.
    03  self-ident                PIC AA VALUE "UW".
    03  uow-code                  TYPE BINARY 16 UNSIGNED
                                    VALUE 142.
  02  retn-code                   TYPE BINARY 16.
  02  retn-code-detail            TYPE BINARY 16.
  02  num-returned                TYPE BINARY 16 UNSIGNED.
  02  items-returned              OCCURS 0 TO !num-requested!
                                    10 TIMES DEPENDING ON
                                    num-returned.
    03  item-id.
      04  dummy                   PIC X(12)
    03  unsave-time.
      04  date-time.
        05  year                  PIC 9(4).
        05  month                 PIC 9(2).
        05  day-of-month          PIC 9(2).
        05  hour                  PIC 9(2).
        05  minute                PIC 9(2).
        05  second                PIC 9(2).
END.
```

SCAN-FOLDER-B00 FIELDS. The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 142.

- FOLDER-NAME is the name of the folder whose contents are to be scanned.

- ITEM-ID identifies the item in the folder following which the retrieval is to start. You can begin with the first item in the folder by setting this field to binary zeros. If the starting ITEM-ID is nonzero, it must be the item ID of an item that is stored in the folder.

- OPTIONS allows you to filter the scan by selecting only items of a given type from the folder, as follows:

  1. To select this filtering, set FILTER-BY-ITEM-TYPE to Y. To suppress filtering, set this field to N.

  2. If you have selected filtering, specify the item type to be retrieved in ITEM-TYPE.

  The RESERVED-1 field in the OPTIONS structure is reserved for use by Tandem; this field must be set to N.

- NUM-REQUESTED is the number of items to be retrieved from the folder. The suggested maximum is 100. Based on a maximum IPC size of 3000 bytes containing the reply for a single SCAN-FOLDER-B00 UOW, about 100 items can be contained in the SCAN-FOLDER-B00 response; this estimate includes IPC and UOW response overhead with the result rounded down. The maximum size for an IPC is application dependent, although 3000 bytes is a reasonable upper bound.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries.

  To indicate successful scanning of the folder:

  0 OK

  To indicate problems with the folder name:

5675	E-FLD-NSRV-ERR	5681	E-FLD-NSRV-NOT-FOUND
5676	E-FLD-NOT-FOUND	5682	E-FLD-NSRV-DOWN
5677	E-FLD-BAD-NAME	5683	E-FLD-NO-PARENT
5678	E-FLD-BAD-TYPE	5686	E-FLD-NET-DOWN
5679	E-FLD-NO-SUCH-NODE	5697	E-FLD-NOT-SAME-NODE
5680	E-FLD-SECURITY	5698	E-FLD-AMBIGUOUS-NAME

To indicate other errors:

4001	W-EOF	4092	E-INVALID-NUM-RQSTD
4047	E-REC-NOT-FOUND	4105	E-CONCURRNT-FLD-UPDATE
4051	E-MUST-BE-YN	4912	E-ERR-FOLDER-FILE
4052	E-RESERVED-MUST-BE-N	4922	E-ERR-INV-FOLDER-FILE
4056	E-INVALID-ITEM-TYPE		

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

- NUM-RETURNED is the number of items retrieved from the folder by TRANSFER.

- ITEMS-RETURNED is an array that contains the IDs and the unsave time of the items retrieved from the folder. The size of this array must be consistent with the number of items requested, as defined in NUM-REQUESTED.

- UNSAVE-TIME is the time when the item will be automatically removed from the folder. The date and time returned is in absolute format. If the item has no unsave date and time, all fields of UNSAVE-TIME are set to 0.

SCAN-FOLDER-B00 OPERATION. SCAN-FOLDER-B00 retrieves the IDs and unsave times of the items in the range denoted by ITEM-ID and NUM-REQUESTED and places these values in the array named ITEMS-RETURNED. Items are returned in ordering key sequence.

The OPTIONS structure allows you to selectively retrieve only items of a particular type.

The number of items returned might be smaller than the number requested because the folder contains fewer items than specified in NUM-REQUESTED; in this case, the W-EOF warning is returned in the RETN-CODE field.

You can use the last item ID returned in ITEMS-RETURNED as input in ITEM-ID for the next request.

SCAN-FOLDER-BY-KEY (UOW Code 140)

SCAN-FOLDER-BY-KEY retrieves the item ID, item type, unsave time, and the corresponding ordering key and key length of items saved in folders with APPLIC-DEFINED ordering. Items are returned in application ordering key sequence.

```
DEF  scan-folder-by-key-uow.
  02  hdr.
    03  self-ident                 PIC AA VALUE "UW".
    03  uow-code                   TYPE BINARY 16 UNSIGNED
                                     VALUE 140.
  02  folder-name                  PIC X(80).
  02  options.
    03  filter-by-item-type        TYPE BOOLEAN.
    03  skip-exact                 TYPE BOOLEAN.
    03  duplicate-restart          TYPE BOOLEAN.
    03  reserved-3                 TYPE BOOLEAN VALUE "N".
    03  reserved-4                 TYPE BOOLEAN VALUE "N".
    03  reserved-5                 TYPE BOOLEAN VALUE "N".
    03  reserved-6                 TYPE BOOLEAN VALUE "N".
    03  reserved-7                 TYPE BOOLEAN VALUE "N".
    03  item-type                  PIC 9(4) COMP.
  02  num-requested                TYPE BINARY 16 UNSIGNED
                                     VALUE 10.
  02  starting-key-len             TYPE BINARY 16 UNSIGNED.
  02  generic-key-len              TYPE BINARY 16 UNSIGNED.
  02  max-key-len                  TYPE BINARY 16.
  02  pad-char                     PIC X VALUE SPACES.
  02  starting-duplicate           PIC X(10) VALUE LOW-VALUES.
  02  starting-key                 PIC X(200).
  02  filler                       TYPE BINARY 16 UNSIGNED
                                     VALUE 0.
END.
```

```
DEF  scan-folder-by-key-rsp.
  02  hdr.
    03  self-ident                 PIC AA VALUE "UW".
    03  uow-code                   TYPE BINARY 16 UNSIGNED
                                     VALUE 140.
  02  retn-code                    TYPE BINARY 16.
  02  retn-code-detail             TYPE BINARY 16.
  02  folder-name                  PIC X(80).
```

⟶

```
  02  options.
    03  filter-by-item-type       TYPE BOOLEAN.
    03  skip-exact                TYPE BOOLEAN.
    03  duplicate-restart         TYPE BOOLEAN.
    03  reserved-3                TYPE BOOLEAN VALUE "N".
    03  reserved-4                TYPE BOOLEAN VALUE "N".
    03  reserved-5                TYPE BOOLEAN VALUE "N".
    03  reserved-6                TYPE BOOLEAN VALUE "N".
    03  reserved-7                TYPE BOOLEAN VALUE "N".
    03  item-type                 PIC 9(4) COMP.
  02  num-requested               TYPE BINARY 16 UNSIGNED
                                    VALUE 10.

  02  starting-key-len            TYPE BINARY 16 UNSIGNED.
  02  generic-key-len             TYPE BINARY 16 UNSIGNED.
  02  max-key-len                 TYPE BINARY 16 UNSIGNED.
  02  pad-char                    PIC X VALUE SPACES.
  02  starting-duplicate          PIC X(10) VALUE LOW-VALUES.
  02  starting-key                PIC X(200).
  02  num-returned                TYPE BINARY 16 UNSIGNED
                                    VALUE 0.

  02  items-returned              OCCURS 0 TO !num-requested!
                                    10 TIMES DEPENDING ON
                                    num-returned.

    03  item-id.
      04  dummy                   PIC X(12).
    03  item-type                 PIC 9(4) COMP.
    03  unsave-time.
      04  date-time.
        05  year                  PIC 9(4).
        05  month                 PIC 9(2).
        05  day-of-month          PIC 9(2).
        05  hour                  PIC 9(2).
        05  minute                PIC 9(2).
        05  second                PIC 9(2).
    03  ordering-key-length       TYPE BINARY 16 UNSIGNED.
    03  ordering-key              PIC !X(MAX-KEY-LEN)! X(200).
END.
```

SCAN-FOLDER-BY-KEY FIELDS. The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 140.

- FOLDER-NAME is the name of the folder whose contents are to be scanned.

- OPTIONS provides criteria for selecting items.

  FILTER-BY-ITEM-TYPE allows you to filter the scan by selecting only items of a given type from the folder.

  - To select filtering, set FILTER-BY-ITEM-TYPE to Y. To suppress filtering, set this field to N.

  - If you have selected filtering, specify the item type to be retrieved in ITEM-TYPE.

  In the response, the input to FILTER-BY-ITEM-TYPE and ITEM-TYPE is echoed as output.

  SKIP-EXACT indicates whether TISERV begins its retrieval with the item specified by the starting key fields or with the next item in the folder.

  Y = Start retrieval with the first item following the item specified by the starting key fields (if that item is present), or with the first item following (if the exact item is not present).

  N = Start retrieval with the exact item specified by the starting key fields (if that item is present), or with the first item following (if the exact item is not present).

  In the response, SKIP-EXACT is set to Y.

  DUPLICATE-RESTART controls the use of the STARTING-DUPLICATE field.

  Y = The STARTING-DUPLICATE field is used in conjunction with STARTING-KEY to identify the first item to return.

  N = The STARTING-DUPLICATE field is ignored.

  DUPLICATE-RESTART contains restart information. On the initial call to SCAN-FOLDER-BY-KEY, DUPLICATE-RESTART is typically set to N. In the response, DUPLICATE-RESTART will be automatically set according to the last item returned in the current scan; this will be the appropriate setting for DUPLICATE-RESTART in the request for a subsequent scan of the same folder.

The RESERVED-3 through RESERVED-7 fields in the OPTIONS structure are reserved for use by Tandem; these fields are always set to N.

- NUM-REQUESTED is the number of items to be retrieved from the folder. The value of NUM-REQUESTED affects the size of the response UOW.

  The maximum of this number is dependent on the value of MAX-KEY-LEN. The suggested maximum for a MAX-KEY-LEN of 200 would be 10. Based on a MAX-KEY-LEN of 200 and a maximum IPC size of 3000 bytes containing the reply for a single SCAN-FOLDER-BY-KEY UOW, about 10 items can be contained in the SCAN-FOLDER-BY-KEY response; this estimate includes IPC and UOW response overhead with the result rounded down. The maximum size for an IPC is application dependent, although 3000 bytes is a reasonable upper bound.

  In the response, the input to NUM-REQUESTED is echoed as output.

- STARTING-KEY-LEN is the length, in bytes, of the initial ordering key information in the STARTING-KEY field. This field together with STARTING-KEY and STARTING-DUPLICATE determines which item is the first retrieved. The first item in the folder with an ordering key either equal to or greater than STARTING-KEY for STARTING-KEY-LEN bytes is the first item returned in the ITEMS-RETURNED field. Only the first STARTING-KEY-LEN bytes of STARTING-KEY are used; the remainder of the field is ignored.

  To retrieve the first item in the folder, set this field to 0; when length is set to 0, GENERIC-KEY-LEN and SKIP-EXACT are ignored.

  The maximum value for STARTING-KEY-LEN is 200. If this field is less than 0 or greater than 200, the error E-INVALID-KEY-LEN is returned.

  In the response, STARTING-KEY-LEN will correspond to the last item returned in the current scan. This is the appropriate setting for the STARTING-KEY-LEN field in the request for a subsequent scan of the same folder.

- GENERIC-KEY-LEN is the length, in bytes, of the STARTING-KEY to be used for generic matching. The maximum value for GENERIC-KEY-LEN is 200. If this field is less than zero or greater than 200, the error E-INVALID-KEY-LEN is returned.

  If GENERIC-KEY-LEN is > 0, only items with ordering keys matching STARTING-KEY for GENERIC-KEY-LEN bytes will be returned.

  If GENERIC-KEY-LEN = 0, generic matching is not used.

  If this field is not less than or equal to STARTING-KEY-LEN, the error E-INVALID-KEY-LEN is returned.

  In the response, input to this field is echoed as output.

- MAX-KEY-LEN refers to the ORDERING-KEY field returned with each item in ITEM-RETURNED. This is the maximum number of bytes in ORDERING-KEY to be returned. The maximum value for MAX-KEY-LEN is 200. If this field is less than zero or greater than 200, the error E-INVALID-KEY-LEN is returned.

  Ordering keys that are shorter than MAX-KEY-LEN are automatically padded with the padding character specified by the PAD-CHAR field.

  Ordering keys that are longer than MAX-KEY-LEN are truncated, and the warning W-ORD-KEY-TRUNCATED is returned. The length returned in the corresponding ORDERING-KEY-LEN field, however, is the actual length prior to truncation.

  MAX-KEY-LEN should be an even number length so that all elements of ITEMS-RETURNED are word aligned. If the number in MAX-KEY-LEN is odd, TISERV automatically increments this value by 1 and returns the warning W-MAX-KEY-LEN-ADJUSTED. This warning, however, is overridden by the warnings W-EOF and W-ORD-KEY-TRUNCATED.

  In the response, the input to this field is echoed as output.

- PAD-CHAR is the character to be used for padding the returned ORDERING-KEY when the ordering key is shorter than MAX-KEY-LEN. In the response, the input to this field is echoed as output.

- STARTING-DUPLICATE is used with folders that contain duplicate ordering keys. This field contains an internal restart value that is used to distinguish between items with duplicate ordering keys.

  STARTING-DUPLICATE is typically not used on the initial call to SCAN-FOLDER-BY-KEY (DUPLICATE-RESTART is typically set to N, which causes STARTING-DUPLICATE to be ignored).

If STARTING-DUPLICATE is used, STARTING-KEY must contain the full ordering key as returned in the response STARTING-KEY field. In the response, STARTING-DUPLICATE will correspond to the last item returned in the current scan. This is the appropriate setting for the STARTING-DUPLICATE field in the request for a subsequent scan of the same folder.

- STARTING-KEY is the ordering key of the first item to retrieve. The size must be consistent with STARTING-KEY-LEN. In the response, STARTING-KEY will correspond to the last item returned in the current scan. This is the appropriate setting for the STARTING-KEY field in the request for a subsequent scan of the same folder.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries.

  To indicate successful retrieval of items:

0	OK

  To indicate problems with the folder name:

5675	E-FLD-NSRV-ERR	5681	E-FLD-NSRV-NOT-FOUND
5676	E-FLD-NOT-FOUND	5682	E-FLD-NSRV-DOWN
5677	E-FLD-BAD-NAME	5683	E-FLD-NO-PARENT
5678	E-FLD-BAD-TYPE	5686	E-FLD-NET-DOWN
5679	E-FLD-NO-SUCH-NODE	5697	E-FLD-NOT-SAME-NODE
5680	E-FLD-SECURITY	5698	E-FLD-AMBIGUOUS-NAME

  To indicate other problems:

4001	W-EOF	4101	W-MAX-KEY-LEN-ADJUSTED
4051	E-MUST-BE-YN	4102	E-INVALID-KEY-LEN
4052	E-RESERVED-MUST-BE-N	4103	E-INCORRECT-FLD-ORDER
4056	E-INVALID-ITEM-TYPE	4105	E-CONCURRNT-FLD-UPDATE
4092	E-INVALID-NUM-RQSTD	4106	E-BAD-ORD-CRITERIA
4100	W-ORD-KEY-TRUNCATED	4912	E-ERR-FOLDER-FILE

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

- NUM-RETURNED is the number of items retrieved from the folder. The number of items retrieved might be less than the number of items requested (NUM-REQUESTED) because:

  either the folder contains fewer items in the range specified by the passed starting key information or the folder contains fewer items in the subset specified for generic matching.

If this occurs, the warning W-EOF is returned in the RETN-CODE field.

- ITEMS-RETURNED is an array containing the item ID (ITEM-ID), item type (ITEM-TYPE), ordering key length (ORDERING-KEY-LEN), and ordering key (ORDERING-KEY) of the items returned. The size of this array must be consistent with the number of items requested, as defined in NUM-REQUESTED.

- UNSAVE-TIME is the time when the item will be automatically removed from the folder. The date and time returned is in absolute format. If the item has no unsave date and time, all fields of UNSAVE-TIME are set to 0.

SCAN-FOLDER-BY-KEY OPERATION. SCAN-FOLDER-BY-KEY retrieves the item IDs, item types, unsave time, and the corresponding ordering key and key length of the items in the range denoted by STARTING-KEY, STARTING-DUPLICATE, and NUM-REQUESTED. These values are placed in the array named ITEMS-RETURNED. Items are returned in application ordering key sequence.

NOTE

> This UOW is restricted to folders with APPLIC-DEFINED ordering disciplines. If this UOW is attempted with a folder that has an ordering discipline other than APPLIC-DEFINED, the error E-INCORRECT-FLD-ORDER is returned.

The OPTIONS structure allows you to selectively retrieve only items of a particular type. The structure also allows you to retrieve either the first matching item or the item immediately following.

The SCAN-FOLDER-BY-KEY UOW allows the application to use the response definition to build the request. VALUE clauses are appropriately set to allow this usage. NUM-RETURNED must be set to 0 when the request is issued; otherwise the request will be the wrong length. Note that the actual value of NUM-RETURNED does not matter; the length of the UOW sent, however, must be correct. In higher level languages, this implies that NUM-RETURNED must be set to 0.

Figure 5-7 illustrates the operation of SCAN-FOLDER-BY-KEY.

Six items are stored in a folder with an APPLIC-DEFINED ordering discipline. The items are stored as follows:

Item	Ordering Key Length	Ordering Key	Duplicate Indicator
first-item	4	TERM	
second-item	4	TERM	first-dup
third-item	4	TERM	second-dup
fourth-item	7	TERM244	
fifth-item	7	TERM245	
sixth-item	7	TERM246	

A SCAN-FOLDER-BY-KEY UOW is issued with values set in the following fields:

SKIP-EXACT	= N	suggested value for initial call
DUPLICATE-RESTART	= N	suggested value for initial call
NUM-REQUESTED	= 5	request for 5 items
STARTING-KEY-LEN	= 0	retrieve the first item in the folder
GENERIC-KEY-LEN	= 0	generic matching is not used
MAX-KEY-LEN	= 6	maximum number of bytes to be retrieved
PAD-CHAR	= *	ordering keys shorter than MAX-KEY-LEN to be padded with * character
STARTING-DUPLICATE	=	ignored; DUPLICATE-RESTART = N
STARTING-KEY	=	ignored; STARTING-KEY-LEN = 0

Figure 5-7. SCAN-FOLDER-BY-KEY UOW Example

TISERV begins retrieval, encounters the first item (TERM), and sets the following fields:

SKIP-EXACT	= Y	set for next scan
DUPLICATE-RESTART	= N	first-item is not preceded by a duplicate
STARTING-DUPLICATE	=	ignored; DUPLICATE-RESTART = N
STARTING-KEY	= TERM	ordering key value of first-item
STARTING-KEY-LEN	= 4	ordering key length of first-item

TISERV encounters the second item (TERM), and sets the following fields:

SKIP-EXACT	= Y	set for next scan
DUPLICATE-RESTART	= Y	second-item is a duplicate
STARTING-DUPLICATE	= first-dup	internal duplicate indicator
STARTING-KEY	= TERM	ordering key value of second-item
STARTING-KEY-LEN	= 4	ordering key length of second-item

TISERV encounters the third item (TERM), and sets the following fields:

SKIP-EXACT	= Y	set for next scan
DUPLICATE-RESTART	= Y	third-item is a duplicate
STARTING-DUPLICATE	= second-dup	internal duplicate indicator
STARTING-KEY	= TERM	ordering key value of third-item
STARTING-KEY-LEN	= 4	ordering key length of third-item

Figure 5-7. SCAN-FOLDER-BY-KEY UOW Example (Continued)

TISERV encounters the fourth item (TERM244), and sets the following fields:

SKIP-EXACT	= Y	set for next scan
DUPLICATE-RESTART	= N	fourth-item is not preceded by a duplicate
STARTING-DUPLICATE	=	ignored; DUPLICATE-RESTART = N
STARTING-KEY	= TERM244	ordering key value of fourth-item
STARTING-KEY-LEN	= 7	ordering key length of fourth-item

TISERV encounters the fifth item (TERM245), and sets the following fields:

SKIP-EXACT	= Y	set for next scan
DUPLICATE-RESTART	= N	fifth-item is not preceded by a duplicate
STARTING-DUPLICATE	=	ignored; DUPLICATE-RESTART = N
STARTING-KEY	= TERM245	ordering key value of fifth-item
STARTING-KEY-LEN	= 7	ordering key length of fifth-item

These returned values for the fifth item (TERM245) are the appropriate settings for the corresponding request fields for a subsequent scan of the same folder.

TISERV sets NUM-RETURNED to 5 and outputs the following entries in the ITEMS-RETURNED structure:

Item	Ordering Key Length	Ordering Key
first-item	4	TERM**
second-item	4	TERM**
third-item	4	TERM**
fourth-item	7	TERM24
fifth-item	7	TERM24

Figure 5-7. SCAN-FOLDER-BY-KEY UOW Example (Continued)

START-SESSION (UOW Code 101)

START-SESSION starts a session.

```
DEF  start-session-uow.
  02  hdr.
    03  self-ident                    PIC AA VALUE "UW".
    03  uow-code                      TYPE BINARY 16 UNSIGNED
                                        VALUE 101.
  02  applic-id                       PIC 9(4) COMP.
  02  corr-name                       PIC X(120).
  02  password                        PIC X(16).
  02  curr-local-time.
    03  year                          PIC 9(4).
    03  month                         PIC 9(2).
    03  day-of-month                  PIC 9(2).
    03  hour                          PIC 9(2).
    03  minute                        PIC 9(2).
    03  second                        PIC 9(2).
  02  redef-local-time                REDEFINES CURR-LOCAL-TIME.
    03  CENTURY                       PIC 9(2).
    03  ACCEPT-DATE                   PIC 9(6).
    03  ACCEPT-TIME                   PIC 9(6).
END.
```

```
DEF  start-session-rsp.
  02  hdr.
    03  self-ident                    PIC AA VALUE "UW".
    03  uow-code                      TYPE BINARY 16 UNSIGNED
                                        VALUE 101.
  02  retn-code                       TYPE BINARY 16.
  02  retn-code-detail                TYPE BINARY 16.
  02  filler                          PIC X.
  02  server-version.
    03  letter                        PIC A.
    03  rev-number                    PIC 99.
  02  time-zone-diff                  PIC S9(4) COMP.
  02  resolved-name                   PIC X(120).
END.
```

START-SESSION FIELDS. The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 101.

- APPLIC-ID is the numeric application ID, as defined by your application. All packages created during this session inherit this attribute as part of their item descriptor; this field can then be used as an agent selection criterion at depots receiving this package. In this field, the values 100 through 999 are reserved for use by Tandem.

- CORR-NAME is the name of the correspondent represented by the requesting process. This name must be previously defined in the system through the CREATE-DEPOT UOW.

- PASSWORD is the password required to establish the session, as defined in the system by the ALTER-PROFILE-ELEM UOW.

- CURR-LOCAL-TIME is the current date and time as obtained by the requesting process. TRANSFER uses this field to determine whether a time difference exists between requester and server. If a difference does exist, TRANSFER applies it to the adjustment of various timestamps used in the delivery of packages.

- REDEF-LOCAL-TIME redefines the CURR-LOCAL-TIME field for SCREEN COBOL coding convenience.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries.

  To indicate successful starting of the session:

0	OK

  To indicate problems with the correspondent name:

5600	E-CORR-NSRV-ERR	5606	E-CORR-NSRV-NOT-FOUND
5601	E-CORR-NOT-FOUND	5607	E-CORR-NSRV-DOWN
5602	E-CORR-BAD-NAME	5611	E-CORR-NET-DOWN
5603	E-CORR-BAD-TYPE	5622	E-CORR-NOT-SAME-NODE
5604	E-CORR-NO-SUCH-NODE	5623	E-CORR-AMBIGUOUS-NAME
5605	E-CORR-SECURITY	5624	E-CORR-BAD-SUFFIX

  To indicate other problems:

4005	W-CONCURRENT-SESSION	4017	E-RESTRICTED-OPERATION
4005	E-CONCURRENT-SESSION	4019	E-ALREADY-IN-SESSION
4007	E-LOGON-DISALLOWED	4021	E-INVALID-ZONE-OFFSET
4010	E-BAD-TRANSACTION	4055	E-INVALID-APPLIC-ID
4013	E-NO-DEPOT-FOR-CORR	4073	E-INVALID-DATE-TIME
4015	E-INVALID-PASSWORD	4201	E-CONTEXT-ERR

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

- SERVER-VERSION is the software version designation of TISERV, returned by TRANSFER. In the first release, this is A01.

- TIME-ZONE-DIFF is the difference between the current timestamps of the server and the requester. This value is expressed in minutes and rounded to the nearest minute.

  Whenever a requester establishes a TRANSFER session, the difference in current times between server and requester is retained as one of the session attributes. TRANSFER uses this time zone difference to translate all timestamps into the local data base frame of reference prior to storage, and to translate them back to the local time of the requester prior to replying. Thus, requesters always communicate with TRANSFER in their own local timeframe, and all timestamps are stored relative to the data base local time.

  The same transformations are applied to any stored time zone differences. The sender time zone difference stored in a package header is initially set to the session (server/requester) time zone difference when the package is submitted. Whenever the package is transferred from one node to another, the following adjustments are made at the receiving node: the difference in local times between the receiving node and the transferring node is added to all timestamps (except the delivered timestamp) and to the time zone difference field.

- RESOLVED-NAME is the resolved name of the correspondent, returned by TRANSFER. If this is a remote name, the session will not be established; however, the returned name can be used to contact the remote server.

START-SESSION OPERATION. START-SESSION validates the correspondent identity and right to communicate with TRANSFER at the local node, and establishes the running environment for a new session. This UOW cannot be issued from within an established session; TRANSFER only performs work for one session within a single IPC request. If present in a request, this UOW can be preceded only by NOOP or GET-CONFIG-NAME UOWs.

When inserting the START-SESSION UOW in an IPC request to initiate a session, you should set the SESSION-ID field of the IPC header to binary zeros; as a result, TRANSFER does not use this field for session validation.

If the session is successfully established, it will be effective for all later UOWs in the same request; TRANSFER returns the ID for the newly created session in the reply IPC header for that request. You must then set the SESSION-ID field to this value in all subsequent requests associated with that session.

NOTE

> TRANSFER automatically eliminates a session that remains idle for an extended period of time. The controlling parameter, IDLESESSIONDELAY, in the PATHWAY configuration file has a default value of 24 hours.

To terminate the session, issue the END-SESSION UOW.

In COBOL or SCREEN COBOL, the following code sequence can be used to set the local time field of this UOW:

```
01  COBOL-TIME.
  05  TRANSFER-TIME       PIC 9(6).
  05  FILLER              PIC 9(2).
...

PROCEDURE DIVISION.

  MOVE 19 TO CENTURY.
  ACCEPT ACCEPT-DATE FROM DATE.
  ACCEPT COBOL-TIME FROM TIME.
  MOVE ACCEPT-TIME TO TRANSFER-TIME.
```

SUBMIT-PKG (UOW Code 117)

SUBMIT-PKG submits a package for delivery.

```
DEF submit-pkg-uow.
  02  hdr.
    03  self-ident                    PIC AA VALUE "UW".
    03  uow-code                      TYPE BINARY 16 UNSIGNED
                                        VALUE 117.
  02  item-id.
    03  dummy                         PIC X(12).
END.
```

```
DEF  submit-pkg-rsp.
  02  hdr.
    03  self-ident                    PIC AA VALUE "UW".
    03  uow-code                      TYPE BINARY 16 UNSIGNED
                                        VALUE 117.
  02  retn-code                       TYPE BINARY 16.
  02  retn-code-detail                TYPE BINARY 16.
END.
```

<u>SUBMIT-PKG FIELDS.</u> The fields in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 117.

- ITEM-ID identifies the package header item for the package to be submitted.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries:

0	OK	4043	E-PREVIOUSLY-SUBMITTED
4010	E-BAD-TRANSACTION	4045	E-TSCHED-UNAVAIL
4035	E-ITEM-NOT-FOUND	4075	W-TIME-WINDOW-EXTENDED
4036	E-ITEM-TOO-COMPLEX	4077	E-LIFESPAN-TOO-LONG
4040	E-BAD-ITEM-DESCR	4079	W-PRIORITY-REDUCED
4041	E-ITEM-UNALTERABLE	4082	E-NO-RECIPS
4042	E-ITEM-NOT-PKG-HDR	4083	E-NOT-CREATED-BY-YOU

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

SUBMIT-PKG OPERATION. SUBMIT-PKG submits a previously created package for delivery. A package can only be submitted by its creator.

If the submittal is successful, TRANSFER marks the package and all of its component items as unalterable.

When the package expiration time is reached, TRANSFER automatically removes the package from the INBOX folders of all recipients who have not acknowledged receipt.

You can cancel delivery of a submitted package by issuing the CANCEL-PKG UOW.

If you wish to change the delivery parameters (such as delivery window or priority) for a package, you must issue the ALTER-ITEM-DESCR UOW prior to the SUBMIT-PKG UOW.

UNSAVE-ITEM (UOW Code 111)

UNSAVE-ITEM removes an item from a folder.

```
DEF  unsave-item-uow.
  02  hdr.
    03  self-ident                     PIC AA VALUE "UW".
    03  uow-code                       TYPE BINARY 16 UNSIGNED
                                         VALUE 111.
  02  item-id.
    03  dummy                          PIC X(12).
  02  folder-name                      PIC X(80).
END.
```

```
DEF  unsave-item-rsp.
  02  hdr.
    03  self-ident                     PIC AA VALUE "UW".
    03  uow-code                       TYPE BINARY 16 UNSIGNED
                                         VALUE 111.
  02  retn-code                        TYPE BINARY 16.
  02  retn-code-detail                 TYPE BINARY 16.
END.
```

UNSAVE-ITEM FIELDS. The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 111.

- ITEM-ID identifies the item to be removed from the folder.

- FOLDER-NAME is the name of the folder from which the item is to be removed.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following.

  To indicate successful unsaving of the item:

0	OK

To indicate problems with the folder name:

5675	E-FLD-NSRV-ERR	5681	E-FLD-NSRV-NOT-FOUND
5676	E-FLD-NOT-FOUND	5682	E-FLD-NSRV-DOWN
5677	E-FLD-BAD-NAME	5686	E-FLD-NET-DOWN
5678	E-FLD-BAD-TYPE	5697	E-FLD-NOT-SAME-NODE
5679	E-FLD-NO-SUCH-NODE	5698	E-FLD-AMBIGUOUS-NAME
5680	E-FLD-SECURITY		

To indicate other problems:

4010	E-BAD-TRANSACTION	4061	W-ITEM-NOT-IN-FOLDER
4035	E-ITEM-NOT-FOUND	4105	E-CONCURRNT-FLD-UPDATE

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

UNSAVE-ITEM OPERATION. UNSAVE-ITEM removes the item identified by ITEM-ID from the folder identified by FOLDER-NAME.

Prior to any UNSAVE-ITEM request for an item, you can issue a SAVE-ITEM request to save the item in the WASTEBASKET folder. This will allow the application to maintain access to the item and reclaim it should the need arise at any time before ending the current session.

WARNING

When an item is unsaved from a folder, the item is scheduled for deletion from the system. The item descriptor and associated data will be deleted if three conditions are satisfied: (1) the item is not saved in any folder at the particular node, (2) the item is not the component of any other item, and (3) the item is a package and the delivery window has passed.

If the transaction containing an UNSAVE-ITEM UOW is aborted after the UNSAVE is completed, it is possible that the item being unsaved will have its item descriptor and associated data deleted but the item entry will still be referenced in the folder. As a result, subsequent SCAN-FOLDER UOWs for the folder will return the item ID; but UOWs requiring access to the item descriptor or data will result in an ITEM-NOT-FOUND error code.

To resolve the UNSAVE problem, you can save the item in the WASTEBASKET folder before unsaving it from the desired folder; issue the SAVE-ITEM in the WASTEBASKET in the same TMF transaction as the UNSAVE-ITEM. This prevents the item descriptor and associated data from being deleted because the item is now saved in another folder. The item will be automatically purged from the WASTEBASKET and deleted from the item descriptor and associated data when the current session is ended.

WHERE-SAVED (UOW Code 121)

WHERE-SAVED retrieves the names of folders containing the specified item.

```
DEF  where-saved-UOW.
  02  hdr.
    03  self-ident                PIC AA VALUE "UW".
    03  uow-code                  TYPE BINARY 16 UNSIGNED
                                    VALUE 121.
  02  item-id.
    03  dummy                     PIC X(12).
  02  prev-folder                 PIC X(80).
  02  num-requested               TYPE BINARY 16 UNSIGNED
                                    VALUE 5.
END.
```

```
DEF  where-saved-rsp.
  02  hdr.
    03  self-ident                PIC AA VALUE "UW".
    03  uow-code                  TYPE BINARY 16 UNSIGNED
                                    VALUE 121.
  02  retn-code                   TYPE BINARY 16.
  02  retn-code-detail            TYPE BINARY 16.
  02  num-returned                TYPE BINARY 16 UNSIGNED.
  02  folders-returned            PIC X(80)
                                    OCCURS 0 TO !num-requested!
                                    5 TIMES DEPENDING ON
                                    num-returned.
END.
```

<u>WHERE-SAVED FIELDS.</u> The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 121.

- ITEM-ID identifies the item.

- PREV-FOLDER is the folder name following which retrieval is to start. You can begin with the first folder by setting this field to binary zeros.

- NUM-REQUESTED is the number of folder names to be retrieved. This value directly determines the length of the response returned by TISERV.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries.

  To indicate successful retrieval:

0	OK

  To indicate problem with the folder name:

5675	E-FLD-NSRV-ERR
5676	E-FLD-NOT-FOUND
5677	E-FLD-BAD-NAME
5678	E-FLD-BAD-TYPE
5679	E-FLD-NO-SUCH-NODE
5680	E-FLD-SECURITY
5681	E-FLD-NSRV-NOT-FOUND
5682	E-FLD-NSRV-DOWN
5686	E-FLD-NET-DOWN
5697	E-FLD-NOT-SAME-NODE
5698	E-FLD-AMBIGUOUS-NAME

  To indicate other problems:

4001	W-EOF
4035	E-ITEM-NOT-FOUND
4092	E-INVALID-NUM-RQSTD
4105	E-CONCURRNT-FLD-UPDATE

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

- NUM-RETURNED is the number of folder names returned by TISERV in the response.

- FOLDERS-RETURNED is an array that contains the folder names returned by TISERV. The size of this array must be consistent with the value specified in NUM-REQUESTED. The array begins with the folder that follows the folder specified in PREV-FOLDER and that contains the item.

NOTE

Since TISERV retrieves the folders in order of their internal identification, the folder names are not arranged in any readily apparent sequence in this array.

WHERE-SAVED OPERATION. WHERE-SAVED returns, in the array named FOLDERS-RETURNED, the names of folders that contain the item identified by ITEM-ID. The UOW begins retrieval with the next folder that follows the folder denoted by PREV-FOLDER, and obtains as many folder names as the number indicated by NUM-REQUESTED. Only folders within the depot represented by the current session are considered.

The number of folders returned might be smaller than the number requested because there are no more folders that contain the item. In this case, the W-EOF warning is returned in the RETN-CODE field.

WRITE-PROFILE-REC (UOW Code 213)

WRITE-PROFILE-REC writes or updates a user-maintained depot profile record.

```
DEF  write-profile-rec-uow.
  02  hdr.
    03  self-ident                    PIC AA VALUE "UW".
    03  uow-code                      TYPE BINARY 16 UNSIGNED
                                        VALUE 213.
  02  corr-name                       PIC X(80) VALUE SPACES.
  02  rec-type                        PIC 9(4) COMP.
  02  rec-seq-num                     PIC 9(4) COMP.
  02  depot-flag                      TYPE BOOLEAN VALUE "Y".
  02  filler                          TYPE CHARACTER 1.
  02  update-control                  PIC S9(4) COMP.
  02  num-data                        TYPE BINARY 16 UNSIGNED.
  02  profile-data.
    03  byte                          OCCURS 0 TO 1000 TIMES
                                        DEPENDING ON num-data
                                        PIC X.
END.
```

```
DEF  write-profile-rec-rsp.
  02  hdr.
    03  self-ident                    PIC AA VALUE "UW".
    03  uow-code                      TYPE BINARY 16 UNSIGNED
                                        VALUE 213.
  02  retn-code                       TYPE BINARY 16.
  02  retn-code-detail                TYPE BINARY 16.
  02  corr-name                       PIC X(80).
END.
```

WRITE-PROFILE-REC FIELDS. The fields defined in this UOW are:

- HDR is the UOW Header. The UOW-CODE value is 213.

- CORR-NAME is the name of the correspondent for whose depot the profile record is to be written. This is also the name of the correspondent represented by the calling process. Only system administrators can enter correspondent names other than their own in this field; correspondents without system administrator privileges must enter their own names or leave the field blank. On input, you can use a partially qualified name, including wildcard characters. In the response, the fully qualified name is returned.

- REC-TYPE is the type assigned to the record by your application. The value in this field must be greater than 799.

  Values 800 through 999 - reserved for use by Tandem

  Values 1000 through 9999 - available for customer use

- REC-SEQ-NUM is the sequence number to be assigned to the record. The number can range from 1 through 9999.

- DEPOT-FLAG determines whether the UOW references a depot profile record or a system control record.

  Y = a depot profile record, as indicated by CORR-NAME

  N = a system control record

  If you make no entry in this field, Y is assumed.

  A depot profile record contains information specific to a particular depot. When a new depot is created, all profile records in a model depot are copied into the new depot.

  A system control record contains global parameters for the node. There can be a unique system control record for any particular REC-TYPE/REC-SEQ-NUM for each node at which your TRANSFER system is running. This record survives deletion of depots, and is not copied into new depots when they are created. Use of information in these records to supply default values for corresponding depot control parameters is determined entirely by your application.

- UPDATE-CONTROL is the counter used to control concurrent update of the profile record between read and write operations. This is the update number that TRANSFER writes into the record each time an update takes place. You should obtain this value through the READ-PROF-REC-A02 UOW, and then pass it back to TRANSFER on the call to the WRITE-PROFILE-REC UOW. If another process has updated the record since the calling process read it, an error message E-UPDATE-MISMATCH is returned.

  - To add a new record, set this field to zero.

  - To bypass this test and update the record regardless of whether anyone else has updated it, set this field to -1.

- NUM-DATA is the number of bytes written by TISERV. This entry can have a maximum value of 1500.

- PROFILE-DATA is the array that contains the new record to be written, or the update information for an existing record. You can modify the array size within the system limitation of 1500 bytes.

- RETN-CODE is the return code. TISERV returns a code in this field to indicate one of the following entries.

  To indicate successful record writing or updating:

0	OK

  To indicate problems with the correspondent name:

5600	E-CORR-NSRV-ERR	5607	E-CORR-NSRV-DOWN
5601	E-CORR-NOT-FOUND	5611	E-CORR-NET-DOWN
5602	E-CORR-BAD-NAME	5622	E-CORR-NOT-SAME-NODE
5604	E-CORR-NO-SUCH-NODE	5623	E-CORR-AMBIGUOUS-NAME
5606	E-CORR-NSRV-NOT-FOUND		

  To indicate other problems:

4010	E-BAD-TRANSACTION	4051	E-MUST-BE-YN
4046	E-INVALID-REC-TYPE	4058	E-INVALID-REC-SEQ-NUM
4047	E-REC-NOT-FOUND	4093	E-SECURITY-VIOLATION
4049	E-REC-ALREADY-EXISTS	4201	E-CONTEXT-ERR
4050	E-UPDATE-MISMATCH	4902	E-ERR-PROFILE-FILE

- RETN-CODE-DETAIL is an error number returned by a subsystem other than TRANSFER or is a further qualification of an error detected by TRANSFER.

WRITE-PROFILE-REC OPERATION. WRITE-PROFILE-REC writes or updates a user-maintained record in the depot Profile file. The UOW must start on a word boundary. Each response consumes a whole number of words of the IPC reply.

To update a record, you supply the update counter for that record in the UPDATE-CONTROL field. When you issue the WRITE-PROFILE-REC UOW with a nonzero value in the UPDATE-CONTROL field, TRANSFER first reads the old record (locking it temporarily) and compares the UPDATE-CONTROL value in the record with that which you have supplied; the old record must already exist.

If the two values match, or if the value you have supplied is -1:

The record is updated with the new information supplied in PROFILE-DATA.

The updated record is written (and unlocked) with its old UPDATE-CONTROL value incremented by 1. TRANSFER ensures that this value wraps around from 9999 to 1 every 10000 updates.

To write a new record, set the UPDATE-CONTROL field to zero. TRANSFER takes the input from PROFILE-DATA, and writes it into a new record in the file. If the record indicated by REC-TYPE and REC-SEQ-NUM already exists, TRANSFER returns an error condition.

SECTION 6

DEVELOPING TRANSFER APPLICATIONS

An application can be designed and developed in many different ways. As a general guideline, Tandem suggests the following combination of steps as one possible way to proceed:

1. Decide whether your application should use TRANSFER.

2. Specify the functional aspects of the application. Identify correspondents and what they do, what kind of information they exchange, how they use that information, and how they acknowledge receipt of packages.

3. Design input screens for users at terminals.

4. Divide the application tasks among clients, agents, and other application programs.

5. Define the package formats and protocol for communication among correspondents.

6. Plan high-level transactions, taking TMF requirements into consideration.

7. Plan low-level implementation.

8. Code and test the software.

APPLICATION DEVELOPMENT STEPS

The application development steps presented in this section are only guidelines that suggest an approach; they do not imply design prerequisites or a rigid methodology for developing a TRANSFER application. Statements about what different entities, such as requesters and servers, should do are simply ideas that offer one clear model of how TRANSFER can be used.

Step 1: Deciding Whether Your Application Should Use TRANSFER

Consider using TRANSFER if your application requires delivery of information to multiple correspondents, particularly across a network, or if it depends upon the staging of transactions over time. These requirements need not be the primary thrust of the application; even if they are only a small part of it, TRANSFER can still help you considerably.

TRANSFER is not an application in itself; it delivers information (packages), but does not process them. TRANSFER does not inherently allow you to defer the transport of packages that have already been posted, nor does it guarantee their delivery in any particular sequence.

TRANSFER emphasizes reliability of delivery rather than speed of transmittal. TRANSFER cannot guarantee that a package will arrive at a precise time, nor can it predict the exact amount of time that a package will spend in transit. This makes TRANSFER unsuitable for time-critical applications such as real-time communication where one terminal operator must converse online with another.

Step 2: Specifying the Functional Aspects of the Application

Identify the correspondents that send and receive packages. Consider whether these correspondents are people, processes, devices, or other entities; your application must interface with each of these types differently.

Consider how many recipients your application will involve, and how they might be grouped into distribution lists. Determine whether all recipients receive identical packages. Decide what action a recipient of a package takes, such as adding items or forwarding it to another recipient.

Define the characteristics of the packages that correspondents exchange. Consider such factors as:

- What kind of information does the package contain? TRANSFER is indifferent to package content. TRANSFER allows applications to define packages, items, and record types for their own purposes; and to nest packages and items inside one another.

- Is the order in which packages arrive at a depot important? Your application can embed sequencing information inside packages, and provide agent code to process packages in sequence.

- Is the time window in which packages will be delivered a consideration? This might involve distinguishing between recipients that are batch applications running only at night, and online applications active during the day. It might also require careful analysis of the daily availability of devices that are recipients of packages.

- How do the correspondents use this information?

- Do the correspondents need to acknowledge package receipt? Some packages might demand a reply from the recipient to the sender.

After considering these factors, define the various transactions that will involve extended (nowait) processing. Such transactions normally begin when a correspondent composes and sends a package. The end of the transaction, however, depends on your application. For example, you can define a transaction to end:

- when an agent at the last recipient's depot receives notification that the package arrived

- when the last intended recipient saves the package in a folder or deletes it

- when the sender receives notification for every recipient that the package was received, or notification that the package could not be delivered or that it expired before it was received

- when every recipient has taken some action and explicitly replied to the sender

- when the sender has taken some specific action based on the reply.

When replies to senders are part of a transaction, define exactly what the reply means to the sender and how that reply is linked to the original package. Examples of deliveries and replies that constitute complete transactions appear in Figure 6-1.

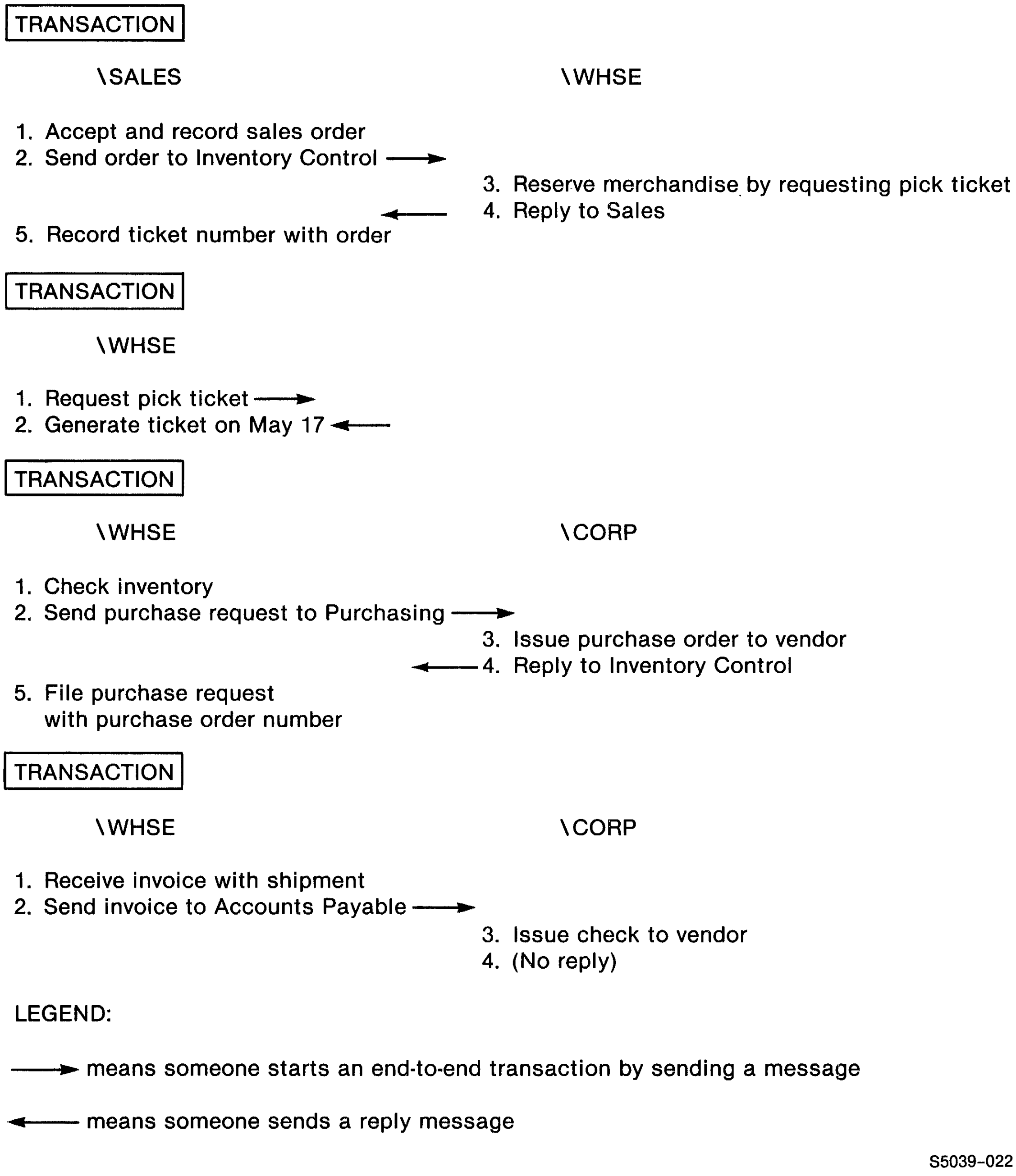
A receiving correspondent can reply to a sender in any of the following ways:

- acknowledge the delivery without reading the package

- acknowledge the delivery after reading the package, but without performing any other processing

- acknowledge the delivery after fully processing the package.

Decide whether to require certification of package delivery. Consider whether return packages will be more useful or more annoying to the sender, and whether the need for certification warrants the additional package traffic.



TRANSACTION

\SALES → \WHSE

1. Accept and record sales order
2. Send order to Inventory Control ⟶
3. Reserve merchandise by requesting pick ticket
4. ⟵ Reply to Sales
5. Record ticket number with order

TRANSACTION

\WHSE

1. Request pick ticket ⟶
2. Generate ticket on May 17 ⟵

TRANSACTION

\WHSE → \CORP

1. Check inventory
2. Send purchase request to Purchasing ⟶
3. Issue purchase order to vendor
4. ⟵ Reply to Inventory Control
5. File purchase request
   with purchase order number

TRANSACTION

\WHSE → \CORP

1. Receive invoice with shipment
2. Send invoice to Accounts Payable ⟶
3. Issue check to vendor
4. (No reply)

LEGEND:

⟶ means someone starts an end-to-end transaction by sending a message

⟵ means someone sends a reply message

S5039-022

Figure 6-1. Complete Transactions Involving Extended Processing

Consider the level of data protection and integrity that your application must provide. This might involve the use of fault-tolerant features, TMF, or both.

Try to anticipate any operational and administrative requirements that your application imposes upon others at your site.

Step 3: Designing Input Screens for Users at Terminals

If your application involves users at terminals, design the input screens and establish conventions for reporting errors.

Determine what screens are needed, how the screens should be grouped, and what path the user should take while progressing through particular screen sequences. As an example:

- A client presents a user with a log-on screen.
- After the user logs on, the client produces a menu screen from which the user can select various groups of functions, such as compose a package.
- After a group is selected, the client allows the user to choose a specific function, such as add a new item or modify an existing one.

Examples of screens presented by a client appear in Section 7.

Screen design should be consistent. You can provide consistency by selecting a standard screen layout. You could divide each screen in the application into four basic areas that always appear in the same locations on each screen:

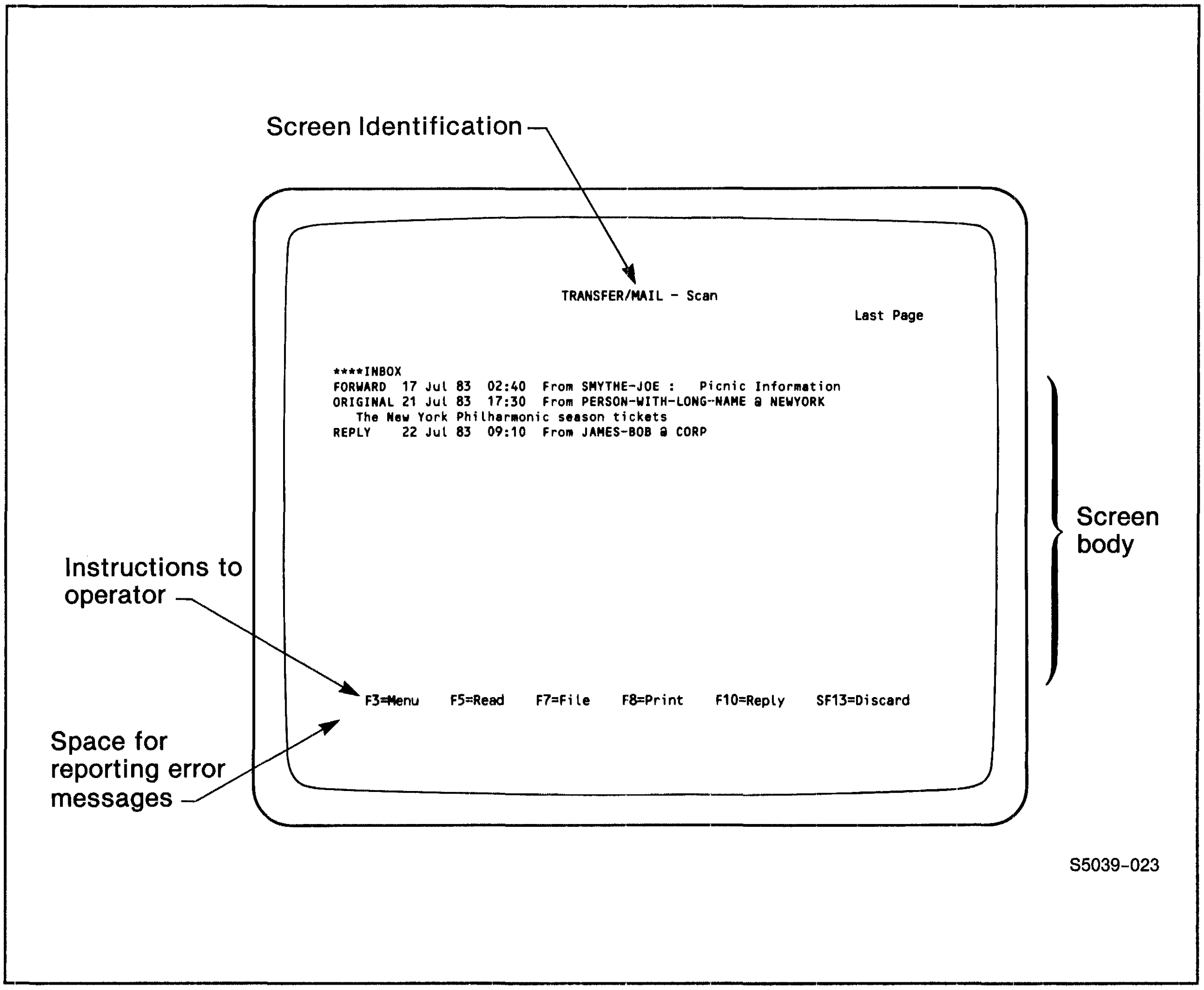
screen identification and headings

screen body

an area for special instructions to the operator

an area for error message reporting.

The example in Figure 6-2 shows the T/MAIL application screen for displaying the contents of an INBOX folder.



```
                         TRANSFER/MAIL - Scan
                                                        Last Page

****INBOX
FORWARD  17 Jul 83  02:40  From SMYTHE-JOE :   Picnic Information
ORIGINAL 21 Jul 83  17:30  From PERSON-WITH-LONG-NAME @ NEWYORK
   The New York Philharmonic season tickets
REPLY    22 Jul 83  09:10  From JAMES-BOB @ CORP




   F3=Menu    F5=Read    F7=File    F8=Print    F10=Reply    SF13=Discard
```

Figure 6-2. Application Input/Output Screen

Carefully integrate the use of function keys with the screen displays. An operator will use these keys either to signal completion of an operator function or to specify a choice, such as add an item or delete an item. To avoid errors and confusion:

- Use the keys consistently on all screens.
- Lay out the references to the keys distinctly on the screen.
- Limit the number of function keys needed on each screen.
- Avoid using multiple keys for the same function.
- Confine screen entries to similar, related choices.
- Consider using shifted keys for functions that might produce irreversible results.

- Provide a series of help screens and menu screens to help the user to progress through the application.

- Distinguish various kinds of fields in the screen layout. You might use underlining or reverse video for entry fields, dim display for special prompts, and blinking or brightened display for error messages.

- Use default values and protect crucial screen fields to help prevent errors. SCREEN COBOL field characteristic clauses can be used to specify integrity constraints, and your application can perform interfield checking after screen editing is complete.

If you are adding TRANSFER to an existing application, decide how to integrate the new functions, screens, and keys into the existing application.

Step 4: Dividing Application Tasks Among Clients, Agents, and Other Programs

Consider how the work performed by the application should be divided among clients, agents, and other application programs. In making these decisions, refer to the discussions of clients and agents in this manual, and to the PATHWAY manuals referenced in the preface.

Step 5: Defining Package Formats and Protocol for Communication Among Correspondents

Design the structure of the packages and replies, and determine how correspondents should interpret them. Often, a single application uses many package formats. Designing a package entails not only deciding what the structure will be, but also defining delivery parameters such as priority, certification, and timeframes.

When you include one package within another, the number of levels of nesting can affect performance. To retrieve the components on each level, a requester must:

1. retrieve the components of the outermost package by issuing a request to TISERV

2. if any of the components is itself a package, retrieve its components by issuing another request

3. continue this process until all components have been retrieved at all levels.

Retrieving the nested components of a package requires at least one SEND statement for every level of nesting in the package. Multiple SEND operations, however, degrade the response time of the application.

The impact of nesting is even more significant upon asynchronous requesters.

Requesters must retrieve all components in order to transport a package to each remote node.

Each level of nesting results not only in a separate SEND operation to transmit the data at each level, but also in a recursive call to the program unit that transports the data.

Deeply nested packages can exhaust the data space available to an asynchronous requester and degrade the performance of TRANSFER across nodes.

An alternative to nesting packages is to build them horizontally, not vertically. Figure 6-3 illustrates two structures that have the same number of component items, but those items are spread more evenly across the second structure than across the first:

Retrieving the components of the first structure requires six SEND operations, including one SEND to get the item ID of the outermost package.

Retrieving the components of the second structure requires three SEND operations. If the package needs to be transported across nodes, the second structure entails less recursive processing by asynchronous requesters.

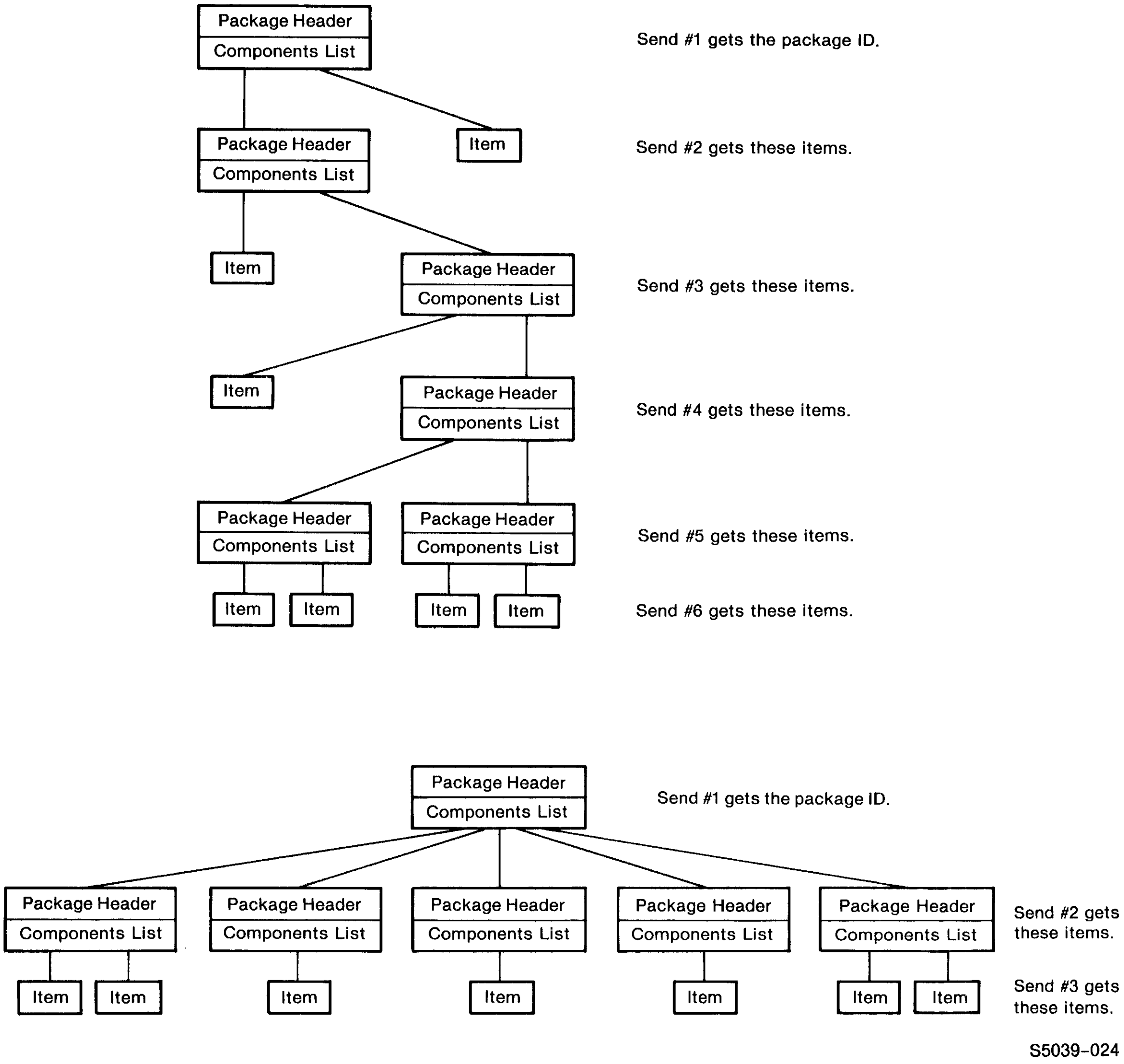

Package Header
Components List
Item
Send #1 gets the package ID.
Send #2 gets these items.
Send #3 gets these items.
Send #4 gets these items.
Send #5 gets these items.
Send #6 gets these items.
Send #1 gets the package ID.
Send #2 gets these items.
Send #3 gets these items.
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Figure 6-3. Avoiding a Nesting Problem

Step 6: Planning High-Level Transactions

A TRANSFER transaction typically consists of several TMF transactions, possibly in different PATHWAY systems. Often, separate TMF transactions are required to build and post the package; deliver the package; respond to the package, such as placing it in a folder on the receiving end; produce and post replies; deliver the replies; and react to the replies. All of these transactions, except the ones involving package delivery, are in the domain of application requesters and agents.

For simple applications, it is generally sufficient to:

- Start a TMF transaction immediately after completion of a terminal read for any request that requires a transaction.

- End this TMF transaction immediately before the next terminal read.

The following recommendations deserve special attention:

- A TMF transaction should never span a read operation from a terminal. This promotes concurrent accesses to the data base.

  - If you allowed a TMF transaction to span a terminal read, the record locks involved in the transaction might be held for a very long time, delaying access by other users.

  - TMF does not allow the audit trail records for a single transaction to span more than a certain number of audit trail files, as determined by a TMFCOM parameter; thus, if a transaction takes so long that several audit trail file switches occur, TMF aborts the transaction.

- Updates which, in combination, transform the data base from one consistent state to another consistent state, should be grouped into a single TMF transaction; otherwise, you fail to take advantage of the TMF guarantee that all or none of the changes in a single transaction are maintained in the data base. Avoid grouping together too many of these transformations because the record locks involved are held for the life of the transaction; a lengthy transaction might maintain locks long enough to dramatically reduce the amount of work on the data base that could proceed concurrently.

- Requests that do not involve changes to files on disc do not require a TMF transaction.

- You only need multiple TMF transactions per user request in cases where a single request might update hundreds of records.

For additional information on TMF transaction processing, refer to the PATHWAY SCREEN COBOL Reference Manual.

Step 7: Planning Low-Level Implementation

Low-level implementation decisions involve packaging your application in individual modules (COBOL or SCREEN COBOL programs, FORTRAN subroutines, or TAL procedures) and subroutines, breaking the application up into small groups of functions. They also involve carefully planning the interfaces between these modules and subroutines, and deciding what information is passed between them.

You can plan for various accounting procedures, collecting usage statistics, and the logging of particular events and errors. Initially, you might want to log every SEND operation requested by a SCREEN COBOL program to provide extensive debugging information.

If a large group of programmers is working on the application, plan and establish coding standards for the group. These standards prevent implementation conflicts, recoding, and readjustment as the development phase progresses.

Plan the methods for reporting errors to users. Your application can find out about errors in several different ways, as illustrated in Figure 6-4.

① Problem reports can arrive as packages in the INBOX folder. A package might state that another package expired before it was acknowledged or could not be delivered on time to a specific recipient.

② Errors in a request, but not specific to a UOW, are reported by TRANSFER in the reply header. These errors usually indicate programming errors in the SCREEN COBOL program that makes the request. Examples of such errors are an incorrect session ID or an incorrect request length (more or fewer UOWs than the request indicated).

③ Errors encountered while processing specific UOWs are reported in the response UOWs by TRANSFER. Examples of such errors are ITEM-NOT-FOUND, for a UOW that refers to an item, or INVALID-FOLDER-NAME, for a UOW that names a folder. An operator could have entered an invalid name, which the requester passed to the server as a parameter in a UOW.

In some cases, an error might be cause to abort and restart a transaction. If a transaction is creating an item and adding records and the request fails because a processor fails, you cannot tell how many records were added successfully to the item; in this case, you should abort and restart the transaction.

④ Errors can be reported by the GUARDIAN operating system, input/output processes, and other software in response to file system requests if the application includes its own servers. PATHWAY reports a variety of errors to SCREEN COBOL programs.

⑤ Certain errors are reported to the system administrator as console messages or entries to a log file.

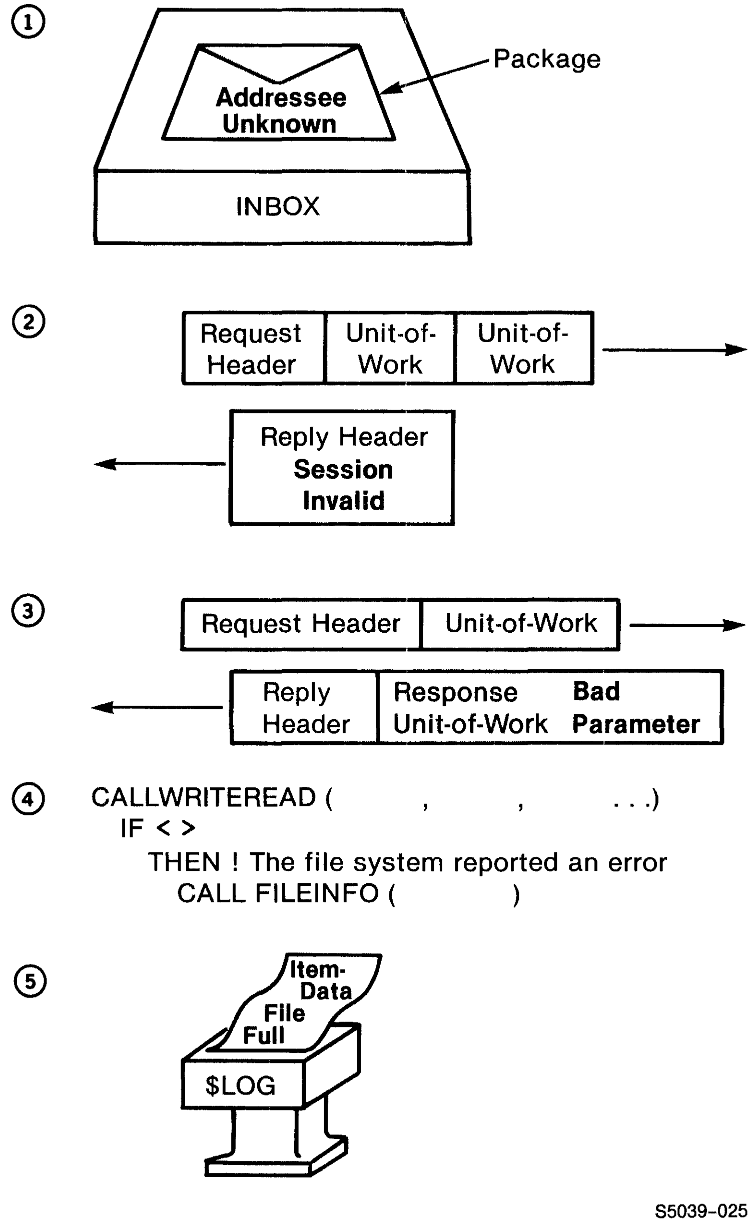


Figure 6-4. Ways in Which Errors Are Reported

Error handling strategies vary with the type of error and with the application. For example, an agent might react to reports of expiration or delivery problems by reporting those conditions to the operator, revising a set of values used to calculate timeframes and priorities, or automatically posting a package again under certain conditions. Figure 6-5 shows an application that maintains parameters for calculating timeframes; if too many of a correspondent's packages cannot be delivered on time, the agent that notices the problem changes the parameters in the application profile.

Step 8: Coding and Testing the Software

Before coding your programs, read the associated language and PATHWAY manuals. Consider carefully the conventions for ensuring fault-tolerant operation and for using TMF to guarantee data base consistency. Various support notes and Tandem Softdoc information might be useful to you.

NOTE

> For programs written in TAL or FORTRAN, values entered in fields with data types equivalent to the COBOL/SCREEN COBOL type PIC(4) COMP are limited to the range 0 through 9999. This limitation applies even if it is not explicitly stated in the TAL or FORTRAN definition for fields of that particular type. Although a PIC(4) COMP field would be assigned type INT in a TAL program, entry of a value less than 0 or greater than 9999 in that field would still result in an error (such as E-INVALID-REC-TYPE).

Fields with the PIC X characteristic, such as the ITEM-ID or SESSION-ID fields, are not displayable as output to terminal sessions.

Test your application module-by-module. If your application is based upon the requester/server model, you can test your servers alone before evaluating their interaction with SCREEN COBOL requesters. Later, you can evaluate your requesters with debugged servers.

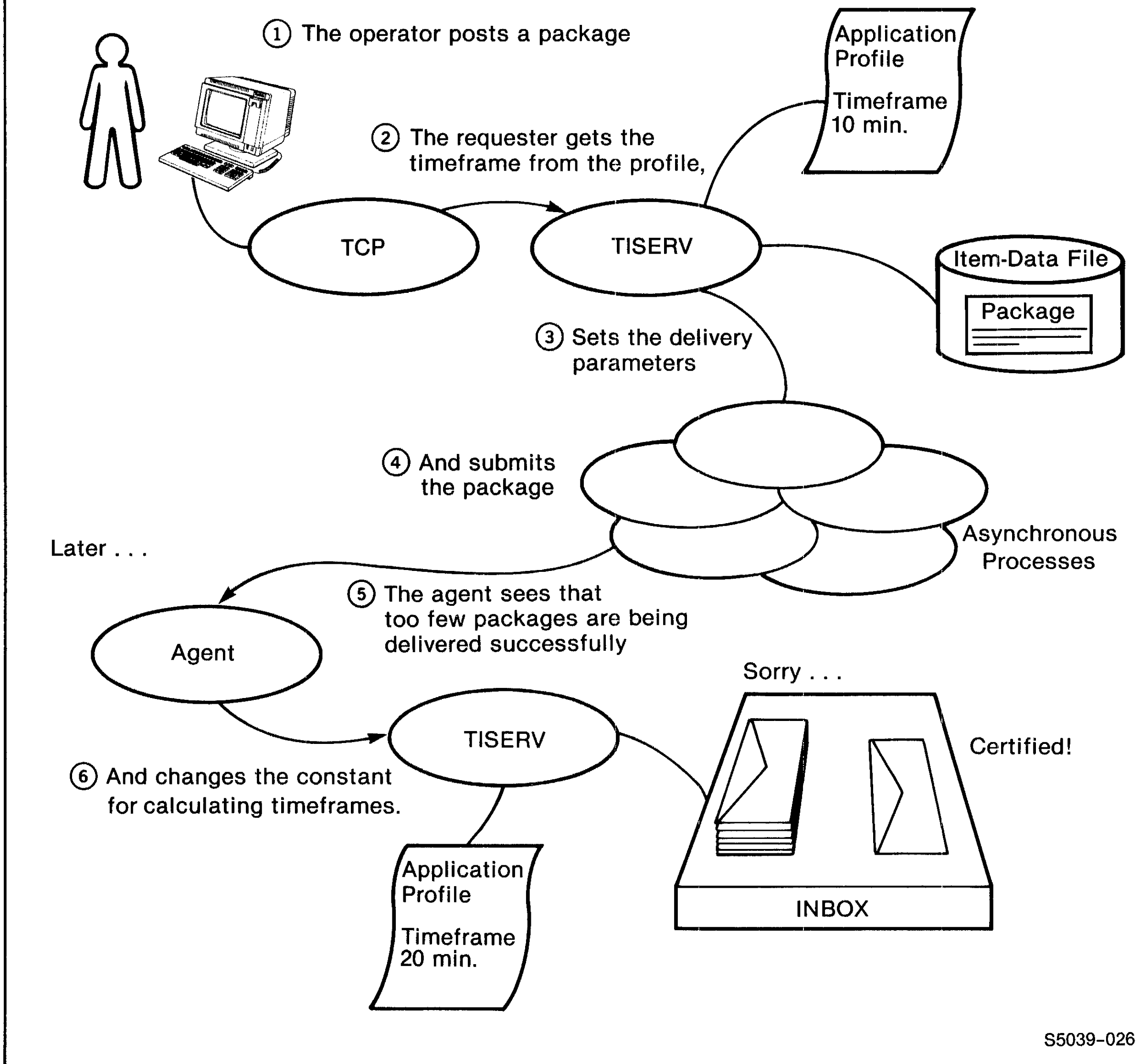

① The operator posts a package
② The requester gets the timeframe from the profile,
Application Profile
Timeframe 10 min.
TCP
TISERV
Item-Data File
Package
③ Sets the delivery parameters
④ And submits the package
Asynchronous Processes
Later . . .
⑤ The agent sees that too few packages are being delivered successfully
Agent
Sorry . . .
TISERV
Certified!
⑥ And changes the constant for calculating timeframes.
INBOX
Application Profile
Timeframe 20 min.
S5039-026

Figure 6-5. An Agent Monitors Package Delivery

When your application is running, you should validate its fault-tolerant operation and reliance upon TMF. This might entail a recovery drill where operators use TMF to recover from various kinds of failures.

DESIGNING AND WRITING A CLIENT

Every TRANSFER application must include one or more clients. Clients are the programs that allow correspondents using the application to communicate and interact with TRANSFER. In most cases, the main job of the client is to provide an interface between correspondents who are users at terminals and the TRANSFER software.

Clients let correspondents issue requests for building, altering, and posting packages; and for receiving, reading, and responding to incoming packages. Clients also let correspondents request various administrative functions, such as defining new correspondents and distribution lists. The application forwards these requests to TRANSFER by issuing UOWs to the TRANSFER interactive server (TISERV). TRANSFER then responds by performing the operations requested.

A client can be either a stand-alone client that operates as an entire application, or a dependent client that is actually a component of a larger application.

Examples of stand-alone clients are:

- An electronic mail system, such as the T/MAIL application supplied by Tandem.
- An online central filing system where packages are deposited by some correspondents to be read by others.
- A suspense file application that reminds correspondents of events scheduled to take place on certain days. With this type of application, correspondents might scan a folder for Thursday, July 29th, and find packages alerting them to various meetings scheduled for that day; or the application might use delayed delivery to automatically alert correspondents to imminent events whenever they log on.

Examples of dependent clients are:

- Applications not originally designed to use TRANSFER. In such applications, TRANSFER might be almost invisible to the users. An example is a warehousing application where the user presses one function key to review an invoice and another to transmit the invoice to a remote node.

- Applications involving T/MAIL. In some cases, the client might invoke T/MAIL to perform various functions, usually by means of menu-screen entries. In other cases, T/MAIL might call the client to perform some specialized function such as formatting special interoffice memos or invoices. Specific information about clients that interact with T/MAIL appears in Appendix B.

Most clients are written in SCREEN COBOL and execute in PATHWAY Terminal Control Processes (TCPs); others are written in COBOL, FORTRAN, or TAL. Only SCREEN COBOL clients, however, can take advantage of PATHWAY and its load-balancing features, ease of coding interprocess communications and TMF transactions, and resource management capabilities.

As you plan the design of your client, consider the following:

1. The client divides its attention among the correspondents; therefore, the total number of correspondents affects the time in which the system can respond to each.

2. If a client represents correspondents who are processes, those processes can be PATHWAY server classes, and possibly agents. If a correspondent is a nonstandard device, the process that issues requests to the device can be either a server (possibly an agent) or a terminal simulator. In any case, a server still requires a SCREEN COBOL program to make requests; each copy of a SCREEN COBOL program must be assigned either a physical terminal or a terminal simulator. Many of these applications might not require PATHWAY.

3. Any request on behalf of a correspondent must be directed to a server class running at the node where the correspondent is registered.

Grouping UOWs in IPCs

A single SEND statement or WRITEREAD call can request multiple services, as long as all of those services are for the same correspondent. There is only one request header to identify the correspondent. For each service requested, your application must issue one UOW.

In your program, you group UOWs into an interprocess communication (IPC) that is forwarded to TISERV by the SEND statement or WRITEREAD call. One IPC exists for each SEND statement or WRITEREAD call; one UOW exists for each operation requested. TRANSFER processes the UOWs in the order in which they appear in the IPC.

The more UOWs you can pack into one IPC (SEND or WRITEREAD request) and the fewer IPCs in your program, the better. For applications running under PATHWAY, reducing the number of SEND operations between screen presentations is particularly important. Both TRANSFER and PATHWAY operate far more efficiently with fewer IPCs. Excessive communication slows the system down, and the processing overhead associated with each request further contributes to this slowdown.

Fewer IPCs offer several advantages:

- results in fewer input/output operations by TISERV as well as fewer interprocess messages

- minimizes the points of interaction between your client and TISERV, potentially simplifying error recovery

- provides an easy way for sequences of operations to control the execution of later operations if an early operation fails.

Packing as many UOWs into as few IPCs as possible is important. In extreme cases, it might even be feasible to start a session, perform all of the work for that session, and terminate the session, within the same IPC.

To facilitate the coding of several UOWs within the same IPC, you can use the RQST-CODE field of the IPC header to specify whether or not to continue processing all UOWs in an IPC in the event of an error or a warning regarding a particular UOW within that IPC. If the RQST-CODE field contains STOP-ON-ERROR, an error condition in a UOW prevents succeeding UOWs in the IPC from being processed. If the RQST-CODE field contains DO-ALL-UOWS, however, an error or a warning will not terminate processing of the remaining UOWs in the IPC.

If you abort a transaction because of an error in an IPC, <u>all</u> changes to the TRANSFER data base caused by this IPC are backed out.

If successful completion of one UOW is necessary for later UOWs, place the dependent UOWs in the same IPC and specify STOP-ON-ERROR.

Suppose, for example, you wish to discard an item in a folder, but before discarding it, you want to save it in the WASTEBASKET folder so that it will remain available until the end of the current session:

> Save the item (with a SAVE-ITEM UOW) and then remove it from the originating folder (with the UNSAVE-ITEM UOW) in the same IPC.
>
> If the SAVE-ITEM UOW fails, the UNSAVE-ITEM UOW will not even be attempted and you will still retain the item.

By putting the SAVE-ITEM and UNSAVE-ITEM UOWs in the same IPC and transmitting the IPC within the framework of a TMF transaction, you can ensure that both of these operations take place or that neither of them do. If the SAVE-ITEM UOW succeeds but the UNSAVE-ITEM UOW fails, TMF will remove the item from the WASTEBASKET folder when the transaction is aborted.

Multiple UOWs in an IPC can complicate error handling:

- You must look at each UOW individually.
- You cannot direct TRANSFER to use the results returned by earlier UOWs as input to later UOWs in the same IPC.
- You must issue two or more IPCs, possibly moving the earlier results to the later requests in the client code.

NOTE

The total size of an IPC or its reply cannot exceed the maximum value defined at TISERV startup time, as indicated in Table 4-1 of Section 4. For PATHWAY requesters, this value is specified at PATHWAY configuration time as indicated in the TRANSFER Delivery System Management and Administration Guide.

Communicating with TISERV

A general rule for PATHWAY applications is to divide server classes so that each request sent to each server takes approximately the same amount of time. When directing UOWs to TISERV, however, you cannot consider individual operations; you must think of groups of UOWs.

Although this makes it more difficult to estimate the time required to handle the UOWs, it does give you more flexibility in balancing the workload per request among servers. One possible approach to this situation might be to define several server classes, with each class using the same server program but different response-time characteristics.

Using Correspondent Names for Distribution Lists

You can use correspondent names as an aid in naming distribution lists. As an example, you could create a correspondent called LIST to help identify public distribution lists. This would indicate to accessors that they were indeed accessing a distribution list; it would also help them recall the correct way to reference the list by requiring them to remember only the distribution list name. Examples would be:

```
LIST.SALESMAN
LIST.MAILER @LA
```

TMF Guidelines

When using TMF, consider the following guidelines:

1. Multiple TMF transactions can significantly impact program execution time; therefore, consider performing all of the work for each request within a single TMF transaction--even if your application does not require the guarantee that either all or none of the individual operations will be completed. In general, your program will only require multiple TMF transactions for a single user request if the request will take a long time, or if it involves updates to hundreds of records in the data base.

2. Changes requested in a TMF transaction are not reflected in the data base until the TMF transaction ends; therefore, applications should not leave a TMF transaction active while waiting for a user to press a function key or react to a prompt. The record locks involved in such a transaction might be held for a very long time, delaying access by other users. Also, if the user leaves the terminal with a TMF transaction still in progress and an error occurs, audit trails on disc cannot be purged.

3. Your application should abort TMF transactions whenever a server detects an error that would make the data base inconsistent. An example of such a TMF transaction is one in which one item is being attached to, or detached from, another. This involves changing both the PARENT-COUNT of the component item and the COMPNT-COUNT of the parent item; an error occurring between these changes would leave the TRANSFER data base inconsistent.

NOTE

Always abort a transaction when a data file is full or when any error that your program is not prepared to handle is returned on a file.

Always abort a transaction when the BAD-TRANSACTION message is returned. This indicates a fatal error, such as the transaction itself no longer existing in the system, a recipient's node going out of service, or some type of system failure.

Network Guidelines

When your application issues a START-SESSION UOW for a correspondent, it must direct this UOW to a server or server class running at the node where the correspondent is registered. Your application must continue to make requests of that same server or server class because the SESSION-ID assigned in the response to the START-SESSION UOW is defined only at the same node.

SCREEN COBOL Coding Guidelines

Guidelines for coding SCREEN COBOL programs operating in a PATHWAY environment appear in the PATHWAY SCREEN COBOL Reference Manual. Guidelines for coding programs in COBOL, FORTRAN, or TAL (which do not run under PATHWAY) appear in the manuals covering those languages. Additional rules apply specifically to programs that are TRANSFER clients:

1. Always abort any transaction if the PW-REPLY-CODE field in the IPC header is set to a value greater than 1 (indicating an error in the IPC header or in an individual UOW). This will retain the consistency of your data base and make it easier to debug your application and get it running again.

2. When coding a client, mistakes creating inconsistencies between the amount of buffer space provided for a reply in an IPC and the actual length of the data returned are not uncommon. You can trap this kind of error by including an ON-ERROR clause in each SEND statement that transmits UOWs.

3. To help conserve working storage, some UOWs are set up so that you can use the response from one as the request portion in another. For example, the response to the GET-PROFILE-ELEM UOW can be used as a request in the ALTER-PROFILE-ELEM UOW. Similarly, the response from the GET-AGENT-SELECT UOW can be used as a request in the ALTER-AGENT-SELECT UOW.

4. The working storage established for the initial transmission of some UOWs to TISERV can be used repeatedly in subsequent transmissions of the same UOW. This is true, in particular, where the responses for some UOWs have the same format and can thus be used as the requests. The READ-NEXT-MEMBER and READ-NEXT-NAME UOWs fall into this category. Such UOWs also return parameters properly for the next call, so you need not move data around when taking advantage of this feature.

Debugging Techniques

As an option, TRANSFER will record on the debug log file information that passes between your client and TISERV. To enable this logging, you issue an ASSIGN directive and two PARAM directives to the server, as illustrated by this example:

