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TCM Route Administration User Manual

TCM Route Administration

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1. General

NOTE — For CSAS documents, any reference to "ZRxxxx" should be changed to "VMxxxx". Also, any reference to "RMxxxx" should be changed to "MMxxxx".

1.1 Document References

This document is one of a series of user manuals that describe the Bellcore CSAS Communication Module (TCM). These documents are listed below.

Number	Title
252-573-260	TCM Online Message Directory
252-573-301	TCM Overview
252-573-302	TCM Route Administration (RA)
252-573-303	TCM Message Administration (MA)
252-573-304	TCM Network Administration (NA)
252-573-305	TCM Translation Administration (TA)
252-573-382	TCM Cron User Manual
252-551-703	CSAS Interface Data Catalog
252-551-791	Planning Transition Guide for a SOP to CSAS Interface
252-551-022	FCIF Description and Syntax

1.2 Introduction To Route Administration

The Route Administration (RA) Component is the heart of TCM. RA is an automatic, online process that functions when an *input* message is received on the IMS message queue. Recall that TCM handles five types of messages:

- Class "1" is an application-to-application message.
- Class "2" is an acknowledgment message.
- Class "3" is an application-to-application DSECT or MDA grouped message.
- Class "4" is an application-to-application message where only the "ROUTCTL" is message switched.
- Class "5" is a DSECT acknowledgment message.

NOTE — Each component that resides with a TCM or each external non-TCM system is called an "application".

An acknowledgment sent in response to the receipt of a message is a class 2 message[1] and can only be sent over class 2 interface paths. Class 2 messages may be positive/warnings or negative. The class 2 message is positive if an incoming message was acceptable and negative if the incoming message was erroneous. If the class 2 ack message is negative, information concerning the error will also be transmitted.

The next subsections detail the functions performed by RA.

1.2.1 Class 1 Message Processing

1.2.1.1 Class 1, Class 3, and Class 4 Message Routing

This is defined as the receipt of a class 1, class 3 or class 4 message via the IMS message queue, a determination of where the message is to go based on information in the "message header", and the placement of that message back on the IMS message queue along with a new header to cause it to CSAS System be delivered to its intended target application.

> **NOTE —** The Message Header information is provided by the sending CSAS System application or by the "reformatter" of the external non-TCM system. The Routing Administration process of TCM handles source and target information passed to it, and sets default values if user entries are not provided. In other cases it adds header fields based on data entered on Network Administration Format MMPNET. For example, TCM will set EPATHID=TACK if REMOTE NOTIFICATION is defined on MMPNET (for "TCM (sending) to TCM scenario" Class 2 Message paths only).

The class 1, class 3 or class 4 message routing function is performed under seven possible scenarios (i.e., "interface situations") as listed in the following table. The term SCTYPE in this table refers to the SCENARIO TYPE of the MMPNET format.

1. Throughout this document, unless specifically stated, a "class 2 message" is used to refer to either a class 2 or a class 5 acknowledgment message. In addition, a "class 1 message" is used to refer to either a class 1 or class 3 or class 4 application-to-application message.

Table 1-1. Scenarios for Class 1 Messages

SCTYPE	SCENARIO DESCRIPTION
S	*TCM (sending) to TCM* TCM receives a message from a local CSAS System component (the sending application) for transmittal to a remote system (the target or receiving application) that also uses TCM for communications.
R	*TCM to TCM (receiving)* TCM receives a message from a remote TCM-using system (the sending application) for transmittal to a local CSAS System component (the target application).
A	*TCM to non-TCM* TCM receives a message from a local CSAS System component (the sending application) for transmittal to a remote component (the target application) that does not use TCM.
Z	*non-TCM to TCM* TCM receives a message from a remote non-TCM-using component (the sending application) for transmittal to its local CSAS System component (the target application).
I	*INTRA-TCM* TCM receives a message from a local CSAS System component.
D	*Application (bypass sending TCM) to TCM (receiving)* TCM receives a message from a remote system (the sending application) for transmittal to a local CSAS System Component (the target application.) The sending application resides in the same IMS control region as the target application and it is supported by a TCM. However, the sending application elects to bypass its TCM when sending a SCTYPE D message to the target application's TCM.
N	*TCM (sending) to non-TCM (no database safestore)* TCM receives a message from a local CSAS System Component (the sending application) for transmittal to a remote non-TCM System. The message will **NOT** be logged in the TLOG database.

A local CSAS System component is one that exists in the same CSAS System as does its copy of TCM.

Under normal conditions, in a TCM to TCM interface where the sending application, the receiving application and their supporting TCMs all reside in the same IMS Control Region, the sending application sends messages (SCTYPE = S) to its supporting TCM for delivery to the receiving system's TCM. The receiving TCM receives the messages (SCTYPE = R) and passes them on to the receiving application. Alternatively, the sending

application can implement a TCM bypass feature where it will send messages (SCTYPE = D) directly to the receiving system's TCM. Input messages of SCTYPE R to the receiving TCM are in the Flexible Computer Interface Format (FCIF) while input messages of SCTYPE D are in Mapped Data Area (MDA) or Data Section (DSECT) format. Input messages of both scenario types are processed by the receiving TCM the same way except that Input Message Format Descriptors (MFD) of the sending applications are required by TPAM (the TCM Parser and Mapper) to properly parse (convert) SCTYPE D messages. These input MFDs are specified on the receiving SCTYPE D paths. Due to the difference in message format, no remaining messages of this interface can exist in the sending and receiving system's TCM TLOG and SENDQ databases when switching from the conventional flow to the alternated TCM bypass flow and vice versa.

With the exception of an "S" or "N" scenario message, a class 1, class 3 or class 4 message that has been successfully routed is stored in the TLOG database under a status of MSG PENDING ACK (pending acknowledgment).

1.2.1.2 Class 1, Class 3 and Class 4 Message Holding

Message holding is defined as the suspension of a class 1, class 3 and class 4 message transmittal to a target application because associated message(s) that were previously received have not yet been transmitted (i.e., "held") or positively acknowledged.

This procedure ensures that associated messages are delivered in the same sequence in which they are received. Associated messages are defined in scenarios "R", "Z" and "D" as having the same activity number (e.g., order number). Associated messages are defined in scenarios "S", "N" and "A" as having the same activity number.

A class 1, class 3 or class 4 message that has been suspended for this reason is stored in the TLOG database under a status of MSG IS HELD.

1.2.1.3 Class 1, Class 3 and Class 4 Message Deferring

There are two types of link deferral, as detailed in the following subsections.

1.2.1.3.1 Link Deferral

Link deferral is defined as the suspension of transmission of a message because a communication channel is unavailable. This status (availability) is set automatically by a Link Verification process in Network Administration. This status may also be updated automatically at any user-specified time by use of the Logical Flag Manipulation process, transaction VMMPNP. These flags may also be manipulated (or displayed) via Format

MMPNET. Please refer to BR 252-573-304, Network Administration, for complete information.

The RA process determines path availability from three status indicators (flags) in the SEC and path segments of the SEC database (VMMPSCDD), as described below. For all the flags, the settings are specified as: “Y = Yes, the physical link is up” and “N = No, the physical link is down.” All three indicators must be set to “Y” before a message can be transmitted. This indicator tells the status of the physical link, such as the “Multiple Systems Coupling” link (MSC), the “Inter System Communication” (ISC) link, or the “LU6.2” (APPC) link. This indicator tells the status of the overall path from application to application. There are both TO and FROM indicators in this segment. They tell the status of communication to and from the SEC.

- *CAN-I Indicator (in the path segment)*
  This indicator tells the status of the physical link, such as the “Multiple Systems Coupling” link (MSC), the “Inter System Communication” (ISC) link, or the “LU6.2” (APPC) link.
- *MAY-I Indicator (in the path segment)*
  This indicator tells the status of the overall path from application to application.
- MAY-I Indicators (in the SEC segment)
  There are both TO and FROM indicators in this segment. They tell the status of communication to the from the SEC.

A class 1, class 3 or class 4 message that has been suspended because of link deferral is stored in the SENDQ database under a status of MSG IS DEFERRED. At regular intervals during the day Network Administration performs a Deferred Message Dequeue process that removes deferred messages from SENDQ. Even if CAN-I and MAY-I indicators are all currently set to “Y”, if any link deferred messages for the same path (RSYS-LINKNAME) presently exist, any new message will be deferred in order to maintain message sequentiality.

1.2.1.3.2 Time Deferral

Time deferral is defined as the suspension of message transmission to either an external TCM target application, a CSAS System component target application, or an external non-TCM target application based on a user-specified time. Deferral times are established by the DFTM field supplied by the sending application to suit existing/changing user requirements. The DFTM field becomes part of the message header sent to TCM.

Time-deferred messages are processed independently of and at a higher priority than link-deferred messages. This means that if an unavailable physical link becomes available, delayed time-deferred messages will be sent to their target application(s) ahead of any link-deferred messages (during subsequent dequeue processing).

1.2.2 Class 2 and Class 5 Message Processing (Acknowledgments)

An acknowledgment is a class 2 or class 5 message that a target application sends to TCM to let TCM know whether or not the earlier transmission of a class 1 or class 3 message to the target application was successful. Successful transmittal means that the application not only receives the message but is satisfied with its contents and is able to process the message within the application.

The optional error exception List Process may be entered to determine whether or not an application error acknowledgment should be changed to a warning or whether a warning acknowledgment should be changed to an application error acknowledgment.

A successful (positive or warning) acknowledgment results in the logged message being deleted from the TLOG database.

An unsuccessful (negative) acknowledgment is accompanied by information about the error that caused it. Internally, it results in both the original class 1, class 3 or class 4 message (pending acknowledgment) and the error information being stored in the TLOG database with a status of APPLICATION ERR until the problem is resolved via the associated Message Administration (MA) component of TCM.

