CSC/TM-86/6034

FLIGHT EXPERIMENT DEMONSTRATION SYSTEM (FEDS) ANALYSIS REPORT

(NASA-CR-177917) FLIGHT EXPERIMENT DEMONSTRATION SYSTEM (FEDS) ANALYSIS REPORT (Computer Sciences Corp.) 323 p Avail: NTIS HC A14/MF A01 CSCL 09B

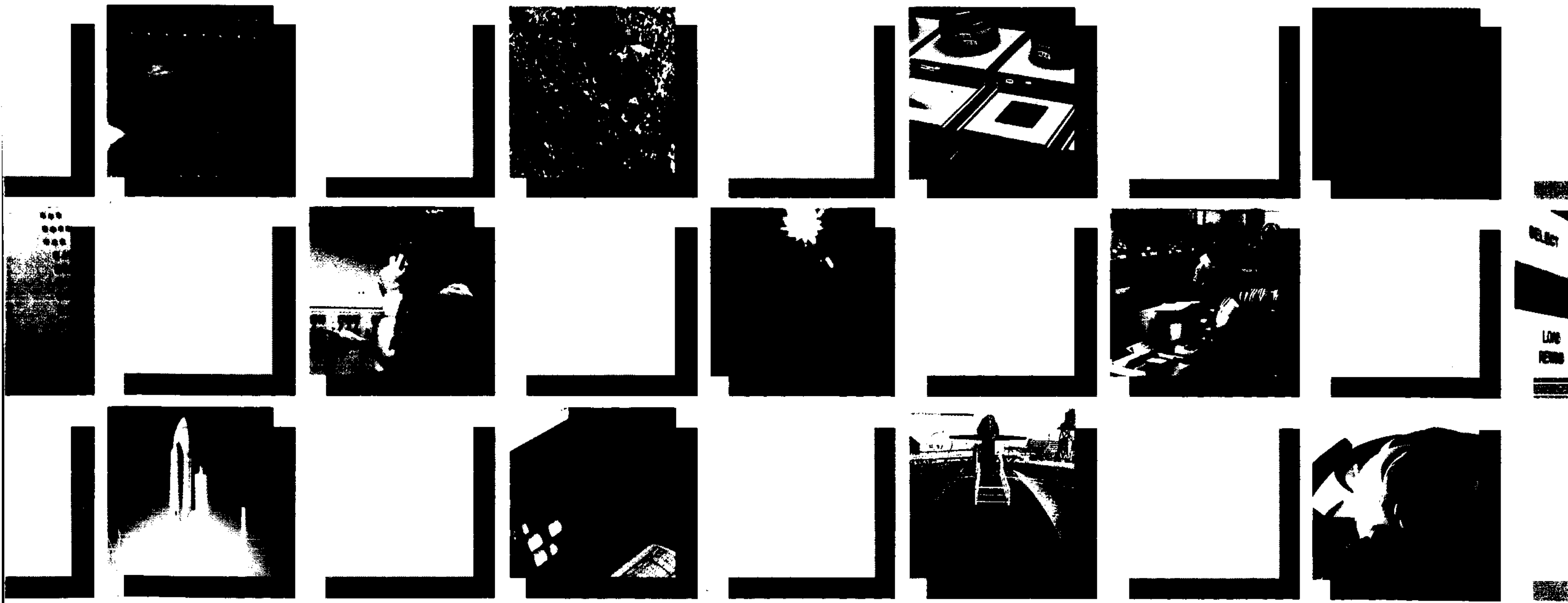
N87-25794

Unclas
G3/61 0082682

Prepared for
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
Goddard Space Flight Center
Greenbelt, Maryland

CONTRACT NAS 5-27888
Task Assignment 46000

JULY 1986



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ANALYSIS REPORT

Prepared for

GODDARD SPACE FLIGHT CENTER

By

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ABSTRACT

The Flight Experiment Demonstration System (FEDS) software and hardware configuration is described, and the results of the demonstration are presented. The purpose of FEDS was to show, in a simulated spacecraft environment, the feasibility of using a microprocessor to automate onboard orbit determination functions.

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SECTION 1 - INTRODUCTION

The purpose of the Flight Experiment Demonstration System (FEDS) was to show, in a simulated spacecraft environment, the feasibility of using a microprocessor to automate the onboard orbit determination functions. The spacecraft environment was simulated using the Automated Orbit Determination System (AODS) Environment Simulator for Prototype Testing (ADEPT) to provide processing parameters and using a second generation Tracking and Data Relay Satellite System (TDRSS) user transponder to collect observation data.

This document describes the software and hardware configuration used to support FEDS during the demonstration, its operation during the demonstration, and results of the demonstration. Much of the material in Section 2 was taken from Reference 1; it describes the software developed for Code 552 to emulate an onboard orbit determination system. Section 3 describes the hardware and procedures used to perform the demonstration. Sections 4 and 5 examine the results obtained from the testing and the conclusions that can be drawn from them. Appendixes A through E present the FEDS output and accuracy results, observation data log, message formats, requirements summary, and data packet descriptions.

SECTION 2 - FEDS SOFTWARE

2.1 OVERVIEW

FEDS fulfills the requirements specified in Appendix D, which is an updated version of those given in Reference 2. FEDS captures all data and control commands uplinked by the simulator. Based on the required time schedule, it processes the uplinked data, predicts one-way Doppler data, predicts state vector tables, and estimates and corrects the user spacecraft state using forward-link observation data. Least-squares estimation is performed by a sliding batch process that uses real-time accumulated TDRSS observations data provided by the transponder. The Communications Box (CB) serves as an interface between the transponder and FEDS. Predicted one-way Doppler data are output from FEDS through the Communications Box to the transponder. Predicted state vector tables and estimator reports are downlinked to ADEPT after they are generated. FEDS also records all status messages and error messages in an activity log that is downlinked to ADEPT either at regular time intervals or when the log is full. Messages placed into the activity log are displayed on the microprocessor console to assist in monitoring FEDS execution. Critical error messages are immediately downlinked to ADEPT to inform the user.

Since no peripherals are available on the PDP-11/23, all data must be stored in random access memory (RAM). In addition, overlaying of tasks is impossible. Because of these factors, FEDS is composed of 11 separate tasks and 4 global COMMON areas that are installed and fixed in memory during execution. The FEDS software configuration is shown in Figure 2-1. One executive task controls the execution of the other FEDS tasks, which are divided into primary and secondary tasks.

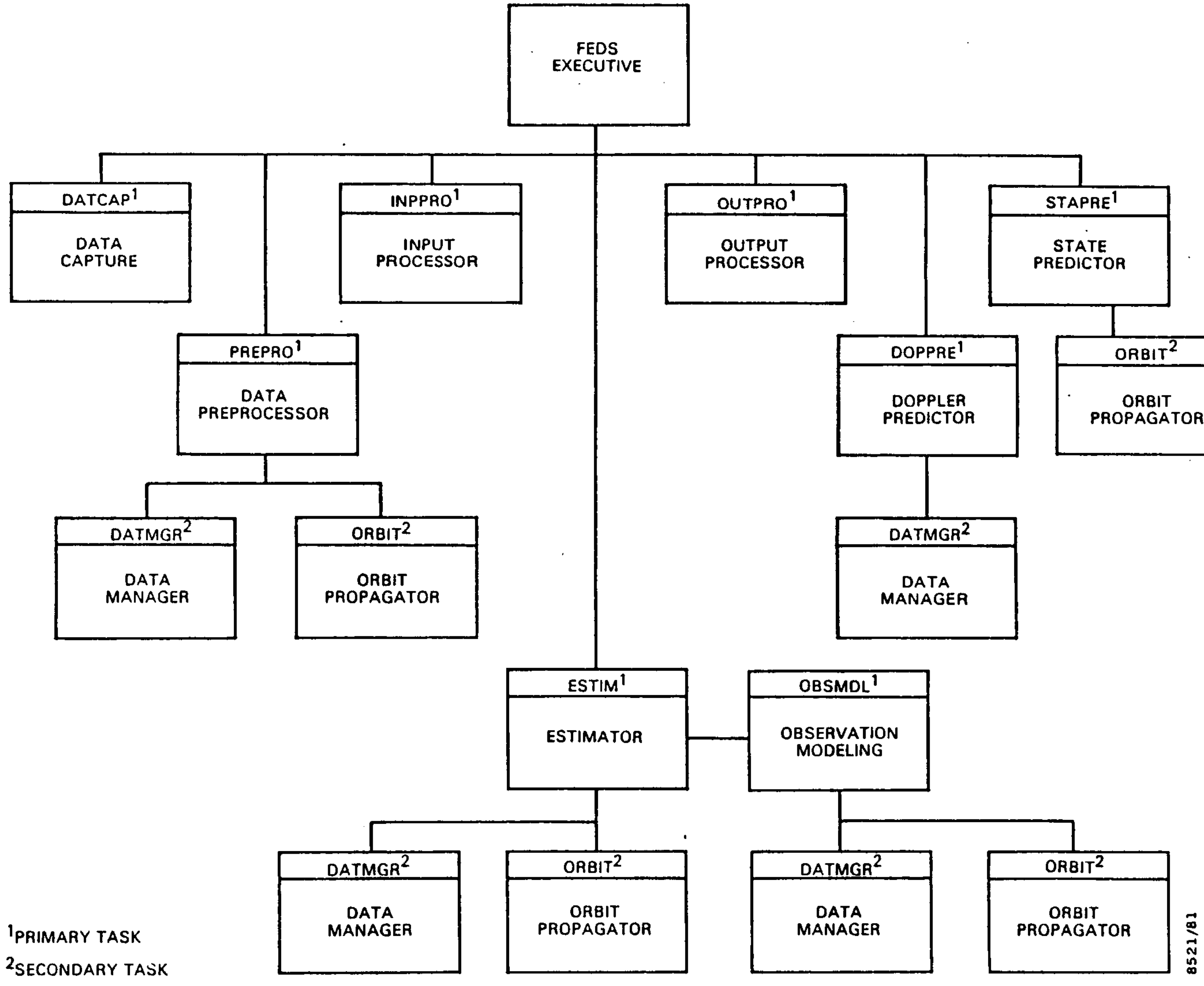

Figure 2-1. Hierarchy of FEDS Tasks

The executive task controls the execution of FEDS. It acts as a minioperating system that allocates time slices to the primary tasks based on the data received, uplinked schedules, the current status of the FEDS tasks, and a predetermined set of priorities. The executive task also generates an activity log based on system status messages from the other FEDS tasks. All error messages received by the executive are loaded in the activity log. When the error is considered severe, the message is also scheduled for immediate downlink to ground control. In addition, the executive task processes all control commands received from ground control.

2.1.1 PRIMARY TASKS

Primary tasks perform specific functions scheduled by the executive. Each primary task is completely controlled by the executive; the executive decides when a primary task is to be executed and determines which function the task is to perform. All communication between the executive and the primary tasks and all communication among the primary tasks are performed through global COMMON blocks. FEDS contains the following eight primary tasks:

1. Data Capture (DATCAP). This task captures all incoming messages, identifies uplinked control commands and notifies the executive, performs limited message validation, loads data and command messages into the input queue for later processing by the input processor, and loads observation messages into the observation buffer.

2. Input Processor (INPPRO). This task checks input messages for validity and stores input data in the appropriate global COMMON blocks.

3. Data Preprocessor (PREPRO). This task validates raw observation data and converts observation data to internal units, generates the Tracking and Data Relay Satellite

(TDRS) orbit files, updates the TDRS orbit files based on uplinked new TDRS vectors, and performs TDRS maneuver recovery.

4. Doppler Predictor (DOPPRE). This task predicts (simulates) one-way Doppler data for a specified time interval.

5. State Predictor (STAPRE). This task generates a predicted state vector table over a specified time interval based on the current best estimate of the user spacecraft state.

6. Estimator (ESTIM). This task performs least-squares estimation by means of a sliding batch process to estimate the six components of the user spacecraft state vector and, optionally, one atmospheric drag coefficient and three coefficients of the frequency model for the one-way Doppler data.

7. Observation Modeling (OBSMDL). This task computes one-way, averaged TDRSS Doppler observations and partial derivatives as requested by the estimator. OBSMDL is an extension of the estimator because of memory restrictions and is, therefore, mainly controlled by the estimator.

8. Output Processor (OUTPRO). This task prepares the messages to be downlinked, performs the actual downlinking of the messages to ADEPT, and outputs messages to the Communications Box.

2.1.2 SECONDARY TASKS

Secondary tasks perform functions that several of the primary tasks require to perform their duties. Because of this arrangement, a secondary task is controlled by the primary task that is currently using it. Communication between a secondary task and the primary task using it is performed by SEND and RECEEV system directives. A secondary task will, however, access global COMMON blocks for uplinked constants and control parameters. The two FEDS secondary tasks are as follows:

1. Data Manager (DATMGR). This task contains the observations file and two TDRS orbit files and performs all storage (writing) and retrieval (reading) of observation data and TDRS state vectors. It is used by the PREPRO, ESTIM, OBSMDL, and DOPPRE primary tasks.

2. Orbit Propagator (ORBIT). This task propagates the TDRS and user spacecraft state vectors using multistep integration and interpolation methods. It is used by the PREPRO, ESTIM, OBSMDL, and STAPRE tasks.

2.1.3 DATA FLOW

The 11 tasks that compose FEDS communicate with each other through the use of global COMMON blocks that are grouped by usage into four major global COMMON areas:

1. GLB1. This area contains all control information, the activity log and all information required to generate it, all global constants, the initialization table, and estimation control parameters.

2. GLB2. This area contains the observations queue, the new TDRS vectors, and the tracking and maneuver schedules.

3. GLB3. This area contains the predicted state vectors table, predicted one-way Doppler data, the differential correction (DC) summary and statistics report, and the DC residuals report to be downlinked. It also contains the global COMMON blocks that allow communication between the estimator and the observation model.

4. GLB4. This area contains the input queue.

All communication and data flow among primary tasks are performed using these global COMMON areas, and the executive communicates with the FEDS tasks through the global COMMON only. Figure 2-2 shows the interfaces of the FEDS tasks with the global COMMON areas and with each other.

The following information is input to FEDS (see Appendix C):

- Input data uplinked by ADEPT
    - New TDRS vectors
    - Maneuver schedule
    - Tracking schedule
    - Initialization table
    - Miscellaneous constants
    - Estimation control parameters
    - Station parameters
    - Geopotential tables
    - Atmospheric density table
    - Timing coefficients
    - Experiment parameters
- Input data transmitted by the Communications Box
    - Time-tagged Doppler Observation
    - External clock time
- Control commands from ADEPT
    - START
    - STOP
    - REBOOT
    - ABORT
    - SUSPEND
    - CONTINUE
    - MARK TIME
    - RESUME
    - BEGIN FAST TIMING
    - STOP FAST TIMING

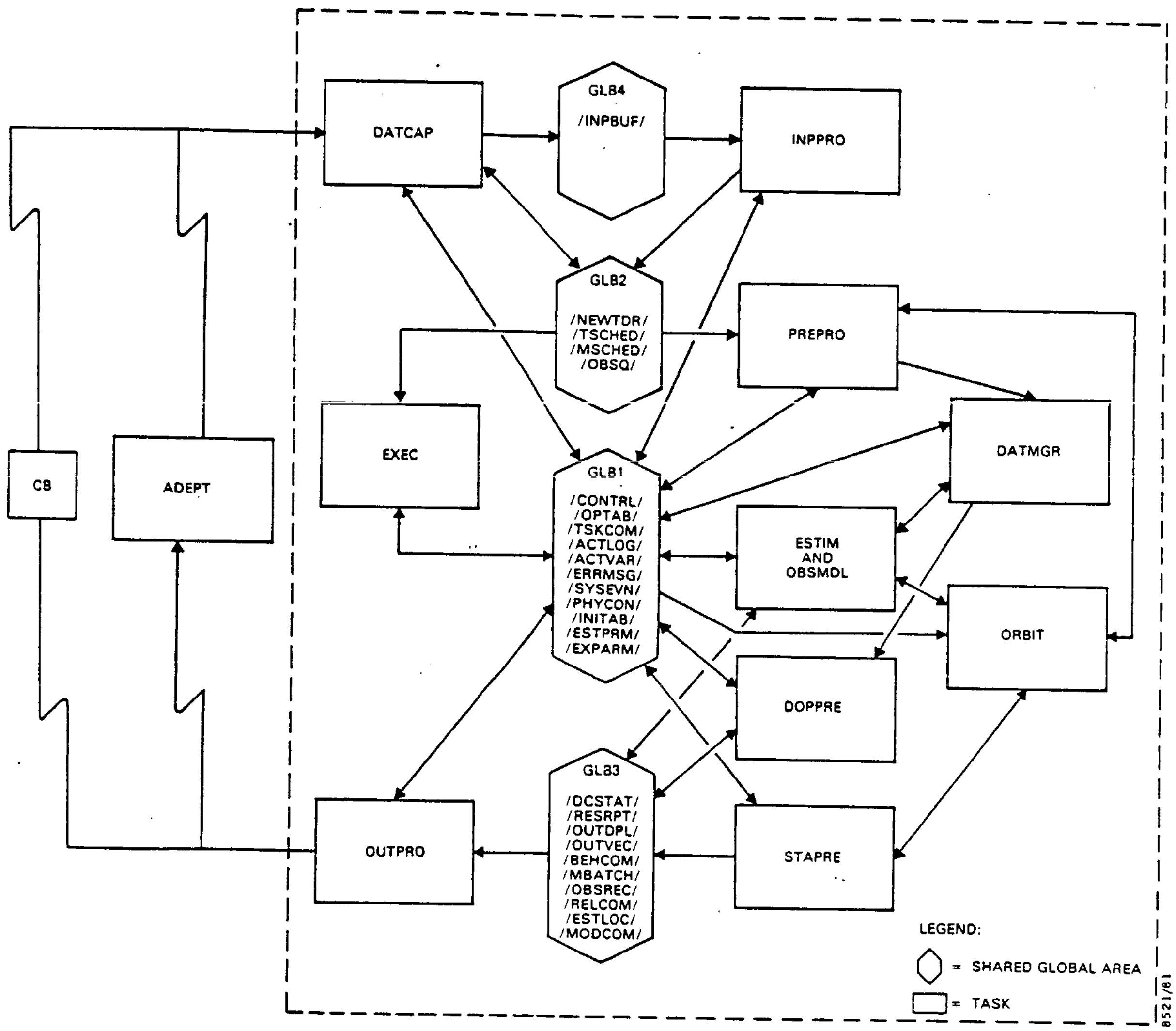

Figure 2-2. FEDS Data Flow

- SET CLOCK
- STATUS REQUEST

- Control Flags from the Communications Box

  - Carrier lock signal
  - Communications established signal

The following information is output from FEDS (see Appendix C)

- Output data downlinked to ADEPT

  - Activity log
  - Priority messages (critical error messages and idle time messages)
  - Predicted state vector tables
  - Predicted one-way Doppler frequency shift
  - DC residuals report from the estimator
  - DC summary and statistics report from the estimator

- Predicted one-way Doppler frequency shift data message output to the Communications Box

- Control messages output to the Communications Box

  - Communication initialization
  - Time request
  - Reset Doppler accumulator
  - Doppler measurement request

The flow of data through the FEDS tasks is as follows:

- FEDS Executive. EXEC uses task status information, tracking and maneuver schedules, and the system time along with knowledge of recently received uplinked data and control commands to assign functions to and schedule FEDS tasks for execution. It also maintains an activity log that is periodically downlinked to ground control. In addition, it generates critical error messages for downlink when necessary.

- Data Capture. DATCAP captures all uplinked messages on demand and loads them in the input queue for later processing. It also extracts all control commands and passes them to the FEDS executive for immediate processing. For messages from the transponder, DATCAP sets flags for the FEDS executive and loads observations into the observation buffer in /OBSQ/.

- Input Processor. INPPRO identifies all data in the input queue and loads all valid data into the appropriate global COMMON blocks where it will be used by the other tasks.

- Data Preprocessor. PREPRO preprocesses the observations data in the observations buffer in /OBSQ/, and sends it to the data manager in chronological order to be written in the observations file. PREPRO also generates and updates the TDRS orbit files based on uplinked TDRS vectors in /NEWTDR/.

- Data Manager. DATMGR reads or writes data in the observations file or in the TDRS orbit files as requested by the primary tasks. These files are stored internally in DATMGR memory.

- Estimator and Observation Modeling. ESTIM estimates the user spacecraft state and other solve-for parameters as specified in the initialization table in /INITAB/. The sliding batch estimation process is controlled by the estimation control parameters in /ESTPRM/. During estimation, ESTIM requests OBSMDL to compute observations, based on the current best estimate of the state (propagated by ORBIT), that correspond to the observations retrieved from the observations file by DATMGR. A state update is then computed and applied based on a comparison of the observed and computed values of the observations data. This process produces two output reports: a DC summary and statistics report, /DCSTAT/, and a DC residuals report, /RESRPT/, both of which are later downlinked to ground control.

- State Predictor. Using ORBIT, STAPRE generates the predicted state vector tables based on the current best estimate of the user spacecraft state. This information is stored in /OUTVEC/ for use by DOPPRE and for downlink to ground control.

- Doppler Predictor. DOPPRE predicts one-way Doppler data based on the user spacecraft vectors in the predicted state vector table in /OUTVEC/ and on the TDRS vectors retrieved from the TDRS orbit file through DATMGR. The predicted Doppler data is stored in /OUTDPL/ for downlink to ground control and output to the Communications Box.

- Output Processor. OUTPRO downlinks the output information to ground control and the Communications Box.

- Orbit Propagator. ORBIT propagates a given state vector; optionally computes the associated partial derivatives using a multistep integrator and interpolator; and sends the results to the requesting primary task.

2.1.4 TIME SYSTEMS IN FEDS

It is important to understand the time systems used in FEDS. To reduce the number of time conversions required in FEDS, all data time tags are converted on input to an internal time system in which most computations will be performed. Time tags on data to be output are then converted back to the external time system before downlink.

All incoming data are time tagged with a universal time coordinated (UTC) time in one form or another. Observation data times are in parallel grouped binary time code 5 (PB5) format consisting of the last four digits of the Julian day, seconds, and milliseconds. All time tags of state vectors and the times in uplinked schedules are input in YYMMDDHHMMSS.SS format. During input processing, all these times are converted to seconds from reference in atomic (A.1) time using the timing coefficients table. The advantage of A.1 time is that time advances at a constant rate; that is, no discontinuities occur periodically as in the UTC time system. Before information is downlinked, it is returned to UTC time in YYMMDDHHMMSS.SS format.

Two reference times are used throughout FEDS. The simulation reference time is the time that is uplinked in the START command in YYMMDDHHMMSS.SS format, synchronized to within several seconds of the PB5 generator. The system reference time is the system clock time (YYMMDDHHMMSS.SS) when the START command is received by FEDS. These two times, which actually represent the same time in two different ways, are used to synchronize the system clock time and the simulation time. After the simulation reference time and the system reference time have been established, an offset is computed to bring the simulation time into agreement with the PB5 generator. During FEDS demonstration, the PB5 generator was connected to a National Bureau of Standards pulse to allow synchronization to within 1 millisecond of current UTC. In this manner, FEDS can schedule simulation events based on the system clock.

At certain places in FEDS, times must be converted to a modified Julian date (modified by 2430000). This is made simple by computing and saving the modified Julian date of the simulation reference time. A time in seconds from reference can be converted to a modified Julian date by simply converting it to days and adding it to the reference Julian date.

Ephemeris time (ET) is also used in the orbit propagator to compute the position of the Sun and the Moon. When necessary, the orbit propagator performs this conversion.

2.1.5 DATA COLLECTION

FEDS collects observation data to perform orbit estimation so that the tracking signal can be acquired on subsequent passes and more observation data can be collected. For a flight system, a tracking signal would be transmitted at a constant frequency from a ground station and collected on board. The onboard system would then use the Doppler-shifted frequency record to estimate location. For a demonstration system, since the receiving transponder is essentially stationary, the frequency transmitted must be shifted to simulate data that would be received by a satellite in a given orbit. These data come in nominal 10-minute passes. The transponder forms an observation by adding the received frequency to a constant bias and accumulating data in a nondestruct mode in a 40-bit accumulator.

The flow of control of FEDS begins with the extension of the file of predicted Doppler frequency shift 5 minutes before the beginning of a pass. Twenty seconds before the beginning of a pass the transponder accumulator is reset to zero. To accomplish this, FEDS sends a message to the Communications Box to reset the accumulator, the Communications Box sends a message to the transponder to reset the accumulator, and the transponder resets the accumulator to zero. FEDS then requests a time message and uses the subsequent reply to update the current simulation time. The Communications Box accesses the PB5 generator and sends the current time to FEDS. FEDS then begins to output predicted Doppler frequency offset. When FEDS sends a predicted Doppler message, containing the predicted offset in the form of a frequency control word, the Communications Box passes the frequency control word to the transponder for use in signal acquisition. FEDS outputs a predicted Doppler message at a user-specified frequency, nominally once every 10 seconds.

When signal lock occurs, the Communications Box sends a signal lock message indicating that FEDS should stop transmitting predicted Doppler messages and that observation data is being collected. FEDS responds to the signal lock message with a request for a Doppler observation. When the Communications Box has received a Doppler observation request from FEDS and an accumulator reading from the transponder, it accesses the PB5 generator to obtain the current time and transmits an observation message. FEDS again responds by transmitting a request for a Doppler observation. This process will continue until the tracking signal is lost. FEDS will try to reacquire signal lock by resuming output of predicted Doppler messages until the end of the scheduled tracking pass. FEDS then performs end-of-pass processing to prepare for the next tracking pass.

The Doppler file is initially generated by the first execution for each tracking pass of the Doppler predictor wherein 60 records of data are written to the file. The Doppler file is extended throughout the pass in a wraparound manner so that at least half of the file (30 records) is in the future. This procedure maintains the immediate availability of the predicted frequency shift for output when the tracking signal is lost.

2.2 EXECUTIVE TASK

The FEDS executive task (EXEC) controls FEDS execution using the RSX-11M(S) system services. The executive controls what each FEDS primary task is doing and when each task is executing. Since FEDS is a real-time system, the FEDS executive must ensure that all schedules are met and that all time-critical functions are performed. The executive must monitor all FEDS queues, anticipate problems, and take action to avoid backlogs. The executive must also ensure that all incoming data are processed as quickly as possible by the time-consuming computational tasks. In addition, the execution must service uplinked control commands as soon as they are received.

Processing priorities can change rapidly in FEDS because of changing system status and uplinked schedules and data. This rapid changing of priorities requires that the executive be able to switch quickly from one primary task to another to ensure that the highest priority function is being performed at any given time. To accomplish this, the executive uses a timeslicing technique that allows a task to execute for only a specified length of time before the executive resumes control, reevaluates priorities, and allows the same or another task to execute during the next time slice, and so on.

Because the executive is executed at the end of each time slice, it is important that it be time efficient; for this reason, all sequential executive functions are included in one large routine called EXEC. Only time conversion routines and certain activity log generation subroutines that are used repeatedly throughout the executive are called by EXEC. A baseline diagram of the FEDS executive task is shown in Figure 2-3.

2.2.1 BASIC EXECUTIVE CONTROL TECHNIQUES

Because many FEDS functions must be performed simultaneously, the executive uses a combination of RSX-11M(S) system priorities, a basic timeslicing technique, and global system

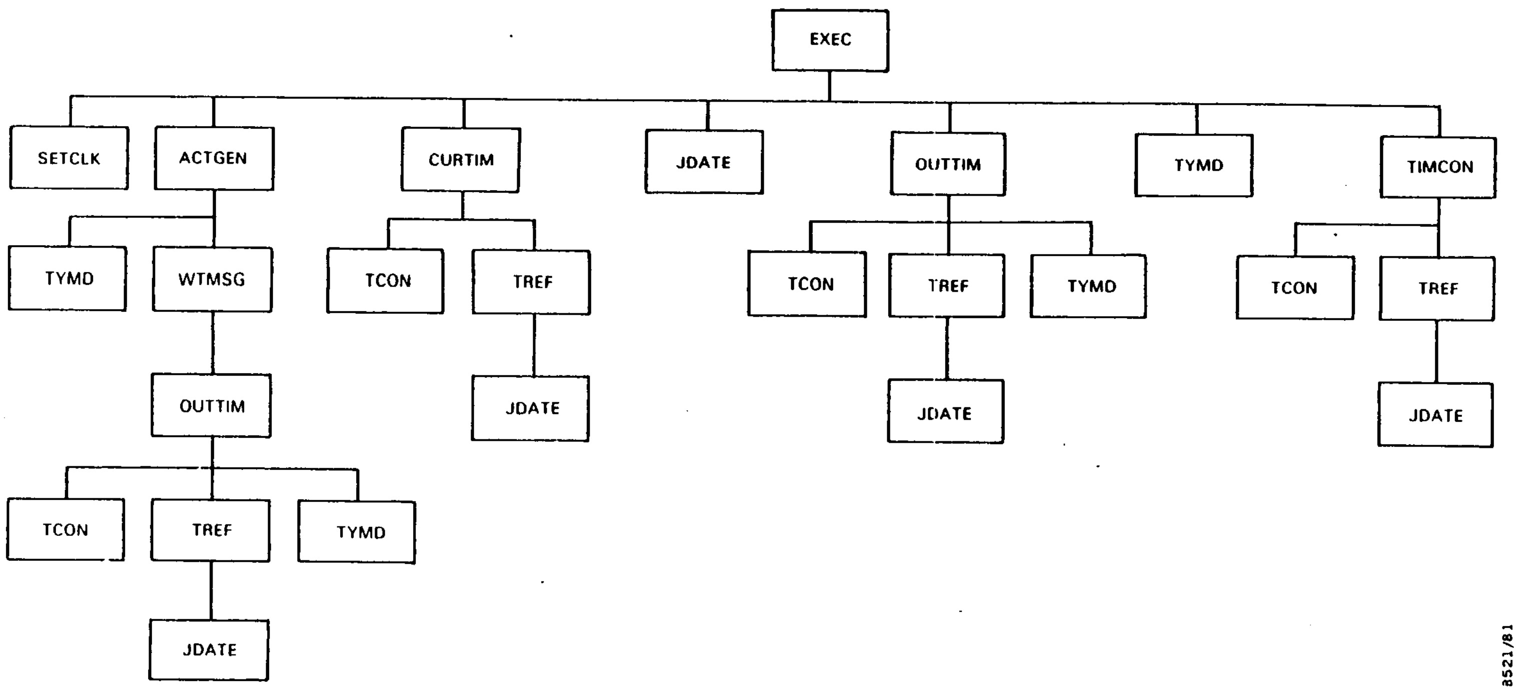

Figure 2-3. Baseline Diagram of EXEC

event flags to control the execution of FEDS primary tasks. Use of these techniques and the system services available under the RSX-11M(S) operating system enables the FEDS executive to give the central processing unit (CPU) to the primary task performing the highest priority function at any given time. These control techniques are described in the following subsections.

2.2.1.1 Use of RSX-11M(S) System Priorities

The FEDS tasks are assigned different RSX-11M(S) system priorities as shown in Table 2-1. With the knowledge of each task's priority and the relative priorities among the tasks, the executive can change the task that is executing rather easily. Based on the priorities given in Table 2-1 and on a fundamental understanding of the RSX-11M(S) operating system, FEDS will perform in the following ways:

- The data capture (DATCAP) task, which has the highest system priority, will interrupt any other task tnat is executing, including the executive, when it receives a message (one that satisfies a queue input/output directive (QIO) issued by DATCAP). This assures the executive that data will be captured on demand and without any direct supervision by the executive. After receiving the message, DATCAP issues another QIO and goes into a wait to the message source state, thereby removing itself from contention for the CPU until the next message is received.

- The executive, which has the second highest system priority (70), will gain control any time one of its wait conditions (WAITFR and WFLOR directives) is satisfied as long as DATCAP is not executing at the time. If DATCAP is executing, EXEC will gain control after DATCAP goes into a wait state.

Table 2-1. System Priorities of FEDS Tasks

TASK NAME	HIGH-PRIORITY LEVEL	LOW-PRIORITY LEVEL
EXECUTIVE – EXEC	70	70
PRIMARY TASKS		
DATA CAPTURE – DATCAP	80	80
INPUT PROCESSOR – INPPRO	50	1
DATA PREPROCESSOR – PREPRO	50	1
ESTIMATOR – ESTIM	50	1
OBSERVATION MODELING – OBSMDL	55	1
DOPPLER PREDICTOR – DOPPRE	50	1
STATE PREDICTOR – STAPRE	50	1
OUTPUT PROCESSOR – OUTPUT	50 (ADEPT) 65 (CB)	1
SECONDARY TASKS		
DATA MANAGER – DATMGR	60	60
ORBIT PROPAGATOR – ORBIT	60	60

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[1]THE HIGH PRIORITY IS ASSIGNED TO THE TASKS DURING TASK BUILDING.

- Secondary tasks (DATMGR and ORBIT) have a priority (60) between the primary tasks and the executive. They will be executed immediately whenever they are requested by a primary task and can be interrupted by either DATCAP or EXEC.

- Primary tasks other than DATCAP will execute only when other active FEDS tasks with higher priority are waiting or are suspended. If one primary task has a system priority of 50 and the others have a priority of 1, the task with priority 50 will be executed. Unlike the priorities assigned to other primary tasks, the high system priority assigned to OBSMDL is 55 rather than 50, which allows the operating system to complete housekeeping functions when OBSMDL exits before allowing the ESTIM task to continue.

Due to the time-critical nature of the information transmitted from FEDS to the Communications Box, OUTPRO has a higher priority (65) than that of the secondary tasks when outputting to the Communications Box.

2.2.1.2 Timeslicing

The FEDS time-slicing scheme is based on the rules just cited. The tasks that are time sliced are the primary tasks other than DATCAP. After these tasks are initialized, their system priority is set to 1. Then, whenever one of these tasks is to be executed, its system priority is raised to the high-priority level, allowing it to be the primary task that will execute when the higher priority tasks give up the CPU. Thus, when the executive selects a primary task to execute during the next time slice, it simply raises the system priority of that task. It then issues a system mark time (MARK TIME) directive and waits either for the primary task to complete or until the end of the time slice, whichever comes first. This allows the selected primary task to execute. When control returns to the executive, the system priority of that primary task is lowered to 1. It should be noted that the priority of OBSMDL is raised and lowered based on the priority of ESTIM when the estimator is scheduled.

This scheme is somewhat complicated when a primary task has requested (called) a secondary task that has not yet completed when the time slice ends. For example, primary task A at priority 50 is waiting for an event flag to be set by the secondary task running at priority 60. In this situation, the same procedure is followed when the executive takes control from the secondary task. Primary task A's priority is lowered to 1. When a new primary task, B (other than OUTPRO sending data to the Communications Box), is selected for the next time slice, its priority is raised to 50, and the executive gives up control by performing a MARK TIME. This time, however, the secondary task continues executing since its priority (60) is higher than that of the selected primary task B. When the secondary task completes and sets the event flag for which primary task A was waiting, task A does not gain control because its priority is 1. The system then selects task B, which has the highest priority (50) of the tasks contending for the CPU. This procedure ensures that execution of primary tasks will not be blocked by a request for a secondary task that is already in use by another primary task. When the primary task B is OUTPRO sending data to the Communications Box, the executive will raise OUTPRO's priority to 65. OUTPRO will then gain control of the CPU and execute to completion. Upon completion of OUTPRO, the executive will regain control to schedule the next primary task.

The length of the time slice is an EXEC parameter that may be set before compilation and task building are performed. This allows the executive to be tuned to use the optimum time slice. However, the time slice may not be changed during FEDS execution.

2.2.1.3 Use of Global System Event Flags

The RSX-11M(S) operating system has a set of global event flags available to all active tasks. A global event flag signals the occurrence of a specific event during execution. Each event flag is identified by a unique number. Global event flags allow one task to detect and control, if necessary, events occurring in other active tasks. They may be set and/or cleared by either active tasks or system services.

The FEDS executive uses these global event flags to monitor events occurring in other FEDS tasks. A list of the global event flags used by the FEDS executive and their functions is given in Table 2-2. In most cases, the executive uses these event flags as a means of regaining control after it gives up the CPU to a lower priority task.

2.2.2 FUNCTIONAL FLOW OF THE EXECUTIVE

The communication and the data flow between EXEC and the other FEDS tasks are shown in Figure 2-4. FEDS execution begins when the FEDS executive is started. The executive first performs an initialization procedure that includes initializing local variables that will be used to perform task scheduling and the startup and initialization of all other FEDS tasks except DATCAP (see Section 2.2.2.1). After each primary task is initialized, its system priority is lowered. The executive then starts DATCAP and directs it to perform initialization and to accept only the START command from ground control and Communications Box messages. The executive then directs OUTPRO to send the Communications Box an initialization message and waits for DATCAP to set event flag IFLAG7, indicating that communication with the Communications Box has been established. The executive will again wait until DATCAP sets IFLAG7, indicating that a control command (in this case, the START COMMAND) has been received.

Table 2-2. FEDS System Event Flags

LOGICAL NAME	ACTUAL EVENT FLAG NUMBER	FUNCTION	SET BY	CLEARED BY
IFLAG5	43	WHEN SET, IT SIGNALS THAT THE EXECUTING PRIMARY TASK HAS COMPLETED ITS ASSIGNED FUNCTION.	PRIMARY TASK	EXEC
IFLAG6	44	WHEN SET, IT SIGNALS THAT THE TIME SLICE HAS EXPIRED.	RSX-11M(S)	EXEC
IFLAG7	45	WHEN SET, IT SIGNALS THAT A CONTROL COMMAND OR MESSAGE FROM THE COMMUNICATIONS BOX HAS BEEN RECEIVED.	DATCAP	EXEC
IFLG10	46	WHEN SET, IT INDICATES THAT THE DATA MANAGER IS NOT ACTIVE; WHEN CLEAR, IT INDICATES THAT THE DATA MANAGER IS ACTIVE.	DATMGR	DATMGR
IFLG11	47	WHEN SET, IT INDICATES THAT THE ORBIT PROPAGATOR IS NOT ACTIVE; WHEN CLEAR, IT INDICATES THAT THE ORBIT PROPAGATOR IS ACTIVE.	ORBIT	ORBIT

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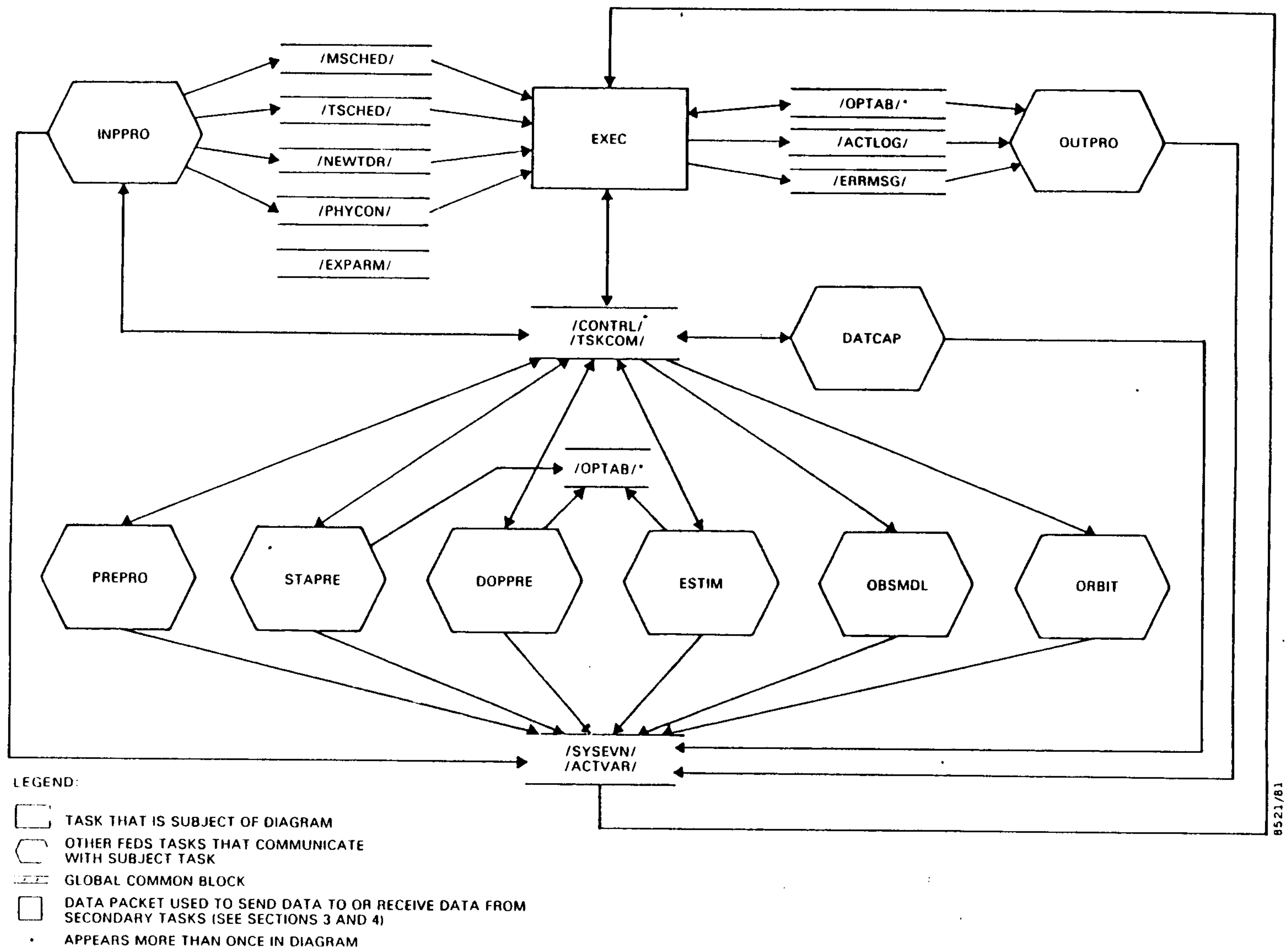

Figure 2-4. EXEC Data Flow

At this point, if a command has been received, the executive performs the functions dictated by the control command (see Section 2.2.2.2). After control command processing has been completed, the executive calls ACTGEN to enter a message in the activity log (see Section 2.2.2.5) about the control command processed. From this point on, DATCAP will execute asynchronously, taking control when a message is received, storing it in the input queue, and then waiting for another uplinked message.

Next, EXEC calls CURTIM to obtain the current time in seconds from reference. It then schedules tasks based on the current time, the uplinked tracking and maneuver schedules, FEDS control flags and parameters, and the FEDS output table. When the primary task that is to execute during the next time slice and the function it will perform have been determined (see Section 2.2.2.3), EXEC checks to see whether a command has been received. If so, EXEC goes back to command processing, responds to the command, and performs task scheduling as described above.

If no control command is present and if a primary task has been selected, the executive proceeds to transfer control to the primary task. EXEC does this by raising the system priority of the selected primary task as described in Section 2.2.1.2. EXEC then clears event flag IFLAG5 and issues a MARK TIME system directive. This effectively sets a timer for the time slice, whose length is selected from whichever is the larger: the default time slice or the time until output to the Communications Box is scheduled. Next, EXEC gives up the CPU by waiting until one of three event flags is set. IFLAG5 will be set by the primary task if it completes its function before the time slice is over; IFLAG6 will be set by the RSX-11M(S) system whenever the time slice has expired; and IFLAG7 will be set by DATCAP if a control command or Communications Box message is received. The executive will regain control when at least one of these event flags is set.

When EXEC regains control, it tests all three event flags to see which condition(s) caused it to regain control. If the time slice has not expired, it is canceled. At this point, EXEC checks to see whether the primary task that was executing was the input processor (INPPRO). If so, EXEC checks whether INPPRO was interrupted in the middle of processing a block of data (BLKFLG is true). If this is the case, EXEC directs INPPRO to complete processing that block of data and waits for it to return control to EXEC (IFLAG5 is set). This prevents a mixing of old and new data in global COMMON blocks. At this point, the system priority of the primary task is lowered. Next, EXEC calls ACTGEN to record status and error messages from the primary task in the activity log. At this time, any severe error messages that are to be entered in the activity log (see Section 2.2.2.5) are also downlinked to ground control.

EXEC then continues to determine why it regained control. If a control command or Communications Box message reception occurred (IFLAG7 is set) and if the primary task did not complete its function (IFLAG5 is clear), EXEC transfers control to the command processing section (after clearing IFLAG7) and proceeds as described above.

If, however, the primary task completed its assigned function or if an error occurred in the primary task (IFLAG5 is set), EXEC performs end-of-task processing (see Section 2.2.2.4). This includes performing FEDS housekeeping functions, clearing the primary task's directive (IDIR(I)) if the primary task has removed itself from the task scheduling list (IACT(I)=0), and setting the primary task's return flag (IRET(I)) to zero. EXEC then goes to the command processing section and begins the cycle again.

If no primary task is selected for execution during the next time slice, EXEC checks for idle time or a stop condition. If a STOP command has been received and if there is no more data to process, EXEC directs the output processor (OUTPRO) to downlink the activity log and then to downlink the end-of-simulation message. EXEC then waits until DATCAP receives a START command at which time processing will resume with command processing. However, if a STOP command has not been received, EXEC finds the time of its next scheduled event and computes the amount of idle time until that event. When the fast-timing option is on and an idle time message has not already been sent, EXEC creates an idle time message, directs OUTPRO to downlink it immediately, and waits until it has been completed. EXEC then transfers control to the command processing section and the cycle begins again.

2.2.2.1 FEDS Initialization

On initiation, EXEC performs an initialization procedure, which initializes all local variables used in the executive. Event flags IFLG10 and IFLG11 are set to indicate that the data manager task, DATMGR, and the orbit propagator task, ORBIT, are not executing. Each primary task (except DATCAP) is then started up and directed to perform initialization. To do this, the executive clears event flag IFLAG5, requests the primary task by name (REQUEST directive), and waits for IFLAG5 to be set by the primary task to indicate that it has finished initialization. This effectively suspends the executive and allows the primary task to execute. When control returns to EXEC, the primary task's system priority is lowered. This is repeated for each primary task.

Next, ORBIT is requested and directed to perform initialization in the same manner as primary tasks. Since ORBIT is a secondary task, its unique event flag, IFLG10, is used to indicate that ORBIT has finished initialization. Unlike the primary tasks, ORBIT will exit after performing initialization. This is the only direct interface that the executive has with a secondary task.

At this point, DATCAP is requested and directed to perform initialization and to accept only a START command from ground control. The executive then directs establishment of communication with the Communications Box and waits for DATCAP to set event flag IFLAG7 to indicate that a START command has been received.

2.2.2.2 Control Command Processing

When a control command is received by DATCAP, the executive immediately gains control through IFLAG7. The control commands are processed according to the FEDS requirements given in Appendix D. The only commands useful during the demonstration are START, STOP, and STATUS REQUEST. The remaining commands are either for testing purposes or placemarkers for commands needed by a flight system. The function of each control command is shown in Table 2-3. The executive responds to each specific control command as follows:

1. START command
   a. Sets the data capture directive to accept all valid uplinked messages
   b. Clears local flag ISTOP to allow FEDS processing to begin
   c. Sets the simulation reference times from the uplinked simulation reference time in the command

Table 2-3. Service Control Commands and Results

ACTION / COMMAND	OVERALL ACTION	INPUT	OUTPUT	COMPUTATIONAL TASKS	DATA	CODE
REBOOT	CONTROL GIVEN TO BOOT ROUTINE	LOST	LOST	LOST	LOST	LOST
ABORT	AODS ABORTED	ONLY START COMMAND ACCEPTED	ACTIVITY LOG DOWNLINKED	STOPPED ABRUPTLY	LOST	KEPT
STOP	DATA PROCESSING TERMINATED	ONLY START COMMAND ACCEPTED	OUTPUT COMPLETED NORMALLY	COMPLETED NORMALLY	LOST	KEPT
START	DATA PROCESSING INITIATED	ALL DATA TYPES ACCEPTED	STANDARD OUTPUT INITIATED	REGULAR PROCESSING INITIATED	COLLECTED	NOT AFFECTED
SUSPEND	CURRENT COMPUTATIONAL PROCESSES SUSPENDED	ALL DATA TYPES ACCEPTED	STANDARD OUTPUT CONTINUES	SUSPENDED	KEPT	KEPT
CONTINUE	SUSPENDED COMPUTATIONAL PROCESSES RESUMED	ALL DATA TYPES ACCEPTED	STANDARD OUTPUT CONTINUES	RESUMED IF NOT AFFECTED BY INPUT; RESTARTED IF AFFECTED BY INPUT	KEPT	KEPT
STATUS REQUEST	ACTIVITY LOG OBTAINED	NOT AFFECTED	ACTIVITY LOG DOWNLINKED	NOT AFFECTED	NOT AFFECTED	NOT AFFECTED
SET CLOCK	CLOCK ADJUSTED FOR FAST TIMING	NOT AFFECTED	ADJUSTED FOR TIME CHANGE	ADJUSTED FOR TIME CHANGE	NOT AFFECTED	NOT AFFECTED
MARK TIME	ALL PROCESSING STOPPED	ONLY RESUME COMMAND ACCEPTED	STOPPED	STOPPED	KEPT	KEPT
RESUME	ALL PROCESSING RESUMED	ALL DATA TYPES ACCEPTED	RESUMED	RESUMED	KEPT	KEPT
BEGIN FAST TIMING	ALL IDLE TIME WILL BE COMPRESSED OUT	NOT AFFECTED	NOT AFFECTED	NOT AFFECTED	NOT AFFECTED	NOT AFFECTED
STOP FAST TIMING	AODS WILL RUN AT ITS REAL-TIME PACE	NOT AFFECTED	NOT AFFECTED	NOT AFFECTED	NOT AFFECTED	NOT AFFECTED

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d. Establishes the FEDS system reference time by accessing the system clock

e. Synchronizes the simulation time with the PB5 generator

f. Computes and stores the Julian date of the simulation reference time

g. Gets the current time (from reference) and defaults the first activity log downlink time

h. Begins task scheduling

2. STOP command

   a. Sets the data capture directive to accept only a START command

   b. Sets local flag ISTOP that will cause FEDS processing to stop (to wait for START command) after all available data is processed and currently scheduled activities have been completed

3. REBOOT command

   a. Aborts all active FEDS tasks (primary and secondary)

   b. Aborts EXEC

   c. Requests the system boot routine (only a dummy boot routine is available at this time)

4. ABORT command

   a. Directs OUTPRO to downlink the activity log and waits until OUTPRO has completed

   b. Aborts all active FEDS tasks

   c. Sets local flag INITLZ to cause the executive to reinitialize and to start over the next cycle

5. SUSPEND command. Suspends computational tasks to allow uplink of constants, tables, and/or control parameters that may affect them

   a. Temporarily suspends the Doppler predictor, state predictor, and estimator (unless the estimator is performing maneuver recovery bookkeeping) by removing the appropriate tasks from the scheduling list

   b. Sets local flag SUSPEN to keep the DOPPRE, STAPRE, and ESTIM tasks from being scheduled

6. CONTINUE command

   a. Directs INPPRO to process all input in the input queue up to the CONTINUE command and waits until INPPRO is finished.

   b. If an initialization table, the estimation control parameters, a geopotential table, an atmospheric density table, and/or the station parameters have been received since suspension, EXEC aborts the estimator, sets the appropriate restart flag, and requests ESTIM. This causes ESTIM to restart the function it was performing when the SUSPEND control command was received; otherwise, EXEC allows ESTIM to continue by putting it back in the scheduling list.

   c. If geopotential tables or atmospheric density tables have been received since suspension, EXEC aborts both DOPPRE and STAPRE, sets the appropriate restart flags, and requests these tasks. This allows them to restart the functions they were performing the next time they are scheduled for execution; otherwise, EXEC allows them to continue as before by inserting them in the scheduling list.

d. Clears local flag SUSPEN to indicate that suspension is over.

7. MARK TIME command

   a. Directs DATCAP to accept only a RESUME command

   b. Stores the time that the FEDS mark time began (current time from reference)

   c. Sets local flag MRKTIM to indicate that FEDS is marking time

   d. Waits for event flag IFLAG7 to be set to indicate that a RESUME command was received

8. RESUME command

   a. If the system is not marking time, EXEC rejects the command.

   b. Computes the time pad necessary to make the timespan of the mark time transparent to FEDS tasks.

   c. Clears local flag MRKTIM to indicate that the mark time is over.

9. BEGIN FAST TIMING command

   a. Sets local flag FAST to indicate that the fast-timing option is on

   b. Sets the minimum idle time allowed in FEDS from the time in the command

10. STOP FAST TIMING command: Clears local flag FAST to indicate that the fast-timing option is off

11. SET CLOCK command (used only when fast timing is on)

    a. Increments the system time pad by the number of seconds in the command, which effectively compresses out the specified amount of idle time

    b. Gets the new current time

    c. Adjusts the activity log output time by the number of seconds in the command

12. STATUS REQUEST command: Directs OUTPRO to downlink the activity log and wait until it has completed

2.2.2.3 Task Scheduling

The executive schedules FEDS primary tasks for execution based on a series of logical tests performed by the executive. These tests were derived from the FEDS functional requirements included in Appendix D. Although each task can perform more than one function, only one function may be scheduled for one task at one time. However, all tasks may be scheduled simultaneously.

To reduce the execution time of the executive, the scheduling logic for each task is coded so that the smallest number of logical tests is executed to determine the highest priority function that the task is to perform. In most cases, this means scheduling the lowest priority function first so that it can be overridden by a higher priority function later, when necessary.

Tasks are scheduled by setting task directive IDIR(I) (where I is the task number or ID) to the proper function number. When no function is scheduled to be performed by task I, then IDIR(I) = 0. When a task is currently being executed, only a limited set of tests will be performed to see whether the schedule should be altered for that task.

After the highest priority function for each task has been identified and the directives have been set accordingly, the corresponding IACT(I) flag is set to 1 for each task to be scheduled. The task scheduled to perform the highest priority function is then identified by using a preset table of priorities in EXEC called IPRIOR. This table contains a FEDS priority (one that has nothing to do with RSX-11M(S) system priorities) for each function that can be performed by each task. When there is more than one task with the highest priority, a round-robin scheduling technique is used by which each task is given a time slice in turn.

Once the task is identified, the task's RSX-11M(S) system priority is raised (set to the primary task execution priority). A MARK TIME system directive is then set up for the length of a time slice, and the primary task is allowed to begin or to continue executing until it finishes its assigned function (IFLAG5 is set), until the time slice has expired (IFLAG6 is set), or until a control command or Communications Box message is received (IFLAG7 is set).

The task scheduling tests performed by the executive for each primary task are described in the following paragraphs. The tests are performed in the order given. Each successive positive decision overrides the previous one for a specific task. The executive sets the system directive for the primary tasks based on the following conditions:

1. DATCAP is not scheduled by the executive in this fashion because of its asynchronous I/O function.

2. INPPRO

   a. If there is data in the input queue, EXEC directs INPPRO to process input data (IDIR(2)=1).

b. If the input queue is almost full, EXEC directs INPPRO to process input data at a higher priority (IDIR(2)=2).

c. If there is no more data in the input queue and if the directive was set otherwise, EXEC does not direct INPPRO to process input data (IDIR(2)=0).

3. PREPRO

a. If the estimator is not running and if the preprocessor is not already scheduled, the executive does the following:

(1) If an observation buffer is full, it directs PREPRO to preprocess a buffer of observation data (IDIR(3)=1).

(2) If new observations have recently been added to the observations file, it directs PREPRO to extend the TDRS orbit files to cover the next scheduled tracking pass (IDIR(3)=6).

(3) If a new TDRS vector has been received and if the corresponding TDRS file has been created and is not currently busy, it directs PREPRO to update the entire corresponding TDRS orbit file (IDIR(3)=3).

(4) If a new TDRS maneuver update vector has been received and if the corresponding TDRS orbit file has been created and is not currently busy, it directs PREPRO to update the portion of the corresponding TDRS orbit file since the last maneuver (IDIR(3)=5).

(5) If a new TDRS vector has been received and the corresponding TDRS orbit file has not been created and if a tracking schedule for Doppler prediction has been received, it directs PREPRO to generate the corresponding TDRS orbit file over a current timespan (IDIR(3)=7).

(6) If the transponder is not currently locked onto the tracking signal and the current time is more than 30 seconds past the scheduled end of the tracking pass, it directs PREPRO to preprocess all observations data in the buffer and to perform end-of-pass processing (IDIR(3)=2).

b. If the preprocessor has not already been scheduled and if it is time for a TDRS maneuver and the corresponding TDRS orbit file has been created and is not currently busy, EXEC directs PREPRO to perform the maneuver for the specified TDRS (IDIR(3)=4 and ITDRSS = IDMAN).

4. DOPPRE: If DOPPRE is not already scheduled, the executive does the following:

a. If the current time is past the scheduled Doppler prediction time and an initialization table has been received, EXEC directs DOPPRE to extend the current table of predicted one-way Doppler data (IDIR(6)=2).

b. If the above tests have been passed and DOPPRE has not been requested to predict data for the current pass, EXEC directs DOPPRE to generate a table of predicted Doppler data (IDIR(6)=1).

5. STAPRE: If STAPRE is not already scheduled, the executive does the following:

   a. If it is time to generate a state predict table (done at regular scheduled intervals) and if an initialization table is present, EXEC directs STAPRE to extend the current state vector table (IDIR(8)=1).

   b. If a new state solution has been obtained (by the estimator), EXEC directs STAPRE to generate a new state predict table based on the new state solution (IDIR(8)=2).

   c. If a new initialization table has recently been received, EXEC directs STAPRE to generate a new state predict table based on the new a priori state vector given in the initialization table (IDIR(8)=3).

   d. If it is time for a user spacecraft maneuver, EXEC directs STAPRE to generate a new state predict table based on the estimated state after the maneuver and to perform maneuver recovery housekeeping functions (IDIR(8)=4).

6. ESTIM

   a. If the estimator is not currently scheduled, the executive does the following:

      (1) If this is the first batch and the observation timespan is equal to or larger than the requested batch timespan, EXEC directs ESTIM to perform a complete estimation (IDIR(5)=1).

      (2) When there is new data in the observations file, when the timespan of the observations file is adequate for a batch,

and when estimation precomputation has been performed, EXEC directs ESTIM to finish the estimation process using the new data (IDIR(5)=3).

(3) If the estimator has not been directed to do anything else in tests 1 and 2 above and if this is not the first batch, EXEC directs ESTIM to perform estimation precomputation (IDIR(5)=2).

b. If a user spacecraft maneuver has been identified by the preprocessor during observation preprocessing and the estimator is not currently executing, EXEC directs ESTIM to perform maneuver recovery (IDIR(5)=4).

c. When the estimator is currently scheduled to perform estimation precomputation but has not started yet, if new data has been added to the observations file, and if the observation timespan is adequate, EXEC directs ESTIM to perform complete estimation (IDIR(5)=1).

7. OUTPRO

a. If any of the following tests are passed, EXEC directs OUTPRO to output the specified function code (ICODE) to the Communications Box (IDIR(7)=10).

(1) If the current time is less than 20 but more than 10 seconds before the scheduled start time of the current pass and the accumulator in the transponder has not been reset since the last pass, EXEC directs OUTPUT to send a reset accumulator message (ICODE=1).

(2) If the current time is less than 10 seconds before the scheduled start time of the current pass and the PB5 generator has not been accessed to obtain an accurate estimate of the current time, EXEC directs OUTPRO to request a clock time message from the Communications Box (ICODE=2).

(3) If the current time is later than the scheduled time to output a predicted Doppler frequency shift, EXEC directs OUTPRO to form and transmit a frequency control word (ICODE=3).

(4) If the transponder is locked onto the tracking signal and all requests for observation messages have been filled, EXEC directs OUTPRO to request an observation message (ICODE=4).

b. EXEC sets the activity log lock flag in the output table when it is time for regular activity log downlink.

c. EXEC loops through the output table, /OPTAB/, to locate the highest priority output requested by other tasks through the table; if any are found, EXEC directs OUTPRO to downlink output tables starting with the highest priority entry (IDIR=1, 2, 3, 4, 5, or 6).

2.2.2.4 End-of-Task Processing

After a task returns control to the executive by setting IFLAG5 to indicate that it has completed its assigned task, EXEC performs end-of-task processing. This consists of a series of housekeeping functions based on the particular primary task that executed during the time slice. The end-of-task housekeeping functions performed for each primary task are as follows:

1. DATCAP: No housekeeping is required

2. INPPRO: No housekeeping is required

3. PREPRO

   a. If PREPRO has completed end-of-pass processing (IDIR(3)=2), EXEC searches through the remainder of the tracking schedule for the next scheduled tracking interval and sets the corresponding executive scheduling parameters.

   b. If PREPRO performed TDRS Maneuver recovery (IDIR(3)=4), EXEC searches through the remainder of the maneuver schedule until it finds the next scheduled TDRS maneuver; it then updates the corresponding executive scheduling parameters.

4. ESTIM

   a. If ESTIM has not yet finished (IACT(5).GT.0) but has returned only to record an error message in the activity log, no housekeeping is performed.

   b. If ESTIM has just finished a complete estimation cycle (IDIR(5).EQ.1), EXEC sets the first-time estimation flag (FIRST) to false.

   c. If ESTIM has just finished estimation (IDIR(5).EQ.3 or 1), EXEC sets the data ready for estimation flag (NEWOBS) to false.

d. If ESTIM has just finished processing a user spacecraft maneuver (IDIR(5).EQ.4), EXEC sets the time of the last maneuver processed by PREPRO past the end time of the simulation.

5. DOPPRE: If DOPPRE has just finished generating the first 60 predicted frequency shift records, EXEC sets the time to transmit a predicted Doppler shift to the transponder to the time of the first record in the file

6. OUTPRO: If OUTPRO has just sent a message to the transponder, EXEC does one of the following:

   a. If OUTPRO sent a request for clock time, EXEC sets a flag to indicate that the clock has been accessed for this pass.

   b. If OUTPRO sent a command to reset the accumulator in the transponder, EXEC sets flags indicating that the accumulator has been reset before the upcoming pass and that the transponder is not currently locked onto the tracking signal.

   c. If OUTPRO has just transmitted a predicted Doppler shift to the transponder, EXEC schedules the next time to transmit a predicted Doppler shift and sets the time slice to whichever is larger: time until output of the next predicted Doppler shift or the default time slice.

   d. If OUTPRO has sent a request for an observation, EXEC sets a flag indicating that a request for data is pending and sets the time to output the next predicted frequency shift to the current time.

7. STAPRE: If STAPRE has just performed user spacecraft maneuver recovery (IDIR(8).EQ.4), EXEC searches through the remainder of the maneuver schedule to locate the next scheduled user spacecraft maneuver and sets the corresponding executive scheduling parameters

After task-specific, end-of-task processing has been performed, EXEC clears the task directive (IDIR(I)=0) for the primary task that was executing if the task has removed itself from the scheduling list (IACT(I).EQ.0). In all cases, EXEC also clears the return status (error) flag (IRET(I)=0) for the primary task.

2.2.2.5 Activity Log Generation

Activity log generation is performed by subroutine ACTGEN. Each time messages are to be inserted in the activity log, EXEC calls ACTGEN specifying the task that has recently executed. ACTGEN then checks the status flags and return status flags for the specified task in global COMMONs /SYSEVN/ and /TSKCOM/, respectively, to identify those messages that are to be entered in the activity log.

For each message to be generated, ACTGEN stores the message number and contents that it retrieves from global COMMONs /ACTVAR/ and /CONTROL/ in local COMMON /ALMESG/. For messages that contain times as part of their contents, ACTGEN converts the times to YYMMDDHHMMSS.SS format when necessary.

Once each message has been created, ACTGEN calls WTMSG to enter the message in the activity log. WTMSG first time tags the activity log message; then the message is inserted in the next available location in the activity log, /ACTLOG/. If the activity log is full, WTMSG directs OUTPRO to downlink it immediately and waits until OUTPRO has completed the downlink. During the demonstration, all messages put into the activity log are also displayed on a terminal.

If the critical error flag is set by ACTGEN, the message is also downlinked as a critical error message. To do this, WTMSG loads the message into global COMMON /ERRMSG/ and directs OUTPRO to downlink it immediately. WTMSG waits until OUTPRO has completed the downlink and then automatically loads another message in the activity log stating that a critical error message was downlinked.

When all indicated messages for the specified task have been generated and entered in the activity log, ACTGEN returns control to EXEC.

2.2.3 ERROR HANDLING

Error handling is a combined effort between the executive and the primary task where the error occurred. Errors occurring in secondary tasks are reported through the primary task that called them.

When an error occurs in a primary task, the primary task evaluates the seriousness of the error. If the task can continue but the error should be recorded, return status flag IRET(I) is set. When the executive regains control, the error message will be entered in the activity log. If the task can continue but the error should be recorded immediately or, optionally, a critical error message should be downlinked to ground control, the return status flag is set, and the primary task immediately gives up control by setting IFLAG5. However, since the primary task can continue, it does not remove itself from the scheduling list. This guarantees that it will get another time slice to continue processing.

When the primary task cannot continue processing due to a critical error, the primary task sets the return status flag appropriately, removes itself from the scheduling list (IACT(I)=0), performs other housekeeping functions necessitated by the error, and gives up control by setting IFLAG5.

When the executive regains control, it enters the error message in the activity log and, optionally, based on preset indicators, downlinks the critical error message to ground control.

2.2.4 FAST-TIMING FEATURE

The fast-timing feature allows a simulation case using the Communications Box simulator to run faster than real time by compressing idle time out of the simulation. When a BEGIN FAST TIMING control command is received by FEDS, the fast-timing option is turned on. This feature is not selected during demonstration executions because the demonstration must proceed in real time.

From this point until a STOP FAST TIMING control command is received by FEDS, the following procedure is performed. Whenever FEDS has nothing scheduled immediately, it finds the time of its next scheduled event. When the amount of idle time (i.e., the time between the current time and the time of the next scheduled event) in FEDS is greater than the maximum amount of idle time permitted during fast timing (uplinked in the BEGIN FAST TIMING command), FEDS downlinks the time of the next scheduled event in an idle time message to ADEPT.

When the simulator receives this message, it checks its list of scheduled events. When an urgent command or data retransmission is required, the simulator ignores the idle time message. Otherwise, if the amount of idle time (i.e., the time between the current time and the next scheduled uplink time) in the simulator is greater than the maximum amount of idle time permitted during fast timing, the simulator sets the amount of idle time to be compressed out (Δt) to the smaller of the FEDS idle time and the simulator idle time. The simulator then moves its current time ahead to compress out the idle time and uplinks to FEDS the amount of idle time to be compressed out (Δt) in a SET CLOCK control command. When FEDS receives the SET CLOCK control command, it adjusts the onboard current time by the uplinked Δt. At this point, the idle time has been compressed out of both systems. This process is repeated each time idle time is discovered in FEDS.

2.3 INFORMATION PROCESSING TASKS

Five FEDS tasks are mainly responsible for data movement, manipulation, and/or conversion:

- Data Capture (DATCAP)
- Input Processor (INPPRO)
- Data Preprocessor (PREPRO)
- Data Manager (DATMGR)
- Output Processor (OUTPRO)

The following subsections provide a functional description of each task, including baseline diagrams and data flow diagrams.

2.3.1 DATA CAPTURE (DATCAP) TASK

The primary responsibility of DATCAP is to receive uplinked data from ADEPT and observations data from the Communications Box and to dispatch them from the uplink buffer to the input message queue in the FEDS system. It also screens the uplinked message for high-priority data types. If the uplinked message is a high-priority type, DATCAP dispatches it to the executive for immediate use. DATCAP has the highest system priority of all the tasks in FEDS to allow it to capture data immediately after they are uplinked. Figure 2-5 is a baseline diagram of DATCAP; Figure 2-6 shows the communication and data flow among DATCAP and other FEDS tasks.

During initialization (INIT(1)=1), the input message queue pointers and counters are initialized. DATCAP clears all global system flags to indicate that it has not yet received

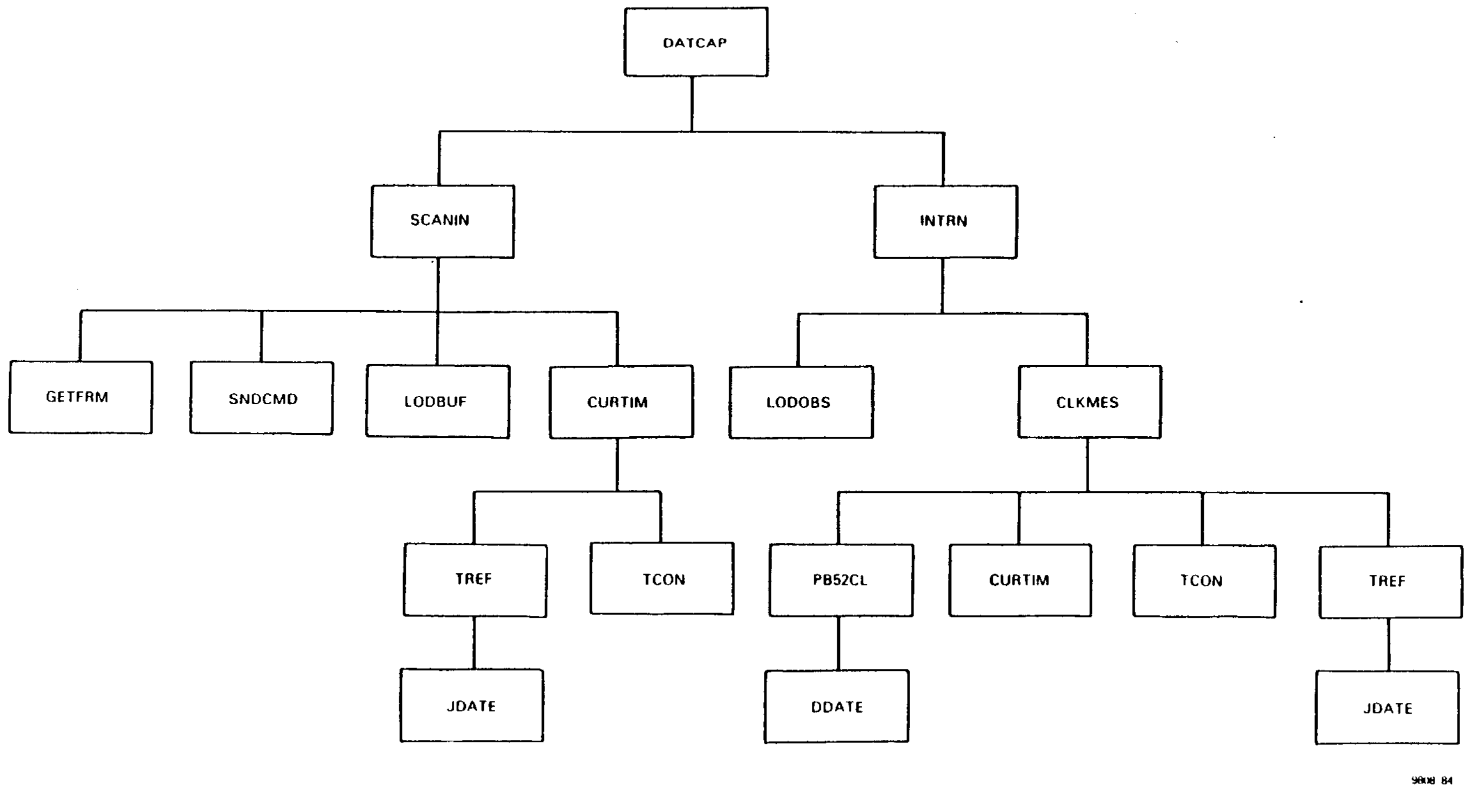


Figure 2-5. Baseline Diagram of DATCAP

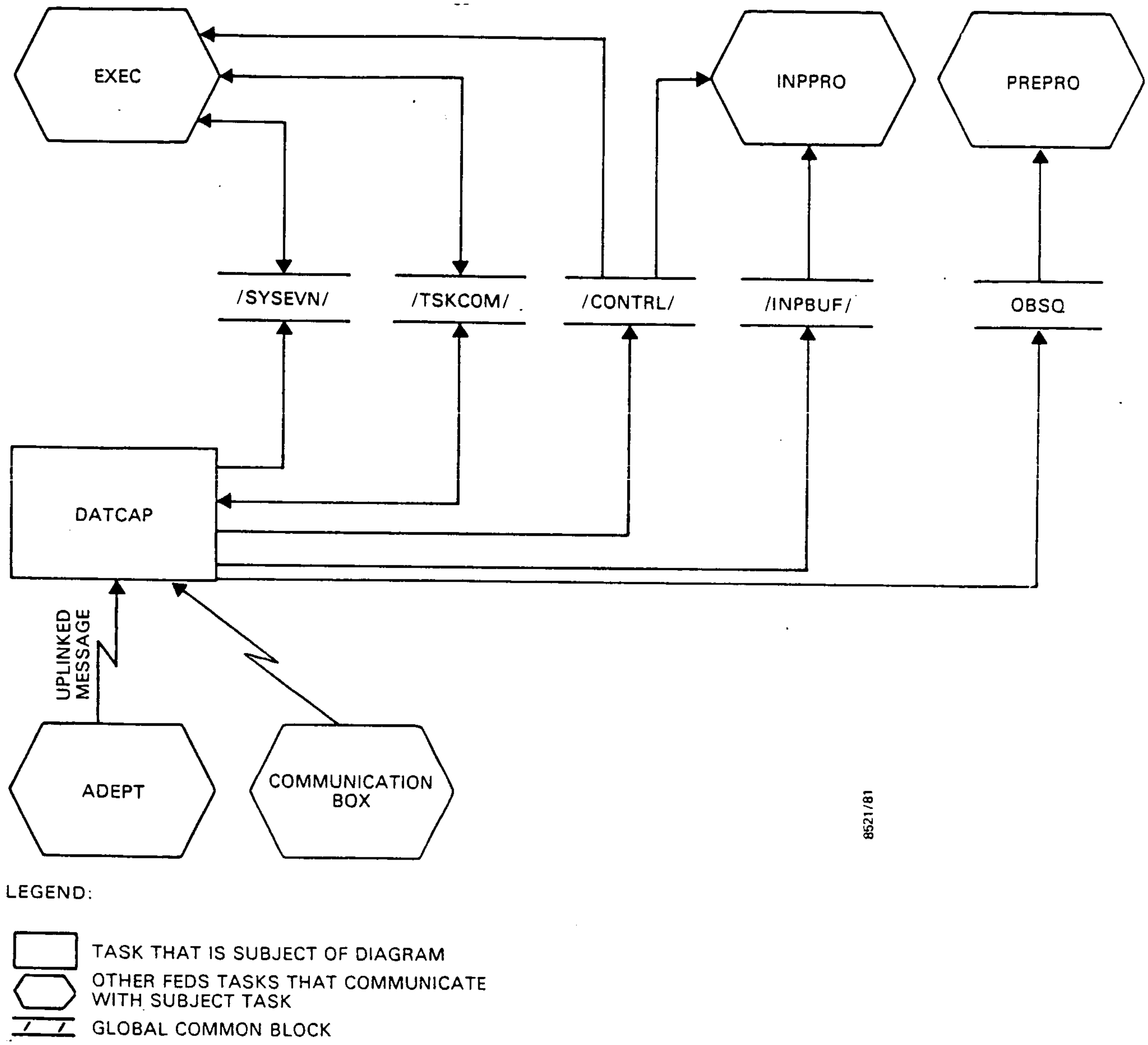


Figure 2-6. DATCAP Data Flow

a command message, a sentinel record, or a data message. DATCAP also clears the input message queue flag to indicate that no messages have been received.

DATCAP issues a "ready" message to ground control by using WTQIO to signal that it is ready to receive the next uplinked message. It then issues QIOs to read the line to receive data from ADEPT and the line connecting FEDS to the Communications Box. At this point, DATCAP goes into a "wait" state and surrenders the CPU to allow other tasks to execute while it is waiting for a message. When a message arrives, DATCAP immediately takes control and receives the message because of its status as the highest priority task.

DATCAP first identifies the source of the message. If the message is from the Communications Box, DATCAP performs all processing and data storage before informing the FEDS executive that a message has been received from the Communications Box. If the message is from ADEPT, DATCAP performs preliminary validity checks on the uplinked message and sets the appropriate return status flag to inform the FEDS executive of the status of the QIO. DATCAP then proceeds to scan the uplinked message.

There are three types of messages uplinked from ADEPT: input data messages, high-priority control command messages, and the sentinel (end-of-transmission) record (see Appendix C). If the message is a sentinel record, subroutine SCANIN sets the global status flags to inform the FEDS executive and subroutine LODBUF loads it into the global COMMON /INPBUF/. If the synchronization characters in the uplinked message record header are bad, LODBUF loads the entire corrupted message into the input queue to keep the pointers consistent. The input processor will handle the corrupted message later. SCANIN next checks to see whether the message is acceptable.

If DATCAP has been directed by the executive to accept all incoming messages (IDIR(1)=1), it checks the type of message. If it is a control command, SCANIN first calls GETFRM to extract the command frame and then calls SNDCMD to transfer the command to the executive by means of global COMMON /CONTRL/ and to set global event flag IFLAG7 to notify the executive that a control command was received. SCANIN next calls LODBUF to store the uplinked message (data or command) in the input queue.

If DATCAP has been directed by the executive to accept only a specific control command (e.g., a START command (IDIR(1)=2), a RESUME command (IDIR(1)=3), or a CONTINUE command (IDIR(1)=4)) and if the message contains the specified command, SCANIN calls SNDCMD to transfer the command to the executive by means of global COMMON /CONTRL/ and to set IFLAG7 to inform the executive that the command for which it is waiting has been received and is ready for processing. SCANIN then calls LODBUF to load the command in the input queue. If the message did not contain the specified command, the message is ignored, except when DATCAP is looking for a CONTINUE command, when all data messages are to be accepted.

After the message process, if the message was from ground control, DATCAP issues another "ready" message to the ground to indicate that it is ready to receive the next message. After issuing the QIO to read to the source of the previous message, DATCAP waits for the next message and the process begins again with the reception of that message. This process continues until DATCAP is aborted by the FEDS executive.

2.3.2 INPUT PROCESSOR (INPPRO) TASK

INPPRO is a primary task in FEDS. Its main function is to empty the input queue, /INPBUF/, and to store the input data in the appropriate global COMMON blocks. Figure 2-7 is a baseline diagram of INPPRO; Figure 2-8 shows the communication and data flow among INPPRO and other FEDS tasks.

During initialization (INIT(2)=1), INPPRO calls subroutine IPINIT to initialize all local flags and the observations queue link-list pointers. INPPRO then sets global event flag IFLAG5 to return control to the executive. When INPPRO is given control again by the executive, it calls subroutine GTHEAD to extract the record header of the first record in the block and to perform a set of quick validity checks on the record header, including data corruption, end of transmission, validity of input type and input data indicators, transmission number, and block ID number. If an error is found by GTHEAD, INPPRO calls STERR to perform error recovery and sets IFLAG5 to give up control. Otherwise, INPPRO waits until the input queue has a complete block of data and then calls the appropriate subroutine to process the input message block. A list of the subroutines and the type of data they process follows.

Subroutine	Item Processed
STINIT	Initialization table
STEST	Estimation control parameters
STTDRS	New TDRSS vectors
STMANS	Maneuver schedule
STTRKS	Tracking schedule
STMISC	Miscellaneous constants
STSTAN	Station parameters
STGEO	Geopotential tables
STATM	Atmospheric density tables
STTIMF	Timing coefficients or constants
STEXP	Experiment parameters

The input data is stored in the proper global COMMON block where it will be used later by other FEDS tasks.

