

OPERATIONAL TRAJECTORY DATA REPORT

December 11, 1970



APOLLO 14 (AS-509) OPERATIONAL TRAJECTORY  
FOR JANUARY 31, 1971, LAUNCH WINDOW

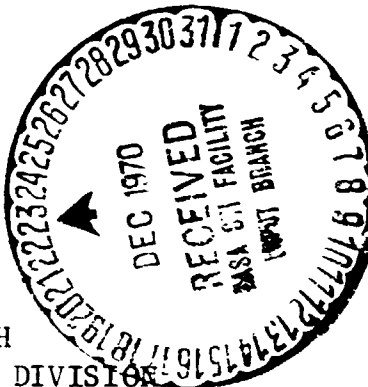
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MISSION PLANNING AND ANALYSIS DIVISION  
AERO-ASTRODYNAMICS LABORATORY

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION



GEORGE C. MARSHALL SPACE FLIGHT CENTER

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George C. Marshall Space Flight Center  
Huntsville, Alabama

ABSTRACT

This report presents the predicted launch vehicle operational trajectory and accompanying data for the Apollo 14, AS-509 mission. All data presented are for a January 31, 1971, launch window. Detailed trajectory printout is provided for only the prime azimuth of 72.0669 degrees corresponding to a launch time of 20:23 GMT (15:23 EST). However, pertinent summary data are presented for other azimuths in the window.

Trajectory data are presented for all phases of flight through spacecraft separation, including data pertaining to the impact of the spent stages. A brief discussion of the flight sequence is presented in addition to a critical event sequence table for the prime azimuth. Launch vehicle guidance and targeting presettings are included as well as predicted performance and mass characteristics.

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## SECTION I: INTRODUCTION

The Apollo 14, AS-509 flight is the ninth mission of the Saturn V vehicle and the seventh manned Saturn V mission. The present launch day planned for Apollo 14 is January 31, 1971. The prime launch time for January 31 is 20:23 GMT (15:23 EST) which corresponds to a flight azimuth of 72.0669 degrees. This launch time is the first integral minute after the opening of the January 31 launch window.

The launch vehicle trajectory is designed to inject the Apollo 14 spacecraft into a circumlunar trajectory. Complete burns of the S-IC and S-II stages and a partial burn of the S-IVB stage place the vehicle into a 100 nautical mile parking orbit as measured with respect to the equatorial radius. During the second or third revolution in parking orbit, allowing two opportunities, the S-IVB is reignited, placing the launch vehicle onto a translunar orbit. Spacecraft separation from the launch vehicle occurs prior to the evasive maneuver approximately one-half hour after translunar injection. Post-spacecraft separation operations include a hybrid maneuver by the Apollo 14 spacecraft to achieve a low periselenium trajectory, deboost into lunar orbit, manned lunar landing, ascent from the lunar surface, docking, transearth injection by the CSM, atmospheric reentry, and finally splashdown in the Pacific Ocean.

Post-separation launch vehicle operations include an S-IVB APS burn to perform a translational evasive maneuver away from the CSM/LM, rotational maneuver to a lunar impact attitude, propellant venting, LOX dump, and APS engine burns to achieve a lunar impact of the S-IVB stage in the desired impact target area.

This report presents trajectory and mission-related groundrules and constraints, a mission description, a launch vehicle trajectory description and data summary, an operational sequence of events, vehicle configuration data including weight and performance data, a propellant reserves summary, and flight profile envelopes. Also presented are launch vehicle guidance and targeting presettings including the S-IC tilt polynomial, and representative trajectory data for all launch vehicle boost and coast phases of flight. The S-IVB lunar impact trajectory data are not included in this report but will be published in a separate document later this month.

This analysis has verified that the AS-509 launch vehicle is capable of achieving all mission and launch vehicle objectives without violating constraints stipulated in the mission implementation criteria. Launch vehicle performance reserves were found adequate to meet all mission objectives in the presence of three-sigma dispersions. Therefore, response to the guidance and targeting presettings will inject the Apollo 14 spacecraft onto the desired translunar trajectory under three-sigma conditions.

The launch vehicle targeting objectives provided by MSC for launch on January 31, 1971, and flight to the Fra Mauro landing site are consistent with the mission planning concept adopted for this launch date--constant time of lunar arrival. Nominal midcourse requirements for the targeted azimuths (72, 80, 88, and 96 degrees) are approximately 1.0 meter/second.

An S-IVB post-TLI trajectory is presented in this report. This trajectory is designated the S-IVB dead stage trajectory and describes the flight path the S-IVB dead stage will follow if time base eight cannot be initiated by ground command during flight.

## SECTION II: MISSION REQUIREMENTS AND DESCRIPTION

The Apollo 14, AS-509 mission is an Apollo Lunar Surface Experiment Package (ALSEP) lunar landing mission. The primary launch date is January 31, 1971, with the landing site being in the Fra Mauro area which is a lunar highlands region.

The primary launch vehicle mission objective requires that the launch vehicle inject a manned Apollo command/service module (CSM) and lunar module (LM) onto a translunar orbit. The manned space flight primary objectives are as follows:

1. Perform selenological inspection, survey, and sampling in a highland area.
2. Deploy ALSEP consistent with a seismic net.
3. Develop the capability to conduct a mission to a specific site.
4. Demonstrate the point landing capability.
5. Develop man's capability to work in the lunar environment.

Other supporting objectives are given below:

1. Launch on a flight azimuth between 72 degrees to 96 degrees east of north.
2. Insert the S-IVB/IU/CSM into a 100 nautical mile circular earth parking orbit.
3. Restart the S-IVB during either the second or third revolution in earth parking orbit and inject the S-IVB/IU/CSM on the planned translunar conic.
4. Provide the required attitude control for the S-IVB/IU/CSM during the transposition, docking, and ejection (TD&E) maneuver.
5. Provide the capability to impact the spent S-IVB/IU on the lunar surface at a predetermined position approximately 33° 15' west longitude and 1° 35' 45.6" south latitude.

6. Use the S-IVB APS burn to execute a launch vehicle evasive maneuver after ejection of the CSM/LM from the S-IVB/IU.

7. Venting and dumping of the remaining gases and liquid to safe th S-IVB/IU.

The launch vehicle operational mission consists of the following phases:

1. Launch and boost to earth parking orbit is accomplished by complete burns of the S-IC and S-II stages and a partial burn of the S-IVB stage.

2. Coast for approximately two to three revolutions in a circular 100 nautical mile earth parking orbit.

3. The second burn of the S-IVB stage from earth parking orbit to translunar injection.

4. Command and service module separation, transposition, and docking with the lunar module and CSM/LM ejection from S-IVB/IU during post-TLI coast.

5. S-IVB evasive maneuver to reduce the probability of recontact with the CSM/LM.

6. S-IVB dumping, venting, and APS burn operation after the evasive maneuver to cause the S-IVB/IU to impact the moon.

Mission objectives and requirements were obtained from Reference 2.

Figure 1 presents a graphic representation of the overall mission from lift-off to earth return.

The Apollo 14 AS-509 vehicle is scheduled to be launched on January 31, 1971, from Pad 39A of the Kennedy Space Center. Lift-off occurs at 3:23 EST which produces a flight azimuth of 72.0669 degrees. This time corresponds to the first integral minute after the opening of the January 31, 1971, launch window.

For launch in accordance with the January 31 launch window, translunar injection occurs approximately -18.66 degrees south latitude and 150.82 degrees east longitude.

The translunar injection boost is targeted for high periselenium free-return targeting consistent with the hybrid lunar landing mission profile.

The free-return trajectory periselenium altitudes will vary from approximately 2029 nautical miles for 72 degrees first opportunity to 1075 nautical miles for 96 degrees for a second opportunity case.

The operational trajectory groundtrack through TLI is presented in Figure 3 for a launch along a 72.0669 degree launch azimuth for first opportunity.

Significant trajectory events and event times are presented in the critical events sequence given in Table 1. Flight times shown in this table are for a launch along a 72.0669 degree launch azimuth. However, events referenced to a time base are applicable with respect to that time base for all launch azimuths. A summary of trajectory parameters and azimuth dependent critical events is presented in Tables 2 through 12.



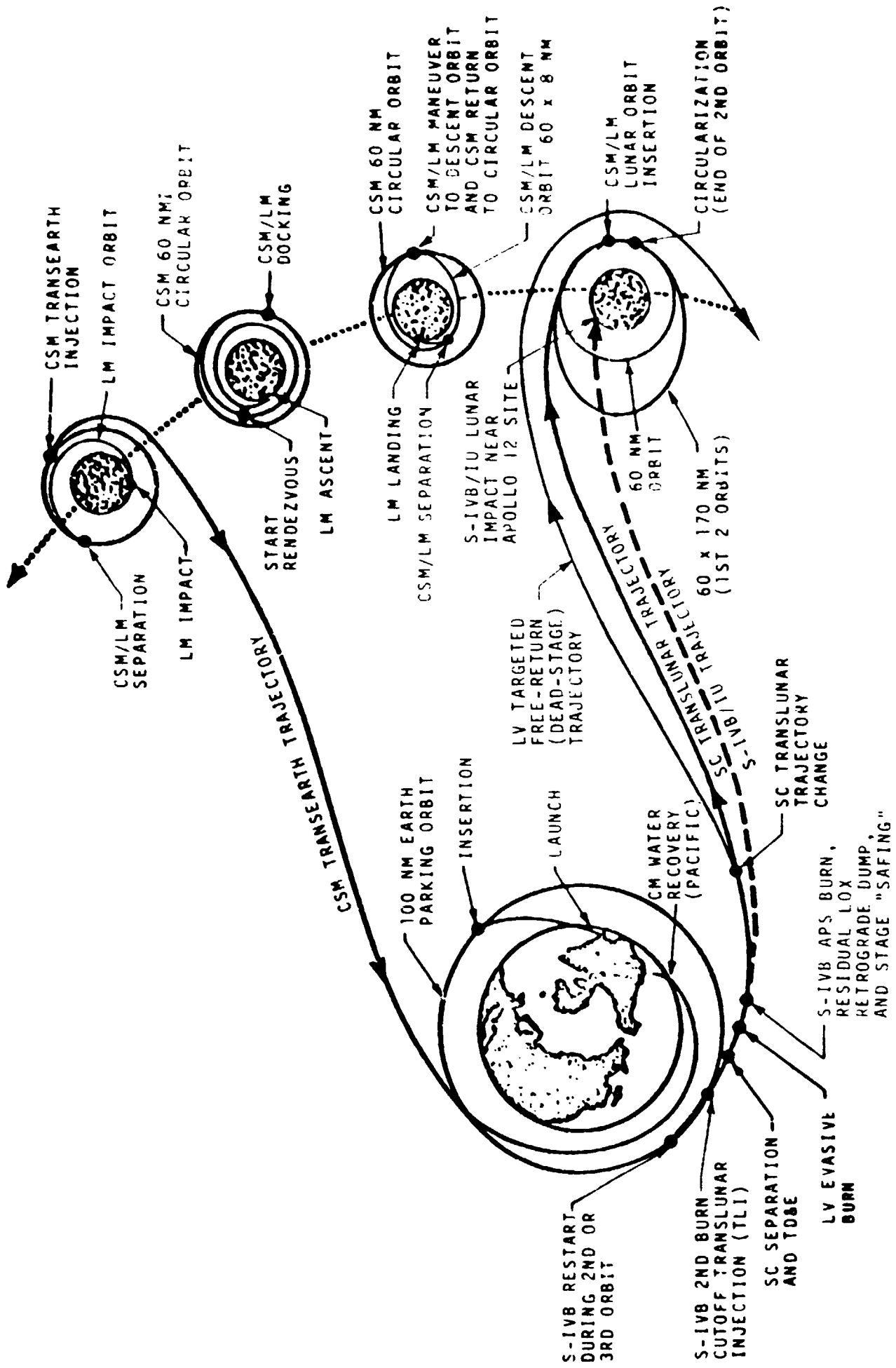


FIGURE 1 AS-509 APOLLO 14 MISSION PROFILE

WINDOW OPENS: 20:22:04:35 GMT JANUARY 31, 1971, AZIMUTH LAUNCH WINDOW  
PRIMARY LAUNCH TIME 20:23 AZIMUTH 72:067

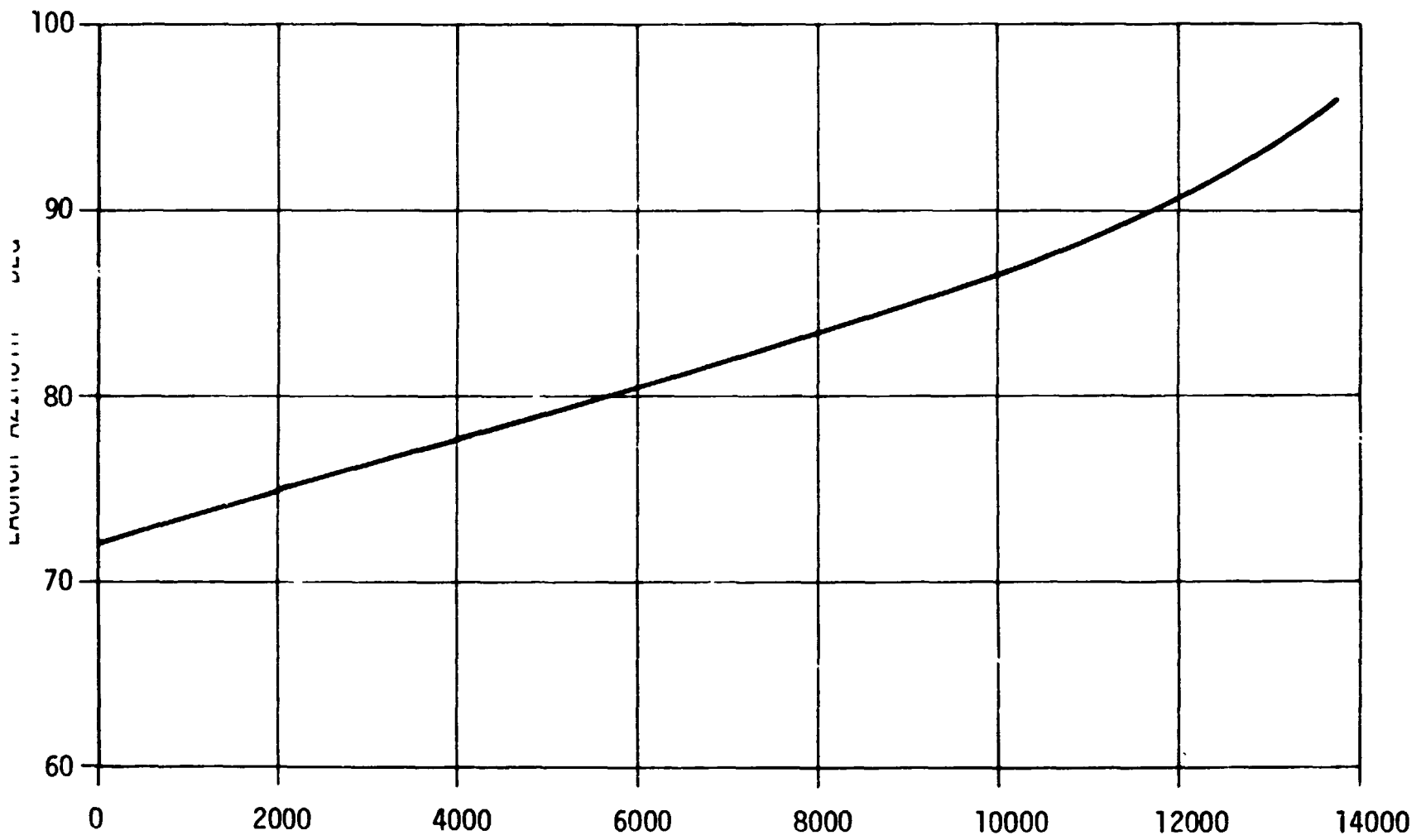


Figure 2 TIME OF GUIDANCE REFERENCE RELEASE (GRR) AFTER THE OPENING OF THE LAUNCH WINDOW ~ SEC

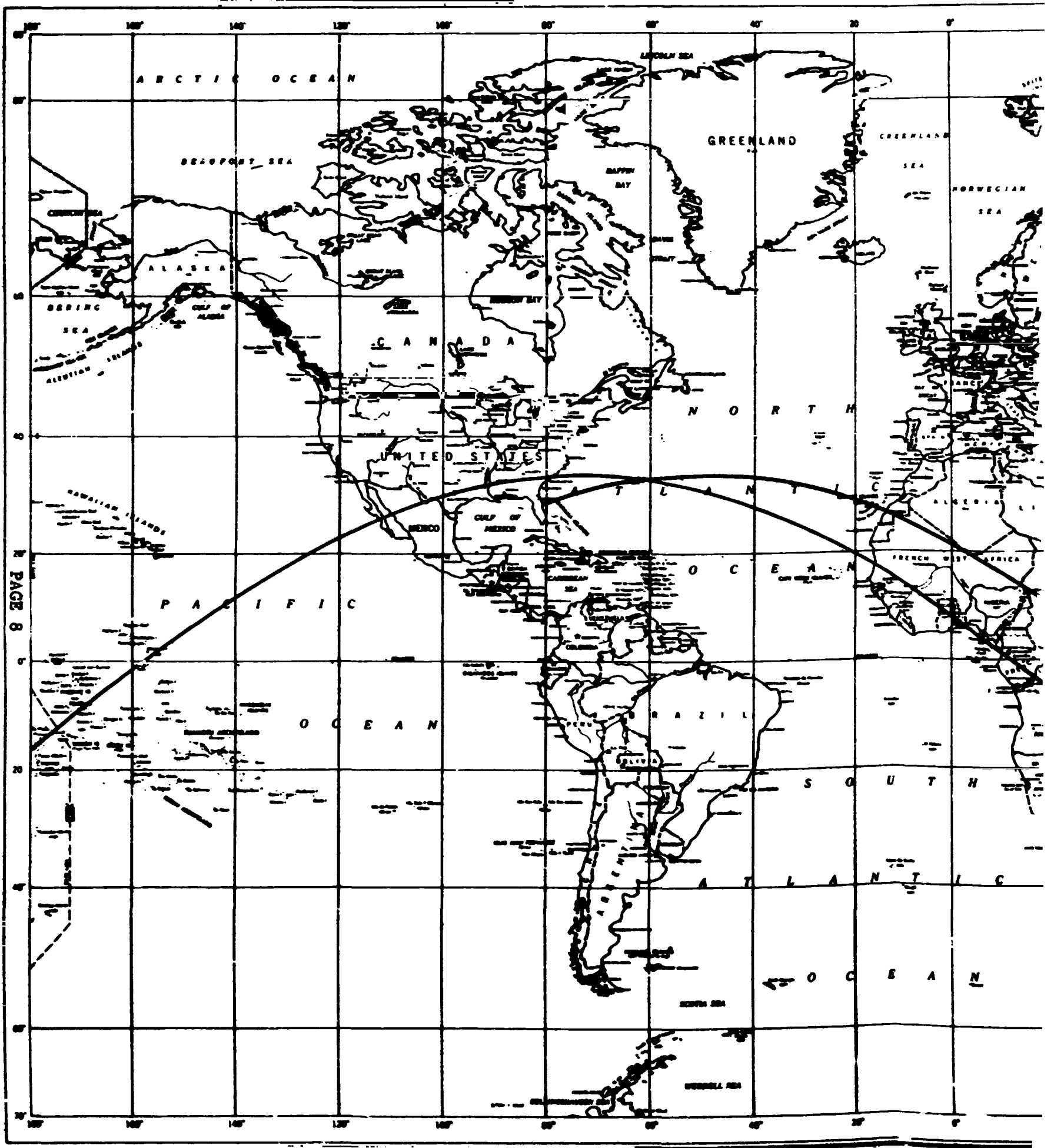
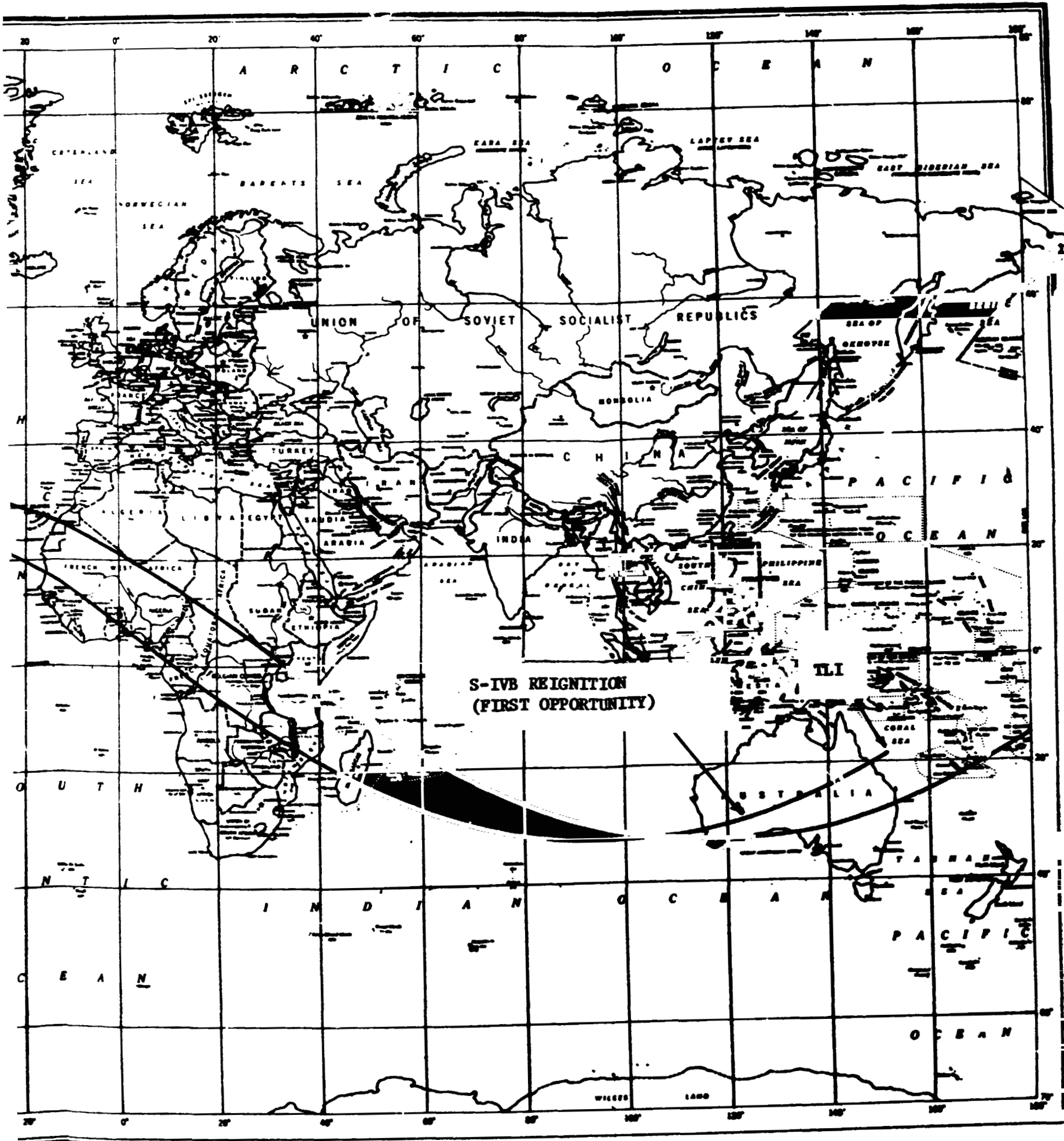


FIGURE 3: AS-509 OPERATIONAL GROUNDTRACK THROUGH TLI F

FOLDOUT FRAME



TRACK THROUGH TLI FOR JANUARY 31, 1971, FIRST OPPORTUNITY

FOLDOUT FRAM

2

### SECTION III: TRAJECTORY DESCRIPTION

The simulated AS-509 vehicle is launched from Pad 39A of the Kennedy Space Center. The launch (lift-off) azimuth is 90 degrees, while the flight azimuth may vary from 72 to 96 degrees. The actual vehicle flight azimuth is computed just prior to launch from a launch day dependent polynomial of launch azimuth as a function of launch time. The primary launch azimuth for January 31, 1971, is 72.0669 degrees.

A brief description of each phase of the trajectory is presented in the following paragraphs.

#### A. S-IC Boost Phase

At approximately 17.25 seconds prior to ignition, guidance reference release (GRR) occurs. At this time the LVDC performs the necessary calculations for the correct flight azimuth. At time zero first motion occurs and the eight holddown arms are released. Lift-off (time base 1) occurs 0.40 of a second after first motion. Following lift-off the vehicle rises vertically from the pad for approximately 138 meters. During this period a yaw maneuver is initiated to provide tower clearance in the event of adverse wind conditions or engine failure. After the launch vehicle has cleared the tower the pitch and roll programs are initiated. The roll maneuver aligns the vehicle body axis with the computed flight azimuth. Except for initial tower clearance and the roll to the proper flight azimuth, both yaw and roll guidance commands are zero during first stage flight.

Guidance during the S-IC burn consists of a pre-programmed pitch profile that is a function of time. The desired pitch commands are computed from a fourth-degree time polynomial obtained from a least-square curve fit of the nominal baseline CHI pitch versus time trajectory. The design criterion for the pitch profile is to maximize weight into parking orbit subject to vehicle performance, heating, and load requirements. The AS-509 S-IC tilt profile was generated for mean November through April winds. An average February/March 50-percentile wind was used in the nominal trajectory simulation for the January 31, 1971, launch window. At specified times in the first stage burn, different segments of the polynomial will be entered.

The first segment of the polynomial is entered after tower clearance or 13 seconds from first motion, whichever occurs first. At 20 seconds from time base 1, the S-IC F-1 engines are canted radially outward. Following S-IC cant the second segment of the pitch polynomial is entered at TB1 + 34.2 seconds. After entering the third segment of the pitch polynomial (TB1 + 66.6 seconds), the vehicle exceeds the speed of sound with Mach one occurring at 69.0 seconds from first motion. Maximum dynamic pressure is encountered at approximately TB1 + 85.0 seconds.

The final segment of the polynomial is entered at TB1 + 97.2 seconds and extends until tilt arrest. During this period control gain changes occur at 105 and 130 seconds from TB1 in order to insure the dynamic stability of the launch vehicle. At TB1 + 134.6 seconds the S-IC inboard engine cutoff signal is given so as to limit the vehicle maximum longitudinal acceleration to 4 g's. Approximately 50 milliseconds later, TB2 is set at 135.1 seconds from first motion. At TB1 + 162.6 seconds tilt arrest occurs. The pitch attitudes are frozen in order to dampen out pitch rates prior to S-IC/S-II separation. The pitch attitude remains constant until the initiation of the Iterative Guidance Mode (IGM) during S-II stage flight.

At TB1 + 164.4 seconds, the S-IC outboard engine cutoff command is initiated by propellant depletion sensors. Nominally, cutoff is initiated by LOX-depletion sensors. Time base 3 initiation occurs 0.1 of a second after cutoff command.

S-II ullage rocket ignition is commanded 0.5 of a second after outboard engine cutoff. S-IC retrorocket ignition and structure severance are commanded 0.2 of a second later. At TB3 + 0.77 of a second, separation is assumed to be complete. The spent S-IC stage during nominal boost to earth parking orbit impacts in the Atlantic Ocean approximately 30.19 degrees north latitude and -74.15 degrees east longitude. A summary of S-IC and S-II impact positions is given in Table 4.

#### B. S-II Boost Phase

As the four S-IC retrorockets are pushing the S-IC stage away from the S-II stage, the four S-II ullage rockets give the vehicle a positive acceleration to help maintain propellant seating and separation distance between the S-IC and S-II stage is increased. The S-II stage ullage rockets have a nominal burn duration of 4.5 seconds, which ends just past S-II mainstage. During the period from time base 3 (TB3) to mainstage, the S-II engine start sequence is initiated (TB3 + 1.4 seconds) which leads to S-II ignition at 167.2 seconds from first motion. The S-II J-2 engines nominally require two seconds from ignition to build up to

mainstage (approximately 90% thrust). The S-II J-2 engines ignite with the propellant utilization (PU) valve at the 4.8 setting; then at TB3 + 6.9 the S-II PU valve is commanded to the 5.5 mixture ratio setting. An open loop two-position PU valve is employed throughout the S-II burn.

The S-II stage pitch and yaw steering commands are generated by a closed loop implementation of the iterative guidance mode (IGM). This scheme essentially surveys the current state parameters, compares these with the desired terminal conditions, and knowing what performance to expect during the remaining portion of flight then applies a simplification of the variational calculus steering law. Terminal accuracy is attained through the frequent iteration of this procedure. Significant perturbation can be tolerated by IGM provided the basic assumptions of constant thrust and specific impulse are not significantly violated.

IGM is initialized at TB3 + 40.6 seconds (i.e., the guidance loop is closed). Prior to this time the guidance commands have been frozen to inertial values that were present at S-IC tilt arrest. IGM is delayed due to the order of several weight drop events occurring over this period. The first event to occur is the S-IC/S-II large interstage drop (S-II second plane separation) at TB3 + 30.7 seconds, and then approximately 5.7 seconds later the launch escape tower (LET) is jettisoned on signal from the crew. By employing IGM after these events, the introduction of discontinuous F/M changes to the guidance system is avoided.

The pitch and yaw steering misalignment correction (SMC) term is initialized 20 seconds after the beginning of IGM. The SMC is utilized to determine the total thrust misalignment caused by certain vehicle system errors such as engine alignment tolerances, thrust vector deviations (from engine center line), stage-to-stage alignment uncertainties, and center of gravity offsets.

For approximately the next 240 seconds, as the vehicle continues to gain velocity and altitude, no major events occur until S-II center engine cutoff. The center engine cutoff command is sent by a signal from the switch selector at a fixed time (TB3 + 299.0 seconds). This event time has been pre-determined such that structural vibration effects are minimized. Also during this period there are two control gain switch points, TB3 + 61.4 seconds and TB3 + 191.4 seconds. After the center engine is out, several IGM values are adjusted and updated to account for a different F/M history. The reason for this being that S-II center engine cutoff is treated as an engine failure by the guidance system; however, guidance presettings are derived to minimize discontinuities.

As mentioned earlier, the PU system performs in an open loop configuration and operates at a 5.5 setting (i.e., the ratio of the mass flow rate of LOX is 5.5 parts of LOX to 1 part of LH2) from mainstage thrust to mainstage + 305 seconds. At this time, a specified pre-determined characteristic velocity is nominally achieved which triggers the IGM to begin what is known as the second phase of IGM. The operation of the guidance system is pre-planned here. In turn, the IGM sends a command through the switch selector to change the PU valve such that a mixture ratio of 4.8 is obtained. The S-II operates at this MR setting for the remainder of the S-II burn. The philosophy of using different mixture ratio settings is to operate the S-II stage at its maximum acceleration capability (maximum thrust) during the period of higher gravity losses, shifting to a more efficient power level once the velocity direction is relatively flat and the corresponding gravity loss rate is lower.

The S-II stage J-2 outboard engines are cut off simultaneously after a timer expiration by a signal from any two of the five propellant depletion sensors located in the LH2 and LOX tanks. The LH2 circuit has a 2.3 second timer, and the LOX has a 1.85 second delay. The cutoff command for AS-509 S-II stage is predicted to occur 556.66 seconds from first motion.

Time base 4 (TB4) begins 0.01 of a second after S-II outboard engine cutoff command. At TB4 + 0.9 of a second, the signal to ignite the S-IVB ullage rocket motor is given. The ullage rocket motors will impart a forward acceleration to help maintain S-IVB propellant positioning.

The S-II/S-IVB separation signal is given at TB4 + 1.0 second. The separation command initiates the firing of the separation devices and the four 34860-pound thrust retrorockets. The retrorocket produces a retarding force to the S-II stage during separation which prevents S-II/S-IVB interaction. S-II/S-IVB physical separation occurs 0.1 of a second later; this corresponds nominally to a flight time of 557.7 seconds from first motion. For the prime azimuth the S-II stage impacts in the Atlantic Ocean at approximately 31.24 degrees north latitude and -32.84 degrees east longitude.



### C. S-IVB First Burn

Following S-II/S-IVB separation, the S-IVB engine start sequence is initiated at TB4 + 1.1 seconds. Start sequence requires three seconds to complete and culminates with S-IVB ignition at TB4 + 4.1 seconds. Buildup to mainstage (approximately 90% thrust) is nominally achieved 2.5 seconds later at TB4 + 6.5 seconds. The ullage rockets, which were ignited prior to separation, are decayed at TB4 + 8.5 seconds and jettisoned 4.3 seconds later.

Once the vehicle has achieved mainstage, the attitude freeze restrictions employed at S-II outboard cutoff are removed. This is done at TB4 + 8.2 seconds, and Phase 3 of the Iterative Guidance Mode (IGM) is enabled. This activity determines the corrections needed to steer the vehicle to the pre-determined position and velocity at earth parking orbit insertion (EPOI). The S-IVB stage PU system operates in a two-position, open-loop configuration during boost flight. The approximate S-IVB LOX/LH2 flow rate mixture ratio used during the S-IVB first burn is 5.0.

Approximately 6.9 seconds after IGM has been re-initiated, pitch and yaw steering misalignment correction (SMC) terms are re-initialized to compensate for any errors due to engine thrust misalignments.

As the terminal conditions are approached, the guidance system becomes more sensitive to perturbations in the desired flight path. Since it may not be practical to completely eliminate all these perturbations (i.e., fuelslosh), another alternative is to relieve the constraints placed on the terminal conditions. This relief is supplied approximately 35 seconds prior to cutoff by decreasing the altitude accuracy constraints. The approach is feasible since the desired altitude has already been reached and the trajectory constraints are more stringent for path angle and velocity.

Approximately 8 seconds prior to cutoff (TB4 + 138.3 seconds) the attitude rates are again zeroed out, so the vehicle will be in a stable attitude at cutoff. Approximately 700 seconds after first motion the desired terminal conditions have been reached, and the command is issued for engine cutoff. Time base 5 (TB5) is set 0.25 of a second later, and thrust decay ends 1.85 seconds after cutoff.

Immediately after cutoff (TB5 + 0.3 of a second) the S-IVB APS ullage engines are ignited. Each of these two engines provides a 72-pound thrust to the stage to maintain propellant seating. They will continue to burn for approximately 87 seconds overlapping by 32 seconds the initiation of the LH2 continuous vent.

Earth parking orbit insertion (EPOI) into a circular 100-nautical mile orbit occurs, by definition, 10 seconds after S-IVB cutoff (TB5 + 9.75). The Launch Vehicle Digital Computer (LVDC) continues to sample accelerometer data until TB5 + 100 seconds. At this time, orbital navigation is initiated and the LVDC updates the position and velocity components in accordance with mathematical models developed prior to the flight.

#### D. Coast in Earth Parking Orbit

During earth parking orbit coast, attitude control is maintained at local horizontal through the use of the reaction control auxiliary propulsion system. The only longitudinal thrusting occurring during this period is a result of the propulsive hydrogen venting of the continuous venting system (CVS). The predicted CVS thrust for the AS-509 mission is shown in Figure 61 and is based upon observed data from previous missions.

Since the accelerations produced by the CVS are extremely small, the accelerometers are not used by the guidance computer to calculate positions and velocities during this phase of flight. Instead, a preset model of the venting accelerations is used by the flight computer in order to determine the trajectory of the vehicle. The vent acceleration model being used for the AS-509 mission is presented in Table 18.

When the position of the launch vehicle satisfies certain geometrical constraints defined by the translunar injection (TLI) targeting presettings, time base 6 is set by the flight computer signaling the beginning of restart preparations. A detailed explanation of the geometrical constraints is given in Reference 20.

#### E. S-IVB Second Burn (Translunar Injection)

The restart preparations are initiated with the ignition of the helium heater (O<sub>2</sub>/H<sub>2</sub> burner) at 42 seconds into time base 6. The CVS is closed 0.2 of a second later. At 496.3 seconds after time base 6 initiation, the APS ullage motors are started in order to further seat the S-IVB propellants prior to mainstage ignition. Following the APS ullage motor ignition, the helium heater is cut off at time base 6 plus 496.8 seconds. At 570 seconds into time base 6, the engine start command is issued and J-2 fuel lead begins marking the initiation of the J-2 restart sequence. The APS ullage motors are cut off 3.0 seconds later, followed by J-2 engine ignition at 8.0 seconds after J-2 fuel lead initiation. Mainstage thrust (approximately 90% thrust) occurs nominally 2.5 seconds after engine ignition.

The translunar injection boost IGM is initiated at approximately 4 seconds after mainstage thrust is achieved. Then some 11.5 seconds later, steering misalignment correction calculations are begun to compensate for any errors due to engine thrust misalignment.

A propellant mixture ratio shift occurs 135 seconds after the nominal time of mainstage thrust during a first opportunity TLI burn. The LOX/LH2 flow rate mixture ratio is approximately 4.5:1 prior to the shift and 5.0:1 after the shift. The mixture ratio shift ends the fourth phase of IGM and signifies the beginning of an artificial tau mode which lasts for 30 seconds. The second opportunity S-IVB burn does not have a mixture ratio shift, and the full boost duration occurs at a flow rate mixture ratio of approximately 5.0:1. There is, however, a short artificial tau mode of 1 second duration at the initiation of IGM followed immediately by the initiation of IC: Phase 5.

When the computed time to go in the fifth phase of IGM becomes  $< 30$  seconds, the  $\bar{X}$  terminal steering guidance mode is entered and calculations of IGM end conditions are terminated, thereby avoiding any large guidance commands in the region of guidance cutoff. The high speed loop is entered approximately 3 seconds prior to cutoff. Then, when the terminal conditions are achieved, guidance cutoff signal is issued followed by time base 7 initiation 0.21 of a second later. LH2 continuous venting begins at TB7 + 0.5 of a second followed by translunar injection (TLI) which is defined as 10 seconds from the time of guidance cutoff signal.

#### F. Post-Translunar Injection

Following translunar injection, the LH2 continuous vent (CVS) remains on until TB7 + 150.9 seconds. The attitude of the vehicle is frozen inertially from guidance cutoff signal until TB7 + 150.9 seconds at which time the orbital guidance and navigation modes are entered. The attitude is then commanded to local horizontal. The CVS is turned off at this time also.

At TB7 + 900 seconds the vehicle is commanded to transposition, docking, and extraction (TD&E) attitude. The simulated CSM separation occurs at TB7 + 1500 seconds with CSM/LM ejection occurring 3780 seconds later. Following CSM/LM ejection, the S-IVB/IU maneuver to the evasive maneuver attitude and the setting of time base 8 (TB8) are initiated by

ground command. During TB8 a combination of switch selector-commanded and ground-commanded thrust operations are used to alter the S-IVB/IU trajectory so that the S-IVB/IU will impact the moon.

The following thrust operations alter the trajectory:

1. LH2 tank CVS venting.
2. LOX tank dumping.
3. APS ullage motor burn.

The first two operations reduce the trajectory periselenium altitude such that a lunar impact will occur after the completion of the LOX dump. The APS burn is used to provide impact at the desired lunar impact site of approximately 33° 15' west longitude and 1° 35' 45.6" south latitude. The detailed post-TLI launch vehicle operations that result in S-IVB/IU lunar impact will be presented in a later document.

Table B-2 presents the S-IVB trajectory ("dead stage") which results if the time base 8 operations mentioned above cannot be initiated. The trajectory is for a launch along a 72.0669-degree launch azimuth. The "dead stage" S-IVB/IU trajectory is the trajectory that results from simulating the launch vehicle response to the TLI boost guidance and targeting presettings. This trajectory is the one from which midcourse correction (MCC) requirements are evaluated to determine the validity of the targeting presettings and the vehicle's response to them. This trajectory is also a good approximation of the spacecraft trajectory prior to the hybrid maneuver MCC made at TLI + 28 hours.

MCC velocity requirements are obtained by establishing the velocity increment that must be applied to the S-IVB "dead stage" trajectory to cause it to satisfy the target-objective arrival conditions at periselenium and at free-return perigee. MCC velocity requirements at TLI + 9 hours are presented in Table 13 for launch on January 31, 1971.

TABLE 1  
 CRITICAL EVENT SEQUENCE  
 AS-509 72.067 DEGREE AZIMUTH BOOST TO ORBIT SEQUENCE

NOMINAL TIME FROM FIRST MOTION (HR-MIN-SEC)	NOMINAL TIME FROM FIRST MOTION (SEC)	PROGRAM TIME REFERENCE (SEC)	PREDICTED SEQUENCE OF EVENTS
.00 00 17.3	.17.3		GUIDANCE REFERENCE RELEASE (GRR)
00 00 00.00	.00		FIRST MOTION (HOLDDOWN ARM RELEASE)
00 00 00.40	.40	0.0(TB1)	LIFT-OFF, TIMEBASE 1 SET
00 00 01.4	1.4	1.0(TB1)	BEGIN TOWER CLEARANCE YAW MANEUVER
00 00 09.4	9.4	9.0(TB1)	END YAW MANEUVER
00 00 13.0	13.0 *		PITCH AND ROLL INITIATION
00 00 20.4	20.4	20.0(TB1)	S-1C RADIAL ENGINE CANT
00 00 31.0	31.0		ROLL MANEUVER COMPLETE
00 00 34.6	34.6 *		BEGIN SECOND SEGMENT OF PITCH POLYNOMIAL
00 01 07.0	67.0 *		BEGIN THIRD SEGMENT OF PITCH POLYNOMIAL
00 01 09.0	69.0		MACH 1
00 01 25.4	85.4 **		MAXIMUM DYNAMIC PRESSURE
00 01 27.6	97.6 *		BEGIN FOURTH SEGMENT OF PITCH POLYNOMIAL
00 01 45.4	105.4	105.0(TB1)	COMPUTER SWITCH POINT NO. 1
00 02 10.4	130.4	130.0(TB1)	COMPUTER SWITCH POINT NO. 2
00 02 15.00	135.00	134.6(TB1)	S-1C CENTER ENGINE CUTOFF
00 02 15.10	135.10	0.0(TB2)	TIMEBASE 2 SET
00 02 43.0	163.0 *		BEGIN TILT ARREST
00 02 44.80	164.80		S-1C OUTBOARD ENGINE CUTOFF
00 02 44.81	164.81	0.0(TB3)	TIME BASE 3 SET

\*THESE EVENTS WILL OCCUR AT THE NEXT MAJOR COMP CYCLE.

\*\*NEAREST TIME POINT AVAILABLE.

TABLE 1  
CRITICAL EVENT SEQUENCE  
AS-509 72.067 DEGREE AZIMUTH BOOST TO ORBIT SEQUENCE

NOMINAL TIME FROM FIRST MOTION (MIN:SEC)	NOMINAL TIME FROM FIRST MOTION (SEC)	PROGRAM TIME REFERENCE (SEC)	PREDICTED SEQUENCE OF EVENTS
00 02 45.3	165.3	.5(TB3)	S-11 ULLAGE IGNITION
00 02 45.5	165.5	.7(TB3)	SIGNAL TO FIRE SEPARATION DEVICES AND RETROCKET MOTORS
00 02 45.6	165.6		SEPARATION STRUCTURE COMPLETELY SEVERED
00 02 45.6	165.6		S-1C RETROCKET THRUST BUILD-UP BEGINS
00 02 46.2	166.2	1.4(TB3)	S-11 ENGINE START SEQUENCE INITIATED
00 02 47.2	167.2		S-11 IGNITION
00 02 49.2	169.2		S-11 ENGINES AT MAINSTAGE THRUST
00 02 49.8	169.8		S-11 ULLAGE THRUST TERMINATION
00 02 51.7	171.7	6.9(TB3)	S-11 P. U. VALVE COMMANDED TO 5.5 MIXTURE RATIO
00 03 15.5	195.5	30.7(TB3)	S-11 SECOND PLANE SEPARATION (JETTISON S-11 AFT INTERSTAGE)
00 03 21.2	201.2		LET JETTISON
00 03 25.4	205.4 *		IGM ENABLE
00 03 45.4	225.4 *		SMC TURN-ON
00 03 46.2	226.2	61.4(TB3)	COMPUTER SWITCH POINT NO. 3
00 04 24.8	264.8	100.0(TB3)	LOX STEP PRESSURIZATION
00 05 56.2	356.2	191.4(TB3)	COMPUTER SWITCH POINT NO. 4
00 07 43.8	463.8	299.0(TB3)	S-11 CENTER ENGINE CUTOFF
00 07 52.0	472.0 **		T11 LE O, SIGNAL PU TO INITIATE MRS, START ARTIFICIAL TAU MODE
00 08 02.0	482.0 *		END ARTIFICIAL TAU MODE, BEGIN IGM PHASE 2

\*THESE EVENTS WILL OCCUR AT THE NEXT MAJOR COMP CYCLE.

\*\*THERE IS APPROXIMATELY 2 SECONDS DELAY AFTER T11 GOES TO ZERO BEFORE THRUST DROP IS SENSED.

TABLE 1  
CRITICAL EVENT SEQUENCE  
AS-500 72.067 DEGREE AZIMUTH BOOST TO ORBIT SEQUENCE

PREDICTED SEQUENCE OF EVENTS  
S-II OUTBOARD ENGINE CUTOFF, ENABLE CHI FREEZE

NOMINAL TIME FROM FIRST MOTION (HR-MIN-SEC)	NOMINAL TIME FROM FIRST MOTION (SEC)	PROGRAM TIME REFERENCE (SEC)	EVENT DESCRIPTION
00 09 16.66	556.66		TIMERASE SET
00 09 16.68	556.68	.0(TB4)	S-IVB ULLAGE IGNITION
00 09 17.6	557.6	.9(TB4)	SIGNAL TO FIRE SEPARATION DEVICES AND RETROCKET MOTORS
00 09 17.7	557.7	1.0(TB4)	SEPARATION STRUCTURE COMPLETELY SEVERED
00 09 17.7	557.7		S-IVB ENGINE START SEQUENCE INITI-
00 09 17.8	557.8	1.1(TB4)	S-IVB IGNITION
00 09 20.7	560.7		S-IVB ENGINE AT MAINSTAGE THRUST
00 09 23.2	563.2		END CHI FREEZE (BEGIN IGM PHASE 3), START ARTIFICIAL TAU MODE
00 09 24.8	564.8		S-IVB ULLAGE THRUST TERMINATION
00 09 25.2	565.2		S-IVB ULLAGE CASE JETTISON
00 09 29.5	569.5	12.8(TB4)	SMC TURN-ON
00 09 31.7	571.7		END ARTIFICIAL TAU MODE
00 09 33.2	573.2		BEGIN CHI STEERING
00 11 09.0	669.0		BEGIN CHI FREEZE, END IGM
00 11 35.0	695.0		S-IVB FIRST GUIDANCE CUTOFF (GCSI)
00 11 43.3	703.3		SET TIMERASE 5
00 11 43.55	703.55	.0(TB5)	S-IVB APS ULLAGE ENGINE NO. 1 IGNITION
00 11 43.9	703.9	.3(TB5)	S-IVB APS ULLAGE ENGINE NO. 2 IGNITION
00 11 44.0	704.0	.4(TB5)	PARKING ORBIT INSERTION
00 11 53.3	713.3	9.8(TB5)	BEGIN ORBITAL GUIDANCE
00 12 03.6	723.6		

\* THESE EVENTS WILL OCCUR AT THE NEXT MAJOR COMP CYCLE.

TABLE 1  
CRITICAL EVENT SEQUENCE  
AS-509 72.067 DEGREE AZIMUTH BOOST TO ORBIT SEQUENCE

NOMINAL TIME FROM FIRST MOTION [HR-MIN-SEC]	NOMINAL TIME FROM FIRST MOTION [SEC]	PROGRAM TIME REFERENCE [SFC]	PREDICTED SEQUENCE OF EVENTS
00 12 42.6	762.6	59.0[1B5]	H2 CONTINUOUS VENT ON
00 13 10.6	790.6	87.0[1B5]	S-1V8 APS ULLAGE ENGINE NO. 1 CUTOFF
00 13 10.7	790.7	87.1[1B5]	S-1V8 APS ULLAGE ENGINE NO. 2 CUTOFF



TABLE 1  
 CRITICAL EVENT SEQUENCE  
 AS-509 72.067 DEGREE AZIMUTH FIRST OPPORTUNITY SEQUENCE

NOMINAL TIME FROM FIRST MOTION (HR-MIN-SEC)	NOMINAL TIME FROM FIRST MOTION (SEC)	PROGRAM TIME REFERENCE (SEC)	PREDICTED SEQUENCE OF EVENTS
02 21 00.12	8460.12	0(TB6)	BEGIN S-1VB RESTART PREPARATIONS, TIMEBASE 6 SET
02 21 42.1	8502.1	42.0(TB6)	HELIUM HEATER ON
02 21 42.3	8502.3	42.2(TB6)	H2 CONTINUOUS VENT OFF
02 29 16.4	8956.4	496.3(TB6)	S-1VB APS ULLAGE ENGINE NO. 1 IGNITION
02 29 16.5	8956.5	496.4(TB6)	S-1VB APS ULLAGE ENGINE NO. 2 IGNITION
02 29 16.9	8956.9	496.8(TB6)	HELIUM HEATER OFF
02 30 30.1	9030.1	570.0(TB6)	INITIATE J-2 FUEL LEAD
02 30 33.1	9033.1	573.0(TB6)	S-1VB APS ULLAGE ENGINE NO. 1 CUTOFF
02 30 33.2	9033.2	573.1(TB6)	S-1VB APS ULLAGE ENGINE NO. 2 CUTOFF
02 30 38.1	9039.1	578.0(TB6)	S-1VB REIGNITION
02 30 40.6	9040.6		S-1VB MAINSTAGE THRUST
02 30 44.6	9044.6		INITIATE OUT-OF-ORBIT IGM, PHASE 4
02 30 55.1	9055.1		SMC TURN-ON
02 32 55.1	9175.1		IGM MR SHIFT, START ARTIFICIAL TAU MODE
02 33 25.1	9205.1		END ARTIFICIAL TAU MODE, BEGIN IGM PHASE 5
02 34 58.1	9298.1	838.0(TB6)	COMPUTER SWITCH POINT NO. 5
02 36 03.1	9363.1		BEGIN CHI STEERING
02 36 32.1	9392.1		BEGIN CHI FREEZE, END IGM
02 36 33.8	9393.8		S-1VB SECOND GUIDANCE CUTOFF SIGNAL (GC92)
02 36 33.97	9393.97	0(TB7)	SET TIMEBASE 7
02 36 34.5	9394.5	5(TB7)	H2 CONTINUOUS VENT ON

\*THESE EVENTS WILL OCCUR AT THE NEXT MAJOR COMP CYCLE.

TABLE 1.  
CRITICAL EVENT SEQUENCE

AS-509 72.067 DEGREE AZIMUTH FIRST OPPORTUNITY SEQUENCE		CRITICAL EVENT SEQUENCE	
NOMINAL TIME FROM FIRST MOTION (HR-MIN-SEC)	NOMINAL TIME FROM FIRST MOTION (SEC)	PROGRAM TIME REFERENCE (SEC)	PREDICTED SEQUENCE OF EVENTS
02 36 43.8	9403.8		TRANSLUNAR INJECTION
02 39 04.9	9544.9	150.9(167)	H2 CONTINUOUS VENT OFF

TABLE 1.  
 CRITICAL EVENT SEQUENCE  
 AS-509 72.067 DEGREE AZIMUTH SECOND OPPORTUNITY SEQUENCE

NOMINAL TIME FROM FIRST MOTION (HR-MIN-SEC)	NOMINAL TIME FROM FIRST MOTION (SEC)	PROGRAM TIME REFERENCE (SEC)	PREDICTED SEQUENCE OF EVENTS
03 49 37.12	13777.12	0(TB6)	BEGIN S-1VB RESTART PREPARATIONS, TIMEBASE 6 SET
03 50 19.1	13819.1	42.0(TB6)	HELIUM HEATER ON
03 50 19.3	13819.3	42.2(TB6)	H2 CONTINUOUS VENT OFF
03 57 53.4	14273.4	496.3(TB6)	S-1VB APS ULLAGE ENGINE NO. 1 IGNITION
03 57 53.5	14273.5	496.4(TB6)	S-1VB APS ULLAGE ENGINE NO. 2 IGNITION
03 57 53.9	14273.9	496.8(TB6)	HELIUM HEATER OFF
03 59 07.1	14347.1	570.0(TB6)	INITIATE J-2 FUEL LEAD
03 59 10.1	14350.1	573.0(TB6)	S-1VB APS ULLAGE ENGINE NO. 1 CUTOFF
03 59 10.2	14350.2	573.1(TB6)	S-1VB APS ULLAGE ENGINE NO. 2 CUTOFF
03 59 15.1	14355.1	578.0(TB6)	S-1VB REIGNITION
03 59 17.6	14357.6		S-1VB MAINSTAGE THRUST
03 59 21.6	14361.6 *		INITIATE OUT-OF-ORBIT IGM, PHASE 4
03 59 23.1	14363.1 *		START ARTIFICIAL TAU MODE
03 59 25.1	14365.1 *		BEGIN IGM PHASE 5, END ARTIFICIAL TAU MODE
03 59 32.1	14372.1 *		SMC TURN-ON
04 03 35.1	14615.1 *	838.0(TB6)	COMPUTER SWITCH POINT NO. 5
04 04 26.1	14666.1 *		BEGIN CHI STEERING
04 04 53.1	14693.1 *		BEGIN CHI FREEZE, END IGM
04 04 55.3	14695.3		S-1VB SECOND GUIDANCE CUTOFF SIGNAL (GCS2)
04 04 55.52	14695.52	0(TB7)	SET TIMEBASE 7
04 04 56.0	14696.0	0.5(TB7)	H2 CONTINUOUS VENT ON

\*THESE EVENTS WILL OCCUR AT THE NEXT MAJOR COMP CYCLE.

TABLE 1  
CRITICAL EVENT SEQUENCE

AS-509 72.067 DEGREE AZIMUTH SECOND OPPORTUNITY SEQUENCE		PREDICTED SEQUENCE OF EVENTS	
NOMINAL TIME FROM (HR-MIN-SEC)	NOMINAL TIME FROM (SEC)	PROGRAM TIME REFERENCE (SEC)	
04 05 05.3	14705.3		TRANSLUNAR INJECTION
04 07 26.4	14846.4	150.9(TB7)	H2 CONTINUOUS VENT OFF

TABLE 2  
 TRAJECTORY PARAMETERS AT S-IC/S-II SEPARATION

Launch Azimuth (deg)	72.0669	80.0085	88.0308	95.9984
Time (sec)	165.582	165.582	165.582	165.582
Geocentric Radius (m)	6440769.7	6440841.7	6440873.2	6440910.2
Geodetic Latitude (deg N)	28.869	28.751	28.629	28.507
Longitude (deg E)	-79.663	-79.632	-79.619	-79.626
Inertial Azimuth (deg)	75.426	82.198	89.012	95.769
Inertial Velocity (m/sec)	2734.199	2744.821	2749.257	2747.467
Altitude (m)	67557.812	67592.625	67585.750	67584.812
Inertial Path Angle (deg)	19.414	19.375	19.369	19.398
Range From Pad 39A (nmi)	52.061	52.029	52.009	51.999
Mass Before Separation (kg)	832900.50	832900.50	832900.50	832900.50
(lb)	1836231.3	1836231.3	1836231.3	1836231.3
Mass After Separation (kg)	666537.74	666537.74	666537.74	666537.74
(lb)	1469464.2	1469464.2	1469464.2	1469464.2

TABLE 3  
 TRAJECTORY PARAMETERS AT S-II/S-IVB SEPARATION

Launch Azimuth (deg)	72.0669	80.0085	88.0308	95.9984
Time (sec)	557.749	557.749	557.749	557.749
Geocentric Radius (m)	6559766.2	6559960.2	6560058.9	6560077.8
Geodetic Latitude (deg N)	31.913	29.866	27.791	25.769
Longitude (deg E)	-63.963	-63.767	-63.895	-64.324
Inertial Azimuth (deg)	82.523	89.893	97.181	104.254
Inertial Velocity (m/sec)	6971.670	6988.067	6995.383	6993.724
Altitude (m)	187542.0	187065.8	186513.12	185928.06
Inertial Path Angle (deg)	.670	.645	.633	.632
Range From Pad 39A (nmi)	886.058	886.241	886.406	886.587
Mass Before Separation (kg)	211371.56	211371.56	211371.56	211371.56
(lb)	465994.53	465994.53	465994.53	465994.53
Mass After Separation (kg)	166266.35	166266.35	166266.35	166266.35
(lb)	366554.56	366554.56	366554.56	366554.56

TABLE 4  
SUMMARY OF S-IC AND S-II IMPACT POSITIONS

<u>Spent Stage</u>	<u>Azimuth (Degrees)</u>	<u>Impact Time From First Motion (Seconds)</u>	<u>Geodetic Latitude (Degrees N)</u>	<u>Longitude (Degrees E)</u>	<u>Range (Nautical Miles)</u>
S-IC	72.067	557.081	30.197	- 74.153	351.885
	80.008	557.428	29.390	- 73.967	352.2445
	88.031	557.575	28.561	- 73.933	352.363
	95.998	557.518	27.741	- 74.032	352.318
S-II	72.067	1274.554	31.239	- 32.835	2476.487
	80.008	1275.817	26.084	- 33.967	2480.902
	88.031	1275.356	21.006	- 35.694	2479.597
	95.998	1273.191	16.194	- 37.914	2472.168

TABLE 5  
TRAJECTORY PARAMETERS AT EARTH PARKING ORBIT INSERTION

Launch Azimuth (deg)	72.0669	80.0084	88.0308	95.9984
Time (sec)	713.344	710.720	709.532	709.771
Geocentric Radius (m)	6563322.2	6563324.0	6563322.7	6563320.
Geocentric Latitude (deg N)	32.677	29.402	26.140	22.981
Longitude (deg E)	-51.3	-53.077	-53.702	-54.635
Inertial Azimuth (deg)	88.799	95.469	102.076	108.514
Inertial Velocity (m/sec)	7793.048	7793.059	7793.070	7793.072
Altitude (m)	191354.87	190281.87	189281.50	188392.81
Inertial Path Angle (deg)	0.00	0.00	0.00	0.00
Range From Pad 39A (nmi)	1455.208	1445.600	1441.4409	1442.741
Mass (kg)	130283.26	136839.91	137091.99	137041.83
(lb)	300453.17	301680.38	302236.11	302125.52
Inclination Angle (deg)	32.527	29.705	28.483	29.091
Descending Node (deg)	123.088	109.478	93.917	78.228
Eccentricity	.000122	.000015	.000122	.000025
Orbital Period (sec)	5291.4	5291.4	5291.4	5291.4



TABLE 6

## AZIMUTH-DEPENDENT EVENT SEQUENCE FOR JANUARY 31, 1971

## FIRST OPPORTUNITY

	Nominal Time From First Motion (sec)		
Launch Azimuth	72.0669	80.0085	88.0308
GCS1	703.345	700.720	699.532
Time Base 6 Set*	8460.125	8163.375	7882.125
Initiate J-2 Fuel Lead	9030.125	8733.375	8452.125
S-IVB Mainstage Thrust	9040.625	8743.875	8462.625
Initiate Out-of-Orbit IGM*	9044.625	8747.875	8466.625
SMC Turn On*	9055.125	8758.375	8477.125
IGM MR Shift*	9175.125	8678.375	8597.125
PU Shift Command	9175.625	8878.875	8597.625
Begin X Steering*	9363.125	9068.375	8789.125
Begin Chi Freeze**	9392.125	9097.375	8816.125
Cutoff Signal (GCS2)	9393.703	9098.469	8817.940

\* Simulated Major Cycle Occurrence Time

\*\* Last Time Chi is Updated

TABLE 7  
 TRAJECTORY PARAMETERS AT TIME BASE 6 INITIATION

	FIRST OPPORTUNITY			
Launch Azimuth (deg)	72.0669	80.0085	88.0308	95.9984
Time (sec)	8460.125	8163.375	7882.125	7721.625
Geocentric Radius (m)	6567123.6	6564144.2	6562227.7	6561139.1
Geodetic Latitude (deg N)	-31.548	-27.351	-25.011	-26.227
Longitude (deg E)	79.414	58.298	38.382	26.353
Inertial Azimuth (deg)	99.038	102.439	104.358	103.352
Inertial Velocity (m/sec)	7794.577	7798.129	7800.105	7800.634
Altitude (m)	194778.37	190464.25	187860.0	187123.37
Inertial Path Angle (deg)	0.02	0.01	-0.01	-0.02
Mass (kg)	135285.06	135864.41	136138.09	136100.34
Mass (lb)	298252.51	299529.76	300133.13	300049.89

TABLE 3

## TLI BOOST TRAJECTORY PARAMETERS FOR JANUARY 31, 1971

## FIRST OPPORTUNITY

Launch Azimuth (deg)	72.0665	80.0085	88.0308	95.9984
<u>Time Base 6 Conditions:</u>				
Time (sec)	8460.125	8163.375	7882.125	7721.625
Geodetic Latitude (deg N)	-31.548	-27.351	-25.011	-26.227
Longitude (deg E)	79.414	58.298	38.382	26.353
<u>Translunar Injection Conditions</u>				
Time (seconds)	9403.763	9108.469	8827.940	8667.405
Geocentric Radius (m)	6716807.9	6,13755.2	6707534.1	6703683.1
Inertial Velocity (m/sec)	10816.948	10820.362	10826.458	10830.420
Inertial Path Angle (deg)	7.615	7.624	7.534	7.480
Inertial Azimuth (deg)	63.226	68.145	70.917	69.455
Altitude (m)	340818.19	338172.81	332209.56	328212.5
Geodetic Latitude (deg N)	-18.666	-20.408	-21.450	-20.865
Longitude (deg E)	150.823	129.845	109.863	97.975
Mass (kg)	63681.91	63954.63	64077.21	64046.31
(lb)	140394.6	140995.84	141266.08	141197.96
Inclination Angle (deg)	32.181	29.478	28.316	28.873
Descending Node (deg)	123.029	109.424	93.856	78.247
Eccentricity	.97218	.97250	.97288	.97317
Twice Specific Energy (km <sup>2</sup> /sec <sup>2</sup> )	-1.6819	-1.6620	-1.6401	-1.6226

TABLE 9  
 AZIMUTH-DEPENDENT EVENT SEQUENCE FOR JANUARY 31, 1971  
 SECOND OPPORTUNITY

Launch Azimuth (deg)	72.0669	80.0085	88.0308	95.9984
GCS1	703.345	700.720	699.532	699.770
Time Base 6 Set*	13777.125	13476.375	13194.125	13032.625
Initiate J-2 Fuel Lead	14347.125	14046.375	13764.125	13602.625
S-IVB Mainstage Thrust	14357.625	14056.875	13774.625	13613.125
Initiate Out-of-Orbit IGM*	14361.625	14060.875	13778.625	13617.125
SMC Turn On*	14372.125	14071.375	13789.125	13627.625
Begin X Steering*	14366.125	14365.375	14085.125	13923.625
Begin Chi Freeze**	14693.125	14394.375	14112.125	13950.625
Cutoff Signal (GCS2)	14695.312	14396.063	14114.554	13953.006

\* Simulated Major Cycle Occurrence Time

\*\* Last Time Chi is Updated

TABLE 10

## TRAJECTORY PARAMETERS AT TIME BASE 6 INITIATION

## SECOND OPPORTUNITY

Launch Azimuth (deg)	72.0669	80.0085	88.0308	95.9984
Time (sec)	13777.125	13476.375	13194.125	13032.625
Geocentric Radius (m)	65700.01	6567014.5	6565031.8	6563920.3
Geodetic Latitude (deg N)	-31.783	-27.657	-25.378	-26.567
Longitude (deg E)	58.557	37.228	17.319	5.315
Inertial Azimuth (deg)	98.084	101.699	103.672	102.627
Inertial Velocity (m/sec)	7792.804	7796.459	7798.521	7799.093
Altitude (m)	197821.75	193427.69	190769.00	190005.06
Inertial Path Angle (deg)	.02	.01	-.01	-.02
Mass (kg)	134927.81	135503.91	135774.66	135735.14
Mass (lb)	297464.92	298735.39	299331.9	299244.78

TABLE 11  
 TLI BOOST TRAJECTORY PARAMETERS FOR JANUARY 31, 1971  
 SECOND OPPORTUNITY

Launch Azimuth (deg)	72.0669	80.0085	88.0308	95.9984
<u>Time Base 6 Conditions</u>				
Time (sec)	13777.125	13476.375	13194.125	13032.625
Geodetic Latitude (deg N)	-31.783	-27.657	-25.378	-26.567
Longitude (deg E)	58.557	37.228	17.319	5.315
<u>Translunar Injection Conditions</u>				
Time (sec)	14705.312	14406.063	14124.554	13963.006
Geocentric Radius (m)	6715547.4	6710263.1	6704570.9	6700588.9
Inertial Velocity (m/sec)	10818.989	10824.374	10830.222	10834.377
Inertial Path Angle (deg)	7.515	7.463	7.385	7.326
Inertial Azimuth (deg)	62.673	67.761	70.570	69.069
Altitude (m)	339504.81	334644.25	329209.37	325079.12
Geodetic Latitude (deg N)	-18.430	-20.258	-21.303	-20.706
Longitude (deg E)	128.572	107.528	87.607	75.712
Mass (kg)	63414.34	63674.85	63789.66	63760.02
(lb)	139804.71	140379.03	140632.14	140566.80
Inclination Angle (deg)	32.502	29.655	28.436	29.028
Descending Node (deg)	122.001	108.494	92.983	77.321
Eccentricity	.9725	.9729	.9733	.9736
Twice Specific Energy (km <sup>2</sup> /sec <sup>2</sup> )	-1.660	-1.637	-1.611	-1.591

TABLE 12

STATE VECTOR SUMMARY (METRIC UNITS)  
 JANUARY 31, 1971 LAUNCH

LAUNCH AZIMUTH	TIME SECONDS	VELOCITY METERS/SEC	RADIUS METERS	ALTITUDE METERS	PATH ANGLE DEGREES	WEIGHT KILOGRAMS	GEODETIC LATITUDE DEGREES	LONGITUDE DEGREES	AZIMUTH DEGREES
EARTH PARKING ORBIT INSERTION									
72.07	713.34	7793.0	6563322.2	191354.9	.00	136283.4	32.68	-52.80	88.79
80.00	710.72	7793.1	6563324.6	190281.8	.00	136839.9	29.40	-53.07	95.47
88.00	709.53	7793.1	6563322.7	189281.5	.00	137091.9	26.14	-53.70	102.08
96.00	709.77	7793.1	6563320.4	188392.8	.00	137041.8	22.98	-54.63	108.51
TIME BASE 6 FIRST OPPORTUNITY									
72.07	8460.12	7794.5	6567123.6	194778.4	.02	135285.1	-31.38	79.41	99.04
80.00	8163.37	7798.1	6564144.2	190464.3	.01	135864.4	-27.19	58.29	102.44
88.00	7882.12	7800.1	6562227.7	187860.0	.01	136138.1	24.86	38.38	104.36
96.00	7721.62	7800.6	6561139.1	187123.4	.02	136100.3	26.08	26.35	103.35
TRANSLUNAR INJECTION FIRST OPPORTUNITY									
72.07	9403.74	10816.9	6716807.9	340818.2	7.62	63681.9	-18.66	150.82	63.23
80.00	9108.47	10820.4	6713755.2	338172.8	7.63	63954.6	-20.41	129.84	68.14
88.00	8827.94	10826.4	6707534.1	332209.6	7.53	64077.2	-21.45	109.86	70.92
96.00	8667.41	10830.4	6703683.1	328212.5	7.48	64046.3	-20.86	97.97	69.45
TIME BASE 6 SECOND OPPORTUNITY									
72.07	13777.12	7792.8	6570089.1	197821.7	.03	134927.8	-31.61	58.56	98.08
80.00	13476.37	7796.4	6567014.5	193427.6	.01	135504.1	-27.50	37.23	101.69
88.00	13194.12	7798.5	6565031.8	190769.0	.01	135774.7	-25.23	17.32	103.67
96.00	13032.62	7799.1	6563920.3	190005.1	.02	135735.1	26.42	5.32	102.63
TRANSLUNAR INJECTION SECOND OPPORTUNITY									
72.07	14705.31	10818.9	6715547.4	339504.8	7.52	63414.3	-18.43	128.57	62.67
80.00	14406.04	10824.3	6710263.1	334644.2	7.46	63674.8	-20.26	107.53	67.76
88.00	14124.55	10830.2	6704570.9	329209.3	7.38	63789.6	-21.30	87.61	70.57
96.00	13963.00	10834.4	6700588.9	325079.1	7.33	63760.0	-20.71	75.71	69.07

TABLE 12 (Continued)

STATE VECTOR SUMMARY (ENGLISH UNITS)  
 JANUARY 31, 1971 LAUNCH

LAUNCH AZIMUTH	TIME SECONDS	VELOCITY FEET/SEC	RADIUS FEET	ALTITUDE FEET	PATH ANGLE DEGREES	WEIGHT POUNDS	GEODETIC LATITUDE DEGREES	LONGITUDE DEGREES	AZIMUTH DEGREES
72.07	713.34	25567.4	21532947.5	627797.2	.00	300453.4	32.68	-52.80	88.79
80.00	710.72	25567.4	21532955.3	624276.5	.00	301680.3	29.40	-53.07	95.47
88.00	709.53	25567.6	21532949.1	620994.7	.00	302235.8	26.14	-53.70	102.08
96.00	709.77	25567.5	21532941.6	618079.1	.00	302125.4	22.98	-54.63	108.51
EARTH PARKING ORBIT INSERTION									
72.07	8460.12	25572.2	21545419.1	639029.0	.02	298252.5	-31.38	79.41	99.04
80.00	8163.37	25584.0	21535644.3	624875.3	.01	299529.6	-27.19	58.29	102.44
88.00	7882.12	25590.6	21529356.6	616331.1	.01	300135.1	-24.86	38.38	104.36
96.00	7721.62	25592.2	21525785.2	613914.4	.02	300049.7	-26.08	26.35	103.35
TIME BASE 6 FIRST OPPORTUNITY									
72.07	9403.76	35488.1	22036503.4	1118156.4	7.62	140394.5	-18.66	150.82	63.23
80.00	9108.47	35499.6	22026488.1	1109477.3	7.63	140995.7	-20.41	129.84	68.14
88.00	8827.94	35519.3	22006077.9	1089913.3	7.53	141266.0	-21.45	109.86	70.92
96.00	8667.41	35532.4	21993443.5	1076799.6	7.48	141197.9	-20.86	97.97	69.45
TRANSLUNAR INJECTION FIRST OPPORTUNITY									
72.07	13777.12	25565.6	21555148.3	649013.4	.03	297464.8	-31.61	58.56	98.08
80.00	13476.37	25578.4	21545061.2	634597.3	.01	298735.3	-27.50	37.23	101.69
88.00	13194.12	25585.3	21538556.3	625874.9	.01	299331.9	-25.23	17.32	103.67
96.00	13032.62	25587.3	21534909.7	623368.7	.02	299244.6	-26.42	5.32	102.63
TIME BASE 6 SECOND OPPORTUNITY									
72.07	14705.31	35494.6	22032367.9	1113847.3	7.52	139804.6	-18.43	128.57	62.67
80.00	14406.06	35512.4	22015031.2	1097900.7	7.46	140378.9	-20.26	107.53	67.76
88.00	14124.55	35531.7	21996356.2	1080069.9	7.38	140632.0	-21.30	87.61	70.57
96.00	13963.00	35545.5	21983292.1	1066519.5	7.33	140566.7	-20.71	75.71	69.07
TRANSLUNAR INJECTION SECOND OPPORTUNITY									



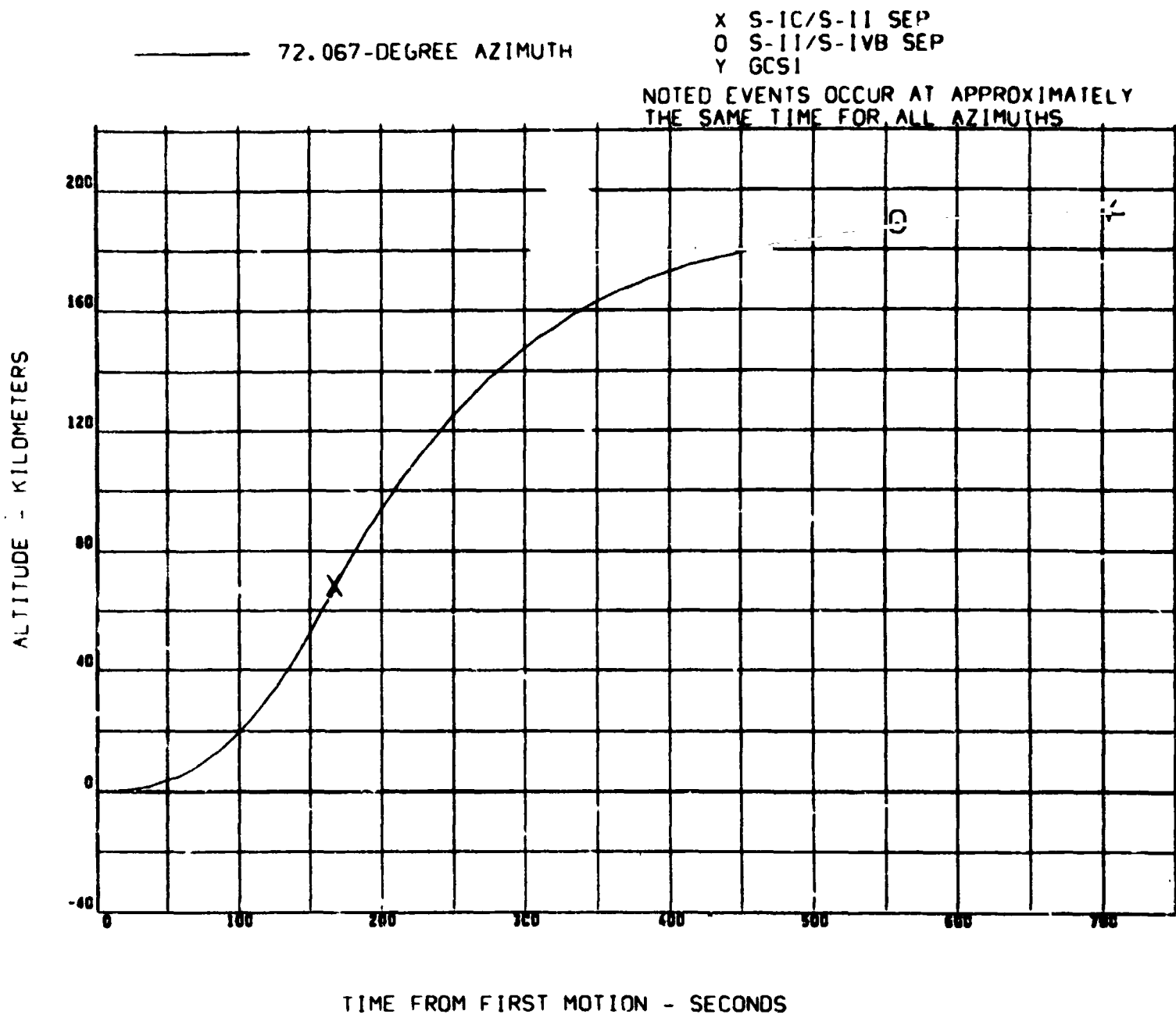


FIGURE 4 ALTITUDE VERSUS TIME DURING BOOST TO PARKING ORBIT

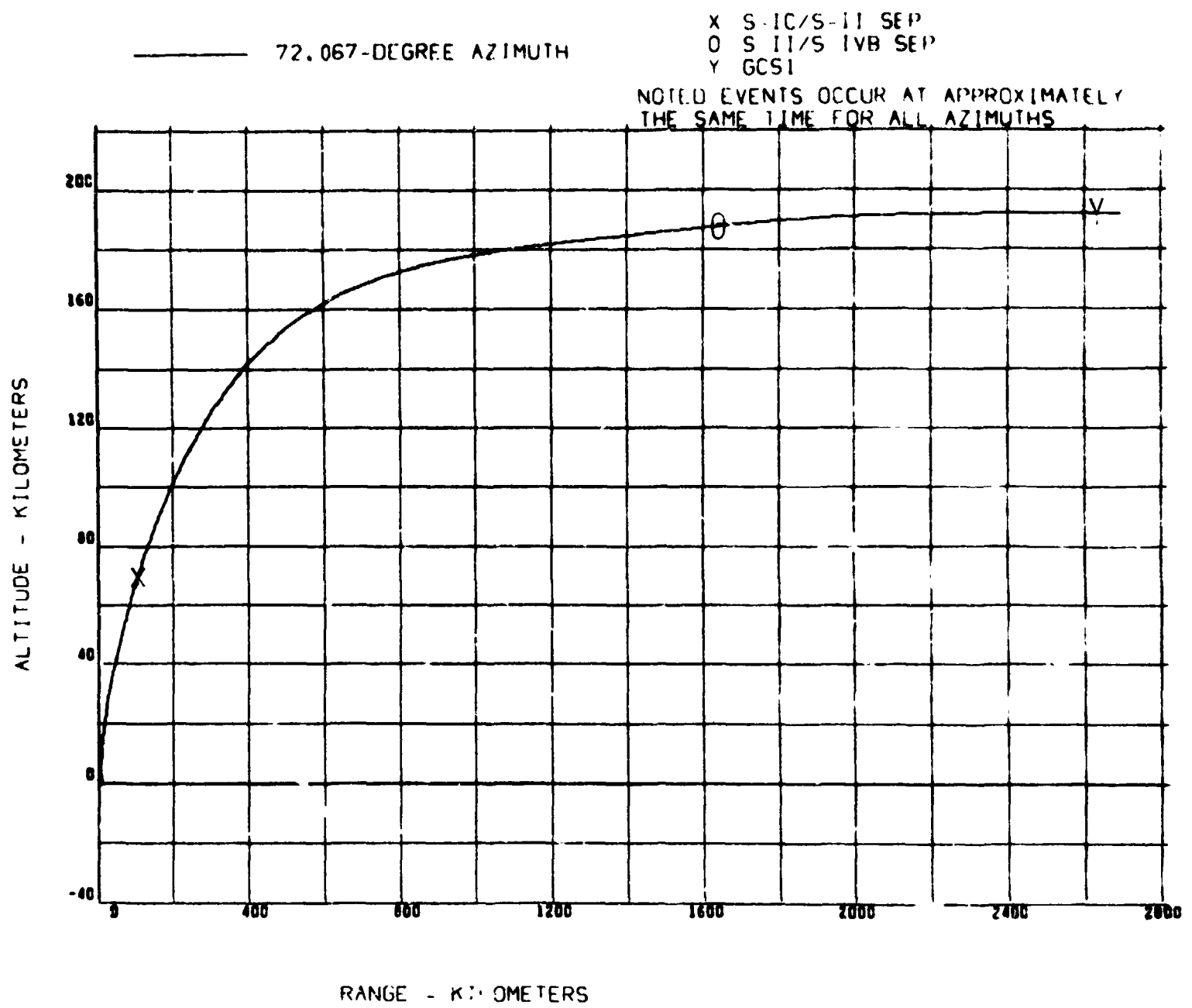


FIGURE 5 ALTITUDE VERSUS RANGE DURING BOOST TO  
PARKING ORBIT

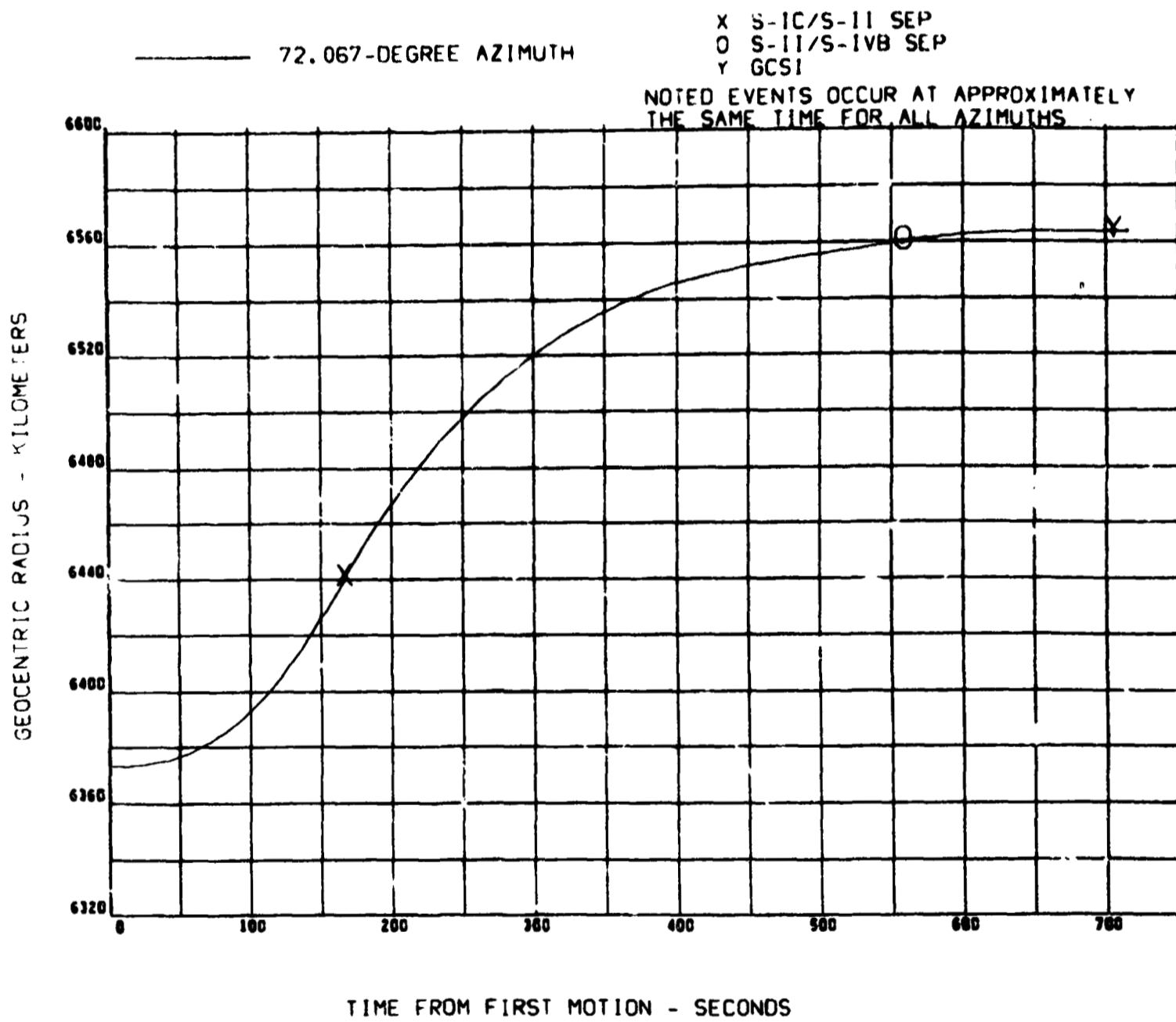


FIGURE 6 GEOCENTRIC RADIUS VERSUS TIME DURING BOOST TO PARKING ORBIT

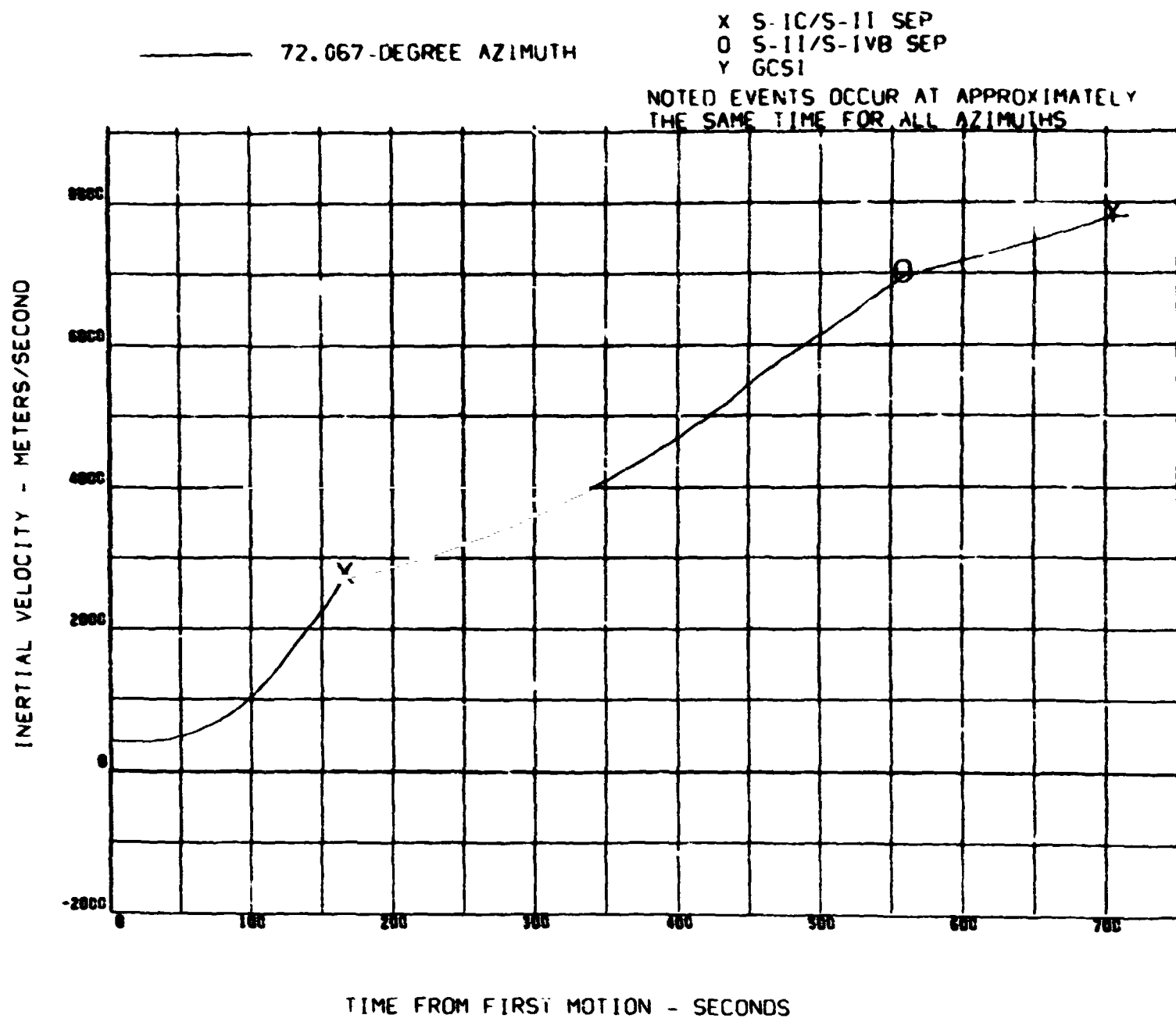


FIGURE 7 INERTIAL VELOCITY VERSUS TIME DURING BOOST TO PARKING ORBIT

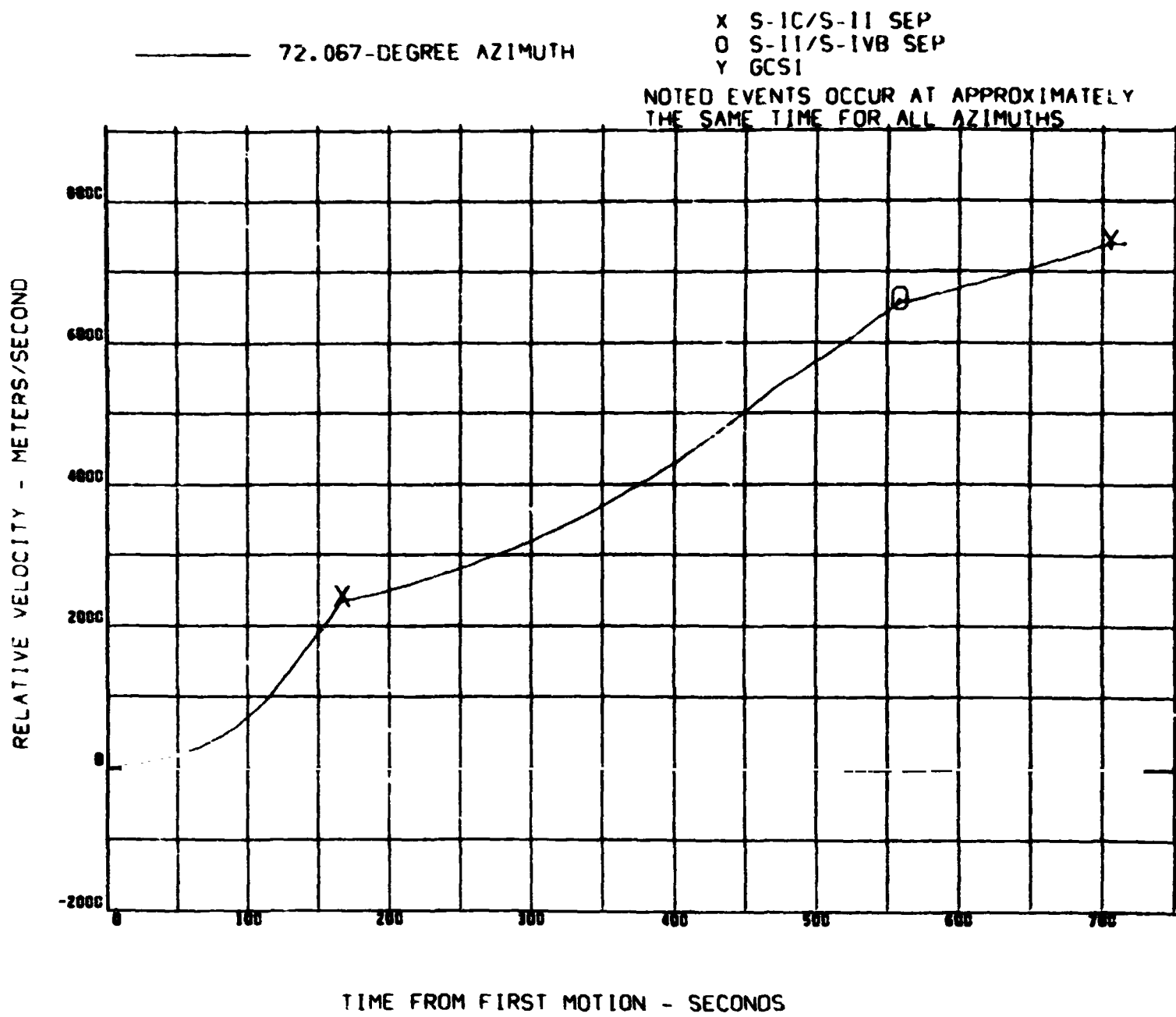


FIGURE 8 RELATIVE VELOCITY VERSUS TIME DURING BOOST TO PARKING ORBIT

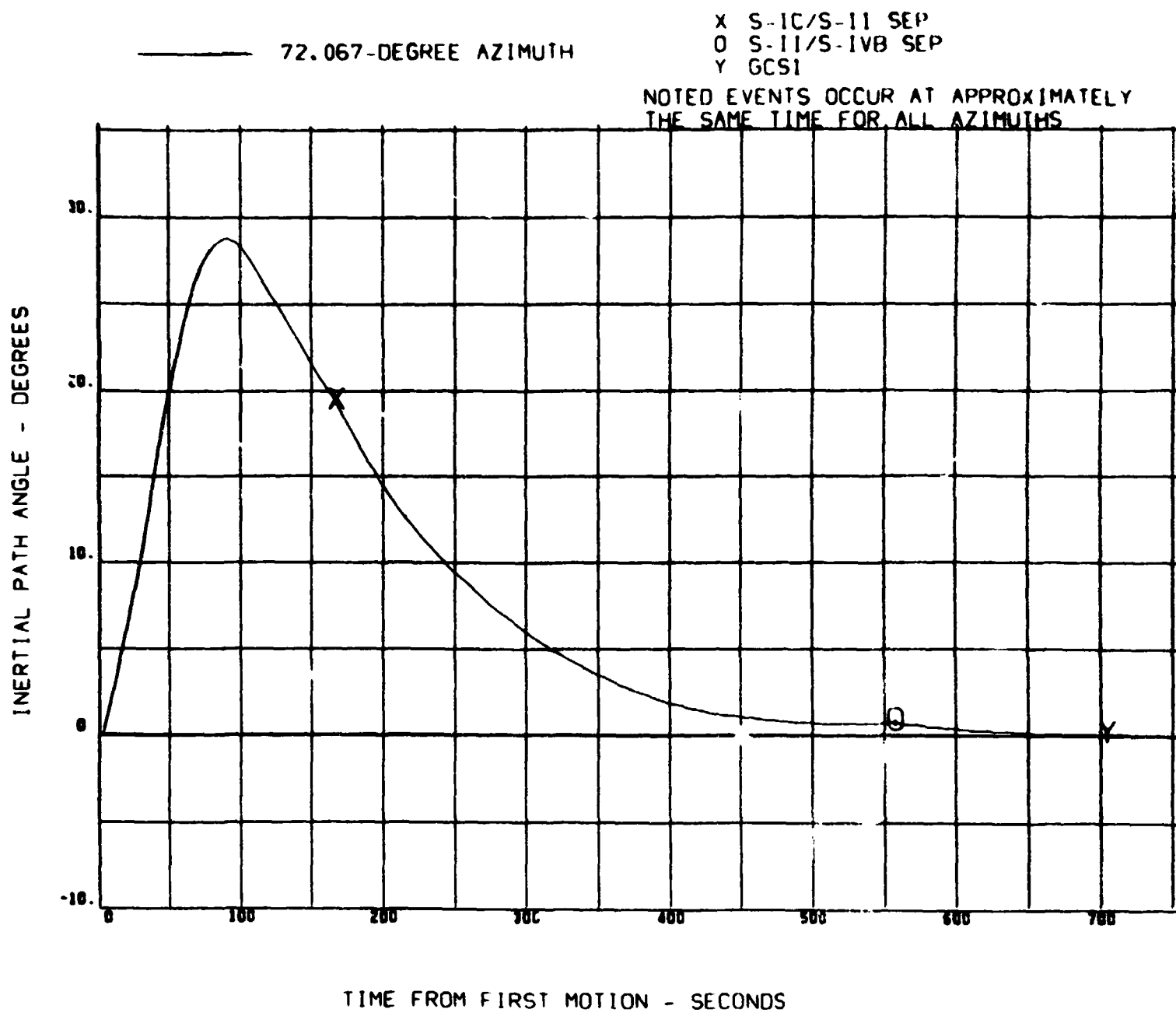


FIGURE 9 INERTIAL PATH ANGLE VERSUS TIME  
 DURING BOOST TO PARKING ORBIT

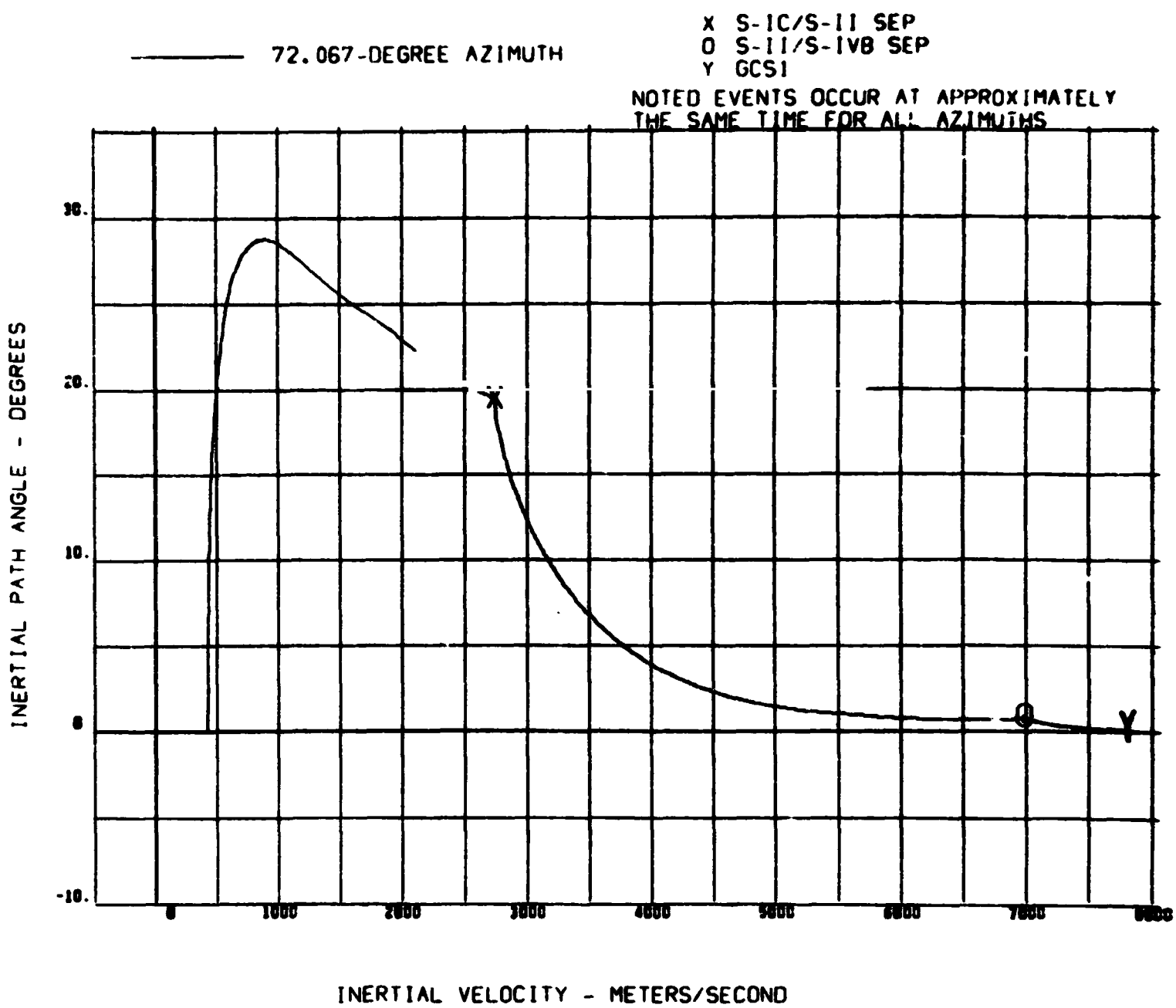


FIGURE 10 INERTIAL PATH ANGLE VERSUS INERTIAL VELOCITY DURING BOOST TO PARKING ORBIT

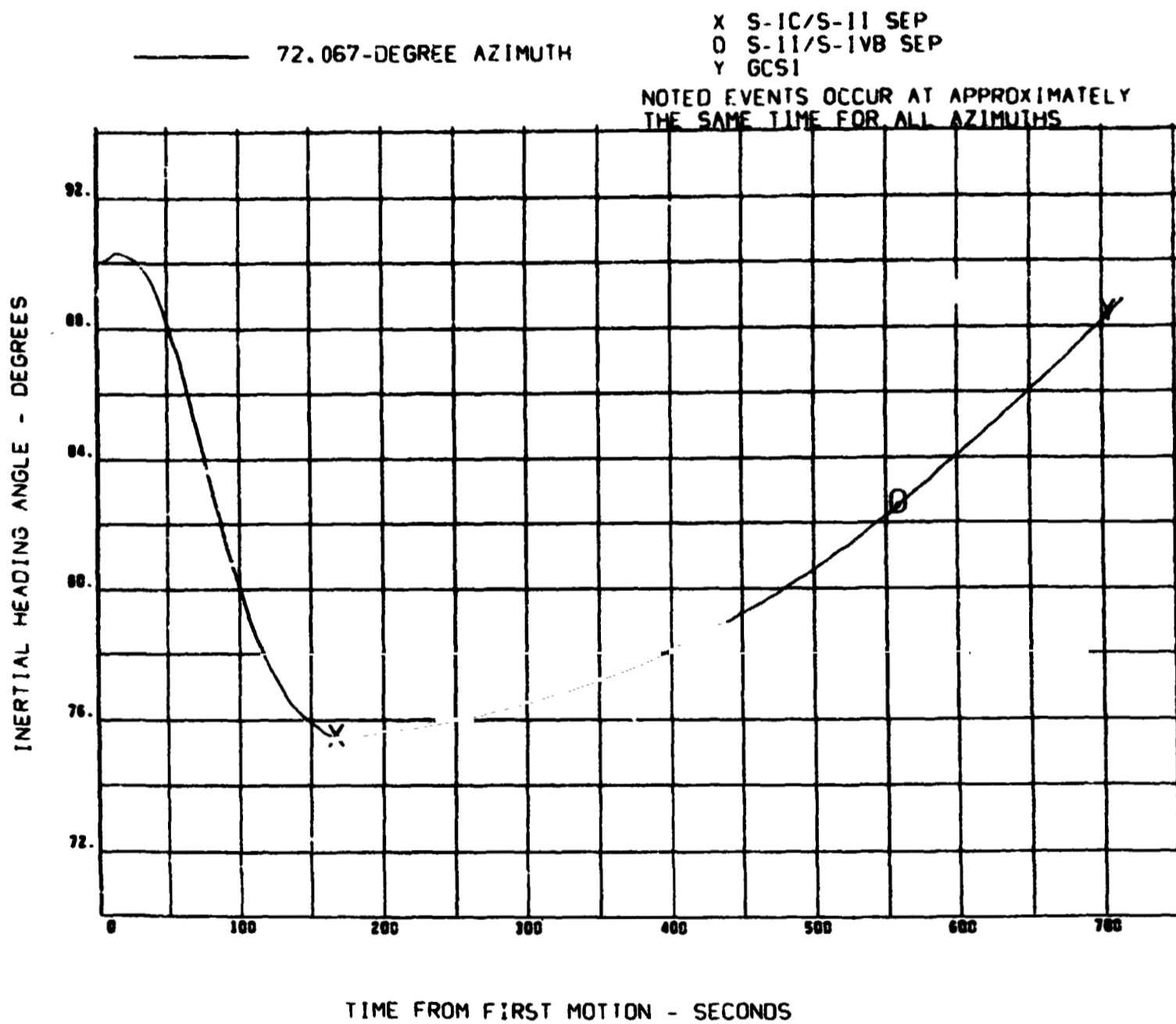


FIGURE 11 INERTIAL HEADING ANGLE VERSUS TIME DURING BOOST TO PARKING ORBIT



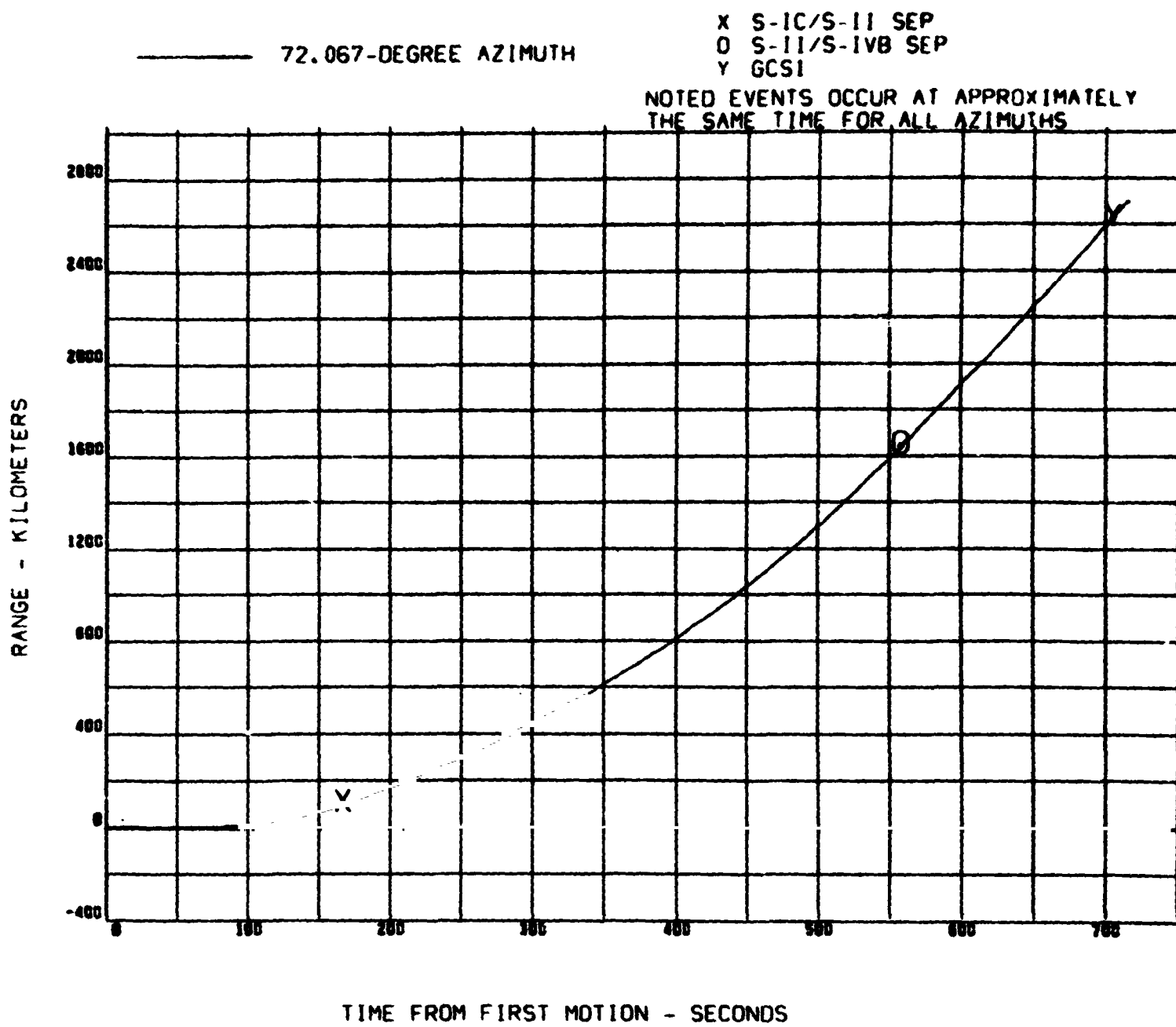


FIGURE 12 RANGE VERSUS TIME DURING BOOST TO PARKING ORBIT

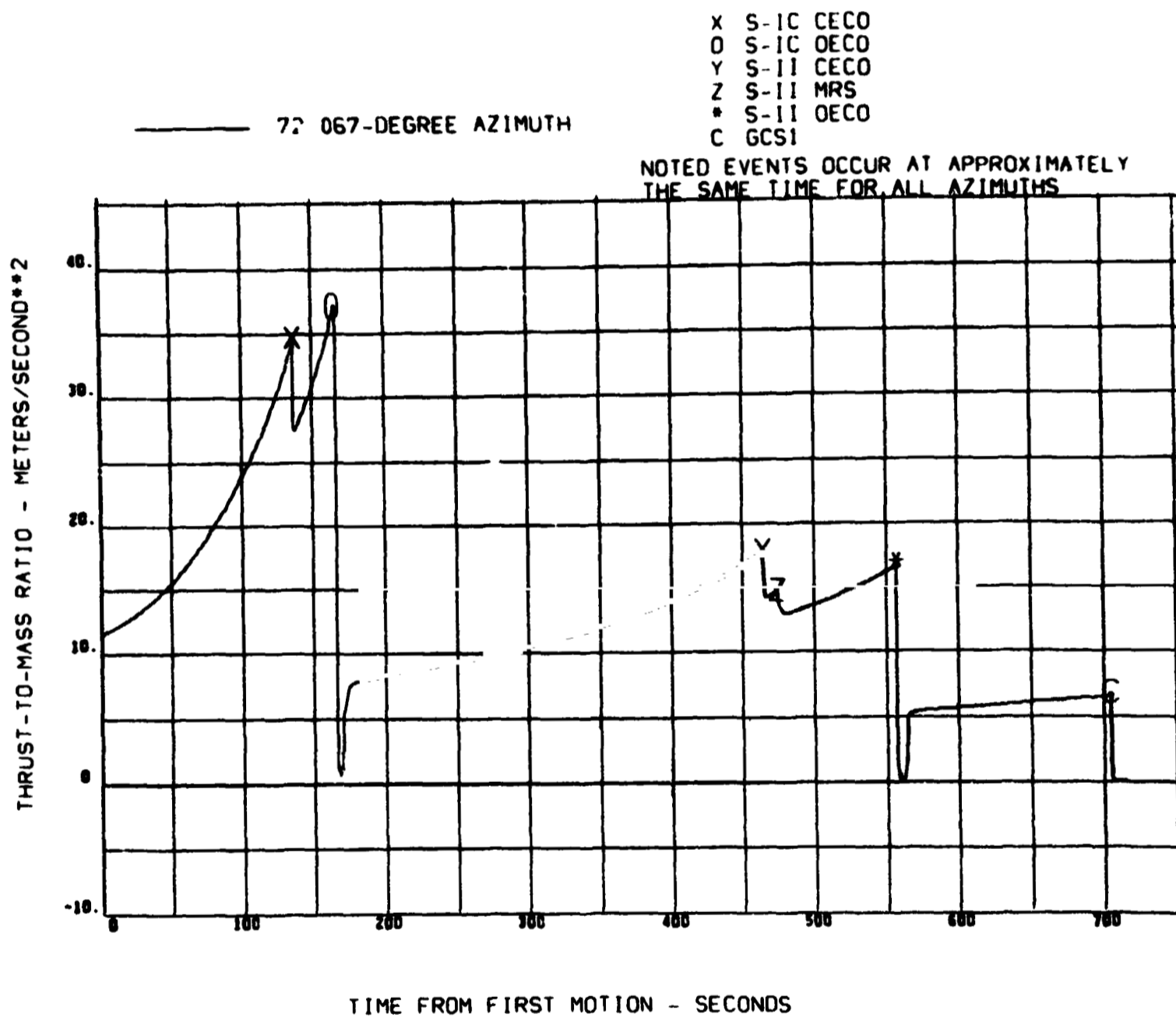


FIGURE 13 THRUST-TO-MASS RATIO VERSUS TIME DURING BOOST TO PARKING ORBIT

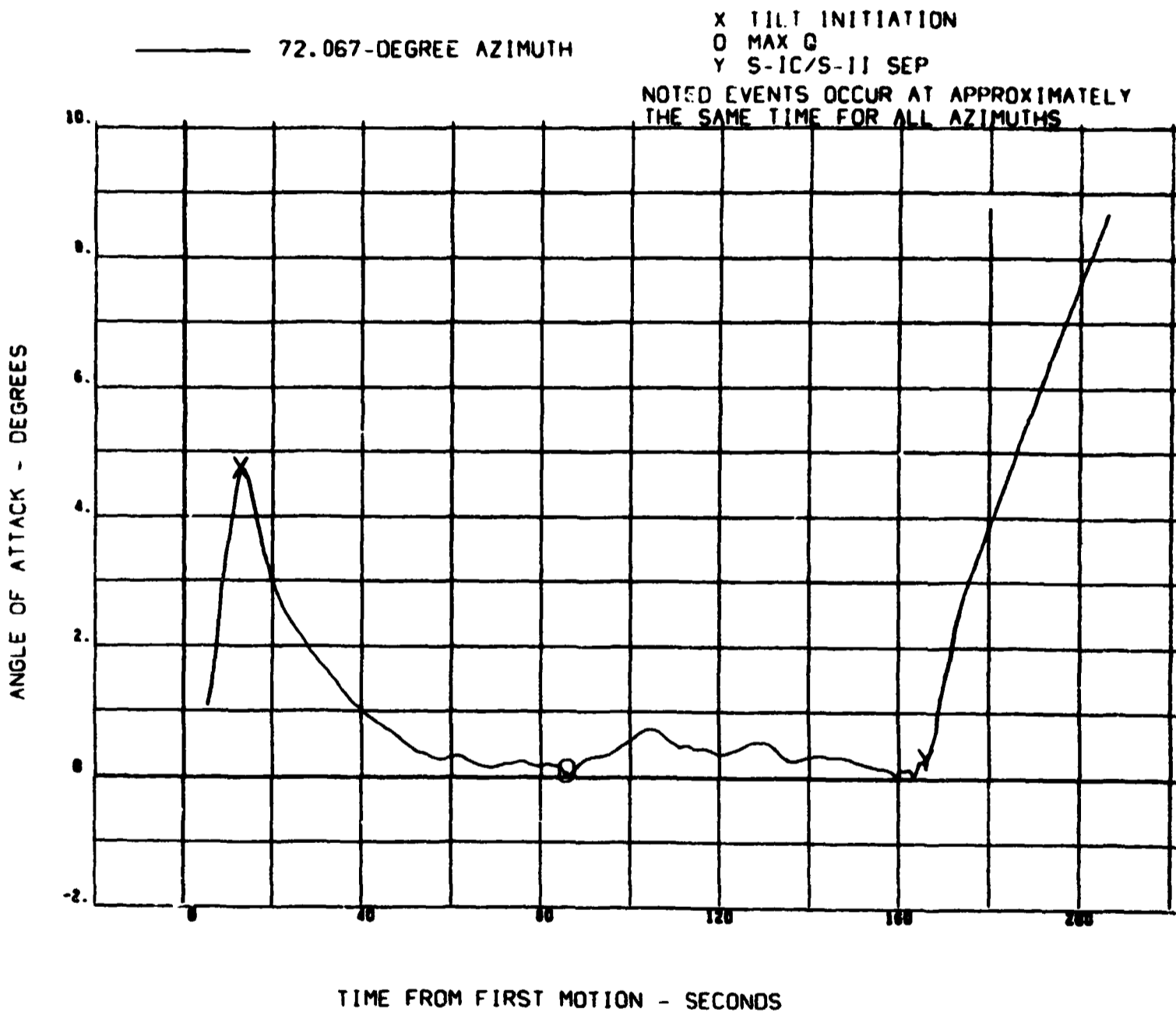


FIGURE 14 TOTAL ANGLE OF ATTACK VERSUS TIME DURING BOOST TO INITIATION OF ITERATIVE GUIDANCE

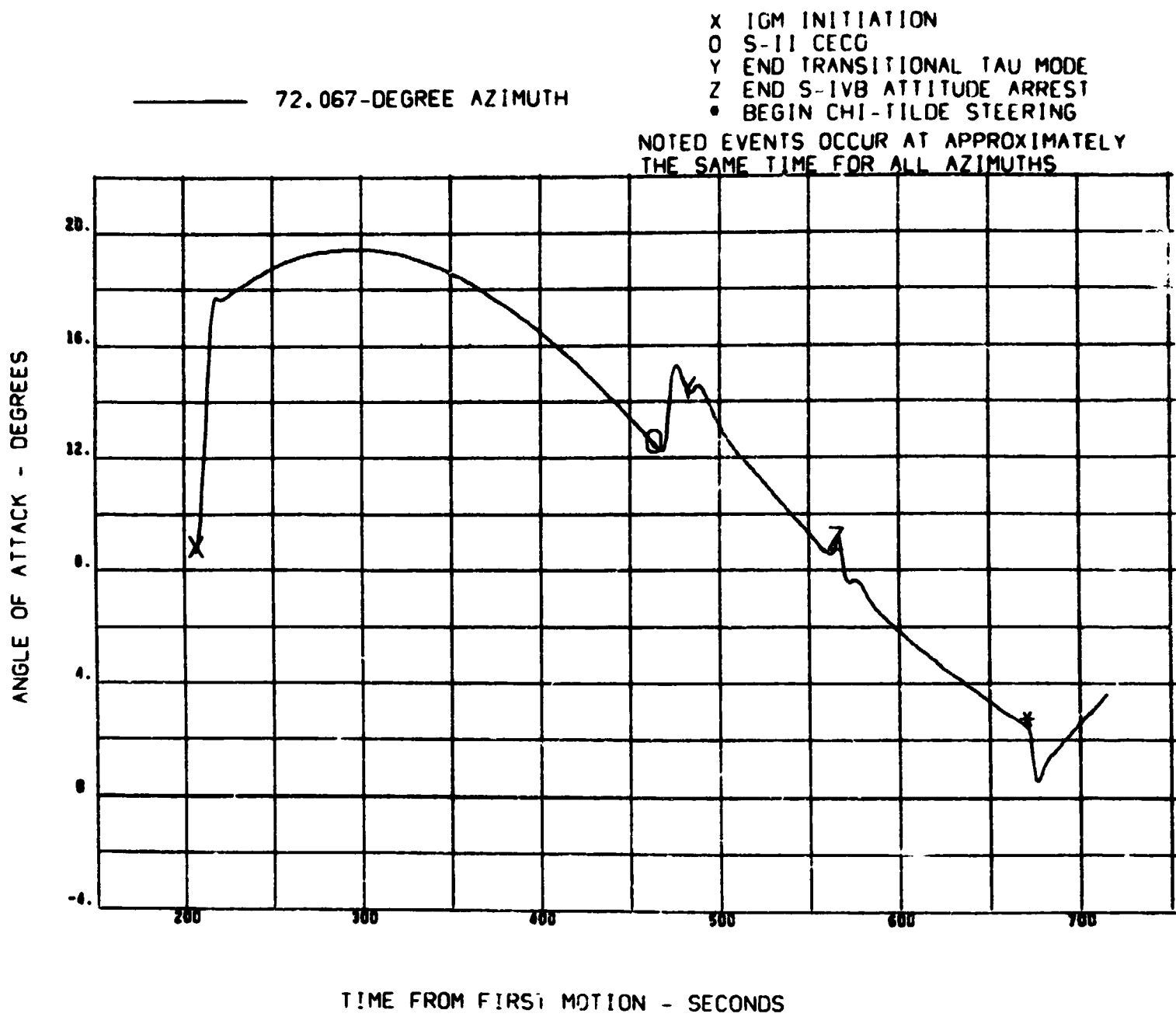


FIGURE 15 TOTAL ANGLE OF ATTACK VERSUS TIME FROM INITIATION OF ITERATIVE GUIDANCE TO PARKING ORBIT

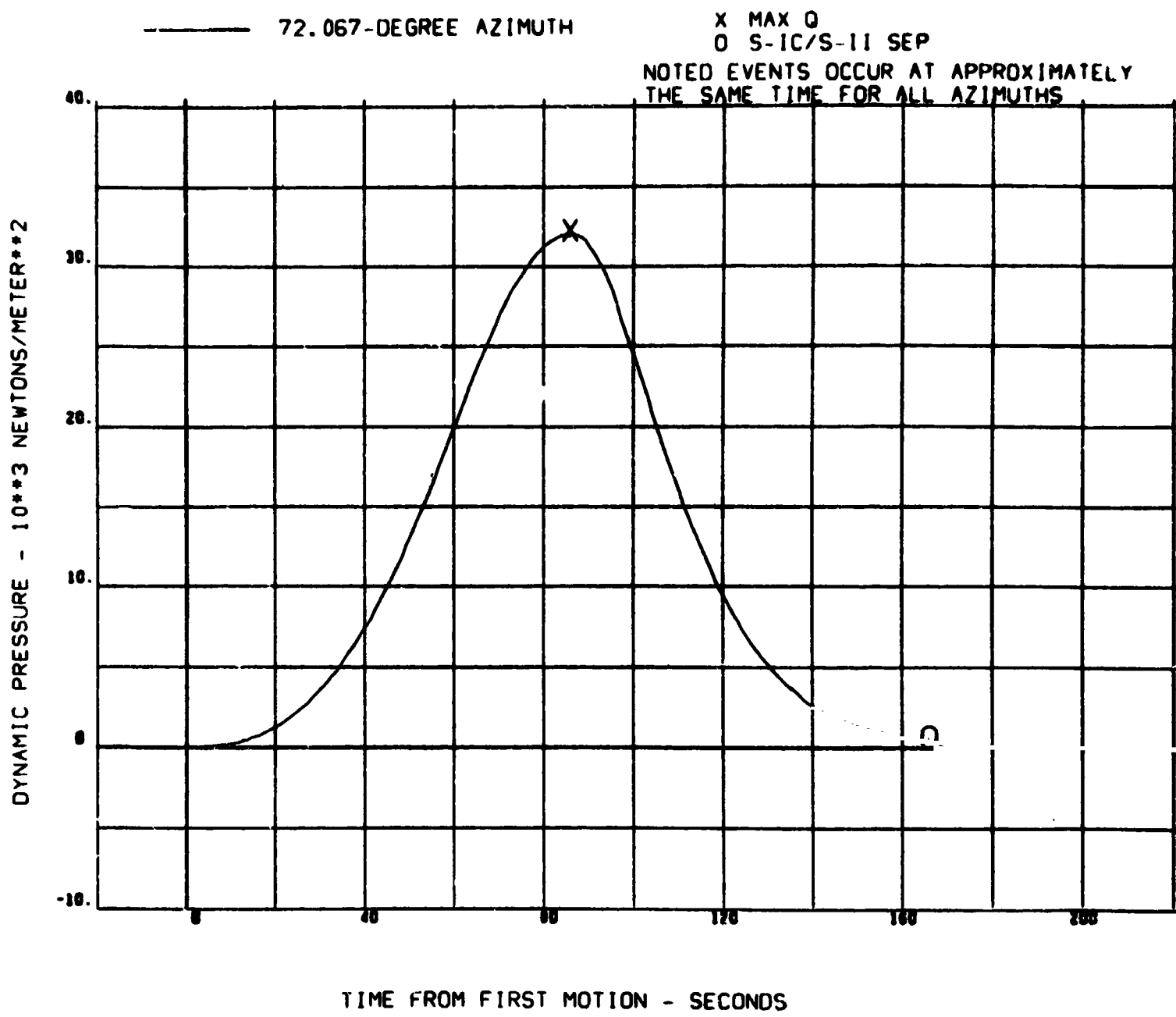


FIGURE 16 DYNAMIC PRESSURE VERSUS TIME DURING BOOST TO INITIATION OF ITERATIVE GUIDANCE

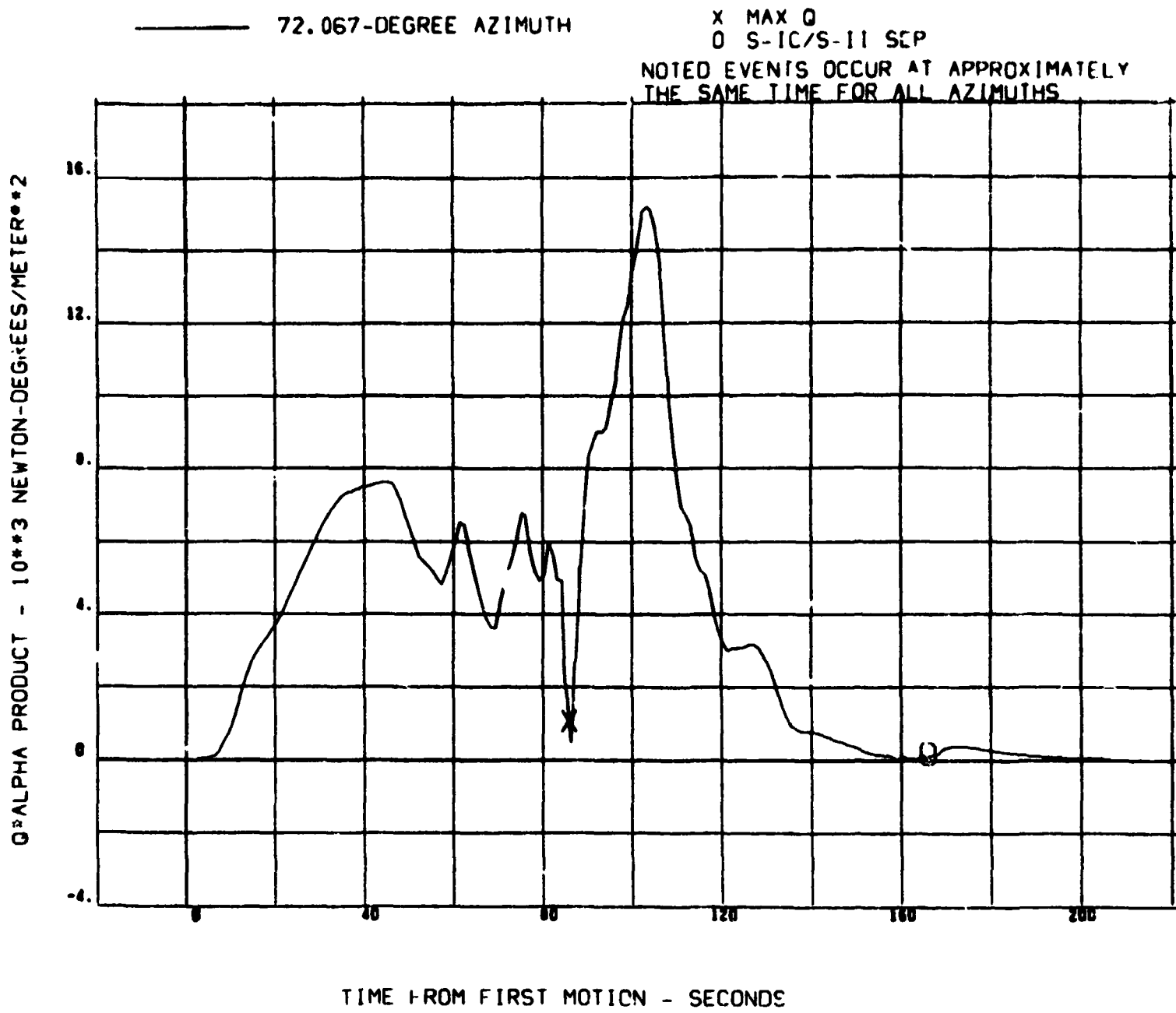


FIGURE 17 Q\*ALPHA PRODUCT VERSUS TIME DURING BOOST TO INITIATION OF ITERATIVE GUIDANCE

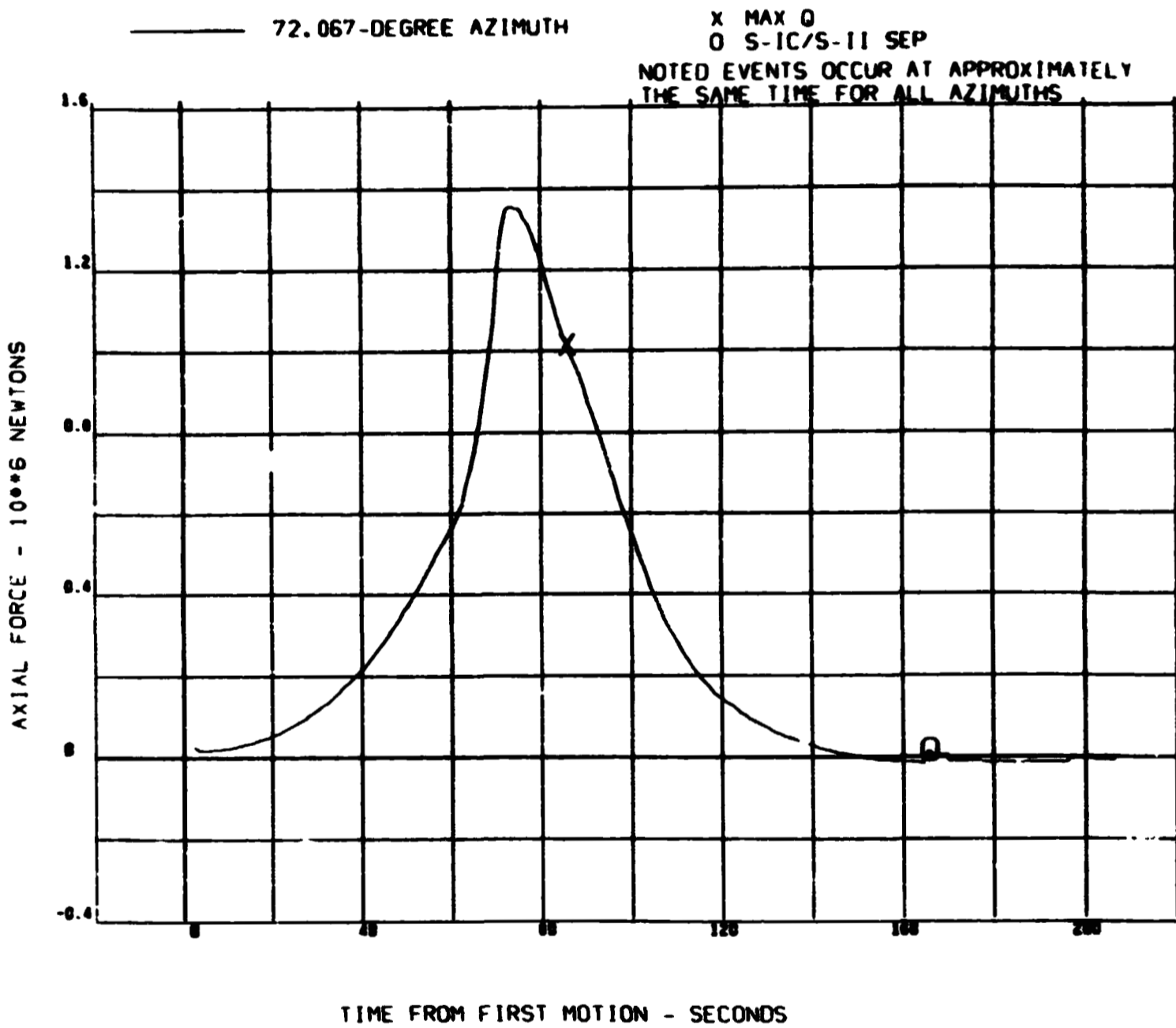


FIGURE 18 AERODYNAMIC AXIAL FORCE VERSUS TIME DURING  
 BOOST TO INITIATION OF ITERATIVE GUIDANCE

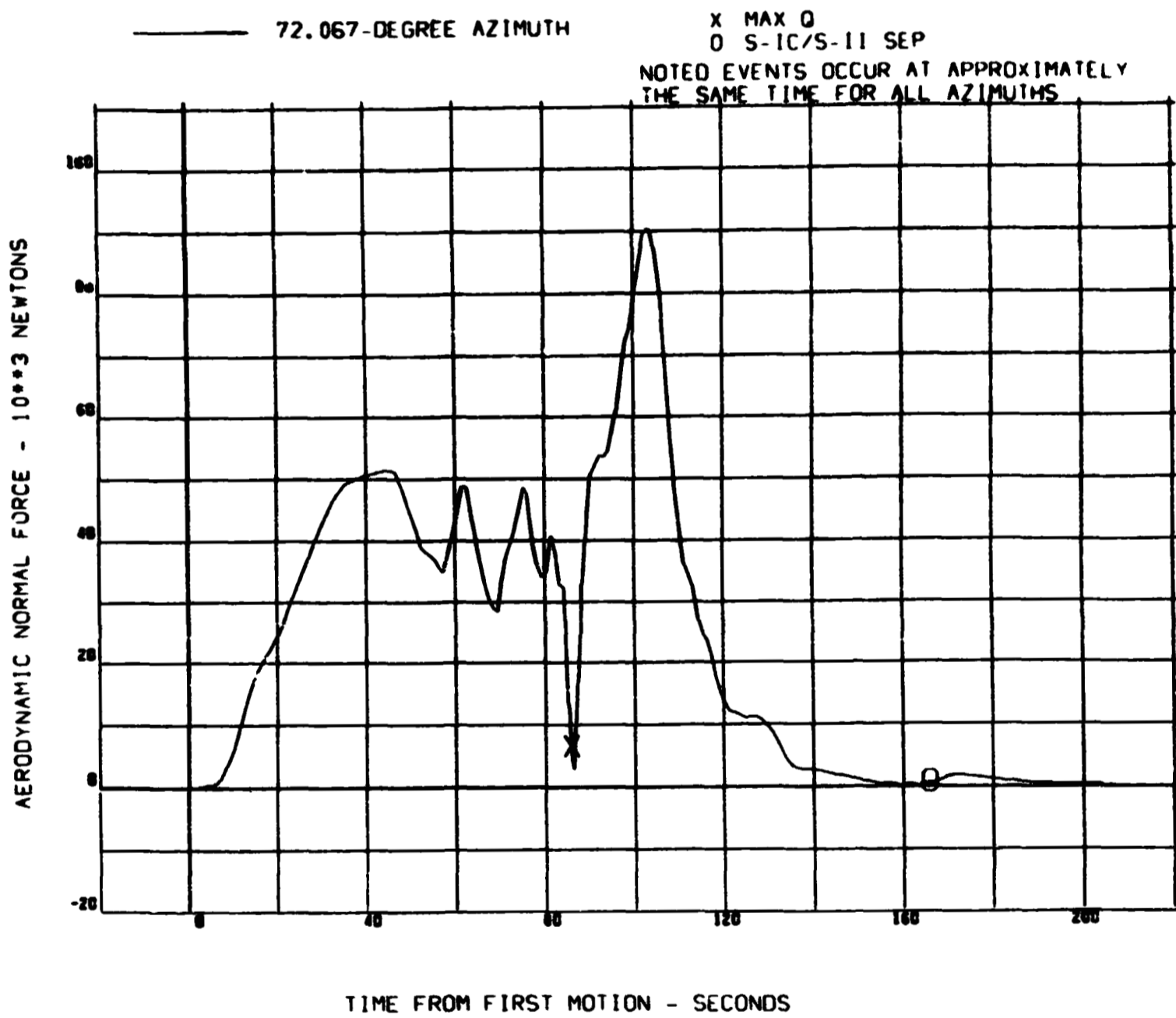


FIGURE 19 AERODYNAMIC NORMAL FORCE VERSUS TIME DURING BOOST TO INITIATION OF ITERATIVE GUIDANCE



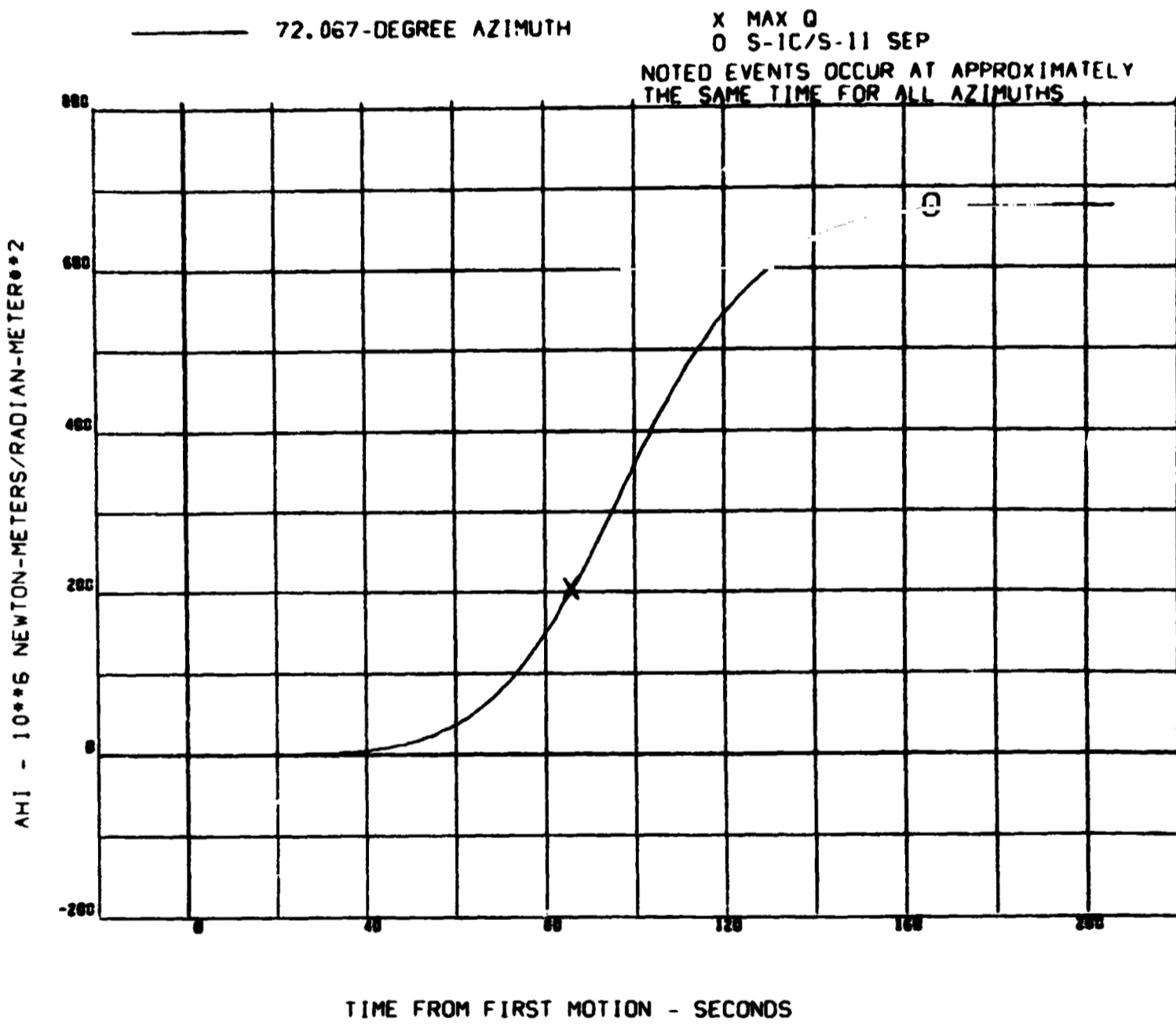


FIGURE 20 AERODYNAMIC HEATING INDICATOR VERSUS TIME DURING BOOST TO INITIATION OF ITERATIVE GUIDANCE

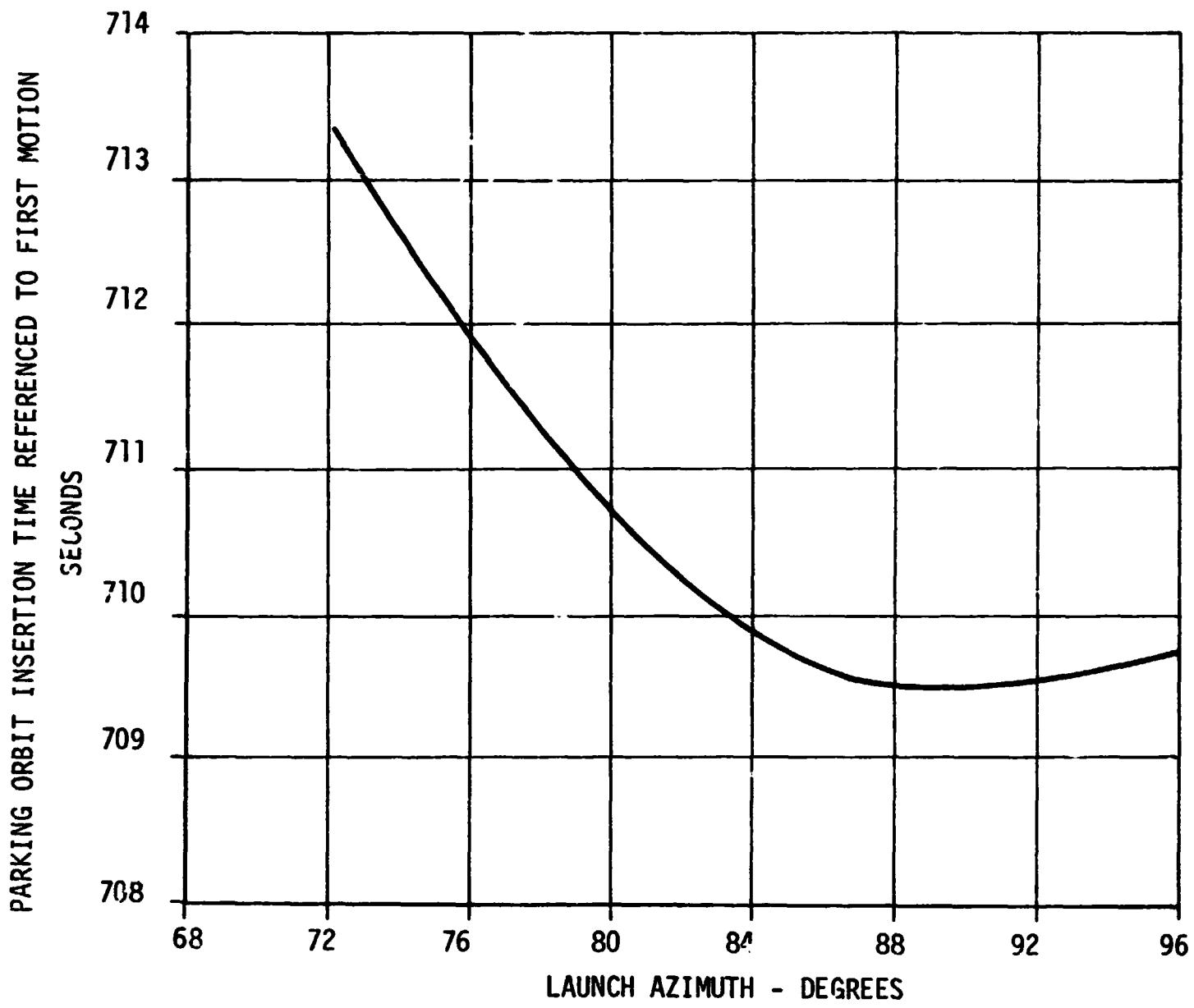


Figure 21 . TIME OF PARKING ORBIT INSERTION VERSUS LAUNCH AZIMUTH

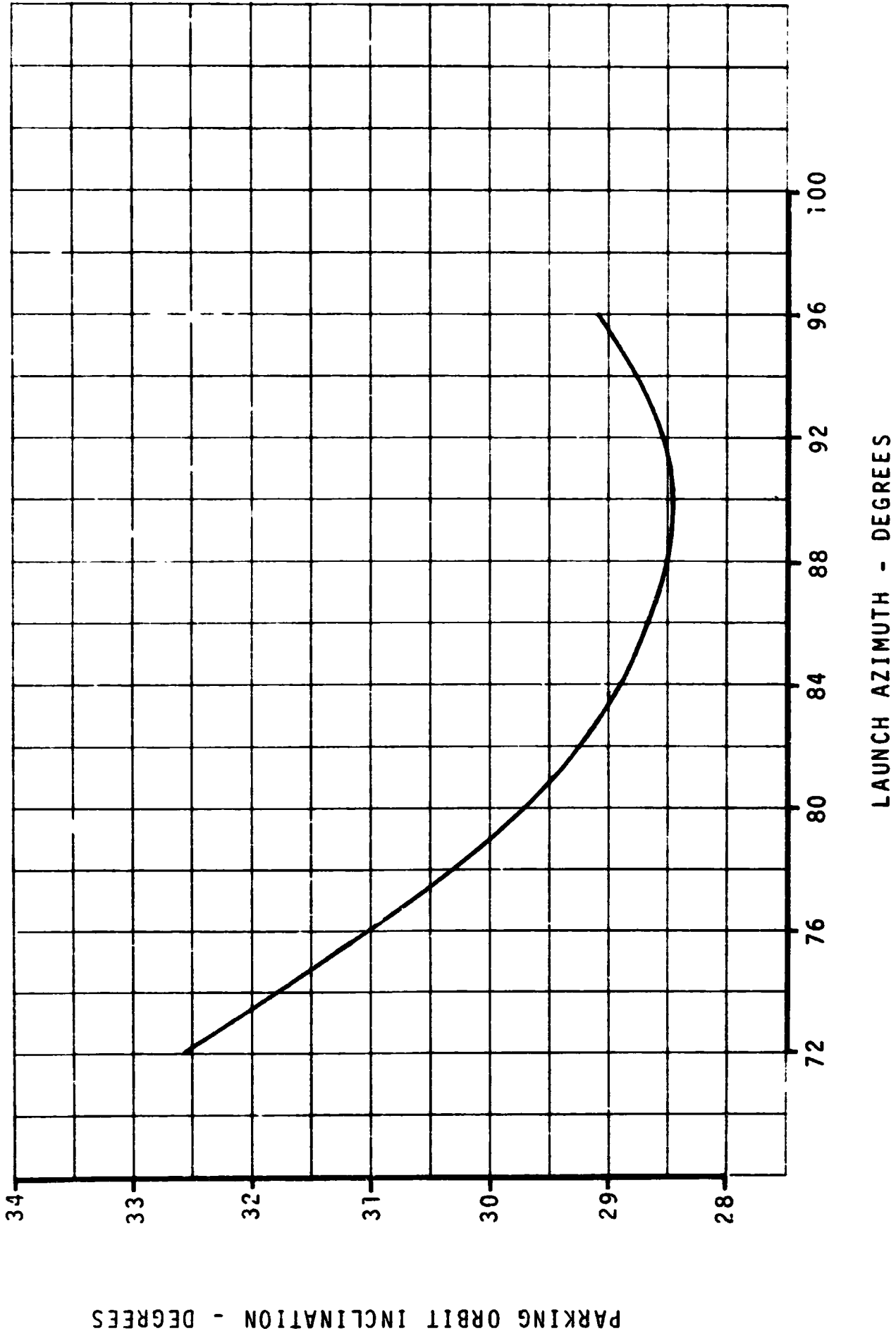


FIGURE 22 PARKING ORBIT INCLINATION VERSUS LAUNCH AZIMUTH

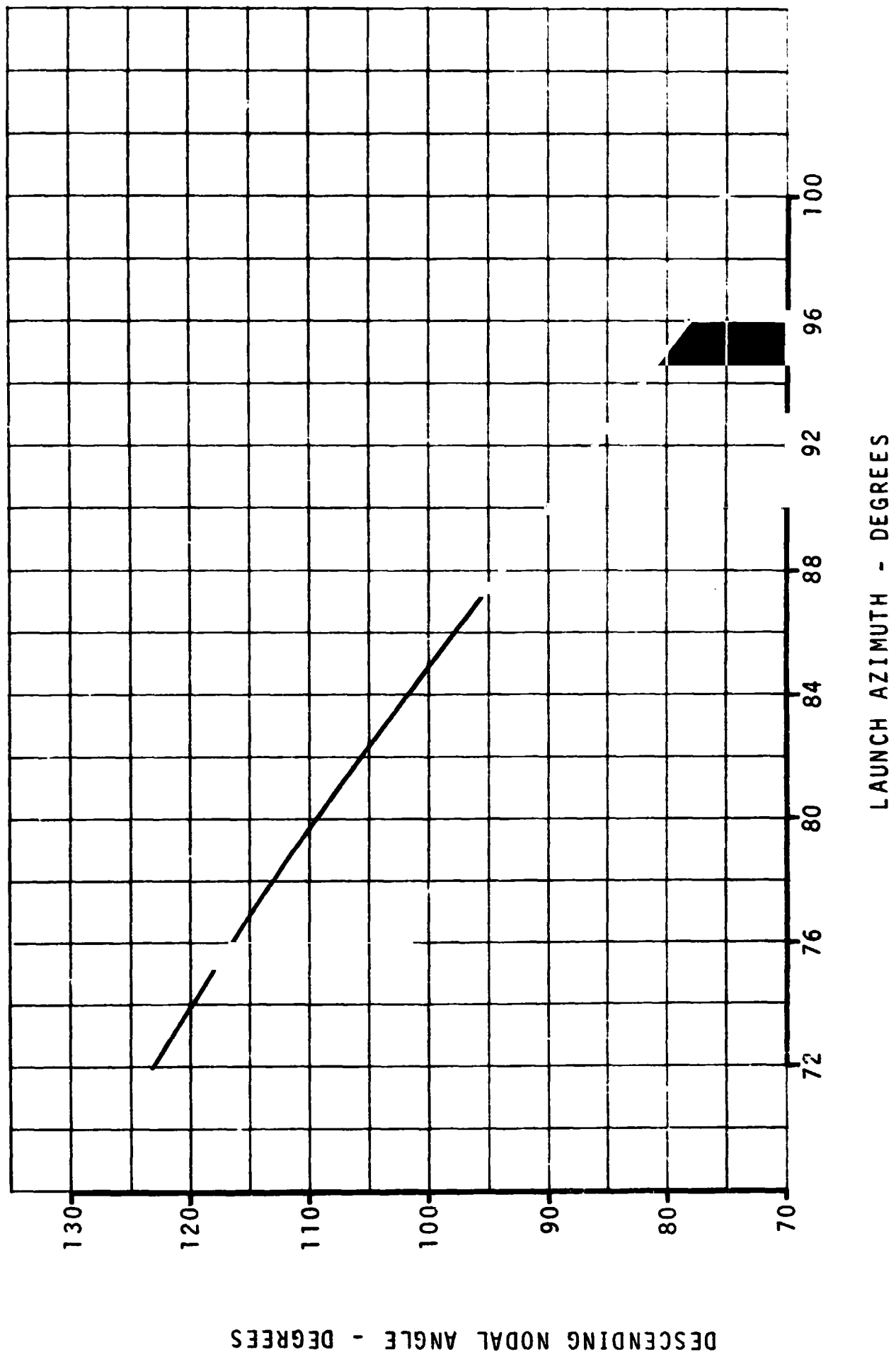


FIGURE 23 PARKING ORBIT DESCENDING NODAL ANGLE VERSUS LAUNCH AZIMUTH

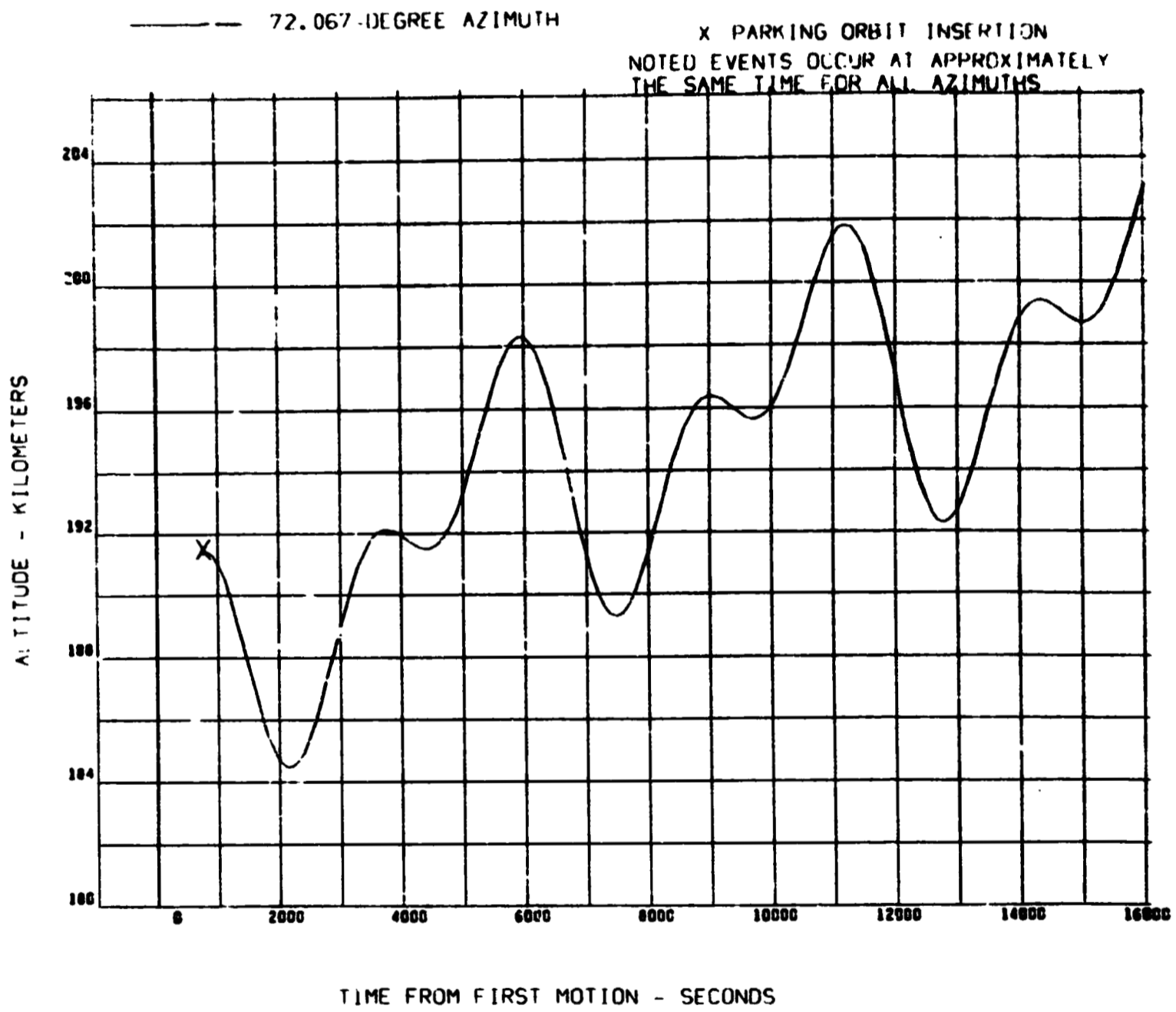


FIGURE 24 ALTITUDE VERSUS TIME DURING PARKING ORBIT

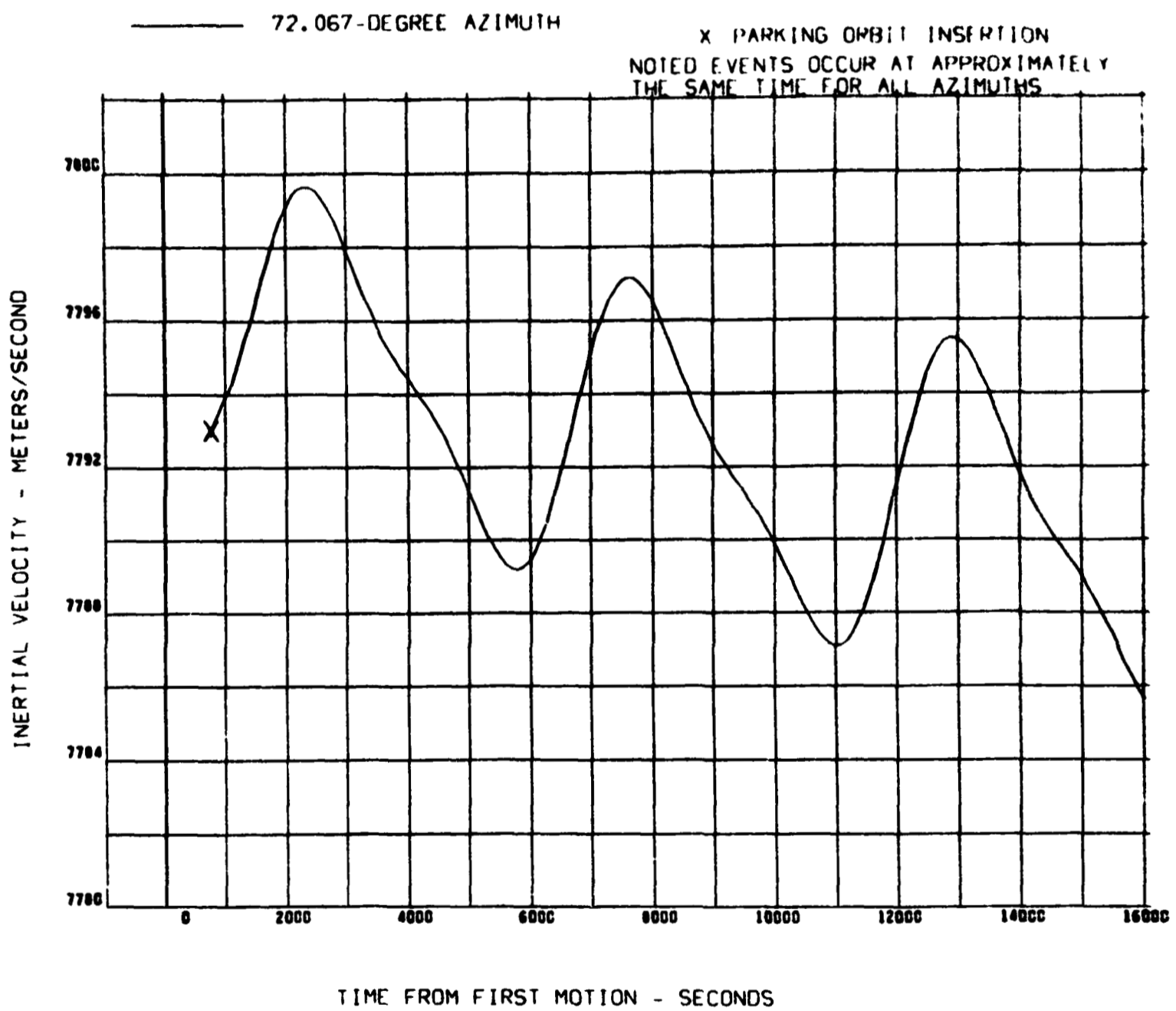


FIGURE 25 INERTIAL VELOCITY VERSUS TIME DURING PARKING ORBIT

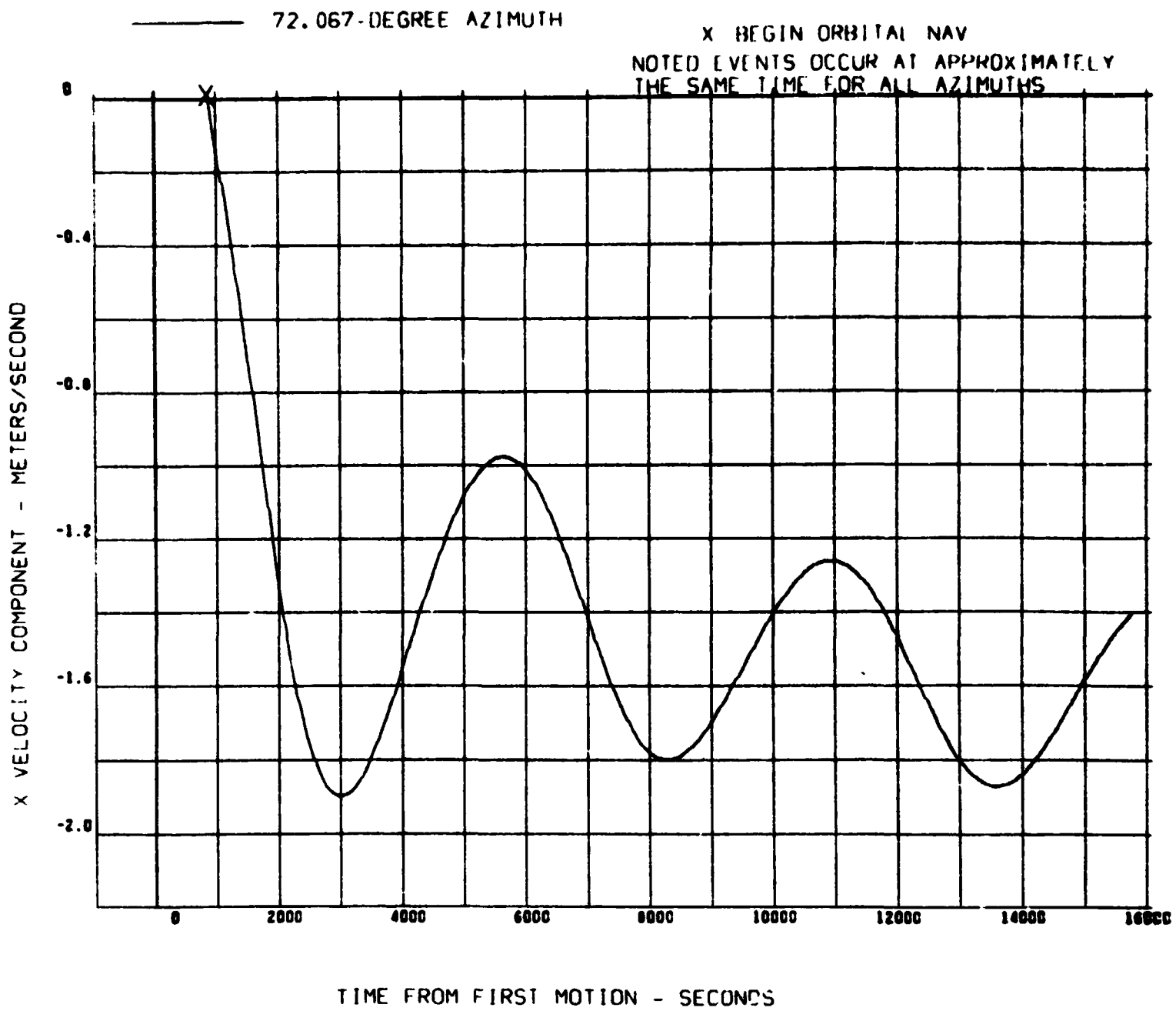


FIGURE 26 X COMPONENT OF THE ACCUMULATED PLATFORM VELOCITY DURING PARKING ORBIT

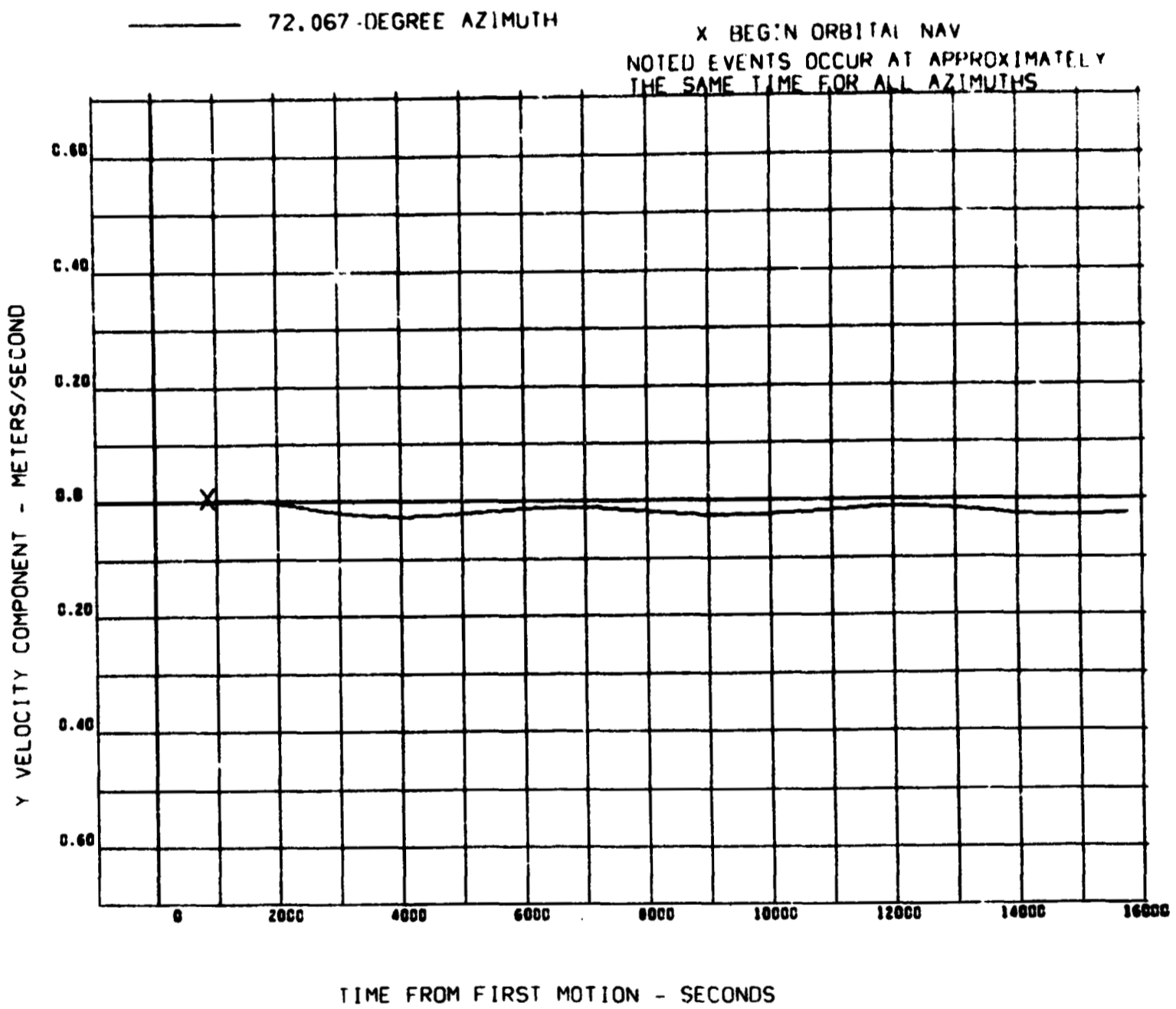


FIGURE 27 Y COMPONENT OF THE ACCUMULATED PLATFORM VELOCITY DURING PARKING ORBIT



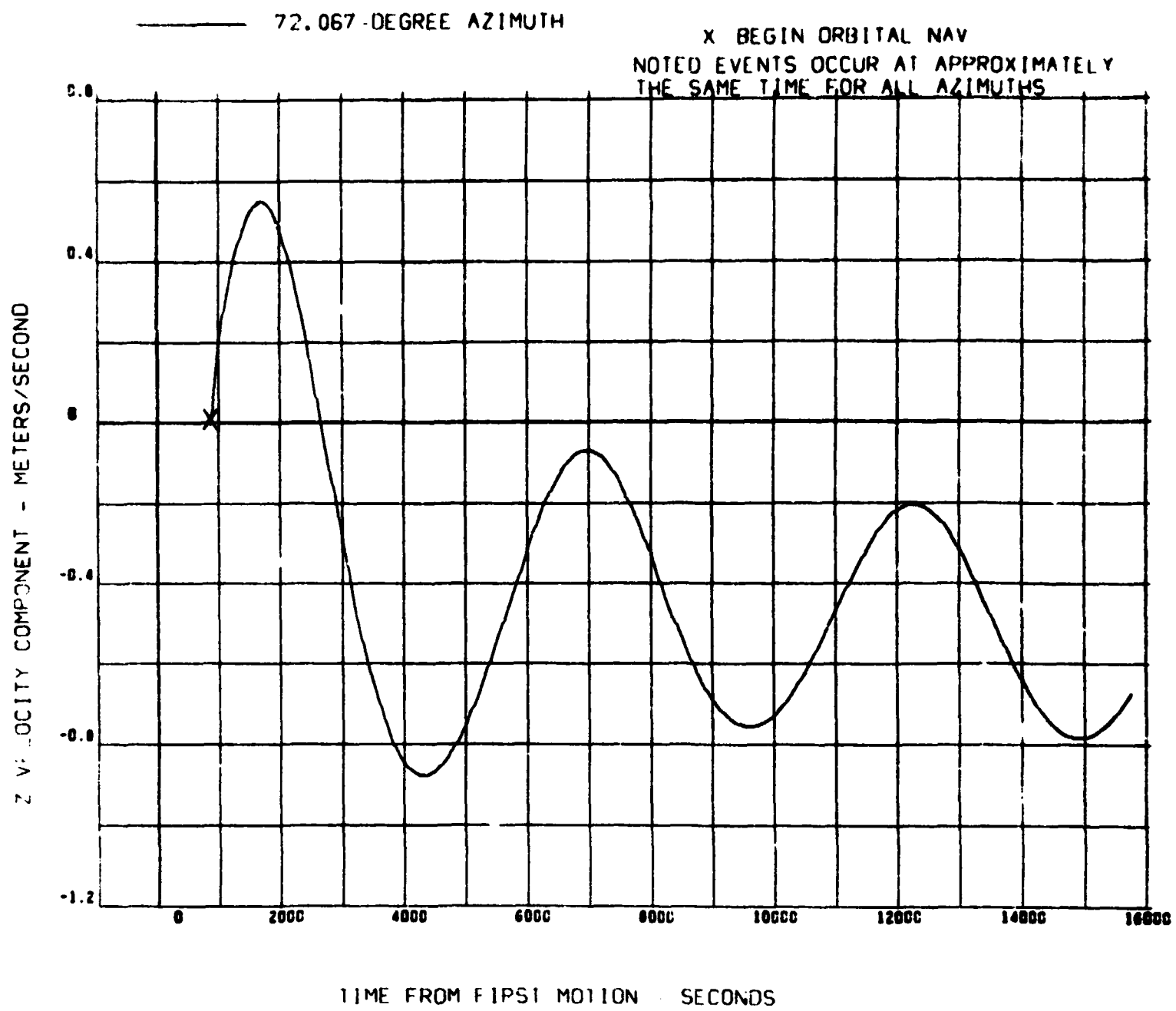


FIGURE 28 Z COMPONENT OF THE ACCUMULATED PLATFORM VELOCITY DURING PARKING ORBIT

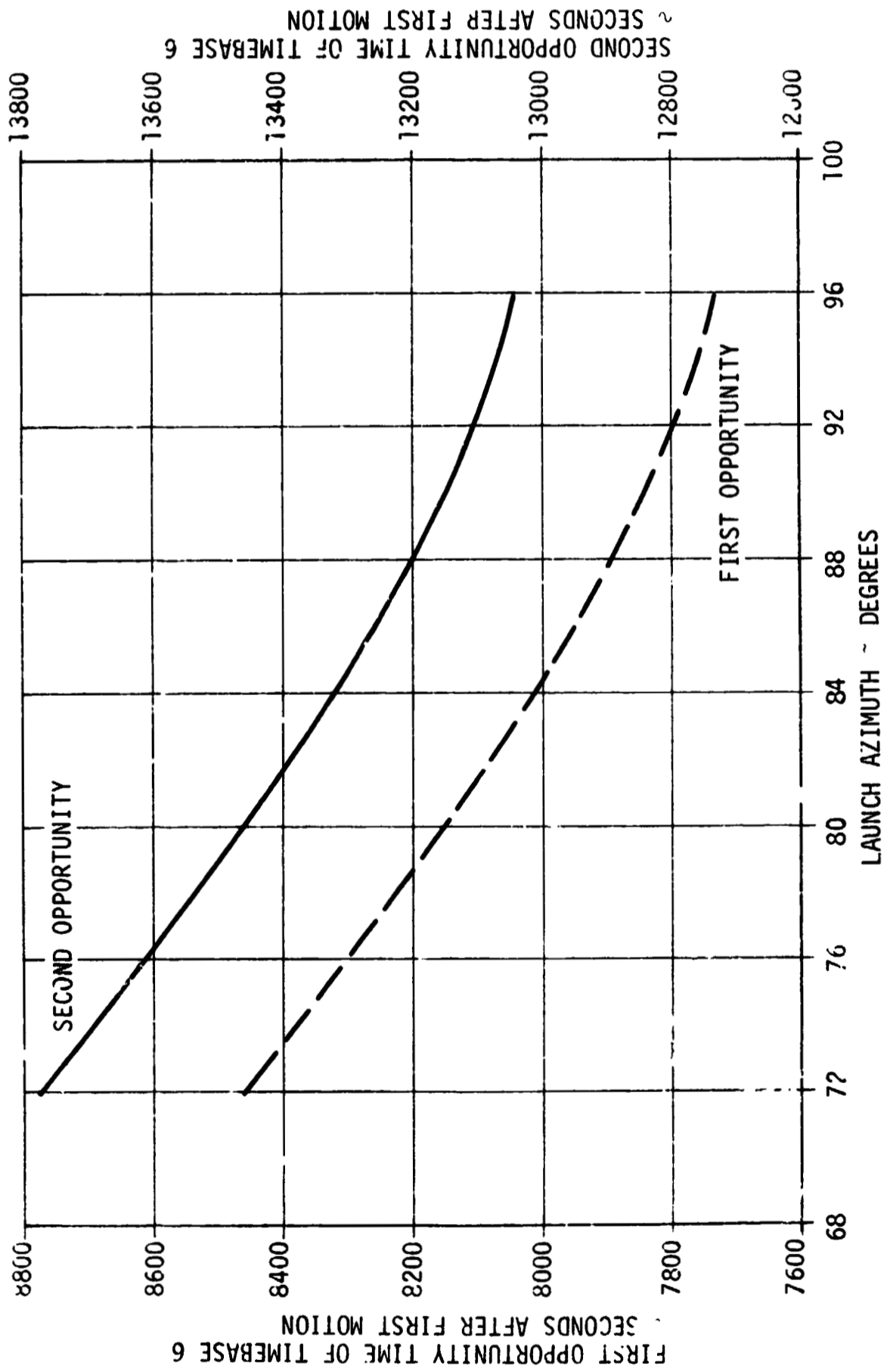


Figure 29 TIME OF TIMEBASE 6 INITIATION FOR 31 JANUARY 1970

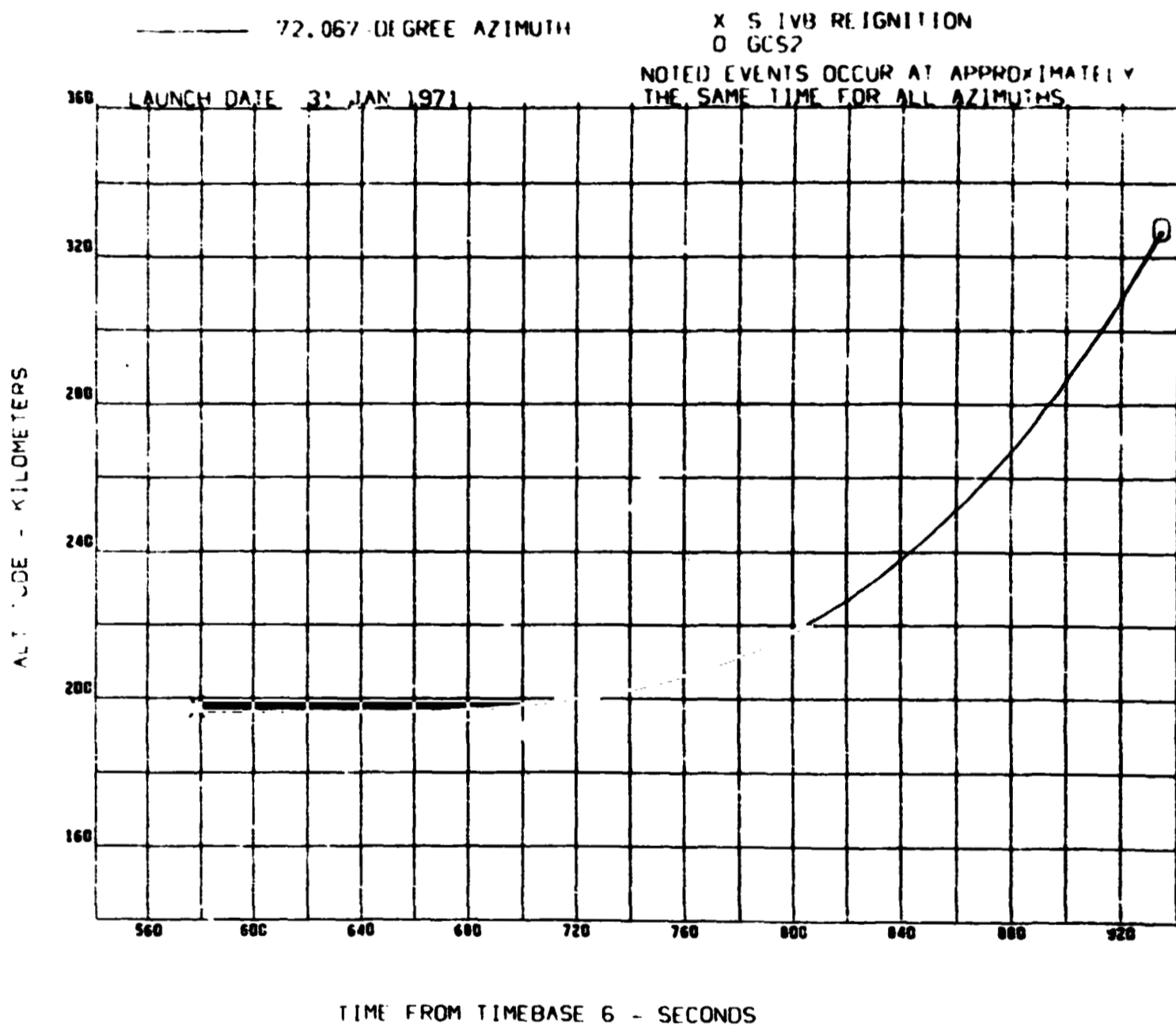


FIGURE 30 ALTITUDE VERSUS TIME DURING S-IVB SECOND BURN (FIRST OPPORTUNITY)