Externally, warning and negative acknowledgments result in an Exception Notice being printed at the Primary, Secondary (if different from the primary), and Remote Notification LTERM(s) (of Format MMPNET) depending on the scenario.

> **NOTE —** For TCM to TCM scenarios, a path must be defined on MMPNET for negative acknowledgments (MESSAGE CLASS = 2) in both the source and target TCM applications if the remote notification LTERM field is populated for the interface path defined in the sending TCM system. A SCENARIO TYPE of “R” is defined at the originating TCM to “receive” and is set equal to “S” at the target to “send” such negative acknowledgments back to the originating (sending) TCM system.

The processing of Class 2 messages, i.e., acknowledgments, is performed under the following possible scenarios.

Table 1-2. Scenarios for Class 2 Messages

SCTYPE	SCENARIO DESCRIPTION
Z	*non-TCM to TCM* The TCM has received an acknowledgment message from a system that does not use TCM for communications.
A	*TCM to non-TCM* TCM sends an acknowledgment to a system that does not use TCM.
I	*INTRA-TCM* The TCM receives an acknowledgment message from a local CSAS System component.
R	*TCM to TCM (receiving)* The originating TCM receives an acknowledgment message from the destination TCM.
S	*TCM (sending) to TCM* The receiving TCM sends an acknowledgment to the originator of the Class 1 message. TCM (sending) to MYSEC. The sending TCM sends an acknowledgment to the originator of the class 1 message. (After it receives an acknowledgment from the non-TCM receiving system).

For a SCTYPE of I (Intra one CSAS System), exceptions will be output to the Primary and Secondary LTERMs defined on MMPNET for the class 1 interface path. This is also true for the non-TCM to TCM case (SCTYPE=Z).

For the TCM to TCM scenarios, negative acknowledgments may be sent back to the originating TCM or to the originating system (the sending application). The REMOTE NOTIFICATION LTERM (defined on MMPNET of the sending TCM) will print Exception Notices when errors are detected at the remote/receiving application(s). (Internally, this is accomplished via the EPATHID field of the message header which is set equal to “TACK” by the originator’s TCM if a Remote Notification LTERM exists.) If the EPATHID field, other than “TACK”, is provided and the corresponding path (REMOTE SEC, EPATHID, SCTYPE of S) is defined in the original receiving TCM, then the receiving TCM will send back negative acknowledgments to the originating application using the IMS transaction code specified on the EPATHID path.

> **NOTE —** With negative acknowledgments routed by RA back to the originating TCM, it is possible for the user to know about problems via Exception Notices before the message itself is returned via the Return to Sender feature

(RETURN Command) of the Message Administration process (format MMPMSG).

The TCM to non-TCM scenario results in an FCIF message being sent back to the external non-TCM system reformatter for interpretation.

The TCM to MYSEC scenario results in an FCIF positive/negative acknowledgment being sent back to the local originating system (MYSEC).

For non-TCM to TCM (SCTYPE=Z) acknowledgments, the non-TCM system must send two IMS message segments: *ROUTCTL and *ACK. For specifics on the *ROUTCTL Section, see Table 2-9. For specifics on the *ACK Section, see Table 4-1 and Section 4 of this document.

1.2.3 Dequeue Processing (Deferred Delivery)

At user defined intervals BMP run VMMPM01 triggers the “automatic link verification and deferred message dequeue” process into action in Network Administration. This process automatically updates the status of all physical links in the SEC database and at the same time determines if there are any messages that can now be dequeued from the SENDQ database. Users may also employ TRAN VMMPNM, the “logical flag manipulation process”, which may be used to change flag settings. This process automatically invokes TRAN VMMPMNP as it exits.

1.2.4 Class 1, Class 3 and Class 4 Message Logging

This is defined as the storage of a class 1 message in a TCM database pending any one of several possible actions. The particular action required is determined by the status condition of the message. The following subsections describe each situation.

1.2.4.1 MSG PENDING ACK (pending acknowledgment)

This status means the class 1, class 3 or class 4 message was transmitted to a target application and is stored in TLOG pending an acknowledgment from the target. For Scenario TYPE S and N, no message is stored for a status of “PENDING ACK”, therefore, no ACK from the target application is required.

The receipt of a class 2 or class 5 positive acknowledgment will tell TCM that the class 1, class 3 or class 4 message was processed successfully by the target application. This will result in the class 1, class 3 or class 4 message being deleted from TLOG.

The receipt of a class 2 or class 5 negative acknowledgment will tell TCM that the target application was unable to process the message. The negative acknowledgment will also

include one or more error codes and text that give the reason why. This will result in the class 1, class 3 or class 4 message combined with the error codes and text being retained in TLOG under a status of APPLICATION ERR (application error).

1.2.4.2 MSG IS HELD (Message is Held)

This status means the processing of the class 1 or class 5 message was suspended because associated messages that were previously received have not yet been transmitted or positively acknowledged. The HELD message is stored in TLOG.

The receipt of a class 2 or class 5 positive acknowledgment informing TCM that a sequentially earlier associated class 1 or class 3 message was successfully received and processed by the target application will allow TCM to unhold and transmit the HELD message. If successfully transmitted, the HELD status will be changed to MSG PENDING ACK.

Sometimes, messages may be stuck in HELD status The HELD Message Release transaction, VMMPHLD releases stuck HELD messages. This transaction reads the TLOG secondary index (VMMPTLP3) finding only HELD messages, where the earliest associated message is in HELD status, and releases the earliest message. The positive acknowledgment of the first message will release all of the associated HELD messages. This transaction can be scheduled via the TCM Cron which would release HELD messages in a more timely fashion. It also will release only stuck HELD messages, not messages held by errors or Pending Acknowledgment messages.

Execution of VMMPHLD transaction requires no input message text. It may be executed by entering the transaction name, VMMPHLD, followed by a space from a clear screen during an IMS session. By default, the transaction will only release stuck held messages whose timestamps are less than seven (7) days old.

1.2.4.3 TCM ERROR

This status means the class 1, class 3 or class 4 message contained an error that was detected by TCM processing (e.g., input header validation errors). The message combined with the error code and text is stored in TLOG.

Error resolution and “resending” of the message is performed by Format MMPMSG in the MA component of TCM. If the RESEND is successful, the TCM ERROR status will be changed to PEND ACK.

1.2.4.4 TPAM PARSING ERROR (TPAM parsing error)

This status means the class 1, class 3 or class 4 message contained an error that was detected by the TPAM parser. The message combined with the error code and text is stored in TLOG.

Error resolution and "resending" of the message is performed by Format MMPMSG in the MA component of TCM. If the RESEND is successful, the TPAM PARSE status will be changed to MSG PENDING ACK.

1.2.4.5 TCM TRANS ERROR (TPAM translation error)

This status means the class 1, class 3 or class 4 message contained an error that was detected by the TPAM translator. The message combined with the error code and text is stored in TLOG.

Error resolution and "resending" of the message is performed by format MMPMSG in the MA component of TCM. If the RESEND is successful, the TPAM TRANS status will be changed to MSG PENDING ACK.

1.2.4.6 TCM MAPPING ERR (TPAM mapping error)

This status means the class 1, class 3 or class 4 message contained an error that was detected by the TPAM mapper. The message combined with the error code and text is stored in TLOG.

Error resolution and "resending" of the message is performed by format MMPMSG in the MA component of TCM. If the RESEND is successful, the TPAM MAP status will be changed to PEND ACK.

1.2.4.7 APPLICATION ERROR (application error)

This status means the class 1, class 3 or class 4 message contained an error that was detected by the application that received the message. The application tells TCM about the error via a class 2 or class 5 negative acknowledgment message. The message combined with the error code(s) and text is stored in TLOG.

Error resolution and "resending" of the message is performed by Format MMPMSG in the MA component of TCM. If the RESEND is successful, the APPLICATION ERR status is changed to MSG PENDING ACK.

1.2.4.8 MSG IS DEFERRED

This status means the processing of the class 1, class 3 or class 4 message was suspended because the logical or physical communication path to the target application was unavailable or a time deferral was requested, or because an earlier message that was previously link deferred for the same path (TSEC-PATHID-LINKNAME) is still deferred or the link queue count maximum has been received for this link. The DEFERRED message is stored in SENDQ.

The removal of messages from SENDQ is performed when an internal dequeue request is received by the RA process. Such requests will be received on a regular basis from the "automatic link verification and deferred message dequeueing" process in the NA component of TCM.

1.2.5 Error Logging

Whenever errors are encountered in the RA processing or when error information is returned in a negative acknowledgment, the error information is logged with the associated message in the TLOG database and kept until resolved.

1.2.6 Exception Notice Generation and Routing

Printed notices are generated for all warnings and errors, and conditionally for (TCM to non-TCM) positive acknowledgments. Procedures exist in the Network Administration component of TCM (via Format MMPNET) for routing these notices to specific LTERMs.

1.2.7 Message Translation

Message Translation is defined as the translation of the message data from its internal CSAS System application format to an external format called FCIF (Flexible Computer Interface Format), and back again, and as the translation of the message data from the remote sending system's application format to the internal CSAS System application format (for scenario type D messages). This task is performed by a special component of TCM called TPAM (the TCM Parser And Mapper).

> **NOTE —** The internal CSAS System application format varies between DSECT (data section) and MDA (map data area). The important point for the user to understand is that the data must be in the FCIF format when it leaves RA for an external TCM system or external or non-TCM system, and when it arrives from the same.

Also performed by RA are field name and/or field value changes via the Translation Administration (TA) component of TCM. These changes only take place, however, if the BCC user prepares the necessary TTS tables and provides certain information (i.e., translation rules) via the tools provided for this purpose in the TA component.