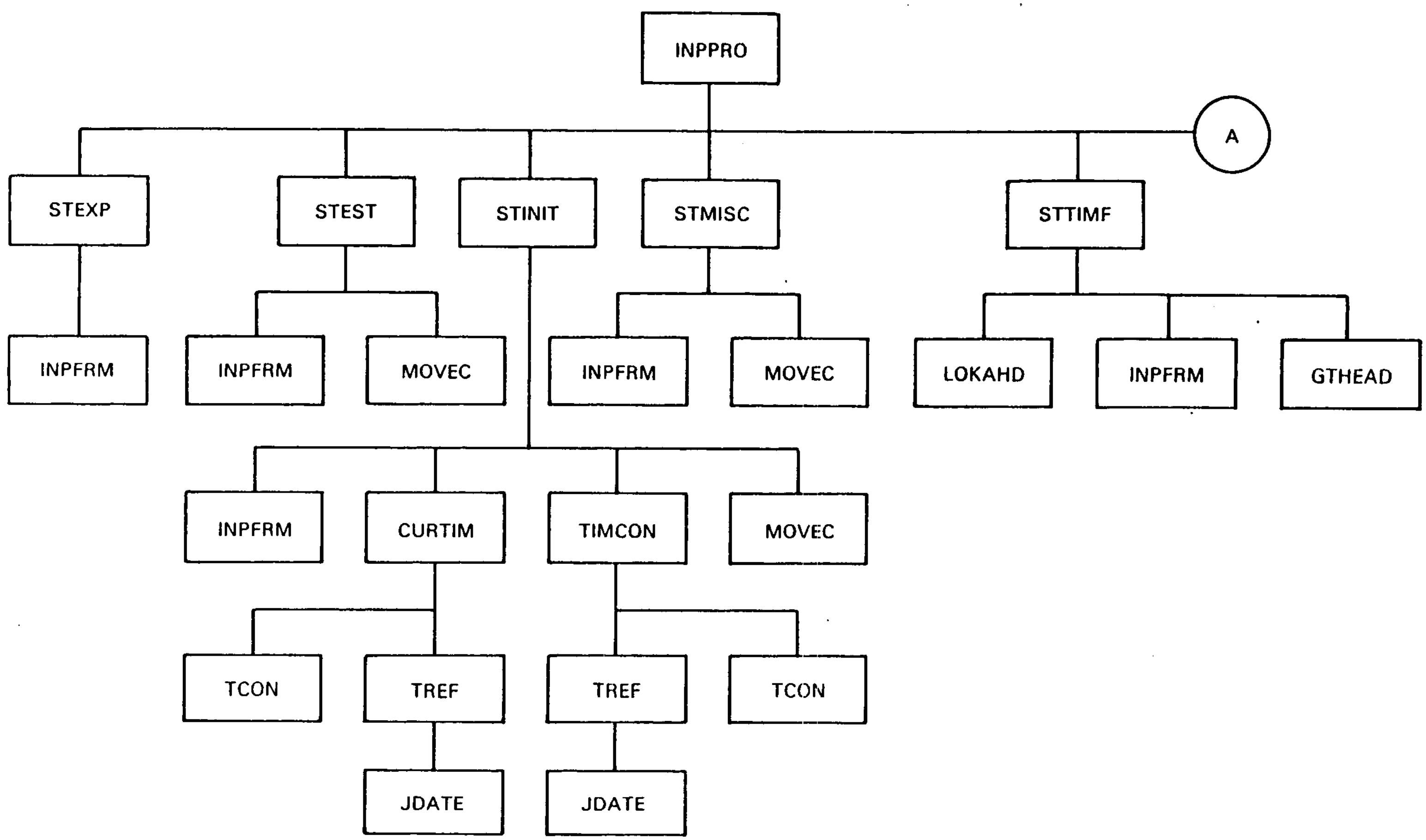


Figure 2-7. Baseline Diagram of INPPRO (1 of 3)

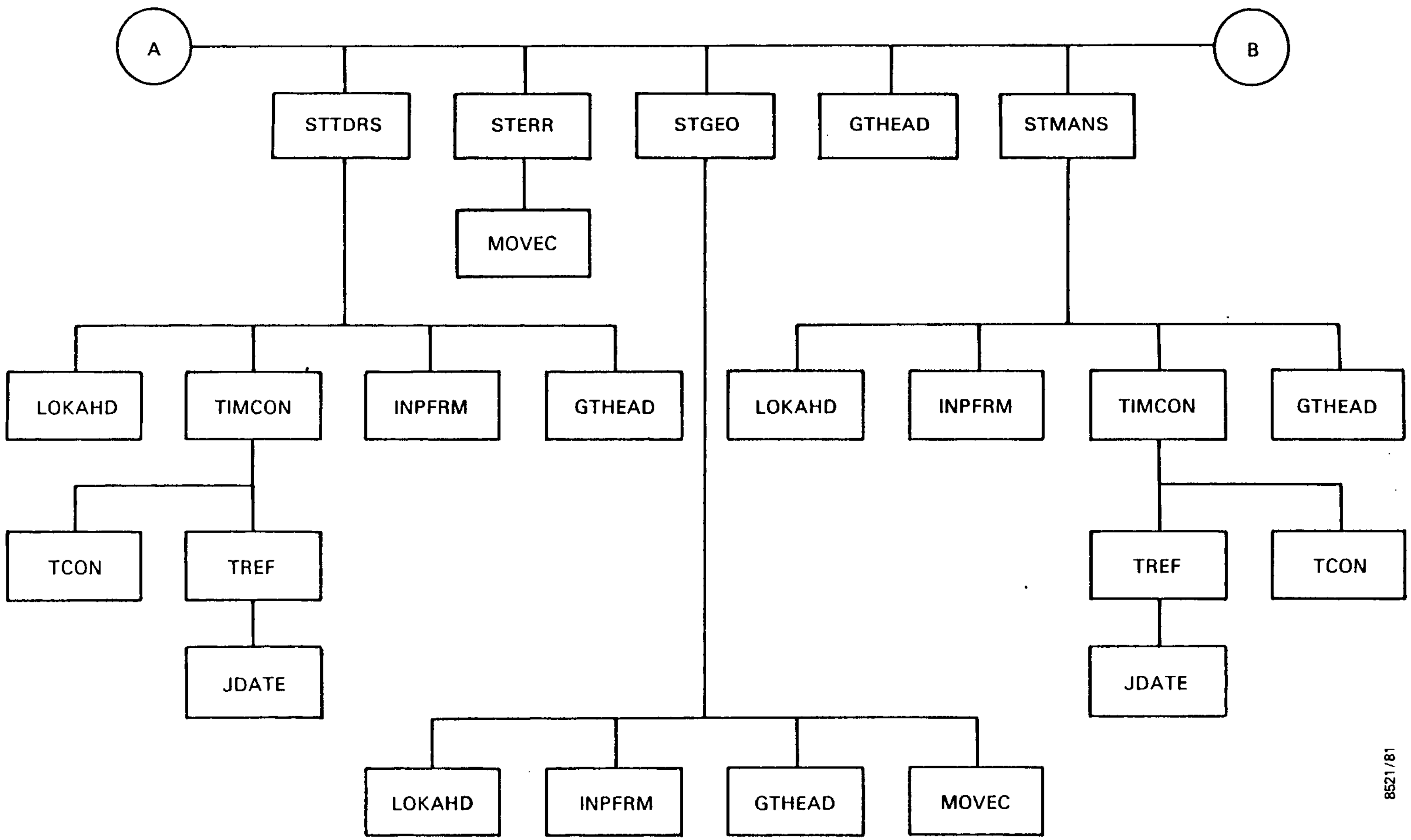


Figure 2-7. Baseline Diagram of INPPRO (2 of 3)

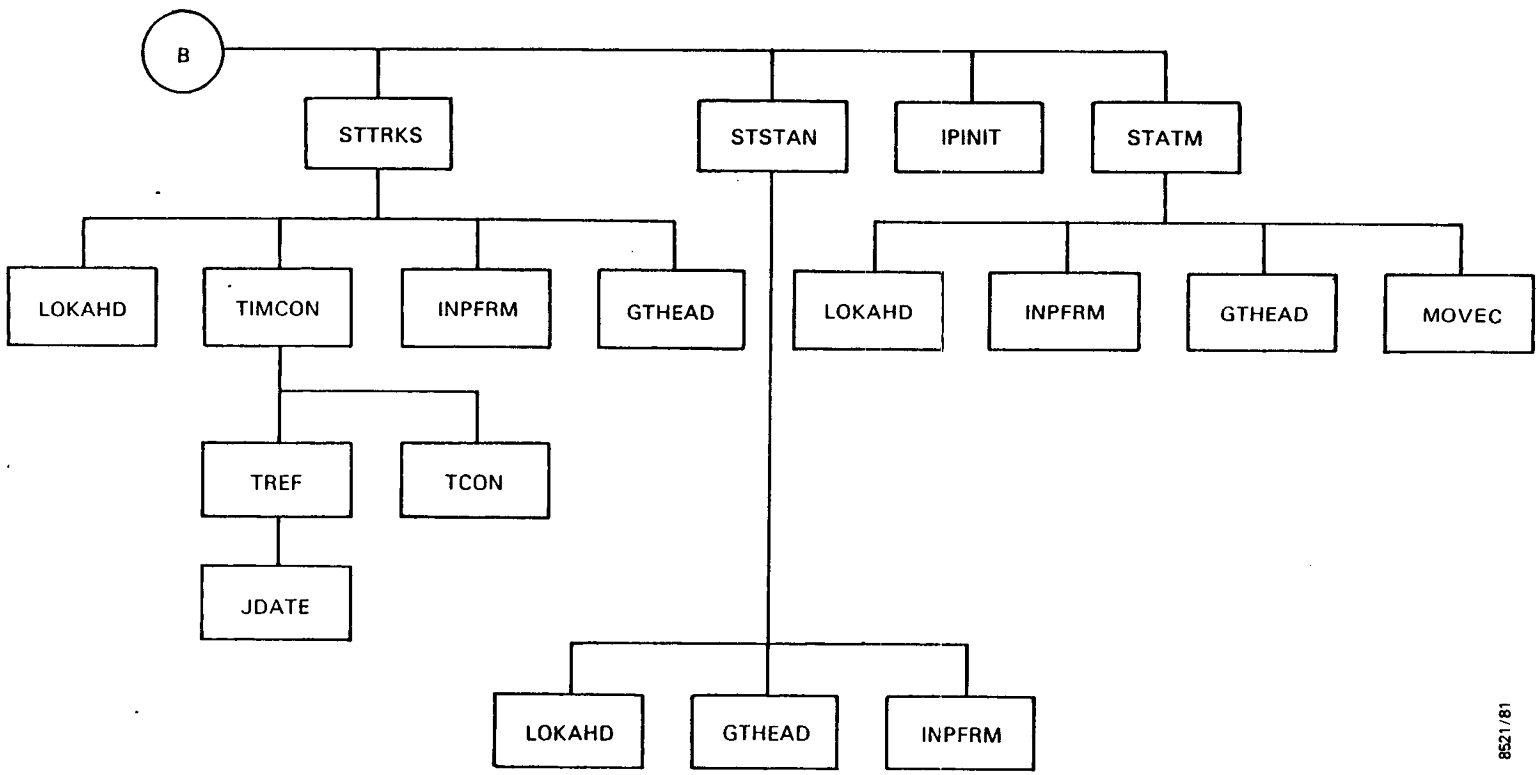


Figure 2-7. Baseline Diagram of INPPRO (3 of 3)

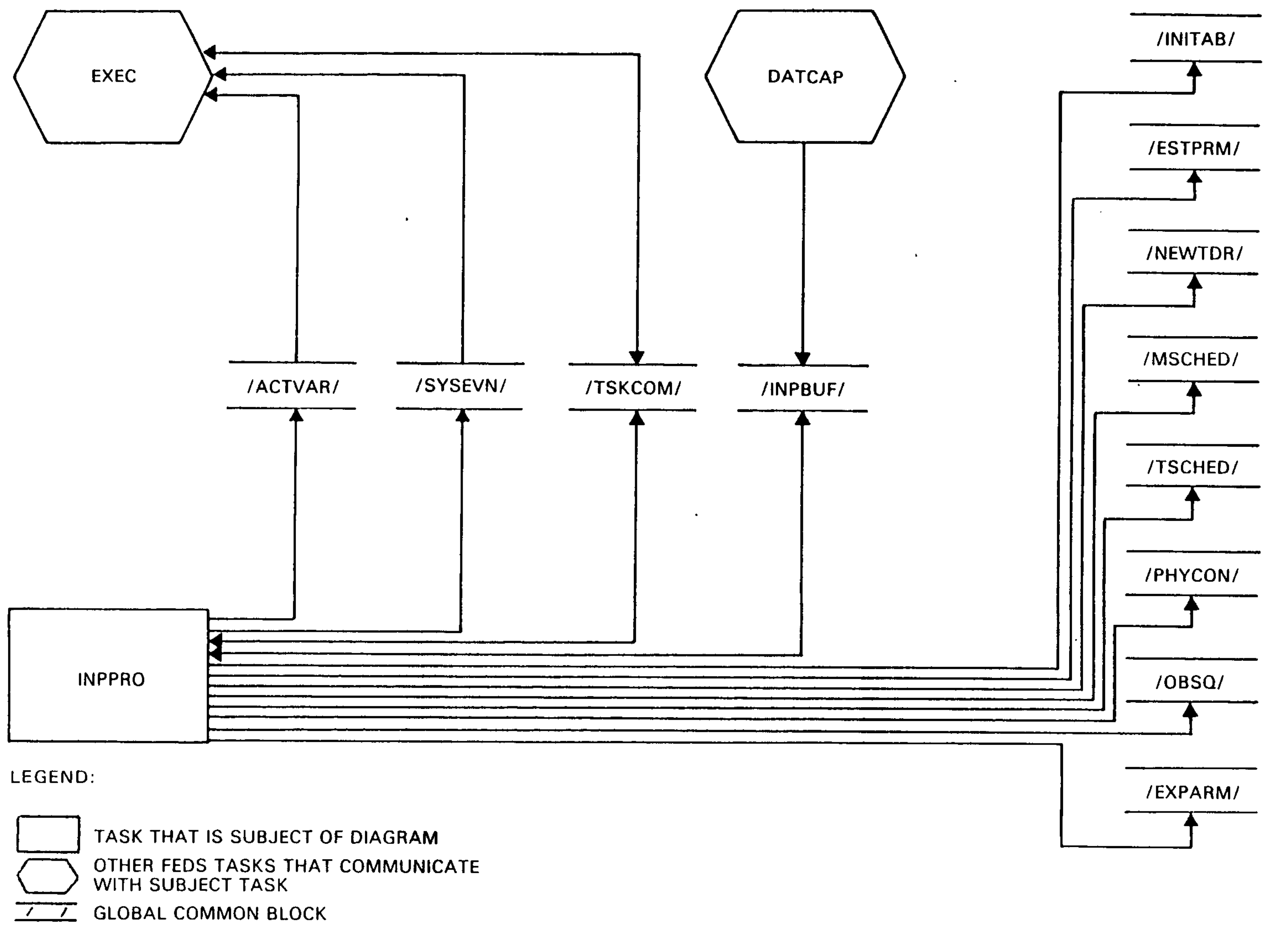


Figure 2-8. INPPRO Data Flow

The subroutine that processes and stores the particular type of input message also validates each block of data before storing any part of it in the global COMMON block. The data block is checked for completeness and for corrupted messages. If the message block is valid, it is then checked to see whether it is acceptable input at this time, based on the data previously received. For instance, miscellaneous constants can never be accepted after the first initialization table has been received. Geopotential tables, station parameters, and atmospheric density tables may be accepted only between a SUSPEND command and a CONTINUE command once data processing has begun. Estimation control parameters may be accepted only when the estimator/observation model is not executing or between SUSPEND and CONTINUE commands.

Once input processing has begun for a particular block of data, the processing subroutine sets BLKFLG to true to indicate that the INPPRO task is in the middle of processing a contiguous block of input messages. This is a safeguard to guarantee that an entire block of input data will be stored in a COMMON block at the same time. If an INPPRO time slice ends and if BLKFLG is true, the executive will allow INPPRO to finish processing the current block of messages before resuming control. Each time input processing of a message block is completed, BLKFLG is set to false.

If an error or an unacceptable message block is discovered during input processing of a specific message block, INPPRO calls subroutine STERR to store the information in global COMMON /ACTVAR/; this information will be used by the executive to record the error in the activity log and, optionally, to downlink a critical error message. When data corruption or an incomplete message block is detected, the record header information is supplied for the critical error message to allow ground control to identify and retransmit the erroneous message block. After STERR has stored this information, INPPRO sets IFLAG5 to return control to the executive so that it may report the error.

If no errors were found during input processing of the particular message block, INPPRO updates the input queue pointers and counters. It then continues to the next message block and begins processing it with the call to GTHEAD described earlier.

The means by which the input processor task voluntarily gives up control depends on the input processor directive (IDIR(2)) set by the executive. If INPPRO has been directed to process all messages available in the input queue (IDIR(2)=1 or 2), INPPRO will continue processing message blocks until the input queue is empty or until an end-of-transmission record is detected. At this point, INPPRO will reinitialize the input queue pointers and counters and will report to the executive, through global parameters, on the condition that caused it to stop. It then removes itself from the scheduling list (IACT(2)=0) and sets IFLAG5 to return control to the executive.

If INPPRO has been directed to process all messages up to the CONTINUE command (IDIR(2)=3), it will continue processing until it detects the CONTINUE command. At this point, it sets the appropriate return status flag, removes itself from the scheduling list, and sets IFLAG5 to return control to the executive.

If INPPRO has been directed to finish processing the current message block only (IDIR(2)=4), INPPRO stops when it has completed the current block. INPPRO is directed to do this when it has not completed processing a message block when the time slice expires. At this point, INPPRO removes itself from the scheduling list and sets IFLAG5 to return control to the executive.

2.3.3 DATA PREPROCESSOR (PREPRO) TASK

PREPRO is an independent primary task in FEDS. Each time it is given control, it is directed by the executive to perform a specified function.

During initialization (INIT(3)=1), PREPRO calls PPINIT to clear the local variables and to request the (secondary) DATMGR task and directs it to purge the observations file and the TDRS orbit files. PREPRO then sets IFLAG5 to return control to the executive.

When PREPRO regains control, it examines task directive IDIR(3) set by the executive to determine which of the following functions it is to perform:

- Preprocess the observation data, buffer full of data (IDIR(3)=1)
- Preprocess the observation data until end of data encountered, set end-of-processing flags, pass has ended (IDIR(3)=2)
- Generate new TDRS orbit files (IDIR(3)=7)
- Extend the TDRS orbit files (IDIR(3)=6)
- Update orbit file (IDIR(3)=3 or 5)
- Perform TDRS maneuver recovery (IDIR(3)=4)

To perform these functions, PREPRO uses the DATMGR and/or ORBIT secondary tasks. The communication between PREPRO and these secondary tasks is performed using the global task directive, return flag and global variables, utility subroutines VSEND and VRCEVE, and global event flags. Detailed descriptions of the methods for requesting DATMGR and ORBIT are given in Sections 2.3.4 and 2.4.1, respectively.

When PREPRO finishes its assigned function, it reports its activities to the executive by setting the global flags and by updating the global variables that will be used to generate activity log messages. PREPRO then removes itself from the scheduling list (IACT(3)=0) and sets IFLAG5 to return control to the executive.

Descriptions of the four major functions performed by PREPRO are given in the following subsections. Figure 2-9 is a baseline diagram of PREPRO; Figure 2-10 shows the communication and data flow among PREPRO and other FEDS tasks. An accompanying description of the send/receive data packets is given in Appendix E.

2.3.3.1 TDRS Orbit File Generation

Two separate directives cause PREPRO to generate TDRS orbit files. These directives cause the same basic function to be performed; however, the method for computing the start and end times of the orbit files is different.

When PREPRO is directed to create the TDRS orbit files (IDIR(3)=7), the start time of the file is set to the simulation reference time and the end time is set to 10 minutes past the end of the first scheduled tracking pass. This directive is used only at the beginning of the simulation.

When PREPRO is directed to extend the TDRS orbit files (IDIR(3)=6), PREPRO sets the end time of the orbit files to 10 minutes after the end time of the next scheduled tracking pass. This directive is used after a tracking pass has ended or, possibly, when a new tracking schedule is uplinked.

When PREPRO is directed to perform either of these functions, new TDRS vectors for the requested timespan are added to all existing TDRS orbit files. If the orbit files are being created for the first time, one file is created for each unique new TDRS vector received (up to two TDRSs). Thus, all TDRS orbit files will have the same start and end times when PREPRO has completed its assigned function.

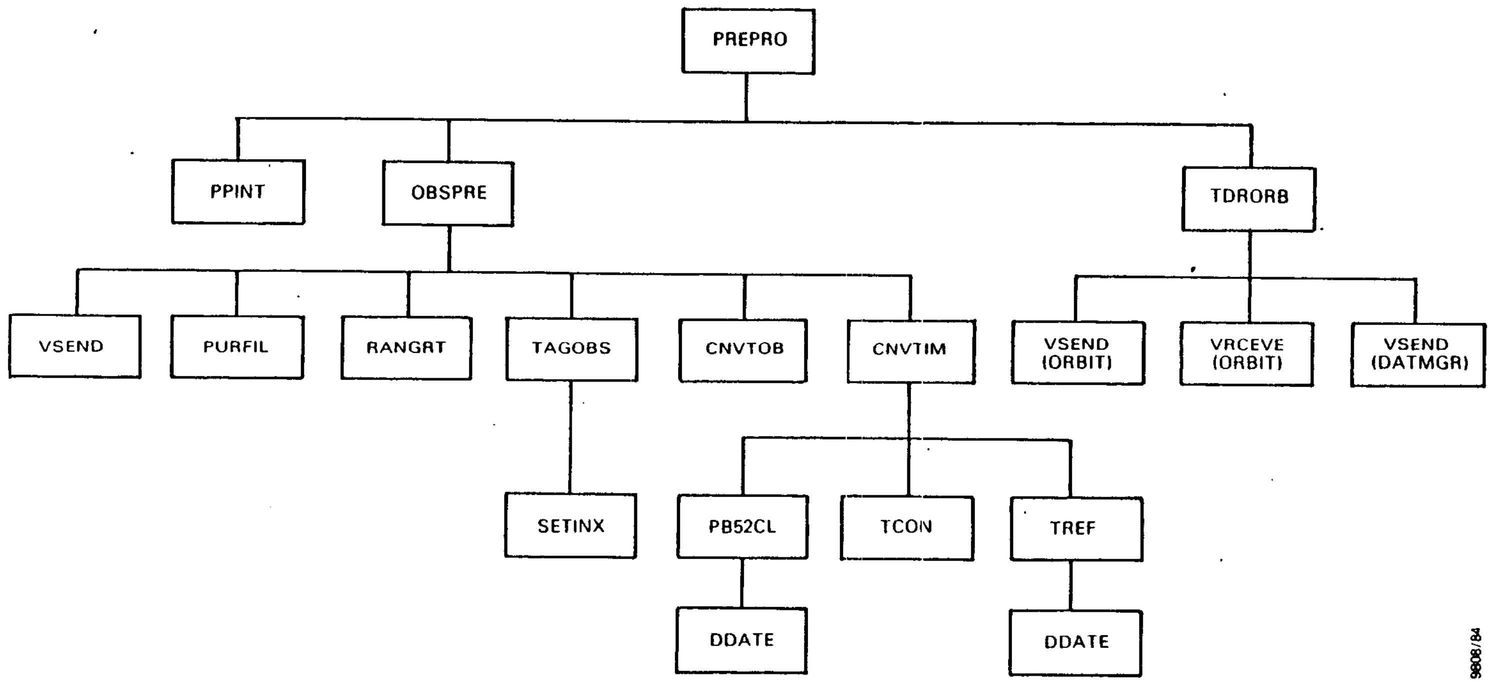


Figure 2-9. Baseline Diagram of PREPRO

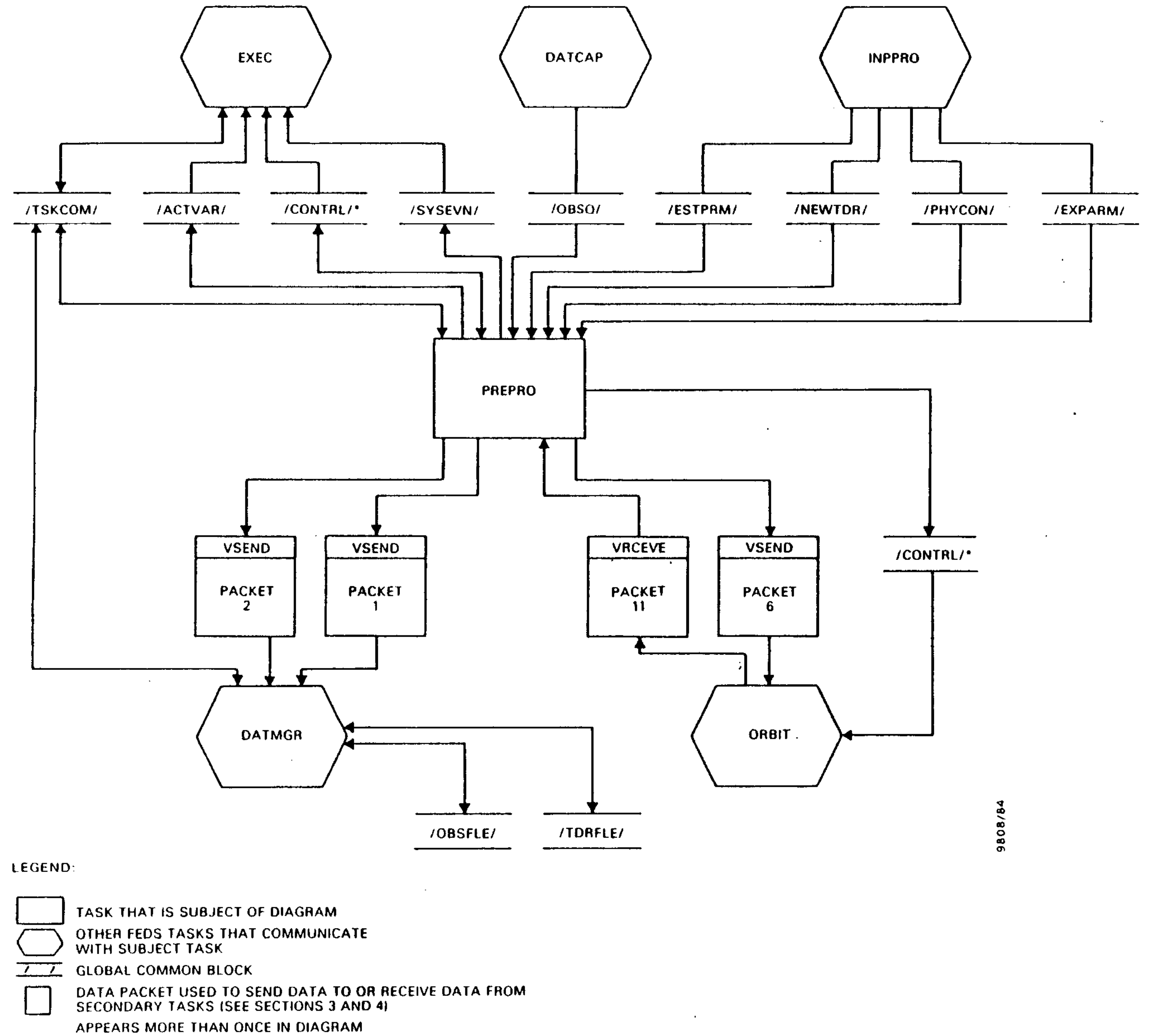


Figure 2-10. PREPRO Data Flow

After PREPRO has determined the start and end times of the orbit files, it calls subroutine TDRORB to generate the specified TDRS orbit file. PREPRO provides the start time, end time, and initial vector for the specified TDRS (specified by the internal TDRS ID). The initial vectors for generating new TDRS files are taken from global COMMON /NEWTDR/; the initial vectors for extending the TDRS orbit files are the vectors associated with the last entry in the current files. Subroutine TDRORB simply requests ORBIT to propagate the vector one step size at a time and then requests DATMGR to store the new TDRS vector in the next location in the orbit file. TDRORB also sets the start flag (ISTART) in the input parameters that are sent to the ORBIT task to indicate whether ORBIT should restart based on the input vector or whether to use its local table of backpoints to generate the requested vector.

While a TDRS orbit file is being generated, TDRORB blocks all other tasks from using the TDRS orbit file by setting global control flag TDRBSY(I) to indicate that the orbit file for TDRS I is busy and then clears the flag when the process is completed. TDRRDY(I) is set when a new orbit file has been generated for TDRS I. TDRORB returns control to PREPRO when the specified TDRS orbit file has been created or extended to the specified end time. PREPRO then calls TDRORB to create or extend the orbit file for the other TDRS. After this, PREPRO removes itself from the scheduling list and sets IFLAG5 to return control to the executive.

2.3.3.2 TDRS Orbit File Update

Each time new TDRS vectors are received, the executive will direct the data preprocessor to update an entire TDRS orbit file or the portion of the specified orbit file that was affected by the most recent maneuver. If it is a simple update request (IDIR(3)=3), PREPRO sets the timespan of the update from the start time to the end time of the file. It then calls subroutine TDRORB to perform the update and provides it with the start time, end time, and new TDRS vector taken from global COMMON /NEWTDR/ for the specified TDRS. TDRORB performs the update by requesting ORBIT and DATMGR as it does during TDRS orbit file generation (see Section 2.3.3.1), except that DATMGR is directed to replace the corresponding old vector in the TDRS orbit file with each new vector.

IF PREPRO is directed to update only the portion of the orbit file following the last maneuver (IDIR(3)=5), it sets the timespan of the update from the time of the last maneuver to the end time of the orbit file. PREPRO then proceeds as described above for a standard update.

When PREPRO has completed the assigned update for the specified TDRS, PREPRO removes itself from the scheduling list and sets IFLAG5 to return control to the executive.

2.3.3.3 TDRS Maneuver Recovery

When the current time matches the scheduled time of a TDRS maneuver, the executive schedules PREPRO to perform the TDRS orbit file maneuver recovery (IDIR(3)=4). Basically, PREPRO obtains the predicted vector after the maneuver from global COMMON /CONTRL/ and sets the timespan of the update from the maneuver time to the end time of the file. TDRORB is then called to update the file as described in Section 3.3.2. The current maneuver vector is saved for later use in local storage. PREPRO then sets the global flags, updates activity log variables, and surrenders control to the executive by removing itself from the scheduling list and setting IFLAG5.

2.3.3.4 Observation Data Preprocessing

The last major function of PREPRO is to preprocess observation data (IDIR(3)=1 or 2). Subroutine OBSPRE is called to preprocess the observation data. If a user spacecraft maneuver has occurred recently, OBSPRE checks the observation to check whether or not it is the first observation following the maneuver by comparing the observation time tag with the maneuver time. If it is the first observation following the maneuver, OBSPRE calls the DATMGR task to purge the observations file and the TDRS orbit files before the user spacecraft maneuver time. OBSPRE then proceeds by checking the validity or acceptability of the observation record based on the observation data time tag and validity flags for the observation data. If the data record is acceptable, OBSPRE converts the time (input in PB5 format) to the FEDS internal time format (A.1 seconds from reference); associates the current pass station ID, TDRS ID, and access method with the data record; and converts the Doppler observations to the proper engineering units. No smoothing of the observation data is done by PREPRO; however, observations are selected at the requested sample frequency. The preprocessed observation data record is then sent to DATMGR to be added to the observations file. This process is repeated for each observation record until the observations buffer is empty. At this point, the observation pass statistics and global flags are updated or set according to the directive and OBSPRE returns to PREPRO. PREPRO then removes itself from the scheduling list and sets IFLAG5 to return control to the executive.

2.3.4 DATA MANAGER (DATMGR) TASK

As a secondary task in FEDS, DATMGR's main functions are to manage one observations file and up to two TDRS orbit files. These files are stored in DATMGR's local memory since no peripherals are available on the PDP-11/23. All access to these files by any FEDS task is controlled by the data manager that locates, reads, writes, and purges data when directed. Figure 2-11 is a baseline diagram of DATMGR; Figure 2-12 shows the communication and data flow among DATMGR and other FEDS tasks. Appendix E describes the data packets.

Because DATMGR is a secondary task, it is controlled completely by the primary tasks PREPRO, ESTIM, OBSMDL, and DOPPRE. As shown in Figure 2-12, communication among DATMGR and the primary tasks is performed by means of task directive IDIR(4) and return status flag IRET(4) in global COMMON /TSKCOM/ and data packets that are sent to and from DATMGR. Global event flag IFLG10 is used to ensure that only one primary task at a time may use DATMGR. While the data manager is busy, IFLG10 is clear and when DATMGR is idle, IFLG10 is set. This allows a primary task to check whether DATMGR is busy before requesting it.

The procedure used by a primary task to request DATMGR is as follows. If the function performed by DATMGR requires input data from the primary task, the primary task sends the proper data packet to DATMGR via VSEND. The primary task then waits until DATMGR is free (IFLG10 is set). When DATMGR is free, the primary task sets task directive IDIR(4) to indicate which function DATMGR is to perform, requests DATMGR, and waits for IFLG10 to be reset by DATMGR to indicate that it has finished. If the function performed by DATMGR caused data to be output to the primary task, the primary task then receives the appropriate data packets using VRCEVE and checks whether an error occurred in DATMGR. The primary task must perform error recovery for any errors that occur in DATMGR.

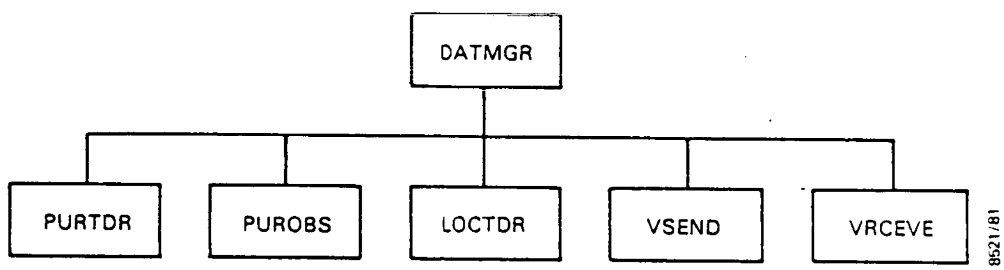


Figure 2-11. Baseline Diagram of DATMGR

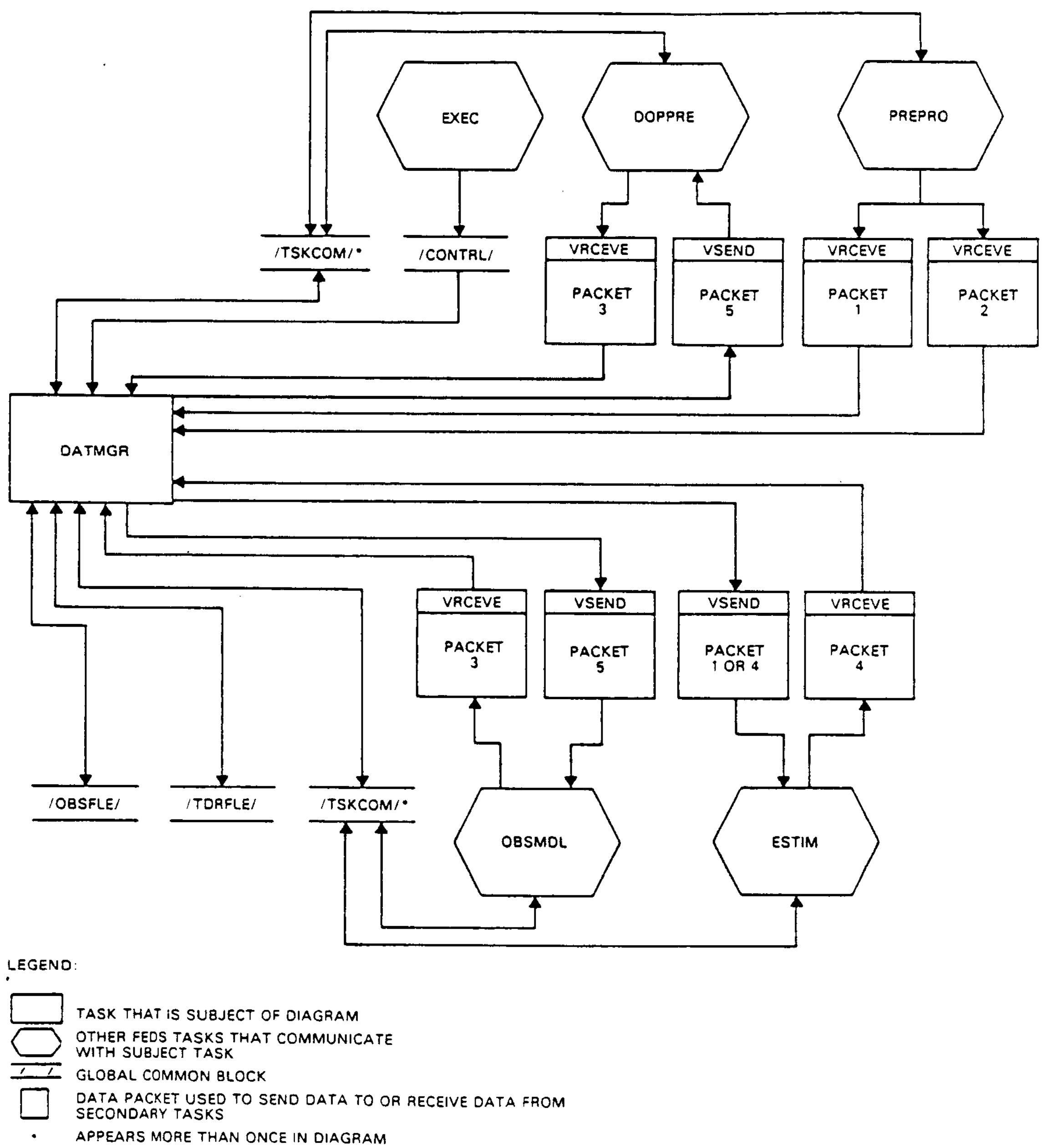


Figure 2-12. DATMGR Data Flow

During initialization (INIT(4)=1), DATMGR is called by PREPRO and is directed to purge all files. At this time, all local pointers and counters are cleared. When initialization is completed, DATMGR sets IFLG10 to notify PREPRO that it is finished and then exits.

Other functions that DATMGR performs relate specifically to TDRS orbit file management and observations file management, both of which are discussed in the following subsections.

2.3.4.1 TDRS Orbit File Management

TDRS orbit files are stored in a wraparound fashion within a fixed-length storage area in local COMMON /TDRFLE/. The files are extended in a sequential record order starting in the first physical record. When all physical records in the orbit file are full, the next record is written in the first physical record of the file, thereby destroying the data previously stored there. The start pointer (first logical record) of the file is then moved to the second physical record. This process continues as new records are added to the file. The data manager uses the start and end pointers for each TDRS orbit file to find the location to write the next record. The time tags of the first and last logical records in each orbit file are also maintained. These times are used to locate a TDRS vector by time tag in the orbit files. When the TDRS orbit files are purged, these pointers and times are cleared, effectively emptying the files.

When DATMGR is directed to add a new TDRS vector to an orbit file (IDIR(4)=6), DATMGR receives the data packet containing the TDRS vector, its time tag, and the associated TDRS ID. DATMGR then stores the vector in the next logical record in the orbit file for the specified TDRS, and the start and end times and pointers for that orbit file are updated. DATMGR then sets IFLG10 and exits.

When DATMGR is directed to update a TDRS record according to its time tag (IDIR(4)=7), DATMGR receives the data packet containing the updated TDRS vector, its time tag, and the associated TDRS ID. DATMGR then calls LOCTDR to locate the current record in the specified orbit file that contains the TDRS vector with the same time tag. DATMGR replaces the old vector in that record with the new (input) TDRS vector, sets IFLG10, and exits.

When DATMGR is directed to return a set of TDRS vectors surrounding a specified time to OBSMDL (IDIR(4)=8) or to DOPPRE (IDIR(4)=9), it receives the data packet containing the specified time tag and TDRS ID. DATMGR then calls LOCTDR to locate the record containing a time tag closest to the input time tag. Next, DATMGR loads into the output data packet 10 vectors that surround the input time tag and are retrieved from the specified orbit file. When possible, the vectors are chosen so that the input time falls in the middle of the timespan of the 10 TDRS vectors. If the input time tag is too close to the start time of the orbit file, the first 10 vectors in the file will be loaded into the output data packet; if the time tag is too close to the end time of the orbit file, the last 10 vectors will be loaded. The output data packet is then sent to the appropriate task and DATMGR sets IFLG10 and exits.

When DATMGR is directed to purge the portion of an orbit file before the time of a maneuver (IDIR(4)=10), it receives the data packet containing the input time tag and TDRS ID. Then, DATMGR resets the start pointer to point to the first record in the orbit file with a time tag equal to or greater than the input time tag and sets the start time of the orbit file accordingly. DATMGR sets IFLG10 and exits.

2.3.4.2 Observations File Management

The observations file is also a wraparound file that is stored in a fixed-length storage area in local COMMON /OBSFLE/. A set of start and end times is maintained for each observation pass in the observations file. These times are updated each time a new record is added to the file. As the file wraps around itself, the earliest pass in the file gets shorter as the start time moves closer to the end time until the pass is eventually eliminated from the file. The observations file holds up to 125 observation records.

When DATMGR is directed to write a new observation record in the observations file (IDIR(4)=1), it receives the data packet containing the observation record. DATMGR writes the observation in the next record in the observations file and updates the pointers and pass timespans accordingly. DATMGR then sets IFLG10 to notify the calling task that it has finished and exits.

When DATMGR is directed to retrieve an observation record and send it to requesting task ESTIM (IDIR(4)=2), DATMGR retrieves the previous record and loads it in the output data packet. It then sends the data packet to the primary task, sets IFLG10, and exits.

When DATMGR is directed to reset the observation read pointer (IDIR(4)=3), it sets the observation read pointer to point to the last observation (the observation with the latest time tag) in the observations file. It then sets IFLG10 and exits.

When DATMGR is directed to update the end-of-pass indicator in the last observation written in the file (IDIR(4)=4), DATMGR changes the end-of-pass indicator in the last record in the file to 1, sets IFLG10, and exits.

When DATMGR is directed to update the last record that was read from the observations file (IDIR(4)=5), it receives the data packet containing the updated observation values. The information is then written into the record to which the observation read pointer is pointing. DATMGR sets IFLG10 and exits.

2.3.5 OUTPUT PROCESSOR (OUTPRO) TASK

OUTPRO is an independent primary task in FEDS that is responsible for downlinking output messages to ground control and for sending messages to the Communications Box. Six types of messages are downlinked from FEDS: predicted state vector tables, predicted one-way Doppler data, priority messages (critical errors and idle time messages), activity logs, DC summary and statistics reports, and DC residuals reports. In addition, OUTPRO downlinks a special end-of-simulation message when directed by the executive. Four types of messages are output to the Communications Box: current time request messages, reset accumulator command messages, predicted frequency shift messages, and Doppler measurement request messages. In addition, an initialization message is sent at the beginning of a simulation to verify communication between FEDS and the Communications Box.

Figure 2-13 is a baseline diagram of OUTPRO; Figure 2-14 shows the communication and data flow among OUTPRO and other FEDS tasks.

Like other primary tasks, OUTPRO is controlled by the FEDS executive. Most of this control is performed by the output control table, /OPTAB/. Each task that generates FEDS output information for downlink to ground control requests output of this information through the output table in the following manner. When the responsible task has completed generating the information and has stored it in the appropriate global COMMON block, it sets a lock flag (LCKFLG(I),

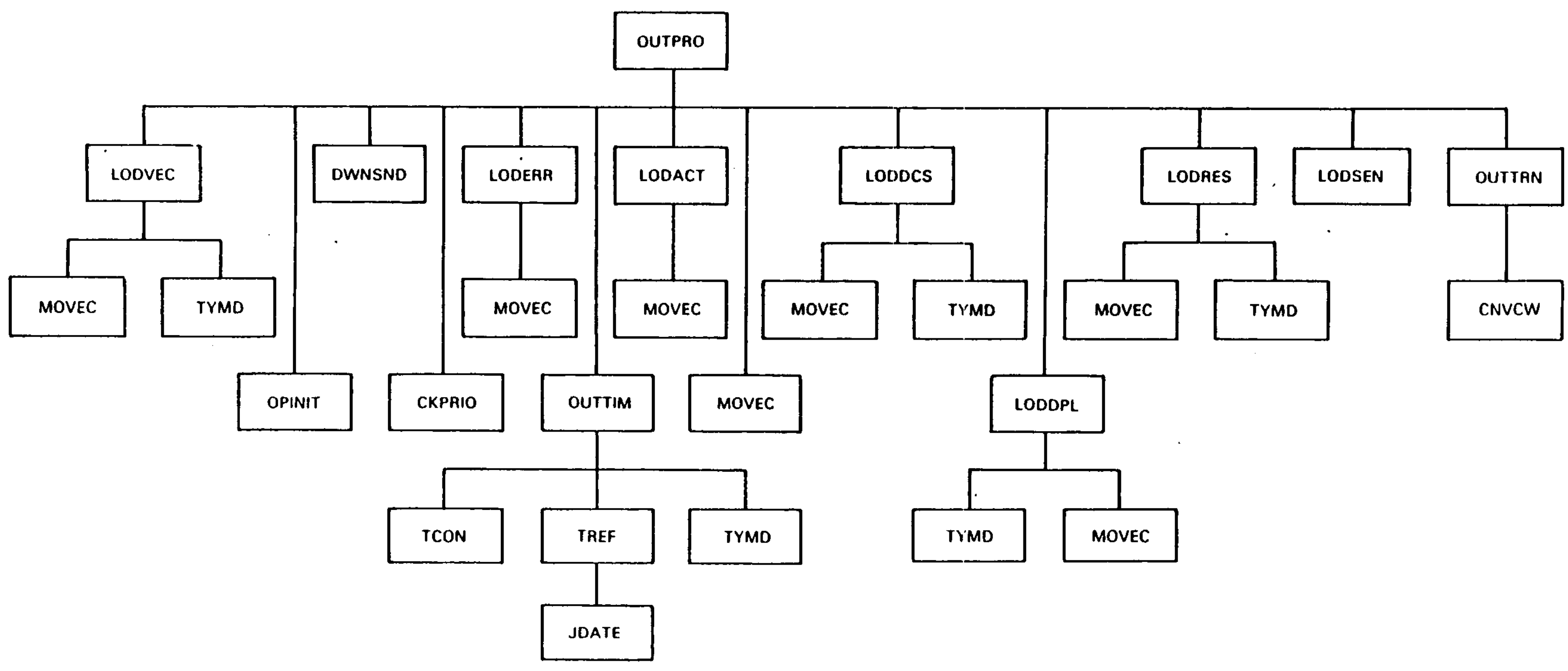


Figure 2-13. Baseline Diagram of OUTPRO

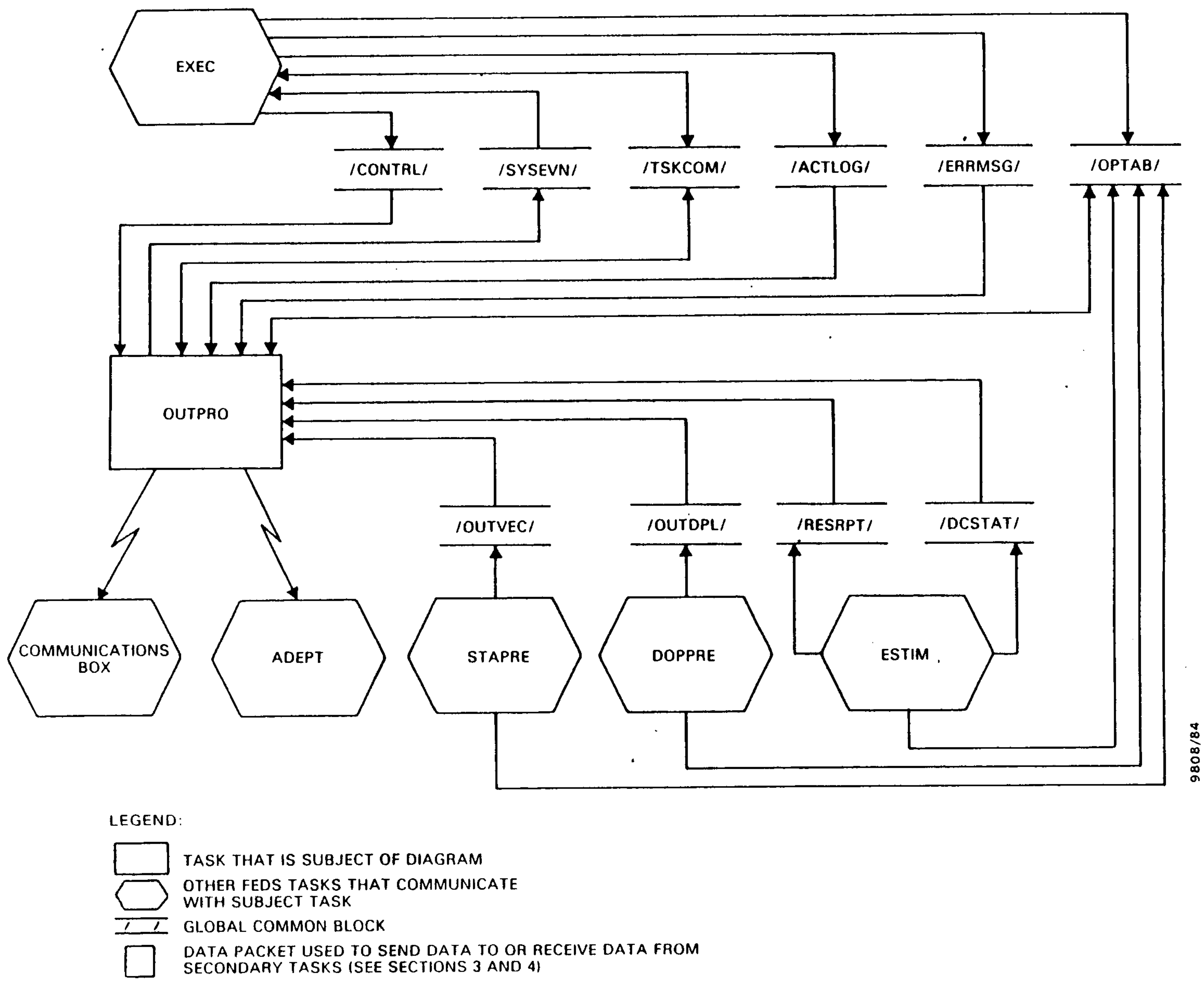


Figure 2-14. OUTPRO Data Flow

where I indicates the type of data) that prevents any task from writing over and thus destroying the information before it is downlinked. The output control table also contains an output priority and the number of frames to be output (NFRAME(I)) for each type of output. Each time the executive gains control, it checks the output table for output requests (lock flag is on). It then finds the highest priority output request in the output table. Directive IDIR(7) is set to the highest priority type of output to be downlinked, and OUTPRO is then scheduled as described in Section 2.2. When OUTPRO gains control it performs standard output. OUTPRO can also be directed to perform priority output; that is, it will downlink the specified information immediately and return control to the executive. Standard and priority output functions are described in the following paragraphs.

During initialization (INIT(7)=1), OUTPRO calls OPINIT to initialize local variables and pointers. OUTPRO then sets IFLAG5 to return control to the executive. When OUTPRO regains control, it examines task directive IDIR(7) to determine whether it is to perform standard or priority output.

If OUTPRO has been directed to perform standard output (IDIR(7) = 1, 2, 3, 4, 5, or 6), OUTPRO calls CKPRIO to scan through the output control table, /OPTAB/, to search for the highest priority information to be output. OUTPRO then calls one of the following subroutines to load the information into the output buffer:

- LODVEC (load next message of the state vector table)
- LODDPL (load one-way Doppler data)
- LODERR (load priority messages)
- LODACT (load activity log)
- LODDCS (load DC summary and statistics report)
- LODRES (load DC residuals report)

If OUTPRO has been directed to perform priority output (IDIR(7)=7 or 8), it calls either LODACT to load the next activity log message (IDIR(7)=7) or LODERR to load the priority message (IDIR(7)=8) in the output buffer. If OUTPRO has been directed to downlink an end-of-simulation message (IDIR(7)=9), it calls LODSEN to load the sentinel record into the output buffer.

Each time a message is loaded into the output buffer, the number of frames is decremented by the number of frames loaded in the message. After the message has been loaded, OUTPRO calls OUTTIM to obtain the current simulation time in YYMMDDHHMMSS.SS format and inserts it into the record header of the downlinked message. OUTPRO then calls DWNSND to downlink the message to ground control. To do this, DWNSND issues a QIO directive to read the ready message sent by ground control. When a message is received, DWNSND checks whether it is a ready message or a retransmission request. If it is a retransmission request, DWNSND issues a QIO to downlink the previously downlinked message that was saved, issues a QIO for a ready message, and the output process described in the preceding paragraphs is performed. When a ready message is received, DWNSND issues a QIO to downlink the current output message in the output buffer. The message is then transferred to the save buffer and DWNSND returns to OUTPRO.

If there are more frames of this type, processing returns to the point at which OUTPRO calls the appropriate subroutine to load the message and processing continues as before.

If all frames of this type have been output (NFRAME(I)=0), output processing of this type of data has been completed. At this time, the output information storage area is unlocked (LCKFLG(I) is turned off). If standard output has been requested, OUTPRO searches the output control table by priority for the next type of output to be downlinked. If one is found, standard processing of that type of data is performed as described above. When no more types of requested output are left in the output control table, OUTPRO removes itself from the scheduling list and sets IFLAG5 to return control to the executive.

If all frames of the specified type of priority output have been output, OUTPRO simply removes itself from the scheduling list and sets IFLAG5 to return control to the executive.

If OUTPRO has been directed to perform output to the Communications Box (IDIR(7)=10), it calls OUTTRN to form and transmit the requested message. OUTTRN examines ICODE in /OPTAB/ to determine which message is to be transmitted, forms the 11-byte message and immediately issues a QIO to transmit the message. After OUTTRN has returned, OUTPRO unconditionally removes itself from the scheduling list and sets IFLAG5 to return control to the executive.

2.4 COMPUTATIONAL TASKS

Five FEDS tasks are primarily responsible for performing computations in FEDS. These tasks generate data to be downlinked to ground control or produce intermediate quantities that must be used by other FEDS computational tasks to generate the output data. They are as follows:

- Orbit Propagator (ORBIT) propagates a given spacecraft state (and, optionally, its partial derivatives) and sends it to a specified task for output or for use in another computational model.

- State Predictor (STAPRE) generates tables of predicted user spacecraft state vector data for downlink to ground control and use in the Doppler predictor.

- Doppler Predictor (DOPPRE) generates predicted one-way Doppler data for downlink to ground control and output to the Communications Box.

- Estimator (ESTIM) estimates and corrects the current user spacecraft state based on the differences in observed and computed TDRSS observations. The output state vector is used for both state prediction and Doppler prediction.

- Observation Modeling (OBSMDL) computes TDRSS Doppler observations and partial derivatives that correspond to the data in the observations file based on the current best estimate of the user spacecraft state and the given TDRS position at each observation time.

The following subsections provide a functional description of each of these tasks including baseline diagrams and data flow diagrams. The mathematics for the computational models used in these tasks, is given in the FEDS mathematical specification (Reference 2). Appendix E contains detailed descriptions of the data packets, shown in the data flow diagrams, that are used for intertask communications.

2.4.1 ORBIT PROPAGATOR (ORBIT) TASK

ORBIT is a secondary task in FEDS. It is used by four of the FEDS primary tasks that require orbit propagation: PREPRO, STAPRE, ESTIM, and OBSMDL. Because of the FEDS time-slicing control scheme, the orbit propagator must be able to service a wide variety of back-to-back requests from the primary tasks. In addition, the application demands that ORBIT must have sufficient force-modeling capabilities to propagate both the high-altitude geosynchronous TDRS orbits and the low-altitude drag-perturbed user spacecraft orbit.

To fulfill the needs of other FEDS tasks, ORBIT has the capability of propagating four separate orbits simultaneously. This means that it can switch from propagating one orbit to propagating another without starting the integrator each time. Each time ORBIT is requested (called) by a primary task, it propagates the requested orbit only. It must finish executing one request before it can be called to do another; it is not reentrant.

The four orbits are identified by two FEDS spacecraft IDs. ISCID, included in the ORBIT input data packets (see Appendix E), is used by the primary task to indicate which orbit is to be propagated, and IDSC is used internally as an index in the ORBIT task. The four orbits are as follows:

ISCID	IDSC	Spacecraft Orbit
1	1	Orbit for TDRS 1; used by PREPRO
2	2	Orbit for TDRS 2; used by PREPRO
4	3	Past-time orbit for user spacecraft that includes associated variational equations; used by ESTIM and OBSMDL
5	4	Real-time orbit for user spacecraft; used by STAPRE

ORBIT uses the multistep method of numerical integration when possible. Two pairs of predictor-corrector integrators from the Adams and Cowell groups of integrators are used. These methods are derived by integrating polynomials that interpolate (or, for the predictors, extrapolate) based on a table of backpoints. A set of previously computed accelerations forms the table of backpoints for a satellite state, and the partial derivatives of accelerations with respect to the initial (epoch) state form the backpoints for the variational equations. Each of the four spacecraft states has its own table of backpoints independent of the other spacecraft trajectories, and the past-time user spacecraft state

(ISCID=4) has the variational equations table of backpoints associated with it.

Because the predictor-corrector methods have inherent limitations in startup capability, a separate procedure for initially filling the table of backpoints is required. In ORBIT, integration startup is performed by a Runge-Kutta-Fehlberg (RKF) integrator. However, this procedure is performed only when necessary for the following reasons: the RKF integrator is slow since it performs five derivative evaluations per step and is of low order (six RKF steps must be performed to approximate one step of the multistep integrator in accuracy).

These types of numerical integration alone are not entirely satisfactory for meeting the requirements placed on the orbit propagator. ORBIT must be able to frequently produce a satellite state and state transition matrix for the observation model and the estimator. The request times for these quantities will almost always be off-grid compared to a fixed step-size ephemeris prediction. Single-step integration (using RKF integration) would enable ORBIT to produce results at the requested times; however, the extreme slowness of the single-step integration compared to multistep integration makes this method unacceptable here, especially for integrating the variational equations (a 6-by-6 or a 6-by-7 matrix).

The solution to this problem is the multistep method of interpolation, which is a generalization of the predictor-corrector methods. This interpolation method takes advantage of the existence of the tables of backpoints already present for multistep integration. Thus, multistep interpolation is the primary method used by ORBIT to produce the state and, optionally, the state transition matrix at the time requested by the calling task. Multistep integration is used only to extend the table(s) of backpoints (forward or backward) in time, and single-step integration is used only to fill the table(s) of backpoints initially.

Figures 2-15 and 2-16 present baseline diagrams of ORBIT. Figure 2-15 shows the hierarchy of the subroutines in ORBIT, whereas Figure 2-16 shows the subroutines grouped by function. The external communication and data flow among ORBIT and other FEDS tasks and the internal data flow in ORBIT are shown in Figure 2-17. Appendix E contains descriptions of the data packets. Further description of orbit integration and interpolation can be found in Reference 2. Following is a description of the data flow in ORBIT.

During initialization (INIORB=1), ORBIT calls ORBINI to initialize local pointers and flags. ORBIT then sets IFLG11 to indicate that it has finished and exits.

Each time ORBIT is requested and initialization is not to be done, the following procedure is performed. ORBIT first checks array ORCALL to determine which primary task has requested it. The input data packet (see Appendix E) is then received from the specified primary task. ORBIT converts the input start and end times of integration from seconds from reference to modified Julian dates.

If partial derivatives are requested (IPART=1 or 2), the number of variational equations (NEQ) is set based on the solve for drag coefficient indicator in the input data packet. Next, ORBIT checks the input value of ISTART to determine whether integration startup is required (ISTART=1) or whether an output vector is to be produced based on the current backpoints table.

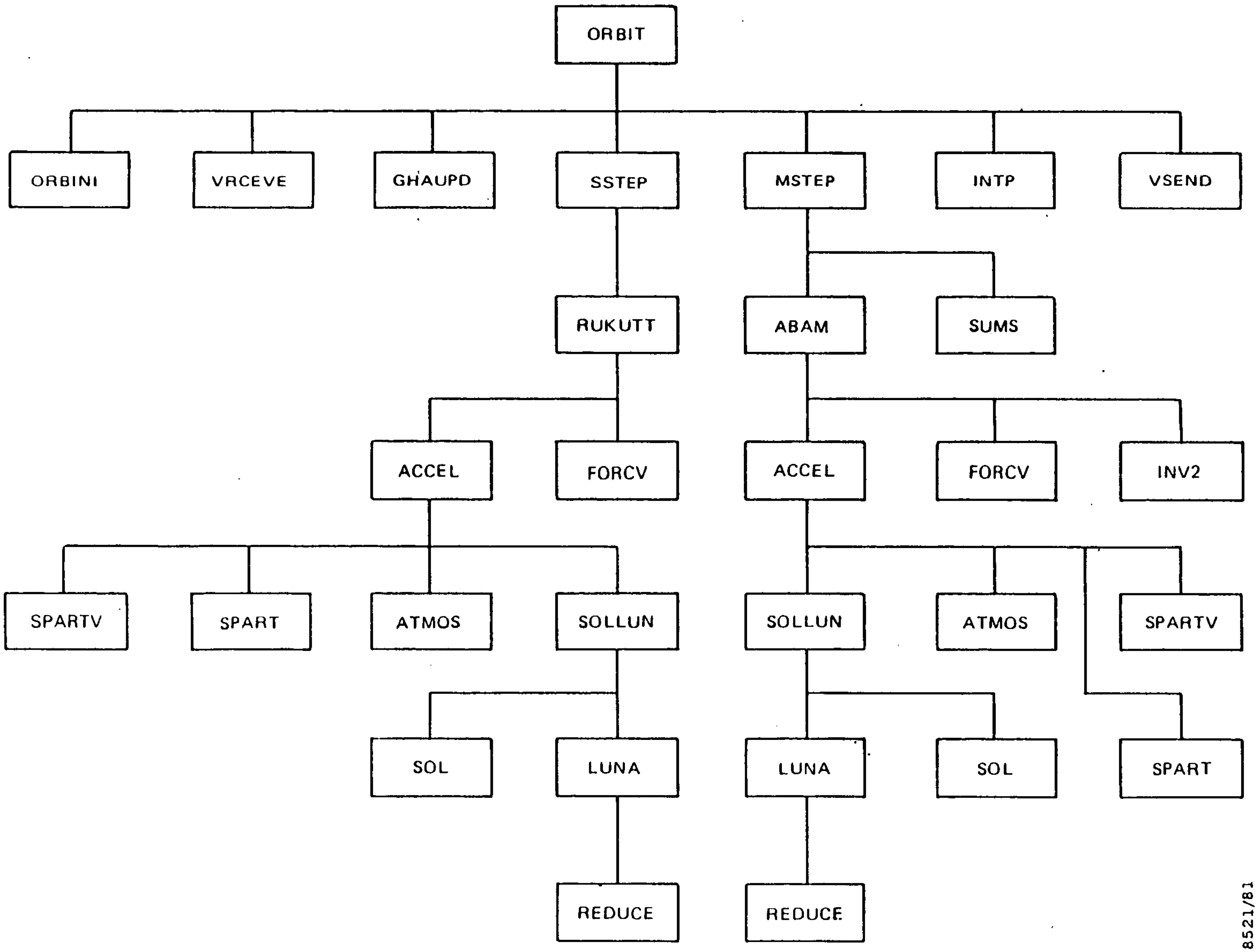
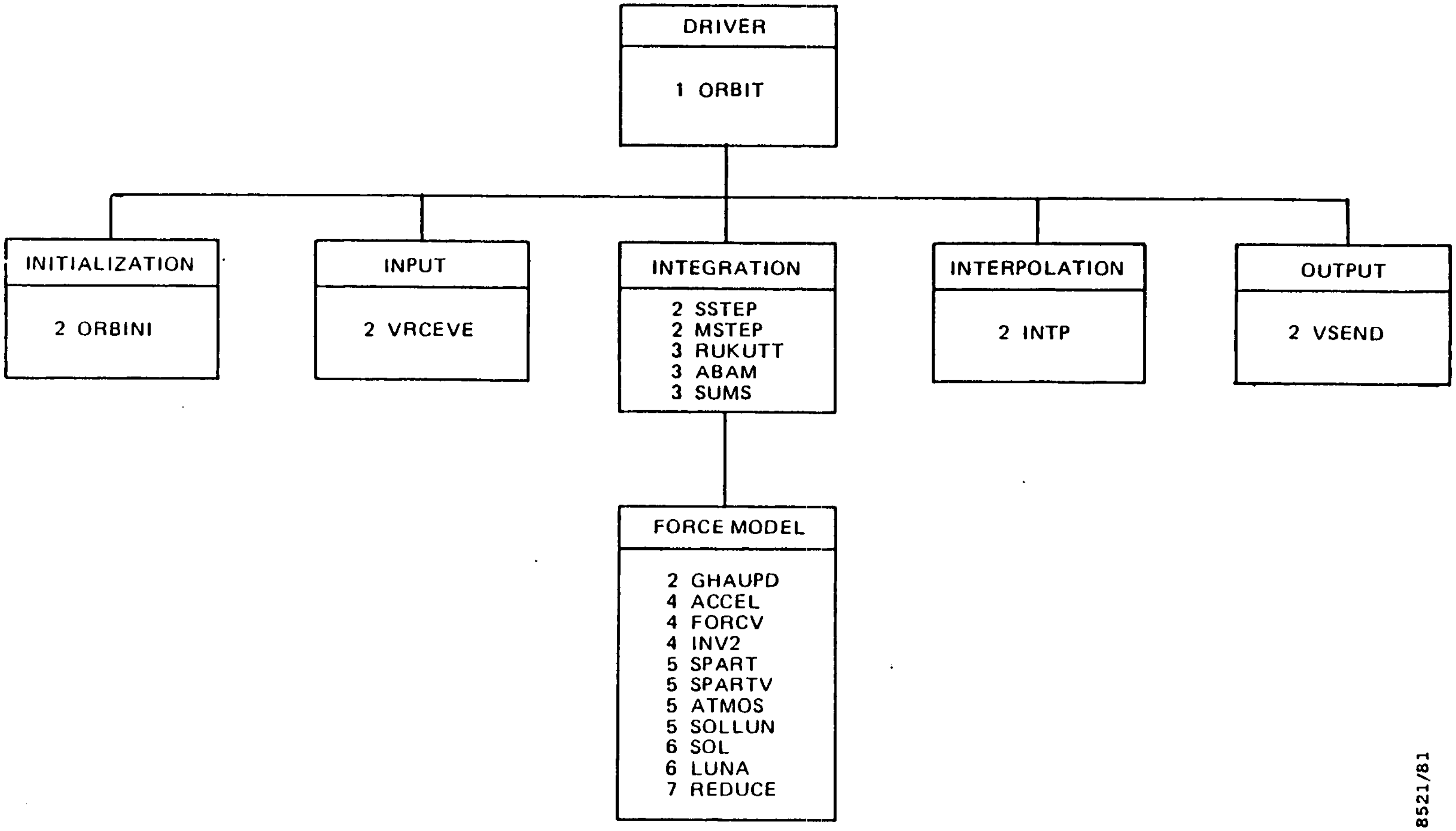
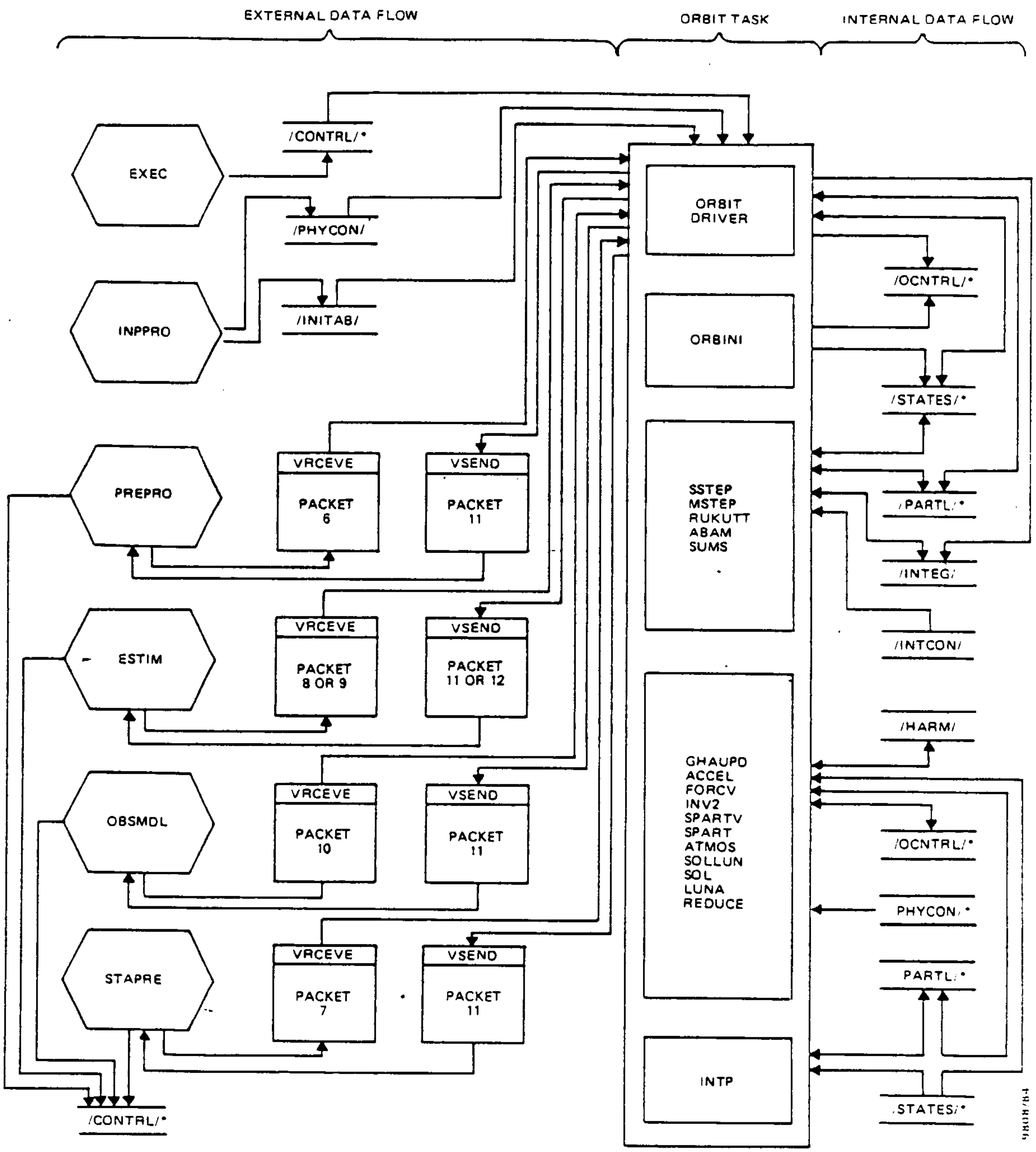


Figure 2-15. Baseline Diagram of ORBIT



NOTE: THE NUMBER PRECEDING THE SUBROUTINE NAME INDICATES THE HIERARCHY.

Figure 2-16. Functional Block Diagram of ORBIT



LEGEND:

- TASK THAT IS SUBJECT OF DIAGRAM
- OTHER FEDS TASKS THAT COMMUNICATE WITH SUBJECT TASK
- GLOBAL COMMON BLOCK
- DATA PACKET USED TO SEND DATA TO OR RECEIVE DATA FROM SECONDARY TASKS (SEE SECTIONS 3 AND 4)
- * APPEARS MORE THAN ONCE IN DIAGRAM

Figure 2-17. ORBIT Data Flow

If integration startup is requested, ORBIT verifies that a reasonable starting vector was input. If not, an error flag is set, IFLG11 is set, and ORBIT exits. ORBIT also verifies that if partial derivatives are requested, the spacecraft ID (ISCID) is 4 (the only orbit for which partial derivatives can be computed). ORBIT then sets the integration step size based on the ISCID and the step sizes given in global COMMON /PHYCON/. If integration startup is requested, the direction pointer is set to indicate forward (IFWD(IDSC)=1) or backward (IFWD(IDSC)=-1) propagation, and the input vector is moved into the internal start vector array. For all cases, the Greenwich hour angle (GHA) is computed at the input start time, and the spacecraft area and mass and the Sun and the Moon force model indicators are set, based on the IDSC and the values given in global COMMON /PHYCON/.

If startup is requested, ORBIT proceeds to call SSTEP for each of 10 steps required to fill the table of backpoints for the specified IDSC. MSTEP is then called to compute and insert the 11th set of accelerations in the table of backpoints and to compute the second sums required for multistep integration and interpolation. Having filled the backpoints table, ORBIT then proceeds as if ISTART were zero.

When the table of backpoints is already full (ISTART=0), ORBIT checks the requested propagation end time (the requested time tag of the output vector). If the end time is within the timespan of the current table of backpoints, ORBIT simply calls INTP to obtain the output vector at the end time through multistep interpolation. Otherwise, ORBIT calls MSTEP to extend the table one step at a time in the direction indicated by IFWD(IDSC). This is done until the requested end time is within the timespan of the table, at which time INTP is called to produce the output state vector at the requested end time. The partial derivatives, if requested, are computed in conjunction with the state during the calls to SSTEP, MSTEP, and INTP.

The output state vector and, optionally, the partial derivatives (state transition matrix) are loaded into the output data packet along with flags that indicate which operations were performed. ORBIT then sends the data packet to the primary task that requested it, IFLG11 is set, and ORBIT exits.

2.4.2 STATE PREDICTOR (STAPRE) TASK

STAPRE is a primary task responsible for generating or extending the predicted state vector table for the user spacecraft. Figure 2-18 is a baseline diagram of STAPRE; Figure 2-19 shows the communication and data flow among STAPRE and other FEDS tasks. Appendix E describes the data packets.

There are two constants, SPINT and SPFREQ, in global COMMON /PHYCON/ that determine the size of the state predict table and how often it is generated. Since this table contains "predicted" vectors, it always contains a future timespan. The requirement for the state predict table is that the table must contain data that covers at least a specified amount of time in the future. To satisfy this requirement, a state vector table twice the specified size (in time units) is generated from the current time forward each time a new table is to be generated. Then, when half of the state vectors are out of date, the table is extended into the future by the table size. For instance, if the state predict table must contain at least 30 minutes of future data at 1-minute intervals, the table is generated to cover the next 60 minutes. Then, after 30 minutes when only 30 minutes of future data remain in the table, it is extended by 30 minutes, replacing the out-of-date data with

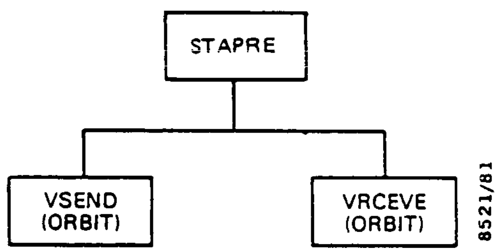


Figure 2-18. Baseline Diagram of STAPRE

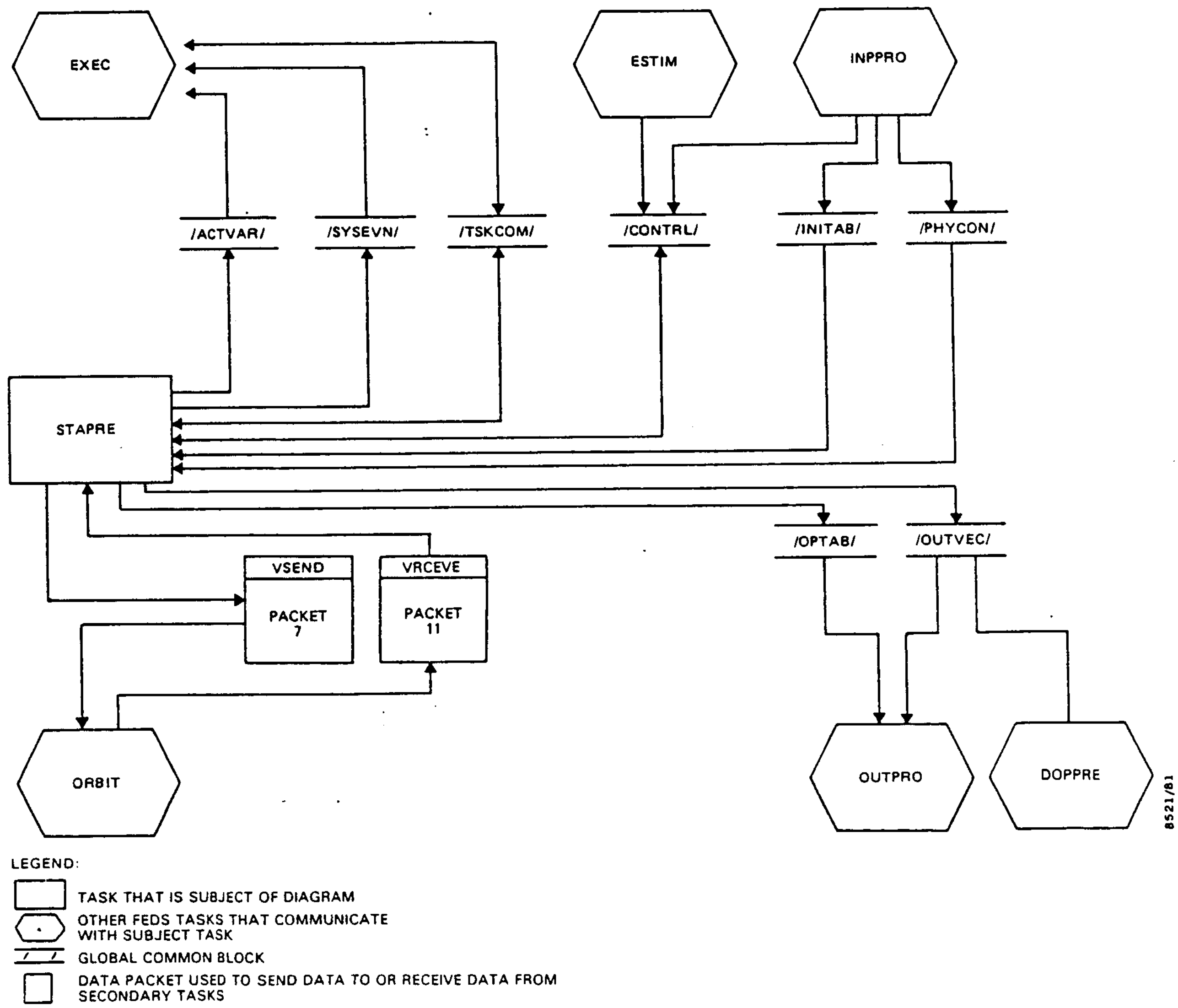


Figure 2-19. STAPRE Data Flow

the new data. After this extension, the last vector in the table should be time tagged 60 minutes after the current time.

Each time a new best estimate of the user spacecraft state is obtained from a new initialization table, from a new state solution from the estimator, or from a user spacecraft maneuver, a new state predict table is generated. The executive determines when the state predict table needs to be extended or generated based on a new vector and directs STAPRE to perform the appropriate function.

During initialization (INIT(8)=1), STAPRE initializes all local variables and flags and sets IFLAG5 to return control to the executive.

When STAPRE regains control, it examines task directive IDIR(8) to determine the function it is to perform. If STAPRE has been directed to generate a new predicted state vector table based on a new state solution (IDIR(8)=2), a new initialization table (IDIR(8)=3), or a user spacecraft maneuver (IDIR(8)=4), it retrieves the initial state vector from the specified source, saves it in /OUTVEC/ as the official FEDS reference state (for use by the Doppler predictor), sends the new vector to ORBIT, and requests ORBIT to restart orbit number 5 (ISCID=5) with the new vector and to propagate it to the current time. STAPRE waits for ORBIT to complete and receives the output state vector at the current time. STAPRE then sets the start time of the table to the current time, sets the end time to the current time plus twice the specified size of the table (SPINT), and reinitializes the pointers. For each time interval, STAPRE then requests ORBIT to obtain the state vector and to store it in the next location of the state predict table.

When the table has been completed, STAPRE sets lock flag LCKFLG(1) in the output control table, /OPTAB/, to indicate that the state predict table is ready to be downlinked. It then saves the last vector in the table as the start vector for the next extension and sets IFLAG5 to return control to the executive.

When STAPRE is called to extend the state predict table (IDIR(8)=1), STAPRE sets the new end time of the table to the previous end time plus the specified size of the table. For each time interval to be added to the table, STAPRE requests ORBIT to obtain the state vector and to store it in the next location of the state predict table in a wraparound fashion. When the table has been extended, the start time is updated, and output pointers are updated to point only to the part of the table that contains the extension. The table is then locked as described earlier to indicate that the extension of the table is ready to be downlinked. The last vector in the table is saved as the start vector for the next extension, and STAPRE sets IFLAG5 to return control to the executive.

2.4.3 DOPPLER PREDICTOR (DOPPRE) TASK

DOPPRE is a primary task in FEDS that predicts one-way TDRSS Doppler observations over a specified tracking interval. The tracking intervals for one-way Doppler prediction are contained in the uplinked tracking schedule. Each tracking interval is defined by a start time and an end time, which are specified in global COMMON /CONTRL/, and an observation frequency, which is specified in global and the COMMON /EXPARM/ TDRS ID to be used, which is specified in global COMMON /TSCHED/.