```
ALTER SERVER serverclass, (ASSIGN DEBUGLOG, $vol.subvol.file),&
 (PARAM DEBUGLOGLEVEL 0), (PARAM DEBUGLOGFORMAT TRUE)
```

- The ASSIGN directive specifies the log file, which is the logical file DEBUGLOG.
- The first PARAM directive selects which information is logged, as follows:

If DEBUGLOGLEVEL is set to the following value, and the PW-REPLY-CODE field in the IPC header of the reply is greater than or equal to this value:	The following action results:
0	All IPCs are logged.
1	IPCs containing UOW warnings, UOW errors, and IPC request errors are logged.
2	IPCs containing UOW errors and IPC request errors are logged.
3	IPCs containing IPC request errors are logged. This option is assigned as a default.
4	Nothing is logged.

- The second PARAM directive determines the format in which the log file is written. Normally, this file is written as a binary file; but through this PARAM directive, you can direct TRANSFER to write it in displayable text by setting DEBUGLOGFORMAT to TRUE.

  Alternatively, you can use the GUARDIAN operating system File Utility Program (FUP) to convert the binary content of the log file to ASCII, octal, or hexadecimal code.

Additional logging techniques include:

Logging on a depot-by-depot basis - Use the ALTER-PROFILE-ELEM UOW to set the DATA-DEPOT-LOG-FLAGS field to request this option.

Logging selectively - Choose particular IPCs for recording on the log file. Set the LOG-THIS-IPC field to Y in the headers of those IPCs that you want logged. This action results in logging of those IPCs whether or not errors occur.

Add information to the log file - Include in each IPC a NOOP UOW that specifies client data identifying the source of the transaction requested in the IPC.

The TRANSFER Scheduler (TSCHED) and the TRANSFER asynchronous requesters (TAREQs) write messages to the OUT file used by TSCHED. These messages reflect problems dealing with initialization, UOWs, IPC headers, and SEND and HOLD operations. If, in addition to the OUT file, you have configured a TSCHED log file, you can examine this log file for possible additional debugging information.

DESIGNING AND WRITING AN AGENT

A TRANSFER application frequently includes one or more agents. These agents are notified when TRANSFER delivers a package to a recipient's depot, and generally take some kind of action as a result. Agent notification is handled by the TAREQ that delivers the package. In response, a particular agent can perform tasks such as filing the package for later retrieval or replying to the sender of the package.

An agent eliminates the need for polling to see if packages have arrived. An agent also allows the application to automatically process incoming packages without human intervention.

The precise responsibilities of agents vary considerably. Some agents retrieve and save packages for their correspondents, delete packages that are not meaningful to their recipients, present messages on output devices, or initiate transactions based upon package delivery. Specific examples are:

- A vacation agent that takes some kind of action in the absence of a package recipient. This agent might reply automatically to all packages; forward the packages to another correspondent, optionally appending text that provides additional information or directives; file the packages for later retrieval; or delete items according to some criteria in the package header.

- A filtering agent that screens incoming mail according to certain criteria; for example, filing packages that pertain to certain subjects or sorting packages according to type before presenting them to a recipient. The agent might place mail memos in one folder and reply messages in another. The agent might file packages from different applications separately; then, the client can allow the correspondent to retrieve the packages selectively.

- An agent that arranges in proper sequence packages that are required to arrive in a certain order. To use an agent in this way, the application would establish an arrangement such as the following:

  1. The sender embeds sequence numbers in the package. As an example, the sequence numbers might be included as data records in the package headers.

  2. The agent at the recipient's depot processes those packages that arrive in the expected order, but saves in a folder any packages that arrive out of order. The folder then becomes a queue for out-of-sequence packages.

  3. Whenever a package has been processed, the agent checks the folder for a package with the next higher sequence number. If the folder contains such a package, the agent processes that package next.

- An interfacing agent that supports the transmittal of packages between a Tandem network and a network consisting of systems furnished by other manufacturers. The sender of the mail, at a Tandem system node, specifies the external mail address of the recipient in a suffix appended to the recipient's name. The agent then uses the suffix to address the package, entering it for delivery in the other system. The application might, in fact, use the interchange formats currently recommended by the National Bureau of Standards as a basis for these operations.

Agents can operate as either requesters or servers.

- An agent that makes requests of TRANSFER server classes to retrieve, save, or post packages is a requester written in SCREEN COBOL. In this role, an agent can be regarded as a specialized client.

- An agent that accesses a GUARDIAN file or input/output device, performs string-handling or complex computations, or does work of long duration, is typically a server written in COBOL, FORTRAN, or TAL.

- An agent that performs both kinds of work is generally written in SCREEN COBOL and makes requests of a special server provided by your application.

SCREEN COBOL agents run in the same TCP as the TAREQs that invoke them. The communication between agent and TAREQ is program unit to program unit, and never TCP to TCP.

The program unit for the TAREQ is located in the TAREQ SCREEN COBOL object code files (TAREQCOD and TAREQDIR). Locate a SCREEN COBOL agent in one of the following ways:

> Compile the SCREEN COBOL agent and copy the program unit into the TAREQ SCREEN COBOL object code files by using the SCREEN COBOL Utility Program (SCUP). Refer to the PATHWAY SCREEN COBOL Reference Manual for a description of SCUP commands.
>
> or
>
> Compile the SCREEN COBOL agent and locate the program unit in a SCREEN COBOL object code file other than the one in which TAREQ resides. You can then supply the PATHCOM TERM TCLPROG parameter for the TAREQ and specify your agent program unit object file as the TCLPROG filename. Refer to the PATHWAY System Management Reference Manual.

An agent required by a package delivery is invoked only if the delivery is successful. The same agent can be associated with several depots, but no depot is required to have an agent. Conversely, many agents can be associated with the same depot.

TAREQs invoke agents in accordance with selection criteria recorded in the recipient's agent profile. Agent selection criteria can be established interactively through the ADMIN client provided by TRANSFER, or programmatically through the ALTER-AGENT-SELECT UOW issued to TISERV. The sender can use fields within package headers to specify information that must match the selection criteria in the recipient's profile in order for the agent to be executed. This makes it possible for different agents at a depot to handle different types of packages and applications. More information about agent selection and the addition of agents to depots appears in the discussion of the ALTER-AGENT-SELECT UOW.

Assigning Names to Agents

If an agent is to run as a PATHWAY requester, you must assign it a valid SCREEN COBOL program name. The name:

- can contain from 1 through 30 characters
- can include only alphanumeric characters or hyphens
- must not include embedded blanks
- must not begin or end with a hyphen.

If an agent is to run as a PATHWAY server, you must assign it a valid server name. The name:

- can contain from 1 through 15 characters
- can include only alphanumeric characters or hyphens
- must begin with a letter
- must be unique within the PATHWAY system in which it is defined
- must not include embedded blanks
- must not be a PATHWAY reserved word.

Any agent with a name longer than 23 characters cannot take advantage of the ADMIN client's user escape sequences for agent configuration and deletion programs. These programs are described in the Configuring or Deleting an Agent paragraph.

NOTE

> When processing an agent name, TISERV verifies that the name contains no embedded blanks. TISERV, however, does not enforce the more restrictive rules and does not verify that the agent really exists in the TRANSFER system.

Establishing Sessions for Agents

If an agent needs access to a correspondent's depot, it must either establish a session or be granted one. Through the ALTER-AGENT-SELECT UOW, you can set up the correspondent's profile so that the agent is automatically granted a session whenever it is invoked.

When an application attempts to start a session for a correspondent, TRANSFER checks to ensure that another session is not already in progress for the same correspondent. Sessions created for agents, however, are not counted in this verification. Thus, the E-CONCURRENT-SESSION or W-CONCURRENT-SESSION message is only issued if other non-agent sessions are active for the correspondent. If an agent that requires a session is configured at a depot where concurrent sessions are forbidden, the agent does not fail if invoked while the depot has an active session.

TAREQ Interface

When a TAREQ invokes a SCREEN COBOL agent, the TAREQ must wait until the agent returns; when a TAREQ invokes a server class agent, the TAREQ must wait until the agent replies. While the agent is performing its task, the TAREQ that invoked the agent remains busy with that agent and can perform no other functions. Therefore, the more work an agent does, the more TAREQs your application will require to handle the workload. This is particularly true where many packages are each frequently delivered to many recipients; the TAREQ must always perform a unique delivery for every recipient.

A SCREEN COBOL agent is expected to perform all of its work within the framework of the TMF transaction provided by the TAREQ.

WARNING

> A SCREEN COBOL agent must not issue a BEGIN-TRANSACTION, ABORT-TRANSACTION, or END-TRANSACTION. A SCREEN COBOL agent can only issue a RESTART-TRANSACTION.
>
> If a SCREEN COBOL agent issues a RESTART-TRANSACTION, TMF backs out the delivery as well as all work performed by preceding agents within the scope of the TAREQ TMF transaction. Then the TAREQ retries the transaction for the number of times specified by the MAXTMFRESTARTS configuration parameter in PATHWAY.
>
> If the SCREEN COBOL agent persists in restarting the transaction, the current function that the TAREQ is processing is placed on HOLD. HOLD always means that the TAREQ will make no further attempt to deliver the package locally for the duration of the HOLD. HOLD might also mean that an expiration function will not be scheduled, and the package might not be transported to other nodes for the duration of the HOLD. The function remains in the scheduler READY file, but is not subject to selection until it is set to UNHOLD by starting the scheduler with PARAM UNHOLD TRUE.

If an agent is a requester written in SCREEN COBOL, the TAREQs invoke it with CALL statements. If an agent belongs to a PATHWAY server class, TAREQs address it by issuing SEND statements to the class.

For additional information, refer to the TAREQ Interface discussion in Section 4 and the description of the ALTER-AGENT-SELECT UOW in Section 5.

Selecting a Programming Language

An agent that requires ongoing access to the TRANSFER data base should be written in SCREEN COBOL.

An agent that frequently accesses only data bases that are not part of TRANSFER, or is not heavily involved in any data base access, should be written in COBOL, FORTRAN, or TAL; thus, the TCP will not be involved in this agent's activity and will be free for other operations. The invoking TAREQ, however, will not be free because it is devoted to the agent.

Debugging an Agent

When debugging an agent, you can develop a program unit that calls the agent and displays a screen that allows you to pass information to the agent, thus simulating a TAREQ. This lets you observe more directly the interaction between the TAREQ and agent. If this program is written as a user mail extension, it will even more closely simulate the TAREQ environment. User mail extensions are discussed in Appendix B.

To use the system DEBUG facilities, you can define the server class with the DEBUG option of the ADD SERVER or SET SERVER PATHCOM command set to ON.

Configuring or Deleting an Agent

When you configure an agent, you must supply certain information for the agent in the depot profile record. This information is described in the discussions of the ALTER-AGENT-SELECT and GET-AGENT-SELECT UOWs. To enable an operator to supply this information, Tandem provides a standard (default) configuration program that is sufficient for many cases.

You can supply your own agent configuration program and tailor it to the specific needs of your agent. The program can display a screen through which the operator can enter information; the program can next determine which of the entries are appropriate for copying to the profile record and then issue the ALTER-AGENT-SELECT UOW to write the information to that record.

The AGENT-DATA field, as modified and retrieved by the ALTER-AGENT-SELECT and GET-AGENT-SELECT UOWs, respectively, can contain up to 80 characters of data. The Default Agent Configuration Screen displayed by the standard default configuration program allows the viewing and modification of only the first 78 characters of this field. If you are providing an agent that requires more than 78 characters of agent data, you must furnish your own configuration program for the agent.

When deleting an agent, the default action of the ADMIN application is not sufficient if your agent configuration module produces special information that is not stored as part of the agent selection criteria in the agent profile. In this case, you must provide your own agent deletion program to delete this information.

Your agent configuration and deletion programs must be written in SCREEN COBOL.

INVOKING THE PROGRAMS. The configuration or deletion program is invoked when an operator presses one of the function keys on the ADMIN Agent Selection Screen. If TRANSFER does not locate a user-supplied program, the following occurs:

- The default program named ADMIN-AGENT-CONFIGURE, which is supplied by Tandem, is invoked in response to the configuration function keys.
- The ADMIN default action takes place in response to the delete function key.

If TRANSFER locates a user-supplied program, the program is invoked and takes the action dictated by the function key:

Function Key	Program/Operation
F13	Invokes your SCREEN COBOL configuration program to configure the agent named on the screen, and then inserts the name of this agent in the list of agents for the depot. TRANSFER obtains the name of the SCREEN COBOL program run unit by appending -CONFIG to the supplied agent name.
F8	Invokes your SCREEN COBOL configuration program to reconfigure the agent named on the screen, which already appears in the list of agents for the depot. TRANSFER obtains the name of the SCREEN COBOL program run unit by appending -CONFIG to the supplied agent name.
SF13	Invokes your SCREEN COBOL deletion program to delete the agent named on the screen. TRANSFER obtains the name of the SCREEN COBOL program run unit by appending -DELETE to the supplied name.

CALLING THE CONFIGURATION OR DELETE PROGRAM. The ADMIN application calls the configuration program through the following calling sequence, where xxxxxxxx is the name of the agent supplied on the screen:

```
CALL xxxxxxxx-CONFIG USING LNKSC-IPC-HDR-L,
                           LNKSD-LINKAGE-BLOCK,
                           LNKSE-ERROR-BLOCK,
                           LNKSF-AGENT-MANAGE-DATA-L.
```

The ADMIN application calls the deletion program through this calling sequence:

```
  CALL xxxxxxxx-DELETE USING LNKSC-IPC-HDR-L,
                             LNKSD-LINKAGE-BLOCK,
                             LNKSE-ERROR-BLOCK,
                             LNKSF-AGENT-MANAGE-DATA-L.
```

Generally, your SCREEN COBOL program has the option of completing the requested configuration or deletion operation itself, refusing to do the operation, or doing part of the operation and then requesting TRANSFER to do the rest.

The parameters passed to your program by the call are blocks of data that must be defined in the Linkage Section of the SCREEN COBOL module. Any restrictions on updating the fields on the screens displayed by a user-supplied module must be defined in the user-supplied module. The parameters are as follows:

- LNKSC-IPC-HDR-L is the standard IPC header. If your program issues a UOW, the program must modify the REQUEST-CODE and UOWS-TO-PROCESS fields. Do not alter other fields, or unpredictable results might occur in ADMIN after your program returns.

- LNKSD-LINKAGE-BLOCK contains general linkage information used between modules. The DDL definition is:

```
DEF linkage-block.
  02  corr-name              TYPE *.
  02  sys-admin-flag         TYPE CHARACTER 1.
  02  tmf-started-flag       PIC 9.
  02  system-name            PIC X(8).
  02  pathmon-name           PIC X(8).
  02  return-state           TYPE BINARY 16.
  02  tiserv-server          PIC X(16).
  02  admin-server           PIC X(16).
  02  filler                 PIC X(208).
END.
```

  In this definition, the fields have the following meanings:

  CORR-NAME is the correspondent name of the logged-on correspondent, or the correspondent name entered on the ADMIN Main Menu Screen by a system administrator. Do not alter this field.

  SYS-ADMIN-FLAG indicates whether the logged-on correspondent is a system administrator. Do not alter this flag.

TMF-STARTED-FLAG is used to control error recovery if your SCREEN COBOL program terminates abnormally. You must set this field to 1 immediately before beginning a TMF transaction, and set it to 0 immediately after terminating a TMF transaction with END-TRANSACTION or ABORT-TRANSACTION.

SYSTEM-NAME is the name of the EXPAND node at which the correspondent named in the CORR-NAME field is registered. Do not alter this field.

PATHMON-NAME is the name of the PATHMON process running the TRANSFER system at the node named in the SYSTEM-NAME field. Do not alter this field.

NOTE

A future release of TRANSFER will allow the EXPAND node name and the PATHMON process name in the SYSTEM-NAME and PATHMON-NAME fields to be different from those names under which your user-supplied module is running. To ensure compatibility with future versions of TRANSFER, you must specify these two field names in the network form of the SCREEN COBOL SEND statement.

RETURN-STATE determines where your program returns; set this field to 0 to return to the calling module, or 1 to return to the ADMIN Main Menu Screen. Do not enter any other values in this field.

TISERV-SERVER and ADMIN-SERVER are server class names for TISERV and ADMIN. Do not alter these fields.

FILLER is unused, and is reserved for use by Tandem.

- LNKSE-ERROR-BLOCK can be used to return an error message to the calling screen. Generally, you should only use this field if your SCREEN COBOL program does not provide for display of this message on a screen. The DDL definition is:

```
DEF error-block.
  02 error-message          TYPE *.
  02  error-attr-flag       PIC 9.
  05  filler                TYPE CHARACTER 13.
END.
```

In this definition, the fields have the following meanings:

ERROR-MESSAGE contains the error message text, which can include up to 67 characters. The definition for this field is:

```
DEF error-message.
  02 error-text          TYPE CHARACTER 67 VALUE SPACES.
  02  error-detail.
    03  sign-field-2     TYPE CHARACTER 1 VALUE SPACES.
    03  error-field-2    PIC 9999 VALUE 0.
    03  sign-field-1     TYPE CHARACTER 1 VALUE SPACES.
    03  error-field-1    PIC 9999 VALUE 0.
    03  unusable         TYPE CHARACTER 3 VALUE SPACES.
END.
```

ERROR-ATTR-FLAG specifies the kind of video display in which the error message appears. To display the message in inverse video, set this field to 1. To display the message in normal video, set this field to 0.

FILLER is unused.

- LNKSF-AGENT-MANAGE-DATA-L contains a return action flag and data for an ALTER-AGENT-SELECT UOW. The DDL definition is:

```
DEF agent-manage-data.
  02  return-action-flag     PIC S9(4) COMP.
  02  agent-alter-data       TYPE GET-AGENT-SELECT-RSP.
END.
```

In this definition, the fields have the following meanings:

RETURN-ACTION-FLAG contains the result of your program's execution. It can be set to one of the following values.

<u>Value</u> <u>Meaning</u>

-1 Your program rejected the configuration or deletion request, either by intent or because of an error in any UOW or server request it attempted. (The program might have placed a message in the error block.) The TMF-STARTED-FLAG and RETURN-STATE fields should both be set to 0.

0 Your program completed the entire operation successfully and requires no action by TRANSFER. This implies that your program issued the appropriate UOWs itself. The TMF-STARTED-FLAG should be set to 0.

Value	Meaning
1	Your program requested TRANSFER to issue the ALTER-AGENT-SELECT UOW. If your program sets the TMF-STARTED-FLAG, TMF will honor the status of that flag. (Your program can do this if it writes data to another file and then requires TRANSFER to complete the agent selection operation under the same transaction ID that your program obtained.) The RETURN-STATE field should be set to 0.

AGENT-ALTER-DATA, on entry, contains the data for an ALTER-AGENT-SELECT UOW appropriate for the add, alter, or delete agent operation being performed. The fields either contain the current values, or default to new values. The user-supplied module can modify these values as appropriate and then either issue the UOW itself, or return with RETURN-ACTION-FLAG set to 1 (in which case ADMIN will issue the modified UOW).

USER-SUPPLIED PROFILE RECORDS AND MODULES

In addition to the standard profile records created and managed by TRANSFER, your application can allow the writing of user-supplied profile records to the Profile file. These are records whose structure, format, and content are defined by your application.

The ADMIN application provides predefined escape functions so that your application can create and manage these records through user-supplied profile modules. These are SCREEN COBOL programs that you write and provide for this purpose.

To invoke a module, an operator presses the user-supplied profile (F9) function key on the ADMIN application Main Menu Screen. The module then typically presents a screen that allows the operator to display and update the user-supplied profile records. Any restrictions on the use of this screen are defined by the module.

The ADMIN application calls the user-supplied profile module through the following calling sequence:

```
CALL ADMIN-PROFILE-USER USING LNKSC-IPC-HDR-L,
                             LNKSD-LINKAGE-BLOCK,
                             LNKSE-ERROR-BLOCK.
```

The parameters passed by this call to the user-supplied module are the same as the first three parameters in the calls that invoke agent configuration or deletion programs. The general meanings of these parameters are described in the Configuring or Deleting an Agent paragraph.

USER-SUPPLIED SYSTEM CONTROL MODULES

A user-supplied system control module provides the means to set parameters for controlling the operating environment of your TRANSFER applications. This module, which displays one or more screens, is called by the ADMIN application when the SF9 function key is pressed from the Main Menu Screen. This SCREEN COBOL module must be named ADMIN-SYSTEM-USER. The calling sequence for the user-supplied system control module is:

```
  CALL ADMIN-SYSTEM-USER USING LNKSC-IPC-HDR-L,
                               LNKSD-LINKAGE-BLOCK,
                               LNKSE-ERROR-BLOCK.
```

The parameters passed by this call to the user-supplied module are the same as the first three parameters in the calls that invoke agent configuration or deletion programs. The general meanings of these parameters are described in the Configuring or Deleting an Agent paragraph.

TMF TRANSACTION PROCESSING GUIDELINES

The basic guidelines for establishing TMF transactions in all programs apply to clients and agents. These are described in the Transaction Monitoring Facility (TMF) User's Guide. In addition to this information, however, you should also be aware of the following points that relate specifically to TRANSFER applications:

1. If the TRANSFER data base is audited exactly as recommended in the TRANSFER Delivery System Management and Administration Guide, TRANSFER makes the following guarantees.

TRANSFER will deliver every successfully submitted package within the time window specified for the package, or will notify the sender of its failure to deliver that package. TRANSFER will deliver a package only once to each recipient. If a failure to deliver a package occurs, TRANSFER will deliver its failure notification only once.

If a TMF rollforward operation is performed and the program that rebuilds the TRANSFER scheduler queues is run following a catastrophic (multipoint) failure, all submit and cancel operations in progress at the time of the failure will be performed again to completion.

All active (usable) data in the TRANSFER data base will remain consistent at all times.

2. While servicing a request, TRANSFER might perform many input/output operations on the TRANSFER data base. Under TMF transactions, these updates require record locking to ensure data base consistency and integrity. The maximum number of locks that can be acquired for each partition of a file in any data base is limited. Transactions might be affected by the lock limits of TMF in some cases.

   To prevent difficulties imposed by these locking limits, keep the number of records per item, items per folder, recipients per distribution list, or recipients per package to moderate levels. Because TRANSFER blocks records rather than storing each record individually, these TMF locking limits do not always correspond exactly to the number of records per item, items per folder, and so forth actually permitted in a particular case. In the worst case, the values as specified by the TMF locking restrictions apply. In many other cases, the following rules might be helpful; these rules apply only if the data is added to the objects sequentially.

   The amount of data in the item data records added to a single item should total less than 500,000 bytes. As an example, 6,200 80-byte data records per single item are permissible.

   The number of recipients per package, or number of members per distribution list, should be less than 5,000.

   The number of items per folder should be less than 500.

   These values are overall limits that will allow TRANSFER to delete the objects involved later without exceeding the TMF locking limits.

3. If your system manager has not arranged for TMF auditing exactly as recommended in the Transaction Monitoring Facility (TMF) User's Guide, additional considerations in dealing with files expected to be audited should be noted. For example, if the SESSIONS file in the TRANSFER data base is not audited, aborting a transaction that includes the START-SESSION or END-SESSION UOW might leave extraneous data in the data base. This could result in a WASTEBASKET folder that does not belong to any current session. As another example, if the ITEM-DATA file is not audited, item data records that no longer belong to any particular item might remain in the system after the item has been deleted.

ITEM AND PACKAGE DESIGN ALTERNATIVES

Certain constraints are imposed upon the depth to which you can nest component items within parent items or items within packages. If you have a choice within the requirements of your application, apply the following guideline:

> It is better to structure large packages and items so that they contain many components at the same level but incorporate fewer levels, than to include an extreme number of levels with fewer components at each level.

TISERV Guidelines

When assembling and submitting a package under TISERV, the amount of nesting allowed can be limited by the amount of stack space available in the server for these activities. The space available is determined by the MEM option of the RUN command, and the MAXREQUEST, MAXREPLY, and MAXLINKS params defined when TISERV is started.

In spite of this constraint, a very deep item tree can be constructed by working from the top down. You would, for example, start with the items at the topmost level, link these items together, and then proceed to the second level, linking the items at this level together, and so forth.

TISERV checks the nesting when your application attaches a component item to a parent (with the ATTACH-COMPNT-A01 UOW), and examines the item tree to see if there is a reference to the parent anywhere in the item tree below the component. If there is such a reference, a component cycle exists as shown in Figure 6-6, and the error E-COMPNT-CYCLE is returned. If the item is nested too deeply, TISERV cannot continue checking for cycles and returns the error E-ITEM-TOO-COMPLEX.

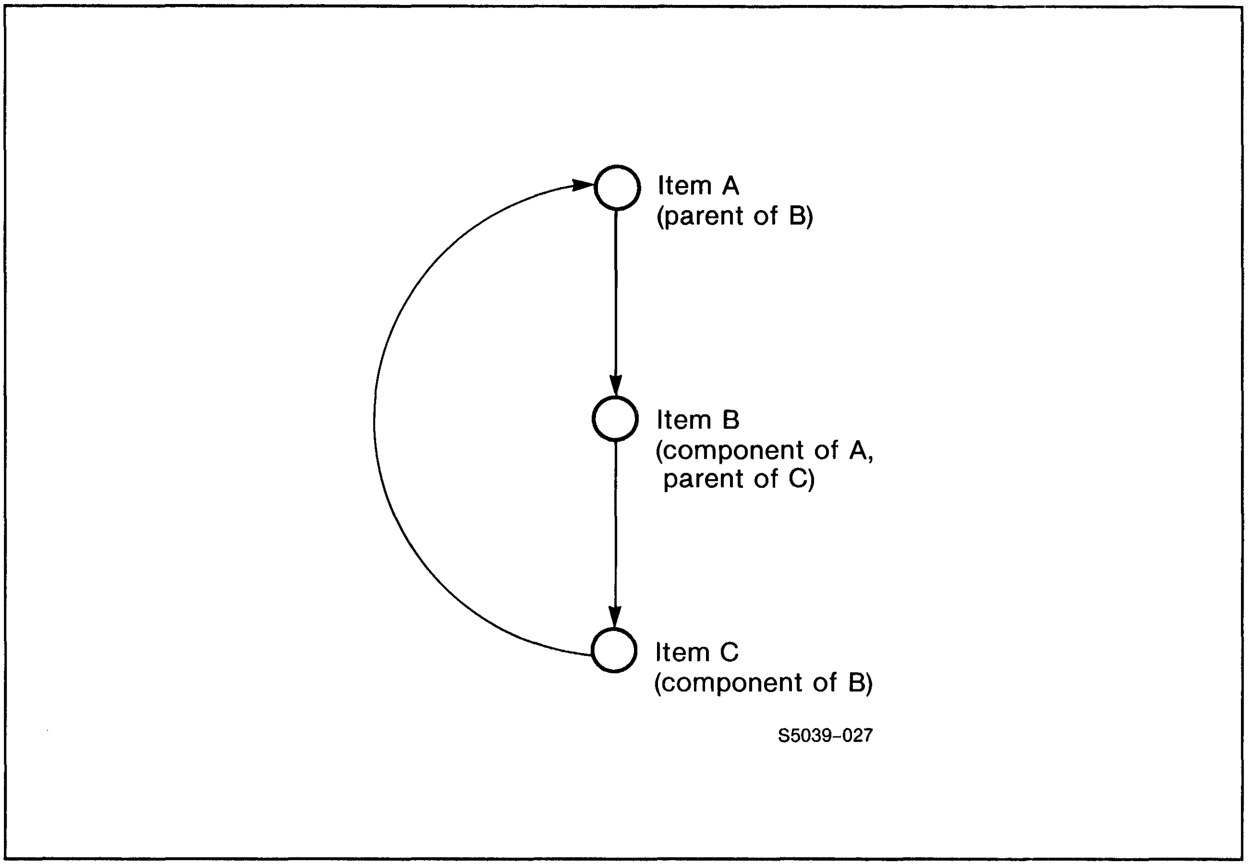


Figure 6-6. Component Cycle

TISERV also checks the nesting of an entire package when your application submits it for delivery (with the SUBMIT-PKG UOW). During this activity, TISERV must flag all items in the package as UNALTERABLE because the same package might be physically shared among several recipients. As in package assembly, if TISERV finds that the package is nested too deeply, it returns the error E-ITEM-TOO-COMPLEX.

TAREQ Guidelines

In addition to the limits imposed by TISERV, additional constraints might be imposed by TWORK, a special server used by TAREQs. When a package is being transported over the network, TWORK saves information recursively about each level of nesting, and the nesting depth permitted depends on the amount of stack space available in TWORK.

You cannot alter the amount of stack space available in TWORK; stack space is already set to its maximum. TWORK stack usage per level of nesting is dependent on many things that are difficult to predict and are subject to change from one release to another. You can assume that any release will always support ten levels of nesting. If a package cannot be transported because of excessive nesting, DELIV-ERR in the recipient record of each remote recipient is set to E-ITEM-TOO-COMPLEX; and a TAREQ event package for the event PACKAGE CANNOT BE TRANSPORTED TO RECIPIENT'S SYSTEM is generated.

Addition of Records to Package Header Items

In addition to adding data records to component items, your application can also add them to package header items. When transmitting short messages, the application can economize by adding records directly to the package header rather than by creating and attaching other items to the header.

Both T/MAIL packages and TAREQ event packages can contain text records in lieu of components in their package headers.

NETWORK GUIDELINES

The following special considerations apply when you are using TRANSFER to deliver packages over a multi-node network:

1. Be sure that TMF is configured at all nodes in the network where TRANSFER is running.

2. A misspelling of network node designators within recipient names might not cause immediate rejection of a package. When your application specifies a node in a recipient name and remote name resolution is deferred, TRANSFER assumes that the node exists, places the package in the network queue, and waits for availability of the node. Although TRANSFER returns an appropriate warning in the case of a nonexistent node, the package is only withdrawn from posting by direct cancellation or by expiration of the delivery time window.

   If remote name resolution is not deferred, specifying an incorrect node name immediately results in an error.

3. If you defer remote name resolution when submitting a package, the package can be reproduced at the receiving node but with invalid recipients. When TRANSFER at that node detects such a recipient, it returns an error to the sending depot.

GENERATING THE SAMPLE CLIENT

The following steps explain how to configure and run the sample client that appears in Section 7.

Arbitrary names are shown in lowercase letters; substitute appropriate names for your installation.

1. Log on and set your current volume to the $volume.subvolume where XBEGIN resides.

2. The sample client source code has been supplied by Tandem and is on your system. The file is named SMPCLNT.

3. Compile the source code:

   ```
   SCOBOL/IN SMPCLNT,OUT output-file/EXAMP;SYMBOLS
   ```

4. Add these PATHCOM commands for your PATHWAY configuration:

   ```
   RESET PROGRAM
   SET PROGRAM TCP your-tcp
   SET PROGRAM TMF ON
   ADD PROGRAM SAMPLE-CLIENT, TYPE your-terminal-type &
      (INITIAL SAMPLE-CLIENT,TCLPROG EXAMP)
   ```

   NOTE

   These commands can be entered into the GBEPATH file that was created by XBEGIN, or they can be added interactively once your system is up and running.

5. Enter this PATHCOM command; RUN SAMPLE-CLIENT

6. The sample ELEC-MAIL Client logon screen appears.

7. Have the system administrator register, without passwords, your name and various other fictitious names. You can then log on as yourself, or as these other correspondents, and send packages back and forth through the TRANSFER system.

SECTION 7

SAMPLE CLIENT

This section presents an example of the operations performed by a client. In this example, the client allows the correspondent to:

1. initiate interaction with the application by logging on

2. assemble packages and transmit them to recipients

3. receive and read packages from other senders

4. terminate interaction with the application by logging off.

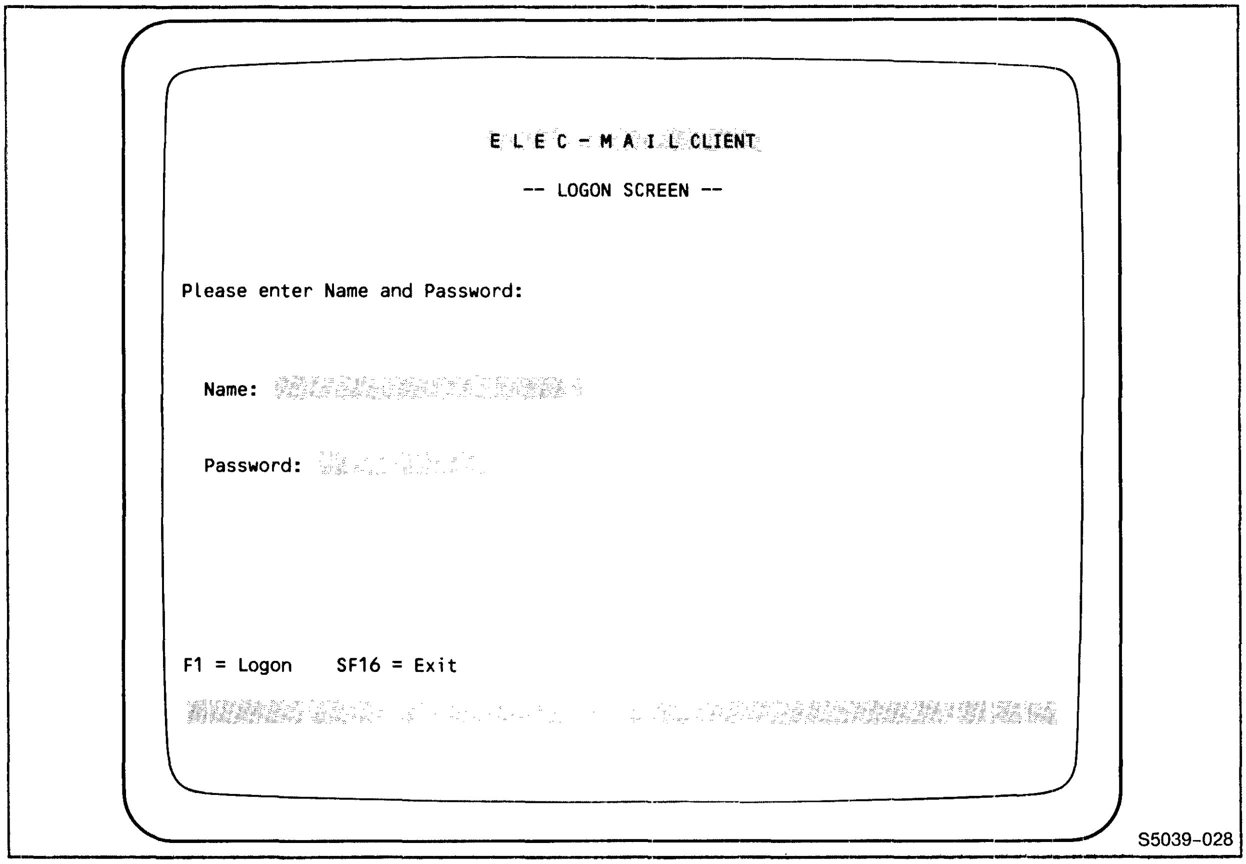
Despite its simplicity, this client illustrates some of the most important functions available with TRANSFER, shows how SCREEN COBOL screens provide interaction between a client and a correspondent, and demonstrates how and when several commonly used UOWs are issued. These UOWs include:

- ACK-RECEIPT
- ADD-ITEM-REC
- ADD-RECIP
- CREATE-ITEM
- END-SESSION
- GET-ITEM-DESCR
- GET-ITEM-REC
- SCAN-FOLDER
- START-SESSION
- SUBMIT-PKG
- UNSAVE-ITEM

FUNCTIONAL DESCRIPTION OF THE SAMPLE CLIENT

After the sample client is started by the System Manager and presents its Logon Screen, the correspondent at a terminal interacts with the client as follows:

1. The Logon Screen includes two entry fields: a 32-character field for the correspondent name and a 16-character field for the password, as shown in Figure 7-1. After entering these fields, the correspondent presses the F1 function key to transmit them to the client. The SF16 function key allows the correspondent to exit the program.



E L E C - M A I L CLIENT

-- LOGON SCREEN --

Please enter Name and Password:

Name:

Password:

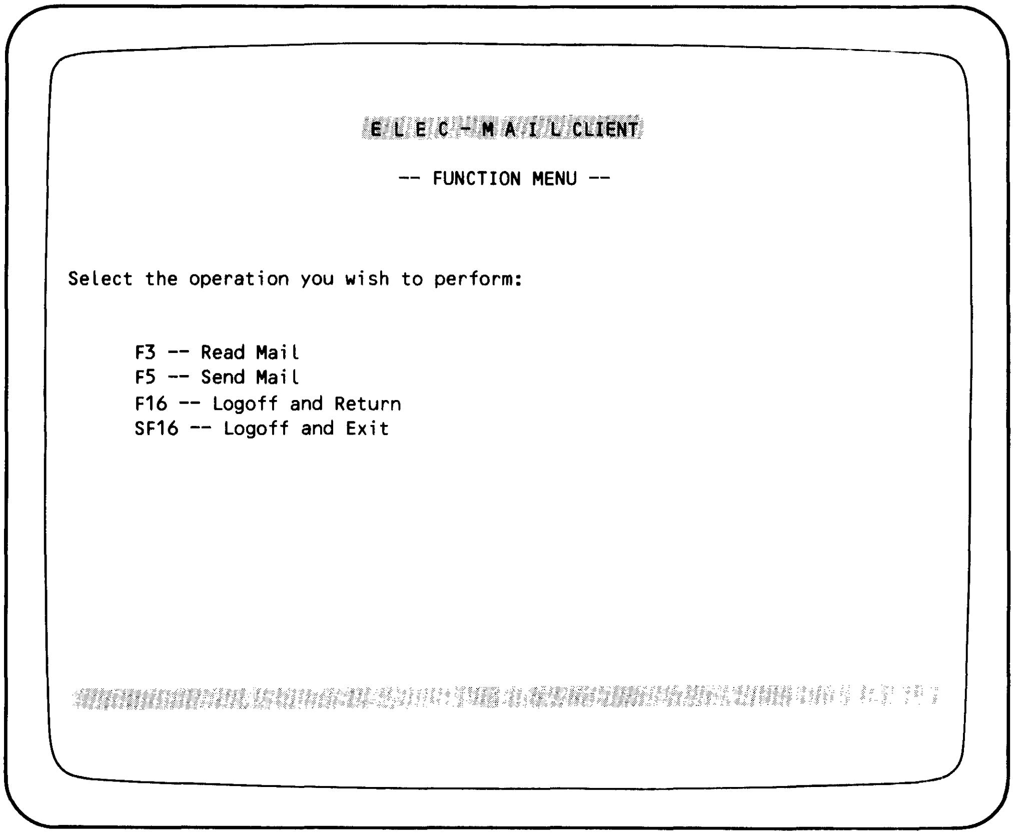
F1 = Logon SF16 = Exit

Figure 7-1. Client's Logon Screen

2. The client passes the information from the Logon Screen to the input buffer for the START-SESSION UOW, executes a BEGIN-TRANSACTION operation to denote the beginning of a TMF transaction, and then issues an IPC containing the START-SESSION UOW to TISERV. If the UOW is successful, TISERV assigns a session ID and begins a session for the correspondent; the client now executes an END-TRANSACTION operation to terminate the transaction and displays its Function Menu Screen. If the UOW fails, TISERV reports the failure to the client, which aborts the transaction and displays an error message on the Logon Screen.

   When creating the session, TISERV returns the session ID in the SESSION-ID field of the IPC header. (Previously, this field contained binary zeros.) A client must enter this same session ID value in the headers for all subsequent IPCs associated with this session.

3. The Function Menu Screen, shown in Figure 7-2, allows the correspondent to select one of four functions by pressing the appropriate function key: read mail, send mail, log off and return to the previous screen, or log off and exit the program. The correspondent, deciding to compose and send some mail, presses the F5 key.



ELEC-MAIL CLIENT

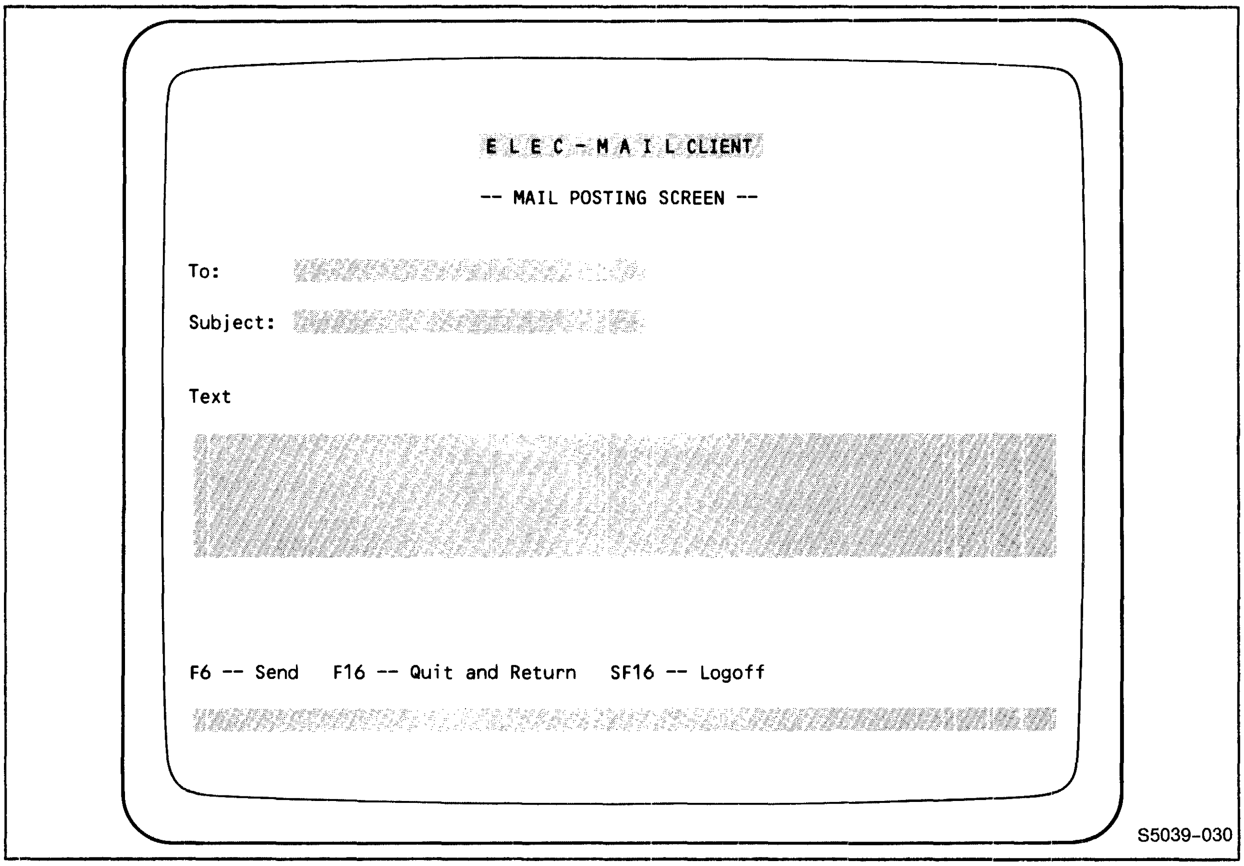
-- FUNCTION MENU --

Select the operation you wish to perform:

```
     F3 -- Read Mail
     F5 -- Send Mail
     F16 -- Logoff and Return
     SF16 -- Logoff and Exit
```

Figure 7-2. Client's Function Menu Screen

4. In response to the F5 function key, the client next displays its Mail Posting Screen, as shown in Figure 7-3. This screen allows the correspondent to enter the name of the recipient of the package, a subject line, and up to five lines of text. Upon entering this information, the correspondent presses the F6 key to post the package. The F16 function key would allow the correspondent to stop package composition and return to the Function Menu Screen.



ELEC-MAIL CLIENT

-- MAIL POSTING SCREEN --

To:

Subject:

Text

F6 -- Send   F16 -- Quit and Return   SF16 -- Logoff

Figure 7-3. Client's Mail Posting Screen

To handle the package, the client executes a BEGIN-TRANSACTION operation and issues an IPC containing a CREATE-ITEM UOW to establish a package header item. This package header item is characterized by the data in the ITEM-TYPE and IS-PKG-HDR fields of the UOW. In the reply to this UOW, TISERV returns a unique item ID for the new item.

As part of the same transaction, the client issues:

a. another IPC that contains:

   1) an ADD-RECIP UOW to define the recipient of the package

   2) a group of ADD-ITEM-REC UOWs to add the subject and text lines to the package. This group can include from 0 to 1 ADD-ITEM-REC UOWs for the subject line, and from 0 to 5 ADD-ITEM-REC UOWs for the text line. (See the ADD-SUBJECT-REC and ADD-TEXT-REC definitions in the code presented for this example at the end of this section.)

b. still another IPC that contains:

   1) an ADD-ITEM-REC UOW to add the recipient name returned in the ACCEPTED-NAME field of the reply to the ADD-RECIP UOW transmitted in Step 4-a-1. This step is taken so that the client will produce packages that are compatible with TRANSFER/MAIL (T/MAIL), which expects to find its recipient as text in the IPC header.

   2) a SUBMIT-PKG UOW to submit the package for delivery.

At this point, the client executes an END-TRANSACTION operation to terminate the transaction, and TRANSFER assumes control of the package to deliver it asynchronously. Now, the client once more displays its Function Menu Screen.

5. Next, the correspondent decides to read incoming mail. Through the Function Menu Screen, the correspondent selects this operation by pressing the F3 function key.

   In response, the client issues an IPC containing the SCAN-FOLDER UOW, referencing the correspondent's INBOX folder. This UOW returns the IDs of the items in the folder to the client, reading them in sequential order. Notice that since this IPC did not involve changes to the TRANSFER data base (and thus, did not involve possible inconsistencies in the event of an error), this IPC was not issued within the framework of a TMF transaction.

   Now, for the first package in the list of item IDs, the client executes a BEGIN-TRANSACTION operation and sends an IPC containing the following UOWs:

   a. a GET-ITEM-DESCR UOW to obtain the item's descriptor fields

   b. a GET-ITEM-REC UOW to obtain the subject record from the item

   c. a GET-ITEM-REC UOW to obtain the recipient for the package

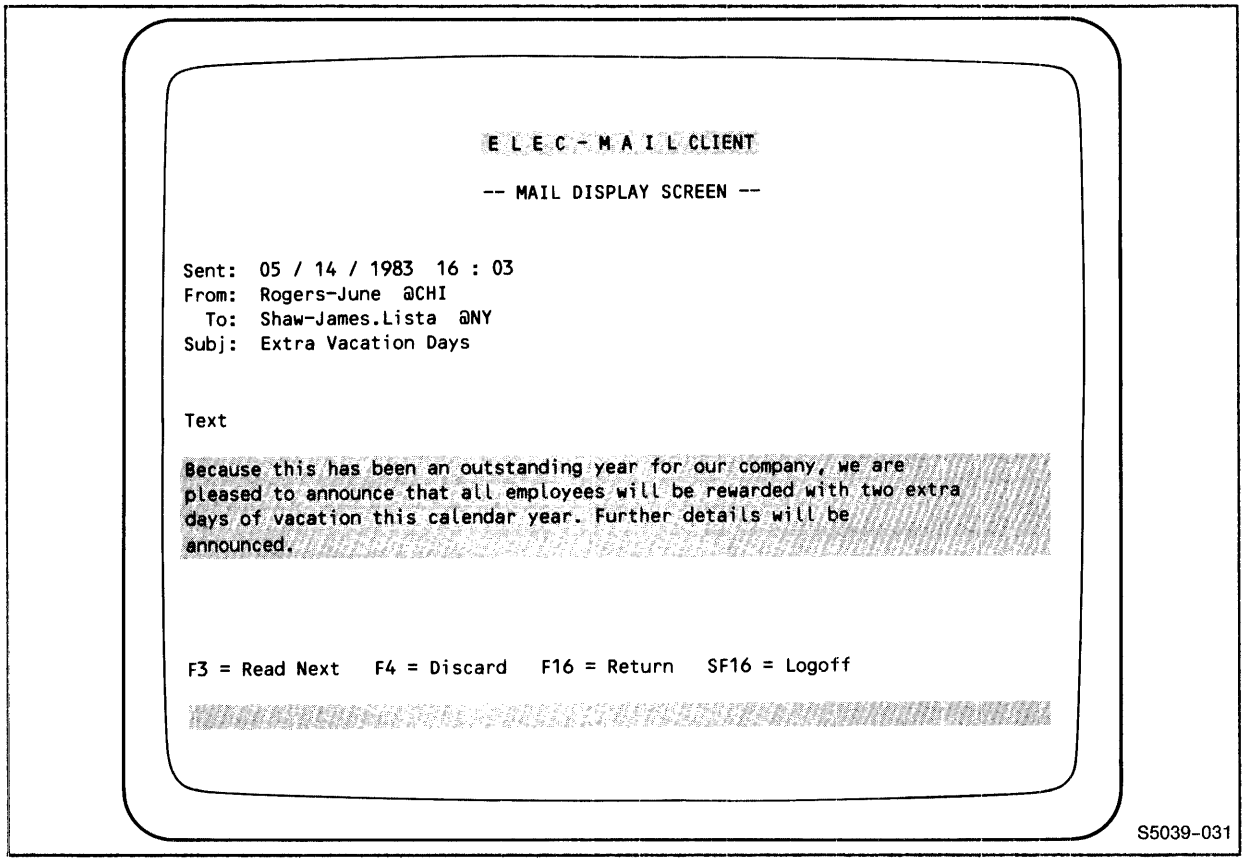
   d. a GET-ITEM-REC UOW to obtain the text records

   e. an ACK-RECEIPT UOW to acknowledge that the package was received at the recipient's depot.

   Next, the client executes an END-TRANSACTION operation. (Note that the presence of the ACK-RECEIPT UOW required that the above IPC be contained within its own transaction.)

Now, the client displays the date and time that the package was posted, the sender's and recipient's names, and the subject and text records on the Mail Display Screen as shown in Figure 7-4. At this point, the client waits for the correspondent to press another function key to read the next package or discard it, or to return to a previous screen.

If TISERV returns W-EOF and no items in the reply to the SCAN-FOLDER UOW, the client displays an error message on the screen.



```
                    ELEC-MAIL CLIENT

                -- MAIL DISPLAY SCREEN --

Sent:  05 / 14 / 1983  16 : 03
From:  Rogers-June  @CHI
  To:  Shaw-James.Lista  @NY
Subj:  Extra Vacation Days


Text

Because this has been an outstanding year for our company, we are
pleased to announce that all employees will be rewarded with two extra
days of vacation this calendar year. Further details will be
announced.
```

F3 = Read Next   F4 = Discard   F16 = Return   SF16 = Logoff
S5039-031

Figure 7-4. Client's Mail Display Screen

6. The correspondent decides to read the next package in the INBOX folder, and presses the F3 function key. If there are more entries in the list, the client reissues the data-collecting UOWs in Steps 5-a through 5-e. If no more items appear in the list and TISERV has not informed the client that there are also no more in the folder, then the client returns to the SCAN-FOLDER UOW at the beginning of Step 5 and continues reissuing the sequence of UOWs from that point. If TISERV indicates that the list is empty, the client again displays the Function Menu Screen.

7. The correspondent can discard the package from INBOX while reading the mail by pressing the F4 function key. In response, the client executes a BEGIN-TRANSACTION operation, issues an UNSAVE-ITEM UOW, and then executes an END-TRANSACTION operation. (If the UNSAVE UOW fails, TISERV reports the error and the client displays an error message.) If more packages reside in INBOX, TISERV displays the next package.

8. After reading the mail, the correspondent presses the F16 key to return to the Logon Screen and log off. In response, the client begins another transaction and issues the END-SESSION UOW. When TISERV terminates the session, the client ends the transaction and again presents the Logon Screen. (At this point, TISERV also resets the SESSION-ID field in the IPC header to binary zeros.)

RUNNING THE SAMPLE CLIENT

The SCREEN COBOL code required to support this simple client appears in Figure 7-5, and is explained with comments embedded in the code. In this code, you will see:

- UOWs that are issued outside the framework of a transaction
- IPCs with one or more UOWs comprising the total content of a transaction
- transactions that span more than one SEND operation.

The code also illustrates how to define your own copies of definitions supplied by TRANSFER, and then modify the lengths of fields or number of occurrences specified by some of them. (This is done, for instance, in the ADD-ITEM-REC, ADD-SUBJECT-REC, and SCAN-FOLDER definitions in this example.)

These definitions can be copied from the GCOB and GLNK files into a program during compilation, as illustrated by the 01 record level definitions in this example. The GCOB file contains COBOL source text for elements commonly used in TRANSFER programs, such as IPC header and UOW definitions. The GLNK file contains the same text as the GCOB file, but without the INITIAL-VALUE clauses. The GLNK file is used for Linkage Section definitions.

Where feasible, the conventions established by T/MAIL for REC-TYPE and other values are also applied in this example. This will allow T/MAIL to handle packages created by this client.

Sample Client

The following steps explain how to configure and run the sample client.

Arbitrary names are shown in lowercase letters; substitute appropriate names for your installation.

1. Logon and set your current volume to the $volume.subvolume where XBEGIN resides.

2. The sample client source code has been supplied by Tandem and is on your system. The file is named SMPCLNT.

3. Compile the source code:

```
SCOBOL/IN SMPCLNT,OUT output-file/EXAMP;SYMBOLS
```

4. Add these PATHCOM commands for your PATHWAY configuration:

```
RESET PROGRAM
SET PROGRAM TCP your-tcp
SET PROGRAM TMF ON
ADD PROGRAM SAMPLE-CLIENT,TYPE your-terminal-type &
   (INITIAL SAMPLE-CLIENT,TCLPROG EXAMP)
```

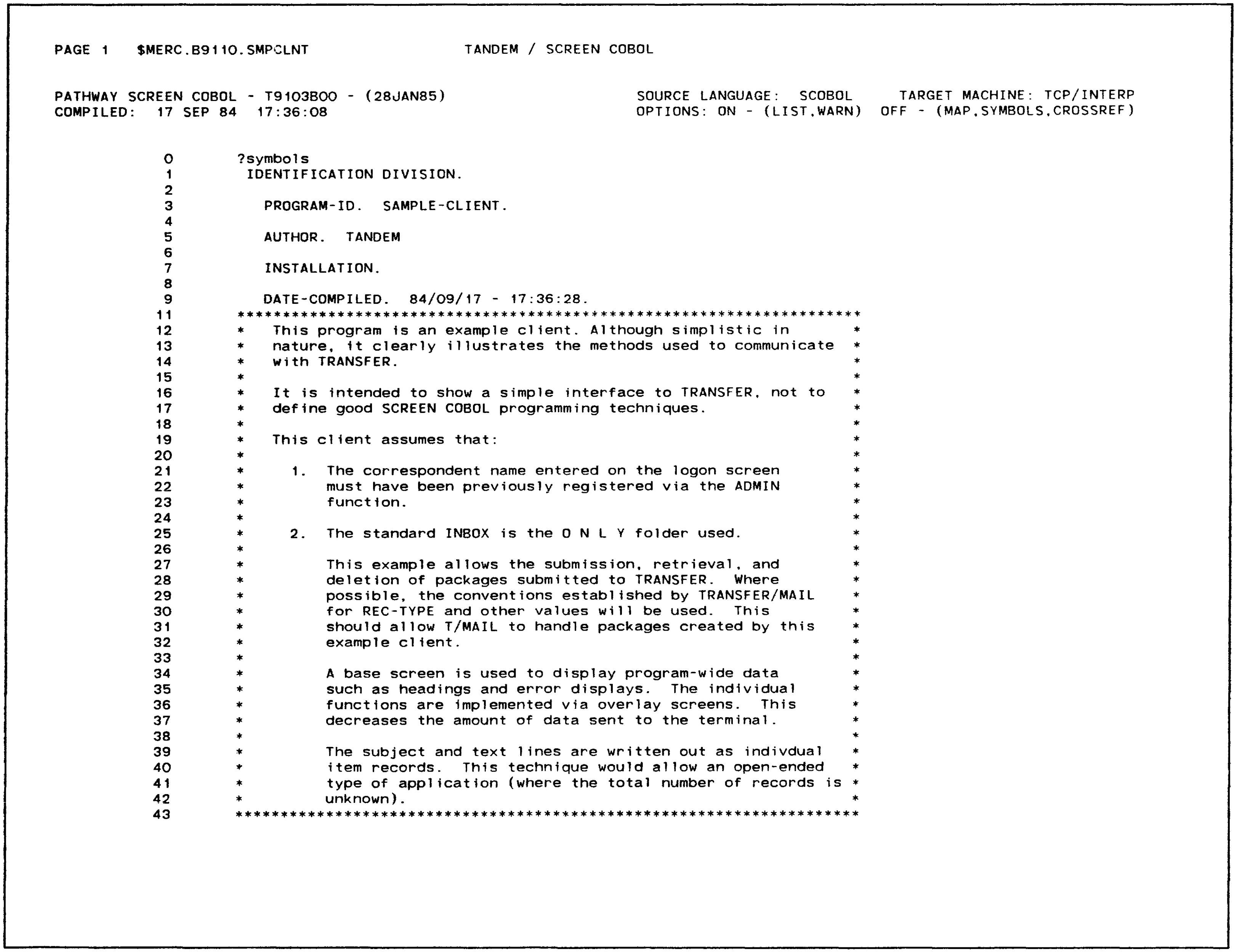
NOTE

These commands can be entered into the GBEPATH file that was created by XBEGIN, or they can be added interactively once your system is up and running.

5. Enter this PATHCOM command: RUN SAMPLE-CLIENT

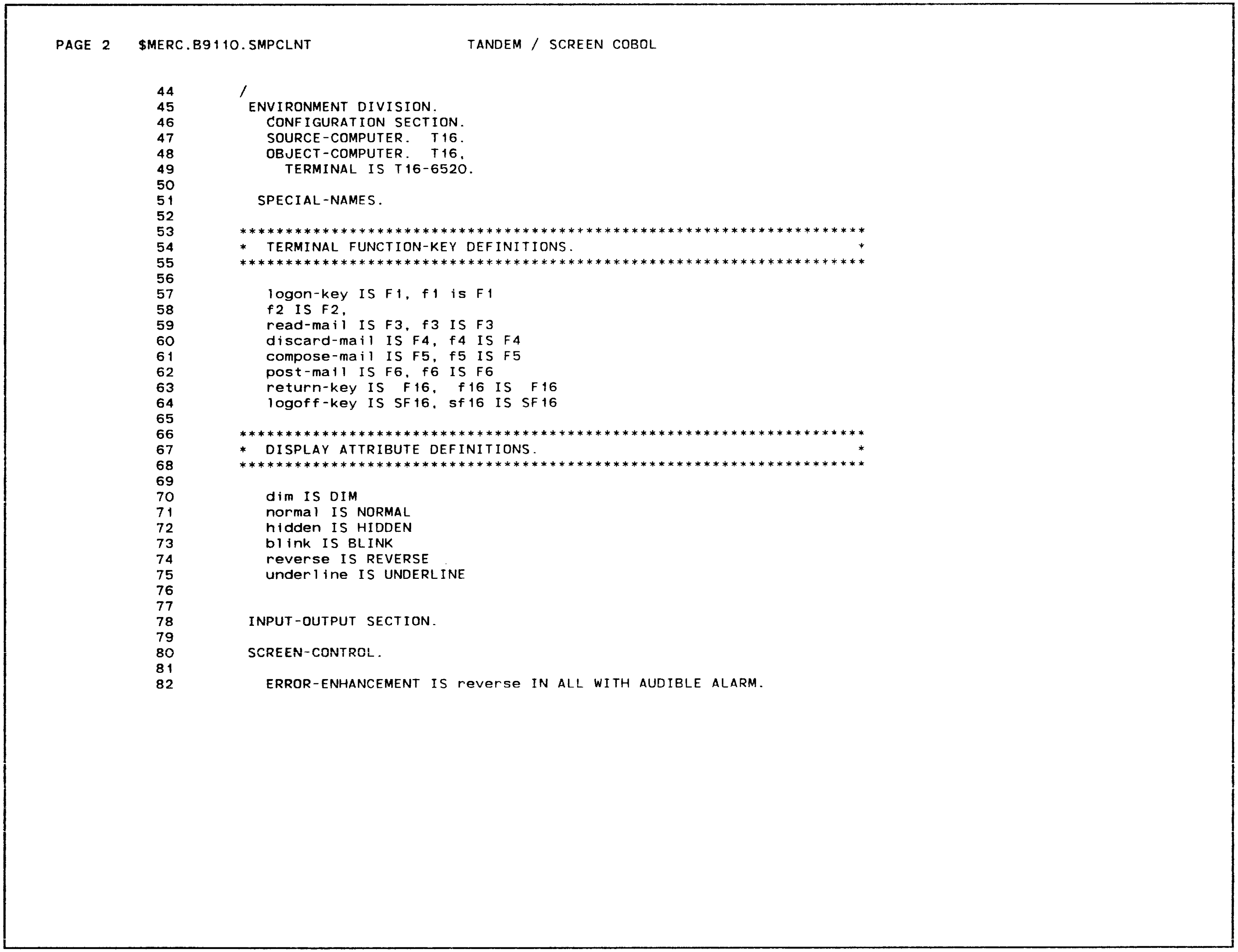
6. The sample ELEC-MAIL Client logon screen appears.

7. Have the system administrator register, without passwords, your name and various other fictitious names. You can then logon as yourself, or as these other correspondents, and send packages back and forth through the TRANSFER system.



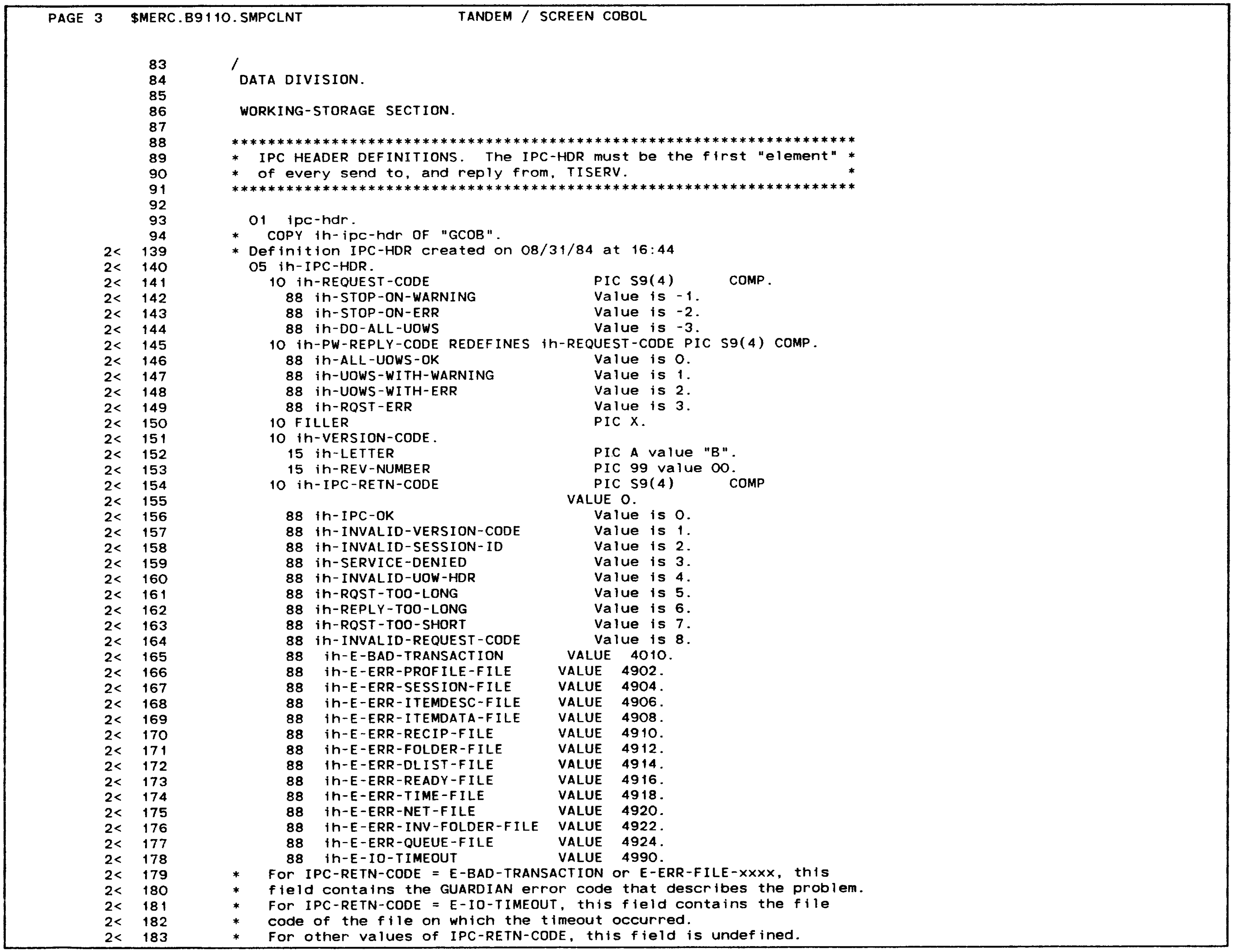
```
PAGE 1   $MERC.B9110.SMPCLNT                 TANDEM / SCREEN COBOL


PATHWAY SCREEN COBOL - T9103B00 - (28JAN85)                   SOURCE LANGUAGE:  SCOBOL     TARGET MACHINE: TCP/INTERP
COMPILED:  17 SEP 84  17:36:08                                OPTIONS: ON - (LIST,WARN)  OFF - (MAP,SYMBOLS,CROSSREF)


        ?symbols
         IDENTIFICATION DIVISION.

           PROGRAM-ID.  SAMPLE-CLIENT.

           AUTHOR.  TANDEM

           INSTALLATION.

           DATE-COMPILED.  84/09/17 - 17:36:28.
        *********************************************************************
        *   This program is an example client. Although simplistic in      *
        *   nature, it clearly illustrates the methods used to communicate *
        *   with TRANSFER.                                                  *
        *                                                                   *
        *   It is intended to show a simple interface to TRANSFER, not to  *
        *   define good SCREEN COBOL programming techniques.               *
        *                                                                   *
        *   This client assumes that:                                       *
        *                                                                   *
        *     1.  The correspondent name entered on the logon screen       *
        *         must have been previously registered via the ADMIN       *
        *         function.                                                 *
        *                                                                   *
        *     2.  The standard INBOX is the O N L Y folder used.           *
        *                                                                   *
        *         This example allows the submission, retrieval, and       *
        *         deletion of packages submitted to TRANSFER.  Where       *
        *         possible, the conventions established by TRANSFER/MAIL   *
        *         for REC-TYPE and other values will be used.  This        *
        *         should allow T/MAIL to handle packages created by this   *
        *         example client.                                           *
        *                                                                   *
        *         A base screen is used to display program-wide data       *
        *         such as headings and error displays.  The individual     *
        *         functions are implemented via overlay screens.  This     *
        *         decreases the amount of data sent to the terminal.       *
        *                                                                   *
        *         The subject and text lines are written out as indivdual  *
        *         item records.  This technique would allow an open-ended  *
        *         type of application (where the total number of records is *
        *         unknown).                                                 *
        *********************************************************************
```

Figure 7-5. SCREEN COBOL Code for Client



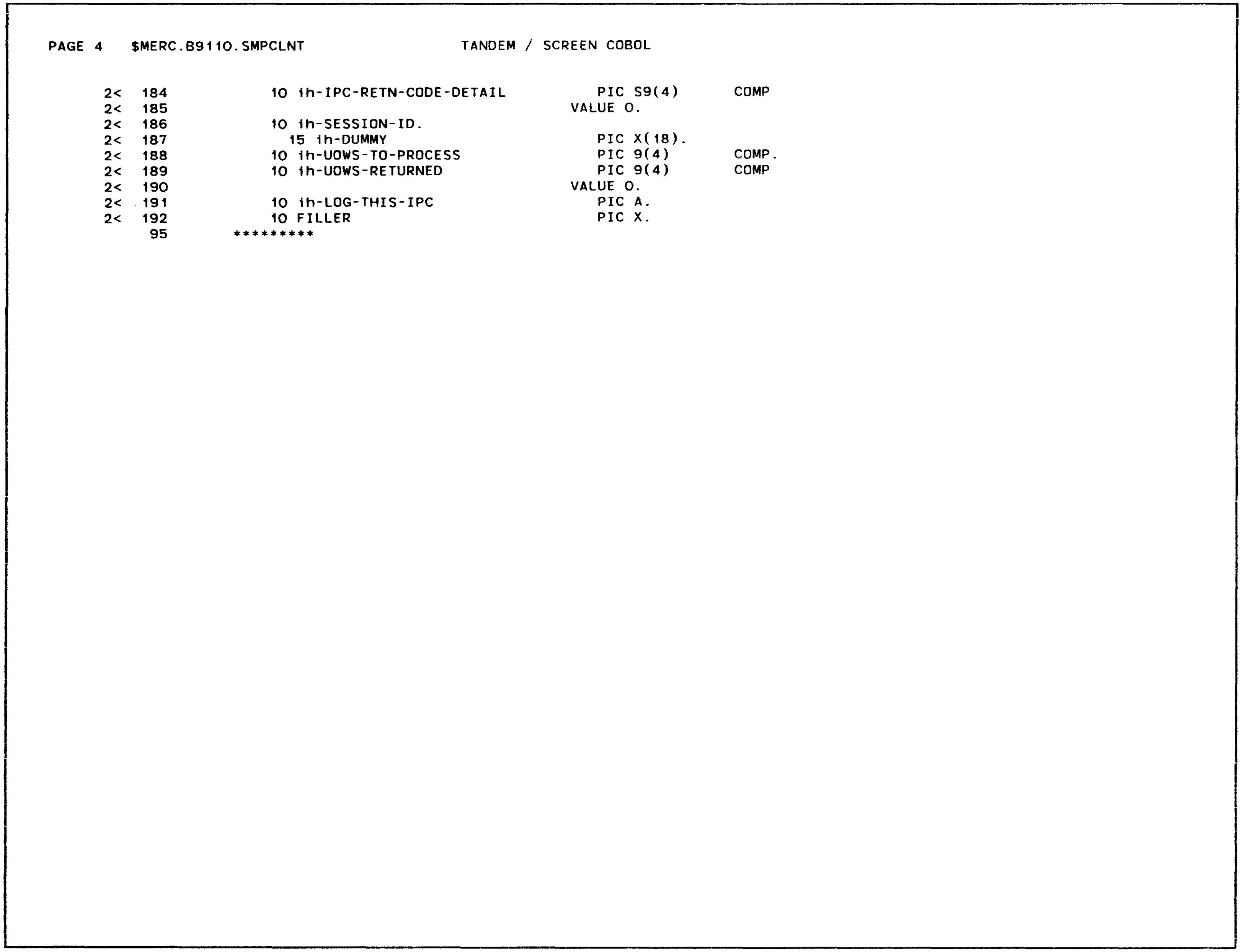
```
PAGE 2   $MERC.B9110.SMPCLNT               TANDEM / SCREEN COBOL

/
 ENVIRONMENT DIVISION.
   CONFIGURATION SECTION.
   SOURCE-COMPUTER.  T16.
   OBJECT-COMPUTER.  T16,
     TERMINAL IS T16-6520.

  SPECIAL-NAMES.

*********************************************************************
*  TERMINAL FUNCTION-KEY DEFINITIONS.                               *
*********************************************************************

   logon-key IS F1, f1 is F1
   f2 IS F2,
   read-mail IS F3, f3 IS F3
   discard-mail IS F4, f4 IS F4
   compose-mail IS F5, f5 IS F5
   post-mail IS F6, f6 IS F6
   return-key IS  F16,  f16 IS  F16
   logoff-key IS SF16, sf16 IS SF16

*********************************************************************
*  DISPLAY ATTRIBUTE DEFINITIONS.                                   *
*********************************************************************

   dim IS DIM
   normal IS NORMAL
   hidden IS HIDDEN
   blink IS BLINK
   reverse IS REVERSE
   underline IS UNDERLINE


 INPUT-OUTPUT SECTION.

 SCREEN-CONTROL.

   ERROR-ENHANCEMENT IS reverse IN ALL WITH AUDIBLE ALARM.
```

Figure 7-5. SCREEN COBOL Code for Client (Continued)



```
PAGE 3   $MERC.B9110.SMPCLNT                TANDEM / SCREEN COBOL


         /
          DATA DIVISION.

          WORKING-STORAGE SECTION.