2. Main Processing - Input Header

2.1 Message Initiation

Class 1 and 3 (application to application) and class 2 and 5 (application to TCM acknowledgment) messages can be initiated by either a TCM supported system application (e.g., CSAS) or a non-TCM supported system application. In either case the messages must be given to TCM on the IMS message queue in the IMS region where the TCM resides.

If the application is in the same IMS region as the TCM, the message merely needs to be placed on the IMS message queue that is common to both.

If the application is “remote”, the message must be transmitted to the IMS region where the TCM resides and placed on the IMS message queue. One method of getting it there is to use the MSC (Multiple System Coupling) link or the ISC (Inter-System Communication) link. TCM supports both MSC and ISC by providing an automatic link verification process that checks the status of those links in IMS and updates the SEC database accordingly.

2.2 TCM Input Header Processing Steps

The header portion of the class 1, 2, 3, 4 or 5 message tells RA what must be done. It must, therefore, be read and interpreted.

Header processing is subdivided into several steps, detailed in the following subsections.

2.2.1 Step 1: TPAM Processing

The header is extracted from the IMS message queue and turned over to TPAM (the TCM Parser and Mapper). TPAM converts the header from its FCIF data format to TCM’s internal data format (DSECT).

TPAM also provides default values for three fields in the header (if no values were provided by the originator of the message). These fields are:

FIELD	DEFAULT VALUE
HLDFLG (hold flag)	Y (yes)
RSFLG (resend flag)	N (no)
DFTM (defer time)	000000000 (no time deferral)

If an error occurs during TPAM processing, the message text is extracted from the IMS message queue and both the text and the header are stored in the TLOG database. The

processing is then turned over to the Error Logging and Exception Notice Generation portion of the RA process.

2.2.2 Step 2: Validation of Header Fields

The validation of each field in the message header is described in the following subsections. If any validation errors are found during these steps, the message text is extracted from the IMS message queue and both the text and header are stored in the TLOG database. The processing is then turned over to the Error Logging and Exception Notice Generation portion of the RA process.

2.2.2.1 ACNO (Activity Number)

Must be present in the input header. If not present, the literal, ACTIVITY NUMBER DEFAULT, will be used for the activity number when the message is logged in the TLOG database along with the error condition.

2.2.2.2 PATHID (Path ID)

Must be present in the input header. A path segment for that PATHID in combination with the scenario type (SCTYPE) specified in the header must exist in the SEC database under the SEC ID of the remote application that either transmitted the message (TSYS) or is to receive the message (RSYS).

2.2.2.3 SCTYPE (Scenario Type)

Must be present in the input header. Allowable values are:

Table 2-1. Acceptable Values for SC_TYPE

VALUE	MEANING
S	TCM (Sending) to TCM
R	TCM to TCM (Receiving)
A	TCM to non-TCM
Z	non-TCM to TCM
I	INTRA-TCM
N	TCM (Sending) to non-TCM (Do not save TLOG Record)
D	Application (bypass sending TCM) to TCM (receiving)

2.2.2.4 TSYS (Transmitting System)

TSYS contains the system entity code (SEC) of the transmitting (or source) system.

NOTE — TSYS (transmitting system) may also be referred to as SSEC (Source SEC).

Validations are listed below. (The reader should note that the term "MYSEC" refers to the TCM doing the validation.)

Table 2-2. Validations for TSYS

SCTYPE	REQUIRED VALIDATIONS
S, A or N	A SEC must be present in the TSYS field in the input header. The SEC must also be identified as MYSEC in the TCM USER CONTROL TTS table.
R, Z or D	A SEC must be present in the TSYS field in the input header. In addition, a record for that SEC must exist in the SEC database. The SEC must also be different from the SEC identified as MYSEC in the TCM USER CONTROL TTS table.

2.2.2.5 RSYS (Receiving System)

RSYS contains the system entity code (SEC) of the receiving (or target) system.

NOTE — RSYS (receiving system) has also been referred to as TSEC (Target SEC).

Validations are listed below.

Table 2-3. Validations for RSYS

SCTYPE	REQUIRED VALIDATIONS
S, A, or N	A SEC must not be present in the RSYS field in the input header from the local CSAS System application.
R, Z, or D	A SEC must be present in the RSYS field in the input header. The SEC must also be identified as MYSEC in the TCM USER CONTROL TTS table.

2.2.2.6 RSYS1 to RSYS10 (Receiving Systems 1 through 10)

The RSYS1 through RSYS10 fields contain the system entity codes of all receiving (or target) systems for the message, as specified by the sending CSAS System application. The user should understand that a separate TLOG record containing a copy of the input message header, input message text and output message text will be generated for each SEC found in these fields and that the SEC will be moved into the RSYS field in the header portion of those TLOG records.

Validations are listed in the following below. (The reader should note that the term "MYSEC" refers to the TCM doing the validation.)

Table 2-4. Validations for RSYS1 through RSYS10

SCTYPE	REQUIRED VALIDATIONS
S, A or N	A SEC must be present in the RSYS1 field in the input header. The presence of SECs in the RSYS2 through RSYS10 fields is optional. In addition, a record for each SEC found in those fields must exist in the SEC database. Each of the SECs must also be different from the SEC identified as MYSEC in the TCM USER CONTROL TTS table.
R. Z or D	Not validated.

2.2.2.7 RSFLG (Resend Flag)

A valid value must be present in the input header. A value may be optionally provided by the originator of the message. If it is not, the TPAM parser provides a default value (see Input Header Processing, Step 1). The valid values and their meanings are listed below.

Table 2-5. Acceptable Values for RSFLG

VALUE	MEANING
Y	Yes, this is a class 1 message resend.
N	No, this is not a class 1 message resend.
R	This message has been returned by the receiving TCM system.

2.2.2.8 HLDFLG (Hold Flag)

A valid value must be present in the input header. A value may be optionally provided by the originator of the message. If it is not, the TPAM parser provides a default value (see

Input Header Processing, Step 1). The acceptable values and their meanings are listed below.

Table 2-6. Acceptable Values for HLDFLG

VALUE	MEANING
Y	Yes, check the TLOG database for related messages to determine if this message should be held.
N	No, do not check to see if the message should be held, and do not cause other messages to be held if this message is stored in TLOG with either an error status or pending acknowledgment status.

2.2.2.9 DFTM (Defer Time)

An optional time at which messages are to be processed by TCM. A value may be provided optionally by the originator of the message. If the value is not provided, the TPAM parser will go to the Network Administration screen to see if the DEF OFFSET (DEFER OFFSET) field is populated. If the field is populated with a value other than zero or blank, it will be calculated using the current time; and sent to the header as a DEFER TIME (DFTM). An input DFTM can have either the long format (CCYYDDDHHMM) or the short format (YYDDDHHMM), where CC is the century, YY is the year, DDD is the Julian day, HH is the hour and MM is the minute.

The message will be released by the Dequeue Transaction VMMPNP when the Defer Time (DFTM) is reached or passed.

RTMST

An optional field containing the value of the timestamp field of the specific (previously-sent) Class 1 message that this TCM (sending) to TCM scenario Class 1 message is to replace. Must be accompanied by a RESEND flag of Y (See TMST).

2.2.2.10 TMST (Timestamp)

The presence of a TMST in the input header is dependent on scenario type and in one case also on the resend flag.

Table 2-7. Acceptable Values for TMST

SCTYPE	RSFLG	TMST
S	-	NO
R	-	YES
Z	Y	YES
Z	N	NO
N	-	NO
D	-	NO

The input timestamp can have either the long format (CCYYDDDHHMMSSTHssss) or the short format (YYDDDHHMMSSTH), where CC is the century, YY is the year, DDD is the Julian day, HH is the hour MM is the minute, SS is the second, TH is the tenth to the hundredth of a second and ssss is the thousandth of the millionth of a second. Timestamp-related fields (timestamp: TMST, resend timestamp: RTMST, defer time: DFTM) if present in the TCM header will be validated. They should be numeric and have either the long format or the short format.

If more than one of these fields are present, then they must *all* have the long or the short format.

If none of these fields are present, then TCM will access the TCM Y2000 EXTSYS (year 2000 external system) TTS table to determine the appropriate format. If the external sending or receiving system's entity code (SEC) exists in the table, then TCM will assume that the external system supports the long format, otherwise, the short format is assumed.

If TCM needs to assign a timestamp to the message, then the format of these timestamp-related fields will determine its precision. That is, if the format is long, then the timestamp will have a micro-second precision, otherwise, it will have a hundredth-second precision.

2.2.2.11 PLTERM (Positive Acknowledgment LTERM)

Optional in all cases and invalidated.

2.2.2.12 PPATHID (Positive Acknowledgment PATHID)

Optional in all cases and invalidated.

2.2.2.13 ELTERM (Error LTERM)

Optional in all cases and invalidated.

2.2.2.14 EPATHID (Error PATHID)

Optional in all cases and invalidated.

> **NOTE —** If PPATHID and EPATHID are specified in the reformatter by the user, positive acknowledgments and/or exception notices in FCIF will be sent back to the external non-TCM system. An acknowledgment path must be defined via Format MMPNET (MESSAGE CLASS = 2) for such messages to be sent.

2.2.2.15 SUPID1 through SUPID5 (Supplemental IDs 1 through 5)

Optional in all cases and invalidated.

2.2.3 Step 3: Header Completion

The final step in header processing is the determination of the “timestamp” that is to be entered into the header. This timestamp becomes part of the record key when the message is logged into either the TLOG or SENDQ databases. The timestamp gives a unique identification to messages that carry the same activity number and TSYS.

