AD-A171 332 FORSCOM SECURITY MONITOR (FSM) COMPUTER PROGRAM DEVELOPMENT SPECIFICATION (TYPE B5)(U) LOGICON INC SAN DIEGO CA FEB 81 N00039-78-C-0323

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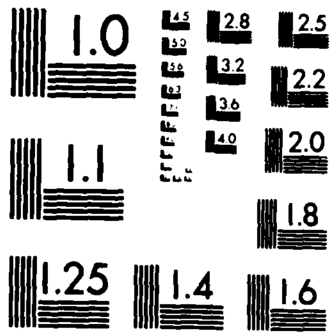

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ARPA-78C0323-05
FEBRUARY 1981

FORSCOM SECURITY MONITOR (FSM)
COMPUTER PROGRAM DEVELOPMENT SPECIFICATION
(TYPE B5)

Contract Number N00039-78-C-0323

Prepared for:

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ACCAT GUARD technology during IOC and to assess potential enhancements to this system, it is desirable to evaluate these concepts in an operational exercise.

The primary purpose of the FORSCOM GUARD experiment is to provide an IOC test bed for GUARD to test the effectiveness of GUARD as a major security application in an operational environment. The major operational exercise will be PROUD SPIRIT. Although the test will be conducted in a benign system-high environment, the experiment will be structured to simulate the "potentially threatening" environment of allowing the availability to non-Top Secret WES sites.

Presently, the MLS ACCAT GUARD system has completed its GENSER phase testing. Based on the GENSER test phase the following new GUARD requirements have been identified:

a. An "automatic" downgrade mechanism for reducing the workload of the Security Watch Officer (SWO).

b. A special "low-to-high" filtering mechanism for limiting low user capabilities on the system.

The first new requirement allows the GUARD, in a trusted manner, to perform automatic downgrade operations for certain recognizable high side outputs. Presently with ACCAT GUARD all high-to-low data must be screened by the SWO. This new feature will reduce the workload of the SWO and also improve the overall responsiveness of the system.

SECTION 1

SCOPE

1.1 IDENTIFICATION

This document sets forth design and implementation requirements for the Initial Operational Capability (IOC) phase of the GUARD project. The IOC phase of GUARD will operate under the UNIX Operating System, which shall ultimately consist of the Kernelized Secure Operating System (KSOS) security kernel and the UNIX emulation package. This IOC phase of GUARD software will operate under a version of Western Electric UNIX (Baseline 6.0) enhanced to provide both a more KSOS-like environment and operate with the special IOC testbed interfaces.

1.2 FUNCTIONAL SUMMARY

The FORSCOM WWMCCS environment has been chosen for the GUARD IOC test site. This environment is ideal for experimenting further with the GUARD technology. It is desired to experiment with the GUARD technology at FORSCOM in order to determine whether FORSCOM could connect its present and future WES sites without jeopardizing security thus eliminating the efforts and associated costs of upgrading these sites to Top Secret, the system high operation. Therefore, to determine the true value of the

The second requirement is for security considerations. The purpose of the filtering mechanism is to confine the low user's activity on the high side of GUARD. It is believed that with the incorporation of the automatic downgrade mechanism, it will be necessary to restrict the low user from performing certain operations. This is particularly true for GUARD's IOC phase at FORSCOM, where the user is provided an interactive environment.

The following outcome of the GUARD IOC experiment will provide excellent data as to the true effectiveness of a downgrade mechanism for solving MLS problems in essentially non-MLS systems.

1.2.1 ACCAT GUARD

The ACCAT GUARD system allows the controlled "writing down" of information from a high security level network computer host to that of a lower security level network computer host. The "writing down" operation of the system is controlled completely by a Security Watch Officer (SWO). Since the ACCAT GUARD will become one of the first applications to be placed under the Kernelized Secure Operating System (KSOS) (currently under development), it will be a verifiably secure system. In particular, the "writing down" mechanism has been formally specified and will be implemented using the Modula programming language, a language which lends itself to formal code proofs.

Funtionally, the ACCAT GUARD (see Figure 1-1) provides a transactional-like interface to its user set. ACCAT GUARD users reside on distant hosts connected to the ARPANET. One user set resides on a host with a high security level and the other user set resides on a host with a lower security level. The users communicate to each other and other hosts through GUARD using standard ARPANET messages (referred to in GUARD as transactions). Three basic transactions are supported by the ACCAT GUARD.

a. Messages from a low/high user to a high/low user.

b. Canonical queries from a low/high user to a high/low host.

c. English queries from a low/high user to a high/low host.

Messages are standard ARPANET mail, canonical queries are queries which are in the proper syntactic form for direct processing by the recipient host, and English queries are queries which must be manually translated by GUARD personnel into canonical queries prior to submission to the recipient host.

Communication security is guaranteed by the COMSEC approved Private-Line-Interfaces (PLI) connecting the hosts to the ARPANET. The PLI's provide encryption/decryption of information flowing from/to the hosts. The connectivity of a low host to a high host is only possible through the ACCAT GUARD. GUARD has two PLI connections to the ARPANET, one compatible with the high host PLI and the other compatible with the low host PLI (Figure 1-1).

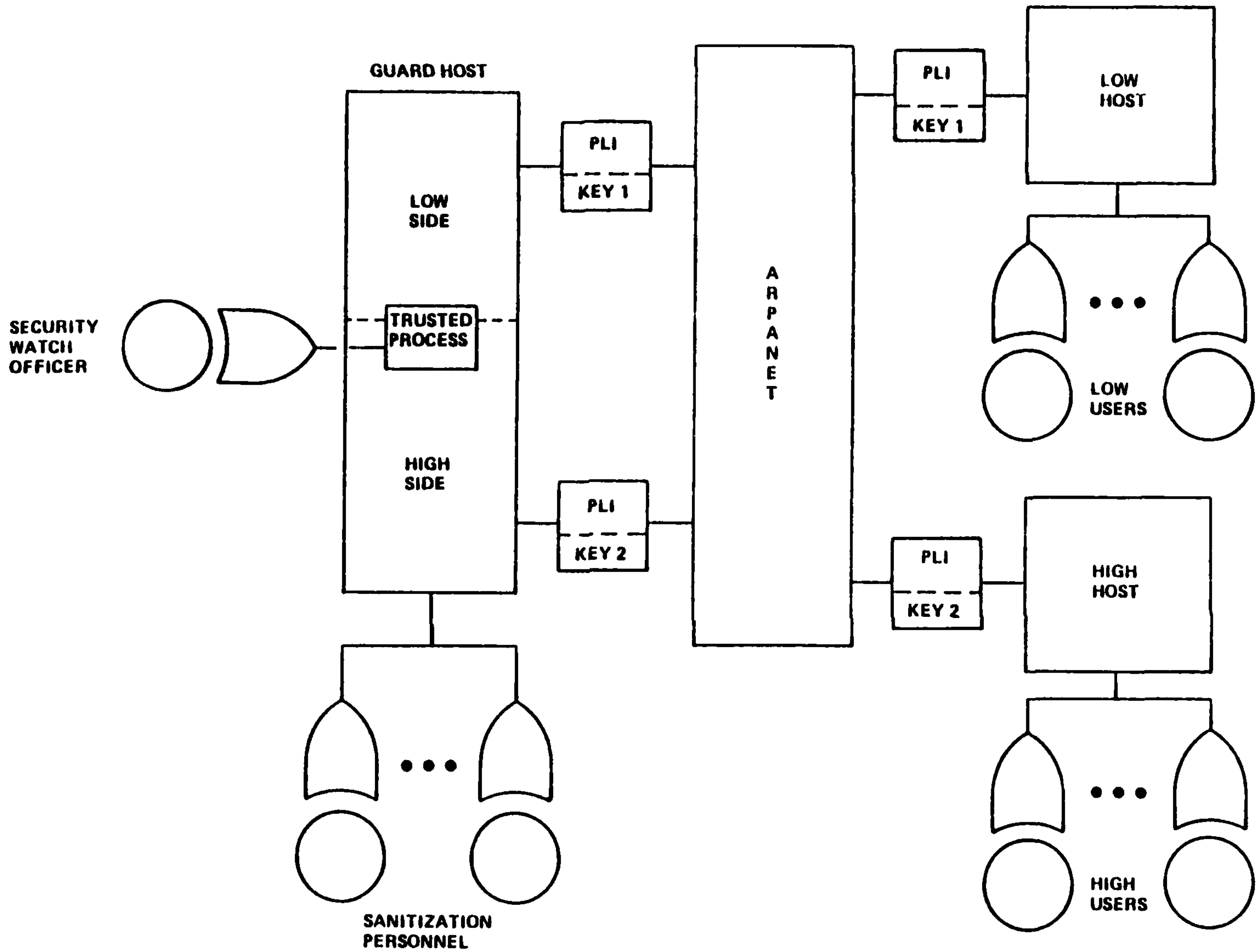


Figure 1-1. MLS ACCAT GUARD Configuration

1.2.2 FORSCOM Security Monitor (FSM) GUARD

The FORSCOM Security Monitor (FSM) GUARD (to be called FSM from here on) will be a further extension of the technology of the existing ACCAT GUARD and be based on the actual software currently comprising this system. The FSM system, however, requires some alterations to the current ACCAT GUARD system. These are as follows:

a. The FSM system will interface a set of low security level users to a high security level host (see Figure 1-2).

b. The "communication unit" of the FSM is not transaction oriented, but instead is highly interactive.

c. Based on GENSER phase testing, the FSM requires that certain low level user inputs be filtered prior to submission to the high level host.

d. Based on GENSER phase testing, the FSM will employ a special "recognition mechanism" which will allow the automatic screening for certain system level prompts to the low security level user.

Since the FSM exercise will be operating in a benign environment, the standard UNIX version of the ACCAT GUARD (GENSER version) can be used as a software baseline for this new system.

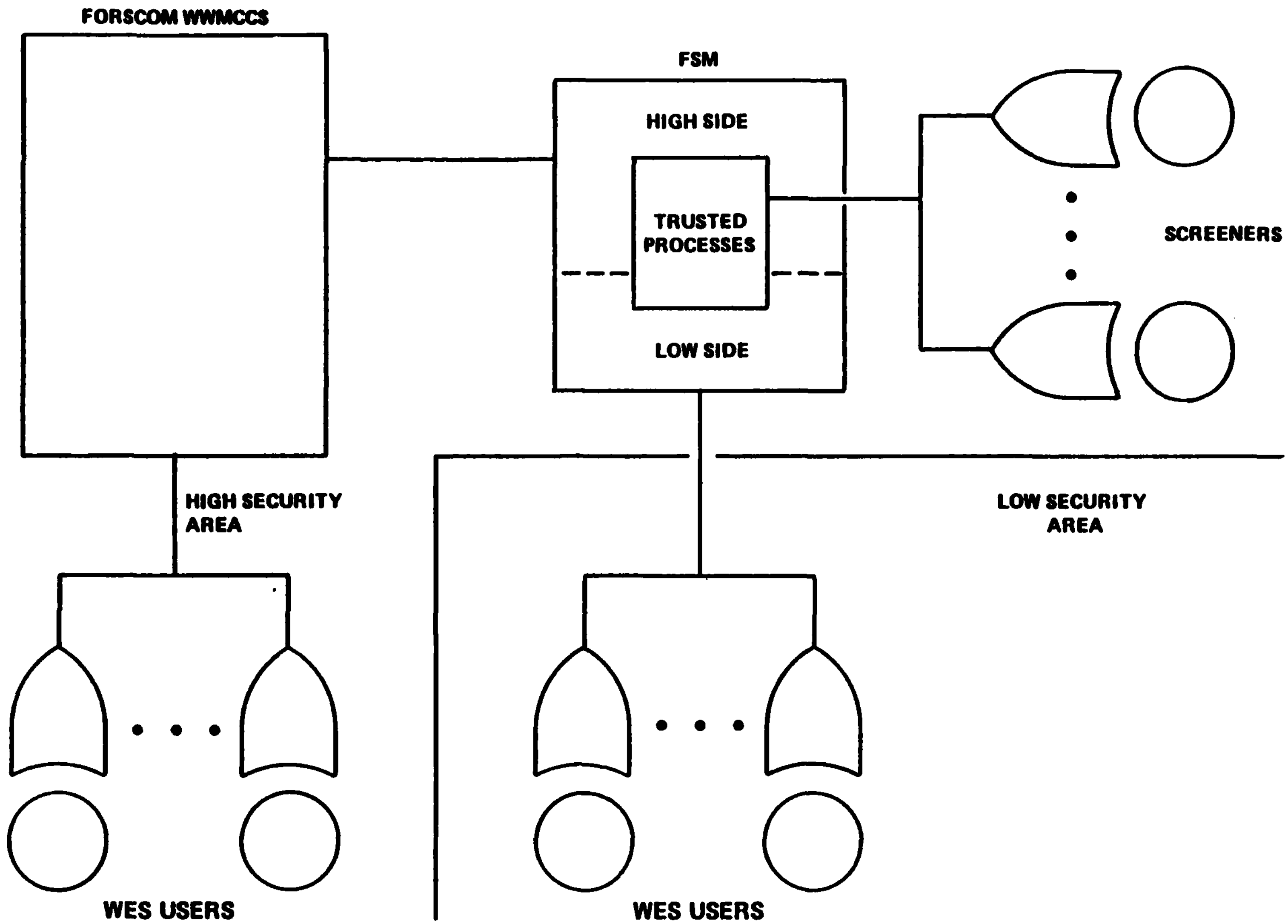


Figure 1-2. FORSCOM Security Monitor (FSM) Configuration

Based on GENSER phase testing, it has become advisable that a special automatic screening mechanism be added to the current GUARD system. Although the initial test of this technology will only simulate the "writing down" of information from a high security level to a lower security level, the basic architecture and design of this mechanism must be carefully analyzed to ensure that future implementations under KSOS can be verified to operate correctly.

The basic operation of the FSM system is as follows. As depicted in Figure 1-2, the FORSCOM WWMCCS system, the FSM and the Screener are located in a Top Secret system high area. (The Screener is the FSM counterpart to the ACCAT GUARD's Security Watch Officer.) The FORSCOM WWMCCS system and the FSM are directly connected and the low security users are connected to the FSM only. Therefore, the multi-level secure situation exists only in the FSM processor. When a low security level user logs onto the FORSCOM system, they are in reality logging onto the FSM system which in turn logs the user onto the FORSCOM system. Note, the FORSCOM system software is not cognizant of the fact that the FSM system is between it and the low security users. Therefore, the FSM system must have complete knowledge of what the user is entering into the system. This is required for two reasons:

a. In order for FSM to properly filter what the user is entering, the filtering must be accomplished within the context of what the user is doing in the FORSCOM system.

b. In order for FSM to properly recognize certain system responses for automatic screening sequences, FSM must again do this within the context of what the user is doing in the FORSCOM system.

A pre-established set of FORSCOM system level prompts will be recognized by the FSM system and sent directly to the low security level user without Screener intervention. All variable data (e.g., teleconferencing messages) must go through the standard screening mechanism.

SECTION 2

APPLICABLE DOCUMENTS

Following is a list of documents relevant to this computer program development specification.

2.1 GOVERNMENT DOCUMENTS

a. Logicon, "ACCAT GUARD Computer Program Development Specification (Type B5)", February 1979.

b. Logicon, "Formal Specification of GUARD Trusted Software", September 1979.

c. Logicon, "ACCAT GUARD Acceptance Test Plan (ATP)", March 1980.

d. Mitre Corporation, "ACCAT GUARD System Specification (Type A)", August 1978.

e. Mitre Corporation, "ACCAT GUARD Overview", November 1979.

f. U.S. Army Forces Command, "WWMCCS Entry System (WES) Terminal User's Handbook", September 1978.

g. IBM, "FORSCOM Computer Security Concept Experiment Notebook", April 1980.

2.2 NON-GOVERNMENT DOCUMENTS

a. Bell Telephone Laboratories, "UNIX Programmer's Manual", May 1973.

SECTION 3

REQUIREMENTS

The FORSCOM Security Monitor (FSM) system shall provide for the secure transfer of information from the FORSCOM WWMCCS system running at Top Secret system high to a set of WWMCCS Entry System (WES) users of a lower classification level. Special facilities provided by FSM will be controlled downgrading of information from FORSCOM WWMCCS to the WES sites, both manual and automatic, low user command filtering, extensive audit trail capabilities, and mechanisms to monitor and alter the FSM environment.

In order to accomplish the above FSM functions two FSM personnel types must be provided: the FSM Screener and the Environment Manager (EM). The Screener is responsible for insuring manually that information being downgraded (i.e., "written down") to low security level WES site users does not contain sensitive information of a higher classification. The Screeners perform their function via a Cathode Ray Tube (CRT) terminal which interfaces with FSM "trusted software." The trusted software will potentially be formally verified to guarantee that it does indeed operate correctly in accomplishing the downgrade. This special software guarantees that information is written down to the "low side" of FSM only if the Screener has viewed all the information and has approved and confirmed a downgrade. The EM is responsible for a variety of tasks; the reassigning of low WES site users to a specific Screener, the monitoring of low WES site user activity, the establishment of special test/exercise parameters for automatic/manual screening, and the control of the FSM audit trail. The EM accomplishes his role via a terminal and untrusted software (albeit, some of the current functionality required for the exercise/experiment is potentially security relevant. However, these mechanisms would be removed in an operational environment).

Automatic screening and low user filtering will be accomplished with trusted software which interacts in concert with the Screener trusted software. Automatic screening is performed on those FORSCOM WWMCCS system outputs which are exactly recognized within the context of the user/system dialogue. Those system outputs which are not recognizable (i.e., termed "variable data") must be screened manually by an assigned Screener. Low WES site user filtering is accomplished by the same set of trusted software which performs automatic screening. For this situation the low user's input is restricted to a subset of the total FORSCOM WWMCCS capability.

The FSM functionality described above will be accomplished by a set of computer programs and data structures. The remainder of this section will describe these in detail.

3.1 PROGRAM IDENTIFICATION

A program is defined by the algorithms it requires and the data structures (i.e., the program "states") required by the algorithms. The specification and subsequent implementation of these algorithms is by the use of computer programs. These programs when activated are called processes. FSM is specified and implemented by a set of concurrent processes which operate over a set of data structures representing the current state of FSM. The remainder of this section presents and specifies in detail all FSM programs, data structures, and their interaction.

3.1.1 Functional Areas

This subsection describes the basic functional areas which comprise the software of the FORSCOM Security Monitor (FSM). As discussed above, FSM will be implemented via a set of concurrent processes and a set of data structures which represent the state of FSM. Some processes will be invoked by user action (i.e., the Screener, the EM, or a low WES site user) while others may exist at all times performing required system functions. The data structures will be comprised of non-volatile disk files and volatile message queues. The precise specification of the states of these data structures in relation to the interaction of the processes constitutes the total algorithm of FSM operation. This section deals with the classes of FSM programs and descriptions of FSM data structures. Before discussing these in detail an overview of information flow in FSM will be given.

The overall information flow of FSM is shown in Figure 3-1. Here FSM programs are represented as executing processes (indicated as ellipses). Each program name is contained within the ellipse. The arrowed lines connecting processes indicate the direction of information flow, where in some cases the information flow is bi-directional (i.e., arrow heads on both ends). The FSM environment is divided into a high security domain and a low security domain. Note, except for the FSM Guardian Program (FSMGP), all FSM programs operate in the high security domain of FSM. FSMGP operates in both domains and has been given the privilege of violating, in a controlled manner, the *-property of the DoD security model (i.e., FSMGP can write information to a lower security level). Consequently, FSMGP must be trusted software. FSM personnel are depicted at the top of Figure 3-1 and interface through the high security domain of FSM. This implies that they must be physically located in an area that is cleared Top Secret "system high". The WES site users are physically located at a site with a lower security classification. The FORSCOM WWMCCS complex is depicted at the bottom of Figure 3-1 and is also connected to the high security domain of FSM.

In order to illustrate the overall information flow in FSM a simple scenario is described below.

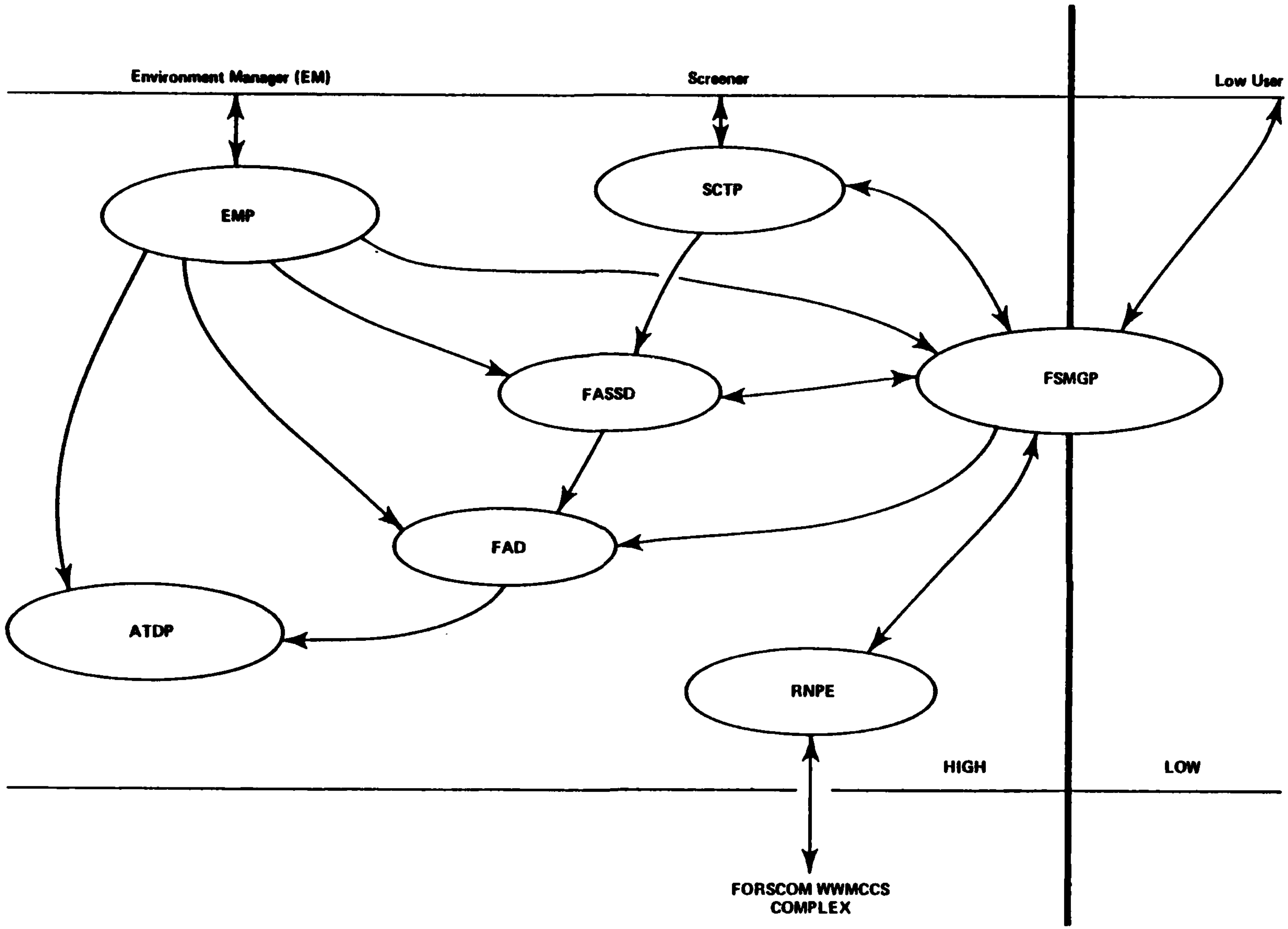


Figure 3-1. Basic FSM Process and Information Flow

For this scenario let's assume that one or more Screeners are currently logged on to the FSM system. Now a low WES site user wishes to access the FORSCOM WWMCCS system. The WES user logs onto the FSM via his terminal. The FSMGP is responsible for interfacing with the user (i.e., there will be a separate copy of FSMGP for each user interfacing to FSM). FSMGP requests a Screener assignment from the FSM Assignment Daemon (FASSD) and allows the WES user to continue until a Screener is needed. Since Screeners are currently logged onto FSM one is available for assignment. Upon receiving the request from FSMGP, FASSD reviews the set of FSM Screeners that are currently logged onto FSM. Based on their current load (i.e., other WES users may be logged onto FSM) and their logon time, FASSD makes the appropriate Screener assignment. The Screener assignment is then passed back to FSMGP by FASSD. Following logon to FSM, FSMGP logs the user on to the FORSCOM WWMCCS complex. This is accomplished by establishing a connection to WWMCCS via the Remote Network Process Emulator (RNPE). Following successful logon to WWMCCS, the WES user and WWMCCS continue with their dialogue, with FSM as a somewhat invisible intermediary. However, FSMGP is busily performing many internal tasks, one of which is auditing specific events. This is accomplished by writing out the audit event and required data which is periodically moved to the FSM audit trail by the FSM Audit Daemon (FAD). FAD is always present in the FSM environment and is responsible for recording other processes' audit events into the FSM audit trail. During the user/WWMCCS dialogue, FSMGP is constantly monitoring all data the user enters and all data the WWMCCS host is writing back to the user. If the user inadvertently enters illegal command sequences (those which are either syntactically incorrect or are privileged and hence not available to the low user) FSMGP will inform the user of the error and not send the input to the WWMCCS system. This is the "filtering" mechanism of FSMGP. For WWMCCS system output, FSMGP determines if the data is recognizable (termed "fixed") or unrecognizable (termed "variable"). If the data is recognizable and the user's current screen mode permits it, FSMGP writes the information to the WES user's terminal. This is the "automatic screening" mechanism of FSMGP. If the data is not recognizable or if the user's current screen mode requires Screener intervention, FSMGP notifies the Screener Trusted Process (SCTP) that manual screening is required (remember, FASSD had assigned a Screener to this specific WES user). SCTP notifies the Screener (note, each Screener logged on to FSM has a separate copy of SCTP) of the "downgrade" request. The variable data from WWMCCS is then viewed, a screen at a time, for potential high level sensitive information. The Screener will screen all data and then make a decision whether to "downgrade" the information. Let's assume for this scenario, the Screener accepts the data. SCTP then asks the Screener to confirm his decision and following confirmation, notifies FSMGP that the data can be written down to the low user. FSMGP also audits this event which is then recorded into the FSM audit trail by FAD. The above sequence is the "manual screening" mechanism provided by FSM. This set of operations is continued until the WES user logs off FSM. FSMGP notifies FASSD of the logoff and then exits.

As a final comment on the overall information flow of FSM, EM can also peruse the FSM Audit Trail via the Audit Trail Display Program (ATDP). This program is called via the EMP as directed by the EM.

3.1.1.1 Programs. The FSM system consists of several different programs which are divided into two classes: transient programs and daemon programs. A transient program is normally brought into existence (i.e., becoming a process) via some external event. Following satisfaction of this event the process usually exits, hence the name "transient". Daemon programs are those programs which are usually brought into existence when the system is brought up and remain active as a process until the system is brought down. Also, daemons usually perform functions which are not tied directly to some external event (although almost always related indirectly to some external event) and appear "invisible", hence the name "daemon".

3.1.1.1.1 FSM Programs. Following is a list of FSM programs, each accompanied with a short description of its function.

a. FSM Guardian Program (FSMGP)

The FSM Guardian Program (FSMGP) interfaces directly with a low WES site user and is responsible for monitoring all information flowing from the WES user to the Top Secret WWMCCS system and vice versa. FSMGP contains the WES user "filtering" and "automatic screening" mechanisms of FSM. FSMGP operates over a set of extensive data structures representing the user/system dialogue set for a WES user.

b. Screener Trusted Program (SCTP)

The Screener Trusted Program (SCTP) interfaces directly with a FSM Screener. The SCTP provides a verifiably secure mechanism by which a Screener can review information coming from the FORSCOM WWMCCS complex and accept/reject it for writing down to the low security level user. The process provides a "manual" screening facility for FSM.

c. FSM Assignment Daemon (FASSD)

The FSM Assignment Daemon (FASSD) is responsible for making initial Screener assignments to WES users. It also maintains overall FSM logon/logoff information in the Global Logon File (GLF).

d. FSM Audit Daemon (FAD)

The FSM Audit Daemon (FAD) operates invisibly within the FSM environment. It is responsible for maintaining the current FSM audit trail. It receives audit requests from the other processes of FSM and records these events onto the current FSM Audit Trail.

e. Environment Manager Program (EMP)

The Environment Manager Program (EMP) interfaces directly with the FSM Environment Manager (EM), performing specific tasks as directed by the EM. These tasks include reassigning FSM Screeners to WES site users, monitoring and modifying WES user environment parameters, and monitoring WES user activity profiles.

f. Audit Trail Display Program (ATDP)

The Audit Trail Display Program (ATDP) interfaces with the FSM Environment Manager (EM). This program allows the EM to selectively display portions of the FSM Audit Trail. Also, ATDP provides an audit trail maintenance facility by which the EM can save current FSM Audit Trails into other "time stamped" files.

g. Remote Network Processor Emulator (RNPE)

The Remote Network Processor Emulator (RNPE) is responsible for communicating with the FORSCOM WWMCCS complex. It emulates (by multiplexing/de-multiplexing WES users) a set of users interfacing to the WWMCCS complex.

3.1.1.1.2 Global Functions. This section provides descriptions of the global functions implemented for the FSM. Functions are defined in the literal sense as in the C language, hence are not programs but are actual functions which are compiled with the individual programs requiring their services. The global functions are described below.

3.1.1.1.2.1 Audit Function (GFAUDIT). To facilitate the logging of audit events, a global audit function is called by all event generators. The passed argument list is variable except that the first argument is always the one-byte event code (FEVENT). GFAUDIT processes its arguments and constructs an audit request file in the audit queue. It returns to the event generator when this is done. Note: The event generator does not wait for the event to be logged, only entered into the audit queue.

Input Paramaters - Inputs to GFAUDIT consist of the passed arguments. With the exception of the first argument (which is always the audit event code, FEVENT), the argument list is of variable length and format. See Table 3-1 for the calling sequences to GFAUDIT, which are dependent upon the event code; see also Appendix D for detailed event definitions. These arguments are passed to GFAUDIT by any one of the four event generators (EMP, FASSD, FSMGP or SCTP):

a. FEVENT -- The audit event code.

   This one-byte quantity ranges from 01 to 19 and indicates which event occurred. It is used by GFAUDIT to process the remaining arguments passed to it.

b. SUBSYS -- The current WWMCCS subsystem code.

This one-byte quantity ranges from 1 to 8 and indicates the WWMCCS subsystem currently in use. A value of zero indicates all subsystems. See Table 3-2 for the subsystem names and their values.

c. SRCFLG -- Text Source Flag

This flag indicates if the audit text pointer (TP) is a character pointer into a buffer (0) or if it is a character pointer to a filename (1) which contains the text to audit.

d. TP -- The audit text pointer or filename where text can be found.

This character pointer is used to reference the beginning of the audit text (system output or user input). The event generator will set up this pointer and use a buffer for storage of the text. Alternatively, if there is a large amount of text the event generator will write a disk file instead of allocate in-core buffers. In this case, the SRCFLG will be set to one, not zero, as in the case of buffers. Upon return from GFAUDIT, the caller may de-allocate the buffer since the text is copied by GFAUDIT into the Audit Request File.

e. FAILEX -- The coded reason why user input was not sent.

This one-byte quantity ranges from 1 to 2 and indicates the reason why user input was not sent to WWMCCS by FSMGP. A value of 1 indicates no match was made with the user input, while a value of 2 indicates a match was made but the input was disallowed. This value is only used in Event 02 (User Input Not Sent).

f. SCRID -- The FSM user ID of the Screener

This one-byte quantity is identical, in concept, to the UNIX user ID and serves to uniquely identify the Screener involved in this event.

g. STATUS -- The status of the subsystem initiation

This one-byte quantity indicates success (1) or failure (0) when a user attempts to initiate a WWMCCS subsystem. Note: Logon is not considered a valid WWMCCS subsystem in this context. This argument is only used in Event 11 (User Initiated WWMCCS Subsystem).

h. USERID -- The FSM user ID of the WES user

Identical to the SCRID argument, except that it identifies the WES user involved in the event. A value of -1 indicates all users.

i. USRTTY -- The WES user's UNIX terminal identifier

This one-byte quantity identifies the user terminal involved with this event. It is the last character of the user's UNIX terminal name ("/dev/tty?").

j. SCRTTY -- The Screener's UNIX terminal identifier

This one-byte value is identical to the USRTTY argument, with the exception that it identifies the Screener terminal involved in this event.

k. SCMODE -- The current screen mode

This one-byte quantity indicates whether no (0), normal (1) or all (2) screening is now in effect. It is only passed for Event 14 (Screen Mode Modified).

l. RATE -- The bandwidth threshold for messages

This one-byte quantity indicates the number of messages which may be automatically downgraded without Screener intervention. It must be a positive integer in the range of one to 127.

m. EMID -- The FSM user ID of the Environment Manager

This one-byte quantity is identical to the SCRID and USERID arguments, with the exception that it identifies the Environment Manager involved in this event.

n. EMTTY -- The EM's UNIX terminal identifier

This one-byte quantity is identical to the USRTTY and SCRTTY agruments, with the exception that it identifies the EM terminal involved in this event.

Output Parameters - None.

Operation - GFAUDIT assumes that the first argument passed to it is the one-byte event code (FEVENT). It uses this event code as a switch to decode the remaining arguments. After the arguments are extracted, GFAUDIT must obtain additional event data, such as the DTG of the event and its size. GFAUDIT then constructs an Audit Request filename from the event DTG, the process ID of the event generator (EMP, FASSD, FSMGP or SCTP) and a random character. This file is created in the Audit Request Queue and the event record is written as record one. If there is also text to audit (implies passing the TP and SRCFLG arguments), GFAUDIT copies the text into the second and possibly additional records. The text is copied "as is". It is null-terminated. GFAUDIT then closes the Audit Request File and returns control to the calling process.

Table 3-1. GFAUDIT Calling Sequences

Code	Description	Calling Sequence	Caller
01	User Input Sent to WWMCCS	gfaudit(01, userid, usrtty, srcflg, tp)	FSMGP
02	User Input not Sent to WWMCCS	gfaudit(02, userid, usrtty, subsys, failex, srcflg, tp)	FSMGP
03	System Output Sent to User	gfaudit(03, userid, usrtty, srcflg, tp)	FSMGP
04	System Output not Sent to User	gfaudit(04, userid, usrtty, subsys, srcflg, tp)	FSMGP
05	System Output Accepted by Screener	gfaudit(05, userid, usrtty, subsys, scrid, scrtty, srcflg, tp)	FSMGP
06	System Output Rejected by Screener	gfaudit(06, userid, usrtty, subsys, scrid, scrtty, srcflg, tp)	FSMGP
07	Screener Logged onto FSM	gfaudit(07, scrid, scrtty)	FASSD
08	Screener Logged off FSM	gfaudit(08, scrid, scrtty)	FASSD
09	WES User Logged onto FSM	gfaudit(09, userid, usrtty)	FSMGP
10	WES User Logged off FSM	gfaudit(10, userid, usrtty)	FASSD
11	User Initiated WWMCCS Subsystem	gfaudit(11, userid, usrtty, subsys, status)	FSMGP
12	User Assigned to Screener	gfaudit(12, userid, usrtty, scrid, scrtty)	FASSD
13	User Input Simulated	gfaudit(13, userid, usrtty, subsys, srcflg, tp)	FSMGP
14	Screen Mode Modified	gfaudit(14, subsys, userid, scmode)	EMP, FSMGP
15	Bandwidth Threshold Modified	gfaudit(15, userid, rate)	EMP
16	EM Logged onto FSM	gfaudit(16, emid, emtty)	EMP
17	EM Logged off FSM	gfaudit(17, emid, emtty)	EMP
18	System Output Received by FSMGP	gfaudit(18, userid, usrtty, subsys, srcflg, tp)	FSMGP
19	Downgrade Request Review Begun	gfaudit(19, scrid, scrtty, subsys)	SCTP

3.1.1.1.2.2 <u>Date Conversion Function (GFDTGTOA).</u> Input Parameters - GFDTGTOA requires a pointer to a buffer to store the converted ASCII time.

Output Parameters - GFDTGTOA outputs a pointer to the null character that terminates the converted ASCII string.

Operation - GFDTGTOA provides a common means for other processes to obtain a null-terminated ASCII string of the current Date-Time Group. GFDTGTOA uses a UNIX function to obtain the current date and then converts that to an ASCII string of the form MMDDHHmmss (Month, Day, Hours, minutes, seconds).

3.1.1.1.2.3 <u>String Match Function (GFEQUAL).</u> Input Parameters - pointers to two null-terminated strings to be tested for equality.

Output Parameters - GFEQUAL outputs a value of 1 if the strings are equal, zero otherwise.

Operation - GFEQUAL does a character-by-character comparison of the two strings until a mismatch occurs or the end of one is reached.

3.1.1.1.2.4 <u>Error Function (GFERROR).</u> Input Parameters - GFERROR requires one input parameter - an error/message number. GFERROR will accept any number of variable length null-terminated ASCII strings following the error/message number.

Output Parameters - None.

Operation - GFERROR provides a common means for the output of errors/messages to a user and system errors/messages to the system console. The first input parameter is an error/message number which specifies the error/message to be output. This number represents a canned message. If the number is greater than 500, then the error/message will be output to the system console and, in addition, if it is a system error and the standard output (file descriptor 1) is a terminal, a standard message will be output to the user indicating that a system error has occurred. Any further parameters will be inserted into the error/message at points where asterisks are encountered. Note: If GFERROR encounters a system error itself, it will output that error instead of the one with which it was called.

If the error is not a system error, the error message number indicates the appropriate error description item in GFEDES (error description file) which in turn contains pointers to the canned message text contained in GFEMES. Any character strings also provided as input parameters will be inserted in the canned message at points where asterisks are encountered. After printing the message to the user's terminal (or the system console for a system error/message), GFERROR returns to the calling function.

GFERROR uses library functions GFLOCK and GFUNLOCK to lock and unlock the system console in order to output system errors/messages. For this reason, it is mandatory that the calling program not have the system console locked when calling GFERROR.

GFERROR also uses two internal functions. These are:

a. gfout - internal function which outputs a string.

b. gfia - internal function which converts integer to ASCII. Input is an integer, output is a pointer to a null-terminated string in a fixed buffer (max of 9 characters).

3.1.1.1.2.5 Obtain User's Logon Name (GFGETNAME). Input Parameters - UNIX user ID.

Output Parameters - GFGETNAME returns a pointer to the user's logon name or to the strings "none" or "unknown", depending upon the user ID passed.

Operation - GFGETNAME opens the UNIX password file and searches for the passed user ID. If found, GFGETNAME returns a pointer to the user's logon name. Otherwise, GFGETNAME returns a pointer to the string "unknown". If no user ID is passed to GFGETNAME, it returns a pointer to the string "none".

3.1.1.1.2.6 File Copy Function (GFILECOPY). Input Parameters - GFILECOPY requires three input parameters:

a. A flag with the following values:

    0 - Create destination file.

    1 - Append data to existing destination file.

b. Pathname of source file.

c. Pathname of destination file.

Output Parameters - GFILECOPY returns a null if the copy was successful, or a positive system error number (with which to call GFERROR) if unsuccessful.

Operation - GFILECOPY provides a mechanism for the copying of one file to another. The first input parameter is a flag which specifies whether the destination file is to be created or not. If the flag is set, the destination file is assumed to exist, and if it cannot be opened, GFILECOPY will return with an error (Open error). The second input parameter is the pathname of the source file, and the third input parameter is the pathname of the destination file. GFILECOPY first attempts to open the source file. If unsuccessful, then it returns an open error to the calling function. Otherwise, GFILECOPY attempts to open/create the destination file, depending on the value of the input flag. If the action is unsuccessful, GFILECOPY returns an open/create error to the calling process. If append is indicated, GFILECOPY seeks to the end of the destination file before beginning the copy. It then reads blocks of data from the source file and writes them to the destination file until the End-Of-File (EOF) of the source file is reached. If a read or write error is encountered at any time, GFILECOPY returns that error to the calling function. Otherwise, after a successful copy, both files are closed and GFILECOPY returns a successful value to the calling function.

3.1.1.1.2.7 <u>Integer to ASCII Function (GFITOS)</u>. Input Parameters - an integer to be converted to an ASCII string.

Output Parameters - GFITOS returns a pointer to the beginning of the

ASCII string.

Operation - GFITOS allocates space for the ASCII string and then uses a modulo operation to fill the buffer from the end to the beginning. If the input integer was less than zero, GFITOS prepends a minus sign character to the ASCII string.

3.1.1.1.2.8 Lock Function (GFLOCK). Input Parameters - GFLOCK requires one input parameter - a pathname of the file to be locked.

Output Parameters - None.

Operation - GFLOCK provides a common means for the locking of data files which must be updated by more than one process. GFLOCK first builds a "lock-file" pathname by concatenating the string "-lock" to the supplied pathname. GFLOCK then attempts to create the lock-file with a read-only mode. If the file already exists, an error status is received. GFLOCK then sleeps for one second and then attempts the create again. Eventually, the create is successful and GFLOCK returns to the calling function. At this point, the file is "locked-out" from other read-for-update attempts. Of course, this assumes the cooperation of other processes which update this file to call GFLOCK prior to such updates. The file can now be updated, and after the update is complete it is mandatory that the calling process call the GFUNLOCK function to "unlock" the file. Note: The user ID of the calling process must not be that of the superuser since, in that case, the create is always successful even if the file does already exist.

3.1.1.1.2.9 Leading Zero Integer to ASCII Conversion Function (GFLZITOA). Input Parameters - GFLZITOA requires three parameters:

a. Number of digits to convert to a string.

b. Integer value to convert.

c. A pointer to a user supplied buffer to place the converted string in.

Output Parameters - None.

Operation - GFLZITOA first converts the integer to an ASCII string, using the same technique as does GFITOS. It then checks the leading characters of the ASCII string and if they are blank, GFLZITOA converts them to character zeroes. Finally, the ASCII string is stored character-by-character beginning at the buffer location given by the third argument.

3.1.1.1.2.10 List Match Function (GFMATCHLIST). Input Parameters - a pointer to an array of strings and a pointer to a string to match to the array.

Output Parameters - GFMATCHLIST returns the index of the array string matched, if found. Otherwise it returns a -1 for no match or a -2 if a match was made to more than one array string.

Operation - GFMATCHLIST first makes certain both array and search string are lower case, and then searches the input array for any occurances of the input string. If only one exact match is made, the index of the matched array string is returned. Otherwise a -1 is returned if no match is found or a -2 is returned if multiple array strings matched the input string.

3.1.1.1.2.11 String Match Function (GFNEQUAL). Input Parameters - GFNEQUAL requires three input parameters:

a. Length of match.

b. Pointer to a string to match.

c. Pointer to a second string to match with.

Output Parameters - GFNEQUAL returns a 1 if both strings are equivalent for the amount of characters specified, otherwise a zero is returned.

Operation - GFNEQUAL compares the two strings character-by-character until a mismatch is detected or the specified number of bytes have been checked, whichever occurs first.

3.1.1.1.2.12 Read IPC Function (GFRIPC). Input Parameters - GFRIPC requires three input parameters:

a. A file descriptor for the port.

b. A pointer to a user supplied buffer in which to store an IPC message.

c. A flag with the following value:

0 - Block on port read.

1 - Poll on port read.

2 - Block on port read, but return EOF if all writers die.

Output Parameters - GFRIPC returns the number of bytes in the current IPC message, 0 for EOF, or -1 if a read error has occurred.

Operation - GFRIPC provides a common means for the reading of ports. The first input parameter is a file descriptor which the user obtained from a successful port call. The second input parameter is the location of a buffer into which the input IPC message will be placed. The third input parameter is a flag with three values. The value of zero (0) indicates that the caller wishes to block on port reads, i.e., does not want GFRIPC to return until a message has been read. The value of one (1) indicates that the caller does not want to block on reads, but wants GFRIPC to return EOF if there is no data available. The value of two (2) indicates that the caller wishes to block on port reads, but does want GFRIPC to return EOF if all of its writers have died. GFRIPC returns one of three values. A count is returned if an IPC message has been read. An EOF (0) is returned if the user has indicated that polling is desired and there is no data, or if the user has indicated that partial blocking is desired and all writers have died. A minus one (-1) is returned if GFRIPC encounters a read error from the port.

GFRIPC uses the alloc and free system calls in order to buffer up IPC messages from more than one writer.

GFRIPC first checks if polling is wanted, and if so performs an EMPTY call on the supplied file descriptor. If no data is available, GFRIPC returns a no data value to the calling function. Otherwise, it reads on the supplied file descriptor. If a system error occurs (read error), a read error value is returned to the calling function. If an End-Of-File (EOF) is encountered (all writers have died) and partial blocking was requested, a no data value is returned to the calling function. Otherwise, GFRIPC reads an IPC header. If this is the first block for this message (indicated by the Process ID (PID) in the header), then GFRIPC allocates enough core for an entire message. If this is not the first segment of a message, then GFRIPC searches for the start of the message in already allocated core. It then reads the block of data into the allocated core. If this is the end of a message, then GFRIPC moves the entire message into the user supplied buffer, deallocates the core and returns the number of characters in the message to the calling function. Otherwise, it reads again on the port for another message segment.

3.1.1.1.2.13 Compute String Size Function (GFSIZE). Input Parameters - a pointer to a null-terminated string whose size is to be computed.

Output Parameters - the number of characters in the string.

Operation - GFSIZE steps through the string counting characters until it finds a null character. It then returns the character count to the caller. Note: the terminating null byte is not included in the count.

3.1.1.1.2.14 String Copy Function (GFSTRCOPY). Input Parameters - a pointer to a null-terminated string to be copied and a pointer to a buffer in which to place the copy.

Output Parameters - a pointer to the terminating null byte in the destination buffer.

Operation - GFSTRCOPY copies the input string character-by-character into the destination buffer until it reaches the terminating null character in the source string.

3.1.1.1.2.15 Unlock Function (GFUNLOCK). Input Parameters - GFUNLOCK requires one input parameter - a pathname of the file to be unlocked.

Output Parameters - None.

Operation - GFUNLOCK provides a common means for the unlocking of data files which must be updated by more than one process. GFUNLOCK first builds a "lock-file" pathname by concatenating the string "-lock" to the supplied pathname. GFUNLOCK then unlinks the lock-file, thus allowing another process to create it and hence gaining control of the file. Of course, failure of a process to call GFUNLOCK after successfully locking out a file with GFLOCK would eventually bring the FSM to a halt.

3.1.1.1.2.16 Write IPC Function (GFWIPC). Input Parameters - GFWIPC requires three input parameters. It will accept a variable number of other parameters as specified below.

a. A flag specifying interpretation of the second parameter:

0 - second parameter is a pathname of a port to open for write,

1 - second parameter is a file descriptor of a port already opened.

b. Pathname of a port, or a file descriptor depending on the value of the first parameter.

c. IPC message type as defined in the FSM global data.

d. Optional parameters, in the following order if present: User ID, Bandwidth rate, Screen Mode, Subsystem index, user security classification, pathname of a downgrade file, pathname of a context file.

Output Parameters - GFWIPC returns the status of the write: 0 - successful, positive error number with which to call GFERROR if write was unsuccessful.

Operation - GFWIPC provides a common means for writing to ports. The first input parameter is a flag which tells GFWIPC whether the second parameter is a pathname of a port to open or a file descriptor of an already opened port. The second input parameter is then either a file descriptor or a port pathname. The third input parameter is an IPC message type which will be stored in the IPC port message structure. Any other parameters are data to be stored in the IPC port message structure.

GFWIPC sets up the IPC message in the structure according to the input parameters which have been passed. If a pathname was input, then GFWIPC opens the port. If the open is unsuccessful, an open error is returned to the calling function. Otherwise, GFWIPC writes the IPC message to the opened port. If a write error occurs, then GFWIPC returns a write error to the calling function. If a pathname was input, GFWIPC closes the port. It then returns to the calling function with a successful value.

3.1.1.2 Data Structures. The state of FSM is contained in a set of data structures which can be divided into two types:

a. non-volatile disk files

b. volatile message queues (i.e., ports)

Disk files are used to contain that information which must be saved through continuous day-in and day-out operations of FSM. Audit trail information is a good example of information contained in disk files. In addition other system oriented information must be maintained in disk files in order for FSM to operate correctly; i.e., predefined data which represents the user/WWMCCS dialogue contexts. Volatile data is that data which is not needed in FSM for long periods of time; message queues for inter-process communication (IPC) are good examples of volatile data. All message queues will be implemented in FSM via the port data structure. Ports provide sophisticated First-In, First-Out (FIFO) queues for efficient inter-process communication between processes. In addition, ports allow inter-process communication across different process families, hence allow transient/daemon process communication.

Figure 3-2 illustrates the entire FSM directory/data structure hierarchy. Before describing this structure the notational conventions used in this figure will be defined.

a. Rectangles represent files or directories with the file/directory name appearing on top. The name is followed by "(d)" if it represents a UNIX directory, and "(f)" if it is a disk file.

b. Disk files entered in a directory have their names inside the rectangle representing their presence.

c. Circles represent ports, with the port name appearing inside the circle.

d. UNIX C-structure names appear in capital letters (e.g., GPROF).

e. Special lock-files are denoted as dashed-line entries in directories (e.g., gaud-lock).

f. Symbolic names are employed to depict multiple occurrences of a name. For example "user-1" through "user-n" is used to depict different FSM WES users.

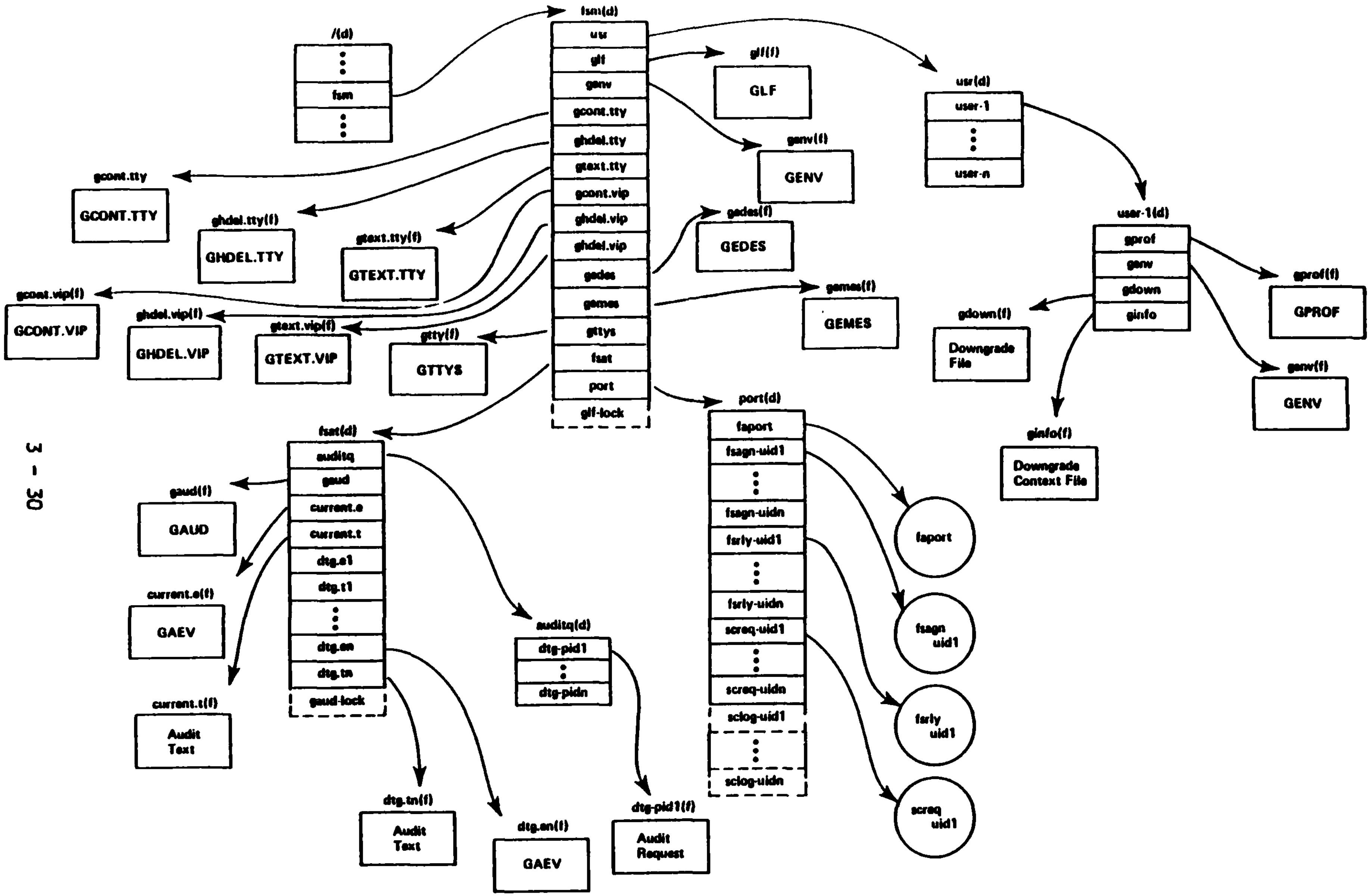


Figure 3-2. FSM Directory/File Hierarchy

To determine the entire UNIX pathname of any given data structure, each directory-to-directory/file/port must be concatenated together. For example, the pathname for the profile file of WES user-i is "/fsm/usr/user-i/gprof". Similarly, the absolute pathname for the Assignment Daemon (FASSD) input port is "/fsm/port/faport".

Before going into the detailed descriptions of the individual data structures depicted in Figure 3-2 a general overview will be given on the entire directory/data structure hierarchy.

All directory/data structures originate directly or indirectly from the UNIX "root" directory, termed "/". FSM will have its own directory with the absolute pathname of "/fsm". It contains system level data structure entries and other related directories. System level data structures are the user logon file ("/fsm/glf") which contains information on all FSM personnel and WES users currently logged onto FSM; the system level environment file ("/fsm/genv") which contains information currently representing system-wide FSM environment values; the user/system dialog context structures for teletypewriter ("/fsm/gcont.tty", "/fsm/ghdel.tty" and "/fsm/gtext.tty") and VIP ("/fsm/gcont.vip", "/fsm/ghdel.vip" and "/fsm/gtext.vip") terminals which control the automatic output screening and input filtering mechanisms of FSM; the error description file ("/fsm/gedes") which contains a pointer to the first character of an error message text and number of characters in the message (used by GFERROR); the error messages themselves ("/fsm/gemes"); and finally, the global terminal file ("/fsm/gttys") which is used by the FSMGTTY program to start up a Guardian Process for specified WES terminals.

The FSM directory contains three directories relevant to data structures: the low user directory ("/fsm/usr"), the FSM audit trail directory ("/fsm/fsat") and the IPC port directory ("/fsm/port"). The user directory contains entries to individual directories for each WES user logged on to FSM. Individual directories exist regardless of whether the user is logged on or not. For user-i, the directory "/fsm/usr/user-i" would contain four data structure references; the user profile file ("/fsm/usr/user-i/gprof"), the user environment file ("/fsm/usr/user-i/genv"), the downgrade file ("/fsm/usr/user-i/gdown") and the user downgrade context information file ("/fsm/usr/user-i/ginfo"). The FSM audit trail directory, "/fsm/fsat", contains the entire FSM audit trail environment. This directory resides on a separate file system to ensure the security of the generated audit trail, since it will contain Top Secret data. The directory contains one directory and two classes of audit trail events/texts, and one lock-file. The primary audit file data structure is "/fsm/fsat/gaud" which contains information describing the current state of the FSM audit trail. Directory "/fsm/fsat/auditq" is used by FSM processes for registering audit trail events. For example, the FSM Guardian Program (FSMGP) in auditing an event would insert an entry into this directory using the current Date-Time Group (DTG), its process identifier (PID) and a random character as a file name. This combination ensures uniqueness within the directory "/fsm/fsat/auditq". Data structure "/fsm/fsat/current.e" and "/fsm/fsat/current.t" contain the event and text information respectively of the current audit trail.

Similarly, data structure entries "/fsm/fsat/dtg.ei" and "/fsm/fsat/dtg.ti" contain previously saved audit trails and are identified by a unique DTG. Finally, the lock-file, "/fsm/fsat/gaud-lock" is used when the audit trail file is being updated (i.e., the file "/fsm/fsat/gaud").

The last directory in the main FSM directory is the port directory ("/fsm/port"). This directory contains all FSM ports. FSM utilizes five basic ports, the FSM Assignment Daemon (FASSD) port ("/fsm/port/faport"), the FSM Screener assignment port ("/fsm/port/fsagn-i"), the Screener request port ("/fsm/port/screq-i"), Screener reply port ("/fsm/port/fsrly-i") and the Screener logoff port ("/fsm/port/sclog-i"). The fsagn and fsrly ports exist for each logged on WES user, while the screq and sclog ports exist for each Screener that is logged on. These four portnames are constructed for uniqueness using the owner's FSM user ID (hence the "-i"). All ports only exist when the reading process is activated within FSM. Note, since FASSD is a daemon the faport is always present.

3.1.1.2.1 Disk File Descriptions. Each disk file that appears in Figure 3-2 will be described in detail in the following sections.

3.1.1.2.1.1 GCONT (Global Context File). This structure provides the information FSMGP needs to follow a user's progress through the various WWMCCS subsystems allowed in the restricted environment. It is tree-like in its structure, since any given item will reference several other items in the file. The file contains a series of CONTEXT items. A CONTEXT item (termed "CONTEXT") represents all possible recognizable user inputs and/or system outputs at a branch of the input/output dialog tree.

Each CONTEXT item contains a HEADER item and one or more SUBCONTEXT items. A HEADER and SUBCONTEXT define a CONTEXT. See Figure 3-3 for a depiction of their relationship. The HEADER supplies information that is applicable to the entire CONTEXT while SUBCONTEXTs supply information relevant to a given user input or system output. The HEADER allows FSMGP to know when to stop accumulating system output or user input. It also provides default actions on error conditions. Figure 3-4 shows a HEADER item. A CONTEXT can have one or more SUBCONTEXTs, depending on the possible recognizable user inputs/system outputs at this stage of the user/system dialog. All SUBCONTEXTs, whether user input or system output are the same size. See Figure 3-5 for a SUBCONTEXT item description.

HEADER Field Descriptions

GPOPTR The pop-up context pointer points to a recovery CONTEXT item when FSMGP encounters an error condition or a user-entered break. Error conditions include a no match condition between current SUBCONTEXT items and system output, a time-out condition on system reads, and Screener rejection of system output. FSMGP usually performs some action (i.e. simulate user input) to resynchronize its processing with the next system output and then proceeds to the appropriate CONTEXT. GPOPTR points to this item, in general a higher level within a given WWMCCS subsystem.