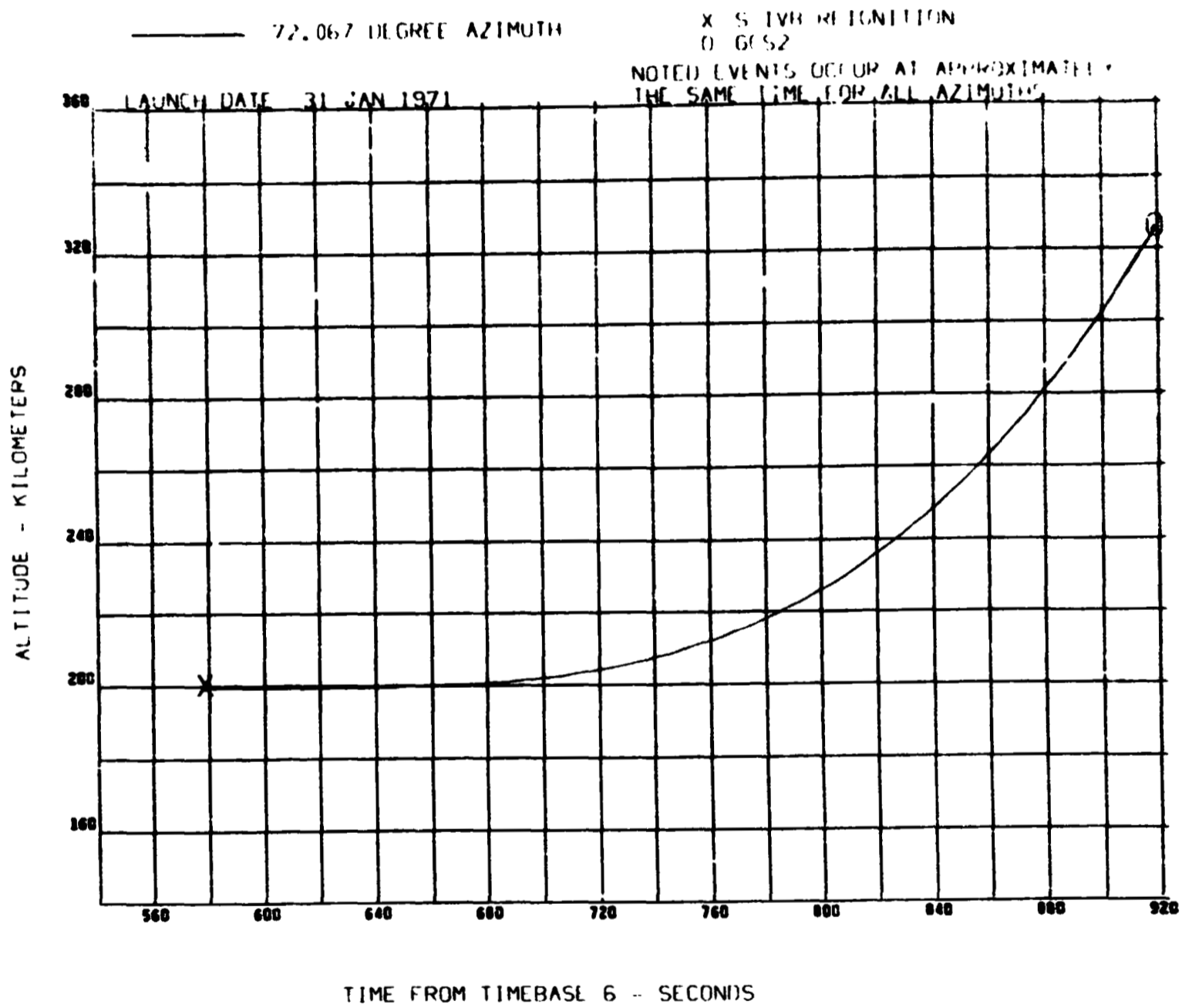


FIGURE 31 ALTITUDE VERSUS TIME DURING S-IVB  
 SECOND BURN (SECOND OPPORTUNITY)

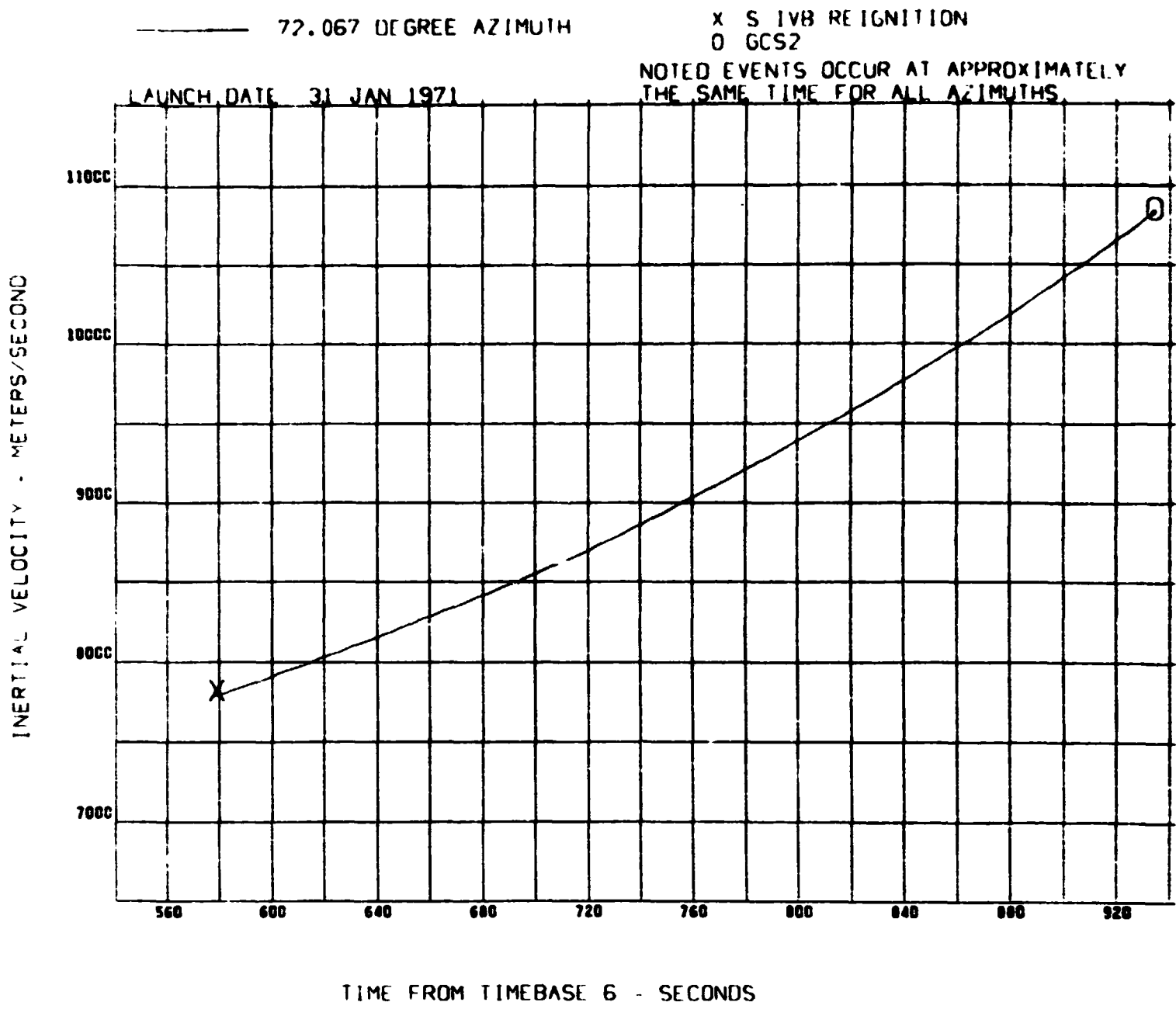


FIGURE 32 INERTIAL VELOCITY VERSUS TIME DURING S-IVB  
 SECOND BURN (FIRST OPPORTUNITY)

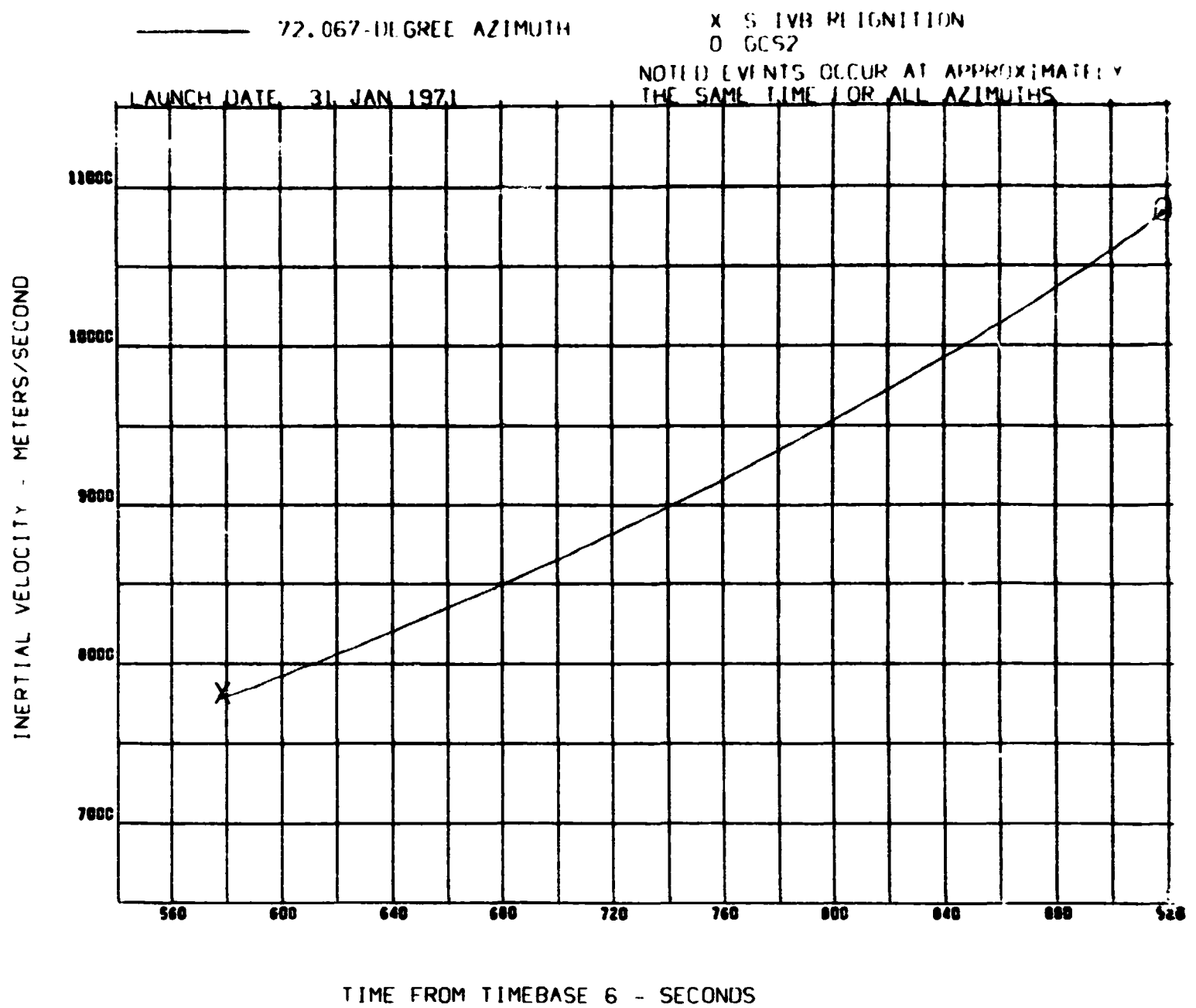


FIGURE 33 INERTIAL VELOCITY VERSUS TIME DURING S-IVB SECOND BURN (SECOND OPPORTUNITY)

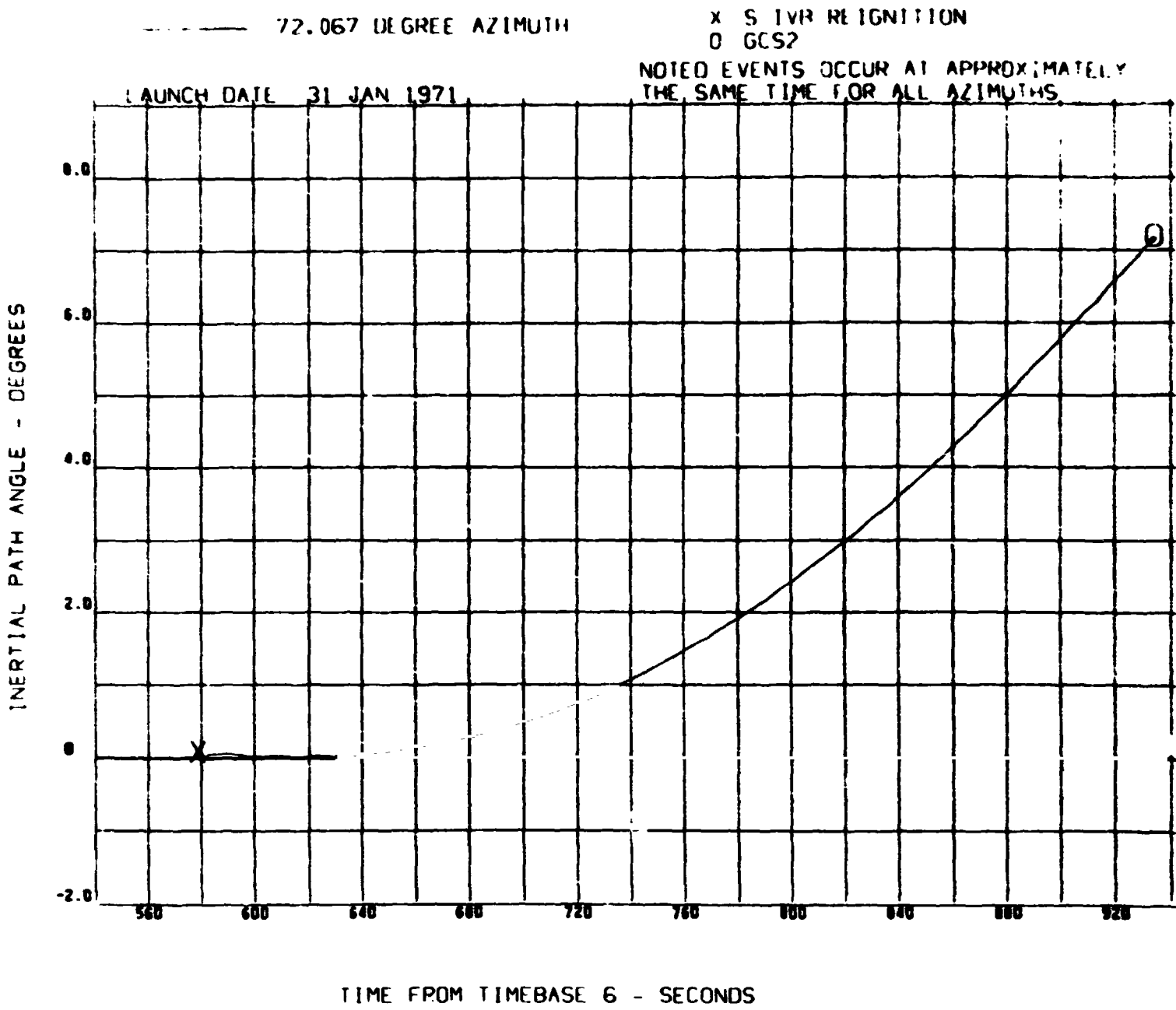


FIGURE 34 INERTIAL PATH ANGLE VERSUS TIME DURING S-IVB SECOND BURN (FIRST OPPORTUNITY)

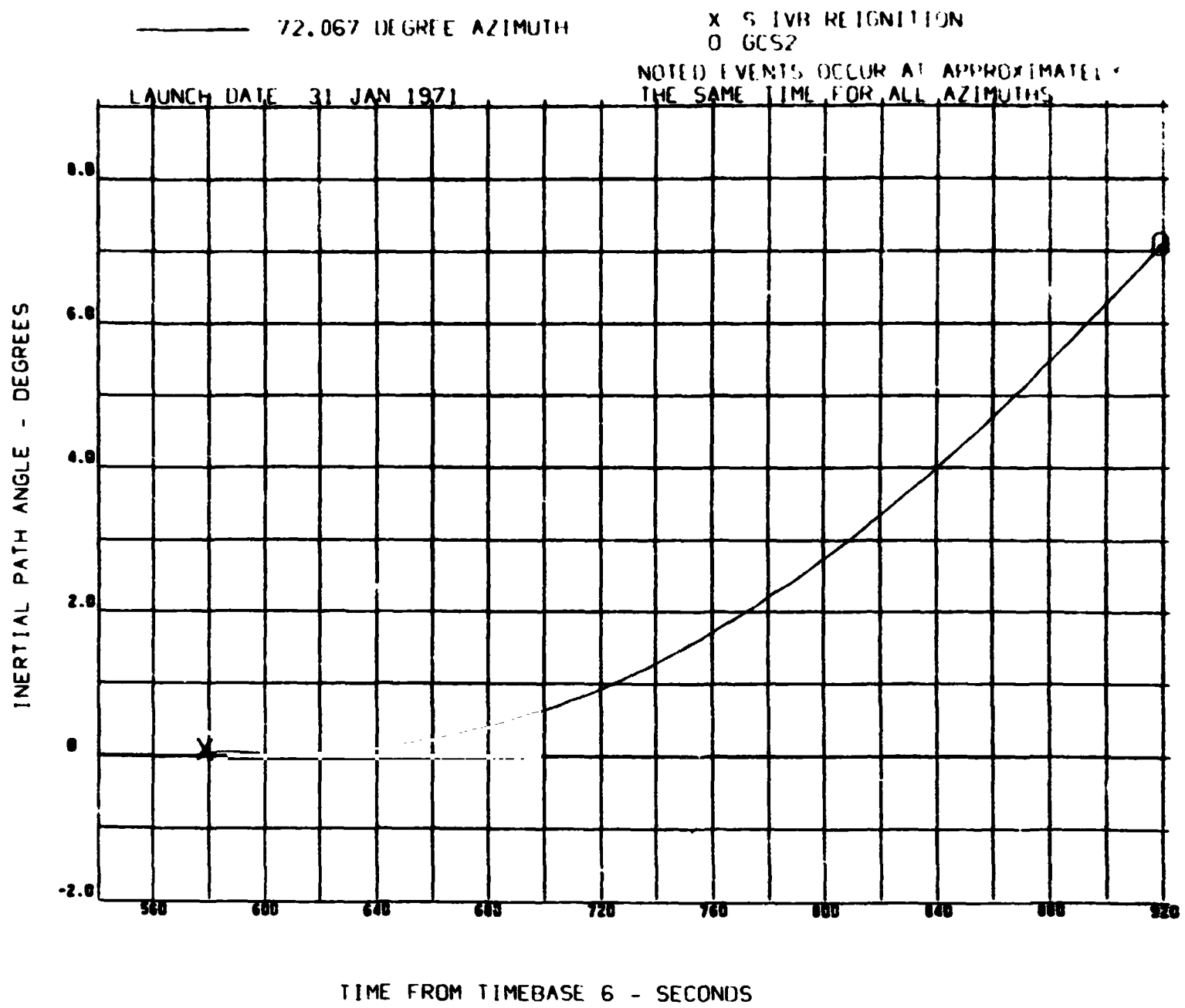


FIGURE 35 INERTIAL PATH ANGLE VERSUS TIME DURING  
 S-IVB SECOND BURST (SECOND OPPORTUNITY)



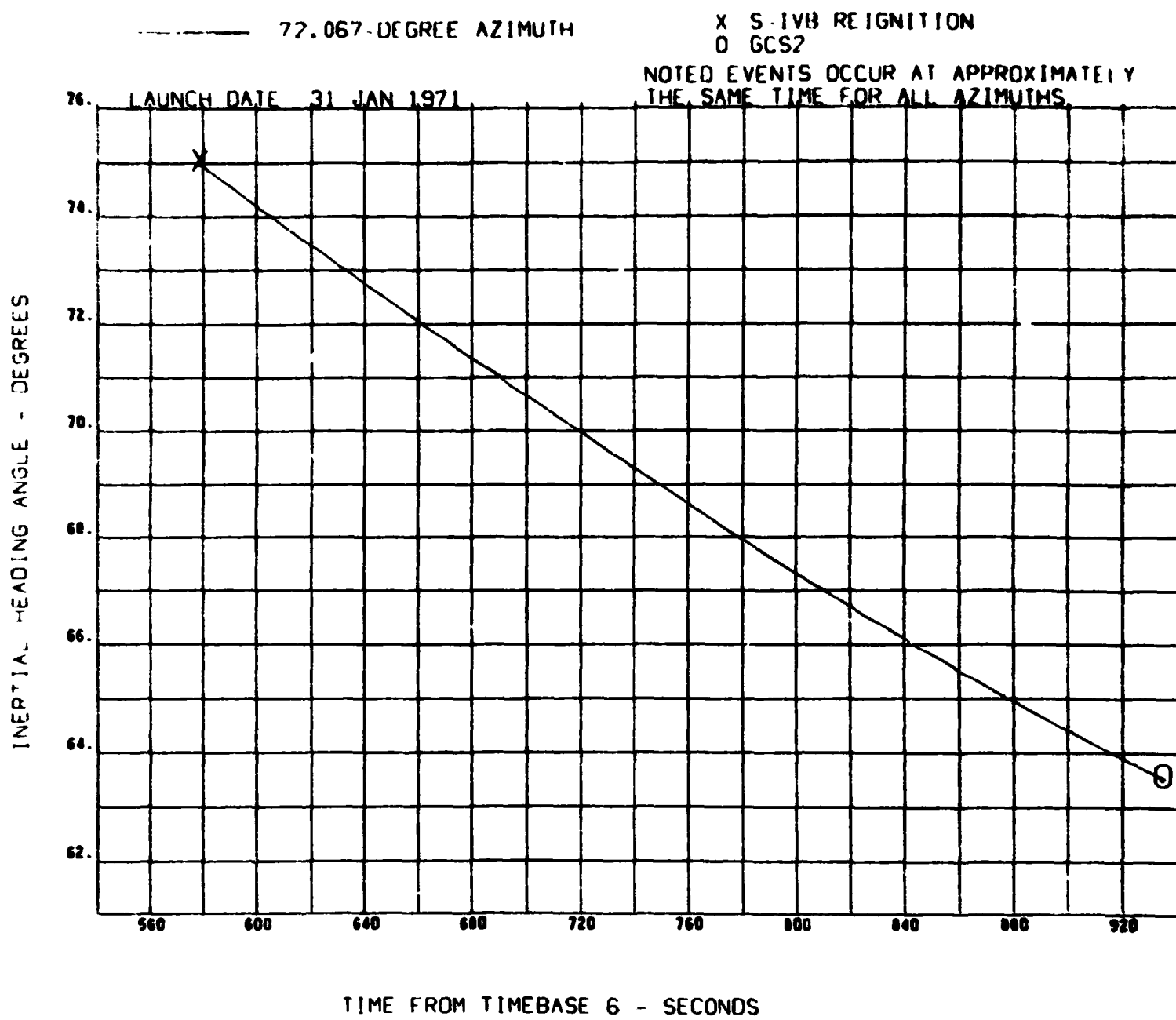


FIGURE 36 INERTIAL HEADING ANGLE VERSUS TIME DURING S-IVB SECOND BURN (FIRST OPPORTUNITY)

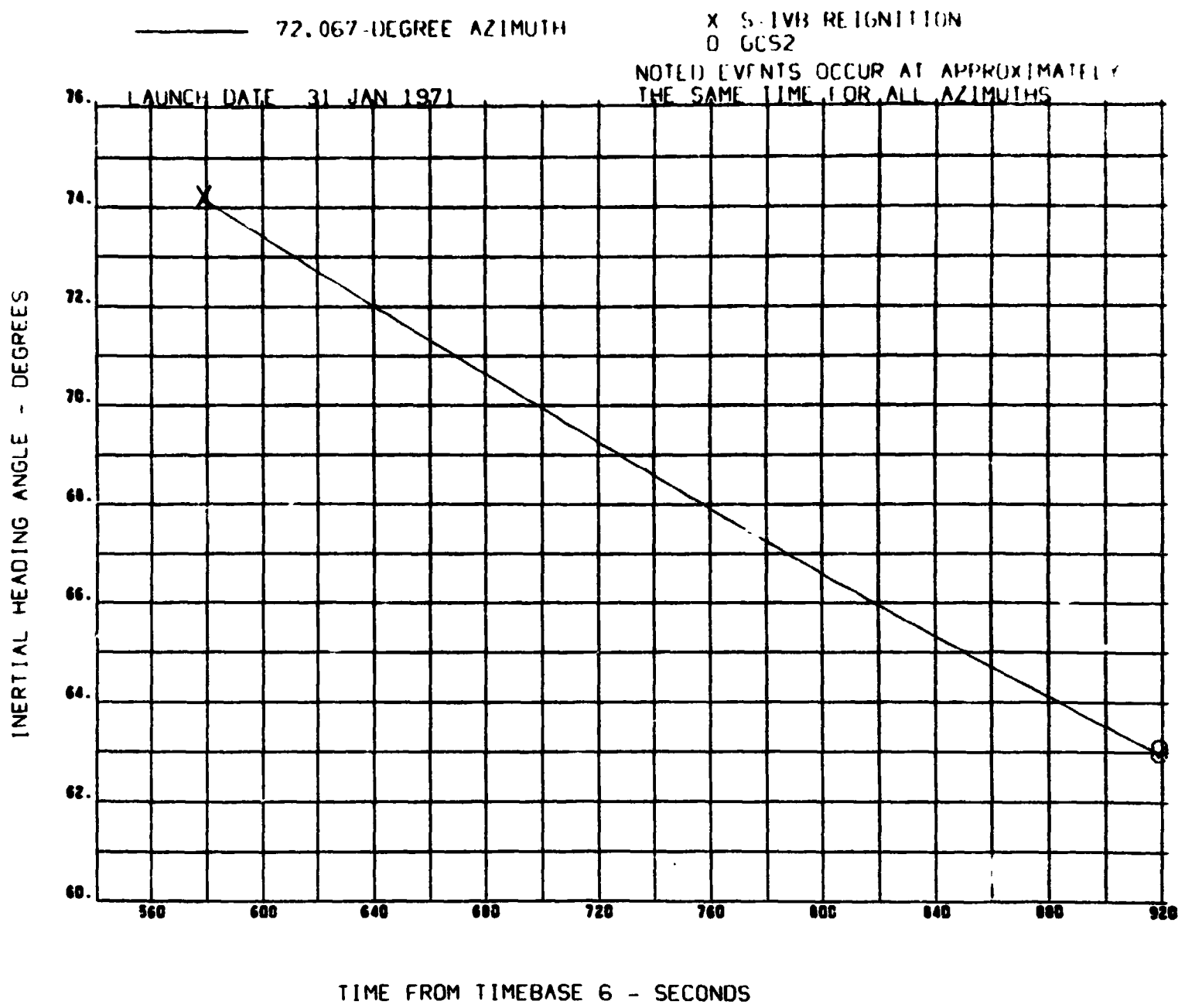


FIGURE 37 INERTIAL HEADING ANGLE VERSUS TIME DURING S-IVB SECOND BURN (SECOND OPPORTUNITY)

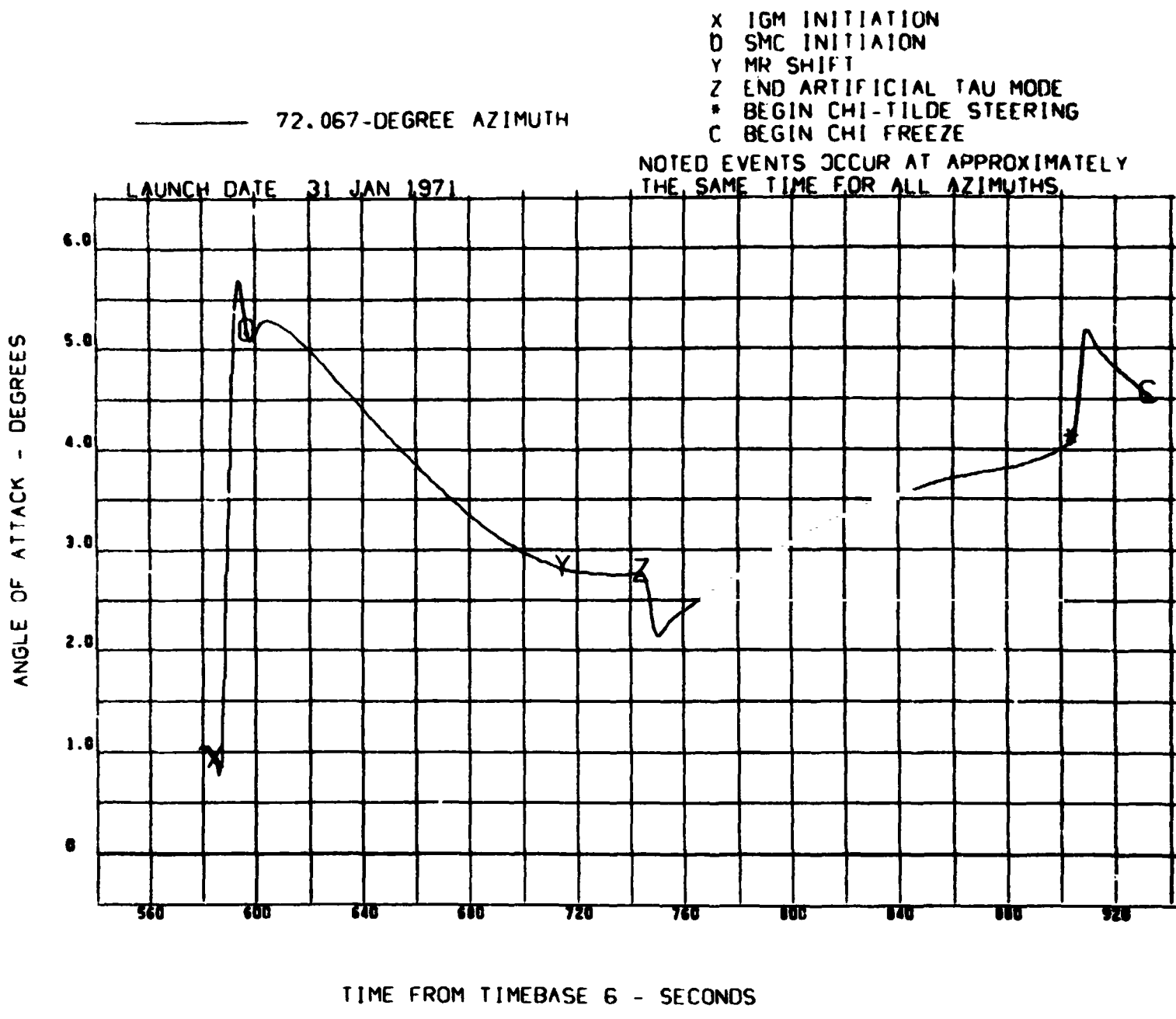


FIGURE 38 ANGLE OF ATTACK VERSUS TIME DURING S-IVB SECOND BURN (FIRST OPPORTUNITY)

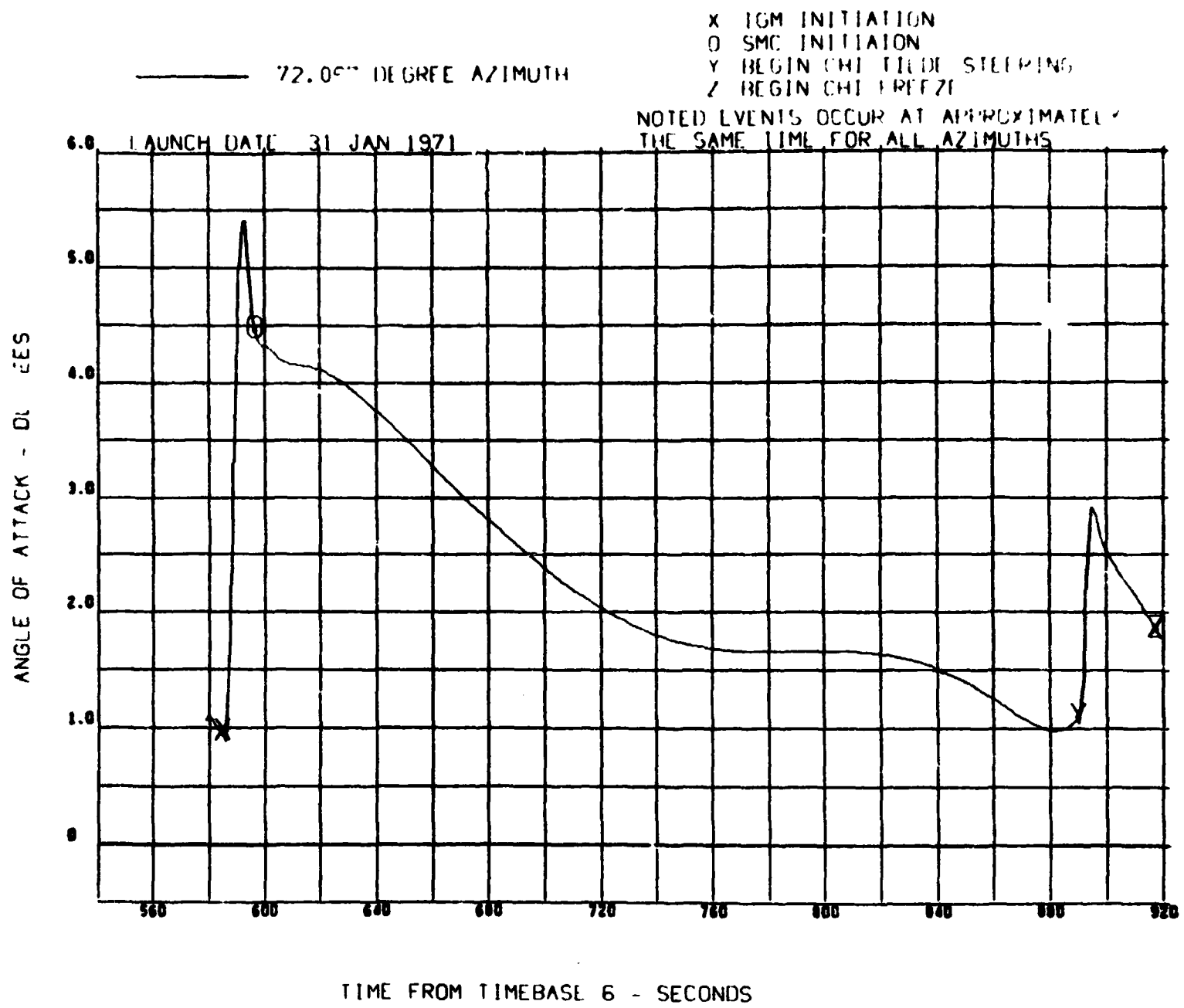


FIGURE 39 ANGLE OF ATTACK VERSUS TIME DURING S-IVB SECOND BURN (SECOND OPPORTUNITY)

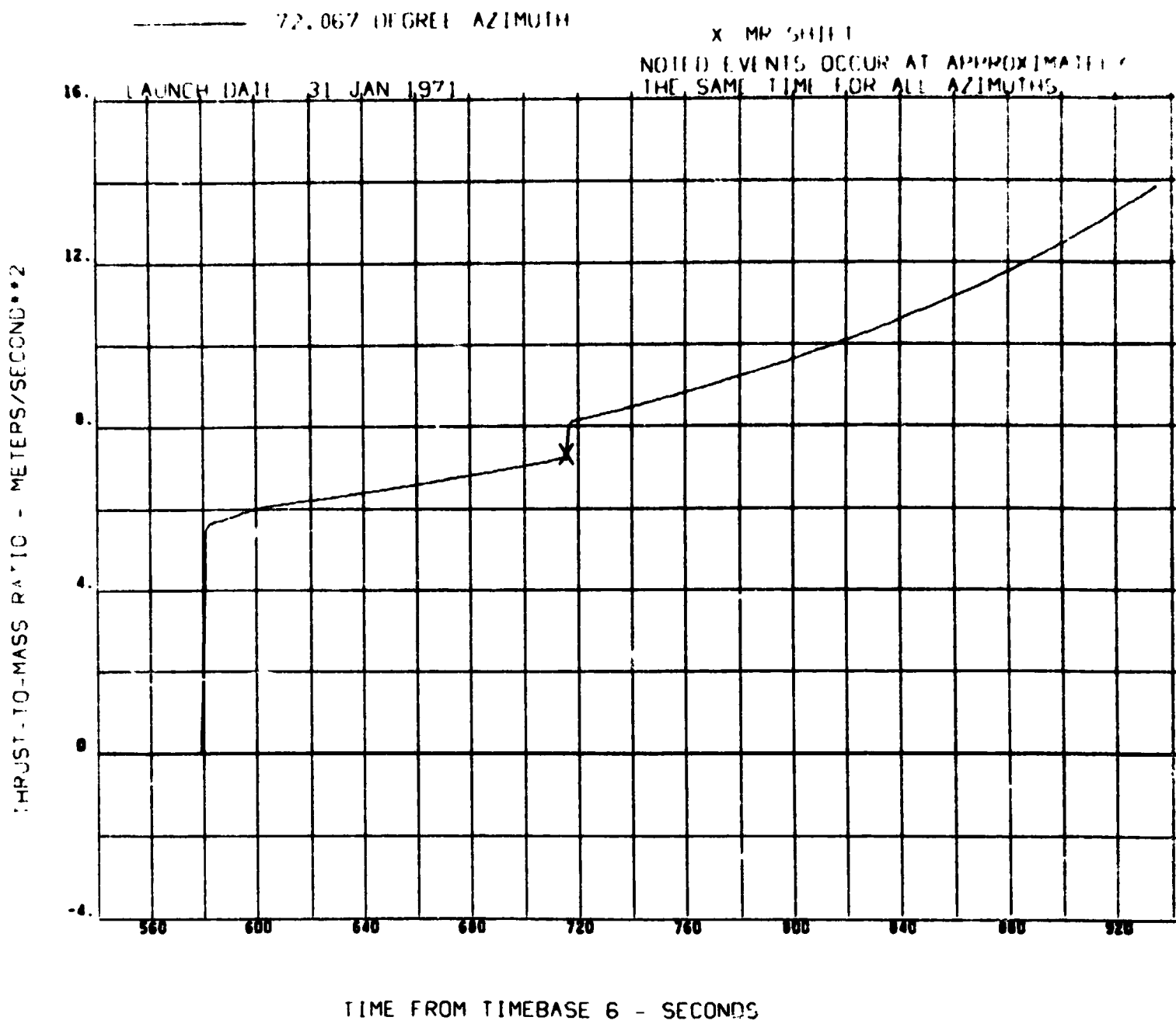


FIGURE 40 THRUST-TO-MASS RATIO VERSUS TIME DURING S-1VB SECOND BURN (FIRST OPPORTUNITY)

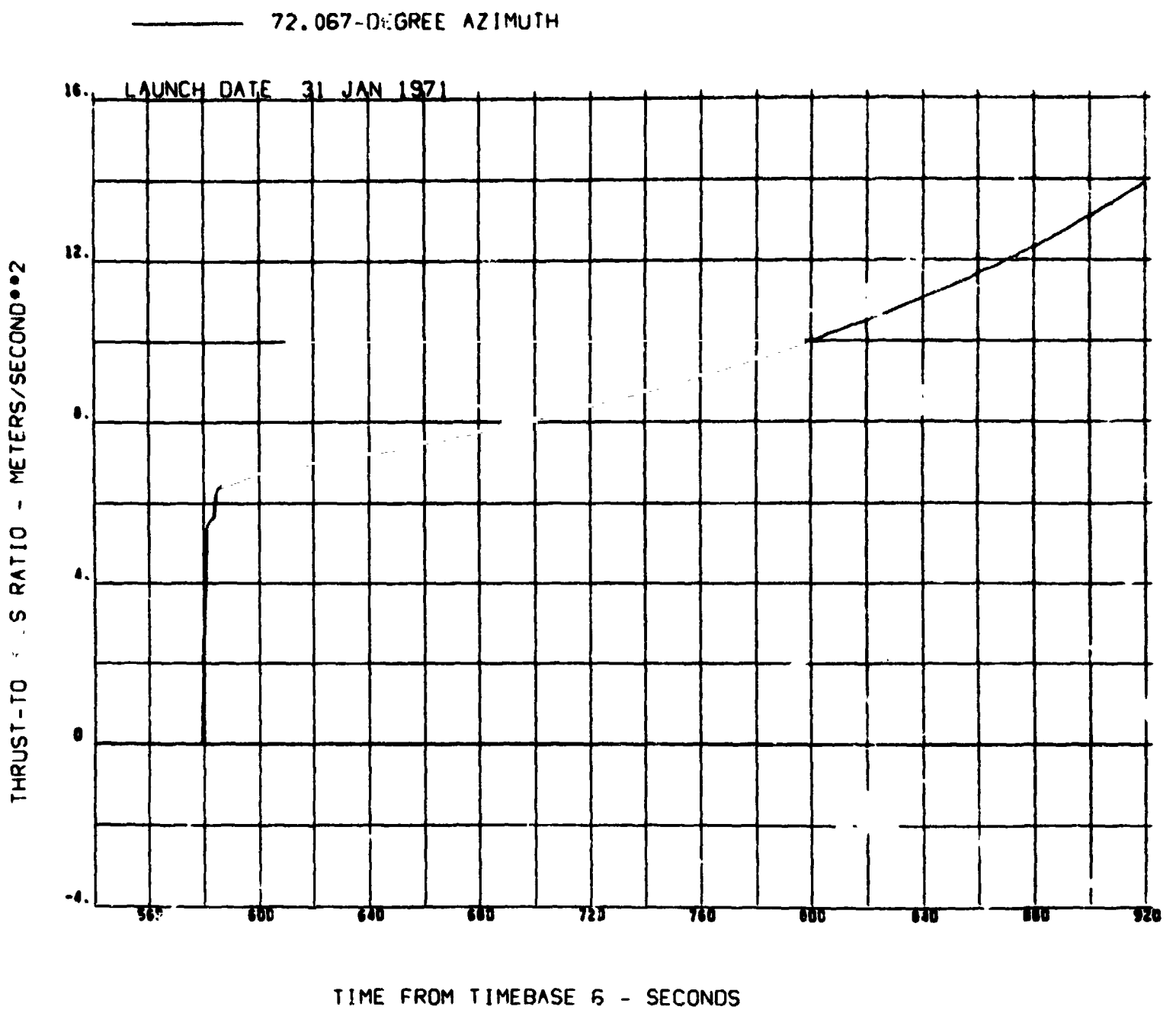


FIGURE 41 THRUST-TO-MASS RATIO VERSUS TIME DURING S-IVB SECOND BURN (SECOND OPPORTUNITY)

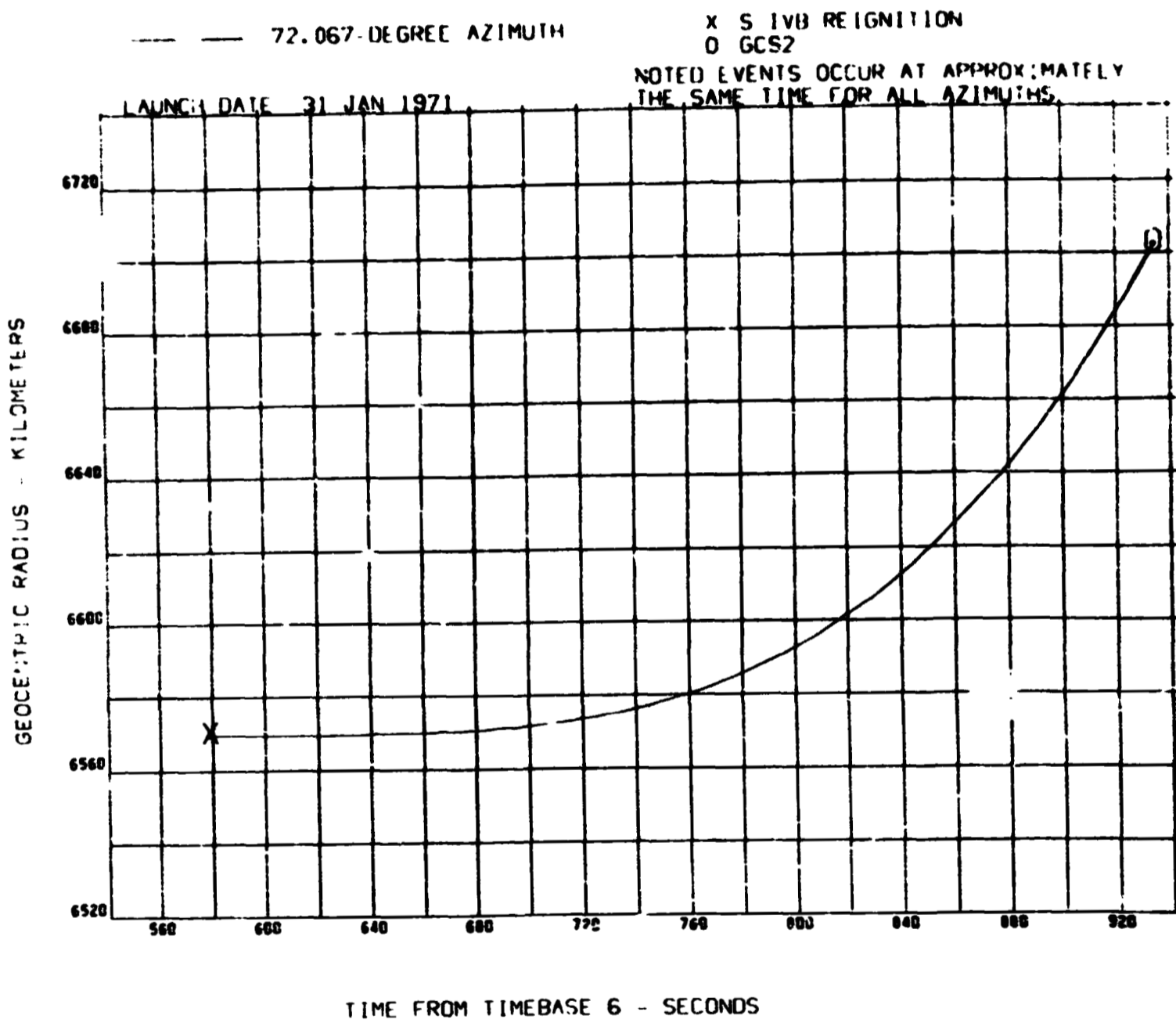


FIGURE 42 GEOCENTRIC RADIUS VERSUS TIME DURING S-IVB SECOND BURN (FIRST OPPORTUNITY)

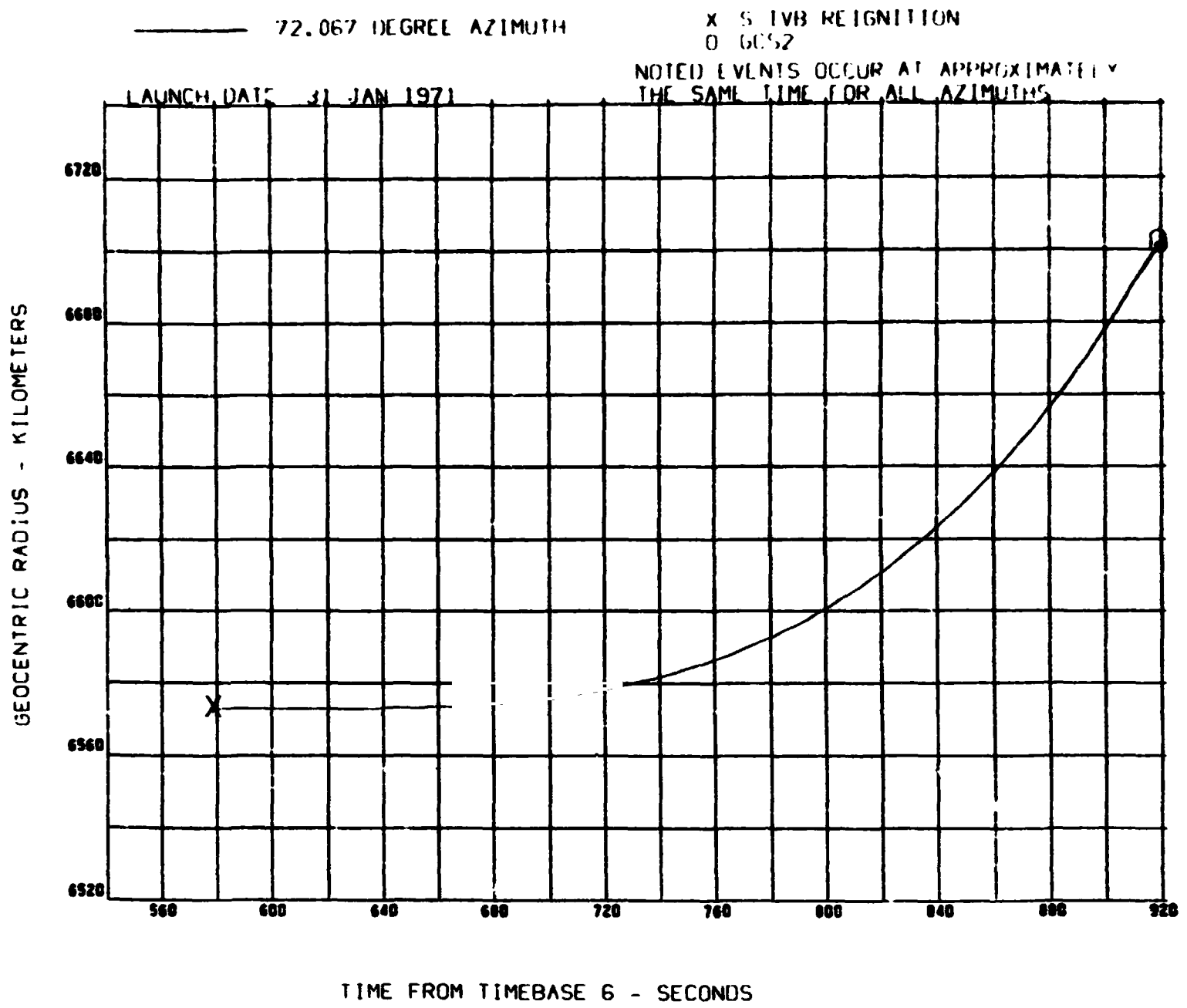


FIGURE 43 GEOCENTRIC RADIUS VERSUS TIME DURING S-IVB SECOND BURN (SECOND OPPORTUNITY)



----- FIRST OPPORTUNITY  
----- SECOND OPPORTUNITY

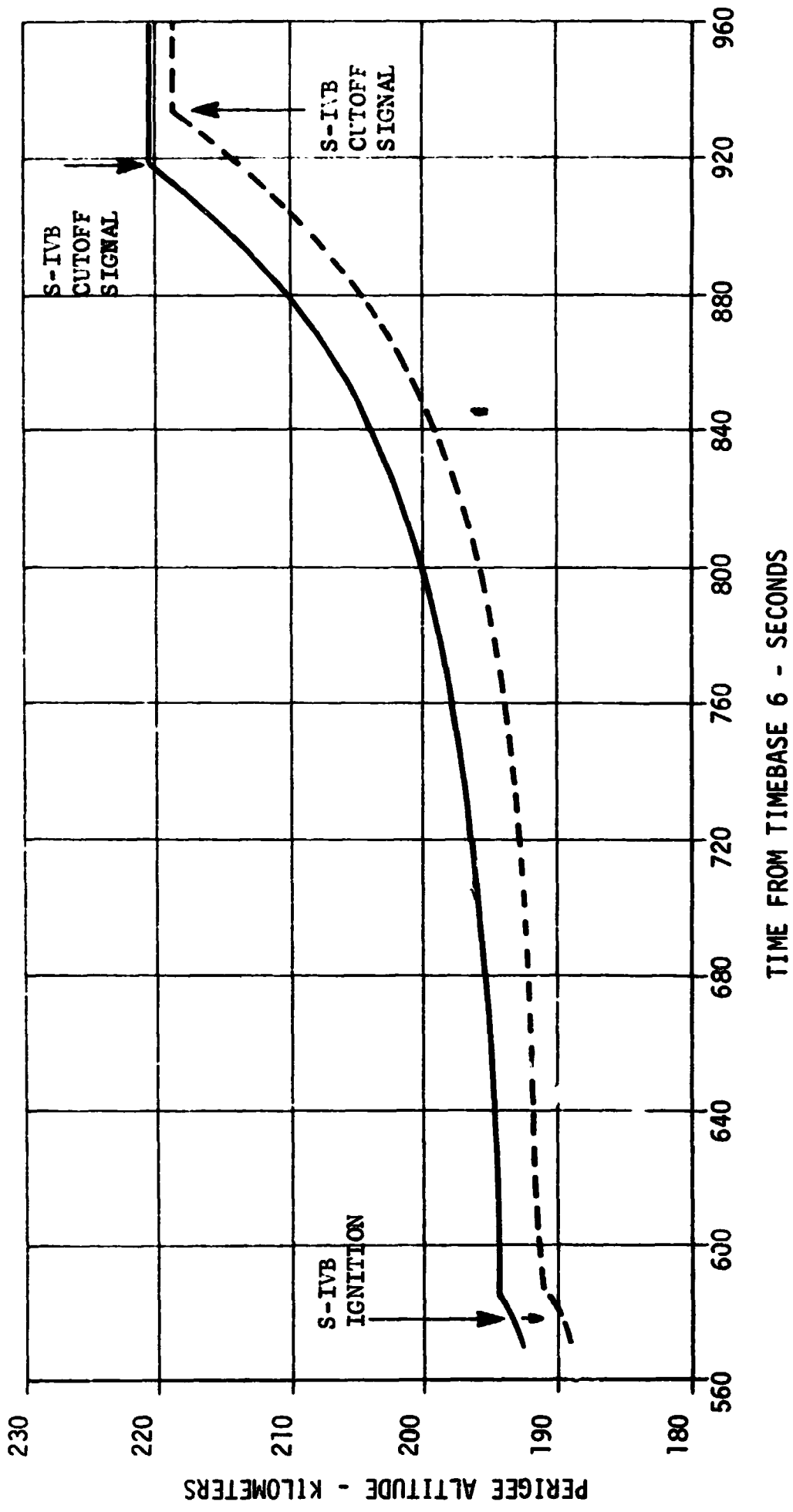


FIGURE 44 . S-IVB INSTANTANEOUS PERIGEE ALTITUDE DURING SECOND BURN

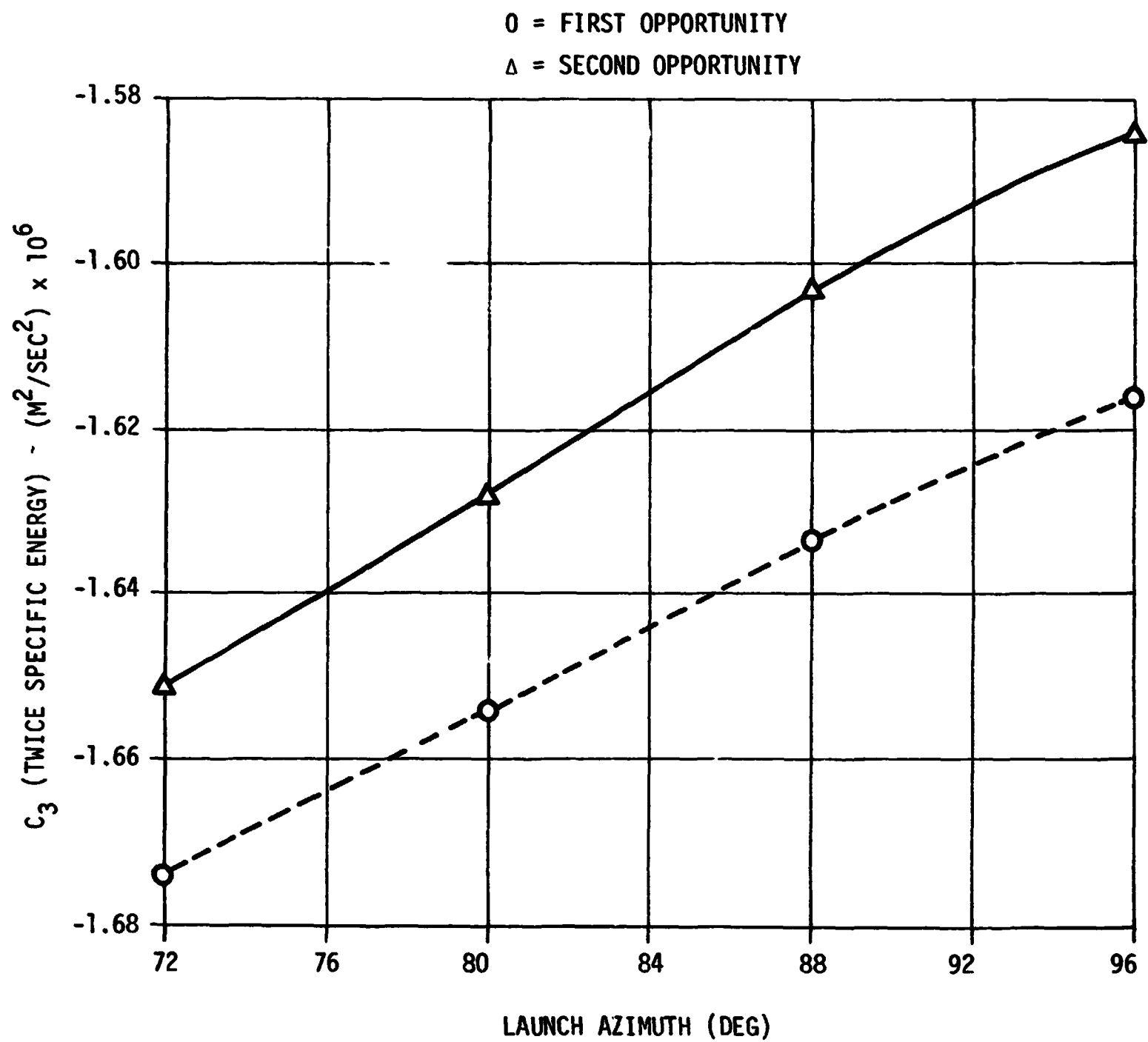


Figure 45 TRANSLUNAR ORBIT  $C_3$  VARIATION FOR 31 JANUARY 1971 LAUNCH WINDOW

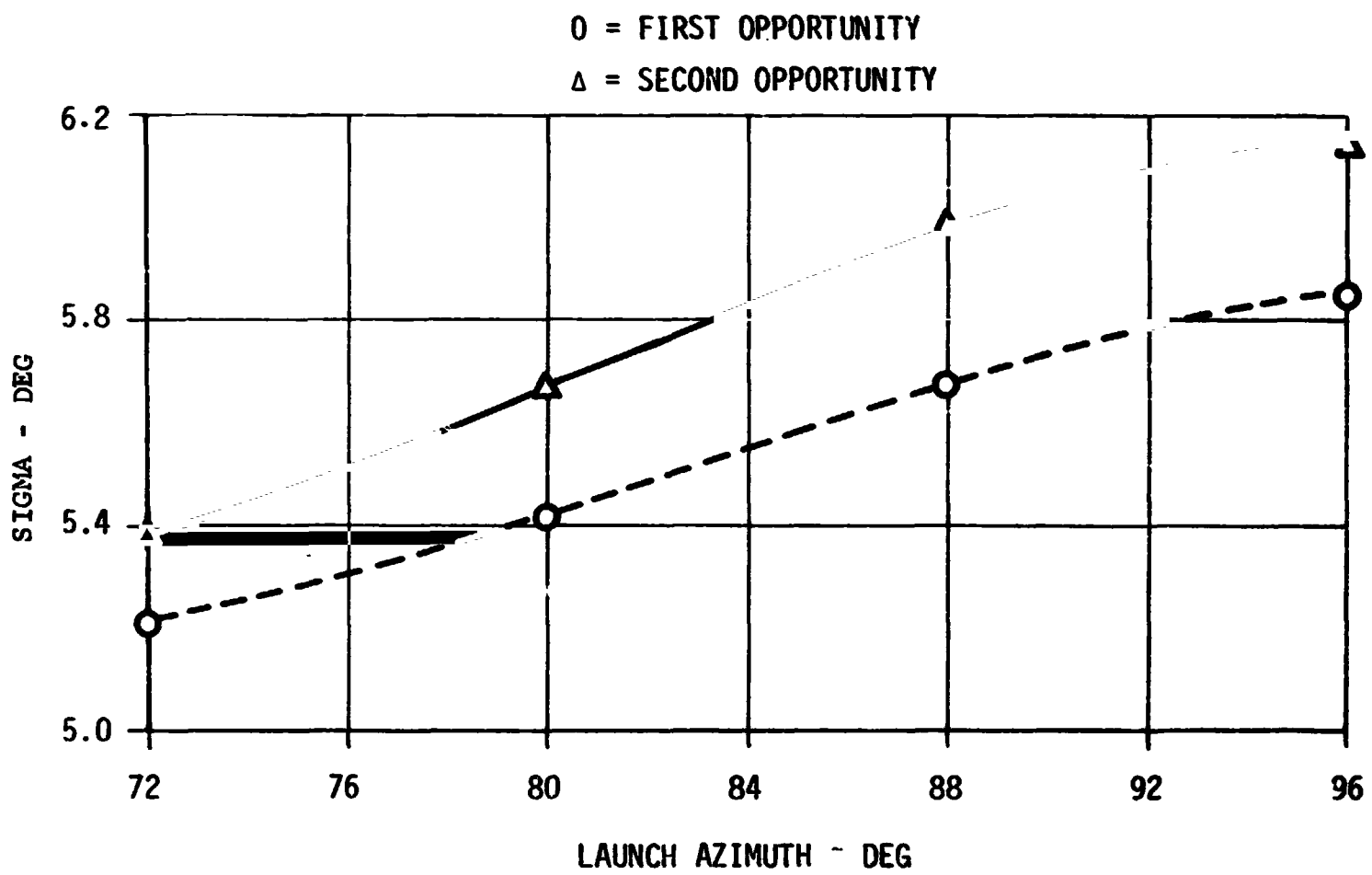


FIGURE 46 SIGMA VARIATION FOR 31 JANUARY 1971 LAUNCH WINDOW

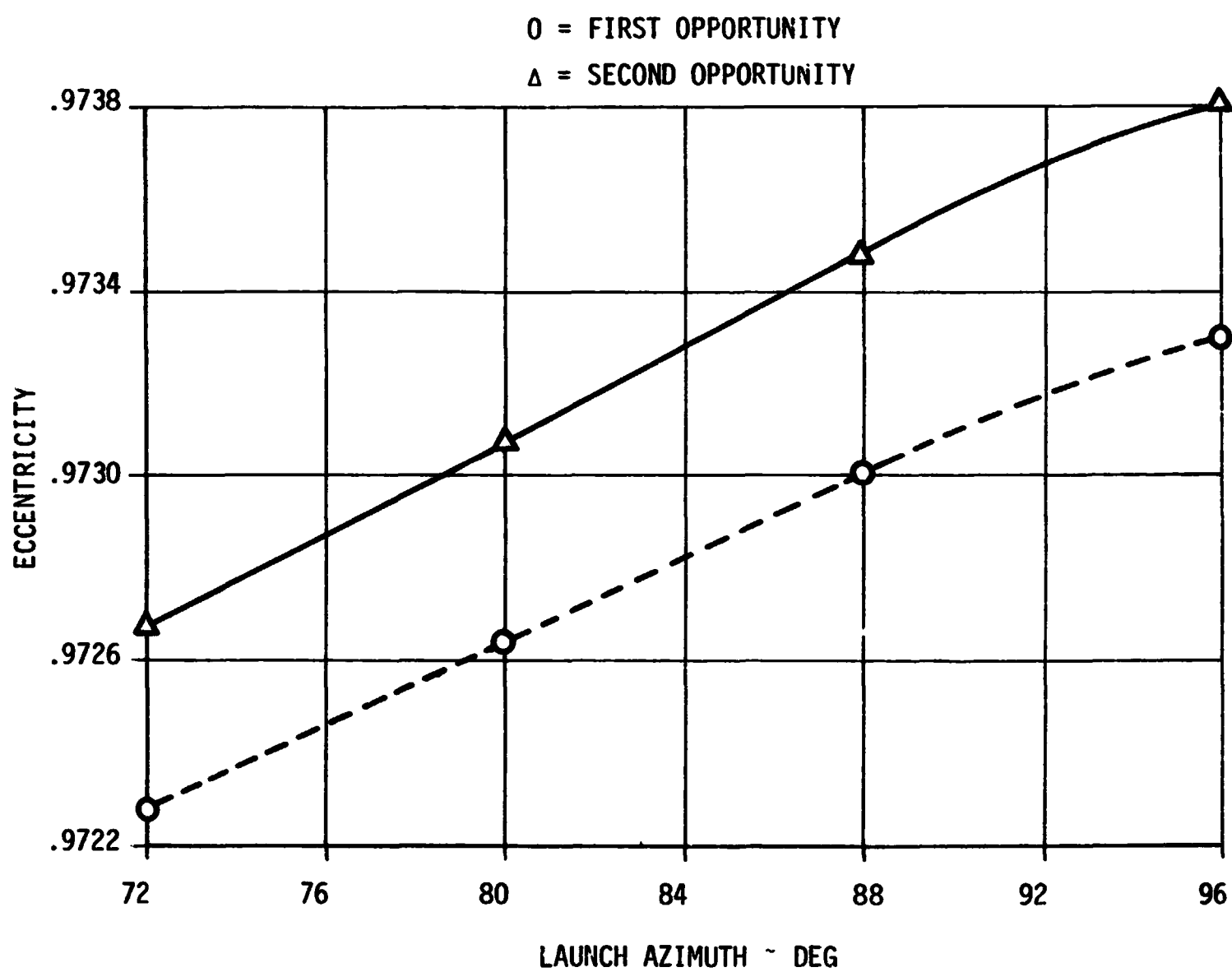


Figure 47 TRANSLUNAR ORBIT ECCENTRICITY VARIATION FOR 31 JANUARY 1971 LAUNCH WINDOW

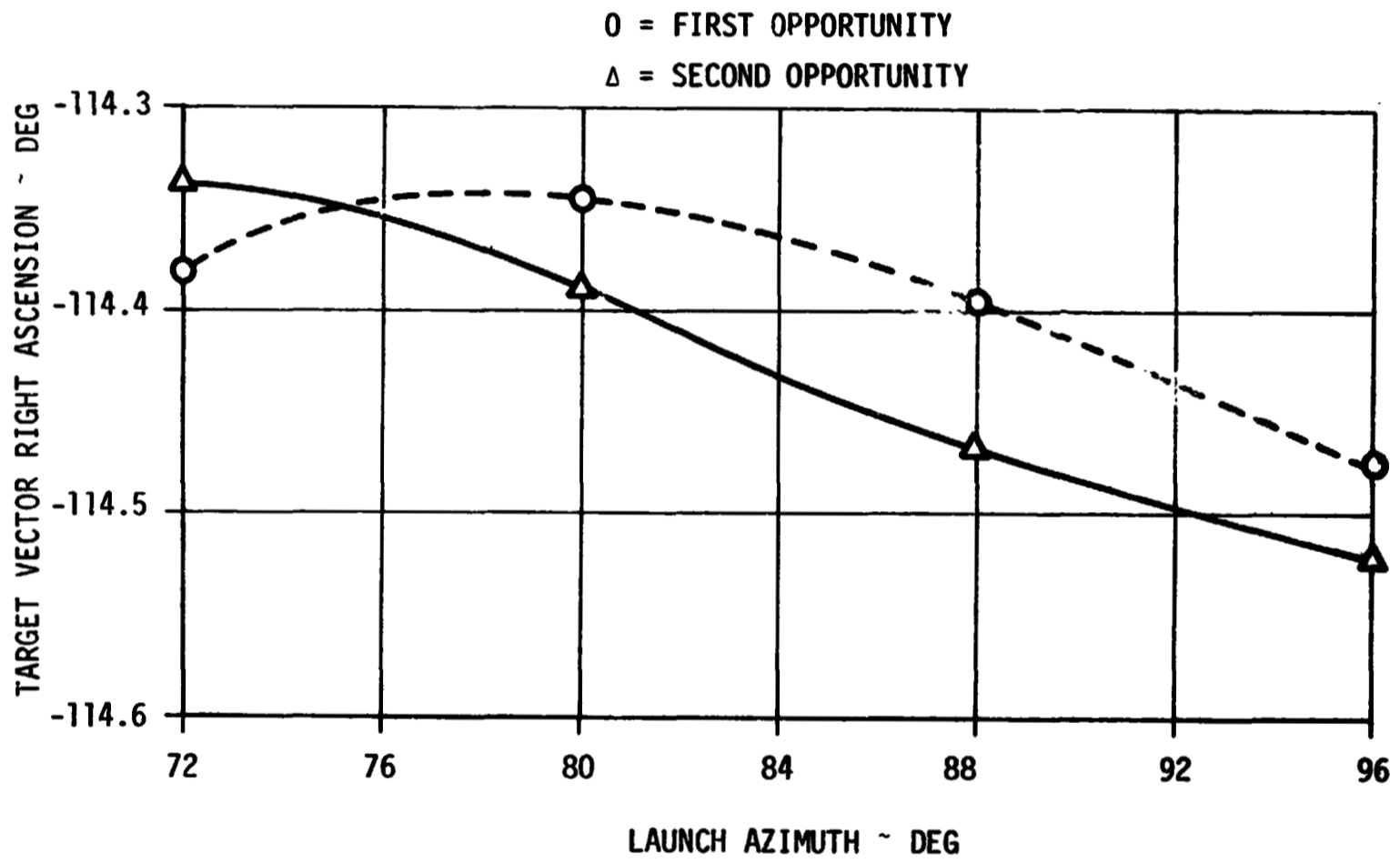


Figure 48 TARGET VECTOR RIGHT ASCENSION FOR 31 JANUARY 1971 LAUNCH WINDOW

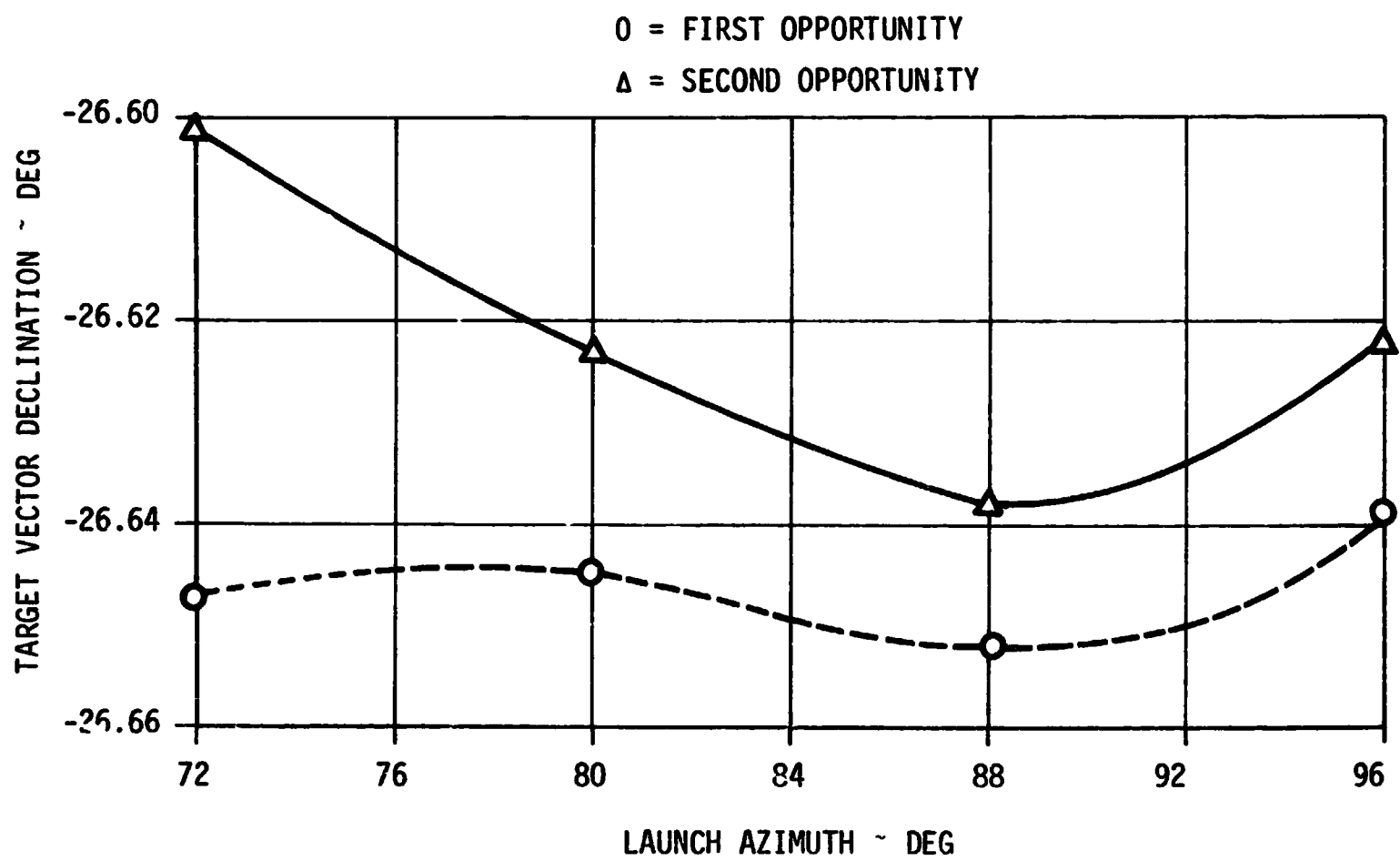


Figure 49 TARGET VECTOR DECLINATION FOR 31 JANUARY 1971 LAUNCH WINDOW

TABLE 13

TRANSLUNAR MIDCOURSE VELOCITY SUMMARY

The values shown here are the midcourse velocities required to return a probe to a nominal free return objective supplied by MSC. The midcourse is applied at TB7 + 9 hours.

<u>Azimuth Deg</u>	<u>First Opportunity M/Sec</u> ( <u>Ft/Sec</u> )	<u>Second Opportunity M/Sec</u> ( <u>Ft/Sec</u> )
72.067	.56 (1.82)	1.11 (3.64)
80.008	.48 (1.57)	1.05 (3.45)
88.030	.21 (.69)	.74 (2.44)
95.998	.27 (.89)	.57 (1.87)

#### SECTION IV: PROPULSION AND MASS CHARACTERISTICS

Propulsion characteristics used in this analysis for the S-IC, S-II, and S-IVB stages were obtained from References 15 and 21. Total mainstage thrust profiles for these stages are presented in Figures 50 through 54. Specific propulsion parameters that are necessary for stage performance comparisons are presented in Table 14.

Thrust histories during S-IC/S-II and S-II/S-IVB staging events are presented in Figures 55 and 56. The data of these figures provide a composite history of mainstage thrust decay, ullage thrust, and mainstage thrust buildup. Thrust histories for first and second burn S-IVB thrust decay, the S-IVB restart sequence, and S-IVB thrust buildup after reignition are presented in Figures 57 through 60.

AS-509 launch vehicle mass characteristics were simulated using data contained in Reference 14. The simulated mass history at key events during the mission is presented in Table 16.



TABLE 14 AS-509 PROPULSION PARAMETERS

The S-IC thrust, referenced to sea-level atmospheric pressure, is averaged over the time interval from first motion to the nearest integer second before center engine cutoff to obtain the average thrust. The thrust is averaged at the intervals that appear on the nominal S-IC propulsion tape. The sea-level turbine exhaust at first motion is also used in the average. The average flow rate is based on the weight difference between first motion and the nearest integer second before center engine cutoff, minus any auxiliary weight loss during this period.

The S-II propulsion parameters are averaged over the following intervals:

- a. S-II mainstage thrust to S-II outboard engine cutoff.
- b. S-II mainstage thrust to mainstage thrust + 294.6 seconds.
- c. S-II mainstage thrust to mainstage thrust + 335.0 seconds.
- d. S-II mainstage thrust + 336. seconds to outboard engine cutoff.

Then the vacuum thrust levels are averaged at the intervals that appear on the nominal propulsion tapes for the periods specified above. The S-II average flow rate is calculated in the same manner as the S-IC stage.

The S-IVB propulsion parameters are averaged over the following intervals:

- a. S-IVB 1st burn : mainstage thrust to S-IVB GCS1
- b. S-IVB 2nd burn, 1st opportunity
  1. Mainstage thrust to S-IVB 2nd guidance cutoff signal.
  2. Mainstage thrust to mainstage thrust + 135.0 seconds.
  3. Mainstage thrust + 136.0 seconds to S-IVB 2nd guidance cutoff signal.
- c. S-IVB 2nd burn, 2nd opportunity : mainstage thrust to S-IVB 2nd guidance cutoff signal.

The S-IVB vacuum thrust levels are averaged at the intervals that appear on the nominal propulsion tapes for the periods specified above. The S-IVB average flow rate is calculated in the same manner as the S-IC stage.

TABLE 14 AS-509 PROPULSION PARAMETERS (CONTINUED)

Stage	Time Interval Sec	Avg. Thrust Nwt (lbs)	Avg. Flow Rate Kg/Sec (lbs/sec)	Specific Impulse Sec	Total Impulse Nt-Sec (lb-sec)
S-IC*	0.0 - 135.	33,996,295.*** (7,642,674.)	13,069.7 (2,913.7)	265.24	4,589,499,825. (1,031,760,990.)
S-II**	0.0 - 387.45	4,783,540. (1,075,383.)	1,150.2 (2,535.7)	424.10	1,853,382,573. (416,657,143.)
S-III**	0.0 - 294.6	5,174,370. (1,163,245.)	1,241.4 (2,736.9)	425.02	1,524,369,462. (342,691,977.)
S-III**	0.0 - 305.0	5,103,959. (1,147,416.)	1,233.0 (2,718.3)	422.11	1,556,707,495. (349,961,880.)
S-III**	306. - 387.45	3,548,083. (797,841.)	843.8 (1,860.2)	428.90	288,991,360. (64,984,149.)
S-IVB** (1st Burn)	0.0 - 140.10	884,626. (198,872.)	211.6 (466.6)	426.22	123,936,102. (27,861,967.)
S-IVB** (2nd Burn, 1st Opp)	0.0 - 353.20	847,595. (190,547.)	202.0 (445.3)	427.91	299,370,554. (67,301,200.)
S-IVB** (2nd Burn, 1st Opp)	0.0 - 135.0	789,096. (177,396.)	186.9 (412.1)	430.47	106,527,960. (23,948,460.)

\* Referenced to Patrick Air Force Base sea-level pressure (10 kg-m<sup>2</sup>)

\*\* Referenced to vacuum pressure 0 time is mainstage thrust point.

\*\*\* Composed of 7,585,794. lbs - average sea level thrust (five F-1 engines)  
56,880. lbs - exhaust thrust at first motion (five turbines)

TABLE 14 AS-509 PROPULSION PARAMETERS (CONTINUED)

Stage	Time Interval Sec	Avg. Thrust Nwt (lbs)	Avg. Flow Rate Kg/Sec (lbs/sec)	Specific Impulse Sec	Total Impulse Nt-Sec (lb-sec)
S-IVB** (2nd Burn, 1st Opp)	136. - 353.20	884,386. (198,818.)	211.4 466.1	426.56	192,088, 39. (43,183,270.)
S-IVB** (2nd Burn, 2nd Opp)	0.0 - 337.70	883,590. (198,639.)	211.4 (466.0)	426.26	298,388,343. (7,080,390.)

\*\* Referenced to vacuum pressure 0 time 's mainstage thrust point.

TABLE 14 AS-509 VEHICLE PROPULSION PARAMETERS (CONTINUED)

Stage	Stage Time Interval sec	Average Flow Rate kg/sec (lb/sec)	Weight Loss kg (lb)	Total Impulse nt-sec (lb-sec)
S-IVB (1st Burn)	C. O. to E. T. D.	30.436 (67.778)	Decay 37.2 (82.0) Prop. Loss 18.1 (40.0)	211,557. (47,560.)
S-IVB (2nd Burn, 1st Opp)	TB6 - TB6 + 570.0	0.050 (0.110)	H <sub>2</sub> Vent 2.9 (6.4) O <sub>2</sub> /H <sub>2</sub> Burner 7.3 (16.0) APS 18.1 (40.0)	111,280. (25,017.)
S-IVB (2nd Burn, 2nd Opp)	TB6 - TB6 + 570.0	0.049 (0.108)	H <sub>2</sub> Vent 2.6 (5.8) O <sub>2</sub> /H <sub>2</sub> Burner 7.3 (16.0) APS 18.1 (40.0)	110,830. (24,916.)
S-IVB (2nd Burn, 1st Opp)	TB6 + 570. - TB6 + 578.0 *LTI to Ignition	1.247 (2.750)	10.0 (22.0)	30,312. (6,814.)
S-IVB (2nd Burn, 2nd Opp)	TB6 + 570. - TB6 + 578.0 *LTI to Ignition	1.247 (2.750)	10.0 (22.0)	30,312. (6,814.)
S-IVB (2nd Burn, 1st Opp)	TB6 + 578. - TB6 + 580.5 Ignition to Mainstage	61.144 (134.800)	151.0 (333.0) Start Tank 1.8 (4.0)	784,776. (176,425.)

\*LTI: Lead Thrust Initiate

TABLE 14 AS-509 VEHICLE PROPULSION PARAMETERS (CONTINUED)

Stage	Stage Time Interval sec	Average Flow Rate kg/sec (lb/sec)	Weight Loss kg (lb)	Total Impulse nt-sec (lb-sec)
S-IVB (2nd Burn, 2nd Opp)	TB6 + 578. - TB6 + 580.5 Ignition to Mainstage	60.963 (134.400)	Mainstage 150.6 (332.0) Start Tank 1.8 (4.0)	784,776. (176,425.)
S-IVB (2nd Burn, 1st Opp)	C. O. to T. D.	29.231 (64.444)	Decay 34.5 76.0 Prop. Loss 18.1 (40.0)	209,734. (47,150.)
S-IVB (2nd Burn, 2nd Opp)	C. O. to E. T. D.	30.491 (67.222)	Decay 36.7 (81.0) Prop. Loss 18.1 (40.0)	209,778. (47,160.)
S-IVB (2nd Burn, Both Opps)	TB7 + .5 - TB7 + 150.9 LH2 Vent, Post TLI	.522 (1.151)	H2 Vent 78.5 And NPV (173.0)	21,556. (4,846.)

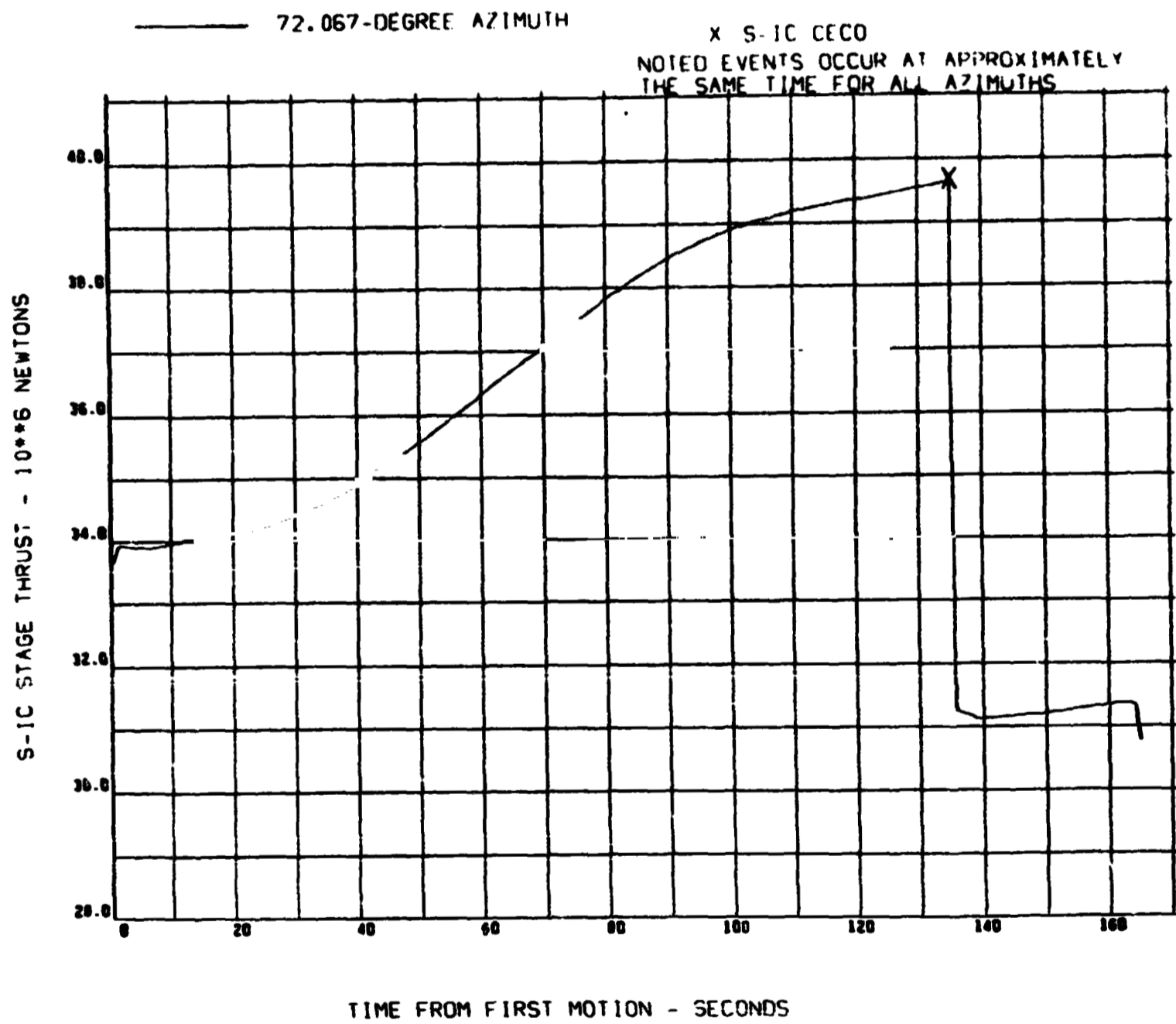


FIGURE 50 S-IC STAGE THRUST HISTORY

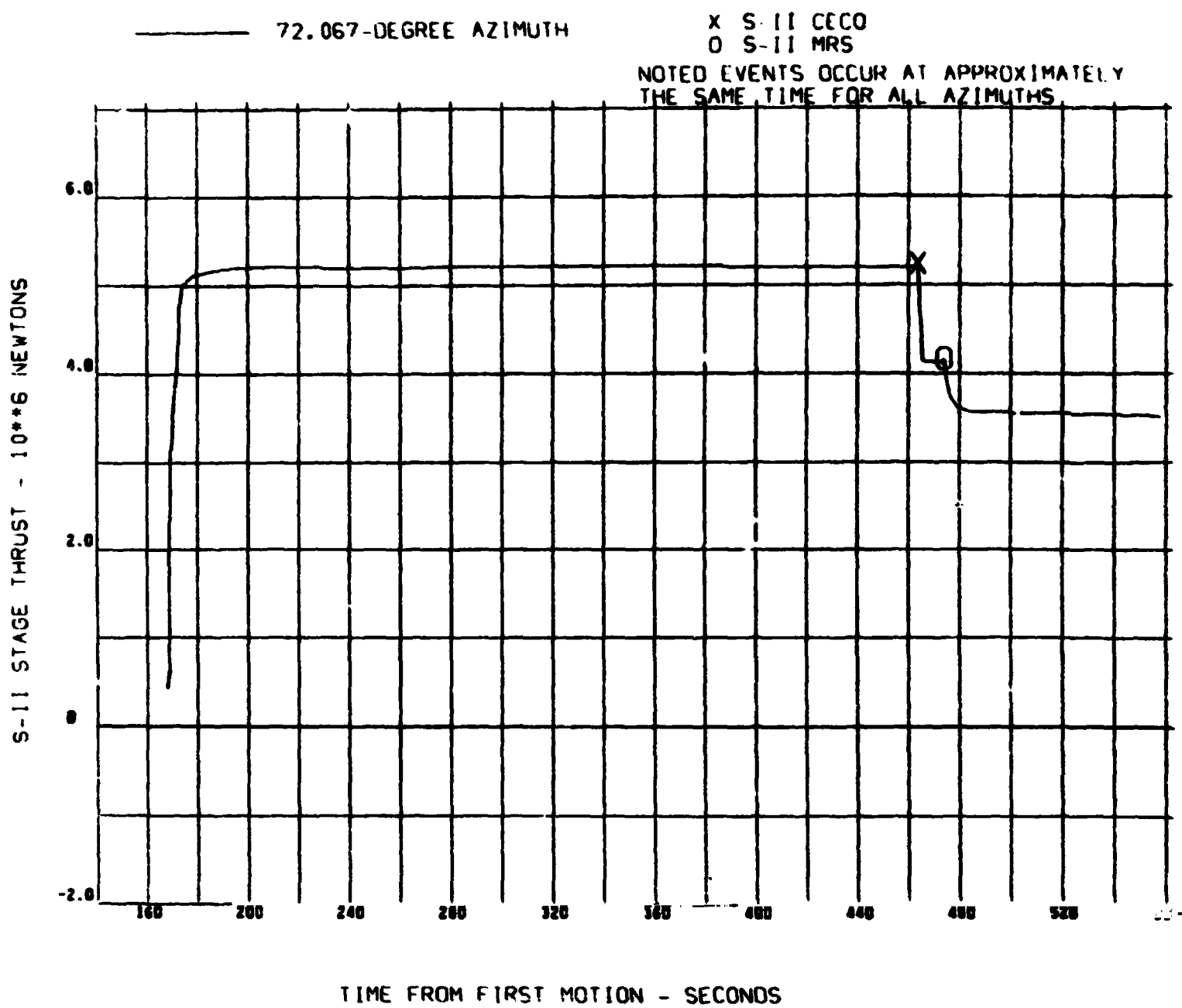


FIGURE 51 S-II STAGE THRUST HISTORY

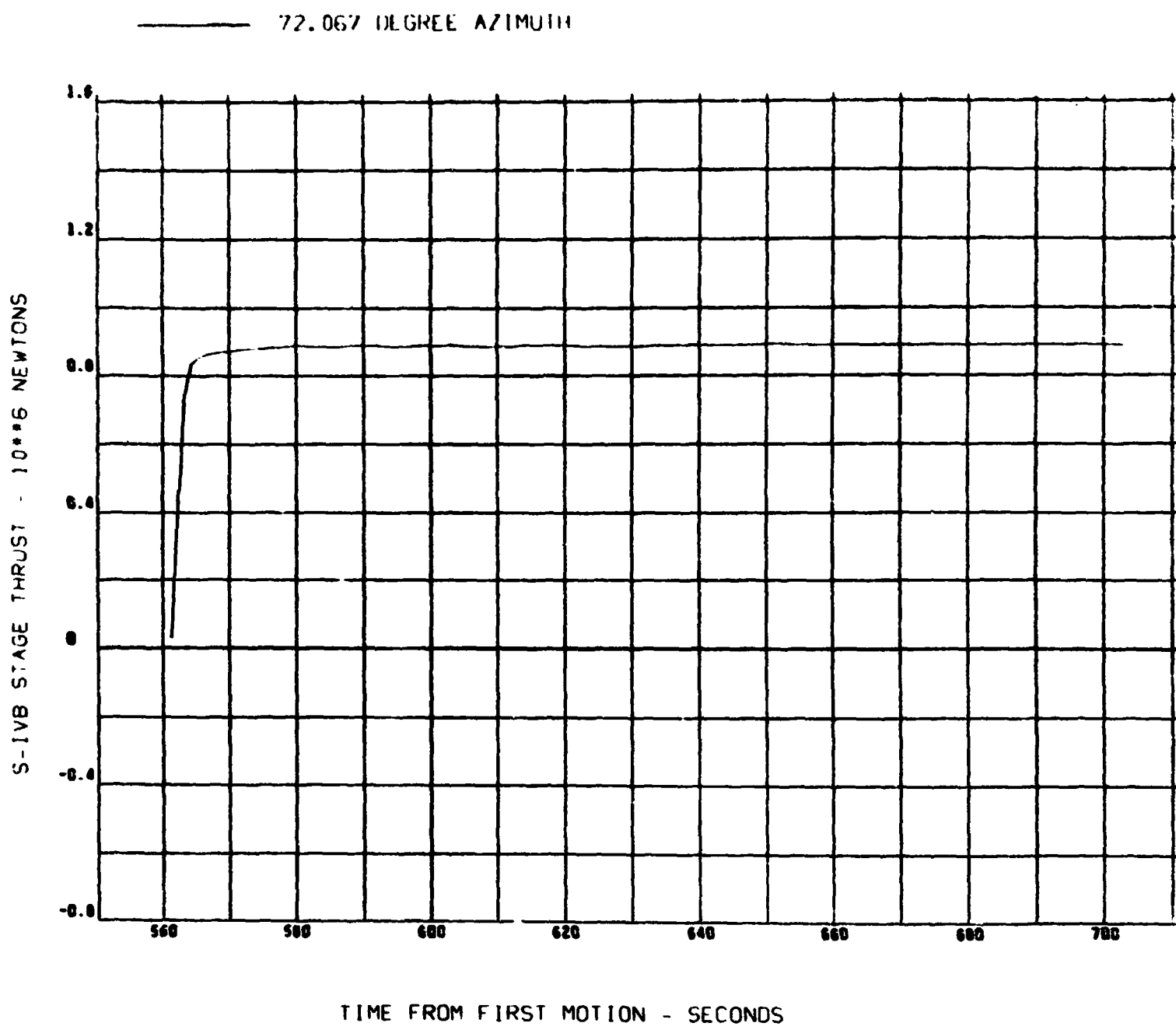


FIGURE 52 S-IVB STAGE THRUST HISTORY (FIRST BURN)



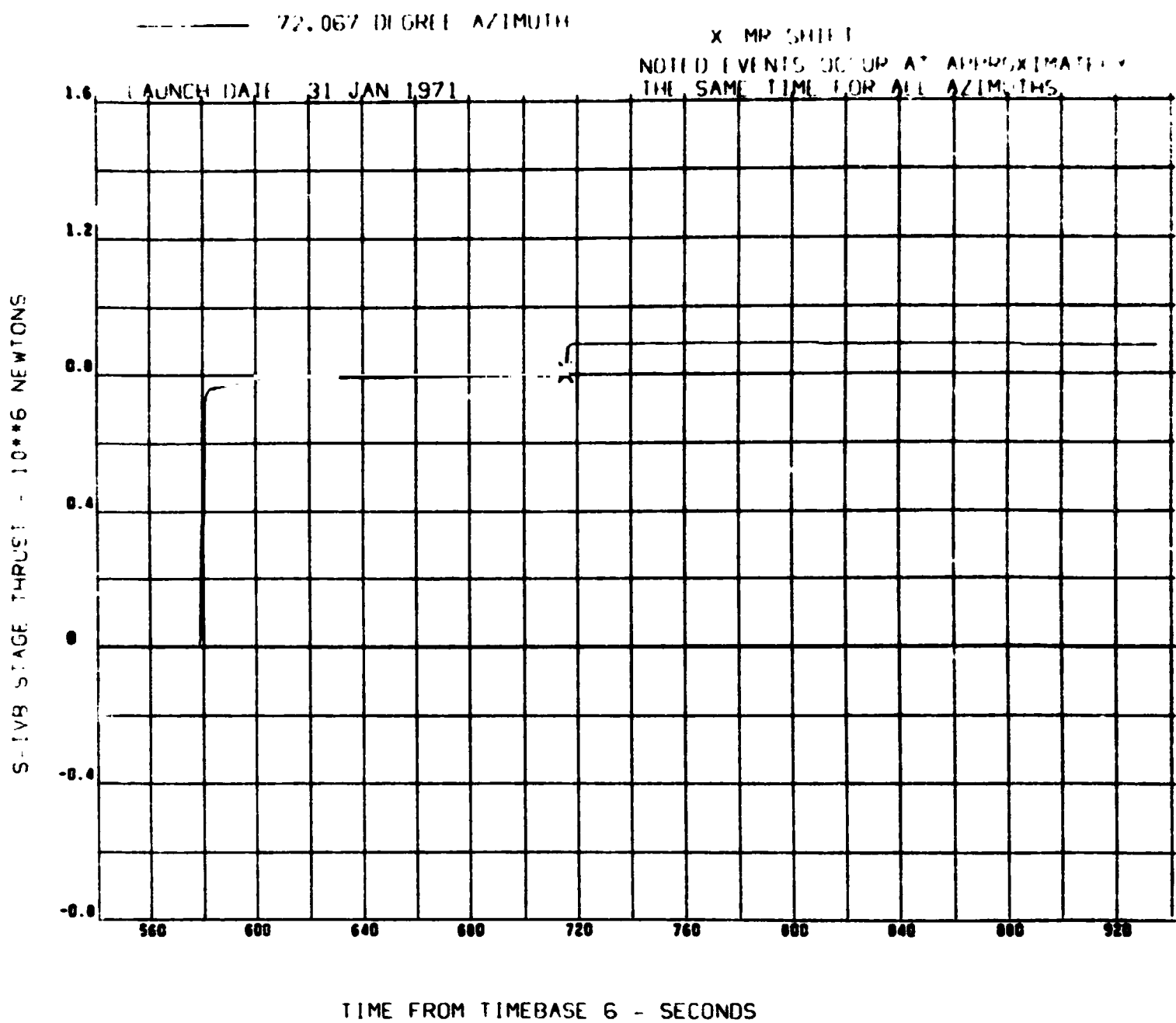


FIGURE 53 S-IVB STAGE THRUST HISTORY  
(SECOND BURN, FIRST OPPORTUNITY)

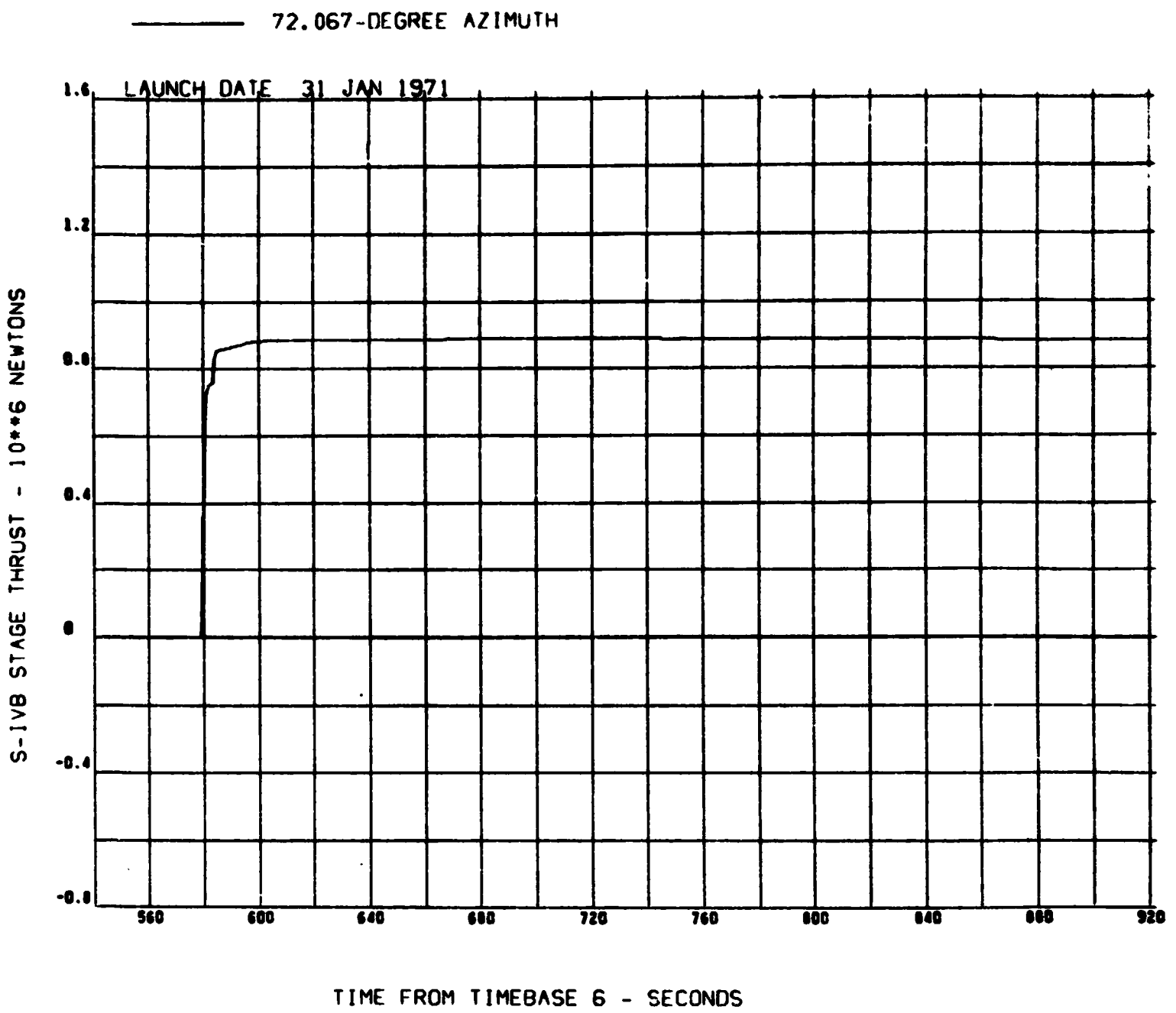


FIGURE 54 S-IVB STAGE THRUST HISTORY  
(SECOND BURN, SECOND OPPORTUNITY)

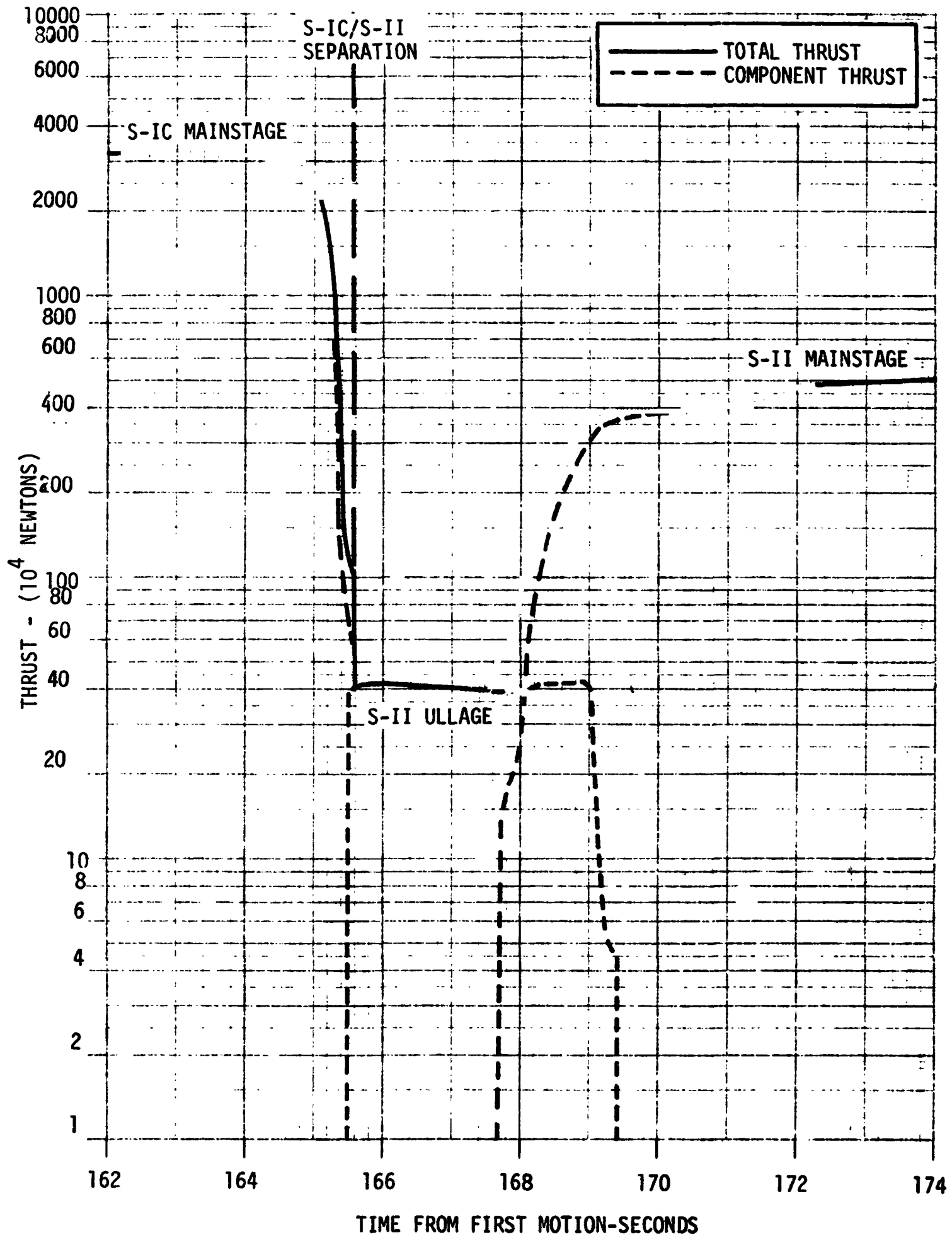


Figure 55 S-IC/S-II STAGING THRUST HISTORY

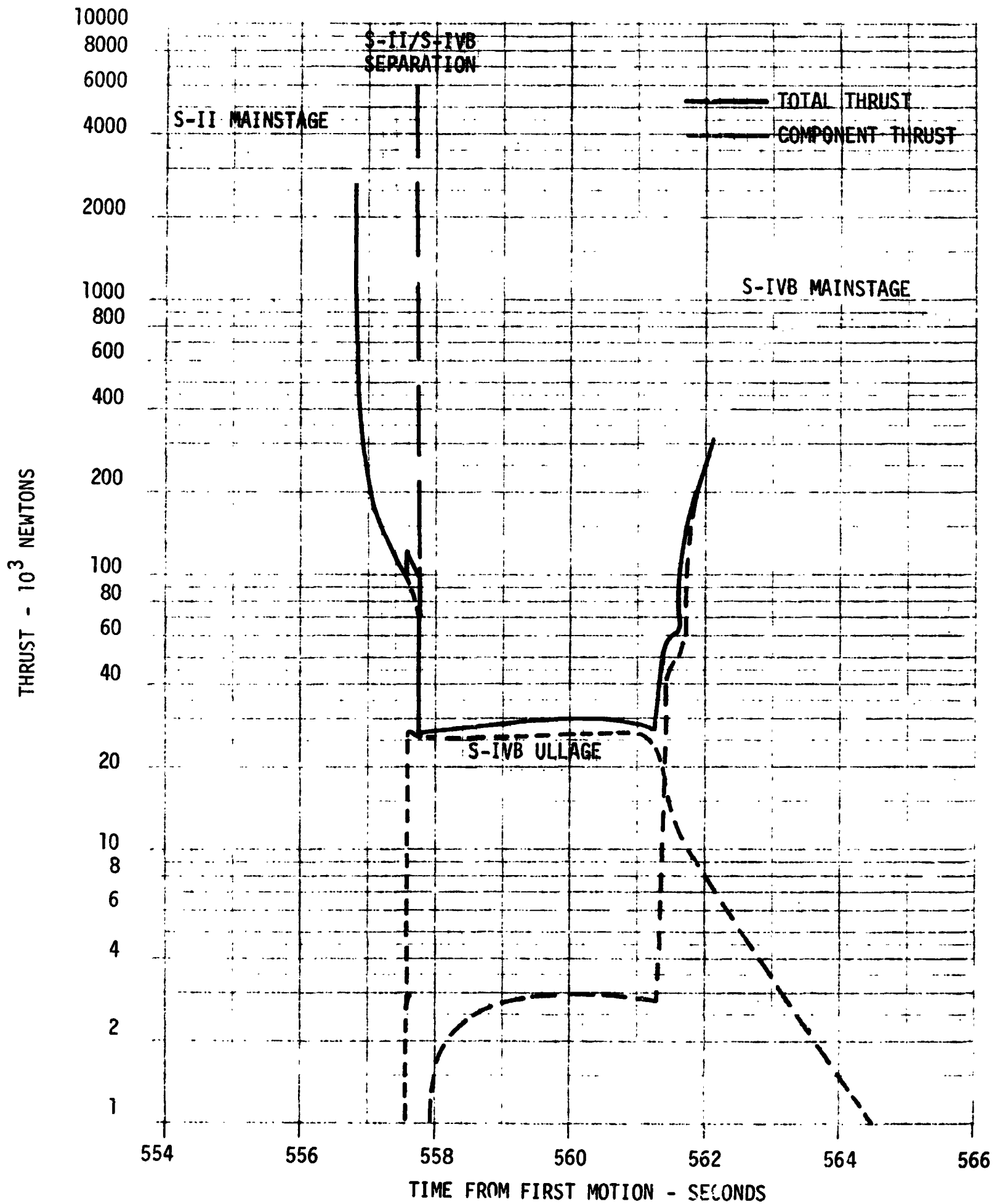


Figure 56 . S-II/S-IVB STAGING THRUST HISTORY

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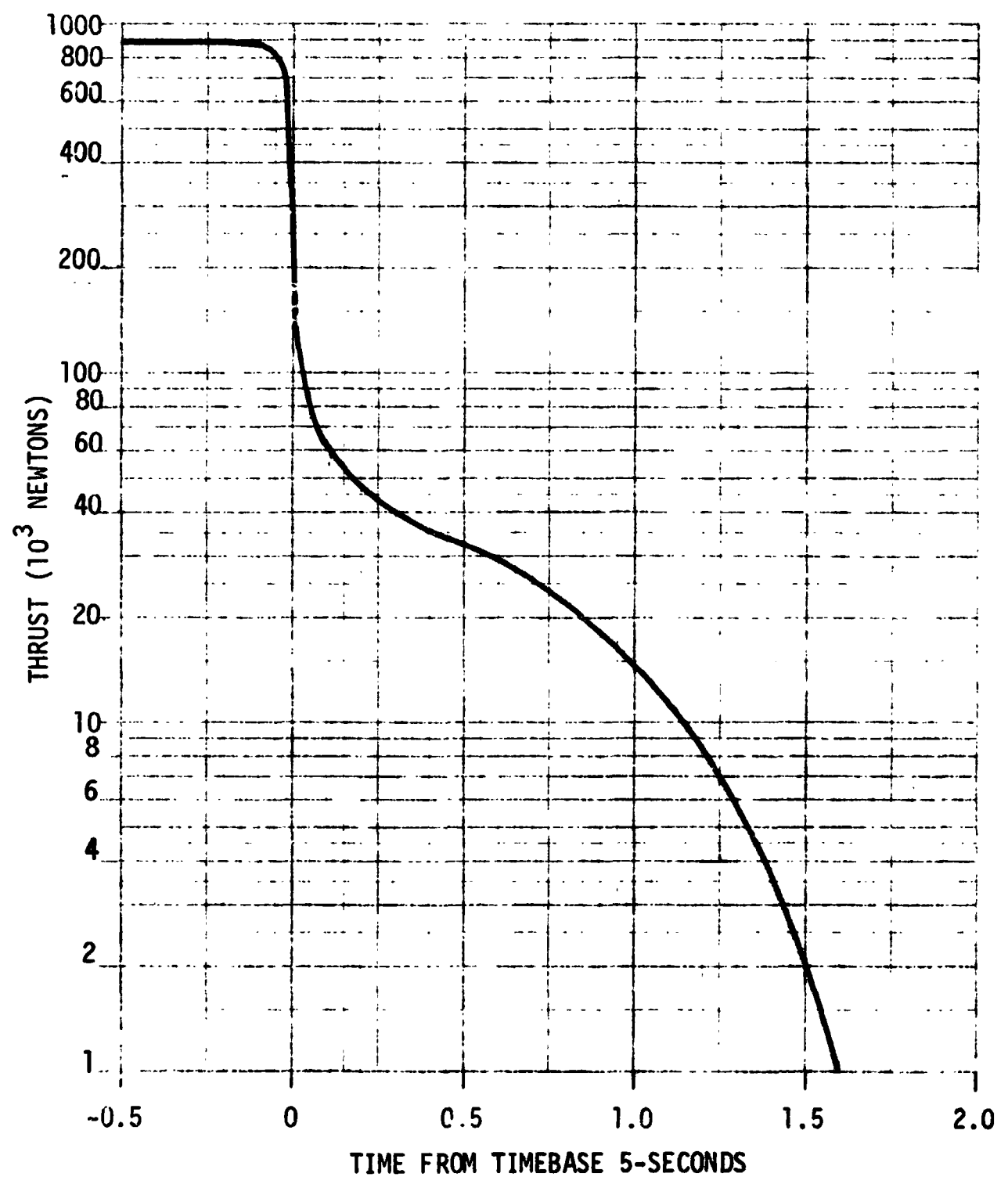


Figure 57 S-IVB FIRST-BURN THRUST DECAY HISTORY

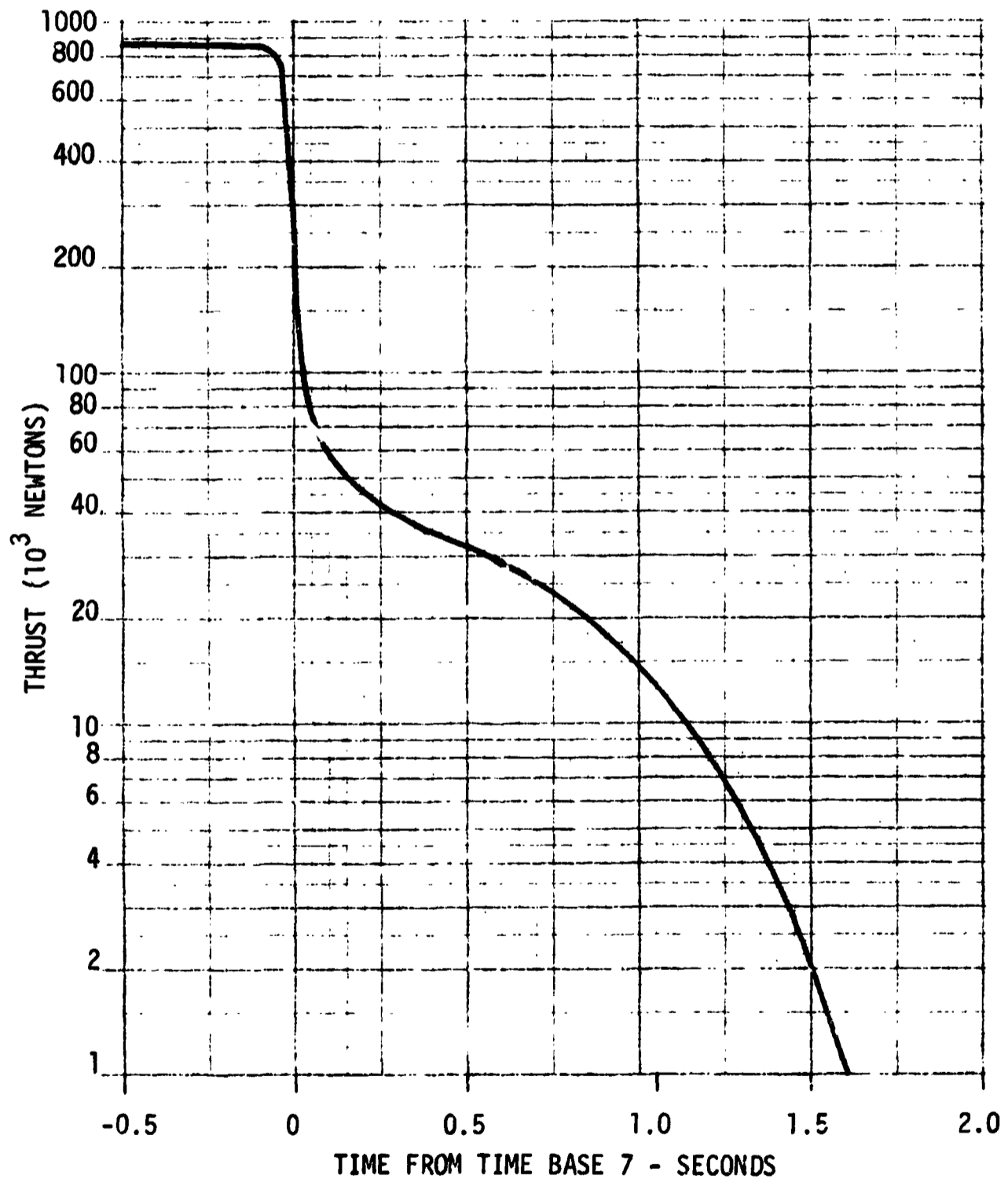
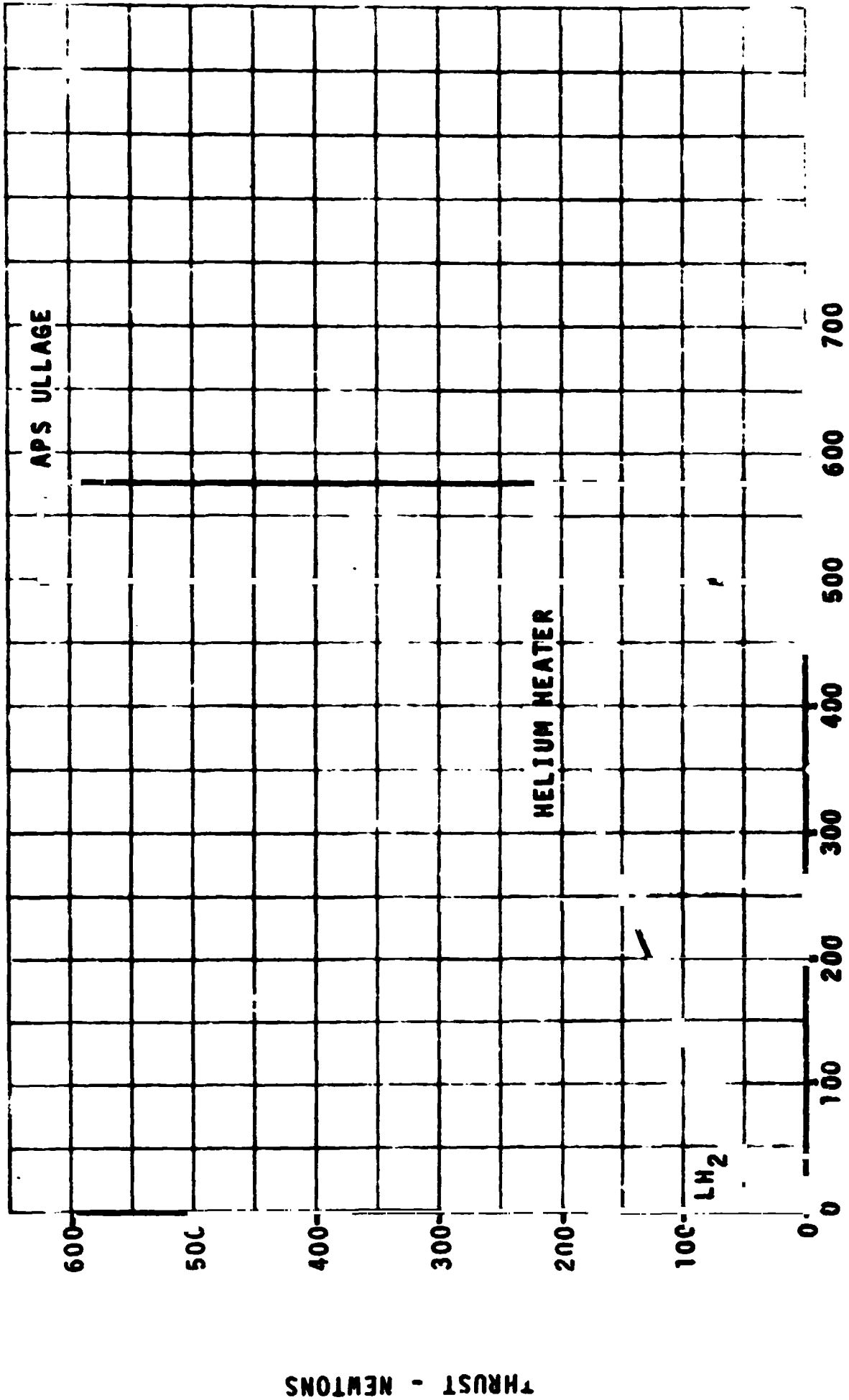


Figure 58 S-IVB SECOND-BURN THRUST DECAY HISTORY



TIME FROM TIMEBASE 6 - SECONDS

FIGURE 59 S-IVB RESTART SEQUENCE THRUST HISTORY

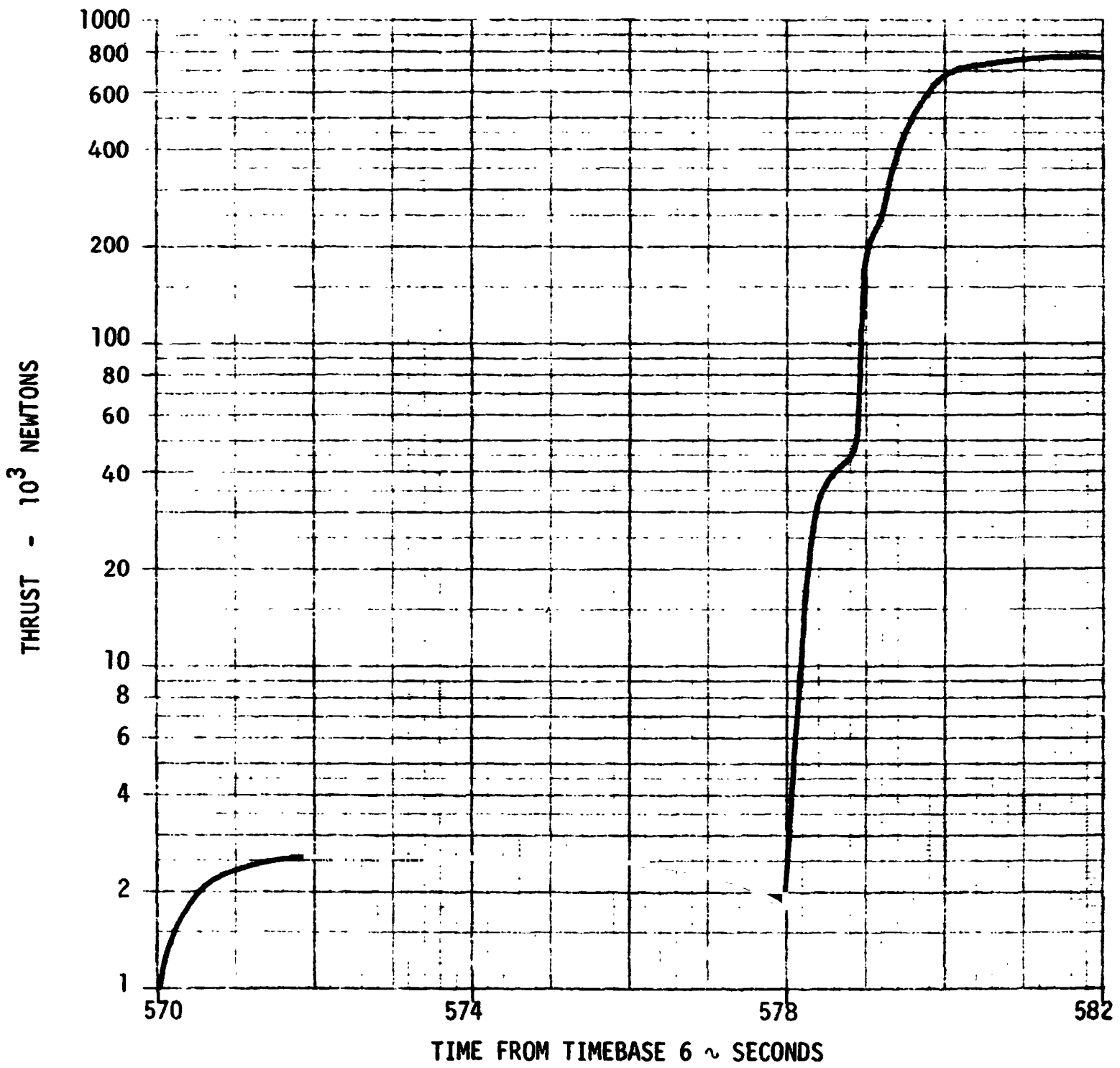


Figure 60 S-IVB SECOND-BURN THRUST BUILDUP HISTORY



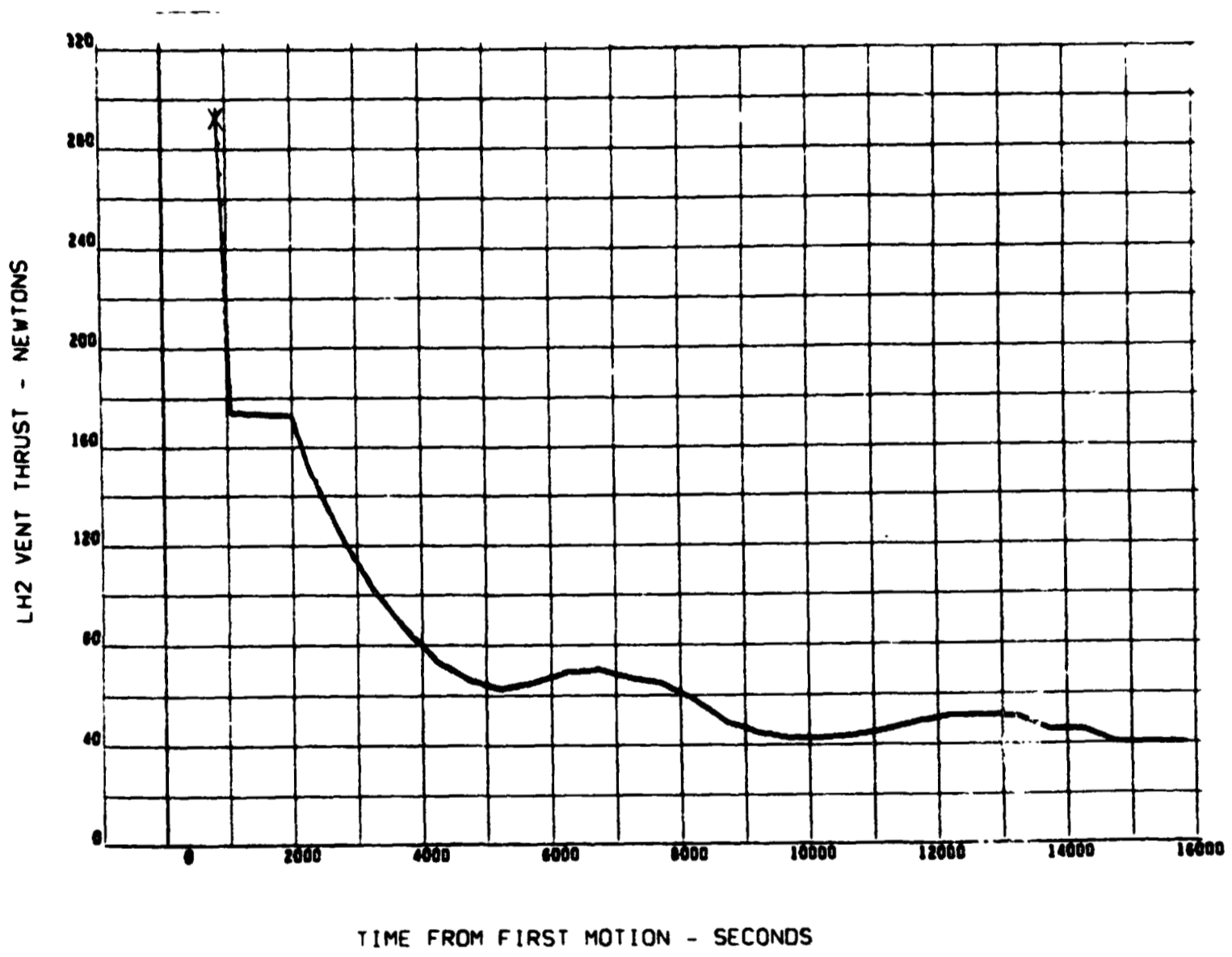


FIGURE 61 PARKING ORBIT CVS THRUST HISTORY

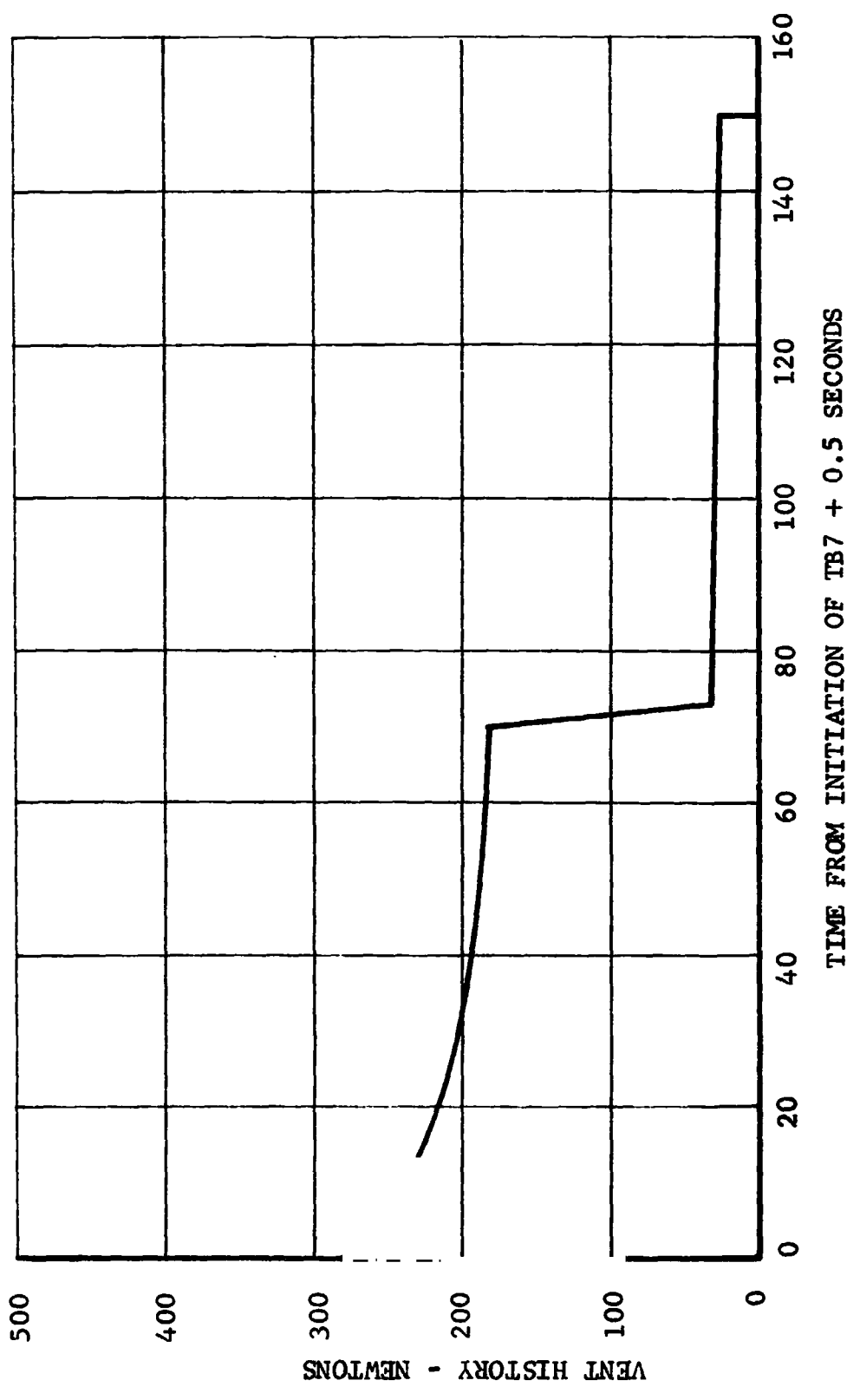


FIGURE 62: HYDROGEN VENT THRUST - POST-TLI

TABLE 15: PROPELLANT RESIDUALS AT GCS2

AZIMUTH/ OPPORTUNITY	TOTAL LOX IN TANK (LBS)*	TOTAL LH2 IN TANK (LBS)*	LOX IN TANK ABOVE LOX DEP. SENSOR (LBS)**	LH2 IN TANK ABOVE LH2 DEP. SENSOR (LBS)**	LH2 THAT WOULD BE BURNED TO LOX DEP. AT FINAL MR (LBS)	TOTAL PROP. CONSUMABLE TO LOX DEP. (LBS)***	LH2 IN TANK ABOVE LH2 DEP. SENSOR AT LOX DEP. (LBS)
72.067/1	4151	2245	3986	1533	822	4808	711
72.067/2	3527	2221	3362	1509	693	4055	816
80.000/1	4411	2388	4446	1676	916	5362	760
80.000/2	3969	2354	3804	1642	784	4588	858
88.000/1	4795	2473	4630	1761	954	5584	807
88.000/2	4146	2430	3981	1718	821	4802	897
96.000/1	4716	2484	4551	1772	938	5489	834
96.000/2	4072	2438	3907	1726	805	4712	921

\* IN-TANK PROPELLANT VALUES DO NOT INCLUDE AMOUNTS TRAPPED IN THE LINES OR THE MASSES OF GOX AND GHP IN THE TANKS THAT BOILED OFF DURING FLIGHT BUT HAVE NOT BEEN VENTED. THESE AMOUNTS ARE SPECIFIED IN REFERENCE 1.

\*\* THE LOX AND LH2 MASSES AT PROPELLANT DEPLETION ARE 165 AND 712 POUNDS, RESPECTIVELY.

\*\*\* USABLE PROPELLANT, INCLUDING FPR, REMAINING AT GCS2 FOR MAINSTAGE BOOST OPERATIONS.

TABLE 16 AS-509 MISSION LAUNCH VEHICLE MASS SEQUENCING SUMMARY

	WEIGHT CHANGE (POUNDS)	EVENT WEIGHT (POUNDS)	WEIGHT CHANGE (KG)	EVENT WEIGHT (KG)
VEHICLE WEIGHT AT S-1C IGNITION	84690	650844	38415	2952181
THRUST BUILDUP PROPELLANT				
VEHICLE WEIGHT AT HOLDDOWN ARM RELEASE		6423754		2913767
S-1C FROST	650		295	
S-1C MAINSTAGE PROPELLANT	3889790		1764380	
S-1C N2 PURGE	37		17	
S-II FROST	450		204	
S-II INSULATION PURGE GAS	38		17	
S-IVB FROST	200		91	
VEHICLE WEIGHT AT CECO SIGNAL		2532589		1148763
CENTER-ENGINE DECAY PROPELLANT	1811		821	
CENTER-ENGINE EXPANDED PROPELLANT	418		190	
S-1C MAINSTAGE PROPELLANT	686812		311533	
VEHICLE WEIGHT AT RECO SIGNAL		1843548		836220
OUTBOARD-ENGINE DECAY PROPELLANT	7245		3286	
S-1C STAGE DROP WEIGHT	365750		165901	
S-1C/S-II SMALL INTERSTAGE	1356		615	
S-II ULLAGE PROPELLANT	73		33	
VEHICLE WEIGHT AT S-1C/S-II PHYSICAL SEPARATION		1469124		666384
S-II ULLAGE PROPELLANT	184		83	

TABLE 16 AS-509 MISSION LAUNCH VEHICLE MASS SEQUENCING SUMMARY

	WEIGHT CHANGE (POUNDS)	EVENT	WEIGHT CHANGE (KG)	EVENT	WEIGHT CHANGE (KG)
VEHICLE WEIGHT AT S-II SSC					666300
THRUST BUILDUP PROPELLANT	1296		588		
S-II START TANK	25		11		
S-II ULLAGE PROPELLANT	1103		500		
VEHICLE WEIGHT AT S-II MAINSTAGE					665201
MAINSTAGE PROPELLANT AND VENTING	982319		45573		
LAUNCH ESCAPE TOWER	9025		4094		
S-II AFT INTERSTAGE	8725		3958		
CENTER ENGINE THRUST DECAY PROPELLANT	138		63		
VEHICLE WEIGHT AT S-II DECO SIGNAL					211514
THRUST DECAY PROPELLANT	373		169		
S-IVB ULLAGE PROPELLANT	5		2		
VEHICLE WEIGHT AT S-II/S-IVB SEPARATION					211343
SIGNAL					
S-II THRUST DECAY PROPELLANT	28		13		
S-II STAGE DROP WEIGHT	91250		41390		
S-II/S-IVB INTERSTAGE (DRY)	7001		3176		
S-IVB AFT FRAME CROPPED	48		22		
S-IVB DETONATOR PACKAGE	3		1		
S-IVB ULLAGE ROCKET PROPELLANT	3		1		
S-II/S-IVB INTERSTAGE PROPELLANT	1060		481		
VEHICLE WEIGHT AT S-II/S-IVB PHYSICAL SEPARATION					166289
ULLAGE ROCKET PROPELLANT	88		40		

TABLE -16 AG-509 MISSION LAUNCH VEHICLE MASS SEQUENCING SUMMARY

EVENT	WEIGHT CHANGE (POUNDS)	WEIGHT CHANGE (KG)	EVENT	WEIGHT CHANGE (KG)
VEHICLE WEIGHT AT 1ST S-1VB IGNITION	366450	166219		
S-1VB ULLAGE PROPELLANT	22	10		
S-1VB H2 IN START TANK	4	2		
THRUST BUILDUP PROPELLANT	342	155		
VEHICLE WEIGHT AT 1ST S-1VB MAINSTAGE	366082	166052		
S-1VB MAINSTAGE PROPELLANT	65362	29648		
S-1VB ULLAGE ROCKET CASES	135	61		
S-1VB APS PROPELLANT	4	2		
VEHICLE WEIGHT AT 1ST S-1VB CUTOFF	300581	136341		
SIGNAL				
THRUST DECAY PROPELLANT	82	37		
APS ULLAGE PROPELLANT	5	2		
ENGINE PROPELLANT LOSS	40	18		

TABLE 16 AC-509 MISSION LAUNCH VEHICLE MASS SEQUENCING SUMMARY

	WEIGHT CHANGE (POUNDS)	EVENT WEIGHT (POUNDS)	WEIGHT CHANGE (KG)	EVENT WEIGHT (KG)
VEHICLE WEIGHT AT PARKING ORBIT		300454		136224
FUEL TANK VENT	2083		945	
LOX TANK VENT	61		28	
APS PROPELLANT	100		45	
H2 IN START TANK	2		1	
O2/H2 BURNER	16		7	
VEHICLE WEIGHT AT S-IVB LEAD THRUST INITIATION - 1ST 9P		298192		135858
S-IVB FUEL LEAD LOSS	22		10	
VEHICLE WEIGHT AT 2ND S-IVB IGNITION - 1ST 0P		298170		135848
S-IVB H2 IN START TANK	4		2	
THRUST BUILDUP PROPELLANT	303		156	
VEHICLE WEIGHT AT 2ND S-IVB MAINSTAGE - 1ST 9P		297823		135090
S-IVB MAINSTAGE PROPELLANT	157286		71344	
APS PROPELLANT	4		2	
VEHICLE WEIGHT AT 2ND S-IVB CUTOFF SIGNAL - 1ST 0P		140533		63748
THRUST DECAY PROPELLANT	81		37	
FUEL TANK VENT	11		5	
ENGINE PROPELLANT LOST	40		18	
LOX TANK VENT	6		3	

TABLE 16 AS-509 MISSION LAUNCH VEHICLE MASS SEQUENCING SUMMARY

WEIGHT CHANGE (POUNDS)	EVENT	WEIGHT CHANGE (KG)	EVENT	WEIGHT (KG)
64575		29291		63682
33640		15259		
2583		1172		
32		15		
78		35		
190		96		

VEHICLE WEIGHT AT TRANSLUNAR 140395 63682

INJECTION - 1ST OP

CSM	29291
LM	15259
SLA PANELS	1172
APS	15
FUEL TANK VENT	35
LHX TANK VENT	96

VEHICLE WEIGHT AFTER S/C SEPARATION - 1ST OP 39297 17825



TABLE 16 AS-509 MISSION LAUNCH VEHICLE MASS SEQUENCING SUMMARY

	WEIGHT CHANGE (POUNDS)	EVENT WEIGHT (POUNDS)	WEIGHT CHANGE (KG)	EVENT WEIGHT (KG)
VEHICLE WEIGHT AT PARKING ORBIT		300454		136284
INSERTION			1303	
FUEL TANK VENT	2872		28	
LOX TANK VENT	61		45	
APS PROPELLANT	100		1	
M2 IN START TANK	2		7	
O2/H2 BURNER	16			
VEHICLE WEIGHT AT S-1VB LEAD THRUST INITIATION - 2ND OP		297403	10	134900
S-1VB FUEL LEAD LOSS	22			
VEHICLE WEIGHT AT 2ND S-1VB IGNITION - 2ND OP		297381	2	134890
S-1VB M2 IN START TANK	4		155	
THRUST BUILDUP PROPELLANT	342			
VEHICLE WEIGHT AT 2ND S-1VB MAINSTAGE - 2ND OP		297035	71254	134733
S-1VB MAINSTAGE PROPELLANT	157089		2	
APS PROPELLANT	4			
VEHICLE WEIGHT AT 2ND S-1VB CUTOFF		139942		63477
SIGNAL - 2ND OP			37	
THRUST DECAY PROPELLANT	81		5	
FUEL TANK VENT	11		18	
ENGINE PROPELLANT LOST	40		3	
LOX TANK VENT	6			

TABLE 16 / AG-500 MISSION LAUNCH VEHICLE MASS SEQUENCING SUMMARY

	WEIGHT CHANGE (POUNDS)	EVENT	WEIGHT CHANGE (KG)	EVENT	WEIGHT CHANGE (KG)
VEHICLE WEIGHT AT TRANS-LUNAR	139804				63414
INJECTION - 2ND AP					
CS	64575		29291		
L	33640		15259		
SLA PANELS	2583		1172		
APS	32		15		
FUEL TANK VENT	78		35		
LOX TANK VENT	190		86		
VEHICLE WEIGHT AFTER S/C SEPARATION - 2ND AP					17557

SECTION V

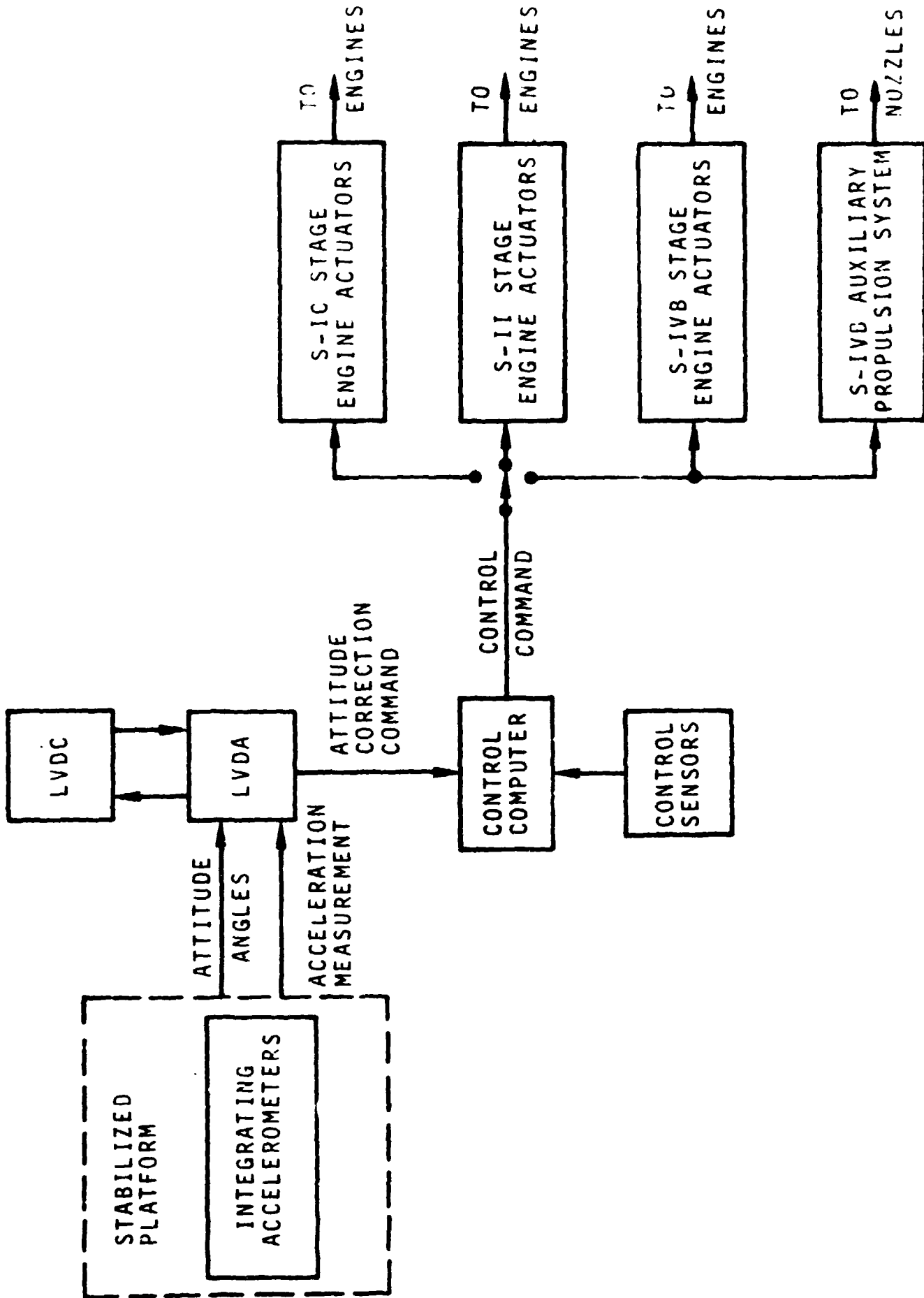


FIGURE 63 NAVIGATION, GUIDANCE, AND CONTROL SYSTEM

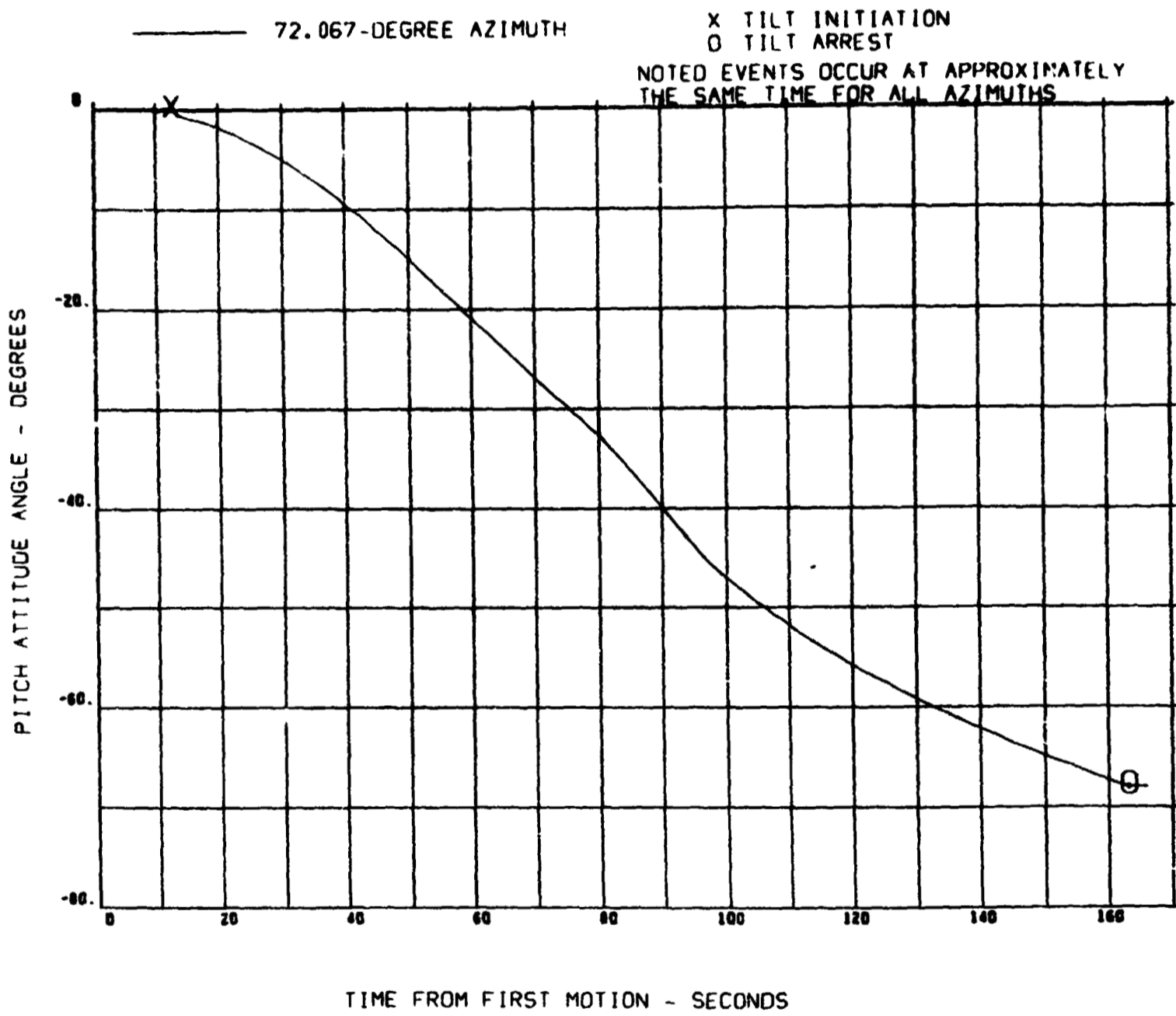


FIGURE 64 COMMANDED VEHICLE PITCH ATTITUDE FOR S-IC STAGE FLIGHT

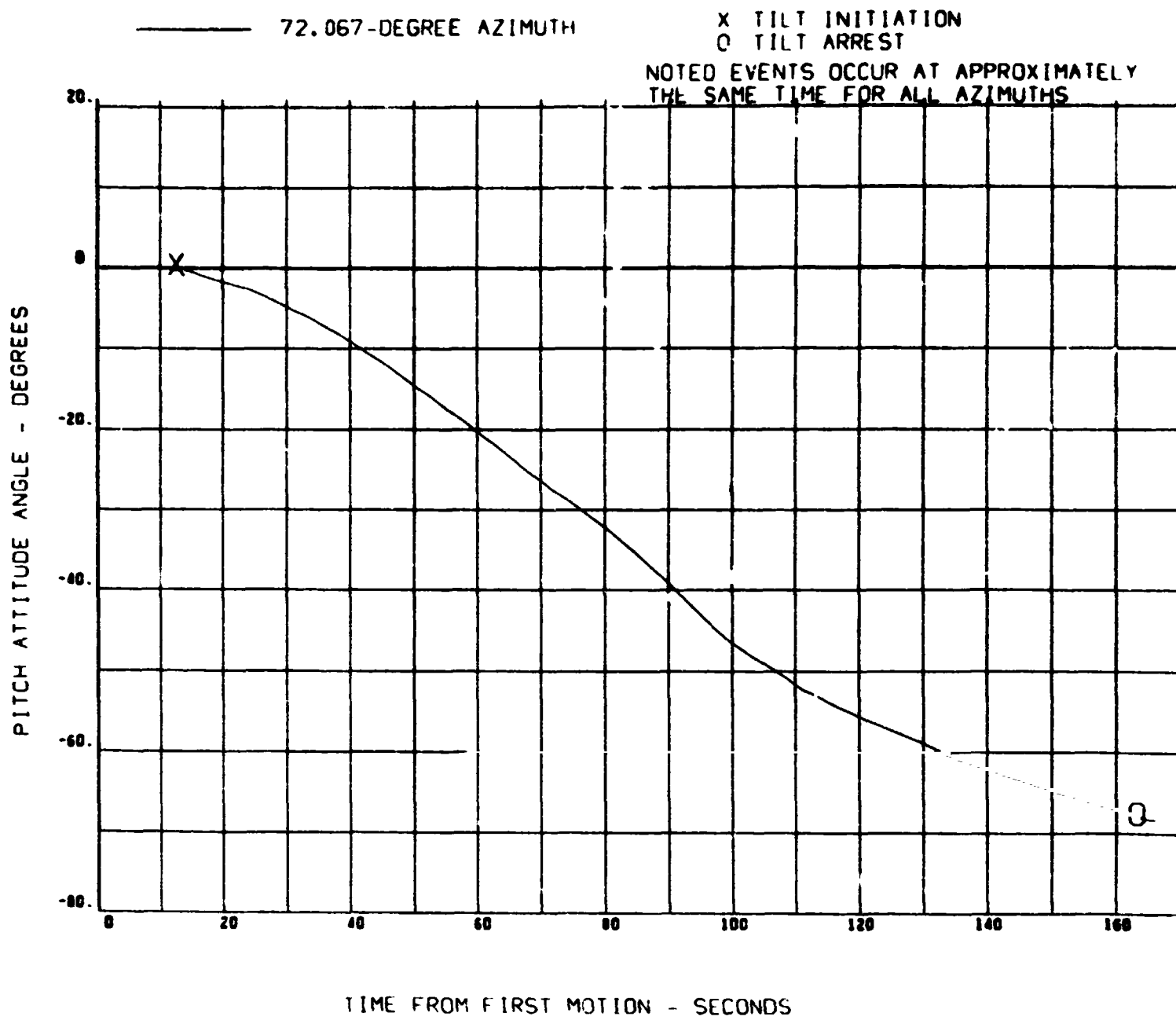


FIGURE 65 ACTUAL VEHICLE PITCH ATTITUDE FOR S-IC STAGE FLIGHT

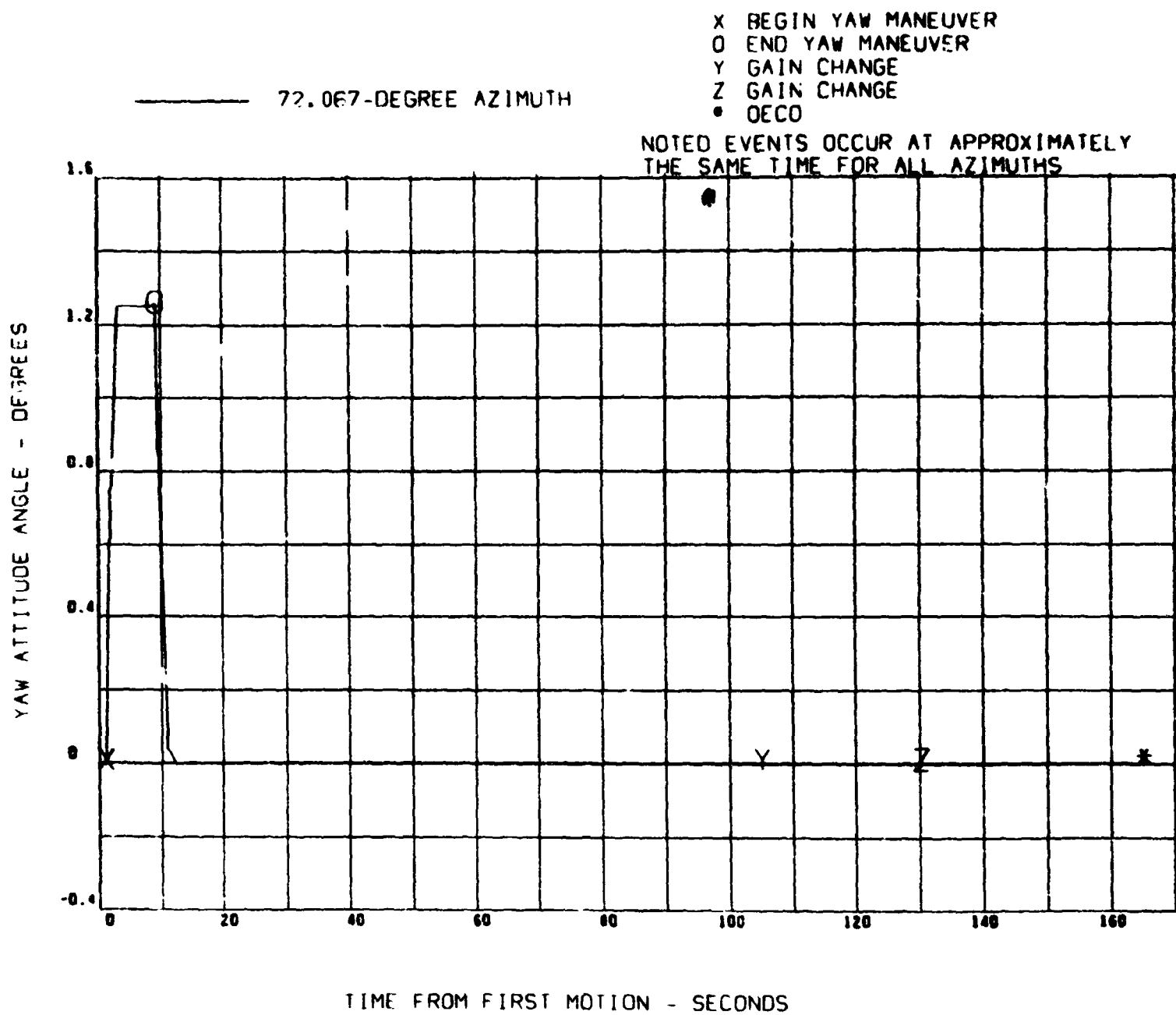


FIGURE 66 COMMANDED VEHICLE YAW ATTITUDE FOR S-IC STAGE FLIGHT

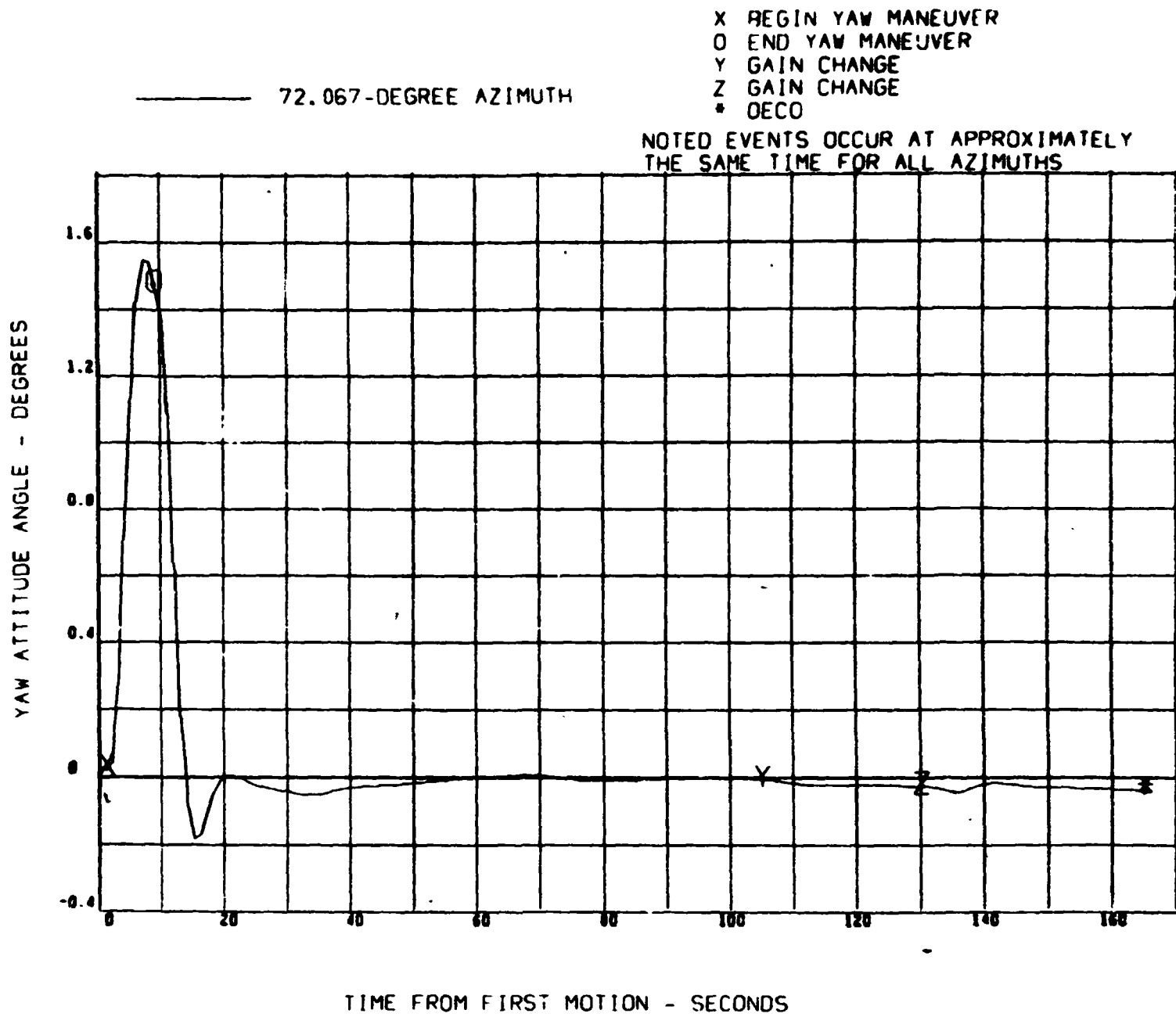


FIGURE 67 ACTUAL VEHICLE YAW ATTITUDE FOR S-IC  
 STAGE FLIGHT

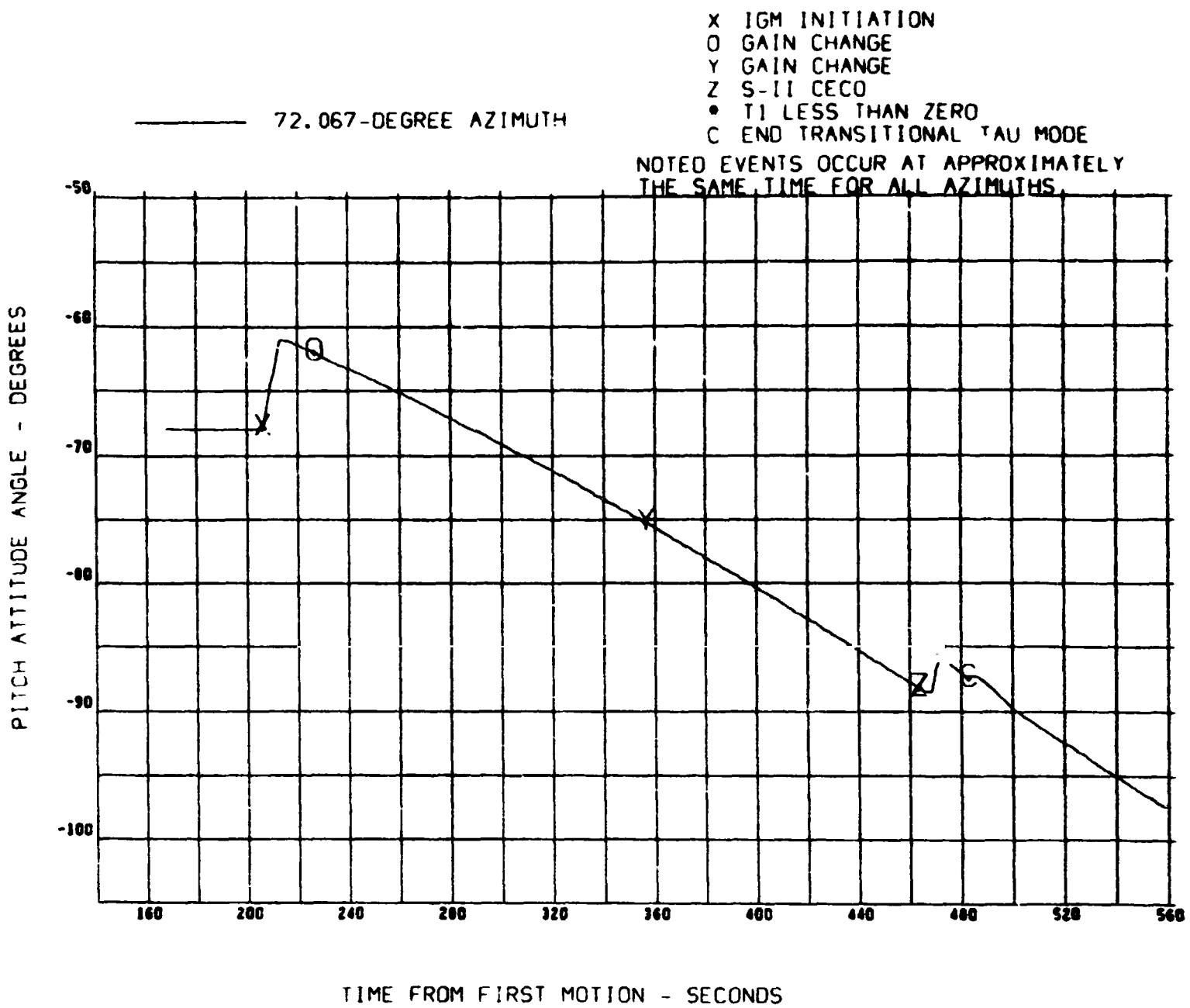


FIGURE 68 COMMANDED VEHICLE PITCH ATTITUDE FOR S-II STAGE FLIGHT



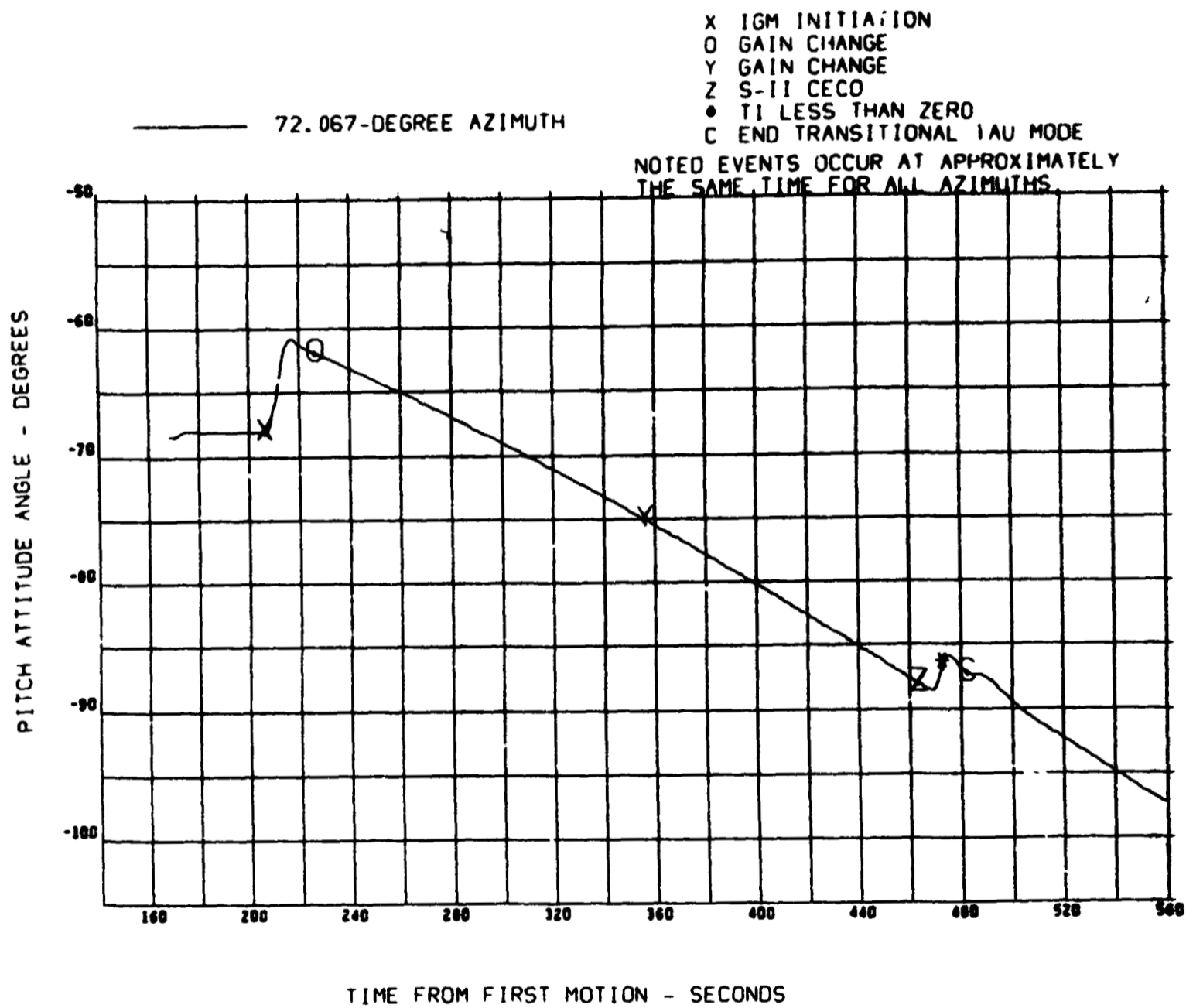


FIGURE 69 . ACTUAL VEHICLE PITCH ATTITUDE FOR S-II STAGE FLIGHT

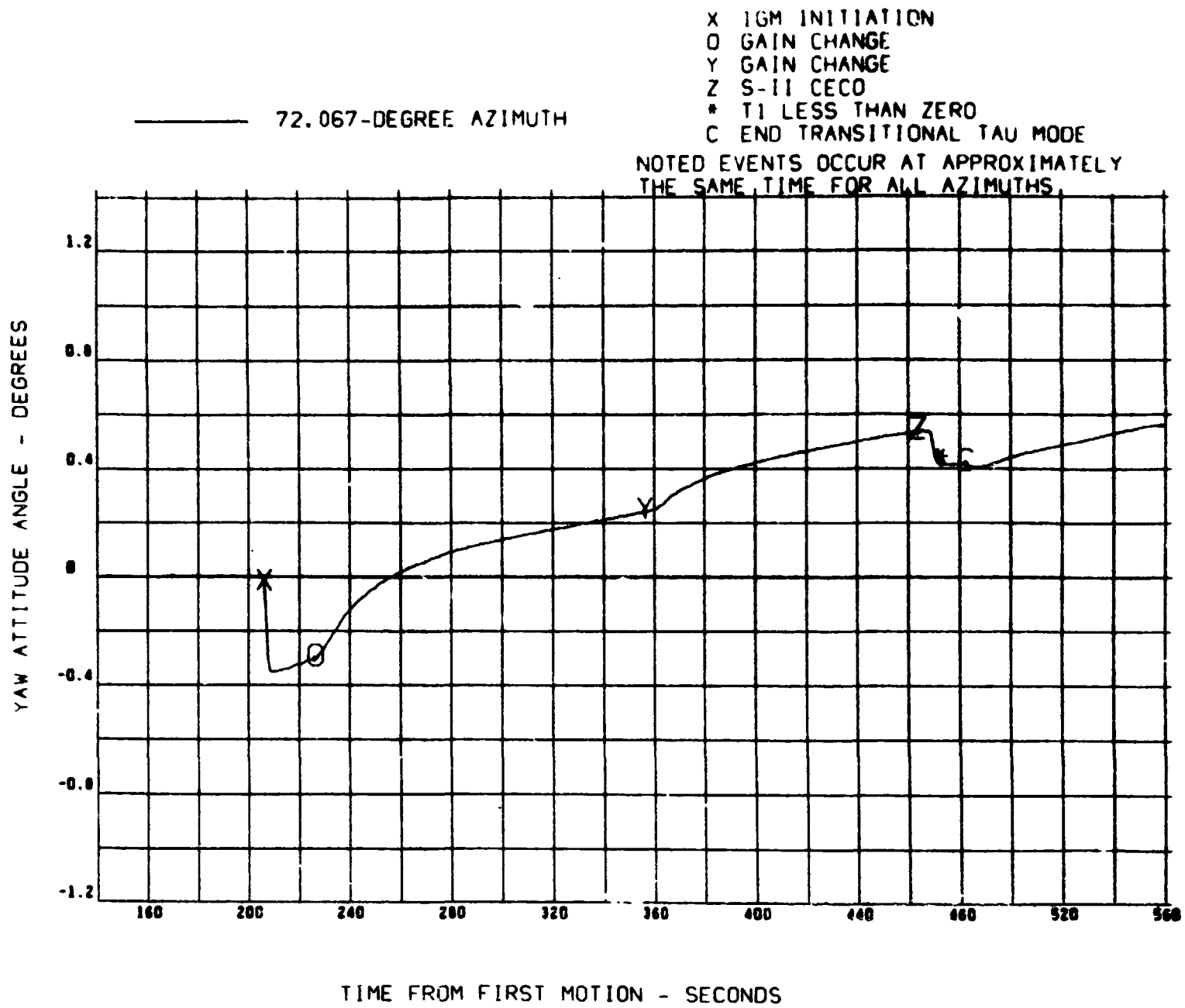


FIGURE 70 COMMANDED VEHICLE YAW ATTITUDE FOR S-II STAGE FLIGHT

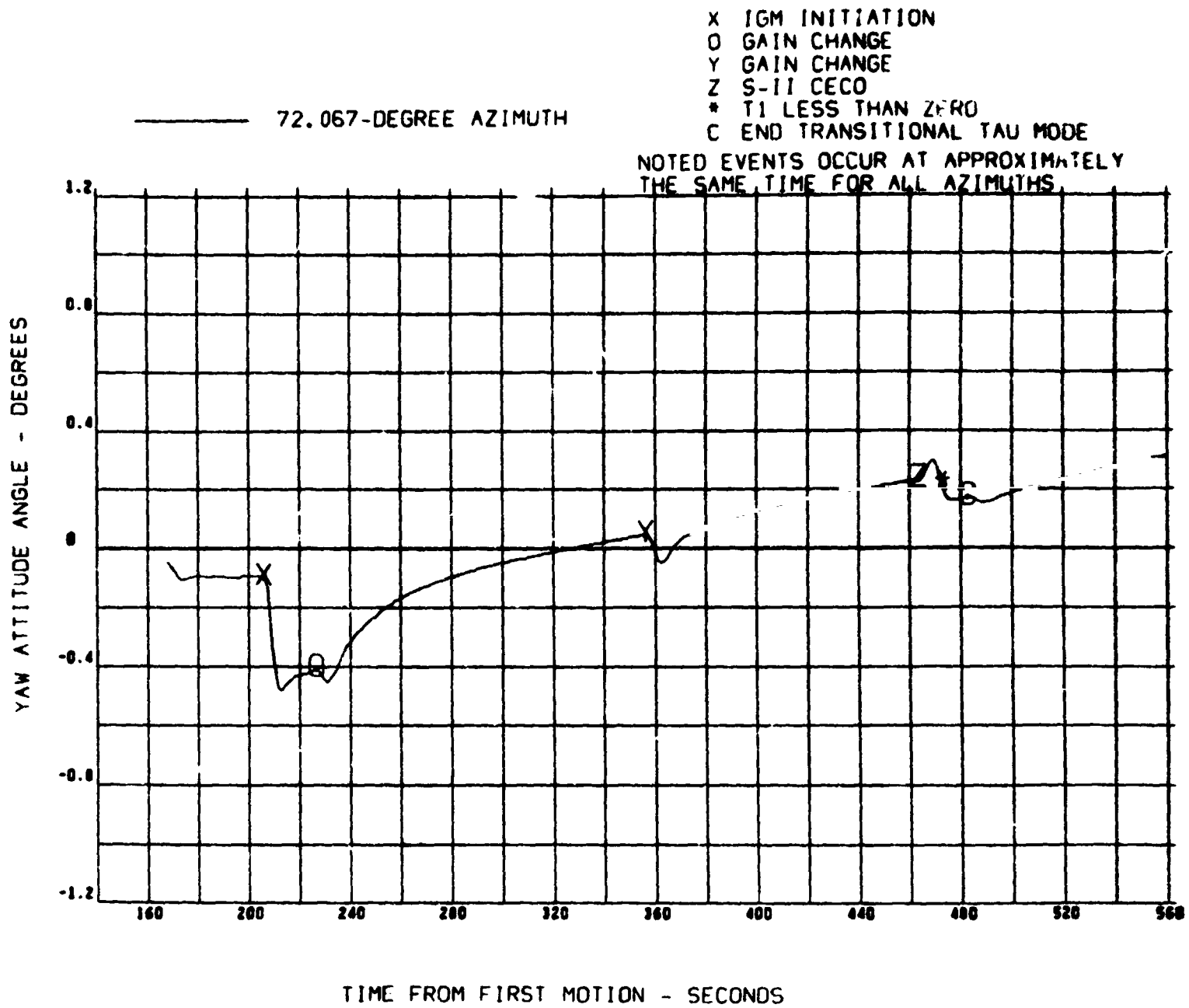


FIGURE 71 ACTUAL VEHICLE YAW ATTITUDE FOR S-II STAGE FLIGHT

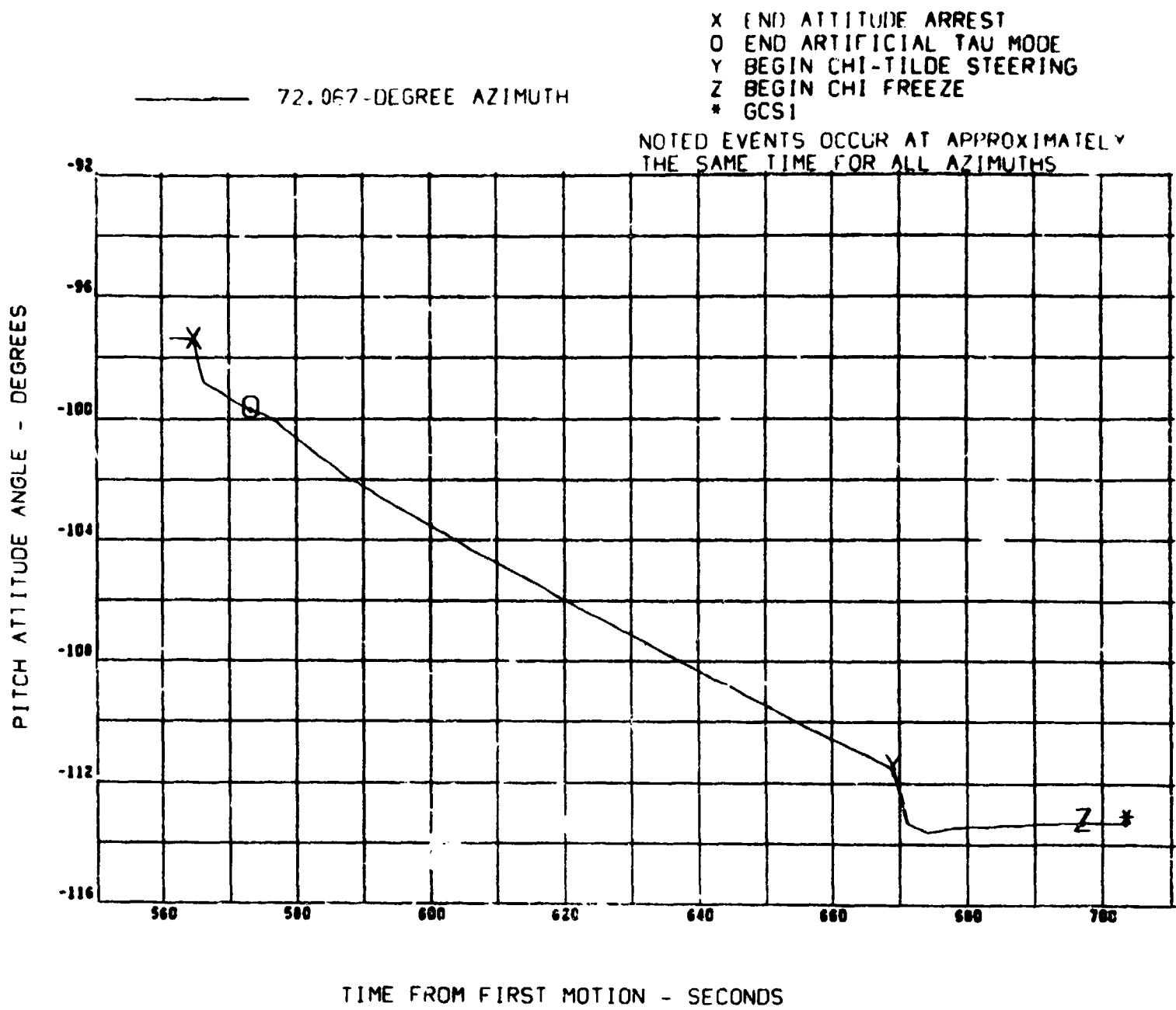


FIGURE 72 COMMANDED VEHICLE PITCH ATTITUDE FOR S-IVB STAGE FLIGHT (FIRST BURN)