2.3 MESSAGE HEADER SUMMARY

The contents of the header and the rules including or excluding a field are summarized in the following two tables

Table 2-8. TCM Header for Class 1 Application to Application Messages

HEADER FIELD	RULES
	8 A/N REQUIRED on all messages.
HLDFLG	Hold Flag 1 A OPTIONAL on all messages. Automatic default is “yes, HOLD the message if related messages exist in TCM”
TMST	Time Stamp 19 N (CCYYDDDHHMMSSTHssss): long format or 13 N (YYDDDHHMMSSTH): short format REQUIRED when message is from another TCM. OPTIONAL when a message from a non-TCM is a RESEND. NOT ALLOWED when a message from a non-TCM is not a RESEND.
PLTERM	Positive Acknowledgment LTERM 8 A/N OPTIONAL in all messages.
ELTERM	Error LTERM 8 A/N OPTIONAL in all messages.
SUPID*n*	Supplemental ID “*n*” (*n* = 1 through 5) 20 A/N OPTIONAL in all messages.
DFTM	Defer Time 11 N (CCYYDDDHHMM): long format or 9N (YYDDDMMHH): short format OPTIONAL in all messages.
EPATHID	Error PATHID 8 A/N OPTIONAL in all messages
PPATHID	Positive Acknowledge PATHID 8 A/N OPTIONAL in all messages.
RTMST	RESEND Time Key 19 N (CCYYDDDHHMMSSTHssss): long format or 13 N (YYDDDHHMMSSTH): short format OPTIONAL when a message from another TCM is a resend; forbidden otherwise.

Table 2-8. TCM Header for Class 1 Application to Application Messages

HEADER FIELD	RULES
SCTYPE	Scenario Type 1 A REQUIRED on all messages. Valid codes are: S TCM to TCM (sending) R TCM to TCM (receiving) A TCM to non-TCM Z non-TCM to TCM I Intra-TCM N TCM (sending) to non-TCM (no database safestore) D Application (bypass sending TCM) to TCM (receiving
ACNO	Activity Number 25 A/N REQUIRED on all messages.
TSYS	Transmitting system entity code (SEC), also called the Source SEC. 8 A/N REQUIRED on all messages.
RSYS	Receiving system entity code (SEC), also called the Target SEC. 8 A/N REQUIRED when the message is from another TCM or from a non-TCM (SCTYPE = R, Z or D). NOT ALLOWED when the message is from the CSAS component associated with the TCM (SCTYPE = S, A or N).
RSYSn	Receiving system entity code (SEC) for system “n” (n= 1 through 10). 8 A/N REQUIRED when the message is from the CSAS component associated with the TCM (SCTYPE = S, A or N).
RSFLG	RESEND Flag 1 A OPTIONAL on all messages. Automatic default is “no, this is not a RESEND”. A “yes” would cause earlier associated messages to be deleted from TCM and this message to be processed in its place.
SKIP	Skip Section 8 A/N OPTIONAL in all messages.
TLGKY	Transaction Log Key (the key to the message record in the TLOG database) 37 A/N: long format (i.e., the timestamp component of the key has the long format) or 31 A/N: short format OPTIONAL in all messages.

Table 2-9. TCM Header for Class 2 Application to Application Messages

HEADER FIELD	RULES
PATHID	Transaction ID 8 A/N REQUIRED on all acknowledgments.
TSYS	Transmitting system entity code (SEC), also called the Source SEC. 8 A/N REQUIRED on all acknowledgments.
RSYS	REQUIRED on all acknowledgments. Receiving system entity code (SEC), also called the target SEC. 8 A/N
SCTYPE	Scenario Type 1 A REQUIRED on all acknowledgments. Valid codes are: I Intra-TCM (the CSAS System to its own TCM) Z non-TCM to TCM R TCM to TCM (Receiving) S TCM (Sending) to TCM A TCM to non-TCM

2.4 Application Input Header Processing

In addition to the TCM message header segment, some external non-TCM systems may require TCM to process a separate application header segment. This requirement is conveyed to TCM via the SEC database entry for the transmitting SEC: If the "TCM versus non-TCM indicator" has a value of "S", TCM will expect to receive as the second segment of the input message (after the TCM header segment and before the first data message segment) an application header segment in FCIF format. When TCM has completed the processing of its own input header, it will process an application header if its presence was indicated by the SEC database. The application header segment will be extracted from the IMS message queue and turned over to TPAM. The TPAM parser and mapper will convert the application header from its FCIF data format to TCM's internal data format (DSECT). If an error occurs during TPAM processing, the message text will be extracted from the IMS message queue and the TCM header, application header, and the message text will be stored in the TLOG database. The processing will then be turned over to the Error Logging and Exception Notice Generation portion of the RA process. No validation is performed on the data in the application header segment.

> **NOTE —** When a class 2 message is received which acknowledges a logged class 1 message containing an application header segment, the presence of the PPATHID (or EPATHID, depending on whether the message is being positively or negatively acknowledged)

field in the class 1 TCM header will cause a class 2 notification message to be routed back to the application system from which the class 1 message originated. In building this output message, an output application header will be generated (in FCIF format) reflecting the data of the input application header. This application header segment will *precede* the TCM header segment when the output message is placed on the IMS message queue for transmittal to the designated application system.

For DLE/SA data from SOAC, the field APPL HEADER (Application Header), must be set to 'Y' if the TCM receiving system is to forward the *C3 Application Header to the local application. For all SOAC-TCM applications, the flag must either be 'Y' or 'N'. If the flag is 'N', the TCM will only send the *ROUTE CNTL Section and the data section along with any optional Skip Section. For DLE/SA data sending from TCM to SOAC, the APPL Header must be `Y' and the scenario type must be 'N'. All other data to SOAC is considered strictly optional acknowledgments.

TCM will send PAWS the required *C1 header segment in lieu of the *ROUTCL section. This is determined by SEC TYPE to determine the *C1 header processing. If the SEC TYPE is P (PAWS) and the data is outgoing data (SCENARIO TYPE A or N), then the *ROUTCTL header section is translated to the *C1 header.

3. Main Processing — Class 1 and Class 3 Messages

3.1 Identification of Class 1 and Class 3 Messages

The Route Administration process is summarized in the following figure.

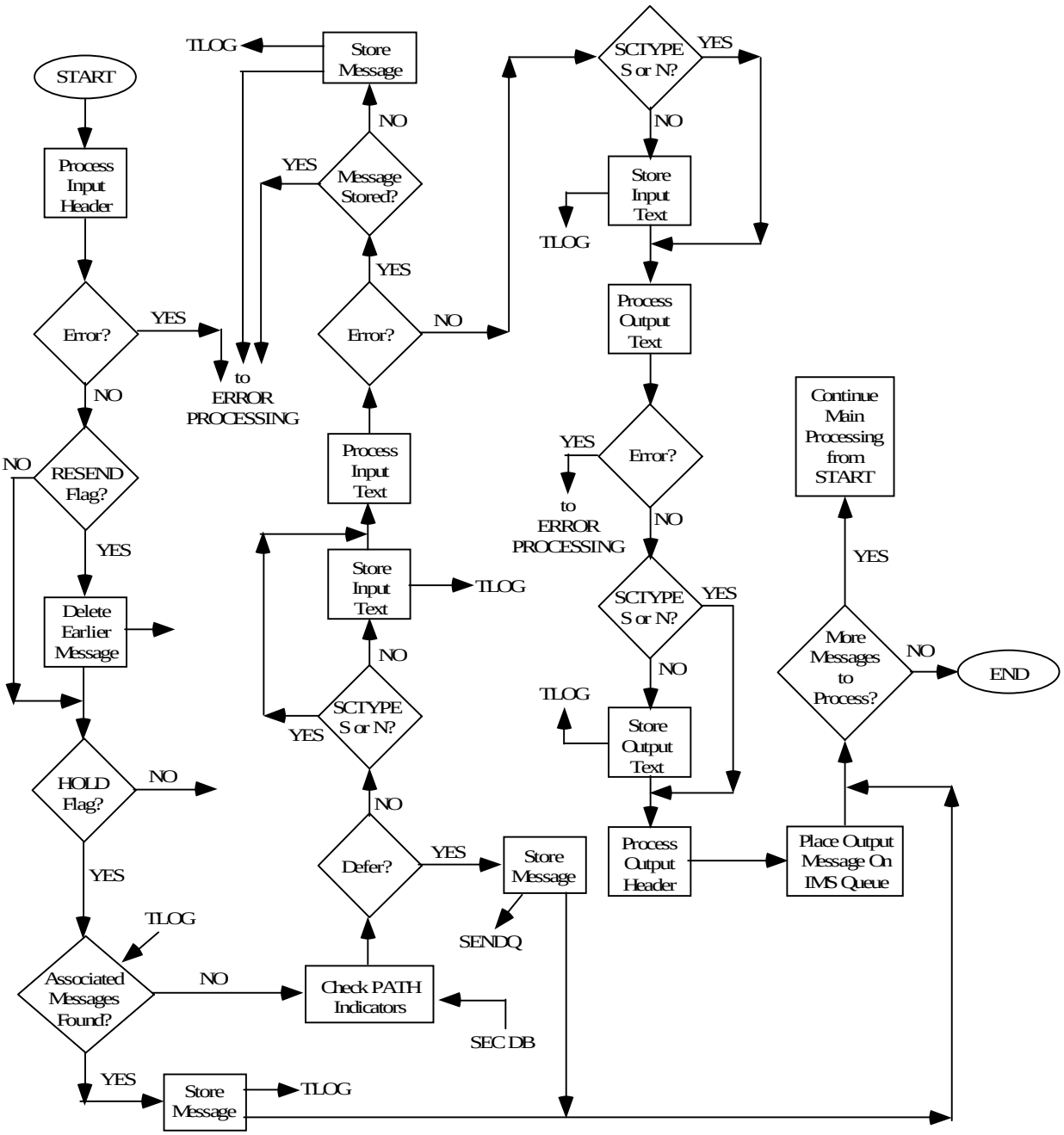

Figure 3-1. Overview of Route Administration

The RA process determines message class from the path information in the SEC database.