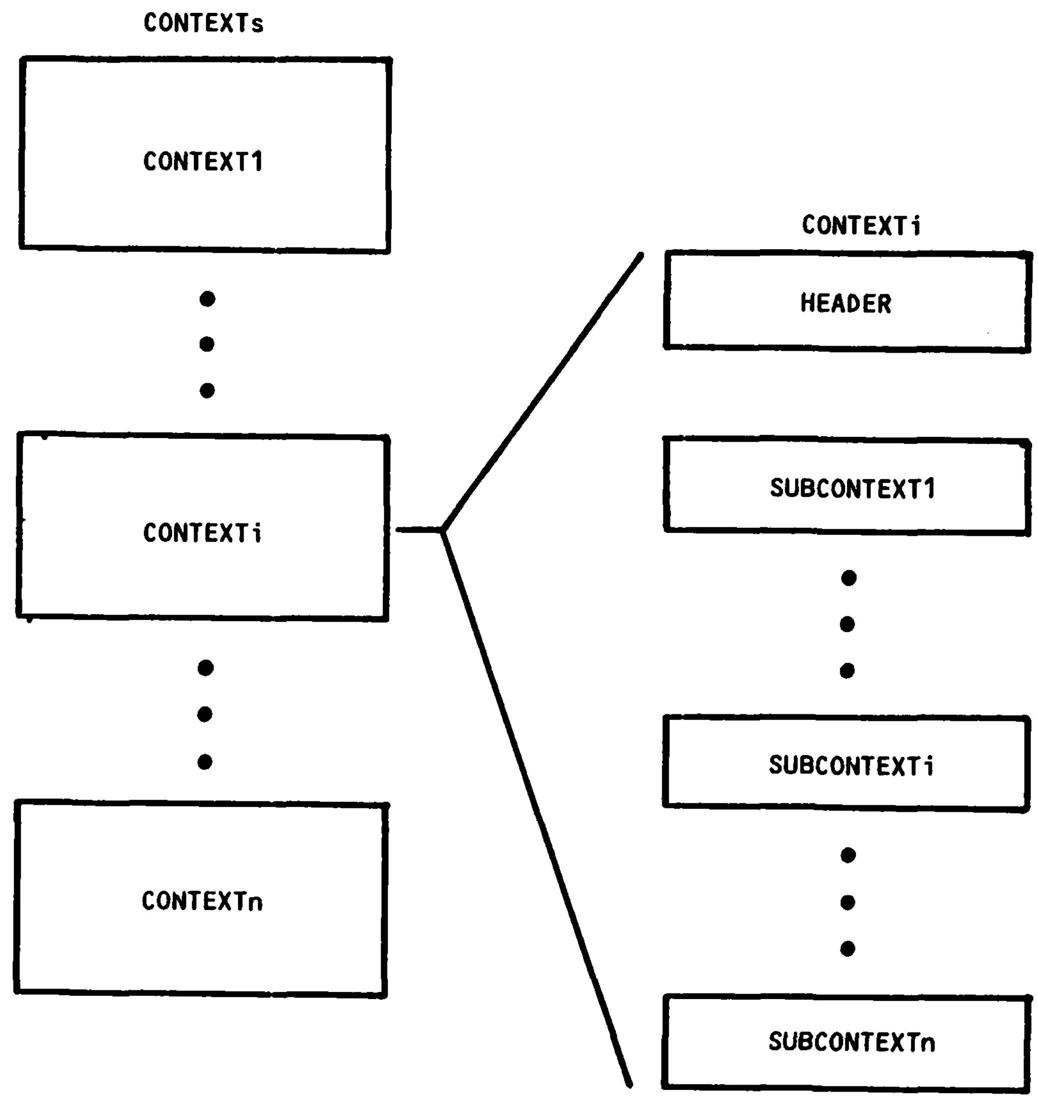


Figure 3-3. Header and Subcontext Relationship

Word 0	GPOPTR	
Word 1	GDLIMP	
Word 2	GNSUBS	GCONFL
Word 3	GFUNX	GSYSX

BIT0	BIT1	BIT2	BIT3	BIT4	BIT5	BIT6	BIT7
			BOTH	USR	RPT	FIX	AUD

GCONFL (from above)

Figure 3-4. GCON Header Item

Word 0	GSTRP	
Word 1	GNEXT	
Word 2	GSFX	GSUBFL
Word 3	GSTART	
Word 4	GLENG	

BIT0	BIT1	BIT2	BIT3	BIT4	BIT5	BIT6	BIT7
		FX	SUB	FUNC	VAL	USI	BEG

GSUBFL (from above)

Figure 3-5. GCON Subcontext Item

GDLIMP The delimiter set pointer points to a byte offset in the Halting Delimiter file at which the particular delimiter set for this CONTEXT resides. FSMGP reads user input or system output until one of these strings is matched.

GNSUBS The number of subcontexts field specifies the number of SUBCONTEXTs comprising this CONTEXT. Since SUBCONTEXTs are of a fixed size, this value can be used in reading the complete CONTEXT for processing by FSMGP.

GCONFL The header flags field contains various bit settings representing conditions of the CONTEXT as a whole, in contrast to states specific to individual SUBCONTEXTs. The following bit settings are used:

BOTH User Input and System Output (1). This bit, when set, signifies that either user input or system output can be expected next. When this bit is set, FSMGP must poll both the user and the system for the next data. Note: when this bit is set, the USR bit is ignored.

USR User input(1) / System Output (0). This bit signifies whether the CONTEXT represents user input or system output. It is only used when the BOTH bit is zero.

RPT Repeating CONTEXT (1) / Non-repeating CONTEXT (0). This bit signifies whether the CONTEXT requires multiple iterations of the FSMGP Read System Output (RSO) function in order to satisfy a single SUBCONTEXT.

FIX Fixed Repeating CONTEXT (1) / Variable Repeating CONTEXT

(0). Only applicable when the RPT bit is set to one. In either situation of this bit setting, multiple calls to the RSO function are required in order to satisfy this CONTEXT. For fixed CONTEXTs, FSMGP will call the Read System Output function repeatedly, doing a continuous match on the indicated search string specified by the single SUBCONTEXT. This will allow, for example, a simple delimiter string set for halting by the RSO function (probably line-by-line for some lengthy output; e.g., TCON skeletons). For variable CONTEXTs, FSMGP will accumulate the variable data until a match is made by one of the SUBCONTEXTs. This mechanism is applicable, for example, to TLCF message texts.

AUD Audit subsystem entry (1) / no audit required (0). This bit signifies that an audit trail event is required because the user just entered another WWMCCS subsystem. The subsystem entered is specified in field GSYSX (see below).

GFUNX This entry indexes a function in FSMGP which will generate the appropriate simulated user input required to place FSMGP (and the WES user) back to the "pop-up" level as specified in field GPOPTR. Different sequences are required for different subsystems.

GSYSX This field specifies which subsystem the CONTEXT is concerned with. It will be filled with an index that identifies the subsystem name. See Table 3-2 for subsystem names and their values.

SUBCONTEXT Field Descriptions

GSTRP This field is an offset into the GTEXT data structure which specifies the string to be searched against for this particular SUBCONTEXT. The SUB bit field in GSUBFL controls how this search is performed.

GNEXT This field is an offset into GCONT specifying the next valid CONTEXT to transfer to if this SUBCONTEXT satisfies the given user input/system output.

GSFX This field indexes a function in FSMGP and indicates that a special function is required to validate user input parameters or to modify system output.

GSUBFL This field contains a set of bit flags which represent various conditions of this particular SUBCONTEXT. The following bits are defined:

FX Fixed data (1) / Variable data (0). This bit in conjunction with the SUB bit indicates the type of match algorithm to use. Fixed data (whether user input or system output) has two cases: substring and no substring. Fixed, no substring matching is perhaps the easiest to comprehend since it involves a character-by-character comparison between the input data and the text string in GTEXT. Fixed, substring on the other hand utilizes two additional values (GSTART and GLENG) to define a window, or substring, within the GTEXT text string to match against. This window is compared against the input data and if a match occurs, the

GTEXT string is written to the user, not the input data. If this bit is not set (i.e. variable), again there are two cases to consider: substring and no substring. Variable, substring is very similar to fixed, substring with the exception that the text string in GTEXT is not further defined and is assumed to be the substring with which to match. Variable, no substring (otherwise known as a "null subcontext") is a wildcard and will match any input data. If the screen mode is normal, fixed data is a candidate for automatic screening by FSMGP, while variable data must be visually inspected by the Screener.

SUB Input data requires Substring match (1) / no substring match (0). Used in conjunction with the FX bit, see description given above.

FUNC This bit signifies that sa special function is required (1) / function not required (0). Field GSFX contains the index of the special function if this bit is set.

VAL This bit signifies that a user's matched input is invalid (1) / matched input is valid (0). This provides a finer granularity on the filtering of user input.

USI This bit signifies the subcontext as user input (1) / system output (0). It is used only if the BOTH bit flag in the CONTEXT header is set.

BEG This bit signifies that the halting delimiter for the subcontext is the beginning of the next subcontext (1) / the end of the current subcontext (0). Since system output strings may terminate with unmatchable variable data, a given halting delimiter may apply to the beginning of the string expected next.

GSTART This field is a byte offset into a fixed system output at which to begin the subcontext match. This field is relevant for fixed, substring system outputs only.

GLENG This field specifies the length of the system output to be matched. It is used in conjunction with GSTART to make an exact match on the substring at the specified location within the system output. This field, like GSTART, is relevant for fixed, substring system outputs only.

3.1.1.2.1.2 GTEXT (Global Text File). This structure contains the actual text strings of user input and system output. These text strings are used by FSMGP when it is identifying the user/system context. When FSMGP has obtained a user input or system output, it must identify it to recognize the user's place in the particular WWMCCS subsystem. This is accomplished by comparing the system output or user input with a subcontext string. Strings in GTEXT are referenced by the GSTRP field in the SUBCONTEXT item. GTEXT is thus simply a concatenation of all possible user input/system output strings in one file, each terminated by a null character. When a particular SUBCONTEXT is checked to see if it matches a particular system output or user input, the SUBCONTEXT field GSTRP points to the appropriate string to match. FSMGP then obtains that string and makes a comparison.

3.1.1.2.1.3 GHDEL (Global Halting Delimiter File). This structure contains all the character strings required by FSMGP to determine when it has accumulated enough system output or user input to satisfy a particular CONTEXT. These delimiter strings are arranged in sets, since the SUBCONTEXTS of a given CONTEXT may be terminated differently. Each delimiter string in the file is terminated by a null character, and the final string in each set of delimiter strings is terminated by two null characters. This allows FSMGP to know when it has reached the end of a particular set.

FSMGP must read system output and user input, but in order for it to know when enough data has been read (and therefore to stop) it must be aware of the possible terminating sequences of any given CONTEXT. GHDEL provides this information. After a new CONTEXT is established by FSMGP (pointed to by the old one), it must read data (system or user) to find a match to one of the particular SUBCONTEXT strings in the current CONTEXT. A read will continue until one of the delimiter strings is found (or an error occurs). The particular string set that FSMGP searches against is pointed to by the GDLIMP field in the current CONTEXT's HEADER.

3.1.1.2.1.4 GDOWN (Global Downgrade File). This structure contains the text of the system output that is to be examined by the Screener. It is created by FSMGP and written to each time a downgrade is required. When a system output is recognized as requiring screening (either because it is variable data or because the current screen mode is set for all data to be screened), FSMGP sends an IPC message to SCTP requesting a downgrade. In this message is the pathname of the user's GDOWN (uniquely identified by user) which SCTP displays to the Screener to accept or reject.

3.1.1.2.1.5 GINFO (Global Downgrade Context File). This structure contains the latest user/system interactions so that the Screener may make his downgrade decision in concert with the current user/system dialog. It contains recent user input and system output text strings in the order of their occurrence. Whenever a downgrade is required FSMGP writes the data from the Downgrade Context (GINFO) Buffer to this file. The Screener may peruse this file if he/she desires.

3.1.1.2.1.6 Global Logon File (GLF). The Global Logon File is established at system generation time and contains one record for each FSM user. The record contains user identification (in the form of FSM logon name) and bit-flags denoting if the user is a Screener, an EM or a WES user and if the user is currently logged on. A user's FSM user ID is obtained by noting the location of the user's record in the file. For example, the user described by record 14 has a FSM user ID of 14. In this way, the normal UNIX user ID is not used. Since the FSM user ID is a one-byte quantity, GLF must contains no more than 127 records (the zeroth record is not used). This file will be updated by the Guardian Process (FSMGP), FSM Assignment Daemon (FASSD), Environment Manager Process (EMP), Screener Trusted Process (SCTP) and by a stand-alone program USER (see Appendix E). In light of the number of potential writers, GLF has an associated lock file ("/fsm/glf-lock") which must be created prior to writing. When a user logs onto the FSM, the user's process (whether EMP, SCTP or FSMGP) checks this file for a record containing the user's name. If there is no match found or a match is made and either the DEFINED bit is not set or the user-type bit (DHI-EM, DHI-SCR or DLO-USR) is not proper, the user cannot proceed and his process is terminated. If a record is found and all bit settings are correct, the user's process marks the record active by setting the DLOGDON bit to one. When a Screener or WES user logs off FSM, FASSD is notified and resets the user's terminal ID to zero and marks the record inactive by setting the DLOGDON bit to zero. EM logoff is taken care of by the EMP. Whenever FASSD makes a WES user/Screener assignment, the WES user's record is modified to contain the assigned Screener's FSM user ID. Finally, when the EM manually reassigns a WES user to a Screener, FASSD modifies GLF. EMP reads this file when processing its commands. See Figure 3-6 for a record layout of the GLF file. The corresponding fields are described below:

LFLAG A collection of bit flags that have the following meanings:

DEFINED This bit signifies that the user which this record describes is a valid FSM user. In this way, records are never removed from GLF (thus altering a user's FSM user ID), but are marked as not-DEFINED, when a user is deleted from FSM participation.

Word 0	GLFLAG	GLUSRID
Word 1	GLTTYID	
Word 2	GLUSRNAM	
Word 3		
Word 4		
Word 5		
Word 6		
Word 7		

BIT0	BIT1	BIT2	BIT3	BIT4	BIT5	BIT6	BIT7
			DE-FINED	DLOG-DON	DHI-EM	DHI-SCR	DLO-USR

LFLAG (from above)

Figure 3-6. A GLF Record

DLOGDON This bit signifies that this user is currently logged onto FSM. During logon, this bit is checked and set by the user's process (EMP, SCTP or FSMGP). During logoff, FASSD resets the bit for WES users and Screeners, while EMP resets it for the EM. Its purpose is to prevent users with the same name from being logged on simultaneously.

DHI-EM This bit indicates that this GLF record describes a "high-side" Environment Manager. Only one record should be marked as an EM.

DHI-SCR This bit indicates that this GLF record describes a "high-side" Screener.

DLO-USR This bit indicates that this GLF record describes a "low-side" WES user.

LUSRID The FSM user ID of this WES user's currently assigned Screener. If there is no Screener currently assigned, the field will be zero. This field is undefined (not used) for Screener and EM records.

LTTYID The UNIX identifier of the terminal this user is logged onto or zero if the user is not logged on.

LUSRNAM The eight-byte UNIX logon name of this Screener or EM; or the twelve-byte WWMCCS user ID of this WES user.

3.1.1.2.1.7 Global Logon File Lock (GLF-LOCK). Because FSMGP, FASSD, SCTP, EMP and USER all modify the Global Logon File (GLF), the standard lock mechanism is used during writes to GLF. The existence of the lock file indicates that a process is currently updating GLF. The lock file has no records, it is merely an entry in the /fsm directory so that its presence or absence may be easily checked.

3.1.1.2.1.8 System Global Environment (GENV) File. Established at FSM initialization is the System Global Environment File. When a WES user logs onto FSM, he is given a copy of the system default values. Subsequent changes in the environment can be made by either the EMP, at the behest of the EM, or by the FSMGP, following detection of bandwidth overflow. The file contains one record with values which indicate bandwidth threshold and subsystem screen modes. Updates occur when the EM, via the EMP, modifies system-wide or user-specific environment values. See Figure 3-7 for a GENV record layout. The corresponding fields are described below:

BANDW The bandwidth threshold. Indicates number of messages per minute which are allowed to be automatically downgraded.

ACCSM The ACCESS subsystem screen mode. A screen mode has one of three discrete values: OFF (no screening is done), NORMAL (FSMGP determines what system outputs need to be sent to the Screener for manual downgrading) or ALL (all output is manually screened).

LSTSM The LIST subsystem screen mode. Screen mode can be OFF (0), NORMAL (1) or ALL (2).

Word 0	BANDW	ACCSM
Word 1	LSTSM	SIOSM
Word 2	TCNSM	TLCSM
Word 3	TSSSM	WDMSM

Figure 3-7. A GENV Record

SIOSM The SIOS subsystem screen mode. Screen mode can be OFF (0), NORMAL (1) or ALL (2).

TCNSM The TCON subsystem screen mode. Screen mode can be OFF (0), NORMAL (1) or ALL (2).

TLCSM The TLCF subsystem screen mode. Screen mode can be OFF (0), NORMAL (1) or ALL (2).

TSSSM The TSS subsystem screen mode. Screen mode can be OFF (0), NORMAL (1) or ALL (2).

WDMSM The WWDMS subsystem screen mode. Screen mode can be OFF (0), NORMAL (1) or ALL (2).

3.1.1.2.1.9 User Global Environment (GENV) File. Associated with every logged-on WES user is a GENV file which contains environment values for the specific user. The file is created when the user logs onto FSM. The user's FSMGP copies the system GENV into the user's GENV. The file is contained in the user's directory ("/fsm/usr/user-i"). The file is modified, when environment values change, by FSMGP. The format of the file follows the system GENV exactly (refer to Figure 3-7). FSMGP modifies this file when the EM makes environment changes pertinent to this WES user and when bandrate overflow has been detected. EMP reads this file when displaying a current WES user's environment to the EM.

3.1.1.2.1.10 Global Profile (GPROF) File. Associated with each WES user is a user profile file. This file is created and updated by the user's FSMGP. The file contains only one record which identifies the user (with FSM user ID and UNIX terminal ID), indicates the current WWMCCS subsystem, user's status and the Date-Time Group (DTG) of the status. Status in this sense refers to potential delays. There are six conditions that can cause delay:

- waiting on user input
- waiting on system output
- waiting for Screener response
- waiting on polling text (user input or system output)
- waiting on Screener assignment
- waiting for RNPE connection

Each time the WES user's delay state changes, FSMGP updates the user's GPROF file. This file is read by EMP whenever the EM requests a user profile. See Figure 3-8 for a GPROF record.

Each record has the following fields:

PUSR The one-byte FSM user ID.

PTTY The UNIX terminal ID.

PSUB The WWMCCS subsystem in use at the time the status was recorded.

PSTAT The user's status. Values are 0 (waiting on user input), 1 (waiting on system output), 2 (waiting on Screener response), 3 (waiting on polling text), 4 (waiting on Screener assignment) and 5 (waiting on RNPE/Honeywell H6000 connection).

PDTG The four-byte DTG of the status.

Word 0	PUSR	PTTY
Word 1	PSUB	PSTAT
Word 2	PDTG	
Word 3		

Figure 3-8. A GPROF Record

3.1.1.2.1.11 Global Audit Description (GAUD) File. In order for ATDP to know quickly what audit files are present, in addition to the total time range they cover, a file exists which contains all audit file-pairs (one entry per pair), including the current pair, their DTG of creation and DTG of last entry. Each time FAD logs an audit event in the current file-pair, it must also update the corresponding GAUD record with the new "last entry" DTG. Since the description record (in GAUD) for the current file-pair is always the last record in the file, FAD has no problem updating it.

The description file contains fixed-length sequential records; one record per audit file-pair. Each record follows this format:

AUDFN Audit file-pair name (14 bytes).

CRET Date-time group of creation (4 bytes).

LMOD Date-time group of last entry (4 bytes).

In addition to FAD, the description file is also updated by ATDP. When ATDP saves the current file-pair, it modifies the description record of the current file-pair by changing the filename from "current" to the DTG of the save. It also writes a new record with a filename of "current" and the DTG of creation. Notice, ATDP does NOT modify the DTG of last entry on the old current file. This data is only modified by FAD. Similarly, FAD never modifies the filename or the DTG of creation. Since both FAD and ATDP have write-access to this file, it must be locked before writing. See Figure 3-9 for a GAUD record.

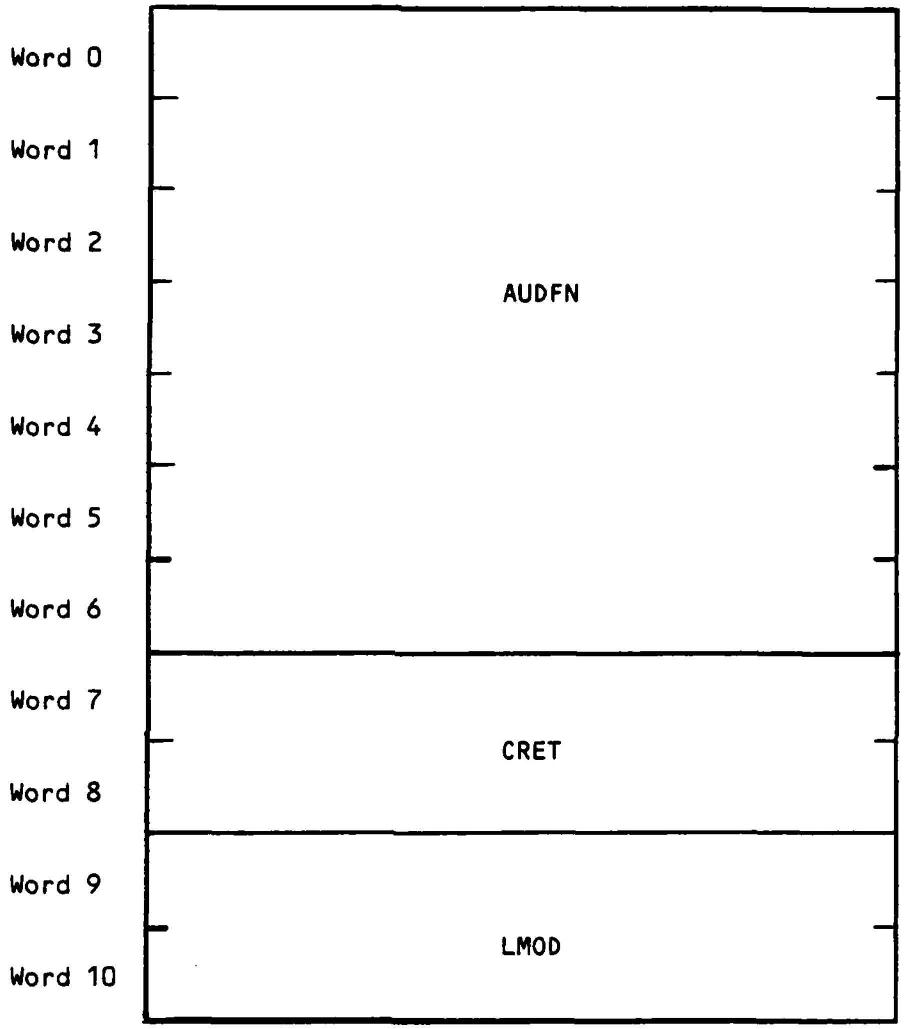


Figure 3-9. A GAUD Record

3.1.1.2.1.12 <u>Audit File Lock (GAUD-LOCK).</u> As mentioned previously, to protect audit files from being simultaneously write-accessed, FSM employs a standard lock-for-writing mechanism. The mechanism involves requiring all writing processes to lock the file before writing and unlocking it after. The existence of the lock file signifies a process is currently updating an audit file. The two file sets which are of concern are the Current Audit File-Pair and the GAUD file. Both are updated by ATDP and FAD. The lock file has no records, it is merely an entry in the audit directory so that its presence or absence can be detected easily.

3.1.1.2.1.13 <u>Current Global Audit Event (GAEV) Files.</u> The Global Audit Event Files are pairs of sequential files which contain records of varying format and length. All audit events are written to the GAEV files. These events can be generated by any one of the four FSM processes: FSM Guardian Process (FSMGP), Environment Manager Process (EMP), Screener Trusted Process (SCTP) or FSM Assignment Daemon (FASSD). Audit events are actually audited (written to the GAEV files) by the FSM Audit Daemon (FAD). User-oriented formatting and display of GAEV records is performed by the Audit Trail Display Program (ATDP).

There are nineteen events logged by FAD:

Event Code	Event Description
01	User input sent to system (WWMCCS)
02	User input not sent to system
03	System output matched and sent to user
04	System output not matched
05	System output accepted by Screener
06	System output rejected by Screener
07	Screener logged onto FSM
08	Screener logged off FSM
09	User logged onto FSM
10	User logged off FSM
11	User initiated a WWMCCS subsystem
12	User assigned to Screener
13	User input simulated (resynch)
14	Screen mode modified
15	Bandwidth threshold modified
16	EM logged onto FSM
17	EM logged off FSM
18	System output received from WWMCCS
19	Screener begins downgrade request

The GAEV file-pair consist of two files: the Event file and the Text file. Every audit event causes a record to be written to the Event file. Additionally, some audit events will write ASCII strings to the Text file. All auditable user input and system output will be written to the Text file with the appropriate offset and length entered with the corresponding Event file record. For example, consider audit event 01 (User input sent to system). This event causes a record to be written in the Event file containing useful data (user ID, DTG and so on), as well as the offset in the Text file where the user input can be found and its length. The motivation behind two files, as opposed to one, stems from the potential size of user inputs and system outputs; as well as the fact that not all audit events have text to audit.

All of the following event records are written to the Event file. Also, the following descriptions pertain only to the Event file, NOT the Text file. Records in the Text file are format-less; that is, they are variable-length ASCII strings.

Each audit event record contains a fixed-size header block followed by a variable length Event Description. Figure 3-10 illustrates an audit event record.

The header is the same for all audit events and contains these fields:

FEVENT The Event Code (01-19).

FEVSIZ The number of bytes in the Event Description. NOTE: This does not include the size of the header.

FEVTIM The Date-Time Group (DTG) of this event in standard UNIX two integer (four bytes) format.

Figure 3-11 is an Event file Record Header Description.

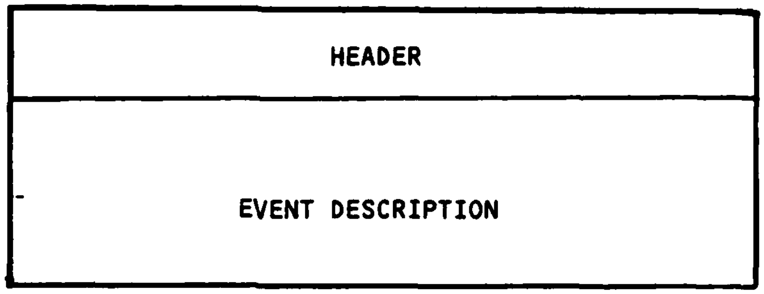


Figure 3-10. An Audit Event Record (written to Event File)

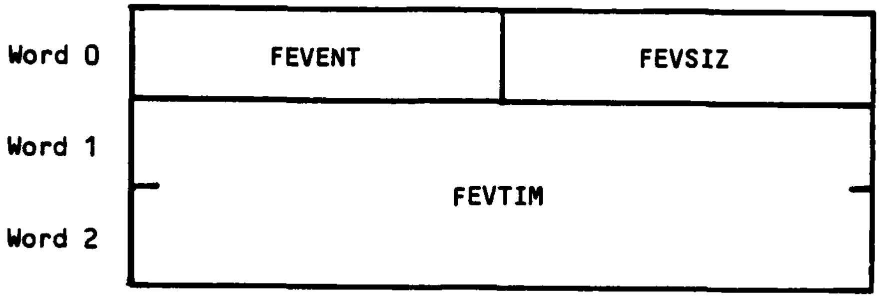


Figure 3-11. An Event File Record Header Description

The following paragraphs provide a description of the content and format of the audit event record for each of the nineteen events recorded in the GAEV files.

EVENT 01 (User input sent to system)

FSMGP will generate this audit event whenever the FSM has recognized and allowed user input to be sent to a WWMCCS subsystem. The user input will be copied to the Text file with the text file offset and text length entered in the Event file. Figure 3-12 is an Event 01 record description to be written to the Event file.

Field Descriptions

USERID The one byte FSM user ID.

USRTTY The UNIX identifier of the terminal from which the input was sent.

SUBSYS The current WWMCCS subsystem in use. See Table 3-2 for the

OFFSET The byte offset from the beginning of the Text file where the user input is written.

LENGTH The byte length of the user input.

Word 0	FEVENT	FEVSIZ
Word 1	FEVTIM	
Word 2		
Word 3	USERID	USRTTY
Word 4	SUBSYS	
Word 5	OFFSET	
Word 6		
Word 7	LENGTH	
Word 8		

Figure 3-12. Description of Event 01, 03, 04 , 13 and 18 Records

Table 3-2. WWMCCS Subsystems and their FSM codes

Subsystem Code	WWMCCS Subsystem
0	ALL subsystems
1	ACCESS
2	LIST
3	SIOS (Standard Input/Output System)
4	TCON (Transaction Constructor)
5	TLCF (Teleconferencing)
6	TSS (Timesharing System)
7	WWDMS (World-Wide Data Management System)
8	Logon

EVENT 02 (User input not sent to system)

Whenever FSMGP cannot recognize the user input or the user attempts to use a privileged WWMCCS facility that is not allowed, FSMGP will generate this audit event. The user input will be written to the Text file. Figure 3-13 is an Event 02 record description to be written to the Event file.

Field Descriptions

USERID The one byte FSM user ID.

Word 0	FEVENT	FEVSIZ
Word 1	FEVTIM	
Word 2		
Word 3	USERID	USRTTY
Word 4	SUBSYS	FAILEX
Word 5	OFFSET	
Word 6		
Word 7	LENGTH	
Word 8		

Figure 3-13. Description of Event 02 Record

USRTTY The UNIX identifier of the terminal from which the input was sent.

SUBSYS The current WWMCCS subsystem in use. Refer to Table 3-2 for code explanations.

FAILEX The coded reason why the input was not sent. Codes are: 1=No match (unrecognizable input) and 2=Match but disallowed.

OFFSET The byte offset from the beginning of the Text file where the user input can be found.

LENGTH The byte length of the user input.

EVENT 03 (System output matched and sent to user)

Whenever system output is matched (recognized) by the FSMGP and sent to the user, thereby bypassing the Screener, FSMGP generates this audit event. The system output is written to the Text file. Refer to Figure 3-12 for an Event 03 record description to be written to the Event file.

Field Descriptions

USERID The one byte FSM user ID.

USRTTY The UNIX identifier of the terminal to which the output was sent.

SUBSYS The current WWMCCS subsystem in use. Refer to Table 3-2 for code explanations.

OFFSET The byte offset from the beginning of the Text file where the system output was written.

LENGTH The byte length of the system output.

EVENT 04 (System output not matched)

In the course of a system-user dialogue, whenever the system responds with unrecognizable output, FSMGP will generate this audit event. The system output will be written to the Text file. Refer to Figure 3-12 for an Event 04 record description to be written to the Event file.

Field Descriptions

USERID The one byte FSM user ID.

USRTTY The UNIX identifier of the terminal to which the output would have been sent.

SUBSYS The current WWMCCS subsystem in use. Refer to Table 3-2 for code explanations.

OFFSET The byte offset from the beginning of the Text file where the system output was written.

LENGTH The byte length of the system output.

EVENT 05 (System output accepted by the Screener)

When a WWMCCS subsystem returns output which must be visually inspected by a Screener for downgrading and the output was accepted for downgrading, FSMGP generates this audit event. The accepted system output is written to the Text file. See Figure 3-14 for an Event 05 record description to be written to the Event file.

Word 0	FEVENT	FEVSIZ
Word 1	FEVTIM	
Word 2		
Word 3	USERID	USRTTY
Word 4	SUBSYS	SCRID
Word 5	OFFSET	
Word 6		
Word 7	LENGTH	
Word 8		

Figure 3-14. Description of an Event 05 and 06 Records

Field Descriptions

USERID The one byte FSM user ID.

USRTTY The UNIX identifier of the terminal to which the accepted output was sent.

SUBSYS The current WWMCCS subsystem in use. Refer to Table 3-2 for code explanations.

SCRID The one byte FSM user ID of the Screener.

OFFSET The byte offset from the beginning of the Text file where the system output is written.

LENGTH The byte length of the accepted system output.

EVENT 06 (System output rejected by Screener)

In this case, a WWMCCS subsystem output was visually inspected by a Screener and the downgrade request was refused. FSMGP will be notified of the downgrade rejection and will then generate this audit event. The rejected system output is written to the Text file. Refer to Figure 3-14 for an Event 06 record description to be written to the Event file.

Field Descriptions

USERID The one byte FSM user ID.

USRTTY The UNIX identifier of the terminal to which the output was to be sent.

SUBSYS The current WWMCCS subsystem in use. Refer to Table 3-2 for code explanations.

SCRID The one byte FSM user ID of the Screener.

OFFSET The byte offset from the beginning of the Text file where the rejected system output is written.

LENGTH The byte length of the rejected system output.

EVENT 07 (Screener logon to FSM)

Whenever a Screener logs onto the FSM (through a new instance of SCTP), SCTP will generate this audit event. See Figure 3-15 for an Event 07 record description to be written to the Event file.

Field Descriptions

SCRID The one byte FSM user ID of the Screener.

SCRTTY The UNIX identifier of the Screener terminal logging on.

EVENT 08 (Screener logoff of FSM)

When a Screener logs off of the FSM, FASSD will generate this audit event. Refer to Figure 3-15 for an Event 08 record description to be written to the Event file.

Field Descriptions

SCRID The one byte FSM user ID of the Screener.

SCRTTY The UNIX identifier of the Screener terminal logging off.

Word 0	FEVENT	FEVSIZ
Word 1	FEVTIM	
Word 2		
Word 3	SCRID	SCRTTY

Figure 3-15. Description of Event 07 and 08 Records

EVENT 09 (User logon to FSM)

When a WES user begins a terminal session (which includes logon sequence) FSMGP will generate this audit event. See Figure 3-16 for an Event 09 record description to be written to the Event file.

Field Descriptions

USERID The one byte FSM user ID.

USRTTY The UNIX identifier of the user terminal logging on.

NOTE: A user who fails the initial logon sequence may not have any audit events generated.

EVENT 10 (User logoff of FSM)

When a WES user ends a terminal session, FASSD will generate this audit event. This event involves two cases: explicit user logoff and user logoff due to error conditions. Refer to Figure 3-16 for an Event 10 record description to be written to the Event file.

Field Descriptions

USERID The one byte FSM user ID.

USRTTY The UNIX identifier of the terminal logging off.

Word 0	FEVENT	FEVSIZ
Word 1	FEVTIM	
Word 2		
Word 3	USERID	USRTTY

Figure 3-16. Description of Event 09 and 10 Records

EVENT 11 (User initiates a WWMCCS subsystem)

When a user initiates a WWMCCS subsystem, FSMGP will generate this audit event. A WWMCCS subsystem can be initiated in response to the "SYSTEM ?" prompt or at other less well-defined times. For instance, if the user is currently using the TCON subsystem, he can invoke the LIST subsystem at any time. NOTE: Logon is not considered a valid WWMCCS subsystem for this event. See Figure 3-17 for an Event 11 record description to be written to the Event file.

Field Descriptions

USERID The one byte FSM user ID.

USRTTY The UNIX identifier of the terminal initiating a WWMCCS subsystem.

SUBSYS The initiated subsystem code. Refer to Table 3-2 for code explanations.

STATUS The status of the initiation attempt (0=Failure, 1=Success). Note: If STATUS=0, SUBSYS will be undefined.

Word 0	FEVENT	FEVSIZ
Word 1	FEVTIM	
Word 2		
Word 3	USERID	USRTTY
Word 4	SUBSYS	STATUS

Figure 3-17. Description of Event 11 Record

EVENT 12 (User assigned to Screener)

Whenever the FASSD makes an initial WES user/Screener assignment or the EM (via the EMP) reasssigns a WES user to a Screener, FASSD generates this audit event. See Figure 3-18 for an Event 12 record description to be written to the Event file.

Field Descriptions

USERID The one byte FSM user ID of the assigned user.

USRTTY The UNIX identifier of the assigned user terminal.

SCRID The one byte FSM user ID of the assigned Screener.

SCRTTY The UNIX identifier of the assigned Screener terminal.

Word 0	FEVENT	FEVSIZ
Word 1	FEVTIM	
Word 2		
Word 3	USERID	USRTTY
Word 4	SCRID	SCRTTY

Figure 3-18. Description of Event 12 Record

EVENT 13 (User input simulated)

When the FSMGP receives system output that is unrecognizable, FSMGP will simulate user input to the WWMCCS subsystem in use in order for FSMGP to keep from getting lost in the context tables. This usually involves "popping up" to the next higher level within WWMCCS. This could terminate the current subsystem (thus, returning the user to the "SYSTEM?" prompt) or return to a well-defined point within the current subsystem (eg. the "NEXT?" prompt in TCON). The simulated user input is written to the Text file. Refer to Figure 3-12 for an Event 13 record description to be written to the Event file.

Field Descriptions

USERID The one byte FSM user ID.

USRTTY The UNIX identifier of the terminal from which input is being simulated.

SUBSYS The current WWMCCS subsystem in use. Refer to Table 3-2 for code explanations.

OFFSET The byte offset from the beginning of the Text file where the simulated user input is written.

LENGTH The byte length of the simulated user input.

EVENT 14 (Screen mode modified)

When the EM (via the EMP) modifies the downgrade screening mode, EMP generates this audit event; or if a WES user's FSMGP detects that the user's bandwidth threshold has been exceeded, FSMGP modifies the user's screen mode (to ALL) and generates this event. Screen mode may be set to any one of three values:

NONE   No output is inspected by the Screener.

NORMAL Only output FSMGP cannot match is inspected by the Screener.

ALL   All output is inspected by the Screener.

Additionally, the screen mode may be set for a user, for a subsystem or for a user/subsystem. See Figure 3-19 for an Event 14 record description to be written to the Event file.

Field Descriptions

USERID The one byte FSM user ID. If ALL users are affected, this value will be set to -1.

USRTTY The UNIX identifier of the user's terminal. This value is undefined if USERID is -1.

SUBSYS The WWMCCS subsystem(s) for which the screen mode was modified. Refer to Table 3-2 for code explanations. The logon subsystem is not affected by the screening mode.

SCMODE The new screen mode (0=NONE, 1=NORMAL and 2=ALL).

Word 0	FEVENT	FEVSIZ
Word 1	FEVTIM	
Word 2		
Word 3	USERID	USRTTY
Word 4	SUBSYS	SCMODE

Figure 3-19. Description of Event 14 Record

EVENT 15 (Bandwidth Threshold modified)

When the EM (via the EMP) modifies the bandwidth threshold for a user, EMP generates this audit event. The bandwidth threshold is defined as the number of messages allowed to be automatically downgraded for a user each minute. If the bandwidth threshold is surpassed, screen mode is automatically modified to ALL for the particular user (by FSMGP). See Figure 3-20 for an Event 15 record to be written to the Event file.

Field Descriptions

USERID The one byte FSM user ID. If ALL users are affected, this value will be -1.

RATE The number of messages per minute which may automatically bypass the Screener. The rate must be a positive integer in the range of one to 127.

EVENT 16 (EM logon to FSM)

When the EM logs onto FSM, EMP generates this audit event. See Figure 3-21 for an Event 16 record to be written to the Event file.

Field Descriptions

EMID The one byte FSM user ID of the Environment Manager.

EMTTY The UNIX identifier of the EM's terminal.

Word 0	FEVENT	FEVSIZ
Word 1	FEVTIM	
Word 2		
Word 3	USERID	RATE

Figure 3-20. Description of Event 15 Record

EVENT 17 (EM logoff of FSM)

When the EM logs off of FSM, EMP generates this audit event. See Figure 3-21 for an Event 17 record to be written to the Event file.

Field Descriptions

EMID The one byte FSM user ID of the Environment Manager.

EMTTY The UNIX identifier of the EM's terminal.

EVENT 18 (System output received by FSMGP)

When FSMGP receives a system output from WWMCCS, via the RNPE, and has matched a halting delimiter (the output may or may not subsequently match a SUBCONTEXT), this event is generated. The system output received is written to the Text file. Refer to Figure 3-12 for an Event 18 record description.

Field Descriptions

USERID The one byte FSM user ID of the user.

USRTTY The UNIX identifier of the user's terminal.

SUBSYS The current WWMCCS subsystem in use. Refer to Table 3-2 for code explanations.

OFFSET The byte offset from the beginning of the Text file where the system output can be found.

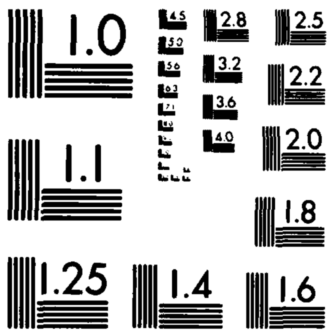
LENGTH The byte length of the user input.

Word 0	FEVENT	FEVSIZ
Word 1	FEVTIM	
Word 2		
Word 3	EMID	EMTTY

Figure 3-21. Description of Event 16 and 17 Records

AD-A171 332 FORSCOM SECURITY MONITOR (FSM) COMPUTER PROGRAM DEVELOPMENT SPECIFICATION (TYPE B5)(U) LOGICON INC SAN DIEGO CA FEB 81 N00039-78-C-0323

UNCLASSIFIED F/G 9/2 NL



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

EVENT 19 (Downgrade request received by Screener)

When the Screener begins reviewing a downgrade request from a WES user this event is generated by SCTP. The time of this event in conjunction with the time of the subsequent event 05 (accept) or 06 (reject) yields the time needed by the Screener to make his decision. See Figure 3-22 for an Event 19 record description.

Field Descriptions

SCRID The one byte FSM user ID of the Screener.

SCRTTY The UNIX identifier of the Screener's terminal.

SUBSYS The current WWMCCS subsystem in use. Refer to Table 3-2 for code explanations.

USERID The one byte FSM user ID of the WES user requesting the downgrade.

3.1.1.2.1.14 Current Audit Text File. When audit events are logged which contain audit text (system output or user input), the text is written in the current audit text file. It has no format. Text is written to the file, by being appended, as ASCII strings. The starting location (OFFSET) and LENGTH of each event's text is recorded with the corresponding event record in the current GAEV file.

Word 0	FEVENT	FEVSIZ
Word 1	FEVTIM	
Word 2		
Word 3	SCRID	SCRTTY
Word 4	SUBSYS	USERID

Figure 3-22. Description of Event 19 Record

3.1.1.2.1.15 <u>Saved Global Audit Environment (GAEV) Files.</u> ATDP can save the current audit file-pair and initialize a new pair. Once a file-pair has been saved, it can be accessed only by ATDP and only for reading. Therefore, saved audit files (i.e. non-current) need no corresponding lock files. A saved audit file-pair is renamed to the DTG of the save operation. For example, saving a current file-pair on April 2 at 12:05:30 has the effect of renaming the current Event file from "current.e" to "0402120530.e" and the current Text file from "current.t" to "0402120530.t". The new current file-pair exists with the same name as before but now with zero length. NOTE: Do not confuse the saved DTG with the DTG of the last-entered audit event. Records in the saved Event files have formats as described above in the Global Audit Event (GAEV) file description. Records in the saved Text files are format-less.

3.1.1.2.1.16 <u>Saved Audit Text Files.</u> Saved audit text files have no format. They contain ASCII strings which were audit text. Associated with each saved text file is a saved GAEV file.

3.1.1.2.1.17 <u>Audit Request Files.</u> After an audit event has been generated by one of the four primary FSM processes, GFAUDIT is called by the generating process and passed pertinent event data items. It processes its arguments and writes a file containing an audit request into the audit queue. The audit request file contains all known event data that is needed by FAD to log the audit event into the current audit files. The file has a name composed of the Date-Time Group (DTG) of the audit event, the process ID of the event generator (one of FSMGP, EMP, SCTP or

FASSD) and a random alphanumeric character. This format guarantees unique filenames in the queue. Specifically, the filename format is:

MMDDhhmmsspppr

where,

MM is the month (01-12)

DD is the day (01-31)

hh is the hour (00-23)

mm is the minute (00-59)

ss is the second (00-59)

ppp is the process ID of the event generator (000-999)

r is a random alphanumeric character

The audit request file written by GFAUDIT is composed of one or more records. The first record of every file will follow the format of the audit event it represents. These follow the formats described above in the Global Audit Event (GAEV) file description. If the particular event also contains text, in the form of system output or user input, there will be a second and possibly additional records which contain the text. The text has no format; that is, it is composed of ASCII strings and is guaranteed to be terminated by a UNIX null byte ('0').

All audit request files are written into an audit request queue by the global audit function GFAUDIT. Audit request files are processed (the events are logged) by the audit daemon FAD. The audit request queue is implemented as a directory entry in the main audit directory "/fsm/fsat".

The queue pathname is "/fsm/fsat/auditq".

An empty audit queue directory (i.e. no files) signifies that there are no pending audit requests. Similarly, n files signifies n pending audit requests. Audit requests are handled in a strict First-in, First-out (FIFO) basis and are unlinked by FAD as the specified event is recorded in the current audit files.

3.1.1.2.1.18 Lock-File sclog-i. This lock-file provides a means for SCTP to inform assigned FSMGPs that a Screener is logging off or has logged off. This prevents downgrade requests from being sent to logged-off Screeners. Prior to requesting a downgrade, FSMGP checks for the presence of this lock-file. If the lock-file is not present, the downgrade request is sent to the assigned Screener. If the port exists, the downgrade request is deferred until a new Screener is assigned. In the latter case, the user is also notified that no Screener is available. The lock-file name consists of the characters "sclog" followed by the Screener's FSM user ID as a five character string with leading zeroes.

3.1.1.2.2 Port Descriptions. The inter-process communication (IPC) ports used by FSM are for the use of FSMGP, FASSD, EMP and SCTP. Ports are used to pass IPC messages indicating various events applicable to FSM, such as Screener assignments, Screener logon/logoff notifications, environment changes, and so on. Following are descriptions of the individual ports implemented in FSM and corresponding message formats.

3.1.1.2.2.1 Port Message Descriptions. The FSM port messages will consist of structured data, both binary and ASCII. See Table 3-3 for a summary of the message types. Figure 3-23 describes the actual structure of the message.

Field Descriptions

GMTYP One byte Message Type.

GUID One byte FSM user ID.

GECNG A one byte environmental change value (bypass rate or screen mode); or a second FSM user ID.

GSSI One byte subsystem index (refer to Table 3-2 for code explanations).

GCLAS Integer security classification code.

GDPTH Pathname of a downgrade file.

GCPTH Pathname of a context file.

Word 0	GMTYP	GUID
Word 1	GECNG	GSSI
Word 2	GCLAS	
Word 3	GDPTH	
	• • •	
Word 15		
Word 16	GCPTH	
	• • •	
Word 28		

Figure 3-23. Description of IPC Messages

Table 3-3. Summary of IPC Messages

General Format:

<mtyp>[<uid>][<ecng>[<ssinx>][<sc><dgfn><ctxfn>]

where:

* Items enclosed in [] are optional.

* "mtyp" represents the IPC message type (byte).

* "uid" represents a user ID (byte).

* "ecng" represents an environment change, a bypass rate change (number of messages per minute), a screen mode change (0 - none, 1 - normal, 2 - all); or a second user ID (all values one byte).

* "ssinx" represents a subsystem index for a screen mode change (byte).

  0 - All subsystems

  1 - ACCESS

  2 - LIST

  3 - SIOS

  4 - TLCF

5 - TLCF

6 - TSS

7 - WWDMS

8 - logon

* "sc" represents the security classification of the user (byte).

  1 - unclassified

  2 - confidential

  3 - offical use only

  4 - secret working papers

  5 - secret

* "dgfn" represents the pathname of a file to be downgraded.

* "ctxfn" represents the pathname of a context file associated with a downgrade file.

IPC Message Types are:

UAREQ	<uid><ecng>	User assignment request.
UALGO	<uid>	User logoff notification.
SCASS	<uid><ecng>	Screener assigned.

SCNAV		Screener not available.
SCCNG	<uid><ecng>	Screener assignment change.
BRCNG	<ecng>	Bypass rate change.
SMCNG	<ecng><ssinx>	Screen mode change.
DGREQ	<uid><ecng><sc><dgfn><ctxfn>	Downgrade request.
DGACC	<uid>	Downgrade accepted.
DGREJ	<uid>	Downgrade rejected.
DRRDY	<uid><ecng>	Screener ready (logon).
DRLGO	<uid>	Screener logoff notification.

3.1.1.2.2.2 Port faport. This port provides a means for a FSMGP to request a Screener assignment for a newly logged on WES user. FSMGP writes a UAREQ message to FASSD. FASSD writes a reply (SCASS or SCNAV) on the appropriate fsagn-i port. SCTP also uses the faport to notify FASSD of Screener logons/logoffs (DRRDY/DRLGO). Finally, EMP utilizes this port to notify FASSD of Screener reassignments (SCCNG).

3.1.1.2.2.3 Port fsagn-i. This port provides a means for FASSD and EMP to communicate with an FSMGP. The port name consists of the characters "fsagn" followed by the WES user's FSM ID as a five character string with leading zeros. FASSD writes messages SCASS and SCNAV on this port to one or more of the currently running FSMGPs. Messages SCASS and SCNAV are replies to the request message UAREQ which FASSD reads from its input port faport. Messages BRCNG and SMCNG can be written at any time on this port by the EMP.

3.1.1.2.2.4 Port screq-i. This port provides a means for a FSMGP to request a downgrade (DGREQ). The port name consists of the characters "screq" followed by the Screener's user ID as a five character string with leading zeroes. The FSMGP writes a DGREQ message to the appropriate SCTP using this port. The SCTP will write a reply message (DGACC, DGREJ or DRLGO) on the appropriate fsrly-i port.

3.1.1.2.2.5 Port fsrly-i. This port provides a means for a SCTP to communicate with a FSMGP. The port name consists of the characters "fsrly" followed by the WES user's FSM ID as a five character string with leading zeroes. The SCTP writes messages DGACC, DGREJ and DRLGO on this port to the appropriate FSMGP. These are reply messages to a DGREQ message which the SCTP read from its input port screq-i.

3.1.2 Process/Data Structure Interfaces

To this point we have described FSM's data structures in great detail but have only given a simplistic view of how they are manipulated by FSM processes. In this subsection we now describe how and when processes access FSM data structures and/or communicate using them (from a data structure viewpoint). For particulars of data access from the process view, see Section 3.2. The descriptions presented below refer to Figures 3-24 and 3-25, disk files and ports, respectively.

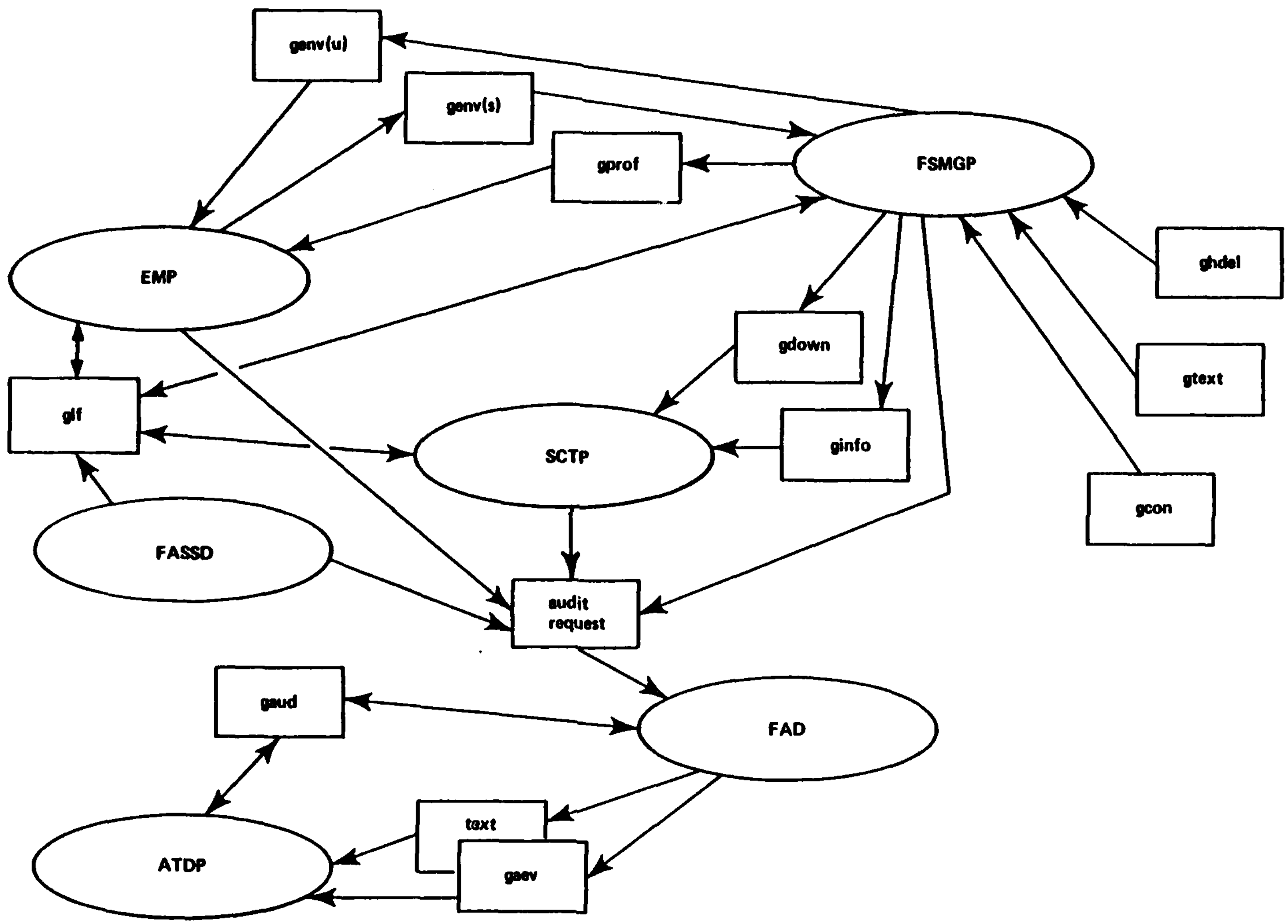


Figure 3-24. FSM Process/Disk File Flow

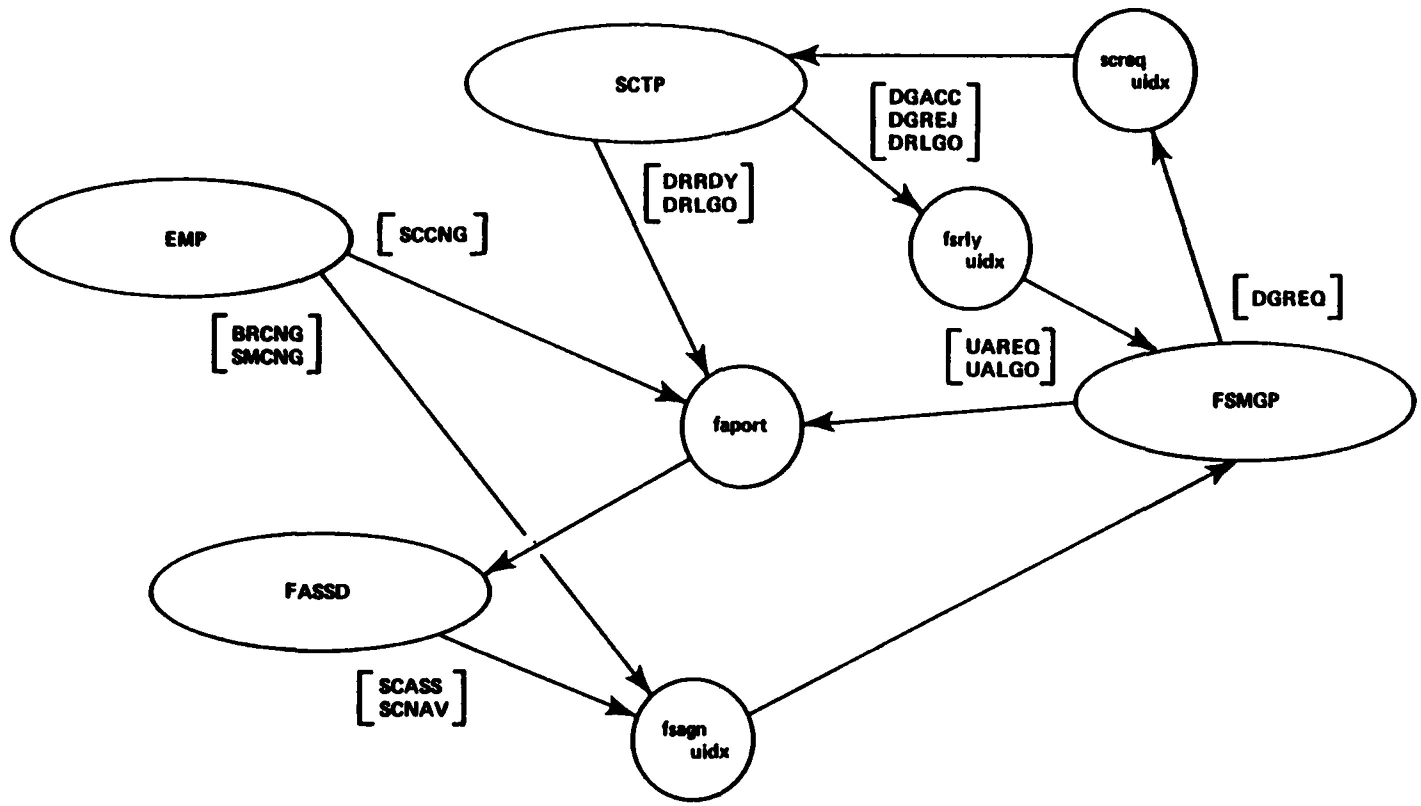


Figure 3-25. FSM Process/Port Flow

3.1.2.1 Disk File Interfaces. All FSM disk file data structures will be described with respect to process manipulation. These disk files are:

a. Context Data (GCONT)

b. Context Text Data (GTEXT)

c. Context Halting Delimiter Data (GHDEL)

d. User Profile Data (GPROF)

e. System Environment Data (GENV)

f. User Environment Data (GENV)

g. User Logon File (GLF)

h. Downgrade File (GDOWN)

i. Downgrade Context Information File (GINFO)

j. Audit Request Data

k. Audit File (GAUD)

l. Audit Event Data (GAEV)

m. Audit Text Data

n. Screener Lock-File (sclog-i)

3.1.2.1.1 Context Data (GCONT). FSM Context Data (GCONT) is manipulated by only one FSM process type, the FSM Guardian Program (FSMGP). This data structure contains the entire user/WWMCCS dialogue context and controls all automatic/manual screening and filtering decisions. It is read-only and is used to control the referencing of its related data structures, the Context Text Data (GTEXT) and the Context Halting Delimiter Data (GHDEL). Since this data structure is read-only it does not need to be locked during FSM operation.