The requirement for the Doppler predict table is that the table must contain data covering at least a specified amount of time in the future. To satisfy this requirement, a Doppler frequency shift predict table, twice the specified size (in time units), is generated from the current time forward each time a new table is to be generated. Then, when half of the Doppler shift records are out of date, the table is extended into the future by the table size. For instance, if the Doppler predict table must contain at least 5 minutes of future data at 10-second intervals, the table is generated to cover the next 10 minutes. Then, after 5 minutes, when only 5 minutes of future data remain in the table, it is extended by 5 minutes, replacing the out-of-date data with the new data. After this extension, the last predicted frequency shift record in the table should be time tagged nearly 10 minutes after the current time.

The executive requests DOPPRE during task initialization and each time Doppler prediction is scheduled based on the tracking schedule. To ensure that the predicted Doppler data will be available for output at the start time of the tracking interval, DOPPRE is scheduled with a specified amount of pad time (TPAD) before the start time of each interval. This gives DOPPRE ample time to generate the data. DOPPRE uses both TDRS vectors retrieved by DATMGR for the specified TDRS and the predicted state vector table for the user spacecraft to perform the one-way Doppler prediction. DOPPRE does not interface with ORBIT. The mathematics for the one-way TDRSS Doppler observation model is given in Reference 2.

Figure 2-20 is a baseline diagram of DOPPRE; Figure 2-21 shows the communication and data flow among DOPPRE and other FEDS tasks. Appendix E contains descriptions of the data packets.

During initialization (INIT(6)=1), DOPPRE calls DPINIT to initialize the local variables used in the Doppler prediction. When initialization is complete, DOPPRE sets IFLAG5 to return control to the executive.

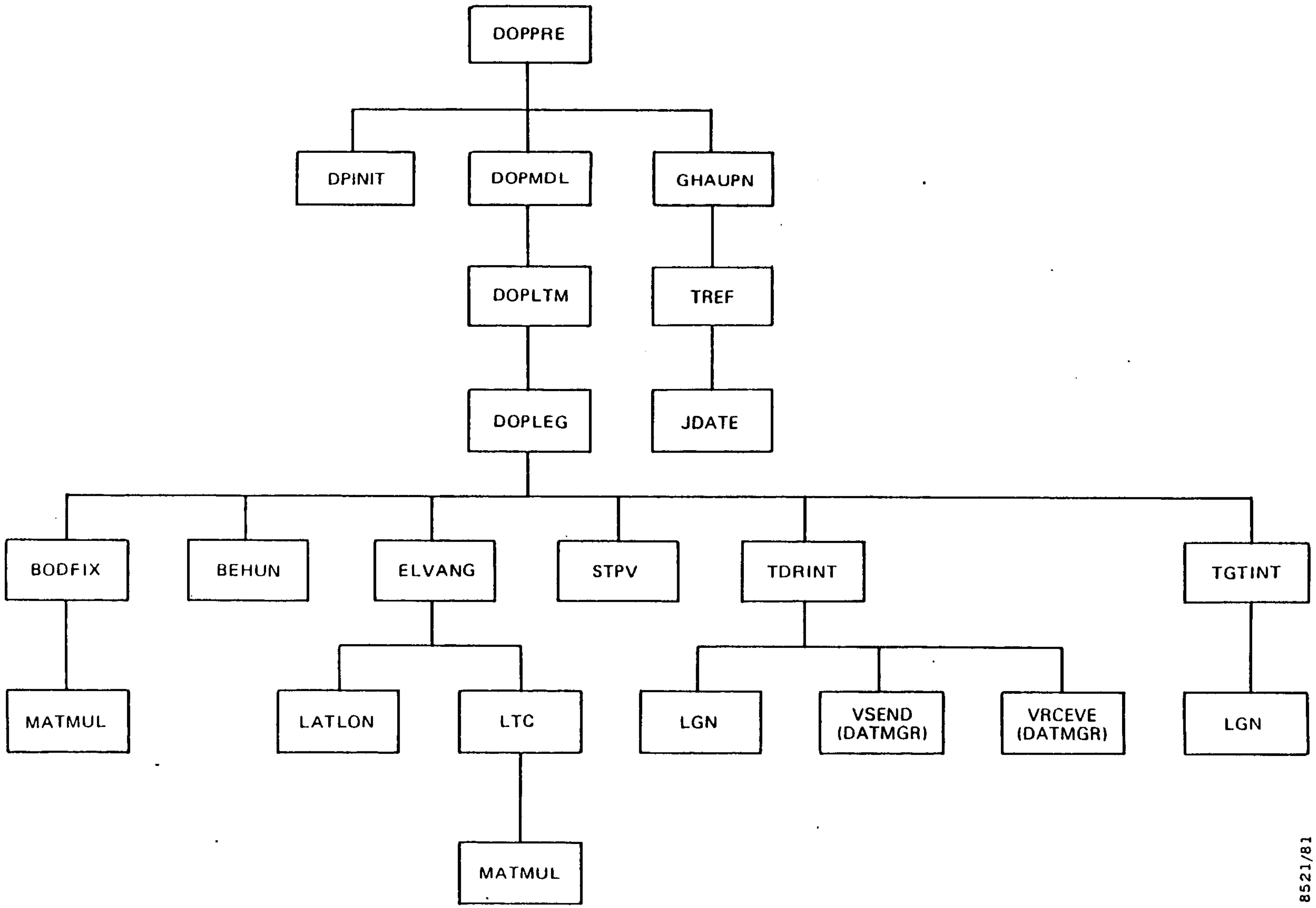


Figure 2-20. Baseline Diagram of DOPPRE

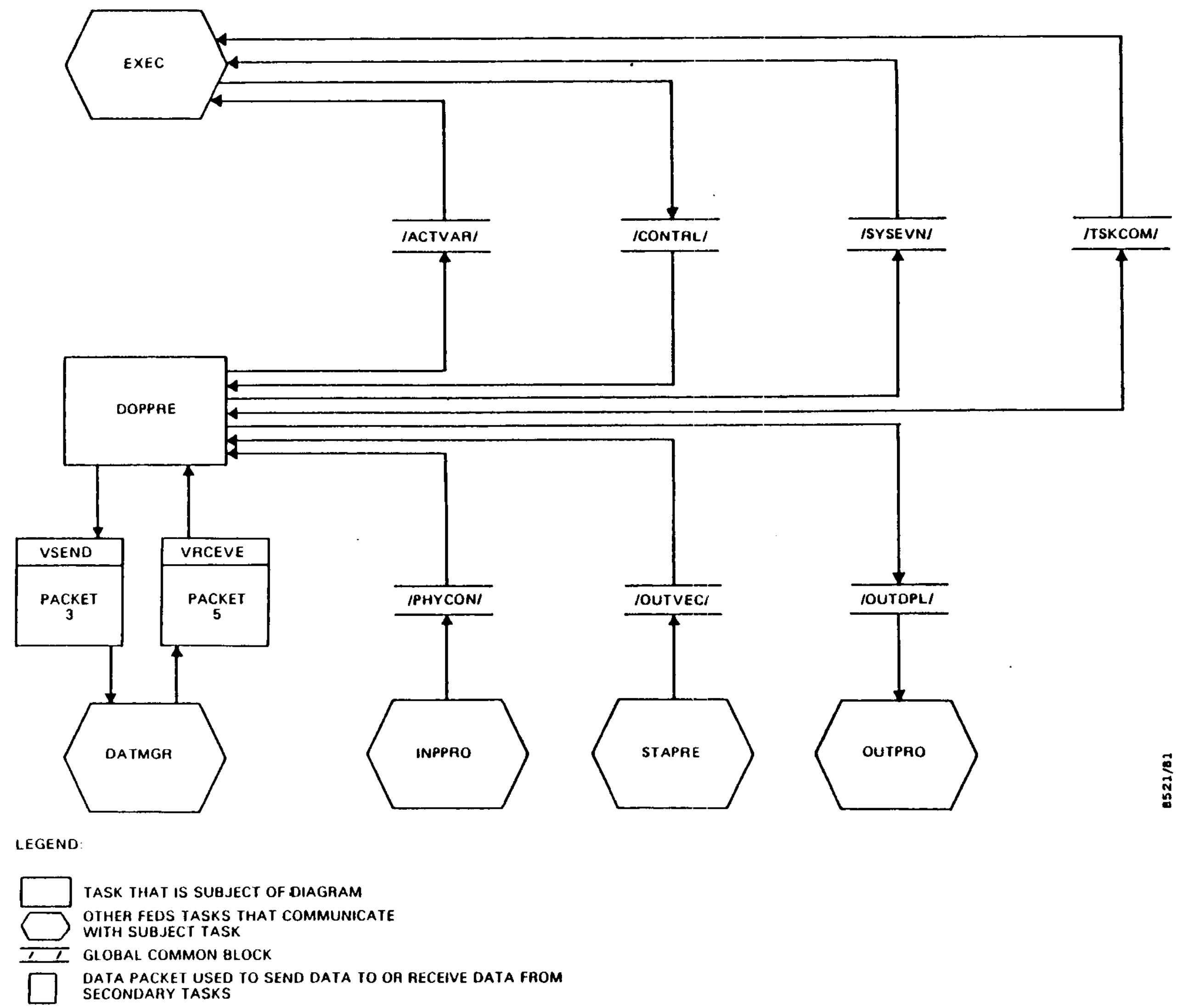


Figure 2-21. DOPPRE Data Flow

When the executive directs DOPPRE to generate a Doppler predict table (IDIR(6)=1), the requested tracking interval is passed through global COMMON /CONTRL/. DOPPRE then predicts one-way Doppler data over this tracking interval in the following manner. DOPPRE locates the specific ground station associated with the specified TDRS ID. DOPPRE calls GHAUPN to compute the GHA update for the ground station at the start time of the tracking interval. After the GHA update is completed, DOPPRE calls DOPMDL to compute the tracking range at the starting time. This is done because a Doppler observation cannot be computed without the initial range at the start time of the tracking interval. DOPPRE then adds the specified observation frequency to the start time to obtain the first observation time tag. DOPPRE then calls DOPMDL to compute a Doppler observation at the observation time and loads the observation into global COMMON /OUTDPL/. The next observation time tag is computed, and DOPMDL is called to compute the associated observation as described above until the table is full or the pass end time is past.

When the executive directs DOPPRE to extend the Doppler predict table (IDIR(6)=2), DOPPRE computes the number of records to produce based on the time of the last entry in the table and the scheduled pass end time. DOPPRE then continues filling the Doppler predict table in wraparound fashion until the proper number of records has been computed.

When all the requested Doppler observations have been computed and placed in COMMON /OUTDPL/, DOPPRE locks the Doppler predict table by setting LCKFLG(2) to .TRUE. in the output control table, which indicates that Doppler data is ready to be downlinked. DOPPRE then removes itself from the active task list (IACT(6)=0) and sets IFLAG5 to return control to the executive.

2.4.4 ESTIMATOR (ESTIM) TASK

ESTIM is a primary task that performs one of the major computational functions in FEDS. Its purpose is to estimate the user spacecraft (target) state using the most recent batch of observation data. A batch least-squares estimator is used to perform differential correction on the target's state parameters in a sliding batch mode in which the previous DC epoch is moved forward to encompass a fixed-length span of observation data. The state parameter set consists of a minimal set of six Cartesian state (position and velocity) components to which four optional parameters can be added--a drag term and three user spacecraft clock terms.

To limit the computational load, the estimation algorithm uses an editing scheme and a measurement partial derivatives computation that are nominally done only once per DC slide. The algorithm also allows a partial precomputation of the next DC slide before all the observations data for that slide are available.

ESTIM was originally designed to include both estimation logic and observation modeling. However, due to task memory limitations, the observation modeling has been separated into another task, OBSMDL. OBSMDL is completely controlled by ESTIM. Communication between the two tasks is accomplished through global COMMON blocks, and an event flag is used for task synchronization.

Figure 2-22 is a baseline diagram of ESTIM. Figure 2-23 shows the data flow between ESTIM and the other FEDS tasks. Appendix E contains descriptions of the data packets.

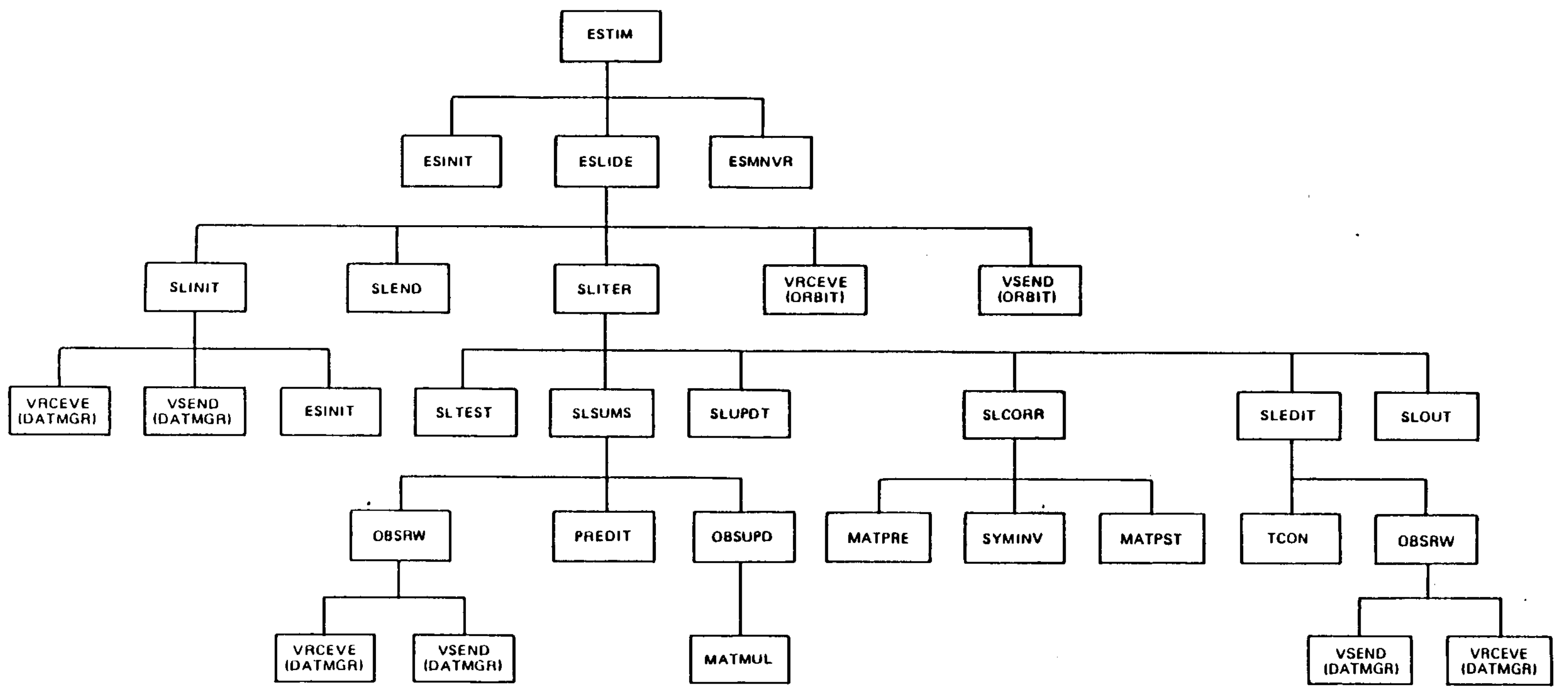


Figure 2-22. Baseline Diagram of ESTIM

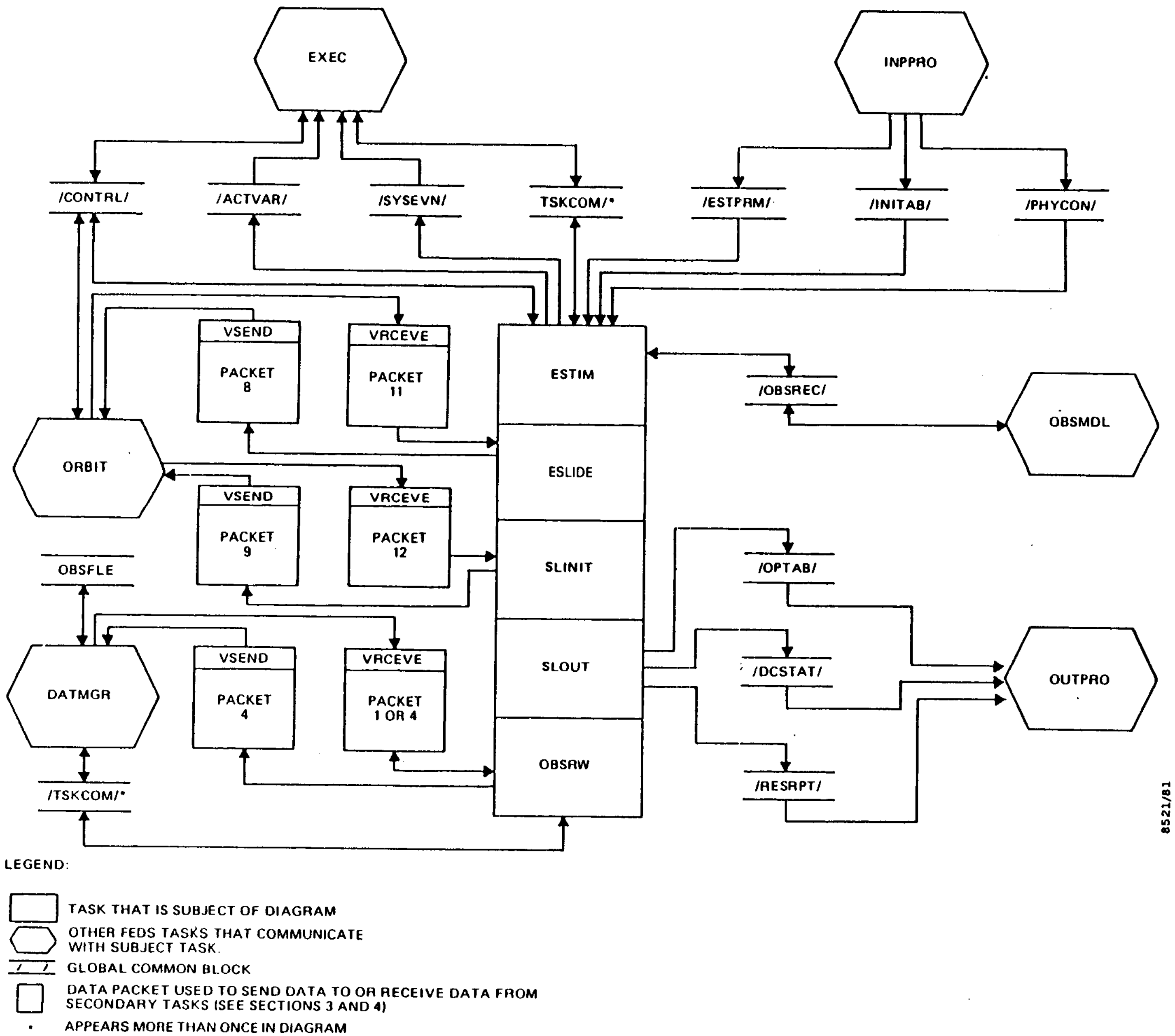


Figure 2-23. ESTIM Data Flow

Four FEDS executive function directives are processed under the control of ESTIM:

1. Perform full estimation (slide forward) over the latest fixed-length batch of observation data (IDIR(5)=1).

2. Partially precompute the next slide using the previous observation span (IDIR(5)=2).

3. Complete estimation (slide forward) after precomputation is finished (IDIR(5)=3).

4. Update a priori state parameters with the predicted user state after a maneuver (IDIR(5)= 4).

When ESTIM is first requested by the executive, the internal COMMON blocks used by ESTIM and OBSMDL are initialized to their default values in ESINIT, a global event flag is set, and ESTIM suspends itself. Upon resumption by the executive, ESTIM transfers control to either ESLIDE or ESMNVR, depending on the function directive to be performed. The first three function directives listed previously are performed by ESLIDE, and the last function is performed by ESMNVR. ESLIDE controls the slide advance and estimation process that consists of initialization (SLINIT), a state correction loop (SLITER), and status return and slide termination (SLEND).

The estimation algorithm consists of one or more iterations of corrections to the solve-for state based upon the most recent batch of multipass data: SLITER controls each iteration and returns updated state and estimation status (convergence/divergence) to ESLIDE. This sequence is performed for each of the different executive function directives: the internal logic that implements each directive is embedded in the modules.

Each iteration consists of a minimum of one pass through all of the available observation data within the timespan of the current slide. During this processing loop, the normal matrix and other batch estimation statistics are accumulated (SLSUMS); the state correction is computed (SLCORR); the solve state is updated (SLUPDT); and estimation reports are queued for downlink (SLOUT). Various types of observation editing are performed during this cycle. The first time that ESTIM uses each observation data record, PREDIT is called to detect grossly out-of-bounds measurements by checking TDRS-target-station geometry. During the first iteration of each slide and if linearity constraints are violated on subsequent slides, the observed-minus-computed residuals are edited if they are larger than acceptable, and one or more edit loops are performed to remove measurements from the accumulated sums based upon the current estimation statistics.

2.4.5 OBSERVATION MODELING (OBSMDL) TASK

OBSMDL is a primary task in FEDS that computes TDRSS observations based on given TDRS orbits and the current best estimate of the user spacecraft orbit. Unlike other primary tasks, OBSMDL is not controlled by the executive. OBSMDL is simply an extension of the estimator and is therefore controlled directly by ESTIM.

OBSMDL models one-way TDRSS Doppler observations and, optionally, computes the partial derivatives required in the estimation algorithm for these observations.

OBSMDL performs the following corrections for the specified types of observations:

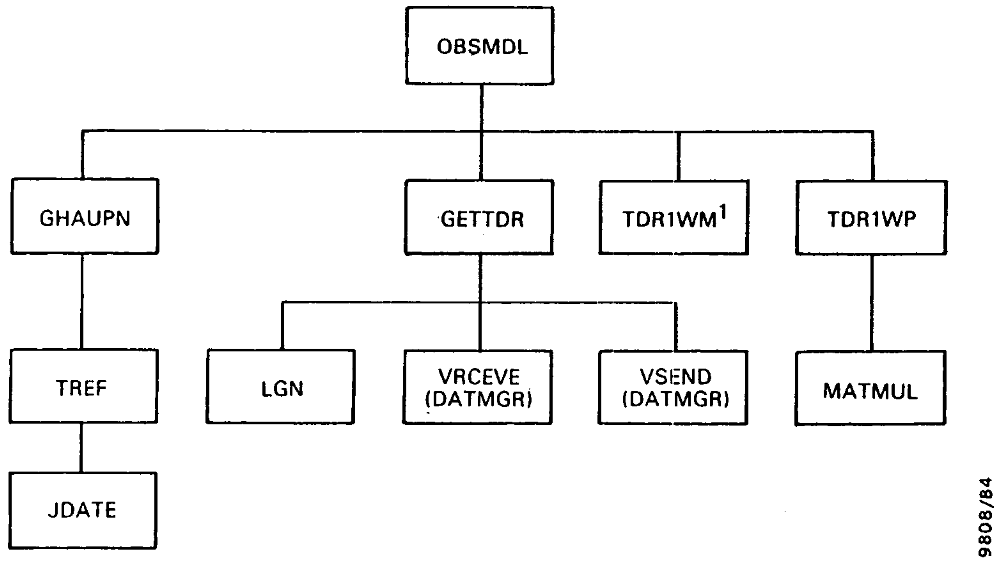
- Backward light-time
- Tropospheric refraction
- Transponder delay
- User frequency offset

- User frequency drift
- User frequency drift rate

The computational models are described in Reference 2. Figure 2-24 is a baseline diagram of OBSMDL. The communication and data flow among OBSMDL and ESTIM and other FEDS tasks are shown in Figure 2-25. Appendix E presents descriptions of the data packets.

If ESTIM has requested OBSMDL to compute an observation residual, OBSMDL begins by retrieving the observation time tag from global COMMON and calling GHAUPN to compute the GHA for the ground station at the time tag. Next, OBSMDL calls TDR1WM to model one-way TDRSS Doppler observations. During observation modeling, subroutine SORBIT is used to propagate the target satellite orbit for short periods of time using a second-order Euler method. This avoids numerous calls to the ORBIT task during light-time correction computation.

If OBSMDL has requested to compute partial derivatives, it calls TDR1WP to compute partial derivatives of TDRSS one-way Doppler observations at the given observation time.



[1]BASELINE DIAGRAM OF TDR1WM IS ON THE NEXT PAGE

Figure 2-24. Baseline Diagram of OBSMDL (1 of 2)

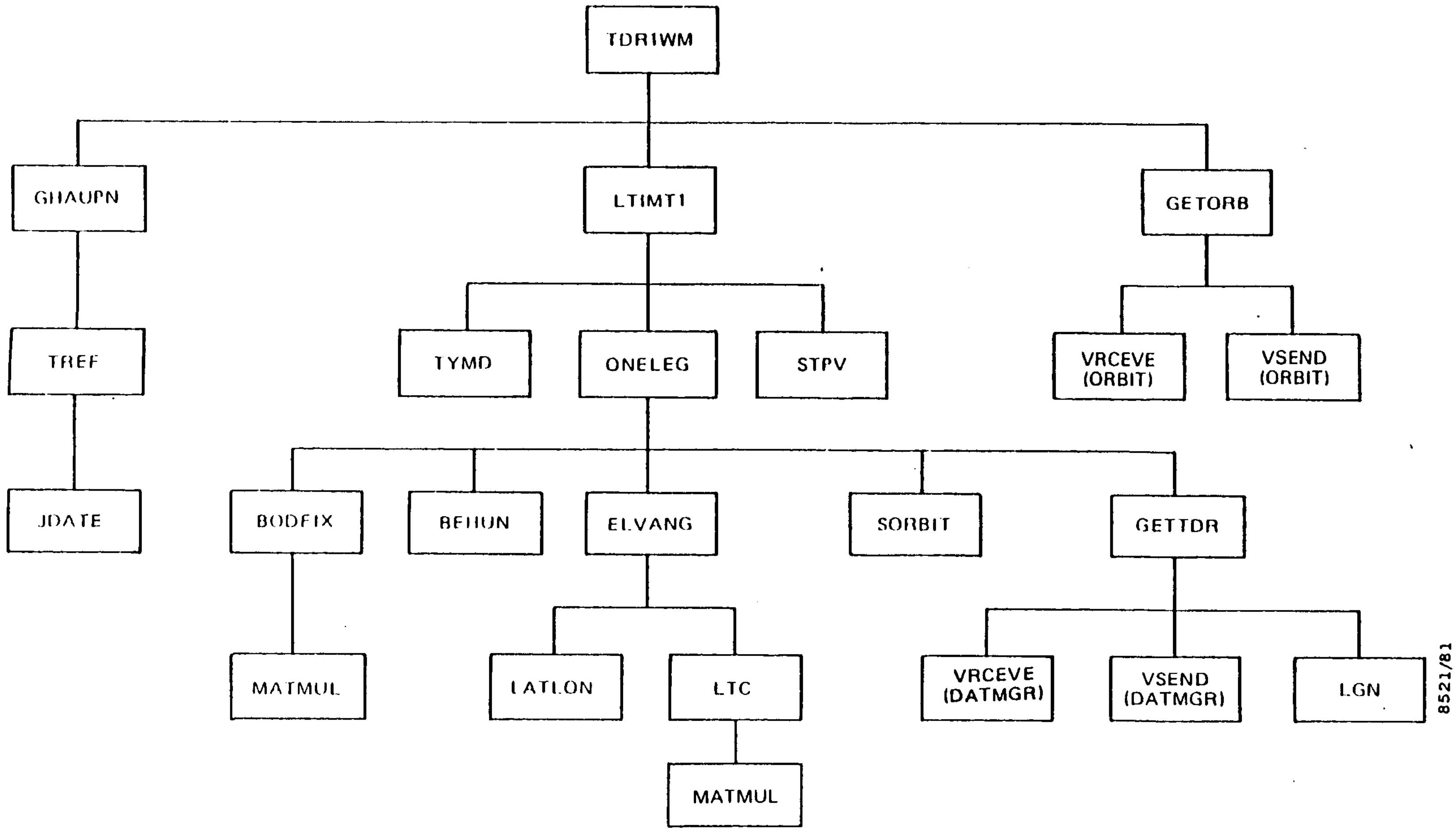


Figure 2-24. Baseline Diagram of OBSMDL (2 of 2)

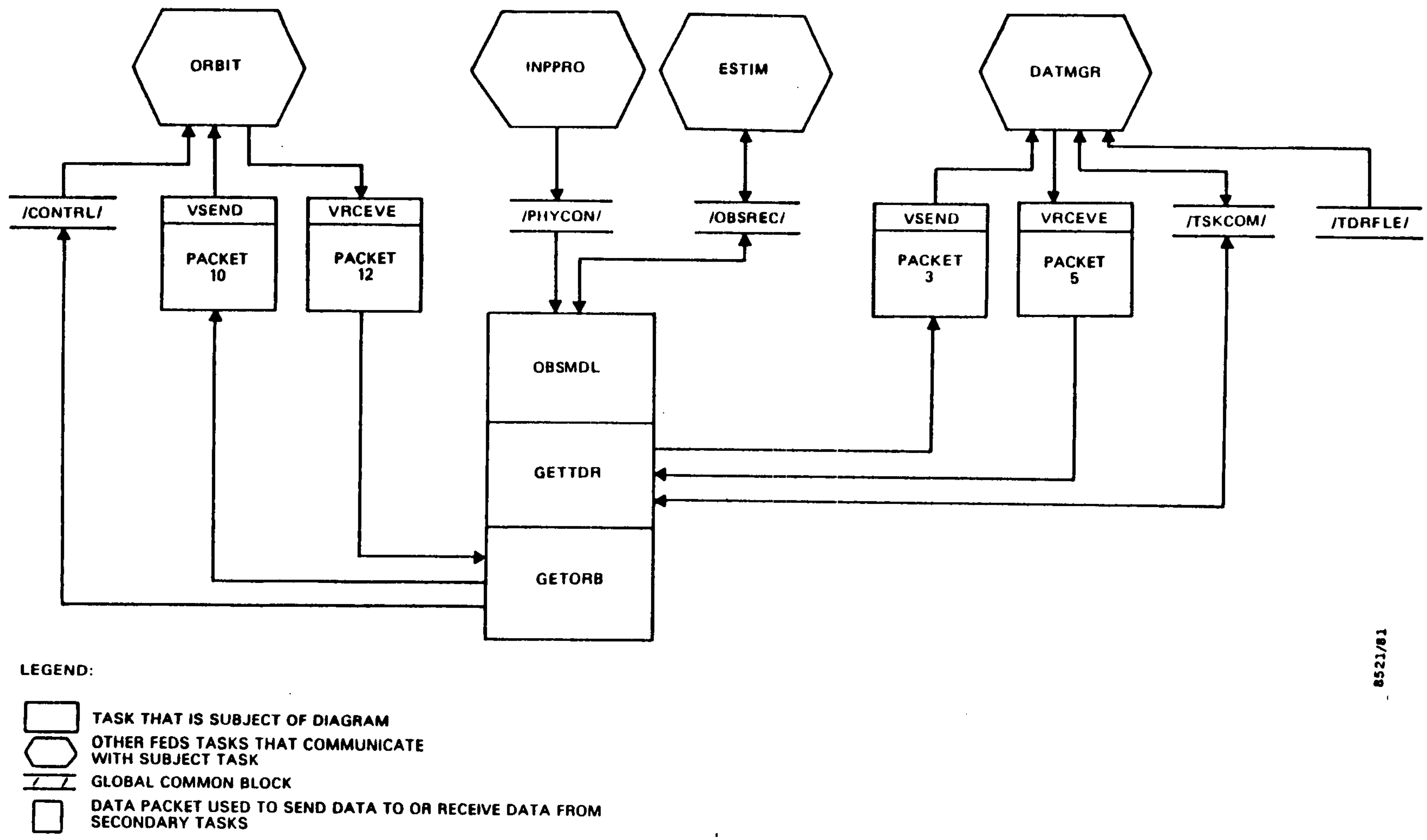


Figure 2-25. OBSMDL Data Flow

SECTION 3 - TEST SETUP

3.1 TEST HARDWARE AND DATA FLOW

During the demonstration, all test hardware was located at the Radio Frequency Simulation Operation Center (RFSOC). Hardware used in the test includes a PDP-11/23 microcomputer executing the FEDS software; communications hardware including a PB5 time code generator; a second-generation TDRSS user transponder; and various signal generators provided by the RFSOC. A high-level view of the test configuration is presented in Figure 3-1. The following sections describe the hardware, the data flow among the hardware, and the function of each component in the demonstration.

3.1.1 PDP-11/23 MICROCOMPUTER

The microcomputer used for the demonstration was a PDP-11/23 that used an LSI-11/23 microprocessor. The computer includes a console terminal port, three other RS-232 compatible ports, and 256 kilobytes of RAM, but no data storage peripherals. This computer was chosen because of its ability to execute PDP-11/70 FORTRAN and its similarity in capability to flight-qualified processors.

The LSI executes the orbit determination and frequency prediction software during the demonstration. The software essentially executes in a loop, first predicting the received frequency offset for a pass, then collecting observations, estimating the user state, and again predicting the received frequency for the subsequent pass. These functions must be performed sufficiently rapidly that frequency prediction data are available during signal acquisition and that estimation completes before the subsequent pass.

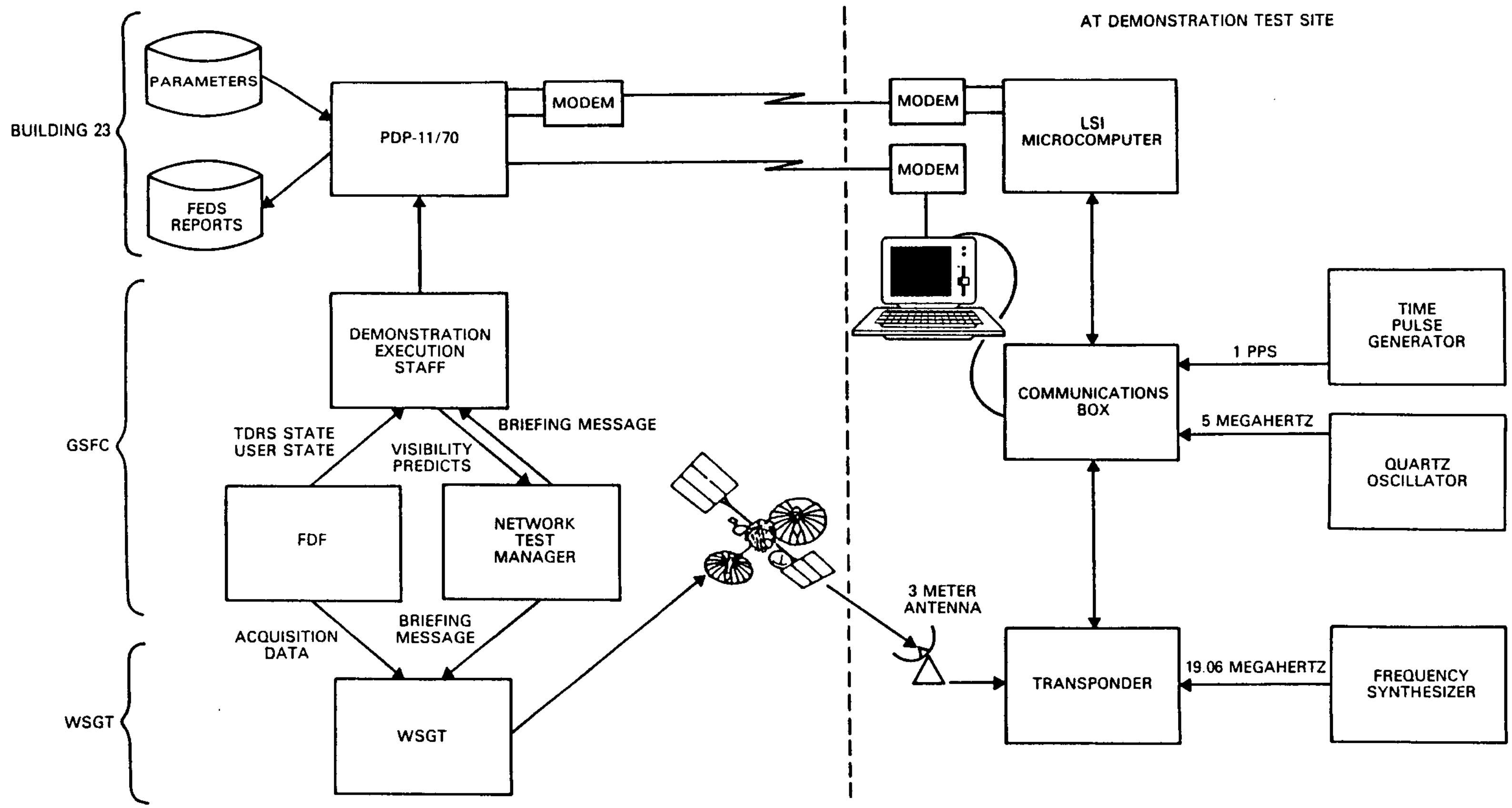


Figure 3-1. Test Configuration

The LSI communicates directly with the Communications Box via a cable and with the PDP-11/70 via a 2400-baud modem over a telephone line. The following data are accepted as input from ADEPT on the PDP-11/70 via a simulated uplink:

- Processing parameters (estimation control parameters and experiment parameters)
- Modeling parameters (station parameters, geopotential tables, atmospheric density tables, timing coefficients, and miscellaneous constants)
- Processing schedules (maneuver schedule and tracking schedule)
- Initial conditions (TDRS vectors and initialization table)

The following data are accepted from the Communiations Box in 11-byte message packets:

- Signal acquisition and loss messages
- Time messages and time-tagged observations

Output from FEDS on the LSI includes reports of predicted user state, predicted receive frequency, estimation residuals and summary, and FEDS activities sent to the PDP-11/70. The LSI transmits formatted frequency offset and transponder accumulator reset commands as well as requests for time from the clock module and observation data to the Communications Box. Section 2 discusses the functions of FEDS on the LSI.

3.1.2 COMMUNICATIONS HARDWARE

The Communications Box is a microprocessor-based piece of communications hardware that handles interfaces between FEDS on the PDP-11/23 and a second-generation transponder. The Communications Box consists of a microprocessor and chassis, a CRT, and a PB5 time code generator. The CRT provides a means for a user to communicate with the Communications Box. The time code generator uses a 1-pulse-per-second signal and a 5-megahertz signal to produce a PB5 time code accurate to 1 millisecond. The microprocessor controls the actions of the Communications Box. Figure 3-2 is a block diagram for the Communications Box.

The microprocessor, an Intel 8085, resides in a single-board computer (SBC-80/30) containing 8 kilobytes of erasable, programmable read-only memory (EPROM). The chassis containing the microprocessor and clock module also contains an interface board and terminal ports. These provide input and output capabilities for data to and from FEDS and the transponder and connectors to accept the two signals needed for the clock module. The microprocessor can also access the clock module memory to obtain the PB5 time code.

The main functions of the Communications Box are to provide an interface between the transponder and FEDS and to access the PB5 time code generator. All actions taken by the Communications Box are in response to messages sent from FEDS or from the transponder. All message formats are provided in Appendix C.

At the beginning of the simulation and before each scheduled tracking pass, the Communications Box receives a time request message from FEDS. The Communications Box then obtains the PB5 time code from the time code generator and forms and transmits the time message to FEDS. The Communications Box also receives a reset Doppler accumulator message before each scheduled tracking pass. In response to this message, the Communications Box sets the Doppler reset input into the transponder.

When the transponder does not have a lock on the tracking signal during a scheduled tracking pass, the Communications Box receives predicted Doppler messages at a preset

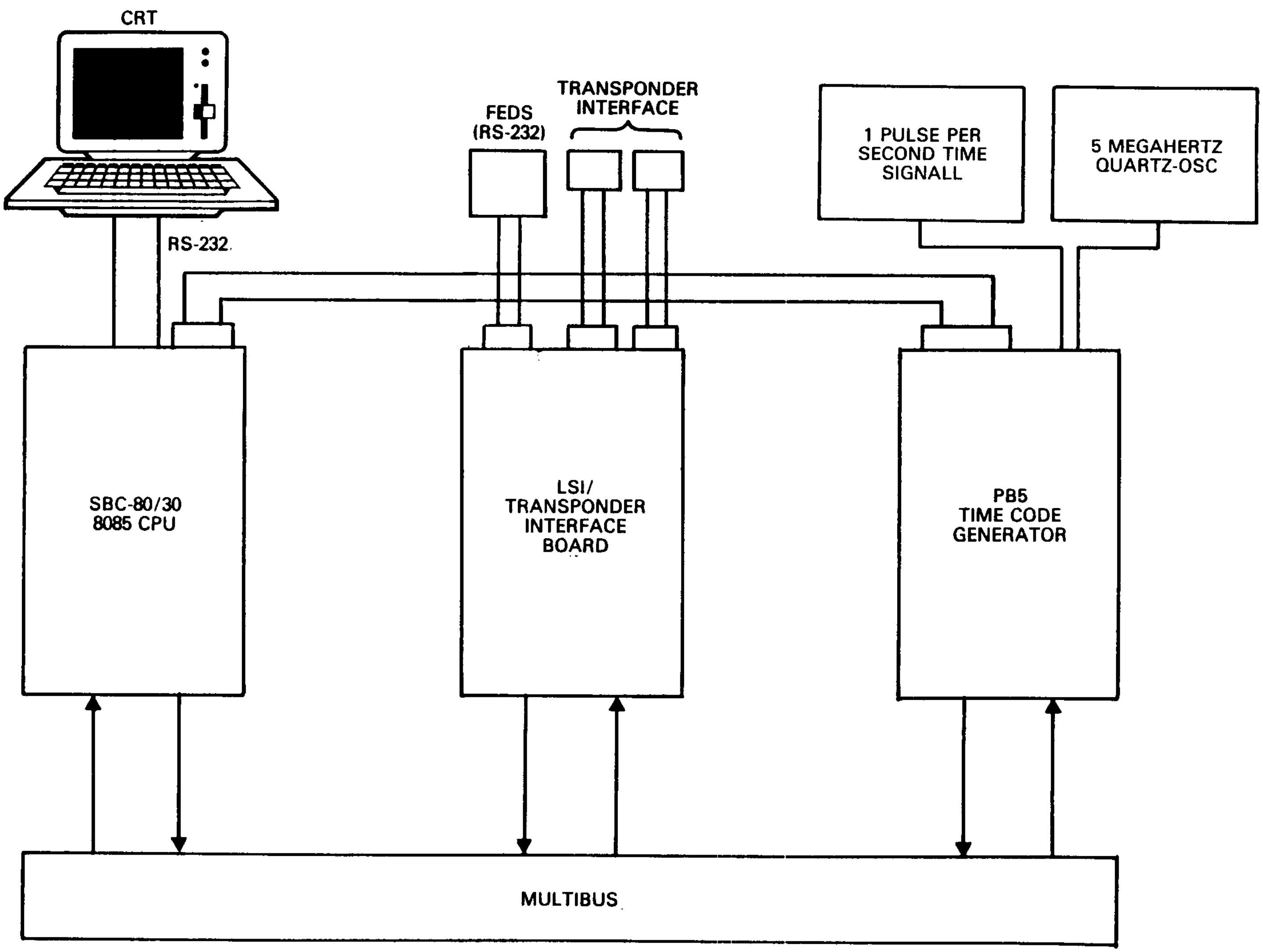


Figure 3-2. Communications Box Block Diagram

frequency, nominally once every 10 seconds. The Communications Box takes two actions in response to this message. First, the frequency control word is extracted from the predicted Doppler message sent from FEDS on the LSI and is transmitted to the transponder. Second, a message indicating that a predicted Doppler message has been successfully processed is transmitted to FEDS.

As soon as signal acquisition has occurred, the Communications Box receives signals from the synchronization detected (sync detect) and carrier lock output of the transponder. The Communications Box transmits a signal acquisition message to FEDS following receipt of the carrier lock output signal.

During the tracking pass, the Communications Box collects observation data from the transponder and associated time tags from the PB5 generator and transmits this information to FEDS. After accumulating data over the Doppler averaging interval, the transponder outputs a time strobe to the Communications Box. The Communications Box immediately obtains the current PB5 time code and then clocks the 40-bit Doppler accumulator from the transponder over a serial port. If FEDS has transmitted a Doppler observation message, indicating that FEDS is ready to receive an observation, the Communications Box immediately transmits the observation data message containing the Doppler accumulator and the PB5 time code to FEDs. Otherwise, the Communications Box awaits the message from FEDS before transmitting the observation data. As soon as the transponder loses the lock on the tracking signal, the Communications Box receives a signal from the carrier lock port of the transponder and responds by transmitting a signal loss message to FEDS.

The PB5 time code generator was produced locally by Code 520 personnel. The generator resides on one board within the

Communications Box, allowing read and write access to the time code. Input required for operation includes a 1-pulse-per-second time signal and a 5-megahertz reference frequency. The time code can be input for clock synchronization. The output of the time code generator is the current PB5 time code to millisecond resolution. The time code is accessed by the Communications Box for transmission to FEDs on the LSI.

3.1.3 TDRSS TRANSPONDER

The transponder used for the demonstration was a prototype of the Second-Generation TDRSS User Transponder. Of interest to the demonstration is the capability of the transponder to accept a frequency offset command to aid in signal acquisition and to form Doppler observations from a forward-link tracking signal.

As input, the transponder accepts a frequency standard, messages from the Communications Box, input from a touch screen terminal, and a TDRSS tracking signal. The 19-megahertz frequency standard is used as a reference both for signal acquisition and during observation formation. Input from the Communications Box consists of

- A frequency control command, which the transponder uses to adjust the center frequency while searching for the tracking signal
- A Doppler reset, which causes the transponder to clear the Doppler accumulator
- Doppler enable and timing pulses, which are used in transferring observation data from the transponder to the Communications Box

The transponder also accepts a mode control word that is formed by transponder control software, which was developed by Code 530 personnel. Input used in forming the control word is entered using a menu system on a touch screen terminal. The final input is the TDRSS tracking signal transmitted from the White Sands Ground Terminal (WSGT).

Output from the transponder includes observation data and status transition signals transmitted to the Communications Box and status information displayed on the touch screen terminal and on a printer. The status information transmitted to the Communications Box is as follows:

- Synchronization Detect and carrier lock signals, which are jointly used to indicate acquisition and loss of a tracking signal by the transponder
- A time strobe, which indicates that the current observation collection interval has expired and observation data are available for transmittal

The status information sent to the display devices includes the above-mentioned data plus an internal time estimate, the current frequency offset command, receiver automatic gain control (AGC), power output, and several flags. The flags indicate transponder mode (TDRSS or Spaceflight Tracking and Data Network (STDN)), receiver acquisition (search or detect), tracking signal main lobe (detected or not), pseudorandom (PN) noise code (detected or not), long PN code (locked or not), and accumulator reset request. Further information on the transponder is presented in Reference 3.

3.1.4 RADIO FREQUENCY SIMULATION OPERATION CENTER

The RFSOC is a facility sponsored by Code 530 to support simulation of TDRS user satellites. For the FEDS demonstration, the RFSOC provided all necessary hardware, other than that specifically designed for the test, including frequency generators, communications facilities, and integration test hardware.

Three frequency generators were required for the FEDS demonstration. The transponder required a frequency standard for reference in signal acquisition and observation formation. The RFSOC provided a signal at 19.056392183 megahertz from a Hewlett Packard 3325A frequency synthesizer.

The PB5 time code generator required two signal inputs. The RFSOC provided a 1-pulse-per-second signal from a Datum model 9110 and a 5-megahertz radio source from a Hewlett Packard 105A quartz oscillator. The timing signals were synchronized to the National Bureau of Standards transmission from Boulder, Colorado.

RFSOC telephone lines were used for communication with the PDP-11/70 computer in Building 23. One line, with Hayes 2400 Smart-modems connected to both ends, provided communication between FEDS on the LSI and the PDP-11/70, including software loading, data uplink, and data downlink. The other line, connecting a Hayes 2400-baud modem and a PDP 1200-baud modem, was used to operate ADEPT on the PDP-11/70.

RFSOC closed-circuit lines were used to communicate with other test elements during the test execution. The RFSOC also provided antennas to capture the TDRS tracking signal. On various days, either a 3-meter dish antenna or a 2-meter dish antenna was used.

The RFSOC also provided a forward-link signal locally during integration testing. The signal, generated by a test set, was used to verify transponder operation and observation data processing before the TDRS signal was available.

3.2 TEST OPERATION

Execution of the FEDS demonstration required the preparation of data by other Goddard Space Flight Center (GSFC) organizations and operational support within GSFC and at other

National Aeronautics and Space Administration (NASA) installations. The following sections describe support required from outside organizations and operational procedures at the test site.

3.2.1 ORGANIZATIONAL INTERFACES AND OUTSIDE SUPPORT

One purpose of the demonstration was to show the ability of an onboard system to assist a transponder in acquiring an uncompensated tracking signal. The primary support required from sources outside the test group was a tracking signal similar to the signal received by a TDRSS user spacecraft. Generation of that signal involved the Orbit Determination Department, Network Test Office, Project Support Office (PSO), and WSGT.

The Orbit Determination Department provided state vectors used to compute the frequency of the tracking signal. For early test events, ephemeris generation runs were made using parameters for the Solar Mesosphere Explorer (SME). For the remainder of the test events, the Orbit Determination Department provided access to the operational orbit determination output data set for SME. Hardcopy output of the SME state vector was also provided to the FEDS demonstration staff.

Scheduling of TDRS contacts was handled by the Network Test Office. The FEDS demonstration staff generated a schedule of TDRS visibility times. For the demonstration, TDRS visibility was defined as times when the angle formed by a vector from the TDRS to SME and a vector from TDRS to the test site at GSFC was less than 4 degrees. The reasons for this definition will be discussed in Section 3.3.2. Based on this schedule and the timing preferences of the test staff, the Network Test Office obtained times for the TDRS multiple-access, forward-link (MA forward) support schedule and generated a briefing message to formalize the demonstration schedule and responsibilities.

The PSO handled accessing the data set output from the Orbit Determination Department and generating the necessary acquisition data for transmission to WSGT. The acquisition data for the test used the SME input with the exception of vehicle identification code (VIC) and SUPIDEN. The PSO manually entered a SUPIDEN of 1841 and a VIC of 01 and transmitted the acquisition data to WSGT via NASCOM.

WSGT was responsible for transmitting the appropriate tracking signal to the RFSOC via TDRS. The appropriate signal consisted of an MA forward signal using PN code 34 modulated at a Doppler-compensated frequency. For the demonstration, the signal was transmitted using 12 elements of the TDRS MA array to direct the signal toward SME. The compensated transmit frequency was computed at WSGT based on the ephemeris of SME supplied by the PSO. The computation was made in such a way that the tracking signal would reach SME at a constant frequency. FEDS can recover the user ephemeris from the frequency received on the ground by the transponder. The modeling to do this is described in Reference 1.

3.2.2 TEST PREPARATIONS

The following preparations were necessary before a test could be performed:

- The schedule needed to be determined.
- Initial TDRS and user vectors needed to be acquired.
- The nutation coefficients needed to be accessed periodically.

One to 2 weeks before a test, TDRS visibility times were determined based on predictive user and TDRS ephemerides. The Network Test Office received this information and produced a TDRS contact schedule. The tracking schedule was then entered into a data set using ADEPT to be uplinked to FEDS during the test.

Once every 10 days, nutation coefficients used in FEDS were updated. These coefficients are available from a static data set on the FDF computers. Following official scheduling of the TDRS contacts, 10 new coefficients and a reference time were input to ADEPT for uplink to FEDS.

One day before a test, the initial TDRS and user state vectors were obtained for 1 to 2 hours before the first contact time. The vectors were retrieved from the operational orbit determination data sets in the FDF by using a command list provided by orbit operations personnel. A hardcopy of the vectors was produced and saved for postdemonstration analysis. These data were also entered, using ADEPT, to be uplinked to FEDS during the test.

3.2.3 TEST EXECUTION

On the day of a test, the primary responsibility of the FEDS demonstration staff was to initiate the components of the demonstration. The transponder, the Communications Box, FEDS on the LSI, and ADEPT all required attention.

RFSOC personnel assumed responsibility for powering up and properly configuring the transponder. Transponder initialization, which took place before test execution, included entering the current time and the PN code number and verifying the proper source of the reference frequency and the status of the transmitter.

Manual initialization of the Communications Box is a two-step procedure, as follows:

- First, the current time was entered into the PB5 generator using the A command. Because the PB5 generator reset milliseconds upon receipt of the 1 pps signal, the manually set time had to be accurate only to the nearest second.

The time was verified by comparison of light-emitting diode (LED) output from the PB5 generator with timing units in the RFSOC.

- Second, the Communiations Box was instructed to wait for an initialization message from FEDS on the LSI using the R command. A brief description of the available Communications Box commands is given in Table 3-1.

Initialization of FEDS consisted of loading a system image from the PDP to the LSI and uplinking the initialization data from ADEPT. Two modems were used at the test site. One was connected at 2400 baud to the input port of the LSI; the other connected a terminal to the PDP. The system image was first loaded to the LSI and took roughly 20 minutes. Following completion of the loading, ADEPT was initiated to load FEDS initialization data and accept FEDS output. In the time between completion of initialization data uplink and generation of the first output, the modem was physically disconnected from the port used for input and uplink and reconnected to the port used for downlink.

For the remainder of a test, it was the responsibility of the demonstration staff to monitor the progress of the test and perform reinitialization when required by anomalous occurrences. Monitoring functions included monitoring communications among demonstration hardware, monitoring execution of FEDS, and communicating via a closed-circuit telephone link with the test director and other test elements. One minute before the scheduled beginning of the TDRS contact, the printer connected to the transponder was turned on to provide a log of the progress of the pass.

3.3 SPECIFIC PROBLEMS ENCOUNTERED

During preparation for and execution of the demonstration, several difficulties were experienced that impeded progress.

Table 3-1. Transponder Interface Commands (1 of 2)

COMMAND	DESCRIPTION	COMMAND SYNTAX	EXAMPLE
D Display Memory	Allows user to display any portion of memory on the CRT.	D<low address>,<high address> Carriage Return (cr)	[1]See example below; display lines too long for column.
Xr Display/Set Register	Allows user to display or set the 8085 CPU registers, program counter (p), or stack pointer(s).	X cr or Xr where r (in Xr) = register (a,b,c,d,e,h,l,m,p,s)	[2]See example below; display lines too long for column.
S Substitute Memory	Allows user to examine and optionally modify memory locations individually.	S<address> (space)	S4000 00-xx 11-yy 22-zz where xx, yy, zz are hex values
I Insert Memory	Allows user to insert large amounts of code into memory.	I<address> cr	[3]See example below; display lines too long for column.
G Go	Allows user to start program in RAM and set optional breakpoints. User must set up the instruction pointer to the start address before executing this command.	G[<start address>] [,−<breakpoint address>] [,−<breakpoint address>] cr	G cr Go from instruction pointer G4000 Go fro 4000 G4000—4010 Go fro 4000 til 4010 executed
M Move Memory	Allows user to move blocks of memory to the area of RAM, beginning at destination.	M<low address>,<high address>, <destination>	M4000, 41000, 6000
N Single Step	Allows user to single step through program one instruction at a time. PC register must be set to the address user wishes to step from.	N cr	—

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[1]D0,10 cr
0000 F3 C3 4F 00 F3 CD E8 05 C3 9C 03 37 0A 12 03
0010 F3

[2]X cr
A = 01 B = 02 C = 03 D = 04 E = 05 F = 16 H = FF L = FF M = FFFF P = 1234 S = 7F80
XA − 01 cr

[3]I4000 cr
1234567890ABCDEF012345678900000012 (escape)
D4000,4010 cr
4000 12 34 56 78 90 AB CD EF 01 23 45 67 89 00 00 00
4010 12

Table 3-1. Transponder Interface Commands (2 of 2)

COMMAND	DESCRIPTION	COMMAND SYNTAX	EXAMPLE
T Set up PB5 Time	Allows user to set time code generator.	Tcr	[4]See example below; display lines too long for column.
A Display PB5 Time	Allows user to display time on the CRT.	Acr	A Julian day 1224 Seconds of day 83372 Ms of day 674 Time of day 23:59:30
R Initialize Xponder Interface	Initializes Transponder Interface Board and requests time delay to wait for response from FEDS.	Rcr	[5]See example below; display lines too long for column.
C Resume Xponder Program	Allows user to resume executing the transponder program used to simulate the transponder in integration testing. If user had interrupted the program for some reason, it can be restarted by using this command.	C	C 'Resume Xponder Program'
H. Menu Display	Displays the Help menu.	H	—
F Send Function Code to LSI	Allows user to send function codes to the LSI.	Fx	Fxzzzzzzzzzzzzzzzzzzzzzz x = 0 to 6 z' s = function code value
L Send to CRT/LSI (C or L)	Allows user to send a function code to the LSI or to a CRT for debug purposes.	Lcr	[6]See example below; display lines too long for column.

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[4]T
'Type in number of days' (message from interface)
1224 cr
'Type in hours & minutes'
2359
'Type in seconds'
30
Time is now entered into Timer Interface Board

[5]R
Initialize Xponder interface
Enter delay in seconds for LSI's response (max 60 sec)
10

If FEDS responds correctly, then the message
'LSI SENT WAKEUP MESSAGE' is displayed on the CRT,
ELSE
'No Response from the LSI' is displayed

[6]L
'Enter C to test with CRT, L to test with LSI'
L
'Send to LSI'

The following sections briefly describe the major problems and present solutions, if any were required.

3.3.1 FORCE MODEL MISMATCH

Before executing the first test, the demonstration execution staff reviewed Goddard Trajectory Determination System (GTDS) modeling of user spacecraft to obtain proper geopotential and atmospheric density tables. It was discovered that the GTDS default corresponded to the tables used in FEDS.

A comparison of GTDS orbit propagation of SME to FEDS propagation revealed a significant mismatch. Over a 2-hour span, position differences were approximately 100 meters. Over a 12-hour span, differences were in kilometers. Examination of GTDS output from a SME orbit determination run revealed several modeling differences between GTDS and FEDS force modeling. Most importantly, GTDS had overwritten the Goddard Earth Model-1 (GEM-1) geopotential table found in the GTDS COMMON block, which was used in FEDS, with a GEM-9 table and had used only an 8-by-8 rather than a 15-by-15 field. Correction of this mismatch in FEDS reduced position differences to about 20 meters after 2 hours of propagation. Correction of a mismatch in atmospheric density and mass of the Earth reduced the position differences to 10 meters after 12 hours of propagation.

3.3.2 TDRS DOPPLER COMPENSATION

The original plan for transmission of the tracking signal called for the TDRS MA antenna to be pointed at WSGT in a simulation mode. The transponder at GSFC would pick up the signal since the angular separation between WSGT and GSFC is approximately 2.9 degrees from the view of TDRS, well inside the beam width of more than 4 degrees. This was not satisfactory, however, since the only compensation available in simulation mode is for relative motion between TDRS and the ground station.

The resolution called for the TDRS MA beam to actually follow the satellite whose elements were chosen, SME. To avoid inadvertent communication with SME, a different PN code was encoded onto the tracking signal.

The transponder would be able to acquire the tracking signal and accumulate data whenever the angle between the transponder and SME was sufficiently small, as viewed from TDRS. The TDRS signal was determined to be strong enough for signal acquisition 4 degrees from the center of the beam and was therefore considered visible whenever the angle formed by the TDRS-to-SME vector and the TDRS-to-GSFC vector was less than 4 degrees. From the view of TDRS, 4 degrees surrounding GSFC covers the western portion of the Earth and reaches from north of the Earth to the northern portions of South America. Figure 3-3 shows the planned and the actual tracking configurations. Figure 3-4 shows the approximate region of visibility for a low Earth satellite.

To predict the times of visibility, a program was quickly developed, primarily using portions of the FEDS orbit propagator and observation model, that computed the angle between SME and GSFC. The visibility times collected from this program indicated sufficient visibility to perform estimation. Passes were available up to 18 minutes in length, nominally once per orbit (90 minutes). Twice daily, there would be a period of roughly 1.5 orbits (2.25 hours) in which only short passes of 5 minutes or less or no passes would be available.

3.3.3 SIMULATION SUPPORT

On several occasions during test preparations, progress was delayed because required support was unavailable. Preparations for the Challenger launch made TDRS unavailable during late January and early February, causing the longest delay. Sharing the transponder with engineering functions made

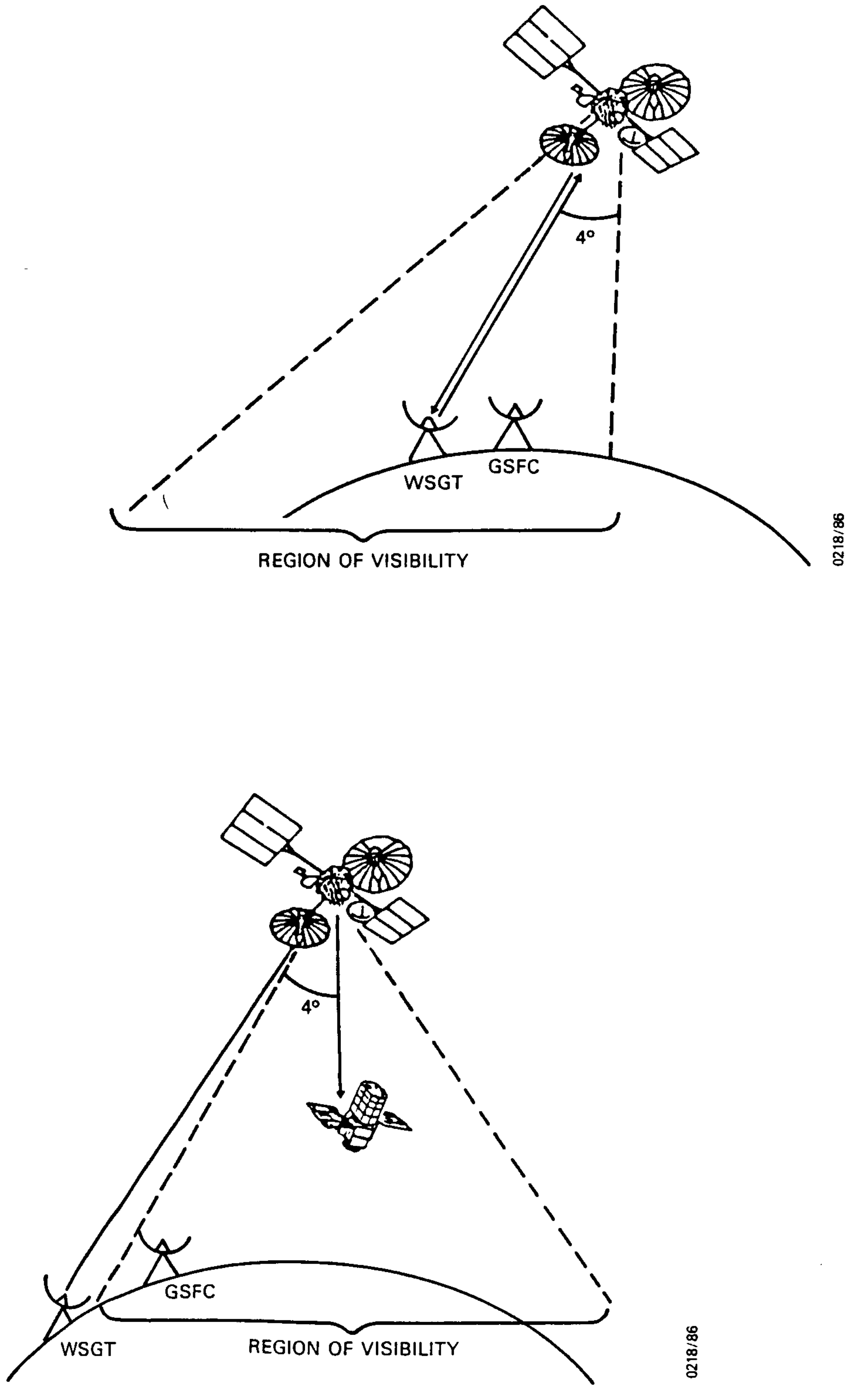

Figure 3-3. Planned/Actual Tracking Configuration

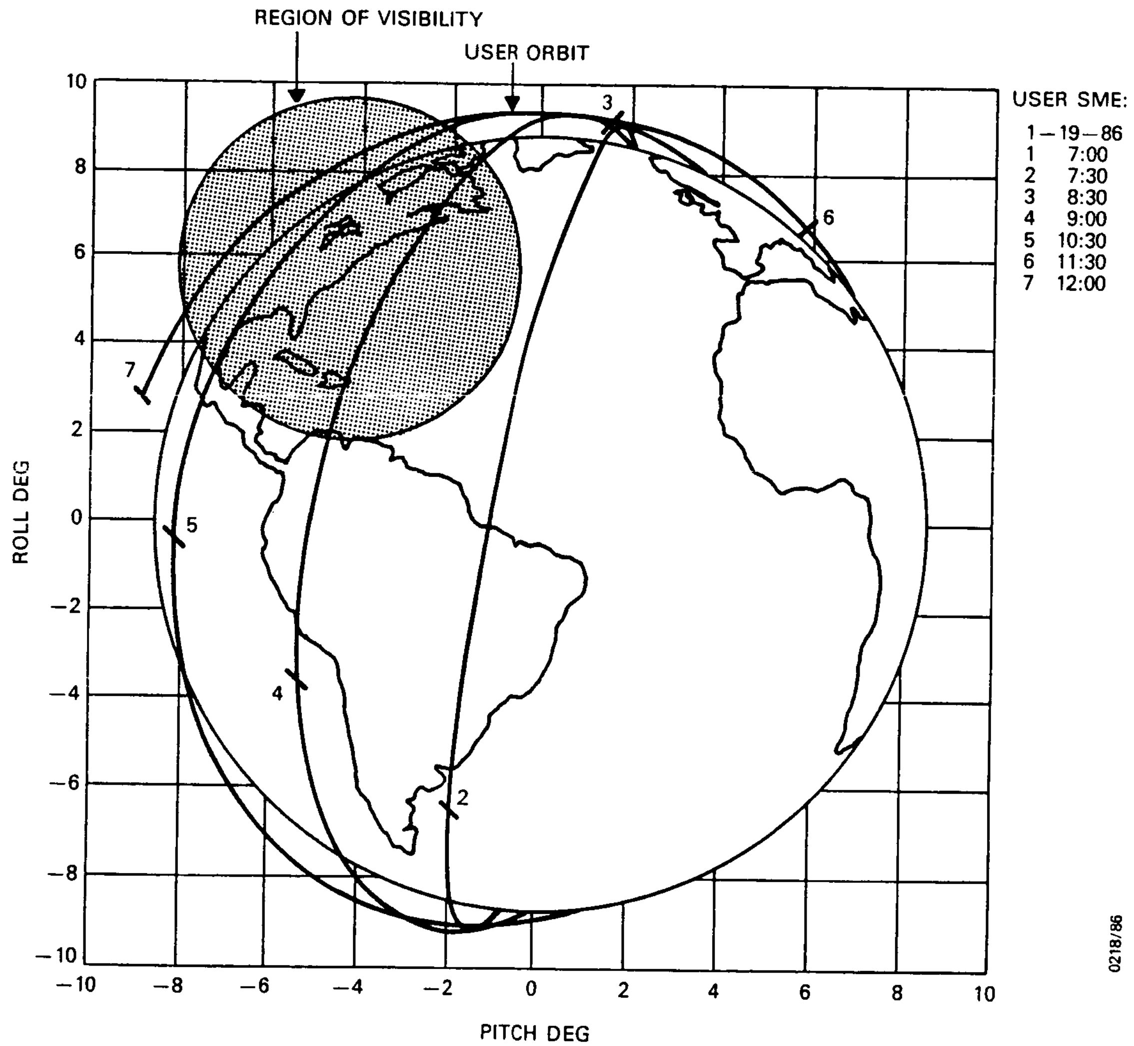

Figure 3-4. Region of Visibility for a Low-Earth Satellite

testing impossible during late February, and downtime at WSGT caused cancellation of several TDRS contacts. These events required no response from the demonstration staff.

3.3.4 INITIAL SME VECTOR ERROR

While preparing all tests in which FEDS controlled signal acquisition and data collection autonomously, position and velocity vectors for TDRS and SME and the tracking schedule were manually input into ADEPT for later uplink to FEDS. The initial SME position vector used on February 11 was in error by approximately 20 kilometers. During the first pass, all data were acquired normally. By the second pass, approximately 4 hours from the epoch, the predicted Doppler shift was in error by over 10,000 hertz, and automatic acquisition failed. Acquisition during the second and third passes of that day was accomplished using manually input frequency commands.

3.3.5 MICROCOMPUTER LOADING FAILURES

Twice during testing, FEDS failed to execute the initialization data receipt properly. The precise cause of these failures was not determined, but the errors were generally attributed to the manual operations required during LSI loading. These failures each resulted in the loss of one pass of autonomously collected data. The software was reloaded immediately and executed properly.

3.3.6 COMPUTER STOPPAGE

Three times during testing, the LSI executing FEDS ceased execution. Although the microprocessor itself was still executing, as evidenced by the continued ability to capture incoming data, progress on all other functions of FEDS stopped. Although a likely area in the code was located, no cause was identified. This problem led to the inability of FEDS to complete an estimation batch during demonstration testing, although estimation updates were made. A work-around was implemented, and the problem was not observed during postdemonstration analysis.

3.3.7 MISALIGNMENT OF DOWNLINKED REPORTS

On the first 2 days of autonomous testing, output from FEDS was not properly received by ADEPT. The data messages were 1 byte from the proper location in the downlink data buffer. Although this caused some extra work, all data from those 2 days were recovered. The problem was caused by incorrectly executing an operational procedure that removed all residual characters from the PDP-11/70 port before the receipt of downlink data. The problem was solved by correcting the operational error.

3.3.8 CLOCK SYNCHRONIZATION

One of the riskier operational procedures involved setting the PB5 time code generator. As mentioned in Section 3.2, the clock was set by typing in the current day, hour, minute, and second. Synchronization was checked by comparing an LED readout with clocks in the RFSOC. During the final day of execution, the clock was set to local time rather than GMT, which resulted in autonomous acquisition failing and the loss of the first several minutes of observation data in the pass of 1635 before the time was corrected.

3.3.9 CONNECTION FAILURE

During one pass during the final day of testing, the connection between the 19-megahertz frequency oscillator and the transponder was broken due to a broken socket. Because of the absence of a consistent reference frequency, the transponder failed in signal acquisition. Although one pass of data was lost, the problem was quickly isolated and corrected and the test continued with collection of the subsequent pass.

SECTION 4 - DEMONSTRATION RESULTS

Integration of hardware and demonstration testing took place at the RFSOC between December 27, 1985, and March 10, 1986. Tracking signal acquisition and data collection results presented here are based on all TDRS contacts. These contacts took place December 28, 1985, and February 4, 6, 10, 11, and 12, March 7 and 10, 1986. Because at least a 5- to 6-hour data span was needed for estimation, most of the estimation results presented are from the March 10 execution and from postdemonstration runs using the March 10 data.

The estimation parameters for the runs presented specify estimation covering about 6 hours of data collected in four passes, totaling 60 to 70 observations. The solve-for state includes position and velocity plus coefficient of drag and frequency bias. Execution with other parameters yields similar results. The results are discussed in terms of signal acquisition support, data communication, and estimation performance.

4.1 TRACKING SIGNAL ACQUISITION

Throughout integration of the demonstration hardware and execution of the tests, signal acquisition occurred more easily than expected. The demonstration system failed to acquire the tracking signal during three passes; twice this was attributable to errors in data entry and once it resulted from a hardware error that was quickly corrected. During the remaining 13 passes, signal acquisition occurred in roughly 6 seconds. The signal acquisition sequence of the transponder began concurrently with tracking signal detection by other hardware.

Information concerning the sensitivity of the transponder to frequency errors indicated an error budget of roughly 700 hertz. On the final 2 days of testing, the predicted signal frequency was in the vicinity of 800 hertz lower than the transmitted frequency. Signal acquisition was not noticeably affected by this error. The earlier data entry error causing frequency prediction errors of over 10 kilohertz did, however, inhibit signal acquisition.

4.2 DATA COMMUNICATION

Interaction between the transponder and FEDS via the Communications Box was extremely successful. In addition to collecting observation data, FEDS appropriately transmitted frequency control words and accumulator reset strobes and successfully received indications of signal acquisition and loss events.

To test the interaction completely, the antenna was disconnected from the transponder during a pass to cause loss of the tracking signal. FEDS collected the final observation before the loss of signal and upon the loss, immediately transmitted a frequency prediction corresponding to the current time and resumed output of predictions at regular 10-second intervals. When the antenna and transponder were reconnected, the signal acquisition process began immediately. The first observation following reacquisition of the signal was also collected and processed properly.

Another test of the data communications logic occurred inadvertently. Between two tracking passes, the transponder was connected to a test set to resolve a hardware question. Although signal acquisition occurred, all transmission of observation data from the transponder was ignored. The net result of such spurious signal acquisition was two entries in the log activity, one stating that acquisition had occurred and another stating that loss of signal had occurred.

4.3 ESTIMATION AND OBSERVATION MODELING

Several unresolved issues remain concerning observation modeling and estimation. A rather constant bias of approximately 800 hertz is seen in the Doppler data taken on March 10. The solution from the estimation was not as accurate as had been expected, with errors in the range of 3 kilometers at the epoch. Estimation executed more quickly than anticipated, however, owing largely to the use of a small (8-by-8) geopotential field for the user spacecraft.

The bias in the observation data is attributable to the transmitted tracking signal frequency, an assertion supported by the agreement between FEDS and GTDS observation modeling. During the FEDS pass of 13:29-13:42 on March 10, TDRS concurrently supported an SME tracking pass. The two-way Doppler observation data had a residual of between 2 and 3 hertz in GTDS. The differences between the FEDS computations and the GTDS observation scaled to correspond to one-way data are in the tens of hertz, a range comparable to the difference between forward- and return-link tracking. A comparison of other passes close in time to the epoch of FEDS TDRS and user state vectors yields similar results.

A comparison of processed Doppler observation data with a log of transmission frequency also produced very good agreement. TDRS motion accounts for the differences realized by the Doppler transmitted frequency and received frequency. This agreement verifies the accumulation of observation data by the transponder and the preprocessing of the observations in FEDS. The preprocessing of observation data was scaled slightly during integration testing; the following equation was used during demonstration testing:

$$D(t) = \left(\frac{\Delta N}{m} - f_B \right) \frac{1}{k} \cdot \frac{f_u \cdot 17}{2^{21} \cdot 240} \cdot S$$

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where ΔN = change accumulator reading

M = number of samples (40,000)

f_B = frequency bias (2^{21} = 2,097,152)

k = rational multiplier (1/4)

f_u = oscillator frequency (19,056,392)

S = scale factor (0.99952)

Following correction of observation data for an 800-hertz bias, residuals remained ranging up to 20 hertz. These seem to be related to a timing error and to TDRS orbit discrepancies, neither of which FEDS can solve for.

Estimation errors were larger than expected. At estimation epoch, position errors ranged from 1.5 to 3 kilometers. Over the 2.5-hour timespan between estimation epoch and subsequent batch completion, position error remained below 4 kilometers in all cases, not significantly worse than at epoch.

The addition of a timing bias of 500 milliseconds reduced the residuals from 20 hertz to rough 10 hertz and yielded nearly constant residuals over each pass. Estimation error at epoch was reduced to less than 1 kilometer, but prediction accuracy degraded to the 3- to 4-kilometer level almost as quickly as solutions without a timing bias.

To verify the integrity of the solution, alternate initial user state vectors were input. At epoch, position errors due to the input state vector grew to as large as 67 kilometers. The estimations converged to within 30 meters of other solutions regardless of initial state, although an additional iteration was occasionally required.

Figure 4-1 shows errors in the along-track (L), cross-track (C), and radial (H) components of the position vector versus time for the March 10 test. In this figure, updates to the state estimate are made at the estimation epoch. Figure 4-2 shows position errors versus time for the March 10 test using a 500-millisecond time bias. In this figure, the update to

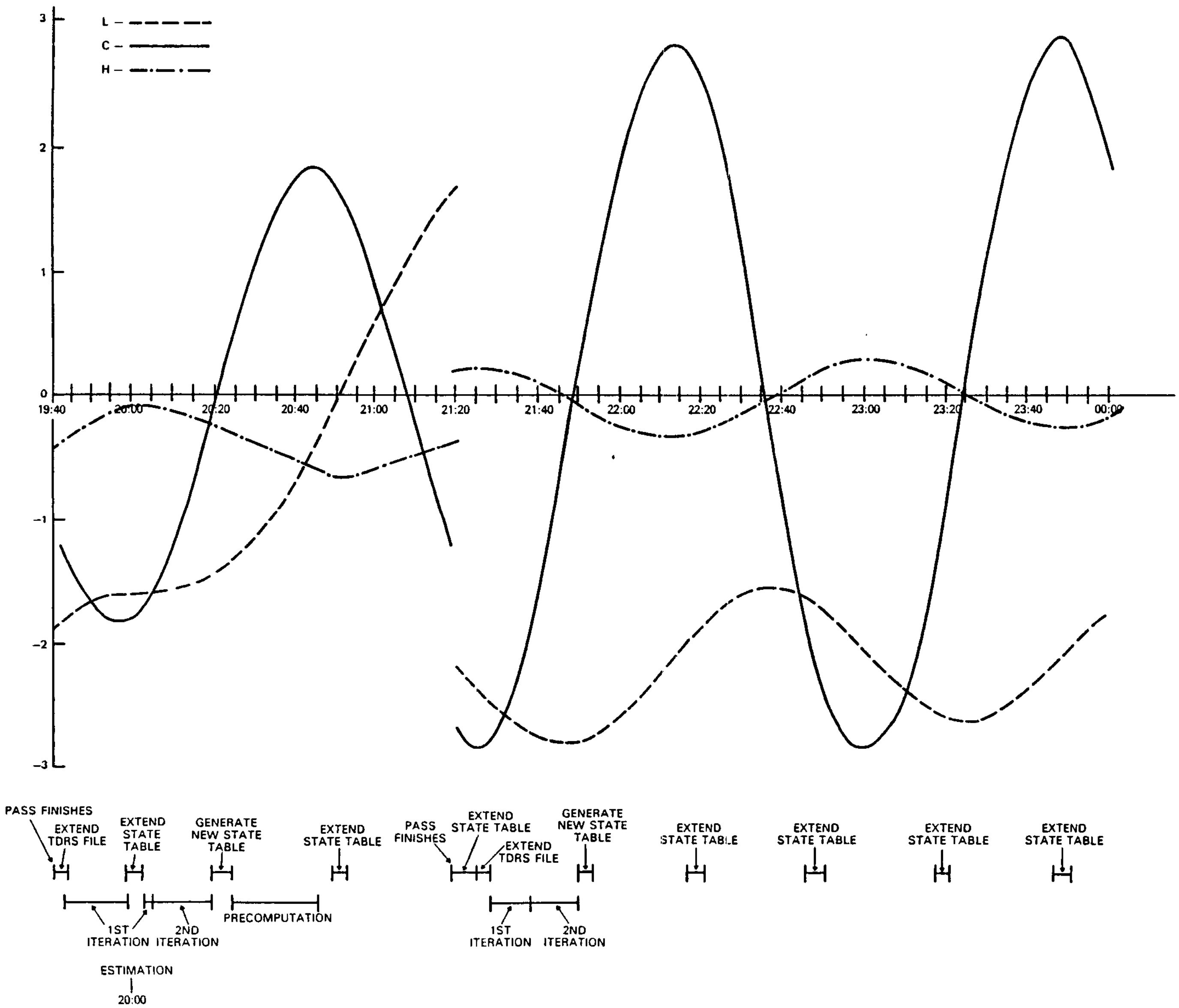

Figure 4-1. Position Errors Versus Time (Uncorrected Data)

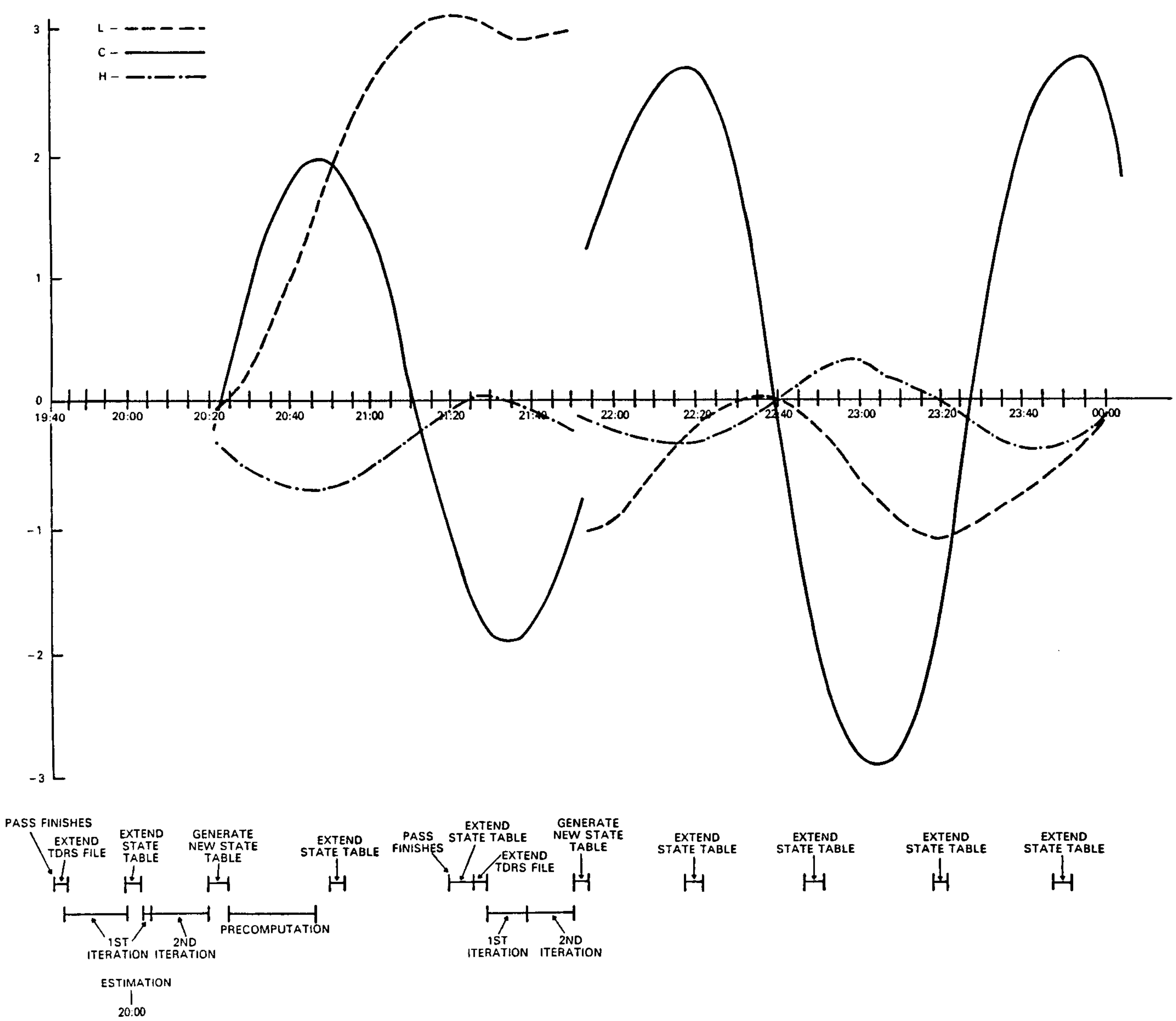

Figure 4-2. Position Errors Versus Time (Corrected Data)

the state estimate is made when the solution becomes available in FEDS. The timeline along the bottom of Figures 4-1 and 4-2 show FEDS activity. These samples show convergence in two iterations for the first batch due to an accurate initial state estimate.