         *********************************************************************
         *  IPC HEADER DEFINITIONS.  The IPC-HDR must be the first "element" *
         *  of every send to, and reply from, TISERV.                        *
         *********************************************************************

           01  ipc-hdr.
         *     COPY ih-ipc-hdr OF "GCOB".
2<       * Definition IPC-HDR created on 08/31/84 at 16:44
2<         05 ih-IPC-HDR.
2<           10 ih-REQUEST-CODE                   PIC S9(4)      COMP.
2<             88 ih-STOP-ON-WARNING              Value is -1.
2<             88 ih-STOP-ON-ERR                  Value is -2.
2<             88 ih-DO-ALL-UOWS                  Value is -3.
2<           10 ih-PW-REPLY-CODE REDEFINES ih-REQUEST-CODE PIC S9(4) COMP.
2<             88 ih-ALL-UOWS-OK                  Value is 0.
2<             88 ih-UOWS-WITH-WARNING            Value is 1.
2<             88 ih-UOWS-WITH-ERR                Value is 2.
2<             88 ih-RQST-ERR                     Value is 3.
2<           10 FILLER                            PIC X.
2<           10 ih-VERSION-CODE.
2<             15 ih-LETTER                       PIC A value "B".
2<             15 ih-REV-NUMBER                   PIC 99 value 00.
2<           10 ih-IPC-RETN-CODE                  PIC S9(4)      COMP
2<                                             VALUE 0.
2<             88 ih-IPC-OK                       Value is 0.
2<             88 ih-INVALID-VERSION-CODE         Value is 1.
2<             88 ih-INVALID-SESSION-ID           Value is 2.
2<             88 ih-SERVICE-DENIED               Value is 3.
2<             88 ih-INVALID-UOW-HDR              Value is 4.
2<             88 ih-RQST-TOO-LONG                Value is 5.
2<             88 ih-REPLY-TOO-LONG               Value is 6.
2<             88 ih-RQST-TOO-SHORT               Value is 7.
2<             88 ih-INVALID-REQUEST-CODE         Value is 8.
2<             88  ih-E-BAD-TRANSACTION        VALUE  4010.
2<             88  ih-E-ERR-PROFILE-FILE      VALUE  4902.
2<             88  ih-E-ERR-SESSION-FILE      VALUE  4904.
2<             88  ih-E-ERR-ITEMDESC-FILE     VALUE  4906.
2<             88  ih-E-ERR-ITEMDATA-FILE     VALUE  4908.
2<             88  ih-E-ERR-RECIP-FILE        VALUE  4910.
2<             88  ih-E-ERR-FOLDER-FILE       VALUE  4912.
2<             88  ih-E-ERR-DLIST-FILE        VALUE  4914.
2<             88  ih-E-ERR-READY-FILE        VALUE  4916.
2<             88  ih-E-ERR-TIME-FILE         VALUE  4918.
2<             88  ih-E-ERR-NET-FILE          VALUE  4920.
2<             88  ih-E-ERR-INV-FOLDER-FILE   VALUE  4922.
2<             88  ih-E-ERR-QUEUE-FILE        VALUE  4924.
2<             88  ih-E-IO-TIMEOUT            VALUE  4990.
2<       *   For IPC-RETN-CODE = E-BAD-TRANSACTION or E-ERR-FILE-xxxx, this
2<       *   field contains the GUARDIAN error code that describes the problem.
2<       *   For IPC-RETN-CODE = E-IO-TIMEOUT, this field contains the file
2<       *   code of the file on which the timeout occurred.
2<       *   For other values of IPC-RETN-CODE, this field is undefined.
```

Figure 7-5. SCREEN COBOL Code for Client (Continued)



```
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      2<  184          10 ih-IPC-RETN-CODE-DETAIL          PIC S9(4)      COMP
      2<  185                                           VALUE O.
      2<  186          10 ih-SESSION-ID.
      2<  187            15 ih-DUMMY                       PIC X(18).
      2<  188          10 ih-UOWS-TO-PROCESS               PIC 9(4)       COMP.
      2<  189          10 ih-UOWS-RETURNED                 PIC 9(4)       COMP
      2<  190                                           VALUE O.
      2<  191          10 ih-LOG-THIS-IPC                  PIC A.
      2<  192          10 FILLER                           PIC X.
           95      *********
```
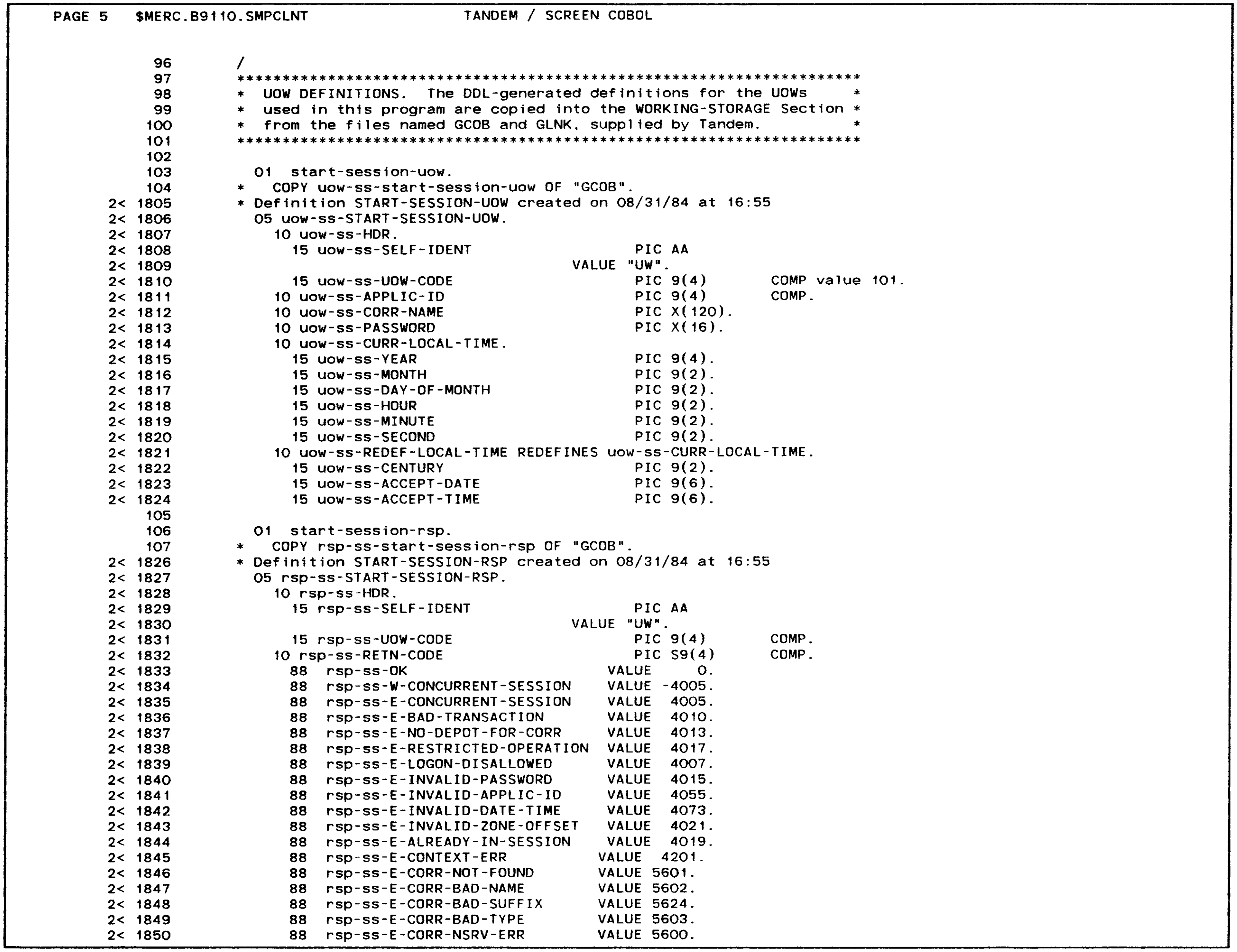
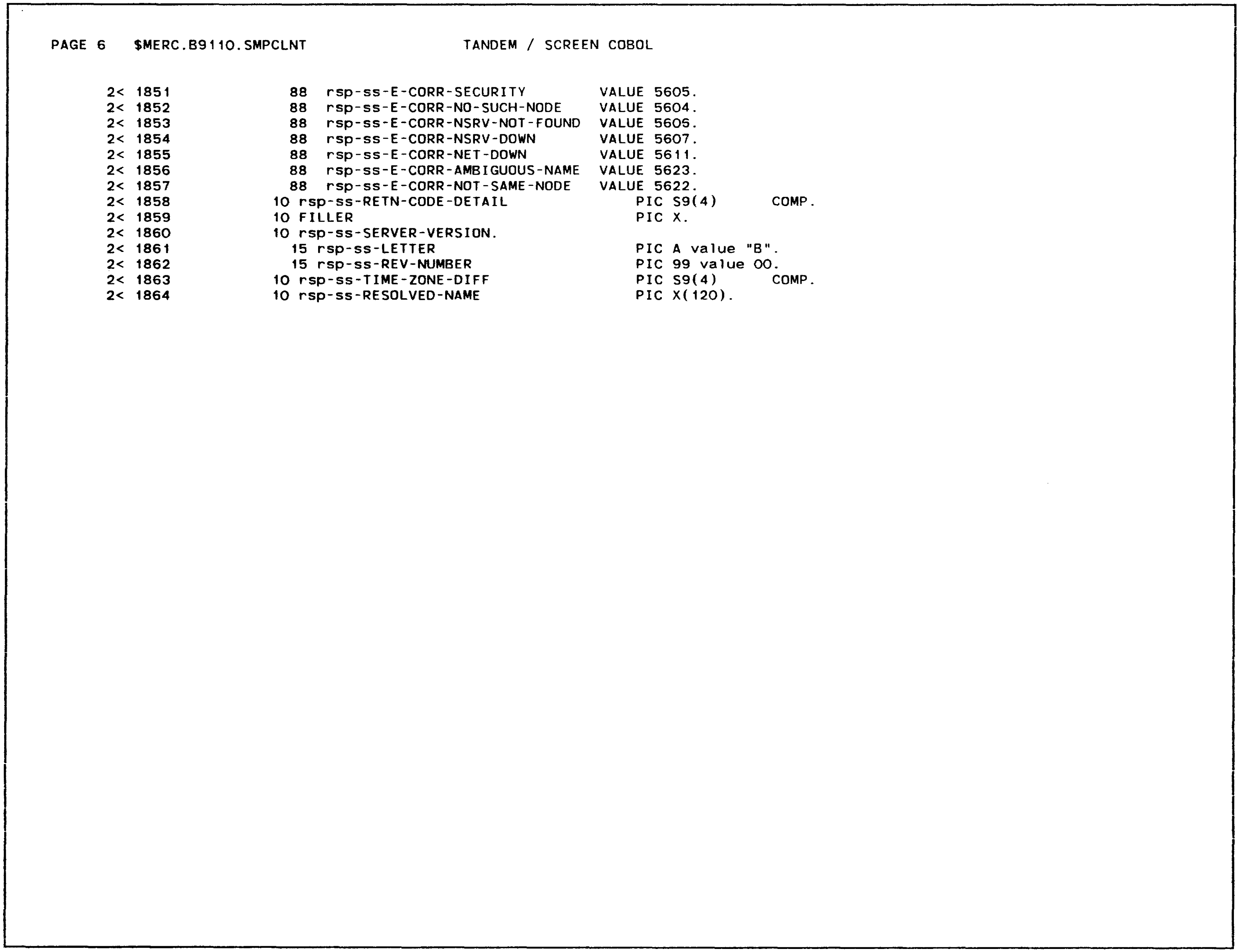

Figure 7-5. SCREEN COBOL Code for Client (Continued)



```
     PAGE 5   $MERC.B9110.SMPCLNT                TANDEM / SCREEN COBOL


                    96       /
                    97       **********************************************************************
                    98       *  UOW DEFINITIONS.  The DDL-generated definitions for the UOWs     *
                    99       *  used in this program are copied into the WORKING-STORAGE Section *
                   100       *  from the files named GCOB and GLNK, supplied by Tandem.          *
                   101       **********************************************************************
                   102
                   103         01  start-session-uow.
               2<  104       *   COPY uow-ss-start-session-uow OF "GCOB".
               2< 1805       * Definition START-SESSION-UOW created on 08/31/84 at 16:55
               2< 1806         05 uow-ss-START-SESSION-UOW.
               2< 1807           10 uow-ss-HDR.
               2< 1808             15 uow-ss-SELF-IDENT                    PIC AA
               2< 1809                                             VALUE "UW".
               2< 1810             15 uow-ss-UOW-CODE                      PIC 9(4)       COMP value 101.
               2< 1811           10 uow-ss-APPLIC-ID                       PIC 9(4)       COMP.
               2< 1812           10 uow-ss-CORR-NAME                       PIC X(120).
               2< 1813           10 uow-ss-PASSWORD                        PIC X(16).
               2< 1814           10 uow-ss-CURR-LOCAL-TIME.
               2< 1815             15 uow-ss-YEAR                          PIC 9(4).
               2< 1816             15 uow-ss-MONTH                         PIC 9(2).
               2< 1817             15 uow-ss-DAY-OF-MONTH                  PIC 9(2).
               2< 1818             15 uow-ss-HOUR                          PIC 9(2).
               2< 1819             15 uow-ss-MINUTE                        PIC 9(2).
               2< 1820             15 uow-ss-SECOND                        PIC 9(2).
               2< 1821           10 uow-ss-REDEF-LOCAL-TIME REDEFINES uow-ss-CURR-LOCAL-TIME.
               2< 1822             15 uow-ss-CENTURY                       PIC 9(2).
               2< 1823             15 uow-ss-ACCEPT-DATE                   PIC 9(6).
               2< 1824             15 uow-ss-ACCEPT-TIME                   PIC 9(6).
                   105
                   106         01  start-session-rsp.
                   107       *   COPY rsp-ss-start-session-rsp OF "GCOB".
               2< 1826       * Definition START-SESSION-RSP created on 08/31/84 at 16:55
               2< 1827         05 rsp-ss-START-SESSION-RSP.
               2< 1828           10 rsp-ss-HDR.
               2< 1829             15 rsp-ss-SELF-IDENT                    PIC AA
               2< 1830                                             VALUE "UW".
               2< 1831             15 rsp-ss-UOW-CODE                      PIC 9(4)       COMP.
               2< 1832           10 rsp-ss-RETN-CODE                       PIC S9(4)      COMP.
               2< 1833             88  rsp-ss-OK                       VALUE     0.
               2< 1834             88  rsp-ss-W-CONCURRENT-SESSION     VALUE -4005.
               2< 1835             88  rsp-ss-E-CONCURRENT-SESSION     VALUE  4005.
               2< 1836             88  rsp-ss-E-BAD-TRANSACTION        VALUE  4010.
               2< 1837             88  rsp-ss-E-NO-DEPOT-FOR-CORR      VALUE  4013.
               2< 1838             88  rsp-ss-E-RESTRICTED-OPERATION   VALUE  4017.
               2< 1839             88  rsp-ss-E-LOGON-DISALLOWED       VALUE  4007.
               2< 1840             88  rsp-ss-E-INVALID-PASSWORD       VALUE  4015.
               2< 1841             88  rsp-ss-E-INVALID-APPLIC-ID      VALUE  4055.
               2< 1842             88  rsp-ss-E-INVALID-DATE-TIME      VALUE  4073.
               2< 1843             88  rsp-ss-E-INVALID-ZONE-OFFSET    VALUE  4021.
               2< 1844             88  rsp-ss-E-ALREADY-IN-SESSION     VALUE  4019.
               2< 1845             88  rsp-ss-E-CONTEXT-ERR           VALUE  4201.
               2< 1846             88  rsp-ss-E-CORR-NOT-FOUND        VALUE 5601.
               2< 1847             88  rsp-ss-E-CORR-BAD-NAME         VALUE 5602.
               2< 1848             88  rsp-ss-E-CORR-BAD-SUFFIX       VALUE 5624.
               2< 1849             88  rsp-ss-E-CORR-BAD-TYPE         VALUE 5603.
               2< 1850             88  rsp-ss-E-CORR-NSRV-ERR         VALUE 5600.
```

Figure 7-5. SCREEN COBOL Code for Client (Continued)



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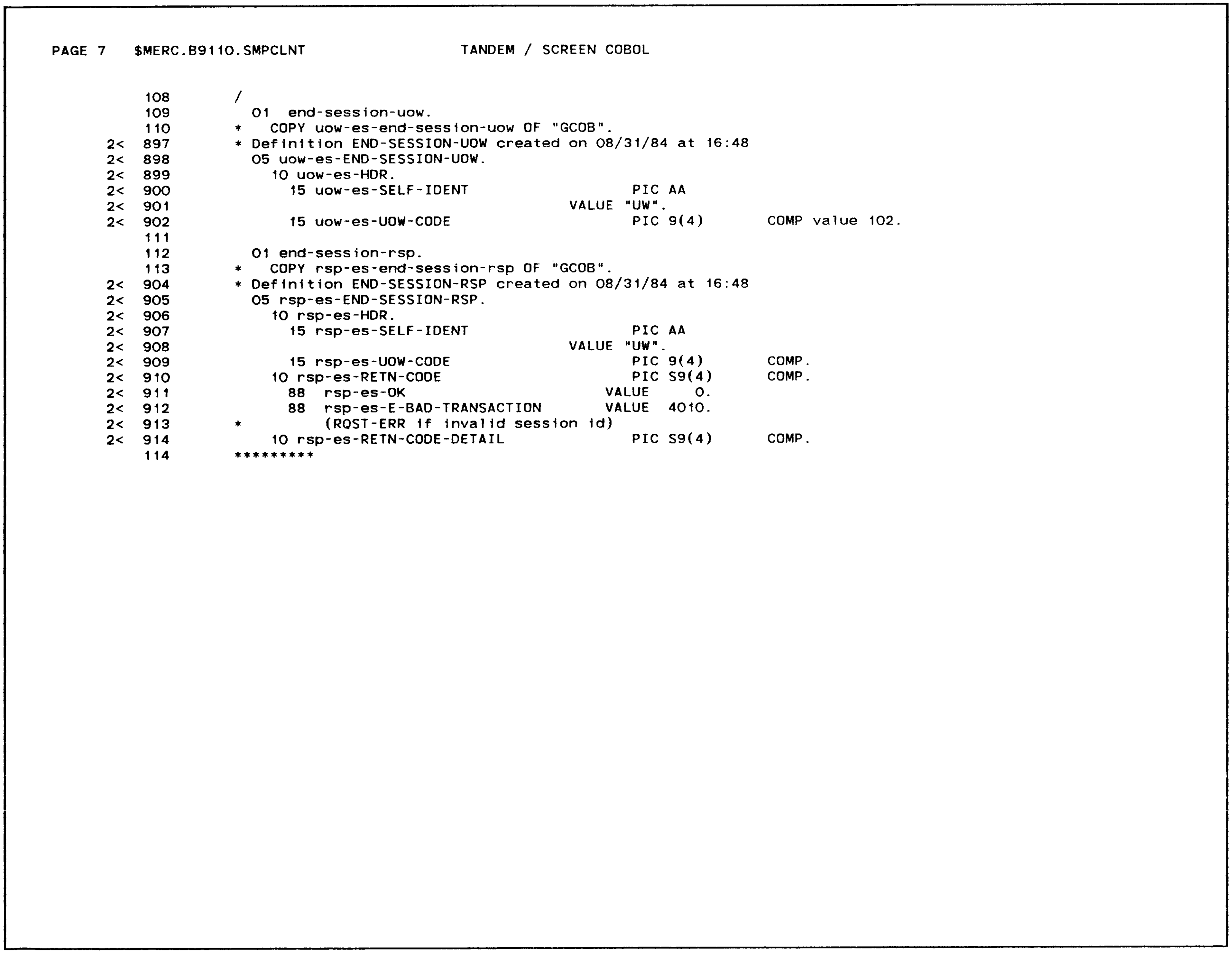
      2< 1851            88  rsp-ss-E-CORR-SECURITY        VALUE 5605.
      2< 1852            88  rsp-ss-E-CORR-NO-SUCH-NODE    VALUE 5604.
      2< 1853            88  rsp-ss-E-CORR-NSRV-NOT-FOUND  VALUE 5606.
      2< 1854            88  rsp-ss-E-CORR-NSRV-DOWN       VALUE 5607.
      2< 1855            88  rsp-ss-E-CORR-NET-DOWN        VALUE 5611.
      2< 1856            88  rsp-ss-E-CORR-AMBIGUOUS-NAME  VALUE 5623.
      2< 1857            88  rsp-ss-E-CORR-NOT-SAME-NODE   VALUE 5622.
      2< 1858           10 rsp-ss-RETN-CODE-DETAIL             PIC S9(4)      COMP.
      2< 1859           10 FILLER                              PIC X.
      2< 1860           10 rsp-ss-SERVER-VERSION.
      2< 1861             15 rsp-ss-LETTER                     PIC A value "B".
      2< 1862             15 rsp-ss-REV-NUMBER                 PIC 99 value 00.
      2< 1863           10 rsp-ss-TIME-ZONE-DIFF               PIC S9(4)      COMP.
      2< 1864           10 rsp-ss-RESOLVED-NAME                PIC X(120).
```

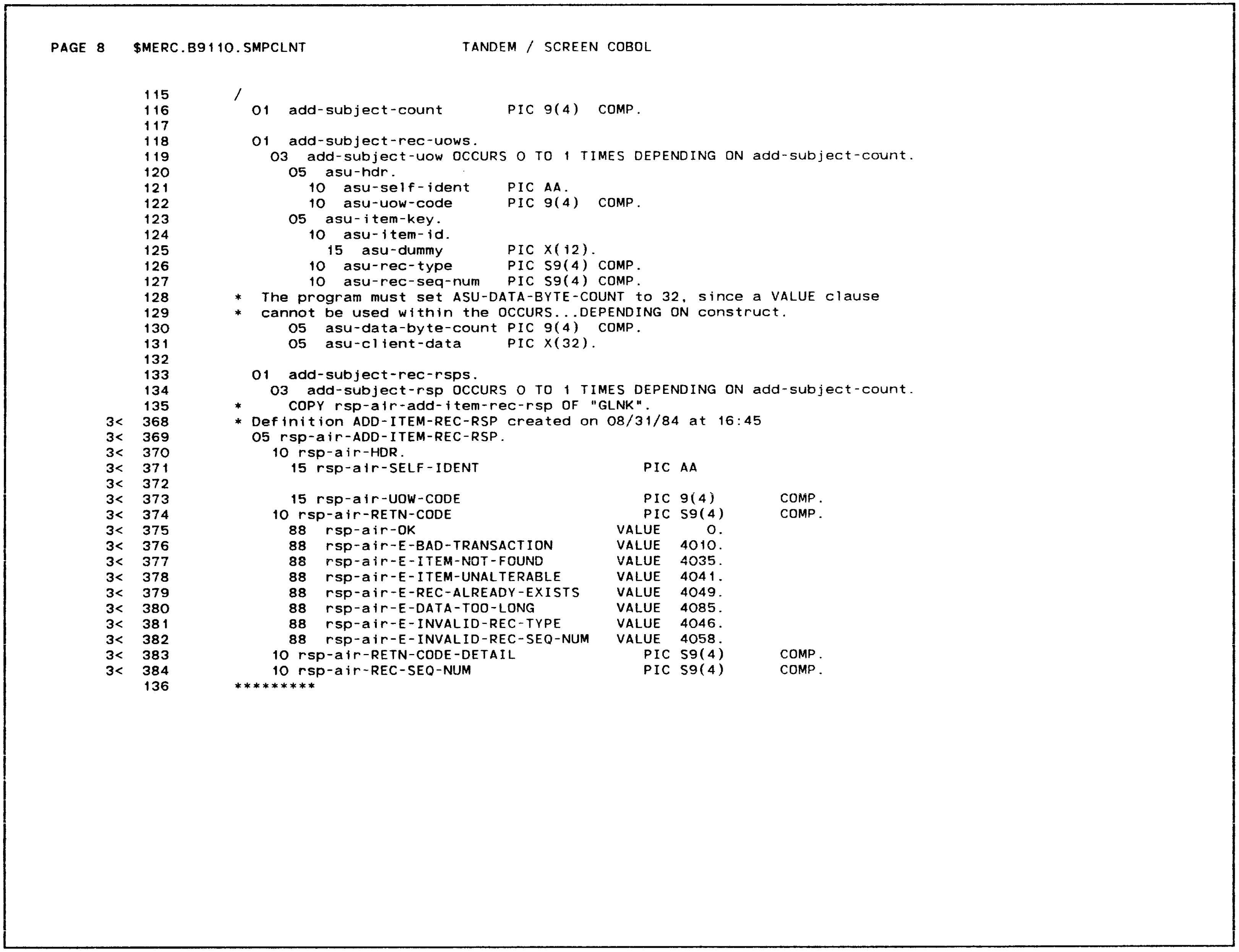
Figure 7-5. SCREEN COBOL Code for Client (Continued)



```
PAGE 7   $MERC.B9110.SMPCLNT                   TANDEM / SCREEN COBOL

           108        /
           109          01  end-session-uow.
           110        *   COPY uow-es-end-session-uow OF "GCOB".
       2<  897        * Definition END-SESSION-UOW created on 08/31/84 at 16:48
       2<  898          05 uow-es-END-SESSION-UOW.
       2<  899            10 uow-es-HDR.
       2<  900              15 uow-es-SELF-IDENT                  PIC AA
       2<  901                                             VALUE "UW".
       2<  902              15 uow-es-UOW-CODE                    PIC 9(4)      COMP value 102.
           111
           112          01 end-session-rsp.
           113        *   COPY rsp-es-end-session-rsp OF "GCOB".
       2<  904        * Definition END-SESSION-RSP created on 08/31/84 at 16:48
       2<  905          05 rsp-es-END-SESSION-RSP.
       2<  906            10 rsp-es-HDR.
       2<  907              15 rsp-es-SELF-IDENT                  PIC AA
       2<  908                                             VALUE "UW".
       2<  909              15 rsp-es-UOW-CODE                    PIC 9(4)      COMP.
       2<  910            10 rsp-es-RETN-CODE                     PIC S9(4)     COMP.
       2<  911              88  rsp-es-OK                     VALUE     0.
       2<  912              88  rsp-es-E-BAD-TRANSACTION      VALUE  4010.
       2<  913        *         (RQST-ERR if invalid session id)
       2<  914            10 rsp-es-RETN-CODE-DETAIL              PIC S9(4)     COMP.
           114        *********
```

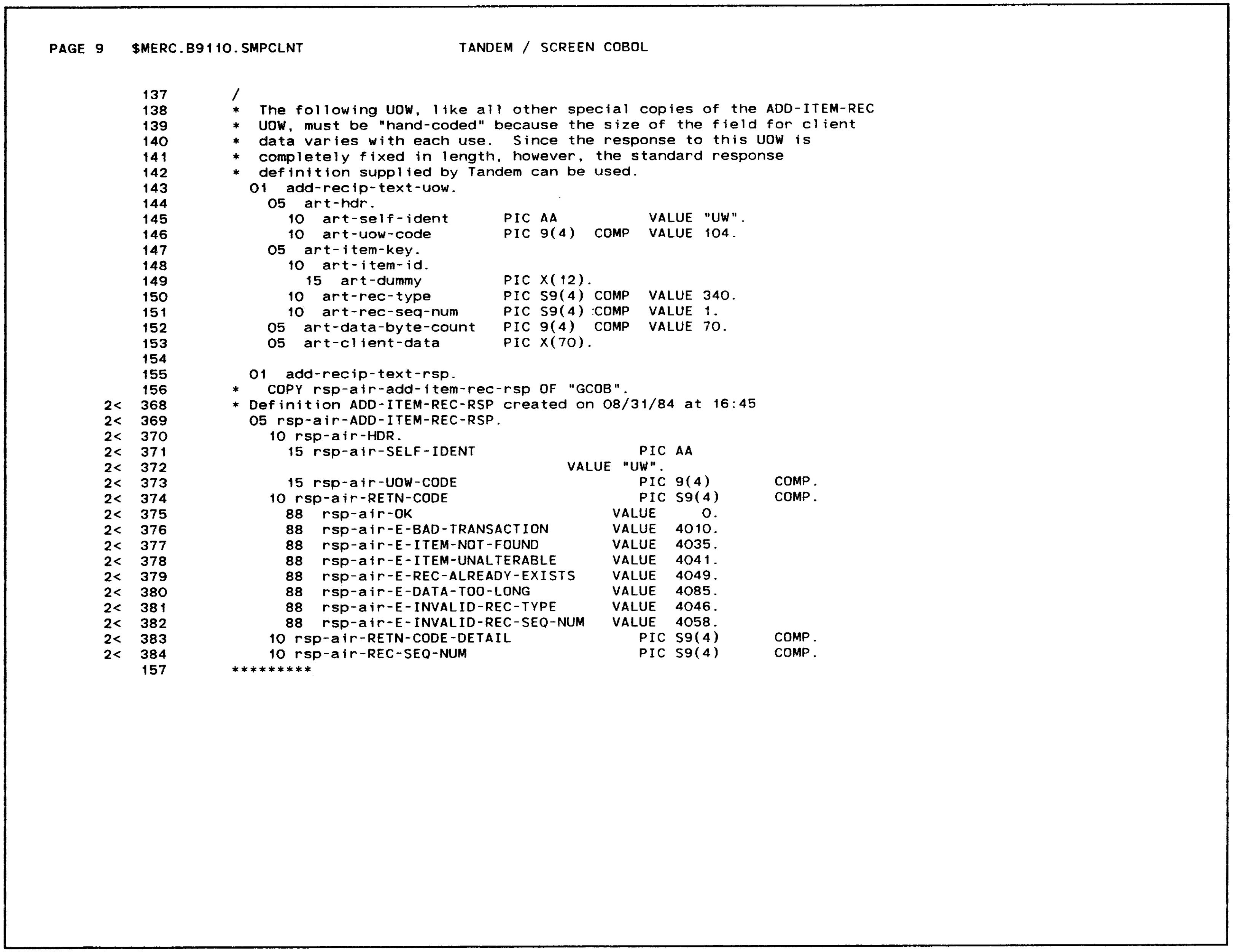
Figure 7-5. SCREEN COBOL Code for Client (Continued)



```
PAGE 8    $MERC.B9110.SMPCLNT                TANDEM / SCREEN COBOL

          115       /
          116         01  add-subject-count       PIC 9(4)  COMP.
          117
          118         01  add-subject-rec-uows.
          119           03  add-subject-uow OCCURS 0 TO 1 TIMES DEPENDING ON add-subject-count.
          120             05  asu-hdr.
          121               10  asu-self-ident    PIC AA.
          122               10  asu-uow-code      PIC 9(4)  COMP.
          123             05  asu-item-key.
          124               10  asu-item-id.
          125                 15  asu-dummy       PIC X(12).
          126               10  asu-rec-type      PIC S9(4) COMP.
          127               10  asu-rec-seq-num   PIC S9(4) COMP.
          128       *  The program must set ASU-DATA-BYTE-COUNT to 32, since a VALUE clause
          129       *  cannot be used within the OCCURS...DEPENDING ON construct.
          130             05  asu-data-byte-count PIC 9(4)  COMP.
          131             05  asu-client-data     PIC X(32).
          132
          133         01  add-subject-rec-rsps.
          134           03  add-subject-rsp OCCURS 0 TO 1 TIMES DEPENDING ON add-subject-count.
          135       *     COPY rsp-air-add-item-rec-rsp OF "GLNK".
      3<  368       * Definition ADD-ITEM-REC-RSP created on 08/31/84 at 16:45
      3<  369         05 rsp-air-ADD-ITEM-REC-RSP.
      3<  370           10 rsp-air-HDR.
      3<  371             15 rsp-air-SELF-IDENT                PIC AA
      3<  372
      3<  373             15 rsp-air-UOW-CODE                  PIC 9(4)      COMP.
      3<  374           10 rsp-air-RETN-CODE                   PIC S9(4)     COMP.
      3<  375             88  rsp-air-OK                    VALUE     0.
      3<  376             88  rsp-air-E-BAD-TRANSACTION     VALUE  4010.
      3<  377             88  rsp-air-E-ITEM-NOT-FOUND      VALUE  4035.
      3<  378             88  rsp-air-E-ITEM-UNALTERABLE    VALUE  4041.
      3<  379             88  rsp-air-E-REC-ALREADY-EXISTS  VALUE  4049.
      3<  380             88  rsp-air-E-DATA-TOO-LONG       VALUE  4085.
      3<  381             88  rsp-air-E-INVALID-REC-TYPE    VALUE  4046.
      3<  382             88  rsp-air-E-INVALID-REC-SEQ-NUM VALUE  4058.
      3<  383           10 rsp-air-RETN-CODE-DETAIL            PIC S9(4)     COMP.
      3<  384           10 rsp-air-REC-SEQ-NUM                 PIC S9(4)     COMP.
          136       *********
```

Figure 7-5. SCREEN COBOL Code for Client (Continued)



```
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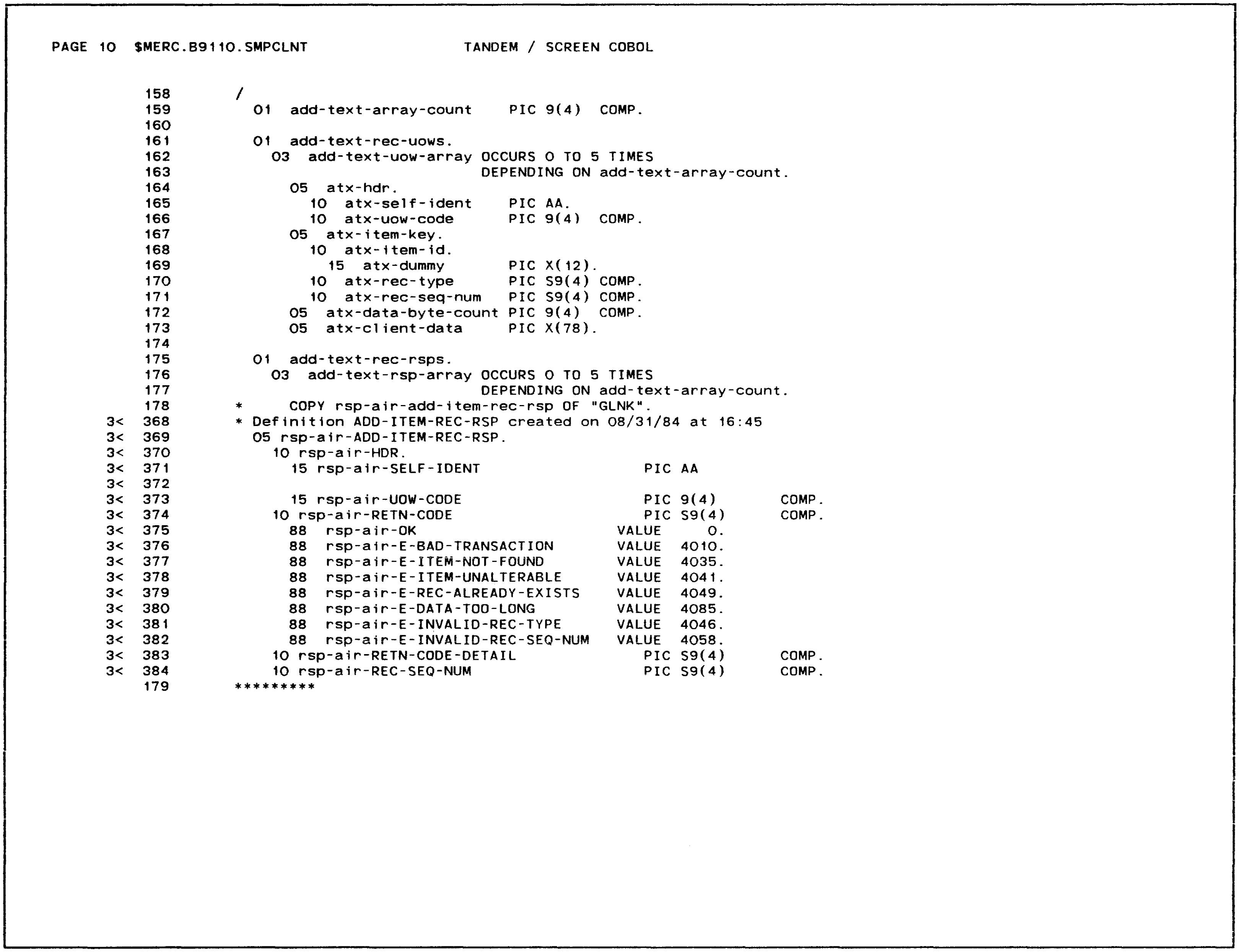
/
*  The following UOW, like all other special copies of the ADD-ITEM-REC
*  UOW, must be "hand-coded" because the size of the field for client
*  data varies with each use.  Since the response to this UOW is
*  completely fixed in length, however, the standard response
*  definition supplied by Tandem can be used.
  01  add-recip-text-uow.
    05  art-hdr.
      10  art-self-ident      PIC AA          VALUE "UW".
      10  art-uow-code        PIC 9(4)  COMP  VALUE 104.
    05  art-item-key.
      10  art-item-id.
        15  art-dummy         PIC X(12).
      10  art-rec-type        PIC S9(4) COMP  VALUE 340.
      10  art-rec-seq-num     PIC S9(4) COMP  VALUE 1.
    05  art-data-byte-count   PIC 9(4)  COMP  VALUE 70.
    05  art-client-data       PIC X(70).

  01  add-recip-text-rsp.
*   COPY rsp-air-add-item-rec-rsp OF "GCOB".
* Definition ADD-ITEM-REC-RSP created on 08/31/84 at 16:45
  05 rsp-air-ADD-ITEM-REC-RSP.
    10 rsp-air-HDR.
      15 rsp-air-SELF-IDENT                   PIC AA
                                     VALUE "UW".
      15 rsp-air-UOW-CODE                     PIC 9(4)       COMP.
    10 rsp-air-RETN-CODE                      PIC S9(4)      COMP.
      88  rsp-air-OK                      VALUE     0.
      88  rsp-air-E-BAD-TRANSACTION       VALUE  4010.
      88  rsp-air-E-ITEM-NOT-FOUND        VALUE  4035.
      88  rsp-air-E-ITEM-UNALTERABLE      VALUE  4041.
      88  rsp-air-E-REC-ALREADY-EXISTS    VALUE  4049.
      88  rsp-air-E-DATA-TOO-LONG         VALUE  4085.
      88  rsp-air-E-INVALID-REC-TYPE      VALUE  4046.
      88  rsp-air-E-INVALID-REC-SEQ-NUM   VALUE  4058.
    10 rsp-air-RETN-CODE-DETAIL               PIC S9(4)      COMP.
    10 rsp-air-REC-SEQ-NUM                    PIC S9(4)      COMP.
*********
```

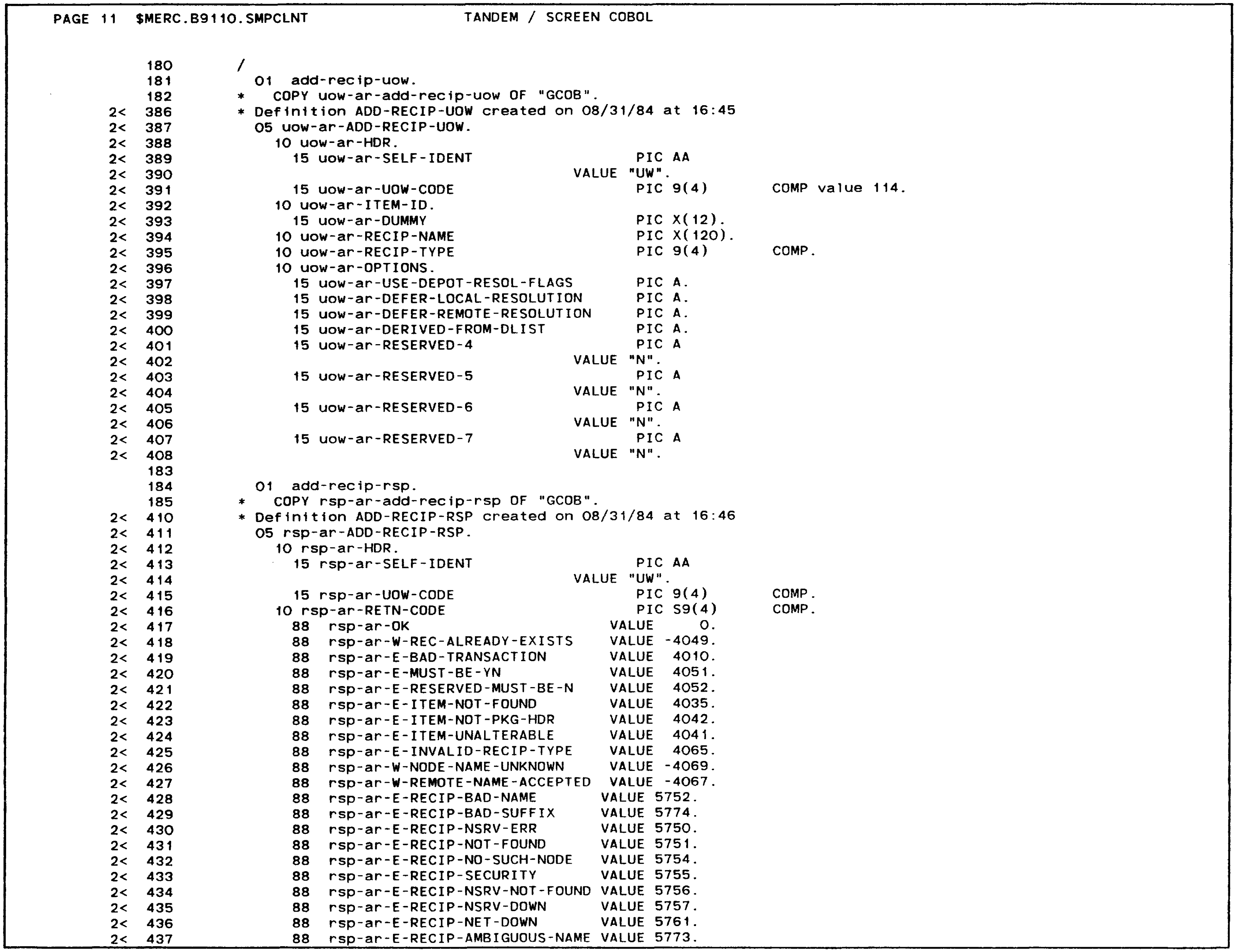
Figure 7-5. SCREEN COBOL Code for Client (Continued)



```
PAGE 10  $MERC.B9110.SMPCLNT                 TANDEM / SCREEN COBOL

           158       /
           159         01  add-text-array-count    PIC 9(4)  COMP.
           160
           161         01  add-text-rec-uows.
           162           03  add-text-uow-array OCCURS 0 TO 5 TIMES
           163                                  DEPENDING ON add-text-array-count.
           164             05  atx-hdr.
           165               10  atx-self-ident     PIC AA.
           166               10  atx-uow-code       PIC 9(4)  COMP.
           167             05  atx-item-key.
           168               10  atx-item-id.
           169                 15  atx-dummy        PIC X(12).
           170               10  atx-rec-type       PIC S9(4) COMP.
           171               10  atx-rec-seq-num    PIC S9(4) COMP.
           172             05  atx-data-byte-count PIC 9(4)  COMP.
           173             05  atx-client-data     PIC X(78).
           174
           175         01  add-text-rec-rsps.
           176           03  add-text-rsp-array OCCURS 0 TO 5 TIMES
           177                                  DEPENDING ON add-text-array-count.
           178       *     COPY rsp-air-add-item-rec-rsp OF "GLNK".
       3<  368       * Definition ADD-ITEM-REC-RSP created on 08/31/84 at 16:45
       3<  369         05 rsp-air-ADD-ITEM-REC-RSP.
       3<  370           10 rsp-air-HDR.
       3<  371             15 rsp-air-SELF-IDENT                   PIC AA
       3<  372
       3<  373             15 rsp-air-UOW-CODE                     PIC 9(4)       COMP.
       3<  374           10 rsp-air-RETN-CODE                      PIC S9(4)      COMP.
       3<  375             88  rsp-air-OK                       VALUE     0.
       3<  376             88  rsp-air-E-BAD-TRANSACTION        VALUE  4010.
       3<  377             88  rsp-air-E-ITEM-NOT-FOUND         VALUE  4035.
       3<  378             88  rsp-air-E-ITEM-UNALTERABLE       VALUE  4041.
       3<  379             88  rsp-air-E-REC-ALREADY-EXISTS     VALUE  4049.
       3<  380             88  rsp-air-E-DATA-TOO-LONG          VALUE  4085.
       3<  381             88  rsp-air-E-INVALID-REC-TYPE       VALUE  4046.
       3<  382             88  rsp-air-E-INVALID-REC-SEQ-NUM    VALUE  4058.
       3<  383           10 rsp-air-RETN-CODE-DETAIL               PIC S9(4)      COMP.
       3<  384           10 rsp-air-REC-SEQ-NUM                    PIC S9(4)      COMP.
           179       *********
```

Figure 7-5. SCREEN COBOL Code for Client (Continued)



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          180       /
          181         01  add-recip-uow.
          182       *   COPY uow-ar-add-recip-uow OF "GCOB".
      2<  386       * Definition ADD-RECIP-UOW created on 08/31/84 at 16:45
      2<  387         05 uow-ar-ADD-RECIP-UOW.
      2<  388           10 uow-ar-HDR.
      2<  389             15 uow-ar-SELF-IDENT                  PIC AA
      2<  390                                            VALUE "UW".
      2<  391             15 uow-ar-UOW-CODE                    PIC 9(4)      COMP value 114.
      2<  392           10 uow-ar-ITEM-ID.
      2<  393             15 uow-ar-DUMMY                       PIC X(12).
      2<  394           10 uow-ar-RECIP-NAME                    PIC X(120).
      2<  395           10 uow-ar-RECIP-TYPE                    PIC 9(4)      COMP.
      2<  396           10 uow-ar-OPTIONS.
      2<  397             15 uow-ar-USE-DEPOT-RESOL-FLAGS       PIC A.
      2<  398             15 uow-ar-DEFER-LOCAL-RESOLUTION      PIC A.
      2<  399             15 uow-ar-DEFER-REMOTE-RESOLUTION     PIC A.
      2<  400             15 uow-ar-DERIVED-FROM-DLIST          PIC A.
      2<  401             15 uow-ar-RESERVED-4                  PIC A
      2<  402                                            VALUE "N".
      2<  403             15 uow-ar-RESERVED-5                  PIC A
      2<  404                                            VALUE "N".
      2<  405             15 uow-ar-RESERVED-6                  PIC A
      2<  406                                            VALUE "N".
      2<  407             15 uow-ar-RESERVED-7                  PIC A
      2<  408                                            VALUE "N".
          183
          184         01  add-recip-rsp.
          185       *   COPY rsp-ar-add-recip-rsp OF "GCOB".
      2<  410       * Definition ADD-RECIP-RSP created on 08/31/84 at 16:46
      2<  411         05 rsp-ar-ADD-RECIP-RSP.
      2<  412           10 rsp-ar-HDR.
      2<  413             15 rsp-ar-SELF-IDENT                  PIC AA
      2<  414                                            VALUE "UW".
      2<  415             15 rsp-ar-UOW-CODE                    PIC 9(4)      COMP.
      2<  416           10 rsp-ar-RETN-CODE                     PIC S9(4)     COMP.
      2<  417             88  rsp-ar-OK                      VALUE     0.
      2<  418             88  rsp-ar-W-REC-ALREADY-EXISTS    VALUE -4049.
      2<  419             88  rsp-ar-E-BAD-TRANSACTION       VALUE  4010.
      2<  420             88  rsp-ar-E-MUST-BE-YN            VALUE  4051.
      2<  421             88  rsp-ar-E-RESERVED-MUST-BE-N    VALUE  4052.
      2<  422             88  rsp-ar-E-ITEM-NOT-FOUND        VALUE  4035.
      2<  423             88  rsp-ar-E-ITEM-NOT-PKG-HDR      VALUE  4042.
      2<  424             88  rsp-ar-E-ITEM-UNALTERABLE      VALUE  4041.
      2<  425             88  rsp-ar-E-INVALID-RECIP-TYPE    VALUE  4065.
      2<  426             88  rsp-ar-W-NODE-NAME-UNKNOWN     VALUE -4069.
      2<  427             88  rsp-ar-W-REMOTE-NAME-ACCEPTED  VALUE -4067.
      2<  428             88  rsp-ar-E-RECIP-BAD-NAME       VALUE 5752.
      2<  429             88  rsp-ar-E-RECIP-BAD-SUFFIX     VALUE 5774.
      2<  430             88  rsp-ar-E-RECIP-NSRV-ERR       VALUE 5750.
      2<  431             88  rsp-ar-E-RECIP-NOT-FOUND      VALUE 5751.
      2<  432             88  rsp-ar-E-RECIP-NO-SUCH-NODE   VALUE 5754.
      2<  433             88  rsp-ar-E-RECIP-SECURITY       VALUE 5755.
      2<  434             88  rsp-ar-E-RECIP-NSRV-NOT-FOUND VALUE 5756.
      2<  435             88  rsp-ar-E-RECIP-NSRV-DOWN      VALUE 5757.
      2<  436             88  rsp-ar-E-RECIP-NET-DOWN       VALUE 5761.
      2<  437             88  rsp-ar-E-RECIP-AMBIGUOUS-NAME VALUE 5773.
```
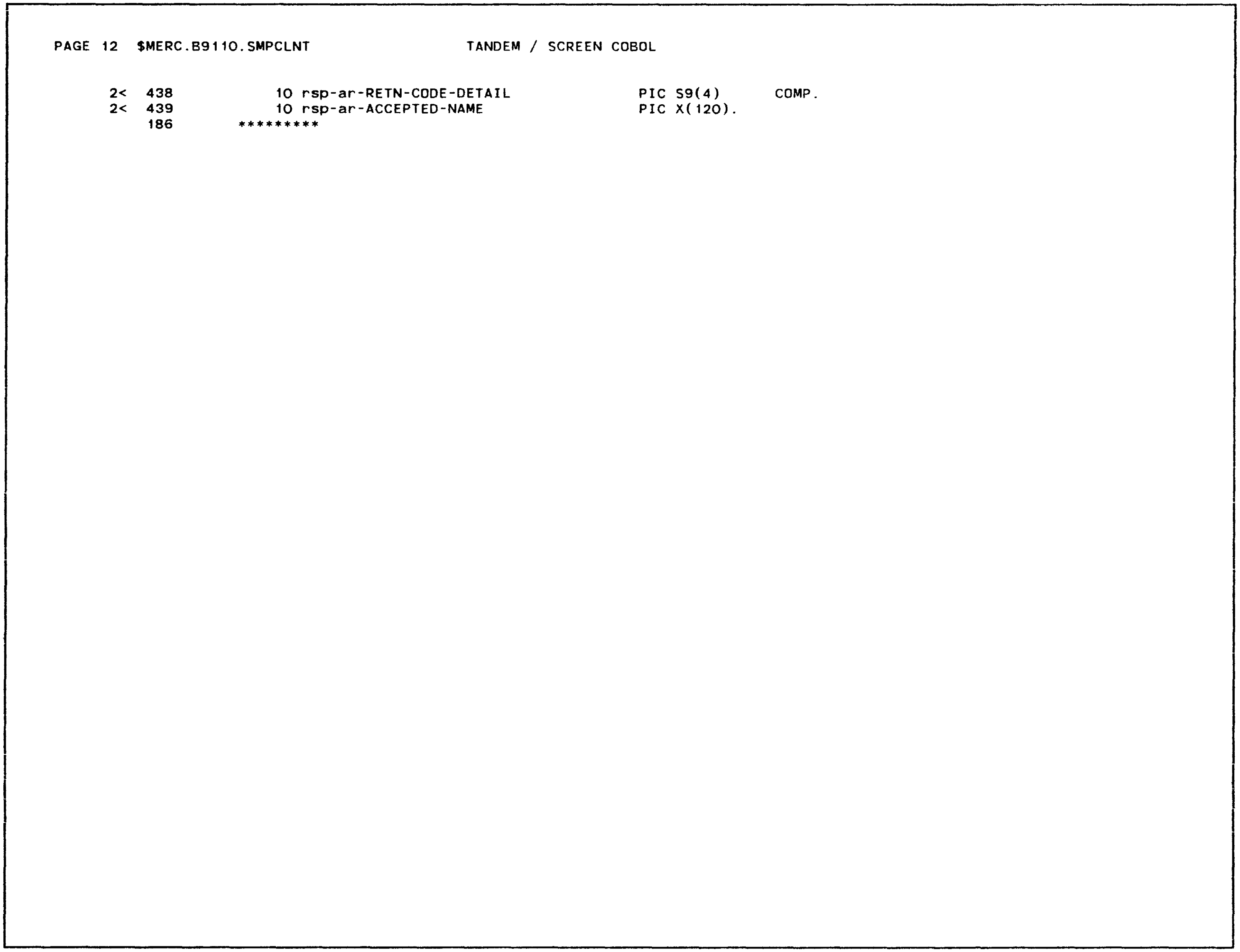

Figure 7-5. SCREEN COBOL Code for Client (Continued)



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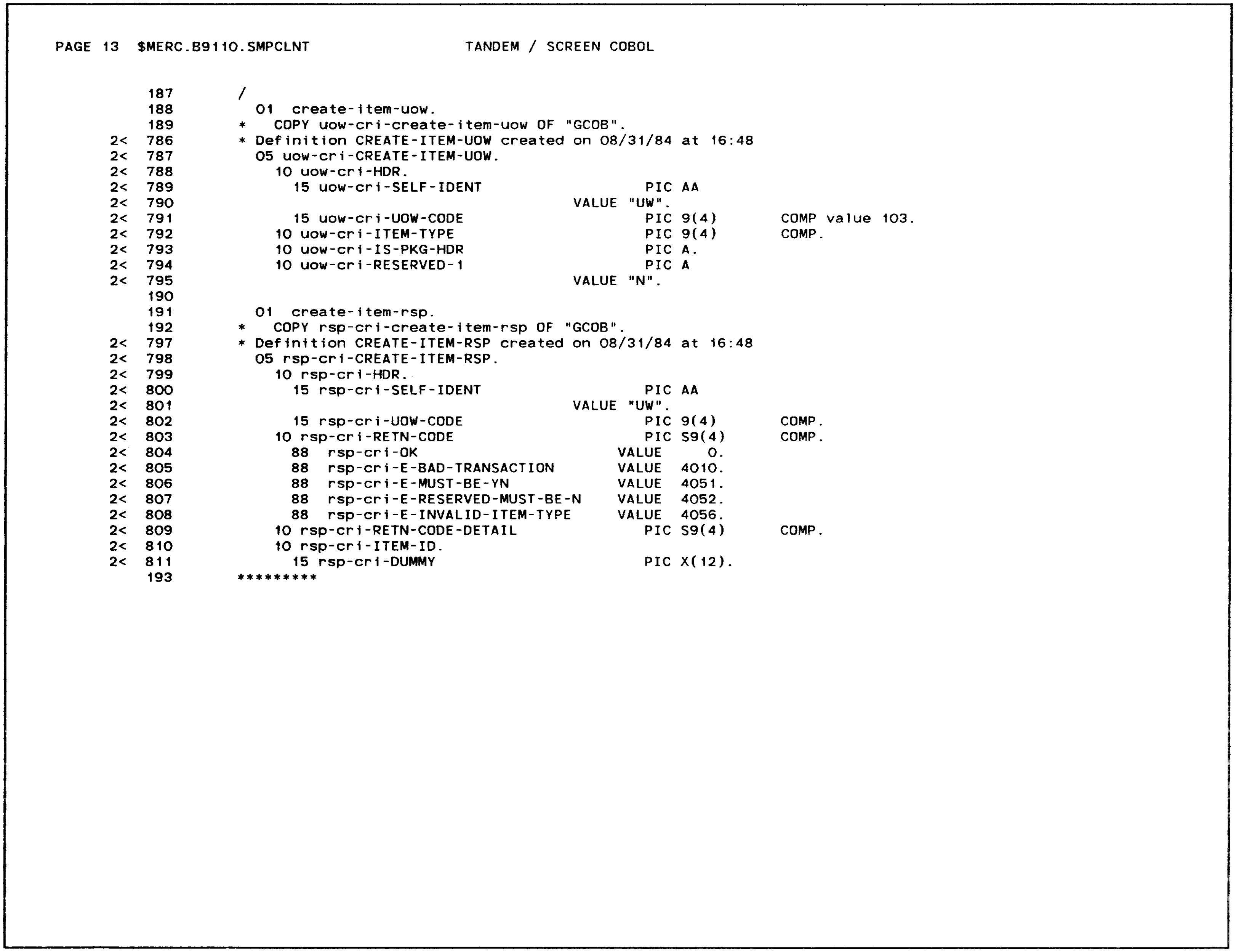
      2<  438           10 rsp-ar-RETN-CODE-DETAIL              PIC S9(4)      COMP.
      2<  439           10 rsp-ar-ACCEPTED-NAME                 PIC X(120).
          186       *********
```

Figure 7-5. SCREEN COBOL Code for Client (Continued)



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         187       /
         188         01  create-item-uow.
         189       *   COPY uow-cri-create-item-uow OF "GCOB".
     2<  786       * Definition CREATE-ITEM-UOW created on 08/31/84 at 16:48
     2<  787         05 uow-cri-CREATE-ITEM-UOW.
     2<  788           10 uow-cri-HDR.
     2<  789             15 uow-cri-SELF-IDENT                  PIC AA
     2<  790                                            VALUE "UW".
     2<  791             15 uow-cri-UOW-CODE                    PIC 9(4)      COMP value 103.
     2<  792           10 uow-cri-ITEM-TYPE                     PIC 9(4)      COMP.
     2<  793           10 uow-cri-IS-PKG-HDR                    PIC A.
     2<  794           10 uow-cri-RESERVED-1                    PIC A
     2<  795                                            VALUE "N".
         190
         191         01  create-item-rsp.
         192       *   COPY rsp-cri-create-item-rsp OF "GCOB".
     2<  797       * Definition CREATE-ITEM-RSP created on 08/31/84 at 16:48
     2<  798         05 rsp-cri-CREATE-ITEM-RSP.
     2<  799           10 rsp-cri-HDR.
     2<  800             15 rsp-cri-SELF-IDENT                  PIC AA
     2<  801                                            VALUE "UW".
     2<  802             15 rsp-cri-UOW-CODE                    PIC 9(4)      COMP.
     2<  803           10 rsp-cri-RETN-CODE                     PIC S9(4)     COMP.
     2<  804              88  rsp-cri-OK                     VALUE    0.
     2<  805              88  rsp-cri-E-BAD-TRANSACTION      VALUE  4010.
     2<  806              88  rsp-cri-E-MUST-BE-YN           VALUE  4051.
     2<  807              88  rsp-cri-E-RESERVED-MUST-BE-N   VALUE  4052.
     2<  808              88  rsp-cri-E-INVALID-ITEM-TYPE    VALUE  4056.
     2<  809           10 rsp-cri-RETN-CODE-DETAIL              PIC S9(4)     COMP.
     2<  810           10 rsp-cri-ITEM-ID.
     2<  811             15 rsp-cri-DUMMY                       PIC X(12).
         193       *********
```
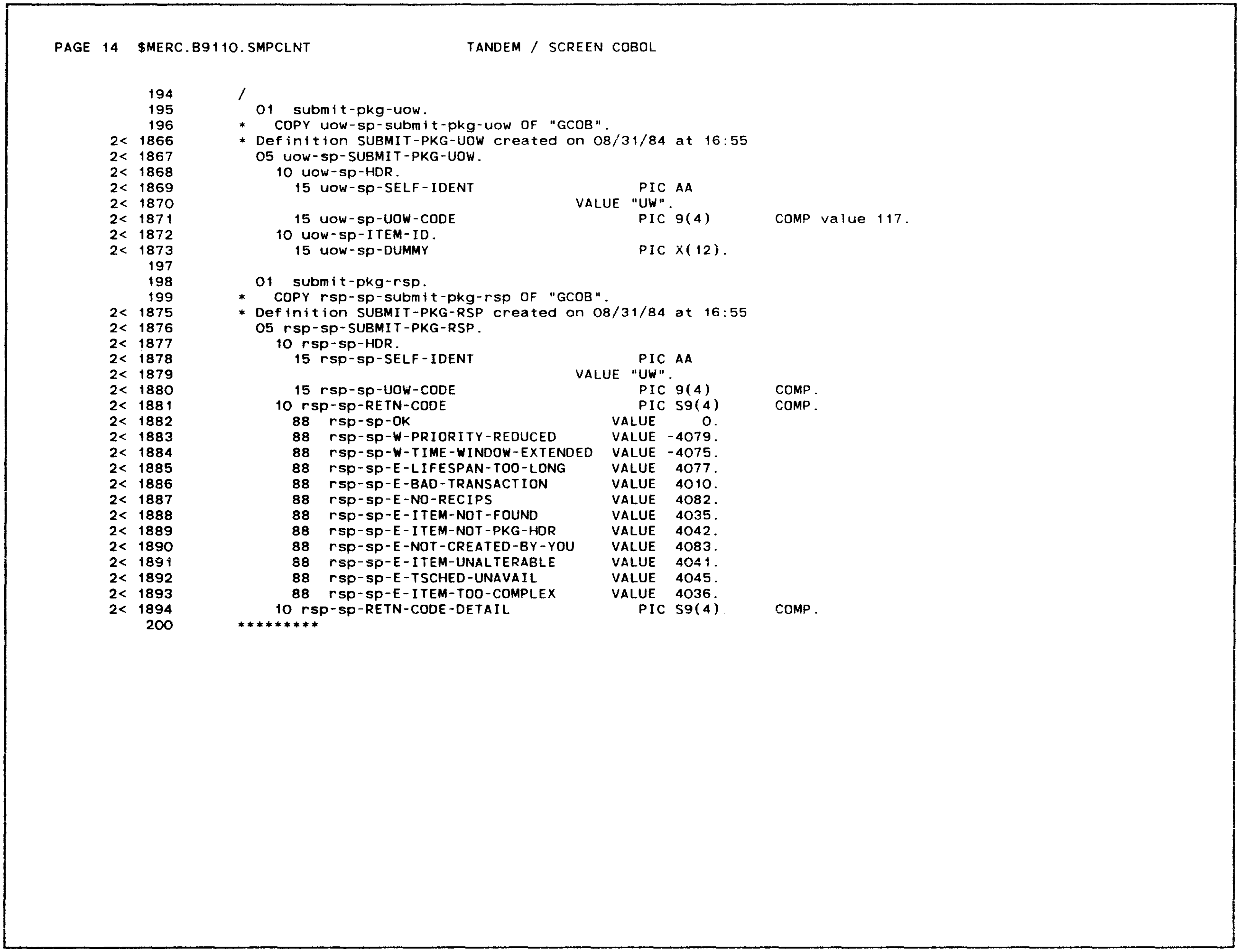

Figure 7-5. SCREEN COBOL Code for Client (Continued)



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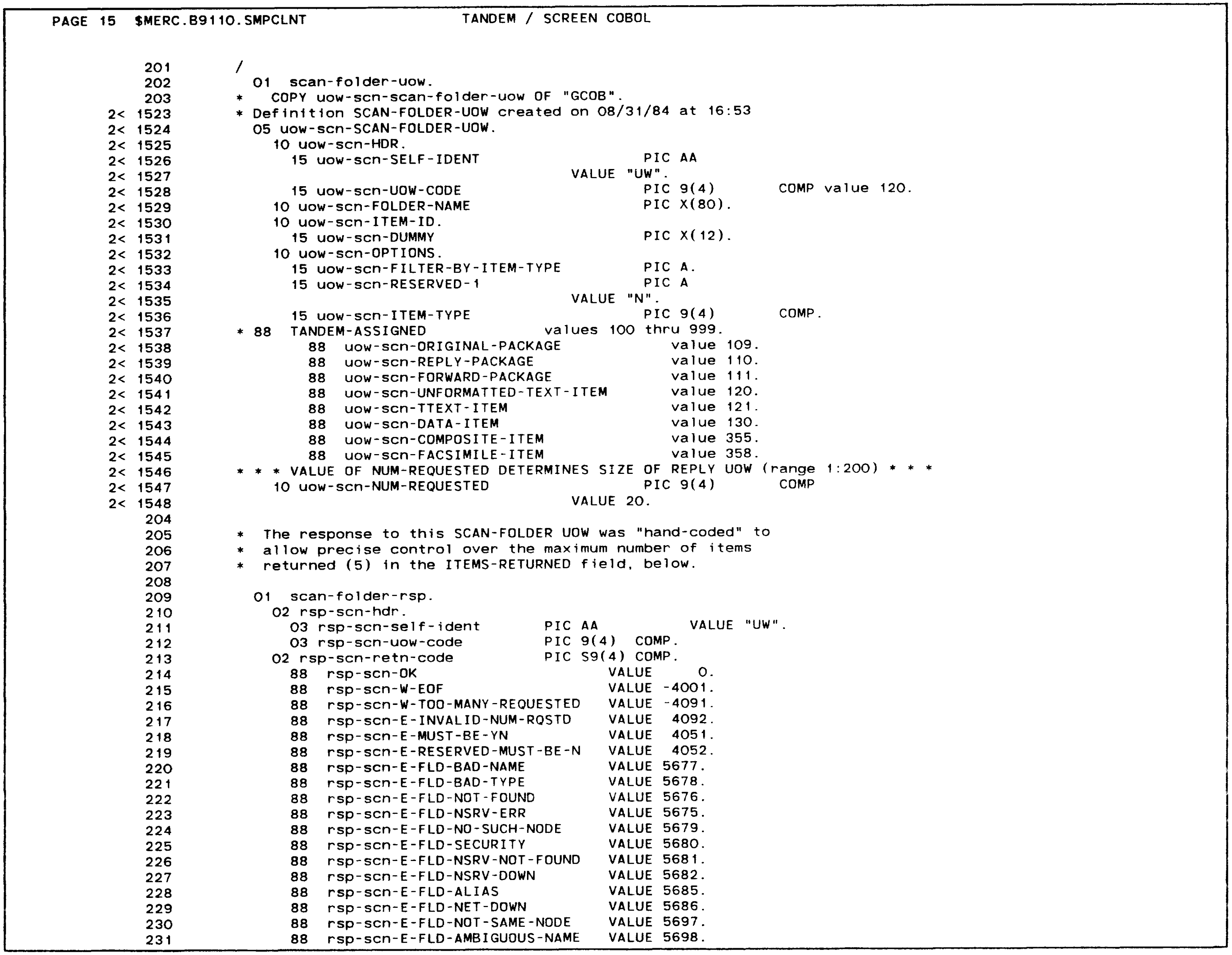
         194       /
         195         01  submit-pkg-uow.
         196       *   COPY uow-sp-submit-pkg-uow OF "GCOB".
     2< 1866       * Definition SUBMIT-PKG-UOW created on 08/31/84 at 16:55
     2< 1867         05 uow-sp-SUBMIT-PKG-UOW.
     2< 1868           10 uow-sp-HDR.
     2< 1869             15 uow-sp-SELF-IDENT                  PIC AA
     2< 1870                                            VALUE "UW".
     2< 1871             15 uow-sp-UOW-CODE                    PIC 9(4)       COMP value 117.
     2< 1872           10 uow-sp-ITEM-ID.
     2< 1873             15 uow-sp-DUMMY                       PIC X(12).
         197
         198         01  submit-pkg-rsp.
         199       *   COPY rsp-sp-submit-pkg-rsp OF "GCOB".
     2< 1875       * Definition SUBMIT-PKG-RSP created on 08/31/84 at 16:55
     2< 1876         05 rsp-sp-SUBMIT-PKG-RSP.
     2< 1877           10 rsp-sp-HDR.
     2< 1878             15 rsp-sp-SELF-IDENT                  PIC AA
     2< 1879                                            VALUE "UW".
     2< 1880             15 rsp-sp-UOW-CODE                    PIC 9(4)       COMP.
     2< 1881           10 rsp-sp-RETN-CODE                     PIC S9(4)      COMP.
     2< 1882             88  rsp-sp-OK                     VALUE     0.
     2< 1883             88  rsp-sp-W-PRIORITY-REDUCED      VALUE -4079.
     2< 1884             88  rsp-sp-W-TIME-WINDOW-EXTENDED  VALUE -4075.
     2< 1885             88  rsp-sp-E-LIFESPAN-TOO-LONG     VALUE  4077.
     2< 1886             88  rsp-sp-E-BAD-TRANSACTION       VALUE  4010.
     2< 1887             88  rsp-sp-E-NO-RECIPS             VALUE  4082.
     2< 1888             88  rsp-sp-E-ITEM-NOT-FOUND        VALUE  4035.
     2< 1889             88  rsp-sp-E-ITEM-NOT-PKG-HDR      VALUE  4042.
     2< 1890             88  rsp-sp-E-NOT-CREATED-BY-YOU    VALUE  4083.
     2< 1891             88  rsp-sp-E-ITEM-UNALTERABLE      VALUE  4041.
     2< 1892             88  rsp-sp-E-TSCHED-UNAVAIL        VALUE  4045.
     2< 1893             88  rsp-sp-E-ITEM-TOO-COMPLEX      VALUE  4036.
     2< 1894           10 rsp-sp-RETN-CODE-DETAIL              PIC S9(4)      COMP.
         200       *********
```

Figure 7-5. SCREEN COBOL Code for Client (Continued)



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/
  01  scan-folder-uow.
*   COPY uow-scn-scan-folder-uow OF "GCOB".
* Definition SCAN-FOLDER-UOW created on 08/31/84 at 16:53
  05 uow-scn-SCAN-FOLDER-UOW.
    10 uow-scn-HDR.
      15 uow-scn-SELF-IDENT                       PIC AA
                                          VALUE "UW".
      15 uow-scn-UOW-CODE                         PIC 9(4)       COMP value 120.
    10 uow-scn-FOLDER-NAME                        PIC X(80).
    10 uow-scn-ITEM-ID.
      15 uow-scn-DUMMY                            PIC X(12).
    10 uow-scn-OPTIONS.
      15 uow-scn-FILTER-BY-ITEM-TYPE              PIC A.
      15 uow-scn-RESERVED-1                       PIC A
                                          VALUE "N".
      15 uow-scn-ITEM-TYPE                        PIC 9(4)       COMP.
* 88  TANDEM-ASSIGNED              values 100 thru 999.
        88  uow-scn-ORIGINAL-PACKAGE                 value 109.
        88  uow-scn-REPLY-PACKAGE                    value 110.
        88  uow-scn-FORWARD-PACKAGE                  value 111.
        88  uow-scn-UNFORMATTED-TEXT-ITEM            value 120.
        88  uow-scn-TTEXT-ITEM                       value 121.
        88  uow-scn-DATA-ITEM                        value 130.
        88  uow-scn-COMPOSITE-ITEM                   value 355.
        88  uow-scn-FACSIMILE-ITEM                   value 358.
* * * VALUE OF NUM-REQUESTED DETERMINES SIZE OF REPLY UOW (range 1:200) * * *
    10 uow-scn-NUM-REQUESTED                      PIC 9(4)       COMP
                                          VALUE 20.

*  The response to this SCAN-FOLDER UOW was "hand-coded" to
*  allow precise control over the maximum number of items
*  returned (5) in the ITEMS-RETURNED field, below.

  01  scan-folder-rsp.
    02 rsp-scn-hdr.
      03 rsp-scn-self-ident       PIC AA          VALUE "UW".
      03 rsp-scn-uow-code         PIC 9(4)  COMP.
    02 rsp-scn-retn-code          PIC S9(4) COMP.
      88  rsp-scn-OK                     VALUE     0.
      88  rsp-scn-W-EOF                  VALUE -4001.
      88  rsp-scn-W-TOO-MANY-REQUESTED   VALUE -4091.
      88  rsp-scn-E-INVALID-NUM-RQSTD    VALUE  4092.
      88  rsp-scn-E-MUST-BE-YN           VALUE  4051.
      88  rsp-scn-E-RESERVED-MUST-BE-N   VALUE  4052.
      88  rsp-scn-E-FLD-BAD-NAME         VALUE 5677.
      88  rsp-scn-E-FLD-BAD-TYPE         VALUE 5678.
      88  rsp-scn-E-FLD-NOT-FOUND        VALUE 5676.
      88  rsp-scn-E-FLD-NSRV-ERR         VALUE 5675.
      88  rsp-scn-E-FLD-NO-SUCH-NODE     VALUE 5679.
      88  rsp-scn-E-FLD-SECURITY         VALUE 5680.
      88  rsp-scn-E-FLD-NSRV-NOT-FOUND   VALUE 5681.
      88  rsp-scn-E-FLD-NSRV-DOWN        VALUE 5682.
      88  rsp-scn-E-FLD-ALIAS            VALUE 5685.
      88  rsp-scn-E-FLD-NET-DOWN         VALUE 5686.
      88  rsp-scn-E-FLD-NOT-SAME-NODE    VALUE 5697.
      88  rsp-scn-E-FLD-AMBIGUOUS-NAME   VALUE 5698.
```
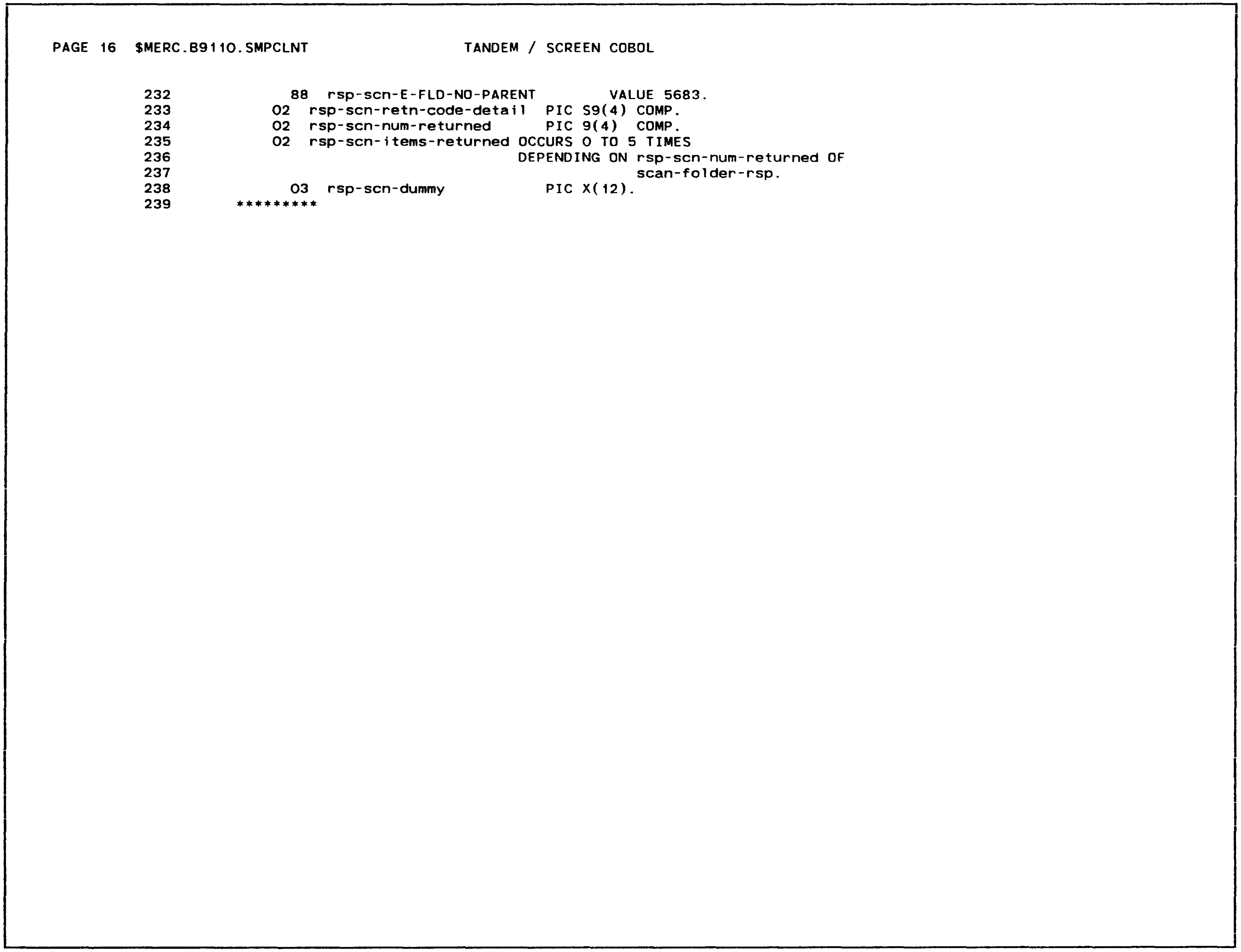

Figure 7-5. SCREEN COBOL Code for Client (Continued)



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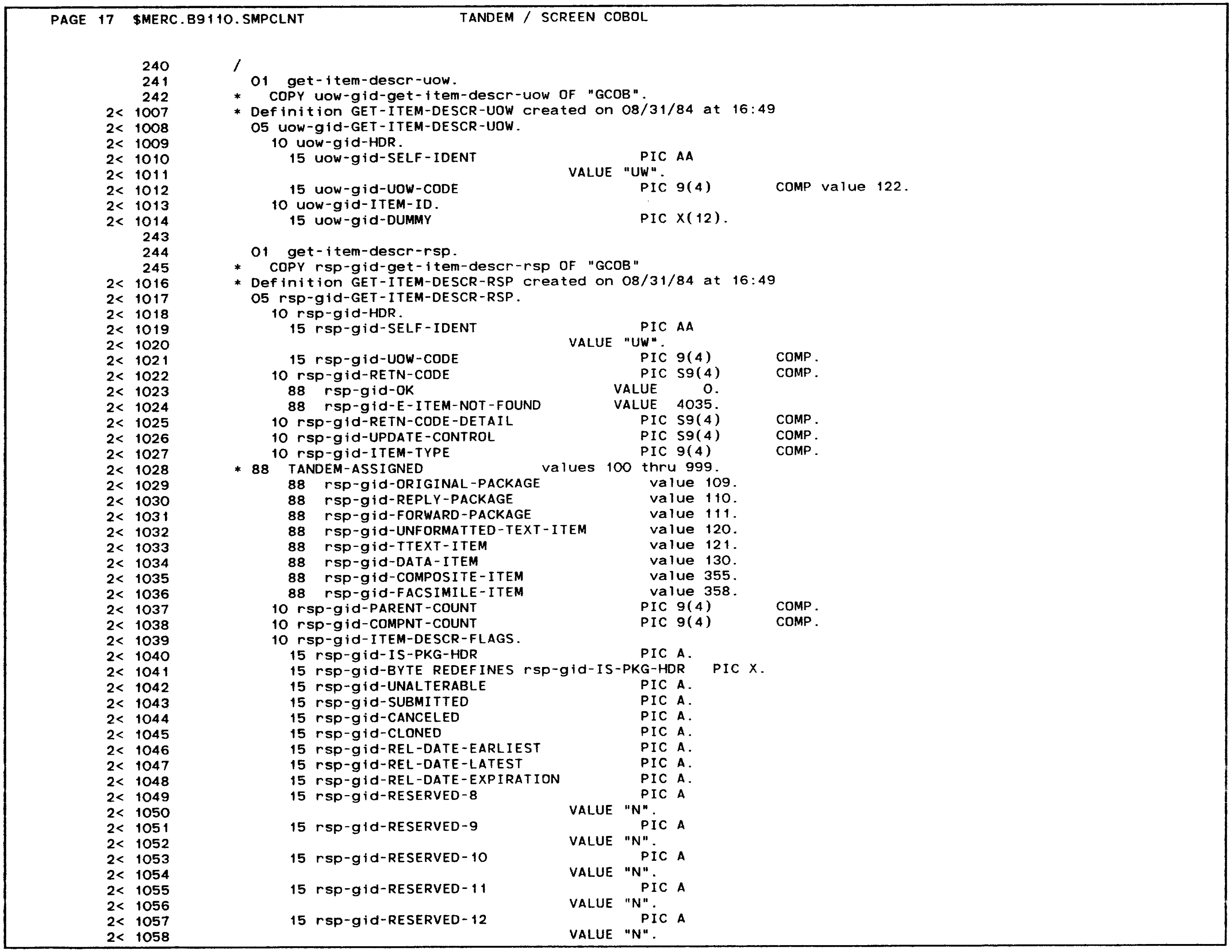
      88  rsp-scn-E-FLD-NO-PARENT        VALUE 5683.
    02  rsp-scn-retn-code-detail  PIC S9(4) COMP.
    02  rsp-scn-num-returned      PIC 9(4)  COMP.
    02  rsp-scn-items-returned OCCURS 0 TO 5 TIMES
                               DEPENDING ON rsp-scn-num-returned OF
                                            scan-folder-rsp.
      03  rsp-scn-dummy           PIC X(12).
*********
```

Figure 7-5. SCREEN COBOL Code for Client (Continued)



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              240        /
              241          01  get-item-descr-uow.
              242        *   COPY uow-gid-get-item-descr-uow OF "GCOB".
          2< 1007        * Definition GET-ITEM-DESCR-UOW created on 08/31/84 at 16:49
          2< 1008          05 uow-gid-GET-ITEM-DESCR-UOW.
          2< 1009            10 uow-gid-HDR.
          2< 1010              15 uow-gid-SELF-IDENT                    PIC AA
          2< 1011                                               VALUE "UW".
          2< 1012              15 uow-gid-UOW-CODE                      PIC 9(4)       COMP value 122.
          2< 1013            10 uow-gid-ITEM-ID.
          2< 1014              15 uow-gid-DUMMY                         PIC X(12).
              243
              244          01  get-item-descr-rsp.
              245        *   COPY rsp-gid-get-item-descr-rsp OF "GCOB"
          2< 1016        * Definition GET-ITEM-DESCR-RSP created on 08/31/84 at 16:49
          2< 1017          05 rsp-gid-GET-ITEM-DESCR-RSP.
          2< 1018            10 rsp-gid-HDR.
          2< 1019              15 rsp-gid-SELF-IDENT                    PIC AA
          2< 1020                                               VALUE "UW".
          2< 1021              15 rsp-gid-UOW-CODE                      PIC 9(4)       COMP.
          2< 1022            10 rsp-gid-RETN-CODE                       PIC S9(4)      COMP.
          2< 1023              88  rsp-gid-OK                      VALUE     0.
          2< 1024              88  rsp-gid-E-ITEM-NOT-FOUND        VALUE  4035.
          2< 1025            10 rsp-gid-RETN-CODE-DETAIL                PIC S9(4)      COMP.
          2< 1026            10 rsp-gid-UPDATE-CONTROL                  PIC S9(4)      COMP.
          2< 1027            10 rsp-gid-ITEM-TYPE                       PIC 9(4)       COMP.
          2< 1028        * 88  TANDEM-ASSIGNED              values 100 thru 999.
          2< 1029              88  rsp-gid-ORIGINAL-PACKAGE              value 109.
          2< 1030              88  rsp-gid-REPLY-PACKAGE                 value 110.
          2< 1031              88  rsp-gid-FORWARD-PACKAGE               value 111.
          2< 1032              88  rsp-gid-UNFORMATTED-TEXT-ITEM         value 120.
          2< 1033              88  rsp-gid-TTEXT-ITEM                    value 121.
          2< 1034              88  rsp-gid-DATA-ITEM                     value 130.
          2< 1035              88  rsp-gid-COMPOSITE-ITEM                value 355.
          2< 1036              88  rsp-gid-FACSIMILE-ITEM                value 358.
          2< 1037            10 rsp-gid-PARENT-COUNT                    PIC 9(4)       COMP.
          2< 1038            10 rsp-gid-COMPNT-COUNT                    PIC 9(4)       COMP.
          2< 1039            10 rsp-gid-ITEM-DESCR-FLAGS.
          2< 1040              15 rsp-gid-IS-PKG-HDR                    PIC A.
          2< 1041              15 rsp-gid-BYTE REDEFINES rsp-gid-IS-PKG-HDR   PIC X.
          2< 1042              15 rsp-gid-UNALTERABLE                   PIC A.
          2< 1043              15 rsp-gid-SUBMITTED                     PIC A.
          2< 1044              15 rsp-gid-CANCELED                      PIC A.
          2< 1045              15 rsp-gid-CLONED                        PIC A.
          2< 1046              15 rsp-gid-REL-DATE-EARLIEST             PIC A.
          2< 1047              15 rsp-gid-REL-DATE-LATEST               PIC A.
          2< 1048              15 rsp-gid-REL-DATE-EXPIRATION           PIC A.
          2< 1049              15 rsp-gid-RESERVED-8                    PIC A
          2< 1050                                               VALUE "N".
          2< 1051              15 rsp-gid-RESERVED-9                    PIC A
          2< 1052                                               VALUE "N".
          2< 1053              15 rsp-gid-RESERVED-10                   PIC A
          2< 1054                                               VALUE "N".
          2< 1055              15 rsp-gid-RESERVED-11                   PIC A
          2< 1056                                               VALUE "N".
          2< 1057              15 rsp-gid-RESERVED-12                   PIC A
          2< 1058                                               VALUE "N".
```
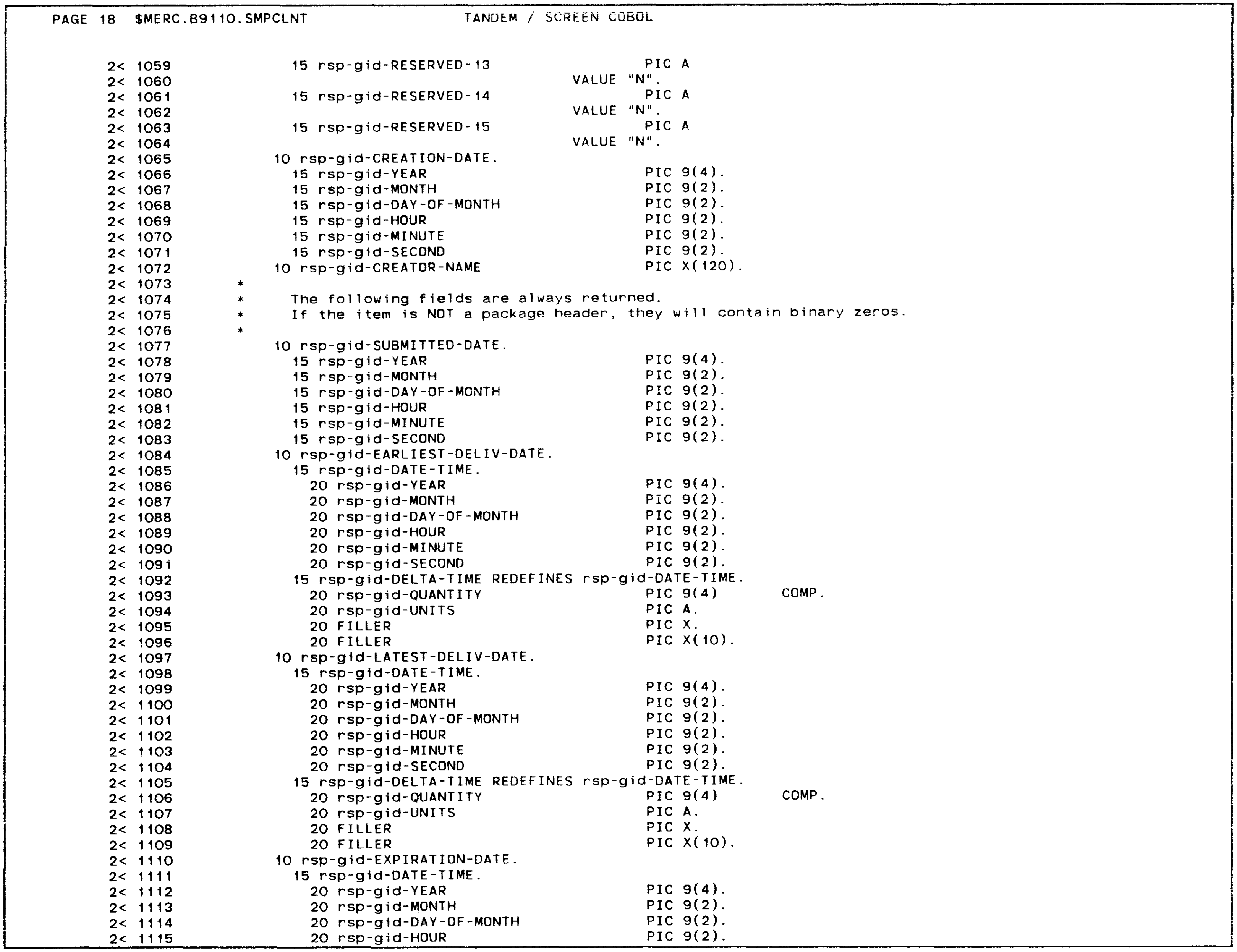

Figure 7-5. SCREEN COBOL Code for Client (Continued)



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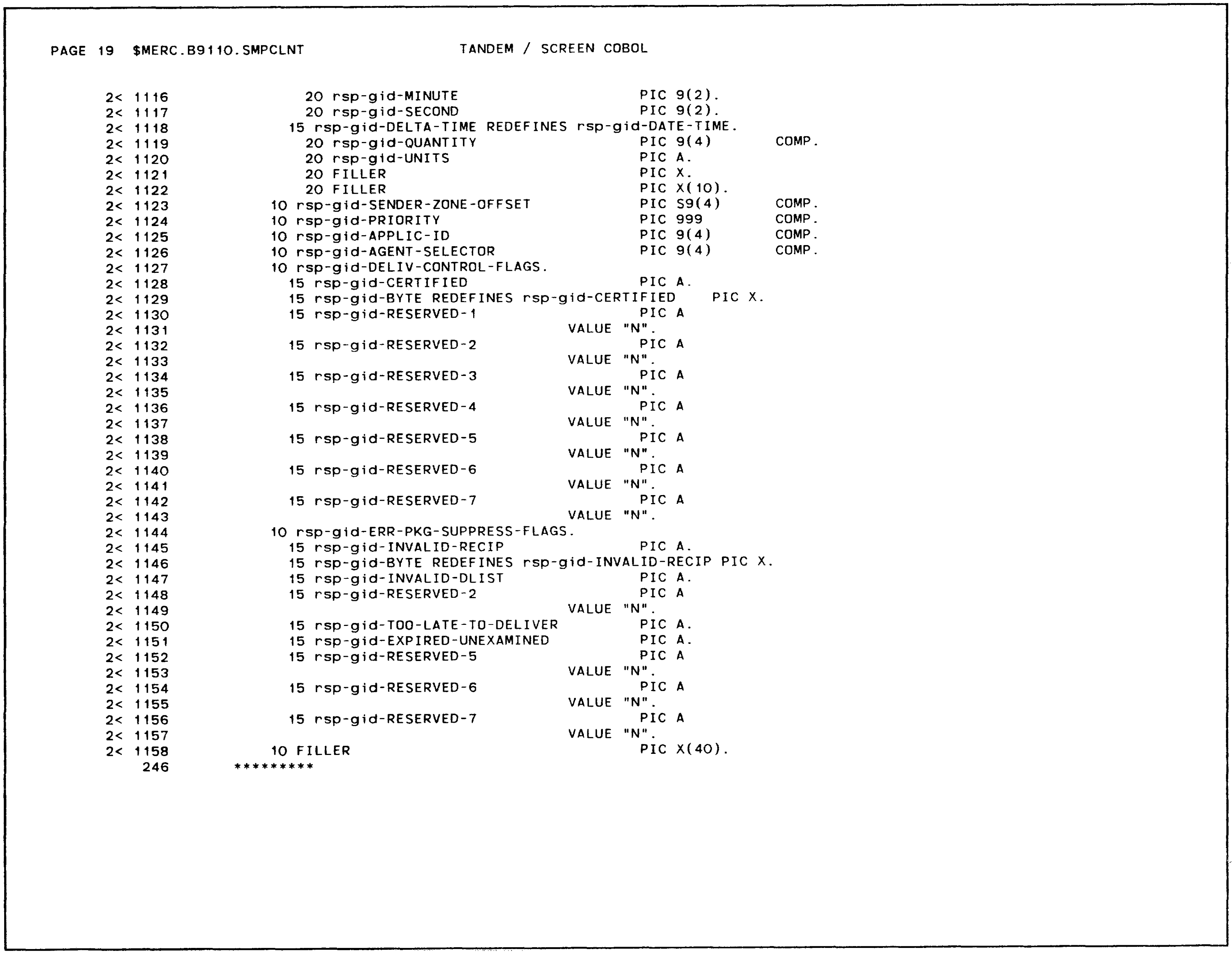
                           15 rsp-gid-RESERVED-13                 PIC A
                                                          VALUE "N".
                           15 rsp-gid-RESERVED-14                 PIC A
                                                          VALUE "N".
                           15 rsp-gid-RESERVED-15                 PIC A
                                                          VALUE "N".
                         10 rsp-gid-CREATION-DATE.
                           15 rsp-gid-YEAR                        PIC 9(4).
                           15 rsp-gid-MONTH                       PIC 9(2).
                           15 rsp-gid-DAY-OF-MONTH                PIC 9(2).
                           15 rsp-gid-HOUR                        PIC 9(2).
                           15 rsp-gid-MINUTE                      PIC 9(2).
                           15 rsp-gid-SECOND                      PIC 9(2).
                         10 rsp-gid-CREATOR-NAME                  PIC X(120).
                     *
                     *     The following fields are always returned.
                     *     If the item is NOT a package header, they will contain binary zeros.
                     *
                         10 rsp-gid-SUBMITTED-DATE.
                           15 rsp-gid-YEAR                        PIC 9(4).
                           15 rsp-gid-MONTH                       PIC 9(2).
                           15 rsp-gid-DAY-OF-MONTH                PIC 9(2).
                           15 rsp-gid-HOUR                        PIC 9(2).
                           15 rsp-gid-MINUTE                      PIC 9(2).
                           15 rsp-gid-SECOND                      PIC 9(2).
                         10 rsp-gid-EARLIEST-DELIV-DATE.
                           15 rsp-gid-DATE-TIME.
                             20 rsp-gid-YEAR                      PIC 9(4).
                             20 rsp-gid-MONTH                     PIC 9(2).
                             20 rsp-gid-DAY-OF-MONTH              PIC 9(2).
                             20 rsp-gid-HOUR                      PIC 9(2).
                             20 rsp-gid-MINUTE                    PIC 9(2).
                             20 rsp-gid-SECOND                    PIC 9(2).
                           15 rsp-gid-DELTA-TIME REDEFINES rsp-gid-DATE-TIME.
                             20 rsp-gid-QUANTITY                  PIC 9(4)       COMP.
                             20 rsp-gid-UNITS                     PIC A.
                             20 FILLER                            PIC X.
                             20 FILLER                            PIC X(10).
                         10 rsp-gid-LATEST-DELIV-DATE.
                           15 rsp-gid-DATE-TIME.
                             20 rsp-gid-YEAR                      PIC 9(4).
                             20 rsp-gid-MONTH                     PIC 9(2).
                             20 rsp-gid-DAY-OF-MONTH              PIC 9(2).
                             20 rsp-gid-HOUR                      PIC 9(2).
                             20 rsp-gid-MINUTE                    PIC 9(2).
                             20 rsp-gid-SECOND                    PIC 9(2).
                           15 rsp-gid-DELTA-TIME REDEFINES rsp-gid-DATE-TIME.
                             20 rsp-gid-QUANTITY                  PIC 9(4)       COMP.
                             20 rsp-gid-UNITS                     PIC A.
                             20 FILLER                            PIC X.
                             20 FILLER                            PIC X(10).
                         10 rsp-gid-EXPIRATION-DATE.
                           15 rsp-gid-DATE-TIME.
                             20 rsp-gid-YEAR                      PIC 9(4).
                             20 rsp-gid-MONTH                     PIC 9(2).
                             20 rsp-gid-DAY-OF-MONTH              PIC 9(2).
                             20 rsp-gid-HOUR                      PIC 9(2).
```