3.1.2.1.2 Context Text Data (GTEXT). FSM Context Text Data (GTEXT) is manipulated by only one FSM process type, FSMGP. This data structure contains the textual data of the user/WWMCCS dialogue context and is pointed to by appropriate entries in GCONT. Since this data structure is read-only it does not require locking sequences.

3.1.2.1.3 Context Halting Delimiter Data (GHDEL). FSM Context Halting Delimiter Data (GHDEL) is referenced by only one FSM process type, FSMGP. This data structure contains halting delimiter strings utilized by FSMGP in recognizing user/system data sequences. As with its related data structures GCONT and GTEXT, this data structure does not require locking sequences.

3.1.2.1.4 User Profile Data (GPROF). The User Profile Data (GPROF) structure is created by FSMGP for each WES user logged onto FSM. GPROF contains the current state the WES user is in during his dialogue with WWMCCS. GPROF is updated by FSMGP each time the WES user enters another profile state. The Environment Manager Program (EMP) reads GPROF when the Environment Manager (EM) wishes to view the profile of some WES user logged onto FSM.

3.1.2.1.5 System Environment Data (GENV). The Environment Data (system) (GENV) structure is created when the FSM is initiated and contains a set of default environment values. The Environment Manager Program (EMP), under direction of the EM, updates this data structure to reflect new system-wide environment values. EMP also displays GENV to the EM. FSMGP utilizes the system GENV to establish initial local environment values for its local user (it is used to build the user level GENV).

3.1.2.1.6 User Environment Data (GENV). The Environment Data (user) Structure is created by FSMGP when a WES user logs onto FSM. FSMGP uses the system GENV data structure to initialize the user's local GENV. As FSMGP receives new environment values from EMP, it updates the user's GENV accordingly.

3.1.2.1.7 Global Logon File (GLF). The Global Logon File (GLF) exists when FSM is initiated and is updated by the FSM Guardian Process (FSMGP), FSM Assignment Daemon (FASSD), Screener Trusted Process (SCTP), Environment Manager Process (EMP) and a stand-alone maintenance program, USER (see Appendix E). When a WES user logs onto FSM, FSMGP updates GLF to reflect that fact. SCTP operates similarly when a Screener logs on. FASSD modifies GLF when WES users or Screeners log off. When an EM logs on or off, EMP modifies GLF. Additionally, FASSD modifies GLF when an assignment is made and when an EM-directed reassignment occurs. USER modifies GLF whenever it is directed to do so.

3.1.2.1.8 Downgrade File (GDOWN). The Downgrade File (GDOWN) is created by the FSM Guardian Program (FSMGP) when a user logs onto FSM. This data structure contains WWMCCS output for manual screening by the FSM Screener assigned to the WES user. Therefore the Screener Trusted Process (SCTP) must read GDOWN.

3.1.2.1.9 Downgrade Context File (GINFO). The Downgrade Context File (GINFO) is created by FSMGP when a WES user logs onto FSM. This data structure contains dialogue context data used by the FSM Screener in making a decision as to the sensitivity of the downgrade data (i.e., GDOWN). Under Screener control, SCTP reads GINFO, displaying a screen at a time to the Screener.

3.1.2.1.10 Audit Request Data. Audit Request Data is created as separate event/text file entries by four FSM processes: the FSM Guardian Program (FSMGP), the Environment Manager Program (EMP), the Screener Trusted Program (SCTP) and the FSM Assignment Daemon (FASSD). FSMGP builds event/text entries for many different audit events, such as entering new WWMCCS subsystems, inputting commands, and so on. EMP creates audit event entries when the EM alters the environment. SCTP audits Screener logon and whenever a downgrade request is accepted for inspection. FASSD creates audit events when a WES user or Screener logs off of FSM or a WES user/Screener assignment is made. The FSM Audit Daemon (FAD) is responsible for updating the current FSM Audit Trail with these audit request data. FAD deletes the request data after it is recorded in the current audit trail.

3.1.2.1.11 Audit File (GAUD). The Audit File (GAUD) exists when FSM is initiated and is updated by the Audit Trail Display Program (ATDP) under direction of the EM. GAUD reflects the current and old (saved) audit trail events/texts. When the EM desires to save the current audit trail, EMP updates GAUD to reflect the saved event/text pair. FAD also updates GAUD to reflect information concerning the current audit trail event/text pair. Since both ATDP and FAD update GAUD, it requires a lock sequence.

3.1.2.1.12 Audit Trail Event Data (GAEV) Structure. The Audit Trail Event Data (GAEV) Structure is created by the FSM Audit Daemon (FAD) and contains current audit trail events. EMP, under direction of the EM, can display this data in concert with its text file counterpart. When the EM wishes to save the current audit trail event/text pair, EMP creates another copy of these data structures and recreates the current GAEV to zero length. Although both ATDP and FAD have write access to the current GAEV, a lock sequence prevents an update conflict.

3.1.2.1.13 Audit Trail Text Data Structure. The Audit Trail Text Data Structure is handled identically as GAEV. It is created by FAD and is displayed by ATDP. ATDP also deletes the current version of this data structure when the EM commands it to be saved.

3.1.2.1.14 Screener Lock-File (sclog-i). The sclog-i lock-file is created when an active Screener is logging off. Its presence indicates that the owner (Screener) is unavailable for any further downgrade requests. Prior to sending his assigned Screener a downgrade request IPC message, FSMGP checks for the existence of this port (the "-i" is the

Screener's FSM ID and uniquely identifies the file). If it is present, FSMGP must defer its downgrade request until another Screener is assigned. Otherwise, the downgrade request can be made as usual.

3.1.2.2 Port Interfaces. Figure 3-25 illustrates the FSM port/process interface. Ports are used in FSM as FIFO message queues and provide an efficient mechanism for inter-process communication (IPC). FSM ports are:

a. FSM Assignment Daemon (faport) Port

b. Screener Assignment (fsagn-i) Port

c. Screener Request (screq-i) Port

d. Screener Reply (fsrly-i) Port

Following is a description of these ports with respect to their utilization by FSM processes.

3.1.2.2.1 FSM Assignment Daemon (faport) Port. The faport port is created by the FSM Assignment Daemon (FASSD) and is utilized by existing FSM Guardian Processes (FSMGP) for requesting WES user/Screener assignments, Screener Trusted Processes (SCTP) for Screener logons/logoffs, and Environment Manager Process (EMP) for reassignment requests.

3.1.2.2.2 Screener Assignment (fsagn-i) Port. The fsagn-i port is created by FSMGP when it is invoked by a WES user. This port is written to by FASSD to pass WES user/Screener assignments and by EMP to indicate new environment values for the WES user. This port type exists for each WES user logged onto FSM and therefore utilizes the user's identifier in its name (i.e., "-i" means the "ith" WES user user ID). Port fsagn-i is deleted from FSM when the WES user logs off of FSM and FSMGP exits.

3.1.2.2.3 Screener Request (screq-i) Port. The screq-i port is created by the Screener Trusted Process (SCTP) and is written to by an assigned FSMGP for Screener requests. Since a FSM Screener can service more than one WES user, potentially many FSMGPs will be writing on any individual screq-i port. Note here, since more than one Screener can be logged onto FSM, the Screener's user ID is used in the port name (i.e., "-i" represents the "ith" Screener user ID). This port is deleted from the system when the Screener logs off of FSM and SCTP exits.

3.1.2.2.4 Screener Reply (fsrly-i) Port. The fsrly-i port is created by FSMGP and is written to by an assigned SCTP. In this situation, since a WES user can only have one Screener assigned to him at any one time, only one SCTP will be writing on this port. SCTP uses this port to inform the FSMGP of the Screener's downgrade decision (i.e., accept/reject) or of Screener logoff. This port is deleted from the system when the WES user logs off of FSM and FSMGP exits.

3.2 DETAILED FUNCTIONAL REQUIREMENTS

This section provides descriptions of the programs comprising the FORSCOM Security Monitor (FSM). Each program description is organized as follows. A short general description is followed by a list of the FSM global data used. Then, if applicable, a list of pertinent local data contained in the program is provided. A general process flow details the major paths the program traverses in accomplishing its task(s), with references to global and local data as well as major functions. The descriptions of major functions, if any, used in the general process flow discussion complete the program description.

The FSM programs described include:

a. FORSCOM Security Monitor Guardian Program (FSMGP)

b. Screener Trusted Program (SCTP)

c. FSM Assignment Daemon (FASSD)

d. FSM Audit Daemon (FAD)

e. Environment Manager Program (EMP)

f. Audit Trail Display Program (ATDP)

Notice, the Remote Network Processor Emulator (RNPE) is not described since it is furnished by a subcontractor and its internal operations are unknown.

3.2.1 FORSCOM Security Monitor Guardian Program (FSMGP)

The FORSCOM Security Monitor Guardian Program (FSMGP) is responsible for following user/system interactions in the restricted WWMCCS environment. It must know exactly where a user is in any given subsystem so that downgrade decisions can be made. Any given user input can be identified only in the context of what system output preceeded it and what is to follow it. Conversely, any given system output can be understood only in terms of what has happened before and what the possible future events are. To do this tracking FSMGP must rely on a disk file, the context file, which contains all user inputs and system outputs, linked together in a tree-like structure. FSMGP is thus table driven, and its processing depends heavily on the information contained in the context file.

3.2.1.1 Global Data Usage. FSMGP uses the following global data files:

GCONT Context items and associated subcontexts.

GHDEL Context halting delimiter strings.

GTEXT Context text strings.

GENV System environment values.

GINFO Downgrade context information buffer.

GLF   Global logon file.

GPROF Current processing state buffer.

3.2.1.2 Local Data Usage. FSMGP uses the following pertinent local data:

IB   Working input buffer.

3.2.1.3 General Process Flow. The FORSCOM Security Monitor Guardian Process (FSMGP) is activated when its parent process, FSMGTTY, receives user input from the terminal keyboard. FSMGP follows the standard WWMCCS TSS and TLCF logon procedures in the LOGON function which also establishes initial conditions. FSMGP receives the terminal identification as an argument and following local validation of the low-side WES user's WWMCCS userid, communicates to the FSM Assignment Daemon (FASSD), via an Inter-Process Communication (IPC) message on the port faport, requesting that a Screener be assigned to this user. FASSD communicates to FSMGP via the port fsagn, which is read only by the FSMGP for this user (the portname has a user identifier appended to it making it unique for this FSMGP). If there is no Screener available, the user is allowed to proceed until one is needed. Otherwise the Screener identification, user identification and terminal identification are written to the Global Logon File (GLF), using a lock mechanism. FSMGP then reads the system default Environment Values file (GENV) to determine the current default screen mode and bandwidth. This information is then written to the user's copy of the GENV, created by LOGON, so that FSMGP can update these values if the Environment Manager decides to change them. An audit event is then passed to the Audit Function, GFAUDIT, indicating that a user has logged onto FSM. LOGON also creates the user Profile file (GPROF), Downgrade file (GDOWN) and the Downgrade Context file (GINFO).

LOGON processing then continues as if for a normal logon to WWMCCS TSS or TLCF systems. Upon successful completion of the logon sequence an event is passed to GFAUDIT recording that fact.

FSMGP then enters the main loop of its processing which continues until the user logs off. Since the loop is iterated each time a user input or a system output occurs, a new context must be established with each iteration. This is accomplished by reading the context file GCONT at the point established by the last context. The current context, with header and a variable amount of subcontexts, is copied into a buffer local to FSMGP so that quick access can be made to the information. Processing then takes alternate paths depending on whether the current context is system output or user input.

If it is a user context a loop is entered which reads inputs from the user until a match is made to one of the subcontext strings in the current context. Before FSMGP reads user input the GPROF file is updated to reflect that fact. If no match is found, an error message

*** UNRECOGNIZABLE OR DISALLOWED INPUT -- PLEASE TRY AGAIN ***

is issued to the user, the previous system output is re-written to the terminal, an audit event is recorded indicating invalid user input and the user is expected to enter new input. If a match is made the particular subcontext is checked for the presence of a special function. Special functions for user subcontexts perform command syntax verification. If a special function is present it is executed. If the user's syntax was incorrect, it is treated the same as if it was invalid input (see above). If no error is detected the loop is exited and the user input is moved to the GINFO buffer, a local buffer to FSMGP that is continually written in a circular fashion enabling the most current user/system interactions to be saved. FSMGP then writes the matched user input to the system, audits that fact and establishes a new context in preparation for the system response.

If the current context is a set of expected system outputs, the System Output Match (SOM) function is called. This function updates GPROF to reflect the fact that FSMGP is waiting for system output, and reads system output from the Remote Network Processor Emulator (RNPE), comparing it to the set of subcontexts in the current context. If a match is found, the system output is written to the user's Downgrade file (GDOWN), which eventually is written to the user (if the system output is fixed), or the Screener (if the system output is variable) for downgrading. System output may be repeating or nonrepeating, which simply serves to indicate the size of a particular expected system output. Contexts of the repeating type are expected to be large, as in the case of TCON skeletons or TLCF messages, and oftentimes there is only one subcontext item. If the context indicates that the expected system output is repeating, SOM may make repeated reads to acquire the entire system output text. If the current context is variable repeating (e.g. TCON skeleton with data or a TLCF message), SOM accumulates system output line-by-line. If the current context is fixed repeating (e.g. TCON skeleton without data), SOM acquires the entire system output matching each character until the terminating delimiter sequence is encountered.

If the current context is nonrepeating, system outputs are expected to be smaller and there may be more than one subcontext item. In this case SOM loops for the number of subcontexts or until a match is found to the current system output. If no match is found to the system output, SOM returns that fact.

If SOM returns with no match to a system output FSMGP audits the no match condition. Then a special function is executed which sends a simulated user input to the system to get FSMGP back in synchronization. This sending of simulated user input is known as a "pop-up". The special function used is indexed by the current context and performs a specific action depending on the particular place FSMGP is in the current subsystem. The current context also contains a pointer to the next context in the event that SOM returns no match. This resynchronization event is audited and FSMGP continues execution at the next context.

If SOM finds a match to the system outut FSMGP must then decide whether or not it is to be sent to the Screener. System output may or may not be automatically screened by FSMGP. This depends on the current screen mode and bandwidth. FSMGP determines these values by first checking the port fsagn to see if the EM has changed either of these values. If so, the user's Environmental Values file (GENV) is updated. FSMGP switches on the screen mode value.

If the current screen mode is for no messages to be sent to the Screener, the system output contained in the GDOWN file is sent to the user's terminal. FSMGP then audits that fact, establishes a new context, and repeats its main execution loop.

If the current screen mode is for all messages to be sent to the Screener, the user's GPROF is updated to show that FSMGP is waiting for the Screener's decision, and a message is sent to SCTP via its port screq, requesting a downgrade. This message contains the name of the user's GDOWN, as well as the name of the user's GINFO. FSMGP then waits for the Screener's reply on the fsrly port, which contains the accept/reject decision. If the Screener accepts the system output, an audit event of that fact is recorded, the system output is sent to the user, a new context is established and FSMGP continues at the top of its main processing loop. If the Screener rejects the system output, an audit event is recorded, an error message is sent to the user, and the special function that resynchronizes FSMGP is executed.

If the current screen mode is for normal and the matched subcontext indicates that the current system output is fixed, the bandwidth rate is checked. This is accomplished in the CBR function, which computes a rate for the number of automatically screened messages that have occurred in a specific amount of time. If this bandwidth has been exceeded, the user's screen mode is automatically changed to "all", and his GENV is updated to reflect that fact. The system output is then sent to the Screener, and processing continues as above. If the bandwidth rate was not exceeded, the system output is written to the user, an audit event is recorded, and processing continues in the main loop with a new context. Finally, if the current system output is variable, it is sent to the Screener and processing continues as above.

When the user terminates his session with WWMCCS, the LOGOFF function is called to terminate the program's execution. This function is invoked as a special function when the user enters a terminating sequence (e.g. bye) at an appropriate point. LOGOFF sends a logoff notification to FASSD, via the faport, so that FASSD may change GLF accordingly.

3.2.1.4 Major Functions.

LOGON

The LOGON function is responsible for establishing FSMGP initial conditions and for tracking a user's progress through the WWMCCS TLCF and TSS logon procedures. LOGON writes an IPC to the FASSD, via the port faport, requesting that a Screener be assigned to the FSMGP's user. LOGON receives FASSD's reply on the port fsagn, and allows the user to continue until a Screener is necessary. (At that time, if there is no Screener available, the user is given the option of waiting for a Screener assignment (and subsequent downgrade decision) or logging off.) If a Screener has been assigned, this information, as well as the user's terminal identification, is written to GLF -- a Global Logon File with records for each valid user. Since this file is written to by every FSMGP during a user logon, a lock mechanism must be used. LOGON then reads the system default Environment Values file (GENV) to determine the system-wide current screen mode and bandwidth rate. This infor- mation is then written to the user's copy of GENV. The user's GENV is maintained by FSMGP and is updated when it is discovered that the Environment Manager has changed one of these values. LOGON then calls the the global function GFAUDIT so that an audit event indicating that the user has logged on to WWMCCS can be recorded in the audit file. LOGON then processes a user's logon to WWMCCS TLCF or TSS systems in the normal fashion with two exceptions. The user's response to the "IDENT?" question is used to look-up this user's User Master Catalog (UMC) designation. All subsequent references to user-owned files, regardless of the WWMCCS subsystem involved, must be preceeded by this UMC. Also, the response "zzz" to the system query "CLASSIFICATION OF YOUR OUTPUT?" is substituted for the user's response so that the paging and classification headers are not displayed by the system. LOGON also creates the user's copy of the Environment Values file (GENV), the user's Profile file (GPROF), the Downgrade file that is sent to the Screener (GDOWN), and the Downgrade Context file that the Screener may peruse during a downgrade (GINFO).

UIM

The User Input Match function (UIM) searches the subcontexts of the current context for a match to the user input that it reads upon its invocation. UIM loops for the number of subcontexts. If a match is found to the user's input the loop is exited. If a null subcontext is encountered it is saved so that it may be returned as a default match. Only one null subcontext per context set is allowed. A matched user input is moved to the Downgrade Context Buffer (GINFO), as well as returned to FSMGP so that it can be written to the system. If no match is found, this fact is returned to FSMGP. FSMGP then issues an error message to the user and calls UIM again.

WTP

The Write to Profile function, WTP, updates the user's GPROF whenever FSMGP is waiting for the next user input, system output or Screener action. Additionally, during logon only, WTP is called to record the fact that FSMGP is waiting for an RNPE connection. Under normal circumstances, this event will occur once for a very short duration. WTP is called when a user input match search is made (by UIM), when a system output match search is made (by SOM), or when a downgrade request is made to the Screener (by STS). GPROF is created for the user by LOGON upon invocation of FSMGP. WTP opens GPROF, writes the index of the appropriate event (passed to it by FSMGP) as well as the current subsystem index (also passed to it by FSMGP) and current DTG. WTP then closes GPROF and exits.

WCB

The Write Context Buffer function, WCB, maintains the Downgrade Context Buffer (GINFO) in preparation for its eventual transferrence to the GINFO file for the Screener's perusal during a downgrade. All user inputs and system outputs are moved to GINFO by WCB, but GINFO is written to the GINFO file only when a downgrade request occurs, thus ensuring that the most current information is in the file. WCB maintains GINFO in a wrap around fashion, moving data to GINFO until the end of the buffer is reached, and then overwriting old data at the beginning of the buffer. When data is written to the GINFO file from GINFO, the start of transferrence in GINFO is that point at which data was last moved into GINFO.

SOM

The System Output Match function (SOM) searches the current context for a match to the current system output. System output contexts may be fixed or variable depending on whether or not the system output that matches them is to be sent to the Screener. System ouput contexts may also be repeating or non-repeating, which provides an indication of expected system output size. Repeating contexts are used when larger system output is expected (e.g. TLCF messages or TCON skeletons). When a system output is matched to a subcontext, the output is written to GDOWN, and SOM returns a match found condition. If no match is made, SOM returns that fact to FSMGP.

Repeating contexts will contain only one subcontext. If the current context is variable repeating SOM looks for the terminating sequence (from the place in the GHDEL file pointed to by the context) in the system output returned by the Read System Output function (RSO). If the terminating sequence is not found, the searched data is written to GDOWN and another call to RSO is made. This sequence of events is continued until a match is made or a read error occurs, either of which is returned to FSMGP.

If the current context is fixed repeating RSO is called and the system output is matched character-for-character to the subcontext until its end or until the system output is exhausted. In the latter case the system output is written to GDOWN and more system output is read and the process continues. In the former SOM writes to GDOWN and returns that a match has been found.

If the current context is non-repeating there may be several subcontexts to compare against the current system output, and SOM loops for the number of subcontexts. Also, one of the subcontexts could be null, which indicates that any system output is to be accepted. If a fixed subcontext is encountered in the loop SOM attempts an exact match. If a match is found, it is written to GDOWN and SOM exits. If not, the search continues. If a subcontext is encountered that is null, it is saved as a default match. If a subcontext is encountered that is variable, a substring match is attempted on the system output. If a match is found, GDOWN is written and SOM returns to FSMGP. Otherwise the search continues.

At the end of the loop the presence of a null subcontext is determined. If so, a match to the system output is assumed and it is written to GDOWN and SOM returns. If no null subcontext was flagged SOM returns a no match condition.

RSO

The Read System Output (RSO) function is responsible for reading WWMCCS system outputs through the Remote Network Processor Emulator (RNPE).

This function must initiate reads from WWMCCS and buffer them so that SOM can attempt a subcontext match. RSO must therefore stop reading when one of the delimiter strings is encountered or a time-out has occurred. The RSO function maintains a local buffer, the input buffer (IB), in which it puts data from RNPE. RSO is passed the delimiter set by SOM (i.e. a pointer to it) so that it may search for these characters in IB. RSO begins searching in IB where it last left off from a previous invocation. RSO searches the buffer until a match is found to one of the delimiter strings or until the end of the system output in IB is encountered. If this is the first invocation of RSO the end of the system output will be found at the outset so that an initial read will occur. The read may result in normal completion with the number of characters read returned, an I/O error from RNPE or a time-out error. RSO returns to SOM when either error condition results. After a read, RSO's buffer pointers are updated and an end of read marker is placed in the buffer indicating the end of the system output, and the search is continued. If a match is found to one of the delimiter strings, pointers to the beginning and end of the system output are returned to SOM.

CES

The Check Environment Set function (CES) determines current values for the Screener identification, bandwidth rate and screen mode. Screener identification is used in communicating with SCTP when a downgrade request is made by FSMGP. Since a Screener is not permanently assigned to any given user (the Screener may log off or be reassigned by an EM), FSMGP must know the assigned Screener before a request is made. Bandwidth rate determines the rate at which messages are allowed to be automatically screened. If this rate is exceeded, FSMGP must change its user's screen mode to 'all', which requires all messages to be screened by the Screener. Screen mode is checked by FSMGP to help it decide whether or not a particular system output is to go to the Screener.

CES must first examine the port fsagn (uniquely identified by the user's identification appended to the port name) to see if the Screener assignment, the bandwidth rate, or the screen mode has been changed. If there is data on the port, the appropriate local FSMGP variables are updated. In addition, if one of the changes involves an environmental value (screen mode or bandwidth), the user's GENV is opened, updated to reflect the change(s), and closed. If there is no data on the port, CES must read the current environment values from GENV and set the appropriate local variables. In either case, CES returns to FSMGP.

STS

The Send to Screener function sends a downgrade request to the Screener and takes appropriate action depending on the Screener's decision. The function actually encompasses several logical tasks, but has common entry from several places in FSMGP. If the screen mode mandates all system output must be screened, or if the screen mode is normal and a particular system output is tagged as variable by its matching subcontext, or if the screen mode is normal and the system output is fixed but the bandwidth has been exceeded, the STS function is executed.

When a downgrade is to go to the Screener, STS writes the information in the local buffer GINFO to the GINFO file. GINFO is the downgrade context buffer and is updated with each user input and system output. The GINFO file allows the Screener to view the downgrade material in context to the current user/system interactions. STS then sends a request message to SCTP via the port screq. This port is uniquely identified to SCTP (so it knows where to send the reply) by STS appending the Screener's identifier to the port name. This message contains the name of the user's GDOWN, which is a text file of the information to be downgraded, and the name of the user's GINFO. STS then waits for a reply to the downgrade request. This reply is delivered on the port fsrly, uniquely identified by appending the user's identifier to the port name. If the Screener accepted the material, STS calls the global function GFAUDIT to record that fact on the audit file GFAUDIT. STS then writes the information in GDOWN to the user and returns to FSMGP.

If the Screener rejected the downgrade material, STS audits that fact and sends a message to the user stating the decision. STS must then establish a new context to proceed. This is accomplished by calling a special function that is pointed to by the current context. Since the particular point in the current subsystem is implicit in the current context, the function that it points to will know the appropriate action to take to "pop-up" FSMGP to a level from which to proceed safely. The current context also contains a pointer to another context appropriate to the special function. Therefore STS sets a new context and calls the special function. This function must send an appropriate simulated user input to the WWMCCS system to resynchronize FSMGP. This is accomplished by sending a canned message to the current WWMCCS subsytem via RNPE. The special function then records the fact that simulated user input has been sent with a call to GFAUDIT.

CBR

The Check Bandwidth Rate function determines a dynamic rate of messages automatically screened by FSMGP and compares it to the current setting of the FSM-wide rate. If the dynamic rate is greater than or equal to the set rate, FSMGP returns this fact to FSMGP which must then change the screen mode of its user to "all". If the dynamic rate is less than the set rate, CBR returns this fact to FSMGP and no special action need be taken.

CBR calculates the dynamic rate by keeping track of the time the last system output was sent to the user (the last invocation of CBR), and the number of system outputs automatically bypassed to date. If the time the last system output was sent to the user was sufficiently long ago (defined by some default time set at FSM initiation), a rate is calculated by dividing the number of system outputs that have been automatically screened by the amount of time. If this rate is greater than the system-wide set rate, CBR returns that value, otherwise CBR returns nothing. In either case CBR must reinitialize its counters before returning. If the time was not sufficiently long ago to calculate a rate, no counters are changed and CBR returns nothing. On its initial invocation, CBR establishes its counters and returns nothing.

LOGOFF

The LOGOFF function performs clean-up activities when the user logs off the WWMCCS system. It must make sure that the assignment daemon knows about the logoff. LOGOFF is invoked when the user indicates he is logging off, for example entering 'bye'. When this occurs, a pointer in the context with the user's input will direct FSMGP to execute LOGOFF. LOGOFF communicates with FASSD over its port FAPORT, informing it that the user has logged off.

3.2.2 Screener Trusted Program (SCTP)

The Screener Trusted Program (SCTP) interfaces directly with the FSM Screener when the Screener logs onto FSM. SCTP is responsible for displaying downgrade information to the Screener in order for the Screener to determine if the information to be written down to the low security domain of FSM contains sensitive high security level data. This information is presented to the Screener one screen at a time. Any time during this data review sequence the Screener can reject the data for downgrading. However, the entire downgrade file must be displayed to the Screener before he can accept it for downgrade. An additional downgrade context information file is also available to the Screener in order to assist in determining if the downgrade information contains sensitive data. This downgrade context file contains two screen fulls of information reflecting the user/system dialogue just prior to the downgrade data. This data can be perused by the Screener following the inspection of the downgrade information. During the perusal of the downgrade context file, the Screener can accept/reject the downgrade request.

3.2.2.1 Global Data Usage. SCTP utilizes the following FSM global data structures in performing its function:

GLF SCTP updates the logon file (GLF) when a Screener logs onto FSM.

GDOWN SCTP reads in the downgrade file (GDOWN) and displays its contents to the Screener for review.

GINFO SCTP reads in the downgrade context information file (GINFO) and displays its contents to the Screener for review.

Audit Requests SCTP builds audit trail requests whenever the Screener logs onto FSM and when the Screener begins reviewing a downgrade request.

3.2.2.2 Local Data Usage. SCTP uses no pertinent local data structures.

3.2.2.3 General Processing Flow. The Screener Trusted Program (SCTP) is invoked when a FSM Screener logs onto FSM. There is a separate copy of SCTP for each Screener logged onto FSM. As soon as SCTP is initiated it locks, opens and reads in the Global Logon File (GLF), updates its contents reflecting the Screener logon, writes GLF out, then closes and unlocks the file. SCTP audits the Screener logon event via the global function GFAUDIT.

Following Screener registration into GLF, SCTP creates its screening request port based on the Screener's user ID. This port will be utilized in receiving screening requests from the zero or more FSM Guardian Processes assigned to this Screener.

Next SCTP checks the screening request port for possible screen requests. If requests are not present then SCTP outputs to the Screener a set of prompts stating that there are no pending screening requests and he may log out if he wishes. Then SCTP checks for both Screener logout requests or potential screening requests. If neither event occurs for some predetermined time SCTP again outputs no screening request/logout prompts to the Screener. This sequence continues indefinitely until either the Screener logs out or a screening request appears.

If the Screener logs out, SCTP deregisters the Screener from GLF by writing a message to FASSD via its port (faport).

If a screening request is present then SCTP notifies the Screener with the prompt options to continue with the screen request or logout. Assuming the Screener decides to continue with the screen request, SCTP then reads in the downgrade file (GDOWN) indicated in the request port message and displays the first page to the Screener. Following this page of data are one of two possible prompts: If this is not the only page of data then SCTP prompts the Screener with a reject/continue option; if this is the first and last page of downgrade information, SCTP prompts the Screener with accept/reject/continue options. For the first situation, the Screener continues screening the downgrade information by continuing for each subsequent page. Following complete display of the downgrade file, the Screener has the option of viewing a downgrade context information file (GINFO). This is accomplished by continuing past the downgrade file. For each page of context data, SCTP prompts the

Screener with an accept/reject/continue option. If the Screener continues through and past the context information file, SCTP will cycle back to the downgrade file, ad infinitum.

During the above sequence the Screener will eventually either accept the downgrade or reject it. If the Screener accepts the downgrade request SCTP requests that he confirm his action. If the Screener does not confirm the accept, SCTP continues displaying information at the point where it left off. If the Screener does confirm the accept action, SCTP notifies the appropriate FSMGP through the screening reply port (fsrly-i). Then SCTP notifies the Screener that the confirmation has been acted upon and continues at the beginning of its cycle looking for another screening request.

If the Screener decides to reject the downgrade, SCTP requests that he confirm the rejection. If the Screener does not confirm the rejection, SCTP continues displaying data. If the Screener confirms the rejection, SCTP notifies the appropriate FSMGP of the rejection through the screening reply port (fsrly-i). Then SCTP notifies the Screener that the rejection has been acted upon and then proceeds to obtain another screening request.

3.2.2.4 Major Functions. Following are a set of salient functions important to SCTP operation.

SCUGLF

The Update GLF function is responsible for processing the Global Logon

File (GLF). This function operates on an input parameter specifying the Screener's logon name. It locks GLF (using global function GFLOCK). The Screener's GLF record is sought and, if found, is checked to see if this Screener is currently logged on. If so, the Screener is informed and his SCTP terminates. If the found record indicates an inactive record (not logged-on), SCTP marks it active and updates GLF with it (the file is still write-locked). If no GLF record is found for this Screener, he is informed and his SCTP terminates. The GLF file is unlocked following this sequence, regardless of the outcome of the logon.

SCPROMPT

The Screener Prompt Function is responsbile for determining the appropriate user prompt based on the current state of SCTP. Prior to outputting the next appropriate prompt, SCPROMPT flushes the Screener's terminal input in order to remove superfluous characters that the Screener may have entered. Then SCPROMPT determines the prompt on the following SCTP states. If the current SCTP state is proceed, then valid prompts are "logout (l)" or "continue (<CR>)"; if the current state is continue, then valid prompts are "continue (<CR>)" and "accept (a)", and "reject (r)". If the Screener has not seen all downgrade information and the state is continue, then "continue (<CR>)" and "reject (r)" are valid prompts. If the state is accept, then "confirm-yes" and "confirm-no" are valid prompts. If the state is reject, then "confirm-yes" and "confirm-no" are valid prompts.

3.2.3 FSM Assignment Daemon (FASSD)

The FSM Assignment Daemon (FASSD) is responsible for automatic WES user/Screener assignments within the FSM. The Environment Manager (EM), via the EMP, can manually reassign users and Screeners as desired. However, since the EMP is not always expected to be running, FASSD makes all initial assignments as WES users and Screeners log on and off.

3.2.3.1 Global Data Usage. FASSD uses the following global data structures:

GLF	FSM global logon file.
GAEV	Current audit event files.
FSAGN-i	FSMGP assignment reply port.
FAPORT	FASSD assignment request port.

3.2.3.2 Local Data Usage. FASSD uses no pertinent local data structures.

3.2.3.3 General Process Flow. FASSD is a daemon which is initiated at FSM system startup. FASSD reads its input port, faport, for an IPC message and blocks on it if empty. If there is at least one port message in faport, FASSD reads the message and checks the message type.

IPC messages from EMP can only be WES user/Screener reassignments (SCCNG) followed by the WES user ID and Screener ID to reassign. FASSD reads the Global Logon File (GLF) searching for the WES user ID. When the user's record is found, the Screener ID for this WES user is changed to reflect the new Screener that the EM reassigned. The record is updated in GLF (after GLF is locked) and FASSD generates an audit event indicating a WES user/Screener assignment has taken place. FASSD checks its port for more messages and if none, blocks.

IPC messages originating from SCTP can either be Screener Logon (DRRDY) or Screener Logoff (DRLGO), followed by the Screener ID and (for DRRDY messages only) the Screener's UNIX terminal ID. If the port message is DRRDY, FASSD may make WES user/Screener assignments if this is the only Screener currently logged onto FSM. If the port message is DRLGO, FASSD searches the GLF for a record with the FSM ID the same as the passed Screener ID and marks the record inactive. Then, FASSD searches GLF looking for active WES users which are assigned to this Screener. If there are any, FASSD uses its assignment algorithm to reassign WES users to other Screeners. If there are no other Screeners available, FASSD sends a port message to the FSMGP of each WES user denoting that no Screeners are available (SCNAV). FASSD generates an audit event when the Screener logs off and whenever a WES user/Screener assignment occurs.

IPC messages from FSMGP can be either User Logon (UAREQ) or User Logoff (UALGO) followed by the user ID and terminal ID. Similar to SCTP message types, FASSD searches GLF for a user ID that matches the passed user ID. In the UAREQ case, FASSD assigns the WES user to a logged-on Screener, if any. FASSD notifies FSMGP of the assignment by sending a Screener Assigned (SCASS) message and the assigned Screener's ID to the FSMGP's port, fsagn-i. If no Screener is available, FASSD sends the SCNAV message to this port. An audit event is generated if an assignment occurs. In the UALGO case, FASSD marks the WES user's GLF record inactive. FASSD generates an audit event indicating that the WES user has logged off of FSM.

3.2.3.3.1 Specification of Assignment Algorithm. Four cases need to be considered with the assignment algorithm:

1. Screener Logs On

2. Screener Logs Off

3. User Logs On

4. User Logs Off

3.2.3.3.1.1 Screener Logs On. FASSD makes no assignment changes in this case. Even though there may be a heavy load on another Screener, no users are automatically assigned to the new Screener, in the interest of user/Screener stability. The new Screener will be the prime candidate for future assignments however.

3.2.3.3.1.2 Screener Logs Off. This is the most serious case since it is likely that at least one WES user, and possbily more, will need reassignment. If no other Screeners are available, the port message No Screeners Available (SCNAV) is sent to each FSMGP's fsagn-i port. FSMGP allows the user to proceed until a Screener is needed, at which time the user has the option of logging off or waiting for either a Screener assignment or screen mode change (via the EMP) to occur.

If other Screeners are available, FASSD chooses the Screener with the smallest current load (fewest users assigned) to reassign the user to. This step may be repeated multiple times in order to reassign all WES users who were assigned to the logged-off Screener. Each time, the Screener with the smallest current load is chosen. In the case of ties (multiple Screeners with the same load), FASSD chooses the Screener who most recently logged on. This is done because the most recently logged-on Screener will probably remain logged-on longer than the other Screener(s). This scheme requires that FASSD record the Screener logon DTG in a local data structure (following a DRRDY port message from a SCTP).

3.2.3.3.1.3 User Logs On. Similar to the previous case, FASSD chooses the Screener with the smallest current load to assign the WES user to. Ties are resolved as stated above. This case will require at most one assignment. As before, there may be no Screeners available.

3.2.3.3.1.4 User Logs Off. FASSD makes no assignment changes when a WES user logs off. The reasoning follows that discussed in "Screener Logs On". The EM may manually reassign users and Screeners; however, in the light of user/Screener stability, FASSD makes no assignments.

3.2.4 FSM Audit Daemon (FAD)

FAD logs audit events in the current audit files based on requests in the audit queue. Audit requests are processed on a strict FIFO scheme. Audit request files are opened, processed and unlinked as the audit event specified is actually logged in the audit files.

3.2.4.1 Global Data Used. The following global data is used by FAD:

Audit Request Files Contains audit events to log.

AUDITQ Directory contains all audit request files.

Current Audit File-Pair Contains logged audit events.

GAUD Audit description file.

GAUD-LOCK Write-lock mechanism for audit files.

3.2.4.2 Local Data Used. FAD uses the UNIX file status buffer returned by the "stat" call.

3.2.4.3 General Process Flow. Due to the large volume of audit events, FAD is implemented as a daemon, rather than a callable process or function. As such, it has no input or output parameters. All data that FAD uses in logging an audit event is either contained in the audit request file(s) or is obtained by FAD. FAD will sleep for 30 seconds, wake up and examine its queue, "/fsm/fsat/auditq", for pending requests. If there are no file entries in the Audit Queue directory, FAD returns to the sleep state and repeats this process again upon waking. If there are pending audit requests, FAD must find their filenames and Date-Time Group (DTG) of last modification. The filenames and DTGs of last modification are entered in a list and are sorted on the DTG using the UNIX qsort function. The filename with the least recent last modification (the oldest file) appears first in the list, followed by the second oldest file and so on.

FAD locks the audit files (GAUD) for writing by calling GFLOCK. Then, it opens the current audit file-pair and the next oldest audit request file. FAD increments the pointer into its sorted filename list, so on the next pass it will pick up the next oldest file. After reading the event record and saving it, FAD reads the text record(s), if any, and copies them byte-by-byte to the current Text file; remembering the beginning location of the text (OFFSET) and keeping a count of the number of bytes transferred. FAD sets up the event record, updates it (with OFFSET and LENGTH) if necessary, and writes it to the current Event file. The event has now been logged, so FAD closes the current audit file-pair. FAD signifies successful event logging by closing and unlinking the audit request file just processed from the audit queue.

FAD must update the Audit Description (GAUD) file, as well, with the new "last entry" DTG for the current audit file-pair. FAD opens GAUD (the audit files are still write-locked), locates the last record in the file and reads it into a small buffer. The DTG of last entry is updated and the record is written back to the GAUD file. FAD closes and unlocks the audit files for writing by calling GFUNLOCK.

If there are any files left in the sorted list, FAD repeats the sequence described above until there are no files left in the list. Then, FAD re-examines the audit queue and if there are any files, continues as described above. Otherwise, FAD will sleep before repeating this entire process.

3.2.5 Environment Manager Program (EMP)

The Environment Manager Program (EMP) permits monitoring and alteration of the FSM operating environment. EMP performs manual WES user/Screener assignments, profiles WES user's status and modifies FSM screen modes and bandwidth thresholds. The EMP is run by the Environment Manager (EM).

3.2.5.1 Global Data Usage. EMP uses the following global data:

GENV System (default) and user's environment files.

GLF FSM global logon file.

GPROF User profile file.

3.2.5.2 Local Data Usage. The following local data is used by EMP:

1. Screener list - a variable-length list whose entries each contain a one-byte Screener ID and an eight-byte Screener logon name.

2. User list - a variable-length list whose entries each contain a one-byte user ID, a one-byte Screener ID (who the user is currently assigned to) and a twelve-byte WWMCCS user ID.

3.2.5.3 General Process Flow. When invoked by the EM, EMP checks the Global Logon File (GLF) to verify the logon name that was entered and to ensure that the EM is not currently logged on. Only one EMP can exist at any given time, and therefore only one EM record can be defined in GLF. If the EM name is valid and not logged on, EMP marks the record as active and updates GLF (after locking it for writing). Then, the EMP help file is displayed which briefly describes available EMP commands. Following this display, the EM is placed at the EMP's command level, signified by an asterisk on the EM's terminal. EMP commands are valid at this point. See Appendix B for detailed command information.

If the assignments command is entered, the EMP prints the current list of user/Screener assignments. This is done by reading each Global Logon File (GLF) record and checking the Logged Bit Flag (DLOGDON) for logged-on users. Records of users that are not logged onto FSM are not considered. For each active (logged-on) record, EMP also checks whether this user is a WES user or a Screener. If the active record indicates a WES user, the FSM user ID, user's WWMCCS user ID and the Screener ID are stored in the user list. If the active record indicates a Screener, the Screener ID and the Screener's logon name are stored in the Screener list. After all GLF records have been read, EMP checks each record in the Screener list. The Screener ID of each record in the Screener list is compared with each Screener ID in the user list. When a match is found (there may be more than one), the Screener user logon name from the Screener list is printed on the EM's terminal, followed by the user's logon name from the user list. Each record in the user list is compared with records in the Screener list. For each Screener list record, if a match occurs a flag is set. After all user list records have been compared with a Screener list record, the flag is checked. If it was never set, the Screener associated with this Screener list record is not assigned to any users. This information is important for future EM-directed WES user/Screener reassignments, hence the Screener's user logon name from the Screener list is printed on the terminal followed by the string "- none assigned -". When the Screener list is exhausted, EMP returns to command level.

If the EM enters the display command at EMP command level, EMP prints out current system/user environment values. Display entered without arguments causes the current system environment values to be listed, followed by the current environment values of every logged-on WES user. If optional names follow the display command, they must be names of logged-on WES users or the keyword "SYSTEM". This causes EMP to only display those user's status. If no arguments followed the command name, EMP reads the system Global Environment (GENV) file and displays the bandwidth threshold and the WWMCCS subsystem screen modes. Additionally, EMP reads each GLF record and keeps counts of the number of logged-on WES users and Screeners. This information is printed out on the terminal. Following the system display, each GLF record is read. For each logged-on WES user, the user ID is used to form a filename of the form "/fsm/usr/user-i/genv". This file contains the user's current environment values. EMP reads it and displays the information on the EM's terminal. When all GLF records have been read, EMP returns to the command level. If optional names follow the display command, each name is compared with the string "SYSTEM". If a match occurs, the procedure described above for displaying system environment values is performed. If the name does not match "SYSTEM", then each logged-on WES GLF record is checked with the user name. If there is no match for a name, EMP warns the EM and requests a replacement user name. If there is none, EMP continues with the next name following the display command, otherwise, it repeats the process for the replacement user name. Each name is processed identically in sequential fashion. The WES user's GENV file is read and the contents formatted for display. When there are no more names remaining, EMP returns to the command level. The display command has a limit of five user names and if this number is exceeded, EMP prints a message and ignores the remaining names.

If the history command is entered at the command level, EMP fork/executes the Audit Trail Display Program (ATDP). This command enables the EM to view previous audit events. The audit event information may aid the EM in making a FSM environment change. When the EM terminates ATDP (by using the quit command), EMP returns to the command level. See Appendix D for detailed ATDP command formats.

If the modify command is entered at the command level, EMP parses and saves any optional arguments. The modify command has both long and short command forms and depending upon which is used, various displays and prompts appear. In the case of no command arguments, EMP prints a menu of valid modification actions and then prompts the EM for the action desired. The selected action then causes a new menu to be displayed and the EM is prompted to enter the new environment value(s). When finished with this modification action, the EM is returned to the initial menu which details modification actions. This was done so that the EM can modify multiple values with one modify command. If command arguments are present, they are parsed syntactically and errors cause EMP to re-prompt for the bad value(s). When the modification has been made, in this case, the EM is returned to the command level. This is an important distinction between the long and short command forms. The short form enables multiple changes to be made with a single modify command, with the EM being prompted from menus. The long form validates the command arguments, modifies the desired value(s) and returns to the command level. Except for this external distinction, the two command forms operate identically. If the system-wide environment values are modified, EMP writes the new values in the system Global Environment (GENV) file. The values in this file are given to each WES user at logon. To alter currently logged-on user's values, a port message (BRCNG or SMCNG) is sent to each FSMGP noting that an environment value has changed and indicating the new value(s). System-wide values that can change include bandwidth threshold and subsystem screening status. Notice, EMP does not update each WES user's GENV file. Following the system-wide change, EMP generates an audit event which details the change and new values. If a specific user's environment values are modified, EMP writes a port message to the user's FSMGP, via the fsagn-i port, noting the change and new value(s). User environment values, like system-wide values, which can be altered are bandwidth threshold and subsystem screening modes. Again, the EMP does not alter the WES user's GENV file. EMP generates an audit event which details the change and new values. The final type of modification that can occur is WES user/Screener reassignment. EMP verifies that both the WES user and Screener specified by the EM are logged onto FSM. If they are not, EMP messages and re-prompts for user names. If both names are valid and logged-on, EMP sends a port message (SCCNG), via the faport, to the FSM Assignment Daemon (FASSD) indicating the user ID and Screener ID to reassign. There is no communication between the user's FSMGP and EMP in this case. EMP returns to command level after the port message has been sent. Notice, EMP does not directly reassign WES users and Screeners and it does not generate an audit event.

If the profile command is entered at the command level, EMP displays the WES user's profile. Profile followed by no optional command arguments causes EMP to read the GLF and for each logged-on WES user, to form the filename "/fsm/usr/user-i/gprof". This file contains the last wait condition for this user. Additionally, the file contains the WES user's terminal ID, WWMCCS subsystem and DTG of the wait. This information is displayed, one line per user, on the EM's terminal. When the GLF file has been exhausted, the EMP returns to command level. If optional command arguments follow the command, EMP checks the GLF for a match between each argument and GLF WES user names (if the argument is longer than one byte) or GLF terminal IDs (if the argument is a single byte). If no match is found, the EMP prints a warning message and the EM is prompted for a replacement name. If a match is found, the user ID of the GLF record is used to form the filename shown above and the file contents are formatted and displayed on the EM's terminal. As with the display command, there is a limit of five names following the command and remaining names are ignored with a message.

The final EMP command is one to terminate the program. Since EMP has no input ports and automatic WES user/Screener assignments are performed by the FSM Assignment Daemon (FASSD), the EMP does not always need to be running during FSM operation. If the EM enters the quit command, EMP exits. The EMP can be run at any future time the EM desires.

3.2.6 Audit Trail Display Program (ATDP)

ATDP performs all formatting and display of generated audit events. It also is used to prevent the current audit file-pair from growing to an unmanageable size. ATDP is invoked by using the HISTORY command in the Environment Manager Program (EMP).

3.2.6.1 Global Data Usage. The following global data is used by ATDP:

Current Audit File-Pair Contains logged audit events.

GAUD-LOCK Audit files lock mechanism.

Saved Audit File-Pair(s) Contains previously logged audit events.

GAUD Audit description file.

3.2.6.2 Local Data Usage. ATDP does not use any pertinent local data.

3.2.6.3 General Process Flow. After ATDP has prompted the EM for command input (signified by ATDP printing a ">" on the EM's terminal) and has read it, argument parsing begins. This is a major phase of ATDP since at least one command has several optional variables, with many variables also taking several optional arguments. The only restrictions on command input are argument ordering. See Appendix D for detailed command syntax and descriptions. The ATDP command name is always the first argument. In the LIST command, the flag variable is always second (if present), followed by the event-name (if present) and the time-range (if present). Several non-fatal errors may be detected during this parsing phase and if an unrecognizable argument is decoded, ATDP prompts for the value again after printing a warning message detailing the problem.

If the command to ATDP is END, ATDP write-locks the audit files by calling GFLOCK. This is necessary since ATDP renames the current audit file-pair and updates GAUD. ATDP renames the current audit file-pair from "current" to the DTG of the END operation. For example, ENDing the current audit file-pair on April 2 at 12:05:30 causes a rename from "current.e" to "0402120530.e" for the Event file and a rename from "current.t" to "0402120530.t" for the Text file to take place. ATDP then updates GAUD (audit files are still write-locked) to change the filename of the old current file to the new DTG and to create a new current record with the filename of current and the DTG of file creation. Then, ATDP unlocks the audit files by calling GFUNLOCK.

If the command is QUIT, ATDP exits back to the Environment Manager Process from which it was fork/executed.

If the command is LIST, ATDP checks the second argument for a flag value. If it is a flag argument, it must be preceeded by a "-". The flag indicates method and destination of the output. Methods include paging and no paging. Destinations include terminal and printer. If the second argument is preceeded by a "-" and the remaining character is not a valid flag argument, a warning message is printed and the flag is ignored.

ATDP checks the next argument, if any, for an event name keyword. If a valid event keyword is found, and there is no valid event type following it, ATDP prompts the user for a list of event types. Otherwise, ATDP decodes the event type and sets the appropriate internal flags. Event types include FSM user names, WWMCCS subsystem names and event codes. This argument serves to limit ATDP output to a selected subset.

ATDP checks the next argument(s), if any, and expects to find valid time ranges or time keywords. A time range is a numeric string indicating month, day, hour and minute or a time keyword. If the remaining argument(s) are not valid time ranges, a warning message is printed. ATDP also reprompts the user for the correct time range. Time ranges, like event types, serve to limit the output to a selected subset of events.

Once all arguments for LIST have been parsed, validated and internal program flags set, ATDP reads the GAUD file from the beginning, searching for the first audit file-pair whose date of last modification is greater than the LIST start-time. By default, the start-time is midnight on the current day. Once a file has been found, ATDP opens it for read-only. Each event is read from the Event file and its FEVTIM (DTG of the event) is compared with the start- and end-times to list. If the record is within the specified time range, ATDP checks the event name condition(s), if any. By default, all event types are chosen. If the event record satisfies the event name condition(s), it is printed out. The event's text, if any, is read and written to the output destination in a byte-by-byte fashion. When the current event is done, ATDP reads the next Event file record. At end of file, ATDP gets the next audit file-pair in the GAUD file. ATDP stops looking for next event records (files) when the DTG of the event is greater than the end-time.

SECTION 4

QUALITY ASSURANCE

This section is not applicable to this document.

SECTION 5

PREPARATION FOR DELIVERY

This section is not applicable to this document.

SECTION 6

NOTES

This section is not applicable to this document.

APPENDIX A

FSM CONTEXT TABLES

A.1 OVERVIEW

The low-level context tables which are used by the FORSCOM Security Monitor (FSM) are produced from high-level files created with the UNIX text editor, ed. A C program named Conbuild exists which makes the transformation from the human-oriented, high-level files to the machine-oriented, low-level files.

Using Conbuild offers many advantages in context table construction. All labels used are symbolic and thus do not require alteration if the file is changed. Non-printing ASCII characters can be easily entered and visually checked. In addition to generating correct low-level tables, Conbuild checks and verifies high-level values. Errors detected in the high-level tables can be quickly pinpointed and corrected.

Conbuild accepts three high-level files and produces three low-level files: context, halting delimiter and text. The formats of the high-level files are detailed below. The halting delimiter and text files make use of special symbols to visualize non-printing or hard to see characters. Special symbols are character strings preceeded and followed by a vertical bar ("|"). Conbuild translates the special symbols into the appropriate character sequence. Special symbols include:

```
| |        one blank
|bell|     terminal bell
|cr|       carriage return
|ctl-A|    control-A
|lf|       line feed
|nl|       new line (carriage return, line feed)
||         null byte
```

A.2 CONTEXT

The high-level context file follows this format:

```
Cs      Cp      Dh      bf      ss      [pf]    [!comment]
Ts      Cn      bf      gs      gl      [sf]    [!comment]
                        .
                        .
                        .
Ts      Cn      bf      gs      gl      [sf]    [!comment]
```

The first line of every context is the context header. The fields are:

1. Cs -- The context label

   This symbolic label serves to identify this context. It can be used by other contexts (as a pop-up reference, following an abnormal match) and subcontexts (as a go-to context, following a match).

2. Cp -- Pop-up context

   If, during normal context processing, an input is received from the user or system which cannot be matched in any of the subcontexts, a "pop-up" is effected. This label serves to symbolically identify the context to process next, in the event of a pop-up.

3. Dh -- Halting delimiter set

The halting delimiter set is identified by this symbolic label. It is an offset into the halting delimiter file where the desired delimiter set can be found.

4. bf -- Context header bit flags

The header bit flags are positional and represent the following:

i. Source of next input

This bit flag can take the value "U" (user input), "S" (system output) or "B" (both). This flag identifies the location of the next input to process. In the degenerate case of both, polling is done and the first input received is processed.

ii. Length of next input

This bit flag can take the value "R" (repeating) or "N" (non-repeating). In the case of multi-line system outputs, such as bare TCON skeletons, multiple reads will need to be performed to obtain the entire output. This occurs because the read function stops reading when a halting delimiter is encountered. One logical system output may contain many halting delimiters.

iii. Matching of next input

This bit flag can take the value "F" (fixed) or "V" (variable). The flag identifies the type of matching to be performed, during repeating reads only. This flag does not supercede the subcontext fixed/variable bit flag.

iv. Subsystem entry to audit

This bit flag can take the value "A" (audit) or "N" (no audit). The flag, if "A", causes an audit event to be generated that records the fact that a new WWMCCS subsystem was entered.

5. ss -- Subsystem name

This field contains the name of the WWMCCS subsystem which this context item pertains to. The field is used for audit purposes when the audit bit flag is set.

6. pf -- Pop-up function name

This optional field, if present, contains the name of a C function to execute which will simulate user input, so as to effect a pop-up to the pop-up context.

7. !comment

An exclamation mark followed by anything can appear at the end of any context header line. It is ignored by all programs. All comments are optional.

Each line of input following the context header is a subcontext item that is part of the context item. The fields are:

1. Ts -- Text string to match on

This symbolic label identifies the text string to use when matching input. It is an offset in the text file of a null-terminated string.

2. Cn -- Next context if match made

If this subcontext's text matched the input, use this symbolic label as the next context to process. It is an offset in the context file of a context item.

3. bf -- Subcontext bit flags

The subcontext bit flags are positional and represent the following:

i. Type of matching to perform

This bit flag can take the value "F" (fixed) or "V" (variable). The value determines the type of matching to perform on the input received. A fixed match compares the input against the text string byte-by-byte. A variable match compares the text string against the input, looking for a match anywhere.

ii. All or partial match

This bit flag can take the value "S" (substring) or "N" (no-substring). Used in combination with the previous bit flag, it denotes whether the entire input is to be matched against, or only part of it. Fixed no-substring requires that the input and the text string be of equivalent sizes, order and each byte matches (i.e. an exact match). Fixed substring requires that a small part of the text string match the input exactly. Following a match, the text string is used and not the input that was received. Variable no-substring involves no matching and is otherwise termed a "null subcontext". This can be thought of as a "wildcard" and will match any input. Variable substring is similar to fixed substring, with the exception that the input is used, rather than the text string.

iii. Special function necessary

This bit flag can take the value "F" (function required) or "N" (no function required). This flag denotes whether the optional field "sf" will be present or not.

iv. Validity of input

This bit flag can take the value "V" (valid input) or "I" (invalid input). Following a match between the received input and the text string, this bit is checked and if not set, the input is not allowed to proceed due to its invalidity. This occurs in subsystems which have commands that FSMGP does not allow to be used. For example, the TCON OLD command is a valid WWMCCS input, but is not part of the subset of WWMCCS operations that FSM allows.

v. Source of input

This bit flag can take the value "U" (user input) or "S" (system output). In the event that the header bit flag was "Both", this bit flag identifies whether this subcontext pertains to the received input or not.

vi. Disposition of input following match

This bit flag can take the value "E" (end of current input) or "B" (beginning of next input). Its use is limited to variable substring matches and serves to identify whether the substring matched is part of the current input, to be downgraded, or is the beginning of the succeeding input. The flag will normally be "E", signifying that the substring matched is to be downgraded with the rest of the input received.

4. gs -- Start of fixed substring match

This field pertains only to fixed substring matches and in that event, gives an offset into the text string to use in matching. The length of the substring, since it is not null-terminated, is given by the next field, "gl".

5. gl -- Length of fixed substring match

This field pertains only to fixed substring matches and in that event, gives a length from the start of the substring to use in matching. In the event that the substring defined by these two fields is matched, the input received is discarded and the entire text string is used as the input.

6. sf -- Special function name

This optional field, if present, contains the name of a C function which can be to perform special actions in regard to the input received, following a successful match. Initially, this field only pertained to user input and was limited to validating complex user inputs so as to reduce the possible number of error messages received. Since that time, the concept has been generalized to include system output as well. The special function can implement any special actions that are not normally performed during the FSMGP's processing loop.

7. !comment

An exclamation mark followed by anything which appears at the end of a subcontext input line is regarded as a comment and is ignored by all programs. It is optional.

Context items, which include the single context header followed by zero or more subcontext items, are delimited from each other by a blank line.

A.3 HALTING DELIMITER

The halting delimiter file follows this format:

```
Ds      d1^d2^ ... di^^

        or

Ds      d1^
        d2^
         .
         .
         .
        di^^
```

Each halting delimiter set contains one or more halting delimiters. Halting delimiters are delimited from each other by a special character that is called a "pseudo-null". This character will be recognized as a meta-symbol and translated to a null byte everywhere it is encountered. The pseudo-null character is a carret ("^"). This indirection is necessary due to the editor's inability to insert nulls in a file. Each halting delimiter set is doubly null-terminated.

The fields in a halting delimiter set are:

1. Ds -- The delimiter set label

   This symbolic label is used in the context file as a reference to a delimiter set.

2. dj -- The halting delimiters

Each halting delimiter is null terminated and can contain any meaningful characters that are legitimate halting delimiters. Typically, halting delimiters will be new-lines or carriage returns.

A halting delimiter set can be entered on a single line or on multiple lines, as desired. It is best NOT to split a halting delimiter across new-lines, however, it will be interpreted correctly. In the event multi-line input is used, following the new-line there must appear a tab. This serves to denote that the set is not yet terminated, as well as providing a visual mnemonic to that effect.

Halting delimiter sets are delimited from each other by a blank line.

A.4 TEXT STRING

The text string file follows a similar format to the halting delimiter file. The format is:

```
Ts      ttttttt ... ttt^

        or

Ts      ttt
        tttt
         .
         .
         .
        ttt^
```

Each text string contains zero or more characters and is terminated by the "pseudo-null" character, as described above. Each text string requires a unique label and is delimited from other text strings by a blank line.

The fields are:

1. Ts -- The text string label

   This symbolic label identifies the text string and is used in the context file. It must be unique.

2. t -- The text string

   The text string must be null-terminated and can be entered on a single input line or on multiple lines. If using multi-line input, following a new-line there must be a tab. Similar to the halting delimiter file, this provides an indication that the text string is not terminated.

A.5 SOURCE CONTEXT TABLES

Following is a listing of the source context files for the teletypewriter and wang terminals which were used during the PROUD SPIRIT exercise.