The speed of estimation was better than had been anticipated. The computational speed of the LSI microprocessor is limited by the standards of current microcomputers but is representative of flight-qualified processors available until very recently. With this limitation, FEDS completed initial estimation within 50 minutes of loss of tracking signal using three iterations. This estimation time is significantly quicker than the requirement for estimation completion and subsequent state prediction before the beginning of the following scheduled tracking, nominally an 80-minute period. Estimation batches other than the first completed more quickly (roughly 25 minutes after loss of signal) because estimation precomputation was performed and because estimation converged in two iterations. As previously stated, the decrease in estimation time from the anticipated 80 minutes to 50 minutes for the first batch and 50 minutes to 25 minutes for other batches was largely due to the reduction of the geopotential field from 15-by-15 to 8-by-8.

SECTION 5 - CONCLUSIONS

The purpose of the demonstration was to show that a microprocessor-based onboard orbit determination system could perform all necessary functions with a minimum of ground support. Specifically, the three main goals were to

- Provide tracking signal frequency predictions needed by the transponder for signal acquisition
- Interact with the transponder and Communications Box so that all possible observation data would be collected and available during estimation
- Perform orbit estimation accurately and quickly enough for completion before subsequent tracking passes

The first two of these goals were extremely successful; estimation was only partially successful. Estimation was completed quickly enough for the results from one estimation to be used in frequency prediction for the subsequent pass and was also much more accurate than necessary for signal acquisition. The Doppler prediction error following initial estimation was in the range of 20 hertz, whereas the error budget was 700 hertz and the transponder demonstrated much less sensitivity.

Estimation accuracy was not, however, sufficient to replace ground-based orbit determination for scientific purposes. For typical missions, orbit determination accuracy requirements call for position errors of 500 meters. These errors, however, appear to be more with the source of the observation than with the orbit determination method.

The correlation of observation residuals to a 500-millisecond timing error reveals a serious limitation of FEDS. FEDS does not solve for a timing error. The use of

Doppler observation only has led to the opinion that timing bias would not easily be solved for. Before operational development is recommended, the question of timing bias solution or observation time tag verification should be more directly addressed. Quality assurance of TDRS vectors used on board would also have to be addressed.

The FEDS demonstration also left unproven the accuracy of forward-link observation modeling. Although the majority of the large residuals were removed as bias in transmission frequency, the remaining 10- to 20-hertz systematic biases are sufficiently large to severely affect estimation accuracy.

APPENDIX A - FEDS OUTPUT RESULTS

This appendix contains output from a post demonstration execution of FEDS using data from March 10, 1986. Included here are the initial conditions uplinked to FEDS, the activity log, the state vector report, the Doppler predict table, and estimation reports.

```
*******************************************************************************************

                                   SIMULATION PREVIEW

                                   DBO: 224, 2 SCHDULD8.DAT          DATE 11-JUL-86     TIME 17:08:00

*******************************************************************************************


C    860310120000.00 START

U    860310120001.00 MISCOND1.DAT                           # 1
                                      TARG DRAG SW           1
                                      TARG SUN  SW           1
                                      TARG MOON SW           1
                                      TARG STEPSIZ          0.60000000E+02
                                      TARG AREA             0.56450000E-06
                                      TARG MASS             0.41500000E+03
                                      TDRS SOLR SW           1
                                      TDRS SUN  SW           1
                                      TDRS MOON SW           1
                                      TDRS STEPSIZ          0.90000000E+03
                                      TDRS1 AREA            0.37523001E-04
                                      TDRS2 AREA            0.37523001E-04
                                      TDRS1 MASS            0.20000000E+04
                                      TDRS2 MASS            0.20000000E+04
                                      SOLAR FLUX            0.44999998E-02
                                      TDRS1 SOLRAD          0.18000000E+01
                                      TDRS2 SOLRAD          0.18000000E+01
                                      REF JUL DATE          0.24300000000000D+07
                                      ROTAT RATE            0.72921159000000D-04
                                      EQUAT RADIUS          0.63781400000000D+04
                                      FLAT COEFF            0.29825000000000D+03
                                      PI                    0.31415926535898D+01
                                      LIGHT SPEED           0.29979250000000D+06
                                      RAD. TO DEG.          0.57295779513082D+02
                                      PILFREQ-MA            -.21275000000000D+10
                                      PILFREQ-SSA1          0.13677500000000D+11
                                      PILFREQ-SSA2          0.13697500000000D+11
                                      PILFREQ-KSA1          -.14750000000000D+10
                                      PILFREQ-KSA2          -.10750000000000D+10
                                      TARG-BIAS             0.00000000000000D+00
                                      REFRACT SW             0
                                      1-WAY DP PAD          0.30000000E+03
                                      OUT TAB SPAN          0.18000000E+04
                                      OUT TAB STEP          0.60000000E+02
                                      ACT LOG SW             1
                                      SIC                    5
                                      VID                    5

U    860310120002.00 ESTPRMD1.DAT                           # 3
                                      DCSPAN                0.36000000E+04
                                      OBSSMP                0.30000000E+02
                                      SEMULT                0.30000000E+01
                                      TMLEAD                0.18000000E+04
                                      MAXITR                  10
                                      INLOOP                  10
                                      STD TDR 1-RG          0.50000000E+01
                                      STD TDR 1-DP          0.50000000E+01
                                      STD TDR 2-RG          0.50000000E+01
```

```
          STD TDR 2-DP      0.50000000E+01
          STD TDR 3-RG      0.50000000E+01
          STD TDR 3-DP      0.50000000E+01
          STD SRE 1-RG      0.50000000E+01
          STD SRE 1-DP      0.50000000E+01
          STD SRE 2-RG      0.50000000E+01
          STD SRE 2-DP      0.50000000E+01
          IROUT                  2
          IDCOUT                 1
          RES TDR 1-RG      0.10000000E+04
          RES TDR 1-DP      0.10000000E+04
          RES TDR 2-RG      0.10000000E+04
          RES TDR 2-DP      0.10000000E+04
          RES TDR 3-RG      0.10000000E+04
          RES TDR 3-DP      0.10000000E+04
          RES SRE 1-RG      0.10000000E+04
          RES SRE 1-RR      0.10000000E+04
          RES SRE 2-RG      0.10000000E+04
          RES SRE 2-RR      0.10000000E+04
          ELVMIN            -.10000000E+00
          RAYANG            0.36000000E+03
          RAYHGT            -.10000000E+05
          EDTOL             0.10000000E-02
          PCONV             0.49999999E-02
          VCONV             0.49999999E-05
          SECONV            0.10000000E-02
          POSDIV            0.20000000E+03
          VELDIV            0.10000000E+03
          RATCOR            0.10000000E+03
          POSLIN            0.30000000E+01
          VELLIN            0.10000000E+01

U   860310120004.00 EXPARMD1.DAT       # 1
          TDRS ID-1              1
          GRNSTN ID-1            9
          ACMETH-1               1
          TDRS ID-2              7
          GRNSTN ID-2           10
          ACMETH-2               1
          DLTOBS            0.10000000000000D+02
          ACMTH FRQ-1       0.21064062500000D+10
          ACMTH FRQ-2       0.21064062500000D+10
          ACMTH FRQ-3       0.21064062500000D+10
          ACMTH FRQ-4       0.15008600000000D+11
          ACMTH FRQ-5       0.15008600000000D+11

U   860310120006.00 GEOTABD1.DAT       # 3


     HARMONIC COEFFICIENTS
          TARGET    MAXIMUM ORDER =   8    MAXIMUM DEGREE =   8
          TDRS      MAXIMUM ORDER =   8    MAXIMUM DEGREE =   8
          POINT MASS = 0.39860053000000D+06

ZONALS
INDEX     VALUE        INDEX     VALUE        INDEX     VALUE        INDEX     VALUE        INDEX     VALUE        INDEX     VALUE
 N  M                   N  M                   N  M                   N  M                   N  M                   N  M
 1  0 0.0000000E+00     2  0 -.1082627E-02     3  0 0.2535887E-05     4  0 0.1624618E-05     5  0 0.2269860E-06     6  0 -.5451857E-06
 7  0 0.3613987E-06     8  0 0.2100686E-06     9  0 0.3291558E-07    10  0 0.9690619E-07    11  0 -.9488462E-07    12  0 0.2970742E-06
13  0 0.8928483E-08    14  0 -.1989147E-06    15  0 0.2618688E-06
```

SECTORALS AND TESSERALS

N	M	C	S	N	M	C	S	N	M	C	S
2	1	-.276359574D-09	-.523574561D-08	2	2	0.157114232D-05	-.902313388D-06	3	1	0.219076946D-05	0.272670746D-06
3	2	0.304668248D-06	-.212592980D-06	3	3	0.979668044D-07	0.196810774D-06	4	1	-.505527510D-06	-.441250137D-06
4	2	0.788425183D-07	0.148189585D-06	4	3	0.590737486D-07	-.121408732D-07	4	4	-.415424939D-08	0.631635411D-08
5	1	-.420501642D-07	-.790017154D-07	5	2	0.105151649D-06	-.525770112D-07	5	3	-.155359423D-07	-.686707669D-08
5	4	-.226186403D-08	0.392171184D-09	5	5	0.396977784D-09	-.162954383D-08	6	1	-.593488494D-07	0.124851578D-07
6	2	0.598689631D-08	-.433599645D-07	6	3	0.122544896D-08	0.287119443D-10	6	4	-.395894706D-09	-.174455805D-08
6	5	-.206585415D-09	-.434857372D-09	6	6	0.437958480D-12	-.563723304D-10	7	1	0.195597792D-06	0.703138525D-07
7	2	0.326559793D-07	0.104633280D-07	7	3	0.337882544D-08	-.306768611D-08	7	4	-.606341255D-09	-.269448769D-09
7	5	0.590013195D-11	0.154573489D-10	7	6	-.252163394D-10	0.914117306D-11	7	7	-.171347664D-12	0.493996879D-12
8	1	0.170628347D-07	0.434784191D-07	8	2	0.600777339D-08	0.420582147D-08	8	3	-.100309691D-09	-.892685925D-09
8	4	-.321393023D-09	0.984011761D-10	8	5	-.226452754D-11	0.149237064D-10	8	6	-.208659197D-11	0.908964570D-11
8	7	0.345613159D-12	0.393219447D-12	8	8	-.154537123D-12	0.162053503D-12				

U 860310120007.00 ATMOSPD1.DAT # 2

ATMOSPHERIC DENSITY TABLE

ALTITUDE NALT(J)	MINIMUM DENSITY DENSITY(1,J)	MAXIMUM DENSITY DENSITY(2,J)
110	0.78000000000000D+02	0.78000000000000D+02
120	0.24899999618530D+02	0.24899999618530D+02
130	0.89130001068115D+01	0.92629995346069D+01
140	0.40510001182556D+01	0.41970000267029D+01
150	0.20920000076294D+01	0.21760001182556D+01
160	0.11599999666214D+01	0.12489999532700D+01
170	0.67809998989105D+00	0.76969999074936D+00
180	0.41569998860359D+00	0.50160002708435D+00
190	0.26530000567436D+00	0.33910000324249D+00
200	0.17249999940395D+00	0.23810000717640D+00
210	0.11509999632835D+00	0.17159999907017D+00
220	0.78659996390343D-01	0.12620000541210D+00
230	0.54850000888109D-01	0.94350002706051D-01
240	0.38940001279116D-01	0.71549996733665D-01
250	0.28100000694394D-01	0.54919999092817D-01
260	0.20560000091791D-01	0.42610000818968D-01
270	0.15230000019073D-01	0.33369999378920D-01
280	0.11409999802709D-01	0.26350000873208D-01
290	0.86310002952814D-02	0.20959999412298D-01
300	0.65540000796318D-02	0.16820000484586D-01
320	0.38399999029934D-02	0.11130000464618D-01
340	0.23010000586510D-02	0.75139999389648D-02
360	0.14029999729246D-02	0.51600001752377D-02
380	0.86839997675270D-03	0.35949999000877D-02
400	0.54400000954047D-03	0.25339999701828D-02
420	0.34190001315437D-03	0.17979999538511D-02
440	0.21889999334235D-03	0.12910000514239D-02
460	0.14180000289343D-03	0.93340000603348D-03
480	0.93039998319000D-04	0.67949999356642D-03
500	0.61940001614857D-04	0.49760000547394D-03
520	0.41949999285862D-04	0.36639999598265D-03
540	0.28989999188849D-04	0.27129999944009D-03
560	0.20499999664025D-04	0.20189999486320D-03
580	0.14870000086376D-04	0.15110000094865D-03
600	0.11090000043623D-04	0.11369999992894D-03
620	0.85000001490698D-05	0.86139996710699D-04

ORIGINAL PAGE IS
OF POOR QUALITY

ORIGINAL PAGE IS
OF POOR QUALITY

640	0.66990000959777D-05	0.65669999457896D-04
660	0.54160000217962D-05	0.50430000555934D-04
680	0.44789999265049D-05	0.39030001062201D-04
700	0.37770000744786D-05	0.30470000638161D-04
720	0.32380000902776D-05	0.24020000637393D-04
740	0.28120000479248D-05	0.19130000509904D-04
760	0.24680000478838D-05	0.15400000847876D-04
780	0.21840000954398D-05	0.12540000170702D-04
800	0.19449998944765D-05	0.10329999895475D-04
850	0.13999999737280D-05	0.73000001066248D-05
900	0.99999999747524D-06	0.52000000323460D-05
950	0.77999999348322D-06	0.38000000586180D-05
1000	0.58000000535685D-06	0.30999999580672D-05
1100	0.35499999739841D-06	0.20499999209278D-05
1200	0.22999999771400D-06	0.13999999737280D-05
1300	0.14500000133921D-06	0.99999999747524D-06
1400	0.90999996871233D-07	0.72000000272965D-06
1500	0.67000001990891D-07	0.54499997759194D-06
1600	0.45000000170603D-07	0.41499998815198D-06
1700	0.32999999177719D-07	0.34000001392087D-06
1800	0.22500000085302D-07	0.26500001126806D-06
1900	0.15999999547489D-07	0.20999999605920D-06
2000	0.12800000170898D-07	0.17000000696044D-06

U 860310120008.00 TIMCOFD1.DAT # 3

TOTAL POLY	0
POLY1-DJUL	0.00000000E+00
POLY1-A11	0.00000000E+00
POLY2-DJUL	0.00000000E+00
POLY2-A21	0.00000000E+00
TOTAL PDELT	1
PDELH1-DATE	0.16493500162435D+05
PDELH1-1	-.17358560687220D-02
PDELH1-2	-.58718821518550D-06
PDELH1-3	0.75311815826500D-07
PDELH1-4	0.51613608571380D-08
PDELH1-5	-.12155169958600D-08
PDELH1-6	0.22475662181500D-11
PDELH1-7	0.66179081679200D-11
PDELH1-8	-.38588891491400D-12
PDELH1-9	-.13052353778800D-13
PDELH1-10	0.16154117881300D-14
PDELH2-DATE	0.00000000000000D+00
PDELH2-1	0.00000000000000D+00
PDELH2-2	0.00000000000000D+00
PDELH2-3	0.00000000000000D+00
PDELH2-4	0.00000000000000D+00
PDELH2-5	0.00000000000000D+00
PDELH2-6	0.00000000000000D+00
PDELH2-7	0.00000000000000D+00
PDELH2-8	0.00000000000000D+00
PDELH2-9	0.00000000000000D+00
PDELH2-10	0.00000000000000D+00

U 860310120009.00 NEWTDRD1.DAT # 7

TDRS1-X	0.25271414400000D+05
TDRS1-Y	-.33731732300000D+05
TDRS1-Z	-.55143140000000D+03
TDRS1-XDOT	0.24609068000000D+01

```
                                  TDRS1-YDOT          0.18446489000000D+01
                                  TDRS1-ZDOT          -.62473000000000D-02
                                  TDRS1-ID               7
                                  TDRS1-REFTIM        0.86031012000000D+12
                                  TDRS1-UPDATE          0
                                  SPARE                 0
                                  TDRS2-X             0.00000000000000D+00
                                  TDRS2-Y             0.00000000000000D+00
                                  TDRS2-Z             0.00000000000000D+00
                                  TDRS2-XDOT          0.00000000000000D+00
                                  TDRS2-YDOT          0.00000000000000D+00
                                  TDRS2-ZDOT          0.00000000000000D+00
                                  TDRS2-ID               0
                                  TDRS2-REFTIM        0.00000000000000D+00
                                  TDRS2-UPDATE          0
                                  SPARE                 0

U   860310120010.00 TSCHEDD1.DAT            # 8
                                  INT1-STTIME         0.86031013290000D+12
                                  INT1-ETIME          0.86031013420000D+12
                                  INT1-OBFREQ         0.10000000E+02
                                  INT1-TDRSID           7
                                  INT2-STTIME         0.86031015030000D+12
                                  INT2-ETIME          0.86031015180000D+12
                                  INT2-OBFREQ         0.10000000E+02
                                  INT2-TDRSID           7
                                  INT3-STTIME         0.86031016390000D+12
                                  INT3-ETIME          0.86031016550000D+12
                                  INT3-OBFREQ         0.10000000E+02
                                  INT3-TDRSID           7
                                  INT4-STTIME         0.86031019260000D+12
                                  INT4-ETIME          0.86031019385000D+12
                                  INT4-OBFREQ         0.10000000E+02
                                  INT4-TDRSID           7
                                  INT5-SSTIME         0.86031020590000D+12
                                  INT5-ETIME          0.86031021170000D+12
                                  INT5-OBFREQ         0.10000000E+02
                                  INT5-TDRSID           7
                                  INT6-SSTIME         0.86031022370000D+12
                                  INT6-ETIME          0.86031022530000D+12
                                  INT6-OBFREQ         0.10000000E+02
                                  INT6-TDRSID           7
                                  INT7-SSTIME         0.00000000000000D+00
                                  INT7-ETIME          0.00000000000000D+00
                                  INT7-OBFREQ         0.00000000E+00
                                  INT7-TDRSID           0
                                  INT8-SSTIME         0.00000000000000D+00
                                  INT8-ETIME          0.00000000000000D+00
                                  INT8-OBFREQ         0.00000000E+00
                                  INT8-TDRSID           0
                                  INT9-SSTIME         0.00000000000000D+00
                                  INT9-ETIME          0.00000000000000D+00
                                  INT9-OBFREQ         0.00000000E+00
                                  INT9-TDRSID           0
                                  INT10-SSTIME        0.00000000000000D+00
                                  INT10-ETIME         0.00000000000000D+00
                                  INT10-OBFREQ        0.00000000E+00
                                  INT10-TDRSID          0
                                  INT11-SSTIME        0.00000000000000D+00
                                  INT11-ETIME         0.00000000000000D+00
                                  INT11-OBFREQ        0.00000000E+00
                                  INT11-TDRSID          0
                                  INT12-SSTIME        0.00000000000000D+00
                                  INT12-ETIME         0.00000000000000D+00
                                  INT12-OBFREQ        0.00000000E+00
```

```
               INT12-TDRSID          0
               INT13-SSTIME         0.000000000000000D+00
               INT13-ETIME          0.000000000000000D+00
               INT13-OBFREQ         0.00000000E+00
               INT13-TDRSID          0
               INT14-SSTIME         0.000000000000000D+00
               INT14-ETIME          0.000000000000000D+00
               INT14-OBFREQ         0.00000000E+00
               INT14-TDRSID          0
               INT15-SSTIME         0.000000000000000D+00
               INT15-ETIME          0.000000000000000D+00
               INT15-OBFREQ         0.00000000E+00
               INT15-TDRSID          0
               INT16-SSTIME         0.000000000000000D+00
               INT16-ETIME          0.000000000000000D+00
               INT16-OBFREQ         0.00000000E+00
               INT16-TDRSID          0

U   860310120011.00 STACOND1.DAT   # 1
               NUM-STATION             3
               STA1-ID                 9
               STA1-X               0.113016300000000D+04
               STA1-Y               -.483288500000000D+04
               STA1-Z               0.399244200000000D+04
               FREQ-BIAS1           0.00000000E+00
               ANTENNA-COR1         0.00000000E+00
               REFLECT  1-1          0
               REFLECT  1-2          0
               REFLECT  1-3          0
               REFLECT  1-4          0
               REFLECT  1-5          0
               REFLECT  1-6          0
               REFLECT  1-7          0
               REFLECT  1-8          0
               REFLECT  1-9          0
               REFLECT  1-10         0
               REFLECT  1-11         0
               REFLECT  1-12         0
               ANT-ALIGN-1           0
               STA2-ID                10
               STA2-X               0.113016300000000D+04
               STA2-Y               -.483288500000000D+04
               STA2-Z               0.399244200000000D+04
               FREQ-BIAS2           0.00000000E+00
               ANTENNA-COR2         0.00000000E+00
               REFLECT  2-1          0
               REFLECT  2-2          0
               REFLECT  2-3          0
               REFLECT  2-4          0
               REFLECT  2-5          0
               REFLECT  2-6          0
               REFLECT  2-7          0
               REFLECT  2-8          0
               REFLECT  2-9          0
               REFLECT  2-10         0
               REFLECT  2-11         0
               REFLECT  2-12         0
               ANT-ALIGN-2           0
               STA3-ID                11
               STA3-X               0.113040000000000D+04
               STA3-Y               -.481960000000000D+04
               STA3-Z               0.400880000000000D+04
               FREQ-BIAS3           0.00000000E+00
               ANTENNA-COR3         0.00000000E+00
               REFLECT  3-1          0
```

REFLECT 3-2	0
REFLECT 3-3	0
REFLECT 3-4	0
REFLECT 3-5	0
REFLECT 3-6	0
REFLECT 3-7	0
REFLECT 3-8	0
REFLECT 3-9	0
REFLECT 3-10	0
REFLECT 3-11	0
REFLECT 3-12	0
ANT-ALIGN-3	0
STA4-ID	0
STA4-X	0.000000000000000D+00
STA4-Y	0.000000000000000D+00
STA4-Z	0.000000000000000D+00
FREQ-BIAS4	0.00000000E+00
ANTENNA-COR4	0.00000000E+00
REFLECT 4-1	0
REFLECT 4-2	0
REFLECT 4-3	0
REFLECT 4-5	0
REFLECT 4-5	0
REFLECT 4-6	0
REFLECT 4-7	0
REFLECT 4-8	0
REFLECT 4-9	0
REFLECT 4-10	0
REFLECT 4-11	0
REFLECT 4-12	0
ANT-ALIGN-4	0
STA5-ID	0
STA5-X	0.000000000000000D+00
STA5-Y	0.000000000000000D+00
STA5-Z	0.000000000000000D+00
FREQ-BIAS5	0.00000000E+00
ANTENNA-COR5	0.00000000E+00
REFLECT 5-1	0
REFLECT 5-2	0
REFLECT 5-3	0
REFLECT 5-5	0
REFLECT 5-5	0
REFLECT 5-6	0
REFLECT 5-7	0
REFLECT 5-8	0
REFLECT 5-9	0
REFLECT 5-10	0
REFLECT 5-11	0
REFLECT 5-12	0
ANT-ALIGN-5	0
STA6-ID	0
STA6-X	0.000000000000000D+00
STA6-Y	0.000000000000000D+00
STA6-Z	0.000000000000000D+00
FREQ-BIAS6	0.00000000E+00
ANTENNA-COR6	0.00000000E+00
REFLECT 6-1	0
REFLECT 6-2	0
REFLECT 6-3	0
REFLECT 6-4	0
REFLECT 6-5	0
REFLECT 6-6	0
REFLECT 6-7	0
REFLECT 6-8	0
REFLECT 6-9	0
REFLECT 6-10	0

REFLECT 6-11	0
REFLECT 6-12	0
ANT-ALIGN-6	0
STA7-ID	0
STA7-X	0.000000000000000D+00
STA7-Y	0.000000000000000D+00
STA7-Z	0.000000000000000D+00
FREQ-BIAS7	0.00000000E+00
ANTENNA-COR7	0.00000000E+00
REFLECT 7-1	0
REFLECT 7-2	0
REFLECT 7-3	0
REFLECT 7-4	0
REFLECT 7-5	0
REFLECT 7-6	0
REFLECT 7-7	0
REFLECT 7-8	0
REFLECT 7-9	0
REFLECT 7-10	0
REFLECT 7-11	0
REFLECT 7-12	0
ANT-ALIGN-7	0
STA8-ID	0
STA8-X	0.000000000000000D+00
STA8-Y	0.000000000000000D+00
STA8-Z	0.000000000000000D+00
FREQ-BIAS8	0.00000000E+00
ANTENNA-COR8	0.00000000E+00
REFLECT 8-1	0
REFLECT 8-2	0
REFLECT 8-3	0
REFLECT 8-4	0
REFLECT 8-5	0
REFLECT 8-6	0
REFLECT 8-7	0
REFLECT 8-8	0
REFLECT 8-9	0
REFLECT 8-10	0
REFLECT 8-11	0
REFLECT 8-12	0
ANT-ALIGN-8	0
STA9-ID	0
STA9-X	0.000000000000000D+00
STA9-Y	0.000000000000000D+00
STA9-Z	0.000000000000000D+00
FREQ-BIAS9	0.00000000E+00
ANTENNA-COR9	0.00000000E+00
REFLECT 9-1	0
REFLECT 9-2	0
REFLECT 9-3	0
REFLECT 9-4	0
REFLECT 9-5	0
REFLECT 9-6	0
REFLECT 9-7	0
REFLECT 9-8	0
REFLECT 9-9	0
REFLECT 9-10	0
REFLECT 9-11	0
REFLECT 9-12	0
ANT-ALIGN-9	0
STA10-ID	0
STA10-X	0.000000000000000D+00
STA10-Y	0.000000000000000D+00
STA10-Z	0.000000000000000D+00
FREQ-BIAS10	0.00000000E+00
ATENNA-COR10	0.00000000E+00

```
                                 REFLCT 10-1           0
                                 REFLCT 10-2           0
                                 REFLCT 10-3           0
                                 REFLCT 10-4           0
                                 REFLCT 10-5           0
                                 REFLCT 10-6           0
                                 REFLCT 10-7           0
                                 REFLCT 10-8           0
                                 REFLCT 10-9           0
                                 REFLCT 10-10          0
                                 REFLCT 10-11          0
                                 REFLCT 10-12          0
                                 ANT-ALIGN-10          0
                                 TRANS-DELAY          0.00000000E+00

U   860310120012.00 MSCHEDD1.DAT                # 1
                                 MAN1-SCID               0
                                 MAN1-TIME            0.000000000000000D+00
                                 MAN1-X               0.000000000000000D+00
                                 MAN1-Y               0.000000000000000D+00
                                 MAN1-Z               0.000000000000000D+00
                                 MAN1-XDOT            0.000000000000000D+00
                                 MAN1-YDOT            0.000000000000000D+00
                                 MAN1-ZDOT            0.000000000000000D+00
                                 MAN2-SCID               0
                                 MAN2-TIME            0.000000000000000D+00
                                 MAN2-X               0.000000000000000D+00
                                 MAN2-Y               0.000000000000000D+00
                                 MAN2-Z               0.000000000000000D+00
                                 MAN2-XDOT            0.000000000000000D+00
                                 MAN2-YDOT            0.000000000000000D+00
                                 MAN2-ZDOT            0.000000000000000D+00
                                 MAN3-SCID               0
                                 MAN3-TIME            0.000000000000000D+00
                                 MAN3-X               0.000000000000000D+00
                                 MAN3-Y               0.000000000000000D+00
                                 MAN3-Z               0.000000000000000D+00
                                 MAN3-XDOT            0.000000000000000D+00
                                 MAN3-YDOT            0.000000000000000D+00
                                 MAN3-ZDOT            0.000000000000000D+00
                                 MAN4-SCID               0
                                 MAN4-TIME            0.000000000000000D+00
                                 MAN4-X               0.000000000000000D+00
                                 MAN4-Y               0.000000000000000D+00
                                 MAN4-Z               0.000000000000000D+00
                                 MAN4-XDOT            0.000000000000000D+00
                                 MAN4-YDOT            0.000000000000000D+00
                                 MAN4-ZDOT            0.000000000000000D+00
                                 MAN5-SCID               0
                                 MAN5-TIME            0.000000000000000D+00
                                 MAN5-X               0.000000000000000D+00
                                 MAN5-Y               0.000000000000000D+00
                                 MAN5-Z               0.000000000000000D+00
                                 MAN5-XDOT            0.000000000000000D+00
                                 MAN5-YDOT            0.000000000000000D+00
                                 MAN5-ZDOT            0.000000000000000D+00
                                 MAN6-SCID               0
                                 MAN6-TIME            0.000000000000000D+00
                                 MAN6-X               0.000000000000000D+00
                                 MAN6-Y               0.000000000000000D+00
                                 MAN6-Z               0.000000000000000D+00
                                 MAN6-XDOT            0.000000000000000D+00
                                 MAN6-YDOT            0.000000000000000D+00
                                 MAN6-ZDOT            0.000000000000000D+00
                                 MAN7-SCID               0
```

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                      MAN7-TIME          0.000000000000000D+00
                      MAN7-X             0.000000000000000D+00
                      MAN7-Y             0.000000000000000D+00
                      MAN7-Z             0.000000000000000D+00
                      MAN7-XDOT          0.000000000000000D+00
                      MAN7-YDOT          0.000000000000000D+00
                      MAN7-ZDOT          0.000000000000000D+00
                      MAN8-SCID              0
                      MAN8-TIME          0.000000000000000D+00
                      MAN8-X             0.000000000000000D+00
                      MAN8-Y             0.000000000000000D+00
                      MAN8-Z             0.000000000000000D+00
                      MAN8-XDOT          0.000000000000000D+00
                      MAN8-YDOT          0.000000000000000D+00
                      MAN8-ZDOT          0.000000000000000D+00

U  860310120013.00 INITABD1.DAT      # 7
                      APR-X              -.187569270000000D+04
                      APR-Y              -.375082380000000D+04
                      APR-Z              0.545505850000000D+04
                      APR-XDOT           -.412750420000000D+01
                      APR-YDOT           -.452611010000000D+01
                      APR-ZDOT           -.451854300000000D+01
                      APR-DRAG           0.200000000000000D+01
                      APR-FREQ1          0.580000000000000D+01
                      APR-FREQ2          0.000000000000000D+00
                      APR-FREQ3          0.000000000000000D+00
                      STD-X              0.000000000000000D+00
                      STD-Y              0.000000000000000D+00
                      STD-Z              0.000000000000000D+00
                      STD-XDOT           0.000000000000000D+00
                      STD-YDOT           0.000000000000000D+00
                      STD-ZDOT           0.000000000000000D+00
                      STD-DRAG           0.000000000000000D+00
                      STD-FREQ1          0.000000000000000D+00
                      STD-FREQ2          0.000000000000000D+00
                      STD-FREQ3          0.000000000000000D+00
                      SOLVE-X            1
                      SOLVE-Y            1
                      SOLVE-Z            1
                      SOLVE-XDOT         1
                      SOLVE-YDOT         1
                      SOLVE-ZDOT         1
                      SOLVE-DRAG         1
                      SOLVE-FREQ1        1
                      SOLVE-FREQ2        0
                      SOLVE-FREQ3        0
                      REF. TIME          0.860310120000000D+12

C  860310120014.00 BEGIN FAST TIMING

C  860311060015.00 STOP FAST TIMING

C  860311060030.00 STOP

HDR 999999999999.99 GOOD SCHEDULE 1
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ORIGINAL PAGE IS
OF POOR QUALITY

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SIMULATION HISTORY AND/OR AODS ACTIVITY LOG DATA COVERING THE TIME INTERVAL FROM 860310120000.00 THRU 860311000000.00

UPLINK SIM    860310120000.06 START COMMAND MESSAGE SENT TO AODS
                  RT = 0   U = 0   TF = 0   MC = 0
                  TIME FROM REFFERENCE =            0.06

UPLINK SIM    860310120001.96 MISCELLANEOUS CONSTANTS SENT TO AODS, BLOCK NUMBER =    1
                  RT = 0   U = 0   TF = 0   MC = 0
                  TIME FROM REFFERENCE =            1.96

AODS ACT LOG 860310120002.68 START COMMAND RECEIVED
                   REFERENCE TIME IS 860310120000.00

UPLINK SIM    860310120003.88 ESTIMATION CONTROL PARAMETERS SENT TO AODS, BLOCK NUMBER =    1
                  RT = 0   U = 0   TF = 0   MC = 0
                  TIME FROM REFFERENCE =            3.88

UPLINK SIM    860310120005.82 EXPERIMENT PARAMETERS SENT TO AODS, BLOCK NUMBER =    1
                  RT = 0   U = 0   TF = 0   MC = 0
                  TIME FROM REFFERENCE =            5.82

AODS ACT LOG 860310120007.68 ESTIMATION CONTROL PARAMETERS RECEIVED

AODS ACT LOG 860310120008.86 MISCELLANEOUS CONSTANTS RECEIVED

UPLINK SIM    860310120013.77 GEOPOTENTIAL TABLES SENT TO AODS, BLOCK NUMBER =    1
                  RT = 0   U = 0   TF = 0   MC = 0
                  TIME FROM REFFERENCE =           13.77

AODS ACT LOG 860310120014.42 EXPERIMENT PARAMETERS RECEIVED

UPLINK SIM    860310120018.98 ATMOSPHERIC DRAG TABLES SENT TO AODS, BLOCK NUMBER =    2
                  RT = 0   U = 0   TF = 0   MC = 0
                  TIME FROM REFFERENCE =           18.98

UPLINK SIM    860310120021.43 TIMING COEFFICIENTS SENT TO AODS, BLOCK NUMBER =    3
                  RT = 0   U = 0   TF = 0   MC = 0
                  TIME FROM REFFERENCE =           21.43

UPLINK SIM    860310120023.28 NEW TDRS VECTORS SENT TO AODS, BLOCK NUMBER =    7
                  RT = 0   U = 0   TF = 0   MC = 0
                  TIME FROM REFFERENCE =           23.28

UPLINK SIM    860310120026.28 TRACKING SCHEDULE SENT TO AODS, BLOCK NUMBER =    7
                  RT = 0   U = 0   TF = 0   MC = 0
                  TIME FROM REFFERENCE =           26.28

AODS ACT LOG 860310120026.31 GEOPOTENTIAL TABLES RECEIVED

AODS ACT LOG 860310120026.91 ATMOSPHERIC DRAG TABLES RECEIVED

AODS ACT LOG 860310120030.32 TIMING COEFFICIENTS RECEIVED

AODS ACT LOG 860310120032.65 NEW TDRS VECTOR WAS RECEIVED

UPLINK SIM    860310120035.02 STATION CONSTANTS SENT TO AODS, BLOCK NUMBER =    1
                  RT = 0   U = 0   TF = 0   MC = 0
                  TIME FROM REFFERENCE =           35.02

AODS ACT LOG 860310120035.06 TRACKING SCHEDULE RECEIVED

UPLINK SIM    860310120038.53 MANUVER SCHEDULE SENT TO AODS, BLOCK NUMBER =    1
                  RT = 0   U = 0   TF = 0   MC = 0
                  TIME FROM REFFERENCE =           38.53

UPLINK SIM    860310120040.94 INITIALIZATION TABLE SENT TO AODS, BLOCK NUMBER =    7
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RT = 0   U = 0   TF = 0   MC = 0
TIME FROM REFFERENCE =          40.94

AODS ACT LOG 860310120247.90 ACTIVITY LOG WAS DOWNLINKED

DOWNLINK SIM 860310120248.61 AODS ACTIVITY LOG RECEIVED BY ADEPT
                   3 RECORDS IN BLOCK

AODS ACT LOG 860310120251.91 ALL TDRS ORBIT FILES WERE EXTENDED TO COVER ALL OBSERVATION DATA.
               THE ACTIVE TIME SPAN OF TDRS ORBIT FILES IS FROM 860310120000.00 TO 860310150000.00

AODS ACT LOG 860310120255.08 INITIALIZATION TABLE RECEIVED

AODS ACT LOG 860310120255.41 MANEUVER SCHEDULE RECEIVED

AODS ACT LOG 860310120255.78 STATION CONSTANTS RECEIVED

AODS ACT LOG 860310120722.85 THE STATE VECTOR PREDICT TABLE WAS GENERATED
               FROM 860310120000.00 TO 860310125900.00
               BASED ON A NEW INITIALIZATION TABLE

AODS ACT LOG 860310120738.71 STATE VECTOR PREDICT TABLE WAS DOWNLINKED

DOWNLINK SIM 860310120744.46 PREDICTED STATE VECTORS RECEIVED BY ADEPT
                  15 RECORDS IN BLOCK

AODS ACT LOG 860310123301.09 THE STATE VECTOR PREDICT TABLE WAS EXTENDED
               FROM 860310123000.00 TO 860310132900.00

AODS ACT LOG 860310123307.60 STATE VECTOR PREDICT TABLE WAS DOWNLINKED

AODS ACT LOG 860310123307.60 ACTIVITY LOG WAS DOWNLINKED

DOWNLINK SIM 860310123315.75 PREDICTED STATE VECTORS RECEIVED BY ADEPT
                   8 RECORDS IN BLOCK

DOWNLINK SIM 860310123318.69 AODS ACTIVITY LOG RECEIVED BY ADEPT
                   3 RECORDS IN BLOCK

AODS ACT LOG 860310130301.33 THE STATE VECTOR PREDICT TABLE WAS EXTENDED
               FROM 860310130000.00 TO 860310135900.00

DOWNLINK SIM 860310130306.05 PREDICTED STATE VECTORS RECEIVED BY ADEPT
                   8 RECORDS IN BLOCK

AODS ACT LOG 860310130307.56 STATE VECTOR PREDICT TABLE WAS DOWNLINKED

AODS ACT LOG 860310130451.77 ACTIVITY LOG WAS DOWNLINKED

DOWNLINK SIM 860310130452.94 AODS ACTIVITY LOG RECEIVED BY ADEPT
                   2 RECORDS IN BLOCK

AODS ACT LOG 860310132504.13 ONE-WAY DOPPLER OBSERVATIONS FILE GENERATED
                 60 OBSERVATIONS WERE COMPUTED USING TDRS  1
               FROM 860310132910.00 TO 860310133900.00
               PASS SCHEDULED TO COMPLETE AT 860310134200.00

AODS ACT LOG 860310132509.22 PREDICTED ONE-WAY DOPPLER OBSERVATIONS WERE DOWNLINKED

DOWNLINK SIM 860310132510.44 PREDICTED 1-WAY DOPPLER DATA RECEIVED BY ADEPT
                   6 RECORDS IN BLOCK

AODS ACT LOG 860310132906.65  SYNC DETECT RECEIVED FROM TRANSPONDER

AODS ACT LOG 860310133318.40 THE STATE VECTOR PREDICT TABLE WAS EXTENDED
               FROM 860310133000.00 TO 860310142900.00
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AODS ACT LOG 860310133325.15 STATE VECTOR PREDICT TABLE WAS DOWNLINKED

AODS ACT LOG 860310133325.15 ACTIVITY LOG WAS DOWNLINKED

DOWNLINK SIM 860310133329.23 PREDICTED STATE VECTORS RECEIVED BY ADEPT
                             8 RECORDS IN BLOCK

DOWNLINK SIM 860310133329.64 AODS ACTIVITY LOG RECEIVED BY ADEPT
                             1 RECORDS IN BLOCK

AODS ACT LOG 860310133422.43 PREPROCESSING OF OBSERVATION BUFFER HAS BEEN COMPLETED
                           5 OBSERVATIONS ACCEPTED
                          24 OBSERVATIONS REJECTED
                          NEW OBS. PASS IS FROM 860310133017.74 TO 860310133417.74

AODS ACT LOG 860310133440.99 ONE-WAY DOPPLER OBSERVATIONS FILE GENERATED
                           24 OBSERVATIONS WERE COMPUTED USING TDRS  1
                         FROM 860310133310.00 TO 860310134300.00
                         PASS SCHEDULED TO COMPLETE AT 860310134200.00

AODS ACT LOG 860310133444.50 PREDICTED ONE-WAY DOPPLER OBSERVATIONS WERE DOWNLINKED

DOWNLINK SIM 860310133445.81 PREDICTED 1-WAY DOPPLER DATA RECEIVED BY ADEPT
                             3 RECORDS IN BLOCK

AODS ACT LOG 860310133647.22 ACTIVITY LOG WAS DOWNLINKED

DOWNLINK SIM 860310133714.32 AODS ACTIVITY LOG RECEIVED BY ADEPT
                             2 RECORDS IN BLOCK

AODS ACT LOG 860310133923.24 PREPROCESSING OF OBSERVATION BUFFER HAS BEEN COMPLETED
                          11 OBSERVATIONS ACCEPTED
                          48 OBSERVATIONS REJECTED
                          NEW OBS. PASS IS FROM 860310133017.74 TO 860310133917.74

AODS ACT LOG 860310134203.19  TDRSS SIGNAL LOST BY TRANSPONDER

AODS ACT LOG 860310134233.32 PREPROCESSING OF A PASS OF DATA WAS COMPLETED
                          15 OBSERVATIONS ACCEPTED
                          60 OBSERVATIONS REJECTED
                         NEW OBSERVATION PASS IS FROM 860310133017.74 TO 860310134157.74

AODS ACT LOG 860310134430.04 ALL TDRS ORBIT FILES WERE EXTENDED TO COVER ALL OBSERVATION DATA.
                         THE ACTIVE TIME SPAN OF TDRS ORBIT FILES IS FROM 860310120000.00 TO 860310154500.00

AODS ACT LOG 860310140236.60 ACTIVITY LOG WAS DOWNLINKED

DOWNLINK SIM 860310140238.35 AODS ACTIVITY LOG RECEIVED BY ADEPT
                             2 RECORDS IN BLOCK

AODS ACT LOG 860310140300.05 THE STATE VECTOR PREDICT TABLE WAS EXTENDED
                         FROM 860310140000.00 TO 860310145900.00

AODS ACT LOG 860310140309.92 STATE VECTOR PREDICT TABLE WAS DOWNLINKED

DOWNLINK SIM 860310140311.28 PREDICTED STATE VECTORS RECEIVED BY ADEPT
                             8 RECORDS IN BLOCK

AODS ACT LOG 860310143301.57 THE STATE VECTOR PREDICT TABLE WAS EXTENDED
                         FROM 860310143000.00 TO 860310152900.00

AODS ACT LOG 860310143308.30 STATE VECTOR PREDICT TABLE WAS DOWNLINKED

DOWNLINK SIM 860310143312.06 PREDICTED STATE VECTORS RECEIVED BY ADEPT
                             8 RECORDS IN BLOCK
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AODS ACT LOG 860310144226.51 ACTIVITY LOG WAS DOWNLINKED

DOWNLINK SIM 860310144228.23 AODS ACTIVITY LOG RECEIVED BY ADEPT
                    2 RECORDS IN BLOCK

AODS ACT LOG 860310150341.54 ONE-WAY DOPPLER OBSERVATIONS FILE GENERATED
                   60 OBSERVATIONS WERE COMPUTED USING TDRS  1
                 FROM 860310150110.00 TO 860310151100.00
                 PASS SCHEDULED TO COMPLETE AT 860310151900.00

AODS ACT LOG 860310150349.32  SYNC DETECT RECEIVED FROM TRANSPONDER

DOWNLINK SIM 860310150355.95 PREDICTED 1-WAY DOPPLER DATA RECEIVED BY ADEPT
                    6 RECORDS IN BLOCK

AODS ACT LOG 860310150356.11 PREDICTED ONE-WAY DOPPLER OBSERVATIONS WERE DOWNLINKED

AODS ACT LOG 860310150442.59 ACTIVITY LOG WAS DOWNLINKED

DOWNLINK SIM 860310150458.70 AODS ACTIVITY LOG RECEIVED BY ADEPT
                    1 RECORDS IN BLOCK

AODS ACT LOG 860310150825.51 ONE-WAY DOPPLER OBSERVATIONS FILE GENERATED
                   30 OBSERVATIONS WERE COMPUTED USING TDRS  1
                 FROM 860310150610.00 TO 860310151600.00
                 PASS SCHEDULED TO COMPLETE AT 860310151900.00

AODS ACT LOG 860310150830.24 PREDICTED ONE-WAY DOPPLER OBSERVATIONS WERE DOWNLINKED

DOWNLINK SIM 860310150842.36 PREDICTED 1-WAY DOPPLER DATA RECEIVED BY ADEPT
                    3 RECORDS IN BLOCK

AODS ACT LOG 860310150854.74 PREPROCESSING OF OBSERVATION BUFFER HAS BEEN COMPLETED
                    5 OBSERVATIONS ACCEPTED
                   24 OBSERVATIONS REJECTED
                  NEW OBS. PASS IS FROM 860310150448.72 TO 860310150848.72

AODS ACT LOG 860310150902.71 THE STATE VECTOR PREDICT TABLE WAS EXTENDED
                 FROM 860310150000.00 TO 860310155900.00

DOWNLINK SIM 860310151108.38 PREDICTED STATE VECTORS RECEIVED BY ADEPT
                    8 RECORDS IN BLOCK

DOWNLINK SIM 860310151259.66 AODS ACTIVITY LOG RECEIVED BY ADEPT
                    1 RECORDS IN BLOCK

AODS ACT LOG 860310151444.77 STATE VECTOR PREDICT TABLE WAS DOWNLINKED

AODS ACT LOG 860310151445.12 ACTIVITY LOG WAS DOWNLINKED

AODS ACT LOG 860310151511.62 ONE-WAY DOPPLER OBSERVATIONS FILE GENERATED
                   24 OBSERVATIONS WERE COMPUTED USING TDRS  1
                 FROM 860310151010.00 TO 860310152000.00
                 PASS SCHEDULED TO COMPLETE AT 860310151900.00

AODS ACT LOG 860310151516.77 PREDICTED ONE-WAY DOPPLER OBSERVATIONS WERE DOWNLINKED

DOWNLINK SIM 860310151517.19 PREDICTED 1-WAY DOPPLER DATA RECEIVED BY ADEPT
                    2 RECORDS IN BLOCK

AODS ACT LOG 860310151859.44  TDRSS SIGNAL LOST BY TRANSPONDER

AODS ACT LOG 860310151936.29 PREPROCESSING OF A PASS OF DATA WAS COMPLETED
                   12 OBSERVATIONS ACCEPTED
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                    46 OBSERVATIONS REJECTED
                   NEW OBSERVATION PASS IS FROM 860310150448.72 TO 860310151858.72

AODS ACT LOG 860310152134.12 ALL TDRS ORBIT FILES WERE EXTENDED TO COVER ALL OBSERVATION DATA.
                   THE ACTIVE TIME SPAN OF TDRS ORBIT FILES IS FROM 860310120000.00 TO 860310171500.00

AODS ACT LOG 860310152447.44 ACTIVITY LOG WAS DOWNLINKED

DOWNLINK SIM 860310152455.78 AODS ACTIVITY LOG RECEIVED BY ADEPT
                     2 RECORDS IN BLOCK

AODS ACT LOG 860310153254.21 THE STATE VECTOR PREDICT TABLE WAS EXTENDED
                   FROM 860310153000.00 TO 860310162900.00

AODS ACT LOG 860310153307.19 STATE VECTOR PREDICT TABLE WAS DOWNLINKED

DOWNLINK SIM 860310153311.83 PREDICTED STATE VECTORS RECEIVED BY ADEPT
                     8 RECORDS IN BLOCK

AODS ACT LOG 860310153445.77 ACTIVITY LOG WAS DOWNLINKED

DOWNLINK SIM 860310153457.12 AODS ACTIVITY LOG RECEIVED BY ADEPT
                     2 RECORDS IN BLOCK

AODS ACT LOG 860310160254.21 THE STATE VECTOR PREDICT TABLE WAS EXTENDED
                   FROM 860310160000.00 TO 860310165900.00

AODS ACT LOG 860310160306.94 STATE VECTOR PREDICT TABLE WAS DOWNLINKED

DOWNLINK SIM 860310160309.22 PREDICTED STATE VECTORS RECEIVED BY ADEPT
                     8 RECORDS IN BLOCK

AODS ACT LOG 860310160446.02 ACTIVITY LOG WAS DOWNLINKED

DOWNLINK SIM 860310160451.74 AODS ACTIVITY LOG RECEIVED BY ADEPT
                     2 RECORDS IN BLOCK

AODS ACT LOG 860310163330.94 ONE-WAY DOPPLER OBSERVATIONS FILE GENERATED
                    60 OBSERVATIONS WERE COMPUTED USING TDRS  1
                   FROM 860310163510.00 TO 860310164500.00
                   PASS SCHEDULED TO COMPLETE AT 860310165500.00

AODS ACT LOG 860310163340.57 PREDICTED ONE-WAY DOPPLER OBSERVATIONS WERE DOWNLINKED

DOWNLINK SIM 860310163342.21 PREDICTED 1-WAY DOPPLER DATA RECEIVED BY ADEPT
                     6 RECORDS IN BLOCK

AODS ACT LOG 860310163404.46 THE STATE VECTOR PREDICT TABLE WAS EXTENDED
                   FROM 860310163000.00 TO 860310172900.00

AODS ACT LOG 860310163417.11 STATE VECTOR PREDICT TABLE WAS DOWNLINKED

DOWNLINK SIM 860310163422.27 PREDICTED STATE VECTORS RECEIVED BY ADEPT
                     8 RECORDS IN BLOCK

AODS ACT LOG 860310163447.94 ACTIVITY LOG WAS DOWNLINKED

DOWNLINK SIM 860310163453.55 AODS ACTIVITY LOG RECEIVED BY ADEPT
                     1 RECORDS IN BLOCK

AODS ACT LOG 860310164116.24  SYNC DETECT RECEIVED FROM TRANSPONDER

AODS ACT LOG 860310164253.57 ONE-WAY DOPPLER OBSERVATIONS FILE GENERATED
                    30 OBSERVATIONS WERE COMPUTED USING TDRS  1
                   FROM 860310164010.00 TO 860310165000.00
                   PASS SCHEDULED TO COMPLETE AT 860310165500.00
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AODS ACT LOG 860310164258.89 PREDICTED ONE-WAY DOPPLER OBSERVATIONS WERE DOWNLINKED

DOWNLINK SIM 860310164301.64 PREDICTED 1-WAY DOPPLER DATA RECEIVED BY ADEPT
                               3 RECORDS IN BLOCK

AODS ACT LOG 860310164442.15 PREPROCESSING OF OBSERVATION BUFFER HAS BEEN COMPLETED
                             3 OBSERVATIONS ACCEPTED
                            26 OBSERVATIONS REJECTED
                            NEW OBS. PASS IS FROM 860310164238.67 TO 860310164438.67

AODS ACT LOG 860310164448.89 ACTIVITY LOG WAS DOWNLINKED

DOWNLINK SIM 860310164454.09 AODS ACTIVITY LOG RECEIVED BY ADEPT
                               1 RECORDS IN BLOCK

AODS ACT LOG 860310164541.49 ONE-WAY DOPPLER OBSERVATIONS FILE GENERATED
                            30 OBSERVATIONS WERE COMPUTED USING TDRS  1
                          FROM 860310164510.00 TO 860310165500.00
                          PASS SCHEDULED TO COMPLETE AT 860310165500.00

AODS ACT LOG 860310164546.55 PREDICTED ONE-WAY DOPPLER OBSERVATIONS WERE DOWNLINKED

DOWNLINK SIM 860310164601.64 PREDICTED 1-WAY DOPPLER DATA RECEIVED BY ADEPT
                               3 RECORDS IN BLOCK

AODS ACT LOG 860310164944.40 PREPROCESSING OF OBSERVATION BUFFER HAS BEEN COMPLETED
                             9 OBSERVATIONS ACCEPTED
                            50 OBSERVATIONS REJECTED
                            NEW OBS. PASS IS FROM 860310164238.67 TO 860310164938.67

AODS ACT LOG 860310165452.47 ACTIVITY LOG WAS DOWNLINKED

DOWNLINK SIM 860310165454.74 AODS ACTIVITY LOG RECEIVED BY ADEPT
                               1 RECORDS IN BLOCK

AODS ACT LOG 860310165503.29  TDRSS SIGNAL LOST BY TRANSPONDER

AODS ACT LOG 860310165530.49 PREPROCESSING OF A PASS OF DATA WAS COMPLETED
                            15 OBSERVATIONS ACCEPTED
                            76 OBSERVATIONS REJECTED
                          NEW OBSERVATION PASS IS FROM 860310164238.67 TO 860310165428.67

AODS ACT LOG 860310165728.65 ALL TDRS ORBIT FILES WERE EXTENDED TO COVER ALL OBSERVATION DATA.
                          THE ACTIVE TIME SPAN OF TDRS ORBIT FILES IS FROM 860310120000.00 TO 860310184500.00

AODS ACT LOG 860310170254.32 THE STATE VECTOR PREDICT TABLE WAS EXTENDED
                          FROM 860310170000.00 TO 860310175900.00

AODS ACT LOG 860310170306.80 STATE VECTOR PREDICT TABLE WAS DOWNLINKED

DOWNLINK SIM 860310170315.71 PREDICTED STATE VECTORS RECEIVED BY ADEPT
                               8 RECORDS IN BLOCK

AODS ACT LOG 860310170453.64 ACTIVITY LOG WAS DOWNLINKED

DOWNLINK SIM 860310170459.62 AODS ACTIVITY LOG RECEIVED BY ADEPT
                               3 RECORDS IN BLOCK

AODS ACT LOG 860310173253.82 THE STATE VECTOR PREDICT TABLE WAS EXTENDED
                          FROM 860310173000.00 TO 860310182900.00

AODS ACT LOG 860310173306.22 STATE VECTOR PREDICT TABLE WAS DOWNLINKED

DOWNLINK SIM 860310173408.37 PREDICTED STATE VECTORS RECEIVED BY ADEPT
                               8 RECORDS IN BLOCK
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AODS ACT LOG 860310173452.39 ACTIVITY LOG WAS DOWNLINKED

DOWNLINK SIM 860310173459.66 AODS ACTIVITY LOG RECEIVED BY ADEPT
                    1 RECORDS IN BLOCK

AODS ACT LOG 860310180254.40 THE STATE VECTOR PREDICT TABLE WAS EXTENDED
                 FROM 860310180000.00 TO 860310185900.00

AODS ACT LOG 860310180307.05 STATE VECTOR PREDICT TABLE WAS DOWNLINKED

DOWNLINK SIM 860310180308.91 PREDICTED STATE VECTORS RECEIVED BY ADEPT
                    8 RECORDS IN BLOCK

AODS ACT LOG 860310180452.64 ACTIVITY LOG WAS DOWNLINKED

DOWNLINK SIM 860310180458.12 AODS ACTIVITY LOG RECEIVED BY ADEPT
                    1 RECORDS IN BLOCK

AODS ACT LOG 860310180659.57 ONE-WAY DOPPLER OBSERVATIONS FILE GENERATED
                   60 OBSERVATIONS WERE COMPUTED USING TDRS  1
                 FROM 860310181110.00 TO 860310182100.00
                 PASS SCHEDULED TO COMPLETE AT 860310182800.00

AODS ACT LOG 860310180709.14 PREDICTED ONE-WAY DOPPLER OBSERVATIONS WERE DOWNLINKED

DOWNLINK SIM 860310180711.66 PREDICTED 1-WAY DOPPLER DATA RECEIVED BY ADEPT
                    6 RECORDS IN BLOCK

AODS ACT LOG 860310181452.82 ACTIVITY LOG WAS DOWNLINKED

DOWNLINK SIM 860310181457.32 AODS ACTIVITY LOG RECEIVED BY ADEPT
                    1 RECORDS IN BLOCK

AODS ACT LOG 860310181811.59 ONE-WAY DOPPLER OBSERVATIONS FILE GENERATED
                   30 OBSERVATIONS WERE COMPUTED USING TDRS  1
                 FROM 860310181610.00 TO 860310182600.00
                 PASS SCHEDULED TO COMPLETE AT 860310182800.00

AODS ACT LOG 860310181816.89 PREDICTED ONE-WAY DOPPLER OBSERVATIONS WERE DOWNLINKED

DOWNLINK SIM 860310181816.93 PREDICTED 1-WAY DOPPLER DATA RECEIVED BY ADEPT
                    3 RECORDS IN BLOCK

AODS ACT LOG 860310182514.38 ACTIVITY LOG WAS DOWNLINKED

DOWNLINK SIM 860310182517.17 AODS ACTIVITY LOG RECEIVED BY ADEPT
                    1 RECORDS IN BLOCK

AODS ACT LOG 860310182533.39 ONE-WAY DOPPLER OBSERVATIONS FILE GENERATED
                   18 OBSERVATIONS WERE COMPUTED USING TDRS  1
                 FROM 860310181910.00 TO 860310182900.00
                 PASS SCHEDULED TO COMPLETE AT 860310182800.00

AODS ACT LOG 860310182537.79 PREDICTED ONE-WAY DOPPLER OBSERVATIONS WERE DOWNLINKED

DOWNLINK SIM 860310182540.93 AODS ACTIVITY LOG RECEIVED BY ADEPT
                    2 RECORDS IN BLOCK

AODS ACT LOG 860310183406.07 THE STATE VECTOR PREDICT TABLE WAS EXTENDED
                 FROM 860310183000.00 TO 860310192900.00

AODS ACT LOG 860310183410.72 STATE VECTOR PREDICT TABLE WAS DOWNLINKED

AODS ACT LOG 860310183411.39  TRACKING PASS AT 860310181100.00 COMPLETE WITH NO DATA COLLECTED
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DOWNLINK SIM 860310183416.48 PREDICTED STATE VECTORS RECEIVED BY ADEPT
                          8 RECORDS IN BLOCK

AODS ACT LOG 860310183611.95 ACTIVITY LOG WAS DOWNLINKED

DOWNLINK SIM 860310183612.17 AODS ACTIVITY LOG RECEIVED BY ADEPT
                          1 RECORDS IN BLOCK

AODS ACT LOG 860310183613.90 ALL TDRS ORBIT FILES WERE EXTENDED TO COVER ALL OBSERVATION DATA.
                     THE ACTIVE TIME SPAN OF TDRS ORBIT FILES IS FROM 860310120000.00 TO 860310200000.00

AODS ACT LOG 860310184439.15  SYNC DETECT RECEIVED FROM TRANSPONDER

AODS ACT LOG 860310184520.95  TDRSS SIGNAL LOST BY TRANSPONDER

AODS ACT LOG 860310184532.82  SYNC DETECT RECEIVED FROM TRANSPONDER

AODS ACT LOG 860310184614.89 ACTIVITY LOG WAS DOWNLINKED

DOWNLINK SIM 860310184615.84 AODS ACTIVITY LOG RECEIVED BY ADEPT
                          3 RECORDS IN BLOCK

AODS ACT LOG 860310184124.85  TDRSS SIGNAL LOST BY TRANSPONDER

AODS ACT LOG 860310184349.85  SYNC DETECT RECEIVED FROM TRANSPONDER

AODS ACT LOG 860310184416.55  TDRSS SIGNAL LOST BY TRANSPONDER

AODS ACT LOG 860310184444.10  SYNC DETECT RECEIVED FROM TRANSPONDER

AODS ACT LOG 860310184453.99  TDRSS SIGNAL LOST BY TRANSPONDER

AODS ACT LOG 860310185614.70 ACTIVITY LOG WAS DOWNLINKED

DOWNLINK SIM 860310185622.29 AODS ACTIVITY LOG RECEIVED BY ADEPT
                          1 RECORDS IN BLOCK

AODS ACT LOG 860310190253.89 THE STATE VECTOR PREDICT TABLE WAS EXTENDED
                     FROM 860310190000.00 TO 860310195900.00

AODS ACT LOG 860310190306.79 STATE VECTOR PREDICT TABLE WAS DOWNLINKED

DOWNLINK SIM 860310190321.27 PREDICTED STATE VECTORS RECEIVED BY ADEPT
                          8 RECORDS IN BLOCK

AODS ACT LOG 860310190613.29 ACTIVITY LOG WAS DOWNLINKED

DOWNLINK SIM 860310190617.61 AODS ACTIVITY LOG RECEIVED BY ADEPT
                          2 RECORDS IN BLOCK

AODS ACT LOG 860310191959.74 ONE-WAY DOPPLER OBSERVATIONS FILE GENERATED
                       60 OBSERVATIONS WERE COMPUTED USING TDRS   1
                     FROM 860310192410.00 TO 860310193400.00
                     PASS SCHEDULED TO COMPLETE AT 860310193900.00

DOWNLINK SIM 860310192008.44 PREDICTED 1-WAY DOPPLER DATA RECEIVED BY ADEPT
                          6 RECORDS IN BLOCK

AODS ACT LOG 860310192009.79 PREDICTED ONE-WAY DOPPLER OBSERVATIONS WERE DOWNLINKED

AODS ACT LOG 860310192605.38  SYNC DETECT RECEIVED FROM TRANSPONDER

AODS ACT LOG 860310192613.73 ACTIVITY LOG WAS DOWNLINKED

DOWNLINK SIM 860310192615.74 AODS ACTIVITY LOG RECEIVED BY ADEPT
                          3 RECORDS IN BLOCK
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AODS ACT LOG 860310193253.00 PREPROCESSING OF OBSERVATION BUFFER HAS BEEN COMPLETED
                   5 OBSERVATIONS ACCEPTED
                  24 OBSERVATIONS REJECTED
                  NEW OBS. PASS IS FROM 860310192704.54 TO 860310193104.54

AODS ACT LOG 860310193325.91 ONE-WAY DOPPLER OBSERVATIONS FILE GENERATED
                   30 OBSERVATIONS WERE COMPUTED USING TDRS  1
                 FROM 860310192910.00 TO 860310193900.00
                 PASS SCHEDULED TO COMPLETE AT 860310193900.00

AODS ACT LOG 860310193330.88 PREDICTED ONE-WAY DOPPLER OBSERVATIONS WERE DOWNLINKED

DOWNLINK SIM 860310193341.62 PREDICTED 1-WAY DOPPLER DATA RECEIVED BY ADEPT
                     3 RECORDS IN BLOCK

AODS ACT LOG 860310193357.33 THE STATE VECTOR PREDICT TABLE WAS EXTENDED
                 FROM 860310193000.00 TO 860310202900.00

AODS ACT LOG 860310193410.23 STATE VECTOR PREDICT TABLE WAS DOWNLINKED

DOWNLINK SIM 860310193416.85 PREDICTED STATE VECTORS RECEIVED BY ADEPT
                     8 RECORDS IN BLOCK

AODS ACT LOG 860310193417.50 ONE-WAY DOPPLER OBSERVATIONS FILE GENERATED
                    6 OBSERVATIONS WERE COMPUTED USING TDRS  1
                 FROM 860310193010.00 TO 860310194000.00
                 PASS SCHEDULED TO COMPLETE AT 860310193900.00

AODS ACT LOG 860310193419.40 PREDICTED ONE-WAY DOPPLER OBSERVATIONS WERE DOWNLINKED

DOWNLINK SIM 860310193425.95 PREDICTED 1-WAY DOPPLER DATA RECEIVED BY ADEPT
                     1 RECORDS IN BLOCK

AODS ACT LOG 860310193610.25 PREPROCESSING OF OBSERVATION BUFFER HAS BEEN COMPLETED
                  11 OBSERVATIONS ACCEPTED
                  48 OBSERVATIONS REJECTED
                  NEW OBS. PASS IS FROM 860310192704.54 TO 860310193604.54

AODS ACT LOG 860310193617.15 ACTIVITY LOG WAS DOWNLINKED

DOWNLINK SIM 860310193625.66 AODS ACTIVITY LOG RECEIVED BY ADEPT
                     3 RECORDS IN BLOCK

AODS ACT LOG 860310193903.75  TDRSS SIGNAL LOST BY TRANSPONDER

AODS ACT LOG 860310193933.83 PREPROCESSING OF A PASS OF DATA WAS COMPLETED
                  15 OBSERVATIONS ACCEPTED
                  61 OBSERVATIONS REJECTED
                 NEW OBSERVATION PASS IS FROM 860310192704.54 TO 860310193844.54

AODS ACT LOG 860310194132.66 ALL TDRS ORBIT FILES WERE EXTENDED TO COVER ALL OBSERVATION DATA.
                 THE ACTIVE TIME SPAN OF TDRS ORBIT FILES IS FROM 860310120000.00 TO 860310214500.00

AODS ACT LOG 860310194618.15 ACTIVITY LOG WAS DOWNLINKED

DOWNLINK SIM 860310194620.16 AODS ACTIVITY LOG RECEIVED BY ADEPT
                     2 RECORDS IN BLOCK

AODS ACT LOG 860310200254.50 THE STATE VECTOR PREDICT TABLE WAS EXTENDED
                 FROM 860310200000.00 TO 860310205900.00

AODS ACT LOG 860310200307.23 STATE VECTOR PREDICT TABLE WAS DOWNLINKED

DOWNLINK SIM 860310200318.72 PREDICTED STATE VECTORS RECEIVED BY ADEPT
                     8 RECORDS IN BLOCK
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AODS ACT LOG 860310200408.49 DC RESIDUALS REPORT WAS DOWNLINKED

AODS ACT LOG 860310200410.56 DC SUMMARY AND STATISTICS REPORT WAS DOWNLINKED

DOWNLINK SIM 860310200413.08 DC RESIDUALS REPORT RECEIVED BY ADEPT
                     16 RECORDS IN BLOCK

DOWNLINK SIM 860310200416.31 DC SUMMARY AND STATISTICS REPORT RECEIVED BY ADEPT
                      3 RECORDS IN BLOCK

AODS ACT LOG 860310200946.31 ACTIVITY LOG WAS DOWNLINKED

DOWNLINK SIM 860310200952.37 AODS ACTIVITY LOG RECEIVED BY ADEPT
                      2 RECORDS IN BLOCK

AODS ACT LOG 860310201652.66 DC RESIDUALS REPORT WAS DOWNLINKED

AODS ACT LOG 860310201656.88 DC SUMMARY AND STATISTICS REPORT WAS DOWNLINKED

DOWNLINK SIM 860310201657.58 DC RESIDUALS REPORT RECEIVED BY ADEPT
                     16 RECORDS IN BLOCK

DOWNLINK SIM 860310201659.79 DC SUMMARY AND STATISTICS REPORT RECEIVED BY ADEPT
                      3 RECORDS IN BLOCK

AODS ACT LOG 860310202016.03 ACTIVITY LOG WAS DOWNLINKED

DOWNLINK SIM 860310202021.67 AODS ACTIVITY LOG RECEIVED BY ADEPT
                      1 RECORDS IN BLOCK

AODS ACT LOG 860310202413.24 DC RESIDUALS REPORT WAS DOWNLINKED

AODS ACT LOG 860310202418.08 DC SUMMARY AND STATISTICS REPORT WAS DOWNLINKED

AODS ACT LOG 860310202418.76 ESTIMATION COMPLETED FOR BATCH NO.   1 .  DC CONVERGED (CODE =   1 )
                 AFTER   3 ITERATIONS USING  57 OF  57 AVAILABLE OBSERVATIONS.
                 START TIME = 860310193834.54 END TIME = 860310133017.74

DOWNLINK SIM 860310202423.13 DC RESIDUALS REPORT RECEIVED BY ADEPT
                     16 RECORDS IN BLOCK

DOWNLINK SIM 860310202425.21 DC SUMMARY AND STATISTICS REPORT RECEIVED BY ADEPT
                      3 RECORDS IN BLOCK

AODS ACT LOG 860310202733.26 THE STATE VECTOR PREDICT TABLE WAS GENERATED
                 FROM 860310202400.00 TO 860310212300.00
                 BASED ON A NEW STATE SOLUTION

AODS ACT LOG 860310202748.24 STATE VECTOR PREDICT TABLE WAS DOWNLINKED

DOWNLINK SIM 860310202801.88 PREDICTED STATE VECTORS RECEIVED BY ADEPT
                     15 RECORDS IN BLOCK

AODS ACT LOG 860310203351.16 ACTIVITY LOG WAS DOWNLINKED

DOWNLINK SIM 860310203355.13 AODS ACTIVITY LOG RECEIVED BY ADEPT
                      2 RECORDS IN BLOCK

AODS ACT LOG 860310205739.00 ONE-WAY DOPPLER OBSERVATIONS FILE GENERATED
                   60 OBSERVATIONS WERE COMPUTED USING TDRS  1
                 FROM 860310205910.00 TO 860310210900.00
                 PASS SCHEDULED TO COMPLETE AT 860310211700.00

AODS ACT LOG 860310205743.77 PREDICTED ONE-WAY DOPPLER OBSERVATIONS WERE DOWNLINKED
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DOWNLINK SIM 860310205746.42 PREDICTED 1-WAY DOPPLER DATA RECEIVED BY ADEPT
                    6 RECORDS IN BLOCK

AODS ACT LOG 860310205846.42 ACTIVITY LOG WAS DOWNLINKED

DOWNLINK SIM 860310205852.48 AODS ACTIVITY LOG RECEIVED BY ADEPT
                    3 RECORDS IN BLOCK

AODS ACT LOG 860310205904.95  SYNC DETECT RECEIVED FROM TRANSPONDER

AODS ACT LOG 860310205947.87 THE STATE VECTOR PREDICT TABLE WAS EXTENDED
                 FROM 860310205400.00 TO 860310215300.00

AODS ACT LOG 860310205953.43 STATE VECTOR PREDICT TABLE WAS DOWNLINKED

DOWNLINK SIM 860310210001.34 PREDICTED STATE VECTORS RECEIVED BY ADEPT
                    8 RECORDS IN BLOCK

AODS ACT LOG 860310210416.78 PREPROCESSING OF OBSERVATION BUFFER HAS BEEN COMPLETED
                   5 OBSERVATIONS ACCEPTED
                  24 OBSERVATIONS REJECTED
                  NEW OBS. PASS IS FROM 860310210004.26 TO 860310210404.26

AODS ACT LOG 860310210447.67 ONE-WAY DOPPLER OBSERVATIONS FILE GENERATED
                   30 OBSERVATIONS WERE COMPUTED USING TDRS  1
                 FROM 860310210410.00 TO 860310211400.00
                 PASS SCHEDULED TO COMPLETE AT 860310211700.00

AODS ACT LOG 860310210450.32 PREDICTED ONE-WAY DOPPLER OBSERVATIONS WERE DOWNLINKED

DOWNLINK SIM 860310210455.07 PREDICTED 1-WAY DOPPLER DATA RECEIVED BY ADEPT
                    3 RECORDS IN BLOCK

AODS ACT LOG 860310210620.43 ACTIVITY LOG WAS DOWNLINKED

DOWNLINK SIM 860310210626.16 AODS ACTIVITY LOG RECEIVED BY ADEPT
                    3 RECORDS IN BLOCK

AODS ACT LOG 860310210909.87 PREPROCESSING OF OBSERVATION BUFFER HAS BEEN COMPLETED
                  11 OBSERVATIONS ACCEPTED
                  48 OBSERVATIONS REJECTED
                  NEW OBS. PASS IS FROM 860310210004.26 TO 860310210904.26

AODS ACT LOG 860310210941.83 ONE-WAY DOPPLER OBSERVATIONS FILE GENERATED
                   24 OBSERVATIONS WERE COMPUTED USING TDRS  1
                 FROM 860310210810.00 TO 860310211800.00
                 PASS SCHEDULED TO COMPLETE AT 860310211700.00

AODS ACT LOG 860310210944.77 PREDICTED ONE-WAY DOPPLER OBSERVATIONS WERE DOWNLINKED

DOWNLINK SIM 860310210951.89 PREDICTED 1-WAY DOPPLER DATA RECEIVED BY ADEPT
                    3 RECORDS IN BLOCK

AODS ACT LOG 860310211409.95 PREPROCESSING OF OBSERVATION BUFFER HAS BEEN COMPLETED
                  17 OBSERVATIONS ACCEPTED
                  72 OBSERVATIONS REJECTED
                  NEW OBS. PASS IS FROM 860310210004.26 TO 860310211404.26

AODS ACT LOG 860310211620.43 ACTIVITY LOG WAS DOWNLINKED

DOWNLINK SIM 860310211621.40 AODS ACTIVITY LOG RECEIVED BY ADEPT
                    3 RECORDS IN BLOCK

AODS ACT LOG 860310211703.73  TDRSS SIGNAL LOST BY TRANSPONDER

AODS ACT LOG 860310211733.78 PREPROCESSING OF A PASS OF DATA WAS COMPLETED
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                    21 OBSERVATIONS ACCEPTED
                    85 OBSERVATIONS REJECTED
                   NEW OBSERVATION PASS IS FROM 860310210004.26 TO 860310211644.26

AODS ACT LOG 860310211932.87 ALL TDRS ORBIT FILES WERE EXTENDED TO COVER ALL OBSERVATION DATA.
                   THE ACTIVE TIME SPAN OF TDRS ORBIT FILES IS FROM 860310120000.00 TO 860310231500.00

AODS ACT LOG 860310212708.72 THE STATE VECTOR PREDICT TABLE WAS EXTENDED
                   FROM 860310212400.00 TO 860310222300.00

AODS ACT LOG 860310212721.72 STATE VECTOR PREDICT TABLE WAS DOWNLINKED

DOWNLINK SIM 860310212731.14 PREDICTED STATE VECTORS RECEIVED BY ADEPT
                       8 RECORDS IN BLOCK

AODS ACT LOG 860310213010.58 ACTIVITY LOG WAS DOWNLINKED

DOWNLINK SIM 860310213014.40 AODS ACTIVITY LOG RECEIVED BY ADEPT
                       3 RECORDS IN BLOCK

AODS ACT LOG 860310213832.59 DC RESIDUALS REPORT WAS DOWNLINKED

AODS ACT LOG 860310213836.11 DC SUMMARY AND STATISTICS REPORT WAS DOWNLINKED

DOWNLINK SIM 860310213847.02 DC RESIDUALS REPORT RECEIVED BY ADEPT
                      17 RECORDS IN BLOCK

DOWNLINK SIM 860310213854.72 DC SUMMARY AND STATISTICS REPORT RECEIVED BY ADEPT
                       3 RECORDS IN BLOCK

AODS ACT LOG 860310214032.21 ACTIVITY LOG WAS DOWNLINKED

DOWNLINK SIM 860310214041.61 AODS ACTIVITY LOG RECEIVED BY ADEPT
                       3 RECORDS IN BLOCK

AODS ACT LOG 860310215126.15 DC RESIDUALS REPORT WAS DOWNLINKED

AODS ACT LOG 860310215127.90 DC SUMMARY AND STATISTICS REPORT WAS DOWNLINKED

AODS ACT LOG 860310215127.56 ESTIMATION COMPLETED FOR BATCH NO.   2 .  DC CONVERGED (CODE =    1 )
                   AFTER   2 ITERATIONS USING  63 OF  63 AVAILABLE OBSERVATIONS.
                   START TIME = 860310210924.26 END TIME = 860310150502.72

DOWNLINK SIM 860310215134.88 DC RESIDUALS REPORT RECEIVED BY ADEPT
                      16 RECORDS IN BLOCK

DOWNLINK SIM 860310215149.78 DC SUMMARY AND STATISTICS REPORT RECEIVED BY ADEPT
                       3 RECORDS IN BLOCK

AODS ACT LOG 860310215504.71 THE STATE VECTOR PREDICT TABLE WAS GENERATED
                   FROM 860310215100.00 TO 860310225000.00
                   BASED ON A NEW STATE SOLUTION

AODS ACT LOG 860310215509.39 STATE VECTOR PREDICT TABLE WAS DOWNLINKED

DOWNLINK SIM 860310215515.52 PREDICTED STATE VECTORS RECEIVED BY ADEPT
                      15 RECORDS IN BLOCK

AODS ACT LOG 860310220119.48 ACTIVITY LOG WAS DOWNLINKED

DOWNLINK SIM 860310220126.71 AODS ACTIVITY LOG RECEIVED BY ADEPT
                       2 RECORDS IN BLOCK

AODS ACT LOG 860310222416.04 THE STATE VECTOR PREDICT TABLE WAS EXTENDED
                   FROM 860310221000.00 TO 860310232000.00
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AODS ACT LOG 860310222421.80 STATE VECTOR PREDICT TABLE WAS DOWNLINKED

DOWNLINK SIM 860310222502.90 PREDICTED STATE VECTORS RECEIVED BY ADEPT
                             8 RECORDS IN BLOCK

AODS ACT LOG 860310223410.76 ONE-WAY DOPPLER OBSERVATIONS FILE GENERATED
                          60 OBSERVATIONS WERE COMPUTED USING TDRS  1
                        FROM 860310223710.00 TO 860310224700.00
                        PASS SCHEDULED TO COMPLETE AT 860310225300.00

AODS ACT LOG 860310223410.76 ACTIVITY LOG WAS DOWNLINKED

AODS ACT LOG 860310223418.00 PREDICTED ONE-WAY DOPPLER OBSERVATIONS WERE DOWNLINKED

DOWNLINK SIM 860310223422.74 AODS ACTIVITY LOG RECEIVED BY ADEPT
                             3 RECORDS IN BLOCK

DOWNLINK SIM 860310223429.43 PREDICTED 1-WAY DOPPLER DATA RECEIVED BY ADEPT
                             6 RECORDS IN BLOCK

AODS ACT LOG 860310224002.30  SYNC DETECT RECEIVED FROM TRANSPONDER

AODS ACT LOG 860310224307.93 ACTIVITY LOG WAS DOWNLINKED

DOWNLINK SIM 860310224313.95 AODS ACTIVITY LOG RECEIVED BY ADEPT
                             2 RECORDS IN BLOCK

AODS ACT LOG 860310224343.23 ONE-WAY DOPPLER OBSERVATIONS FILE GENERATED
                          30 OBSERVATIONS WERE COMPUTED USING TDRS  1
                        FROM 860310224210.00 TO 860310225200.00
                        PASS SCHEDULED TO COMPLETE AT 860310225300.00