Figure 7-5. SCREEN COBOL Code for Client (Continued)



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      2< 1116               20 rsp-gid-MINUTE                    PIC 9(2).
      2< 1117               20 rsp-gid-SECOND                    PIC 9(2).
      2< 1118             15 rsp-gid-DELTA-TIME REDEFINES rsp-gid-DATE-TIME.
      2< 1119               20 rsp-gid-QUANTITY                  PIC 9(4)       COMP.
      2< 1120               20 rsp-gid-UNITS                     PIC A.
      2< 1121               20 FILLER                            PIC X.
      2< 1122               20 FILLER                            PIC X(10).
      2< 1123           10 rsp-gid-SENDER-ZONE-OFFSET            PIC S9(4)      COMP.
      2< 1124           10 rsp-gid-PRIORITY                      PIC 999        COMP.
      2< 1125           10 rsp-gid-APPLIC-ID                     PIC 9(4)       COMP.
      2< 1126           10 rsp-gid-AGENT-SELECTOR                PIC 9(4)       COMP.
      2< 1127           10 rsp-gid-DELIV-CONTROL-FLAGS.
      2< 1128             15 rsp-gid-CERTIFIED                   PIC A.
      2< 1129             15 rsp-gid-BYTE REDEFINES rsp-gid-CERTIFIED    PIC X.
      2< 1130             15 rsp-gid-RESERVED-1                  PIC A
      2< 1131                                            VALUE "N".
      2< 1132             15 rsp-gid-RESERVED-2                  PIC A
      2< 1133                                            VALUE "N".
      2< 1134             15 rsp-gid-RESERVED-3                  PIC A
      2< 1135                                            VALUE "N".
      2< 1136             15 rsp-gid-RESERVED-4                  PIC A
      2< 1137                                            VALUE "N".
      2< 1138             15 rsp-gid-RESERVED-5                  PIC A
      2< 1139                                            VALUE "N".
      2< 1140             15 rsp-gid-RESERVED-6                  PIC A
      2< 1141                                            VALUE "N".
      2< 1142             15 rsp-gid-RESERVED-7                  PIC A
      2< 1143                                            VALUE "N".
      2< 1144           10 rsp-gid-ERR-PKG-SUPPRESS-FLAGS.
      2< 1145             15 rsp-gid-INVALID-RECIP               PIC A.
      2< 1146             15 rsp-gid-BYTE REDEFINES rsp-gid-INVALID-RECIP PIC X.
      2< 1147             15 rsp-gid-INVALID-DLIST               PIC A.
      2< 1148             15 rsp-gid-RESERVED-2                  PIC A
      2< 1149                                            VALUE "N".
      2< 1150             15 rsp-gid-TOO-LATE-TO-DELIVER         PIC A.
      2< 1151             15 rsp-gid-EXPIRED-UNEXAMINED          PIC A.
      2< 1152             15 rsp-gid-RESERVED-5                  PIC A
      2< 1153                                            VALUE "N".
      2< 1154             15 rsp-gid-RESERVED-6                  PIC A
      2< 1155                                            VALUE "N".
      2< 1156             15 rsp-gid-RESERVED-7                  PIC A
      2< 1157                                            VALUE "N".
      2< 1158           10 FILLER                                PIC X(40).
          246       *********
```
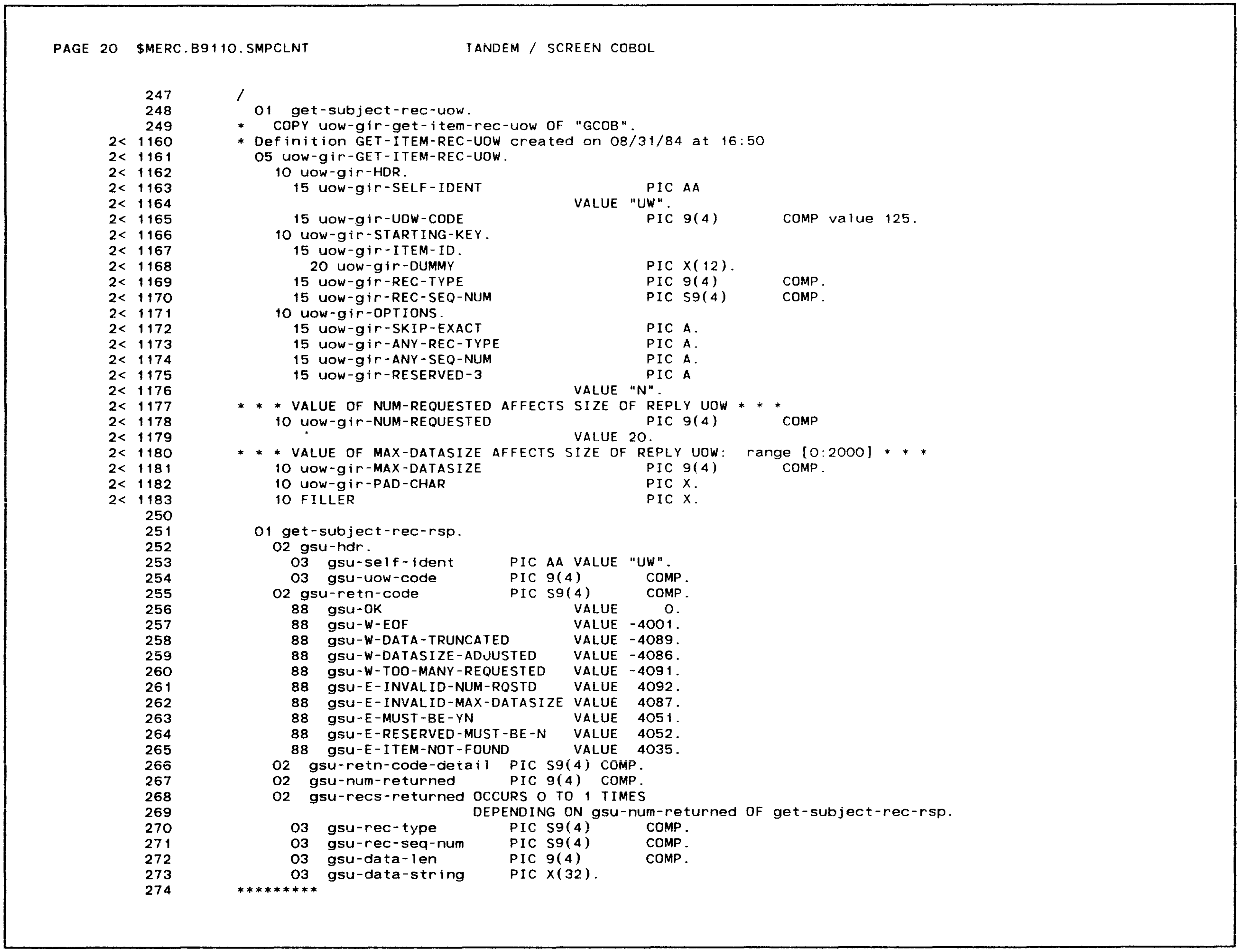
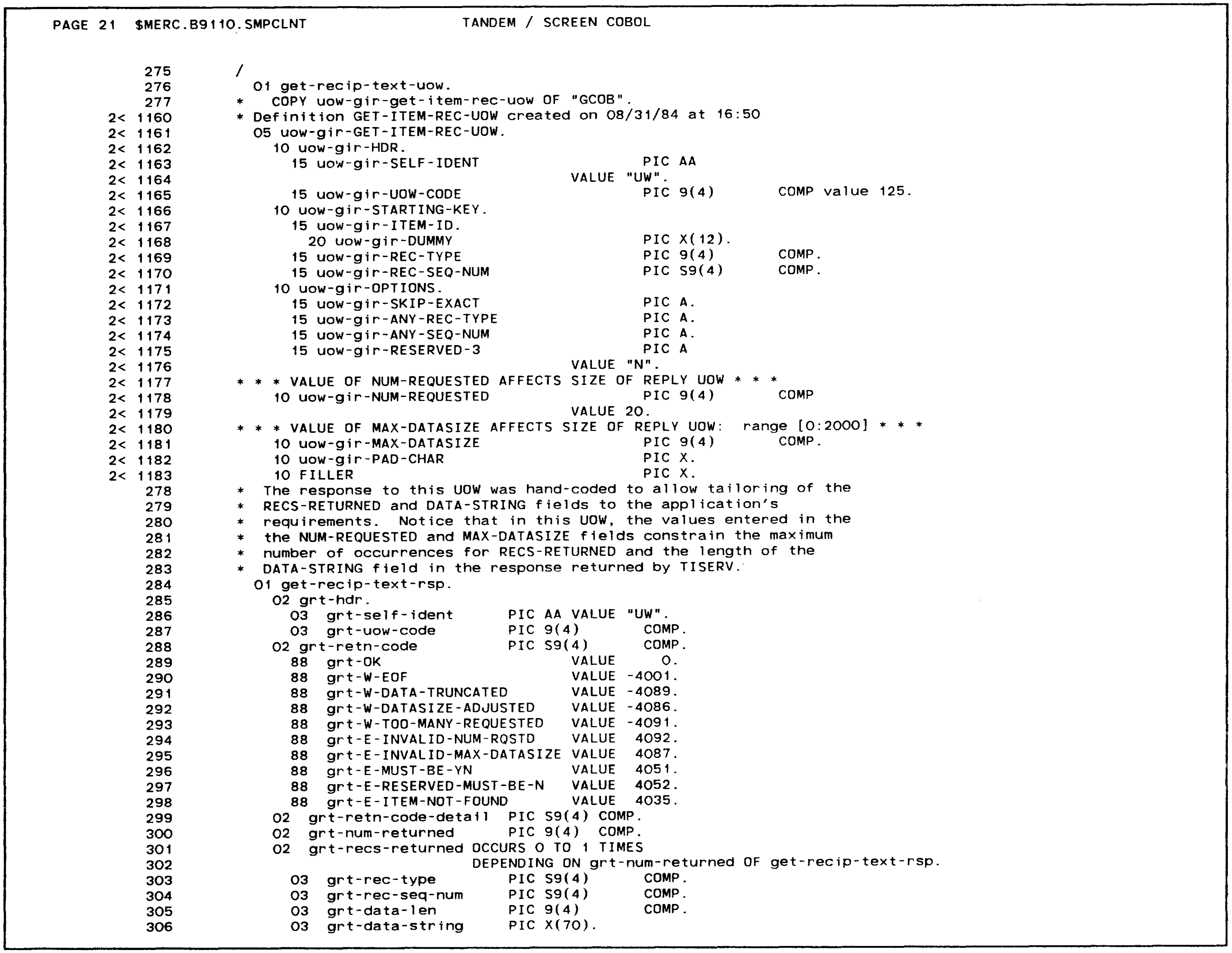

Figure 7-5. SCREEN COBOL Code for Client (Continued)



```
PAGE 20  $MERC.B9110.SMPCLNT                TANDEM / SCREEN COBOL

/
  01  get-subject-rec-uow.
*   COPY uow-gir-get-item-rec-uow OF "GCOB".
* Definition GET-ITEM-REC-UOW created on 08/31/84 at 16:50
  05 uow-gir-GET-ITEM-REC-UOW.
    10 uow-gir-HDR.
      15 uow-gir-SELF-IDENT                  PIC AA
                                     VALUE "UW".
      15 uow-gir-UOW-CODE                    PIC 9(4)       COMP value 125.
    10 uow-gir-STARTING-KEY.
      15 uow-gir-ITEM-ID.
        20 uow-gir-DUMMY                     PIC X(12).
      15 uow-gir-REC-TYPE                    PIC 9(4)       COMP.
      15 uow-gir-REC-SEQ-NUM                 PIC S9(4)      COMP.
    10 uow-gir-OPTIONS.
      15 uow-gir-SKIP-EXACT                  PIC A.
      15 uow-gir-ANY-REC-TYPE                PIC A.
      15 uow-gir-ANY-SEQ-NUM                 PIC A.
      15 uow-gir-RESERVED-3                  PIC A
                                     VALUE "N".
* * * VALUE OF NUM-REQUESTED AFFECTS SIZE OF REPLY UOW * * *
    10 uow-gir-NUM-REQUESTED                 PIC 9(4)       COMP
                                     VALUE 20.
* * * VALUE OF MAX-DATASIZE AFFECTS SIZE OF REPLY UOW:  range [0:2000] * * *
    10 uow-gir-MAX-DATASIZE                  PIC 9(4)       COMP.
    10 uow-gir-PAD-CHAR                      PIC X.
    10 FILLER                                PIC X.

  01 get-subject-rec-rsp.
    02 gsu-hdr.
      03  gsu-self-ident      PIC AA VALUE "UW".
      03  gsu-uow-code        PIC 9(4)       COMP.
    02 gsu-retn-code          PIC S9(4)      COMP.
      88  gsu-OK                     VALUE     0.
      88  gsu-W-EOF                  VALUE -4001.
      88  gsu-W-DATA-TRUNCATED       VALUE -4089.
      88  gsu-W-DATASIZE-ADJUSTED    VALUE -4086.
      88  gsu-W-TOO-MANY-REQUESTED   VALUE -4091.
      88  gsu-E-INVALID-NUM-RQSTD    VALUE  4092.
      88  gsu-E-INVALID-MAX-DATASIZE VALUE  4087.
      88  gsu-E-MUST-BE-YN           VALUE  4051.
      88  gsu-E-RESERVED-MUST-BE-N   VALUE  4052.
      88  gsu-E-ITEM-NOT-FOUND       VALUE  4035.
    02  gsu-retn-code-detail  PIC S9(4) COMP.
    02  gsu-num-returned      PIC 9(4)  COMP.
    02  gsu-recs-returned OCCURS 0 TO 1 TIMES
                          DEPENDING ON gsu-num-returned OF get-subject-rec-rsp.
      03  gsu-rec-type        PIC S9(4)      COMP.
      03  gsu-rec-seq-num     PIC S9(4)      COMP.
      03  gsu-data-len        PIC 9(4)       COMP.
      03  gsu-data-string     PIC X(32).
*********
```

Figure 7-5. SCREEN COBOL Code for Client (Continued)



```
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/
  01 get-recip-text-uow.
*   COPY uow-gir-get-item-rec-uow OF "GCOB".
* Definition GET-ITEM-REC-UOW created on 08/31/84 at 16:50
  05 uow-gir-GET-ITEM-REC-UOW.
    10 uow-gir-HDR.
      15 uow-gir-SELF-IDENT                      PIC AA
                                         VALUE "UW".
      15 uow-gir-UOW-CODE                        PIC 9(4)       COMP value 125.
    10 uow-gir-STARTING-KEY.
      15 uow-gir-ITEM-ID.
        20 uow-gir-DUMMY                         PIC X(12).
      15 uow-gir-REC-TYPE                        PIC 9(4)       COMP.
      15 uow-gir-REC-SEQ-NUM                     PIC S9(4)      COMP.
    10 uow-gir-OPTIONS.
      15 uow-gir-SKIP-EXACT                      PIC A.
      15 uow-gir-ANY-REC-TYPE                    PIC A.
      15 uow-gir-ANY-SEQ-NUM                     PIC A.
      15 uow-gir-RESERVED-3                      PIC A
                                         VALUE "N".
* * * VALUE OF NUM-REQUESTED AFFECTS SIZE OF REPLY UOW * * *
    10 uow-gir-NUM-REQUESTED                     PIC 9(4)       COMP
                                         VALUE 20.
* * * VALUE OF MAX-DATASIZE AFFECTS SIZE OF REPLY UOW:  range [0:2000] * * *
    10 uow-gir-MAX-DATASIZE                      PIC 9(4)       COMP.
    10 uow-gir-PAD-CHAR                          PIC X.
    10 FILLER                                    PIC X.
*  The response to this UOW was hand-coded to allow tailoring of the
*  RECS-RETURNED and DATA-STRING fields to the application's
*  requirements.  Notice that in this UOW, the values entered in the
*  the NUM-REQUESTED and MAX-DATASIZE fields constrain the maximum
*  number of occurrences for RECS-RETURNED and the length of the
*  DATA-STRING field in the response returned by TISERV.
  01 get-recip-text-rsp.
    02 grt-hdr.
      03  grt-self-ident      PIC AA VALUE "UW".
      03  grt-uow-code        PIC 9(4)       COMP.
    02 grt-retn-code          PIC S9(4)      COMP.
      88  grt-OK                     VALUE     0.
      88  grt-W-EOF                  VALUE -4001.
      88  grt-W-DATA-TRUNCATED       VALUE -4089.
      88  grt-W-DATASIZE-ADJUSTED    VALUE -4086.
      88  grt-W-TOO-MANY-REQUESTED   VALUE -4091.
      88  grt-E-INVALID-NUM-RQSTD    VALUE  4092.
      88  grt-E-INVALID-MAX-DATASIZE VALUE  4087.
      88  grt-E-MUST-BE-YN           VALUE  4051.
      88  grt-E-RESERVED-MUST-BE-N   VALUE  4052.
      88  grt-E-ITEM-NOT-FOUND       VALUE  4035.
    02  grt-retn-code-detail  PIC S9(4) COMP.
    02  grt-num-returned      PIC 9(4)  COMP.
    02  grt-recs-returned OCCURS 0 TO 1 TIMES
                          DEPENDING ON grt-num-returned OF get-recip-text-rsp.
      03  grt-rec-type        PIC S9(4)      COMP.
      03  grt-rec-seq-num     PIC S9(4)      COMP.
      03  grt-data-len        PIC 9(4)       COMP.
      03  grt-data-string     PIC X(70).
```
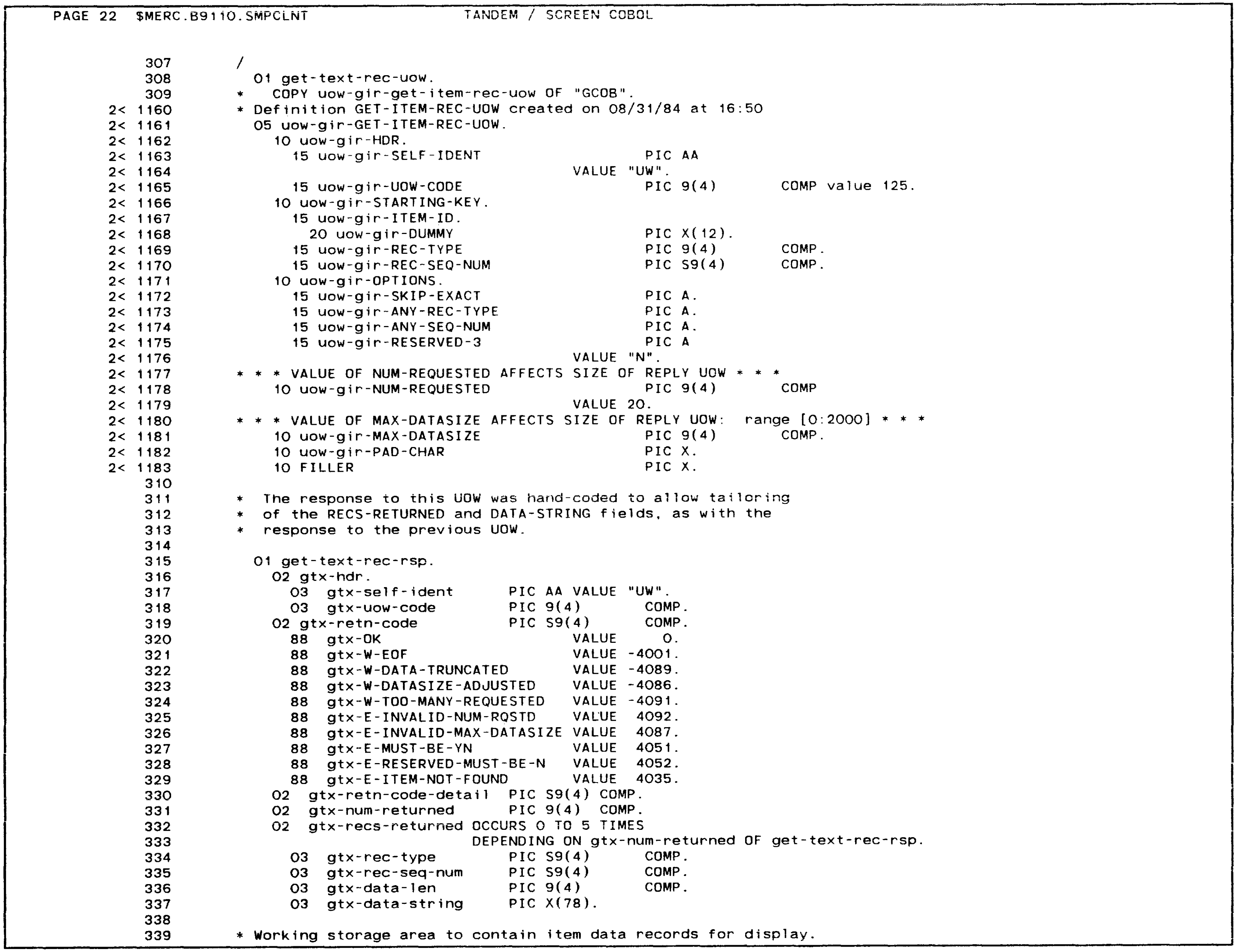

Figure 7-5. SCREEN COBOL Code for Client (Continued)



```
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/
  01 get-text-rec-uow.
*   COPY uow-gir-get-item-rec-uow OF "GCOB".
* Definition GET-ITEM-REC-UOW created on 08/31/84 at 16:50
  05 uow-gir-GET-ITEM-REC-UOW.
    10 uow-gir-HDR.
      15 uow-gir-SELF-IDENT                   PIC AA
                                      VALUE "UW".
      15 uow-gir-UOW-CODE                     PIC 9(4)       COMP value 125.
    10 uow-gir-STARTING-KEY.
      15 uow-gir-ITEM-ID.
        20 uow-gir-DUMMY                      PIC X(12).
      15 uow-gir-REC-TYPE                     PIC 9(4)       COMP.
      15 uow-gir-REC-SEQ-NUM                  PIC S9(4)      COMP.
    10 uow-gir-OPTIONS.
      15 uow-gir-SKIP-EXACT                   PIC A.
      15 uow-gir-ANY-REC-TYPE                 PIC A.
      15 uow-gir-ANY-SEQ-NUM                  PIC A.
      15 uow-gir-RESERVED-3                   PIC A
                                      VALUE "N".
* * * VALUE OF NUM-REQUESTED AFFECTS SIZE OF REPLY UOW * * *
    10 uow-gir-NUM-REQUESTED                  PIC 9(4)       COMP
                                      VALUE 20.
* * * VALUE OF MAX-DATASIZE AFFECTS SIZE OF REPLY UOW:  range [0:2000] * * *
    10 uow-gir-MAX-DATASIZE                   PIC 9(4)       COMP.
    10 uow-gir-PAD-CHAR                       PIC X.
    10 FILLER                                 PIC X.

*  The response to this UOW was hand-coded to allow tailoring
*  of the RECS-RETURNED and DATA-STRING fields, as with the
*  response to the previous UOW.

  01 get-text-rec-rsp.
    02 gtx-hdr.
      03  gtx-self-ident      PIC AA VALUE "UW".
      03  gtx-uow-code        PIC 9(4)       COMP.
    02 gtx-retn-code          PIC S9(4)      COMP.
      88  gtx-OK                     VALUE     0.
      88  gtx-W-EOF                  VALUE -4001.
      88  gtx-W-DATA-TRUNCATED       VALUE -4089.
      88  gtx-W-DATASIZE-ADJUSTED    VALUE -4086.
      88  gtx-W-TOO-MANY-REQUESTED   VALUE -4091.
      88  gtx-E-INVALID-NUM-RQSTD    VALUE  4092.
      88  gtx-E-INVALID-MAX-DATASIZE VALUE  4087.
      88  gtx-E-MUST-BE-YN           VALUE  4051.
      88  gtx-E-RESERVED-MUST-BE-N   VALUE  4052.
      88  gtx-E-ITEM-NOT-FOUND       VALUE  4035.
    02  gtx-retn-code-detail  PIC S9(4) COMP.
    02  gtx-num-returned      PIC 9(4)  COMP.
    02  gtx-recs-returned OCCURS 0 TO 5 TIMES
                          DEPENDING ON gtx-num-returned OF get-text-rec-rsp.
      03  gtx-rec-type        PIC S9(4)      COMP.
      03  gtx-rec-seq-num     PIC S9(4)      COMP.
      03  gtx-data-len        PIC 9(4)       COMP.
      03  gtx-data-string     PIC X(78).

* Working storage area to contain item data records for display.
```
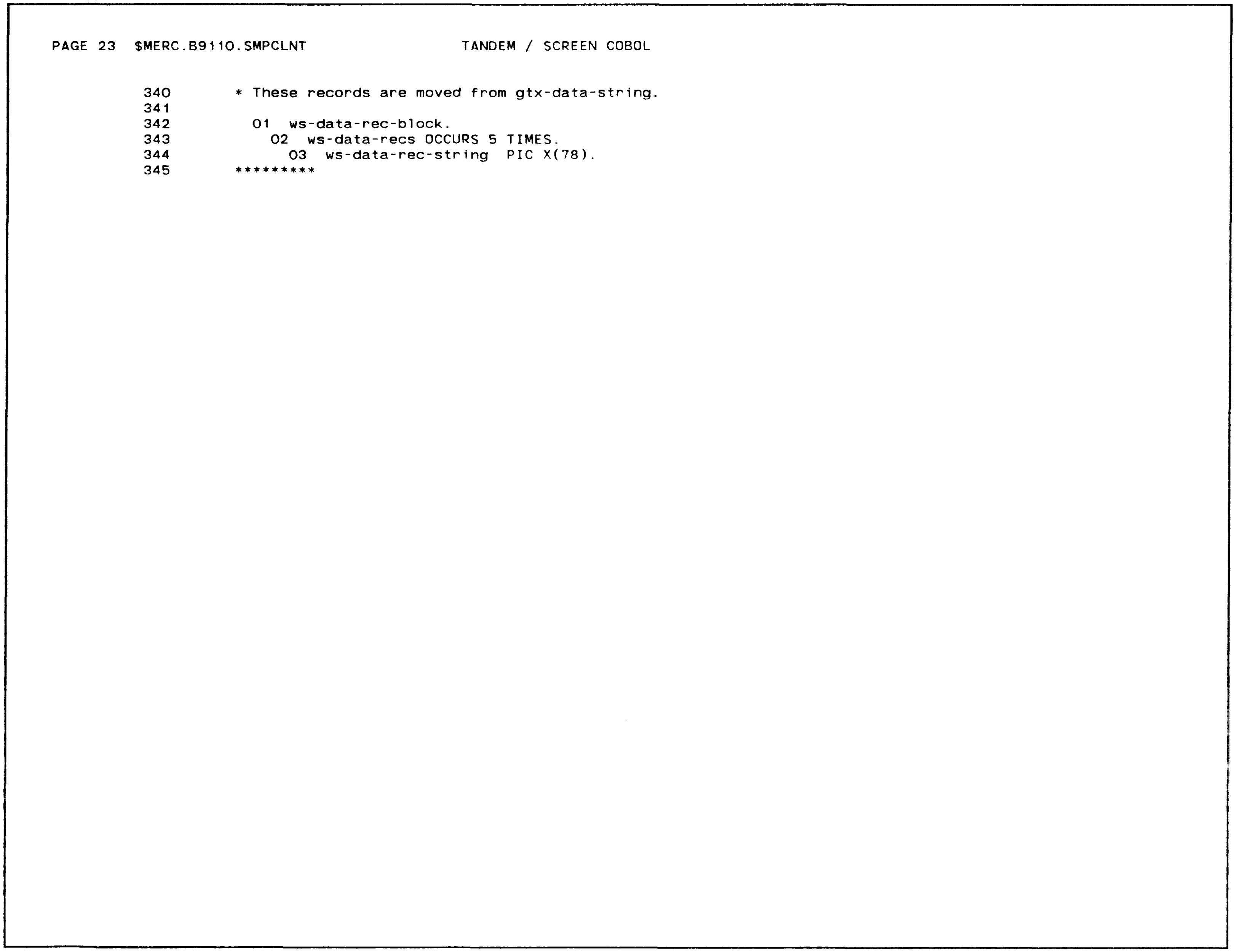

Figure 7-5. SCREEN COBOL Code for Client (Continued)



```
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          * These records are moved from gtx-data-string.

            01  ws-data-rec-block.
              02  ws-data-recs OCCURS 5 TIMES.
                03  ws-data-rec-string  PIC X(78).
          *********
```
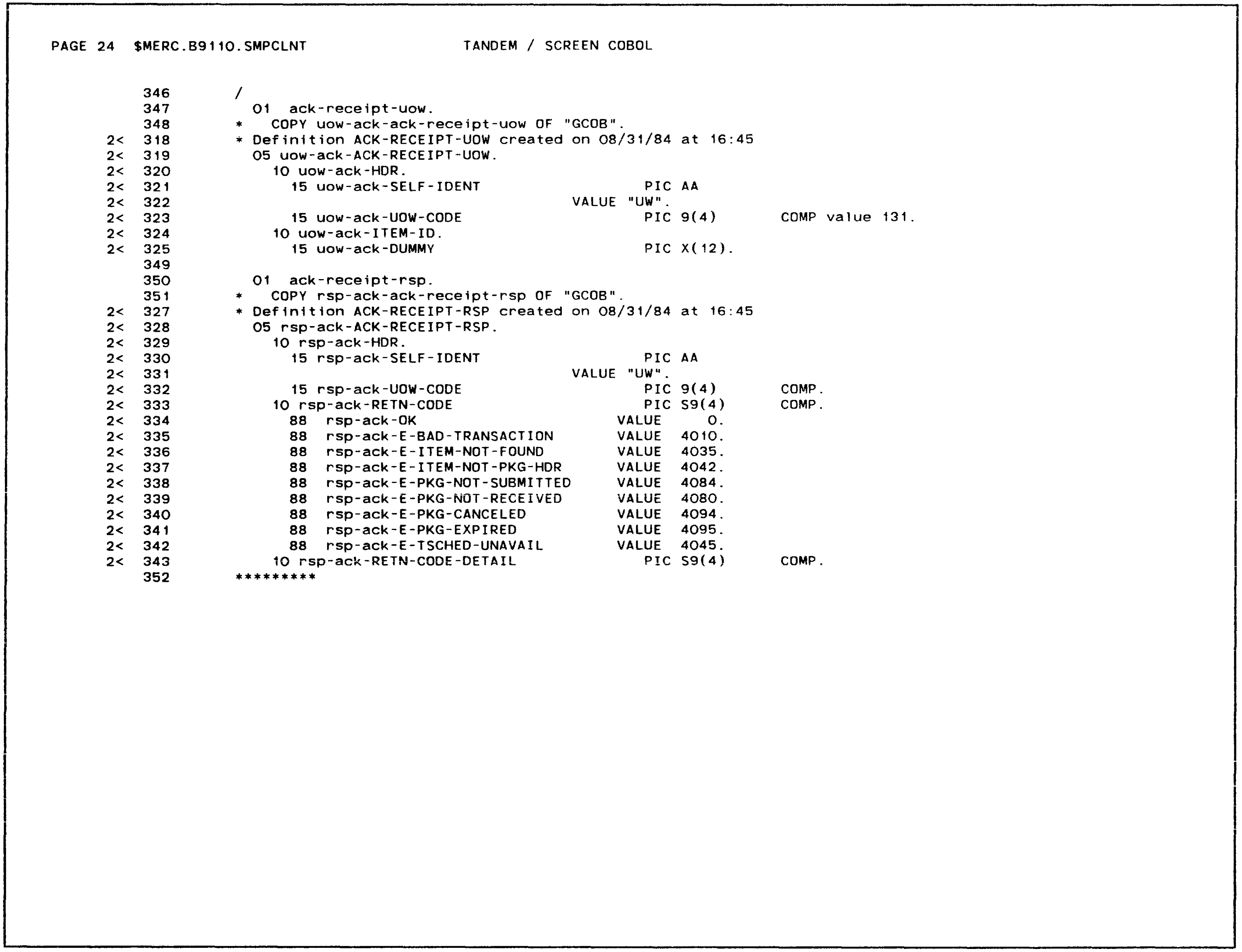
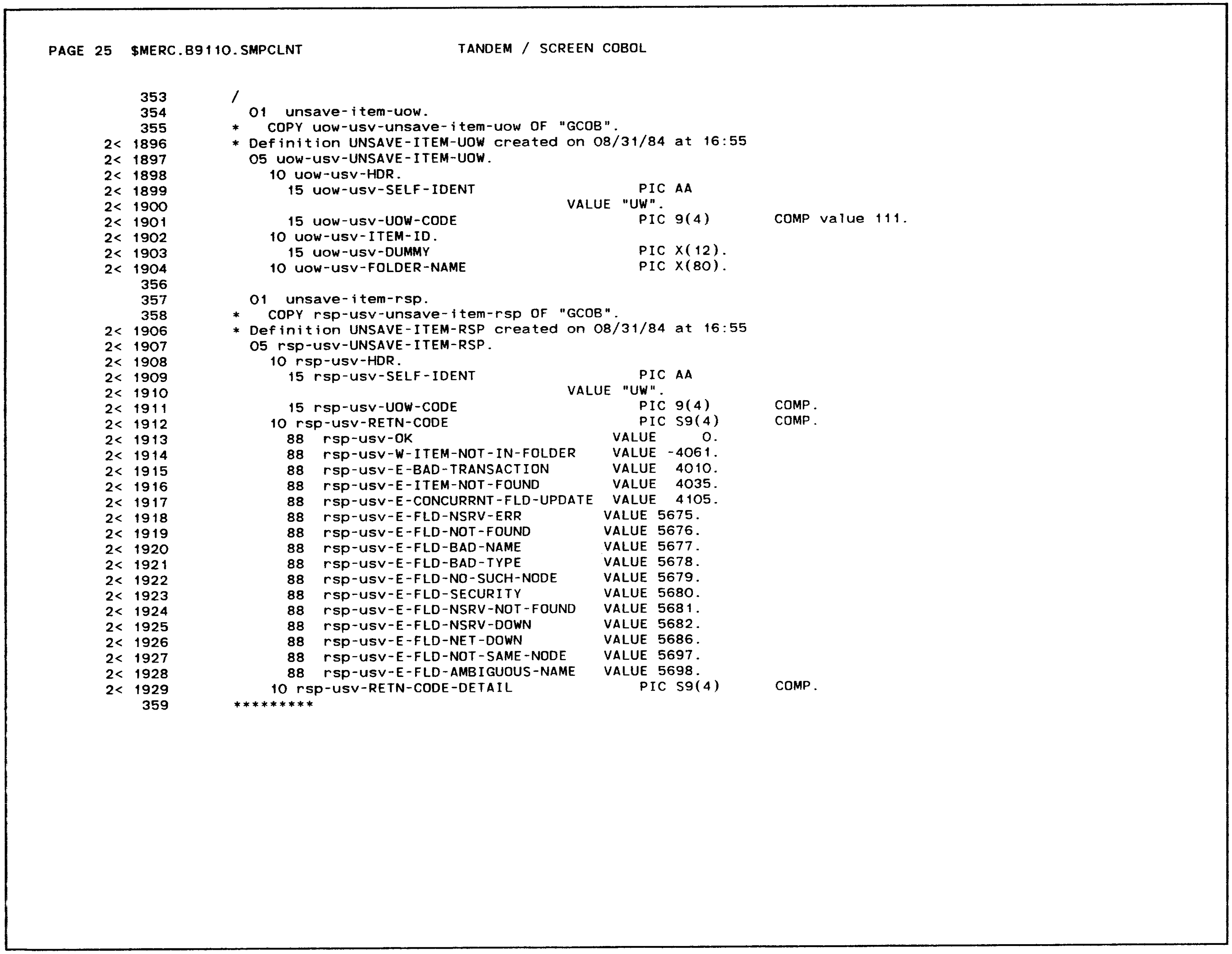

Figure 7-5. SCREEN COBOL Code for Client (Continued)



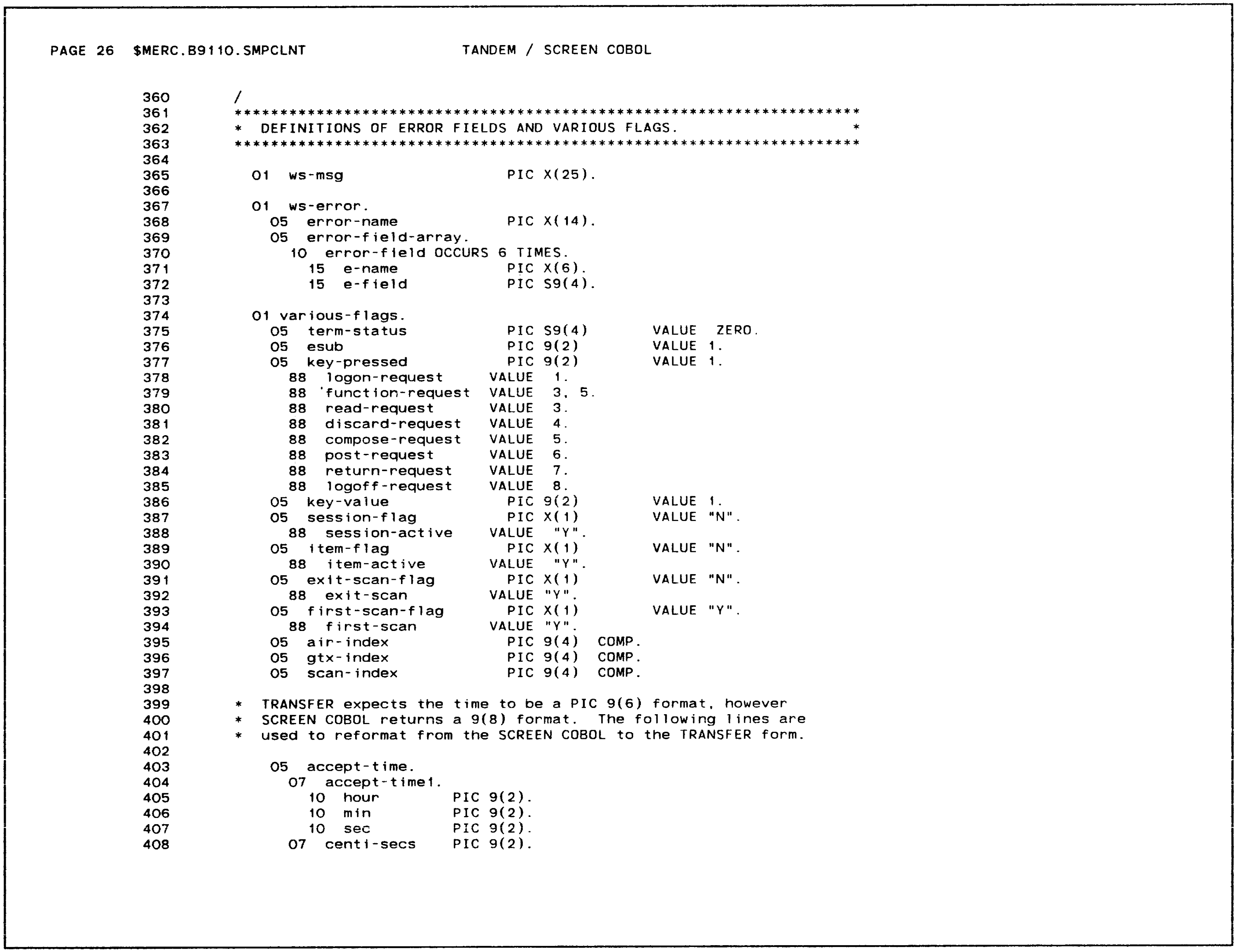
```
PAGE 24  $MERC.B9110.SMPCLNT                  TANDEM / SCREEN COBOL

           346        /
           347          01  ack-receipt-uow.
           348        *   COPY uow-ack-ack-receipt-uow OF "GCOB".
       2<  318        * Definition ACK-RECEIPT-UOW created on 08/31/84 at 16:45
       2<  319          05 uow-ack-ACK-RECEIPT-UOW.
       2<  320            10 uow-ack-HDR.
       2<  321              15 uow-ack-SELF-IDENT                 PIC AA
       2<  322                                            VALUE "UW".
       2<  323              15 uow-ack-UOW-CODE                   PIC 9(4)      COMP value 131.
       2<  324            10 uow-ack-ITEM-ID.
       2<  325              15 uow-ack-DUMMY                      PIC X(12).
           349
           350          01  ack-receipt-rsp.
           351        *   COPY rsp-ack-ack-receipt-rsp OF "GCOB".
       2<  327        * Definition ACK-RECEIPT-RSP created on 08/31/84 at 16:45
       2<  328          05 rsp-ack-ACK-RECEIPT-RSP.
       2<  329            10 rsp-ack-HDR.
       2<  330              15 rsp-ack-SELF-IDENT                 PIC AA
       2<  331                                            VALUE "UW".
       2<  332              15 rsp-ack-UOW-CODE                   PIC 9(4)      COMP.
       2<  333            10 rsp-ack-RETN-CODE                    PIC S9(4)     COMP.
       2<  334              88  rsp-ack-OK                   VALUE     0.
       2<  335              88  rsp-ack-E-BAD-TRANSACTION    VALUE  4010.
       2<  336              88  rsp-ack-E-ITEM-NOT-FOUND     VALUE  4035.
       2<  337              88  rsp-ack-E-ITEM-NOT-PKG-HDR   VALUE  4042.
       2<  338              88  rsp-ack-E-PKG-NOT-SUBMITTED  VALUE  4084.
       2<  339              88  rsp-ack-E-PKG-NOT-RECEIVED   VALUE  4080.
       2<  340              88  rsp-ack-E-PKG-CANCELED       VALUE  4094.
       2<  341              88  rsp-ack-E-PKG-EXPIRED        VALUE  4095.
       2<  342              88  rsp-ack-E-TSCHED-UNAVAIL     VALUE  4045.
       2<  343            10 rsp-ack-RETN-CODE-DETAIL             PIC S9(4)     COMP.
           352        *********
```

Figure 7-5. SCREEN COBOL Code for Client (Continued)



```
PAGE 25  $MERC.B9110.SMPCLNT                   TANDEM / SCREEN COBOL

          353       /
          354         01  unsave-item-uow.
          355       *   COPY uow-usv-unsave-item-uow OF "GCOB".
       2< 1896      * Definition UNSAVE-ITEM-UOW created on 08/31/84 at 16:55
       2< 1897        05 uow-usv-UNSAVE-ITEM-UOW.
       2< 1898          10 uow-usv-HDR.
       2< 1899            15 uow-usv-SELF-IDENT                  PIC AA
       2< 1900                                           VALUE "UW".
       2< 1901            15 uow-usv-UOW-CODE                    PIC 9(4)      COMP value 111.
       2< 1902          10 uow-usv-ITEM-ID.
       2< 1903            15 uow-usv-DUMMY                       PIC X(12).
       2< 1904          10 uow-usv-FOLDER-NAME                   PIC X(80).
          356
          357         01  unsave-item-rsp.
          358       *   COPY rsp-usv-unsave-item-rsp OF "GCOB".
       2< 1906      * Definition UNSAVE-ITEM-RSP created on 08/31/84 at 16:55
       2< 1907        05 rsp-usv-UNSAVE-ITEM-RSP.
       2< 1908          10 rsp-usv-HDR.
       2< 1909            15 rsp-usv-SELF-IDENT                  PIC AA
       2< 1910                                           VALUE "UW".
       2< 1911            15 rsp-usv-UOW-CODE                    PIC 9(4)      COMP.
       2< 1912          10 rsp-usv-RETN-CODE                     PIC S9(4)     COMP.
       2< 1913            88  rsp-usv-OK                      VALUE     0.
       2< 1914            88  rsp-usv-W-ITEM-NOT-IN-FOLDER    VALUE -4061.
       2< 1915            88  rsp-usv-E-BAD-TRANSACTION       VALUE  4010.
       2< 1916            88  rsp-usv-E-ITEM-NOT-FOUND        VALUE  4035.
       2< 1917            88  rsp-usv-E-CONCURRNT-FLD-UPDATE  VALUE  4105.
       2< 1918            88  rsp-usv-E-FLD-NSRV-ERR         VALUE 5675.
       2< 1919            88  rsp-usv-E-FLD-NOT-FOUND        VALUE 5676.
       2< 1920            88  rsp-usv-E-FLD-BAD-NAME         VALUE 5677.
       2< 1921            88  rsp-usv-E-FLD-BAD-TYPE         VALUE 5678.
       2< 1922            88  rsp-usv-E-FLD-NO-SUCH-NODE     VALUE 5679.
       2< 1923            88  rsp-usv-E-FLD-SECURITY         VALUE 5680.
       2< 1924            88  rsp-usv-E-FLD-NSRV-NOT-FOUND   VALUE 5681.
       2< 1925            88  rsp-usv-E-FLD-NSRV-DOWN        VALUE 5682.
       2< 1926            88  rsp-usv-E-FLD-NET-DOWN         VALUE 5686.
       2< 1927            88  rsp-usv-E-FLD-NOT-SAME-NODE    VALUE 5697.
       2< 1928            88  rsp-usv-E-FLD-AMBIGUOUS-NAME   VALUE 5698.
       2< 1929          10 rsp-usv-RETN-CODE-DETAIL              PIC S9(4)     COMP.
          359       *********
```

Figure 7-5. SCREEN COBOL Code for Client (Continued)



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PAGE 26  $MERC.B9110.SMPCLNT                 TANDEM / SCREEN COBOL

/
********************************************************************
*  DEFINITIONS OF ERROR FIELDS AND VARIOUS FLAGS.                  *
********************************************************************

  01  ws-msg                 PIC X(25).

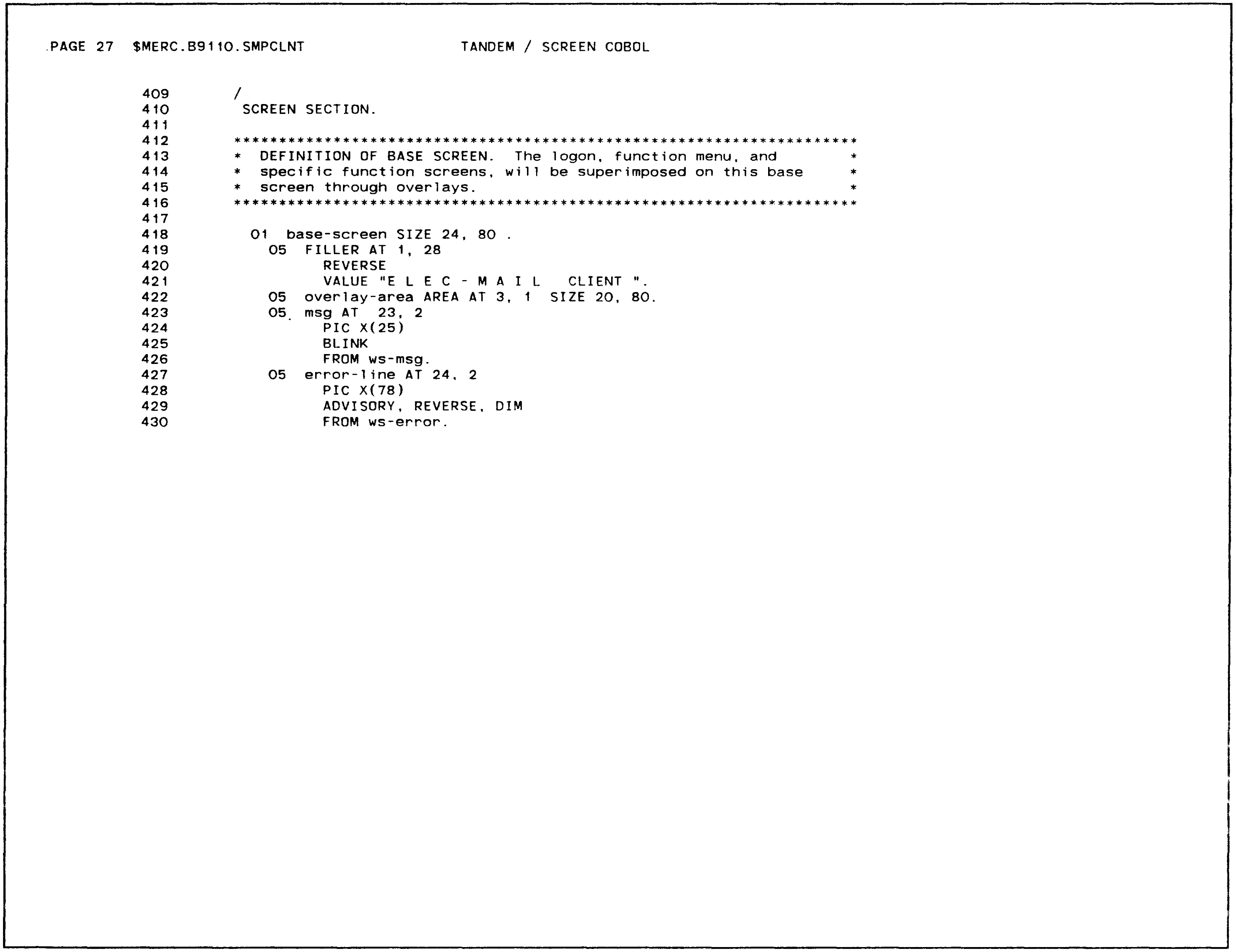
  01  ws-error.
    05  error-name           PIC X(14).
    05  error-field-array.
      10  error-field OCCURS 6 TIMES.
        15  e-name           PIC X(6).
        15  e-field          PIC S9(4).

  01 various-flags.
    05  term-status          PIC S9(4)       VALUE  ZERO.
    05  esub                 PIC 9(2)        VALUE 1.
    05  key-pressed          PIC 9(2)        VALUE 1.
      88  logon-request    VALUE  1.
      88 'function-request VALUE  3, 5.
      88  read-request     VALUE  3.
      88  discard-request  VALUE  4.
      88  compose-request  VALUE  5.
      88  post-request     VALUE  6.
      88  return-request   VALUE  7.
      88  logoff-request   VALUE  8.
    05  key-value            PIC 9(2)        VALUE 1.
    05  session-flag         PIC X(1)        VALUE "N".
      88  session-active   VALUE  "Y".
    05  item-flag            PIC X(1)        VALUE "N".
      88  item-active      VALUE  "Y".
    05  exit-scan-flag       PIC X(1)        VALUE "N".
      88  exit-scan        VALUE "Y".
    05  first-scan-flag      PIC X(1)        VALUE "Y".
      88  first-scan       VALUE "Y".
    05  air-index            PIC 9(4)  COMP.
    05  gtx-index            PIC 9(4)  COMP.
    05  scan-index           PIC 9(4)  COMP.

*  TRANSFER expects the time to be a PIC 9(6) format, however
*  SCREEN COBOL returns a 9(8) format.  The following lines are
*  used to reformat from the SCREEN COBOL to the TRANSFER form.

    05  accept-time.
      07  accept-time1.
        10  hour           PIC 9(2).
        10  min            PIC 9(2).
        10  sec            PIC 9(2).
      07  centi-secs       PIC 9(2).
```

Figure 7-5. SCREEN COBOL Code for Client (Continued)



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/
 SCREEN SECTION.

*********************************************************************
*  DEFINITION OF BASE SCREEN.  The logon, function menu, and        *
*  specific function screens, will be superimposed on this base     *
*  screen through overlays.                                         *
*********************************************************************

  01  base-screen SIZE 24, 80 .
    05  FILLER AT 1, 28
          REVERSE
          VALUE "E L E C - M A I L   CLIENT ".
    05  overlay-area AREA AT 3, 1  SIZE 20, 80.
    05  msg AT  23, 2
          PIC X(25)
          BLINK
          FROM ws-msg.
    05  error-line AT 24, 2
          PIC X(78)
          ADVISORY, REVERSE, DIM
          FROM ws-error.
```
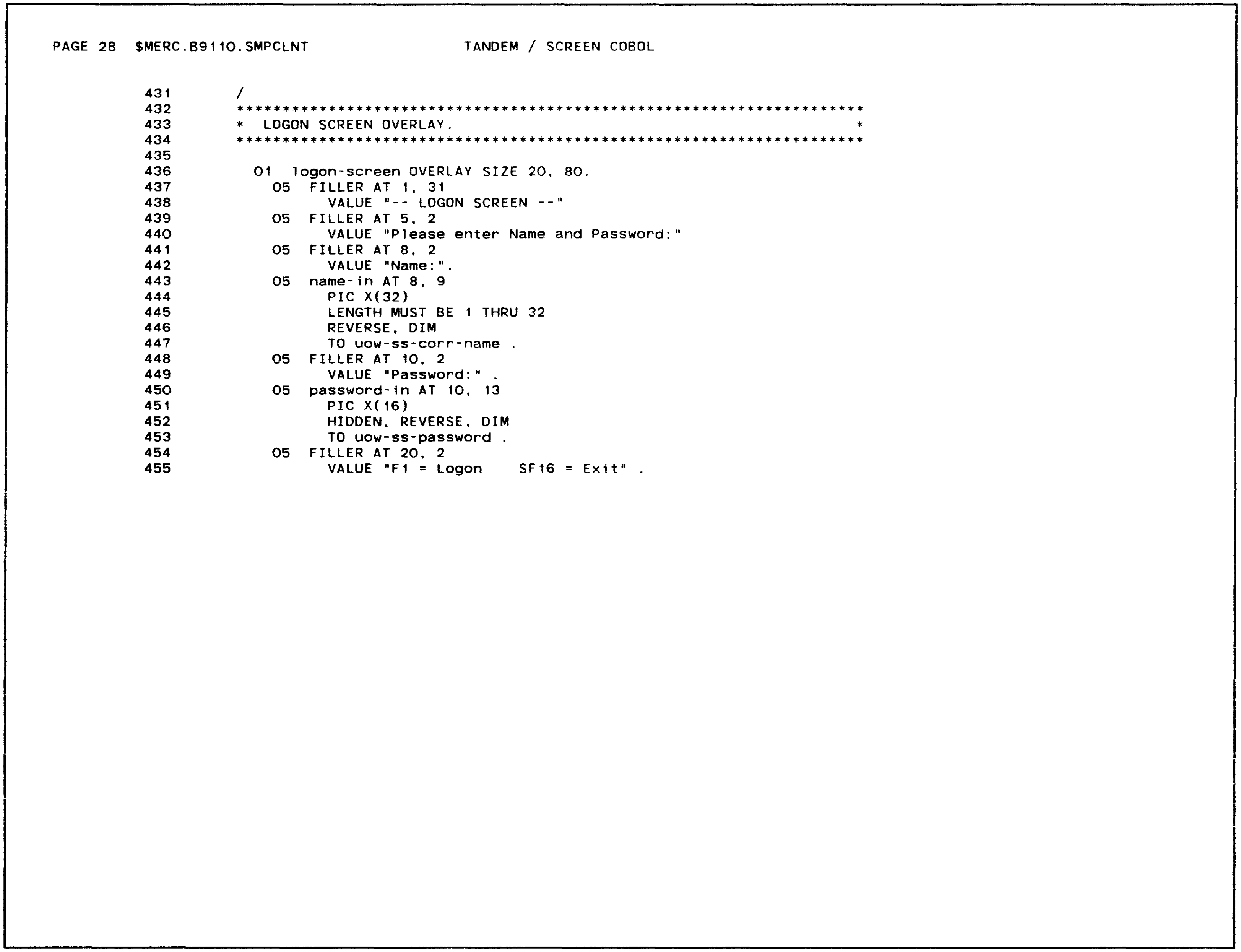

Figure 7-5. SCREEN COBOL Code for Client (Continued)



```
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/
**********************************************************************
*  LOGON SCREEN OVERLAY.                                             *
**********************************************************************

  01  logon-screen OVERLAY SIZE 20, 80.
    05  FILLER AT 1, 31
          VALUE "-- LOGON SCREEN --"
    05  FILLER AT 5, 2
          VALUE "Please enter Name and Password:"
    05  FILLER AT 8, 2
          VALUE "Name:".
    05  name-in AT 8, 9
          PIC X(32)
          LENGTH MUST BE 1 THRU 32
          REVERSE, DIM
          TO uow-ss-corr-name .
    05  FILLER AT 10, 2
          VALUE "Password:" .
    05  password-in AT 10, 13
          PIC X(16)
          HIDDEN, REVERSE, DIM
          TO uow-ss-password .
    05  FILLER AT 20, 2
          VALUE "F1 = Logon    SF16 = Exit" .
```
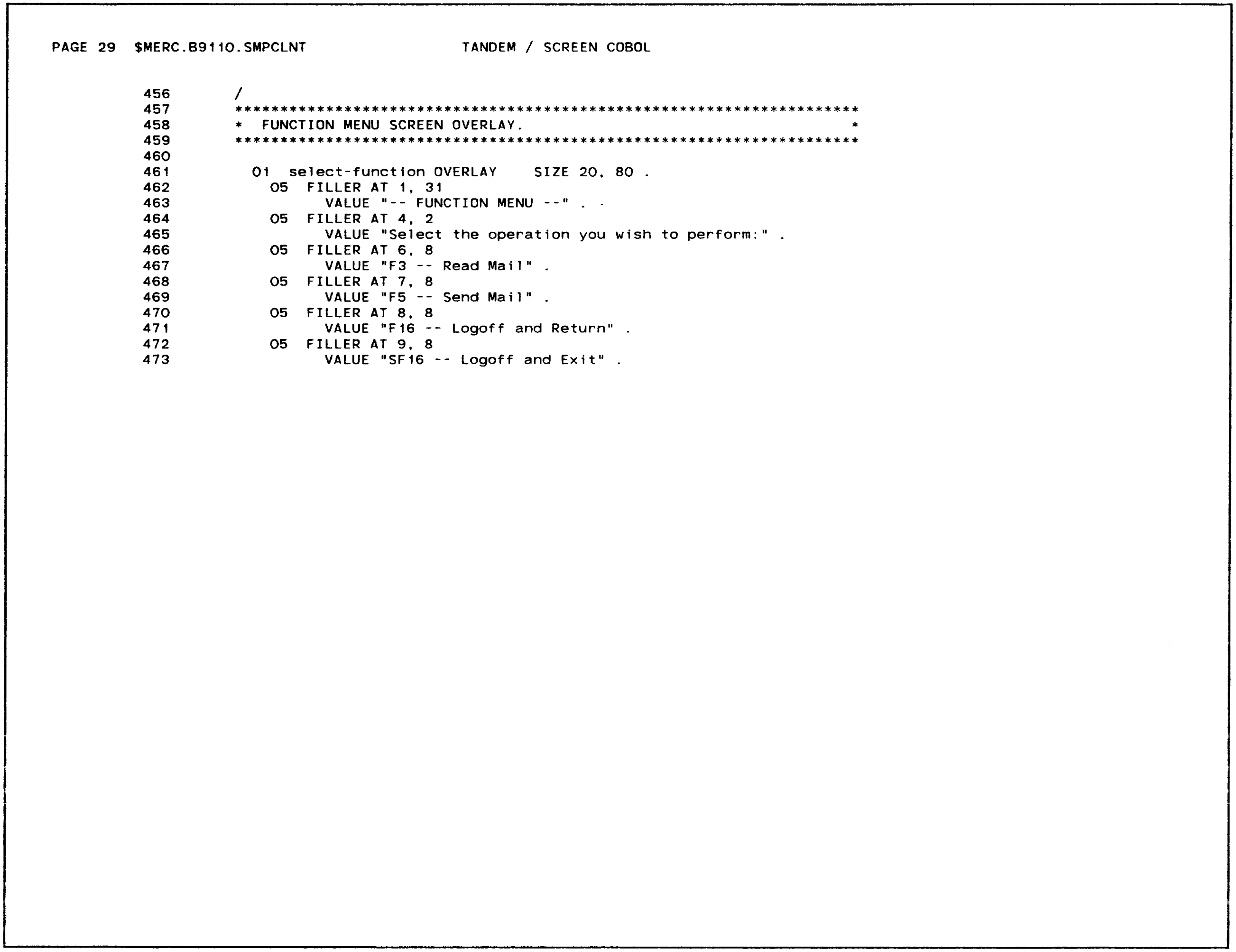
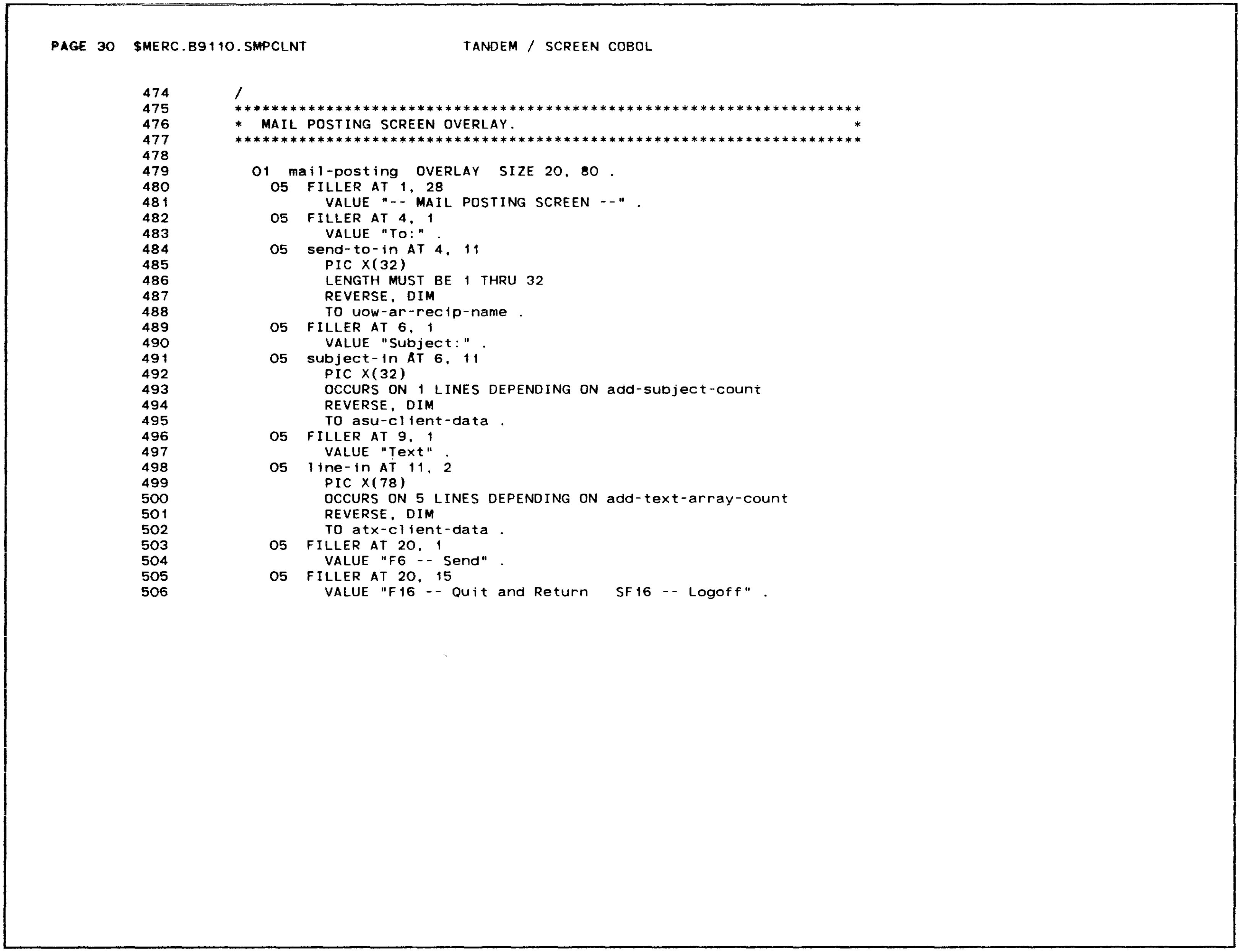

Figure 7-5. SCREEN COBOL Code for Client (Continued)



```
PAGE 29  $MERC.B9110.SMPCLNT                 TANDEM / SCREEN COBOL

          /
          *******************************************************************
          *  FUNCTION MENU SCREEN OVERLAY.                                  *
          *******************************************************************

            01  select-function OVERLAY    SIZE 20, 80 .
              05  FILLER AT 1, 31
                    VALUE "-- FUNCTION MENU --" . .
              05  FILLER AT 4, 2
                    VALUE "Select the operation you wish to perform:" .
              05  FILLER AT 6, 8
                    VALUE "F3 -- Read Mail" .
              05  FILLER AT 7, 8
                    VALUE "F5 -- Send Mail" .
              05  FILLER AT 8, 8
                    VALUE "F16 -- Logoff and Return" .
              05  FILLER AT 9, 8
                    VALUE "SF16 -- Logoff and Exit" .
```

Figure 7-5. SCREEN COBOL Code for Client (Continued)



```
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/
**********************************************************************
*  MAIL POSTING SCREEN OVERLAY.                                      *
**********************************************************************

  01  mail-posting  OVERLAY  SIZE 20, 80 .
    05  FILLER AT 1, 28
          VALUE "-- MAIL POSTING SCREEN --" .
    05  FILLER AT 4, 1
          VALUE "To:" .
    05  send-to-in AT 4, 11
          PIC X(32)
          LENGTH MUST BE 1 THRU 32
          REVERSE, DIM
          TO uow-ar-recip-name .
    05  FILLER AT 6, 1
          VALUE "Subject:" .
    05  subject-in AT 6, 11
          PIC X(32)
          OCCURS ON 1 LINES DEPENDING ON add-subject-count
          REVERSE, DIM
          TO asu-client-data .
    05  FILLER AT 9, 1
          VALUE "Text" .
    05  line-in AT 11, 2
          PIC X(78)
          OCCURS ON 5 LINES DEPENDING ON add-text-array-count
          REVERSE, DIM
          TO atx-client-data .
    05  FILLER AT 20, 1
          VALUE "F6 -- Send" .
    05  FILLER AT 20, 15
          VALUE "F16 -- Quit and Return   SF16 -- Logoff" .
```
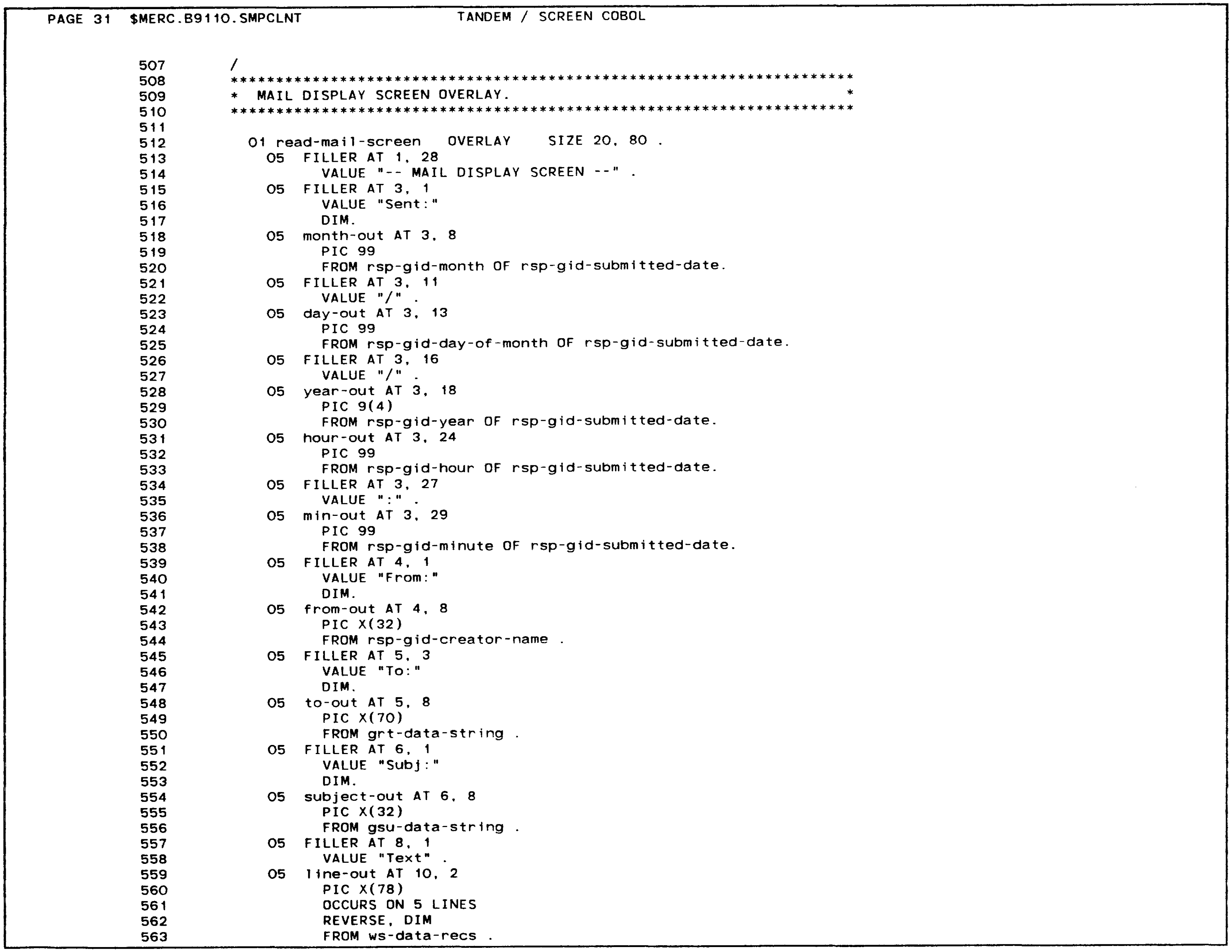

Figure 7-5. SCREEN COBOL Code for Client (Continued)



```
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          /
          ********************************************************************
          *  MAIL DISPLAY SCREEN OVERLAY.                                       *
          ********************************************************************

            01 read-mail-screen   OVERLAY    SIZE 20, 80 .
              05  FILLER AT 1, 28
                  VALUE "-- MAIL DISPLAY SCREEN --" .
              05  FILLER AT 3, 1
                  VALUE "Sent:"
                  DIM.
              05  month-out AT 3, 8
                  PIC 99
                  FROM rsp-gid-month OF rsp-gid-submitted-date.
              05  FILLER AT 3, 11
                  VALUE "/" .
              05  day-out AT 3, 13
                  PIC 99
                  FROM rsp-gid-day-of-month OF rsp-gid-submitted-date.
              05  FILLER AT 3, 16
                  VALUE "/" .
              05  year-out AT 3, 18
                  PIC 9(4)
                  FROM rsp-gid-year OF rsp-gid-submitted-date.
              05  hour-out AT 3, 24
                  PIC 99
                  FROM rsp-gid-hour OF rsp-gid-submitted-date.
              05  FILLER AT 3, 27
                  VALUE ":" .
              05  min-out AT 3, 29
                  PIC 99
                  FROM rsp-gid-minute OF rsp-gid-submitted-date.
              05  FILLER AT 4, 1
                  VALUE "From:"
                  DIM.
              05  from-out AT 4, 8
                  PIC X(32)
                  FROM rsp-gid-creator-name .
              05  FILLER AT 5, 3
                  VALUE "To:"
                  DIM.
              05  to-out AT 5, 8
                  PIC X(70)
                  FROM grt-data-string .
              05  FILLER AT 6, 1
                  VALUE "Subj:"
                  DIM.
              05  subject-out AT 6, 8
                  PIC X(32)
                  FROM gsu-data-string .
              05  FILLER AT 8, 1
                  VALUE "Text" .
              05  line-out AT 10, 2
                  PIC X(78)
                  OCCURS ON 5 LINES
                  REVERSE, DIM
                  FROM ws-data-recs .
```
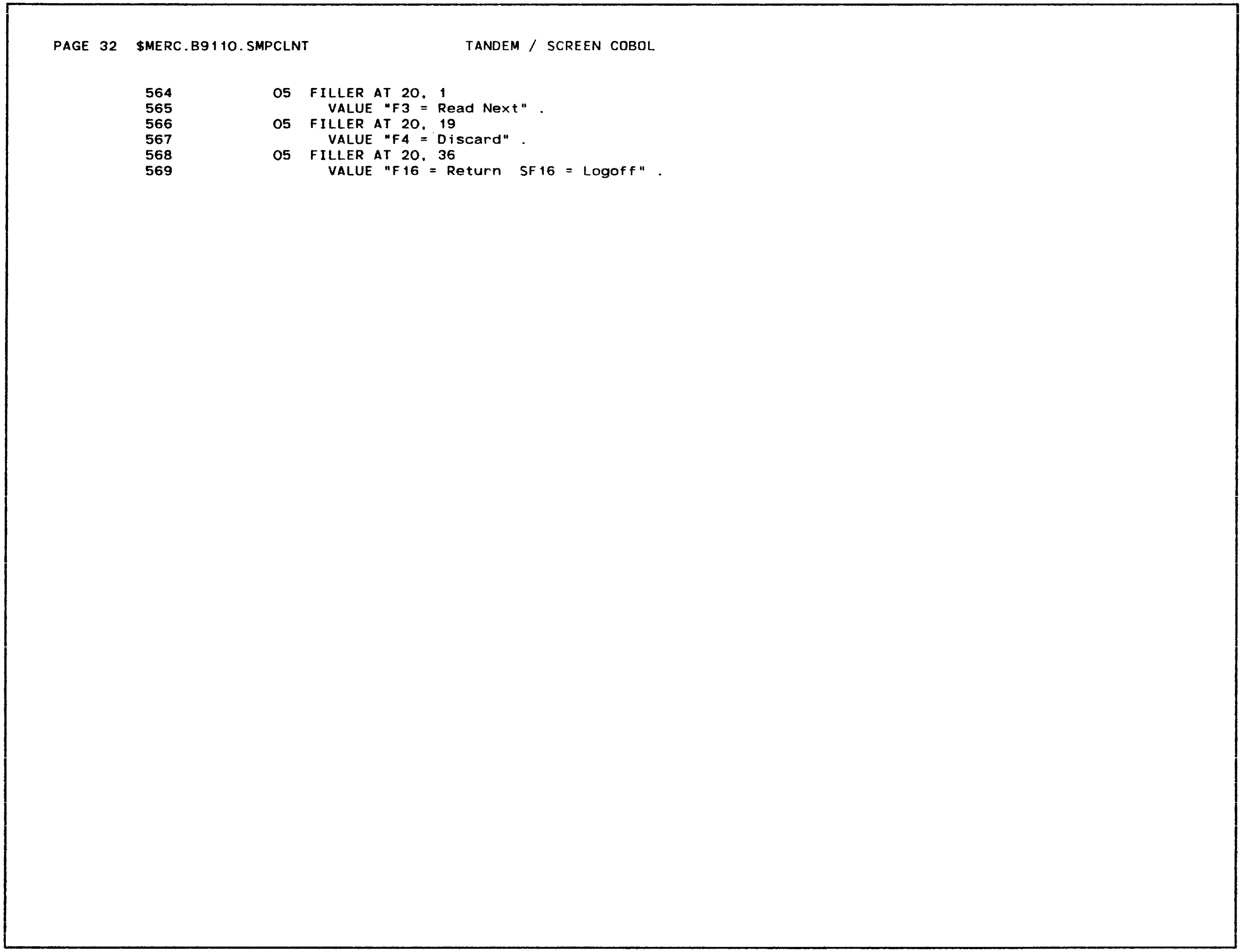

Figure 7-5. SCREEN COBOL Code for Client (Continued)



```
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              05  FILLER AT 20, 1
                    VALUE "F3 = Read Next" .
              05  FILLER AT 20, 19
                    VALUE "F4 = Discard" .
              05  FILLER AT 20, 36
                    VALUE "F16 = Return  SF16 = Logoff" .
```
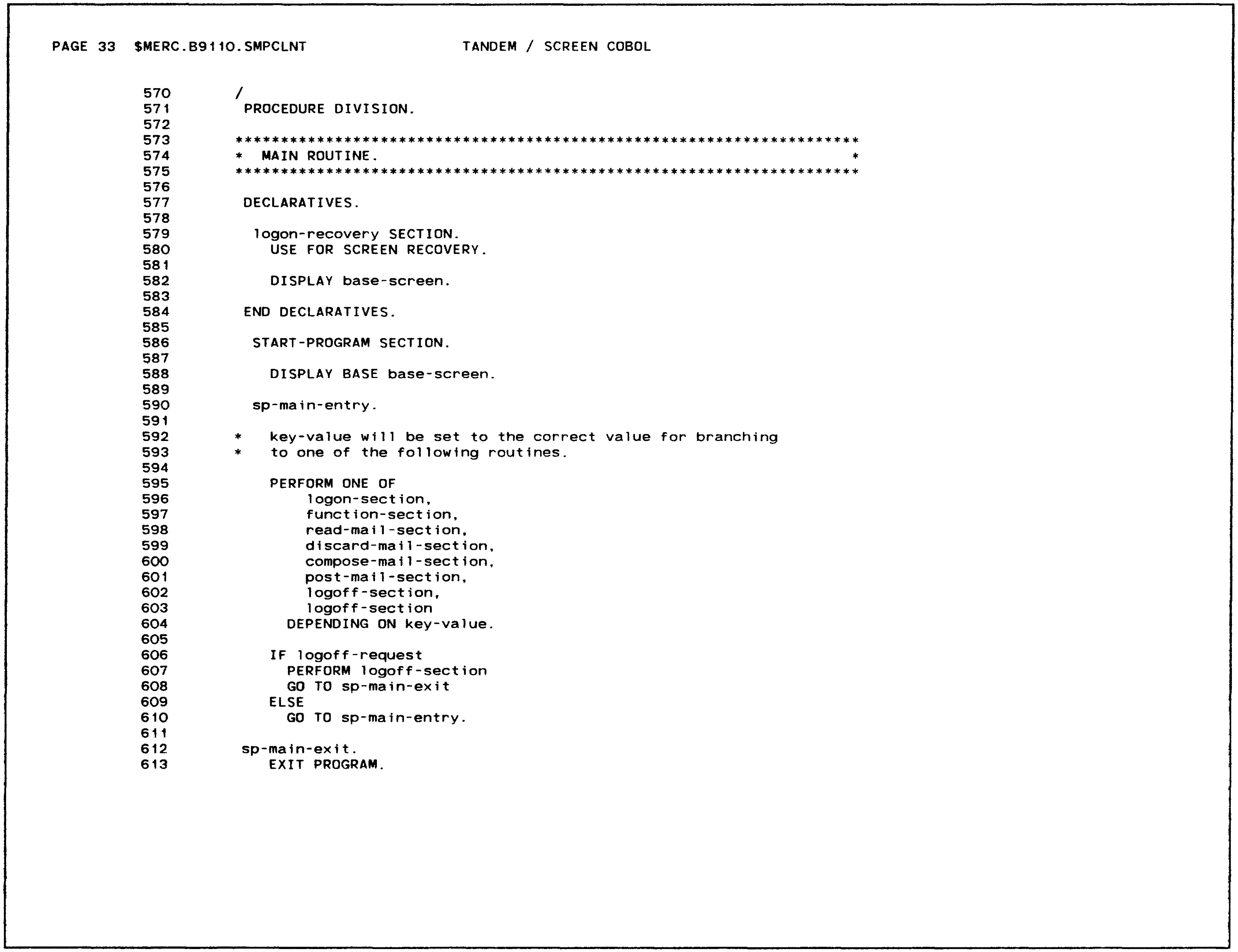

Figure 7-5. SCREEN COBOL Code for Client (Continued)



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/
 PROCEDURE DIVISION.

*********************************************************************
*  MAIN ROUTINE.                                                    *
*********************************************************************

 DECLARATIVES.

  logon-recovery SECTION.
    USE FOR SCREEN RECOVERY.

    DISPLAY base-screen.

 END DECLARATIVES.

  START-PROGRAM SECTION.

    DISPLAY BASE base-screen.

  sp-main-entry.

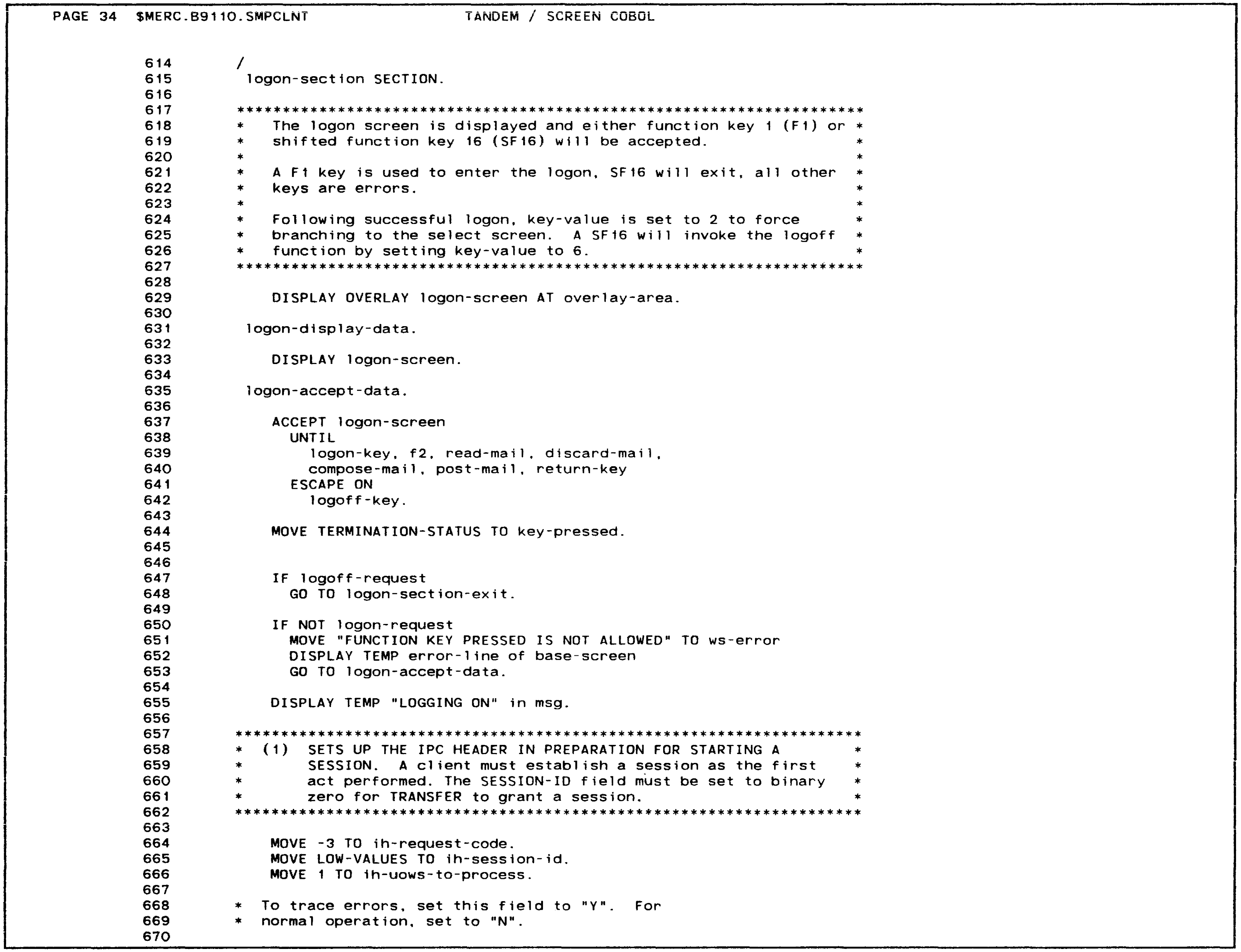
*   key-value will be set to the correct value for branching
*   to one of the following routines.

    PERFORM ONE OF
        logon-section,
        function-section,
        read-mail-section,
        discard-mail-section,
        compose-mail-section,
        post-mail-section,
        logoff-section,
        logoff-section
      DEPENDING ON key-value.

    IF logoff-request
      PERFORM logoff-section
      GO TO sp-main-exit
    ELSE
      GO TO sp-main-entry.

 sp-main-exit.
    EXIT PROGRAM.
```

Figure 7-5. SCREEN COBOL Code for Client (Continued)



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/
 logon-section SECTION.