A.5.1 Source Context File (GCONT)

The context file which follows has had its comments truncated to eighty columns in order to fit onto the page. All essential data is otherwise intact.

```
C1      C999    D1      SRVN    LOGON   outnup  ! begin tty/wang logon
T2      C10     VSNVSE  0       0       ! "1316400" (line number)
T1      C10     VNNVSE  0       0       ! (anything else)

C10     C999    D20     SNVN    LOGON   outnup  ! system prompts for subsystem
T10     C20     VSNVSE  0       0       ! "PROGRAM NAME -"

C20     C999    D40     UNFN    LOGON   outnup  ! user enters subsystem
T20     C30     FNNVUE  0       0       ! "tss"
T21     C200    FNNVUE  0       0       ! "tlcf"

C30     C999    D30     SNFN    LOGON   outnup  ! Begin TSS logon
T30     C40     FNNVSE  0       0       ! "TERMINAL "

C40     C999    D1      SNVN    LOGON   outnup  ! system identifies terminal
T40     C50     VSFVSE  0       0       termid  ! "nn" (terminal id)

C50     C999    D50     SNFN    LOGON   outnup  ! system prompts for userid
T50     C60     FNNVSE  0       0       ! "USERID$PASSWORD ... "
T51     C999    FNFVSE  0       0       locked  ! "LOCKED" (terminal is locked)

C60     C70     D40     UNVN    LOGON   outnup  ! user enters userid
T60     C60     VSNIUE  0       0       ! <uid>$<pw>/scc/scc [invalid]
T61     C90     VSFVUE  0       0       getuid  ! <uid>$<pw>

C70     C999    D40     SRFN    LOGON   outnup  ! system re-prompts for userid
T50     C80     FNNVSE  0       0       ! "USERID$PASSWORD ... "

C80     C999    D40     UNVN    LOGON   outnup  ! user enters userid (last chan
T60     C80     VSNIUE  0       0       ! <uid>$<pw>/scc/scc [invalid]
T61     C90     VSFVUE  0       0       getuid  ! <uid>$<pw>

C90     C999    D1      SRFN    TSS     outnup  ! system prompts for ident
T90     C100    FNNVSE  0       0       ! "IDENT?"

C100    C999    D40     UNVN    TSS     outnup  ! user enters identifier
T100    C110    VSNVUE  0       0       ! <ident>

C110    C999    D110    SNFA    TSS     outnup  ! system responds to ident
```

```
T110    C120    FNNVSE  0       0       ! "CLASSIFICATION OF YOUR OUTPUT?"
T110    C120    VSNVSE  0       0       ! "CLASSIFICATION OF YOUR OUTPUT?" +
T111    C120    FNNVSE  0       0       ! "classification of your output?"
T111    C120    VSNVSE  0       0       ! "classification of your output?" +
T90     C100    FNNVSE  0       0       ! "IDENT?" (previous one bad)

C120    C999    D40     UNFN    TSS     outnup  ! user enters output class
T121    C130    FNFVUE  0       0       getcls  ! uzz
T122    C130    FNFVUE  0       0       getcls  ! ufo
T123    C130    FNFVUE  0       0       getcls  ! czz
T124    C130    FNFVUE  0       0       getcls  ! szz
T125    C130    FNFVUE  0       0       getcls  ! swp

C130    C999    D130    SNFN    TSS     outnup  ! system responds to output cla
T130    C140    FNNVSE  0       0       ! "CLASSIFICATION OF FILES ... "
T131    C140    FNNVSE  0       0       ! "classification of files ... "
T132    C110    FNNVSE  0       0       ! "ILLEGAL CLASSIFICATION CODE"
T133    C110    FNNVSE  0       0       ! "illegal classification code"

C140    C999    D40     UNFN    TSS     outnup  ! user enters file class
T121    C150    FNNVUE  0       0       ! uzz
T122    C150    FNNVUE  0       0       ! ufo
T123    C150    FNNVUE  0       0       ! czz
T124    C150    FNNVUE  0       0       ! szz
T125    C150    FNNVUE  0       0       ! swp

C150    C150    D150    SNVN    TSS     outnup  ! system responds to file class
T150    C160    FNNVSE  0       0       ! "SYSTEM ?" (only)
T151    C160    FNNVSE  0       0       ! "SYSTEM ?" (after pop-up)
T150    C160    VSNVSE  0       0       ! "SYSTEM ?" (preceded by message)
T132    C130    FNNVSE  0       0       ! "ILLEGAL CLASSIFICATION CODE"
T133    C130    FNNVSE  0       0       ! "illegal classification code"

C160    C150    D40     UNVN    TSS     outnup  ! user enters TSS subsystem
T160    C1000   FNNVUE  0       0       ! acce (ss)
T161    C1000   FNNVUE  0       0       ! acces (s)
T162    C1000   FNNVUE  0       0       ! access
T170    C7000   FNNVUE  0       0       ! list (with no arguments)
T163    C7000   VSFVUE  0       0       vumcl   ! list
T164    C6000   FNNVUE  0       0       ! sios
T165    C2000   FNNVUE  0       0       ! tcon
T166    C9000   FNNVUE  0       0       ! wwdm (s)
T167    C9000   FNNVUE  0       0       ! wwdms
T168    C990    FNNVUE  0       0       ! bye (logoff)
T171    C7000   FNNVUE  0       0       ! listl (with no arguments)
T169    C7000   VSFVUE  0       0       vumcl   ! listl
T172    C9020   FNNVUE  0       0       ! wwdm n(ew)
T173    C9020   FNNVUE  0       0       ! wwdms n(ew)
T174    C9020   FNNVUE  0       0       ! wwdm new
T175    C9020   FNNVUE  0       0       ! wwdms new
```

```
C200    C999    D30     SNFN    LOGON   outnup  ! Begin TLCF logon
T30     C210    FNNVSE  0       0       ! "TERMINAL "

C210    C999    D1      SNVN    LOGON   outnup  ! system identifies terminal
T40     C220    VSFVSE  0       0       termid  ! "nn" (terminal id)

C220    C999    D50     SNFN    LOGON   outnup  ! system prompts for userid
T50     C230    FNNVSE  0       0       ! "USERID$PASSWORD ... "
T51     C999    FNFVSE  0       0       locked  ! "LOCKED" (terminal is locked)

C230    C240    D40     UNVN    LOGON   outnup  ! user enters userid
T60     C230    VSNIUE  0       0       ! <uid>$<pw>/scc/scc [invalid]
T61     C260    VSFVUE  0       0       getuid  ! <uid>$<pw>

C240    C999    D40     SRFN    LOGON   outnup  ! system re-prompts for userid
T50     C250    FNNVSE  0       0       ! "USERID$PASSWORD ... "

C250    C999    D40     UNVN    LOGON   outnup  ! user enters userid (last chan
T60     C250    VSNIUE  0       0       ! <uid>$<pw>/scc/scc [invalid]
T61     C260    VSFVUE  0       0       getuid  ! <uid>$<pw>

C260    C999    D1      SRFN    LOGON   outnup  ! system prompts for ident
T90     C270    FNNVSE  0       0       ! "IDENT?"

C270    C999    D40     UNVN    LOGON   outnup  ! user enters identifier
T100    C280    VSNVUE  0       0       ! <ident>

C280    C999    D110    SNFA    TLCF    outnup  ! system responds to ident
T110    C290    FNNVSE  0       0       ! "CLASSIFICATION OF YOUR OUTPUT?"
T111    C290    FNNVSE  0       0       ! "classification of your output?"
T90     C270    FNNVSE  0       0       ! "IDENT?" (previous one bad)

C290    C999    D40     UNFN    TLCF    outnup  ! user enters output class
T121    C11000  FNFVUE  0       0       getcls  ! uzz
T122    C11000  FNFVUE  0       0       getcls  ! ufo
T123    C11000  FNFVUE  0       0       getcls  ! czz
T124    C11000  FNFVUE  0       0       getcls  ! szz
T125    C11000  FNFVUE  0       0       getcls  ! swp

C990    C999    D990    SNVN    TSS     exit    ! system accounting info
T995    C999    VSNVSE  0       0       ! "**on at  ... "
T991    C990    FSNVSE  0       0       ! "LINE TERMINATED CP"

C999    C999    D999    SNVN    TSS     exit    ! end of the line !
T1      C999    VNFVSE  0       0       exit    ! fsmgp termination !

C1000   C150    D1000   SNFA    ACCESS  outnup  ! begin access
T1000   C1020   FNNVSE  0       0       ! "FUNCTION?"

C1010   C150    D1000   SNFN    ACCESS  outnup  ! system prompt for 2nd+ passes
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T1000   C1020   FNNVSE  0       0       ! "FUNCTION?"

C1020   C150    D40     UNFN    ACCESS  outnup  ! user enters acecess function
T1020   C1030   FNNVUE  0       0       ! mf (modify file)
T1021   C1030   FNNVUE  0       0       ! fm (file modify)
T1022   C150    FNNVUE  0       0       ! done
T1023   C150    FNNVUE  0       0       ! <carriage return>

C1030   C150    D1030   SRFN    ACCESS  outnup  ! prompt user for catalog
T1030   C1040   FNNVSE  0       0       ! "CATALOG STRUCTURE TO WORKING LEVEL?"

C1040   C150    D40     UNVN    ACCESS  outnup  ! user inputs catalog string
T1040   C1050   VNFVUE  0       0       vumc1   ! <cat string>
T1023   C1050   FNNVUE  0       0       ! <carriage return> (only)

C1050   C150    D1050   SNFN    ACCESS  outnup  ! system prompts for file
T1050   C1060   FNNVSE  0       0       ! "FILE TO BE MODIFIED?"
T1051   C1030   VSNVSE  0       0       ! "ERR-FIELD STARTING WITH...TOO LONG"

C1060   C150    D40     UNVN    ACCESS  outnup  ! user enters file name
T1040   C1070   VNNVUE  0       0       ! <filename>
T1023   C1010   FNNVUE  0       0       ! <carriage return>
T1060   C1060   VSNIUE  0       0       ! / [invalid]

C1070   C150    D1050   SNFN    ACCESS  outnup  ! system prompts for new file n
T1070   C1080   FNNVSE  0       0       ! "NEW NAME?"
T1051   C1050   VSNVSE  0       0       ! "ERR-FIELD STARTING WITH...TOO LONG"

C1080   C150    D40     UNVN    ACCESS  outnup  ! user enters new file name
T1040   C1090   VNNVUE  0       0       ! <new filename>

C1090   C150    D1050   SNFN    ACCESS  outnup  ! system prompts for file size
T1090   C1100   FNNVSE  0       0       ! "NEW MAX SIZE IN LLINKS?"
T1051   C1070   VSNVSE  0       0       ! "ERR-FIELD STARTING WITH...TOO LONG"

C1100   C150    D40     UNVN    ACCESS  outnup  ! user enters file's new size
T1040   C1200   VNNVUE  0       0       ! <new file size>

C1200   C150    D1200   SNFN    ACCESS  outnup  ! system prompts for new passwo
T1200   C1210   FNNVSE  0       0       ! "NEW PASSWORD?"
T1201   C1090   FNNVSE  0       0       ! "ERR—MAX SIZE ILLEGALLY STATED"

C1210   C150    D40     UNVN    ACCESS  outnup  ! user enters new password
T1040   C1220   VNNVUE  0       0       ! <new password>

C1220   C150    D1050   SNVN    ACCESS  outnup  ! system prompts for general pe
T1220   C1230   FNNVSE  0       0       ! "GENERAL PERMISSIONS?"
T1051   C1200   VSNVSE  0       0       ! "ERR-FIELD STARTING WITH...TOO LONG"

C1230   C150    D40     UNFN    ACCESS  outnup  ! user enters general permissio
```

```
T1230   C1240   FNNVUE  0       0       ! read
T1231   C1240   FNNVUE  0       0       ! r (read)
T1232   C1240   FNNVUE  0       0       ! execute
T1233   C1240   FNNVUE  0       0       ! e (execute)
T1234   C1240   FNNVUE  0       0       ! write
T1235   C1240   FNNVUE  0       0       ! w (write)
T1236   C1240   FNNVUE  0       0       ! append
T1237   C1240   FNNVUE  0       0       ! a (append)
T1238   C1240   FNNVUE  0       0       ! modify
T1239   C1240   FNNVUE  0       0       ! m (modify)
T1023   C1240   FNNVUE  0       0       ! <carriage return>

C1240   C150    D1240   SNVN    ACCESS  outnup  ! system prompts user for speci
T1240   C1250   FNNVSE  0       0       ! "SPECIFIC PERMISSIONS?"
T1051   C1220   VSNVSE  0       0       ! "ERR-..." (several types)

C1250   C150    D40     UNVN    ACCESS  outnup  ! user inputs specific permissi
T1250   C1300   VSNVUE  0       0       ! read/
T1251   C1300   VSNVUE  0       0       ! r/ (read)
T1252   C1300   VSNVUE  0       0       ! write/
T1253   C1300   VSNVUE  0       0       ! w/ (write)
T1254   C1300   VSNVUE  0       0       ! append/
T1255   C1300   VSNVUE  0       0       ! a/ (append)
T1256   C1300   VSNVUE  0       0       ! execute/
T1257   C1300   VSNVUE  0       0       ! e/ (execute)
T1258   C1300   VSNVUE  0       0       ! modify/
T1259   C1300   VSNVUE  0       0       ! m/ (modify)
T1023   C1300   FNNVUE  0       0       ! <carriage return> (end specific permi

C1300   C150    D1300   SNFN    ACCESS  outnup  ! response to above permissions
T1240   C1250   FNNVSE  0       0       ! "SPECIFIC PERMISSIONS?"
T1300   C1310   FNNVSE  0       0       ! "MORE?"
T1301   C1320   FNNVSE  0       0       ! "SUCCESSFUL."
T1302   C1240   FNNVSE  0       0       ! "ERR-PERMISSIONS ILLEGALLY STATED"
T1051   C1240   VSNVSE  0       0       ! "ERR-..." (several types)
T1303   C1010   VSNVSE  0       0       ! "REQUEST DENIED-"

C1310   C150    D40     UNVN    ACCESS  outnup  ! user enters more names
T1040   C1300   VNNVUE  0       0       ! (anything)

C1320   C150    D581    SNFN    ACCESS  outnup  ! system prompts for file name
T1320   C1060   FNNVSE  0       0       ! "FILE TO BE MODIFIED?"

C2000   C2004   D510    SNVA    TCON    outnup  !tcon start1
T2002   C2010   FNNVSE  0       0       !<all>TCON VERSION 6.3, JUNE 1976<SP><C
T2020   C150    VSNVSE  0       0       !NO TEMPORARY FILE SPACE CODE

C2001   C2004   D501    SNFN    TCON    outnup  !tcon first question
T2001   C2010   FNNVSE  0       0       !<all>FUNCTIONAL AREA?
```

```
C2003   C2004   D40     UNFN    TCON    outnup  !user hits <nl>
T2100   C2001   FNNVUE  0       0       !<all><CR>

C2004   C2004   D509    SNVN    TCON    outnup  !back to system or top
T150    C160    FNNVSE  0       0       !SYSTEM ?
T150    C160    VSNVSE  0       0       !SYSTEM ? preceded by message
T2000   C2003   FNNVSE  0       0       !TCON VERSION 6.3, JUNE 1976

C2010   C2004   D40     UNFN    TCON    outnup  !user input functional area
T2030   C2020   FNNVUE  0       0       !<all>fs
T2040   C4020   FNNVUE  0       0       !<all>dem
T2100   C150    FNNVUE  0       0       !<all><CR>

C2015   C2015   D509    SNVN    TCON    outnup  !back to system, top or type?
T150    C160    FNNVSE  0       0       !SYSTEM ?
T150    C160    VSNVSE  0       0       !SYSTEM ? preceded by message
T2000   C2016   FNNVSE  0       0       !TCON VERSION 6.3, JUNE 1976
T2201   C2070   FNNVSE  0       0       !<CR><NL>    TRANSACTION TYPE ?<SP><SP>

C2016   C2015   D40     UNFN    TCON    outnup  !user hits <nl>
T2100   C2017   FNNVUE  0       0       !<CR>

C2017   C2015   D501    SNFN    TCON    outnup  !tcon first question
T2001   C2018   FNNVSE  0       0       !FUNCTIONAL AREA?

C2018   C2015   D40     UNFN    TCON    outnup  !user input functional area
T2030   C2020   FNNVUE  0       0       !fs
T2040   C4020   FNNVUE  0       0       !dem
T2100   C150    FNNVUE  0       0       !<CR>

C2020   C2015   D520    SNFN    TCON    outnup  !system asks for old or new
T2110   C2030   FNNVSE  0       0       !<c2010(t2030)>OLD OR NEW-
T2110   C2030   VSNVSE  0       0       !OLD OR NEW-
T2190   C2020   FNNVSE  0       0       !<c2030(t2140)>READY
T2200   C2070   FNNVSE  0       0       !<all><CR><NL><NL><CR><NL>TRANSACTION T
T2201   C2070   FNNVSE  0       0       !<all><CR><NL>    TRANSACTION TYPE ?<SP
T2120   C150    FNNVSE  0       0       !FUNCTIONAL AREA BUSY

C2030   C2015   D40     UNVN    TCON    outnup  !user response to old or new
T2130   C2020   FNNVUE  0       0       !<all>new<CR>
T2140   C2020   FNNVUE  0       0       !<all>n<CR>
T2640   C3000   FNNVUE  0       0       !<all>old<CR>
T2645   C3000   FNNVUE  0       0       !<all>o<CR>
T2162   C2800   VSFVUE  0       0       vumc2   !<all>old <filename>
T2160   C2800   VSFVUE  0       0       vumc2   !<all>o <filename>
T2180   C2042   FNNVUE  0       0       !<all>same<CR>
T2181   C2042   FNNVUE  0       0       !<all>s<CR>
T2100   C150    FNNVUE  0       0       !<all><CR>

C2042   C2015   D530    SNFN    TCON    outnup  !sys resp to same
```

```
T2210   C2020   FNNVSE  0      0       !<all>YOU PRESENTLY DO NOT HAVE A CURRE
T2190   C2800   FNNVSE  0      0       !READY

C2050   C2015   D510    SNVN   TCON    outnup  !tcon start2
T2002   C2018   FNNVSE  0      0       !TCON VERSION 6.3, JUNE 1976
T2020   C150    VSNVSE  0      0       !NO TEMPORARY FILE SPACE CODE

C2070   C2015   D40     UNVN   TCON    outnup  !user input transaction type
T2290   C2692   FNNVUE  0      0       !<c2020(t2200)>a
T2300   C2692   FNNVUE  0      0       !<c2020(t2200)>a a
T2310   C2692   FNNVUE  0      0       !<c2020(t2200)>aa1
T2320   C2692   FNNVUE  0      0       !<c2020(t2200)>d
T2330   C2692   FNNVUE  0      0       !<c2020(t2200)>e
T2340   C2692   FNNVUE  0      0       !<c2020(t2200)>h
T2350   C2692   FNNVUE  0      0       !j
T2360   C2692   FNNVUE  0      0       !k
T2370   C2692   FNNVUE  0      0       !ka1
T2380   C2692   FNNVUE  0      0       !l
T2390   C2692   FNNVUE  0      0       !m
T2400   C2692   FNNVUE  0      0       !n
T2410   C2692   FNNVUE  0      0       !p
T2420   C2692   FNNVUE  0      0       !r-1
T2430   C2692   FNNVUE  0      0       !r-2
T2440   C2692   FNNVUE  0      0       !r11
T2450   C2692   FNNVUE  0      0       !r12
T2460   C2692   FNNVUE  0      0       !aa4
T2470   C2692   FNNVUE  0      0       !ka2
T2480   C2692   FNNVUE  0      0       !t
T2490   C2692   FNNVUE  0      0       !v
T2500   C2692   FNNVUE  0      0       !x
T2510   C2692   FNNVUE  0      0       !z a
T2512   C2692   FNNVUE  0      0       !jsb
T2514   C2692   FNNVUE  0      0       !j b
T2516   C2692   FNNVUE  0      0       !n a
T2518   C2692   FNNVUE  0      0       !n b
T2519   C2692   FNNVUE  0      0       !xxx
T3030   C990    FNNVUE  0      0       !<c2040>bye
T2100   C2050   FNNVUE  0      0       !<c2040 c2072 c2020(t2201)><CR>
T2540   C2072   VSNVUE  0      0       !<c2040 c2072>dele(te) <transaction>
T2520   C150    FNNVUE  0      0       !<c2040>done<CR>
T2610   C2071   FNNVUE  0      0       !<c2040>list<CR>
T2612   C2071   FNNVUE  0      0       !listl<CR>
T2611   C2071   VSFVUE  0      0       vumcl   !<c2040>list <filename>
T2613   C2071   VSFVUE  0      0       vumcl   !listl <filename>
T2640   C3000   FNNVUE  0      0       !<c2072(t2202)>old<CR>
T2162   C2800   VSFVUE  0      0       vumc2   !old <filename>
T2550   C2072   FNNVUE  0      0       !<c2072>remove clearfiles
T2555   C2072   FNNVUE  0      0       !<c2072 c2040>remov clearfiles
T2560   C2072   FNNVUE  0      0       !<c2040 c2072>remo clearfiles
T2630   C2075   FNNVUE  0      0       !<c2072(t2202)>resave<CR>
```

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T2631   C2075   FNNVUE  0       0       !<c2072(t2202)>resa<CR>
T2632   C2077   VSFVUE  0       0       vumc2   !<c2077>resave <filename>
T2633   C2077   VSFVUE  0       0       vumc2   !<c2077>resa <filename>
T2580   C2072   VSNVUE  0       0       !<c2074>rese(quence)
T2600   C2074   VSNVUE  0       0       !<c2020(t2200) c2072(t2202)>retr

C2071   C2015   D506    SNVN    TCON    outnup  !sys resp to list
T2280   C2072   FNNVSE  0       0       !<all>ready
T2281   C2072   VSNVSE  0       0       !ready preceded by data/error

C2072   C2072   D1000   SNFN    TCON    outnup  !sys resp after ready(list), re
T2201   C2070   FNNVSE  0       0       !<c2070(t2540)><CR><NL>    TRANSACTION
T2202   C2070   FNNVSE  0       0       !<c2060 c2070(t2560,t2555,t2550,t2580)

C2074   C2072   D599    SNVN    TCON    outnup  !sys resp after retr
T2250   C2072   FNNVSE  0       0       !<CR><NL>ILLEGAL PARAMETER<SP><SP><SP>
T2202   C2070   VSNVSE  0       0       !<all><CR><NL>TRANSACTION TYPE ?<SP><SP

C2075   C2072   D581    SNFN    TCON    outnup  !file name for resave
T2211   C2076   FNNVSE  0       0       !<all><CR><NL>FILE NAME?<SP>

C2076   C2072   D40     UNVN    TCON    outnup  !user input file name
T2100   C2072   FNNVUE  0       0       !<all><CR>
T2100   C2077   VSFVUE  0       0       vumc1   !<all><filename>

C2077   C2072   D502    SNVN    TCON    outnup  !sys resp to file name
T2221   C2072   FNNVSE  0       0       !<c2070(t2633)><CR><NL><NL>ERR-FILE NAM
T2202   C2070   VSNVSE  0       0       !<c2076 c2070(t2632)><CR><NL>TRANSACTIO

C2080   C2691   D560    SRFN    TCON    outnup  !a skeleton
T2660   C2690   FNNVSE  0       0       !<all>a skeleton

C2100   C2691   D560    SRFN    TCON    outnup  !a a skeleton
T2670   C2690   FNNVSE  0       0       !<all>a a skeleton

C2120   C2691   D560    SRFN    TCON    outnup  !aa1 skeleton
T2680   C2690   FNNVSE  0       0       !aa1 skeleton

C2140   C2691   D560    SRFN    TCON    outnup  !d skeleton
T2690   C2690   FNNVSE  0       0       !<all>d skeleton

C2160   C2691   D560    SRFN    TCON    outnup  !e skeleton
T2700   C2690   FNNVSE  0       0       !<all>e skeleton

C2180   C2691   D560    SRFN    TCON    outnup  !h skeleton
T2710   C2690   FNNVSE  0       0       !<all>h skeleton

C2200   C2691   D560    SRFN    TCON    outnup  !j skeleton
T2720   C2690   FNNVSE  0       0       !<all>skeleton
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C2220   C2691   D560    SRFN    TCON    outnup  !k skeleton
T2730   C2690   FNNVSE  0       0       !<all>skeleton

C2240   C2691   D560    SRFN    TCON    outnup  !ka1 skeleton
T2740   C2690   FNNVSE  0       0       !<all>skeleton

C2260   C2691   D560    SRFN    TCON    outnup  !l skeleton
T2750   C2690   FNNVSE  0       0       !<all>skeleton

C2280   C2691   D560    SRFN    TCON    outnup  !m skeleton
T2760   C2690   FNNVSE  0       0       !<all>skeleton

C2300   C2691   D560    SRFN    TCON    outnup  !n skeleton
T2770   C2690   FNNVSE  0       0       !<all>skeleton

C2320   C2691   D560    SRFN    TCON    outnup  !p skeleton
T2780   C2690   FNNVSE  0       0       !<all>skeleton

C2340   C2691   D560    SRFN    TCON    outnup  !r-1 skeleton
T2790   C2690   FNNVSE  0       0       !<all>skeleton

C2360   C2691   D560    SRFN    TCON    outnup  !r-2 skeleton
T2800   C2690   FNNVSE  0       0       !skeleton

C2380   C2691   D560    SRFN    TCON    outnup  !r11 skeleton
T2810   C2690   FNNVSE  0       0       !skeleton

C2400   C2691   D560    SRFN    TCON    outnup  !r12 skeleton
T2820   C2690   FNNVSE  0       0       !skeleton

C2420   C2691   D560    SRFN    TCON    outnup  !aa4 skeleton
T2830   C2690   FNNVSE  0       0       !skeleton

C2440   C2691   D560    SRFN    TCON    outnup  !ka2 skeleton
T2840   C2690   FNNVSE  0       0       !skeleton

C2460   C2691   D560    SRFN    TCON    outnup  !t skeleton
T2850   C2690   FNNVSE  0       0       !skeleton

C2480   C2691   D560    SRFN    TCON    outnup  !v skeleton
T2860   C2690   FNNVSE  0       0       !skeleton

C2500   C2691   D560    SRFN    TCON    outnup  !x skeleton
T2870   C2690   FNNVSE  0       0       !skeleton

C2520   C2691   D560    SRFN    TCON    outnup  !z a skeleton
T2880   C2690   FNNVSE  0       0       !skeleton

C2540   C2691   D560    SRFN    TCON    outnup  !jsb skeleton
T3140   C2690   FNNVSE  0       0       !skeleton
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C2560   C2691   D560    SRFN   TCON   outnup  !j b skeleton
T3150   C2690   FNNVSE  0      0      !skeleton

C2580   C2691   D560    SRFN   TCON   outnup  !n a skeleton
T3160   C2690   FNNVSE  0      0      !skeleton

C2600   C2691   D560    SRFN   TCON   outnup  !n b skeleton
T3170   C2690   FNNVSE  0      0      !skeleton

C2620   C2691   D560    SRFN   TCON   outnup  !xxx skeleton
T3180   C2690   FNNVSE  0      0      !skeleton

C2690   C2691   D550    SNFN   TCON   outnup  !end of skeletons
T3070   C2700   FNNVSE  0      0      !<c2080c2100c2120c2140c2160 2180c2200c2

C2691   C2710   D560    SRVN   TCON   outnup  !remnants of skeleton after <br
T2050   C2691   VSNVSE  0      0      !<CR><NL>

C2692   C2710   D560    SRVN   TCON   outnup  !variable skeleton
T3070   C2700   VSNVSE  0      0      !<c2070(t2290t2300t2310t2320t2330t2340)

C2700   C2710   D40     UNVN   TCON   outnup  !user skeleton data entry
T3030   C990    FNNVUE  0      0      !<c2710(t2050)c2720(t3070)>bye
T3040   C2800   FNNVUE  0      0      !<c2690 c2710(t2050)c3071>d (done with
T2520   C150    FNNVUE  0      0      !<c2690>done<CR>
T2610   C2730   FNNVUE  0      0      !<c2710(t2050)c3071>list<CR>
T2612   C2730   FNNVUE  0      0      !<c3071(t3070)>listl<CR>
T2640   C3000   FNNVUE  0      0      !<c2692c2710(t2050)>old<CR>
T2550   C2710   FNNVUE  0      0      !<c2692c2721(t3070)>remove clearfiles
T2555   C2710   FNNVUE  0      0      !<c2710(t2050)>remov clearfiles
T2560   C2710   FNNVUE  0      0      !<c2710(t2050)>remo clearfiles
T2630   C2711   FNNVUE  0      0      !resave<CR>
T2631   C2711   FNNVUE  0      0      !resa<CR>
T3011   C2700   FNNIUE  0      0      !<c2710(t2050)>system<CR>
T3012   C2700   FNNIUE  0      0      !<c2701(t2050)>syst<CR>
T3000   C2720   FNNVUE  0      0      !<c2710(t2050)>test<CR>
T3001   C2720   FNNVUE  0      0      !<c2710(t2050)>t<CR>
T2890   C2720   FNNVUE  0      0      !<c2690>tn<CR>
T3020   C2720   FNNVUE  0      0      !<c2720(t3070)c2732>xmit<CR>
T3021   C2720   FNNVUE  0      0      !<c2710(t2050)>x<CR>
T3010   C2710   FNNVUE  0      0      !<c2690 c2720(t3070)c3071>*<CR>
T2100   C2720   FNNVUE  0      0      !<c2690 c2710(t2050)><CR>
T2960   C2720   VSNVUE  0      0      !<c2710(t2050)c2690>backward
T2540   C2800   VSNVUE  0      0      !<c2692c3071>dele(te)
T2541   C2700   VSNIUE  0      0      !<all>feed(back)
T2940   C2720   VSNVUE  0      0      !<c2721(t3080)>forward
T2980   C2720   VSNVUE  0      0      !<c2710(t2050)c2721(t3070)>get<SP>
T2547   C2700   VSNIUE  0      0      !<all>help
T2611   C2730   VSFVUE  0      0      vumcl   !<c2720(t3070)>list <filename>
T2613   C2730   VSFVUE  0      0      vumcl   !<c2710(t2050)>listl <filename>
```

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T2542   C2700   VSNIUE  0      0      !<all>next
T2543   C2700   VSNIUE  0      0      !<all>nofe(ed)
T2162   C2800   VSFVUE  0      0      vumc2   !<c2692c2721(t3080)c3071>old <f
T2544   C2700   VSNIUE  0      0      !<all>pass
T2545   C2700   VSNIUE  0      0      !<all>rewi(nd)
T2546   C2700   VSNIUE  0      0      !<all>skip
T2548   C2700   VSNIUE  0      0      !<all>voca(bulary)
T2632   C2713   VSFVUE  0      0      vumc2   !resave <filename>
T2633   C2713   VSFVUE  0      0      vumc2   !resa <filename>
T2580   C2710   VSNVUE  0      0      !<all>rese(quence)
T2600   C2731   VSNVUE  0      0      !<c2692c2710(t2050)c2721(t3080)c3071>re
T2161   C2710   VSNVUE  0      0      !<c2690>ol <filename>
T2981   C2720   VSNVUE  0      0      !<c2721(3070)>g<SP>
T2160   C2710   VSNVUE  0      0      !<c2690>o <filename>
T2891   C2710   VSNVUE  0      0      !<c2690>tn
T2910   C2710   VSNVUE  0      0      !<c2720(t3070)>[
T2060   C2710   VSNVUE  0      0      !0<SP>
T2061   C2710   VSNVUE  0      0      !1<SP>
T2062   C2710   VSNVUE  0      0      !2<SP>
T2063   C2710   VSNVUE  0      0      !3<SP>
T2064   C2710   VSNVUE  0      0      !4<SP>
T2065   C2710   VSNVUE  0      0      !5<SP>
T2066   C2710   VSNVUE  0      0      !6<SP>
T2067   C2710   VSNVUE  0      0      !7<SP>
T2068   C2710   VSNVUE  0      0      !8<SP>
T2069   C2710   VSNVUE  0      0      !9<SP>
T2961   C2720   VSNVUE  0      0      !<c2721(t3070)>b
T2941   C2720   VSNVUE  0      0      !<c2721(t3070)>f

C2710   C2710   D570    SNVN   TCON   outnup  !sys resp to skel data entry
T2050   C2700   FNNVSE  0      0      !<c2800c2730(t2281)c2731(t2240t2250)c26
T3060   C2710   FNNVSE  0      0      !<c2700(t2160t3010)><CR><NL>INVALID COM
T3050   C2715   VSNVSE  0      0      ! DATA TRUNCATED<SP>

C2711   C2710   D581    SNFN   TCON   outnup  !sys resp to resave
T2211   C2712   FNNVSE  0      0      !<c2700(t2631)>FILE NAME?<SP>

C2712   C2800   D40     UNVN   TCON   outnup  !user input filename
T2100   C2710   FNNVUE  0      0      !<all><CR>
T2100   C2713   VNFVUE  0      0      vumc1   !<all><filename>

C2713   C2710   D539    SNVN   TCON   outnup  !sys resp to filename
T2270   C2714   FNNVSE  0      0      !<CR><NL>DATA SAVED-
T2196   C2710   VSNVSE  0      0      !FILE '<filename>' DOES NOT EXIST--USE
T2220   C2710   VSNVSE  0      0      !<CR><NL><50>FILE <filename> -- INCORRE
T2221   C2710   FNNVSE  0      0      !<CR><NL><NL>ERR-FILE NAME >8 CHARACTER
T2224   C2710   VSNVSE  0      0      !<CR><NL><NL>ERR-'<character>' IS AN IL
T2225   C2710   VSNVSE  0      0      !<CR><NL><NL>ERR-FIELD STARTING WITH '<

C2714   C2710   D560    SNVN   TCON   outnup  !end of data saved msg
```

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T2100   C2700   VNNVSE  0     0      !<filename><CR><NL>

C2715   C2710   D40     UNVN  TCON   outnup  ! |cr|^
T2100   C2710   VSNVUE  0     0      !anything

C2720   C2710   D580    SNVN  TCON   outnup  ! ? ^E|cr||nl|^R  |cr||nl|^LEVE
T2240   C2710   VSNVSE  0     0      !TRANSACTION xxxxxx NOT IN CURR FILE<SP
T2657   C2721   FNNVSE  0     0      !<c2700(t2980t2981)><CR><NL>spaces<CR><
T2658   C2721   VSNVSE  0     0      !TRANSACTION SEQUENCE NUMBER  <CR><NL>
T2659   C2721   VSNVSE  0     0      !<c2700(t2960t2961t2940t2941)>ERROR MES
T3090   C3060   FNNVSE  0     0      !<c2700(t3020)>TRANSACTION SENT. NEXT?<
T3090   C3060   VSNVSE  0     0      !TRANSACTION SENT. NEXT?<SP>
T3060   C2710   FNNVSE  0     0      !<CR><NL>INVALID COMMAND AT THIS LEVEL<

C2721   C2710   D560    SRVN  TCON   outnup  ! |cr||nl|^
T3070   C2700   VSNVSE  0     0      !<c2720(t2657t2659)>END OF TRANSACTION
T3080   C2700   VSNVSE  0     0      !<c2720(t2659t2657)>MORE - - - -<CR><NL

C2730   C2800   D506    SNVN  TCON   outnup  !sys out of list
T2280   C2710   FNNVSE  0     0      !ready
T2281   C2710   VSNVSE  0     0      !<c2700(t2610t2611t2612t2613)>ready pre

C2731   C2800   D598    SNVN  TCON   outnup  ! |cr||nl|^TYPE  ^-   ^
T2205   C2733   FNNVSE  0     0      !<c2700(t2600)>INVALID TRANSACTION TYPE
T2240   C2710   VSNVSE  0     0      !<c2700(t2600)>TRANSACTION xxxxxx NOT I
T2250   C2710   FNNVSE  0     0      !<c2700(t2600)><CR><NL>ILLEGAL PARAMETE
T2657   C2732   FNNVSE  0     0      !<CR><NL>spaces<CR><NL>TN[000010spacesT
T2658   C2732   VSNVSE  0     0      !<c2700(t2600)>TRANSACTION SEQUENCE NUM

C2732   C2800   D560    SRVN  TCON   outnup  ! <CR><NL>
T3070   C2700   VSNVSE  0     0      !<c2731(t2658)>END OF TRANSACTION  <CR>

C2733   C2731   D40     UNFN  TCON   !user enters tran type
T2290   C3070   FNNVUE  0     0      !<c2731>a
T2300   C3070   FNNVUE  0     0      !<c2731>a a
T2310   C3070   FNNVUE  0     0      !aa1
T2320   C3070   FNNVUE  0     0      !d
T2330   C3070   FNNVUE  0     0      !e
T2340   C3070   FNNVUE  0     0      !h
T2350   C3070   FNNVUE  0     0      !j
T2360   C3070   FNNVUE  0     0      !k
T2370   C3070   FNNVUE  0     0      !ka1
T2380   C3070   FNNVUE  0     0      !l
T2390   C3070   FNNVUE  0     0      !m
T2400   C3070   FNNVUE  0     0      !n
T2410   C3070   FNNVUE  0     0      !p
T2420   C3070   FNNVUE  0     0      !r-1
T2430   C3070   FNNVUE  0     0      !r-2
T2440   C3070   FNNVUE  0     0      !r11
T2450   C3070   FNNVUE  0     0      !r12
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T2460   C3070   FNNVUE  0       0       !aa4
T2470   C3070   FNNVUE  0       0       !ka2
T2480   C3070   FNNVUE  0       0       !t
T2490   C3070   FNNVUE  0       0       !v
T2500   C3070   FNNVUE  0       0       !x
T2510   C3070   FNNVUE  0       0       !z a
T2512   C3070   FNNVUE  0       0       !jsb
T2514   C3070   FNNVUE  0       0       !j b
T2516   C3070   FNNVUE  0       0       !n a
T2518   C3070   FNNVUE  0       0       !n b
T2519   C3070   FNNVUE  0       0       !xxx

C2800   C4004   D540    SNVN    TCON    outnup  !variable tran type
T2110   C2990   FNNVSE  0       0       !OLD OR NEW-
T2110   C2990   VSNVSE  0       0       !OLD OR NEW-
T2190   C2800   FNNVSE  0       0       !<c2700(t2162)c3010c3060(t2162)>READY
T2200   C3060   FNNVSE  0       0       !<c2800><CR><NL><NL><CR><NL>TRANSACTION
T2200   C3060   VSNVSE  0       0       !<CR><NL><NL><CR><NL>TRANSACTION TYPE ?
T2201   C3060   FNNVSE  0       0       !<c2700(t2540t3040) c2992 c2800(t2190)c
T2201   C3060   VSNVSE  0       0       !<CR><NL>    TRANSACTION TYPE ?<SP><SP>
T2222   C2800   FNNVSE  0       0       !<CR><NL>ERR-FILE NAME >8 CHARACTERS

C2990   C4004   D40     UNVN    TCON    outnup  !user response to old or new
T2130   C2020   FNNVUE  0       0       !new<CR>
T2140   C2020   FNNVUE  0       0       !n<CR>
T2640   C3000   FNNVUE  0       0       !old<CR>
T2645   C3000   FNNVUE  0       0       !o<CR>
T2162   C2800   VSFVUE  0       0       vumc2   !old <filename>
T2160   C2800   VSFVUE  0       0       vumc2   !o <filename>
T2180   C2992   FNNVUE  0       0       !same<CR>
T2181   C2992   FNNVUE  0       0       !s<CR>
T2100   C150    FNNVUE  0       0       !<CR>

C2992   C4004   D530    SNFN    TCON    outnup  !sys resp to same
T2210   C2800   FNNVSE  0       0       !YOU PRESENTLY DO NOT HAVE A CURRENT FI
T2190   C2800   FNNVSE  0       0       !<c2990(t2180)>READY

C3000   C2800   D581    SNFN    TCON    outnup  !old file path
T3110   C3010   FNNVSE  0       0       !<c2030 c2070(t2640) c2700(t2640) c3060

C3010   C2800   D40     UNVN    TCON    outnup  !user input old filename
T2100   C2800   FNNVUE  0       0       !<CR>
T2100   C2800   VNFVUE  0       0       vumc1   !<filename>

C3060   C2710   D40     UNVN    TCON    outnup  !user input transaction type
T2290   C3070   FNNVUE  0       0       !<c2800(t2200t2201)c3062(t2202)>a
T2300   C3070   FNNVUE  0       0       !<c2800(t2201)>a a
T2310   C3070   FNNVUE  0       0       !<c2800(t2201)>aa1
T2320   C3070   FNNVUE  0       0       !<c2800(t2201)>d
T2330   C3070   FNNVUE  0       0       !<c2800(t2201)>e
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T2340	C3070	FNNVUE	0	0	!<c2800(t2201)>h
T2350	C3070	FNNVUE	0	0	!<c2800(t2201)>j
T2360	C3070	FNNVUE	0	0	!k
T2370	C3070	FNNVUE	0	0	!ka1
T2380	C3070	FNNVUE	0	0	!l
T2390	C3070	FNNVUE	0	0	!m
T2400	C3070	FNNVUE	0	0	!n
T2410	C3070	FNNVUE	0	0	!p
T2420	C3070	FNNVUE	0	0	!r-1
T2430	C3070	FNNVUE	0	0	!r-2
T2440	C3070	FNNVUE	0	0	!r11
T2450	C3070	FNNVUE	0	0	!r12
T2460	C3070	FNNVUE	0	0	!aa4
T2470	C3070	FNNVUE	0	0	!ka2
T2480	C3070	FNNVUE	0	0	!t
T2490	C3070	FNNVUE	0	0	!v
T2500	C3070	FNNVUE	0	0	!x
T2510	C3070	FNNVUE	0	0	!z a
T2512	C3070	FNNVUE	0	0	!jsb
T2514	C3070	FNNVUE	0	0	!j b
T2516	C3070	FNNVUE	0	0	!n a
T2518	C3070	FNNVUE	0	0	!n b
T2519	C3070	FNNVUE	0	0	!xxx
T3010	C3070	FNNVUE	0	0	!*
T3030	C990	FNNVUE	0	0	!<c2042 c3062(t2201t2202)>bye
T2100	C4000	FNNVUE	0	0	!<c2800(t2201)c3062(t2202)><CR>
T2540	C3062	VSNVUE	0	0	!<c3062(t2202)>dele(te) <transaction>
T2520	C150	FNNVUE	0	0	!<c2720c2800(t2201)>done<CR>
T2610	C3061	FNNVUE	0	0	!<c2800(t2201)>list<CR>
T2612	C3061	FNNVUE	0	0	!<c2800(t2201)>listl<CR>
T2611	C3061	VSFVUE	0	0	vumcl !<c2800(t2201)>list <filename>
T2613	C3061	VSFVUE	0	0	vumcl !<c3062(t2202)>listl <filename>
T2640	C3000	FNNVUE	0	0	!<c3062(t2202)>old<CR>
T2162	C2800	VSFVUE	0	0	vumc2 !<c3067>old <filename>
T2550	C3062	FNNVUE	0	0	!<c3062(t2201)>remove clearfiles
T2555	C3062	FNNVUE	0	0	!<c3062(t2202)>remov clearfiles
T2560	C3062	FNNVUE	0	0	!<c3062(t2202)>remo clearfiles
T2630	C3063	FNNVUE	0	0	!<c2720>resave<CR>
T2631	C3063	FNNVUE	0	0	!<c3062(t2202)>resa<CR>
T2632	C3065	VSFVUE	0	0	vumc2 !resave <filename>
T2633	C3065	VSFVUE	0	0	vumc2 !resa <filename>
T2580	C3062	VSNVUE	0	0	!<c3062(t2202)>rese(quence)
T2600	C3070	VSNVUE	0	0	!<c2800(t2200t2201)c3062(t2202)>retr
C3061	C4004	D506	SNVN	TCON	outnup !sys resp to list
T2280	C3062	FNNVSE	0	0	!<c3060(t2610)>ready
T2281	C3062	VSNVSE	0	0	!<c3060(t2610t2612 t2613)>ready precede
C3062	C3062	D1000	SNFN	TCON	outnup !sys resp after ready(list), re
T2201	C3060	FNNVSE	0	0	!<c3060(t2540)c3070(pop)><CR><NL> TR

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T2202  C3060  FNNVSE  0     0     !<c3060(t2550t2555t2560t2580)c3061c3064

C3063  C3062  D581    SNFN  TCON  outnup  !sys resp to resave
T2211  C3064  FNNVSE  0     0     !<all>FILE NAME?<SP>

C3064  C3062  D40     UNVN  TCON  outnup  !user input filename
T2100  C3062  FNNVUE  0     0     !<all><CR>
T2100  C3065  VNFVUE  0     0     vumc1   !<all><filename>

C3065  C3062  D502    SNVN  TCON  outnup  !sys resp to resave
T2202  C3060  VSNVSE  0     0     !<CR><NL>TRANSACTION TYPE ?<SP><SP> pre
T2221  C3062  FNNVSE  0     0     !<CR><NL><NL>ERR-FILE NAME >8 CHARACTER

C3070  C3062  D598    SNVN  TCON  outnup  !<t2205t2230> |cr||nl|^CURR FIL
T2230  C3060  FNNVSE  0     0     !INVALID TRANSACTION TYPE -RETYPE-<SP><
T2205  C2733  FNNVSE  0     0     !INVALID TRANSACTION TYPE ON RETRIEVE<C
T2240  C3062  VSNVSE  0     0     !TRANSACTION xxxxxx NOT IN CURR FILE<SP
T2250  C3062  FNNVSE  0     0     !<c3060(t2600)><CR><NL>ILLEGAL PARAMETE
T2657  C3071  FNNVSE  0     0     !<c3060(t2300t2310)><CR><NL>spaces<CR><
T2658  C3071  VSNVSE  0     0     !<c2733(t2290t2300)c3060(t2290t2320t234

C3071  C2691  D560    SRVN  TCON  outnup  ! |cr||nl|^
T3070  C2700  VSNVSE  0     0     !<c3070(t2657t2658)>END OF TRANSACTION

C4000  C4004  D510    SNVN  TCON  outnup  !tcon start3
T2002  C4010  FNNVSE  0     0     !<all>TCON VERSION 6.3, JUNE 1976
T2020  C150   VSNVSE  0     0     !NO TEMPORARY FILE SPACE CODE

C4001  C4004  D501    SNFN  TCON  outnup  !tcon first question
T2001  C4010  FNNVSE  0     0     !<all>FUNCTIONAL AREA?

C4003  C4004  D40     UNFN  TCON  outnup  !user hits <nl>
T2100  C4001  FNNVUE  0     0     !<all><CR>

C4004  C4004  D509    SNVN  TCON  outnup  !back to system, top or type?
T150   C160   FNNVSE  0     0     !SYSTEM ?
T150   C160   VSNVSE  0     0     !SYSTEM ? preceded by message
T2000  C4003  FNNVSE  0     0     !<c2800>TCON VERSION 6.3, JUNE 1976
T2201  C3060  FNNVSE  0     0     !<CR><NL>    TRANSACTION TYPE ?<SP><SP>

C4010  C4004  D40     UNFN  TCON  outnup  !user input functional area
T2030  C2800  FNNVUE  0     0     !<all>fs
T2040  C4800  FNNVUE  0     0     !<all>dem
T2100  C150   FNNVUE  0     0     !<all><CR>

C4015  C4015  D509    SNVN  TCON  outnup  !back to system, top or type?
T150   C160   FNNVSE  0     0     !SYSTEM ?
T150   C160   VSNVSE  0     0     !SYSTEM ? preceded by message
T2000  C4016  FNNVSE  0     0     !TCON VERSION 6.3, JUNE 1976
T2201  C4070  FNNVSE  0     0     !<CR><NL>    TRANSACTION TYPE ?<SP><SP>
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C4016   C4015   D40     UNFN    TCON    outnup  !user hits <nl>
T2100   C4017   FNNVUE  0       0       !<CR>

C4017   C4015   D501    SNFN    TCON    outnup  !tcon first question
T2001   C4018   FNNVSE  0       0       !FUNCTIONAL AREA?

C4018   C4015   D40     UNFN    TCON    outnup  !user input functional area
T2030   C4020   FNNVUE  0       0       !fs
T2040   C4020   FNNVUE  0       0       !dem
T2100   C150    FNNVUE  0       0       !<CR>

C4020   C4015   D520    SNFN    TCON    outnup  !system asks for old or new
T2110   C4030   FNNVSE  0       0       !<c2010>OLD OR NEW-
T2110   C4030   VSNVSE  0       0       !OLD OR NEW-
T2190   C4020   FNNVSE  0       0       !<c4030(t2130t2140)>READY
T2200   C4070   FNNVSE  0       0       !<c4020(t2190)><CR><NL><NL><CR><NL>TRAN
T2201   C4070   FNNVSE  0       0       !<CR><NL>    TRANSACTION TYPE ?<SP><SP>
T2120   C150    FNNVSE  0       0       !FUNCTIONAL AREA BUSY

C4030   C4015   D40     UNVN    TCON    outnup  !user response to old or new
T2130   C4020   FNNVUE  0       0       !<all>new<CR>
T2140   C4020   FNNVUE  0       0       !<all>n<CR>
T2640   C5020   FNNVUE  0       0       !<all>old<CR>
T2645   C5020   FNNVUE  0       0       !<all>o<CR>
T2162   C4800   VSFVUE  0       0       vumc2   !old <filename>
T2160   C4800   VSFVUE  0       0       vumc2   !o <filename>
T2180   C4042   FNNVUE  0       0       !same<CR>
T2181   C4042   FNNVUE  0       0       !<all>s<CR>
T2100   C150    FNNVUE  0       0       !<CR>

C4042   C4015   D530    SNFN    TCON    outnup  !sys.resp to same
T2210   C4020   FNNVSE  0       0       !YOU PRESENTLY DO NOT HAVE A CURRENT FI
T2190   C4800   FNNVSE  0       0       !READY

C4050   C4015   D510    SNVN    TCON    outnup  !tcon start4
T2002   C4018   FNNVSE  0       0       !TCON VERSION 6.3, JUNE 1976
T2020   C150    VSNVSE  0       0       !NO TEMPORARY FILE SPACE CODE

C4070   C4015   D40     UNVN    TCON    outnup  !user input tran type
T3300   C4342   FNNVUE  0       0       !<c4020(t2200)>hd
T3310   C4342   FNNVUE  0       0       !<c4020(t2200)>as
T3320   C4342   FNNVUE  0       0       !am
T3330   C4342   FNNVUE  0       0       !av
T3340   C4342   FNNVUE  0       0       !ae
T3350   C4342   FNNVUE  0       0       !at
T3380   C4342   FNNVUE  0       0       !ma
T3390   C4342   FNNVUE  0       0       !mc
T3400   C4342   FNNVUE  0       0       !pl
T3410   C4342   FNNVUE  0       0       !pd
T3420   C4342   FNNVUE  0       0       !ol
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T3430   C4342   FNNVUE  0       0       !od
T3030   C990    FNNVUE  0       0       !bye
T2100   C4050   FNNVUE  0       0       !<CR>
T2520   C150    FNNVUE  0       0       !<c4020(t2200)>done<CR>
T2540   C4072   VSNVUE  0       0       !dele(te) <transaction>
T2610   C4071   FNNVUE  0       0       !list<CR>
T2612   C4071   FNNVUE  0       0       !listl<CR>
T2611   C4071   VSFVUE  0       0       vumcl   !list <filename>
T2613   C4071   VSFVUE  0       0       vumcl   !listl <filename>
T2640   C5020   FNNVUE  0       0       !old<CR>
T2162   C4800   VSFVUE  0       0       vumc2   !old <filename>
T2550   C4072   FNNVUE  0       0       !remove clearfiles
T2555   C4072   FNNVUE  0       0       !remov clearfiles
T2560   C4072   FNNVUE  0       0       !remo clearfiles
T2630   C4075   FNNVUE  0       0       !resave<CR>
T2631   C4075   FNNVUE  0       0       !resa<CR>
T2632   C4077   VSFVUE  0       0       vumc2   !resave <filename>
T2633   C4077   VSFVUE  0       0       vumc2   !resa <filename>
T2580   C4072   VSNVUE  0       0       !rese(quence)
T2600   C4074   VSNVUE  0       0       !retr

C4071   C4015   D506    SNVN    TCON    outnup  !sys resp to list
T2280   C4072   FNNVSE  0       0       !ready
T2281   C4072   VSNVSE  0       0       !ready preceded by data/error

C4072   C4072   D1000   SNFN    TCON    outnup  !sys resp after ready(list), re
T2201   C4070   FNNVSE  0       0       !<CR><NL>    TRANSACTION TYPE ?<SP><SP>
T2202   C4070   FNNVSE  0       0       !<CR><NL>TRANSACTION TYPE ?<SP><SP>

C4074   C4072   D599    SNVN    TCON    outnup  !sys resp after retr
T2250   C4072   FNNVSE  0       0       !<CR><NL>ILLEGAL PARAMETER<SP><SP><SP>
T2202   C4070   VSNVSE  0       0       !<CR><NL>TRANSACTION TYPE ?<SP><SP>prec

C4075   C4072   D581    SNFN    TCON    outnup  !file name for resave
T2211   C4076   FNNVSE  0       0       !<CR><NL>FILE NAME?<SP>

C4076   C4072   D40     UNVN    TCON    outnup  !user input file name
T2100   C4072   FNNVUE  0       0       !<CR>
T2100   C4077   VSFVUE  0       0       vumc1   !<filename>

C4077   C4072   D502    SNVN    TCON    outnup  !sys resp to file name
T2221   C4072   FNNVSE  0       0       !<CR><NL><NL>ERR-FILE NAME >8 CHARACTER
T2202   C4070   VSNVSE  0       0       !<CR><NL>TRANSACTION TYPE ?<SP><SP>prec

C4080   C4341   D560    SRFN    TCON    outnup  !hd skeleton
T3440   C4340   FNNVSE  0       0       !skeleton

C4085   C4341   D560    SRFN    TCON    outnup  !as skeleton
T3450   C4340   FNNVSE  0       0       !skeleton
```

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C4090   C4341   D560    SRFN    TCON    outnup  !am skeleton
T3460   C4340   FNNVSE  0       0       !skeleton

C4110   C4341   D560    SRFN    TCON    outnup  !av skeleton
T3470   C4340   FNNVSE  0       0       !skeleton

C4130   C4341   D560    SRFN    TCON    outnup  !ae skeleton
T3480   C4340   FNNVSE  0       0       !skeleton

C4150   C4341   D560    SRFN    TCON    outnup  !at skeleton
T3490   C4340   FNNVSE  0       0       !skeleton

C4210   C4341   D560    SRFN    TCON    outnup  !ma skeleton
T3520   C4340   FNNVSE  0       0       !skeleton

C4230   C4341   D560    SRFN    TCON    outnup  !mc skeleton
T3530   C4340   FNNVSE  0       0       !skeleton

C4250   C4341   D560    SRFN    TCON    outnup  !pl skeleton
T3540   C4340   FNNVSE  0       0       !skeleton

C4270   C4341   D560    SRFN    TCON    outnup  !pd skeleton
T3550   C4340   FNNVSE  0       0       !skeleton

C4290   C4341   D560    SRFN    TCON    outnup  !ol skeleton
T3560   C4340   FNNVSE  0       0       !skeleton

C4310   C4341   D560    SRFN    TCON    outnup  !od skeleton
T3570   C4340   FNNVSE  0       0       !skeleton

C4340   C4341   D550    SNFN    TCON    outnup  !end of skeletons
T3070   C4700   FNNVSE  0      0       !END OF TRANSACTION

C4341   C4710   D560    SRVN    TCON    outnup  !remnants of skeleton after <br
T2050   C4341   VSNVSE  0       0       !<CR><NL>

C4342   C4710   D560    SRVN    TCON    outnup  !variable skeleton
T3070   C4700   VSNVSE  0       0       !<c4070(t3300t3310)>END OF TRANSACTION

C4700   C4710   D40     UNVN    TCON    outnup  !user skeleton data entry
T3030   C990    FNNVUE  0       0       !<c4710(t2050)>bye
T3040   C4800   FNNVUE  0       0       !<c4342>d (done with this skeleton)
T2520   C150    FNNVUE  0       0       !<c5071>done<CR>
T2610   C4380   FNNVUE  0       0       !<c5071>list<CR>
T2612   C4380   FNNVUE  0       0       !<c4360(t2050)>listl<CR>
T2640   C5020   FNNVUE  0       0       !<c4360(t2050)>old<CR>
T2550   C4710   FNNVUE  0       0       !remove clearfiles
T2555   C4710   FNNVUE  0       0       !remov clearfiles
T2560   C4710   FNNVUE  0       0       !remo clearfiles
T2630   C4711   FNNVUE  0       0       !<c5071>resave<CR>
```