Each message points to a specific path segment in this database via three keys:

- SEC (system entity code) of either TSYS, RSYS, or "MYSEC" as per follows:

SCTYPE	SEC
S,A,N	RSYS
R,Z,D	TSYS
I	TSYS or TSYS (which should be MYSEC)

- PATHID in the message header
- Scenario type (SCTYPE) in the message header

The message class for which the path is specifically intended is part of the information in this record.

3.2 Resend Processing (Class 1, Class 3 and Class 4 Messages)

The RA process receives and logs each class 1 message until the message is successfully transmitted and positively acknowledged. This does not hold for Scenario Type N messages. These messages are only logged if they cause errors before they are transmitted. If RA re-receives the same message (called a "resend"), the earlier copy must be deleted from TCM before the newly arrived copy can be processed. This allows for message correction or message replacement.

The initiation of the resend processing logic is controlled by the RSFLG (resend flag) in the input message header. If the RSFLG is "N" (for NO), this processing is bypassed. If the RSFLG is "Y" (for YES), the process is initiated.

The resend logic must first determine whether one or more messages that may be logged in the TLOG database must be deleted. This determination is based on the receipt or non-receipt of a value in the TMST (timestamp) field (for non-TCM source systems) or in the RTMST field (for TCM-to-TCM [receiving] scenario) on the input message header. If a timestamp value is present, the sender is specifying that only the message with the given timestamp and given SEC of the sending system (TSYS) should be deleted and replaced with the re-sent message.

The absence of a resend timestamp value means that the re-sent message is to replace **all** messages with the same activity number and SEC of the sending system (TSYS) regardless of their timestamp.

3.3 Hold Processing (Class 1 and Class 3 Messages)

Messages are “held” when RA determines that their transmittal would be out-of-sequence with earlier associated messages. These previously received messages have the same ACNO & TSYS and have a status of either MSG PENDING ACK, MSG IS HELD, or one of the several ERROR status conditions.

The initiation of the hold processing logic is controlled by the HLDFLG (hold flag) in the input message header. If the HLDFLG is “N” (for NO), this processing is bypassed. If the HLDFLG is “Y” (for YES), the process is initiated.

The hold logic must first determine if “holding” is necessary. This is done by checking the TLOG database for previously received messages that are related by activity number and TSYS.

If one or more related messages are found in the TLOG database, a check of the HLDFLG in their headers is made to determine if “holding” is dependent on any of them. If the HLDFLG in any one of these related messages is equal to “Y”, the newly arrived message must be “held”. Thus, the hold flag in a given message has two meanings:

- When the flag = Y, the message is totally interdependent with other associated messages. This means the processing of the message is dependent on previously received messages and the processing of subsequently received messages will be dependent on it — sequentiality is preserved.
- When the flag = N, the message is totally independent of other associated messages. This means the processing of the message is independent of previously received messages and the processing of subsequently received messages will be independent of it. TCM does not actively preserve sequentiality.

If “holding” is necessary, the process calls upon a Message Interface Controller (MIC) process to find and retrieve the message and then to store both the text and the header in the TLOG database. The message stays in TLOG in the MSG IS HELD status until the class 1 or class 3 messages ahead of it are successfully transmitted and positively acknowledged.

NOTE — The message text may be found by MIC in any one of three places: the IMS message queue, an internal buffer area called the MIB (message input buffer), or the TLOG database itself. Initially, the MIC finds and extracts the message text from the IMS queue. It then temporarily stores the text in the MIB and retains it until processing is complete. If additional targets (i.e., RSYS2 through RSYS10) are to be processed, the MIC copies the text for those targets from the MIB. If, however, the MIB is not large enough to contain the message text, the MIC will store the text directly in TLOG as if it were logging the message. If message logging turns out to be required

(see Section 4.05 and 4.06), the text stays in TLOG. If message logging turns out not to be required, the MIC removes it from the database.

NOTE — In a TCM to TCM interface where the sending application, receiving application and their supporting TCMs reside in the same IMS Control Region, the sending application can elect to send messages through its supporting TCM (SCTYPE = S/R) or bypass it (SCTYPE = D). The message text received by the receiving TCM for the first scenario will be in the Flexible Computer Interface Format (FCIF) while the message text for the latter scenario will be in either the Data Section (DSECT) or Mapped Data Area (MDA) format. If the hold processing is used in both cases, then all messages of this interface will need to be removed from the TLOG and SENDQ Databases of the sending and receiving TCMs when switching from the first scenario to the second one and vice versa.

3.4 Defer Processing (Class 1 and Class 3 Messages)

Messages are deferred when either the TCM has been denied the necessary communication to the target system, or when link deferred messages still exist in the SENDQ database for that communication path.

The RA process determines the availability of the communication paths by checking three indicators in the SEC database.

- MAY-I LINK indicator in the SEC segment of the database.
- CAN-I LINK indicator in the path segment of the database.
- MAY-I LINK indicator in the path segment of the database.

If any one of the above indicators is set to “N”, the RA process is denied permission to use that link and must therefore defer processing of this message.

If the three indicators are set to “Y”, the permission to use the link is granted, but the RA process must then check to see if link deferred messages still exist in the SENDQ database for that path (RSYS-PATHID-LINKNAME). (Messages must be delivered in proper sequence. To preserve sequentiality, the new message must be deferred until the previously deferred messages are delivered.)

The check for link deferred messages is made in the path segment of the SEC database. A special field exists in that segment in which the number of messages stored in the SENDQ

database for that path is stored. If the number of messages is greater than zero and a previous message for the path (RSYS-PATHID-LINKNAME) was link deferred, the new message must be deferred.

If the three link indicators are set to "Y" and there are no link deferred messages in the SENDQ database (for that path (RSYS-PATHID-LINKNAME)), the DEFER processing is bypassed.

If "deferring" is necessary, the RA process calls upon a Message Interface Controller (MIC) process to find and retrieve the message and then to store both the text and the header in the SENDQ database. The message stays in SENDQ in the MSG IS DEFERRED status until a dequeue request is received by RA from the "automatic link verification and deferred message dequeue" process in the NA component of TCM. This process is triggered into action at regular intervals during the day by BMP run VMMPM01. The message text may be found by MIC in any one of three places. Please refer to the material on HOLD Processing for details.

3.5 Input Header Logging (Class 1, Class 3 and Class 4 Messages)

If the incoming message successfully passes the "hold" and "defer" tests, the RA process must determine if logging the input header and, if present, the application header (and, later on, the message text) is necessary. The RA process does this by checking the SCTYPE (scenario type) indicator in the input header. The rule is detailed below.

SCTYPE	LOGGING RULE
S,N	Do not log the header.
R,A,Z,D	Log the header.

This rule is based on the philosophy that 1) in a TCM to TCM scenario, the TCM at the receiving location will do all the necessary logging (SCTYPE=S), 2) in a TCM to non-TCM scenario, where the receiving system will not acknowledge TCM, it is not necessary to log the message (SCTYPE=N).

If logging is necessary, the RA process creates a record in the TLOG database. The key to the record is the TSYS from the input header and the timestamp that was generated in step 3 of the input header processing. The user should note that the input header is logged in both the 01 root segment and the 03 segment of the record. In the 01 segment, the header is stored in its internal TCM form. In the 03 segment the header is stored in its FCIF form.

3.6 Input Message Processing and Logging (Class 1 and Class 3 Messages)

All input message text processing is controlled by TPAM's Parser logic. Three basic steps are involved:

- Retrieval of the input message text.
- Logging of the input message text (if necessary).
- Conversion of the input message text to the internal TPAM data format called the hierarchical map data area (HMDA).

It is possible to direct TPAM to bypass a section of a multi-section FCIF message. If the (optional) ROUTCTL field SKIP is populated, then TPAM will "skip" the processing of this section of a multi-section FCIF message that is also marked with the value of the SKIP field. The SKIP section will be tacked onto the end of the message after the rest of the message has been processed by TPAM. TCM will not allow any changes to be made to a SKIP section.

The TPAM parser uses MIC (message interface controller) to handle the retrieval and logging process.

The need to log is determined by checking the SCTYPE (scenario type) and following the same rule as was described under "input header logging".

If logging is necessary, the message text is added to the 03 input segments of the TLOG record that was created under the "input header logging".

The Parser then converts the input message text to the internal TPAM data format HMDA.

The Parser's operation is dependent on the type of data format it receives as input. If the input is in the FCIF format, the Parser can generate the HMDA format directly from it. If, however, the input is in a CSAS System application internal format or the remote system application's internal format (SCTYPE=D) such as DSECT (data section) or MDA (mapped data area) format, the Parser must use that input in combination with a special MFD (message format descriptor) to generate the HMDA format. The MFD is provided by the CSAS System application or the remote system application (SCTYPE=D) to describe the aggregates into which the MDA's to DSCET's data fields are to be grouped. The user should also note that the Parser obtains the name of the MFD from the path segment of the SEC database.

3.7 Output Message Processing and Logging (Class 1 and Class 3 Messages)

All output message text processing is controlled by TPAM's Translator and Mapper logic. Three basic steps are involved. They are described in the following subsections.

- Translation of the message text, if specified by the user.
- Conversion of the message text to an appropriate output data format (either MDA, DSECT or FCIF).
- Logging of the output message text (via MIC), if necessary.

3.7.1 Step 1: Translation

The translation function is performed by the TPAM Translator. Its purpose is to reassign data values to data names and/or to change the data values according to whatever rules may be specified by the operating telephone company.