AODS ACT LOG 860310224344.92 PREDICTED ONE-WAY DOPPLER OBSERVATIONS WERE DOWNLINKED

DOWNLINK SIM 860310224347.29 PREDICTED 1-WAY DOPPLER DATA RECEIVED BY ADEPT
                             3 RECORDS IN BLOCK

AODS ACT LOG 860310224742.11 ONE-WAY DOPPLER OBSERVATIONS FILE GENERATED
                          12 OBSERVATIONS WERE COMPUTED USING TDRS  1
                        FROM 860310224410.00 TO 860310225400.00
                        PASS SCHEDULED TO COMPLETE AT 860310225300.00

AODS ACT LOG 860310224743.06 PREDICTED ONE-WAY DOPPLER OBSERVATIONS WERE DOWNLINKED

DOWNLINK SIM 860310224749.56 PREDICTED 1-WAY DOPPLER DATA RECEIVED BY ADEPT
                             2 RECORDS IN BLOCK

AODS ACT LOG 860310225412.42 THE STATE VECTOR PREDICT TABLE WAS EXTENDED
                        FROM 860310225100.00 TO 860310235000.00

AODS ACT LOG 860310225416.38 STATE VECTOR PREDICT TABLE WAS DOWNLINKED

DOWNLINK SIM 860310225426.84 PREDICTED STATE VECTORS RECEIVED BY ADEPT
                             8 RECORDS IN BLOCK

AODS ACT LOG 860310225308.43 ACTIVITY LOG WAS DOWNLINKED

DOWNLINK SIM 860310225318.90 AODS ACTIVITY LOG RECEIVED BY ADEPT
                             2 RECORDS IN BLOCK

AODS ACT LOG 860310232413.79 THE STATE VECTOR PREDICT TABLE WAS EXTENDED
                        FROM 860310232100.00 TO 860311002000.00

AODS ACT LOG 860310232417.94 STATE VECTOR PREDICT TABLE WAS DOWNLINKED

***NO MORE AODS ACTIVITY LOG ENTRIES EXIST FOR THE SPECIFIED TIME
INTERVAL

DOWNLINK SIM 860310232426.72 PREDICTED STATE VECTORS RECEIVED BY ADEPT
                             8 RECORDS IN BLOCK

***NO MORE SIMULATION HISTORY LOG ENTRIES EXIST FOR THE SPECIFIED
TIME INTERVAL
```

PREDICTED STATE VECTOR DATA REPORT

START TIME OF INTERVAL : 860310120000.00
END TIME OF INTERVAL : 860311000000.00

TIME	ID	POSITION VECTOR X	POSITION VECTOR Y	POSITION VECTOR Z	VELOCITY VECTOR X	VELOCITY VECTOR Y	VELOCITY VECTOR Z
860310120000.00	I 1	-1875.69270	-3750.82380	5455.05850	-4.12750	-4.52611	-4.51854
860310120100.00	I 1	-2119.04435	-4013.95795	5172.13679	-3.98124	-4.24181	-4.90873
860310120200.00	I 1	-2353.09182	-4259.46748	4866.44185	-3.81748	-3.93884	-5.27737
860310120300.00	I 1	-2576.80570	-4486.27136	4539.31613	-3.63692	-3.61852	-5.62283
860310120400.00	I 1	-2789.20175	-4693.37064	4192.19723	-3.44035	-3.28226	-5.94356
860310120500.00	I 1	-2989.34539	-4879.85301	3826.61159	-3.22865	-2.93154	-6.23816
860310120600.00	I 1	-3176.35592	-5044.89705	3444.16783	-3.00275	-2.56791	-6.50529
860310120700.00	I 1	-3349.41064	-5187.77598	3046.54962	-2.76363	-2.19297	-6.74378
860310120800.00	I 1	-3507.74853	-5307.86105	2635.50818	-2.51237	-1.80839	-6.95257
860310120900.00	I 1	-3650.67377	-5404.62449	2212.85446	-2.25007	-1.41587	-7.13072
860310121000.00	I 1	-3777.55894	-5477.64189	1780.45095	-1.97789	-1.01715	-7.27744
860310121100.00	I 1	-3887.84786	-5526.59424	1340.20331	-1.69706	-0.61400	-7.39209
860310121200.00	I 1	-3981.05810	-5551.26935	894.05173	-1.40882	-0.20821	-7.47417
860310121300.00	I 1	-4056.78320	-5551.56284	443.96213	-1.11444	0.19842	-7.52331
860310121400.00	I 1	-4114.69443	-5527.47860	-8.08274	-0.81524	0.60408	-7.53932
860310121500.00	I 1	-4154.54227	-5479.12873	-460.09238	-0.51255	1.00697	-7.52214
860310121600.00	I 1	-4176.15748	-5406.73292	-910.07754	-0.20771	1.40531	-7.47187
860310121700.00	I 1	-4179.45174	-5310.61736	-1356.05928	0.09792	1.79734	-7.38875
860310121800.00	I 1	-4164.41794	-5191.21306	-1796.07796	0.40300	2.18132	-7.27318
860310121900.00	I 1	-4131.13006	-5049.05375	-2228.20204	0.70617	2.55556	-7.12569
860310122000.00	I 1	-4079.74268	-4884.77318	-2650.53675	1.00609	2.91843	-6.94699
860310122100.00	I 1	-4010.49001	-4699.10205	-3061.23251	1.30146	3.26832	-6.73788
860310122200.00	I 1	-3923.68472	-4492.86445	-3458.49307	1.59097	3.60373	-6.49932
860310122300.00	I 1	-3819.71623	-4266.97394	-3840.58335	1.87336	3.92318	-6.23239
860310122400.00	I 1	-3699.04880	-4022.42921	-4205.83692	2.14740	4.22531	-5.93831
860310122500.00	I 1	-3562.21924	-3760.30944	-4552.66309	2.41190	4.50881	-5.61838
860310122600.00	I 1	-3409.83430	-3481.76930	-4879.55371	2.66572	4.77246	-5.27403
860310122700.00	I 1	-3242.56784	-3188.03371	-5185.08940	2.90777	5.01514	-4.90681
860310122800.00	I 1	-3061.15766	-2880.39231	-5467.94546	3.13701	5.23582	-4.51832
860310122900.00	I 1	-2866.40212	-2560.19369	-5726.89730	3.35246	5.43357	-4.11029
860310123000.00	I 1	-2659.15655	-2228.83941	-5960.82540	3.55320	5.60755	-3.68450
860310123100.00	I 1	-2440.32939	-1887.77789	-6168.71974	3.73838	5.75703	-3.24282
860310123200.00	I 1	-2210.87820	-1538.49809	-6349.68381	3.90721	5.88140	-2.78715
860310123300.00	I 1	-1971.80549	-1182.52313	-6502.93809	4.05898	5.98013	-2.31949
860310123400.00	I 1	-1724.15439	-821.40382	-6627.82303	4.19306	6.05282	-1.84185
860310123500.00	I 1	-1469.00423	-456.71208	-6723.80158	4.30886	6.09917	-1.35629
860310123600.00	I 1	-1207.46597	-90.03440	-6790.46117	4.40592	6.11899	-0.86490
860310123700.00	I 1	-940.67754	277.03478	-6827.51532	4.48381	6.11221	-0.36979
860310123800.00	I 1	-669.79913	642.89971	-6834.80469	4.54220	6.07886	0.12690
860310123900.00	I 1	-396.00835	1005.96986	-6812.29768	4.58085	6.01909	0.62306
860310124000.00	I 1	-120.49535	1364.66660	-6760.09061	4.59959	5.93313	1.11655
860310124100.00	I 1	155.54207	1717.42968	-6678.40734	4.59832	5.82137	1.60525
860310124200.00	I 1	430.90350	2062.72378	-6567.59848	4.57706	5.68426	2.08706
860310124300.00	I 1	704.39085	2399.04488	-6428.14007	4.53588	5.52237	2.55989
860310124400.00	I 1	974.81342	2724.92667	-6260.63180	4.47494	5.33640	3.02171
860310124500.00	I 1	1240.99287	3038.94671	-6065.79469	4.39449	5.12712	3.47052
860310124600.00	I 1	1501.76820	3339.73252	-5844.46839	4.29486	4.89541	3.90437
860310124700.00	I 1	1756.00075	3625.96754	-5597.60784	4.17647	4.64227	4.32135

PREDICTED STATE VECTOR DATA REPORT (CON.)

TIME	ID	POSITION VECTOR X	POSITION VECTOR Y	POSITION VECTOR Z	VELOCITY VECTOR X	VELOCITY VECTOR Y	VELOCITY VECTOR Z
860310124800.00	I 1	2002.57901	3896.39685	-5326.27957	4.03981	4.36874	4.71966
860310124900.00	I 1	2240.42352	4149.83269	-5031.65745	3.88545	4.07602	5.09753
860310125000.00	I 1	2468.49156	4385.15981	-4715.01800	3.71404	3.76534	5.45330
860310125100.00	I 1	2685.78178	4601.34043	-4377.73518	3.52631	3.43803	5.78539
860310125200.00	I 1	2891.33865	4797.41910	-4021.27474	3.32307	3.09551	6.09232
860310125300.00	I 1	3084.25685	4972.52707	-3647.18816	3.10517	2.73926	6.37271
860310125400.00	I 1	3263.68534	5125.88639	-3257.10607	2.87357	2.37082	6.62530
860310125500.00	I 1	3428.83133	5256.81367	-2852.73132	2.62926	1.99180	6.84895
860310125600.00	I 1	3578.96394	5364.72338	-2435.83163	2.37331	1.60385	7.04264
860310125700.00	I 1	3713.41767	5449.13074	-2008.23191	2.10682	1.20867	7.20548
860310125800.00	I 1	3831.59552	5509.65418	-1571.80624	1.83098	0.80801	7.33672
860310125900.00	I 1	3932.97184	5546.01731	-1128.46955	1.54698	0.40362	7.43576
860310130000.00	I 1	4017.09484	5558.05039	-680.16916	1.25608	-0.00269	7.50211
860310130100.00	I 1	4083.58883	5545.69133	-228.87585	0.95956	-0.40915	7.53548
860310130200.00	I 1	4132.15598	5508.98616	223.42476	0.65874	-0.81393	7.53568
860310130300.00	I 1	4162.57781	5448.08896	674.74137	0.35494	-1.21525	7.50269
860310130400.00	I 1	4174.71629	5363.26129	1123.08600	0.04952	-1.61132	7.43664
860310130500.00	I 1	4168.51449	5254.87113	1566.48299	-0.25618	-2.00037	7.33783
860310130600.00	I 1	4143.99694	5123.39123	2002.97802	-0.56078	-2.38069	7.20666
860310130700.00	I 1	4101.26952	4969.39701	2430.64699	-0.86295	-2.75057	7.04373
860310130800.00	I 1	4040.51899	4793.56399	2847.60475	-1.16133	-3.10838	6.84975
860310130900.00	I 1	3962.01211	4596.66463	3252.01367	-1.45461	-3.45252	6.62559
860310131000.00	I 1	3866.09440	4379.56485	3642.09193	-1.74148	-3.78148	6.37224
860310131100.00	I 1	3753.18851	4143.21998	4016.12154	-2.02067	-4.09379	6.09084
860310131200.00	I 1	3623.79221	3888.67038	4372.45605	-2.29095	-4.38808	5.78262
860310131300.00	I 1	3478.47607	3617.03667	4709.52781	-2.55114	-4.66305	5.44898
860310131400.00	I 1	3317.88077	3329.51453	5025.85490	-2.80007	-4.91750	5.09139
860310131500.00	I 1	3142.71414	3027.36932	5320.04755	-3.03667	-5.15031	4.71144
860310131600.00	I 1	2953.74787	2711.93026	5590.81418	-3.25989	-5.36047	4.31081
860310131700.00	I 1	2751.81401	2384.58456	5836.96689	-3.46877	-5.54706	3.89128
860310131800.00	I 1	2537.80125	2046.77114	6057.42648	-3.66238	-5.70927	3.45469
860310131900.00	I 1	2312.65085	1699.97434	6251.22703	-3.83989	-5.84639	3.00297
860310132000.00	I 1	2077.35258	1345.71736	6417.51992	-4.00052	-5.95785	2.53810
860310132100.00	I 1	1832.94026	985.55560	6555.57740	-4.14358	-6.04315	2.06213
860310132200.00	I 1	1580.48727	621.06988	6664.79560	-4.26844	-6.10193	1.57715
860310132300.00	I 1	1321.10186	253.85959	6744.69704	-4.37457	-6.13394	1.08527
860310132400.00	I 1	1055.92231	-114.46427	6794.93263	-4.46151	-6.13904	0.58864
860310132500.00	I 1	786.11201	-482.28603	6815.28308	-4.52888	-6.11721	0.08946
860310132600.00	I 1	512.85439	-847.99241	6805.65975	-4.57638	-6.06855	-0.41012
860310132700.00	I 1	237.34785	-1209.97937	6766.10505	-4.60381	-5.99327	-0.90789
860310132800.00	I 1	-39.19943	-1566.65913	6696.79213	-4.61106	-5.89171	-1.40170
860310132900.00	I 1	-315.57464	-1916.46692	6598.02424	-4.59808	-5.76429	-1.88937
860310133000.00	I 1	-590.56556	-2257.86772	6470.23339	-4.56493	-5.61157	-2.36877
860310133100.00	I 1	-862.96581	-2589.36299	6313.97861	-4.51175	-5.43422	-2.83782
860310133200.00	I 1	-1131.57993	-2909.49701	6129.94365	-4.43877	-5.23300	-3.29444
860310133300.00	I 1	-1395.22869	-3216.86329	5918.93423	-4.34630	-5.00879	-3.73664
860310133400.00	I 1	-1652.75415	-3510.11081	5681.87469	-4.23474	-4.76255	-4.16246
860310133500.00	I 1	-1903.02479	-3787.94991	5419.80417	-4.10456	-4.49536	-4.57003
860310133600.00	I 1	-2144.94053	-4049.15816	5133.87228	-3.95634	-4.20839	-4.95755
860310133700.00	I 1	-2377.43766	-4292.58577	4825.33417	-3.79072	-3.90289	-5.32329
860310133800.00	I 1	-2599.49357	-4517.16087	4495.54519	-3.60843	-3.58020	-5.66565

PREDICTED STATE VECTOR DATA REPORT (CON.)

TIME	ID	POSITION VECTOR X	POSITION VECTOR Y	POSITION VECTOR Z	VELOCITY VECTOR X	VELOCITY VECTOR Y	VELOCITY VECTOR Z
860310133900.00	I 1	-2810.13140	-4721.89437	4145.95497	-3.41026	-3.24174	-5.98309
860310134000.00	I 1	-3008.42447	-4905.88446	3778.10109	-3.19709	-2.88901	-6.27421
860310134100.00	I 1	-3193.50043	-5068.32078	3393.60234	-2.96985	-2.52355	-6.53771
860310134200.00	I 1	-3364.54523	-5208.48811	2994.15153	-2.72955	-2.14698	-6.77243
860310134300.00	I 1	-3520.80683	-5325.76971	2581.50797	-2.47726	-1.76097	-6.97731
860310134400.00	I 1	-3661.59864	-5419.65016	2157.48966	-2.21408	-1.36723	-7.15144
860310134500.00	I 1	-3786.30263	-5489.71781	1723.96514	-1.94120	-0.96751	-7.29406
860310134600.00	I 1	-3894.37218	-5535.66666	1282.84504	-1.65981	-0.56357	-7.40454
860310134700.00	I 1	-3985.33460	-5557.29788	836.07349	-1.37117	-0.15722	-7.48238
860310134800.00	I 1	-4058.79330	-5554.52066	385.61925	-1.07657	0.24974	-7.52725
860310134900.00	I 1	-4114.42955	-5527.35267	-66.53328	-0.77731	0.65551	-7.53897
860310135000.00	I 1	-4152.00395	-5475.91987	-518.39310	-0.47473	1.05827	-7.51750
860310135100.00	I 1	-4171.35739	-5400.45584	-967.97169	-0.17017	1.45625	-7.46296
860310135200.00	I 1	-4172.41169	-5301.30053	-1413.29211	0.13502	1.84769	-7.37562
860310135300.00	I 1	-4155.16978	-5178.89856	-1852.39790	0.43948	2.23086	-7.25589
860310135400.00	I 1	-4119.71551	-5033.79693	-2283.36187	0.74187	2.60407	-7.10433
860310135500.00	I 1	-4066.21309	-4866.64237	-2704.29474	1.04086	2.96569	-6.92165
860310135600.00	I 1	-3994.90611	-4678.17812	-3113.35347	1.33514	3.31413	-6.70867
860310135700.00	I 1	-3906.11626	-4469.24043	-3508.74934	1.62341	3.64789	-6.46639
860310135800.00	I 1	-3800.24164	-4240.75453	-3888.75572	1.90443	3.96550	-6.19589
860310135900.00	I 1	-3677.75480	-3993.73036	-4251.71558	2.17695	4.26561	-5.89838
860310140000.00	I 1	-3539.20044	-3729.25782	-4596.04850	2.43982	4.54691	-5.57522
860310140100.00	I 1	-3385.19274	-3448.50173	-4920.25748	2.69188	4.80820	-5.22783
860310140200.00	I 1	-3216.41256	-3152.69661	-5222.93507	2.93206	5.04836	-4.85777
860310140300.00	I 1	-3033.60418	-2843.14098	-5502.76932	3.15932	5.26639	-4.46667
860310140400.00	I 1	-2837.57191	-2521.19163	-5758.54907	3.37270	5.46134	-4.05625
860310140500.00	I 1	-2629.17647	-2188.25754	-5989.16882	3.57128	5.63242	-3.62831
860310140600.00	I 1	-2409.33112	-1845.79376	-6193.63317	3.75423	5.77889	-3.18472
860310140700.00	I 1	-2178.99763	-1495.29506	-6371.06063	3.92076	5.90015	-2.72741
860310140800.00	I 1	-1939.18215	-1138.28960	-6520.68709	4.07018	5.99571	-2.25835
860310140900.00	I 1	-1690.93082	-776.33236	-6641.86872	4.20186	6.06516	-1.77959
860310141000.00	I 1	-1435.32540	-410.99869	-6734.08440	4.31523	6.10822	-1.29317
860310141100.00	I 1	-1173.47866	-43.87768	-6796.93772	4.40983	6.12471	-0.80119
860310141200.00	I 1	-906.52978	323.43440	-6830.15850	4.48524	6.11458	-0.30577
860310141300.00	I 1	-635.63955	689.34079	-6833.60380	4.54116	6.07787	0.19097
860310141400.00	I 1	-361.98561	1052.25079	-6807.25849	4.57733	6.01474	0.68689
860310141500.00	I 1	-86.75752	1410.58639	-6751.23533	4.59361	5.92545	1.17988
860310141600.00	I 1	188.84813	1762.78883	-6665.77457	4.58991	5.81037	1.66780
860310141700.00	I 1	463.63274	2107.32508	-6551.24308	4.56625	5.67000	2.14855
860310141800.00	I 1	736.40065	2442.69430	-6408.13295	4.52271	5.50491	2.62007
860310141900.00	I 1	1005.96418	2767.43414	-6237.05967	4.45947	5.31581	3.08032
860310142000.00	I 1	1271.14860	3080.12694	-6038.75971	4.37679	5.10349	3.52730
860310142100.00	I 1	1530.79715	3379.40585	-5814.08778	4.27501	4.86884	3.95907
860310142200.00	I 1	1783.77592	3663.96066	-5564.01341	4.15454	4.61286	4.37374
860310142300.00	I 1	2028.97878	3932.54358	-5289.61719	4.01590	4.33663	4.76950
860310142400.00	I 1	2265.33215	4183.97472	-4992.08644	3.85966	4.04133	5.14461
860310142500.00	I 1	2491.79974	4417.14737	-4672.71047	3.68649	3.72823	5.49741
860310142600.00	I 1	2707.38709	4631.03299	-4332.87530	3.49712	3.39866	5.82633
860310142700.00	I 1	2911.14606	4824.68595	-3974.05797	3.29235	3.05405	6.12991
860310142800.00	I 1	3102.17908	4997.24793	-3597.82038	3.07307	2.69588	6.40679
860310142900.00	I 1	3279.64328	5147.95196	-3205.80274	2.84022	2.32572	6.65571

PREDICTED STATE VECTOR DATA REPORT (CON.)

TIME	ID		POSITION VECTOR X	POSITION VECTOR Y	POSITION VECTOR Z	VELOCITY VECTOR X	VELOCITY VECTOR Y	VELOCITY VECTOR Z
860310143000.00	I	1	3442.75434	5276.12611	-2799.71659	2.59481	1.94516	6.87556
860310143100.00	I	1	3590.79023	5381.19679	-2381.33727	2.33790	1.55588	7.06533
860310143200.00	I	1	3723.09449	5462.69157	-1952.49645	2.07061	1.15959	7.22414
860310143300.00	I	1	3839.07946	5520.24158	-1515.07388	1.79412	0.75802	7.35127
860310143400.00	I	1	3938.22902	5553.58345	-1070.98914	1.50964	0.35294	7.44613
860310143500.00	I	1	4020.10112	5562.56071	-622.19303	1.21842	-0.05384	7.50826
860310143600.00	I	1	4084.32990	5547.12473	-170.65884	0.92174	-0.46053	7.53736
860310143700.00	I	1	4130.62747	5507.33510	281.62657	0.62093	-0.86533	7.53329
860310143800.00	I	1	4158.78536	5443.35952	732.67176	0.31731	-1.26643	7.49603
860310143900.00	I	1	4168.67550	5355.47318	1180.48975	0.01223	-1.66206	7.42575
860310144000.00	I	1	4160.25092	5244.05758	1623.10702	-0.29295	-2.05045	7.32274
860310144100.00	I	1	4133.54597	5109.59889	2058.57255	-0.59689	-2.42987	7.18745
860310144200.00	I	1	4088.67623	4952.68575	2484.96665	-0.89822	-2.79865	7.02047
860310144300.00	I	1	4025.83794	4774.00664	2900.40973	-1.19562	-3.15514	6.82255
860310144400.00	I	1	3945.30714	4574.34667	3303.07078	-1.48776	-3.49775	6.59456
860310144500.00	I	1	3847.43831	4354.58400	3691.17572	-1.77334	-3.82498	6.33752
860310144600.00	I	1	3732.66273	4115.68575	4063.01529	-2.05111	-4.13537	6.05258
860310144700.00	I	1	3601.48643	3858.70356	4416.95273	-2.31983	-4.42756	5.74101
860310144800.00	I	1	3454.48781	3584.76873	4751.43101	-2.57832	-4.70025	5.40418
860310144900.00	I	1	3292.31491	3295.08701	5064.97966	-2.82545	-4.95226	5.04361
860310145000.00	I	1	3115.68247	2990.93318	5356.22112	-3.06013	-5.18248	4.66089
860310145100.00	I	1	2925.36859	2673.64527	5623.87673	-3.28133	-5.38991	4.25770
860310145200.00	I	1	2722.21123	2344.61853	5866.77215	-3.48809	-5.57363	3.83585
860310145300.00	I	1	2507.10442	2005.29931	6083.84239	-3.67951	-5.73286	3.39718
860310145400.00	I	1	2280.99427	1657.17861	6274.13632	-3.85474	-5.86691	2.94363
860310145500.00	I	1	2044.87475	1301.78551	6436.82064	-4.01303	-5.97519	2.47720
860310145600.00	I	1	1799.78334	940.68051	6571.18341	-4.15369	-6.05724	1.99993
860310145700.00	I	1	1546.79640	575.44866	6676.63699	-4.27612	-6.11270	1.51391
860310145800.00	I	1	1287.02454	207.69268	6752.72049	-4.37978	-6.14135	1.02128
860310145900.00	I	1	1021.60770	-160.97403	6799.10159	-4.46422	-6.14305	0.52419
860310150000.00	I	1	751.71029	-528.93430	6815.57790	-4.52907	-6.11781	0.02482
860310150100.00	I	1	478.51606	-894.57431	6802.07774	-4.57407	-6.06574	-0.47466
860310150200.00	I	1	203.22313	-1256.29034	6758.66037	-4.59901	-5.98706	-0.97206
860310150300.00	I	1	-72.96118	-1612.49576	6685.51572	-4.60377	-5.88211	-1.46521
860310150400.00	I	1	-348.82556	-1961.62782	6582.96365	-4.58834	-5.75136	-1.55195
860310150500.00	I	1	-623.15987	-2302.15434	6451.45263	-4.55279	-5.59537	-2.43015
860310150600.00	I	1	-894.76036	-2632.58039	6291.55790	-4.49725	-5.41480	-2.89773
860310150700.00	I	1	-1162.43488	-2951.45474	6103.97921	-4.42197	-5.21045	-3.35261
860310150800.00	I	1	-1425.00808	-3257.37624	5889.53792	-4.32727	-4.98320	-3.79282
860310150900.00	I	1	-1681.32658	-3549.00001	5649.17360	-4.21355	-4.73403	-4.21640
860310151000.00	I	1	-1930.26404	-3825.04341	5383.94012	-4.08132	-4.46404	-4.62148
860310151100.00	I	1	-2170.72618	-4084.29177	5095.00119	-3.93114	-4.17440	-5.00629
860310151200.00	I	1	-2401.65560	-4325.60387	4783.62534	-3.76368	-3.86638	-5.36911
860310151300.00	I	1	-2622.03659	-4547.91708	4451.18056	-3.57966	-3.54134	-5.70833
860310151400.00	I	1	-2830.89961	-4750.25217	4099.12824	-3.37989	-3.20069	-6.02245
860310151500.00	I	1	-3027.32571	-4931.71783	3729.01693	-3.16525	-2.84594	-6.31007
860310151600.00	I	1	-3210.45064	-5091.51472	3342.47547	-2.93668	-2.47866	-6.56992
860310151700.00	I	1	-3379.46884	-5228.93918	2941.20583	-2.69520	-2.10047	-6.80083
860310151800.00	I	1	-3533.63709	-5343.38653	2526.97560	-2.44186	-1.71304	-7.00178
860310151900.00	I	1	-3672.27794	-5434.35388	2101.61004	-2.17781	-1.31809	-7.17187
860310152000.00	I	1	-3794.78283	-5501.44253	1666.98390	-1.90420	-0.91738	-7.31035

PREDICTED STATE VECTOR DATA REPORT (CON.)

TIME	ID	POSITION VECTOR X	Y	Z	VELOCITY VECTOR X	Y	Z
860310152100.00	I 1	-3900.61494	-5544.35982	1225.01296	-1.62225	-0.51268	-7.41660
860310152200.00	I 1	-3989.31159	-5562.92050	777.64527	-1.33323	-0.10579	-7.49017
860310152300.00	I 1	-4060.48638	-5557.04753	326.85229	-1.03841	0.30147	-7.53074
860310152400.00	I 1	-4113.83092	-5526.77245	-125.38009	-0.73911	0.70731	-7.53814
860310152500.00	I 1	-4149.11611	-5472.23505	-577.06065	-0.43665	1.10992	-7.51236
860310152600.00	I 1	-4166.19314	-5393.68267	-1026.20186	-0.13239	1.50751	-7.45353
860310152700.00	I 1	-4164.99396	-5291.46887	-1470.82889	0.17233	1.89834	-7.36194
860310152800.00	I 1	-4145.53150	-5166.05169	-1908.98851	0.47616	2.28068	-7.23803
860310152900.00	I 1	-4107.89940	-5017.99136	-2338.75789	0.77776	2.65284	-7.08238
860310153000.00	I 1	-4052.27143	-4847.94758	-2758.25308	1.07580	3.01319	-6.89569
860310153100.00	I 1	-3978.90047	-4656.67626	-3165.63750	1.36898	3.36016	-6.67884
860310153200.00	I 1	-3888.11726	-4445.02603	-3559.12987	1.65600	3.69224	-6.43280
860310153300.00	I 1	-3780.32863	-4213.93411	-3937.01207	1.93562	4.00798	-6.15870
860310153400.00	I 1	-3656.01553	-3964.42192	-4297.63659	2.20662	4.30603	-5.85776
860310153500.00	I 1	-3515.73064	-3697.59030	-4639.43350	2.46782	4.58509	-5.53134
860310153600.00	I 1	-3360.09572	-3414.61442	-4960.91719	2.71810	4.84398	-5.18090
860310153700.00	I 1	-3189.79869	-3116.73840	-5260.69246	2.95638	5.08159	-4.80800
860310153800.00	I 1	-3005.59038	-2805.26966	-5537.46036	3.18164	5.29691	-4.41427
860310153900.00	I 1	-2808.28111	-2481.57308	-5790.02335	3.39292	5.48904	-4.00146
860310154000.00	I 1	-2598.73702	-2147.06502	-6017.29016	3.58933	5.65717	-3.57137
860310154100.00	I 1	-2377.87622	-1803.20707	-6218.28008	3.77002	5.80059	-3.12588
860310154200.00	I 1	-2146.66476	-1451.49981	-6392.12678	3.93423	5.91872	-2.66693
860310154300.00	I 1	-1906.11243	-1093.47641	-6538.08164	4.08127	6.01106	-2.19649
860310154400.00	I 1	-1657.26848	-730.69609	-6655.51667	4.21052	6.07723	-1.71661
860310154500.00	I 1	-1401.21711	-364.73766	-6743.92691	4.32143	6.11696	-1.22934
860310154600.00	I 1	-1139.07296	2.80715	-6802.93230	4.41354	6.13009	-0.73680
860310154700.00	I 1	-871.97644	370.34028	-6832.27921	4.48645	6.11657	-0.24108
860310154800.00	I 1	-601.08897	736.26397	-6831.84136	4.53986	6.07646	0.25567
860310154900.00	I 1	-327.58816	1098.98737	-6801.62035	4.57353	6.00993	0.75133
860310155000.00	I 1	-52.66295	1456.93320	-6741.74566	4.58732	5.91727	1.24377
860310155100.00	I 1	222.49137	1808.54426	-6652.47417	4.58116	5.79885	1.73088
860310155200.00	I 1	496.67808	2152.28997	-6534.18924	4.55508	5.65518	2.21054
860310155300.00	I 1	768.70406	2486.67275	-6387.39926	4.50916	5.48686	2.68070
860310155400.00	I 1	1037.38478	2810.23440	-6212.73569	4.44361	5.29460	3.13933
860310155500.00	I 1	1301.54927	3121.56221	-6010.95066	4.35867	5.07921	3.58442
860310155600.00	I 1	1560.04511	3419.29512	-5782.91405	4.25472	4.84160	4.01406
860310155700.00	I 1	1811.74333	3702.12949	-5529.61011	4.13217	4.58277	4.42636
860310155800.00	I 1	2055.54328	3968.82486	-5252.13354	3.99153	4.30382	4.81952
860310155900.00	I 1	2290.37738	4218.20942	-4951.68517	3.83341	4.00595	5.19181
860310160000.00	I 1	2515.21581	4449.18518	-4629.56714	3.65846	3.69041	5.54158
860310160100.00	I 1	2729.07112	4660.73307	-4287.17749	3.46743	3.35858	5.86728
860310160200.00	I 1	2931.00257	4851.91750	-3926.00462	3.26114	3.01188	6.16745
860310160300.00	I 1	3120.12043	5021.89079	-3547.62092	3.04047	2.65180	6.44075
860310160400.00	I 1	3295.59007	5169.89716	-3153.67620	2.80636	2.27991	6.68596
860310160500.00	I 1	3456.63582	5295.27641	-2745.89067	2.55985	1.89784	6.90194
860310160600.00	I 1	3602.54458	5397.46712	-2326.04746	2.30198	1.50724	7.08772
860310160700.00	I 1	3732.66922	5476.00945	-1895.98491	2.03390	1.10985	7.24245
860310160800.00	I 1	3846.43160	5530.54750	-1457.58841	1.75677	0.70739	7.36542
860310160900.00	I 1	3943.32540	5560.83111	-1012.78206	1.47182	0.30166	7.45603
860310161000.00	I 1	4022.91848	5566.71730	-563.52008	1.18029	-0.10555	7.51388
860310161100.00	I 1	4084.85506	5548.17108	-111.77805	0.88349	-0.51245	7.53867

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TIME	ID	POSITION VECTOR X	POSITION VECTOR Y	POSITION VECTOR Z	VELOCITY VECTOR X	VELOCITY VECTOR Y	VELOCITY VECTOR Z
860310161200.00	I 1	4128.85738	5505.26580	340.45607	0.58271	-0.91722	7.53027
860310161300.00	I 1	4154.72713	5438.18297	791.19085	0.27929	-1.31807	7.48870
860310161400.00	I 1	4162.34640	5347.21159	1238.44053	-0.02542	-1.71321	7.41414
860310161500.00	I 1	4151.67830	5232.74691	1680.23400	-0.33006	-2.10089	7.30690
860310161600.00	I 1	4122.76719	5095.28869	2114.62379	-0.63329	-2.47938	7.16744
860310161700.00	I 1	4075.73846	4935.43895	2539.69497	-0.93376	-2.84700	6.99639
860310161800.00	I 1	4010.79799	4753.89921	2953.57385	-1.23013	-3.20211	6.79450
860310161900.00	I 1	3928.23115	4551.46727	3354.43645	-1.52109	-3.54315	6.56268
860310162000.00	I 1	3828.40144	4329.03350	3740.51673	-1.80535	-3.86859	6.30194
860310162100.00	I 1	3711.74879	4087.57674	4110.11449	-2.08165	-4.17701	6.01346
860310162200.00	I 1	3578.78745	3828.15980	4461.60294	-2.34877	-4.46705	5.69852
860310162300.00	I 1	3430.10362	3551.92457	4793.43589	-2.60554	-4.73742	5.35852
860310162400.00	I 1	3266.35268	3260.08687	5104.15448	-2.85082	-4.98694	4.99497
860310162500.00	I 1	3088.25620	2953.93087	5392.39357	-3.08355	-5.21452	4.60948
860310162600.00	I 1	2896.59865	2634.80338	5656.88761	-3.30269	-5.41916	4.20376
860310162700.00	I 1	2692.22381	2304.10781	5896.47612	-3.50730	-5.59998	3.77960
860310162800.00	I 1	2476.03102	1963.29788	6110.10863	-3.69648	-5.75619	3.33888
860310162900.00	I 1	2248.97111	1613.87119	6296.84912	-3.86941	-5.88710	2.88353
860310163000.00	I 1	2012.04220	1257.36265	6455.87996	-4.02533	-5.99217	2.41556
860310163100.00	I 1	1766.28522	895.33756	6586.50534	-4.16357	-6.07092	1.93703
860310163200.00	I 1	1512.77943	529.38497	6688.15407	-4.28353	-6.12304	1.45003
860310163300.00	I 1	1252.63762	161.11064	6760.38195	-4.38469	-6.14829	0.95669
860310163400.00	I 1	987.00134	-207.86988	6802.87351	-4.46661	-6.14657	0.45918
860310163500.00	I 1	717.03591	-575.93820	6815.44327	-4.52894	-6.11789	-0.04034
860310163600.00	I 1	443.92544	-941.48005	6798.03650	-4.57141	-6.06238	-0.53968
860310163700.00	I 1	168.86776	-1302.89217	6750.72937	-4.59383	-5.98028	-1.03665
860310163800.00	I 1	-106.93075	-1658.58922	6673.72868	-4.59609	-5.87195	-1.52910
860310163900.00	I 1	-382.26030	-2007.01055	6567.37105	-4.57820	-5.73785	-2.01486
860310164000.00	I 1	-655.91296	-2346.62696	6432.12156	-4.54022	-5.57856	-2.49181
860310164100.00	I 1	-926.68781	-2675.94732	6268.57189	-4.48231	-5.39477	-2.95786
860310164200.00	I 1	-1193.39622	-2993.52510	6077.43787	-4.40472	-5.18728	-3.41095
860310164300.00	I 1	-1454.86699	-3297.96470	5859.55659	-4.30778	-4.95699	-3.84910
860310164400.00	I 1	-1709.95152	-3587.92764	5615.88287	-4.19192	-4.70490	-4.27038
860310164500.00	I 1	-1957.52887	-3862.13849	5347.48523	-4.05763	-4.43211	-4.67293
860310164600.00	I 1	-2196.51068	-4119.39056	5055.54141	-3.90551	-4.13981	-5.05497
860310164700.00	I 1	-2425.84604	-4358.55133	4741.33331	-3.73620	-3.82929	-5.41480
860310164800.00	I 1	-2644.52618	-4578.56760	4406.24147	-3.55046	-3.50190	-5.75083
860310164900.00	I 1	-2851.58901	-4778.47022	4051.73911	-3.34910	-3.15908	-6.06158
860310165000.00	I 1	-3046.12346	-4957.37857	3679.38574	-3.13300	-2.80234	-6.34565
860310165100.00	I 1	-3227.27359	-5114.50459	3290.82025	-2.90312	-2.43327	-6.60178
860310165200.00	I 1	-3394.24257	-5249.15648	2887.75374	-2.66047	-2.05348	-6.82884
860310165300.00	I 1	-3546.29628	-5360.74187	2471.96186	-2.40613	-1.66467	-7.02580
860310165400.00	I 1	-3682.76669	-5448.77061	2045.27686	-2.14122	-1.26855	-7.19180
860310165500.00	I 1	-3803.05495	-5512.85707	1609.57938	-1.86692	-0.86689	-7.32611
860310165600.00	I 1	-3906.63414	-5552.72195	1166.78986	-1.58446	-0.46146	-7.42812
860310165700.00	I 1	-3993.05163	-5568.19353	718.85991	-1.29508	-0.05408	-7.49739
860310165800.00	I 1	-4061.93115	-5559.20846	267.76336	-1.00008	0.35346	-7.53364
860310165900.00	I 1	-4112.97445	-5525.81200	-184.51268	-0.70076	0.75933	-7.53670
860310170000.00	I 1	-4145.96258	-5468.15776	-635.97685	-0.39846	1.16175	-7.50659
860310170100.00	I 1	-4160.75682	-5386.50682	-1084.64271	-0.09452	1.55893	-7.44346
860310170200.00	I 1	-4157.29917	-5281.22651	-1528.53757	0.20971	1.94911	-7.34762

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TIME	ID	POSITION VECTOR X	POSITION VECTOR Y	POSITION VECTOR Z	VELOCITY VECTOR X	VELOCITY VECTOR Y	VELOCITY VECTOR Z
860310170300.00	I 1	-4135.61248	-5152.78847	-1965.71151	0.51289	2.33057	-7.21952
860310170400.00	I 1	-4095.80020	-5001.76641	-2394.24613	0.81368	2.70163	-7.05975
860310170500.00	I 1	-4038.04574	-4828.83322	-2812.26313	1.11074	3.06067	-6.86906
860310170600.00	I 1	-3962.61141	-4634.75771	-3217.93264	1.40279	3.40612	-6.64833
860310170700.00	I 1	-3869.83706	-4420.40092	-3609.48127	1.68853	3.73647	-6.39855
860310170800.00	I 1	-3760.13834	-4186.71199	-3985.19985	1.96673	4.05029	-6.12086
860310170900.00	I 1	-3634.00458	-3934.72367	-4343.45076	2.23617	4.34623	-5.81651
860310171000.00	I 1	-3491.99641	-3665.54748	-4682.67494	2.49569	4.62302	-5.48687
860310171100.00	I 1	-3334.74309	-3380.36862	-5001.39840	2.74416	4.87946	-5.13340
860310171200.00	I 1	-3162.93949	-3080.44050	-5298.23834	2.98052	5.11448	-4.75769
860310171300.00	I 1	-2977.34287	-2767.07918	-5571.90883	3.20376	5.32708	-4.36137
860310171400.00	I 1	-2778.76946	-2441.65745	-5821.22601	3.41293	5.51636	-3.94621
860310171500.00	I 1	-2568.09075	-2105.59884	-6045.11284	3.60713	5.68152	-3.51400
860310171600.00	I 1	-2346.22961	-1760.37141	-6242.60329	3.78554	5.82188	-3.06665
860310171700.00	I 1	-2114.15631	-1407.48145	-6412.84624	3.94742	5.93685	-2.60608
860310171800.00	I 1	-1872.88425	-1048.46706	-6555.10866	4.09206	6.02595	-2.13430
860310171900.00	I 1	-1623.46569	-684.89161	-6668.77853	4.21887	6.08883	-1.65334
860310172000.00	I 1	-1366.98722	-318.33725	-6753.36712	4.32731	6.12522	-1.16527
860310172100.00	I 1	-1104.56525	49.60180	-6808.51086	4.41692	6.13497	-0.67220
860310172200.00	I 1	-837.34132	417.32580	-6833.97278	4.48732	6.11805	-0.17623
860310172300.00	I 1	-566.47733	783.23618	-6829.64334	4.53821	6.07454	0.32049
860310172400.00	I 1	-293.15075	1145.74214	-6795.54092	4.56937	6.00461	0.81585
860310172500.00	I 1	-18.54971	1503.26730	-6731.81172	4.58068	5.90857	1.30770
860310172600.00	I 1	256.13192	1854.25623	-6638.72928	4.57206	5.78681	1.79394
860310172700.00	I 1	529.69948	2197.18092	-6516.69338	4.54355	5.63986	2.27247
860310172800.00	I 1	800.96252	2530.54729	-6366.22863	4.49527	5.46831	2.74123
860310172900.00	I 1	1068.73978	2852.90137	-6187.98239	4.42740	5.27291	3.19818
860310173000.00	I 1	1331.86415	3162.83558	-5982.72232	4.34022	5.05447	3.64136
860310173100.00	I 1	1589.18767	3458.99476	-5751.33338	4.23410	4.81390	4.06883
860310173200.00	I 1	1839.58634	3740.08195	-5494.81442	4.10948	4.55224	4.47872
860310173300.00	I 1	2081.96504	4004.86413	-5214.27420	3.96686	4.27060	4.86924
860310173400.00	I 1	2315.26225	4252.17766	-4910.92700	3.80687	3.97016	5.23868
860310173500.00	I 1	2538.45472	4480.93347	-4586.08770	3.63016	3.65223	5.58538
860310173600.00	I 1	2750.56203	4690.12202	-4241.16645	3.43749	3.31815	5.90783
860310173700.00	I 1	2950.65097	4878.81796	-3877.66284	3.22969	2.96938	6.20456
860310173800.00	I 1	3137.83976	5046.18439	-3497.15963	3.00764	2.60743	6.47427
860310173900.00	I 1	3311.30215	5191.47692	-3101.31611	2.77231	2.23385	6.71571
860310174000.00	I 1	3470.27116	5314.04716	-2691.86096	2.52470	1.85029	6.92781
860310174100.00	I 1	3614.04274	5413.34596	-2270.58481	2.26591	1.45842	7.10960
860310174200.00	I 1	3741.97904	5488.92613	-1839.33243	1.99705	1.05996	7.26023
860310174300.00	I 1	3853.51147	5540.44470	-1399.99462	1.71931	0.65667	7.37901
860310174400.00	I 1	3948.14342	5567.66479	-954.49980	1.43391	0.25031	7.46538
860310174500.00	I 1	4025.45266	5570.45685	-504.80543	1.14210	-0.15730	7.51894
860310174600.00	I 1	4085.09340	5548.79953	-52.88919	0.84518	-0.56437	7.53941
860310174700.00	I 1	4126.79800	5502.77992	399.25998	0.54445	-0.96908	7.52669
860310174800.00	I 1	4150.37827	5432.59335	849.65087	0.24126	-1.36963	7.48082
860310174900.00	I 1	4155.72647	5338.54260	1296.29910	-0.06306	-1.76425	7.40198
860310175000.00	I 1	4142.81578	5221.03660	1737.23613	-0.36715	-2.15119	7.29052
860310175100.00	I 1	4111.70053	5080.58860	2170.51827	-0.66965	-2.52870	7.14691
860310175200.00	I 1	4062.51589	4917.81385	2594.23553	-0.96924	-2.89513	6.97180
860310175300.00	I 1	3995.47728	4733.42678	3006.52021	-1.26457	-3.24885	6.76597

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TIME	ID	POSITION VECTOR X	POSITION VECTOR Y	POSITION VECTOR Z	VELOCITY VECTOR X	VELOCITY VECTOR Y	VELOCITY VECTOR Z
860310175400.00	I 1	3910.87932	4528.23772	3405.55544	-1.55433	-3.58828	6.53032
860310175500.00	I 1	3809.09445	4303.14914	3789.58327	-1.83725	-3.91192	6.26591
860310175600.00	I 1	3690.57115	4059.15155	4156.91256	-2.11207	-4.21835	5.97391
860310175700.00	I 1	3555.83186	3797.31893	4505.92651	-2.37759	-4.50620	5.65562
860310175800.00	I 1	3405.47056	3518.80380	4835.08979	-2.63262	-4.77423	5.31246
860310175900.00	I 1	3240.14996	3224.83205	5142.95529	-2.87605	-5.02124	4.94596
860310180000.00	I 1	3060.59856	2916.69733	5428.17044	-3.10680	-5.24615	4.55773
860310180100.00	I 1	2867.60716	2595.75517	5689.48310	-3.32388	-5.44800	4.14950
860310180200.00	I 1	2662.02543	2263.41696	5925.74687	-3.52633	-5.62588	3.72308
860310180300.00	I 1	2444.75799	1921.14363	6135.92600	-3.71326	-5.77905	3.28034
860310180400.00	I 1	2216.76034	1570.43911	6319.09977	-3.88387	-5.90682	2.82323
860310180500.00	I 1	1979.03467	1212.84372	6474.46629	-4.03741	-6.00866	2.35377
860310180600.00	I 1	1732.62539	849.92743	6601.34580	-4.17322	-6.08412	1.87401
860310180700.00	I 1	1478.61456	483.28297	6699.18348	-4.29071	-6.13289	1.38606
860310180800.00	I 1	1218.11718	114.51899	6767.55169	-4.38936	-6.15475	0.89205
860310180900.00	I 1	952.27637	-254.74691	6806.15166	-4.46876	-6.14961	0.39415
860310181000.00	I 1	682.25842	-622.89512	6814.81479	-4.52855	-6.11751	-0.10548
860310181100.00	I 1	409.24777	-988.31098	6793.50324	-4.56848	-6.05857	-0.60465
860310181200.00	I 1	134.44192	-1349.39169	6742.31018	-4.58837	-5.97305	-1.10117
860310181300.00	I 1	-140.95373	-1704.55322	6661.45935	-4.58813	-5.86133	-1.59288
860310181400.00	I 1	-415.73105	-2052.23714	6551.30424	-4.56776	-5.72389	-2.07762
860310181500.00	I 1	-688.68444	-2390.91736	6412.32660	-4.52735	-5.56132	-2.55328
860310181600.00	I 1	-958.61602	-2719.10673	6245.13450	-4.46707	-5.37432	-3.01776
860310181700.00	I 1	-1224.34081	-3035.36357	6050.45981	-4.38718	-5.16371	-3.46903
860310181800.00	I 1	-1484.69194	-3338.29798	5829.15519	-4.28801	-4.93040	-3.90510
860310181900.00	I 1	-1738.52570	-3626.57796	5582.19049	-4.17001	-4.67541	-4.32405
860310182000.00	I 1	-1984.72658	-3898.93531	5310.64873	-4.03368	-4.39984	-4.72403
860310182100.00	I 1	-2222.21224	-4154.17135	5015.72150	-3.87961	-4.10490	-5.10328
860310182200.00	I 1	-2449.93825	-4391.16226	4698.70390	-3.70847	-3.79189	-5.46011
860310182300.00	I 1	-2666.90286	-4608.86423	4360.98894	-3.52103	-3.46218	-5.79293
860310182400.00	I 1	-2872.15141	-4806.31819	4004.06158	-3.31808	-3.11721	-6.10028
860310182500.00	I 1	-3064.78076	-4982.65421	3629.49216	-3.10054	-2.75850	-6.38078
860310182600.00	I 1	-3243.94332	-5137.09557	3238.92958	-2.86936	-2.38765	-6.63319
860310182700.00	I 1	-3408.85100	-5268.96230	2834.09390	-2.62555	-2.00629	-6.85638
860310182800.00	I 1	-3558.77875	-5377.67439	2416.76876	-2.37021	-1.61612	-7.04935
860310182900.00	I 1	-3693.06793	-5462.75447	1988.79331	-2.10446	-1.21885	-7.21126
860310183000.00	I 1	-3811.12931	-5523.83002	1552.05399	-1.82948	-0.81626	-7.34137
860310183100.00	I 1	-3912.44580	-5560.63514	1108.47587	-1.54650	-0.41014	-7.43913
860310183200.00	I 1	-3996.57475	-5573.01174	660.01412	-1.25678	-0.00228	-7.50410
860310183300.00	I 1	-4063.15000	-5560.91029	208.64498	-0.96160	0.40550	-7.53601
860310183400.00	I 1	-4111.88348	-5524.38997	-243.64321	-0.66227	0.81138	-7.53473
860310183500.00	I 1	-4142.56649	-5463.61837	-694.85904	-0.36014	1.21357	-7.50028
860310183600.00	I 1	-4155.07055	-5378.87057	-1143.01716	-0.05653	1.61029	-7.43285
860310183700.00	I 1	-4149.34787	-5270.52779	-1586.14723	0.24720	1.99978	-7.33275
860310183800.00	I 1	-4125.43142	-5139.07542	-2022.30292	0.54970	2.38033	-7.20046
860310183900.00	I 1	-4083.43462	-4985.10062	-2449.57060	0.84965	2.75026	-7.03660
860310184000.00	I 1	-4023.55060	-4809.28941	-2866.07794	1.14573	3.10794	-6.84192
860310184100.00	I 1	-3946.05114	-4612.42330	-3270.00213	1.43662	3.45183	-6.61732
860310184200.00	I 1	-3851.28519	-4395.37551	-3659.57795	1.72107	3.78042	-6.36382
860310184300.00	I 1	-3739.67710	-4159.10682	-4033.10533	1.99782	4.09230	-6.08257
860310184400.00	I 1	-3611.72449	-3904.66103	-4388.95666	2.26569	4.38611	-5.77484

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TIME	ID	POSITION VECTOR X	POSITION VECTOR Y	POSITION VECTOR Z	VELOCITY VECTOR X	VELOCITY VECTOR Y	VELOCITY VECTOR Z
860310184500.00	I 1	-3467.99583	-3633.16009	-4725.58370	2.52350	4.66060	-5.44200
860310184600.00	I 1	-3309.12774	-3345.79903	-5041.52407	2.77015	4.91459	-5.08554
860310184700.00	I 1	-3135.82195	-3043.84045	-5335.40725	3.00458	5.14701	-4.70703
860310184800.00	I 1	-2948.84212	-2728.60893	-5605.96029	3.22579	5.35687	-4.30815
860310184900.00	I 1	-2749.01035	-2401.48516	-5852.01291	3.43283	5.54328	-3.89065
860310185000.00	I 1	-2537.20348	-2063.89983	-6072.50222	3.62482	5.70547	-3.45635
860310185100.00	I 1	-2314.34919	-1717.32748	-6266.47696	3.80095	5.84274	-3.00715
860310185200.00	I 1	-2081.42196	-1363.28011	-6433.10119	3.96047	5.95455	-2.54500
860310185300.00	I 1	-1839.43885	-1003.30074	-6571.65757	4.10270	6.04041	-2.07189
860310185400.00	I 1	-1589.45511	-638.95687	-6681.55012	4.22706	6.09998	-1.58988
860310185500.00	I 1	-1332.55976	-271.83391	-6762.30645	4.33301	6.13301	-1.10103
860310185600.00	I 1	-1069.87093	96.47147	-6813.57961	4.42011	6.13938	-0.60746
860310185700.00	I 1	-802.53127	464.35799	-6835.14935	4.48798	6.11906	-0.11127
860310185800.00	I 1	-531.70313	830.22636	-6826.92296	4.53635	6.07213	0.38539
860310185900.00	I 1	-258.56376	1192.48599	-6788.93567	4.56500	5.99881	0.88040
860310190000.00	I 1	15.69952	1549.56149	-6721.35048	4.57380	5.89939	1.37163
860310190100.00	I 1	289.89438	1899.89938	-6624.45754	4.56271	5.77430	1.85697
860310190200.00	I 1	562.82824	2241.97438	-6498.67312	4.53178	5.62406	2.33434
860310190300.00	I 1	833.31339	2574.29596	-6344.53803	4.48112	5.44930	2.80166
860310190400.00	I 1	1100.17189	2895.41459	-6162.71549	4.41093	5.25076	3.25692
860310190500.00	I 1	1362.24058	3203.92786	-5953.98869	4.32151	5.02927	3.69814
860310190600.00	I 1	1618.37597	3498.48660	-5719.25769	4.21322	4.78577	4.12341
860310190700.00	I 1	1867.45914	3777.80061	-5459.53592	4.08652	4.52129	4.53086
860310190800.00	I 1	2108.40061	4040.64440	-5175.94618	3.94193	4.23696	4.91872
860310190900.00	I 1	2340.14500	4285.86258	-4869.71618	3.78006	3.93398	5.28526
860310191000.00	I 1	2561.67576	4512.37504	-4542.17356	3.60159	3.61366	5.62887
860310191100.00	I 1	2772.01963	4719.18191	-4194.74047	3.40730	3.27736	5.94803
860310191200.00	I 1	2970.25104	4905.36809	-3828.92771	3.19799	2.92655	6.24130
860310191300.00	I 1	3155.49628	5070.10760	-3446.32840	2.97458	2.56273	6.50737
860310191400.00	I 1	3326.93756	5212.66747	-3048.61125	2.73802	2.18749	6.74504
860310191500.00	I 1	3483.81672	5332.41125	-2637.51342	2.48935	1.80247	6.95323
860310191600.00	I 1	3625.43887	5428.80220	-2214.83299	2.22964	1.40935	7.13098
860310191700.00	I 1	3751.17558	5501.40593	-1782.42119	1.96003	1.00986	7.27748
860310191800.00	I 1	3860.46796	5549.89264	-1342.17416	1.68170	0.60575	7.39205
860310191900.00	I 1	3952.82928	5574.03889	-896.02458	1.39587	0.19881	7.47415
860310192000.00	I 1	4027.84738	5573.72885	-445.93298	1.10380	-0.20916	7.52340
860310192100.00	I 1	4085.18666	5548.95503	6.12106	0.80679	-0.61635	7.53954
860310192200.00	I 1	4124.58974	5499.81848	458.14789	0.50615	-1.02095	7.52249
860310192300.00	I 1	4145.87871	5426.52851	908.15683	0.20321	-1.42117	7.47230
860310192400.00	I 1	4148.95605	5329.40181	1354.16526	-0.10068	-1.81522	7.38919
860310192500.00	I 1	4133.80507	5208.86105	1794.20760	-0.40417	-2.20135	7.27350
860310192600.00	I 1	4100.49003	5065.43303	2226.34430	-0.70592	-2.57784	7.12576
860310192700.00	I 1	4049.15586	4899.74625	2648.67062	-1.00459	-2.94303	6.94661
860310192800.00	I 1	3980.02747	4712.52806	3059.32525	-1.29885	-3.29529	6.73685
860310192900.00	I 1	3893.40865	4504.60129	3456.49872	-1.58739	-3.63306	6.49741
860310193000.00	I 1	3789.68072	4276.88052	3838.44149	-1.86894	-3.95485	6.22935
860310193100.00	I 1	3669.30068	4030.36783	4203.47190	-2.14225	-4.25923	5.93387
860310193200.00	I 1	3532.79912	3766.14824	4549.98344	-2.40613	-4.54486	5.61228
860310193300.00	I 1	3380.77772	3485.38479	4876.45207	-2.65939	-4.81049	5.26602
860310193400.00	I 1	3213.90649	3189.31314	5181.44277	-2.90094	-5.05495	4.89662
860310193500.00	I 1	3032.92067	2879.23605	5463.61591	-3.12971	-5.27717	4.50571

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TIME	ID		POSITION VECTOR X	POSITION VECTOR Y	POSITION VECTOR Z	VELOCITY VECTOR X	VELOCITY VECTOR Y	VELOCITY VECTOR Z
860310193600.00	I	1	2838.61735	2556.51744	5721.73295	-3.34469	-5.47618	4.09504
860310193700.00	I	1	2631.85187	2222.57625	5954.66176	-3.54496	-5.65112	3.66642
860310193800.00	I	1	2413.53393	1878.88017	6161.38142	-3.72964	-5.80122	3.22172
860310193900.00	I	1	2184.62353	1526.93905	6340.98648	-3.89791	-5.92585	2.76293
860310194000.00	I	1	1946.12672	1168.29835	6492.69073	-4.04907	-6.02446	2.29204
860310194100.00	I	1	1699.09116	804.53234	6615.83041	-4.18244	-6.09663	1.81112
860310194200.00	U	1	1444.16226	435.01654	6710.14311	-4.29670	-6.14332	1.31950
860310194300.00	U	1	1183.38127	65.73280	6774.49761	-4.39282	-6.16164	0.82487
860310194400.00	U	1	917.40950	-303.83913	6809.05562	-4.46966	-6.15292	0.32664
860310194500.00	U	1	647.41372	-672.07834	6813.66586	-4.52690	-6.11723	-0.17302
860310194600.00	U	1	374.58438	-1037.34909	6788.31838	-4.56428	-6.05470	-0.67191
860310194700.00	U	1	100.10649	-1398.09055	6733.10425	-4.58164	-5.96562	-1.16789
860310194800.00	U	1	-174.81047	-1752.69946	6648.27389	-4.57891	-5.85036	-1.65876
860310194900.00	U	1	-448.96051	-2099.61977	6534.19803	-4.55608	-5.70942	-2.14238
860310195000.00	U	1	-721.14076	-2437.32872	6391.37547	-4.51327	-5.54342	-2.61663
860310195100.00	U	1	-990.15671	-2764.34341	6220.43096	-4.45065	-5.35308	-3.07944
860310195200.00	U	1	-1254.82734	-3079.22728	6022.11267	-4.36848	-5.13921	-3.52876
860310195300.00	U	1	-1513.99033	-3380.59638	5797.28908	-4.26712	-4.90275	-3.96262
860310195400.00	U	1	-1766.50705	-3667.12554	5546.94539	-4.14702	-4.64472	-4.37912
860310195500.00	U	1	-2011.26766	-3937.55418	5272.17938	-4.00868	-4.36626	-4.77640
860310195600.00	U	1	-2247.19597	-4190.69200	4974.19678	-3.85271	-4.06857	-5.15272
860310195700.00	U	1	-2473.25429	-4425.42436	4654.30615	-3.67980	-3.75297	-5.50640
860310195800.00	U	1	-2688.44807	-4640.71733	4313.91327	-3.49069	-3.42083	-5.83587
860310195900.00	U	1	-2891.83041	-4835.62244	3954.51496	-3.28623	-3.07362	-6.13968
860310200000.00	U	1	-3082.50636	-5009.28103	3577.69260	-3.06730	-2.71287	-6.41646
860310200100.00	U	1	-3259.63696	-5160.92823	3185.10510	-2.83488	-2.34018	-6.66499
860310200200.00	U	1	-3422.44314	-5289.89646	2778.48159	-2.59000	-1.95719	-6.88415
860310200300.00	U	1	-3570.20919	-5395.61857	2359.61361	-2.33373	-1.56559	-7.07298
860310200400.00	U	1	-3702.28612	-5477.63046	1930.34720	-2.06722	-1.16714	-7.23064
860310200500.00	U	1	-3818.09457	-5535.57325	1492.57448	-1.79165	-0.76359	-7.35642
860310200600.00	U	1	-3917.12748	-5569.19498	1048.22518	-1.50824	-0.35674	-7.44978
860310200700.00	U	1	-3998.95244	-5578.35177	599.25787	-1.21827	0.05161	-7.51030
860310200800.00	U	1	-4063.21363	-5563.00849	147.65100	-0.92300	0.45963	-7.53773
860310200900.00	U	1	-4109.63340	-5523.23887	-304.60609	-0.62377	0.86552	-7.53197
860310201000.00	U	1	-4138.01353	-5459.22510	-755.52227	-0.32190	1.26747	-7.49306
860310201100.00	U	1	-4148.23598	-5371.25689	-1203.11376	-0.01874	1.66370	-7.42119
860310201200.00	U	1	-4140.26333	-5259.72989	-1645.41309	0.28437	2.05247	-7.31672
860310201300.00	U	1	-4114.13879	-5125.14378	-2080.47808	0.58610	2.43206	-7.18014
860310201400.00	U	1	-4069.98576	-4968.09964	-2506.40049	0.88510	2.80080	-7.01209
860310201500.00	U	1	-4008.00709	-4789.29702	-2921.31458	1.18007	3.15708	-6.81334
860310201600.00	U	1	-3928.48390	-4589.53052	-3323.40527	1.46971	3.49934	-6.58480
860310201700.00	U	1	-3831.77411	-4369.68591	-3710.91604	1.75275	3.82611	-6.32752
860310201800.00	U	1	-3718.31057	-4130.73598	-4082.15654	2.02796	4.13596	-6.04267
860310201900.00	U	1	-3588.59895	-3873.73596	-4435.50977	2.29416	4.42756	-5.73151
860310202000.00	U	1	-3443.21529	-3599.81866	-4769.43890	2.55018	4.69967	-5.39544
860310202100.00	U	1	-3282.80325	-3310.18931	-5082.49376	2.79492	4.95111	-5.03595
860310202200.00	U	1	-3108.07116	-3006.12014	-5373.31683	3.02734	5.18082	-4.65465
860310202300.00	U	1	-2919.78869	-2688.94463	-5640.64880	3.24644	5.38783	-4.25320
860310202400.00	U	1	-2718.78343	-2360.05168	-5883.33375	3.45128	5.57127	-3.83338
860310202500.00	U	1	-2505.93712	-2020.87945	-6100.32378	3.64100	5.73036	-3.39702
860310202600.00	U	1	-2282.18179	-1672.90912	-6290.68312	3.81479	5.86444	-2.94601

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TIME	ID	POSITION VECTOR X	Y	Z	VELOCITY VECTOR X	Y	Z
860310202700.00	U 1	-2048.49564	-1317.65853	-6453.59189	3.97191	5.97295	-2.48233
860310202800.00	U 1	-1805.89882	-956.67564	-6588.34919	4.11171	6.05545	-2.00797
860310202900.00	U 1	-1555.44903	-591.53202	-6694.37583	4.23359	6.11159	-1.52499
860310203000.00	U 1	-1298.23707	-223.81621	-6771.21648	4.33703	6.14116	-1.03545
860310203100.00	U 1	-1035.38222	144.87289	-6818.54141	4.42162	6.14403	-0.54148
860310203200.00	U 1	-768.02757	512.93269	-6836.14769	4.48698	6.12019	-0.04519
860310203300.00	U 1	-497.33529	878.76354	-6823.95997	4.53283	6.06975	0.45130
860310203400.00	U 1	-224.48176	1240.77536	-6782.03073	4.55899	5.99293	0.94584
860310203500.00	U 1	49.34724	1597.39423	-6710.54011	4.56534	5.89005	1.43632
860310203600.00	U 1	322.96146	1947.06893	-6609.79522	4.55183	5.76154	1.92064
860310203700.00	U 1	595.17113	2288.27741	-6480.22898	4.51853	5.60794	2.39669
860310203800.00	U 1	864.79191	2619.53316	-6322.39851	4.46557	5.42990	2.86244
860310203900.00	U 1	1130.64984	2939.39153	-6136.98301	4.39315	5.22816	3.31586
860310204000.00	U 1	1391.58631	3246.45583	-5924.78111	4.30157	5.00358	3.75499
860310204100.00	U 1	1646.46292	3539.38334	-5686.70785	4.19122	4.75710	4.17793
860310204200.00	U 1	1894.16642	3816.89115	-5423.79105	4.06255	4.48977	4.58281
860310204300.00	U 1	2133.61347	4077.76177	-5137.16726	3.91610	4.20273	4.96787
860310204400.00	U 1	2363.75539	4320.84855	-4828.07726	3.75249	3.89719	5.33141
860310204500.00	U 1	2583.58271	4545.08077	-4497.86099	3.57241	3.57447	5.67182
860310204600.00	U 1	2792.12981	4749.46861	-4147.95203	3.37661	3.23595	5.98759
860310204700.00	U 1	2988.47906	4933.10761	-3779.87181	3.16596	2.88309	6.27730
860310204800.00	U 1	3171.76510	5095.18295	-3395.22314	2.94133	2.51742	6.53966
860310204900.00	U 1	3341.17880	5234.97332	-2995.68349	2.70371	2.14053	6.77348
860310205000.00	U 1	3495.97097	5351.85441	-2582.99776	2.45412	1.75405	6.97770
860310205100.00	U 1	3635.45593	5445.30197	-2158.97083	2.19366	1.35969	7.15137
860310205200.00	U 1	3759.01472	5514.89448	-1725.45960	1.92344	0.95918	7.29372
860310205300.00	U 1	3866.09805	5560.31530	-1284.36488	1.64467	0.55427	7.40406
860310205400.00	U 1	3956.22900	5581.35442	-837.62288	1.35857	0.14675	7.48189
860310205500.00	U 1	4029.00531	5577.90960	-387.19655	1.06640	-0.26156	7.52682
860310205600.00	U 1	4084.10135	5549.98709	64.93325	0.76945	-0.66887	7.53864
860310205700.00	U 1	4121.26973	5497.70175	516.77678	0.46903	-1.07336	7.51728
860310205800.00	U 1	4140.34249	5421.27668	966.34442	0.16648	-1.47323	7.46281
860310205900.00	U 1	4141.23196	5321.04227	1411.65579	-0.13685	-1.86671	7.37545
860310210000.00	U 1	4123.93119	5197.43479	1850.74868	-0.43963	-2.25204	7.25560
860310210100.00	U 1	4088.51396	5050.99443	2281.68806	-0.74051	-2.62752	7.10377
860310210200.00	U 1	4035.13448	4882.36280	2702.57481	-1.03815	-2.99148	6.92064
860310210300.00	U 1	3964.02664	4692.28006	3111.55433	-1.33124	-3.34229	6.70701
860310210400.00	U 1	3875.50291	4481.58149	3506.82488	-1.61847	-3.67842	6.46384
860310210500.00	U 1	3769.95290	4251.19365	3886.64571	-1.89857	-3.99836	6.19221
860310210600.00	U 1	3647.84149	4002.13014	4249.34481	-2.17031	-4.30071	5.89333
860310210700.00	U 1	3509.70669	3735.48695	4593.32635	-2.43249	-4.58413	5.56852
860310210800.00	U 1	3356.15716	3452.43743	4917.07776	-2.68395	-4.84739	5.21924
860310210900.00	U 1	3187.86932	3154.22693	5219.17628	-2.92359	-5.08932	4.84703
860310211000.00	U 1	3005.58432	2842.16720	5498.29521	-3.15035	-5.30886	4.45353
860310211100.00	U 1	2810.10461	2517.63040	5753.20957	-3.36325	-5.50507	4.04050
860310211200.00	U 1	2602.29030	2182.04304	5982.80135	-3.56135	-5.67708	3.60976
860310211300.00	U 1	2383.05533	1836.87959	6186.06421	-3.74380	-5.82416	3.16320
860310211400.00	U 1	2153.36335	1483.65597	6362.10771	-3.90979	-5.94566	2.70278
860310211500.00	U 1	1914.22352	1123.92299	6510.16104	-4.05862	-6.04106	2.23053
860310211600.00	U 1	1666.68598	759.25941	6629.57621	-4.18962	-6.10995	1.74852
860310211700.00	U 1	1411.83740	391.26531	6719.83072	-4.30223	-6.15204	1.25886

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TIME	ID	POSITION VECTOR X	POSITION VECTOR Y	POSITION VECTOR Z	VELOCITY VECTOR X	VELOCITY VECTOR Y	VELOCITY VECTOR Z
860310211800.00	U 1	1150.79614	21.55498	6780.52977	-4.39596	-6.16714	0.76370
860310211900.00	U 1	884.70747	-348.24995	6811.40786	-4.47041	-6.15519	0.26519
860310212000.00	U 2	613.61727	-719.79639	6811.61988	-4.52616	-6.11585	-0.23793
860310212100.00	U 2	340.90049	-1084.90026	6782.37313	-4.56108	-6.04983	-0.73661
860310212200.00	U 2	66.68832	-1445.24491	6723.29114	-4.57599	-5.95727	-1.23207
860310212300.00	U 2	-207.81628	-1799.24926	6634.63225	-4.57082	-5.83856	-1.72215
860310212400.00	U 2	-481.40892	-2145.35973	6516.78426	-4.54560	-5.69423	-2.20469
860310212500.00	U 2	-752.88899	-2482.05694	6370.26278	-4.50043	-5.52490	-2.67758
860310212600.00	U 2	-1021.06485	-2807.86228	6195.70909	-4.43550	-5.33130	-3.13875
860310212700.00	U 2	-1284.75900	-3121.34442	5993.88757	-4.35109	-5.11427	-3.58618
860310212800.00	U 2	-1542.81324	-3421.12552	5765.68245	-4.24757	-4.87476	-4.01788
860310212900.00	U 2	-1794.09372	-3705.88733	5512.09419	-4.12538	-4.61381	-4.43197
860310213000.00	U 2	-2037.49595	-3974.37707	5234.23521	-3.98505	-4.33256	-4.82661
860310213100.00	U 2	-2271.94973	-4225.41303	4933.32525	-3.82721	-4.03223	-5.20005
860310213200.00	U 2	-2496.42388	-4457.88989	4610.68610	-3.65252	-3.71415	-5.55065
860310213300.00	U 2	-2709.93088	-4670.78378	4267.73593	-3.46177	-3.37971	-5.87683
860310213400.00	U 2	-2911.53135	-4863.15691	3905.98312	-3.25578	-3.03038	-6.17717
860310213500.00	U 2	-3100.33824	-5034.16192	3527.01963	-3.03547	-2.66770	-6.45031
860310213600.00	U 2	-3275.52091	-5183.04578	3132.51405	-2.80181	-2.29328	-6.69505
860310213700.00	U 2	-3436.30894	-5309.15330	2724.20412	-2.55583	-1.90877	-6.91029
860310213800.00	U 2	-3581.99557	-5411.93018	2303.88902	-2.29862	-1.51588	-7.09507
860310213900.00	U 2	-3711.94107	-5490.92560	1873.42129	-2.03132	-1.11635	-7.24858
860310214000.00	U 2	-3825.57559	-5545.79431	1434.69848	-1.75512	-0.71195	-7.37014
860310214100.00	U 2	-3922.40184	-5576.29830	989.65452	-1.47125	-0.30449	-7.45921
860310214200.00	U 2	-4001.99735	-5582.30779	540.25097	-1.18097	0.10423	-7.51541
860310214300.00	U 2	-4064.01638	-5563.80190	88.46800	-0.88558	0.51239	-7.53850
860310214400.00	U 2	-4108.19145	-5520.86856	-363.70457	-0.58640	0.91818	-7.52839
860310214500.00	U 2	-4134.33449	-5453.70409	-814.27642	-0.28474	1.31980	-7.48516
860310214600.00	U 2	-4142.33756	-5362.61208	-1261.26575	0.01805	1.71547	-7.40902
860310214700.00	U 2	-4132.17319	-5248.00186	-1702.70824	0.32062	2.10345	-7.30034
860310214800.00	U 2	-4103.89433	-5110.38642	-2136.66595	0.62164	2.48203	-7.15963
860310214900.00	U 2	-4057.63390	-4950.37986	-2561.23595	0.91978	2.84955	-6.98754
860310215000.00	U 2	-3993.60398	-4768.69439	-2974.55873	1.21374	3.20439	-6.78486
860310215100.00	U 2	-3912.09460	-4566.13689	-3374.82644	1.50222	3.54503	-6.55253
860310215200.00	U 2	-3813.47228	-4343.60504	-3760.29072	1.78396	3.86997	-6.29160
860310215300.00	U 2	-3698.17810	-4102.08312	-4129.27027	2.05775	4.17780	-6.00325
860310215400.00	U 2	-3566.72558	-3842.63739	-4480.15807	2.32238	4.46721	-5.68877
860310215500.00	U 2	-3419.69820	-3566.41120	-4811.42814	2.57672	4.73695	-5.34957
860310215600.00	U 2	-3257.74661	-3274.61972	-5121.64200	2.81968	4.98587	-4.98716
860310215700.00	U 2	-3081.58563	-2968.54447	-5409.45457	3.05020	5.21291	-4.60313
860310215800.00	U 2	-2891.99097	-2649.52757	-5673.61978	3.26731	5.41711	-4.19920
860310215900.00	U 2	-2689.79568	-2318.96579	-5912.99553	3.47007	5.59760	-3.77712
860310220000.00	U 2	-2475.88645	-1978.30438	-6126.54833	3.65763	5.75364	-3.33875
860310220100.00	U 2	-2251.19971	-1629.03085	-6313.35733	3.82920	5.88457	-2.88598
860310220200.00	U 2	-2016.71747	-1272.66850	-6472.61797	3.98403	5.98986	-2.42080
860310220300.00	U 2	-1773.46314	-910.76997	-6603.64503	4.12150	6.06905	-1.94520
860310220400.00	U 2	-1522.49710	-544.91066	-6705.87529	4.24100	6.12184	-1.46125
860310220500.00	U 2	-1264.91225	-176.68211	-6778.86962	4.34205	6.14800	-0.97102
860310220600.00	U 2	-1001.82940	192.31462	-6822.31465	4.42420	6.14743	-0.47663
860310220700.00	U 2	-734.39256	560.47563	-6836.02395	4.48713	6.12015	0.01981
860310220800.00	U 2	-463.76423	926.20078	-6819.93867	4.53055	6.06627	0.51617

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TIME	ID	POSITION VECTOR X	POSITION VECTOR Y	POSITION VECTOR Z	VELOCITY VECTOR X	VELOCITY VECTOR Y	VELOCITY VECTOR Z
860310220900.00	U 2	-191.12055	1287.90038	-6774.12782	4.55428	5.98601	1.01031
860310221000.00	U 2	82.35355	1644.00169	-6698.78796	4.55822	5.87972	1.50012
860310221100.00	U 2	355.46924	1992.95552	-6594.24251	4.54234	5.74785	1.98348
860310221200.00	U 2	627.03877	2333.24267	-6460.94053	4.50670	5.59094	2.45832
860310221300.00	U 2	895.88034	2663.38028	-6299.45502	4.45144	5.40965	2.92260
860310221400.00	U 2	1160.82315	2981.92814	-6110.48076	4.37678	5.20475	3.37429
860310221500.00	U 2	1420.71224	3287.49480	-5894.83166	4.28304	4.97709	3.81143
860310221600.00	U 2	1674.41347	3578.74359	-5653.43758	4.17059	4.72765	4.23214
860310221700.00	U 2	1920.81834	3854.39836	-5387.34074	4.03991	4.45748	4.63456
860310221800.00	U 2	2158.84878	4113.24918	-5097.69155	3.89154	4.16772	5.01693
860310221900.00	U 2	2387.46189	4354.15765	-4785.74403	3.72611	3.85961	5.37756
860310222000.00	U 2	2605.65446	4576.06205	-4452.85079	3.54431	3.53448	5.71486
860310222100.00	U 2	2812.46757	4777.98220	-4100.45737	3.34693	3.19371	6.02733
860310222200.00	U 2	3006.99074	4959.02396	-3730.09639	3.13479	2.83878	6.31356
860310222300.00	U 2	3188.36620	5118.38344	-3343.38107	2.90883	2.47123	6.57227
860310222400.00	U 2	3355.79278	5255.35086	-2941.99839	2.67000	2.09265	6.80228
860310222500.00	U 2	3508.52966	5369.31396	-2527.70191	2.41935	1.70470	7.00256
860310222600.00	U 2	3645.89983	5459.76105	-2102.30410	2.15796	1.30907	7.17219
860310222700.00	U 2	3767.29335	5526.28360	-1667.66851	1.88699	0.90751	7.31037
860310222800.00	U 2	3872.17022	5568.57832	-1225.70145	1.60761	0.50177	7.41647
860310222900.00	U 2	3960.06301	5586.44881	-778.34354	1.32106	0.09366	7.48999
860310223000.00	U 2	4030.57913	5579.80668	-327.56103	1.02860	-0.31501	7.53058
860310223100.00	U 2	4083.40275	5548.67218	124.66312	0.73153	-0.72245	7.53803
860310223200.00	U 2	4118.29632	5493.17422	576.33816	0.43115	-1.12683	7.51228
860310223300.00	U 2	4135.10181	5413.55000	1025.47461	0.12881	-1.52636	7.45344
860310223400.00	U 2	4133.74143	5310.14398	1470.09336	-0.17415	-1.91926	7.36174
860310223500.00	U 2	4114.21810	5183.40646	1908.23462	-0.47639	-2.30379	7.23760
860310223600.00	U 2	4076.61542	5033.89146	2337.96689	-0.77657	-2.67823	7.08155
860310223700.00	U 2	4021.09728	4862.25434	2757.39573	-1.07335	-3.04092	6.89428
860310223800.00	U 2	3947.90717	4669.24868	3164.67235	-1.36542	-3.39025	6.67662
860310223900.00	U 2	3857.36692	4455.72291	3558.00201	-1.65148	-3.72467	6.42955
860310224000.00	U 2	3749.87529	4222.61632	3935.65203	-1.93026	-4.04270	6.15416
860310224100.00	U 2	3625.90600	3970.95477	4295.95959	-2.20053	-4.34294	5.85168
860310224200.00	U 2	3486.00556	3701.84598	4637.33907	-2.46110	-4.62406	5.52346
860310224300.00	U 2	3330.79068	3416.47439	4958.28909	-2.71083	-4.88483	5.17095
860310224400.00	U 2	3160.94543	3116.09586	5257.39900	-2.94860	-5.12411	4.79573
860310224500.00	U 2	2977.21807	2802.03190	5533.35503	-3.17339	-5.34085	4.39944
860310224600.00	U 2	2780.41763	2475.66379	5784.94591	-3.38421	-5.53410	3.98385
860310224700.00	U 2	2571.41029	2138.42637	6011.06806	-3.58014	-5.70303	3.55080
860310224800.00	U 2	2351.11543	1791.80169	6210.73022	-3.76033	-5.84690	3.10218
860310224900.00	U 2	2120.50159	1437.31250	6383.05765	-3.92398	-5.96508	2.63997
860310225000.00	U 2	1880.58217	1076.51552	6527.29575	-4.07040	-6.05708	2.16621
860310225100.00	U 2	1632.41095	710.99462	6642.81324	-4.19894	-6.12249	1.68297
860310225200.00	U 2	1377.07757	342.35405	6729.10473	-4.30905	-6.16103	1.19237
860310225300.00	U 2	1115.70272	-27.78861	6785.79282	-4.40025	-6.17254	0.69655
860310225400.00	U 2	849.43336	-397.80944	6812.62966	-4.47215	-6.15697	0.19769
860310225500.00	U 3	579.68641	-766.14119	6809.55120	-4.52449	-6.11421	-0.30188
860310225600.00	U 3	307.14403	-1131.04504	6776.47493	-4.55693	-6.04480	-0.80027
860310225700.00	U 3	33.25434	-1490.98714	6713.58943	-4.56938	-5.94888	-1.29515
860310225800.00	U 3	-240.78111	-1844.38813	6621.16985	-4.56179	-5.82685	-1.78438
860310225900.00	U 3	-513.76000	-2189.69703	6499.62056	-4.53418	-5.67924	-2.26579

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TIME	ID	POSITION VECTOR X	POSITION VECTOR Y	POSITION VECTOR Z	VELOCITY VECTOR X	VELOCITY VECTOR Y	VELOCITY VECTOR Z
860310230000.00	U 3	-784.48443	-2525.39791	6349.47351	-4.48667	-5.50669	-2.73729
860310230100.00	U 3	-1051.76612	-2850.01653	6171.38607	-4.41946	-5.30996	-3.19680
860310230200.00	U 3	-1314.43155	-3162.12672	5966.13822	-4.33285	-5.08990	-3.64230
860310230300.00	U 3	-1571.32709	-3460.35668	5734.62938	-4.22720	-4.84746	-4.07184
860310230400.00	U 3	-1821.32410	-3743.39498	5477.87457	-4.10298	-4.58369	-4.48352
860310230500.00	U 3	-2063.32379	-4009.99641	5197.00020	-3.96072	-4.29976	-4.87553
860310230600.00	U 3	-2296.26219	-4258.98756	4893.23929	-3.80105	-3.99690	-5.24613
860310230700.00	U 3	-2519.11483	-4489.27209	4567.92619	-3.62465	-3.67643	-5.59367
860310230800.00	U 3	-2730.90133	-4699.83571	4222.49089	-3.43231	-3.33978	-5.91662
860310230900.00	U 3	-2930.68988	-4889.75089	3858.45280	-3.22487	-2.98841	-6.21353
860310231000.00	U 3	-3117.60142	-5058.18111	3477.41411	-3.00323	-2.62387	-6.48309
860310231100.00	U 3	-3290.81373	-5204.38475	3081.05271	-2.76839	-2.24779	-6.72410
860310231200.00	U 3	-3449.56514	-5327.71858	2671.11472	-2.52138	-1.86183	-6.93548
860310231300.00	U 3	-3593.15809	-5427.64076	2249.40664	-2.26330	-1.46769	-7.11629
860310231400.00	U 3	-3720.96230	-5503.71332	1817.78724	-1.99529	-1.06714	-7.26574
860310231500.00	U 3	-3832.41769	-5555.60423	1378.15907	-1.71854	-0.66194	-7.38315
860310231600.00	U 3	-3927.03686	-5583.08886	932.45985	-1.43429	-0.25389	-7.46803
860310231700.00	U 3	-4004.40736	-5586.05101	482.65368	-1.14380	0.15518	-7.52000
860310231800.00	U 3	-4064.19346	-5564.48332	30.72204	-0.84836	0.56346	-7.53886
860310231900.00	U 3	-4106.13760	-5518.48726	-421.34511	-0.54928	0.96916	-7.52452
860310232000.00	U 3	-4130.06151	-5448.27251	-871.55845	-0.24791	1.37046	-7.47709
860310232100.00	U 3	-4135.86685	-5354.15593	-1317.93822	0.05444	1.76559	-7.39679
860310232200.00	U 3	-4123.53559	-5236.55991	-1758.52318	0.35643	2.15282	-7.28400
860310232300.00	U 3	-4093.12989	-5096.01034	-2191.37944	0.65670	2.53043	-7.13926
860310232400.00	U 3	-4044.79166	-4933.13401	-2614.60906	0.95396	2.89677	-6.96324
860310232500.00	U 3	-3978.74179	-4748.65555	-3026.35854	1.24688	3.25024	-6.75674
860310232600.00	U 3	-3895.27889	-4543.39399	-3424.82700	1.53418	3.58929	-6.52071
860310232700.00	U 3	-3794.77778	-4318.25880	-3808.27401	1.81461	3.91245	-6.25621
860310232800.00	U 3	-3677.68759	-4074.24563	-4175.02720	2.08695	4.21833	-5.96445
860310232900.00	U 3	-3544.52955	-3812.43160	-4523.48940	2.35001	4.50560	-5.64674
860310233000.00	U 3	-3395.89446	-3533.97032	-4852.14538	2.60266	4.77304	-5.30449
860310233100.00	U 3	-3232.43986	-3240.08663	-5159.56823	2.84382	5.01950	-4.93923
860310233200.00	U 3	-3054.88700	-2932.07101	-5444.42523	3.07244	5.24394	-4.55257
860310233300.00	U 3	-2864.01750	-2611.27384	-5705.48329	3.28755	5.44540	-4.14622
860310233400.00	U 3	-2660.66980	-2279.09938	-5941.61392	3.48823	5.62305	-3.72196
860310233500.00	U 3	-2445.73543	-1936.99969	-6151.79776	3.67363	5.77613	-3.28165
860310233600.00	U 3	-2220.15507	-1586.46826	-6335.12855	3.84297	5.90401	-2.82719
860310233700.00	U 3	-1984.91446	-1229.03367	-6490.81670	3.99553	6.00615	-2.36056
860310233800.00	U 3	-1741.04013	-866.25301	-6618.19232	4.13066	6.08215	-1.88378
860310233900.00	U 3	-1489.59504	-499.70540	-6716.70780	4.24780	6.13168	-1.39890
860310234000.00	U 3	-1231.67407	-130.98527	-6785.93986	4.34645	6.15454	-0.90801
860310234100.00	U 3	-968.39944	238.30423	-6825.59116	4.42619	6.15065	-0.41323
860310234200.00	U 3	-700.91597	606.55791	-6835.49141	4.48669	6.12003	0.08334
860310234300.00	U 3	-430.38640	972.17517	-6815.59798	4.52769	6.06280	0.57954
860310234400.00	U 3	-157.98650	1333.56666	-6765.99611	4.54901	5.97922	1.07326
860310234500.00	U 3	115.09975	1689.16083	-6686.89854	4.55056	5.86962	1.56238
860310234600.00	U 3	387.68509	2037.41049	-6578.64474	4.53232	5.73448	2.04479
860310234700.00	U 3	658.58390	2376.79922	-6441.69965	4.49436	5.57436	2.51841
860310234800.00	U 3	926.61716	2705.84779	-6276.65191	4.43683	5.38993	2.98121
860310234900.00	U 3	1190.61735	3023.12039	-6084.21166	4.35997	5.18197	3.43117
860310235000.00	U 3	1449.43340	3327.23075	-5865.20776	4.26409	4.95135	3.86634

PREDICTED STATE VECTOR DATA REPORT (CON.)

TIME	ID	POSITION VECTOR X	POSITION VECTOR Y	POSITION VECTOR Z	VELOCITY VECTOR X	VELOCITY VECTOR Y	VELOCITY VECTOR Z
860310235100.00	U 3	1701.93561	3616.84814	-5620.58465	4.14958	4.69904	4.28483
860310235200.00	U 3	1947.02042	3890.70312	-5351.39862	4.01693	4.42612	4.68480
860310235300.00	U 3	2183.61526	4147.59317	-5058.81365	3.86668	4.13374	5.06451
860310235400.00	U 3	2410.68318	4386.38805	-4744.09675	3.69948	3.82316	5.42226
860310235500.00	U 3	2627.22748	4606.03484	-4408.61284	3.51602	3.49570	5.75648
860310235600.00	U 3	2832.29614	4805.56288	-4053.81911	3.31709	3.15278	6.06568
860310235700.00	U 3	3024.98609	4984.08816	-3681.25904	3.10354	2.79586	6.34847
860310235800.00	U 3	3204.44738	5140.81752	-3292.55589	2.87630	2.42651	6.60358
860310235900.00	U 3	3369.88706	5275.05247	-2889.40584	2.63633	2.04632	6.82986
860310240000.00	U 3	3520.57290	5386.19254	-2473.57063	2.38468	1.65696	7.02626

PREDICTED ONE-WAY DOPPLER DATA COVERING THE TIME INTERVAL FROM 860310120000.00 THROUGH 860310200000.00

OBS. TYPE	TDRS ID	FORWARD LINK STATION ID	ASSOCIATED TIME	DOPPLER OBSERVATION
1	7	10	860310132910.00	0.78200405D+04
1	7	10	860310132920.00	0.79459892D+04
1	7	10	860310132930.00	0.80706214D+04
1	7	10	860310132940.00	0.81939122D+04
1	7	10	860310132950.00	0.83158371D+04
1	7	10	860310133000.00	0.84363715D+04
1	7	10	860310133010.00	0.85554913D+04
1	7	10	860310133020.00	0.86731727D+04
1	7	10	860310133030.00	0.87893922D+04
1	7	10	860310133040.00	0.89041265D+04
1	7	10	860310133050.00	0.90173525D+04
1	7	10	860310133100.00	0.91290477D+04
1	7	10	860310133110.00	0.92391897D+04
1	7	10	860310133120.00	0.93477564D+04
1	7	10	860310133130.00	0.94547261D+04
1	7	10	860310133140.00	0.95600774D+04
1	7	10	860310133150.00	0.96637892D+04
1	7	10	860310133200.00	0.97658409D+04
1	7	10	860310133210.00	0.98662121D+04
1	7	10	860310133220.00	0.99648826D+04
1	7	10	860310133230.00	0.10061833D+05
1	7	10	860310133240.00	0.10157043D+05
1	7	10	860310133250.00	0.10250495D+05
1	7	10	860310133300.00	0.10342169D+05
1	7	10	860310133310.00	0.10432047D+05
1	7	10	860310133320.00	0.10520111D+05
1	7	10	860310133330.00	0.10606342D+05
1	7	10	860310133340.00	0.10690723D+05
1	7	10	860310133350.00	0.10773236D+05
1	7	10	860310133400.00	0.10853863D+05
1	7	10	860310133410.00	0.10932605D+05
1	7	10	860310133420.00	0.11009423D+05
1	7	10	860310133430.00	0.11084312D+05
1	7	10	860310133440.00	0.11157255D+05
1	7	10	860310133450.00	0.11228237D+05
1	7	10	860310133500.00	0.11297244D+05
1	7	10	860310133510.00	0.11364262D+05
1	7	10	860310133520.00	0.11429278D+05
1	7	10	860310133530.00	0.11492278D+05
1	7	10	860310133540.00	0.11553249D+05
1	7	10	860310133550.00	0.11612178D+05
1	7	10	860310133600.00	0.11669054D+05
1	7	10	860310133610.00	0.11723864D+05
1	7	10	860310133620.00	0.11776598D+05
1	7	10	860310133630.00	0.11827244D+05
1	7	10	860310133640.00	0.11875791D+05
1	7	10	860310133650.00	0.11922230D+05
1	7	10	860310133700.00	0.11966550D+05
1	7	10	860310133710.00	0.12008742D+05
1	7	10	860310133720.00	0.12048797D+05
1	7	10	860310133730.00	0.12086706D+05
1	7	10	860310133740.00	0.12122460D+05
1	7	10	860310133750.00	0.12156053D+05

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OBS. TYPE	TDRS ID	FORWARD LINK STATION ID	ASSOCIATED TIME	DOPPLER OBSERVATION
1	7	10	860310133800.00	0.12187475D+05
1	7	10	860310133810.00	0.12216721D+05
1	7	10	860310133820.00	0.12243782D+05
1	7	10	860310133830.00	0.12268654D+05
1	7	10	860310133840.00	0.12291329D+05
1	7	10	860310133850.00	0.12311802D+05
1	7	10	860310133900.00	0.12330069D+05
1	7	10	860310132910.00	0.78200405D+04
1	7	10	860310132920.00	0.79459892D+04
1	7	10	860310132930.00	0.80706214D+04
1	7	10	860310132940.00	0.81939122D+04
1	7	10	860310132950.00	0.83158371D+04
1	7	10	860310133000.00	0.84363715D+04
1	7	10	860310133010.00	0.85554913D+04
1	7	10	860310133020.00	0.86731727D+04
1	7	10	860310133030.00	0.87893922D+04
1	7	10	860310133040.00	0.89041265D+04
1	7	10	860310133050.00	0.90173525D+04
1	7	10	860310133910.00	0.12346123D+05
1	7	10	860310133920.00	0.12359960D+05
1	7	10	860310133930.00	0.12371577D+05
1	7	10	860310133940.00	0.12380969D+05
1	7	10	860310133950.00	0.12388133D+05
1	7	10	860310134000.00	0.12393067D+05
1	7	10	860310134010.00	0.12395767D+05
1	7	10	860310134020.00	0.12396231D+05
1	7	10	860310134030.00	0.12394457D+05
1	7	10	860310134040.00	0.12390445D+05
1	7	10	860310134050.00	0.12384192D+05
1	7	10	860310134100.00	0.12375698D+05
1	7	10	860310134110.00	0.12364963D+05
1	7	10	860310134120.00	0.12351987D+05
1	7	10	860310134130.00	0.12336769D+05
1	7	10	860310134140.00	0.12319311D+05
1	7	10	860310134150.00	0.12299614D+05
1	7	10	860310134200.00	0.12277678D+05
1	7	10	860310134210.00	0.12253507D+05
1	7	10	860310134220.00	0.12227102D+05
1	7	10	860310134230.00	0.12198466D+05
1	7	10	860310134240.00	0.12167600D+05
1	7	10	860310134250.00	0.12134510D+05
1	7	10	860310134300.00	0.12099198D+05
1	7	10	860310150310.00	0.27287904D+05
1	7	10	860310150320.00	0.27329962D+05
1	7	10	860310150330.00	0.27368335D+05
1	7	10	860310150340.00	0.27403020D+05
1	7	10	860310150350.00	0.27434016D+05
1	7	10	860310150400.00	0.27461321D+05
1	7	10	860310150410.00	0.27484933D+05
1	7	10	860310150420.00	0.27504853D+05
1	7	10	860310150430.00	0.27521081D+05
1	7	10	860310150440.00	0.27533617D+05
1	7	10	860310150450.00	0.27542462D+05
1	7	10	860310150500.00	0.27547617D+05
1	7	10	860310150510.00	0.27549086D+05

OBS. TYPE	TDRS ID	FORWARD LINK STATION ID	ASSOCIATED TIME	DOPPLER OBSERVATION
1	7	10	860310150520.00	0.27546870D+05
1	7	10	860310150530.00	0.27540972D+05
1	7	10	860310150540.00	0.27531395D+05
1	7	10	860310150550.00	0.27518145D+05
1	7	10	860310150600.00	0.27501224D+05
1	7	10	860310150610.00	0.27480639D+05
1	7	10	860310150620.00	0.27456394D+05
1	7	10	860310150630.00	0.27428495D+05
1	7	10	860310150640.00	0.27396948D+05
1	7	10	860310150650.00	0.27361761D+05
1	7	10	860310150700.00	0.27322939D+05
1	7	10	860310150710.00	0.27280491D+05
1	7	10	860310150720.00	0.27234425D+05
1	7	10	860310150730.00	0.27184749D+05
1	7	10	860310150740.00	0.27131472D+05
1	7	10	860310150750.00	0.27074602D+05
1	7	10	860310150800.00	0.27014151D+05
1	7	10	860310150810.00	0.26950128D+05
1	7	10	860310150820.00	0.26882542D+05
1	7	10	860310150830.00	0.26811406D+05
1	7	10	860310150840.00	0.267367300D+05
1	7	10	860310150850.00	0.26658527D+05
1	7	10	860310150900.00	0.26576807D+05
1	7	10	860310150910.00	0.26491584D+05
1	7	10	860310150920.00	0.26402869D+05
1	7	10	860310150930.00	0.26310678D+05
1	7	10	860310150940.00	0.26215022D+05
1	7	10	860310150950.00	0.26115916D+05
1	7	10	860310151000.00	0.26013374D+05
1	7	10	860310151010.00	0.25907410D+05
1	7	10	860310151020.00	0.25798040D+05
1	7	10	860310151030.00	0.25685278D+05
1	7	10	860310151040.00	0.25569141D+05
1	7	10	860310151050.00	0.25449644D+05
1	7	10	860310151100.00	0.25326804D+05
1	7	10	860310151110.00	0.25200637D+05
1	7	10	860310151120.00	0.25071160D+05
1	7	10	860310151130.00	0.24938390D+05
1	7	10	860310151140.00	0.24802345D+05
1	7	10	860310151150.00	0.24663043D+05
1	7	10	860310151200.00	0.24520502D+05
1	7	10	860310151210.00	0.24374740D+05
1	7	10	860310151220.00	0.24225776D+05
1	7	10	860310151230.00	0.24073629D+05
1	7	10	860310151240.00	0.23918319D+05
1	7	10	860310151250.00	0.23759864D+05
1	7	10	860310151300.00	0.23598286D+05
1	7	10	860310151310.00	0.23433604D+05
1	7	10	860310151320.00	0.23265839D+05
1	7	10	860310151330.00	0.23095011D+05
1	7	10	860310151340.00	0.22921142D+05
1	7	10	860310151350.00	0.22744252D+05
1	7	10	860310151400.00	0.22564364D+05
1	7	10	860310151410.00	0.22381498D+05
1	7	10	860310151420.00	0.22195678D+05

OBS. TYPE	TDRS ID	FORWARD LINK STATION ID	ASSOCIATED TIME	DOPPLER OBSERVATION
1	7	10	860310151430.00	0.22006925D+05
1	7	10	860310151440.00	0.21815262D+05
1	7	10	860310151450.00	0.21620711D+05
1	7	10	860310151500.00	0.21423296D+05
1	7	10	860310151510.00	0.21223040D+05
1	7	10	860310151520.00	0.21019967D+05
1	7	10	860310151530.00	0.20814099D+05
1	7	10	860310151540.00	0.20605462D+05
1	7	10	860310151550.00	0.20394079D+05
1	7	10	860310151600.00	0.20179974D+05
1	7	10	860310151610.00	0.19963173D+05
1	7	10	860310151620.00	0.19743700D+05
1	7	10	860310151630.00	0.19521581D+05
1	7	10	860310151640.00	0.19296839D+05
1	7	10	860310151650.00	0.19069502D+05
1	7	10	860310151700.00	0.18839594D+05
1	7	10	860310151710.00	0.18607142D+05
1	7	10	860310151720.00	0.18372171D+05
1	7	10	860310151730.00	0.18134708D+05
1	7	10	860310151740.00	0.17894779D+05
1	7	10	860310151750.00	0.17652412D+05
1	7	10	860310151800.00	0.17407632D+05
1	7	10	860310151810.00	0.17160467D+05
1	7	10	860310151820.00	0.16910944D+05
1	7	10	860310151830.00	0.16659091D+05
1	7	10	860310151840.00	0.16404934D+05
1	7	10	860310151850.00	0.16148503D+05
1	7	10	860310151900.00	0.15889824D+05
1	7	10	860310163910.00	0.41740056D+05
1	7	10	860310163920.00	0.41637827D+05
1	7	10	860310163930.00	0.41530668D+05
1	7	10	860310163940.00	0.41418603D+05
1	7	10	860310163950.00	0.41301660D+05
1	7	10	860310164000.00	0.41179867D+05
1	7	10	860310164010.00	0.41053251D+05
1	7	10	860310164020.00	0.40921840D+05
1	7	10	860310164030.00	0.40785662D+05
1	7	10	860310164040.00	0.40644746D+05
1	7	10	860310164050.00	0.40499120D+05
1	7	10	860310164100.00	0.40348813D+05
1	7	10	860310164110.00	0.40193856D+05
1	7	10	860310164120.00	0.40034277D+05
1	7	10	860310164130.00	0.39870107D+05
1	7	10	860310164140.00	0.39701375D+05
1	7	10	860310164150.00	0.39528112D+05
1	7	10	860310164200.00	0.39350349D+05
1	7	10	860310164210.00	0.39168116D+05
1	7	10	860310164220.00	0.38981445D+05
1	7	10	860310164230.00	0.38790367D+05
1	7	10	860310164240.00	0.38594913D+05
1	7	10	860310164250.00	0.38395116D+05
1	7	10	860310164300.00	0.38191007D+05
1	7	10	860310164310.00	0.37982618D+05
1	7	10	860310164320.00	0.37769983D+05
1	7	10	860310164330.00	0.37553132D+05

OBS. TYPE	TDRS ID	FORWARD LINK STATION ID	ASSOCIATED TIME	DOPPLER OBSERVATION
1	7	10	860310164340.00	0.37332100D+05
1	7	10	860310164350.00	0.37106919D+05
1	7	10	860310164400.00	0.36877623D+05
1	7	10	860310164410.00	0.36644244D+05
1	7	10	860310164420.00	0.36406816D+05
1	7	10	860310164430.00	0.36165373D+05
1	7	10	860310164440.00	0.35919948D+05
1	7	10	860310164450.00	0.35670576D+05
1	7	10	860310164500.00	0.35417290D+05
1	7	10	860310164510.00	0.35160125D+05
1	7	10	860310164520.00	0.34899115D+05
1	7	10	860310164530.00	0.34634295D+05
1	7	10	860310164540.00	0.34365700D+05
1	7	10	860310164550.00	0.34093364D+05
1	7	10	860310164600.00	0.33817322D+05
1	7	10	860310164610.00	0.33537609D+05
1	7	10	860310164620.00	0.33254261D+05
1	7	10	860310164630.00	0.32967313D+05
1	7	10	860310164640.00	0.32676800D+05
1	7	10	860310164650.00	0.32382758D+05
1	7	10	860310164700.00	0.32085222D+05
1	7	10	860310164710.00	0.31784229D+05
1	7	10	860310164720.00	0.31479814D+05
1	7	10	860310164730.00	0.31172014D+05
1	7	10	860310164740.00	0.30860863D+05
1	7	10	860310164750.00	0.30546399D+05
1	7	10	860310164800.00	0.30228658D+05
1	7	10	860310164810.00	0.29907677D+05
1	7	10	860310164820.00	0.29583491D+05
1	7	10	860310164830.00	0.29256137D+05
1	7	10	860310164840.00	0.28925653D+05
1	7	10	860310164850.00	0.28592074D+05
1	7	10	860310164900.00	0.28255438D+05
1	7	10	860310164910.00	0.27915782D+05
1	7	10	860310164920.00	0.27573143D+05
1	7	10	860310164930.00	0.27227557D+05
1	7	10	860310164940.00	0.26879062D+05
1	7	10	860310164950.00	0.26527696D+05
1	7	10	860310165000.00	0.26173495D+05
1	7	10	860310165010.00	0.25816498D+05
1	7	10	860310165020.00	0.25456741D+05
1	7	10	860310165030.00	0.25094262D+05
1	7	10	860310165040.00	0.24729099D+05
1	7	10	860310165050.00	0.24361290D+05
1	7	10	860310165100.00	0.23990872D+05
1	7	10	860310165110.00	0.23617883D+05
1	7	10	860310165120.00	0.23242361D+05
1	7	10	860310165130.00	0.22864345D+05
1	7	10	860310165140.00	0.22483871D+05
1	7	10	860310165150.00	0.22100979D+05
1	7	10	860310165200.00	0.21715707D+05
1	7	10	860310165210.00	0.21328092D+05
1	7	10	860310165220.00	0.20938174D+05
1	7	10	860310165230.00	0.20545989D+05
1	7	10	860310165240.00	0.20151578D+05

OBS. TYPE	TDRS ID	FORWARD LINK STATION ID	ASSOCIATED TIME	DOPPLER OBSERVATION
1	7	10	860310165250.00	0.19754978D+05
1	7	10	860310165300.00	0.19356227D+05
1	7	10	860310165310.00	0.18955365D+05
1	7	10	860310165320.00	0.18552430D+05
1	7	10	860310165330.00	0.18147461D+05
1	7	10	860310165340.00	0.17740497D+05
1	7	10	860310165350.00	0.17331575D+05
1	7	10	860310165400.00	0.16920736D+05
1	7	10	860310165410.00	0.16508017D+05
1	7	10	860310165420.00	0.16093459D+05
1	7	10	860310165430.00	0.15677099D+05
1	7	10	860310165440.00	0.15258977D+05
1	7	10	860310165450.00	0.14839133D+05
1	7	10	860310165500.00	0.14417604D+05
1	7	10	860310165510.00	0.13994431D+05
1	7	10	860310165520.00	0.13569652D+05
1	7	10	860310165530.00	0.13143306D+05
1	7	10	860310165540.00	0.12715434D+05
1	7	10	860310165550.00	0.12286074D+05
1	7	10	860310165600.00	0.11855265D+05
1	7	10	860310192610.00	0.21950923D+05
1	7	10	860310192620.00	0.22592122D+05
1	7	10	860310192630.00	0.23228692D+05
1	7	10	860310192640.00	0.23860519D+05
1	7	10	860310192650.00	0.24487489D+05
1	7	10	860310192700.00	0.25109493D+05
1	7	10	860310192710.00	0.25726420D+05
1	7	10	860310192720.00	0.26338167D+05
1	7	10	860310192730.00	0.26944628D+05
1	7	10	860310192740.00	0.27545701D+05
1	7	10	860310192750.00	0.28141288D+05
1	7	10	860310192800.00	0.28731290D+05
1	7	10	860310192810.00	0.29315614D+05
1	7	10	860310192820.00	0.29894167D+05
1	7	10	860310192830.00	0.30466859D+05
1	7	10	860310192840.00	0.31033601D+05
1	7	10	860310192850.00	0.31594309D+05
1	7	10	860310192900.00	0.32148900D+05
1	7	10	860310192910.00	0.32697292D+05
1	7	10	860310192920.00	0.33239408D+05
1	7	10	860310192930.00	0.33775172D+05
1	7	10	860310192940.00	0.34304510D+05
1	7	10	860310192950.00	0.34827352D+05
1	7	10	860310193000.00	0.35343629D+05
1	7	10	860310193010.00	0.35853275D+05
1	7	10	860310193020.00	0.36356226D+05
1	7	10	860310193030.00	0.36852422D+05
1	7	10	860310193040.00	0.37341803D+05
1	7	10	860310193050.00	0.37824313D+05
1	7	10	860310193100.00	0.38298899D+05
1	7	10	860310193110.00	0.38768488D+05
1	7	10	860310193120.00	0.39230057D+05
1	7	10	860310193130.00	0.39684550D+05
1	7	10	860310193140.00	0.40131921D+05
1	7	10	860310193150.00	0.40572126D+05

OBS. TYPE	TDRS ID	FORWARD LINK STATION ID	ASSOCIATED TIME	DOPPLER OBSERVATION
1	7	10	860310193200.00	0.41005125D+05
1	7	10	860310193210.00	0.41430880D+05
1	7	10	860310193220.00	0.41849353D+05
1	7.	10	860310193230.00	0.42260510D+05
1	7	10	860310193240.00	0.42664320D+05
1	7	10	860310193250.00	0.43060752D+05
1	7	10	860310193300.00	0.43449778D+05
1	7	10	860310193310.00	0.43831372D+05
1	7	10	860310193320.00	0.44205510D+05
1	7	10	860310193330.00	0.44572170D+05
1	7	10	860310193340.00	0.44931332D+05
1	7	10	860310193350.00	0.45282978D+05
1	7	10	860310193400.00	0.45627092D+05
1	7	10	860310193410.00	0.45963661D+05
1	7	10	860310193420.00	0.46292670D+05
1	7	10	860310193430.00	0.46614110D+05
1	7	10	860310193440.00	0.46927973D+05
1	7	10	860310193450.00	0.47234250D+05
1	7	10	860310193500.00	0.47532937D+05
1	7	10	860310193510.00	0.47824029D+05
1	7	10	860310193520.00	0.48107525D+05
1	7	10	860310193530.00	0.48383423D+05
1	7	10	860310193540.00	0.48651725D+05
1	7	10	860310193550.00	0.48912432D+05
1	7	10	860310193600.00	0.49165547D+05
1	7	10	860310193610.00	0.49411092D+05
1	7	10	860310193620.00	0.49649053D+05
1	7	10	860310193630.00	0.49879447D+05
1	7	10	860310193640.00	0.50102284D+05
1	7	10	860310193650.00	0.50317574D+05
1	7	10	860310193700.00	0.50525331D+05
1	7	10	860310193710.00	0.50725567D+05
1	7	10	860310193720.00	0.50918299D+05
1	7	10	860310193730.00	0.51103543D+05
1	7	10	860310193740.00	0.51281315D+05
1	7	10	860310193750.00	0.51451636D+05
1	7	10	860310193800.00	0.51614524D+05
1	7	10	860310193810.00	0.51770000D+05
1	7	10	860310193820.00	0.51918088D+05
1	7	10	860310193830.00	0.52058808D+05
1	7	10	860310193840.00	0.52192186D+05
1	7	10	860310193850.00	0.52318247D+05
1	7	10	860310193900.00	0.52437016D+05
1	7	10	860310193910.00	0.52548520D+05
1	7	10	860310193920.00	0.52652787D+05
1	7	10	860310193930.00	0.52749845D+05
1	7	10	860310193940.00	0.52839725D+05
1	7	10	860310193950.00	0.52922456D+05
1	7	10	860310205910.00	0.16964563D+05
1	7	10	860310205920.00	0.17533246D+05
1	7	10	860310205930.00	0.18098135D+05
1	7	10	860310205940.00	0.18659129D+05
1	7	10	860310205950.00	0.19216133D+05
1	7	10	860310210000.00	0.19769049D+05
1	7	10	860310210010.00	0.20317783D+05

OBS. TYPE	TDRS ID	FORWARD LINK STATION ID	ASSOCIATED TIME	DOPPLER OBSERVATION
1	7	10	860310210020.00	0.20862242D+05
1	7	10	860310210030.00	0.21402335D+05
1	7	10	860310210040.00	0.21937973D+05
1	7	10	860310210050.00	0.22469068D+05
1	7	10	860310210100.00	0.22995535D+05
1	7	10	860310210110.00	0.23517289D+05
1	7	10	860310210120.00	0.24034249D+05
1	7	10	860310210130.00	0.24546333D+05
1	7	10	860310210140.00	0.25053464D+05
1	7	10	860310210150.00	0.25555565D+05
1	7	10	860310210200.00	0.26052561D+05
1	7	10	860310210210.00	0.26544379D+05
1	7	10	860310210220.00	0.27030948D+05
1	7	10	860310210230.00	0.27512199D+05
1	7	10	860310210240.00	0.27988065D+05
1	7	10	860310210250.00	0.28458480D+05
1	7	10	860310210300.00	0.28923381D+05
1	7	10	860310210310.00	0.29382706D+05
1	7	10	860310210320.00	0.29836396D+05
1	7	10	860310210330.00	0.30284393D+05
1	7	10	860310210340.00	0.30726642D+05
1	7	10	860310210350.00	0.31163088D+05
1	7	10	860310210400.00	0.31593679D+05
1	7	10	860310210410.00	0.32018364D+05
1	7	10	860310210420.00	0.32437097D+05
1	7	10	860310210430.00	0.32849830D+05
1	7	10	860310210440.00	0.33256519D+05
1	7	10	860310210450.00	0.33657121D+05
1	7	10	860310210500.00	0.34051595D+05
1	7	10	860310210510.00	0.34439902D+05
1	7	10	860310210520.00	0.34822006D+05
1	7	10	860310210530.00	0.35197870D+05
1	7	10	860310210540.00	0.35567460D+05
1	7	10	860310210550.00	0.35930746D+05
1	7	10	860310210600.00	0.36287697D+05
1	7	10	860310210610.00	0.36638285D+05
1	7	10	860310210620.00	0.36982483D+05
1	7	10	860310210630.00	0.37320265D+05
1	7	10	860310210640.00	0.37651610D+05
1	7	10	860310210650.00	0.37976494D+05
1	7	10	860310210700.00	0.38294899D+05
1	7	10	860310210710.00	0.38606806D+05
1	7	10	860310210720.00	0.38912198D+05
1	7	10	860310210730.00	0.39211059D+05
1	7	10	860310210740.00	0.39503377D+05
1	7	10	860310210750.00	0.39789140D+05
1	7	10	860310210800.00	0.40068336D+05
1	7	10	860310210810.00	0.40340957D+05
1	7	10	860310210820.00	0.40606995D+05
1	7	10	860310210830.00	0.40866445D+05
1	7	10	860310210840.00	0.41119301D+05
1	7	10	860310210850.00	0.41365560D+05
1	7	10	860310210900.00	0.41605221D+05
1	7	10	860310210910.00	0.41838279D+05
1	7	10	860310210920.00	0.42064740D+05

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OBS. TYPE	TDRS ID	FORWARD LINK STATION ID	ASSOCIATED TIME	DOPPLER OBSERVATION
1	7	10	860310210930.00	0.42284604D+05
1	7	10	860310210940.00	0.42497874D+05
1	7	10	860310210950.00	0.42704556D+05
1	7	10	860310211000.00	0.42904654D+05
1	7	10	860310211010.00	0.43098175D+05
1	7	10	860310211020.00	0.43285128D+05
1	7	10	860310211030.00	0.43465522D+05
1	7	10	860310211040.00	0.43639368D+05
1	7	10	860310211050.00	0.43806676D+05
1	7	10	860310211100.00	0.43967459D+05
1	7	10	860310211110.00	0.44121732D+05
1	7	10	860310211120.00	0.44269507D+05
1	7	10	860310211130.00	0.44410802D+05
1	7	10	860310211140.00	0.44545633D+05
1	7	10	860310211150.00	0.44674017D+05
1	7	10	860310211200.00	0.44795973D+05
1	7	10	860310211210.00	0.44911521D+05
1	7	10	860310211220.00	0.45020680D+05
1	7	10	860310211230.00	0.45123471D+05
1	7	10	860310211240.00	0.45219918D+05
1	7	10	860310211250.00	0.45310042D+05
1	7	10	860310211300.00	0.45393867D+05
1	7	10	860310211310.00	0.45471417D+05
1	7	10	860310211320.00	0.45542718D+05
1	7	10	860310211330.00	0.45607795D+05
1	7	10	860310211340.00	0.45666674D+05
1	7	10	860310211350.00	0.45719382D+05
1	7	10	860310211400.00	0.45765945D+05
1	7	10	860310211410.00	0.45806405D+05
1	7	10	860310211420.00	0.45840776D+05
1	7	10	860310211430.00	0.45869092D+05
1	7	10	860310211440.00	0.45891383D+05
1	7	10	860310211450.00	0.45907682D+05
1	7	10	860310211500.00	0.45918019D+05
1	7	10	860310211510.00	0.45922427D+05
1	7	10	860310211520.00	0.45920938D+05
1	7	10	860310211530.00	0.45913584D+05
1	7	10	860310211540.00	0.45900401D+05
1	7	10	860310211550.00	0.45881421D+05
1	7	10	860310211600.00	0.45856679D+05
1	7	10	860310211610.00	0.45826211D+05
1	7	10	860310211620.00	0.45790050D+05
1	7	10	860310211630.00	0.45748234D+05
1	7	10	860310211640.00	0.45700799D+05
1	7	10	860310211650.00	0.45647780D+05
1	7	10	860310211700.00	0.45589214D+05
1	7	10	860310211710.00	0.45525140D+05
1	7	10	860310211720.00	0.45455593D+05
1	7	10	860310211730.00	0.45380613D+05
1	7	10	860310211740.00	0.45300237D+05
1	7	10	860310211750.00	0.45214504D+05
1	7	10	860310211800.00	0.45123453D+05
1	7	10	860310223710.00	0.22201623D+05
1	7	10	860310223720.00	0.22487864D+05
1	7	10	860310223730.00	0.22769930D+05

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OBS. TYPE	TDRS ID	FORWARD LINK STATION ID	ASSOCIATED TIME	DOPPLER OBSERVATION
1	7	10	860310223740.00	0.23047793D+05
1	7	10	860310223750.00	0.23321423D+05
1	7	10	860310223800.00	0.23590793D+05
1	7	10	860310223810.00	0.23855875D+05
1	7	10	860310223820.00	0.24116644D+05
1	7	10	860310223830.00	0.24373075D+05
1	7	10	860310223840.00	0.24625146D+05
1	7	10	860310223850.00	0.24872833D+05
1	7	10	860310223900.00	0.25116115D+05
1	7	10	860310223910.00	0.25354972D+05
1	7	10	860310223920.00	0.25589385D+05
1	7	10	860310223930.00	0.25819334D+05
1	7	10	860310223940.00	0.26044804D+05
1	7	10	860310223950.00	0.26265778D+05
1	7	10	860310224000.00	0.26482240D+05
1	7	10	860310224010.00	0.26694177D+05
1	7	10	860310224020.00	0.26901575D+05
1	7	10	860310224030.00	0.27104422D+05
1	7	10	860310224040.00	0.27302707D+05
1	7	10	860310224050.00	0.27496419D+05
1	7	10	860310224100.00	0.27685550D+05
1	7	10	860310224110.00	0.27870091D+05
1	7	10	860310224120.00	0.28050034D+05
1	7	10	860310224130.00	0.28225373D+05
1	7	10	860310224140.00	0.28396103D+05
1	7	10	860310224150.00	0.28562219D+05
1	7	10	860310224200.00	0.28723717D+05
1	7	10	860310224210.00	0.28880594D+05
1	7	10	860310224220.00	0.29032849D+05
1	7	10	860310224230.00	0.29180479D+05
1	7	10	860310224240.00	0.29323486D+05
1	7	10	860310224250.00	0.29461869D+05
1	7	10	860310224300.00	0.29595630D+05
1	7	10	860310224310.00	0.29724770D+05
1	7	10	860310224320.00	0.29849294D+05
1	7	10	860310224330.00	0.29969205D+05
1	7	10	860310224340.00	0.30084507D+05
1	7	10	860310224350.00	0.30195206D+05
1	7	10	860310224400.00	0.30301307D+05
1	7	10	860310224410.00	0.30402818D+05
1	7	10	860310224420.00	0.30499747D+05
1	7	10	860310224430.00	0.30592101D+05
1	7	10	860310224440.00	0.30679890D+05
1	7	10	860310224450.00	0.30763123D+05
1	7	10	860310224500.00	0.30841810D+05
1	7	10	860310224510.00	0.30915964D+05
1	7	10	860310224520.00	0.30985594D+05
1	7	10	860310224530.00	0.31050715D+05
1	7	10	860310224540.00	0.31111338D+05
1	7	10	860310224550.00	0.31167478D+05
1	7	10	860310224600.00	0.31219149D+05
1	7	10	860310224610.00	0.31266364D+05
1	7	10	860310224620.00	0.31309141D+05
1	7	10	860310224630.00	0.31347495D+05
1	7	10	860310224640.00	0.31381441D+05

OBS. TYPE	TDRS ID	FORWARD LINK STATION ID	ASSOCIATED TIME	DOPPLER OBSERVATION
1	7	10	860310224650.00	0.31410998D+05
1	7	10	860310224700.00	0.31436183D+05
1	7	10	860310224710.00	0.31457016D+05
1	7	10	860310224720.00	0.31473512D+05
1	7	10	860310224730.00	0.31485694D+05
1	7	10	860310224740.00	0.31493579D+05
1	7	10	860310224750.00	0.31497188D+05
1	7	10	860310224800.00	0.31496541D+05
1	7	10	860310224810.00	0.31491661D+05
1	7	10	860310224820.00	0.31482568D+05
1	7	10	860310224830.00	0.31469284D+05
1	7	10	860310224840.00	0.31451833D+05
1	7	10	860310224850.00	0.31430235D+05
1	7	10	860310224900.00	0.31404516D+05
1	7	10	860310224910.00	0.31374699D+05
1	7	10	860310224920.00	0.31340807D+05
1	7	10	860310224930.00	0.31302865D+05
1	7	10	860310224940.00	0.31260899D+05
1	7	10	860310224950.00	0.31214933D+05
1	7	10	860310225000.00	0.31164993D+05
1	7	10	860310225010.00	0.31111105D+05
1	7	10	860310225020.00	0.31053296D+05
1	7	10	860310225030.00	0.30991591D+05
1	7	10	860310225040.00	0.30926018D+05
1	7	10	860310225050.00	0.30856604D+05
1	7	10	860310225100.00	0.30783376D+05
1	7	10	860310225110.00	0.30706362D+05
1	7	10	860310225120.00	0.30625589D+05
1	7	10	860310225130.00	0.30541084D+05
1	7	10	860310225140.00	0.30452876D+05
1	7	10	860310225150.00	0.30360993D+05
1	7	10	860310225200.00	0.30265460D+05
1	7	10	860310225210.00	0.30166342D+05
1	7	10	860310225220.00	0.30063623D+05
1	7	10	860310225230.00	0.29957350D+05
1	7	10	860310225240.00	0.29847553D+05
1	7	10	860310225250.00	0.29734262D+05
1	7	10	860310225300.00	0.29617507D+05
1	7	10	860310225310.00	0.29497320D+05
1	7	10	860310225320.00	0.29373730D+05
1	7	10	860310225330.00	0.29246770D+05
1	7	10	860310225340.00	0.29116470D+05
1	7	10	860310225350.00	0.28982861D+05
1	7	10	860310225400.00	0.28845976D+05

***END OF REPORT, NO MORE DATA EXISTS FOR SPECIFIED TIME INTERVAL

AODS OBSERVATION RESIDUALS REPORT FOR ITERATION NO. 1 OF BATCH NO. 1 EDIT LOOP NO. 1

EPOCH : 860310193834.54 START TIME : 860310193834.54 END TIME : 860310133017.74

TYPE	OBSERVATION TIME	STA. FOR	ID RET	TDRS FOR	ID RET	RANGE OBSERVED	RANGE RESIDUAL	RANGE PRED RESID	RANGE EDIT	DOPPLER/RANGE-RATE OBSERVED	DOPPLER/RANGE-RATE RESIDUAL	DOPPLER/RANGE-RATE PRED RESID	DOPPLER/RANGE-RATE EDIT
1	860310193834.539	10	3	7	0	-.21325317697082D+02	0.000	0.000000	0	0.52121650113873D+05	-801.343	-0.185371	0
1	860310193744.539	10	3	7	0	-.21351439989766D+02	0.000	0.000000	0	0.51360892052574D+05	-800.019	-0.125006	0
1	860310193654.539	10	3	7	0	-.21377309393822D+02	0.000	0.000000	0	0.50414089920023D+05	-798.721	-0.073934	0
1	860310193604.539	10	3	7	0	-.21402900135874D+02	0.000	0.000000	0	0.49279145018358D+05	-797.403	-0.023321	0
1	860310193514.539	10	3	7	0	-.21428237835292D+02	0.000	0.000000	0	0.47954753922207D+05	-796.112	0.018031	0
1	860310193424.539	10	3	7	0	-.21453303144151D+02	0.000	0.000000	0	0.46440507741635D+05	-794.845	0.050690	0
1	860310193334.539	10	3	7	0	-.21478095990880D+02	0.000	0.000000	0	0.44736997685708D+05	-793.602	0.075688	0
1	860310193244.539	10	3	7	0	-.21502635557255D+02	0.000	0.000000	0	0.42845917184681D+05	-792.386	0.092751	0
1	860310193154.539	10	3	7	0	-.21526896096101D+02	0.000	0.000000	0	0.40770157893188D+05	-791.226	0.097502	0
1	860310193104.539	10	3	7	0	-.21550903193558D+02	0.000	0.000000	0	0.38513902109465D+05	-790.132	0.088571	0
1	860310193014.539	10	3	7	0	-.21574631092226D+02	0.000	0.000000	0	0.36082698128566D+05	-789.102	0.067862	0
1	860310192924.539	10	3	7	0	-.21598105377605D+02	0.000	0.000000	0	0.33483525034754D+05	-788.136	0.036853	0
1	860310192834.539	10	3	7	0	-.21621300288462D+02	0.000	0.000000	0	0.30724832682447D+05	-787.243	-0.004525	0
1	860310192744.539	10	3	7	0	-.21644241395599D+02	0.000	0.000000	0	0.27816562505291D+05	-786.472	-0.064476	0
1	860310192654.539	10	3	7	0	-.21666902906470D+02	0.000	0.000000	0	0.24770136576930D+05	-785.783	-0.133113	0
1	860310165458.668	10	3	7	0	-.21317219491182D+02	0.000	0.000000	0	0.14472635595137D+05	-836.058	0.045029	0
1	860310165408.668	10	3	7	0	-.21291137078471D+02	0.000	0.000000	0	0.16561942111408D+05	-835.477	0.050512	0
1	860310165318.668	10	3	7	0	-.21264793676782D+02	0.000	0.000000	0	0.18605126209964D+05	-834.855	0.051205	0
1	860310165228.668	10	3	7	0	-.21238189571762D+02	0.000	0.000000	0	0.20597333854061D+05	-834.173	0.052014	0
1	860310165138.668	10	3	7	0	-.21211344288346D+02	0.000	0.000000	0	0.22533743161113D+05	-833.458	0.047904	0
1	860310165048.668	10	3	7	0	-.21184232478755D+02	0.000	0.000000	0	0.24409566768547D+05	-832.681	0.045267	0
1	860310164958.668	10	3	7	0	-.21156880068451D+02	0.000	0.000000	0	0.26220056678956D+05	-831.852	0.042581	0
1	860310164908.668	10	3	7	0	-.21129261714767D+02	0.000	0.000000	0	0.27960506670143D+05	-831.014	0.032061	0
1	860310164818.668	10	3	7	0	-.21101403368728D+02	0.000	0.000000	0	0.29626258236557D+05	-830.110	0.025463	0
1	860310164728.668	10	3	7	0	-.21073279659548D+02	0.000	0.000000	0	0.31212703793555D+05	-829.154	0.020487	0
1	860310164638.668	10	3	7	0	-.21044916552950D+02	0.000	0.000000	0	0.32715294130744D+05	-828.183	0.010244	0
1	860310164548.668	10	3	7	0	-.21016288673676D+02	0.000	0.000000	0	0.34129543074316D+05	-827.156	0.003477	0
1	860310164458.668	10	3	7	0	-.20987421953579D+02	0.000	0.000000	0	0.35451037268161D+05	-826.080	-0.000533	0
1	860310164408.668	10	3	7	0	-.20958291031460D+02	0.000	0.000000	0	0.36675443143380D+05	-824.982	-0.006947	0
1	860310164318.668	10	3	7	0	-.20928921799554D+02	0.000	0.000000	0	0.37798519870256D+05	-823.854	-0.014811	0
1	860310164228.668	10	3	7	0	-.20899288881961D+02	0.000	0.000000	0	0.38816129500110D+05	-822.687	-0.020474	0
1	860310164138.668	10	3	7	0	-.20869418167083D+02	0.000	0.000000	0	0.39724253698601D+05	-821.475	-0.023175	0
1	860310164048.668	10	3	7	0	-.20839284244514D+02	0.000	0.000000	0	0.40519007664906D+05	-820.223	-0.023907	0
1	860310151732.724	10	3	7	0	-.16612946936375D+02	0.000	0.000000	0	0.18069034673704D+05	-824.867	-0.205578	0
1	860310151642.724	10	3	7	0	-.16559065645798D+02	0.000	0.000000	0	0.19234644613887D+05	-824.138	-0.182319	0
1	860310151552.724	10	3	7	0	-.16504954150256D+02	0.000	0.000000	0	0.20335538393135D+05	-823.386	-0.160274	0
1	860310151502.724	10	3	7	0	-.16450638382883D+02	0.000	0.000000	0	0.21368578172202D+05	-822.596	-0.135577	0
1	860310151412.724	10	3	7	0	-.16396093034878D+02	0.000	0.000000	0	0.22330762430210D+05	-821.796	-0.112519	0
1	860310151322.724	10	3	7	0	-.16341344060463D+02	0.000	0.000000	0	0.23219236521079D+05	-820.969	-0.087652	0
1	860310151232.724	10	3	7	0	-.16286366201959D+02	0.000	0.000000	0	0.24031301226613D+05	-820.100	-0.057595	0
1	860310151142.724	10	3	7	0	-.16231185439149D+02	0.000	0.000000	0	0.24764424717183D+05	-819.251	-0.034065	0
1	860310151052.724	10	3	7	0	-.16175776542473D+02	0.000	0.000000	0	0.25416252442641D+05	-818.373	-0.006432	0
1	860310151002.724	10	3	7	0	-.16120165546669D+02	0.000	0.000000	0	0.25984620777757D+05	-817.472	0.023887	0
1	860310150912.724	10	3	7	0	-.16064327246459D+02	0.000	0.000000	0	0.26467568319120D+05	-816.571	0.053248	0
1	860310150822.724	10	3	7	0	-.16008287725789D+02	0.000	0.000000	0	0.26863350966688D+05	-815.667	0.082702	0
1	860310150732.724	10	3	7	0	-.15952021837532D+02	0.000	0.000000	0	0.27170454258045D+05	-814.754	0.113140	0
1	860310150642.724	10	3	7	0	-.15895555693111D+02	0.000	0.000000	0	0.27387609302085D+05	-813.850	0.142436	0
1	860310150552.724	10	3	7	0	-.15838864208025D+02	0.000	0.000000	0	0.27513805478008D+05	-812.921	0.176635	0

AODS OBSERVATION RESIDUALS REPORT FOR ITERATION NO. 1 OF BATCH NO. 1 (CON.)

TYPE	OBSERVATION TIME	STA. FOR	ID RET	TDRS FOR	ID RET	RANGE OBSERVED	RANGE RESIDUAL	RANGE PRED RESID	RANGE EDIT	DOPPLER/RANGE-RATE OBSERVED	DOPPLER/RANGE-RATE RESIDUAL	DOPPLER/RANGE-RATE PRED RESID	DOPPLER/RANGE-RATE EDIT
1	860310150502.724	10	3	7	0	-.15781973544181D+02	0.000	0.000000	0	0.27548306560479D+05	-812.010	0.207697	0
1	860310134157.742	10	3	7	0	-.91445356285590D+01	0.000	0.000000	0	0.12282630702772D+05	-805.161	0.145487	0
1	860310134107.742	10	3	7	0	-.90693589655543D+01	0.000	0.000000	0	0.12367378649866D+05	-805.161	0.125107	0
1	860310134017.742	10	3	7	0	-.89940226414335D+01	0.000	0.000000	0	0.12396108231329D+05	-805.207	0.101092	0
1	860310133927.742	10	3	7	0	-.89185530532658D+01	0.000	0.000000	0	0.12368925445444D+05	-805.259	0.081456	0
1	860310133837.742	10	3	7	0	-.88429254162557D+01	0.000	0.000000	0	0.12286169021499D+05	-805.358	0.058060	0
1	860310133747.742	10	3	7	0	-.87671661383361D+01	0.000	0.000000	0	0.12148414380403D+05	-805.466	0.038796	0
1	860310133657.742	10	3	7	0	-.86912504187357D+01	0.000	0.000000	0	0.11956475236870D+05	-805.648	0.011041	0
1	860310133607.742	10	3	7	0	-.86152046915875D+01	0.000	0.000000	0	0.11711405465061D+05	-805.832	-0.011311	0
1	860310133517.742	10	3	7	0	-.85390041490910D+01	0.000	0.000000	0	0.11414498311847D+05	-806.028	-0.029617	0
1	860310133427.742	10	3	7	0	-.84626752272964D+01	0.000	0.000000	0	0.11067285547469D+05	-806.261	-0.049153	0
1	860310133337.742	10	3	7	0	-.83861931439641D+01	0.000	0.000000	0	0.10671533709655D+05	-806.519	-0.067952	0
1	860310133247.742	10	3	7	0	-.83095843268370D+01	0.000	0.000000	0	0.10229240064737D+05	-806.825	-0.090362	0
1	860310133157.742	10	3	7	0	0.86463893208003D+04	0.000	0.000000	0	0.97426255900876D+04	-807.142	-0.109408	0
1	860310133107.742	10	3	7	0	0.92141275693423D+04	0.000	0.000000	0	0.92141275693423D+04	-807.483	-0.127810	0
1	860310133017.742	10	3	7	0	0.97426255900876D+04	0.000	0.000000	0	0.86463893208003D+04	-807.856	-0.147771	0

AODS OBSERVATION RESIDUALS REPORT FOR ITERATION NO. 2 OF BATCH NO. 1 EDIT LOOP NO. 1

EPOCH : 860310193834.54 START TIME : 860310193834.54 END TIME : 860310133017.74

TYPE	OBSERVATION TIME	STA. FOR	ID RET	TDRS FOR	ID RET	RANGE OBSERVED	RANGE RESIDUAL	RANGE PRED RESID	RANGE EDIT	DOPPLER/RANGE-RATE OBSERVED	DOPPLER/RANGE-RATE RESIDUAL	DOPPLER/RANGE-RATE PRED RESID	DOPPLER/RANGE-RATE EDIT
1	860310193834.539	10	3	7	0	-.21325309525009D+02	0.000	0.000000	0	0.51321219863443D+05	-0.913	-0.185371	0
1	860310193744.539	10	3	7	0	-.21351431807682D+02	0.000	0.000000	0	0.50561478848847D+05	-0.606	-0.125006	0
1	860310193654.539	10	3	7	0	-.21377301201825D+02	0.000	0.000000	0	0.49615719805768D+05	-0.351	-0.073934	0
1	860310193604.539	10	3	7	0	-.21402891934070D+02	0.000	0.000000	0	0.48481839891916D+05	-0.098	-0.023321	0
1	860310193514.539	10	3	7	0	-.21428229623779D+02	0.000	0.000000	0	0.47158534345995D+05	0.108	0.018031	0
1	860310193424.539	10	3	7	0	-.21453294923032D+02	0.000	0.000000	0	0.45645392083896D+05	0.270	0.050690	0
1	860310193334.539	10	3	7	0	-.21478087760260D+02	0.000	0.000000	0	0.43943001368133D+05	0.395	0.075688	0
1	860310193244.539	10	3	7	0	-.21502627317232D+02	0.000	0.000000	0	0.42053051936386D+05	0.479	0.092751	0
1	860310193154.539	10	3	7	0	-.21526887846781D+02	0.000	0.000000	0	0.39978430802641D+05	0.501	0.097502	0
1	860310193104.539	10	3	7	0	-.21550894935038D+02	0.000	0.000000	0	0.37723314662899D+05	0.456	0.088571	0
1	860310193014.539	10	3	7	0	-.21574622824613D+02	0.000	0.000000	0	0.35293245352522D+05	0.351	0.067862	0
1	860310192924.539	10	3	7	0	-.21598097100997D+02	0.000	0.000000	0	0.32695194624347D+05	0.194	0.036853	0
1	860310192834.539	10	3	7	0	-.21621292002965D+02	0.000	0.000000	0	0.29937604101297D+05	-0.014	-0.004525	0
1	860310192744.539	10	3	7	0	-.21644233101311D+02	0.000	0.000000	0	0.27030406171807D+05	-0.315	-0.064476	0
1	860310192654.539	10	3	7	0	-.21666894603497D+02	0.000	0.000000	0	0.23985013342375D+05	-0.660	-0.133113	0
1	860310165458.668	10	3	7	0	-.21317211322212D+02	0.000	0.000000	0	0.13636092309911D+05	0.485	0.045029	0
1	860310165408.668	10	3	7	0	-.21291128919496D+02	0.000	0.000000	0	0.15725954144507D+05	0.511	0.050512	0
1	860310165318.668	10	3	7	0	-.21264785527902D+02	0.000	0.000000	0	0.17769757649605D+05	0.513	0.051205	0
1	860310165228.668	10	3	7	0	-.21238181433076D+02	0.000	0.000000	0	0.19762645855127D+05	0.515	0.052014	0
1	860310165138.668	10	3	7	0	-.21211336159949D+02	0.000	0.000000	0	0.21699793948202D+05	0.492	0.047904	0
1	860310165048.668	10	3	7	0	-.21184224360746D+02	0.000	0.000000	0	0.23576411641118D+05	0.475	0.045267	0
1	860310164958.668	10	3	7	0	-.21156871960924D+02	0.000	0.000000	0	0.25387748072825D+05	0.457	0.042581	0
1	860310164908.668	10	3	7	0	-.21129253617824D+02	0.000	0.000000	0	0.27129094234089D+05	0.399	0.032061	0
1	860310164818.668	10	3	7	0	-.21101395282460D+02	0.000	0.000000	0	0.28795788933833D+05	0.360	0.025463	0
1	860310164728.668	10	3	7	0	-.21073271584057D+02	0.000	0.000000	0	0.30383222006797D+05	0.327	0.020487	0
1	860310164638.668	10	3	7	0	-.21044908488329D+02	0.000	0.000000	0	0.31886841819553D+05	0.269	0.010244	0
1	860310164548.668	10	3	7	0	-.21016280620025D+02	0.000	0.000000	0	0.33302159927415D+05	0.227	0.003477	0
1	860310164458.668	10	3	7	0	-.20987413910991D+02	0.000	0.000000	0	0.34624760748559D+05	0.197	-0.000533	0
1	860310164408.668	10	3	7	0	-.20958283000035D+02	0.000	0.000000	0	0.35850308988927D+05	0.152	-0.006947	0
1	860310164318.668	10	3	7	0	-.20928913779383D+02	0.000	0.000000	0	0.36974561846032D+05	0.104	-0.014811	0
1	860310164228.668	10	3	7	0	-.20899280873146D+02	0.000	0.000000	0	0.37993379850681D+05	0.062	-0.020474	0
1	860310164138.668	10	3	7	0	-.20869410169715D+02	0.000	0.000000	0	0.38902743162149D+05	0.036	-0.023175	0
1	860310164048.668	10	3	7	0	-.20839276258693D+02	0.000	0.000000	0	0.39698765787177D+05	0.019	-0.023907	0
1	860310151732.724	10	3	7	0	-.16612940570129D+02	0.000	0.000000	0	0.17244914770194D+05	-0.747	-0.205578	0
1	860310151642.724	10	3	7	0	-.16559059300200D+02	0.000	0.000000	0	0.18411148434641D+05	-0.641	-0.182319	0
1	860310151552.724	10	3	7	0	-.16504947825394D+02	0.000	0.000000	0	0.19512693734124D+05	-0.541	-0.160274	0
1	860310151502.724	10	3	7	0	-.16450632078835D+02	0.000	0.000000	0	0.20546409693527D+05	-0.428	-0.135577	0
1	860310151412.724	10	3	7	0	-.16396086751732D+02	0.000	0.000000	0	0.21509291767320D+05	-0.325	-0.112519	0
1	860310151322.724	10	3	7	0	-.16341337798297D+02	0.000	0.000000	0	0.22398482367588D+05	-0.215	-0.087652	0
1	860310151232.724	10	3	7	0	-.16286359960862D+02	0.000	0.000000	0	0.23211279485957D+05	-0.079	-0.057595	0
1	860310151142.724	10	3	7	0	-.16231179219198D+02	0.000	0.000000	0	0.23945148640335D+05	0.025	-0.034065	0
1	860310151052.724	10	3	7	0	-.16175770343754D+02	0.000	0.000000	0	0.24597732764495D+05	0.146	-0.006432	0
1	860310151002.724	10	3	7	0	-.16120159369261D+02	0.000	0.000000	0	0.25166865959916D+05	0.282	0.023887	0
1	860310150912.724	10	3	7	0	-.16064321090449D+02	0.000	0.000000	0	0.25650584491775D+05	0.413	0.053248	0
1	860310150822.724	10	3	7	0	-.16008281591254D+02	0.000	0.000000	0	0.26047142337460D+05	0.542	0.082702	0
1	860310150732.724	10	3	7	0	-.15952015724558D+02	0.000	0.000000	0	0.26355023140908D+05	0.677	0.113140	0
1	860310150642.724	10	3	7	0	-.15895549601776D+02	0.000	0.000000	0	0.26572956310294D+05	0.803	0.142436	0
1	860310150552.724	10	3	7	0	-.15838858138415D+02	0.000	0.000000	0	0.26699929668159D+05	0.955	0.176635	0

AODS OBSERVATION RESIDUALS REPORT FOR ITERATION NO. 2 OF BATCH NO. 1 (CON.)

TYPE	OBSERVATION TIME	STA. ID FOR	STA. ID RET	TDRS ID FOR	TDRS ID RET	RANGE OBSERVED	RANGE RESIDUAL	RANGE PRED RESID	RANGE EDIT	DOPPLER/RANGE-RATE OBSERVED	DOPPLER/RANGE-RATE RESIDUAL	DOPPLER/RANGE-RATE PRED RESID	DOPPLER/RANGE-RATE EDIT
1	860310150502.724	10	3	7	0	-.15781967496372D+02	0.000	0.000000	0	0.26735205519835D+05	1.091	0.207697	0
1	860310134157.742	10	3	7	0	-.91445321242821D+01	0.000	0.000000	0	0.11476676099986D+05	0.794	0.145487	0
1	860310134107.742	10	3	7	0	-.90693554900859D+01	0.000	0.000000	0	0.11561540322517D+05	0.677	0.125107	0
1	860310134017.742	10	3	7	0	-.89940191948346D+01	0.000	0.000000	0	0.11590359965674D+05	0.541	0.101092	0
1	860310133927.742	10	3	7	0	-.89185496355877D+01	0.000	0.000000	0	0.11563239543669D+05	0.427	0.081456	0
1	860310133837.742	10	3	7	0	-.88429220275588D+01	0.000	0.000000	0	0.11480516568729D+05	0.294	0.058060	0
1	860310133747.742	10	3	7	0	-.87671627786710D+01	0.000	0.000000	0	0.11342765506458D+05	0.183	0.038796	0
1	860310133657.742	10	3	7	0	-.86912470881622D+01	0.000	0.000000	0	0.11150799435827D+05	0.028	0.011041	0
1	860310133607.742	10	3	7	0	-.86152013901555D+01	0.000	0.000000	0	0.10905671790728D+05	-0.098	-0.011311	0
1	860310133517.742	10	3	7	0	-.85390008768598D+01	0.000	0.000000	0	0.10608675770190D+05	-0.205	-0.029617	0
1	860310133427.742	10	3	7	0	-.84626719843151D+01	0.000	0.000000	0	0.10261343302759D+05	-0.319	-0.049153	0
1	860310133337.742	10	3	7	0	-.83861899302915D+01	0.000	0.000000	0	0.98654414143896D+04	-0.427	-0.067952	0
1	860310133247.742	10	3	7	0	-.83095811425218D+01	0.000	0.000000	0	0.94229680797941D+04	-0.553	-0.090362	0
1	860310133157.742	10	3	7	0	0.78394118206800D+04	0.000	0.000000	0	0.89361452673504D+04	-0.662	-0.109408	0
1	860310133107.742	10	3	7	0	0.84074116048502D+04	0.000	0.000000	0	0.84074116048502D+04	-0.767	-0.127810	0
1	860310133017.742	10	3	7	0	0.89361452673504D+04	0.000	0.000000	0	0.78394118206800D+04	-0.879	-0.147771	0

DC SUMMARY AND STATISTICS REPORT FOR ITERATION NO. 1, BATCH NO. 1

EPOCH : 860310193834.54
START TIME : 860310193834.54
END TIME : 860310133017.74

NO CONVERGENCE/DIVERGENCE
TOTAL OBSERVATIONS AVAILABLE : 64
NO. OF OBSERVATIONS USED : 64

SOLVE-FOR PARAMETER SUMMARY

PARAMETER	CURRENT VALUE	CORRECTION	PREVIOUS VALUE	APRIORI VALUE
X	0.22824154925819D+04	-.57621003672034D+00	0.22829917026186D+04	0.22829917026186D+04
Y	0.16752892601248D+04	-.19043812958389D+01	0.16771936414206D+04	0.16771936414206D+04
Z	0.62689803871649D+04	0.84423750194810D+00	0.62681361496629D+04	0.62681361496629D+04
XDOT	-.38279525743321D+01	0.60442271810501D-03	-.38285569970502D+01	-.38285569970502D+01
YDOT	-.58779059597652D+01	-.17908209981021D-02	-.58761151387671D+01	-.58761151387671D+01
ZDOT	0.29565087175750D+01	-.27030879711072D-02	0.29592118055461D+01	0.29592118055461D+01
DRAG	-.16310789220072D+04	-.16330789220072D+04	0.20000000000000D+01	0.20000000000000D+01
BIAS1	-.80139580597465D+03	-.80719580597465D+03	0.58000000000000D+01	0.58000000000000D+01

INNER LOOP STATISTICS

LOOP NO.	SIGMA EDITING PARAMETER	QUALITY CONTROL PARAMETER	RMS
1	0.1794651E+04	0.8454530E+07	0.8191425D+03

LINEARITY INDICATOR : F

DC SUMMARY AND STATISTICS REPORT FOR ITERATION NO. 2, BATCH NO. 1

EPOCH :	860310193834.54	CONVERGE - CODE :	1
START TIME :	860310193834.54	TOTAL OBSERVATIONS AVAILABLE :	64
END TIME :	860310133017.74	NO. OF OBSERVATIONS USED :	64

SOLVE-FOR PARAMETER SUMMARY

PARAMETER	CURRENT VALUE	CORRECTION	PREVIOUS VALUE	APRIORI VALUE
X	0.22824132674011D+04	-.22251807581251D-02	0.22824154925819D+04	0.22829917026186D+04
Y	0.16752882361978D+04	-.10239270197070D-02	0.16752892601248D+04	0.16771936414206D+04
Z	0.62689785471813D+04	-.18399835536908D-02	0.62689803871649D+04	0.62681361496629D+04
XDOT	-.38279553465476D+01	-.27722154847886D-05	-.38279525743321D+01	-.38285569970502D+01
YDOT	-.58779073515298D+01	-.13917646786147D-05	-.58779059597652D+01	-.58761151387671D+01
ZDOT	0.29565065118720D+01	-.22057029443526D-05	0.29565087175750D+01	0.29592118055461D+01
DRAG	-.16434682403331D+04	-.12389318325857D+02	-.16310789220072D+04	0.20000000000000D+01
BIAS1	-.80138981261550D+03	0.59933591417796D-02	-.80139580597465D+03	0.58000000000000D+01

INNER LOOP STATISTICS

LOOP NO.	SIGMA EDITING PARAMETER	QUALITY CONTROL PARAMETER	RMS
1	0.2780386E+00	0.2951093E+01	0.4839564D+00

LINEARITY INDICATOR : F

AODS OBSERVATION RESIDUALS REPORT FOR ITERATION NO. 1 OF BATCH NO. 2 EDIT LOOP NO. 1

EPOCH : 860310210924.26 START TIME : 860310210924.26 END TIME : 860310150502.72

TYPE	OBSERVATION TIME	STA. ID FOR	STA. ID RET	TDRS ID FOR	TDRS ID RET	RANGE OBSERVED	RANGE RESIDUAL	RANGE PRED RESID	RANGE EDIT	DOPPLER/RANGE-RATE OBSERVED	DOPPLER/RANGE-RATE RESIDUAL	DOPPLER/RANGE-RATE PRED RESID	DOPPLER/RANGE-RATE EDIT
1	860310210924.259	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.41357722314721D+05	8.298	-0.007348	0
1	860310210834.259	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.40173391499175D+05	9.702	-0.012885	0
1	860310210744.259	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.38824245999662D+05	11.078	-0.010519	0
1	860310210654.259	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.37311157226983D+05	12.395	-0.007503	0
1	860310210604.259	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.35635946430066D+05	13.623	-0.008480	0
1	860310210514.259	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.33801440903088D+05	14.790	-0.006286	0
1	860310210424.259	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.31811537739027D+05	15.868	-0.005432	0
1	860310210334.259	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.29671253018940D+05	16.879	0.000223	0
1	860310210244.259	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.27386761989190D+05	17.789	0.005200	0
1	860310210154.259	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.24965419969622D+05	18.584	0.007903	0
1	860310210104.259	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.22415769179792D+05	19.280	0.012584	0
1	860310210014.259	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.19747521671924D+05	19.848	0.014699	0
1	860310193834.539	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.51318105127497D+05	-0.908	0.033543	0
1	860310193744.539	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.50558403543424D+05	-0.594	0.022749	0
1	860310193654.539	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.49612700170411D+05	-0.338	0.009749	0
1	860310193604.539	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.48478894410520D+05	-0.090	0.004700	0
1	860310193514.539	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.47155679411379D+05	0.105	-0.000547	0
1	860310193424.539	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.45642642594376D+05	0.254	-0.004701	0
1	860310193334.539	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.43940369726278D+05	0.364	-0.006117	0
1	860310193244.539	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.42050548890688D+05	0.434	-0.004456	0
1	860310193154.539	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.39976064964665D+05	0.445	-0.003534	0
1	860310193104.539	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.37721090175749D+05	0.394	-0.004467	0
1	860310193014.539	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.35291165411452D+05	0.292	-0.005042	0
1	860310192924.539	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.32693258598470D+05	0.149	-0.003540	0
1	860310192834.539	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.29935809223449D+05	-0.033	-0.000021	0
1	860310192744.539	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.27028745697003D+05	-0.293	-0.002952	0
1	860310192654.539	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.23983477879840D+05	-0.578	-0.002732	0
1	860310165458.668	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.13635477723786D+05	0.273	-0.014514	0
1	860310165408.668	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.15725256845584D+05	0.255	-0.005747	0
1	860310165318.668	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.17768968263479D+05	0.226	-0.000705	0
1	860310165228.668	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.19761756233719D+05	0.208	0.004945	0
1	860310165138.668	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.21698797277784D+05	0.173	0.005893	0
1	860310165048.668	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.23575302532721D+05	0.155	0.008594	0
1	860310164958.668	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.25386522644453D+05	0.144	0.011103	0
1	860310164908.668	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.27127750177162D+05	0.099	0.005672	0
1	860310164818.668	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.28794325567285D+05	0.078	0.003911	0
1	860310164728.668	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.30381640305719D+05	0.068	0.003468	0
1	860310164638.668	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.31885144438842D+05	0.034	-0.002393	0
1	860310164548.668	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.33300351204867D+05	0.018	-0.004979	0
1	860310164458.668	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.34622846661141D+05	0.013	-0.005256	0
1	860310164408.668	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.35848297212002D+05	-0.008	-0.008031	0
1	860310164318.668	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.36972461592441D+05	-0.036	-0.011450	0
1	860310164228.668	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.37991201880188D+05	-0.062	-0.012557	0
1	860310164138.668	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.38900499661076D+05	-0.078	-0.009970	0
1	860310164048.668	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.39696470301700D+05	-0.091	-0.004203	0
1	860310151732.724	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.17244043419924D+05	-0.920	0.012918	0
1	860310151642.724	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.18410225596990D+05	-0.834	0.010951	0
1	860310151552.724	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.19511716590148D+05	-0.746	0.007279	0

AODS OBSERVATION RESIDUALS REPORT FOR ITERATION NO. 1 OF BATCH NO. 2 (CON.)

TYPE	OBSERVATION TIME	STA. FOR	ID RET	TDRS FOR	ID RET	RANGE OBSERVED	RANGE RESIDUAL	RANGE PRED RESID	RANGE EDIT	DOPPLER/RANGE-RATE OBSERVED	DOPPLER/RANGE-RATE RESIDUAL	DOPPLER/RANGE-RATE PRED RESID	DOPPLER/RANGE-RATE EDIT
1	860310151502.724	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.20545376508243D+05	-0.640	0.005402	0
1	860310151412.724	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.21508201895896D+05	-0.539	0.000794	0
1	860310151322.724	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.22397336294009D+05	-0.426	-0.002783	0
1	860310151232.724	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.23210078801149D+05	-0.284	-0.001755	0
1	860310151142.724	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.23943896028034D+05	-0.173	-0.007298	0
1	860310151052.724	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.24596431964817D+05	-0.043	-0.009710	0
1	860310151002.724	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.25165521747052D+05	0.102	-0.008672	0
1	860310150912.724	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.25649202547403D+05	0.241	-0.008073	0
1	860310150822.724	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.26045729249880D+05	0.376	-0.007115	0
1	860310150732.724	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.26353586278729D+05	0.517	-0.003397	0
1	860310150642.724	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.26571503731414D+05	0.646	0.000293	0
1	860310150552.724	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.26698470003150D+05	0.796	0.011004	0
1	860310150502.724	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.26733747839125D+05	0.929	0.021577	0

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AODS OBSERVATION RESIDUALS REPORT FOR ITERATION NO. 2 OF BATCH NO. 2 EDIT LOOP NO. 1

EPOCH : 860310210924.26 START TIME : 860310210924.26 END TIME : 860310150502.72

TYPE	OBSERVATION TIME	STA. FOR	ID RET	TDRS FOR	ID RET	RANGE OBSERVED	RANGE RESIDUAL	RANGE PRED RESID	RANGE EDIT	DOPPLER/RANGE-RATE OBSERVED	DOPPLER/RANGE-RATE RESIDUAL	DOPPLER/RANGE-RATE PRED RESID	DOPPLER/RANGE-RATE EDIT
1	860310210924.259	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.41366060478390D+05	-0.040	-0.007796	0
1	860310210834.259	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.40183159240260D+05	-0.065	-0.012755	0
1	860310210744.259	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.38835378068341D+05	-0.055	-0.010411	0
1	860310210654.259	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.37323592233092D+05	-0.040	-0.007383	0
1	860310210604.259	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.35649615323721D+05	-0.046	-0.008383	0
1	860310210514.259	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.33816267287226D+05	-0.036	-0.006208	0
1	860310210424.259	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.31827438135988D+05	-0.033	-0.005389	0
1	860310210334.259	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.29688136862938D+05	-0.005	0.000239	0
1	860310210244.259	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.27404531984899D+05	0.019	0.005169	0
1	860310210154.259	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.24983972577020D+05	0.031	0.007831	0
1	860310210104.259	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.22434995081661D+05	0.054	0.012458	0
1	860310210014.259	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.19767306500920D+05	0.063	0.014509	0
1	860310193834.539	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.51317100887008D+05	0.097	0.033066	0
1	860310193744.539	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.50557785773674D+05	0.024	0.022419	0
1	860310193654.539	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.49612422919460D+05	-0.060	0.009549	0
1	860310193604.539	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.48478908875566D+05	-0.105	0.004604	0
1	860310193514.539	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.47155935210979D+05	-0.151	-0.000549	0
1	860310193424.539	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.45643087262951D+05	-0.191	-0.004604	0
1	860310193334.539	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.43940950259994D+05	-0.217	-0.005948	0
1	860310193244.539	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.42051210504213D+05	-0.228	-0.004252	0
1	860310193154.539	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.39976752442621D+05	-0.243	-0.003391	0
1	860310193104.539	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.37721750206834D+05	-0.266	-0.004299	0
1	860310193014.539	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.35291743943426D+05	-0.286	-0.004869	0
1	860310192924.539	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.32693703745326D+05	-0.296	-0.003363	0
1	860310192834.539	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.29936071000350D+05	-0.295	0.000031	0
1	860310192744.539	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.27028778158290D+05	-0.325	-0.003003	0
1	860310192654.539	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.23983237709072D+05	-0.338	-0.002765	0
1	860310165458.668	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.13635162124673D+05	0.589	-0.014613	0
1	860310165408.668	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.15724887333795D+05	0.625	-0.005801	0
1	860310165318.668	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.17768553944889D+05	0.640	-0.000757	0
1	860310165228.668	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.19761306612331D+05	0.657	0.004933	0
1	860310165138.668	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.21698321962329D+05	0.649	0.005919	0
1	860310165048.668	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.23574811014783D+05	0.647	0.008587	0
1	860310164958.668	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.25386024001726D+05	0.642	0.011154	0
1	860310164908.668	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.27127252801245D+05	0.596	0.005747	0
1	860310164818.668	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.28793836892317D+05	0.567	0.004056	0
1	860310164728.668	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.30381166581964D+05	0.542	0.003572	0
1	860310164638.668	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.31884690455581D+05	0.488	-0.002272	0
1	860310164548.668	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.33299920016103D+05	0.449	-0.004901	0
1	860310164458.668	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.34622439607521D+05	0.420	-0.005076	0
1	860310164408.668	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.35847913153930D+05	0.376	-0.007923	0
1	860310164318.668	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.36972097336757D+05	0.328	-0.011225	0
1	860310164228.668	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.37990851598482D+05	0.289	-0.012465	0
1	860310164138.668	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.38900154975089D+05	0.267	-0.009905	0
1	860310164048.668	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.39696120015188D+05	0.259	-0.004202	0
1	860310151732.724	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.17242503656195D+05	0.619	0.012773	0
1	860310151642.724	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.18408804487398D+05	0.587	0.010831	0
1	860310151552.724	10	3	7	0	0.00000000000000D+00	0.000	0.000000	0	0.19510426112779D+05	0.544	0.007165	0

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                    AODS OBSERVATION RESIDUALS REPORT FOR ITERATION NO.   2 OF BATCH NO.   2 (CON.)

     OBSERVATION    STA. ID TDRS ID    -------------------RANGE-------------------    ------------DOPPLER/RANGE-RATE------------
TYPE     TIME        FOR RET FOR RET      OBSERVED           RESIDUAL  PRED RESID EDIT      OBSERVED          RESIDUAL  PRED RESID EDIT

 1 860310151502.724  10   3   7   0 0.00000000000000D+00    0.000    0.000000 0 0.20544227700613D+05    0.509    0.005326  0
 1 860310151412.724  10   3   7   0 0.00000000000000D+00    0.000    0.000000 0 0.21507204625837D+05    0.459    0.000742  0
 1 860310151322.724  10   3   7   0 0.00000000000000D+00    0.000    0.000000 0 0.22396498996376D+05    0.412   -0.002821  0
 1 860310151232.724  10   3   7   0 0.00000000000000D+00    0.000    0.000000 0 0.23209408231965D+05    0.386   -0.001791  0
 1 860310151142.724  10   3   7   0 0.00000000000000D+00    0.000    0.000000 0 0.23943397007024D+05    0.326   -0.007339  0
 1 860310151052.724  10   3   7   0 0.00000000000000D+00    0.000    0.000000 0 0.24596107244957D+05    0.281   -0.009622  0
 1 860310151002.724  10   3   7   0 0.00000000000000D+00    0.000    0.000000 0 0.25165371576327D+05    0.252   -0.008577  0
 1 860310150912.724  10   3   7   0 0.00000000000000D+00    0.000    0.000000 0 0.25649224897605D+05    0.218   -0.008079  0
 1 860310150822.724  10   3   7   0 0.00000000000000D+00    0.000    0.000000 0 0.26045919280527D+05    0.186   -0.007084  0
 1 860310150732.724  10   3   7   0 0.00000000000000D+00    0.000    0.000000 0 0.26353936399335D+05    0.167   -0.003451  0
 1 860310150642.724  10   3   7   0 0.00000000000000D+00    0.000    0.000000 0 0.26572003452465D+05    0.146    0.000182  0
 1 860310150552.724  10   3   7   0 0.00000000000000D+00    0.000    0.000000 0 0.26699105875994D+05    0.161    0.010956  0
 1 860310150502.724  10   3   7   0 0.00000000000000D+00    0.000    0.000000 0 0.26734503647852D+05    0.173    0.021449  0
DC RESIDUALS REPORTS INCOMPLETE.
LAST RESIDUALS REPORT ARCHIVED AT 860310210924.26
REQUESTED END TIME IS 860311000000.00
```