T2631	C4711	FNNVUE	0	0	!<c4360(t2050)>resa<CR>
T3011	C4700	FNNIUE	0	0	!system<CR>
T3012	C4700	FNNIUE	0	0	!syst<CR>
T3000	C4370	FNNVUE	0	0	!test<CR>
T3001	C4370	FNNVUE	0	0	!t<CR>
T2890	C4370	FNNVUE	0	0	!tn<CR>
T3020	C4370	FNNVUE	0	0	!xmit<CR>
T3021	C4370	FNNVUE	0	0	!x<CR>
T3010	C4710	FNNVUE	0	0	!*<CR>
T2100	C4370	FNNVUE	0	0	!<CR>
T2960	C4370	VSNVUE	0	0	!backward
T2940	C4370	VSNVUE	0	0	!forward
T2980	C4370	VSNVUE	0	0	!get<SP>
T2540	C4800	VSNVUE	0	0	!dele(te)
T2541	C4700	VSNIUE	0	0	!feed(back)
T2547	C4700	VSNIUE	0	0	!help
T2611	C4380	VSFVUE	0	0	vumcl !list <filename>
T2613	C4380	VSFVUE	0	0	vumcl !listl <filename>
T2542	C4700	VSNIUE	0	0	!next
T2543	C4700	VSNIUE	0	0	!nofe(ed)
T2162	C4800	VSFVUE	0	0	vumc2 !old <filename>
T2544	C4700	VSNIUE	0	0	!pass
T2545	C4700	VSNIUE	0	0	!rewi(nd)
T2546	C4700	VSNIUE	0	0	!skip
T2548	C4700	VSNIUE	0	0	!voca(bulary)
T2632	C4713	VSFVUE	0	0	vumc2 !resave <filename>
T2633	C4713	VSFVUE	0	0	vumc2 !resa <filename>
T2580	C4710	VSNVUE	0	0	!rese(quence)
T2600	C4731	VSNVUE	0	0	!retr
T2161	C4710	VSNVUE	0	0	!ol <filename>
T2981	C4370	VSNVUE	0	0	!g<SP>
T2160	C4710	VSNVUE	0	0	!o <filename>
T2891	C4710	VSNVUE	0	0	!tn
T2910	C4710	VSNVUE	0	0	![
T2060	C4710	VSNVUE	0	0	!0<SP>
T2061	C4710	VSNVUE	0	0	!1<SP>
T2062	C4710	VSNVUE	0	0	!2<SP>
T2063	C4710	VSNVUE	0	0	!3<SP>
T2064	C4710	VSNVUE	0	0	!4<SP>
T2065	C4710	VSNVUE	0	0	!5<SP>
T2066	C4710	VSNVUE	0	0	!6<SP>
T2067	C4710	VSNVUE	0	0	!7<SP>
T2068	C4710	VSNVUE	0	0	!8<SP>
T2069	C4710	VSNVUE	0	0	!9<SP>
T2961	C4370	VSNVUE	0	0	!b
T2941	C4370	VSNVUE	0	0	!f
C4710	C4710	D570	SNVN	TCON	outnup !sys resp to skel data entry
T2050	C4700	FNNVSE	0	0	!<c4380(t2281)c4712c5050><CR><NL>
T3060	C4710	FNNVSE	0	0	!INVALID COMMAND AT THIS LEVEL

```
T3050   C4715   VSNVSE  0       0       ! DATA TRUNCATED<SP>

C4711   C4710   D581    SNFN    TCON    outnup  !sys resp to resa cmd
T2211   C4712   FNNVSE  0       0       !<all>FILE NAME?<SP>

C4712   C4370   D40     UNVN    TCON    outnup  !user input filename
T2100   C4710   FNNVUE  0       0       !<all><CR>
T2100   C4713   VNFVUE  0       0       vumc1   !<all><filename>

C4713   C4710   D539    SNVN    TCON    outnup  !sys resp to filename
T2270   C4714   FNNVSE  0       0       !<CR><NL>DATA SAVED-
T2196   C4710   VSNVSE  0       0       !FILE '<filename>' DOES NOT EXIST--USE
T2220   C4710   VSNVSE  0       0       !<CR><NL><50>FILE <filename> -- INCORRE
T2221   C4710   FNNVSE  0       0       !<CR><NL><NL>ERR-FILE NAME >8 CHARACTER
T2224   C4710   VSNVSE  0       0       !<CR><NL><NL>ERR-'<character>' IS AN IL
T2225   C4710   VSNVSE  0       0       !<CR><NL><NL>ERR-FIELD STARTING WITH '<

C4714   C4710   D560    SNVN    TCON    outnup  !end of data saved msg
T2100   C4700   VNNVSE  0       0       !<filename><CR><NL>

C4715   C4710   D40     UNVN    TCON    outnup  ! |cr|^
T2100   C4710   VSNVUE  0       0       !anything

C4370   C4710   D580    SNVN    TCON    outnup  ! ? ^E|cr||nl|^R  |cr||nl|^LEVE
T2240   C4710   VSNVSE  0       0       !TRANSACTION xxxxxx NOT IN CURR FILE<SP
T2657   C4371   FNNVSE  0       0       !<CR><NL>spaces<CR><NL>TN[000010spacesT
T2658   C4371   VSNVSE  0       0       !TRANSACTION SEQUENCE NUMBER  <CR><NL>
T2659   C4371   VSNVSE  0       0       !ERROR MESSAGE<CR><NL>
T3090   C5060   FNNVSE  0       0       !TRANSACTION SENT. NEXT?<SP>
T3090   C5060   VSNVSE  0       0       !TRANSACTION SENT. NEXT?<SP>
T3060   C4710   FNNVSE  0       0       !INVALID COMMAND AT THIS LEVEL

C4371   C4710   D560    SRVN    TCON    outnup  ! |cr||nl|^
T3070   C4700   VSNVSE  0       0       !END OF TRANSACTION  <CR><NL>
T3080   C4700   VSNVSE  0       0       !MORE - - - -<CR><NL>

C4380   C4800   D506    SNVN    TCON    outnup  !sys out of list
T2280   C4710   FNNVSE  0       0       !ready
T2281   C4710   VSNVSE  0       0       !<c4700(t2610t2612)>ready preceded by d

C4731   C4800   D598    SNVN    TCON    outnup  ! |cr||nl|^TYPE  ^-   ^
T2205   C4733   FNNVSE  0       0       !INVALID TRANSACTION TYPE ON RETRIEVE<C
T2240   C4710   VSNVSE  0       0       !TRANSACTION xxxxxx NOT IN CURR FILE<SP
T2250   C4710   FNNVSE  0       0       !<CR><NL>ILLEGAL PARAMETER<SP><SP><SP>
T2657   C4732   FNNVSE  0       0       !<CR><NL>spaces<CR><NL>TN[000010spacesT
T2658   C4732   VSNVSE  0       0       !TRANSACTION SEQUENCE NUMBER  <CR><NL>

C4732   C4800   D560    SRVN    TCON    outnup  ! <CR><NL>
T3070   C4700   VSNVSE  0       0       !END OF TRANSACTION  <CR><NL>
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C4733   C4731   D40     UNFN    TCON    !user enters tran type
T3300   C5070   FNNVUE  0       0       !hd
T3310   C5070   FNNVUE  0       0       !as
T3320   C5070   FNNVUE  0       0       !am
T3330   C5070   FNNVUE  0       0       !av
T3340   C5070   FNNVUE  0       0       !ae
T3350   C5070   FNNVUE  0       0       !at
T3380   C5070   FNNVUE  0       0       !ma
T3390   C5070   FNNVUE  0       0       !mc
T3400   C5070   FNNVUE  0       0       !pl
T3410   C5070   FNNVUE  0       0       !pd
T3420   C5070   FNNVUE  0       0       !ol
T3430   C5070   FNNVUE  0       0       !od

C4800   C5084   D540    SNVN    TCON    outnup  !variable tran type
T2110   C4990   FNNVSE  0       0       !OLD OR NEW-
T2110   C4990   VSNVSE  0       0       !OLD OR NEW-
T2190   C4800   FNNVSE  0       0       !<c5030>READY
T2200   C5060   FNNVSE  0       0       !<c5050(t2190)><CR><NL><NL><CR><NL>TRAN
T2200   C5060   VSNVSE  0       0       !<CR><NL><NL><CR><NL>TRANSACTION TYPE ?
T2201   C5060   FNNVSE  0       0       !<c4010c4700(t3040)c505U(t2222)><CR><NL
T2201   C5060   VSNVSE  U       0       !<CR><NL>    TRANSACTION TYPE ?<SP><SP>
T2222   C4800   FNNVSE  0       0       !<c5030><CR><NL>ERR-FILE NAME >8 CHARAC

C4990   C5084   D40     UNVN    TCON    outnup  !user response to old or new
T2130   C4020   FNNVUE  0       0       !new<CR>
T2140   C4020   FNNVUE  0       0       !n<CR>
T2640   C5020   FNNVUE  0       0       !old<CR>
T2645   C5020   FNNVUE  0       0       !o<CR>
T2162   C4800   VSFVUE  0       0       vumc2   !old <filename>
T2160   C4800   VSFVUE  0       0       vumc2   !o <filename>
T2180   C5012   FNNVUE  0       0       !same<CR>
T2181   C5012   FNNVUE  0       0       !s<CR>
T2100   C150    FNNVUE  0       0       !<CR>

C5012   C5084   D530    SNFN    TCON    outnup  !sys resp to same
T2210   C4800   FNNVSE  0       0       !YOU PRESENTLY DO NOT HAVE A CURRENT FI
T2190   C4800   FNNVSE  0       0       !READY

C5020   C4800   D581    SNFN    TCON    outnup  !sys resp to old<CR>
T3110   C5030   FNNVSE  0       0       !<c4030(t2640t2645)c4700(t2640)c4990(t2

C5030   C4800   D40     UNVN    TCON    outnup  !user input old filename
T2100   C4800   FNNVUE  0       0       !<CR>
T2100   C4800   VNFVUE  0       0       vumc1   !<c5020><filename>

C5051   C4710   D560    SNVN    TCON    outnup  !end of data saved msg
T2100   C4700   VNNVSE  0       0       !<filename><CR><NL>

C5060   C4710   D40     UNVN    TCON    outnup  !user input tran type
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```
T3300   C5070   FNNVUE  0       0       !<c5050(t2201)>hd
T3310   C5070   FNNVUE  0       0       !<c5050(t2201)>as
T3320   C5070   FNNVUE  0       0       !am
T3330   C5070   FNNVUE  0       0       !av
T3340   C5070   FNNVUE  0       0       !ae
T3350   C5070   FNNVUE  0       0       !at
T3380   C5070   FNNVUE  0       0       !ma
T3390   C5070   FNNVUE  0       0       !mc
T3400   C5070   FNNVUE  0       0       !pl
T3410   C5070   FNNVUE  0       0       !pd
T3420   C5070   FNNVUE  0       0       !ol
T3430   C5070   FNNVUE  0       0       !od
T3010   C5070   FNNVUE  0       0       !<c5050(t2201)>*
T3030   C990    FNNVUE  0       0       !bye
T2100   C5080   FNNVUE  0       0       !<CR>
T2540   C5062   VSNVUE  0       0       !dele(te) <transaction>
T2520   C150    FNNVUE  0       0       !done<CR>
T2610   C5061   FNNVUE  0       0       !list<CR>
T2612   C5061   FNNVUE  0       0       !listl<CR>
T2611   C5061   VSFVUE  0       0       vumcl   !list <filename>
T2613   C5061   VSFVUE  0       0       vumcl   !listl <filename>
T2640   C5020   FNNVUE  0       0       !old<CR>
T2162   C4800   VSFVUE  0       0       vumc2   !old <filename>
T2550   C5062   FNNVUE  0       0       !remove clearfiles
T2555   C5062   FNNVUE  0       0       !remov clearfiles
T2560   C5062   FNNVUE  0       0       !remo clearfiles
T2630   C5063   FNNVUE  0       0       !resave<CR>
T2631   C5063   FNNVUE  0       0       !resa<CR>
T2632   C5065   VSFVUE  0       0       vumc2   !resave <filename>
T2633   C5065   VSFVUE  0       0       vumc2   !resa <filename>
T2580   C5062   VSNVUE  0       0       !rese(quence)
T2600   C5070   VSNVUE  0       0       !retr

C5061   C5084   D506    SNVN    TCON    outnup  !sys resp to list
T2280   C5062   FNNVSE  0       0       !ready
T2281   C5062   VSNVSE  0       0       !ready preceded by data/error

C5062   C5062   D1000   SNFN    TCON    outnup  !sys resp after ready(list), re
T2201   C5060   FNNVSE  0       0       !<CR><NL>    TRANSACTION TYPE ?<SP><SP>
T2202   C5060   FNNVSE  0       0       !<CR><NL>TRANSACTION TYPE ?<SP><SP>

C5063   C5062   D581    SNFN    TCON    outnup  !sys resp to resave
T2211   C5064   FNNVSE  0       0       !FILE NAME?<SP>

C5064   C5062   D40     UNVN    TCON    outnup  !user input filename
T2100   C5062   FNNVUE  0       0       !<CR>
T2100   C5065   VNFVUE  0       0       vumc1   !<all><filename>

C5065   C5062   D502    SNVN    TCON    outnup  !sys resp to resave
T2202   C5060   VSNVSE  0       0       !<CR><NL>TRANSACTION TYPE ?<SP><SP> pre
```

```
T2221   C5062   FNNVSE  0       0       !<CR><NL><NL>ERR-FILE NAME >8 CHARACTER

C5070   C4800   D598    SNVN    TCON    outnup  ! |cr||nl|^CURR FILE ^| || || |
T2230   C5060   FNNVSE  0       0       !INVALID TRANSACTION TYPE -RETYPE-<SP><
T2205   C4733   FNNVSE  0       0       !INVALID TRANSACTION TYPE ON RETRIEVE<C
T2240   C5062   VSNVSE  0       0       !TRANSACTION xxxxxx NOT IN CURR FILE<SP
T2250   C5062   FNNVSE  0       0       !<CR><NL>ILLEGAL PARAMETER<SP><SP><SP>
T2657   C5071   FNNVSE  0       0       !<c5060(t3010)><CR><NL>spaces<CR><NL>TN
T2658   C5071   VSNVSE  0       0       !<c5060(t3300t3310)>TRANSACTION SEQUENC

C5071   C4341   D560    SRVN    TCON    outnup  ! |cr||nl|^
T3070   C4700   VSNVSE  0       0       !<all>END OF TRANSACTION  <CR><NL>

C5080   C5084   D510    SNVN    TCON    outnup  !tcon start5
T2002   C5090   FNNVSE  0       0       !TCON VERSION 6.3, JUNE 1976
T2020   C150    VSNVSE  0       0       !NO TEMPORARY FILE SPACE CODE

C5081   C5084   D501    SNFN    TCON    outnup  !tcon first question
T2001   C5090   FNNVSE  0       0       !<all>FUNCTIONAL AREA?

C5084   C5084   D509    SNVN    TCON    outnup  !back to system, top or type?
T150    C160    FNNVSE  0       0       !SYSTEM ?
T150    C160    VSNVSE  0       0       !SYSTEM ? preceded by message
T2000   C5083   FNNVSE  0       0       !TCON VERSION 6.3, JUNE 1976
T2201   C5060   FNNVSE  0       0       !<CR><NL>    TRANSACTION TYPE ?<SP><SP>

C5083   C5084   D40     UNFN    TCON    outnup  !user hits <nl>
T2100   C5081   FNNVUE  0       0       !<all><CR>

C5090   C5084   D40     UNFN    TCON    outnup  !user input functional area
T2030   C2800   FNNVUE  0       0       !<all>fs
T2040   C4800   FNNVUE  0       0       !<all>dem
T2100   C150    FNNVUE  0       0       !<all><CR>

C6000   C150    D6000   SNFA    SIOS    outnup  ! begin sios
T6000   C6010   FNNVSE  0       0       ! "SIOS ROUTINE ... "

C6010   C150    D40     SNVN    SIOS    outnup  ! WWMCCS userid follows
T6010   C6020   VSNVSE  0       0       ! "<userid>"

C6020   C150    D40     SRFN    SIOS    outnup  ! prompt for function wanted
T6020   C6030   FNNVSE  0       0       ! "WHAT FUNCTION DO YOU WANT ... "

C6030   C150    D40     UNVN    SIOS    outnup  ! user enters function
T6030   C6100   VSNVUE  0       0       ! m (move)
T6031   C6300   FNNVUE  0       0       ! c (clear)
T6032   C6300   VSNVUE  0       0       ! cl (clear)
T6033   C6400   VSNVUE  0       0       ! s (search)
T6034   C6200   VSNVUE  0       0       ! r (return)
T6035   C150    FNNVUE  0       0       ! <carriage return>
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C6100   C150    D40     SRFN    SIOS    outnup  ! prompt for file to use
T6100   C6110   FNNVSE  0       0       ! "SIOS MOVE ROUTINE ... "

C6110   C150    D40     UNVN    SIOS    outnup  ! user enters file to use
T6110   C6120   VNFVUE  0       0       vumc1   ! <file name>
T6035   C150    FNNVUE  0       0       ! <carriage return>

C6120   C150    D6120   SNFN    SIOS    outnup  ! sios response to file name
T6120   C6130   FNNVSE  0       0       ! "SYSTEM ID YOU WANT TO USE"
T6121   C6100   FNNVSE  0       0       ! "YOUR FILE IS BUSY"
T6122   C6100   FNNVSE  0       0       ! "UNABLE TO ACCESS YOUR FILE"

C6130   C150    D40     UNVN    SIOS    outnup  ! user enters system id
T6110   C6140   VNNVUE  0       0       ! <system id to use>
T6035   C150    FNNVUE  0       0       ! <carriage return>

C6140   C150    D6140   SNFN    SIOS    outnup  ! sios response to system id
T6140   C6150   FNNVSE  0       0       ! "WUFI FILE YOU WANT TO USE"
T6141   C6120   FNNVSE  0       0       ! "SYSTEM ID IS NOT AUTHORIZED"

C6150   C150    D40     UNVN    SIOS    outnup  ! user enters wufi file
T6110   C6160   VNNVUE  0       0       ! <wufi file name>
T6035   C150    FNNVUE  0       0       ! <carriage return>

C6160   C150    D6160   SNFN    SIOS    outnup  ! sios response to wufi file
T6160   C6170   FNNVSE  0       0       ! "DATA WAS MOVED"
T6161   C6140   FNNVSE  0       0       ! "SYSTEM ID IS INVALID ON WUFI"

C6170   C150    D40     SNVN    SIOS    outnup  ! number of records moved
T6170   C6020   VSNVSE  0       0       ! "nnnnnn RECORDS"

C6200   C150    D40     SRFN    SIOS    outnup  ! prompt for file to use
T6200   C6210   FNNVSE  0       0       ! "SIOS RETURN ROUTINE ... "

C6210   C150    D40     UNVN    SIOS    outnup  ! user enters file to use
T6110   C6220   VNFVUE  0       0       vumc1   ! <file name>
T6035   C150    FNNVUE  0       0       ! <carriage return>

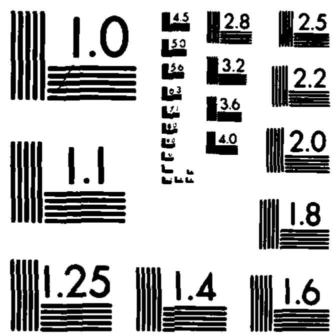
C6220   C150    D6120   SNFN    SIOS    outnup  ! sios response to file name
T6120   C6230   FNNVSE  0       0       ! "SYSTEM ID YOU WANT TO USE"
T6121   C6200   FNNVSE  0       0       ! "YOUR FILE IS BUSY"
T6122   C6200   FNNVSE  0       0       ! "UNABLE TO ACCESS YOUR FILE"

C6230   C150    D40     UNVN    SIOS    outnup  ! user enters system id
T6110   C6240   VNNVUE  0       0       ! <system id to use>
T6035   C150    FNNVUE  0       0       ! <carriage return>

C6240   C150    D6140   SNFN    SIOS    outnup  ! sios response to system id
T6140   C6250   FNNVSE  0       0       ! "WUFI FILE YOU WANT TO USE"
```

AD-A171 332 FORSCOM SECURITY MONITOR (FSM) COMPUTER PROGRAM DEVELOPMENT SPECIFICATION (TYPE B5)(U) LOGICON INC SAN DIEGO CA FEB 81 N00039-78-C-0323

UNCLASSIFIED F/G 9/2 NL



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

```
C6250   C150    D40     UNVN    SIOS    outnup  ! user enters wufi file
T6110   C6260   VNNVUE  0       0       ! <wufi file name>
T6035   C150    FNNVUE  0       0       ! <carriage return>

C6260   C150    D6260   SNFN    SIOS    outnup  ! sios response to wufi file
T6260   C6270   FNNVSE  0       0       ! "RECORDS WERE RETURNED"
T6261   C6020   FNNVSE  0       0       ! "NO DATA FOR THIS SYSTEM ID ... "
T2100   C6020   VSNVSE  0       0       !error message

C6270   C150    D40     SNVN    SIOS    outnup  ! number of records returned
T6170   C6280   VSNVSE  0       0       ! "nnnnnn RECORDS"

C6280   C150    D6140   SNFN    SIOS    outnup  ! finish up normal return
T6280   C6020   FNNVSE  0       0       ! "WUFI RECORDS WERE CLEARED"

C6300   C150    D40     SRFN    SIOS    outnup  ! prompt for system id to use
T6300   C6310   FNNVSE  0       0       ! "SIOS CLEAR ROUTINE ... "

C6310   C150    D40     UNVN    SIOS    outnup  ! users enters system id
T6110   C6320   VNNVUE  0       0       ! <system id>
T6035   C150    FNNVUE  0       0       ! <carriage return>

C6320   C150    D6140   SNFN    SIOS    outnup  ! sios response to system id
T6140   C6330   FNNVSE  0       0       ! "WUFI FILE YOU WANT TO USE"

C6330   C150    D40     UNVN    SIOS    outnup  ! user enters wufi file
T6110   C6340   VNNVUE  0       0       ! <wufi file name>
T6035   C150    FNNVUE  0       0       ! <carriage return>

C6340   C150    D6340   SNFN    SIOS    outnup  ! sios response to wufi file
T6280   C6020   FNNVSE  0       0       ! "WUFI RECORDS WERE CLEARED"
T6340   C6020   FNNVSE  0       0       ! "NO DATA TO CLEAR"

C6400   C150    D40     SRFN    SIOS    outnup  ! prompt for system id
T6400   C6410   FNNVSE  0       0       ! "SIOS SEARCH ROUTINE ... "

C6410   C150    D40     UNVN    SIOS    outnup  ! user enters system id
T6110   C6420   VNNVUE  0       0       ! <system id>
T6035   C150    FNNVUE  0       0       ! <carriage return>

C6420   C150    D6140   SNFN    SIOS    outnup  ! sios response to system id
T6140   C6430   FNNVSE  0       0       ! "WUFI FILE YOU WANT TO USE"

C6430   C150    D40     UNVN    SIOS    outnup  ! user enters wufi file
T6110   C6440   VNNVUE  0       0       ! <wufi file name>
T6035   C150    FNNVUE  0       0       ! <carriage return>

C6440   C150    D6140   SNVN    SIOS    outnup  ! sios response to wufi file
T6440   C6450   VSNVSE  0       0       ! "nnnnnn  BLOCKS OF DATA"
T6441   C6020   FNNVSE  0       0       ! "NO RECORDS FOUND"
```

```
C6450   C150    D40     SNVN    SIOS    outnup  ! number of records involved
T6170   C6020   VSNVSE  0       0       ! "nnnnnn RECORDS"

C7000   C150    D7000   SRVA    LIST    outnup  ! list output
T7000   C150    VSNVSE  0       0       ! "ready"
T7001   C150    FNNVSE  0       0       !<CR><NL>illegal character
T7002   C150    FNNVSE  0       0       !<CR><NL><52>CURRENT FILE NOT DEFINED <
T150    C160    VSNVSE  0       0       !<CR><NL>SYSTEM ? (preceded by anything

C9000   C150    D20     SNFA    WWDMS   outnup  !<pop>WWDMS entry point
T2110   C9010   FNNVSE  0       0       !<all>OLD OR NEW-

C9010   C150    D40     UNFN    WWDMS   outnup  !user resp to old/new
T2100   C150    FNNVUE  0       0       !<c9000><CR>
T2130   C9020   FNNVUE  0       0       !<all>new<CR>
T2140   C9020   FNNVUE  0       0       !<all>n<CR>

C9020   C150    D9020   SNFN    WWDMS   outnup  !<all>system is ready
T2190   C9030   FNNVSE  0       0       !<all>READY

C9030   C150    D9030   SNVN    WWDMS   outnup  !WWDMS prompt
T9030   C9040   FNNVSE  0       0       !<c9020 c9210><CR><NL>*
T9030   C9040   VSNVSE  0       0       !<c9160(pop)>prompt preceded by error

C9040   C150    D40     UNFN    WWDMS   outnup  !run commands
T9040   C9050   FNNVUE  0       0       !<c9030(t9030F>>run mc76/exercise/equip
T9050   C9050   FNNVUE  0       0       !<c9030(t9030F)>runs mc76/exercise/equi
T9060   C9050   FNNVUE  0       0       !<c9030(t9030F)>runj mc76/exercise/equi
T9070   C9550   FNNVUE  0       0       !<c9030(t9030F)>run mc76/exercise/rptmo
T9075   C9550   FNNVUE  0       0       !<c9030(t9030F)>runs mc76/exercise/rptm
T9080   C9550   FNNVUE  0       0       !<c9030(t9030F)>runj mc76/exercise/rptm
T9090   C9300   FNNVUE  0       0       !<c9030(t9030F)>run mc76/exercise/accim
T9100   C9300   FNNVUE  0       0       !<c9210(t9030V)>runs mc76/exercise/acci
T9110   C9300   FNNVUE  0       0       !<c9210(t9030V)>runj mc76/exercise/acci
T9120   C9300   FNNVUE  0       0       !<c9170(t9030V)>run mc76/exercise/info
T9130   C9300   FNNVUE  0       0       !<c9210(t9030V)>runs mc76/exercise/info
T9140   C9300   FNNVUE  0       0       !<c9160(t9030F)>runj mc76/exercise/info
T9150   C9300   FNNVUE  0       0       !<c9160(t9030F)>run mc76/exercise/stren
T9160   C9300   FNNVUE  0       0       !runs mc76/exercise/strength
T9170   C9300   FNNVUE  0       0       !<c9030(t9030F)>runj mc76/exercise/stre
T9180   C9300   FNNVUE  0       0       !run mc76/exercise/ready
T9190   C9300   FNNVUE  0       0       !runs mc76/exercise/ready
T9200   C9300   FNNVUE  0       0       !<c9030(t9030F)>runj mc76/exercise/read
T9210   C9300   FNNVUE  0       0       !run mc76/exercise/pomcus
T9220   C9300   FNNVUE  0       0       !runs mc76/exercise/pomcus
T9230   C9300   FNNVUE  0       0       !<c9030(t9030F)>runj mc76/exercise/pomc
T9240   C9550   FNNVUE  0       0       !run mc76/exercise/deployrp
T9250   C9550   FNNVUE  0       0       !runs mc76/exercise/deployrp
T9260   C9550   FNNVUE  0       0       !runj mc76/exercise/deployrp
T9270   C9300   FNNVUE  0       0       !run mc76/exercise/dployhpa
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T9280   C9300   FNNVUE  0     0       !runs mc76/exercise/dployhpa
T9290   C9300   FNNVUE  0     0       !runj mc76/exercise/dployhpa
T9300   C9300   FNNVUE  0     0       !run mc76/exercise/cinc
T9310   C9300   FNNVUE  0     0       !runs mc76/exercise/cinc
T9320   C9300   FNNVUE  0     0       !<c9030(t9030F)>runj mc76/exercise/cinc
T9330   C9550   FNNVUE  0     0       !run mc76/exercise/exdeploy
T9340   C9550   FNNVUE  0     0       !runs mc76/exercise/exdeploy
T9350   C9550   FNNVUE  0     0       !runj mc76/exercise/exdeploy
T9360   C9300   FNNVUE  0     0       !run mc76/exercise/trans
T9370   C9300   FNNVUE  0     0       !runs mc76/exercise/trans
T9380   C9300   FNNVUE  0     0       !<c9030(t9030F)>runj mc76/exercise/tran
T9390   C9550   FNNVUE  0     0       !<c9030(t9030F)>run mc76/exercise/rptor
T9400   C9550   FNNVUE  0     0       !runs mc76/exercise/rptor
T9410   C9550   FNNVUE  0     0       !runj mc76/exercise/rptor
T9420   C9300   FNNVUE  0     0       !run mc76/exercise/mbcoistl
T9430   C9300   FNNVUE  0     0       !runs mc76/exercise/mbcoistl
T9440   C9300   FNNVUE  0     0       !<c9030(t9030F)>runj mc76/exercise/mbco
T3030   C990    FNNVUE  0     0       !<c9030>bye
T2520   C150    FNNVUE  0     0       !<c9030(t9030F)>done<CR>
T2100   C9030   FNNVUE  0     0       !<CR>

C9050   C9030   D9040   SNFN  WWDMS   outnup  !compiler pass 1
T9500   C9051   FNNVSE  0     0       !<c9040(t9040 t9060)><CR><NL> .

C9051   C9030   D560    SNFN  WWDMS   outnup  !compiler pass 2
T9501   C9052   FSNVSE  0     1       !<all>.<CR><NL>

C9052   C9030   D9045   SNFN  WWDMS   outnup  !1st question for EQUIP
T9520   C9070   FNNVSE  0     0       !<all>ENTER REQUIRED PARAMETER FOR 'OMN

C9070   C9030   D40     UNVN  WWDMS   outnup  !user enters cat file
T2100   C9080   VSNVUE  0     0       !<all>omni/<userid-prefix>/<filename>

C9080   C9030   D9060   SNVN  WWDMS   outnup  !query for fldname
T9530   C9090   FNNVSE  0     0       !<all>ENTER FLDNAME = LITERAL
T9530   C9090   VSNVSE  0     0       !ENTER FLDNAME = LITERAL
T9030   C9040   FNNVSE  0     0       !<CR><NL>*
T9030   C9040   VSNVSE  0     0       !prompt preceded by error

C9090   C9030   D40     UNVN  WWDMS   outnup  !user enters fieldname
T2100   C9100   VSNVUE  0     0       !<all>fieldname = "literal"

C9100   C9030   D9060   SNVN  WWDMS   outnup  !query for sort-key1
T9540   C9110   FNNVSE  0     0       !<c9090>ENTER SORT-KEY1
T9540   C9110   VSNVSE  0     0       !ENTER SORT-KEY1
T9030   C9040   FNNVSE  0     0       !<CR><NL>*
T9030   C9040   VSNVSE  0     0       !prompt preceded by error

C9110   C9030   D40     UNVN  WWDMS   outnup  !user enters sort-key1
T2100   C9120   VSNVUE  0     0       !<all>sort-key1
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C9120   C9030   D9060    SNVN    WWDMS   outnup  !query for sort-key2
T9550   C9130   FNNVSE   0       0       !<c9110>ENTER SORT-KEY2
T9550   C9130   VSNVSE   0       0       !ENTER SORT-KEY2
T9030   C9040   FNNVSE   0       0       !<CR><NL>*
T9030   C9040   VSNVSE   0       0       !prompt preceded by error

C9130   C9030   D40      UNVN    WWDMS   outnup  !user enters last arg
T9325   C9140   VNNVUE   0       0       !<c9120(t9550F) c9390(t9600F t9600V)>la

C9140   C9030   D9060    SNVN    WWDMS   outnup  !query for output file
T9560   C9150   FNNVSE   0       0       !<all>ENTER OUTPUT FILENAME
T9560   C9150   VSNVSE   0       0       !<all>ENTER OUTPUT FILENAME
T9030   C9040   FNNVSE   0       0       !<CR><NL>*
T9030   C9040   VSNVSE   0       0       !prompt preceded by error

C9150   C9030   D40      UNVN    WWDMS   outnup  !user enters filename
T9325   C9160   VNFVUE   0       0       vumc1   !<c9140><filename>

C9160   C9160   D9050    SNVN    WWDMS   !compiler pass 3
T9500   C9170   FNNVSE   0       0       !<all><CR><NL> .
T9030   C9040   FNNVSE   0       0       !<all><CR><NL>*
T9030   C9040   VSNVSE   0       0       !prompt preceded by error

C9170   C9170   D9070    SNVN    WWDMS   !run-id
T9501   C9170   FSNVSE   0       1       !<c9160(t9500F)>.<CR><NL>
T9700   C9180   FNNVSE   0       0       !<c9170(t9501)>RUN-ID?
T9030   C9040   FNNVSE   0       0       !<CR><NL>*
T9030   C9040   VSNVSE   0       0       !<c9170(t2100)>prompt preceded by error
T2050   C9170   FNNVSE   0       0       !<c9160(t9500F)><CR><NL>
T9325   C9170   VNNVSE   0       0       !<c9170(t2050)>errors

C9180   C9030   D40      UNVN    WWDMS   outnup  !user enters run-id
T9325   C9190   VNNVUE   0       0       !<all><run-id>

C9190   C9030   D9080    SNVN    WWDMS   outnup  !ident?
T9710   C9200   FNNVSE   0       0       !<all>$ IDENT?
T9750   C9170   FNNVSE   0       0       !<CR><NL>MUST BE 12 CHARACTERS OR LESS
T2100   C9030   VNNVSE   0       0       !(anything else)

C9200   C9030   D40      UNVN    WWDMS   outnup  !user enters ident
T100    C9210   VSNVUE   0       0       !<all><ident>

C9210   C9211   D9120    SNVN    WWDMS   !end of status
T9030   C9040   FNNVSE   0       0       !<CR><NL>*
T9030   C9040   VSNVSE   0       0       !<c9200 c9210(t10290)><CR><NL>* precede
T10210  C9210   VSNVSE   0       0       !<c9200>(ab)normal termination
T10290  C9210   VSNVSE   0       0       !<c9200>NOT IN SYSTEM
T10300  C9030   VSNVSE   0       0       !<c9200>INVOKE JOUT MANUALLY
T9800   C9230   VSNVSE   0       0       !<c9210(t10210)>JOUT INVOKED FOR SNUMB.
T2100   C9210   FNNVSE   0       0       ! <carriage return> (only)
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T9325   C9210   VNNVSE  0       0       ! anything else

C9211   C9211   D9061   SNVN    WWDMS   outnup  !<break> during output
T9030   C9040   FNNVSE  0       0       !<CR><NL>*
T9030   C9040   VSNVSE  0       0       !<CR><NL>* preceded by error
T9755   C9212   FNNVSE  0       0       !LOOK, MORE, DELE, ABRT, OR QUIT?

C9212   C9211   D40     UNVN    WWDMS   outnup  !user response
T9760   C9210   FNNVUE  0       0       !look
T9761   C9213   FNNVUE  0       0       !more
T9762   C9215   VSNVUE  0       0       !dele(te)
T9763   C9218   FNNVUE  0       0       !abrt
T9764   C9210   FNNVUE  0       0       !quit
T2100   C9210   FNNVUE  0       0       !<CR>

C9213   C9211   D9097   SNFN    WWDMS   outnup  !asks for snumbs
T9756   C9214   FNNVSE  0       0       !SNUMB(S)-

C9214   C9211   D40     UNVN    WWDMS   outnup  !user inputs snumbs
T2100   C9210   VSNVUE  0       0       !numbers or <CR>

C9215   C9211   D581    SNFN    WWDMS   outnup  !asks for snumbs
T9757   C9216   FNNVSE  0       0       !SNUMB?

C9216   C9211   D40     UNVN    WWDMS   outnup  !user inputs snumb
T2100   C9211   FNNVUE  0       0       !<CR>
T2100   C9217   VSNVUE  0       0       !number

C9217   C9211   D9063   SNFN    WWDMS   outnup  !bad snumb
T9758   C9215   FNNVSE  0       0       !SNUMB NOT IN TABLE
T2100   C9211   VNNVSE  0       0       !errors?

C9218   C9211   D9064   SNFN    WWDMS   outnup  !asks for snumb
T9759   C9219   FNNVSE  0       0       !snumb?

C9219   C9211   D40     UNVN    WWDMS   outnup  !user inputs snumb
T2100   C9220   VSNVUE  0       0       !number or <CR>

C9220   C9211   D9065   SNFN    WWDMS   outnup  !bad snumb
T9754   C9211   FNNVSE  0       0       !SNUMB NOT IN SYSTEM
T2100   C9211   VNNVSE  0       0       !errors?

C9230   C9231   D9100   SNVN    WWDMS   outnup  !asks for print func
T10270  C9030   VSNVSE  0       0       !output not found
T10280  C9030   VSNVSE  0       0       !output busy
T9801   C9240   FNNVSE  0       0       !<c9210(t9800)>function?
T9030   C9040   FNNVSE  0       0       !<CR><NL>*

C9231   C9231   D9096   SNVN    WWDMS   outnup  !user must release, etc.
T9030   C9040   FNNVSE  0       0       !<CR><NL>*
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T9030   C9040   VSNVSE  0       0       !<CR><NL>* preceded by data/error
T9780   C9270   FNNVSE  0       0       !please direct, release, or hold before

C9240   C9231   D40     UNFN    WWDMS   outnup  !user inputs print
T9802   C9250   FNNVUE  0       0       !print $$
T9803   C9250   FNNVUE  0       0       !prin $$
T10230  C9250   FNNVUE  0       0       !<all>print 74
T10240  C9250   FNNVUE  0       0       !prin 74

C9250   C9231   D9095   SRVN    WWDMS   outnup  !end of print
T10170  C9260   VSNVSE  0       0       !end of $$
T10250  C9260   VSNVSE  0       0       !end of 74
T10260  C9230   FSNVSE  2       13      !74 not found

C9260   C9231   D9064   SNFN    WWDMS   outnup  !second function
T9801   C9270   FNNVSE  0       0       !function?

C9270   C9231   D40     UNVN    WWDMS   outnup  !second func choices
T10180  C9030   FNNVUE  0       0       !hold
T10190  C9030   VSNVUE  0       0       !rele
T10200  C9030   FNNVUE  0       0       !direct ac
T10205  C9030   FNNVUE  0       0       !direct onl

C9300   C9030   D9040   SNFN    WWDMS   outnup  !compiler pass 1
T9500   C9301   FNNVSE  0       0       !<c9040(t9110 t9140 t9440 t9200 t9230 t

C9301   C9030   D560    SNFN    WWDMS   outnup  !compiler pass 2
T9501   C9302   FSNVSE  0       1       !<all>.<CR><NL>

C9302   C9030   D9045   SNFN    WWDMS   outnup  !1st question for ACCIMOB, INFO
T9520   C9320   FNNVSE  0       0       !<all>ENTER REQUIRED PARAMETER FOR 'OMN

C9320   C9030   D40     UNVN    WWDMS   outnup  !user enters cat file
T9325   C9330   VNNVUE  0       0       !<all>omni/<userid-prefix>/<filename>

C9330   C9030   D9060   SNVN    WWDMS   outnup  !query for fldname
T9530   C9340   FNNVSE  0       0       !<all>ENTER FLDNAME = LITERAL
T9530   C9340   VSNVSE  0       0       !ENTER FLDNAME = LITERAL
T9531   C9340   FNNVSE  0       0       !<all>ENTER FIELDNAME = LITERAL
T9531   C9340   VSNVSE  0       0       !<all>ENTER FIELDNAME = LITERAL
T9030   C9040   FNNVSE  0       0       !<CR><NL>*
T9030   C9040   VSNVSE  0       0       !<CR><NL>* preceded by error

C9340   C9030   D40     UNVN    WWDMS   outnup  !user enters fieldname
T9325   C9350   VNNVUE  0       0       !<all>fieldname = "literal"

C9350   C9030   D9060   SNVN    WWDMS   outnup  !query for sort-field1
T9580   C9360   FNNVSE  0       0       !<all>ENTER SORT-FLD1
T9580   C9360   VSNVSE  0       0       !<c9340>ENTER SORT-FLD1
T9030   C9040   FNNVSE  0       0       !<CR><NL>*
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T9030   C9040   VSNVSE  0       0       !<CR><NL>* preceded by error

C9360   C9030   D40     UNVN    WWDMS   outnup  !user enters sort-field1
T9325   C9370   VNNVUE  0       0       !<all>sort-field1

C9370   C9030   D9060   SNVN    WWDMS   outnup  !query for sort-field2
T9590   C9380   FNNVSE  0       0       !<all>ENTER SORT-FLD2
T9590   C9380   VSNVSE  0       0       !<all>ENTER SORT-FLD2
T9030   C9040   FNNVSE  0       0       !<CR><NL>*
T9030   C9040   VSNVSE  0       0       !<CR><NL>* preceded by error

C9380   C9030   D40     UNVN    WWDMS   outnup  !user enters sort-field2
T9325   C9390   VNNVUE  0       0       !<all>sort-field2

C9390   C9030   D9060   SNVN    WWDMS   outnup  !sort-field3 query
T9600   C9130   FNNVSE  0       0       !<all>ENTER SORT-FLD3
T9600   C9130   VSNVSE  0       0       !<all>ENTER SORT-FLD3
T9030   C9040   FNNVSE  0       0       !<CR><NL>*
T9030   C9040   VSNVSE  0       0       !<CR><NL>* preceded by error

C9550   C9030   D9040   SNFN    WWDMS   outnup  !compiler pass 1
T9500   C9551   FNNVSE  0       0       !<CR><NL> .

C9551   C9030   D560    SNFN    WWDMS   outnup  !compiler pass 2
T9501   C9552   FSNVSE  0       1       !.<CR><NL>

C9552   C9030   D9045   SNFN    WWDMS   outnup  !1st question for RPTMOB,DEPLOY
T9570   C9570   FNNVSE  0       0       !ENTER PARAM FOR 'SBRPT'

C9570   C9030   D40     UNVN    WWDMS   outnup  !user enters sbrpt
T2100   C9580   VSNVUE  0       0       !<all>"w..."

C9580   C9030   D9060   SNVN    WWDMS   outnup  !query for cat file
T9521   C9590   FNNVSE  0       0       !<all>ENTER PARAM FOR OMNI CATFILE
T9521   C9590   VSNVSE  0       0       !ENTER PARAM FOR OMNI CATFILE
T9030   C9040   FNNVSE  0       0       !<CR><NL>*
T9030   C9040   VSNVSE  0       0       !<CR><NL>* preceded by error

C9590   C9030   D40     UNVN    WWDMS   outnup  !user enters catfile name
T2100   C9350   VSNVUE  0       0       !<all>omni/<userid-prefix>/<filename>

C11000  C999    D11000  SNVN    TLCF    outnup  ! announce teleconferencing
T11000  C11010  VSNVSE  0       0       ! "TELECONFERENCING AT ... "
T11001  C280    FNNVSE  0       0       ! "ILLEGAL CLASSIFICATION CODE"

C11010  C11010  D11010  SNFN    TLCF    outnup  ! prompt user for conf action
T11010  C11020  FSNVSE  122     31      ! "USER ASSISTANCE IS AVAILABLE ... "

C11020  C11010  D40     UNFN    TLCF    outnup  ! user enters conf action
T11020  C11030  FNNVUE  0       U       ! j(oin)
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T11021  C11030  FNNVUE  0      0      ! jo(in)
T11022  C11030  FNNVUE  0      0      ! joi(n)
T11023  C11030  FNNVUE  0      0      ! join

C11030  C11010  D11030  SNFN   TLCF   outnup  ! prompt user for conf name
T11030  C11040  FNNVSE  0      0      ! "NAME OF CONFERENCE YOU WISH TO JOIN?
T11031  C999    VSFVSE  0      0      exit    ! "LINE TERMINATED" (bad conf n

C11040  C11010  D40     UNFN   TLCF   outnup  ! user enters conf name
T11040  C11050  VNNVUE  0      0      ! <conference name>

C11050  C11030  D11050  SNFN   TLCF   outnup  ! prompt user for name
T11050  C11060  FNNVSE  0      0      ! "PARTICIPANT'S NAME? "
T11051  C11030  FNNVSE  0      0      ! "SORRY, THAT CONFERENCE IS NOT IN SES

C11060  C11010  D40     UNVN   TLCF   outnup  ! user enters name
T11040  C11070  VNNVUE  0      0      ! <name>

C11070  C11050  D11070  SNFN   TLCF   outnup  ! prompt user for password
T11070  C11080  FNNVSE  0      0      ! "PARTICIPANT'S PASSWORD ... "
T11071  C11050  FNNVSE  0      0      ! "SORRY, NAME GIVEN NOT RECOGNIZED"
T11072  C999    FNNVSE  0      0      ! "ACCESS DENIED"

C11080  C11010  D40     UNVN   TLCF   outnup  ! user enters password
T11040  C11090  VNNVUE  0      0      ! <participant password>

C11090  C11070  D11090  SNFN   TLCF   outnup  ! prompt user for host name
T11090  C11100  FNNVSE  0      0      ! "THE FOLLOWING QUESTIONS CONCERN ...
T11091  C11140  FNNVSE  0      0      ! "ACCESS GRANTED"
T11072  C999    FNNVSE  0      0      ! "ACCESS DENIED"
T11070  C11080  FNNVSE  0      0      ! "PARTICIPANTS PASSWORD ... "

C11100  C11010  D40     UNVN   TLCF   outnup  ! user enters host name
T11040  C11110  VNNVUE  0      0      ! <host name>

C11110  C11090  D11110  SNFN   TLCF   outnup  ! prompt user for ident
T11110  C11120  FNNVSE  0      0      ! "ENTER YOUR ACCOUNT NUMBER, ... "
T11111  C11120  FNNVSE  0      0      ! "ENTER YOUR ACCOUNT NUMBER, ... "
T12271  C11090  FNNVSE  0      0      !INVALID HOST NAME<SP><SP><SP>

C11120  C11010  D40     UNVN   TLCF   outnup  ! user enters ident
T11120  C11130  VSNVUE  0      0      ! <ident>

C11130  C11010  D11130  SNFN   TLCF   outnup  ! outcome of join
T11091  C11140  FNNVSE  0      0      ! "ACCESS GRANTED"

C11140  C11010  D11140  SNVN   TLCF   outnup  ! conf security classification
T11140  C11150  VSNVSE  0      0      ! "CONFERENCE SECURITY CLASSIFICATION .

C11150  C11010  D11140  SNVN   TLCF   outnup  ! message announcement status
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T11150  C11160  FNNVSE  0     0     ! "THERE ARE NO ANNOUNCMENTS AT THIS TI
T11151  C11160  VSNVSE  0     0     ! "ANNOUNCEMENT MESSAGE NUMBERS ARE ...

C11160  C11010  D11140  SNVN  TLCF  outnup  ! current message status
T11160  C11170  VSNVSE  0     0     ! "LATEST MESSAGE NUMBER IS n"

C11170  C11010  D11140  SNVN  TLCF  outnup  ! previous message status
T11170  C11180  VSNVSE  0     0     ! "LAST MESSAGE SEEN WAS NUMBER n"

C11180  C12000  D11180  SNVN  TLCF  outnup  ! listen mode entered initially
T11180  C11510  VSNVSE  0     0     ! "LISTEN MODE ENTERED IN ... "

C11500  C12000  D11180  SNVN  TLCF  outnup  ! listen mode entered subsequen
T11500  C11510  VSNVSE  0     0     ! "LISTEN MODE ENTERED IN ... "

C11510  C12000  D11510  BRVN  TLCF  ! listen mode polling
T11510  C11510  VSNVSE  0     0     !<NP>
T11190  C11510  VSNVSE  0     0     !<dtg> <name> HAS JOINED THE CONFERENCE
T11191  C11510  VSNVSE  0     0     !<dtg> <name> HAS LEFT THE CONFERENCE<S
T11040  C11510  VNNVUE  0     0     ! (any user input is accepted and ignor

C12000  C12000  D12000  SNVN  TLCF  outnup  ! command mode entered
T12000  C12010  FNNVSE  0     0     ! "COMMAND ?"
T12001  C12010  FNNVSE  0     0     ! "COMMAND ?" (preceded by form feed)
T12000  C12010  VSNVSE  0     0     ! "COMMAND ?" (preceded by message)

C12010  C12000  D40     UNVN  TLCF  outnup  ! user enters command
T12022  C12500  VSNVUE  0     0     ! desc(ribe)
T12012  C12100  VSNVUE  0     0     ! defi(nition)
T12010  C12040  VSNVUE  0     0     ! bull(etin)
T12011  C12060  VSNVUE  0     0     ! comm(unication)
T12013  C12200  VSNVUE  0     0     ! floo(r)
T12014  C12240  VSNVUE  0     0     ! give(up)
T12015  C11500  VSNVUE  0     0     ! list(en)
T12016  C12250  VSNVUE  0     0     ! prin(t)
T12017  C12350  VSNVUE  0     0     ! quit
T12018  C12360  VSNVUE  0     0     ! revi(ew)
T12019  C12450  VSNVUE  0     0     ! stat(us)
T12020  C13000  VSNVUE  0     0     ! talk
T12021  C12470  VSNVUE  0     0     ! ?

C12040  C12000  D12040  SNFN  TLCF  outnup  ! bulletin verb
T12040  C12000  FSNVSE  0     21    ! "NO MESSAGES WAITING"
T12041  C12050  FNNVSE  0     0     ! "MESSAGE NUMBER"

C12050  C12000  D12050  SRVN  TLCF  outnup  ! bulletin message
T11600  C12050  VSNVSE  0     0     !<CR><NL><NP>
T12050  C12010  VSNVSE  0     0     ! "COMMAND ?"

C12060  C12000  D12060  SNFN  TLCF  outnup  ! communication
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T12060  C12070  FSNVSE  0     92    ! "ENTER ONE LINE PER PROMPT (-) ... "
T12061  C12000  FSNVSE  0     34    ! "INVALID COMMUNICATION ARGUMENT"

C12070  C12000  D12070  SNVN  TLCF  outnup  ! comm input prompt
T12070  C12080  FSNVSE  0     3     ! "-"
T12071  C12000  FSNVSE  0     22    ! "COMMUNICATION SENT"
T12072  C12000  FSNVSE  0     34    ! "COMMUNICATION REQUEST IGNORED"
T12000  C12010  VSNVSE  0     0     ! "COMMAND ?" (preceded by msg)

C12080  C12000  D40     UNFN  TLCF  outnup  ! user comm input
T11040  C12070  VNNVUE  0     0     ! (any user input)

C12100  C12000  D12100  SRVN  TLCF  outnup  ! definition output
T12100  C12010  FNNVSE  0     0     ! "FLOOR RECORDING IS OFF"
T12101  C12010  FNNVSE  0     0     ! "FLOOR RECORDING IS ON"
T12102  C12010  FNNVSE  0     0     ! "CONFERENCE IS OPEN TO JOINING ... "
T12103  C12010  FNNVSE  0     0     ! "CONFERENCE IS CLOSED TO JOINING ...
T12104  C12010  FNNVSE  0     0     ! "OPTION RESTRICTED TO INITIATING ...
T12105  C12010  FNNVSE  0     0     ! "OPTION RESTRICTIED TO CURRENT ... "
T12106  C12010  FNNVSE  0     0     ! "NO ALTERNATES HAVE BEEN ASSIGNED"
T12107  C12110  VSNVSE  0     0     ! " ... CHANGE?"
T12108  C12100  VSNVSE  0     0     ! " ... FILE INSERT LIMIT IS— ... "
T12000  C12010  VSNVSE  0     0     ! "COMMAND ?" (preceded by anything)

C12110  C12000  D40     UNVN  TLCF  outnup  ! user responds to definition p
T11040  C12120  VNNVUE  0     0     ! user response

C12120  C12000  D12120  SNVN  TLCF  outnup  ! system response to user input
T12000  C12010  FNNVSE  0     0     ! "COMMAND ?" (only)
T12120  C12110  FSNVSE  0     12    ! "HOST?"
T12121  C12110  FSNVSE  0     11    ! "$IDENT?"
T12122  C12110  FSNVSE  0     54    ! "NEW IDENT CARD NOT VALID AT THIS ...
T12000  C12010  VSNVSE  0     0     ! "COMMAND ?" (preceded by anything)

C12200  C12000  D12200  SNVN  TLCF  outnup  ! floor response
T12200  C12210  FSNVSE  0     53    ! "ENTER ONE LINE OF TEXT ... "
T12201  C12000  FSNVSE  0     54    ! "CHAIRMAN NOT PRESENT ... "
T12202  C12000  FSNVSE  0     30    ! "FLOOR        INVALID COMMAND"
T12203  C12010  VSNVSE  0     0     ! "INVALID FLOOR COMMAND ... "
T12000  C12010  VSNVSE  0     0     ! "COMMAND ?" (preceded by anything)

C12210  C12000  D12210  SNFN  TLCF  outnup  ! floor prompt for input
T12210  C12220  FSNVSE  0     62    ! "(ENTER BREAK STATUS OR NULL ...)"

C12220  C12000  D40     UNVN  TLCF  outnup  ! floor request input
T11040  C12230  VNNVUE  0     0     ! <line of input to accompany floor req

C12230  C12000  D12230  SNFN  TLCF  outnup  ! floor request acknowledged
T12230  C12000  FSNVSE  0     64    ! "CHAIRMAN'S APPROVAL ... "
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C12240  C12000  D12240  SNFN    TLCF    outnup  ! giveup response
T12240  C12000  FSNVSE  0       30      ! "COMMAND VALID FOR FLOOR ONLY"

C12250  C12000  D12250  SNVN    TLCF    outnup  ! print response
T12250  C12000  FSNVSE  0       38      ! "PRINT REQUEST INCOMPLETE OR INVALID"
T12251  C12000  FSNVSE  0       26      ! "MESSAGE NUMBER TOO HIGH"
T12252  C12260  VSNVSE  0       0       ! " ... CHANGE?"
T12000  C12010  VSNVSE  0       0       ! "COMMAND ?" (preceded by anything)

C12260  C12000  D40     UNVN    TLCF    outnup  ! user enters info to prompt
T11040  C12270  VNNVUE  0       0       ! (any user input)

C12270  C12000  D12270  SNVN    TLCF    outnup  ! print request prompts
T12270  C12260  FSNVSE  0       46      ! "ENTER HOST NAME FOR DELIVERY ... "
T12271  C12270  FSNVSE  0       22      ! "INVALID HOST NAME"
T12272  C12260  VSNVSE  0       0       ! " ... CHANGE? "
T12273  C12260  FSNVSE  0       52      ! "ENTER YOUR ACCOUNT NUMBER, NAME ...
T12274  C12260  FSNVSE  0       80      ! "IDENT INFORMATION NOT VALID ... "
T12000  C12010  VSNVSE  0       0       ! "COMMAND ?" (preceded by anything)

C12350  C12000  D12350  SNFN    TLCF    outnup  ! quit
T12350  C999    FSNVSE  0       18      ! "QUIT SUCCESSFUL"

C12360  C12000  D12360  SNFN    TLCF    outnup  ! review
T12360  C12000  FSNVSE  0       24      ! "INVALID REVIEW REQUEST"
T11600  C12050  FNNVSE  0       0       !<CR><NL><NP>

C12450  C12000  D12450  SRVN    TLCF    outnup  ! status
T12050  C12010  VSNVSE  0       0       ! "COMMAND ?"

C12470  C12000  D12450  SRFN    TLCF    outnup  ! ? output
T12470  C12010  FSNVSE  809     9       ! "THIS TERMINAL IS CURRENTLY ... "

C12500  C12000  D12500  SNFN    TLCF    outnup  ! determine describe output
T12500  C12600  FSNVSE  5       14      ! ">>>ADD<<<"
T12501  C12610  FSNVSE  5       14      ! ">>>ADJOURN<<<"
T12502  C12620  FSNVSE  5       14      ! ">>>ANNOUNCE<<<"
T12503  C12630  FSNVSE  5       14      ! ">>>BULLETIN<<<"
T12504  C12640  FSNVSE  5       14      ! ">>>CHAIR TO<<<"
T12505  C12650  FSNVSE  5       14      ! ">>>COMMUNICATION<<<"
T12506  C12660  FSNVSE  5       14      ! ">>>DEFINITION<<<"
T12507  C12670  FSNVSE  5       14      ! ">>>DELETE<<<"
T12508  C12680  FSNVSE  5       14      ! ">>>DESCRIBE<<<"
T12509  C12690  FSNVSE  5       14      ! ">>>ERASE<<<"
T12510  C12700  FSNVSE  5       14      ! ">>>FLOOR<<<"
T12511  C12710  FSNVSE  5       14      ! ">>>FORMAT<<<"
T12512  C12720  FSNVSE  5       14      ! ">>>GIVEUP<<<"
T12513  C12730  FSNVSE  5       14      ! ">>>INSERT<<<"
T12514  C12740  FSNVSE  5       14      ! ">>>KEYWORD<<<"
T12515  C12750  FSNVSE  5       14      ! ">>>LISTEN<<<"
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T12516  C12760  FSNVSE  5     14     ! ">>>PDAC<<<"
T12517  C12770  FSNVSE  5     14     ! ">>>PRINT<<<"
T12518  C12780  FSNVSE  5     14     ! ">>>QUIT<<<"
T12519  C12790  FSNVSE  5     14     ! ">>>REVIEW<<<"
T12520  C12800  FSNVSE  5     14     ! ">>>STATUS<<<"
T12521  C12810  FSNVSE  5     14     ! ">>>TALK<<<"
T12522  C12820  FSNVSE  5     14     ! ">>>TERMINATE<<<"
T12523  C12830  FSNVSE  5     14     ! ">>>?<<<"
T12524  C12470  FSNVSE  5     14     ! "INVALID DESCRIBE ARGUMENT PASSED"

C12600  C12000  D12450  SRFN  TLCF   outnup  ! add text
T12600  C12010  FSNVSE  471   9      ! "THIS VERB'S USAGE IS RESTRICTED ...

C12610  C12000  D12450  SRFN  TLCF   outnup  ! adjourn text
T12610  C12010  FSNVSE  454   9      ! "THIS VERB'S USAGE IS RESTRICTED ...

C12620  C12000  D12450  SRFN  TLCF   outnup  ! announce text
T12620  C12010  FSNVSE  589   9      ! "THIS VERB'S USAGE IS RESTRICTED ...

C12630  C12000  D12450  SRFN  TLCF   outnup  ! bulletin text
T12630  C12010  FSNVSE  240   9      ! "THIS VERB ALLOWS AN INDIVIDUAL ... "

C12640  C12000  D12450  SRFN  TLCF   outnup  ! chair to text
T12640  C12010  FSNVSE  822   9      ! "THIS VERB'S USAGE IS RESTRICTED ...

C12650  C12000  D12450  SRFN  TLCF   outnup  ! communication text
T12650  C12010  FSNVSE  918   9      ! "THIS VERB WILL ALLOW INFORMAL ... "

C12660  C12000  D12450  SRFN  TLCF   outnup  ! definition text
T12660  C12010  FSNVSE  2644  9      ! "THIS VERB DISPLAYS THE STATE ... "

C12670  C12000  D12450  SRFN  TLCF   outnup  ! delete text
T12670  C12010  FSNVSE  360   9      ! "THIS COMMAND ALLOWS THE ... "

C12680  C12000  D12450  SRFN  TLCF   outnup  ! describe text
T12680  C12010  FSNVSE  572   9      ! "THIS VERB IS USED TO OBTAIN ... "

C12690  C12000  D12450  SRFN  TLCF   outnup  ! erase text
T12690  C12010  FSNVSE  289   9      ! "THIS COMMAND IS USED BY THE ... "

C12700  C12000  D12450  SRFN  TLCF   outnup  ! floor text
T12700  C12010  FSNVSE  1311  9      ! "THE PURPOSE OF THE FLOOR ... "

C12710  C12000  D12450  SRFN  TLCF   outnup  ! format text
T12710  C12010  FSNVSE  685   9      ! "THIS COMMAND IS USED BY THE ... "

C12720  C12000  D12450  SRFN  TLCF   outnup  ! giveup text
T12720  C12010  FSNVSE  181   9      ! "THIS VERB ALLOWS A PARTICIPANT ... "

C12730  C12000  D12450  SRFN  TLCF   outnup  ! insert text
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T12730  C12010  FSNVSE  618     9       ! "THIS IS A CHAIRMAN ONLY VERB ... "

C12740  C12000  D12450  SRFN    TLCF    outnup  ! keyword text
T12740  C12010  FSNVSE  528     9       ! "MESSAGES MAY BE ASSIGNED A ... "

C12750  C12000  D12450  SRFN    TLCF    outnup  ! listen text
T12750  C12010  FSNVSE  328     9       ! "TO RECEIVE CONFERENCE MESSAGES ... "

C12760  C12000  D12450  SRFN    TLCF    outnup  ! pdac text
T12760  C12010  FSNVSE  561     9       ! "THIS VERB OPENS A CONNECTION ... "

C12770  C12000  D12450  SRFN    TLCF    outnup  ! print text
T12770  C12010  FSNVSE  1868    9       ! "THIS VERB ALLOWS AN INDIVIDUAL ... "

C12780  C12000  D12450  SRFN    TLCF    outnup  ! quit text
T12780  C12010  FSNVSE  115     9       ! "THIS VERB DISCONNECTS A ... "

C12790  C12000  D12450  SRFN    TLCF    outnup  ! review text
T12790  C12010  FSNVSE  1265    9       ! "THIS VERB ALLOWS A SELECTIVE ... "

C12800  C12000  D12450  SRFN    TLCF    outnup  ! status text
T12800  C12010  FSNVSE  294     9       ! "THIS VERB PRODUCES A REPORT ... "

C12810  C12000  D12450  SRFN    TLCF    outnup  ! talk text
T12810  C12010  FSNVSE  233     9       ! "THIS VERB TRANSFERS A ... "

C12820  C12000  D12450  SRFN    TLCF    outnup  ! terminate text
T12820  C12010  FSNVSE  422     9       ! "THIS VERB'S USAGE IS RESTRICTED ...

C12830  C12000  D12450  SRFN    TLCF    outnup  ! ? text
T12830  C12010  FSNVSE 173     9       ! "THE QUESTION MARK IS USED ... "

C13000  C13500  D13000  SNVN    TLCF    outnup  ! talk mode entered
T13000  C13010  VSNVSE  0       0       ! "TALK MODE ENTERED IN ... "

C13010  C13500  D13010  SNFN    TLCF    outnup  ! talk mode prompt
T13010  C13050  FSNVSE  0       3       ! ">" (talk mode prompt)
T13011  C13050  FSNVSE  0       3       ! "-" (alternate talk mode prompt)
T13012  C13020  FNNVSE  0       0       !<CR><NL>TO?
T13012  C13020  VSNVSE  0       0       !<CR><NL>TO?
T13013  C13020  FSNVSE  0       7       ! "FROM?"
T13014  C13020  FSNVSE  0       10      ! "SUBJECT?"
T13015  C13020  FSNVSE  0       8       ! "CLASS?"
T13016  C13020  FSNVSE  0       7       ! "INFO?"
T13017  C13020  FSNVSE  0       6       ! "REF?"

C13020  C13500  D40     UNVN    TLCF    outnup  ! user enters format info
T11040  C13030  VNNVUE  0       0       ! (anything is valid)

C13030  C13500  D13010  SNFN    TLCF    outnup  ! complete message formatting
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T13010  C13050  FSNVSE  0       3       ! ">" (talk mode prompt)
T13011  C13020  FSNVSE  0       3       ! "-" (msg format prompt)
T13012  C13020  FSNVSE  0       5       ! "TO?"
T13013  C13020  FSNVSE  0       7       ! "FROM?"
T13014  C13020  FSNVSE  0       10      ! "SUBJECT?"
T13015  C13020  FSNVSE  0       8       ! "CLASS?"
T13016  C13020  FSNVSE  0       7       ! "INFO?"
T13017  C13020  FSNVSE  0       6       ! "REF?"

C13050  C13500  D40     UNVN    TLCF    outnup  ! user enters talk mode command
T13050  C13100  VSNVUE  0       0       ! $desc(ribe)
T13051  C12000  VSNVUE  0       0       ! $comm(and)
T13052  C13300  VSNVUE  0       0       ! $dele(te)
T13053  C13320  VSNVUE  0       0       ! $end
T12080  C13320  FNNVUE  0       0       ! <carriage return> (same as $end)
T13054  C13340  VSNVUE  0       0       ! $list
T13055  C13360  VSNVUE  0       0       ! $sele(ct)
T13056  C13380  VSNVUE  0       0       ! $subj(ect)
T13057  C13410  VSNVUE  0       0       ! $talk
T13058  C13210  FNNVUE  0       0       ! ?
T11040  C13010  VNNVUE  0       0       ! (anything else is part of a message)

C13100  C13500  D13100  SNFN    TLCF    outnup  ! determine describe output
T13100  C13110  FSNVSE  5       14      ! ">>>$DESCRIBE<<<"
T13101  C13120  FSNVSE  5       14      ! ">>>$COMMAND<<<"
T13102  C13130  FSNVSE  5       14      ! ">>>$DELETE<<<"
T13103  C13140  FSNVSE  5       14      ! ">>>$END<<<"
T13104  C13150  FSNVSE  5       14      ! ">>>$LIST<<<"
T13105  C13160  FSNVSE  5       14      ! ">>>$SELECT<<<"
T13106  C13170  FSNVSE  5       14      ! ">>>$SUBJECT<<<"
T13107  C13180  FSNVSE  5       14      ! ">>>$TALK<<<"
T13108  C13190  FSNVSE  5       14      ! ">>> ? <<"
T13109  C13200  FSNVSE  5       14      ! ">>>$INSERT<<<"
T13099  C13210  FSNVSE  5       14      ! "INVALID DESCRIBE ARGUMENT PASSED"

C13110  C13500  D560    SRFN    TLCF    outnup  ! $describe text
T13110  C13010  FSNVSE  358     10      ! "THIS PARAMETER IS USED TO OBTAIN ...

C13120  C13500  D560    SRFN    TLCF    outnup  ! $command text
T13120  C13010  FSNVSE  159     17      ! "THIS PARAMETER WILL CAUSE A ... "

C13130  C13500  D560    SRFN    TLCF    outnup  ! $delete text
T13130  C13010  FSNVSE  110     14      ! "THIS PARAMETER WILL CAUSE THE ... "

C13140  C13500  D560    SRFN    TLCF    outnup  ! $end text
T13140  C13010  FSNVSE  357     10      ! "THIS PARAMETER WILL CAUSE A ... "

C13150  C13500  D560    SRFN    TLCF    outnup  ! $list text
T13150  C13010  FSNVSE  214     10      ! "$LIST AS THE FIRST CHARACTERS ... "
```

```
C13160  C13500  D560    SRFN    TLCF    outnup  ! $select text
T13160  C13010  FSNVSE  256     10      ! "THIS VERB ALLOWS A PARTICIPANT ... "

C13170  C13500  D560    SRFN    TLCF    outnup  ! $subject text
T13170  C13010  FSNVSE  300     20      ! "THIS VERB ALLOWS A PARTICIPANT ... "

C13180  C13500  D560    SRFN    TLCF    outnup  ! $talk text
T13180  C13010  FSNVSE  233     7       ! "THIS PARAMETER WILL CAUSE A ... "

C13190  C13500  D13190  SRFN    TLCF    outnup  ! ? text
T13190  C13010  FSNVSE  143     15      ! "THE QUESTION MARK IS USED ... "

C13200  C13500  D560    SRFN    TLCF    outnup  ! $insert text
T13200  C13010  FSNVSE  636     27      ! "THIS PARAMETER ALLOWS PREVIOUSLY ...

C13210  C13500  D560    SRFN    TLCF    outnup  ! ? or bad describe argument
T13210  C13010  FSNVSE  855     19      ! "THIS TERMINAL IS CURRENTLY ... "

C13300  C13500  D13300  SNVN    TLCF    outnup  ! $delete command
T13300  C13300  FNNVSE  0       0       !<CR><NL>MESSAGE DELETED BY PARTICIPANT
T13300  C13300  VSNVSE  0       0       !<CR><NL>MESSAGE DELETED BY PARTICIPANT
T12000  C12010  FSNVSE  2       9       ! "COMMAND ?" (command mode entered)
T11500  C11510  VSNVSE  0       0       ! "LISTEN MODE ENTERED IN ... "

C13320  C13500  D13320  SNFN    TLCF    outnup  ! $end command
T13320  C13330  FSNVSE  0       18      ! "MESSAGE ACCEPTED"

C13330  C13500  D13330  SRVN    TLCF    outnup  ! leave talk mode
T11500  C11510  VSNVSE  0       0       ! "LISTEN MODE ENTERED IN ... "
T12000  C12010  VSNVSE  0       0       ! "COMMAND ?"

C13340  C13500  D13340  SRVN    TLCF    outnup  ! $list command
T13340  C13050  FSNVSE  2       24      ! "NO TEXT HAS BEEN ENTERED"
T13010  C13050  VSNVSE  0       0       ! ">" (talk mode prompt)

C13360  C13500  D13360  SNVN    TLCF    outnup  ! $select command
T13360  C13010  FSNVSE  0       55      ! "... NO PARTICIPANT NAMES"
T13010  C13050  VSNVSE  0       0       ! ">" (talk mode prompt)
T13011  C13050  VSNVSE  0       0       ! "-" (alternate talk mode prompt)

C13380  C13500  D13000  SNFN    TLCF    outnup  ! $subject command
T13380  C13020  FSNVSE  0       3       ! "-"
T13381  C13050  FSNVSE  0       48      ! "INVALID SUBJECT REQUEST--..."

C13410  C13500  D13410  SNFN    TLCF    outnup  ! $talk command
T13320  C13420  FSNVSE  0       18      ! "MESSAGE ACCEPTED"
T13430  C13410  FNNVSE  0       0       !CONTINUING IN TALK MODE<SP>
T13010  C13050  FNNVSE  0       0       !<CR><NL>>
T13010  C13050  VSNVSE  0       0       !<CR><NL>> preceded by message
```

```
C13420  C13500  D13420  SNVN    TLCF    outnup  ! message number assigned
T13420  C13430  VSNVSE  0       0       ! "MESSAGE NUMBER ... "

C13430  C13500  D13430  SNFN    TLCF    outnup  ! return to talk mode
T13430  C13010  FNNVSE  0       0       ! "CONTINUING IN TALK MODE"

C13500  C13500  D13300  SNVN    TLCF    outnup  ! user entered a break
T13300  C13510  FNNVSE  0       0       !<CR><NL>MESSAGE DELETED BY PARTICIPANT
T13300  C13510  VSNVSE  0       0       !<CR><NL>MESSAGE DELETED BY PARTICIPANT
T12000  C12010  FSNVSE  0       9       ! "COMMAND ?" (command mode entered)
T11500  C11510  VSNVSE  0       0       ! "LISTEN MODE ENTERED IN ... "

C13510  C13500  D40     UNVN    TLCF    outnup  ! user enters carriage return
T11040  C11500  VNNVUE  0       0       ! (anything)
```