The Translation action is initiated only if the name of a set of rules is found in the path segment of the SEC database. The name identifies the rule set that is stored in a partitioned data set (PDS) known to IMS (e.g., PGMLIB). The Translator extracts the rule set from the library, loads the set into core, and then executes each rule one at a time.

The execution of a rule is based on rule type and its associated parameters.

TPAM translation is a rather complex process, and only the highlights have been described here. For additional details and instructions for creating rules, please refer to BR 252-573-305, TCM Translation Administration (TA).

3.7.2 Step 2: Data Mapping

The conversion of the message text from HMDA to an appropriate output format is performed by the TPAM Mapper. The action of the Mapper is controlled by scenario type and by whether or not output has been received from the TPAM Translator.

If the output of the Mapper is to be transmitted to a remote TCM or non-TCM location (SCTYPE = S, A or N), the conversion is to the FCIF format. The Mapper can generate the FCIF format directly from the HMDA input.

If the output of the Mapper is to be transmitted to the local CSAS System application (SCTYPE = R, Z or D), the conversion is to the MDA or DSECT format. In this case the Mapper must use the HMDA input in combination with a special MFD (message format descriptor) to generate the MDA or DSECT format. The MFD is needed to tell the Mapper exactly what fields are to be extracted from the HMDA and passed on to the CSAS application. The Mapper obtains the name of the MFD from the 03 segment of the SEC database.

If output was received from the TPAM Translator, the Mapper has an additional function to perform. The output of the Translator consists of a “supplementary” HMDA. This data area contains all of the data translations that were performed by the Translator. The Mapper

must select data from the supplementary HMDA before it uses any data from the HMDA that was created by the TPAM Parser.

3.7.3 Step 3: Message Logging

The Mapper logic determines if logging the message text is necessary by checking the SCTYPE (scenario type) and following the rule described under “input header logging”.

If logging is necessary, the message text is added to the 03 output segments of the TLOG record that was created under the “input header logging”.

3.8 Output Header Processing (Class 1, Class 3 and Class 4 Messages)

A TCM output message header is generated in FCIF format no matter if it is being transmitted toward a remote location or to a local CSAS System application. The content of the header is identical to the TCM input header with the following exceptions:

- A value of “R” will be placed in the SCTYPE field in the output header if a value of “S” was found in the same field in the input header.
- The output header will not contain values in the VMTERM and ELTERM fields.
- A value will always be placed in the TMST field of the output header. However, the origin of the value will depend on several factors.

  If the output header is being generated at a sending TCM (SCTYPE = S, A or N) or a receiving TCM (SCTYPE = Z or D) and the RSFLG = N in the input header, the value will be generated internally by the RA process. However, if the RSFLG = Y, the value will be obtained from the TMST field from the input header, if it was provided by the originator of the message. If it was not provided, the value will be generated internally by the RA process.

  If the output header is being generated at a receiving TCM (SCTYPE = R), the value will be obtained from the TMST field from the input header.
- A value will always be placed in the RSYS field of the output header. The value is obtained from one of the RSYS1 through RSYS10 fields in the input header when the SCTYPE field in the input header is S, A or N. The value is obtained from the RSYS field in the input header when the SCTYPE field in the input header is R, Z or D.
- A value will be placed in the TLGKY field in the output header. This value will consist of the “source SEC” (TSYS), “timestamp”, “TPAM message sequence number” and “IMS transaction code for the target application” that is the key to the class 1, class 3 or class 4 message record in the TLOG database. It is necessary to send this information

to the receiving application so that they can identify that class 1, class 3 or class 4 message in their class 2 or class 5 acknowledgment message.

The field will be left blank only when the output message is being transmitted to another TCM as indicated below:

SCTYPE in input header	TLGKY in output header	Destination of output message
S	NO	external TCM system
R	YES	CSAS application
A	YES	external non-TCM application
Z	YES	CSAS application
N	YES	external non-TCM application
D	YES	CSAS application

3.9 Output Message Transmittal (Class 1, Class 3 and Class 4 Messages)

The class 1, class 3 or class 4 message is now placed on the IMS message queue for transmittal to the designated receiving system.

If the target is a CSAS System application in the same CSAS System system as the TCM, it takes the message from the IMS message queue directly.

If the target is at a remote location, the message may be transmitted via an MSC (Multiple System Coupling) link or an ISC (Inter-System Communication) link. Messages transmitted to an ISC link use the MFS (Message Format Service) MOD (Message Output Descriptor), MMPTC1. This MFS format has no screen or printer format associated with it. It is used to take advantage of routing and formatting functions that are associated with ISC usage and TCIS (TCIS is an acronym for TOP Communications Interface System. TOP is an acronym for Transaction Oriented Protocol.), which is used to communicate with the system where SOAC resides.

When all processing is ended, the RA process checks to see if additional targets must be processed.

If additional targets exist, the RA process returns to the start of the “input header processing” steps.

If no additional targets exist, the processing of the class 1, class 3 or class 4 message comes to an end.

4. Acknowledgment Processing

An acknowledgment is a class 2 or class 5 message that lets TCM know whether or not the class 1, class 3 or class 4 message received by an application was acceptable.

The optional Error Exception List Process may be entered to check if the application error acknowledgment should be changed to a warning or if a warning acknowledgment should be changed to an application error acknowledgment.

The acknowledgment is positive (with or without warnings) if the class 1, class 3 or class 4 message was acceptable. The acknowledgment is negative if the class 1, class 3 or class 4 message was unacceptable. Negative acknowledgments cause the initiation of error processing. After the message header has been validated and it is determined (from the path information in the SEC database) that the message is class 2 or class 5, the acknowledgment text is read and converted into TPAM's internal data format.

An overview of the TCM Acknowledgment Process appears in the following figure.

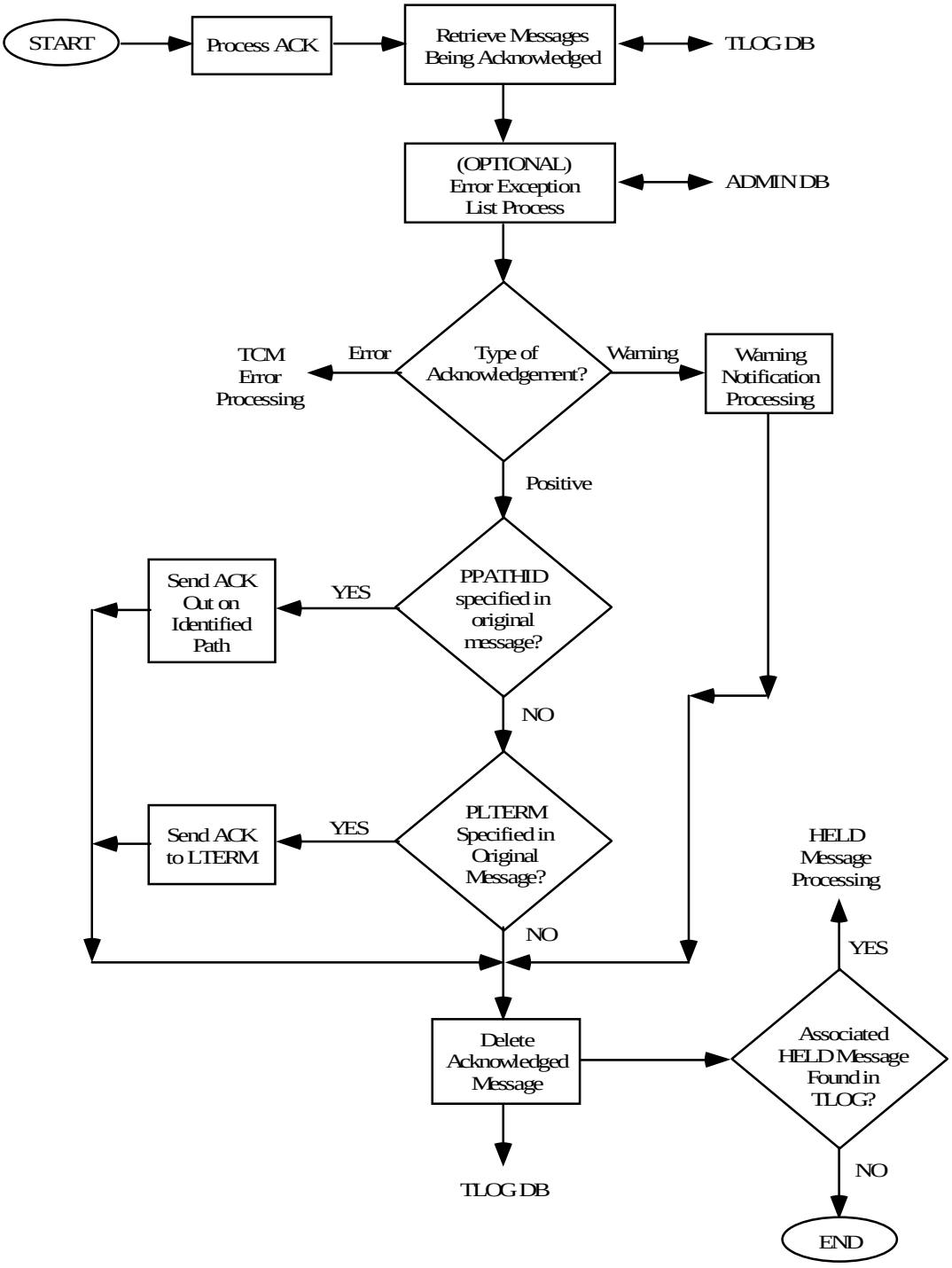

Figure 4-1. TCM Acknowledgment Processing

Acknowledgment text contains very specific fields. The fields and the rules for including or excluding a particular field in the message are summarized in the following table

Table 4-1. TCM Text Fields in Class 2 Acknowledgment Messages

TEXT FIELD	RULES
*ACK	
ACKTYPE	Acknowledgment Type 3 N REQUIRED on all acknowledgments. Valid values are: 000 no errors (positive acknowledgment) 001 TCM errors (negative acknowledgment) 002 parsing errors (negative acknowledgment) 004 translation errors (negative acknowledgment) 005 application errors (negative acknowledgment) 006 warning (positive or negative acknowledgment with warning messages) 007 mapping errors (negative acknowledgment)
TLGKY	Transaction Log Key (the key to the message record in the TLOG database) 31 A/N is the short format. 37 A/N is the long format REQUIRED on all acknowledgments
LTERM	LTERM name for an additional printer designation on which exception notices for the receiving system (RSYS) should be printed. 8 A/N Optional
ACKSTAT	Acknowledgment Status 1 A Optional Valid Values: S successful E in error
LDEST	Logical Destination identifier (to be used by receiving system) 3 A/N Optional
RMTIND	Remote Indicator specifying whether the sender of the acknowledgment is the local TCM or the external (remote) TCM system. 1 A Generated and used mainly by TCM Valid Values: Y the sender of the acknowledgment is an external TCM system N the sender of the acknowledgment is the local TCM
ERRCNT	Error Count (number of errors in this message) 2 N Required on all acknowledgments.
NOTICE	aggregate
ERRCODE	Error Code 8 A/N Required only if errors exist.
ERRTEXT	Error Text 70 A/N Required only if error exists.