DC SUMMARY AND STATISTICS REPORT FOR ITERATION NO. 1, BATCH NO. 2

EPOCH : 860310210924.26
START TIME : 860310210924.26
END TIME : 860310150502.72

NO CONVERGENCE/DIVERGENCE
TOTAL OBSERVATIONS AVAILABLE : 61
NO. OF OBSERVATIONS USED : 61

SOLVE-FOR PARAMETER SUMMARY

PARAMETER	CURRENT VALUE	CORRECTION	PREVIOUS VALUE	APRIORI VALUE
X	0.31157362870029D+04	-.45275461873109D+00	0.31161890416217D+04	0.31161890416217D+04
Y	0.30267843006450D+04	-.31875739435386D+01	0.30299718745885D+04	0.30299718745885D+04
Z	0.53360576408480D+04	0.13231475835530D+01	0.53347344932644D+04	0.53347344932644D+04
XDOT	-.30177603767359D+01	-.12949200587991D-02	-.30164654566771D+01	-.30164654566771D+01
YDOT	-.51826167363376D+01	-.22186098304974D-02	-.51803981265071D+01	-.51803981265071D+01
ZDOT	0.46882430149244D+01	-.25786465710013D-02	0.46908216614954D+01	0.46908216614954D+01
DRAG	0.92447373057039D+03	0.28871717919719D+04	-.19626980614016D+04	-.19626980614016D+04
BIAS1	-.80831469363783D+03	-.57741174975037D+01	-.80254057614033D+03	-.80254057614033D+03

INNER LOOP STATISTICS

LOOP NO.	SIGMA EDITING PARAMETER	QUALITY CONTROL PARAMETER	RMS
1	0.1500950E+02	0.5632427E+03	0.3063883D+01

LINEARITY INDICATOR : F

DC SUMMARY AND STATISTICS REPORT FOR ITERATION NO. 2, BATCH NO. 2

EPOCH : 860310210924.26
START TIME : 860310210924.26
END TIME : 860310150502.72

CONVERGE - CODE : 1
TOTAL OBSERVATIONS AVAILABLE : 61
NO. OF OBSERVATIONS USED : 61

SOLVE-FOR PARAMETER SUMMARY

PARAMETER	CURRENT VALUE	CORRECTION	PREVIOUS VALUE	APRIORI VALUE
X	0.31157356192212D+04	-.66778176334825D-03	0.31157362870029D+04	0.31161890416217D+04
Y	0.30267861821766D+04	0.18815316454770D-02	0.30267843006450D+04	0.30299718745885D+04
Z	0.53360569764857D+04	-.66436231074513D-03	0.53360576408480D+04	0.53347344932644D+04
XDOT	-.30177588789664D+01	0.14977695292195D-05	-.30177603767359D+01	-.30164654566771D+01
YDOT	-.51826147118912D+01	0.20244463585460D-05	-.51826167363376D+01	-.51803981265071D+01
ZDOT	0.46882427981861D+01	-.21673822267915D-06	0.46882430149244D+01	0.46908216614954D+01
DRAG	0.91617635168556D+03	-.82973788848245D+01	0.92447373057039D+03	-.19626980614016D+04
BIAS1	-.80830051884258D+03	0.14174795246925D-01	-.80831469363783D+03	-.80254057614033D+03

INNER LOOP STATISTICS

LOOP NO.	SIGMA EDITING PARAMETER	QUALITY CONTROL PARAMETER	RMS
1	0.7905127E+00	0.1589488E+01	0.1627620D+00

LINEARITY INDICATOR : F

REPORT INCOMPLETE - REQUESTED END TIME IS : 860311000000.00

LAST SUMMARY AND STATISTICS REPORT TIME IS : 860310210924.26

APPENDIX B - OBSERVATION DATA LOG

This appendix contains all observation data collected during the demonstration. The initial TDRS and SME state data are presented before the listing for each day's data. Both the hexadecimal accumulator reading and the processed observation are given where available. A computed residual based on the given initial conditions is also included when available.