*********************************************************************
*   The logon screen is displayed and either function key 1 (F1) or *
*   shifted function key 16 (SF16) will be accepted.                *
*                                                                   *
*   A F1 key is used to enter the logon, SF16 will exit, all other  *
*   keys are errors.                                                *
*                                                                   *
*   Following successful logon, key-value is set to 2 to force      *
*   branching to the select screen.  A SF16 will invoke the logoff  *
*   function by setting key-value to 6.                             *
*********************************************************************

    DISPLAY OVERLAY logon-screen AT overlay-area.

 logon-display-data.

    DISPLAY logon-screen.

 logon-accept-data.

    ACCEPT logon-screen
      UNTIL
        logon-key, f2, read-mail, discard-mail,
        compose-mail, post-mail, return-key
      ESCAPE ON
        logoff-key.

    MOVE TERMINATION-STATUS TO key-pressed.


    IF logoff-request
      GO TO logon-section-exit.

    IF NOT logon-request
      MOVE "FUNCTION KEY PRESSED IS NOT ALLOWED" TO ws-error
      DISPLAY TEMP error-line of base-screen
      GO TO logon-accept-data.

    DISPLAY TEMP "LOGGING ON" in msg.

*********************************************************************
*  (1)  SETS UP THE IPC HEADER IN PREPARATION FOR STARTING A        *
*       SESSION.  A client must establish a session as the first    *
*       act performed. The SESSION-ID field must be set to binary   *
*       zero for TRANSFER to grant a session.                       *
*********************************************************************

    MOVE -3 TO ih-request-code.
    MOVE LOW-VALUES TO ih-session-id.
    MOVE 1 TO ih-uows-to-process.

*  To trace errors, set this field to "Y".  For
*  normal operation, set to "N".

```
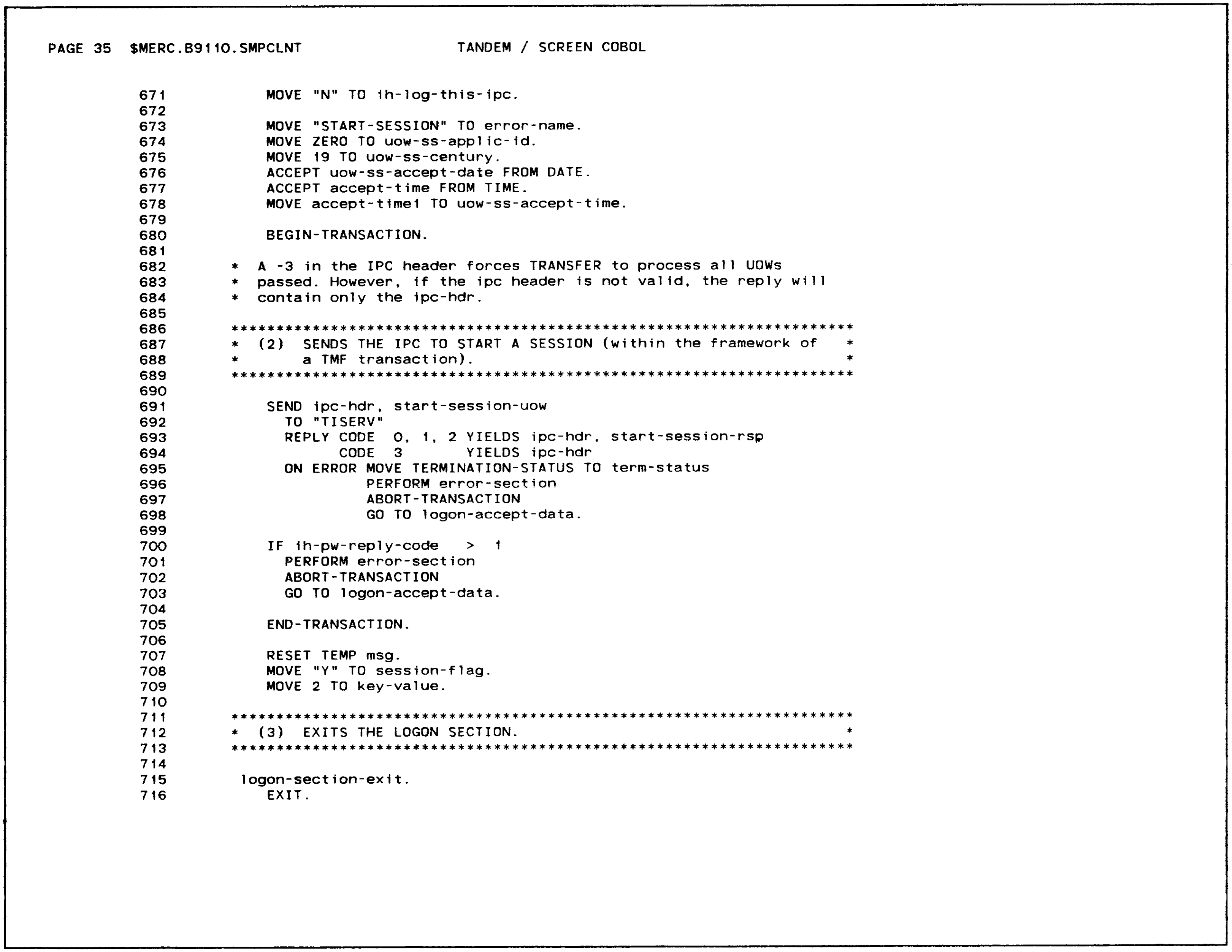

Figure 7-5. SCREEN COBOL Code for Client (Continued)



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    MOVE "N" TO ih-log-this-ipc.

    MOVE "START-SESSION" TO error-name.
    MOVE ZERO TO uow-ss-applic-id.
    MOVE 19 TO uow-ss-century.
    ACCEPT uow-ss-accept-date FROM DATE.
    ACCEPT accept-time FROM TIME.
    MOVE accept-time1 TO uow-ss-accept-time.

    BEGIN-TRANSACTION.

*  A -3 in the IPC header forces TRANSFER to process all UOWs
*  passed. However, if the ipc header is not valid, the reply will
*  contain only the ipc-hdr.

**********************************************************************
*  (2)  SENDS THE IPC TO START A SESSION (within the framework of    *
*       a TMF transaction).                                          *
**********************************************************************

    SEND ipc-hdr, start-session-uow
      TO "TISERV"
      REPLY CODE  0, 1, 2 YIELDS ipc-hdr, start-session-rsp
            CODE  3       YIELDS ipc-hdr
      ON ERROR MOVE TERMINATION-STATUS TO term-status
               PERFORM error-section
               ABORT-TRANSACTION
               GO TO logon-accept-data.

    IF ih-pw-reply-code   >  1
      PERFORM error-section
      ABORT-TRANSACTION
      GO TO logon-accept-data.

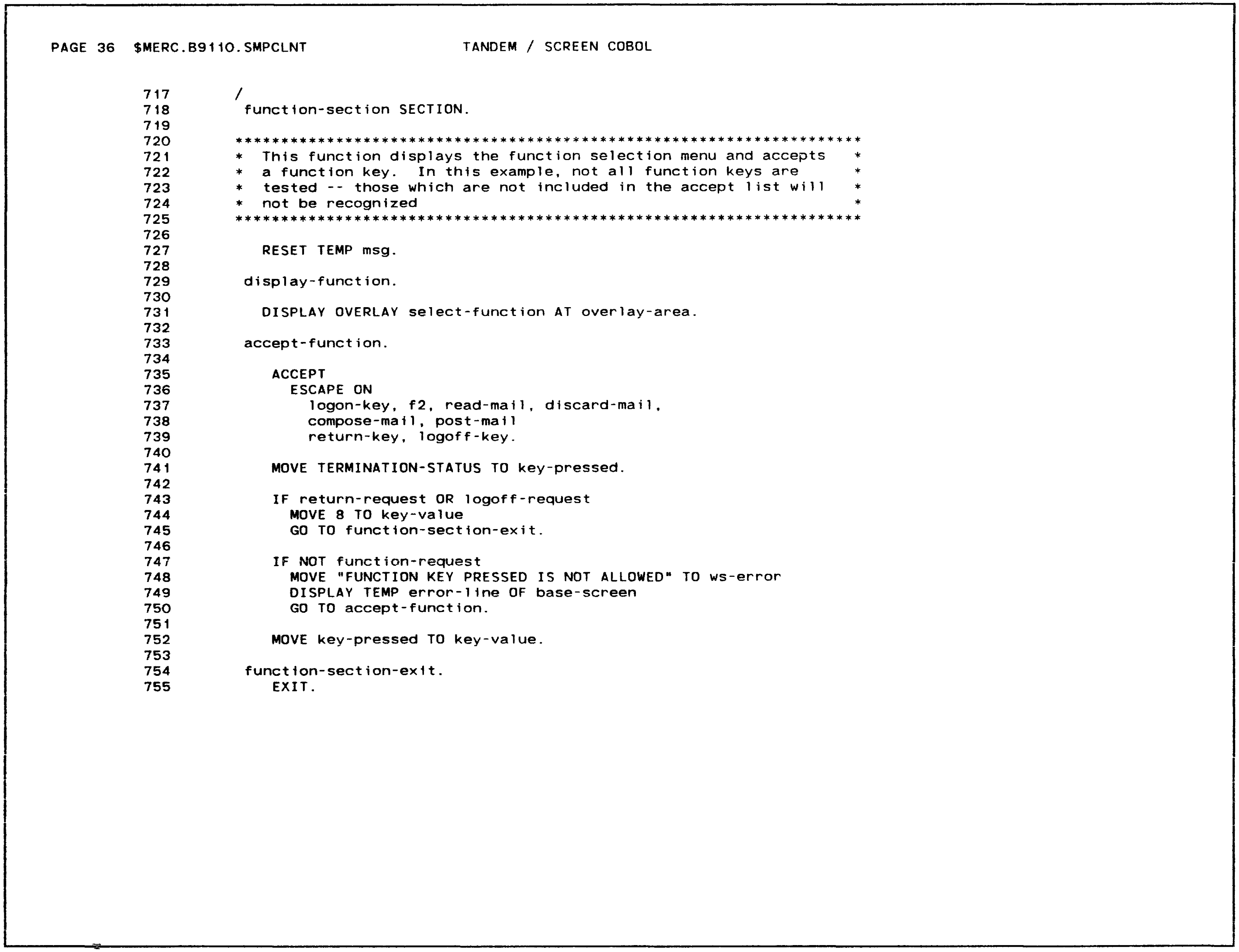
    END-TRANSACTION.

    RESET TEMP msg.
    MOVE "Y" TO session-flag.
    MOVE 2 TO key-value.

**********************************************************************
*  (3)  EXITS THE LOGON SECTION.                                     *
**********************************************************************

 logon-section-exit.
    EXIT.
```

Figure 7-5. SCREEN COBOL Code for Client (Continued)



```
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/
 function-section SECTION.

**********************************************************************
*  This function displays the function selection menu and accepts   *
*  a function key.  In this example, not all function keys are       *
*  tested -- those which are not included in the accept list will    *
*  not be recognized                                                 *
**********************************************************************

   RESET TEMP msg.

 display-function.

   DISPLAY OVERLAY select-function AT overlay-area.

 accept-function.

    ACCEPT
      ESCAPE ON
        logon-key, f2, read-mail, discard-mail,
        compose-mail, post-mail
        return-key, logoff-key.

    MOVE TERMINATION-STATUS TO key-pressed.

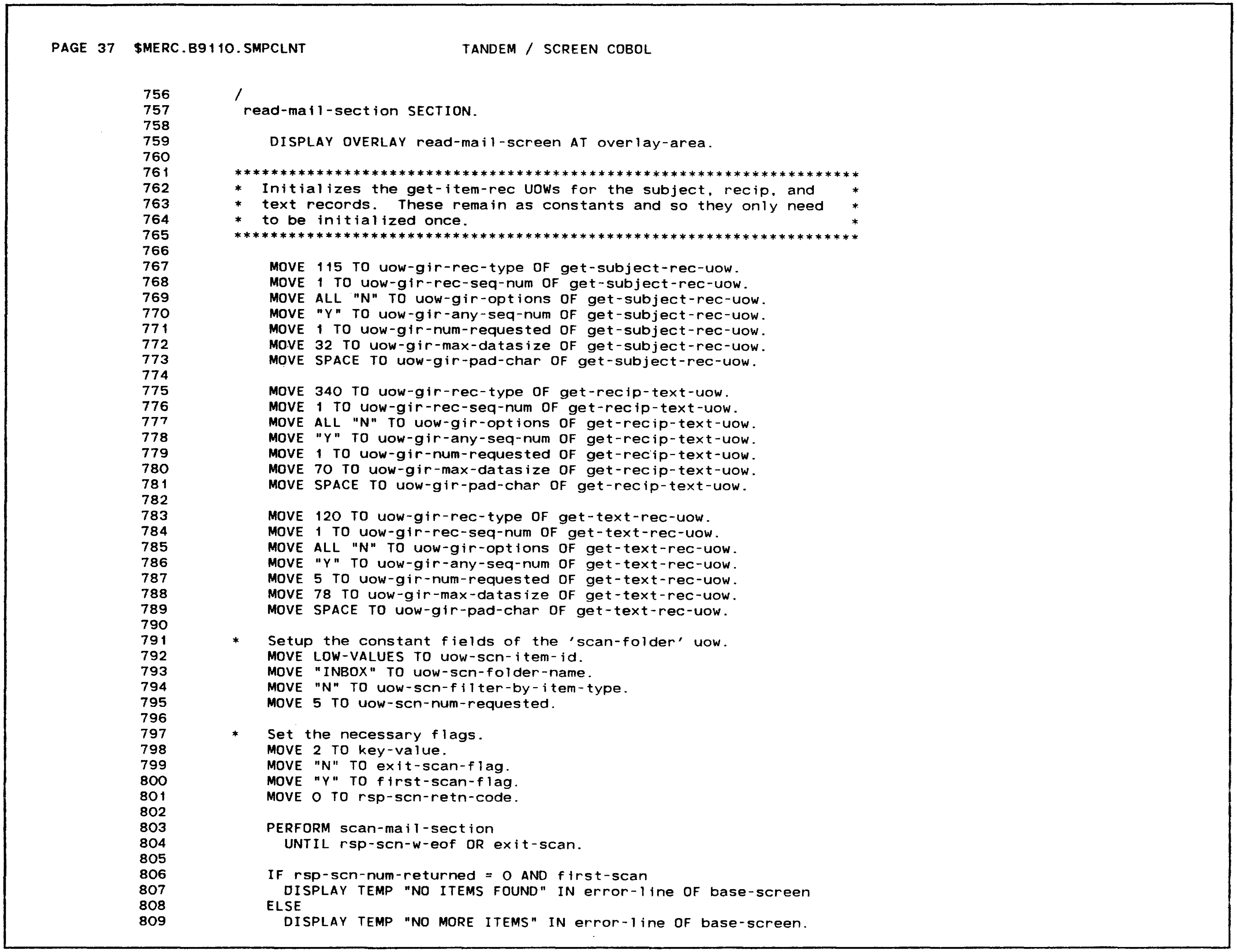
    IF return-request OR logoff-request
      MOVE 8 TO key-value
      GO TO function-section-exit.

    IF NOT function-request
      MOVE "FUNCTION KEY PRESSED IS NOT ALLOWED" TO ws-error
      DISPLAY TEMP error-line OF base-screen
      GO TO accept-function.

    MOVE key-pressed TO key-value.

 function-section-exit.
    EXIT.
```

Figure 7-5. SCREEN COBOL Code for Client (Continued)



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/
 read-mail-section SECTION.

    DISPLAY OVERLAY read-mail-screen AT overlay-area.

**********************************************************************
*  Initializes the get-item-rec UOWs for the subject, recip, and     *
*  text records.  These remain as constants and so they only need    *
*  to be initialized once.                                           *
**********************************************************************

    MOVE 115 TO uow-gir-rec-type OF get-subject-rec-uow.
    MOVE 1 TO uow-gir-rec-seq-num OF get-subject-rec-uow.
    MOVE ALL "N" TO uow-gir-options OF get-subject-rec-uow.
    MOVE "Y" TO uow-gir-any-seq-num OF get-subject-rec-uow.
    MOVE 1 TO uow-gir-num-requested OF get-subject-rec-uow.
    MOVE 32 TO uow-gir-max-datasize OF get-subject-rec-uow.
    MOVE SPACE TO uow-gir-pad-char OF get-subject-rec-uow.

    MOVE 340 TO uow-gir-rec-type OF get-recip-text-uow.
    MOVE 1 TO uow-gir-rec-seq-num OF get-recip-text-uow.
    MOVE ALL "N" TO uow-gir-options OF get-recip-text-uow.
    MOVE "Y" TO uow-gir-any-seq-num OF get-recip-text-uow.
    MOVE 1 TO uow-gir-num-requested OF get-recip-text-uow.
    MOVE 70 TO uow-gir-max-datasize OF get-recip-text-uow.
    MOVE SPACE TO uow-gir-pad-char OF get-recip-text-uow.

    MOVE 120 TO uow-gir-rec-type OF get-text-rec-uow.
    MOVE 1 TO uow-gir-rec-seq-num OF get-text-rec-uow.
    MOVE ALL "N" TO uow-gir-options OF get-text-rec-uow.
    MOVE "Y" TO uow-gir-any-seq-num OF get-text-rec-uow.
    MOVE 5 TO uow-gir-num-requested OF get-text-rec-uow.
    MOVE 78 TO uow-gir-max-datasize OF get-text-rec-uow.
    MOVE SPACE TO uow-gir-pad-char OF get-text-rec-uow.

*   Setup the constant fields of the 'scan-folder' uow.
    MOVE LOW-VALUES TO uow-scn-item-id.
    MOVE "INBOX" TO uow-scn-folder-name.
    MOVE "N" TO uow-scn-filter-by-item-type.
    MOVE 5 TO uow-scn-num-requested.

*   Set the necessary flags.
    MOVE 2 TO key-value.
    MOVE "N" TO exit-scan-flag.
    MOVE "Y" TO first-scan-flag.
    MOVE 0 TO rsp-scn-retn-code.

    PERFORM scan-mail-section
      UNTIL rsp-scn-w-eof OR exit-scan.

    IF rsp-scn-num-returned = 0 AND first-scan
      DISPLAY TEMP "NO ITEMS FOUND" IN error-line OF base-screen
    ELSE
      DISPLAY TEMP "NO MORE ITEMS" IN error-line OF base-screen.
```
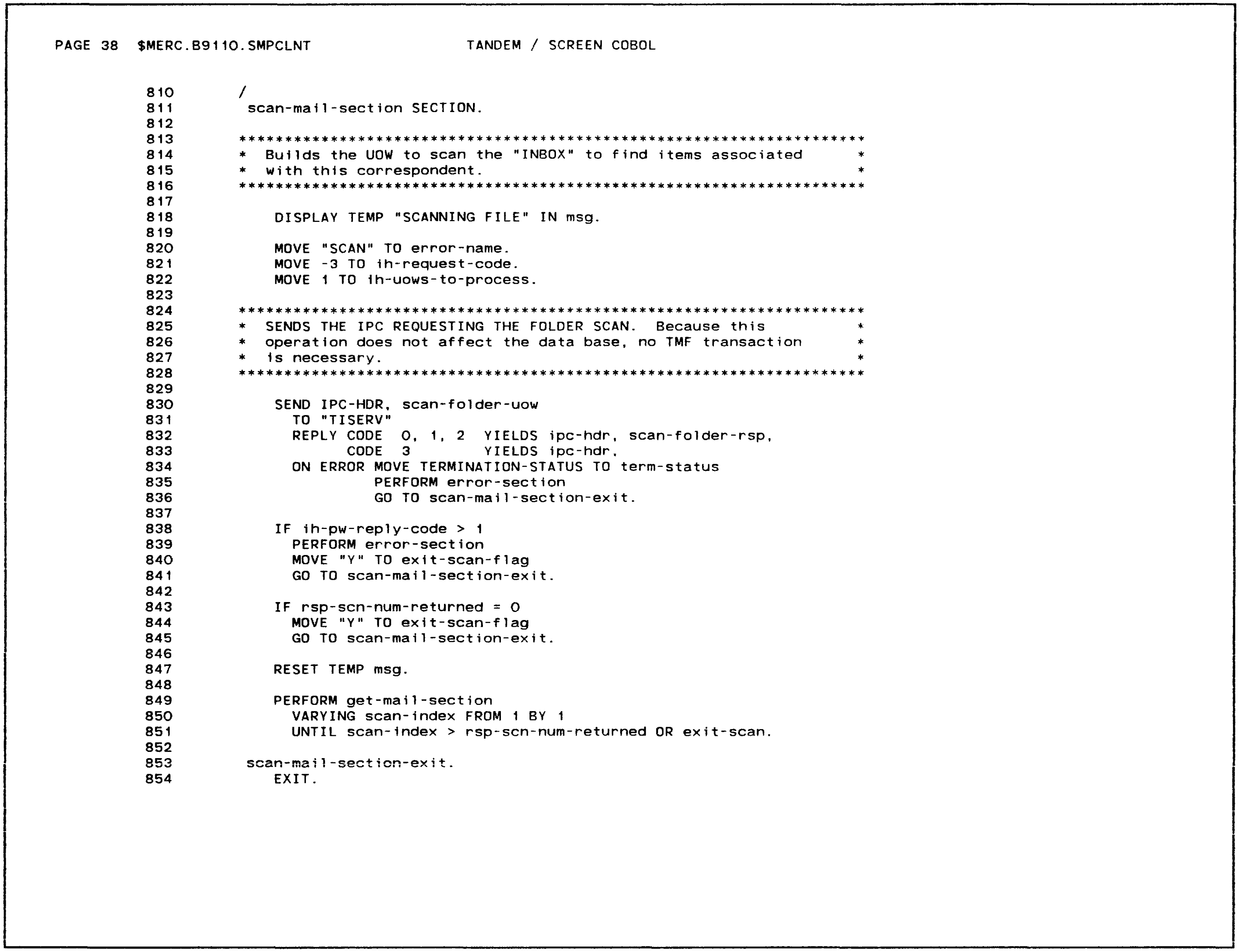

Figure 7-5. SCREEN COBOL Code for Client (Continued)



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/
 scan-mail-section SECTION.

*********************************************************************
*  Builds the UOW to scan the "INBOX" to find items associated      *
*  with this correspondent.                                         *
*********************************************************************

    DISPLAY TEMP "SCANNING FILE" IN msg.

    MOVE "SCAN" TO error-name.
    MOVE -3 TO ih-request-code.
    MOVE 1 TO ih-uows-to-process.

*********************************************************************
*  SENDS THE IPC REQUESTING THE FOLDER SCAN.  Because this          *
*  operation does not affect the data base, no TMF transaction      *
*  is necessary.                                                    *
*********************************************************************

    SEND IPC-HDR, scan-folder-uow
      TO "TISERV"
      REPLY CODE  0, 1, 2  YIELDS ipc-hdr, scan-folder-rsp,
            CODE  3        YIELDS ipc-hdr,
      ON ERROR MOVE TERMINATION-STATUS TO term-status
               PERFORM error-section
               GO TO scan-mail-section-exit.

    IF ih-pw-reply-code > 1
      PERFORM error-section
      MOVE "Y" TO exit-scan-flag
      GO TO scan-mail-section-exit.

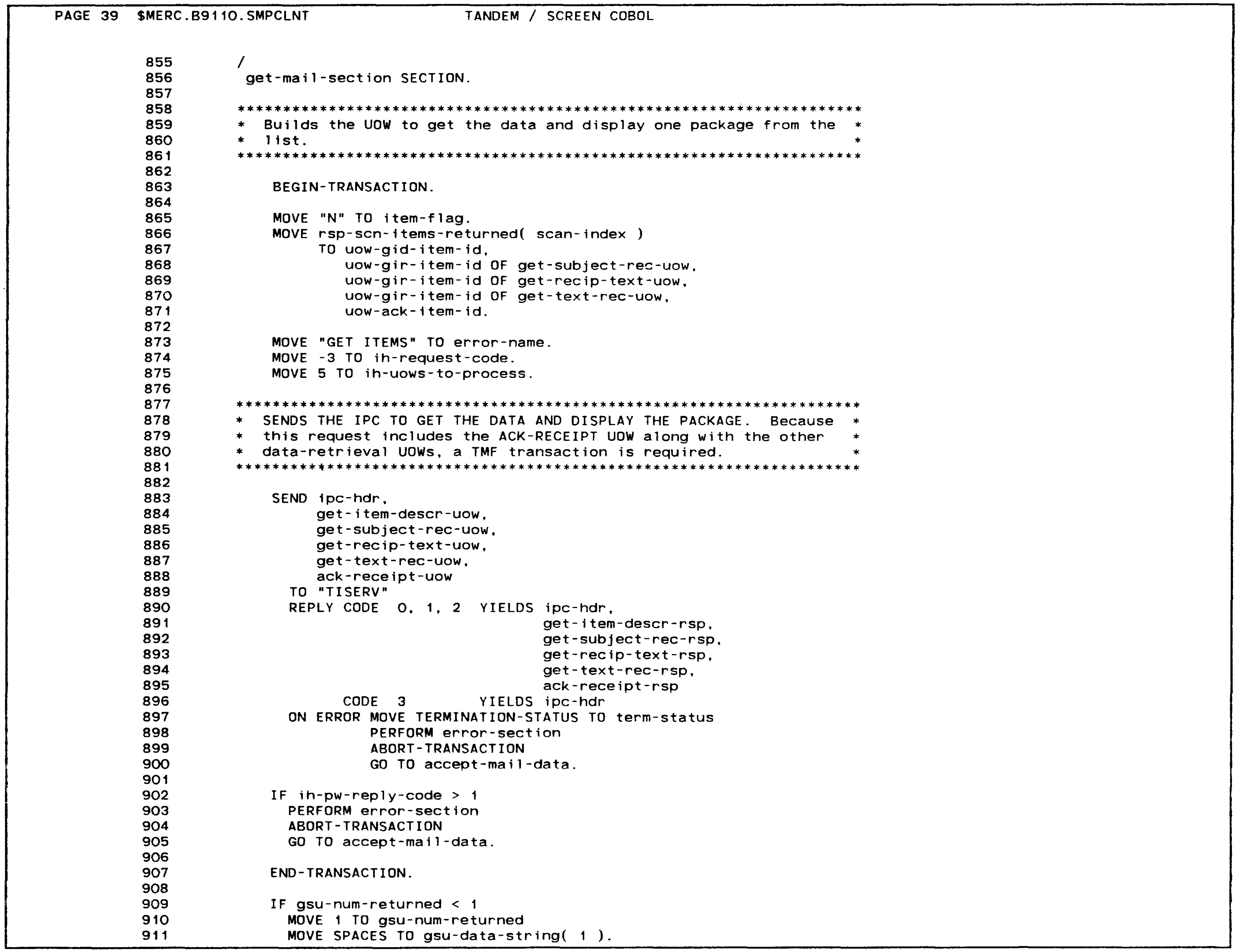
    IF rsp-scn-num-returned = 0
      MOVE "Y" TO exit-scan-flag
      GO TO scan-mail-section-exit.

    RESET TEMP msg.

    PERFORM get-mail-section
      VARYING scan-index FROM 1 BY 1
      UNTIL scan-index > rsp-scn-num-returned OR exit-scan.

 scan-mail-section-exit.
    EXIT.
```

Figure 7-5. SCREEN COBOL Code for Client (Continued)



```
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/
 get-mail-section SECTION.

**********************************************************************
*  Builds the UOW to get the data and display one package from the  *
*  list.                                                             *
**********************************************************************

    BEGIN-TRANSACTION.

    MOVE "N" TO item-flag.
    MOVE rsp-scn-items-returned( scan-index )
         TO uow-gid-item-id,
            uow-gir-item-id OF get-subject-rec-uow,
            uow-gir-item-id OF get-recip-text-uow,
            uow-gir-item-id OF get-text-rec-uow,
            uow-ack-item-id.

    MOVE "GET ITEMS" TO error-name.
    MOVE -3 TO ih-request-code.
    MOVE 5 TO ih-uows-to-process.

**********************************************************************
*  SENDS THE IPC TO GET THE DATA AND DISPLAY THE PACKAGE.  Because   *
*  this request includes the ACK-RECEIPT UOW along with the other    *
*  data-retrieval UOWs, a TMF transaction is required.               *
**********************************************************************

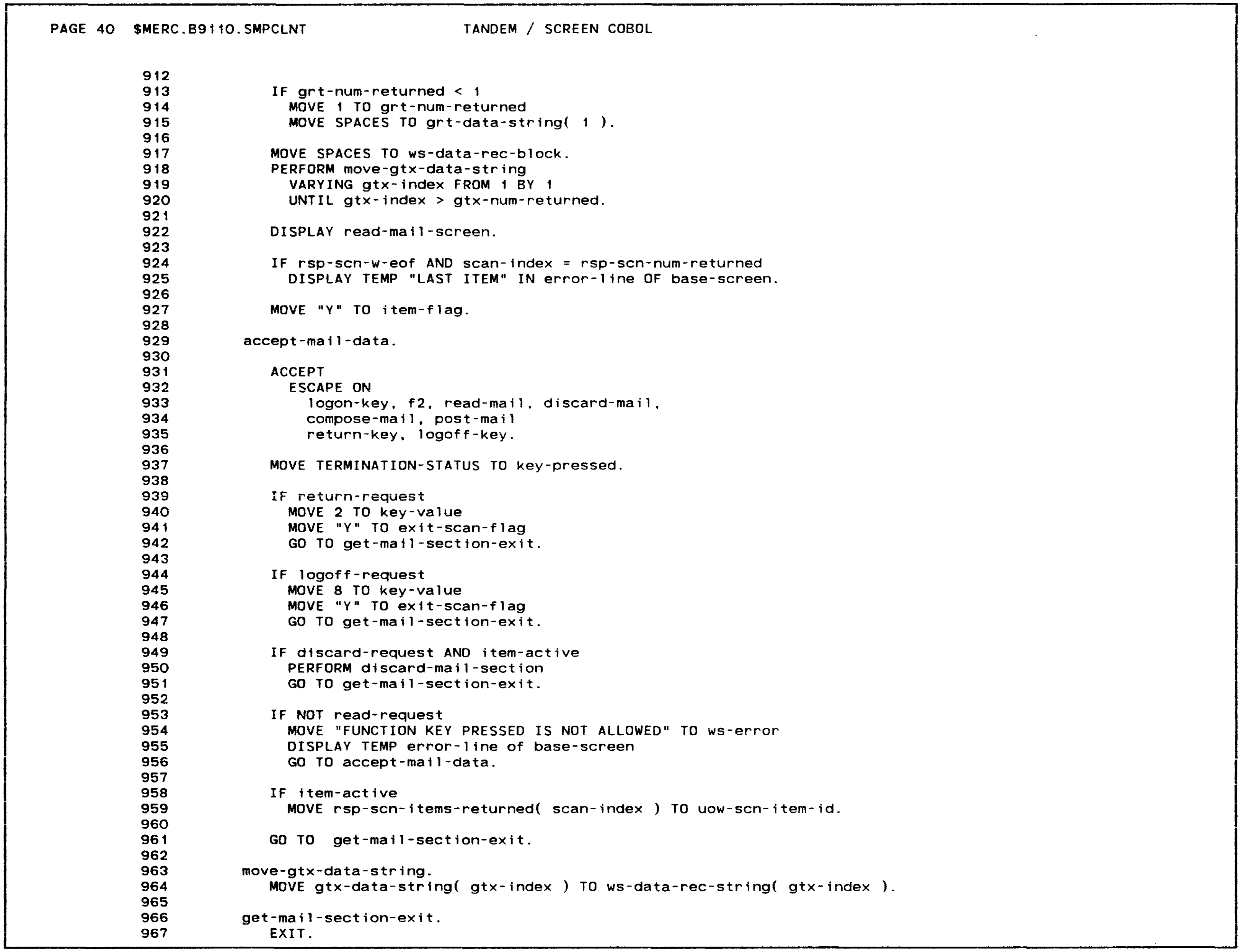
    SEND ipc-hdr,
         get-item-descr-uow,
         get-subject-rec-uow,
         get-recip-text-uow,
         get-text-rec-uow,
         ack-receipt-uow
      TO "TISERV"
      REPLY CODE  0, 1, 2  YIELDS ipc-hdr,
                                  get-item-descr-rsp,
                                  get-subject-rec-rsp,
                                  get-recip-text-rsp,
                                  get-text-rec-rsp,
                                  ack-receipt-rsp
            CODE  3        YIELDS ipc-hdr
      ON ERROR MOVE TERMINATION-STATUS TO term-status
               PERFORM error-section
               ABORT-TRANSACTION
               GO TO accept-mail-data.

    IF ih-pw-reply-code > 1
      PERFORM error-section
      ABORT-TRANSACTION
      GO TO accept-mail-data.

    END-TRANSACTION.

    IF gsu-num-returned < 1
      MOVE 1 TO gsu-num-returned
      MOVE SPACES TO gsu-data-string( 1 ).
```

Figure 7-5. SCREEN COBOL Code for Client (Continued)



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   IF grt-num-returned < 1
     MOVE 1 TO grt-num-returned
     MOVE SPACES TO grt-data-string( 1 ).

   MOVE SPACES TO ws-data-rec-block.
   PERFORM move-gtx-data-string
     VARYING gtx-index FROM 1 BY 1
     UNTIL gtx-index > gtx-num-returned.

   DISPLAY read-mail-screen.

   IF rsp-scn-w-eof AND scan-index = rsp-scn-num-returned
     DISPLAY TEMP "LAST ITEM" IN error-line OF base-screen.

   MOVE "Y" TO item-flag.

accept-mail-data.

   ACCEPT
     ESCAPE ON
       logon-key, f2, read-mail, discard-mail,
       compose-mail, post-mail
       return-key, logoff-key.

   MOVE TERMINATION-STATUS TO key-pressed.

   IF return-request
     MOVE 2 TO key-value
     MOVE "Y" TO exit-scan-flag
     GO TO get-mail-section-exit.

   IF logoff-request
     MOVE 8 TO key-value
     MOVE "Y" TO exit-scan-flag
     GO TO get-mail-section-exit.

   IF discard-request AND item-active
     PERFORM discard-mail-section
     GO TO get-mail-section-exit.

   IF NOT read-request
     MOVE "FUNCTION KEY PRESSED IS NOT ALLOWED" TO ws-error
     DISPLAY TEMP error-line of base-screen
     GO TO accept-mail-data.

   IF item-active
     MOVE rsp-scn-items-returned( scan-index ) TO uow-scn-item-id.

   GO TO  get-mail-section-exit.

move-gtx-data-string.
   MOVE gtx-data-string( gtx-index ) TO ws-data-rec-string( gtx-index ).

get-mail-section-exit.
   EXIT.
```
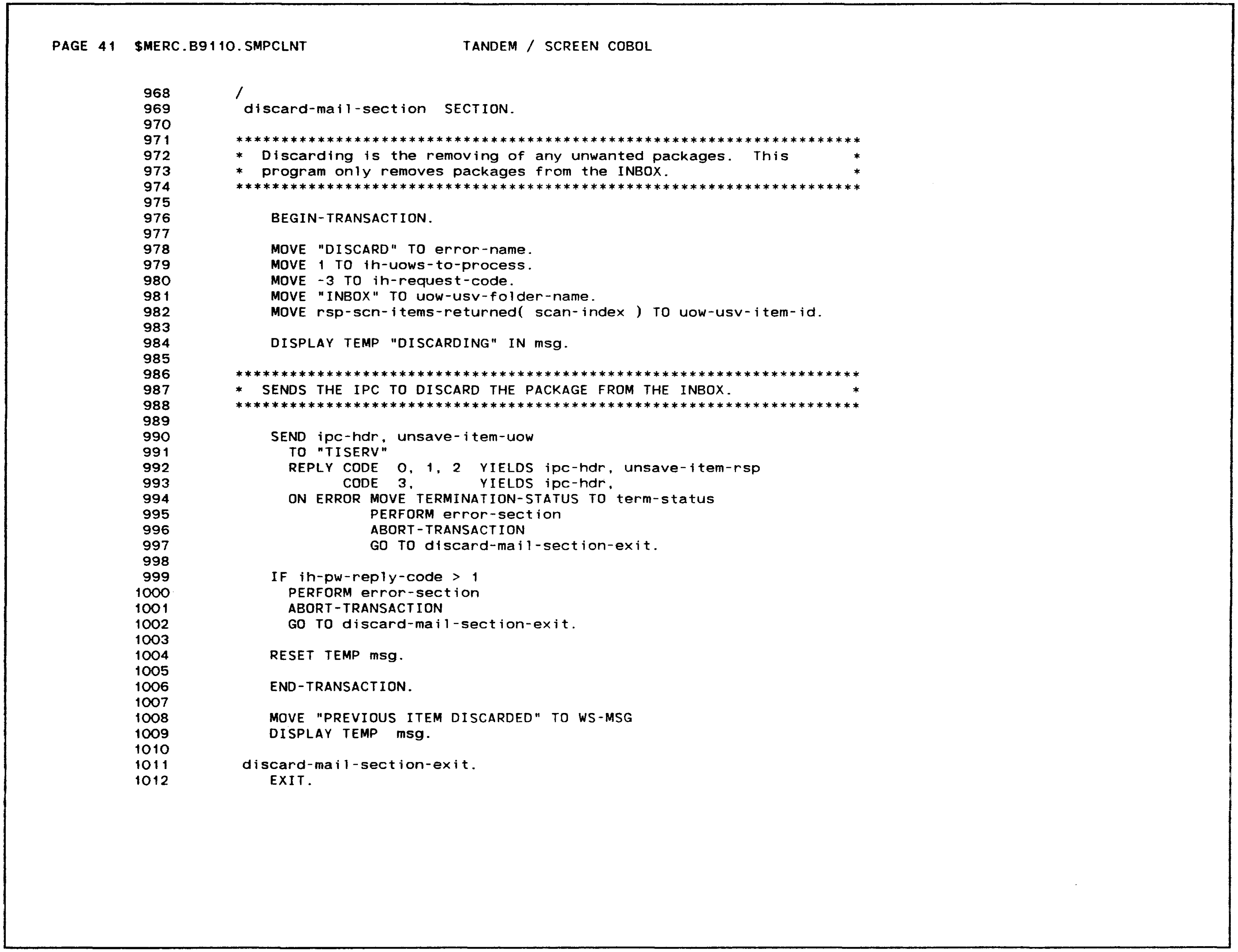

Figure 7-5. SCREEN COBOL Code for Client (Continued)



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/
 discard-mail-section  SECTION.

*********************************************************************
*  Discarding is the removing of any unwanted packages.  This       *
*  program only removes packages from the INBOX.                    *
*********************************************************************

    BEGIN-TRANSACTION.

    MOVE "DISCARD" TO error-name.
    MOVE 1 TO ih-uows-to-process.
    MOVE -3 TO ih-request-code.
    MOVE "INBOX" TO uow-usv-folder-name.
    MOVE rsp-scn-items-returned( scan-index ) TO uow-usv-item-id.

    DISPLAY TEMP "DISCARDING" IN msg.

*********************************************************************
*  SENDS THE IPC TO DISCARD THE PACKAGE FROM THE INBOX.             *
*********************************************************************

    SEND ipc-hdr, unsave-item-uow
      TO "TISERV"
      REPLY CODE  0, 1, 2  YIELDS ipc-hdr, unsave-item-rsp
            CODE  3,       YIELDS ipc-hdr,
      ON ERROR MOVE TERMINATION-STATUS TO term-status
               PERFORM error-section
               ABORT-TRANSACTION
               GO TO discard-mail-section-exit.

    IF ih-pw-reply-code > 1
      PERFORM error-section
      ABORT-TRANSACTION
      GO TO discard-mail-section-exit.

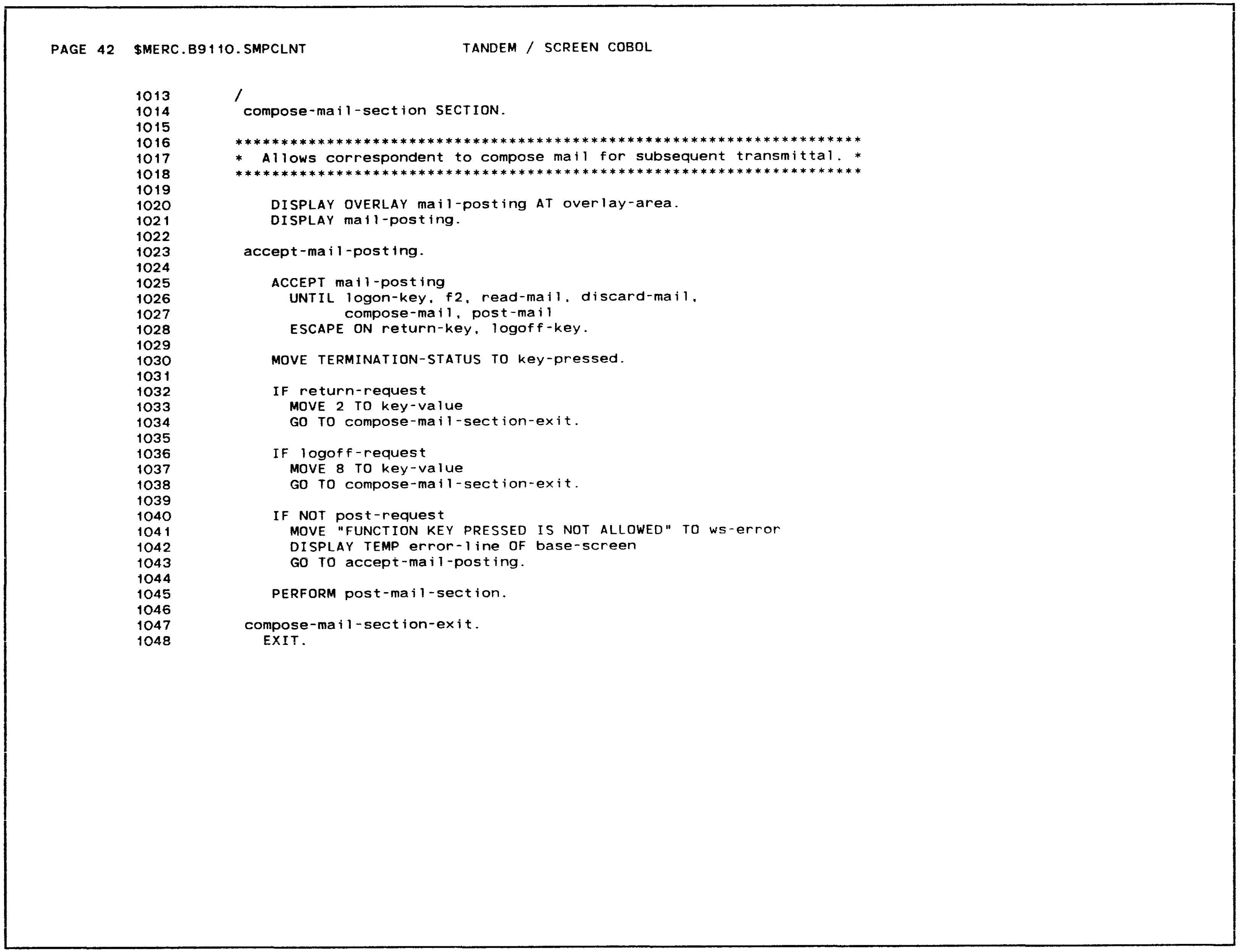
    RESET TEMP msg.

    END-TRANSACTION.

    MOVE "PREVIOUS ITEM DISCARDED" TO WS-MSG
    DISPLAY TEMP  msg.

 discard-mail-section-exit.
    EXIT.
```

Figure 7-5. SCREEN COBOL Code for Client (Continued)



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/
 compose-mail-section SECTION.

*********************************************************************
*  Allows correspondent to compose mail for subsequent transmittal. *
*********************************************************************

    DISPLAY OVERLAY mail-posting AT overlay-area.
    DISPLAY mail-posting.

 accept-mail-posting.

    ACCEPT mail-posting
      UNTIL logon-key, f2, read-mail, discard-mail,
            compose-mail, post-mail
      ESCAPE ON return-key, logoff-key.

    MOVE TERMINATION-STATUS TO key-pressed.

    IF return-request
      MOVE 2 TO key-value
      GO TO compose-mail-section-exit.

    IF logoff-request
      MOVE 8 TO key-value
      GO TO compose-mail-section-exit.

    IF NOT post-request
      MOVE "FUNCTION KEY PRESSED IS NOT ALLOWED" TO ws-error
      DISPLAY TEMP error-line OF base-screen
      GO TO accept-mail-posting.

    PERFORM post-mail-section.

 compose-mail-section-exit.
   EXIT.
```
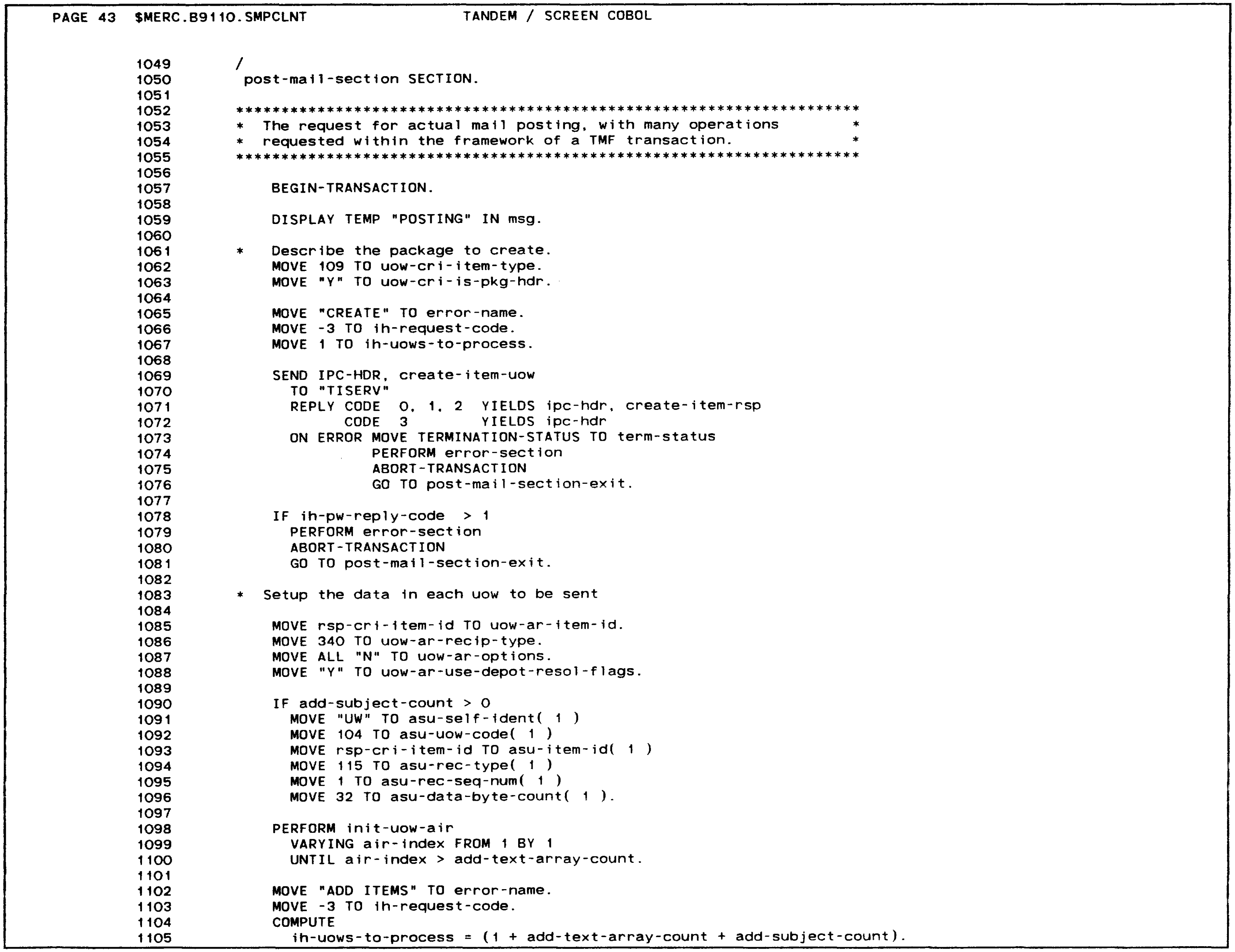

Figure 7-5. SCREEN COBOL Code for Client (Continued)



```
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/
 post-mail-section SECTION.

**********************************************************************
*  The request for actual mail posting, with many operations         *
*  requested within the framework of a TMF transaction.              *
**********************************************************************

    BEGIN-TRANSACTION.

    DISPLAY TEMP "POSTING" IN msg.

*   Describe the package to create.
    MOVE 109 TO uow-cri-item-type.
    MOVE "Y" TO uow-cri-is-pkg-hdr.

    MOVE "CREATE" TO error-name.
    MOVE -3 TO ih-request-code.
    MOVE 1 TO ih-uows-to-process.

    SEND IPC-HDR, create-item-uow
      TO "TISERV"
      REPLY CODE  0, 1, 2  YIELDS ipc-hdr, create-item-rsp
            CODE  3        YIELDS ipc-hdr
      ON ERROR MOVE TERMINATION-STATUS TO term-status
               PERFORM error-section
               ABORT-TRANSACTION
               GO TO post-mail-section-exit.

    IF ih-pw-reply-code  > 1
      PERFORM error-section
      ABORT-TRANSACTION
      GO TO post-mail-section-exit.

*  Setup the data in each uow to be sent

    MOVE rsp-cri-item-id TO uow-ar-item-id.
    MOVE 340 TO uow-ar-recip-type.
    MOVE ALL "N" TO uow-ar-options.
    MOVE "Y" TO uow-ar-use-depot-resol-flags.

    IF add-subject-count > 0
      MOVE "UW" TO asu-self-ident( 1 )
      MOVE 104 TO asu-uow-code( 1 )
      MOVE rsp-cri-item-id TO asu-item-id( 1 )
      MOVE 115 TO asu-rec-type( 1 )
      MOVE 1 TO asu-rec-seq-num( 1 )
      MOVE 32 TO asu-data-byte-count( 1 ).

    PERFORM init-uow-air
      VARYING air-index FROM 1 BY 1
      UNTIL air-index > add-text-array-count.

    MOVE "ADD ITEMS" TO error-name.
    MOVE -3 TO ih-request-code.
    COMPUTE
      ih-uows-to-process = (1 + add-text-array-count + add-subject-count).
```
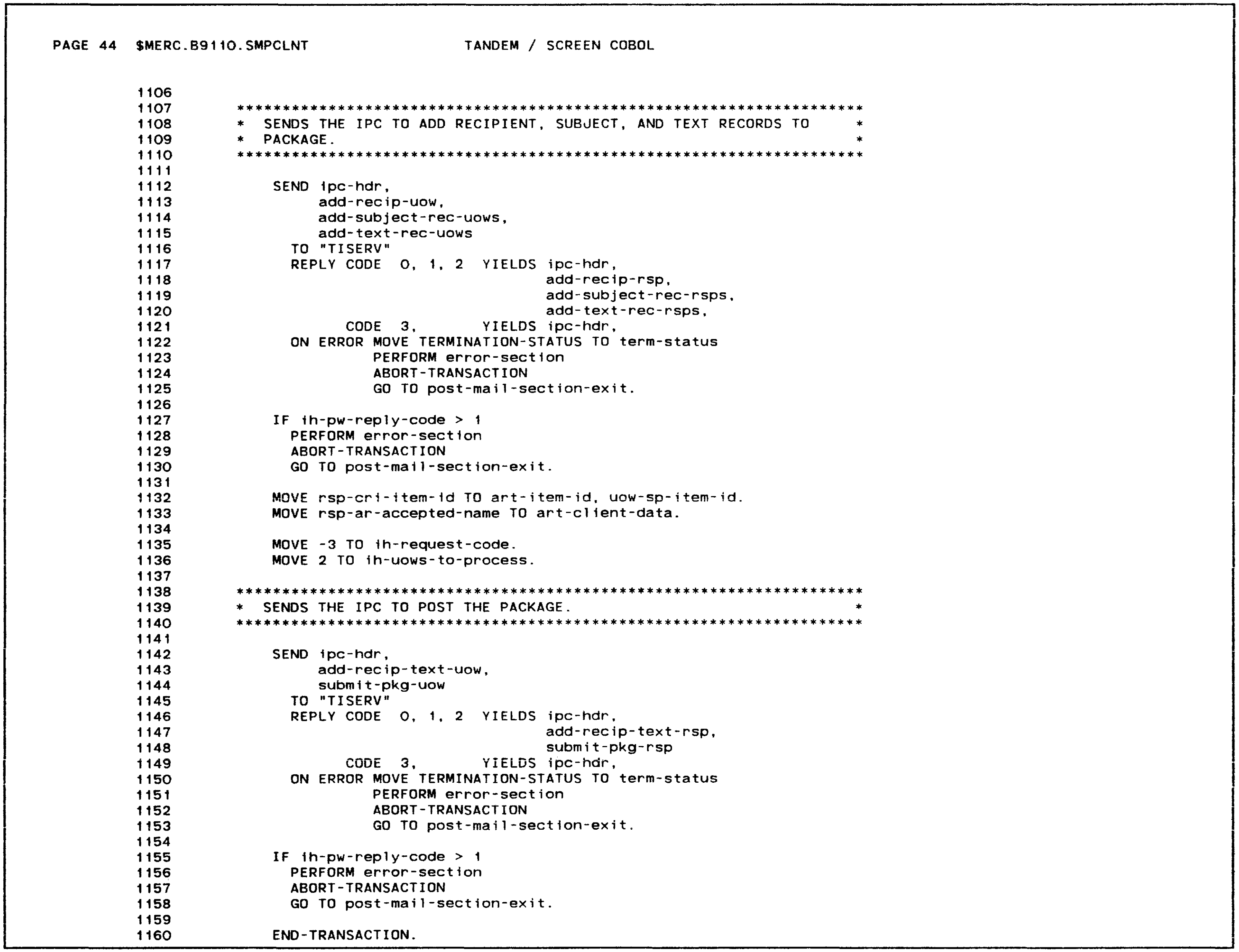

Figure 7-5. SCREEN COBOL Code for Client (Continued)



```
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      **********************************************************************
      *  SENDS THE IPC TO ADD RECIPIENT, SUBJECT, AND TEXT RECORDS TO     *
      *  PACKAGE.                                                          *
      **********************************************************************

          SEND ipc-hdr,
               add-recip-uow,
               add-subject-rec-uows,
               add-text-rec-uows
            TO "TISERV"
            REPLY CODE  0, 1, 2  YIELDS ipc-hdr,
                                        add-recip-rsp,
                                        add-subject-rec-rsps,
                                        add-text-rec-rsps,
                  CODE  3,       YIELDS ipc-hdr,
            ON ERROR MOVE TERMINATION-STATUS TO term-status
                     PERFORM error-section
                     ABORT-TRANSACTION
                     GO TO post-mail-section-exit.

          IF ih-pw-reply-code > 1
            PERFORM error-section
            ABORT-TRANSACTION
            GO TO post-mail-section-exit.

          MOVE rsp-cri-item-id TO art-item-id, uow-sp-item-id.
          MOVE rsp-ar-accepted-name TO art-client-data.

          MOVE -3 TO ih-request-code.
          MOVE 2 TO ih-uows-to-process.

      **********************************************************************
      *  SENDS THE IPC TO POST THE PACKAGE.                                *
      **********************************************************************

          SEND ipc-hdr,
               add-recip-text-uow,
               submit-pkg-uow
            TO "TISERV"
            REPLY CODE  0, 1, 2  YIELDS ipc-hdr,
                                        add-recip-text-rsp,
                                        submit-pkg-rsp
                  CODE  3,       YIELDS ipc-hdr,
            ON ERROR MOVE TERMINATION-STATUS TO term-status
                     PERFORM error-section
                     ABORT-TRANSACTION
                     GO TO post-mail-section-exit.

          IF ih-pw-reply-code > 1
            PERFORM error-section
            ABORT-TRANSACTION
            GO TO post-mail-section-exit.

          END-TRANSACTION.
```
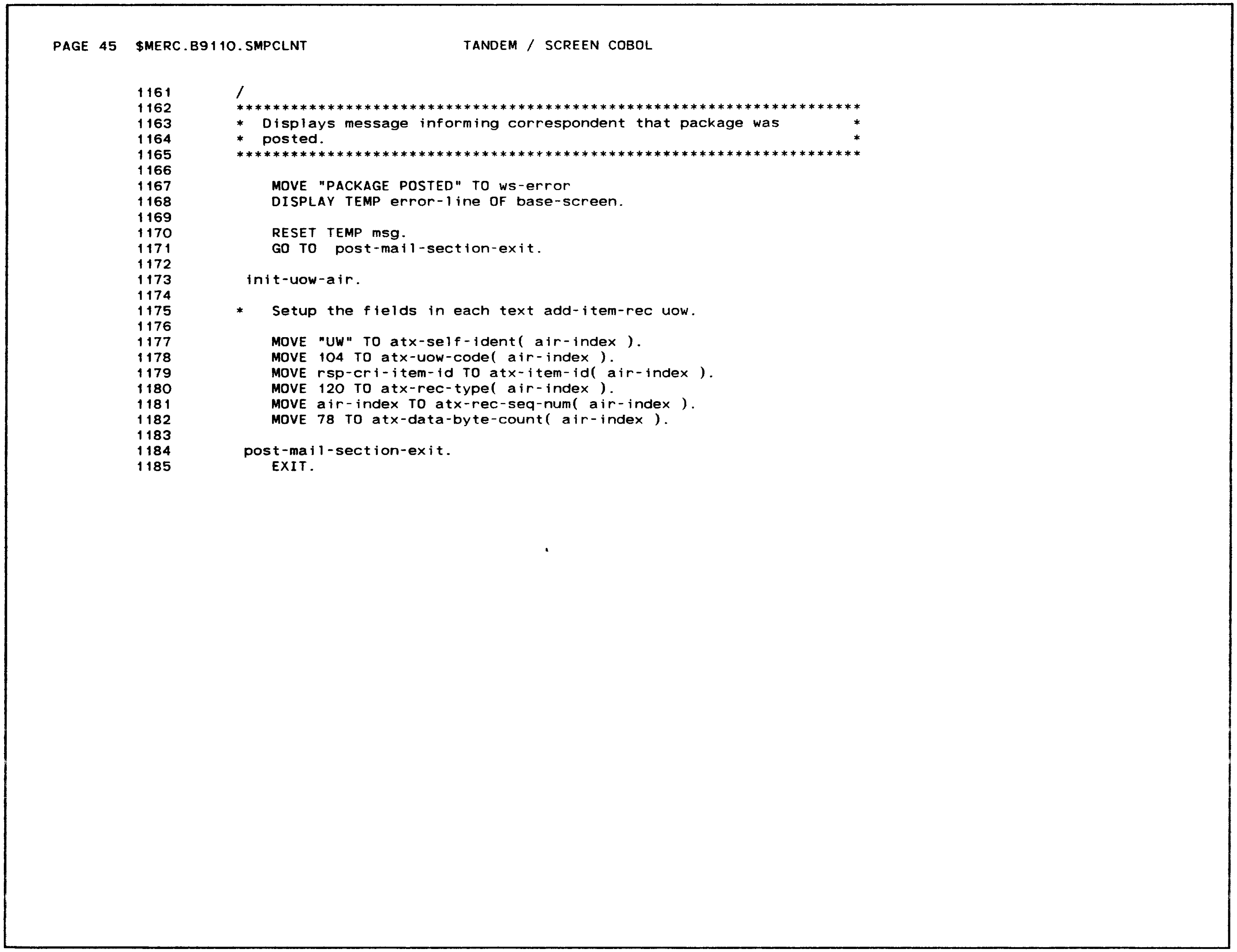

Figure 7-5. SCREEN COBOL Code for Client (Continued)



```
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/
**********************************************************************
*  Displays message informing correspondent that package was        *
*  posted.                                                          *
**********************************************************************

    MOVE "PACKAGE POSTED" TO ws-error
    DISPLAY TEMP error-line OF base-screen.

    RESET TEMP msg.
    GO TO  post-mail-section-exit.

 init-uow-air.

*   Setup the fields in each text add-item-rec uow.

    MOVE "UW" TO atx-self-ident( air-index ).
    MOVE 104 TO atx-uow-code( air-index ).
    MOVE rsp-cri-item-id TO atx-item-id( air-index ).
    MOVE 120 TO atx-rec-type( air-index ).
    MOVE air-index TO atx-rec-seq-num( air-index ).
    MOVE 78 TO atx-data-byte-count( air-index ).

 post-mail-section-exit.
    EXIT.
```
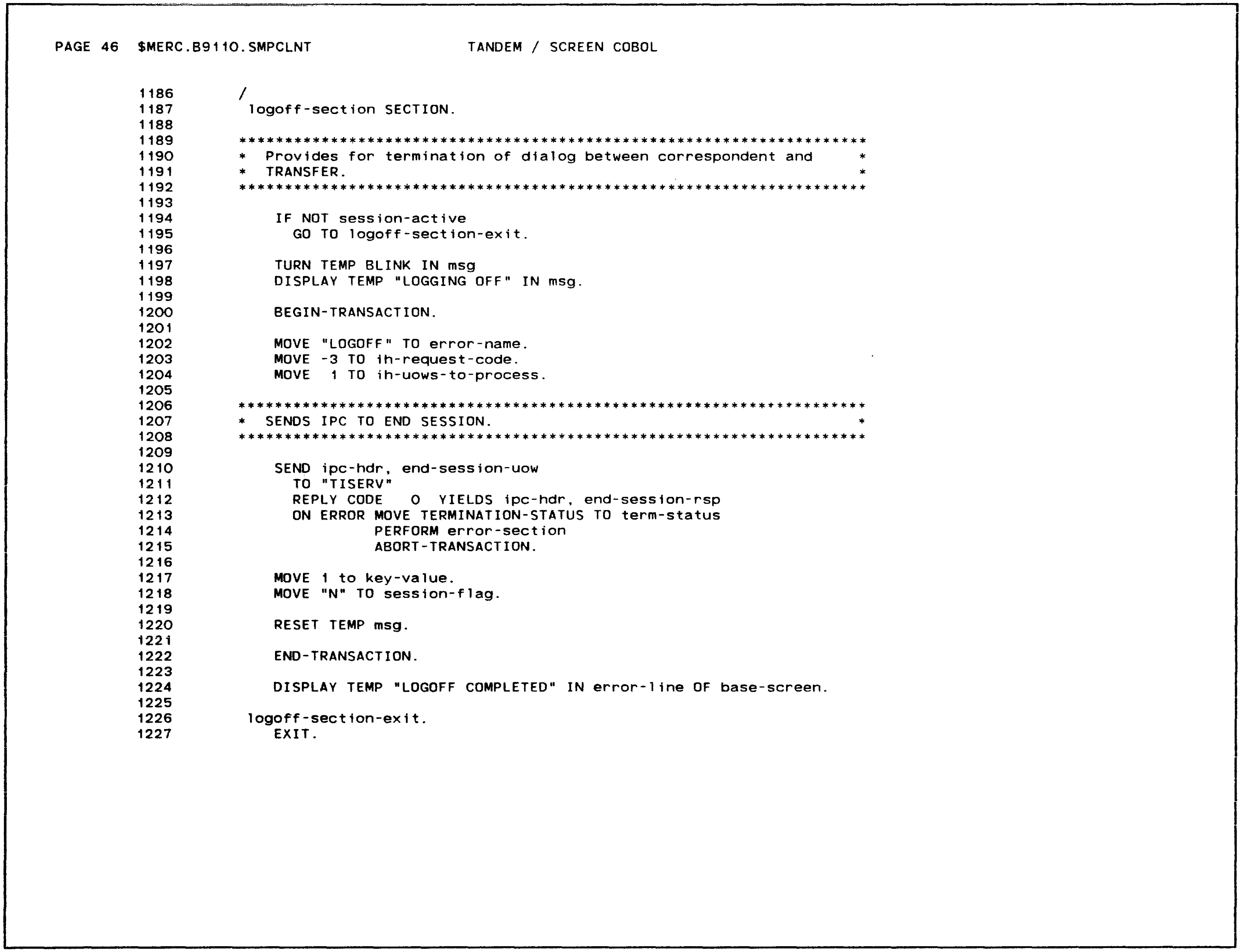

Figure 7-5. SCREEN COBOL Code for Client (Continued)



```
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        /
         logoff-section SECTION.

        ********************************************************************
        *  Provides for termination of dialog between correspondent and    *
        *  TRANSFER.                                                       *
        ********************************************************************

            IF NOT session-active
              GO TO logoff-section-exit.

            TURN TEMP BLINK IN msg
            DISPLAY TEMP "LOGGING OFF" IN msg.

            BEGIN-TRANSACTION.

            MOVE "LOGOFF" TO error-name.
            MOVE -3 TO ih-request-code.
            MOVE  1 TO ih-uows-to-process.

        ********************************************************************
        *  SENDS IPC TO END SESSION.                                       *
        ********************************************************************

            SEND ipc-hdr, end-session-uow
              TO "TISERV"
              REPLY CODE   0  YIELDS ipc-hdr, end-session-rsp
              ON ERROR MOVE TERMINATION-STATUS TO term-status
                       PERFORM error-section
                       ABORT-TRANSACTION.

            MOVE 1 to key-value.
            MOVE "N" TO session-flag.

            RESET TEMP msg.

            END-TRANSACTION.

            DISPLAY TEMP "LOGOFF COMPLETED" IN error-line OF base-screen.

         logoff-section-exit.
            EXIT.
```
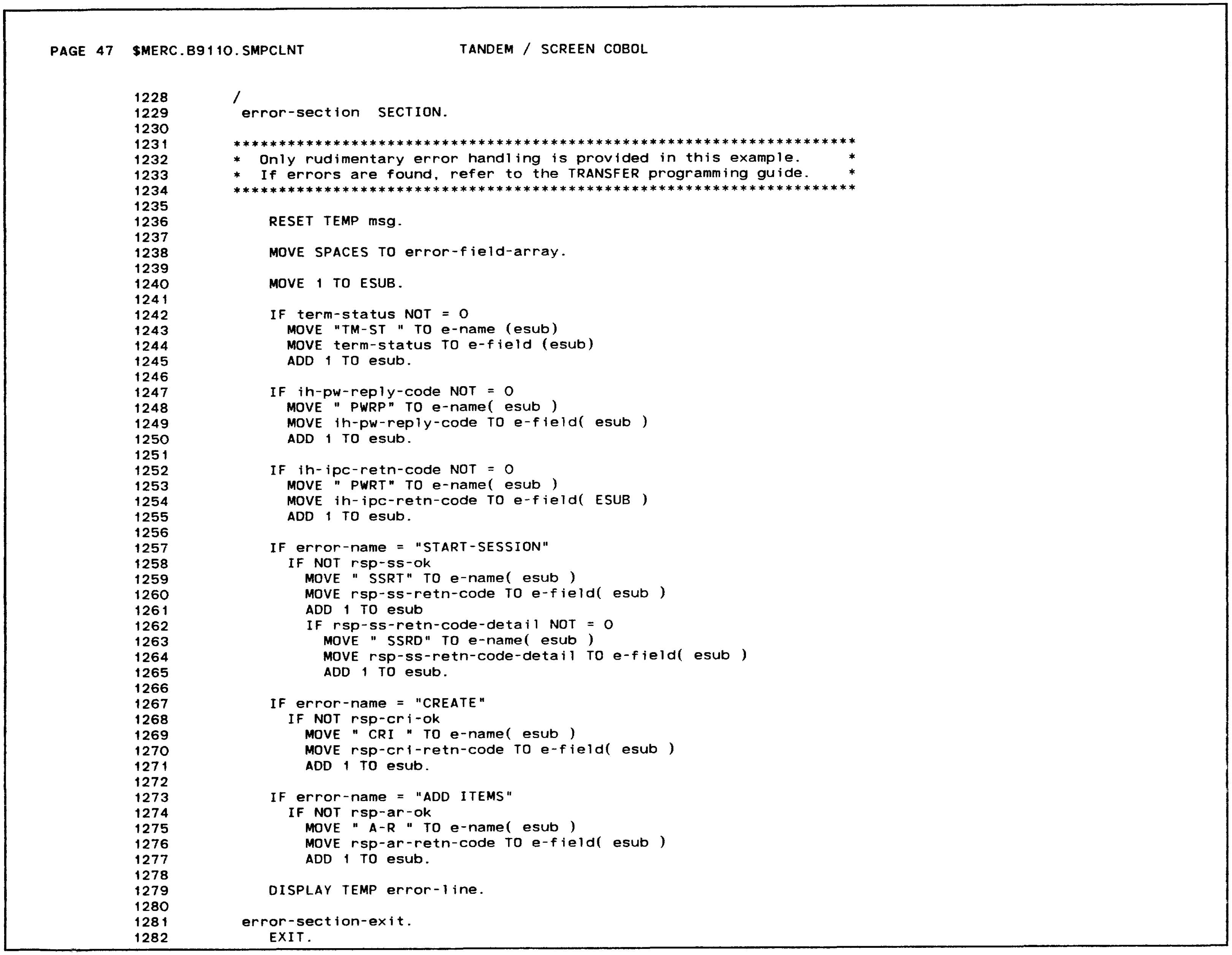

Figure 7-5. SCREEN COBOL Code for Client (Continued)



```
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/
 error-section  SECTION.

**********************************************************************
*  Only rudimentary error handling is provided in this example.      *
*  If errors are found, refer to the TRANSFER programming guide.     *
**********************************************************************

    RESET TEMP msg.

    MOVE SPACES TO error-field-array.

    MOVE 1 TO ESUB.

    IF term-status NOT = 0
      MOVE "TM-ST " TO e-name (esub)
      MOVE term-status TO e-field (esub)
      ADD 1 TO esub.

    IF ih-pw-reply-code NOT = 0
      MOVE " PWRP" TO e-name( esub )
      MOVE ih-pw-reply-code TO e-field( esub )
      ADD 1 TO esub.

    IF ih-ipc-retn-code NOT = 0
      MOVE " PWRT" TO e-name( esub )
      MOVE ih-ipc-retn-code TO e-field( ESUB )
      ADD 1 TO esub.

    IF error-name = "START-SESSION"
      IF NOT rsp-ss-ok
        MOVE " SSRT" TO e-name( esub )
        MOVE rsp-ss-retn-code TO e-field( esub )
        ADD 1 TO esub
        IF rsp-ss-retn-code-detail NOT = 0
          MOVE " SSRD" TO e-name( esub )
          MOVE rsp-ss-retn-code-detail TO e-field( esub )
          ADD 1 TO esub.

    IF error-name = "CREATE"
      IF NOT rsp-cri-ok
        MOVE " CRI " TO e-name( esub )
        MOVE rsp-cri-retn-code TO e-field( esub )
        ADD 1 TO esub.

    IF error-name = "ADD ITEMS"
      IF NOT rsp-ar-ok
        MOVE " A-R " TO e-name( esub )
        MOVE rsp-ar-retn-code TO e-field( esub )
        ADD 1 TO esub.