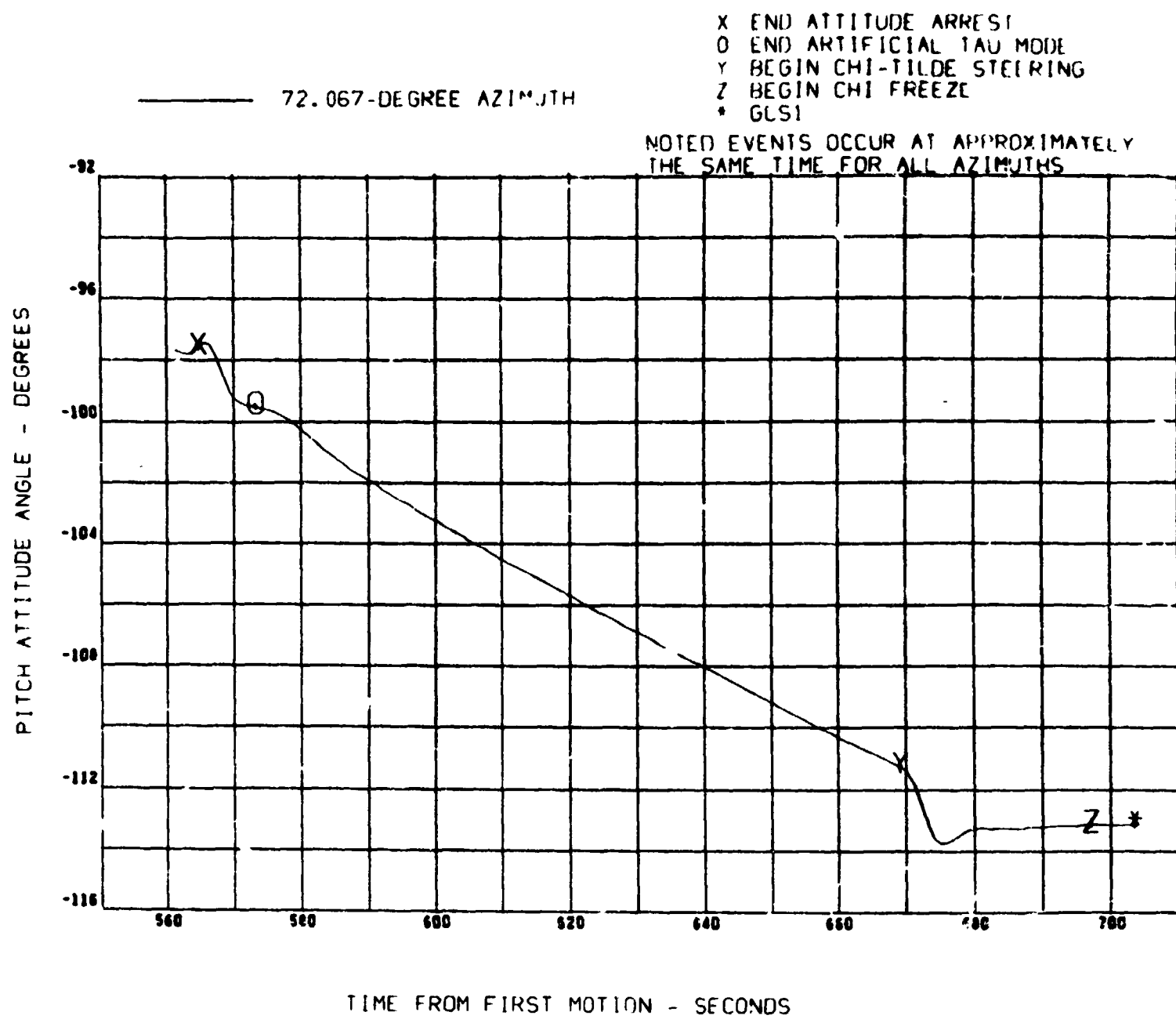


FIGURE 73 ACTUAL VEHICLE PITCH ATTITUDE FOR S-IVB STAGE FLIGHT (FIRST BURN)

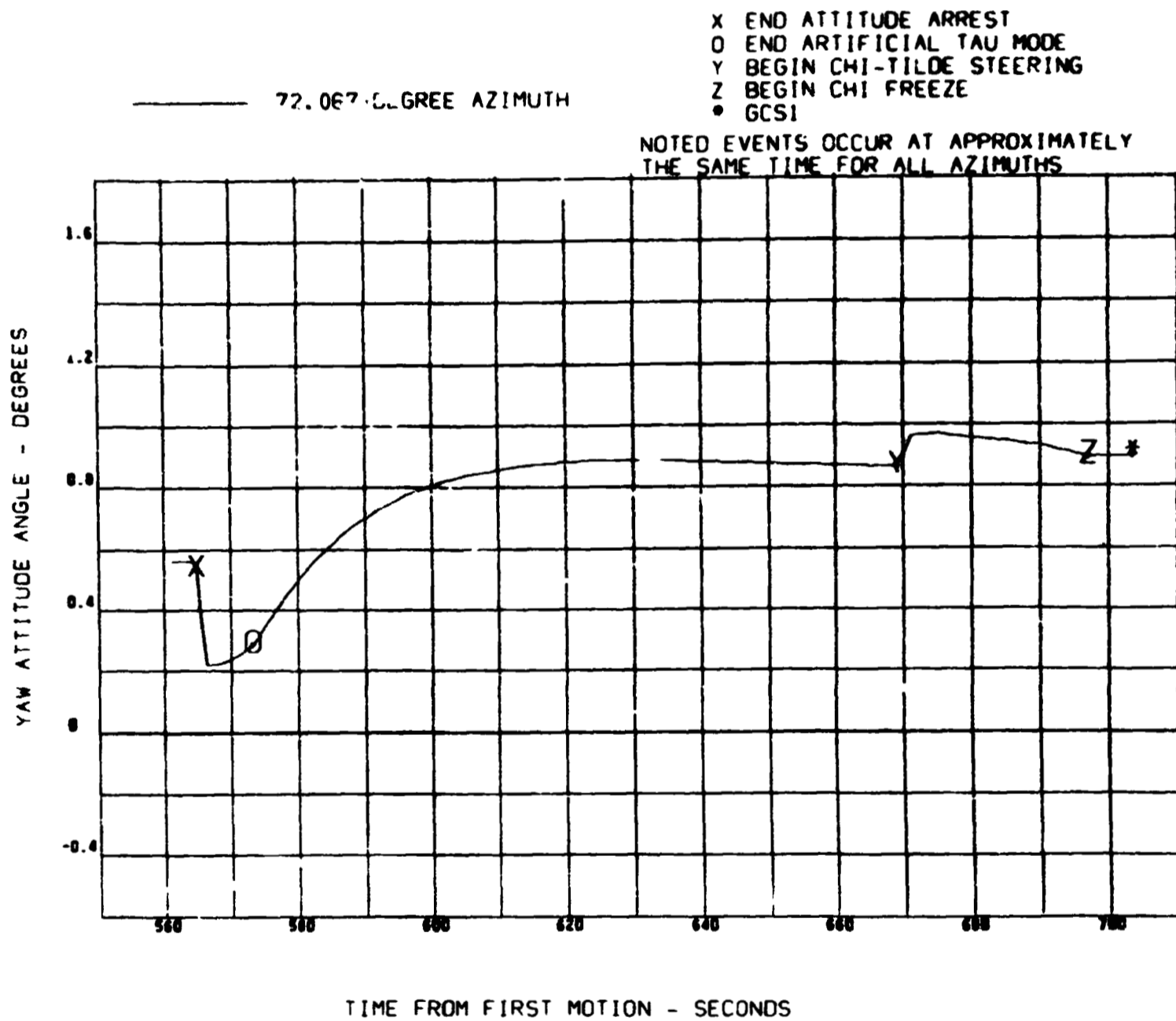


FIGURE 74 COMMANDED VEHICLE YAW ATTITUDE FOR S-IVB STAGE FLIGHT (FIRST BURN)

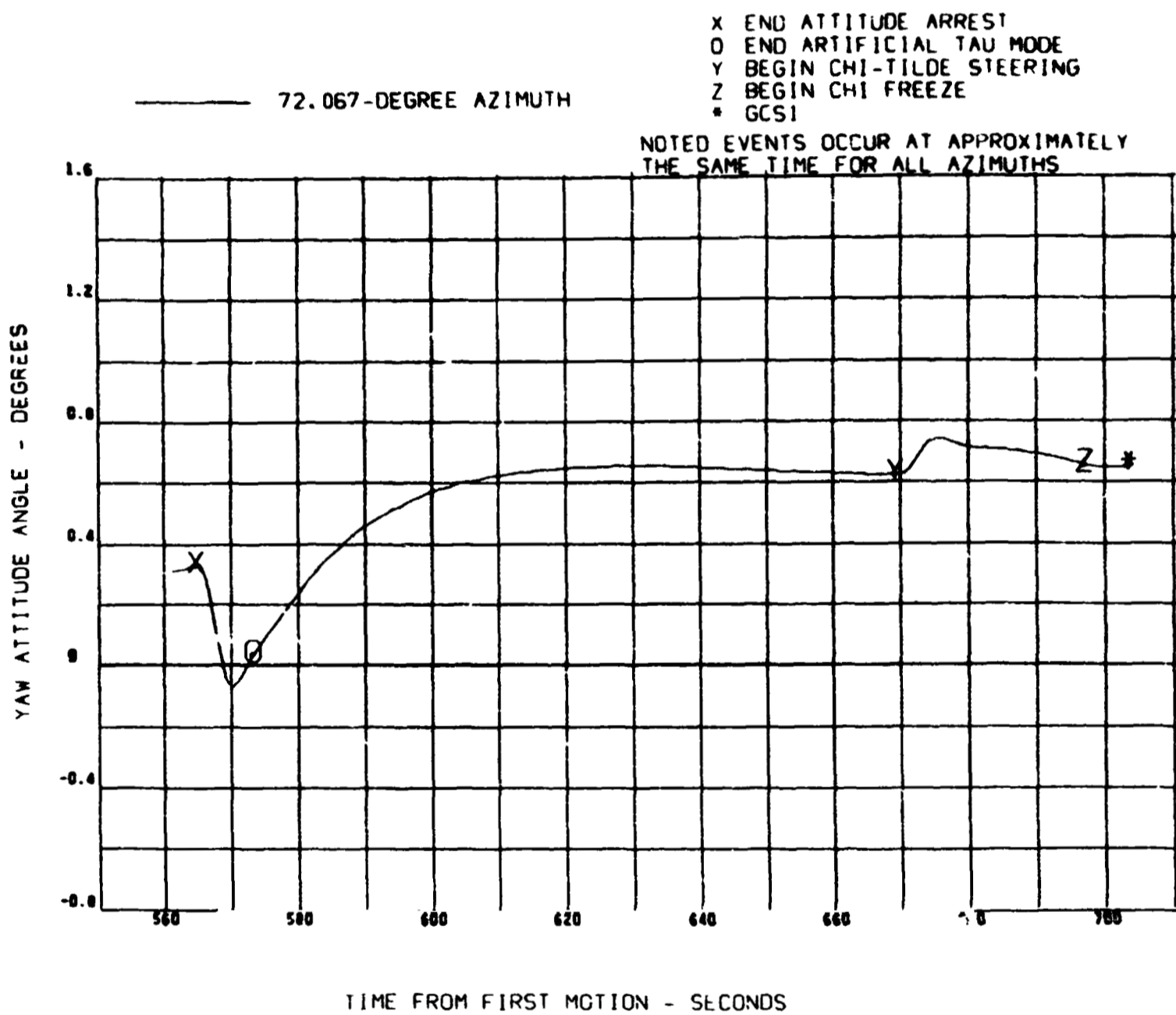


FIGURE 75 ACTUAL VEHICLE YAW ATTITUDE FOR S-IVB STAGE FLIGHT (FIRST BURN)

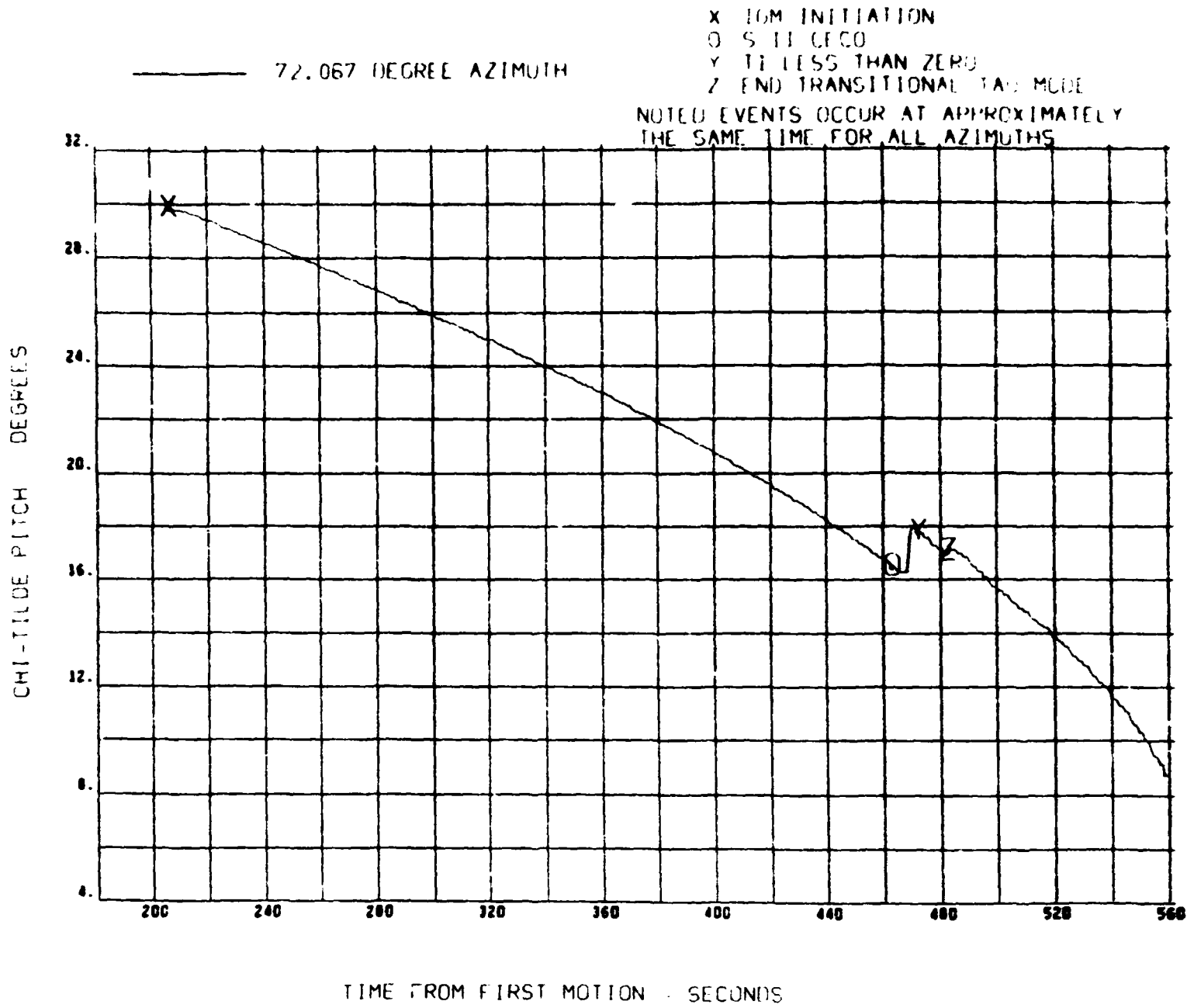


FIGURE 76 REQUIRED PITCH STEERING ANGLE TO SATISFY  
 TERMINAL VELOCITY REQUIREMENTS FOR S-II  
 STAGE FLIGHT



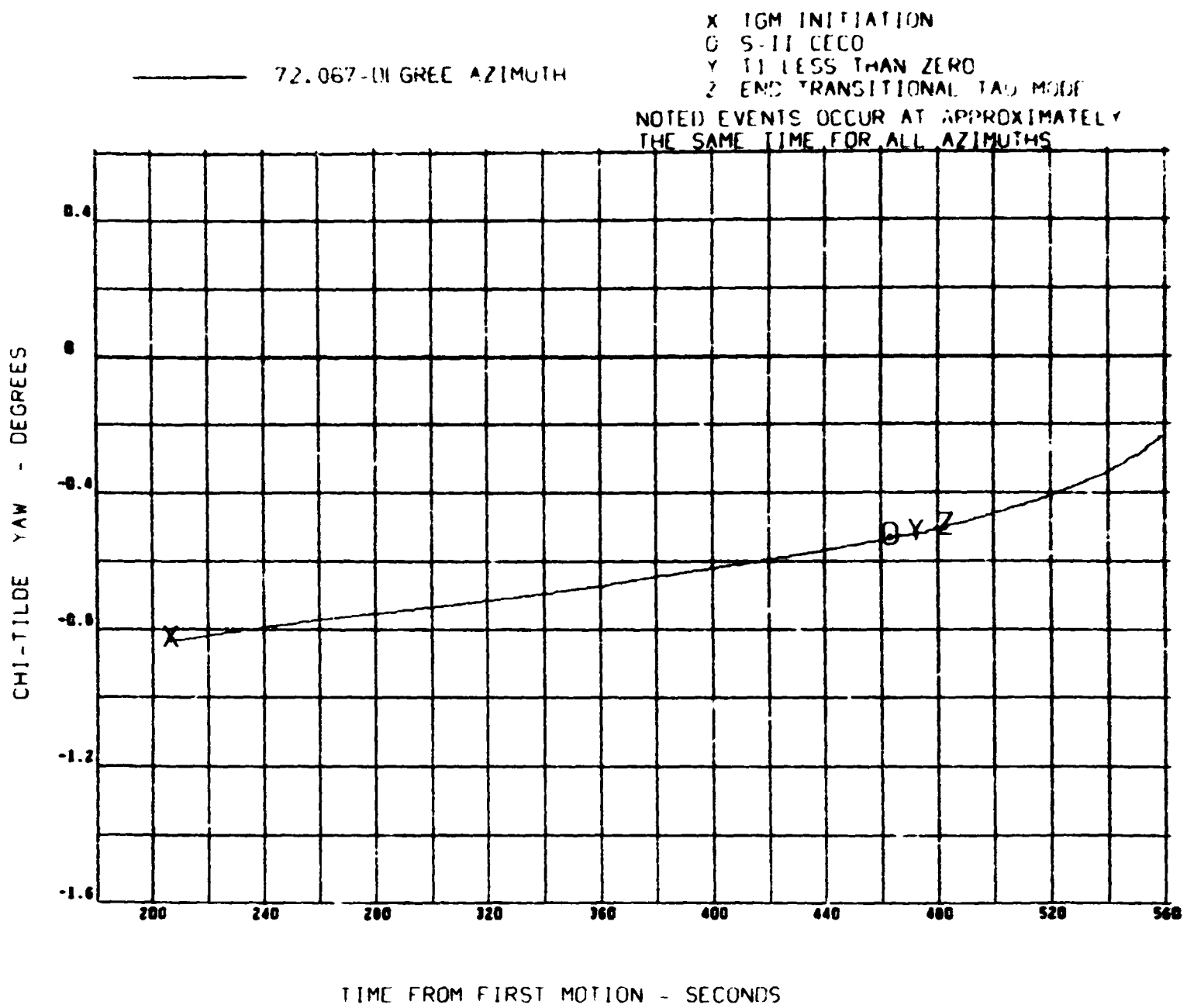


FIGURE 77 REQUIRED YAW STEERING ANGLE TO SATISFY  
 TERMINAL VELOCITY REQUIREMENTS FOR S-II  
 STAGE FLIGHT

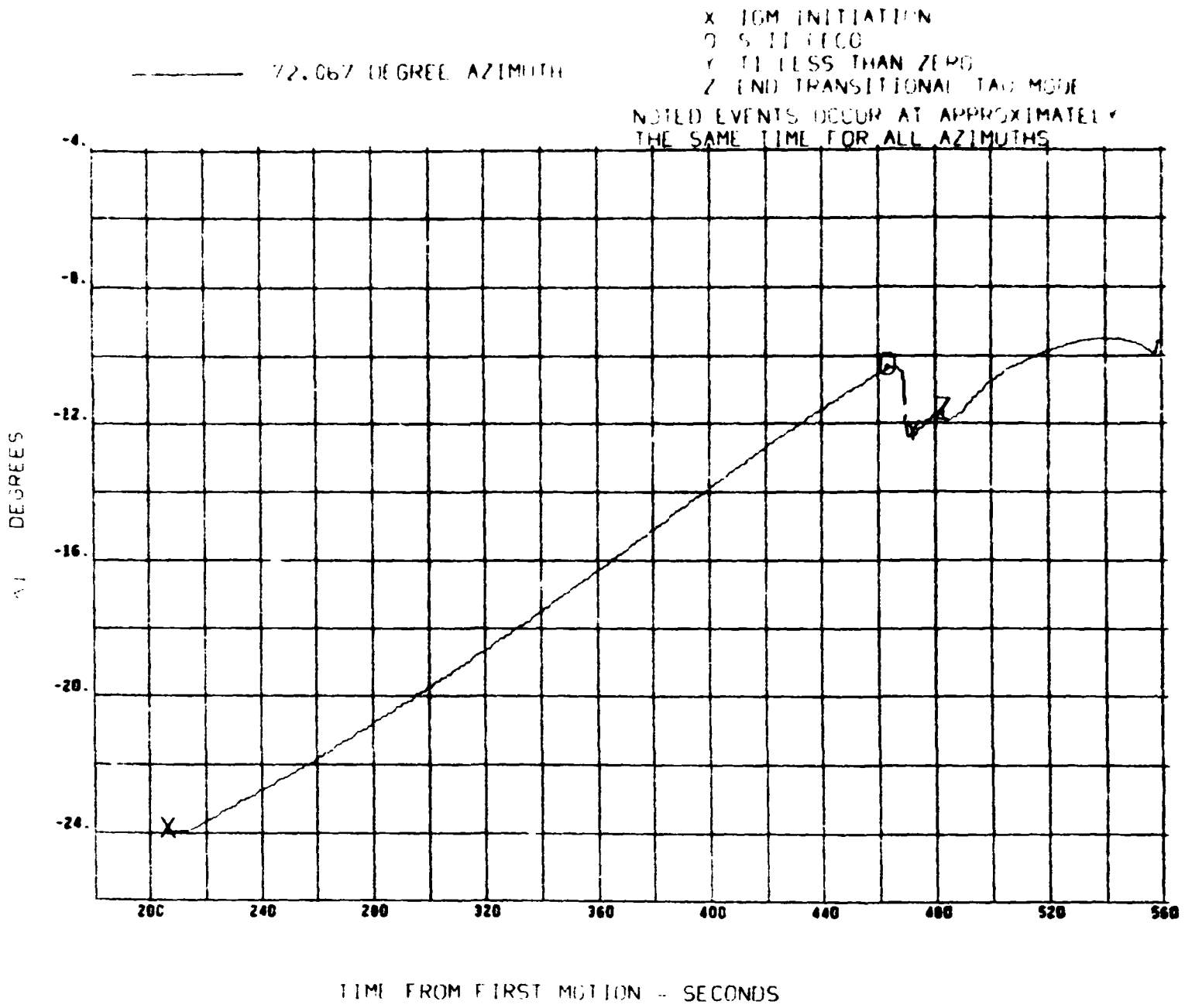


FIGURE 78 PITCH STEERING ANGLE BIAS TO ENFORCE  
 TERMINAL POSITION REQUIREMENTS FOR S-II  
 STAGE FLIGHT

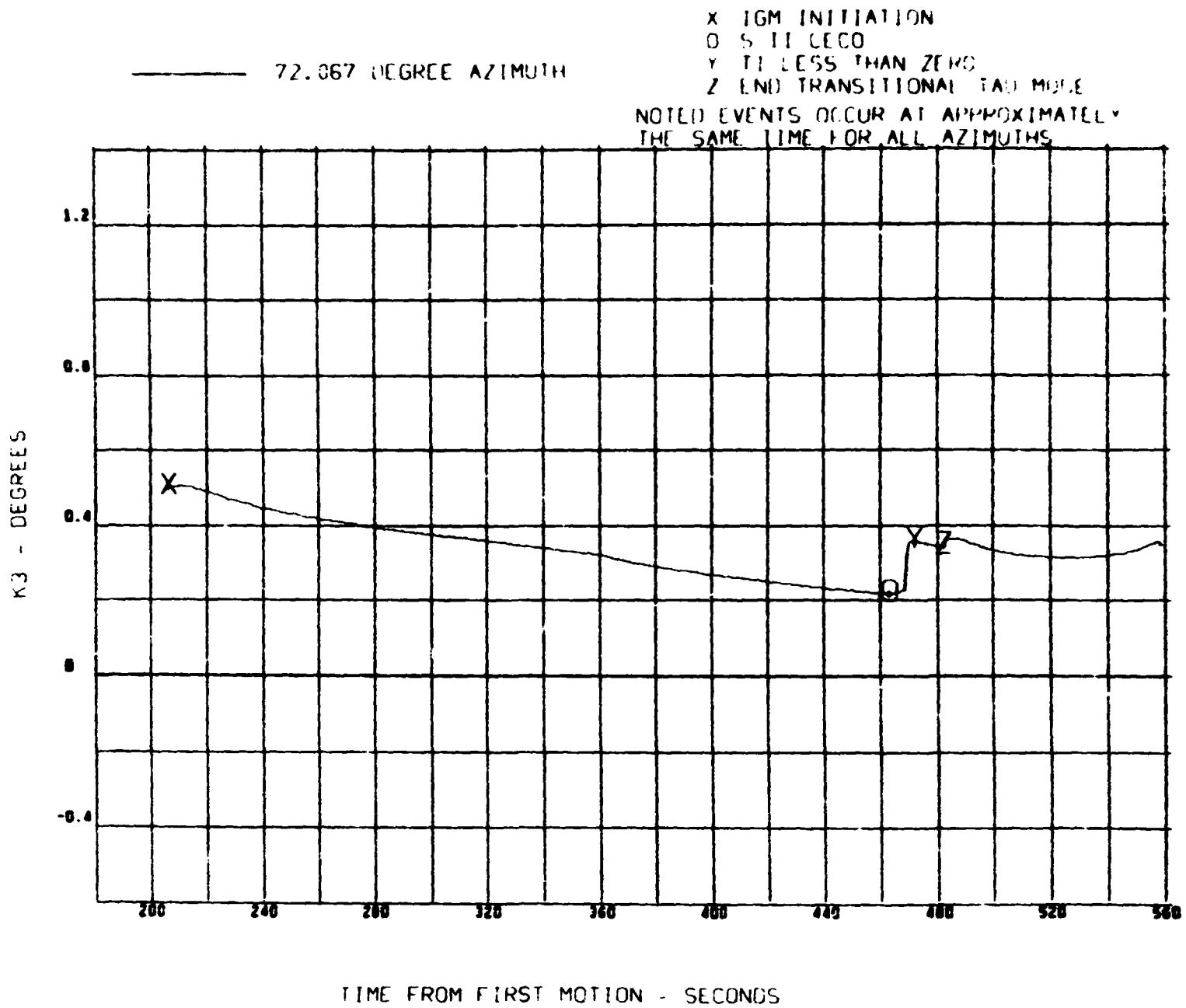


FIGURE 79 YAW STEERING ANGLE BIAS TO ENFORCE  
 TERMINAL POSITION REQUIREMENTS FOR S-II  
 STAGE FLIGHT

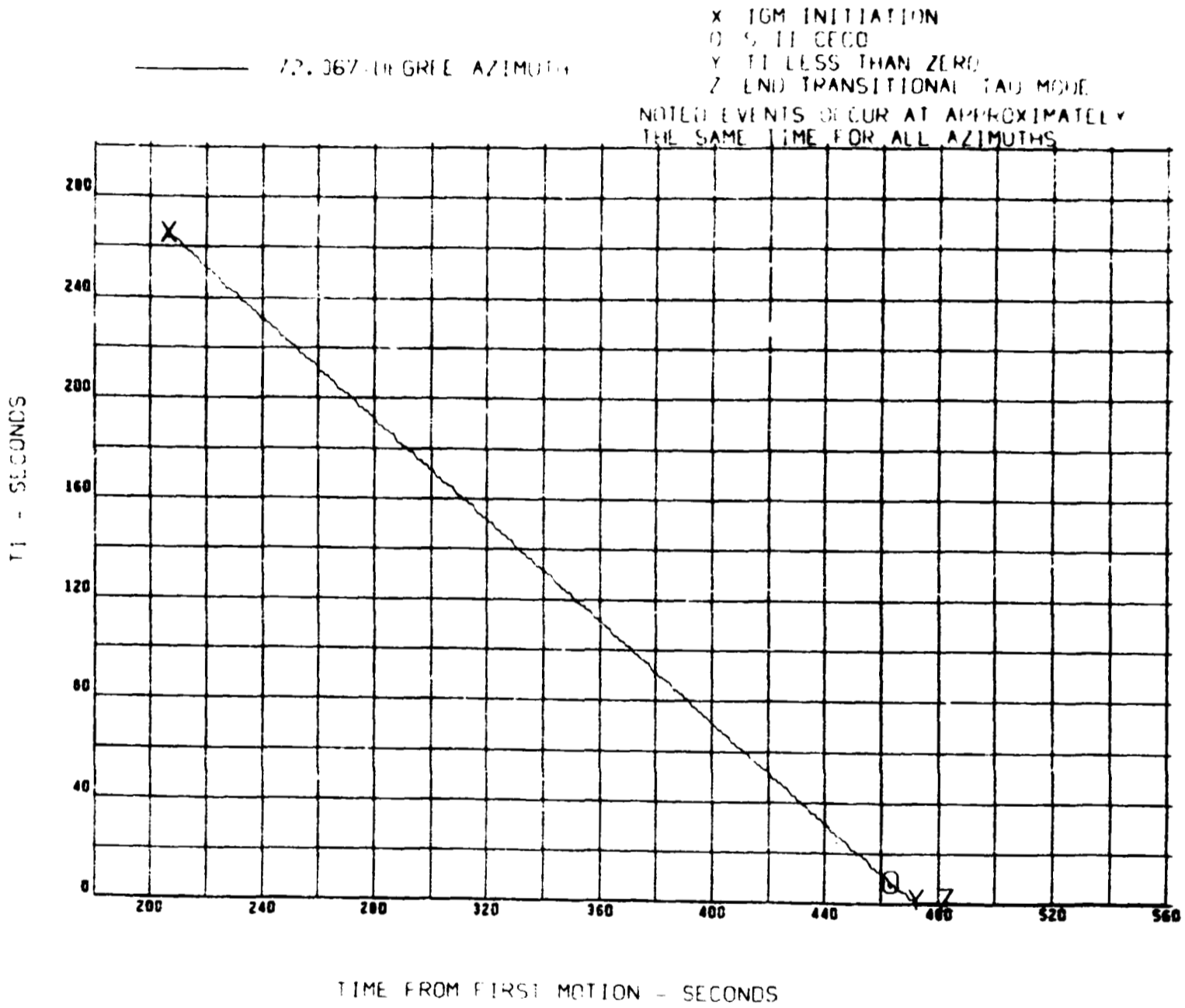


FIGURE 80 TIME REMAINING IN IGM PHASE I FOR S-II STAGE FLIGHT

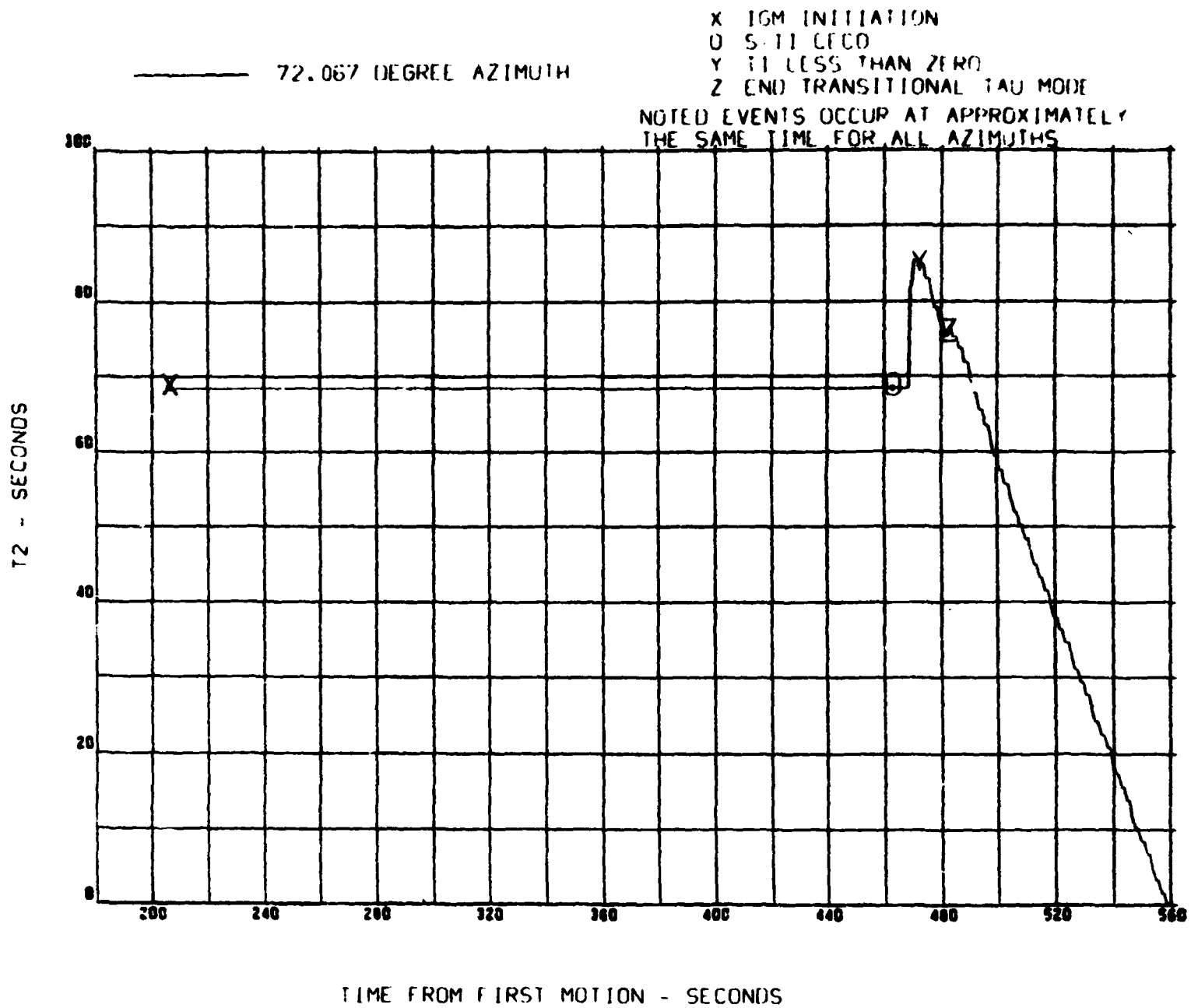


FIGURE 81 TIME REMAINING IN IGM PHASE 2  
 FOR S-II STAGE FLIGHT

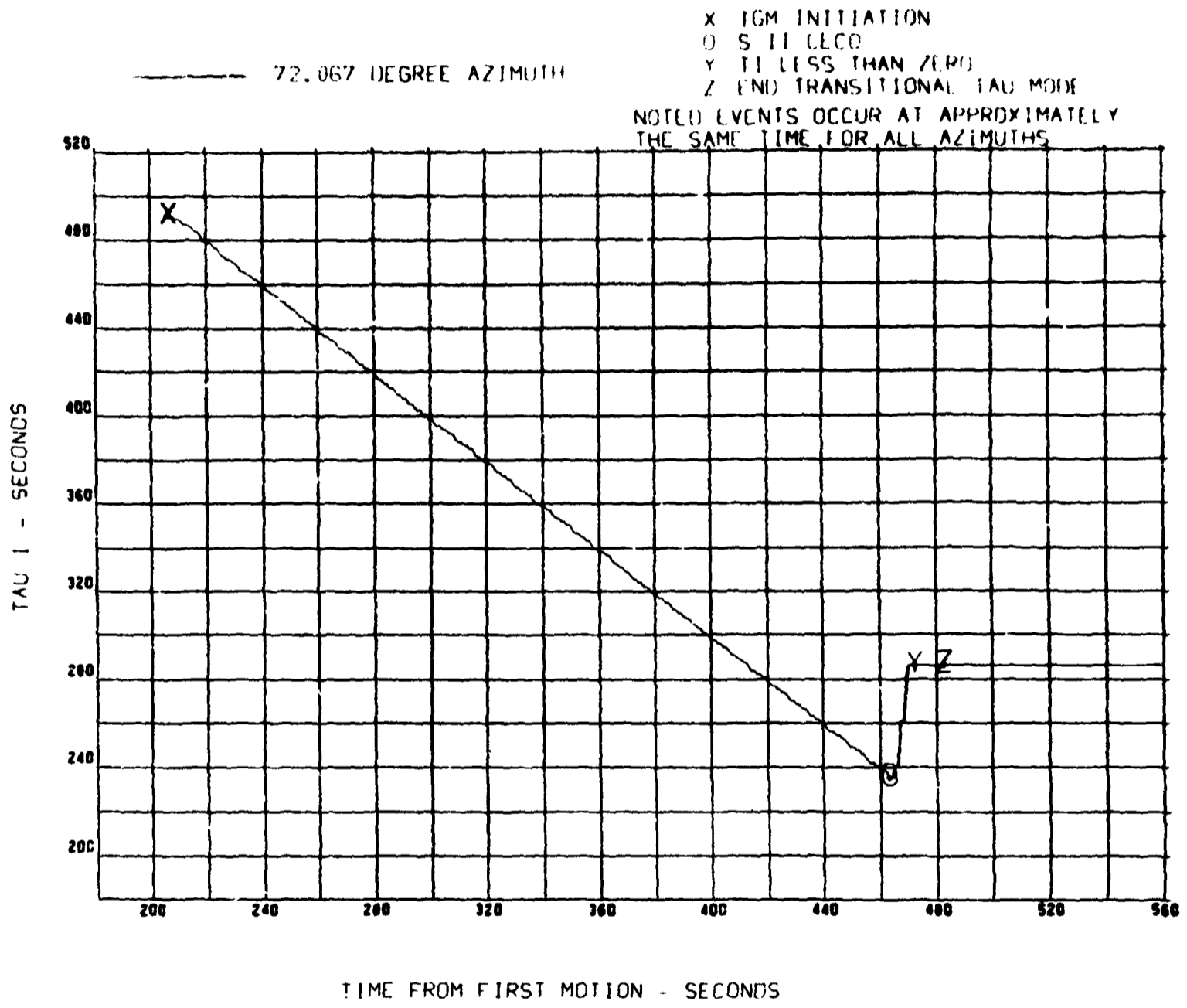


FIGURE 82 RATIO OF MASS TO MASS-FLOWRATE FOR S-II STAGE FLIGHT (IGM PHASE I)

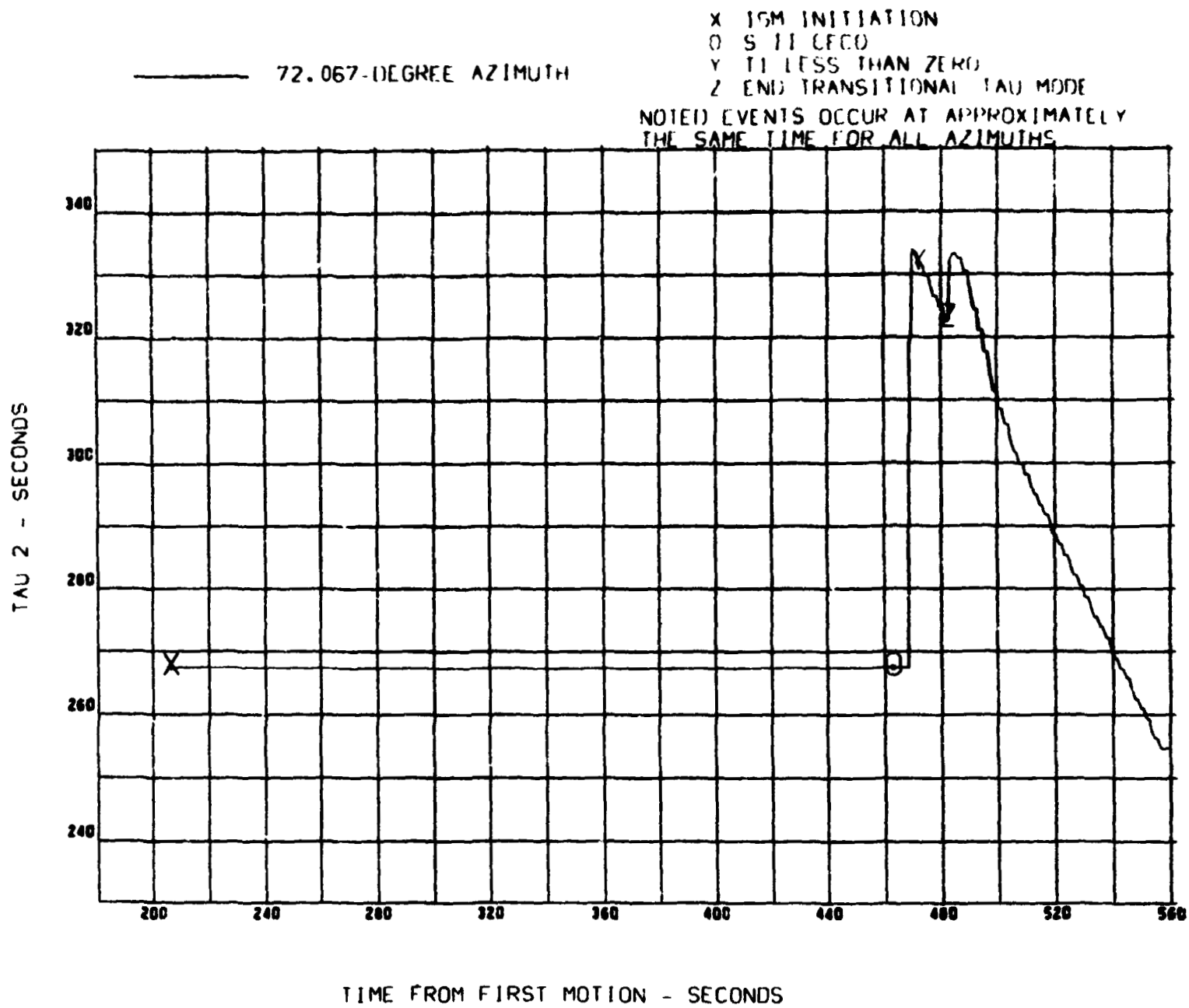


FIGURE 83 RATIO OF MASS TO MASS-FLOWRATE  
 FOR S-II STAGE FLIGHT (IGM PHASE 2)

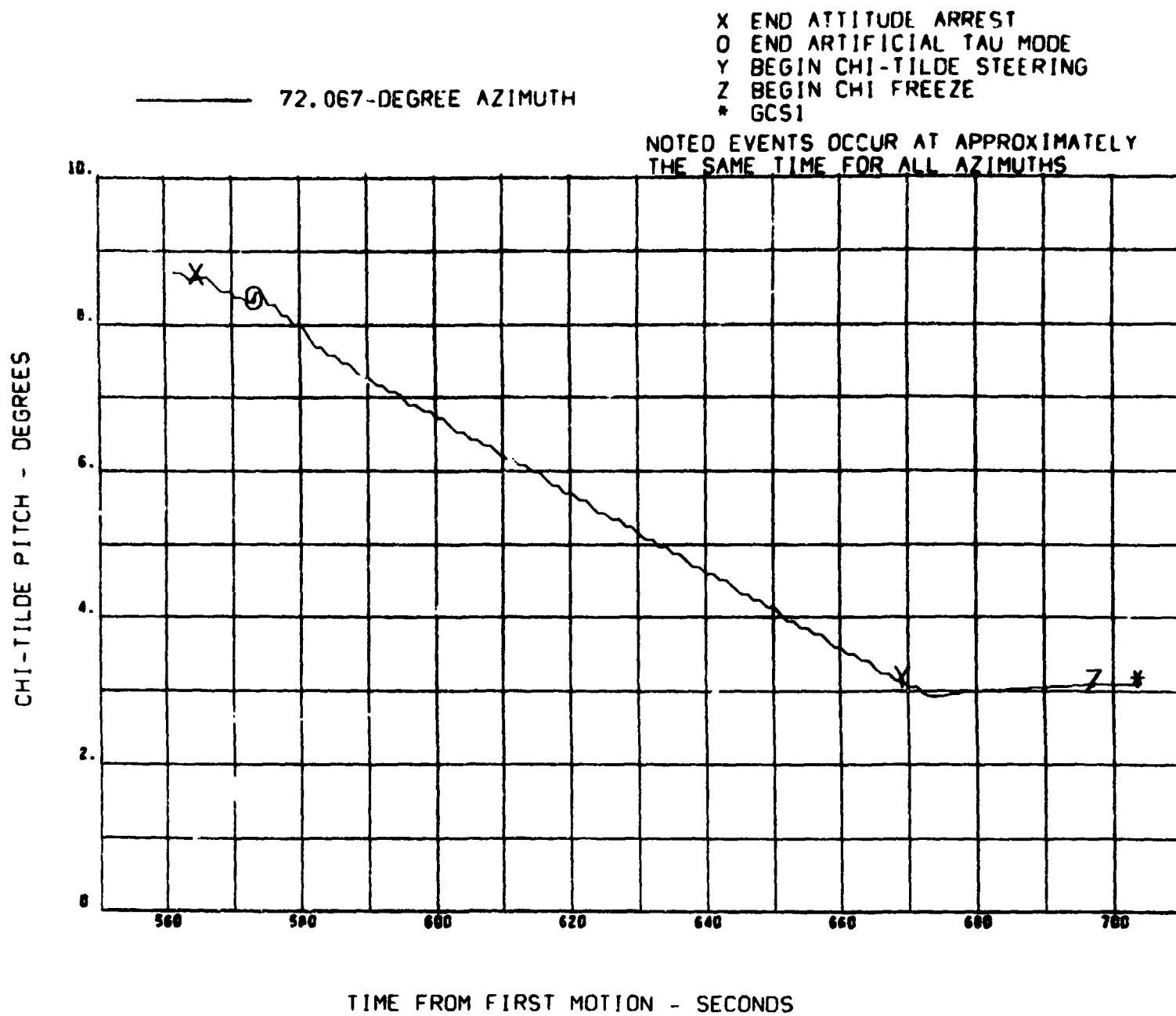


FIGURE 84 REQUIRED PITCH STEERING ANGLE TO SATISFY  
 TERMINAL VELOCITY REQUIREMENTS FOR S-IVB  
 FIRST BURN



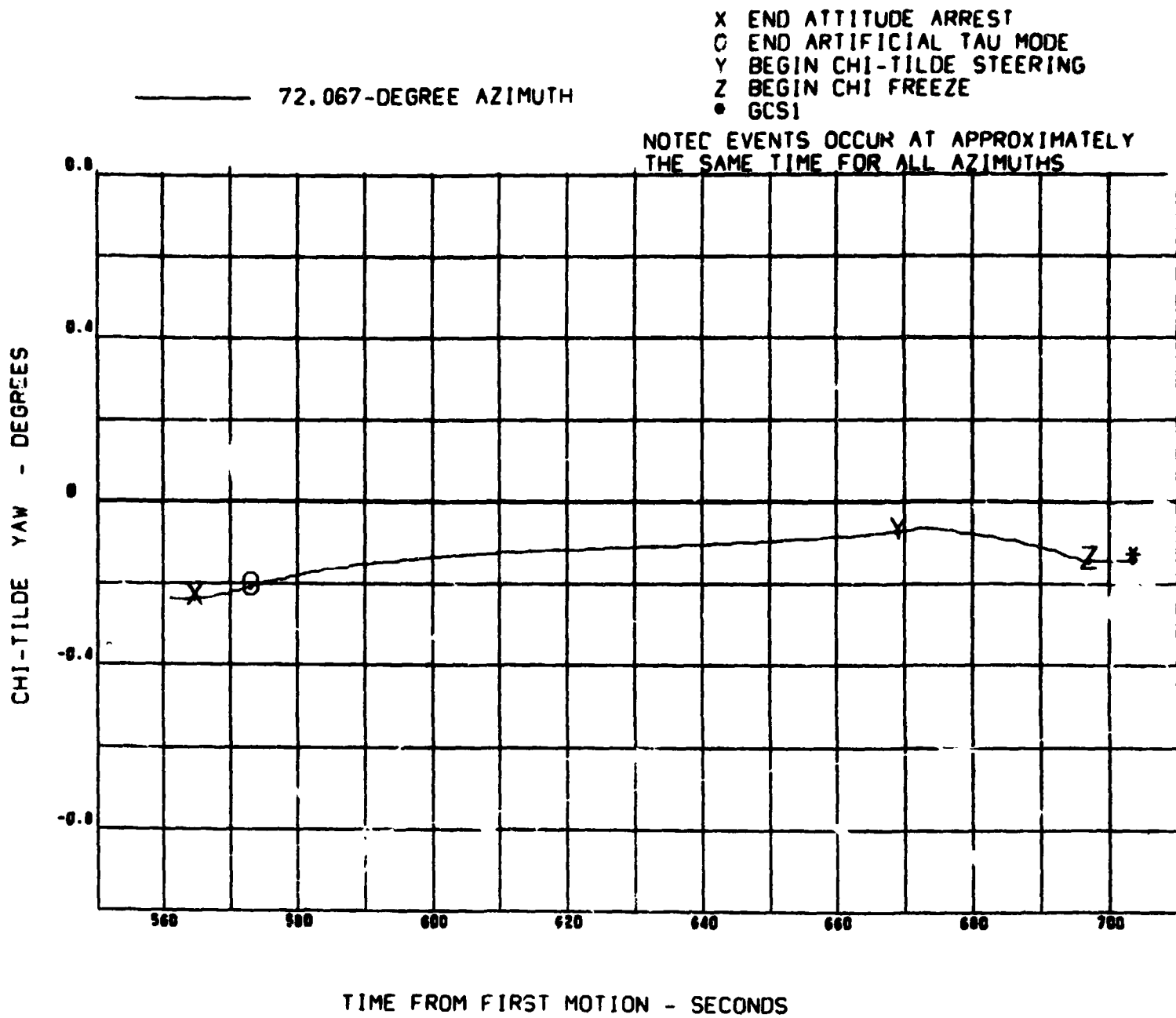


FIGURE 85 REQUIRED YAW STEERING ANGLE TO SATISFY  
 TERMINAL VELOCITY REQUIREMENTS FOR S-IVB  
 FIRST BURN

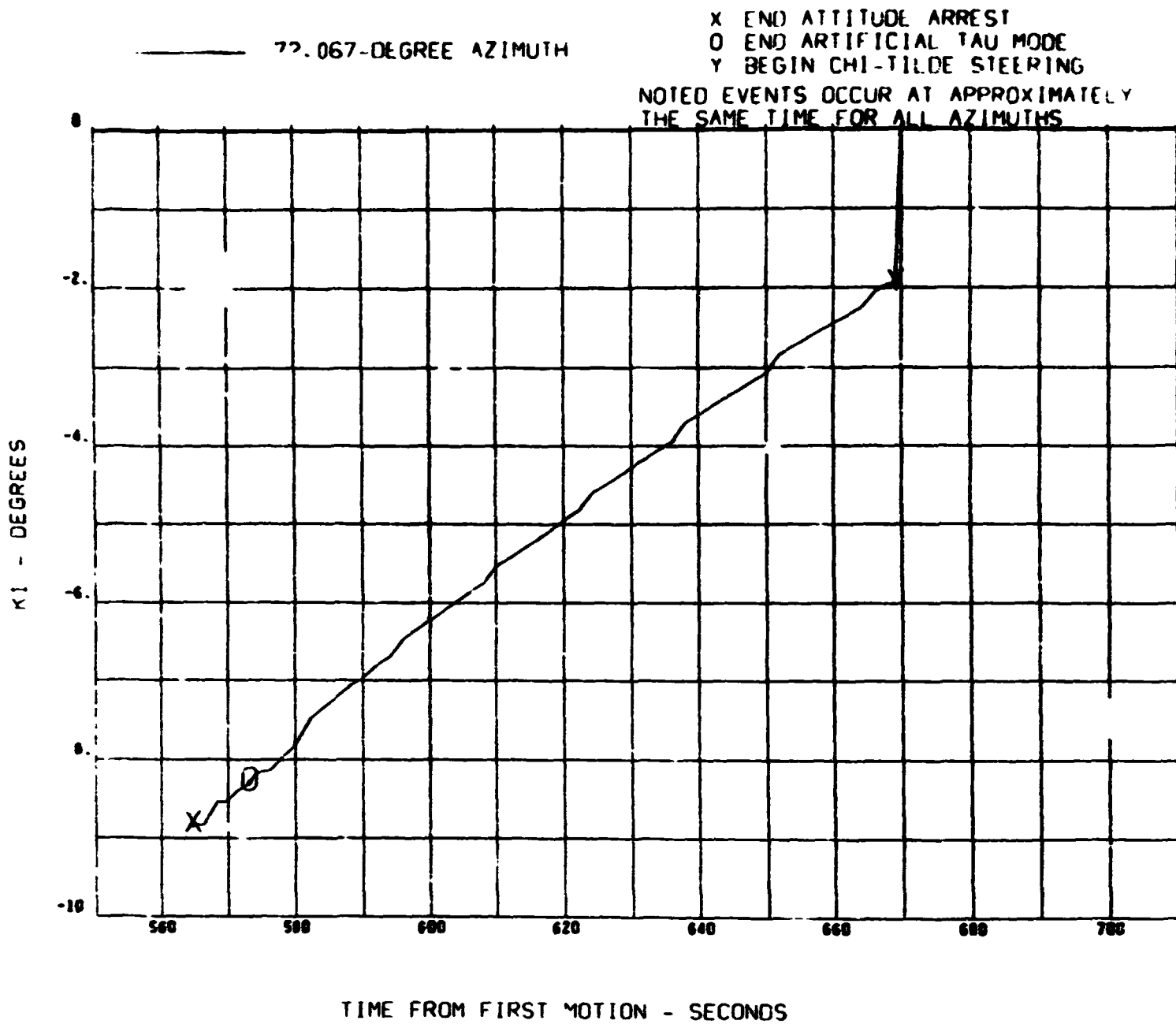


FIGURE 36 PITCH STEERING ANGLE BIAS TO ENFORCE  
 TERMINAL POSITION REQUIREMENTS FOR S-IVB  
 FIRST BURN

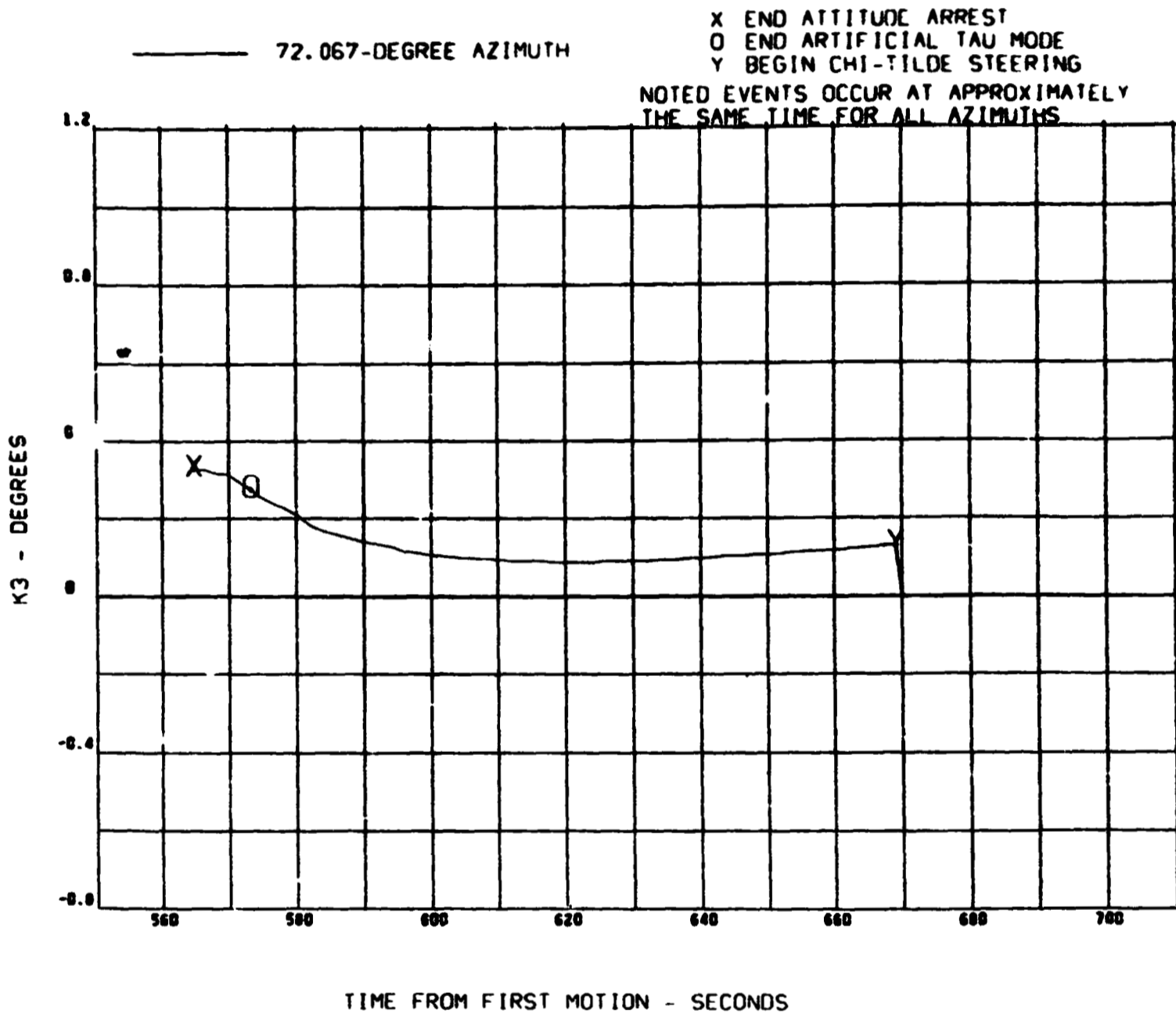


FIGURE 87 YAW STEERING ANGLE BIAS TO ENFORCE  
 TERMINAL POSITION REQUIREMENTS FOR S-IVB  
 FIRST BURN

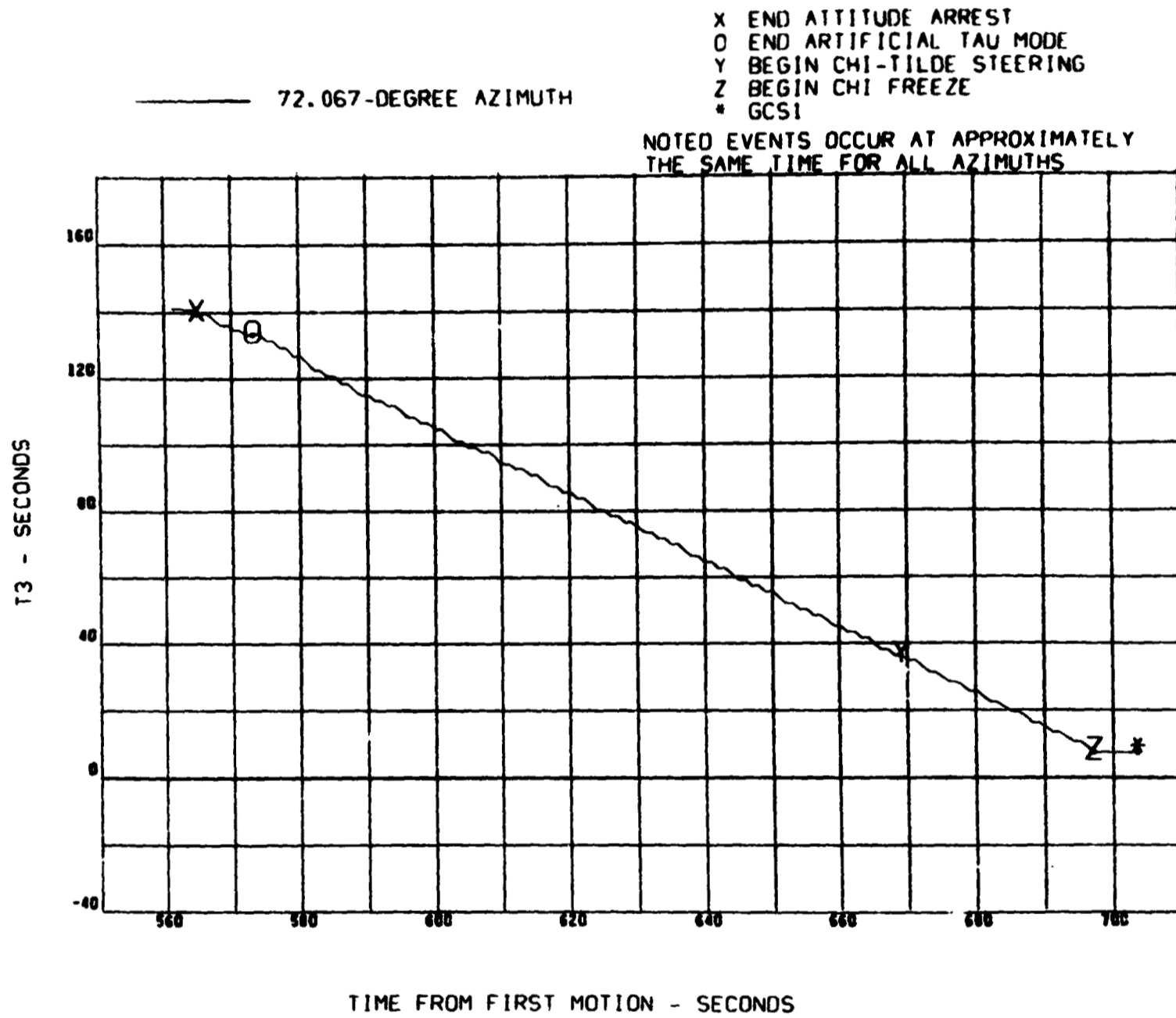


FIGURE 88 TIME-TO-GO IN THIRD STAGE OF IGM

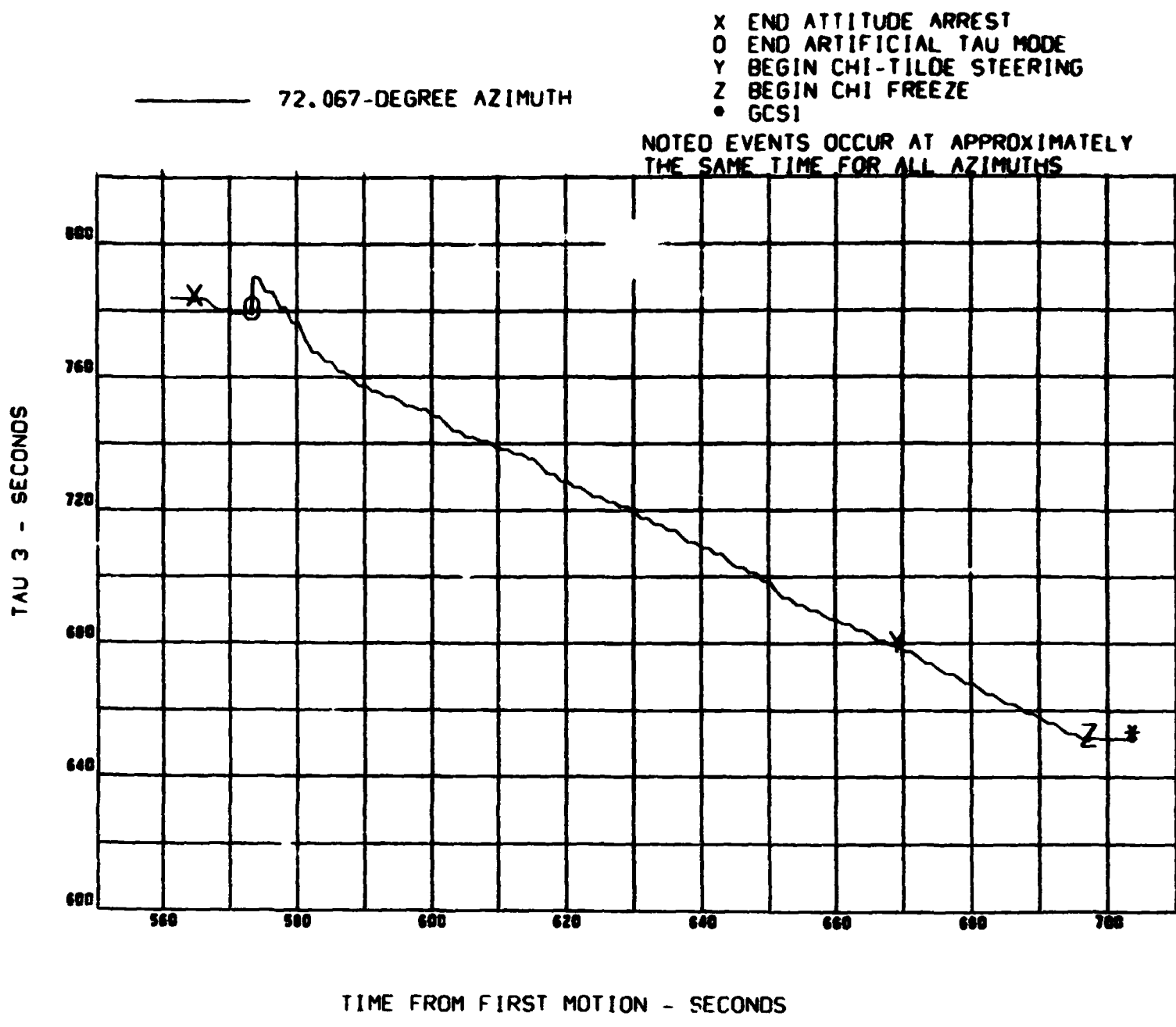


FIGURE 89 RATIO OF MASS TO MASS-FLOWRATE  
 FOR S-IVB FIRST BURN (IGM  
 PHASE 3)

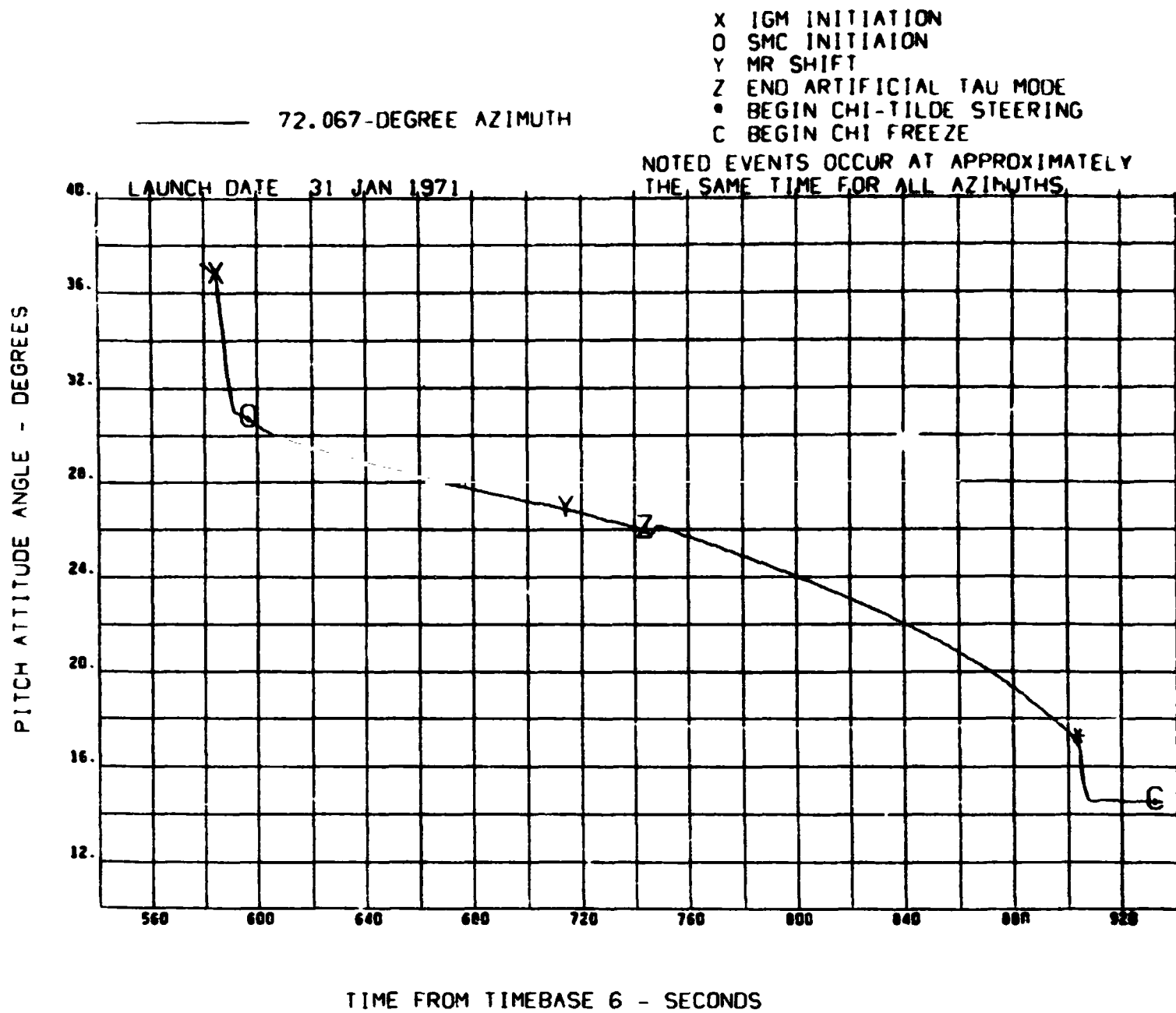


FIGURE 90 COMMANDED VEHICLE PITCH ATTITUDE FOR S-IVB SECOND BURN (FIRST OPPORTUNITY)

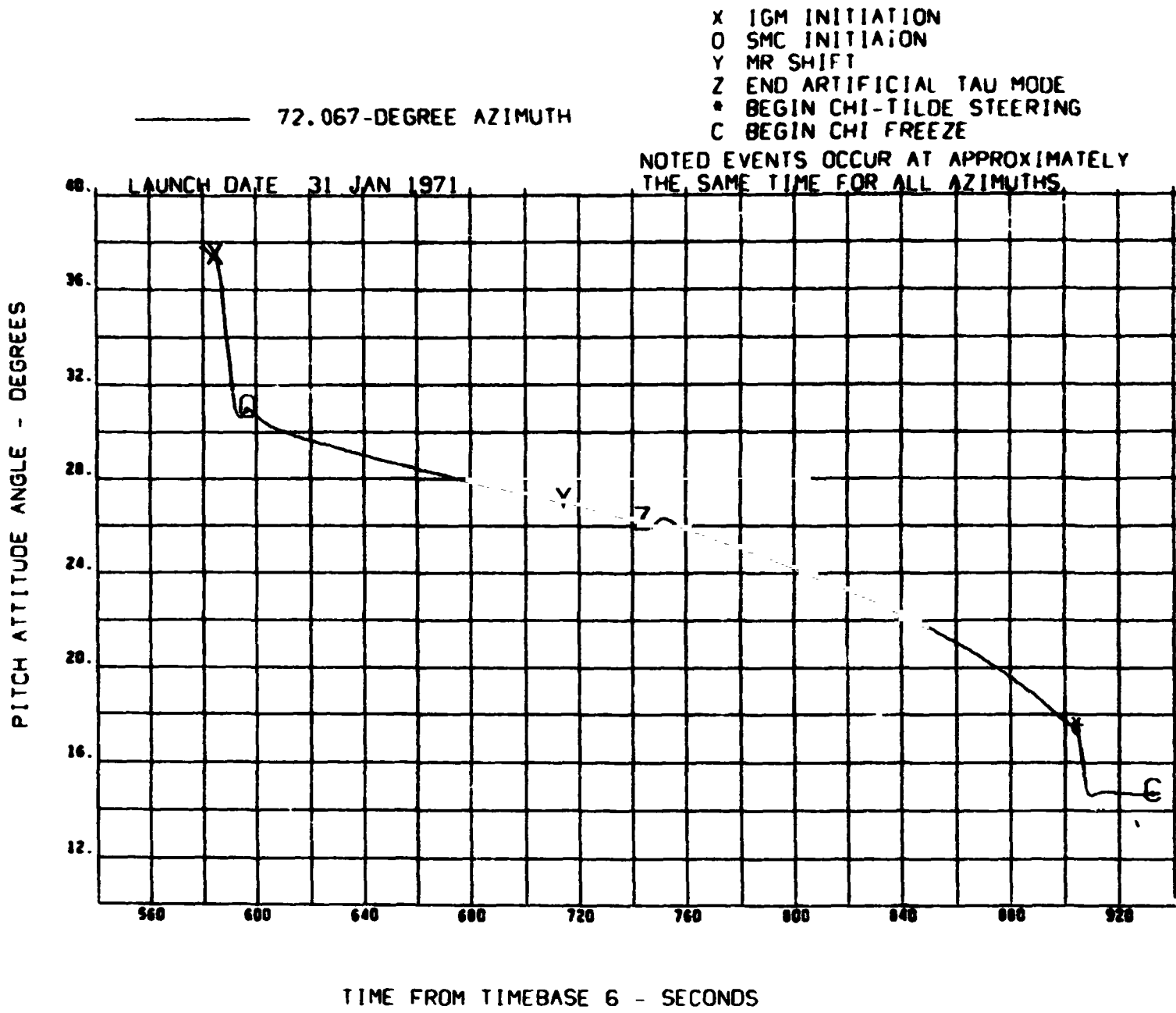


FIGURE 91 ACTUAL VEHICLE PITCH ATTITUDE FOR S-IVB SECOND BURN (FIRST OPPORTUNITY)

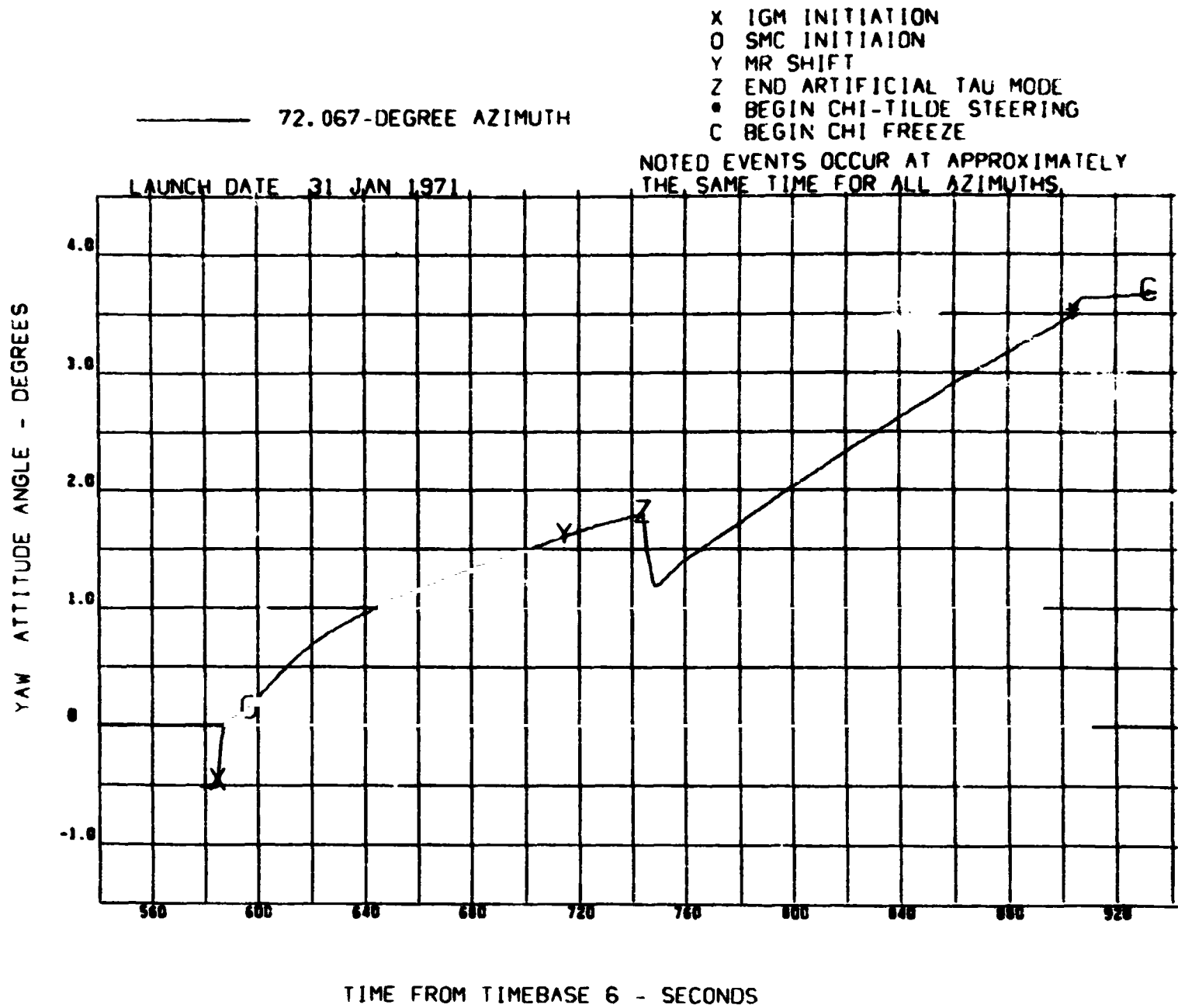


FIGURE 92 COMMANDED VEHICLE YAW ATTITUDE FOR S-IVB SECOND BURN (FIRST OPPORTUNITY)



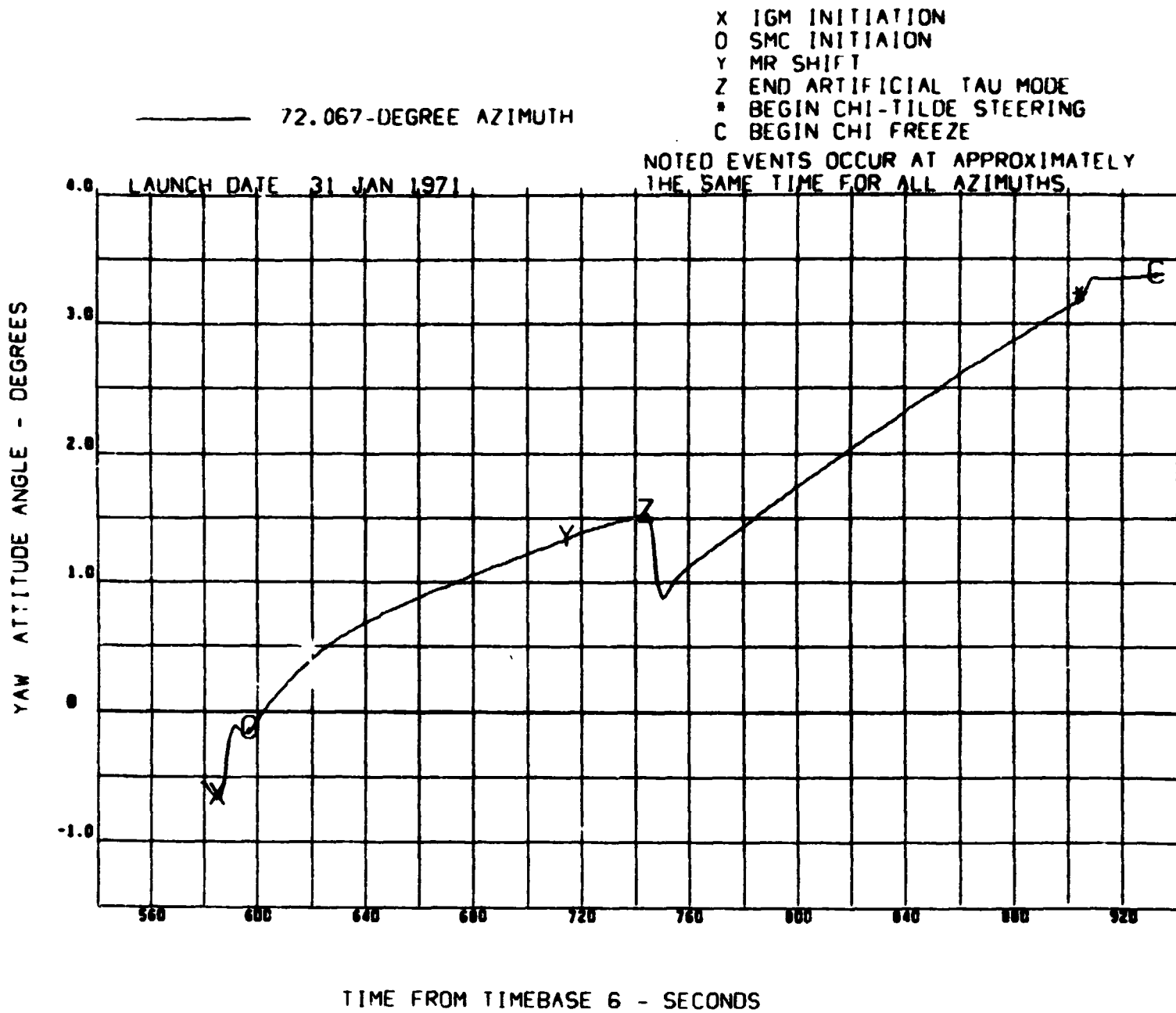


FIGURE 93 ACTUAL VEHICLE YAW ATTITUDE FOR S-IVB SECOND BURN (FIRST OPPORTUNITY)

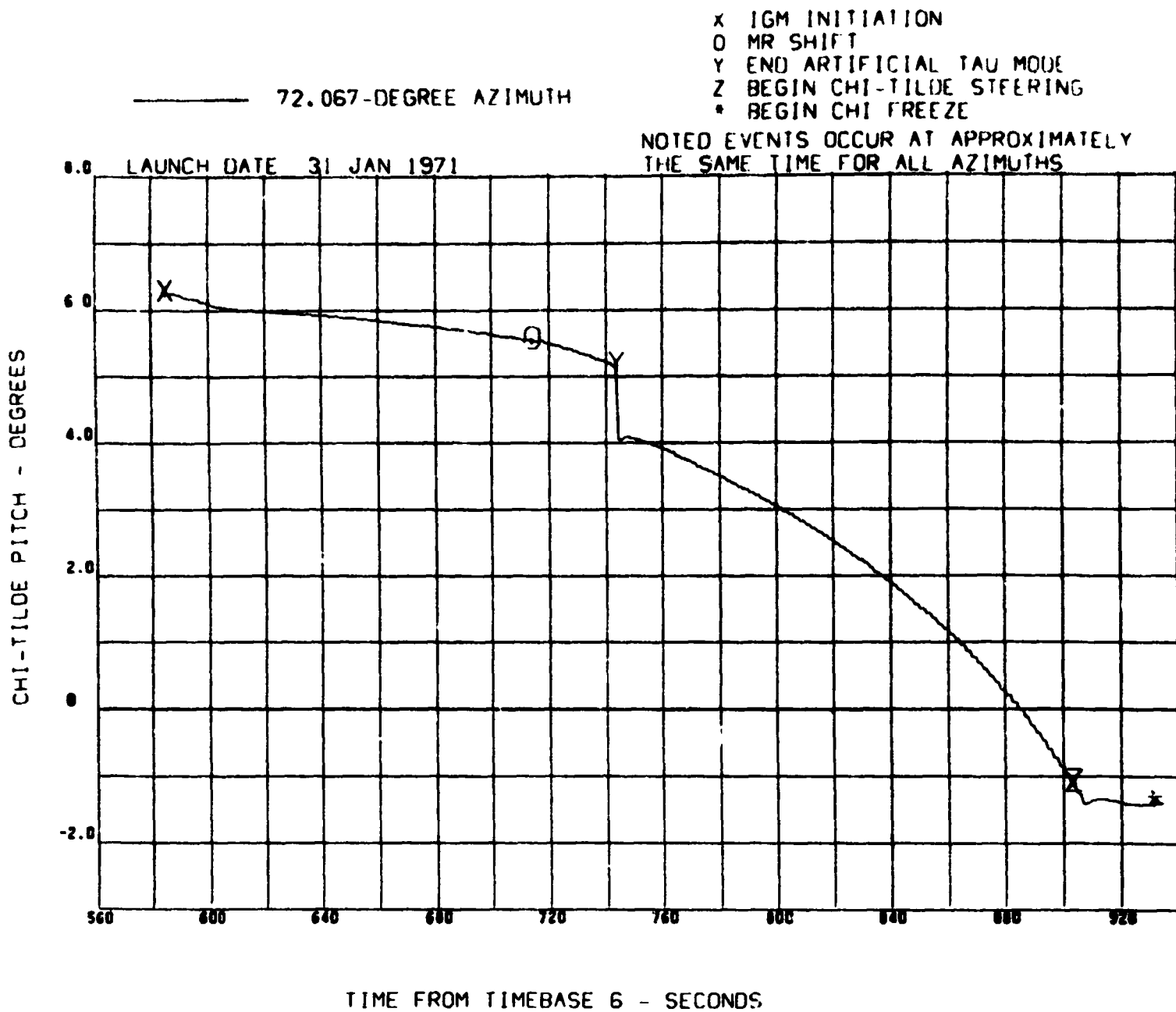


FIGURE 94 REQUIRED PITCH STEERING ANGLE TO SATISFY TERMINAL VELOCITY REQUIREMENTS FOR S-IVB SECOND BURN (FIRST OPPORTUNITY)

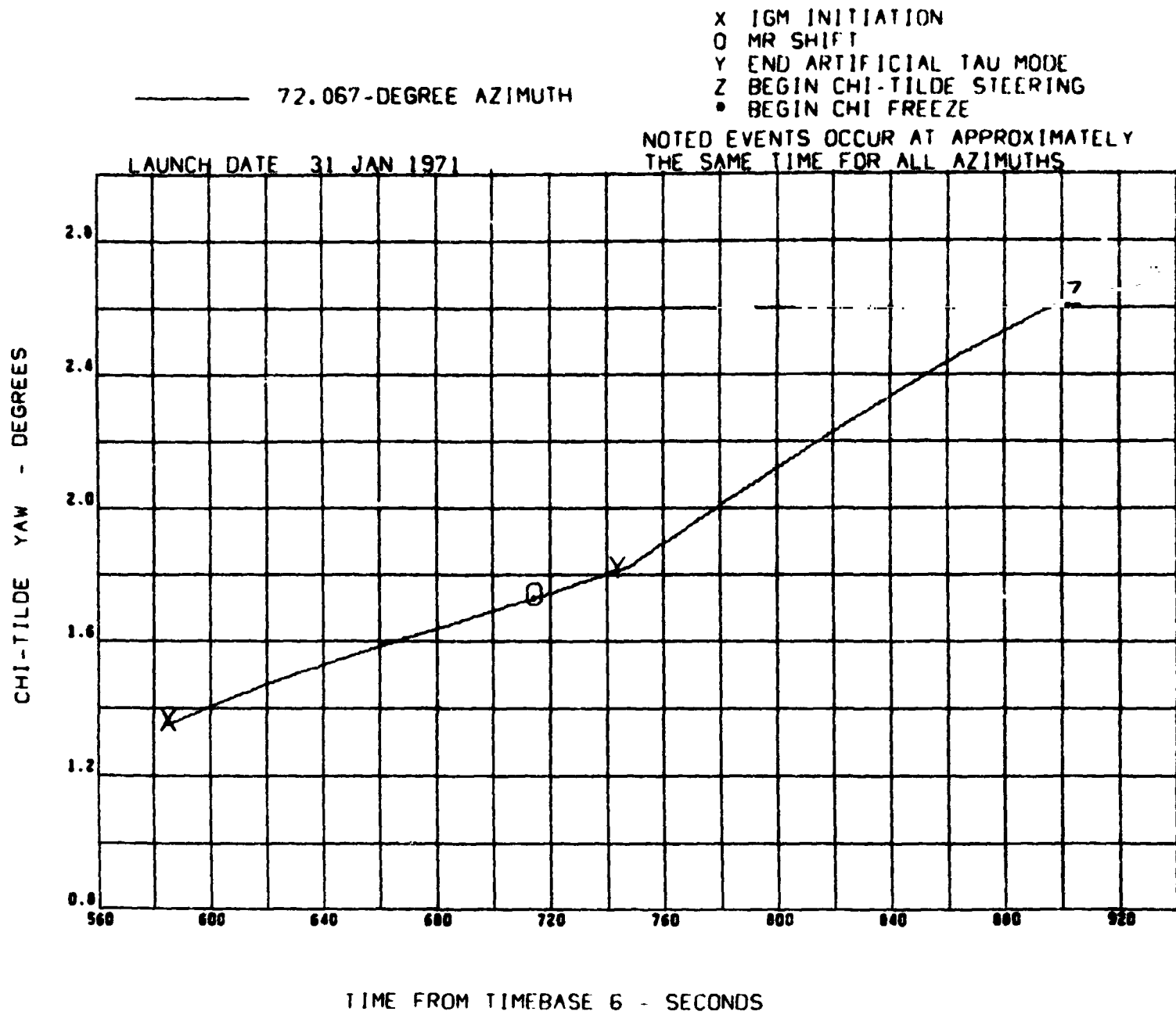


FIGURE 95 REQUIRED YAW STEERING ANGLE TO SATISFY  
TERMINAL VELOCITY REQUIREMENTS FOR S-IVB  
SECOND BURN (FIRST OPPORTUNITY)

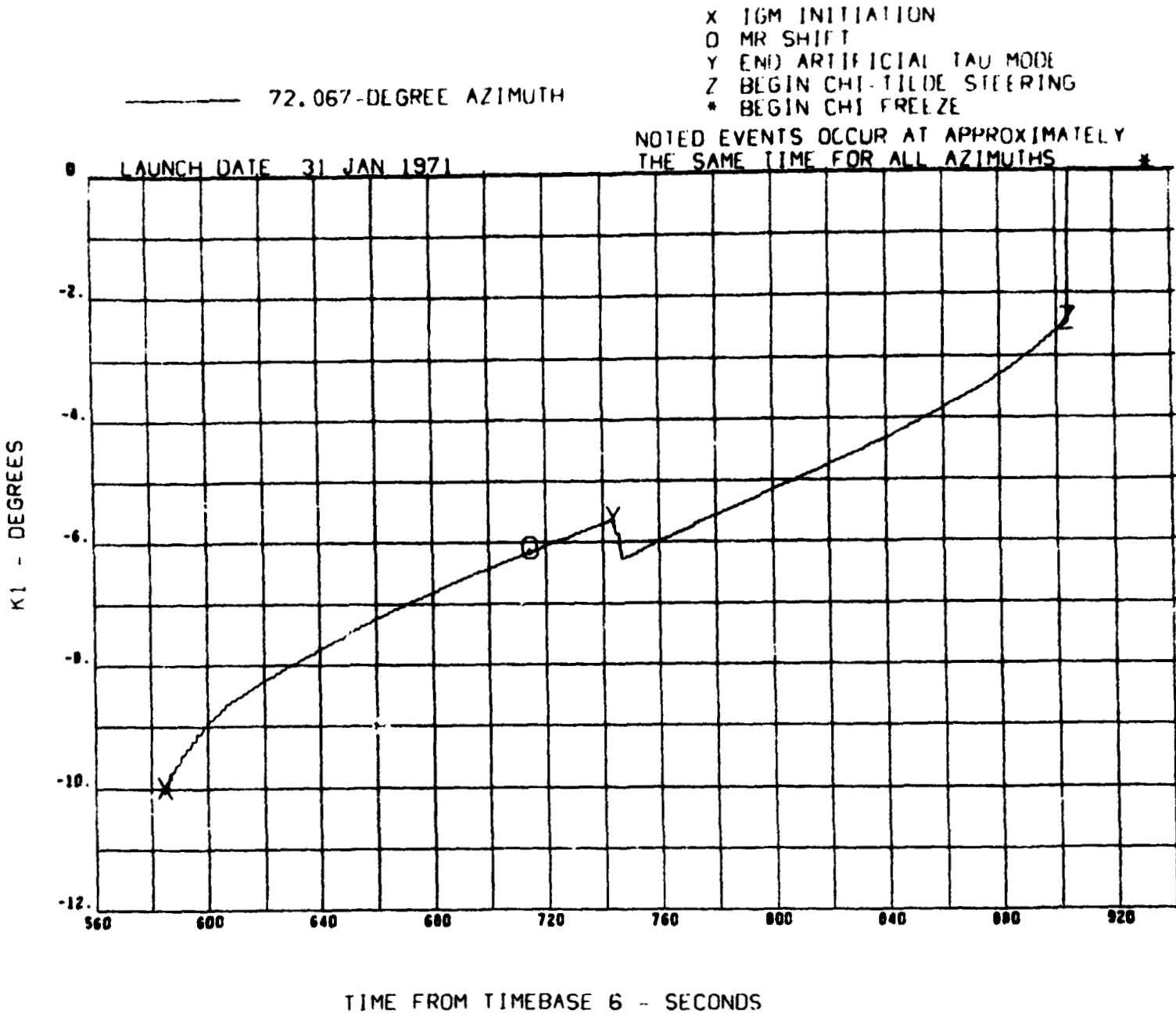


FIGURE 96 PITCH STEERING ANGLE BIAS TO ENFORCE  
 TERMINAL POSITION REQUIREMENTS FOR S-IVB  
 SECOND BURN (FIRST OPPORTUNITY)

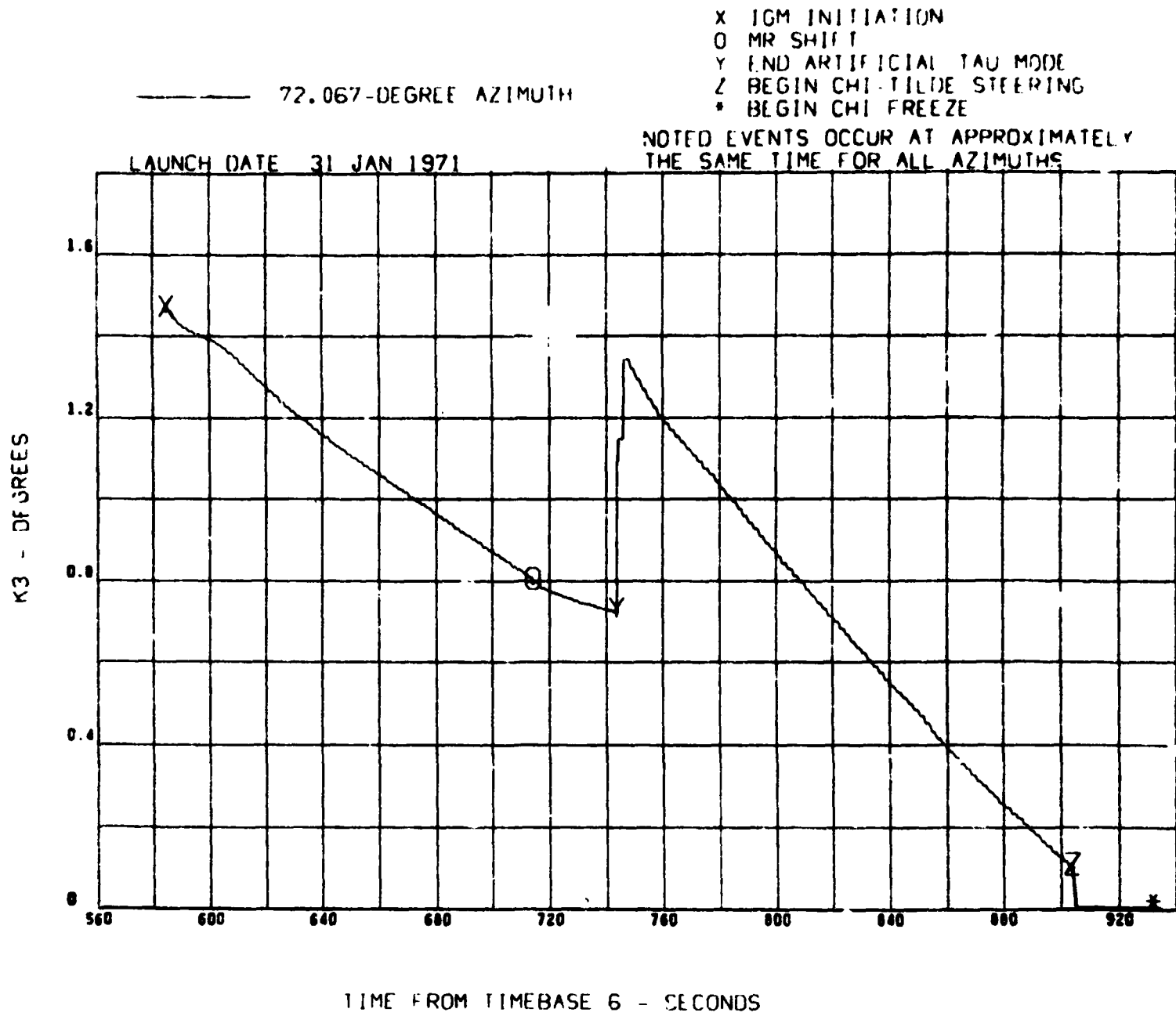


FIGURE 97 YAW STEERING ANGLE BIAS TO ENFORCE TERMINAL POSITION REQUIREMENTS FOR S-IVB SECOND BURN (FIRST OPPORTUNITY)

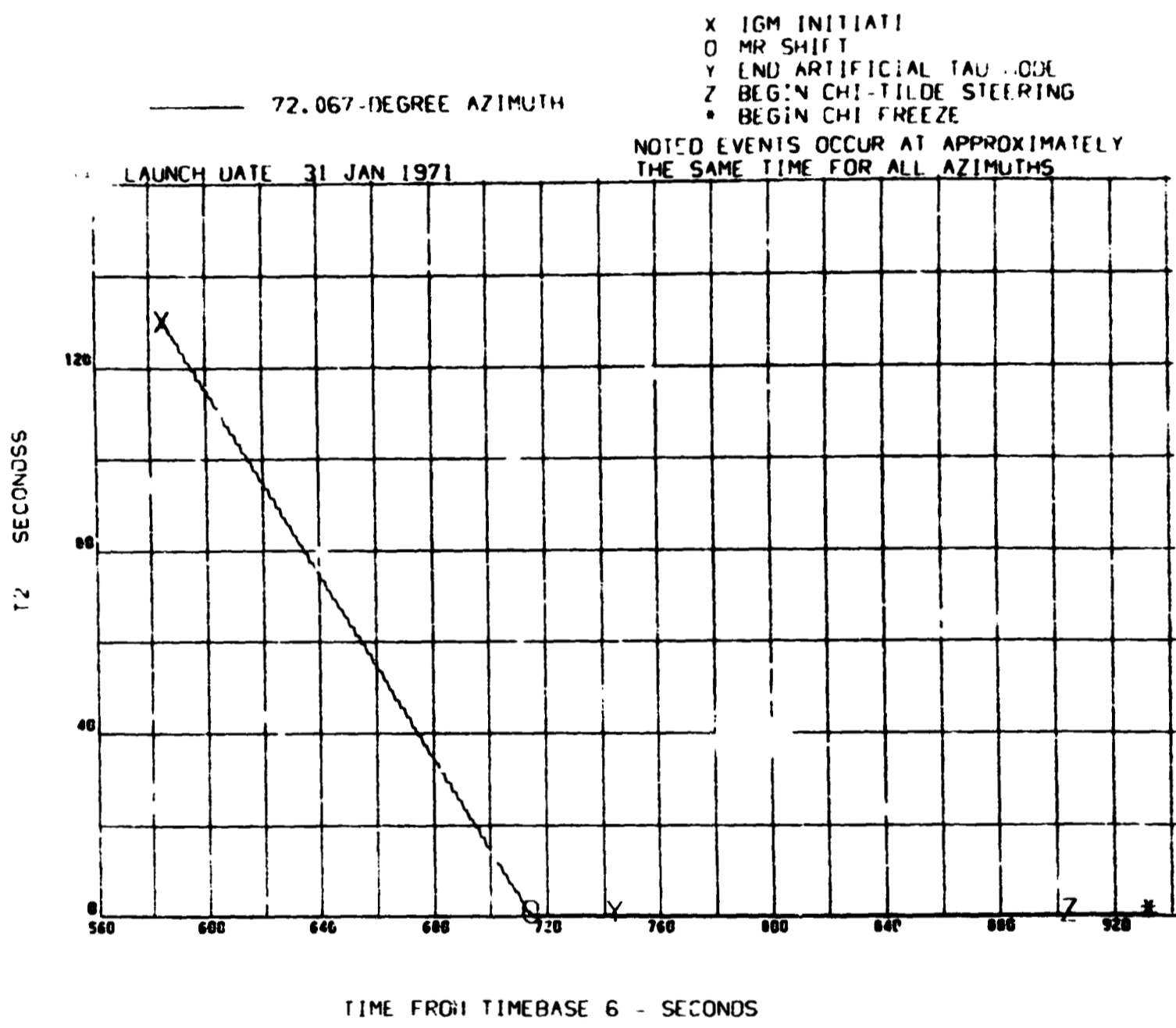


FIGURE 90 TIME REMAINING IN IGM PHASE 4 FOR S-IVB SECOND BURN (FIRST OPPORTUNITY)

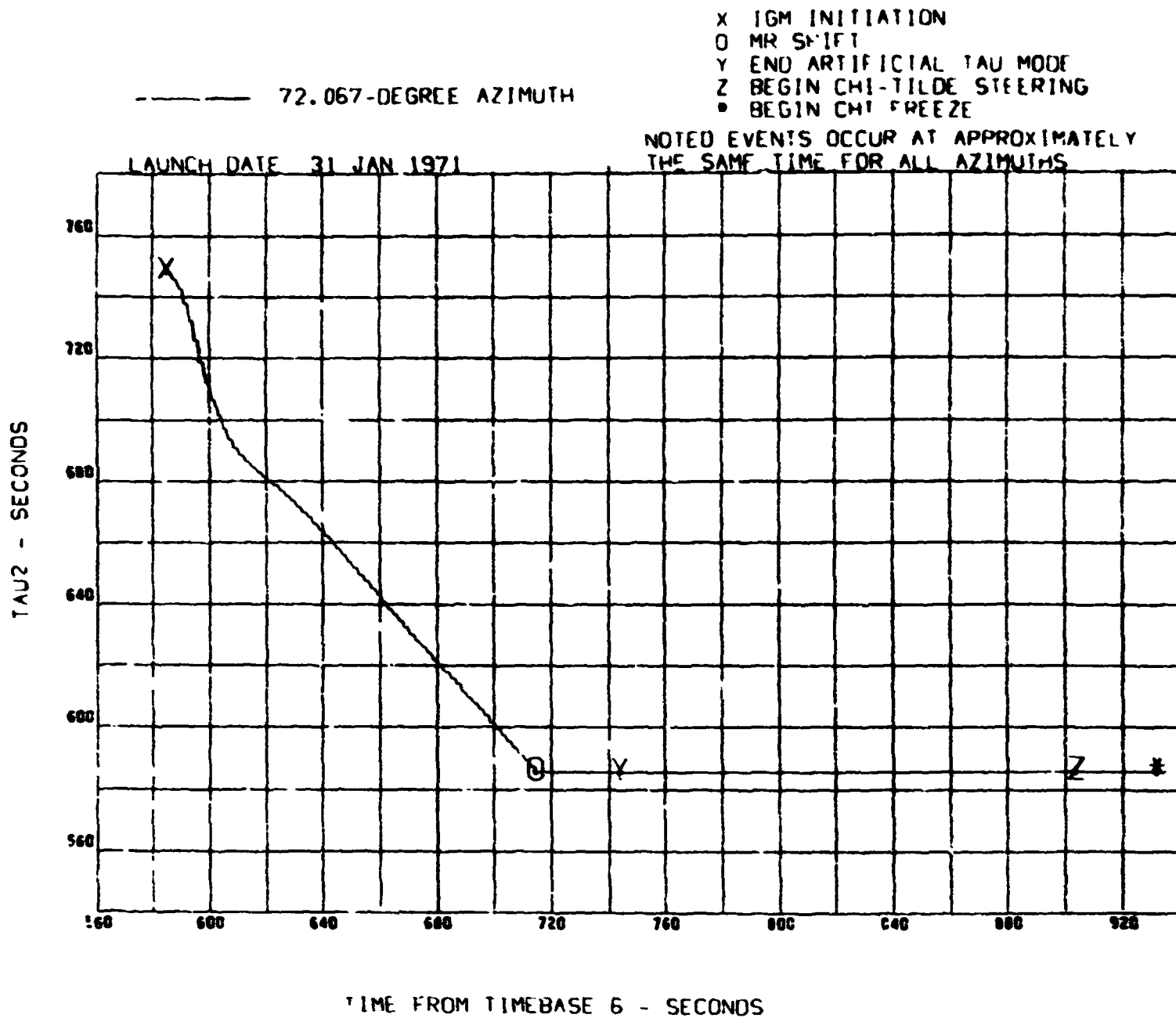


FIGURE 99 RATIO OF MASS TO MASS-FLOWRATE FOR S-IVB SECOND BURN (FIRST OPPORTUNITY - IGM PHASE 4)

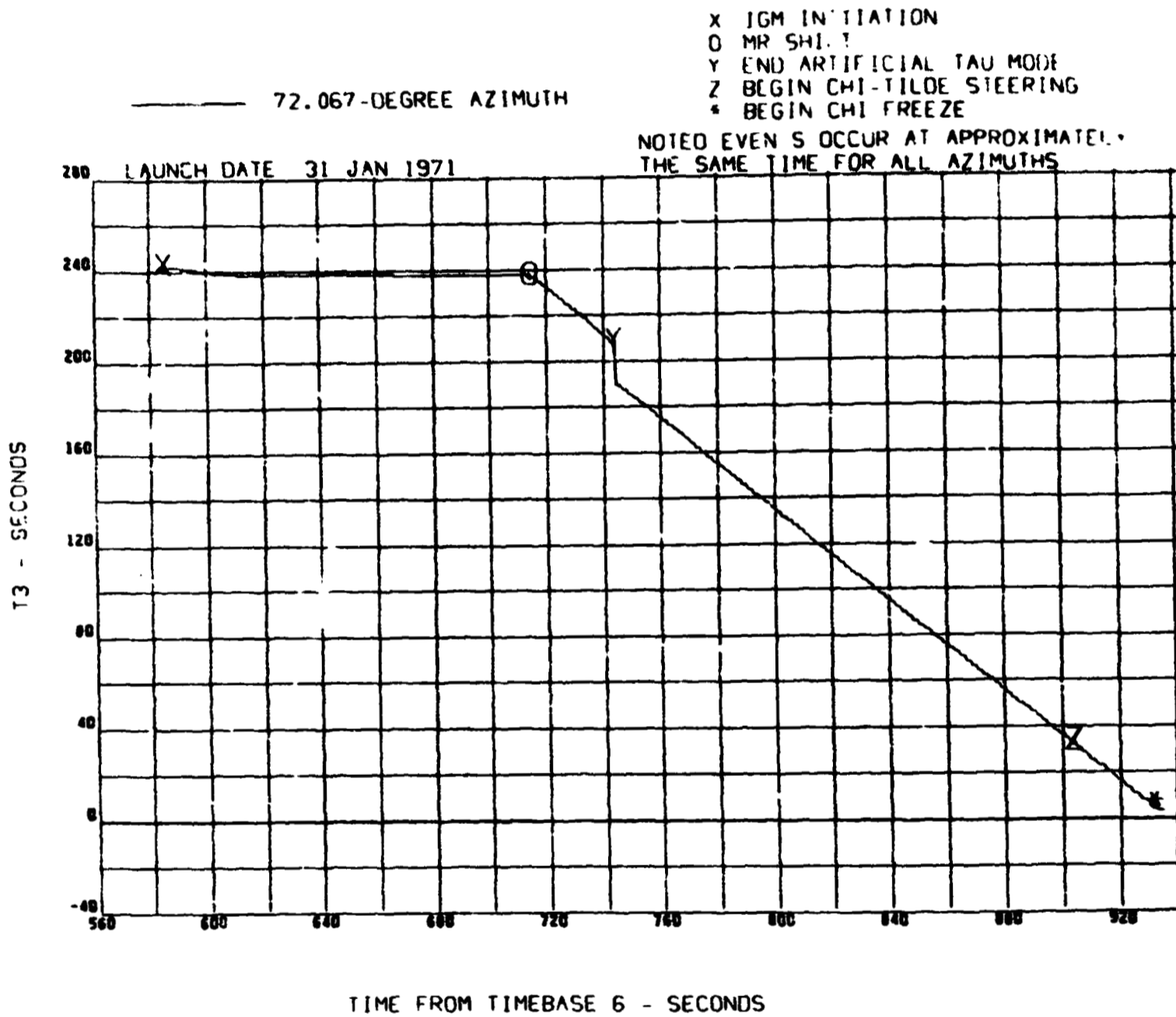


FIGURE 100 TIME REMAINING IN IGM PHASE 5 FOR S-IVB SECOND BURN (FIRST OPPORTUNITY)



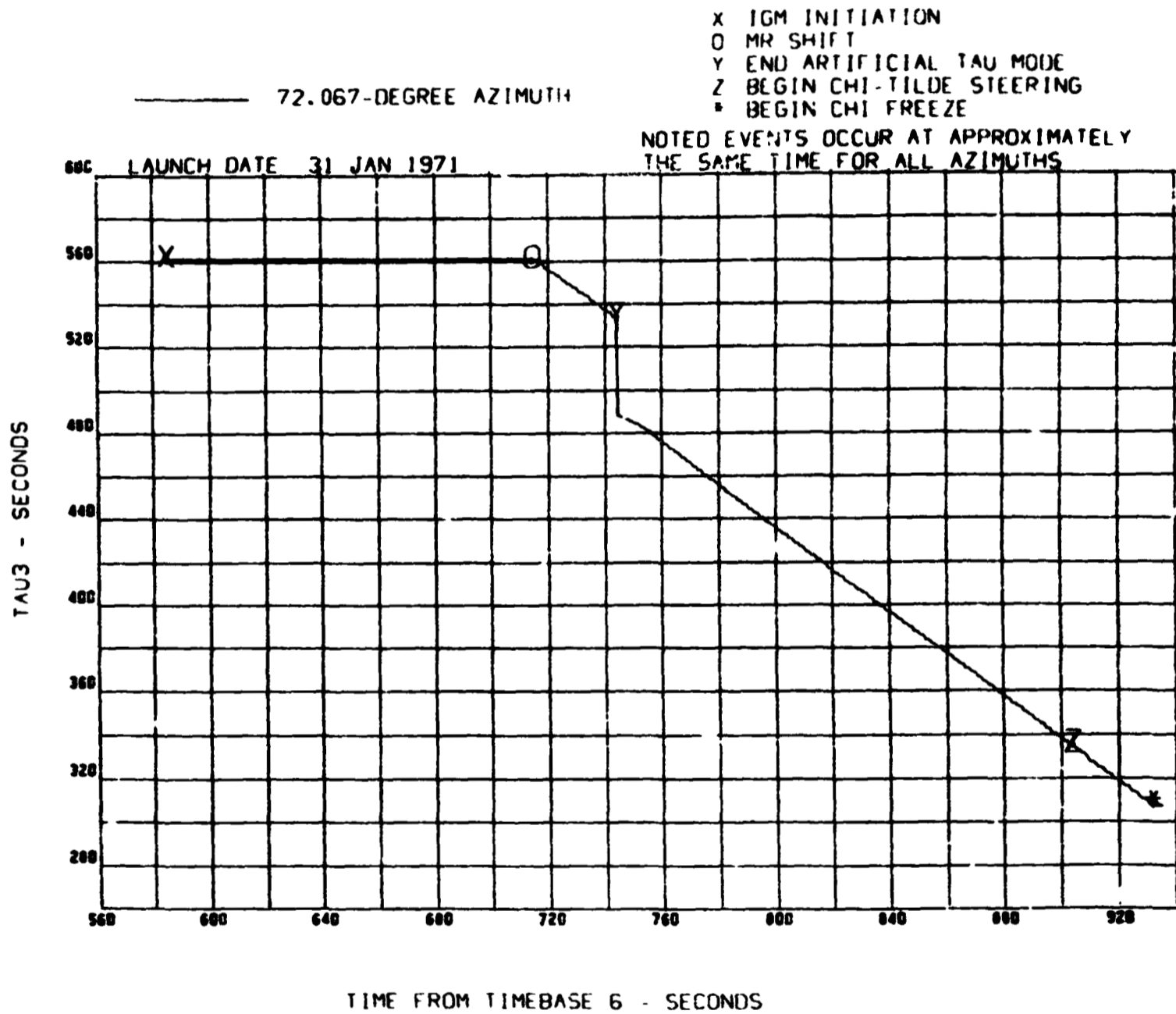


FIGURE 101 RATIO OF MASS TO MASS-FLOWRATE FOR S-IVB SECOND BURN (FIRST OPPORTUNITY - IGM PHASE 5)

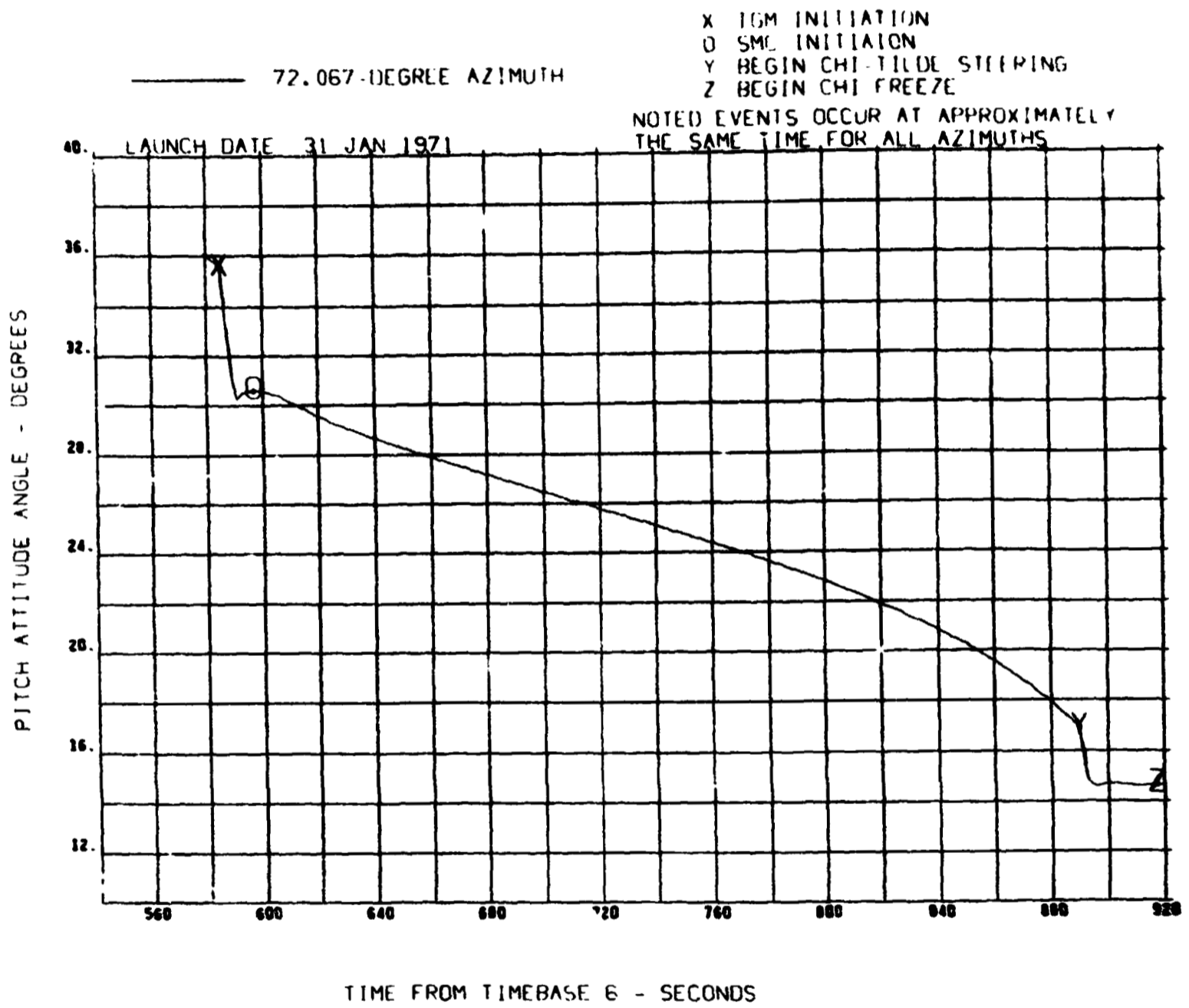


FIGURE 102 COMMANDED VEHICLE PITCH ATTITUDE FOR S-IVB SECOND BURN (SECOND OPPORTUNITY)

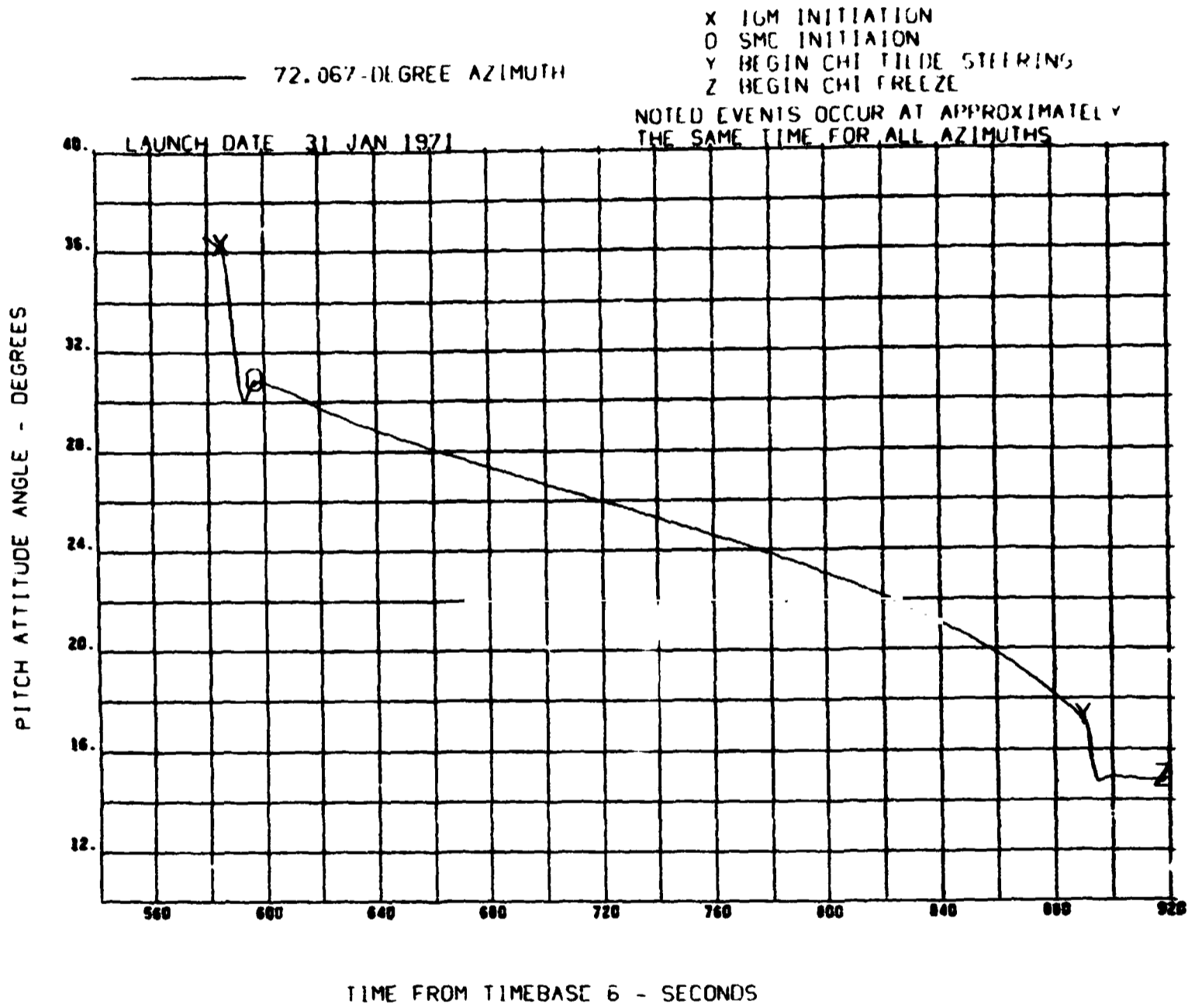


FIGURE 103 ACTUAL VEHICLE PITCH ATTITUDE FOR S-IVB SECOND BURN (SECOND OPPORTUNITY)

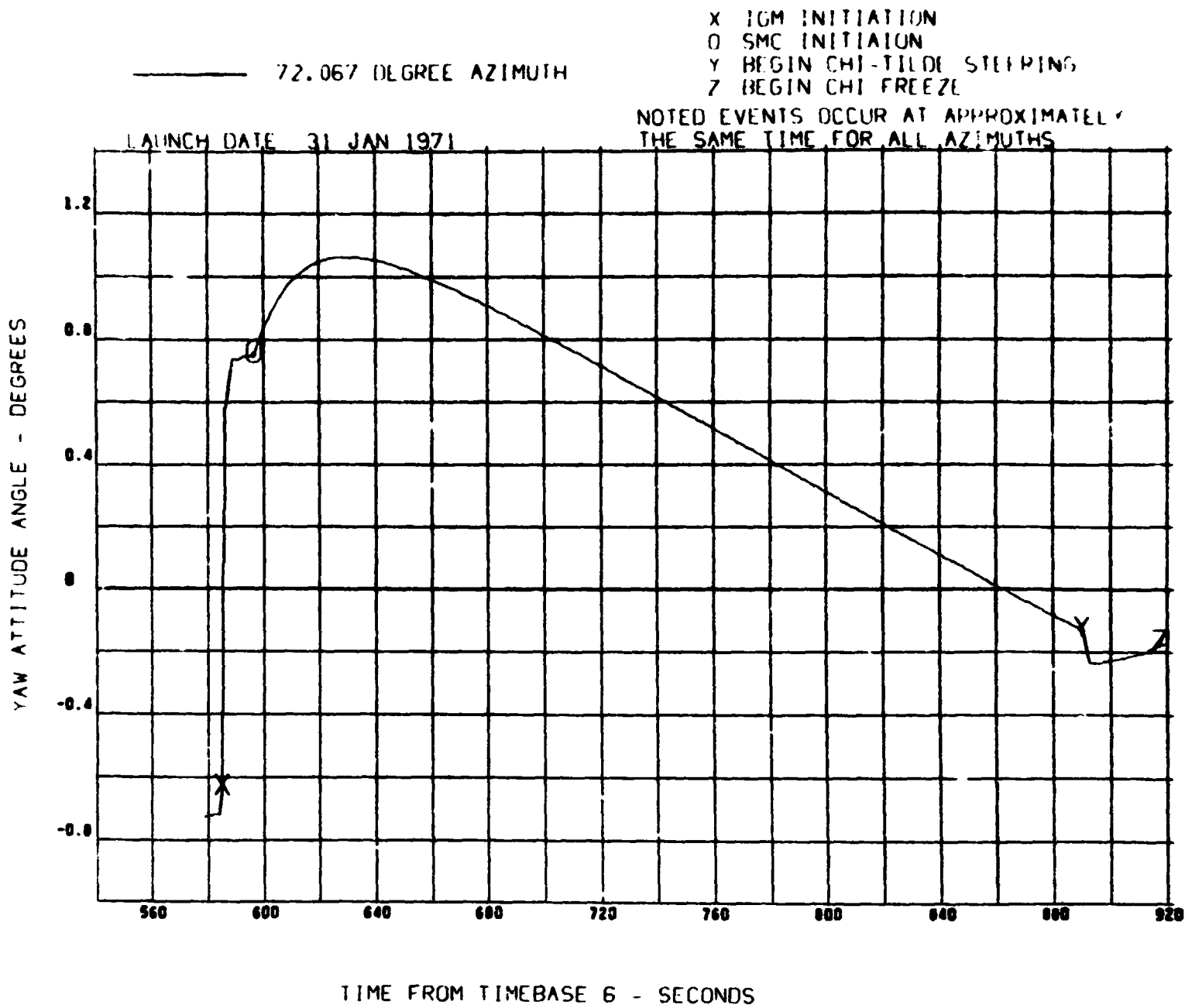


FIGURE 104 COMMANDED VEHICLE YAW ATTITUDE FOR S-IVB  
 SECOND BURN (SECOND OPPORTUNITY)

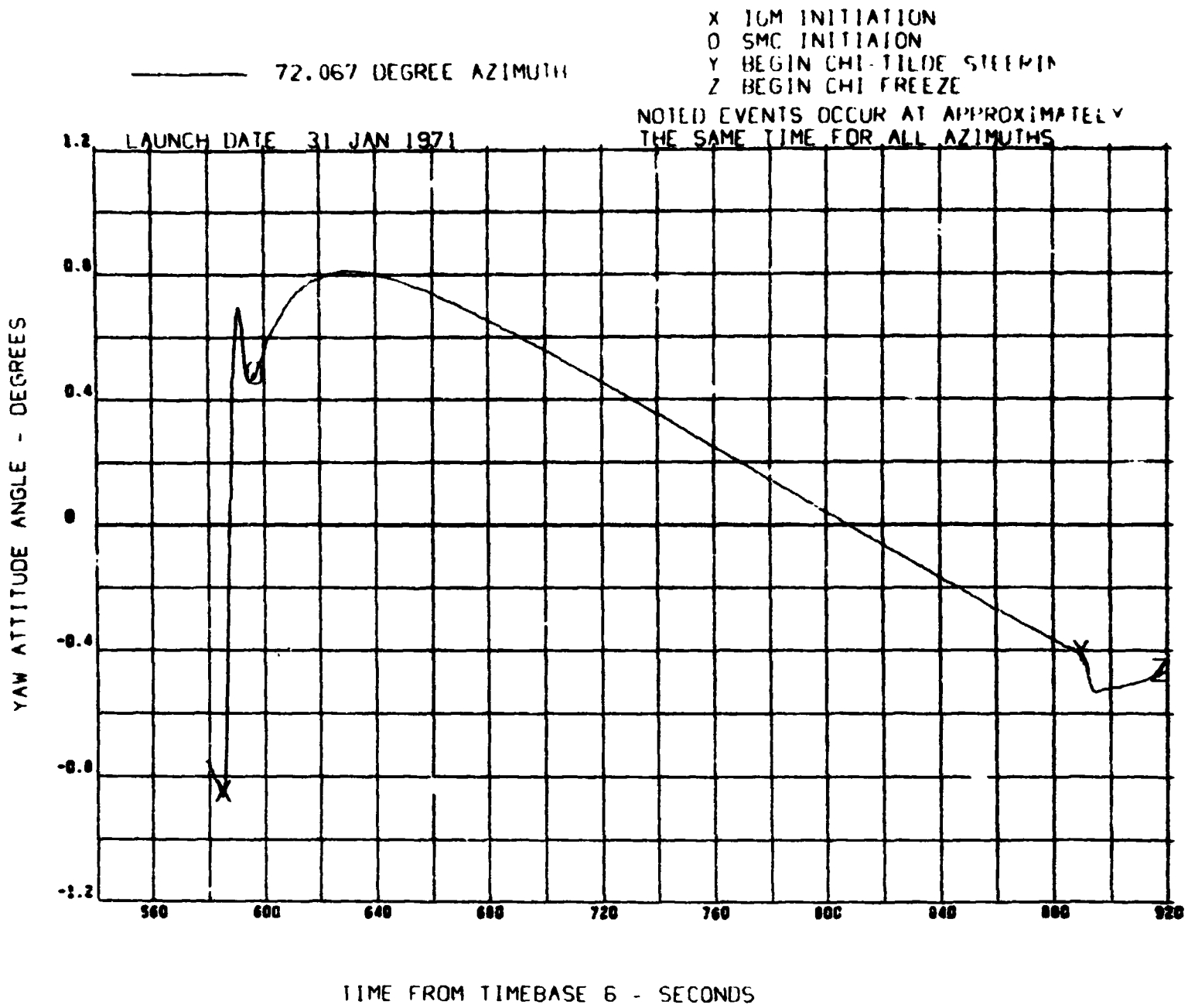


FIGURE 105 ACTUAL VEHICLE YAW ATTITUDE FOR S-IVB SECOND BURN (SECOND OPPORTUNITY)

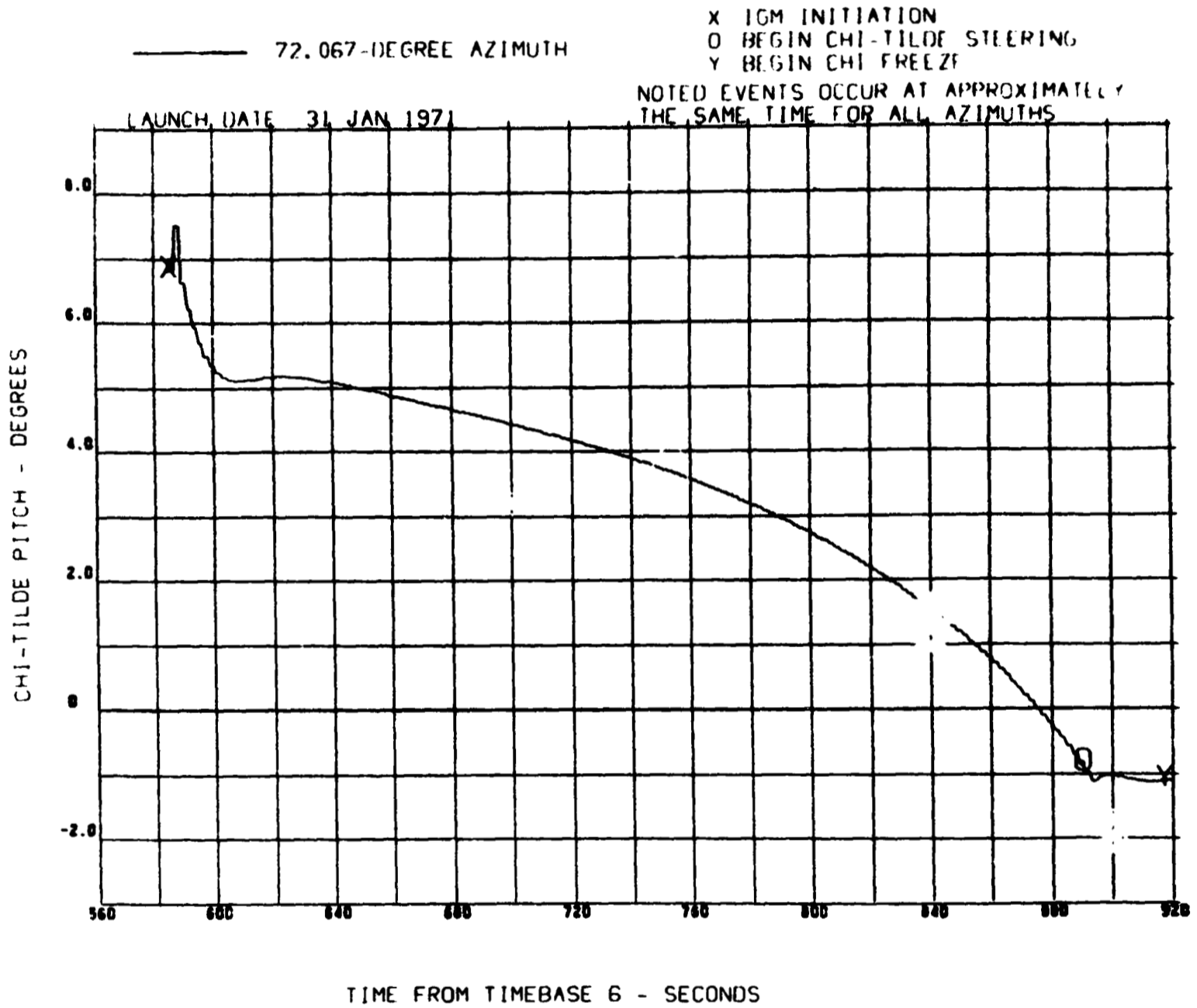


FIGURE 106 REQUIRED PITCH STEERING ANGLE TO SATISFY  
 TERMINAL VELOCITY REQUIREMENTS FOR S-IVB  
 SECOND BURN (SECOND OPPORTUNITY)

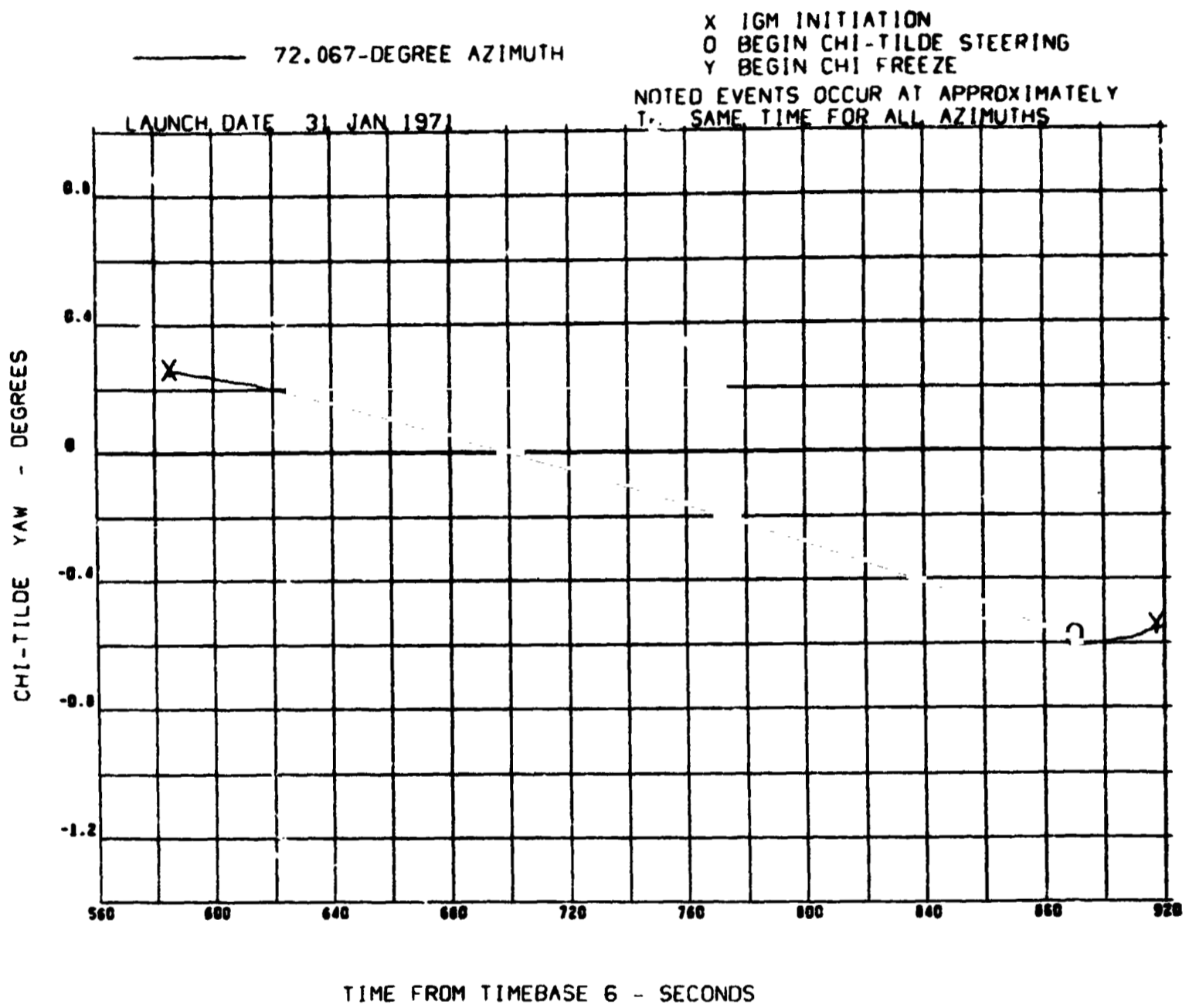


FIGURE 107 REQUIRED YAW STEERING ANGLE TO SATISFY  
 TERMINAL VELOCITY REQUIREMENTS FOR S-IVB  
 SECOND BURN (SECOND OPPORTUNITY)

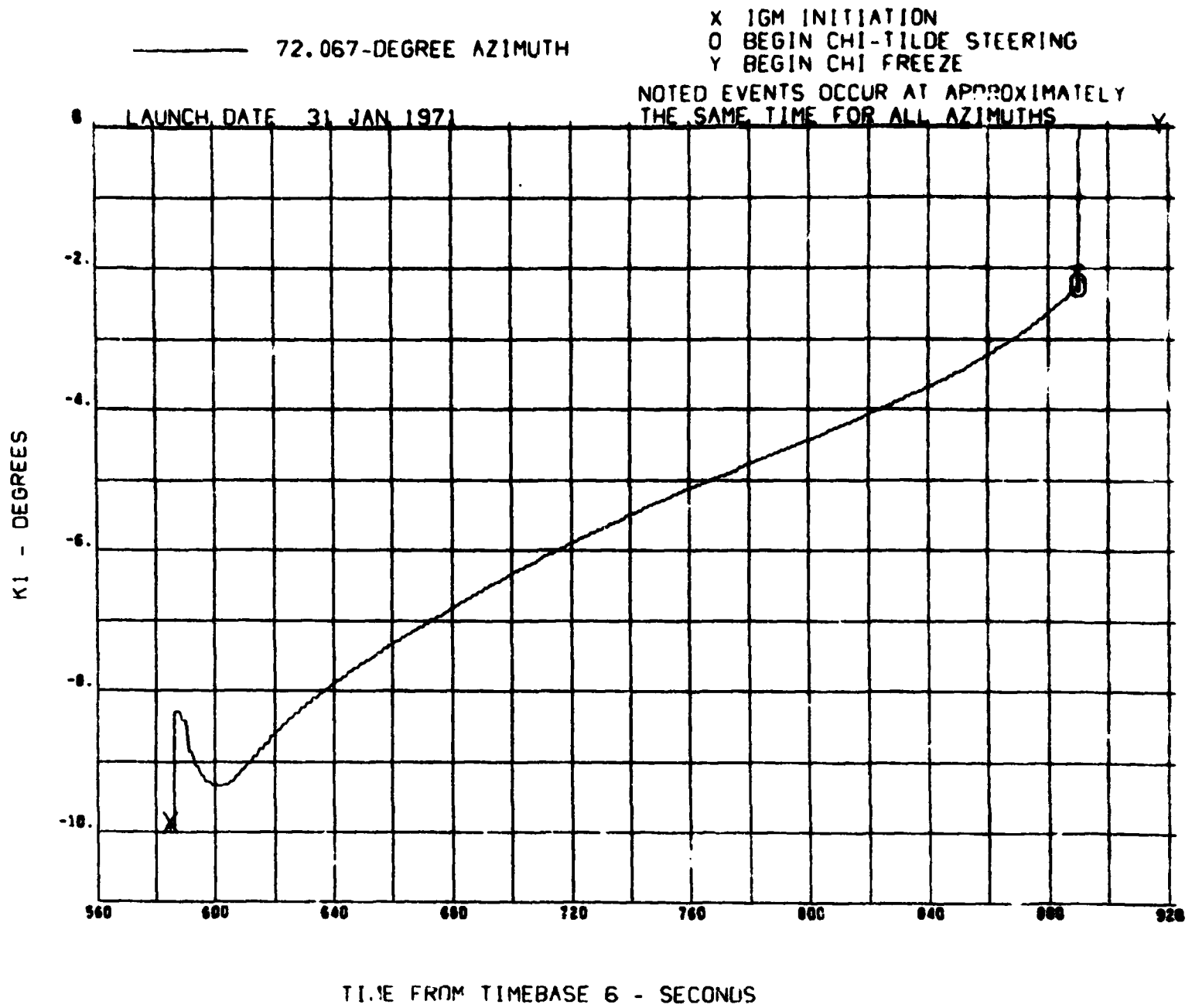


FIGURE 108 PITCH STEERING ANGLE BIAS TO ENFORCE  
 TERMINAL POSITION REQUIREMENTS FOR S-IVB  
 SECOND BURN (SECOND OPPORTUNITY)



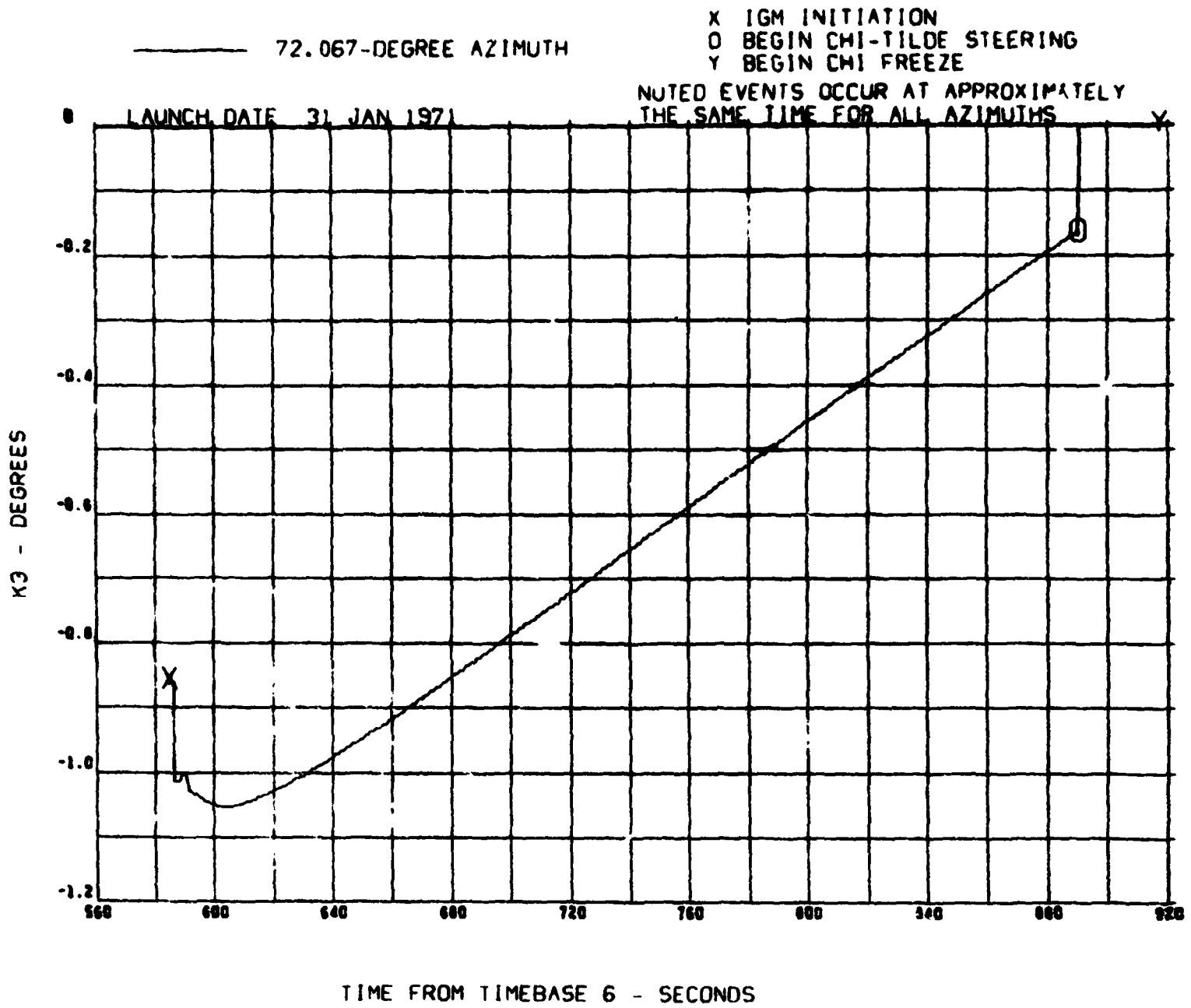


FIGURE 109 YAW STEERING ANGLE BIAS TO ENFORCE  
 TERMINAL POSITION REQUIREMENTS FOR S-IVB  
 SECOND BURN (SECOND OPPORTUNITY)

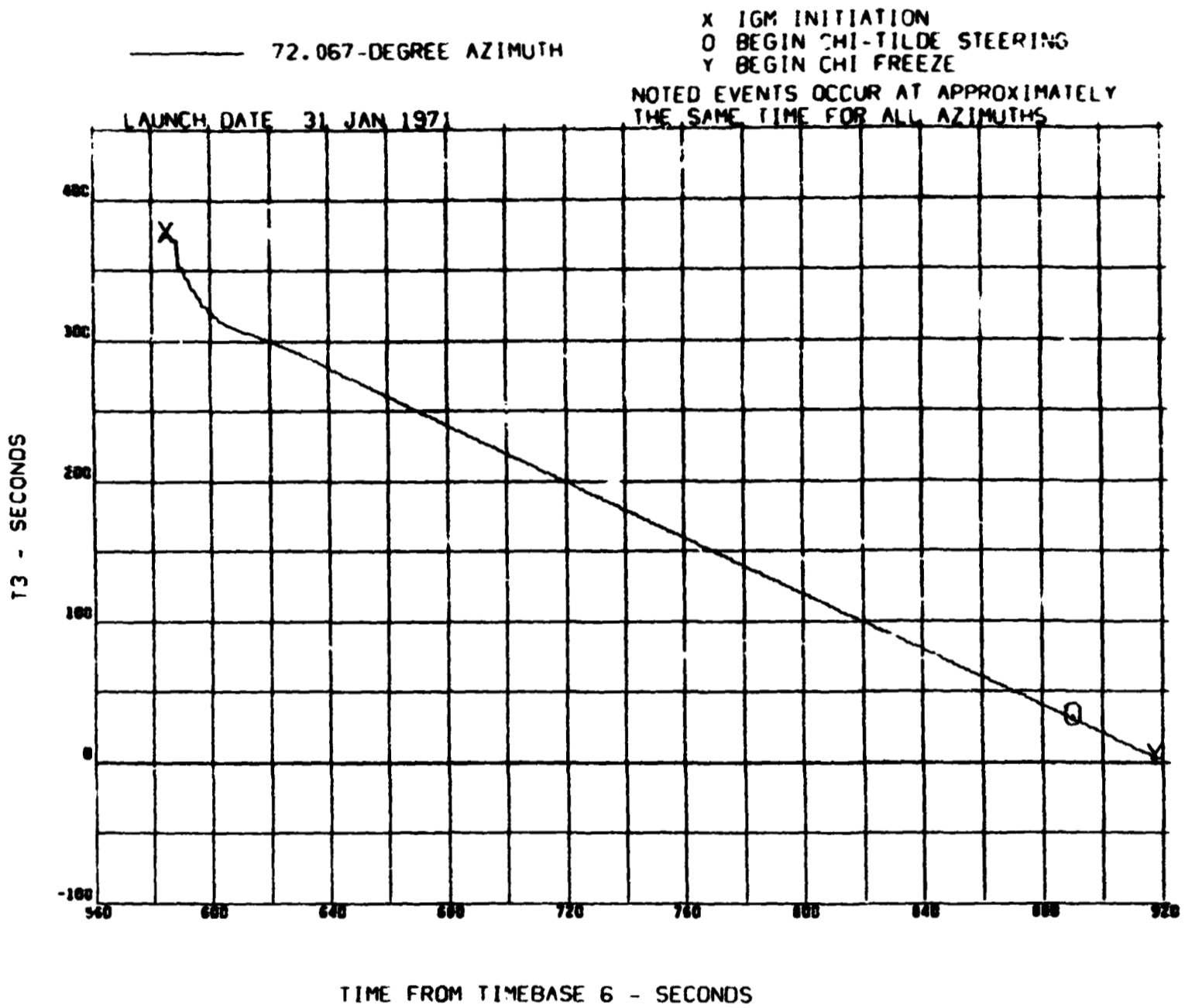


FIGURE 110 TIME REMAINING IN IGM PHASE 5 FOR S-IVB SECOND BURN (SECOND OPPORTUNITY)

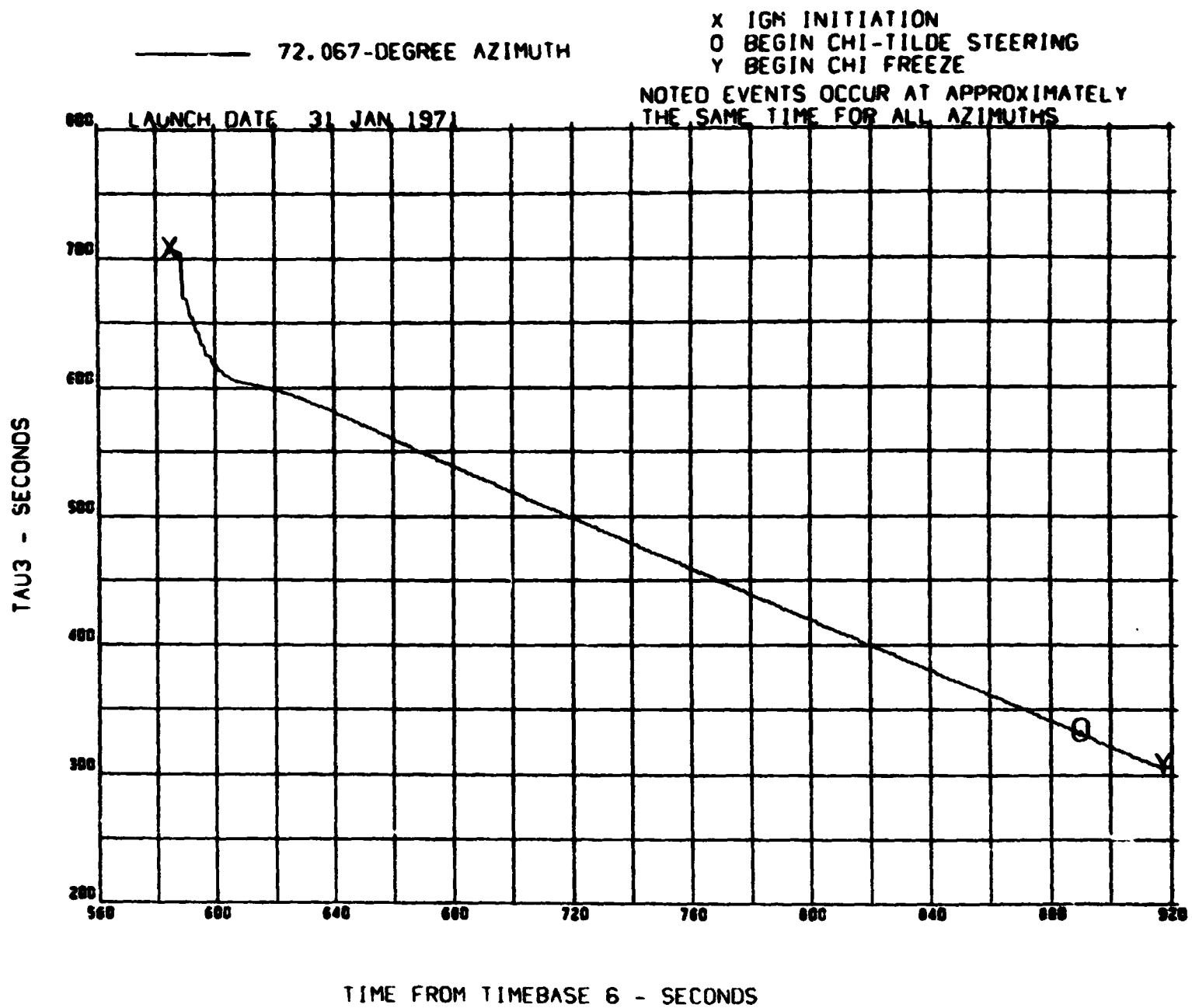
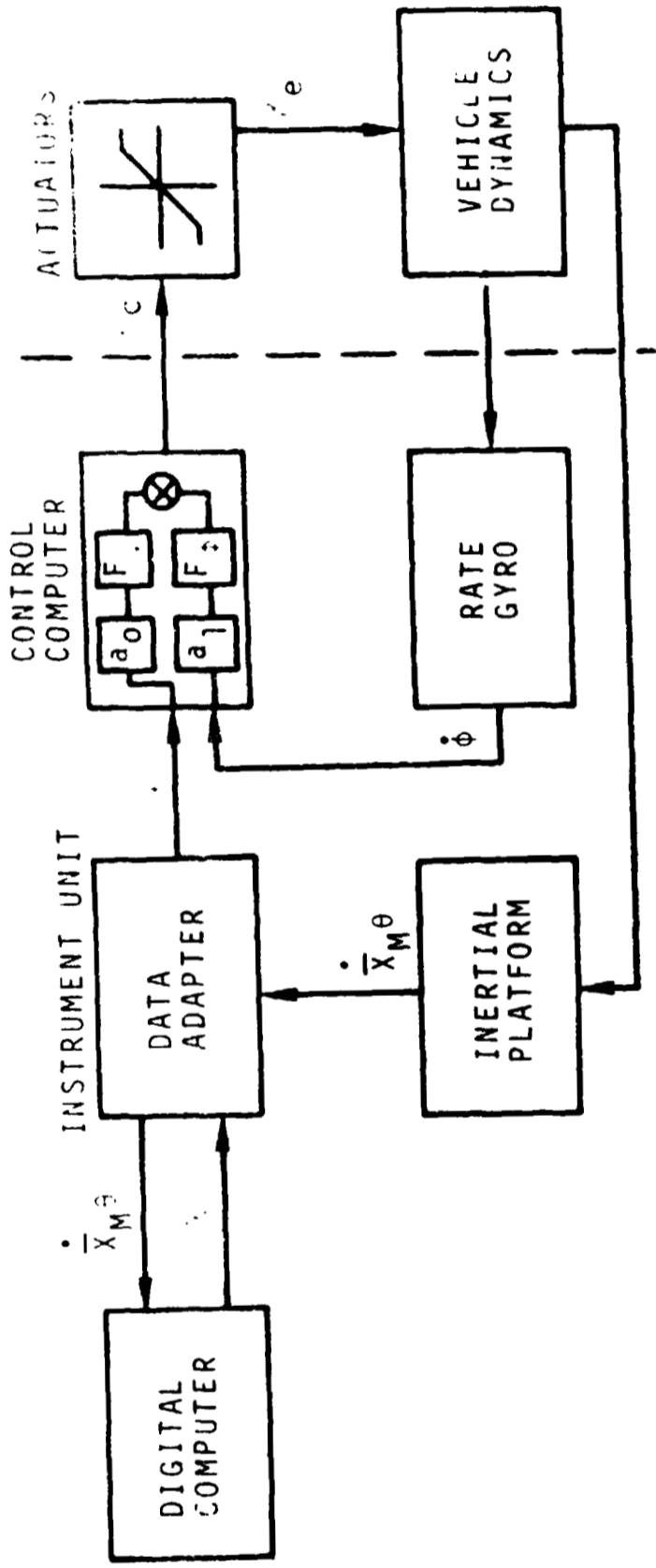


FIGURE 111 RATIO OF MASS TO MASS-FLOWRATE FOR S-IVB SECOND BURN (SECOND OPPORTUNITY - IGM PHASE 5)



VARIABLE	LIMIT	LIMIT LOCATION
$\dot{X}$	$\pm 1.0$ DEG/SEC	LVDC
$X_Z$	$\pm 45.0$ DEG	LVDC
$\psi$	$\pm 15.3$ DEG (until TB4)	D/A SATURATION LIMIT
	$\pm 3.5$ DEG (after TB4)	D/A SATURATION LIMIT
$\dot{\psi}$	$\pm 12.0$ DEG/SEC	LVDA
$\dot{\phi}$	$\pm 10.0$ DEG/SEC	CONTROL SIGNAL PROCESSOR
$\beta_e$	$\pm 5.16$ DEG	S-IC ACTUATORS
$\beta_e$	7.29 DEG (extended) 5.90 DEG (retracted)	S-II ACTUATORS
$\beta_e$	$\pm 7.00$ DEG	S-IVB ACTUATORS

FIGURE 112 ATTITUDE CONTROL SYSTEM

TABLE 17 AS-509 CONTROL GAINS AND SIMPLIFIED FILTERS

	S-IC BURN (FROM TB1)		S-II BURN (FROM TB3)		S-IVB BURN	
	0 to 105	105 to 130.0	0 to 61.4	61.4 to 191.4	191.4 to CO	CO
$a_0^*$ DEG/DEG	0.90	0.45	1.12	0.65	0.44	0.810
$a_1^*$ DEG/DEG/SEC	0.69	0.44	1.89	1.10	0.74	0.970
$F_{\downarrow}^*$	$\frac{.47(S+.1)}{S+.047}$	$\frac{.47(S+.1)}{S+.047}$	1	1	1	1
$F_{\downarrow}^*$	1	1	1	1	1	1
$a_0^{**}$ DEG/DEG	0.245	0.245	0.250	0.250	0.250	-
$a_1^{**}$ DEG/DEG/SEC	0.150	0.150	0.200	0.200	0.200	-
$F_{\downarrow}^{**}$	$\frac{2.35}{S+.2.35}$	$\frac{2.35}{S+.2.35}$	1	1	1	-
$F_{\downarrow}^{**}$	1	1	1	1	1	-