INITIAL TDRS VECTOR	860204000000.00	
	X	-.23697344880000D+04
	Y	0.42102340020000D+05
	Z	0.43019127590000D+03
	XDOT	-.30693838010000D+01
	YDOT	-.17206987720000D+00
	ZDOT	0.23381977030000D-01
	ID	7
	REFTIM	0.86020400000000D+12

INITIAL USER VECTOR	860204000000.00	
	X	-.20928594420000D+04
	Y	0.23791584710000D+03
	Z	-.65658694190000D+04
	XDOT	0.68357288480000D+01
	YDOT	0.25617893790000D+01
	ZDOT	-.20881442230000D+01
	DRAG	0.00000000000000D+00
	FREQ1	0.00000000000000D+00
	FREQ2	0.00000000000000D+00
	FREQ3	0.00000000000000D+00
	SOLVE-X	1
	SOLVE-Y	1
	SOLVE-Z	1
	SOLVE-XDOT	1
	SOLVE-YDOT	1
	SOLVE-ZDOT	1
	SOLVE-DRAG	0
	SOLVE-FREQ1	0
	SOLVE-FREQ2	0
	SOLVE-FREQ3	0
	REF. TIME	0.86020400000000D+12

PASS START TIME 860204151400.00 PASS END TIME 860204152300.00

TIME TAG	ACCUMULATOR IN HEX	PROCESSED OBSERVATION	INITIAL RESIDUAL
860204151501.	0A2B057255	27813.881	
860204151511.	1455A1A1D3	27702.871	
860204151521.	1E7FCE167F	27585.039	
860204151531.	28A987752D	27463.667	
860204151541.	32D2CA6CEE	27338.799	
860204151551.	3CFB93A8FA	27210.417	
860204151601.	4723DFE0C5	27078.572	
860204151611.	514BABCA0F	26943.258	
860204151621.	5B72F422DA	26804.508	
860204151631.	6599B5A9CE	26662.324	
860204151641.	6FBFED25F8	26516.743	
860204151651.	79E59765ED	26367.794	
860204151701.	840AB13814	26215.477	
860204151711.	8E2F376F28	26059.809	
860204151721.	985326E54F	25900.822	
860204151731.	A2767C7A39	25738.538	
860204151741.	AC99350E47	25572.959	
860204151751.	B6BB4D8E42	25404.138	
860204151801.	C0DCC2E72F	25232.074	
860204151811.	CAFD92089B	25056.779	
860204151821.	D51DB7ED85	24878.300	
860204151831.	DF3D31954E	24696.654	
860204151841.	E95BFBFE30	24511.837	
860204151851.	F37A143983	24323.927	
860204151901.	FD97774ED2	24132.885	
860204151911.	07B4225318	23938.765	
860204151921.	11D0125318	23741.534	
860204151931.	1BEB4496D8	23541.436	
860204151941.	2605B61AC5	23338.160	
860204151951.	301F641A8C	23131.965	
860204152001.	3A384BC543	22922.800	
860204152011.	44506A5276	22710.701	
860204152021.	4E67BCFDBB	22495.683	
860204152031.	587E410BD8	22277.784	
860204152041.	6293F3C831	22057.033	
860204152051.	6CA8D2813C	21833.440	
860204152101.	76BCDA8A62	21607.028	
860204152111.	80D0093F62	21377.829	
860204152121.	8AE25C04C8	21145.881	
860204152131.	94F3D04183	20911.193	
860204152141.	9F04636633	20673.805	
860204152151.	A91412EAAB	20433.747	
860204152201.	B322DC4D9D	20191.047	
860204152211.	BD30BD0E68	19945.708	
860204152221.	C73DB2B6B0	19697.772	
860204152231.	D149BAD632	19447.264	
860204152241.	DB54D30947	19194.237	

PASS START TIME 860204164200.00 PASS END TIME 860204170100.00

TIME TAG	ACCUMULATOR IN HEX	PROCESSED OBSERVATION	INITIAL RESIDUAL
	5045F9B906		
860204164419.	5AAA1A2700	43231.307	
860204164429.	650DD6185C	43125.332	
860204164439.	6F712980F5	43015.088	
860204164449.	79D40F9E75	42899.826	
860204164459.	843683B29D	42779.561	
860204164509.	8E98810A13	42654.339	
860204164519.	98FA02F971	42524.192	
860204164529.	A35B04D702	42389.128	
860204164539.	ADBB820000	42249.174	
860204164549.	B81B75DF78	42104.389	
860204164559.	C27ADBE09E	41954.772	
860204164609.	CCD9AF7974	41800.368	
860204164619.	D737EC2538	41641.199	
860204164629.	E1958D6BB9	41477.316	
860204164639.	EBF28ED84A	41308.734	
860204164649.	F64EEC001F	41135.494	
860204164659.	00AAA08046	40957.628	
860204164709.	0B05A7F826	40775.145	
860204164719.	155FFE1804	40588.115	
860204164729.	1FB99E9286	40396.548	
860204164739.	2A12851F88	40200.466	
860204164749.	346AAD8528	39999.926	
860204164759.	3EC2138D8F	39794.947	
860204164809.	4918B30CE2	39585.568	
860204164819.	536E87DD9D	39371.816	
860204164829.	5DC38DE2E6	39153.727	
860204164839.	6817C10A91	38931.344	
860204164849.	726B1D45EF	38704.683	
860204164859.	7CBD9E92D4	38473.794	
860204164909.	870F40F462	38238.699	
860204164919.	9160007975	37999.448	
860204164929.	9BAFD93655	37756.061	
860204164939.	A5FEC74B55	37508.589	
860204164949.	B04CC6DB2A	37257.042	
860204164959.	BA99D41590	37001.473	
860204165009.	C4E5EB3617	36741.930	
860204165019.	CF310878A5	36478.416	
860204165029.	D97B2826EE	36210.987	
860204165039.	E3C44693DF	35939.682	
860204165229.	54A2474B68		
860204165239.	5EDE43DD47	32394.212	
860204165249.	6919126E45	32075.714	
860204165259.	7352AFCE38	31753.854	
860204165309.	7D8B18D15F	31428.650	
860204165319.	87C24A5655	31100.144	
860204165329.	91F84144C1	30768.374	
860204165339.	9C2CFA9240	30433.398	
860204165349.	A6607336C7	30095.224	
860204165359.	B092A83650	29753.903	
860204165409.	BAC3969E62	29409.474	
860204165419.	C4F33B888F	29061.986	
860204165429.	CF21940B7D	28711.428	
860204165439.	D94E9D58CA	28357.911	

PASS START TIME 860204164200.00 PASS END TIME 860204170100.00

TIME TAG	ACCUMULATOR IN HEX	PROCESSED OBSERVATION	INITIAL RESIDUAL
860204165449.	E37A549E1E	28001.417	
860204165459.	EDA4B71623	27642.002	
860204165509.	F7CDC2054F	27279.705	
860204165519.	01F572BBBE	26914.573	
860204165529.	0C1BC88EAD	26548.739	
860204165539.	1640BADE30	26173.808	
860204165549.	20644D1468	25802.479	
860204165559.	2A867AA230	25426.342	
860204165609.	34A7410665	25047.563	
860204165619.	3EC69DC7CC	24666.176	
860204165629.	48E48E7264	24282.201	
860204165639.	530110A12A	23895.701	
860204165649.	5D1C21F314	23506.692	
860204165659.	6735C017E5	23115.244	
860204165709.	714DE8C187	22721.364	
860204165719.	7B6499AC99	22325.098	
860204165729.	8579D0A2DA	21926.499	
860204165739.	8F8D8B768F	21525.602	
860204165749.	999FC8013B	21122.437	
860204165759.	A3B084260E	20717.045	
860204165809.	ADBFBDD0CB	20309.460	
860204165819.	B7CD72FB34	19899.740	
860204165829.	C1D9A1A148	19487.894	
860204165839.	CBE447D0FB	19073.997	
860204165849.	D5ED63A052	18658.081	
860204165859.	DFF4F32B6D	18240.171	
860204165909.	E9FAF49B08	17820.321	
860204165919.	F3FF6619AC	17398.536	
860204165929.	FE0245E75F	16974.906	
860204165939.	08039243AA	16549.428	
860204165949.	1203498116	16122.181	
860204165959.	1C0169F410	15693.172	
860204170009.	25FDF1FB68	15262.445	
860204170019.	2FF8E000EE	14830.045	
860204170029.	39F2327AE9	14396.022	
860204170039.	43E9E7E64A	13960.406	
860204170049.	4DDFFEC8F2	13523.231	
860204170059.	57D475B63A	13084.554	

PASS START TIME 860204182700.00 PASS END TIME 860204183300.00

TIME TAG	ACCUMULATOR IN HEX	PROCESSED OBSERVATION	INITIAL RESIDUAL
860204182749.	0A3F7E33D5	33340.870	
860204182759.	147D766131	32929.543	
860204182809.	1EB9E4BC2E	32514.212	
860204182819.	28F4C67AD8	32095.940	
860204182829.	332E18DE37	31674.772	
860204182839.	3D65D931B2	31250.750	
860204182849.	479C04CCE4	30823.926	
860204182859.	51D0990DCB	30394.325	
860204182909.	5C03936381	29962.018	
860204182919.	6634F13FF9	29527.016	
860204182929.	7064B02505	29089.385	
860204182939.	7A92CD9D38	28649.162	
860204182949.	84BF473FD9	28206.397	
860204182959.	8EEA1AAC88	27761.127	
860204183009.	9913458F85	27313.402	
860204183019.	A33AC59D09	26863.256	
860204183029.	AD609892BD	26410.727	
860204183039.	B784BC3BF9	25955.872	
860204183049.	C1A72E6F51	25498.738	
860204183059.	CBC7ED0A70	25039.352	
860204183109.	D5E6F5F945	24577.775	
860204183119.	E00447300E	24114.040	
860204183129.	EA1FDEADC4	23648.191	
860204183139.	F439BA7958	23180.262	
860204183149.	FE51D8AB4D	22710.325	
860204183159.	08683760EA	22238.399	
860204183209.	127CD4C46F	21764.538	
860204183219.	1C8FAF066F	21288.768	
860204183229.	26A0C4666C	20811.150	
860204183239.	30B0132F14	20331.730	
860204183249.	3ABD99B2B0	19850.540	
860204183259.	44C9564C3B	19367.616	

INITIAL TDRS VECTOR	860206120000.00	
	X	0.40857264000000D+04
	Y	-.41959400900000D+05
	Z	-.44286610000000D+03
	XDOT	0.30604355000000D+01
	YDOT	0.29924570000000D+00
	ZDOT	-.22662400000000D-01
	ID	7
	REF. TIME	0.86020612000000D+12

INITIAL USER VECTOR	860206120000.00	
	X	-.40538949000000D+04
	Y	-.74937770000000D+03
	Z	-.55260816000000D+04
	XDOT	0.55265827000000D+01
	YDOT	0.27450692000000D+01
	ZDOT	-.44306542000000D+01
	DRAG	0.00000000000000D+00
	FREQ1	0.00000000000000D+00
	FREQ2	0.00000000000000D+00
	FREQ3	0.00000000000000D+00
	SOLVE-X	1
	SOLVE-Y	1
	SOLVE-Z	1
	SOLVE-XDOT	1
	SOLVE-YDOT	1
	SOLVE-ZDOT	1
	SOLVE-DRAG	0
	SOLVE-FREQ1	0
	SOLVE-FREQ2	0
	SOLVE-FREQ3	0
	REF. TIME	0.86020612000000D+12

PASS START TIME 860206160900.00 PASS END TIME 860206162700.00

TIME TAG	ACCUMULATOR IN HEX	PROCESSED OBSERVATION	INITIAL RESIDUAL
	F40E6D1DFE		
860206160909.178	FE150499BF	17978.563	
860206160919.178	086AF7F779	39404.035	
860206160929.178	12C0D0F0F0	39376.202	
860206160939.178	1D168AE341	39343.480	178.883
860206160949.178	276C212EB6	39305.881	
860206160959.178	31C18F33B2	39263.406	
860206161009.178	3C16D05BBA	39216.092	179.177
860206161019.178	466BE013A4	39163.954	
860206161029.178	50C0B9CD66	39107.012	
860206161039.178	5B1558FC6E	39045.273	179.465
860206161049.178	6569B91C41	38978.770	
860206161059.178	6FBDD5AE15	38907.525	
860206161109.178	7A11AA3378	38831.542	179.756
860206161119.178	8465323573	38750.850	
860206161129.178	8EB869421E	38665.470	
860206161139.178	990B4AEB4A	38575.417	180.023
860206161149.178	A35DD2CCBD	38480.734	
860206161159.178	ADAFFC821E	38381.418	
860206161209.178	B801C38099	38277.312	180.297
860206161219.178	C25323FFF8	38169.218	
860206161229.178	CCA4191EF8	38055.977	
860206161239.178	D6F49EC158	37938.401	180.552
860206161249.178	E144B0A1A3	37816.320	
860206161259.178	EB944A80B1	37689.761	
860206161309.178	F5E3682283	37558.736	180.813
860206161319.178	0032055164	37423.272	
860206161329.178	0A801DE529	37283.423	
860206161339.178	14CDADB46E	37139.186	181.059
860206161349.178	1F1AB09CF9	36990.589	
860206161359.178	296722853B	36837.669	
860206161409.178	33B2FF54F5	36680.430	181.295
860206161419.178	3DFE430162	36518.928	
860206161429.178	4848E98009	36353.164	
860206161439.178	5292EED07C	36183.181	181.522
860206161449.178	5CDC4EFADF	36009.012	
860206161459.178	67250609B6	35830.668	
860206161509.178	716D10115B	35648.190	181.757
860206161519.178	7BB4692A9E	35461.595	
860206161529.178	85FB0D76BB	35270.919	
860206161539.178	9040F91FCD	35076.198	181.984
860206161549.178	9A86285046	34877.433	
860206161559.178	A4CA974195	34674.687	
860206161609.178	AF0E423026	34467.971	182.195
860206161619.178	B951255E96	34257.310	
860206161629.178	C3933D1BC3	34042.756	
860206161639.178	CDD485B9F3	33824.323	182.410
860206161649.178	D814FB9274	33602.039	
860206161659.178	E2549B0719	33375.940	
860206161709.178	EC936080CF	33146.054	182.617
860206161719.178	F6D148711D	32912.418	
860206161729.178	010E4F4F39	32675.054	
860206161739.178	0B4A719998	32433.993	182.817
860206161749.178	1585ABD86C	32189.274	

PASS START TIME 860206160900.00 PASS END TIME 860206162700.00

TIME TAG	ACCUMULATOR IN HEX	PROCESSED OBSERVATION	INITIAL RESIDUAL
860206161759.178	1FBFFA9B2A	31940.928	
860206161809.178	29F95A7621	31688.974	183.002
860206161819.178	3431C8092B	31433.461	
860206161829.178	3E693FF87A	31174.405	
860206161839.178	489FBEF2BD	30911.851	183.168
860206161849.178	52D541AF6C	30645.834	
860206161859.178	5D09C4EA97	30376.373	
860206161909.178	673D456B29	30103.513	183.334
860206161919.178	716FBFFEB8	29827.282	
860206161929.178	7BA1317969	29547.706	
860206161939.178	85D196BA3D	29264.830	183.518
860206161949.178	9000ECA56D	28978.676	
860206161959.178	9A2F302954	28689.285	
860206162009.178	A45C5E3C7C	28396.692	183.658
860206162019.178	AE8873DAA9	28100.917	
860206162029.178	B8B36E0D88	27802.019	
860206162039.178	C2DD49E32F	27500.014	183.793
860206162049.178	CD06047153	27194.936	
860206162059.178	D72D9AD625	26886.817	
860206162109.178	E1540A3AB8	26575.704	183.916
860206162119.178	EB794FD060	26261.631	
860206162129.178	F59D68CB0A	25944.607	
860206162139.178	FFC0526F49	25624.702	184.041
860206162149.178	09E209FF5A	25301.906	
860206162159.178	14028CD129	24976.300	
860206162209.178	1E21D83CB3	24647.893	184.121
860206162219.178	283FE9A4A0	24316.729	
860206162229.178	325CBE78C6	23982.861	
860206162239.178	3C785425E5	23646.277	184.211
860206162249.178	4692A82C65	23307.059	
860206162259.178	50ABB80E1C	22965.212	
860206162309.178	5AC3815BA1	22620.796	184.301
860206162319.178	64DA01A768	22273.820	
860206162329.178	6EEF3691C8	21924.341	
860206162339.178	79031DC535	21572.399	184.379
860206162349.178	8315B4F022	21218.013	
860206162359.178	8D26F9CB7E	20861.225	
860206162409.178	9736EA182E	20502.067	184.457
860206162419.178	A145839F54	20140.575	
860206162429.178	AB52C437A5	19776.803	
860206162439.178	B55EA9BB35	19410.765	184.522
860206162449.178	BF69321007	19042.511	
860206162459.178	C9725B22FE	18672.069	
860206162509.178	D37A22EB67	18299.482	184.582
860206162519.178	DD80876891	17924.784	
860206162529.178	E78586A3FC	17548.014	
860206162539.178	F1891EB113	17169.216	184.680
860206162549.178	FB8B4DA863	16788.410	
860206162559.178	058C11A814	16405.618	
860206162609.178	0F8B68E1CC	16020.922	184.699
860206162619.178	1989518A7C	15634.335	
860206162629.178	2385C9E628	15245.919	
860206162639.178	2D80D0389C	14855.673	184.745
860206162649.178	377A62D176	14463.645	
860206162659.178	4172800A81	14069.878	

PASS START TIME 860206174400.00 PASS END TIME 860206180100.00

TIME TAG	ACCUMULATOR IN HEX	PROCESSED OBSERVATION	INITIAL RESIDUAL
860206174416.061	0A7A613CB8	49239.256	
860206174426.061	14F447B1A9	49109.770	
860206174436.061	1F6DAD48D8	48973.865	
860206174446.061	29E68CCA99	48832.458	180.220
860206174456.061	345EE105AB	48685.575	
860206174506.061	3ED6A4D4D0	48533.266	
860206174516.061	494DD31B89	48375.566	180.469
860206174526.061	53C466C71B	48212.516	
860206174536.061	5E3A5AC933	48044.134	
860206174546.061	68AFAA22FF	47870.483	180.712
860206174556.061	73244FDD4F	47691.596	
860206174606.061	7D9847091F	47507.506	
860206174616.061	880B8AC1DB	47318.255	180.946
860206174626.061	927E162DBB	47123.889	
860206174636.061	9CEFE47B9B	46924.443	
860206174646.061	A760F0DF2C	46719.936	181.118
860206174656.061	B1D136A0CA	46510.455	
860206174706.061	BC40B105D2	46295.986	
860206174716.061	C6AF5B665B	46076.608	181.403
860206174726.061	D11D31229D	45852.352	
860206174736.061	DB8A2DA2C3	45623.253	
860206174746.061	E5F64C5A00	45389.355	181.615
860206174756.061	F06188C512	45150.697	
860206174806.061	FACBDE6C6D	44907.329	
860206174816.061	053548DDAB	44659.271	181.824
860206174826.061	0F9DC3B473	44406.582	
860206174836.061	1A054A94A1	44149.294	
860206174846.061	246BD92D57	43887.455	182.025
860206174856.061	2ED16B34F7	43621.093	
860206174906.061	3935FC6D87	43350.258	
860206174916.061	439988A4B1	43074.998	182.204
860206174926.061	4DFC0BB038	42795.344	
860206174936.061	585D817271	42511.351	
860206174946.061	62BDE5D251	42223.035	182.380
860206174956.061	6D1D34C38A	41930.450	
860206175006.061	777B6A4905	41633.659	
860206175016.061	81D8826A11	41332.680	182.577
860206175026.061	8C34793ABF	41027.564	
860206175036.061	968F4AD54D	40718.338	
860206175046.061	A0E8F3639C	40405.067	182.747
860206175056.061	AB416F140C	40087.768	
860206175106.061	B598BA244B	39766.504	
860206175116.061	BFEED0D868	39441.303	182.896
860206175126.061	CA43AF7ECF	39112.206	
860206175136.061	D497527497	38779.274	
860206175146.061	DEE9B61E55	38442.538	183.045
860206175156.061	E93AD6E834	38102.029	
860206175206.061	F38AB14B9F	37757.802	
860206175216.061	FDD941CA3A	37409.890	183.177
860206175226.061	082684F1D3	37058.344	
860206175236.061	1272775992	36703.203	
860206175246.061	1CBD15A272	36344.506	183.305
860206175256.061	27065C792B	35982.302	

PASS START TIME 860206174400.00 PASS END TIME 860206180100.00

TIME TAG	ACCUMULATOR IN HEX	PROCESSED OBSERVATION	INITIAL RESIDUAL
860206175306.061	314E4892C8	35616.626	
860206175316.061	3B94D6AE0E	35247.517	183.422
860206175326.061	45DA0397F7	34875.033	
860206175336.061	501DCC1F48	34499.184	
860206175346.061	5A602D280F	34120.055	183.562
860206175356.061	64A1239B55	33737.668	
860206175406.061	6EE0AC6A0A	33352.055	
860206175416.061	791EC4940B	32963.277	183.667
860206175448.006	835AD9D3B7	32420.239	
860206175458.006	8D92C7DFC1	31298.968	183.781
860206175508.006	97C936474B	30894.372	
860206175518.006	A1FE22474E	30486.864	
860206175528.006	AC31892862	30076.490	183.850
860206175538.006	B663683AD8	29663.284	
860206175548.006	C093BCDC7F	29247.300	
860206175558.006	CAC2846E3E	28828.552	183.903
860206175608.006	D4EFBC6566	28407.123	
860206175618.006	DF1B623B3C	27983.030	
860206175628.006	E94573745F	27556.319	183.964
860206175638.006	F36DED9EEE	27127.030	
860206175648.006	FD94CE5572	26695.213	
860206175658.006	07BA133A88	26260.903	184.047
860206175708.006	11DDB9FE79	25824.155	
860206175718.006	1BFFC05A71	25385.006	
860206175728.006	2620240FF1	24943.491	184.110
860206175738.006	303EE2E857	24499.641	
860206175748.006	3A5BFABBFB	24053.518	
860206175758.006	4477696BF8	23605.159	184.129
860206175808.006	4E912CE672	23154.617	
860206175818.006	58A9432071	22701.921	
860206175828.006	62BFAA189A	22247.110	184.165
860206175838.006	6CD45FD846	21790.228	
860206175848.006	76E76274D6	21331.325	
860206175858.006	80F8B010D1	20870.455	184.185
860206175908.006	8B0846D555	20407.646	
860206175918.006	951624F310	19942.927	
860206175928.006	9F2248ABBC	19476.370	184.221
860206175938.006	A92CB0403B	19007.971	
860206175948.006	B3355A07B6	18537.822	
860206175958.006	BD3C445E07	18065.942	184.216
860206180008.006	C7416DAAEF	17592.380	
860206180018.006	D144D45F76	17117.175	
860206180028.006	DB4676F543	16640.362	184.263
860206180038.006	E54653F502	16162.002	
860206180048.006	EF4469EECC	15682.127	
860206180058.006	F940B779B8	15200.765	184.260

PASS START TIME 860206203100.00 PASS END TIME 860206205000.00

TIME TAG	ACCUMULATOR IN HEX	PROCESSED OBSERVATION	INITIAL RESIDUAL
860206203113.328	0A07294CEA	18132.592	
860206203123.328	14108C53C5	18733.187	
860206203133.328	1E1C24F99C	19329.701	
860206203143.328	2829EF5FEF	19922.134	
860206203154.328	3239E789C9	20510.361	
860206203203.328	3C4C096027	21094.275	
860206203213.328	466050BAC1	21673.804	
860206203223.328	5076B951FB	22248.820	
860206203233.328	5A8F3EC9AF	22819.238	
860206203243.328	64A9DCAA6F	23384.945	
860206203253.328	6EC68E6ABF	23945.868	
860206203303.328	78E54F65AF	24501.892	
860206203313.328	83061AE77A	25052.958	
860206203323.328	8D28EC2382	25598.962	
860206203333.328	974DBE3753	26139.815	
860206203343.328	A1748C2E38	26675.441	
860206203353.328	AB9D50FCD0	27205.747	
860206203403.328	B5C80785D8	27730.660	
860206203413.328	BFF4AA9814	28250.097	
860206203423.328	CA2334F1E2	28763.990	
860206203433.328	D453A13F55	29272.264	
860206203443.328	DE85EA183D	29774.836	
860206203453.328	E8BA0A06A5	30271.649	
860206203503.328	F2EFFB8316	30762.631	
860206203513.328	FD27B8F75A	31247.721	172.291
860206203523.328	07613CBB90	31726.847	
860206203533.328	119C811C80	32199.961	
860206203543.328	1BD98052C8	32666.980	172.622
860206203553.328	2618349050	33127.878	
860206203603.328	305897F126	33582.563	
860206203613.328	3A9AA48B45	34031.011	172.946
860206203623.328	44DE546766	34473.168	
860206203633.328	4F23A1807C	34908.976	
860206203643.328	596A85C65D	35338.389	173.273
860206203653.328	63B2FB21C6	35761.379	
860206203703.328	6DFCFB67F4	36177.865	
860206203713.328	7848806DD0	36587.846	173.604
860206203723.328	829583F661	36991.248	
860206203733.328	8CE3FFC46F	37388.071	
860206203743.328	9733ED8C5C	37778.254	173.918
860206203753.328	A18546FBE7	38161.770	
860206203803.328	ABD805B915	38538.588	
860206203813.328	B62C2360D5	38908.670	174.223
860206203823.328	C081998C68	39272.002	
860206203833.328	CAD861D043	39628.562	
860206203843.328	D53075B705	39978.311	174.496
860206203853.328	DF89CEC843	40321.237	
860206203903.328	E9E4668606	40657.316	
860206203913.328	F440366FD3	40986.538	174.818
860206203923.328	FE9D37FAEF	41308.860	
860206203933.328	08FB649C2E	41624.282	
860206203943.328	135AB5C802	41932.801	175.107
860206203953.328	1DBB24ED13	42234.394	

PASS START TIME 860206203100.00 PASS END TIME 860206205000.00

TIME TAG	ACCUMULATOR IN HEX	PROCESSED OBSERVATION	INITIAL RESIDUAL
860206204003.328	281CAB7C00	42529.068	
860206204013.328	327F42DB9C	42816.783	175.414
860206204023.328	3CE2E4766C	43097.555	
860206204033.328	474789B316	43371.368	
860206204043.328	51AD2BF8CA	43638.223	175.712
860206204053.328	5C13C4AD90	43898.116	
860206204103.328	667B4D394C	44151.055	
860206204113.328	70E3BF002A	44397.025	176.015
860206204123.328	7B4D13686C	44636.033	
860206204133.328	85B743D731	44868.075	
860206204143.328	902249B6EF	45093.174	176.301
860206204153.328	9A8E1E7051	45311.322	
860206204203.328	A4FABB7076	45522.537	
860206204213.328	AF681A2490	45726.819	176.600
860206204223.328	B9D633F8CF	45924.165	
860206204233.328	C445026191	46114.608	
860206204243.328	CEB47ED33A	46298.148	176.876
860206204253.328	D924A2C434	46474.793	
860206204303.328	E39567B16E	46644.571	
860206204313.328	EE06C718EC	46807.486	
860206204323.328	F878BA80CC	46963.571	177.210
860206204333.328	02EB3B6E86	47112.823	
860206204343.328	0D5E437082	47255.280	
860206204353.328	17D1CC171F	47390.949	177.481
860206204403.328	2245CEF365	47519.833	
860206204413.328	2CBA45A50F	47641.993	
860206204423.328	372F29CBE4	47757.429	177.734
860206204433.328	41A4750AAE	47866.153	
860206204443.328	4C1A210F21	47968.211	
860206204453.328	5690278AA8	48063.617	177.974
860206204503.328	6106823300	48152.389	
860206204513.328	6B7D2AC7D6	48234.569	
860206204523.328	75F41B0E0C	48310.178	178.199
860206204533.328	806B4CD301	48379.250	
860206204543.328	8AE2B9E78A	48441.800	
860206204553.328	955A5C24B5	48497.862	178.426
860206204616.486	9FD2221776	48535.522	
860206204626.486	AA4A48F46D	48637.730	
860206204636.486	B4C28AC72A	48666.162	178.730
860206204646.486	BF3AE19100	48688.273	
860206204656.486	C9B3475B7C	48704.095	
860206204706.486	D42BB63852	48713.662	178.925
860206204716.486	DEA4284147	48717.007	
860206204726.486	E91C979B35	48714.177	
860206204736.486	F394FE76A5	48705.219	179.122
860206204746.486	FE0D570420	48690.133	
860206204756.486	08859B7F62	48668.966	
860206204806.486	12FDC63057	48641.767	179.301
860206204816.486	1D75D166B8	48608.569	
860206204826.486	27EDB77863	48569.397	
860206204836.486	326572CADB	48524.315	179.478
860206204846.486	3CDCFDCB23	48473.355	
860206204856.486	475452EAE4	48416.536	

INITIAL TDRS VECTOR	860210140000.00	
	X	0.26806963600000D+05
	Y	-.32528894600000D+05
	Z	-.53977990000000D+03
	XDOT	0.23729623000000D+01
	YDOT	0.19564756000000D+01
	ZDOT	-.16008000000000D-02
	ID	7
	REF. TIME	0.86021014000000D+12

INITIAL USER VECTOR	860210140000.00	
	X	-.46633298000000D+04
	Y	-.14524350000000D+04
	Z	-.48657075000000D+04
	XDOT	0.45996872000000D+01
	YDOT	0.29316564000000D+01
	ZDOT	-.52898710000000D+01
	DRAG	0.15000000000000D+01
	FREQ1	0.58000000000000D+01
	FREQ2	0.00000000000000D+00
	FREQ3	0.00000000000000D+00
	SOLVE-X	1
	SOLVE-Y	1
	SOLVE-Z	1
	SOLVE-XDOT	1
	SOLVE-YDOT	1
	SOLVE-ZDOT	1
	SOLVE-DRAG	1
	SOLVE-FREQ1	1
	SOLVE-FREQ2	0
	SOLVE-FREQ3	0
	REF. TIME	0.86021014000000D+12

PASS START TIME 860210164400.00 PASS END TIME 860210165400.00

TIME TAG	ACCUMULATOR IN HEX	PROCESSED OBSERVATION	INITIAL RESIDUAL
860210164428.702	0A4502EBDD	34830.748	
860210164438.702	1489AE501F	34738.437	
860210164448.702	1ECD571794	34465.700	
860210164458.702	290FF9B636	34189.222	
860210164508.702	335192A9C5	33909.044	
860210164518.702	3D921E77F1	33625.198	
860210164528.702	47D199AB73	33337.705	
860210164538.702	521000DDD4	33046.626	
860210164548.702	5C4D50AD31	32751.980	
860210164558.702	668985C121	32453.806	
860210164608.702	70C49CCAB1	32152.143	
860210164618.702	7AFE9283AB	31847.027	
860210164628.702	853763AC66	31538.485	
860210164638.702	8F6F0D0DE9	31226.552	
860210164648.702	99A58B7DBA	30911.280	
860210164658.702	A3DADBD9CE	30592.705	
860210164708.702	AE0EFB081F	30270.858	
860210164718.702	B841E5F4E4	29945.766	
860210164728.702	C2739999AA	29617.484	
860210164738.702	CCA412F57E	29286.033	
860210164748.702	D6D34F123C	28951.460	
860210164758.702	E1014AFFE3	28613.789	
860210164808.702	EB2E03DB39	28273.072	
860210164818.702	F55976C912	27929.343	
860210164828.702	FF83A0FA9A	27582.653	
860210164838.702	09AC7FA053	27232.999	
860210164848.702	13D40FFB3F	26880.449	
860210164858.702	1DFA4F5502	26525.038	
860210164908.702	281F3AFCB3	26166.789	
860210164918.702	3242D04ECA	25805.758	
860210164928.702	3C650CAB12	25441.957	
860210164938.702	4685ED833D	25075.461	
860210164948.702	50A5704D6F	24706.287	
860210164958.702	5AC3928722	24334.467	
860210165008.702	64E051BC0A	23960.058	
860210165018.702	6EFBAB7DC5	23583.085	
860210165028.702	79159D656F	23203.580	
860210165038.702	832E251A45	22821.599	
860210165048.702	8D45404996	22437.168	
860210165058.702	975AECAA49	22050.327	
860210165108.702	A16F27FD55	21661.118	
860210165118.702	AB81F00DAD	21269.580	
860210165128.702	B59342AF28	20875.751	
860210165138.702	BFA31DBB76	20479.655	
860210165148.702	C9B17F1AAC	20081.352	
860210165158.702	D3BE64B8F8	19680.857	
860210165208.702	DDC9CC920A	19278.236	
860210165218.702	E7D3B4A668	18873.507	
860210165228.702	F1DC1B037E	18466.724	
860210165238.702	FBE2FDBD3A	18057.915	
860210165248.702	05E85AF355	17647.127	
860210165258.702	0FEC30CD31	17234.391	
860210165308.702	19EE7D7E50	16819.759	

PASS START TIME 860210164400.00 PASS END TIME 860210165400.00

TIME TAG	ACCUMULATOR IN HEX	PROCESSED OBSERVATION	INITIAL RESIDUAL
860210165318.702	23EF3F3F93	16403.252	
860210165328.702	2DEE7455DC	15984.919	
860210165338.702	37EC1B10E5	15564.806	
860210165348.702	41E831C83E	15142.944	
860210165358.702	4BE2B6D51E	14719.340	

PASS START TIME 860210181200.00 PASS END TIME 860210182700.00

TIME TAG	ACCUMULATOR IN HEX	PROCESSED OBSERVATION	INITIAL RESIDUAL
860210181217.84	0A7C41B3BA	49745.962	
860210181227.84	14F7DE1D69	49571.646	
860210181237.84	1F72D08607	49392.356	
860210181247.84	29ED13DA00	49207.713	
860210181257.84	3466A30A9F	49017.737	
860210181307.84	3EDF791666	48822.481	
860210181317.84	495791055D	48621.985	
860210181327.84	53CEE5E8B9	48416.287	
860210181337.84	5E4572DD5F	48205.435	
860210181347.84	68BB330A5D	47989.470	
860210181357.84	7330219F8F	47768.430	
860210181407.84	7DA439D9D7	47542.367	
860210181417.84	88177701B4	47311.331	
860210181427.84	9289D464A4	47075.340	
860210181437.84	9CFB4D5EBA	46834.455	
860210181447.84	A76BDD54F2	46588.713	
860210181457.84	B1DB7FB501	46338.151	
860210181507.84	BC4A2FFA2D	46082.823	
860210181517.84	C6B7E9A957	45822.769	
860210181527.84	D124A85099	45558.028	
860210181537.84	DB90678CE0	45288.660	
860210181547.84	E5FB22FFBA	45014.684	
860210181557.84	F064D6573B	44736.152	
860210181607.84	FACD7D4E66	44453.118	
860210181617.84	053513A64B	44165.606	
860210181627.84	0F9B952E2B	43873.675	
860210181637.84	1A00FDBF96	43577.367	
860210181647.84	2465493E16	43276.723	
860210181657.84	2EC8739802	42971.788	
860210181707.84	392A78C6DD	42662.608	
860210181717.84	438B54CBD2	42349.214	
860210181727.84	4DEB03B67A	42031.666	
860210181737.84	5849819F0C	41710.000	
860210181747.84	62A6CAA87E	41384.259	
860210181757.84	6D02DAFFF6	41054.485	
860210181807.84	775DAEDCA3	40720.720	
860210181817.84	81B7428682	40383.033	
860210181827.84	8C0F9244B0	40041.421	
860210181837.84	96669A71A0	39695.963	
860210181847.84	A0BC576CF8	39346.681	
860210181857.84	AB10C5A543	38993.635	
860210181907.84	B563E1943D	38636.873	
860210181917.84	BFB5A7BB62	38276.425	
860210181927.84	CA0614A8F1	37912.345	
860210181937.84	D45524F513	37544.673	
860210181947.84	DEA2D540C3	37173.446	
860210181957.84	E8EF2235B5	36798.700	
860210182007.84	F33A088C2A	36420.494	
860210182017.84	FD83850956	36038.882	
860210182027.84	07CB94785F	35653.889	
860210182037.84	121233AF96	35265.560	
860210182047.84	1C575F8FAE	34873.938	
860210182057.84	269B150811	34479.084	

PASS START TIME 860210181200.00 PASS END TIME 860210182700.00

TIME TAG	ACCUMULATOR IN HEX	PROCESSED OBSERVATION	INITIAL RESIDUAL
860210182107.84	30DD510D53	34081.020	
860210182117.84	3B1E10A0E0	33679.797	
860210182127.84	455D50CC99	33275.451	
860210182137.84	4F9B0EA9DD	32868.046	
860210182147.84	59D7475A9A	32457.616	
860210182157.84	6411F80585	32044.182	
860210182207.84	6E4B1DE71E	31627.834	
860210182217.84	7882B63B32	31208.568	
860210182227.84	82B8BE5172	30786.467	
860210182237.84	8CED337B73	30361.537	
860210182247.84	9720131DDE	29933.859	
860210182257.84	A1515AA246	29503.452	
860210182307.84	AB81077DCE	29070.363	
860210182317.84	B5AF173036	28634.637	
860210182327.84	BFDB8741E9	28196.309	
860210182337.84	CA065548CF	27755.435	
860210182347.84	D42F7EE697	27312.062	
860210182357.84	DE5701C468	26866.223	
860210182407.84	E87CDB97E6	26417.969	
860210182417.84	F2A10A1FC8	25967.336	
860210182427.84	FCC38B24E8	25514.366	
860210182437.84	06E45C7CC2	25059.113	
860210182447.84	11037C0375	24601.602	
860210182457.84	1B20E7A145	24141.884	
860210182507.84	253C9D4A89	23680.009	
860210182517.84	2F569B0182	23216.034	
860210182527.84	396EDECAC4	22749.969	
860210182537.84	438566BBDD	22281.883	
860210182547.84	4D9A36F41C	21818.145	
860210182557.84	57AD3B957A	21333.454	11.379
860210182607.84	61BE84DA32	20865.877	
860210182617.84	6BCE0AFC9F	20390.104	
860210182627.84		19905.182	11.746
860210182657.84		18463.037	12.051

PASS START TIME 860210192500.00 PASS END TIME 860210193900.00

TIME TAG	ACCUMULATOR IN HEX	PROCESSED OBSERVATION	INITIAL RESIDUAL
	1E493361D8		
860210192547.18	286649C163	24051.985	21.252
860210192557.18	3285B03F64	24676.444	
860210192607.18	3CA7621CF5	25295.898	
860210192617.18	46CB5A880B	25910.268	

INITIAL TDRS VECTOR	860211150000.00	
	X	0.34735413600000D+05
	Y	-.23875756700000D+05
	Z	-.52451110000000D+03
	XDOT	0.17419608000000D+01
	YDOT	0.25347867000000D+01
	ZDOT	0.92052000000000D-02
	ID	7
	REF. TIME	0.86021115000000D+12

INITIAL USER VECTOR	860211150000.00	
	X	-.55503654000000D+04
	Y	-.31103423000000D+04
	Z	0.26317860000000D+04
	XDOT	-.30573734000000D+01
	YDOT	-.45369790000000D+00
	ZDOT	-.69561795000000D+01
	DRAG	0.15000000000000D+01
	FREQ1	0.58000000000000D+01
	FREQ2	0.00000000000000D+00
	FREQ3	0.00000000000000D+00
	SOLVE-X	1
	SOLVE-Y	1
	SOLVE-Z	1
	SOLVE-XDOT	1
	SOLVE-YDOT	1
	SOLVE-ZDOT	1
	SOLVE-DRAG	1
	SOLVE-FREQ1	1
	SOLVE-FREQ2	0
	SOLVE-FREQ3	0
	REF. TIME	0.86021115000000D+12

PASS START TIME 860211162000.00 PASS END TIME 860211163000.00

TIME TAG	ACCUMULATOR IN HEX	PROCESSED OBSERVATION	INITIAL RESIDUAL
860211162016.578	0A5A156520	40519.850	
860211162026.578	14B3FB072D	40469.480	
860211162036.578	1F0DABF4D1	40413.896	
860211162046.578	2967219145	40351.340	
860211162056.578	33C0591F63	40285.894	105.600
860211162106.578	3E194D581A	40214.883	
860211162116.578	4871F99832	40138.981	
860211162126.578	52CA5948E6	40058.240	111.425
860211162136.578	5D2267D38F	39972.659	
860211162146.578	677A20A79D	39882.264	
860211162156.578	71D17F3ED4	39787.098	117.156
860211162206.578	7C287F12F7	39687.160	
86021116????.396		35150.977	
86021116????.396		34360.523	

PASS START TIME 860211180000.00 PASS END TIME 860211181100.00

TIME TAG	ACCUMULATOR IN HEX	PROCESSED OBSERVATION	INITIAL RESIDUAL
860211180337.312		35606.705	
860211180407.312		34465.883	201.865
860211180437.312		33295.660	204.851
860211180507.312		32097.240	207.728
860211180537.312		30871.745	210.464
860211180607.312		29620.335	213.064
860211180637.312		28344.180	215.545
860211180707.312		27044.409	217.881
860211180737.312		25722.211	220.107
860211180807.312		24378.714	222.198
860211180837.312		23015.077	224.159
860211180907.312		21632.464	226.001
860211180937.312		20232.004	227.701
860211181007.312		18814.869	229.278
860211181037.312		17382.194	230.715

PASS START TIME 860211191100.00 PASS END TIME 860211192000.00

TIME TAG	ACCUMULATOR IN HEX	PROCESSED OBSERVATION	INITIAL RESIDUAL
860211191121.875		32249.002	
860211191151.875		33889.237	-107.845
860211191221.875		35471.902	-101.123
860211191251.875		36995.074	-94.225
860211191321.875		38457.086	-87.139
860211191351.875		39856.357	-79.957
860211191421.875		41191.685	-72.577
860211191451.875		42461.848	-65.101
860211191521.875		43665.875	-57.555
860211191551.875		44802.995	-49.936
860211191621.875		45872.582	-42.262
860211191651.875		46874.162	-34.554
860211191721.875		47807.409	-26.836
860211191751.875		48672.161	-19.108
860211191821.875		49468.379	-11.384
860211191851.875		50196.128	-3.695
860211191921.875		50855.624	3.957
860211191951.875		51447.192	11.571

INITIAL TDRS VECTOR	860212150000.00	
	X	0.35127903200000D+05
	Y	-.23294600700000D+05
	Z	-.52218190000000D+03
	XDOT	0.16995559000000D+01
	YDOT	0.25633912000000D+01
	ZDOT	0.97868000000000D-02
	ID	7
	REF. TIME	0.86021215000000D+12

INITIAL USER VECTOR	860212150000.00	
	X	-.48801117000000D+04
	Y	-.18113466000000D+04
	Z	-.45199284000000D+04
	XDOT	0.41266030000000D+01
	YDOT	0.29644712000000D+01
	ZDOT	-.56510306000000D+01
	DRAG	0.15000000000000D+01
	FREQ1	0.58000000000000D+01
	FREQ2	0.00000000000000D+00
	FREQ3	0.00000000000000D+00
	SOLVE-X	1
	SOLVE-Y	1
	SOLVE-Z	1
	SOLVE-XDOT	1
	SOLVE-YDOT	1
	SOLVE-ZDOT	1
	SOLVE-DRAG	1
	SOLVE-FREQ1	1
	SOLVE-FREQ2	0
	SOLVE-FREQ3	0
	REF. TIME	0.86021215000000D+12

PASS START TIME 860212160400.00 PASS END TIME 860212162000.00

TIME TAG	ACCUMULATOR IN HEX	PROCESSED OBSERVATION	INITIAL RESIDUAL
860212160427.870	0A50245806	37835.797	
860212160437.870	14A00EF843	37774.926	
860212160447.870	1EEFBB4558	37709.197	
860212160457.870	293F24DE96	37638.852	
860212160507.870	338E4760C9	37563.879	
860212160517.870	3DDD1E7130	37484.314	
860212160527.870	482BA5BB0F	37400.182	
860212160537.870	5279D8EE40	37311.500	
860212160547.870	5CC7B3BB60	37218.274	
860212160557.870	671531DB87	37120.536	
860212160607.870	71624F0F9F	37018.320	
860212160617.870	7BAF07188E	36911.626	
860212160627.870	85FB55C154	36800.495	
860212160637.870	904736D557	36684.929	
860212160647.870	9A92A62938	36564.966	
860212160657.870	A4DD9F96CB	36440.627	
860212160707.870	AF281EFB1E	36311.926	
860212160717.870	B972203DB9	36178.905	
860212160727.870	C3BB9F45C4	36041.564	
860212160737.870	CE049802FF	35899.937	
860212160747.870	D84D067258	35754.079	
860212160757.870	E294D68A38	35587.089	
860212160807.870	ECDC344B1D	35466.505	
860212160817.870	F722EBC469	35291.143	
860212160827.870	0169090093	35128.480	
860212160837.870	0BAE8818FE	34961.704	
860212160847.870	15F365263F	34790.810	
860212160857.870	20379C4D1B	34615.849	
860212160907.870	2A7B29D44D	34436.961	
860212160917.870	34BE098CE7	34253.661	
860212160927.870	3F00380F3C	34066.770	
860212160937.870	4941B175D4	33875.770	
860212160947.870	538272004A	33680.814	
860212160957.870	5DC275FD81	33481.964	
860212161007.870	6801B9BFC6	33279.235	
860212161017.870	7240399A36	33072.630	
860212161027.870	7C7DF1EEB6	32862.209	
860212161037.870	86BADF211C	32647.981	
860212161047.870	90F6FDA52A	32430.012	
860212161057.870	9B3249EBF6	32208.290	
860212161107.870	A56CC06F6C	31982.852	
860212161117.870	AFA65DB3E9	31753.741	
860212161127.870	B9DF1E43F4	31520.982	
860212161137.870	C416FEB315	31284.612	
860212161147.870	CE4DFB9767	31044.642	
860212161157.870	D88411950B	30801.130	
860212161207.870	E2B93D525A	30554.085	
860212161217.870	ECED787F10	30300.381	
860212161227.870	F720C8D06F	30052.697	
860212161237.870	01532207A1	29792.099	
860212161247.870	0B8483E84B	29531.252	
860212161257.870	15B4EB3FDB	29267.033	
860212161307.870	1FE454E6EB	28999.488	

PASS START TIME 860212160400.00 PASS END TIME 860212162000.00

TIME TAG	ACCUMULATOR IN HEX	PROCESSED OBSERVATION	INITIAL RESIDUAL
860212161317.870	2A12B6B91C	28721.246	
860212161327.870	3440229B8B	28461.878	
860212161337.870	3E6C807E9B	28177.134	
860212161347.870	4897D45121	27896.537	
860212161357.870	52C21B13D8	27612.780	
860212161407.870	5CEB51CAA4	27325.876	
860212161417.870	67137582AB	27035.861	
860212161427.870	713A8350F1	26742.769	
860212161437.870	7B607850DF	26446.626	
860212161447.870	858551A7A6	26147.473	
860212161457.870	8FA90C8217	25845.340	
860212161507.870	99CBA619A1	25540.280	
860212161517.870	A3ED1BA5C1	25232.285	
860212161527.870	AE0D6A7059	24921.431	
860212161537.870	B82C8FC62C	24607.728	
860212161547.870	C24A88FCA9	24291.214	
860212161557.870	CC6753737E	23971.930	
860212161607.870	D682EC90E1	23649.904	
860212161617.870	E09D51C04F	23325.156	
860212161627.870	EAB6807F27	22997.761	
860212161637.870	F4CE764A16	22667.716	
860212161647.870	FEE530AA51	22335.072	
860212161657.870	08FAAD2FBA	21999.857	
860212161707.870	130EE973DB	21662.111	
860212161717.870	1D21E31616	21321.857	
860212161727.870	273397C3F8	20979.155	
860212161737.870	3144052F6E	20634.021	
860212161747.870	3B532914A1	20286.499	
860212161757.870	45610137CB	19936.622	
860212161807.870	4F6D8B666E	19584.427	
860212161817.870	5978C571B6	19229.930	
860212161827.870	6382AD3AAE	18873.196	
860212161837.870	6D8B40A639	18514.242	
860212161847.870	77927DA707	18153.123	
860212161857.870	8198D22E35	17907.951	
860212161907.870	8B9CEC441F	17306.353	
860212161917.870	95A019F070	17057.028	
860212161927.870	9FA1E94361	16687.544	
860212161937.870	A9A25859A6	16316.069	
860212161947.870	B3A16558B5	15942.639	
860212161957.870	BD9F0E6716	15567.258	

PASS START TIME 860212174200.00 PASS END TIME 860212175500.00

TIME TAG	ACCUMULATOR IN HEX	PROCESSED OBSERVATION	INITIAL RESIDUAL
	0F46777397		
860212174236.601	19AA7D5EFB	47523.059	
860212174246.601	240D88F03F	42939.323	
860212174256.601	2E6F95ED83	42670.841	
860212174306.601	38D0A02A7B	42397.958	
860212174316.601	4330A38B49	42120.741	
860212174326.601	4D8F9BF6C1	41839.202	
860212174336.601	57ED855C39	41553.376	
860212174346.601	624A5BB757	41263.314	
860212174356.601	6CA61B0C98	40969.052	
860212174406.601	7700BF6F94	40670.652	
860212174416.601	815A44F733	40368.128	
860212174426.601	8BB2A7CB9C	40061.551	
860212174436.601	9609E4146F	39750.918	
860212174446.601	A05FF60BC8	39436.307	
860212174456.601	AAB4D9F469	39117.752	
860212174506.601	B5088C18CF	38795.285	
860212174516.601	BF5B08CF08	38468.955	
860212174526.601	C9AC4C7840	38138.806	
860212174536.601	D3FC537E2D	37804.874	
860212174546.601	DE4B1A53F5	37467.199	
860212174556.601	E8989D76C4	37125.820	
860212174606.601	F2E4D97111	36780.794	
860212174616.601	FD2FCAD145	36432.135	
860212174626.601	07796E3652	36079.913	
860212174636.601	11C1C047BE	35724.163	
860212174646.601	1C08B0B4D6	35351.206	
860212174656.601	264E633A68	35015.939	
860212174706.601	3092AD9943	34636.117	
860212174716.601	3AD599A324	34266.651	
860212174726.601	4517242FED	33893.856	
860212174736.601	4F574A21B0	33517.774	
860212174746.601	599608640F	33138.444	
860212174756.601	63D35BEED1	32755.916	
860212174806.601	6E0F41C734	32370.246	
860212174816.601	7849B6F629	31981.449	
860212174826.601	8282B88FD9	31589.571	
860212174836.601	8CBA43B70D	31194.673	
860212175306.601		19076.804	
860212175326.601		18145.897	
860212175346.601		17208.058	
860212175406.601		16263.644	
860212175426.601		15312.985	
860212175446.601		14356.436	

PASS START TIME 860212221600.00 PASS END TIME 860212221800.00

TIME TAG	ACCUMULATOR IN HEX	PROCESSED OBSERVATION	INITIAL RESIDUAL
860212221647.364		36353.102	
860212221707.364		36200.054	
860212221727.364		36029.614	
860212221747.364		35842.065	

INITIAL TDRS VECTOR	860307200000.00	
	X	0.18366629400000D+05
	Y	0.37949229000000D+05
	Z	0.18130580000000D+03
	XDOT	-.27671957000000D+01
	YDOT	0.13400576000000D+01
	ZDOT	0.38601400000000D-01
	ID	7
	REF. TIME	0.86030720000000D+12

INITIAL USER VECTOR	860307200000.00	
	X	0.26089616000000D+04
	Y	0.42010101000000D+04
	Z	-.48067382000000D+04
	XDOT	0.39440464000000D+01
	YDOT	0.36704139000000D+01
	ZDOT	0.53547301000000D+01
	DRAG	0.00000000000000D+00
	FREQ1	0.00000000000000D+00
	FREQ2	0.00000000000000D+00
	FREQ3	0.00000000000000D+00
	SOLVE-X	1
	SOLVE-Y	1
	SOLVE-Z	1
	SOLVE-XDOT	1
	SOLVE-YDOT	1
	SOLVE-ZDOT	1
	SOLVE-DRAG	0
	SOLVE-FREQ1	0
	SOLVE-FREQ2	0
	SOLVE-FREQ3	0
	REF. TIME	0.86030720000000D+12

PASS START TIME 860307202100.00 PASS END TIME 860307203300.00

TIME TAG	ACCUMULATOR IN HEX	PROCESSED OBSERVATION	INITIAL RESIDUAL
	269D24058D		
860307202106.	30E41CC285	35359.972	
860307202116.	3B2CBB0C61	35804.546	
860307202126.	4576F875A0	36242.341	
860307202136.	4FC2CEAD8F	36673.477	
860307202146.	5A103747A2	37097.837	
860307202156.	645F2BB78C	37515.291	
860307202206.	6EAFA58F70	37925.966	
860307202216.	79019E30B3	38329.659	
860307202226.	83550F16EE	38726.479	
860307202236.	8DA9F1A755	39116.334	
860307202246.	98003F3CB6	39499.180	
860307202256.	A257F12EDF	39875.006	
860307202306.	ACB100CF7E	40243.786	
860307202316.	B70B676466	40605.471	
860307202326.	C1671E2748	40960.012	
860307202336.	CBC41E7D2F	41307.586	
860307202346.	D622618652	41647.911	
860307202356.	E081E080DD	41981.110	
860307202406.	EAE2949D90	42307.128	
860307202416.	F5447715C1	42625.999	
860307202426.	FFA7810B63	42937.628	
860307202436.	0A0BABB806	43242.111	
860307202446.	1470F03390	43539.311	
860307202456.	1ED747B605	43829.359	
860307202506.	293EAB5C9A	44112.145	
860307202516.	33A7145339	44387.730	
860307202526.	3E107BBCE5	44656.076	
860307202536.	487ADABE9C	44917.193	
860307202546.	52E62A84BA	45171.110	
860307202556.	5D5264213C	45417.719	
860307202606.	67BF80D19A	45657.199	
860307202616.	722D79B49B	45889.423	
860307202626.	7C9C47F293	46114.431	
860307202636.	870BE4C003	46332.274	
860307202646.	917C494200	46542.886	
860307202656.	9BED6EAB60	46746.326	
860307202706.	A65F4E3208	46942.605	
860307202716.	B0D1E10B76	47131.723	
860307202726.	BB452071B8	47313.697	
860307202736.	C5B905A43B	47488.550	
860307202746.	D02D89E397	47656.287	
860307202756.	DAA2A67815	47816.939	
860307202806.	E51854AC4F	47970.517	
860307202816.	EF8E8DD351	48117.054	
860307202826.	FA054B3C0A	48256.534	
860307202836.	047C8643D1	48389.017	
860307202846.	0EF438488E	48514.504	
860307202856.	196C5AB183	48633.034	
860307202906.	23E4E6EDC0	48744.639	
860307202916.	2E5DD666C6	48849.296	
860307202926.	38D7229AAD	48947.091	
860307202936.	4350C5076C	49038.022	
860307202946.	4DCAB73230	49122.120	

PASS START TIME 860307202100.00 PASS END TIME 860307203300.00

TIME TAG	ACCUMULATOR IN HEX	PROCESSED OBSERVATION	INITIAL RESIDUAL
860307202956.	5844F2A13E	49199.388	
860307203006.	62BF70F30C	49269.927	
860307203016.	6D3A2BC079	49333.713	
860307203026.	77B51CA6C5	49390.765	
860307203036.	82303D4D71	49441.124	
860307203046.	8CAB876CBB	49484.861	
860307203056.	9726F4C124	49521.991	
860307203106.	A1A27F06C9	49552.514	
860307203116.	AC1E200E65	49576.515	
860307203126.	B699D1A85F	49593.991	
860307203136.	C1158DB417	49605.006	
860307203146.	CB914E10B0	49609.558	
860307203156.	D60D0CB0A6	49607.726	
860307203206.	E088C38471	49599.503	
860307203216.	EB046C8703	49584.931	
860307203226.	F58001D40F	49564.145	
860307203236.	FFFB7D63EE	49537.001	
860307203246.	0A76D963B5	49503.714	
860307203256.	14F20FF2D4	49464.229	

PASS START TIME 860307225100.00 PASS END TIME 860307225800.00

TIME TAG	ACCUMULATOR IN HEX	PROCESSED OBSERVATION	INITIAL RESIDUAL
860307225117.	0A0CB0D3AC	19625.182	
860307225127.	141AFCA078	20058.601	
860307225137.	1E2ADEFE13	20487.372	
860307225147.	283C540137	20912.010	
860307225157.	324F578F09	21332.319	
860307225207.	3C63E57A39	21748.223	
860307225217.	4679F98480	22159.651	
860307225227.	50918F7331	22566.620	
860307225237.	5AAAA2E923	22968.986	
860307225247.	64C52F8B78	23366.760	
860307225257.	6EE130DE5A	23759.804	
860307225307.	78FEA269DB	24148.137	
860307225317.	831D7FA9E4	24531.706	
860307225327.	8D3DC4070A	24910.434	
860307225337.	975F6AE8AA	25284.314	
860307225347.	A1826FAA2D	25653.297	
860307225357.	ABA6CD8E8E	26017.284	
860307225407.	B5CC7FDDE1	26376.294	
860307225417.	BFF381C884	26730.231	
860307225427.	CA1BCE8C0E	27079.148	
860307225437.	D445614753	27422.919	
860307225447.	DE70350D38	27761.494	
860307225457.	E89C45071E	28094.968	
860307225507.	F2C98C3DE4	28423.204	
860307225517.	FCF805A065	28746.097	
860307225527.	0727AC440F	29063.805	
860307225537.	11587B1A0F	29376.179	
860307225547.	1B8A6D1C7C	29683.256	
860307225557.	25BD7D1DDA	29984.872	
860307225607.	2FF1A6150F	30281.177	
860307225617.	3A26E2D50B	30572.024	
860307225627.	445D2E3830	30857.443	
860307225637.	4E94831549	31137.419	
860307225647.	58CCDC4104	31411.943	
860307225657.	630634876B	31680.980	
860307225707.	6D4086A0E3	31944.449	

INITIAL TDRS VECTOR	860310120000.00	
	X	0.25271414400000D+05
	Y	-.33731732300000D+05
	Z	-.55143140000000D+03
	XDOT	0.24609068000000D+01
	YDOT	0.18446489000000D+01
	ZDOT	-.62473000000000D-02
	ID	7
	REF. TIME	0.86031012000000D+12

INITIAL USER VECTOR	860310120000.00	
	X	-.18756927000000D+04
	Y	-.37508238000000D+04
	Z	0.54550585000000D+04
	XDOT	-.41275042000000D+01
	YDOT	-.45261101000000D+01
	ZDOT	-.45185430000000D+01
	DRAG	0.20000000000000D+01
	FREQ1	0.58000000000000D+01
	FREQ2	0.00000000000000D+00
	FREQ3	0.00000000000000D+00
	SOLVE-X	1
	SOLVE-Y	1
	SOLVE-Z	1
	SOLVE-XDOT	1
	SOLVE-YDOT	1
	SOLVE-ZDOT	1
	SOLVE-DRAG	1
	SOLVE-FREQ1	1
	SOLVE-FREQ2	0
	SOLVE-FREQ3	0
	REF. TIME	0.86031012000000D+12

PASS START TIME 860310132900.00 PASS END TIME 860310134500.00

TIME TAG	ACCUMULATOR IN HEX	PROCESSED OBSERVATION	INITIAL RESIDUAL
860310132917.742	09DE54D48E	7108.993	
860310132927.742	13BD20302A	7233.994	
860310132937.742	1D9C60CDD7	7357.657	
860310132947.742	277C156989	7479.984	
860310132957.742	315C3CBAF8	7600.959	
860310133007.742	3B3CD54BCF	7720.392	
860310133017.742	451DDDE286	7838.533	-807.920
860310133027.742	4EFF5521E3	7955.236	
860310133037.742	58E1397AF7	8070.295	
860310133047.742	62C3899C1F	8183.963	
860310133057.742	6CA6440E68	8296.087	
860310133107.742	768967559D	8406.644	-807.542
860310133117.742	806CF1E909	8515.584	
860310133127.742	8A50E2603F	8623.038	
860310133137.742	94353730CD	8728.868	
860310133147.742	9E19EEBA3A	8832.982	
860310133157.742	A7FF07751A	8935.484	-807.195
860310133207.742	B1E47FC88C	9036.301	
860310133217.742	BBCA561BF4	9135.435	
860310133227.742	C5B088CFB1	9232.856	
860310133237.742	CF97162E72	9328.476	
860310133247.742	D97DFCA00D	9422.415	-806.872
860310133257.742	E3653A6FFB	9514.555	
860310133307.742	ED4CCDED46	9604.912	
860310133317.742	F734B55F30	9693.453	
860310133327.742	011CEF0ABF	9780.169	
860310133337.742	0B057929E7	9865.014	-806.560
860310133347.742	14EE51FDB4	9948.019	
860310133357.742	1ED777BADA	10029.131	
860310133407.742	28C0E8939B	10108.341	
860310133417.742	32AAA2BE43	10185.665	
860310133427.742	3C94A45DCD	10261.025	-806.296
860310133437.742	467EEB9CED	10334.451	
860310133447.742	506976A40F	10405.934	
860310133457.742	5A54439869	10475.461	
860310133507.742	643F509669	10542.996	
860310133517.742	6E2A9BA9C8	10608.471	-806.055
860310133527.742	781622F659	10671.983	
860310133537.742	8201E48AD6	10733.447	
860310133547.742	8BEDDE7A4D	10792.881	
860310133557.742	95DA0EC79F	10850.217	
860310133607.742	9FC673925D	10905.573	-805.853
860310133617.742	A9B30AE69D	10958.871	
860310133627.742	B39FD2B427	11009.992	
860310133637.742	BD8CC90517	11059.046	
860310133647.742	C779EBD929	11105.989	
860310133657.742	D167393177	11150.828	-805.661
860310133707.742	DB54AF0B79	11193.547	
860310133717.742	E5424B6053	11234.128	
860310133727.742	EF300C25AF	11272.558	
860310133737.742	F91DEF4C6D	11308.816	
860310133747.742	030BF2D080	11342.948	-805.472
860310133757.742	0CFA149940	11374.870	

PASS START TIME 860310132900.00 PASS END TIME 860310134500.00

TIME TAG	ACCUMULATOR IN HEX	PROCESSED OBSERVATION	INITIAL RESIDUAL
860310133807.742	16E8529E64	11404.648	
860310133817.742	20D6AAC8A3	11432.221	
860310133827.742	2AC51B0C4E	11457.636	
860310133837.742	34B3A14961	11480.811	-805.357
860310133847.742	3EA23B78BF	11501.846	
860310133857.742	4890E77122	11520.603	
860310133907.742	527FA31877	11537.143	
860310133917.742	5C6E6C63DA	11551.529	
860310133927.742	665D4131A6	11563.667	-805.250
860310133937.742	704C1F72E6	11573.634	
860310133947.742	7A3B04EAC2	11581.241	
860310133957.742	8429EF7C72	11586.621	
860310134007.742	8E18DD2FE0	11589.924	
860310134017.742	9807CBD085	11590.901	-805.191
860310134027.742	A1F6B94344	11589.657	
860310134037.742	ABE5A362D9	11586.151	
860310134047.742	B5D48812E6	11580.418	
860310134057.742	BFC365343E	11572.448	
860310134107.742	C9B238A227	11562.217	-805.137
860310134117.742	D3A1003FFA	11549.759	
860310134127.742	DD8FB9EAE0	11535.048	
860310134137.742	E77E638F53	11518.148	
860310134147.742	F16CFB22DC	11499.095	-805.129
860310134157.742	FB5B7E3515	11477.470	

PASS START TIME 860310150000.00 PASS END TIME 860310152000.00

TIME TAG	ACCUMULATOR IN HEX	PROCESSED OBSERVATION	INITIAL RESIDUAL
860310150402.724	0A269BDD45	26622.605	
860310150412.724	144D6DBA3A	26679.553	
860310150422.724	1E74515B1B	26698.288	
860310150432.724	289B4341F9	26713.341	
860310150442.724	32C23FEB6C	26724.689	
860310150452.724	3CE943D6BB	26732.343	
860310150502.724	47104B81E1	26736.297	-811.975
860310150512.724	5137537445	26736.590	
860310150522.724	5B5E5829A9	26733.175	
860310150532.724	65855624E9	26726.081	
860310150542.724	6FAC49EC32	26715.320	
860310150552.724	79D3300344	26700.884	-812.859
860310150602.724	83FA04EC83	26682.767	
860310150612.724	8E20C531AB	26660.999	
860310150622.724	98476D59A1	26635.568	
860310150632.724	A26DF9ED21	26606.481	
860310150642.724	AC946779B5	26573.760	-813.761
860310150652.724	B6BAB28A7C	26537.393	
860310150702.724	C0E0D7AD7E	26497.392	
860310150712.724	CB06D3772D	26453.785	
860310150722.724	D52CA275B0	26406.545	
860310150732.724	DF52413DFA	26355.700	-814.639
860310150742.724	E977AC6780	26301.261	
860310150752.724	F39CE0897E	26243.226	
860310150802.724	FDC1DA3FCA	26181.614	
860310150812.724	07E6962667	26116.427	
860310150822.724	120B10DE34	26047.684	-815.526
860310150832.724	1C2F470C26	25975.402	
860310150842.724	265335518B	25899.566	
860310150852.724	3076D85860	25820.212	
860310150902.724	3A9A2CCE96	25737.356	
860310150912.724	44BD2F61DA	25650.998	-816.404
860310150922.724	4EDFDCBFD6	25561.136	
860310150932.724	590231A1DD	25467.819	
860310150942.724	63242ABEA9	25371.036	
860310150952.724	6D45C4D19D	25270.807	
860310151002.724	7766FC9A42	25167.148	-817.280
860310151012.724	8187CED85F	25060.061	
860310151022.724	8BA8385630	24949.589	
860310151032.724	95C835DAF3	24835.719	
860310151042.724	9FE7C4350B	24718.481	
860310151052.724	AA06E03402	24597.879	-818.156
860310151102.724	B42586BA83	24473.993	
860310151112.724	BE43B48448	24346.661	
860310151122.724	C861668B00	24216.140	
860310151132.724	D27E99A5DA	24082.286	
860310151142.724	DC9B4ABDCD	23945.174	-819.009
860310151152.724	E6B776BF99	23804.819	
860310151202.724	F0D31A95F2	23661.212	
860310151212.724	FAEE3335AD	23514.395	
860310151222.724	0508BD9719	23364.383	
860310151232.724	0F22B6B8BE	23211.201	-819.836
860310151242.724	193C1B98AF	23054.847	

PASS START TIME 860310150000.00 PASS END TIME 860310152000.00

TIME TAG	ACCUMULATOR IN HEX	PROCESSED OBSERVATION	INITIAL RESIDUAL
860310151252.724	2354E93D7C	22895.356	
860310151302.724	2D6D1CB3F8	22732.754	
860310151312.724	3784B30AE4	22567.049	
860310151322.724	419BA9576A	22398.268	-820.681
860310151332.724	4BB1FCB74B	22226.445	
860310151342.724	55C7AA458F	22051.570	
860310151352.724	5FDCAF2994	21873.693	
860310151402.724	69F108895E	21692.809	
860310151412.724	7404B396F6	21508.967	-821.487
860310151422.724	7E17AD8905	21322.186	
860310151432.724	8829F3957E	21132.464	
860310151442.724	923B82FEAB	20939.851	
860310151452.724	9C4C5908CD	20744.355	
860310151502.724	A65C72F960	20545.982	-822.266
860310151512.724	B06BCE24C2	20344.792	
860310151522.724	BA7A67DF1E	20140.786	
860310151532.724	C4883D86A6	19934.003	
860310151542.724	CE954C78E5	19724.442	
860310151552.724	D8A1921F8C	19512.153	-823.035
860310151602.724	E2AD0BE927	19297.155	
860310151612.724	ECB7B74901	19079.468	
860310151622.724	F6C191B780	18859.114	
860310151632.724	00CA98B3C0	18636.119	
860310151642.724	0AD2C9C282	18410.507	-823.767
860310151652.724	14DA226E1C	18182.301	
860310151702.724	1EE0A04E1F	17951.556	
860310151712.724	28E640F78D	17718.261	
860310151722.724	32EB020B4A	17482.465	
860310151732.724	3CEEE12A51	17244.168	-824.478
860310151742.724	46F1DC0476	17003.431	
860310151752.724	50F3F048C1	16760.252	
860310151802.724	5AF51BB20C	16514.679	
860310151812.724	64F55BFD49	16266.720	
860310151822.724	6EF4AEEDF1	16016.403	-825.166
860310151832.724	78F312536A	15763.776	
860310151842.724	82F0840726	15508.881	
860310151852.724	8CED01D974	15251.681	
860310151902.724	96E88A5882	14992.956	

PASS START TIME 860310163900.00 PASS END TIME 860310165500.00

TIME TAG	ACCUMULATOR IN HEX	PROCESSED OBSERVATION	INITIAL RESIDUAL
	487BB5C07A		
860310164008.668	52D4CCA53E	40251.449	
860310164018.668	5D2D674835	40120.405	
860310164028.668	6785812641	39984.603	
860310164038.668	71DD15BD13	39844.046	
860310164048.668	7C342096D9	39698.784	-819.855
860310164058.668	868A9D40EC	39548.832	
860310164108.668	90E0875085	39394.222	
860310164118.668	9B35DA64EC	39234.995	
860310164128.668	A58A922733	39071.191	
860310164138.668	AFDEAA38D8	38902.779	-821.054
860310164148.668	BA321E5429	38729.862	
860310164218.668	D928784C06		
860310164228.668	E379321F51	37993.442	-822.216
860310164238.668	EDC932F216	37798.336	
860310164248.668	F818769C40	37598.846	
860310164258.668	0266F90AE0	37395.060	
860310164308.668	0CB4B62D7A	37186.987	
860310164318.668	1701A9FCB0	36974.666	-823.335
860310164328.668	214DD07981	36758.130	
860310164338.668	2B9925AAC2	36537.404	
860310164348.668	35E3A5A26F	36312.533	
860310164358.668	402D4C78BC	36083.544	
860310164408.668	4A76164C20	35850.461	-824.415
860310164418.668	54BDFF4371	35613.320	
860310164428.668	5F05038EE9	35372.160	
860310164438.668	694B1F6918	35127.022	
860310164448.668	73904F1642	34877.947	
860310164458.668	7DD48EE02C	34624.957	-825.468
860310164508.668	8817DB146C	34368.069	
860310164518.668	925A300B85	34107.327	
860310164528.668	9C9B8A29E1	33842.780	
860310164538.668	A6DBE5DB02	33574.457	
860310164548.668	B11B3F9130	33302.387	-826.502
860310164558.668	BB5993C7C4	33026.606	
860310164608.668	C596DF051A	32747.160	
860310164618.668	CFD31DD48A	32464.070	
860310164628.668	DA0E4CCAE2	32177.375	
860310164638.668	E4486885E5	31887.111	-827.488
860310164648.668	EE816DAC8F	31593.316	
860310164658.668	F8B958EDC5	31296.024	
860310164708.668	02F027037A	30995.279	
860310164718.668	0D25D4ADF2	30691.107	
860310164728.668	175A5EB734	30383.549	-828.420
860310164738.668	218DC1EE99	30072.628	
860310164748.668	2BBFFB2FDB	29758.392	
860310164758.668	35F1075D68	29440.872	
860310164808.668	4020E365BC	29120.115	
860310164818.668	4A4F8C3DDB	28796.149	-829.338
860310164828.668	547CFEE550	28469.017	
860310164838.668	5EA938623D	28138.747	
860310164848.668	68D435C3C0	27805.375	

PASS START TIME 860310163900.00 PASS END TIME 860310165500.00

TIME TAG	ACCUMULATOR IN HEX	PROCESSED OBSERVATION	INITIAL RESIDUAL
860310164858.668	72FDF423D1	27468.946	
860310164908.668	7D2670A445	27129.493	-830.207
860310164918.668	874DA871EA	26787.060	
860310164928.668	917398BF4C	26441.672	
860310164938.668	9B983EC983	26093.372	
860310164948.668	A5BB97D7C0	25742.201	
860310164958.668	AFDDA13C15	25388.205	-831.013
860310165008.668	B9FE58497C	25031.386	
860310165018.668	C41DBA63B8	24671.815	
860310165028.668	CE3BC4F4D4	24309.516	
860310165038.668	D858756CED	23944.516	
860310165048.668	E273C94DDE	23576.886	-831.810
860310165058.668	EC8DBE1825	23206.622	
860310165108.668	F6A6515EBA	22833.800	
860310165118.668	00BD80BCEE	22458.454	
860310165128.668	0AD349D0AE	22080.594	
860310165138.668	14E7AA4772	21700.285	-832.558
860310165148.668	1EFA9FD259	21317.543	
860310165158.668	290C283262	20932.431	
860310165208.668	331C412D40	20544.970	
860310165218.668	3D2AE8932F	20155.202	
860310165228.668	47381C3C31	19763.161	-833.246
860310165238.668	5143DA0992	19368.884	
860310165248.668	5B4E1FE9DC	18972.426	
860310165258.668	6556EBD33C	18573.819	
860310165308.668	6F5E3BC05B	18173.080	
860310165318.668	79640DBAD5	17770.271	-833.904
860310165328.668	83685FD63A	17365.434	
860310165338.668	8D6B302958	16958.581	
860310165348.668	976C7CDA99	16549.778	
860310165358.668	A16C441906	16139.059	
860310165408.668	AB6A841D99	15726.465	-834.503
860310165418.668	B5673B24A4	15312.011	
860310165428.668	BF62677A15	14895.760	
860310165438.668	C95C077430	14477.756	
860310165448.668	D354196E60	14058.019	
860310165458.668	DD4A9BCAFE	13636.577	-835.064

PASS START TIME 860310192600.00 PASS END TIME 860310194000.00

TIME TAG	ACCUMULATOR IN HEX	PROCESSED OBSERVATION	INITIAL RESIDUAL
860310192614.539	0A13782848	21455.291	
860310192624.539	14294FB004	22095.837	
860310192634.539	1E4180B7BE	22730.189	
860310192644.539	285C06B1DF	23359.739	
860310192654.539	3278DCF044	23984.353	-788.093
860310192704.539	3C97FEB66B	24603.973	
860310192714.539	46B9672467	25218.451	
860310192724.539	50DD11456E	25827.703	
860310192734.539	5B02F80BBD	26431.624	
860310192744.539	652B164B25	27030.091	-788.691
860310192754.539	6F5566C6F8	27623.035	
860310192804.539	7981E425FD	28210.337	
860310192814.539	83B088FE2D	28791.930	
860310192824.539	8DE14FCDB1	29367.716	
860310192834.539	981432F9D0	29937.590	-789.362
860310192844.539	A2492CD2F3	30501.468	
860310192854.539	AC80379347	31059.258	
860310192904.539	B6B94D626F	31610.884	
860310192914.539	C0F4685B2B	32156.292	
860310192924.539	CB31828171	32695.389	-790.146
860310192934.539	D57095C58D	33228.094	
860310192944.539	DFB19C03BB	33754.323	
860310192954.539	E9F48F0E73	34274.037	
860310193004.539	F43968A2E5	34787.148	
860310193014.539	FE80226FA5	35293.596	-790.995
860310193024.539	08C8B61657	35793.328	
860310193034.539	13131D24A9	36286.261	
860310193044.539	1D5F511BDF	36772.344	
860310193054.539	27AD4B7408	37251.539	
860310193104.539	31FD059293	37723.770	-791.902
860310193114.539	3C4E78D1CF	38188.991	
860310193124.539	46A19E83AB	38647.167	
860310193134.539	50F66FEB0C	39098.236	
860310193144.539	5B4CE6461C	39542.179	
860310193154.539	65A4FAC395	39978.932	-792.867
860310193204.539	6FFEA686DB	40408.449	
860310193214.539	7A59E2AADE	40830.694	
860310193224.539	84B6A844F9	41245.645	
860310193234.539	8F14F0645F	41653.276	
860310193244.539	9974B40A69	42053.531	-793.794
860310193254.539	A3D5EC36C4	42446.402	
860310193304.539	AE3891D874	42831.820	
860310193314.539	B89C9DE791	43209.824	
860310193324.539	C302094EAA	43580.357	
860310193334.539	CD68CCF2B6	43943.396	-794.973
860310193344.539	D7D0E1B5F1	44298.930	
860310193354.539	E23A40753D	44646.938	
860310193404.539	ECA4E20AAE	44987.406	
860310193414.539	F710BF497B	45320.308	
860310193424.539	017DD1096E	45645.662	-796.077
860310193434.539	0BEC101922	45963.431	
860310193444.539	165B754867	46273.618	
860310193454.539	20CBF96615	46576.221	

PASS START TIME 860310192600.00 PASS END TIME 860310194000.00

TIME TAG	ACCUMULATOR IN HEX	PROCESSED OBSERVATION	INITIAL RESIDUAL
860310193504.539	2B3D953EAA	46871.229	
860310193514.539	35B0419EA0	47158.642	-797.203
860310193524.539	4023F75035	47438.452	
860310193534.539	4A98AF1E0C	47710.659	
860310193544.539	550E61D58B	47975.276	
860310193554.539	5F85084459	48232.303	
860310193604.539	69FC9B3860	48481.742	-798.353
860310193614.539	7475138035	48723.594	
860310193624.539	7EEE69EA17	48957.859	
860310193634.539	8968974F1C	49184.582	
860310193644.539	93E39483DD	49403.743	
860310193654.539	9E5F5A6311	49615.369	-799.529
860310193704.539	A8D8E1C9BC	49009.522	
860310193714.539	B359239395	50825.981	
860310193724.539	BDD718A944	50205.124	
860310193734.539	C855B9F37F	50386.735	
860310193744.539	D2D5005C77	50560.873	-800.686
860310193754.539	DD54E4D3EB	50727.562	
860310193804.539	E7D560517C	50886.835	
860310193814.539	F2566BCEAF	51038.698	
860310193824.539	FCD8004DAF	51183.188	
860310193834.539	075A16D14C	51320.307	-801.871
860310193844.539	11DCA867CB	51450.103	
860310193854.539	1C5FAE239F	51572.592	

PASS START TIME 860310205900.00 PASS END TIME 860310211710.00

TIME TAG	ACCUMULATOR IN HEX	PROCESSED OBSERVATION	INITIAL RESIDUAL
860310205914.259	0A00D43B80	16422.739	
860310205924.259	1403C50D9F	16992.852	
860310205934.259	1E08CBEC73	17556.070	
860310205944.259	280FE51C19	18115.350	
860310205954.259	32190CC824	18670.591	
860310210004.259	3C243F02F6	19221.689	
860310210014.259	463177CC41	19768.567	
860310210024.259	5040B30BE7	20311.128	
860310210034.259	5A51EC9694	20849.292	-785.485
860310210044.259	6465202223	21382.931	
860310210054.259	6E7A495ADA	21912.008	
860310210104.259	789163D1A9	22436.408	
860310210114.259	82AA6B0538	22956.057	
860310210124.259	8CC55A61AD	23470.879	-785.921
860310210134.259	96E22D3BE9	23980.777	
860310210144.259	A100DED70E	24485.678	
860310210154.259	AB216A664F	24985.518	
860310210204.259	B543CB0BF7	25480.225	
860310210214.259	BF67FBD516	25969.714	-786.471
860310210224.259	C98DF7BF42	26453.919	
860310210234.259	D3B5B9B8ED	26932.779	
860310210244.259	DDDF3C9CA0	27406.211	
860310210254.259	E80A7B37C6	27874.162	
860310210304.259	F237704B34	28336.580	-787.101
860310210314.259	FC66168437	28793.384	
860310210324.259	0696688146	29244.513	
860310210334.259	10C860D801	29689.931	
860310210344.259	1AFBFA0E3E	30129.572	
860310210354.259	25312E9BDE	30563.380	-787.841
860310210404.259	2F67F8ED09	30991.305	
860310210414.259	39A0536378	31413.305	
860310210424.259	43DA3855B0	31829.334	
860310210434.259	4E15A20E7D	32239.344	
860310210444.259	58528ACC7C	32643.283	-788.639
860310210454.259	6290ECC3B2	33041.110	
860310210504.259	6CD0C21FCE	33432.788	
860310210514.259	7712050334	33818.281	
860310210524.259	8154AF8671	34197.546	
860310210534.259	8B98BBB5BB	34570.535	-789.543
860310210544.259	95DE23A88A	34937.293	
860310210554.259	A024E1532A	35297.674	
860310210604.259	AA6CEEB5FD	35651.730	
860310210614.259	B4B645C266	35999.397	
860310210624.259	BF00E066E3	36340.665	-790.459
860310210634.259	C94CB88BDA	36675.508	
860310210644.259	D399C8135C	37003.899	
860310210654.259	DDE808D907	37325.814	
860310210704.259	E83774B465	37641.234	
860310210714.259	F2880577E2	37950.138	-791.462
860310210724.259	FCD9B4F7DF	38252.535	
860310210734.259	072C7CFD45	38548.377	
860310210744.259	11805753E6	38837.677	
860310210754.259	1BD53DC472	39120.421	

PASS START TIME 860310205900.00 PASS END TIME 860310211710.00

TIME TAG	ACCUMULATOR IN HEX	PROCESSED OBSERVATION	INITIAL RESIDUAL
860310210804.259	262B2A0F31	39396.575	-792.514
860310210814.259	308215F7D2	39666.153	
860310210824.259	3AD9FB3E82	39929.140	
860310210834.259	4532D3A1AC	40185.529	
860310210844.259	4F8C98E310	40435.334	
860310210854.259	59E744C173	40678.542	-793.614
860310210904.259	6442D0F6BC	40915.135	
860310210914.259	6E9F37416E	41145.129	
860310210924.259	78FC716044	41368.527	
860310210934.259	835A791090	41585.323	
860310210944.259	8DB948140A	41795.535	-794.744
860310210954.259	9818D82A18	41999.152	
860310211004.259	A2792311D7	42196.175	
860310211014.259	ACDA229269	42386.635	
860310211024.259	B73BD071F4	42570.530	
860310211034.259	C19E2675AD	42747.855	-795.908
860310211044.259	CC011E6EEB	42918.659	
860310211054.259	D664B22449	43082.900	
860310211104.259	E0C8DB6777	43240.622	
860310211114.259	EB2D940F84	43391.848	
860310211124.259	F592D5F708	43536.592	-797.085
860310211134.259	FFF89AF8B4	43674.854	
860310211144.259	0A5EDCF307	43806.651	
860310211154.259	14C595CC59	43932.015	
860310211204.259	1F2CBF6AB6	44050.943	
860310211214.259	299453BB33	44163.467	-798.302
860310211224.259	33FC4CB746	44269.635	
860310211234.259	3E64A4549D	44369.433	
860310211244.259	48CD549092	44462.893	
860310211254.259	5336576DE5	44550.037	
860310211304.259	5D9FA6F6A8	44630.894	-799.499
860310211314.259	68093D3BFC	44705.494	
860310211324.259	7273144FDE	44773.840	
860310211334.259	7CDD264EBB	44835.976	
860310211344.259	87476D5B98	44891.928	
860310211354.259	91B1E39FD1	44941.723	-800.709
860310211404.259	9C1C8347A6	44985.373	
860310211414.259	A687468CF4	45022.933	
860310211424.259	B0F227AB1A	45054.410	
860310211434.259	BB5D20E792	45079.846	
860310211444.259	C5C82C9349	45099.288	-801.952
860310211454.259	D0334501BC	45112.745	
860310211504.259	DA9E648F8F	45120.257	
860310211514.259	E509859CB0	45121.836	
860310211524.259	EF74A296CB	45117.539	
860310211534.259	F9DFB5F0C8	45107.388	-803.177
860310211544.259	044ABA2953	45091.431	
860310211554.259	0EB5A9C3BD	45069.687	
860310211604.259	19207F4D87	45042.198	
860310211614.259	238B355B74	45008.995	
860310211624.259	2DF5C68C6C	44970.119	-804.384
860310211634.259	38602D850A	44925.593	
860310211644.259	42CA64F83E	44875.476	
860310211654.259	4D3467986D	44819.767	
860310211704.259	5754D5E203	24954.647	

PASS START TIME 860310224000.00 PASS END TIME 860310225500.00

TIME TAG	ACCUMULATOR IN HEX	PROCESSED OBSERVATION	INITIAL RESIDUAL
860310224035.709	0A25709895	26451.478	
860310224045.709	144B9F393B	26507.402	
860310224055.709	1E728548B8	26700.853	
860310224105.709	289A1E6E47	26889.720	
860310224115.709	32C2665058	27074.000	
860310224125.709	3CEB5892E2	27253.683	
860310224135.709	4714F0D76C	27428.757	
860310224145.709	513F2ABF43	27599.223	
860310224155.709	5B6A01EBED	27765.082	
860310224205.709	659571FC37	27926.321	
860310224215.709	6FC1768C64	28082.931	
860310224225.709	79EE0B397D	28234.915	
860310224235.709	841B2BA28B	28382.281	
860310224245.709	8E48D366BA	28525.030	
860310224255.709	9876FE2423	28663.157	
860310224305.709	A2A5A77812	28796.659	
860310224315.709	ACD4CB0041	28925.537	
860310224325.709	B704645F02	29049.811	
860310224335.709	C1346F3168	29169.459	
860310224345.709	CB64E7171E	29284.492	
860310224355.709	D595C7B1F6	29394.919	
860310224405.709	DFC70CAA6A	29500.766	
860310224415.709	E9F8B1A781	29602.028	
860310224425.709	F42AB2501C	29698.705	
860310224435.709	FE5D0A4B36	29790.796	
860310224445.709	088FB54463	29878.322	
860310224455.709	12C2AEEB36	29961.297	
860310224505.709	1CF5F2F246	30039.735	
860310224515.709	27297D09E3	30113.627	
860310224525.709	315D48EC08	30183.011	
860310224535.709	3B9152509C	30247.880	
860310224545.709	45C594F343	30308.249	
860310224555.709	4FFA0C9340	30364.133	
860310224605.709	5A2EB4F718	30415.561	
860310224615.709	646389E43C	30462.530	
860310224625.709	6E98872525	30505.060	
860310224635.709	78CDA88A8A	30543.176	
860310224645.709	8302E9E4E7	30576.878	
860310224655.709	8D38470869	30606.182	
860310224705.709	976DBBD2C5	30631.125	
860310224715.709	A1A344228B	30651.713	
860310224725.709	ABD8DBDB47	30667.964	
860310224735.709	B60E7EE8E5	30679.915	
860310224745.709	C044293722	30687.563	
860310224755.709	CA79D6B53C	30690.924	
860310224805.709	D4AF836002	30690.054	
860310224815.709	DEE52B2F65	30684.931	
860310224825.709	E91ACA286F	30675.612	
860310224835.709	F3505C52FD	30662.105	
860310224845.709	FD85DDBA61	30644.428	
860310224855.709	07BB4A6EE4	30622.598	
860310224905.709	11F09E891A	30596.652	
860310224915.709	1C25D627E5	30566.614	

PASS START TIME 860310224000.00 PASS END TIME 860310225500.00

TIME TAG	ACCUMULATOR IN HEX	PROCESSED OBSERVATION	INITIAL RESIDUAL
860310224925.709	265AED6D80	30532.499	
860310224935.709	308FE08432	30494.340	
860310224945.709	3AC4AB9969	30452.149	
860310224955.709	44F94AE848	30405.983	
860310225005.709	4F2DBAA8C9	30355.830	
860310225015.709	5961F71CBD	30301.729	
860310225025.709	6395FC8C2B	30243.706	
860310225035.709	6DC9C74778	30181.796	
860310225045.709	77FD539FFB	30116.003	
860310225055.709	82309DF46E	30046.382	
860310225105.709	8C63A2A9D2	29972.958	
860310225115.709	96965E2582	29895.733	
860310225125.709	A0C8CCDB22	29814.766	
860310225135.709	AAFAEB4130	29730.069	
860310225145.709	B52CB5D193	29641.656	
860310225155.709	BF5E2914A4	29549.586	
860310225205.709	C98F4195A8	29453.871	
860310225215.709	D3BFFBE9B7	29354.552	
860310225225.709	DDF054AAD8	29251.648	
860310225235.709	E820487A3B	29145.191	
860310225245.709	F24FD400D3	29035.211	
860310225255.709	FC7EF3EDE5	28921.734	
860310225305.709	06ADA4FBB5	28804.807	

APPENDIX C - MESSAGE FORMATS

This appendix details the formats of the messages transmitted to support FEDS. Section C.1 describes the messages between FEDS and ADEPT. Section C.2 describes the messages between FEDS and the Communications Box. Section C.3 describes the messages between the transponder and the Communications Box.