    DISPLAY TEMP error-line.

 error-section-exit.
    EXIT.
```
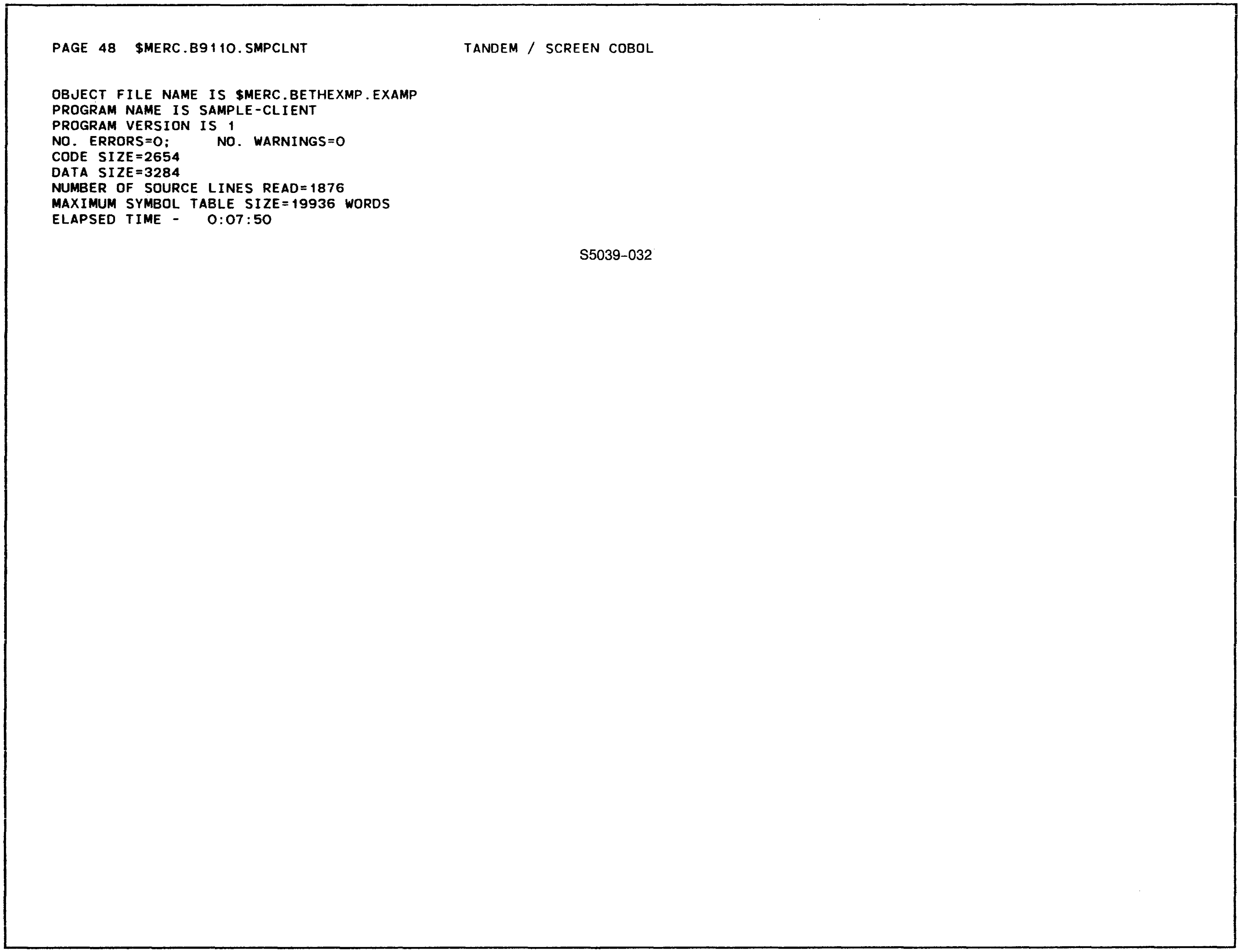

Figure 7-5. SCREEN COBOL Code for Client (Continued)



```
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OBJECT FILE NAME IS $MERC.BETHEXMP.EXAMP
PROGRAM NAME IS SAMPLE-CLIENT
PROGRAM VERSION IS 1
NO. ERRORS=0;     NO. WARNINGS=0
CODE SIZE=2654
DATA SIZE=3284
NUMBER OF SOURCE LINES READ=1876
MAXIMUM SYMBOL TABLE SIZE=19936 WORDS
ELAPSED TIME -   0:07:50
```

S5039-032

Figure 7-5. SCREEN COBOL Code for Client (Continued)

SECTION 8

SAMPLE AGENT

This section presents an example of the operations performed by a very simple agent. In this example, the agent:

1. forwards each package received at the depot to another correspondent

2. removes the package from the depot's INBOX folder

3. acknowledges receipt of the package.

The correspondent to whom the packages are forwarded is specified when the agent is configured.

The SCREEN COBOL source code required for this agent appears in Figure 8-1. The sample agent uses the following UOWs:

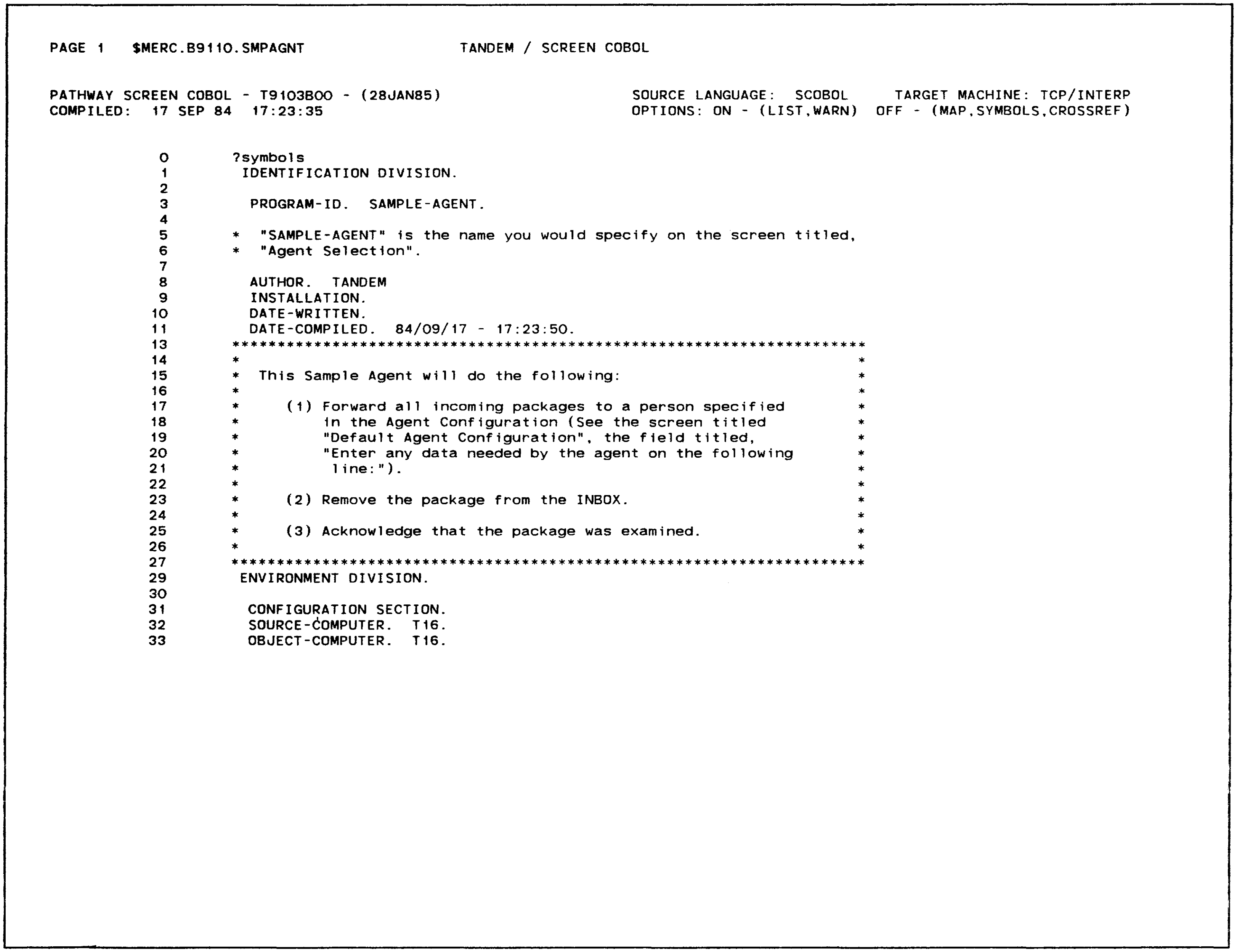
```
ACK-RECEIPT             CREATE-ITEM
ADD-ITEM-REC            SUBMIT-PKG
ATTACH-COMPNT-A01       UNSAVE-ITEM
ADD-RECIP
```

Through 01 record level definitions, this code illustrates how definitions from the GCOB and GLNK files can be copied into a program during compilation. The GCOB file contains COBOL source code for commonly used TRANSFER elements, such as IPC header and UOW definitions. The GLNK file contains similar code for use in the Linkage Section of the program; in this file, however, the INITIAL-VALUE clauses have been removed to comply with the requirements of the Linkage Section.

Notice that the names of GLNK fields that appear in the USING clause in the first line of the PROCEDURE Division (Line 101) must match exactly the names appearing in the Linkage Section (Lines 95 and 98).

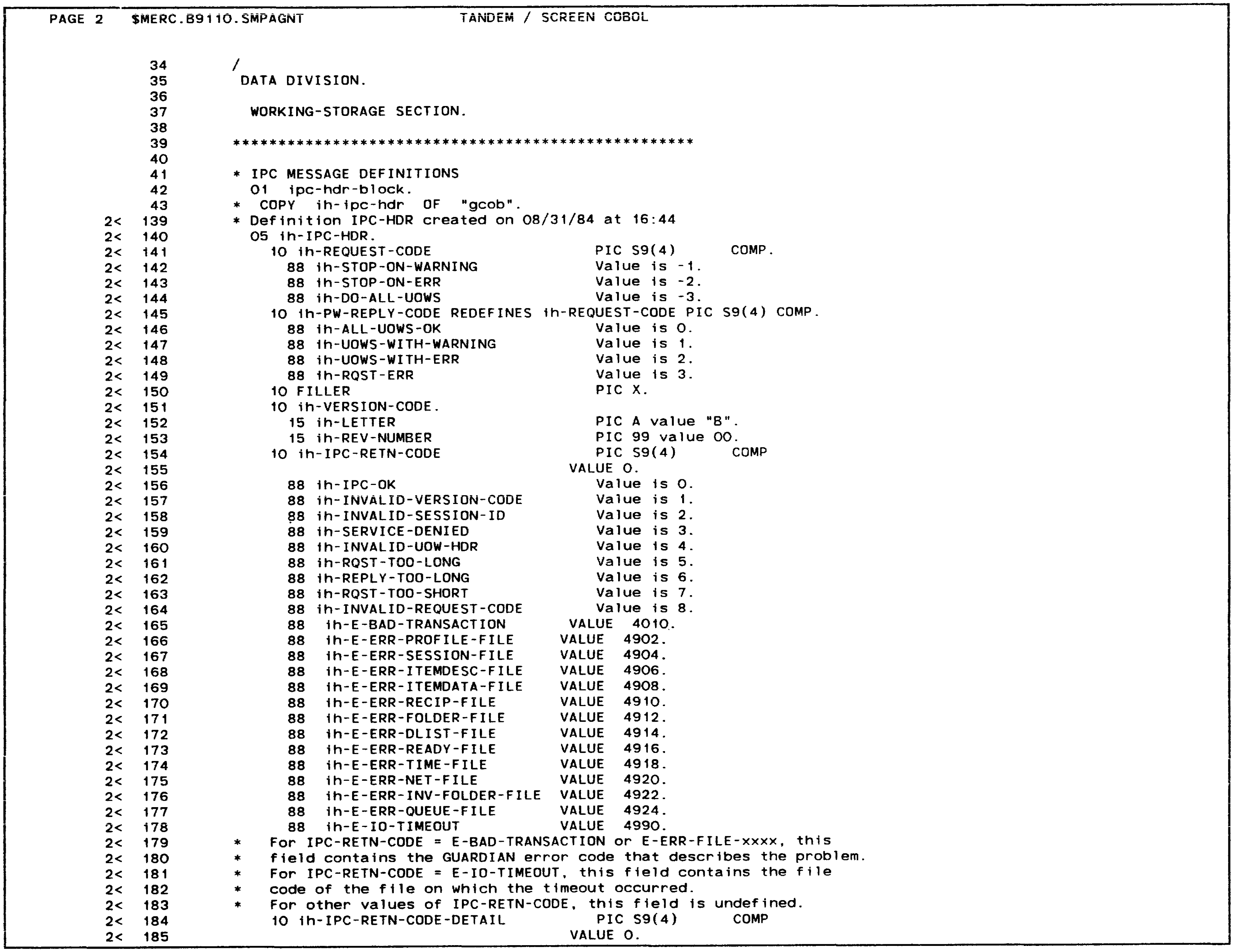
For clarity, this example is coded in a very straightforward way and is explained by comments within the source program code. To reduce storage requirements, you could use the REDEFINES clause to redefine certain UOWs and their responses to occupy the same storage space; you would do this, however, only when you were certain that the redefined space was no longer needed for its original purpose.

Source code for the sample agent has been supplied by Tandem and is on your system. The file is named SMPAGNT. Unlike the sample client, instructions are not provided for configuring this agent. To have the sample agent installed in your TRANSFER system, see your system manager. The paragraph titled DESIGNING AND WRITING AN AGENT in Section 6 provides instructions. After the sample agent is installed, it can be configured for a depot with the default agent configuration screen described in the TRANSFER Delivery System Management and Administration Guide.



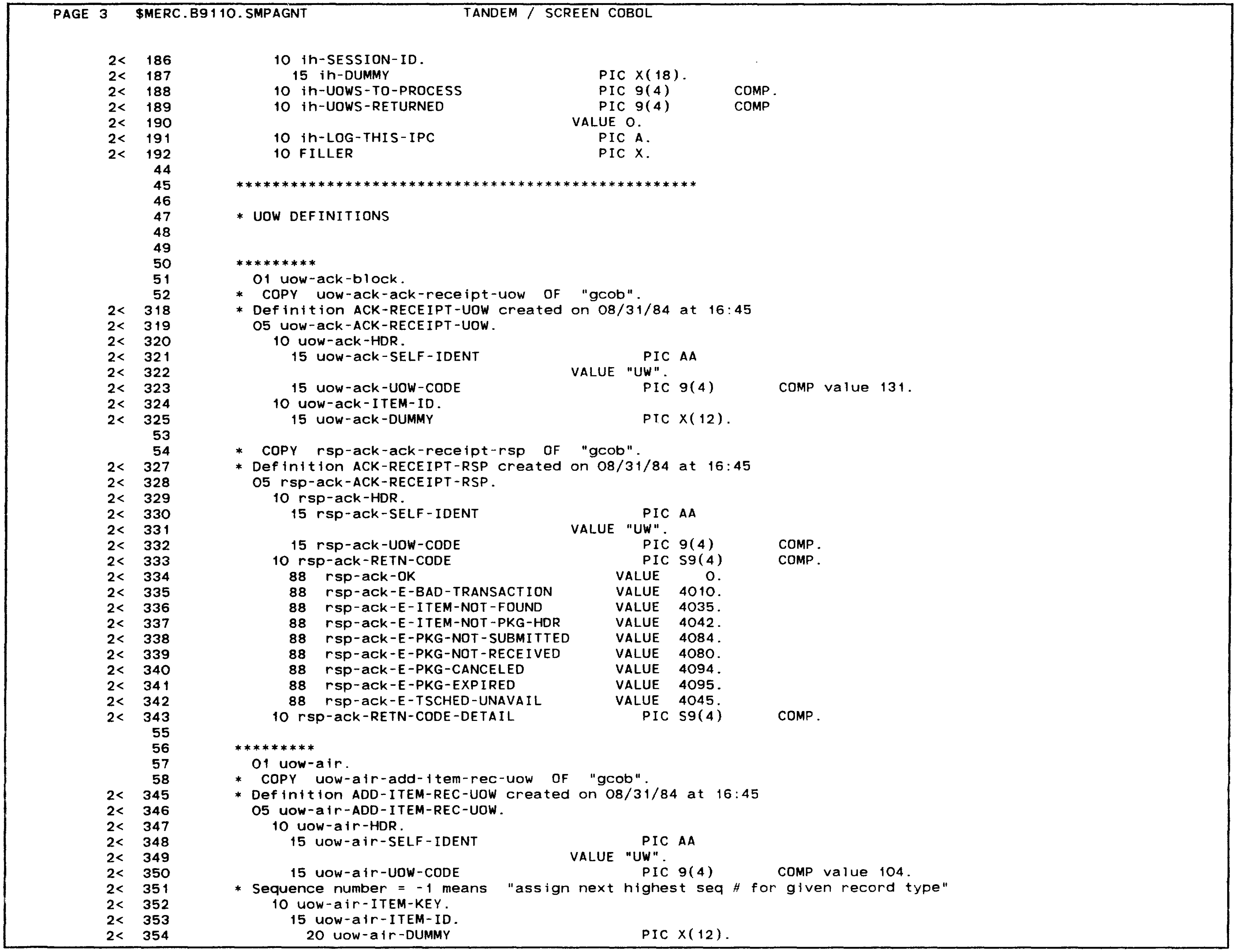
```
PAGE 1   $MERC.B9110.SMPAGNT                  TANDEM / SCREEN COBOL

PATHWAY SCREEN COBOL - T9103B00 - (28JAN85)                     SOURCE LANGUAGE:  SCOBOL     TARGET MACHINE: TCP/INTERP
COMPILED:  17 SEP 84  17:23:35                                  OPTIONS: ON - (LIST,WARN)  OFF - (MAP,SYMBOLS,CROSSREF)

      ?symbols
       IDENTIFICATION DIVISION.

        PROGRAM-ID.  SAMPLE-AGENT.

      *  "SAMPLE-AGENT" is the name you would specify on the screen titled,
      *  "Agent Selection".

        AUTHOR.  TANDEM
        INSTALLATION.
        DATE-WRITTEN.
        DATE-COMPILED.  84/09/17 - 17:23:50.
      ******************************************************************
      *                                                                *
      *  This Sample Agent will do the following:                      *
      *                                                                *
      *     (1) Forward all incoming packages to a person specified    *
      *         in the Agent Configuration (See the screen titled      *
      *         "Default Agent Configuration", the field titled,       *
      *         "Enter any data needed by the agent on the following   *
      *          line:").                                              *
      *                                                                *
      *     (2) Remove the package from the INBOX.                     *
      *                                                                *
      *     (3) Acknowledge that the package was examined.             *
      *                                                                *
      ******************************************************************
       ENVIRONMENT DIVISION.

        CONFIGURATION SECTION.
        SOURCE-COMPUTER.  T16.
        OBJECT-COMPUTER.  T16.
```

Figure 8-1. SCREEN COBOL Code for Agent



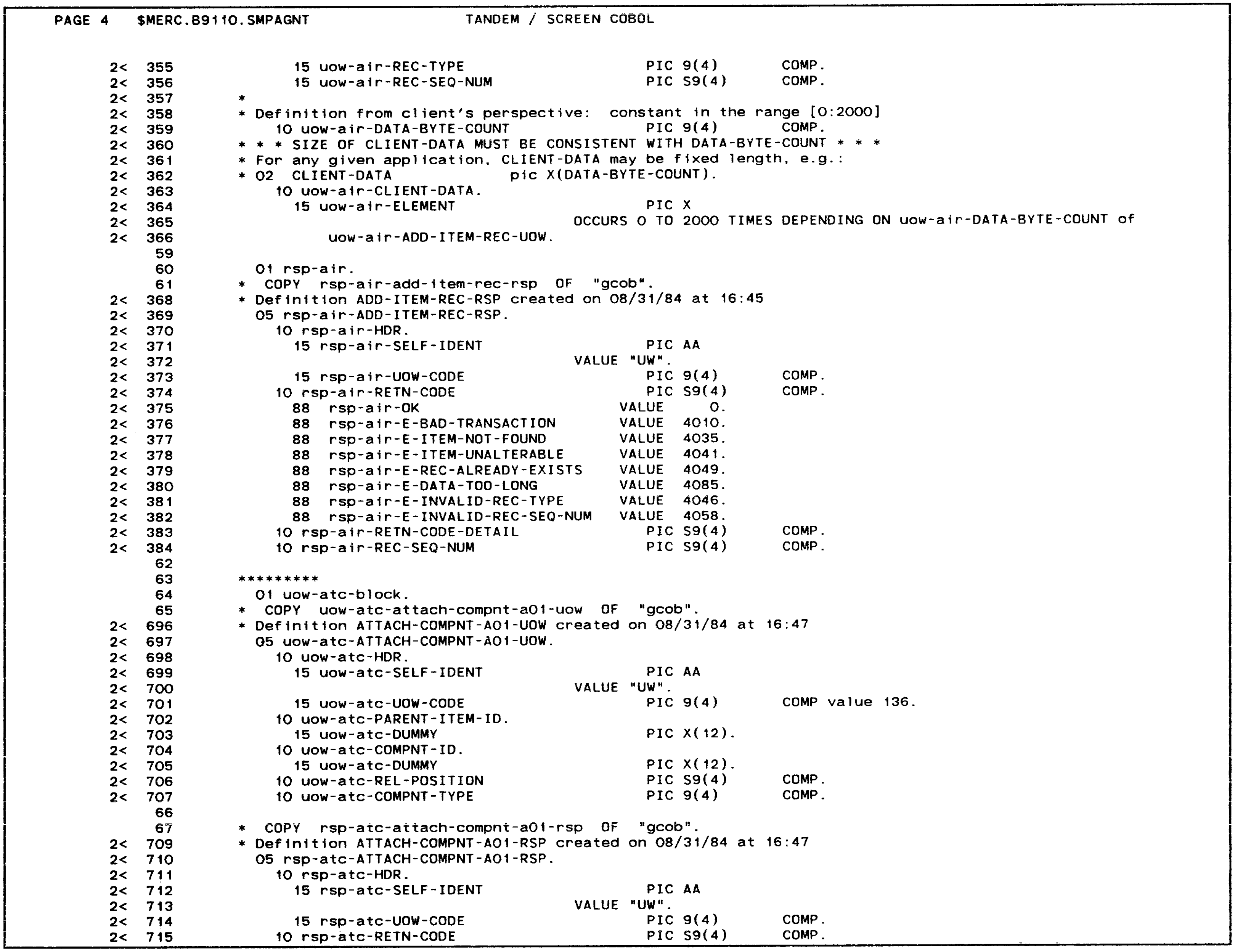
```
PAGE 2   $MERC.B9110.SMPAGNT                 TANDEM / SCREEN COBOL


                34      /
                35       DATA DIVISION.
                36
                37         WORKING-STORAGE SECTION.
                38
                39      ***************************************************
                40
                41      * IPC MESSAGE DEFINITIONS
                42         01  ipc-hdr-block.
                43      *   COPY  ih-ipc-hdr  OF  "gcob".
          2<  139       * Definition IPC-HDR created on 08/31/84 at 16:44
          2<  140          05 ih-IPC-HDR.
          2<  141             10 ih-REQUEST-CODE                   PIC S9(4)       COMP.
          2<  142               88 ih-STOP-ON-WARNING              Value is -1.
          2<  143               88 ih-STOP-ON-ERR                  Value is -2.
          2<  144               88 ih-DO-ALL-UOWS                  Value is -3.
          2<  145             10 ih-PW-REPLY-CODE REDEFINES ih-REQUEST-CODE PIC S9(4) COMP.
          2<  146               88 ih-ALL-UOWS-OK                  Value is 0.
          2<  147               88 ih-UOWS-WITH-WARNING            Value is 1.
          2<  148               88 ih-UOWS-WITH-ERR                Value is 2.
          2<  149               88 ih-RQST-ERR                     Value is 3.
          2<  150             10 FILLER                            PIC X.
          2<  151             10 ih-VERSION-CODE.
          2<  152               15 ih-LETTER                       PIC A value "B".
          2<  153               15 ih-REV-NUMBER                   PIC 99 value 00.
          2<  154             10 ih-IPC-RETN-CODE                  PIC S9(4)       COMP
          2<  155                                               VALUE 0.
          2<  156               88 ih-IPC-OK                       Value is 0.
          2<  157               88 ih-INVALID-VERSION-CODE         Value is 1.
          2<  158               88 ih-INVALID-SESSION-ID           Value is 2.
          2<  159               88 ih-SERVICE-DENIED               Value is 3.
          2<  160               88 ih-INVALID-UOW-HDR              Value is 4.
          2<  161               88 ih-RQST-TOO-LONG                Value is 5.
          2<  162               88 ih-REPLY-TOO-LONG               Value is 6.
          2<  163               88 ih-RQST-TOO-SHORT               Value is 7.
          2<  164               88 ih-INVALID-REQUEST-CODE         Value is 8.
          2<  165               88  ih-E-BAD-TRANSACTION        VALUE  4010.
          2<  166               88  ih-E-ERR-PROFILE-FILE      VALUE  4902.
          2<  167               88  ih-E-ERR-SESSION-FILE      VALUE  4904.
          2<  168               88  ih-E-ERR-ITEMDESC-FILE     VALUE  4906.
          2<  169               88  ih-E-ERR-ITEMDATA-FILE     VALUE  4908.
          2<  170               88  ih-E-ERR-RECIP-FILE        VALUE  4910.
          2<  171               88  ih-E-ERR-FOLDER-FILE       VALUE  4912.
          2<  172               88  ih-E-ERR-DLIST-FILE        VALUE  4914.
          2<  173               88  ih-E-ERR-READY-FILE        VALUE  4916.
          2<  174               88  ih-E-ERR-TIME-FILE         VALUE  4918.
          2<  175               88  ih-E-ERR-NET-FILE          VALUE  4920.
          2<  176               88  ih-E-ERR-INV-FOLDER-FILE   VALUE  4922.
          2<  177               88  ih-E-ERR-QUEUE-FILE        VALUE  4924.
          2<  178               88  ih-E-IO-TIMEOUT            VALUE  4990.
          2<  179       *   For IPC-RETN-CODE = E-BAD-TRANSACTION or E-ERR-FILE-xxxx, this
          2<  180       *   field contains the GUARDIAN error code that describes the problem.
          2<  181       *   For IPC-RETN-CODE = E-IO-TIMEOUT, this field contains the file
          2<  182       *   code of the file on which the timeout occurred.
          2<  183       *   For other values of IPC-RETN-CODE, this field is undefined.
          2<  184             10 ih-IPC-RETN-CODE-DETAIL           PIC S9(4)       COMP
          2<  185                                               VALUE 0.
```

Figure 8-1. SCREEN COBOL Code for Agent (Continued)



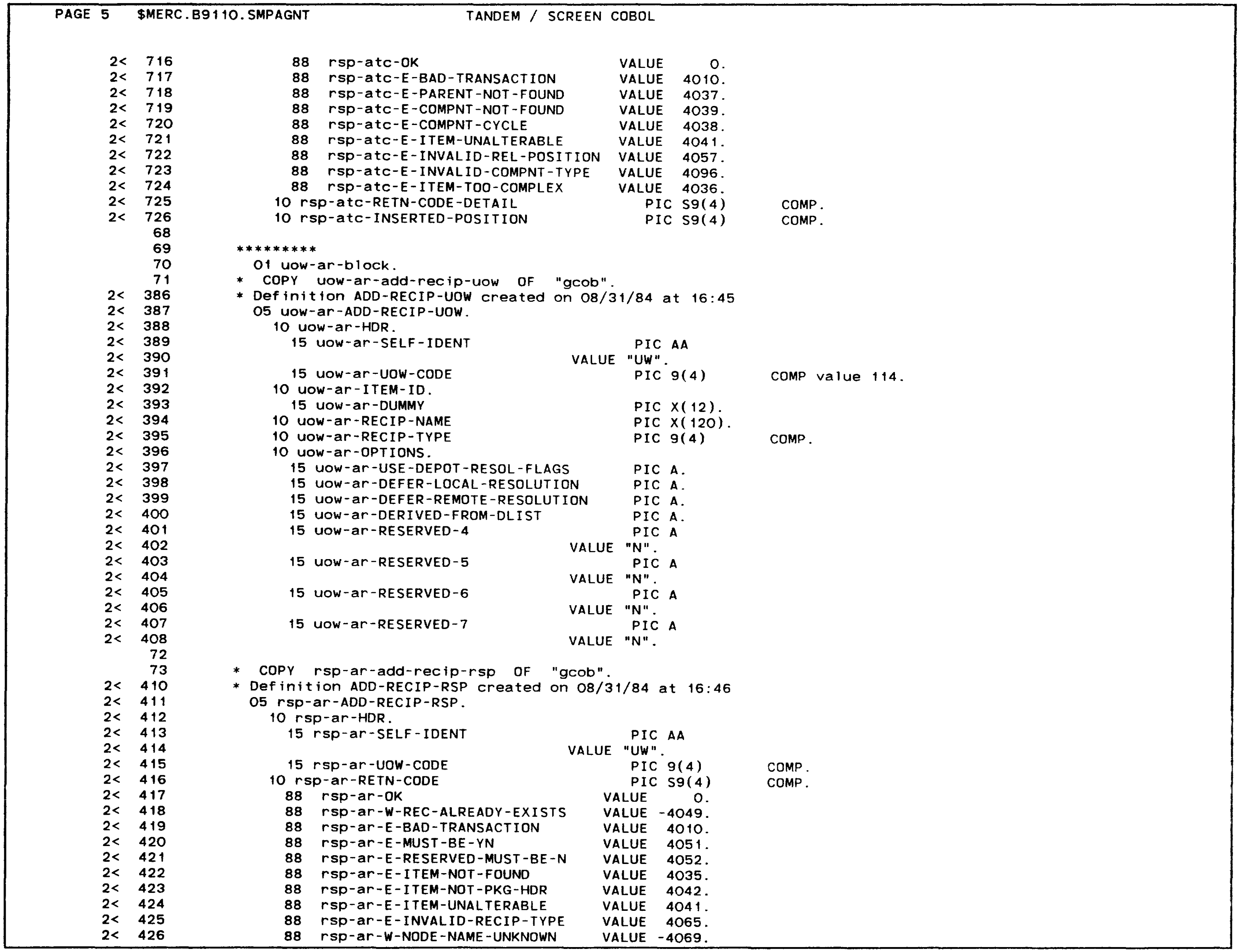
```
PAGE 3   $MERC.B9110.SMPAGNT                 TANDEM / SCREEN COBOL


      2<  186           10 ih-SESSION-ID.
      2<  187             15 ih-DUMMY                      PIC X(18).
      2<  188           10 ih-UOWS-TO-PROCESS              PIC 9(4)       COMP.
      2<  189           10 ih-UOWS-RETURNED                PIC 9(4)       COMP
      2<  190                                           VALUE 0.
      2<  191           10 ih-LOG-THIS-IPC                 PIC A.
      2<  192           10 FILLER                          PIC X.
           44
           45       ***************************************************
           46
           47       * UOW DEFINITIONS
           48
           49
           50       *********
           51         01 uow-ack-block.
           52       *  COPY  uow-ack-ack-receipt-uow  OF  "gcob".
      2<  318       * Definition ACK-RECEIPT-UOW created on 08/31/84 at 16:45
      2<  319         05 uow-ack-ACK-RECEIPT-UOW.
      2<  320           10 uow-ack-HDR.
      2<  321             15 uow-ack-SELF-IDENT                 PIC AA
      2<  322                                        VALUE "UW".
      2<  323             15 uow-ack-UOW-CODE                   PIC 9(4)       COMP value 131.
      2<  324           10 uow-ack-ITEM-ID.
      2<  325             15 uow-ack-DUMMY                      PIC X(12).
           53
           54       *  COPY  rsp-ack-ack-receipt-rsp  OF  "gcob".
      2<  327       * Definition ACK-RECEIPT-RSP created on 08/31/84 at 16:45
      2<  328         05 rsp-ack-ACK-RECEIPT-RSP.
      2<  329           10 rsp-ack-HDR.
      2<  330             15 rsp-ack-SELF-IDENT                 PIC AA
      2<  331                                        VALUE "UW".
      2<  332             15 rsp-ack-UOW-CODE                   PIC 9(4)       COMP.
      2<  333           10 rsp-ack-RETN-CODE                    PIC S9(4)      COMP.
      2<  334              88  rsp-ack-OK                  VALUE     0.
      2<  335              88  rsp-ack-E-BAD-TRANSACTION   VALUE  4010.
      2<  336              88  rsp-ack-E-ITEM-NOT-FOUND    VALUE  4035.
      2<  337              88  rsp-ack-E-ITEM-NOT-PKG-HDR  VALUE  4042.
      2<  338              88  rsp-ack-E-PKG-NOT-SUBMITTED VALUE  4084.
      2<  339              88  rsp-ack-E-PKG-NOT-RECEIVED  VALUE  4080.
      2<  340              88  rsp-ack-E-PKG-CANCELED      VALUE  4094.
      2<  341              88  rsp-ack-E-PKG-EXPIRED       VALUE  4095.
      2<  342              88  rsp-ack-E-TSCHED-UNAVAIL    VALUE  4045.
      2<  343           10 rsp-ack-RETN-CODE-DETAIL             PIC S9(4)      COMP.
           55
           56       *********
           57         01 uow-air.
           58       *  COPY  uow-air-add-item-rec-uow  OF  "gcob".
      2<  345       * Definition ADD-ITEM-REC-UOW created on 08/31/84 at 16:45
      2<  346         05 uow-air-ADD-ITEM-REC-UOW.
      2<  347           10 uow-air-HDR.
      2<  348             15 uow-air-SELF-IDENT                 PIC AA
      2<  349                                        VALUE "UW".
      2<  350             15 uow-air-UOW-CODE                   PIC 9(4)       COMP value 104.
      2<  351       * Sequence number = -1 means  "assign next highest seq # for given record type"
      2<  352           10 uow-air-ITEM-KEY.
      2<  353             15 uow-air-ITEM-ID.
      2<  354               20 uow-air-DUMMY                    PIC X(12).
```

Figure 8-1. SCREEN COBOL Code for Agent (Continued)



```
        PAGE 4   $MERC.B9110.SMPAGNT                 TANDEM / SCREEN COBOL

          2<  355              15 uow-air-REC-TYPE                      PIC 9(4)       COMP.
          2<  356              15 uow-air-REC-SEQ-NUM                   PIC S9(4)      COMP.
          2<  357       *
          2<  358       * Definition from client's perspective:  constant in the range [0:2000]
          2<  359            10 uow-air-DATA-BYTE-COUNT                 PIC 9(4)       COMP.
          2<  360       * * * SIZE OF CLIENT-DATA MUST BE CONSISTENT WITH DATA-BYTE-COUNT * * *
          2<  361       * For any given application, CLIENT-DATA may be fixed length, e.g.:
          2<  362       * 02  CLIENT-DATA             pic X(DATA-BYTE-COUNT).
          2<  363            10 uow-air-CLIENT-DATA.
          2<  364              15 uow-air-ELEMENT                       PIC X
          2<  365                                               OCCURS 0 TO 2000 TIMES DEPENDING ON uow-air-DATA-BYTE-COUNT of
          2<  366                  uow-air-ADD-ITEM-REC-UOW.
               59
               60         01 rsp-air.
               61       *  COPY  rsp-air-add-item-rec-rsp  OF  "gcob".
          2<  368       * Definition ADD-ITEM-REC-RSP created on 08/31/84 at 16:45
          2<  369         05 rsp-air-ADD-ITEM-REC-RSP.
          2<  370            10 rsp-air-HDR.
          2<  371              15 rsp-air-SELF-IDENT                    PIC AA
          2<  372                                               VALUE "UW".
          2<  373              15 rsp-air-UOW-CODE                      PIC 9(4)       COMP.
          2<  374            10 rsp-air-RETN-CODE                       PIC S9(4)      COMP.
          2<  375              88  rsp-air-OK                        VALUE     0.
          2<  376              88  rsp-air-E-BAD-TRANSACTION         VALUE  4010.
          2<  377              88  rsp-air-E-ITEM-NOT-FOUND          VALUE  4035.
          2<  378              88  rsp-air-E-ITEM-UNALTERABLE        VALUE  4041.
          2<  379              88  rsp-air-E-REC-ALREADY-EXISTS      VALUE  4049.
          2<  380              88  rsp-air-E-DATA-TOO-LONG           VALUE  4085.
          2<  381              88  rsp-air-E-INVALID-REC-TYPE        VALUE  4046.
          2<  382              88  rsp-air-E-INVALID-REC-SEQ-NUM     VALUE  4058.
          2<  383            10 rsp-air-RETN-CODE-DETAIL                PIC S9(4)      COMP.
          2<  384            10 rsp-air-REC-SEQ-NUM                     PIC S9(4)      COMP.
               62
               63       *********
               64         01 uow-atc-block.
               65       *  COPY  uow-atc-attach-compnt-a01-uow  OF  "gcob".
          2<  696       * Definition ATTACH-COMPNT-A01-UOW created on 08/31/84 at 16:47
          2<  697         05 uow-atc-ATTACH-COMPNT-A01-UOW.
          2<  698            10 uow-atc-HDR.
          2<  699              15 uow-atc-SELF-IDENT                    PIC AA
          2<  700                                               VALUE "UW".
          2<  701              15 uow-atc-UOW-CODE                      PIC 9(4)       COMP value 136.
          2<  702            10 uow-atc-PARENT-ITEM-ID.
          2<  703              15 uow-atc-DUMMY                         PIC X(12).
          2<  704            10 uow-atc-COMPNT-ID.
          2<  705              15 uow-atc-DUMMY                         PIC X(12).
          2<  706            10 uow-atc-REL-POSITION                    PIC S9(4)      COMP.
          2<  707            10 uow-atc-COMPNT-TYPE                     PIC 9(4)       COMP.
               66
               67       *  COPY  rsp-atc-attach-compnt-a01-rsp  OF  "gcob".
          2<  709       * Definition ATTACH-COMPNT-A01-RSP created on 08/31/84 at 16:47
          2<  710         05 rsp-atc-ATTACH-COMPNT-A01-RSP.
          2<  711            10 rsp-atc-HDR.
          2<  712              15 rsp-atc-SELF-IDENT                    PIC AA
          2<  713                                               VALUE "UW".
          2<  714              15 rsp-atc-UOW-CODE                      PIC 9(4)       COMP.
          2<  715            10 rsp-atc-RETN-CODE                       PIC S9(4)      COMP.
```

Figure 8-1. SCREEN COBOL Code for Agent (Continued)



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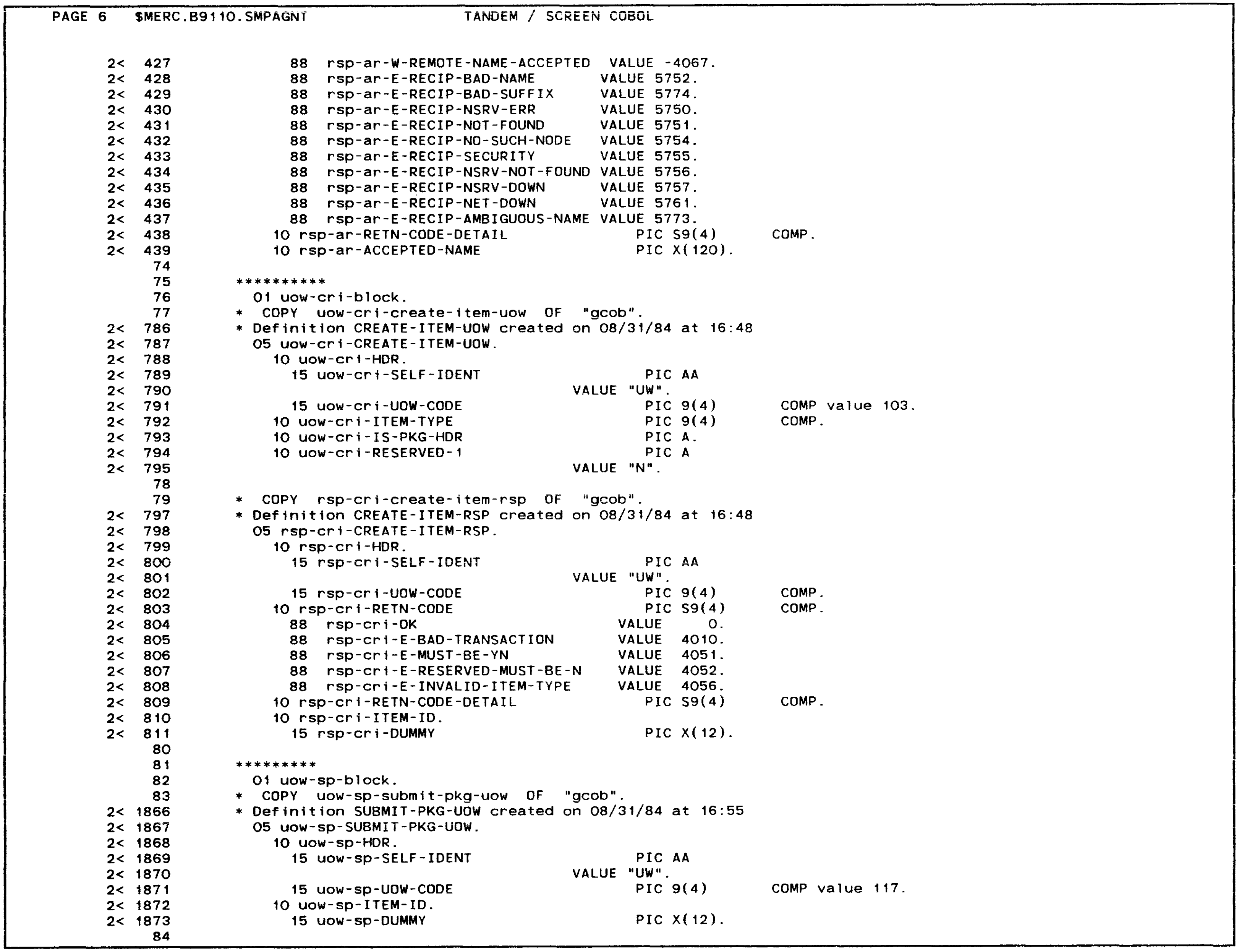
      2<  716            88  rsp-atc-OK                      VALUE     0.
      2<  717            88  rsp-atc-E-BAD-TRANSACTION       VALUE  4010.
      2<  718            88  rsp-atc-E-PARENT-NOT-FOUND      VALUE  4037.
      2<  719            88  rsp-atc-E-COMPNT-NOT-FOUND      VALUE  4039.
      2<  720            88  rsp-atc-E-COMPNT-CYCLE          VALUE  4038.
      2<  721            88  rsp-atc-E-ITEM-UNALTERABLE      VALUE  4041.
      2<  722            88  rsp-atc-E-INVALID-REL-POSITION  VALUE  4057.
      2<  723            88  rsp-atc-E-INVALID-COMPNT-TYPE   VALUE  4096.
      2<  724            88  rsp-atc-E-ITEM-TOO-COMPLEX      VALUE  4036.
      2<  725          10 rsp-atc-RETN-CODE-DETAIL              PIC S9(4)      COMP.
      2<  726          10 rsp-atc-INSERTED-POSITION             PIC S9(4)      COMP.
           68
           69      *********
           70        01 uow-ar-block.
           71      *  COPY  uow-ar-add-recip-uow  OF  "gcob".
      2<  386      * Definition ADD-RECIP-UOW created on 08/31/84 at 16:45
      2<  387        05 uow-ar-ADD-RECIP-UOW.
      2<  388          10 uow-ar-HDR.
      2<  389            15 uow-ar-SELF-IDENT                   PIC AA
      2<  390                                          VALUE "UW".
      2<  391            15 uow-ar-UOW-CODE                     PIC 9(4)      COMP value 114.
      2<  392          10 uow-ar-ITEM-ID.
      2<  393            15 uow-ar-DUMMY                        PIC X(12).
      2<  394          10 uow-ar-RECIP-NAME                     PIC X(120).
      2<  395          10 uow-ar-RECIP-TYPE                     PIC 9(4)      COMP.
      2<  396          10 uow-ar-OPTIONS.
      2<  397            15 uow-ar-USE-DEPOT-RESOL-FLAGS        PIC A.
      2<  398            15 uow-ar-DEFER-LOCAL-RESOLUTION       PIC A.
      2<  399            15 uow-ar-DEFER-REMOTE-RESOLUTION      PIC A.
      2<  400            15 uow-ar-DERIVED-FROM-DLIST           PIC A.
      2<  401            15 uow-ar-RESERVED-4                   PIC A
      2<  402                                          VALUE "N".
      2<  403            15 uow-ar-RESERVED-5                   PIC A
      2<  404                                          VALUE "N".
      2<  405            15 uow-ar-RESERVED-6                   PIC A
      2<  406                                          VALUE "N".
      2<  407            15 uow-ar-RESERVED-7                   PIC A
      2<  408                                          VALUE "N".
           72
           73      *  COPY  rsp-ar-add-recip-rsp  OF  "gcob".
      2<  410      * Definition ADD-RECIP-RSP created on 08/31/84 at 16:46
      2<  411        05 rsp-ar-ADD-RECIP-RSP.
      2<  412          10 rsp-ar-HDR.
      2<  413            15 rsp-ar-SELF-IDENT                   PIC AA
      2<  414                                          VALUE "UW".
      2<  415            15 rsp-ar-UOW-CODE                     PIC 9(4)      COMP.
      2<  416          10 rsp-ar-RETN-CODE                      PIC S9(4)     COMP.
      2<  417            88 rsp-ar-OK                      VALUE     0.
      2<  418            88 rsp-ar-W-REC-ALREADY-EXISTS    VALUE -4049.
      2<  419            88 rsp-ar-E-BAD-TRANSACTION       VALUE  4010.
      2<  420            88 rsp-ar-E-MUST-BE-YN            VALUE  4051.
      2<  421            88 rsp-ar-E-RESERVED-MUST-BE-N    VALUE  4052.
      2<  422            88 rsp-ar-E-ITEM-NOT-FOUND        VALUE  4035.
      2<  423            88 rsp-ar-E-ITEM-NOT-PKG-HDR      VALUE  4042.
      2<  424            88 rsp-ar-E-ITEM-UNALTERABLE      VALUE  4041.
      2<  425            88 rsp-ar-E-INVALID-RECIP-TYPE    VALUE  4065.
      2<  426            88 rsp-ar-W-NODE-NAME-UNKNOWN     VALUE -4069.
```

Figure 8-1. SCREEN COBOL Code for Agent (Continued)



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      2<  427             88  rsp-ar-W-REMOTE-NAME-ACCEPTED  VALUE -4067.
      2<  428             88  rsp-ar-E-RECIP-BAD-NAME        VALUE 5752.
      2<  429             88  rsp-ar-E-RECIP-BAD-SUFFIX      VALUE 5774.
      2<  430             88  rsp-ar-E-RECIP-NSRV-ERR        VALUE 5750.
      2<  431             88  rsp-ar-E-RECIP-NOT-FOUND       VALUE 5751.
      2<  432             88  rsp-ar-E-RECIP-NO-SUCH-NODE    VALUE 5754.
      2<  433             88  rsp-ar-E-RECIP-SECURITY        VALUE 5755.
      2<  434             88  rsp-ar-E-RECIP-NSRV-NOT-FOUND  VALUE 5756.
      2<  435             88  rsp-ar-E-RECIP-NSRV-DOWN       VALUE 5757.
      2<  436             88  rsp-ar-E-RECIP-NET-DOWN        VALUE 5761.
      2<  437             88  rsp-ar-E-RECIP-AMBIGUOUS-NAME  VALUE 5773.
      2<  438           10 rsp-ar-RETN-CODE-DETAIL             PIC S9(4)      COMP.
      2<  439           10 rsp-ar-ACCEPTED-NAME                PIC X(120).
           74
           75       **********
           76         01 uow-cri-block.
           77       *  COPY  uow-cri-create-item-uow  OF  "gcob".
      2<  786       * Definition CREATE-ITEM-UOW created on 08/31/84 at 16:48
      2<  787         05 uow-cri-CREATE-ITEM-UOW.
      2<  788           10 uow-cri-HDR.
      2<  789             15 uow-cri-SELF-IDENT                PIC AA
      2<  790                                          VALUE "UW".
      2<  791             15 uow-cri-UOW-CODE                  PIC 9(4)       COMP value 103.
      2<  792           10 uow-cri-ITEM-TYPE                   PIC 9(4)       COMP.
      2<  793           10 uow-cri-IS-PKG-HDR                  PIC A.
      2<  794           10 uow-cri-RESERVED-1                  PIC A
      2<  795                                          VALUE "N".
           78
           79       *  COPY  rsp-cri-create-item-rsp  OF  "gcob".
      2<  797       * Definition CREATE-ITEM-RSP created on 08/31/84 at 16:48
      2<  798         05 rsp-cri-CREATE-ITEM-RSP.
      2<  799           10 rsp-cri-HDR.
      2<  800             15 rsp-cri-SELF-IDENT                PIC AA
      2<  801                                          VALUE "UW".
      2<  802             15 rsp-cri-UOW-CODE                  PIC 9(4)       COMP.
      2<  803           10 rsp-cri-RETN-CODE                   PIC S9(4)      COMP.
      2<  804             88  rsp-cri-OK                     VALUE     0.
      2<  805             88  rsp-cri-E-BAD-TRANSACTION      VALUE  4010.
      2<  806             88  rsp-cri-E-MUST-BE-YN           VALUE  4051.
      2<  807             88  rsp-cri-E-RESERVED-MUST-BE-N   VALUE  4052.
      2<  808             88  rsp-cri-E-INVALID-ITEM-TYPE    VALUE  4056.
      2<  809           10 rsp-cri-RETN-CODE-DETAIL            PIC S9(4)      COMP.
      2<  810           10 rsp-cri-ITEM-ID.
      2<  811             15 rsp-cri-DUMMY                     PIC X(12).
           80
           81       *********
           82         01 uow-sp-block.
           83       *  COPY  uow-sp-submit-pkg-uow  OF  "gcob".
      2< 1866       * Definition SUBMIT-PKG-UOW created on 08/31/84 at 16:55
      2< 1867         05 uow-sp-SUBMIT-PKG-UOW.
      2< 1868           10 uow-sp-HDR.
      2< 1869             15 uow-sp-SELF-IDENT                PIC AA
      2< 1870                                          VALUE "UW".
      2< 1871             15 uow-sp-UOW-CODE                  PIC 9(4)       COMP value 117.
      2< 1872           10 uow-sp-ITEM-ID.
      2< 1873             15 uow-sp-DUMMY                     PIC X(12).
           84
```
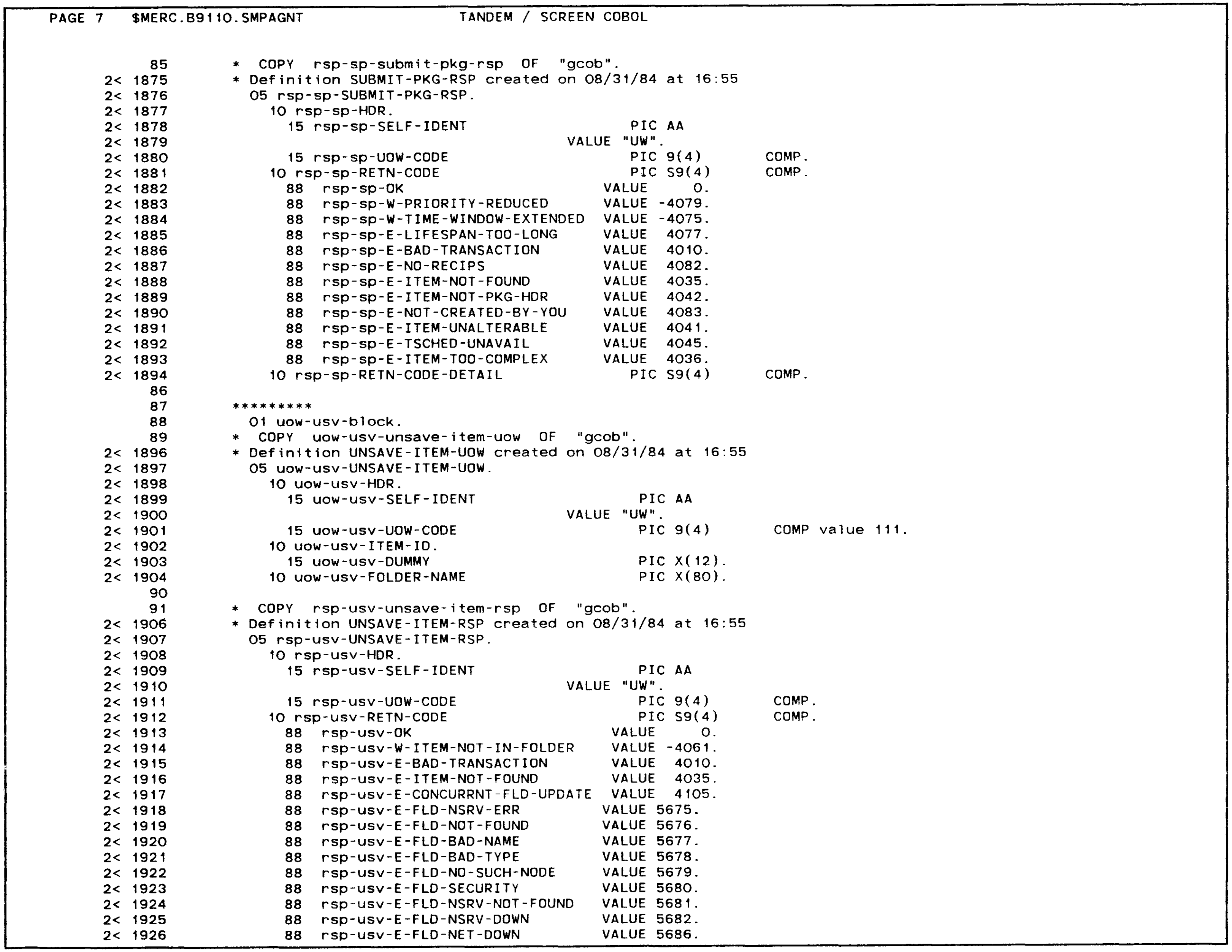

Figure 8-1. SCREEN COBOL Code for Agent (Continued)



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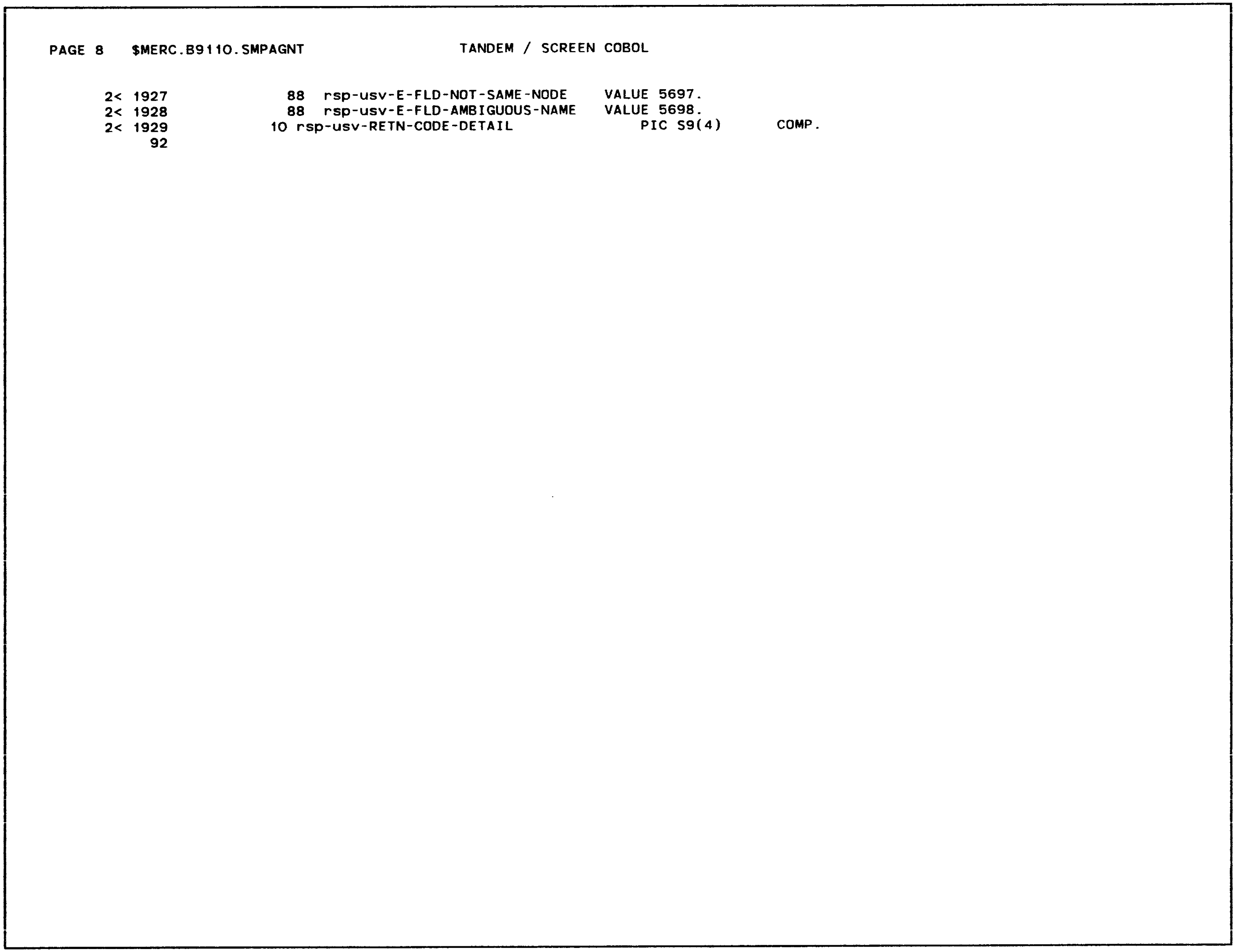
            85        *  COPY  rsp-sp-submit-pkg-rsp  OF  "gcob".
       2< 1875        * Definition SUBMIT-PKG-RSP created on 08/31/84 at 16:55
       2< 1876          05 rsp-sp-SUBMIT-PKG-RSP.
       2< 1877            10 rsp-sp-HDR.
       2< 1878              15 rsp-sp-SELF-IDENT                  PIC AA
       2< 1879                                             VALUE "UW".
       2< 1880              15 rsp-sp-UOW-CODE                    PIC 9(4)      COMP.
       2< 1881            10 rsp-sp-RETN-CODE                     PIC S9(4)     COMP.
       2< 1882              88  rsp-sp-OK                      VALUE     0.
       2< 1883              88  rsp-sp-W-PRIORITY-REDUCED      VALUE -4079.
       2< 1884              88  rsp-sp-W-TIME-WINDOW-EXTENDED  VALUE -4075.
       2< 1885              88  rsp-sp-E-LIFESPAN-TOO-LONG     VALUE  4077.
       2< 1886              88  rsp-sp-E-BAD-TRANSACTION       VALUE  4010.
       2< 1887              88  rsp-sp-E-NO-RECIPS             VALUE  4082.
       2< 1888              88  rsp-sp-E-ITEM-NOT-FOUND        VALUE  4035.
       2< 1889              88  rsp-sp-E-ITEM-NOT-PKG-HDR      VALUE  4042.
       2< 1890              88  rsp-sp-E-NOT-CREATED-BY-YOU    VALUE  4083.
       2< 1891              88  rsp-sp-E-ITEM-UNALTERABLE      VALUE  4041.
       2< 1892              88  rsp-sp-E-TSCHED-UNAVAIL        VALUE  4045.
       2< 1893              88  rsp-sp-E-ITEM-TOO-COMPLEX      VALUE  4036.
       2< 1894            10 rsp-sp-RETN-CODE-DETAIL              PIC S9(4)     COMP.
            86
            87        *********
            88          01 uow-usv-block.
            89        *  COPY  uow-usv-unsave-item-uow  OF  "gcob".
       2< 1896        * Definition UNSAVE-ITEM-UOW created on 08/31/84 at 16:55
       2< 1897          05 uow-usv-UNSAVE-ITEM-UOW.
       2< 1898            10 uow-usv-HDR.
       2< 1899              15 uow-usv-SELF-IDENT                  PIC AA
       2< 1900                                             VALUE "UW".
       2< 1901              15 uow-usv-UOW-CODE                    PIC 9(4)      COMP value 111.
       2< 1902            10 uow-usv-ITEM-ID.
       2< 1903              15 uow-usv-DUMMY                       PIC X(12).
       2< 1904            10 uow-usv-FOLDER-NAME                   PIC X(80).
            90
            91        *  COPY  rsp-usv-unsave-item-rsp  OF  "gcob".
       2< 1906        * Definition UNSAVE-ITEM-RSP created on 08/31/84 at 16:55
       2< 1907          05 rsp-usv-UNSAVE-ITEM-RSP.
       2< 1908            10 rsp-usv-HDR.
       2< 1909              15 rsp-usv-SELF-IDENT                  PIC AA
       2< 1910                                             VALUE "UW".
       2< 1911              15 rsp-usv-UOW-CODE                    PIC 9(4)      COMP.
       2< 1912            10 rsp-usv-RETN-CODE                     PIC S9(4)     COMP.
       2< 1913              88  rsp-usv-OK                      VALUE     0.
       2< 1914              88  rsp-usv-W-ITEM-NOT-IN-FOLDER    VALUE -4061.
       2< 1915              88  rsp-usv-E-BAD-TRANSACTION       VALUE  4010.
       2< 1916              88  rsp-usv-E-ITEM-NOT-FOUND        VALUE  4035.
       2< 1917              88  rsp-usv-E-CONCURRNT-FLD-UPDATE  VALUE  4105.
       2< 1918              88  rsp-usv-E-FLD-NSRV-ERR         VALUE 5675.
       2< 1919              88  rsp-usv-E-FLD-NOT-FOUND        VALUE 5676.
       2< 1920              88  rsp-usv-E-FLD-BAD-NAME         VALUE 5677.
       2< 1921              88  rsp-usv-E-FLD-BAD-TYPE         VALUE 5678.
       2< 1922              88  rsp-usv-E-FLD-NO-SUCH-NODE     VALUE 5679.
       2< 1923              88  rsp-usv-E-FLD-SECURITY         VALUE 5680.
       2< 1924              88  rsp-usv-E-FLD-NSRV-NOT-FOUND   VALUE 5681.
       2< 1925              88  rsp-usv-E-FLD-NSRV-DOWN        VALUE 5682.
       2< 1926              88  rsp-usv-E-FLD-NET-DOWN         VALUE 5686.
```

Figure 8-1. SCREEN COBOL Code for Agent (Continued)



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     2< 1927             88  rsp-usv-E-FLD-NOT-SAME-NODE    VALUE 5697.
     2< 1928             88  rsp-usv-E-FLD-AMBIGUOUS-NAME   VALUE 5698.
     2< 1929           10 rsp-usv-RETN-CODE-DETAIL              PIC S9(4)      COMP.
          92
```
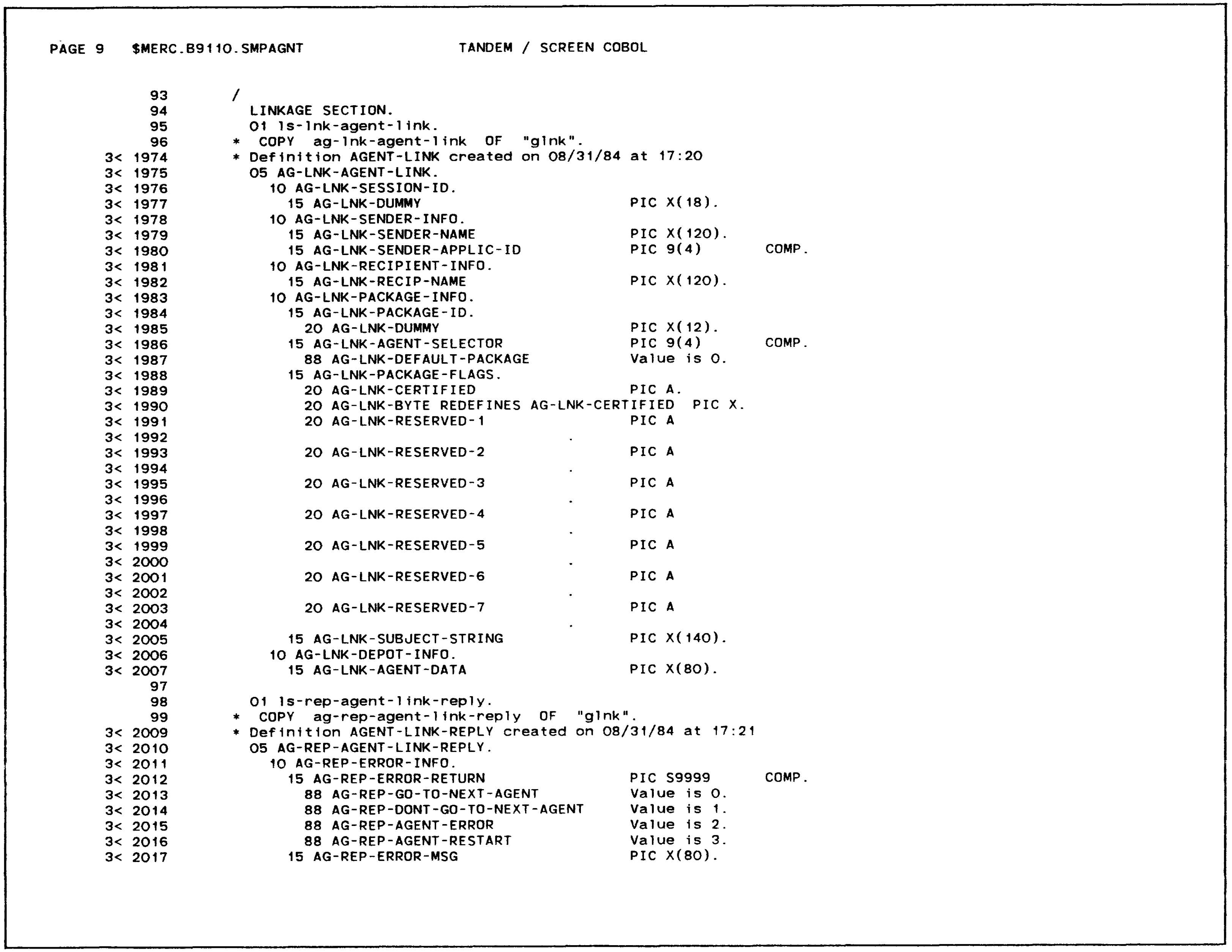

Figure 8-1. SCREEN COBOL Code for Agent (Continued)



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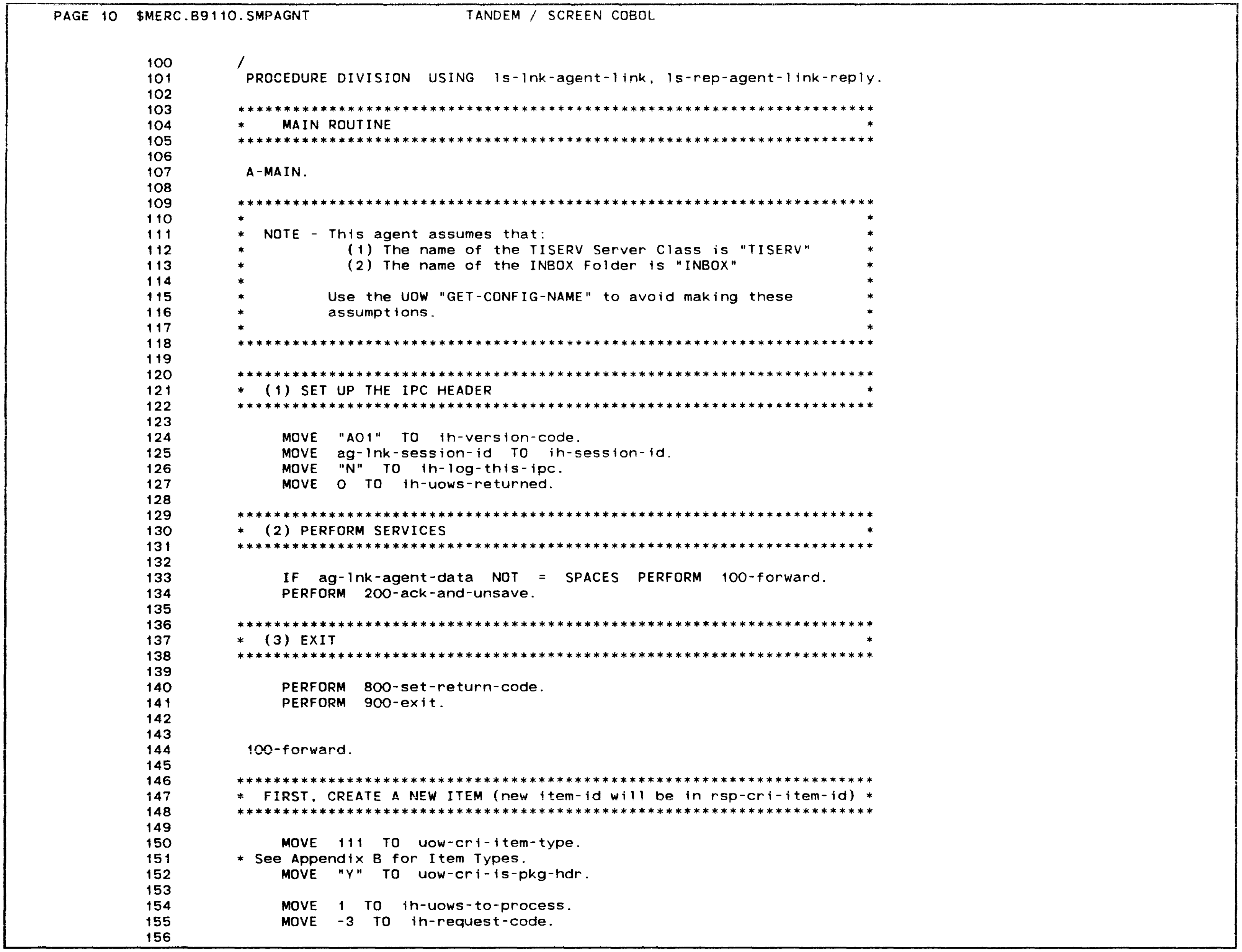
PAGE 9   $MERC.B9110.SMPAGNT                TANDEM / SCREEN COBOL

     93       /
     94         LINKAGE SECTION.
     95         01 ls-lnk-agent-link.
     96       *  COPY  ag-lnk-agent-link  OF  "glnk".
3< 1974       * Definition AGENT-LINK created on 08/31/84 at 17:20
3< 1975         05 AG-LNK-AGENT-LINK.
3< 1976           10 AG-LNK-SESSION-ID.
3< 1977             15 AG-LNK-DUMMY                       PIC X(18).
3< 1978           10 AG-LNK-SENDER-INFO.
3< 1979             15 AG-LNK-SENDER-NAME                 PIC X(120).
3< 1980             15 AG-LNK-SENDER-APPLIC-ID            PIC 9(4)       COMP.
3< 1981           10 AG-LNK-RECIPIENT-INFO.
3< 1982             15 AG-LNK-RECIP-NAME                  PIC X(120).
3< 1983           10 AG-LNK-PACKAGE-INFO.
3< 1984             15 AG-LNK-PACKAGE-ID.
3< 1985               20 AG-LNK-DUMMY                     PIC X(12).
3< 1986             15 AG-LNK-AGENT-SELECTOR              PIC 9(4)       COMP.
3< 1987               88 AG-LNK-DEFAULT-PACKAGE           Value is 0.
3< 1988             15 AG-LNK-PACKAGE-FLAGS.
3< 1989               20 AG-LNK-CERTIFIED                 PIC A.
3< 1990               20 AG-LNK-BYTE REDEFINES AG-LNK-CERTIFIED  PIC X.
3< 1991               20 AG-LNK-RESERVED-1                PIC A
3< 1992                                            .
3< 1993               20 AG-LNK-RESERVED-2                PIC A
3< 1994                                            .
3< 1995               20 AG-LNK-RESERVED-3                PIC A
3< 1996                                            .
3< 1997               20 AG-LNK-RESERVED-4                PIC A
3< 1998                                            .
3< 1999               20 AG-LNK-RESERVED-5                PIC A
3< 2000                                            .
3< 2001               20 AG-LNK-RESERVED-6                PIC A
3< 2002                                            .
3< 2003               20 AG-LNK-RESERVED-7                PIC A
3< 2004                                            .
3< 2005             15 AG-LNK-SUBJECT-STRING              PIC X(140).
3< 2006           10 AG-LNK-DEPOT-INFO.
3< 2007             15 AG-LNK-AGENT-DATA                  PIC X(80).
     97
     98         01 ls-rep-agent-link-reply.
     99       *  COPY  ag-rep-agent-link-reply  OF  "glnk".
3< 2009       * Definition AGENT-LINK-REPLY created on 08/31/84 at 17:21
3< 2010         05 AG-REP-AGENT-LINK-REPLY.
3< 2011           10 AG-REP-ERROR-INFO.
3< 2012             15 AG-REP-ERROR-RETURN                PIC S9999      COMP.
3< 2013               88 AG-REP-GO-TO-NEXT-AGENT          Value is 0.
3< 2014               88 AG-REP-DONT-GO-TO-NEXT-AGENT     Value is 1.
3< 2015               88 AG-REP-AGENT-ERROR               Value is 2.
3< 2016               88 AG-REP-AGENT-RESTART             Value is 3.
3< 2017             15 AG-REP-ERROR-MSG                   PIC X(80).
```

Figure 8-1. SCREEN COBOL Code for Agent (Continued)



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/
 PROCEDURE DIVISION  USING  ls-lnk-agent-link, ls-rep-agent-link-reply.

**********************************************************************
*    MAIN ROUTINE                                                    *
**********************************************************************

 A-MAIN.

**********************************************************************
*                                                                    *
*  NOTE - This agent assumes that:                                   *
*           (1) The name of the TISERV Server Class is "TISERV"      *
*           (2) The name of the INBOX Folder is "INBOX"              *
*                                                                    *
*         Use the UOW "GET-CONFIG-NAME" to avoid making these        *
*         assumptions.                                               *
*                                                                    *
**********************************************************************

**********************************************************************
*  (1) SET UP THE IPC HEADER                                         *
**********************************************************************

     MOVE  "A01"  TO  ih-version-code.
     MOVE  ag-lnk-session-id  TO  ih-session-id.
     MOVE  "N"  TO  ih-log-this-ipc.
     MOVE  0  TO  ih-uows-returned.

**********************************************************************
*  (2) PERFORM SERVICES                                              *
**********************************************************************

     IF  ag-lnk-agent-data  NOT  =  SPACES  PERFORM  100-forward.
     PERFORM  200-ack-and-unsave.

**********************************************************************
*  (3) EXIT                                                          *
**********************************************************************

     PERFORM  800-set-return-code.
     PERFORM  900-exit.


 100-forward.

**********************************************************************
*  FIRST, CREATE A NEW ITEM (new item-id will be in rsp-cri-item-id) *
**********************************************************************

     MOVE  111  TO  uow-cri-item-type.
* See Appendix B for Item Types.
     MOVE  "Y"  TO  uow-cri-is-pkg-hdr.

     MOVE  1  TO  ih-uows-to-process.
     MOVE  -3  TO  ih-request-code.

```
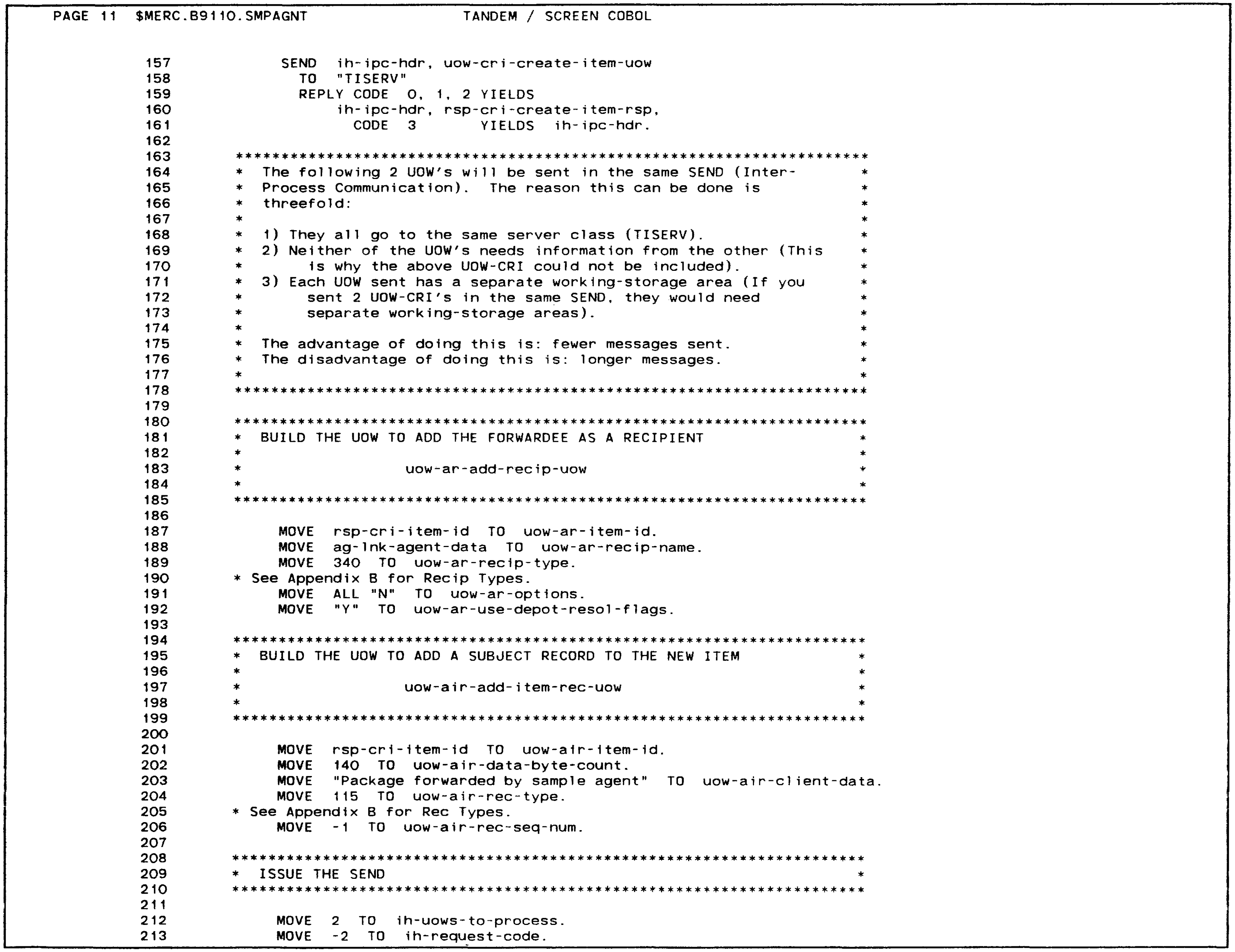

Figure 8-1. SCREEN COBOL Code for Agent (Continued)



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     SEND  ih-ipc-hdr, uow-cri-create-item-uow
       TO  "TISERV"
       REPLY CODE  0, 1, 2 YIELDS
           ih-ipc-hdr, rsp-cri-create-item-rsp,
             CODE  3       YIELDS  ih-ipc-hdr.

**********************************************************************
*  The following 2 UOW's will be sent in the same SEND (Inter-       *
*  Process Communication).  The reason this can be done is           *
*  threefold:                                                        *
*                                                                    *
*  1) They all go to the same server class (TISERV).                 *
*  2) Neither of the UOW's needs information from the other (This    *
*       is why the above UOW-CRI could not be included).             *
*  3) Each UOW sent has a separate working-storage area (If you      *
*       sent 2 UOW-CRI's in the same SEND, they would need           *
*       separate working-storage areas).                             *
*                                                                    *
*  The advantage of doing this is: fewer messages sent.              *
*  The disadvantage of doing this is: longer messages.               *
*                                                                    *
**********************************************************************

**********************************************************************
*  BUILD THE UOW TO ADD THE FORWARDEE AS A RECIPIENT                 *
*                                                                    *
*                  uow-ar-add-recip-uow                              *
*                                                                    *
**********************************************************************

     MOVE  rsp-cri-item-id  TO  uow-ar-item-id.
     MOVE  ag-lnk-agent-data  TO  uow-ar-recip-name.
     MOVE  340  TO  uow-ar-recip-type.
* See Appendix B for Recip Types.
     MOVE  ALL "N"  TO  uow-ar-options.
     MOVE  "Y"  TO  uow-ar-use-depot-resol-flags.

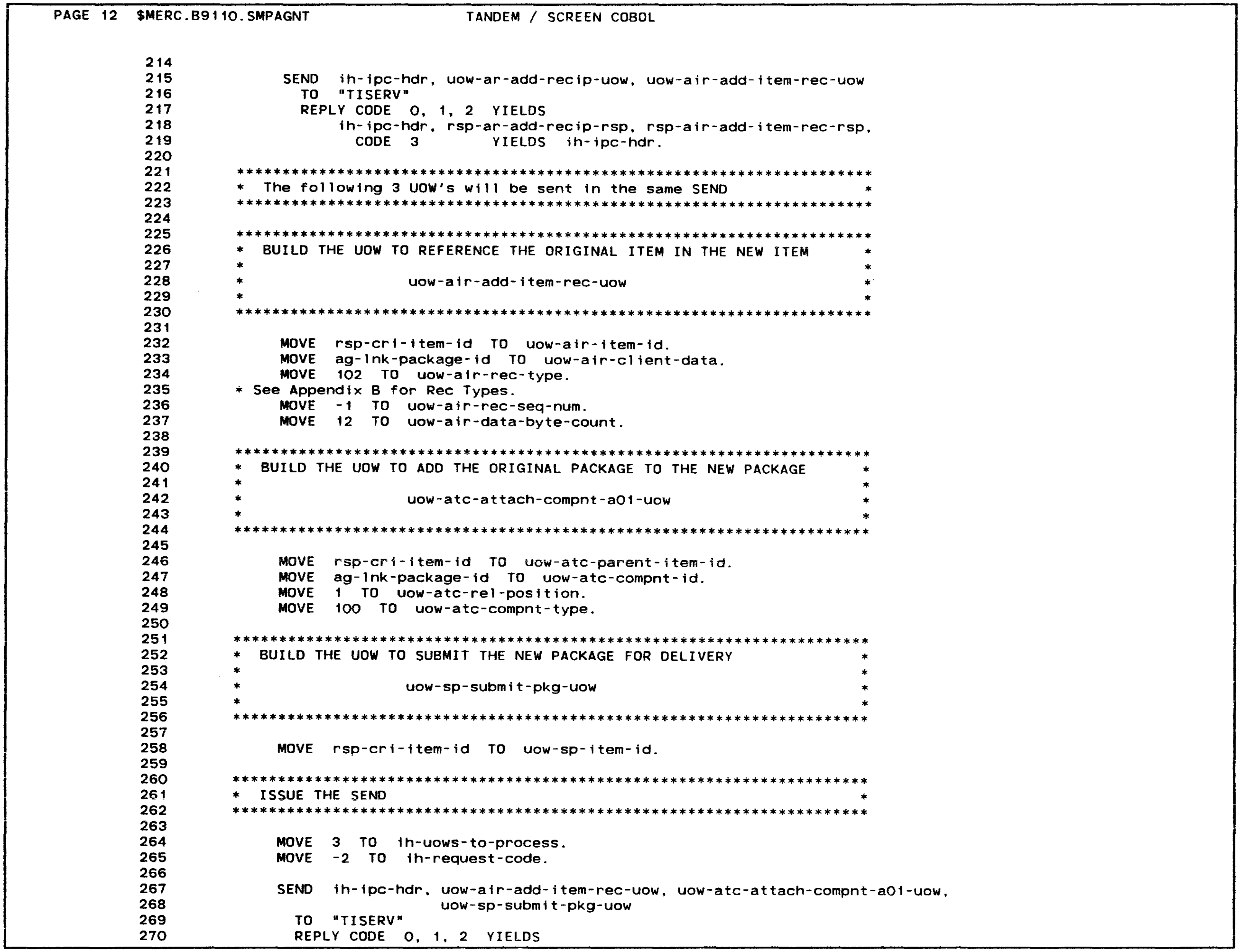
**********************************************************************
*  BUILD THE UOW TO ADD A SUBJECT RECORD TO THE NEW ITEM             *
*                                                                    *
*                  uow-air-add-item-rec-uow                          *
*                                                                    *
**********************************************************************

     MOVE  rsp-cri-item-id  TO  uow-air-item-id.
     MOVE  140  TO  uow-air-data-byte-count.
     MOVE  "Package forwarded by sample agent"  TO  uow-air-client-data.
     MOVE  115  TO  uow-air-rec-type.
* See Appendix B for Rec Types.
     MOVE  -1  TO  uow-air-rec-seq-num.

**********************************************************************
*  ISSUE THE SEND                                                    *
**********************************************************************

     MOVE  2  TO  ih-uows-to-process.
     MOVE  -2  TO  ih-request-code.
```

Figure 8-1. SCREEN COBOL Code for Agent (Continued)



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     SEND  ih-ipc-hdr, uow-ar-add-recip-uow, uow-air-add-item-rec-uow
       TO  "TISERV"
       REPLY CODE  0, 1, 2  YIELDS
           ih-ipc-hdr, rsp-ar-add-recip-rsp, rsp-air-add-item-rec-rsp,
             CODE  3         YIELDS  ih-ipc-hdr.

**********************************************************************
*  The following 3 UOW's will be sent in the same SEND               *
**********************************************************************

**********************************************************************
*  BUILD THE UOW TO REFERENCE THE ORIGINAL ITEM IN THE NEW ITEM      *
*                                                                    *
*                  uow-air-add-item-rec-uow                          *
*                                                                    *
**********************************************************************

     MOVE  rsp-cri-item-id  TO  uow-air-item-id.
     MOVE  ag-lnk-package-id  TO  uow-air-client-data.
     MOVE  102  TO  uow-air-rec-type.
* See Appendix B for Rec Types.
     MOVE  -1  TO  uow-air-rec-seq-num.
     MOVE  12  TO  uow-air-data-byte-count.

**********************************************************************
*  BUILD THE UOW TO ADD THE ORIGINAL PACKAGE TO THE NEW PACKAGE      *
*                                                                    *
*                  uow-atc-attach-compnt-a01-uow                     *
*                                                                    *
**********************************************************************

     MOVE  rsp-cri-item-id  TO  uow-atc-parent-item-id.
     MOVE  ag-lnk-package-id  TO  uow-atc-compnt-id.
     MOVE  1  TO  uow-atc-rel-position.
     MOVE  100  TO  uow-atc-compnt-type.

**********************************************************************
*  BUILD THE UOW TO SUBMIT THE NEW PACKAGE FOR DELIVERY              *
*                                                                    *
*                  uow-sp-submit-pkg-uow                             *
*                                                                    *
**********************************************************************

     MOVE  rsp-cri-item-id  TO  uow-sp-item-id.

**********************************************************************
*  ISSUE THE SEND                                                    *
**********************************************************************

     MOVE  3  TO  ih-uows-to-process.
     MOVE  -2  TO  ih-request-code.