1 THROUGH FIRST BURN AND TB6 + 838 SEC OF SECOND BURN.

2 TB6 + 838 SECONDS OF SECOND BURN TO SECOND-BURN CUTOFF

\* PITCH AND YAW

\*\* ROLL

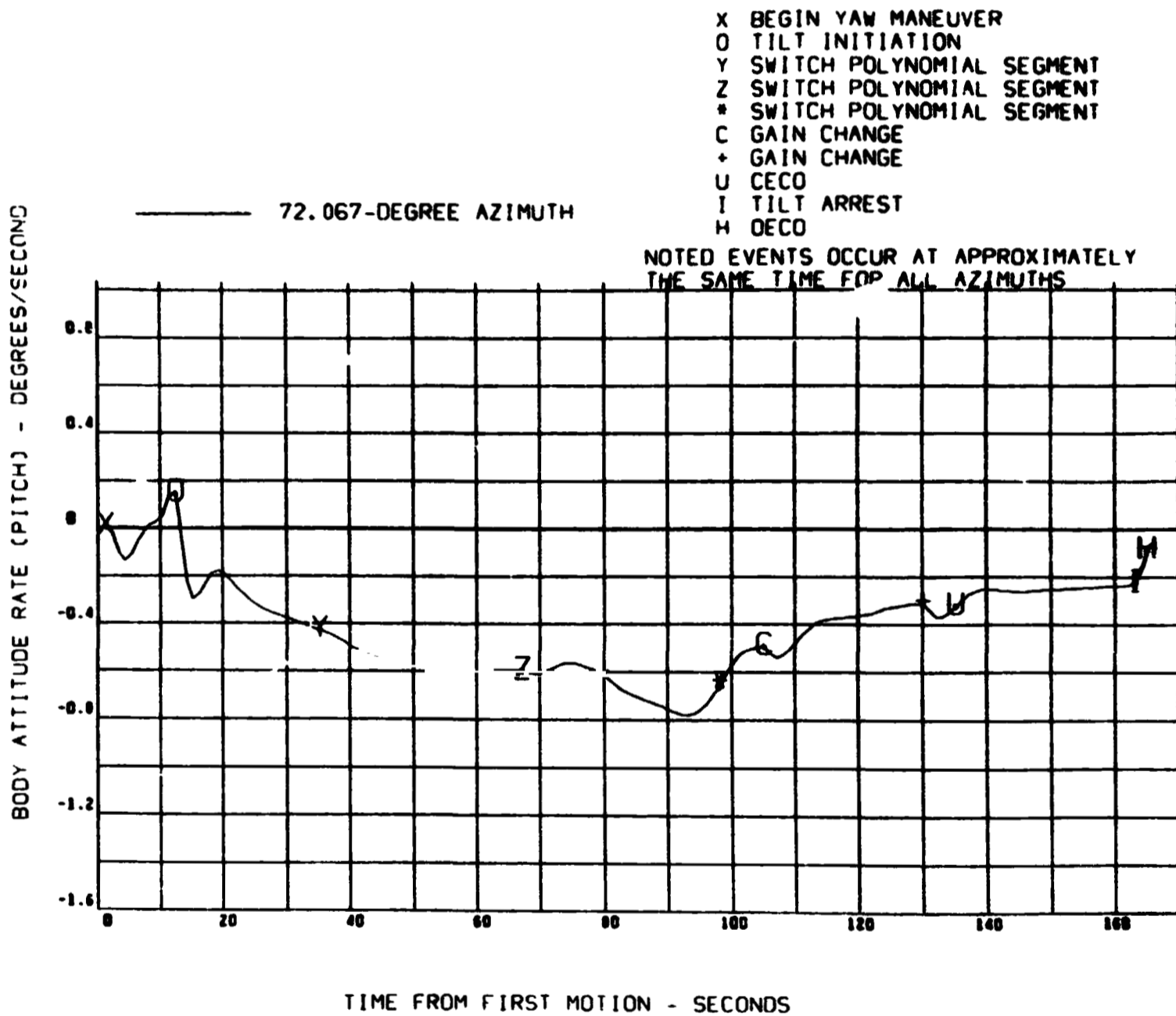


FIGURE 113 PREDICTED BODY PITCH ATTITUDE RATE FOR S-IC STAGE FLIGHT

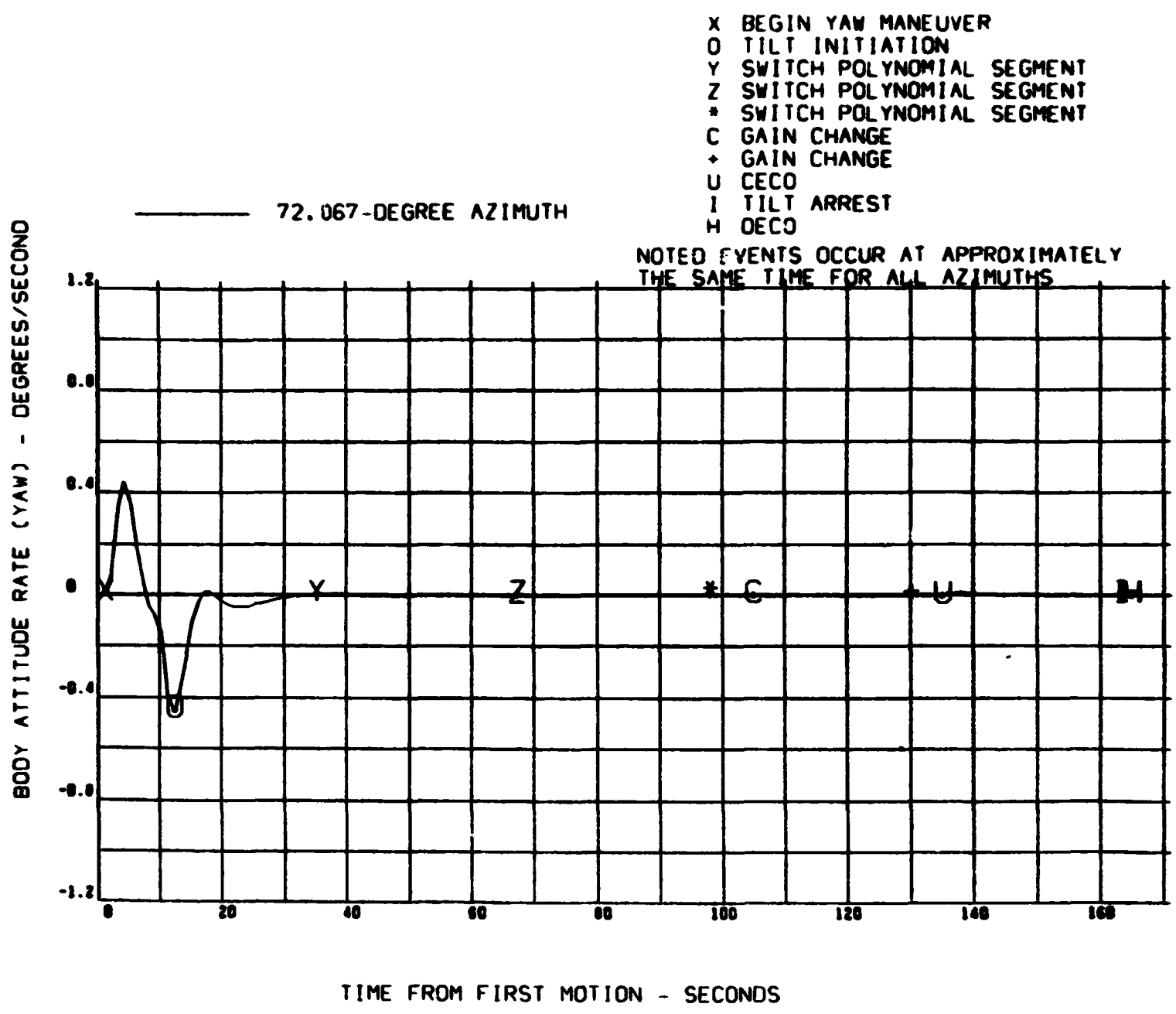


FIGURE 114 PREDICTED BODY YAW ATTITUDE RATE FOR S-IC STAGE FLIGHT

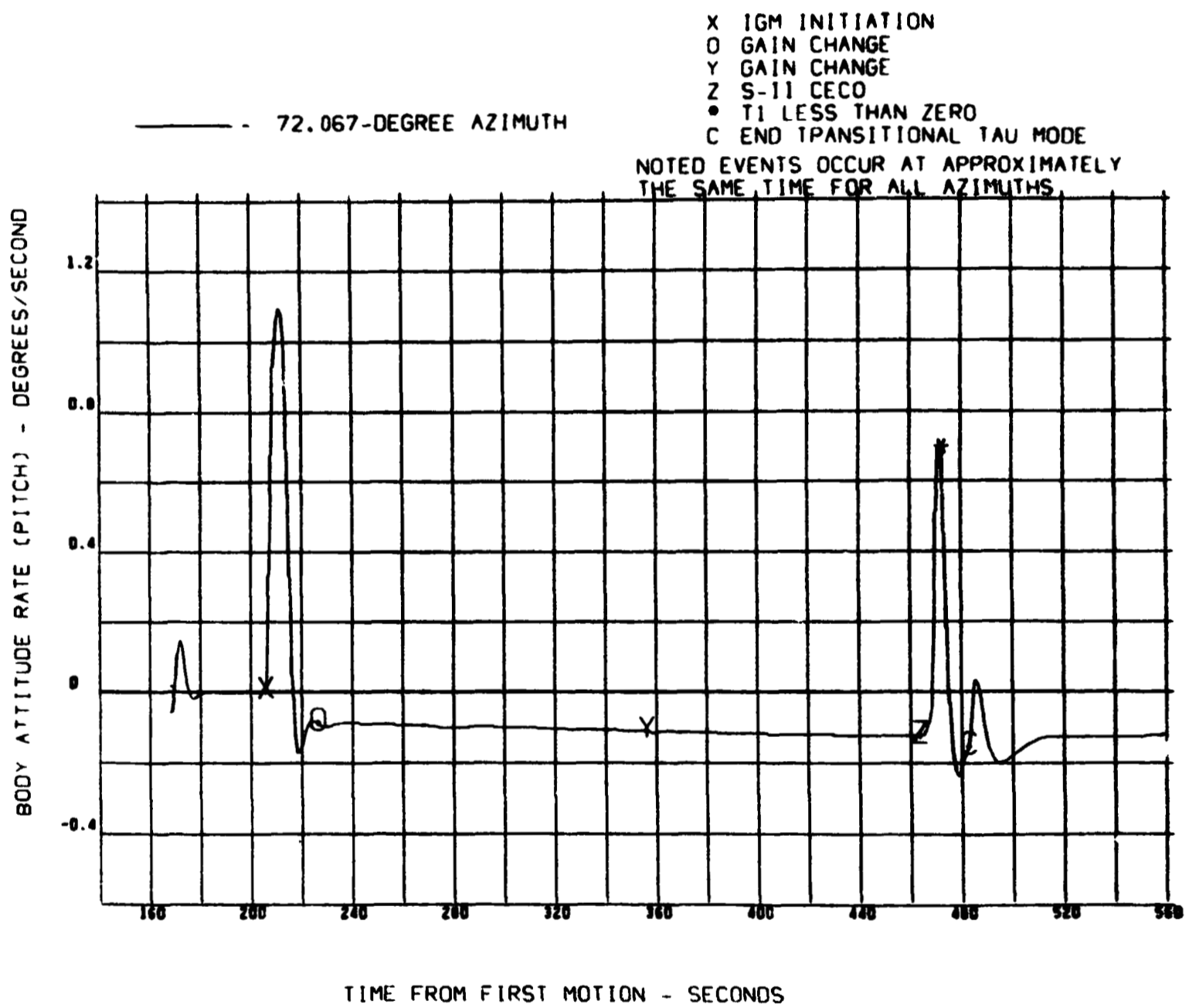


FIGURE 115 PREDICTED BODY PITCH ATTITUDE RATE FOR S-II STAGE FLIGHT



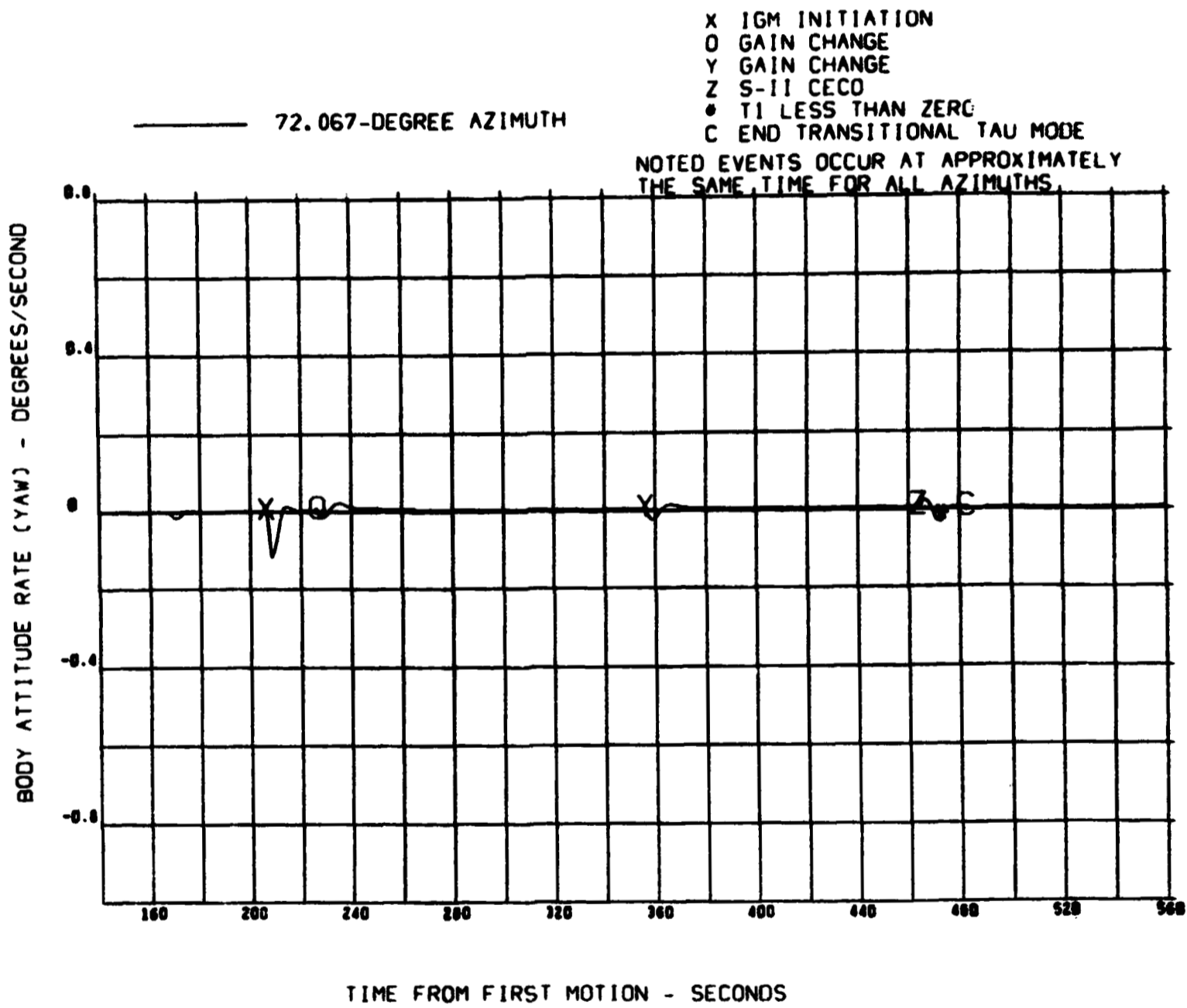


FIGURE 116 PREDICTED BODY YAW ATTITUDE RATE  
 FOR S-II STAGE FLIGHT

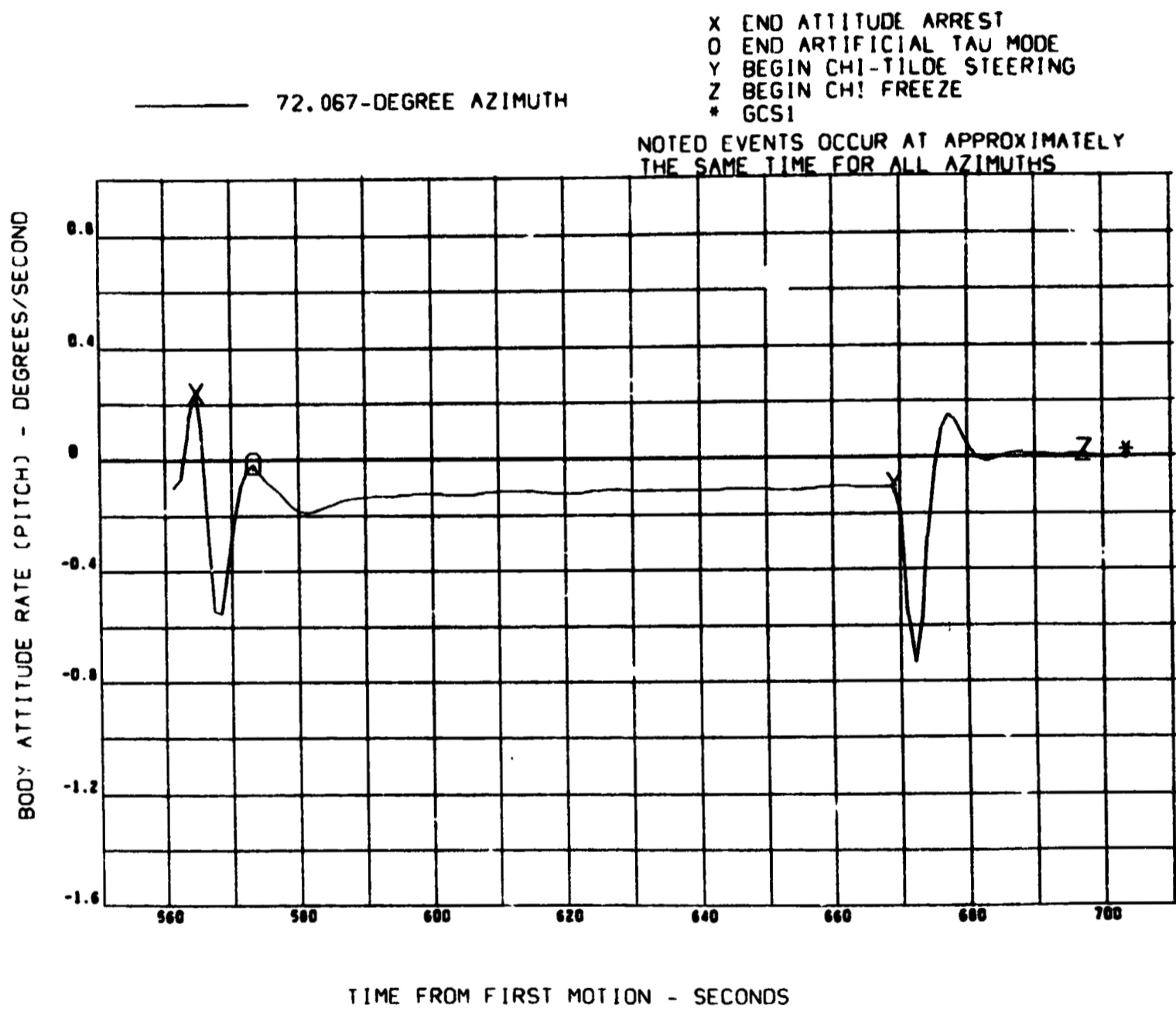


FIGURE 117 PREDICTED BODY PITCH ATTITUDE RATE  
 FOR S-IVB STAGE FLIGHT (FIRST BURN)

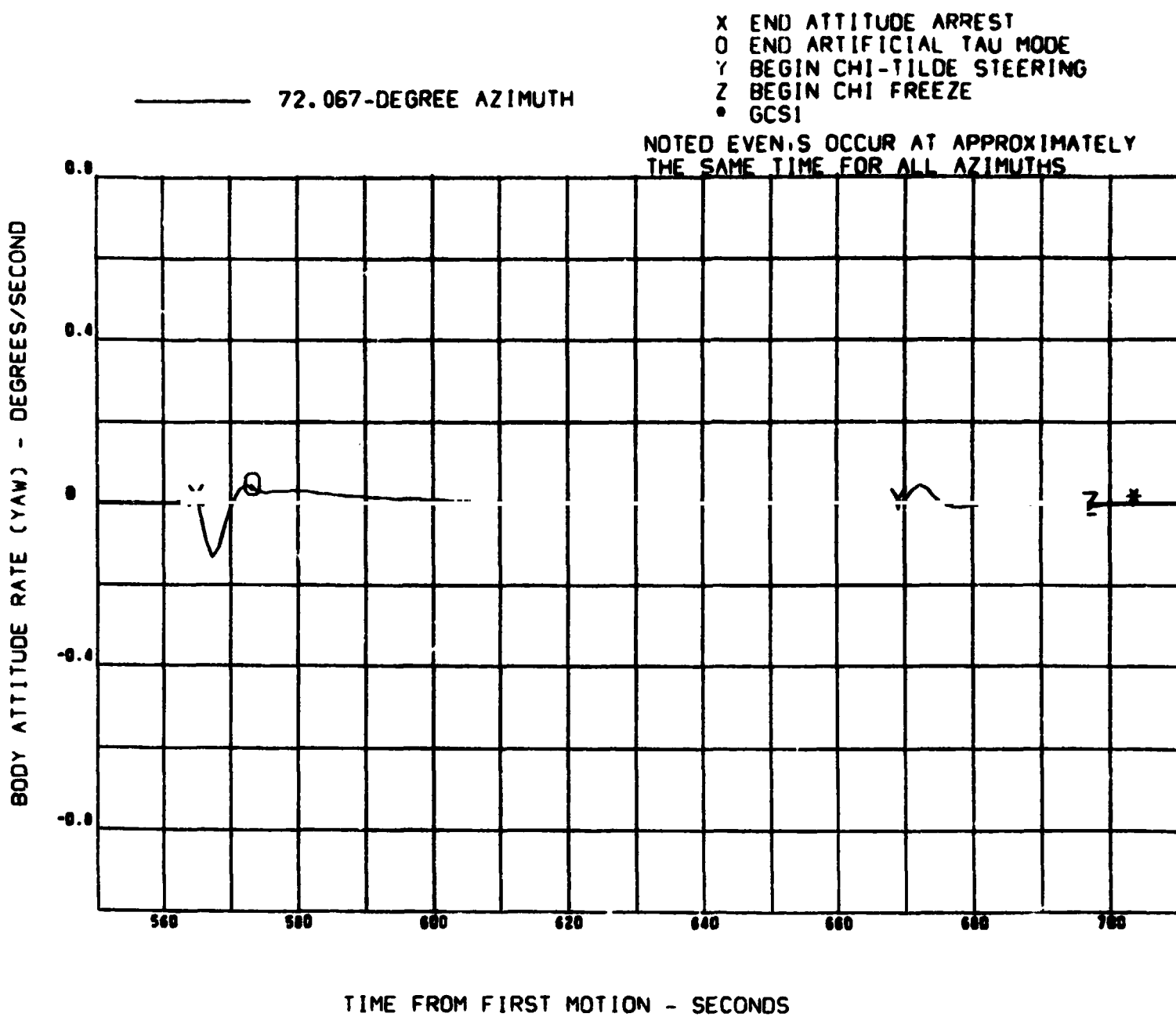


FIGURE 118 PREDICTED BODY YAW ATTITUDE RATE  
 FOR S-IVB STAGE FLIGHT (FIRST BURN)

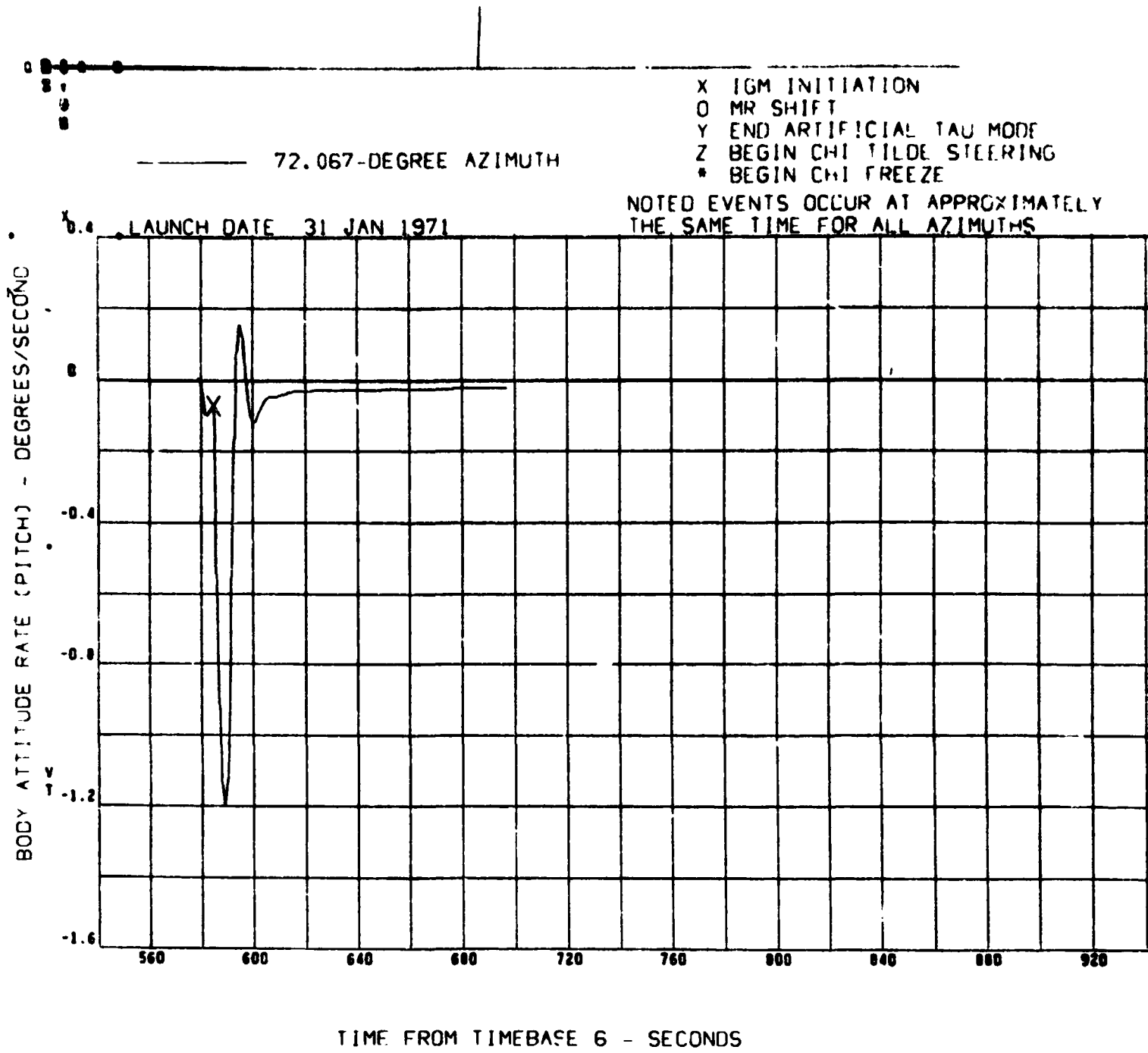


FIGURE 119 PREDICTED BODY PITCH ATTITUDE RATE FOR S-IVB SECOND BURN (FIRST OPPORTUNITY)

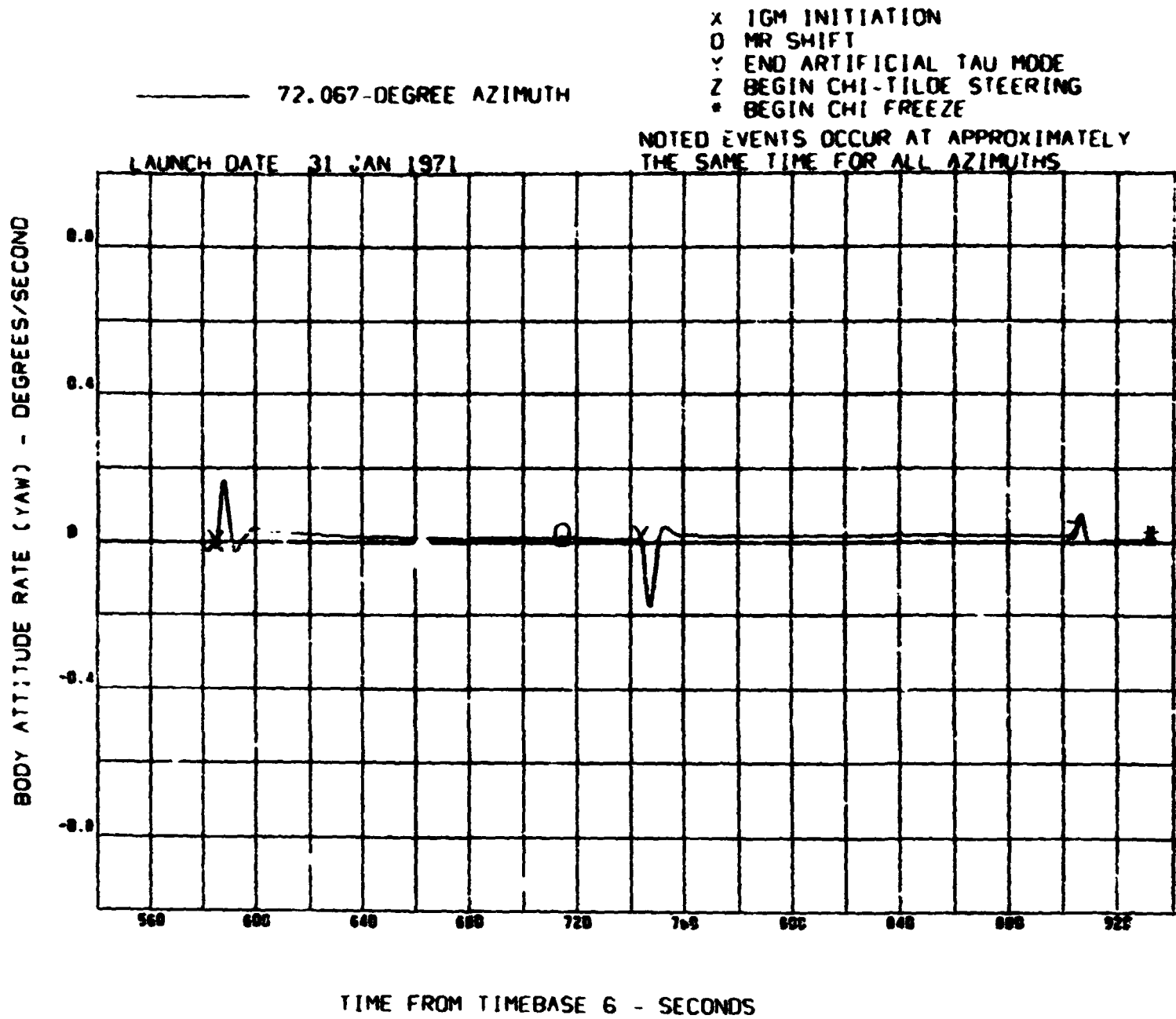


FIGURE 120 PREDICTED BODY YAW ATTITUDE RATE FOR S-IVB SECOND BURN (FIRST OPPORTUNITY)

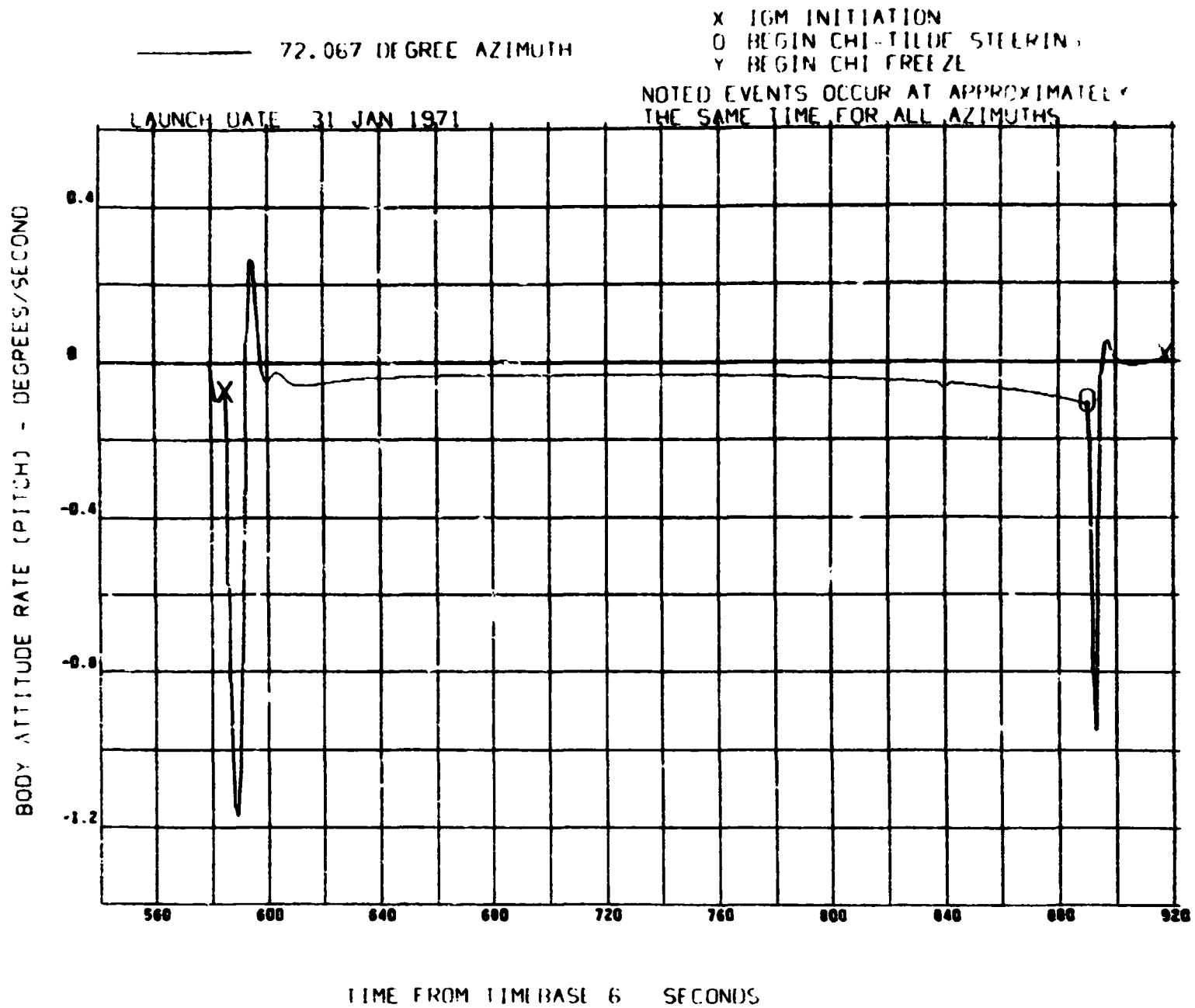


FIGURE 121 PREDICTED BODY PITCH ATTITUDE RATE FOR S-IVB SECOND BURN (SECOND OPPORTUNITY)

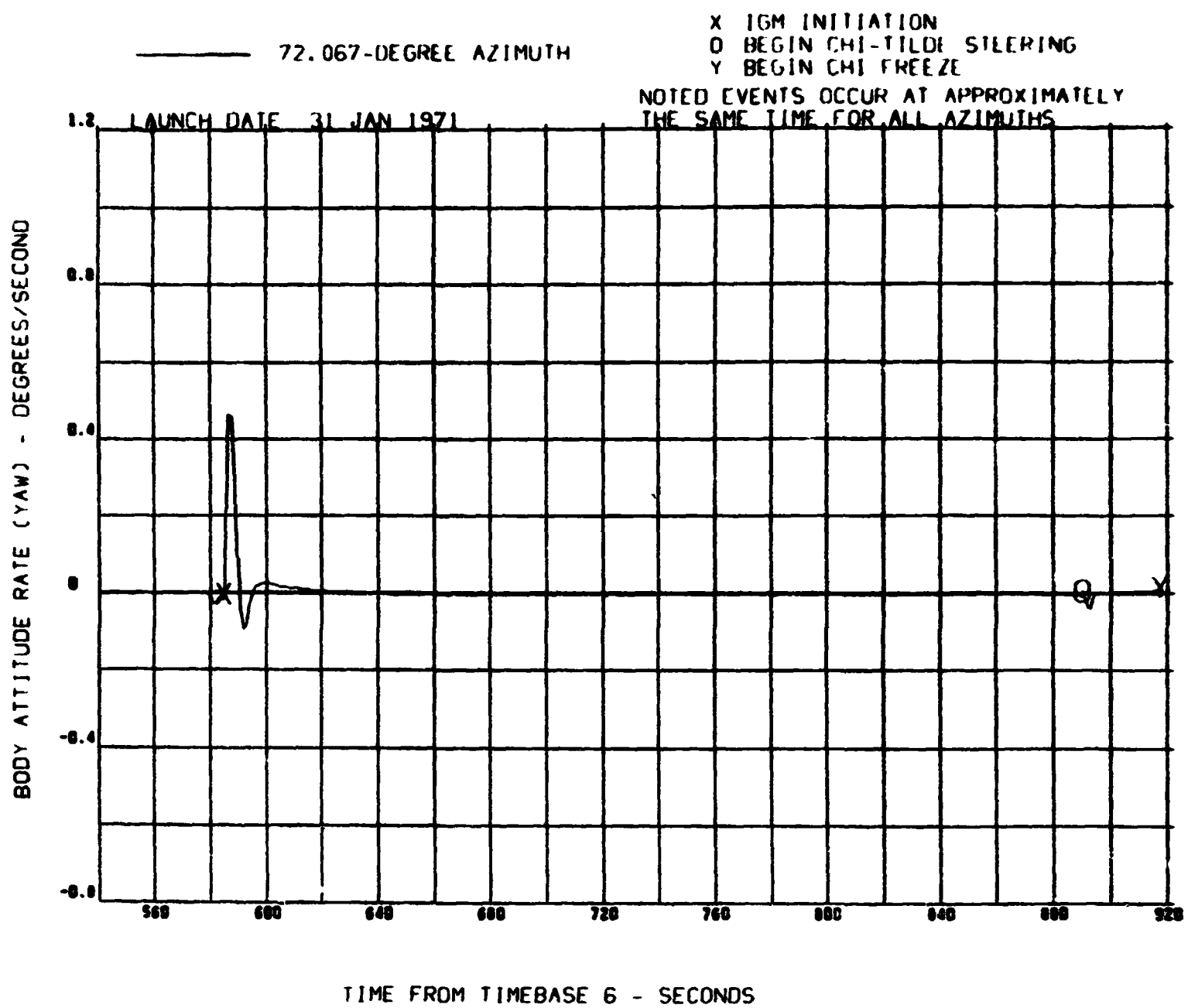


FIGURE 122 PREDICTED BODY YAW ATTITUDE RATE FOR S-IVB SECOND BURN (SECOND OPPORTUNITY)

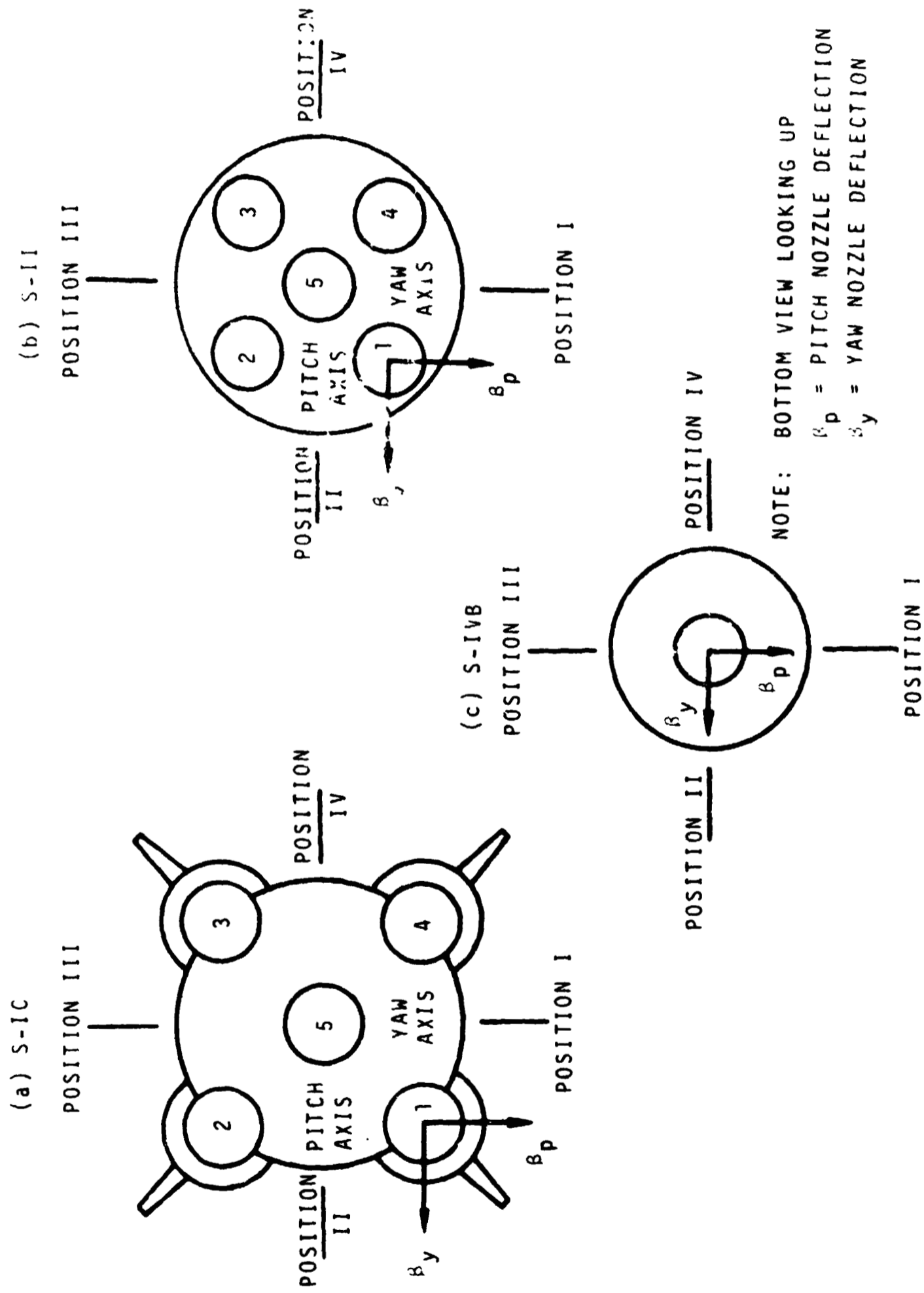


FIGURE 123 ENGINE AND ACTUATOR IDENTIFICATION



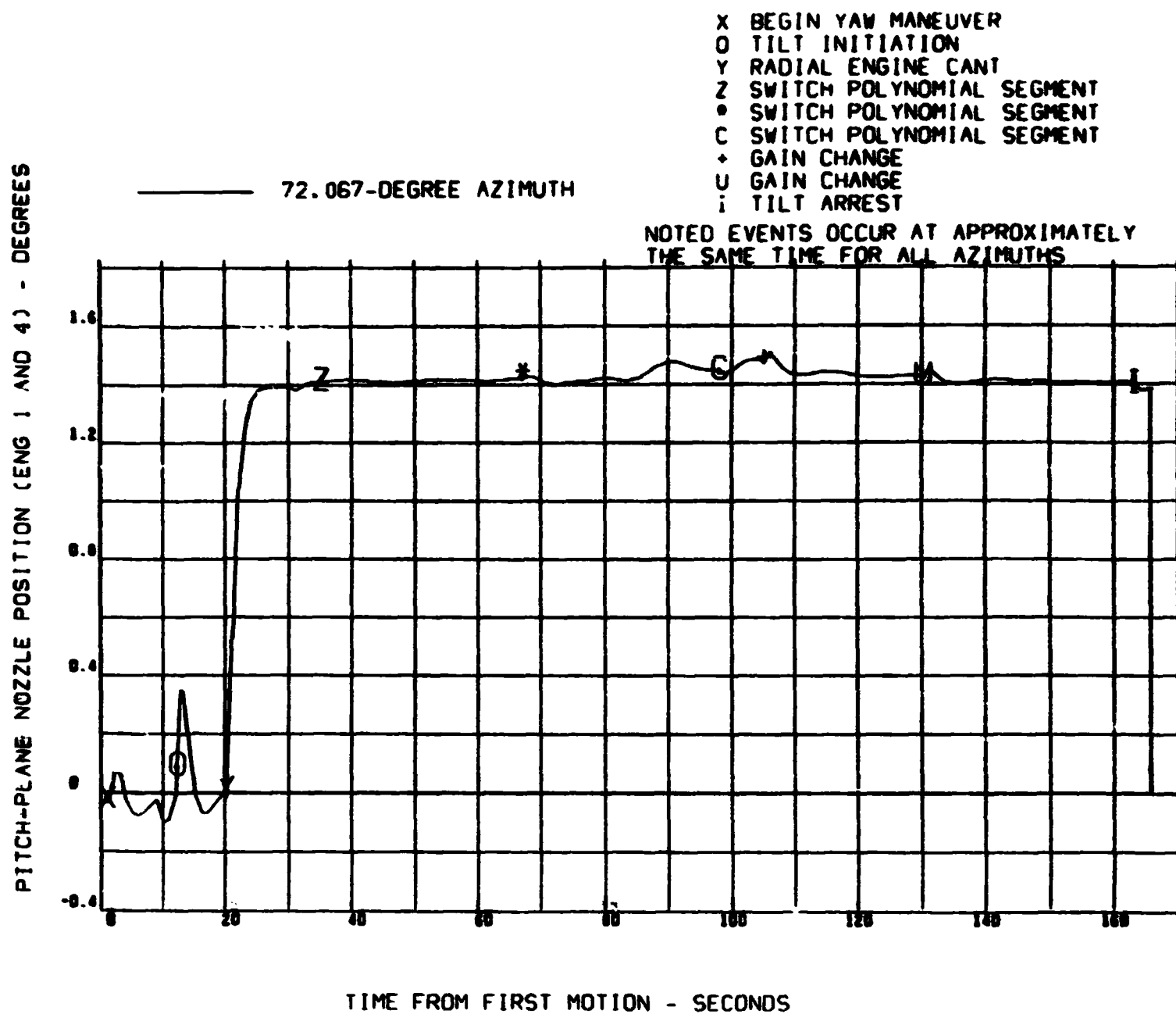


FIGURE 124 PITCH-PLANE NOZZLE POSITION HISTORY FOR S-IC STAGE (ENGINES 1 AND 4)

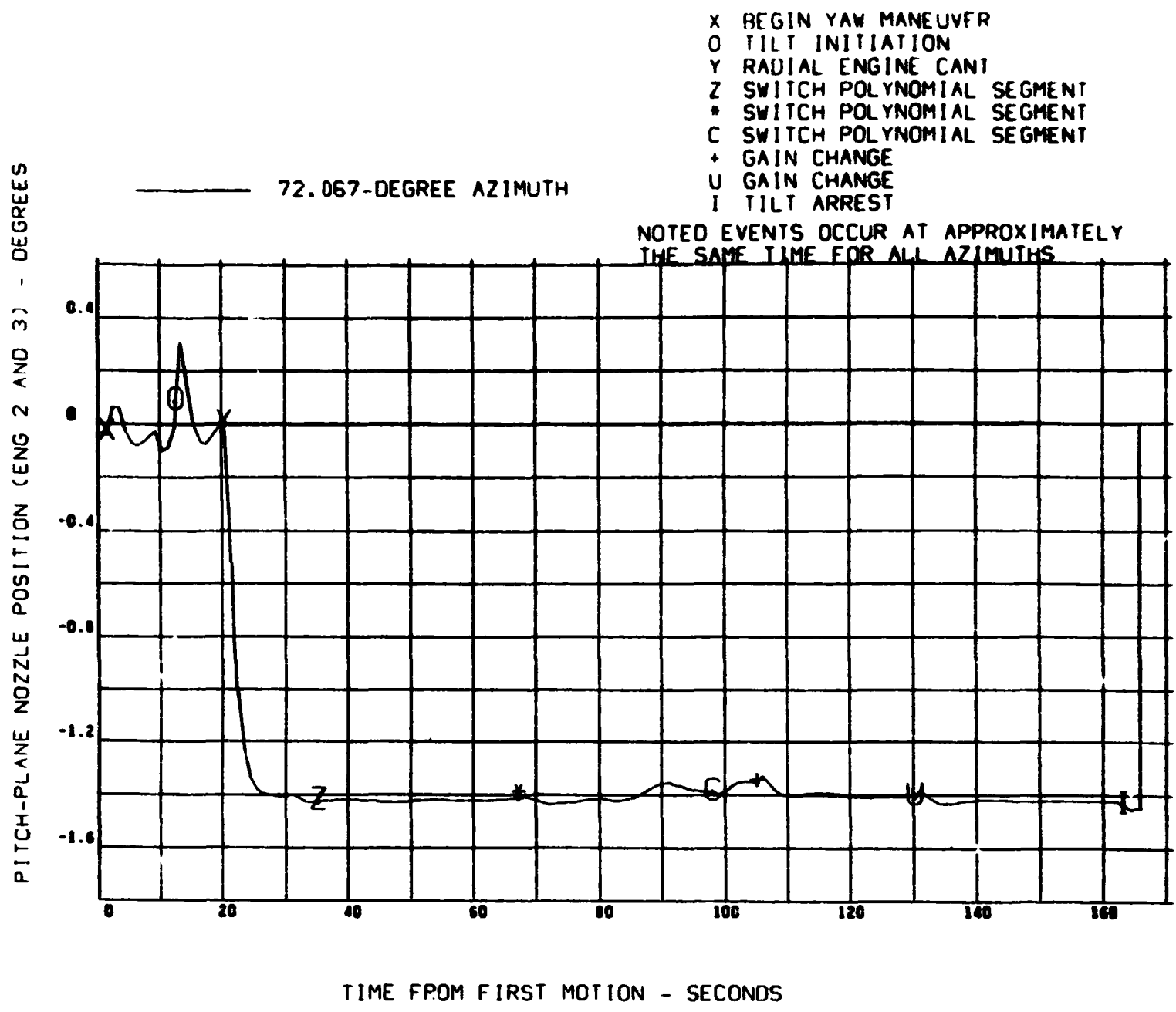


FIGURE 125 PITCH-PLANE NOZZLE POSITION HISTORY FOR S-IC STAGE (ENGINES 2 AND 3)

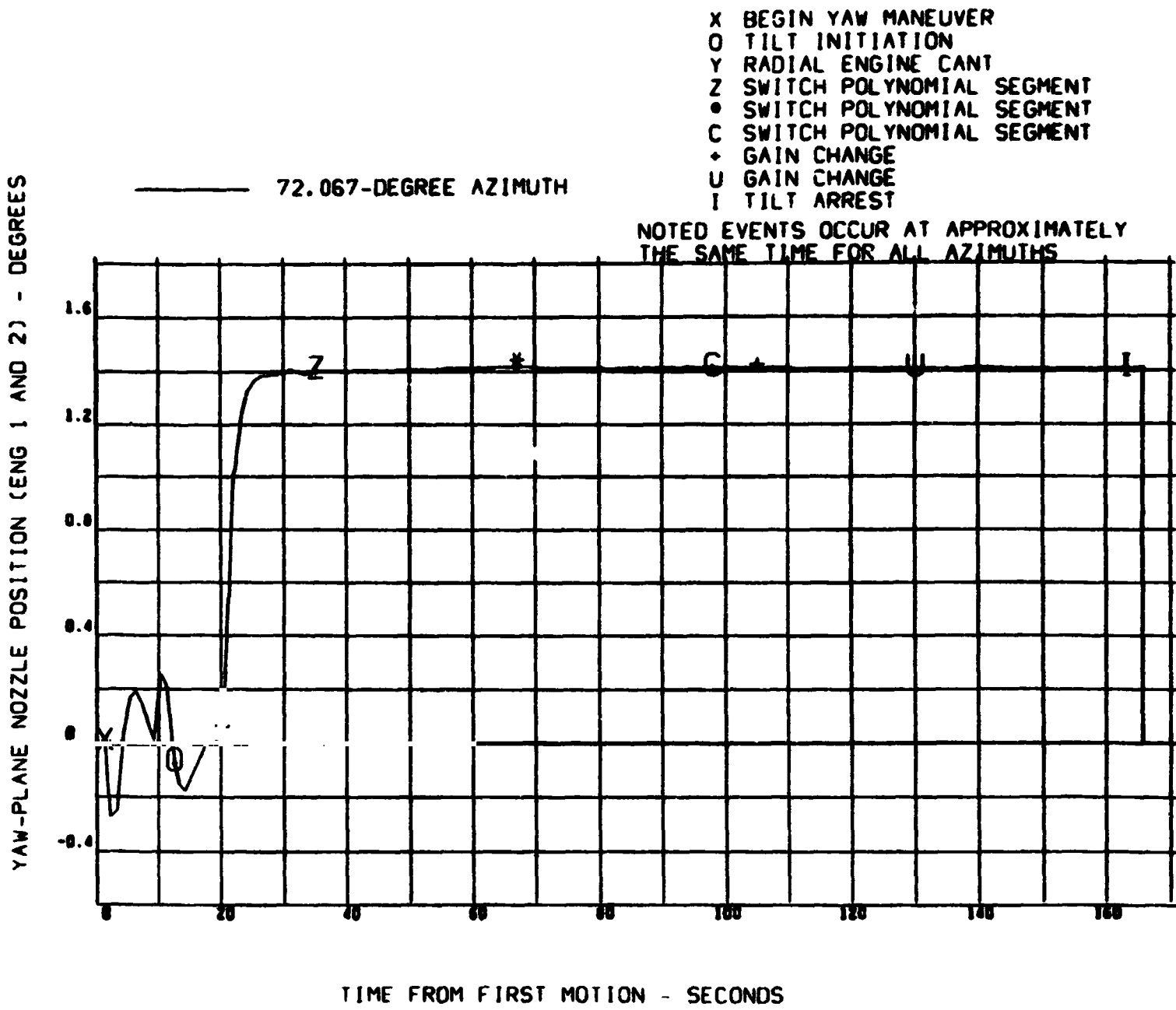


FIGURE 126 YAW-PLANE NOZZLE POSITION HISTORY FOR S-IC STAGE (ENGINES 1 AND 2)

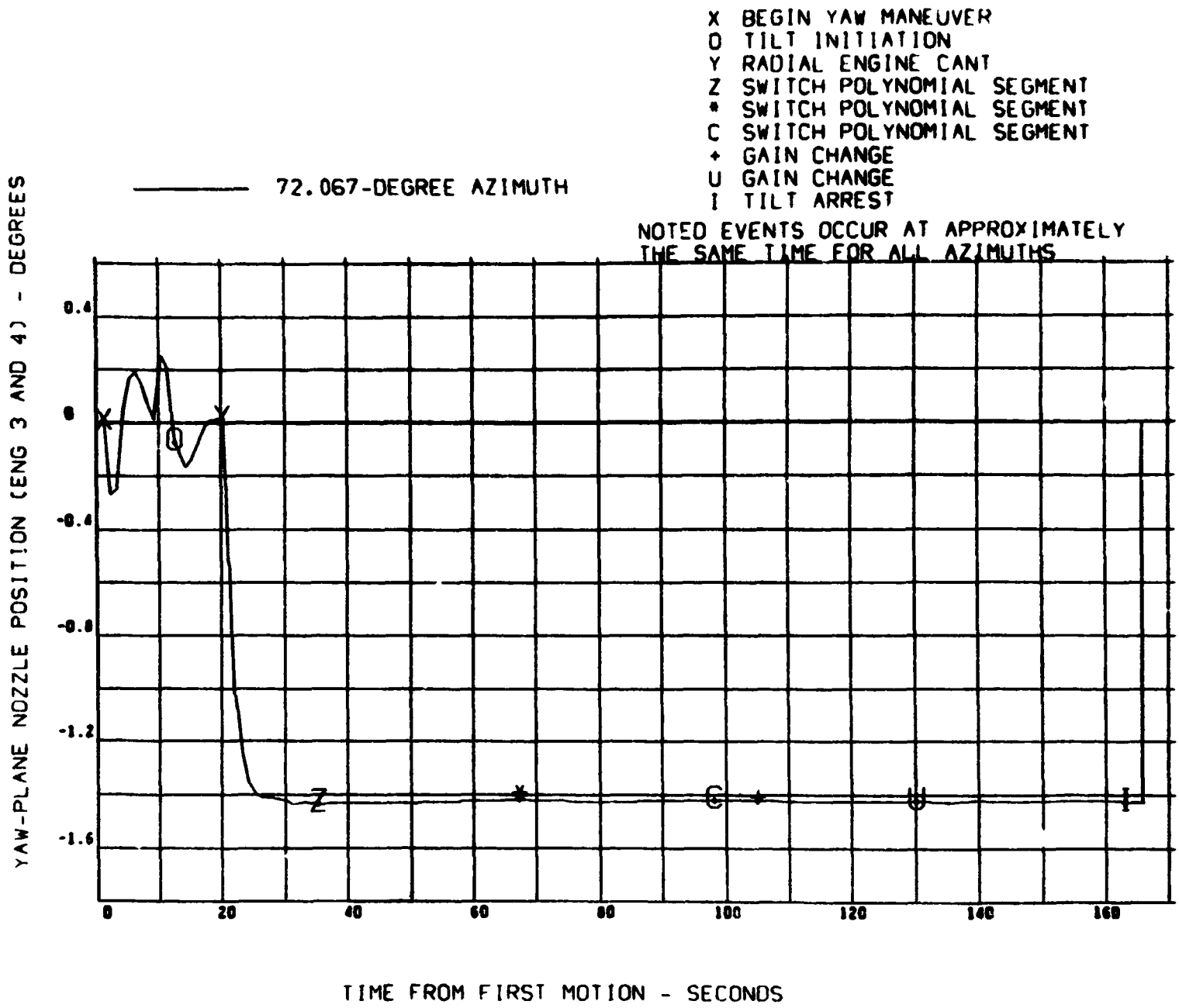


FIGURE 127 YAW-PLANE NOZZLE POSITION HISTORY FOR S-IC STAGE (ENGINES 3 AND 4)

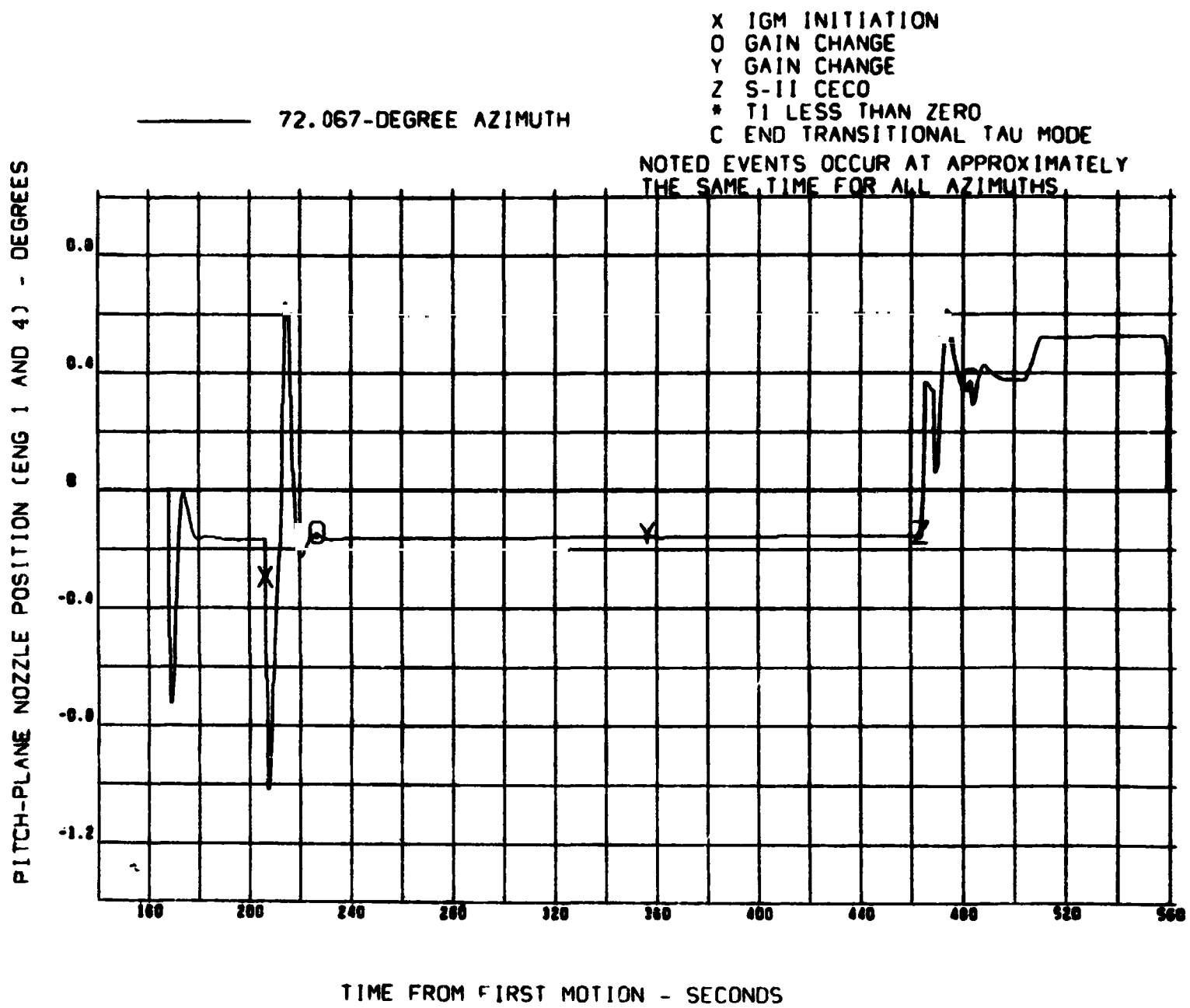


FIGURE 128 PITCH-PLANE NOZZLE POSITION HISTORY  
 FOR S-II STAGE (ENGINES 1 AND 4)

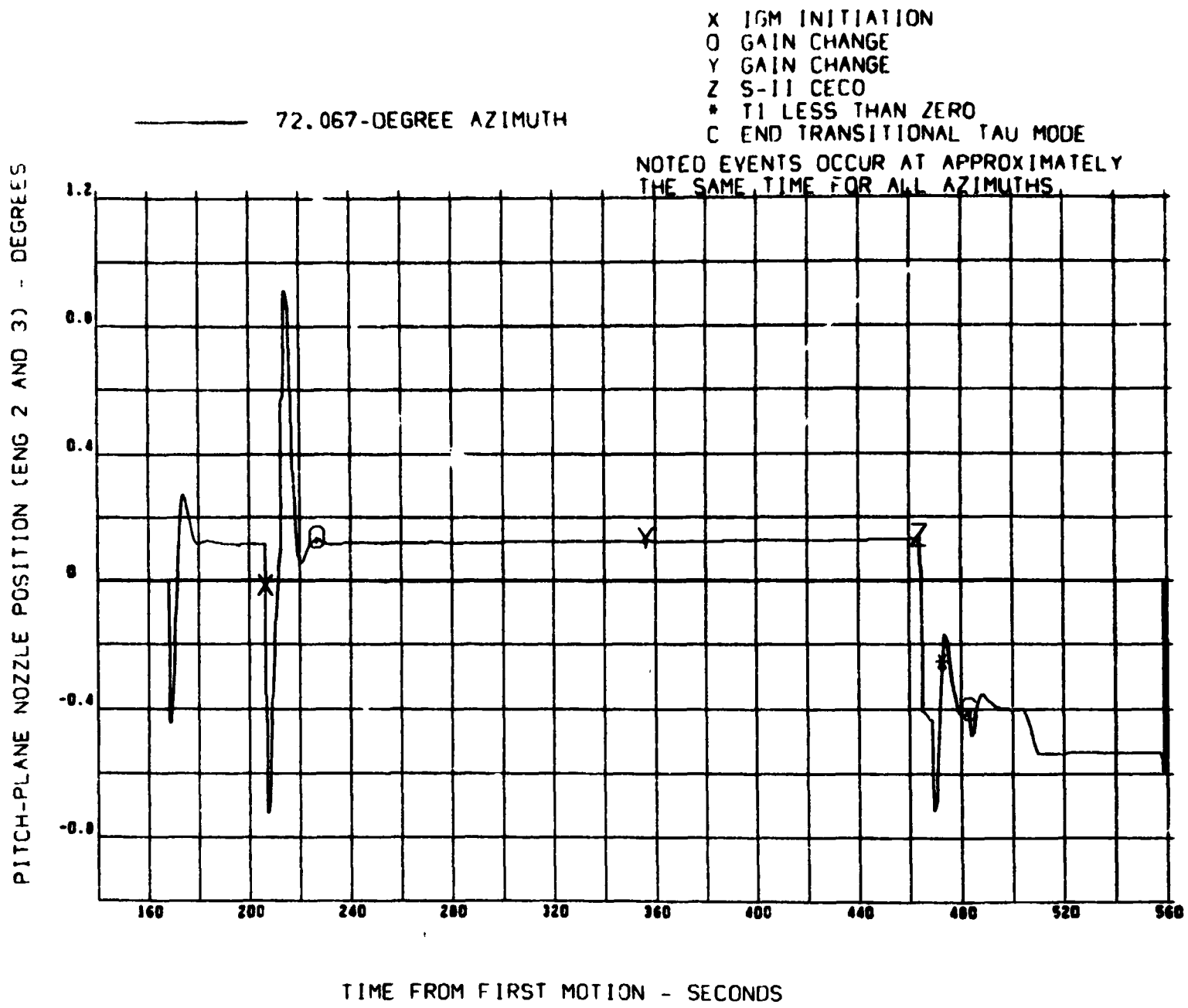


FIGURE 129 PITCH-PLANE NOZZLE POSITION HISTORY  
 FOR S-II STAGE (ENGINES 2 AND 3)

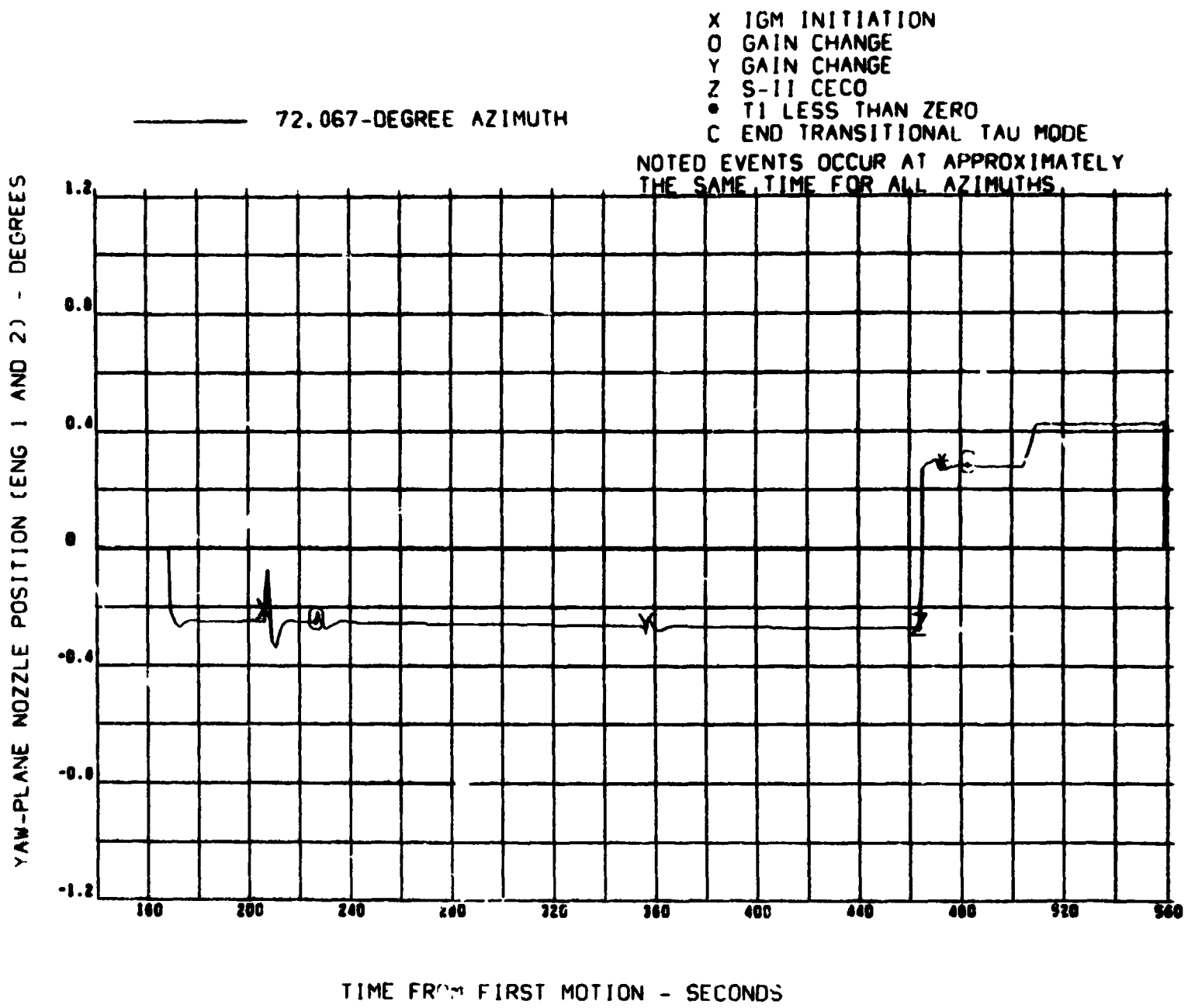


FIGURE 130 YAW-PLANE NOZZLE POSITION HISTORY  
 FOR S-II STAGE (ENGINES 1 AND 2)

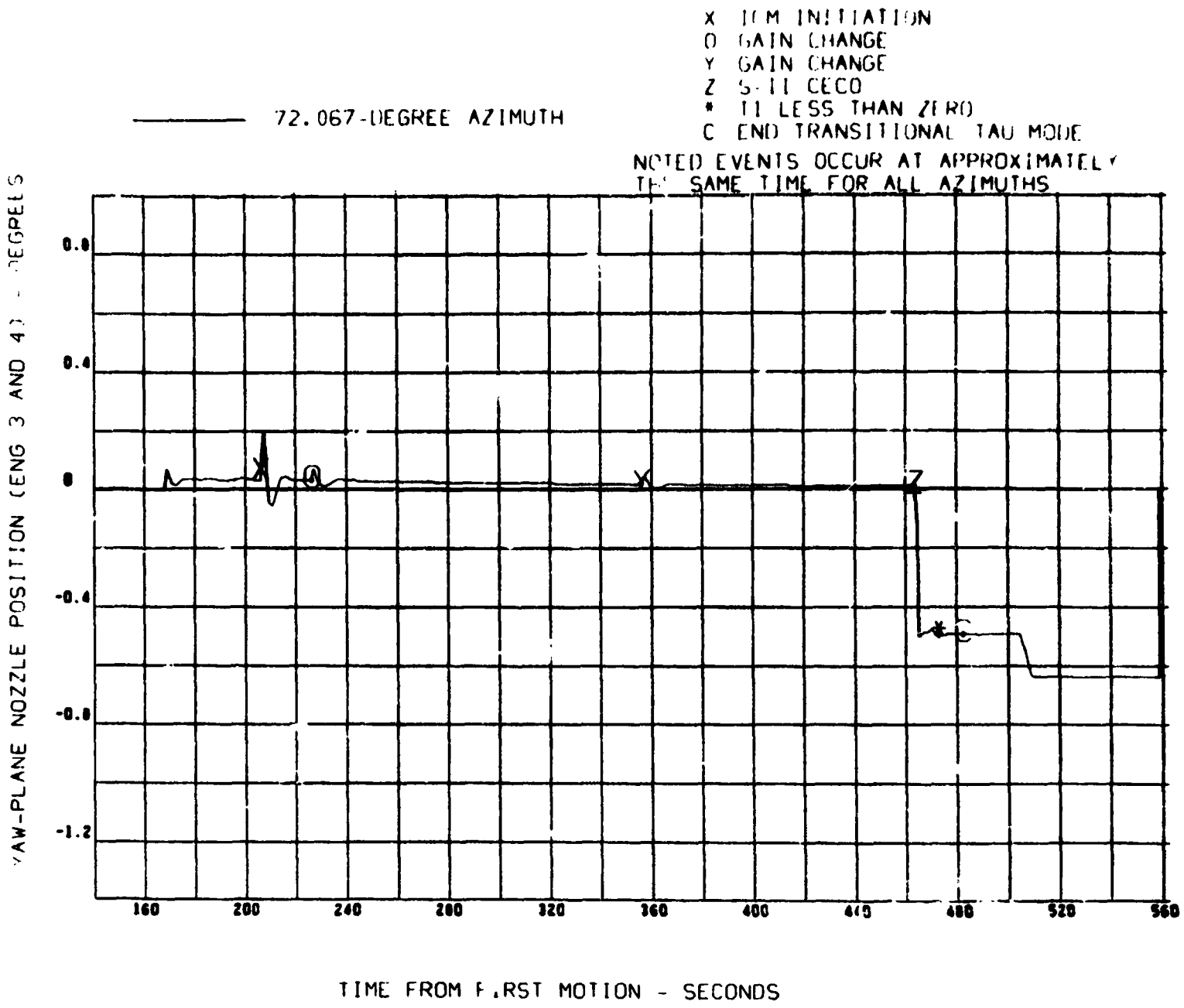


FIGURE 131 YAW-PLANE NOZZLE POSITION HISTORY  
 FOR S-II STAGE (ENGINES 3 AND 4)



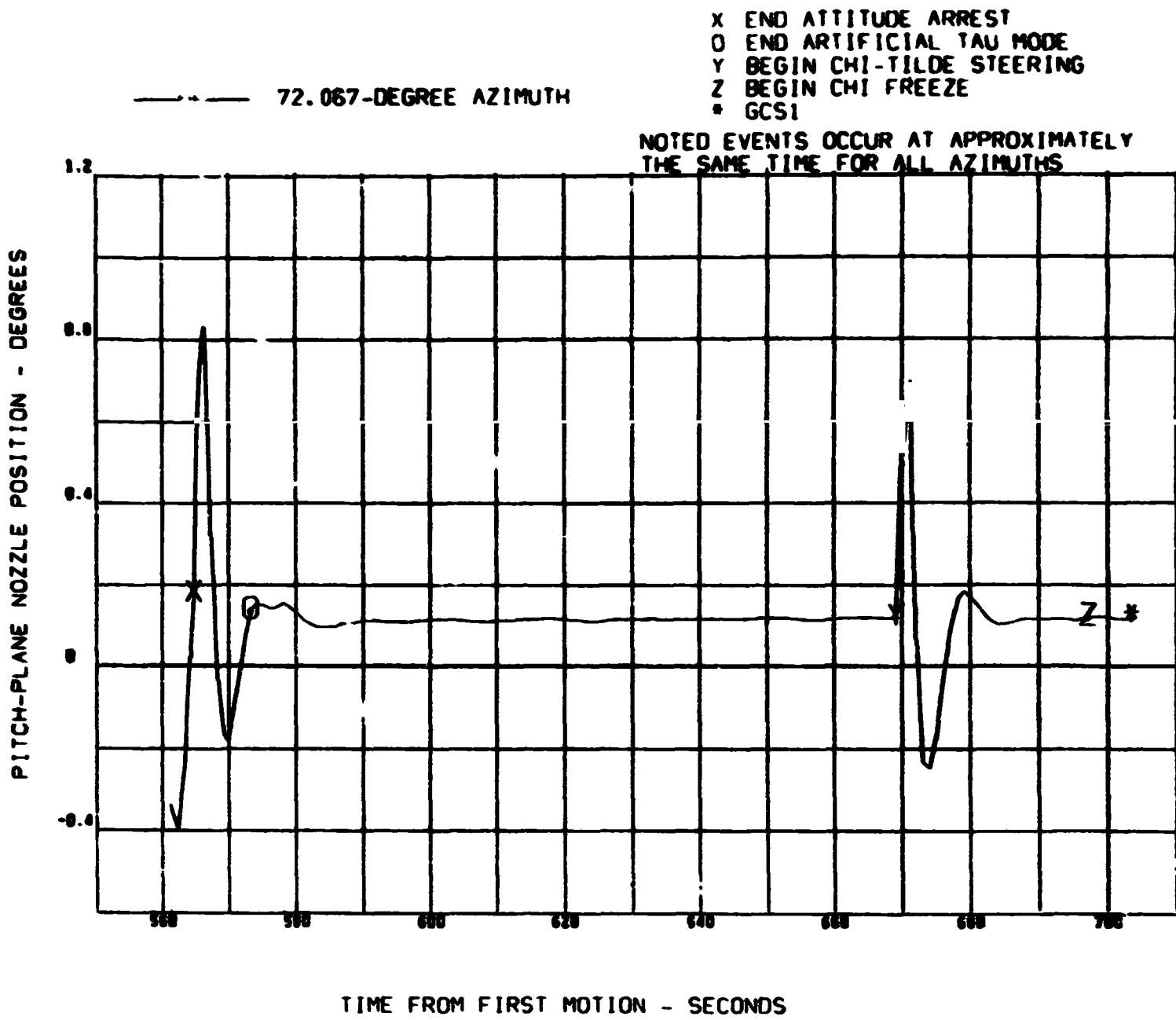


FIGURE 132 PITCH-PLANE NOZZLE POSITION HISTORY FOR S-IVB STAGE (FIRST BURN)

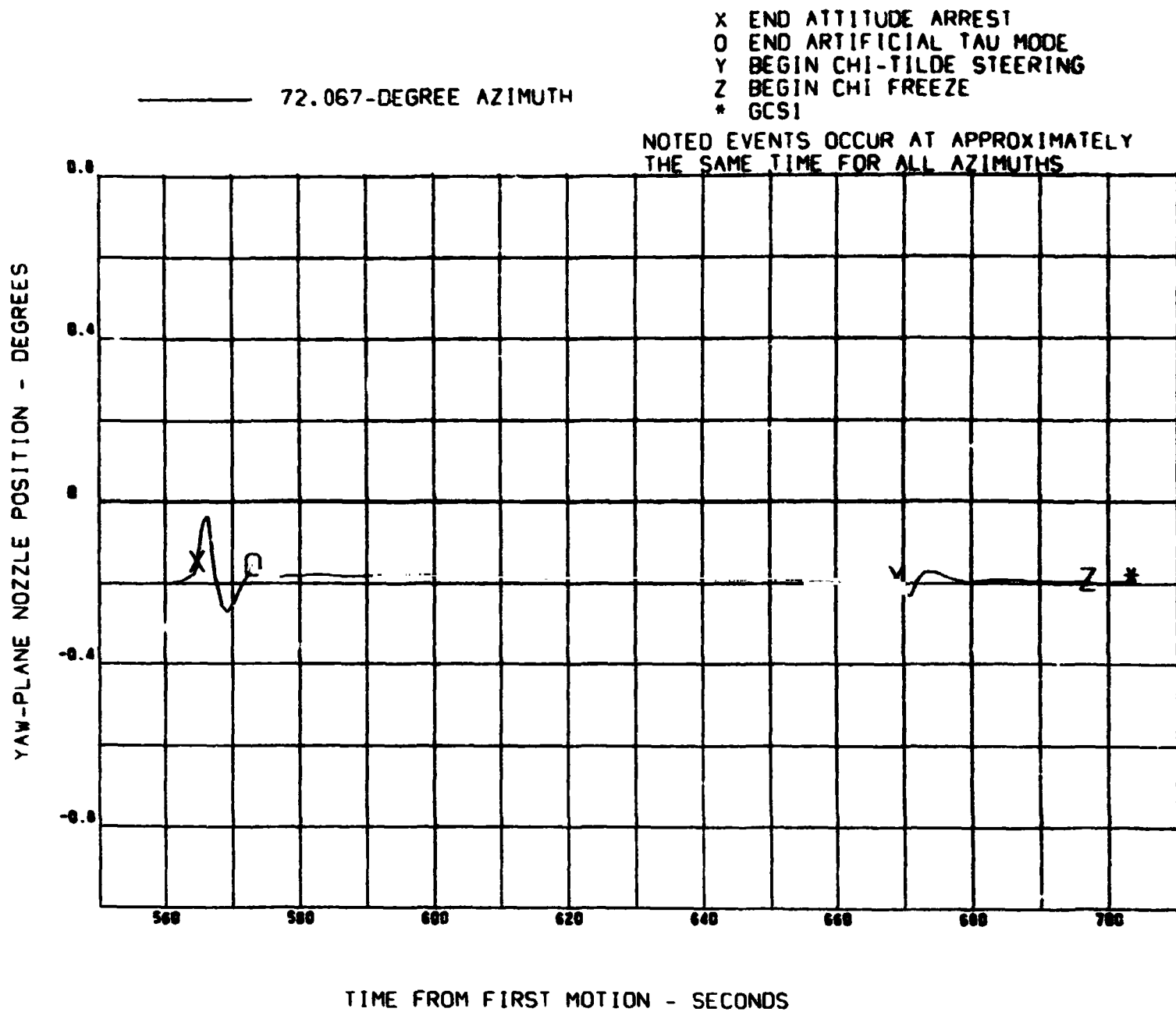


FIGURE 133 YAW-PLANE NOZZLE POSITION HISTORY  
 FOR S-IVB STAGE (FIRST BURN)

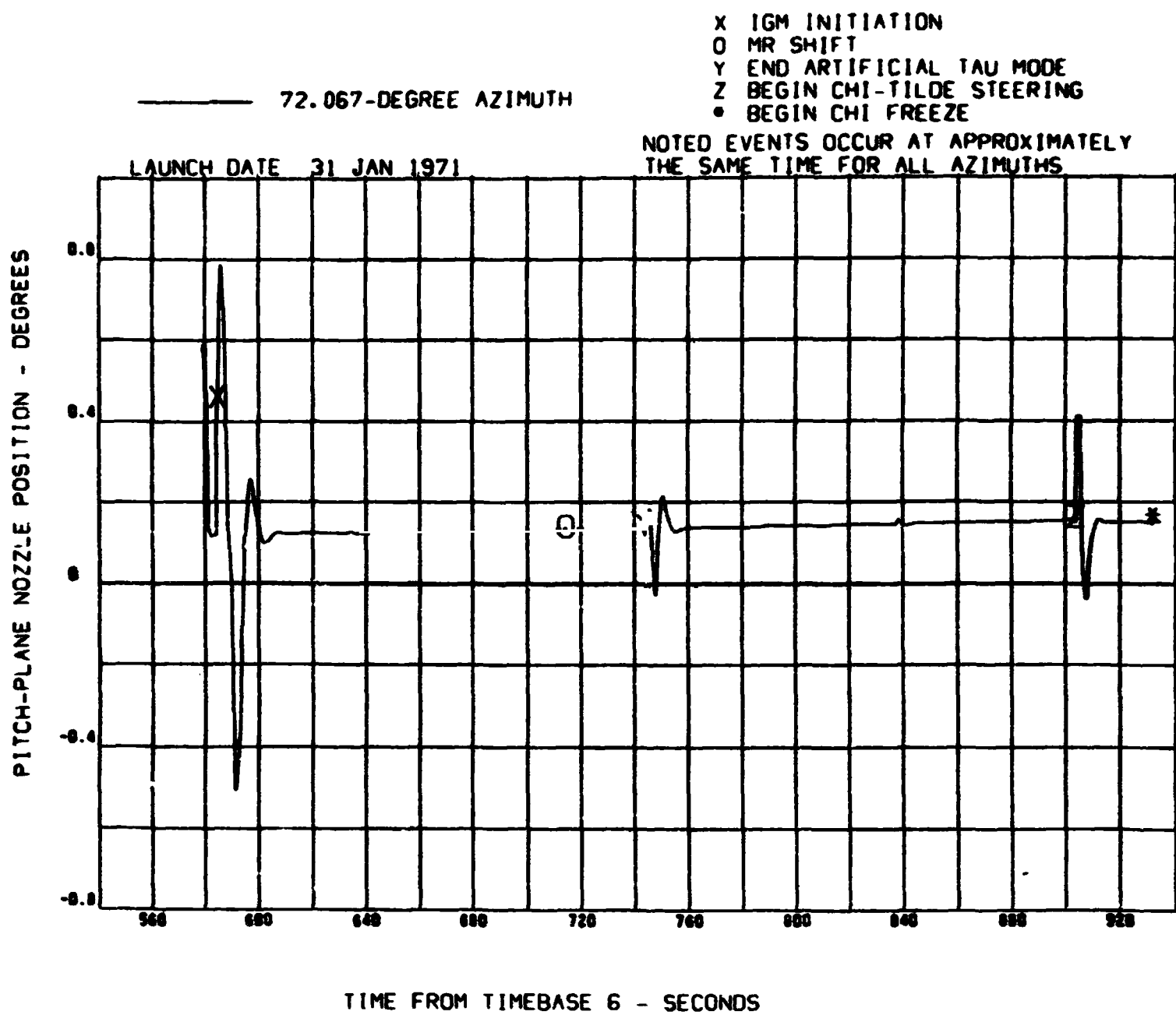


FIGURE 134 PITCH-PLANE NOZZLE POSITION HISTORY FOR S-IVB SECOND BURN (FIRST OPPORTUNITY)

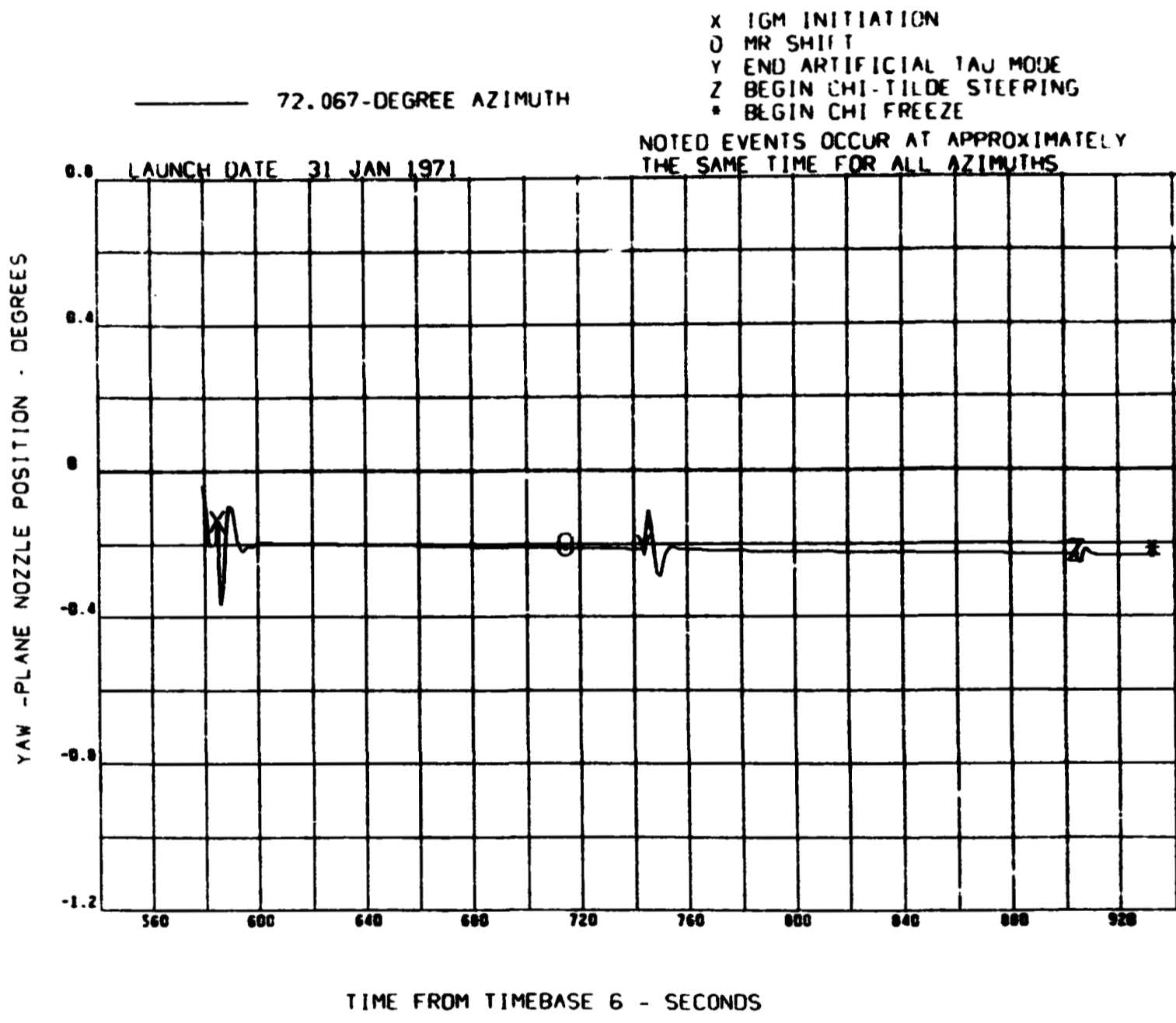


FIGURE 135 YAW-PLANE NOZZLE POSITION HISTORY FOR S-IVB SECOND BURN (FIRST OPPORTUNITY)

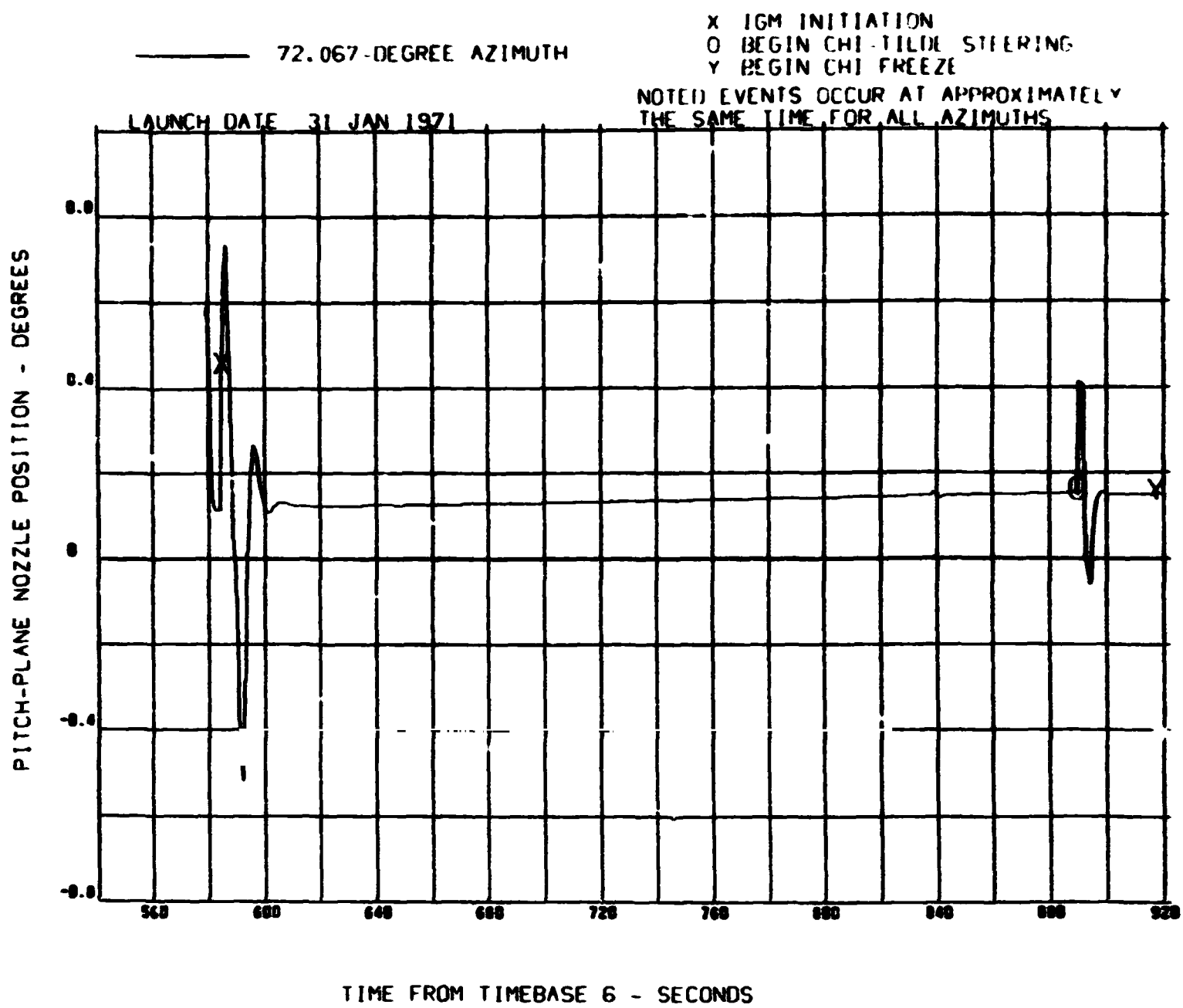


FIGURE 136 PITCH-PLANE NOZZLE POSITION HISTORY FOR S-IVB SECOND BURN (SECOND OPPORTUNITY)

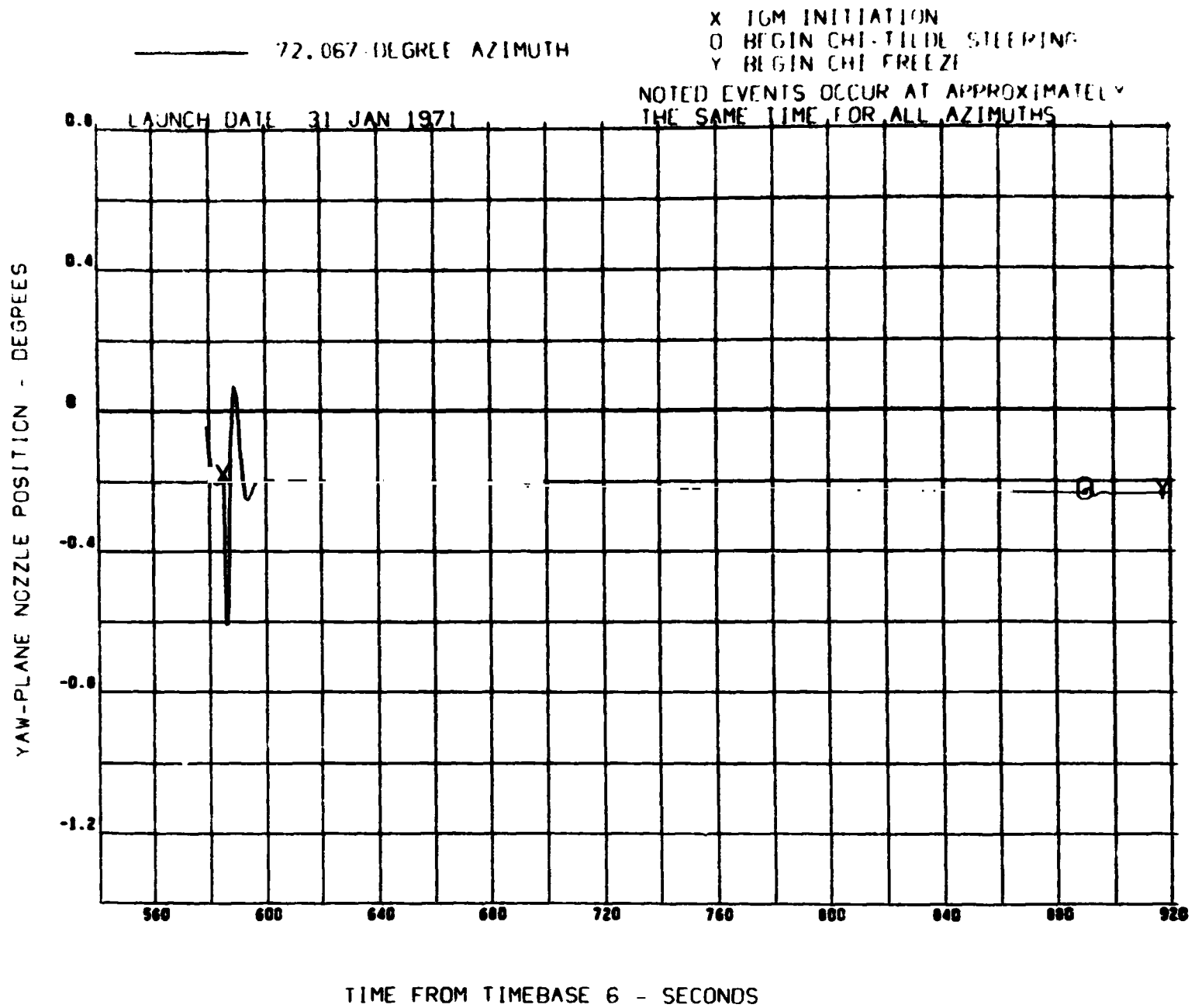


FIGURE 137 YAW-PLANE NOZZLE POSITION HISTORY FOR S-IVB SECOND BURN (SECOND OPPORTUNITY)

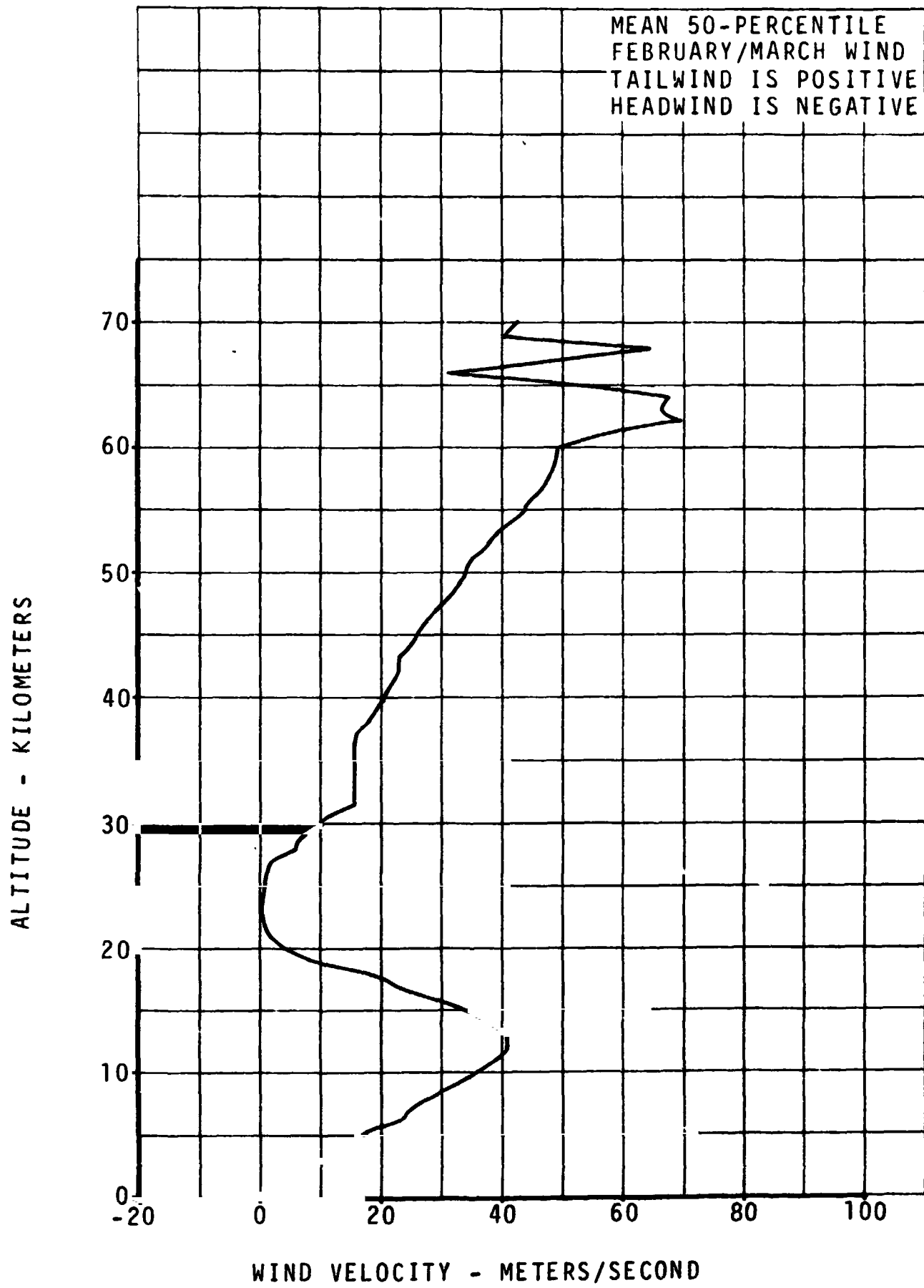


FIGURE 138 MEAN WIND FOR FLIGHT SIMULATION (72- THROUGH 82.5-DEGREE LAUNCH AZIMUTH)

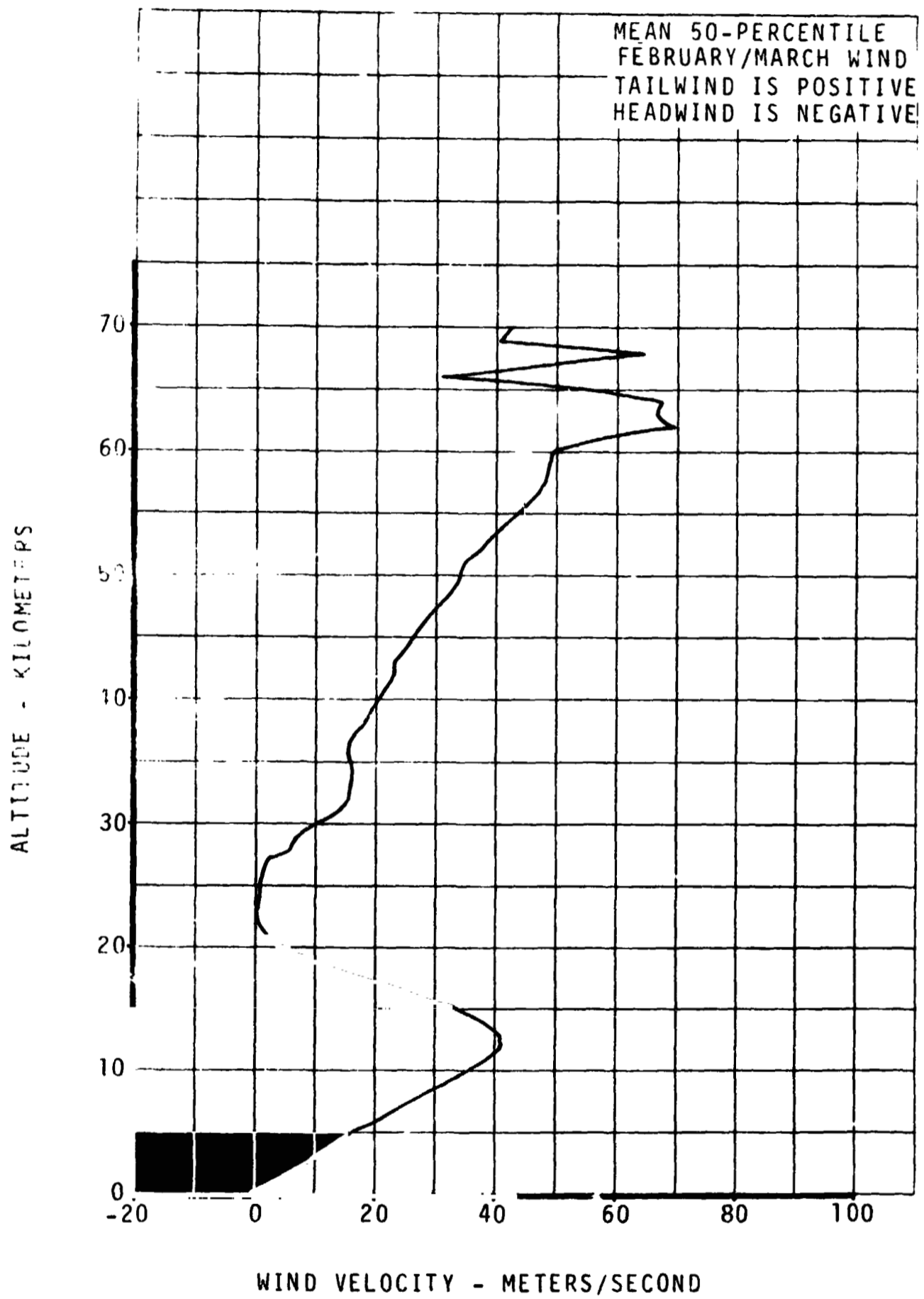


FIGURE 139 MEAN WIND FOR FLIGHT SIMULATION (82.5- THROUGH 96-DEGREE LAUNCH AZIMUTH)



## SECTION VI: GUIDANCE PRESETTINGS

Except for initial tower clearance and the roll to the proper flight azimuth, both yaw and roll guidance commands are zero during first stage flight. The Saturn V launch vehicle utilizes a fourth-order, four-segment polynomial for the guidance commands (only pitch plane) during the S-IC stage. The general form of the polynomial is as follows:

$$\chi_p = A_0 + A_1 t + A_2 t^2 + A_3 t^3 + A_4 t^4$$

where the  $A_i$  are the coefficients determined from a least-square curve fit to the design chi pitch history and  $t$  is the time from time base 1.

The tilt polynomial is designed for a 72-degree flight azimuth and optimized for a 100-nautical mile earth parking orbit. The polynomial was generated for a mean November through April wind. An average February March 50-percentile wind is used in nominal trajectory simulations for the January 31, 1971, launch. The tilt polynomial is designed to minimize the angle of attack during the high dynamic pressure region and also during S-IC/S-II separation. Table 19 gives the minor-loop pitch attitude commands resulting from the use of this polynomial.

During the S-II and S-IVB phases of flight, the Saturn V launch vehicle employs a scheme known as the iterative guidance mode (IGM) to generate the guidance commands (both pitch and yaw). This scheme requires pre-  
settings to establish the desired mission, provide information on the launch vehicle characteristics, and initialize various internal parameters and logic variables.

The pre-  
settings required are grouped into three phases:

1. Guidance pre-  
settings for boost to earth parking orbit.
2. Guidance pre-  
settings for translunar injection boost.
3. Targeting pre-  
settings' octal cards.

The boost to earth parking orbit and translunar injection boost pre-  
settings are derived using the latest trajectory characteristics that are available. These pre-  
settings are designed to obtain the maximum performance and minimize discontinuities in the guidance commands. The BTC, TLI boost pre-  
settings, and octal card listing are given in Tables 18 and 20.

TABLE 18  
GUIDANCE PRESETTINGS FOR BOOST TO EARTH PARKING ORBIT.

PROGRAM SYMBOL	PRESETTING	UNITS	LVDC MODULE	DEFINITION
$a_e$	6378165.0	M	GR, OA	EARTH'S SEMIMAJOR AXIS.
$b$	6356783.0	M	OA	EARTH'S SEMIMINOR AXIS.
$B_a$	0.15	N/D	IG	MINIMUM FRACTIONAL DEVIATION OF CALCULATED THRUST FROM NOMINAL THRUST WHICH INITIATES OFF-NOMINAL-PROPULSION LOGIC.
$BN_5$	100.0	SEC	EP	TIME IN TIMEFRAME 5 TO ENTER ORBIT INITIALIZE AND BEGIN ORBIT NAVIGATION.
$C_{D0}$	11.079923	N/D	OA	COEFFICIENTS OF THE POLYNOMIAL THAT CALCULATES DRAG COEFFICIENT AS A FUNCTION OF ANGLE OF ATTACK.
$C_{D1}$	0.17954281	N/D	OA	
$C_{D2}$	-2.1771971	N/D	OA	
$C_{D3}$	-0.28074902	N/D	OA	
$C_{D4}$	-5.8764139	N/D	OA	
$C'_0$	10.0	SEC	IG	LENGTH OF THE ARTIFICIAL TAU MODE FOR FIRST S-IVB BURN.
$\cos(\theta_T)$	1.0	N/D	IG	COSINE OF THE DESIRED TERMINAL FLIGHT-PATH ANGLE.

TABLE 18 (Continued)  
GUIDANCE PRESETTINGS FOR BOOST TO EARTH PARKING ORBIT. (CONTINUED)

PROGRAM SYMBOL	PRESSETTING	UNITS	LVDC MODULE	DEFINITION
D	0.7875D-5	N/D	GR	COEFFICIENT OF 4TH HARMONIC IN GRAVITATIONAL POTENTIAL MODEL.
(F/M) N20	15.72	M/SEC**2	IG	NOMINAL ACCELERATION FOR S-II STAGE SECOND PHASE IGM COMPUTATIONS.
FN	5194374.9	NT	IG	NOMINAL THRUST OF S-II STAGE BEFORE PMR.
F0	32.55754	DEG	IN	COEFFICIENTS OF PARKING ORBIT INCLINATION POLYNOMIAL.
f1	-15.94615	DEG		
f2	11.64780	DEG		
f3	9.890970	DEG		
f4	-5.111430	DEG		
f5	0.0	DEG		
f6	0.0	DEG		
F10	-4.002179320 0	DEG	IN,TT	COEFFICIENTS OF THE FIRST SEGMENT OF THE FOUR-SEGMENT FIRST-STAGE TILT POLYNOMIAL.
F11	+6.752831240-1	DEG/SEC	IN,TT	

TABLE 18 (CONTINUED)  
GUIDANCE SETTINGS FOR BOOST TO EARTH PARKING ORBIT. (CONTINUED)

PROGRAM SYMBOL	PREF SETTING	UNITS	LVDC MODULE	DEFINITION
F12	- 4.22882801D-2	DEG/SEC**2	IN,TT	COEFFICIENTS OF THE SECOND SEGMENT OF THE FOUR-SEGMENT FIRST-STAGE TILT POLYNOMIAL.
F13	+ 2.00463663D-4	DEG/SEC**3	IN,TT	
F14	- 6.53449740D-6	DEG/SEC**4	IN,TT	
F20	- 1.551866495D1	DEG	TT	
F21	+ 1.360718594D0	DEG/SEC	TT	COEFFICIENTS OF THE THIRD SEGMENT OF THE FOUR-SEGMENT FIRST-STAGE TILT POLYNOMIAL.
F22	- 4.847695166D- 2	DEG/SEC**2	TT	
F23	+ 5.339513825D- 4	DEG/SEC**3	TT	
F24	- 2.215702229D- 6	DEG/SEC**4	TT	
F30	+ 8.072796772D2	DEG	TT	COEFFICIENTS OF THE FOURTH SEGMENT OF THE FOUR-SEGMENT FIRST-STAGE TILT POLYNOMIAL.
F31	- 4.103704707D1	DEG/SEC	TT	
F32	+ 7.665286348D- 1	DEG/SEC**2	TT	
F33	- 6.390057662D- 3	DEG/SEC**3	TT	
F34	+ 1.974236826D- 5	DEG/SEC**4	TT	COEFFICIENTS OF THE FOURTH SEGMENT OF THE FOUR-SEGMENT FIRST-STAGE TILT POLYNOMIAL.
F40	+ 1.501143721D2	DEG	TT	

TABLE 18 (Continued)

GUIDANCE PRESETTING: FOR BOOST TO EARTH PARKING ORBIT. (CONTINUED)

PROGRAM SYMBOL	PRESETTING	UNITS	LVDC MOBILE	DEFINITION
F 41	-4.51089216100	DEG/SEC	TT	
F 42	+3.9016154190-2	DEG/SEC**2	TT	
F 43	-1.6214743150-4	DEG/SEC**3	TT	
F 44	+2.587555850-7	DEG/SEC**4	TT	
GANTRY	138.0	M	IN,TT	TOWER CLEARANCE ALTITUDE.
90	123.1935	DEG	IN	COEFFICIENTS OF PARKING ORBIT DESCENDING NODAL ANGLE POLYNOMIAL.
91	-55.06485	DEG		
92	-35.26208	DEG		
93	26.01324	DEG		
94	-1.47591	DEG		
95	0.0	DEG		
96	0.0	D		
H	0.5750-5	N/D	GR	THIRD ZONAL HARMONIC COEFFICIENT IN GRAVITATIONAL POTENTIAL MODEL.
h <sub>1</sub>	1.505	M	DA	MAXIMUM ALTITUDE TO USE CONSTANT ATMOSPHERIC DENSITY, RHO.

TABLE 18 (Continued)

GUIDANCE PRESETTINGS FOR BOOST TO EARTH PARKING ORBIT. (CONTINUED)

PROGRAM SYMBOL	PRESSETTING	UNITS	LVDC MODULE	DEFINITION
h <sub>2</sub>	3.705	M	CA	MAXIMUM ALTITUDE TO USE ATMOSPHERIC DENSITY POLYNOMIAL.
IG2	0.0	SEC	IG	TIME REMAINING IN FIRST IGM PHASE TO START CHECKING F/M FOR S-II PMR.
J	1.623450-3	N/D	G <sub>0</sub>	SECOND ZONAL HARMONIC COEFFICIENT IN GRAVITATIONAL POTENTIAL MODEL.
K <sub>D</sub>	1.273230-4	M**2/KG	DA	ORBITAL DRAG MODEL CONSTANT.
LIM1	1.0	DEG/SEC	MS	BOOST PHASE CHI-RATE LIMIT FOR ROLL.
LIM2	1.0	DEG/SEC	MS	BOOST PHASE CHI-RATE LIMIT FOR PITCH AND YAW.
M <sub>CO</sub>	658300.83	KG	IG	REFERENCE MASS USED TO PROVIDE BASELINE MASS CALCULATIONS DURING THE FIRST IGM PHASE.
(M/F) 0	.1521	SEC**2/M	IN, DV	MASS-TO-THRUST RATIO USED TO INITIALIZE S-II (M/F) SMOOTHING FILTER.
(M/F) 1	.1899	SEC**2/M	EP, DV	MASS-TO-THRUST RATIO USED TO INITIALIZE S-IVR FIRST-RURN (M/F) SMOOTHING FILTER.

TABLE 18 (Continued)  
GUIDANCE PRE SETTINGS FOR BOOST TO EARTH PARKING ORBIT. (CONTINUED)

PROGRAM SYMBOL	PREF SETTING	UNITS	LVDC MODULE	DEFINITION
MFK1	.39254895	N/D	DV	M/F FILTER COEFFICIENTS, FOR S-II STAGE.
MFK2	-0.3135895	N/D	DV	
MFK3	0.0	N/D	DV	
MFK4	0.0	N/D	DV	
MFK5	0.0	N/D	DV	
MFK6	1.56507857	N/D	DV	
MFK7	-0.64403642	N/D	DV	
MFK8	0.0	N/D	DV	
MFK9	0.0	N/D	DV	
P <sub>CMR</sub>	10.0	SEC	IG	NOMINAL DURATION OF S-II PMR THRUST TRANSIENT PERIOD.
P <sub>CO</sub>	0.0	SEC	IG	TIME AFTER TII BECOMES NEGATIVE WHEN STAGING OF THE GUIDANCE EQUATIONS IS FORCED.
R <sub>L</sub>	6373407.3	M	IN	RADIUS FROM GEOCENTRIC CENTER OF THE EARTH TO CENTER OF IU ON LAUNCH PAD (PAD A).
ROV	1.5	N/D	IG	CONSTANT FOR RAISING TERMINAL RANGE-ANGLE PREDICTION IN FIRST S-IVB BURN.

TABLE 18 (Continued)  
GUIDANCE SETTINGS FOR BOOST TO EARTH PARKING ORBIT. (CONTINUED)

PROGRAM SYMBOL	SETTING	UNITS	LVDC MODULE	DEFINITION
SMCG1	0.05	RAD/SEC	SM	STEERING MISALIGNMENT CORRECTION GAINS FOR S-II AND S-IVB BURNS.
S4MFK1	0.39254005	N/D	DV	M/F FILTER COEFFICIENTS, FOR S-IVB STAGE.
S4MFK2	-0.3135895	N/D	DV	
S4MFK3	0.0	N/D	DV	
S4MFK4	0.0	N/D	DV	
S4MFK5	0.0	N/D	DV	
S4MFK6	1.54507857	N/D	DV	
S4MFK7	-0.64403642	N/D	DV	
S4MFK8	0.0	N/D	DV	
S4MFK9	0.0	N/D	DV	
T <sub>ar</sub>	163.0	SEC	TT	LVDC IMPLEMENTATION TIME OF TILT ARREST DURING TIMEBASE 1.
T <sub>Ci</sub>	6.5	SEC	IG	GUIDANCE COAST TIME BETWEEN S-II CUTOFF AND INITIATION OF THIRD STAGE OF IGM GUIDANCE.
T <sub>HSL1</sub>	8.0	SEC	IG	VALUE OF THIRD-STAGE GUIDANCE TIME REMAINING AT WHICH THE HIGH-SPEED CUTOFF LOOP IS ENTERED.



TABLE 18 (Continued)  
GUIDANCE PRESETTINGS FOR BOOST TO EARTH PARKING ORBIT. (CONTINUED)

PROGRAM SYMBOL	PRESETTING	UNITS	LVOC MODULE	DEFINITION
T <sub>SMC</sub>	60.6	SEC	FP	TIME IN TIMEBASE 3 TO BEGIN COMPUTING STEERING MISALIGNMENT CORRECTIONS (SMC).
T <sub>SMC2</sub>	15.0	SFC	EP	TIME IN TIMEBASE 4 TO BEGIN COMPUTING STEERING MISALIGNMENT CORRECTIONS (SMC).
T <sub>S1</sub>	34.6	SFC	TT	SEGMENT SWITCH TIMES FOR FOUR-SEGMENT FIRST-STAGE TILT POLYNOMIAL REFERENCED TO TIMEBASE 1.
T <sub>S2</sub>	66.975	SEC	TT	
T <sub>S3</sub>	97.6	SEC	TT	
T <sub>I1</sub>	263.1	SEC	IG	TIME REMAINING IN THE FIRST STAGE OF IGM GUIDANCE.
T <sub>3 FM</sub>	6.7	SFC	EP	TIME FROM TIMEBASE 3 WHEN FIRST PASS THROUGH S-II (M/F) SMOOTHING FILTER IS ENABLED.
T <sub>3 FMC</sub>	4.4	SEC	EP	TIME IN TIMEBASE 3 TO BEGIN ACCUMULATING CHARACTERISTIC VELOCITY. ENABLE ACCELEROMETER ZERO TEST, DECREASE X AND Z ACCELEROMETER RTC, START USING MONT? AND F2 TO COMPUTE BACKUP ACCELERATION.

TABLE 18 (Continued)  
GUIDANCE PRESETTINGS FOR BOOST TO EARTH PARKING ORBIT. (CONTINUED)

PROGRAM SYMBOL	PRESSETTING	UNITS	LVFC MCCBLE	DEFINITION
T3 IGM	47.6	SEC	FP	TIME FROM TIMEBASE 3 TO ENABLE FIRST STAGE OF IGM GUIDANCE.
T3	139.0	SEC	IN, DP	ESTIMATED THIRD STAGE BURN TIME.
T4 FM	12.0	SEC	EP RN	TIME FROM TIMEBASE 4 WHEN FIRST PASS THROUGH S-IVB FIRST-BURN (F/M) SMOOTHING FILTER IS ENABLED.
T4 FMC	6.5	SEC	FP	TIME IN TIMEBASE 4 TO DECREASE X AND 7 RTC, START USING M00T4 AND F4 TO COMPUTE BACKUP ACCELERATION, ENABLE ACCELEROMETER ZERO TEST.
T5M2	23.0	SEC	EP	TIME IN TIMEBASE 5 TO MANEUVER TO LOCAL REFERENCE ATTITUDE.
VCN	4748.7	M/SEC	IG	CHARACTERISTIC VELOCITY GAINED BETWEEN S-IC/S-II SEP AND T4+C.
VC0	5.816	M/SEC	IN, IG	INITIAL CHARACTERISTIC VELOCITY AT T3+T3FMC.
VC1N	3508.3	M/SEC	IG	CHARACTERISTIC VELOCITY GAINED BETWEEN S-IC/S-II SEPARATION AND S-II PMR.
VENT 1A	0.001342	M/SEC**2	FP, CA	ORBITAL VENT ACCELERATIONS.

TABLE 18 (Continued)  
GUIDANCE PRESETTINGS FOR BOOST TO EARTH PARKING ORBIT. (CONTINUED)

PROGRAM SYMBOL	PRESSETTING	UNITS	LVDC MODULE	DEFINITION
VENT 2A	0.0006478	M/SEC**2	EP, OA	
VENT 3A	0.0004472	M/SEC**2	EP, OA	
VENT 4A	0.0003724	M/SEC**2	EP, OA	
VENT 5A	0.0002858	M/SEC**2	FP, OA	
V <sub>ex1</sub>	4170.5	M/SEC	IG	EXHAUST VELOCITIES FOR THE FIRST, SECOND, AND THIRD STAGES OF IGM GUIDANCE, RESPECTIVELY.
V <sub>ex2</sub>	4203.8	M/SEC	IG	
V <sub>ex3</sub>	4185.	M/SEC	IG	
V <sub>GRD1</sub>	300.0	M/SEC	IG	S-IVB FIRST BURN VELOCITY GUARD FOR HIGH-SPEED LOOP ENTRANCE.
V <sub>T</sub>	7793.0429	M/SEC	IG	DESIRED TERMINAL VELOCITY .
VTIM1	1800.	SEC	FP	SEGMENT SWITCH TIMES FOR ORBITAL VENT ACCELERATIONS MEASURED FROM TB5.
VTIM2	4300.	SEC	EP	
VTIM3	7300.	SEC	EP	
VTIM4	12800.	SEC	EP	

TABLE 18 (Continued)

GUIDANCE PRESETTINGS FOR BOOST TO EARTH PARKING ORBIT. (CONTINUED)

PROGRAM SYMBOI	PREFSETTING	UNITS	LVDC. MODULE	DEFINITION
$X_{LS}$	6373382.0	M	IN	INITIAL RADIUS COMPONENT OF IU ALONG XS AXIS (PAD A).
$X_{VT}$	6563366.0	M	IG	DESIRED TERMINAL RADIUS.
$\ddot{X}_{VGT}$	-9.255	M/SEC**2	IG	COMPONENTS OF TERMINAL GRAVITY VECTOR IN GUIDANCE COORDINATE SYSTEM FOR S-IVB FIRST BURN.
$\ddot{Y}_{VGT}$	0.0	M/SEC**2	IG	
$\ddot{Z}_{VGT}$	0.0	M/SEC**2	IG	
$\Delta PM$	32.0	M/SEC**2	IG	F/M TOLERANCE USED IN TEST TO SENSE PMR IN S-II STAGE.
$\Delta V_b$	1.607	M/SEC	IG	CUTOFF VELOCITY BIAS FOR S-IVB FIRST BURN.
$\epsilon_2$	35.0	SEC	IG	CONSTANT TIME FOR SELECTION OF GUIDANCE OPTION THAT ENFORCES ONLY TERMINAL VELOCITY END-CONDITIONS.
$\lambda_L$	-80.604133	DEG	GL	LONGITUDE OF THE LAUNCH SITE, MEASURED POSITIVE EASTWARD FROM THE GREENWICH MERIDIAN (PAD A).
$\mu$	3.986032014	M**3/SEC**2	IG, GR, RS	PRODUCT OF UNIVERSAL GRAVITATIONAL CONSTANT AND MASS OF THE EARTH.

TABLE 18 (Continued)  
GUIDANCE PRESETTINGS FOR BOOST TO EARTH PARKING ORBIT. (CONTINUED)

PROGRAM SYMBOL	PRESSETTING	UNITS	LVDC MODILE	DEFINITION
P <sub>C</sub>	C.5D-7	KG/M**3	0A	CONSTANT ATMOSPHERIC DENSITY USED BELOW ALTI.
P <sub>O</sub>	0.17914200D-06	KG/M**3	CA	ATMOSPHERIC DENSITY MODEL POLYNOMIAL COEFFICIENTS.
P <sub>1</sub>	-0.37213949D-11	KG/M**4	0A	
P <sub>2</sub>	C.31057986D-16	KG/M**5	0A	
P <sub>3</sub>	-0.17962178D-21	KG/M**6	0A	
P <sub>4</sub>	0.76996419D-27	KG/M**7	0A	
P <sub>5</sub>	-0.22388267D-33	KG/M**8	0A	
τ <sub>2</sub>	334.2	SEC	IG	ESTIMATED TIME TO BURN UP VEHICLE COMPLETELY, FROM A SELECTED TIME BETWEEN TII=C AND THE END OF THE ARTIFICIAL TAU MODE.
τ <sub>3</sub>	782.9	SEC	IG	ESTIMATED TIME TO BURN UP S-IVB COMPLETELY, CONSTANT DURING FIRST AND SECOND STAGES OF IGM.
τ <sub>3N</sub>	782.9	SEC	IG	NOMINAL TAU, USED IN THE S-IVB FIRST-BURN ARTIFICIAL TAU MODE.
φ <sub>L</sub>	28.608422	DEG	IN	GEODETTIC LATITUDE OF THE LAUNCH SITE (PAD A).

TABLE 18 (Continued)

GUIDANCE PRESETTINGS FOR BOOST TO EARTH PARKING ORBIT. (CONTINUED)

PROGRAM SYMBOL	PRESSETTING	UNITS	LVDC MODULE	DEFINITION
$\phi_L$	28.446964	DEG	IN	GEOCENTRIC LATITUDE OF THE LAUNCH SITE (PAD A).

TABLE 18 (Continued)  
GUIDANCE PRESETTINGS FOR TRANS-LUNAR INJECTION BOOST. (CONTINUED)

PROGRAM SYMBOL	PRESETTING	UNITS	LVDC MODULE	DEFINITION
BN <sub>2</sub>	578.0	SEC	EP	TIME IN TIMEBASE 6 TO CALCULATE FIRST GUESS AT ACCELERATION USING FNR, MNR, AND MDO <sub>TNR</sub> .
BN <sub>4</sub>	150.9	SEC	EP	TIME IN TIMEBASE 7 TO ENTER ORBIT INITIALIZE AND RESUME ORBIT NAVIGATION.
F <sub>NRA</sub>	759682.0	NEWTONS	EP	NOMINAL THRUST USED AT PRECALCULATIONS FOR FIRST OPPORTUNITY.
F <sub>NRB</sub>	795448.	NEWTONS	EP	NOMINAL THRUST USED AT PRECALCULATIONS FOR SECOND OPPORTUNITY.
IG7	0.0	SEC	IG	TIME BEFORE NOMINAL S-IVB SECOND BURN EMRC TO SEARCH FOR EMRC.
M <sub>NRA</sub>	134656.1	KG	EP	NOMINAL MASS USED AT PRECALCULATIONS FOR FIRST OPPORTUNITY.
M <sub>NRB</sub>	134272.8	KG	EP	NOMINAL MASS USED AT PRECALCULATIONS FOR SECOND OPPORTUNITY.
M <sub>NR</sub>	212.11	KG/SEC	EP	NOMINAL S-IVB FIRST BURN MASS FLOWRATE USED AT PRECALCULATIONS
M <sub>5GA</sub>	187.343 12.837	KG/SEC SLUG/SEC	IG	AVERAGE MASS FLOWRATE DURING FOURTH STAGE OF IGM GUIDANCE FOR FIRST OPPORTUNITY.

TABLE 18 (Continued)

GUIDANCE PRESETTINGS FOR TRANSLUNAR INJECTION BOOST. (CONTINUED)

PROGRAM SYMBOL	PRESSETTING	UNITS	LVDC MODULE	DEFINITION
$\dot{M}_{6GA}$	211.405 14.485	KG/SEC SLUG/SEC	IG	AVERAGE MASS FLOWRATE DURING FIFTH STAGE OF IGM GUIDANCE FOR FIRST OPPORTUNITY.
$\dot{M}_{5GB}$	211.393 14.485	KG/SFC SLUG/SEC	IG	AVERAGE MASS FLOWRATE DURING FOURTH STAGE OF IGM GUIDANCE FOR SECOND OPPORTUNITY.
$\dot{M}_{6GB}$	211.393 14.485	KG/SEC SLUG/SEC	IG	AVERAGE MASS FLOWRATE DURING FIFTH STAGE OF IGM GUIDANCE FOR SECOND OPPORTUNITY.
P COR	0.0	SEC	IG	TIME AFTER NOMINAL S-IVB SECOND-BURN PMR SHIFT WHEN STAGING OF THE GUIDANCE EQUATIONS IS FORCED.
ROVR	-0.40		IG	CONSTANT FOR BIASING TERMINAL RANGE-ANGLE PREDICTION IN SECOND S-IVB BURN.
SMCG3	0.05	RAD/SEC	SM	SMC GAIN FOR S-IVB SECOND-BURN.
$t_{BLA}$	30.0	SEC	IG	NOMINAL TRANSITION TIME FOR S-IVB SECOND-BURN PMR SHIFT USED IN IGM STAGE LOGIC FOR FIRST OPPORTUNITY.
$t_{L1B}$	1.0	SEC	IG	NOMINAL TRANSITION TIME FOR S-IVB SECOND-BURN PMR SHIFT USED IN IGM STAGE LOGIC FOR SECOND OPPORTUNITY.



**TABLE 18 (Continued)**  
**GUIDANCE PREF SETTINGS FOR TRANSLINAR INJECTION HOIST. (CONTINUED)**

PROGRAM SYMBOL	PREF SETTING	UNITS	LVDC MODULE	DEFINITION
T HS, 2	3.0	SEC	IG	VALUE OF SECOND S-IVB BURN GUIDANCE TIME REMAINING AT WHICH THE HIGH-SPEED CUTOFF LOOP IS IMPLEMENTED.
T SMC..	555.0	SEC	FP	TIME IN TIMEBASE 6 TO BEGIN COMPUTING STEERING MISALIGNMENT CORRECTIONS (SMC).
T 2iRA	131.0	SEC	IG	NOMINAL DURATION OF FIRST STAGE OF IGM FOR FIRST OPPORTUNITY.
T 2iKB	1.0	SFC	IG	NOMINAL DURATION OF FOURTH STAGE OF IGM FOR SECOND OPPORTUNITY.
T 4N	146.9	SFC	EP	NOMINAL TIME FROM TB4 TO TB5.
T 6FM	583.0	SEC	EP	TIME IN TIMEBASE 6 TO BEGIN SMOOTHED M/F COMPUTATION.
T 6PMC	580.5	SEC	EP	TIME IN TIMEBASE 6 TO BEGIN HACKIP ACCELERATION CALCULATION.
T 6 IGM	584.0	SEC	EP	TIME IN TIMEBASE 6 TO ENABLF FOURTH PHASE OF IGM.
T 7M9	150.0	SEC	FP	TIME IN TIMEBASE 7 TO BEGIN MANEUVER TO LOCAL HORIZONTAL ATTITUDE.

TABLE 18 (Continued)

GUIDANCE PREFSETTINGS FOR TRANS-LUNAR INJECTION BOOST. (CONTINUED)

PROGRAM SYMBO	PREFSETTING	UNITS	LVDC MODULE	DEFINITION
T7M10	900.0	SEC	FP	TIME IN TIMEBASE 7 TO COMPUTE INERTIAL ATTITUDE CORRESPONDING TO LOCALLY REFERENCED SEPARATION ATTITUDE.
T8M12	580.0	SEC	FP	TIME IN TIMEBASE 8 TO BEGIN MANEUVER TO LOCAL-REFERENCE LOX-DUMP ATTITUDE
V <sub>ex2</sub> RA	4218.86	M/SEC	IG	EXHAUST VELOCITIES FOR FOURTH AND FIFTH STAGES OF IGM GUIDANCE FOR FIRST OPPORTUNITY.
V <sub>ex3</sub> RA	4182.71	M/SEC	IG	
V <sub>ex2</sub> RB	4180.0	M/SEC	IG	EXHAUST VELOCITIES FOR FOURTH AND FIFTH STAGES OF IGM GUIDANCE FOR SECOND OPPORTUNITY.
V <sub>ex3</sub> RB	4180.0	M/SEC	IG	
V <sub>GRD2</sub>	150.0	M/SEC	IG	VELOCITY GUARD FOR HIGH SPEED LOOP ENTRANCE.
ΔFMS4	32.0	M/SFC#2	IG	F/M TOLERANCE USED IN TEST TO SENSE PMR DURING S-IVB SECOND BURN.
ε <sub>2R</sub>	30.0	SEC	IG	CONSTANT TIME FOR SELECTION OF GUIDANCE OPTION THAT ENFORCES ONLY TERMINAL VELOCITY END-CONDITIONS DURING S-IVB SECOND BURN.

TABLE 18 (Continued)

GUIDANCE SETTINGS FOR TRANS-LUNAR INJECTION BOOST. (CONTINUED)

PROGRAM SYMBOL	SETTING	UNITS	LVDC MODULE	DEFINITION
E3R	30.0	SEC	IG	CONSTANT TIME FOR SELECTION OF GUIDANCE OPTION THAT FREEZES THE TERMINAL CONDITIONS DURING THE SECOND S-IVB BURN.

TABLE 18 (Continued)

INITIALS PRE SETTINGS

PROGRAM SYMBOL	PRESETTING	UNITS	LVCC SECTION	DEFINITION
ALFTSA	7.927304D-02	PIRADS	RTST	DESIRED ANGLE BETWEEN THE S VECTOR (INITIAL CROSSING OF TARGET ELLIPSE AND EARTH PARKING ORBIT) AND T (UNIT TARGET) VECTOR AT RESTART PREPARATION FOR FIRST OPPORTUNITY. (CONSTANT ACROSS DAILY LAUNCH WINDOW.)
ALFTSB	7.925066D-02	PIRADS	RTST	DESIRED ANGLE BETWEEN THE S VECTOR AND TARGET VECTOR AT RESTART PREPARATION FOR SECOND OPPORTUNITY. (CONSTANT ACROSS DAILY LAUNCH WINDOW.)
AZO	4.000000D-01	PIRADS	RTST	AZIMUTH AT OPENING OF LAUNCH WINDOW.
AZS	2.000000D-01	PIRADS	RTST	DIFFERENCE BETWEEN OPENING AND CLOSING AZIMUTHS OF LAUNCH WINDOW.
PFTAA	3.438875D-01	PIRADS	RTST	ANGLE BETWEEN S VECTOR AND RADIUS VECTOR AT INITIATIONS OF S-IVR RESTART PREPARATIONS FOR FIRST OPPORTUNITY. (CONSTANT ACROSS LAUNCH WINDOW.)
EETAB	3.376960D-01	PIRADS	RTST	ANGLE BETWEEN S VECTOR AND RADIUS VECTOR AT INITIATIONS OF S-IVR RESTART PREPARATIONS FOR SECOND OPPORTUNITY. (CONSTANT ACROSS LAUNCH WINDOW.)

TABLE 16 (Continued)

TARGETING PRESETTINGS

PROGRAM SYMBOL	PRESETTING	UNITS	LVDC SECTION	DEFINITION
CKS15	NOT AVAILABLE			CHECK SUM CONSTANTS FOR SECTOR 13.
CKS16	NOT AVAILABLE			CHECK SUM CONSTANTS FOR SECTOR 14.
CCSAC	9.958662D-01	NONE	BTST	CCSAC THROUGH CCSA14 ARE VALUES OF A 15 POINT TABLE OF THE COSINE OF THE TRUE ANOMALY OF THE TARGET VECTOR AS A FUNCTION OF TIME INTO THE LAUNCH WINDOW FOR FIRST OPPORTUNITY.
CCSA1	9.955362D-01	NONE	BTST	
CCSA2	9.950941D-01	NCNE	BTST	
CCSA3	9.947899D-01	NCNE	BTST	
CCSA4	0.0	NCNE	HTST	
CCSA5 TO CCSA34	0.0	NCNE	PTST	
CCS80	9.955928D-01	NONE	BTST	CCS80 THROUGH CCS814 ARE VALUES OF A 15 POINT TABLE OF THE COSINE OF THE TRUE ANOMALY OF THE TARGET VECTOR AS A FUNCTION OF TIME INTO THE LAUNCH WINDOW FOR SECOND OPPORTUNITY.

TABLE 18 (Continued)

TARGETING PRESETTINGS

PROGRAM SYMBOL	PRESETTING	UNITS	LVDC SECTION	DEFINITION
C301	9.951091D-01	NCNE	BTST	
C302	9.945684D-01	NCNE	BTST	
C303	9.942668D-01	NCNE	BTST	
C304	0.0	NCNE	BTST	
CCSB5 TO COSB14	0.0	NCNE	BTST	
C3A0	-1.674269D+06	M**2/SEC**	BTST	C3A0 THROUGH C3A14 ARE VALUES OF A 15 POINT TABLE OF TWICE THE SPECIFIC ENERGY OF THE TARGET ELLIPSE AS A FUNCTION OF TIME INTO THE LAUNCH WINDOW FOR FIRST OPPORTUNITY.
C3A1	-1.654607D+06	M**2/SEC**	BTST	
C3A2	-1.632856D+06	M**2/SEC**	BTST	
C3A3	-1.615992E+06	M**2/SEC**	BTST	
C3A4	0.0	M**2/SEC**	BTST	
C3A5 TO C3A14	0.0	M**2/SEC**	BTST	
C3B0	-1.650693D+06	M**2/SEC**	BTST	C3B0 THROUGH C3B14 ARE VALUES OF A 15 POINT TABLE OF TWICE THE SPECIFIC ENERGY OF THE TARGET ELLIPSE AS A FUNCTION OF TIME INTO THE LAUNCH WINDOW FOR SECOND OPPORTUNITY.

TABLE 18 (Continued)

TARGETING PRESETTINGS

PROGRAM SYMBOL	PRESETTING	UNITS	LVDC SECTION	DEFINITION
C281	-1.627765D+06	M**2/SEC**	RTST	DATE OF LAUNCH EXPRESSED IN DAYS AFTER JAN. 1 OF YEAR OF LAUNCH (JAN. 1 IS DAY 00).
C282	-1.603183D+06	M**2/SEC**	RTST	
C283	-1.584406D+06	M**2/SEC**	RTST	
C284	0.0	M**2/SEC**	RTST	
C285 TO C3B1A	0.0	M**2/SEC**	RTST	
DECA0	30.0	DAYS	RTST	DATE OF LAUNCH EXPRESSED IN DAYS AFTER JAN. 1 OF YEAR OF LAUNCH (JAN. 1 IS DAY 00).
DECA0	-1.480384D-01	PIRADS	RTST	DECA0 THROUGH DECA14 ARE VALUES OF A 15 POINT TABLE OF TARGET VECTOR DECLINATION AS A FUNCTION OF TIME INTO THE LAUNCH WINDOW FOR FIRST OPPORTUNITY.
CECA1	-1.480305D-01	PIRADS	RTST	
CECA2	-1.480655D-01	PIRADS	RTST	
CECA3	-1.479969D-01	PIRADS	RTST	
CECA4	0.0	PIRADS	RTST	

TABLE 18 (Continued)

TARGETING PRESETTINGS

PROGRAM SYMBOL	PRESETTING	UNITS	LVCC SECTION	DEFINITION
DECA5 TO DECA14	C.C	PIRADS	HTST	
DECHC	-1.477838D-01	PIRADS	PTST	DECEC THROUGH DECP14 ARE VALUES OF A 15 POINT TABLE OF TARGET VECTOR DECLINATION AS A FUNCTION OF TIME INTO THE LAUNCH WINDOW FOR SECOND OPPORTUNITY.
DECB1	-1.479046D-01	PIRADS	HTST	
DECB2	-1.479906D-01	PIRADS	HTST	
DECB3	-1.479015D-01	PIRADS	RTST	
DECB4	0.0	PIRADS	BTST	
DECB5 TO DECB14	0.0	PIRADS	RTST	
DPIT1	6.666667D-01	PIRADS	LG	LAUNCH VEHICLE PITCH ATTITUDE REQUIRED FOR S/C SEPARATION MEASURED FROM LOCAL HORIZONTAL COORDINATE SYSTEM AT T87 + 90C SECONDS.
CPIT2	NOT AVAILABLE	PIRADS	DG	LV PITCH ATTITUDE REQUIRED FOR SLINGSHOT ATTITUDE MEASURED FROM LOCAL HORIZONTAL COORDINATE SYSTEM.



TABLE 18 (Continued)

TARGETING PRESETTINGS

PRCGPAM SYMBOL	PRESETTING	UNITS	LVDC SECTION	DEFINITION
ERCLL1	9.999999D-01	PIRADS	CG	LV ROLL ATTITUDE REQUIRED FOR S/C SEPARATION ATTITUDE.
ERCLL2	NOT AVAILABLE	PIRADS	CG	LV ROLL ATTITUDE REQUIRED FOR SLINGSHOT ATTITUDE.
EVPR4	3.33	M/SFC	BTST	CUTOFF VELOCITY BIAS FOR TRANSLUNAR INJECTION FOR FIRST OPPORTUNITY (CONSTANT ACROSS DAILY LAUNCH WINDOW).
CVBR8	3.33	M/SFC	BTST	CUTOFF VELOCITY BIAS FOR TRANSLUNAR INJECTION FOR SECOND OPPORTUNITY (CONSTANT ACROSS DAILY LAUNCH WINDOW).
EYAW1		PIRADS	OG	LV YAW ATTITUDE REQUIRED FOR S/C SEPARATION ATTITUDE.
DYAW2	NOT AVAILABLE	PIRADS	OG	LV YAW ATTITUDE REQUIRED FOR SLINGSHOT ATTITUDE.
ENAO	.9723098	NONE	BTST	ENAC THROUGH ENA14 ARE VALUES OF A 15 POINT TABLE OF TARGET ELLIPSE ECCENTRICITY AS A FUNCTION OF TIME INTO THE LAUNCH WINDOW FOR FIRST OPPOR- TUNITY.
ENA1	.9726332	NONE	BTST	

TABLE 18 (Continued)

TARGETING PRESETTINGS

PROGRAM SYMGL	PRESETTING	UNITS	LVLC SECTION	DEFINITION
ENA2	.9729937	NCNE	BTST	ENR0 THROUGH ENR14 ARE VALUES OF A 15 POINT TABLE OF TARGET ELLIPSE ECCENTRICITY AS A FUNCTION OF TIME INTO THE LAUNCH WINDOW FOR SFCCND OPPORTUNITY.
ENA3	.9732735	NCNF	BTST	
ENA4	0.0	NCNE	BTST	
ENA5 TO ENA14	0.0	NCNF	BTST	
ENR0	.9726923	NCNF	BTST	
ENB1	.9730707	NCNF	BTST	TRUE ANOMALY OF THE PREDICTED CUTOFF RADIUS VECTOR FOR FIRST OPPORTUNITY (CONSTANT ACROSS DAILY LAUNCH WINDOW).
EN32	.9734775	NCNF	BTST	
ENR3	.9737887	NCNE	BTST	
ENR4	0.0	NCNF	BTST	
ENR5 TO ENB14	0.0	NCNE	BTST	
FA	7.927600D-02	PIRADS	BTST	

TABLE 18 (Continued)

TARGETING PRESETTINGS

PROGRAM SYMBOL	PRESETTING	UNITS	LVDC SECTION	DEFINITION
F8	7.806707D-02	PIRADS	BTST	TRUE ANOMALY OF THE PREDICTED CUTOFF RADIUS VECTOR FOR SECOND OPPORTUNITY. (CONSTANT ACROSS DAILY LAUNCH WINDOW).
H10	+0.000558D+01	PIRADS	BTST	H10 THROUGH H14 ARE COEFFICIENTS OF THE FIRST-SEGMENT POLYNOMIAL OF LAUNCH AZIMUTH VERSUS TIME.
H11	99134939D+02	PIRADS	BTST	
H12	-66686770D+03	PIRADS	BTST	
H13	-99997166D+03	PIRADS	BTST	
H14	1.748218D+02	PIRADS	BTST	
H20	0.0	PIRADS	BTST	H20 THROUGH H24 ARE COEFFICIENTS OF THE SECOND-SEGMENT POLYNOMIAL OF LAUNCH AZIMUTH VERSUS TIME.
H21	0.0	PIRADS	BTST	
H22	0.0	PIRADS	BTST	
H23	0.0	PIRADS	BTST	
H24	0.0	PIRADS	BTST	

TABLE 1B (Continued)

TARGETING PREFSETTINGS

PROGRAM SYMBOL	PREFSETTING	UNITS	IVDC SECTION	DEFINITION
F20	0.0	PIRADS	BTST	H30 THROUGH H24 ARE COEFFICIENTS OF THE THIRD-SEGMENT POLYNOMIAL OF LAUNCH AZIMUTH VERSUS TIME.
F21	0.0	PIRADS	BTST	
F22	0.0	PIRADS	BTST	
F23	0.0	PIRADS	BTST	
F24	0.0	PIRADS	BTST	
FAD	0.00000000 CC	N/D	BTST	LAUNCH PAD INDICATOR FLAG (SET TO CATAL VALUE OF 7777777776 FOR PAD 39B LAUNCH).
RASA0	-6.354583D-01	PIRADS	BTST	RASA0 THROUGH RASA14 ARE VALUES OF A 15 POINT TABLE OF THE TARGET VECTOR RIGHT ASCENSION VS A FUNCTION OF TIME INTO THE LAUNCH WINDOW FOR FIRST OPPORTUNITY.
RASA1	-6.352486D-01	PIRADS	BTST	
RASA2	-6.355317D-01	PIRADS	BTST	
RASA3	-6.359761D-01	PIRADS	BTST	
RASA4	0.0	PIRADS	BTST	

TABLE 18 (Continued)

TARGETING PRE-SETTINGS

PROGRAM SYMBGL	PRE-SETTING	UNITS	LVDC SECTION	DEFINITION
RASAS TO RASA14	0.0	PIRADS	BTST	
RASBC	-6.352107D-01	PIRADS	BTST	RASBC THROUGH RASB14 ARE VALUES OF A 15 POINT TABLE OF THE TARGET VECTOR RIGHT ASCENSION AS A FUNCTION OF TIME INTO THE LAUNCH WINDOW FOR SECOND OPPORTUNITY.
RASB1	-6.354903D-01	PIRADS	BTST	
RASB2	-6.359329D-01	PIRADS	BTST	
RASB3	-6.362291D-01	PIRADS	BTST	
RASB4	0.0	PIKAFS	BTST	
RASB5 TO RASB14	0.0	PIRADS	BTST	
PNA	6.564948D+06	M	BTST	PREDICTED RADIUS AT REIGNITION FOR FIRST OPPORTUNITY (CONSTANT ACROSS DAILY LAUNCH WINDOW).
RNB	6.568043D+06	M	BTST	PREDICTED RADIUS AT REIGNITION FOR SECOND OPPORTUNITY (CONSTANT ACROSS DAILY LAUNCH WINDOW).
TAU3RA	5.610000D+02	SEC	IGM	ESTIMATED PERIOD OF TIME REQUIRED TO CONSUME THE VEHICLE MASS AT THE TIME OF FIRST OPPORTUNITY MIXTURE-RATIO SHIFT USING THE POST-SHIFT NOMINAL PROPELLANT FLOWRATE.

TABLE 18 (Continued)

TARGETING PREFEETINGS

PROGRAM SYMBOL	PREFEETING	UNITS	LVIC SECTION	DEFINITION
TALSRH	7.050000D+02	SEC	ICM	ESTIMATED PERIOD OF TIME REQUIRED TO CONSUME THE VEHICLE MASS AT THE TIME OF SECOND OPPORTUNITY MIXTURE-RATIO SHIFT USING THE POST-SHIFT NOMINAL PROPELLANT FLOWRATE.
TCS0	0.0	SEC	WTST	TCS0 THROUGH TCS3 ARE THE PARABOLIC TIMES FOR LAUNCH AZIMUTH POLYNOMIAL SEGMENTS.
TCS1	1.109362D+04	SEC	BTST	TCS1 THROUGH TCS3 ARE THE INITIAL TIMES FOR THE AZIMUTH POLYNOMIAL SEGMENTS.
TCS2	1.374437D+04	SEC	ATST	
TCS3	0.0	SEC	CTST	
TC1	0.0	SEC	DTST	
TC2	1.109362D+04	SEC	BTST	ANGLE BETWEEN THE INERTIAL MERIDIAN OF THE VERNAL EQUINOX AND PAC 39A MERIDIAN AT TLO. PAC 39A VALUE IS SUPPLIED EVEN FOR PAC 39B LAUNCHES.
TC3	1.374437D+04	SEC	CTST	
THTFD	-2.603661D-02	PIRALS	DTST	

TABLE 18 (Continued)

TARGETING PRESETTINGS

PROGRAM SYMBOL	PRESLTTING	UNITS	LVDC SECTION	DEFINITION
TLC	7.332435D+04	SEC	RTST	TIME FROM MIDNIGHT GREENWICH MEAN TIME TO GRR AT THE OPENING OF THE DAILY LAUNCH WINDOW.
TPA0	0.0	SEC	RTST	TPA0 THROUGH TPA14 ARE VALUES OF A 15 POINT TABLE OF TIME SINCE LAUNCH WINDOW OPENING. THESE TIMES ARE VALUES OF THE INDEPENDENT VARIABLE FOR ALL OUT-OF-ORBIT TARGETING TABLES FOR FIRST OPPORTUNITY.
TPA1	5.619079D+03	SEC	RTST	
TPA2	1.077741D+04	SEC	RTST	
TPA3	1.374437D+04	SEC	RTST	
TPA4	0.0	SEC	BTST	
TPA5 TO TPA14	0.0	SEC	RTST	
TPB0	0.0	SEC	RTST	TPB0 THROUGH TPB14 ARE VALUES OF A 15 POINT TABLE OF TIME SINCE LAUNCH WINDOW OPENING. THESE TIMES ARE VALUES OF THE INDEPENDENT VARIABLE FOR ALL OUT-OF-ORBIT TARGETING TABLES FOR SECOND OPPORTUNITY.

TABLE 18 (Continued)

TARGETING PARAMETERS

PROGRAM SYMBOL	PRESSETTING	UNITS	LVLC SECTION	DEFINITION
TPR1	5.619079D+03	SEC	RTST	
TPB2	1.077741D+04	SEC	PTST	
TPR3	1.374437D+04	SEC	BTST	
TPB4	0.0	SEC	PTST	
TPB5 TO TPB14	0.0	SEC	RTST	
TSD1	1.109362D+04	SEC	PTST	TSD1 THROUGH TSD3 ARE AZIMUTH POLYNOMIAL NORMALIZING COEFFICIENTS.
TSP2	2.650750D+03	SEC	RTST	
TSD3	0.0	SEC	PTST	
TSTA	6.924720D+03	SEC	BTST	TIMF TO BEGIN TESTING FOR KFSTART PREPARATIONS REFERENCED TO TIMEBASE 5 FOR FIPST OPPORTUNITY.
TSTB	1.223517D	SEC	PTST	TIME TO BEGIN TESTING FOR KFSTART PREPARATIONS REFERENCED TO TIMEBASE 5 FOR SECOND OPPORTUNITY.
TVRATE	2.321150D-05	PIRADS/SEC	BT, VLAS	EARTH ROTATION RATE (C IS USED FOR FIXED AZIMUTH MISSIONS).



**TABLE 18 (Continued)**

**TARGETING PRESETTINGS F**

<b>PROGRAM SYMBOL</b>	<b>PRESETTING</b>	<b>UNITS</b>	<b>LVDC SECTION</b>	<b>DEFINITION</b>
<b>T3PRA</b>	<b>2.430000D+02</b>	<b>SEC</b>	<b>BTST</b>	<b>ESTIMATE OF THE FIFTH STAGE IGM BURN TIME FOR FIRST OPPORTUNITY</b>
<b>T3PRB</b>	<b>3.350000D+02</b>	<b>SEC</b>	<b>BTST</b>	<b>ESTIMATE OF THE FIFTH STAGE IGM BURN TIME FOR SECOND OPPCRTUNITY.</b>

TABLE 19  
MINOR LOOP CHI COMMANDS

<u>TIME FROM TIME BASE 1</u>	<u>MINOR LOOP CHI (DEG)</u>
12.6	-.6654
13.6	-.8458
14.6	-.9576
15.6	-1.0994
16.6	-1.2688
17.6	-1.4635
18.6	-1.6815
19.6	-1.9209
20.6	-2.1797
21.6	-2.4583
22.6	-2.7530
23.6	-3.0625
24.6	-3.3857
25.6	-3.7214
26.6	-4.0688
27.6	-4.4272
28.6	-4.7971
29.6	-5.1768
30.6	-5.5661
31.6	-5.9648
32.6	-6.3730
33.6	-6.7909
34.6	-7.2187
35.6	-7.6624
36.6	-8.1224
37.6	-8.5974
38.6	-9.0863
39.6	-9.5879
40.6	-10.1011

TABLE 19 (Continued)

<u>TIME FROM TIME BASE 1</u>	<u>MINOR LOOP CHI (DEG)</u>
41.6	-10.6249
42.6	-11.1594
43.6	-11.7024
44.6	-12.2529
45.6	-12.8104
46.6	-13.3739
47.6	-13.9428
48.7	-14.5163
49.6	-15.0942
50.6	-15.6756
51.6	-16.2597
52.6	-16.8462
53.6	-17.4348
54.6	-18.0249
55.6	-18.6163
56.6	-19.2088
57.6	-19.8020
58.6	-20.3959
59.6	-20.9903
60.6	-21.5851
61.6	-22.1803
62.6	-22.7760
3.6	-23.3724
64.6	-23.9674
65.6	-24.5674
66.6	-25.1666
67.6	-25.7778
68.6	-26.3812
69.6	-26.9666
70.6	-27.5388
71.6	-28.1042
72.6	-28.6675

Table 19 (Continued)

<u>TIME FROM TIME BASE 1</u>	<u>MINOR LOOP CHI (DEG)</u>
73.6	-29.2325
74.6	-29.8027
75.6	-30.3815
76.6	-30.9713
77.6	-31.5761
78.6	-32.1963
79.6	-32.8330
80.6	-33.4873
81.6	-34.1594
82.6	-34.8492
83.6	-35.5562
84.6	-36.2812
85.6	-37.0208
86.6	-37.7731
87.6	-38.5356
88.6	-39.3055
89.6	-40.0797
90.6	-40.8545
91.6	-41.6249
92.6	-42.3860
93.6	-43.1330
94.6	-43.8602
95.6	-44.5617
96.6	-45.2311
97.6	-45.8614
98.6	-46.4209
99.6	-46.9685
100.6	-47.5042
101.6	-48.0286
102.6	-48.5418

TABLE 19 (Continued)

<u>TIME FROM TIME BASE 1</u>	<u>MINOR LOOP CHI (DEG)</u>
103.6	-49. 44
104.6	-49.5365
105.6	-50.0174
106.6	-50.4885
107.6	-50.9502
108.6	-51.4028
109.6	-51.8465
110.6	-52.2816
111.6	-52.7084
112.6	-53.1263
113.6	-53.5365
114.6	-53.9393
115.6	-54.3348
116.6	-54.7234
117.6	-55.1053
118.6	-55.4807
119.6	-55.8492
120.6	-56.2117
121.6	-56.5684
122.6	-56.9196
123.6	-57.2655
124.6	-57.6061
125.6	-57.9419
126.6	-58.2724
127.6	-58.5983
128.6	-58.9198
129.6	-59.2372
130.6	-59.5505
131.6	-59.8599
132.6	-60.1656
133.6	-60.4673

TABLE 19 (Continued)

<u>TIME FROM TIME BASE 1</u>	<u>MINOR LOOP CHI (DEG)</u>
134.6	-60.7656
135.6	-61.0607
136.6	-61.3526
137.6	-61.6414
138.6	-61.9274
139.6	-62.2105
140.6	-62.4906
141.6	-62.7682
142.6	-63.0433
143.6	-63.3159
144.6	-63.5863
145.6	-63.8544
146.6	-64.1204
147.6	-64.3839
148.6	-64.6455
149.6	-64.9051
150.6	-65.1627
151.6	-65.4184
152.6	-65.6722
153.6	-65.9242
154.6	-66.1741
155.6	-66.4222
156.6	-66.6686
157.6	-66.9131
158.6	-67.1558
159.6	-67.3967
160.6	-67.6358
161.6	-67.8729
162.6	-68.0496

TABLE 20

## AS-509 H-2 MISSION OCTAL PRESET CARD LISTINGS

FOR THE JAN LAUNCH WINDOW

ADD OCTAL	VALUE OCTAL	NAME	VALUE DECIMAL	FACTOR SCALE	VEHICLE	DATE LAUNCH
AS-509	31 JAN 71					
015200146314630		AZO	4.000000D-01	0	AS-509	31 JAN 71
015201063146314		AZS	2.000000D-01	0	AS-509	31 JAN 71
015202771253250		THTEO	-2.603661D-02	0	AS-509	31 JAN 71
015203000000000		PAD	0.000000D 00	0	AS-509	31 JAN 71
015210000032506		DVBRA	3.330000D 0014		AS-509	31 JAN 71
015211000032506		DVBRB	3.330000D 0014		AS-509	31 JAN 71
015212024226672		FA	7.927600D-02	0	AS-509	31 JAN 71
015213023770320		FR	7.806707D-02	0	AS-509	31 JAN 71
015214004304000		TAU3RA	5.610000D 0215		AS-509	31 JAN 71
015215005404000		TAU3RB	7.050000D 0215		AS-509	31 JAN 71
015220024226362		ALFTSA	7.927304D-02	0	AS-509	31 JAN 71
015221024223424		ALFTSB	7.925066D-02	0	AS-509	31 JAN 71
015222310261242		RNA	6.564948D 0623		AS-509	31 JAN 71
015223310341524		RNB	6.568043D 0623		AS-509	31 JAN 71
015230066062700		TSTA	6.924720D 0315		AS-509	31 JAN 71
015231137454540		TSTB	1.223517D 0415		AS-509	31 JAN 71
015232252525252		DPIT1	6.666667D-01	0	AS-509	31 JAN 71
015233707070710		DYAW1	-2.222222D-01	0	AS-509	31 JAN 71
015234377777776		DROLL1	9.999999D-01	0	AS-509	31 JAN 71
015235		DPIT2	NOT AVAILABLE		AS-509	31 JAN 71
015236		DYAW2	NOT AVAILABLE		AS-509	31 JAN 71
015237		DROLL2	NOT AVAILABLE		AS-509	31 JAN 71
015240001714000		T3PRA	2.430000D 0215		AS-509	31 JAN 71
015241002474000		T3PRB	3.350000D 0215		AS-509	31 JAN 71
015250000000000		TD1	0.0	15	AS-509	31 JAN 71
015251126526374		TD2	1.109362D 0415		AS-509	31 JAN 71
015252153301374		TD3	1.374437D 0415		AS-509	31 JAN 71
015260126526374		TSD1	1.109362D 0415		AS-509	31 JAN 71
015261024553000		TSD2	2.650750D 0315		AS-509	31 JAN 71
015262000000000		TSD3	0.0	15	AS-509	31 JAN 71
015317		CKS15	NOT AVAILABLE		AS-509	31 JAN 71
016000000000000		TPA0	0.0	15	AS-509	31 JAN 71
016001053714240		TPA1	5.619079D 0315		AS-509	31 JAN 71
016002124145516		TPA2	1.077741D 0415		AS-509	31 JAN 71
016003153301374		TPA3	1.374437D 0415		AS-509	31 JAN 71
016004000000000		TPA4	0.0	15	AS-509	31 JAN 71
016005000000000		TPA5	0.0	15	AS-509	31 JAN 71
016006000000000		TPA6	0.0	15	AS-509	31 JAN 71
016007000000000		TPA7	0.0	15	AS-509	31 JAN 71
016010000000000		TPA8	0.0	15	AS-509	31 JAN 71
016011000000000		TPA9	0.0	15	AS-509	31 JAN 71
016012000000000		TPA10	0.0	15	AS-509	31 JAN 71
016013000000000		TPA11	0.0	15	AS-509	31 JAN 71
016014000000000		TPA12	0.0	15	AS-509	31 JAN 71
016015000000000		TPA13	0.0	15	AS-509	31 JAN 71
016016000000000		TPA14	0.0	15	AS-509	31 JAN 71
016017130022016		BETA A	3.438875D-01	0	AS-509	31 JAN 71
016020771471742		C3A0	-1.674269D 0626		AS-509	31 JAN 71
016021771540262		C3A1	-1.654607D 0626		AS-509	31 JAN 71
016022771612650		C3A2	-1.632856D 0626		AS-509	31 JAN 71
016023771653622		C3A3	-1.615982D 0626		AS-509	31 JAN 71
016024000000000		C3A4	0.0	26	AS-509	31 JAN 71
016025000000000		C3A5	0.0	26	AS-509	31 JAN 71

0160260000000000	C3A6	0.0	26	AS-509	31 JAN 71
0160270000000000	C3A7	0.0	26	AS-509	31 JAN 71
0160300000000000	C3A8	0.0	26	AS-509	31 JAN 71
0160310000000000	C3A9	0.0	26	AS-509	31 JAN 71
0160320000000000	C3A10	0.0	26	AS-509	31 JAN 71
0160330000000000	C3A11	0.0	26	AS-509	31 JAN 71
0160340000000000	C3A12	0.0	26	AS-509	31 JAN 71
0160350000000000	C3A13	0.0	26	AS-509	31 JAN 71
0160360000000000	C3A14	0.0	26	AS-509	31 JAN 71
016040376742132	COSA0	9.958662D-01	0	AS-509	31 JAN 71
016041376666724	COSA1	9.955362D-01	0	AS-509	31 JAN 71
016042376574762	COSA2	9.950941D-01	0	AS-509	31 JAN 71
016043376524242	COSA3	9.947839D-01	0	AS-509	31 JAN 71
0160440000000000	COSA4	0.0	0	AS-509	31 JAN 71
0160450000000000	COSA5	0.0	0	AS-509	31 JAN 71
0160460000000000	COSA6	0.0	0	AS-509	31 JAN 71
0160470000000000	COSA7	0.0	0	AS-509	31 JAN 71
0160500000000000	COSA8	0.0	0	AS-509	31 JAN 71
0160510000000000	COSA9	0.0	0	AS-509	31 JAN 71
0160520000000000	COSA10	0.0	0	AS-509	31 JAN 71
0160530000000000	COSA11	0.0	0	AS-509	31 JAN 71
0160540000000000	COSA12	0.0	0	AS-509	31 JAN 71
0160550000000000	COSA13	0.0	0	AS-509	31 JAN 71
0160560000000000	COSA14	0.0	0	AS-509	31 JAN 71
016060535245152	RASA0	-6.354583D-01	0	AS-509	31 JAN 71
016061535300544	RASA1	-6.352486D-01	0	AS-509	31 JAN 71
016062535233454	RASA2	-6.355317D-01	0	AS-509	31 JAN 71
016063535141262	RASA3	-6.359761D-01	0	AS-509	31 JAN 71
0160640000000000	RASA4	0.0	0	AS-509	31 JAN 71
0160650000000000	RASA5	0.0	0	AS-509	31 JAN 71
0160660000000000	RASA6	0.0	0	AS-509	31 JAN 71
0160670000000000	RASA7	0.0	0	AS-509	31 JAN 71
0160700000000000	RASA8	0.0	0	AS-509	31 JAN 71
0160710000000000	RASA9	0.0	0	AS-509	31 JAN 71
0160720000000000	RASA10	0.0	0	AS-509	31 JAN 71
0160730000000000	RASA11	0.0	0	AS-509	31 JAN 71
0160740000000000	RASA12	0.0	0	AS-509	31 JAN 71
0160750000000000	RASA13	0.0	0	AS-509	31 JAN 71
0160760000000000	RASA14	0.0	0	AS-509	31 JAN 71
016100732064240	DECA0	-1.480384D-01	0	AS-509	31 JAN 71
016101732065260	DECA1	-1.480305D-01	0	AS-509	31 JAN 71
016102732060604	DECA2	-1.480655D-01	0	AS-509	31 JAN 71
016103732071602	DECA3	-1.479969D-01	0	AS-509	31 JAN 71
0161040000000000	DECA4	0.0	0	AS-509	31 JAN 71
0161050000000000	DECA5	0.0	0	AS-509	31 JAN 71
0161060000000000	DECA6	0.0	0	AS-509	31 JAN 71
0161070000000000	DECA7	0.0	0	AS-509	31 JAN 71
0161100000000000	DECA8	0.0	0	AS-509	31 JAN 71
0161110000000000	DECA9	0.0	0	AS-509	31 JAN 71
0161120000000000	DECA10	0.0	0	AS-509	31 JAN 71
0161130000000000	DECA11	0.0	0	AS-509	31 JAN 71
0161140000000000	DECA12	0.0	0	AS-509	31 JAN 71
0161150000000000	DECA13	0.0	0	AS-509	31 JAN 71
0161160000000000	DECA14	0.0	0	AS-509	31 JAN 71
016120370722454	ENA0	9.726332D-01	0	AS-509	31 JAN 71
016121370774764	ENA1	9.726332D-01	0	AS-509	31 JAN 71
016122371054154	ENA2	9.729937D-01	0	AS-509	31 JAN 71
016123371120714	ENA3	9.732735D-01	0	AS-509	31 JAN 71
0161240000000000	ENA4	0.0	0	AS-509	31 JAN 71
0161250000000000	ENA5	0.0	0	AS-509	31 JAN 71



0161260000000000	ENA6	0.0	0	AS-509	31 JAN 71
0161270000000000	ENA7	0.0	0	AS-509	31 JAN 71
0161300000000000	ENA8	0.0	0	AS-509	31 JAN 71
0161310000000000	ENA9	0.0	0	AS-509	31 JAN 71
0161320000000000	ENA	0.0	0	AS-509	31 JAN 71
0161330000000000	ENA11	0.0	0	AS-509	31 JAN 71
0161340000000000	ENA12	0.0	0	AS-509	31 JAN 71
0161350000000000	ENA13	0.0	0	AS-509	31 JAN 71
0161360000000000	ENA14	0.0	0	AS-509	31 JAN 71
0161400000000000	TPB0	0.0	15	AS-509	31 JAN 71
016141053714240	TPB1	5.6190790	0315	AS-509	31 JAN 71
016142124145516	TPB2	1.0777410	0415	AS-509	31 JAN 71
016143153301374	TPB3	1.3744370	0415	AS-509	31 JAN 71
0161440000000000	TPB4	0.0	15	AS-509	31 JAN 71
0161450000000000	TPB5	0.0	15	AS-509	31 JAN 71
0161460000000000	TPB6	0.0	15	AS-509	31 JAN 71
0161470000000000	TPB7	0.0	15	AS-509	31 JAN 71
0161500000000000	TPB8	0.0	15	AS-509	31 JAN 71
0161510000000000	TPB9	0.0	15	AS-509	31 JAN 71
0161520000000000	TPB10	0.0	15	AS-509	31 JAN 71
0161530000000000	TPB11	0.0	15	AS-509	31 JAN 71
0161540000000000	TPB12	0.0	15	AS-509	31 JAN 71
0161550000000000	TPB13	0.0	15	AS-509	31 JAN 71
0161560000000000	TPB14	0.0	15	AS-509	31 JAN 71
016157126346372	HETAB	3.3769600-01	0	AS-509	31 JAN 71
016160771547772	C3B0	-1.6503930	0626	AS-509	31 JAN 71
016161771624612	C3B1	-1.6277650	0626	AS-509	31 JAN 71
016162771704622	C3B2	-1.6031830	0626	AS-509	31 JAN 71
016163771751352	C3B3	-1.5844060	0626	AS-509	31 JAN 71
0161640000000000	C3B4	0.0	26	AS-509	31 JAN 71
0161650000000000	C3B5	0.0	26	AS-509	31 JAN 71
0161660000000000	C3B6	0.0	26	AS-509	31 JAN 71
0161670000000000	C3B7	0.0	26	AS-509	31 JAN 71
0161700000000000	C3B8	0.0	26	AS-509	31 JAN 71
0161710000000000	C3B9	0.0	26	AS-509	31 JAN 71
0161720000000000	C3B10	0.0	26	AS-509	31 JAN 71
0161730000000000	C3B11	0.0	26	AS-509	31 JAN 71
0161740000000000	C3B12	0.0	26	AS-509	31 JAN 71
0161750000000000	C3B13	0.0	26	AS-509	31 JAN 71
0161760000000000	C3B14	0.0	26	AS-509	31 JAN 71
016200376676254	COSB0	9.9559280-01	0	AS-509	31 JAN 71
016201376576736	COSB1	9.9510910-01	0	AS-509	31 JAN 71
016202376470040	COSB2	9.9456840-01	0	AS-509	31 JAN 71
016203376420420	COSB3	9.9426680-01	0	AS-509	31 JAN 71
0162040000000000	COSB4	0.0	0	AS-509	31 JAN 71
0162050000000000	COSB5	0.0	0	AS-509	31 JAN 71
0162060000000000	COSB6	0.0	0	AS-509	31 JAN 71
0162070000000000	COSB7	0.0	0	AS-509	31 JAN 71
0162100000000000	COSB8	0.0	0	AS-509	31 JAN 71
0162110000000000	COSB9	0.0	0	AS-509	31 JAN 71
0162120000000000	COSB10	0.0	0	AS-509	31 JAN 71
0162130000000000	COSB11	0.0	0	AS-509	31 JAN 71
0162140000000000	COSB12	0.0	0	AS-509	31 JAN 71
0162150000000000	COSB13	0.0	0	AS-509	31 JAN 71
0162160000000000	COSB14	0.0	0	AS-509	31 JAN 71
016220535305526	RASB0	-6.3521070-01	0	AS-509	31 JAN 71
016221535241014	RASB1	-6.3549030-01	0	AS-509	31 JAN 71
016222535147000	RASB2	-6.3593290-01	0	AS-509	31 JAN 71
016223535100132	RASB3	-6.3622910-01	0	AS-509	31 JAN 71
0162240000000000	RASB4	0.0	0	AS-509	31 JAN 71

0162250000000000	RASB5	0.0	0	AS-509	31 JAN 71
0162260000000000	RASB6	0.0	0	AS-509	31 JAN 71
0162270000000000	RASB7	0.0	0	AS-509	31 JAN 71
0162300000000000	RASB8	0.0	0	AS-509	31 JAN 71
0162310000000000	RASB9	0.0	0	AS-509	31 JAN 71
0162320000000000	RASB10	0.0	0	AS-509	31 JAN 71
0162330000000000	RASB11	0.0	0	AS-509	31 JAN 71
0162340000000000	RASB12	0.0	0	AS-509	31 JAN 71
0162350000000000	RASB13	0.0	0	AS-509	31 JAN 71
0162360000000000	RASB14	0.0	0	AS-509	31 JAN 71
016240732125536	DECB0	-1.477838D-01	0	AS-509	31 JAN 71
016241732105664	DECB1	-1.479046D-01	0	AS-509	31 JAN 71
016242732072450	DECB2	-1.479906D-01	0	AS-509	31 JAN 71
016243732106202	DECB3	-1.479015D-01	0	AS-509	31 JAN 71
0162440000000000	DECB4	0.0	0	AS-509	31 JAN 71
0162450000000000	DECB5	0.0	0	AS-509	31 JAN 71
0162450000000000	DECB6	0.0	0	AS-509	31 JAN 71
0162470000000000	DECB7	0.0	0	AS-509	31 JAN 71
0162500000000000	DECB8	0.0	0	AS-509	31 JAN 71
0162510000000000	DECB9	0.0	0	AS-509	31 JAN 71
0162520000000000	DECB10	0.0	0	AS-509	31 JAN 71
0162530000000000	DECB11	0.0	0	AS-509	31 JAN 71
0162540000000000	DECB12	0.0	0	AS-509	31 JAN 71
0162550000000000	DECB13	0.0	0	AS-509	31 JAN 71
0162560000000000	DECB14	0.0	0	AS-509	31 JAN 71
016260371004562	ENB0	9.726923D-01	0	AS-509	31 JAN 71
016261371066242	ENB1	9.730707D-01	0	AS-509	31 JAN 71
016262371153506	ENB2	9.734775D-01	0	AS-509	31 JAN 71
016263371224332	ENB3	9.737987D-01	0	AS-509	31 JAN 71
0162640000000000	ENB4	0.0	0	AS-509	31 JAN 71
0162650000000000	ENB5	0.0	0	AS-509	31 JAN 71
0162660000000000	ENB6	0.0	0	AS-509	31 JAN 71
0162670000000000	ENB7	0.0	0	AS-509	31 JAN 71
0162700000000000	ENB8	0.0	0	AS-509	31 JAN 71
0162710000000000	ENB9	0.0	0	AS-509	31 JAN 71
0162720000000000	ENB10	0.0	0	AS-509	31 JAN 71
0162730000000000	ENB11	0.0	0	AS-509	31 JAN 71
0162740000000000	ENB12	0.0	0	AS-509	31 JAN 71
0162750000000000	ENB13	0.0	0	AS-509	31 JAN 71
0162760000000000	ENB14	0.0	0	AS-509	31 JAN 71
016300146324070	H10	4.000558D-01	0	AS-509	31 JAN 71
016301027305260	H11	9.134939D-02	0	AS-509	31 JAN 71
016302776723432	H12	-6.686770D-03	0	AS-509	31 JAN 71
016303775341516	H13	-9.997166D-03	0	AS-509	31 JAN 71
016304004363330	H14	1.748218D-02	0	AS-509	31 JAN 71
016305126526374	TDS1	1.109362D	0415	AS-509	31 JAN 71
0163060000000000	TDS0	0.0	15	AS-509	31 JAN 71
016310176020344	H20	4.923130D-01	0	AS-509	31 JAN 71
016311007340664	H21	2.905924D-02	0	AS-509	31 JAN 71
016312002073324	H22	8.265803D-03	0	AS-509	31 JAN 71
016313777360536	H23	-2.069972D-03	0	AS-509	31 JAN 71
016314001362444	H24	5.756940D-03	0	AS-509	31 JAN 71
016315153301374	TDS2	1.374437D	0415	AS-509	31 JAN 71
0163200000000000	H30	0.0	0	AS-509	31 JAN 71
0163210000000000	H31	0.0	0	AS-509	31 JAN 71
0163220000000000	H32	0.0	0	AS-509	31 JAN 71
0163230000000000	H33	0.0	0	AS-509	31 JAN 71
0163240000000000	H34	0.0	0	AS-509	31 JAN 71
0163250000000000	TDS3	0.0	15	AS-509	31 JAN 71
016347	CKS16	NOT AVAILABLE		AS-509	31 JAN 71

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0163540074000.0	DATE	3.0000000 J110	AS-509	31 JAN 71
016355302554504	TVRATE	2.3211500-0515-	AS-509	31 JAN 71
016373217154264	TLO	7.3324350 0417	AS-509	31 JAN 71

END  
EO7

TABLE 21  
SUMMARY OF AS-509 B-7 TAPES

<u>Launch Date</u>	<u>Azimuth/(File)</u>	<u>Tape Number *</u>
1/31/71	72.0669/(1-9)	39446
1/31/71	80.0085/(1-9)	33633
1/31/71	88.0308/(1-9)	32289
1/31/71	95.9984/(1-9)	7240

All tapes contain data from boost to TLI + 150 seconds including both opportunities. Each tape is arranged according to the following format:

File 1	Boost data; S-IC
File 2	Boost data; S-II
File 3	Boost data; S-IVB first burn
File 4	EPO first opportunity
File 5	TLI first opportunity
File 6	Post-TLI first opportunity
File 7	EPO second opportunity
File 8	TLI second opportunity
File 9	Post-TLI second opportunity

\* These are copies of the ones given in Reference 1.