A.5.2 <u>Source Halting Delimiter File (GHDEL)</u>

```
D1      |nl|^^

D20     -^^

D30     | |^^

D40     |cr|^^

D50     ZMA|cr|^
        KED|cr|^^

D110    ?|cr||nl|^^

D130    ?|cr||nl|^
        code^^

D150    ?^
        code^^

D501    ?   ^^

D502    ?  ^
        ERS^^

D503    6 ^^

D504    L ^^

D506    y|cr||nl|^^

D509    6 ^
        ?  ^
        M ?^^

D510    ?   ^
        CODE^^

D520    -^
        DY^
        ?  ^
        USY ^^

D530    ?  ^
        DY^
        FILE^^
```

```
D539    ERS^
        VED-^
        T CHARACTER^
        LONG^
        TION^
        E SAVE^^

D540    ?  ^
        DY^
        ERS^
        W-^
        E SAVE^^

D550      |cr||nl|^^

D560    |cr||nl|^^

D570    |cr||nl|INVALID COMMAND AT THIS LEVEL ^
        |cr||nl|^
        TED ^^

D580    ? ^
        E|cr||nl|^
        R  |cr||nl|^
        LEVEL ^
        R FILE ^^

D581    ? ^^

D598    R FILE ^
        R   ^
        -   ^
        E  ^
        R  |cr||nl|^^

D599    ?  ^
           ^^

D611    -   ^^

D990    |nl||nl|^
         CP^^

D995    |nl||nl|^^

D999    |nl|^
        |cr|^
        | || |^^

D1000   ?  ^^
```

```
D1030   | || || |^^

D1050   ? ^
        INPUT CHARACTER^
        ' TOO LONG^^

D1200   RWM|cr|^
        STATED^^

D1240   ? ^
        INPUT CHARACTER^
        ' TOO LONG^
        E PERMISSION^^

D1300   ? ^
        EXIST^
        FUL.^
        INPUT CHARACTER^
        ' TOO LONG^
        STATED^^

D6000   E|nl||cr|^^

D6120   | ||nl||cr|^
        E|nl||cr|^
        Y|nl||cr|^^

D6140   | ||nl||cr|^
        D|nl||cr|^^

D6160   D|nl||cr|^
        I|nl||cr|^^

D6260   | || || ||nl||cr|^^

D6340   | ||nl||cr|^
        R|nl||cr|^^

D7000   y|cr||nl|^
        cter^
        NED|cr||nl|^
        M ?^^

D9020   Y^^

D9030   |cr||nl|*^^

D9040    .^^

D9045   |cr||nl|=^^
```

```
D9050     .^
          |cr||nl|*^^

D9060     |cr||nl|=^
          |cr||nl|*^^

D9061     *^
          ? ^^

D9063     E|cr||nl|^^

D9064     ?^^

D9065     TEM^^

D9070     |cr||nl|*^
          |cr||nl|^
          ? ^^

D9080     ?  ^
          LESS^
          |cr||cr||nl|^^

D9095     of  74^
          of  $$^
          found^
          |cr||nl|^^

D9096     t|cr||nl|^
          *^^

D9097     -  ^^

D9100     ?^
          *^
          busy^
          found^^

D9120     |cr||nl|*^
          |cr||nl|^
          |bell||bell||bell||bell||bell||bell|^
          TEM^
          ALLY^^

D11000    | ||cr||nl|^
          CODE^^

D11010    JOIN?^^

D11030    JOIN?^
```

```
        CP^^

D11050  NAME? ^
        SESSION^^

D11070  ZMA|cr|^
        NIZED^
        DENIED   ^^

D11090  COPY   ^
        GRANTED  ^
        DENIED   ^
        ZMA|cr|^^

D11110  NAME   ^
        CARD  ^
        CARD--^^

D11130    ^^

D11140   |cr|^^

D11180     |cr||nl|^^

D11190  CONFERENCE ^^

D11510  |cr||nl|^
        CONFERENCE ^
        |ff|^^

D12000  COMMAND ?^^

D12040  WAITING^
        MESSAGE NUMBER^^

D12050  |cr||nl||ff|^
        |cr||nl|^
        COMMAND ?^^

D12060  AGE   ^
        ENT  ^^

D12070  -^
        SENT  ^
        IGNORED   ^
        COMMAND ?^^

D12100  COMMAND ?^
        CHANGE? |cr||nl|^
        LIMIT IS-- ^^
```

```
D12120  ?    |cr||nl|^
        ?  |cr||nl|^
        ? |cr||nl|^
        COMMAND ?^^

D12200  MAND^
        LEGE^
         ?^^

D12210  )|cr||nl|^^

D12230  TIVITY^^

D12240  ONLY^^

D12250  VALID ^
        HIGH ^
        CHANGE?^
        COMMAND ?^^

D12270  COPY    ^
        NAME    ^
        CHANGE? ^
        CARD    |cr||nl|^
        NO)?^
        COMMAND ?^^

D12350  FUL ^^

D12360  EST  ^
        |ff|^^

D12450  |nl|^
        ?^^

D12500   |cr||nl|^
        <|cr||nl|^
        PASSED^^

D13000  |yy|^^

D13010  >^
        -^
        ?^^

D13100  >|cr||nl|^
         |cr||nl|^
        PASSED^^

D13190  |cr||nl|^
```

```
        UNCTION.        ^^

D13300  PANT  ^
           |cr||nl|^
        MAND ?^^

D13320  TED^^

D13330  |yy|   |cr||nl|^
        COMMAND ?^^

D13340  ENTERED^
        |cr||nl|>^
        |cr||nl|-^
        |cr|^^

D13360  NAMES|cr||nl|^
        |cr||nl|>^
        |cr||nl|-^^

D13400  |cr||nl|-^^

D13410  |cr||nl|>^
        MODE ^
        ACCEPTED^^

D13420   |cr||nl|^^

D13430  MODE ^^

D13440  |cr||nl||ff|^^
```

A.5.3 Source Text String File (GTEXT)

Long text string lines have been "wrapped around" onto the next line in order to fit onto the page. This wrapping is indicated by the characters "->" at the end of a line.

```
T1      ^

T2      |cr||nl|1316400|cr||nl|^

T10     |cr||nl|PROGRAM NAME -^

T20     tss|cr|^

T21     tlcf|cr|^

T30     |cr||nl|TERMINAL ^

T40     |cr||nl|^

T50     USERID$PASSWORD?|cr||nl||cr||nl|
        *%&<%#>?*#S%#?AM*5*48#N&#|cr|
        TXOGWBMWEPVRMCBQNKMGAKZMA|cr|^

T51     LOCKED|cr|^

T60     /^

T61     $^

T90     |cr||nl|IDENT?|cr||nl|^

T100    .^

T110    |cr||nl|CLASSIFICATION OF YOUR OUTPUT?|cr||nl|^

T111    |cr||nl|classification of your output?|cr||nl|^

T120    zzz|cr|^

T121    uzz|cr|^

T122    ufo|cr|^

T123    czz|cr|^
```

```
T124    szz|cr|^

T125    swp|cr|^

T130    |cr||nl|CLASSIFICATION OF FILES YOU WILL CREATE?|cr||nl|^

T131    |cr||nl|classification of files you will create?|cr||nl|^

T132    |cr||nl|ILLEGAL CLASSIFICATION CODE^

T133    |cr||nl|illegal classification code^

T150    |cr||nl|SYSTEM ?^

T151    |nl||cr||cr||nl|SYSTEM ?^

T160    acce|cr|^

T161    acces|cr|^

T162    access|cr|^

T163    list ^

T164    sios|cr|^

T165    tcon|cr|^

T166    wwdm|cr|^

T167    wwdms|cr|^

T168    bye|cr|^

T169    listl ^

T170    list|cr|^

T171    listl|cr|^

T172    wwdm n|cr|^

T173    wwdms n|cr|^

T174    wwdm new|cr|^

T175    wwdms new|cr|^

T991    |cr||nl|    LINE TERMINATED CP^
```

```
T995    |cr||nl|**on at ^

T1000   |cr||nl||nl| FUNCTION? ^

T1020   mf|cr|^

T1021   fm|cr|^

T1022   done|cr|^

T1023   |cr|^

T1030   |cr||nl|     CATALOG STRUCTURE TO WORKING LEVEL?|cr||nl|   ^

T1040   ^

T1050   |cr||nl|     FILE TO BE MODIFIED? ^

T1051   |cr||nl||nl|ERR-^

T1060   /^

T1070   |cr||nl|     NEW NAME? ^

T1090   |cr||nl|     NEW MAX SIZE IN LLINKS? ^

T1200   |cr||nl|NEW PASSWORD?|cr||nl|
        @%&<%#>?#@$%&#|cr|
        TXOGWBMWEPVRWM|cr|^

T1201   |cr||nl||nl|ERR--MAX SIZE ILLEGALLY STATED^

T1220   |cr||nl|     GENERAL PERMISSIONS? ^

T1230   read|cr|^

T1231   r|cr|^

T1232   execute|cr|^

T1233   e|cr|^

T1234   write|cr|^

T1235   w|cr|^

T1236   append|cr|^

T1237   a|cr|^
```

T1238 modify|cr|^

T1239 m|cr|^

T1240 |cr||nl| SPECIFIC PERMISSIONS? ^

T1250 read/^

T1251 r/^

T1252 write/^

T1253 w/^

T1254 append/^

T1255 a/^

T1256 execute/^

T1257 e/^

T1258 modify/^

T1259 m/^

T1300 |cr||nl|MORE? ^

T1301 |cr||nl| SUCCESSFUL.^

T1302 |cr||nl||nl|ERR-PERMISSIONS ILLEGALLY STATED^

T1303 |cr||nl||nl|REQUEST DENIED-^

T1320 |cr||nl||nl| FILE TO BE MODIFIED? ^

T2000 |cr||nl|TCON VERSION 6.3, JUNE 1976 ^

T2001 |cr||nl|FUNCTIONAL AREA ?   ^

T2002 |cr||nl|TCON VERSION 6.3, JUNE 1976
|cr||nl|FUNCTIONAL AREA ?   ^

T2020 |cr||nl|NO TEMPORARY FILE SPACE CODE^

T2030 fs|cr|^

T2040 dem|cr|^

T2050 |cr||nl|^

T2060 0 ^

T2061 1 ^

T2062 2 ^

T2063 3 ^

T2064 4 ^

T2065 5 ^

T2066 6 ^

T2067 7 ^

T2068 8 ^

T2069 9 ^

T2100 |cr|^

T2110 |cr||nl|OLD OR NEW-^

T2120 |cr||nl|FUNCTIONAL AREA BUSY ^

T2130 new|cr|^

T2140 n|cr|^

T2160 o ^

T2161 ol ^

T2162 old ^

T2180 same|cr|^

T2181 s|cr|^

T2190 |cr||nl|READY^

T2195 -- NONEXISTENT^

T2196 ' DOES NOT EXIST--USE SAVE^

T2200 |cr||nl||nl||cr||nl|TRANSACTION TYPE ? ^

T2201 |cr||nl| TRANSACTION TYPE ? ^

```
T2202   |cr||nl|TRANSACTION TYPE ?  ^

T2205   |cr||nl||nl||cr||nl|INVALID TRANSACTION TYPE ON RETRIEVE
        |cr||nl||cr||nl|ENTER TRANSACTION TYPE  ^

T2210   |cr||nl|YOU PRESENTLY DO NOT HAVE A CURRENT FILE^

T2211   |cr||nl|FILE NAME? ^

T2220   INCORRECT CAT/FILE DESCRIPTION^

T2221   |cr||nl||nl|ERR-FILE NAME >8 CHARACTERS^

T2222   |cr||nl|ERR-FILE NAME >8 CHARACTERS^

T2223    IS NOT A LEGAL INPUT CHARACTER^

T2224    IS AN ILLEGAL INPUT CHARACTER^

T2225    TOO LONG^

T2230   |cr||nl||nl||cr||nl|INVALID TRANSACTION TYPE -RETYPE-   ^

T2240   NOT IN CURR FILE ^

T2250   |cr||nl|ILLEGAL PARAMETER   ^

T2260   FILE PRESENTLY BUSY^

T2270   |cr||nl|DATA SAVED-^

T2280   |cr||nl||cr||nl||dc3||cr||nl|ready|cr||nl|^

T2281   |cr||nl|ready|cr||nl|^

T2290   a|cr|^

T2300   a a|cr|^

T2310   aa1|cr|^

T2320   d|cr|^

T2330   e|cr|^

T2340   h|cr|^

T2350   j|cr|^

T2360   k|cr|^
```

```
T2370   ka1|cr|^
T2380   l|cr|^
T2390   m|cr|^
T2400   n|cr|^
T2410   p|cr|^
T2420   r-1|cr|^
T2430   r-2|cr|^
T2440   r11|cr|^
T2450   r12|cr|^
T2460   aa4|cr|^
T2470   ka2|cr|^
T2480   t|cr|^
T2490   v|cr|^
T2500   x|cr|^
T2510   z a|cr|^
T2512   jsb|cr|^
T2514   j b|cr|^
T2516   n a|cr|^
T2518   n b|cr|^
T2519   xxx|cr|^
T2520   done|cr|^
T2540   dele^
T2541   feed^
T2542   next^
T2543   nofe^
```

T2544	pass^
T2545	rewi^
T2546	skip^
T2547	help^
T2548	voca^
T2550	remove clearfiles|cr|^
T2555	remov clearfiles|cr|^
T2560	remo clearfiles|cr|^
T2580	rese^
T2600	retr^
T2610	list|cr|^
T2611	list ^
T2612	listl|cr|^
T2613	listl ^
T2630	resave|cr|^
T2631	resa|cr|^
T2632	resave ^
T2633	resa ^
T2640	old|cr|^
T2645	o|cr|^
T2890	tn|cr|^
T2891	tn^
T2910	[^
T2940	forward^
T2941	f^

```
T2960   backward^
T2961   b^
T2980   get ^
T2981   g ^
T3000   test|cr|^
T3001   t|cr|^
T3010   *|cr|^
T3011   system|cr|^
T3012   syst|cr|^
T3020   xmit|cr|^
T3021   x|cr|^
T3030   bye|cr|^
T3040   d|cr|^
T3050    DATA TRUNCATED ^
T3060   |cr||nl|INVALID COMMAND AT THIS LEVEL ^
T3070   END OF TRANSACTION  |cr||nl|^
T3080   MORE - - - -|cr||nl|^
T3090   |cr||nl||nl||cr||nl|TRANSACTION SENT. NEXT? ^
T3110   |cr||nl|OLD FILE? ^
T3120   |cr||nl|INVALID COMMAND AT THIS LEVEL |cr||nl|^
T3130   |cr||nl||nl||cr||nl|INVALID TRANSACTION TYPE -RETYPE-   ^
T3300   hd|cr|^
T3310   as|cr|^
T3320   am|cr|^
T3330   av|cr|^
```

```
T3340   ae|cr|^

T3350   at|cr|^

T3360   ed|cr|^

T3370   ea|cr|^

T3380   ma|cr|^

T3390   mc|cr|^

T3400   pl|cr|^

T3410   pd|cr|^

T3420   ol|cr|^

T3430   od|cr|^

T2657   |cr||nl|
        |cr||nl|TN[000010      TRANSACTION SEQUENCE NUMBER   |cr||nl|^

T2658   TRANSACTION SEQUENCE NUMBER   |cr||nl|^

T2659   ERROR MESSAGE|cr||nl|^

T2660   |cr||nl|
        |cr||nl|TN[000010      TRANSACTION SEQUENCE NUMBER   |cr||nl|
          DATA                             NAME             ERROR MESSAGE|cr->
        ||nl|
        01[---                             A-CARD-SEQ|cr||nl|
        02[-                               A-SECURITY-CL|cr||nl|
        03[-                               A-TRAN-TYPE|cr||nl|
        04[A                               A-CARD-TYPE|cr||nl|
        05[------                          A-UIC|cr||nl|
        06[-                               A-UDC|cr||nl|
        07[------------------------------  A-ANAME|cr||nl|
        08[-----                           A-UTC|cr||nl|
        09[---                             A-ULC|cr||nl|
        10[------                          A-MJCOM|cr||nl|
        11[-                               A-MAJOR|cr||nl|
        12[-                               A-REVAL|cr||nl|
        13[-                               A-SCLAS|cr||nl|
        14[------                          A-ORGUIC|cr||nl|
        15[FS                              A-RPTYP|cr||nl|
        16[---                             A-RPTNR|cr||nl||cr||nl|^

T2670   |cr||nl|
        |cr||nl|TN[000010      TRANSACTION SEQUENCE NUMBER   |cr||nl|
```

```
             DATA                  NAME              ERROR MESSAGE|cr||nl|
          01[---                   A-A-CARD-SEQ|cr||nl|
          02[-                     A-A-SECURITY-CL|cr||nl|
          03[-                     A-A-TRAN-TYPE|cr||nl|
          04[A A                   A-A-CARD-TYPE|cr||nl|
          05[------                A-A-UIC|cr||nl|
          06[--------------        A-A-SRC|cr||nl|
          07[----                  TAPFOR-CODE|cr||nl|
          08[-                     A-A-PACING|cr||nl|
          09[--                    A-A-RDYCD|cr||nl|
          10[-                     A-A-TPSNCD|cr||nl|
          11[------                A-A-SBRPT2|cr||nl|
          12[----                  A-A-ROBCO1|cr||nl|
          13[-                     A-A-MSYSACD|cr||nl|
          14[---                   A-A-ROBCO|cr||nl|
          15[-----                 A-A-DAMPL|cr||nl|
          16[----                  A-A-SEQKEY|cr||nl|
          17[-                     A-A-IFREQ|cr||nl|
          18[-                     A-A-ARR|cr||nl|
          19[--                    A-A-ARGO|cr||nl|
          20[-                     A-A-ARMY|cr||nl|
          21[------                A-A-ORGUIC|cr||nl|
          22[FS                    A-A-RPTYP|cr||nl|
          23[---                   A-A-RPTNR|cr||nl||cr||nl|^

T2680     |cr||nl|
          |cr||nl|TN[000010     TRANSACTION SEQUENCE NUMBER  |cr||nl|
             DATA              NAME              ERROR MESSAGE|cr||nl|
          01[---               AA1-CARD-SEQ|cr||nl|
          02[-                 AA1-SECURITY-CL|cr||nl|
          03[-                 AA1-TRAN-TYPE|cr||nl|
          04[AA1               AA1-CARD-TYPE|cr||nl|
          05[------            AA1-UIC|cr||nl|
          06[-                 AA1-LIC|cr||nl|
          07[------            AA1-EDATE|cr||nl|
          08[-----             AA1-TPSN15|cr||nl|
          09[--                AA1-TPSN-EL-SEQ|cr||nl|
          10[-                 AA1-OESTS|cr||nl|
          11[--                AA1-STATC|cr||nl|
          12[-                 AA1-FUAC|cr||nl|
          13[--                AA1-ASGMT|cr||nl|
          14[-----             AA1-ZIP|cr||nl|
          15[----              AA1-APO|cr||nl|
          16[--                AA1-PPA|cr||nl|
          17[----------        AA1-MAC|cr||nl|
          18[----              AA1-PLGEO|cr||nl|
          19[------            AA1-ORGUIC|cr||nl|
          20[FS                AA1-RPTYP|cr||nl|
          21[---               AA1-RPTNR|cr||nl||cr||nl|^
```

```
T2690   |cr||nl|
        |cr||nl|TN[000010      TRANSACTION SEQUENCE NUMBER  |cr||nl|
           DATA         NAME              ERROR MESSAGE|cr||nl|
        01[---          D-CARD-SEQ|cr||nl|
        02[-            D-SECURITY-CL|cr||nl|
        03[-            D-TRAN-TYPE|cr||nl|
        04[D            D-CARD-TYPE|cr||nl|
        05[------       D-UIC|cr||nl|
        06[-            D-CSERV|cr||nl|
        07[------       D-OPCON|cr||nl|
        08[------       D-ADCON|cr||nl|
        09[----         D-HOGEO|cr||nl|
        10[----         D-PRGEO|cr||nl|
        11[------       D-EMBRK|cr||nl|
        12[--           D-ACTIV|cr||nl|
        13[-            D-DFCON|cr||nl|
        14[-            D-NUCIN|cr||nl|
        15[-            D-PCTEF|cr||nl|
        16[------       D-ORGUIC|cr||nl|
        17[FS           D-RPTYP|cr||nl|
        18[---          D-RPTNR|cr||nl||cr||nl|^

T2700   |cr||nl|
        |cr||nl|TN[000010      TRANSACTION SEQUENCE NUMBER  |cr||nl|
           DATA         NAME              ERROR MESSAGE|cr||nl|
        01[---          E-CARD-SEQ|cr||nl|
        02[-            E-SECURITY-CL|cr||nl|
        03[E            E-CARD-TYPE|cr||nl|
        04[------       E-ORGUIC|cr||nl|
        05[FS           E-RPTYP|cr||nl|
        06[---          E-RPTNR|cr||nl||cr||nl|^

T2710   |cr||nl|
        |cr||nl|TN[000010      TRANSACTION SEQUENCE NUMBER  |cr||nl|
           DATA         NAME                 ERROR MESSAGE|cr||nl|
        01[001          H-CARD-SEQ|cr||nl|
        02[-            H-SECURITY-CL|cr||nl|
        03[H            H-CARD-TYPE|cr||nl|
        04[--           H-CARD-DAY|cr||nl|
        05[--           H-CARD-HR|cr||nl|
        06[--           H-CARD-MIN|cr||nl|
        07[Z            H-ZULU|cr||nl|
        08[---          H-CARD-MONTH|cr||nl|
        09[--           H-CARD-YEAR|cr||nl|
        10[-            H-REAL-EXERCISE|cr||nl|
        11[------       H-ORGUIC|cr||nl|
        12[FS           H-RPTYP|cr||nl|
        13[---          H-RPTNR|cr||nl||cr||nl|^

T2720   |cr||nl|
```

```
         |cr||nl|TN[000010       TRANSACTION SEQUENCE NUMBER  |cr||nl|
            DATA       NAME             ERROR MESSAGE|cr||nl|
         01[---        J-CARD-SEQ|cr||nl|
         02[-          J-SECURITY-CL|cr||nl|
         03[-          J-TRAN-TYPE|cr||nl|
         04[J          J-CARD-TYPE|cr||nl|
         05[------     J-UIC|cr||nl|
         06[--         J-TPERS|cr||nl|
         07[------     J-PEGEO|cr||nl|
         08[-----      J-STRUC|cr||nl|
         09[-----      J-AUTH|cr||nl|
         10[-----      J-ASGD|cr||nl|
         11[-----      J-POSTR|cr||nl|
         12[------     J-PICDA|cr||nl|
         13[-----      J-DEPS|cr||nl|
         14[-----      J-CASPW|cr||nl|
         15[-----      J-CCASP|cr||nl|
         16[------     J-ORGUIC|cr||nl|
         17[FS         J-RPTYP|cr||nl|
         18[---        J-RPTNR|cr||nl||cr||nl|^

T2730    |cr||nl|
         |cr||nl|TN[000010       TRANSACTION SEQUENCE NUMBER  |cr||nl|
            DATA       NAME             ERROR MESSAGE|cr||nl|
         01[---        CARD-SEQ|cr||nl|
         02[-          SECURITY-CL|cr||nl|
         03[-          TRAN-TYPE|cr||nl|
         04[---        CARD-TYPE|cr||nl|
         05[------     UIC|cr||nl|
         06[-          READY|cr||nl|
         07[-          REASN|cr||nl|
         08[-          PRRAT|cr||nl|
         09[---        PRRES|cr||nl|
         10[-          ESRAT|cr||nl|
         11[---        ESRES|cr||nl|
         12[-          ERRAT|cr||nl|
         13[---        ERRES|cr||nl|
         14[-          TRRAT|cr||nl|
         15[---        TRRES|cr||nl|
         16[---        SECRN|cr||nl|
         17[---        TERRN|cr||nl|
         18[-          CARAT|cr||nl|
         19[------     CADAT|cr||nl|
         20[-          LIM|cr||nl|
         21[-          RLIM|cr||nl|
         22[------     RICDA|cr||nl|
         23[------     ORGUIC|cr||nl|
         24[FS         RPTYP|cr||nl|
         25[---        RPTNR|cr||nl||cr||nl|^
```

```
T2740   |cr||nl|
        |cr||nl|TN[000010       TRANSACTION SEQUENCE NUMBER  |cr||nl|
          DATA         NAME            ERROR MESSAGE|cr||nl|
        01[---         CARD-SEQ|cr||nl|
        02[-           SECURITY-CS|cr||nl|
        03[-           TRANS-TYPE|cr||nl|
        04[---         CARD-TYPE|cr||nl|
        05[------      UIC|cr||nl|
        06[---         PSPER|cr||nl|
        07[--          MSPER|cr||nl|
        08[--          SGPER|cr||nl|
        09[--          APERT|cr||nl|
        10[--          DEPST|cr||nl|
        11[---         EHRDN|cr||nl|
        12[---         EHRD1|cr||nl|
        13[---         EHRD2|cr||nl|
        14[---         EHRD3|cr||nl|
        15[---         EHRD4|cr||nl|
        16[--          PILFIL|cr||nl|
        17[--          PERRY|cr||nl|
        18[--          PI-ES|cr||nl|
        19[--          ER|cr||nl|
        20[--          PI-ER|cr||nl|
        21[-           TWRC1|cr||nl|
        22[-           ITAVS|cr||nl|
        23[-           ITBMM|cr||nl|
        24[-           ITAFT|cr||nl|
        25[-           ITAEM|cr||nl|
        26[-           ITAQL|cr||nl|
        27[-           ITATF|cr||nl|
        28[-           ITAFL|cr||nl|
        29[-           ITATA|cr||nl|
        30[-           ITATM|cr||nl|
        31[-           READ2|cr||nl|
        32[-           ALO|cr||nl|
        33[------      RICD1|cr||nl|
        34[-           PUID|cr||nl|
        35[------      ORGUIC|cr||nl|
        36[FS          RPTYP|cr||nl|
        37[---         RPTNR|cr||nl||cr||nl|^

T2750   |cr||nl|
        |cr||nl|TN[000010       TRANSACTION SEQUENCE NUMBER  |cr||nl|
          DATA                 NAME           ERROR MESSAGE|cr||nl|
        01[---                 L-CARD-SEQ|cr||nl|
        02[-                   L-SECURITY-CL|cr||nl|
        03[-                   L-TRAN-TYPE|cr||nl|
        04[L                   L-CARD-TYPE|cr||nl|
        05[------              L-UIC|cr||nl|
        06[-------------       L-MEQPT|cr||nl|
```

```
        07[---                L-MEPSA|cr||nl|
        08[---                L-MEPSD|cr||nl|
        09[---                L-MEORD|cr||nl|
        10[---                L-MEORN|cr||nl|
        11[------             L-MEREC|cr||nl|
        12[------             L-ORGUIC|cr||nl|
        13[FS                 L-RPTYP|cr||nl|
        14[---                L-RPTNR|cr||nl||cr||nl|^

T2760   |cr||nl|
        |cr||nl|TN[000010       TRANSACTION SEQUENCE NUMBER  |cr||nl|
           DATA               NAME              ERROR MESSAGE|cr||nl|
        01[---                M-CARD-SEQ|cr||nl|
        02[-                  M-SECURITY-CL|cr||nl|
        03[-                  M-TRAN-TYPE|cr||nl|
        04[M                  M-CARD-TYPE|cr||nl|
        05[------             M-UIC|cr||nl|
        06[-------------      M-MEQPT|cr||nl|
        07[------             M-TEGEO|cr||nl|
        08[---                M-MEPSD|cr||nl|
        09[---                M-MEORD|cr||nl|
        10[---                M-MEORN|cr||nl|
        11[------             M-MEREC|cr||nl|
        12[------             M-ORGUIC|cr||nl|
        13[FS                 M-RPTYP|cr||nl|
        14[---                M-RPTNR|cr||nl||cr||nl|^

T2770   |cr||nl|
        |cr||nl|TN[000010       TRANSACTION SEQUENCE NUMBER  |cr||nl|
           DATA          NAME              ERROR MESSAGE|cr||nl|
        01[---           N-CARD-SEQ|cr||nl|
        02[-             N-SECURITY-CL|cr||nl|
        03[-             N-TRAN-TYPE|cr||nl|
        04[N             N-CARD-TYPE|cr||nl|
        05[------        N-UIC|cr||nl|
        06[-----         N-PIN|cr||nl|
        07[-----         N-FRN|cr||nl|
        08[-             N-PLEAC|cr||nl|
        09[--            N-DDP|cr||nl|
        10[--------      N-DDPRD|cr||nl|
        11[-----         N-MDT|cr||nl|
        12[-----         N-PUTCV|cr||nl|
        13[------        N-ORGUIC|cr||nl|
        14[FS            N-RPTYP|cr||nl|
        15[---           N-RPTNR|cr||nl||cr||nl|^

T2780   |cr||nl|
        |cr||nl|TN[000010       TRANSACTION SEQUENCE NUMBER  |cr||nl|
           DATA               NAME              ERROR MESSAGE|cr||nl|
        01[---                P-CARD-SEQ|cr||nl|
```

```
      02[-                 P-SECURITY-CL|cr||nl|
      03[-                 P-TRAN-TYPE|cr||nl|
      04[P                 P-CARD-TYPE|cr||nl|
      05[------            P-UIC|cr||nl|
      06[-----             P-PIN|cr||nl|
      07[-------------     P-PEQPT|cr||nl|
      08[------            P-TPGEO|cr||nl|
      09[--                P-ALTYP|cr||nl|
      10[---               P-NUMRR|cr||nl|
      11[---               P-NUMEA|cr||nl|
      12[-----             P-ALRET|cr||nl|
      13[------            P-ORGUIC|cr||nl|
      14[FS                P-RPTYP|cr||nl|
      15[---               P-RPTNR|cr||nl||cr||nl|^

T2790 |cr||nl|
      |cr||nl|TN[000010     TRANSACTION SEQUENCE NUMBER  |cr||nl|
         DATA                          NAME              ERROR MESSAGE|c->
      r||nl|
      01[---                           R-1-CARD-SEQ|cr||nl|
      02[-                             R-1-SECURITY-CL|cr||nl|
      03[-                             R-1-TRAN-TYPE|cr||nl|
      04[---                           R-1-CARD-TYPE|cr||nl|
      05[------                        R-1-UIC|cr||nl|
      06[1                             R-1-RMK-SEQ-NUM|cr||nl|
      07[-                             R-1-NUM-OF-CARDS|cr||nl|
      08[-----                         R-1-RMK-LABEL|cr||nl|
      09[---------------------------   R-1-SEC-CONTROL|cr||nl|
      10[----                          R-1-RMK-DATE|cr||nl|
      11[-----                         R-1-RMAE|cr||nl|
      12[------------                  R-1-RMK-NARRATIVE|cr||nl|
      13[------                        R-1-ORGUIC|cr||nl|
      14[FS                            R-1-RPTYP|cr||nl|
      15[---                           R-1-RPTNR|cr||nl||cr||nl|^

T2800 |cr||nl|
      |cr||nl|TN[000010     TRANSACTION SEQUENCE NUMBER  |cr||nl|
         DATA                                          NAME     ->
                ERROR MESSAGE|cr||nl|
      01[---                                           R-2-CARD-->
      SEQ|cr||nl|
      02[-                                             R-2-SECUR->
      ITY-CL|cr||nl|
      03[-                                             R-2-TRAN-->
      TYPE|cr||nl|
      04[---                                           R-2-CARD-->
      TYPE|cr||nl|
      05[------                                        R-2-UIC|c->
      r||nl|
      06[-                                             R-2-RMK-S->
```

```
          EQ-NUM|cr||nl|
          07[-                                                        R-2-NUM-O->
          F-RMKS|cr||nl|
          08[-------------------------------------------------------  R-2-RMK-N->
          ARRATIVE|cr||nl|
          09[------                                                   R-2-ORGUI->
          C|cr||nl|
          10[FS                                                       R-2-RPTYP->
          |cr||nl|
          11[---                                                      R-2-RPTNR->
          |cr||nl||cr||nl|^

T2810     |cr||nl|
          |cr||nl|TN[000010     TRANSACTION SEQUENCE NUMBER   |cr||nl|
             DATA                                             NAME           ->
           ERROR MESSAGE|cr||nl|
          01[---                                              R-11-CARD-SEQ|cr||->
          nl|
          02[-                                                R-11-SECURITY-CL|c->
          r||nl|
          03[-                                                R-11-TRAN-TYPE|cr|->
          |nl|
          04[---                                              R-11-CARD-TYPE|cr|->
          |nl|
          05[------                                           R-11-UIC|cr||nl|
          06[1                                                R-11-RMK-SEQ-NUM|c->
          r||nl|
          07[-                                                R-11-NUM-OF-RMKS|c->
          r||nl|
          08[-----                                            R-11-RMK-LABEL|cr|->
          |nl|
          09[----                                             R-11-RMK-DATE|cr||->
          nl|
          10[---------------------------------------------    R-11-RMK-NARRITI|c->
          r||nl|
          11[------                                           R-11-ORGUIC|cr||nl->
          |
          12[FS                                               R-11-RPTYP|cr||nl|
          13[---                                              R-11-RPTNR|cr||nl|->
          |cr||nl|^

T2820     |cr||nl|
          |cr||nl|TN[000010     TR^NSACTION SEQUENCE NUMBER   |cr||nl|
             DATA                                                   NAME     ->
                    ERROR MESSAGE|cr||nl|
          01[---                                                    R-12-CARD->
          -SEQ|cr||nl|
          02[-                                                      R-12-SECU->
          RITY-CL|cr||nl|
          03[-                                                      R-12-TRAN->
```

```
        -TYPE|cr||nl|
        04[---                                                          R-12-CARD->
        -TYPE|cr||nl|
        05[------                                                       R-12-UIC|->
        cr||nl|
        06[-                                                            R-12-RMK-->
        SEQ|cr||nl|
        07[-                                                            R-12-NUM-->
        RMKS|cr||nl|
        08[--------------------------------------------------------     R-12-RMK-->
        NARRIT|cr||nl|
        09[------                                                       R-12-ORGU->
        IC|cr||nl|
        10[FS                                                           R-12-RPTY->
        P|cr||nl|
        11[---                                                          R-12-RPTN->
        R|cr||nl||cr||nl|^

T2830   |cr||nl|
        |cr||nl|TN[000010      TRANSACTION SEQUENCE NUMBER  |cr||nl|
           DATA               NAME                ERROR MESSAGE|cr||nl|
        01[---                AA4-SEQ|cr||nl|
        02[-                  AA4-SECURITY-CL|cr||nl|
        03[-                  AA4-TRANS-TYPE|cr||nl|
        04[AA4                AA4-CARD-TYPE|cr||nl|
        05[------             AA4-UIC-CONTROL|cr||nl|
        06[--                 AA4-ASGMT|cr||nl|
        07[-----              AA4-TPSN15|cr||nl|
        08[--                 AA4-TPSN-EL-SEQ|cr||nl|
        09[------------       AA4-SRC|cr||nl|
        10[-                  AA4-OESTS|cr||nl|
        11[--                 AA4-STATC|cr||nl|
        12[----------         AA4-MAC|cr||nl|
        13[------             AA4-POAD|cr||nl|
        14[------             AA4-PIDD|cr||nl|
        15[WOZUFF             AA4-ORGUIC|cr||nl|
        16[FS                 AA4-RPTYP|cr||nl|
        17[---                AA4-RPTNBR|cr||nl||cr||nl|^

T2840   |cr||nl|
        |cr||nl|TN[000010      TRANSACTION SEQUENCE NUMBER  |cr||nl|
           DATA         NAME          ERROR MESSAGE|cr||nl|
        01[---          CARD-SEQ|cr||nl|
        02[-            SECURITY-CL|cr||nl|
        03[-            TRAN-TYPE|cr||nl|
        04[KA2          CARD-TYPE|cr||nl|
        05[------       UIC|cr||nl|
        06[---          PEOHN|cr||nl|
        07[---          PEOH1|cr||nl|
        08[---          PEOH2|cr||nl|
```

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        09[---          PEOH3|cr||nl|
        10[---          PEOH4|cr||nl|
        11[--           PIEOH|cr||nl|
        12[--           POMRR|cr||nl|
        13[--           POMPI|cr||nl|
        14[--           POMER|cr||nl|
        15[--           PRIER|cr||nl|
        16[------       RICD2|cr||nl|
        17[------       ORGUIC|cr||nl|
        18[FS           RPTYP|cr||nl|
        19[---          RPTNR|cr||nl||cr||nl|^

T2850   |cr||nl|
        |cr||nl|TN[000010       TRANSACTION SEQUENCE NUMBER  |cr||nl|
          DATA              NAME             ERROR MESSAGE|cr||nl|
        01[---              T-CARD-SEQ|cr||nl|
        02[-                T-SECURITY-CL|cr||nl|
        03[-                T-TRAN-TYPE|cr||nl|
        04[T                T-CARD-TYPE|cr||nl|
        05[------           T-UIC|cr||nl|
        06[-----------      T-TEQPT|cr||nl|
        07[----             T-MESEN|cr||nl|
        08[-                T-DECON|cr||nl|
        09[--               T-MECUS|cr||nl|
        10[-                T-AVCAT|cr||nl|
        11[-                T-RESND|cr||nl|
        12[------           T-ERDTE|cr||nl|
        13[-                T-EXDAC|cr||nl|
        14[----             T-CPGEO|cr||nl|
        15[----             T-CFGEO|cr||nl|
        16[------           T-EQDEP|cr||nl|
        17[------           T-EQARR|cr||nl|
        18[-----            T-TPIN|cr||nl|
        19[-                T-TLEAC|cr||nl|
        20[--               T-TLEQE|cr||nl|
        21[------           T-ORGUIC|cr||nl|
        22[FS               T-RPTYP|cr||nl|
        23[---              T-RPTNR|cr||nl||cr||nl|^

T2860   |cr||nl|
        |cr||nl|TN[000010       TRANSACTION SEQUENCE NUMBER  |cr||nl|
          DATA          NAME             ERROR MESSAGE|cr||nl|
        01[---          V-CARD-SEQ|cr||nl|
        02[-            V-SECURITY-CL|cr||nl|
        03[-            V-TRAN-TYPE|cr||nl|
        04[V            V-CARD-TYPE|cr||nl|
        05[------       V-UIC|cr||nl|
        06[----         V-ACGEO|cr||nl|
        07[--           V-ACITY|cr||nl|
        08[------       V-ADATE|cr||nl|
```

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     09[----       V-MDATE|cr||nl|
     10[------     V-RDATE|cr||nl|
     11[------     V-ORGUIC|cr||nl|
     12[FS         V-RPTYP|cr||nl|
     13[---        V-RPTNR|cr||nl||cr||nl|^

T2870 |cr||nl|
     |cr||nl|TN[000010      TRANSACTION SEQUENCE NUMBER  |cr||nl|
        DATA       NAME              ERROR MESSAGE|cr||nl|
     01[---        X-CARD-SEQ|cr||nl|
     02[-          X-SECURITY-CL|cr||nl|
     03[C          X-TRAN-TYPE|cr||nl|
     04[X          X-CARD-TYPE|cr||nl|
     05[------     X-UIC|cr||nl|
     06[------     X-GCMD|cr||nl|
     07[------     X-TDATE|cr||nl|
     08[----       X-TRGEO|cr||nl|
     09[------     X-DEPDT|cr||nl|
     10[------     X-ARRDT|cr||nl|
     11[------     X-RPTOR|cr||nl|
     12[------     X-INTRST1|cr||nl|
     13[------     X-INTRST2|cr||nl|
     14[------     X-SBRPT|cr||nl|
     15[---        X-ATACH|cr||nl|
     16[------     X-ORGUIC|cr||nl|
     17[FS         X-RPTYP|cr||nl|
     18[---        X-RPTNR|cr||nl||cr||nl|^

T2880 |cr||nl|
     |cr||nl|TN[000010      TRANSACTION SEQUENCE NUMBER  |cr||nl|
        DATA                                         NAME                ER->
     ROR MESSAGE|cr||nl|
     01[---                                          Z-A-CARD-SEQ|cr||nl|
     02[-                                            Z-A-SECURITY-CL|cr||nl->
     |
     03[                                             Z-A-TRAN-TYPE|cr||nl|
     04[Z A                                          Z-A-CARD-TYPE|cr||nl|
     05[------                                       Z-A-UIC|cr||nl|
     06[---                                          Z-A-CARD-TYPE-IN|cr||n->
     l|
     07[-                                            Z-A-TRANS-CODE|cr||nl|
     08[----------------------------------------     Z-A-ERROR-CODE|cr||nl|
     09[---                                          Z-A-CARD-NUMBER|cr||nl->
     |
     10[---                                          Z-A-REPORT-NUMBER|cr||->
     nl|
     11[------                                       Z-A-ORGUIC|cr||nl|
     12[FS                                           Z-A-RPTYP|cr||nl|
     13[---                                          Z-A-RPTNR|cr||nl||cr||->
     nl|^
```

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T3140   |cr||nl|
        |cr||nl|TN[000010      TRANSACTION SEQUENCE NUMBER  |cr||nl|
           DATA       NAME                ERROR MESSAGE|cr||nl|
        01[---        J-B-CARD-SEQ|cr||nl|
        02[-          J-B-SECURITY-CL|cr||nl|
        03[-          J-B-TRAN-TYPE|cr||nl|
        04[J B        J-B-CARD-TYPE|cr||nl|
        05[------     J-B-UIC|cr||nl|
        06[-          J-B-COMPO|cr||nl|
        07[------     J-B-EDATE|cr||nl|
        08[-----      J-B-STRUCO|cr||nl|
        09[-----      J-B-STRUCW|cr||nl|
        10[-----      J-B-STRUCE|cr||nl|
        11[-----      J-B-AUTHO|cr||nl|
        12[-----      J-B-AUTHW|cr||nl|
        13[-----      J-B-AUTHE|cr||nl|
        14[------     J-B-ORGUIC|cr||nl|
        15[FS         J-B-RPTYP|cr||nl|
        16[---        J-B-RPTNR|cr||nl||cr||nl|^

T3150   |cr||nl|
        |cr||nl|TN[000010      TRANSACTION SEQUENCE NUMBER  |cr||nl|
           DATA       NAME          ERROR MESSAGE|cr||nl|
        01[---        CARD-SEQ|cr||nl|
        02[-          SECURITY-CS|cr||nl|
        03[-          TRANS-TYPE|cr||nl|
        04[J B        CARD-TYPE|cr||nl|
        05[------     UIC|cr||nl|
        06[-----      STRUCO|cr||nl|
        07[-----      STRUCW|cr||nl|
        08[-----      STRUCE|cr||nl|
        09[-----      AUTHO|cr||nl|
        10[-----      AUTHW|cr||nl|
        11[-----      AUTHE|cr||nl|
        12[-----      DAMPL|cr||nl|
        13[---        ROBCO|cr||nl|
        14[------     ORGUIC|cr||nl|
        15[FS         RPTYP|cr||nl|
        16[---        RPTNR|cr||nl||cr||nl|^

T3160   |cr||nl|
        |cr||nl|TN[000010      TRANSACTION SEQUENCE NUMBER  |cr||nl|
           DATA                    NAME              ERROR MESSAGE|cr||nl|
        01[---                     N-A-CARD-SEQ|cr||nl|
        02[-                       N-A-SECURITY-CL|cr||nl|
        03[-                       N-A-TRAN-TYPE|cr||nl|
        04[N A                     N-A-CARD-TYPE|cr||nl|
        05[------                  N-A-UIC|cr||nl|
        06[----------------        N-A-DISTR|cr||nl|
        07[------                  N-A-ORGUIC|cr||nl|
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        08[FS                          N-A-RPTYP|cr||nl|
        09[---                         N-A-RPTNR|cr||nl||cr||nl|^

T3170   |cr||nl|
        |cr||nl|TN[000010       TRANSACTION SEQUENCE NUMBER  |cr||nl|
           DATA        NAME                  ERROR MESSAGE|cr||nl|
        01[---         N-B-CARD-SEQ|cr||nl|
        02[-           N-B-SECURITY-CL|cr||nl|
        03[-           N-B-TRAN-TYPE|cr||nl|
        04[N B         N-B-CARD-TYPE|cr||nl|
        05[------      N-B-UIC|cr||nl|
        06[-----       N-B-PIN|cr||nl|
        07[-----       N-B-FRN|cr||nl|
        08[-           N-B-RPTDES|cr||nl|
        09[-           N-B-PLEAC|cr||nl|
        10[------      N-B-RTM|cr||nl|
        11[---         N-B-RSNLA|cr||nl|
        12[-----       N-B-PUTCV|cr||nl|
        13[----        N-B-POEGEO|cr||nl|
        14[----        N-B-PODGEO|cr||nl|
        15[---         N-B-MODE|cr||nl|
        16[------      N-B-LAD|cr||nl|
        17[------      N-B-RTMDIR|cr||nl|
        18[-           N-B-GCMDCODE|cr||nl|
        19[------      N-B-ORGUIC|cr||nl|
        20[FS          N-B-RPTYP|cr||nl|
        21[---         N-B-RPTNR|cr||nl||cr||nl|^

T3180   |cr||nl|
        |cr||nl|TN[000010       TRANSACTION SEQUENCE NUMBER  |cr||nl|
           DATA        NAME                  ERROR MESSAGE|cr||nl|
        01[---         KA1-CARD-SEQ|cr||nl|
        02[-           KA1-SECURITY-CL|cr||nl|
        03[-           KA1-TRAN-TYPE|cr||nl|
        04[KA1         KA1-CARD-TYPE|cr||nl|
        05[------      KA1-UIC|cr||nl|
        06[-           KA1-EXLIM|cr||nl|
        07[--          KA1-TWRC1|cr||nl|
        08[---         KA1-PSPER|cr||nl|
        09[--          KA1-MSPER|cr||nl|
        10[--          KA1-APERT|cr||nl|
        11[-----       KA1-DEPST|cr||nl|
        12[----        KA1-DUTYO|cr||nl|
        13[---         KA1-DUTYW|cr||nl|
        14[-----       KA1-DUTYE|cr||nl|
        15[-           KA1-MSYSA|cr||nl|
        16[----        KA1-PERTL|cr||nl|
        17[--          KA1-PERAB|cr||nl|
        18[--          KA1-PERRS|cr||nl|
        19[--          KA1-PERRE|cr||nl|
```

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        20[---          KA1-EHRDN|cr||nl|
        21[---          KA1-EHRD1|cr||nl|
        22[---          KA1-EHRD2|cr||nl|
        23[---          KA1-EHRD3|cr||nl|
        24[---          KA1-EHRD4|cr||nl|
        25[------       KA1-ORGUIC|cr||nl|
        26[FS           KA1-RPTYP|cr||nl|
        27[---          KA1-RPTNR|cr||nl||cr||nl|^

T3440   |cr||nl|
        |cr||nl|TN[000010      TRANSACTION SEQUENCE NUMBER  |cr||nl|
           DATA                          NAME              ERROR MESSAGE|cr||n->
        l|
        01[HD                            DEMSTAT-HEADER|cr||nl|
        02[------                        ORGUIC|cr||nl|
        03[---                           RPTNR|cr||nl|
        04[--                            DATE|cr||nl|
        05[----                          TIME|cr||nl|
        06[---                           MONTH|cr||nl|
        07[--                            YEAR|cr||nl|
        08[-----                         PIN|cr||nl|
        09[-------------------------     EXERC-OP-NAME|cr||nl||cr||nl|^

T3450   |cr||nl|
        |cr||nl|TN[000010      TRANSACTION SEQUENCE NUMBER  |cr||nl|
           DATA         NAME         ERROR MESSAGE|cr||nl|
        01[AS           SHORT-TONS|cr||nl|
        02[---          TRANSNUM|cr||nl|
        03[-----        PIN|cr||nl|
        04[-------      ULN|cr||nl|
        05[------       UIC|cr||nl|
        06[--------     STONBU|cr||nl|
        07[--------     STONOVS|cr||nl|
        08[--------     STONOTS|cr||nl|
        09[--------     STONNAT|cr||nl||cr||nl|^

T3460   |cr||nl|
        |cr||nl|TN[000010      TRANSACTION SEQUENCE NUMBER  |cr||nl|
           DATA         NAME                   ERROR MESSAGE|cr||nl|
        01[AM           MEASUREMENT-TONS|cr||nl|
        02[---          TRANSNUM|cr||nl|
        03[-----        PIN|cr||nl|
        04[-------      ULN|cr||nl|
        05[------       UIC|cr||nl|
        06[--------     MTONBU|cr||nl|
        07[--------     MTONOVS|cr||nl|
        08[--------     MTONOTS|cr||nl|
        09[--------     MTONNAT|cr||nl||cr||nl|^

T3470   |cr||nl|
```

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        |cr||nl|TN[000010      TRANSACTION SEQUENCE NUMBER  |cr||nl|
          DATA          NAME          ERROR MESSAGE|cr||nl|
        01[AV           VEHICLE-PAX|cr||nl|
        02[---          TRANSNUM|cr||nl|
        03[-----        PIN|cr||nl|
        04[-------      ULN|cr||nl|
        05[------       UIC|cr||nl|
        06[--------     STONVEH|cr||nl|
        07[--------     MTONVEH|cr||nl|
        08[--------     SQFTUNVEH|cr||nl|
        09[-----        PAX|cr||nl||cr||nl|^