     SEND  ih-ipc-hdr, uow-air-add-item-rec-uow, uow-atc-attach-compnt-a01-uow,
                       uow-sp-submit-pkg-uow
       TO  "TISERV"
       REPLY CODE  0, 1, 2  YIELDS
```
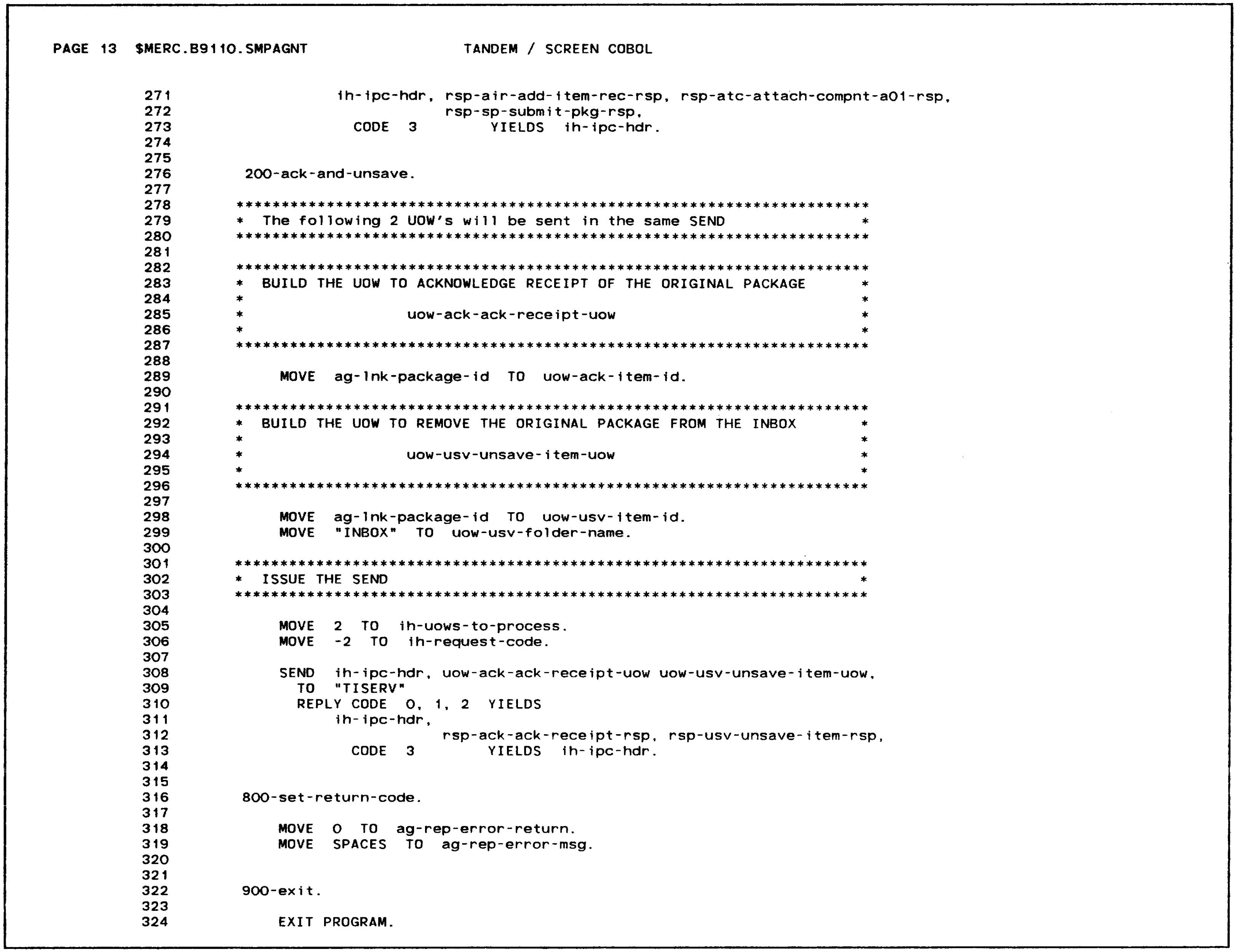
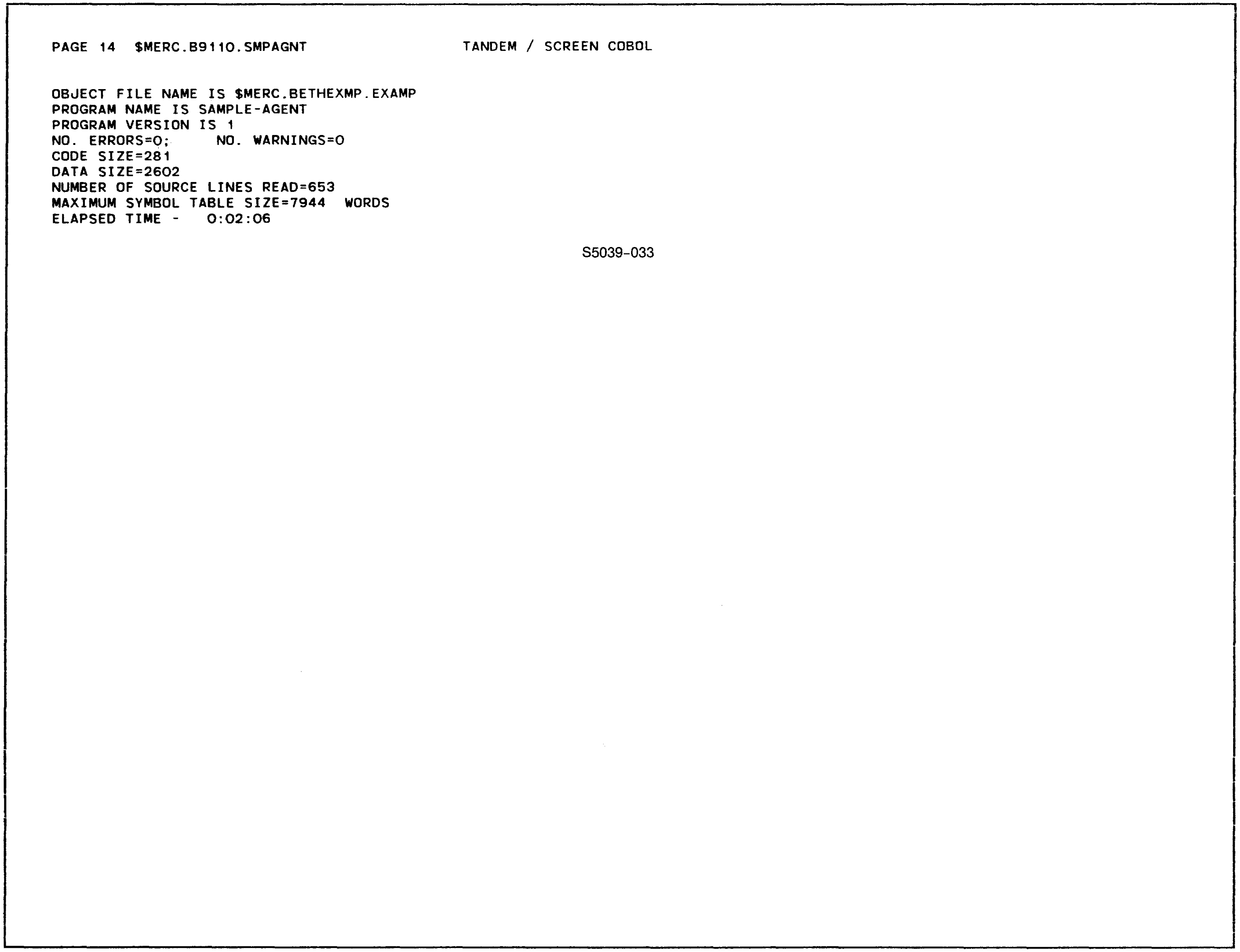

Figure 8-1. SCREEN COBOL Code for Agent (Continued)



```
PAGE 13  $MERC.B9110.SMPAGNT                TANDEM / SCREEN COBOL

           ih-ipc-hdr, rsp-air-add-item-rec-rsp, rsp-atc-attach-compnt-a01-rsp,
                       rsp-sp-submit-pkg-rsp,
             CODE  3        YIELDS  ih-ipc-hdr.


 200-ack-and-unsave.

**********************************************************************
*  The following 2 UOW's will be sent in the same SEND               *
**********************************************************************

**********************************************************************
*  BUILD THE UOW TO ACKNOWLEDGE RECEIPT OF THE ORIGINAL PACKAGE      *
*                                                                    *
*                  uow-ack-ack-receipt-uow                           *
*                                                                    *
**********************************************************************

     MOVE  ag-lnk-package-id  TO  uow-ack-item-id.

**********************************************************************
*  BUILD THE UOW TO REMOVE THE ORIGINAL PACKAGE FROM THE INBOX       *
*                                                                    *
*                  uow-usv-unsave-item-uow                           *
*                                                                    *
**********************************************************************

     MOVE  ag-lnk-package-id  TO  uow-usv-item-id.
     MOVE  "INBOX"  TO  uow-usv-folder-name.

**********************************************************************
*  ISSUE THE SEND                                                    *
**********************************************************************

     MOVE  2  TO  ih-uows-to-process.
     MOVE  -2  TO  ih-request-code.

     SEND  ih-ipc-hdr, uow-ack-ack-receipt-uow uow-usv-unsave-item-uow,
       TO  "TISERV"
       REPLY CODE  0, 1, 2  YIELDS
           ih-ipc-hdr,
                       rsp-ack-ack-receipt-rsp, rsp-usv-unsave-item-rsp,
             CODE  3        YIELDS  ih-ipc-hdr.


 800-set-return-code.

     MOVE  0  TO  ag-rep-error-return.
     MOVE  SPACES  TO  ag-rep-error-msg.


 900-exit.

     EXIT PROGRAM.
```

Figure 8-1. SCREEN COBOL Code for Agent (Continued)



```
PAGE 14  $MERC.B9110.SMPAGNT                TANDEM / SCREEN COBOL

OBJECT FILE NAME IS $MERC.BETHEXMP.EXAMP
PROGRAM NAME IS SAMPLE-AGENT
PROGRAM VERSION IS 1
NO. ERRORS=0;     NO. WARNINGS=0
CODE SIZE=281
DATA SIZE=2602
NUMBER OF SOURCE LINES READ=653
MAXIMUM SYMBOL TABLE SIZE=7944  WORDS
ELAPSED TIME -   0:02:06
```

S5039-033

Figure 8-1. SCREEN COBOL Code for Agent (Continued)

SECTION 9

QUEUE MANAGEMENT

The clients and agents that operate in a TRANSFER application have distinguishable characteristics:

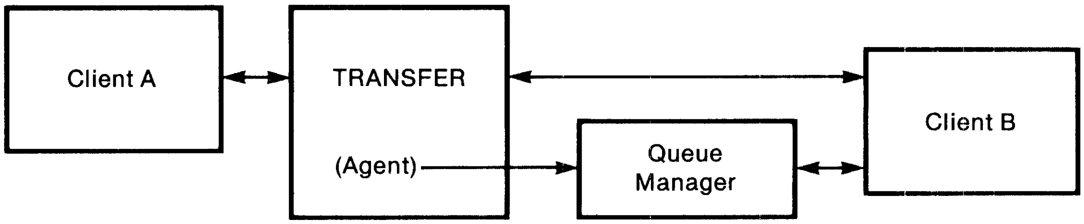
- Clients are processes that operate within their own area of control. They manage their own transactions.

- Agents function as logical subroutines operating inside TRANSFER transactions. They temporarily take over the TRANSFER area of control. Agents--even server agents operating as separate processes--always complete their operations before returning control to TRANSFER.

Queue management allows an agent to schedule an interaction between a client and the TRANSFER data base. Scheduling is an important consideration because many clients need to acquire resources outside of TRANSFER in order to carry out their interactions with the TRANSFER data base. With scheduling, the agent does not have to wait for the client to obtain the resources and perform the interaction and, consequently, causes minimum interruption of TRANSFER activities. The client waits for appropriate work.

An agent can enqueue an event to the queue manager after possibly performing some delivery related operations such as saving the package in a special folder. Whenever the client has the required resources outside of the TRANSFER environment, it can request work from the queue manager. This interaction is illustrated in Figure 9-1.

Queue management is not restricted to use with clients and agents. The queueing function can be used in any application that needs to separate an activity into multiple stages.



Activities of Client A are initiated by an event outside of TRANSFER; this interaction presents no problem.

Activities of Client B are initiated by an event within TRANSFER; without the queue manager, Client B would have to be ready for such an initiation and TRANSFER would have to wait for the agent/client interaction to complete.

S5039-034

Figure 9-1. Interaction Between TRANSFER Clients

QUEUE MANAGER

The queue manager provides a facility where queue entries can be supplied and consumed by different requesters. Throughout this section the term supplier refers to the process that places an entry on the queue; the term consumer refers to the process that retrieves an entry from the queue for processing.

The queue manager is passive in that the consumption of queue entries is initiated strictly by consumer request and performed by external instructions.

The queue manager consists of two server types:

Entry Manager	handles enqueuing, reading, and dequeuing of queue entries.
Wait Manager	handles waiting for new queue entries.

The Entry Manager and Wait Manager servers operate on a common file called the Queue file; this file can contain information for many different queues. When you configure the server classes in a PATHWAY environment, you can have many Entry Managers per Queue file, but only one Wait Manager per Queue file.

The Queue file is an audited key-sequenced file that has been previously created and in which multiple queues can be stored. Each queue entry has a 32-byte queue-name field, a priority field, a timestamp field, a cpu-pin field that holds the cpu,pin of the server placing the entry on the queue, and a user data field as appropriate.

The maximum length for records in the Queue file controls the amount of user data that can be present in each queue entry. The queue manager reserves 128 bytes at the beginning of the physical record; user data can occupy the remaining space in the record.

The system manager can partition the Queue file by the first two bytes of the physical key. To facilitate this partitioning, the first two bytes of the queue-name field are used as the first two bytes of the Queue file physical key.

The queue manager provides four functions for a queue:

- Dequeue an entry from the queue (DEQ)
- Enqueue an entry on the queue (ENQ)
- Read an entry from the queue (READQ)

Requests are sent to an Entry Manager

- Wait for an entry on the queue (WAITQ)

Requests are sent to the Wait Manager

These functions are supported via a message interface suitable for use from SCREEN COBOL.

Dequeue (DEQ) Function

A dequeue function, which is initiated by a consumer, is handled by a DEQ request that must take place in transaction mode. The DEQ request results in a READLOCK followed by a WRITEUPDATE to delete the entry from the queue.

The function does not require an END-TRANSACTION to be issued soon after the DEQ request. The transaction can persist because a lock on a deleted record does not block read requests to other records with a similar key value.

Enqueue (ENQ) Function

An enqueue function, which is initiated by a supplier, is handled by an ENQ request that must take place in transaction mode. An entry is inserted on the queue in a single WRITE. The new insertion remains locked until an END-TRANSACTION is issued; the lock will block any read request on that record and this could prevent DEQ operations from succeeding on available queue entries with a similar key value. Lockout can be prevented by including only a minimum of application work with the ENQ request within the TMF transaction.

The ENQ request causes a message to be sent to the Wait Manager for the Queue file. This message allows the Wait Manager to respond to a WAITQ request.

Read (READQ) Function

A read function, which might be initiated by either a supplier or a consumer, is handled by a READQ request that does not need to take place in transaction mode. The function retrieves an entry from the queue but does not delete the entry. This allows applications to place information on a queue and access it repeatedly in read-only mode.

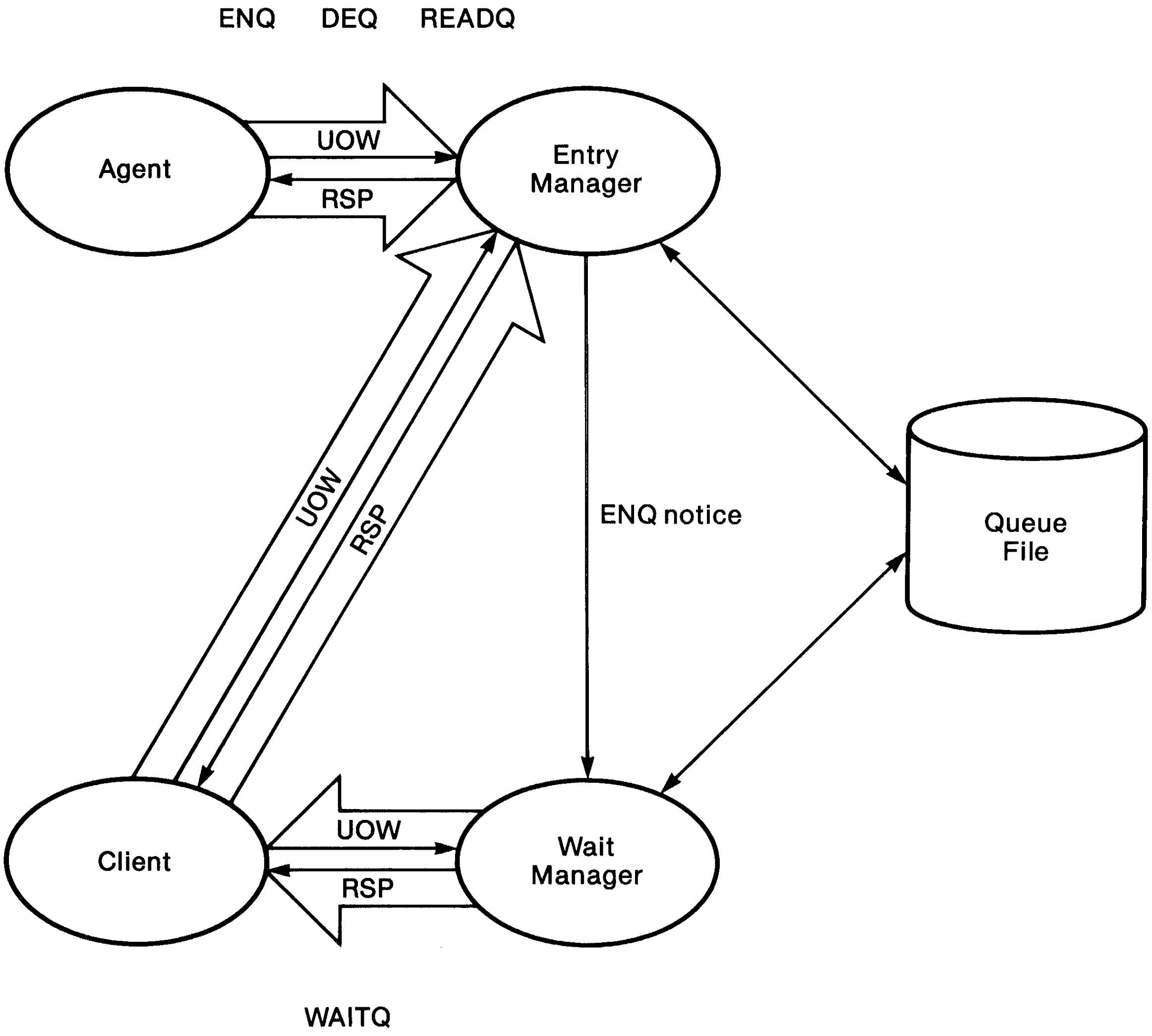
Wait (WAITQ) Function

A wait function, which is initiated by a consumer, is handled by a WAITQ request that should not take place in transaction mode. The wait could be extensive, and transactions should not be outstanding for long periods of time.

When a WAITQ request is received for a particular queue, the Wait Manager performs a read to ensure there is no entry on that queue. If an entry is on the queue, the Wait Manager issues a response to the consumer; if the queue is empty, the Wait Manager waits for an entry. The application logic should attempt a DEQ before calling WAITQ if it typically expects other entries. If other entries are not expected, the WAITQ should only be issued immediately after completing a DEQ.

USING THE QUEUE MANAGER

Figure 9-2 illustrates the DEQ, ENQ, and READQ UOWs being sent to the Entry Manager and the WAITQ UOW being sent to the Wait Manager.



The large arrows show the effective direction of control. An agent or client requests services of the Entry Manager while the Wait Manager triggers a waiting client that has previously issued a WAITQ request.

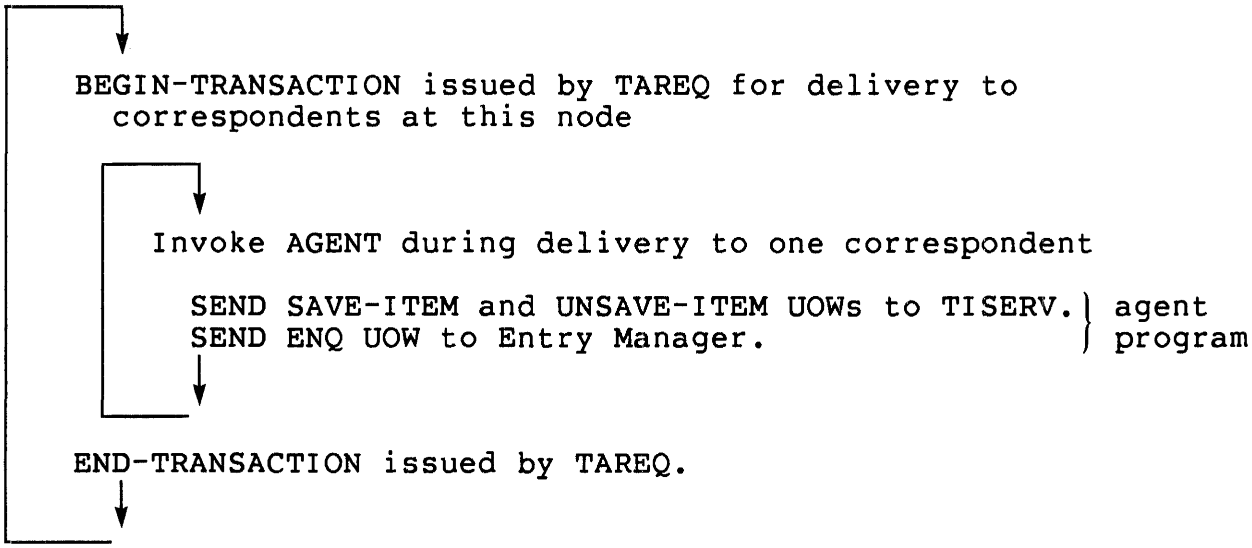
S5039-035

Figure 9-2. Queue Management Interaction

In the TRANSFER environment, the UOWs would typically be used in the following sequence:

Step 1

Upon receipt of a package, an agent would issue an ENQ request to the Entry Manager. The ENQ would be a request for services of the client handling that particular type of package. The agent would probably move the package to a folder other than INBOX where the client would expect to find it. The agent returns, its role completed.



BEGIN-TRANSACTION issued by TAREQ for delivery to correspondents at this node

Invoke AGENT during delivery to one correspondent

SEND SAVE-ITEM and UNSAVE-ITEM UOWs to TISERV.
SEND ENQ UOW to Entry Manager.

agent program

END-TRANSACTION issued by TAREQ.

Step 2

The client would first issue a WAITQ request to the Wait Manager, specifying it wants to wait until a specific type of request is placed in the queue. This request will be issued outside of transaction mode because the client could be waiting a long time to receive a reply from the Wait Manager.

Step 3

When an entry is placed in the queue for the type requested, the client will receive a reply indicating the queue entry to process. The client will then retrieve the entry by issuing a DEQ UOW to the Entry Manager in transaction mode. The TMF transaction is now under the control of the client and not automatically handled on behalf of the application as it was for an agent.

```
SEND a WAITQ UOW to the Wait Manager.

BEGIN-TRANSACTION.

SEND a DEQ UOW to the Entry Manager.

    Process the queue entry.

END-TRANSACTION.
```

The preceding example assumes that typically there would be no entry in the queue for the client to process. If the application expected an entry to be waiting in the queue for the client, it should first issue the DEQ request before issuing the WAITQ request, as shown in the following example.

```
        BEGIN-TRANSACTION.
        SEND a DEQ UOW to the Entry Manager.
        If the queue contains an entry of the desired type,
            process the queue entry and
            END-TRANSACTION and
   ------   look for more entries
        Else
            END-TRANSACTION and
            SEND a WAITQ UOW to the Wait Manager.
```

The program would normally be in the DEQ and process loop, entering the WAITQ loop only when the DEQ ran out of entries to process.

READQ is typically used to read entries in a queue for a status report.

SERVER INTERFACE

Processes interface with the Wait Manager and the Entry Manager servers through units-of-work (UOWs) issued within requests. The format of requests issued by a program is the same, whether the request is issued by a SEND statement in SCREEN COBOL or by a WRITEREAD call in TAL. The data buffer for each request consists of the following:

- A request header that specifies version information and error handling controls and that provides space for reply and return codes.

- One or more UOWs, each of which specifies a code for an operation plus any necessary parameters. For example, the DEQ UOW request would include the name of the queue from which an entry is to be removed.

The reply from a server, which is written in the same format as the request to which it responds, consists of the following:

- A reply header, with reply and return codes supplied by the server.

- One or more response UOWs that return requested data or completion status to the consumer. For example, the response to a DEQ UOW request would include the data of the queue entry removed from the queue.

For each UOW in the request there is a corresponding response UOW in the overall reply. The servers process UOWs in the order in which they appear in the request. Thus, the response UOWs are returned in the same order as the corresponding UOWs in the request.

For certain errors, however, no response UOWs are included. The number of UOWs in the reply is indicated by a field in the reply header. A response UOW will never be skipped in the reply; the first error that would cause a UOW to be excluded from the reply will terminate the request.

Each UOW has a standard header that identifies the operation requested. Each response UOW has a return code that identifies the action taken in response to the corresponding request UOW.

Request and Reply Headers

The format for request and reply headers is the same for all requests and replies. Within an application program, these headers are defined together as the interprocess communication (IPC) header. Your application must establish values for the IPC header fields that are transmitted in the request.

All requests to and replies from the Entry Manager and Wait Manager servers must be prefixed with an IPC header. The basic format for the messages conforms to the TRANSFER IPC format. The following rules apply:

- You must supply an IPC header followed by one or more UOWs.
- Each UOW must be a DEQ, ENQ, READQ, or WAITQ UOW.
- The WAITQ UOW must be the only UOW in an IPC request. If you specify more than one UOW for the Wait Manager, the PW-REPLY-CODE field of the IPC-HDR will be set to RQST-ERR and the IPC-RETN-CODE field will be set to RQST-TOO-LONG.

IPC Header Format

The format of the IPC header is shown by the following DDL definition:

```
DEF ipc-hdr.
  02  request-code              TYPE BINARY 16.
      88 stop-on-warning        VALUE -1.
      88 stop-on-err            VALUE -2.
      88 do-all-uows            VALUE -3.
  02  pw-reply-code             TYPE BINARY 16
                                  REDEFINES REQUEST-CODE.
      88 all-uows-ok            VALUE 0.
      88 uows-with-warning      VALUE 1.
      88 uows-with-err          VALUE 2.
      88 rqst-err               VALUE 3.
  02  filler                    PIC X.
  02  version-code.
    03  letter                  PIC A.
    03  rev-number              PIC 99.
  02  ipc-retn-code             TYPE BINARY 16 VALUE 0.
      88 ipc-ok                 VALUE 0.
      88 invalid-version-code   VALUE 1.
      88 invalid-session-id     VALUE 2.
```

→

```
        88 service-denied          VALUE 3.
        88 invalid-uow-header      VALUE 4.
        88 rqst-too-long           VALUE 5.
        88 reply-too-long          VALUE 6.
        88 rqst-too-short          VALUE 7.
        88 invalid-request-code    VALUE 8.
        88 e-bad-transaction       VALUE 4010.
        88 e-err-queue-file        VALUE 4924.
        88 e-io-timeout            VALUE 4990.
        88 e-waitmanager-unavail   VALUE 6006.
    02  ipc-retn-code-detail       TYPE BINARY 16 VALUE 0.
    02  session-id.
      03  dummy                    PIC X(18).
    02  uows-to-process            TYPE BINARY 16 UNSIGNED.
    02  uows-returned              TYPE BINARY 16 UNSIGNED.
    02  log-this-ipc               TYPE BOOLEAN.
    02  filler                     PIC X.
 END.
```

Individual fields in the IPC header can contain the following information:

- REQUEST-CODE

  In a request to the Entry Manager or Wait Manager server, your application sets this field to indicate request processing conditions. In the request, this field always contains a value less than zero, as follows.

  STOP-ON-WARNING (-1) stops the processing if a UOW warning indication is encountered. Warnings imply successful completion of the UOW in which they occur.

  STOP-ON-ERR (-2) stops the processing if a UOW error occurs. Errors imply that the UOW was not processed successfully.

  DO-ALL-UOWS (-3) requests processing of all UOWs in the request. Processing halts only if a request error, as defined by the RQST-ERR value, or a system error occurs.

- PW-REPLY-CODE

  In a reply from the server, the REQUEST-CODE field is redefined as the PW-REPLY-CODE field. This field contains a value that indicates request processing results. In the reply, this field always contains a value of zero or greater, as follows:

  ALL-UOWS-OK (0) indicates that all UOWs in the request were processed successfully.

UOWS-WITH-WARNING (1) indicates that warning indications were encountered in one or more UOWs. If STOP-ON-WARNING was not specified in the REQUEST-CODE field, all UOWs in the request have a corresponding response UOW in the reply. If STOP-ON-WARNING was specified, only those UOWs preceding and including the first with a warning indication have corresponding response UOWs.

UOWS-WITH-ERR (2) indicates that errors were detected in one or more UOWs. If neither STOP-ON-ERR nor STOP-ON-WARNING was specified in the REQUEST-CODE field, all UOWs in the request have a corresponding response UOW. If STOP-ON-ERR or STOP-ON-WARNING was specified, only those UOWs preceding and including the first with an error have corresponding response UOWs. If STOP-ON-ERR is specified in the request, the UOWs preceding the first with an error might return warning indications.

RQST-ERR (3) indicates that a request error occurred. This type of error typically indicates that something was wrong with the data in the IPC header and that the error is not specific to any particular UOW. In certain cases, the error might involve an individual UOW--for example, one with an invalid UOW header. For further information, your application should examine the IPC-RETN-CODE field.

CAUTION

If your application receives a value of 2 or 3 in this field, the transaction should be aborted, causing transaction backout. If the transaction is not backed out, consistency in the TRANSFER data base cannot be guaranteed.

- VERSION-CODE

  This field designates the version of the message formats used. The version code is defined by Tandem and consists of a letter followed by a two-digit revision number.

- IPC-RETN-CODE

  In a request to the server, this field is ignored. In a reply from the server, one of the following values appears.

  IPC-OK (0) indicates the server detected no errors in the IPC header. Warning indications or errors, however, might have been present in the individual UOWs in the request.

INVALID-VERSION-CODE (1) indicates the request contained an IPC version code that could not be recognized by the server.

INVALID-SESSION-ID (2) refers to access validation in TRANSFER servers and is not applicable to queue management.

SERVICE-DENIED (3) is reserved for use by Tandem.

INVALID-UOW-HDR (4) indicates an invalid UOW header appeared in your request. This could occur if the previous UOW specified the wrong size or if you omitted the value UW from the UOW header.

RQST-TOO-LONG (5) indicates the request was too long; that is, the request contained more UOWs than the number specified in the UOWS-TO-PROCESS field, contained more data than the buffer allowed, or contained more than one WAITQ UOW. Buffer size is determined by the MAXREPLY and MAXREQUEST parameters when configuring PATHWAY or when starting the servers.

REPLY-TOO-LONG (6) indicates the reply was too long; the buffer space allotted for the reply was insufficient.

RQST-TOO-SHORT (7) indicates the request was too short; that is, the request contained fewer UOWs than the number specified in the UOWS-TO-PROCESS field, or fewer bytes were sent than were expected.

INVALID-REQUEST-CODE (8) indicates the REQUEST-CODE field contained an invalid entry.

E-BAD-TRANSACTION (4010) indicates that the request did not have a TMF transaction and attempted to perform an operation that required one, or that the transaction associated with the request is unusable, probably due to the failure of some component of the system or network. IPC-RETN-CODE-DETAIL contains the actual GUARDIAN file error code.

E-ERR-QUEUE-FILE (4924) indicates an error occurred on the Queue file. Check the IPC-RETN-CODE-DETAIL.

E-IO-TIMEOUT (4990) indicates a timeout occurred on file I/O. This usually indicates a deadlock with another process. IPC-RETN-CODE-DETAIL contains the file code of the file on which the error occurred. If you receive this error and the request was issued under a TMF transaction, you must abort the TMF transaction; you should then retry the request under a new transaction.

E-WAITMANAGER-UNAVAIL (6006) indicates an error occurred when the Entry Manager was communicating with the Wait Manager. Applications can use the NOTIFY-WAIT-MANAGER flag in the ENQ UOW to add the queue entry if the application is willing to make the entry when the Wait Manager is unavailable.

- IPC-RETN-CODE-DETAIL

  In a request to the server, this field is ignored. In a reply from the server, the meaning of this field depends on the value of IPC-RETN-CODE as specified for relevant IPC-RETN-CODEs.

- SESSION-ID

  This field is used for access validation in TRANSFER servers; the field is ignored for queue management. The field can have any value. The value sent in the request will be returned in the response, thus allowing the same buffer to be used for the IPC header when using queue management and TISERV.

- UOWS-TO-PROCESS

  In a request to the server, this field indicates the number of UOWs transmitted with the request. The value is echoed in a reply.

- UOWS-RETURNED

  In a request to the server, this field is ignored. In a reply, the field is set to the number of UOWs processed by the server.

- LOG-THIS-IPC

  In a request to the server, this field specifies whether the request and its reply are logged (Y) or not logged (N).

UOW HEADER AND RETURN CODE

Information is transmitted to the Entry Manager and Wait Manager servers through UOWs issued within requests. Information transmitted by a UOW is moved into the individual fields of the UOW by your program. Information returned in a UOW response is entered in the individual fields of the response by the servers.

Each UOW transmitted to the servers begins with a UOW header. The DDL definition for this header is:

```
  DEF uow-hdr.
    02  self-ident          PIC AA VALUE "UW".
    02  uow-code            TYPE BINARY 16 UNSIGNED.
  END.
```

Individual fields in the UOW header contain the following information:

- SELF-IDENT always contains the characters UW to identify the header as a UOW header.

- UOW-CODE is a code value that identifies the specific UOW request being made.

Each response UOW returned from the servers begins with the same header as the request, followed by two fields dealing with return codes.

Individual fields in the response UOW header contain the following additional information:

- UOW-RETN-CODE is the return code.

  - If no errors were encountered, this field is set to 0.

  - If an error occurred, the field contains a positive value; a positive value indicates the UOW was not processed.

  - If a warning was indicated, the field contains a negative value; a negative value indicates the UOW was successfully processed.

  In the RETN-CODE field for each UOW, entries that begin with E denote errors returned to your process by the server, and entries that begin with W denote warnings. All possible entries are listed for each UOW. These errors are summarized at the end of this section.

- RETN-CODE-DETAIL is a code that primarily identifies an error detected by a subsystem other than the queue management facility, such as the GUARDIAN operating system or the EXPAND network software, and for which the queue management facility provides no standard handling. These errors are discussed further in Appendix A.

All request and response UOWs must be aligned on word boundaries.

SOFTWARE PROVIDED WITH QUEUE MANAGEMENT

The TRANSFER software release provides three files for interfacing with the queue manager: GPQCOB, GPQLNK, and GPQDDL. These files contain source code for commonly used queue manager elements whose field and structure definitions appear in this manual. Typical queue manager elements are the interprocess communication (IPC) header that initiates a request, and the unit-of-work (UOW) definitions that describe operations to be performed.

This code can be copied into a SCREEN COBOL or COBOL source program by coding the record level and then using the COPY statement

```
COPY copy-text OF "filename"

  where

    copy-text is the unique name for the definition
    in the named file.  You determine the correct
    copy-text name by searching the files.
```

GPQCOB - This file contains COBOL source code for Working-Storage Section definitions.

GPQLNK - This file contains the same code as the GPQCOB file, but without the INITIAL-VALUE clauses. The GPQLNK file is used for Linkage Section definitions.

GPQCOB and GPQLNK have information in addition to the information produced by DDL when generating COBOL. The primary additions are prefixes for all field names, and many level 88 declarations for fields.

GPQDDL - This file contains DDL code that is used to create definitions for use when programming in a language other than SCREEN COBOL or COBOL.

GPQDDL code does not exactly match the DDL syntax shown in this manual, but it should be immediately obvious how to interpret any differences.

UOW DEFINITIONS

Four UOWs are available for use with the queue management facility. The UOWs and the functions they perform are summarized in Table 9-1.

Table 9-1. Queue Management UOW Summary

UOW	UOW Code	Function
DEQ	501	Dequeues an entry from a queue
ENQ	502	Enqueues an entry on a queue
READQ	504	Reads an entry from a queue
WAITQ	505	Waits for an entry on a queue

The following paragraphs present the UOWs. Each definition begins with the DDL format for the UOW request and corresponding response, followed by a description of the fields and the operations performed.

Error codes are listed and defined in Appendix A.

DEQ (UOW Code 501)

DEQ dequeues an entry from a queue. This operation requires a TMF transaction.

```
DEF deq-uow.
  02  hdr.
    03  self-ident                PIC AA VALUE "UW".
    03  uow-code                  PIC 9(4) COMP VALUE 501.
  02  flags.
    03  specific-deq              TYPE BOOLEAN VALUE "N".
    03  reserved-1                TYPE BOOLEAN VALUE "N".
    03  reserved-2                TYPE BOOLEAN VALUE "N".
    03  reserved-3                TYPE BOOLEAN VALUE "N".
    03  reserved-4                TYPE BOOLEAN VALUE "N".
    03  reserved-5                TYPE BOOLEAN VALUE "N".
    03  reserved-6                TYPE BOOLEAN VALUE "N".
    03  reserved-7                TYPE BOOLEAN VALUE "N".
  02  queue-name                  PIC X(32) VALUE SPACES.
  02  priority                    PIC 9(3) COMP VALUE 0.
  02  time-of-enq                 PIC X(8) VALUE LOW-VALUES.
  02  cpu-pin                     PIC X(2) VALUE LOW-VALUES.
  02  max-data-size               PIC 9(5) COMP.
  02  pad-char                    PIC X(1) VALUE LOW-VALUE.
  02  filler                      PIC X(1) VALUE LOW-VALUE.
END.
```

```
DEF deq-rsp.
  02  hdr.
    03  self-ident                PIC AA VALUE "UW".
    03  uow-code                  PIC 9(4) COMP VALUE 501.
  02  retn-code                   PIC S9(4) COMP.
  02  retn-code-detail            PIC S9(4) COMP.
  02  queue-name                  PIC X(32) VALUE SPACES.
  02  priority                    PIC 9(3) COMP.
  02  time-of-enq                 PIC X(8) VALUE LOW-VALUES.
  02  cpu-pin                     PIC X(2) VALUE LOW-VALUES.
  02  data-len                    PIC 9(5) COMP.

* Applications should define the actual format of the data
* portion, for example:
* 02  data-field                  PIC X(!queue length!).

END.
```

<u>DEQ FIELDS.</u> The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 501.

- FLAGS lets you qualify the search for a queue entry. Fields within FLAGS are as follows:

  SPECIFIC-DEQ specifies whether or not the PRIORITY, TIME-OF-ENQ, and CPU-PIN fields are to be included in the search for the queue entry.

  Y = Include the PRIORITY, TIME-OF-ENQ, and CPU-PIN fields. The search will return the entry requested provided the entry exists.

  N = Do not include the PRIORITY, TIME-OF-ENQ, and CPU-PIN fields. The search will return the entry with the highest priority. If more than one entry has the same PRIORITY, the search will return the entry with the oldest TIME-OF-ENQ. If more than one entry has the same PRIORITY and TIME-OF-ENQ, the search will return the entry with the lowest CPU-PIN.

  This field is typically set to N and not used. The field is expected to be used only when a supplier removes a queue entry that it added; presumably the application no longer needs the entry. When the field is set to N, the PRIORITY field only is checked for validity.

  RESERVED-1 through RESERVED-7 are reserved for future use; these fields must be set to N.

- QUEUE-NAME is the name of the queue from which the entry is to be dequeued. Input to this field is echoed in the response.

- PRIORITY in the request is ignored if SPECIFIC-DEQ = N; the field is checked for validity, however.

  In the request, PRIORITY is the priority value to be used in the search.

  In the response, PRIORITY is the priority value that was specified by the supplier when it made the entry on the queue.

- TIME-OF-ENQ in the request is ignored if SPECIFIC-DEQ = N.

  In the request, TIME-OF-ENQ is timestamp value to be used in the search.

  In the response, TIME-OF-ENQ is the timestamp generated by the Entry Manager that made the entry on the queue.

- CPU-PIN in the request is ignored if SPECIFIC-DEQ = N.

  In the request, CPU-PIN is the cpu,pin value to be used in the search.

  In the response, CPU-PIN is the cpu,pin of the Entry Manager that made the entry.

- MAX-DATA-SIZE is the maximum number of bytes to be returned.

- PAD-CHAR is the character to be used for padding the reply buffer when the actual data length is less than MAX-DATA-SIZE.

- RETN-CODE is the return code. The server returns a code in this field to indicate one of the following entries.

0	OK	4087	E-INVALID-MAX-DATASIZE
4010	E-BAD-TRANSACTION	4089	W-DATA-TRUNCATED
4051	E-MUST-BE-YN	4924	E-ERR-QUEUE-FILE
4052	E-RESERVED-MUST-BE-N	4990	E-IO-TIMEOUT
4078	E-INVALID-PRIORITY	6001	W-QUEUE-EMPTY

- RETN-CODE-DETAIL is an error number returned by a subsystem other than the queue management facility or is a further qualification of an error detected by the server.

- DATA-LEN is the actual length of the data field before padding the reply buffer to MAX-DATA-SIZE bytes in length.

- The format of the data in the queue entry returned by DEQ must be defined by the application. This data would immediately follow the DATA-LEN field and be MAX-DATA-SIZE bytes. The maximum size for the data portion of the response is constrained by the record size defined for the Queue file at configuration time. Refer to the TRANSFER Delivery System Management and Administration Guide.

  A sample format for the data portion would be:

```
  02  data-field     PIC X(100).
```

DEQ OPERATION. DEQ retrieves, thereby removing, an entry from the named queue, and returns either an entry from the queue or an error. The error could be a warning that there was nothing on the queue. The application should follow the DEQ operation with a WAITQ request for the case where the queue does not contain an entry for the consumer; the WAITQ request is used as a delay until the queue has an entry.

The response will always contain MAX-DATA-SIZE bytes of data immediately following the DATA-LEN field. If the actual length of the data for the queue entry is less than MAX-DATA-SIZE, or if an error occurs during processing, PAD-CHAR will be used to pad the field.

The entry returned will be the oldest entry among those with the highest priority or will be the one specified if SPECIFIC-DEQ is set to Y.

ENQ (UOW Code 502)

ENQ enqueues an entry on a queue. This operation requires a TMF transaction.

```
DEF enq-uow.
  02  hdr.
    03  self-ident              PIC AA VALUE "UW".
    03  uow-code                PIC 9(4) COMP VALUE 502.
  02  flags.
    03  notify-wait-manager     TYPE BOOLEAN VALUE "Y".
    03  reserved-1              TYPE BOOLEAN VALUE "N".
    03  reserved-2              TYPE BOOLEAN VALUE "N".
    03  reserved-3              TYPE BOOLEAN VALUE "N".
    03  reserved-4              TYPE BOOLEAN VALUE "N".
    03  reserved-5              TYPE BOOLEAN VALUE "N".
    03  reserved-6              TYPE BOOLEAN VALUE "N".
    03  reserved-7              TYPE BOOLEAN VALUE "N".
  02  queue-name                PIC X(32) VALUE SPACES.
  02  priority                  PIC 9(3) COMP VALUE 0.
  02  data-byte-count           PIC 9(5) COMP VALUE 0.

* Applications should define the actual format of the data
* portion, for example:
* 02  data-field                PIC X(!queue length!).

END.
```

```
DEF enq-rsp.
  02  hdr.
    03  self-ident              PIC AA VALUE "UW".
    03  uow-code                PIC 9(4) COMP VALUE 502.
  02  retn-code                 PIC S9(4) COMP.
  02  retn-code-detail          PIC S9(4) COMP.
  02  time-of-enq               PIC X(8).
  02  cpu-pin                   PIC X(2).
END.
```

<u>ENQ FIELDS.</u> The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 502.

- FLAGS lets you qualify the entry insertion. Fields within FLAGS are as follows:

  NOTIFY-WAIT-MANAGER specifies whether or not the Wait Manager should be notified about this new queue entry.

  Y = Notify the Wait Manager.

  N = Do not notify the Wait Manager.

  The option not to notify the Wait Manager exists only to allow reduced overhead for applications that do not need the Wait Manager. These applications must have some other mechanism for deciding when to issue a DEQ request.

  This field should always be set to Y unless the Wait Manager is not being used.

  RESERVED-1 through RESERVED-7 are reserved for future use; these fields must be set to N.

- QUEUE-NAME is the name of the queue on which the entry is to be inserted. The name is selected by the user.

- PRIORITY affects the order in which entries are inserted on the queue for each value of QUEUE-NAME. The field can contain an unsigned value ranging from 0 (lowest priority) through 199 (highest priority).

  Higher numbers will be processed (with a DEQ or READQ request) before lower numbers.

- DATA-BYTE-COUNT is the number of data bytes that are present in the request.

- The format of the data in the queue entry supplied by ENQ should be defined by the application. This data would immediately follow the DATA-BYTE-COUNT field and must be DATA-BYTE-COUNT bytes. The maximum size for the data portion of the request is constrained by the record size defined for the Queue file at configuration time. Refer to the <u>TRANSFER Delivery System Management and Administration Guide</u>.

  A sample format for the data portion would be:

  ```
  02  data-field     PIC X(100).
  ```

- RETN-CODE is the return code. The server returns a code in this field to indicate one of the following entries.

0	OK		
4010	E-BAD-TRANSACTION	4085	E-DATA-TOO-LONG
4051	E-MUST-BE-YN	4924	E-ERR-QUEUE-FILE
4052	E-RESERVED-MUST-BE-N	4990	E-IO-TIMEOUT
4078	E-INVALID-PRIORITY	6006	E-WAITMANAGER-UNAVAIL

- RETN-CODE-DETAIL is an error number returned by a subsystem other than the queue management facility or is a further qualification of an error detected by the server.

- TIME-OF-ENQ is the timestamp generated by the Entry Manager that makes the entry.

- CPU-PIN is the cpu,pin of the Entry Manager that makes the queue entry. This value is used to ensure that entries on the queue are unique.

ENQ OPERATION. ENQ adds an entry to the named queue. The application making the entry should end its transaction as soon as possible after adding the entry. This will minimize conflict when available queue entries exist in the file but are inaccessible because they are locked. If a queue entry remains locked, an available consumer could issue a DEQ, fail, and go back to waiting. The Wait Manager, however, will not be notified that the lock has been removed, forcing the potential consumer to wait until the next entry for QUEUE-NAME is made.

The ordering for queue entries with the same queue-name and priority is based on a combination of the current system timestamp and the cpu-pin of the Entry Manager. These generated values are returned in the response.

READQ (UOW Code 504)

READQ reads an entry from a queue. This operation does not require a TMF transaction.

```
DEF readq-uow.
  02  hdr.
    03  self-ident                  PIC AA VALUE "UW".
    03  uow-code                    PIC 9(4) COMP VALUE 504.
  02  flags.
    03  any-queue-name              TYPE BOOLEAN VALUE "N".
    03  any-priority                TYPE BOOLEAN VALUE "Y".
    03  any-time-of-enq             TYPE BOOLEAN VALUE "Y".
    03  any-cpu-pin                 TYPE BOOLEAN VALUE "Y".
    03  skip-exact                  TYPE BOOLEAN VALUE "N".
    03  reposition                  TYPE BOOLEAN VALUE "N".
    03  reserved-6                  TYPE BOOLEAN VALUE "N".
    03  reserved-7                  TYPE BOOLEAN VALUE "N".
  02  queue-name                    PIC X(32) VALUE SPACES.
  02  priority                      PIC 9(3) COMP VALUE 0.
  02  time-of-enq                   PIC X(8) VALUE LOW-VALUES.
  02  cpu-pin                       PIC X(2) VALUE LOW-VALUES.
  02  max-data-size                 PIC 9(5) COMP.
  02  pad-char                      PIC X(1) VALUE LOW-VALUE.
  02  filler                        PIC X(1) VALUE LOW-VALUE.
END.
```

```
DEF readq-rsp.
  02  hdr.
    03  self-ident                  PIC AA VALUE "UW".
    03  uow-code                    PIC 9(4) COMP VALUE 504.
  02  retn-code                     PIC S9(4) COMP.
  02  retn-code-detail              PIC S9(4) COMP.
  02  queue-name                    PIC X(32) VALUE SPACES.
  02  priority                      PIC 9(3) COMP VALUE 0.
  02  time-of-enq                   PIC X(8).
  02  cpu-pin                       PIC X(2).
  02  data-len                      PIC 9(5) COMP.

* Applications should define the actual format of the data
* portion, for example:
* 02  data-field                    PIC X(!queue length!).

END.
```

READQ FIELDS. The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 504.

- FLAGS lets you qualify the read operation. Fields within FLAGS are as follows.

  ANY-QUEUE-NAME specifies whether or not the read is restricted to a specific queue.

  Y = The read is not restricted to a specific queue. A Y value in this field will cause ANY-PRIORITY, ANY-TIME-OF-ENQ, and ANY-CPU-PIN to be automatically set to Y.

  N = The read is restricted to the queue name entered in the QUEUE-NAME field of the request.

  ANY-PRIORITY specifies whether or not the read is restricted to a specific value of PRIORITY.

  Y = The read is not restricted to a specific priority. A Y value in this field will cause ANY-TIME-OF-ENQ and ANY-CPU-PIN to be automatically set to Y.

  N = The read is restricted to the priority entered in the PRIORITY field of the request.

  ANY-TIME-OF-ENQ specifies whether or not the read is restricted to a specific value of TIME-OF-ENQ.

  Y = The read is not restricted to a specific timestamp. A Y value in this field will cause ANY-CPU-PIN to be automatically set to Y.

  N = The read is restricted to the timestamp entered in the TIME-OF-ENQ field of the request.

  ANY-CPU-PIN specifies whether or not the read is restricted to a specific value of CPU-PIN.

  Y = The read is not restricted to a specific cpu and pin.

  N = The read is restricted to the cpu and pin entered in the CPU-PIN field of the request.

SKIP-EXACT determines which entry is to be read.

Y = Read and return the entry immediately following the entry that was an exact match of the specified fields.

N = Read and return the entry that is an exact match of the specified fields.

REPOSITION is used for sequential reading of a specific queue or the entire Queue file. Setting this flag to Y after the initial read informs the Entry Manager that the values in the four fields QUEUE-NAME, PRIORITY, TIME-OF-ENQ, and CPU-PIN are being supplied based on the result of a previous READQ request.

To read sequentially from the beginning of a specified queue or from the beginning of the Queue file:

```
- Let SKIP-EXACT and REPOSITION        = N
- Set the four ANY- flags              = as desired
- Set ANY- flags' corresponding fields = as appropriate
```

For subsequent sequential reads:

```
- Set SKIP-EXACT and REPOSITION   = Y
- Let ANY- flags remain at their same settings.
- Copy all fields from the previous READQ response into
   the UOW for the next request.
```

An end-of-file warning indicates the end of the group has been reached.

RESERVED-6 and RESERVED-7 are reserved for future use; these fields must be set to N.

- QUEUE-NAME in the request is the name of the queue to which the read is restricted.

  QUEUE-NAME in the response is the name of the queue from which the entry was taken.

- PRIORITY in the request is the priority value to which the read is restricted.

  PRIORITY in the response is the value specified by the application that made the queue entry.

- TIME-OF-ENQ in the request is the Entry Manager timestamp to which the read is restricted.

  TIME-OF-ENQ in the response is the timestamp generated by the Entry Manager that made the queue entry.

- CPU-PIN in the request is the Entry Manager cpu,pin to which the read is restricted.

  CPU-PIN in the response is the cpu,pin of the Entry Manager that made the queue entry.

- MAX-DATA-SIZE is the maximum number of bytes to be returned.

- PAD-CHAR is the character to be used for padding the reply buffer when the actual data length is less than MAX-DATA-SIZE.

- RETN-CODE is the return code. The server returns a code in this field to indicate one of the following entries.

0	OK		
4001	W-EOF	4087	E-INVALID-MAX-DATASIZE
4051	E-MUST-BE-YN	4089	W-DATA-TRUNCATED
4052	E-RESERVED-MUST-BE-N	4924	E-ERR-QUEUE-FILE
4078	E-INVALID-PRIORITY	4990	E-IO-TIMEOUT

- RETN-CODE-DETAIL is an error number returned by a subsystem other than the queue management facility or is a further qualification of an error detected by the server.

- DATA-LEN is the actual length of the data field before padding the reply buffer to MAX-DATA-SIZE bytes in length.

- The format of the data in the queue entry returned by READQ should be defined by the application. This data would immediately follow the DATA-LEN field and be MAX-DATA-SIZE bytes. The maximum size for the data portion of the response is constrained by the record size defined for the Queue file at configuration time. Refer to the TRANSFER Delivery System Management and Administration Guide.

  A sample format for the data portion would be:

```
  02  data-field     PIC X(100).
```

READQ OPERATION. READQ reads an entry from the named queue. The request returns either an entry from the queue or an error. The error could be an indication there was nothing on the queue.

The response will always contain MAX-DATA-SIZE bytes of data immediately following the DATA-LEN field. If the actual length of the data for the queue entry is less than MAX-DATA-SIZE, or if an error occurs during processing, PAD-CHAR will be used to fill in the field.

The entry returned will be the oldest entry from among those with the highest priority.

WAITQ (UOW Code 505)

WAITQ waits for an entry on a queue. This operation does not require a TMF transaction.

```
DEF waitq-uow.
  02  hdr.
    03  self-ident              PIC AA VALUE "UW".
    03  uow-code                PIC 9(4) COMP VALUE 505.
  02  flags.
    03  any-queue-name          TYPE BOOLEAN VALUE "N".
    03  reserved-1              TYPE BOOLEAN VALUE "N".
    03  reserved-2              TYPE BOOLEAN VALUE "N".
    03  reserved-3              TYPE BOOLEAN VALUE "N".
    03  reserved-4              TYPE BOOLEAN VALUE "N".
    03  reserved-5              TYPE BOOLEAN VALUE "N".
    03  reserved-6              TYPE BOOLEAN VALUE "N".
    03  reserved-7              TYPE BOOLEAN VALUE "N".
  02  queue-name                PIC X(32) VALUE SPACES.
  02  wait-priority             PIC 9(3) COMP VALUE 0.
  02  wait-timeout              PIC S9(4) COMP VALUE -1.
END.
```