TABLE 21 (Continued)

SUMMARY OF AS-509 PRESET AND TRIM TAPES FOR THE JANUARY 31 LAUNCH

<u>MSFC Tape Number</u>	<u>Comments</u>
33515	PRESET
37382	TRIM

APPENDIX A

TABLE A-1  
FLIGHT TRAJECTORY PARAMETER DEFINITIONS

<u>Parameter</u>	<u>Units</u>	<u>Definition</u>
Time	Sec	Time from first motion.
Thrust	Newtons Pounds	Total vehicle engine thrust.
Weight	Kilograms Pounds	Instantaneous mass of the vehicle.
Altitude	Meters Feet	Altitude of vehicle center of mass above an oblate earth.
Inertial Velocity	M/Sec Ft/Sec	Magnitude of inertial velocity.
Inertial Path Angle	Deg	Angle between the inertial velocity vector and its projection onto a plane perpendicular to the geocentric position vector.
*Longitudinal Acceleration	M/Sec <sup>2</sup> Ft/Sec <sup>2</sup>	Longitudinal component of vehicle acceleration in the $X_B$ system.
*Radial Distance of the CG	Meters Feet	Radial distance of the CG from the center of the earth in inertial system.

TABLE A-1  
FLIGHT TRAJECTORY PARAMETER DEFINITIONS

<u>Parameter</u>	<u>Units</u>	<u>Definition</u>
Earth-Fixed Velocity	M/Sec Ft/Sec	Magnitude of the earth-fixed velocity in Apollo 10 coordinates.
*Latitude	Deg	Geodetic latitude (sub-vehicle latitude on spherical earth).
Longitude	Deg	Vehicle longitude, measured positive eastward from the prime meridian.
Range	Km Nmi	Arc range along spherical earth to sub-vehicle point.
Vehicle Position Earth-Fixed Coordinates	Meters Feet	Position vector components of vehicle center of mass in the Apollo 10 earth-fixed launch site coordinate system.
Vehicle Velocity Earth-Fixed Coordinates	M/Sec Ft/Sec	Velocity vector components of vehicle center of mass in the Apollo 10 earth-fixed launch site coordinate system.
Pitch, Yaw, and Roll Attitude Command	Deg	Minor-loop commanded vehicle pitch, yaw, and roll attitude angles.
Vehicle Pitch, Yaw, and Roll Attitude Angles	Deg	Actual vehicle pitch, yaw, and roll attitude angles.

TABLE A-1  
FLIGHT TRAJECTORY PARAMETER DEFINITIONS

<u>Parameter</u>	<u>Units</u>	<u>Definition</u>
Mach Number	Unitless	Local free-stream Mach number.
Dynamic Pressure	Nt/M <sup>2</sup> Lb/Ft <sup>2</sup>	Aerodynamic pressure equal to one-half the product of the atmospheric density and the aerodynamic velocity squared.
Angle of Attack	Deg	Total angle measured between the aerodynamic velocity vector and the vehicle longitudinal axis.
*Drag	Kg Lb	Component of the resultant aerodynamic force along the relative velocity vector.
*Aerodynamic Load	Kg/M <sup>2</sup> Lb/Ft <sup>2</sup>	Aerodynamic load indicator (dynamic pressure times total angle of attack).
Aerodynamic Force Vector	Kg Lb	Magnitude of the aerodynamic force vector perpendicular to the vehicle longitude axis.
Vehicle Position Inertial Coordinates	M Ft	Position vector components of vehicle center of mass in the Apollo 13 coordinate system.
Vehicle Velocity Inertial Coordinates	M/Sec Ft/Sec	Velocity vector components of vehicle center of mass in the Apollo 13 coordinate system.



TABLE A-1  
FLIGHT TRAJECTORY PARAMETER DEFINITIONS

<u>Parameter</u>	<u>Units</u>	<u>Definition</u>
Spacecraft Gimbal Angles	Deg	Gimbal deflection angle required in pitch, yaw, and roll.
Pitch, Yaw, and Roll Rates	Deg/Sec	Eulerian attitude rates in pitch, yaw, and roll.

TABLE A-2  
KEY EVENT NOMENCLATURE

<u>Printout Symbol</u>	<u>Trajectory Key Event</u>
TB1	Time Base 1
Mach 1	Mach One
Max Q	Maximum Dynamic Pressure
S-IC CECO	S-IC Center Engine Cutoff
S-IC OECO	S-IC Outboard Engine Cutoff
TB3	Time Base 3
S-IC/S-II Sep	S-IC/S-II Separation
S-II Engine Start	S-II Engine Start
S-II Mainstage	S-II Engine Mainstage Thrust
Initiate IGM	Initiate IGM
S-II CECO	S-II Center Engine Cutoff
S-II OECO	S-II Outboard Engine Cutoff
TB4	Time Base 4
S-II/S-IVB Separation	S-II/S-IVB Separation
S-IVB Engine Start	S-IVB Engine Start
S-IVB Mainstage	S-IVB Engine Mainstage Thrust
S-IVB Ullage Jett	S-IVB Ullage Rocket Jettison
S-IVB GCS1	S-IVB Guidance Cutoff Signal
TB5	Time Base 5
EPOI	Earth Parking Orbit Insertion
TB6	Time Base 6
O2/H2 Burner On	Helium Heater On
E8 Engine Off	E8 Engine Off
Ullage Ignition	APS Ullage Ignition
J-2 F-L Ini	J-2 Fuel Lead Initiated

TABLE A-2  
KEY EVENT NOMENCLATURE

<u>Printout Symbol</u>	<u>Trajectory Key Event</u>
Ull Cutoff	Ullage Cutoff
Reign	S-IVB Reignition
90% Thrust	S-IVB Engine Mainstage Thrust
IGM Ini	IGM Initiate
GCS2	S-IVB Guidance Cutoff Signal
T.T	Translunar Injection
End of Coast	End of S-IVB Coast

TABLE 7

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

TIME FROM FIRST MOTION (SEC)	TOTAL VEHICLE ENGINE THRUST (NEWTONS)	TOTAL VEHICLE WEIGHT (KG)	ALTITUDE ABOVE EARTH (M)	MAGNITUDE OF SPACE FIXED VELOCITY IN KPP SYSTEM (M/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (M/SEC <sup>2</sup> )
0.00	33649095.50	2913765.34	54.6	408.64	.00	10.428
0.48	33767407.50	2908548.12	59.6	408.64	.06	10.490
5.00	33903179.00	2848546.47	81.7	408.80	1.33	11.924
10.00	33972163.00	2783334.84	156.9	409.87	2.92	12.226
15.00	34051799.00	2718078.78	293.2	410.61	4.73	12.543
20.00	34128393.50	2552873.06	498.1	413.23	6.73	12.873
25.00	34240433.50	2527731.75	779.9	417.69	8.90	13.228
30.00	34413904.50	2522429.44	1147.4	424.92	11.22	13.623
35.00	3464712.00	2457557.31	1609.7	435.49	13.62	14.055
40.00	3471470.50	2392494.69	2176.4	449.95	16.05	14.524
45.00	35230676.50	2327431.84	2857.1	468.95	18.42	15.031
50.00	35574721.00	2262360.84	3661.4	493.00	20.64	15.574
55.00	34946325.50	2197283.03	4598.4	522.43	22.65	16.153
60.00	34327450.00	2132202.03	5676.7	587.50	24.39	16.784
65.00	34707376.00	2067082.94	6904.2	598.23	25.84	17.397
69.00	34997046.00	2014878.31	7998.0	634.75	26.77	17.825
70.00	37071384.00	2001828.69	8287.2	644.39	26.97	17.918
75.00	37442606.00	1936572.37	9829.0	695.90	27.78	18.643
80.00	37817109.50	1871263.94	11534.6	753.56	28.38	19.567
85.00	38156042.00	1866054.44	13411.7	818.14	28.68	20.559
85.37	38172729.00	1801160.66	13559.6	823.27	28.70	20.634
90.00	38451538.50	1740740.84	15445.6	889.91	28.77	21.592
95.00	38676256.50	1675369.59	17498.1	949.21	28.59	22.672
100.00	3888072.50	1609888.31	20107.2	1056.17	28.19	23.814
105.00	39037755.50	1544313.94	22692.0	1150.51	27.66	25.023
110.00	39159326.00	1478650.44	25454.6	1252.30	27.07	26.293
115.00	39257910.00	1412890.31	29401.0	1361.51	26.49	27.648
120.00	39345314.50	1347039.69	31533.9	1479.14	25.81	29.107
125.00	39434050.50	1281076.81	34849.1	1605.64	25.07	30.707
130.00	39524244.50	1214993.94	38349.7	1741.38	24.36	32.478
135.00	39608235.50	1148763.31	42044.8	1887.26	23.68	34.444
140.00	31100210.75	1095451.47	45901.8	2008.12	22.90	36.567
145.00	31139409.00	1043365.34	49873.4	2134.06	22.15	38.836
150.00	31182001.75	991216.84	53964.8	2268.43	21.44	41.460
155.00	31252294.75	938965.78	58181.9	2412.09	20.76	44.291
160.00	31316111.75	886602.41	62532.9	2566.08	20.11	47.337
164.80	30726779.75	836219.31	66846.0	2724.42	19.53	50.765
164.81	30726779.50	836171.84	66855.1	2724.75	19.53	50.768
165.00	20924940.00	635277.62	67026.7	2730.39	19.60	50.722
165.50	1017298.42	432900.66	67557.8	2734.20	19.41	50.243

A-7

MACH 1

MAX Q

S-1C CECO

S-1C OECO  
TSJ

S-1C/S-11 SEP

\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

TIME FROM FIRST MOTION (SEC)	TOTAL VEHICLE ENGINE THRUST (NEWTONS)	TOTAL VEHICLE WEIGHT (KG)	ALTITUDE ABOVE OBLATE EARTH (M)	MAGNITUDE OF SPACE FIXED VELOCITY IN XPP SYSTEM (M/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (M/S**2)
165.58	417657.37	646537.85	67557.8	2734.20	19.41	.673
166.21	412762.07	666299.60	68129.9	2732.58	19.31	.671
169.21	348092.81	665199.78	70809.1	2728.56	18.81	5.252
170.00	3822929.97	664368.33	71501.9	2730.45	18.69	5.774
175.00	5047774.94	658945.29	75811.9	2750.41	17.92	7.681
180.00	5120193.56	652870.81	79984.9	2774.60	17.18	7.864
185.00	5151435.06	646711.35	84024.7	2800.04	16.45	7.998
190.00	5174287.69	640514.34	87934.3	2826.59	15.75	8.101
195.00	5188172.06	634293.73	91715.9	2854.16	15.06	8.192
200.00	5194422.12	624101.05	95372.1	2882.85	14.40	8.335
205.00	5196378.06	613768.40	98905.8	2912.66	13.76	8.479
205.41	5196607.75	613254.29	99191.6	2915.16	13.71	8.486
210.00	5196947.19	607529.32	102319.4	2943.35	13.14	8.567
215.00	5197256.75	601291.01	105623.6	2973.88	12.61	8.656
220.00	5195333.94	595054.68	108834.9	3004.77	12.12	8.744
225.00	5195854.06	588820.42	111954.6	3036.56	11.64	8.837
230.00	5193770.50	582587.84	114983.5	3069.11	11.17	8.928
235.00	5193202.69	576357.93	117923.2	3102.45	10.72	9.024
240.00	5192684.00	570129.13	120774.9	3136.60	10.27	9.122
245.00	5192136.00	563901.39	123539.5	3171.54	9.84	9.221
250.00	5191685.31	557674.92	126218.4	3207.28	9.42	9.323
255.00	5191216.50	551448.97	128812.7	3243.84	9.02	9.429
260.00	5190715.50	545223.30	131323.9	3281.20	8.62	9.537
265.00	5190274.19	538997.59	133753.0	3319.39	8.24	9.648
270.00	5189841.31	532770.51	136101.6	3358.41	7.86	9.766
275.00	5189421.81	526540.18	138370.9	3398.29	7.50	9.887
280.00	5189041.37	520307.29	140562.2	3439.04	7.15	10.007
285.00	5188731.02	514074.02	142676.9	3480.64	6.82	10.129
290.00	5188472.75	507840.76	144716.2	3523.09	6.49	10.254
295.00	5188237.62	501607.59	146681.5	3566.41	6.17	10.381
300.00	5188038.00	495378.27	148574.1	3610.60	5.87	10.510
305.00	5187859.06	489143.83	150395.6	3655.66	5.57	10.643
310.00	5187721.56	482912.99	152147.2	3701.61	5.25	10.779
315.00	5187648.28	476682.65	153830.6	3748.47	5.01	10.920
320.00	5187511.44	470452.66	155446.9	3796.24	4.75	11.064
325.00	5187459.81	464222.79	156998.0	3844.95	4.49	11.213
330.00	5187312.12	457993.13	158485.0	3894.61	4.25	11.365
335.00	5187059.69	451763.72	159909.5	3945.23	4.02	11.521
340.00	5186884.44	445534.82	161273.3	3996.83	3.79	11.681
345.00	5186688.12	439306.41	162577.8	4049.43	3.57	11.846
350.00	5186523.62	433078.81	163823.9	4103.04	3.37	12.018
355.00	5186569.12	426851.61	165014.2	4157.69	3.17	12.198

INITIATE 1GM

\*\* ENCLOSURE 4 \*\*  
AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

TIME FROM FIRST MOTION (SEC)	TOTAL VEHICLE ENGINE THRUST (NEWTONS)	TOTAL VEHICLE WEIGHT (KG)	ALTITUDE ABOVE OBLATE EARTH (M)	MAGNITUDE OF SPACE FIXED VELOCITY IN XPP SYSTEM (M/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (M/SEC <sup>2</sup> )
360.00	5195671.81	420424.15	166149.9	4213.40	2.98	12.371
365.00	5195699.25	414396.63	167232.6	4270.19	2.80	12.557
370.00	5195746.56	408169.09	168264.2	4328.11	2.63	12.748
375.00	5195367.37	401941.66	169246.0	4387.16	2.47	12.942
380.00	5195011.00	395714.72	170179.9	4447.36	2.31	13.148
385.00	5194629.75	389488.16	171067.9	4508.75	2.17	13.357
390.00	5194283.81	383261.90	171911.8	4571.35	2.03	13.573
395.00	5193740.44	377036.32	172713.3	4635.20	1.90	13.796
400.00	5193258.19	370811.22	173474.5	4700.32	1.77	14.026
405.00	5192724.69	364586.72	174197.4	4766.76	1.66	14.264
410.00	5192254.37	358362.81	174884.0	4834.54	1.55	14.511
415.00	5191824.04	352139.33	175536.3	4903.71	1.45	14.766
420.00	5191411.87	345916.34	176156.6	4974.32	1.36	15.030
425.00	5191017.82	339693.66	176747.1	5046.40	1.28	15.304
430.00	5190590.00	333471.59	177310.0	5120.00	1.20	15.589
435.00	5189767.44	327250.73	177847.6	5195.16	1.13	15.882
440.00	5188963.75	321029.64	178362.6	5271.94	1.07	16.188
445.00	5188098.31	314810.10	178857.4	5350.39	1.01	16.505
450.00	5187232.00	308591.52	179334.6	5430.57	.96	16.835
455.00	5186308.50	302373.53	179796.8	5512.53	.92	17.178
460.00	5185167.00	296154.94	180247.1	5596.35	.88	17.535
463.81	5183623.50	291414.68	180584.1	5661.54	.86	17.812
465.00	4134633.69	290223.07	180687.9	5748.01	.85	18.273
470.00	415165.19	285223.87	181107.9	5816.80	.78	18.453
475.00	378251.47	280393.42	181507.9	5879.43	.75	18.536
480.00	3577642.81	276028.80	181900.4	5879.43	.73	18.990
485.00	3557710.94	271789.09	182280.0	5942.00	.69	19.119
490.00	3553814.66	267561.80	182648.0	6005.34	.67	19.311
495.00	3551136.37	263336.00	183009.1	6069.77	.65	19.515
500.00	3548580.91	259113.05	183363.6	6135.45	.63	19.725
505.00	3545965.16	254893.03	183711.5	6202.34	.61	19.938
510.00	3543317.62	250676.24	184054.4	6270.39	.60	20.151
515.00	3540527.81	246462.63	184394.1	6339.64	.59	20.381
520.00	3537710.50	242252.40	184733.0	6410.12	.58	20.619
525.00	3534736.12	238045.48	185073.7	6481.88	.58	20.865
530.00	3531601.97	233842.35	185418.8	6554.95	.58	21.119
535.00	3528183.72	229643.02	185771.1	6629.37	.59	21.380
540.00	3524383.44	225448.01	186133.2	6705.18	.61	21.650
545.00	3519819.91	221258.02	186508.2	6782.40	.62	21.928
550.00	3513731.47	217074.42	186898.9	6861.06	.64	22.204
555.00	3502322.19	212900.28	187308.6	6941.13	.67	22.488
566.66	3485572.37	211513.97	187449.8	6968.06	.68	22.697

S-11 CEEO

S11 OEEO

.. ENCLOSURE 4 ..

A9-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

TIME FROM FIRST MOTION (SEC)	TOTAL VEHICLE ENGINE THRUST (NEWTONS)	TOTAL VEHICLE WEIGHT (KG)	ALTITUDE ABOVE OBLATE EARTH (M)	MAGNITUDE OF SPACE FIXED VFLOCITY IN XPP SYSTEM (M/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (M/S <sup>002</sup> )
556.67	3485572.37	211512.66	187450.6	6968.23	.68	16.497
557.75	100320.15	211371.59	187542.0	6971.67	.67	.492

S-11/S-1V8 SEP

\*\* ENCLOSURE 4 \*\*  
AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

TIME FROM FIRST MOTION (SEC)	TOTAL VEHICLE ENGINE THRUST (NEWTONS)	TOTAL VEHICLE WEIGHT (KG)	ALTITUDE ABOVE ORBLATE EARTH (M)	MAGNITUDE OF SPACE FIXED VELOCITY IN XPP SYSTEM (M/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (M/S**2)
557.75	24235.78	162766.38	187542.00	6971.67	.67	.181
557.77	26126.42	162258.52	187544.1	6971.67	.67	.180
560.00	27055.12	162228.65	187726.7	6971.60	.64	.163
563.27	602725.37	166051.05	187979.2	6976.33	.59	4.834
565.00	849044.80	165709.71	188104.6	6984.71	.58	5.124
569.47	870127.54	164813.47	188424.7	7007.30	.55	5.279
570.00	870911.50	164642.85	188460.9	7010.00	.54	5.250
575.00	879543.73	163592.67	188791.5	7036.02	.50	5.375
580.00	885549.98	162533.89	189097.6	7062.45	.46	5.441
585.00	885293.72	161472.22	189380.9	7089.20	.42	5.483
590.00	885789.54	160410.69	189641.0	7116.20	.38	5.522
595.00	885317.09	159349.09	189879.6	7144.43	.35	5.556
603.00	887813.66	158286.72	190094.6	7170.90	.31	5.609
605.00	885670.91	157223.18	190289.4	7198.65	.28	5.633
610.00	885107.20	156161.76	190464.3	7226.56	.25	5.668
615.00	887411.39	155100.06	190620.1	7254.70	.22	5.721
620.00	885272.59	154036.98	190757.7	7283.13	.19	5.747
625.00	885301.66	152975.35	190878.1	7311.72	.16	5.787
630.00	885406.65	151914.46	190982.3	7340.55	.14	5.828
635.00	885623.26	150853.49	191071.5	7369.61	.11	5.871
640.00	885861.39	149792.49	191146.7	7398.91	.09	5.914
645.00	886050.67	148731.15	191209.0	7428.45	.07	5.957
650.00	889376.87	147668.13	191259.6	7458.29	.04	6.023
655.00	887297.71	146604.14	191299.7	7488.39	.04	6.052
660.00	887266.65	145542.01	191330.4	7518.68	.03	6.096
665.00	887277.98	144480.07	191352.7	7549.21	.02	6.141
670.00	887297.95	143418.34	191368.4	7579.98	.01	6.187
675.00	887336.45	142356.7	191377.7	7611.00	-.00	6.233
680.00	887386.52	141295.19	191377.9	7642.28	-.01	6.280
685.00	887380.34	140233.78	191372.1	7673.80	-.02	6.328
690.00	887358.30	139172.51	191363.6	7705.54	-.22	6.376
695.00	887279.98	138111.43	191355.2	7737.54	-.62	6.424
700.00	887210.77	137050.58	191350.2	7769.76	-.01	6.474
703.34	887149.43	136341.05	191350.1	7791.44	-.00	6.507
703.55	257716.89	136295.64	191350.2	7792.68	-.00	1.891
705.00	9574.78	136283.37	191351.1	7793.01	-.00	.034
710.00	630.81	136283.29	191353.5	7793.03	-.00	.005
713.34	630.81	136283.29	191354.9	7793.05	-.00	.005

S-1VB GCSI  
TBS  
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\*\* ENCLOSURE 4 \*\*  
AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	TOTAL VEHICLE ENGINE THRUST (NEWTONS)	TOTAL VEHICLE WEIGHT (KG)	ALTITUDE ABOVE OBLATE EARTH (M)	MAGNITUDE OF SPACE FIXED VELOCITY IN KPP SYSTEM (M/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (M/SEC <sup>2</sup> )
713.12	630.81	136223.79	191356.7	7793.05	--00	.005
722.17	630.81	136280.82	191357.1	7793.09	--00	.005
732.12	630.81	136277.85	191357.8	7793.13	--00	.005
743.12	630.31	136274.79	191356.6	7793.19	--00	.005
754.12	630.81	136271.63	191352.7	7793.24	--00	.005
765.12	960.88	136267.92	191346.8	7793.30	--00	.007
776.12	945.10	136262.43	191330.6	7793.38	--00	.007
787.12	929.32	136256.93	191324.0	7793.47	--00	.007
798.12	288.18	136253.87	191315.3	7793.51	--00	.002
844.12	254.69	136245.66	191239.5	7793.65	--00	.002
932.12	191.21	136229.96	190991.5	7793.95	--00	.001
1020.12	175.70	136214.26	190617.9	7794.29	--00	.001
1108.12	175.70	136198.56	190134.6	7794.69	--00	.001
1196.12	175.70	136182.86	189561.2	7795.15	--00	.001
1284.12	175.20	136167.16	188920.6	7795.64	--00	.001
1372.12	174.65	136151.46	188238.5	7796.16	--00	.001
1460.12	174.11	136135.75	187541.7	7796.69	--00	.001
1548.12	173.56	136120.05	186857.9	7797.22	--00	.001
1636.12	173.01	136104.35	186214.1	7797.73	--01	.001
1724.12	172.55	136087.61	185635.4	7798.20	--01	.001
1812.12	172.40	136071.44	185144.3	7798.63	--01	.001
1900.12	172.24	136057.27	184740.1	7799.00	--01	.001
1988.12	170.24	136047.47	184497.4	7799.31	--01	.001
2076.12	165.39	136036.94	184365.8	7799.54	--01	.001
2164.12	160.53	135986.77	184370.5	7799.70	--01	.001
2252.12	155.72	135947.92	184517.5	7799.77	--01	.001
2340.12	150.95	135950.15	184780.2	7799.76	--01	.001
2428.12	146.17	135932.37	185168.9	7799.68	--00	.001
2516.12	141.39	135914.60	185661.6	7799.52	--00	.001
2604.12	136.62	135896.82	186239.6	7799.30	--00	.001
2692.12	131.84	135879.05	186881.6	7799.02	.00	.001
2780.12	127.48	135865.45	187564.7	7798.70	.00	.001
2868.12	123.17	135852.46	188264.7	7798.35	.01	.001
2956.12	118.86	135839.48	188958.6	7797.97	.01	.001
3044.12	114.56	135826.50	189623.6	7797.57	.01	.001
3132.12	110.25	135813.52	190240.1	7797.18	.02	.001
3220.12	106.09	135800.75	190791.0	7796.78	.02	.001
3308.12	102.57	135788.89	191263.5	7796.40	.03	.001
3388.12	99.37	135778.11	191617.3	7796.07	.03	.001
3476.12	95.85	135766.25	191919.1	7795.72	.03	.001
3564.12	92.32	135754.39	192129.2	7795.40	.04	.001
3652.12	88.80	135742.53	192252.6	7795.10	.04	.001

\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH#72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	TOTAL ENGINE THRUST (NEWTONS)	TOTAL VEHICLE WEIGHT (KG)	ALTITUDE ABOVE EARTH (M)	MAGNITUDE OF SPACE FIXED VELOCITY IN XPP SYSTEM (M/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION
3740.12	85.83	135731.99	192297.9	7794.83	.04	.001
3828.13	83.64	135723.33	192277.6	7794.57	.04	.001
3916.12	81.45	135714.66	192207.7	7794.33	.04	.001
4004.12	79.25	135706.00	192106.0	7794.11	.04	.001
4092.12	77.06	135697.33	191992.2	7793.88	.04	.001
4180.12	74.87	135688.67	191886.4	7793.66	.04	.001
4268.12	73.14	135680.00	191807.7	7793.43	.04	.001
4356.12	71.57	135671.34	191774.4	7793.19	.04	.001
4444.12	70.00	135662.67	191801.7	7792.93	.04	.001
4532.12	68.44	135654.01	191902.4	7792.65	.03	.000
4620.12	66.87	135645.34	192084.3	7792.36	.03	.000
4708.12	65.38	135636.68	192352.2	7792.05	.03	.000
4796.12	65.22	135628.01	192705.2	7791.72	.02	.000
4884.12	65.07	135619.34	193138.1	7791.37	.02	.000
4972.12	64.91	135610.68	193641.5	7791.02	.01	.000
5060.12	64.75	135602.01	194201.5	7790.68	.01	.000
5148.12	64.60	135593.35	194800.4	7790.34	.00	.000
5236.12	64.64	135584.68	195418.1	7790.02	.00	.000
5324.12	65.04	135576.01	196032.2	7789.73	-.00	.000
5412.12	65.43	135567.35	196619.6	7789.48	-.01	.000
5500.12	65.82	135558.68	197156.6	7789.29	-.01	.000
5588.12	66.21	135550.02	197620.7	7789.15	-.01	.000
5676.12	66.60	135541.35	197991.9	7789.08	-.01	.000
5764.12	66.99	135532.32	198252.1	7789.08	-.01	.000
5852.12	67.38	135523.14	198387.8	7789.17	-.02	.000
5940.12	67.78	135513.95	198389.4	7789.33	-.02	.000
6028.12	68.17	135504.76	198252.4	7789.58	-.02	.000
6116.12	68.56	135495.57	197976.8	7789.91	-.02	.000
6204.12	68.95	135486.39	197568.7	7790.31	-.02	.001
6292.12	69.03	135477.20	197038.3	7790.78	-.02	.001
6372.12	69.10	135468.05	196463.2	7791.25	-.02	.001
6460.12	69.18	135459.66	195746.0	7791.82	-.02	.001
6548.12	69.25	135450.47	194962.5	7792.43	-.02	.001
6636.12	69.33	135441.29	194137.7	7793.05	-.02	.001
6724.12	69.34	135432.38	193298.9	7793.68	-.02	.001
6812.12	69.10	135424.39	192473.9	7794.31	-.02	.001
6900.12	68.87	135416.40	191690.0	7794.90	-.02	.001
6988.12	68.63	135408.41	190972.9	7795.46	-.02	.000
7076.12	68.40	135400.42	190346.1	7795.97	-.02	.000
7164.12	68.16	135392.44	189829.6	7796.41	-.01	.000
7252.12	67.80	135384.45	189439.3	7796.78	-.01	.000
7340.12	67.33	135376.46	189186.1	7797.07	-.01	.000

\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	TOTAL VEHICLE ENGINE THRUST (NEWTONS)	TOTAL VEHICLE WEIGHT (KG)	ALTITUDE ABOVE OBLATE EARTH (M)	MAGNITUDE OF SPACE FIXED VELOCITY IN XPP SYSTEM (M/SEC)	SPACE FIXED PATH ANGLE (DEG)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (M/S**2)
7428.12	66.86	135368.47	189075.9	7797.27	.01	.01	.000
7516.12	66.39	135360.48	189109.4	7797.39	.01	.01	.000
7604.12	65.92	135352.49	189281.7	7797.42	.01	.01	.000
7692.12	65.45	135344.50	189583.3	7797.37	.01	.01	.000
7780.12	64.23	135337.56	190000.0	7797.24	.01	.01	.000
7868.12	62.90	135330.77	190513.6	7797.03	.00	.00	.000
7956.12	61.57	135323.97	191103.2	7796.77	.00	.00	.000
8044.12	60.24	135317.18	191745.6	7796.45	.00	.00	.000
8132.12	58.91	135310.39	192416.6	-796.09	.00	.00	.000
8220.12	57.54	135303.60	193092.0	7795.71	.01	.01	.000
8308.12	56.15	135296.81	193748.8	7795.30	.01	.01	.000
8396.12	54.74	135290.02	194365.8	7794.88	.02	.02	.000
8484.12	53.91	135286.01	194703.9	7794.63	.02	.02	.000
8459.12	53.73	135285.16	194772.2	7794.58	.02	.02	.000
8460.12	53.72	135285.08	194778.8	7794.58	.02	.02	.000

TIME BASE 4

\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	TOTAL VEHICLE ENGINE THRUST (NEWTONS)	TOTAL VEHICLE WEIGHT (KG)	ALTITUDE ABOVE ORLATE EARTH (M)	MAGNITUDE OF SPACE FIXED VELOCITY IN XPP SYSTEM (M/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (M/S**2)
0460.12	53.72	135285.08	194778.4	7794.58	.02	.000
0465.12	53.72	135284.73	194809.2	7794.55	.02	.000
0470.12	53.72	135284.37	194839.7	7794.53	.02	.000
0475.12	53.72	135284.01	194870.1	7794.51	.02	.000
0480.12	53.72	135283.66	194900.2	7794.48	.02	.000
0485.12	53.72	135283.30	194930.2	7794.46	.02	.000
0490.12	53.72	135282.94	194959.9	7794.44	.02	.000
0495.12	53.72	135282.59	194989.4	7794.41	.02	.000
0500.12	53.72	135282.23	195018.7	7794.39	.02	.000
0502.12	62.98	135282.09	195030.4	7794.38	.02	.000
0502.32	37.98	135282.07	195031.6	7794.38	.02	.000
0505.12	37.07	135282.03	195047.8	7794.36	.02	.000
0510.12	56.98	135281.95	195076.6	7794.34	.02	.000
0515.12	59.28	135281.87	195105.2	7794.32	.02	.000
0520.12	61.58	135281.79	195133.5	7794.29	.02	.000
0525.12	63.88	135281.71	195161.6	7794.27	.02	.000
0530.12	66.18	135281.63	195189.4	7794.25	.02	.000
0535.12	68.48	135281.55	195217.0	7794.23	.02	.001
0540.12	70.78	135281.47	195244.2	7794.20	.02	.001
0545.12	73.08	135281.39	195271.2	7794.18	.02	.001
0550.12	75.38	135281.31	195298.0	7794.16	.02	.001
0555.12	77.68	135281.23	195324.6	7794.14	.02	.001
0560.12	79.98	135281.15	195350.7	7794.11	.02	.001
0565.12	82.28	135281.07	195376.8	7794.09	.02	.001
0570.12	84.58	135280.99	195402.4	7794.07	.02	.001
0575.12	86.88	135280.91	195427.9	7794.05	.02	.001
0580.12	89.18	135280.83	195452.9	7794.03	.02	.001
0585.12	91.48	135280.75	195477.7	7794.01	.03	.001
0590.12	93.78	135280.67	195502.3	7793.99	.03	.001
0595.12	96.08	135280.59	195526.6	7793.96	.03	.001
0600.12	98.38	135280.51	195550.6	7793.94	.03	.001
0605.12	100.68	135280.43	195574.4	7793.92	.03	.001
0610.12	102.98	135280.35	195597.8	7793.90	.03	.001
0615.12	105.28	135280.27	195620.9	7793.88	.03	.001
0620.12	107.58	135280.19	195643.9	7793.86	.03	.001
0625.12	109.88	135280.11	195666.5	7793.84	.03	.001
0630.12	112.18	135280.03	195688.8	7793.82	.03	.001
0635.12	114.48	135279.95	195710.9	7793.80	.03	.001
0640.12	116.78	135279.87	195732.7	7793.78	.03	.001
0645.12	119.08	135279.79	195754.2	7793.76	.03	.001
0650.12	121.38	135279.71	195775.6	7793.74	.03	.001
0655.12	123.67	135279.63	195796.5	7793.72	.03	.001

02/M2 BURNER ON  
ENGINE OFF

\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	TOTAL VEHICLE ENGINE THRUST (NEWTONS)	TOTAL VEHICLE WEIGHT (KG)	ALTITUDE ABOVE OBLATE EARTH (M)	MAGNITUDE OF SPACE FIXED VELOCITY IN XPP SYSTEM (M/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (M/SEC <sup>2</sup> )
8660.12	125.68	135279.55	195817.2	7793.70	.03	.001
8665.12	127.80	135279.47	195837.6	7793.69	.03	.001
8670.12	129.91	135279.39	195857.7	7793.67	.03	.001
8675.12	132.03	135279.31	195877.6	7793.65	.03	.001
8680.12	134.14	135279.23	195897.2	7793.63	.03	.001
8685.12	136.26	135279.15	195916.4	7793.61	.03	.001
8690.12	138.37	135279.07	195935.4	7793.59	.03	.001
8695.12	140.49	135278.99	195954.1	7793.57	.03	.001
8700.12	142.60	135278.91	195972.4	7793.56	.03	.001
8705.12	144.72	135278.83	195990.6	7793.54	.03	.001
8710.12	146.83	135278.75	196008.4	7793.52	.03	.001
8715.12	148.95	135278.67	196025.9	7793.50	.03	.001
8720.12	151.06	135278.59	196043.2	7793.49	.03	.001
8725.12	153.18	135278.51	196060.1	7793.47	.03	.001
8730.12	155.29	135278.43	196076.7	7793.45	.03	.001
8735.12	157.41	135278.35	196093.1	7793.43	.03	.001
8740.12	159.52	135278.27	196109.2	7793.42	.03	.001
8745.12	161.64	135278.19	196125.0	7793.40	.03	.001
8750.12	163.75	135278.11	196140.4	7793.38	.03	.001
8755.12	165.40	135278.03	196155.7	7793.37	.03	.001
8760.12	166.73	135277.95	196170.5	7793.35	.03	.001
8765.12	168.07	135277.87	196185.1	7793.34	.03	.001
8770.12	169.40	135277.79	196199.6	7793.32	.03	.001
8775.12	170.73	135277.71	196213.5	7793.30	.03	.001
8780.12	172.07	135277.63	196227.4	7793.29	.03	.001
8785.12	172.73	135277.55	196240.8	7793.27	.03	.001
8790.12	172.96	135277.47	196254.1	7793.26	.03	.001
8795.12	173.18	135277.39	196266.9	7793.24	.03	.001
8800.12	173.41	135277.31	196279.6	7793.23	.03	.001
8805.12	173.10	135277.23	196291.8	7793.21	.03	.001
8810.12	172.43	135277.15	196303.9	7793.20	.03	.001
8815.12	171.76	135277.08	196315.7	7793.18	.04	.001
8820.12	171.09	135277.00	196327.2	7793.16	.04	.001
8825.12	170.42	135276.92	196338.4	7793.15	.04	.001
8830.12	169.75	135276.84	196349.4	7793.13	.04	.001
8835.12	169.08	135276.76	196360.1	7793.12	.04	.001
8840.12	168.41	135276.68	196370.4	7793.10	.04	.001
8845.12	167.74	135276.60	196380.6	7793.09	.04	.001
8850.12	167.07	135276.52	196390.4	7793.08	.04	.001
8855.12	166.80	135276.44	196399.9	7793.06	.04	.001
8860.12	166.80	135276.36	196409.3	7793.05	.04	.001
8865.12	166.80	135276.28	196418.4	7793.03	.04	.001

ENCLOSURE 4

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	TOTAL VEHICLE ENGINE THRUST (NEWTONS)	TOTAL VEHICLE WEIGHT (KG)	ALTITUDE ABOVE EARTH (M)	MAGNITUDE OF SPACE FIXED VELOCITY IN XPP SYSTEM (M/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (M/S <sup>2</sup> )
8870.12	166.80	135276.20	196427.1	7793.02	.04	.001
8875.12	166.80	135276.12	196435.6	7793.00	.04	.001
8880.17	166.80	135276.04	196443.7	7792.99	.04	.001
8885.12	166.80	135275.96	196451.9	7792.97	.04	.001
8890.12	166.80	135275.88	196459.6	7792.96	.04	.001
8895.12	166.80	135275.80	196466.6	7792.94	.04	.001
8900.12	166.80	135275.72	196474.2	7792.93	.04	.001
8905.12	166.80	135275.64	196481.2	7792.92	.04	.001
8910.12	166.80	135275.56	196487.8	7792.90	.04	.001
8915.12	166.80	135275.48	196494.3	7792.89	.04	.001
8920.12	166.80	135275.40	196500.5	7792.87	.04	.001
8925.12	166.80	135275.32	196506.5	7792.86	.04	.001
8930.12	166.80	135275.24	196512.2	7792.85	.04	.001
8935.12	166.80	135275.16	196517.7	7792.83	.04	.001
8940.12	166.80	135275.08	196523.1	7792.82	.04	.001
8945.12	166.80	135275.00	196528.1	7792.80	.04	.001
8950.12	166.80	135274.92	196532.9	7792.79	.04	.001
8955.12	166.80	135274.84	196537.4	7792.78	.04	.001
8956.42	780.09	135274.82	196538.6	7792.77	.04	.006
8956.92	613.29	135274.70	196539.1	7792.77	.04	.005
8960.12	613.29	135273.93	196541.8	7792.78	.04	.005
8965.12	613.29	135272.74	196545.9	7792.78	.04	.005
8970.12	613.29	135271.54	196549.9	7792.78	.04	.005
8975.12	613.29	135270.35	196553.4	7792.78	.04	.005
8980.12	613.29	135269.16	196556.9	7792.79	.04	.005
8985.12	613.29	135267.96	196560.2	7792.79	.04	.005
8990.12	613.29	135266.77	196563.2	7792.79	.04	.005
8995.12	613.29	135265.57	196566.1	7792.80	.04	.005
9000.12	613.29	135264.38	196568.7	7792.80	.04	.005
9005.12	613.29	135263.18	196571.1	7792.80	.04	.005
9010.12	613.29	135261.99	196573.4	7792.81	.04	.005
9015.12	613.29	135260.79	196575.4	7792.81	.04	.005
9020.12	613.29	135259.60	196577.2	7792.81	.04	.005
9025.12	613.29	135258.41	196578.9	7792.82	.04	.005
9030.12	613.29	135257.21	196580.4	7792.82	.04	.005
9033.12	2880.78	135254.08	196581.1	7792.85	.04	.021
9035.12	4801.30	135251.04	196581.6	7792.90	.04	.035
9038.12	7682.09	135246.42	196582.3	7793.03	.04	.057
9040.12	674926.31	135125.64	196582.7	7796.42	.04	4.995
9040.62	734920.29	135095.45	196582.8	7799.05	.04	5.440
9044.62	762232.80	134392.31	196584.0	7821.45	.05	5.671
9045.12	762059.87	134304.42	196584.2	7824.28	.05	5.681

A-17

ULLAGE IGNITION  
02/M2 BURNER OFF

J-2 F-L INI  
ULL CUT OFF

REIGN

905 THR  
16M INI

\*\* ENCLOSURE 4 \*\*  
 A9-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	TOTAL VEHICLE ENGINE THRUST (NEWTONS)	TOTAL VEHICLE WEIGHT (KG)	ALTITUDE ABOVE OBLATE EARTH (M)	MAGNITUDE OF SPACE FIXED VELOCITY IN XPP SYSTEM (M/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (M/SEC <sup>2</sup> )
9050.12	771936.81	133399.08	196589.6	7852.91	.05	5.787
9055.12	781897.98	132479.38	196594.2	7882.00	.04	5.902
9060.12	78166.95	131548.12	196589.6	7911.62	.03	5.990
9065.12	789956.32	130612.16	196579.1	7941.60	.02	6.048
9070.12	790770.98	129674.50	196574.1	7971.85	.02	6.068
9075.12	790966.55	128734.37	196576.1	8002.35	.02	6.144
9080.12	790957.93	127798.17	196527.7	8033.07	.02	6.189
9085.12	790959.73	126860.00	196510.9	8064.03	.02	6.235
9090.12	790880.40	125921.75	196498.2	8095.22	.03	6.281
9095.12	790692.31	124983.66	196491.9	8126.64	.04	6.326
9100.12	790710.05	124045.79	196494.4	8158.29	.06	6.374
9105.12	791011.96	123107.69	196503.1	8190.18	.07	6.425
9110.12	791369.45	122169.41	196535.7	8222.32	.10	6.478
9115.12	791817.37	121230.82	196579.6	8254.71	.12	6.531
9120.12	792241.04	120291.88	196642.4	8287.36	.15	6.586
9125.12	792631.17	119352.53	196726.9	8320.26	.18	6.641
9130.12	792909.62	118412.98	196835.4	8353.42	.21	6.696
9135.12	793054.42	117473.37	196970.9	8386.83	.25	6.751
9140.12	793201.12	116533.75	197135.3	8420.48	.30	6.807
9145.12	793256.36	115593.97	197314.3	8454.39	.34	6.862
9150.12	793409.72	114654.29	197517.7	8488.54	.39	6.920
9155.12	793582.41	113714.55	197839.5	8522.95	.44	6.979
9160.12	793717.74	112774.71	198152.7	8557.61	.50	7.038
9165.12	793729.84	111834.91	198510.3	8592.52	.56	7.097
9170.12	793689.12	110895.24	198915.2	8627.68	.62	7.157
9175.12	793569.14	109955.86	199370.9	8663.10	.69	7.217
9180.12	887643.42	108912.21	199880.2	8702.50	.76	8.150
9185.12	837460.04	107851.42	200446.7	8742.01	.83	8.228
9190.12	887263.44	106790.30	201072.8	8781.46	.91	8.308
9195.12	887041.58	105729.42	201765.0	8820.85	.99	8.390
9200.12	887857.09	104668.92	202524.0	8860.18	1.08	8.473
9205.12	886744.20	103608.75	203354.4	8900.45	1.17	8.558
9210.12	886581.97	102548.78	204259.9	8941.66	1.26	8.645
9215.12	886422.63	101489.03	205244.2	8983.81	1.36	8.734
9220.12	886365.04	100429.51	206312.8	9027.01	1.46	8.826
9225.12	886372.66	99369.93	207469.2	9071.36	1.57	8.920
9230.12	886349.06	98310.50	208717.3	9116.86	1.68	9.016
9235.12	886259.05	97251.17	210061.1	9163.51	1.79	9.113
9240.12	886164.39	96192.01	211504.2	9209.62	1.91	9.212
9245.12	886063.30	95132.91	213050.7	9254.25	2.03	9.314
9250.12	885961.74	94073.94	214704.8	9299.50	2.16	9.418
9255.12	885858.97	93015.07	216470.4	9345.06	2.29	9.524

\*\* ENCLOSURE 4 \*\*  
AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	TOTAL VEHICLE ENGINE THRUST (NEWTONS)	TOTAL VEHICLE WEIGHT (KG)	ALTITUDE ABO'L OBLATE EARTH (M)	MAGNITUDE OF SPACE FIXED VELOCITY IN APP SYSTEM (M/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCEL RATION
9260.12	885756.25	91956.32	218351.5	9391.06	2.42	9.632
9265.12	885653.53	90977.7	220352.6	9437.49	2.56	9.743
9270.12	885549.55	89839.37	222477.7	9484.37	2.70	9.857
9275.12	885410.74	88781.09	224731.1	9531.72	2.84	9.973
9280.12	885271.92	87723.01	227117.3	9579.53	2.99	10.092
9285.12	885133.04	86665.04	229640.6	9627.82	3.14	10.213
9290.12	884993.03	85607.25	232305.3	9676.61	3.30	10.338
9295.12	884851.23	84549.72	235116.1	9725.90	3.45	10.465
9300.12	884709.30	83492.38	238777.2	9775.71	3.62	10.596
9305.12	884567.27	82435.13	241193.3	9826.05	3.78	10.730
9310.12	884302.12	81378.14	244469.1	9876.94	3.95	10.866
9315.12	883072.10	80321.96	247908.7	9928.33	4.1	10.994
9320.12	882924.80	79266.06	251517.2	9980.28	4.30	11.139
9325.12	882774.82	78210.31	255298.9	10032.84	4.48	11.287
9330.12	882621.67	77154.82	259258.4	10086.00	4.66	11.439
9335.12	882446.47	76099.60	263400.4	10139.80	4.84	11.596
9340.12	882267.93	75044.57	267729.6	10194.24	5.03	11.756
9345.12	882085.38	73989.77	272250.3	10249.36	5.22	11.922
9350.12	881901.30	72935.19	276967.1	10305.17	5.42	12.091
9355.12	881669.89	71880.79	281884.5	10361.69	5.61	12.266
9360.12	881434.84	70826.75	287006.9	10418.94	5.81	12.445
9365.12	881195.52	69773.02	292338.4	10476.94	6.01	12.629
9370.12	880944.74	68719.53	297879.6	10535.69	6.20	12.819
9375.12	880661.97	67666.47	303627.0	10595.23	6.39	13.013
9380.12	880360.92	66613.70	309587.6	10655.64	6.59	13.216
9385.12	880046.06	65561.40	315769.1	10716.94	6.80	13.423
9390.12	879713.26	64509.49	322179.9	10779.15	7.01	13.637
9393.76	879587.39	63744.41	326992.7	825.00	7.16	13.798
9393.97	255766.88	63695.31	327274.3	5627.37	7.17	9.015
9395.12	11801.16	63682.68	328874.9	10826.74	7.23	.181
9400.12	.00	63681.93	335692.4	10821.16	7.45	.000
9403.76	.00	63681.93	340018.2	10816.95	7.61	.000

652  
787  
711



\*\* ENCLASURE 4 \*\*

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 157 OPP.

TIME FROM FIRST MOTION (SEC)	TOTAL VEHICLE ENGINE THRUST (NEWTONS)	TOTAL VEHICLE WEIGHT (KG)	ALTITUDE ABOVE OBLATE EARTH (M)	MAGNITUDE OF SPACE FIXED VELOCITY IN XPP SYSTEM (M/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (M/S <sup>002</sup> )
9403.76	142.05	63677.71	390816.2	10816.95	7.61	.002
9413.76	142.05	63673.16	355471.9	10804.97	8.06	.002
9424.76	142.05	63668.16	372538.7	10791.06	8.56	.002
9435.76	142.05	63663.16	390588.9	10776.42	9.05	.002
9446.76	142.05	63658.16	409611.9	10761.05	9.53	.002
9457.76	142.05	63653.16	429596.7	10744.98	10.02	.002
9462.76	142.05	63648.16	450531.8	10728.21	10.50	.002
9479.76	142.05	63643.17	472405.4	10710.78	10.97	.002
9490.76	142.05	63638.17	495205.3	10692.71	11.45	.002
9501.76	142.05	63633.17	518919.3	10674.00	11.92	.002
9512.76	142.05	63628.17	543534.1	10654.69	12.39	.002
9523.76	142.05	63623.17	569036.8	10634.79	12.85	.002
9539.76	142.05	63618.17	595414.0	10614.32	13.31	.002
9549.66	142.05	63613.67	619889.7	10595.43	13.73	.002

CVS OFF

\*\* ENCLOSURE 4 \*\*

A5-509 TRAJ DATA (METRIC UNITS) JANUARY 3: 1971 AZIMUTH=72.067 DEG.

TIME FROM FIRST MOTION (SFC)	RADIAL DISTANCE OF THE C G (M)	MAGNITUDE OF THE EARTH FIXED VELOCITY (M/SEC)	SUP VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON GBLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (KM)
00	6373353.94	.000	28.6084	-80.60	.00
05	6373353.94	.405	28.6084	-80.60	.00
10	6373376.06	9.515	28.6084	-80.60	.01
15	6373451.37	20.959	28.6084	-80.60	.01
20	6373587.67	33.915	28.6083	-80.60	.02
25	6373792.56	48.460	28.6082	-80.60	.04
30	6374074.44	64.765	28.6081	-80.60	.06
35	6374441.94	83.062	28.6082	-80.60	.11
40	6374904.19	103.631	28.6082	-80.60	.20
45	6375470.81	126.782	28.6084	-80.60	.35
50	6376151.37	152.854	28.6088	-80.60	.58
55	6376955.44	182.711	28.6094	-80.60	.90
60	6377892.19	215.172	28.6103	-80.60	1.35
65	6378970.12	252.143	28.6115	-80.59	1.94
70	6380197.12	293.328	28.6131	-80.59	2.53
75	6381290.37	329.701	28.6147	-80.58	2.70
80	6381579.50	338.669	28.6152	-80.58	3.66
85	6383120.37	388.237	28.6178	-80.57	4.84
90	6384825.00	443.347	28.6211	-80.56	6.28
95	6386700.75	504.768	28.6251	-80.54	6.90
100	6388648.56	509.635	28.6254	-80.54	8.02
105	6388753.12	572.750	28.6299	-80.53	10.09
110	6390983.81	647.599	28.6354	-80.51	12.54
115	6393390.87	729.661	28.6424	-80.48	15.41
120	6395973.17	819.196	28.6503	-80.45	18.74
125	6398732.81	916.458	28.6594	-80.42	22.57
130	6401675.94	1021.662	28.6699	-80.38	26.93
135	6404805.12	1135.273	28.6819	-80.34	31.89
140	6408116.00	1257.869	28.6954	-80.29	37.47
145	6411611.87	1390.120	28.7107	-80.24	43.73
150	6415301.54	1532.857	28.7278	-80.18	50.65
155	6419152.62	1650.580	28.7466	-80.11	58.18
160	6423117.94	1773.630	28.7670	-80.04	66.35
165	6427202.25	1905.351	28.7891	-79.96	75.21
170	6431411.87	2046.595	28.8129	-79.87	84.79
175	6435754.69	2198.364	28.8387	-79.78	94.74
180	6440259.37	2354.749	28.8653	-79.68	99.76
185	6440068.44	2355.079	28.8654	-79.68	98.16
190	6440239.75	2360.639	28.8665	-79.68	96.92
195	6440769.75	2364.181	28.8698	-79.66	

S-1C/S-1: SEP

\*\*\*\* MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM

\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

TIME FROM FIRST MOTION (SFC)	RADIAL DISTANCE OF THE C G (M)	MAGNITUDE OF THE EARTH FIXED VELOCITY (M/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGI JDE ON OBLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (KM)
S-1C/S-11 SEP	6440769.75	2344.181	28.8698	-79.66	96.42
S-11 ENGINE START	6441340.69	2342.253	28.8734	-79.65	97.78
S-11 MAINSTAGE	6444014.44	2356.790	28.8907	-79.59	104.26
	6444705.81	2358.312	28.8953	-79.57	105.96
	6449006.69	2376.082	28.9242	-79.46	116.86
	6453170.44	2398.231	28.9535	-79.35	127.91
	6457201.00	2421.754	28.9831	-79.24	139.12
	6461101.12	2446.504	29.0130	-79.13	150.49
	6464873.12	2472.391	29.0432	-79.02	162.04
	6468519.62	2499.513	29.0737	-78.90	173.73
	6472043.56	2527.861	29.1046	-78.79	185.63
	6472328.56	2530.245	29.1072	-78.78	186.62
	6475447.31	2557.203	29.1358	-78.67	197.69
	6478741.44	2584.612	29.1673	-78.55	209.92
	6481942.69	2616.480	29.1992	-78.43	222.32
	6485052.19	2647.311	29.2313	-78.30	234.86
	6488070.81	2678.951	29.2637	-78.18	247.63
	6491000.12	2711.436	29.2965	-78.05	260.54
	6493841.25	2744.778	29.3295	-77.92	273.64
	6496595.25	2778.967	29.3629	-77.79	286.92
	6499263.37	2813.994	29.3966	-77.66	300.38
	6501846.87	2849.885	29.4306	-77.52	314.03
	6504347.12	2886.626	29.4649	-77.38	327.86
	6506765.25	2924.226	29.4995	-77.24	341.90
	6509107.75	2962.700	29.5343	-77.10	356.13
	6511360.75	3002.067	29.5696	-76.96	370.55
	6513640.69	3042.330	29.6051	-76.81	385.19
	6515644.00	3083.482	29.6409	-76.67	400.03
	6517671.69	3125.522	29.6770	-76.52	415.07
	6519625.37	3168.452	29.7134	-76.36	430.34
	6521506.19	3212.276	29.7501	-76.21	445.82
	6523315.75	3257.002	29.7871	-76.05	461.52
	6525055.44	3302.640	29.8245	-75.89	477.45
	6526726.69	3349.204	29.8621	-75.73	493.61
	6528330.87	3396.707	29.9000	-75.57	510.00
	6529869.62	3445.164	29.9382	-75.40	526.62
	6531344.25	3494.589	29.9767	-75.23	543.49
	6532756.31	3544.996	30.0155	-75.06	560.61
	6534107.44	3596.398	30.0546	-74.89	577.97
	6535399.00	3648.812	30.0940	-74.71	595.59
	6536632.62	3702.253	30.1337	-74.53	613.47
	6537809.44	3756.745	30.1737	-74.35	631.61

..... MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM

ENCLOSURE 4  
 45509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

TIME FROM MOTION (SFC)	RADIAL DISTANCE OF THE C G (M)	MAGNITUDE OF THE EARTH FIXED VELOCITY (M/SEC)	SUB LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (KM)
360.00	6538932.62	3812.310	30.2139	-74.16	650.02
365.00	6540002.75	3868.970	30.2544	-73.97	668.70
370.00	6541020.56	3926.744	30.2952	-73.78	687.47
375.00	6541989.06	3985.701	30.3363	-73.59	706.91
380.00	6542909.62	4045.797	30.3777	-73.39	726.45
385.00	6543784.12	4107.088	30.4193	-73.19	746.28
390.00	6544614.31	4169.600	30.4611	-72.99	766.41
395.00	6545402.19	4233.364	30.5033	-72.78	786.85
400.00	6546149.56	4298.411	30.5456	-72.57	807.60
405.00	6546858.56	4364.776	30.5882	-72.35	828.67
410.00	6547531.19	4432.495	30.6311	-72.14	850.07
415.00	6548169.50	4501.608	30.6742	-71.92	871.80
420.00	6548775.69	4572.156	30.7175	-71.69	893.86
425.00	6549351.87	4644.182	30.7610	-71.46	916.28
430.00	6549900.50	4717.733	30.8047	-71.23	939.04
435.00	6550423.81	4792.853	30.8486	-70.99	962.17
440.00	6550924.37	4869.590	30.8927	-70.75	985.66
445.00	6551404.62	4947.999	30.9370	-70.51	1009.53
450.00	6551867.19	5028.136	30.9814	-70.26	1033.78
455.00	6552314.81	5110.065	31.0260	-70.01	1058.43
460.00	6552750.37	5193.846	31.0707	-69.75	1083.47
465.00	6553076.12	5259.007	31.1049	-69.55	1102.84
465.00	6553176.37	5276.119	31.1156	-69.49	1108.93
470.00	6553581.69	5345.434	31.1605	-69.22	1134.74
475.00	6553966.94	5414.189	31.2053	-68.95	1160.90
480.00	6554344.62	5476.789	31.2500	-68.68	1187.37
485.00	6554709.56	5539.330	31.2946	-68.40	1214.14
490.00	6555062.87	5602.637	31.3389	-68.12	1241.22
495.00	6555409.37	5667.039	31.3830	-67.84	1268.60
500.00	6555749.31	5732.685	31.4270	-67.55	1296.30
505.00	6556082.81	5799.546	31.4707	-67.26	1324.32
510.00	6556411.25	5867.575	31.5142	-66.97	1352.67
515.00	6556736.62	5936.791	31.5574	-66.67	1381.35
520.00	6557061.31	6007.247	31.6004	-66.37	1410.36
525.00	6557387.81	6078.981	31.6430	-66.07	1439.72
530.00	6557718.94	6152.027	31.6853	-65.76	1469.43
535.00	6558057.19	6227.422	31.7272	-65.44	1499.50
540.00	6558405.50	6302.200	31.7688	-65.12	1529.93
545.00	6558766.81	6379.393	31.8100	-64.80	1560.73
550.00	6559143.87	6458.022	31.8507	-64.48	1591.90
555.00	6559540.12	6538.064	31.8911	-64.15	1623.46
560.64	6559976.94	6619.991	31.9044	-64.04	1634.06

S-11 CECO

S-11 OECO

MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM

.. ENCLOSURE 4 ..  
 AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.  
 ..  

TIME FROM FIRST MOTION (SEC)	RADIAL DISTANCE OF THE C G (M)	MAGNITUDE OF THE EARTH FIXED VELOCITY (M/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON OBLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (KM)
784	6559677.69	6565.153	31.9044	-64.04	1634.12
S-11/5-1V8 SEP	6559766.25	6568.509	31.9130	-63.96	1640.98

  
 .. MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM

ENCLOSURE 4 00  
 49-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

TIME FROM FIRST MOTION (SFC)	RADIAL DISTANCE OF THE C.G. (M)	MAGNITUDE OF THE EARTH FIXED VELOCITY (M/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON OBLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (KM)
S-11/S-1VB SEP	6559746.25	6568.589	31.9130	-63.96	1640.98
S-1VB ENGINE START	6559768.25	6568.591	31.9132	-63.96	1641.14
	6559945.00	6568.698	31.9308	-63.81	1655.34
S-1VB MAINSTAGE	6560189.00	6573.706	31.9563	-63.59	1676.23
	6560311.87	6581.575	31.9696	-63.48	1687.25
S-1VB ULLAGE JETT	6560618.69	6604.133	32.0036	-63.18	1715.91
	6560653.56	6606.827	32.0075	-63.14	1719.27
	6560971.75	6632.824	32.0446	-62.81	1751.42
	6561265.81	6659.217	32.0808	-62.47	1783.69
	6561537.19	6685.941	32.1162	-62.13	1816.09
	6561785.75	6712.914	32.1506	-61.78	1848.61
	6562012.12	6740.120	32.1842	-61.44	1881.27
	6562217.06	6767.574	32.2168	-61.09	1914.06
	6562401.31	6795.300	32.2485	-60.75	1946.98
	6562565.87	6823.189	32.2792	-60.40	1980.04
	6562711.69	6851.310	32.3090	-60.05	2013.23
	6562839.56	6879.730	32.3378	-59.69	2046.56
	6562950.69	6908.307	32.3657	-59.34	2080.02
	6563045.81	6937.118	32.3925	-58.98	2113.63
	6563126.37	6966.166	32.4183	-58.63	2147.37
	6563193.25	6995.455	32.4430	-58.27	2181.24
	6563247.54	7024.985	32.4667	-57.91	2215.14
	6563290.50	7054.816	32.4894	-57.54	2249.07
	6563323.31	7084.910	32.5110	-57.18	2283.04
	6563347.06	7115.195	32.5315	-56.81	2318.24
	6563362.94	7145.717	32.5508	-56.45	2352.85
	6563372.37	7176.479	32.5691	-56.08	2387.61
	6563376.00	7207.493	32.5862	-55.71	2422.52
	6563370.75	7238.777	32.6022	-55.33	2457.58
	6563359.94	7270.293	32.6170	-54.96	2492.79
	6563346.81	7302.045	32.6306	-54.58	2528.16
	6563334.31	7334.029	32.6430	-54.20	2563.68
	6563325.50	7366.243	32.6542	-53.82	2599.36
S-1VB GCS1	6563323.12	7387.921	32.6609	-53.57	2623.31
TBS	6563323.06	7389.159	32.6613	-53.55	2624.82
	6563323.00	7389.492	32.6641	-53.44	2635.18
	6563322.50	7389.514	32.6728	-53.04	2671.05
EPO1	6563322.19	7389.527	32.6778	-52.80	2695.04

6600 MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.      \*\* ENCLOSURE 4 \*\*

TIME FROM FIRST MOTION (SEC)	RADIAL DISTANCE OF THE C G (M)	MAGNITUDE OF THE EARTH FIXED VELOCITY (M/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON OBLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (KM)
713.12	6563324.06	7389.524	32.6776	-52.82	2693.47
722.12	6563320.81	7389.564	32.6884	-52.13	2758.03
732.12	6563319.12	7389.608	32.6956	-51.37	2829.77
743.12	6563317.19	7389.660	32.6975	-50.52	2908.68
754.12	6563314.87	7389.715	32.6931	-49.68	2987.89
765.12	6563312.50	7389.779	32.6825	-48.84	3066.50
776.12	6563310.00	7389.845	32.6654	-48.00	3145.41
787.12	6563307.25	7389.954	32.6425	-47.16	3224.33
798.12	6563304.50	7390.009	32.6131	-46.32	3303.24
809.12	6563292.81	7390.198	32.4230	-42.81	3633.25
932.12	6563264.50	7390.664	31.7605	-36.17	4264.60
1020.12	6563236.19	7391.265	30.7196	-29.65	4896.01
1108.12	6563202.62	7392.009	29.3228	-23.30	5527.48
1196.12	6563166.06	7392.870	27.5982	-17.15	6159.04
1284.12	6563126.00	7393.819	25.5779	-11.22	6790.67
1372.12	6563081.87	7394.822	23.2954	-5.51	7422.39
1460.12	6563032.87	7395.842	20.7853	-0.01	8054.17
1548.12	6562978.31	7396.845	18.0806	5.30	8685.99
1636.12	6562917.56	7397.794	15.2137	10.43	9317.83
1724.12	6562850.44	7398.656	12.2154	15.41	9949.66
1812.12	6562776.87	7399.403	9.1148	20.27	10581.44
1900.12	6562697.94	7400.009	5.9399	25.04	11213.12
1988.12	6562614.62	7400.456	2.7173	29.75	11844.67
2076.12	6562529.00	7400.728	-0.5270	34.44	12476.04
2164.12	6562443.81	7400.819	-3.7672	39.13	13107.19
2252.12	6562362.37	7400.730	-6.9776	43.86	13738.07
2340.12	6562280.50	7400.469	-10.1320	48.65	14368.64
2428.12	6562226.87	7400.050	-13.2033	53.55	14998.84
2516.12	6562181.81	7399.493	-16.1631	58.58	15628.59
2604.12	6562158.56	7398.822	-18.9816	63.76	16257.80
2692.12	6562162.00	7398.066	-21.6277	69.13	16886.24
2780.12	6562197.06	7397.256	-24.0683	74.70	17513.51
2868.12	6562268.06	7396.423	-26.2698	80.49	18138.61
2956.12	6562379.25	7395.598	-28.1977	86.50	18758.52
3044.12	6562533.37	7394.810	-29.8189	92.72	19358.78
3132.12	6562732.91	7394.086	-31.1022	99.13	19742.86
3220.12	6562979.04	7393.447	-32.0211	105.70	19305.80
3308.12	6563272.12	7392.912	-32.5552	112.38	18701.39
3396.12	6563578.25	7392.526	-32.6964	118.49	18137.13
3476.12	6563956.62	7392.215	-32.4694	125.22	17512.07
3564.12	6564375.25	7392.025	-31.8476	131.87	16895.23
3652.12	6564829.62	7391.949	-30.8454	138.41	16257.62

\*\*\* MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM

\*\*\*\*\* ENCLOSURE 4 \*\*\*\*\*

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	RADIAL DISTANCE OF THE C G (M)	MAGNITUDE OF THE EARTH FIXED VELOCITY (M/SEC)	SUR VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (KM)
3740.12	6565314.25	7391.975	-29.4849	144.77	15629.64
3828.13	6565822.50	7392.087	-27.7940	150.94	15001.49
3916.12	6566347.25	7392.264	-25.8045	156.89	14373.24
4004.12	6566880.37	7392.482	-23.5501	162.63	13744.93
4092.12	6567414.04	7392.714	-21.0649	168.14	13116.59
4180.12	6567940.04	7392.934	-18.3827	173.46	12488.21
4268.12	6568450.12	7393.116	-15.5358	178.60	11859.79
4356.12	6568936.69	7393.237	-12.5550	-176.41	11231.35
4444.12	6569392.37	7393.275	-9.4697	-171.55	10602.89
4532.12	6569811.19	7393.214	-6.3076	-166.78	9974.41
4620.12	6570187.37	7393.043	-3.0956	-162.07	9345.96
4708.12	6570517.06	7392.756	.1406	-157.39	8717.54
4796.12	6570796.42	7392.354	3.3753	-152.72	8089.22
4884.12	6571024.19	7391.843	6.5832	-148.01	7461.02
4972.12	6571199.44	7391.237	9.7383	-143.23	6833.01
5060.12	6571322.62	7390.583	12.8139	-138.36	6205.28
5148.12	6571395.31	7389.815	15.7822	-133.37	5577.90
5236.12	6571420.19	7389.048	18.6139	-128.22	4951.02
5324.12	6571400.61	7388.283	21.2701	-122.89	4324.83
5412.12	6571341.37	7387.550	23.7427	-117.36	3699.64
5500.12	6571246.62	7386.882	26.9740	-111.62	3076.01
5588.12	6571121.37	7386.306	27.9382	-105.66	2455.03
5676.12	6570970.94	7385.851	29.6019	-99.49	1839.31
5764.12	6570800.19	7385.541	30.9339	-93.12	1236.58
5852.12	6570614.06	7385.392	31.9067	-86.58	681.94
5940.12	6570417.00	7385.420	32.4992	-79.93	436.66
6028.12	6570212.94	7385.629	32.6975	-73.22	840.22
6116.12	6570005.19	7386.020	32.4968	-66.51	1418.10
6204.12	6569796.56	7386.585	31.9019	-59.86	2026.32
6292.12	6569588.87	7387.311	30.9264	-53.33	2644.10
6372.12	6569402.31	7388.093	29.7270	-47.53	3209.41
6460.12	6569200.25	7389.064	28.0890	-41.33	3833.47
6548.12	6569001.81	7390.122	26.1472	-35.35	4458.96
6636.12	6568806.87	7391.234	23.9348	-29.58	5085.38
6724.12	6568615.25	7392.364	21.4858	-24.03	5712.47
6812.12	6568426.44	7393.476	18.8338	-18.68	6340.05
6900.12	6568240.12	7394.534	16.0114	-13.52	6967.98
6988.12	6568056.00	7395.503	13.0495	-8.50	7596.18
7076.12	6567874.12	7396.384	9.9776	-3.62	8224.55
7164.12	6567695.06	7397.060	6.8240	1.17	8853.02
7252.12	6567519.87	7397.602	3.6154	5.89	9481.53
7340.12	6567350.06	7397.963	.3780	10.57	10110.02

\*\*\*\*\* MEASUREMENT FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM \*\*\*\*\*



AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG, 1ST OPP.

ENCLOSURE 4

TIME FROM MOTION (SFC)	RADIAL DISTANCE OF THE C G (M)	MAGNITUDE OF THE EARTH FIXED VELOCITY (M/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON OBLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (KM)
7428.12	6567187.94	7398.138	-2.8626	15.25	10738.42
7516.12	6567036.25	7398.125	-6.0807	19.96	11366.69
7604.12	6566891.50	7397.931	-9.2503	24.73	11994.76
7692.12	6566778.37	7397.568	-12.3448	29.59	12622.59
7780.12	6566680.37	7397.057	-15.3361	34.57	13250.12
7868.12	6566608.75	7396.419	-18.1951	39.71	13877.30
7956.12	6566568.25	7395.683	-20.8910	45.02	14504.03
8044.12	6566563.06	7394.879	-23.3915	50.52	15130.21
8132.12	6566597.25	7394.039	-26.6629	56.24	15755.65
8220.12	6566674.50	7393.195	-27.6712	62.18	16380.02
8308.12	6566797.75	7392.378	-29.3827	68.33	17002.72
8396.12	6566968.87	7391.614	-30.7657	74.69	17622.46
8484.12	6567092.87	7391.199	-31.4169	78.52	17986.19
8572.12	6567121.00	7391.114	-31.5382	79.34	18062.77
8660.12	6567123.62	7391.107	-31.5490	79.41	18069.72

TIME BASE 6 0000 MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM

ENCLOSURE 4

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	RADIAL DISTANCE OF THE C G (M)	MAGNITUDE OF THE EARTH FIXED VELOCITY (M/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON OBLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (KM)
0460.12	6567123.62	7391.107	-31.5490	79.41	18069.72
0465.12	6567136.87	7391.069	-31.6019	79.79	18104.47
0470.12	6567150.25	7391.032	-31.6537	80.16	18139.18
0475.12	6567163.81	7390.995	-31.7042	80.53	18173.86
0480.12	6567177.50	7390.958	-31.7535	80.91	18208.49
0485.12	6567191.44	7390.922	-31.8016	81.28	18243.09
0490.12	6567205.50	7390.885	-31.8485	81.66	18277.63
0495.12	6567219.87	7390.849	-31.8942	82.03	18312.13
0500.12	6567234.37	7390.814	-31.9386	82.41	18346.58
0502.12	6567240.19	7390.800	-31.9560	82.56	18360.35
0502.32	6567240.75	7390.798	-31.9577	82.57	18361.72
0505.12	6567248.94	7390.778	-31.9818	82.78	18380.98
0510.12	6567263.81	7390.743	-32.0237	83.14	18415.32
0515.12	6567278.75	7390.709	-32.0644	83.54	18449.60
0520.12	6567293.81	7390.675	-32.1038	83.91	18483.81
0525.12	6567309.12	7390.641	-32.1420	84.29	18517.95
0530.12	6567324.56	7390.608	-32.1790	84.67	18552.02
0535.12	6567340.12	7390.575	-32.2147	85.05	18586.01
0540.12	6567355.87	7390.543	-32.2491	85.42	18619.91
0545.12	6567371.75	7390.511	-32.2823	85.80	18653.72
0550.12	6567387.81	7390.480	-32.3142	86.18	18687.43
0555.12	6567404.00	7390.449	-32.3449	86.56	18721.04
0560.12	6567420.37	7390.418	-32.3743	86.94	18754.52
0565.12	6567436.87	7390.388	-32.4024	87.32	18787.89
0570.12	6567453.50	7390.359	-32.4293	87.70	18821.12
0575.12	6567470.31	7390.329	-32.4548	88.08	18854.20
0580.12	6567487.19	7390.301	-32.4791	88.46	18887.12
0585.12	6567504.25	7390.273	-32.5022	88.84	18919.87
0590.12	6567521.50	7390.245	-32.5239	89.22	18952.42
0595.12	6567538.87	7390.218	-32.5444	89.60	18984.77
0600.12	6567556.37	7390.191	-32.5636	89.98	19016.90
0605.12	6567574.12	7390.165	-32.5815	90.36	19048.76
0610.12	6567591.94	7390.139	-32.5981	90.75	19080.36
0615.12	6567609.94	7390.114	-32.6135	91.13	19111.64
0620.12	6567628.12	7390.089	-32.6275	91.51	19142.59
0625.12	6567646.37	7390.064	-32.6403	91.89	19173.16
0630.12	6567664.81	7390.040	-32.6518	92.27	19203.32
0635.12	6567683.50	7390.016	-32.6619	92.65	19233.01
0640.12	6567702.25	7389.993	-32.6708	93.04	19262.18
0645.12	6567721.25	7389.970	-32.6785	93.42	19290.74
0650.12	6567740.37	7389.948	-32.6848	93.80	19318.70
0655.12	6567759.62	7389.926	-32.6898	94.18	19345.89

D2/H2 BURNER ON  
ENGINE OFF

MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM

.. ENCLOSURE 4 ..  
 AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	RADIAL DISTANCE OF THE C G (M)	MAGNITUDE OF THE EARTH FIXED VELOCITY (M/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON OBLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (M)
8660.12	6567779.12	7389.905	-32.6935	94.56	19372.25
8665.12	6567798.69	7389.884	-32.6960	94.95	19397.69
8670.12	6567818.44	7389.864	-32.6971	95.33	19422.07
8675.12	6567839.31	7389.844	-32.6970	95.71	19445.26
8680.12	6567858.37	7389.824	-32.6955	96.09	19467.11
8685.12	6567878.56	7389.805	-32.6928	96.48	19487.47
8690.12	6567898.87	7389.786	-32.6888	96.86	19506.14
8695.12	6567919.37	7389.767	-32.6835	97.24	19522.94
8700.12	6567939.94	7389.751	-32.6769	97.62	19537.69
8705.12	6567960.91	7389.734	-32.6690	98.01	19550.16
8710.12	6567981.69	7389.717	-32.6598	98.39	19560.20
8715.12	6568002.75	7389.701	-32.6493	98.77	19567.64
8720.12	6568024.00	7389.685	-32.6375	99.15	19572.33
8725.12	6568045.31	7389.670	-32.6245	99.53	19574.22
8730.12	6568066.81	7389.655	-32.6101	99.91	19573.24
8735.12	6568088.44	7389.641	-32.5945	100.30	19569.43
8740.12	6568110.25	7389.627	-32.5776	100.68	19562.84
8745.12	6568132.19	7389.614	-32.5594	101.06	19553.62
8750.12	6568154.19	7389.601	-32.5399	101.44	19541.89
8755.12	6568176.44	7389.589	-32.5192	101.82	19527.84
8760.12	6568198.69	7389.577	-32.4971	102.20	19511.68
8765.12	6568221.19	7389.565	-32.4738	102.58	19493.58
8770.12	6568243.87	7389.554	-32.4492	102.96	19473.74
8775.12	6568266.56	7389.543	-32.4234	103.34	19452.35
8780.12	6568289.50	7389.533	-32.3963	103.72	19429.58
8785.12	6568312.50	7389.523	-32.3679	104.10	19405.57
8790.12	6568335.69	7389.514	-32.3382	104.48	19380.47
8795.12	6568359.00	7389.505	-32.3073	104.86	19357.40
8800.12	6568382.44	7389.496	-32.2751	105.24	19337.47
8805.12	6568405.94	7389.487	-32.2416	105.62	19319.78
8810.12	6568429.69	7389.479	-32.2069	105.99	19301.41
8815.12	6568453.56	7389.472	-32.1709	106.37	19282.43
8820.12	6568477.50	7389.464	-32.1337	106.75	19262.92
8825.12	6568501.62	7389.458	-32.0953	107.13	19242.92
8830.12	6568525.87	7389.451	-32.0556	107.50	19222.49
8835.12	6568550.25	7389.445	-32.0146	107.88	19201.68
8840.12	6568574.69	7389.439	-31.9724	108.25	19180.51
8845.12	6568599.31	7389.434	-31.9290	108.63	19159.03
8850.12	6568624.06	7389.428	-31.8843	109.01	19137.27
8855.12	6568648.94	7389.424	-31.8384	109.39	18995.27
8860.12	6568674.00	7389.417	-31.7913	109.76	18962.98
8865.12	6568699.12	7389.415	-31.7429	110.13	18930.51

..... MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM

\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	RADIAL DISTANCE OF THE C G (M)	MAGNITUDE OF THE EARTH FIXED VELOCITY (M/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE OBLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (KM)
8870.12	6568724.37	7389.411	-31.6934	110.50	18097.84
8875.12	6568749.75	7339.408	-31.6426	110.88	18065.00
8880.12	6568775.19	7389.405	-31.5906	111.25	18031.98
8885.12	6568800.47	7389.402	-31.5374	111.62	18098.82
8890.12	6568826.62	7389.400	-31.4837	111.99	18065.52
8895.12	6568852.44	7389.398	-31.4274	112.36	18032.10
8900.12	6568878.44	7389.397	-31.3706	112.74	18098.55
8905.12	6568904.62	7389.395	-31.3126	113.11	18064.89
8910.12	6568930.81	7389.394	-31.253	113.48	18031.14
8915.12	6568957.19	7389.394	-31.193	113.85	18097.28
8920.12	6568983.62	7389.393	-31.131	114.22	18063.35
8925.12	6569010.25	7389.393	-31.068	114.58	18029.33
8930.12	6569036.94	7389.393	-31.0048	114.95	18095.23
8935.12	6569063.81	7389.393	-30.9416	115.32	18061.07
8940.12	6569090.87	7389.394	-30.8735	115.69	18026.83
8945.12	6569117.94	7389.395	-30.8061	116.06	18092.54
8950.12	6569145.19	7389.397	-30.7376	116.42	18058.19
8955.12	6569172.44	7389.399	-30.6679	116.78	18023.70
8960.12	6569199.94	7389.402	-30.5971	117.15	18089.32
8965.12	6569227.44	7389.403	-30.5251	117.51	18054.81
8970.12	6569255.12	7389.452	-30.4520	117.88	18020.26
8975.12	6569282.87	7389.472	-30.3777	118.24	18085.66
8980.12	6569310.75	7389.492	-30.3024	118.60	18051.03
8985.12	6569338.81	7389.512	-30.2254	118.96	18016.35
8990.12	6569366.81	7389.522	-30.1483	119.33	18081.64
8995.12	6569395.12	7389.551	-30.0696	119.69	18046.90
9000.12	6569423.44	7389.572	-29.9898	120.05	18012.12
9005.12	6569451.81	7389.593	-29.9089	120.41	17977.31
9010.12	6569480.44	7389.615	-29.8269	120.76	17942.47
9015.12	6569509.12	7389.637	-29.7438	121.12	17907.60
9020.12	6569537.87	7389.658	-29.6596	121.48	17872.71
9025.12	6569566.75	7389.681	-29.5744	121.84	17837.79
9030.12	6569595.75	7389.703	-29.4881	122.19	17802.85
9035.12	6569613.12	7389.749	-29.4358	122.41	17781.87
9040.12	6569624.75	7389.806	-29.4007	122.55	17747.89
9045.12	6569642.25	7389.948	-29.3477	122.76	17746.90
9050.12	6569653.94	7395.34	-29.3122	122.90	17722.90
9055.12	6569656.87	7395.972	-29.3033	122.94	17729.40
9060.12	6569680.81	7410.383	-29.2316	123.22	17701.32
9065.12	6569683.94	7421.221	-29.2225	123.26	17697.81

ULLAGE IGNITION  
02/M2 BURNER OFF

J-2 F-- IMI  
ULL CUT OFF

REIGN

905 IMI  
121 IMI

\*\*\*\*\* MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

ENCLOSURE 4 00

TIME FROM FIRST MOTION (SEC)	RADIAL DISTANCE OF THE C G (M)	MAGNITUDE OF THE EARTH FIXED VELOCITY (M/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON OBLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (KM)
9050.12	6569710.12	7449.862	-29.1314	123.62	17662.56
9055.12	6569751.41	7478.968	-29.0390	123.97	17627.16
9060.12	6569774.81	7508.608	-28.9451	124.33	17591.60
9065.12	6569796.37	7538.602	-28.8498	124.69	17555.88
9070.12	6569811.62	7568.867	-28.7530	125.05	17520.00
9075.12	6569824.44	7599.377	-28.6549	125.41	17483.96
9080.12	6569837.12	7630.118	-28.5553	125.77	17447.76
9085.12	6569851.81	7661.091	-28.4543	126.13	17411.39
9090.12	6569871.00	7692.295	-28.3518	126.49	17374.86
9095.12	6569896.34	7723.725	-28.2478	126.85	17338.16
9100.12	6569922.00	7755.382	-28.1424	127.22	17301.30
9105.12	6569978.81	7787.281	-28.0355	127.58	17264.28
9110.12	6570039.69	7819.428	-27.9272	127.94	17227.08
9115.12	6570117.31	7851.826	-27.8173	128.31	17189.72
9120.12	6570214.25	7884.479	-27.7060	128.68	17152.20
9125.12	6570333.12	7917.385	-27.5931	129.04	17114.50
9130.12	6570476.56	7950.545	-27.4788	129.41	17076.64
9135.12	6570647.25	7983.982	-27.3629	129.78	17038.60
9140.12	6570848.12	8017.606	-27.2455	130.15	17000.39
9145.12	6571082.06	8051.575	-27.1266	130.52	16962.02
9150.12	657135.75	8085.652	-27.0061	130.89	16923.47
9155.12	6571660.12	8120.049	-26.8841	131.26	16884.74
9160.12	6572017.25	8154.699	-26.7605	131.63	16845.85
9165.12	6572405.19	8189.599	-26.6354	132.01	16806.78
9170.12	6572847.81	8224.745	-26.5087	132.38	16767.54
9175.12	6573341.37	8260.138	-26.3804	132.76	16728.12
9180.12	6573889.06	8295.518	-26.2506	133.13	16688.51
9185.12	6574494.19	8339.801	-26.1191	133.51	16648.71
9190.12	6575160.31	8380.417	-25.9859	133.88	16608.71
9195.12	6575890.87	8421.367	-25.8511	134.26	16568.52
9200.12	6576689.56	8462.658	-25.7146	134.64	16528.12
9205.12	6577540.00	8504.297	-25.5765	135.02	16487.52
9210.12	6578505.81	8546.290	-25.4366	135.40	16446.72
9215.12	6579530.87	8588.659	-25.2951	135.78	16405.72
9220.12	6580640.44	8631.391	-25.1518	136.17	16364.51
9225.12	6581838.19	8674.498	-25.0068	136.55	16323.11
9230.12	6583127.94	8717.986	-24.8601	136.93	16281.49
9235.12	6584513.69	8761.860	-24.7116	137.32	16239.67
9240.12	6585999.06	8806.126	-24.5614	137.71	16197.65
9245.12	6587588.12	8850.792	-24.4095	138.09	16155.41
9250.12	6589285.00	8895.864	-24.2558	138.48	16112.97
9255.12	6591093.69	8941.352	-24.1003	138.87	16070.32

MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED; EARTH CENTERED PLUMBLINE SYSTEM

\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SFC)	RADIAL DISTANCE OF THE C G (M)	MAGNITUDE OF THE EARTH FIXED VELOCITY (M/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (KM)
9760.12	6593018.25	8987.265	-23.9431	139.26	16027.47
9265.12	6595062.94	9033.612	-23.7841	139.65	15984.40
9270.12	6597231.94	9080.403	-23.6233	140.04	15941.12
9275.12	6599529.56	9127.647	-23.4608	140.43	15897.63
9280.12	6601960.12	9175.355	-23.2965	140.83	15853.93
9285.12	6604528.06	9223.538	-23.1304	141.22	15810.01
9290.12	6607237.62	9272.208	-22.9626	141.62	15765.89
9295.12	6610093.50	9321.378	-22.7929	142.01	15721.54
9300.12	6613099.94	9371.061	-22.6215	142.41	15676.99
9305.12	6616261.56	9421.271	-22.4483	142.81	15632.22
9310.12	6619582.94	9472.022	-22.2733	143.20	15587.23
9315.12	6623068.56	9523.262	-22.0965	143.60	15542.03
9320.12	6626723.06	9575.068	-21.9179	144.00	15496.62
9325.12	6630550.94	9627.462	-21.7375	144.41	15450.98
9330.12	6634556.75	9680.463	-21.5553	144.81	15405.13
9335.12	6638745.28	9734.088	-21.3713	145.21	15359.06
9340.12	6643120.94	9788.357	-21.1856	145.61	15312.77
9345.12	6647688.37	9843.288	-20.9980	146.02	15266.27
9350.12	6652452.06	9898.904	-20.8086	146.42	15219.54
9355.12	6657416.31	9955.225	-20.6175	146.83	15172.60
9360.12	6662585.69	10012.272	-20.4245	147.24	15125.43
9365.12	6667964.19	10070.049	-20.2298	147.65	15078.04
9370.12	6673552.56	10128.572	-20.0333	148.05	15030.43
9375.12	6679377.12	10187.871	-19.8349	148.46	14982.60
9380.12	6685354.91	10248.033	-19.6348	148.87	14934.54
9385.12	6691583.56	10309.080	-19.4329	149.29	14886.26
9390.12	6698041.44	10371.038	-19.2291	149.70	14837.75
9393.76	6702888.62	10416.707	-19.0799	150.00	14800.26
9393.97	6703172.25	10419.070	-19.0711	150.02	14800.26
9395.12	6704735.69	10418.417	-19.0236	150.11	14789.02
9400.12	6711648.19	10412.636	-18.8172	150.52	14740.29
9403.76	6716807.87	10408.297	-18.6666	150.82	14704.91

\*\*\* MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.      \*\* ENCLOSURE 4 \*\*

TIME FROM FIRST MOTION (SFC)	RADIAL DISTANCE OF THE C G (M)	MAGNITUDE OF THE EARTH FIXED VELOCITY (M/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON OBLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (KM)
9403.76	671607.87	10408.297	-18.6666	150.82	14704.91
9413.76	6731554.06	10395.940	-18.2512	151.64	14407.92
9424.76	6740721.06	10381.594	-17.7921	152.53	14501.74
9435.76	6766869.54	10366.483	-17.3310	153.40	14396.13
9446.76	6785989.00	10350.618	-16.8681	154.27	14291.11
9457.76	6806068.19	10334.021	-16.4039	155.13	14186.71
9468.76	6827095.50	10316.710	-15.9386	155.98	14082.95
9479.76	6849055.06	10298.705	-15.4726	156.82	13979.86
9490.76	6871946.69	10280.027	-15.0061	157.65	13877.45
9501.76	6895745.94	10260.697	-14.5395	158.47	13775.76
9512.76	6920443.44	10240.734	-14.0730	159.28	13674.81
9523.76	6946026.44	10220.161	-13.6068	160.08	13574.60
9534.76	6972461.25	10198.998	-13.1413	160.88	13475.17
9544.66	6997024.62	10179.465	-12.7231	161.58	13386.36

CVS OFF

\*\*\*\* MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM

00 ENCLOSURE 4 00  
 A3-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

TIME FROM FIRST MOTION (SEC)	X COORDINATE EARTH FIXED, PAD CENTERED, PLUMBIN SYS. (M)	Y COORDINATE EARTH FIXED, PAD CENTERED, PLUMBIN SYS. (M)	Z COORDINATE EARTH FIXED, PAD CENTERED, PLUMBIN SYS. (M)	X COMPONENT OF VEL. IN THE XXXE SYSTEM (M/S)	Y COMPONENT OF VEL. IN THE XXXE SYSTEM (M/S)	Z COMPONENT OF VEL. IN THE XXXE SYSTEM (M/S)
0.00	59.500	-0.031	0.005	0.000	-0.000	-0.000
0.40	59.500	-0.057	0.014	0.405	0.000	0.001
5.00	81.625	-0.018	0.024	9.512	0.203	-0.009
10.00	157.000	5.156	-0.166	20.882	1.798	-0.068
15.00	293.125	16.190	-0.745	33.845	2.175	-0.126
20.00	498.062	26.452	1.409	48.405	2.013	1.148
25.00	779.937	36.147	12.509	64.640	1.854	3.579
30.00	1147.437	45.011	40.460	82.663	1.681	7.963
35.00	1609.687	52.941	96.142	102.565	1.484	14.748
40.00	2176.312	59.807	192.682	124.409	1.275	24.383
45.00	2857.000	65.499	345.750	148.185	1.080	37.474
50.00	3661.250	70.648	574.138	173.830	0.900	54.889
55.00	4598.250	74.739	899.045	201.244	0.737	76.152
60.00	5676.500	78.030	1343.818	230.325	0.597	102.597
65.00	6903.875	80.729	1933.617	260.835	0.479	134.187
69.00	7997.500	82.523	2527.313	286.004	0.415	163.220
70.00	8286.625	82.917	2694.412	292.324	0.400	171.006
75.00	9827.875	84.760	3652.863	324.362	0.330	213.347
80.00	11532.687	86.288	4837.911	357.835	0.284	261.746
85.00	13408.437	87.646	6282.133	392.653	0.272	317.198
85.37	13556.187	87.713	6401.929	395.298	0.274	321.663
90.00	15460.375	89.095	8022.782	428.175	0.330	380.405
95.00	17689.875	91.054	10100.572	463.543	0.475	452.230
100.00	20094.687	93.969	12560.079	498.310	0.703	533.003
105.00	22673.250	98.216	15444.101	533.180	1.001	621.933
110.00	25424.812	104.061	18793.028	568.466	1.335	718.846
115.00	28360.750	111.537	22644.490	605.164	1.663	823.144
120.00	31476.750	120.791	27040.625	640.945	2.052	937.033
125.00	34768.937	132.273	32031.270	676.025	2.552	1060.762
130.00	38239.062	146.493	37663.593	712.282	3.144	1193.767
135.00	41894.000	163.849	43985.801	749.881	3.803	1336.905
140.00	45699.375	184.444	50978.307	771.198	4.468	1459.331
145.00	49604.312	208.758	58591.115	791.677	5.268	1587.131
150.00	53617.125	237.255	66863.554	812.744	6.144	1723.302
155.00	57735.000	270.374	75839.479	834.568	7.125	1868.688
160.00	61944.375	308.676	85567.437	857.331	8.285	2024.282
164.80	66135.812	350.840	95667.814	880.138	9.373	2189.059
164.81	66144.562	350.939	95689.660	880.184	9.375	2184.396
165.00	66310.062	352.716	96100.898	880.809	9.420	2190.138
165.58	66822.062	358.227	97377.708	877.549	9.510	2195.261



AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

ENCLOSURE 4

	X COORDINATE		Y COORDINATE		Z COORDINATE		COMPONENT OF		COMPONENT OF	
	EARTH FIXED	PAD CENTERED	EARTH FIXED	PAD CENTERED	EARTH FIXED	PAD CENTERED	VEL. IN THE	VEL. IN THE	VEL. IN THE	VEL. IN THE
	PLUMBIN SYS.	PLUMBIN SYS.	PLUMBIN SYS.	PLUMBIN SYS.	PLUMBIN SYS.	PLUMBIN SYS.	XXIX SYSTEM	XXIX SYSTEM	XXIX SYSTEM	XXIX SYSTEM
	(M)	(M)	(M)	(M)	(M)	(M)	(M/S)	(M/S)	(M/S)	(M/S)
135.00	66822.062	358.227	97377.700	877.549	9.510	2195.261				
140.00	67373.125	364.232	98760.787	871.929	9.586	2195.464				
145.00	69948.375	393.542	105350.230	84.939	9.961	2199.715				
150.00	70612.750	401.462	107085.078	840.741	10.066	2203.526				
155.00	74729.750	453.363	118176.647	807.306	10.698	2234.705				
160.00	78687.687	508.517	129416.133	775.894	11.363	2269.223				
165.00	82489.250	567.013	140869.850	744.817	12.054	2304.343				
170.00	86136.312	629.073	152480.363	719.060	12.768	2339.944				
175.00	89630.312	694.736	164269.986	683.592	13.505	2375.971				
180.00	92972.750	764.139	176241.062	653.471	14.270	2412.538				
185.00	96165.687	837.498	188396.289	623.702	15.061	2449.663				
190.00	99210.125	914.830	200738.322	594.333	15.824	2487.128				
195.00	102115.750	995.177	213265.076	568.653	16.327	2523.277				
200.00	104898.625	1078.301	225970.787	544.314	16.919	2559.180				
205.00	107558.437	1164.386	238857.959	519.649	17.534	2595.749				
210.00	110095.250	1253.652	251928.992	495.095	18.184	2632.742				
215.00	112509.150	1346.358	265186.207	470.521	18.880	2670.232				
220.00	114800.175	1442.448	278632.168	449.909	19.579	2708.245				
225.00	116968.375	1542.348	292269.484	421.285	20.401	2746.773				
230.00	119013.187	1646.571	306100.750	396.652	21.298	2785.822				
235.00	120934.875	1755.438	320128.598	371.992	22.245	2825.415				
240.00	122733.125	1869.110	334355.816	347.304	23.253	2865.563				
245.00	124407.812	1988.731	348785.156	322.579	24.311	2906.278				
250.00	125958.875	2112.323	363419.551	297.813	25.417	2947.585				
255.00	127385.875	2242.272	378262.020	273.003	26.569	2989.510				
260.00	128688.687	2378.090	393315.684	248.125	27.766	3032.048				
265.00	129866.937	2519.998	408583.727	223.160	29.008	3075.259				
270.00	130920.187	2668.715	424069.336	198.113	30.293	3119.090				
275.00	131847.875	2822.994	439775.698	172.982	31.621	3163.549				
280.00	132449.812	2984.527	455706.082	147.756	32.992	3208.707				
285.00	133326.750	3152.973	471863.871	122.429	34.406	3254.519				
290.00	133873.875	3328.637	488252.406	96.988	35.863	3301.021				
295.00	134245.000	3511.724	504875.230	71.424	37.315	3348.234				
300.00	134567.875	3702.380	521735.941	45.723	38.912	3396.177				
305.00	134757.000	3900.910	538838.711	19.873	40.505	3444.869				
310.00	134786.312	4107.496	556185.867	-6.139	42.142	3494.330				
315.00	134690.250	4322.393	573782.789	-32.327	43.830	3544.677				
320.00	134462.750	4545.854	591673.953	-58.701	45.567	3595.631				
325.00	134102.937	4778.160	609740.430	-85.275	47.355	3647.588				
330.00	133609.687	5019.510	628109.406	-112.061	49.191	3700.230				
335.00	132981.937	5270.187	646744.148	-139.071	51.082	3753.822				

INITIATE 16M

\*\* ENCLOSURE 4 \*\*  
AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

TIME FROM MOTION (SEC)	X COORDINATE EARTH FIXED, PAD CENTERED, PLUMBIN SYS. (M)	Y COORDINATE EARTH FIXED, PAD CENTERED, PLUMBIN SYS. (M)	Z COORDINATE EARTH FIXED, PAD CENTERED, PLUMBIN SYS. (M)	COMPONENT OF VEL. IN THE XXXF SYSTEM (M/S)	COMPONENT OF VEL. IN THE XAXE SYSTEM (M/S)	COMPONENT OF VEL. IN THE YXRE SYSTEM (M/S)
360.00	132218.562	5530.404	665649.086	-166.319	53.025	3808.312
365.00	131318.312	5607.466	684828.758	-193.813	54.982	3863.722
370.00	130279.81	6080.022	704287.867	-221.619	56.852	3920.092
375.00	129101.62	6369.291	724031.250	-249.716	58.884	3977.435
380.00	127782.312	6669.069	744063.812	-278.095	61.029	4035.767
385.00	126320.187	6979.661	764390.594	-306.797	63.229	4095.125
390.00	124713.687	7301.486	785016.789	-335.835	65.516	4155.537
395.00	122961.250	7634.973	805947.734	-365.726	67.882	4217.034
400.00	121060.812	7980.429	827188.961	-394.993	70.319	4279.696
405.00	119010.625	8338.258	848746.102	-425.155	72.831	4343.410
410.00	116808.625	8708.855	870624.992	-455.732	75.418	4408.359
415.00	114452.625	9092.603	892831.680	-486.747	78.082	4474.534
420.00	111940.437	9489.817	915372.392	-518.222	80.823	4541.973
425.00	109269.562	9900.921	938253.570	-550.181	83.642	4610.719
430.00	106437.687	10326.359	961481.805	-582.648	86.538	4680.816
435.00	103442.187	10766.481	985063.969	-615.649	89.520	4752.305
440.00	100280.250	11221.708	1009007.211	-649.209	92.588	4825.232
445.00	96949.062	11692.473	1033318.742	-683.354	95.738	4899.649
450.00	93445.625	12179.226	1058006.203	-718.110	98.979	4975.608
455.00	89766.875	12682.413	1083077.406	-753.513	102.315	5053.168
460.00	85909.437	13202.556	1108540.547	-789.593	105.746	5132.387
463.81	82846.712	13610.749	1128222.172	-817.577	108.427	5193.936
465.00	81869.625	13740.016	1134402.344	-826.595	109.204	5209.822
470.00	77640.562	14294.362	1160610.828	-865.129	112.564	5273.760
475.00	73222.750	14865.472	1187140.609	-901.234	115.831	5337.397
480.00	68628.312	15452.377	1213971.937	-936.910	118.937	5394.745
485.00	63850.937	16054.976	1241087.609	-974.113	122.102	5451.639
490.00	58887.750	16673.388	1268989.375	-1011.124	125.289	5509.217
495.00	53738.562	17307.926	1296181.172	-1048.747	128.539	5567.669
500.00	48398.562	17958.966	1324167.831	-1087.473	131.880	5627.050
505.00	42867.437	18626.896	1352453.172	-1127.099	135.304	5687.381
510.00	37126.250	19312.146	1381042.594	-1167.497	138.807	5748.576
515.00	31186.112	20015.097	1409940.406	-1208.581	142.390	5810.776
520.00	25039.312	20736.162	1439151.453	-1250.333	146.054	5873.871
525.00	18681.750	21475.750	1468802.766	-1292.778	149.803	5938.038
530.00	12110.312	22234.328	1498833.516	-1335.950	153.639	6003.255
535.00	5321.062	23012.289	1528718.016	-1379.877	157.565	6069.530
540.00	-1689.812	23810.127	1559230.781	-1424.585	161.582	6136.952
545.00	-8926.125	24628.279	1590086.344	-1470.098	165.691	6205.483
550.00	-1392.187	25467.195	1621287.453	-1516.434	169.896	6275.158
555.00	-24091.875	26327.384	1652839.719	-1563.606	174.198	6345.949
556.64	-26708.937	26618.668	1663428.516	-1579.498	178.680	6369.729

S-11 CECO

S11 OECO

.. ENCLOSURE 4 ..  
 AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

TIME FROM FIRST MOTION (SEC)	X COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (M)	Y COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (M)	Z COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (M)	COMPONENT OF VEL. IN THE XXKE SYSTEM (M/S)	COMPONENT OF VEL. IN THE XXKE SYSTEM (M/S)	COMPONENT OF VEL. IN THE XXKE SYSTEM (M/S)
556.67	-26724.250	26620.405	1663489.219	-1579.594	175.658	6369.872
557.75	-28427.312	26809.573	1670338.766	-1589.672	176.255	6371.148

TRAJ  
 S-11/S-1VB SEP

00 ENCLOSURE 4 00  
AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

TIME FROM FIRST MOTION (SEC)	X COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS, (M)	Y COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS, (M)	Z COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS, (M)	COMPONENT OF VEL. IN THE XXKE SYSTEM (M/S)	COMPONENT OF VEL. IN THE YYKE SYSTEM (M/S)	COMPONENT OF VEL. IN THE ZZKE SYSTEM (M/S)
3-11/S-1V8 SEP	-28427.312	26809.573	1670338.766	-1588.672	176.255	6371.140
S-1V8 ENGINE START	-28467.062	26813.995	1670498.016	-1588.876	176.267	6371.090
	-32022.500	27207.371	1684668.766	-1607.045	177.331	6366.612
S-1V8 MAINSTAGE	-37329.625	27790.752	1705510.984	-1634.217	178.987	6364.302
	-40161.500	28100.383	1716493.516	-1649.031	180.013	6369.099
S-1V8 ULLAGE JETT	-47626.062	28912.130	1745024.625	-1687.215	182.753	6382.357
	-48513.125	29008.154	1748375.812	-1691.793	183.051	6383.925
	-57082.500	29930.350	1780332.812	-1735.955	185.870	6398.927
	-65872.312	30867.145	1812365.375	-1780.013	188.866	6414.129
	-74883.375	31819.138	1844473.984	-1824.507	191.934	6429.319
	-84117.937	32786.624	1876658.359	-1869.339	195.075	6444.435
	-93577.312	33769.938	1908918.141	-1914.443	198.270	6459.474
	-103262.750	34769.401	1941252.937	-1959.802	201.512	6474.960
	-113175.750	35785.131	1973662.641	-2005.439	204.793	6489.414
	-123317.312	36817.362	2006146.719	-2051.256	208.104	6504.225
	-133688.625	37866.225	2038704.641	-2097.329	211.442	6518.968
	-144290.937	38931.863	2071336.266	-2143.646	214.807	6533.707
	-155125.437	40014.326	2104041.219	-2190.193	218.193	6548.294
	-166193.312	41113.810	2136818.706	-2236.967	221.601	6562.810
	-177495.500	42230.381	2169669.031	-2283.968	225.030	6577.258
	-189033.375	43364.109	2202591.219	-2331.203	228.479	6591.637
	-200807.937	44515.209	2235585.125	-2378.674	231.947	6605.946
	-212820.500	45683.651	2268650.500	-2426.398	235.436	6620.242
	-225072.312	46869.570	2301787.312	-2474.369	238.945	6634.482
	-237564.562	48073.119	2334994.937	-2522.570	242.473	6648.597
	-250298.312	49294.346	2368273.031	-2570.992	246.020	6662.638
	-263274.750	50533.349	2401621.062	-2619.635	249.588	6676.606
	-276495.562	51790.285	2435038.562	-2669.092	253.220	6690.281
	-289966.125	53065.591	2468523.594	-2719.048	256.901	6703.781
	-303685.625	54359.299	2502076.344	-2768.755	260.587	6717.384
	-317653.562	55671.515	2535697.281	-2818.430	264.288	6731.008
	-331869.625	57002.221	2569386.406	-2868.024	267.999	6744.672
	-346333.625	58351.506	2603143.937	-2917.561	271.720	6758.369
S-1V8 6CS1	-356147.000	59264.453	2625763.000	-2950.684	274.223	6767.543
T85	-356766.812	59322.071	2627184.187	-2952.719	274.376	6768.001
	-361042.812	59719.194	2636963.750	-2963.854	275.125	6763.466
	-375957.250	61101.189	2670738.844	-3001.916	277.671	6746.578
713.34	-386039.812	62032.727	2693284.156	-3027.322	279.369	6735.161

\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	X COORDINATE EARTH FIXED, PAD CENTERED PLUMB IN SYS. (M)	Y COORDINATE EARTH FIXED, PAD CENTERED PLUMB IN SYS. (M)	Z COORDINATE EARTH FIXED, PAD CENTERED PLUMB IN SYS. (M)	X COMPONENT OF VEL. IN THE XXXE SYSTEM (M/S)	Y COMPONENT OF VEL. IN THE XYXE SYSTEM (M/S)	Z COMPONENT OF VEL. IN THE XXXE SYSTEM (M/S)
713.12	5987895.000	79052.299	2686277.094	-3025.648	279.241	6735.915
722.12	5960355.562	81592.481	2746758.687	-3093.815	283.810	6764.731
732.12	5929039.875	84455.741	2813629.281	-3169.176	288.835	6669.273
743.12	5893724.812	87663.119	2886772.219	-3251.609	294.322	6629.290
754.12	5857505.562	90930.617	2959469.687	-3333.542	299.762	6588.287
765.12	5820388.000	94257.730	3031710.469	-3414.966	305.156	6546.275
776.12	5782377.500	97643.859	3103483.812	-3495.875	310.501	6503.273
787.12	5743480.062	101048.537	3174778.531	-3576.246	315.795	6459.269
798.12	5703761.625	104591.134	3245583.594	-3656.050	321.034	6414.239
844.12	5527951.875	119852.220	3536127.062	-3983.520	347.317	6215.257
932.12	5150871.750	151659.994	4064724.594	-4579.454	379.831	5788.458
1020.12	4723286.125	186555.867	4553222.312	-5130.441	412.349	5304.653
1108.12	4249389.937	224060.852	4996809.937	-5631.112	438.989	4768.612
1196.12	3733833.156	263621.859	539118.937	-6076.568	458.948	4185.598
1284.12	3181662.094	304618.602	5732264.437	-6462.437	471.510	3561.342
1372.12	2598300.719	346372.551	6016884.687	-6784.925	476.064	2901.991
1460.12	1989468.172	388156.410	6242175.062	-7040.851	472.118	2214.047
1548.12	1361138.125	429204.961	6405916.750	-7227.684	459.301	1504.309
1636.12	719477.594	468726.195	6506499.312	-7343.566	437.379	779.802
1724.12	70786.336	505913.680	6542938.625	-7387.340	406.258	47.711
1812.12	-578565.273	539958.969	6514886.437	-7358.560	365.987	-604.693
1900.12	-1222199.328	570064.719	6422636.375	-7257.502	316.767	-1410.128
1988.12	-1853793.703	595457.484	6267119.687	-7085.158	258.944	-2121.375
2076.12	-2467145.094	615400.805	6049897.750	-6843.231	193.011	-2811.353
2164.12	-3056230.741	629207.883	5773146.250	-6534.121	119.602	-3473.195
2252.12	-3615268.781	636253.828	5439633.437	-6160.896	39.488	-4100.318
2340.12	-4138775.500	635987.117	5052691.062	-5727.264	-46.434	-4686.494
2428.12	-4621623.500	627940.594	4616181.812	-5237.532	-137.150	-5225.915
2516.12	-5059076.937	611740.773	4134458.000	-4696.559	-231.541	-5713.249
2604.12	-5446867.937	587116.852	3612318.656	-4109.708	-128.399	-6143.698
2692.12	-5781269.000	553907.719	3054959.625	-3482.784	-426.440	-6513.045
2780.12	-6058843.250	512068.000	2467920.969	-2821.981	-524.321	-6817.691
2868.12	-6277073.937	461672.375	1857030.641	-2133.811	-620.660	-7054.694
2956.12	-6433789.187	402918.305	1228345.784	-1425.044	-714.051	-7221.790
3044.12	-6527481.000	336127.273	58892.719	-702.636	-803.083	-7317.416
3132.12	-6557259.937	261744.402	-57397.042	26.337	-886.363	-7340.720
3220.12	-6522861.500	180336.062	-701747.852	754.749	-962.531	-7291.567
3308.12	-6424648.375	92586.046	-1338603.672	1475.491	-1030.279	-7170.537
3396.12	-6280804.437	7977.811	-1905778.047	2118.142	-1083.522	-6999.207
3476.12	-6064013.437	-89580.779	-2511024.062	2804.862	-1131.844	-6745.111
3564.12	-5787958.625	-190882.121	-3090974.062	3463.953	-1168.420	-6424.785
3652.12	-5455355.625	-294850.883	-3639937.500	4089.006	-1192.324	-6041.466

ENCLOSURE 4

S-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM MOTION (SEC)	X COORDINATE EARTH FIXED, PAD CENTERED, PLUMBIN SYS, (M)	Y COORDINATE EARTH FIXED, PAD CENTERED, PLUMBIN SYS, (M)	Z COORDINATE EARTH FIXED, PAD CENTERED, PLUMBIN SYS, (M)	COMPONENT OF VEL. IN THE XXKE SYSTEM (M/S)	COMPONENT OF VEL. IN THE YYKE SYSTEM (M/S)	COMPONENT OF VEL. IN THE ZZKE SYSTEM (M/S)
3740.12	-5069469.875	-400336.168	-4152536.125	4673.947	-1202.768	-5599.004
3828.13	-4634084.250	-506124.344	-4623756.625	5213.091	-1199.116	-5101.837
3916.12	-4153462.844	-610952.070	-5048999.625	5701.199	-1180.893	-4554.931
4004.12	-3632309.531	-713525.070	-5424124.437	6133.524	-1147.800	-3963.739
4092.17	-3075722.312	-812525.891	-5745490.437	6505.863	-1099.722	-3339.153
4180.12	-2489143.719	-906638.328	-600992.250	6814.596	-1036.728	-2672.443
4268.12	-1878307.594	-994560.016	-6315090.250	7056.723	-959.084	-1985.191
4356.12	-1249183.562	-1075020.547	-6538834.312	7229.896	-867.248	-1279.234
4444.12	-607918.234	-1146798.266	-6539891.687	7332.441	-761.873	-561.586
4532.17	39224.852	-1206737.312	-6457540.812	7363.379	-643.797	160.625
4620.17	685927.078	-1259763.844	-6411697.187	7322.433	-514.047	880.237
4708.12	1325876.406	-1298931.937	-6302903.937	7210.036	-373.819	1590.120
4796.12	952829.984	-1325288.297	-6132326.875	7027.322	-224.475	2283.256
4884.12	2560675.000	-1338186.078	-5901742.062	6776.114	-67.523	2952.808
4972.12	3143489.125	-1336997.141	-5613517.187	6458.907	93.393	3592.188
5060.12	369597.781	-1321273.250	-5270585.687	6078.839	262.516	4175.126
5148.12	4211629.750	-1290775.031	-4876416.425	5639.659	431.993	4795.733
5236.12	4884589.250	-1245229.797	-4434978.375	5145.886	601.896	5268.555
5324.12	5115804.250	-1198036.844	-3950698.156	4601.766	770.243	5728.630
5412.12	5495170.062	-1109771.344	-3428416.656	4013.219	935.027	6131.533
5500.12	5820989.375	-1020435.789	-2873338.531	3385.790	1094.229	6473.415
5588.12	6090106.875	-917409.406	-2290980.719	2725.589	1245.651	6751.040
5676.12	6299918.937	-801445.687	-1687116.984	2039.029	1387.937	6961.810
5764.12	6448397.312	-673467.719	-1067720.625	1332.770	1518.594	7103.788
5852.12	6534108.500	-534561.305	-428905.687	613.655	1636.019	7175.715
5940.12	6556226.625	185966.273	193132.906	-111.360	1708.519	7277.017
6028.12	6514541.000	29065.672	82280.250	-835.261	1824.534	7107.808
6116.12	6409458.000	-65373.165	1442041.516	-1551.048	1892.659	6968.887
6204.12	6241997.062	103481.267	2046702.731	-2251.796	1916.661	6761.731
6292.12	6013781.562	275767.496	2630186.100	-2930.719	1970.499	6488.481
6380.12	5755442.312	43345.312	3137468.344	-3523.437	1976.511	6185.046
6468.12	5417861.750	607595.656	3669968.219	-4142.634	1963.726	5793.862
6556.12	5027517.500	779344.695	4155535.125	-4721.638	1932.982	5346.365
6644.12	4588198.000	947151.406	4604407.175	-5254.881	1877.124	4847.042
6732.12	4104170.125	1109072.406	5007239.875	-5736.907	1799.252	4300.888
6820.12	3580138.719	1263184.062	5360149.000	-6163.227	1699.721	3713.363
6908.12	3021201.656	1407605.687	5659749.500	-6529.567	1579.147	3090.336
6996.12	2432800.625	1540821.937	5903188.250	-6832.312	1438.492	2438.027
7084.12	1820663.375	1660285.344	6086173.312	-7068.467	1278.611	1742.948
7172.12	1190772.969	1765038.469	6212995.750	-7235.687	1101.144	1071.833
7260.12	649259.133	1853534.859	6276546.750	-7332.308	907.606	371.572
7348.12	-97612.658	1924358.750	6278327.875	-7357.353	699.820	-330.862

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.      \*\* ENCLOSURE 4 \*\*

TIME FROM MOTION (SEC)	X COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (M)	Y COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (M)	Z COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (M)	X COMPONENT OF VEL. IN THE XXE SYSTEM (M/S)	Y COMPONENT OF VEL. IN THE XXE SYSTEM (M/S)	Z COMPONENT OF VEL. IN THE XXE SYSTEM (M/S)
7428.12	-743577.352	1976344.125	6218455.437	-7310.570	479.810	-1028.486
75:6.12	-1382174.641	2008511.078	6097657.687	-7192.410	249.783	-1714.380
7604.12	-7007331.109	2020080.984	5917267.062	-7004.032	12.101	-2381.758
7692.12	-2612882.062	2010489.156	5679204.000	-6747.293	-230.741	-3024.040
7760.12	-3192922.531	1979395.203	5385956.687	-6424.724	-476.142	-3634.922
7868.12	-3741794.750	1926691.156	5040553.750	-6039.506	-721.429	-4208.434
7956.12	-4254148.312	1852506.641	4646531.812	-5595.433	-963.881	-4739.006
8044.12	-4724991.937	1757211.422	4207898.312	-5096.873	-1290.762	-5221.522
8132.12	-5149742.375	1641415.500	3729089.281	-4548.721	-1429.355	-5651.362
8220.12	-5524268.750	1505966.375	3214923.375	-3956.381	-1646.988	-6024.955
8308.12	-5844932.000	1351943.078	2670552.531	-3325.555	-1851.070	-6337.308
8396.12	-6108619.125	1180448.375	2101409.125	-2662.499	-2039.114	-6587.039
8484.12	-6236591.250	1071917.312	1755742.250	-2258.133	-2141.738	-6704.000
8459.12	-6260954.562	1048243.195	1681877.422	-2171.569	-2162.580	-6725.779
8460.12	-6263122.128	1046079.680	1675150.641	-2163.683	-2164.459	-6727.708

00 ENCLOSURE 4 00

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM MO'ON (SEC)	X COORDINATE EARTH FIXED, PAD CENTERED, PLUMBIN SYS. (M)	Y COORDINATE EARTH FIXED, PAD CENTERED, PLUMBIN SYS. (M)	Z COORDINATE EARTH FIXED, PAD CENTERED, PLUMBIN SYS. (M)	COMPONENT OF VEL. IN THE XXXE SYSTEM (M/S)	COMPONENT OF VEL. IN THE YYYE SYSTEM (M/S)	COMPONENT OF VEL. IN THE ZZZE SYSTEM (M/S)
0460.12	-12636391.125	1028972.422	1680680.562	-2163.683	-2164.459	-6727.708
0465.12	-12647110.875	1018146.703	1647018.156	-2124.213	-2173.817	-6737.221
0470.12	-12657633.125	1007254.367	1613308.719	-2084.677	-2183.109	-6746.516
0475.12	-12667957.625	996315.695	1579553.359	-2045.075	-2192.337	-6755.600
0480.12	-12678083.750	985331.109	1545753.078	-2005.410	-2201.498	-6764.466
0485.12	-12688011.625	974300.836	1511909.047	-1965.690	-2210.592	-6773.114
0490.12	-12697740.625	963225.305	1478022.328	-1925.911	-2219.620	-6781.544
0495.12	-12707270.500	952104.773	1444093.937	-1886.067	-2228.580	-6789.760
0500.12	-12716601.125	940939.609	1410125.094	-1846.158	-2237.475	-6797.759
0505.12	-12725732.000	936461.094	1396526.422	-1806.178	-2241.014	-6800.899
0510.12	-12734663.000	936012.977	1395166.516	-1806.191	-2241.367	-6801.211
0515.12	-12743393.625	929730.141	1376116.703	-1766.168	-2246.302	-6813.107
0520.12	-12751923.750	925819.281	1342070.062	-1726.090	-2255.061	-6820.456
0525.12	-12760253.125	918476.680	1307865.797	-1685.958	-2272.374	-6827.586
0530.12	-12768381.375	90939.602	1239710.547	-1645.773	-2280.926	-6834.499
0535.12	-12776308.375	873030.148	1205521.187	-1605.537	-2289.410	-6841.194
0540.12	-12784029.375	861542.023	1171298.937	-1565.251	-2297.823	-6847.671
0545.12	-12791557.500	850052.008	1137044.812	-1524.916	-2306.162	-6853.932
0550.12	-12798879.000	838500.539	1102760.000	-1484.532	-2314.423	-6859.976
0555.12	-12805998.375	826907.891	1068445.453	-1444.103	-2322.624	-6865.797
0560.12	-12812915.250	815274.406	1034102.359	-1403.626	-2330.755	-6871.401
0565.12	-12819629.375	803404.469	999731.805	-1363.102	-2338.815	-6876.785
0570.12	-12826140.500	791886.383	965334.898	-1322.538	-2346.802	-6881.751
0575.12	-12832448.625	780132.586	930912.719	-1281.936	-2354.717	-6886.897
0580.12	-12838553.500	768339.359	896466.281	-1241.294	-2362.558	-6891.624
0585.12	-12844454.750	756507.086	861996.805	-1200.614	-2370.327	-6896.131
0590.12	-12850152.375	744636.180	827505.359	-1159.896	-2378.022	-6900.419
0595.12	-12855646.125	732726.984	792992.984	-1119.142	-2385.644	-6904.487
0600.12	-12860935.875	720779.867	758460.828	-1078.353	-2393.191	-6908.336
0605.12	-12866021.375	708795.203	723909.969	-1037.531	-2400.665	-6911.945
0610.12	-12870902.625	696773.344	689341.531	-996.676	-2408.063	-6915.375
0615.12	-12875579.125	684714.695	654756.641	-955.791	-2415.386	-6918.564
0620.12	-12880051.250	672619.641	620156.266	-914.875	-2422.634	-6921.533
0625.12	-12884319.500	660488.492	585541.656	-873.932	-2429.806	-6924.283
0630.12	-12888380.750	648321.711	550913.820	-832.961	-2436.902	-6926.812
0635.12	-12892238.125	636119.578	516273.852	-791.964	-2443.922	-6929.122
0640.12	-12895890.250	623882.609	481622.992	-750.944	-2450.865	-6931.211
0645.12	-12899337.125	611611.053	446962.129	-709.904	-2457.730	-6933.080
0650.12	-12902578.750	586965.984	412292.527	-668.846	-2464.518	-6934.729
0655.12	-12905614.625	574593.273	377618.234	-627.760	-2471.228	-6936.56
			342931.281	-586.653	-2477.861	-6937.366

02/M2 BURNER ON  
ENGINE OFF



\*\* ENCLOSURE 4 \*\*  
 AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM MOTION (SEC)	X COORDINATE (M)		Y COORDINATE (M)		Z COORDINATE (M)		COMPONENT OF VELOCITY IN THE XXXX SYSTEM (M/S)		COMPONENT OF VELOCITY IN THE YYYE SYSTEM (M/S)		COMPONENT OF VELOCITY IN THE ZZZZ SYSTEM (M/S)	
	EARTH FIXED, PAD CENTERED, PLUMBIN SYS.	EARTH FIXED, PAD CENTERED, PLUMBIN SYS.	EARTH FIXED, PAD CENTERED, PLUMBIN SYS.	EARTH FIXED, PAD CENTERED, PLUMBIN SYS.	EARTH FIXED, PAD CENTERED, PLUMBIN SYS.	EARTH FIXED, PAD CENTERED, PLUMBIN SYS.	XXXX	YYYY	ZZZZ	YYYE	ZZZZ	ZZZZ
0660.12	-12902445.125	562187.947	308241.941	-545.528	-2484.414	-6938.355						
0665.12	-12911609.875	549749.219	273548.141	-504.386	-2490.892	-6939.124						
0670.12	-12913489.000	537278.750	238851.082	-463.228	-2497.289	-6939.672						
0675.12	-12915792.250	524776.477	204151.789	-422.056	-2503.605	-6940.002						
0680.12	-12917709.500	512242.859	169451.418	-380.870	-2509.829	-6940.115						
0685.12	-12919510.875	499678.289	134750.982	-339.674	-2515.988	-6940.003						
0690.12	-12921106.250	487083.109	100051.727	-298.466	-2522.046	-6939.672						
0695.12	-12922495.500	474457.754	65354.620	-257.250	-2528.065	-6939.170						
0700.12	-12923678.750	461802.621	30660.887	-216.026	-2533.982	-6938.349						
0705.12	-12924655.750	449118.070	-4028.441	-174.795	-2539.819	-6937.358						
0710.12	-12925426.625	436404.551	-38712.288	-133.559	-2545.575	-6936.147						
0715.12	-12925991.250	423662.457	-73389.609	-92.319	-2551.249	-6934.716						
0720.12	-12926349.750	410892.211	-108059.161	-51.076	-2556.841	-6933.046						
0725.12	-12926502.125	398094.207	-142719.850	-9.832	-2562.351	-6931.196						
0730.12	-12926448.250	385268.801	-177370.736	31.412	-2567.779	-6929.107						
0735.12	-12926188.000	372416.527	-212010.553	72.655	-2573.125	-6926.799						
0740.12	-12925721.625	359537.746	-246638.365	113.896	-2578.387	-6924.272						
0745.12	-12925049.125	346632.801	-281252.906	155.132	-2583.566	-6921.525						
0750.12	-12924170.250	333702.187	-315853.215	196.364	-2588.662	-6918.560						
0755.12	-12923085.375	320746.312	-350438.191	237.590	-2593.675	-6915.376						
0760.12	-12921794.500	307765.566	-385006.641	278.807	-2598.603	-6911.973						
0765.12	-12920297.375	294760.453	-419557.543	320.016	-2603.447	-6908.352						
0770.12	-12918594.375	281731.738	-454089.785	361.215	-2608.207	-6904.512						
0775.12	-12916685.250	268678.473	-488602.277	402.402	-2612.882	-6900.454						
0780.12	-12914570.250	255602.582	-523093.953	443.576	-2617.472	-6896.178						
0785.12	-12912249.500	242503.898	-557563.727	484.736	-2621.977	-6891.685						
0790.12	-12909722.875	229382.969	-592010.437	525.881	-2626.397	-6886.973						
0795.12	-12906990.750	216240.104	-626433.039	567.009	-2630.731	-6882.045						
0800.12	-12904052.875	203075.781	-660830.492	608.119	-2634.976	-6876.899						
0805.12	-12900909.500	189890.475	-695201.695	649.210	-2639.128	-6871.539						
0810.12	-12897560.750	176684.623	-729545.555	690.281	-2643.200	-6865.960						
0815.12	-12894006.750	163458.639	-763860.945	731.329	-2647.189	-6860.163						
0820.12	-12890247.625	150212.893	-798146.820	772.354	-2651.091	-6854.150						
0825.12	-12886283.375	136947.848	-832402.094	813.355	-2654.906	-6847.920						
0830.12	-12882114.125	123663.947	-866625.648	854.330	-2658.634	-6841.474						
0835.12	-12877740.125	110361.645	-900816.469	895.275	-2662.275	-6834.813						
0840.12	-12873161.375	97041.369	-934973.398	936.198	-2665.828	-6827.936						
0845.12	-12868378.000	83703.530	-969095.508	977.088	-2669.293	-6820.844						
0850.12	-12863390.500	70348.603	-1003181.453	1017.948	-2672.669	-6813.536						
0855.12	-12858198.625	56976.989	-1037230.461	1058.775	-2675.958	-6806.014						
0860.12	-12852802.875	43589.152	-1071241.312	1099.569	-2679.158	-6798.278						
0865.12	-12847203.000	30185.535	-1105212.922	1140.328	-2682.270	-6790.327						

00 ENCLOSURE 4 00

A9-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	X COORDINATE EARTH FIXED, PAD CENTERED, PLUMBIN SYS, (M)	Y COORDINATE EARTH FIXED, PAD CENTERED, PLUMBIN SYS, (M)	Z COORDINATE EARTH FIXED, PAD CENTERED, PLUMBIN SYS, (M)	K COMPONENT OF VEL. IN THE XXXE SYSTEM (M/S)	Y COMPONENT OF VEL. IN THE XXXE SYSTEM (M/S)	Z COMPONENT OF VEL. IN THE XXXE SYSTEM (M/S)
8870.12	-12841399.625	16766.633	-1139144.187	1181.651	-2685.293	-6782.162
8875.12	-12635392.625	3332.799	-1173034.172	1221.737	-2688.226	-6773.784
8880.12	-12829182.250	-10115.467	-1206881.656	1262.385	-2691.070	-6765.193
8885.12	-12822764.875	-23577.752	-1240685.672	1302.992	-2693.825	-6756.389
8890.12	-12816152.375	-37053.618	-127445.234	1343.559	-2696.490	-6747.372
8895.12	-12809333.375	-50542.555	-1308159.047	1384.083	-2699.066	-6738.142
8900.12	-12802311.625	-64044.100	-1341826.281	1424.564	-2701.551	-6728.701
8905.12	-12795087.750	-77557.909	-1375445.750	1465.000	-2703.947	-6719.048
8910.12	-12787661.750	-91083.410	-1409016.406	1505.390	-2706.252	-6709.184
8915.12	-12780033.875	-104620.257	-1442537.234	1545.732	-2708.466	-6699.109
8920.12	-12772204.500	-118167.954	-1476007.203	1586.026	-2710.590	-6688.824
8925.12	-12764173.750	-131726.004	-1509425.141	1626.268	-2712.623	-6678.328
8930.12	-12755941.875	-145293.988	-1542790.062	1666.456	-2714.555	-6667.627
8935.12	-12747509.250	-158871.354	-1576101.047	1706.592	-2716.388	-6656.719
8940.12	-12738876.125	-172457.785	-1609356.906	1746.677	-2718.148	-6645.595
8945.12	-12730042.500	-186052.691	-1642556.641	1786.709	-2719.816	-6634.263
8950.12	-12721009.125	-199655.750	-1675699.187	1826.684	-2721.393	-6622.721
8955.12	-12711775.875	-213266.498	-1708783.531	1866.602	-2722.878	-6610.972
8956.42	-12709342.625	-216806.262	-1717375.359	1876.970	-2723.249	-6607.883
8956.92	-12708403.125	-21817.912	-1720678.953	1880.958	-2723.391	-6606.694
8960.12	-12702343.125	-226884.389	-1741808.594	1906.464	-2724.277	-6599.026
8965.12	-12692711.250	-240509.158	-1774773.453	1946.265	-2725.607	-6586.869
8970.12	-12682880.500	-254140.316	-1807676.984	1986.004	-2726.834	-6574.509
8975.12	-12672851.250	-267777.324	-1840518.141	2025.688	-2727.957	-6561.947
8980.12	-12662623.750	-281419.711	-1873296.078	2065.301	-2728.986	-6549.179
8985.12	-12652198.375	-295067.039	-1906009.641	2104.853	-2729.924	-6536.207
8990.12	-12641575.375	-308718.788	-1938657.844	2144.319	-2730.754	-6523.034
8995.12	-12630755.125	-322374.410	-1971239.609	2183.758	-2731.483	-6509.660
9000.12	-1249737.875	-336033.469	-2003754.078	2223.188	-2732.128	-6496.079
9005.12	-12608524.125	-349695.535	-2036200.062	2262.387	-2732.694	-6482.289
9010.12	-12597114.125	-363360.246	-2068576.656	2301.596	-2733.168	-6468.296
9015.12	-12585504.375	-377027.078	-2100882.687	2340.732	-2733.548	-6454.101
9020.12	-12573707.000	-390695.621	-2133117.281	2379.793	-2733.853	-6439.696
9025.12	-12561710.500	-404365.453	-2165279.344	2418.778	-2734.070	-6425.088
9030.12	-12549519.375	-418036.148	-2197367.844	2457.689	-2734.182	-6410.283
9033.12	-12542111.250	-426238.730	-2226585.281	2481.010	-2734.209	-6401.334
9035.12	-1253733.625	-431707.152	-2229381.906	2496.552	-2734.217	-6395.351
9038.12	-12529609.000	-439909.816	-2248554.500	2519.859	-2734.217	-6386.364
9040.12	-12524553.250	-445378.738	-2261322.594	2536.543	-2735.285	-6383.234
9040.62	-12523283.750	-446746.602	-2264514.375	2541.332	-2736.148	-6384.006
9044.62	-12513041.375	-457706.648	-2290064.562	2579.818	-2744.053	-6391.175
9045.12	-12511750.250	-459078.930	-2293260.344	2584.626	-2745.072	-6392.090

ULLAGE IGNITION  
02/M2 BURNER OFF

J-2 F-L INI  
ULL CUT OFF

REIGN

908 THR  
16M INI

\*\* ENCLOSURE 4 \*\*  
 AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	Y COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (M)	Y COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (M)	Z COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (M)	X COMPONENT OF VEL. IN THE XXRE SYSTEM (M/S)	Y COMPONENT OF VEL. IN THE XXRE SYSTEM (M/S)	Z COMPONENT OF VEL. IN THE XXRE SYSTEM (M/S)
9050.12	-12498706.750	-472029.297	-2325244.062	2632.981	-2755.016	-6401.386
9055.12	-12485415.250	-486620.910	-2357272.594	2664.060	-2764.831	-6409.875
9060.12	-12471865.750	-500477.754	-2389343.187	2735.642	-2774.708	-6418.447
9065.12	-12458058.500	-514375.914	-2421457.031	2787.393	-2784.538	-6427.076
9070.12	-12443991.500	-528323.008	-2453613.937	2839.332	-2794.303	-6435.667
9075.12	-12429664.875	-542318.812	-2485813.656	2891.365	-2804.003	-6444.230
9080.12	-12415077.750	-556362.945	-2518056.187	2943.474	-2813.641	-6452.757
9085.12	-12400230.000	-570455.125	-2550341.187	2995.652	-2823.224	-6461.253
9090.12	-12385121.125	-584595.117	-2582668.687	3047.689	-2832.758	-6469.718
9095.12	-12369751.125	-598782.680	-2615038.344	3100.184	-2842.249	-6478.148
9100.12	-12354119.125	-613017.500	-2647450.062	3152.536	-2851.697	-6486.547
9105.12	-12338225.625	-627299.547	-2679903.750	3204.950	-2861.112	-6494.928
9110.12	-12322069.625	-641628.617	-2712399.344	3257.426	-2870.497	-6503.297
9115.12	-12305651.125	-656004.492	-2744936.750	3309.967	-2879.856	-6511.661
9120.12	-12288969.875	-670427.125	-2777515.969	3362.572	-2889.193	-6520.022
9125.12	-12272025.375	-684896.352	-2810137.000	3415.240	-2898.507	-6528.383
9130.12	-12254817.375	-699412.156	-2842799.719	3467.969	-2907.800	-6536.747
9135.12	-12237345.625	-713974.359	-2875504.437	3520.784	-2917.070	-6545.112
9140.12	-12219609.750	-728562.812	-2908250.875	3573.592	-2926.318	-6553.481
9145.12	-12201609.625	-743237.516	-2941039.281	3626.482	-2935.546	-6561.855
9150.12	-12183344.875	-757938.250	-2973869.437	3679.426	-2944.752	-6570.238
9155.12	-12164815.250	-772684.977	-3006741.594	3732.422	-2953.940	-6578.636
9160.12	-12146020.500	-787477.633	-3039655.844	3785.472	-2963.112	-6587.054
9165.12	-12126960.500	-802316.086	-3072612.187	3838.573	-2972.267	-6595.492
9170.12	-12107634.750	-817200.219	-3105610.812	3891.725	-2981.403	-6603.950
9175.12	-12088043.125	-832130.102	-3138651.719	3944.924	-2990.524	-6612.429
9180.12	-12068181.375	-847108.055	-3171741.625	4000.025	-3000.830	-6620.950
9185.12	-12048042.500	-862138.477	-3204891.594	4055.524	-3011.339	-6629.026
9190.12	-12027625.875	-877221.461	-3238102.062	4111.147	-3021.856	-6638.175
9195.12	-12006930.875	-892357.055	-3271373.500	4166.893	-3032.383	-6647.412
9200.12	-11985956.750	-907545.312	-3304706.281	4222.764	-3042.923	-6656.741
9205.12	-11964703.125	-922786.336	-3338101.094	4278.763	-3053.484	-6666.170
9210.12	-11943169.000	-938080.219	-3371558.250	4334.890	-3064.059	-6675.711
9215.12	-11921353.875	-953427.898	-3405078.000	4391.057	-3075.130	-6685.235
9220.12	-11899258.500	-968831.453	-3438661.031	4447.170	-3086.266	-6694.987
9225.12	-11876881.875	-984290.555	-3472308.062	4503.501	-3097.377	-6704.848
9230.12	-11854223.125	-999805.180	-3506019.719	4560.015	-3108.477	-6714.846
9235.12	-11831281.375	-1015375.305	-3539796.719	4616.716	-3119.572	-6724.982
9240.12	-11808055.625	-1031000.836	-3573639.750	4673.605	-3130.665	-6735.265
9245.12	-11784545.000	-1046681.945	-3607549.625	4730.692	-3141.758	-6745.699
9250.12	-11760748.375	-1062418.453	-3641527.031	4787.982	-3152.850	-6756.291
9255.12	-11736664.750	-1078210.422	-3675572.612	4845.481	-3163.946	-6767.060

\*\* ENCLOSURE 4 \*\*  
AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM MOTION (SEC)	X COORDINATE (M)		Y COORDINATE (M)		Z COORDINATE (M)		EARTH FIXED, PAD CENTERED PLUMBIN SYS.		EARTH FIXED, PAD CENTERED PLUMBIN SYS.		COMPONENT OF VEL. IN THE XXXE SYSTEM (M/S)		COMPONENT OF VEL. IN THE XXXE SYSTEM (M/S)	
	EARTH FIXED, PAD CENTERED PLUMBIN SYS.	(M)	EARTH FIXED, PAD CENTERED PLUMBIN SYS.	(M)	EARTH FIXED, PAD CENTERED PLUMBIN SYS.	(M)	EARTH FIXED, PAD CENTERED PLUMBIN SYS.	(M)	EARTH FIXED, PAD CENTERED PLUMBIN SYS.	(M)	XXXE SYSTEM	XXXE SYSTEM	XXXE SYSTEM	XXXE SYSTEM
9260.12	-11712293.250	-1094057.922	-3709687.844	4903.198	-3175.047	-6829.982								
9265.12	-11687632.500	-1109960.922	-3743872.906	4961.141	-3186.158	-6844.094								
9270.12	-11662681.375	-1125919.516	-3778129.125	5019.320	-3197.280	-6858.392								
9275.12	-11637438.875	-1141933.734	-3812457.187	5077.744	-3208.414	-6872.884								
9280.12	-11611903.500	-1158003.703	-3846858.281	5136.425	-3219.565	-6887.575								
9285.12	-11586074.125	-1174129.422	-3881333.312	5195.375	-3230.734	-6902.470								
9290.12	-11559949.250	-1190311.047	-3915883.312	5254.607	-3241.921	-6917.579								
9295.12	-11533527.625	-1206548.703	-3950509.437	5314.135	-3253.131	-6932.907								
9300.12	-11506807.500	-1222842.406	-3985212.750	5373.976	-3264.365	-6948.460								
9305.12	-11479787.250	-1239192.359	-4019994.469	5434.147	-3275.623	-6964.243								
9310.12	-11452465.375	-1255598.656	-4054855.531	5494.666	-3286.910	-6980.263								
9315.12	-11424840.125	-1272061.453	-4089797.312	5555.514	-3298.207	-6996.473								
9320.12	-11396909.625	-1288580.797	-4124820.687	5616.751	-3309.525	-7012.923								
9325.12	-11368671.875	-1305156.781	-4159927.000	5678.402	-3320.872	-7029.622								
9330.12	-11340124.875	-1321789.562	-4195117.312	5740.491	-3332.254	-7046.575								
9335.12	-11311266.250	-1338479.359	-4230393.062	5803.044	-3343.673	-7063.781								
9340.12	-11282093.500	-1355226.375	-4265755.625	5866.094	-3355.131	-7081.240								
9345.12	-11252604.375	-1372030.750	-4301205.937	5929.676	-3366.628	-7098.950								
9350.12	-11222795.875	-1388892.719	-4336745.500	5993.829	-3378.160	-7116.906								
9355.12	-11192665.125	-1405812.422	-4372375.437	6058.595	-3389.726	-7135.103								
9360.12	-11162208.875	-1422790.031	-4408096.937	6124.022	-3401.322	-7153.527								
9365.12	-11131423.625	-1439825.687	-4443911.000	6190.143	-3412.954	-7172.180								
9370.12	-11100303.250	-1456918.625	-4479816.875	6258.475	-3424.134	-7189.906								
9375.12	-11068837.875	-1474067.734	-4515810.562	6327.736	-3435.338	-7207.700								
9380.12	-11037025.500	-1491272.406	-4551894.937	6397.235	-3446.778	-7226.153								
9385.12	-11004865.000	-1508535.406	-4588073.312	6467.003	-3458.456	-7245.281								
9390.12	-10972355.000	-1525857.422	-4624348.937	6537.054	-3470.381	-7265.109								
9393.76	-10948981.375	-1538498.047	-4658085.062	6588.200	-3479.217	-7280.034								
9393.97	-10947097.875	-1539228.578	-4652333.625	6590.969	-3479.654	-7280.670								
9395.12	-10939499.875	-1543237.234	-4660719.250	6597.181	-3478.420	-7274.696								
9400.12	-10904951.500	-1560613.984	-4697022.750	6622.087	-3472.252	-7246.684								
9403.76	-10882329.000	-1573237.125	-4723347.687	6640.004	-3467.701	-7226.206								

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Y67

YLI

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.      \*\* ENCLOSURE 4 \*\*

TIME FROM FIRST MOTION (SEC)	X COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (M)	Y COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (M)	Z COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (M)	COMPONENT OF VEL. IN THE XXXE SYSTEM (M/S)	COMPONENT OF VEL. IN THE XXXE SYSTEM (M/S)	COMPONENT OF VEL. IN THE XXXE SYSTEM (M/S)
9403.76	-4509059.937	-1556149.875	-4728877.562	6640.004	-3467.701	-7226.206
9413.76	-4442416.375	-1590763.406	-4800856.812	6688.466	-3454.962	-7169.605
9424.76	-4368556.187	-1628689.094	-4879377.437	6740.400	-3440.562	-7106.834
9435.76	-4294132.437	-1666454.203	-4957204.812	6790.880	-3425.775	-7043.578
9446.76	-4219161.625	-1704054.562	-5034333.875	6839.895	-3410.620	-6979.887
9457.76	-4143659.719	-1741486.344	-5110760.375	6887.435	-3395.113	-6915.810
9468.76	-4067643.000	-1778745.672	-5186480.062	6933.495	-3379.274	-6851.399
9479.76	-3991127.875	-1815829.047	-5261489.562	6978.069	-3363.120	-6786.700
9490.76	-3914130.562	-1852733.078	-5335786.062	7021.157	-3346.672	-6721.744
9501.76	-3836667.531	-1889454.625	-5409367.187	7062.758	-3329.945	-6656.637
9512.76	-3758755.000	-1925990.750	-5482231.000	7102.875	-3312.960	-6591.365
9523.76	-3680409.312	-1962338.672	-5554176.250	7141.513	-3295.734	-6525.995
9534.76	-3601646.719	-1998495.875	-5625807.062	7178.679	-3278.285	-6460.571
9544.66	-3530417.906	-2030871.984	-5689469.312	7210.876	-3262.405	-6401.679

CVS OFF

\*\* ENCLOSURE 4 \*\*  
AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

TIME FROM FIRST MOTION (SEC)	COMMANDED PITCH ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN PITCH (DEG)	COMMANDED YAW ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN YAW (DEG)	COMMANDED ROLL ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN ROLL (DEG)
00	.000	-.0602	.000	.019464	-17.933	-17.89853430
040	.000	-.0620	.000	.020338	-17.933	-17.89844179
5.00	.000	-.0278	1.250	1.163988	-17.933	-17.93014693
10.00	.000	-.0285	.650	1.285400	-17.933	-17.93273644
15.00	-.958	-.5736	.000	-.261336	-16.458	-17.54897213
20.00	-1.921	-1.6533	.000	.004646	-12.083	-12.31756532
25.00	-3.376	-3.0373	.000	.046570	-6.833	-7.35220432
30.00	-5.177	-4.7928	.000	-.042819	-1.583	-2.35355660
35.00	-7.219	-6.8171	.000	.051963	.000	-.06457043
40.00	-9.588	-9.1144	.000	-.037154	.000	.00124853
45.00	-12.253	-11.7550	.000	-.028433	.000	.00007098
50.00	-15.094	-14.5932	.000	-.019570	.000	.00004876
55.00	-18.025	-17.5331	.000	-.014446	.000	.00010125
60.00	-20.990	-20.5739	.000	-.009722	.000	.00024406
65.00	-23.969	-23.5006	.000	-.002716	.000	.00026374
69.00	-26.381	-25.9010	.000	-.001872	.000	.00021016
70.00	-26.967	-26.5140	.000	-.004442	.000	.00026439
75.00	-29.803	-29.4238	.000	-.012488	.000	.00048335
80.00	-32.833	-32.3583	.000	-.015178	.000	.00032546
85.00	-36.281	-35.7044	.000	-.015931	.000	.00013548
85.37	-36.557	-35.9667	.000	-.015307	.000	.00004734
90.00	-40.080	-39.3098	.000	-.007542	.000	-.00064056
95.00	-43.860	-43.1433	.000	-.001154	.000	-.00078491
100.00	-46.968	-46.4470	.000	.003001	.000	-.00115519
105.00	-49.536	-48.9982	.000	.000410	.000	-.00137796
110.00	-51.846	-50.8838	.000	-.019295	.000	-.00189986
115.00	-53.939	-52.9546	.000	-.037324	.000	-.00124771
120.00	-55.849	-55.7207	.000	-.035400	.000	-.00005663
125.00	-57.606	-57.6056	.000	-.029522	.000	-.00010654
130.00	-59.237	-59.1100	.000	-.032019	.000	-.00018723
135.00	-60.766	-60.6659	.000	-.056878	.000	-.00027440
140.00	-62.210	-62.0785	.000	-.026996	.000	-.00005086
145.00	-63.586	-63.4428	.000	-.032578	.000	-.00007319
150.00	-64.905	-64.7554	.000	-.035157	.000	-.00005235
155.00	-66.174	-66.0215	.000	-.037785	.000	-.00004556
160.00	-67.397	-67.2428	.000	-.040424	.000	-.00004786
164.80	-68.050	-68.2553	.000	-.043082	.000	.00024178
164.81	-68.050	-68.2561	.000	-.043087	.000	.00024134
165.00	-68.050	-68.2684	.000	-.043185	.000	.00022360
165.58	-68.050	-68.2962	.000	-.043595	.000	.00010637

T01

MACH 1

MAX Q

S-1C CECO

S-1C OECO

T03

S-1C/S-11 SEP

\*\* ENCLOSURE 4 \*\*  
AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

TIME FROM FIRST MOTION (SEC)	COMMANDED PITCH ATTITUDE (DEG)	EULFRIAN ANGLE OF ATTITUDE IN PITCH (DEG)	COMMANDED YAW ATTITUDE (DEG)	EULFRIAN ANGLE OF ATTITUDE IN YAW (DEG)	COMMANDED ROLL ATTITUDE (DEG)	EULFRIAN ANGLE OF ATTITUDE IN ROLL (DEG)
S-IC/S-II SEP	-68.050	-68.2962	.000	-043595	.000	.00010637
S-II ENGINE START	-68.050	-68.3227	.000	-044758	.000	-00021230
S-II MAINSTAGE	-68.050	-68.3A22	.000	-070131	.000	-00136159
	-68.050	-68.3329	.000	-084518	.000	.0051A512
	-68.050	-67.9A23	.000	-153315	.000	-00066589
	-68.050	-68.0791	.000	-132959	.000	-00045243
	-68.050	-68.0706	.000	-137155	.000	-001389A8
	-68.050	-68.0799	.000	-136687	.000	-00073371
	-68.050	-66.0A32	.000	-138023	.000	-00061203
	-68.050	-68.0A11	.000	-131919	.000	-00048771
	-68.050	-68.0A17	.000	-137181	.000	-00044443
	-68.050	-68.0A17	.000	-137594	.000	-00044529
	-63.675	-65.8465	-.331	-444611	.000	.01657110
	-61.615	-1.1547	-.314	-468148	.000	-0388A190
	-62.032	-61.9734	-.298	-438424	.000	.00751006
	-62.425	-62.3191	-.282	-428483	.000	-001569A0
	-62.872	-62.7473	-.226	-397682	.000	-00044810
	-63.327	-63.2105	-.156	-425397	.000	-00078227
	-63.780	-63.6948	-.070	-358592	.000	-00019364
	-64.230	-64.1302	-.004	-254394	.000	-00040061
	-64.688	-64.5860	.039	-219A73	.000	-00047516
	-65.148	-65.0478	.077	-183599	.000	-00044064
	-65.615	-65.5097	.108	-148769	.000	-00049890
	-66.086	-65.9A01	.132	-125522	.000	-00050028
	-66.564	-66.4543	.153	-105325	.000	-00053886
	-67.061	-66.9423	.171	-087181	.000	-00062693
	-67.567	-67.4491	.187	-071274	.000	-00053A10
	-68.063	-67.9509	.201	-057577	.000	-00046743
	-68.553	-68.4396	.214	-046066	.000	-00056428
	-69.046	-68.9303	.225	-035672	.000	-00058373
	-69.541	-69.4243	.235	-026088	.000	-00058445
	-70.041	-69.9214	.244	-017138	.000	-00062112
	-70.547	-70.4254	.254	-008471	.000	-00062940
	-71.061	-70.9359	.263	-000048	.000	-00064656
	-71.582	-71.4540	.271	.008256	.000	-00066442
	-72.109	-71.9791	.280	.014577	.000	-00066837
	-72.641	-72.5090	.289	.022277	.000	-00068711
	-73.177	-73.0436	.298	.031936	.000	-00068876
	-73.717	-73.5818	.307	.040137	.000	-00070453
	-74.261	-74.1240	.315	.046322	.000	-00071942
	-74.808	-74.6698	.324	.053926	.000	-00073439
	-75.361	-75.2198	.332	.061284	.000	-00076545

INITIATE IGM

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	COMMANDED PITCH ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN PITCH (DEG)	COMMANDED YAW ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN YAW (DEG)	COMMANDED ROLL ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN ROLL (DEG)
360.00	-75.922	-75.7751	.341	.069167	.000	-.00081111
365.00	-76.490	-76.3418	.351	-.051993	.000	-.00139011
370.00	-77.059	-76.9443	.406	-.049968	.000	-.00060702
375.00	-77.622	-77.4948	.454	.058198	.000	-.00077865
380.00	-78.195	-78.0411	.477	.068890	.000	-.00096738
385.00	-78.773	-78.6412	.501	.084665	.000	-.00088887
390.00	-79.354	-79.2191	.522	.113798	.000	-.00092638
395.00	-79.941	-79.8029	.537	.125728	.000	-.00097640
400.00	-80.531	-80.3919	.551	.137751	.000	-.00098410
405.00	-81.125	-80.9839	.564	.150490	.000	-.00101011
410.00	-81.723	-81.5798	.575	.160644	.000	-.00103498
415.00	-82.325	-82.1795	.585	.170159	.000	-.00105163
420.00	-82.930	-82.7826	.594	.179126	.000	-.00107337
425.00	-83.538	-83.3890	.603	.185186	.000	-.00109368
430.00	-84.149	-83.9981	.612	.192684	.000	-.00111577
435.00	-84.762	-84.6098	.620	.202265	.000	-.00112414
440.00	-85.377	-85.2230	.628	.207740	.000	-.00114437
445.00	-85.993	-85.8359	.635	.212673	.000	-.00118820
450.00	-86.613	-86.4530	.644	.221361	.000	-.00122370
455.00	-87.235	-87.0739	.651	.228109	.000	-.00122038
460.00	-87.857	-87.6951	.657	.233308	.000	-.00124652
463.81	-88.333	-88.1696	.663	.237778	.000	-.00125631
465.00	-88.461	-88.3173	.664	.251377	.000	-.00116841
470.00	-86.722	-88.4129	.566	.321884	.000	.02971411
475.00	-86.109	-85.5603	.522	.167109	.000	-.02946865
480.00	-87.122	-86.8810	.525	.178899	.000	.00312556
485.00	-87.270	-87.4983	.505	.172455	.000	.01022564
490.00	-87.889	-87.5474	.506	.152504	.000	-.00701259
495.00	-88.902	-88.6090	.522	.170226	.000	-.00057990
500.00	-89.809	-89.5728	.537	.185925	.000	-.00056699
505.00	-90.575	-90.3775	.549	.197521	.000	-.00052518
510.00	-91.245	-91.0706	.559	.207892	.000	-.00057907
515.00	-91.872	-91.7026	.569	.217124	.000	-.00074622
520.00	-92.497	-92.3244	.579	.226510	.000	-.00083231
525.00	-93.128	-92.9525	.589	.236536	.000	-.00085413
530.00	-93.762	-93.5856	.599	.246913	.000	-.00086671
535.00	-94.396	-94.2197	.609	.257295	.000	-.00087583
540.00	-95.028	-94.8516	.618	.265989	.000	-.00088087
545.00	-95.654	-95.4787	.628	.274662	.000	-.00088342
550.00	-96.271	-96.0990	.637	.284855	.000	-.00087482
555.00	-96.876	-96.7081	.643	.292290	.000	-.00085341
560.66	-96.951	-96.9072	.644	.294084	.000	-.00083664

5-11 CECO

911 OEC



AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	COMMANDED PITCH ATTITUDE (DEG)	EULFRIAN ANGLE OF ATTITUDE IN PITCH (DEG)	COMMANDED YAW ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN YAW (DEG)	COMMANDED ROLL ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN ROLL (DEG)
556.67	-96.951	-96.9084	.644	.294094	.000	-.00083647
557.75	-96.951	-97.0315	.644	.295166	.000	-.00021580

T04  
S-11/S-1V0 SEP

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	COMMANDED PITCH ATTITUDE (DEG)	EULERIAN ANGLE OF IN PITCH (DEG)	COMMANDED YAW ATTITUDE (DEG)	EULERIAN ANGLE OF IN YAW (DEG)	COMMANDED ROLL ATTITUDE (DEG)	EULERIAN ANGLE OF IN ROLL (DEG)
S-11/S-118 SEP	-96.951	-97.0315	.644	.295166	.000	-.00021580
S-118 ENGINE START	-96.951	-97.0343	.644	.295166	.000	-.00019335
S-118 MAINSTAGE	-96.951	-97.2770	.644	.287769	.000	.00184781
S-118 JLLAGE JETT	-96.951	-97.4290	.644	.289964	.000	.04873312
	-96.951	-96.9415	.644	.401179	.000	.20351804
	-99.211	-98.2141	.206	.086662	.000	.00616506
	-99.324	-98.5895	.207	-.009362	.000	-.08642523
	-99.908	-99.7137	.338	.054937	.000	-.06082959
	-100.671	-100.2652	.490	.239931	.000	.00389753
	-101.569	-101.2684	.603	.352523	.000	.035937
	-102.294	-101.9981	.684	.441780	.000	.22440330
	-102.957	-102.6765	.742	.502210	.000	.33024035
	-103.579	-103.2996	.782	.547206	.000	.44600116
	-104.218	-103.9342	.810	.575275	.000	.55754819
	-104.808	-104.5422	.828	.594609	.000	.67352079
	-105.383	-105.1111	.840	.606355	.000	.79658441
	-105.988	-105.7043	.847	.613516	.000	.90143657
	-106.564	-106.3318	.851	.617459	.000	.92641753
	-107.120	-106.8489	.853	.618588	.000	.88404528
	-107.683	-107.4121	.853	.619631	.000	.83820987
	-108.245	-107.9743	.850	.616188	.000	.79189122
	-108.803	-108.5337	.848	.613096	.000	.74604354
	-109.352	-109.0869	.847	.610408	.000	.70140219
	-109.931	-109.6602	.844	.608348	.000	.65253881
	-110.455	-110.1968	.846	.607448	.000	.61134854
	-110.975	-110.7102	.847	.607321	.000	.57496119
	-112.068	-111.2484	.889	.609047	.000	.53355593
	-113.729	-113.9157	.972	.751176	.000	.07050448
	-113.429	-113.2587	.952	.708976	.000	.27633130
	-113.588	-113.2741	.943	.704387	.000	.34752833
	-113.304	-113.1790	.927	.688252	.000	.44021944
	-113.237	-113.1105	.902	.666347	.000	.52659119
	-113.252	-113.1111	.909	.665954	.000	.60131282
	-113.252	-113.1092	.909	.664771	.000	.65161464
	-113.252	-113.1089	.909	.664599	.000	.65479597
	-113.252	-113.1069	.909	.663439	.000	.67666402
	-113.252	-113.0992	.909	.657819	.000	.75223708
	-113.252	-113.0930	.909	.652578	.000	.80273690

S-118 GCS1  
T85  
E901

AS-509 THAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	COMMANDED PITCH ATTITUDE (DEG)	CULPRIAN ANGLE OF ATTITUDE IN PITCH (DEG)	COMMANDED YAW ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN YAW (DEG)	COMMANDED ROLL ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN ROLL (DEG)
713.12	-113.093	-113.0930	.653	.652578	.803	.80273690
722.12	-113.093	-113.0930	.653	.652578	.803	.80273690
732.12	-118.033	-118.0331	.538	.538364	.000	.00000000
743.12	-118.781	-118.7814	.528	.527616	.000	.00000000
754.12	-119.530	-119.5297	.517	.516777	.000	.00000000
765.12	-120.278	-120.2780	.506	.505850	.000	.00000000
776.12	-121.026	-121.0264	.495	.494637	.000	.00000000
787.12	-121.775	-121.7747	.484	.483739	.000	.00000000
798.12	-122.523	-122.5230	.473	.472559	.000	.00000000
844.12	-125.652	-125.6524	.425	.424952	.000	.00000000
932.12	-131.639	-131.6391	.330	.330469	.000	.00000000
1020.12	-137.626	-137.6260	.232	.232376	.000	.00000000
1108.12	-143.613	-143.6131	.132	.131744	.000	.00000000
1196.12	-149.601	-149.6005	.030	.029668	.000	.00000000
1284.12	-155.588	-155.5883	-.073	-.072739	.000	.00000000
1372.12	-161.577	-161.5766	-.174	-.174359	.000	.00000000
1460.12	-167.565	-167.5653	-.274	-.274083	.000	.00000000
1548.12	-173.555	-173.5547	-.371	-.370823	.000	.00000000
1636.12	-179.545	-179.5446	-.464	-.463522	.000	.00000000
1724.12	-174.465	-174.4649	-.551	-.551165	.000	.00000000
1812.12	-168.474	-168.4739	-.633	-.632794	.000	.00000000
1900.12	-162.482	-162.4822	-.708	-.707516	.000	.00000000
1988.12	-156.490	-156.4901	-.775	-.774512	.000	.00000000
2076.12	-150.497	-150.4975	-.833	-.833047	.000	.00000000
2164.12	-144.504	-144.5044	-.882	-.882481	.000	.00000000
2252.12	-138.511	-138.5111	-.922	-.922270	.000	.00000000
2340.12	-132.518	-132.5176	-.952	-.951980	.000	.00000000
2428.12	-126.524	-126.5240	-.971	-.971284	.000	.00000000
2516.12	-120.530	-120.5303	-.980	-.979970	.000	.00000000
2604.12	-114.537	-114.5368	-.978	-.977945	.000	.00000000
2692.12	-108.543	-108.5434	-.965	-.965231	.000	.00000000
2780.12	-102.550	-102.5504	-.942	-.941968	.000	.00000000
2868.12	-96.558	-96.5578	-.908	-.908413	.000	.00000000
2956.12	-90.566	-90.5657	-.865	-.864934	.000	.00000000
3044.12	-84.574	-84.5741	-.812	-.812010	.000	.00000000
3132.12	-78.583	-78.5832	-.750	-.750221	.000	.00000000
3220.12	-72.593	-72.5930	-.680	-.680244	.000	.00000000
3308.12	-66.604	-66.6038	-.603	-.602847	.000	.00000000
3396.12	-61.159	-61.1592	-.527	-.526759	.000	.00000000
3484.12	-55.171	-55.1711	-.438	-.437609	.000	.00000000
3572.12	-49.184	-49.1839	-.344	-.343695	.000	.00000000
3660.12	-43.197	-43.1974	-.246	-.246041	.000	.00000000

\*\* ENCLOSURE 4 \*\*

A9-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH#72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	COMMANDED PITCH ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN PITCH (DEG)	COMMANDED YAW ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN YAW (DEG)	COMMANDED ROLL ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN ROLL (DEG)
3740.12	37.212	37.216	.146	-145715	.000	.0000000
3828.13	31.227	31.2265	.044	-.043812	.000	.0000000
3916.17	25.242	25.2421	.059	.058558	.000	.0000000
4004.12	19.258	19.2584	.160	.160279	.000	.0000000
4092.12	13.275	13.2752	.260	.260242	.000	.0000000
4180.17	7.293	7.2924	.357	.357359	.000	.0000000
4268.12	1.311	1.3105	.451	.450574	.000	.0000000
4356.12	-4.671	-4.6711	.539	.538872	.000	.0000000
4444.12	-10.652	-10.6522	.621	.621295	.000	.0000000
4532.12	-16.633	-16.6330	.697	.696946	.000	.0000000
4620.12	-22.613	-22.6133	.765	.765005	.000	.0000000
4708.12	-28.593	-28.5933	.825	.824733	.000	.0000000
4796.12	-34.573	-34.5729	.875	.875482	.000	.0000000
4884.12	-40.552	-40.5522	.917	.916702	.000	.0000000
4972.12	-46.531	-46.5311	.948	.947947	.000	.0000000
5060.12	-52.510	-52.5097	.969	.968881	.000	.0000000
5148.12	-58.488	-58.4881	.979	.979276	.000	.0000000
5236.12	-64.466	-64.4661	.979	.979021	.000	.0000000
5324.12	-70.444	-70.4439	.968	.968122	.000	.0000000
5412.12	-76.421	-76.4214	.947	.946696	.000	.0000000
5500.12	-82.399	-82.3988	.915	.914979	.000	.0000000
5588.12	-88.376	-88.3760	.873	.873315	.000	.0000000
5676.12	-94.353	-94.3530	.822	.822156	.000	.0000000
5764.12	-100.330	-100.3300	.762	.762058	.000	.0000000
5852.12	-106.307	-106.3071	.694	.693674	.000	.0000000
5940.12	-112.284	-112.2842	.618	.617745	.000	.0000000
6028.12	-118.261	-118.2614	.535	.535095	.000	.0000000
6116.12	-124.239	-124.2389	.447	.446621	.000	.0000000
6204.12	-130.217	-130.2168	.353	.353283	.000	.0000000
6292.12	-136.195	-136.1950	.256	.256094	.000	.0000000
6372.12	-141.630	-141.6301	.165	.165287	.000	.0000000
6460.12	-147.609	-147.6093	.064	.063705	.000	.0000000
6548.12	-153.589	-153.5892	-.039	-.038581	.000	.0000000
6636.12	-159.570	-159.5697	-.140	-.140459	.000	.0000000
6724.12	-165.551	-165.5509	-.241	-.240818	.000	.0000000
6812.12	-171.533	-171.5329	-.339	-.338566	.000	.0000000
6900.12	-177.516	-177.5157	-.433	-.432636	.000	.0000000
6988.12	-176.501	-176.5008	-.522	-.522003	.000	.0000000
7076.12	-170.516	-170.5165	-.606	-.605689	.000	.0000000
7164.12	-164.531	-164.5315	-.683	-.682781	.000	.0000000
7252.12	-158.546	-158.5458	-.752	-.752436	.000	.0000000
7340.12	-152.560	-152.5595	-.814	-.813890	.000	.0000000

\*\* ENCLOSURE 4 \*\*  
 AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	COMMAND'D PITCH ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN PITCH (DEG)	COMMAND'D YAW ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN YAW (DEG)	COMMAND'D ROLL ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN ROLL (DEG)
7428.12	146.573	146.5727	-0.866	-0.866473	.000	.00000000
7516.12	143.586	140.5855	-0.910	-0.909606	.000	.00000000
7604.12	134.598	134.5980	-0.943	-0.942819	.000	.00000000
7692.12	128.610	128.6102	-0.964	-0.965748	.000	.00000000
7780.12	122.622	122.6224	-0.976	-0.978141	.000	.00000000
7868.12	116.635	116.6347	-0.980	-0.979863	.000	.00000000
7956.12	110.647	110.6471	-0.971	-0.970895	.000	.00000000
8044.12	104.660	104.6597	-0.951	-0.951338	.000	.00000000
8132.12	98.673	98.6728	-0.921	-0.921405	.000	.00000000
8220.12	92.686	92.6863	-0.881	-0.881425	.000	.00000000
8308.12	86.700	86.7004	-0.832	-0.831837	.000	.00000000
8396.12	80.715	80.7152	-0.773	-0.773184	.000	.00000000
8484.12	74.729	74.7287	-0.735	-0.734521	.000	.00000000
8572.12	68.743	68.7427	-0.724	-0.725979	.000	.00000000
8660.12	62.757	62.7562	-0.725	-0.725177	.000	.00000000

TIME BASE 6

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH#72.067 DEG. 1ST OPP.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	COMMANDED PITCH ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN PITCH (DEG)	COMMANDED YAW ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN YAW (DEG)	COMMANDED ROLL ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN ROLL (DEG)
8460.12	76.363	76.3627	-0.725	-0.725197	.000	.00000000
8465.12	76.105	76.3658	-0.722	-0.720524	.000	.00003981
8470.12	75.697	76.3723	-0.717	-0.704505	.000	.00015771
8475.12	75.425	76.3911	-0.714	-0.683141	.000	.00034910
8480.12	75.017	76.4094	-0.710	-0.650431	.000	.00062995
8485.12	74.745	76.3308	-0.706	-0.608363	.000	.003529582
8490.12	74.337	76.0111	-0.701	-0.556746	.000	.015060208
8495.12	74.065	75.4777	-0.698	-0.500420	.000	.019133647
8500.12	73.657	74.8843	-0.693	-0.438454	.000	.014167412
8502.12	73.521	74.6445	-0.692	-0.411131	.000	.011921711
8502.32	73.521	74.6250	-0.692	-0.408317	.000	.011696535
8505.12	73.385	74.2967	-0.690	-0.366148	.000	.008529968
8510.12	72.977	73.7153	-0.685	-0.277624	.000	.002807416
8515.12	72.705	73.1406	-0.682	-0.172152	.000	.00015229
8520.12	72.297	72.5720	-0.677	-0.049737	.000	.00952504
8525.12	72.025	72.0095	-0.673	.087566	.000	.09150902
8530.12	71.617	71.4531	-0.668	.240289	.000	.05152963
8535.12	71.345	70.9030	-0.665	.409491	.000	.00033676
8540.12	70.937	70.3585	-0.660	.572780	.000	.005695527
8545.12	70.665	69.8077	-0.656	.514717	.000	.003751868
8550.12	70.257	69.2580	-0.651	.315181	.000	.04419967
8555.12	69.985	68.7399	-0.647	.131155	.000	.07153994
8560.12	69.577	68.1429	-0.642	-.037300	.000	.09063420
8565.12	69.305	68.0840	-0.639	-.188999	.000	.14211288
8570.12	68.897	67.8880	-0.633	-.324819	.000	.17126640
8575.12	68.626	67.7006	-0.630	-.444615	.000	.17692257
8580.12	68.218	67.5194	-0.624	-.547455	.000	.18227163
8585.12	67.946	67.3445	-0.621	-.633337	.000	.18738911
8590.12	67.538	67.1758	-0.615	-.702261	.000	.19234502
8595.12	67.266	67.0134	-0.612	-.754225	.000	.19720384
8600.12	66.858	66.8572	-0.606	-.789230	.000	.20202456
8605.12	66.586	66.7073	-0.603	-.807274	.000	.20686061
8610.12	66.178	66.5637	-0.597	-.807511	.000	.18790783
8615.12	65.906	66.4263	-0.593	-.790578	.000	.1671000
8620.12	65.498	66.2952	-0.588	-.756688	.000	.13843721
8625.12	65.216	66.1704	-0.584	-.705847	.000	.11395063
8630.12	64.818	66.0519	-0.578	-.638096	.000	.08966590
8635.12	64.546	65.9273	-0.575	-.553335	.000	.06158890
8640.12	64.138	65.7027	-0.569	-.451764	.000	.000078594
8645.12	63.846	65.3201	-0.563	-.333227	.000	-.01575821
8650.12	63.458	64.8353	-0.560	-.201884	.000	-.04288569
8655.12	63.187	64.3387	-0.556	.055416	.000	-.012242802

02/42 BURNER ON  
ENGINE OFF

\*\* ENCLOSURE 4 \*\*  
AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM MOTION (SEC)	COMMANDED PITCH ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN PITCH	COMMANDED YAW ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN YAW	COMMANDED ROLL ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN ROLL
0660.12	62.779	63.8444	-0.550	0.107972	0.000	-0.10064104
0665.12	62.507	63.3644	-0.546	0.288049	0.000	-0.07115647
0670.12	62.099	62.8869	-0.540	0.463027	0.000	-0.01627491
0675.12	61.827	62.4150	-0.536	0.646330	0.000	-0.030444802
0680.12	61.419	61.9436	-0.531	0.830762	0.000	0.03114607
0685.12	61.147	61.4747	-0.527	1.014394	0.000	0.05664569
0690.12	60.739	61.0122	-0.521	1.194409	0.000	0.08122474
0695.12	60.467	60.5561	-0.517	1.373337	0.000	0.10712117
0700.12	60.059	60.1063	-0.511	1.55184	0.000	0.13416770
0705.12	59.787	59.6628	-0.507	1.73046	0.000	0.16220253
0710.12	59.380	59.2257	-0.501	1.90953	0.000	0.19128383
0715.12	59.108	58.7950	-0.497	2.08961	0.000	0.22146294
0720.12	58.700	58.3707	-0.491	2.27020	0.000	0.25279663
0725.12	58.428	57.9527	-0.487	2.45197	0.000	0.28525150
0730.12	58.020	57.5411	-0.481	2.63461	0.000	0.31883143
0735.12	57.748	57.1359	-0.477	2.81841	0.000	0.35353517
0740.12	57.340	56.7370	-0.471	3.00369	0.000	0.38937252
0745.12	57.068	56.3445	-0.466	3.19026	0.000	0.42634761
0750.12	56.661	55.9584	-0.460	3.37814	0.000	0.46447284
0755.12	56.389	55.5788	-0.456	3.56726	0.000	0.50375734
0760.12	55.981	55.2058	-0.450	3.75761	0.000	0.54429197
0765.12	55.709	54.8387	-0.446	3.94919	0.000	0.58607086
0770.12	55.301	54.4781	-0.440	4.14207	0.000	0.629093558
0775.12	55.029	54.1239	-0.435	4.33621	0.000	0.67336998
0780.12	54.621	53.7761	-0.429	4.53161	0.000	0.718902451
0785.12	54.349	53.4343	-0.425	4.72826	0.000	0.765709954
0790.12	53.942	53.0986	-0.419	4.92619	0.000	0.813804864
0795.12	53.670	52.7692	-0.414	5.12543	0.000	0.863203136
0800.12	53.262	52.4458	-0.408	5.32597	0.000	0.91391492
0805.12	52.990	52.1241	-0.404	5.52781	0.000	0.96593911
0810.12	52.582	51.8047	-0.398	5.73096	0.000	0.102813923
0815.12	52.310	51.4909	-0.393	5.93543	0.000	0.06991335
0820.12	51.902	51.1835	-0.387	6.14134	0.000	0.03684492
0825.12	51.631	50.8824	-0.383	6.34864	0.000	0.003703911
0830.12	51.223	50.5876	-0.376	6.55743	0.000	0.02813923
0835.12	50.951	50.2993	-0.372	6.76771	0.000	0.06991335
0840.12	50.543	49.7415	-0.365	6.97957	0.000	0.09691310
0845.12	50.271	49.4722	-0.361	7.19299	0.000	0.10475011
0850.12	49.863	49.2093	-0.355	7.40797	0.000	0.12330436
0855.12	49.592	48.9526	-0.350	7.62451	0.000	0.14246137
0860.12	49.104	48.7023	-0.344	7.84261	0.000	0.16211226
0865.12	48.912	48.4526	-0.339	8.06226	0.000	0.18215371
					0.000	0.20246797
					0.000	0.22302287
					0.000	0.2440215
					0.000	0.26547949

ENCLOSURE 4  
AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. '1ST OPP.