T3480   |cr||nl|
        |cr||nl|TN[000010      TRANSACTION SEQUENCE NUMBER  |cr||nl|
          DATA          NAME          ERROR MESSAGE|cr||nl|
        01[AE           VALIDATION|cr||nl|
        02[---          TRANSNUM|cr||nl|
        03[-----        PIN|cr||nl|
        04[-------      ULN|cr||nl|
        05[------       UIC|cr||nl|
        06[-            RTM|cr||nl|
        07[------       RTMEST|cr||nl|
        08[---          RSNLA|cr||nl||cr||nl|^

T3490   |cr||nl|
        |cr||nl|TN[000010      TRANSACTION SEQUENCE NUMBER  |cr||nl|
          DATA          NAME          ERROR MESSAGE|cr||nl|
        01[AT           TOA-PICKUP|cr||nl|
        02[---          TRANSNUM|cr||nl|
        03[-----        PIN|cr||nl|
        04[-------      ULN|cr||nl|
        05[------       UIC|cr||nl|
        06[----------   RTMTOA|cr||nl||cr||nl|^

T3500   |cr||nl|
        |cr||nl|TN[000010      TRANSACTION SEQUENCE NUMBER  |cr||nl|
          DATA          NAME               ERROR MESSAGE|cr||nl|
        01[ED           EMPLOY-DEPART|cr||nl|
        02[---          TRANSNUM|cr||nl|
        03[-----        PIN|cr||nl|
        04[-------      ULN|cr||nl|
        05[------       UIC|cr||nl|
        06[----------   EMDD|cr||nl||cr||nl|^

T3510   |cr||nl|
        |cr||nl|TN[000010      TRANSACTION SEQUENCE NUMBER  |cr||nl|
          DATA          NAME               ERROR MESSAGE|cr||nl|
        01[EA           EMPLOY-ARRIVE|cr||nl|
        02[---          TRANSNUM|cr||nl|
        03[-----        PIN|cr||nl|
```

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        04[-------        ULN|cr||nl|
        05[------         UIC|cr||nl|
        06[----------     EMAD|cr||nl||cr||nl|^

T3520   |cr||nl|
        |cr||nl|TN[000010      TRANSACTION SEQUENCE NUMBER  |cr||nl|
           DATA        NAME                  ERROR MESSAGE|cr||nl|
        01[MA          ARRIVE-MOBSTATION|cr||nl|
        02[---         TRANSNUM|cr||nl|
        03[------      UIC|cr||nl|
        04[------      DTAMS|cr||nl|
        05[--          PPA|cr||nl||cr||nl|^

T3530   |cr||nl|
        |cr||nl|TN[000010      TRANSACTION SEQUENCE NUMBER  |cr||nl|
           DATA        NAME                ERROR MESSAGE|cr||nl|
        01[MC          CHANGE-MOB-DATA|cr||nl|
        02[---         TRANSNUM|cr||nl|
        03[------      UIC|cr||nl|
        04[------      MDATE|cr||nl|
        05[------      MBODD|cr||nl|
        06[------      MBSAD|cr||nl|
        07[----        ACGEO|cr||nl|
        08[--          MBCMD|cr||nl||cr||nl|^

T3540   |cr||nl|
        |cr||nl|TN[000010      TRANSACTION SEQUENCE NUMBER  |cr||nl|
           DATA            NAME                ERROR MESSAGE|cr||nl|
        01[PL              POE-LAST-DEPART|cr||nl|
        02[---             TRANSNUM|cr||nl|
        03[-----           PIN|cr||nl|
        04[-------         ULN|cr||nl|
        05[------          UIC|cr||nl|
        06[----------      POELDEPART|cr||nl||cr||nl|^

T3550   |cr||nl|
        |cr||nl|TN[000010      TRANSACTION SEQUENCE NUMBER  |cr||nl|
           DATA                 NAME          ERROR MESSAGE|cr||nl|
        01[PD                   POE-DEPART|cr||nl|
        02[---                  TRANSNUM|cr||nl|
        03[-----                PIN|cr||nl|
        04[-------              ULN|cr||nl|
        05[------               UIC|cr||nl|
        06[----------           POEDEPART|cr||nl|
        07[--------------       POECARRIER|cr||nl||cr||nl|^

T3560   |cr||nl|
        |cr||nl|TN[000010      TRANSACTION SEQUENCE NUMBER  |cr||nl|
           DATA            NAME                  ERROR MESSAGE|cr||nl|
        01[OL              ORIGIN-LAST-DEPRT|cr||nl|
```

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        02[---           TRANSNUM|cr||nl|
        U3[-----         PIN|cr||nl|
        U4[-------       ULN|cr||nl|
        U5[------        UIC|cr||nl|
        U6[----------    ORLDEPART|cr||nl||cr||nl|^

T3570   |cr||nl|
        |cr||nl|TN[000010     TRANSACTION SEQUENCE NUMBER  |cr||nl|
           DATA                NAME             ERROR MESSAGE|cr||nl|
        01[OD                  ORIGIN-DEPART|cr||nl|
        02[---                 TRANSNUM|cr||nl|
        03[-----               PIN|cr||nl|
        04[-------             ULN|cr||nl|
        U5[------              UIC|cr||nl|
        U6[----------          ORDEPART|cr||nl|
        U7[---------------     ORCARRIER|cr||nl||cr||nl|^

T6000   |nl||cr|SIOS ROUTINE|nl||cr|^

T6010   |nl||cr|^

T6020   |nl||cr|WHAT FUNCTION DO YOU WANT   |nl||cr||nl||cr|
        MOVE, RETURN, CLEAR, SEARCH |nl||cr|^

T6030   m^

T6031   c|cr|^

T6032   cl^

T6033   s^

T6034   r^

T6035   |cr|^

T6100   |nl||cr|SIOS MOVE ROUTINE |nl||cr||nl||cr|
        YOUR FILE YOU WANT TO USE   |nl||cr|^

T6110   ^

T6120   |nl||cr|SYSTEM ID YOU WANT TO USE   |nl||cr|^

T6121   |nl||cr|YOUR FILE IS BUSY|nl||cr|^

T6122   |nl||cr|UNABLE TO ACCESS YOUR FILE|nl||cr|^

T6140   |nl||cr|WUFI FILE YOU WANT TO USE   |nl||cr|^

T6141   |nl||cr|SYSTEM ID IS NOT AUTHORIZED |nl||cr|^
```

```
T6160   |nl||cr|DATA WAS MOVED|nl||cr|^

T6161   |nl||cr|SYSTEM ID IS INVALID ON WUFI|nl||cr|^

T6170    RECORDS|nl||cr|^

T6200   |nl||cr|SIOS RETURN ROUTINE |nl||cr||nl||cr|
        YOUR FILE YOU WANT TO USE   |nl||cr|^

T6260   |nl||cr|RECORDS WERE RETURNED       |nl||cr|^

T6261   |nl||cr|NO DATA FOR THIS SYSTEM ID  |nl||cr||nl||cr|
        RECORDS WERE NOT RETURNED   |nl||cr|^

T6280   |nl||cr|WUFI RECORDS WERE CLEARED |nl||cr|^

T6300   |nl||cr|SIOS CLEAR ROUTINE  |nl||cr||nl||cr|
        SYSTEM ID YOU WANT TO USE   |nl||cr|^

T6340   |nl||cr|NO DATA TO CLEAR|nl||cr|^

T6400   |nl||cr|SIOS SEARCH ROUTINE |nl||cr||nl||cr|
        SYSTEM ID YOU WANT TO USE   |nl||cr|^

T6440     BLOCKS OF DATA  |nl||cr|^

T6441   |nl||cr|NO RECORDS FOUND|nl||cr|^

T7000   ready|cr||nl|^

T7001   |cr||nl|illegal character^

T7002   |cr||nl|<52>CURRENT FILE NOT DEFINED|cr||nl|^

T9030   |cr||nl|*^

T9040   run mc76/exercise/equip|cr|^

T9050   runs mc76/exercise/equip|cr|^

T9060   runj mc76/exercise/equip|cr|^

T9070   run mc76/exercise/rptmob|cr|^

T9075   runs mc76/exercise/rptmob|cr|^

T9080   runj mc76/exercise/rptmob|cr|^

T9090   run mc76/exercise/accimob|cr|^
```

```
T9100   runs mc76/exercise/accimob|cr|^
T9110   runj mc76/exercise/accimob|cr|^
T9120   run mc76/exercise/info|cr|^
T9130   runs mc76/exercise/info|cr|^
T9140   runj mc76/exercise/info|cr|^
T9150   run mc76/exercise/strength|cr|^
T9160   runs mc76/exercise/strength|cr|^
T9170   runj mc76/exercise/strength|cr|^
T9180   run mc76/exercise/ready|cr|^
T9190   runs mc76/exercise/ready|cr|^
T9200   runj mc76/exercise/ready|cr|^
T9210   run mc76/exercise/pomcus|cr|^
T9220   runs mc76/exercise/pomcus|cr|^
T9230   runj mc76/exercise/pomcus|cr|^
T9240   run mc76/exercise/deployrp|cr|^
T9250   runs mc76/exercise/deployrp|cr|^
T9260   runj mc76/exercise/deployrp|cr|^
T9270   run mc76/exercise/dployhpa|cr|^
T9280   runs mc76/exercise/dployhpa|cr|^
T9290   runj mc76/exercise/dployhpa|cr|^
T9300   run mc76/exercise/cinc|cr|^
T9310   runs mc76/exercise/cinc|cr|^
T9320   runj mc76/exercise/cinc|cr|^
T9325   ^
T9330   run mc76/exercise/exdeploy|cr|^
```

```
T9340   runs mc76/exercise/exdeploy|cr|^

T9350   runj mc76/exercise/exdeploy|cr|^

T9360   run mc76/exercise/trans|cr|^

T9370   runs mc76/exercise/trans|cr|^

T9380   runj mc76/exercise/trans|cr|^

T9390   run mc76/exercise/rptor|cr|^

T9400   runs mc76/exercise/rptor|cr|^

T9410   runj mc76/exercise/rptor|cr|^

T9420   run mc76/exercise/mbcoistl|cr|^

T9430   runs mc76/exercise/mbcoistl|cr|^

T9440   runj mc76/exercise/mbcoistl|cr|^

T9500   |cr||nl| .^

T9501   .|cr||nl|^

T9520   ENTER REQUIRED PARAMETER FOR 'OMNI-CATFILE'|cr||nl|=^

T9521   |cr||nl|ENTER REQUIRED PARAMETER FOR 'OMNI-CATFILE'|cr||nl|=^

T9530   |cr||nl|ENTER REQUIRED PARAMETER FOR 'WHERE-FLDNAME="LITERAL"'|cr||nl->
        |=^

T9531   |cr||nl|ENTER REQUIRED PARAMETER FOR 'WHERE-FIELDNAME="LITERAL"'|cr||->
        nl|=^

T9540   |cr||nl|ENTER REQUIRED PARAMETER FOR 'SORT-KEY1'|cr||nl|=^

T9550   |cr||nl|ENTER REQUIRED PARAMETER FOR 'SORT-KEY2'|cr||nl|=^

T9560   |cr||nl|ENTER REQUIRED PARAMETER FOR 'OUTPUT-CATFILE'|cr||nl|=^

T9570   ENTER REQUIRED PARAMETER FOR '"SBRPT"'|cr||nl|=^

T9580   |cr||nl|ENTER REQUIRED PARAMETER FOR 'SORT-FLD1-OR-BLANKS'|cr||nl|=^

T9590   |cr||nl|ENTER REQUIRED PARAMETER FOR 'SORT-FLD2-OR-BLANKS'|cr||nl|=^

T9600   |cr||nl|ENTER REQUIRED PARAMETER FOR 'SORT-FLD3-OR-BLANKS'|cr||nl|=^
```

```
T9700   RUN-ID? ^
T9710   |cr||nl|$ IDENT?  ^
T9750   |cr||nl|MUST BE 12 CHARACTERS OR LESS^
T9754   |cr||nl|SNUMB NOT IN SYSTEM^
T9755   |cr||nl|LOOK, MORE, DELE, ABRT, QUIT? ^
T9756   |cr||nl|SNUMB(S)-  ^
T9757   |cr||nl|SNUMB? ^
T9758   |cr||nl|SNUMB NOT IN TABLE|cr||nl|^
T9759   |cr||nl|snumb?^
T9760   look|cr|^
T9761   more|cr|^
T9762   dele^
T9763   abrt|cr|^
T9764   quit|cr|^
T9780   |cr||nl|please direct, release, or hold before exit|cr||nl|^
T9800    JOUT INVOKED FOR SNUMB^
T9801   |cr||nl|function?^
T9802   print $$|cr|^
T9803   prin $$|cr|^
T10170  end of  $$^
T10180  hold|cr|^
T10190  rele^
T10200  direct ac|cr|^
T10205  direct onl|cr|^
T10210  normal termination ^
```

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T10230  print 74|cr|^

T10240  prin 74|cr|^

T10250  end of  74^

T10260  |cr||nl|74  not found^

T10270  output not found^

T10280  output busy^

T10290  NOT IN SYSTEM^

T10300  INVOKE JOUT MANUALLY^

T11000  |cr||nl||ff||cr||nl|TELECONFERENCING AT ^

T11001  |cr||nl|ILLEGAL CLASSIFICATION CODE^

T11010  |cr||nl|USER ASSISTANCE IS AVAILABLE IN TALK AND COMMAND MODES. |cr||->
        nl|
        THE QUESTION MARK (?) WILL INTRODUCE YOU TO THIS FEATURE.   |cr||nl|
        |cr||nl|INITIATE, RECONVENE, OR JOIN?^

T11020  j|cr|^

T11021  jo|cr|^

T11022  joi|cr|^

T11023  join|cr|^

T11030  |cr||nl|NAME OF CONFERENCE YOU WISH TO JOIN?^

T11031  LINE TERMINATED^

T11040  ^

T11050  |cr||nl|PARTICIPANT'S NAME? ^

T11051  |cr||nl|SORRY, THAT CONFERENCE IS NOT IN SESSION^

T11070  |cr||nl|PARTICIPANT'S PASSWORD? |cr||nl|
        *%&<%#>?*#$%#?AM*5*48#N&#|cr|
        TXOGWBMWEPVRMCBQNKMGAKZMA|cr|^

T11071  |cr||nl|SORRY, NAME GIVEN NOT RECOGNIZED^

T11072  |cr||nl|ACCESS DENIED   ^
```

T11090 |cr||nl|THE FOLLOWING QUESTIONS CONCERN TRANSCRIPT DELIVERY |cr||nl| ENTER HOST NAME FOR DELIVERY OF YOUR COPY ^

T11110 |cr||nl|ENTER YOUR ACCOUNT NUMBER, NAME FOR |cr||nl| IDENT CARD ^

T11091 |cr||nl|ACCESS GRANTED ^

T11111 |cr||nl|ENTER YOUR ACCOUNT NUMBER, NAME FOR |cr||nl| IDENT CARD—^

T11120 .^

T11140 |cr||nl|CONFERENCE SECURITY CLASSIFICATION CODE IS ^

T11150 |nl|THERE ARE NO ANNOUNCEMENTS AT THIS TIME |cr|^

T11151 |nl|ANNOUNCEMENT MESSAGE NUMBERS ARE|cr||nl|^

T11160 |nl|LATEST MESSAGE NUMBER IS^

T11170 |nl|LAST MESSAGE SEEN WAS NUMBER^

T11180 |nl||ff||cr||nl|LISTEN MODE ENTERED IN ^

T11190 HAS JOINED THE CONFERENCE ^

T11191 HAS LEFT THE CONFERENCE ^

T11500 |cr||nl||ff||cr||nl|LISTEN MODE ENTERED IN ^

T11510 |ff|^

T11600 |cr||nl||ff|^

T12000 |cr||nl|COMMAND ?^

T12001 |cr||nl||ff||cr||nl|COMMAND ?^

T12010 bull^

T12011 comm^

T12012 defi^

T12013 floo^

T12014 give^

T12015 list^

T12016 prin^

T12017 quit^

T12018 revi^

T12019 stat^

T12020 talk^

T12021 ?^

T12022 desc^

T12040 |cr||nl|NO MESSAGES WAITING^

T12041 |cr||nl||ff||cr||nl|MESSAGE NUMBER^

T12050 COMMAND ?^

T12060 |cr||nl|ENTER ONE LINE PER PROMPT (-), 13 LINES MAX |cr||nl|
NULL INPUT OR ALL SPACES = END OF MESSAGE ^

T12061 |cr||nl|INVALID COMMUNICATION ARGUMENT ^

T12070 |cr||nl|-^

T12071 |cr||nl|COMMUNICATION SENT ^

T12072 |cr||nl|COMMUNICATION REQUEST IGNORED ^

T12080 |cr|^

T12100 |cr||nl|FLOOR RECORDING IS OFF |cr||nl|
COMMAND ?^

T12101 |cr||nl|FLOOR RECORDING IS ON |cr||nl|
COMMAND ?^

T12102 |cr||nl|CONFERENCE IS OPEN TO JOINING PARTICIPANTS |cr||nl|
COMMAND ?^

T12103 |cr||nl|CONFERENCE IS CLOSED TO JOINING PARTICIPANTS |cr||nl|
COMMAND ?^

T12104 |cr||nl|OPTION RESTRICTED TO INITIATING CHAIRMAN|cr||nl|
COMMAND ?^

T12105 |cr||nl|OPTION RESTRICTED TO CURRENT CHAIRMAN |cr||nl|
COMMAND ?^

```
T12106  |cr||nl|NO ALTERNATES HAVE BEEN ASSIGNED|cr||nl|
        COMMAND ?^

T12107  CHANGE? |cr||nl|^

T12108  FILE INSERT LIMIT IS-- ^

T12120  |cr||nl|HOST?   |cr||nl|^

T12121  |cr||nl|$IDENT? |cr||nl|^

T12122  |cr||nl|NEW IDENT CARD NOT VALID AT THIS HOST   |cr||nl|
        CHANGE? |cr||nl|^

T12200  |cr||nl|ENTER ONE LINE OF TEXT TO BE SENT WITH YOUR REQUEST^

T12201  |cr||nl|SORRY, CHAIRMAN NOT PRESENT TO GRANT FLOOR PRIVILEGE^

T12202  |cr||nl|FLOOR        INVALID COMMAND^

T12203  |cr||nl|INVALID FLOOR COMMAND ARGUMENT--^

T12210  |cr||nl|(ENTER BREAK STATUS OR NULL RESPONSE IF TEXT IS NOT DESIRED)^

T12230  |cr||nl|CHAIRMAN'S APPROVAL IS BEING REQUESTED, CONTINUE YOUR ACTIVIT->
        Y^

T12240  |cr||nl|COMMAND VALID FOR FLOOR ONLY^

T12250  |cr||nl|PRINT REQUEST INCOMPLETE OR INVALID ^

T12251  |cr||nl|MESSAGE NUMBER TOO HIGH ^

T12252  CHANGE?^

T12270  |cr||nl|ENTER HOST NAME FOR DELIVERY OF YOUR COPY   ^

T12271  |cr||nl|INVALID HOST NAME   ^

T12272  |cr||nl|CHANGE? ^

T12273  |cr||nl|ENTER YOUR ACCOUNT NUMBER,NAME FOR IDENT CARD   |cr||nl|^

T12274  |cr||nl|IDENT INFORMATION NOT VALID AT THIS HOST|cr||nl|
        DO YOU WISH TO CHANGE IT(YES OR NO)?^

T12350  |cr||nl|QUIT SUCCESSFUL ^

T12360  |cr||nl|INVALID REVIEW REQUEST^
```

```
T12470  |cr||nl||cr||nl|THIS TERMINAL IS CURRENTLY IN COMMAND MODE.|cr||nl||c->
        r||nl|
        COMMAND MODE ALLOWS A PARTICIPANT TO ENTER OTHER MODES, TO|cr||nl|
        OBTAIN CONFERENCE INFORMATION AND TO PERFORM SPECIFIC FUNCTIONS.|cr||->
        nl|
        A SPECIFIC COMMAND CAPABILITY IS ACQUIRED BY RESPONDING WITH A|cr||nl->
        |
        COMMAND VERB TO THE PROMPT 'COMMAND?'.  THE POSSBLE RESPONSES|cr||nl|
        ARE:|cr||nl||cr||nl|
        ADD             ADJOURN         ANNOUNCE        BULLETIN        CHAIR TO|->
        cr||nl|
        COMMUNICATION   DEFINITION      DELETE          DESCRIBE        ERASE|cr|->
        |nl|
        FLOOR           FORMAT          GIVEUP          INSERT          KEYWORD|c->
        r||nl|
        LISTEN          PDAC            PRINT           QUIT            REVIEW|cr->
        ||nl|
        STATUS          TALK            TERMINATE       ?|cr||nl||cr||nl|
        AN EXPLANATION OF EACH VERB IS POSSIBLE BY RESPONDING|cr||nl|
        'DESCRIBE VERB'--WHERE VERB IS ANY VALID COMMAND MODE VERB.|cr||nl||c->
        r||nl|
                  EXAMPLE|cr||nl|
                  COMMAND?DESCRIBE FLOOR|cr||nl|
        |cr||nl|COMMAND ?^

T12500  |cr||nl||ff||cr||nl|>>>ADD<<<                 |cr||nl|^

T12501  |cr||nl||ff||cr||nl|>>>ADJOURN<<<             |cr||nl|^

T12502  |cr||nl||ff||cr||nl|>>>ANNOUNCE<<<            |cr||nl|^

T12503  |cr||nl||ff||cr||nl|>>>BULLETIN<<<  |cr||nl|^

T12504  |cr||nl||ff||cr||nl|>>>CHAIR TO<<<  |cr||nl|^

T12505  |cr||nl||ff||cr||nl|>>>COMMUNICATION<<< |cr||nl|^

T12506  |cr||nl||ff||cr||nl|>>>DEFINITION<<<|cr||nl|^

T12507  |cr||nl||ff||cr||nl|>>>DELETE<<<|cr||nl|^

T12508  |cr||nl||ff||cr||nl|>>>DESCRIBE<<<            |cr||nl|^

T12509  |cr||nl||ff||cr||nl|>>>ERASE<<< |cr||nl|^

T12510  |cr||nl||ff||cr||nl|>>>FLOOR<<<               |cr||nl|^

T12511  |cr||nl||ff||cr||nl|>>>FORMAT<<<|cr||nl|^

T12512  |cr||nl||ff||cr||nl|>>>GIVEUP<<<              |cr||nl|^
```

```
T12513  |cr||nl||ff||cr||nl|>>>INSERT<<<    |cr||nl|^

T12514  |cr||nl||ff||cr||nl|>>>KEYWORD<<<          |cr||nl|^

T12515  |cr||nl||ff||cr||nl|>>>LISTEN<<<           |cr||nl|^

T12516  |cr||nl||ff||cr||nl|>>>PDAC<<<             |cr||nl|^

T12517  |cr||nl||ff||cr||nl|>>>PRINT<<< |cr||nl|^

T12518  |cr||nl||ff||cr||nl|>>>QUIT<<<             |cr||nl|^

T12519  |cr||nl||ff||cr||nl|>>>REVIEW<<<           |cr||nl|^

T12520  |cr||nl||ff||cr||nl|>>>STATUS<<<           |cr||nl|^

T12521  |cr||nl||ff||cr||nl|>>>TALK<<<             |cr||nl|^

T12522  |cr||nl||ff||cr||nl|>>>TERMINATE<<<        |cr||nl|^

T12523  |cr||nl||ff||cr||nl|>>> ? <<<              |cr||nl|^

T12524  |cr||nl|INVALID DESCRIBE ARGUMENT PASSED^

T12600  |cr||nl|THIS VERB'S USAGE IS RESTRICTED TO THE CURRENT CHAIRMAN AND A->
        LLOWS|cr||nl|
        HIM TO ADD TO THE VALID PARTICIPANT LIST FOR THE CONFERENCE.  IT|cr||->
        nl|
        ALSO ALLOWS HIM TO CORRECT/CHANGE THE USERID ASSOCIATED WITH A|cr||nl->
        |
        PARTICULAR PARTICIPANT NAME.  A PARTICIPANT NAME CANNOT BE CHANGED.|c->
        r||nl|
        THE USERID AND PARTICIPANT NAME TO BE ADDED/CORRECTED MUST FOLLOW|cr|->
        |nl|
        THE VERB IN THE SAME FORMAT USED DURING CONFERENCE INITIATION|cr||nl|
        DEFINITION.|cr||nl||cr||nl|
                  EXAMPLE|cr||nl|
                  COMMAND?ADD USERID/PNAME|cr||nl|
        |cr||nl|COMMAND ?^

T12610  |cr||nl|THIS VERB'S USAGE IS RESTRICTED TO THE CURRENT CHAIRMAN AND A->
        LLOWS|cr||nl|
        HIM TO ADJOURN A CONFERENCE SESSION.  AN ADJOURNED CONFERENCE CAN|cr|->
        |nl|
        BE RECONVENED AT A LATER TIME.  AN ADJOURNMENT WILL NOT TAKE PLACE|cr->
        ||nl|
        IF THERE ARE ACTIVE PARTICIPANTS OTHER THAN THE CHAIRMAN STILL|cr||nl->
        |
        CONNECTED TO THE CONFERENCE.  NO PARTICIPANTS ARE PERMITTED TO JOIN|c->
        r||nl|
```

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THE CURRENT SESSION OF THE CONFERENCE ONCE THE ADJOURN IS ENTERED.|cr->
||nl|
          EXAMPLE|cr||nl|
          COMMAND?ADJOURN|cr||nl|
|cr||nl|COMMAND ?^

T12620 |cr||nl|THIS VERB'S USAGE IS RESTRICTED TO THE CURRENT CHAIRMAN AND A->
LLOWS|cr||nl|
HIM TO CREATE A LIST OF MESSAGES TO BE DISPLAYED TO PARTICIPANTS|cr||->
nl|
UPON JOINING.  IT ALLOWS HIM TO CHANGE OR DELETE THE LIST.|cr||nl|
ARGUMENTS FOR THE VERB ARE A LIST OF UP TO 10 VALID MESSAGE NUMBERS|c->
r||nl|
DELIMITED BY SEMICOLONS.  IF NO ARGUMENTS ARE FOUND THE ANNOUNCEMENT|->
cr||nl|
LIST IS PURGED.|cr||nl||cr||nl|
          EXAMPLE 1|cr||nl|
          COMMAND?ANNOUNCE 2;3;5|cr||nl||cr||nl|
(MESSAGES 2, 3, 5 WILL BE ANNOUNCED TO NEW PARTICIPANTS AS|cr||nl|
THEY JOIN.)|cr||nl||cr||nl|
          EXAMPLE 2|cr||nl|
          COMMAND?ANNOUNCE|cr||nl||cr||nl|
(ANY PREVIOUS ANNOUNCEMENT LIST WILL BE ERASED.)|cr||nl|
|cr||nl|COMMAND ?^

T12630 |cr||nl|THIS VERB ALLOWS AN INDIVIDUAL PARTICIPANT TO SEE THE NEXT ME->
SSAGE|cr||nl|
QUEUED TO HIS TERMINAL WITHOUT ENTERING LISTEN MODE.  ONLY ONE|cr||nl->
|
MESSAGE WILL BE RECEIVED PER EACH BULLETIN REQUEST.|cr||nl||cr||nl|
          EXAMPLE|cr||nl|
          COMMAND?BULLETIN|cr||nl||cr||nl|
|cr||nl|COMMAND ?^

T12640 |cr||nl|THIS VERB'S USAGE IS RESTRICTED TO THE CHAIRMAN (CURRENT OR|c->
r||nl|
ORIGINAL).  THE CURRENT CHAIRMAN MAY PASS THE CHAIRMANSHIP TO|cr||nl|
ANOTHER ACTIVE PARTICIPANT.  THE ORIGINAL CHAIRMAN CAN AT ANY TIME|cr->
||nl|
RETAKE THE CHAIRMANSHIP HE PREVIOUSLY PASSED.|cr||nl||cr||nl|
          EXAMPLE 1|cr||nl|
          COMMAND?CHAIR TO PARTICIPANT NAME|cr||nl||cr||nl|
(THE CHAIRMANSHIP WILL BE GIVEN TO THE NAMED PARTICIPANT.)|cr||nl||cr->
||nl||cr||nl|
          EXAMPLE 2|cr||nl|
          COMMAND?CHAIR TO|cr||nl||cr||nl|
(FORM OF VERB INITIATING CHAIRMAN WOULD USE TO RETAKE THE|cr||nl|
CHAIRMANSHIP.)|cr||nl||cr||nl|
ANOTHER FUNCTION OF THIS COMMAND IS TO ALLOW A DESIGNATED ALTERNATE|c->
r||nl|
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        TO ASSUME THE CHAIRMANSHIP.  THIS MAY ONLY BE DONE IF THE CONFERENCE|->
        cr||nl|
        IS WITHOUT A CHAIRMAN AT THE TIME THE COMMAND IS INVOKED.|cr||nl||cr|->
        |nl|
                  EXAMPLE 3|cr||nl|
                  COMMAND?CHAIR TO|cr||nl||cr||nl|
        (THE DESIGNATED ALTERNATE WILL RECEIVE THE CHAIR IF IT IS VACANT.)
        |cr||nl|COMMAND ?^

T12650  |cr||nl|THIS VERB WILL ALLOW INFORMAL MESSAGE TEXT TO BE SENT TO SEVE->
        RAL|cr||nl|
        OR ALL ACTIVE PARTICIPANTS.  IT DIFFERS FROM A TALK MESSAGE IN THAT|c->
        r||nl|
        THE MESSAGE IS NOT WRITTEN TO THE TRANSCRIPT AND IS DELIVERED WITH|cr->
        ||nl|
        PRIORITY MESSAGES.  THIS MEANS THE RECIPIENT DOES NOT HAVE TO BE IN|c->
        r||nl|
        LISTEN MODE TO RECEIVE THE COMMUNICATION.|cr||nl||cr||nl|
                  EXAMPLE|cr||nl|
                  COMMAND?COMMUNICATION $ALL|cr||nl|
                  ENTER TEXT WHEN PROMPT CHARACTER APPEARS (-),|cr||nl|
                  MAXIMUM INPUT IS 13 LINES|cr||nl|
                  NULL INPUT OR ALL SPACES INDICATES END OF MESSAGE|cr||nl|
                  -THIS IS AN EXAMPLE OF A GENERAL COMMUNICATION REQUEST|cr||->
        nl|
                  -(CR)|cr||nl||cr||nl|
                  EXAMPLE|cr||nl|
                  COMMAND?COMMUNICATION TO PARTICIPANT1|cr||nl|
                  ENTER TEXT WHEN PROMPT CHARACTER APPEARS (-),|cr||nl|
                  MAXIMUM INPUT IS 13 LINES|cr||nl|
                  NULL INPUT OR ALL SPACES INDICATES END OF MESSAGE|cr||nl|
                  -THIS MESSAGE WILL BE DELIVERED TO PARTICIPANT 1|cr||nl|
                  -(CR)|cr||nl|
        |cr||nl|COMMAND ?^

T12660  |cr||nl|THIS VERB DISPLAYS THE STATE OF SEVERAL CONFERENCE PARAMETERS->
        . IN|cr||nl|
        SOME CASES IT ALLOWS THE STATE TO BE CHANGED.  A REQUEST MAY BE|cr||n->
        l|
        GENERAL OR SPECIFIC.  A GENERAL REQUEST WILL DISPLAY ALL INFORMATION|->
        cr||nl|
        TO WHICH THE USER IS ENTITLED.  A SPECIFIC REQUEST WILL DISPLAY THE|c->
        r||nl|
        REQUESTED INFORMATION, AND PROMPT FOR CHANGE WHEN CHANGE IS POSSI-|cr->
        ||nl|
        BLE.|cr||nl||cr||nl|
                  DEFINITION -- THOSE CONFERENCE PARAMETERS AVAILABLE FOR|cr|->
        |nl|
                       VIEWING BY THE INDIVIDUAL ARE DISPLAYED|cr||nl|
                  DEFINITION SCC -- DISPLAYS CONFERENCE SECURITY CLASSIFICA-|->
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cr||nl|
                 TION; CAN BE CHANGED BY THE CURRENT CHAIRMAN|cr||nl|
            DEFINITION ACCESS -- INFORMS AS TO WHETHER NEW PARTICIPANTS->
 MAY JOIN;|cr||nl|
                 CAN BE CHANGED BY THE CURRENT CHAIRMAN|cr||nl|
            DEFINITION FLOOR -- INFORMS AS TO WHETHER FLOOR RECORDING I->
S TAKING|cr||nl|
                 PLACE; CAN BE CHANGED BY THE CURRENT CHAIRMAN|cr||nl|
            DEFINITION FILE -- DISPLAYS THE NAME OF THE TRANSCRIPT FILE->
|cr||nl|
            DEFINITION ANNOUNCE -- DISPLAYS THE ANNOUNCEMENT MESSAGE|cr->
||nl|
                 NUMBERS; CAN BE CHANGED BY THE CURRENT CHAIRMAN USING|->
cr||nl|
                 COMMAND MODE VERB ANNOUNCE|cr||nl|
            DEFINITION INSERT -- DISPLAYS CURRENT INSERT FILE LINE|cr||->
nl|
                 LIMIT; CAN BE CHANGED BY CURRENT CHAIRMAN USING|cr||nl->
|
                 COMMAND MODE VERB INSERT|cr||nl|
            DEFINITION KEYWORD -- TELLS HOW MANY KEYWORDS ARE CURRENT-|->
cr||nl|
                 LY ASSIGNED; CAN BE CHANGED BY THE CURRENT CHAIRMAN|cr->
||nl|
                 USING COMMAND MODE VERB KEYWORD|cr||nl|
            DEFINITION CHAIR -- DISPLAYS TO THE INITIATING CHAIRMAN|cr|->
|nl|
                 HIS PASSWORD AND PROMPTS HIM FOR CHANGE|cr||nl|
            DEFINITION PARTICIPANT -- DISPLAYS TO THE CHAIRMAN THE|cr||->
nl|
                 CURRENT PARTICIPANT PASSWORD AND PROMPTS FOR CHANGE|cr->
||nl|
            DEFINITION LIST -- DISPLAYS A LIST OF ALL VALID PARTICI-|cr->
||nl|
                 PANTS, FOR THE CURRENT CHAIRMAN IT ALSO DISPLAYS THE|c->
r||nl|
                 ASSOCIATED USERID; CAN BE CHANGED BY THE CURRENT|cr||n->
l|
                 CHAIRMAN USING COMMAND MODE VERB ADD|cr||nl|
            DEFINITION DELIVERY -- DISPLAYS USER TRANSCRIPT DELIVERY|cr->
||nl|
                 INFORMATION PROVIDED DURING JOIN PROCESSING AND|cr||nl->
|
                 PROMPTS FOR CHANGE|cr||nl|
            DEFINITION ALTERNATE -- DISPLAYS THE NAMES OF THOSE PARTI-|->
cr||nl|
                 CIPANTS WHO HAVE BEEN DESIGNATED AS ALTERNATE CHAIRMAN->
;|cr||nl|
                 CAN BE CHANGED BY THE CURRENT CHAIRMAN|cr||nl||cr||nl|
            EXAMPLE|cr||nl|
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                  COMMAND?DEFINITION DELIVERY|cr||nl|
                  DELIVERY INSTRUCTIONS FOR YOUR COPY OF TRANSCRIPT|cr||nl|
                  HOST-HOST NAME|cr||nl|
                  $IDENT-$IDENT INFORMATION|cr||nl|
                  CHANGE?YES|cr||nl|
                  HOST?HOST NAME|cr||nl|
                  $IDENT-(NULL, WILL NOT CHANGE)|cr||nl||cr||nl|
         |cr||nl|COMMAND ?^

T12670   |cr||nl|THIS COMMAND ALLOWS THE CHAIRMAN TO REMOVE AN UNUSED PARTICIP->
         ANT|cr||nl|
         NAME FROM THE LIST OF NAMES ACCEPTABLE TO THE CONFERENCE.  A LIST OF|->
         cr||nl|
         UNUSED NAMES IS AVAILABLE BY INVOKING THE COMMAND WITHOUT AN|cr||nl|
         ARGUMENT.|cr||nl||cr||nl|
                  EXAMPLE 1|cr||nl|
                  COMMAND?DELETE|cr||nl|
         (LIST OF UNUSED PARTICIPANT NAMES)|cr||nl||cr||nl|
                  EXAMPLE 2|cr||nl|
                  COMMAND?DELETE PARTICIPANT5|cr||nl|
         |cr||nl|COMMAND ?^

T12680   |cr||nl|THIS VERB IS USED TO OBTAIN AN EXPLANATION OF COMMAND MODE|cr->
         ||nl|
         VERBS.  TO RECEIVE AN EXPLANATION OF A VERB, THE|cr||nl|
         VERB WOULD FOLLOW THE WORD 'DESCRIBE'.  THE VERBS THAT CAN BE|cr||nl|
         DESCRIBED ARE:|cr||nl||cr||nl|
         ADD            ADJOURN        ANNOUNCE       BULLETIN       CHAIR TO|->
         cr||nl|
         COMMUNICATION  DEFINITION     DELETE         DESCRIBE       ERASE|cr|->
         |nl|
         FLOOR          FORMAT         GIVEUP         INSERT         KEYWORD|c->
         r||nl|
         LISTEN         PDAC           PRINT          QUIT           REVIEW|cr->
         ||nl|
         STATUS         TALK           TERMINATE      ?|cr||nl||cr||nl|
                  EXAMPLE|cr||nl|
                  COMMAND?DESCRIBE FLOOR|cr||nl|
         |cr||nl|COMMAND ?^

T12690   |cr||nl|THIS COMMAND IS USED BY THE CHAIRMAN TO REMOVE THE TEXT OF A ->
         MESSAGE|cr||nl|
         FROM THE CONFERENCE TRANSCRIPT.  THE MESSAGE BANNER WILL BE RETAINED|->
         cr||nl|
         WITH A NOTE STATING THAT THE MESSAGE HAS BEEN DELETED.  A MESSAGE|cr|->
         |nl|
         BEING READ CANNOT BE ERASED.|cr||nl||cr||nl|
                  EXAMPLE|cr||nl|
                  COMMAND?ERASE 5|cr||nl|
         |cr||nl|COMMAND ?^
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T12700  |cr||nl|THE PURPOSE OF THE FLOOR IS TO ALLOW A PARTICIPANT TO ADDRESS->
        |cr||nl|
        MULTIPLE PARTICIPANTS AT THE SAME TIME.  THE FLOOR PRIVILEGE CAN|cr||->
        nl|
        ONLY BE ATTAINED BY DIRECT ACTION ON THE PART OF THE CHAIRMAN.  THIS|->
        cr||nl|
        ACTION CAN BE AT THE CHAIRMAN'S INITIATIVE OR PROMPTED BY A|cr||nl|
        PARTICIPANT REQUEST.|cr||nl||cr||nl|
                  FLOOR -- REQUEST BY PARTICIPANT OR CHAIRMAN FOR THE FLOOR.|->
        cr||nl|
                      THE PARTICIPANT MUST WAIT FOR INTERVENTION BY THE|cr||->
        nl|
                      CHAIRMAN.  THE CHAIRMAN WOULD AUTOMATICALLY RECEIVE|cr->
        ||nl|
                      THE FLOOR|cr||nl|
                  FLOOR [TO] PARTICIPANT NAME -- WITH THIS FORM OF THE|cr||nl->
        |
                      COMMAND THE CHAIRMAN CAN GIVE THE FLOOR TO A PARTICI-|->
        cr||nl|
                      PANT.  IF THE PARTICIPANT ACCEPTS RECEIPT OF THE|cr||n->
        l|
                      FLOOR, ANYONE CURRENTLY OCCUPYING THE FLOOR WOULD|cr||->
        nl|
                      IT|cr||nl|
                  FLOOR FREE -- WITH THIS FORM OF THE COMMAND THE CHAIRMAN|cr->
        ||nl|
                      CAN TAKE THE FLOOR FROM WHOMEVER HAS IT AND LEAVE IT|c->
        r||nl|
                      VACANT|cr||nl|
                  FLOOR CANCEL -- A PARTICIPANT WOULD USE THIS FORM OF THE|cr->
        ||nl|
                      COMMAND TO CANCEL A FLOOR REQUEST NOT YET ACTED UPON|c->
        r||nl|
                      BY THE CHAIRMAN|cr||nl||cr||nl|
                  EXAMPLE|cr||nl|
                  COMMAND?FLOOR TO PARTICIPANT NAME|cr||nl||cr||nl|
        (FLOOR WILL BE TAKEN FROM WHOMEVER MIGHT HAVE IT, AND GIVEN TO THE|cr->
        ||nl|
        NAMED PARTICIPANT IF HE ACCEPTS THE FLOOR)|cr||nl|
        |cr||nl|COMMAND ?^

T12710  |cr||nl|THIS COMMAND IS USED BY THE CHAIRMAN TO ESTABLISH THE HEADER ->
        TO|cr||nl|
        APPEAR AT THE BEGINNING OF TALK MESSAGES.  THE COMMAND WILL PROMPT|cr->
        ||nl|
        FOR INPUT WHEN THE OPTIONS DESIRED ARE NOT PART OF THE INITIAL|cr||nl->
        |
        REQUEST.  THE OPTIONS ARE IMPLEMENTED IN THE ORDER RECEIVED.  END OF|->
        cr||nl|
        REQUEST IS INDICATED BY TRANSMITTING SEND OR EOM TO THE INPUT PROMPT.->
```

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       |cr||nl|
       THE OPTIONS MAY BE CHANGED AT ANYTIME.  THEY MAY BE CANCELLED BY USE|->
       cr||nl|
       OF THE ARGUMENT CANCEL.  THE OPTIONS ARE:|cr||nl||cr||nl|
       CLASSIFICATION   DATE-TIME-GROUP  FROM            INFORMATION|cr||nl->
       |
       REFERENCE        SUBJECT          TO|cr||nl||cr||nl|
                 EXAMPLE 1|cr||nl|
                 COMMAND?FORMAT TO;FROM;SUBJECT;$END|cr||nl||cr||nl|
                 EXAMPLE 2|cr||nl|
                 COMMAND?FORMAT CANCEL|cr||nl|
       |cr||nl|COMMAND ?^

T12720 |cr||nl|THIS VERB ALLOWS A PARTICIPANT TO RELINQUISH THE FLOOR|cr||nl->
       |
       PRIVILEGE.  IT IS INVALID IF THE PARTICIPANT DOES NOT HAVE THE|cr||nl->
       |
       FLOOR.|cr||nl||cr||nl|
                 EXAMPLE|cr||nl||cr||nl|
                 COMMAND?GIVEUP|cr||nl|
       |cr||nl|COMMAND ?^

T12730 |cr||nl|THIS IS A CHAIRMAN ONLY VERB.  IT ALLOWS HIM TO CONTROL THE N->
       UMBER|cr||nl|
       OF LINES THAT CAN BE INSERTED INTO A MESSAGE FROM AN EXTERNAL FILE.|c->
       r||nl|
       THE LINES CAN BE RESTRICTED TO A VALUE BETWEEN 1 AND 600, OR ANY|cr||->
       nl|
       RESTRICTION CAN BE COMPLETELY ELIMINATED.|cr||nl||cr||nl|
                 EXAMPLE 1|cr||nl|
                 COMMAND?INSERT 10|cr||nl||cr||nl|
                 EXAMPLE 2|cr||nl|
                 COMMAND?INSERT ELIMINATE|cr||nl||cr||nl|
       NOTE:NO MORE THAN 600 FULL 80 CHARACTER LINES MAY MAKE UP A CON-|cr||->
       nl|
       FERENCE MESSAGE.  IF THE AVERAGE LINE CHARACTER COUNT IS LESS THAN|cr->
       ||nl|
       80, THE MAXIMUM POSSIBLE LINES WOULD INCREASE.  IT IS ONLY IN THESE|c->
       r||nl|
       CASES THAT ELIMINATING LINE COUNT HAS ANY MEANING.|cr||nl|
       |cr||nl|COMMAND ?^

T12740 |cr||nl|MESSAGES MAY BE ASSIGNED A SUBJECT LINE WHEN THEY ARE BUILT. ->
        THE|cr||nl|
       SUBJECT LINE PROVIDES FOR TOPIC ORIENTATION AND SELECTIVE REVIEWING.|->
       cr||nl|
       TO CONTROL THE CONFERENCE SUBJECTS THE CHAIRMAN WOULD USE THE|cr||nl|
       VERB 'KEYWORD' TO BUILD A VALID SUBJECT LIST.  ONLY MESSAGES WHOSE|cr->
       ||nl|
       SUBJECT LINE CONTAINS A WORD FROM THIS LIST WILL BE REVIEWABLE BY|cr|->
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        |nl|
        SUBJECT.|cr||nl||cr||nl|
                EXAMPLE|cr||nl|
                COMMAND?KEYWORD|cr||nl|
                ITEM?TANKS|cr||nl|
                THE SUBJECT WORD TO BE ADDED IS-TANKS|cr||nl|
                (YES OR NO)?YES|cr||nl|
                SUBJECT WORD ACCEPTED|cr||nl|
        |cr||nl|COMMAND ?^

T12750  |cr||nl|TO RECEIVE CONFERENCE MESSAGES AND VIEW FLOOR ACTIVITY A PART->
        ICIPANT|cr||nl|
        MUST BE IN LISTEN MODE.  THIS VERB TRANSFERS A PARTICIPANT FROM|cr||n->
        l|
        COMMAND MODE TO LISTEN MODE.  IT IS INVALID IF THE PARTICIPANT HAS|cr->
        ||nl|
        THE FLOOR.|cr||nl||cr||nl|
                EXAMPLE|cr||nl|
                COMMAND?LISTEN|cr||nl||cr||nl|
        NOTE:  IT IS NOT HONORED IF THE PARTICIPANT HAS THE FLOOR.|cr||nl|
        |cr||nl|COMMAND ?^

T12760  |cr||nl|THIS VERB OPENS A CONNECTION TO A DIRECT ACCESS PROGRAM IN TH->
        E SAME|cr||nl|
        HOST.  THE VERB MUST BE FOLLOWED BY THE NAME OF THE DIRECT ACCESS|cr|->
        |nl|
        PROGRAM TO BE CONNECTED TO.  WHEN NECESSARY A PDAC CONNECTION CAN BE|->
        cr||nl|
        SUSPENDED.  THIS IS ACCOMPLISHED BY USING '|~|S' AS THE FIRST CHARAC-->
        |cr||nl|
        RUPTED FOR MESSAGES FROM THE CONFERENCE.  THIS INTERRUPTION CAN BE|cr->
        ||nl|
        PREVENTED BY USING '|~|N' AS THE FIRST CHARACTERS OF INPUT FROM THE|c->
        r||nl|
        TERMINAL.  TO RESUME RECEIPT OF MESSAGES FROM THE CONFERENCE THE|cr||->
        nl|
        CHARACTERS '|~|P' WOULD BE USED.|cr||nl||cr||nl|
                EXAMPLE|cr||nl|
                COMMAND?PDAC TSS|cr||nl|
        |cr||nl|COMMAND ?^

T12770  |cr||nl|THIS VERB ALLOWS AN INDIVIDUAL TO REQUEST A PRINTED COPY OF S->
        ELECTED|cr||nl|
        PORTIONS OF THE TRANSCRIPT DURING THE CONFERENCE.  THE TRANSCRIPT|cr|->
        |nl|
        MAY BE DIRECTED TO A REMOTE PRINTER OR BY DEFAULT BE DIRECTED TO THE|->
        cr||nl|
        SYSTEM PRINTER.  SOME VALIDITY CHECKING OF THE ARGUMENTS IS DONE|cr||->
        nl|
        PRIOR TO SPAWNING THE PRINT JOB.  IF AN ERROR IS FOUND THE|cr||nl|
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PARTICIPANT WILL BE INFORMED AND THE REQUEST IGNORED.  THE ARGUMENTS|->
cr||nl|
ARE:|cr||nl|
            PRINT ALL -- ALL CONFERENCE MESSAGES WILL BE PRINTED|cr||nl->
|
            PRINT ALL BY PARTICIPANT NAME -- ALL MESSAGES BY THE NAMED|->
cr||nl|
                  PARTICIPANT WILL BE PRINTED|cr||nl|
            PRINT LAST XX -- THE MOST CURRENT XX MESSAGES WILL BE|cr||n->
l|
                  PRINTED|cr||nl|
            PRINT LAST XX BY PARTICIPANT NAME -- THE MOST CURRENT XX|cr->
||nl|
                  MESSAGES BY THE NAMED PARTICIPANT WILL BE PRINTED|cr||->
nl|
            PRINT N[;N...] -- THE SPECIFIED MESSAGES WILL BE PRINTED|cr->
||nl|
                  THE LIST SHOULD NOT EXCEED 20 NUMBERS|cr||nl|
            PRINT N-X -- MESSAGES 'N' THROOUGH 'X' WILL BE PRINTED|cr||->
nl|
            PRINT SUBJECT KEYWORD -- ALL MESSAGES WITH A SUBJECT LINE|c->
r||nl|
                  CONTAINING THE SPECIFIED KEYWORD WILL BE PRINTED|cr||n->
l|
            PRINT FLOOR -- ALL FLOOR ACTIVITY WILL BE PRINTED|cr||nl|
            PRINT FLOOR FROM HHMM TO HHMM ON DDMMYY -- ALL ACTIVITY|cr|->
|nl|
                  RECORDED DURING THE TIME SPAN ON THE SPECIFIED DAY|cr|->
|nl|
                  WILL BE PRINTED|cr||nl|
            PRINT FLOOR ON DDMMMYY -- ALL FLOOR ACTIVITY RECORDED ON|cr->
||nl|
                  THE SPECIFIED DAY WILL BE PRINTED|cr||nl|
            PRINT EVENTS -- RECORDED EVENTS WILL BE PRINTED|cr||nl|
            PRINT MESSAGES -- CONFERENCE MESSAGES WILL BE PRINTED|cr||n->
l||cr||nl|
TO DIRECT THE OUTPUT TO A REMOTE PRINTER THE PHRASE 'ON ID' WOULD|cr|->
|nl|
FOLLOW THE REQUEST.  'ID' WOULD BE A VALID RMOTE PRINTER|cr||nl|
DESIGNATOR.|cr||nl||cr||nl|
            EXAMPLE 1|cr||nl|
            COMMAND?PRINT ALL ON AA|cr||nl||cr||nl|
            EXAMPLE 2|cr||nl|
            COMMAND?PRINT FLOOR ON 26OCT80|cr||nl|
|cr||nl|COMMAND ?^

T12780  |cr||nl|THIS VERB DISCONNECTS A PARTICIPANT FROM THE CONFERENCE PROGR->
AM.|cr||nl||cr||nl|
            EXAMPLE|cr||nl|
            COMMAND?QUIT|cr||nl|
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       |cr||nl|COMMAND ?^

T12790 |cr||nl|THIS VERB ALLOWS A SELECTIVE REVIEW OF CONFERENCE MESSAGES AN->
       D|cr||nl|
       FLOOR ACTIVITY.  SELECTIVITY IS PROVIDED BY THE ARGUMENTS THAT|cr||nl->
       |
       ACCOMPANY THE VERB.  THESE INCLUDE|cr||nl|
                 REVIEW ALL -- ALL PREVIOUS MESSAGES WILL BE REVIEWED.|cr||n->
       l|
                 REVIEW ALL BY PARTICIPANT NAME -- ALL MESSAGES BY THE|cr||n->
       l|
                      NAMED INDIVIDUAL WILL BE REVIEWED.|cr||nl|
                 REVIEW LAST XX -- THE MOST CURRENT XX MESSAGES WILL|cr||nl|
                      BE REVIEWED.|cr||nl|
                 REVIEW LAST XX BY PARTICIPANT NAME -- THE MOST CURRENT|cr||->
       nl|
                      XX MESSAGES BY THE NAMED INDIVIDUAL WILL BE|cr||nl|
                      REVIEWED.|cr||nl|
                 REVIEW N[;N...] -- THE SPECIFIED MESSAGES WILL BE|cr||nl|
                      REVIEWED.  THE LIST CANNOT EXCEED 20 VALID MESSAGE|cr|->
       |nl|
                      NUMBERS.|cr||nl|
                 REVIEW N-X -- MESSAGES 'N' THROUGH 'X' WILL BE DISPLAYED|cr->
       ||nl|
                 REVIEW SUBJECT -- THE LIST OF AVAILABLE SUBJECTS FOR|cr||nl->
       |
                      TALK MESSAGES WILL BE DISPLAYED.|cr||nl|
                 REVIEW SUBJECT KEYWORD -- ALL MESSAGES CONTAINING THE|cr||n->
       l|
                      SPECIFIED KEYWORD WILL BE LISTED.|cr||nl|
                 REVIEW FLOOR -- ALL RECORDED FLOOR ACTIVITY WILL BE|cr||nl|
                      REVIEWED.|cr||nl|
                 REVIEW FLOOR FROM HHMM TO HHMM -- ALL FLOOR ACTIVITY|cr||nl->
       |
                      RECORDED DURING THE GIVEN TIME SPAN WILL BE REVIEWED.|->
       cr||nl|
       |cr||nl|COMMAND ?^

T12800 |cr||nl|THIS VERB PRODUCES A REPORT OF THE CURRENT CONFERENCE STATUS.->
         THE|cr||nl|
       DISPLAY INCLUDES CONFERENCE NAME, START TIME AND DATE, CURRENT|cr||nl->
       |
       CHAIRMAN'S NAME, HOST NAME, WHETHER THE FLOOR IS OCCUPIED, AND A|cr||->
       nl|
       LIST OF ACTIVE PARTICIPANTS AND THEIR MODE.|cr||nl||cr||nl|
                 EXAMPLE|cr||nl|
                 COMMAND?STATUS|cr||nl|
       |cr||nl|COMMAND ?^

T12810 |cr||nl|THIS VERB TRANSFERS A PARTICIPANT FROM COMMAND MODE TO TALK M->
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        ODE.|cr||nl|
        TALK MODE IS THE STATE IN WHICH A PARTICIPANT CAN BUILD MESSAGES|cr||->
        nl|
        TO BE DELIVERED TO OTHER CONFERENCE PARTICIPANTS.|cr||nl||cr||nl|
                  EXAMPLE|cr||nl|
                  COMMAND?TALK|cr||nl|
        |cr||nl|COMMAND ?^

T12820  |cr||nl|THIS VERB'S USAGE IS RESTRICTED TO THE CHAIRMAN AND ALLOWS HI->
        M TO|cr||nl|
        TERMINATE A CONFERENCE SESSION.  A TERMINATED CONFERENCE CAN NOT BE|c->
        r||nl|
        RECONVENED.  TERMINATION WILL NOT TAKE PLACE IF THERE ARE ACTIVE|cr||->
        nl|
        PARTICIPANTS OTHER THAN THE CHAIRMAN STILL CONNECTED TO THE|cr||nl|
        CONFERENCE.  NO PARTICIPANTS ARE PERMITTED TO JOIN THE CONFERENCE|cr|->
        |nl|
        ONCE A TERMINATE REQUEST IS ENTERED.|cr||nl||cr||nl|
                  EXAMPLE|cr||nl|
                  COMMAND?TERMINATE|cr||nl|
        |cr||nl|COMMAND ?^

T12830  |cr||nl|THE QUESTION MARK IS USED TO OBTAIN AN EXPLANATION OF THE MOD->
        E|cr||nl|
        THE PARTICIPANT IS IN.  IT WORKS FROM COMMAND AND TALK MODES.|cr||nl|->
        |cr||nl|
                  EXAMPLE|cr||nl|
                  COMMAND??|cr||nl|
        |cr||nl|COMMAND ?^

T13000  |cr||nl||ff||cr||nl|TALK MODE ENTERED IN ^

T13010  |cr||nl|>^

T13011  |cr||nl|-^

T13012  |cr||nl|TO?^

T13013  |cr||nl|FROM?^

T13014  |cr||nl|SUBJECT?^

T13015  |cr||nl|CLASS?^

T13016  |cr||nl|INFO?^

T13017  |cr||nl|REF?^

T13050  $desc^
```

```
T13051  $comm^

T13052  $dele^

T13053  $end^

T13054  $list^

T13055  $sele^

T13056  $subj^

T13057  $talk^

T13058  ?|cr|^

T13100  |cr||nl||ff||cr||nl|>>>$DESCRIBE<<<                              ->
           |cr||nl|^

T13101  |cr||nl||ff||cr||nl|>>>$COMMAND<<<          |cr||nl|^

T13102  |cr||nl||ff||cr||nl|>>>$DELETE<<<           |cr||nl|^

T13103  |cr||nl||ff||cr||nl|>>>$END<<<              |cr||nl|^

T13104  |cr||nl||ff||cr||nl|>>>$LIST<<<     |cr||nl|^

T13105  |cr||nl||ff||cr||nl|>>>$SELECT<<|cr||nl|^

T13106  |cr||nl||ff||cr||nl|>>>$SUBJECT<<<  |cr||nl|^

T13107  |cr||nl||ff||cr||nl|>>>$TALK<<< |cr||nl|^

T13108  |cr||nl||ff||cr||nl|>>> ? <<               |cr||nl|^

T13109  |cr||nl||ff||cr||nl|>>>$INSERT<<<   |cr||nl|^

T13099  |cr||nl|INVALID DESCRIBE ARGUMENT PASSED^

T13110  |cr||nl|THIS PARAMETER IS USED TO OBTAIN AN EXPLANATION OF THE POSSIB->
        LE     |cr||nl|
        TALK MODE VERBS.  THE AVAILABLE VERBS ARE   |cr||nl||cr||nl|
        $COMMAND       $DELETE        $DESCRIBE      $END           $INSERT |->
        cr||nl|
        $LIST          $SELECT        $SUBJECT       $TALK          ?   |cr||->
        nl||cr||nl|
        THE PARAMETER TO BE EXPLAINED WOULD FOLLOW $DESCRIBE.   |cr||nl||cr||->
        nl|
                  EXAMPLE   |cr||nl|
                  >$DESCRIBE $END   |cr||nl|^
```

```
T13120  |cr||nl|THIS PARAMETER WILL CAUSE A MESSAGE BEING BUILT TO BE ACCEPTE->
        D AS    |cr||nl|
        COMPLETE AND QUEUED FOR TRANSMISSION.  THE PARTICIPANT WILL THEN BE |->
        cr||nl|
        TRANSFERRED TO COMMAND MODE.     |cr||nl||cr||nl|^

T13130  |cr||nl|THIS PARAMETER WILL CAUSE THE MESSAGE BEING ENTERED TO BE    ->
              |cr||nl|
        DELETED AND THE TERMINAL TRANSFERRED TO LISTEN MODE.|cr||nl|^

T13140  |cr||nl|THIS PARAMETER WILL CAUSE A MESSAGE BEING BUILT TO BE ACCEPTE->
        D       |cr||nl|
        AS COMPLETE AND QUEUED FOR TRANSMISSION.  THE MESSAGE WILL BE   |cr||->
        nl|
        ASSIGNED A NUMMBER AND STAMPED WITH THE AUTHOR'S NAME AND THE TIME   ->
        |cr||nl|
        AND DATE.  THE PARTICIPANT WILL THEN BE TRANSFERRED TO LISTEN MODE. |->
        cr||nl||cr||nl|
        (NOTE:  NULL INPUT(CARRIAGE RETURN) FROM A TERMINAL WILL SERVE THE  |->
        cr||nl|
        SAME PURPOSE.    |cr||nl|^

T13150  |cr||nl|$LIST AS THE FIRST CHARACTERS OF INPUT WILL CAUSE THE ENTIRE ->
        MESSAGE|cr||nl|
        BEING BUILT, OR THE LAST SEVERAL LINES ENTERED IF THE $LIST IS      |->
        cr||nl|
        FOLLOWIND BY A NUMBER, TO BE LISTED.|cr||nl||cr||nl|
                EXAMPLE    |cr||nl|
                >$LIST 10 |cr||nl|^

T13160  |cr||nl|THIS VERB ALLOWS A PARTICIPANT TO DIRECT HIS MESSAGE TO UP TO->
         FOUR  |cr||nl|
        SPECIFIED RECIPIENTS.  IF $SELECT IS NOT SPECIFIED THE MESSAGE IS   |->
        cr||nl|
        DELIVERED TO ALL ACTIVE PARTICIPANTS|cr||nl||cr||nl|
                EXAMPLE    |cr||nl|
                >$SELECT PARTICIPANT1 PARTICIPANT2 PARTICIPANT3   |cr||nl||->
        cr||nl|^

T13170  |cr||nl|THIS VERB ALLOWS A PARTICIPANT TO ASSIGN A SUBJECT LINE TO A|->
        cr||nl|
        MESSAGE.  THE LINE SHOULD CONTAIN A WORD THAT IS IN THE SUBJECT |cr||->
        nl|
        LIST CREATED BY THE CONFERENCE CHAIRMAN IF THE MESSAGE IS TO BE |cr||->
        nl|
        REVIEWED BY SUBJECT, OTHERWISE NOT REQUIRED.|cr||nl||cr||nl|
                EXAMPLE    |cr||nl|
                >$SUBJECT LANTCOM MANPOWER RESOURCES      |cr||nl||cr||nl|^

T13180  |cr||nl|THIS PARAMETER WILL CAUSE A MESSAGE BEING BUILT TO BE ACCEPTE->
```

D AS |cr||nl|
COMPLETE AND QUEUED FOR TRANSMISSION. THE PARTICIPAPANT WILL REMAIN|->
cr||nl|
IN TALK MODE, AND BE PROMPTED TO START ANOTHER MESSAGE. |cr||nl||cr||->
nl|
EXAMPLE |cr||nl|
>$TALK|cr||nl|^

T13190 |cr||nl|THE QUESTION MARK IS USED TO FIND OUT THE CURRENT MODE. BESID->
ES |cr||nl|
STATING THE MODE, IT GIVES A BRIEF DESCRIPTION OF THE MODE'S |->
cr||nl|
FUNCTION.