C.1 ADEPT/FEDS INTERFACE

This section contains the uplink and downlink message formats through which ADEPT communicates with FEDS. Figure C-1 shows the standard data transmission format that is used for both uplink and downlink; Figure C-2 illustrates the transmission record format. The terms used in Figure C-1 and throughout the section are defined below.

Term	Definition
Transmission	Set of one or more blocks of data that are transmitted contiguously. A transmission is always terminated by an end-of-transmission record (all -1s).
Block	Set of one or more data records that contain the same type of data.
Record	A 256-byte record containing a header (20 bytes) and one or more frames of data (see Figure C-2).
Frame	One entity of data.
Header	A 20-byte header frame that describes the contents of the record.

The message formats given here supersede those given in Appendix D of Reference 4.

C.1.1 UPLINK MESSAGES FORMATS

This section contains the uplink message formats through which data and commands are uplinked to FEDS. The format of the record header (first 20 bytes), which is common to all uplinked messages, is given on Page C-5, and the message block attributes and the frame format for each type of input data and command are presented on the following pages.

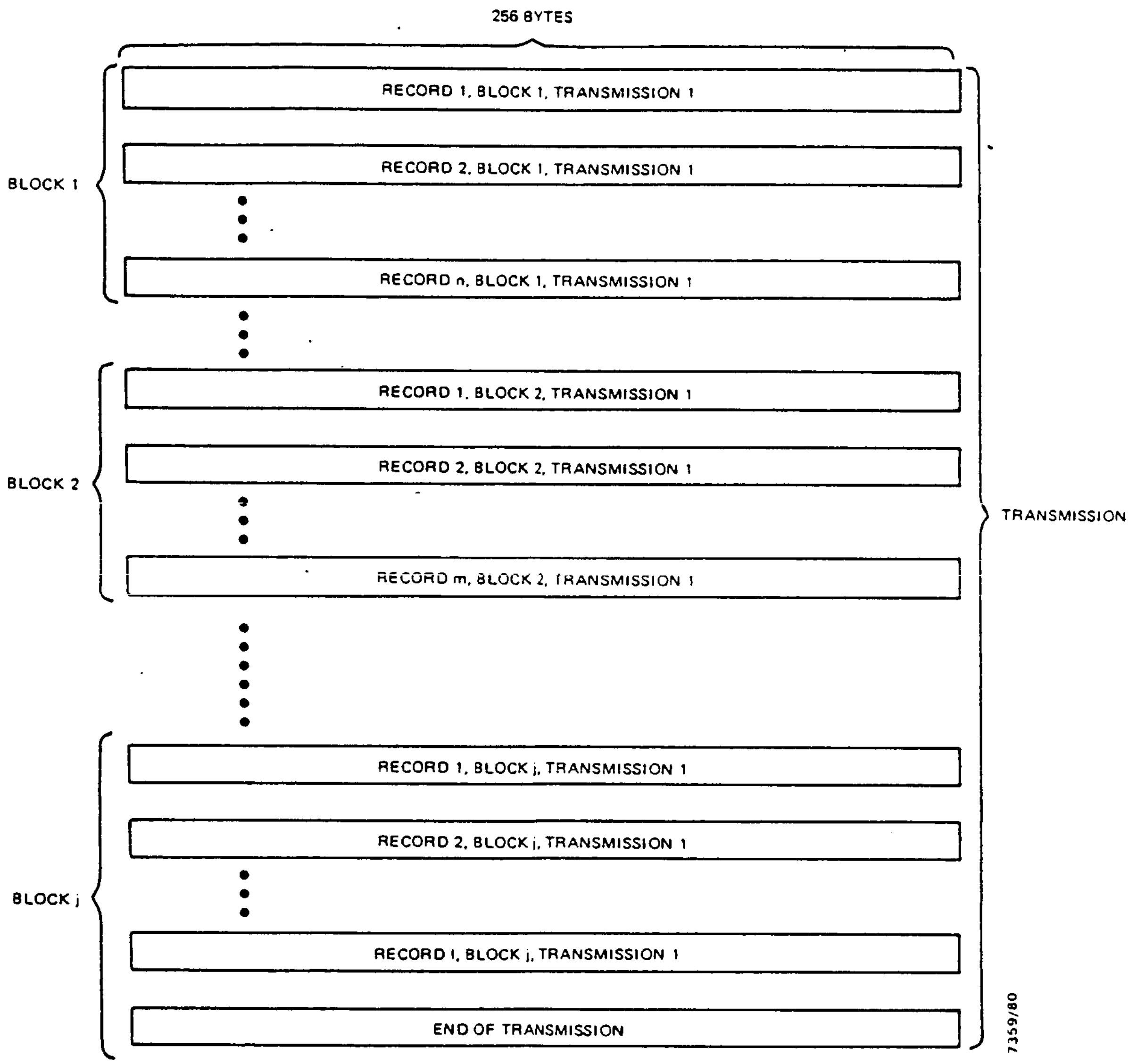


Figure C-1. Data Transmission Format

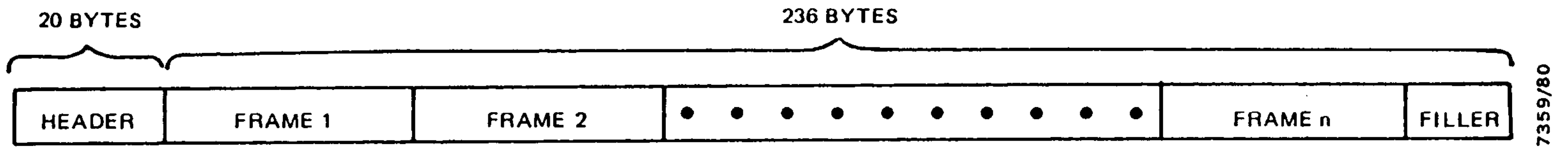


Figure C-2. Transmission Record Format

RECORD HEADER

FRAME FORMAT:

Variable	Type	Dimension	Description
IDSC	Byte	1	First synchronization code
IDEX	Byte	1	Second synchronization code
INTYPE	Byte	1	Type of input: = 1, data = 2, code = 3, command
INDATA	Byte	1	Type of data: = 1, not used in FEDS = 2, initialization table = 3, new TDRS vector = 4, estimation control parameters = 5, maneuver schedule = 6, tracking schedule = 7, miscellaneous constants = 8, station constants = 9, geopotential tables = 10, atmospheric drag = 11, timing coefficients = 12, experiment parameters
NBLOCK	Byte	1	Running number of records in block
MBLOCK	Byte	1	Total number of records in block
NTRAN	I*2	1	Running number of records in transmission
IDBLCK	I*2	1	Block ID number
NSIZE	I*2	1	Number of bytes used in record
TTRAN	R*8	1	Time of transmission (seconds from reference time)

EXPERIMENT PARAMETERS INPUT MESSAGE

1 frame = 1 experiment parameters set

1 record = header + 1 frame + fill
256 = 20 + 60 + fill
256 = 80 + fill

1 block = 1 record

FRAME FORMAT:

Variable	Type	Dimension	Description
FRACC	R*8	5	Frequency associated with access method I
DLTOBS	R*8	1	Time period between observation messages from transponder
IFRACC	I*2	2	Access method associated with Ith TDRS
IDGRS	I*2	2	Ground station associated with Ith TDRS
IDT	I*2	2	TDRS ID associated with Ith TDRS

INITIALIZATION TABLE INPUT MESSAGE

MESSAGE BLOCK ATTRIBUTES:

```
 1 frame = 1 initialization table (188 bytes)
1 record = 1 header + frame + fill
     256 = 20 + 188 + fill
     256 = 208 + fill
 1 block = 1 record
```

FRAME FORMAT:

Variable	Type	Dimension	Description
REFTM	R*8	1	Reference time
REFAPR	R*8	10	A priori state vector
REFSTD	R*8	10	A priori standard deviation
MAP	I*2	10	Solve-for/consider map

ESTIMATION CONTROL PARAMETERS INPUT MESSAGE

MESSAGE BLOCK ATTRIBUTES:

1 frame = estimation control parameters set (152 bytes)

1 record = header + 1 frame + fill
256 = 20 + 152 + fill
256 = 172 + fill

1 block = 1 record

FRAME FORMAT:

Variable	Type	Dimension	Description
DCSPAN	R*4	1	Estimation timespan (size of batch of data in seconds)
OBSSMP	R*2	1	Sample frequency for observations (seconds)
SEMULT	R*4	1	S_e multiplier for inner loop editing
TMLEAD	R*4	1	Lead time for DC precomputation (seconds)
MAXITR	I*2	1	Maximum number of iterations to be performed per slide
INLOOP	I*2	1	Maximum number of inner edit loops allowed
OBSSTD(I,J)	R*4	2,5	Observation standard deviations (only OBSSTD(2,1) is used in FEDS) I = measurement type: = 1, range = 2, Doppler J = observation type: = 1, one-way TDRSS = 2, two-way TDRSS = 3, three-way TDRSS = 4, one-way standard ranging equipment (SRE) = 5, two-way SRE
IROUT	I*2	1	Residuals report output control switch: = 0, no report generated = 1, report generated after last iteration on a batch of data

0218

Variable	Type	Dimension	Description
IROUT (Cont'd)			= 2, report generated after first and last inner edit loops at each iteration on a batch of data
IDCOUT	I*2	1	DC Summary and Statistics Report output control switch: = 0, no report generated = 1, report generated after last iteration on a batch of data = 2, report generated after every iteration
RESMAX(I,J)	R*4	2,5	Maximum observed-minus-computed value for each observation type (only, RESMAX(2,1) is used in FEDS) I = measurement type J = observation type
ELVMIN	R*4	1	Maximum acceptable elevation angle for SRE data (degrees); not used in FEDS
RAYANG	R*4	1	Maximum acceptable ray path angle for TDRSS data (degrees)
RAYHGT	R*4	1	Minimum acceptable ray path height for TDRSS data types (kilometers)
EDTOL	R*4	1	Edit test tolerance
PCONV	R*4	1	Position correction convergence tolerance
VCONV	R*4	1	Velocity correction convergence tolerance
SECONV	R*4	1	S_e convergence tolerance
POSDIV	R*4	1	Maximum allowable position correction
VELDIV	R*4	1	Maximum allowable velocity correction
RATCOR	R*4	1	Position and velocity correction differences multiplier
POSLIN	R*4	1	Position linearity tolerance
VELLIN	R*4	1	Velocity linearity tolerance

NEW TDRS VECTOR(S) INPUT MESSAGE

MESSAGE BLOCK ATTRIBUTES:

1 frame = new TDRS vector for 1 TDRS (60 bytes)

1 record = header + 1 (2) frame(s) + fill
256 = 20 + 60 (120) + fill
256 = 80 (140) + fill

1 block = 1 record (1 of 2 frames defined at transmission)

FRAME FORMAT:

Variable	Type	Dimension	Description
TDRTIM	R*8	1	TDRS reference time (YYMMDDHHMMSS.SS)
TDRSX	R*8	6	New TDRS position and velocity vectors
IDTDRS	I*2	1	TDRS ID
VECTYP	I*2	1	Type of input vector: = 0, new estimate of TDRS vector = 1, update to previous TDRS maneuver

MANEUVER SCHEDULE INPUT MESSAGE

MESSAGE BLOCK ATTRIBUTES:

```
 1 frame = 1 scheduled maneuver (58 bytes)
1 record = header + 4 frames + fill
     256 = 20 + 232 + fill
     256 = 252 + fill
 1 block = 2 records
```

FRAME FORMAT:

Variable	Type	Dimension	Description
TIM01	R*8	1	Time of maneuver (YYMMDDHHMMSS.SS)
XM01	R*8	6	Predicted state (position and velocity) after maneuver
MSID01	I*2	1	ID of maneuvered spacecraft (TDRS ID for TDRS; support ID code (SIC) and vehicle ID (VID) for user spacecraft)

TRACKING SCHEDULE INPUT MESSAGE

MESSAGE BLOCK ATTRIBUTES

```
 1 frame = schedule for 1 tracking interval (22 bytes)

1 record = header + 8 frames + fill
     256 = 20 + 8 x 22 + fill
     256 = 20 + 176 + fill
     256 = 196 + fill

 1 block = 2 records
```

FRAME FORMAT:

Variable	Type	Dimension	Description
STIME	R*8	1	Start time of tracking interval (YYMMDDHHMMSS.SS)
ETIME	R*8	1	End time of tracking interval (YYMMDDHHMMSS.SS)
OBSFRQ	R*4	1	Observation frequency
IDPTDR	I*2	1	ID of TDRS to be used for one-way Doppler prediction during this interval

MISCELLANEOUS CONSTANTS INPUT MESSAGE

MESSAGE BLOCK ATTRIBUTES:

1 frame = set of constants

1 record = header + 1 frame + fill
256 = 20 + 170 + fill = 190 bytes

1 block = 1 record

FRAME FORMAT:

Variable	Type	Dimension	Description
EQTRAD	R*8	1	Equatorial radius
FLAT	R*8	1	Flattening coefficient
OMEGA	R*8	1	Rotation rate of Earth
PI	R*8	1	π
REFJUL	R*8	2	Reference time of Julian date (used with timing coefficients)
RTD	R*8	1	Radians-to-degrees conversion constant
TBIASS	R*8	1	Timing bias for user spacecraft
TFREQ(I)	R*8	5	Table used to compute pilot frequency for the following access methods (not used in FEDS) I = 1, multiple-access (MA) I = 2, S-band single-access link (SSA1) I = 3, SSA2 I = 4, K-band single-access link (KSA1) I = 5, KSA2
VLITE	R*8	1	Velocity of light
SCAREA	R*4	1	User spacecraft area
SCMASS	R*4	1	User spacecraft mass
SFLUX	R*4	1	Solar flux value
SPFREQ	R*4	1	State vector frequency in predict table (minutes) (default = 1 minute)

Variable	Type	Dimension	Description
SPINT	R*4	1	State vector frequency in predict table (minutes) (default = 30 minutes)
SOLRAD(I)	R*4	2	Solar radiation pressure for TDRS I
STEPSZ(1)	R*4	2	Integration step size: I = 1, target I = 2, TDRS
TDAREA(I)	R*4	2	Area of TDRS I
TDMASS(I)	R*4	2	Mass of TDRS I
TPAD	R*4	1	Time pad for output of predicted one-way Doppler data (minutes)
ACTFLG	Byte	1	Activity log generation switch: = 0, off = 1, on
IFRAC	Byte	1	Refraction switch: = 0, off = 1, on
NDRAG	Byte	1	Drag switch for target: = 0, off = 1, on
NOOM(I)	Byte	2	Moon switches: I = 1, target I = 2, TDRS (= 0, off; = 1, on)
NSOLRP	Byte	1	Solar radiation pressure switch for TDRS: = 0, off = 1, on
NSUN(I)	Byte	2	Sun switches: I = 1, target I = 2, TDRS
IDEX1	Byte	1	VID for user spacecraft
IDSC1	Byte	1	SIC for user spacecraft

STATION PARAMETERS INPUT MESSAGE

MESSAGE BLOCK ATTRIBUTES:

Set of constants = 946 bytes

Record 1 = header + frame 1 (234 bytes) = 254 bytes + fill
Record 2 = header + frame 2 (192 bytes) = 212 bytes + fill
Record 3 = header + frame 3 (176 bytes) = 196 bytes + fill
Record 4 = header + frame 4 (200 bytes) = 220 bytes + fill
Record 5 = header + frame 5 (144 bytes) = 164 bytes + fill

1 block = 5 records

FRAME 1 FORMAT:

Variable	Type	Dimension	Description
NSTA	I*2	1	Total number of stations used
IDSTA(J)	I*2	20	Station IDs in order corresponding to constants in following arrays
STAT(I,J)	R*8	3,8	Constants for station J, where J = 1 through 8: I = 1, Earth-fixed position component-X I = 2, Earth-fixed position component-Y I = 3, Earth-fixed position component-Z

FRAME 2 FORMAT:

Variable	Type	Dimension	Description
STAT(I,J)	R*8	3,8	Constants for station J, where J = 9 through 16 (see frame 1 format, above)

FRAME 3 FORMAT:

Variable	Type	Dimension	Description
STAT(I,J)	R*8	3,4	Constants for station J, where J = 17 through 20 (see frame 1 format, above)
FREQB(J)	R*4	20	Station-dependent frequency bias (hertz) for SRE data types for station J, where J = 1 through 20; not used in FEDS

FRAME 4 FORMAT:

Variable	Type	Dimension	Description
ANTCOR(J)	R*4	20	Antenna mount correction (kilometers) for SRE data types for station J, where J = 1 through 20; not used in FEDS
MREFRC(I,J)	Byte	12,10	Monthly surface refractivity values for station J, where J = 1 through 10, and month of year I, where I = 1 to 12

FRAME 5 FORMAT:

Variable	Type	Dimension	Description
MREFRC(I,J)	Byte	12,10	Monthly surface refractivity values for station J, where J = 11 through 20 (see frame 4 format, above)
ANTALG(J)	Byte	20	Antenna alignment indicator for station J, where J = 1 through 20; not used in FEDS
TDELAY	R*4	1	User spacecraft transponder delay (kilometers)

GEOPOTENTIAL TABLES INPUT MESSAGE

MESSAGE BLOCK ATTRIBUTES:

Total set of constants = 1032 bytes

Record 1 = header + frame 1 (232 bytes) = 256 bytes
Record 2 = header + frame 2 (200 bytes) = 220 bytes
Record 3 = header + frame 3 (200 bytes) = 220 bytes
Record 4 = header + frame 4 (200 bytes) = 220 bytes
Record 5 = header + frame 5 (200 bytes) = 220 bytes

1 block = 5 records

FRAME 1 FORMAT:

Variable	Type	Dimension	Description
MORD(I)	Byte	2	Order of harmonic field: I = 1, target I = 2, TDRS
MDEG(I)	Byte	2	Degree of harmonic field: I = 1, target I = 2, TDRS
GM	R*8	1	Point mass
XJ	R*4	15	Zonal harmonics (J_1 through J_{15})
CS	R*4	40	First 40 C- and S-harmonic coefficients (C-harmonic coefficients in lower triangle of 15-by-16 matrix; S-harmonic coefficients in upper triangle of 15-by-16 matrix) for 15-by-15 geopotential model

FRAME 2 FORMAT:

Variable	Type	Dimension	Description
CS	R*4	50	Next 50 C- and S-harmonic coefficients (C-harmonic coefficients in lower triangle; S-harmonic coefficients in upper triangle) of 15-by-15 model

FRAME 3 FORMAT:

Variable	Type	Dimension	Description
CS	R*4	50	Next 50 C- and S-harmonic coefficients (C-harmonic coefficients in lower triangle; S-harmonic coefficients in upper triangle) of 15-by-15 model

FRAME 4 FORMAT:

Variable	Type	Dimension	Description
CS	R*4	50	Next 50 C- and S-harmonic coefficients (C-harmonic coefficients in lower triangle; S-harmonic coefficients in upper triangle) of 15-by-15 model

FRAME 5 FORMAT:

Variable	Type	Dimension	Description
CS	R*4	50	Next 50 C- and S-harmonic coefficients (C-harmonic coefficients in lower triangle; S-harmonic coefficients in upper triangle) of 15-by-15 model

ATMOSPHERIC DENSITY TABLES INPUT MESSAGE

MESSAGE BLOCK ATTRIBUTES:

Total set of data = 662 bytes

Record 1 = header + frame 1 (234 bytes) = 254 + fill
Record 2 = header + Frame 2 (224 bytes) = 244 + fill
Record 3 = header + Frame 3 (144 bytes) = 164 + fill

1 block = records

FRAME 1 FORMAT:

Variable	Type	Dimension	Description
NDENS	I*2	1	Number of entries in density table
NALT(J)	I*2	60	Altitude associated with density intervals (in ascending order)
DENSTY(I,J)	R*4	2,14	First 14 intervals in density table: I = 1, minimum density associated with NALT(J) I = 2, maximum density associated with NALT(J) (where J = 1 through 14)

FRAME 2 FORMAT:

Variable	Type	Dimension	Description
DENSTY(I,J)	R*4	2,28	Next 28 intervals in density table (where J = 15 through 42)

FRAME 3 FORMAT:

Variable	Type	Dimension	Description
DENSTY(I,J)	R*4	2,18	Last 18 intervals in density table (where J = 43 through 60)

TIMING COEFFICIENTS INPUT MESSAGE

MESSAGE BLOCK ATTRIBUTES:

Total set of data = 194 bytes

1 frame = set of timing coefficients

1 record = 1 header + 1 frame + fill
256 = 20 + 194 + fill
256 = 214 + fill

1 block = 1 record

FRAME FORMAT:

Variable	Type	Dimension	Description
NDAYS	I*2	1	Number of polynomials used in TCOEFF (1 or 2)
TCOEFF(I,J)	R*4	2,2	Coefficients of polynomials approximating United States Naval Observatory (USNO) time difference data: I = 1, modified Julian date associated with polynomial J I = 2, constant adjustment in polynomial J
NPDLHS	I*2	1	Number of polynomials used in PDELHT (1 or 2)
PDELHT(J)	R*8	2	Modified Julian date associated with PDELH polynomial J
PDELH(I,J)	R*8	10,2	Coefficients for equations of equinoxes used to correct mean GHA over a 20-day span: J = 1, first nutation polynomial J = 2, second nutation polynomial NOTE: I represents Ith coefficient of Jth polynomial

CONTROL COMMAND INPUT MESSAGE

MESSAGE BLOCK ATTRIBUTES:

```
  1 frame = 1 command (20 bytes)
 1 record = header + 1 frame
      256 = 20 + 20 + fill
      256 = 40 + fill
  1 block = 1 record
```

FRAME FORMAT:

Variable	Type	Dimension	Description
ICTYPE	I*2	1	Type of command: = 1, start = 2, stop = 3, reboot = 4, abort = 5, suspend = 6, continue = 7, mark time = 8. resume = 9, begin fast timing = 10, stop fast timing = 11, set clock = 12, status request
COMMAND(I)	Byte	20	Contents of command (depends on type of command)

C.1.2 DOWNLINK MESSAGE FORMATS

This section contains the downlink message formats through which data, reports, and messages are downlinked from FEDS. The format of the record header, which is common to all downlinked messages, is given on page C-23, and the message block attributes and frame formats for each type of output data, report, and message are presented on the following pages.

RECORD HEADER

FRAME FORMAT:

Variable	Type	Dimension	Description
IDSC	Byte	1	Spacecraft ID
IDEX	Byte	1	Experiment ID
OUTYPE	Byte	1	Type of output: = 1, spacecraft vectors = 2, Doppler observations = 3, error message = 4, activity log = 5, DC Summary and Statistics Report = 6, DC Residuals Report
	Byte	1	Blank
NBLOCK	I*2	2	Running number of records in block
NTRAN	I*2	2	Running number of records in transmission
NSIZE	I*2	2	Record size in bytes
NTOT	I*2	2	Total number of records in block
TTRAN	R*8	8	Time of transmission (seconds from reference time)

OUTPUT USER SPACECRAFT STATE VECTORS

MESSAGE BLOCK ATTRIBUTES:

1 frame = 1 state vector (58 bytes)

1 record = header + 4 frames + fill
256 = 20 + 232 + fill
256 = 252 + fill

1 block = 1 or more records

FRAME FORMAT:

Variable	Type	Dimension	Description
ID1	Byte	1	Indicator of source of initial state vector; can have values of I, U, M
ID2	Byte	1	Counter incremented when source of state vector initially used for generation is changed
TTAG	R*8	1	Time tag (YMDHMS)
PVEC	R*8	3	Position vector (x, y, z)
VVEC	R*8	3	Velocity vector (x, y z)

OUTPUT ONE-WAY DOPPLER OBSERVATIONS

MESSAGE BLOCK ATTRIBUTES:

1 frame = 1 observation (20 bytes)

1 record = header + 11 frames + fill
256 = 20 + 220 + fill
256 = 240 + fill

1 block = 1 or more records

FRAME FORMAT:

Variable	Type	Dimension	Description
OBTYPE	Byte	1	Observation type (= 1, TDRS one-way)
IDTDRS	Byte	1	TDRS ID
IDSTAF	I*2	1	Forward link station ID
OBTIME	R*8	1	Time tag (YMDHMS)
DOPLR1	R*8	1	Doppler observation

OUTPUT ERROR MESSAGE

MESSAGE BLOCK ATTRIBUTES:

1 frame = 1 error message (50 bytes)

1 record = header + 1 frame + fill
256 = 20 + 50 + fill
256 = 70 + fill

1 block = 1 record

FRAME FORMAT:

Variable	Type	Dimension	Description
TERR	R*8	1	Time of error (YMDHMS)
NERR	I*2	1	Message number
ERRMSG	Byte	40	Message

OUTPUT FROM ACTIVITY LOG

```
     1 frame = 1 message (50 bytes)
    1 record = header + 4 frames + fill
         256 = 20 + 200 + fill
         256 = 220 + fill
     1 block = 20 records
```

FRAME FORMAT:

Variable	Type	Dimension	Description
TMSG	R*8	1	Time message entered log (YMDHMS)
MSGNUM	I*2	1	Message number
MSG	Byte	40	Message

DC SUMMARY AND STATISTICS REPORT

MESSAGE BLOCK ATTRIBUTES;

Whole report = 524 bytes

Record 1 = header + frame 1 + fill = 20 + 184 + fill = 256
Record 2 = header + frame 2 + fill = 20 + 160 + fill = 256
Record 3 = header + frame 3 + fill = 20 + 196 + fill = 256

1 block = 3 records

FRAME 1 FORMAT:

Variable	Type	Dimension	Description
DCEPCH	R*8	1	Epoch
DCSTRT	R*8	1	Start time of estimation data span
DCEND	R*8	1	End time of estimation data span
SE	R*4	10	S_e at each inner loop
QSUM	R*4	10	Q summed at each inner loop
XPREV	R*8	10	Previous state vector

FRAME 2 FORMAT:

Variable	Type	Dimension	Description
XCURR	R*8	10	Current state vector
XAPR	R*8	10	A priori state vector

FRAME 3 FORMAT:

Variable	Type	Dimension	Description
RMS	R*8	10	Predicted root mean square at each inner loop
XUPD	R*8	10	State correction vector
ISTATE	I*2	10	Parameter numbers
NSTATE	I*2	1	Number of solve-for parameters
NTOTAL	I*2	1	Total number of observations available
NUSED	I*2	1	Number of observations used

Variable	Type	Dimension	Description
NITER	I*2	1	Iteration number
NBATCH	I*2	1	Slide number
ICONVG	I*2	1	Convergence/divergence indicator: = 0, no convergence/divergence this iteration = 1, convergence (PCONV, VCONV tests) = 2, convergence (SECONV test) = 3, reduced convergence (maximum iteration reached but within tolerance of three times PCONV, VCONV, SECONV) = 4, diverged (data arc length after edit less than minimum estimation span) = 5, diverged (all new observations edited) = 6, diverged (POSDIV, VELDIV tests) = 7, diverged (RATCOR tests) = 8, diverged (maximum iterations)
NLOOP	I*2	1	Number of inner edit loop this iteration
LINTST	L*2	1	Linearity indicator: = TRUE, do not recompute partials or edit loop = FALSE, recompute partials and edit loop

DC RESIDUALS REPORT

MESSAGE BLOCK ATTRIBUTES:

1 frame = 1 line of report (48 bytes) or report descriptor information (48 bytes)

1 record = header + 4 frames + fill
256 = 20 + 192 + fill
256 = 212 + fill

1 block = up to 32 records

First record of block = header + descriptor frame + 3 data frames

All other records = header + 4 data frames

DESCRIPTOR FRAME FORMAT:

Variable	Type	Dimension	Description
REPOCH	R*8	1	Epoch (YYMMDDHHMMSS.SS)
STRES	R*8	1	Start time of batch (YYMMDDHHMMSS.SS)
ENDRES	R*8	1	End time of batch (YYMMMDDHHMMSS.SS)
RESITR	I*2	1	Iteration number
RESBAT	I*2	1	Batch number
RESINL	I*2	1	Inner loop number
SPARES	Byte	18	Spares

DATA FRAME FORMAT:

Variable	Type	Dimension	Description
IOBTYP	Byte	1	Observation type (= 1, TDRSS one-way)
IEDIT(I)	Byte	2	Edit flag (I = 1, not used; I = 2, Doppler): = 0, not edited = 1, edited by DC during edit loop = 2, edited during preprocessing = 3, edited by DC for maximum observed-minus-computed value

Variable	Type	Dimension	Description
IEDIT(I) (Cont'd)			= 4, edited by DC for minimum ray path angle (TDRSS)
ITDRSF	Byte	1	TDRSS ID (forward link)
ITDRSR	Byte	1	TDRSS ID (return link)
ISTATF	Byte	1	Forward link station ID
ISTATR	Byte	1	Return link station ID
ISPARE	Byte	1	Spare location
OBTIME	R*8	1	Time tag
COBS(1)	R*8	1	Computed range observations (not used in FEDS)
COBS(2)	R*8	1	Computed Doppler observation
RESID(1)	R*4	1	Range residual (not used in FEDS)
RESID(2)	R*4	1	Doppler residual
PRESID(1)	R*4	1	Predicted residual for range (not used in FEDS)
PRESID(2)	R*4	1	Predicted residual for Doppler

C.2 COMMUNICATIONS BOX/FEDS INTERFACE

The Communications Box and FEDS transmit and receive messages to control acquisition of a tracking signal by the transponder and to accumulate observation data. All messages between FEDS and the Communications Box are sent in an 11-byte format, shown in Figure C-3. The first seven bits of the first byte in the message constitute the function code. The first six bits define the message being sent and the seventh bit indicates the source of the message: 0 if the message is from FEDS, 1 if the message is from the Communications Box. The eighth bit of the first byte and the next five bytes are reserved for the PB5 time code. The remaining five bytes of the message constitute a data field. All unused fields in each message are zero-filled.

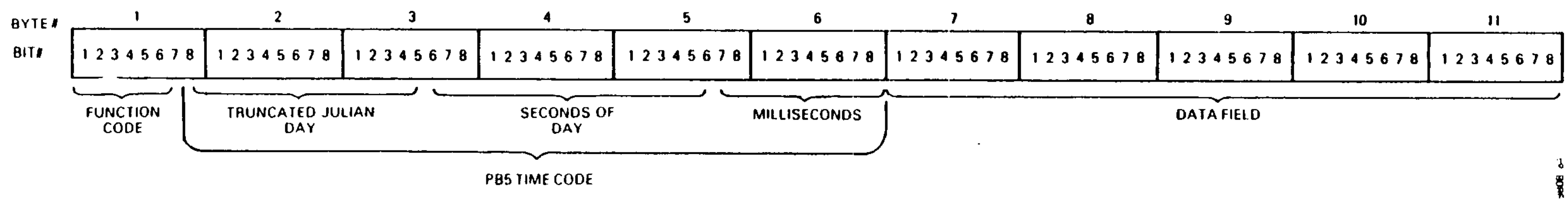


Figure C-3. Communications Box/FEDS Interface Format

C.2.1 INITIALIZATION MESSAGES

FEDS TO COMMUNICATIONS BOX

Function Code	Bytes 2 to 11	Interpretation
0 (0000000 binary)	192 (11000000 binary)	FEDS executing; verify communication with Communications Box

COMMUNICATIONS BOX TO FEDS

Function Code	Bytes 2 to 11	Interpretation
0 (0000001 binary)	Not used	Initialization message received; communication verified

C.2.2 DOPPLER OBSERVATION MESSAGES

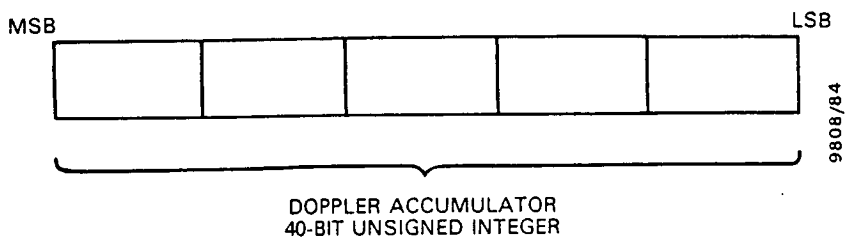
FEDS TO COMMUNICATIONS BOX

Function Code	Time Field	Data Field	Interpretation
1 (1000000 binary)	Not used	Not used	FEDS ready to receive Doppler observation

COMMUNICATIONS BOX TO FEDS

Function Code	Time Field	Data Field	Interpretation
1 (1000001 binary)	PB5 Time Code	Doppler accumulator from the transponder (format shown below)	Doppler observation at the specified time

Doppler accumulator 40-bit
Unsigned integer



C.2.3 TIME CODE MESSAGES

FEDS TO COMMUNICATIONS BOX

Function Code	Time Field	Data Field	Interpretation
2 (0100000 binary)	Not used	Not used	Request for current time from time code generator

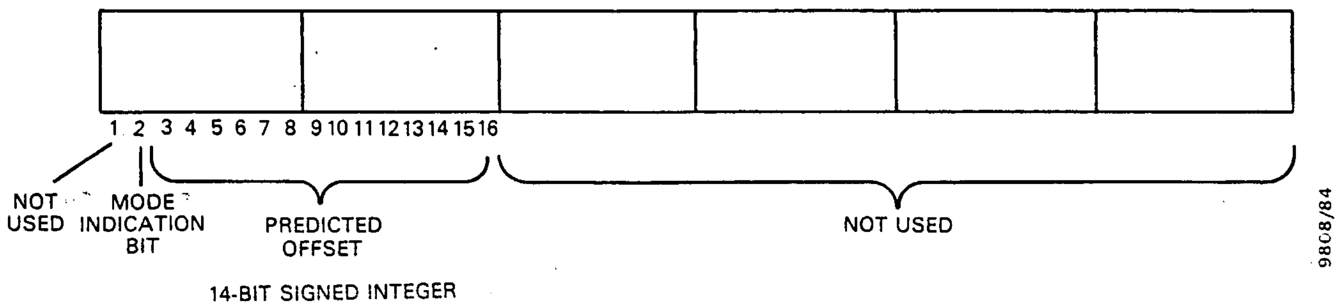
COMMUNICATIONS BOX TO FEDS

Function Code	Time Field	Data Field	Interpretation
2 (0100001 binary)	PB5 Time Code	Not used	Time field contains current time

C.2.4 PREDICTED DOPPLER MESSAGES

FEDS TO COMMUNICATIONS BOX

Function Code	Time Field	Data Field	Interpretation
3 (0010000 binary)	Not used	Frequency control word (format below)	Predicted frequency offset for use in signal acquisition by transponder



COMMUNICATIONS BOX TO FEDS

Function Code	Time Field	Data Field	Interpretation
3 (0010001 binary)	Not used	Not used	Frequency control word received from FEDS and transmitted to transponder

C.2.5 SIGNAL ACQUISITION MESSAGE

FEDS TO COMMUNICATIONS BOX

No message sent

COMMUNICATIONS BOX TO FEDS

Function Code	Time Field	Data Field	Interpretation
4 (0001001 binary)	Not used	Not used	Transponder has acquired tracking signal

C.2.6 ACCUMULATOR RESET MESSAGE

FEDS TO COMMUNICATIONS BOX

Function Code	Time Field	Data Field	Interpretation
5 (0000100 binary)	Not used	Not used	Request transponder to reset the Doppler accumulator

COMMUNICATIONS BOX TO FEDS

No Message sent

C.2.7 SIGNAL LOSS MESSAGE

FEDS TO COMMUNICATIONS BOX

No message sent

COMMUNICATIONS BOX TO FEDS

Function Code	Time Field	Data Field	Interpretation
6 (0000011 binary)	Not used	Not used	Transponder has lost the tracking signal

C.3 COMMUNICATIONS BOX/TRANSPONDER INTERFACE

The interface between the Communications Box and the transponder was developed by personnel outside code 550: the Communications Box by Code 520; the transponder, by Motorola for Code 530. A brief description of each connection follows. The entire interface, including the transponder connection to a controller developed by Code 530, is described in Table C-1. Further information is available in Reference 4.

Two different 37-pin ports are used to pass data between the transponder and the Communications Box. Port J8 is used to transmit Doppler observation data and related signals. Port J11 is used to transmit frequency control data and related signals. The assignment of pins in port J8 is as follows:

- Pin 1--Ground
- Pins 2 and 3--Doppler data; the value of the 40-bit Doppler accumulator at the time that the time strobe is set high is output using these pins; transmitted by the transponder.
- Pins 4 and 5--Time strobe; the transition from low to high indicates the end of a Doppler averaging period; the transition from high to low indicates that the data are available for transfer; transmitted by the transponder
- Pin 6--Doppler reset; a low setting indicates a request to clear the accumulator and reset the averaging interval; transmitted by the Communications Box
- Pin 7--Doppler enable; required to be low for Doppler data to be transmitted; transmitted by the Communications Box

Table C-1. Communications Box/Transponder Interface Pin Assignments

Communications Box	Transponder Controller	Transponder	
Connector 1	**Port J7**	**Port J7**	**Port J8**
Ground	50	50	1
Doppler data (+)	47	49	2
Doppler data (-)	44	48	3
Time strobe (+)	41	47	4
Time strobe (-)	38	46	5
Doppler reset	35	45	6
Doppler enable	32	44	7
Doppler clock (+)	26	42	9
Doppler clock (-)	23	41	10
Carrier lock	20	40	11
Sync detect	17	39	12
Connector 2	**Port J12**	**Port J12**	**Port J11**
Frequency/mode data (-)	38	46	1
Frequency/mode data (+)	35	45	2
Frequency/mode enable	47	49	3
Frequency/mode clock (-)	44	48	4
Frequency/mode clock (+)	41	47	5
Ground			6

- Pins 9 and 10--Doppler clock; used to shift the Doppler data when the Doppler enable is active; transmitted by the Communications Box
- Pin 11--Carrier lock; set high when the transponder has a phase lock on the forward-link signal; transmitted by the transponder
- Pin 12--Sync detect; set high to indicate PN synchronization to a TDRSS forward-link signal

The assignment of pins in part J11 is as follows:

- Pins 1 and 2--Frequency/mode data; a 16-bit command word containing either mode control information concerning the state of the transponder or frequency control information indicating the center frequency offset of the tracking signal search; only the frequency data are transmitted by the Communications Box
- Pin 3--Frequency/mode enable; must be set low for frequency or mode control data to be transmitted; transmitted by the Communications Box
- Pins 4 and 5--Frequency/mode clock; used to shift the command data into the transponder when the enable is set
- Pin 6--Ground

APPENDIX D - FEDS REQUIREMENTS SUMMARY

This appendix contains the updated FEDS requirements presented in Reference 5. The FEDS requirements are presented according to level of detail, as follows:

- Section D.1 specifies the system requirements, which are the tasks the system must perform (on the highest level) to satisfy the needs and objectives of the end user.
- Section D.2 specifies the system performance requirements and limitations. These consist of the schedules on which specific requirements must be satisfied and any limitations that will affect the performance of the system.
- Section D.3 specifies the functional requirements, which are the functions the system must perform to satisfy the system requirements. These are the most detailed requirements given.

D.1 SYSTEM REQUIREMENTS

FEDS will be an onboard orbit determination system requiring periodic ground support. The objective of FEDS is to provide the outside world with orbit information (i.e., position and velocity) on a near-real-time basis that could be used for experimental data annotation.

For the ground demonstration, FEDS will be located on the ground with a transponder at GSFC. The external world including the ground support system will be simulated by ADEPT in GSFC's Systems Technology Laboratory (STL). Among other input, ADEPT will provide FEDS with an initial spacecraft state. During the experiment, WSGT will perform Doppler compensation based on the corresponding ephemeris tape. The resulting Doppler signals will be transmitted through a TDRS to the transponder connected to FEDS. Based on the initial state, FEDS will predict the Doppler frequency shift to enable the transponder to receive these signals. The Doppler measurements will then be used by FEDS to achieve a new best estimate of the state. The new state vector will be used on the next pass to predict the Doppler frequency shift. Figure D-1, the FEDS context diagram, shows the relationship of the ground demonstration version of FEDS to its external environment.

This section specifies the system requirements, that is, the tasks that the prototype FEDS must perform to satisfy the needs and objectives of the ground demonstration. These requirements include the top-level FEDS requirements, presented in Section D.1.1, and the input and output requirements, presented in Sections D.1.2 and D.1.3, respectively.

D.1.1 TOP-LEVEL REQUIREMENTS

The top-level requirements of FEDS are as follows:

- FEDS will provide position and velocity on a near-real-time basis for experimental data annotation and direct downlink.
- FEDS will predict one-way Doppler observations on a scheduled basis for direct downlink to ADEPT and for transponder acquisition.
- FEDS will generate and output a state vector predict table containing vectors at a specified frequency over a specified time interval.
- FEDS will maintain and output an activity log on a regular basis and when specifically requested through a control command.
- FEDS will perform any preprocessing required to process the input one-way Doppler observations.

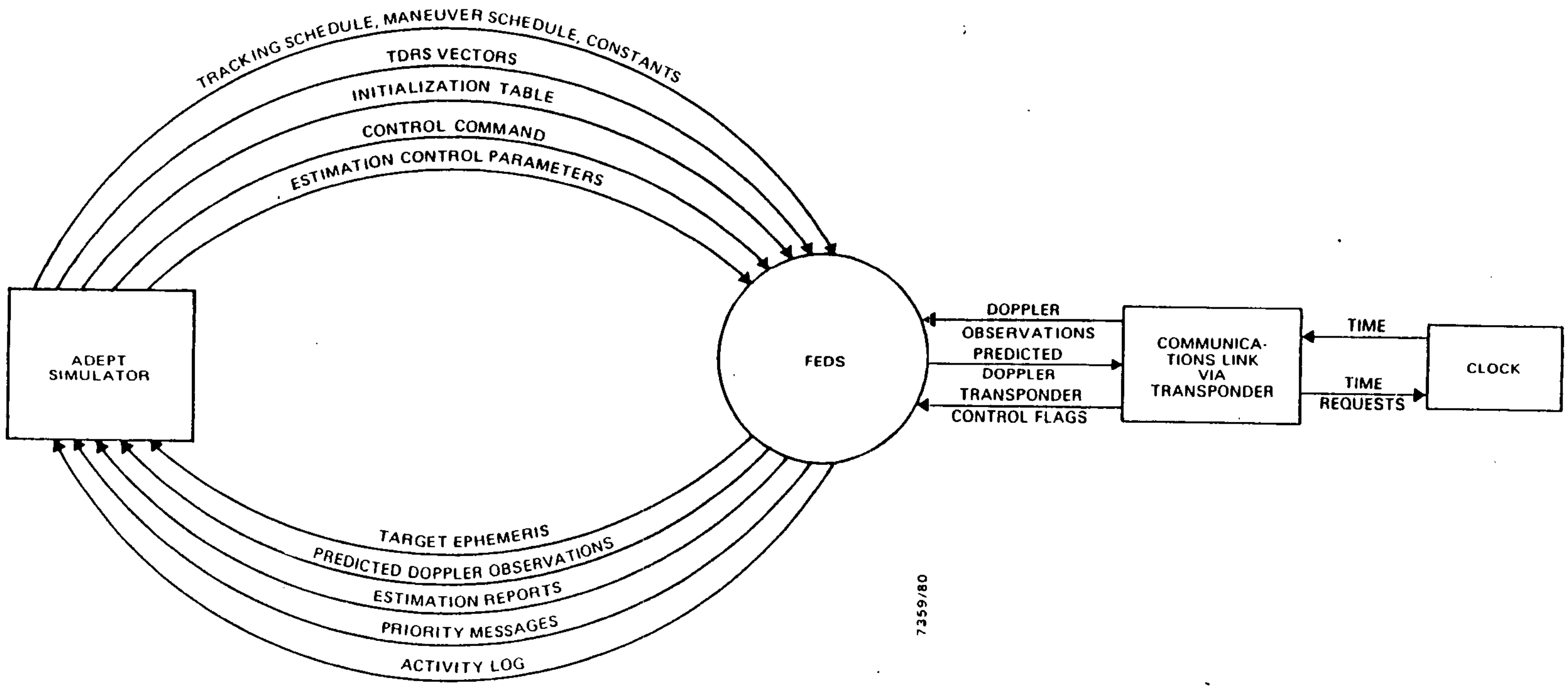


Figure D-1. FEDS Context Diagram

- FEDS will be capable of recovering from both user spacecraft and TDRS maneuvers.
- FEDS will perform orbit determination using a batch least-squares method of estimation, differentially correcting the orbit of the target (user spacecraft). FEDS will estimate the following state parameters:
  - Six parameters of the orbital state (target) (position and velocity)
  - Atmospheric drag coefficient, C_D
  - Coefficients of the frequency model for one-way TDRSS data
- FEDS will process one-way TDRSS Doppler observation data.

D.1.2 INPUT REQUIREMENTS

The FEDS input requirements are as follows:

- FEDS will accept input messages containing data and control commands.
- FEDS will accept from ADEPT the following input data:
  - New TDRS vectors. These data include one state vector (position and velocity) for each active TDRS, up to two TDRSs. New TDRS vectors will be uplinked at least once per day.
  - Maneuver schedule. This schedule specifies the predicted states and times of user spacecraft and/or TDRS maneuvers. It covers up to eight maneuvers and will be uplinked as necessary. The entire maneuver schedule will be uplinked at the same time.

- Tracking schedule. This schedule is the tracking schedule for the prediction of one-way Doppler frequency shift and the annotation of observations with tracking configuration. It covers 16 tracking intervals and will be uplinked as necessary. The entire tracking schedule will be uplinked at the same time.
- Initialization table. This table specifies the initial conditions for the estimator, including the a priori state vector, which will be propagated for output until a solution is reached. This table will be uplinked at the start of FEDS execution and then later at the user's direction.
- Constants. These constants, which will be used throughout the FEDS processes, may have to be changed during long-term operations. They are categorized as follows: integration, conversion, and physical constants; station positions (minimum of three stations) and observation modeling constants; geopotential model constants; atmospheric drag model constants; and timing coefficients.
- Estimation control parameters. This set of parameters (e.g., maximum iterations, observation weights, convergence criteria) provides control in estimating the spacecraft state. It will be uplinked at the first estimation process and then later at the user's discretion.

• FEDS will accept Doppler observations from the communications link with the transponder consisting of a 40-bit serial word that is time tagged.

- FEDS will recognize the following control commands from ADEPT:
  - REBOOT: Reboot FEDS.
  - ABORT: Abort FEDS processing; output activity log.
  - STOP: Terminate FEDS processing in a normal manner; do not accept more data.
  - START: Start FEDS processing; accept all data. (This is a reply to commands STOP and ABORT.)
  - SUSPEND: Suspend computational processes; continue accepting data.
  - CONTINUE: Resume computations. (This is a reply to command SUSPEND.)
  - MARK TIME: Suspend all processing to allow shutdown of ground support system.
  - RESUME PROCESSING: Resume all processing: (This is a reply to command MARK TIME.)
  - BEGIN FAST TIMING: Begin fast-timing mode (i.e., compress out all idle time)
  - STOP FAST TIMING: Terminate fast-timing mode; (i.e., resume processing in real time).
  - STATUS REQUEST: Output activity log.
  - SET CLOCK: Set system clock to new time.
- FEDS will accept the following control flags from the communications link with the transponder:
  - Stop Doppler compensation indicating that the receiver carrier is locked onto the TDRS signal.

- Doppler data available flag indicating the Doppler measurement has been taken and is available for FEDS processing.

D.1.3 OUTPUT REQUIREMENTS

The FEDS output requirements are as follows:

- FEDS will periodically output an activity log containing a history of all activities it has performed.
- FEDS will output priority messages to request special ground support such as error handling, fast-timing, and so forth.
- FEDS will output tables of predicted state vectors for direct downlink to ADEPT.
- FEDS will output predicted one-way Doppler frequency shift on a scheduled basis to the transponder via the communication link for receiver acquisition.
- FEDS will output predicted one-way Doppler frequency shift on a scheduled basis for direct downlink to ADEPT.
- FEDS will output the following reports from the estimator:
  - DC residuals report. This report contains information about each individual observation (e.g., tracking configuration, observation residual, editing).
  - DC summary and statistics report. This report contains DC summary information (e.g., state update, new state, standard deviations of state parameters) and DC statistics (e.g.,

current root-mean-square (rms), previous rms, batch editing statistics).

D.2 SYSTEM PERFORMANCE REQUIREMENTS AND LIMITATIONS

This section specifies those requirements that deal with system performance and the limitations associated with it. Section D.2.1 presents the system performance requirements that define the schedules on which specific requirements must be satisfied. Section D.2.2 presents the hardware and software requirements and the limitations that will affect FEDS performance.

D.2.1 SYSTEM PERFORMANCE REQUIREMENTS

The system performance requirements for FEDS are as follows:

- FEDS will capture all incoming messages upon demand.
- FEDS will service each control command immediately after reception.
- FEDS will maintain an activity log and output (downlink) it on a scheduled basis or when requested by a control command.
- FEDS will output a table of predicted user spacecraft state vectors over a specified time interval at a specified frequency. For example, if the time interval is 1/2 hour and the frequency is 1 minute, the state vector predict tables will be generated as follows:
    - Each time a new solution is reached or a new a priori state vector (initialization table) is received, a table containing state vectors at 1-minute intervals starting at the current time (t_n) and ending 1 hour later ($t_n + 1$) will be generated and output.

- Then, 1/2 hour later (t_n + 1/2), the next table will be generated and output. This table will contain state vectors at 1-minute intervals over the next 1/2 hour. The start time of this table will be the end time of the previous table (t_n + 1) and the end time will be 1/2 hour after that (t_n + 1-1/2).
- The second step will be repeated until a new solution is reached or a new a priori state vector is received, which causes the process to begin again with the first step.

- FEDS will output one-way Doppler frequency shift no later than 1 minute before the start time of the current tracking interval. The actual amount of lead time will be specified by ground control.
- FEDS will complete data preprocessing and estimation on each batch of data by the time the next pass of Doppler data is received. Since observations data will be received every revolution under normal circumstances, this processing time will be limited to the length of one revolution of the user spacecraft (nominally, 100 minutes).
- FEDS will be capable of performing batch estimation over a user-specified minimum data span that will never be larger than 24 hours. In addition, FEDS must be capable of handling a maximum of 125 observations in each batch of data.
- FEDS will be capable of generating two types of reports during each DC slide:
  - The DC residuals report, if generated, will be generated either after the last inner edit

loop of each iteration or after the last iteration on each batch of data.

- The DC summary and statistics report, if generated, will be generated either after each DC iteration or after the last iteration of each DC slide.

D.2.2 HARDWARE AND SOFTWARE REQUIREMENTS AND LIMITATIONS

The FEDS hardware and software requirements and the limitations associated with them are as follows:

- The development computer will be the STL PDP-11/70 under the RSX-11M operating system.
- The target computer will be a PDP-11/23 under the RSX-11S operating system. It will have 256K bytes of RAM. The only peripheral available will be a ground terminal to monitor FEDS status during testing.
- All necessary system software (i.e., the device handlers) in both the development and target computers will be available.
- Since there will be no data storage peripherals in the target system, all data must be managed in RAM. In addition, overlaying of tasks is impossible.
- A communications link with the transponder will provide time-tagged Doppler measurements and control Doppler compensation, indicate when a measurement is available, and control the Doppler accumulator.

D.3 FUNCTIONAL REQUIREMENTS DEFINITION

This section specifies the FEDS functional requirements, that is, the functions that the system must perform to satisfy the system requirements and the performance requirements.

D.3.1 FUNCTIONAL REQUIREMENTS

The FEDS functional requirements specified in this section are presented according to functional areas, as follows:

- System control (Section D.3.1.1)
- Input processing (Section D.3.1.2)
- Data preprocessing (Section D.3.1.3)
- Data management (Section D.3.1.4)
- Estimation (Section D.3.1.5)
- One-way Doppler prediction (Section D.3.1.6)
- Output processing (Section D.3.1.7)

These functional requirements are the most detailed requirements presented. No attempt is made to define computational models or algorithms here, except where the requirements are specifically affected.

The functional requirements specified in Sections D.3.1.1 through D.3.1.7 are numbered for convenience. In the numbering system used, R indicates requirement.

D.3.1.1 System Control Functional Requirements

The functional requirements for system control are as follows:

R1.1 FEDS will maintain an activity log containing the following: system events, information messages, error messages, directives, and control commands.

R1.2 FEDS will service each control command immediately upon reception.

R1.3 FEDS will schedule maneuver recovery according to clock time and the maneuver schedule.

R1.4 FEDS maneuver recovery will consist of the following:

R1.4.1 TDRS maneuver. The predicted state after the maneuver will be given to the data preprocessor to be used for future generation of the TDRS orbit file.

R1.4.2 User spacecraft maneuver. The TDRS orbit files and the observations file will be purged. The startup procedure will be performed; estimation will be resumed only when a complete estimation span of data has been received.

R1.5 FEDS will schedule one-way Doppler prediction a user-specified number of minutes before the start time of each tracking interval in the tracking schedule.

R1.6 FEDS will schedule the output of data and messages.

R1.6.1 FEDS will schedule the output of severe errors from which the system cannot recover.

R1.6.2 FEDS will schedule the output of priority messages.

R1.6.3 FEDS will schedule the output of the activity log at a specified interval.

R1.6.4 FEDS will schedule the output of the activity log when specifically requested through a control command.

R1.6.5 FEDS will schedule the output of the predicted Doppler frequency shift at least

1 minute before the time tag of the first observation.

R1.7 FEDS will schedule the generation and output of the state vector predict table at the end of the specified interval after the last time of output.

R1.8 FEDS will schedule the generation and output of the state vector predict table immediately after a new solution is obtained.

R1.9 FEDS will schedule input processing when the input queue is full or when the input queue contains data and the system is otherwise idle.

R1.10 FEDS will schedule data preprocessing when a complete pass of data has been processed through input and estimation on the previous batch has been completed.

R1.11 FEDS will schedule data preprocessing when a TDRS maneuver occurs or when a new TDRS vector has been received.

R1.12 FEDS will schedule estimation when a new pass of data has been added to the observations data set.

R1.13 FEDS will notify ground control when it has an excessive amount of idle time for fast timing.

D.3.1.2 Input Processing Functional Requirements

The functional requirements for input processing are as follows:

R2.1 FEDS will capture all incoming messages upon demand.

R2.2 FEDS will accept, as input, messages containing data and control commands.

R2.3 FEDS will process the following types of input data: Doppler measurements, transponder control flags, new TDRS vectors, maneuver schedule, tracking schedule, initialization table, estimation control parameters, and constants (i.e., miscellaneous constants, station constants, geopotential tables, atmospheric density tables, and timing coefficients).

R2.4 FEDS will accept the following control commands: REBOOT, ABORT, STOP, START, SUSPEND, CONTINUE, STATUS REQUEST, SET CLOCK, MARK TIME, RESUME PROCESSING, BEGIN FAST TIMING, and STOP FAST TIMING.

R2.5 Deleted.

D.3.1.3 Data Preprocessing Functional Requirements

The functional requirements for data preprocessing are as follows:

R3.1 FEDS will accept only those Doppler observation measurements that are in ascending time order and have a reasonable value.

R3.2 FEDS will convert the Doppler observation measurements and time tag to the correct engineering units.

R3.3 No smoothing of the raw observation data will be performed.

R3.4 FEDS will pregenerate TDRS orbit files from the uplinked TDRS vectors (one file for each TDRS). These files will cover the same timespan as the observations file; they will be used iteratively by the batch estimator.

R3.5 FEDS will update the TDRS orbit files when a new TDRS vector is received.

R3.6 After a TDRS maneuver, FEDS will use the predicted state vector as the base vector for generating the TDRS orbit files in the future.

R3.7 After receiving an update to a TDRS maneuver, FEDS will update the appropriate TDRS orbit file from the maneuver time to the current processing time by propagating the input TDRS vector.

D.3.1.4 Data Management Functional Requirements

The functional requirements for data management are as follows:

R4.1 FEDS will manage all data files in memory, since no data storage peripherals will be provided.

R4.2 FEDS will have the capability to locate, read, and write observation records in the observations file.

R4.3 FEDS will have the capability to locate, read, write, and update the records of the TDRS orbit files.

R4.4 FEDS will have the capability to purge all data files.

D.3.1.5 Estimation Functional Requirements

The functional requirements for estimation are as follows:

R5.1 FEDS will perform differential correction on the most recent fixed-length minimum data span (specified through control parameters) of observation data. The observation data used will be whole passes except when data wraparound occurs.

R5.2 The method of estimation will be batch least squares.

R5.3 Due to the real-time processing of FEDS, the estimation timespan will be slid forward to encompass each new pass of observations data. This will be referred to as a "sliding batch estimator."

R5.4 During initialization of the estimation process (defined as operations included in estimation using a particular batch of data), the following will be performed:

R5.4.1 FEDS will initialize the estimation parameters from the initialization table and/or the estimation control parameters if either was received since the beginning of the previous estimation process.

R5.4.2 FEDS will set up the new estimation span.

R5.5 Initialization of the estimation parameters will be performed after estimation has been suspended through a control command.

R5.6 FEDS will model one-way TDRSS Doppler observations.

R5.6.1 Deleted.

R5.6.2 Unless directed otherwise, the measurement partials will be computed only on the first iteration. The linearity test described in R5.8.3 will determine whether or not recomputation is necessary.

R5.7 FEDS will perform an edit loop during the first (or, on demand, subsequent) iteration of each DC slide based on the predicted residuals and estimation statistics (specified through control parameters).

R5.7.1 The computed measurements and associated partials will remain unchanged during this process.

R5.7.2 The edit loop will terminate upon either the maximum number of loops this iteration (maximum = 10) or no observations were edited during the predicted residual versus sigma test (input parameter).

R5.8 FEDS will test for DC slide convergence, divergence, and linearity violation at the end of each iteration.

R5.8.1 FEDS will declare a new state solution at the point of convergence. Convergence is defined in Reference 6, "FEDS Estimation Logic," memorandum Sections II.A.11(a) and II.A.12(a).

R5.8.2 FEDS will remain in the propagate mode if divergence occurs. Divergence is defined in Reference 6, Sections II.A.11(b) and II.A.12(a).

R5.8.3 FEDS will perform another iteration if neither convergence nor divergence has occurred. The linearity test defined in Reference 6, Section II.A.12(b) will be performed to determine whether recomputation of partial derivatives and another edit loop will be done on the next iteration.

R5.8.4 FEDS will declare the current iteration as the last iteration of this DC slide if either convergence or divergence occurs.

R5.9 FEDS will be capable of generating a DC summary and statistics report. This report, if generated, will be generated and output either (1) after every iteration or (2) after the last iteration on each batch.

R5.10 FEDS will be capable of generating a DC residuals report. If generated, this report will be output either after the first and last edit loops of each iteration or after the last iteration of each DC slide.

R5.11 If time allows, FEDS will precompute values needed for the next DC slide prior to the actual receipt of the next data pass. This will be done for all slides except the initial slide.

R5.11.1 The new epoch will be predetermined as the current epoch plus a fixed lead time (input parameter).

R5.11.2 Measurement residuals and partial derivatives will be computed over all observations in the previous slide.

D.3.1.6 <u>One-Way Doppler Prediction Functional Requirements</u>

The functional requirements for one-way Doppler prediction are as follows:

R6.1 FEDS will predict (simulate) one-way Doppler frequency shift over the timespans indicated by the uplinked tracking schedule.

R6.2 FEDS will use the TDRS whose ID will be specified with each tracking interval to predict the one-way Doppler frequency shift.

R6.3 No observation feasibility checking will be performed, since the tracking schedule will contain valid intervals for the specified TDRS.

R6.4 The target (user spacecraft) state vector used in one-way Doppler prediction will be based on the most recent state solution. When a user spacecraft maneuver has occurred or a new initialization table has been received, the most recent solution will be overridden by the new a priori estimate.

R6.5 The TDRS state vector used in one-way Doppler prediction will be based on the TDRS vector used to generate the TDRS orbit file.

D.3.1.7 Output Processing Functional Requirements

The functional requirements for output processing are as follows:

R7.1 FEDS will generate and output the state vector predict table. This table will be based on the most recent state solution. When a user spacecraft maneuver has occurred or a new initialization table has been received, the most recent solution will be overridden by the new a priori state vector.

R7.2 FEDS will output priority messages directly to the ground control (ADEPT).

R7.3 FEDS will output the activity log to ADEPT.

R7.4 FEDS will output the predicted Doppler shift to the communications link with the transponder at a specified interval.

R7.5 FEDS will output to ADEPT the DC residuals reports as they are generated by the estimator.

R7.6 FEDS will output to ADEPT the DC summary and statistics reports as they are generated by the estimator.

R7.7 FEDS will output a table of the predicted Doppler data for each tracking interval to ADEPT.

APPENDIX E - DATA PACKET DESCRIPTIONS

This appendix describes the data packets used to transfer data by means of SEND and RECEEV directives between FEDS primary and secondary tasks.

E.1 DATA PACKET 1

SIZE: 73 words (146 bytes)

SENT BY: PREPRO

RECEIVED BY: DATMGR

FORMAT:

Parameter	Type	Dimension	Description
IOBTYP	I*2	1	Observation type = 1, one-way TDRSS
OBSTIM	R*8	1	Observation time tag
Spare	Byte	8	Spare
OBS	R*8	1	Doppler observation
FREQ	R*8	1	TDRS frequency
DOPINT	R*4	1	Doppler averaging interval
Spare	Byte	1	Spare
FORANT	Byte	1	Forward station ID (internal index)
Spare	Byte	1	Spare
FORTDR	Byte	1	Forward TDRS ID (internal index)
EDIT(I)	Byte	2	Observation data edit flag: = 0, not edited = 1, edited by DC during edit loop = 2, edited by preprocessor = 3, edited by DC for maximum observed-minus-computed value = 4, edited by DC for ray path (EDIT(1) not used in FEDS)
Spare	Byte	1	Spare
FORACC	Byte	1	Forward access method (internal index)
JPASS	Byte	1	End-of-pass indicator
BAND	Byte	1	Band frequency: = 48, S-band = 96, Ku-band

E.1 DATA PACKET 1 (Cont'd)

Parameter	Type	Dimension	Description
NEWREC	L*1	1	New record flag (= 7, record has not been processed by estimator)
Spare	Byte	97	Spare

E.2 DATA PACKET 2

SIZE: 17 words (34 bytes)

SENT BY: PREPRO

RECEIVED BY: DATMGR

FORMAT:

Parameter	Type	Dimension	Description
ITYPE	I*2	1	Type of TDRS vector: = 1, TDRS 1 = 2, TDRS 2
INPVEC	R*8	4	Input vector (time and position vector)

E.3 DATA PACKET 3

SIZE: 5 words (10 bytes)

SENT BY: DOPPRE, OBSMDL

RECEIVED BY: DATMGR

FORMAT:

Parameter	Type	Dimension	Description
NTDR	I*2	1	Type of TDRS vector: = 1, TDRS 1 = 2, TDRS 2
TTAG	R*8	1	Requesting time for a set of 10 TDRS vectors

E.4 DATA PACKET 4

SIZE: 73 words (146 bytes)

SENT BY: ESTIM, DATMGR

RECEIVED BY: DATMGR, ESTIM

FORMAT:

Parameter	Type	Dimension	Description
IOBTYP	I*2	1	Observation type: (= 1, one-way TDRSS)
OBSTIM	R*8	1	Observation time tag
Spare	Byte	8	Spare
OBS	R*8	1	Doppler observation
FREQ	R*8	1	TDRSS frequency
DOPINT	R*4	1	Doppler averaging interval
Spare	Byte	1	Spare
FORANT	Byte	1	Forward station ID (internal index)
Spare	Byte	1	Spare
FORTDR	Byte	1	Forward TDRS ID (internal index)
EDIT(I)	Byte	2	Observation data edit flag: = 0, not edited = 1, edited by DC during edit loop = 2, edited by preprocessor = 3, edited by DC for maximum observed-minus-computed value = 4, edited by DC for ray path (EDIT(1) not used in FEDS)
Spare	Byte	1	Spare
FORACC	Byte	1	Forward access method (internal index)
JPASS	Byte	1	End-of-pass indicator
BAND	Byte	1	Band frequency: = 48, S-band = 96, Ku-band

E.4 DATA PACKET 4 (Cont'd)

Parameter	Type	Dimension	Description
NEWREC	L*1	1	New record flag (= 7, record has not been processed by estimator)
Spare	Byte	4	Spare
OBSPAR	R*4	10	Doppler observation partial derivatives
SPARE	Byte	8	Spare
OBSRES	R*8	2	Doppler observation residual

E.5 DATA PACKET 5

SIZE: 160 words (320 bytes)

SENT BY: DATMGR

RECEIVED BY: DOPPRE, OBSMDL

FORMAT:

Parameter	Type	Dimension	Description
OUTVEC(I,J)	R*8	4,10	Requested set of 10 TDRS vectors surrounding request time: I = 1, time tag associated with the vector J I = 2, X-position component of vector J I = 3, Y-position component of vector J I = 4, Z-position component of vector J

E.6 DATA PACKET 6

SIZE: 40 words (80 bytes)

SENT BY: PREPRO

RECEIVED BY: ORBIT

FORMAT:

Parameter	Type	Dimension	Description
ISTART	I*2	1	Start mode for propagation: = 1, use input vector = 2, use internal table
IPART	I*2	1	Variational equation control flag (= 0, do not integrate variational equation)
TTAG	R*8	1	Starting vector time tag (A.1 seconds from reference time)
X(6)	R*8	6	Starting vector (ignored if ISTART = 2)
Spare	Byte	10	Spare
ISCID	I*2	1	Spacecraft ID: = 1, TDRS 1 = 2, TDRS 2
ENDTIM	R*8	1	Requested end time of propagation (A.1 seconds from reference time)

E.7 DATA PACKET 7

SIZE: 40 words (80 bytes)

SENT BY: STAPRE

RECEIVED BY: ORBIT

FORMAT:

Parameter	Type	Dimension	Description
ISTART	I*2	1	Start mode for propagation: = 1, use input vector = 2, use internal table
IPART	I*2	1	Variational equation control flag (= 0, do not integrate variational equation)
TTAG	R*8	1	Starting vector time tag (A.1 seconds from reference time)
X(6)	R*8	6	Starting vector (ignored if ISTART = 2)
CD	R*8	1	Coefficient of drag
IMAP7	I*2	1	CD use indicator: = 0, use default coefficient of drag > 0, use CD if ISTART = 1
ISCID	I*2	1	Spacecraft ID (= 5, user predict)
ENDTIM	R*8	1	Requested end time of propagation (A.1 seconds from reference time)

E.8 DATA PACKET 8

SIZE: 40 words (80 bytes)

SENT BY: ESTIM

RECEIVED BY: ORBIT

FORMAT:

Parameter	Type	Dimension	Description
ISTART	I*2	1	Start mode for propagation (= 1, use input vector)
IPART	I*2	1	Variational equation control flag (= 0, do not integrate variational equation)
TTAG	R*8	1	Starting vector time tag (A.1 seconds from reference time)
X(6)	R*8	6	Starting vector
CD	R*8	1	Coefficient of drag
IMAP7	I*2	1	CD use indicator: = 0, use default coefficient of drag > 0, use CD
ISCID	I*2	1	Spacecraft ID (= 4, user past)
ENDTIM	R*8	1	Requested end time of propagation (A.1 seconds from reference time)

E.9 DATA PACKET 9

SIZE: 40 words (80 bytes)

SENT BY: ESTIM

RECEIVED BY: ORBIT

FORMAT:

Parameter	Type	Dimension	Description
ISTART	I*2	1	Start mode for propagation (= 1, use input vector)
IPART	I*2	1	Variational equation control flag: = 1, integrate variational equation without drag partial derivative = 2, integrate variational equation with drag partial derivative
TTAG	R*8	1	Starting vector time tag (A.1 seconds from reference time)
X(6)	R*8	6	Starting vector
CD	R*8	1	Coefficient of drag
IMAP7	I*2	1	CD use indicator: = 0, use default coefficient of drag > 0, use CD
ISCID	I*2	1	Spacecraft ID (= 4, user past)
ENDTIM	R*8	1	Requested end time of propagation (A.1 seconds from reference time)

E.10 DATA PACKET 10

SIZE: 40 words (80 bytes)

SENT BY: OBSMDL

RECEIVED BY: ORBIT

FORMAT:

Parameter	Type	Dimension	Description
ISTART	I*2	1	Start mode for propagation (= 2, use internal table)
IPART	I*2	1	Variational equation control flag: = 1, integrate variational equation without drag partial derivative = 2, integrate variational equation with drag partial derivative
TTAG	R*8	1	Starting vector time tag (A.1 seconds from reference time)
X(6)	R*8	6	Ignored because ISTART = 2
CD	R*8	1	Ignored because ISTART = 2
IMAP7	I*2	1	Ignored because ISTART = 2
ISCID	I*2	1	Spacecraft ID (= 4, user past)
ENDTIM	R*8	1	Requested end time of propagation (A.1 seconds from reference time)

E.11 DATA PACKET 11

SIZE: 204 words (408 bytes)

SENT BY: ORBIT

RECEIVED BY: PREPRO, STAPRE, ESTIM, OBSMDL

FORMAT:

Parameter	Type	Dimension	Description
NEWORB	I*2	1	Reference vector chosen by ORBIT for propagation: = 0, used internal table = 1, used input vector
IPARTO	I*2	1	State transition matrix output flag: (= 0, no state transition matrix)
ENDTM1	R*8	1	End time of propagation (time tag associated with the new vector)
XOUT	R*8	6	New vector
ISCIDO	I*2	1	Spacecraft ID: = 1, TDRS 1 = 2, TDRS 2 = 4, user past = 5, user predict
IVALID	I*2	5	Validity-of-results flag:[1] = 0, no error detected = 1, input parameter error; execution continues = 50, numerical fault; execution continues = 100, input parameter error and termination = 200, input parameter out of range and termination = 500, numerical error and termination
Spare	Byte	336	Spare

[1]Up to five errors can be entered.

E.12 DATA PACKET 12

SIZE: 204 words (408 bytes)

SENT BY: ORBIT

RECEIVED BY: ESTIM, OBSMDL

FORMAT:

Parameter	Type	Dimension	Description
NEWORB	I*2	1	Vector chosen by ORBIT for startup: = 0, used stored starting vector = 1, used input vector
IPARTO	I*2	1	State transition matrix output flag: = 1, state transition matrix without drag = 2, state transition matrix with drag
ENDTM1	R*8	1	End time of propagation (time tag associated with the new vector)
XOUT	R*8	6	New vector
ISCIDO	I*2	1	Spacecraft ID (= 4, past user orbit)
IVALID	I*2	5	Validity-of-results flag:[1] = 0, no error detected = 1, input parameter error; execution continues = 50, numerical fault; execution continues = 100, input parameter error and termination = 200, input parameter out of range and termination = 500, numerical error and termination
STM	R*8	6,7	State transition matrix at ENDTM1

[1] Up to five errors can be entered.

GLOSSARY

ADEPT	AODS Environment Simulator for Prototype Testing
AGC	automatic gain control
AODS	Automated Orbit Determination System
CPU	central processing unit
CRT	cathode ray tube
DC	differential correction
EPROM	erasable, programmable read-only memory
ET	ephemeris time
FED	Flight Experiment Demonstration System
GEM	Goddard Earth Model
GHA	Greenwich hour angle
GMT	Greenwich mean time
GSFC	Goddard Space Flight Center
GTDS	Goddard Trajectory Determination System
ID	identification
LED	light-emitting diode
MA	multiple access
NASA	National Aeronautics and Space Administration
PB	parallel grouped binary
PN	pseudorandom noise
PSO	Project Support Office
QIO	queue input/output
RAM	randum access memory
RFSOC	Radio Frequency Simulation Operation Center
RKF	Runge-Kutta-Fehlberg
rms	root mean square
SIC	support ID code
SME	Solar Mesophere Explorer
SRE	standard ranging equipment
SSA	S-band single access

STDN	Spaceflight Tracking and Data Network
STL	Systems Technology Laboratory
TDRS	Tracking and Data Relay Satellite
TDRSS	Tracking and Data Relay Satellite System
USNO	United States Naval Observatory
UTC	universal time coordinated
VIC	vehicle identification code
VID	vehicle ID
WSGT	White Sands Ground Terminal

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