TIME FROM FIRST MOTION (SEC)	COMMANDED PITCH ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN PITCH (DEG)	COMMANDED YAW ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN YAW (DEG)	COMMANDED ROLL ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN ROLL (DEG)
870.12	48.504	48.4584	.333	-.394074	.000	-.14490598
875.12	48.232	48.2208	.328	-.367200	.000	-.10451248
880.12	47.824	47.9896	.322	-.323400	.000	-.06393538
885.12	47.553	47.7647	.317	-.262672	.000	-.02311666
890.12	47.145	47.5461	.311	-.185013	.000	.01799618
895.12	46.873	47.3338	.306	-.090418	.000	.05945012
900.12	46.465	47.1278	.300	.021115	.000	.10128666
905.12	46.193	46.9281	.295	.149589	.000	.14354181
910.12	45.786	46.7343	.289	.292093	.000	.18293649
915.12	45.514	46.5468	.284	.451216	.000	.05353980
920.12	45.106	46.3656	.278	.627276	.000	.00462794
925.12	44.834	46.1805	.273	.819265	.000	-.01856962
930.12	44.426	45.9182	.266	.972320	.000	.01186269
935.12	44.154	45.5266	.262	.683468	.000	-.03328206
940.12	43.747	45.0428	.255	.223857	.000	-.06390950
945.12	43.475	44.5946	.251	-.218828	.000	-.10186495
950.12	43.067	44.1326	.244	-.644573	.000	-.14269260
955.12	42.795	43.6767	.239	-.1049339	.000	-.07235166
956.42	42.659	43.5592	.237	-.1151721	.000	-.05252827
956.92	42.659	43.5141	.237	-.1190809	.000	-.04495483
960.12	42.388	43.2274	.233	-.1436360	.000	.0194319
965.12	42.116	42.7863	.228	-.1495612	.000	.01441686
970.12	41.788	42.3534	.221	-.1402708	.000	-.03263338
975.12	41.436	41.9282	.217	-.443911	.000	-.18350610
980.12	41.028	41.5112	.210	.142259	.000	-.17006772
985.12	40.757	41.1022	.205	.738929	.000	-.04889703
990.12	40.349	40.6978	.199	1.236852	.000	.01997708
995.12	40.077	40.2865	.194	1.208888	.000	-.08663024
9000.12	39.669	39.8675	.187	.655417	.000	-.01221727
9035.12	39.397	39.4532	.183	.002027	.000	.05412288
9010.12	38.990	39.0468	.176	-.637154	.000	.11587294
9015.12	38.718	38.6485	.171	-.1256662	.000	.02066792
9070.12	38.310	38.2585	.164	-.1676261	.000	.04300854
9025.12	38.038	37.8748	.160	-.1519930	.000	.06124586
9030.12	37.631	37.4974	.153	-.828237	.000	.01859113
9035.12	37.495	37.2760	.151	-.354061	.000	.09607377
9038.12	37.359	37.1337	.148	-.036649	.000	.14939898
9038.12	37.087	36.9332	.144	.425338	.000	.12886758
9040.12	37.087	36.8655	.144	.569116	.000	.07105497
9040.42	37.087	36.9110	.144	.442588	.000	.04931926
9044.62	37.087	37.3597	.144	-.735859	.000	-.08739731
9045.12	37.087	37.3456	.144	-.694115	.000	-.09020961

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\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	COMMANDED PITCH ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN PITCH (DEG)	COMMANDED YAW ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN YAW (DEG)	COMMANDED ROLL ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN ROLL (DEG)
9050.12	33.087	34.5446	.052	-.099558	.000	-.2083802
9055.12	30.523	30.0952	.090	.187393	.000	.11369004
9060.12	30.266	30.6829	.225	-.048825	.000	.08600393
9065.12	29.645	29.9713	.360	.095709	.000	-.18518877
9070.12	29.611	29.8136	.478	.211804	.000	-.19267005
9075.12	29.412	29.5833	.584	.320314	.000	-.16414094
9080.12	29.249	29.4266	.676	.413797	.000	-.12140243
9085.12	29.094	29.2886	.756	.495158	.000	-.08387085
9090.12	28.944	29.1704	.825	.564834	.000	-.04936655
9095.12	28.796	28.9719	.887	.626140	.000	-.01999490
9100.12	28.653	28.8280	.944	.683669	.000	.00728928
9105.12	28.512	28.6886	.996	.735869	.000	.03076046
9110.12	28.373	28.5496	1.045	.784402	.000	.05020623
9115.12	28.237	28.4139	1.091	.830397	.000	.06637287
9120.12	28.104	28.2803	1.135	.873911	.000	.07900309
9125.12	27.975	28.1502	1.179	.916173	.000	.08850642
9130.12	27.849	28.0254	1.222	.959532	.000	.09586424
9135.12	27.727	27.9032	1.265	1.001514	.000	.09925105
9140.12	27.607	27.7840	1.306	1.042453	.000	.09972009
9145.12	27.489	27.6659	1.348	1.082711	.000	.09656111
9150.12	27.373	27.5492	1.389	1.124306	.000	.09011752
9155.12	27.258	27.4350	1.430	1.164090	.000	.08020700
9160.12	27.143	27.3207	1.471	1.203415	.000	.06643363
9165.12	27.029	27.2069	1.511	1.244072	.000	.04915764
9170.12	26.915	27.0936	1.551	1.283188	.000	.02800950
9175.12	26.801	26.9805	1.591	1.322014	.000	.00303485
9180.12	26.686	26.8688	1.622	1.358135	.000	-.02774596
9185.12	26.507	26.6936	1.653	1.381820	.000	-.07229107
9190.12	26.352	26.5393	1.695	1.424103	.000	-.11620593
9195.12	26.197	26.3842	1.733	1.462194	.000	-.16467201
9200.12	26.042	26.2306	1.766	1.494802	.000	-.19366306
9205.12	25.886	26.0759	1.793	1.521029	.000	-.19228022
9210.12	25.548	25.8561	1.398	1.400010	.000	-.20970595
9215.12	25.949	26.2331	1.163	.805063	.000	.08826113
9220.12	25.715	25.9040	1.293	1.016644	.000	.18955839
9225.12	25.511	25.7146	1.383	1.097594	.000	.14725655
9230.12	25.304	25.5055	1.470	1.185069	.000	.09336513
9235.12	25.098	25.3009	1.554	1.268784	.000	.0368915
9240.12	24.890	25.0932	1.638	1.351376	.000	-.02563539
9245.12	24.679	24.8824	1.722	1.434966	.000	-.09163801
9250.12	24.465	24.6700	1.805	1.517447	.000	-.16170828
9255.12	24.247	24.4535	1.887	1.599011	.000	-.19383332

\*\* ENCLOSURE 4 \*\*  
AS-809 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	COMMANDED PITCH ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN PITCH (DEG)	COMMANDED YAW ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN YAW (DEG)	COMMANDED ROLL ATTITUDE (DEG)	EULERIAN ANGL. OF ATTITUDE IN ROLL (DEG)
9260.12	24.026	24.2336	1.967	1.676136	.000	-.15856071
9265.12	23.900	24.0088	2.047	1.757070	.000	-.12793130
9270.12	23.568	23.7789	2.125	1.835522	.000	-.10202977
9275.12	23.331	23.5437	2.202	1.911926	.000	-.08104189
9280.12	23.084	23.2999	2.280	1.987808	.000	-.06531637
9285.12	22.834	23.0496	2.357	2.064696	.000	-.05433719
9290.12	22.574	22.7919	2.433	2.140490	.000	-.04643372
9295.12	22.305	22.5258	2.509	2.215286	.000	-.04774236
9300.12	22.025	22.2460	2.585	2.290846	.000	-.05252548
9305.12	21.736	21.9606	2.659	2.365707	.000	-.06263808
9310.12	21.434	21.6614	2.733	2.438522	.000	-.07830316
9315.12	21.116	21.3482	2.813	2.515674	.000	-.09927345
9320.12	20.783	21.0175	2.894	2.596717	.000	-.12587199
9325.12	20.440	20.6763	2.967	2.669965	.000	-.15841558
9330.12	20.079	20.3193	3.037	2.740467	.000	-.18723161
9335.12	19.696	19.9436	3.106	2.808458	.000	-.17203154
9340.12	19.295	19.5446	3.174	2.876788	.000	-.16330468
9345.12	18.865	19.1198	3.244	2.944574	.000	-.16112230
9350.12	18.407	18.6672	3.314	3.014498	.000	-.16544783
9355.12	17.918	18.1851	3.383	3.083395	.000	-.17651823
9360.12	17.385	17.6594	3.452	3.151700	.000	-.19400627
9365.12	15.926	16.9171	3.608	3.237589	.000	-.19722912
9370.12	14.198	14.3703	3.720	3.431728	.000	.02818455
9375.12	14.305	14.4697	3.711	3.421899	.000	.16643821
9380.12	14.400	14.5677	3.706	3.415834	.000	.15479142
9385.12	14.467	14.6547	3.704	3.412267	.000	.10897871
9390.12	14.587	14.7505	3.705	3.412354	.000	.05957149
9393.76	14.587	14.7793	3.705	3.412868	.000	.01881479
9393.97	14.587	14.7756	3.705	3.412710	.000	.01609197
9395.12	14.587	14.7887	3.705	3.412968	.000	.00127497
9400.12	14.587	14.6988	3.705	3.436547	.000	-.06336821
9403.76	14.587	14.6648	3.705	3.482464	.000	-.11099378

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.. ENCLOSURE 4 ..  
 AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. . 1ST OPP.

TIME FROM MOTION (SEC)	COMMANDED PITCH ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN PITCH (DEG)	COMMANDED YAW ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN YAW (DEG)	COMMANDED ROLL ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN ROLL (DEG)
9403.76	14.665	14.6648	3.482	3.482464	.111	.11094375
9413.76	14.665	14.6648	3.482	3.482464	.111	.11094375
9424.76	14.665	14.6648	3.482	3.482464	.111	.11094375
9435.76	14.665	14.6648	3.482	3.482464	.111	.11094375
9446.76	14.665	14.6648	3.482	3.482464	.111	.11094375
9457.76	14.665	14.6648	3.482	3.482464	.111	.11094375
9468.76	14.665	14.6648	3.482	3.482464	.111	.11094375
9479.76	14.665	14.6648	3.482	3.482464	.111	.11094375
9490.76	14.665	14.6648	3.482	3.482464	.111	.11094375
9501.76	14.665	14.6648	3.482	3.482464	.111	.11094375
9512.76	14.665	14.6648	3.482	3.482464	.111	.11094375
9523.76	14.665	14.6648	3.482	3.482464	.111	.11094375
9534.76	14.665	14.6648	3.482	3.482464	.111	.11094375
9544.66	-4.306	-4.3056	.534	.533636	.000	.00000000

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\*\* ENCLOSURE 4 \*\*  
AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (NT/M <sup>2</sup> )	ATTACK ANGLE OF (DEG)	DRAG VELOCITY VECTOR (KG)	AERODYNAMIC LOAD (KG/M <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (KG)
00	00	03	89.9497	0333	0049	3498
040	00	13	29.3969	01393	0067	14649
500	03	53.20	09828	536.8599	0931	338929
1000	06	256.35	3.6753	1206.1976	1.6768	614.0718
1500	10	663.19	4.2258	2472.5223	4.9878	1852.2383
2000	14	1327.71	2.7946	4457.2100	6.6035	2445.4092
2500	19	2305.80	2.2088	7296.6731	9.0642	3395.1335
3000	24	3650.29	1.7374	11136.0084	11.2868	4110.8553
3500	30	5404.66	1.3651	16125.6174	13.1303	4782.2896
4000	37	7596.60	1.0263	22414.1428	13.8760	5053.8869
4500	45	10227.62	0.7945	30134.5647	14.4625	5267.4833
5000	54	13272.53	0.5326	39403.4141	12.5807	4582.0909
5500	64	16626.03	0.4217	50133.3960	12.4777	4544.5786
6000	75	20158.92	0.4004	58633.4719	14.3639	5885.5197
6500	88	23728.23	0.2647	78988.8848	11.1771	4579.7551
6900	100	26405.42	0.1963	112883.0645	9.2238	4199.3102
7000	103	26998.57	0.2333	125128.8828	11.2104	5103.7554
7500	121	29516.25	0.3031	138595.3086	15.9232	6524.4887
8000	141	31279.09	0.2199	124141.8857	12.2403	5015.3958
8500	165	31942.27	0.1043	105630.3633	5.9293	2294.5157
8537	167	31946.20	0.0739	104480.3672	4.1994	1625.0752
9000	193	31130.96	0.2720	88865.0293	15.0707	5469.0142
9500	222	28334.51	0.2824	73074.2656	19.2813	7022.5950
10000	250	24135.81	0.6495	56289.0815	27.8990	10161.3007
10500	277	19761.58	0.8046	40365.7944	28.2988	10306.8972
11000	306	15732.29	1.1930	28678.7817	33.4023	12165.6925
11500	336	12176.01	0.9664	19888.0840	20.9429	7627.7669
12000	367	9157.33	0.0445	13969.9349	0.7258	198.2593
12500	399	6772.97	0.060	9746.5817	0.0726	19.8284
13000	433	4929.95	0.1771	6506.3781	1.5535	424.3677
13500	468	3541.06	0.1483	3914.3663	0.9345	255.2817
14000	495	2429.91	0.1447	2553.9844	0.6256	142.4140
14500	529	1692.27	0.1121	938.4241	0.3377	76.8659
15000	575	1197.83	0.0493	-146.4016	0.1050	23.9098
15500	629	829.94	0.0415	-916.5004	0.0613	13.9429
16000	698	563.96	0.0382	-1447.9176	0.0384	8.7354
16400	776	375.65	0.2861	-1757.1395	0.1913	39.1840
16481	776	375.32	0.2878	-1757.6658	0.1923	39.3891
16500	779	368.75	0.3226	-1767.6884	0.2117	43.3801
16558	784	344.99	0.4417	-1800.0246	0.2712	58.5648

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (NT/M <sup>2</sup> )	ATTACK OF (DEG)	DRAG ALONG VELOCITY VECTOR (KG)	AERODYNAMIC LOAD (KG/M <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (KG)
165.58	7.88	348.24	5536	294.3448	.3431	82.0020
166.21	7.90	321.65	6599	296.7396	.3778	107.4923
169.21	8.03	220.50	1.2346	224.9890	.4845	137.8641
170.00	8.07	200.01	1.4495	211.3925	.5160	146.8183
175.00	8.37	107.27	2.8292	138.5598	.5401	135.6752
180.00	8.70	56.73	3.7348	82.0110	.3771	87.3544
185.00	8.99	29.20	4.7251	45.2452	.2456	55.9042
190.00	9.08	14.53	5.6749	23.6789	.1467	33.3980
195.00	9.05	7.24	6.6081	12.3345	.0851	19.6386
200.00	8.89	3.71	7.5229	6.6069	.0496	11.6397
205.00	8.76	2.02	8.4111	3.7602	.0302	7.2341
205.41	8.75	1.92	8.4833	3.5991	.0290	6.9728
210.00	8.56	1.14	11.5153	2.4432	.0233	6.1103
215.00	8.35	.67	16.9619	1.8557	.0203	5.6962
220.00	8.18	.42	16.8528	1.1578	.0126	3.5530
225.00	7.89	.27	17.2110	.7315	.0081	2.2458
230.00	7.58	.18	17.4747	.4694	.0054	1.4668
235.00	7.34	.12	17.6812	.3191	.0038	1.0117
240.00	7.06	.09	17.8568	.2212	.0028	.7132
245.00	6.67	.06	18.0675	.1550	.0020	.5163
250.00	6.37	.05	18.2451	.1154	.0015	.3945
255.00	6.14	.04	18.4036	.0897	.0012	.3131
260.00	5.94	.03	18.5489	.0718	.0010	.2557
265.00	5.79	.02	18.6728	.0584	.0008	.2135
270.00	5.66	.02	18.7803	.0491	.0007	.1821
275.00	5.55	.02	18.8614	.0420	.0006	.1582
280.00	5.46	.02	18.9116	.0366	.0005	.1395
285.00	5.39	.01	18.9551	.0324	.0005	.1247
290.00	5.33	.01	19.0001	.0291	.0004	.1129
295.00	5.29	.01	19.0313	.0264	.0004	.1032
300.00	5.25	.01	19.0481	.0242	.0004	.0952
305.00	5.23	.01	19.0507	.0225	.0003	.0887
310.00	5.23	.01	19.0357	.0213	.0003	.0838
315.00	5.24	.01	19.0036	.0202	.0003	.0795
320.00	5.25	.01	18.9538	.0193	.0003	.0759
325.00	5.26	.01	18.8870	.0186	.0003	.0728
330.00	5.29	.01	18.8058	.0179	.0003	.0701
335.00	5.31	.01	18.7106	.0174	.0003	.0678
340.00	5.35	.01	18.6027	.0171	.0003	.0661
345.00	5.40	.01	18.4820	.0168	.0002	.0647
350.00	5.45	.01	18.3492	.0167	.0002	.0636
355.00	5.50	.01	18.2038	.0165	.0002	.0626

S-1C/S-11 SEP  
S-11 ENGINE START  
S-11 MAINSTAGE.

INITIATE 1GM

AS-809 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (NT/M <sup>2</sup> )	ATTACK ANGLE OF (DEG)	DRAG ALONG VELOCITY VECTOR (KG)	AERODYNAMIC LOAD (KG/M <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (KG)
360.00	5.55	.01	18.0449	.0164	.0002	.0617
365.00	5.61	.01	17.8669	.0164	.0002	.0611
370.00	5.67	.01	17.6959	.0164	.0002	.0605
375.00	5.73	.01	17.4695	.0164	.0002	.0601
380.00	5.80	.01	17.2702	.0165	.0002	.0599
385.00	5.87	.01	17.0502	.0166	.0002	.0599
390.00	5.95	.01	16.8258	.0168	.0002	.0599
395.00	6.02	.01	16.5890	.0170	.0002	.0601
400.00	6.10	.01	16.3409	.0172	.0002	.0602
405.00	6.18	.01	16.0839	.0174	.0002	.0604
410.00	6.27	.01	15.8172	.0174	.0002	.0598
415.00	6.35	.01	15.5411	.0174	.0002	.0589
420.00	6.44	.01	15.2563	.0175	.0002	.0579
425.00	6.53	.01	14.9631	.0175	.0002	.0569
430.00	6.63	.01	14.6622	.0176	.0002	.0559
435.00	6.72	.01	14.3541	.0177	.0002	.0548
440.00	6.82	.01	14.0398	.0177	.0002	.0537
445.00	6.92	.01	13.7214	.0176	.0002	.0527
450.00	7.02	.01	13.3946	.0174	.0002	.0516
455.00	7.13	.01	13.0600	.0180	.0002	.0509
460.00	7.23	.01	12.7211	.0182	.0002	.0502
463.81	7.32	.01	12.4594	.0184	.0002	.0496
465.00	7.34	.01	12.3859	.0184	.0002	.0493
470.00	7.43	.01	12.6091	.0190	.0002	.0514
475.00	7.52	.01	15.7461	.0227	.0002	.0707
480.00	7.59	.01	14.7311	.0220	.0002	.0657
485.00	7.67	.01	14.3898	.0221	.0002	.0645
490.00	7.75	.01	14.6324	.0227	.0002	.0660
495.00	7.84	.01	13.8508	.0223	.0002	.0626
500.00	7.92	.01	13.1750	.0220	.0002	.0597
505.00	8.00	.01	12.6593	.0216	.0002	.0572
510.00	8.09	.01	12.2544	.0214	.0002	.0553
515.00	8.18	.01	11.9092	.0213	.0002	.0538
520.00	8.27	.01	11.5725	.0213	.0002	.0526
525.00	8.36	.01	11.2270	.0212	.0002	.0512
530.00	8.45	.01	10.8752	.0211	.0002	.0498
535.00	8.55	.01	10.5208	.0210	.0002	.0483
540.00	8.64	.01	10.1669	.0209	.0002	.0467
545.00	8.74	.01	9.8164	.0209	.0002	.0453
550.00	8.84	.01	9.4712	.0208	.0002	.0439
555.00	8.94	.01	9.1358	.0207	.0002	.0426
556.66	8.97	.01	9.0275	.0206	.0002	.0420

3-11 CECO

311 OECO

.. ENCLOSURE 4 ..  
 AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.  
 ..  
 TIME FROM FIRST MOTION (SECI) ..  
 MACH NUMBER ..  
 DYNAMIC PRESSURE (NT/M<sup>002</sup>) ..  
 TOTAL ANGLE OF ATTACK (DEGI) ..  
 DRAG ALONG VELOCITY VECTOR (KG) ..  
 AERODYNAMIC LOAD (KG/M<sup>002</sup>) ..  
 MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (KG) ..  
 ..  
 704 556.47 0.97 9.0269 0.0204 0.0002 0.0420  
 5-11/3-1VB SEP 557.75 0.97 0.9810 0.0205 0.0002 0.0417

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (NT/M <sup>2</sup> )	ATTACK ANGLE OF (DEG)	DRAG ALONG VELOCITY VECTOR (KG)	AERODYNAMIC LOAD (KG/M <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (KG)
S-11/S-1VB SEP	8.97	.01	8.99	.0166	.0002	.0480
S-1VB ENGINE START	8.97	.01	8.9809	.0166	.0002	.0480
	8.97	.01	8.9092	.0164	.0002	.0476
S-1VB MAINSTAGE	8.97	.01	9.0033	.0165	.0002	.0475
	8.98	.01	9.6122	.0175	.0002	.0488
S-1VB ULLAGE JETT	9.00	.01	8.6485	.0158	.0002	.0466
	9.00	.01	8.2128	.0150	.0002	.0456
	9.03	.01	7.5400	.0146	.0001	.0451
	9.06	.01	7.3345	.0146	.0001	.0451
	9.09	.01	6.6815	.0146	.0001	.0450
	9.12	.01	6.3035	.0146	.0001	.0451
	9.15	.01	5.9768	.0146	.0001	.0419
	9.18	.01	5.7050	.0144	.0001	.0417
	9.22	.01	5.4207	.0141	.0001	.0404
	9.25	.01	5.1421	.0139	.0001	.0383
	9.29	.01	4.9417	.0138	.0001	.0366
	9.32	.01	4.6960	.0136	.0001	.0346
	9.36	.01	4.4453	.0134	.0001	.0326
	9.40	.01	4.2441	.0133	.0001	.0310
	9.44	.01	4.0260	.0131	.0001	.0293
	9.48	.01	3.8079	.0131	.0001	.0277
	9.51	.01	3.5919	.0130	.0001	.0261
	9.55	.01	3.3814	.0130	.0001	.0246
	9.59	.01	3.1501	.0130	.0001	.0229
	9.63	.01	2.9549	.0130	.0001	.0215
	9.67	.01	2.7820	.0130	.0001	.0202
	9.72	.01	2.5835	.0129	.0001	.0188
	9.76	.01	2.4066	.0126	.0000	.0028
	9.80	.01	1.2844	.0127	.0000	.0091
	9.84	.01	1.6011	.0129	.0000	.0114
	9.89	.01	2.0261	.0131	.0000	.0146
	9.93	.01	2.4234	.0134	.0001	.0182
	9.97	.01	2.7516	.0138	.0001	.0213
S-1VB GCS1	10.00	.01	2.9720	.0140	.0001	.0233
TBS	10.00	.01	2.9860	.0140	.0001	.0235
	10.00	.01	3.0855	.0141	.0001	.0243
	10.00	.01	3.4327	.0143	.0001	.0274
CP01	10.00	.01	3.6658	.0144	.0001	.0295



ENCLOSURE 4 00

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (NT/M <sup>2</sup> )	ATTACK ANGLE OF (DEG)	DRAG ALONG VELOCITY VECTOR (KG)	AERODYNAMIC LOAD (KG/M <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (KG)
713.12	10.00	.01	3.4598	.1100	.0001	.0000
722.12	10.00	.01	4.2625	.1100	.0001	.0000
732.12	10.00	.01	.0178	.1100	.0000	.0000
743.12	10.01	.01	.0095	.1100	.0000	.0000
754.12	10.01	.01	.0366	.1101	.0000	.0000
765.12	10.01	.01	.0637	.1101	.0000	.0000
776.12	10.01	.01	.0909	.1101	.0000	.0000
787.12	10.01	.01	.1180	.1101	.0000	.0000
798.12	10.01	.01	.1451	.1102	.0000	.0000
844.12	10.01	.01	.2581	.1104	.0000	.0000
932.12	10.01	.01	.4717	.1112	.0000	.0000
1020.12	10.02	.01	.6800	.1123	.0000	.0000
1108.12	10.03	.01	.8805	.1139	.0000	.0000
1196.12	10.05	.01	1.0709	.1158	.0000	.0000
1284.12	10.06	.01	1.2492	.1180	.0000	.0000
1372.12	10.08	.01	1.4132	.1204	.0000	.0000
1460.12	10.10	.01	1.5612	.1229	.0000	.0000
1548.12	10.12	.01	1.6914	.1254	.0000	.0000
1636.12	10.14	.01	1.8023	.1279	.0000	.0000
1724.12	10.16	.01	1.8928	.1301	.0000	.0000
1812.12	10.17	.01	1.9617	.1321	.0001	.0000
1900.12	10.18	.01	2.0084	.1336	.0001	.0000
1988.12	10.19	.01	2.0322	.1347	.0001	.0000
2076.12	10.20	.01	2.0329	.1352	.0001	.0000
2164.12	10.20	.01	2.0106	.1352	.0001	.0000
2252.12	10.19	.01	1.9654	.1346	.0001	.0000
2340.12	10.18	.01	1.8978	.1336	.0000	.0000
2428.12	10.17	.01	1.8087	.1320	.0000	.0000
2516.12	10.16	.01	1.6990	.1301	.0000	.0000
2604.12	10.14	.01	1.5700	.1278	.0000	.0000
2692.12	10.12	.01	1.4231	.1254	.0000	.0000
2780.12	10.10	.01	1.2600	.1229	.0000	.0000
2868.12	10.08	.01	1.0825	.1204	.0000	.0000
2956.12	10.07	.01	.8927	.1179	.0000	.0000
3044.12	10.05	.01	.6927	.1156	.0000	.0000
3132.12	10.03	.01	.4848	.1136	.0000	.0000
3220.12	10.02	.01	.2719	.1119	.0000	.0000
3308.12	10.01	.01	.0408	.1104	.0000	.0000
3388.12	10.00	.01	.1471	.1093	.0000	.0000
3476.12	10.00	.01	.3614	.1084	.0000	.0000
3564.12	9.99	.01	.5729	.1078	.0000	.0000
3652.12	9.99	.01	.7783	.1074	.0000	.0000

66 ENCLOSURE 4 66  
 49-509 TR J DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (NT/M <sup>2</sup> )	TOTAL ANGLE OF ATTACK (DEG)	DRAG ALONG VELOCITY VECTOR (KG)	AERODYNAMIC LOAD (KG/M <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (KG)
3740.12	9.99	.01	.9749	.1673	.0000	.0000
3828.13	9.99	.01	1.1606	.1074	.0000	.0000
3916.12	9.99	.01	1.3332	.1076	.0000	.0000
4004.12	10.00	.01	1.4908	.1079	.0000	.0000
4092.12	10.00	.01	1.6315	.1082	.0000	.0000
4180.12	10.00	.01	1.7537	.1086	.0000	.0000
4268.12	10.00	.01	1.8562	.1088	.0000	.0000
4356.12	10.00	.01	1.9376	.1089	.0000	.0000
4444.12	10.00	.01	1.9971	.1088	.0000	.0000
4532.12	10.00	.01	2.0340	.1085	.0000	.0000
4620.12	10.00	.01	2.0479	.1080	.0000	.0000
4708.12	9.99	.01	2.0386	.1072	.0000	.0000
4796.12	9.98	.01	2.0063	.1061	.0000	.0000
4884.12	9.99	.01	1.9512	.1049	.0000	.0000
4972.12	9.97	.01	1.8740	.1034	.0000	.0000
5060.12	9.95	.01	1.7756	.1019	.0000	.0000
5148.12	9.94	.01	1.6570	.1002	.0000	.0000
5236.12	9.93	.01	1.5196	.0985	.0000	.0000
5324.12	9.92	.01	1.3549	.0969	.0000	.0000
5412.12	9.91	.01	1.1946	.0954	.0000	.0000
5500.12	9.90	.01	1.0108	.0940	.0000	.0000
5588.12	9.89	.01	.8154	.0928	.0000	.0000
5676.12	9.88	.01	.6107	.0919	.0000	.0000
5764.12	9.87	.01	.3990	.0912	.0000	.0000
5852.12	9.87	.01	.1831	.0909	.0000	.0000
5940.12	9.87	.01	.0404	.0909	.0000	.0000
6028.12	9.87	.01	.2553	.0912	.0000	.0000
6116.12	9.86	.01	.4704	.0919	.0000	.0000
6204.12	9.89	.01	.6808	.0930	.0000	.0000
6292.12	9.90	.01	.8634	.0943	.0000	.0000
6372.12	9.91	.01	1.0390	.0958	.0000	.0000
6460.12	9.92	.01	1.2408	.0977	.0000	.0000
6548.12	9.94	.01	1.4086	.0998	.0000	.0000
6636.12	9.96	.01	1.5605	.1021	.0000	.0000
6724.12	9.97	.01	1.6947	.1044	.0000	.0000
6812.12	9.99	.01	1.8098	.1068	.0000	.0000
6900.12	10.01	.01	1.9045	.1092	.0000	.0000
6988.12	10.02	.01	1.9775	.1114	.0000	.0000
7076.12	10.03	.01	2.0282	.1133	.0000	.0000
7164.12	10.04	.01	2.0560	.1150	.0000	.0000
7252.12	10.06	.01	2.0605	.1143	.0000	.0000
7340.12	10.06	.01	2.0416	.1172	.0000	.0000

ENCLOSURE 4

A-70 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (NT/1002)	ATTACK OF (DEG)	TOTAL ANGLE OF (DEG)	DRAG ALONG VELOCITY VECTOR (KG)	AERODYNAMIC LOAD (KG/M <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (KG)
7426.12	10.07	.01	1.9996	1.176	.0000	.0000	
7516.12	10.06	.01	1.9349	.1175	.0000	.0000	
7604.12	10.06	.01	1.8482	.1169	.0000	.0000	
7692.12	10.05	.01	1.7406	.1159	.0000	.0000	
7780.12	10.04	.01	1.6131	.1144	.0000	.0000	
7868.12	10.03	.01	1.4673	.1128	.0000	.0000	
7956.12	10.02	.01	1.3048	.1110	.0000	.0000	
8044.12	10.00	.01	1.1273	.1090	.0000	.0000	
8132.12	9.99	.01	.9369	.1070	.0000	.0000	
8220.12	9.98	.01	.7358	.1051	.0000	.0000	
8308.12	9.96	.01	.5263	.1032	.0000	.0000	
8396.12	9.95	.01	.3108	.1014	.0000	.0000	
8484.12	9.93	.01	.1820	.1005	.0000	.0000	
8572.12	9.94	.01	.1548	.1003	.0000	.0000	
8660.12	9.94	.01	.1523	.1003	.0000	.0000	

TIME BASE 4

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (NT/M <sup>2</sup> )	ATTACK ANGLE OF (DEG)	TOTAL ANGLE	DRAG ALONG VELOCITY VECTOR (KG)	AERODYNAMIC LOAD (KG/M <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (KG)
0460.12	9.94	.00	.1523	.3493	.0000	.0000	.0000
0465.12	9.94	.00	.6802	.0000	.0000	.0000	.0000
0470.12	9.94	.00	1.0294	.0000	.0000	.0000	.0000
0475.12	9.94	.00	1.3849	.0000	.0000	.0000	.0000
0480.12	9.94	.00	1.6456	.0000	.0000	.0000	.0000
0485.12	9.94	.00	1.6671	.0000	.0000	.0000	.0000
0490.12	9.94	.00	1.4781	.0000	.0000	.0000	.0000
0495.12	9.94	.00	1.2355	.0000	.0000	.0000	.0000
0500.12	9.94	.00	1.1431	.0000	.0000	.0000	.0000
0502.32	9.94	.00	1.1340	.0000	.0000	.0000	.0000
0505.12	9.94	.00	1.0118	.0000	.0000	.0000	.0000
0510.12	9.94	.00	.8234	.0000	.0000	.0000	.0000
0515.12	9.94	.00	.7002	.0000	.0000	.0000	.0000
0520.12	9.94	.00	.6805	.0000	.0000	.0000	.0000
0525.12	9.94	.00	.7732	.0000	.0000	.0000	.0000
0530.12	9.94	.00	.9490	.0000	.0000	.0000	.0000
0535.12	9.94	.00	1.1748	.0000	.0000	.0000	.0000
0540.12	9.94	.00	1.4104	.0000	.0000	.0000	.0000
0545.12	9.93	.00	1.4679	.0000	.0000	.0000	.0000
0550.12	9.93	.00	1.4494	.0000	.0000	.0000	.0000
0555.12	9.93	.00	1.4686	.0000	.0000	.0000	.0000
0560.12	9.93	.00	1.4297	.0000	.0000	.0000	.0000
0565.12	9.93	.00	1.2912	.0000	.0000	.0000	.0000
0570.12	9.93	.00	1.1073	.0000	.0000	.0000	.0000
0575.12	9.93	.00	.9243	.0000	.0000	.0000	.0000
0580.12	9.93	.00	.7433	.0000	.0000	.0000	.0000
0585.12	9.93	.00	.5629	.0000	.0000	.0000	.0000
0590.12	9.93	.00	.3819	.0000	.0000	.0000	.0000
0595.12	9.93	.00	.1991	.0000	.0000	.0000	.0000
0600.12	9.93	.00	.0200	.0000	.0000	.0000	.0000
0605.12	9.93	.00	.1796	.0000	.0000	.0000	.0000
0610.12	9.93	.00	.3760	.0000	.0000	.0000	.0000
0615.12	9.93	.00	.5796	.0000	.0000	.0000	.0000
0620.12	9.93	.00	.7912	.0000	.0000	.0000	.0000
0625.12	9.93	.00	1.0118	.0000	.0000	.0000	.0000
0630.12	9.93	.00	1.2422	.0000	.0000	.0000	.0000
0635.12	9.93	.00	1.4713	.0000	.0000	.0000	.0000
0640.12	9.93	.00	1.6089	.0000	.0000	.0000	.0000
0645.12	9.93	.00	1.6059	.0000	.0000	.0000	.0000
0650.12	9.93	.00	1.5272	.0000	.0000	.0000	.0000
0655.12	9.93	.00	1.4706	.0000	.0000	.0000	.0000

02/M2 BURNER ON  
ENGINE OFF

\*\* ENCLOSURE 4 \*\*

AS-309 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (NT/M <sup>2</sup> )	TOTAL ANGLE OF ATTACK (DEG)	DRAG ALONG VELOCITY VECTOR (KG)	AERODYNAMIC LOAD (KG/M <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (KG)
8660.12	9.92	.00	1.4617	.0000	.0000	.0000
8665.12	9.92	.00	1.5051	.0000	.0000	.0000
8670.12	9.92	.00	1.5492	.0000	.0000	.0000
8675.12	9.92	.00	1.7329	.0000	.0000	.0000
8680.12	9.92	.00	1.6615	.0000	.0000	.0000
8685.12	9.92	.00	1.4530	.0000	.0000	.0000
8690.12	9.92	.00	1.2659	.0000	.0000	.0000
8695.12	9.92	.00	1.1024	.0000	.0000	.0000
8700.12	9.92	.00	.9645	.0000	.0000	.0000
8705.12	9.92	.00	.8545	.0000	.0000	.0000
8710.12	9.92	.00	.7738	.0000	.0000	.0000
8715.12	9.92	.00	.7233	.0000	.0000	.0000
8720.12	9.92	.00	.7020	.0000	.0000	.0000
8725.12	9.92	.00	.7087	.0000	.0000	.0000
8730.12	9.92	.00	.7288	.0000	.0000	.0000
8735.12	9.92	.00	.7661	.0000	.0000	.0000
8740.12	9.92	.00	.8131	.0000	.0000	.0000
8745.12	9.92	.00	.8675	.0000	.0000	.0000
8750.12	9.92	.00	.9279	.0000	.0000	.0000
8755.12	9.92	.00	.9936	.0000	.0000	.0000
8760.12	9.92	.00	1.0653	.0000	.0000	.0000
8765.12	9.92	.00	1.1451	.0000	.0000	.0000
8770.12	9.92	.00	1.2345	.0000	.0000	.0000
8775.12	9.92	.00	1.3354	.0000	.0000	.0000
8780.12	9.92	.00	1.4494	.0000	.0000	.0000
8785.12	9.92	.00	1.5767	.0000	.0000	.0000
8790.12	9.92	.00	1.7182	.0000	.0000	.0000
8795.12	9.92	.00	1.8764	.0000	.0000	.0000
8800.12	9.92	.00	2.0463	.0000	.0000	.0000
8805.12	9.92	.00	2.0560	.0000	.0000	.0000
8810.12	9.91	.00	1.9039	.0000	.0000	.0000
8815.12	9.91	.00	1.7382	.0000	.0000	.0000
8820.12	9.91	.00	1.5851	.0000	.0000	.0000
8825.12	9.91	.00	1.4450	.0000	.0000	.0000
8830.12	9.91	.00	1.3171	.0000	.0000	.0000
8835.12	9.91	.00	1.2009	.0000	.0000	.0000
8840.12	9.91	.00	1.0964	.0000	.0000	.0000
8845.12	9.91	.00	1.0037	.0000	.0000	.0000
8850.12	9.91	.00	.9239	.0000	.0000	.0000
8855.12	9.91	.00	.8591	.0000	.0000	.0000
8860.12	9.91	.00	.8129	.0000	.0000	.0000
8865.12	9.91	.00	.7902	.0000	.0000	.0000

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (NT/M <sup>2</sup> )	ATTACK ANGLE (DEG)	DRAG ALONG VELOCITY VECTOR (KG)	AERODYNAMIC LOAD (KG/M <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (KG)
8870.17	9.91	.00	.7936	.0000	.0000	.0000
8875.17	9.91	.00	.8260	.0000	.0000	.0000
8880.17	9.91	.00	.8482	.0000	.0000	.0000
8885.12	9.91	.00	.9793	.0000	.0000	.0000
8890.12	9.91	.00	1.0971	.0000	.0000	.0000
8895.12	9.91	.00	1.2394	.0000	.0000	.0000
8900.12	9.91	.00	1.4039	.0000	.0000	.0000
8905.12	9.91	.00	1.5892	.0000	.0000	.0000
8910.12	9.91	.00	1.7913	.0000	.0000	.0000
8915.12	9.91	.00	2.0120	.0000	.0000	.0000
8920.12	9.91	.00	2.2510	.0000	.0000	.0000
8925.12	9.91	.00	2.5013	.0000	.0000	.0000
8930.12	9.91	.00	2.6761	.0000	.0001	.0000
8935.17	9.91	.00	2.4141	.0000	.0000	.0000
8940.12	9.91	.00	1.9823	.0000	.0000	.0000
8945.12	9.91	.00	1.5807	.0000	.0000	.0000
8950.12	9.91	.00	1.2319	.0000	.0000	.0000
8955.12	9.91	.00	.9698	.0000	.0000	.0000
8956.42	9.91	.00	.9218	.0000	.0000	.0000
8956.92	9.91	.00	.9061	.0000	.0000	.0000
8960.12	9.91	.00	.8455	.0000	.0000	.0000
8965.17	9.91	.00	.7587	.0000	.0000	.0000
8970.12	9.91	.00	.6956	.0000	.0000	.0000
8975.12	9.91	.00	1.0211	.0000	.0000	.0000
8980.12	9.91	.00	1.5258	.0000	.0000	.0000
8985.12	9.91	.00	2.0913	.0000	.0000	.0000
8990.17	9.91	.00	2.5770	.0000	.0000	.0000
8995.12	9.91	.00	2.5454	.0000	.0000	.0000
9000.12	9.71	.00	1.9914	.0000	.0000	.0000
9005.12	9.91	.00	1.3388	.0000	.0000	.0000
9010.12	9.91	.00	.7010	.0000	.0000	.0000
9015.12	9.91	.00	.6848	.0000	.0000	.0000
9020.12	9.91	.00	.3354	.0000	.0000	.0000
9025.12	9.91	.00	.1975	.0000	.0000	.0000
9030.17	9.91	.00	.5453	.0000	.0000	.0000
9033.17	9.91	.00	1.0162	.0000	.0000	.0000
9035.12	9.91	.00	1.3333	.0000	.0000	.0000
9038.12	9.91	.00	1.7950	.0000	.0000	.0000
9040.17	9.92	.00	1.9345	.0000	.0000	.0000
9040.62	9.92	.00	1.8055	.0000	.0000	.0000
9044.62	9.95	.00	.9453	.0000	.0000	.0000
9045.12	9.95	.00	.9879	.0000	.0000	.0000

ULLAGE IGNITION  
02/M2 BURNER OFF

J-2 F-L INI  
ULL CUT OFF

REIGN

908 THR  
16H INI

\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (NT/M <sup>2</sup> )	ATTACK ANGLE OF (DEG)	DRAG ALONG VELOCITY VECTOR (KG)	AERODYNAMIC LOAD (KG/M <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (KG)
9050.12	9.99	.00	2.1519	.0000	.0000	.0000
9055.12	10.03	.00	5.9523	.0000	.0001	.0000
9060.12	10.07	.00	5.0660	.0000	.0001	.0000
9065.12	10.11	.00	5.4495	.0000	.0001	.0000
9070.12	10.15	.00	5.2954	.0000	.0001	.0000
9075.12	10.19	.00	5.2144	.0000	.0001	.0000
9080.12	10.23	.00	5.0648	.0000	.0001	.0000
9085.12	10.28	.00	4.9180	.0000	.0001	.0000
9090.12	10.32	.00	4.7639	.0000	.0001	.0000
9095.12	10.36	.00	4.6123	.0000	.0001	.0000
9100.12	10.40	.00	4.4606	.0000	.0001	.0000
9105.12	10.44	.00	4.3083	.0000	.0001	.0000
9110.12	10.49	.00	4.1601	.0000	.0001	.0000
9115.12	10.53	.00	4.0140	.0000	.0001	.0000
9120.12	10.57	.00	3.8715	.0000	.0001	.0000
9125.12	10.62	.00	3.7325	.0000	.0001	.0000
9130.12	10.66	.00	3.5977	.0000	.0001	.0000
9135.12	10.70	.00	3.4686	.0000	.0001	.0000
9140.12	10.74	.00	3.3454	.0000	.0001	.0000
9145.12	10.78	.00	3.2313	.0000	.0001	.0000
9150.12	10.82	.00	3.1277	.0000	.0001	.0000
9155.12	10.87	.00	3.0325	.0000	.0001	.0000
9160.12	10.91	.00	2.9492	.0000	.0001	.0000
9165.12	10.94	.00	2.8795	.0000	.0001	.0000
9170.12	10.98	.00	2.8214	.0000	.0001	.0000
9175.12	11.02	.00	2.7767	.0000	.0001	.0000
9180.12	11.06	.00	2.7445	.0000	.0001	.0000
9185.12	11.11	.00	2.7229	.0000	.0001	.0000
9190.12	11.15	.00	2.7246	.0000	.0001	.0000
9195.12	11.19	.00	2.7306	.0000	.0001	.0000
9200.12	11.23	.00	2.7387	.0000	.0001	.0000
9205.12	11.27	.00	2.7479	.0000	.0001	.0000
9210.12	11.31	.00	2.6164	.0000	.0001	.0000
9215.12	11.34	.00	2.1156	.0000	.0000	.0000
9220.12	11.38	.00	2.3002	.0000	.0000	.0000
9225.12	11.41	.00	2.3972	.0000	.0000	.0000
9230.12	11.44	.00	2.4952	.0000	.0000	.0000
9235.12	11.47	.00	2.5907	.0000	.0000	.0000
9240.12	11.50	.00	2.6838	.0000	.0000	.0000
9245.12	11.53	.00	2.7757	.0000	.0000	.0000
9250.12	11.54	.00	2.8662	.0000	.0000	.0000
9255.12	11.58	.00	2.9530	.0000	.0000	.0000

AS-507 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (NT/M <sup>2</sup> )	TOTAL ANGLE OF ATTACK (DEG)	DRAG ALONG VELOCITY VECTOR (KG)	AERODYNAMIC LOAD (KG/M <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (KG)
9260.12	11.60	.00	3.0352	.0000	.0000	.0000
9265.12	11.63	.00	3.1144	.0000	.0000	.0000
9270.12	11.64	.00	3.1901	.0000	.0000	.0000
9275.12	11.66	.00	3.2608	.0000	.0000	.0000
9280.12	11.68	.00	3.3266	.0000	.0000	.0000
9285.12	11.69	.00	3.3898	.0000	.0000	.0000
9290.12	11.71	.00	3.4483	.0000	.0000	.0000
9295.12	11.73	.00	3.5020	.0000	.0000	.0000
9300.12	11.75	.00	3.5516	.0000	.0000	.0000
9305.12	11.77	.00	3.5964	.0000	.0000	.0000
9310.12	11.78	.00	3.6365	.0000	.0000	.0000
9315.12	11.79	.00	3.6764	.0000	.0000	.0000
9320.12	11.81	.00	3.7162	.0000	.0000	.0000
9325.12	11.82	.00	3.7477	.0000	.0000	.0000
9330.12	11.82	.00	3.7756	.0000	.0000	.0000
9335.12	11.83	.00	3.8010	.0000	.0000	.0000
9340.12	11.84	.00	3.8277	.0000	.0000	.0000
9345.12	11.84	.00	3.8541	.0000	.0000	.0000
9350.12	11.84	.00	3.8999	.0000	.0000	.0000
9355.12	11.84	.00	3.9518	.0000	.0000	.0000
9360.12	11.84	.00	4.0218	.0000	.0000	.0000
9365.12	11.84	.00	4.1714	.0000	.0000	.0000
9370.12	11.84	.00	5.3303	.0000	.0000	.0000
9375.12	11.84	.00	5.0997	.0000	.0000	.0000
9380.12	11.85	.00	4.8897	.0000	.0000	.6000
9385.12	11.85	.00	4.7050	.0000	.0000	.5300
9390.12	11.84	.00	4.5381	.0000	.0000	.0000
9393.76	11.84	.00	4.4453	.0000	.0000	.0000
9393.97	11.86	.00	4.4421	.0000	.0000	.0000
9395.12	11.84	.00	4.4301	.0000	.0000	.0000
9400.12	11.77	.00	4.4005	.0000	.0000	.0000
9403.76	11.71	.00	4.4040	.0000	.0000	.0000

6C52

T87

TL1



\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (NT/M <sup>2</sup> )	TOTAL ANGLE OF ATTACK (DEG)	DRAG ALONG VELOCITY VECTOR (KG)	AERODYNAMIC LOAD (KG/M <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (KG)
9403.76	11.71	.00	4.4040	.0090	.0000	.0000
9413.76	11.56	.00	4.2978	.0070	.0000	.0000
9424.76	11.38	.00	4.2324	.0052	.0000	.0000
9435.76	11.21	.00	4.2223	.0039	.0000	.0000
9446.76	11.04	.00	4.2672	.0029	.0000	.0000
9457.76	10.90	.00	4.3642	.0022	.0000	.0700
9468.76	10.75	.00	4.5091	.0016	.0000	.0000
9479.76	10.60	.00	4.6965	.0012	.0000	.0000
9490.76	10.45	.00	4.9204	.0009	.0000	.0000
9501.76	10.33	.00	5.1752	.0006	.0000	.0000
9512.76	10.23	.00	5.4557	.0005	.0000	.0000
9523.76	10.12	.00	5.7572	.0003	.0000	.0000
9534.76	10.01	.00	6.0771	.0002	.0000	.0000
9544.64	9.93	.00	14.3424	.0002	.0000	.0000

CVS OFF

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.267 DEG.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	X POST COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	Y POST COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	Z POST COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	X VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)	Y VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)	Z VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)
00	6373324.8	19255.6	1177.3	-0.451	125.587	388.860
040	6373324.7	19305.9	1332.8	-0.057	125.582	388.863
5.00	6373344.4	19883.4	3121.7	8.930	125.727	388.887
10.00	6373416.5	20516.1	5066.1	20.168	127.262	388.878
15.00	6373548.7	21111.3	7010.4	33.000	127.585	388.883
20.00	6373749.1	21791.5	8957.8	47.425	127.371	390.235
25.00	6374025.7	22427.9	10914.5	63.522	127.164	392.761
30.00	6374387.3	23063.1	12868.7	81.398	126.944	397.261
35.00	6374842.9	23697.3	14891.2	101.142	126.701	404.185
40.00	6375401.9	24330.1	16935.3	122.810	126.444	413.983
45.00	6376074.1	24961.7	19036.8	146.389	126.198	427.265
50.00	6376868.9	25592.1	21214.7	171.807	125.959	444.600
55.00	6377795.1	26221.3	23490.3	198.959	125.727	466.414
60.00	6378861.2	26849.4	25887.1	227.733	125.503	493.144
65.00	6380074.7	27476.4	28430.4	257.886	5.283	525.052
69.00	6381155.9	27977.2	30588.1	282.727	5.122	554.363
70.00	6381441.7	28107.3	31146.4	288.960	5.080	562.221
75.00	6382964.9	28727.1	34061.9	320.517	124.858	604.945
80.00	6384449.2	29350.8	37205.9	353.433	124.628	653.744
85.00	6386501.4	29973.4	40611.4	387.605	124.395	709.675
85.37	6386647.2	30020.0	40878.3	390.198	124.378	714.175
90.00	6388526.2	30594.8	44315.6	422.379	124.184	773.376
95.00	6390724.7	31215.3	48359.6	456.879	124.001	845.727
100.00	6393093.7	31834.9	52787.9	490.648	123.836	927.052
105.00	6395631.2	32453.6	57643.6	524.383	123.672	1016.566
110.00	6398337.6	33071.3	62967.3	558.389	123.473	1114.098
115.00	6401217.7	33688.2	68796.6	593.658	123.196	1219.057
120.00	6404272.2	34303.4	75174.0	627.833	122.886	1333.632
125.00	6407494.4	34917.1	82149.4	661.115	122.586	1458.072
130.00	6410885.1	35529.3	89770.2	695.375	122.277	1591.829
135.00	6414400.0	36139.8	98094.6	730.761	121.924	1735.762
140.00	6418154.4	36748.5	107073.1	749.934	121.577	1858.861
145.00	6421949.4	37355.7	116685.3	768.104	121.274	1987.342
150.00	6425836.1	37961.2	126961.5	786.658	120.937	2124.218
155.00	6429816.9	38565.0	137942.9	805.746	120.586	2270.333
160.00	6433894.7	39167.0	149680.9	825.527	120.212	2426.686
164.88	6437906.1	39743.4	161715.4	845.718	119.829	2587.218
164.81	6437914.5	39744.6	161741.3	845.258	119.828	2587.557
165.00	6438073.4	39767.1	162228.3	845.764	119.813	2593.326
165.58	6438564.9	39836.8	163739.8	842.276	119.781	2598.475

TBI

MACH 1

MAX Q

S-1C CECO

S-1C OECO

TBJ

S-1C/S-11 SEP

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH#72.2. OEG.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	X POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	Y POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	Z POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	X VEL, COMP, SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)	Y VE, COMP, SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)	Z VEL, COMP, SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)
S-1C/S-II SEP	6438564.9	39836.8	163739.8	842.276	119.781	2598.475
S-II ENGINE START	6439093.7	39912.3	165376.9	836.368	119.751	2598.662
S-II MAINSTAGE	6441561.2	40271.3	173176.0	809.515	119.599	2607.952
	6442196.8	40345.5	175228.7	803.570	119.551	2606.746
	6446125.9	40622.3	188336.8	768.787	119.162	2638.088
	6449886.4	41557.2	201613.5	715.457	118.764	2672.717
	6453481.0	42150.0	216064.9	702.423	118.361	2707.923
	6456911.1	42740.8	228693.5	669.671	117.951	2743.594
	6460178.1	43329.5	242501.4	637.170	117.534	2779.645
	6462283.3	43916.1	256490.9	604.975	117.114	2816.223
	6466228.4	44500.6	270644.5	571.092	116.687	2853.334
	6466463.9	44544.7	271840.7	573.476	116.652	2856.411
	6469014.4	45083.0	285024.8	541.570	116.204	2890.763
	6471450.9	45662.1	299569.7	513.722	115.461	2926.899
	6474153.6	46237.7	314293.5	487.186	114.788	2962.784
	6476522.2	46809.9	329198.6	460.282	114.104	2999.306
	6478756.5	47378.8	344287.2	433.449	113.425	3036.231
	6480856.5	47944.3	359561.7	406.555	112.761	3073.629
	6482821.9	48506.3	375024.4	379.579	112.068	3111.525
	6484652.2	49065.1	390677.7	352.549	111.465	3149.914
	6486347.3	49621.0	406524.3	325.466	110.905	3188.800
	6487906.7	50174.2	422566.6	298.311	110.331	3228.206
	6489330.3	50724.7	438807.2	271.082	109.844	3268.142
	6490617.4	51272.6	455248.9	243.770	109.343	3308.622
	6491767.9	51818.1	471894.4	216.370	108.854	3349.669
	6492781.0	52361.2	488746.6	188.876	108.376	3391.310
	6493556.4	52901.9	505808.5	161.215	107.906	3433.558
	6494393.4	53440.3	523083.1	133.516	107.444	3476.414
	6494991.3	53976.4	540573.6	105.634	106.987	3519.884
	6495449.5	54510.2	558283.0	77.616	106.535	3563.976
	6495767.2	55041.7	576214.4	49.449	106.086	3608.702
	6495943.7	55571.0	594371.1	21.126	105.641	3654.075
	6495978.2	56098.1	612756.2	-7.365	105.199	3700.111
	6495869.7	56623.0	631373.3	-36.037	104.759	3746.831
	6495617.5	57145.7	650225.7	-64.903	104.324	3794.253
	6495220.4	57666.2	669317.0	-93.978	103.890	3842.396
	6494677.3	58184.6	688650.8	-123.277	103.457	3891.280
	6493987.2	58700.8	708231.0	-152.811	103.029	3940.921
	6493148.8	59214.9	728061.3	-182.597	102.605	3991.338
	6492160.8	59726.9	748148.7	-212.646	102.184	4042.550
	6491021.9	60236.8	768488.1	-242.975	101.765	4094.875
	6489730.6	60744.5	789092.8	-273.595	101.350	4147.939

INITIATE 16M

AS-809 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	X POSI COORD (M)	Y POSI COORD (M)	Z POSI COORD (M)	SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	X VEL. COMP. (M/S)	Y VEL. COMP. (M/S)	Z VEL. COMP. (M/S)
360.00	648285.4	61250.3	809911.9	-304.522	100.938	4201.169			
365.00	648668.8	61753.9	831105.9	-335.766	100.489	4255.766			
370.00	648992.1	62254.9	852523.3	-367.395	99.900	4311.328			
375.00	649310.2	62753.1	874220.7	-399.389	99.418	4367.809			
380.00	649632.6	63249.2	896202.9	-431.742	98.996	4425.245			
385.00	649954.2	63743.1	918474.8	-464.496	98.571	4483.672			
390.00	650276.9	64234.9	941041.3	-497.667	98.176	4543.117			
395.00	650597.8	64724.9	963907.7	-531.273	97.801	4603.609			
400.00	650917.4	65213.0	987079.2	-565.339	97.435	4665.179			
405.00	651235.7	65699.2	1010561.3	-599.828	97.083	4727.860			
410.00	651552.7	66183.8	1034359.6	-634.740	96.741	4791.658			
415.00	651868.3	66666.7	1058480.1	-670.522	96.410	4856.698			
420.00	652182.6	67147.9	1082928.6	-706.658	96.089	4922.931			
425.00	652495.7	67627.6	1107711.5	-743.374	95.776	4990.426			
430.00	652807.6	68105.7	1132835.0	-780.698	95.469	5059.227			
435.00	653118.1	68582.3	1158305.9	-818.658	95.173	5129.373			
440.00	653427.2	69057.4	1184131.0	-857.283	94.887	5200.909			
445.00	653734.7	69531.2	1210317.4	-896.600	94.607	5273.886			
450.00	654040.7	70003.5	1236872.3	-936.640	94.335	5348.359			
455.00	654345.0	70474.5	1263803.4	-977.442	94.077	5424.370			
460.00	654648.1	70944.3	1291118.6	-1019.041	93.827	5501.989			
465.00	654950.2	71412.6	1318824.7	-1061.314	93.582	5582.281			
470.00	655251.1	71879.6	1346868.2	-1061.580	93.573	5577.764			
475.00	655550.9	72346.5	1375224.7	-1105.318	93.388	5639.965			
480.00	655849.7	72811.0	1403874.2	-1146.676	93.092	5701.898			
485.00	656147.6	73273.6	1432799.3	-1187.469	92.706	5757.521			
490.00	656444.5	73734.2	1462001.3	-1229.825	92.332	5812.609			
495.00	656740.4	74192.8	1491484.1	-1272.063	91.928	5868.350			
500.00	657035.3	74649.5	1521251.8	-1314.992	91.525	5924.910			
505.00	657329.2	75104.3	1551308.7	-1359.106	91.142	5982.327			
510.00	657622.1	75557.3	1581659.2	-1404.202	90.773	6040.609			
515.00	657914.0	76008.5	1612307.4	-1450.154	90.415	6099.730			
520.00	658204.9	76457.9	1643257.9	-1496.877	90.068	6159.726			
525.00	658494.8	76905.8	1674515.5	-1544.357	89.731	6220.654			
530.00	658783.7	77352.0	1706084.9	-1592.621	89.406	6282.541			
535.00	659071.6	77796.8	1737971.2	-1641.704	89.094	6345.413			
540.00	659358.5	78240.0	1770179.6	-1691.638	88.797	6409.295			
545.00	659644.4	78681.9	1802715.0	-1742.449	88.512	6474.215			
550.00	659929.3	79122.4	1835583.2	-1794.165	88.239	6540.194			
555.00	660213.2	79561.7	1868789.2	-1846.805	87.980	6607.243			
560.00	660496.1	79999.7	1902338.6	-1900.382	87.736	6675.335			
565.00	660778.0	80436.6	1936236.6	-1954.928	87.507	6744.480			

9-11 CREU

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AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.
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TIME X POSI COORD Y POSI COORD Z POSI COORD X VEL. COMP. Y VEL. COMP. Z VEL. COMP.
FROM SPACE FIXED SPACE FIXED SPACE FIXED SPACE FIXED SPACE FIXED SPACE FIXED
FIRST EARTH CENTER EARTH CENTER EARTH CENTER EARTH CENTER EARTH CENTER EARTH CENTER
MOTION PLUMBLINE SYS PLUMBLINE SYS PLUMBLINE SYS PLUMBLINE SYS PLUMBLINE SYS
(SEC) (M) (M) (M/S) (M/S) (M/S)
.....
104 586.67 628400.2 7970.6 187999.6 -1918.937 87.687 6698.336
S-11/S-1VB SEP 887.78 628192.2 79802.0 1887191.9 -1928.814 87.861 6699.086
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AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

ENCLOSURE 4

TIME FROM MOTION (SEC)	X POSI COORD (M)	Y POSI COORD (M)	Z POSI COORD (M)	EARTH CENTER PLUMBLINE SYS	SPACE FIXED EARTH CENTER PLUMBLINE SYS	K VEL, COMP. (M/S)	SPACE FIXED EARTH CENTER PLUMBLINE SYS	Y VEL, COMP. (M/S)	SPACE FIXED EARTH CENTER PLUMBLINE SYS	Z VEL, COMP. (M/S)
S-11/S-1VB SEP	6281932.2	79802.8	1887191.9	-1928.514	07.561	6699.054				
S-1VB ENGINE START	6281884.0	79905.0	1887359.4	-1928.737	07.558	6698.994				
S-1VB MAINSTAGE	6277570.6	79999.6	1902258.5	-1948.517	07.337	6693.471				
S-1VB ULLAGE JETT	6271141.2	80285.0	1924168.2	-1978.209	07.008	6689.418				
	6267714.6	80435.0	1935710.8	-1994.564	06.857	6693.308				
	6258694.7	80823.0	196547.5	-2036.781	04.519	6704.199				
	6257624.0	80868.4	1989207.6	-2041.833	06.453	6705.484				
	6247293.1	81298.9	2002745.5	-2090.517	05.791	6717.738				
	6236719.2	81724.6	2036385.2	-2139.119	05.281	6730.159				
	6225901.2	82151.8	2070066.9	-2188.169	04.819	6742.510				
	6214836.9	82574.9	210381.0	-2237.566	04.407	6754.731				
	6203525.0	82995.9	2137613.9	-2287.245	04.027	6766.829				
	6191964.1	83415.2	2171478.0	-2337.190	03.670	6778.819				
	6180152.7	83832.7	2205401.9	-2387.394	03.330	6790.721				
	6168089.7	84248.5	2239384.8	-2437.844	02.999	6802.437				
	6155773.9	84662.7	2273426.0	-2488.529	02.673	6814.030				
	6143204.0	85075.2	2307524.9	-2539.470	02.351	6825.544				
	6130378.8	85486.2	2351681.1	-2590.446	02.029	6836.893				
	6117297.1	85895.5	2395893.5	-2642.059	01.707	6848.102				
	6103957.9	86303.2	2440161.7	-2693.707	01.384	6859.187				
	6090359.7	86709.3	2484485.0	-2745.598	01.059	6870.150				
	6076501.4	87113.8	2478862.8	-2797.732	00.730	6880.989				
	6062381.9	87516.6	2513294.6	-2850.130	00.399	6891.760				
	6047999.7	87917.8	2547780.1	-2902.783	00.065	6902.420				
	6033.53.7	88317.3	2582318.4	-2955.673	7.728	6912.900				
	6018412.7	88715.1	2616908.7	-3008.791	7.390	6923.252				
	6003265.6	89111.2	2651550.5	-3062.138	7.049	6933.476				
	5987820.4	89505.6	2686242.9	-3116.297	78.749	6943.328				
	5972102.1	89898.7	2720983.4	-3170.958	78.473	6952.938				
	5956111.3	90290.3	2755772.2	-3225.384	78.183	6962.615				
	5939848.4	90680.5	2790609.4	-3279.790	77.887	6972.266				
	5923313.6	91069.2	2825494.7	-3334.127	77.580	6981.915				
	5906507.2	91456.3	2860428.4	-3388.419	77.261	6991.552				
	5895113.7	91714.3	2883822.8	-3424.729	77.050	6997.986				
S-1VB GCSI	5894394.3	91730.5	2885292.3	-3426.958	77.036	6998.272				
S-1VB TBS	5889432.1	91841.8	2895404.0	-3439.098	76.870	6992.689				
	5872132.9	92224.6	2930316.1	-3480.571	76.286	6972.172				
	5860445.7	92479.1	2953611.9	-3508.244	75.893	6958.307				

\*\* ENCLOSURE 4 \*\*  
AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM NOTION (SEC)	X POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	Y POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	Z POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	X VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)	Y VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)	Z VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)
713.12	5861217.1	97456.1	2952085.6	-3506.421	75.902	6959.224
722.12	5829323.4	93141.0	3014547.2	-3580.629	74.858	6921.395
732.12	5793106.4	93803.6	3083547.1	-3662.577	73.669	6878.436
743.12	5752324.4	94686.7	3158944.7	-3752.167	72.348	6830.063
754.12	5710560.4	95475.2	3233803.9	-3841.097	71.016	6780.524
765.12	5667821.9	96249.0	3308111.7	-3929.377	69.671	6729.835
776.12	5624115.9	97007.9	3381855.8	-4016.997	68.314	6678.015
787.12	5579449.8	97751.9	3455023.5	-4103.933	66.946	6625.055
798.12	5533831.4	98490.7	3527602.3	-4190.151	65.566	6570.934
809.12	5487224.2	101361.9	3624455.3	-4542.763	59.674	6332.516
932.12	4904787.6	106100.0	4359847.5	-5178.761	47.909	5824.413
1020.12	4423116.9	109777.7	4847685.7	-5758.345	35.593	5252.729
1108.12	3893158.6	112351.8	5282643.6	-6275.214	22.848	4623.680
1196.12	3320684.9	113790.1	5659694.9	-6723.721	9.802	3944.087
1284.12	2711933.6	114071.9	5975535.7	-7098.950	-3.415	3221.328
1372.12	2073540.8	113187.9	6225886.4	-7396.773	-16.669	2463.257
1460.12	1412469.4	111141.0	6408274.2	-7613.898	-29.825	1678.125
1548.12	735933.7	107945.5	6520692.8	-7747.908	-42.748	874.492
1636.12	51320.4	103628.0	6561898.7	-7797.291	-55.304	-753.053
1724.12	-633889.2	98226.6	6531427.3	-7761.464	-67.362	-1559.151
1812.12	-1312206.6	91790.6	6429597.9	-7640.777	-78.795	-2348.321
1900.12	-1976213.5	84380.5	6257512.7	-7436.520	-89.482	-3111.901
1988.12	-2618646.6	76066.9	6017043.8	-7150.906	-99.309	-3841.503
2076.12	-3232476.7	66930.5	5710814.5	-6787.049	-108.168	-4529.116
2164.12	-3810987.7	57060.6	5342170.6	-6348.932	-115.963	-5167.189
2252.12	-4347850.3	46554.8	4915143.1	-5841.363	-122.607	-5748.723
2340.12	-4837192.7	35517.7	4434403.7	-5269.922	-128.026	-6267.347
2428.12	-5273665.9	24060.1	3905213.3	-4640.889	-132.156	-6717.392
2516.12	-5652501.6	12297.5	3333362.6	-3961.182	-134.948	-7093.949
2604.12	-5969565.3	349.5	2725108.4	-3238.269	-136.367	-7392.926
2692.12	-6221401.2	-11662.1	2087103.8	-2480.087	-136.389	-7611.090
2780.12	-6405269.1	-23613.9	1426324.6	-1694.952	-135.008	-7746.098
2868.12	-6519173.6	-35382.5	719991.9	-891.463	-132.230	-7745.521
2956.12	-6561885.3	-48846.1	65493.3	-78.407	-128.078	-7761.856
3044.12	-6532952.4	-57884.9	-619699.0	735.337	-122.585	-7642.525
3132.12	-6432705.6	-68383.2	-1298108.8	1540.893	-115.603	-7439.871
3220.12	-6262252.4	-78230.1	-1962338.2	2329.487	-107.793	-7156.139
3308.12	-6023464.7	-87321.0	-2605144.7	3092.539	-98.632	-6830.456
3396.12	-5749273.4	-94847.0	-3145030.8	3757.070	-89.379	-6401.314
3476.12	-5387892.7	-102230.5	-3747757.8	4448.636	-78.274	-5902.473
3564.12	-4967738.0	-108597.8	-4289616.4	5091.631	-66.304	-5339.378
3652.12	-44993395.1	-113878.1	-4784707.0	5679.072	-53.588	

TIME FROM FIRST MOTION (SEC)	X POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	Y POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	Z POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	X VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)	Y VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)	Z VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)
3740.12	-3970038.3	-118011.1	-5227640.1	6204.576	-40.252	-4718.154
3828.13	-3403374.4	-120948.2	-5613594.3	6662.433	-26.431	-4045.574
3916.12	-2799581.0	-122652.7	-5938368.4	7047.661	-12.262	-3328.960
4004.17	-2165239.9	-123100.4	-6198427.3	7356.067	2.109	-2576.113
4092.12	-1507265.7	-122279.9	-6390940.9	7584.291	16.535	-1795.234
4180.12	-832810.5	-120193.0	-6513814.9	7729.843	30.868	-994.831
4268.12	-149285.8	-116854.2	-6568713.7	7791.135	44.960	-183.631
4356.12	535917.2	-112291.4	-6546076.2	7767.498	58.663	629.517
4444.12	1215309.3	-106545.1	-6455121.1	7659.193	71.833	1435.743
4532.12	1881485.4	-99668.4	-6293846.1	7467.408	84.332	2226.246
4620.12	2527185.0	-91726.3	-6064015.6	7194.247	96.025	2992.401
4708.12	3145372.6	-82795.3	-5768142.8	6842.707	106.788	3725.848
4796.12	3729314.2	-72962.4	-5409440.3	6416.643	116.503	4418.591
4884.12	4272651.6	-62324.6	-4991885.8	5920.728	125.065	5063.085
4972.12	4769471.6	-50987.7	-4519978.3	5360.396	132.378	5652.317
5060.12	5214370.8	-39065.1	-3998886.9	4741.780	138.360	6179.889
5148.12	5602512.4	-26677.2	-3434294.7	4071.645	142.943	6640.079
5236.12	5929682.1	-13949.9	-2832355.8	3357.309	146.070	7027.913
5324.12	6192329.7	-1012.8	-2199627.7	2606.563	147.703	7339.205
5412.12	6387688.1	12001.3	-1542999.6	1827.583	147.817	7570.611
5500.12	6513403.6	24958.1	-869616.9	1028.837	146.402	7719.653
5588.12	6568357.4	37723.3	-186804.0	219.001	143.464	7784.747
5676.12	6551879.4	50163.7	498015.3	-593.143	139.026	7765.216
5764.12	6464154.1	62149.0	1177397.7	-1398.794	133.126	7661.296
5852.12	6306137.5	73552.5	1843960.4	-2189.228	125.815	7474.126
5940.12	6079546.8	84253.0	2490460.4	-2955.889	117.161	7205.739
6028.12	5786841.4	94135.8	3109872.1	-3690.477	107.246	6859.039
6116.12	5431196.6	103094.1	3695462.6	-4385.035	96.165	6437.768
6204.12	5016470.2	111029.8	4240863.9	-5032.030	84.025	5946.470
6292.12	4547160.6	117894.9	4740141.4	-5624.436	70.945	5390.444
6372.12	4077424.2	123030.7	5149419.7	-6110.180	58.346	4833.832
6460.12	3518505.2	127531.3	5546012.1	-6581.014	43.839	4171.433
6548.12	2921263.1	130730.5	5882254.4	-6980.361	28.793	3463.477
6636.12	2292187.8	132587.5	615471.6	-7303.833	13.360	2717.633
6724.12	1638119.4	133075.2	6359682.6	-7547.660	-2.300	1941.990
6812.12	966175.0	132180.7	6495634.0	-7709.728	-18.026	1149.977
6900.12	283671.4	129905.4	6560825.7	-7787.616	-33.656	335.278
6988.12	-401954.6	126265.0	6554528.9	-7780.620	-49.024	-478.280
7076.12	-1083227.6	121289.7	6476795.4	-7688.766	-63.968	-1286.805
7164.12	-2272715.4	115023.7	6328457.7	-7513.016	-78.337	-2081.451
7252.12	-3483111.6	107525.3	611121.9	-7255.256	-91.954	-2853.514
7340.12	-4827315.7	98865.7	5827149.6	-6918.283	-104.695	-3594.830



.. ENCLOSURE 4 ..

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	X POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	Y POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	Z POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	X VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)	Y VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)	Z VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)
742.12	-3618512.4	89129.0	5479633.4	-6505.770	-116.412	-4296.374
751.62	-4176246.7	78411.0	5072362.4	-6022.230	-126.977	-4951.351
760.42	-4676495.8	66818.4	4609780.8	-5472.961	-136.271	-5552.284
769.22	-5131735.3	54467.6	4096938.6	-4863.987	-144.191	-6092.598
778.02	-5531000.8	41483.8	3539435.1	-4201.989	-150.645	-6566.390
786.82	-5869941.7	27999.3	2943357.2	-3494.227	-155.558	-6968.494
795.62	-6144868.9	14152.5	2318211.6	-2748.459	-158.870	-7294.542
804.42	-6352794.4	86.3	1661852.9	-1972.851	-160.538	-7541.005
813.22	-6491463.3	-14053.2	990407.7	-1175.885	-160.536	-7705.232
822.02	-6559378.0	-28118.7	308196.4	-366.264	-158.855	-7785.476
830.82	-6555812.8	-41962.7	-377347.3	447.182	-155.504	-7780.907
839.62	-6480821.0	-55439.2	-1058757.2	1255.594	-150.510	-7691.619
848.42	-6403239.3	-63171.7	-1456449.8	1727.351	-146.803	-7599.410
857.22	-6383693.2	-64781.9	-1539916.7	1826.357	-145.949	-7576.188
866.02	-6381862.4	-64927.8	-1547491.8	1838.342	-143.870	-7574.013

TIME BASE 6

.. ENCLOSURE 4 ..  
 A4-5C4 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG, 1ST OPP.

TIME FROM MOTION (SEC)	X POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	Y POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	Z POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	X VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)	Y VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)	Z VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)
0460.12	-6381862.4	-84927.8	-1547491.8	1835.342	-145.870	-7574.013
0465.12	-6372573.4	-65656.1	-1585334.4	1880.230	-145.472	-7562.978
0470.12	-6363060.2	-66382.5	-1623121.2	1925.050	-145.070	-7551.678
0475.12	-6353323.0	-67106.8	-1660850.7	1969.802	-144.662	-7540.112
0480.12	-6343367.2	-67829.1	-1698521.8	2014.484	-144.249	-7528.281
0485.12	-6333178.3	-68549.3	-1736133.1	2059.087	-143.832	-7516.187
0490.12	-6322771.5	-69267.4	-1773683.3	2103.615	-143.409	-7503.830
0495.12	-6312142.2	-69983.4	-1811171.0	2148.073	-142.982	-7491.208
0500.12	-6301290.9	-70697.2	-1848594.9	2192.461	-142.549	-7478.321
0502.12	-6296888.2	-70982.1	-1863546.3	2210.194	-142.375	-7473.093
0502.32	-6296446.1	-71010.6	-1865040.5	2211.964	-142.357	-7472.568
0505.12	-6290217.7	-71408.9	-1885953.7	2236.771	-142.112	-7465.171
0510.12	-6278923.3	-72118.3	-1923246.2	2281.002	-141.670	-7451.759
0515.12	-6267407.9	-72825.5	-1960470.9	2325.153	-141.222	-7438.085
0520.12	-6255671.9	-73530.5	-1997626.6	2369.221	-140.770	-7424.150
0525.12	-6243715.8	-74233.2	-2034712.0	2413.206	-140.313	-7409.955
0530.12	-6231540.0	-74933.7	-2071725.7	2457.105	-139.851	-7395.498
0535.12	-6219144.9	-75631.8	-2108666.5	2500.918	-139.385	-7380.782
0540.12	-6206530.9	-76327.5	-2145533.1	2544.642	-138.908	-7365.807
0545.12	-6193498.6	-77020.8	-2182324.1	2588.276	-138.420	-7350.573
0550.12	-6180648.3	-77711.7	-2219038.4	2631.819	-137.938	-7335.081
0555.12	-6167380.6	-78400.2	-2255674.5	2675.272	-137.452	-7319.330
0560.12	-6153895.7	-79086.2	-2292231.2	2718.633	-136.962	-7303.321
0565.12	-6140194.4	-79769.8	-2328707.3	2761.897	-136.466	-7287.056
0570.12	-6126277.0	-80450.9	-2365101.4	2805.059	-135.966	-7270.536
0575.12	-6112144.0	-81129.5	-2401412.2	2848.123	-135.461	-7253.762
0580.12	-6097795.9	-81805.5	-2437638.6	2891.085	-134.952	-7236.732
0585.12	-6083233.3	-82479.0	-2473779.1	2933.946	-134.437	-7219.448
0590.12	-6068454.6	-83149.9	-2509832.7	2976.703	-133.918	-7201.911
0595.12	-6053466.4	-83818.1	-2545797.8	3019.355	-133.395	-7184.121
0600.12	-6038243.2	-84483.8	-2581673.4	3061.901	-132.866	-7166.078
0605.12	-6022847.6	-85146.8	-2617458.2	3104.338	-132.333	-7147.784
0610.12	-6007220.1	-85807.1	-2653150.8	3146.666	-131.796	-7129.239
0615.12	-5991381.1	-86464.7	-2688750.2	3188.883	-131.254	-7110.443
0620.12	-5975331.4	-87119.6	-2724254.9	3230.988	-130.707	-7091.398
0625.12	-5959071.4	-87771.8	-2759663.7	3272.978	-130.156	-7072.104
0630.12	-5942601.8	-88421.2	-2794975.5	3314.854	-129.600	-7052.561
0635.12	-5925923.1	-89067.8	-2830188.9	3356.610	-129.040	-7032.771
0640.12	-5909035.9	-89711.6	-2865302.8	3398.244	-128.475	-7012.737
0645.12	-5891940.9	-90352.5	-2900315.9	3439.759	-127.905	-6992.456
0650.12	-5874638.6	-90990.6	-2935226.9	3481.156	-127.331	-6971.928
0655.12	-5857129.5	-91625.8	-2970034.7	3522.432	-126.753	-6951.154

D2/M2 BURNER ON  
 ENGINE OFF

\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM MOTION (SEC)	X POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	Y POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	Z POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	X VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)	Y VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)	Z VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)
8650.12	-5839414.4	-92258.2	-3004738.1	3583.584	-126.170	-6930.136
8665.12	-5821493.9	-92887.5	-3039335.7	3604.611	-125.583	-6908.875
8670.12	-5803368.6	-93514.0	-3073826.4	3645.510	-124.991	-6887.371
8675.12	-5785039.0	-94137.4	-3108209.0	3686.281	-124.393	-6865.625
8680.12	-5766505.9	-94757.9	-3142482.2	3726.922	-123.777	-6843.638
8685.12	-5747770.0	-95375.2	-3176645.0	3767.432	-123.172	-6821.411
8690.12	-5728831.8	-95989.6	-3210696.0	3807.810	-122.563	-6798.945
8695.12	-5709692.1	-96600.9	-3244634.0	3848.053	-121.949	-6776.239
8700.12	-5690351.5	-97209.1	-3278458.0	3888.160	-121.332	-6753.296
8705.12	-5670810.7	-97814.2	-3312166.6	3928.131	-120.710	-6730.116
8710.12	-5651070.4	-98416.2	-3345758.7	3967.964	-120.084	-6706.699
8715.12	-5631131.3	-99015.0	-3379233.2	4007.656	-119.463	-6683.047
8720.12	-5610994.1	-99610.7	-3412588.8	4047.208	-118.819	-6659.160
8725.12	-5590659.5	-100203.2	-3445824.4	4086.617	-118.180	-6635.039
8730.12	-5570128.2	-100792.5	-3478938.8	4125.882	-117.537	-6610.686
8735.12	-5549400.9	-101378.5	-3511930.9	4165.002	-116.890	-6586.100
8740.12	-5528478.4	-101961.4	-3544799.4	4203.975	-116.239	-6561.284
8745.12	-5507361.4	-102540.9	-3577543.3	4242.800	-115.583	-6536.236
8750.12	-5486050.7	-103117.2	-3610161.4	4281.476	-114.924	-6510.960
8755.12	-5464546.9	-103690.1	-3642652.6	4320.001	-114.260	-6485.455
8760.12	-5442850.9	-104259.8	-3675015.6	4358.375	-113.593	-6459.722
8765.12	-5420963.4	-104826.1	-3707249.4	4396.594	-112.921	-6433.762
8770.12	-5398885.2	-105389.0	-3739352.8	4434.659	-112.245	-6407.576
8775.12	-5376617.1	-105948.5	-3771324.8	4472.568	-111.566	-6381.166
8780.12	-5354159.8	-106504.6	-3803164.1	4510.319	-110.882	-6354.531
8785.12	-5331514.1	-107057.3	-3834869.7	4547.912	-110.195	-6327.674
8790.12	-5308680.9	-107606.6	-3866440.5	4585.345	-109.503	-6300.594
8795.12	-5285661.0	-108152.4	-3897875.3	4622.616	-108.808	-6273.293
8800.12	-5262455.1	-108694.6	-3929173.0	4659.724	-108.106	-6245.771
8805.12	-5239064.0	-109233.4	-3960332.6	4696.669	-107.392	-6218.031
8810.12	-5215488.6	-109768.6	-3991353.0	4733.448	-106.681	-6190.072
8815.12	-5191729.8	-110300.2	-4022233.0	4770.060	-105.970	-6161.895
8820.12	-5167788.3	-110828.3	-4052971.6	4806.505	-105.255	-6133.503
8825.12	-5143665.1	-111352.7	-4083567.7	4842.780	-104.537	-6104.899
8830.12	-5119360.8	-111873.6	-4114020.2	4878.885	-103.815	-6076.072
8835.12	-5094876.5	-112390.9	-4144328.0	4914.819	-103.089	-6047.036
8840.12	-5070212.9	-112904.5	-4174490.2	4950.579	-102.360	-6017.788
8845.12	-5045370.9	-113414.5	-4204505.6	4986.165	-101.627	-5988.329
8850.12	-5020351.6	-113920.8	-4234373.1	5021.576	-100.890	-5958.659
8855.12	-4995155.5	-114423.4	-4264091.7	5056.810	-100.150	-5928.780
8860.12	-4969783.7	-114922.3	-4293660.6	5091.866	-99.406	-5898.693
8865.12	-4944237.1	-115417.4	-4323078.4	5126.743	-98.659	-5868.399

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM MOTION (SEC)	X POST COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	Y POST COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	Z POST COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	X VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)	Y VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)	Z VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)
8870.12	-4918516.6	-115908.9	-4352344.2	5161.440	-97.908	-5837.898
8875.12	-4972623.1	-116396.5	-4381457.0	5195.955	-97.154	-5807.193
8880.12	-4866557.4	-116880.4	-4410415.7	5230.287	-96.396	-5776.284
8885.12	-4890320.5	-117360.5	-4439219.5	5264.435	-95.634	-5745.172
8890.12	-4813913.3	-117836.7	-4467867.2	5298.398	-94.869	-5713.859
8895.12	-4787336.8	-118309.1	-4496357.7	5332.174	-94.101	-5682.345
8900.12	-4760591.9	-118777.7	-4524690.2	5365.763	-93.329	-5650.631
8905.12	-4733679.5	-119242.4	-4552663.7	5399.164	-92.554	-5618.719
8910.12	-4706600.6	-119703.3	-4580877.1	5432.374	-91.775	-5586.610
8915.12	-4679356.1	-120160.2	-4608729.5	5465.393	-90.993	-5554.304
8920.12	-4651946.9	-120613.2	-4636419.9	5498.220	-90.208	-5521.804
8925.12	-4624374.2	-121062.2	-4663947.2	5530.853	-89.419	-5489.111
8930.12	-4596638.7	-121507.4	-4691310.6	5563.288	-88.618	-5456.228
8935.12	-4568741.6	-121948.4	-4718509.2	5595.527	-87.803	-5423.153
8940.12	-4540683.8	-122385.4	-4745541.9	5627.573	-87.005	-5389.885
8945.12	-4512466.2	-122818.5	-4772407.7	5659.422	-86.204	-5356.427
8950.12	-4484089.9	-123247.5	-4799105.8	5691.071	-85.400	-5322.781
8955.12	-4455555.9	-123672.4	-4825635.2	5722.521	-84.592	-5288.948
8956.42	-4440111.7	-123782.3	-4832504.7	5730.664	-84.362	-5280.121
8956.92	-4445245.6	-123824.4	-4835143.9	5733.794	-84.301	-5276.724
8960.12	-4426865.0	-124093.4	-4851995.0	5753.778	-83.784	-5254.938
8965.12	-4398018.4	-124510.3	-4878184.2	5784.836	-82.994	-5220.745
8970.12	-4369016.9	-124923.3	-4904202.1	5815.690	-82.191	-5186.370
8975.12	-4339861.8	-125332.2	-4930047.6	5846.340	-81.372	-5151.812
8980.12	-4310553.9	-125737.0	-4955719.9	5876.785	-80.549	-5117.074
8985.12	-4281094.3	-126137.7	-4981218.1	5907.023	-79.723	-5082.156
8990.12	-4251484.0	-126534.2	-5006541.2	5937.053	-78.879	-5047.060
8995.12	-4221724.1	-126926.5	-5031688.4	5966.874	-78.023	-5011.786
9000.12	-4191815.6	-127314.4	-5056658.7	5996.486	-77.173	-4976.336
9005.12	-4161759.6	-127698.2	-5081451.4	6025.887	-76.335	-4940.711
9010.12	-4131557.1	-128077.8	-5106065.6	6055.077	-75.495	-4904.913
9015.12	-4101209.2	-128453.2	-5130500.3	6084.053	-74.653	-4868.943
9020.12	-4070716.9	-128824.4	-5154754.7	6112.816	-73.827	-4832.801
9025.12	-4040081.4	-129191.4	-5178828.1	6141.363	-73.004	-4796.489
9030.12	-4009303.7	-129554.4	-5202719.4	6169.695	-72.186	-4760.009
9033.12	-3990769.2	-129770.1	-5216966.4	6186.616	-71.654	-4738.060
9035.12	-3978384.7	-129913.1	-5226427.9	6197.874	-71.313	-4723.410
9038.12	-3959765.7	-130126.2	-5240565.1	6214.739	-70.797	-4701.417
9040.12	-3947323.8	-130267.5	-5249954.2	6228.591	-70.385	-4688.698
9040.62	-3944208.3	-130302.6	-5252298.0	6233.475	-70.259	-4686.582
9044.62	-3919194.6	-130582.5	-5271012.1	6273.415	-69.836	-4670.592
9045.12	-3916056.7	-130617.5	-5273346.9	6278.421	-69.805	-4668.615

ULLAGE IGNITION  
02/M2 BURNER OFF

J-2 F-L IMI  
ULL CUT OFF

REIGA

908 THR  
16M IMI

\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM MOTION (SEC)	X POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	Y POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	Z POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	X VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)	Y VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)	Z VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)
9050.12	-3884539.2	-120965.1	-5296640.6	6328.716	-69.195	-4648.735
9055.12	-3852766.0	-131309.4	-5319830.0	6380.850	-68.513	-4626.657
9060.12	-3820730.2	-131650.2	-5342907.2	6433.443	-67.815	-4604.343
9065.12	-3788431.2	-131987.4	-5365873.1	6486.176	-67.035	-4581.926
9070.12	-3755868.3	-132320.4	-5388726.2	6539.011	-66.187	-4559.314
9075.12	-3723041.1	-132649.1	-5411465.9	6591.878	-65.276	-4536.564
9080.12	-3689949.5	-132973.1	-5434091.6	6644.757	-64.309	-4513.682
9085.12	-3656593.5	-133292.1	-5456602.6	6697.643	-63.291	-4490.679
9090.12	-3622973.0	-133605.9	-5478998.2	6750.533	-62.229	-4467.560
9095.12	-3589088.2	-133914.4	-5501278.0	6803.424	-61.129	-4444.323
9100.12	-3554938.8	-134217.2	-5523441.2	6856.318	-59.992	-4420.973
9105.12	-3520524.9	-134514.2	-5545487.6	6909.227	-58.820	-4397.520
9110.12	-3485846.5	-134805.3	-5567416.3	6962.156	-57.616	-4373.969
9115.12	-3450903.3	-135090.3	-5589227.1	7015.109	-56.380	-4350.325
9120.12	-3415695.3	-135369.1	-5610919.4	7068.090	-55.114	-4326.591
9125.12	-3380222.4	-135641.4	-5632492.9	7121.098	-53.820	-4302.770
9130.12	-3344444.3	-135907.2	-5653947.0	7174.133	-52.494	-4278.867
9135.12	-3308481.0	-136166.3	-5675281.4	7227.188	-51.139	-4254.881
9140.12	-3272212.4	-136418.6	-5696495.6	7280.265	-49.753	-4230.815
9145.12	-3235678.3	-136663.8	-5717589.4	7333.364	-48.339	-4206.674
9150.12	-3198878.7	-136901.9	-5738562.2	7386.485	-46.894	-4182.457
9155.12	-3161813.5	-137132.7	-5759413.9	7439.633	-45.417	-4158.173
9160.12	-3124482.3	-137356.0	-5780143.9	7492.811	-43.912	-4133.823
9165.12	-3086885.3	-137571.7	-5800752.0	7546.017	-42.374	-4109.409
9170.12	-3049022.2	-137779.7	-5821237.9	7599.249	-40.806	-4084.932
9175.12	-3010922.7	-137979.7	-5841601.2	7652.508	-39.206	-4060.394
9180.12	-2972489.8	-138171.6	-5861845.4	7705.130	-37.501	-4037.500
9185.12	-2933801.1	-138354.7	-5881976.2	7766.382	-35.759	-4014.819
9190.12	-2894825.8	-138529.1	-5901993.5	7823.760	-33.961	-3992.085
9195.12	-2855563.3	-138694.5	-5921897.0	7881.266	-32.165	-3969.304
9200.12	-2816012.9	-138850.7	-5941686.4	7938.908	-30.314	-3946.480
9205.12	-2776174.0	-138997.6	-5961361.7	7996.691	-28.432	-3923.619
9210.12	-2736045.7	-139134.9	-5980922.6	8054.621	-2.507	-3900.729
9215.12	-2695627.4	-139263.6	-6000368.8	8112.663	-25.042	-3877.874
9220.12	-2654918.8	-139385.1	-6019701.6	8170.811	-23.557	-3855.196
9225.12	-2613919.0	-139499.0	-6038920.7	8229.149	-21.985	-3832.426
9230.12	-2572627.0	-139604.8	-6058025.7	8287.686	-20.335	-3809.609
9235.12	-2531041.7	-139702.2	-6077016.7	8346.425	-18.611	-3786.748
9240.12	-2489162.3	-139790.8	-6095893.2	8405.375	-16.813	-3763.844
9245.12	-2446987.7	-139870.2	-6114655.1	8464.544	-14.939	-3740.900
9250.12	-2404516.5	-139940.1	-6133302.1	8523.942	-12.986	-3717.917
9255.12	-2361747.8	-140000.0	-6151834.2	8583.578	-10.955	-3694.898

.. ENCLOSURE 4 ..  
 AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM MOTION (SEC)	X POST COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	Y POST COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	Z POST COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	X VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)	Y VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)	Z VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)
9260.12	-2318680.3	-140049.5	-6170251.1	8443.463	-8.844	-3471.844
9265.12	-2275312.8	-140088.3	-6188552.6	8703.607	-6.654	-3648.757
9270.12	-2231643.8	-140115.9	-6206738.6	8764.024	-4.382	-3625.636
9275.12	-2187672.1	-140132.0	-6224808.9	8824.724	-2.029	-3602.482
9280.12	-2143396.1	-140136.1	-6242763.3	8885.721	.406	-3579.295
9285.12	-2098814.3	-140127.8	-6260601.7	8947.028	2.926	-3556.070
9290.12	-2053925.2	-140106.7	-6278323.9	9008.660	5.532	-3532.807
9295.12	-2008727.2	-140072.3	-6295929.7	9070.634	8.226	-3509.504
9300.12	-1963218.3	-140024.2	-6313418.9	9132.964	11.009	-3486.157
9305.12	-1917396.9	-139962.1	-6330791.2	9195.671	13.884	-3462.760
9310.12	-1871261.0	-139885.3	-6348046.4	9258.771	16.851	-3439.307
9315.12	-1824808.6	-139793.4	-6365184.1	9322.220	19.910	-3415.767
9320.12	-1778038.0	-139686.0	-6382204.0	9386.098	23.073	-3392.150
9325.12	-1730946.9	-139562.5	-6399105.5	9450.431	26.337	-3368.450
9330.12	-1683532.9	-139422.4	-6415888.3	9515.241	29.701	-3344.657
9335.12	-1635793.7	-139265.3	-6432551.9	9580.552	33.165	-3320.757
9340.12	-1587726.5	-139090.6	-6449095.7	9646.389	36.731	-3296.732
9345.12	-1539328.8	-138897.8	-6465519.0	9712.781	40.401	-3272.559
9350.12	-1490597.7	-138686.4	-6481821.0	9779.759	44.178	-3248.211
9355.12	-1441530.2	-138455.9	-6498000.7	9847.351	48.067	-3223.660
9360.12	-1392123.2	-138205.6	-6514057.2	9915.571	52.069	-3198.865
9365.12	-1342373.2	-137935.0	-6529988.9	9984.506	56.184	-3173.812
9370.12	-1292275.9	-137643.2	-6545791.2	10054.647	60.580	-3146.616
9375.12	-1241825.6	-137329.1	-6561454.8	10125.572	65.060	-3118.896
9380.12	-1191019.2	-136992.5	-6576980.8	10197.063	69.580	-3091.558
9385.12	-1139854.0	-136633.2	-6592371.1	10269.151	74.147	-3064.598
9390.12	-1088326.7	-136251.0	-6607627.4	10341.865	78.765	-3038.029
9393.76	-1056608.0	-135958.3	-6618644.5	10395.179	82.160	-3018.967
9393.97	-1048425.1	-135941.0	-6619278.2	10397.989	82.341	-3017.796
9395.12	-1036442.9	-135846.0	-6622749.7	10400.226	82.577	-3007.865
9400.12	-984424.7	-135430.9	-6637679.5	10406.961	83.441	-2994.058
9403.76	-946537.6	-135126.3	-6648404.2	10411.604	84.064	-2992.203

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00 ENCLOSURE 4 00  
 49-504 (R) DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=2.067 DEG. 1ST OPP.

TIME	X POSI COORD	Y POSI COORD	Z POSI COORD	X VEL. COMP.	Y VEL. COMP.	Z VEL. COMP.
FROM	SPACE FIXED	SPACE FIXED	SPACE FIXED	SPACE FIXED	SPACE FIXED	SPACE FIXED
FIRST	EARTH CENTER	EARTH CENTER	EARTH CENTER	EARTH CENTER	EARTH CENTER	EARTH CENTER
MODION	PLUMBIN SYS	PLUMBIN SYS	PLUMBIN SYS	PLUMBIN SYS	PLUMBIN SYS	PLUMBIN SYS
(SEC)	(M)	(M)	(M)	(M/S)	(M/S)	(M/S)
9103.74	93657.6	-13517.3	-158994.2	10411.604	84.064	-2932.203
943.76	-842381.3	-134277.1	-67288.7	10423.401	85.745	-2844.765
947.4074	-727460.0	-133323.5	-708052.9	10347.717	87.611	-2748.838
9435.74	-612923.7	-132349.7	-677763.4	10447.112	89.432	-253.221
9446.76	-497871.3	-13356.1	-6766424.2	10452.207	91.225	-2557.981
9457.76	-362691.3	-130342.9	-679539.9	10458.426	92.791	-2463.178
947.076	-27511.9	-129310.4	-6820615.0	10462.994	94.729	-2368.822
9479.76	-152731.3	-128258.9	-6846155.4	10465.938	96.439	-2275.024
9490.78	-37567.1	-127188.8	-6870646.9	10467.269	98.119	-2161.792
9501.76	77573.3	-126100.4	-6894156.5	10467.076	99.769	-2089.180
9512.76	192702.9	-124994.0	-6916630.7	10465.331	101.390	-1997.233
9523.76	37805.1	-123864.9	-6938097.4	10462.089	102.980	-1905.992
9534.76	422863.5	-122728.5	-6958534.6	10457.383	104.539	-1815.497
9545.66	826364.4	-121686.8	-6976137.0	10451.927	106.916	-1734.720

CVS OFF

ENCLOSURE 4  
 A-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

TI C	GIMBAL DEFLECTION ANG REQUIRED	GIMBAL DEFLECTION ANG REQUIRED	GIMBAL DEFLECTION ANG REQUIRED	EULERIAN ATTITUDE RATE IN PITCH	EULERIAN ATTITUDE RATE IN YAW	EULERIAN ATTITUDE RATE IN ROLL
FROM FIRST MOTION (SEC)	(DEG)	(DEG)	(DEG)	(DEG/S)	(DEG/S)	(DEG/S)
0.00	.00000	.00000	.00000	-.00349746	.00112729	.00207173
.40	-.0261	.000170	.002110	-.00409535	.00261778	-.00652139
5.00	-.0856	.227507	.000478	.00371117	.44019682	-.00003141
10.00	-.0548	.110270	.000006	.00067065	-.10317833	.00203876
15.00	.0766	-.174279	-.005193	-.37786564	.00926045	.01133314
20.00	.0345	.018019	.006589	-.17816319	-.02576198	1.09623341
25.00	-.0151	-.010704	-.02218:	-.32476094	.00594002	.97819494
30.00	-.0150	-.013413	.005442	-.38106376	-.00087684	.92530315
35.00	-.0199	-.017328	-.006059	-.42712213	.00178487	.03453845
40.00	-.0139	-.012596	.000191	-.49411742	.00296800	.30079759
45.00	-.0219	-.013308	.000027	-.55202445	.00183534	-.00004089
50.00	-.0226	-.011443	.000020	-.57955123	.00142601	-.00001259
55.00	-.0232	-.010447	.000031	-.59418016	.00106598	.00001277
60.00	-.0268	-.008748	-.000064	-.59795626	.00038363	.00003911
65.00	-.0155	-.003815	.000064	-.59221038	.00297746	-.00000779
69.00	-.0150	-.006:9	.000054	-.61243921	-.00311943	-.00002257
70.00	-.0281	-.007:21	.000074	-.611:7390	-.00264318	.00011528
75.00	-.0318	-.0102:5	.000124	-.56710710	-.00161350	-.00104504
80.00	-.0211	-.011290	.000090	-.62160059	-.00095254	.00003429
85.00	-.0270	-.011221	.000024	-.69884771	.00162111	-.00023127
85.37	-.0222	-.010840	.000019	-.70019978	.00169079	-.000234582
90.00	.0442	-.007283	-.000154	-.75436044	.00196887	-.00003583
95.00	.0409	-.004391	-.000194	-.74434038	.00119483	-.00009425
100.00	.0630	-.001952	-.000288	-.55358249	.00063771	-.00012224
105.00	.1455	-.003116	-.000338	-.50597885	.00105932	.00005210
110.00	.2218	-.008034	-.000471	-.29643481	-.00546080	-.00011019
115.00	.1570	-.011782	-.000337	-.53297873	-.00162412	.00024960
120.00	-.0518	-.010998	.000014	-.49748313	.00192151	.00008793
125.00	-.0208	-.010945	.000001	-.30744402	.00006085	-.00003103
130.00	-.0068	-.012364	-.000028	-.30047764	-.00006413	.00000359
135.00	-.0153	-.015174	-.000022	-.29812485	-.00453179	-.00000315
140.00	-.0110	-.007363	-.000002	-.27424665	.00416844	.00000623
145.00	-.0128	-.010687	-.000005	-.26825467	-.00199483	.00000228
150.00	-.0130	-.010538	-.000000	-.25785406	.00007377	.00000363
155.00	-.0132	-.011385	.000001	-.24851725	-.00058839	.00000008
160.00	-.0128	-.012063	.000000	-.23914721	-.00096890	.00000439
164.80	-.0454	-.012614	.000071	-.07577392	-.00043636	-.00004159
164.81	-.0453	-.012616	.000071	-.07474172	-.00044527	-.00004671
165.00	-.0421	-.012661	.000065	-.05787815	-.00058880	-.00013688
165.58	-.0348	-.012832	.000040	-.04384194	-.00088395	-.00024303



\*\* ENCLOSURE 4 \*\*  
AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

TIME FROM FIRST MOTION (SEC)	GIMBAL DEFLECTION ANG REQUIRED	GIMBAL YAW CHANNEL (DEG)	GIMBAL DEFLECTION ANG REQUIRED	GIMBAL ROLL CHANNEL (DEG)	FULERIAN ATTITUDE RATE IN PITCH (DEG/S)	FULERIAN ATTITUDE RATE IN YAW (DEG/S)	EULERIAN ATTITUDE RATE IN ROLL (DEG/S)
S-1C/S-11 SFP	.0000	.00000	.00000	.04384196	-.00088395	-.00088395	-.00024303
S-11 ENGINE START	-.2546	-.036212	-.000089	-.04029361	-.00281023	-.00281023	-.00078069
S-11 MAINSTAGE	-.2518	-.072865	.000472	.03841178	-.01702206	-.01702206	.00740378
	-.1488	-.094309	.01917	.08340182	-.02380482	-.02380482	.00659143
	.0573	-.118786	-.000961	-.00608317	.00481922	.00481922	.00209819
	-.0324	-.106427	-.000081	-.00494751	-.00048315	-.00048315	-.00013015
	.0161	-.109792	-.000235	.00003158	.00010209	.00010209	.00009351
	.0263	-.109616	-.000116	-.00152409	-.00021722	-.00021722	.00005898
	.0273	-.110723	-.000099	-.00036523	-.00017649	-.00017649	.00001790
	-.0250	-.104900	-.000079	.00006137	.00034312	.00034312	.00001301
	-.0258	-.111305	-.000074	-.00004997	-.00111897	-.00111897	-.00000576
	-.0258	-.111382	-.000073	-.00005943	-.00088786	-.00088786	.00000125
	-.03196	-.204065	.002309	1.11071418	-.08452596	-.08452596	-.01722251
	.0051	-.094748	-.000583	.25956628	.02199411	.02199411	-.00315674
	.0181	-.113293	.001647	-.16452978	-.00097552	-.00097552	.00086865
	.0057	-.112037	-.000407	-.05976226	.00362333	.00362333	-.00044369
	-.0258	-.119841	-.000078	-.09656561	.00144486	.00144486	.00027137
	.0244	-.130178	-.000097	-.10212592	-.00716460	-.00716460	.00031044
	.0312	-.114636	-.000007	-.08921300	.02642808	.02642808	.00002342
	-.0230	-.106495	-.000063	-.08833500	.01175223	.01175223	-.00005363
	-.0256	-.115726	-.000061	-.09280069	.00571126	.00571126	.00001432
	-.0257	-.114897	-.000054	-.09184821	.00069499	.00069499	-.00001009
	-.0246	-.114722	-.000062	-.09333344	.00553640	.00553640	-.00000594
	-.0251	-.116260	-.000059	-.09458969	.00411150	.00411150	.00000086
	-.0240	-.116785	-.000067	-.09542613	.00388810	.00388810	-.00003322
	-.0232	-.117322	-.000074	-.10004626	.00338825	.00338825	.00000766
	-.0253	-.117838	-.000054	-.10176501	.00297977	.00297977	.00002368
	-.0289	-.118309	-.000045	-.09863429	.00249100	.00249100	-.00001084
	-.0241	-.118658	-.000062	-.09755602	.00215977	.00215977	-.00001665
	-.0241	-.119278	-.000061	-.09867434	.00200219	.00200219	.00000640
	-.0239	-.119673	-.000061	-.09893909	.00183522	.00183522	-.00000799
	-.0234	-.120048	-.000065	-.10007734	.00175693	.00175693	-.00000531
	-.0233	-.120359	-.000064	-.10147708	.00170646	.00170646	-.00000192
	-.0230	-.120649	-.000065	-.10275695	.00166636	.00166636	-.00000707
	-.0229	-.120905	-.000065	-.10444098	.00161738	.00161738	.00000282
	-.0229	-.122422	-.000064	-.10551672	.00155113	.00155113	-.00000534
	-.0226	-.122655	-.000065	-.10646122	.00197339	.00197339	-.00000065
	-.0225	-.122406	-.000063	-.10730613	.00175764	.00175764	-.00000172
	-.0223	-.122642	-.000064	-.10801289	.00155851	.00155851	-.00000460
	-.0221	-.123944	-.000065	-.10863553	.00105900	.00105900	-.00000471
	-.0219	-.123869	-.000065	-.10948322	.00186482	.00186482	-.00000179
	-.0214	-.124911	-.000068	-.11042425	.00115636	.00115636	-.00000407

INITIATE 16M

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH#72.067 DEG.

ENCLOSURE 4

TIME FROM MOTION (SEC)	GIMBAL DEFLECTION ANG REQUIRED	GIMBAL DEFLECTION ANG REQUIRED	GIMBAL DEFLECTION ANG REQUIRED	EULERIAN ATTITUDE RATE IN PITCH	EULERIAN ATTITUDE RATE IN YAW	EULERIAN ATTITUDE RATE IN ROLL
	(DEG)	(DEG)	(DEG)	(DEG/S)	(DEG/S)	(DEG/S)
360.00	.0199	-.12428	-.000070	-.1119304	.00192272	.0000558
365.00	.0177	-.141146	-.000131	-.0352946	-.02973384	.00025347
370.00	.0246	-.131944	-.000021	-.11367177	.02447249	.00006954
375.00	.0183	-.118294	-.000063	-.11010363	.01070033	-.00008114
380.00	.0100	-.12448	-.000078	-.11577634	-.110079330	.00000604
385.00	.0198	-.127631	-.000062	-.11565463	.10662008	.00008881
390.00	.0189	-.126153	-.000066	-.11597701	.10377778	-.00001558
395.00	.0188	-.128191	-.000069	-.11744458	.00194683	-.00000279
400.00	.0187	-.128516	-.000067	-.11807922	.00272963	-.00000234
405.00	.0184	-.128731	-.000068	-.11874811	.00223840	-.00000614
410.00	.0181	-.129218	-.000069	-.11959615	.00191988	-.00000415
415.00	.0179	-.129464	-.000068	-.12026528	.00186761	-.00000510
420.00	.0177	-.129463	-.000068	-.12098063	.00166898	-.00000226
425.00	.0175	-.130848	-.000069	-.12157102	.00093518	-.00000575
430.00	.0172	-.130835	-.000069	-.12208903	.00199432	-.00000132
435.00	.0170	-.130590	-.000068	-.12250948	.00163767	-.00000118
440.00	.0167	-.131594	-.000068	-.12276615	.00078813	.00000095
445.00	.0154	-.132287	-.000072	-.12262623	.00125769	-.00002388
450.00	.0153	-.131737	-.000070	-.12409024	.00192770	.00000801
455.00	.0151	-.13229	-.000069	-.12417705	.00092404	-.00000599
460.00	.0148	-.132702	-.000070	-.12437797	.00119446	-.00000294
463.81	.0146	-.133004	-.000070	-.12451954	.00112523	-.00000345
465.00	.0171	-.121580	-.000054	-.12387811	.02355286	.00025001
470.00	.03502	-.087009	.006133	.39406888	-.02480382	.02223511
475.00	.0272	-.116568	-.004974	.07279744	-.00835107	-.00071710
480.00	.0729	-.107106	.001202	-.29173096	.00291356	.00346141
485.00	.0531	-.107622	.001493	.06491151	-.00657765	-.00247240
490.00	.0316	-.110741	-.000830	-.15630826	.00102882	.00117599
495.00	.0227	-.108596	.000180	-.21693554	.00409877	.00041049
500.00	.0180	-.109118	.000076	-.173873.7	.00247625	-.00008088
505.00	.0167	-.105393	.000067	-.14870070	.00219478	.00001108
510.00	.0144	-.109483	.000035	-.13032147	.00193692	-.00002876
515.00	.0125	-.109642	.000003	-.12420079	.0018037	-.00003235
520.00	.0119	-.109702	-.000004	-.12491666	.00194773	-.00000864
525.00	.0118	-.109686	-.000002	-.126242.2	.00204177	-.00000253
530.00	.0117	-.109598	-.000001	-.12684959	.00208801	-.00000145
535.00	.0115	-.109449	.000000	-.12670545	.00200061	-.00000323
540.00	.0113	-.109888	.000002	-.12600746	.00168820	.00000089
545.00	.0111	-.110104	.000003	-.12480829	.00182643	.00000114
550.00	.0110	-.109682	.000008	-.12312290	.00194020	.00000647
555.00	.0109	-.109800	.000006	-.12026041	.00114280	.00001102
556.66	.0109	-.109818	.000007	-.11890551	.00098162	.00001710

5-11 CECCO

811 CECCO

AS-509 \*RAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

ENCLOSURE 4

TIME	GIMBAL	GIMBAL	GIMBAL	EULERIAN	EULERIAN	EULERIAN
FROM	DEFLECTION	DEFLECTION	DEFLECTION	ATTITUDE	ATTITUDE	ATTITUDE
FIRST	ANG REQUIRED	ANG REQUIRED	ANG REQUIRED	RATE IN	RATE IN	RATE IN
MOTION	PITCH CHANL	YAW CHANL	ROLL CHANL	PITCH	YAW	ROLL
(SEC)	(DEG)	(DEG)	(DEG)	(DEG/S)	(DEG/S)	(DEG/S)
556.67	0.0107	0.10919	0.00011	0.11889650	0.0098009	0.0001703
557.75	0.0763	0.109275	0.000120	0.11163278	0.0001622	0.00089843

19-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	F 18AL	GIMBAL DEFLECTION ANG REQUIRED	GIMBAL DEFLECTION ANG REQUIRED	GIMBAL DEFLECTION ANG REQUIRED	EULERIAN ATTITUDE RATE IN PITCH (DEG/S)	EULERIAN ATTITUDE RATE IN YAW (DEG/S)	EULERIAN ATTITUDE RATE IN ROLL (DEG/S)
S-11/S-1VB SEP	557.75	.0000	.00000	.00000	-.11163278	.00081622	.00089843
S-1VB ENGINE START	557.77	-.0001	.00000	.00000	-.11157584	.00071641	.00089807
S-1VB MAINSTAGE	540.00	-.3491	-.293801	.000000	-.10650184	-.00704552	.00098444
S-1VB ULLAGE JETT	563.27	-.2744	-.256710	.000000	.18821439	.04733721	.06843730
	565.00	.2430	-.146090	.000000	.28465430	.06175252	.08953800
	569.47	.0133	-.258678	.000000	-.93452758	-.19960014	-.19759814
	570.00	-.2269	-.314957	.000000	-.86263565	-.16299421	-.15614449
	575.00	.2067	-.163664	.000000	.07085675	.07052465	.07118181
	580.00	.1202	-.163108	.000000	-.21948414	.01879852	.00392365
	505.00	.0830	-.180455	.000000	-.16452764	.02298231	.01626125
	590.00	.1041	-.182791	.000000	-.13948860	.01379076	.02053156
	595.00	.1009	-.183868	.000000	-.12971197	.01063676	.02227335
	600.00	.1049	-.183566	.000000	-.12186990	.00711010	.02351027
	605.00	.1040	-.185375	.000000	-.12965402	.00463862	.02163888
	610.00	.1041	-.186155	.000000	-.11314933	.00303580	.02482722
	615.00	.1049	-.187285	.000000	-.11556512	.00179904	.02417076
	620.00	.1090	-.188232	.000000	-.12312056	.00108421	.01132729
	625.00	.1028	-.188991	.000000	-.11132936	.00049081	-.00882419
	630.78	.1104	-.189813	.000000	-.11151670	.00018000	-.00892673
		.1091	-.189049	.000000	-.11268458	-.00019401	-.00923674
		.1090	-.190454	.000000	-.11204483	-.00077479	-.00920929
		.1092	-.191134	.000000	-.11115965	-.00053930	-.00902443
		.1131	-.191984	.000000	-.11206745	-.00051390	-.00923530
		.1078	-.192713	.000000	-.11400320	-.00028326	-.00962950
		.1093	-.193414	.000000	-.10182491	-.00010735	-.00710444
		.1123	-.194187	.000000	-.10467373	.00008828	-.00768577
		.3864	-.215574	.000000	-.15534089	.00361491	-.01779877
		-.2681	-.174818	.000000	.10876221	.00248459	-.00724907
		.1187	-.20854	.000000	.05851400	-.00347266	.02692026
		.0957	-.195464	.000000	.00484458	-.00198535	.01578861
		.1181	-.197286	.000000	.01806957	-.00375988	.01826672
		.1138	-.197060	.000000	.01267889	-.00545555	.01691613
		.1099	-.196196	.000000	-.00339715	.00147026	.01495769
		.1159	-.199363	.000000	.00152368	-.00085531	.01516327
		.1160	-.199460	.000000	.00135949	-.00078033	.01513701
		.1175	-.200440	.000000	.00136981	-.00065884	.01512362
		.1238	-.208534	.000000	.00172754	-.00138944	.01510549
		.1289	-.210142	.000000	.00196964	-.00174451	.01509260

S-1VB  
T3  
EFC1

\*\* ENCLOSURE 4 \*\*  
AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM MOTION (SEC)	GIMBAL DEFLECTIV ANG REQUIRED PITCH CHANL (DEG)	GIMBAL DEFLECTION ANG REQUIRED YAW CHANNE (DEG)	GIMBAL DEFLECTION ANG REQUIRED ROLL CHANNEL (DEG)	EULERIAN ATTITUDE RATE IN PITCH (DEG/S)	EULERIAN ATTITUDE RATE IN YAW (DEG/S)	EULERIAN ATTITUDE RATE IN ROLL (DEG/S)
8870.12	.0707	-.047207	.000000	-.04816035	.00356092	.00839645
8875.12	.0421	-.026553	.000000	-.04489434	.00698177	.00839628
8880.12	.1018	.006068	.000000	-.04562587	.01040171	.00839599
8885.12	.1407	.054049	.000000	-.04435493	.01382074	.00839561
8890.12	.2949	.113905	.000000	-.04308152	.01723884	.00839513
8895.12	.3441	.189199	.000000	-.04180566	.02065602	.00839457
8900.12	.5086	.276275	.000000	-.04052733	.02407228	.00839392
8905.12	.5681	.378868	.000000	-.03924654	.02748762	.00839320
8910.12	.7423	.490853	.000000	-.03807278	.03019902	-.01012191
8915.12	.8113	.618786	.000000	-.03683828	.03355303	-.01012275
8920.12	.9954	.758677	.000000	-.03560670	.03690811	-.01012364
8925.12	1.0609	.912681	.000000	-.04209987	.03960990	.00630597
8930.12	1.1630	.999744	.000000	-.04493985	-.00492546	-.010518617
8935.12	1.0488	.700474	.000000	-.00910920	-.09366661	-.00552188
8940.12	1.0000	.325341	.000000	-.09398832	-.09033469	.00747504
8945.12	.8419	-.034338	.000000	-.09286822	-.08700864	-.00753229
8950.12	.7993	-.381844	.000000	-.09156709	-.08337127	.00133048
8955.12	.6510	-.711142	.000000	-.09044077	-.07931559	.01698821
8956.42	.6660	-.795375	.000000	-.09014253	-.07840087	.01698951
8956.92	.6296	-.826890	.000000	-.08999712	-.07810356	.01699001
8960.12	.6178	-1.023964	.000000	-.08936033	-.06972165	.06215977
8965.12	.4820	-.992632	.000000	-.08713913	.04876847	-.11290122
8970.12	.4629	-.567544	.000000	-.08588044	.11347658	-.03787249
8975.12	.3396	-.101779	.000000	-.08462232	.11654503	-.02532622
8980.12	.3326	.368233	.000000	-.08293411	.11767241	.02359488
8985.12	.2228	.849498	.000000	-.0812438	.12068030	.02358800
8990.12	.2257	1.99387	.000000	-.08169474	.05249690	-.13095520
8995.12	.1105	.2583	.000000	-.08331672	-.06268819	-.10806183
9000.12	.1019	.0027	.000000	-.08360372	-.13211374	.01279354
9005.12	-.0123	.059095	.000000	-.08217898	-.12918095	.01280116
9010.12	-.0106	-.462172	.000000	-.08075110	-.12624968	.01280849
9015.12	-.1117	-.964878	.000000	-.0793196	-.12232487	-.02112015
9020.12	-.0965	-1.244233	.000000	-.07738628	-.02792011	.16265561
9025.12	-.1864	-1.037570	.000000	-.07624825	.09164598	.10481384
9030.12	-.1103	-.437058	.000000	-.07462108	.15717998	.02649179
9033.12	-.2278	-.053507	.000000	-.07221913	.3889372	.02675856
9035.12	-.2307	.201470	.000000	-.0729326	.15838661	.02702693
9038.12	-.1182	.565177	.000000	-.07307365	.14874725	-.02594594
9040.12	-.1399	.463428	.000000	.05586107	-.16283953	-.03898999
9040.62	-.0570	.240899	.000000	.12201994	-.33425618	-.04594927
9044.62	.2111	-.446486	.000000	-.01462249	.04724343	-.00687514
9045.12	.1815	-.365079	.000000	-.04052766	.11529140	-.00386580

ULLAGE IGNITION  
02/M2 BURNER OFF

J=2 F-L IN1  
ULL CUT OFF

REIGN

908 TMR  
16M IN1

\*\* ENCLOSURE 4 \*\*  
AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	GIMBAL			GIMBAL			EULERIAN			EULERIAN		
	DEFLECTION ANG REQUIRED	DEFLECTION ANG REQUIRED	DEFLECTION ANG REQUIRED	ATTITUDE RATE IN	ATTITUDE RATE IN	ATTITUDE RATE IN	ATTITUDE RATE IN	ATTITUDE RATE IN	ATTITUDE RATE IN	ATTITUDE RATE IN	ATTITUDE RATE IN	
	PITCH CHANL (DEG)	YAW CHANNEL (DEG)	ROLL CHANNEL (DEG)	PITCH (DEG/S)	YAW (DEG/S)	ROLL (DEG/S)	PITCH (DEG/S)	YAW (DEG/S)	ROLL (DEG/S)	PITCH (DEG/S)	YAW (DEG/S)	ROLL (DEG/S)
9050.12	.2669	-.116428	.000000	-.130572483	.00571419	-.00381592	.01884323	.01884323	.01884323	.01884323	.01884323	.01884323
9055.12	.3546	-.211294	.000000	-.010666443	.03250724	-.07128704	.02389775	.02389775	.02389775	.02389775	.02389775	.02389775
9060.12	.2566	-.199158	.000000	-.11521931	.05364905	-.00596637	.04770886	.04770886	.04770886	.04770886	.04770886	.04770886
9065.12	.0654	-.196958	.000000	-.04770886	.03455997	-.00548274	-.03455997	.01969532	.01969532	.01969532	.01969532	.01969532
9070.12	.1307	-.199387	.000000	-.03455997	.01969532	.00816530	-.03455997	.01969532	.01969532	.01969532	.01969532	.01969532
9075.12	.1147	-.199406	.000000	-.03455997	.01969532	.00816530	-.03455997	.01969532	.01969532	.01969532	.01969532	.01969532
9080.12	.1216	-.200123	.000000	-.03455997	.01969532	.00816530	-.03455997	.01969532	.01969532	.01969532	.01969532	.01969532
9085.12	.1205	-.200519	.000000	-.03455997	.01969532	.00816530	-.03455997	.01969532	.01969532	.01969532	.01969532	.01969532
9090.12	.1221	-.202073	.000000	-.03455997	.01969532	.00816530	-.03455997	.01969532	.01969532	.01969532	.01969532	.01969532
9095.12	.1216	-.203171	.000000	-.03455997	.01969532	.00816530	-.03455997	.01969532	.01969532	.01969532	.01969532	.01969532
9100.12	.1220	-.203527	.000000	-.03455997	.01969532	.00816530	-.03455997	.01969532	.01969532	.01969532	.01969532	.01969532
9105.12	.1230	-.203928	.000000	-.03455997	.01969532	.00816530	-.03455997	.01969532	.01969532	.01969532	.01969532	.01969532
9110.12	.1235	-.204415	.000000	-.03455997	.01969532	.00816530	-.03455997	.01969532	.01969532	.01969532	.01969532	.01969532
9115.12	.1243	-.204759	.000000	-.03455997	.01969532	.00816530	-.03455997	.01969532	.01969532	.01969532	.01969532	.01969532
9120.12	.1242	-.205958	.000000	-.03455997	.01969532	.00816530	-.03455997	.01969532	.01969532	.01969532	.01969532	.01969532
9125.12	.1242	-.206833	.000000	-.03455997	.01969532	.00816530	-.03455997	.01969532	.01969532	.01969532	.01969532	.01969532
9130.12	.1251	-.206947	.000000	-.03455997	.01969532	.00816530	-.03455997	.01969532	.01969532	.01969532	.01969532	.01969532
9135.12	.1257	-.207247	.000000	-.03455997	.01969532	.00816530	-.03455997	.01969532	.01969532	.01969532	.01969532	.01969532
9140.12	.1264	-.208770	.000000	-.03455997	.01969532	.00816530	-.03455997	.01969532	.01969532	.01969532	.01969532	.01969532
9145.12	.1262	-.209019	.000000	-.03455997	.01969532	.00816530	-.03455997	.01969532	.01969532	.01969532	.01969532	.01969532
9150.12	.1263	-.209067	.000000	-.03455997	.01969532	.00816530	-.03455997	.01969532	.01969532	.01969532	.01969532	.01969532
9155.12	.1270	-.210044	.000000	-.03455997	.01969532	.00816530	-.03455997	.01969532	.01969532	.01969532	.01969532	.01969532
9160.12	.1276	-.210687	.000000	-.03455997	.01969532	.00816530	-.03455997	.01969532	.01969532	.01969532	.01969532	.01969532
9165.12	.1281	-.210663	.000000	-.03455997	.01969532	.00816530	-.03455997	.01969532	.01969532	.01969532	.01969532	.01969532
9170.12	.1286	-.211554	.000000	-.03455997	.01969532	.00816530	-.03455997	.01969532	.01969532	.01969532	.01969532	.01969532
9175.12	.1291	-.212049	.000000	-.03455997	.01969532	.00816530	-.03455997	.01969532	.01969532	.01969532	.01969532	.01969532
9180.12	.1341	-.210822	.000000	-.03455997	.01969532	.00816530	-.03455997	.01969532	.01969532	.01969532	.01969532	.01969532
9185.12	.1293	-.214205	.000000	-.03455997	.01969532	.00816530	-.03455997	.01969532	.01969532	.01969532	.01969532	.01969532
9190.12	.1303	-.213813	.000000	-.03455997	.01969532	.00816530	-.03455997	.01969532	.01969532	.01969532	.01969532	.01969532
9195.12	.1305	-.214524	.000000	-.03455997	.01969532	.00816530	-.03455997	.01969532	.01969532	.01969532	.01969532	.01969532
9200.12	.1318	-.215349	.000000	-.03455997	.01969532	.00816530	-.03455997	.01969532	.01969532	.01969532	.01969532	.01969532
9205.12	.1323	-.216338	.000000	-.03455997	.01969532	.00816530	-.03455997	.01969532	.01969532	.01969532	.01969532	.01969532
9210.12	.17.2	-.118070	.000000	-.03455997	.01969532	.00816530	-.03455997	.01969532	.01969532	.01969532	.01969532	.01969532
9215.12	.2303	-.251779	.000000	-.03455997	.01969532	.00816530	-.03455997	.01969532	.01969532	.01969532	.01969532	.01969532
9220.12	.1239	-.215961	.000000	-.03455997	.01969532	.00816530	-.03455997	.01969532	.01969532	.01969532	.01969532	.01969532
9225.12	.1347	-.217598	.000000	-.03455997	.01969532	.00816530	-.03455997	.01969532	.01969532	.01969532	.01969532	.01969532
9230.12	.1342	-.218783	.000000	-.03455997	.01969532	.00816530	-.03455997	.01969532	.01969532	.01969532	.01969532	.01969532
9235.12	.1353	-.219268	.000000	-.03455997	.01969532	.00816530	-.03455997	.01969532	.01969532	.01969532	.01969532	.01969532
9240.12	.1354	-.220691	.000000	-.03455997	.01969532	.00816530	-.03455997	.01969532	.01969532	.01969532	.01969532	.01969532
9245.12	.1355	-.221215	.000000	-.03455997	.01969532	.00816530	-.03455997	.01969532	.01969532	.01969532	.01969532	.01969532
9250.12	.1364	-.221617	.000000	-.03455997	.01969532	.00816530	-.03455997	.01969532	.01969532	.01969532	.01969532	.01969532
9255.12	.1368	-.221487	.000000	-.03455997	.01969532	.00816530	-.03455997	.01969532	.01969532	.01969532	.01969532	.01969532

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.      \*\* ENCLOSURE 4 \*\*

TIME FROM MOTION (SEC)	GIMBAL DEFLECTION ANG REQUIRED PITCH CHANNEL (DEG)	GIMBAL DEFLECTION ANG REQUIRED YAW CHANNEL (DEG)	GIMBAL DEFLECTION ANG REQUIRED ROLL CHANNEL (DEG)	EULERIAN ATTITUDE RATE IN PITCH (DEG/S)	EULERIAN ATTITUDE RATE IN YAW (DEG/S)	EULERIAN ATTITUDE RATE IN ROLL (DEG/S)
9260.12	.1374	-.223121	.000000	-.04430015	.01547091	.00530070
9265.12	.1375	-.223402	.000000	-.04567733	.01576994	.00423622
9270.12	.1381	-.223588	.000000	-.04636576	.01546003	.00323493
9275.12	.1392	-.224579	.000000	-.04779806	.01502516	.00207449
9280.12	.1389	-.225592	.000000	-.04944925	.01516245	.00093923
9285.12	.1395	-.225669	.000000	-.05062338	.01542531	-.00008909
9290.12	.1402	-.226460	.000000	-.05244624	.01487528	-.00133119
9295.12	.1412	-.2272.3	.000000	-.05409149	.01492627	-.00247097
9300.12	.1406	-.227190	.000000	-.055657913	.01513970	-.00374338
9305.12	.1412	-.227728	.000000	-.05834454	.01457534	-.00496440
9310.12	.1414	-.228326	.000000	-.06103205	.01458765	-.00628255
9315.12	.1426	-.229001	.000000	-.06481186	.01692027	-.00753581
9320.12	.1425	-.229961	.000000	-.06724620	.01492032	-.00901240
9325.12	.1431	-.230466	.000000	-.06969410	.01412703	-.01035732
9330.12	.1439	-.230343	.000000	-.07319993	.01370991	.00017831
9335.12	.1447	-.231044	.000000	-.07764274	.01346339	-.00143149
9340.12	.1446	-.231903	.000000	-.08214203	.01327336	-.00303002
9345.12	.1454	-.232809	.000000	-.08759703	.01353549	-.00472049
9350.12	.1458	-.232836	.000000	-.09335696	.01381410	-.00643769
9355.12	.1466	-.233389	.000000	-.10019919	.01326914	-.00836940
9360.12	.1462	-.233565	.000000	-.10882993	.01367176	-.00475398
9365.12	.1496	-.257440	.000000	-.156045924	.05854132	-.03235995
9370.12	.1351	-.236871	.000000	-.00544503	-.03471739	.08434832
9375.12	.1474	-.235953	.000000	.02152044	-.00211984	.00499323
9380.12	.1476	-.236125	.000000	.01794411	-.00101050	-.00762034
9385.12	.1478	-.237337	.000000	.01738104	-.00054278	-.00854191
9390.12	.1480	-.236718	.000000	.02270101	.00051791	-.00073244
9393.76	.1415	-.237201	.000000	-.02005537	-.00082643	-.01426436
9393.97	.1413	-.237202	.000000	-.01594847	-.00065079	-.01313542
9395.12	.1293	-.235743	.000000	-.01362120	.00110592	-.01364105
9400.12	.0833	-.209355	.000000	-.01044099	.00913114	-.01364206
9403.76	.0574	-.169674	.000000	-.00826651	.01498560	-.01364212

GC52  
T87  
TL1

19-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH#72.067 DEG. 1ST OPP.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	GIMBAL DEFLECTION ANG REQUIRED PITCH CHANL (DEG)	GIMBAL DEFLECTION ANG REQUIRED YAW CHANL (DEG)	GIMBAL DEFLECTION ANG REQUIRED P LL CHANL (DEG)	EULERIAN ATTITUDE RATE IN PITCH (DEG/S)	EULERIAN ATTITUDE RATE IN YAW (DEG/S)	EULERIAN ATTITUDE RATE IN ROLL (DEG/S)
9403.76	.000	.000000	.000000	.00000000	.00000000	.00000000
9413.76	.0000	.000000	.000000	.00000000	.00000000	.00000000
9424.76	.0000	.000000	.000000	.00000000	.00000000	.00000000
9435.76	.0000	.000000	.000000	.00000000	.00000000	.00000000
9446.76	.0000	.000000	.000000	.00000000	.00000000	.00000000
9457.76	.0000	.000000	.000000	.00000000	.00000000	.00000000
9468.76	.0000	.000000	.000000	.00000000	.00000000	.00000000
9479.76	.0000	.000000	.000000	.00000000	.00000000	.00000000
9490.76	.0000	.000000	.000000	.00000000	.00000000	.00000000
9501.76	.0000	.000000	.000000	.00000000	.00000000	.00000000
9512.76	.0000	.000000	.000000	.00000000	.00000000	.00000000
9523.76	.0000	.000000	.000000	.00000000	.00000000	.00000000
9534.76	.0000	.000000	.000000	.00000000	.00000000	.00000000
9544.66	.0000	.000000	.000000	.00000000	.00000000	.00000000

CVS OFF



\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	TOTAL VEHICLE ENGINE THRUST (NEWTONS)	TOTAL VEHICLE WEIGHT	ALTITUDE ABOVE OBLATE EARTH (M)	MAGNITUDE OF SPACE FIXED VELOCITY IN XPP SYSTEM (M/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION
713.12	630.81	136283.29	191356.7	7793.05	-0.00	.005
722.12	630.81	136280.82	191357.1	7793.09	-0.00	.005
732.12	630.81	136277.95	191357.8	7793.13	-0.00	.005
743.12	630.81	136274.79	191356.4	7793.19	-0.00	.005
754.12	630.81	136271.63	191352.7	7793.24	-0.00	.005
765.12	960.88	136268.47	191346.8	7793.30	-0.00	.007
776.12	945.10	136262.43	191338.6	7793.38	-0.00	.007
787.12	929.32	136256.93	191328.0	7793.47	-0.00	.007
798.12	288.18	136253.87	191315.3	7793.51	-0.00	.002
844.12	254.89	136245.66	191239.5	7793.65	-0.00	.002
932.12	191.21	136229.96	190991.5	7793.95	-0.00	.001
1020.12	175.70	136214.26	190617.9	7794.29	-0.00	.001
1108.12	175.70	136198.56	190134.6	7794.69	-0.00	.001
1196.12	175.70	136182.86	189561.2	7795.15	-0.00	.001
1284.12	175.20	136167.16	188920.6	7795.64	-0.00	.001
1372.12	174.65	136151.46	188338.5	7796.16	-0.00	.001
1460.12	174.11	136135.75	187741.7	7796.69	-0.00	.001
1548.12	173.56	136120.05	187157.9	7797.22	-0.00	.001
1636.12	173.01	136104.35	186584.1	7797.73	-0.01	.001
1724.12	172.55	136087.61	185635.4	7798.20	-0.01	.001
1812.12	172.40	136067.44	185144.3	7798.63	-0.01	.001
1900.12	172.24	136047.27	184760.1	7799.00	-0.01	.001
1988.12	170.24	136027.10	184497.4	7799.31	-0.01	.001
2076.12	165.39	136006.94	184365.8	7799.54	-0.01	.001
2164.12	160.53	135986.77	184370.5	7799.70	-0.01	.001
2252.12	155.72	135967.92	184510.5	7799.77	-0.01	.001
2340.12	150.95	135950.15	184780.2	7799.76	-0.01	.001
2428.12	146.17	135932.37	185168.9	7799.68	-0.00	.001
2516.12	141.39	135914.60	185661.6	7799.52	-0.00	.001
2604.12	136.62	135896.82	186259.6	7799.30	-0.00	.001
2692.12	131.84	135879.05	186881.6	7799.02	-0.00	.001
2780.12	127.48	135865.45	187564.7	7798.70	-0.00	.001
2868.12	123.17	135852.46	188364.7	7798.35	-0.01	.001
2956.12	118.86	135839.48	189258.6	7797.97	-0.01	.001
3044.12	114.54	135826.50	190223.6	7797.57	-0.01	.001
3132.12	110.25	135813.52	190740.1	7797.18	-0.02	.001
3220.12	106.09	135800.75	190791.0	7796.78	-0.02	.001
3308.12	102.57	135788.89	191263.5	7796.40	-0.03	.001
3388.12	99.37	135778.11	191617.3	7796.07	-0.03	.001
3476.12	95.85	135766.25	191919.1	7795.72	-0.03	.001
3564.12	92.32	135754.39	192129.2	7795.40	-0.04	.001
3652.12	88.80	135742.53	192252.6	7795.10	-0.04	.001

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.      ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	TOTAL VEHICLE ENGINE THRUST (NEWTONS)	TOTAL VEHICLE WEIGHT (KG)	ALTITUDE ABOVE OBLATE EARTH (M)	MAGNITUDE OF SPACE FIXED VELOCITY IN XPP SYSTEM (M/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (M/S <sup>2</sup> )
3740.12	65.83	135731.99	192297.9	7794.83	.04	.001
3828.13	63.64	135723.33	192277.6	7794.57	.04	.001
3916.12	61.45	135714.66	192207.7	7794.33	.04	.001
4004.12	79.25	135706.00	192106.0	7794.11	.04	.001
4092.12	77.06	135697.33	191992.2	7793.88	.04	.001
4180.12	74.87	135688.67	191886.4	7793.66	.04	.001
4268.12	73.14	135680.00	191807.7	7793.43	.04	.001
4356.12	71.57	135671.34	191774.4	7793.19	.04	.001
4444.12	70.00	135662.67	191801.7	7792.93	.04	.001
4532.12	68.44	135654.01	191902.4	7792.65	.03	.000
4620.12	66.87	135645.34	92084.3	7792.36	.03	.000
4708.12	65.30	135636.68	192352.2	7792.05	.03	.000
4796.12	65.22	135628.01	192705.2	7791.72	.02	.000
4884.12	65.07	135619.34	193138.1	7791.37	.02	.000
4972.12	64.91	135610.68	193641.5	7791.02	.01	.000
5060.12	64.75	135602.01	194201.5	7790.64	.01	.000
5148.12	64.60	135593.35	194800.4	7790.34	.00	.000
5236.12	64.64	135584.68	195418.1	7790.02	.00	.000
5324.12	65.04	135576.01	196032.2	7789.73	-.00	.000
5412.12	65.43	135567.35	196619.6	7789.48	-.01	.000
5500.12	65.82	135558.68	197156.6	7789.29	-.01	.000
5588.12	66.21	135550.02	197620.7	7789.15	-.01	.000
5676.12	66.60	135541.35	197991.9	7789.08	-.01	.000
5764.12	66.99	135532.32	198252.1	7789.00	-.01	.000
5852.12	67.38	135523.14	198387.8	7789.17	-.02	.000
5940.12	67.78	135513.95	198389.4	7789.33	-.02	.000
6028.12	68.17	135504.76	198252.4	7789.58	-.02	.000
6116.12	68.56	135495.57	197976.8	7789.91	-.02	.000
6204.12	68.95	135486.39	197568.7	7790.31	-.02	.001
6292.12	69.33	135477.20	197038.3	7790.78	-.02	.001
6372.12	69.70	135468.05	196463.2	7791.25	-.02	.001
6460.12	69.10	135459.66	195746.0	7791.82	-.02	.001
6548.12	69.25	135450.47	194962.5	7792.43	-.02	.001
6636.12	69.33	135441.29	194137.7	7793.05	-.02	.001
6724.12	69.34	135432.38	193298.9	7793.68	-.02	.001
6812.12	69.11	135424.39	192473.9	7794.31	-.02	.001
6900.12	68.87	135416.40	191690.0	7794.90	-.02	.001
6988.12	68.63	135408.41	190972.9	7795.46	-.02	.000
7076.12	68.40	135400.42	190346.1	7796.07	-.02	.000
7164.12	68.17	135392.44	189829.6	7796.41	-.01	.000
7252.12	67.90	135384.45	189439.3	7796.78	-.01	.000
7340.12	67.33	135376.46	189186.1	7797.07	-.01	.000

●● ENCLOSURE 4 ●●

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	TOTAL ENGINE THRUST (NEWTONS)	TOTAL VEHICLE WEIGHT (KG)	ALTITUDE ABOVE OBLATE EARTH (M)	MAGNITUDE OF SPACE FIXED VELOCITY IN XPP SYSTEM (M/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (M/S <sup>2</sup> )
7428.12	66.81	135368.47	189075.9	7797.27	-01	.000
7516.12	66.37	135360.48	189109.4	7797.39	-01	.000
7604.12	65.92	135352.49	189281.7	7797.42	-01	.000
7692.12	65.45	135344.50	189583.3	7797.37	-01	.000
7780.12	64.23	135337.56	190000.0	7797.24	-01	.000
7868.12	62.90	135330.77	190513.6	7797.03	-00	.000
7956.12	61.57	135323.97	191103.2	7796.77	-00	.000
8044.12	60.24	135317.18	191745.6	7796.45	.00	.000
8132.12	58.91	135310.39	192416.6	7796.09	.00	.000
8220.12	57.56	135303.60	193092.0	7795.71	.01	.000
8308.12	56.15	135296.81	193748.8	7795.30	.01	.050
8396.12	54.74	135290.02	194365.8	7794.88	.02	.000
8484.12	53.33	135283.23	194924.6	7794.46	.02	.000
8572.12	51.92	135276.44	195410.5	7794.06	.02	.000
8660.12	50.52	135269.65	195813.1	7793.67	.03	.000
8748.12	49.46	135263.10	196126.0	7793.29	.03	.000
8836.12	48.76	135256.79	196348.1	7792.95	.04	.000
8924.12	48.05	135250.48	196482.1	7792.63	.04	.000
9012.12	47.35	135244.17	196535.7	7792.33	.04	.000
9100.12	46.64	135237.86	196520.6	7792.05	.04	.000
9188.12	45.94	135231.54	196451.1	7791.80	.04	.000
9276.12	45.36	135225.23	196344.8	7791.56	.04	.000
9364.12	44.82	135218.92	196220.6	7791.33	.04	.000
9452.12	44.27	135212.61	196098.1	7791.10	.04	.000
9540.12	43.72	135206.30	195996.7	7790.87	.04	.000
9628.12	43.17	135199.99	195934.5	7790.63	.04	.000
9716.12	42.69	135193.71	195927.4	7790.39	.04	.000
9804.12	42.61	135187.64	195988.2	7790.13	.03	.000
9892.12	42.54	135181.67	196126.6	7789.85	.03	.000
9980.12	42.46	135175.50	196346.9	7789.56	.02	.000
10068.12	42.38	135169.43	196650.3	7789.25	.02	.000
10156.12	42.30	135163.36	197037.6	7788.94	.01	.000
10244.12	42.37	135157.29	197485.1	7788.62	.01	.000
10332.12	42.60	135151.22	197994.8	7788.30	.01	.000
10420.12	42.84	135145.14	198545.6	7788.00	.00	.000
10508.12	43.07	135139.07	199117.5	7787.71	-00	.000
10596.12	43.31	135133.00	199689.4	7787.46	-01	.000
10684.12	43.54	135126.93	200238.1	7787.24	-01	.000
10772.12	44.02	135121.54	200740.4	7787.07	-01	.000
10860.12	44.57	135116.35	201174.0	7786.96	-02	.000
10948.12	45.12	135111.16	201517.9	7786.92	-02	.000
11036.12	45.66	135105.97	201784.7	7786.96	-02	.000

\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OP?.

TIME FROM FIRST MOTION (SEC)	TOTAL VEHICLE ENGINE THRUST (NEWTONS)	TOTAL VEHICLE WEIGHT (KG)	ALTITUDE ABOVE OBLATE EARTH (M)	MAGNITUDE OF SPACE FIXED VELOCITY IN XPP SYSTEM (M/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (M/SEC <sup>2</sup> )
11:24.12	46.21	135100.76	201669.6	7787.07	-02	.000
11:212.12	46.74	135095.58	201852.5	7787.26	-02	.000
11:300.12	47.14	135090.39	201697.7	7787.53	-02	.000
11:388.12	47.53	135085.20	201405.0	7787.89	-02	.000
11:476.12	47.92	135080.00	200978.9	7788.32	-02	.000
11:564.12	48.31	135074.81	200429.1	7788.61	-02	.000
11:652.12	48.70	135069.62	199770.3	7739.37	-02	.000
11:740.12	49.09	135064.43	199021.2	7789.97	-02	.000
11:828.12	49.48	135058.10	198204.4	7790.60	-02	.000
11:916.12	49.88	135052.11	197344.9	7791.26	-02	.000
12:004.12	50.27	135046.12	196469.9	7791.92	-02	.000
12:092.12	50.66	135040.13	195607.1	7792.57	-02	.000
12:180.12	51.05	135034.14	194784.1	7793.20	-02	.000
12:268.12	51.33	135028.14	194027.3	7793.79	-02	.000
12:356.12	51.56	135022.15	193360.4	7794.32	-02	.000
12:444.12	51.80	135016.16	192803.8	7794.79	-02	.000
12:532.12	52.03	135010.17	192374.4	7795.18	-02	.000
12:620.12	52.27	135004.18	192083.6	7795.49	-02	.000
12:708.12	52.47	134998.20	191938.3	7795.71	-01	.000
12:796.12	52.16	134992.40	191939.9	7795.85	-01	.000
12:884.12	51.85	134986.61	192084.2	7795.89	-01	.000
12:972.12	51.53	134980.82	192362.3	7795.85	-01	.000
13:060.12	51.22	134975.03	192760.7	7795.72	-01	.000
13:148.12	50.91	134969.24	193261.6	7795.52	-00	.000
13:236.12	50.62	134963.45	193844.2	7795.26	-00	.000
13:324.12	50.39	134957.65	194465.5	7794.93	.00	.000
13:412.12	50.15	134951.86	195161.5	7794.56	.00	.000
13:500.12	49.92	134946.07	195847.6	7794.16	.01	.000
13:588.12	49.68	134940.28	196520.4	7793.74	.01	.000
13:676.12	49.45	134934.49	197158.1	7793.30	.02	.000
13:764.12	49.20	134928.69	197741.4	7792.87	.02	.000
13:852.12	48.98	134922.84	19803.4	7792.82	.02	.000
13:940.12	48.66	134927.84	197821.7	7792.80	.02	.000

TIME BASE 4

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP. ENCLOSURE 4 00

TIME FROM FIRST MOTION (SEC)	TOTAL ENGINE THRUST (NEWTONS)	TOTAL VEHICLE WEIGHT (KG)	ALTITUDE ABOVE EARTH (M)	MAGNITUDE OF SPACE FIXED VELOCITY IN X P SYSTEM (M/SEC)	SPACE FIXED PATH ANGLE (DEG)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION
13777.12	48.66	134927.84	197821.7	7792.80	.02	.02	.000
13782.12	48.66	134927.48	197852.4	7792.78	.02	.02	.000
13787.12	48.66	134927.12	197882.7	7792.75	.02	.02	.000
13792.12	48.66	134926.77	197912.9	7792.73	.02	.02	.000
13797.12	48.66	134926.41	197942.8	7792.71	.02	.02	.000
13802.12	48.66	134926.05	197972.5	7792.68	.02	.02	.000
13807.12	48.66	134925.70	198002.0	7792.66	.02	.02	.000
13812.12	48.66	134925.34	198031.2	7792.63	.02	.02	.000
13817.12	48.66	134924.98	198060.4	7792.61	.02	.02	.000
13819.12	57.92	134924.84	198071.9	7792.60	.02	.02	.000
13819.32	35.45	134924.83	198073.0	7792.60	.02	.02	.000
13822.12	37.07	134924.78	198089.1	7792.58	.02	.02	.000
13827.12	56.98	134924.70	198117.7	7792.56	.02	.02	.000
13832.12	59.28	134924.62	198144.0	7792.53	.02	.02	.000
13837.12	61.58	134924.54	198174.1	7792.51	.02	.02	.000
13842.12	63.88	134924.46	198201.9	7792.49	.02	.02	.000
13847.12	66.18	134924.38	198229.4	7792.46	.03	.03	.000
13852.12	68.48	134924.30	198256.7	7792.44	.03	.03	.001
13857.12	70.78	134924.22	198283.7	7792.41	.03	.03	.001
13862.12	73.08	134924.14	198310.4	7792.39	.03	.03	.001
13867.12	75.38	134924.06	198336.9	7792.37	.03	.03	.001
13872.12	77.68	134923.98	198363.1	7792.34	.03	.03	.001
13877.12	79.98	134923.90	198389.0	7792.32	.03	.03	.001
13882.12	82.28	134923.82	198414.7	7792.30	.03	.03	.001
13887.12	84.58	134923.74	198440.0	7792.28	.03	.03	.001
13892.12	86.88	134923.66	198465.0	7792.25	.03	.03	.001
13897.12	89.18	134923.58	198489.9	7792.23	.03	.03	.001
13902.12	91.48	134923.50	198514.4	7792.21	.03	.03	.001
13907.12	93.78	134923.43	198538.6	7792.19	.03	.03	.001
13912.12	96.08	134923.35	198562.6	7792.17	.03	.03	.001
13917.12	98.38	134923.27	198586.2	7792.14	.03	.03	.001
13922.12	100.68	134923.19	198609.6	7792.12	.03	.03	.001
13927.12	102.98	134923.11	198632.7	7792.10	.03	.03	.001
13932.12	105.28	134923.03	198655.6	7792.08	.03	.03	.001
13937.12	107.58	134922.95	198678.2	7792.06	.03	.03	.001
13942.12	109.88	134922.87	198700.4	7792.04	.03	.03	.001
13947.12	112.18	134922.79	198722.4	7792.02	.03	.03	.001
13952.12	114.48	134922.71	198744.2	7792.00	.03	.03	.001
13957.12	116.78	134922.63	198765.6	7791.98	.03	.03	.001
13962.12	119.08	134922.55	198786.8	7791.96	.03	.03	.001
13967.12	121.38	134922.47	198807.7	7791.94	.03	.03	.001
13972.12	123.67	134922.39	198828.3	7791.92	.03	.03	.001

02/42 BURNER ON  
02/42 BURNER OFF

\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	TOTAL VEHICLE ENGINE THRUST (NEWTONS)	TOTAL VEHICLE WEIGHT (KG)	ALTITUDE ABOVE OBLATE EARTH (M)	MAGNITUDE OF SPACE FIXED VELOCITY IN XPP SYSTEM (M/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (M/S <sup>2</sup> )
13977.12	125.68	134922.31	198648.7	7791.90	.03	.001
13982.12	127.80	134922.23	198668.7	7791.88	.03	.001
13987.12	129.91	134922.15	198688.5	7791.86	.03	.001
13992.12	132.03	134922.07	198908.0	7791.84	.03	.001
13997.12	134.14	134921.99	198927.2	7791.82	.03	.001
14002.12	136.26	134921.91	198946.1	7791.80	.03	.001
14007.12	138.37	134921.83	198964.7	7791.78	.03	.001
14012.12	140.49	134921.75	198983.1	7791.76	.03	.001
14017.12	142.60	134921.67	199001.1	7791.74	.03	.001
14022.12	144.72	134921.59	199018.8	7791.72	.03	.001
14027.12	146.83	134921.51	199036.4	7791.70	.03	.001
14032.12	148.95	134921.43	199053.6	7791.69	.03	.001
14037.12	151.06	134921.35	199070.4	7791.67	.03	.001
14042.12	153.18	134921.27	199087.0	7791.65	.03	.001
14047.12	155.29	134921.19	199103.3	7791.63	.03	.001
14052.12	157.41	134921.11	199119.4	7791.61	.03	.001
14057.12	159.52	134921.03	199135.1	7791.60	.03	.001
14062.12	161.64	134920.95	199150.6	7791.58	.03	.001
14067.12	163.75	134920.87	199165.7	7791.56	.03	.001
14072.12	165.86	134920.79	199180.6	7791.54	.04	.001
14077.12	167.97	134920.71	199195.1	7791.53	.04	.001
14082.12	169.07	134920.63	199209.5	7791.51	.04	.001
14087.12	169.40	134920.55	199223.5	7791.49	.04	.001
14092.12	170.73	134920.47	199237.2	7791.48	.04	.001
14097.12	172.07	134920.39	199250.6	7791.46	.04	.001
14102.12	172.73	134920.31	199263.9	7791.44	.04	.001
14107.12	172.96	134920.23	199276.7	7791.43	.04	.001
14112.12	173.18	134920.15	199289.4	7791.41	.04	.001
14117.12	173.41	134920.07	199301.7	7791.39	.04	.001
14122.12	173.60	134919.99	199313.7	7791.38	.04	.001
14127.12	172.43	134919.91	199325.6	7791.36	.04	.001
14132.12	171.76	134919.83	199337.1	7791.35	.04	.001
14137.12	171.09	134919.75	199348.4	7791.33	.04	.001
14142.12	170.42	134919.67	199359.2	7791.31	.04	.001
14147.12	169.75	134919.59	199370.1	7791.30	.04	.001
14152.12	169.08	134919.51	199380.4	7791.28	.04	.001
14157.12	168.41	134919.43	199390.6	7791.27	.04	.001
14162.12	167.74	134919.35	199400.4	7791.25	.04	.001
14167.12	167.07	134919.27	199410.1	7791.23	.04	.001
14172.12	166.40	134919.19	199419.4	7791.22	.04	.001
14177.12	166.00	134919.11	199428.5	7791.20	.04	.001
14182.12	166.00	134919.03	199437.4	7791.18	.04	.001

\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.047 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	TOTAL ENGINE THRUST (NEWTONS)	TOTAL VEHICLE WEIGHT (KG)	ALTITUDE ABOVE OBLATE EARTH (M)	MAGNITUDE OF SPACE FIXED XPP SYSTEM (M/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (M/S**2)
14187.12	166.80	134918.95	199446.0	7791.17	.04	.001
14192.12	166.80	134918.87	199454.3	7791.15	.04	.001
14197.12	166.80	134918.79	199462.4	7791.14	.04	.001
14202.12	166.80	134918.71	199470.1	7791.12	.04	.001
14207.12	166.80	134918.63	199477.7	7791.11	.04	.001
14212.12	166.80	134918.55	199485.0	7791.09	.04	.001
14217.12	166.80	134918.47	199492.1	7791.08	.04	.001
14222.12	166.80	134918.39	199498.9	7791.06	.04	.001
14227.12	166.80	134918.31	199505.4	7791.05	.04	.001
14232.12	166.80	134918.23	199511.8	7791.03	.04	.001
14237.12	166.80	134918.15	199517.9	7791.01	.04	.001
14242.12	166.80	134918.07	199523.8	7791.00	.04	.001
14247.12	166.80	134917.99	199529.4	7790.99	.04	.001
14252.12	166.80	134917.91	199534.7	7790.97	.04	.001
14257.12	166.80	134917.83	199539.9	7790.96	.04	.001
14262.12	166.80	134917.75	199544.8	7790.94	.04	.001
14267.12	166.80	134917.68	199549.5	7790.93	.04	.001
14272.12	166.80	134917.60	199554.1	7790.91	.04	.001
14273.42	780.09	134917.57	199555.2	7790.91	.04	.004
14273.92	613.29	134917.45	199555.5	7790.91	.04	.005
14277.12	613.29	134916.69	199558.1	7790.91	.04	.005
14282.12	613.29	134915.49	199562.2	7790.91	.04	.005
14287.12	613.29	134914.30	199566.1	7790.91	.04	.005
14292.12	613.29	134913.11	199569.6	7790.91	.04	.005
14297.12	613.29	134911.91	199573.1	7790.92	.04	.005
14302.12	613.29	134910.72	199576.2	7790.92	.04	.005
14307.12	613.29	134909.52	199579.2	7790.92	.04	.005
14312.12	613.29	134908.33	199582.1	7790.92	.04	.005
14317.12	613.29	134907.13	199584.7	7790.92	.04	.005
14322.12	613.29	134905.94	199587.2	7790.93	.04	.005
14327.12	613.29	134904.75	199589.4	7790.93	.04	.005
14332.12	613.29	134903.55	199591.4	7790.93	.04	.005
14337.12	613.29	134902.36	199593.3	7790.93	.04	.005
14342.12	613.29	134901.16	199595.2	7790.93	.04	.005
14347.12	613.29	134899.97	199596.7	7790.94	.04	.005
14350.12	2880.8	134896.84	199597.5	7790.97	.04	.021
14352.12	4801.30	134893.80	199598.1	7791.02	.04	.036
14355.12	7682.09	134889.17	199598.8	7791.15	.05	.057
14357.12	674926.30	134768.40	199599.4	7794.55	.05	5.007
14357.62	734381.73	134738.21	199599.6	7797.18	.05	5.450
14361.62	853870.61	133993.12	199601.7	7820.54	.05	6.372
14362.12	854791.93	133899.98	199601.9	7823.72	.05	6.384

ULLAGE IGNITION  
02/M2 BURNER OFF

J02 F-L INI  
ULL CUT OFF

REIGN

908 THF  
16M INI

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	TOTAL VEHICLE ENGINE THRUST (NEWTONS)	TOTAL VEHICLE WEIGHT (KG)	ALTITUDE ABOVE OBLATE EARTH (M)	MAGNITUDE OF SPACE FIXED VELOCITY IN XPP SYSTEM (M/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (M/S <sup>2</sup> )
14367.17	864454.16	132981.59	199608.1	7855.90	.06	6.505
14372.12	875086.28	131841.07	199612.9	7888.61	.04	6.637
14377.12	881471.81	130787.73	199609.7	7921.98	.04	6.740
14382.12	883429.70	129729.66	199603.7	7955.78	.04	6.810
14387.12	884212.69	128669.90	199597.3	7989.91	.04	6.872
14392.12	884341.68	127609.70	199592.6	8024.34	.04	6.930
14397.12	884266.64	126549.60	199591.6	8059.04	.05	6.987
14402.12	884201.99	125489.51	199596.2	8094.04	.06	7.046
14407.12	884056.52	124429.58	199609.1	8129.32	.07	7.105
14412.12	883813.63	123369.83	199632.4	8164.88	.09	7.164
14417.12	883776.54	122310.43	199668.9	8200.73	.11	7.226
14422.12	884023.58	121250.90	199721.1	8236.89	.13	7.291
14427.12	884326.28	120191.28	199791.7	8273.37	.16	7.358
14432.12	884726.48	119131.43	199883.7	8310.16	.19	7.426
14437.12	885102.45	118071.33	199999.6	8347.28	.23	7.496
14442.12	885444.89	117010.99	200142.6	8384.72	.26	7.567
14447.12	885675.77	115950.50	200315.4	8422.50	.31	7.638
14452.12	885774.72	114889.96	200521.3	8460.59	.35	7.710
14457.12	885875.59	113829.54	200763.1	8499.02	.40	7.782
14462.12	885979.09	112769.17	201044.1	8537.77	.45	7.856
14467.12	886086.54	111708.77	201367.1	8576.85	.51	7.932
14472.12	886204.93	110648.48	201735.9	8616.27	.57	8.009
14477.12	886286.03	109588.17	202153.3	8656.03	.64	8.087
14482.12	886315.56	108527.93	202622.8	8696.13	.71	8.167
14487.12	886315.99	107467.83	203147.8	8736.58	.78	8.247
14492.12	886266.73	106407.86	203731.7	8777.38	.85	8.329
14497.12	886191.79	105348.07	204378.2	8818.53	.93	8.412
14502.12	886058.42	104288.54	205090.6	8860.03	1.02	8.496
14507.12	885911.43	103229.28	205872.6	8901.89	1.11	8.582
14512.12	885747.05	102170.26	206728.0	8944.11	1.20	8.669
14517.12	885620.10	101111.54	207660.5	8986.69	1.29	8.759
14522.12	885544.80	100052.98	208673.7	9029.66	1.39	8.851
14527.12	885460.91	98994.63	209771.7	9073.01	1.49	8.944
14532.12	885353.45	97936.39	210958.2	9116.74	1.60	9.040
14537.12	885307.70	96878.37	212237.4	9160.87	1.71	9.138
14542.12	885347.12	95820.28	213613.1	9205.42	1.83	9.240
14547.12	885356.30	94762.31	215089.6	9250.38	1.95	9.343
14552.12	885305.34	93704.31	216670.9	9295.76	2.07	9.448
14557.12	885249.28	92646.43	218361.2	9341.57	2.20	9.555
14562.12	885186.75	91588.60	220165.0	9387.83	2.33	9.665
14567.12	885123.97	90530.82	222086.4	9434.53	2.46	9.777
14572.12	885045.59	89473.16	224129.7	9481.69	2.60	9.892



\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	TOTAL VEHICLE ENGINE THRUST (NEWTONS)	TOTAL VEHICLE WEIGHT (KG)	ALTITUDE ABOVE OBLATE EARTH (M)	MAGNITUDE OF SPACE FIXED VELOCITY IN XPP SYSTEM (M/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (M/S**2)
14577.12	884966.48	88415.60	226299.5	9529.32	2.74	10.000
14582.12	884887.38	87358.18	228600.3	9577.43	2.89	10.129
14587.12	884807.54	86300.76	231036.4	9626.03	3.04	10.252
14592.12	884690.30	85244.51	233612.6	9675.13	3.19	10.378
14597.12	884572.50	84186.44	236333.4	9724.74	3.35	10.507
14602.12	884454.59	83129.55	239203.4	9774.89	3.51	10.639
14607.12	884335.27	82072.72	242227.4	9825.57	3.67	10.775
14612.12	884195.92	81016.06	245410.2	9876.81	3.84	10.914
14617.12	884055.35	79959.58	248756.4	9928.63	4.01	11.056
14622.12	883915.05	78903.28	252270.9	9981.03	4.19	11.202
14627.12	883649.89	77847.24	255958.4	10034.03	4.37	11.351
14632.12	882411.20	76791.97	259823.6	10087.59	4.55	11.491
14637.12	882254.59	75737.02	263871.4	10141.78	4.74	11.649
14642.12	882074.39	74682.19	268106.8	10196.63	4.93	11.811
14647.12	881893.23	73627.64	272534.2	10252.16	5.12	11.978
14652.12	881735.80	72573.37	277158.6	10308.39	5.31	12.149
14657.12	881569.75	71519.26	281944.5	10365.35	5.51	12.326
14662.12	881402.67	70465.32	287016.5	10423.05	5.71	12.508
14667.12	881225.56	69411.60	292259.2	10481.53	5.91	12.696
14672.12	881019.16	68358.11	297715.1	10540.78	6.11	12.888
14677.12	880810.68	67304.93	303380.4	10600.84	6.30	13.087
14682.12	880571.59	66252.02	309261.1	10661.77	6.50	13.291
14687.12	880315.24	65199.35	315365.4	10723.61	6.71	13.502
14692.12	879998.89	64147.14	321701.4	10786.37	6.92	13.718
14695.31	879772.48	63476.67	325865.1	10826.87	7.06	13.860
14695.52	255820.70	63427.71	326142.8	10829.27	7.07	4.033
14697.12	.00	63414.36	328275.8	10828.22	7.15	.000
14702.12	.00	63414.36	335067.1	10822.63	7.37	.000
14705.31	.00	63414.36	339504.8	10818.99	7.52	.000

GCS2  
T87  
TL1

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	TOTAL VEHICLE ENGINE THRUST (NEWTONS)	TOTAL VEHICLE WEIGHT (KG)	ALTITUDE ABOVE ORBLATE EARTH (M)	MAGNITUDE OF SPACE FIXED VELOCITY IN XPP SYSTEM (M/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (M/S <sup>2</sup> )
14705.31	142.85	63410.14	339504.8	10818.99	7.52	.002
14715.31	142.85	63405.59	353974.1	10807.16	7.96	.002
14726.31	142.85	63400.60	370840.0	10793.41	8.46	.002
14737.31	142.85	63395.60	388691.5	10778.92	8.95	.002
14748.31	142.85	63390.60	407517.7	10763.71	9.43	.002
14759.31	142.85	63385.60	427308.0	10747.78	9.92	.002
14770.31	142.85	63380.60	448050.8	10731.17	10.40	.002
14781.31	142.85	63375.60	469734.7	10713.88	10.88	.002
14792.31	142.85	63370.60	492347.2	10695.94	11.35	.002
14803.31	142.85	63365.60	515876.2	10677.37	11.82	.002
14814.31	142.85	63360.60	540308.7	10658.19	12.29	.002
14825.31	142.85	63355.60	565632.1	10638.42	12.76	.002
14836.31	142.85	63350.60	591832.4	10618.08	13.22	.002
14846.21	142.85	63346.10	618151.5	10599.30	13.63	.002

CVS OFF

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP. ENCLOSURE 4

TIME FROM FIRST MOTION (SFC)	RADIAL DISTANCE OF THE C G (M)	MAGNITUDE OF THE EARTH FIXED VELOCITY (M/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON OBLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (KM)
713.12	6563324.06	7389.524	32.6776	-52.82	2693.47
722.12	6563320.81	7389.564	32.6884	-52.13	2758.03
732.12	6563319.12	7389.608	32.6956	-51.37	2829.77
743.12	6563317.19	7389.660	32.6975	-50.52	2908.68
754.12	6563314.87	7389.715	32.6931	-49.68	2987.59
765.12	6563312.50	7389.779	32.6825	-48.84	3066.50
776.12	6563310.00	7389.865	32.6656	-48.00	3145.41
787.12	6563307.25	7389.954	32.6425	-47.16	3224.33
798.12	6563304.50	7390.009	32.6131	-46.32	3303.24
844.12	6563292.81	7390.198	32.4230	-42.81	3633.25
932.12	6563266.50	7390.664	31.7605	-36.17	4264.60
1020.12	6563236.19	7391.265	30.7196	-29.65	4896.01
1108.12	6563202.62	7392.009	29.3228	-23.30	5527.48
1196.12	6563166.06	7392.870	27.5982	-17.15	6159.04
1284.12	6563126.00	7393.619	25.5779	-11.22	6790.67
1372.12	6563081.87	7394.822	23.2956	-5.51	7422.39
1460.12	6563032.87	7395.842	20.7853	5.30	8054.17
1548.12	6562978.31	7396.845	18.0806	10.43	8685.99
1636.12	6562917.56	7397.794	15.2137	15.41	9317.83
1724.12	6562850.44	7398.656	12.2154	20.27	9949.66
1812.12	6562776.87	7399.403	9.1148	25.04	10581.44
1900.12	6562697.94	7400.009	5.9399	29.75	11213.12
1988.12	6562614.62	7400.456	2.7173	34.44	11844.67
2076.12	6562529.00	7400.728	-0.5270	39.13	12476.04
2164.12	6562443.81	7400.819	-3.7672	43.86	13107.19
2252.12	6562362.37	7400.730	-6.9776	48.65	13738.07
2340.12	6562289.50	7400.469	-10.1320	53.55	14368.64
2428.12	6562226.87	7400.050	-13.2033	58.58	14998.84
2516.12	6562181.81	7399.493	-16.1631	63.76	15628.59
2604.12	6562150.56	7398.822	-18.9816	69.13	16257.80
2692.12	6562162.00	7398.066	-21.6277	74.70	16886.24
2780.12	6562197.06	7397.256	-24.0683	80.49	17513.51
2868.12	6562268.06	7396.423	-26.2698	86.50	18138.61
2956.12	6562379.25	7395.598	-28.1977	92.72	18758.52
3044.12	6562533.37	7394.810	-29.8189	99.13	19358.78
3132.12	6562731.94	7394.086	-31.1022	105.70	19742.86
3220.12	6562979.06	7393.447	-32.0211	112.38	19305.80
3308.12	6563272.12	7392.912	-32.5552	118.49	18701.39
3396.12	6563578.25	7392.526	-32.6964	125.22	18137.12
3476.12	6563956.62	7392.215	-32.4694	131.87	17512.07
3564.12	6564375.25	7392.025	-31.8476	138.41	16885.23
3652.12	6564829.62	7391.949	-30.8454	145.87	16257.62

MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM

\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	RADIAL DISTANCE OF THE C G (M)	MAGNITUDE OF THE EARTH FIXED VELOCITY (M/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON OBLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (KM)
3740.12	6565314.25	7391.975	-29.4849	144.77	15629.64
3828.13	6565822.50	7392.087	-27.7940	150.94	15001.49
3916.12	6566347.25	7392.264	-25.8045	156.89	14373.24
4004.12	6566880.37	7392.482	-23.5501	162.63	13744.93
4092.12	6567414.06	7392.714	-21.0649	168.14	13116.59
4180.12	6567940.06	7392.934	-18.3827	173.46	12488.21
4268.12	6568450.12	7393.116	-15.5358	178.60	11859.79
4356.12	6568936.69	7393.237	-12.5550	-176.41	11231.35
4444.12	6569392.37	7393.275	-9.4697	-171.55	10602.89
4532.12	6569811.19	7393.214	-6.3076	-166.78	9974.41
4620.12	6570187.37	7393.043	-3.0956	-162.07	9345.96
4708.12	6570517.06	7392.756	.1406	-157.39	8717.54
4796.12	6570796.62	7392.354	3.3753	-152.72	8089.22
4884.12	6571024.19	7391.843	6.5832	-148.01	7461.02
4972.12	6571199.44	7391.237	9.7383	-143.23	6833.01
5060.12	6571322.62	7390.553	12.8139	-138.36	6205.28
5148.12	6571395.31	7389.815	15.8022	-133.37	5577.90
5236.12	6571420.19	7389.048	18.6139	-128.22	4951.02
5324.12	6571400.41	7388.283	21.2781	-122.89	4324.83
5412.12	6571341.37	7387.550	23.7427	-117.36	3699.64
5500.12	6571246.62	7386.862	25.9740	-111.62	3076.01
5588.12	6571121.37	7386.306	27.9382	-105.66	2455.03
5676.12	6570970.94	7385.851	29.6019	-99.49	1834.31
5764.12	6570800.19	7385.541	30.9339	-93.12	1236.58
5852.12	6570614.06	7385.392	31.9067	-86.58	681.94
5940.12	6570417.00	7385.420	32.4992	-79.93	436.66
6028.12	6570212.94	7385.629	32.6975	-73.22	840.22
6116.12	6570005.19	7386.020	32.4968	-66.51	1418.10
6204.12	6569796.56	7386.585	31.9019	-59.86	2026.12
6292.12	6569588.87	7387.311	30.9264	-53.33	2644.10
6372.12	6569402.31	7388.093	29.7270	-47.53	3209.41
6460.12	6569200.25	7389.064	28.0890	-41.33	3833.47
6548.12	6569001.81	7390.122	26.1472	-35.35	4458.96
6636.12	6568806.87	7391.234	23.9346	-29.58	5085.38
6724.12	6568615.25	7392.364	21.4858	-24.03	5712.47
6812.12	6568426.44	7393.476	18.8338	-18.68	6340.05
6900.12	6568240.12	7394.534	16.0114	-13.52	6967.98
6988.12	6568056.00	7395.513	13.0495	-8.50	7596.18
7076.12	6567874.12	7396.354	9.9776	-3.62	8224.58
7164.12	6567695.06	7397.060	6.8240	1.17	8853.02
7252.12	6567519.87	7397.602	3.6154	5.89	9481.53
7340.12	6567350.06	7397.963	.3780	10.57	10110.02

\*\*\*\*\* MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	RADIAL DISTANCE OF THE C G (M)	EARTH FIXED VELOCITY (M/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON OBLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (KM)
7428.12	6567187.94	7396.138	-2.8626	15.25	10738.42
7516.12	6567036.25	7396.125	-6.0807	19.96	11366.69
7604.12	6566898.50	7397.931	-9.2503	24.73	11994.76
7692.12	6566778.37	7397.568	-12.3448	29.59	12622.59
7780.12	6566680.37	7397.057	-15.3361	34.57	13250.12
7868.12	6566608.75	7396.419	-18.1951	39.71	13877.30
7956.12	6566568.25	7395.683	-20.8910	45.02	14504.03
8044.12	6566533.06	7394.879	-23.3915	50.52	15131.21
8132.12	6566597.25	7394.037	-25.6629	56.24	15755.65
8220.12	6566674.50	7393.195	-27.6712	62.18	16380.02
8308.12	6566797.75	7392.378	-29.3827	68.33	17002.72
8396.12	6566968.87	7391.614	-30.7657	74.69	17622.46
8484.12	6567189.00	7390.929	-31.7921	81.21	18236.17
8572.12	6567458.06	7390.342	-32.4396	87.85	18834.37
8660.12	6567774.94	7389.866	-32.6935	94.56	19372.26
8748.12	6568137.12	7389.510	-32.5478	101.29	19546.87
8836.12	6568541.00	7389.275	-32.0062	107.95	19115.49
8924.12	6568981.69	7389.158	-31.0813	114.51	18536.17
9012.12	6569453.50	7389.147	-29.7937	120.91	17928.59
9100.12	6569949.56	7389.228	-28.1703	127.11	17311.78
9188.12	6570462.50	7389.381	-26.2420	133.10	16690.92
9276.12	6570984.31	7389.582	-24.0423	138.88	16167.92
9364.12	6571506.62	7389.807	-21.6051	144.43	15443.65
9452.12	6572021.00	7390.028	-18.9643	149.78	14818.53
9540.12	6572519.06	7390.221	-16.1523	154.95	14192.80
9628.12	6572992.87	7390.361	-13.2004	159.97	13566.62
9716.12	6573435.00	7390.426	-10.1380	164.85	12940.06
9804.12	6573838.69	7390.400	-6.9932	169.63	12313.20
9892.12	6574198.62	7390.270	-3.7928	174.35	11686.09
9980.12	6574509.81	7390.029	-0.5628	179.02	11058.76
10068.12	6574769.12	7389.676	2.6714	176.31	10431.28
10156.12	6574974.56	7389.216	5.8843	171.61	9803.67
10244.12	6575125.00	7388.661	9.0503	166.86	9175.99
10332.12	6575220.81	7388.026	12.1430	162.02	8548.27
10420.12	6575263.69	7387.335	15.1347	157.06	7920.54
10508.12	6575256.06	7386.612	17.9968	151.95	7292.91
10596.12	6575201.75	7385.886	20.6988	146.67	6665.37
10684.12	6575104.75	7385.188	23.2087	141.20	6037.98
10772.12	6574970.00	7384.547	25.4935	135.51	5410.81
10860.12	6574802.81	7383.995	27.5192	129.60	4783.95
10948.12	6574608.19	7383.559	29.2523	123.48	4157.52
11036.12	6574391.87	7383.262	30.6611	117.16	3531.73

MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH#72.067 DEG. 2ND OPP.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	RADIAL DISTANCE OF THE C <sup>1</sup> (M)	MAGNITUDE OF THE EARTH FIXED VELOCITY (M/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON ORLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (KM)
1124.12	6574158.94	7303.124	31.7172	-110.66	2906.97
11212.12	6573914.19	7303.159	32.3977	-104.04	2284.08
11300.12	6573661.81	7303.375	32.6871	-97.34	1665.17
11368.12	6573405.61	7303.772	32.5784	-90.63	1057.30
11476.12	6573149.12	7304.344	32.0742	-83.97	502.57
11564.12	6572894.31	7305.078	31.1860	-77.41	421.02
11652.12	6572643.25	7305.956	29.9334	-71.00	944.69
11740.12	6572397.00	7306.953	28.3424	-64.78	1548.78
11828.12	6572156.31	7308.039	26.4435	-58.77	2167.21
11916.12	6571921.44	7309.181	24.2694	-52.98	2790.59
12004.12	6571692.37	7310.345	21.8542	-47.40	3416.31
12092.12	6571468.69	7311.492	19.2315	-42.03	4043.37
12180.12	6571250.25	7312.586	16.4338	-36.84	4671.29
12268.12	6571037.06	7313.595	13.4924	-31.11	5299.79
12356.12	6570829.06	7314.486	10.4370	-26.91	5928.73
12444.12	6570626.62	7315.232	7.2957	-22.12	6557.97
12532.12	6570431.12	7315.813	4.0957	-17.39	7187.43
12620.12	6570243.69	7316.213	.8630	-12.11	7817.05
12708.12	6570066.75	7316.423	-2.3766	-8.13	8446.76
12796.12	6569903.00	7316.441	-5.5977	-3.33	9076.51
12884.12	6569755.44	7316.274	-8.7744	1.42	9706.27
12972.12	6569628.00	7315.933	-11.8800	6.27	10336.01
13060.12	6569524.87	7315.436	-14.8871	11.22	10965.71
13148.12	6569450.12	7314.806	-17.7665	16.33	11595.35
13236.12	6569408.06	7314.072	-20.4878	21.60	12224.94
13324.12	6569403.12	7313.262	-23.0189	27.08	12854.47
13412.12	6569439.25	7312.410	-25.3266	32.76	13483.97
13500.12	6569519.81	7311.547	-27.3764	38.66	14113.44
13588.12	6569647.56	7310.705	-29.1357	44.77	14742.92
13676.12	6569824.56	7309.911	-30.5712	51.09	15372.42
13764.12	6570051.56	7309.191	-31.6547	57.69	16001.95
13774.12	6570080.31	7309.115	-31.7545	58.33	16073.47
13777.12	6570089.06	7309.092	-31.7835	58.56	16094.95