Table 4-1. TCM Text Fields in Class 2 Acknowledgment Messages

TEXT FIELD	RULES
OFFSET	Offset of the field in error in the class 1 message text to which the acknowledgment refers. 6 N Optional
AGGNR	Aggregate Number (identifies the aggregate in which the error exists). 4 N Optional
FLDNAME	Field Name (name of the field in error) 8 A/N Optional
USERDATA	Free-format field for user data 50 A/N Optional
SCRNAME	Screen Name 8 A/N Optional

The *ACK section may contain the THDR and STATUS aggregates. The THDR aggregate is generated by TCM in TCM's acknowledgment to the originating system. It contains header fields that are present in the original message's *ROUTCTL section, for example, ACNO, DFTM, ELTERM, EPATHID, VMTERM, PPATHID, HLDFLG, PATHID, RSFLAG, RSYS, RSYS1-10, RTMST, SKIP, SUPID1-5, SCTYPE, and TMST. The DFTM field has the default value (DFTM=000000000 for short format and DFTM=00000000000 for long format) if it is not specified in the input message. The STATUS field showing the TCM status of the original message is also included in the THDR aggregate.

The STATUS aggregate is present only if it is specified in the acknowledgment contract between the sending and receiving systems.

The last seven fields (ERRCODE, ERRTEXT, OFFSET, AGGNR, FLDNAME, USERDATA, and SCRNAME) are repeated (as a group) as many times as the number in the ERRCNT field. These seven fields are contained in an FCIF aggregate named NOTICE. The entire message is contained in a section named "*ACK". The ACKTYPE field is analyzed to determine if a positive (with or without warnings) or negative acknowledgment has been received.

A warning is considered a positive acknowledgment, although warning message processing does share some steps with error processing. An overview of the warning message process appears in the following diagram.

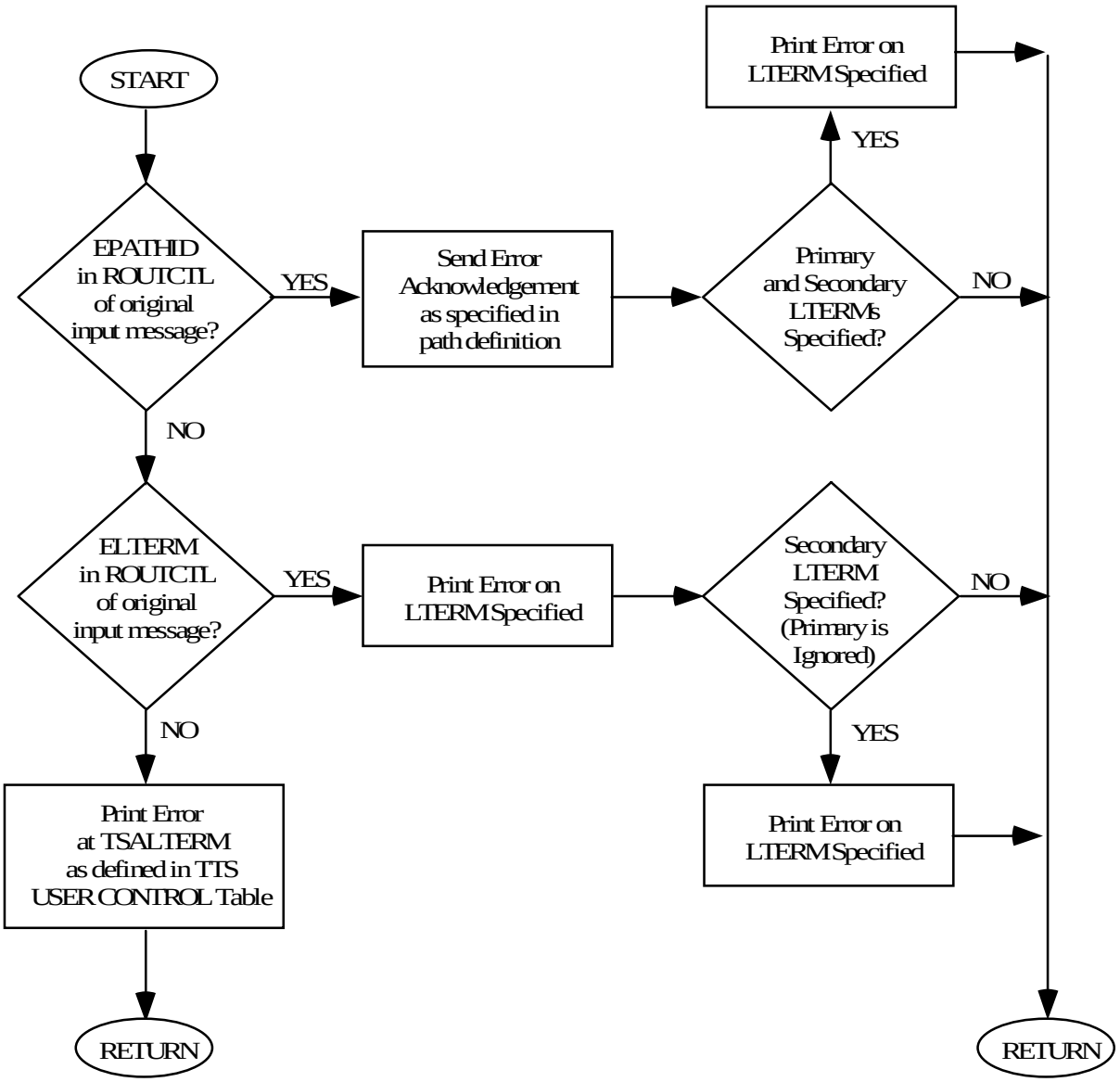

Figure 4-2. Warning Message Processing

4.1 Error Exception List Process

- *Verify Acknowledgment Type.*
  If the acknowledgment is an application error or a warning the next step is processed.
- *Compare Error Exception List.*
  If the acknowledgment is an application error and the "TREAT ALL ERRORS AS WARNINGS" flag is set to "Y", the acknowledgment will be changed to a warning.

  If the acknowledgment is a warning and the "TREAT ALL WARNINGS AS ERRORS" flag is set to "Y", the acknowledgment will be changed to an application error.

  If an Error List is present, a comparison is made between the error codes contained in the acknowledgment and error exception list. If all the error codes within the acknowledgment are in the error exception list, the application error acknowledgment is changed to a warning acknowledgment or the warning acknowledgment is changed to an application error acknowledgment.

4.2 Positive/Warning Acknowledgment Text Processing Steps

- *Exception Notice Printing. A positive acknowledgment notice is printed.*
  If the acknowledgment contained a warning, the issuing of notifications is controlled by the "error processing" logic. Otherwise, if a PPATHID is present in the TCM header of the class 1 message being acknowledged, then a class 2 message is output to the PPATHID; If no PPATHID is present, the notification is printed to the VMTERM in the class 1 message TCM header.
- *Class 1 Message Deletion.*
  If the acknowledgment is positive, with or without a warning, the class 1 message to which it refers is deleted from the TLOG database. In addition, if a copy of the message was being viewed by an LTERM (via RMPMSG), the copy of the message in the TERM DB (VMC1XXDD) will also be deleted.
- *HELD Message Check.*
  After successfully processing a warning or positive acknowledgment, RA will check to see if a related message with the same activity number is in hold status on the TLOG database. If so, the message unhold process will be initiated.

4.3 Negative Acknowledgment Processing

The acknowledgment is negative if the Class 1 message was unacceptable. The negative acknowledgment is routed to the EPATHID (if present) in the header of the message of the original Class 1 message. Negative acknowledgments cause the initiation of error

processing. Negative acknowledgments take the form of exception notices which are printed on the ELTERM contained in the class 1 message header or on the Primary and Secondary LTERMs designated in Network Administration via format RMPNET.

In the cases of TCM or application error acknowledgments that are routed via EPATHID, the message will contain a logical destination (LDEST) identifier to be used by the receiving system. The LDEST identifier is retrieved from the PATH segment of the SEC database for the original Class 1 message (added via RMPNET). If no LDESTs have been added, the default values of “TSA” for TCM errors and “TCP” for application errors are used. If TCM ERROR LDEST and APPL ERROR LDEST are not needed, leave these fields blank. These fields are important to TCMs that communicate with SOAC, because SOAC uses them to route error messages back to its own applications. Therefore, the EPATHID must be set or the (Class 2 TCM to application) negative acknowledgment message will not be sent to SOAC at all.