```
DEF waitq-rsp.
  02  hdr.
    03  self-ident              PIC AA VALUE "UW".
    03  uow-code                PIC 9(4) COMP VALUE 505.
  02  retn-code                 PIC S9(4) COMP.
  02  retn-code-detail          PIC S9(4) COMP.
  02  queue-name                PIC X(32) VALUE SPACES.
END.
```

WAITQ FIELDS. The fields defined in this UOW are:

- HDR is the UOW header. The UOW-CODE value is 505.
- FLAGS lets you qualify the wait operation. Fields within FLAGS are as follows:

  ANY-QUEUE-NAME specifies whether or not the wait is restricted to a specific queue.

Y = Wait for an entry on any queue.

N = Wait for an entry on the queue entered in the QUEUE-NAME field of the request.

RESERVED-1 through RESERVED-7 are reserved for future use; these fields must be set to N.

- QUEUE-NAME identifies the specific queue for the wait request.

- WAIT-PRIORITY determines which waiting consumer is responded to first. The field can contain an unsigned value ranging from 0 (lowest priority) through 199 (highest priority).

  Higher numbers will be processed before lower numbers.

- WAIT-TIMEOUT sets an upperbound, in seconds, on the amount of time the requesting application is willing to wait for an entry.

  A value of -1 is an unlimited wait.

- RETN-CODE is the return code. The server returns a code in this field to indicate one of the following entries:

0	OK	6002	E-TOO-MANY-WAITERS
4078	E-INVALID-PRIORITY	6003	E-INVALID-WAITPRIORITY
4924	E-ERR-QUEUE-FILE	6004	E-INVALID-WAITTIMEOUT
4990	E-IO-TIMEOUT	6005	W-WAIT-TIMEOUT

- RETN-CODE-DETAIL is an error number returned by a subsystem other than the queue management facility or is a further qualification of an error detected by the server.

- QUEUE-NAME in the response is the name of the queue for which a new queue entry has arrived.

<u>WAITQ OPERATION.</u> WAITQ responds to a WAITQ request for a particular queue by reading that queue. If the queue has an entry, WAITQ issues a response; if the queue is empty, WAITQ waits for an entry. When a queue entry is made and WAITQ issues a response to a consumer, the consumer is generally expected to start a transaction and then issue a DEQ request.

If the queue entry is made and then the transaction is aborted, the queue entry might disappear. It is possible, therefore, that the DEQ will return with queue empty even immediately after the WAITQ returns indicating that the queue is not empty. In this case, the consumer should end the transaction and call WAITQ again. If the DEQ returns with an E-IO-TIMEOUT error, the application should delay for a short while and retry. The entry might still be locked because the supplier has not yet ended the transaction.

The Wait Manager has no way of knowing if a consumer has canceled its request; to ensure that an available waiting consumer is notified of a new arrival on a queue, the Wait Manager replies to all consumers waiting on the newly added queue entry.

Applications that expect to cancel the WAITQ request based on a timeout should use the WAIT-TIMEOUT feature of this UOW. This will allow the Wait Manager to reclaim space in internal tables as soon as the waiting consumer is not interested in being notified. Another consumer process will then be able to access the Wait Manager.

The following rules apply to WAITQ:

1. Only one WAITQ UOW can appear in a request. If you specify more than one UOW for the Wait Manager, the PW-REPLY-CODE will be set to RQST-ERR (3) and the IPC-RETN-CODE field will be set to RQST-TOO-LONG (5).

2. The WAITQ UOW must be the only UOW in the request. The Wait Manager will not process any portion of the message buffer after the WAITQ UOW.

STARTING THE SERVER PROCESSES

The Entry Manager and the Wait Manager are separate server programs. Both servers interpret the startup message as follows:

default subvolume - ignored

IN file name - ignored

OUT file name - used to write serious error messages; these messages usually indicate a problem in the data base or the operational environment, not in the client

parameter string - ignored

Table 9-2 lists the parameters that the servers accept at startup time. Unless specified otherwise, the parameters apply to both servers.

Table 9-2. Queue Manager Server Parameters at Startup Time

Parameter Name	Default Value	Description
DEBUGLOGFORMAT	FALSE	If FALSE: the debugging log will contain binary characters suitable for writing to an entry-sequenced disc file. If TRUE: the debugging log will be formatted in ASCII characters suitable for writing to a terminal or printer.
DEBUGLOGLEVEL	3	If the PW-REPLY-CODE field of any response is greater than or equal to this value, the message and reply will be written to the debugging log. Specifying a value of zero causes all messages and replies to be logged.

Table 9-2. Queue Manager Server Parameters at Startup Time (Continued)

Parameter Name	Default Value	Description
DEBUGLOGRECSPEROPEN	20	After this many IPCs and their replies are written to the debug log, the log is closed and reopened.
HANGAROUND	FALSE	If FALSE: the server stops after all requesters have closed it. If TRUE: the server never stops automatically. CAUTION When requesters and servers are both running in the PATHWAY environment, the HANGAROUND parameter for the PATHWAY server must be set to FALSE. When a requester is running outside the PATHWAY environment and accessing a PATHWAY server, that PATHWAY server must be in its own server class so the HANGAROUND parameter can be set to TRUE; with the TRUE setting, the server remains available after it has been closed by the last opener.
IOTIMEOUT	20	Longest time, in seconds, to wait for I/O requests that are blocked due to other transactions.
MAXLINKS	8	Number of simultaneous openers of a server process. Entry Manager: The actual limit is related to MAXLINKS and the values for MAXREQUEST and MAXREPLY. Wait Manager: The number must not be more than 250; a larger value will cause a diagnostic to be issued and the server to ABEND.

Table 9-2. Queue Manager Server Parameters at Startup Time (Continued)

Parameter Name	Default Value	Description
MAXREPLY Entry Manager only	2048	Size (in bytes) of largest reply a server can generate. This might affect the maximum number of simultaneous openers due to memory limitations. This parameter does not apply to the Wait Manager, which has a built-in unalterable value of 100.
MAXREQUEST Entry Manager only	2048	Size (in bytes) of largest request a server will accept. This might affect the maximum number of simultaneous openers due to memory limitations. This parameter does not apply to the Wait Manager, which has a built-in unalterable value of 450.
MAXWAITERS Wait Manager only	MAXLINKS	Number of simultaneous WAITQs that can be outstanding at any one time. The number must not be more than 250; a larger value will cause a diagnostic to be issued and the server to ABEND.
RESERVEDLINKS Wait Manager only	1	Number of openers (set by MAXLINKS) that must be Entry Manager programs rather than application components. The number of application components that can open the Wait Manager is MAXLINKS minus RESERVEDLINKS.

Table 9-2. Queue Manager Server Parameters at Startup Time (Continued)

Parameter Name	Default Value	Description
RESERVELCBS Wait Manager only	0	Number of LCBs that a Wait Manager reserves for its own use. Use of this parameter allows the message about outstanding requests on a process to be removed. If your Wait Manager will typically have a large number of waiters outstanding, this probably should be set to a number that corresponds to the expected number of simultaneous waiters.
WAKEUPINTERVAL Wait Manager only	60 seconds	Amount of time the Wait Manager will sit idle waiting on $RECEIVE. After this much idle time has passed, the Wait Manager will check the Queue file to make sure there are no entries to be processed (entries could be there if a transaction with a DEQ aborts, for example). If there are no outstanding requests, the Wait Manager will wake up every WAKEUPINTERVAL and perform a check on a single opener. One opener is checked every WAKEUPINTERVAL until all openers have been checked. (MAXLINKS x WAKEUPINTERVAL) is the amount of idle time that will pass before all checks have been made and the Wait Manager starts over from the beginning.

Logical File Assignments

The servers accept parameters in the ASSIGN command at initialization time for several logical files. These logical files allow some control over the physical files used by the queue management servers.

ASSIGN command parameters are listed and described in Table 9-3. For additional information, refer to the TRANSFER Delivery System Management and Administration Guide.

Table 9-3. Queue Manager ASSIGN Command Parameters at Startup Time

Parameter Name	Default Value	Description
DEBUGLOG	None	Specifies the file to which a debugging log is written. The log contains a copy of some or all of the IPCs received and replied to by the servers. Control over log entries is provided by the parameters listed in Table 9-2 and by a flag field in the IPC header. If this parameter is omitted, a debugging log is not written. If this parameter refers to a disc file that does not exist, an entry-sequenced file will be created. This parameter cannot refer to an EDIT file.
QUEUEFILE	QUEUE (in the volume and subvolume on which the server program resides)	Specifies the file that contains all queue information and that is opened and used by both servers. The file must exist and must be audited; otherwise, an error message is reported and the server ABENDs.

Table 9-3. Queue Manager ASSIGN Command Parameters at Startup Time (Continued)

Parameter Name	Default Value	Description
WAITMANAGER	None	Specifies the process name of the Wait Manager that is handling wait requests for new entries on the Queue file. This parameter is required by all Entry Managers operating on a single Queue file. If a value is not supplied, the Entry Manager reports an error and ABENDs.

Server Program Files

The Entry Manager and Wait Manager are each in one program file.

The Entry Manager server is named EMSERV. The server handles requests one at a time even when there are multiple openers.

The Wait Manager server is named WMSERV. The server handles multiple requests concurrently.

The servers allow access to queue data only if the requesting process has read and write access to the Queue file. Both servers check security when they receive an OPEN request from the requester. If the requester does not have access privilege, the servers deny access and issue a security violation.

A security violation (error 48) implies that the opening process does not have a user-id falling within the access security of the Queue file. Either the user-id of the requesting process or the security mask on the file must be changed before the process can successfully open the server.

QUEUE MANAGEMENT INITIALIZATION ERROR MESSAGES

Error messages that can be issued during initialization are listed in Table 9-4. Errors reported by the queue management UOWs appear in Appendix A.

Table 9-4. Queue Management Initialization Error Messages

Message	Definition
Bad version number on file <filename>	The version number in the control record of the specified file was invalid for the running version of the server. The file must be converted to the current compatible version.
Defined data structure queue-file-control inconsistent	The data within the structure is inconsistent with the length of the structure itself. This will cause the particular server to ABEND. There might be a problem with the compilation procedure used to build the server. See your Tandem representative.
Error <error> obtaining maximum record length of file <filename>	An error occurred when the server attempted to obtain the maximum record length of the specified file. The <error> value is the file system error number to see for additional information.
Error <error> obtaining information for file <filename>	An error occurred when the server attempted to obtain information about the specified file. The <error> value is the file system error number to see for additional information.
Error <error> opening file <filename>	The attempt to open the specified file failed. The <error> value is the file system error number to see for additional information.

Table 9-4. Queue Management Initialization Error Messages (Continued)

Message	Definition
Error <error> while setting lock mode of file <filename>	The specified file system error occurred while trying to set the locking mode of the specified file. The <error> value is the file system error number to see for additional information.
File code incorrect for file <filename>	The file code for the specified file is incorrect. The file must be recreated with the correct file code.
File <filename> must be audited	The specified file is not a TMF audited file. The file must be specified as audited.
Insufficient memory for required Wait Manager tables	The Wait Manager could not obtain sufficient memory for its tables. The parameters defining the number of openers and waiters supported by the Wait Manager must be reduced to conform to memory restrictions.
Invalid event value in Wait Manager	The event value that designates Wait Manager action was invalid; the server will ABEND. Starting the server again might solve the problem; if not, the problem is in the server code.

Table 9-4. Queue Management Initialization Error Messages (Continued)

Message	Definition
KEYPOSITION error <error> on file <filename>	The specified file system error occurred when a KEYPOSITION was attempted on the specified file. The <error> value is the file system error number to see for additional information.
No control record found in file <filename>	The specified file contained records, but no control record. The file must be recreated so that a control record is written.
MAXLINKS value is too large	The MAXLINKS parameter has a value that is greater than the defined maximum. The value must be reduced and the server started again.
MAXWAITERS value is too large	The MAXWAITERS parameter has a value that is greater than the defined maximum. The value must be reduced and the server started again.
READ error <error> on file <filename>	The specified file system error occurred when a READ was attempted on the specified file. The <error> value is the file system error number to see for additional information.

Table 9-4. Queue Management Initialization Error Messages (Continued)

Message	Definition
Unable to reserve lcb's	The server was unable to reserve the required lcb's. The number of RESERVELCBS must be reduced and the server started again.
Unexpected error <error> on file <filename>	An unexpected error is returned from the file system. The specified <error> indicates the problem.
WRITE error <error> on file <filename>	The specified file system error occurred when a WRITE was attempted on the specified file. The <error> value is the file system error number to see for additional information.

APPENDIX A

ERROR CODES

Error codes can be returned to a TRANSFER application process in the following fields:

• PW-REPLY-CODE	in the interprocess communication (IPC) header
• IPC-RETN-CODE	
• IPC-RETN-CODE-DETAIL	
• RETN-CODE	in the UOW header
• RETN-CODE-DETAIL	
• MBR-RETN-CODE	in the ADD-MEMBER and DELETE-MEMBER UOW responses
• ELEM-RETN-CODE	in the ALTER-PROFILE-ELEM and GET-PROFILE-ELEM UOW responses
• DELIV-ERR	in the GET-RECIP-REC UOW response

ERROR CODE FIELDS

The following paragraphs give a general discussion of the fields that contain error codes. All error codes are listed and explained in this appendix.

PW-REPLY-CODE Errors

A value of zero in the PW-REPLY-CODE field of the IPC header indicates that all UOWs in the request were processed successfully. Any other value denotes an error. Additional information about these errors appears in Section 4.

CAUTION

> A value of 2 or greater in the PW-REPLY-CODE field field requires a transaction abort and full transaction backout by TMF.

IPC-RETN-CODE Errors

A value of zero in the IPC-RETN-CODE field of the IPC header indicates that TRANSFER detected no errors in the header; warning indications or errors, however, might have been detected in individual UOWs. Any other value in this field denotes an error in the header, in a file access operation, or in some other area that is not specific to any particular UOW in the request.

IPC-RETN-CODE-DETAIL Errors

A value other than zero in the IPC-RETN-CODE-DETAIL field of the IPC header indicates that although the data in the IPC header was correct, an error was detected by the GUARDIAN operating system. The meaning of this error also depends upon the content of the IPC-RETN-CODE field. For information about these particular errors, refer to the GUARDIAN Operating System Programming Manual.

RETN-CODE Errors

A value of zero in the RETN-CODE field of the UOW header indicates that no errors occurred during the processing of the particular UOW. Any other value in this field is one of the following:

- an error code - a positive value ranging from 4000 through 5999, denoting that the UOW could not be processed because of an error.
- a warning code - a negative value ranging from -5999 through -4000, denoting that the UOW contained an anomaly; but in spite of the anomaly, the UOW was processed successfully.

Error code text for these errors begins with E and warning code text begins with W.

The range within which the error or warning code number falls indicates which process detected the anomaly, as follows:

Positive/Negative Range	Process
4000 through 4399	TRANSFER interactive server (TISERV)
4600 through 4699	TRANSFER asynchronous processors
4900 through 4999	GUARDIAN file system
5600 through 5799	TRANSFER name server
6000 through 6099	TRANSFER queue manager

TRANSFER issues RETN-CODE errors in the range 4000 through 6099. This appendix lists only those codes returned by UOWs in the RETN-CODE field, or written by TAREQs in the DELIV-ERR field of recipient records. Other codes in this range can be generated by the T/MAIL application and the ADMIN client; the messages associated with these codes appear in the TRANSFER/MAIL User's Guide and the TRANSFER Delivery System Management and Administration Guide.

All UOW code numbers that are passed to TRANSFER by your application and that are not explicitly listed in this appendix return one of these errors to the RETN-CODE field:

E-INVALID-UOW-HDR — This is a request error. The UOW code is undefined in the system.

E-RESTRICTED-OPERATION — This is a UOW error. The UOW is reserved for use by TAREQs.

E-UOW-NOT-IMPLEMENTED — This is a UOW error. The code is reserved for a UOW that is not yet implemented.

RETN-CODE-DETAIL Errors

Certain errors reported in the RETN-CODE field also cause additional related error codes to appear in the RETN-CODE-DETAIL field. These additional codes can reflect:

- Errors detected by the GUARDIAN operating system. For information about such errors, refer to the GUARDIAN Operating System Programming Manual.

- Errors detected by the TRANSFER name server. These errors are reported almost identically to the way in which file errors detected by the GUARDIAN operating system are reported. The messages that accompany the name server errors have approximately the same meaning as similar messages generated by the operating system.

Error Codes

- Errors detected by TRANSFER indicating an improper entry in an absolute DATE-TIME subfield, as follows:

Error Value Returned in RETN-CODE-DETAIL	DATE-TIME Subfield Containing Error
1	YEAR
2	MONTH
3	DAY-OF-MONTH
4	HOUR
5	MINUTE
6	SECOND

MBR-RETN-CODE Errors

The MBR-RETN-CODE field of the ADD-MEMBER and DELETE-MEMBER UOWs can contain error codes numbered from 5650 through 5674.

ELEM-RETN-CODE Errors

Error codes can sometimes be returned in the responses to the ALTER-PROFILE-ELEM and GET-PROFILE-ELEM UOWs. These codes are listed in the description of the GET-PROFILE-ELEM UOW.

DELIV-ERR Errors

Error codes can be returned by TAREQs in the response to the GET-RECIP-REC UOW. These error codes are numbered from 4600 through 4609.

GUARDIAN FILE CODES

GUARDIAN file codes can be returned in some error code fields. These codes indicate the TRANSFER file on which the error occurred. File codes are listed and identified in Table A-1.

Table A-1. GUARDIAN File Codes

File Code	File Name	File Code	File Name
250	Profile	259	Net
251	Session	260	Inverted Folder
252	Item Descriptor	261	Restart
253	Recipient	262	Name
254	Folder	263	DIN
255	Item Data	264	Alias
256	Distribution List	265	Trace
257	Ready	266	Queue File
258	Time		

SUMMARY OF ERROR CODES

Errors reported by TRANSFER are listed in Table A-2. Error codes appear in ascending numeric order.

The first column shows the error number associated with each error and the field in which the error is reported.

The second column shows the mnemonic text that describes the error and the specific meaning of the error.

Error code text begins with E; warning code text begins with W.

The minus signs that precede the numeric codes for warnings are omitted.

Errors listed in Table A-2 are also listed in Table A-3 for cross-reference. Error messages in Table A-3 appear in alphabetic order.

Table A-2. Error Codes

Error No./ (Field)	Text/ Meaning
1 (PW-REPLY-CODE)	UOWS-WITH-WARNING TRANSFER encountered warning indications in one or more UOWs. If STOP-ON-WARNING was not specified in the RQST-CODE field, then all UOWs in the request have a corresponding response UOW in the reply. If STOP-ON-WARNING was specified, only those UOWs preceding and including the first with a warning indication have corresponding response UOWs.
1 (IPC-RETN-CODE)	INVALID-VERSION-CODE The request contained an IPC version code that could not be recognized by TRANSFER.
2 (PW-REPLY-CODE)	UOWS-WITH-ERR TRANSFER detected errors in one or more UOWs. If neither STOP-ON-ERR nor STOP-ON-WARNING was specified in the RQST-CODE field, then all UOWs in the request have a corresponding response UOW; otherwise, only those UOWs preceding and including the first with an error have corresponding response UOWs. (The UOWs preceding the first with an error might return warning indications if STOP-ON-ERR is specified in the request.) CAUTION If your application receives a value of 2 in the PW-REPLY-CODE field, full transaction backout with TMF is recommended. If the transaction is not backed out, consistency in the data base cannot be guaranteed.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
2 (IPC-RETN-CODE)	INVALID-SESSION-ID The request contained a session ID that could not be recognized by TRANSFER. Perhaps the IPC referenced a session that no longer existed.
3 (PW-REPLY-CODE)	RQST-ERR A request error occurred. This type of error indicates that something was wrong in the data in the IPC header, and that the error probably does not apply to any particular UOW. In certain cases, however, it might involve an individual UOW, for example, one with an invalid UOW header. When this error occurs, the number of response UOWs might be less than the number of UOWs in the request. For further information, your application should examine the IPC-RETN-CODE field. CAUTION If your application receives a value of 3 in the PW-REPLY-CODE field, full transaction backout with TMF is recommended. If the transaction is not backed out, consistency in the TRANSFER data base cannot be guaranteed.
3 (IPC-RETN-CODE)	SERVICE-DENIED Reserved for future use by Tandem Computers.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
4	INVALID-UOW-HDR
(IPC-RETN-CODE)	Your request contained an invalid UOW header. This error occurs when the previous UOW header specified the wrong size, or when you omitted the characters UW from the UOW header, or when the UOW code in the UOW header is undefined for the server class.
5	RQST-TOO-LONG
(IPC-RETN-CODE)	The request was too long to be handled by TISERV. (The TISERV parameter MAXREQUEST specifies the size of the largest request that TISERV can process.)
6	REPLY-TOO-LONG
(IPC-RETN-CODE)	The reply from the server was too long to fit into the allocated reply buffer.
7	RQST-TOO-SHORT
(IPC-RETN-CODE)	The request was too short; it contained fewer UOWs than the number specified in the UOWS-TO-PROCESS field.
8	INVALID-REQUEST-CODE
(IPC-RETN-CODE)	The RQST-CODE field contained an invalid entry.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
4001	W-EOF
(RETN-CODE)	While reading information from its data base, TRANSFER encountered an end-of-file indicator. This error occurs with such UOWs as GET-ITEM-REC, GET-RECIP-REC, READ-NEXT-MEMBER, READ-NEXT-NAME, or READ-PROFILE-REC. Since TRANSFER has returned to your program all available data in the file, your process should not call the UOW again for more data.
4003	E-UOW-NOT-IMPLEMENTED
(RETN-CODE)	Your process issued a UOW that is not implemented in TRANSFER.
4005	E-CONCURRENT-SESSION W-CONCURRENT-SESSION
(RETN-CODE)	Your application attempted to start a session for a correspondent (with the START-SESSION UOW) while another session was already in progress for the same correspondent. This can be either an error or a warning message, depending on the configuration of the depot involved.
4007	E-LOGON-DISALLOWED
(RETN-CODE)	A correspondent attempted to log on, but a system administrator has set the LOGON-DISALLOWED field in the correspondent's profile record to Y, preventing anyone from logging on under that correspondent's name.
4009	E-WRITES-DISALLOWED
(RETN-CODE)	Your process attempted a write operation, but writing has been explicitly disallowed.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
4010 (IPC-RETN-CODE or RETN-CODE)	E-BAD-TRANSACTION Your process issued a UOW without first obtaining the required transaction ID; or the current transaction could not be used, probably because some component of the system or network failed. See IPC-RETN-CODE-DETAIL or RETN-CODE-DETAIL for the file system error returned by the GUARDIAN operating system.
4013 (RETN-CODE)	E-NO-DEPOT-FOR-CORR Your process attempted to start a session for a correspondent whose name is defined in the TRANSFER name directory, but for whom no profile record currently exists.
4015 (RETN-CODE)	E-INVALID-PASSWORD Your process attempted to start a session for a correspondent who entered an invalid password.
4017 (RETN-CODE)	E-RESTRICTED-OPERATION Your process issued a UOW that should only be issued by TRANSFER.
4019 (RETN-CODE)	E-ALREADY-IN-SESSION Your process issued a START-SESSION UOW without first resetting the session ID in the IPC header.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
4021	E-INVALID-ZONE-OFFSET
(RETN-CODE)	The CURR-LOCAL-TIME specified in the START-SESSION UOW differs from the local time of the TISERV server (to which the UOW was issued) by more than 24 hours. This error normally indicates that your client specified the local time incorrectly.
4035	E-ITEM-NOT-FOUND
(RETN-CODE)	Your process referenced an item that was not: • saved in any of your folders, • created by you in the current session, or • returned by TRANSFER in response to a GET-ITEM-COMPNT-A01 UOW in the current session.
4036	E-ITEM-TOO-COMPLEX
(RETN-CODE)	Your process issued an ATTACH-COMPNT or SUBMIT-PKG UOW for an item that involved too many levels of nesting. Restructure the item to include fewer levels, and retry the request.
4037	E-PARENT-NOT-FOUND
(RETN-CODE)	Your process attempted to attach or detach an item as a component of a parent item that was not: • saved in any of your folders, • created by you in the current session, or • returned by TRANSFER in response to a GET-ITEM-COMPNT-A01 UOW in current session.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
4038 (RETN-CODE)	E-COMPNT-CYCLE Your process attempted to attach one item as a component of another (with the ATTACH-COMPNT UOW), but the first item was already defined as an ancestor of the second.
4039 (RETN-CODE)	E-COMPNT-NOT-FOUND Your process attempted to attach or detach one item as a component of another, but the component item was not: • saved in any of your folders, • created by you in the current session, or • returned by TRANSFER in response to a GET-ITEM-COMPNT-A01 UOW in the current session.
4040 (RETN-CODE)	E-BAD-ITEM-DESCR Your process attempted to attach a component (ATTACH-COMPNT-A01 UOW), detach a component (DETACH-COMPNT UOW), retrieve a component (GET-ITEM-COMPNT-A01 UOW), or post a package (SUBMIT-PKG UOW); but TRANSFER detected an internal inconsistency for the referenced item in its descriptor.
4041 (RETN-CODE)	E-ITEM-UNALTERABLE Your process attempted to alter an item that was part of a package already submitted for delivery, or to change the recipient list for such a package.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
4042 (RETN-CODE)	E-ITEM-NOT-PKG-HDR Your process tried to perform an operation with a package, but referenced an item that was not a package header. This error might occur while acknowledging receipt of a package, reading or altering its recipient list, altering the item descriptor, or submitting or canceling the package.
4043 (RETN-CODE)	E-PREVIOUSLY-SUBMITTED Your process tried to post (SUBMIT-PKG UOW) a package that was already posted.
4044 (RETN-CODE)	E-PREVIOUSLY-CANCELED Your process tried to cancel (CANCEL-PKG UOW) a package that was already canceled.
4045 (RETN-CODE)	E-TSCHED-UNAVAIL Your process requested a function that required asynchronous services (posting or canceling a package, or acknowledging its receipt), but these services were not available. If this error occurs when your process is saving an item with the SAVE-ITEM-BOO or SAVE-ITEM-BY-KEY UOW, you must either wait for TSCHED to become available or save the item without an unsave date and time specified.
4046 (RETN-CODE)	E-INVALID-REC-TYPE When reading, writing, or deleting a profile or item data record, your process specified a record type that was either reserved for use by TRANSFER only or was outside the range 1 through 9999.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
4047	E-REC-NOT-FOUND
(RETN-CODE)	When altering agent selection criteria, deleting a data record from an item, or purging a recipient or correspondent's profile, your process referenced a record that could not be found in the TRANSFER data base.
4049	E-REC-ALREADY-EXISTS W-REC-ALREADY-EXISTS
(RETN-CODE)	When adding a record to an item or a recipient to a recipient list, or when saving an item or writing a profile record, your process tried to create a record that already existed.
4050	E-UPDATE-MISMATCH
(RETN-CODE)	Your process tried to update a record with the ALTER-ITEM-DESCR or WRITE-PROFILE-REC UOW, but the UPDATE-CONTROL field for the record does not match the current update control count maintained by TRANSFER. Either your process returned the wrong record key, or another process updated the record between the time that it was read and the time that it was written.
4051	E-MUST-BE-YN W-MUST-BE-YN
(RETN-CODE)	Your process attempted to set a flag in the TRANSFER data base to a value other than Y, N, y, or n.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
4052 (RETN-CODE)	E-RESERVED-MUST-BE-N Your process tried to set a TRANSFER data base flag that is reserved for future use by TRANSFER. Such flags are initialized to N, and must remain at this setting.
4054 (RETN-CODE)	E-INVALID-AGENT-SEL Through the ALTER-AGENT-SELECT UOW, your process entered a value in the AGENT-SEL-LOW or AGENT-SEL-HIGH field that was outside the range of 0 through 9999; or in the ALTER-ITEM-DESCR UOW, you specified an agent selector outside the range of 0 through 9999.
4055 (RETN-CODE)	E-INVALID-APPLIC-ID Through the ALTER-AGENT-SELECT UOW, your process entered a value in the APPLIC-ID-LOW, APPLIC-ID-HIGH, or APPLIC-ID-FOR-LOGON field that was outside the range of 0 through 9999; or, in the START-SESSION UOW, you specified an APPLIC-ID outside the range of 0 through 9999.
4056 (RETN-CODE)	E-INVALID-ITEM-TYPE Your process entered an item type value that was outside the range of 0 through 9999.
4057 (RETN-CODE)	E-INVALID-REL-POSITION While attaching, detaching, or retrieving a component item (with the ATTACH-COMPNT, DETACH-COMPNT, or GET-ITEM-COMPNT UOWs, respectively), your process specified a relative position for the item within the component list that was out of range.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
4058 (RETN-CODE)	E-INVALID-REC-SEQ-NUM When altering agent selection criteria (with the ALTER-AGENT-SELECT UOW), when writing a profile record (with the WRITE-PROFILE-REC UOW), or when adding an item data record (with the ADD-ITEM-REC UOW), your process specified a record sequence number that was not within the range of 0 through 9999.
4061 (RETN-CODE)	W-ITEM-NOT-IN-FOLDER While removing an item from a folder (with the UNSAVE-ITEM UOW), your process referenced an item that was not present in the folder.
4065 (RETN-CODE)	E-INVALID-RECIP-TYPE In the ADD-RECIP UOW, your process specified a recipient type that was not within the range of 0 through 9999.
4067 (RETN-CODE)	W-REMOTE-NAME-ACCEPTED Your process specified a correspondent or distribution list supposedly defined at a remote node. At your request, TRANSFER accepted that name without validating that it exists. This warning might occur while adding recipients to a package or members to a distribution list.
4069 (RETN-CODE)	W-NODE-NAME-UNKNOWN While adding a recipient (with the ADD-RECIP or ADD-MEMBER UOW), your process referenced a network node name that was not currently known in the EXPAND network. This message is a warning, indicating that TRANSFER has accepted the name anyway.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
4071	E-PAST-DATE-TIME
(RETN-CODE)	Your process specified a date that was in the past. The UNSAVE-TIME field requires a date in the future.
4072	E-UNITS-MUST-BE-DHM
(RETN-CODE)	Your process specified a unit of time, as in a delivery date, but did not specify D (for day), H (for hour), or M (for minute) in the UNITS field. (To enter zero as a quantity of time, type 0 in the QUANTITY field and D, H, or M in the UNITS field; this unit of time will always be output as 0 D.)
4073	E-INVALID-DATE-TIME
(RETN-CODE)	In a request to start a session (START-SESSION UOW) or alter an item descriptor (ALTER-ITEM-DESCR UOW), your process specified an invalid date or time as a delivery parameter.
4074	E-INVALID-REL-TIME-QTY
(RETN-CODE)	Your process specified a quantity of time that was outside the required range.
4075	W-TIME-WINDOW-EXTENDED
(RETN-CODE)	In a request to post a package (SUBMIT-PKG UOW), your process specified a delivery parameter that was less than the minimum time allowed by the system. TRANSFER extended the specified time to the minimum allowed.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
4077 (RETN-CODE)	E-LIFESPAN-TOO-LONG In a request to post a package (SUBMIT-PKG UOW), your process submitted a package whose lifetime exceeded the maximum allowed by the system.
4078 (RETN-CODE)	E-INVALID-PRIORITY Your process specified a delivery priority for a package that was outside the range of 0 through 199.
4079 (RETN-CODE)	W-PRIORITY-REDUCED In a request to post a package (SUBMIT-PKG UOW), your process submitted a package with a priority that was too high, and TRANSFER reduced it to the value defined as the limit for the depot.
4080 (RETN-CODE)	E-PKG-NOT-RECEIVED Your process tried to acknowledge (with the ACK-RECEIPT UOW) delivery of a package that was not received by the logged-on correspondent.
4081 (RETN-CODE)	W-DELIV-IN-PROGRESS Your process tried to cancel a package for which delivery was already in progress. The system will cancel further deliveries, but cannot guarantee that some recipient has not already received the package.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
4082 (RETN-CODE)	E-NO-RECIPS Your process posted (with the SUBMIT-PKG UOW) a package for which no recipients were defined.
4083 (RETN-CODE)	E-NOT-CREATED-BY-YOU A correspondent tried to submit or cancel a package that was created by another correspondent.
4084 (RETN-CODE)	E-PKG-NOT-SUBMITTED A correspondent tried to cancel a package that was not submitted.
4085 (RETN-CODE)	E-DATA-TOO-LONG Your process tried to add a record to an item (with the ADD-ITEM-REC UOW), but the record exceeded the maximum allowed length of 2000 bytes.
4086 (RETN-CODE)	W-DATASIZE-ADJUSTED Your process retrieved a record (with the GET-ITEM-REC UOW) and the size of the buffer was adjusted to an even number to accommodate word alignment; MAX-DATASIZE was odd.
4087 (RETN-CODE)	E-INVALID-MAX-DATASIZE Your process specified too much data for a record.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
4089 (RETN-CODE)	W-DATA-TRUNCATED Your process retrieved a record (with the GET-ITEM-REC UOW) but the data was longer than the buffer space allocated for the response. The data was truncated.
4092 (RETN-CODE)	E-INVALID-NUM-RQSTD Your process specified a zero or negative value for the NUM-REQUESTED field of a UOW.
4093 (RETN-CODE)	E-SECURITY-VIOLATION Your process tried to access or modify a data element that can only be accessed by the depot owner or a system administrator.
4094 (RETN-CODE)	E-PKG-CANCELED Your process attempted to acknowledge receipt of a package whose delivery has been canceled.
4095 (RETN-CODE)	E-PKG-EXPIRED Your process attempted to acknowledge receipt of a package that has expired.
4096 (RETN-CODE)	E-INVALID-COMPNT-TYPE Your process specified an invalid number in the COMPNT-TYPE field when requesting attachment of a component item. This value must be within the range 0 through 9999.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
4100 (RETN-CODE)	W-ORD-KEY-TRUNCATED An item was retrieved, but the corresponding ordering key was longer than the buffer space allocated for the ordering key in the response. The ordering key was truncated.
4101 (RETN-CODE)	W-MAX-KEY-LEN-ADJUSTED Your process specified an odd number for MAX-KEY-LEN. You should specify an even number for this value so that all elements of the returned array are word aligned. When an odd number is specified, TRANSFER automatically increments the value by 1.
4102 (RETN-CODE)	E-INVALID-KEY-LEN Your process specified an ordering key length that was less than 0 or greater than 200. The SCAN-FOLDER-BY-KEY UOW also returns this error if GENERIC-KEY-LEN is greater than STARTING-KEY-LEN.
4103 (RETN-CODE)	E-INCORRECT-FLD-ORDER Your process issued a SAVE-ITEM UOW for a folder with an APPLIC-DEFINED ordering discipline; or your process issued either a SAVE-ITEM-BY-KEY or SCAN-FOLDER-BY-KEY UOW for a folder with an ordering discipline other than APPLIC-DEFINED.
4104 (RETN-CODE)	E-DUP-ORDER-KEY The specified folder does not allow duplicate ordering keys. Your process attempted to save an item with an ordering key identical to the ordering key of another item already saved in the specified folder.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
4105 (RETN-CODE)	E-CONCURRNT-FLD-UPDATE Your process attempted to access a folder that was being updated at the same time. Either the folder was being deleted or the folder order was being altered. WARNING: If the UOW required a TMF transaction, your process must issue an ABORT-TRANSACTION; failure to issue an ABORT-TRANSACTION can cause the folder to become inconsistent.
4106 (RETN-CODE)	E-BAD-ORD-CRITERIA The ordering criteria for the folder is invalid. Report this error to your Tandem representative. The folder is still usable and most UOWs accessing folders can still be issued for the folder; however, additional items cannot be stored in this folder.
4201 (RETN-CODE)	E-CONTEXT-ERR A GUARDIAN error occurred while the current request was in process. This is an unusual event. In response, your process should abort the current transaction and retry the operation. Report this error to your Tandem representative.
4202 (RETN-CODE)	E-INVALID-APPL-CODE A naming error occurred. This is an unusual condition. In response, your process should abort the current transaction and retry the operation.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
4205	E-MODEL-DEPOT-ABSENT
(RETN-CODE)	Your process specified a model depot name that existed in the name directory, but for which no profile existed.
4208	E-CORR-BLANK
(RETN-CODE)	Your process attempted to add a new correspondent, but left the CORR-NAME field blank.
4209	E-INVALID-IDENTIFIER
(IDENTIFIER-ERR)	A request to obtain or update profile data elements included an identifier that TRANSFER could not recognize as legal. This error occurs only in response to the GET-PROFILE-ELEM and ALTER-PROFILE-ELEM UOWs, and is returned in the ELEM-RETN-CODE field rather than the RETN-CODE field.
4210	W-IDENTIFIER-ERRS
(RETN-CODE)	In a GET-PROFILE-ELEM or ALTER-PROFILE-ELEM UOW, your process included one or more identifiers that have an error associated with them. Examine the ELEM-RETN-CODE field(s), find the errors, correct them, and resubmit the UOW.
4213	E-ITEMS-EXIST
(RETN-CODE)	Your process issued a request to delete a folder or a depot, but directly or indirectly referenced a folder that contained one or more items.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
4214	E-INVALID-AGENT-NAME
(RETN-CODE)	In the ALTER-AGENT-SELECT UOW, your process specified an invalid agent name. For instance, the name might have contained embedded blanks or special characters not valid in a SCREEN COBOL program name.
4218	W-CONTENTS-PURGED
(RETN-CODE)	Your process attempted to delete (with the DELETE-FOLDER UOW) either the INBOX or WASTEBASKET folder. In this case, TRANSFER deletes the contents of the folder, but not the folder itself.
4219	E-SESSIONS-ACTIVE
(RETN-CODE)	Your process issued a DELETE-DEPOT UOW that requested deletion of a depot, but a session was active for the depot at the time of the request.
4220	W-EXACT-REC-READ
(RETN-CODE)	In response to a READ-PROFILE-REC UOW, the exact record requested by your process was read.
4221	W-NEXT-REC-READ
(RETN-CODE)	In response to a GET-AGENT-SELECT or READ-PROFILE-REC UOW, the next record requested by your process was read.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
4225 (RETN-CODE)	E-MEMBERS-EXIST Your process issued a DELETE-DLIST UOW (or DELETE-DEPOT UOW requesting deletion of a distribution list), but the list contained members.
4227 (RETN-CODE)	W-ERR-ON-MEMBER Your process issued an ADD-MEMBER UOW or a DELETE-MEMBER UOW that referenced one or more member names that were in error. For information about the exact error, see the detailed MEMBER-NAME fields.
4229 (RETN-CODE)	E-MUST-BE-EA Your process tried to set to another value a flag that can only be set to E or A.
4230 (RETN-CODE)	E-MUST-BE-IWD Your process tried to set to another value a flag that can only be set to I, W, or D.
4231 (RETN-CODE)	E-INVALID-AGENT-FLAG Your process attempted to set an AGENT-FLAG to a value other than Y or N.
4232 (RETN-CODE)	E-INVALID-AGENT-TYPE Your process attempted to set an AGENT-TYPE flag to a value other than Y or N.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
4237 (RETN-CODE)	E-INVALID-GUARD-NAME Your process attempted to reference a file with an invalid GUARDIAN file name.
4238 (RETN-CODE)	E-TFER-PROFILE-ABSENT Your process referenced a correspondent for whom no TRANSFER profile record was present. If this occurs when your process is attempting to access the profile records of a logged-on correspondent, call your Tandem representative.
4239 (RETN-CODE)	E-MAIL-PROFILE-ABSENT While using T/MAIL, a correspondent referenced a depot for which no T/MAIL profile record was present. If this occurs when your process is attempting to access the profile records of a logged-on correspondent, call your Tandem representative.
4240 (RETN-CODE)	E-FAX-PROFILE-ABSENT Your process referenced a correspondent for whom no FAX profile record was present.
4241 (RETN-CODE)	E-TFER-CTL-REC-ABSENT TRANSFER could not locate a required system control record. Call your Tandem representative.
4242 (RETN-CODE)	E-MAIL-CTL-REC-ABSENT While interfacing with T/MAIL, TRANSFER could not locate a required system control record. Call your Tandem representative.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
4265 (RETN-CODE)	E-INVALID-ORD-DISCIPLN Your process entered a value other than T (TIME-SAVED), C (CREATOR-NAME), E (EARLIEST-DELIV-DATE), or A (APPLIC-DEFINED) for the folder ordering discipline.
4266 (RETN-CODE)	E-INVALID-APP-ORD-TYPE Your process entered an invalid application defined ordering type. The value was outside the 0 through 9999 range.
4267 (RETN-CODE)	E-ITEMS-IN-FLD Your process attempted to alter the ordering criteria of a folder that has items saved in it. The folder must be empty before the ordering criteria can be altered.
4268 (RETN-CODE)	E-SPECIAL-FLD Your process attempted to alter the ordering criteria of the INBOX, OUTBOX, or WASTEBASKET to values invalid for a special folder. A special folder cannot have an APPLIC-DEFINED ordering discipline and must allow duplicate ordering keys.
4300 (ELEM-RETN-CODE)	E-PASSWORD-MATCH-FAIL In a request to alter a profile, your process used an invalid password that does not match that in the profile. This is a detailed identifier error, accompanied by UOW Warning No. 4210.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
4302	E-NOT-UPDATABLE
(ELEM-RETN-CODE)	Your process issued an ALTER-PROFILE-ELEM UOW with an invalid identifier. This is a detailed identifier error, accompanied by UOW Warning No. 4210.
4303	E-WINDOW-TOO-LARGE
(ELEM-RETN-CODE)	Your process specified a time window outside the allowed range for one of the following parameters: maximum package lifespan, package expiration, delivery end, minimum delivery window, or minimum expiration. When a package is submitted and the depot's default expiration or delivery values conflict with the system defaults, the values for the package are adjusted to be within the system limits. This is a detailed identifier error, accompanied by UOW Error No. 4210.
4304	E-INVALID-GUARDIAN-ID
(ELEM-RETN-CODE)	Your process specified a blank or invalid GUARDIAN-ID, or an invalid password. Enter a valid GUARDIAN-ID (which can be NONE) or password. This is a detailed identifier error, accompanied by UOW Error No. 4210.
4305	E-INVALID-FILENAME
(ELEM-RETN-CODE)	In an ALTER-PROFILE-ELEM UOW, your process specified an invalid GUARDIAN file name. Enter a name that is acceptable to GUARDIAN. This is a detailed identifier error, accompanied by UOW Error No. 4210.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
4306	E-BAD-VOL-SUBVOL
(ELEM-RETN-CODE)	Your process specified an invalid GUARDIAN file name. Enter a name that is acceptable to GUARDIAN. This is a detailed identifier error, accompanied by UOW Error No. 4210.
4307	E-FIELD-TOO-LONG
(ELEM-RETN-CODE)	Your process specified a field that is longer than the maximum field length allowed. Specify a shorter field. This is a detailed identifier error, accompanied by UOW Error No. 4210.
4308	E-INVALID-NODE
(ELEM-RETN-CODE)	Your process specified an invalid node name. Either the name format was incorrect or the node did not exist. This is a detailed identifier error, accompanied by UOW Error No. 4210.
4310	E-PRIORITY-SEQUENCE
(ELEM-RETN-CODE)	Your process specified priority numbers that were not in logical sequence (LOW greater than HIGH, for example). This is a detailed identifier error, accompanied by UOW Error No. 4210.
4311	E-INVALID-EDITOR
(ELEM-RETN-CODE)	Your process specified an invalid text editor file name.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
4381 (ELEM-RETN-CODE)	E-DISC-DOES-NOT-EXIST Your process referenced the name of a disc that does not exist. This is a detailed identifier error, accompanied by UOW Error No. 4210.
4382 (ELEM-RETN-CODE)	E-MUST-BE-SLT Your process tried to set the MESSAGE-SEQUENCE flag to a value other than S, L, or T. This is a detailed identifier error, accompanied by UOW Error No. 4210.
4383 (ELEM-RETN-CODE)	E-MUST-BE-TCN Your process tried to set the CC-LIST flag to a value other than T, C, or N. This is a detailed identifier error, accompanied by UOW Error No. 4260.
4384 (ELEM-RETN-CODE)	E-MUST-BE-MD Your process tried to set the date format flag to a value other than M or D. This is a detailed identifier error, accompanied by UOW Error No. 4210.
4388 (ELEM-RETN-CODE)	E-PRIV-MUST-BE-RWN Your process tried to set the SYSTEM-ADMIN flag to a value other than R, W, or N. This is a detailed identifier error, accompanied by UOW Error No. 4210.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
4390	E-FILENAME-BLANK
(ELEM-RETN-CODE)	Your process supplied a blank file name. This is a detailed identifier error, accompanied by UOW Error No. 4210.
4391	E-MUST-BE-IS
(ELEM-RETN-CODE)	Your process tried to set to another value a flag that can only be set to I or S. This is a detailed identifier error, accompanied by UOW Error No. 4210.
4392	E-MUST-BE-DISC
(ELEM-RETN-CODE)	Your process supplied the name of a non-disc file (such as a process or printer name) where a disc file name was required. This is a detailed identifier error, accompanied by UOW Error No. 4210.
4395	E-INVALID-INDENT
(ELEM-RETN-CODE)	Your process specified an invalid number of columns to be indented on the output device. This must be a value ranging from 0 through 9999, and is usually set somewhere from 0 through 10. This is a detailed identifier error, accompanied by UOW Error No. 4210.
4600	W-NOT-PROCESSED-HERE
(DELIV-ERR in Recip Record)	When a TAREQ transports a package to a particular node, a list of all original recipients accompanies that package. This message flags any listed member who is not local to that node.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
4601 (DELIV-ERR in Recip Record)	W-XPORTED In the local list of remote recipients used by a TAREQ in transporting a package, recipients are grouped according to nodes. Whenever the TAREQ completes its scan of the recipients for a particular node, it transports the package to that node and flags all recipients in the local list with this message to indicate that the package has been sent to them.
4602 (DELIV-ERR in Recip Record)	E-XPORT-FAILED The TAREQ could not transport the package for this recipient, probably because the package was nested too deeply.
4603 (DELIV-ERR in Recip Record)	E-TOO-LATE-TO-XPORT The TAREQ could not transport the package to this recipient because the delivery window closed. In some cases, this situation could result in multiple instances of a TAREQ event package. For instance, if a TAREQ at Node A sends a package to Nodes B and C, and the TAREQs at those nodes detect that the package is to be transported to Node D, and the delivery window has closed, then TAREQs at Nodes B and C will both notify Node A with the same event package.
4604 (DELIV-ERR in Recip Record)	W-FULLY-EXPANDED-DLIST After a TAREQ has expanded each distribution list in a recipient list, it flags that distribution list with this message.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
4605 (DELIV-ERR in Recip Record)	E-CANCELED-UNEXAMINED A TAREQ removed a package from the INBOX folder before the recipient examined the package. This message occurs when a process issues the CANCEL-PKG UOW.
4607 (DELIV-ERR in Recip Record)	E-EXPIRED-UNEXAMINED The package was transported, but expired without being read by the recipient.
4608 (DELIV-ERR in Recip Record)	E-TOO-LATE-TO-DELIV The TAREQ could not deliver the package to a recipient before the delivery window closed.
4609 (DELIV-ERR in Recip Record)	E-INCONSISTENT-RECIP In the recipient record, inconsistent record types have been recorded. Call your Tandem Representative.

NOTE

Errors 4610 through 4622 reflect errors passed between TRANSFER asynchronous processing components. These error codes are never returned to the user, but they do appear in the OUT and LOG files of the asynchronous processing components.

4610	E-ASYNC-UNKNOWN-FUNC Unassigned error code.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
4611	E-ASYNC-UNKNOWN-FUNC An interprocess message between two components contained an unknown function code. Call your Tandem representative.
4612	E-ASYNCH-MESSAGE-SHORT An interprocess message between two components was too short. Call your Tandem representative.
4613	E-ASYNCH-MESSAGE-LONG An interprocess message between two components was too long. Call your Tandem representative.
4614	E-ASYNCH-BAD-SEQUENCE The component receiving an interprocess message determined from its function that the sender of the message was not in the state that the receiver anticipated. The components will resynchronize themselves.
4615	W-ASYNCH-PRE-TRECV A remote TRANSFER system is running, but its TSCHED does not know how to handle a request to have a TRECV assigned. The remote function will be put back into the NET file and will be retried later. The remote system must be upgraded before the remote assignment can be carried out.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
4616	W-ASYNCH-NO-IDLE-TRECV A remote TRANSFER system is running, but all of its TREVCs are busy. The remote function will be put back into the NET file and will be retried later.
4617	W-ASYNCH-CANT-REACH A remote TRANSFER system is not running. The remote function will be put back into the NET file and will be retried later.
4618	E-ASYNCH-SAY-AGAIN The component receiving an interprocess message is momentarily incapable of handling it correctly; the sender of the interprocess message should immediately repeat it.
4619	W-ASYNCH-NO-TRECV-WORK At the direction of its TFRONT, a TRECV became available to its TSCHED for assignment; but the TSCHED had no assignment for the TRECV. The TRECV should continue waiting for word from its TFRONT. This can occur when two TSCHEDs have problems establishing a TWORK to TRECV connection.
4620	E-ASYNCH-INVALID-SEQNO The synchronization between two components has become confused. The components will correct the situation.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
4621	E-ASYNCH-BAD-PASSWORD A component supplied the wrong password and cannot start its own session. The component will get a corrected password and try again to start the session. This can occur because some components use computed rather than stored passwords.
4622	E-ASYNCH-WRONG-REV A component has determined that some other component is not at an acceptable revision level. Make sure that your configuration does not incorrectly mix components from various releases.
NOTE Errors 4902 through 4924 reflect errors on files in the TRANSFER data base. The IPC-RETN-CODE-DETAIL field contains the specific file error code returned by the GUARDIAN operating system. File error codes are listed in Table A-1. If your process receives one of these errors in response to a request issued within a TMF transaction, you MUST abort this transaction.	
4902 (IPC-RETN-CODE or RETN-CODE)	E-ERR-PROFILE-FILE An error occurred on the file named PROFILE, which contains profiles of the correspondents who have depots at the node.
4904 (IPC-RETN-CODE or RETN-CODE)	E-ERR-SESSION-FILE An error occurred on the file named SESSION, which defines all of the currently active sessions.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
4906 (IPC-RETN-CODE or RETN-CODE)	E-ERR-ITEMDESC-FILE An error occurred on the file named ITEMDESC, which contains the item descriptors for all items and packages defined for the node, and for all packages received from other nodes.
4908 (IPC-RETN-CODE or RETN-CODE)	E-ERR-ITEMDATA-FILE An error occurred on the file named ITEMDATA, which contains the data for all items and packages defined for the node, and for all packages received from other nodes.
4910 (IPC-RETN-CODE or RETN-CODE)	E-ERR-RECIP-FILE An error occurred on the file named RECIP, which contains the names of recipients of packages either sent from or delivered to the node.
4912 (IPC-RETN-CODE or RETN-CODE)	E-ERR-FOLDER-FILE An error occurred on the file named FOLDER, which contains the item IDs of items saved in each folder at the node.
4914 (IPC-RETN-CODE or RETN-CODE)	E-ERR-DLIST-FILE An error occurred on the file named DLIST, which contains the names of members of distribution lists defined at the node.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
4916 (IPC-RETN-CODE or RETN-CODE)	E-ERR-READY-FILE An error occurred on the file named READY, which contains the TISERV Scheduler Ready Queue. (Each record in this file represents a task ready for assignment to an asynchronous requester.)
4918 (IPC-RETN-CODE or RETN-CODE)	E-ERR-TIME-FILE An error occurred on the file named TIME, which contains the list of tasks that have been deferred by sender's orders.
4920 (IPC-RETN-CODE or RETN-CODE)	E-ERR-NET-FILE An error occurred on the file named NET, which contains the list of tasks that have been deferred because a recipient's node was unavailable.
4922 (IPC-RETN-CODE or RETN-CODE)	E-ERR-INV-FOLDER-FILE An error occurred on the file named IFOLDER (the inverted folder file), which is used to determine in what folders each item or package is saved.
4924 (IPC-RETN-CODE or RETN-CODE)	E-ERR-QUEUE-FILE An error occurred on the Queue file. IPC-RETN-CODE-DETAIL contains the file code of the file on which the error occurred. If you receive this error and the request was issued under a TMF transaction, you must abort the TMF transaction; you should then retry the request under a new transaction.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
4990	E-IO-TIMEOUT
(IPC-RETN-CODE or RETN-CODE)	TISERV could not access portions of the TRANSFER data base needed to complete the requested operation because the data base was being modified by another correspondent. This error code can be returned by any UOW except NOOP. The RETN-CODE-DETAIL field contains the GUARDIAN file code for the file that was unavailable. Your application should abort or restart the current TMF transaction (if one was in progress when the error occurred); then, retry the request under a new transaction.
5600	E-CORR-NSRV-ERR
(RETN-CODE)	The name server encountered an error while processing a correspondent name. The RETN-CODE-DETAIL field contains the GUARDIAN file error code describing the problem.
5601	E-CORR-NOT-FOUND
(RETN-CODE)	The name server could not locate the correspondent referenced. This condition is analogous to placing a telephone call to a number that does not exist, or that is not listed in the telephone directory.
5602	E-CORR-BAD-NAME
(RETN-CODE)	A correspondent name contained a syntax error.
5603	E-CORR-BAD-TYPE
(RETN-CODE)	Your process referenced a correspondent name and the name was located by TRANSFER, but it was not of type CORRESPONDENT.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
5604 (RETN-CODE)	E-CORR-NO-SUCH-NODE The node referenced by your process either does not exist, or was specified with an invalid name. This condition is analogous to placing a telephone call to an area code that does not exist.
5605 (RETN-CODE)	E-CORR-SECURITY A security violation occurred in a reference to a correspondent.
5606 (RETN-CODE)	E-CORR-NSRV-NOT-FOUND TRANSFER could not locate the correspondent's name server.
5607 (RETN-CODE)	E-CORR-NSRV-DOWN The correspondent's name server is not operating correctly. The RETN-CODE-DETAIL field contains the GUARDIAN file error code describing the problem.
5608 (RETN-CODE)	E-CORR-NO-PARENT When your process tried to add a correspondent, the name server could not locate the CORR directory.
5609 (RETN-CODE)	E-CORR-NOT-EMPTY This error reflects difficulty with the name directory. Call your Tandem representative.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
5611 (RETN-CODE)	E-CORR-NET-DOWN Processing of a correspondent or recipient name required access to names at other nodes, but the network was down. This condition is analogous to placing a telephone call to a number that is either disconnected or busy.
5612 (RETN-CODE)	E-CORR-ALREADY-EXISTS With the CREATE-DEPOT or CREATE-DLIST UOW, your process tried to add a correspondent whose name already exists in the system.
5622 (RETN-CODE)	E-CORR-NOT-SAME-NODE Your process requested an operation involving a correspondent at another node, but this operation is restricted to correspondents at the local node.
5623 (RETN-CODE)	E-CORR-AMBIGUOUS-NAME Your process entered a name containing a wildcard character, but more characters are needed to make the name unique.
5624 (RETN-CODE)	E-CORR-BAD-SUFFIX Your process specified a recipient name with an improper suffix. Perhaps the parentheses were not balanced, or the name contained illegal characters.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
5625 (RETN-CODE)	E-DLIST-NSRV-ERR The name server encountered an error while processing a distribution list. The RETN-CODE-DETAIL field contains the GUARDIAN file error code describing the problem.
5626 (RETN-CODE)	E-DLIST-NOT-FOUND The name server could not locate the distribution list referenced by your process. Either the list does not exist, or an improper name was supplied.
5627 (RETN-CODE)	E-DLIST-BAD-NAME Your process entered either an invalid correspondent name, or a blank one. The name, for instance, might have contained embedded blanks or illegal characters.
5628 (RETN-CODE)	E-DLIST-BAD-TYPE Your process entered a distribution list name and the name server located that name, but it represented an object of a type other than DISTRIBUTION-LIST.
5629 (RETN-CODE)	E-DLIST-NO-SUCH-NODE Your process specified a distribution list with a node name that either was invalid or that referenced a nonexistent node.
5630 (RETN-CODE)	E-DLIST-SECURITY A security violation occurred in a reference to a distribution list.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
5631 (RETN-CODE)	E-DLIST-NSRV-NOT-FOUND TRANSFER could not locate the distribution list's name server.
5632 (RETN-CODE)	E-DLIST-NSRV-DOWN The distribution list's name server was not operating correctly. The RETN-CODE-DETAIL field contains the GUARDIAN file error code describing the problem.
5633 (RETN-CODE)	E-DLIST-NO-PARENT Your process tried to add a distribution list under the name of a correspondent that could not be located. This error occurs, for instance, if the distribution list name contains periods.
5634 (RETN-CODE)	E-DLIST-NOT-EMPTY Your process tried to delete a distribution list that contains named objects that have not yet been deleted.
5636 (RETN-CODE)	E-DLIST-NET-DOWN Processing of a distribution list name required access to names at other nodes, but the network was down.
5637 (RETN-CODE)	E-DLIST-ALREADY-EXISTS Your process tried to create a distribution list (with the CREATE-DLIST UOW) using a name that was already in use for a distribution list or folder in your depot. The distribution list was not created.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
5647 (RETN-CODE)	E-DLIST-NOT-SAME-NODE Your process requested an operation on a distribution list defined at another node, but this operation is restricted to distribution lists at your node.
5648 (RETN-CODE)	E-DLIST-AMBIGUOUS-NAME Your process entered a distribution list name containing a wildcard character, but more characters were needed to make the name unique.
5649 (RETN-CODE)	E-DLIST-BAD-SUFFIX Your process specified a distribution list name with a bad suffix. Perhaps the parentheses were not balanced or the name contained illegal characters.
5650 (MBR-RETN-CODE)	E-MBR-NSRV-ERR The name server encountered an error while processing the ADD-MEMBER UOW to add a distribution list member.
5651 (MBR-RETN-CODE)	E-MBR-NOT-FOUND Your process tried to add a member to a distribution list (with the ADD-MEMBER UOW) but the name server could not locate that correspondent. Either the correspondent did not exist in the system, or your process supplied an invalid correspondent name.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
5652 (MBR-RETN-CODE)	E-MBR-BAD-NAME In an attempt to add a member (ADD-MEMBER UOW) or delete a member (DELETE-MEMBER UOW) on a distribution list, your process specified either an invalid correspondent name or a blank one. The name might have contained embedded blanks or illegal characters.
5653 (MBR-RETN-CODE)	E-MBR-BAD-TYPE Your process specified the name of a distribution list member and the name server located that name, but it represented an object of a type not valid for use as a distribution list member.
5654 (MBR-RETN-CODE)	E-MBR-NO-SUCH-NODE In an attempt to add a member to a distribution list (ADD-MEMBER UOW), your process specified a distribution list member with a node name that either was invalid or that referenced a nonexistent node.
5655 (MBR-RETN-CODE)	E-MBR-SECURITY In an attempt to add a member to a distribution list (ADD-MEMBER UOW), a security violation occurred.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
5656 (MBR-RETN-CODE)	E-MBR-NSRV-NOT-FOUND Your process attempted to add a member (ADD-MEMBER UOW) or delete a member (DELETE-MEMBER UOW) on a distribution list; the member was defined at another node and TRANSFER was not running at that node. Wait until the node becomes available, and then attempt to add or delete the name again.
5657 (MBR-RETN-CODE)	E-MBR-NSRV-DOWN Your process tried to add a member to a distribution list (ADD-MEMBER UOW), but the distribution list member's name server was not operating correctly.
5658 (MBR-RETN-CODE)	E-MBR-NO-PARENT Your process attempted to add a correspondent to a distribution list, but the correspondent could not be located. This error occurs, for instance, if the correspondent's name contains periods.
5659 (MBR-RETN-CODE)	E-MBR-NOT-EMPTY This error reflects difficulty with the name directory. Call your Tandem representative.
5661 (MBR-RETN-CODE)	E-MBR-NET-DOWN In an attempt to add a member to a distribution list (ADD-MEMBER UOW), processing of a distribution list member's name required access to names at other nodes, but the network was down.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
5662 (MBR-RETN-CODE)	E-MBR-ALREADY-EXISTS Your process tried to add a correspondent to a distribution list (ADD-MEMBER UOW), but that correspondent was already defined as a member of the list.
5673 (MBR-RETN-CODE)	E-MBR-AMBIGUOUS-NAME In a request to add or delete a member on a distribution list (ADD-MEMBER or DELETE-MEMBER UOW) your process entered the name of a member containing a wildcard character, but more characters are needed to make the name unique.
5674 (MBR-RETN-CODE)	E-MBR-BAD-SUFFIX While adding a name to a distribution list (ADD-MEMBER UOW), your process specified the name of a correspondent with an improper suffix. Perhaps the suffix contained unbalanced parentheses or illegal characters.
5675 (RETN-CODE)	E-FLD-NSRV-ERR The name server encountered an error while processing a folder name. The RETN-CODE-DETAIL field contains the GUARDIAN file error code describing the problem.
5676 (RETN-CODE)	E-FLD-NOT-FOUND The name server could not locate the folder referenced by your process. Either the folder does not exist, or an improper name was supplied.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
5677 (RETN-CODE)	E-FLD-BAD-NAME Your process entered either an invalid folder name or a blank one. The name, for instance, might have contained embedded blanks or illegal characters.
5678 (RETN-CODE)	E-FLD-BAD-TYPE Your process entered a folder name and the name server located that name, but it represented an object other than a folder.
5679 (RETN-CODE)	E-FLD-NO-SUCH-NODE Your process specified a folder with a node name that either was invalid or that referenced a nonexistent node.
5680 (RETN-CODE)	E-FLD-SECURITY A security violation occurred in a reference to a folder.
5681 (RETN-CODE)	E-FLD-NSRV-NOT-FOUND TRANSFER could not locate the folder's name server.
5682 (RETN-CODE)	E-FLD-NSRV-DOWN The folder's name server was not operating correctly. The RETN-CODE-DETAIL field contains the GUARDIAN file error code describing the problem.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
5683 (RETN-CODE)	E-FLD-NO-PARENT Your process tried to add a folder to a depot (correspondent name) that could not be located. This error occurs, for instance, if the folder name contains periods.
5684 (RETN-CODE)	E-FLD-NOT-EMPTY This error indicates difficulty with the name directory. Call your Tandem representative.
5686 (RETN-CODE)	E-FLD-NET-DOWN Processing of a folder name required access to names at other nodes, but the network was down.
5687 (RETN-CODE)	E-FLD-ALREADY-EXISTS Your process tried to create a folder and used a name that was already in use for a folder or distribution list in your depot. The folder was not created.
5697 (RETN-CODE)	E-FLD-NOT-SAME-NODE Your process requested an operation involving a folder at another node, but this operation is restricted to folders at the local node.
5698 (RETN-CODE)	E-FLD-AMBIGUOUS-NAME Your process entered a name containing a wildcard character, but more characters are needed to make the name unique.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
5700 (RETN-CODE)	E-ALIAS-NSRV-ERR The name server encountered an error while processing a name input in the GET-CONFIG-NAME UOW. The RETN-CODE-DETAIL field contains the GUARDIAN file error code describing the problem.
5701 (RETN-CODE)	E-ALIAS-NOT-FOUND The name server could not locate a name input with the GET-CONFIG-NAME UOW.
5702 (RETN-CODE)	E-ALIAS-BAD-NAME The name server could not locate the name specified in the GET-CONFIG-NAME UOW.
5703 (RETN-CODE)	E-ALIAS-BAD-TYPE Your process referenced a name in the GET-CONFIG-NAME UOW and the name server located that name, but it represented an object of a type not valid for the context in which it was referenced.
5704 (RETN-CODE)	E-ALIAS-NO-SUCH-NODE Your process specified, in the GET-CONFIG-NAME UOW, an object with a node name that either was invalid or that referenced a nonexistent node.
5705 (RETN-CODE)	E-ALIAS-SECURITY A security violation occurred in a reference to a name input in the GET-CONFIG-NAME UOW.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
5706 (RETN-CODE)	E-ALIAS-NSRV-NOT-FOUND TRANSFER could not locate the name server for an object referenced in a GET-CONFIG-NAME UOW.
5707 (RETN-CODE)	E-ALIAS-NSRV-DOWN The name server for an object referenced by the GET-CONFIG-NAME UOW was not operating correctly. The RETN-CODE-DETAIL field contains the GUARDIAN file error describing the problem.
5708 (RETN-CODE)	E-ALIAS-NO-PARENT A system error occurred. Call your Tandem representative.
5709 (RETN-CODE)	E-ALIAS-NOT-EMPTY A system error occurred. Call your Tandem Representative.
5710 (RETN-CODE)	E-ALIAS-ALIAS An ambiguous reference occurred in a name input with the GET-CONFIG-NAME UOW.
5711 (RETN-CODE)	E-ALIAS-NET-DOWN Processing of a name entered with the GET-CONFIG-NAME UOW required access to names defined at other nodes, but the network was down.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
5722 (RETN-CODE)	E-ALIAS-NOT-SAME-NODE The GET-CONFIG-NAME UOW requested an operation involving an object defined at another node, but this operation is restricted to objects at this node.
5723 (RETN-CODE)	E-ALIAS-AMBIGUOUS-NAME The GET-CONFIG-NAME UOW referenced a name containing a wildcard character, but more characters are needed to make the name unique.
5725 (RETN-CODE)	E-MODEL-NSRV-ERR The name server encountered an error while processing a model name. The RETN-CODE-DETAIL field contains the GUARDIAN file error code describing the problem.
5726 (RETN-CODE)	E-MODEL-NOT-FOUND Your process issued a CREATE-DEPOT-UOW, but the name server could not locate the model depot referenced by your process. Either the depot does not exist, or an improper name was supplied.
5727 (RETN-CODE)	E-MODEL-BAD-NAME Your process issued a CREATE-DEPOT UOW and referenced either an invalid model depot name or a blank one. The name, for instance, might have contained embedded blanks or illegal characters.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
5728 (RETN-CODE)	E-MODEL-BAD-TYPE Your process referenced a model depot name and the name server located that name, but it represented an object of a type not valid for use as a model depot.
5729 (RETN-CODE)	E-MODEL-NO-SUCH-NODE In a CREATE-DEPOT UOW, your process specified a model depot with a node name that either was invalid or that referenced a nonexistent node.
5730 (RETN-CODE)	E-MODEL-SECURITY A security violation occurred in a reference to a model depot.
5731 (RETN-CODE)	E-MODEL-NSRV-NOT-FOUND Your process entered a CREATE-DEPOT UOW, but TRANSFER could not locate the model depot's name server.
5732 (RETN-CODE)	E-MODEL-NSRV-DOWN Your process entered a CREATE-DEPOT UOW, but the model depot's name server was not operating correctly. The RETN-CODE-DETAIL field contains the GUARDIAN file error code describing the problem.
5733 (RETN-CODE)	E-MODEL-NO-PARENT A system error occurred. Call your Tandem representative.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
5734 (RETN-CODE)	E-MODEL-NOT-EMPTY A system error occurred. Call your Tandem representative.
5736 (RETN-CODE)	E-MODEL-NET-DOWN Your process entered a CREATE-DEPOT UOW and processing of a model depot name required access to names at other nodes, but the network was down.
5737 (RETN-CODE)	E-MODEL-ALREADY-EXISTS A system error occurred. Call your Tandem representative.
5747 (RETN-CODE)	E-MODEL-NOT-SAME-NODE In a CREATE-DEPOT UOW, your process referenced a model depot located at another node.
5748 (RETN-CODE)	E-MODEL-AMBIGUOUS-NAME In a CREATE-DEPOT UOW, your process referenced a model depot name containing a wildcard character, but more characters are needed to make the name unique.
5750 (RETN-CODE)	E-RECIP-NSRV-ERR The name server encountered an error while processing a recipient list name. The RETN-CODE-DETAIL field contains the GUARDIAN file error code describing the problem.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
5751 (RETN-CODE)	E-RECIP-NOT-FOUND The name server could not locate the recipient referenced by your process. Either the list does not exist, or an improper name was supplied.
5752 (RETN-CODE)	E-RECIP-BAD-NAME Your process entered either an invalid recipient name or a blank one. The name, for instance, might have contained embedded blanks or illegal characters, or might have been too long.
5753 (RETN-CODE)	E-RECIP-BAD-TYPE Your process referenced a recipient name and the name server located that name, but it represented an object of a type not valid for use as a recipient.
5754 (RETN-CODE)	E-RECIP-NO-SUCH-NODE Your process specified a recipient with a node name that was either invalid or that referenced a nonexistent node.
5755 (RETN-CODE)	E-RECIP-SECURITY A security violation occurred in a reference to a recipient.
5756 (RETN-CODE)	E-RECIP-NSRV-NOT-FOUND TRANSFER could not locate the recipient's name server.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
5757 (RETN-CODE)	E-RECIP-NSRV-DOWN The recipient's name server was not operating correctly. The RETN-CODE-DETAIL field contains the GUARDIAN file error code describing the problem.
5758 (RETN-CODE)	E-RECIP-NO-PARENT A system error occurred. Call your Tandem representative.
5759 (RETN-CODE)	E-RECIP-NOT-EMPTY A system error occurred. Call your Tandem representative.
5761 (RETN-CODE)	E-RECIP-NET-DOWN Processing of a recipient name required access to names at other nodes, but the network was down.
5762 (RETN-CODE)	E-RECIP-ALREADY-EXISTS A system error occurred. Call your Tandem representative.
5773 (RETN-CODE)	E-RECIP-AMBIGUOUS-NAME Your process entered a recipient name containing a wildcard character, but more characters are needed to make the name unique.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
5774 (RETN-CODE)	E-RECIP-BAD-SUFFIX Your process specified a recipient name with an improper suffix. Perhaps the parentheses were not balanced, or the name contained illegal characters.
6001 (RETN-CODE)	W-QUEUE-EMPTY Returned by DEQ. There are no entries on the Queue file for the specified QUEUE-NAME.
6002 (RETN-CODE)	E-TOO-MANY-WAITERS Returned by WAITQ. The Wait Manager cannot handle additional waiting requesters. The Wait Manager should be configured with a larger value for the MAXWAITERS parameters.
6003 (RETN-CODE)	E-INVALID-WAITPRIORITY Returned by WAITQ. The value for WAIT-PRIORITY is not 0 through 199.
6004 (RETN-CODE)	E-INVALID-WAITTIMEOUT Returned by WAITQ. The value for WAIT-TIMEOUT is not -1 through +9999.
6005 (RETN-CODE)	W-WAIT-TIMEOUT Returned by WAITQ. The WAITQ UOW has been responded to because of elapsed time, not because of a new entry on the Queue file.

Table A-2. Error Codes (Continued)

Error No./ (Field)	Text/ Meaning
6006	E-WAITMANAGER-UNAVAIL
(IPC-RETN-CODE or RETN-CODE)	Returned by ENQ. There is an error in communicating with the Wait Manager. Applications can use the NOTIFY-WAIT-MANAGER flag to add the queue entry if the application is willing to make the entry when the Wait Manager is unavailable.

Table A-3. Alphabetic Listing of Error Codes

Text	Error No.
ALIAS-ALIAS	5710
ALIAS-AMBIGUOUS-NAME	5723
ALIAS-BAD-NAME	5702
ALIAS-BAD-TYPE	5703
ALIAS-NET-DOWN	5711
ALIAS-NO-PARENT	5708
ALIAS-NO-SUCH-NODE	5704
ALIAS-NOT-EMPTY	5709
ALIAS-NOT-FOUND	5701
ALIAS-NOT-SAME-NODE	5722
ALIAS-NSRV-DOWN	5707
ALIAS-NSRV-ERR	5700
ALIAS-NSRV-NOT-FOUND	5706
ALIAS-SECURITY	5705
ALREADY-IN-SESSION	4019
ASYNCH-BAD-PASSWORD	4621
ASYNCH-BAD-SEQUENCE	4614
ASYNCH-CANT-REACH	4617
ASYNCH-INVALID-SEQNO	4620
ASYNCH-MESSAGE-LONG	4613
ASYNCH-MESSAGE-SHORT	4612
ASYNCH-NO-IDLE-TRECV	4616
ASYNCH-NO-TRECV-WORK	4619
ASYNCH-PRE-TRECV	4615
ASYNCH-SAY-AGAIN	4618
ASYNC-UNKNOWN-FUNC	4610
ASYNC-UNKNOWN-FUNC	4611
ASYNCH-WRONG-REV	4622
BAD-ITEM-DESCR	4040
BAD-ORD-CRITERIA	4106
BAD-TRANSACTION	4010
BAD-VOL-SUBVOL	4306
CANCELED-UNEXAMINED	4605
COMPNT-CYCLE	4038
COMPNT-NOT-FOUND	4039
CONCURRENT-SESSION	4005
CONCURRNT-FLD-UPDATE	4105
CONTENTS-PURGED	4218
CONTEXT-ERR	4201
CORR-ALREADY-EXISTS	5612
CORR-AMBIGUOUS-NAME	5623
CORR-BAD-NAME	5602
CORR-BAD-SUFFIX	5624

Table A-3. Alphabetic Listing of Error Codes (Continued)

Text	Error No.
CORR-BAD-TYPE	5603
CORR-BLANK	4208
CORR-NET-DOWN	5611
CORR-NO-PARENT	5608
CORR-NO-SUCH-NODE	5604
CORR-NOT-EMPTY	5609
CORR-NOT-FOUND	5601
CORR-NOT-SAME-NODE	5622
CORR-NSRV-DOWN	5607
CORR-NSRV-ERR	5600
CORR-NSRV-NOT-FOUND	5606
CORR-SECURITY	5605
DATA-TOO-LONG	4085
DATA-TRUNCATED	4089
DATASIZE-ADJUSTED	4086
DELIV-IN-PROGRESS	4081
DISC-DOES-NOT-EXIST	4381
DLIST-ALREADY-EXISTS	5637
DLIST-AMBIGUOUS-NAME	5648
DLIST-BAD-NAME	5627
DLIST-BAD-SUFFIX	5649
DLIST-BAD-TYPE	5628
DLIST-NET-DOWN	5636
DLIST-NO-PARENT	5633
DLIST-NO-SUCH-NODE	5629
DLIST-NOT-EMPTY	5634
DLIST-NOT-FOUND	5626
DLIST-NOT-SAME-NODE	5647
DLIST-NSRV-DOWN	5632
DLIST-NSRV-ERR	5625
DLIST-NSRV-NOT-FOUND	5631
DLIST-SECURITY	5630
DUP-ORDER-KEY	4104
EOF	4001
ERR-DLIST-FILE	4914
ERR-FOLDER-FILE	4912
ERR-INV-FOLDER-FILE	4922
ERR-ITEMDATA-FILE	4908
ERR-ITEMDESC-FILE	4906
ERR-NET-FILE	4920
ERR-ON-MEMBER	4227
ERR-PROFILE-FILE	4902
ERR-QUEUE-FILE	4924

Table A-3. Alphabetic Listing of Error Codes (Continued)

Text	Error No.
ERR-READY-FILE	4916
ERR-RECIP-FILE	4910
ERR-SESSION-FILE	4904
ERR-TIME-FILE	4918
EXACT-REC-READ	4220
EXPIRED-UNEXAMINED	4607
FAX-PROF-ABSENT	4240
FIELD-TOO-LONG	4307
FILENAME-BLANK	4390
FLD-ALREADY-EXISTS	5687
FLD-AMBIGUOUS-NAME	5698
FLD-BAD-NAME	5677
FLD-BAD-TYPE	5678
FLD-NET-DOWN	5686
FLD-NO-PARENT	5683
FLD-NO-SUCH-NODE	5679
FLD-NOT-EMPTY	5684
FLD-NOT-FOUND	5676
FLD-NOT-SAME-NODE	5697
FLD-NSRV-DOWN	5682
FLD-NSRV-ERR	5675
FLD-NSRV-NOT-FOUND	5681
FLD-SECURITY	5680
FULLY-EXPANDED-DLIST	4604
IDENTIFIER-ERRS	4210
INCONSISTENT-RECIP	4609
INCORRECT-FLD-ORDER	4103
INVALID-AGENT-FLAG	4231
INVALID-AGENT-NAME	4214
INVALID-AGENT-SEL	4054
INVALID-AGENT-TYPE	4232
INVALID-APP-ORD-TYPE	4266
INVALID-APPL-CODE	4202
INVALID-APPLIC-ID	4055
INVALID-COMPNT-TYPE	4096
INVALID-DATE-TIME	4073
INVALID-EDITOR	4311
INVALID-FILENAME	4305
INVALID-GUARD-NAME	4237
INVALID-GUARDIAN-ID	4304
INVALID-IDENTIFIER	4209
INVALID-INDENT	4395
INVALID-ITEM-TYPE	4056

Table A-3. Alphabetic Listing of Error Codes (Continued)

Text	Error No.
INVALID-KEY-LEN	4102
INVALID-MAX-DATASIZE	4087
INVALID-NODE	4308
INVALID-NUM-RQSTD	4092
INVALID-ORD-DISCIPLN	4265
INVALID-PASSWORD	4015
INVALID-PRIORITY	4078
INVALID-REC-SEQ-NUM	4058
INVALID-REC-TYPE	4046
INVALID-RECIP-TYPE	4065
INVALID-REL-POSITION	4057
INVALID-REL-TIME-QTY	4074
INVALID-REQUEST-CODE	8
INVALID-SESSION-ID	2
INVALID-UOW-HDR	4
INVALID-VERSION-CODE	1
INVALID-WAITPRIORITY	6003
INVALID-WAITTIMEOUT	6004
INVALID-ZONE-OFFSET	4021
IO-TIMEOUT	4990
ITEM-NOT-FOUND	4035
ITEM-NOT-IN-FOLDER	4061
ITEM-NOT-PKG-HDR	4042
ITEM-TOO-COMPLEX	4036
ITEM-UNALTERABLE	4041
ITEMS-EXIST	4213
ITEMS-IN-FLD	4267
LIFESPAN-TOO-LONG	4077
LOGON-DISALLOWED	4007
MAX-KEY-LEN-ADJUSTED	4101
MAIL-CTL-REC-ABSENT	4242
MAIL-PROFILE-ABSENT	4239
MBR-ALREADY-EXISTS	5662
MBR-AMBIGUOUS-NAME	5673
MBR-BAD-NAME	5652
MBR-BAD-SUFFIX	5674
MBR-BAD-TYPE	5653
MBR-NET-DOWN	5661
MBR-NO-SUCH-NODE	5654
MBR-NO-PARENT	5658
MBR-NOT-EMPTY	5659
MBR-NOT-FOUND	5651

Table A-3. Alphabetic Listing of Error Codes (Continued)

Text	Error No.
MBR-NSRV-DOWN	5657
MBR-NSRV-ERR	5650
MBR-NSRV-NOT-FOUND	5656
MBR-SECURITY	5655
MEMBERS-EXIST	4225
MODEL-ALREADY-EXISTS	5737
MODEL-AMBIGUOUS-NAME	5748
MODEL-BAD-NAME	5727
MODEL-BAD-TYPE	5728
MODEL-DEPOT-ABSENT	4205
MODEL-NET-DOWN	5736
MODEL-NO-PARENT	5733
MODEL-NO-SUCH-NODE	5729
MODEL-NOT-EMPTY	5734
MODEL-NOT-FOUND	5726
MODEL-NOT-SAME-NODE	5747
MODEL-NSRV-DOWN	5732
MODEL-NSRV-ERR	5725
MODEL-NSRV-NOT-FOUND	5731
MODEL-SECURITY	5730
MUST-BE-DISC	4392
MUST-BE-EA	4229
MUST-BE-IS	4391
MUST-BE-IWD	4230
MUST-BE-MD	4384
MUST-BE-SLT	4382
MUST-BE-TCN	4383
MUST-BE-YN	4051
NEXT-REC-READ	4221
NO-DEPOT-FOR-CORR	4013
NO-RECIPS	4082
NODE-NAME-UNKNOWN	4069
NOT-CREATED-BY-YOU	4083
NOT-PROCESSED-HERE	4600
NOT-UPDATABLE	4302
ORD-KEY-TRUNCATED	4100
PARENT-NOT-FOUND	4037
PASSWORD-MATCH-FAIL	4300
PAST-DATE-TIME	4071
PKG-CANCELED	4094
PKG-EXPIRED	4095
PKG-NOT-RECEIVED	4080

Table A-3. Alphabetic Listing of Error Codes (Continued)

Text	Error No.
PKG-NOT-SUBMITTED	4084
PREVIOUSLY-CANCELED	4044
PREVIOUSLY-SUBMITTED	4043
PRIORITY-REDUCED	4079
PRIORITY-SEQUENCE	4310
PRIV-MUST-BE-RWN	4388
QUEUE-EMPTY	6001
REC-ALREADY-EXISTS	4049
REC-NOT-FOUND	4047
RECIP-ALREADY-EXISTS	5762
RECIP-AMBIGUOUS-NAME	5773
RECIP-BAD-NAME	5752
RECIP-BAD-SUFFIX	5774
RECIP-BAD-TYPE	5753
RECIP-NET-DOWN	5761
RECIP-NO-PARENT	5758
RECIP-NO-SUCH-NODE	5754
RECIP-NOT-EMPTY	5759
RECIP-NOT-FOUND	5751
RECIP-NSRV-DOWN	5757
RECIP-NSRV-ERR	5750
RECIP-NSRV-NOT-FOUND	5756
RECIP-SECURITY	5755
REMOTE-NAME-ACCEPTED	4067
REPLY-TOO-LONG	6
RESERVED-MUST-BE-N	4052
RESTRICTED-OPERATION	4017
RQST-ERR	3
RQST-TOO-SHORT	7
SECURITY-VIOLATION	4093
SERVICE-DENIED	3
SESSIONS-ACTIVE	4219
SPECIAL-FLD	4268
TFER-CTL-REC-ABSENT	4241
TFER-PROFILE-ABSENT	4238
TIME-WINDOW-EXTENDED	4075
TOO-LATE-TO-DELIV	4608
TOO-LATE-TO-XPORT	4603
TOO-MANY-WAITERS	6002
TSCHED-UNAVAIL	4045

Table A-3. Alphabetic Listing of Error Codes (Continued)

Text	Error No.
UNITS-MUST-BE-DHM	4072
UOW-NOT-IMPLEMENTED	4003
UOWS-WITH-ERR	2
UOWS-WITH-WARNING	1
UPDATE-MISMATCH	4050
WAITMANAGER-UNAVAIL	6006
WAIT-TIMEOUT	6005
WINDOW-TOO-LARGE	4303
WRITES-DISALLOWED	4009
XPORT-FAILED	4602
XPORTED	4601

APPENDIX B

INTERFACING APPLICATIONS WITH TRANSFER/MAIL

In certain cases, your application might need to interact with the TRANSFER/MAIL (T/MAIL) application supplied by Tandem. This would be necessary, for example, when T/MAIL is embedded within an application, or when you write application software that is called by T/MAIL.

INVOKING T/MAIL FROM YOUR APPLICATION

Your application can invoke T/MAIL through three programmatic entry points:

- MAIL-TERMINAL
- MAIL-PROGRAM
- LOGON-MAIN-A00 USING ipc-hdr

MAIL-TERMINAL is a program unit that is used when T/MAIL is configured as an application program that runs exclusively on a terminal. Once this program unit is invoked, it never exits. The program unit can only be stopped by entering the PATHWAY command STOP TERM through the terminal.

MAIL-PROGRAM is a program unit that exits when the T/MAIL Logon Screen program unit returns as a result of someone pressing the RETURN or EXIT keys. This function is required by the RUN program capability of PATHCOM.

LOGON-MAIN-A00 is a program unit that enables you to embed T/MAIL within another application. The format of IPC-HDR, referenced in the USING clause, is described in Section 4. If the SESSION-ID field in the IPC-HDR structure is not set to the figurative constant LOW-VALUES, T/MAIL bypasses the Logon Screen and displays the Main Menu Screen directly.

If T/MAIL is invoked and cannot obtain its required configuration of servers, T/MAIL performs an EXIT PROGRAM WITH ERROR operation. The values of TERMINATION-STATUS and TERMINATION-SUBSTATUS will indicate the specific configuration error.

```
TERMINATION-STATUS    = 253:  error in GET-CONFIG-NAME UOW
TERMINATION-SUBSTATUS = RETN-CODE of response


TERMINATION-STATUS    = 254:  SEND ON ERROR for IPC with all
                                GET-CONFIG-NAME UOWs
TERMINATION-SUBSTATUS = TERMINATION-STATUS from SEND ON ERROR


TERMINATION-STATUS    = 255:  RQST-ERR for IPC with all
                                GET-CONFIG-NAME UOWs
TERMINATION-SUBSTATUS = IPC-RETN-CODE
```

INVOKING APPLICATION SOFTWARE FROM T/MAIL

You can extend the features supplied by T/MAIL to handle specialized output; for example, displaying mail in a special format or copying mail to some device other than a terminal. To handle this type of task, you must supply your own application software, known in this case as a user mail extension and identified by the program unit name MAIL-EXTENSION-A00.

The person running the application invokes the user mail extension by pressing the shifted F11 (MAIL EXTN) function key on the terminal when any of the following screens are displayed: Scan, Scan Menu, Create Mail, Create Mail Menu, Show Enclosures, or Show Enclosures Menu. This action causes T/MAIL to call your user mail extension, using the following calling convention:

```
CALL MAIL-EXTENSION-A00
  USING ipc-hdr, lnksd-linkage-block,
  workspace-item, component-item
```

The IPC-HDR, LNKSD-LINKAGE-BLOCK, WORKSPACE-ITEM, and COMPONENT-ITEM parameters must be declared in the LINKAGE Section of your program unit code in the order presented here.

IPC-HDR indicates the IPC header.

LNKSD-LINKAGE-BLOCK contains general linkage information used between ADMIN and your module. Refer to Section 6 of this guide, and to the _TRANSFER Delivery System Management and Administration Guide_ for details.

WORKSPACE-ITEM is the T/MAIL workspace used for the construction of new packages and items.

COMPONENT-ITEM indicates the ID of a component item to be displayed or added to the package.

Within your application program, IPC-HDR has the format shown in Section 4. WORKSPACE-ITEM and COMPONENT-ITEM are declared in the following formats.

```
DEF workspace-item.
  02  dummy          PIC X(12).
END.

DEF component-item.
  02  dummy          PIC X(12).
END.
```

The IPC-HDR structure contains a valid SESSION-ID, allowing your application-supplied program unit or units to request TRANSFER services on behalf of the user. WORKSPACE-ITEM and COMPONENT-ITEM can each contain either an item ID or LOW-VALUES (binary zeros) in specific combinations, with the results noted in Table B-1.

BUILDING PACKAGES THAT T/MAIL CAN READ

When your application prepares packages that are passed to T/MAIL, the packages must be assembled in a format that T/MAIL can read. In planning these packages, the information in the following paragraphs must be considered.

Application ID

When T/MAIL logs on, it uses an application ID of 111. This value is assigned in the APPLIC-ID field of the START-SESSION UOW.

The following APPLIC-ID values are reserved for Tandem use:

100-499	Tandem clients; ID 100 indicates a TAREQ, and ID 111 is T/MAIL.
500-999	Tandem agents; ID 500 is the VACATION agent.

Table B-1. Effect of WORKSPACE-ITEM and COMPONENT-ITEM Settings

WORKSPACE-ITEM CONTENT	COMPONENT-ITEM CONTENT	RESULT
LOW-VALUES	item ID	This operation is requested from the Scan Screen, or from the Show Enclosures Screen for an item that is not part of the workspace. Your program unit should display the item indicated by item ID to the user. The program unit can allow the user to modify the item; the program unit, however, does not have enough information to move the item to another folder, or to determine the package to which the item belongs.
item ID	LOW-VALUES	Your program unit should create a new component item, and add that item to the component items list.
item ID	item ID	Your program unit can either create a new component and add it to the component list as noted in the above option, or modify the specified component. One situation where both WORKSPACE-ITEM and COMPONENT-ITEM contain item IDs occurs, for instance, when the user enters text on the Create Mail Screen before pressing the shifted F11 key.

Item Types

T/MAIL handles five types of items, as designated by the ITEM-TYPE field of the item descriptor:

Item Type	Value in ITEM-TYPE Field
Original package	109
Reply package	110
Forward package	111
Unformatted text item	120
TTEXT item	121

T/MAIL always regards ITEM-TYPE values 109, 110, and 111 as indicating a package.

When T/MAIL presents an item with ITEM-TYPE 120 or 121, it reads all of the records included in the item, independent of their record type. For ITEM-TYPE 120, all of the records must contain only printable characters.

TTEXT items can have embedded ASCII control characters, which are inserted and used for formatting purposes by the T-TEXT text editor. Before displaying a TTEXT item, T/MAIL strips out all embedded ASCII control characters.

Packages and Items

For any package, your application should set the IS-PKG-HDR flag in the ITEM-DESCR-FLAG structure to Y. Then, if the ITEM-TYPE is any value other than 109, 110, or 111, T/MAIL will attempt to treat it as an original package (ITEM-TYPE 109) by default.

Whenever T/MAIL receives a package or an item with an ITEM-TYPE field that does not contain 109, 110, or 111, or in which the item descriptor does not indicate a package header, T/MAIL does not attempt to display the entire package or item; instead, T/MAIL presents only selected data from the item descriptor such as item type, creator name, or creation date.

Record Types

T/MAIL handles four types of data records, as designated by the REC-TYPE field in each record:

Record Type	Value in REC-TYPE Field
Subject text	115
Unformatted text	120
Cc-recipients	323
To-recipients	340

If a user provides text for the subject field on the Create Mail screen, T/MAIL inserts within a package header a subject text record with a REC-TYPE of 115 and a sequence number (REC-SEQ-NUM) of 1 within that record type. When T/MAIL reads a package, it searches for the subject text record as a record with REC-TYPE 115 and REC-SEQ-NUM 1. If such a record is not present, T/MAIL selects the record with the lowest REC-SEQ-NUM having a REC-TYPE of 115.

The subject text record contains up to 140 bytes of ASCII text. This text must consist of displayable characters only. When T/MAIL reads this record, it requests no more than 140 bytes. If the record contains fewer bytes, it is padded with blanks to 140 bytes; if the record contains more than 140 bytes, the excess bytes are truncated from the record. T/MAIL always displays the 140-byte record as two 70-byte lines.

The unformatted text record can contain up to 2000 bytes of ASCII text, but T/MAIL displays only the first 79 bytes. T/MAIL expects unformatted text records (REC-TYPE 120) either in the package header or in a separate item identified by either ITEM-TYPE 120 or ITEM-TYPE 121. Any item created by T/MAIL with ITEM-TYPE 120 or 121 contains only records with REC-TYPE 120. T/MAIL displays records with REC-TYPE 120 from the package header.

For displaying the recipients of a package, T/MAIL depends on the records in the package header with REC-TYPE values of 340 and 323, indicating To-recipients and Cc-recipients, respectively. These records are each 70 bytes long and contain ASCII text, including lists of recipient names separated by commas. The recipient names are resolved as fully as possible at the time the package is submitted, and are stored in that form. For records of REC-TYPE 340 and 323, the REC-SEQ-NUM values must start with 1 and must then increase by 1 for each additional record.

Recipients

T/MAIL recognizes two types of recipients, as indicated in the RECIP-TYPE field:

Recipient Type	Value in RECIP-TYPE Field
Courtesy-copy recipient	323
To recipient	340

T/MAIL adds recipients using these types but does not depend on the TRANSFER recipient lists (available through the GET-RECIP-REC UOW) to display the recipients. To remain compatible with T/MAIL and other applications compatible with T/MAIL, all applications should use these RECIP-TYPE values if possible.

Component Types

T/MAIL uses two values for the COMPNT-TYPE field:

Component Type	Value in COMPNT-TYPE Field
Undefined/Default	0
In-reference-to-package	100

T/MAIL searches the component list of a package with ITEM-TYPE 110 or 111 for a component with COMPNT-TYPE 100. This entry indicates the package being replied to or forwarded.

Acknowledging Receipt

Some applications must receive certification of package delivery. After reading the INBOX folder, T/MAIL calls the ACK-RECEIPT UOW under these conditions:

- When the Scan Screen is displayed and a user requests any function that specifically references a single package (such as discard, read, or file a package), T/MAIL acknowledges receipt of the package and then attempts the requested operation.

- When a user attempts to read the entire INBOX without using the SCAN operation, T/MAIL acknowledges receipt of each package before displaying it.
- When the Detailed Selection Screen is displayed and a user requests the printing of all items in INBOX, T/MAIL constructs the list of items, acknowledges receipt of all items, and then prints the entire list.

Copy Mail Function

For the COPY MAIL function, T/MAIL reports an error if the package header contains more than 13 text records. This can occur if another application sends packages containing more text records. At present, T/MAIL only places up to 13 text records in a package header.

When copying information from a package into the workspace, T/MAIL does not copy data records to the new package. Instead, T/MAIL only copies the component list for the package. Thus, if an application places additional records in the package header, T/MAIL does not preserve those records in the newly made package.

Examples of Standard Packages

Examples of standard send and reply packages appear in Figure B-1. In these examples, a correspondent named SMITH transmits a send package to a recipient named JONES, who responds by transmitting a reply package to SMITH. Each package consists of a package header item and one component item, and references its own recipient list. Each component item contains two or three data records.

The data records in a package can have the same record type (340 or 323) as records in a recipient list, but these records should never be confused because they serve entirely different purposes. Recipient records typically contain delivery information that data records do not; they specify delivery status flags, such as DELIVERED or EXAMINED, as well as other data.

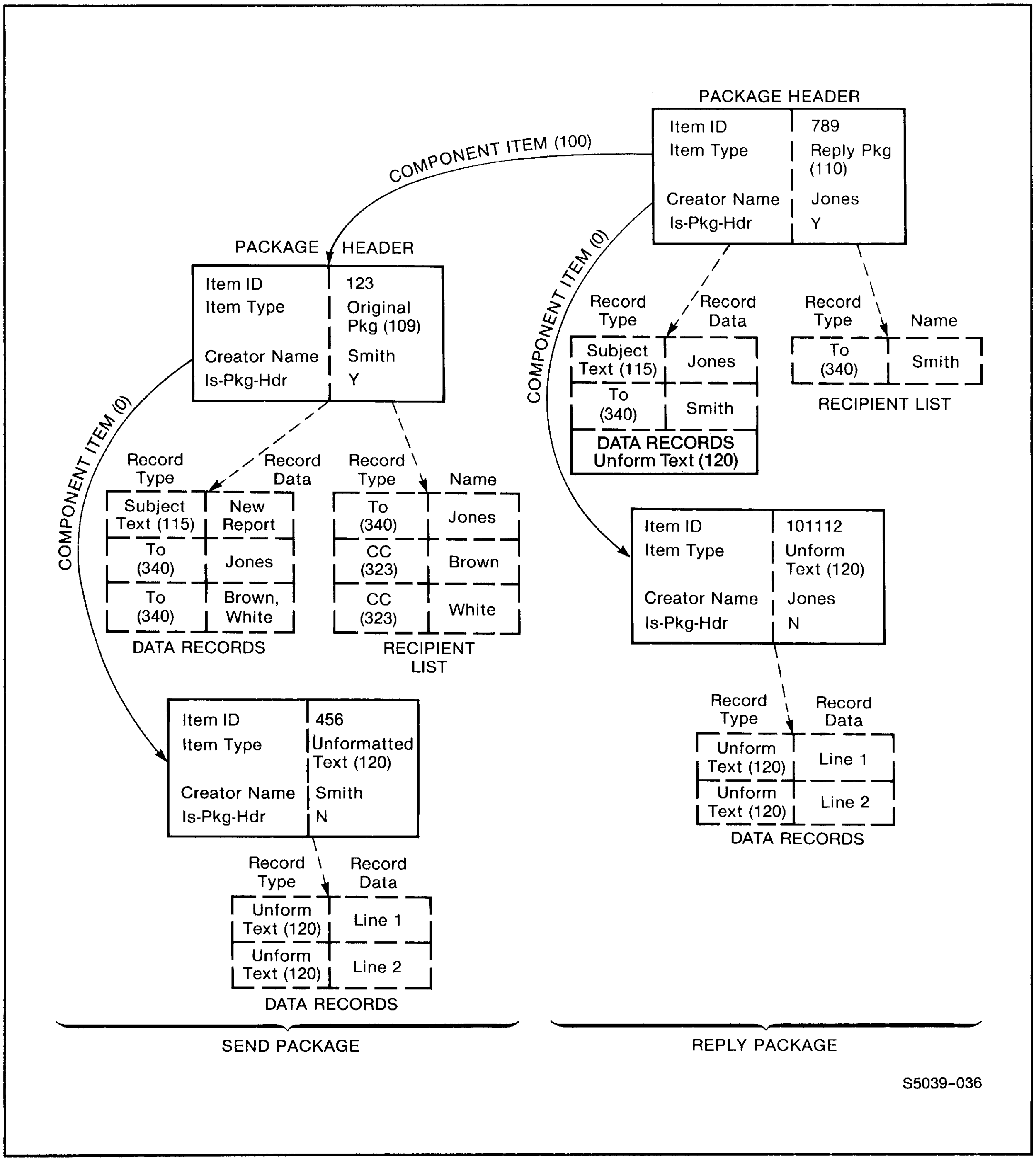


Figure B-1. Standard Send and Reply Packages

APPENDIX C

PROCESSES RUNNING OUTSIDE PATHWAY

PATHWAY is required for configuring a TRANSFER system. As a minimum, this involves the following:

1. Defining the server classes used by TRANSFER and the application; this includes at least one copy of TISERV for use by the TRANSFER TAREQs.

2. Defining the TAREQ SCREEN COBOL object file.

3. Defining the TRANSFER name server that handles the name directory and the TRANSFER scheduler server that handles asynchronous processing; these must be defined as server classes with only one member each.

Once the TRANSFER name and scheduler servers are running, you can start other TRANSFER processes that run outside the PATHWAY operating environment.

Figure C-1 illustrates an application configured to have:

- a requester communicating with its own unique copy of TISERV

- a requester not controlled by PATHWAY, but communicating with a server that runs under PATHWAY.

TRANSFER servers running outside the PATHWAY operating environment must communicate with the TRANSFER name server in order to locate required TRANSFER objects. To permit this communication, the PARAM NAMESPACE must be passed to these TRANSFER servers at startup time.

Processes outside the PATHWAY environment cannot take advantage of PATHWAY load-balancing features, provisions for fault-tolerant operation, and interfacing with TMF. For example:

> If a requester not controlled by PATHWAY is communicating with a PATHWAY server and the server cannot adequately handle this

additional requester, the ability of PATHWAY to maintain the system load balance could be affected.

If a server outside the PATHWAY operating environment is not running as a fault-tolerant process and the CPU on which it is running becomes unavailable, you must recreate the server.

If a requester not controlled by PATHWAY requires TMF transaction restart, the requester must handle the restart context management that is normally handled by the PATHWAY RESTART-TRANSACTION verb.

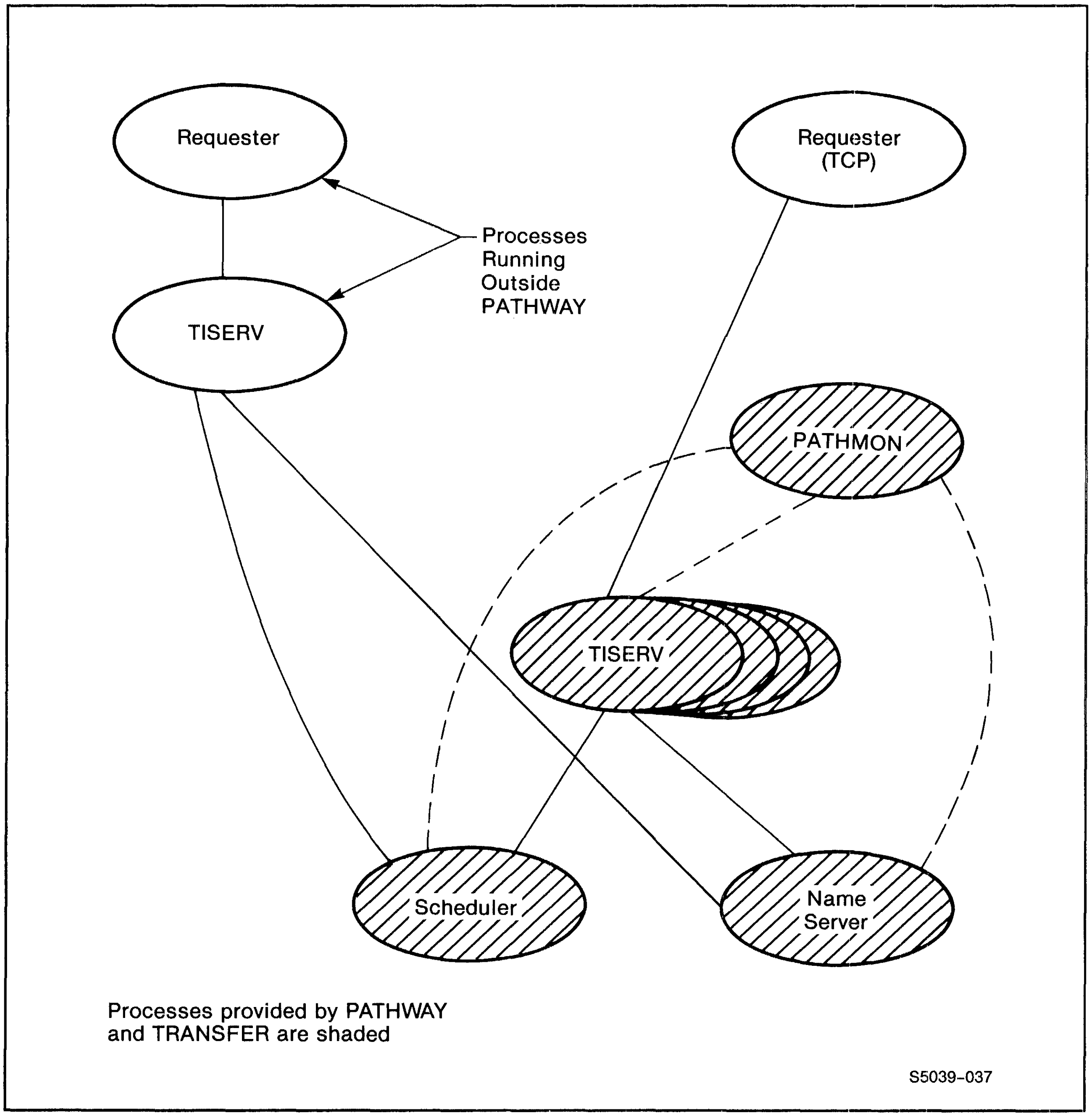

Requester
Requester (TCP)
Processes Running Outside PATHWAY
TISERV
PATHMON
TISERV
Scheduler
Name Server
Processes provided by PATHWAY and TRANSFER are shaded
S5039-037

Figure C-1. Application with Processes Outside PATHWAY

APPENDIX D

TAREQ AGENT SELECTOR VALUES FOR TAREQ-GENERATED PACKAGES

When certain events occur, the TAREQ generates TAREQ event packages. The application ID is always TAREQ (100). The agent selector value and the event that triggered the package are listed in Table D-1.

Table D-1. TAREQ Events

Agent-Selector Value	Event
1	TRANSFER SYSTEM ERROR
2	RECIPIENT HAS EXAMINED CERTIFIED PACKAGE
3	PACKAGE HAS INVALID RECIPIENT
4	PACKAGE HAS DISTRIBUTION LIST WITH INVALID RECIPIENT
5	PACKAGE HAS RECIPIENT WITH INVALID AGENT
6	PACKAGE COULD NOT BE DELIVERED TO RECIPIENT IN TIME
7	RECIPIENT DID NOT EXAMINE PACKAGE BEFORE IT EXPIRED
8	RECIPIENT HAS ALREADY EXAMINED CANCELED PACKAGE
9	SENDER CANCELED PACKAGE AFTER YOU EXAMINED IT
10	PACKAGE CANNOT BE TRANSPORTED TO RECIPIENT'S SYSTEM
11	AGENT IS MISBEHAVING
12	AGENT HAS LOGGED AN ERROR

APPENDIX E

GLOSSARY

ADMIN application - A TRANSFER application that provides a user interface to the TRANSFER administrative functions; supplied by Tandem.

Agent - A SCREEN COBOL program or PATHWAY server class that is automatically invoked to handle packages received at a depot. Multiple agents can be assigned to a depot; the same agent can be assigned to more than one depot.

Agent profile - A depot profile that defines the criteria for selecting an agent when packages are delivered to the depot. The profile can also contain information that is passed to the agent when the agent is invoked.

Agent selection criteria - Two ranges of values that determine whether or not the agent is invoked. The applicable fields in the package header of an incoming package must be in the ranges indicated by the agent profile in order for the agent to be invoked.

Audited file - A data file that is flagged for auditing by the Transaction Monitoring Facility (TMF); auditing is the monitoring of transactions in preparation for recovery efforts.

Client - A requester program that provides the interface between correspondents and TRANSFER. The client directs requests to the TRANSFER interactive server via the TRANSFER IPC interface. Every TRANSFER application requires at least one client.

Consumer - The process that retrieves an entry from a queue for processing.

Correspondent - A sender and/or receiver of information within the TRANSFER system. A correspondent can be a person, a process, or a device.

Correspondent profile - A depot profile that describes the correspondent to TRANSFER. The profile provides default values for package delivery parameters and operational parameters used when the correspondent has a session in progress.

DDL - The Data Definition Language that is used to describe the records and files comprising a data base and the formats of interprocess messages.

Default model depot - The depot whose profiles are copied when a model depot is not specified for a new correspondent. The default model depot is established when TRANSFER is initialized.

Delivery - The TRANSFER action of placing a package in the INBOX folder of a recipient.

Delivery window - The time period between earliest and latest possible delivery for a package.

Depot - That portion of the TRANSFER data base associated with a particular correspondent. A depot includes the profiles, folders, and distribution lists that belong to the correspondent. Each correspondent has exactly one depot, which is created when the correspondent is registered with TRANSFER.

Depot owner - The correspondent for whom the depot was created.

Depot profile record - A profile record that contains information specific to a particular depot. When a new depot is created, all profile records in a model depot are copied into the new depot.

Distribution list - A predefined list of recipient names that provides a simple method for a correspondent to send a package to multiple destinations. A member of a distribution list can be a correspondent or another distribution list. The distribution list belongs to the depot owner, but can be used by any correspondent. Contrast with recipient list.

EMSERV - See Entry Manager.

Entry Manager (EMSERV) - A server that handles enqueuing, reading, and dequeuing of queue entries; an application can have many Entry Managers per Queue file.

Expiration window - The time period between latest possible delivery and scheduled expiration of a package.

Folder - An area in which items and packages can be stored. A folder belongs to the depot owner, and only the depot owner can inspect the contents of the folder.

Fully qualified name - A name that includes the complete name of the correspondent and the network node.

GUARDIAN operating system - The Tandem operating system.

INBOX folder - A special folder that is automatically created for each correspondent. TRANSFER delivers a package to the INBOX folder of each recipient of the package.

Interprocess communication (IPC) - The request to or reply from the TRANSFER interactive server. The IPC contains a header and one or more units-of-work.

IPC header - The first entry in an IPC. The header in an IPC request establishes processing conditions. The header in an IPC reply indicates what occurred during processing.

IPC interface - The means by which a client communicates with TRANSFER.

Item - A collection of information that has a unique identity and that consists of an item descriptor and zero or more data records.

Item descriptor - A record or collection of records that describe the attributes and composition of an item.

Member - An entity named in a distribution list. The member name can be the name of a correspondent or the name of another distribution list.

Model depot - An existing depot whose profiles are copied for a new correspondent.

Name directory - See TRANSFER name directory.

Name resolution - The means by which TRANSFER establishes the validity of a name. TRANSFER fully qualifies the name and then validates the name by checking the TRANSFER name directory.

Name server - A TRANSFER process that manages the TRANSFER name directory.

Node - A Tandem computer system that participates in an EXPAND network.

Object - A generic term used to reference entities managed by TRANSFER. Objects can be: correspondents, depots, distribution lists, folders, items, packages, and profiles.

Ordering criteria - The ordering discipline of a folder, plus the ascending/descending and duplicates options.

Ordering discipline - The information TISERV uses as the ordering key when saving items in a folder.

OUTBOX folder - A special folder that is automatically created for each correspondent. The OUTBOX folder is not currently used and is reserved.

Package - A collection of information that can be sent from one correspondent to other correspondents. A package contains at least one item.

Package header - An item that indicates the sender, the recipient list, priority, and delivery and expiration timeframes of a package.

Package lifespan - The maximum length of time TRANSFER monitors a package. If a package has an expiration time, the lifespan is the time period from posting to scheduled expiration. If a package does not have an expiration time, the lifespan is the time period from posting to latest possible delivery.

PATHWAY - A transaction processing system that supplies the programs, procedures, and structures necessary to produce user-written applications.

Pattern - A partial name entered when requesting a list of correspondent, folder, or distribution list names. An asterisk indicates that any characters (zero or more) can appear in that position. Only those names that match the pattern are listed. Contrast with wildcard name.

Posting - The submittal of a package for delivery by TRANSFER.

Process - A running program.

Profile - A description of a correspondent. Each depot has a TRANSFER correspondent profile and a T/MAIL profile. Any depot can also include one or more agent profiles and user-supplied profiles.

Queue - A list of queue entries. Functions are provided to enqueue (add) entries, dequeue (retrieve and delete) entries, read entries, and wait for entries to appear.

Queue entry - Application data that must fit in a single record.

Queue file - An audited key-sequenced file in which multiple queues are stored.

Queue management - An operating environment in which a set of queues are managed for two or more programs.

Queue manager - A facility that allows queue entries to be supplied and consumed by different requesters; consists of two server types: Entry Manager and Wait Manager.

Recipient - A correspondent to whom a package is delivered.

Recipient list - The names of correspondents and distribution lists that are to receive a particular package. The recipient list is an attribute of the package and applies only to the package for which the recipient list is created. Contrast with distribution list.

Recipient name - A correspondent name or distribution list name that appears in the recipient list for a particular package.

Registration - A function of TRANSFER by which a correspondent is made known to the system; a depot is automatically created for that correspondent during registration.

Requester process - A process that executes application program object code and sends requests to a server; synonymous with requester.

Scheduler - The TRANSFER process that handles asynchronous events; monitors posted packages and assigns them to TRANSFER asynchronous requesters for delivery at the appropriate time.

SCREEN COBOL - A procedural language that is used to define and control terminal displays.

Server class - A grouping of duplicate copies of a single server program; server processes within the class have identical attributes.

Server process - A process that implements application requests and sends replies to the requester; synonymous with server.

Session - The period of time during which a correspondent can submit requests to TRANSFER. A correspondent must specifically initiate and should terminate a session.

Simple name - A 1- to 32-character name used to identify a correspondent, folder, or distribution list. The name can consist of hyphen (-) and underscore (_) characters; letters A-Z (uppercase and lowercase); and digits 0-9.

Suffix - One or more characters enclosed in parentheses and appended to a correspondent name for use by agents assigned to the depot of the recipient. Any characters except commas, single and double quotation marks, and parentheses can appear in a suffix.

Supplier - The process that places an entry on a queue.

System administrator - A correspondent who is responsible for managing TRANSFER objects. Each node has at least one system administrator.

System control record - A profile record that contains global parameters for the node. There can be a unique system control record for any particular REC-TYPE/REC-SEQ-NUM for each node at which your TRANSFER system is running. This record survives deletion of depots, and is not copied into new depots when they are created. Use of information in these records to supply default values for corresponding depot control parameters is determined entirely by your application.

System manager - An individual responsible for initializing, monitoring, and controlling TRANSFER at the local node.

TAL - The Tandem Transaction Application Language that is used to write systems software and routines that support transaction-oriented applications.

TAREQ - See TRANSFER asynchronous requester.

Time window - See delivery window and expiration window.

TISERV - See TRANSFER interactive server.

Transaction Monitoring Facility (TMF) - A data management product that maintains the consistency of a data base and provides the tools for data base recovery.

TRANSFER application - A set of processes that communicate with each other and with TRANSFER, and work together to perform a common task.

TRANSFER asynchronous requester (TAREQ) - A collection of SCREEN COBOL programs that handle the actual delivery of a package to a depot. These programs are supplied by Tandem and run within a standard PATHWAY TCP. The asynchronous requester locates the recipients of a package, delivers the package to local depots, and transports the package to remote nodes for delivery by their asynchronous requesters.

TRANSFER data base - A set of internal files that contain information related to local correspondents and packages in transit. The data base is completely controlled by TRANSFER.

TRANSFER delivery system - A high-level software product that supports communications between people, input/output devices, and processes.

TRANSFER interactive server (TISERV) - A TRANSFER server that starts and terminates sessions, services item and package handling requests, and handles administrative requests; supplied by Tandem.

TRANSFER/MAIL (T/MAIL) - A TRANSFER electronic mail application; supplied by Tandem.

TRANSFER name directory - A directory of all names of correspondents, distribution lists, and folders defined at the local node. TRANSFER uses this directory whenever a local name is supplied by a correspondent.

Transporting - The TRANSFER action of sending a package to a remote node for local delivery at that node.

T/MAIL - See TRANSFER/MAIL.

T/MAIL profile - A depot profile that contains parameters used during T/MAIL sessions initiated by the correspondent.

Unit-of-work - An elementary operation to be performed by the TRANSFER interactive server. Several units-of-work can appear within an IPC.

In the queue management environment, an elementary operation to be performed by an Entry Manager or the Wait Manager. Several units-of-work can appear within an IPC, but only one unit-of-work can appear for the Wait Manager.

UOW - See unit-of-work.

Wait Manager (WMSERV) - A server that handles waiting for new queue entries; an application can have only one Wait Manager per Queue file.

WASTEBASKET folder - A special folder that is automatically created for each session started by a correspondent. When a session is terminated, the WASTEBASKET folder for that session is deleted.

Wildcard character - An asterisk included in a TRANSFER simple name to indicate that any character or characters can appear in that position. The separator period must be entered when wildcard characters are used in a fully qualified name. Contrast with pattern.

WMSERV - See Wait Manager.

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