TIME BASE 6

MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM

ENCLOSURE 4

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	RADIAL DISTANCE OF THE C G (M)	MAGNITUDE OF THE EARTH FIXED VELOCITY (M/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON OBLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (KM)
1377.12	6570089.04	7389.092	-31.7835	58.54	16094.95
1378.12	6570103.94	7389.055	-31.8308	58.93	16130.72
1379.12	6570118.94	7389.018	-31.8769	59.31	16166.49
1380.12	6570134.12	7388.981	-31.9217	59.68	16202.27
1381.12	6570149.50	7388.945	-31.9653	60.06	16238.04
1382.12	6570165.00	7388.903	-32.0077	60.43	16273.81
1383.12	6570180.49	7388.872	-32.0489	60.81	16309.58
1384.12	6570196.62	7388.836	-32.0888	61.19	16345.35
1385.12	6570212.81	7388.801	-32.1274	61.54	16381.12
1386.12	6570229.25	7388.767	-32.1645	61.71	16395.43
1387.12	6570245.94	7388.731	-32.1999	61.73	16396.86
1388.12	6570262.04	7388.697	-32.2331	61.94	16416.90
1389.12	6570278.81	7388.664	-32.2645	62.32	16452.67
1390.12	6570295.81	7388.631	-32.2939	62.70	16488.44
1391.12	6570312.81	7388.598	-32.3215	63.07	16524.21
1392.12	6570330.12	7388.566	-32.3475	63.45	16559.98
1393.12	6570347.44	7388.534	-32.3719	63.83	16595.76
1394.12	6570364.94	7388.503	-32.3949	64.21	16631.53
1395.12	6570382.75	7388.472	-32.4168	64.59	16667.30
1396.12	6570400.56	7388.441	-32.4369	64.97	16703.07
1397.12	6570418.56	7388.411	-32.4555	65.35	16738.85
1398.12	6570436.69	7388.382	-32.4727	65.73	16774.62
1399.12	6570454.94	7388.353	-32.4886	66.11	16810.39
1400.12	6570473.31	7388.324	-32.5034	66.49	16846.17
1401.12	6570491.94	7388.296	-32.5173	66.87	16881.94
1402.12	6570510.69	7388.269	-32.5303	67.25	16917.71
1403.12	6570529.56	7388.241	-32.5425	67.63	16953.49
1404.12	6570548.62	7388.215	-32.5539	68.01	16989.26
1405.12	6570567.75	7388.189	-32.5645	68.39	17025.03
1406.12	6570587.12	7388.163	-32.5743	68.77	17060.81
1407.12	6570606.69	7388.138	-32.5833	69.16	17096.58
1408.12	6570626.25	7388.113	-32.5916	69.54	17132.35
1409.12	6570644.19	7388.088	-32.6003	69.92	17168.13
1410.12	6570666.06	7388.065	-32.6075	70.30	17203.90
1411.12	6570686.19	7388.041	-32.6155	70.68	17239.67
1412.12	6570706.50	7388.018	-32.6233	71.06	17275.45
1413.12	6570726.87	7387.995	-32.6311	71.45	17311.22
1414.12	6570747.56	7387.973	-32.6389	71.83	17346.99
1415.12	6570768.31	7387.952	-32.6467	72.21	17382.76
1416.12	6570789.25	7387.930	-32.6545	72.59	17418.54
1417.12			-32.6623	72.97	17454.31
1418.12			-32.6701	73.36	17490.08

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MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1471 AZIMUTH 72.067 DEG. 2ND OPP. ENCLOSURE 4 00

TIME FROM FIRST MOTION (SFC)	RADIAL DISTANCE OF THE C G (M)	MAGNITUDE OF THE EARTH FIXED VELOCITY (M/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON OBLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (KM)
13977.12	6570810.37	7387.909	-32.6940	73.74	17525.85
13982.12	6570831.62	7387.889	-32.6905	74.12	17561.62
13987.12	6570853.00	7387.869	-32.6867	74.50	17597.40
13992.12	6570874.56	7387.850	-32.6796	74.88	17633.17
13997.12	6570896.25	7387.831	-32.6723	75.27	17668.94
14002.12	6570918.06	7387.812	-32.6651	75.65	17704.71
14007.12	6570940.06	7387.795	-32.6579	76.03	17740.48
14012.12	6570962.19	7387.777	-32.6507	76.41	17776.24
14017.12	6570984.44	7387.760	-32.6435	76.79	17812.01
14022.12	6571006.87	7387.744	-32.6363	77.17	17847.78
14027.12	6571029.50	7387.728	-32.6291	77.56	17883.55
14032.12	6571052.19	7387.712	-32.6219	77.94	17919.31
14037.12	6571075.00	7387.697	-32.6147	78.32	17955.08
14042.12	6571098.00	7387.682	-32.6075	78.70	17990.84
14047.12	6571121.17	7387.668	-32.5999	79.08	18026.61
14052.12	6571144.37	7387.654	-32.5927	79.46	18062.37
14057.12	6571167.81	7387.641	-32.5856	79.84	18098.13
14062.12	6571191.37	7387.628	-32.5784	80.22	18133.89
14067.12	6571215.00	7387.616	-32.5713	80.60	18169.65
14072.12	6571238.87	7387.604	-32.5641	80.98	18205.41
14077.12	6571262.81	7387.593	-32.5570	81.36	18241.16
14082.12	6571286.94	7387.582	-32.5498	81.74	18276.92
14087.12	6571311.19	7387.571	-32.5427	82.12	18312.67
14092.12	6571335.50	7387.561	-32.5355	82.49	18348.42
14097.12	6571360.00	7387.551	-32.5284	82.87	18384.17
14102.12	6571384.69	7387.542	-32.5212	83.25	18419.92
14107.12	6571409.44	7387.533	-32.5141	83.63	18455.66
14112.12	6571434.37	7387.524	-32.5070	84.01	18491.40
14117.12	6571459.37	7387.515	-32.4998	84.38	18527.14
14122.12	6571484.56	7387.508	-32.4927	84.76	18562.87
14127.12	6571509.87	7387.500	-32.4855	85.14	18598.60
14132.12	6571535.25	7387.493	-31.9905	85.51	18634.33
14137.12	6571560.87	7387.486	-31.99474	85.89	18670.05
14142.12	6571586.50	7387.480	-31.9935	86.26	18705.77
14147.12	6571612.37	7387.474	-31.9922	86.64	18741.48
14152.12	6571638.31	7387.468	-31.9910	87.01	18777.19
14157.12	6571664.37	7387.463	-31.9898	87.39	18812.89
14162.12	6571690.56	7387.458	-31.9886	87.76	18848.58
14167.12	6571716.87	7387.453	-31.9874	88.13	18884.27
14172.12	6571743.31	7387.447	-31.9862	88.50	18919.95
14177.12	6571769.87	7387.442	-31.9850	88.88	18955.62
14182.12	6571796.56	7387.438	-31.9838	89.25	18991.28

0000 MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM



AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP. ENCLOSURE 4.00

TIME FROM FIRST MOTION (SEC)	RADIAL DISTANCE OF THE C G (M)	MAGNITUDE OF THE EARTH FIXED VELOCITY (M/SEC)	SUR VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON OBLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (KM)
14187.12	6571823.37	7387.435	-31.4516	89.62	19026.93
14192.12	6571850.31	7387.432	-31.3954	89.99	19062.57
14197.12	6571877.37	7387.429	-31.3379	90.36	19098.19
14202.12	6571904.50	7387.427	-31.2793	90.73	19133.79
14207.12	6571931.81	7387.424	-31.2195	91.10	19169.38
14212.12	6571959.19	7387.423	-31.1585	91.47	19204.95
14217.12	6571986.75	7387.422	-31.0963	91.84	19240.49
14222.12	6572014.37	7387.420	-31.0330	92.21	19276.01
14227.12	6572042.12	7387.418	-30.9685	92.57	19311.50
14232.12	6572070.00	7387.417	-30.9028	92.94	19346.95
14237.12	6572098.00	7387.416	-30.8360	93.31	19382.34
14242.12	6572126.06	7387.416	-30.7680	93.67	19417.73
14247.12	6572154.25	7387.417	-30.6988	94.04	19453.03
14252.12	6572182.56	7387.418	-30.6286	94.40	19488.27
14257.12	6572211.00	7387.419	-30.5571	94.77	19523.41
14262.12	6572239.50	7387.420	-30.4846	95.13	19558.46
14267.12	6572268.12	7387.422	-30.4109	95.49	19593.38
14272.12	6572296.87	7387.425	-30.3361	95.86	19628.13
14273.42	6572304.37	7387.425	-30.3164	95.95	19637.13
14273.92	6572307.19	7387.427	-30.3089	95.99	19640.59
14277.12	6572325.56	7387.439	-30.2601	96.22	19662.67
14282.12	6572354.56	7387.457	-30.1831	96.58	19696.93
14287.12	6572383.62	7387.475	-30.1050	96.94	19730.81
14292.12	6572412.75	7387.494	-30.0257	97.30	19764.16
14297.12	6572442.06	7387.514	-29.9453	97.66	19796.75
14302.12	6572471.44	7387.535	-29.8639	98.02	19828.19
14307.12	6572500.87	7387.555	-29.7814	98.38	19857.81
14312.12	6572530.44	7387.576	-29.6977	98.74	19884.45
14317.12	6572560.19	7387.597	-29.6130	99.09	19907.01
14322.12	6572590.00	7387.619	-29.5273	99.45	19919.34
14327.12	6572619.87	7387.641	-29.4404	99.80	19920.86
14332.12	6572649.87	7387.662	-29.3527	100.16	19910.37
14337.12	6572680.00	7387.682	-29.2635	100.51	19890.64
14342.12	6572710.31	7387.703	-29.1735	100.87	19865.13
14347.12	6572740.69	7387.725	-29.0825	101.22	19836.20
14350.12	6572758.87	7387.770	-29.0274	101.43	19817.79
14352.12	6572771.06	7387.827	-28.9904	101.57	19805.22
14355.12	6572789.37	7387.966	-28.9346	101.78	19785.98
14357.12	6572801.69	7391.376	-28.8973	101.93	19772.95
14357.62	6572804.81	7394.014	-28.8879	101.96	19769.68
14361.62	6572830.62	7417.381	-28.8124	102.24	19743.12
14362.14	6572833.87	7420.569	-28.8029	102.28	19739.77

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MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	RADIAL DISTANCE OF THE C G (M)	MAGNITUDE OF THE EARTH FIXED VELOCITY (M/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON OBLATE EARTH (DEG)	ARC RANGE A-ONG SPHER. EARTH TO SUB VEHICLE PT. (KM)
14367.12	6572870.06	7452.756	-28.7071	102.63	19705.87
14372.12	6572905.31	7485.472	-28.6099	102.98	19671.40
14377.12	6572932.75	7518.857	-28.5113	103.34	19636.46
14382.12	6572958.00	7552.662	-28.4113	103.69	19601.13
14387.12	6572983.12	7586.800	-28.3098	104.05	19565.46
14392.12	6573010.25	7621.232	-28.2068	104.41	19529.49
14397.12	6573041.50	7655.945	-28.1024	104.77	19493.24
14402.12	6573078.87	7690.942	-27.9965	105.12	19456.73
14407.12	6573124.75	7726.226	-27.8892	105.48	19419.98
14412.12	6573181.50	7761.794	-27.7803	105.85	19382.99
14417.12	6573251.69	7797.651	-27.6699	106.21	19345.78
14422.12	6573338.06	7833.814	-27.5581	106.57	19308.34
14427.12	6573443.19	7870.289	-27.4446	106.93	19270.70
14432.12	6573570.00	7907.083	-27.3297	107.30	19232.85
14437.12	6573721.19	7944.202	-27.2132	107.66	19194.79
14442.12	6573899.75	7981.645	-27.0951	108.03	19156.52
14447.12	6574108.62	8019.415	-26.9755	108.40	19118.06
14452.12	6574350.81	8057.507	-26.8543	108.77	19079.39
14457.12	6574629.37	8095.923	-26.7315	109.14	19040.52
14462.12	6574947.37	8134.666	-26.6070	109.51	19001.45
14467.12	6575307.87	8173.740	-26.4810	109.88	18962.18
14472.12	6575714.37	8213.150	-26.3533	110.25	18922.71
14477.12	6576169.94	8252.898	-26.2240	110.62	18883.05
14482.12	6576677.94	8292.986	-26.0931	110.99	18843.18
14487.12	6577241.75	8333.418	-25.9605	111.37	18803.11
14492.12	6577864.87	8374.195	-25.8262	111.75	18762.84
14497.12	6578550.81	8415.321	-25.6902	112.12	18722.37
14502.12	6579303.12	8456.798	-25.5526	112.50	18681.70
14507.12	6580125.31	8498.630	-25.4133	112.88	18640.83
14512.12	6581021.19	8540.820	-25.2722	113.26	18599.76
14517.12	6581994.50	8583.375	-25.1294	113.64	18558.48
14522.12	6583048.87	8626.304	-24.9849	114.02	18517.00
14527.12	6584188.37	8669.614	-24.8387	114.40	18475.31
14532.12	6585416.69	8713.310	-24.6907	114.78	18433.43
14537.12	6586737.94	8757.399	-24.5409	115.17	18391.33
14542.12	6588156.06	8801.894	-24.3894	115.55	18349.03
14547.12	6589675.25	8846.805	-24.2361	115.94	18306.52
14552.12	6591299.56	8892.135	-24.0810	116.32	18263.80
14557.12	6593033.19	8937.892	-23.9241	116.71	18220.88
14562.12	6594880.50	8984.086	-23.7655	117.10	18177.75
14567.12	6596845.62	9030.725	-23.6050	117.49	18134.40
14572.12	6598933.12	9077.819	-23.4427	117.88	18090.80

MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM

AS-309 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	RADIAL DISTANCE OF THE C G (M)	MAGNITUDE OF THE EARTH FIXER VELOCITY (M/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON OBLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (KM)
14577.12	6601147.19	9125.377	-23.2785	118.27	18047.09
14582.12	6603492.56	9173.412	-23.1126	118.66	18003.11
14587.12	6605973.56	9221.935	-22.9448	119.05	17958.92
14592.12	6608594.75	9270.956	-22.7751	119.45	17914.52
14597.12	6611360.87	9320.487	-22.6036	119.84	17869.91
14602.12	6614276.37	9370.543	-22.4303	120.24	17825.08
14607.12	6617346.12	9421.137	-22.2557	120.63	17780.03
14612.12	6620574.81	9472.282	-22.0779	121.03	17734.77
14617.12	6623967.06	9523.996	-21.8989	121.43	17689.30
14622.12	6627527.81	9576.293	-21.7181	121.83	17643.61
14627.12	6631261.75	9629.191	-21.5353	122.22	17597.70
14632.12	6635173.62	9682.636	-21.3506	122.63	17551.57
14637.12	6639268.25	9736.711	-21.1641	123.03	17505.23
14642.12	6643550.44	9791.440	-20.9756	123.43	17458.67
14647.12	6648024.94	9846.844	-20.7852	123.83	17411.89
14652.12	6652696.37	9902.946	-20.5929	124.23	17364.89
14657.12	6657569.56	9959.769	-20.3987	124.64	17317.67
14662.12	6662648.94	10017.336	-20.2026	125.04	17270.23
14667.12	6667939.06	10075.671	-20.0045	125.45	17222.56
14672.12	6673442.44	10134.766	-19.8045	125.86	17174.68
14677.12	6679155.25	10194.663	-19.6025	126.26	17126.56
14682.12	6685083.50	10255.435	-19.3986	126.67	17078.23
14687.12	6691235.44	10317.103	-19.1927	127.08	17029.67
14692.12	6697619.12	10379.694	-18.9849	127.49	16980.88
14695.31	6704241.06	10443.083	-18.7752	127.90	16931.88
14697.12	6711079.75	10507.177	-18.5646	128.31	16882.91
14702.12	6718133.04	10571.986	-18.3514	128.75	16834.17
14705.31	6725399.06	10637.517	-18.1357	129.18	16785.66
14708.31	6732882.44	10703.774	-17.9176	129.63	16737.38
14711.31	6740583.50	10770.754	-17.6972	130.08	16689.32
14714.31	6748503.50	10838.462	-17.4746	130.55	16641.48
14717.31	6756643.50	10906.894	-17.2498	131.03	16593.86
14720.31	6764999.06	10976.057	-17.0229	131.52	16546.46
14723.31	6773570.44	11045.951	-16.7940	132.03	16499.28
14726.31	6782357.06	11116.574	-16.5631	132.55	16452.32
14729.31	6791359.06	11187.925	-16.3302	133.09	16405.58
14732.31	6800576.44	11259.904	-16.0954	133.65	16359.06
14735.31	6810009.06	11332.511	-15.8587	134.23	16312.76
14738.31	6819657.06	11405.846	-15.6202	134.83	16266.68
14741.31	6829520.44	11479.910	-15.3799	135.45	16220.82
14744.31	6839599.06	11554.603	-15.1378	136.09	16175.18
14747.31	6849893.06	11629.925	-14.8939	136.75	16129.76
14750.31	6860402.44	11705.877	-14.6482	137.43	16084.56
14753.31	6871127.06	11782.459	-14.4008	138.13	16039.58
14756.31	6882068.44	11859.672	-14.1517	138.85	16000.00
14759.31	6893226.44	11937.517	-13.9009	139.59	15960.82
14762.31	6904599.06	12016.094	-13.6484	140.35	15922.05
14765.31	6916186.44	12095.403	-13.3943	141.13	15883.70
14768.31	6927988.44	12175.444	-13.1387	141.93	15845.76
14771.31	6939996.44	12256.217	-12.8816	142.75	15808.24
14774.31	6952219.06	12337.723	-12.6230	143.59	15771.14
14777.31	6964657.06	12419.962	-12.3629	144.45	15734.46
14780.31	6977310.44	12502.935	-12.1014	145.33	15698.20
14783.31	6990179.06	12586.643	-11.8385	146.23	15662.46
14786.31	7003263.06	12671.086	-11.5743	147.15	15627.24
14789.31	7016562.44	12756.264	-11.3088	148.09	15592.54
14792.31	7030077.06	12842.177	-11.0421	149.05	15558.36
14795.31	7043807.06	12928.825	-10.7743	149.93	15524.70
14798.31	7057752.44	13016.208	-10.5054	150.83	15491.56
14801.31	7071913.06	13104.327	-10.2354	151.75	15458.94
14804.31	7086289.06	13193.182	-9.9643	152.69	15426.84
14807.31	7100880.44	13282.774	-9.6922	153.65	15395.26
14810.31	7115687.06	13373.103	-9.4192	154.63	15364.20
14813.31	7130709.06	13464.170	-9.1453	155.63	15333.66
14816.31	7145946.44	13555.975	-8.8705	156.65	15303.64
14819.31	7161399.06	13648.518	-8.5948	157.69	15274.14
14822.31	7177067.06	13741.800	-8.3183	158.75	15245.16
14825.31	7192950.44	13835.821	-8.0410	159.83	15216.70
14828.31	7209049.06	13930.582	-7.7630	160.93	15188.76
14831.31	7225363.06	14026.084	-7.4843	162.05	15161.34
14834.31	7241892.44	14122.327	-7.2050	163.19	15134.44
14837.31	7258637.06	14219.312	-6.9251	164.35	15108.06
14840.31	7275597.06	14317.039	-6.6447	165.53	15082.20
14843.31	7292772.44	14415.510	-6.3638	166.73	15056.86
14846.31	7310163.06	14514.725	-6.0824	167.95	15032.04
14849.31	7327769.06	14614.684	-5.8006	169.19	15007.74
14852.31	7345591.06	14715.388	-5.5183	170.45	14983.96
14855.31	7363629.06	14816.837	-5.2356	171.73	14960.70
14858.31	7381883.06	14918.941	-4.9525	173.03	14937.96
14861.31	7400353.06	15021.699	-4.6690	174.35	14915.74
14864.31	7419039.06	15125.112	-4.3851	175.69	14894.04
14867.31	7437942.44	15229.180	-4.1008	177.05	14872.86
14870.31	7457063.06	15333.913	-3.8162	178.43	14852.20
14873.31	7476400.44	15439.311	-3.5313	179.83	14832.16
14876.31	7495954.44	15545.375	-3.2461	181.25	14812.64
14879.31	7515725.06	15652.105	-2.9607	182.69	14793.64
14882.31	7535713.06	15759.501	-2.6751	184.15	14775.16
14885.31	7555918.44	15867.563	-2.3893	185.63	14757.20
14888.31	7576340.44	15976.292	-2.1034	187.13	14739.76
14891.31	7596979.06	16085.689	-1.8174	188.65	14722.84
14894.31	7617835.06	16195.754	-1.5313	190.19	14706.44
14897.31	7638908.44	16306.487	-1.2451	191.75	14690.56
14900.31	7660199.06	16417.889	-0.9589	193.33	14675.20
14903.31	7681707.06	16529.960	-0.6727	194.93	14660.36
14906.31	7703432.44	16642.699	-0.3865	196.55	14646.04
14909.31	7725375.06	16756.107	-0.1003	198.19	14632.24
14912.31	7747535.06	16870.184	0.1859	199.85	14618.96
14915.31	7769912.44	16984.930	0.4723	201.53	14606.20
14918.31	7792507.06	17100.345	0.7596	203.23	14593.96
14921.31	7815319.06	17217.429	1.0478	204.95	14582.24
14924.31	7838348.44	17335.183	1.3369	206.69	14571.04
14927.31	7861595.06	17453.607	1.6269	208.45	14560.36
14930.31	7885059.06	17572.701	1.9178	210.23	14550.20
14933.31	7908741.06	17693.465	2.2096	212.03	14540.56
14936.31	7932641.06	17814.899	2.5024	213.85	14531.44
14939.31	7956759.06	17936.914	2.7961	215.69	14522.84
14942.31	7981095.06	18059.510	3.0908	217.55	14514.76
14945.31	8005649.06	18182.687	3.3865	219.43	14507.20
14948.31	8030421.06	18306.445	3.6833	221.33	14500.16
14951.31	8055412.44	18430.784	3.9811	223.25	14493.54
14954.31	8080623.06	18555.704	4.2800	225.19	14487.34
14957.31	8106053.06	18681.205	4.5800	227.15	14481.56
14960.31	8131703.06	18807.288	4.8811	229.13	14476.20
14963.31	8157573.06	18933.953	5.1833	231.13	14471.26
14966.31	8183663.06	19061.199	5.4866	233.15	14466.74
14969.31	8209973.06	19189.027	5.7911	235.19	14462.64
14972.31	8236503.06	19317.437	6.0967	237.25	14458.96
14975.31	8263253.06	19446.429	6.4035	239.33	14455.70
14978.31	8290223.06	19576.903	6.7115	241.43	14452.86
14981.31	8317413.06	19707.960	7.0207	243.55	14450.44
14984.31	8344823.06	19839.599	7.3311	245.69	14448.44
14987.31	8372453.06	19971.830	7.6428	247.85	14446.86
14990.31	8400303.06	20104.653	7.9558	250.03	14445.70
14993.31	8428373.06	20238.069	8.2701	252.23	14444.96
14996.31	8456663.06	20372.078	8.5857	254.45	14444.64
14999.31	8485173.06	20506.681	8.9026	256.69	14444.74
15002.31	8513903.06	20641.878	9.2208	258.95	14445.26
15005.31	8542853.06	20777.670	9.5403	261.23	14446.20
15008.31	8572023.06	20914.057	9.8612	263.53	14447.56
15011.31	8601413.06	21051.040	10.1835	265.85	14449.34
15014.31	8631023.06	21188.619	10.5073	268.19	14451.54
15017.31	8660853.06	21326.794	10.8326	270.55	14454.16
15020.31	8690903.06	21465.565	11.1594	272.93	14457.20
15023.31	8721173.06	21604.932	11.4877	275.33	14460.66
15026.31	8751673.06	21744.895	11.8175	277.75	14464.54
15029.31	8782393.06	21885.454	12.1488	280.19	14468.84
15032.31	8813333.06	22026.609	12.4816	282.65	14473.56
15035.31	8844493.06	22168.360	12.8160	285.13	14478.70
15038.31	8875873.06	22310.707	13.1520	287.63	14484.26
15041.31	8907473.06	22453.650	13.4896	290.15	14490.24
15044.31	8939293.06	22597.189	13.8288	292.69	14496.64
15047.31	8971333.06	22741.324	14.1697	295.25	14503.46
15050.31	9003593.06	22886.055	14.5123	297.83	14510.70
15053.31	9036073.06	23031.382	14.8566	300.43	14518.36
15056.31	9068773.06	23177.305	15.2026	303.05	14526.44
15059.31	9101693.06	23323.824	15.5503	305.69	14534.94
15062.31	9134833.06	23470.939	15.8997	308.35	

AS-519 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

ENCLOSURE 4

TIME FROM FIRST MOTION (SFC)	RADIAL DISTANCE OF THE C G (M)	MAGNITUDE OF THE EARTH FIXED VELOCITY (M/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON OBLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (KM)
14705.31	6715547.44	10411.860	-18.4300	128.57	16851.74
14715.31	6730110.00	10399.658	-18.0065	129.38	16754.25
14724.31	6747076.69	10385.483	-17.5386	130.27	16647.51
14737.31	6765027.12	10370.534	-17.0687	131.14	16541.34
14748.31	6783950.19	10354.831	-16.5973	132.00	16435.77
14759.31	6803835.12	10338.392	-16.1247	132.86	16330.82
14770.31	6824670.37	10321.236	-15.6511	133.70	16226.51
14781.31	6846444.31	10303.383	-15.1769	134.54	16122.87
14792.31	6869144.37	10284.853	-14.7023	135.36	16019.92
14803.31	6892758.50	10265.666	-14.2277	136.18	15917.69
14814.31	6917273.50	10245.843	-13.7534	136.98	15816.19
14825.31	6942676.62	10225.406	-13.2795	137.78	15715.45
14836.31	6968954.06	10204.375	-12.8064	138.57	15615.48
14846.21	6993340.12	10184.958	-12.3815	139.27	15526.19

CVS OFF

MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.										
** ENCLOSURE 4 **										
TIME FROM MOTION (SEC)	X COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN. SYS. (M)	Y COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (M)	Z COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (M)	COMPONENT OF VEL. IN THE XXE SYSTEM (M/S)	COMPONENT OF VEL. IN THE YXE SYSTEM (M/S)	COMPONENT OF VEL. IN THE ZXE SYSTEM (M/S)	X COMPONENT OF VEL. IN THE XXE SYSTEM (M/S)	Y COMPONENT OF VEL. IN THE YXE SYSTEM (M/S)	Z COMPONENT OF VEL. IN THE ZXE SYSTEM (M/S)	
713.12	5967895.000	79052.299	2686277.094	-3025.648	279.241	6735.915	-3093.815	283.810	6704.731	
722.12	5960355.562	81594.481	2746758.687	-3169.176	286.835	6669.273	-3251.609	294.322	6629.290	
732.12	5929039.875	84455.741	2813629.281	-3333.542	299.762	6588.287	-3495.875	305.156	6546.275	
743.12	5893724.812	87663.119	2886772.219	-3495.875	310.501	6503.273	-3576.246	315.795	6459.269	
754.12	5857505.562	90930.617	2959469.687	-3656.050	321.034	6414.239	-3983.540	342.317	6215.257	
765.12	5820388.000	94257.730	3031710.469	-4579.454	379.831	5708.458	-5130.441	412.349	5304.653	
776.12	5782377.500	97643.859	3103483.812	-5631.112	438.969	4768.612	-6076.568	458.948	4185.598	
787.12	5743480.062	101088.537	3174778.531	-6462.437	480.948	4185.598	-6784.925	476.064	2901.991	
798.12	5703701.625	104591.134	3245583.594	-7040.851	472.118	2214.047	-7227.684	459.301	1504.309	
844.12	5527951.875	119452.220	3536127.062	-7387.340	437.379	779.802	-7335.560	406.258	47.711	
932.12	5150871.750	151459.994	4064724.594	-7257.502	365.987	-684.693	-7387.340	365.987	-684.693	
1020.12	4723286.125	186555.867	4553222.312	-7085.158	316.767	-1410.128	-7358.560	316.767	-1410.128	
1108.12	4249389.937	224060.852	4996809.937	-6534.121	258.944	-2121.375	-7257.502	258.944	-2121.375	
1196.12	3733833.156	263621.859	5391118.937	-6462.437	193.011	-2811.353	-7085.158	193.011	-2811.353	
1284.12	3181662.094	304418.402	5732264.437	-6140.896	119.602	-3473.195	-6843.231	119.602	-3473.195	
1372.12	2598350.719	346372.551	6014884.687	-5727.264	39.488	-4100.318	-6534.121	39.488	-4100.318	
1460.12	1989468.172	388156.410	6242175.062	-5237.532	-46.434	-4686.494	-6140.896	-46.434	-4686.494	
1548.12	1361138.125	429204.961	6405916.750	-4696.559	-137.150	-5225.915	-7227.684	-137.150	-5225.915	
1636.12	719477.594	468726.195	6506499.312	-4109.708	-231.541	-5713.249	-7387.340	-231.541	-5713.249	
1724.12	70786.336	505913.680	6542938.625	-3482.784	-328.399	-6143.698	-7335.560	-328.399	-6143.698	
1812.12	-578565.273	539958.969	6514886.437	-2821.981	-426.440	-6513.045	-7358.560	-426.440	-6513.045	
1900.12	-1222199.328	570044.719	6422636.375	-2021.981	-524.321	-6817.691	-7257.502	-524.321	-6817.691	
1988.12	-1853793.703	595457.484	6267119.687	-2133.811	-620.660	-7054.694	-7085.158	-620.660	-7054.694	
2076.12	-2467145.094	615400.805	6049897.750	-1425.044	-714.051	-7221.790	-6843.231	-714.051	-7221.790	
2164.12	-3056230.781	629207.883	5773146.250	-702.636	-803.083	-7317.416	-6534.121	-803.083	-7317.416	
2252.12	-3615268.781	636253.828	5439633.437	26.337	-886.363	-7340.720	-6140.896	-886.363	-7340.720	
2340.12	-4138775.500	635987.117	5052691.062	26.337	-962.531	-7291.567	-5727.264	-962.531	-7291.567	
2428.12	-4621623.500	627940.594	4616181.812	754.749	-1030.279	-7170.537	-5237.532	-1030.279	-7170.537	
2516.12	-5059076.937	611740.773	4134458.000	1475.491	-1083.522	-6999.207	-4696.559	-1083.522	-6999.207	
2604.12	-5446867.937	587116.852	3612318.656	2118.142	-1183.844	-6745.111	-4109.708	-1183.844	-6745.111	
2692.12	-5781209.000	553907.719	3054959.625	-702.636	-1168.420	-6424.785	-3482.784	-1168.420	-6424.785	
2780.12	-6058843.250	512048.000	2467920.969	26.337	-1192.324	-6091.966	-2821.981	-1192.324	-6091.966	
2868.12	-6277073.937	461672.375	1857030.641	754.749	-1338.603	-5678.111	-2021.981	-1338.603	-5678.111	
2956.12	-6433789.187	402918.305	1228345.984	1475.491	-1905.778	-5263.422	-1425.044	-1905.778	-5263.422	
3044.12	-6527481.000	336127.273	588092.719	-57397.042	-2590.974	-4062.062	-702.636	-2590.974	-4062.062	
3132.12	-6557259.937	61744.402	-57397.042	26.337	-3363.937	-3363.937	26.337	26.337	-3363.937	
3220.12	-6522861.500	180336.062	-701747.852	754.749	-4089.006	-3089.953	754.749	-4089.006	-3089.953	
3308.12	-6424646.375	92586.046	-1338603.672	1475.491	-5009.006	-2948.862	1475.491	-5009.006	-2948.862	
3396.12	-6280804.437	7977.811	-1905778.047	2118.142	-6091.966	-2744.785	2118.142	-6091.966	-2744.785	
3484.12	-6064013.437	-89580.779	-2511024.062	-2044.862	-7054.694	-2590.974	-89580.779	-7054.694	-2590.974	
3572.12	-5787958.625	-190882.121	-3090974.062	-2948.862	-8099.006	-2444.785	-190882.121	-8099.006	-2444.785	
3660.12	-5555355.625	-294880.883	-3639937.500	4089.006	-9009.006	-2300.006	-294880.883	-9009.006	-2300.006	

\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. ZND OPP.

TIME FROM FIRST MOTION (SEC)	Y COORDINATE			Z COORDINATE			X COMPONENT OF VELOCITY (M/S)			Y COMPONENT OF VELOCITY (M/S)			Z COMPONENT OF VELOCITY (M/S)		
	EARTH FIXED, PAD CENTERED, PLUMBIN SYS, (M)	EARTH FIXED, PAD CENTERED, PLUMBIN SYS, (M)	EARTH FIXED, PAD CENTERED, PLUMBIN SYS, (M)	EARTH FIXED, PAD CENTERED, PLUMBIN SYS, (M)	EARTH FIXED, PAD CENTERED, PLUMBIN SYS, (M)	EARTH FIXED, PAD CENTERED, PLUMBIN SYS, (M)	XXE SYSTEM (M/S)	XYE SYSTEM (M/S)	XZE SYSTEM (M/S)	YYE SYSTEM (M/S)	YYE SYSTEM (M/S)	YYE SYSTEM (M/S)	YYE SYSTEM (M/S)	YYE SYSTEM (M/S)	YYE SYSTEM (M/S)
3740.12	-50699.875	-400336.168	-4152536.125	4673.947	-1202.768	-5599.006									
3828.13	-4634084.250	-506124.344	-4423756.625	5213.091	-1199.116	-5101.839									
3916.12	-4153462.844	-610952.898	-5048999.625	5701.199	-1180.893	-4554.731									
4004.12	-3632309.531	-713525.070	-5424124.437	6133.524	-1147.800	-3963.739									
4092.12	-3075722.312	-812525.891	-5745490.437	6505.863	-1099.722	-3334.153									
4180.12	-2489143.719	-906638.328	-6009992.250	6814.596	-1036.728	-2672.443									
4268.12	-1878307.594	-994560.016	-6215090.250	7056.723	-959.084	-1985.191									
4356.12	-1249183.562	-1075070.547	-6358836.312	7229.896	-867.248	-1279.234									
4444.12	-607918.234	-1146798.266	-6439891.687	7332.441	-761.873	-561.586									
4532.12	39224.852	-1208737.312	-6457540.812	7363.379	-643.797	160.625									
4620.12	685927.078	-1259763.844	-6411697.187	7322.433	-514.047	880.237									
4708.12	1325876.406	-1298901.937	-6302903.937	7210.036	-373.819	1590.120									
4796.12	1952829.984	-1325288.797	-6132326.875	7027.322	-224.475	2283.256									
4884.12	2560675.000	-1338186.078	-5901742.062	6776.114	-67.523	2952.808									
4972.12	3143489.125	-1336997.141	-5613517.187	6458.907	95.393	3592.188									
5060.12	3695597.781	-1321273.250	-5270585.687	6078.839	262.516	4195.126									
5148.12	4211629.750	-1290725.031	-4876416.625	5639.659	431.993	4755.733									
5236.12	4686569.250	-1245229.797	-4434978.375	5145.686	601.896	5268.555									
5324.12	5115804.250	-1184836.844	-3950698.156	4601.766	770.243	5728.630									
5412.12	5495170.062	-1109771.344	-3428416.656	4013.219	935.027	6131.533									
5500.12	5820989.375	-1020435.789	-2873338.531	3385.790	1094.229	6473.415									
5588.12	6090166.875	-917409.406	-2290980.719	2725.589	1245.851	6751.040									
5676.12	6299918.937	-801445.687	-1687116.984	2039.029	1387.937	6961.810									
5764.12	6448397.312	-673467.719	-1067720.625	1332.770	1518.594	7103.788									
5852.12	6534108.500	-534561.305	-438905.687	613.655	1636.019	7175.715									
5940.12	6556226.625	-385966.273	822180.250	-111.360	1738.519	7177.017									
6028.12	6514541.000	-229065.672	193132.906	-835.261	1824.534	7107.808									
6116.12	6409458.000	-65373.165	1442061.516	-1551.048	1892.659	6968.887									
6204.12	6241997.062	103481.267	2046702.031	-2251.796	1941.661	6761.731									
6292.12	6013781.562	275767.496	2630186.500	-2930.719	1970.499	6488.481									
6372.12	5755442.312	433845.312	3137468.344	-3523.437	1978.511	6195.046									
6460.12	5417861.750	607595.656	3664968.219	-4142.634	1966.726	5793.862									
6548.12	5027517.500	779344.495	415535.125	-4721.638	1932.982	5346.365									
6636.12	4588198.000	947151.406	4604407.25	-5254.801	1877.124	4847.042									
6724.12	4104170.125	1109072.406	5002339.875	-5736.907	1799.252	4300.888									
6812.12	3580134.719	1263184.062	5360149.000	-6163.227	1699.721	3713.363									
6900.12	3021201.656	1407605.687	5659749.500	-6529.567	1579.147	3090.336									
6988.12	2432805.625	1540521.937	5903188.250	-6832.312	1438.402	2438.027									
7076.12	1820668.375	1660205.349	6088173.312	-7068.467	1278.611	1762.948									
7164.12	1190772.969	1765038.469	6212995.750	-7235.687	1101.144	1071.833									
7252.12	549259.133	1853534.859	6276546.750	-7332.305	907.604	371.572									
7340.12	-97612.655	1924354.760	6278327.875	-7387.353	699.820	-330.862									

\*\* ENCLOSURE 4 \*\*

AS-509 YRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND CPP.

TIME FROM FIRST MOTION (SEC)	X COORDINATE (M)			Y COORDINATE (M)			Z COORDINATE (M)			EARTH FIXED, PAD CENTERED PLUMBIN SYS.			EARTH FIXED, PAD CENTERED PLUMBIN SYS.			COMPONENT OF VEL. IN THE XXXE SYSTEM (M/S)			COMPONENT OF VEL. IN THE XXXE SYSTEM (M/S)			
	EARTH FIXED, PAD CENTERED	PLUMBIN SYS.	(M)	EARTH FIXED, PAD CENTERED	PLUMBIN SYS.	(M)	EARTH FIXED, PAD CENTERED	PLUMBIN SYS.	(M)	EARTH FIXED, PAD CENTERED	PLUMBIN SYS.	(M)	XXXE SYSTEM	XXXE SYSTEM	XXXE SYSTEM	XXXE SYSTEM	XXXE SYSTEM	XXXE SYSTEM	XXXE SYSTEM	XXXE SYSTEM	XXXE SYSTEM	XXXE SYSTEM
7428.12	-743527.352	1976344.125	6218455.437	697657.687	6097657.687	7310.570	479.810	-1028.486	-1714.380	249.783	-7192.410	7310.570	479.810	-1028.486	-1714.380	249.783	-7192.410	7310.570	479.810	-1028.486	-1714.380	249.783
7516.12	-1382178.641	2008511.078	6097657.687	5917267.062	6097657.687	7192.410	249.783	-2381.758	-3024.040	12.101	-7004.032	7192.410	249.783	-2381.758	-3024.040	12.101	-7004.032	7192.410	249.783	-2381.758	-3024.040	12.101
7624.12	-2612482.062	2010449.156	5679204.000	5385956.687	5679204.000	6747.293	-230.741	-3634.922	-4208.434	6747.293	6747.293	6747.293	-230.741	-3634.922	-4208.434	6747.293	6747.293	6747.293	-230.741	-3634.922	-4208.434	6747.293
7780.12	-3192922.531	1979395.203	5385956.687	5040553.750	5385956.687	6424.724	-476.142	-4739.006	-5221.522	6424.724	6424.724	6424.724	-476.142	-4739.006	-5221.522	6424.724	6424.724	6424.724	-476.142	-4739.006	-5221.522	6424.724
7868.12	-3741794.750	1926691.156	5040553.750	4646531.812	5040553.750	6039.506	-963.881	-4739.006	-5651.362	6039.506	6039.506	6039.506	-963.881	-4739.006	-5651.362	6039.506	6039.506	6039.506	-963.881	-4739.006	-5651.362	6039.506
7956.12	-4254148.312	1852506.641	4646531.812	4207898.312	4646531.812	5595.433	-1200.762	-5221.522	-6024.455	5595.433	5595.433	5595.433	-1200.762	-5221.522	-6024.455	5595.433	5595.433	5595.433	-1200.762	-5221.522	-6024.455	5595.433
8044.12	-4724991.937	1757211.422	4207898.312	3729089.281	4207898.312	5096.873	-1429.355	-5651.362	-6337.308	5096.873	5096.873	5096.873	-1429.355	-5651.362	-6337.308	5096.873	5096.873	5096.873	-1429.355	-5651.362	-6337.308	5096.873
8132.12	-5149742.375	1641415.500	3729089.281	3214923.375	3729089.281	3956.351	-1646.988	-6024.455	-6587.039	3956.351	3956.351	3956.351	-1646.988	-6024.455	-6587.039	3956.351	3956.351	3956.351	-1646.988	-6024.455	-6587.039	3956.351
8220.12	-5524268.750	1505966.375	3214923.375	2670552.531	3214923.375	3325.555	-1851.070	-6337.308	-6771.403	3325.555	3325.555	3325.555	-1851.070	-6337.308	-6771.403	3325.555	3325.555	3325.555	-1851.070	-6337.308	-6771.403	3325.555
8308.12	-5844932.000	1351943.078	2670552.531	2101409.125	2670552.531	2662.495	-2039.116	-6587.039	-6880.805	2662.495	2662.495	2662.495	-2039.116	-6587.039	-6880.805	2662.495	2662.495	2662.495	-2039.116	-6587.039	-6880.805	2662.495
8396.12	-6108619.135	1180648.375	2101409.125	1513151.406	2101409.125	1973.632	-2208.780	-6771.403	-6938.314	1973.632	1973.632	1973.632	-2208.780	-6771.403	-6938.314	1973.632	1973.632	1973.632	-2208.780	-6771.403	-6938.314	1973.632
8484.12	-6312773.250	993597.820	1513151.406	911606.836	1513151.406	1265.671	-2357.880	-6880.805	-6919.667	1265.671	1265.671	1265.671	-2357.880	-6880.805	-6919.667	1265.671	1265.671	1265.671	-2357.880	-6880.805	-6919.667	1265.671
8572.12	-6455917.187	792506.375	911606.836	30273.793	792506.375	911.606	-2484.424	-6938.314	-6833.270	911.606	911.606	911.606	-2484.424	-6938.314	-6833.270	911.606	911.606	911.606	-2484.424	-6938.314	-6833.270	911.606
8660.12	-6535172.000	59272.766	30273.793	-307536.609	59272.766	179.910	-2586.638	-6919.667	-6680.190	-307536.609	-307536.609	-307536.609	-2586.638	-6919.667	-6680.190	-307536.609	-307536.609	-307536.609	-2586.638	-6919.667	-6680.190	-307536.609
8748.12	-6551269.750	355961.005	-307536.609	-913159.695	355961.005	903.498	-2662.986	-6833.270	-6462.140	-913159.695	-913159.695	-913159.695	-2662.986	-6833.270	-6462.140	-913159.695	-913159.695	-913159.695	-2662.986	-6833.270	-6462.140	-913159.695
8836.12	-6503560.375	124783.316	-913159.695	-1508235.344	124783.316	1618.253	-2712.189	-6680.190	-6181.466	-1508235.344	-1508235.344	-1508235.344	-2712.189	-6680.190	-6181.466	-1508235.344	-1508235.344	-1508235.344	-2712.189	-6680.190	-6181.466	-1508235.344
8924.12	-6372512.542	-111927.454	-1508235.344	-2056966.437	-111927.454	2317.240	-2733.245	-6462.140	-5844.115	-2056966.437	-2056966.437	-2056966.437	-2733.245	-6462.140	-5844.115	-2056966.437	-2056966.437	-2056966.437	-2733.245	-6462.140	-5844.115	-2056966.437
9012.12	-6219209.750	-351735.902	-2056966.437	-2643734.094	-351735.902	2993.678	-2725.447	-6181.466	-5444.115	-351735.902	-351735.902	-351735.902	-2725.447	-6181.466	-5444.115	-351735.902	-351735.902	-351735.902	-2725.447	-6181.466	-5444.115	-351735.902
9100.12	-5985339.187	-592131.859	-2643734.094	-3173152.875	-592131.859	3640.999	-2688.321	-5844.115	-5496.316	-592131.859	-592131.859	-592131.859	-2688.321	-5844.115	-5496.316	-592131.859	-592131.859	-592131.859	-2688.321	-5844.115	-5496.316	-592131.859
9188.12	-5693176.062	-830555.969	-3173152.875	-3670122.500	-830555.969	4252.912	-2621.986	-5444.115	-4996.316	-830555.969	-830555.969	-830555.969	-2621.986	-5444.115	-4996.316	-830555.969	-830555.969	-830555.969	-2621.986	-5444.115	-4996.316	-830555.969
9276.12	-5345561.625	-1064427.312	-3670122.500	-4129876.781	-1064427.312	4823.467	-2526.465	-4996.316	-4499.944	-1064427.312	-1064427.312	-1064427.312	-2526.465	-4996.316	-4499.944	-1064427.312	-1064427.312	-1064427.312	-2526.465	-4996.316	-4499.944	-1064427.312
9364.12	-4945876.375	-1291171.000	-4129876.781	-4548030.312	-1291171.000	5347.109	-2402.384	-4499.944	-3961.362	-1291171.000	-1291171.000	-1291171.000	-2402.384	-4499.944	-3961.362	-1291171.000	-1291171.000	-1291171.000	-2402.384	-4499.944	-3961.362	-1291171.000
9452.12	-4498007.375	-1508246.953	-4548030.312	-4920619.687	-1508246.953	5818.735	-2250.623	-3961.362	-33.721	-1508246.953	-1508246.953	-1508246.953	-2250.623	-3961.362	-33.721	-1508246.953	-1508246.953	-1508246.953	-2250.623	-3961.362	-33.721	-1508246.953
9540.12	-4006310.969	-1713178.172	-4920619.687	-5244142.187	-1713178.172	6233.745	-2072.379	-33.721	-2778.799	-1713178.172	-1713178.172	-1713178.172	-2072.379	-33.721	-2778.799	-1713178.172	-1713178.172	-1713178.172	-2072.379	-33.721	-2778.799	-1713178.172
9628.12	-345570.969	-1903579.266	-5244142.187	-5515588.250	-1903579.266	6588.089	-1869.161	-2778.799	-2146.668	-1903579.266	-1903579.266	-1903579.266	-1869.161	-2778.799	-2146.668	-1903579.266	-1903579.266	-1903579.266	-1869.161	-2778.799	-2146.668	-1903579.266
9716.12	-2910951.687	-2077183.781	-5515588.250	-5895335.250	-2077183.781	6878.308	-1642.776	-2146.668	-1495.627	-2077183.781	-2077183.781	-2077183.781	-1642.776	-2146.668	-1495.627	-2077183.781	-2077183.781	-2077183.781	-1642.776	-2146.668	-1495.627	-2077183.781
9804.12	-2317948.562	-2231871.437	-5895335.250	-6039130.312	-2231871.437	7101.570	-1395.313	-1495.627	-832.143	-2231871.437	-2231871.437	-2231871.437	-1395.313	-1495.627	-832.143	-2231871.437	-2231871.437	-2231871.437	-1395.313	-1495.627	-832.143	-2231871.437
9892.12	-1702339.062	-2365693.562	-6039130.312	-624004.687	-2365693.562	7255.697	-846.805	-832.143	-162.778	-1702339.062	-1702339.062	-1702339.062	-846.805	-832.143	-162.778	-1702339.062	-1702339.062	-1702339.062	-846.805	-832.143	-162.778	-1702339.062
9980.12	-1070100.797	-2476896.844	-624004.687	-5995335.250	-2476896.844	7339.192	-551.157	-162.778	505.871	-1070100.797	-1070100.797	-1070100.797	-551.157	-162.778	505.871	-1070100.797	-1070100.797	-1070100.797	-551.157	-162.778	505.871	-1070100.797
10068.12	-427403.746	-2563945.937	-5995335.250	-5818971.312	-2563945.937	7351.247	-245.171	505.871	1167.247	-427403.746	-427403.746	-427403.746	-245.171	505.871	1167.247	-427403.746	-427403.746	-427403.746	-245.171	505.871	1167.247	-427403.746
10156.12	219500.779	-2625543.187	-5818971.312	-5631475.500	-2625543.187	7391.247	68.010	1167.247	1814.892	219500.779	219500.779	219500.779	68.010	1167.247	1814.892	219500.779	219500.779	219500.779	68.010	1167.247	1814.892	219500.779
10244.12	864316.375	-2660645.906	-5631475.500	-5389852.500	-2660645.906	7291.758	385.123	1814.892	2442.519	864316.375	864316.375	864316.375	385.123	1814.892	2442.519	864316.375	864316.375	864316.375	385.123	1814.892	2442.519	864316.375
10332.12	1500768.062	-2668481.750	-5389852.500	-5096653.812	-2668481.750	6961.214	702.820	2442.519	3044.066	1500768.062	1500768.062	1500768.062	702.820	2442.519	3044.066	1500768.062	1500768.062	1500768.062	702.820	2442.519	3044.066	1500768.062
10420.12	2122663.906	-2648560.406	-5096653.812	-4754923.500	-2648560.406	6493.410	1017.706	3044.066	3613.763	2122663.906	2122663.906	2122663.906	1017.706	3044.066	3613.763	2122663.906	2122663.906	2122663.906	1017.706	3044.066	3613.763	2122663.906
10508.12	2723954.937	-2600682.625	-4754923.500	-4368167.062	-2600682.625	5965.812	1326.373	3613.763	4146.181	2723954.937	2723954.937	2723954.937	1326.373	3613.763	4146.181	2723954.937	2723954.937	2723954.937	1326.373	3613.763	4146.181	2723954.937
10596.12	3298794.187	-2524946.219	-4368167.062	-3940313.625	-2524946.219	5513.108	1625.437	4146.181	4636.285	3298794.187	3298794.187	3298794.187	1625.437	4146.181	4636.285	3298794.187	3298794.187	3298794.187	1625.437	4146.181	4636.285	3298794.187
10684.12	3841593.000	-2421748.500	-3940313.625	-3475675.750	-2421748.500	5006.812	1911.575	4636.285														

AS-5C9 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG, 2ND OPP.

ENCLOSURE 4

TIME FROM MOTION (SEC)	X COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (M)	Y COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (M)	Z COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (M)	COMPONENT OF VEL. IN THE XXE SYSTEM (M/S)	COMPONENT OF VEL. IN THE YYE SYSTEM (M/S)	COMPONENT OF VEL. IN THE ZZE SYSTEM (M/S)
11124.12	5903964.062	-1528386.953	-2454950.687	3217.717	2660.879	6089.051
11212.12	6157974.625	-1285075.750	-1908998.437	2550.508	2864.553	6308.747
11300.12	6352122.687	-1025029.430	-1346431.984	1858.352	3040.828	6466.384
11388.12	6484507.937	-750759.594	-772773.641	1147.933	3187.464	6560.671
11476.12	6553823.687	-464962.656	-193632.361	426.112	3302.506	6590.934
11564.12	6559373.000	-170493.848	385350.527	-300.130	3384.307	6557.116
11652.12	6501076.500	129661.520	958556.141	-1023.761	3431.554	6459.776
11740.12	6379172.875	432417.355	1520441.312	1737.761	3443.282	6300.085
11828.12	6195716.000	734619.195	2065593.078	-2435.188	3418.894	6079.814
11916.12	5951564.625	1033076.464	2588779.875	-3109.245	3358.172	5801.317
12004.12	5649367.125	1324596.719	3085001.562	-3753.345	3261.285	5467.505
12092.12	5252039.562	1606017.734	3549538.531	-4361.175	3122.794	5081.826
12180.12	4883039.250	1874246.875	3977996.312	-4926.762	2961.651	4648.223
12268.12	4426332.062	2126290.656	4366348.437	-5444.532	2761.200	4171.102
12356.12	3926354.375	2359290.906	4710974.437	-5909.371	2529.161	3655.285
12444.12	3387970.719	2570557.000	5008694.875	-6316.674	2267.620	3105.962
12532.12	2816426.375	2757597.531	5256801.437	-6662.398	1979.014	2528.637
12620.12	2217295.937	2918149.812	5453081.812	-6943.708	1666.101	1929.074
12708.12	1596428.891	3050207.312	5595840.062	-7156.007	1331.937	1313.233
12796.12	959890.711	3152044.275	5683911.500	-7298.971	979.848	687.214
12884.12	313903.703	3222238.250	5716671.187	-7370.574	613.386	57.183
12972.12	-335215.426	3259688.062	5694038.562	-7370.096	236.301	-570.679
13060.12	-981117.992	3263629.656	5616774.375	-7297.535	-147.504	-110.250
13148.12	-1617487.109	3233647.437	5484973.312	-7153.605	-534.018	-1795.528
13236.12	-2236099.656	3169682.312	5301051.312	-6939.725	-919.159	-2380.684
13324.12	-2836887.875	3072035.625	5060726.875	-6658.004	-1298.826	-2940.129
13412.12	-3407998.937	2941369.094	478498.125	-6311.217	-1668.935	-3468.562
13500.12	-3945632.594	2778700.875	4457315.062	-5902.774	-2025.474	-3961.021
13588.12	-4445195.312	2585398.250	4088547.812	-5436.685	-2364.535	-4412.931
13676.12	-4901151.125	2363111.469	3681950.562	-4917.516	-2682.365	-4820.139
13764.12	-5309269.125	2114029.156	3241622.781	-4350.349	-2975.402	-5178.957
13774.12	-5352436.625	2084113.875	3189644.750	-4283.104	-3006.982	-5216.522
13777.12	-5365255.437	2075081.812	3173978.406	-4262.825	-3016.385	-5227.660

TIME BASE 6



•• ENCLOSURE 4 ••

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP

TIME FROM FIRST MOTION (SEC)	X COORDINATE EARTH FIXED, PAD CENTERED PLUMB IN SYS, (M)	Y COORDINATE EARTH FIXED, PAD CENTERED PLUMB IN SYS, (M)	Z COORDINATE EARTH FIXED, PAD CENTERED PLUMB IN SYS, (M)	X COMPONENT OF VEL. IN THE XXE SYSTEM (M/S)	Y COMPONENT OF VEL. IN THE XXE SYSTEM (M/S)	Z COMPONENT OF VEL. IN THE XXE SYSTEM (M/S)
1377.12	-11738524.500	2057994.562	3179508.312	-4262.825	-3016.385	-5227.660
1378.12	-11759753.875	2042873.578	3153323.812	-4228.919	-3031.981	-5244.091
1379.12	-11780983.375	2027674.859	3127047.594	-4194.879	-3047.485	-5264.353
1380.12	-11801702.375	2012398.906	3100680.594	-4160.707	-3062.895	-5282.445
1381.12	-11822421.375	1997046.078	3174223.469	-4126.405	-3078.211	-5300.358
1382.12	-11842966.375	1981616.922	3047677.187	-4091.978	-3093.430	-5318.117
1383.12	-11863339.875	1966111.875	3021042.562	-4057.425	-3108.553	-5335.694
1384.12	-11883540.375	1950711.547	2994320.531	-4022.741	-3123.581	-5353.102
1385.12	-11903567.000	1934876.281	2967511.844	-3987.924	-3138.515	-5370.342
1386.12	-11911529.000	1928593.281	2956764.312	-3973.962	-3144.441	-5377.189
1387.12	-11912323.375	1927964.516	2955689.062	-3972.565	-3145.055	-5377.872
1388.12	-11923419.250	1919146.531	2940617.312	-3952.981	-3153.352	-5387.409
1389.12	-11943096.625	1903342.937	2913638.031	-3917.914	-3168.091	-5404.304
1390.12	-11962598.250	1887465.811	2886574.625	-3882.723	-3182.733	-5421.026
1391.12	-11981923.625	1871515.734	2859428.031	-3847.410	-3197.276	-5437.574
1392.12	-12001072.125	1855493.203	2832199.143	-3811.976	-3211.720	-5453.949
1393.12	-12020043.250	1839398.734	2804888.906	-3776.421	-3226.064	-5470.149
1394.12	-12038936.125	1823232.746	2777497.969	-3740.746	-3240.300	-5486.175
1395.12	-12057450.500	1806995.812	2750027.406	-3704.956	-3254.444	-5502.029
1396.12	-12075885.500	1790688.469	2722477.969	-3669.047	-3268.480	-5517.708
1397.12	-12094140.750	1774311.187	2694850.656	-3633.023	-3282.421	-5533.206
1398.12	-12112215.625	1757864.422	2667146.250	-3596.883	-3296.259	-5548.529
1399.12	-12130109.375	1741348.734	2639365.656	-3560.626	-3309.996	-5563.676
1400.12	-12147821.625	1724764.672	2611509.781	-3524.258	-3323.629	-5578.645
1401.12	-12165351.750	1708112.625	2583579.469	-3487.782	-3337.158	-5593.435
1402.12	-12182699.250	1691393.187	2555575.656	-3451.197	-3350.581	-5608.046
1403.12	-12199863.625	1674606.969	2527499.250	-3414.503	-3363.900	-5622.479
1404.12	-12216844.125	1657754.422	2499351.219	-3377.702	-3377.113	-5636.732
1405.12	-12233640.500	1640836.016	2471132.281	-3340.793	-3390.221	-5650.807
1406.12	-12250251.875	1623852.375	2442843.406	-3303.780	-3403.222	-5664.701
1407.12	-12266678.000	1606803.969	2414480.594	-3266.662	-3416.116	-5678.415
1408.12	-12282918.375	1589691.406	2386059.625	-3229.442	-3428.902	-5691.949
1409.12	-12298972.375	1572515.125	2357566.375	-3192.119	-3441.581	-5705.302
1410.12	-12314839.375	1555275.750	2329006.644	-3154.696	-3454.152	-5718.474
1411.12	-12330519.000	1537973.844	2300382.000	-3117.174	-3466.613	-5731.463
1412.12	-12346011.000	1520609.812	2271692.562	-3079.553	-3478.965	-5744.271
1413.12	-12361314.500	1503184.344	2242939.562	-3041.835	-3491.207	-5756.897
1414.12	-12376429.125	1485697.969	2214123.875	-3004.022	-3503.339	-5769.339
1415.12	-12391354.500	1468151.125	2185246.469	-2966.119	-3515.357	-5781.597
1416.12	-12406090.250	1450544.516	2156308.187	-2928.123	-3527.267	-5793.672
1417.12	-12420635.625	1432878.654	2127310.031	-2890.032	-3539.064	-5805.564
1418.12	-12434990.375	1415154.062	2098252.875	-2851.847	-3550.743	-5817.276

D2/M2 BURNER ON  
ENGINE OFF

TIME FROM FIRST MOTION (SEC)	X COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS, (M)	Y COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS, (M)	Z COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS, (M)	X COMPONENT OF VEL. IN THE XXXE SYSTEM (M/S)	Y COMPONENT OF VEL. IN THE XXXE SYSTEM (M/S)	Z COMPONENT OF VEL. IN THE XXXE SYSTEM (M/S)
13977.12	-12449154.000	1397371.406	2069137.625	-2813.571	-3562.308	-5828.906
13982.12	-12463125.875	1379531.141	2039965.141	-2775.207	-3573.769	-5840.144
13987.12	-12476905.875	1361633.922	2010736.457	-2736.755	-3585.115	-5851.301
13992.12	-12490493.250	1343680.219	1981452.453	-2698.217	-3596.348	-5862.272
13997.12	-12503887.875	1325670.625	1952114.047	-2659.594	-3607.467	-5873.054
14002.12	-12517089.125	1307605.734	1922722.156	-2620.887	-3618.470	-5883.655
14007.12	-12530094.625	1289486.125	1893277.828	-2582.097	-3629.359	-5894.068
14012.12	-12542909.875	1271312.359	1863781.875	-2543.226	-3640.131	-5904.295
14017.12	-12555528.750	1253086.000	1834235.141	-2504.274	-3650.788	-5914.335
14022.12	-12567952.625	1234804.625	1804638.797	-2465.243	-3661.317	-5924.189
14027.12	-12580181.000	1216471.922	1774993.609	-2426.135	-3671.750	-5933.855
14032.12	-12592213.750	1198087.328	1745300.547	-2386.950	-3682.056	-5943.334
14037.12	-12604050.375	1179651.516	1715560.531	-2347.690	-3692.243	-5952.626
14042.12	-12615690.500	1161165.109	1685774.562	-2308.356	-3702.313	-5961.730
14047.12	-12627133.875	1142628.625	1655943.562	-2268.949	-3712.264	-5970.646
14052.12	-12638379.875	1124042.672	1626068.391	-2229.470	-3722.095	-5979.374
14057.12	-12649428.375	1105407.828	1596150.094	-2189.920	-3731.807	-5987.913
14062.12	-12660279.000	1086724.828	1566189.656	-2150.302	-3741.400	-5996.264
14067.12	-12670931.375	1067994.062	1536187.844	-2110.616	-3750.872	-6004.426
14072.12	-12681385.125	1049218.266	1506145.641	-2070.863	-3760.224	-6012.399
14077.12	-12691639.750	1030392.023	1476064.094	-2031.045	-3769.454	-6020.183
14082.12	-12701693.375	1011521.937	1445944.203	-1991.162	-3778.563	-6027.777
14087.12	-12711551.375	992606.578	1415786.656	-1951.217	-3787.551	-6035.182
14092.12	-1272127.500	973646.633	1385592.625	-1911.210	-3796.413	-6042.397
14097.12	-12730663.375	954642.664	1355363.078	-1871.143	-3805.159	-6049.422
14102.12	-12739918.750	935595.242	1325098.766	-1831.016	-3813.779	-6056.257
14107.12	-12748973.375	916505.062	1294800.766	-1790.832	-3822.275	-6062.902
14112.12	-12757827.000	897372.695	1264470.031	-1750.591	-3830.635	-6069.364
14117.12	-12766479.250	878198.937	1234107.484	-1710.294	-3838.870	-6075.636
14122.12	-12774929.875	858984.219	1203714.047	-1669.944	-3846.995	-6081.709
14127.12	-12783170.625	839729.141	1173290.641	-1629.541	-3854.996	-6087.591
14132.12	-12791225.125	820434.461	1142838.469	-1589.086	-3862.871	-6093.282
14137.12	-12799069.375	801100.672	1112358.187	-1548.581	-3870.621	-6098.782
14142.12	-12806711.000	781728.422	1081850.922	-1508.028	-3878.253	-6104.086
14147.12	-12814149.625	762318.289	1051317.625	-1467.427	-3885.772	-6109.190
14152.12	-12821385.125	742870.977	1020759.359	-1426.780	-3893.152	-6114.111
14157.12	-12828417.375	723387.023	990176.883	-1386.086	-3900.397	-6118.844
14162.12	-12835243.875	703867.187	959571.164	-1345.349	-3907.515	-6123.389
14167.12	-12841870.750	684312.055	928943.258	-1304.570	-3914.500	-6127.744
14172.12	-12848291.500	664722.430	898294.055	-1263.748	-3921.343	-6131.914
14177.12	-12854508.250	645098.652	867624.437	-1222.887	-3928.057	-6135.894
14182.12	-12860520.250	625442.062	836935.422	-1181.988	-3934.657	-6139.674

\*\* ENCLOSURE 4 \*\*

A9-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM MOTION (SEC)	X COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (M)	Y COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (M)	Z COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (M)	X COMPONENT OF VEL. IN THE XXXE SYSTEM (M/S)	Y COMPONENT OF VEL. IN THE XXXE SYSTEM (M/S)	Z COMPONENT OF VEL. IN THE XXXE SYSTEM (M/S)
14187.12	-1286327.875	605752.514	806228.055	-1141.051	-3941.137	-6143.240
14192.12	-12871930.750	586030.914	775503.164	-1100.077	-3947.486	-6146.651
14197.12	-12877328.750	566277.812	744761.059	-1059.070	-3953.725	-6149.840
14202.12	-12882521.375	546493.836	714005.084	-1018.021	-3959.838	-6152.934
14207.12	-12887558.875	526679.856	683233.859	-976.956	-3965.818	-6155.638
14212.12	-12892290.875	506835.938	652449.008	-935.852	-3971.651	-6158.242
14217.12	-12896867.375	486963.348	621651.492	-894.717	-3977.353	-6160.693
14222.12	-12901238.125	467062.660	590842.430	-853.554	-3982.914	-6162.939
14227.12	-12905402.875	447134.488	560022.500	-812.364	-3988.334	-6164.998
14232.12	-12909361.625	427179.484	529192.711	-771.148	-3993.623	-6166.866
14237.12	-12913114.250	407198.391	498354.066	-729.907	-3998.790	-6168.535
14242.12	-12916660.625	387191.812	467507.742	-688.644	-4003.839	-6170.005
14247.12	-12920000.750	367160.281	436654.404	-647.358	-4008.756	-6171.283
14252.12	-12923134.250	347104.402	405795.164	-606.053	-4013.559	-6172.356
14257.12	-12926061.125	327024.887	374931.145	-564.729	-4018.233	-6173.236
14262.12	-12928781.500	306922.309	344063.195	-523.386	-4022.774	-6173.924
14267.12	-12931295.000	286797.418	313192.171	-482.026	-4027.165	-6174.432
14272.12	-12933601.750	266650.875	282319.145	-440.651	-4031.419	-6174.749
14273.42	-12934167.500	261409.672	274292.437	-429.892	-4032.503	-6174.801
14277.12	-12935701.375	246483.469	251445.025	-428.753	-4032.917	-6174.870
14282.12	-12937594.250	226295.791	220570.504	-399.262	-4035.531	-6174.895
14287.12	-12939230.000	207088.584	189696.674	-357.861	-4039.506	-6174.854
14292.12	-12940758.625	185862.480	158624.559	-316.448	-4043.349	-6174.624
14297.12	-12942030.125	165618.135	127955.104	-275.024	-4047.066	-6174.195
14302.12	-12943094.625	145356.100	97089.284	-233.593	-4050.663	-6173.547
14307.12	-12943951.750	125077.047	62227.975	-192.153	-4054.128	-6172.744
14312.12	-12944601.625	104781.579	35372.411	-150.708	-4057.478	-6171.721
14317.12	-12945044.250	84470.335	4523.296	-109.258	-4060.693	-6170.504
14322.12	-12945279.625	64144.130	-24318.314	-67.804	-4063.774	-6169.096
14327.12	-12945307.750	43803.587	-57151.492	15.108	-4066.499	-6167.510
14332.12	-12945128.625	23449.481	-87975.288	56.562	-4072.129	-6165.733
14337.12	-12944742.125	3082.513	-118788.914	98.018	-4074.627	-6163.774
14342.12	-12944148.500	-17296.595	-149591.303	139.471	-4076.989	-6159.291
14347.12	-12943347.500	-37687.169	-180381.564	180.921	-4079.220	-6156.761
14350.12	-12942767.375	-49226.768	-198849.428	205.789	-4080.521	-6155.173
14352.12	-12942339.125	-58088.644	-211158.684	222.365	-4081.376	-6154.098
14355.12	-12941624.750	-70334.687	-229618.525	247.229	-4082.647	-6152.472
14357.12	-12941123.750	-78501.670	-241923.635	263.842	-4085.324	-6154.100
14357.62	-12940990.750	-80544.732	-249001.137	268.032	-4086.982	-6155.987
14361.62	-12939851.000	-96920.149	-269658.168	301.926	-4101.011	-6173.176
14362.12	-12939699.000	-98971.147	-272745.314	304.170	-4102.883	-6175.553

ULLAGE IGNITION  
02/H2 BURNER OFF

J-2 F-L IMI  
ULL CUT OFF

REIGN

908 THR  
ISM IMI

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP. ENCLOSURE 4 00

TIME FROM MOTION (SEC)	X COORDINATE EARTH FIXED, PAD CENTERED, PLUMBIN SYS. (M)	Y COORDINATE EARTH FIXED, PAD CENTERED, PLUMBIN SYS. (M)	Z COORDINATE EARTH FIXED, PAD CENTERED, PLUMBIN SYS. (M)	K COMPONENT OF VEL. IN THE XXXE SYSTEM (M/S)	Y COMPONENT OF VEL. IN THE XXXE SYSTEM (M/S)	Z COMPONENT OF VEL. IN THE XXXE SYSTEM (M/S)
14367.12	-1293062.376	-119532.959	-303682.453	348.631	-4121.858	-6199.381
14372.12	-1293626.250	-140198.861	-334739.836	394.284	-4140.549	-6223.559
14377.12	-12939120.875	-160939.119	-365918.602	439.728	-4159.564	-6248.029
14382.12	-12931808.750	-181784.479	-397220.473	485.176	-4178.570	-6272.708
14387.12	-12929268.875	-202724.846	-428645.816	530.735	-4197.594	-6297.465
14392.12	-12926501.000	-223760.373	-460195.164	576.504	-4216.611	-6322.263
14397.12	-1292353.625	-244890.998	-491868.555	622.468	-4235.631	-6347.083
14402.12	-12920276.000	-266116.684	-523665.984	668.603	-4254.660	-6371.925
14407.12	-12916817.375	-287437.613	-555587.805	714.883	-4273.706	-6396.792
14412.12	-12913127.000	-308853.870	-587633.977	761.288	-4292.772	-6421.682
14417.12	-12909204.375	-330365.391	-619804.703	807.807	-4311.867	-6446.598
14422.12	-12905048.750	-351972.539	-652100.000	854.437	-4330.999	-6471.555
14427.12	-12900459.750	-373675.449	-684520.320	901.175	-4350.176	-6496.561
14432.12	-12896036.875	-395474.395	-717065.742	948.018	-4369.405	-6521.620
14437.12	-12891179.375	-417369.586	-749736.625	994.964	-4388.688	-6546.710
14442.12	-12886087.000	-439361.348	-782633.203	1042.012	-4408.030	-6571.921
14447.12	-12880759.125	-461449.969	-815455.883	1089.162	-4427.432	-6597.166
14452.12	-12875195.250	-483638.777	-848505.023	1136.412	-4446.894	-6622.471
14457.12	-12869394.875	-505919.016	-881680.695	1183.762	-4466.417	-6647.841
14462.12	-12863357.500	-528300.062	-914983.492	1231.212	-4486.007	-6673.274
14467.12	-12857082.500	-550779.172	-948413.641	1278.762	-4505.666	-6698.789
14472.12	-12850569.625	-573356.859	-981971.570	1326.411	-4525.397	-6724.377
14477.12	-12843818.250	-596033.336	-1015657.531	1374.160	-4545.205	-6750.046
14482.12	-12836827.875	-618809.047	-1049472.109	1422.007	-4565.092	-6775.799
14487.12	-12829598.000	-641684.383	-1083415.703	1469.952	-4585.061	-6801.641
14492.12	-12822128.125	-664659.760	-1117488.641	1517.996	-4605.115	-6827.573
14497.12	-12814417.875	-687735.656	-1151691.547	1566.137	-4625.255	-6853.602
14502.12	-12806466.750	-710912.492	-1186024.855	1614.378	-4645.486	-6879.730
14507.12	-12798274.000	-734190.672	-1220489.047	1662.719	-4665.810	-6905.960
14512.12	-12789839.250	-757570.742	-1255084.625	1711.160	-4686.233	-6932.298
14517.12	-12781162.250	-781053.180	-1289812.219	1759.704	-4706.758	-6958.750
14522.12	-12772242.125	-804638.500	-1324672.359	1808.351	-4727.391	-6985.326
14527.12	-12763078.500	-828327.281	-1359665.719	1857.105	-4748.137	-7012.030
14532.12	-12753670.875	-852120.078	-1394792.875	1905.966	-4769.001	-7038.870
14537.12	-12744018.625	-876017.477	-1430054.656	1954.936	-4789.988	-7065.853
14542.12	-12734121.375	-900020.187	-1465451.719	2004.022	-4811.106	-7092.990
14547.12	-12723978.250	-924128.773	-1500984.766	2053.226	-4832.360	-7120.289
14552.12	-12713588.875	-948344.023	-1536654.844	2102.550	-4853.766	-7147.755
14557.12	-12702952.500	-972666.578	-1572462.654	2152.000	-4875.298	-7175.394
14562.12	-12692068.625	-997097.288	-1608409.141	2201.580	-4896.993	-7203.215
14567.12	-12680936.500	-1021636.766	-1644495.062	2251.297	-4918.846	-7231.224
14572.12	-12669555.375	-1046285.983	-1680721.625	2301.156	-4940.863	-7259.432

00 ENCLOSURE 4 00

A9-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM MOTION (SEC)	X COORDINATE EARTH FIXED, PAD CENTERED PLUMB IN SYS, (M)	Y COORDINATE EARTH FIXED, PAD CENTERED PLUMB IN SYS, (M)	Z COORDINATE EARTH FIXED, PAD CENTERED PLUMB IN SYS, (M)	COMPONENT OF VEL. IN THE XXE SYSTEM (M/S)	COMPONENT OF VEL. IN THE XYY SYSTEM (M/S)	COMPONENT OF VEL. IN THE XZZ SYSTEM (M/S)
14577.12	-12657924.625	-1071045.703	-1717089.781	2351.164	-4963.052	-7287.843
14582.12	-12646042.500	-1095916.781	-1753600.406	2401.330	-4985.417	-7316.469
14587.12	-12633911.125	-1120900.156	-1790284.797	2451.662	-5007.968	-7345.318
14592.12	-12621526.625	-1145996.766	-1827054.000	2502.149	-5030.709	-7374.397
14597.12	-12608889.125	-1171207.578	-1863999.234	2552.863	-5053.647	-7403.717
14602.12	-12595997.750	-1196533.609	-1901091.547	2603.754	-5076.790	-7433.286
14607.12	-12582851.250	-1221975.828	-1938332.469	2654.858	-5100.147	-7463.113
14612.12	-12569448.625	-1247535.406	-1975723.172	2706.187	-5123.723	-7493.207
14617.12	-12555788.875	-1273213.437	-2013265.078	2757.761	-5147.526	-7523.578
14622.12	-12541870.625	-1299011.062	-2050959.341	2809.595	-5171.565	-7554.236
14627.12	-12527692.500	-1324929.469	-2088807.875	2861.712	-5195.847	-7585.189
14632.12	-12513253.000	-1350969.906	-2126811.719	2914.114	-5220.342	-7616.391
14637.12	-12498550.750	-1377133.328	-2164972.250	2966.849	-5245.094	-7647.897
14642.12	-12483584.000	-1403421.266	-2203291.219	3019.942	-5270.111	-7679.725
14647.12	-12468350.750	-1429834.937	-2241770.094	3073.425	-5295.402	-7711.882
14652.12	-12452849.000	-1456375.750	-2280410.625	3127.334	-5320.971	-7744.378
14657.12	-12437076.625	-1483045.141	-2319214.406	3181.712	-5346.829	-7777.219
14662.12	-12421031.000	-1509844.531	-2358183.375	3236.609	-5372.980	-7810.408
14667.12	-12404739.500	-1536775.406	-2397319.125	3292.080	-5399.430	-7843.948
14672.12	-12388107.500	-1563839.094	-2436622.750	3349.402	-5426.021	-7877.390
14677.12	-12371214.000	-1591060.047	-2476093.469	3408.005	-5452.825	-7910.965
14682.12	-12354027.375	-1618368.047	-2515733.531	3466.613	-5480.045	-7945.165
14687.12	-12336547.750	-1645837.187	-2555546.187	3525.743	-5507.692	-7980.014
14692.12	-12318775.000	-1673445.719	-2595534.719	3583.897	-5535.779	-8015.540
14695.31	-12307293.000	-1691117.844	-2621118.000	3621.301	-5553.918	-8038.552
14695.52	-12306532.375	-1692284.062	-2622805.875	3623.664	-5554.973	-8039.859
14697.12	-12300715.125	-1701186.656	-2635689.281	3634.598	-5552.945	-8034.912
14702.12	-12282459.625	-1728932.500	-2675820.781	3667.577	-5545.373	-8017.655
14705.31	-1227037.250	-1746598.516	-2701356.437	3688.508	-5540.469	-8004.568

6CS2  
T87

T61

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

ENCLOSURE 4.00

TIME FROM FIRST MOTION (SEC)	X COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS, (M)	Y COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS, (M)	Z COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS, (M)	COMPONENT OF VEL. IN THE XXXE SYSTEM (M/D)	COMPONENT OF VEL. IN THE XXXE SYSTEM (M/S)	COMPONENT OF VEL. IN THE XXXE SYSTEM (M/S)
14705.31	-5897468.250	-1729511.266	-2706886.344	3688.505	-5540.469	-8066.558
14715.31	-5860257.000	-1784837.656	-2786776.094	3753.563	-5524.710	-7971.276
14726.31	-5818578.937	-1845511.047	-2874242.750	3824.026	-5506.720	-7931.652
14737.31	-5776132.250	-1905942.922	-2961269.219	3893.308	-5488.067	-7891.214
14748.31	-5732930.062	-1966246.031	-3047846.437	3961.378	-5468.775	-7850.001
14759.31	-5688985.875	-2026293.500	-3133966.250	4028.210	-5448.870	-7808.053
14770.31	-5644313.500	-2086118.812	-3219620.719	4093.781	-5428.378	-7765.410
14781.31	-5598926.875	-2145715.562	-3304802.531	4158.049	-5407.324	-7722.112
14792.31	-5552840.187	-2205077.750	-3389804.594	4221.054	-5385.735	-7678.200
14803.31	-5506067.937	-2264199.625	-3473720.500	4282.721	-5363.636	-7633.715
14814.31	-5458624.625	-2323075.750	-3557444.062	4343.055	-5341.055	-7588.694
14825.31	-5410525.125	-2381700.937	-3640669.594	4402.044	-5318.018	-7543.184
14836.31	-5361784.062	-2440070.281	-3723392.000	4459.678	-5294.550	-7497.215
14846.21	-5317381.500	-2492379.687	-3797407.219	4510.385	-5273.082	-7456.498

CVS OFF

\*\* ENCLOSURE 4 \*\*  
AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG, 2ND OPP.

TIME FROM FIRST MOTION (SEC)	COMMANDED PITCH ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN PITCH (DEG)	COMMANDED YAW ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN YAW (DEG)	COMMANDED ROLL ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN ROLL (DEG)
713.12	-113.093	-113.0930	.653	.652578	.803	.80273690
722.12	-113.093	-113.0930	.653	.652578	.803	.80273690
732.12	-118.033	-118.0331	.534	.536564	.000	.00000000
743.12	-118.781	-118.7814	.528	.527616	.000	.00000000
754.12	-119.530	-119.5297	.517	.516777	.000	.00000000
765.12	-120.278	-120.2780	.506	.505850	.000	.00000000
776.12	-121.026	-121.0264	.495	.494837	.000	.00000000
787.12	-121.775	-121.7747	.484	.483739	.000	.00000000
798.12	-122.523	-122.5230	.473	.472554	.000	.00000000
844.12	-125.652	-125.6524	.425	.424952	.000	.00000000
932.12	-131.639	-131.6391	.330	.330469	.000	.00000000
1020.12	-137.626	-137.6260	.231	.232376	.000	.00000000
1108.12	-143.613	-143.6131	.132	.131744	.000	.00000000
1196.12	-149.601	-149.6005	.030	.024668	.000	.00000000
1284.12	-155.588	-155.5883	-.073	-.072739	.000	.00000000
1372.12	-161.577	-161.5766	-.174	-.174359	.000	.00000000
1460.12	-167.565	-167.5653	-.274	-.274083	.000	.00000000
1548.12	-173.555	-173.5547	-.371	-.370823	.000	.00000000
1636.12	-179.545	-179.5446	-.464	-.463522	.000	.00000000
1724.12	-174.465	-174.4649	-.581	-.581165	.000	.00000000
1812.12	-168.474	-168.4739	-.633	-.632794	.000	.00000000
1900.12	-162.482	-162.4822	-.708	-.707516	.000	.00000000
1988.12	-156.490	-156.4901	-.775	-.774512	.000	.00000000
2076.12	-150.497	-150.4975	-.833	-.833047	.000	.00000000
2164.12	-144.504	-144.5044	-.882	-.882481	.000	.00000000
2252.12	-138.511	-138.5111	-.922	-.922270	.000	.00000000
2340.12	-132.518	-132.5176	-.952	-.951980	.000	.00000000
2428.12	-126.524	-126.5240	-.971	-.971284	.000	.00000000
2516.12	-120.530	-120.5303	-.981	-.979970	.000	.00000000
2604.12	-114.537	-114.5368	-.978	-.977945	.000	.00000000
2692.12	-108.543	-108.5434	-.965	-.965231	.000	.00000000
2780.12	-102.550	-102.5504	-.942	-.941948	.000	.00000000
2868.12	-96.558	-96.5578	-.908	-.908413	.000	.00000000
2956.12	-90.566	-90.5657	-.865	-.864934	.000	.00000000
3044.12	-84.574	-84.5741	-.812	-.812010	.000	.00000000
3132.12	-78.583	-78.5832	-.750	-.750221	.000	.00000000
3220.12	-72.593	-72.5930	-.680	-.680244	.000	.00000000
3308.12	-66.604	-66.6035	-.603	-.602847	.000	.00000000
3396.12	-61.615	-61.6152	-.527	-.526759	.000	.00000000
3484.12	-55.626	-55.6261	-.438	-.437609	.000	.00000000
3572.12	-49.637	-49.6374	-.344	-.343695	.000	.00000000
3660.12	-43.648	-43.6481	-.246	-.246041	.000	.00000000

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.      \*\* ENCLOSURE 4 \*\*

TIME FROM FIRST MOTION (SEC)	COMMANDED PITCH ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN PITCH (DEG)	COMMANDED YAW ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN YAW (DEG)	COMMANDED ROLL ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN ROLL (DEG)
3740.12	37.212	37.2116	-0.146	-0.145715	.000	.00000000
3828.13	31.227	31.2265	-0.044	-0.043812	.000	.00000000
3916.12	25.242	25.2421	.059	.058558	.000	.00000000
4004.12	19.258	19.2584	.160	.160279	.000	.00000000
4092.12	13.275	13.2752	.260	.260242	.000	.00000000
4180.12	7.293	7.2926	.357	.357359	.000	.00000000
4268.12	1.311	1.3105	.451	.450574	.000	.00000000
4356.12	-4.671	-4.6711	.539	.538872	.000	.00000000
4444.12	-10.652	-10.6522	.621	.621295	.000	.00000000
4532.12	-16.633	-16.6330	.697	.696946	.000	.00000000
4620.12	-22.613	-22.6133	.765	.765005	.000	.00000000
4708.12	-28.593	-28.5933	.825	.824733	.000	.00000000
4796.12	-34.573	-34.5729	.875	.875482	.000	.00000000
4884.12	-40.552	-40.5522	.917	.916702	.000	.00000000
4972.12	-46.531	-46.5311	.948	.947947	.000	.00000000
5060.12	-52.510	-52.5097	.969	.968881	.000	.00000000
5148.12	-58.488	-58.4881	.979	.979276	.000	.00000000
5236.12	-64.466	-64.4661	.979	.979021	.000	.00000000
5324.12	-70.444	-70.4439	.968	.968122	.000	.00000000
5412.12	-76.421	-76.4214	.947	.946696	.000	.00000000
5500.12	-82.399	-82.3988	.915	.914979	.000	.00000000
5588.12	-88.376	-88.3760	.873	.873315	.000	.00000000
5676.12	-94.353	-94.3530	.822	.822156	.000	.00000000
5764.12	-100.330	-100.3300	.762	.762058	.000	.00000000
5852.12	-106.307	-106.3071	.694	.693674	.000	.00000000
5940.12	-112.284	-112.2842	.618	.617745	.000	.00000000
6028.12	-118.261	-118.2614	.535	.535095	.000	.00000000
6116.12	-124.239	-124.2389	.447	.446621	.000	.00000000
6204.12	-130.217	-130.2168	.353	.353283	.000	.00000000
6292.12	-136.195	-136.1950	.256	.256094	.000	.00000000
6372.12	-141.630	-141.6301	.165	.165287	.000	.00000000
6460.12	-147.609	-147.6093	.064	.063705	.000	.00000000
6548.12	-153.589	-153.5892	-.039	-.038581	.000	.00000000
6636.12	-159.570	-159.5697	-.140	-.140459	.000	.00000000
6724.12	-165.551	-165.5509	-.241	-.240818	.000	.00000000
6812.12	-171.533	-171.5329	-.339	-.338566	.000	.00000000
6900.12	-177.516	-177.5157	-.433	-.432436	.000	.00000000
6988.12	176.501	176.5008	-.522	-.522003	.000	.00000000
7076.12	170.516	170.5165	-.606	-.605689	.000	.00000000
7164.12	164.531	164.5315	-.683	-.682781	.000	.00000000
7252.12	158.546	158.5458	-.762	-.762436	.000	.00000000
7340.12	152.560	152.5595	-.814	-.813890	.000	.00000000



\*\* ENCLOSURE 4 \*\*

A9-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	COMMANDED PITCH ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN PITCH (DEG)	COMMANDED YAW ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN YAW (DEG)	COMMANDED ROLL ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN ROLL (DEG)
7428.12	146.573	146.5727	-0.866	-0.866473	.000	.00000000
7516.12	140.586	140.5855	-0.910	-0.909606	.000	.00000000
7604.12	134.598	134.5980	-0.943	-0.942819	.000	.00000000
7692.12	128.610	128.6102	-0.966	-0.965748	.000	.00000000
7780.12	122.622	122.6224	-0.978	-0.978141	.000	.00000000
7868.12	116.635	116.6347	-0.980	-0.979863	.000	.00000000
7956.12	110.647	110.6471	-0.971	-0.970895	.000	.00000000
8044.12	104.660	104.6597	-0.951	-0.951338	.000	.00000000
8132.12	98.673	98.6728	-0.921	-0.921405	.000	.00000000
8220.12	92.686	92.6863	-0.881	-0.881425	.000	.00000000
8308.12	86.700	86.7004	-0.832	-0.831837	.000	.00000000
8396.12	80.715	80.7152	-0.773	-0.773184	.000	.00000000
8484.12	74.731	74.7306	-0.706	-0.706108	.000	.00000000
8572.12	68.747	68.7467	-0.631	-0.631344	.000	.00000000
8660.12	62.764	62.7637	-0.550	-0.549709	.000	.00000000
8748.12	56.781	56.7814	-0.462	-0.462094	.000	.00000000
8836.12	50.800	50.7999	-0.369	-0.369456	.000	.00000000
8924.12	44.819	44.8191	-0.273	-0.272806	.000	.00000000
9012.12	38.839	38.8391	-0.173	-0.173197	.000	.00000000
9100.12	32.860	32.8598	-0.072	-0.071715	.000	.00000000
9188.12	26.881	26.8812	.031	.030536	.000	.00000000
9276.12	20.903	20.9032	.132	.132444	.000	.00000000
9364.12	14.926	14.9258	.233	.232900	.000	.00000000
9452.12	8.949	8.9489	.331	.330814	.000	.00000000
9540.12	2.972	2.9724	.425	.425120	.000	.00000000
9628.12	-3.004	-3.0035	.515	.514797	.000	.00000000
9716.12	-8.979	-8.9791	.599	.598870	.000	.00000000
9804.12	-14.954	-14.9543	.676	.676429	.000	.00000000
9892.12	-20.929	-20.9291	.747	.746633	.000	.00000000
9980.12	-26.904	-26.9036	.809	.808720	.000	.00000000
10068.12	-32.878	-32.8778	.862	.862020	.000	.00000000
10156.12	-38.852	-38.8517	.906	.905955	.000	.00000000
10244.12	-44.825	-44.8253	.940	.940050	.000	.00000000
10332.12	-50.799	-50.7986	.964	.963937	.000	.00000000
10420.12	-56.772	-56.7717	.977	.977359	.000	.00000000
10508.12	-62.745	-62.7446	.980	.980171	.000	.00000000
10596.12	-68.717	-68.7172	.972	.972344	.000	.00000000
10684.12	-74.690	-74.6896	.954	.953963	.000	.00000000
10772.12	-80.662	-80.6618	.925	.925229	.000	.00000000
10860.12	-86.634	-86.6340	.886	.886453	.000	.00000000
10948.12	-92.606	-92.6060	.838	.838056	.000	.00000000
11036.12	-98.578	-98.5780	.781	.780561	.000	.00000000

\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	COMMANDED PITCH ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN PITCH (DEG)	COMMANDED YAW ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN YAW (DEG)	COMMANDED ROLL ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN ROLL (DEG)
11124.12	-104.550	-104.5501	.715	.714592	.000	.00000000
11212.12	-110.522	-110.5223	.641	.640863	.000	.00000000
11300.12	-116.495	-116.4947	.560	.560171	.000	.00000000
11388.12	-122.467	-122.4674	.473	.473392	.000	.00000000
11476.12	-128.441	-128.4405	.381	.381465	.000	.00000000
11564.12	-134.414	-134.4141	.285	.285386	.000	.00000000
11652.12	-140.388	-140.3882	.186	.186197	.000	.00000000
11740.12	-146.363	-146.3629	.085	.084975	.000	.00000000
11828.12	-152.338	-152.3383	-.017	-.017183	.000	.00000000
11916.12	-158.315	-158.3145	-.119	-.119166	.000	.00000000
12004.12	-164.292	-164.2915	-.220	-.219865	.000	.00000000
12092.12	-170.269	-170.2694	-.318	-.318186	.000	.00000000
12180.12	-176.248	-176.2481	-.413	-.413056	.000	.00000000
12268.12	177.772	177.7723	-.503	-.503443	.000	.00000000
12356.12	171.792	171.7919	-.588	-.588361	.000	.00000000
12444.12	165.811	165.8107	-.667	-.666881	.000	.00000000
12532.12	159.829	159.8288	-.738	-.738148	.000	.00000000
12620.12	153.846	153.8462	-.801	-.801382	.000	.00000000
12708.12	147.863	147.8631	-.856	-.855891	.000	.00000000
12796.12	141.879	141.8795	-.901	-.901080	.000	.00000000
12884.12	135.896	135.8956	-.936	-.936454	.000	.00000000
12972.12	129.911	129.9115	-.962	-.961625	.000	.00000000
13060.12	123.927	123.9273	-.976	-.976320	.000	.00000000
13148.12	117.943	117.9432	-.980	-.980376	.000	.00000000
13236.12	111.959	111.9592	-.974	-.973751	.000	.00000000
13324.12	105.976	105.9756	-.957	-.956518	.000	.00000000
13412.12	99.992	99.9924	-.929	-.928866	.000	.00000000
13500.12	94.010	94.0098	-.891	-.891099	.000	.00000000
13588.12	88.028	88.0277	-.844	-.843630	.000	.00000000
13676.12	82.046	82.0463	-.787	-.786979	.000	.00000000
13764.12	76.064	76.0657	-.722	-.721766	.000	.00000000
13774.12	75.386	75.3862	-.714	-.713844	.000	.00000000
13777.12	75.182	75.1823	-.711	-.711448	.000	.00000000

TIME BASE 6

\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH: 77.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	COMMANDED PITCH ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN PITCH (DEG)	COMMANDED YAW ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN YAW (DEG)	COMMANDED ROLL ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN ROLL (DEG)
13777.12	75.182	75.1823	-0.711	-0.711448	0.000	0.0000000
13782.12	74.945	75.1855	-0.709	-0.706556	0.000	0.0003909
13787.12	74.537	75.1949	-0.704	-0.691882	0.000	0.0015474
13792.12	74.265	75.2107	-0.701	-0.687424	0.000	0.0034213
13797.12	73.858	75.2303	-0.696	-0.683183	0.000	0.0024341
13802.12	73.586	75.1630	-0.692	-0.589148	0.000	0.03126072
13807.12	73.178	74.8577	-0.687	-0.535148	0.000	0.14192937
13812.12	72.906	74.3321	-0.684	-0.475750	0.000	0.18784626
13817.12	72.499	73.7374	-0.679	-0.409188	0.000	0.17652938
13819.12	72.363	73.5006	-0.677	-0.379815	0.000	0.17203901
13819.37	72.363	73.4769	-0.677	-0.370792	0.000	0.17159302
13822.12	72.227	73.1472	-0.676	-0.331736	0.000	0.16505576
13827.12	71.819	72.5633	-0.671	-0.238274	0.000	0.15267966
13832.12	71.547	71.9859	-0.667	-0.129150	0.000	0.11105238
13837.12	71.140	71.4148	-0.662	0.004376	0.000	0.04004662
13842.12	70.668	70.8501	-0.659	0.137044	0.000	0.3226743
13847.12	70.460	70.2915	-0.653	0.293194	0.000	0.5147463
13852.12	70.189	69.7389	-0.650	0.464087	0.000	0.8182285
13857.12	69.781	69.1918	-0.645	0.594902	0.000	0.6826334
13862.12	69.509	68.6476	-0.641	0.61720	0.000	0.0016229
13867.12	69.102	68.1089	-0.636	0.322258	0.000	0.03273356
13872.12	68.830	67.5977	-0.632	0.179414	0.000	0.06645036
13877.12	68.422	67.1987	-0.627	0.053092	0.000	0.06305565
13882.12	68.151	66.9319	-0.624	0.056725	0.000	0.03060812
13887.12	67.743	66.7294	-0.618	0.149926	0.000	0.2464570
13892.12	67.471	66.5378	-0.614	0.226466	0.000	0.8156376
13897.12	67.064	66.3524	-0.609	0.286336	0.000	1.3781372
13902.12	66.792	66.1733	-0.605	0.330432	0.000	1.6840930
13907.12	66.384	66.0001	-0.600	0.359956	0.000	1.3874547
13912.12	66.113	65.8333	-0.596	0.372798	0.000	1.0905829
13917.12	65.705	65.6728	-0.591	0.368962	0.000	0.7939878
13922.12	65.433	65.5185	-0.587	0.348452	0.000	0.4981250
13927.12	65.026	65.3706	-0.581	0.311272	0.000	0.2033954
13932.12	64.754	65.2289	-0.578	0.257424	0.000	0.00898553
13937.12	64.346	65.0936	-0.572	0.186913	0.000	0.03613362
13942.17	64.075	64.9646	-0.568	0.099743	0.000	0.06708121
13947.12	63.667	64.8420	-0.562	0.004083	0.000	0.09581026
13952.12	63.395	64.7233	-0.559	0.122922	0.000	0.07887171
13957.12	62.988	64.5372	-0.553	0.256852	0.000	0.03860307
13962.12	62.716	64.1962	-0.549	0.407272	0.000	0.04022324
13967.12	62.308	63.7279	-0.543	0.571907	0.000	0.01186428
13972.12	62.037	63.2271	-0.539	0.710168	0.000	0.07568942

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AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH 72.067 DEG. 2ND OPP.

ENCLOSURE 4

TIME FROM MOTION (SEC)	COMMANDED PITCH ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN PITCH (DEG)	COMMANDED YAW ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN YAW (DEG)	COMMANDED ROLL ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN ROLL (DEG)
13977.12	61.629	62.7258	-0.534	0.58710	0.000	-0.00337949
13982.12	61.357	62.2748	-0.530	0.384371	0.000	0.03564903
13987.12	60.950	61.7341	-0.524	0.197565	0.000	0.07296023
13992.12	60.678	61.2478	-0.520	0.027408	0.000	0.10873709
13997.12	60.271	60.7677	-0.514	-0.126081	0.000	0.14315712
14002.12	59.999	60.2939	-0.510	-0.262889	0.000	0.17639233
14007.12	59.591	59.8264	-0.504	-0.383003	0.000	0.20860929
14012.12	59.320	59.3651	-0.500	-0.486412	0.000	0.23996915
14017.12	58.912	58.9101	-0.494	-0.571362	0.000	0.22170016
14022.12	58.640	58.4614	-0.490	-0.639100	0.000	0.18918731
14027.12	58.233	58.0190	-0.484	-0.690113	0.000	0.15628578
14032.12	57.961	57.5828	-0.480	-0.724404	0.000	0.12313490
14037.12	57.554	57.1529	-0.474	-0.741975	0.000	0.08986852
14042.12	57.282	56.7292	-0.470	-0.742830	0.000	0.05661505
14047.12	57.074	56.3119	-0.463	-0.726974	0.000	0.02349739
14052.12	56.603	55.9009	-0.459	-0.694413	0.000	-0.00936711
14057.12	56.145	55.4962	-0.453	-0.645153	0.000	-0.04186663
14062.12	55.924	55.0979	-0.449	-0.579201	0.000	-0.07389495
14067.12	55.516	54.7059	-0.443	-0.496565	0.000	-0.10535143
14072.12	55.244	54.3203	-0.439	-0.397253	0.000	-0.13614108
14077.12	54.837	53.9410	-0.432	-0.281274	0.000	-0.16617450
14082.12	54.565	53.5681	-0.428	-0.148907	0.000	-0.18778315
14087.12	54.158	53.2017	-0.422	-0.002320	0.000	-0.14021910
14092.12	53.886	52.8417	-0.418	0.160908	0.000	-0.09168147
14097.12	53.478	52.4880	-0.411	0.340777	0.000	-0.04210255
14102.12	53.207	52.1406	-0.407	0.537285	0.000	0.00858004
14107.12	52.799	51.7994	-0.401	0.748958	0.000	0.01838042
14112.12	52.528	51.4613	-0.397	0.853723	0.000	0.00547713
14117.12	52.120	51.1169	-0.390	0.466141	0.000	0.01852387
14122.12	51.848	50.7759	-0.386	-0.019433	0.000	-0.03567091
14127.12	51.441	50.4413	-0.380	-0.488343	0.000	-0.09265406
14132.12	51.169	50.1129	-0.375	-0.939954	0.000	-0.13439792
14137.12	50.762	49.7905	-0.369	-1.370732	0.000	-0.06028300
14142.12	50.490	49.4727	-0.365	0.1725743	0.000	0.03082524
14147.12	50.083	49.1585	-0.358	0.1594316	0.000	-0.04912373
14152.12	49.811	48.8517	-0.354	-0.980918	0.000	-0.05460631
14157.12	49.404	48.5514	-0.347	-0.311222	0.000	-0.14778355
14162.12	49.132	48.2578	-0.343	0.370358	0.000	-0.10719528
14167.12	48.724	47.9700	-0.336	1.038878	0.000	0.00822779
14172.12	48.453	47.6775	-0.332	1.292414	0.000	-0.04848228
14177.12	48.045	47.3762	-0.325	0.966467	0.000	-0.01007942
14182.12	47.774	47.0696	-0.321	0.198227	0.000	0.05394648

\*\* ENCLOSURE 4 \*\*  
AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	COMMANDED PITCH ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN PITCH (DEG)	COMMANDED YAW ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN YAW (DEG)	COMMANDED ROLL ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN ROLL (DEG)
14187.12	47.366	46.7485	-0.314	-0.589724	0.000	-0.6342031
14192.12	47.095	46.4740	-0.310	-1.352291	0.000	0.02497702
14197.12	46.687	46.1849	-0.303	0.1905873	0.000	-0.03526463
14202.12	46.415	45.9014	-0.299	-1.868450	0.000	0.02302185
14207.12	46.008	45.6279	-0.292	-1.231614	0.000	0.01716425
14212.12	45.736	45.3504	-0.288	-0.369760	0.000	-0.13001521
14217.12	45.329	45.0847	-0.281	0.502196	0.000	-0.08875191
14222.12	45.057	44.8233	-0.277	1.297857	0.000	0.02452825
14227.12	44.650	44.5539	-0.270	1.580191	0.000	-0.06951963
14232.12	44.378	44.2743	-0.266	1.275786	0.000	-0.07848370
14237.12	43.971	43.9852	-0.259	0.48526	0.000	-0.06988832
14242.12	43.699	43.6990	-0.254	-0.465162	0.000	-0.18223525
14247.12	43.292	43.4181	-0.248	-1.352564	0.000	-0.02521955
14252.12	43.020	43.1436	-0.243	-1.973295	0.000	0.01610869
14257.12	42.513	42.8729	-0.236	-1.984467	0.000	0.02788313
14262.12	42.341	42.6101	-0.232	-1.363977	0.000	0.00221892
14267.12	41.934	42.3535	-0.225	-0.402324	0.000	-0.05724021
14272.12	41.662	42.1035	-0.221	0.600467	0.000	-0.07446280
14273.42	41.526	42.0396	-0.218	0.861708	0.000	-0.02400848
14273.92	41.526	42.0149	-0.218	0.957911	0.000	-0.02626094
14277.12	41.255	41.8556	-0.214	1.436476	0.000	0.03381304
14282.12	40.983	41.5991	-0.209	1.695131	0.000	-0.05645129
14287.12	40.576	41.3338	-0.202	1.366955	0.000	-0.11342541
14292.12	40.304	41.0603	-0.198	0.512997	0.000	-0.04641401
14297.12	39.896	40.7913	-0.191	-0.437527	0.000	-0.04321569
14302.12	39.625	40.5300	-0.186	-1.368776	0.000	0.04876918
14307.12	39.217	40.2765	-0.180	-1.944081	0.000	-0.01171044
14312.12	38.946	40.0299	-0.175	-1.903366	0.000	0.11884080
14317.12	38.538	39.7796	-0.168	-1.248848	0.000	0.03016453
14322.12	38.267	39.5526	-0.164	-0.284693	0.000	0.10444288
14327.12	37.859	39.2877	-0.157	0.691515	0.000	0.06775792
14332.12	37.588	39.0458	-0.152	1.543666	0.000	0.01186161
14337.12	37.180	38.8300	-0.145	1.848669	0.000	-0.04415967
14342.12	36.909	38.0906	-0.141	1.563376	0.000	-0.05529724
14347.12	36.501	37.6429	-0.134	0.710251	0.000	-0.04698492
14350.12	36.366	37.3722	-0.131	0.86408	0.000	-0.03499213
14352.12	36.230	37.1842	-0.129	-0.328336	0.000	-0.02527929
14355.12	35.958	36.8898	-0.124	-0.939822	0.000	0.00046567
14357.12	35.958	36.6067	-0.124	-1.202233	0.000	0.01181212
14357.62	35.958	36.4705	-0.124	-1.121010	0.000	0.20374967
14361.62	35.958	35.9303	-0.124	-0.101768	0.000	0.21432527
14362.12	35.958	35.9811	-0.124	-0.133430	0.000	

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AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	COMMANDED PITCH ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN PITCH (DEG)	COMMANDED YAW ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN YAW (DEG)	COMMANDED ROLL ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN ROLL (DEG)
14367.12	31.958	33.3418	.69	.302703	.000	-.14552877
14372.12	30.255	29.6221	.726	.475752	.000	.07954314
14377.12	30.592	30.9187	.838	.569365	.000	-.00941828
14382.12	30.386	30.5474	.926	.668109	.000	-.18500259
14387.12	30.075	30.2979	.985	.730625	.000	-.19113139
14392.12	29.720	29.9742	1.022	.768161	.000	-.19829840
14397.12	29.402	29.6012	1.043	.790137	.000	-.20043079
14402.12	29.130	29.3222	1.052	.800552	.000	-.19848500
14407.12	28.895	29.0831	1.057	.801733	.000	-.19311163
14412.12	28.684	28.8699	1.046	.795735	.000	-.18699659
14417.12	28.485	28.6707	1.037	.785546	.000	-.1827667
14422.12	28.294	28.4787	1.024	.773270	.000	-.178792
14427.12	28.111	28.2943	1.009	.756971	.000	-.1752
14432.12	27.931	28.1153	.992	.734095	.000	-.1719819
14437.12	27.755	27.9389	.973	.720034	.000	-.16875612
14442.12	27.580	27.7643	.954	.699869	.000	-.16549348
14447.12	27.406	27.5912	.933	.678619	.000	-.16218213
14452.12	27.233	27.4190	.912	.656734	.000	-.15882075
14457.12	27.061	27.2471	.890	.634268	.000	-.1554182
14462.12	26.890	27.0761	.868	.611208	.000	-.15198350
14467.12	26.720	26.9069	.845	.587899	.000	-.14852831
14472.12	26.552	26.7391	.822	.564189	.000	-.14503806
14477.12	26.385	26.5723	.799	.540320	.000	-.14150291
14482.12	26.219	26.4063	.775	.515334	.000	-.13792940
14487.12	26.052	26.2405	.752	.490919	.000	-.13438672
14492.12	25.886	26.0759	.728	.467071	.000	-.13086183
14497.12	25.719	25.9103	.704	.442903	.000	-.12735487
14502.12	25.552	25.7432	.680	.417467	.000	-.12386149
14507.12	25.385	25.5761	.656	.392318	.000	-.12038496
14512.12	25.216	25.4085	.632	.367213	.000	-.116915094
14517.12	25.048	25.2409	.607	.342132	.000	-.113461034
14522.12	24.877	25.0718	.583	.317103	.000	-.110024328
14527.12	24.706	24.9037	.559	.292121	.000	.00369356
14532.12	24.533	24.7292	.535	.267118	.000	.00905447
14537.12	24.358	24.5551	.510	.242035	.000	.00570211
14542.12	24.180	24.3775	.486	.216914	.000	.00255077
14547.12	24.000	24.1991	.461	.191833	.000	-.000256235
14552.12	23.816	24.0165	.436	.166685	.000	-.001584806
14557.12	23.629	23.8301	.411	.140587	.000	-.002912421
14562.12	23.436	23.6389	.387	.115083	.000	-.004244190
14567.12	23.249	23.4431	.362	.090397	.000	-.005571948
14572.12	23.036	23.2422	.337	.064559	.000	-.00689847

( \* ENCLOSURE 4 \* )

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	COMMANDED PITCH ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN PITCH (DEG)	COMMANDED YAW ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN YAW (DEG)	COMMANDED ROLL ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN ROLL (DEG)
14577.12	22.827	23.0346	.313	.039236	.000	-.15832377
14582.12	22.612	22.8209	.288	.014138	.000	-.18826528
14587.12	22.390	22.6013	.264	-.011967	.10	-.15156211
14592.12	22.159	22.3724	.240	-.034332	.30	-.12085415
14597.12	21.921	22.1355	.215	-.061352	.000	-.09558130
14602.12	21.672	21.8891	.190	-.087064	.000	-.07658216
14607.12	21.412	21.6317	.166	-.112332	.000	-.06383860
14612.12	21.140	21.3630	.141	-.137343	.000	-.05742491
14617.12	20.856	21.0811	.117	-.162217	.000	-.05767700
14622.12	20.557	20.7858	.093	-.187032	.000	-.06459794
14627.12	20.244	20.4749	.069	-.211764	.000	-.07859910
14632.12	19.909	20.1452	.043	-.237926	.000	-.10030935
14637.12	19.555	19.7948	.018	-.264119	.000	-.12991336
14642.12	19.183	19.4267	-.005	-.288467	.000	-.16670788
14647.12	18.788	19.0369	-.028	-.311450	.000	-.18588545
14652.12	18.364	18.6189	-.051	-.334977	.000	-.17948056
14657.12	17.909	18.1694	-.074	-.358922	.000	-.18328012
14662.12	17.414	17.6810	-.097	-.382534	.000	-.18105805
14667.12	16.870	17.1483	-.120	-.406400	.000	-.17781902
14672.12	16.406	16.5582	-.240	-.535881	.000	.03071543
14677.12	16.465	16.6299	.1231	-.523260	.000	.18431234
14682.12	16.557	16.7246	.219	-.512309	.000	.18264237
14687.12	16.642	16.8103	.203	-.498411	.000	.17489317
14692.12	16.748	16.9082	.178	-.477218	.000	.16478011
14695.31	16.720	16.9047	.186	-.478725	.000	.14713275
14695.52	16.720	16.9034	.186	-.479092	.000	.14575479
14697.12	16.720	16.8970	.186	-.479212	.000	.13F57353
14702.12	16.720	16.8883	.186	-.480035	.000	.10404662
14705.31	16.720	16.8907	.186	-.4815373	.000	.08401393

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\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM MOTION (SEC)	COMMANDED PITCH ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN PITCH (DEG)	COMMANDED YAW ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN YAW (DEG)	COMMANDED ROL ATTITUDE (DEG)	EULERIAN ANGLE OF ATTITUDE IN ROLL (DEG)
14705.31	14.891	14.8907	-0.415	-0.415373	.084	.0841173
14715.31	14.891	14.8907	-0.415	-0.415373	.084	.08401393
14726.31	14.891	14.8907	-0.415	-0.415373	.084	.08401393
14737.31	14.891	14.8907	-0.415	-0.415373	.084	.08401393
14748.31	14.891	14.8907	-0.415	-0.415373	.084	.08401393
14759.31	14.891	14.8907	-0.415	-0.415373	.084	.08401393
14770.31	14.891	14.8907	-0.415	-0.415373	.084	.08401393
14781.31	14.891	14.8907	-0.415	-0.415373	.084	.08401393
14792.31	14.891	14.8907	-0.415	-0.415373	.084	.08401393
14803.31	14.891	14.8907	-0.415	-0.415373	.084	.08401393
14814.31	14.891	14.8907	-0.415	-0.415373	.084	.08401393
14825.31	14.891	14.8907	-0.415	-0.415373	.084	.08401393
14836.31	14.891	14.8907	-0.415	-0.415373	.084	.08401393
14846.21	-4.340	-4.3404	.534	.534114	.000	.00000000

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.. ENCLOSURE 4 ..

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (NT/M <sup>2</sup> )	ATTACK ANGLE OF (DEG)	TOTAL DRAG VELOCITY VECTOR (KG)	AERODYNAMIC LOAD (KG/M <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (KG)
713.12	10.00	.01	3.6508	.1100	.0001	.0000
722.12	10.00	.01	4.2425	.1100	.0001	.0000
732.12	10.00	.01	.0178	.1100	.0000	.0000
743.12	10.01	.01	.0095	.1100	.0000	.0000
754.12	10.01	.01	.0366	.1101	.0000	.0000
765.12	10.01	.01	.0637	.1101	.0000	.0000
776.12	10.01	.01	.0909	.1101	.0000	.0000
787.12	10.01	.01	.1180	.1101	.0000	.0000
798.12	10.01	.01	.1451	.1104	.0000	.0000
849.12	10.01	.01	.2581	.1104	.0000	.0000
932.12	10.01	.01	.4717	.1112	.0000	.0000
1020.12	10.02	.01	.6800	.1123	.0000	.0000
1108.12	10.03	.01	.8805	.1139	.0000	.0000
1196.12	10.05	.01	1.0709	.1158	.0000	.0000
1284.12	10.04	.01	1.2492	.1180	.0000	.0000
1372.12	10.08	.01	1.4132	.1204	.0000	.0010
1460.12	10.10	.01	1.5612	.1229	.0000	.0000
1548.12	10.12	.01	1.6914	.1254	.0000	.0000
1636.12	10.14	.01	1.8023	.127	.0000	.0000
1724.12	10.16	.01	1.8928	.1301	.0000	.0000
1812.12	10.17	.01	1.9617	.1321	.0001	.0000
1900.12	10.18	.01	2.0084	.1336	.0001	.0000
1988.12	10.19	.01	2.0322	.1347	.0001	.0000
2076.12	10.20	.01	2.0329	.1352	.0001	.0000
2164.12	10.20	.01	2.0106	.1352	.0001	.0000
2252.12	10.19	.01	1.9654	.1346	.0001	.0000
2340.12	10.18	.01	1.8978	.1336	.0000	.0000
2428.12	10.17	.01	1.8087	.1320	.0000	.0000
2516.12	10.16	.01	1.6990	.1301	.0000	.0000
2604.12	10.14	.01	1.5700	.1278	.0000	.0000
2692.12	10.12	.01	1.4231	.1254	.0000	.0000
2780.12	10.10	.01	1.2600	.1229	.0000	.0000
2868.12	10.08	.01	1.0825	.1204	.0000	.0000
2956.12	10.07	.01	.8927	.1179	.0000	.0000
3044.12	10.05	.01	.6927	.1156	.0000	.0000
3132.12	10.03	.01	.4848	.1136	.0000	.0000
3220.12	10.02	.01	.2719	.1119	.0000	.0000
3308.12	10.01	.01	.0608	.1104	.0000	.0000
3396.12	10.00	.01	.1471	.1093	.0000	.0000
3484.12	9.99	.01	.3614	.1084	.0000	.0000
3572.12	9.99	.01	.5729	.1078	.0000	.0000
3660.12	9.99	.01	.7783	.1074	.0000	.0000

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP. ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (NT/M <sup>2</sup> )	TOTAL ANGLE OF ATTACK (DEG)	DRAG ALONG VELOCITY VECTOR (KG)	AERODYNAMIC LOAD (KG/M <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (KG)
3740.12	9.99	.01	.9749	.1073	.0000	.0000
3828.12	9.99	.01	1.1604	.1074	.0000	.0000
3916.12	9.99	.01	1.3332	.1076	.0000	.0000
4004.12	10.00	.01	1.4968	.1079	.0000	.0000
4092.12	10.00	.01	1.6315	.1082	.0000	.0000
4180.12	10.00	.01	1.7537	.1086	.0000	.0000
4268.12	10.00	.01	1.8562	.1088	.0000	.0000
4356.12	10.00	.01	1.9376	.1089	.0000	.0000
4444.12	10.00	.01	1.9971	.1088	.0000	.0000
4532.12	10.00	.01	2.0340	.1085	.0000	.0000
4620.12	10.00	.01	2.0479	.1080	.0000	.0000
4708.12	9.99	.01	2.0356	.1072	.0000	.0000
4796.12	9.98	.01	2.0063	.1061	.0000	.0000
4884.12	9.98	.01	1.9512	.1049	.0000	.0000
4972.12	9.97	.01	1.8740	.1034	.0000	.0000
5060.12	9.95	.01	1.7756	.1019	.0000	.0000
5148.12	9.94	.01	1.6570	.1002	.0000	.0000
5236.12	9.93	.01	1.5196	.0985	.0000	.0000
5324.12	9.92	.01	1.3649	.0969	.0000	.0000
5412.12	9.91	.01	1.1946	.0954	.0000	.0000
5500.12	9.90	.01	1.0108	.0940	.0000	.0000
5588.12	9.89	.01	.8154	.0928	.0000	.0000
5676.12	9.88	.01	.6107	.0919	.0000	.0000
5764.12	9.87	.01	.3990	.0912	.0000	.0000
5852.12	9.87	.01	.1831	.0909	.0000	.0000
5940.12	9.87	.01	.0404	.0909	.0000	.0000
6028.12	9.87	.01	.2553	.0912	.0000	.0000
6116.12	9.88	.01	.4706	.0919	.0000	.0000
6204.12	9.89	.01	.6808	.0930	.0000	.0000
6292.12	9.90	.01	.8834	.0943	.0000	.0000
6372.12	9.91	.01	1.0590	.0958	.0000	.0000
6460.12	9.92	.01	1.2408	.0977	.0000	.0000
6548.12	9.94	.01	1.4084	.0998	.0000	.0000
6636.12	9.96	.01	1.5605	.1021	.0000	.0000
6724.12	9.97	.01	1.6947	.1044	.0000	.0000
6812.12	9.99	.01	1.8098	.1068	.0000	.0000
6900.12	10.01	.01	1.9045	.1092	.0000	.0000
6988.12	10.02	.01	1.9775	.1114	.0000	.0000
7076.12	10.03	.01	2.0282	.1133	.0000	.0000
7164.12	10.04	.01	2.0560	.1150	.0000	.0000
7252.12	10.06	.01	2.0605	.1163	.0000	.0000
7340.12	10.06	.01	2.0416	.1172	.0000	.0000

\*\* ENCLOSURE \*\*

A5-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG, 2ND OPP.

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (NT/M <sup>2</sup> )	TOTAL ANGLE OF ATTACK (DEG)	DRAG ALONG VELOCITY VECTOR (KG)	AERODYNAMIC LOAD (KG/M <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (KG)
7428.12	10.07	.01	1.9996	.1174	.0000	.0000
7516.12	10.06	.01	1.9349	.1175	.0000	.0000
7634.12	10.06	.01	1.8482	.1169	.0000	.0000
7692.12	10.05	.01	1.7406	.1159	.0000	.0000
7780.12	10.04	.01	1.6131	.1144	.0000	.0000
7869.12	10.03	.01	1.4673	.1128	.0000	.0000
7956.12	10.02	.01	1.3048	.1110	.0000	.0000
8044.12	10.00	.01	1.1273	.1090	.0000	.0000
8132.12	9.99	.01	.9369	.1070	.0000	.0000
8220.12	9.98	.01	.7358	.1051	.0000	.0000
8308.12	9.96	.01	.5263	.1032	.0000	.0000
8396.12	9.95	.01	.3108	.1014	.0000	.0000
8484.12	9.94	.01	.0934	.0999	.0000	.0000
8572.12	9.93	.01	.1324	.0986	.0000	.0000
8660.12	9.92	.01	.3506	.0975	.0000	.0000
8748.12	9.92	.01	.5860	.0967	.0000	.0000
8836.12	9.91	.01	.7753	.0961	.0000	.0000
8924.12	9.91	.01	.9761	.0958	.0000	.0000
9012.12	9.91	.01	1.1660	.0956	.0000	.0000
9100.12	9.91	.01	1.3429	.0957	.0000	.0000
9188.12	9.91	.01	1.5048	.0958	.0000	.0000
9276.12	9.91	.01	1.6498	.0961	.0000	.0000
9364.12	9.92	.01	1.7762	.0965	.0000	.0000
9452.12	9.92	.01	1.8826	.0968	.0000	.0000
9540.12	9.92	.01	1.9679	.0970	.0000	.0000
9628.12	9.92	.01	2.0310	.0972	.0000	.0000
9716.12	9.92	.01	2.0712	.0972	.0000	.0000
9804.12	9.92	.01	2.0881	.0971	.0000	.0000
9892.12	9.92	.01	2.0814	.0967	.0000	.0000
9980.12	9.91	.01	2.0512	.0961	.0000	.0000
10068.12	9.91	.01	1.9978	.0953	.0000	.0000
10156.12	9.90	.01	1.9219	.0944	.0000	.0000
10244.12	9.89	.01	1.8242	.0932	.0000	.0000
10332.12	9.88	.01	1.7058	.0919	.0000	.0000
10420.12	9.87	.01	1.5681	.0906	.0000	.0000
10508.12	9.86	.01	1.4124	.0892	.0000	.0000
10596.12	9.85	.01	1.2409	.0878	.0000	.0000
10684.12	9.84	.01	1.0551	.0866	.0000	.0000
10772.12	9.83	.01	.8572	.0854	.0000	.0000
10860.12	9.82	.01	.6494	.0844	.0000	.0000
10948.12	9.81	.01	.4342	.0836	.0000	.0000
11036.12	9.81	.01	.2142	.0831	.0000	.0000

\*\* ENCLOSURE 1 \*\*  
AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (NT/M <sup>2</sup> )	TOTAL ANGLE OF ATTACK (DEG)	DRAG ALONG VELOCITY VECTOR (KG)	AERODYNAMIC LOAD (KG/M <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (KG)
11124.12	9.81	.01	.0233	.0829	.0000	.0000
11212.12	9.81	.01	.2341	.0829	.0000	.0000
11300.12	9.81	.01	.4545	.0832	.0000	.0000
11388.12	9.82	.01	.6702	.0839	.0000	.0000
11476.12	9.83	.01	.8787	.0849	.0000	.0000
11564.12	9.84	.01	1.0774	.0861	.0000	.0000
11652.12	9.85	.01	1.2642	.0877	.0000	.0000
11740.12	9.86	.01	1.4368	.0894	.0000	.0000
11828.12	9.88	.01	1.5934	.0914	.0000	.0000
11916.12	9.90	.01	1.7320	.0936	.0000	.0000
12004.12	9.91	.01	1.8512	.0958	.0000	.0000
12092.12	9.93	.01	1.9496	.0981	.0000	.0000
12180.12	9.95	.01	2.0260	.1003	.0000	.0000
12268.12	9.96	.01	2.0796	.1024	.0000	.0000
12356.12	9.97	.01	2.1097	.1043	.0000	.0000
12444.12	9.99	.01	2.1160	.1059	.0000	.0000
12532.12	9.99	.01	2.0984	.1072	.0000	.0000
12620.12	10.00	.01	2.0571	.1081	.0000	.0000
12708.12	10.00	.01	1.9925	.1095	.0000	.0000
12796.12	10.00	.01	1.9054	.1085	.0000	.0000
12884.12	10.00	.01	1.7966	.1081	.0000	.0000
12972.12	10.00	.01	1.6674	.1072	.0000	.0000
13060.12	9.99	.01	1.5192	.1061	.0000	.0000
13148.12	9.98	.01	1.3538	.1046	.0000	.0000
13236.12	9.97	.01	1.1728	.1030	.0000	.0000
13324.12	9.95	.01	.9784	.1012	.0000	.0000
13412.12	9.94	.01	.7727	.0993	.0000	.0000
13500.12	9.93	.01	.5581	.0975	.0000	.0000
13588.12	9.91	.01	-.370	.0957	.0000	.0000
13676.12	9.90	.01	.1128	.0941	.0000	.0000
13764.12	9.89	.01	.1176	.0926	.0000	.0000
13774.12	9.89	.01	.1431	.0924	.0000	.0000
13777.12	9.89	.01	.1507	.0924	.0000	.0000

TIME BASE 6

\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (NT/M <sup>2</sup> )	ATTACK ANGLE OF (DEG)	DRAG ALONG VELOCITY VECTOR (KG)	AERODYNAMIC LOAD (KG/M <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (KG)
1377.12	9.89	.00	.1507	.0000	.0000	.0000
1378.12	9.89	.00	.3602	.0000	.0000	.0000
1379.12	9.89	.00	.6958	.0000	.0000	.0000
1380.12	9.89	.00	1.0491	.0000	.0000	.0000
1381.12	9.88	.00	1.4097	.0000	.0000	.0000
1382.12	9.88	.00	1.6871	.0000	.0000	.0000
1383.12	9.88	.00	1.7334	.0000	.0000	.0000
1384.12	9.88	.00	1.5704	.0000	.0000	.0000
1385.12	9.88	.00	1.3551	.0000	.0000	.0000
1386.12	9.88	.00	1.2764	.0000	.0000	.0000
1387.12	9.88	.00	1.2688	.0000	.0000	.0000
1388.12	9.88	.00	1.1702	.0000	.0000	.0000
1389.12	9.88	.00	1.0369	.0000	.0000	.0000
1390.12	9.88	.00	.9762	.0000	.0000	.0000
1391.12	9.88	.00	1.0025	.0000	.0000	.0000
1392.12	9.88	.00	1.1122	.0000	.0000	.0000
1393.12	9.88	.00	1.2848	.0000	.0000	.0000
1394.12	9.88	.00	1.5008	.0000	.0000	.0000
1395.12	9.88	.00	1.6949	.0000	.0000	.0000
1396.12	9.88	.00	1.6815	.0000	.0000	.0000
1397.12	9.88	.00	1.6587	.0000	.0000	.0000
1398.12	9.88	.00	1.6659	.0000	.0000	.0000
1399.12	9.88	.00	1.6264	.0000	.0000	.0000
1400.12	9.88	.00	1.5045	.0000	.0000	.0000
1401.12	9.88	.00	1.3453	.0000	.0000	.0000
1402.12	9.87	.00	1.1904	.0000	.0000	.0000
1403.12	9.87	.00	1.0460	.0000	.0000	.0000
1404.12	9.87	.00	.9169	.0000	.0000	.0000
1405.12	9.87	.00	.8109	.0000	.0000	.0000
1406.12	9.87	.00	.7429	.0000	.0000	.0000
1407.12	9.87	.00	.7278	.0000	.0000	.0000
1408.12	9.87	.00	.7738	.0000	.0000	.0000
1409.12	9.87	.00	.8769	.0000	.0000	.0000
1410.12	9.87	.00	1.0258	.0000	.0000	.0000
1411.12	9.87	.00	1.2092	.0000	.0000	.0000
1412.12	9.87	.00	1.4192	.0000	.0000	.0000
1413.12	9.87	.00	1.6511	.0000	.0000	.0000
1414.12	9.87	.00	1.8989	.0000	.0000	.0000
1415.12	9.87	.00	2.1078	.0000	.0000	.0000
1416.12	9.87	.00	2.2161	.0000	.0000	.0000
1417.12	9.87	.00	2.2577	.0000	.0000	.0000
1418.12	9.87	.00	2.2786	.0000	.0000	.0000

02/M2 BURNER ON  
ENGINE OFF

\*\* ENCLOSURE 4 \*\*  
AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (NT/M <sup>2</sup> )	TOTAL ANGLE OF ATTACK (DEG)	DRAG ALONG VELOCITY VECTOR (KG)	AERODYNAMIC LOAD (KG/M <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (KG)
13977.12	9.87	.00	2.0343	.0000	.0000	.0000
13982.12	9.87	.00	1.8439	.0000	.0000	.0000
13987.12	9.87	.00	1.6118	.0000	.0000	.0000
13992.12	9.87	.00	1.3985	.0000	.0000	.0000
13997.12	9.87	.00	1.2052	.0000	.0000	.0000
14002.12	9.87	.00	1.0332	.0000	.0000	.7000
14007.12	9.87	.00	.8850	.0000	.0000	.0000
14012.12	9.86	.00	.7638	.0000	.0000	.0000
14017.12	9.86	.00	.6756	.0000	.0000	.0000
14022.12	9.86	.00	.6226	.0000	.0000	.0000
14027.12	9.86	.00	.6051	.0000	.0000	.0000
14032.12	9.86	.00	.6194	.0000	.0000	.0000
14037.12	9.86	.00	.6588	.0000	.0000	.0000
14042.12	9.86	.00	.7159	.0000	.0000	.0000
14047.12	9.86	.00	.7853	.0000	.0000	.0000
14052.12	9.86	.00	.8636	.0000	.0000	.0000
14057.12	9.86	.00	.9492	.0000	.0000	.0000
14062.12	9.86	.00	1.0419	.0000	.0000	.0000
14067.12	9.86	.00	1.1421	.0000	.0000	.0000
14072.12	9.86	.00	1.2508	.0000	.0000	.0000
14077.12	9.86	.00	1.3691	.0000	.0000	.0000
14082.12	9.86	.00	1.4981	.0000	.0000	.0000
14087.12	9.86	.00	1.6372	.0000	.0000	.0000
14092.12	9.86	.00	1.7896	.0000	.0000	.0000
14097.12	9.86	.00	1.9562	.0000	.0000	.0000
14102.12	9.86	.00	2.1379	.0000	.0000	.0000
14107.12	9.86	.00	2.3343	.0000	.0000	.0000
14112.12	9.86	.00	2.4346	.0000	.0000	.0000
14117.12	9.86	.00	2.0935	.0000	.0000	.0000
14122.12	9.86	.00	1.6867	.0000	.0000	.0000
14127.12	9.86	.00	1.3359	.0000	.0000	.0000
14132.12	9.86	.00	1.0750	.0000	.0000	.0000
14137.12	9.86	.00	.9557	.0000	.0000	.0000
14142.12	9.86	.00	.9850	.0000	.0000	.0000
14147.12	9.86	.00	.9251	.0000	.0000	.0000
14152.12	9.86	.00	.9798	.0000	.0000	.0000
14157.12	9.86	.00	1.3946	.0000	.0000	.0000
14162.12	9.86	.00	1.9691	.0000	.0000	.0000
14167.12	9.86	.00	2.5855	.0000	.0000	.0000
14172.12	9.86	.00	2.8228	.0000	.0000	.0000
14177.12	9.86	.00	2.5030	.0000	.0000	.0000
14182.12	9.86	.00	1.7658	.0000	.0000	.0000

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

ENCLOSURE 4

TIME FROM FIRST MOYION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (NT/M <sup>2</sup> )	TOTAL ANGLE OF ATTACK (DEG)	DRAG ALONG VELOCITY VECTOR (KG)	AERODYNAMIC LCAD (KG/M <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (KG)
14187.12	9.86	.00	1.0469	.0000	.0000	.0000
14192.12	9.86	.00	.5470	.0000	.0000	.0000
14197.12	9.86	.00	.6502	.0000	.0000	.0000
14202.12	9.86	.00	.5798	.0000	.0000	.0000
14207.12	9.86	.00	.4449	.0000	.0000	.0000
14212.12	9.86	.00	1.1580	.0000	.0000	.0000
14217.12	9.86	.00	2.0084	.0000	.0000	.0000
14222.12	9.86	.00	2.8002	.0000	.0000	.0000
14227.12	9.86	.00	3.0845	.0000	.0001	.0000
14232.12	9.86	.00	2.7840	.0000	.0000	.0000
14237.12	9.86	.00	1.9618	.0000	.0000	.0000
14242.12	9.85	.00	1.0563	.0000	.0000	.0000
14247.12	9.85	.00	.2243	.0000	.0000	.0000
14252.12	9.85	.00	.4925	.0000	.0000	.0000
14257.12	9.85	.00	.5314	.0000	.0000	.0000
14262.12	9.85	.00	.3883	.0000	.0000	.0000
14267.12	9.85	.00	1.2218	.0000	.0000	.0000
14272.12	9.85	.00	2.2116	.0000	.0000	.0000
14273.42	9.85	.00	2.4726	.0000	.0000	.0000
14273.92	9.85	.00	2.5689	.0000	.0000	.0000
14277.12	9.85	.00	3.0516	.0000	.0001	.0000
14282.12	9.85	.00	3.3261	.0000	.0001	.0000
14287.12	9.85	.00	3.0285	.0000	.0000	.0000
14292.12	9.85	.00	2.2423	.0000	.0000	.0000
14297.12	9.85	.00	1.4550	.0000	.0000	.0000
14302.12	9.85	.00	1.0145	.0000	.0000	.0000
14307.12	9.85	.00	1.1106	.0000	.0000	.0000
14312.12	9.85	.00	1.2164	.0000	.0000	.0000
14317.12	9.85	.00	1.3162	.0000	.0000	.0000
14322.12	9.85	.00	1.8958	.0000	.0000	.0000
14327.12	9.85	.00	2.7063	.0000	.0000	.0000
14332.12	9.85	.00	3.4586	.0000	.0001	.0000
14337.12	9.85	.00	3.7123	.0000	.0001	.0000
14342.12	9.85	.00	3.4137	.0000	.0001	.0000
14347.12	9.85	.00	2.5941	.0000	.0000	.0000
14350.12	9.85	.00	2.0208	.0000	.0000	.0000
14352.12	9.85	.00	1.6562	.0000	.0000	.0000
14355.12	9.85	.00	1.1683	.0000	.0000	.0000
14357.12	9.86	.00	.9061	.0000	.0000	.0000
14357.62	9.86	.00	.8604	.0000	.0000	.0000
14361.62	9.89	.00	1.5747	.0000	.0000	.0000
14362.12	9.90	.00	1.5700	.0000	.0000	.0000

ULLAGE IGNITION  
02/M2 BURNER OFF

J-2 F-L INI  
ULL CUT OFF

REIGN  
908 THR  
16M INI

\*\* ENCLOSURE 4 \*\*  
 45-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (NT/M <sup>2</sup> )	TOTAL ANGLE OF ATTACK (DEG)	DRAG ALONG VELOCITY VECTOR (KG)	AERODYNAMIC LOAD (KG/M <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (KG)
14367.12	9.94	.00	2.6066	.0000	.0000	.0000
14372.12	9.98	.00	5.5558	.0000	.0001	.0000
14377.12	10.03	.00	4.1217	.0000	.0001	.0000
14382.12	10.07	.00	4.1909	.0000	.0001	.0000
14387.12	10.12	.00	4.1415	.0000	.0001	.0000
14392.12	10.17	.00	4.1830	.0000	.0001	.0000
14397.12	10.21	.00	4.1753	.0000	.0001	.0000
14402.12	10.26	.00	4.1263	.0000	.0001	.0000
14407.12	10.31	.00	4.0414	.0000	.0001	.0000
14412.12	10.35	.00	3.9338	.0000	.0001	.0000
14417.12	10.40	.00	3.8153	.0000	.0001	.0000
14422.12	10.45	.00	3.6928	.0000	.0001	.0000
14427.12	10.49	.00	3.5652	.0000	.0001	.0000
14432.12	10.54	.00	3.4359	.0000	.0001	.0000
14437.12	10.59	.00	3.3074	.0000	.0001	.0000
14442.12	10.64	.00	3.1805	.0000	.0001	.0000
14447.12	10.68	.00	3.0558	.0000	.0001	.0000
14452.12	10.73	.00	2.9340	.0000	.0001	.0000
14457.12	10.78	.00	2.8159	.0000	.0001	.0000
14462.12	10.82	.00	2.7011	.0000	.0001	.0000
14467.12	10.87	.00	2.5900	.0000	.0001	.0000
14472.12	10.91	.00	2.4828	.0000	.0001	.0000
14477.12	10.96	.00	2.3802	.0000	.0000	.0000
14482.12	11.00	.00	2.2821	.0000	.0000	.0000
14487.12	11.05	.00	2.1906	.0000	.0000	.0000
14492.12	11.09	.00	2.1056	.0000	.0000	.0000
14497.12	11.13	.00	2.0277	.0000	.0000	.0000
14502.12	11.17	.00	1.9563	.0000	.0000	.0000
14507.12	11.21	.00	1.8927	.0000	.0000	.0000
14512.12	11.25	.00	1.8369	.0000	.0000	.0000
14517.12	11.29	.00	1.7890	.0000	.0000	.0000
14522.12	11.32	.00	1.7493	.0000	.0000	.0000
14527.12	11.36	.00	1.7177	.0000	.0000	.0000
14532.12	11.39	.00	1.6936	.0000	.0000	.0000
14537.12	11.43	.00	1.6785	.0000	.0000	.0000
14542.12	11.46	.00	1.6656	.0000	.0000	.0000
14547.12	11.49	.00	1.6608	.0000	.0000	.0000
14552.12	11.51	.00	1.6603	.0000	.0000	.0000
14557.12	11.54	.00	1.6623	.0000	.0000	.0000
14562.12	11.57	.00	1.6671	.0000	.0000	.0000
14567.12	11.59	.00	1.6739	.0000	.0000	.0000
14572.12	11.61	.00	1.6796	.0000	.0000	.0000



\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.037 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (NT/M <sup>2</sup> )	TOTAL ANGLE OF ATTACK (DEG)	DRAW ALONG VELOCITY VECTOR (KG)	AERODYNAMIC LOAD (KG/M <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (KG)
14577.12	11.63	.00	1.6843	.0000	.0000	.0000
14582.12	11.65	.00	1.6870	.0000	.0000	.0000
14587.12	11.67	.00	1.6862	.0000	.0000	.0000
14592.12	11.69	.00	1.6815	.0000	.0000	.0000
14597.12	11.71	.00	1.6711	.0000	.0000	.0000
14602.12	11.73	.00	1.6538	.0000	.0000	.0000
14607.12	11.75	.00	1.6289	.0000	.0000	.0000
14612.12	11.77	.00	1.5961	.0000	.0000	.0000
14617.12	11.78	.00	1.5539	.0000	.0000	.0000
14622.12	11.80	.00	1.5025	.0000	.0000	.0000
14627.12	11.81	.00	1.4409	.0000	.0000	.0000
14632.12	11.82	.00	1.3674	.0000	.0000	.0000
14637.12	11.83	.00	1.2842	.0000	.0000	.0000
14642.12	11.84	.00	1.1983	.0000	.0000	.0000
14647.12	11.84	.00	1.1137	.0000	.0000	.0000
14652.12	11.84	.00	1.0369	.0000	.0000	.0000
14657.12	11.85	.00	.9860	.0000	.0000	.0000
14662.12	11.85	.00	.9884	.0000	.0000	.0000
14667.12	11.85	.00	1.0736	.0000	.0000	.0000
14672.12	11.85	.00	2.9814	.0000	.0000	.0000
14677.12	11.85	.00	2.6777	.0000	.0000	.0000
14682.12	11.86	.00	2.3603	.0000	.0000	.0000
14687.12	11.87	.00	2.0632	.0000	.0000	.0000
14692.12	11.87	.00	1.7729	.0000	.0000	.0000
14695.31	11.87	.00	1.6464	.0000	.0000	.0000
14695.52	11.87	.00	1.6390	.0000	.0000	.0000
14697.12	11.85	.00	1.5842	.0000	.0000	.0000
14702.12	11.78	.00	1.4269	.0000	.0000	.0000
14705.31	11.73	.00	1.3443	.0000	.0000	.0000

6CSZ  
T07  
TL1

.. ENCLOSURE 4 ..  
 A7-508 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. ZND OPP.

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (N7/P007)	TOTAL ANGLE OF ATTACK (DEG)	DRAG ALONG VELOCITY VECTOR (KG)	AERODYNAMIC LOAD (KG/M002)	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (KG)
14775.31	10.73	.00	1.3443	.0092	.0030	.0000
14776.31	10.57	.00	1.0745	.0072	.0000	.0000
14726.31	11.40	.00	.9458	.0052	.0000	.0000
14737.31	11.23	.00	1.0521	.0040	.0000	.0000
14748.31	11.06	.00	1.3355	.0030	.0000	.0000
14759.31	10.92	.00	1.7076	.0022	.0000	.0000
14770.31	10.77	.00	2.1201	.0017	.0300	.0000
14781.31	10.62	.00	2.5517	.0012	.0700	.0000
14792.31	10.47	.00	2.9926	.0009	.0000	.0000
14803.31	10.35	.00	3.4377	.0007	.0000	.0000
14814.31	10.24	.00	3.8842	.0005	.0000	.0000
14825.31	10.14	.00	4.3306	.0004	.0000	.0000
14836.31	10.03	.00	4.7757	.0003	.0000	.0000
14846.21	9.95	.00	14.2951	.0002	.0000	.0000

CVS OFF

\*\* ENCLOSURE 4 \*\*  
 AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	X POSI COORD (M)	Y POSI COORD (M)	Z POSI COORD (M)	SPACE FIXED EARTH CENTER PLUMBLIN SYS	SPACE FIXED EARTH CENTER PLUMBLIN SYS	SPACE FIXED EARTH CENTER PLUMBLIN SYS	X VEL. COMP. (M/S)	Y VEL. COMP. (M/S)	Z VEL. COMP. (M/S)
713.12	5461217.1	92456.1	2952085.6	-3506.421	75.902	6959.224			
722.12	5829323.4	93141.0	3014547.2	-3540.629	74.858	6921.395			
732.12	5793106.4	93883.6	3083547.1	-3662.597	73.669	6878.436			
743.12	5753324.4	94484.7	3158944.7	-3752.167	72.348	6830.043			
754.12	5710560.4	95475.2	3233803.9	-3841.097	71.016	6780.524			
765.12	5667821.9	96249.0	3308111.7	-3929.377	69.671	6729.835			
776.12	5624115.9	97007.9	3381855.8	-4016.997	68.314	6678.015			
787.12	5579449.8	97781.9	3455023.5	-4103.933	66.946	6625.055			
798.12	5533831.4	98480.7	3527602.3	-4190.151	65.566	6570.934			
844.12	5332924.2	101361.9	3824455.3	-4572.763	59.674	6332.516			
932.12	4904787.1	104107.0	4359847.5	-5178.761	47.909	5824.413			
1025.12	4423116.0	109777.7	4847685.7	-5758.345	35.593	5252.729			
1108.12	3893158.6	112351.8	5282643.6	-6275.214	27.848	4623.680			
1196.12	3320684.9	113790.1	5659969.4	-6723.721	11.802	3944.087			
1284.12	2711933.6	114071.9	5975535.7	-7398.950	-3.415	3221.328			
1372.12	2073540.8	113187.9	6225886.4	-7396.773	-16.669	2463.257			
1460.12	1411469.4	111141.0	6408274.2	-7613.898	-27.825	1678.125			
1548.12	735933.7	107945.5	6520692.8	-7747.908	-42.748	874.492			
1636.12	51320.9	103628.0	6561898.7	-7797.791	-55.304	61.134			
1724.12	-633887.2	98226.6	6531427.3	-7761.464	-67.362	-753.053			
1812.12	-1312206.6	91790.6	6429597.9	-7640.777	-78.795	-1559.151			
1900.12	-1976213.5	84380.5	6257512.7	-7436.520	-89.482	-2348.321			
1988.12	-2616644.6	76066.9	6017043.8	-7150.906	-99.309	-3111.901			
2076.12	-3232476.7	66930.5	5710814.5	-6787.049	-108.168	-3841.503			
2164.12	-3810987.7	57060.6	5342170.6	-6348.932	-115.963	-4529.116			
2252.12	-4347850.3	46554.8	4915143.1	-5841.363	-122.607	-5167.189			
2340.12	-4837192.7	35817.7	4514403.7	-5269.922	-128.026	-5748.723			
2428.12	-5273465.9	24060.1	3905213.3	-4640.889	-132.156	-6267.347			
2516.12	-5652501.6	12297.5	3333362.6	-3961.182	-134.948	-6717.392			
2604.12	-5959565.3	349.5	2725108.4	-3238.269	-136.367	-7093.949			
2692.12	-6221401.2	-11642.1	2087103.8	-2480.087	-136.389	-7392.926			
2780.12	-6405269.1	-23613.9	1426324.6	-1694.952	-135.008	-7611.090			
2868.12	-6519173.6	-35382.5	749991.9	-891.463	-132.230	-7746.098			
2956.12	-6561885.3	-46846.1	65493.3	-78.407	-128.078	-7796.521			
3044.12	-6532952.4	-57884.9	-619699.0	735.337	-122.585	-7761.864			
3132.12	-6432705.6	-68383.2	-1298108.8	1540.893	-115.603	-7647.525			
3220.12	-6262252.4	-78230.1	-1962338.2	2329.487	-107.793	-7474.871			
3308.12	-6023464.7	-8721.0	-2605146.7	3092.539	-98.632	-7156.139			
3396.12	-5740273.4	-94847.0	-3165030.8	3757.070	-89.379	-6830.455			
3476.12	-5387892.7	-102230.5	-3747767.8	4448.636	-78.274	-6401.314			
3564.12	-4967738.0	-108397.8	-4289616.4	5091.631	-65.304	-5902.473			
3652.12	-4493395.1	-113878.1	-4784707.0	5679.072	-53.588	-5339.375			

.. ENCLASURE 4 ..

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	X POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	Y POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	Z POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	X VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)	Y VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)	Z VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)
3740.12	-3970038.3	-118011.1	-5227640.1	6204.576	-40.252	-4718.154
3828.13	-3403379.4	-170948.2	-5613594.3	6662.433	-74.431	-4045.571
3916.12	-2799561.0	-122652.7	-5938368.4	7047.661	-12.262	-3328.920
4004.12	-2165239.9	-123100.4	-6198427.3	7356.067	2.109	-2576.113
4092.12	-1507265.7	-122279.9	-6390940.9	7584.291	16.535	-1795.234
4180.12	-832830.6	-120193.0	-6513614.9	7729.843	30.868	-994.831
4268.12	-199265.8	-116854.2	-6565713.7	7791.135	4.960	-183.631
4356.12	535917.3	-112291.4	-6546076.2	7767.498	58.43	629.517
4444.12	1215309.3	-106545.1	-6455121.1	7659.193	71.833	1435.743
4532.12	1881985.4	-99668.4	-6293846.1	7467.408	84.332	2226.246
4620.12	2527185.0	-91724.3	-6064015.6	7194.247	96.025	2992.401
4708.12	3145372.6	-82795.3	-5768142.8	6842.707	106.788	3725.848
4796.12	3729314.2	-72962.4	-5409460.3	6416.643	116.503	4418.591
4884.12	4272651.6	-62324.6	-4991885.8	5920.728	125.065	5063.085
4972.12	4769471.6	-50967.7	-4519978.3	5340.396	132.378	5752.317
5060.12	5214370.6	-39065.1	-3998886.9	4741.700	138.360	6479.889
5148.12	5602512.4	-26677.3	-3434294.7	4071.645	142.943	6640.079
5236.12	5929682.1	-13949.9	-2832355.8	3357.309	146.070	7027.913
5324.12	6192329.7	-1012.8	-2199627.7	2606.563	147.703	7339.205
5412.12	6387608.1	12001.3	-1542999.6	1827.583	147.817	7570.611
5500.12	6513403.6	24958.1	-869616.9	1028.837	146.402	7719.653
5588.12	6560357.4	37723.3	-186804.0	219.001	143.447	7784.747
5676.12	6551879.9	50163.7	498015.3	-593.143	139.026	7765.216
5764.12	6464154.1	62149.0	1177397.7	-1398.794	133.126	7661.296
5852.12	6306137.5	73552.5	1843960.4	-2189.228	125.815	7474.126
5940.12	6079546.8	84253.0	2490460.4	-2955.889	117.161	7205.739
6028.12	5786841.4	94135.8	3109872.1	-3690.477	107.246	6859.039
6116.12	5431196.6	103094.1	3695462.6	-4385.035	96.165	6437.768
6204.12	5016470.2	111029.8	4240863.9	-5032.030	84.025	5946.470
6292.12	4547160.6	117884.9	4740141.4	-5624.436	70.945	5390.444
6380.12	4077424.2	123030.7	5149419.7	-6110.180	58.346	4833.832
6468.12	3518588.2	127531.3	5546012.1	-6581.014	43.839	4171.433
6556.12	2921263.1	130730.6	5882254.4	-6980.361	28.793	3463.477
6644.12	2292187.6	132887.5	6154471.6	-7303.833	13.360	2717.633
6732.12	1636119.4	133075.2	6359682.6	-7547.860	-2.300	1941.990
6820.12	966175.0	137180.7	6495634.0	-7709.728	-18.026	1144.479
6908.12	253671.4	127905.4	6560425.7	-7787.616	-33.656	335.278
6996.12	-401954.6	126265.0	6554528.9	-7780.620	-49.024	-478.280
7084.12	-1083227.6	121289.7	6476795.4	-7688.766	-63.968	-1286.805
7172.12	-1752715.4	118023.7	6328457.7	-7513.016	-78.330	-2081.481
7260.12	-2403111.6	107525.3	611121.9	-7255.256	-91.954	-2883.814
7348.12	-3027315.7	98865.7	5827149.0	-6918.283	-104.695	-3594.930

\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM MOTION (SEC)	X POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	Y POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	Z POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	X VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)	Y VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)	Z VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)
7428.12	-3618512.4	89129.0	547533.4	-6505.770	-116.412	-429A.374
7516.12	-4170246.7	70411.0	5072362.4	-6022.230	-126.977	-4951.351
7604.12	-4676415.8	66818.4	46097A0.8	-5472.961	-136.271	-5552.2A4
7692.12	-5151735.3	54467.6	409693A.6	-48A.987	-144.191	-6092.59A
77A0.12	-553.000.6	41483.8	3539435.1	-4201.9A9	-150.645	-6566.390
786A.12	-5869941.7	27999.3	2943357.2	-3494.227	-155.558	-6968.494
7956.12	-6144848.9	14152.5	2315211.6	-2745.459	-158.870	-7294.542
8044.12	-6352794.4	8.6.3	1661852.9	-1972.851	-160.538	-7541.005
8132.12	-6491463.3	-14053.2	990407.7	-1175.885	-160.536	-7705.232
8220.12	-6559378.0	-28.1A.7	308196.4	-366.264	-158.855	-7785.476
8338.12	-6555812.8	-41962.7	-377347.3	447.182	-155.504	-7780.907
8396.12	-6460821.0	-55439.2	-1058757.2	1255.594	-150.510	-7691.619
8484.12	-6335233.2	-6A405.4	-1728615.8	2050.180	-143.916	-7518.625
8572.12	-6120647.6	-80723.2	-2379635.2	2A22.308	-135.783	-7263.847
8660.12	-5839411.3	-92260.3	-3004735.0	3543.597	-126.188	-6930.085
8748.12	-5494594.7	-102892.1	-3597119.4	4266.007	-115.224	-6520.993
8836.12	-508957.8	-112502.7	-4150349.9	4921.923	-102.997	-6041.034
8924.12	-4629908.7	-120986.2	-4458414.8	5524.234	-89.629	-5495.436
9012.12	-4119456.7	-126247.9	-5115794.0	6066.409	-75.254	-4890.132
9100.12	-3564157.5	-134205.5	-551751A.3	6542.549	-60.014	-4231.701
9188.12	-2970053.2	-138789.6	-5859223.5	6947.543	-44.067	-3527.296
9276.12	-2343607.5	-141945.2	-6137197.4	7276.933	-27.573	-2784.573
9364.12	-1691635.7	-143631.5	-6348420.2	7527.157	-10.709	-2811.604
9452.12	-1021230.6	-143823.1	-649059A.1	7695.491	6.367	-1214.794
9540.12	-339685.9	-142510.1	-6562188.1	7780.101	23.462	-408.7A9
9628.12	345583.4	-13949A.3	-6562415.2	7760.066	40.401	403.617
9716.12	1027121.7	-135409.3	-6491281.4	7695.385	57.006	1211.577
9804.12	1697514.3	-129680.3	-6349565.7	7526.985	73.100	2006.291
9892.12	234946A.3	-122563.8	-6138816.2	7276.710	88.512	2779.104
9980.12	2975892.1	-114127.2	-5861332.4	6947.297	103.075	3521.600
10068.12	3569975.7	-104452.0	-5520140.7	6542.351	116.634	4225.498
10156.12	4125259.7	-93633.4	-5118960.6	6066.302	129.059	4883.739
10244.12	4635710.7	-81779.0	-4662163.4	5524.356	140.154	5488.576
10332.12	5095745.7	-69007.7	-4154724.5	4922.433	149.857	6033.646
10420.12	5500491.1	-5544A.8	-3602168.2	4267.104	156.037	6513.047
10508.12	5845437.6	-41240.5	-3010506.9	3565.511	164.602	6921.597
10596.12	6126886.9	-2652A.5	-2386175.0	2825.294	169.475	7254.893
10684.12	6341791.4	-11464.4	-173595A.9	2054.500	172.595	7509.351
10772.12	6467826.6	3795.6	-1066922.5	1261.497	173.921	7682.245
10860.12	6563415.0	19092.4	-386331.2	454.884	173.431	7771.732
10948.12	6567742.5	34266.0	298427.3	-356.604	171.120	7776.872
11036.12	6500766.6	49156.8	979922.0	-1164.187	167.002	7697.628

\*\* ENCLOSURE 4 \*\*

A9-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	X POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	Y POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	Z POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	X VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)	Y VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)	Z VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)
1124.12	6343215.9	63604.3	1650759.0	-199.132	161.111	7534.870
11212.12	6156581.7	77461.6	2303660.2	-2732.848	153.500	7290.363
11300.12	5883102.2	90573.8	2931541.3	-3476.970	144.238	6966.746
11388.12	5545738.7	102801.5	3527588.1	-4183.451	133.412	6567.506
11476.12	5148143.3	114011.6	4085328.9	-4844.440	121.178	6096.937
11564.12	4694620.7	124080.8	4598704.2	-5453.349	107.505	5560.106
11652.12	4190083.0	132897.1	5062132.2	-6003.024	92.679	4962.792
11740.12	3639996.8	140361.2	5470569.0	-6487.622	76.797	4311.433
11828.12	3050325.6	146387.0	5819563.9	-6901.663	60.020	3613.057
11916.12	2427466.2	150903.4	6105308.2	-7241.206	42.519	2875.215
12004.12	1778180.6	153854.3	6324677.4	-7501.910	24.474	2105.896
12092.12	1109522.3	155200.2	6475266.4	-7681.083	6.072	1313.446
12180.12	428761.3	154918.1	6555417.2	-7776.714	-12.495	506.482
12268.12	-256695.8	153002.0	6564238.5	-7787.707	-31.032	-306.210
12356.12	-939386.3	149463.2	6501615.9	-7713.888	-49.341	-1115.761
12444.12	-1611873.5	144330.3	6368215.4	-7556.016	-67.228	-1913.327
12532.12	-2246828.0	137649.0	6165477.2	-7315.778	-84.500	-2690.184
12620.12	-2897109.5	129481.7	5895599.6	-6995.773	-100.971	-3437.824
12708.12	-3495845.2	119906.9	5561516.6	-6599.482	-116.461	-4148.065
12796.12	-4056506.3	109018.3	5166865.4	-6131.232	-130.800	-4813.122
12884.12	-4572980.2	96924.5	4715945.9	-5596.144	-143.829	-5425.718
12972.12	-5039437.9	83747.2	4213674.1	-5000.081	-155.402	-5979.155
13060.12	-5451396.2	69620.2	3655527.3	-4349.573	-165.391	-6467.371
13148.12	-5803773.6	54688.3	3077482.3	-3651.748	-173.680	-6885.109
13236.12	-6092938.8	39105.3	2455950.1	-2914.246	-180.173	-7227.773
13324.12	-6315752.6	23032.8	1807705.0	-2145.135	-184.742	-7491.677
13412.12	-6469800.9	6638.5	1139809.2	-1352.817	-187.480	-7673.981
13500.12	-6553420.5	-9905.9	459535.7	-545.938	-188.200	-7772.742
13588.12	-6565716.0	-26426.3	-225711.8	264.713	-186.933	-7786.932
13676.12	-6506568.5	-42748.0	-908479.3	1076.293	-183.685	-7716.441
13764.12	-6376635.8	-58697.4	-1381344.1	1874.007	-178.460	-7562.079
13774.12	-6357447.7	-60478.7	-1656851.8	1963.518	-177.766	-7539.298
13777.12	-6351516.9	-61011.6	-1679459.1	1990.317	-177.547	-7532.257

TIME BASE 4

TIME FROM FIRST MOTION (SEC)	X POST COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	Y POST COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	Z POST COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	X VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)	Y VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)	Z VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)
1417.12	-4831574.2	-124942.4	-4452992.6	5277.287	-128.116	-5730.284
1419.12	-4805103.1	-125581.0	-4481565.7	5311.142	-127.298	-5698.917
1419.12	-4778463.1	-126215.4	-4509981.5	5344.809	-126.495	-5667.349
1420.12	-4751655.2	-126845.9	-4538238.9	5378.289	-125.693	-5635.583
1420.12	-4724480.5	-127472.4	-4566337.0	5411.581	-124.883	-5603.620
1421.12	-4697539.7	-128094.7	-4594274.7	5444.682	-124.047	-5571.460
1421.12	-4670234.0	-128712.8	-4622051.2	5477.592	-123.206	-5539.105
1422.12	-4642764.2	-129324.7	-4649665.5	5510.309	-122.348	-5506.557
1422.12	-4615336.2	-129936.5	-4677336.5	5543.026	-121.483	-5474.009
1423.12	-4587939.9	-130542.2	-4705007.0	5575.743	-120.612	-5441.461
1424.12	-4560523.6	-131142.2	-4732623.1	5607.460	-119.722	-5407.756
1424.12	-4533126.3	-131738.7	-4758480.6	5639.177	-118.860	-5374.442
1424.12	-4505729.0	-132330.8	-4785269.1	5670.894	-117.994	-5340.939
1425.12	-4478331.7	-132918.7	-4811889.6	5702.611	-117.146	-5307.249
1425.12	-4450934.4	-133502.3	-4838341.2	5734.328	-116.296	-5273.372
1426.12	-4423537.1	-134081.6	-4864623.1	5766.045	-115.441	-5239.311
1426.12	-4396139.8	-134656.6	-4890734.1	5797.762	-114.561	-5205.066
1427.12	-4368742.5	-135227.2	-4916673.4	5829.479	-113.673	-5170.639
1427.12	-4341345.2	-135794.8	-4942338.9	5861.196	-112.741	-5136.159
1428.12	-4313947.9	-136361.5	-4967804.4	5892.913	-111.841	-5101.659
1428.12	-4286550.6	-136927.7	-4993069.9	5924.630	-110.941	-5067.159
1429.12	-4259153.3	-137494.4	-5018235.4	5956.347	-109.996	-5032.659
1429.12	-4231756.0	-138061.1	-5043400.9	5988.064	-109.068	-4998.159
1430.12	-4204358.7	-138627.7	-5068566.4	6019.781	-108.179	-4963.659
1430.12	-4176961.4	-139194.4	-5093731.9	6051.498	-107.288	-4929.159
1431.12	-4149564.1	-139761.1	-5118897.4	6083.215	-106.395	-4894.659
1431.12	-4122166.8	-140327.7	-5144062.9	6114.932	-105.496	-4860.159
1432.12	-4094769.5	-140894.4	-5169228.4	6146.649	-104.569	-4825.659
1432.12	-4067372.2	-141461.1	-5194393.9	6178.366	-103.637	-4791.159
1433.12	-4039974.9	-142027.7	-5219559.4	6210.083	-102.686	-4756.659
1433.12	-4012577.6	-142594.4	-5244724.9	6241.800	-101.721	-4722.159
1434.12	-3985180.3	-143161.1	-5269890.4	6273.517	-100.753	-4687.659
1434.12	-3957783.0	-143727.7	-5295055.9	6305.234	-99.786	-4653.159
1435.12	-3930385.7	-144294.4	-5320221.4	6336.951	-99.217	-4618.659
1435.12	-3902988.4	-144861.1	-5345386.9	6368.668	-98.836	-4584.159
1436.12	-3875591.1	-145427.7	-5370552.4	6400.385	-98.268	-4549.659
1436.12	-3848193.8	-145994.4	-5395717.9	6432.102	-98.010	-4515.159
1437.12	-3820796.5	-146561.1	-5420883.4	6463.819	-98.002	-4480.659
1437.12	-3793399.2	-147127.7	-5446048.9	6495.536	-97.469	-4446.159
1438.12	-3765901.9	-147694.4	-5471214.4	6527.253	-97.382	-4411.659
1438.12	-3738504.6	-148261.1	-5496379.9	6558.970	-97.382	-4377.159
1439.12	-3711107.3	-148827.7	-5521545.4	6590.687	-97.382	-4342.659
1439.12	-3683710.0	-149394.4	-5546710.9	6622.404	-97.382	-4308.159
1440.12	-3656312.7	-149961.1	-5571876.4	6654.121	-97.382	-4273.659
1440.12	-3628915.4	-150527.7	-5597041.9	6685.838	-97.382	-4239.159
1441.12	-3601518.1	-151094.4	-5622207.4	6717.555	-97.382	-4204.659
1441.12	-3574120.8	-151661.1	-5647372.9	6749.272	-97.382	-4170.159
1442.12	-3546723.5	-152227.7	-5672538.4	6780.989	-97.382	-4135.659
1442.12	-3519326.2	-152794.4	-5697703.9	6812.706	-97.382	-4101.159
1443.12	-3491928.9	-153361.1	-5722869.4	6844.423	-97.382	-4066.659
1443.12	-3464531.6	-153927.7	-5748034.9	6876.140	-97.382	-4032.159
1444.12	-3437134.3	-154494.4	-5773200.4	6907.857	-97.382	-3997.659
1444.12	-3409737.0	-155061.1	-5798365.9	6939.574	-97.382	-3963.159
1445.12	-3382339.7	-155627.7	-5823531.4	6971.291	-97.382	-3928.659
1445.12	-3354942.4	-156194.4	-5848696.9	7003.008	-97.382	-3894.159
1446.12	-3327545.1	-156761.1	-5873862.4	7034.725	-97.382	-3859.659
1446.12	-3300147.8	-157327.7	-5899027.9	7066.442	-97.382	-3825.159
1447.12	-3272750.5	-157894.4	-5924193.4	7098.159	-97.382	-3790.659
1447.12	-3245353.2	-158461.1	-5949358.9	7129.876	-97.382	-3756.159
1448.12	-3217955.9	-159027.7	-5974524.4	7161.593	-97.382	-3721.659
1448.12	-3190558.6	-159594.4	-6000000.0	7193.310	-97.382	-3687.159
1449.12	-3163161.3	-160161.1	-6025165.5	7225.027	-97.382	-3652.659
1449.12	-3135764.0	-160727.7	-6050331.0	7256.744	-97.382	-3618.159
1450.12	-3108366.7	-161294.4	-6075496.5	7288.461	-97.382	-3583.659
1450.12	-3080969.4	-161861.1	-6100662.0	7320.178	-97.382	-3549.159
1451.12	-3053572.1	-162427.7	-6125827.5	7351.895	-97.382	-3514.659
1451.12	-3026174.8	-162994.4	-6150993.0	7383.612	-97.382	-3480.159
1452.12	-2998777.5	-163561.1	-6176158.5	7415.329	-97.382	-3445.659
1452.12	-2971380.2	-164127.7	-6201324.0	7447.046	-97.382	-3411.159
1453.12	-2943982.9	-164694.4	-6226489.5	7478.763	-97.382	-3376.659
1453.12	-2916585.6	-165261.1	-6251655.0	7510.480	-97.382	-3342.159
1454.12	-2889188.3	-165827.7	-6276820.5	7542.197	-97.382	-3307.659
1454.12	-2861791.0	-166394.4	-6301986.0	7573.914	-97.382	-3273.159
1455.12	-2834393.7	-166961.1	-6327151.5	7605.631	-97.382	-3238.659
1455.12	-2806996.4	-167527.7	-6352317.0	7637.348	-97.382	-3204.159
1456.12	-2779599.1	-168094.4	-6377482.5	7669.065	-97.382	-3169.659
1456.12	-2752201.8	-168661.1	-6402648.0	7700.782	-97.382	-3135.159
1457.12	-2724804.5	-169227.7	-6427813.5	7732.499	-97.382	-3100.659
1457.12	-2697407.2	-169794.4	-6452979.0	7764.216	-97.382	-3066.159
1458.12	-2670009.9	-170361.1	-6478144.5	7795.933	-97.382	-3031.659
1458.12	-2642612.6	-170927.7	-6503310.0	7827.650	-97.382	-2997.159
1459.12	-2615215.3	-171494.4	-6528475.5	7859.367	-97.382	-2962.659
1459.12	-2587818.0	-172061.1	-6553641.0	7891.084	-97.382	-2928.159
1460.12	-2560420.7	-172627.7	-6578806.5	7922.801	-97.382	-2893.659
1460.12	-2533023.4	-173194.4	-6603972.0	7954.518	-97.382	-2859.159
1461.12	-2505626.1	-173761.1	-6629137.5	7986.235	-97.382	-2824.659
1461.12	-2478228.8	-174327.7	-6654303.0	8017.952	-97.382	-2790.159
1462.12	-2450831.5	-174894.4	-6679468.5	8049.669	-97.382	-2755.659
1462.12	-2423434.2	-175461.1	-6704634.0	8081.386	-97.382	-2721.159
1463.12	-2396036.9	-176027.7	-6729800.0	8113.103	-97.382	-2686.659
1463.12	-2368639.6	-176594.4	-6754965.5	8144.820	-97.382	-2652.159
1464.12	-2341242.3	-177161.1	-6780131.0	8176.537	-97.382	-2617.659
1464.12	-2313845.0	-177727.7	-6805296.5	8208.254	-97.382	-2583.159
1465.12	-2286447.7	-178294.4	-6830462.0	8239.971	-97.382	-2548.659
1465.12	-2259050.4	-178861.1	-6855627.5	8271.688	-97.382	-2514.159
1466.12	-2231653.1	-179427.7	-6880793.0	8303.405	-97.382	-2479.659
1466.12	-2204255.8	-179994.4	-6905958.5	8335.122	-97.382	-2445.159
1467.12	-2176858.5	-180561.1	-6931124.0	8366.839	-97.382	-2410.659
1467.12	-2149461.2	-181127.7	-6956289.5	8398.556	-97.382	-2376.159
1468.12	-2122063.9	-181694.4	-6981455.0	8430.273	-97.382	-2341.659
1468.12	-2094666.6	-182261.1	-7006620.5	8461.990	-97.382	-2307.159
1469.12	-2067269.3	-182827.7	-7031786.0	8493.707	-97.382	-2272.659
1469.12	-2039872.0	-183394.4	-7056951.5	8525.424	-97.382	-2238.159
1470.12	-2012474.7	-183961.1	-7082117.0	8557.141	-97.382	-2203.659
1470.12	-1985077.4	-184527.7	-7107282.5	8588.858	-97.382	-2169.159
1471.12	-1957680.1	-185094.4	-7132448.0	8620.575	-97.382	-2134.659
1471.12	-1930282.8	-185661.1	-7157613.5	8652.292	-97.382	-2100.159
1472.12	-1902885.5	-186227.7	-7182779.0	8684.009	-97.382	-2065.659
1472.12	-1875488.2	-186794.4	-7207944.5	8715.726	-97.382	-2031.159
1473.12	-1848090.9	-187361.1	-7233110.0	8747.443	-97.382	-1996.659
1473.12	-1820693.6	-187927.7	-7258275.5	8779.160	-97.382	-1962.159
1474.12	-1793296.3	-188494.4	-7283441.0	8810.877	-97.382	-1927.659
1474.12	-1765899.0	-189061.1	-7308606.5	8842.594	-97.382	-1893.159
1475.12	-1738501.7	-189627.7	-7333772.0	8874.311	-97.382	-1858.659
1475.12	-1711104.4	-190194.4	-7358937.5	8906.028	-97.382	-1824.159
1476.12	-1683707.1	-190761.1	-7384103.0	8937.745	-97.382	-1789.659
1476.12	-1656309.8	-191327.7	-7409268.5	8969.462	-97.382	-1755.159
1477.12	-1628912.5	-191894.4	-7434434.0	9001.179	-97.382	-1720.659
1477.12	-1601515.2	-192461.1	-7459600.0	9032.896	-97.382	-1686.159
1478.12	-1574117.9	-193027.7	-7484765.5	9064.613	-97.382	-1651.659
1478.12	-1546720.6	-193594.4	-7509931.0	9096.330	-97.382	-1617.159
1479.12	-1519323.3	-194161.1	-7535096.5	9128.047	-97.382	-1582.659
1479.12	-1491926.0	-194727.7	-7560262.0	9159.764	-97.382	-1548.159
1480.12	-1464528.7	-195294.4	-7585427.5	9191.481	-97.382	-1513.659
1480.12	-1437131.4	-195861.1	-7610593.0	9223.198	-97.382	-1479.159
1481.12	-1409734.1	-196427.7	-7635758.5	9254.915	-97.382	-1444.659
1481.12	-1382336.8	-196994.4	-7660924.0	9286.632	-97.382	-14

\* \* \* ENCLOSURE 4 \* \* \*

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM MOTION (SEC)	X POST COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	Y POST COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	Z POST COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	X VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)	Y VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)	Z VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)
14367.12	-3778999.7	-145200.1	-5375937.1	6423.211	-94.689	-4521.941
14372.12	-3746747.5	-145680.4	-5398494.8	6477.989	-95.457	-4500.740
14377.12	-3714220.0	-146154.9	-5420945.9	6532.955	-94.346	-4479.888
14382.12	-3681417.6	-146623.6	-5443293.5	6588.038	-93.112	-4459.094
14387.12	-3648339.4	-147086.0	-5465536.8	6643.233	-91.841	-4438.210
14392.12	-3614985.0	-147541.9	-5487675.2	6698.563	-90.530	-4417.131
14397.12	-3581353.6	-147991.3	-5509707.8	6754.010	-89.198	-4395.861
14402.12	-3547444.7	-148433.9	-5531633.6	6809.563	-87.850	-4374.421
14407.12	-3513257.8	-148869.7	-5553451.8	6865.211	-86.492	-4352.835
14412.12	-3478792.5	-149298.8	-5575161.7	6920.942	-85.130	-4331.119
14417.12	-3444046.3	-149721.0	-5596762.8	6976.753	-83.768	-4309.284
14422.12	-3409024.8	-150134.5	-5618254.4	7032.658	-82.407	-4287.349
14427.12	-3373721.5	-150545.1	-5639636.1	7088.662	-81.048	-4265.315
14432.12	-3338138.0	-150947.0	-5660927.4	7144.770	-79.686	-4243.193
14437.12	-3302273.7	-151342.1	-5682067.9	7200.987	-78.349	-4220.987
14442.12	-3266127.9	-151730.5	-5703117.1	7257.313	-77.010	-4198.700
14447.12	-3229700.3	-152112.2	-5724054.7	7313.752	-75.679	-4176.334
14452.12	-3192990.2	-152487.3	-5744880.4	7370.300	-74.358	-4153.890
14457.12	-3155997.2	-152855.8	-5765593.6	7426.960	-73.046	-4131.369
14462.12	-3118720.5	-153217.8	-5786193.9	7483.735	-71.745	-4108.773
14467.12	-3081159.6	-153573.3	-5806681.1	7540.631	-70.454	-4086.107
14472.12	-3043313.9	-153922.3	-5827054.9	7597.652	-69.175	-4063.374
14477.12	-3005182.8	-154265.0	-5847314.8	7654.803	-67.908	-4040.577
14482.12	-2966765.7	-154601.4	-5867460.6	7712.084	-66.655	-4017.720
14487.12	-2928061.8	-154931.6	-5887491.9	7769.501	-65.416	-3994.805
14492.12	-2889070.4	-155255.6	-5907408.5	7827.057	-64.190	-3971.834
14497.12	-2849710.0	-155573.5	-5927210.1	7884.755	-62.977	-3948.812
14502.12	-2810000.7	-155885.4	-5946896.6	7942.599	-61.780	-3925.739
14507.12	-2770360.7	-156191.3	-5966467.4	8000.595	-60.598	-3902.616
14512.12	-2730216.4	-156491.4	-5985922.6	8058.748	-59.432	-3879.448
14517.12	-2689777.0	-156785.7	-6005261.9	8117.063	-58.283	-3856.238
14522.12	-2649045.5	-157074.3	-6024484.9	8175.552	-57.151	-3832.992
14527.12	-2608021.2	-157357.2	-6043591.7	8234.222	-56.035	-3809.711
14532.12	-2566703.0	-157634.7	-6062582.0	8293.080	-54.938	-3786.398
14537.12	-2525090.0	-157906.6	-6081455.7	8352.133	-53.858	-3763.058
14542.12	-2483181.3	-158173.3	-6100212.6	8411.397	-52.798	-3739.694
14547.12	-2440975.7	-158434.7	-6118852.6	8470.882	-51.756	-3716.309
14552.12	-2398472.1	-158690.9	-6137375.6	8530.594	-50.734	-3692.906
14557.12	-2355669.4	-158942.0	-6155781.6	8590.542	-49.733	-3669.489
14562.12	-2312566.3	-159188.2	-6174070.4	8650.738	-48.755	-3646.047
14567.12	-2269161.6	-159429.6	-6192242.0	8711.192	-47.797	-3622.593
14572.12	-2225483.9	-159666.2	-6210296.3	8771.917	-46.862	-3599.126



AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	X POSI COORD (M)	Y POSI COORD (M)	Z POSI COORD (M)	SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	X VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)	Y VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)	Z VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)
14577.12	-2181441.9	-159898.3	-6228233.2	8932.925	-45.950	-3575.644	
14582.12	-2137124.2	-160125.8	-6236052.7	8894.229	-45.062	-3552.146	
14587.12	-2092499.1	-160348.9	-6263754.7	8955.845	-44.199	-3528.634	
14592.12	-2047565.2	-160567.8	-6281339.1	9017.784	-43.361	-3505.106	
14597.12	-2002320.7	-160782.6	-6298805.7	9080.064	-42.548	-3481.558	
14602.12	-1956763.9	-160993.3	-6316154.6	9142.701	-41.761	-3457.989	
14607.12	-1910893.1	-161200.2	-6333385.6	9205.712	-41.002	-3434.393	
14612.12	-1864706.2	-161403.4	-6350498.5	9269.115	-40.271	-3410.767	
14617.12	-1818201.2	-161603.0	-6367493.2	9332.931	-39.569	-3387.102	
14622.12	-1771376.1	-161799.1	-6384369.4	9397.181	-38.896	-3363.391	
14627.12	-1724228.7	-161992.0	-6401127.0	9461.885	-38.253	-3339.625	
14632.12	-1676756.6	-162181.7	-6417765.5	9527.001	-37.641	-3315.767	
14637.12	-1628957.8	-162368.5	-6434284.5	9592.615	-37.063	-3291.821	
14642.12	-1580829.6	-162552.4	-6450683.6	9658.757	-36.518	-3267.776	
14647.12	-1532369.3	-162733.7	-6466962.1	9725.454	-36.007	-3243.614	
14652.12	-1483574.1	-162912.5	-6483119.4	9792.737	-35.529	-3219.312	
14657.12	-1434440.9	-163089.1	-6499154.9	9860.639	-35.086	-3194.840	
14662.12	-1384966.6	-163263.5	-6515067.5	9929.195	-34.679	-3170.162	
14667.12	-1335147.8	-163435.9	-6530856.1	9998.442	-34.310	-3145.235	
14672.12	-1284980.5	-163606.7	-6546517.6	10068.775	-34.050	-3118.757	
14677.12	-1234458.7	-163776.5	-6562042.7	10140.036	-33.854	-3091.322	
14682.12	-1183579.1	-163945.3	-6577431.5	10211.880	-33.663	-3064.269	
14687.12	-1132338.8	-164113.1	-6592686.0	10284.339	-33.473	-3037.590	
14692.12	-1080739.7	-164280.0	-6607808.1	10357.438	-33.279	-3011.326	
14695.31	-1047649.4	-164385.8	-6617379.2	10404.382	-33.152	-2994.794	
14695.52	-1095464.6	-164392.8	-6618007.9	10407.212	-33.140	-2993.634	
14697.12	-1026780.2	-164445.7	-6622795.4	10410.103	-32.811	-2979.760	
14702.12	-976712.9	-164607.1	-6637584.6	10416.750	-31.759	-2935.932	
14705.31	-943506.9	-164707.2	-6646897.3	10420.797	-31.089	-2908.018	

GCS2  
T87  
TL1

\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	X POST COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	Y POST COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	Z POST COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (M)	X VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)	Y VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)	Z VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (M/S)
14705.31	-943506.9	-164707.2	-6646897.3	10420.797	-31.089	-2908.015
14715.31	-839236.9	-165007.6	-6675539.0	10432.560	-28.992	-2820.544
14726.31	-724417.0	-165313.9	-6706037.3	10443.838	-26.695	-2724.573
14737.31	-609480.6	-165594.9	-6735481.0	10453.393	-24.410	-2628.915
14748.31	-494448.5	-165850.9	-6763874.2	10461.246	-22.137	-2533.626
14759.31	-379339.3	-166082.0	-6791221.6	10467.422	-19.878	-2438.760
14770.31	-264171.3	-166288.3	-6817528.1	10471.944	-17.635	-2344.367
14781.31	-148962.5	-166470.0	-6842799.0	10474.841	-15.408	-2250.498
14792.31	-33730.6	-166627.3	-6867040.4	10476.141	-13.198	-2157.201
14803.31	81506.9	-166760.4	-6890258.9	10475.875	-11.006	-2064.522
14814.31	196733.0	-166869.5	-6912461.6	10474.074	-9.834	-1972.504
14825.31	311931.0	-166954.8	-6933655.9	10470.773	-6.682	-1881.190
14836.31	427064.6	-167016.5	-6953849.7	10466.005	-4.581	-1790.619
14846.21	530670.6	-167082.2	-6971175.6	10460.490	-2.651	-1709.772

SYS OFF

\*\* ENCLOSURE 4 \*\*  
 A5-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	GIMBAL DEFLECTION ANG REQUIRED	GIMBAL DEFLECTION ANG REQUIRED	GIMBAL DEFLECTION ANG REQUIRED	GIMBAL DEFLECTION ANG REQUIRED	EULERIAN ATTITUDE RATE IN PITCH (DEG/S)	EULERIAN ATTITUDE RATE IN YAW (DEG/S)	EULERIAN ATTITUDE RATE IN ROLL (DEG/S)
14187.12	-.5264	-.330323	.000000	.000000	-.05996070	-.15427779	-.01929285
14192.12	-.5436	-.949323	.000000	.000000	-.05932533	-.15023441	-.03162012
14197.12	-.4465	-1.336034	.000000	.000000	-.05744716	-.05410611	.11595793
14202.12	-.4560	-1.222874	.000000	.000000	-.05628079	.06906421	.13724613
14207.12	-.3506	-.641304	.000000	.000000	-.05507571	.17071819	-.02869135
14212.12	-.3505	.055037	.000000	.000000	-.05423489	.17391583	-.02869819
14217.12	-.2352	.756948	.000000	.000000	-.05273685	.17510227	.03269871
14222.12	-.2264	1.355665	.000000	.000000	-.05313044	.11459935	-.12538081
14227.12	-.1173	1.497448	.000000	.000000	-.05519968	-.00168951	-.14065119
14232.12	-.1250	1.164994	.000000	.000000	-.05709712	-.11918468	-.12007366
14237.12	-.0290	.443664	.000000	.000000	-.05763119	-.18471625	-.02938915
14242.12	-.0391	-.296445	.000000	.000000	-.05611490	-.17954479	.02607637
14247.12	.0643	-1.017309	.000000	.000000	-.05532044	-.17473255	.01367818
14252.12	.0610	-1.446281	.000000	.000000	-.05441051	-.06401523	-.11249031
14257.12	.1733	-1.374380	.000000	.000000	-.05300674	.05950559	-.10244131
14262.12	.1317	-.807171	.000000	.000000	-.05162650	.18010809	-.13000270
14267.12	.3046	-.003741	.000000	.000000	-.05087554	.19954929	-.02343363
14272.12	.3225	.805797	.000000	.000000	-.04956560	.20080922	.03440602
14273.42	.3812	1.013161	.000000	.000000	-.04917533	.19757918	.03365473
14273.52	.3612	1.083364	.000000	.000000	-.04927033	.18654377	.05034530
14277.12	.4519	1.414952	.000000	.000000	-.05049205	.11205423	-.07027739
14282.12	.4616	1.538004	.000000	.000000	-.05244736	-.00676145	-.14203892
14287.12	.5751	1.185814	.000000	.000000	-.05403978	-.12277197	-.09071624
14292.12	.5744	.441925	.000000	.000000	-.05443083	-.19154033	.00059960
14297.12	.6979	-.331559	.000000	.000000	-.05286968	-.18875302	.00060701
14302.12	.6965	-1.075711	.000000	.000000	-.05158085	-.17383943	-.00060003
14307.12	.8227	-1.466473	.000000	.000000	-.05016578	-.05329109	.13392583
14312.12	.8425	-1.351347	.000000	.000000	-.04861882	.07077652	.11629896
14317.12	.9797	-.742505	.000000	.000000	-.04770854	.19022882	.05041040
14322.12	1.0076	.037066	.000000	.000000	-.04833486	.17448926	.00990368
14327.12	1.1162	.823297	.000000	.000000	-.05879271	.19567451	-.03832269
14332.12	1.0456	1.457269	.000000	.000000	-.07777375	.11975857	-.11900743
14337.12	1.0313	1.616506	.000000	.000000	-.08684867	.00124457	-.10594600
14342.12	.8943	1.299801	.000000	.000000	-.08890996	-.11553047	-.12134068
14347.12	.8614	.538430	.000000	.000000	-.08963051	-.20814015	.00674731
14350.12	.7514	.031485	.000000	.000000	-.09122340	-.20791122	.00599742
14352.12	.7083	-.306047	.000000	.000000	-.09483946	-.20697669	.00502413
14355.12	.6827	-.799586	.000000	.000000	-.10287742	-.19902265	.00379531
14357.12	.3546	-.818282	.000000	.000000	-.24380700	.07815731	.02399921
14357.62	.2090	-.639472	.000000	.000000	-.29409750	.23967160	.03312520
14361.62	.0418	-.003608	.000000	.000000	.09203181	-.03147944	.02829670
14362.12	.0958	-.071093	.000000	.000000	.10968119	-.09113935	-.00288836

ULLAGE IGNITION  
 D2/H2 BURNER OFF

J-2 F-L INI  
 ULL CUT OFF

REIGN

908 THR  
 16M INI

ENCLOSURE 4

AS-509 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	GIMBAL			GIMBAL			EULERIAN			EULERIAN		
	DEFLECTION ANG REQUIRED PITCH CHANL (DEG)	DEFLECTION ANG REQUIRED YAW CHANNEL (DEG)	DEFLECTION ANG REQUIRED ROLL CHANNEL (DEG)	DEFLECTION ANG REQUIRED PITCH (DEG/S)	DEFLECTION ANG REQUIRED YAW (DEG/S)	DEFLECTION ANG REQUIRED ROLL (DEG/S)	ATTITUDE RATE IN PITCH (DEG/S)	ATTITUDE RATE IN YAW (DEG/S)	ATTITUDE RATE IN ROLL (DEG/S)	ATTITUDE RATE IN PITCH (DEG/S)	ATTITUDE RATE IN YAW (DEG/S)	ATTITUDE RATE IN ROLL (DEG/S)
14367.12	.1196	-.109358	.00000	-1.35393599	.30190584	-.06609570						
14372.12	-.2637	-.248615	.00000	.35603526	-.06592571	.08670594						
14377.12	.206	-.185502	.00000	-.08405850	.04614379	-.09903220						
14382.12	.1182	-.202895	.00000	-.01843745	.0830720	-.00104393						
14387.12	.1243	-.198257	.00000	-.08840623	.01125731	-.00277159						
14392.12	.1188	-.201483	.00000	-.06738487	.00497388	-.00145022						
14397.12	.1192	-.202086	.00000	-.06087478	.00318744	-.00097068						
14402.12	.1198	-.202489	.00000	-.05124752	.0080140	.00011166						
14407.12	.1217	-.203002	.00000	-.04480688	-.00059458	.00661348						
14412.12	.1226	-.204271	.00000	-.04089172	-.00208037	.00054243						
14417.12	.1237	-.204936	.00000	-.03894172	-.00215341	.00022207						
14422.12	.1232	-.205089	.00000	-.03784126	-.00297298	.00038588						
14427.12	.1238	-.206335	.00000	-.03602238	-.00381567	-.00083875						
14432.12	.1244	-.206786	.00000	-.03558291	-.00349325	-.00144495						
14437.12	.1251	-.207889	.00000	-.03502813	-.00439918	-.00218988						
14442.12	.1256	-.208139	.00000	-.03475874	-.00393524	.00290782						
14447.12	.1262	-.209321	.00000	-.03449123	-.00472095	.00210824						
14452.12	.1267	-.210607	.00000	-.03428106	-.00472469	.00143445						
14457.12	.1271	-.210580	.00000	-.03399916	-.00441677	.00060275						
14462.12	.1276	-.210817	.00000	-.03399916	-.004510921	.00002630						
14467.12	.1280	-.211782	.00000	-.03370884	-.00510921	-.00081864						
14472.12	.1284	-.211863	.00000	-.03346001	-.00454354	-.00145869						
14477.12	.1288	-.212677	.00000	-.03323000	-.00520478	-.00226407						
14482.12	.1292	-.213712	.00000	-.03315388	-.00501690	-.00299517						
14487.12	.1296	-.214274	.00000	-.03316565	-.00458861	.00791672						
14492.12	.1309	-.214753	.00000	-.03274326	-.00465092	.00721842						
14497.12	.1314	-.215322	.00000	-.03340871	-.00524021	.00621640						
14502.12	.1316	-.216177	.00000	-.03340452	-.00507074	.00545230						
14507.12	.1319	-.216978	.00000	-.03342760	-.00506418	.00466111						
14512.12	.1321	-.217726	.00000	-.03358276	-.00503868	.00383988						
14517.12	.1332	-.218437	.00000	-.03348598	-.00502405	.00306878						
14522.12	.1336	-.219087	.00000	-.03422218	-.00499674	.00212148						
14527.12	.1337	-.219695	.00000	-.03426195	-.00499814	.00131444						
14532.12	.1347	-.220243	.00000	-.03432087	-.00499874	.00059122						
14537.12	.1350	-.220746	.00000	-.03533705	-.00501990	.00051390						
14542.12	.1350	-.221706	.00000	-.03562258	-.00501543	.00137644						
14547.12	.1359	-.221606	.00000	-.03586281	-.00501512	-.00223188						
14552.12	.1361	-.221946	.00000	-.03713908	-.00506064	-.00330260						
14557.12	.1369	-.223097	.00000	-.03760596	-.00540232	-.00424815						
14562.12	.1371	-.223527	.00000	-.03889409	-.00489405	-.00525405						
14567.12	.1376	-.223713	.00000	-.03931774	-.00505603	-.00617406						
14572.12	.1386	-.224682	.00000	-.04080567	-.00541587	-.00732415						

\*\* ENCLOSURE 4 \*\*

AS-509 TF DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.647 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	GIMBAL DEFLECTION ANG REQUIRED PITCH CHANL (DEG)	GIMBAL DEFLECTION ANG REQUIRED YAW CHANNEL (DEG)	GIMBAL DEFLECTION ANG REQUIRED ROLL CHANNE (DEG)	EULERIAN ATTITUDE RATE IN PITCH (DEG/S)	EULERIAN ATTITUDE RATE IN YAW (DEG/S)	EULERIAN ATTITUDE RATE IN ROLL (DEG/S)
14577.12	.1386	-.224927	.000000	-.04240850	-.00494390	-.00839791
14582.12	.1393	-.225177	.000000	-.04318080	-.00488181	.00794605
14587.12	.1400	-.226707	.000000	-.04474285	-.00515705	.00678815
14592.12	.1399	-.226737	.000000	-.04692449	-.00483653	.00158496
14597.12	.1404	-.227373	.000000	-.04820761	-.00529932	.00446348
14602.12	.1412	-.228096	.000000	-.05032206	-.00515228	.00325970
14607.12	.1415	-.228730	.000000	-.05250781	-.00508434	.00203620
14612.12	.1422	-.229288	.000000	-.05524198	-.00503425	.00071761
14617.12	.1424	-.229774	.000000	-.05762193	-.00502711	-.00053895
14622.12	.1430	-.230182	.000000	-.06058371	-.00501963	-.00188970
14627.12	.1430	-.230507	.000000	-.06354748	-.00503821	-.00323634
14632.12	.1437	-.231470	.000000	-.06884630	-.00574363	-.00502873
14637.12	.1444	-.231831	.000000	-.07160939	-.00498309	-.00624968
14642.12	.1449	-.232605	.000000	-.07551131	-.00513443	-.00773599
14647.12	.1450	-.232637	.000000	-.08093876	-.00480247	.00244188
14652.12	.1458	-.233304	.000000	-.08681818	-.00509269	.00066556
14657.12	.1458	-.233964	.000000	-.09364629	-.00503970	-.00119894
14662.12	.1461	-.234513	.000000	-.10107247	-.00515557	.00257285
14667.12	.1465	-.234927	.000000	-.11343654	-.00511704	-.00001452
14672.12	.1471	-.233672	.000000	-.04130922	.00818283	.10716706
14677.12	.1475	-.236107	.000000	.02092987	.00147903	.00573178
14682.12	.1478	-.236404	.000000	.01765064	.00236199	-.00121355
14687.12	.1479	-.236975	.000000	.01692794	.00301976	-.00214372
14692.12	.1467	-.238090	.000000	.02519205	.00628191	-.00183995
14695.31	.1436	-.239144	.000000	-.00761205	-.00212027	-.00667729
1495.52	.1444	-.238933	.000000	-.00501398	-.00139781	-.00638048
14697.12	.1405	-.237176	.000000	-.00324980	.00122318	-.00629102
14702.12	.1356	-.210305	.000000	-.00020745	.00925546	-.00629102
14705.31	.1390	-.176191	.000000	.00172966	.01437629	-.00629102

6CS2  
T87  
TL1

\*\* ENCLOSURE 4 \*\*  
 AS-5C9 TRAJ DATA (METRIC UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. ZND OPP.