5. Error Processing

An overview of TCM error processing appears in the following figure.

Error processing may be initiated by the receipt of a negative acknowledgment or as the result of an error that may have occurred during the Routing Administration (RA) process.

The error processing steps are the same for the following six types:

- TCM header validation error
- TPAM parsing error
- TPAM translation error
- TPAM mapping error
- TPAM general error
- Application error from a negative acknowledgment

5.1 Error Logging

Each error that is received is logged with the class 1 message that is stored in the TLOG database. This includes the error code and the error text. Up to ninety-nine (99) sets of error code and text can be logged for the same message.

The status of the message is also updated to show the type of error logged.

5.2 Error Printing

Exception notices are issued for the first fifty (50) errors and warnings encountered during RA processing. Destination of notices is selected as follows: If an EPATHID is present in the class 1 TCM message header, then a class 2 message is output to the EPATHID and an exception notice is sent to the PRIMARY or SECONDARY (if it exists and is different from the PRIMARY LTERM) LTERM contained in the SEC database (in the path segment used by the message).

If no EPATHID is present, first choice becomes both the ELTERM contained in the class 1 message header and the SECONDARY LTERM contained in the SEC database (in the path segment used by that message).

Second choice (if ELTERM is not present) is both the PRIMARY and SECONDARY LTERM contained in the SEC database.

The last resort is to print the exception notice to the TSA LTERM specified in the TCM USER CONTROL TTS table. The exception notices, in turn, become input to the manual NA and MA processes.

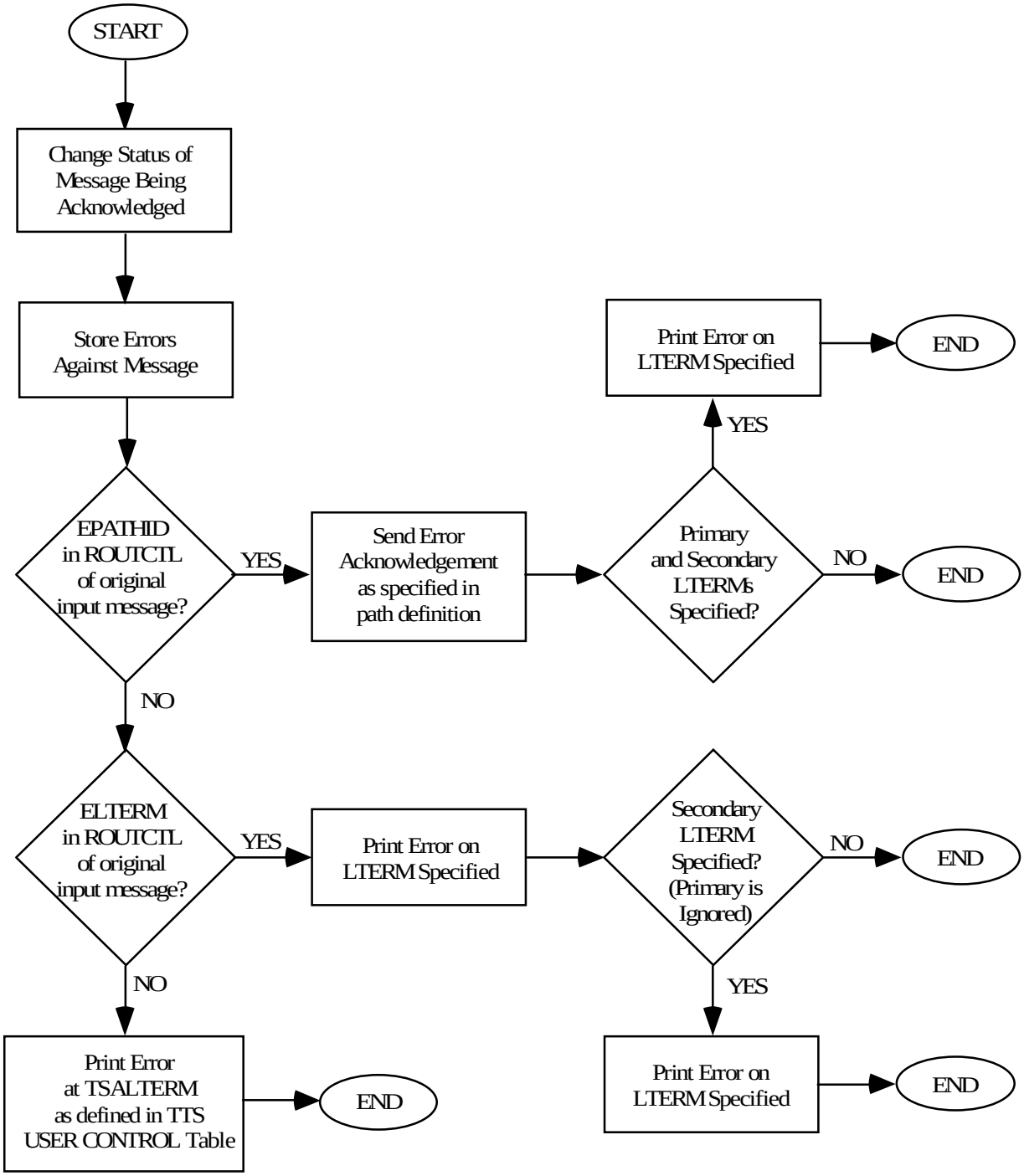

Figure 5-1. Error Processing

6. Dequeue Processing

Dequeue processing is initiated at regular intervals during the day by BMP run VMMPM01. The status of each physical link in the SEC database is automatically updated. At the same time this process determines if there are any messages to be dequeued from the SENDQ database. If there are messages, the process sends a dequeue request to the RA process. The RA process then removes the messages one at a time from SENDQ and processes them as if they had just been received from the IMS queue.

Dequeue processing is diagramed in the following figure.

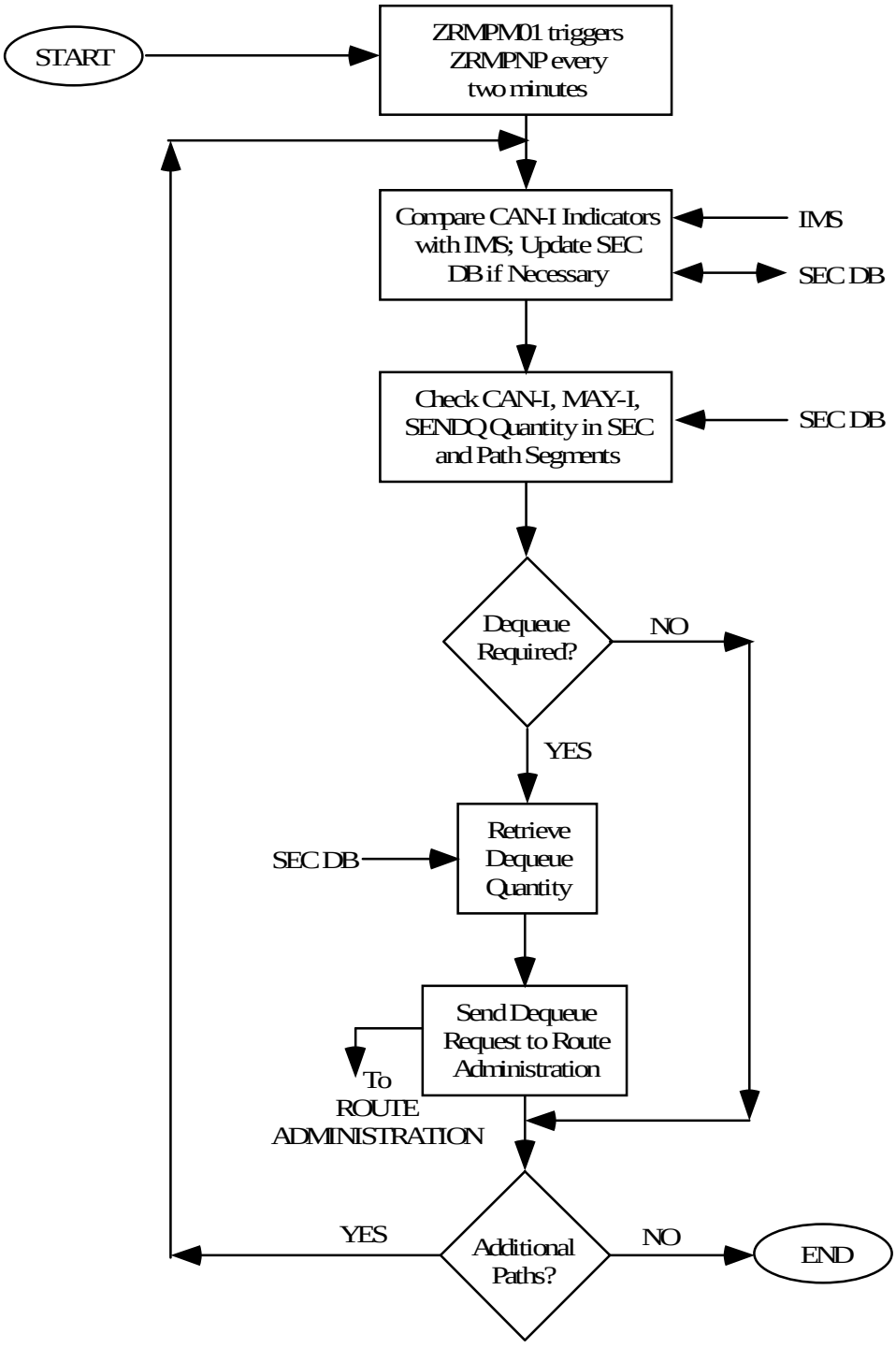

Figure 6-1. TCM Dequeue Processing