T13200 |cr||nl|THIS PARAMETER ALLOWS PREVIOUSLY CREATED FILES TO BE INSERTED->
INTO A|cr||nl|
MESSAGE. THE FILE MUST BE IN STANDARD FORMAT WITH TIMESHARING |cr||->
nl|
ASCII MEDIA CODE 6. THE LOGICAL RECORD SIZE SHOULD BE 80 CHARACTERS|->
cr||nl|
OR LESS. THE FULL NAME OF THE FILE TO BE INSERTED MUST FOLLOW THE |->
cr||nl|
PARAMETER. THE ACTUAL NUMBER OF LINES THAT WILL BE ACCEPTED IS SET |->
cr||nl|
BY THE CHAIRMAN. THIS PARAMETER MAY ALSO BE USED TO INSERT A |cr||->
nl|
PREVIOUS MESSAGE INTO THE ONE BEING BUILT. THIS IS DONE BY NOT FOL-|->
cr||nl|
LOWING THE REQUEST WITH A FILE NAME. A PROMPT WILL FOLLOW FOR THE |->
cr||nl|
NUMBER OF THE MESSAGE TO BE INSERTED. |cr||nl||cr||nl||cr||nl|
EXAMPLE |cr||nl|
>$INSERT UMC/CATA/FILE |cr||nl|^

T13210 |cr||nl||ff||cr||nl|THIS TERMINAL IS CURRENTLY IN TALK MODE. ->
|cr||nl||cr||nl|
THE FUNCTION OF TALK MODE IS THE ENTERING OF MESSAGES FOR OTHER |->
cr||nl|
PARTICIPANTS ON THE CONFERENCE. A MESSAGE MAY HAVE A SUBJECT |cr||->
nl|
ASSIGNED TO IT, HAVE A PREEXISTING FILE INCLUDED IN IT, OR HAVE A |->
cr||nl|
PREVIOUS TALK MESSAGE INCLUDED IN IT. THE TALK MODE FUNCTIONS ARE |->
cr||nl|
CONTROLLED BY THE FOLLOWING VERBS |cr||nl||cr||nl|
$COMMAND $DELETE $DESCRIBE $END $INSERT |->
cr||nl|
$LIST $SELECT $SUBJECT $TALK ? |cr||->
nl||cr||nl|
AN EXPLANTION OF EACH PARAMETER IS OBTAINED BY USING THE |c->

```
        r||nl|
        PARAMETER '$DESCRIBE' FOLLOWED BY THE VERB TO BE EXPLAINED. |cr||nl||->
        cr||nl|
                EXAMPLE   |cr||nl|
                >$DESCRIBE $INSERT                          |cr||nl||cr||nl||->
        cr||nl|
        THE EXIT FROM TALK UPON COMPLETION OF A MESSAGE IS CONTROLLED BY THE|->
        cr||nl|
        USER.   CONTROL IS BASED ON THE TALK MODE VERB USED TO END THE MESSA->
        GE.  |cr||nl|^

T13300  |cr||nl|MESSAGE DELETED BY PARTICIPANT  ^

T13320  |cr||nl|MESSAGE ACCEPTED^

T13340  |cr||nl|NO TEXT HAS BEEN ENTERED^

T13360  |cr||nl|ILLEGAL SELECT REQUEST DUE TO--NO PARTICIPANT NAMES|cr||nl|^

T13380  |cr||nl|-^

T13381  |cr||nl|INVALID SUBJECT REQUEST--NO SUBJECT LINE   |cr||nl|>^

T13420  |cr||nl|MESSAGE NUMBER ^

T13430  |cr||nl||ff||cr||nl|CONTINUING IN TALK MODE ^
```

APPENDIX B

ENVIRONMENT MANAGER PROCESS (EMP) USER INTERFACE

The Environment Manager Process (EMP) allows FSM personnel, the Environment Manager (EM), to monitor and change the FSM operating environment. The EM can observe a user's current status, reassign users to Screeners, and change FSM screen modes and bandwidth thresholds. The EM initiates EMP by logging on as a normal UNIX user. After logging on, the EM is initially presented with a help message informing him of the available commands. The EMP then signifies that it is ready to accept commands by printing a "*" on the terminal.

EMP provides the EM with seven commands. These commands allow the EM to make all necessary changes in the FSM environment. The commands are:

1. ASSIGNMENTS - Display a list of current logged on users and Screeners and the assignments of each.

2. DISPLAY - Display detailed user/system information.

3. HELP - Display a list of commands or detailed information about a specific command.

4. HISTORY - Invoke the ATDP program to view previous FSM events.

5. MODIFY - Change the current FSM operating environment.

6. PROFILE - Display the current status of logged on users.

7. QUIT - Terminate EMP and log off UNIX.

Descriptions of each command follow, including examples and syntax. Also, the syntax for the complete set of EMP commands is provided in Appendix A.

B.1 ASSIGNMENTS

The ASSIGNMENTS command provides the EM with a list of all current user/Screener assignments. It displays all current users and Screeners logged on, showing which Screener is assigned to which user. If a user currently has no Screener, ASSIGNMENTS displays "No Screener" for that user. If a Screener currently has no users, ASSIGNMENTS displays "- none assigned -" for that Screener. The command syntax is:

```
a[ssignments] <nl>
```

where the letters enclosed in brackets "[]" are optional and <nl> represents a newline or carriage return. ASSIGNMENTS returns to the command level prompt ("*") after displaying the user/Screener assignments.

Following is an example of the output from the ASSIGNMENTS command.

CURRENT FSM USER/SCREENER ASSIGNMENTS   Mon Sep 15 14:56:28 1980

Screener	User
mees	af3gwbrglre
atlas	- none assigned -
mees	af3gwbrgmes
jones	af9gwglmrmb
jones	af3gwbrgslw

B.2 DISPLAY

The DISPLAY command gives the EM a detailed description of current FSM system state as well as the current states of any logged on users. At the system level, DISPLAY produces the current bandwidth rate, the screening status for each WWMCCS subsystem, the number of Screeners currently logged on, and the number of users currently logged on. At the user level, the DISPLAY command gives the user identification, the user's current terminal, the assigned Screener, the current bandwidth rate, and the screening status for each WWMCCS subsystem. The syntax for this command is:

```
d[isplay]  [<userlist>]  <nl>

<userlist>  :=  <user> | <user> <userlist>

<user>      :=  system | <username>

<username>  :=  a valid logged on WWMCCS user name

<nl>        :=  a newline or carriage return
```

Arguments enclosed in brackets "[]" are optional. DISPLAY returns to the command prompt ("*") after displaying the requested information. A maximum of five arguments to the DISPLAY command is allowed.

The DISPLAY command with no arguments causes reports on the system and all logged on users to appear. For example:

```
dis <nl>
```

might cause EMP to display:

```
CURRENT FSM ENVIRONMENT VALUES         Mon Sep 22 09:51:54 1980

System-wide :
     Bandwidth is 10 messages/minute
     Subsytem screening status:
           ACCESS is normal
           LIST   is normal
           SIOS   is normal
           TCON   is normal
           TLCF   is normal
           TSS    is normal
           wWDMS  is normal
     Screeners logged on - 1
     Users logged on - 1

User:
     Username - af3gwbrgmes
     Terminal - 7
     Screener assigned - erickson
     Bandwidth is 5 messages/minute
     Subsystem screening status:
           ACCESS is normal
           LIST   is none
           SIOS   is normal
           TCON   is none
           TLCF   is normal
           TSS    is all
           WWDMS  is normal
```

Had the EM input:

```
d sys <nl>
```

EMP would have displayed only the system portion of the above display. Alternatively, the EM could have asked for information on users. For example, if the EM inputs:

```
di af3gwbrgjdm af8gwglmrmb af3gwglmjtc <nl>
```

EMP would output:

```
CURRENT FSM ENVIRONMENT VALUES        Mon Sep 22 09:51:54 1980


User:
     Username - af3gwbrgjdm
     Terminal - k
     Screener assigned - jones
     Bandwidth is 10 messages/minute
     Subsystem screening status:
           ACCESS is none
           LIST   is none
           SIOS   is normal
           TCON   is normal
           TLCF   is all
           TSS    is none
           WWDMS  is normal

User:
     Username - af8gwglmrmb
     Terminal - 1
     Screener assigned - jones
     Bandwidth is 1 messages/minute
     Subsystem screening status:
           ACCESS is none
           LIST   is none
           SIOS   is none
           TCON   is none
           TLCF   is none
           TSS    is none
           WWDMS  is none
User:
     Username - af3gwglmjtc
     Terminal - j
     Screener assigned - jones
     Bandwidth is 25 messages/minute
     Subsystem screening status:
```

```
ACCESS is none
LIST   is all
SIOS   is normal
TCON   is none
TLCF   is none
TSS    is all
WWDMS  is normal
```

Finally, the EM could have asked for users and system information, as in the example:

dis af3gwbrgrmb system af9gwglmslw <nl>

which would result in a display of the system information, af3gwbrgrmb's information, and finally the information on af9gwglmslw.

If the EM enters an invalid user name (not defined to FSM or not currently logged on) EMP outputs an appropriate message and reprompts for the information.

B.3 HELP

The HELP command displays information about all or each EMP command. The command syntax is:

```
he[lp] [<command-name-list>] <nl>
<command-name-list>  := <command-name> |
                        <command-name><command-name-list>
<command-name>       := assignments | display | help |
                        history | modify | profile | quit
<nl>                 := newline or return key
```

Syntax is shown in a modified BNF format. Optional arguments are shown in brackets "[]", and terminal tokens are shown between the characters "<>". The bar character "|" separates options.

The HELP command displays general information on all commands or the syntax for one or more specific commands. If the EM entered:

```
h <nl>
```

EMP would display:

```
This is a brief list of EMP commands. To get  further  information  on  a
specific  command,  enter  "help  <command-name>" where the valid command
names are "assignments, display, help, history, modify, profile, quit".

ASSIGNMENTS - List current user/Screener assignments.
DISPLAY     - Display current screening and bandwidth data for
              system and all logged on users or specified
              data only.
HELP        - Display this list of commands or information about
              one or more specified commands.
HISTORY     - Call the Audit Trail Display Program to display
              audit data.
MODIFY      - Modify specified system or user data.
PROFILE     - Display current profile data for all or specified
              users.
QUIT        - Terminate the Environment Manager's Program.
```

In another example, if the EM entered:

```
help  display  modify <nl>
```

EM would output:

```
DISPLAY   -  Display current screening and bandwidth data for
             system and all logged on users or specified data
             only.
```

Syntax is shown in a modified BNF format. Optional arguments are shown in brakets "[]", and terminal tokens are shown between the characters "<>". The bar character "|" separates options.

Syntax:

```
display [<disp-arg-list>] <nl>
```

```
<disp-arg-list>   := system | <user-name-list> | system <user-name-list>
<user-name-list>  := <user-name> | <user-name> <user-name-list>
<user-name>       := <valid user name known to FSM (WES user)
     Where only five arguments are allowed.

<nl>              := newline or return key
```

MODIFY - Modify specified system or user data.

Syntax is shown in a modified BNF format. Optional arguments are shown in brakets "[]", and terminal tokens are shown between the characters "<>". The bar character "|" separates options.

Syntax:

```
modify [<modify-arg>] <nl>
        Where a menu will be presented with the various choices
        if no arguments are specified.

<modify-arg>            := <mod-screen-arg> | <mod-band-arg> |
                           <mod-sub-arg> | <mod-uscreen-arg> |
                           <mod-uband-arg> | <mod-usub-arg> |
                           <mod-assign-arg>

<mod-screen-arg>        := screen <screen-mode>
<mod-band-arg>          := bandwidth <bandwidth-rate>
<mod-sub-arg>           := subsystem <subsystem-name> <screen-mode>
<mod-uscreen-arg>       := user <user-name> <screen-mode>
<mod-uband-arg>         := ubandwidth <user-name> <bandwidth-rate>
<mod-usub-arg>          := usubsystem <user-name> <subsystem-name>
                           <screen-mode>
<mod-assign-arg>        := uassignments <user-name> <Screener-name>

<screen-mode>           := all | normal | none | off
        Where none and off mean no screening.

<bandwidth-rate>        := digit between the values 1 and 255 inclusively.
<subsystem-name>        := tss | tlcf | wwdms | tcon | sios | access | list
<user-name>             := valid user name known to FSM (WES user)
<Screener-name>         := valid user name known to FSM (Screener)

<nl>                    := newline or return key
```

B.4 HISTORY

The HISTORY command allows the EM to view previous FSM events that were audited. Its invocation activates the Audit Trail Display Program (ATDP). ATDP permits the display of any and all audit events. The syntax of the HISTORY command is:

hi[story] <nl>

where the letters in brackets "[ ]" are optional, and <nl> represents a newline or carriage return. A complete description of the options available for ATDP appears in Section 3. Control returns to EMP when the EM is finished with ATDP.

B.5 MODIFY

The MODIFY command is the most powerful of all EMP commands. Through it the EM can modify the FSM environment. Environment values that may be modified include:

1. system-wide screening

2. system-wide bandwidth threshold

3. subsystem screening

4. user screening

5. user subsystem screening

6. user bandwidth threshold

7. user/Screener assignments

Because of the complexity of this command, two forms are available. The long form accepts arguments and processes one MODIFY command at a time; it can be used by an EM familiar with EMP. The other, the short form, does not accept arguments and prompts the user for the necessary information. The initial prompt is a menu requesting the user to enter the number of the MODIFY command he/she desires. Further prompts are specific questions. This form of the MODIFY command continues until the user specifically exits from it.

B.5.1 Short Form Modify Command

The short form MODIFY command has the syntax:

```
m[odify] <nl>
```

where the letters enclosed in brackets "[]" are optional and <nl> represents a newline or carriage return. EMP responds with

```
MODIFY CURRENT FSM ENVIRONMENT VALUES      Mon Sept 15 15:36:45 1980

     Please enter the character which corresponds to the desired action

          1  -  modify system-wide screening
          2  -  modify system-wide bandwidth
          3  -  modify subsystem screening
          4  -  modify user screening
          5  -  modify user/subsystem screening
          6  -  modify user bandwidth
          7  -  modify user/Screener assignments
          h  -  display this list of options
          q or <cr>  -  terminate modifications
```

action?

The EM enters the character at the "action?" prompt. An incorrect response, "22" for example, causes EMP to output:

"22" is an invalid argument for this command.

B.5.1.1 Short Form Modify System-Wide Screening. If the EM wants to change system-wide screening he enters "1<nl>" in response to the "action?" menu prompt. EMP responds with:

MODIFY System-Wide Screening Mon Sep 15 15:37:21 1980

Set screening to all, none, or normal (q or <cr> to quit):

The EM may enter "all", "off", "none" or "normal" in response to this prompt, setting system-wide screening to all, none or normal respectively. The characters "off" may be used at any time a screen mode is requested and means the same as "none". The EM may also enter any part of the above strings as long as enough characters are provided to uniquely identify it. Entering "nor" for example causes EMP to respond:

Current system-wide screening is now normal

The EM may also hit newline or return in response to the above prompt. In this case EMP says:

System-wide screening not changed

Had the EM entered an incorrect response, for example "nominal", EMP indicates this fact and prompts for another user input:

"nominal" is an invalid screen mode. Enter replacement or <cr>

If the EM enters an ambiguous screen mode, "no" for example, EMP says:

    Input no is ambiguous. Enter replacement or <cr>

B.5.1.2 Short Form System-Wide Bandwidth. To change the system bandwidth threshold the EM enters "2<nl>" in response to the menu prompt. EMP will then output:

    MODIFY System-wide Bandwidth   Tue Sep 16 11:21:45 1980

    Current system-wide bandwidth is 10 messages/minute.

    Set it to (1-255) (q or <cr> to quit):

The EM may enter any integer within the specified range, "5" for example, and EMP will output:

    Current system-wide bandwidth is now 5

An incorrect entry, "350" for example, will cause:

    "350" is an invalid bandwidth rate. Enter replacement or <cr>

At this point the EM may enter a replacement value or return. If a return is entered, EMP says:

    Bandwidth not changed

and returns to the menu prompt display.

B.5.1.3 Short Form Modify Subsystem Screening. Entry of "3" followed by <nl> at the menu prompt causes EMP to output:

MODIFY Subsystem Screening   Tue Sep 16 11:32:36 1980

    Subsystem Screening Status:

```
ACCESS is normal
LIST   is none
SIOS   is all
TCON   is normal
TLCF   is none
TSS    is normal
WWDMS  is normal
```

Enter the next subsystem name (q or <cr> to quit):

The EM may then enter any subsystem name (with enough characters to uniquely identify it). Entering q or <cr> causes EMP to return to the menu prompt. If the user enters "w" followed by <nl> (he wants to modify the screen mode for WWDMS), EMP responds with:

Set screening to all, none or normal (q or <cr> to quit):

If EM enters "a" followed by <nl> in response to this query, EMP outputs

Screening for WWDMS is now all

EMP then reprompts for another subsystem name.

The entry of an invalid or ambiguous system name or screen mode causes EMP to issue an appropriate message and reprompt for the information.

B.5.1.4 Short Form Modify User Screening. A "4" response followed by <nl> will cause EMP to enter the MODIFY user screening subcommand and output

MODIFY User Screening   Tue Sep 16 11:40:29 1980

Enter the next user name whose overall screen mode you wish to modify <q or <cr> to quit):

EM then enters a user name, "af8gwbrgjdm" for example. EMP then asks for the screen mode:

Set screening to all, none or normal (q or <cr> to quit):

A correct response (enough characters to identify the string as one of "all", "none" or "normal"), "non" for example, causes EMP to display:

Current screening for af8gwbrqjdm is none

EMP then reprompts for another user name. The characters "all" may be input to change the screen modes for all currently logged on users.

The entry of an invalid username (unknown to FSM or not currently logged-on) causes a reprompt. An invalid or ambiguous screen mode causes an appropriate message and a reprompt.

B.5.1.5 Short Form Modify User Subsystem Screening. If the EM enters "5" followed by <nl> in response to the menu prompt, he/she can then change the screen modes of specified users for specified subsystems. EMP prompts with:

MODIFY User/Subsystem Screening   Tue Sep 16 13:18:36 1980

Enter the next user name whose subsystem screen mode you wish to modify (q or <cr> to quit):

The EM then enters a valid user name, "af8gwbrqlre" for example. EMP then prompts for subsystem:

Enter the next subsystem name (q or <cr> to quit):

A valid unique subsystem entry (enough characters to identify the string as one of "all", "access", "list", "sios", "tcon", "tlcf", "tss" or "wwdms"), "tl" for example, causes EMP to output:

Set screening to all, none or normal (q or <cr> to quit):

A correct response (enough characters to identify the string as one of "all", "none" or "normal"), "a" for example, causes:

Please enter the character which corresponds to the desired action

```
1 - modify system-wide screening
2 - modify system-wide bandwidth
3 - modify subsystem screening
4 - modify user screening
5 - modify user/subsystem screening
6 - modify user bandwidth
7 - modify user/Screener assignments
h - display this list of options
q or <cr> - terminate modifications
```

action?

During normal operation, the EMP will continue to output data to the screen until it is full, and then request the EM to hit a newline key to get the next screen. The above options will be repeated each time the screen is cleared.

B.5.2 Long Form Modify Commands

The following sections describe each long form MODIFY command in detail. In contrast to the short form, long form MODIFY commands do only the action specified. Repeat MODIFY commands are not allowed in the long form.

B.5.2.1 Long Form Modify System-Wide Screening. This subcommand changes the value of the system screen mode. Its effect is to change the screen mode for all subsystems as well as the screen modes for all logged on user's subsystems (and all users who subsequently log on to FSM). The syntax for this command is

```
m[odify] sc[creen] <mode> <nl>

<mode> := a[ll] | non[e] | nor[mal] | o[ff]
```

<nl> := return or newline key

Arguments enclosed in brackets "[ ]" are optional.

For example,

m scr none <nl>

would change the value of the screen mode of all subsystems for all logged on users so that no screening would occur. It would result in the message:

Current system-wide screening is now none

Had the EM entered "screen" incorrectly, EMP would output an appropriate message and return to the command level prompt. Had the EM entered an incorrect or ambiguous screen mode, EMP would output an appropriate message and reprompt.

B.5.2.2 Long Form Modify System-Wide Bandwidth Threshold. This subcommand changes the value of the system bandwidth threshold. Its effect is to change the threshold value for all users currently logged on to FSM (and all users who subsequently log on). The syntax for this command is:

m[odify] b[andwidth] <rate> <nl>

<rate> := positive integer between 1 and 255 inclusive.

<nl> := return or newline key

Arguments enclosed in brackets "[ ]" are optional.

If the EM enters

mod b 10 <nl>

for example, the command would result in changing the current system-wide bandwidth threshold to 10 and would output:

Current system-wide bandwidth is now 10

If the EM had entered an out-of-range bandwidth EMP would output an appropriate message and reprompt for another bandwidth value.

B.5.2.3 Long Form Modify Subsystem Screening. This subcommand changes individual subsystem screen modes. Its effect is to change the individual subsystem screen mode for all users currently logged onto FSM (and all users who subsequently log on). The syntax for this command is:

```
m[odify] su[bsystem] <subname> <mode> <nl>
<subname> := ac[cess] | l[ist] | s[ios] | tl[cf] |
             tc[on] | ts[s] | w[wdms] | al[l]
<mode>    := a[ll] | non[e] | nor[mal] | o[ff]
<nl>      := return or newline key
```

Arguments enclosed in brackets "[ ]" are optional.

An example of this command is:

```
m su tc a <nl>
```

This command would set the screen mode for tcon to all. EMP would output:

```
Screening for TCON is now all
```

If the EM had entered an incorrect or ambiguous subsystem name, or an incorrect or ambiguous screen mode, EMP would issue an appropriate message and reprompt.

B.5.2.4 Long Form Modify User Screening. This subcommand changes all subsystem screen modes for a single user. The syntax of the command is:

```
m[odify] use[r] <username> <mode> <nl>
<username> := a valid logged on WWMCCS username | a[ll]
<mode>     := a[ll] | non[e] | nor[mal] | o[ff]
```

<nl>   := return or newline key

Arguments enclosed in brackets "[ ]" are optional.

An example of this command is:

modify user af3gwbrqlre all <nl>

This command would change the screen mode of all subsystems for user af3gwbrglre to all. EMP would output:

Current screening for af3gwbrglre is all

If the EM had entered an invalid username (not defined to FSM or not currently logged on) or an incorrect or ambiguous screen mode, EMP would output an appropriate message and reprompt for the information.

B.5.2.5 Long Form Modify User Subsystem Screening. This subcommand changes individual screen modes for a single user. The syntax of the command is:

m[odify] usu[bsystem] <username> <subname> <mode> <nl>

<username> := a valid logged on WWMCCS username | a[ll]

<subname> := ac[cess] | l[ist] | s[ios] | tl[cf] |

:= tc[on] | ts[s] | w[wdms] | a[ll]

<mode>   := a[ll] | non[e] | nor[mal] | o[ff]

<nl>   := return or newline key

Arguments enclosed in brackets "[ ]" are optional.

An example of this command is:

mod usub af8gwglmxyz lis non <nl>

This command would change af8gwglmxyz's list subsystem screen mode to none. EMP would output:

Current screening for af8gwglmxyz using LIST is none

Had the EM entered an invalid username (not defined to FSM or not currently logged on), an incorrect or ambiguous subsystem name, or an incorrect or ambiguous screen mode, EMP would output an appropriate message and reprompt.

B.5.2.6 Long Form Modify User Bandwidth. This subcommand changes a bandwidth threshold value for a single user. The syntax of the command is:

m[odify] ub[andwidth] <username> <rate> <nl>

<username> := a valid logged on WWMCCS username | a[ll]

<rate> := a positive integer between 1 and 255 inclusive

<nl> := return or newline key

Arguments enclosed in brackets "[ ]" are optional.

An example of this command is:

m ub af3gwbrgmes 2 <nl>

This command would change the bandwidth threshold for the user af3gwbrgmes to 2. EMP would output in response to this command:

Current bandwidth for af3gwbrgmes is now 2

If the EM enters an invalid username (not defined to FSM or not currently logged on), or an incorrect bandwidth threshold rate, EMP outputs an appropriate message and reprompts for the information.

B.5.2.7 <u>Long Form Modify User/Screener Assignments.</u> This subcommand changes a user's Screener. Ths syntax of the command is:

m[odify] ua[ssignments] <username> <Screenername> <nl>

<username> := a valid logged on WWMCCS username

<Screenername> := a valid logged on Screener

<nl> := return or newline key

Arguments enclosed in brackets "[ ]" are optional.

An example of this command is:

mod uas af3gwbrglre mees <nl>

This command would change af3gwbrglre's current Screener to be Mees. EMP would output a message indicating the change:

User af3gwbrglre is now assigned to Screener Mees

If the EM enters an invalid username or Screener name (not defined to FSM or not currently logged on) EMP issues an appropriate message and reprompts.

B.6 PROFILE

The PROFILE command displays the current status of any or all current FSM low-side users. There are six status types:

1. waiting on user input

2. waiting on system output

3. waiting on Screener response

4. waiting on user input/system output

5. waiting on Screener assignment

6. waiting to logon (connect to WWMCCS).

Waiting on user input means that the user's FSMGP is waiting for the WWMCCS user to ente data so that it may proceed. Waiting on system output means that the WWMCCS user's FSMGP is waiting for output from WWMCCS to proceed. Waiting for Screener response means that the user's FSMGP is waiting for a decision from a Screener before the system output can be sent to the user. Waiting on user input/system output means that the user's FSMGP is waiting for data from either WWMCCS or the user in order to proceed (e.g., LISTEN mode in TLCF). Waiting on Screener assignment means that the user is waiting to be assigned a Screener before he may proceed. Waiting to logon means that the user's FSMGP is waiting to connect to the WWMCCS via the Remote Network Processor Emulator (RNPE).

The command syntax is:

```
p[rofile] [<userlist>] <nl>
<userlist> := <user> | <user> <userlist>
<user>     := <termid> | <username>
<termid>   := last character of valid FSM terminal
<username> := a valid logged on WWMCCS username
<nl>       := a newline or return key
```

Arguments enclosed in brackets "[ ]" are optional. PROFILE returns to the command prompt ("*") after displaying the status information.

The PROFILE command with no arguments causes profiles for all currently logged on WWMCCS users to be displayed. Each logged on user causes one record to be displayed with the user name, terminal ID, current subsystem status and DTG (date-time group) of the status to be displayed. For example:

```
    pro  af3gwbrgjdm  <nl>
```

would cause EMP to output:

```
CURRENT FSM USER STATUS         Wed Sep 17 14:53:46 1980

User          Terminal  Subsystem  Waiting On     DTG of Status
af3gwbrgjdm   1         WWDMS      user input     Sep 17 14:30:22 1980
```

In another example, if the EM entered:

```
    p  af3gwbrgmes  5  af8gwglmlre  <nl>
```

EMP might display:

```
CURRENT FSM USER STATUS         Wed Sep 17 15:13:07 1980

User          Terminal  Subsystem  Waiting On             DTG of Status
af3gwbrgmes   6         TSS        Screener assignment    Sep 17 15:12:03 1980
af8gwbrgjdm   5         TLCF       system output          Sep 17 15:12:43 1980
af8gwbrglre   f         TCON       user input             Sep 17 15:05:40 1980
```

If the EM enters an invalid username (not defined to FSM or not currently logged on) or an invalid terminal identifier (not currently in use) EMP outputs an appropriate message and prompts for the information.

B.7 <u>QUIT</u>

The QUIT command terminates EMP and logs the user off the system. Its syntax is:

    q[uit] <nl>

where the letters in brackets "[ ]" are optional, and <nl> is a newline or carriage return.

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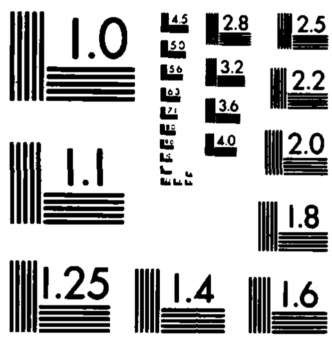
UNCLASSIFIED F/G 9/2 NL



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

APPENDIX C

SCREENER TRUSTED PROGRAM (SCTP) USER INTERFACE

The decision to let users view system output is made by Screener personnel via the Screener Trusted Program (SCTP). Since SCTP must be verified, its interface with the Screener is minimal. All inputs are single letter responses to prompts, and SCTP operates in raw mode (no newline or return keystrokes are necessary). Therefore, no syntax is presented in this section. Rather, a scenario is presented in which all possible Screener actions are covered.

The Screener logs on to FSM in the normal UNIX fashion. If there are no downgrades pending, SCTP clears the screen and outputs:

```
***************** No Pending Downgrade Requests *****************


          Enter  l  to  logout    :
```

This message remains on the screen until a downgrade is requested or the Screener types "l". When a downgrade request appears, SCTP clears the terminal screen and outputs:

```
******************    DOWNGRADE REQUESTED    ******************
```

Enter <return> to proceed

l to logout :

This prompt is followed by three audible alarms (bells). When the Screener is ready to perform the downgrade he presses the terminal's "return" key. SCTP then outputs the first page of downgrade data followed by the prompt (on the bottom of the same screen):

"downgrade data"

******************** Downgrade File ********************

Classification is: OFFICIAL USE ONLY

Enter r for REJECT :

<return> to continue :

The Screener is not allowed to accept a downgrade request until the entire contents of the downgrade file has been displayed; the Screener can always reject a downgrade at any time during his perusal of the data. The above prompt is positioned at the bottom of each page (except the last page) of downgrade information. Notice that the classification of the user's output is displayed for the Screener. This information is obtained from the user's response to the "CLASSIFICATION OF YOUR OUTPUT?" query from WWMCCS. The user in this example responded "ufo". The following is a list of possible classification outputs displayed by SCTP:

1. if the user enters "uzz" SCTP displays "UNCLASSIFIED"

2. if the user enters "ufo" SCTP displays "OFFICIAL USE ONLY"

3. if the user enters "czz" SCTP displays "CONFIDENTIAL"

4. if the user enters "szz" SCTP displays "SECRET"

5. if the user enters "swp" SCTP displays "SECRET WORKING PAPERS"

When the last page of information is displayed SCTP outputs the following prompt:

"downgrade data"

```
*******************     Downgrade File     *******************
     Classification is: OFFICIAL USE ONLY


           Enter r          for REJECT
                 a          for ACCEPT
                 <return>   to continue   :
```

SCTP will clear its Screener's input buffer before the output of each prompt. Thus, the Screener must wait for the data to be presented before replying. In addition, SCTP will not accept invalid responses. Should the Screener enter one, SCTP outputs "??" and waits for the next entry. This is true for all prompts.

For all downgrade requests, the Screener is given the option of viewing an additional context file. This file contains two screens of information just preceding the downgrade data. This file contains both ordered user input and system output. In some situations this additional data may aid the Screener in determining whether to accept or reject the downgrade request. If the Screener decides to view the context file (by depressing the "return" key) then SCTP outputs the first page of data from this file followed by the prompt

```
"context information data"

******************        Information File        ******************

           Enter   r            for REJECT
                   a            for ACCEPT
                   <return>     to continue       :
```

SCTP always displays downgrade and context data in a cyclic manner. That is, if the Screener always depressed the "return" key, SCTP would first display the downgrade data (one page at a time), and then the context file data (if present), and then cycle back to the downgrade data, and so on.

If the Screener decides to accept a downgrade request (after having viewed all downgrade data) he depresses "a". SCTP requires that the Screener confirm all accept/reject inputs and thus outputs

******************** Confirm Downgrade ********************

Enter y   for CONFIRMATION

n   for no :

If the Screener enters "n" (for no confirmation), SCTP outputs the next page of the current file (downgrade or context file), followed by the appropriate reject-accept-continue prompt. If the Screener enters "y" (confirming the downgrade request), SCTP outputs

Downgrade Accepted

and proceeds to the next downgrade request. If the Screener decides to reject the downgrade request SCTP asks for confirmation

******************* Confirm Rejection *******************

Enter y   for CONFIRMATION

n   for no :

If the Screener confirms the rejection SCTP responds with

Downgrade Rejected

and proceeds to the next downgrade request.

When a downgrade request comes as a result of the Environment Manager changing the screen mode to ALL, SCTP displays this fact in the downgrade file prompt:

```
*******************     Downgrade File (All/EM)     ********************

  Classification is:  SECRET


        Enter r         for REJECT

              a         for ACCEPT

              <return> to  continue   :
```

If the screen mode had changed because the user exceeded his/her current bandwidth threshold, SCTP displays this in the downgrade file prompt:

```
*******************     Downgrade File (All/Band)     ********************

  Classification is:  SECRET WORKING PAPERS


        Enter r         for REJECT

              a         for ACCEPT

              <return> to  continue   :
```

APPENDIX D

AUDIT TRAIL DISPLAY PROGRAM (ATDP) USER INTERFACE

The Audit Trail Display Program (ATDP) displays FSM audit events to help analyze FSM activities. The program is invoked by the Environment Manager (EM) via the "history" command. (See Appendix B for more information on EM commands).

The FSM Audit Trail consists of a "current" file and saved files that were previously current. When a current file is saved (by using the END command), its name will be changed from 'current' to the date-time group (DTG) of the save. In this way the size of the current file may be limited to a manageable amount. In addition, if the EM saved the current file daily, a uniform audit data base could be maintained. See the END command for more details.

ATDP commands include:

1. END - Save the current audit file and start a new one.

2. FILES - List all of the existing audit files.

3. HELP - Display a list of commands or information about one or more specified commands.

4. LIST - Display audited events with optional specifiers in ascending time order.

5. QUIT - Terminate the Audit Trail Display Program.

Additionally, unrecognizable input causes a message to be output and a return to the command level prompt.

When ATDP is invoked by the EM, it initially displays a help message informing the EM of the available commands. Then ATDP signifies that it is ready to accept commands by printing a ">" on the terminal. This informs the user that any of the commands listed above can be entered. This prompt distinguishes it from other EM commands, which prompt with an asterisk (*). The following sections describe each ATDP command in detail.

D.1 END

The END command saves the current audit file.

The command syntax is:

```
e[nd] <nl>
<nl>    := newline or return key
```

The END command terminates the current audit file and saves it. The current file will be renamed with the DTG of the save. This command allows the audit files to be kept to reasonable sizes, allowing more efficient processing by the LIST command. To illustrate the renaming property of END, assume that the current audit file is ENDed on April 2 at 12:05:30. The current audit file would be renamed to "0402120530" and the "current" file length would be reset to zero.

D.2 FILES

The FILES command lists all existing audit files.

The command syntax is:

files [<output-flag>] <nl>

<output-flag> := -t | -l | -p

- -t = output to terminal with paging (default)
- -l = output to terminal with no paging
- -p = output to printer with no paging

<nl> := newlinn or return key

The FILES command displays in order all past audit files that have been saved by the END command. It displays each file's name, DTG of creation, date of last modification and size in 512 character blocks. In addition, FILES displays the above information on the "current" file. If the FILES command were entered as:

f <nl>

ATDP would output, for example:

File name	Creation date	Last modified date	Size (blocks)
0904115524	Tue Aug 19 15:15:53 1980	Thu Sep 4 11:03:29 1980	250
0906101828	Thu Sep 4 11:55:26 1980	Sat Sep 6 10:16:09 1980	52
0908083713	Sat Sep 6 10:18:29 1980	Mon Sep 8 05:43:59 1980	60
0908114403	Mon Sep 8 08:37:14 1980	Mon Sep 8 10:37:35 1980	19
0908143618	Mon Sep 8 11:44:04 1980	Mon Sep 8 14:34:10 1980	33
0909084141	Mon Sep 8 14:36:19 1980	Tue Sep 9 08:32:49 1980	1
0909140811	Tue Sep 9 08:42:04 1980	Tue Sep 9 13:57:03 1980	68
0910145636	Tue Sep 9 14:08:13 1980	Wed Sep 10 14:55:02 1980	71
current	Wed Sep 10 14:56:37 1980	Fri Sep 19 13:03:30 1980	22

D.3 HELP

The HELP command displays information about all or each ATDP command.

The command syntax is:

```
help [<output-flag>] [<command-name-list>] <nl>

<output-flag>        := -t | -l | -p

     -t = output to terminal with paging (default).

     -l = output to terminal with no paging.

     -p = output to printer with no paging.

<command-name-list> := <command-name> | <command-name> <command-name-list>

<command-name>       := end | files | help | list | quit

<nl>                 := newline or return key
```

Syntax is shown in a modified BNF format. Optional arguments are shown in brackets "[]", and terminal tokens are shown between the characters "<>". The bar character "|" separates options.

The HELP command displays general information on all commands or the syntax for one or more specific commands. If the EM entered:

    h <nl>

ATDP would display:

This is a brief list of ATDP commands. To get further information on a specific command, enter "help <command-name>" where the valid command names are "end, files, help, list, quit".

END - Save the current audit file and start a new one.
FILES- List all of the existing audit files.
HELP - Display this list of commands or information about one or more specified commands.
LIST - Display audited events with optional specifiers in ascending time order.
QUIT - Terminate the Audit Trail Display Program.

In another example, if the EM entered:

    help files <nl>

ATDP would output:

FILES - List all of the existing audit files.

Syntax is shown in a modified BNF format. Optional arguments are shown in brackets "[]", and terminal tokens are shown between the characters "<>". The bar character "|" separates options.

Syntax:

files [<output-flag>] <nl>

<output-flag> := -t | -l | -p
    -t = output to terminal with paging (default).
    -l = output to terminal with no paging.
    -p = output to printer with no paging.

<nl> := newline or return key

D.4 LIST

The LIST command prints all or specified FSM audit events.

The command syntax is:

```
list [<output-flag>] [<list-arg-list>] <nl>

<output-flag>      := -t | -l | -p

     -t = output to terminal with paging (default).

     -l = output to terminal with no paging.

     -p = output to printer with no paging.

<list-arg-list>    := <list-arg> | <list-arg> <list-arg-list>

<list-arg>         := <user-arg> | <system-arg> | <event-arg> | <time-arg>

     where each <list-arg> can only appear once.

<user-arg>         := user [<user-name-list>]

<user-name-list>   := <user-name> | <user-name> <user-name-list>

<user-name>        := valid user name known to FSM (manager, screener, WES u

<system-arg>       := subsystem [<subsys-name-list>]

<subsys-name-list>:= <subsys-name> | <subsys-name> <subsys-name-list>

<subsys-name>      := tss | tlcf | wwdms | tcon | sios | access | list | log

<event-arg>        := event [<event-type-list>]

<event-type-list>  := <event-type> | <event-type> <event-type-list>

<event-type>       := 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |

                        13 | 14 | 15 | 16 | 17 | 18 | 19

     1  = valid user input received

     2  = invalid user input received
```

3 = system output sent to user

4 = system output not sent to user

5 = system output accepted by screener

6 = system output rejected by screener

7 = screener logged onto FSM

8 = screener logged off of FSM

9 = WES user logged onto FSM

10 = WES user logged off of FSM

11 = user initiated WWMCCS subsystem

12 = user assigned to screener

13 = user input simulated

14 = screen mode modified

15 = bandwidth threshold modified

16 = environment manager logged onto FSM

17 = environment manager logged off of FSM

18 = system output received from WWMCCS

19 = system output received by screener

<time-arg> := <start-time> | <end-time> | <start-time> <end-time>

<start-time> := start | <dtg>

<end-time> := end | <dtg>

where a <dtg> by itself will be interpreted as a <start-time>.

<dtg> := MMDDhhmm[YY]

MM = month (01 - 12)

DD = day of month (01 - 31)

hh = hour of day (00 - 23)

mm = minute of hour (00 - 59)

YY = year minus 1900 (00 - 99)

(default time-range is current day)

<nl> := newline or return key

Syntax is shown in a modified BNF format. Optional arguments are shown in brackets "[]", and terminal tokens are shown between the characters "<>". The bar character "|" separates options.

LIST allows the user-oriented display of accumulated FSM audit events. Each event listed contains the following information:

1) time of the event
2) event description
3) event data items such as user name, terminal ID, etc.

When no arguments are entered with the command, LIST produces a listing of all events logged for the current day. Events of particular interest (such as WWMCCS subsystem usage or a specific user history) can also be selectively listed using an optional list argument. See below for sample LIST input and output.

The following arguments are known to LIST:

EVENT event-type(s) All audit events of the numeric type(s) (see a detailed description of FSM audit events for the event codes and their explanation). For instance, all "Valid user input received" events could be listed using an event-type of 1. If EVENT is used with no event-type, the user will be prompted for the desired event-type(s). Input can consist of multiple types.

SUBSYSTEM subsystem(s)	Audit events pertaining to the particular WWMCCS subsystem(s) (i.e. TSS, TLCF, WWDMS, TCON, SIOS, ACCESS, LIST and LOGON) are listed.
USER user-name(s)	Audit events involving the particular user(s) are listed.

The output of LIST may be further restricted to events within a specified time-range. The time-range arguments must be in one of the following forms:

START		All events from the start of the FSM audit trail to the current time.
END		All events for the current day.
START	END	All events from the start of the FSM audit trail to the current

time.

START	MMDDhhmm[YY]	All events from the start of the FSM audit trail to the specified month, day, hour, minute and year.
MMDDhhmm[YY]	MMDDhhmm[YY]	All events from the specified start-time to the specified end-time.
MMDDhhmm[YY]	END	All events from the specified month, hour, minute and year to the current time.
MMDDhhmm[YY]		All events from the specified month, day, hour, minute and year to the current time.

If arguments are combined, LIST output can become very specific. The boolean property of the LIST command allows the EM to restrict the LIST output to precise events. For example:

list event 11 user af3gwbrgjdm sub sios <nl>

would list (for the current day) only the events in which the user af3gwbrgjdm entered the WWMCCS subsystem (event 11) SIOS. That is, LIST would search for audit events that were event 11 AND user af3gwbrgjdm AND subsystem SIOS. Had the ATDP user entered:

list event 15 user af3gwbrgjdm af8gwbrgrmb <nl>

LIST would search for audit events that were event 15 (bandwidth threshold modified) AND user af3gwbrgjdm OR event 15 AND user af8gwbrgrmb. In this way the ATDP user can display each event in which two users had their bandwidth thresholds modified (if any).

Sample LIST input follows:

a) list

This is the default form of LIST; i.e. all events for the current day (April 15) are displayed. This form of the command is equivalent to: list -t 04150000 end

b) list -p event 01

Send all "Valid user input received" (Event 01) audit events for the current day to the line printer.

c) list event start end

Please choose one or more of the following event types:

```
1  -  Valid user input received
2  -  Invalid user input received
3  -  System output sent to user
4  -  System output not sent to user
5  -  System output accepted by screener
6  -  System output rejected by screener
7  -  Screener logged onto FSM
8  -  Screener logged off of FSM
9  -  WES user logged onto FSM
10 -  WES user logged off of FSM
11 -  User initiated WWMCCS subsystem
```

12 - User assigned to screener
13 - User input simulated
14 - Screen mode modified
15 - Bandwidth threshold modified
16 - Environment manager logged onto FSM
17 - Environment manager logged off of FSM
18 - System output received from WWMCCS
19 - System output received by screener

Event types? 7 8 9 10

Display on the terminal (with paging) the logging events Screener logon/logoff and User logon/logoff for the entire time-range the audit files cover. Notice, the user was presented with a menu of event-types an prompted for the events desired since none were entered.

d) list -l sub tlcf 04021200 04150830

Display on the terminal (without paging) all audit events concerned with the WWMCCS Teleconferencing (TLCF) subsystem between April 2nd at noon until April 15th at 8:30 am.

e) list user

User name(s)? RAH MEES SCHELLER

Display on the terminal (with paging) all audit events concerned with the named users (RAH, MEES, SCHELLER) for the current day.

f) list -p start end

List all audit events on the printer. Every audited event would be printed out using this command.

Sample LIST output for each audit event is shown in Figure D-1.

```
Wed Sep 10 14:17:23 1980
     Event:      Valid user input received                 1
     User:       af8gwbrgjdm
     Terminal:   k
     Subsystem:  LOGON
**********              TEXT              **********
001
**********          END OF TEXT           **********

Wed Sep 10 15:17:19 1980
     Event:      Invalid user input received               2
     User:       af8gwbrgjdm
     Terminal:   k
     Subsystem:  TSS
     Reason:     No match.
**********              TEXT              **********
zzz
**********          END OF TEXT           **********

Wed Sep 10 14:17:37 1980
     Event:      System output sent to user                3
     User:       af8gwbrgjdm
     Terminal:   k
     Subsystem:  TSS
**********              TEXT              **********
CLASSIFICATION OF YOUR OUTPUT?
**********          END OF TEXT           **********

Fri Sep 12 12:43:38 1980
     Event:      System output not sent to user            4
     User:       af8gwbrgjdm
     Terminal:   1
     Subsystem:  TSS
**********              TEXT              **********
CP DISCONNECT
**********          END OF TEXT           **********

Wed Sep 10 14:21:18 1980
     Event:      System output accepted by screener        5
     User:       af8gwbrgjdm
     Terminal:   k
```

```
     Subsystem:  TSS
     Screener:   screener
**********            TEXT            **********

DATE
**********         END OF TEXT        **********

Fri Sep 19 11:46:13 1980
     Event:      System output rejected by screener       6
     User:       af3gwbrgrah
     Terminal:   k
     Subsystem:  LIST
     Screener:   harvey
**********            TEXT            **********
ready
**********         END OF TEXT        **********

Wed Sep 10 14:18:22 1980
     Event:      Screener logged onto FSM                 7
     User:       screener
     Terminal:   7

Wed Sep 17 15:58:26 1980
     Event:      Screener logged off of FSM               8
     User:       harvey
     Terminal:   k

Wed Sep 10 14:17:34 1980
     Event:      WES user logged onto FSM                 9
     User:       af8gwbrgjdm
     Terminal:   k

Wed Sep 10 08:16:33 1980
     Event:      WES user logged off of FSM               10
     User:       af8gwbrgjdm
     Terminal:   l

Wed Sep 10 14:17:36 1980
     Event:      User initiated WWMCCS subsystem          11
     User:       af8gwbrgjdm
     Terminal:   k
     Subsystem:  TSS

Wed Sep 10 14:18:26 1980
     Event:      User assigned to screener                12
     User:       af8gwbrgjdm
     Terminal:   k
     Screener:   screener
     Terminal:   7
```

```
Wed Sep 10 14:17:45 1980
     Event:      User input simulated                          13
     User:       af8ywbrgjdm
     Terminal:   k
     Subsystem:  TSS
**********             TEXT            **********
zzz
**********           END OF TEXT       **********

Fri Sep 19 12:31:10 1980
     Event:      Screen mode modified                          14
     User:       af3gwbrgrah
     Subsystem:  ALL
     Screen mode:      No screening

Fri Sep 19 12:25:10 1980
     Event:      Bandwidth threshold modified                  15
     User:       ALL
     Bandwidth threshold:    1

Wed Sep 10 14:22:03 1980
     Event:      Environment manager logged onto FSM           16
     User:       manager
     Terminal:   1

Fri Sep 19 13:03:05 1980
     Event:      Environment manager logged off of FSM         17
     User:       manager
     Terminal:   l

Wed Sep 10 14:17:29 1980
     Event:      System output received from WWMCCS            18
     User:       af8gwbrgjdm
     Terminal:   k
     Subsystem:  LOGON
**********             TEXT            **********
TERMINAL
**********           END OF TEXT       **********

Wed Sep 10 14:19:22 1980
     Event:      System output received by screener            19
     User:       af8gwbrgjdm
     Subsystem:  TSS
     Screener:   screener
     Terminal:   7
```

Figure D-1. Sample LIST output.

Notice several features of Figure D-1. First, each event has an English description of the event as well as the event number. Second, each event has the DTG of its recording. Finally, where applicable, the audit texts are included.

It is also possible to restrict the ATDP output by requesting a combination of arguments. For example, if a user wanted certain events for a given user he might input:

```
l user af3gwbrgjdm event 10 <nl>
```

which would display all events for the current day of type 10 for user af3gwbrgjdm. ATDP might output:

```
List events between Tue Sep 23 08:00:00 1980 and Tue Sep 23 15:19:57 1980
Concerning users: af3gwbrgjdm
Concerning events: 10


Tue Sep 23 08:16:33 1980
     Event:      WES user logged off of FSM                10
     User:       af3gwbrgjdm
     Terminal:   l
```

Notice that ATDP uses a Boolean algorithm to obtain the user's request. That is, ATDP searches the audit files for events that involve user 'af8gwbrgjdm' AND are of type 10.

In another example, a user might want to restrict the event selection further:

```
l user af8gwbrgjdm event 3 sub sios <nl>
```

ATDP might output:

```
List events between Tue Sep 23 08:00:00 1980 and Tue Sep 23 15:38:28 1980
Concerning users: af8gwbrgjdm
Concerning subsystems: sios
Concerning events: 3


Tue Sep 23 14:21:36 1980
     Event:      System output sent to user              3
     User:       af8gwbrgjdm
     Terminal:   k
     Subsystem:  SIOS
**********           TEXT            **********
SIOS ROUTINE
**********        END OF TEXT        **********
```

Finally, ATDP outputs an appropriate message when it cannot find the requested events. For example, if no events had been generated for September 23, and the EM entered:

```
l <nl>
```

ATDP would output:

```
List events between Tue Sep 23 00:00:00 1980 and Tue Sep 23 15:47:31 1980
with no specific search categories specified.

No audit records were found which satisfied the requirements.
```

D.5 QUIT

The QUIT command terminates ATDP processing.

The command syntax is:

```
q[uit] <nl>

<nl>    := newline or return key
```

QUIT terminates ATDP and returns control to the Environment Manager Process.

APPENDIX E

GLOBAL LOGON FILE MODIFIER (USER) USER INTERFACE

The USER utility program adds and deletes users from the FSM environment. With it, WWMCCS users, Screeners and Environment Managers can be added and deleted, and a current list of users (all those listed above) can be displayed. The USER program is executed by issuing the command "user <nl>" at the command prompt. USER responds with the prompt:

```
Please choose the next action to be performed:
Type  a  to add a new WWMCCS user
Type  s  to add a new Screener
Type  e  to add a new Environment Manager
Type  d  to delete a WWMCCS user
Type  t  to delete a Screener or Environment Manager
Type  l  to list currently defined users
Type  q  to quit the UPDATE program

Option?
```

If the user wants to add a WWMCCS user, he/she enters "a" at the Option? prompt. USER then outputs:

```
Add a WWMCCS user
Please enter a user name with exactly 11 characters with the format:

af[389] [gx] [mw] [site code (3 chars)] [user initials (3 chars)]:
```

If the user enters "af3gwbrgrmb", USER responds with:

```
User af3gwbrgrmb is now a valid user name
```

USER then redisplays the command options and the prompt. If the user had entered a WWMCCS user name in the wrong format, USER outputs:

```
Invalid user name, must follow the following format:
```

af[389] [gx] [mw] [site code (3 chars)] [user initials (3 chars)]

and then redisplays the command options prompt. If the user had entered too many characters, USER responds with:

Invalid user name, too many characters

and then redisplays the command options prompt. If the user attempted to add an existing WWMCCS user (already defined to FSM), 'af3gwbrgjdm' for example, USER outputs:

User af3gwbrgjdm is already a valid user name

If the WWMCCS user had previously been deleted (undefined to FSM), USER outputs:

User af3gwbrgrmb is a previously used user name.
Do you wish this name to be reinstated?

A 'y' to this question results in:

User af3gwbrgrmb is now a valid user name

Any other response results in a redisplay of the command options prompt.

If the user wants to add a Screener, he/she would respond to the Option? prompt with 's'. USER would respond with:

Add a Screener
Please enter a user name not exceeding 8 characters.

Had the user entered 'mees', for example, USER would respond with:

User mees is now a valid user name

Had the user entered a name already defined to FSM, or a name with too many characters, USER would output an appropriate message and redisplay the command options prompt.

If the user wanted to add an Environment Manager to FSM, he/she would enter "e" at the Option? prompt. This would result in:

```
Add an Environment Manager
Please enter a user name not exceeding 8 characters:
```

Had the user entered 'smyth', for example, USER would output:

```
User smyth is now a valid user name
```

However, only one Environment Manager may be defined to FSM at any one time. If there had already been an EM when the user tried to add one, USER would output:

```
Only one manager may be defined at a time, 'smyth' already exists
```

Deleting (undefining users to FSM) is as easy as adding them. To delete a WWMCCS user the user enters 'd'; to delete a Screener or Environment Manager the user enters 't'. This results in:

```
Delete a WWMCCS user
Please enter a user name with exactly 11 characters with the format:

af [389] [gx] [mw] [site code (3 chars)] [user initials (3 chars)]:
```

for WWMCCS users and

```
Delete a Screener or Environment Manager
Please enter a user name not exceeding 8 characters:
```

for Screeners and EMs. Entering the correct names (they must exist to FSM), results in USER confirming the deletion. Entry errors (invalid format or trying to delete non-existent users) cause USER to issue an error and redisplay the command options prompt.

The user can also display the currently existing FSM users. This is done by entering 'l' at the Option? prompt. USER might display, for example:

USER ID	USER NAME	USER TYPE	VALID USER?	LOGGED ON	TTY ID	ASSIGNED SCREENER
1	smyth	Env Mngr	Yes	No		
2	mees	Screener	Yes	Yes	1	
3	af3gmbrglre	WES User	Yes	Yes	2	mees
4	af8xwbrgabc	WES User	Yes	No		
5	af8gwbrgjzm	WES User	Yes	No		
6	af9xwglmrmb	WES User	Yes	Yes	5	jones
7	af3gwbrgrah	WES User	Yes	No		
8	jones	Screener	Yes	Yes	6	
9	af8gwbrgjdm	WES User	Yes	Yes	7	mees
10	af3gwbrgrmb	WES User	No			

Finally, to terminate the USER program, the user enters "q" at the Option? prompt. USER responds with:

```
UPDATE program terminated
Good-bye
```

APPENDIX F

FSMGTTY PROGRAM DESCRIPTION

FSMGTTY is a small program that sets up the WES user/Guard environment when the WES user initiates a terminal session. During FSM startup, FSMGTTY is executed and attempts to open each terminal that is connected to Guard (via the PDP 11/70). After setting terminal attributes to resemble normal WWMCCS terminals, FSMGTTY waits until the WES user enters data at the terminal keyboard. Once this occurs, FSMGTTY fork/executes a copy of itself which obtains current copies of the context tables and fork/executes the Guardian Process (FSMGP). In this way, little machine overhead is consumed while a terminal is not being used, due to FSMGTTY's small size.

FSMGTTY, when executed, changes the UNIX terminal attributes to resemble WWMCCS terminals. These changes involve changing the character delete and line erase characters, as well as mapping keyboard carriage returns into strict carriage returns (sans line feed). It also arranges to ignore potentially troublesome input, such as control-S, delete and other characters that have a special meaning to the UNIX operating system.

When a WES initiates a terminal session (by typing a carriage return or control-A from a tty terminal or "$*$log24" from a vip terminal), FSMGTTY locks the context files, preventing any changes from being made, and makes copies of them for this user. This facilitates context table changes during normal FSM operation and assures that each WES user obtains the most current version of the context tables. When the copies have been made, the lock is removed and the Guardian Process is fork/executed. Following WES user logoff (either normally, or following a system error), FSMGP terminates and control returns to FSMGTTY. It will start the entire sequence again, beginning with changing the terminal attributes.

An external file (/fsm/gttys) contains terminal identifiers and all associated information that FSMGTTY needs. A copy of this file follows:

```
: FSM active terminals for low-side WES users.  Format is:
: one character terminal type, 'v' = vip, 't' = tty/wang.
: Colon to separate fields, ':'.
: one character to be used for logging for this terminal.
: Colon to separate fields, ':'.
: UNIX pathname for terminal, E.g. /dev/tty8.
: Colon to separate fields, ':'.
: UNIX pathname for RNPE line, E.g. /dev/rnpe/300/8
:
t:e:/dev/ttye:/dev/rnpe/300/e
t:f:/dev/ttyf:/dev/rnpe/300/f
t:g:/dev/ttyg:/dev/rnpe/300/g
t:h:/dev/ttyh:/dev/rnpe/300/h
```

END

12-86

DTIC