TIME FROM FIRST MOTION (SEC)	GIMBAL DEFLECTION ANG REQUIRED PITCH CHANL (DEG)	GIMBAL DEFLECTION ANG REQUIRED YAW CHANNEL (DEG)	GIMBAL DEFLECTION ANG REQUIRED ROLL CHANNEL (DEG)	EULERIAN ATTITUDE RATE IN PITCH (DEG/S)	EULERIAN ATTITUDE RATE IN YAW (DEG/S)	EULERIAN ATTITUDE RATE IN ROLL (DEG/S)
14705.31	.0000	.000000	.000000	.00000000	.00000000	.00000000
14715.31	.0000	.000000	.000000	.00000000	.00000000	.00000000
14726.31	.0000	.000000	.000000	.00000000	.00000000	.00000000
14737.31	.0000	.000000	.000000	.00000000	.00000000	.00000000
14748.31	.0000	.000000	.000000	.00000000	.00000000	.00000000
14759.31	.0000	.000000	.000000	.00000000	.00000000	.00000000
14770.31	.0000	.000000	.000000	.00000000	.00000000	.00000000
14781.31	.0000	.000000	.000000	.00000000	.00000000	.00000000
14792.31	.0000	.000000	.000000	.00000000	.00000000	.00000000
14803.31	.0000	.000000	.000000	.00000000	.00000000	.00000000
14814.31	.0000	.000000	.000000	.00000000	.00000000	.00000000
14825.31	.0000	.000000	.000000	.00000000	.00000000	.00000000
14836.31	.0000	.000000	.000000	.00000000	.00000000	.00000000
14846.21	.0000	.000000	.000000	.00000000	.00000000	.00000000

CVS OFF

\*\* ENCLOSURE 4 \*\*  
AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

TIME FROM FIRST MOTION (SEC)	TOTAL VEHICLE ENGINE THRUST (LR)	TOTAL VEHICLE WEIGHT (LB)	ALTITUDE ABOVE OBLATE EARTH (FT)	MAGNITUDE OF SPACE FIXED VELOCITY IN XPP SYSTEM (FT/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (FT/S <sup>2</sup> )
.00	7563493.37	6423752.87	195.4	1340.67	.00	34.211
.40	7591215.00	6412250.87	195.4	1340.68	.06	34.415
5.00	7621737.69	6279969.87	248.0	1341.22	1.33	39.120
10.00	7637245.87	6136702.87	514.9	1344.04	2.92	40.110
15.00	7655148.75	5992337.87	961.9	1347.13	4.73	41.153
20.00	7672367.87	5848583.87	1634.1	1355.73	6.73	42.233
25.00	7697555.50	5704971.87	2558.9	1370.38	8.90	43.400
30.00	7736553.31	5561445.81	3764.6	1394.09	11.22	44.694
35.00	7787631.62	5417986.37	5281.3	1426.76	13.62	46.111
40.00	7849685.00	5274547.81	7140.5	1476.21	16.05	47.650
45.00	7920170.94	5131108.81	9373.8	1538.54	18.42	49.315
50.00	7997964.87	4987651.81	12012.4	1617.47	20.64	51.096
55.00	8081015.25	4844179.81	15084.7	1714.01	22.65	52.997
60.00	8166735.44	4700700.75	18624.5	1829.06	24.39	55.064
65.00	8252146.19	4557137.75	22651.7	1962.70	25.84	57.077
69.00	8317266.62	4442046.25	26240.2	2082.52	26.77	58.480
70.00	8333978.94	4413276.75	27189.1	2114.13	26.97	58.785
75.00	8417477.37	4269411.19	32247.4	2283.14	27.78	61.143
80.00	8501623.25	4125430.75	37643.3	2472.31	28.35	64.195
85.00	8577819.25	3981668.41	44001.6	2684.18	28.68	67.451
85.37	8583155.50	3970879.47	44486.8	2701.01	28.70	67.698
90.00	8644249.50	3837720.69	50740.0	2919.85	28.77	73.841
95.00	8699309.25	3693557.66	58064.5	3179.82	28.59	74.384
100.00	8742386.25	3549196.12	65968.7	3465.13	28.19	78.131
105.00	8776036.37	3404629.37	74448.8	3774.65	27.66	82.096
110.00	8803366.50	3259866.16	83512.3	4108.60	27.07	86.244
115.00	8825529.00	3114689.91	93179.1	4466.89	26.49	90.708
120.00	8845178.37	2969714.12	103457.8	4852.81	25.81	95.496
125.00	8865177.00	2824790.87	114334.2	5267.84	25.07	100.746
130.00	8885403.37	2678603.06	125819.4	5713.20	24.36	106.555
135.00	8904285.37	2532589.53	137942.3	6191.80	23.68	113.011
140.00	891665.37	2415057.03	150596.5	6588.32	22.90	93.049
145.00	7000416.31	2300226.81	163627.2	7001.51	22.15	97.868
150.00	700992.69	2185259.03	177049.9	7442.34	21.44	103.214
155.00	7025795.19	2070065.17	190885.6	7913.68	20.76	109.230
160.00	7040141.81	1954623.69	205160.6	8418.89	20.11	115.937
164.80	6907654.69	1843547.98	219311.0	8938.38	19.53	120.622
164.81	6907654.44	1843443.33	219340.8	8939.47	19.53	120.678
165.00	4704113.50	1841471.92	219904.0	8957.96	19.50	82.258
165.58	228697.10	1836231.59	221646.4	8970.47	19.41	4.077

TBI

MACH 1

MAX Q

S-1C CECO

S-1C OECO

TB3

S-1C/S-11 SEP

AS-5C9 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

ENCLOSURE 4

TIME FROM FIRST ACTION (SEC)	TOTAL VEHICLE ENGINE THRUST (LB)	TOTAL VEHICLE WEIGHT (LB)	ALTITUDE ABOVE ORLATE EARTH (FT)	MAGNITUDE OF SPACE FIXED PATH XPP SYSTEM VELOCITY IN (FT/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (FT/S <sup>2</sup> )
S-1C/S-11 SEP	93893.11	1469464.41	221646.4	8970.47	19.41	2.045
S-1C/S-11 SEP	92792.60	1468939.16	223523.2	8965.16	19.31	2.037
S-11 ENGINE START	782538.06	1466514.47	232313.2	8951.98	18.81	17.231
S-11 MAINSTAGE	859428.83	1464681.42	234586.2	8958.17	18.69	18.942
	1134785.37	1452769.77	248726.6	9023.65	17.92	25.199
	1151068.27	1439333.73	262417.6	9103.03	17.18	25.801
	1158088.64	1425754.45	275671.7	9186.50	16.45	26.207
	1163226.11	1412092.39	288498.4	9273.60	15.75	26.579
	1166347.45	1398378.28	300905.3	9364.04	15.06	26.875
	1167752.52	1375907.27	312900.5	9458.17	14.40	27.347
	1168237.19	1353127.67	324494.1	9555.96	13.76	27.819
	1168243.86	1331944.25	325431.8	9654.16	13.71	27.843
	1168320.17	1339372.86	335693.7	9656.66	13.14	28.107
	1168389.77	1325619.73	346534.0	9756.83	12.61	28.398
	1168602.47	1311870.98	357069.8	9858.15	12.12	28.688
	1168674.44	1298124.80	367305.2	9962.48	11.64	28.994
	1167666.03	1284384.30	377242.5	10069.26	11.17	29.292
	1167478.37	1270651.70	386947.1	10178.64	10.72	29.606
	1167361.77	1256919.56	396443.0	10290.67	10.27	29.926
	1167251.58	1243189.73	405313.7	10405.32	9.84	30.254
	1167137.27	1229462.72	414112.2	10522.59	9.42	30.589
	1167149.23	1215738.84	422813.8	10642.51	9.02	30.935
	1167233.97	1202011.59	430852.6	10765.11	8.62	31.290
	1167269.64	1188286.25	438222.2	10890.39	8.24	31.652
	1167914.20	1174557.89	44627.6	11018.42	7.86	32.040
	1168561.77	1160822.37	453972.9	11149.26	7.50	32.437
	1168790.97	1147081.20	461162.0	11282.93	7.15	32.832
	1168878.70	1133339.20	468100.2	11419.41	6.82	33.233
	1168932.91	1119597.20	474790.6	11558.71	6.49	33.642
	1168835.08	1105855.41	481238.5	11700.83	6.17	34.057
	1168722.09	1092115.52	487447.9	11845.80	5.87	34.482
	1168615.09	1078377.53	493423.8	11993.64	5.57	34.918
	1168494.27	1064640.89	499170.8	12144.40	5.29	35.365
	1168477.78	1050905.33	504693.4	12298.12	5.01	35.827
	1168447.02	1037170.57	509996.3	12454.86	4.75	36.301
	1168435.42	1023436.05	515045.3	12614.66	4.49	36.787
	1168402.22	1009702.01	51963.9	12777.58	4.25	37.287
	1168345.47	995968.50	524637.8	12943.66	4.02	37.799
	1168261.11	982236.12	529111.9	13112.96	3.79	38.325
	1168127.05	968504.84	53390.7	13286.53	3.57	38.864
	1168000.14	954775.34	537480.1	13461.42	3.37	39.418
	1168010.37	941046.70	541388.1	13640.71	3.17	39.994

INITIATE 16M



TIME FROM FIRST MOTION (SEC)	TOTAL VEHICLE ENGINE THRUST (LB)	TOTAL VEHICLE WEIGHT (LB)	ALTITUDE ABOVE OBLATE EARTH (FT)	MAGNITUDE OF SPACE FIXED VELOCITY IN XPP SYSTEM (FT/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (FT/SEC <sup>2</sup> )
360.00	116022.22	927317.50	545111.3	13823.49	2.98	40.586
365.00	116039.62	913588.18	548663.5	14009.82	2.80	41.197
370.00	116050.27	899858.79	552047.9	14199.83	2.63	41.824
375.00	116065.02	886129.27	555249.0	14393.56	2.47	42.471
380.00	116084.91	872401.61	558333.1	14591.07	2.31	43.136
385.00	116099.19	858674.38	561246.5	14792.47	2.17	43.822
390.00	116121.42	844947.84	564015.1	14997.86	2.03	44.531
395.00	116159.27	831222.79	566644.7	15207.33	1.90	45.262
400.00	116190.86	817498.79	569142.1	15420.99	1.77	46.017
405.00	116225.92	803776.12	571513.7	15638.96	1.66	46.798
410.00	116265.19	790054.75	573766.4	15861.35	1.55	47.607
415.00	116318.67	776334.31	575996.5	16088.30	1.45	48.444
420.00	116375.78	762614.97	57941.7	16319.94	1.36	49.312
425.00	116437.16	748896.30	579878.8	16556.42	1.28	50.211
430.00	116503.02	735178.99	581725.7	16797.89	1.20	51.144
435.00	116573.11	721463.24	583489.6	17044.50	1.13	52.108
440.00	116652.42	707749.20	585179.2	17296.40	1.07	53.109
445.00	116730.87	694037.46	586802.6	17553.78	1.01	54.150
450.00	116813.11	680327.84	588368.0	17816.83	.96	55.232
455.00	116902.50	666619.52	589884.5	18085.74	.92	56.357
460.00	116999.89	652909.87	591362.0	18360.73	.88	57.528
465.00	117103.00	642459.38	592467.4	18630.77	.86	58.740
470.00	92952.61	639832.34	592808.0	18898.31	.85	60.030
475.00	925125.91	628810.99	594186.1	19163.99	.78	61.730
480.00	851632.79	618161.67	595498.5	19429.47	.75	63.426
485.00	804331.04	608539.34	596786.0	19694.77	.73	65.181
490.00	799805.22	599192.37	598031.5	19949.77	.69	66.963
495.00	798929.30	589872.80	599238.8	19702.56	.67	68.769
500.00	798327.20	580554.49	600423.4	19913.95	.65	70.602
505.00	797752.70	571246.49	601586.5	20129.42	.63	72.460
510.00	797164.66	561942.93	602728.0	20348.97	.61	74.344
515.00	796569.47	552646.51	603852.9	20572.16	.60	76.248
520.00	795942.30	543357.09	604967.4	20799.33	.59	78.163
525.00	795308.94	534075.11	606079.4	21030.57	.58	80.090
530.00	794640.27	524800.43	607197.1	21266.01	.58	82.034
535.00	793935.69	515534.13	608329.4	21505.75	.59	84.000
540.00	793167.23	506276.20	609485.1	21749.91	.61	86.080
545.00	792312.90	497027.77	610673.2	21998.62	.62	88.274
550.00	791286.98	487790.44	611903.7	22251.97	.64	90.584
555.00	789918.24	478567.17	613185.3	22510.03	.67	93.010
560.00	787353.33	469364.77	614529.4	22772.73	.68	95.554
565.66	783567.82	466308.47	614992.8	22861.10	.68	98.214

S-11 CECO

S-11 OECO

.. ENCLOSURE 4 ..

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

TIME FROM FIRST MOTION (SEC)	TOTAL VEHICLE ENGINE THRUST (LB)	TOTAL VEHICLE WEIGHT (LB)	ALTITUDE ABOVE OBLATE EARTH (FT)	MAGNITUDE OF SPACE FIXED VELOCITY IN XPP SYSTEM (FT/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (FT/S <sup>2</sup> )
704	556.67	783587.02	466305.60	614995.5	22061.03	.68
S-11/S-1VB SEP	557.78	22552.07	465994.59	615295.3	22072.93	.67

\*\* ENCLOSURE 4 \*\*  
AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

TIME FROM FIRST MOTION (SEC)	TOTAL VEHICLE ENGINE THRUST (LB)	TOTAL VEHICLE WEIGHT (LB)	ALTITUDE ABOVE OBLATE EARTH (FT)	MAGNITUDE OF SPACE FIXED VELOCITY IN XPP SYSTEM (FT/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (FT/S**2)
S-11/S-1VB SEP	5898.04	36655.61	615295.3	22872.93	.67	.592
S-1VB ENGINE START	5873.45	366537.29	615302.0	22872.94	.67	.590
	602.23	366471.43	615901.2	22873.35	.64	.534
S-1VB MAINSTAGE	180459.84	366079.89	616729.8	22888.23	.59	15.860
	190872.86	365327.38	617147.5	22915.72	.58	16.810
	195612.45	363351.50	618191.4	22989.83	.55	17.321
S-1VB ULLAGE JETT	195788.69	362975.34	618310.0	22996.68	.54	17.354
	197729.29	360660.10	619394.7	23084.07	.50	17.639
	199084.05	358325.88	620399.0	23170.75	.46	17.876
	199021.94	355985.30	621328.5	23258.52	.42	17.988
	199133.41	353645.02	622181.7	23347.10	.38	18.117
	199027.20	351304.60	622961.4	23436.44	.35	18.228
	199588.45	348962.48	623669.8	23526.58	.31	18.402
	199691.00	346617.78	624309.0	23617.61	.28	18.480
	199890.01	344277.75	624882.9	23709.18	.25	18.595
	199498.01	341937.11	625393.9	23801.50	.22	18.771
	199017.19	339593.41	625845.4	23894.79	.19	18.855
	199023.73	337252.91	626240.6	23988.59	.16	18.987
	199047.33	334914.04	626582.4	24083.16	.14	19.122
	199096.02	332575.00	626875.0	24178.50	.11	19.261
	199149.56	330235.90	627121.7	24274.63	.09	19.402
	199192.11	32796.04	627326.1	24371.55	.07	19.545
	199339.87	32552.50	627492.0	24469.45	.06	19.760
	199472.46	323206.80	627623.8	24568.20	.04	19.857
	199465.47	320865.21	627724.3	24667.59	.03	20.001
	199468.02	318524.02	627797.7	24767.74	.02	20.148
	199472.51	316183.32	627849.0	24868.69	.01	20.297
	199481.17	313842.86	627879.7	24970.47	.00	20.450
	199492.87	311502.56	627980.2	25073.10	.00	20.605
	199491.03	309162.56	627861.1	25176.51	.02	20.761
	199486.08	306822.86	627833.2	25280.69	.02	20.918
	199468.47	304483.57	627805.9	25385.64	.02	21.077
	199452.91	302144.81	627789.3	25491.33	.01	21.239
S-1VB GCS1	199439.12	300580.56	627789.1	25562.46	.00	21.348
T85	57937.06	300480.46	627789.3	25566.53	.00	6.204
	1028.45	300453.38	627792.2	25567.62	.00	.110
	141.81	300453.21	627800.2	25567.70	.00	.015
EPO1	141.81	300453.21	627804.7	25567.74	.00	.015

\*\* ENCLOSURE 4 \*\*

A5-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	TOTAL VEHICLE ENGINE THRUST (LB)	TOTAL VEHICLE WEIGHT (LB)	ALTITUDE ABOVE OBLATE EARTH (FT)	MAGNITUDE OF SPACE FIXED VELOCITY IN XPP SYSTEM (FT/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (FT/S**2)
713.12	141.81	300453.21	627810.6	25567.73	-0.00	.015
722.12	141.81	300447.78	627811.9	25567.87	-0.00	.015
732.12	141.81	300441.45	627814.3	25568.02	-0.00	.015
743.12	141.81	300434.47	627810.2	25568.19	-0.00	.015
754.12	141.81	300427.51	627797.7	25568.37	-0.00	.015
765.12	216.02	300419.33	627778.2	25568.57	-0.00	.023
776.12	212.47	300407.22	627751.2	25568.84	-0.00	.023
787.12	208.92	300395.11	627716.5	25569.11	-0.00	.022
798.12	64.78	300388.34	627674.9	25569.27	-0.00	.007
844.12	57.30	300370.26	627424.2	25569.73	-0.00	.006
932.12	42.99	300335.65	626612.5	25570.70	-0.00	.005
1020.12	39.50	300301.03	625384.9	25571.82	-0.00	.004
1108.12	39.50	300266.42	623601.1	25573.14	-0.00	.004
1196.12	39.50	300231.80	621919.9	25574.63	-0.00	.004
1284.12	39.39	300197.19	619818.3	25576.26	-0.00	.004
1372.12	39.26	300162.57	617580.4	25577.96	-0.20	.004
1460.12	39.14	300127.96	615294.5	25579.70	-0.00	.004
1548.12	39.02	300093.34	613051.0	25581.43	-0.00	.004
1636.12	38.89	300058.73	610938.7	25583.09	-0.01	.004
1724.12	38.79	300021.81	609040.1	25584.65	-0.01	.004
1812.12	38.76	299977.35	607428.8	25586.06	-0.01	.004
1900.12	38.72	299932.89	606168.4	25587.28	-0.01	.004
1988.12	38.27	299888.43	605304.3	25588.29	-0.01	.004
2076.12	37.14	299843.96	604674.7	25589.05	-0.01	.004
2164.12	36.09	299799.50	604890.1	25589.56	-0.01	.004
2252.12	35.01	299757.95	605349.4	25589.79	-0.01	.004
2340.12	33.93	299718.76	606234.2	25589.77	-0.01	.004
2428.12	32.86	299679.58	607509.6	25589.49	-0.00	.003
2516.12	31.79	299640.39	609126.1	25588.98	-0.00	.003
2604.12	30.71	299601.21	611022.4	25588.26	-0.00	.003
2692.12	29.64	299562.02	613124.7	25587.35	.00	.003
2780.12	28.66	299522.83	615369.7	25586.30	.00	.003
2868.12	27.69	299483.64	617646.5	25585.13	.01	.003
2956.12	26.72	299444.45	619943.0	25583.88	.01	.003
3044.12	25.75	299405.26	622124.7	25582.59	.01	.003
3132.12	24.79	299366.07	624147.4	25581.24	.02	.003
3220.12	23.85	299326.88	625954.7	25579.99	.02	.003
3308.12	23.06	299287.69	627504.9	25578.74	.03	.002
3396.12	22.34	299248.50	628665.7	25577.65	.03	.002
3476.12	21.85	299213.34	629455.7	25576.52	.03	.002
3544.12	20.75	299287.19	630345.3	25575.47	.04	.002
3632.12	19.96	299261.04	630749.9	25574.49	.04	.002

\*\* ENCLOSURE 4 \*\*  
AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM MOTION (SEC)	TOTAL ENGINE THRUST (LB)	TOTAL VEHICLE WEIGHT (LB)	ALTITUDE ABOVE ORLATE EARTH (FT)	MAGNITUDE OF SPACE FIXED VELOCITY IN XPP SYSTEM (FT/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (FT/SEC <sup>2</sup> )
3740.12	19.30	299237.82	630898.5	25573.59	.04	.002
3828.13	18.80	299218.71	630832.1	25572.75	.04	.002
3916.12	18.31	299199.61	630602.6	25571.96	.04	.002
4004.12	17.82	299180.51	630269.0	25571.21	.04	.002
4092.12	17.32	299161.40	629895.8	25570.48	.04	.002
4180.12	16.83	299142.30	629548.7	25569.75	.04	.002
4268.12	16.44	299123.20	629290.5	25568.99	.04	.002
4356.12	16.09	299104.05	629111.2	25568.20	.04	.002
4444.12	15.74	299084.99	629270.8	25567.35	.04	.002
4532.12	15.39	299065.88	629601.0	25566.45	.03	.002
4620.12	15.03	299046.79	630197.9	25565.48	.03	.002
4708.12	14.70	299027.68	631076.9	25564.45	.03	.002
4796.12	14.66	299008.57	632235.1	25563.37	.02	.002
4884.12	14.63	298989.47	633655.1	25562.25	.02	.002
4972.12	14.59	298970.36	635304.7	25561.10	.01	.002
5060.12	14.56	298951.26	637144.0	25559.96	.01	.002
5148.12	14.52	298932.15	639109.0	25558.85	.00	.002
5236.12	14.53	298913.05	641135.6	25557.81	.00	.002
5324.12	14.62	298893.94	643150.4	25556.86	.01	.002
5412.12	14.71	298874.84	645077.3	25556.05	.01	.002
5500.12	14.80	298855.73	646839.1	25555.40	.01	.002
5588.12	14.88	298836.62	648362.0	25554.95	.01	.002
5676.12	14.97	298817.52	649579.6	25554.72	.01	.002
5764.12	15.06	298797.62	650433.5	25554.73	.01	.002
5852.12	15.15	298777.37	650878.6	25555.01	.02	.002
5940.12	15.24	298757.11	650884.0	25555.55	.02	.002
6028.12	15.32	298736.86	650434.3	25556.36	.02	.002
6116.12	15.41	298716.60	649530.2	25557.43	.02	.002
6204.12	15.50	298696.35	648191.2	25558.75	.02	.002
6292.12	15.52	298676.09	646451.1	25560.29	.02	.002
6372.12	15.53	298657.68	644564.3	25561.86	.02	.002
6460.12	15.55	298637.43	642211.3	25563.73	.02	.002
6548.12	15.57	298617.17	639640.7	25565.71	.02	.002
6636.12	15.59	298596.91	636934.7	25567.76	.02	.002
6724.12	15.59	298577.28	634142.9	25569.83	.02	.002
6812.12	15.53	298559.67	631474.0	25571.87	.02	.002
6900.12	15.48	298542.05	628904.2	25573.83	.02	.002
6988.12	15.43	298524.44	626551.4	25575.66	.02	.002
7076.12	15.38	298506.83	624495.2	25577.32	.02	.002
7164.12	15.32	298489.22	622800.6	25578.77	.01	.002
7252.12	15.24	298471.61	621520.0	25579.98	.01	.002
7340.12	15.14	298454.00	620689.2	25580.93	.01	.002

\*\* ENCLOSURE 4 \*\*  
AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	TOTAL VEHICLE ENGINE THRUST (LB)	TOTAL VEHICLE WEIGHT (LB)	ALTITUDE ABOVE ORLATE EARTH (FT)	MAGNITUDE OF SPACE FIXED VELOCITY IN XPP SYSTEM (FT/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (FT/S**2)
7428.12	15.03	298436.38	620327.9	25581.60	-0.01	0.002
7516.12	14.92	298416.77	620437.6	25581.98	-0.01	0.002
7604.12	14.82	298401.16	621003.1	25582.08	-0.01	0.002
7692.12	14.71	298383.55	621992.5	25581.91	-0.01	0.002
7780.12	14.44	298368.23	623359.6	25581.48	-0.01	0.002
7868.12	14.14	298353.26	625044.7	25580.82	-0.00	0.001
7956.12	13.84	298338.29	626979.0	25579.95	-0.00	0.001
8044.12	13.54	298323.32	629086.5	25578.91	0.00	0.001
8132.12	13.24	298308.35	631287.9	25577.74	0.00	0.001
8220.12	12.94	298293.38	633603.9	25576.46	0.01	0.001
8308.12	12.62	298278.41	635658.8	25575.12	0.01	0.001
8396.12	12.31	298263.44	637683.1	25573.76	0.02	0.001
8484.12	12.12	298254.59	638792.2	25572.95	0.02	0.001
8459.12	12.08	298252.72	639016.4	25572.77	0.02	0.001
8460.12	12.08	298252.55	639036.7	25572.76	0.02	0.001

TIME BASE 4

\*\* ENCLOSURE 4 \*\*  
AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	TOTAL VEHICLE ENGINE THRUST (LB)	TOTAL VEHICLE WEIGHT (LB)	ALTITUDE ABOVE ORBITAL EARTH (FT)	MAGNITUDE OF SPACE FIXED VELOCITY IN XPP SYSTEM (FT/SEC)	SPACE FIXED PATH ANGLE (DEG)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (FT/S**2)
0460.12	12.08	298252.55	639036.7	25572.76	.02	.02	.001
0465.12	12.08	298251.76	639137.7	25572.68	.02	.02	.001
0470.12	12.08	298250.98	639238.0	25572.61	.02	.02	.001
0475.12	12.08	298250.19	639337.7	25572.53	.02	.02	.001
0480.12	12.08	298249.40	639436.5	25572.45	.02	.02	.001
0485.12	12.08	298248.62	639534.7	25572.37	.02	.02	.001
0490.12	12.08	298247.83	639632.1	25572.30	.02	.02	.001
0495.12	12.08	298247.04	639729.1	25572.22	.02	.02	.001
0500.12	12.08	298246.26	639825.3	25572.14	.02	.02	.001
0502.12	14.16	298245.94	639863.4	25572.11	.02	.02	.002
0502.32	8.54	298245.91	639867.3	25572.11	.02	.02	.001
0505.12	8.33	298245.81	639920.6	25572.06	.02	.02	.001
0510.12	12.81	298245.64	640015.2	25571.99	.02	.02	.001
0515.12	13.33	298245.46	640108.9	25571.91	.02	.02	.001
0520.12	13.84	298245.29	640201.8	25571.83	.02	.02	.001
0525.12	14.36	298245.11	640293.8	25571.76	.02	.02	.002
0530.12	14.88	298244.93	640385.3	25571.68	.02	.02	.002
0535.12	15.39	298244.75	640475.7	25571.61	.02	.02	.002
0540.12	15.91	298244.58	640565.1	25571.53	.02	.02	.002
0545.12	16.43	298244.41	640653.7	25571.46	.02	.02	.002
0550.12	16.95	298244.23	640741.5	25571.39	.02	.02	.002
0555.12	17.46	298244.05	640828.6	25571.31	.02	.02	.002
0560.12	17.98	298243.87	640914.5	25571.24	.02	.02	.002
0565.12	18.50	298243.70	641000.0	25571.17	.02	.02	.002
0570.12	19.01	298243.52	641083.9	25571.10	.02	.02	.002
0575.12	19.53	298243.34	641167.6	25571.03	.02	.02	.002
0580.12	20.05	298243.17	641249.8	25570.96	.02	.02	.002
0585.12	20.57	298242.99	641331.0	25570.89	.03	.03	.002
0590.12	21.08	298242.82	641411.8	25570.82	.03	.03	.002
0595.12	21.60	298242.64	641491.5	25570.75	.03	.03	.002
0600.12	22.12	298242.46	641570.1	25570.68	.03	.03	.002
0605.12	22.63	298242.29	641648.2	25570.61	.03	.03	.002
0610.12	23.15	298242.11	641725.1	25570.55	.03	.03	.002
0615.12	23.67	298241.94	641801.0	25570.48	.03	.03	.003
0620.12	24.18	298241.76	641876.4	25570.41	.03	.03	.003
0625.12	24.70	298241.59	641950.5	25570.35	.03	.03	.003
0630.12	25.22	298241.41	642023.7	25570.28	.03	.03	.003
0635.12	25.74	298241.23	642096.2	25570.22	.03	.03	.003
0640.12	26.25	298241.06	642167.6	25570.15	.03	.03	.003
0645.12	26.77	298240.88	642238.4	25570.09	.03	.03	.003
0650.12	27.29	298240.71	642308.3	25570.02	.03	.03	.003
0655.12	27.78	298240.53	642377.0	25569.96	.03	.03	.003

D2/H2 BURNER ON  
ENGINE OFF

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	TOTAL VEHICLE ENGINE THRUST (LB)	TOTAL VEHICLE WEIGHT (LB)	ALTITUDE ABOVE OBLATE EARTH (FT)	MAGNITUDE OF SPACE FIXED VELOCITY IN XPP SYSTEM (FT/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (FT/S**2)
8660.12	28.25	298240.35	642445.0	25569.90	.03	.003
8665.12	28.73	298240.18	642511.9	25569.83	.03	.003
8670.12	29.21	298240.00	642577.9	25569.77	.03	.003
8675.12	29.68	298239.82	642642.9	25569.71	.03	.003
8680.12	30.16	298239.65	642707.3	25569.65	.03	.003
8685.12	30.63	298239.47	642770.5	25569.59	.03	.003
8690.12	31.11	298239.30	642832.6	25569.53	.03	.003
8695.12	31.58	298239.12	642893.9	25569.47	.03	.003
8700.12	32.06	298238.95	642954.2	25569.41	.03	.003
8705.12	32.53	298238.77	643013.9	25569.35	.03	.003
8710.12	33.01	298238.59	643072.1	25569.29	.03	.003
8715.12	33.49	298238.41	643129.5	25569.24	.03	.003
8720.12	33.96	298238.24	643186.3	25569.18	.03	.003
8725.12	34.44	298238.07	643241.9	25569.12	.03	.003
8730.12	34.91	298237.89	643296.4	25569.07	.03	.003
8735.12	35.39	298237.71	643350.1	25569.01	.03	.003
8740.12	35.86	298237.54	643402.8	25568.96	.03	.003
8745.12	36.34	298237.36	643454.7	25568.90	.03	.003
8750.12	36.81	298237.18	643505.2	25568.85	.03	.003
8755.12	37.28	298237.01	643555.4	25568.79	.03	.003
8760.12	37.76	298236.83	643604.0	25568.74	.03	.003
8765.12	38.23	298236.65	643652.0	25568.69	.03	.003
8770.12	38.70	298236.48	643699.3	25568.63	.03	.003
8775.12	39.18	298236.30	643745.1	25568.58	.03	.003
8780.12	39.65	298236.13	643790.6	25568.53	.03	.003
8785.12	40.13	298235.95	643834.7	25568.48	.03	.003
8790.12	40.60	298235.77	643878.2	25568.43	.03	.003
8795.12	41.08	298235.60	643920.4	25568.38	.03	.003
8800.12	41.55	298235.42	643961.8	25568.33	.03	.003
8805.12	42.03	298235.25	644002.0	25568.28	.03	.003
8810.12	42.50	298235.07	644041.6	25568.23	.03	.003
8815.12	42.98	298234.90	644080.5	25568.18	.03	.003
8820.12	43.45	298234.72	644118.1	25568.13	.03	.003
8825.12	43.93	298234.54	644155.0	25568.08	.03	.003
8830.12	44.40	298234.37	644191.1	25568.03	.03	.003
8835.12	44.88	298234.19	644226.1	25567.98	.03	.003
8840.12	45.35	298234.02	644259.8	25567.93	.03	.003
8845.12	45.83	298233.84	644293.2	25567.88	.03	.003
8850.12	46.30	298233.66	644325.6	25567.83	.03	.003
8855.12	46.78	298233.48	644356.7	25567.78	.03	.003
8860.12	47.25	298233.31	644387.5	25567.73	.03	.003
8865.12	47.73	298233.14	644417.2	25567.69	.03	.003



\*\* ENCLOSURE 4 \*\*  
 AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 157 OPP.

TIME FROM FIRST MOTION (SECI)	TOTAL VEHICLE ENGINE THRUST (LRI)	TOTAL VEHICLE WEIGHT (LBI)	ALTITUDE ABOVE OBLATE EARTH (FT)	MAGNITUDE OF SPACE FIXED VELOCITY IN XPP SYSTEM (FT/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (FT/S**2)
8870.12	37.50	298232.96	644445.9	25567.64	.04	.004
8875.12	37.50	298232.78	644473.8	25567.59	.04	.004
8880.12	37.50	298232.61	644500.5	25567.54	.04	.004
8885.12	37.50	298232.43	644527.1	25567.50	.04	.004
8890.12	37.50	298232.25	644552.4	25567.45	.04	.004
8895.12	37.50	298232.08	644576.6	25567.40	.04	.004
8900.12	37.50	298231.90	644600.4	25567.36	.04	.004
8905.12	37.50	298231.73	644623.3	25567.31	.04	.004
8910.12	37.50	298231.55	644645.0	25567.26	.04	.004
8915.12	37.50	298231.37	644666.4	25567.22	.04	.004
8920.12	37.50	298231.20	644686.7	25567.17	.04	.004
8925.12	37.50	298231.02	644706.4	25567.13	.04	.004
8930.12	37.50	298230.84	644725.0	25567.08	.04	.004
8935.12	37.50	298230.67	644743.3	25567.03	.04	.004
8940.12	37.50	298230.49	644760.9	25566.99	.04	.004
8945.12	37.50	298230.32	644777.3	25566.94	.04	.004
8950.12	37.50	298230.14	644793.1	25566.90	.04	.004
8955.12	37.50	298229.96	644807.9	25566.85	.04	.004
8960.12	175.37	298229.92	644811.8	25566.84	.04	.019
8965.12	137.87	298229.65	644813.2	25566.84	.04	.015
8970.12	137.87	298229.97	644822.2	25566.85	.04	.015
8975.12	137.87	298229.33	644835.7	25566.86	.04	.015
8980.12	137.87	298229.70	644848.7	25566.87	.04	.015
8985.12	137.87	298229.07	644860.4	25566.88	.04	.015
8990.12	137.87	298217.44	644871.8	25566.89	.04	.015
8995.12	137.87	298214.80	644882.7	25566.90	.04	.015
9000.12	137.87	298212.17	644892.3	25566.91	.04	.015
9005.12	137.87	298209.54	644901.8	25566.92	.04	.015
9010.12	137.87	298206.90	644910.6	25566.93	.04	.015
9015.12	137.87	298204.27	644918.2	25566.94	.04	.015
9020.12	137.87	298201.64	644925.8	25566.95	.04	.015
9025.12	137.87	298199.00	644932.5	25566.96	.04	.015
9030.12	137.87	298196.37	644938.5	25566.97	.04	.015
9035.12	137.87	298193.74	644944.0	25566.98	.04	.015
9040.12	137.87	298191.11	644948.7	25566.99	.04	.015
9045.12	647.63	298184.20	644951.2	25567.10	.04	.070
9050.12	1079.38	298177.51	644952.6	25567.27	.04	.116
9055.12	1727.00	298167.30	644955.1	25567.68	.04	.186
9060.12	151729.47	297901.05	644956.3	25578.81	.04	16.367
9065.12	145216.65	297834.48	644956.7	25587.44	.04	17.848
9070.12	171356.75	296284.33	644960.6	25660.92	.05	18.607
9075.12	171542.68	296090.56	644961.4	25670.22	.05	18.690

ULLAGE IGNITION  
 02/M2 BURNER OFF

J-2 F-L INI  
 ULL CUT OFF

REIGN

908 THR  
 16M INI

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP. 00 ENCLOSURE 4 00

TIME FROM FIRST MOTION (SEC)	TOTAL VEHICLE ENGINE THRUST (LB)	TOTAL VEHICLE WEIGHT (LB)	ALTITUDE ABOVE EARTH (FT)	MAGNITUDE OF SPACE FIXED VELOCITY IN XPP SYSTEM (FT/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (FT/S <sup>2</sup> )
9050.12	173538.29	294094.62	644979.1	25764.13	.05	18.985
9055.12	175777.65	292067.03	644994.0	25859.57	.04	19.343
9060.12	177142.01	290013.95	644978.9	25956.77	.03	19.652
9065.12	177589.24	287950.51	644944.6	26055.12	.02	19.843
9070.12	177772.36	285803.34	644895.2	26154.36	.02	20.007
9075.12	177816.35	283813.11	644834.4	26254.41	.02	20.156
9080.12	177814.41	281746.73	644775.9	26355.23	.02	20.305
9085.12	177814.82	279678.42	644720.9	26456.80	.02	20.456
9090.12	177796.98	277609.93	644679.1	26559.13	.03	20.606
9095.12	177754.70	275541.79	644658.6	26662.22	.04	20.756
9100.12	177758.69	273474.14	644666.6	26766.04	.06	20.913
9105.12	177826.54	271406.00	644711.7	26870.67	.07	21.080
9110.12	177906.92	269337.45	64482.3	26976.11	.10	21.252
9115.12	178007.62	267268.21	644946.3	27082.39	.12	21.429
9120.12	178102.87	265198.19	645152.4	27189.80	.15	21.607
9125.12	178190.57	263127.28	645429.4	27297.45	.18	21.788
9130.12	178253.17	261055.92	645785.6	27406.24	.21	21.969
9135.12	178285.72	258984.43	646230.1	27515.84	.25	22.149
9140.12	178318.70	256912.93	646772.7	27626.26	.30	22.331
9145.12	178331.12	254841.07	647422.3	27737.89	.34	22.514
9150.12	178365.60	252769.44	648188.1	27849.54	.38	22.703
9155.12	178404.42	250697.66	649079.7	27962.42	.44	22.896
9160.12	178434.84	248625.68	650107.2	28076.14	.50	23.091
9165.12	178437.56	246553.77	651280.5	28190.68	.56	23.285
9170.12	178423.91	244482.14	652609.1	28306.03	.62	23.481
9175.12	178401.44	242411.17	654103.9	28422.23	.69	23.679
9180.12	199550.17	240110.32	655774.9	28551.51	.76	23.879
9185.12	199508.95	237771.68	657633.5	28683.76	.83	24.086
9190.12	199464.75	235432.31	659691.0	28817.11	.91	24.298
9195.12	199414.87	233093.46	661958.7	28951.58	.99	24.525
9200.12	199373.40	230755.47	664488.8	29087.17	1.08	24.768
9205.12	199343.52	228418.20	667173.1	29223.92	1.17	25.028
9210.12	199311.55	226081.36	670143.9	29361.83	1.26	25.304
9215.12	199280.21	223745.01	673373.3	29500.97	1.36	25.656
9220.12	199262.78	221409.16	676879.3	29641.30	1.46	26.056
9225.12	199264.50	219073.18	680673.2	29782.88	1.57	26.525
9230.12	199259.19	216737.54	684768.1	29925.73	1.68	27.079
9235.12	199238.96	214402.12	689176.9	30069.86	1.79	27.728
9240.12	199217.68	212067.08	693911.4	30215.29	1.91	28.484
9245.12	199194.95	209732.17	698985.4	30362.05	2.03	29.357
9250.12	199172.12	207397.54	704412.1	30510.16	2.16	30.358
9255.12	199149.01	205063.12	710204.6	30659.65	2.29	31.496

ENCLOSURE 4

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH#72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	TOTAL ENGINE THRUST (LB)	TOTAL VEHICLE WEIGHT (LB)	ALTITUDE ABOVE OBLATE EARTH (FT)	MAGNITUDE OF SPACE FIXED XPP SYSTEM (FT/SEC)	SPACE PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (FT/S <sup>2</sup> )
9260.12	199125.92	202728.99	716376.3	30810.56	2.42	31.602
9265.12	199102.83	200395.25	722941.5	30962.90	2.56	31.966
9270.12	199079.46	198061.91	729913.7	31116.72	2.70	32.339
9275.12	199048.25	195728.79	737364.8	31272.04	2.84	32.719
9280.12	199017.04	193396.13	745135.5	31428.90	2.99	33.109
9285.12	198985.83	191063.71	753413.9	31587.34	3.14	33.508
9290.12	198954.34	188731.68	762186.5	31747.40	3.30	33.916
9295.12	198922.47	186400.22	771378.2	31909.11	3.45	34.335
9300.12	198890.56	184069.18	781093.1	32072.53	3.62	34.764
9305.12	198858.63	181738.36	791316.6	32237.73	3.78	35.205
9310.12	198799.02	179408.10	802063.9	32404.66	3.95	35.651
9315.12	198722.50	177079.61	813349.1	32573.25	4.12	36.070
9320.12	198649.39	174751.76	825167.8	32743.71	4.30	36.544
9325.12	198555.67	172424.22	837594.9	32916.13	4.48	37.031
9330.12	198421.24	170097.26	850585.2	33090.55	4.66	37.531
9335.12	198381.65	167770.90	864174.7	33267.05	4.84	38.044
9340.12	198341.72	165444.96	878377.8	33445.68	5.03	38.571
9345.12	198300.68	163119.51	893209.7	33626.51	5.22	39.113
9350.12	198259.29	160794.57	908684.8	33809.61	5.42	39.670
9355.12	198207.27	158470.02	924817.9	33995.04	5.61	40.241
9360.12	198154.43	156146.24	941623.6	34182.69	5.81	40.829
9365.12	198100.63	153823.17	959115.4	34373.21	6.01	41.434
9370.12	198044.29	151500.62	977295.4	34568.92	6.20	42.058
9375.12	197980.68	149179.02	996151.6	34761.26	6.39	42.699
9380.12	197913.00	146858.06	1015707.2	34959.45	6.59	43.359
9385.12	197842.22	144538.15	1035987.9	35160.55	6.80	44.039
9390.12	197767.40	142219.07	1057030.6	35364.65	7.01	44.740
9393.76	197739.11	140532.36	1072810.6	35515.10	7.16	45.271
9393.97	57498.68	140424.11	1073734.6	35522.88	7.17	45.174
9395.12	2885.56	140396.27	1078028.5	35520.87	7.23	45.593
9400.12	.00	140394.62	1101353.1	35502.48	7.45	46.000
9403.76	.00	140374.62	1118169.9	35488.68	7.61	46.000

6CS2  
T87  
TL1

.. ENCLOSURE 4 ..

AS-809 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OFF.

TIME FROM FIRST MOTION (SEC)	TOTAL VEHICLE ENGINE THRUST (LB)	TOTAL VEHICLE WEIGHT (LB)	ALTITUDE ABOVE OBLATE EARTH (FT)	MAGNITUDE OF SPACE FIXED VELOCITY IN XPP SYSTEM (FT/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (FT/S**2)
9403.76	32.11	140385.31	1118169.9	35488.63	7.61	.007
9413.76	32.11	140375.29	1166246.5	35449.37	8.06	.007
9424.76	32.11	140364.27	1222240.0	35403.75	8.66	.007
9435.76	32.11	140353.24	1281459.5	35355.71	9.05	.007
9446.76	32.11	140342.22	1343871.2	35305.28	9.53	.007
9457.76	32.11	140331.20	1409438.1	35252.54	10.02	.007
9468.76	32.11	140320.18	1478122.7	35197.55	10.60	.007
9479.76	32.11	140309.16	1549886.4	35140.37	10.97	.007
9490.76	32.11	140298.14	1624609.3	35081.06	11.45	.007
9501.76	32.11	140287.12	1702491.2	35019.69	11.92	.007
9512.76	32.11	140276.09	1783248.2	34956.32	12.39	.007
9523.76	32.11	140265.07	1866918.7	34891.04	12.86	.007
9534.76	32.11	140254.05	1953458.0	34823.89	13.31	.007
9544.66	32.11	140244.13	2033759.0	34761.92	13.73	.007

CVS OFF

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

ENCLOSURE 4

TIME FROM FIRST MOTION (SFC)	RADIAL DISTANCE OF THE C G (FT)	MAGNITUDE OF THE EARTH FIXED VELOCITY (FT/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON OBLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (NM)
.00	2090953.75	.000	28.6084	-80.60	.00
.40	2090953.75	1.329	28.6084	-80.60	.00
5.00	20910026.75	31.216	28.6084	-80.60	.00
10.00	20910273.50	68.763	28.6084	-80.60	.00
15.00	20910720.50	111.271	28.6083	-80.60	.01
20.00	20911392.75	158.990	28.6082	-80.60	.01
25.00	20912317.50	212.485	28.6081	-80.60	.02
30.00	20913523.25	272.514	28.6082	-80.60	.03
35.00	20915039.75	339.997	28.6082	-80.60	.04
40.00	20916898.75	415.951	28.6084	-80.60	.11
45.00	20919131.75	501.490	28.6088	-80.60	.19
50.00	20921769.75	597.777	28.6094	-80.60	.31
55.00	20924843.00	705.945	28.6103	-80.60	.49
60.00	20928379.50	827.242	28.6115	-80.59	.73
65.00	20932405.00	962.263	28.6131	-80.59	1.05
69.00	20935992.00	1090.363	28.6147	-80.58	1.37
70.00	20936940.50	1111.118	28.6152	-80.58	1.46
75.00	20941995.75	1273.744	28.6178	-80.57	1.97
80.00	20947588.50	1454.250	28.6211	-80.56	2.61
85.00	20953742.50	1656.064	28.6251	-80.54	3.39
85.37	20954227.50	1672.030	28.6254	-80.54	3.46
90.00	20960476.00	1879.100	28.6299	-80.53	4.33
95.00	20967794.50	2124.669	28.6354	-80.51	5.45
100.00	20975691.75	2393.902	28.6424	-80.48	6.77
105.00	20984163.75	2667.651	28.6503	-80.45	8.32
110.00	20993217.75	3006.751	28.6594	-80.42	10.12
115.00	21002873.75	3351.908	28.6694	-80.38	12.19
120.00	21013140.00	3724.650	28.6819	-80.34	14.54
125.00	21024002.50	4126.866	28.6954	-80.29	17.22
130.00	21035472.00	4560.762	28.7107	-80.24	20.23
135.00	21047577.25	5029.058	28.7278	-80.18	23.61
140.00	21060211.75	5415.288	28.7466	-80.11	27.35
145.00	21073221.50	5818.997	28.7670	-80.04	31.41
150.00	21086621.50	6251.151	28.7891	-79.96	35.83
155.00	21100432.50	6714.549	28.8129	-79.87	40.61
160.00	21114680.50	7212.480	28.8387	-79.78	45.78
164.00	21128803.50	7725.554	28.8653	-79.68	51.15
164.81	21128833.25	7726.638	28.8654	-79.68	51.16
165.00	21129395.25	7744.880	28.8665	-79.68	51.38
165.58	21131134.25	7756.100	28.8698	-79.66	52.06

TB1

MACH 1

MAX 0

S-1C CECO

S-1C OECO

TB3

S-1C/S-11 SEC

MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	RADIAL DISTANCE OF THE C G (FT)	MAGNITUDE OF THE EARTH FIXED VELOCITY (FT/SEC)	SUD VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON OBLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (NM)
165.50	21131134.25	7756.500	20.8698	-79.66	52.06
166.21	21133007.25	7750.175	28.8734	-79.65	52.80
169.21	21141779.50	7732.251	28.8907	-79.59	56.29
170.00	21144047.75	7737.243	28.8953	-79.57	57.22
175.00	21158158.25	7795.544	28.9242	-79.46	63.10
180.00	2117818.75	7868.213	28.9535	-79.35	69.07
185.00	21185042.50	7945.388	28.9831	-79.24	75.12
190.00	21197838.25	8026.589	29.0130	-79.13	81.26
195.00	21210213.50	8111.520	29.0432	-79.02	87.49
200.00	21222177.00	8200.503	29.0737	-78.90	93.82
205.00	21233736.50	8293.506	29.1046	-78.79	100.23
205.41	21234673.50	8301.328	29.1072	-78.78	100.76
210.00	21244905.75	8389.774	29.1358	-78.67	106.74
215.00	21255713.25	8486.259	29.1673	-78.55	113.35
220.00	21266216.00	8584.250	29.1992	-78.43	120.04
225.00	21276417.75	8685.463	29.2313	-78.30	126.83
230.00	21286321.50	8789.210	29.2637	-78.18	133.71
235.00	21295932.00	8895.789	29.2965	-78.05	140.68
240.00	21305253.25	9005.178	29.3295	-77.92	147.75
245.00	21314288.75	9117.346	29.3629	-77.79	154.92
250.00	21323042.50	9232.281	29.3966	-77.66	162.19
255.00	21331518.50	9350.015	29.4306	-77.52	169.56
260.00	21339721.50	9470.587	29.4649	-77.38	177.03
265.00	21347654.75	9593.919	29.4995	-77.24	184.61
270.00	21355323.75	9720.146	29.5343	-77.10	192.29
275.00	21362732.00	9849.301	29.5696	-76.96	200.08
280.00	21369884.00	9981.398	29.6051	-76.81	207.98
285.00	21376784.50	10116.410	29.6409	-76.67	216.00
290.00	21383437.25	10254.338	29.6770	-76.52	224.12
295.00	21389846.75	10395.184	29.7134	-76.36	232.36
300.00	21396017.50	10538.964	29.7501	-76.21	240.72
305.00	21401954.50	10685.704	29.7871	-76.05	249.20
310.00	21407662.00	10835.434	29.8245	-75.89	257.80
315.00	21413145.25	10988.202	29.8621	-75.73	266.53
320.00	21418408.25	11144.052	29.9000	-75.57	275.38
325.00	21423456.50	11303.032	29.9382	-75.40	284.35
330.00	21428294.75	11465.187	29.9767	-75.23	293.44
335.00	21432927.50	11630.543	30.0155	-75.06	302.70
340.00	21437360.25	11799.207	30.0546	-74.89	312.08
345.00	21441597.50	11971.168	30.0940	-74.71	321.59
350.00	21445645.00	12146.500	30.1337	-74.53	331.25
355.00	21449507.50	12325.278	30.1737	-74.35	341.04

S-1C/S-1: SEP  
S-11 ENGINE START  
S-11 MAINSTAGE

INITIATE 16M

MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	RADIAL DISTANCE OF THE C G (FT)	MAGNITUDE OF THE EARTH FIXED VELOCITY (FT/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON OBLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE FT. (NM)
360.00	21453190.75	12507.580	30.2139	-74.16	350.98
365.00	21456700.25	12693.473	30.2544	-73.97	361.07
370.00	21460041.00	12863.093	30.2952	-73.78	371.31
375.00	21463218.50	13076.446	30.3363	-73.59	381.70
380.00	21466238.75	13273.613	30.3777	-73.39	392.25
385.00	21469107.75	13474.697	30.4193	-73.19	402.96
390.00	21471831.50	13679.791	30.4611	-72.99	413.83
395.00	21474416.50	13888.989	30.5033	-72.78	424.87
400.00	21476868.50	14102.398	30.5456	-72.57	436.07
405.00	21479194.50	14320.131	30.5882	-72.35	447.45
410.00	21481401.50	14542.307	30.6311	-72.14	459.00
415.00	21483495.50	14769.055	30.6742	-71.92	470.73
420.00	21485484.50	15000.511	30.7175	-71.69	482.65
425.00	21487374.75	15236.818	30.7610	-71.46	494.75
430.00	21489174.75	15478.126	30.8047	-71.23	507.04
435.00	21490891.50	15724.582	30.8486	-70.99	519.53
440.00	21492534.00	15976.346	30.8927	-70.75	532.21
445.00	21494109.50	16233.593	30.9370	-70.51	545.10
450.00	21495627.00	16496.510	30.9814	-70.26	558.20
455.00	21497095.75	16765.303	31.0260	-70.01	571.50
460.00	21498524.75	17040.176	31.0707	-69.75	585.03
463.81	21499543.50	17253.959	31.1049	-69.55	595.49
465.00	21499922.25	17310.101	31.1156	-69.49	598.77
470.00	21501252.00	17537.514	31.1405	-69.22	612.71
475.00	21502516.00	17763.088	31.2053	-68.95	626.83
480.00	21503755.25	17968.467	31.2500	-68.68	641.13
485.00	21504952.50	18173.654	31.2945	-68.40	655.58
490.00	21506111.75	18381.355	31.3389	-68.12	670.20
495.00	21507248.50	18592.647	31.3830	-67.84	684.99
500.00	21508363.75	18808.023	31.4270	-67.55	699.95
505.00	21509458.00	19027.383	31.4707	-67.26	715.08
510.00	21510535.50	19250.575	31.5142	-66.97	730.38
515.00	21511603.00	19477.659	31.5574	-66.67	745.87
520.00	21512668.25	19708.817	31.6004	-66.37	761.53
525.00	21513739.50	19944.162	31.6430	-66.07	777.39
530.00	21514825.75	20183.815	31.6853	-65.76	793.43
535.00	21515935.50	20427.892	31.7272	-65.44	809.66
540.00	21517078.25	20676.510	31.7688	-65.12	826.10
545.00	21518263.75	20929.749	31.8100	-64.80	842.73
550.00	21519500.75	21187.738	31.8507	-64.48	859.56
555.00	21520800.75	21450.342	31.8911	-64.15	876.60
556.66	21521210.75	21538.686	31.9044	-64.04	882.32

S-11 CECO

S11 OECO

MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM

.. ENCLOSURE 4 ..  
 AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.  
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TIME FROM FIRST MOTION (SE-)	MAGNITUDE OF THE EARTH FIXED VELOCITY (FT/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON OBLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (NM)
184	21521252.00	31.9044	-64.04	882.36
5-11/S-118 SEP	21521542.75	31.9130	-63.96	886.06

  
 .. MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM



A-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.      \*\* ENCLOSURE 4 \*\*

TIME FROM FIRST MOTION (SEC)	RADIAL DISTANCE OF THE C G (FT)	MAGNITUDE OF THE EARTH FIXED VELOCITY (FT/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON OBLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (NM)
S-11/S-11B SEP	21521542.75	21550.489	31.9130	-63.96	886.04
S-11B ENGINE START	21521549.25	21550.494	31.9132	-63.96	886.14
	21522129.00	21550.845	31.9308	-63.81	893.81
S-11B MAINSTAGE	21522929.75	21565.636	31.9563	-63.59	705.09
	21523332.75	21593.094	31.9696	-63.48	911.04
S-11B ULLAGE JETT	21524339.25	21667.102	32.0036	-63.18	926.51
	21524453.75	21675.942	32.0075	-63.14	928.33
	21525497.75	21761.232	32.0446	-62.81	945.69
	21526462.50	21847.825	32.0808	-62.47	963.11
	21527352.75	21935.502	32.1162	-62.13	980.61
	21528166.25	22023.997	32.1506	-61.78	998.17
	21528911.00	22113.253	32.1842	-61.44	1015.81
	21529583.50	22203.326	32.2168	-61.09	1033.51
	21530188.00	22294.291	32.2485	-60.75	1051.29
	21530727.75	22386.787	32.2792	-60.40	1069.14
	21531206.25	22478.050	32.3090	-60.05	1087.06
	21531625.75	22571.299	32.3378	-59.69	1105.05
	21531990.25	22665.744	32.3657	-59.34	1123.12
	21532302.50	22759.774	32.3925	-58.98	1141.27
	21532566.75	22854.075	32.4183	-58.63	1159.49
	21532786.00	22950.747	32.4430	-58.27	1177.79
	21532964.25	23047.650	32.4667	-57.91	1196.16
	21533105.25	23145.723	32.4894	-57.54	1214.61
	21533212.75	23244.455	32.5110	-57.18	1233.14
	21533290.75	23343.814	32.5315	-56.81	1251.75
	21533342.75	23443.953	32.5508	-56.45	1270.44
	21533373.75	23544.878	32.5691	-56.08	1289.21
	21533385.75	23646.648	32.5862	-55.71	1308.06
	21533368.50	23749.270	32.6022	-55.33	1326.99
	21533333.00	23852.667	32.6170	-54.96	1346.00
	21533290.00	23956.840	32.6306	-54.58	1365.10
	21533249.00	24061.775	32.6430	-54.20	1384.28
	21533220.00	24167.465	32.6542	-53.82	1403.54
S-11B GCSI	21533212.25	24238.586	32.6609	-53.57	1416.47
TBS	21533212.00	24242.646	32.6613	-53.55	1417.29
	21533211.75	24243.740	32.6641	-53.44	1422.89
	21533210.25	24243.811	32.6728	-53.06	1442.25
EP01	21533209.00	24243.856	32.6778	-52.80	1455.21

\*\*\*\* MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM

\*\* ENCLOSURE 4 \*\*

15-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM MOTION (SEC)	RADIAL DISTANCE OF THE C G (FT)	MAGNITUDE OF THE FIXED VELOCITY (FT/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (NM)
713.12	2153215.25	24243.846	32.6776	-52.82	1454.36
722.12	21533204.50	24243.976	32.6884	-52.13	1489.22
732.12	21533199.00	24244.121	32.6956	-51.37	1527.95
743.12	21533192.75	24244.291	32.6975	-50.52	1570.56
754.12	21533185.25	24244.470	32.6931	-49.68	1613.17
765.12	21533177.25	24244.681	32.6825	-48.84	1655.78
776.12	21533169.25	24244.965	32.6656	-48.00	1698.39
787.12	21533160.00	24245.255	32.6425	-47.16	1741.00
798.12	21533151.00	24245.435	32.6131	-46.32	1783.61
809.12	21533142.75	24246.056	32.4230	-42.81	1961.80
820.12	21533026.50	24247.585	31.7605	-36.17	2302.70
831.12	21532927.00	24249.558	30.7196	-29.65	2643.63
842.12	21532816.75	24251.997	29.3228	-23.30	2984.60
853.12	21532697.00	24254.824	27.5982	-17.15	3325.61
864.12	21532565.50	24257.937	25.5779	-11.22	3666.67
875.12	21532420.75	24261.227	23.2956	-5.51	4007.77
886.12	21532260.00	24264.575	20.7853	-0.01	4348.90
897.12	21532081.00	24267.863	18.0806	5.30	4690.06
908.12	21531881.50	24270.976	15.2137	10.43	5031.23
919.12	21531661.50	24273.805	12.2154	15.41	5372.39
930.12	21531420.00	24276.255	9.1148	20.27	5713.52
941.12	21531161.00	24278.245	5.9399	25.04	6054.60
952.12	21530887.75	24279.710	2.7173	29.75	6395.61
963.12	21530606.75	24280.603	-0.5270	34.44	6736.52
974.12	21530327.25	24280.902	-3.7672	39.13	7077.32
985.12	21530060.25	24280.610	-6.9776	43.86	7417.96
996.12	21529817.75	24279.752	-10.1320	48.65	7758.44
1007.12	21529615.50	24278.378	-13.2033	53.55	8098.72
1018.12	21529467.75	24276.550	-16.1631	58.58	8438.77
1029.12	21529391.50	24274.350	-18.9816	63.76	8778.51
1040.12	21529402.75	24271.871	-21.6277	69.13	9117.84
1051.12	21529517.75	24269.213	-24.0683	74.70	9456.54
1062.12	21529750.75	24266.479	-26.2698	80.49	9794.07
1073.12	21530115.50	24243.771	-28.1977	86.50	10128.79
1084.12	21530621.25	2421.187	-29.8189	92.72	10452.90
1095.12	21531276.00	24258.811	-31.1022	99.13	10660.29
1106.12	21532083.50	24256.716	-32.0211	105.70	10424.30
1117.12	21533044.75	24254.961	-32.5552	112.38	10097.94
1128.12	21534049.25	24253.693	-32.6964	118.49	9793.27
1139.12	21535290.50	24252.675	-32.4694	125.22	9455.76
1150.12	21536664.00	24252.052	-31.8476	131.87	9117.29
1161.12	21538154.75	24251.802	-30.8464	138.41	8778.41

\*\*\*\* MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	RADIAL DISTANCE OF THE C G (FT)	MAGNITUDE OF THE EARTH FIXED VELOCITY (FT/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON OBLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (NM)
370.12	21539744.75	24251.81	-29.4849	144.77	8439.33
3828.13	21541412.25	24252.255	-27.7940	150.94	8100.15
3916.12	21543133.75	24252.835	-25.8045	156.89	7760.93
4004.12	21544883.00	24253.549	-23.5501	162.63	7421.67
4092.12	21546634.00	24254.310	-21.0649	168.14	7082.39
4180.12	21548359.75	24255.032	-18.3827	173.46	6743.09
4268.12	21550033.00	24255.630	-15.5358	178.60	6403.78
4356.12	21551629.50	24256.026	-12.5550	176.41	6064.44
4444.12	21553124.50	24256.152	-9.4697	171.55	5725.10
4532.12	21554498.50	24255.952	-6.3076	166.78	5385.75
4620.12	21555732.75	24255.391	-3.0956	162.07	5046.41
4708.12	21556814.25	24254.450	.1406	157.39	4707.10
4796.12	21557731.50	24253.130	3.3753	152.72	4367.83
4884.12	21558478.25	24251.455	6.5832	148.01	4028.63
4972.12	21559053.00	24249.466	9.7383	143.23	3689.53
5060.12	21559457.25	24247.222	12.8139	138.36	3350.58
5148.12	21559695.75	24244.799	15.7822	133.37	3011.82
5236.12	21559777.25	24242.264	18.6139	128.22	2673.34
5324.12	21559713.75	24239.773	21.2781	122.89	2335.22
5412.12	21559518.75	24237.370	23.7427	117.36	1997.65
5500.12	21559208.00	24235.176	25.9740	111.62	1660.91
5588.12	21558727.00	24233.287	27.9382	105.66	1325.61
5676.12	21558303.50	24231.795	29.6019	99.49	993.15
5764.12	21557743.25	24230.776	30.9339	93.12	667.70
5852.12	21557132.50	24230.290	31.9067	86.58	348.22
5940.12	21556446.00	24230.379	32.4992	79.93	235.78
6028.12	21555814.50	24231.066	32.6975	73.21	453.68
6116.12	21555135.00	24232.349	32.4968	66.51	745.71
6204.12	21554450.50	24234.203	31.9019	59.86	1094.13
6292.12	21553769.00	24236.584	30.9264	53.33	1427.70
6372.12	21553157.00	24239.150	29.7270	47.53	1732.95
6460.12	21552494.00	24242.335	28.0890	41.33	2069.91
6548.12	21551843.00	24245.807	26.1472	35.35	2407.64
6636.12	21551203.50	24249.456	23.9348	29.58	2745.89
6724.12	21550574.75	24253.163	21.4858	24.03	3084.49
6812.12	21549955.25	24256.811	18.8338	18.68	3423.35
6900.12	21549344.00	24260.280	16.0114	13.52	3762.41
6988.12	21548740.00	24263.461	13.0495	8.50	4101.61
7076.12	21548143.25	24266.252	9.9776	3.62	4440.90
7164.12	21547555.75	24268.570	6.8240	1.17	4780.25
7252.12	21546981.00	24270.346	3.6154	5.89	5119.62
7340.12	21546424.00	24271.532	.3780	10.57	5458.97

MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG 1ST OPP.

ENCLOSURE 4

TIME FROM FIRST MOTION (SFC)	RADIAL DISTANCE OF THE C G (FT)	MAGNITUDE OF THE EARTH FIXED VELOCITY (FT/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON OBLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (NM)
7428.12	21545892.70	24272.105	-7.8626	15.25	5798.28
7516.12	21545394.25	24272.063	-3.0807	19.96	6137.52
7604.12	21544947.50	24271.426	-9.2503	24.73	6476.65
7692.12	21544546.25	24270.237	-12.3448	29.59	6815.65
7780.12	21544226.75	24268.558	-15.3361	34.57	7154.49
7868.12	21543991.75	24266.466	-18.1951	39.71	7493.14
7956.12	21543859.00	24264.051	-20.8917	45.02	7831.55
8044.12	21543842.00	24261.413	-23.3715	50.52	8169.66
8132.12	21543954.00	24258.658	-25.6629	56.24	8507.37
8220.12	21544207.50	24255.889	-27.6712	62.18	8844.50
8308.12	21544612.00	24253.208	-29.3827	68.33	9180.73
8396.12	21545173.25	24250.703	-30.7657	74.69	9515.37
8484.12	21545580.25	24249.339	-31.9169	78.52	9711.77
8459.12	21545672.50	24249.063	-31.5382	79.34	9753.11
8460.12	21545681.00	24249.038	-31.5490	79.41	9756.87

TIME BASE 6

MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.      \*\* ENCLOSURE 4 \*\*

TIME FROM FIRST MOTION (SEC)	RADIAL DISTANCE OF THE C G (FT)	MAGNITUDE OF THE EARTH FIXED VELOCITY (FT/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON OBLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (NM)
0460.12	21545681.00	24249.038	-31.5490	79.41	9754.87
0465.12	21545724.50	24248.914	-31.6019	79.77	9775.63
0470.12	21545768.50	24248.792	-31.6537	80.16	9794.38
0475.12	21545813.00	24248.671	-31.7042	80.53	9813.10
0480.12	21545857.75	24248.551	-31.7535	80.91	9831.90
0485.12	21545903.50	24248.431	-31.8016	81.28	9850.48
0490.12	21545949.75	24248.311	-31.8485	81.66	9869.13
0495.12	21545996.75	24248.193	-31.8942	82.03	9887.76
0500.12	21546044.50	24248.076	-31.9386	82.41	9906.36
0502.12	21546063.50	24248.030	-31.9560	82.56	9913.79
0507.32	21546065.25	24248.025	-31.9577	82.57	9914.54
0509.12	21546092.25	24247.958	-31.9818	82.78	9924.94
0510.12	21546141.00	24247.844	-32.0237	83.16	9943.48
0515.12	21546190.00	24247.731	-32.0644	83.54	9961.98
0520.12	21546239.50	24247.620	-32.1038	83.91	9980.46
0525.12	21546289.50	24247.510	-32.1420	84.29	9998.89
0530.12	21546340.25	24247.401	-32.1790	84.67	10017.29
0535.12	21546391.25	24247.294	-32.2147	85.05	10035.64
0540.12	21546443.00	24247.188	-32.2491	85.42	10053.95
0545.12	21546495.00	24247.083	-32.2823	85.80	10072.20
0550.12	21546547.75	24246.980	-32.3142	86.18	10090.41
0555.12	21546601.00	24246.879	-32.3449	86.56	10108.55
0560.12	21546654.50	24246.779	-32.3743	86.94	10126.63
0565.12	21546708.75	24246.680	-32.4024	87.32	10144.65
0570.12	21546763.25	24246.583	-32.4293	87.70	10162.59
0575.12	21546818.50	24246.488	-32.4548	88.08	10180.45
0580.12	21546873.75	24246.394	-32.4791	88.46	10198.23
0585.12	21546929.75	24246.301	-32.5022	88.84	10215.91
0590.12	21546986.50	24246.211	-32.5239	89.22	10233.49
0595.12	21547043.50	24246.122	-32.5444	89.60	10250.96
0600.12	21547100.75	24246.034	-32.5636	89.98	10268.30
0605.12	21547159.00	24245.948	-32.5815	90.36	10285.51
0610.12	21547217.50	24245.863	-32.5981	90.75	10302.57
0615.12	21547276.50	24245.779	-32.6135	91.13	10319.46
0620.12	21547336.25	24245.698	-32.6275	91.51	10336.17
0625.12	21547396.00	24245.617	-32.6403	91.89	10352.68
0630.12	21547456.50	24245.538	-32.6518	92.27	10368.96
0635.12	21547518.00	24245.461	-32.6619	92.65	10384.99
0640.12	21547579.50	24245.385	-32.6708	93.04	10400.74
0645.12	21547641.75	24245.310	-32.6785	93.42	10416.18
0650.12	21547704.50	24245.237	-32.6848	93.80	10431.26
0655.12	21547767.75	24245.165	-32.6898	94.18	10445.94

02/M2 BURNER ON  
ENGINE OFF

\*\*\*\* MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTER, PLUMBLINE SYSTEM

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	RADIAL DISTANCE OF THE C G (FT)	MAGNITUDE OF THE EARTH FIXED VELOCITY (FT/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON OBLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (NM)
0660.12	21547031.50	24245.095	-32.6935	94.54	10460.18
0665.12	21547695.75	24245.027	-32.6960	94.95	10473.91
0670.12	21547960.50	24244.960	-32.6971	95.33	10487.08
0675.12	21548025.75	24244.895	-32.6970	95.71	10499.60
0680.12	21548091.75	24244.829	-32.6955	96.09	10511.40
0685.12	21548157.75	24244.767	-32.6928	96.48	10522.39
0690.12	21548224.50	24244.706	-32.6888	96.86	10532.47
0695.12	21548291.75	24244.647	-32.6835	97.24	10541.54
0700.12	21548359.25	24244.589	-32.6769	97.62	10549.51
0705.12	21548427.75	24244.533	-32.6690	98.01	10556.24
0710.12	21548496.75	24244.479	-32.6598	98.39	10561.67
0715.12	21548565.25	24244.426	-32.6493	98.77	10566.68
0720.12	21548635.00	24244.374	-32.6375	99.15	10568.21
0725.12	21548705.00	24244.324	-32.6245	99.53	10569.23
0730.12	21548775.50	24244.276	-32.6101	99.91	10568.70
0735.12	21548846.50	24244.229	-32.5945	100.30	10566.64
0740.12	21548918.00	24244.183	-32.5776	100.68	10563.09
0745.12	21548990.00	24244.140	-32.5594	101.06	10558.11
0750.12	21549062.25	24244.097	-32.5399	101.44	10551.77
0755.12	21549135.25	24244.057	-32.5192	101.82	10544.19
0760.12	21549208.25	24244.017	-32.4971	102.20	10535.46
0765.12	21549282.00	24243.979	-32.4738	102.58	10525.69
0770.12	21549356.50	24243.943	-32.4492	102.96	10514.98
0775.12	21549430.75	24243.908	-32.4234	103.34	10503.43
0780.12	21549506.00	24243.874	-32.3963	103.72	10491.13
0785.12	21549581.50	24243.842	-32.3679	104.10	10478.17
0790.12	21549657.50	24243.811	-32.3382	104.48	10464.62
0795.12	21549734.00	24243.782	-32.3073	104.86	10450.54
0800.12	21549811.00	24243.753	-32.2751	105.24	10436.00
0805.12	21549888.00	24243.725	-32.2416	105.62	10421.05
0810.12	21549966.00	24243.698	-32.2069	105.99	10405.73
0815.12	21550044.25	24243.673	-32.1709	106.37	10390.08
0820.12	21550123.00	24243.649	-32.1337	106.75	10374.15
0825.12	21550202.00	24243.627	-32.0953	107.13	10357.95
0830.12	21550281.50	24243.606	-32.0554	107.50	10341.52
0835.12	21550361.50	24243.586	-32.0144	107.88	10324.88
0840.12	21550441.75	24243.567	-1.9724	108.25	10308.05
0845.12	21550522.50	24243.548	-1.9290	108.63	10291.05
0850.12	21550603.75	24243.531	-1.8843	109.01	10273.90
0855.12	21550685.25	24243.516	-1.8384	109.38	10256.61
0860.12	21550767.50	24243.501	-1.7913	109.76	10239.19
0865.12	21550850.00	24243.488	-1.7429	110.13	10221.66

MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG, 1ST OPP.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	RADIAL DISTANCE OF THE C G (FT)	MAGNITUDE OF THE EARTH FIXED VELOCITY (FT/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON OBLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (NM)
8870.12	21550932.75	24243.476	-31.6934	110.50	10204.02
8875.12	21551016.00	24243.465	-31.6426	110.88	10186.28
8880.12	21551099.50	24243.455	-31.5906	111.25	10168.44
8885.12	21551183.75	24243.444	-31.5374	111.62	10150.55
8890.12	21551268.25	24243.439	-31.4830	111.99	10132.57
8895.12	21551353.00	24243.432	-31.4274	112.36	10114.52
8900.12	21551438.25	24243.427	-31.3706	112.74	10096.41
8905.12	21551524.25	24243.423	-31.3126	113.11	10078.24
8910.12	21551610.00	24243.420	-31.2534	113.48	10060.01
8915.12	21551696.75	24243.418	-31.1930	113.85	10041.73
8920.12	21551783.50	24243.417	-31.1315	114.22	10023.41
8925.12	21551870.75	24243.417	-31.0687	114.58	10005.04
8930.12	21551958.25	24243.416	-31.0048	114.95	9986.63
8935.12	21552046.50	24243.416	-30.9398	115.32	9968.18
8940.12	21552135.25	24243.419	-30.8735	115.69	9949.69
8945.12	21552224.00	24243.423	-30.8061	116.05	9931.18
8950.12	21552313.50	24243.428	-30.7376	116.42	9912.63
8955.12	21552402.75	24243.435	-30.6679	116.78	9894.05
8960.12	21552492.50	24243.436	-30.5966	117.15	9875.44
8965.12	21552583.25	24243.444	-30.5251	117.51	9856.81
8970.12	21552674.25	24243.459	-30.4520	117.88	9838.15
8975.12	21552765.25	24243.473	-30.3777	118.24	9819.47
8980.12	21552856.75	24243.479	-30.3024	118.60	9800.77
8985.12	21552948.75	24243.485	-30.2259	118.96	9782.05
8990.12	21553040.50	24243.487	-30.1483	119.33	9763.31
8995.12	21553133.50	24243.495	-30.0696	119.69	9744.54
9000.12	21553226.25	24244.001	-29.9898	120.05	9725.76
9005.12	21553319.50	24244.012	-29.9089	120.41	9706.97
9010.12	21553413.25	24244.014	-29.8269	120.76	9688.16
9015.12	21553507.50	24244.014	-29.7438	121.12	9669.33
9020.12	21553601.75	24244.014	-29.6596	121.48	9650.49
9025.12	21553696.50	24244.014	-29.5744	121.84	9631.64
9030.12	21553791.75	24244.014	-29.4881	122.19	9612.77
9035.12	21553886.75	24244.014	-29.4007	122.55	9601.44
9040.12	21553982.50	24244.014	-29.3122	122.90	9593.89
9045.12	21554078.75	24244.014	-29.2225	123.26	9582.54
9050.12	21554175.00	24244.014	-29.1311	123.61	9573.11
9055.12	21554271.25	24244.014	-29.0386	123.96	9564.58
9060.12	21554367.50	24244.014	-28.9451	124.31	9556.85

ULLAGE IGNITION  
02/H2 BURNER OFF

J-2 P-L INI  
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9CS THR  
1CM INI

MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

ENCLOSURE 4

TIME FROM MOTION (SEC)	RADIAL DISTANCE OF THE C.G. (FT)	MAGNITUDE OF THE EARTH FIXED VELOCITY (FT/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON OBLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (NM)
9080.12	21554193.25	24441.804	-29.1314	123.62	9537.02
9085.12	21554303.75	24537.297	-29.0390	123.97	9517.91
9090.12	21554385.75	24634.542	-28.9451	124.33	9498.71
9095.12	21554450.00	24732.947	-28.8498	124.69	9479.42
9100.12	21554507.00	24832.241	-28.7530	125.05	9460.04
9105.12	21554542.00	24932.339	-28.6549	125.41	9440.58
9110.12	21554583.50	25033.196	-28.5553	125.77	9421.03
9115.12	21554631.75	25134.812	-28.4543	126.13	9401.40
9120.12	21554694.75	25237.187	-28.3518	126.49	9381.67
9125.12	21554779.75	25340.304	-28.2478	126.85	9361.86
9130.12	21554894.75	25444.166	-28.1424	127.22	9341.95
9135.12	21555048.50	25548.823	-28.0355	127.58	9321.96
9140.12	21555248.25	25654.290	-27.9272	127.94	9301.88
9145.12	21555507.75	25760.584	-27.8173	128.31	9281.71
9150.12	21555820.75	25867.713	-27.7060	128.68	9261.44
9155.12	21556211.00	25975.674	-27.5931	129.04	9241.09
9160.12	21556681.50	26084.466	-27.4788	129.41	9220.65
9165.12	21557241.50	26194.069	-27.3629	129.78	9200.11
9170.12	21557900.50	26304.480	-27.2453	130.15	9179.48
9175.12	21558668.00	26415.700	-27.1266	130.52	9158.76
9180.12	21559552.75	26527.729	-27.0061	130.89	9137.94
9185.12	21560564.50	26640.560	-26.8841	131.26	9117.03
9190.12	21561713.25	26754.260	-26.7605	131.63	9096.03
9195.12	21563009.00	26868.761	-26.6354	132.01	9074.94
9200.12	21564461.25	26984.072	-26.5087	132.38	9053.75
9205.12	21566080.50	27100.190	-26.3804	132.76	9032.46
9210.12	21567877.25	27229.390	-26.2506	133.13	9011.08
9215.12	21569842.75	27361.552	-26.1191	133.51	8989.59
9220.12	21572048.00	27494.805	-25.9859	133.88	8967.99
9225.12	21574495.00	27629.158	-25.8511	134.26	8946.28
9230.12	21577065.25	27764.626	-25.7146	134.64	8924.47
9235.12	21579921.00	27901.238	-25.5765	135.02	8902.55
9240.12	21583024.25	28039.008	-25.4366	135.40	8880.52
9245.12	21586387.25	28178.015	-25.2951	135.78	8858.38
9250.12	21590027.50	28318.212	-25.1518	136.17	8836.13
9255.12	21593957.25	28459.638	-25.0068	136.55	8813.77
9260.12	21598188.50	28602.317	-24.8601	136.93	8791.30
9265.12	21602735.00	28746.261	-24.7116	137.32	8768.72
9270.12	21607608.25	28891.490	-24.5614	137.71	8746.03
9275.12	21612821.75	29038.031	-24.4095	138.09	8723.23
9280.12	21618389.00	29185.904	-24.2558	138.48	8700.31
9285.12	21624323.00	29335.145	-24.1003	138.87	8677.28

MEASURED FROM CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM



\*\*\*\*\* ENCLOSURE 4 \*\*\*\*\*

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	RADIAL DISTANCE OF THE C G (FT)	MAGNITUDE OF THE EARTH FIXED VELOCITY (FT/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON OBLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (NM)
9260.12	21630637.75	29485.777	-23.9431	139.26	8654.14
9265.12	21637345.50	29637.833	-23.7841	139.65	8630.88
9270.12	21644461.50	29791.347	-23.6233	140.04	8607.52
9275.12	21651999.75	29946.349	-23.4608	140.43	8584.93
9280.12	21659974.00	30102.871	-23.2965	140.83	8560.44
9285.12	21668399.00	30260.951	-23.1304	141.22	8536.72
9290.12	21677288.75	30420.630	-22.9626	141.62	8512.90
9295.12	21686658.25	30581.949	-22.7929	142.01	8488.45
9300.12	21696522.00	30744.950	-22.6215	142.41	8464.90
9305.12	21706894.75	30909.680	-22.4483	142.81	8440.72
9310.12	21717791.75	31076.188	-22.2733	143.20	8416.43
9315.12	21729227.50	31244.299	-22.0965	143.60	8392.03
9320.12	21741217.25	31414.265	-21.9179	144.00	8367.50
9325.12	21753776.00	31586.163	-21.7375	144.41	8342.86
9330.12	21766918.75	31760.050	-21.5553	144.81	8318.11
9335.12	21780660.00	31935.985	-21.3713	145.21	8293.23
9340.12	21795016.00	32114.031	-21.1856	145.61	8268.24
9345.12	21810001.00	32294.253	-20.9980	146.02	8243.13
9350.12	21825630.00	32476.720	-20.8086	146.42	8217.90
9355.12	21841917.00	32661.500	-20.6175	146.83	8192.55
9360.12	21858876.75	32848.662	-20.4245	147.24	8167.08
9365.12	21876522.75	33038.284	-20.2298	147.65	8141.49
9370.12	21894857.25	33230.221	-20.0333	148.05	8115.78
9375.12	21913868.25	33424.774	-19.8349	148.46	8089.96
9380.12	21933578.50	33622.155	-19.6348	148.87	8064.01
9385.12	21954014.25	33822.441	-19.4329	149.29	8037.93
9390.12	21975201.50	34025.714	-19.2291	149.70	8011.74
9393.76	21991104.25	34175.548	-19.0798	150.00	7992.61
9393.97	21992034.75	34183.300	-19.0711	150.02	7991.50
9395.12	21997164.25	34181.157	-19.0236	150.11	7985.43
9400.12	22019843.00	34162.193	-18.8172	150.52	7959.12
9403.76	22036771.00	34147.957	-18.6666	150.82	7940.01

GCS2  
T87

TL1

\*\*\*\*\* MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM \*\*\*\*\*

\*\* ENCLOSURE 4 \*\*

A9-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	RADIAL DISTANCE OF THE C G (FT)	MAGNITUDE OF THE EARTH FIXED VELOCITY (FT/SEC)	SUR VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON OBLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (NM)
9403.76	22036771.00	34147.957	-18.6666	150.82	7940.01
9413.76	22085151.00	34107.415	-18.2512	151.64	7887.64
9424.76	22141473.25	34060.355	-17.7921	152.53	7830.32
9435.76	22201015.50	34010.771	-17.3310	153.40	7773.29
9446.76	22263743.25	33958.722	-16.8681	154.27	7716.58
9457.76	22329620.00	33904.267	-16.4039	155.13	7660.21
9468.76	22398607.25	33847.472	-15.9386	155.98	7604.18
9479.76	22470666.00	33788.402	-15.4726	156.82	7548.52
9490.76	22545756.75	33727.124	-15.0061	157.65	7493.23
9501.76	22623838.25	33663.703	-14.5395	158.47	7438.32
9512.76	22704866.75	33598.209	-14.0730	159.28	7383.80
9523.76	22788800.50	33530.711	-13.6068	160.08	7329.70
9534.76	22875594.50	33461.279	-13.1413	160.88	7276.01
9544.66	22956117.50	33397.195	-12.7231	161.58	7228.05

CVS OFF

\*\*\* MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.      \*\* ENCLOSURE 4 \*\*

TIME FROM FIRST MOTION (SEC)	X COORDINATE			Y COORDINATE			Z COORDINATE			COMPONENT OF VEL. IN THE XXE SYSTEM (FT/S)	COMPONENT OF VEL. IN THE YYE SYSTEM (FT/S)	COMPONENT OF VEL. IN THE ZZE SYSTEM (FT/S)
	EARTH FIXED, PAD CENTERED, PLUMBIN SYS. (FT)	EARTH FIXED, PAD CENTERED, PLUMBIN SYS. (FT)	EARTH FIXED, PAD CENTERED, PLUMBIN SYS. (FT)	EARTH FIXED, PAD CENTERED, PLUMBIN SYS. (FT)	EARTH FIXED, PAD CENTERED, PLUMBIN SYS. (FT)	EARTH FIXED, PAD CENTERED, PLUMBIN SYS. (FT)	EARTH FIXED, PAD CENTERED, PLUMBIN SYS. (FT)	EARTH FIXED, PAD CENTERED, PLUMBIN SYS. (FT)	EARTH FIXED, PAD CENTERED, PLUMBIN SYS. (FT)			
0.00	195.210	-0.103	0.018	0.000	-0.000	-0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.40	195.216	-0.188	0.047	1.329	0.001	0.003	0.001	0.003	0.001	0.003	0.003	0.003
5.00	267.799	-0.060	0.078	31.209	0.666	0.029	60.509	5.897	5.897	0.223	0.223	0.223
10.00	515.092	16.922	-0.843	111.041	7.136	-0.413	158.808	7.136	7.136	3.767	3.767	3.767
15.00	961.696	53.116	-2.446	158.808	6.605	0.000	212.073	6.605	6.605	11.742	11.742	11.742
20.00	1634.063	86.786	4.621	41.041	4.621	0.000	271.203	4.621	4.621	26.125	26.125	26.125
25.00	2558.650	118.594	132.741	315.427	132.741	0.000	336.501	315.427	315.427	48.387	48.387	48.387
30.00	3764.559	147.675	632.160	1134.350	632.160	0.000	408.165	408.165	408.165	79.998	79.998	79.998
35.00	5281.127	173.690	1883.684	2949.621	1883.684	0.000	486.173	486.173	486.173	122.948	122.948	122.948
40.00	7140.133	196.218	4408.850	660.751	4408.850	0.000	570.309	570.309	570.309	179.098	179.098	179.098
45.00	9373.359	215.549	6343.868	755.660	6343.868	0.000	660.751	660.751	660.751	249.843	249.843	249.843
50.00	12011.975	231.784	8291.708	855.758	8291.708	0.000	755.660	755.660	755.660	336.605	336.605	336.605
55.00	15086.122	245.208	10399.933	959.069	10399.933	0.000	855.758	855.758	855.758	440.246	440.246	440.246
60.00	18623.687	256.002	11964.460	1044.181	11964.460	0.000	959.069	959.069	959.069	538.499	538.499	538.499
65.00	22650.508	264.857	13872.413	1173.998	13872.413	0.000	1044.181	1044.181	1044.181	661.042	661.042	661.042
69.00	26238.517	270.745	15872.413	1296.909	15872.413	0.000	1173.998	1173.998	1173.998	808.746	808.746	808.746
70.00	27167.090	272.039	16321.464	1296.909	16321.464	0.000	1296.909	1296.909	1296.909	1058.325	1058.325	1058.325
75.00	32243.684	278.086	1749.278	1404.774	1749.278	0.000	1404.774	1404.774	1404.774	1248.049	1248.049	1248.049
80.00	37836.901	283.097	21003.705	1520.810	21003.705	0.000	1520.810	1520.810	1520.810	1483.696	1483.696	1483.696
85.00	43990.937	287.774	2217.931	1634.876	2217.931	0.000	1634.876	1634.876	1634.876	1748.696	1748.696	1748.696
89.00	49475.681	292.308	2336.882	1749.278	2336.882	0.000	1749.278	1749.278	1749.278	2040.461	2040.461	2040.461
90.00	50723.015	292.308	2336.882	1865.045	2336.882	0.000	1865.045	1865.045	1865.045	2358.419	2358.419	2358.419
95.00	58037.647	298.735	2460.740	1985.445	2460.740	0.000	1985.445	1985.445	1985.445	2700.604	2700.604	2700.604
100.00	65927.452	308.296	2530.177	2102.837	2530.177	0.000	2102.837	2102.837	2102.837	3074.256	3074.256	3074.256
105.00	74387.303	322.231	2597.365	2217.931	2597.365	0.000	2217.931	2217.931	2217.931	3480.191	3480.191	3480.191
110.00	83421.300	341.407	2666.484	2336.882	2666.484	0.000	2336.882	2336.882	2336.882	3916.558	3916.558	3916.558
115.00	93047.079	365.934	2738.059	2460.740	2738.059	0.000	2460.740	2460.740	2460.740	4386.170	4386.170	4386.170
120.00	103270.177	396.294	2807.330	2530.177	2807.330	0.000	2530.177	2530.177	2530.177	4787.832	4787.832	4787.832
125.00	114071.316	433.967	2873.059	2597.365	2873.059	0.000	2597.365	2597.365	2597.365	5207.122	5207.122	5207.122
130.00	125956.241	480.621	2936.613	2666.484	2936.613	0.000	2666.484	2666.484	2666.484	5653.879	5653.879	5653.879
135.00	137447.506	537.562	2987.053	2738.059	2987.053	0.000	2738.059	2738.059	2738.059	6130.866	6130.866	6130.866
140.00	149932.332	605.132	3007.781	2812.767	3007.781	0.000	2812.767	2812.767	2812.767	6641.346	6641.346	6641.346
145.00	162753.367	684.900	3032.951	2887.590	3032.951	0.000	2887.590	2887.590	2887.590	7165.547	7165.547	7165.547
150.00	175909.201	778.395	3052.453	2967.743	3052.453	0.000	2967.743	2967.743	2967.743	7755.492	7755.492	7755.492
155.00	189419.291	887.053	3052.453	3052.453	3052.453	0.000	3052.453	3052.453	3052.453	8399.994	8399.994	8399.994
160.00	203295.191	1012.717	3052.453	3052.453	3052.453	0.000	3052.453	3052.453	3052.453	9099.994	9099.994	9099.994
164.88	216981.012	1151.117	3052.453	3052.453	3052.453	0.000	3052.453	3052.453	3052.453	9859.994	9859.994	9859.994
164.81	217009.719	1151.374	3052.453	3052.453	3052.453	0.000	3052.453	3052.453	3052.453	10679.994	10679.994	10679.994
165.00	217552.697	1157.206	3052.453	3052.453	3052.453	0.000	3052.453	3052.453	3052.453	11559.994	11559.994	11559.994
165.58	219232.486	1175.286	3052.453	3052.453	3052.453	0.000	3052.453	3052.453	3052.453	12509.994	12509.994	12509.994

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	X COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS, (FT)	Y COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS, (FT)	Z COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS, (FT)	COMPONENT OF VEL. IN THE XXXF SYSTEM (FT/S)	COMPONENT OF VEL. IN THE XXYE SYSTEM (FT/S)	COMPONENT OF VEL. IN THE XXZE SYSTEM (FT/S)
165.58	219232.486	1175.246	319480.668	2879.098	31.201	7202.300
166.21	221040.436	1194.987	324018.336	2860.331	31.451	7202.967
169.21	229489.418	1291.147	345637.238	2775.390	32.682	7216.914
170.00	231669.127	1317.132	351328.992	2756.695	33.024	7229.417
175.00	245176.344	1487.412	387718.656	2648.643	35.097	7331.710
190.00	258161.703	1668.362	424659.227	2545.583	37.280	7444.957
185.00	270634.020	1860.280	462171.422	2443.625	39.547	7560.181
190.00	282599.449	2063.889	500263.656	2342.717	41.890	7676.982
195.00	294062.703	2279.317	538943.523	2242.757	44.309	7795.180
200.00	305028.703	2507.017	578218.703	2143.932	46.819	7915.151
205.00	315504.223	2747.697	618098.055	2046.267	49.411	8036.552
205.41	316345.348	2768.137	621411.344	2038.264	49.627	8047.054
210.00	325492.535	3001.411	658590.289	1949.913	51.914	8159.868
215.00	335025.426	3265.016	699488.562	1865.659	53.567	8278.469
220.00	344155.590	3537.732	741373.969	1785.805	55.509	8396.259
225.00	352882.012	3823.163	783654.719	1704.885	57.527	8516.237
230.00	361204.887	4113.030	826538.680	1624.326	59.658	8637.605
235.00	369124.832	4417.185	870033.484	1543.706	61.941	8760.605
240.00	376641.648	4732.443	914147.531	1462.956	64.235	8885.118
245.00	383754.508	5060.197	958889.383	1382.170	66.931	9011.721
250.00	390463.211	5402.134	1004267.547	1301.352	69.875	9139.837
255.00	396767.961	5759.312	1050290.672	1220.445	72.923	9269.734
260.00	402667.730	6132.250	1096967.891	1139.447	76.288	9401.452
265.00	408162.113	6522.412	1144308.250	1058.329	79.762	9535.033
270.00	413250.898	6930.194	1192321.344	977.076	83.388	9670.553
275.00	417932.656	7356.536	1241017.109	895.480	87.167	9808.104
280.00	422206.977	7802.134	1290405.781	814.058	91.096	9947.729
285.00	426072.629	8267.710	1340497.781	732.151	95.170	10089.432
290.00	429528.172	8753.986	1391303.578	649.976	99.387	10233.236
295.00	432571.766	9261.790	1442833.641	567.526	103.744	10379.162
300.00	435202.793	9791.754	1495098.687	484.765	108.241	10527.253
305.00	437418.797	10344.400	1548109.797	401.669	112.879	10677.555
310.00	439218.746	10920.725	1601877.969	318.203	117.661	10830.122
315.00	440600.391	11521.412	1656414.781	234.330	122.549	10985.019
320.00	441561.266	12146.916	1711732.078	150.011	127.665	11142.311
325.00	442099.734	12798.261	1767841.891	65.200	132.890	11302.063
330.00	442212.309	13476.036	1824756.766	-20.142	138.262	11464.336
335.00	441897.145	14181.080	1882489.453	-106.058	143.798	11629.190
340.00	441150.754	14914.218	1941052.984	-192.588	149.499	11796.688
345.00	439970.266	15676.379	2000460.719	-279.772	155.363	11966.890
350.00	438351.992	16468.209	2060726.391	-367.654	161.389	12139.862
355.00	436292.441	17290.638	2121864.000	-456.270	167.591	12315.690

INITIATE IGM

\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

TIME FROM FIRST MOTION (SEC)	X COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (FT)	Y COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (FT)	Z COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (FT)	X COMPONENT OF VEL. IN THE XXXE SYSTEM (FT/S)	Y COMPONENT OF VEL. IN THE XXXE SYSTEM (FT/S)	Z COMPONENT OF VEL. IN THE XXXE SYSTEM (FT/S)
360.00	433787.934	18144.369	218388.062	-545.665	173.966	12499.461
365.00	430834.355	19030.399	2246813.500	-635.870	180.387	12676.253
370.00	427427.203	19947.580	2310655.719	-727.098	186.521	12861.196
375.00	423561.758	20896.622	2375430.594	-819.279	193.188	13049.326
380.00	419233.305	21880.148	2441154.219	-912.386	200.228	13240.705
385.00	414436.309	22899.149	2507843.125	-1006.551	207.443	13435.449
390.00	409165.641	23955.005	2575514.375	-1101.821	214.948	13633.653
395.00	403416.172	25049.125	2644185.469	-1198.248	222.711	13835.412
400.00	397181.141	26182.510	2713874.531	-1295.909	230.705	14040.835
405.00	390454.805	27356.488	2784600.062	-1394.865	238.946	14250.032
410.00	383230.395	28572.360	2856381.187	-1495.184	247.435	14463.122
415.00	375500.734	29831.374	2929237.781	-1596.939	256.174	14680.230
420.00	367258.652	31134.571	3003190.250	-1700.204	265.167	14901.488
425.00	358495.937	32483.336	3078259.719	-1805.056	274.415	15127.032
430.00	349205.008	33879.129	3154467.844	-1911.575	283.918	15357.007
435.00	339377.254	35323.099	3231837.156	-2019.845	293.701	15591.550
440.00	329003.441	36816.626	3310391.094	-2129.952	303.765	15830.814
445.00	318074.352	38361.130	3390153.344	-2241.975	314.102	16074.963
450.00	306580.133	39958.091	3471148.937	-2356.004	324.734	16324.174
455.00	294510.742	41608.967	3553403.531	-2472.155	335.681	16578.636
460.00	281855.109	43315.473	3636944.031	-2590.530	346.935	16838.539
463.81	271805.434	44654.688	3701516.281	-2682.338	355.731	17040.471
465.00	268601.129	45078.792	3721792.437	-2711.925	358.280	17092.592
470.00	254726.254	46897.511	3807778.281	-2838.351	369.306	17302.364
475.00	240232.117	48771.232	3894818.250	-2956.806	380.023	17511.144
480.00	225158.504	50696.774	3982847.531	-3073.852	390.212	17699.293
485.00	209484.701	52673.641	4071809.719	-3195.908	400.597	17885.955
490.00	193201.277	54702.717	4161710.531	-3317.335	411.052	18074.859
495.00	176307.619	56784.535	4252562.875	-3440.771	421.716	18266.630
500.00	158787.934	58920.491	4344381.625	-3567.826	432.678	18461.450
505.00	140624.793	61111.845	4437182.312	-3697.831	443.910	18659.322
510.00	121805.281	63360.057	4530979.625	-3830.370	455.404	18860.156
515.00	102317.298	65666.327	4625788.687	-3965.160	467.159	19064.062
520.00	82149.975	68032.025	4721625.437	-4102.142	479.181	19271.230
525.00	61291.831	70458.498	4818506.437	-4241.399	491.479	19481.750
530.00	39731.996	72947.271	4916448.500	-4383.038	504.064	19695.717
535.00	17457.554	75499.634	5015469.187	-4527.156	516.945	19913.222
540.00	-5544.004	78117.214	5115586.500	-4673.837	530.125	20134.355
545.00	-29285.187	80801.439	5216818.687	-4823.156	543.606	20359.196
550.00	-53780.143	83553.788	5319184.500	-4975.178	557.402	20587.789
555.00	-79041.584	86379.932	5422702.437	-5129.943	571.514	20820.044
566.66	-87626.106	87331.589	5457432.750	-5182.080	576.279	20998.061

S-11 CECO

S11 OECO

\* \* ENCLASURE 4 \* \*

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

TIME FROM FIRST MOTION (SEC)	X COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS, (FT)	Y COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS, (FT)	Z COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS, (FT)	X COMPONENT OF VEL. IN THE XXXE SYSTEM (FT/S)	Y COMPONENT OF VEL. IN THE XXXE SYSTEM (FT/S)	Z COMPONENT OF VEL. IN THE XXXE SYSTEM (FT/S)
T04	-87677.985	87337.287	5457641.750	-5182.394	576.307	20898.529
S-11/S-1V8 SEP	-93265.460	87957.915	5480114.000	-5212.177	578.266	20902.607

\*\* ENCLASURE 4 \*\*

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

TIME FROM MOTION (SEC)	X COORDINATE (FT)			Y COORDINATE (FT)			Z COORDINATE (FT)			COMPONENT OF VEL. IN THE XXE SYSTEM (FT/S)			COMPONENT OF VEL. IN THE XXE SYSTEM (FT/S)		
	EARTH FIXED, PAD CENTERED, PLUMBIN SYS.	EARTH FIXED, PAD CENTERED, PLUMBIN SYS.	EARTH FIXED, PAD CENTERED, PLUMBIN SYS.	EARTH FIXED, PAD CENTERED, PLUMBIN SYS.	EARTH FIXED, PAD CENTERED, PLUMBIN SYS.	EARTH FIXED, PAD CENTERED, PLUMBIN SYS.	EARTH FIXED, PAD CENTERED, PLUMBIN SYS.	EARTH FIXED, PAD CENTERED, PLUMBIN SYS.	EARTH FIXED, PAD CENTERED, PLUMBIN SYS.	XXE SYSTEM	XXE SYSTEM	XXE SYSTEM	XXE SYSTEM	XXE SYSTEM	XXE SYSTEM
	-93265.460	87957.915	5480114.000	-5212.177	578.266	20902.689	-5212.847	578.305	20902.526						
S-11/S-1VB SEP	-93395.874	87972.474	5480636.500	-5272.456	581.794	20867.835	-5361.604	587.229	20880.254						
S-1VB ENGINE START	-105060.695	91177.007	5595508.437	-5410.208	590.594	20895.994	-5535.481	599.584	20939.490						
S-1VB MAINSTAGE	-122472.522	92192.858	5631540.375	-5550.501	600.562	20944.635	-5695.390	609.811	20993.854						
S-1VB ULLAGE JETT	-131763.451	94856.070	5725146.375	-5839.939	619.638	21043.731	-5985.917	629.703	21093.567						
	-156253.484	95171.107	5736141.062	-6133.003	640.010	21143.158	-6429.796	661.130	21241.665						
	-159163.795	96196.685	5840966.875	-6429.796	671.894	21290.729	-6579.425	672.755	21339.321						
	-187278.543	101270.158	5946080.562	-6729.844	693.707	21387.691	-6881.000	704.749	21436.046						
	-216116.510	104393.496	6051423.812	-7032.958	715.858	21483.904	-7185.672	727.037	21531.530						
	-245680.363	107567.683	6157015.562	-7339.131	738.287	21578.930	-7493.333	749.604	21626.105						
	-275977.484	110793.759	6262854.750	-7648.305	760.981	21673.050	-7804.050	772.428	21719.953						
	-307012.176	114072.839	6368940.062	-8118.008	783.941	21766.673	-8118.008	795.514	21812.982						
	-338788.547	117405.286	6475271.062	-8276.149	807.152	21859.049	-8276.149	807.152	21904.876						
	-371311.512	120791.870	6581846.125	-8435.013	830.774	21949.741	-8435.013	830.774	21994.032						
	-404584.355	124233.020	6688663.500	-8594.602	854.943	22038.662	-8594.602	854.943	22083.359						
	-438610.973	127729.210	6795722.625	-8756.864	879.262	22128.188	-8756.864	879.262	22173.125						
	-473395.461	131280.596	6903022.312	-8920.762	891.470	22203.226	-8920.762	891.470	22204.727						
	-508941.723	134687.826	7010560.687	-9083.841	899.681	22283.359	-9083.841	899.681	22324.942						
	-545253.648	138551.119	7116336.687	-9246.817	902.641	22384.805	-9246.817	902.641	22396.984						
	-582334.312	142270.697	7226349.125	-9409.528	916.566	22496.159	-9409.528	916.566	22496.159						
	-620188.234	146047.271	7334596.812	-9572.051	916.566	22596.159	-9572.051	916.566	22596.159						
	-658818.687	149883.742	7443079.000	-9680.722	916.566	22683.359	-9680.722	916.566	22683.359						
	-698229.984	153771.555	7551795.625	-9680.722	916.566	22766.673	-9680.722	916.566	22766.673						
	-738426.219	157720.205	7660744.500	-9680.722	916.566	22849.741	-9680.722	916.566	22849.741						
	-779411.289	161726.855	7769924.625	-9680.722	916.566	22932.226	-9680.722	916.566	22932.226						
	-821888.687	165791.824	7879334.125	-9680.722	916.566	23015.158	-9680.722	916.566	23015.158						
	-863762.297	169915.633	7988971.625	-9680.722	916.566	23098.662	-9680.722	916.566	23098.662						
	-907137.664	174099.707	8098700.625	-9680.722	916.566	23181.182	-9680.722	916.566	23181.182						
	-951332.430	178344.154	8208430.625	-9680.722	916.566	23263.656	-9680.722	916.566	23263.656						
	-996343.906	182649.324	8318160.625	-9680.722	916.566	23346.182	-9680.722	916.566	23346.182						
	-1042170.477	187015.158	8427945.375	-9680.722	916.566	23428.708	-9680.722	916.566	23428.708						
	-1088811.094	191441.947	8537680.375	-9680.722	916.566	23511.234	-9680.722	916.566	23511.234						
	-1136265.172	194437.182	8647415.375	-9680.722	916.566	23593.760	-9680.722	916.566	23593.760						
	-1184461.281	194626.217	8651455.750	-9680.722	916.566	23676.286	-9680.722	916.566	23676.286						
	-1170494.781	195929.113	8651455.750	-9680.722	916.566	23758.812	-9680.722	916.566	23758.812						
	-1184523.656	200463.219	8762216.500	-9680.722	916.566	23841.338	-9680.722	916.566	23841.338						
	-1233455.531	203519.443	8836234.000	-9680.722	916.566	23923.864	-9680.722	916.566	23923.864						
	-1266537.812	203519.443	8836234.000	-9680.722	916.566	24006.390	-9680.722	916.566	24006.390						

S-1VB GCSI  
TBS  
EPCI

ENCLOSURE 4

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM MOTION (SEC)	X COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (FT)	Y COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (FT)	Z COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (FT)	X COMPONENT OF VEL. IN THE XXE SYSTEM (FT/S)	Y COMPONENT OF VEL. IN THE XXE SYSTEM (FT/S)	Z COMPONENT OF VEL. IN THE XXE SYSTEM (FT/S)
713.12	1645324.750	259357.934	8813245.000	-9926.666	916.145	22099.459
722.12	19554972.250	267691.867	9011675.375	-10150.311	931.136	21997.149
732.12	19452230.000	277085.762	9231067.125	-10397.560	947.623	21880.817
743.12	19336367.250	287608.656	9471037.375	-10668.004	965.622	21749.639
754.12	19217537.750	298328.793	9709546.125	-10936.818	983.473	21615.113
765.12	19095761.000	309244.520	9946556.625	-11203.957	1001.168	21477.280
776.12	18971054.750	320353.967	10182033.375	-11469.405	1018.705	21336.198
787.12	18843438.250	331655.305	10415940.000	-11733.090	1036.072	21191.828
798.12	18712931.750	343146.762	10648240.000	-11994.915	1053.260	21044.092
844.12	18136325.000	393215.941	11601466.625	-13069.290	1123.080	20391.262
932.12	16899185.500	497572.156	13335710.500	-15024.455	1246.165	18991.004
1020.12	15496345.500	612059.930	14938393.375	-16832.155	1352.851	17403.719
1108.12	13941568.000	735107.773	16393733.250	-18474.778	1490.254	15645.052
1196.12	12250098.875	864901.109	17687398.000	-19936.245	1505.734	13732.275
1284.12	10438523.875	999404.852	1880741.750	-21202.220	1546.947	11684.192
1372.12	8524608.625	1136392.750	19740435.250	-22260.253	1561.891	9520.966
1460.12	6527126.500	1273479.031	20479573.750	-23099.905	1546.944	7263.934
1548.12	4465676.250	1408152.750	21016787.000	-23712.872	1506.894	4935.396
1636.12	2360490.781	1537815.594	2134782.250	-24093.063	1434.972	2558.406
1724.12	232238.633	1559821.781	21466334.000	-24236.679	1332.866	156.533
1812.12	-1898180.016	1771518.922	2134299.250	-24142.258	1200.746	-2246.368
1900.12	-4009840.281	1870291.062	21071641.500	-23810.701	1039.263	-4626.404
1988.12	-6082000.312	1933600.656	20561416.250	-23245.269	849.554	-6959.892
2076.12	-8094308.000	2019031.500	19848745.750	-22451.546	633.237	-9223.600
2164.12	-10027003.750	2064330.312	18940768.500	-21437.404	422.394	-11394.996
2252.12	-11861118.000	2087446.937	17846566.250	-20212.913	129.553	-13452.487
2340.12	-13578659.750	2086571.891	16577070.375	-18790.236	-152.344	-15375.637
2428.12	-15162796.875	2060172.547	15144953.375	-1718.113	-449.967	-17145.390
2516.12	-16598021.375	207023.531	13564494.625	-1540.590	-759.650	-18744.254
2604.12	-17870301.500	1926236.375	11851439.125	-1348.293	-1077.425	-20156.490
2692.12	-18967221.000	1817202.531	10022833.375	-11426.457	-1399.080	-21368.254
2780.12	-19878094.500	1680013.109	806853.500	-9258.468	-1720.214	-22367.752
2868.12	-20540374.500	1514673.141	602620.187	-7900.694	-2036.286	-23143.320
2956.12	-21108232.000	1371910.437	4010006.500	-4675.343	-2342.686	-23693.535
3044.12	-21415620.000	1102779.766	1529138.047	-2305.237	-2634.787	-24007.269
3132.12	-21513319.750	858741.469	-188310.506	86.408	-2908.016	-24053.726
3220.12	-21400464.000	591653.742	-2302322.344	2476.211	-3157.909	-23922.464
3308.12	-2107821.2.500	303759.992	-4351744.312	4840.650	-3380.181	-23525.384
3396.12	-20606313.500	26173.921	-6252552.625	6449.285	-3541.862	-22963.276
3476.12	-19895057.000	-293900.191	-8238267.875	9202.304	-3713.430	-22129.630
3564.12	-16789365.500	-626253.672	-10140991.000	11364.674	-3633.400	-21076.392
3652.12	-17898148.250	-867358.631	-11912052.125	13415.374	-3511.825	-19821.082



\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	X COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS, (FT)	Y COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS, (FT)	Z COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS, (FT)	X COMPONENT OF VEL. IN THE XXKE SYSTEM (FT/S)	Y COMPONENT OF VEL. IN THE XXKE SYSTEM (FT/S)	Z COMPONENT OF VEL. IN THE XXKE SYSTEM (FT/S)
3743.12	-1663211.875	-1313438.859	-13623806.123	15334.472	-3946.090	-18369.443
3828.12	-15203688.375	-1660512.922	-15169806.125	17103.318	-3934.106	-16730.315
3916.12	-13626846.500	-2004438.625	-16564959.375	18704.720	-3874.320	-14943.999
4004.12	-11917026.000	-2340961.500	-17795683.750	20123.107	-3775.749	-13004.393
4092.12	-10090952.375	-2665767.344	-1885034.000	21344.694	-3608.011	-10938.823
4180.12	-816482.000	-2974535.187	-19717822.250	22357.598	-3401.339	-8767.856
4268.12	-6162426.427	-3262992.156	-20390716.000	23151.979	-3146.601	-6513.094
4356.12	-4098371.250	-3526970.281	-20862323.750	23720.130	-2845.303	-4196.961
4444.12	-1994482.391	-3762461.469	-21128253.500	24056.564	-2499.582	-1872.474
4532.12	128690.457	-3965673.642	-21186157.250	24158.066	-2112.196	526.986
4620.12	2250416.906	-4133083.469	-21035751.750	24023.731	-1684.206	2887.916
4708.12	4349988.187	-4261489.250	-20678818.500	23654.975	-1226.441	5216.929
4796.12	6406922.500	-4348058.687	-20119182.500	23095.517	-736.466	7490.998
4884.12	8401164.625	-4390374.250	-19362670.750	22231.344	-221.533	9687.690
4972.12	10313284.500	-4386473.500	-18417051.000	21190.639	312.969	11785.393
5060.12	12124664.500	-4334885.937	-17291947.750	19943.697	861.274	13763.537
5148.12	13817682.875	-4234662.125	-15998742.125	18502.817	1417.300	15602.797
5236.12	15375883.250	-4085399.562	-14550453.875	16882.172	1974.723	17285.285
5324.12	16784134.500	-3887259.969	-12961608.000	15097.656	2827.045	18794.718
5412.12	18028773.000	-3640982.062	-11248086.125	13166.730	3067.672	20116.579
5500.12	19097734.000	-3347886.437	-9426963.625	11108.236	3589.989	21238.239
5588.12	19780665.500	-3009873.375	-7516340.875	8942.220	4087.439	22149.081
5676.12	20669025.250	-2629414.969	-5535160.687	6889.727	4553.599	22840.583
5764.12	21156159.000	-2209539.750	-3503020.406	4372.606	4982.264	23306.391
5852.12	21437343.750	-1753810.047	-1439979.281	2013.302	5367.516	23542.373
5940.12	21509929.750	-1266293.831	633639.141	-2740.353	5703.802	23546.644
6028.12	21373165.750	-751527.789	2697441.750	-2740.356	5986.005	23319.579
6116.12	21028425.250	-214478.885	4731172.937	-5088.740	6209.512	22863.802
6204.12	20478992.750	339505.445	6714901.625	-7307.761	6370.279	22184.157
6292.12	19730254.250	904749.000	8629220.750	-9615.218	6464.891	21287.667
6372.12	18882684.500	1423377.000	10293531.250	-11559.834	6491.179	20292.146
6460.12	17775136.750	1993424.042	12024173.875	-13691.319	6482.515	19008.733
6548.12	16494479.875	2586905.156	13633645.375	-15490.939	6341.804	17540.568
6636.12	15053143.000	3107452.094	15106322.500	-17240.161	6158.543	15902.368
6724.12	13465125.000	3638688.969	16427952.250	-18411.874	5903.057	14110.526
6812.12	11749861.875	4144304.656	17585790.500	-20220.562	5576.514	12182.950
6900.12	9912078.875	4618128.875	18568731.750	-21422.464	5180.930	10138.897
6988.12	7981629.312	5054205.712	19367415.250	-22415.722	4719.167	7998.776
7076.12	5973321.375	5448867.875	19974321.750	-23190.506	4194.917	5783.949
7164.12	3906735.437	5798808.542	20383844.250	-23739.129	3612.677	3516.511
7252.12	1802031.266	6081151.062	20592344.750	-24056.118	2977.709	1219.068
7340.12	-320251.492	6312512.937	20598188.500	-24138.297	2295.996	-1085.504

\*\* ENCLOSURE 4 \*\*  
 A4-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH#72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	X COORDINATE			Y COORDINATE			Z COORDINATE			COMPONENT OF VELOCITY IN THE XXXE SYSTEM (FT/S)			COMPONENT OF VELOCITY IN THE XXXE SYSTEM (FT/S)		
	EARTH FIXED	PAD CENTERED	PLUMBIN SYS.	EARTH FIXED	PAD CENTERED	PLUMBIN SYS.	EARTH FIXED	PAD CENTERED	PLUMBIN SYS.	XXE SYSTEM	XXE SYSTEM	XXE SYSTEM	XXE SYSTEM	XXE SYSTEM	XXE SYSTEM
7420.12	-2439394.187	6384068.625	20401756.500	-23964.811	1574.180	-3374.299	-23597.146	819.498	-5624.606	-7814.165	-9921.391	-11925.596	-13807.198	-15547.921	-17130.976
7516.12	-4531706.812	6389603.250	20005438.500	-22979.107	39.701	-7814.165	-22136.787	-757.023	-1562.147	-2366.894	-13807.198	-15547.921	-17130.976	-18541.213	-19765.271
7604.12	-6585731.937	6627562.250	19413605.750	-19814.653	-3162.338	-18547.921	-16722.025	-3939.508	-4689.484	-5403.504	-2079.692	-21611.021	-21994.749	-22066.205	-22072.532
7692.12	-8572447.625	6596093.000	18632559.000	-18357.721	-6073.065	-2079.692	-14923.627	-4689.484	-5403.504	-6073.065	-21611.021	-21994.749	-22066.205	-22072.532	-22072.532
7780.12	-10475467.500	6494078.687	17670461.500	-16357.721	-8735.219	-21994.749	-12980.153	-10910.614	-6073.065	-8735.219	-21994.749	-22066.205	-22072.532	-22072.532	-22072.532
7868.12	-12276229.375	6321165.187	16537249.750	-10357.721	-8735.219	-22066.205	-10910.614	-6073.065	-8735.219	-7408.573	-7124.871	-7098.698	-7098.698	-7098.698	-7098.698
7956.12	-13957179.375	6077777.625	15244526.875	-8735.219	-6894386.875	-22066.205	-10910.614	-6073.065	-8735.219	-7408.573	-7124.871	-7098.698	-7098.698	-7098.698	-7098.698
8044.12	-1580192.000	5765129.312	13805440.625	-7408.573	-5760309.187	-22066.205	-10910.614	-6073.065	-8735.219	-7408.573	-7124.871	-7098.698	-7098.698	-7098.698	-7098.698
8132.12	-16995400.000	5385221.437	12234544.750	-6073.065	-516789.062	-22066.205	-10910.614	-6073.065	-8735.219	-7408.573	-7124.871	-7098.698	-7098.698	-7098.698	-7098.698
8220.12	-1824241.250	4950834.500	10547648.750	-435608.750	-3939.508	-22066.205	-10910.614	-6073.065	-8735.219	-7408.573	-7124.871	-7098.698	-7098.698	-7098.698	-7098.698
8308.12	-19176206.000	4435608.750	8761655.250	-3873518.281	-6894386.875	-22066.205	-10910.614	-6073.065	-8735.219	-7408.573	-7124.871	-7098.698	-7098.698	-7098.698	-7098.698
8396.12	-20041401.250	3873518.281	6894386.875	-3873518.281	-516789.062	-22066.205	-10910.614	-6073.065	-8735.219	-7408.573	-7124.871	-7098.698	-7098.698	-7098.698	-7098.698
8484.12	-20831257.250	3139118.062	516789.062	-3139118.062	-3939.508	-22066.205	-10910.614	-6073.065	-8735.219	-7408.573	-7124.871	-7098.698	-7098.698	-7098.698	-7098.698
8572.12	-212541189.250	3432019.937	5496901.000	-3432019.937	-3432019.937	-22066.205	-10910.614	-6073.065	-8735.219	-7408.573	-7124.871	-7098.698	-7098.698	-7098.698	-7098.698
8660.12	-20848300.750	3432019.937	5496901.000	-3432019.937	-3432019.937	-22066.205	-10910.614	-6073.065	-8735.219	-7408.573	-7124.871	-7098.698	-7098.698	-7098.698	-7098.698

TIME BASE \*

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

ENCLOSURE 4

TIME FROM MOTION (SEC)	X COORDINATE EARTH FIXED, PAD CENTERED, PLUMBIN SYS, (FT)	Y COORDINATE EARTH FIXED, PAD CENTERED, PLUMBIN SYS, (FT)	Z COORDINATE EARTH FIXED, PAD CENTERED, PLUMBIN SYS, (FT)	COMPONENT OF VEL. IN THE XXXE SYSTEM (FT/S)	COMPONENT OF VEL. IN THE XXXF SYSTEM (FT/S)	COMPONENT OF VEL. IN THE XXXG SYSTEM (FT/S)
8460.12	-4145776.000	337599.375	5514043.812	-7098.698	-7101.244	-22072.532
8465.12	-41493145.500	3340376.312	5403602.812	-6969.203	-7131.945	-22103.742
8470.12	-41527667.500	3304440.281	5293007.562	-6839.490	-7162.432	-22134.246
8475.12	-41561540.500	3268752.250	5182261.625	-6709.564	-7192.706	-22164.042
8480.12	-41594762.500	3232713.594	5071368.312	-6579.430	-7222.764	-22193.130
8485.12	-41627334.500	3196525.031	4960331.500	-6449.114	-7252.600	-22221.501
8490.12	-41659253.500	3160188.070	4849154.562	-6318.604	-7282.216	-22249.181
8495.12	-41690519.500	3123703.312	4737840.937	-6187.884	-7311.615	-22276.114
8500.12	-41721132.000	3087072.187	4626394.625	-6056.949	-7340.797	-22302.360
8502.32	-41734393.500	3072378.906	4581779.562	-6004.522	-7352.408	-22312.640
8505.12	-41751089.000	3050295.719	4514818.562	-5925.825	-7353.567	-22313.683
8510.12	-41780390.000	3013374.906	4403116.937	-5794.516	-7369.767	-22327.893
8515.12	-41809034.000	2976311.187	4291292.117	-5663.026	-7398.494	-22352.714
8520.12	-41837020.000	2939105.219	4179349.719	-5531.359	-7427.007	-22376.823
8525.12	-41864347.000	2902758.594	4067291.812	-5399.519	-7455.294	-22400.216
8530.12	-41891014.500	2866472.125	3955122.000	-5267.511	-7483.354	-22422.898
8535.12	-41917022.000	2826647.031	3842844.250	-5135.338	-7511.187	-22444.863
8540.12	-41942368.000	2786884.531	3730461.969	-5003.004	-7538.790	-22466.113
8545.12	-41967052.000	2750946.000	3617978.969	-4870.513	-7566.148	-22486.652
8550.12	-41991072.500	2712952.375	3505398.437	-4737.872	-7593.250	-22506.481
8555.12	-42014430.000	2674784.781	3392724.250	-4605.074	-7620.159	-22525.581
8560.12	-42037123.000	2636444.469	3279959.969	-4472.121	-7646.834	-22543.965
8565.12	-42059151.000	2598052.406	3167109.219	-4339.035	-7673.277	-22561.632
8570.12	-42080513.000	2559490.094	3054175.562	-4205.826	-7699.482	-22578.580
8575.12	-42101209.000	2520798.406	2941162.312	-4072.487	-7725.448	-22594.807
8580.12	-42121238.000	2481978.594	2828073.500	-3939.021	-7751.175	-22610.314
8585.12	-42140599.500	2443032.062	2714912.562	-3805.433	-7776.664	-22625.102
8590.12	-42159292.500	2403959.906	2601683.000	-3671.726	-7801.911	-22639.170
8595.12	-42177316.500	2364763.312	2488388.531	-3537.905	-7826.916	-22652.518
8600.12	-42194671.000	2325443.562	2375032.687	-3403.973	-7851.678	-22665.145
8605.12	-42211356.000	2286001.750	2261619.187	-3269.936	-7876.196	-22677.051
8610.12	-42227370.500	2246439.281	2148151.667	-3135.797	-7900.469	-22688.237
8615.12	-42242713.500	2206757.344	2034633.406	-3001.560	-7924.496	-22698.700
8620.12	-42257385.500	2166956.969	1921068.422	-2867.230	-7948.275	-22708.443
8625.12	-42271306.000	2127039.719	1807460.031	-2732.811	-7971.806	-22717.464
8630.12	-42284713.500	2087006.484	1693811.844	-2598.307	-7995.087	-22725.763
8635.12	-42297369.000	2046898.937	1580127.922	-2463.729	-8018.117	-22733.340
8640.12	-42309351.000	2006597.937	1466411.172	-2329.087	-8040.895	-22740.194
8645.12	-42320659.500	1966225.125	1352665.766	-2194.375	-8063.419	-22746.325
8650.12	-42331295.000	1925741.406	1238895.109	-2059.581	-8085.689	-22751.734
8655.12	-42341255.000	1885148.531	1125102.625	-1924.715	-8107.705	-22756.422
				-1924.715	-8129.466	-22760.388

92/42 BURNER ON  
ENGINE OFF

AR-50 RAJ DATA (ENGLISH UNITS) JANUARY 3, 1971 AZIMUTH=72.067 DEG. 1ST OPP.

ENCLOSURE 4

TIME FROM MOTION (SEC)	X COORDINATE EARTH FIXED, PAC CENTERED PLUMBIN SYS. (FT)	Y COORDINATE EARTH FIXED, PAC CENTERED PLUMBIN SYS. (FT)	Z COORDINATE EARTH FIXED, PAC CENTERED PLUMBIN SYS. (FT)	X COMPONENT OF VEL. IN THE XXE SYSTEM (FT/S)	Y COMPONENT OF VEL. IN THE XXE SYSTEM (FT/S)	Z COMPONENT OF VEL. IN THE XXE SYSTEM (FT/S)
860.12	-423505.91.500	184447.378	101122.516	-1769.791	-81.0.971	-22763.633
865.12	-42359153.000	1903639.156	897467.648	-1654.810	-8172.218	-22766.155
870.12	-42367089.500	1762725.547	783632.186	-1519.778	-8193.206	-22767.954
875.12	-42374351.000	1721707.594	669789.328	-1384.699	-8213.927	-22769.034
880.12	-42380936.500	1680586.797	55942.969	-1249.575	-8234.347	-22769.406
885.12	-42386846.500	1639364.453	442096.395	-1114.414	-8254.552	-22769.040
890.12	-42392080.500	1598041.687	328253.695	-979.220	-8274.495	-22767.952
895.12	-42396636.500	1556619.922	214418.043	-843.996	-8294.175	-22766.142
900.12	-42400520.500	1515100.453	100593.461	-708.746	-8313.590	-22763.612
905.12	-42403726.000	1473484.469	-13216.668	-573.474	-8332.740	-22760.360
910.12	-42406255.000	1431773.453	-127008.818	-438.184	-8351.622	-22756.387
915.12	-42408107.500	1389968.687	-240779.557	-302.884	-8370.238	-22751.694
920.12	-42409283.500	1348071.547	-384524.805	-167.573	-8388.586	-22746.280
925.12	-42410978.500	1306083.344	-468240.973	-32.258	-8406.664	-22740.146
930.12	-42412967.000	1264005.250	-581924.984	103.058	-8424.472	-22733.292
935.12	-42414873.000	1221838.944	-695572.672	238.370	-8442.010	-22725.719
940.12	-42416723.000	1179586.766	-809180.984	373.673	-8459.275	-22717.427
945.12	-424185016.500	1137246.719	-922745.750	508.965	-8476.268	-22708.416
950.12	-424202133.000	1094823.037	-1036263.620	644.239	-8492.987	-22698.687
955.12	-424218574.000	1052317.281	-1149731.594	779.493	-8509.431	-22688.241
960.12	-424234336.500	1009729.547	-1263145.141	914.722	-8525.600	-22677.077
965.12	-424249427.000	967061.852	-1376501.109	1049.921	-8541.494	-22665.196
970.12	-424263839.500	924313.078	-1489795.875	1185.087	-8557.110	-22652.599
975.12	-424277576.000	881491.047	-1603025.891	1320.215	-8572.448	-22639.286
980.12	-424290637.000	83851.141	-1716167.500	1455.301	-8587.508	-22625.257
985.12	-424303023.000	795616.461	-1829277.312	1590.341	-8602.288	-22610.514
990.12	-424314733.500	752688.789	-1942291.453	1725.330	-8616.788	-22595.057
995.12	-424325770.000	70919.156	-2055226.500	1860.265	-8631.007	-22578.866
000.12	-424336131.000	66511.117	-2168079.031	1995.140	-8644.936	-22562.005
005.12	-424345818.500	6211.42	-2280445.437	2129.954	-8658.558	-22544.420
010.12	-424354831.500	5761.953	-2393522.156	2264.700	-8671.915	-22526.117
015.12	-424363171.500	53201.617	-2506105.437	2399.373	-8685.002	-22507.098
020.12	-424370838.500	49224.449	-2618591.906	2533.971	-8697.805	-22487.368
025.12	-424377832.500	449303.961	-2730977.969	2668.488	-8710.322	-22466.930
030.12	-424384153.500	405721.609	-2843259.969	2802.920	-8722.553	-22445.782
035.12	-424389803.000	362078.949	-2955434.594	2937.264	-8734.497	-22423.927
040.12	-424394761.000	318377.191	-3067498.000	3071.516	-8746.153	-22401.365
045.12	-42439887.500	274617.879	-3179447.187	3205.670	-8757.521	-22378.095
050.12	-424402724.500	230802.500	-3291277.719	3339.723	-8768.601	-22354.121
055.12	-424406490.500	186932.379	-3402987.062	3473.671	-8779.390	-22329.442
060.12	-424409988.000	143009.027	-3514571.219	3607.509	-8789.690	-22304.060
065.12	-4244131616.000	99033.905	-3626026.625	3741.234	-8800.098	-22277.975

TIME FROM FIRST MOTION (SEC)	X COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS, (FT)	Y COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS, (FT)	Z COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS, (FT)	X COMPONENT OF VEL. IN THE XXXE SYSTEM (FT/S)	Y COMPONENT OF VEL. IN THE XXXE SYSTEM (FT/S)	Z COMPONENT OF VEL. IN THE XXXE SYSTEM (FT/S)
8870.12	-42130574.000	55008.638	-3737349.687	3874.840	-8810.015	-22251.188
8875.12	-42110868.000	0934.379	-3848537.281	4008.324	-8819.639	-22223.701
8880.12	-42093492.500	-33167.292	-3959585.469	4141.682	-8828.971	-22195.514
8885.12	-42076951.500	-77354.829	-4070491.031	4274.909	-8838.009	-22166.629
8890.12	-42047743.500	-121566.988	-4181250.750	4408.002	-8846.753	-22137.046
8895.12	-42025371.500	-165822.029	-4291860.375	4540.956	-8855.203	-22106.746
8900.12	-42002334.500	-210118.437	-4402317.187	4673.767	-8863.358	-22075.791
8905.12	-41978634.000	-254485.082	-4512617.250	4806.430	-8871.216	-22044.122
8910.12	-41954270.500	-298830.082	-4622757.187	4938.942	-8878.778	-22011.760
8915.12	-41929244.500	-343242.309	-4732733.687	5071.299	-8886.043	-21978.705
8920.12	-41903558.000	-387690.137	-4842543.250	5203.496	-8893.011	-21944.960
8925.12	-41877210.000	-432171.926	-4952182.187	5335.523	-8899.680	-21910.526
8930.12	-41850202.500	-476686.312	-5061647.125	5467.375	-8906.021	-21875.416
8935.12	-41822536.500	-521231.473	-5170935.125	5599.054	-8912.034	-21839.630
8940.12	-41794212.500	-565806.375	-5280042.312	5730.569	-8917.807	-21803.134
8945.12	-41765231.000	-610409.086	-5388968.312	5861.905	-8923.280	-21765.953
8950.12	-41735594.000	-655038.547	-5497700.687	5993.057	-8928.453	-21728.088
8955.12	-41705301.000	-699693.227	-5606245.125	6124.021	-8933.326	-21689.541
8956.42	-41697318.000	-711306.625	-5634933.562	6158.038	-8934.543	-21679.408
8956.92	-41694235.500	-715773.984	-5645272.125	6171.121	-8935.009	-21675.504
8960.12	-41674354.000	-744371.352	-5714595.062	6254.802	-8937.914	-21650.349
8965.12	-41642753.000	-789072.039	-5822747.500	6385.383	-8942.279	-21610.442
8970.12	-41610500.000	-833793.687	-5930698.750	6515.766	-8946.305	-21569.910
8975.12	-41577595.500	-878534.523	-6038645.312	6645.949	-8949.939	-21528.697
8980.12	-41544041.000	-923293.008	-6145984.437	6775.923	-8953.387	-21486.809
8985.12	-41509837.000	-968067.711	-6253312.437	6905.684	-8956.443	-21444.247
8990.12	-41474984.500	-1012856.898	-6360425.937	7035.231	-8959.168	-21401.030
8995.12	-41439485.000	-1057658.812	-6467321.500	7164.559	-8961.558	-21357.152
9000.12	-41403339.000	-1102472.000	-6573996.250	7293.660	-8963.674	-21312.594
9005.12	-41366548.500	-1147295.047	-6680446.375	7422.530	-8965.532	-21267.353
9010.12	-41329114.500	-1192126.781	-6786668.750	7551.167	-8967.085	-21221.445
9015.12	-41291037.500	-1236965.469	-6892659.687	7679.567	-8968.334	-21174.871
9020.12	-41252317.000	-1281809.766	-6998416.250	7807.719	-8969.335	-21127.612
9025.12	-41212967.500	-1326658.297	-7103934.812	7935.625	-8970.045	-21079.685
9030.12	-41172963.500	-1371509.656	-7209712.062	8063.285	-8970.414	-21031.112
9033.12	-41148658.500	-1398421.014	-7272261.375	8139.798	-8970.502	-21001.752
9036.12	-41123228.000	-1416362.031	-7314245.062	8190.786	-8970.528	-20982.123
9038.12	-41107641.000	-1443273.672	-7377147.250	8267.252	-8970.530	-20952.638
9040.12	-41091053.500	-1461216.328	-7419037.312	8321.992	-8974.032	-20942.369
9040.62	-41086888.500	-1465704.062	-7429507.062	8337.704	-8976.864	-20944.901
9044.62	-41053285.000	-1501662.219	-7513335.125	8463.971	-9002.799	-20968.423
9048.12	-41049049.000	-1506164.453	-7523820.000	8479.745	-9006.142	-20971.423

ULLAGE IGNITION  
02/H2 BURNER OFF

J-2 F-L INI  
ULL CUT OFF  
REIGN  
905 THR  
16M INI

.. ENCLOSURE 4 ..

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	X COORDINATE (FT)			Y COORDINATE (FT)			Z COORDINATE (FT)			K COMPONENT OF VEL. IN THE XXE SYSTEM (FT/S)			Y COMPONENT OF VEL. IN THE XXE SYSTEM (FT/S)			Z COMPONENT OF VEL. IN THE XXE SYSTEM (FT/S)		
	EARTH FIXED			EARTH FIXED			EARTH FIXED			K COMPONENT OF VEL. IN THE XXE SYSTEM			Y COMPONENT OF VEL. IN THE XXE SYSTEM			Z COMPONENT OF VEL. IN THE XXE SYSTEM		
	PAD CENTERED			PAD CENTERED			PAD CENTERED			K COMPONENT OF VEL. IN THE XXE SYSTEM			Y COMPONENT OF VEL. IN THE XXE SYSTEM			Z COMPONENT OF VEL. IN THE XXE SYSTEM		
	PLUMBIN SYS.	PLUMBIN SYS.	PLUMBIN SYS.	PLUMBIN SYS.	PLUMBIN SYS.	PLUMBIN SYS.	PLUMBIN SYS.	PLUMBIN SYS.	PLUMBIN SYS.	PLUMBIN SYS.	PLUMBIN SYS.	PLUMBIN SYS.	PLUMBIN SYS.	PLUMBIN SYS.	PLUMBIN SYS.	PLUMBIN SYS.	PLUMBIN SYS.	PLUMBIN SYS.
9050.12	-41004255.500	-1551277.203	-7628753.437	6638.390	-9038.766	-21001.922												
9055.12	-40942648.000	-1596551.531	-7733833.937	8805.972	-9070.969	-21029.772												
9060.12	-40918194.500	-1641987.375	-7839052.437	8975.202	-9103.374	-21057.894												
9065.12	-40872895.000	-1687585.016	-7944412.812	9144.991	-9135.625	-21086.208												
9070.12	-40826743.500	-1733343.187	-8049914.437	9315.393	-9167.662	-21114.394												
9075.12	-40779740.000	-1779261.187	-8155556.562	9486.106	-9199.486	-21142.457												
9080.12	-40731862.000	-1825337.734	-8261339.125	9657.074	-9231.107	-21170.463												
9085.12	-40683169.000	-1871571.922	-8367261.062	9828.255	-9262.546	-21198.335												
9090.12	-40633599.000	-1917962.969	-8473322.375	9999.637	-9293.827	-21226.108												
9095.12	-40583172.500	-1964510.094	-8579522.000	10171.208	-9324.962	-21253.768												
9100.12	-40531866.500	-2011212.266	-8685859.750	10342.967	-9355.961	-21281.321												
9105.12	-404797742.500	-2058069.375	-8792335.125	10514.927	-9386.849	-21308.818												
9110.12	-404276737.500	-2105080.750	-8898947.875	10687.093	-9417.641	-21336.276												
9115.12	-403755732.000	-2152245.687	-9005697.875	10859.471	-9448.348	-21363.716												
9120.12	-403234727.500	-2199564.031	-9112508.125	11032.060	-9478.978	-21391.148												
9125.12	-402713722.000	-2247035.250	-9219609.500	11204.857	-9509.539	-21418.578												
9130.12	-402192717.500	-2294659.281	-9326770.625	11377.851	-9540.028	-21446.020												
9135.12	-401671712.000	-2342435.531	-9434069.625	11551.029	-9570.440	-21473.464												
9140.12	-401150707.500	-2390363.531	-9541505.375	11724.382	-9600.781	-21500.920												
9145.12	-400629702.000	-2438443.281	-9649078.875	11897.907	-9631.056	-21528.395												
9150.12	-400108697.500	-2486674.031	-9756789.375	12071.607	-9661.261	-21555.898												
9155.12	-399587692.000	-2535055.687	-9864637.750	12245.479	-9691.406	-21583.452												
9160.12	-399066687.500	-2583588.000	-9972624.125	12419.527	-9721.498	-21611.049												
9165.12	-398545682.000	-2632270.594	-10080748.625	12593.744	-9751.531	-21638.752												
9170.12	-398024677.500	-2681103.062	-10189011.750	12768.125	-9781.507	-21666.501												
9175.12	-397503672.000	-2730085.625	-10297413.750	12942.666	-9811.429	-21694.371												
9180.12	-396982667.500	-2779225.875	-10405976.375	13123.442	-9845.244	-21732.145												
9185.12	-396461662.000	-2828538.281	-10514736.125	13305.526	-9879.721	-21771.740												
9190.12	-395940657.500	-2878023.156	-10623694.375	13488.015	-9914.227	-21811.599												
9195.12	-395419652.000	-2927680.594	-10732852.625	13670.909	-9948.762	-21851.745												
9200.12	-394898647.500	-2977510.844	-10842212.125	13854.213	-9983.342	-21892.194												
9205.12	-394377642.000	-3027514.219	-10951775.125	14037.936	-10017.992	-21932.973												
9210.12	-393856637.500	-3077691.070	-11061542.750	14222.081	-10052.688	-21974.118												
9215.12	-393335632.000	-3128044.281	-11171515.625	14406.356	-10089.011	-22015.206												
9220.12	-392814627.500	-3178580.875	-11281696.250	14590.453	-10125.546	-22057.043												
9225.12	-392293622.000	-3229299.687	-11392086.750	14775.266	-10161.996	-22099.239												
9230.12	-391772617.500	-3280200.687	-11502689.250	14960.681	-10198.414	-22141.882												
9235.12	-391251612.000	-3331283.761	-11613506.250	15146.705	-10234.816	-22184.981												
9240.12	-390730607.500	-3382548.656	-11724539.750	15333.350	-10271.210	-22228.560												
9245.12	-390209602.000	-3433995.875	-11835792.625	15520.643	-10307.604	-22272.633												
9250.12	-389688597.500	-3485624.812	-11947267.125	15708.601	-10343.998	-22317.228												
9255.12	-389167592.000	-3537438.750	-12058965.875	15897.247	-10380.401	-22362.369												

\*\* ENCLOSURE 4 \*\*  
AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH#72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	X COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (FT)	Y COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (FT)	Z COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (FT)	X COMPONENT OF VEL. IN THE XXXE SYSTEM (FT/S)	Y COMPONENT OF VEL. IN THE XXXE SYSTEM (FT/S)	Z COMPONENT OF VEL. IN THE XXXE SYSTEM (FT/S)
9260.12	-18426158.500	-3589428.844	-12170891.750	16086.638	-10416.822	-22468.077
9265.12	-18345250.500	-3641604.062	-12283047.500	16276.710	-10453.276	-22454.375
9270.12	-18263390.000	-3693961.656	-12395436.625	16467.586	-10489.762	-22501.286
9275.12	-18180573.500	-3746501.719	-12508061.500	16659.266	-10526.292	-22548.832
9280.12	-18096796.000	-3799224.719	-12620926.000	16851.787	-10562.877	-22597.029
9285.12	-18012054.000	-3852130.625	-12734033.125	17045.193	-10599.520	-22645.899
9290.12	-17926347.500	-3905219.937	-12847386.125	17239.524	-10636.224	-22695.469
9295.12	-17839657.500	-3958493.094	-12960988.875	17434.827	-10673.002	-22745.757
9300.12	-17751993.000	-4011950.125	-13074844.875	17631.154	-10709.858	-22796.783
9305.12	-17663333.000	-4065591.719	-13188958.125	17828.566	-10746.795	-22848.566
9310.12	-17573795.000	-4119418.156	-13303331.750	18027.118	-10783.827	-22901.126
9315.12	-17483071.000	-4173429.937	-13417970.125	18226.750	-10820.888	-22954.306
9320.12	-17391435.500	-4227627.250	-13532876.250	18427.660	-10858.020	-23008.277
9325.12	-17298792.000	-4282010.375	-13648054.375	18629.929	-10895.249	-23063.045
9330.12	-17205134.000	-4336579.875	-13763508.125	18833.633	-10932.592	-23118.683
9335.12	-17110453.500	-4391336.437	-13879242.250	19038.859	-10970.057	-23175.134
9340.12	-17014742.000	-4446283.750	-13995261.125	19245.715	-11007.649	-23232.416
9345.12	-16917993.000	-4501413.187	-14111568.000	19454.317	-11045.367	-23290.518
9350.12	-16820196.000	-4556734.625	-14228167.625	19664.793	-11083.203	-23349.430
9355.12	-16721342.000	-4612245.437	-14345063.750	19877.280	-11121.147	-23409.131
9360.12	-16621420.000	-4667946.250	-14462260.250	20091.937	-11159.194	-23469.577
9365.12	-16520416.500	-4723837.500	-14579760.375	20308.869	-11197.357	-23530.773
9370.12	-16418317.500	-4779916.687	-14697561.875	20533.055	-11234.036	-23588.932
9375.12	-16315084.500	-4836178.562	-14815651.375	20760.287	-11270.793	-23644.009
9380.12	-16210713.500	-4892625.937	-14934038.375	20988.304	-11308.326	-23701.111
9385.12	-16105203.000	-4949263.125	-15052733.875	21217.201	-11346.641	-23770.606
9390.12	-15998539.500	-5006093.875	-15171748.375	21447.028	-11385.763	-23835.660
9393.76	-15923214.000	-5047565.750	-1528546.750	21614.830	-11414.755	-23864.527
9393.97	-15915675.000	-5049962.500	-15263561.625	21623.914	-11416.188	-23864.712
9395.12	-15890747.500	-5063114.250	-15291073.625	21644.296	-11412.139	-23867.112
9400.12	-15870221.000	-5120124.862	-15410179.500	21726.007	-11391.903	-23775.211
9403.76	-158703179.000	-5161539.062	-15496547.500	21784.790	-11376.972	-23708.024

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TL1

\*\* ENCLASURE 4 \*\*

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	X COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS, (FT)	Y COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS, (FT)	Z COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS, (FT)	X COMPONENT OF VEL. IN THE XXE SYSTEM (FT/S)	Y COMPONENT OF VEL. IN THE AYE SYSTEM (FT/S)	Z COMPONENT OF VEL. IN THE ZZE SYSTEM (FT/S)
9403.76	-14793503.625	-5105479.562	-15514690.125	21784.790	-11376.972	-23708.024
9413.76	-14574856.750	-5219046.000	-15750842.500	21943.786	-11335.176	-23522.325
9424.76	-14332533.375	-5343468.125	-16008456.125	22114.172	-11287.934	-23316.385
9435.76	-14088360.875	-5467369.375	-16263795.250	22279.769	-11239.421	-23108.851
9446.76	-13842393.750	-5590730.125	-16516843.375	22440.599	-11189.697	-22899.891
9457.76	-13594684.000	-5713537.812	-16767586.500	22596.572	-11138.822	-22689.666
9468.76	-13345285.375	-5835779.750	-17016010.500	22747.686	-11086.856	-22478.342
9479.76	-13094251.500	-5957444.312	-17262104.750	22893.927	-11033.860	-22266.077
9490.76	-12841635.625	-6078520.562	-17505859.750	23035.292	-10979.893	-22053.031
9501.76	-12587491.875	-6198998.062	-17747267.500	23171.779	-10925.017	-21839.359
9512.76	-12331873.250	-6318467.250	-17986322.000	23303.397	-10869.292	-21625.214
9523.76	-12074833.625	-6438118.937	-18223019.000	23430.162	-10812.776	-21410.745
9534.76	-11816426.125	-6556744.937	-18457355.750	23552.096	-10755.529	-21196.099
9544.66	-11582735.875	-6662965.812	-18666237.750	23657.730	-10703.430	-21002.883

CVS OFF



AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (LB/FT <sup>2</sup> )	TOTAL ANGLE OF ATTACK (DEG)	DRAG ALONG VELOCITY VECTOR (LB)	AERODYNAMIC LOAD (LB/FT <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (FT)
0.00	0.00	0.00	89.9497	0.0733	0.010	0.7713
0.40	0.00	0.00	29.3969	0.3072	0.014	3.2495
5.00	0.03	1.11	0.928	1183.5734	0.0191	74.7211
10.00	0.06	5.35	3.6753	2659.2104	0.0434	1353.7965
15.00	0.10	13.85	4.2758	5451.0004	1.0216	4083.4864
20.00	0.14	27.73	2.7946	9826.4658	1.3525	5391.2043
25.00	0.19	48.16	2.2088	16086.4103	1.6565	7484.9880
30.00	0.24	76.24	1.7374	24950.6958	2.3117	9062.8844
35.00	0.30	112.88	1.3651	35550.9004	2.6893	10543.1436
40.00	0.37	158.66	1.0263	49414.7256	2.8420	11141.9132
45.00	0.45	213.61	0.7945	66435.3418	2.9622	11612.8127
50.00	0.54	277.20	0.5326	86869.6562	2.5767	10101.7810
55.00	0.64	347.24	0.4217	110525.2168	2.5556	10019.0807
60.00	0.75	421.03	0.4004	129264.5664	2.9420	12975.3497
65.00	0.88	495.57	0.2647	174140.6797	2.2893	10096.6316
69.00	1.00	551.49	0.1963	248864.5527	1.8892	9257.8942
70.00	1.03	563.88	0.2333	275861.9409	2.2961	11251.8545
75.00	1.21	616.46	0.3031	305550.3477	3.2613	14383.9470
80.00	1.41	653.28	0.2199	273686.0039	2.5070	11057.0547
85.00	1.65	667.13	0.1043	232875.0840	1.2144	5058.5413
85.37	1.67	667.21	0.0739	230339.7773	0.8601	3562.6775
90.00	1.93	650.18	0.2720	195913.8516	3.0867	12101.2047
95.00	2.22	591.78	0.3824	161101.1758	3.9491	15482.1715
100.00	2.50	504.09	0.6495	124096.1807	5.7142	22401.8330
105.00	2.77	412.73	0.8046	88991.3418	5.7960	22722.8184
110.00	3.06	328.58	1.1930	63225.8901	6.8413	26820.7605
115.00	3.36	254.30	0.9664	43845.6748	4.2894	16816.3472
120.00	3.67	191.25	0.445	30796.4341	1.487	437.0870
125.00	3.99	141.46	0.060	21487.5339	0.0149	43.7142
130.00	4.33	102.96	0.1771	14344.1082	0.3162	935.5707
135.00	4.68	73.96	0.1483	8629.7004	0.1914	562.7987
140.00	4.95	50.75	0.1447	5630.5717	0.1281	313.9691
145.00	5.29	35.34	0.1121	2068.8709	0.0692	169.4603
150.00	5.75	25.02	0.0493	-322.7604	0.0215	52.7120
155.00	6.29	17.32	0.0416	-2020.5375	0.0125	30.7387
160.00	6.98	11.78	0.0382	-3192.1119	0.0079	19.2583
164.80	7.76	7.85	0.2861	-3873.8295	0.0392	66.3859
164.81	7.76	7.84	0.2878	-3874.9898	0.0394	66.8382
168.00	7.79	7.70	0.3226	-3897.0859	0.0434	95.6367
168.58	7.84	7.21	0.4417	-3968.3748	0.0555	122.4988

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (LB/FT <sup>2</sup> )	ATTACK ANGLE OF (DEG)	DRAG ALONG VELOCITY VECTOR (LB)	AERODYNAMIC LOAD (LB/FT <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (FT)
S-1C/S-11 SEP	7.88	7.27	.5536	649.0075	.0703	180.7836
S-11 ENGINE START	7.90	6.72	.6599	54.1989	.0774	236.9799
S-11 MAINSTAGE	8.03	4.61	1.2346	496.0158	.0992	303.9383
	8.07	4.18	1.4495	466.0407	.1057	323.6790
	8.37	2.24	2.8292	305.4720	.1106	299.1124
	8.70	1.18	3.7348	180.6051	.0772	192.5834
	8.99	.61	4.7251	99.7706	.0503	123.2476
	9.08	.30	5.6749	52.0927	.0300	73.6299
	9.05	.15	6.6081	27.1930	.0174	43.2956
	8.89	.08	7.5229	14.5358	.0102	25.6612
	8.74	.04	8.4111	8.2899	.0062	15.9485
	8.75	.04	8.4833	7.9345	.0059	15.3725
	8.56	.02	11.5153	5.4744	.0048	13.4709
	8.35	.01	16.9619	4.0912	.0042	12.5580
	8.18	.01	16.8528	2.5525	.0026	7.8330
	7.89	.01	17.2110	1.6127	.0017	4.9512
	7.58	.00	17.4747	1.0349	.0011	3.2336
	7.34	.00	17.6812	.7034	.0008	2.2304
	7.06	.00	17.8568	.4876	.0006	1.5724
	6.67	.00	18.0675	.3417	.0004	1.1383
	6.37	.00	18.2451	.2544	.0003	.8697
	6.14	.00	18.4036	.1977	.0002	.6902
	5.94	.00	18.5489	.1582	.0002	.5637
	5.79	.00	18.6728	.1293	.0002	.4706
	5.66	.00	18.7803	.1083	.0001	.4015
	5.55	.00	18.8614	.0927	.0001	.3487
	5.46	.00	18.9117	.0808	.0001	.3076
	5.39	.00	18.9551	.0715	.0001	.2750
	5.33	.00	19.0001	.0641	.0001	.2488
	5.29	.00	19.0373	.0582	.0001	.2274
	5.25	.00	19.0481	.0534	.0001	.2098
	5.23	.00	19.0507	.0496	.0001	.1955
	5.23	.00	19.0357	.0469	.0001	.1846
	5.24	.00	19.0036	.0445	.0001	.1753
	5.25	.00	18.9538	.0426	.0001	.1673
	5.26	.00	18.8870	.0409	.0001	.1604
	5.29	.00	18.8058	.0395	.0001	.1545
	5.31	.00	18.7106	.0384	.0001	.1494
	5.35	.00	18.6027	.0377	.0001	.1458
	5.40	.00	18.4820	.0371	.0000	.1427
	5.45	.00	18.3492	.0367	.0000	.1401
	5.50	.00	18.2038	.0364	.0000	.1379

INITIATE 16M

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (LB/FT <sup>2</sup> )	TOTAL ANGLE OF ATTACK (DEG)	DRAG ALONG VELOCITY VECTOR (LB)	AERODYNAMIC LOAD (LB/FT <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (FT)
360.00	5.55	.00	18.449	.0362	.0000	.1361
365.00	5.61	.00	17.8669	.0361	.0000	.1346
370.00	5.67	.00	17.5459	.0361	.0000	.1335
375.00	5.73	.00	17.4695	.0362	.0000	.1326
380.00	5.80	.00	17.2702	.0363	.0000	.1321
385.00	5.87	.00	17.0502	.0367	.0000	.1320
390.00	5.95	.00	16.8258	.0371	.0000	.1321
395.00	6.02	.00	16.5890	.0376	.0000	.1324
400.00	6.10	.00	16.3409	.0379	.0000	.1327
405.00	6.18	.00	16.0839	.0383	.0000	.1331
410.00	6.27	.00	15.8172	.0383	.0000	.1319
415.00	6.35	.00	15.5411	.0384	.0000	.1298
420.00	6.44	.00	15.2563	.0385	.0000	.1276
425.00	6.53	.00	14.9631	.0386	.0000	.1254
430.00	6.63	.00	14.6622	.0388	.0000	.1232
435.00	6.72	.00	14.3541	.0389	.0000	.1209
440.00	6.82	.00	14.0398	.0391	.0000	.1185
445.00	6.92	.00	13.7214	.0387	.0000	.1161
450.00	7.02	.00	13.3946	.0394	.0000	.1139
455.00	7.13	.00	13.0600	.0398	.0000	.1123
460.00	7.23	.00	12.7211	.0402	.0000	.1106
463.81	7.32	.00	12.4594	.0405	.0000	.1092
465.00	7.34	.00	12.3859	.0405	.0000	.1088
470.00	7.43	.00	12.6091	.0419	.0000	.1133
475.00	7.52	.00	15.7461	.0499	.0000	.1558
480.00	7.59	.00	14.7311	.0486	.0000	.1447
485.00	7.67	.00	14.3898	.0487	.0000	.1422
490.00	7.75	.00	14.6324	.0501	.0000	.1475
495.00	7.84	.00	13.8508	.0491	.0000	.1384
500.00	7.92	.00	13.1750	.0484	.0000	.1317
505.00	8.00	.00	12.6593	.0477	.0000	.1261
510.00	8.09	.00	12.2544	.0473	.0000	.1219
515.00	8.18	.00	11.9092	.0470	.0000	.1186
520.00	8.27	.00	11.5723	.0469	.0000	.1159
525.00	8.36	.00	11.2270	.0468	.0000	.1129
530.00	8.45	.00	10.8752	.0466	.0000	.1097
535.00	8.55	.00	10.5208	.0464	.0000	.1064
540.00	8.64	.00	10.1669	.0462	.0000	.1030
545.00	8.74	.00	9.8164	.0460	.0000	.0998
550.00	8.84	.00	9.4712	.0458	.0000	.0967
555.00	8.94	.00	9.1358	.0455	.0000	.0936
564.66	8.97	.00	9.0275	.0455	.0000	.0924

5-11 GECO

311 OECO

\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (LB/FT <sup>2</sup> )	TOTAL ANGLE OF ATTACK (DEG)	DRAG ALONG VELOCITY VECTOR (LB)	AERODYNAMIC LOAD (LB/FT <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (FT)
556.67	8.97	.00	9.0269	.0455	.0000	.0924
557.75	8.97	.00	8.9818	.0453	.0000	.0918

Y04  
S-11/S-1V0 SEP

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (LB/FT <sup>2</sup> )	ATTACK ANGLE OF (DEG)	DRAG ALONG VELOCITY VECTOR (LB)	AERODYNAMIC LOAD (LB/FT <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (FT)
557.75	8.97	.00	8.9418	.0367	.0030	.1058
557.77	8.97	.00	8.9809	.0367	.0000	.1057
563.00	8.97	.00	8.9092	.0362	.0000	.1049
563.27	8.97	.00	9.0033	.0367	.0000	.1047
565.00	8.98	.00	9.6122	.031	.0000	.1075
569.47	9.00	.00	8.6485	.031	.0000	.1076
570.00	9.00	.00	8.2128	.031	.0000	.1074
575.30	9.03	.00	7.5400	.0320	.0000	.09.4
580.00	9.06	.00	7.3345	.0322	.0000	.0993
585.00	9.09	.00	6.6815	.0322	.0000	.0993
590.00	9.12	.00	6.3035	.0322	.0000	.0994
595.00	9.15	.00	5.9768	.0322	.0000	.0990
600.00	9.18	.00	5.7050	.0317	.0000	.0941
605.00	9.22	.00	5.4207	.0312	.0000	.0890
610.00	9.25	.00	5.1621	.0307	.0000	.0849
615.00	9.29	.00	4.9417	.0304	.0000	.0806
620.00	9.32	.00	4.6960	.0300	.0000	.0763
625.00	9.36	.00	4.4453	.0296	.0000	.0718
630.00	9.40	.00	4.2441	.0293	.0000	.0684
635.00	9.44	.00	4.0260	.0290	.0000	.0645
640.00	9.48	.00	3.8079	.0288	.0000	.0611
645.00	9.51	.00	3.5919	.0286	.0000	.0576
650.00	9.55	.00	3.3714	.0287	.0000	.0543
655.00	9.59	.00	3.1501	.0286	.0000	.0506
660.00	9.63	.00	2.9549	.0286	.0000	.0474
665.00	9.67	.00	2.7870	.0296	.0000	.0446
670.00	9.72	.00	2.5835	.0285	.0000	.0414
675.00	9.76	.00	2.4066	.0277	.0000	.0383
680.00	9.80	.00	2.2444	.0281	.0000	.0350
685.00	9.84	.00	2.0911	.0284	.0000	.0322
690.00	9.89	.00	1.9461	.0288	.0000	.0301
695.00	9.93	.00	1.8124	.0296	.0000	.0284
700.00	9.97	.00	1.6851	.0303	.0000	.0269
703.34	10.00	.00	1.5797	.0308	.0000	.0252
703.55	10.00	.00	1.4898	.0308	.0000	.0232
705.00	10.00	.00	1.4058	.0310	.0000	.0214
710.00	10.00	.00	1.3277	.0315	.0000	.0197
713.34	10.00	.00	1.2558	.0318	.0000	.0180

3-1VB 6CS1  
108  
EPO1

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 15T 0' .

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (LB/FT <sup>2</sup> )	ANGLE OF ATTACK (DEG)	DRAG VELOCITY VECTOR (LB)	AERODYNAMIC LOAD (LB/FT <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (FT)
713.12	10.00	.00	3.6508	.2426	.0000	.0000
722.12	10.00	.00	4.2625	.2426	.0000	.0000
732.12	10.00	.00	.0178	.2426	.0000	.0000
743.12	10.01	.00	.0095	.2426	.0000	.0000
754.12	10.01	.00	.0366	.2426	.0000	.0000
765.12	10.01	.00	.0637	.2427	.0000	.0000
776.12	10.01	.00	.0909	.2427	.0000	.0000
787.12	10.01	.00	.1180	.2428	.0000	.0000
798.12	10.01	.00	.1451	.2429	.0000	.0000
809.12	10.01	.00	.2581	.2434	.0000	.0000
932.12	10.01	.00	.4717	.2451	.0000	.0000
1020.12	10.02	.00	.6800	.2477	.0000	.0000
1108.12	10.03	.00	.8805	.2510	.0000	.0000
1196.12	10.05	.00	1.0709	.2552	.0000	.0000
1284.12	10.06	.00	1.2492	.2601	.0000	.0000
1372.12	10.08	.00	1.4132	.2654	.0000	.0000
1460.12	10.10	.00	1.5612	.2710	.0000	.0000
1548.12	10.12	.00	1.6914	.2766	.0000	.0000
1636.12	10.14	.00	1.8123	.2819	.0000	.0000
1724.12	10.16	.00	1.8928	.2869	.0000	.0000
1812.12	10.17	.00	1.9617	.2912	.0000	.0000
1900.12	10.18	.00	2.0084	.2946	.0000	.0000
1988.12	10.19	.00	2.0322	.2969	.0000	.0000
2076.12	10.20	.00	2.0329	.2981	.0000	.0000
2164.12	10.20	.00	2.0106	.2981	.0000	.0000
2252.12	10.19	.00	1.9654	.2968	.0000	.0000
2340.12	10.18	.00	1.8978	.2944	.0000	.0000
2428.12	10.17	.00	1.8087	.2910	.0000	.0000
2516.12	10.16	.00	1.6990	.2867	.0000	.0000
2604.12	10.14	.00	1.5700	.2818	.0000	.0000
2692.12	10.12	.00	1.4231	.2765	.0000	.0000
2780.12	10.10	.00	1.2600	.2709	.0000	.0000
2868.12	10.08	.00	1.0825	.2653	.0000	.0000
2955.12	10.07	.00	.8927	.2600	.0000	.0000
3044.12	10.05	.00	.6927	.2547	.0000	.0000
3132.12	10.03	.00	.4848	.2504	.0000	.0000
3220.12	10.02	.00	.2719	.2466	.0000	.0000
3308.12	10.01	.00	.0608	.2434	.0000	.0000
3396.12	10.00	.00	.1471	.2411	.0000	.0000
3476.12	10.00	.00	.3614	.2391	.0000	.0000
3564.12	9.99	.00	.5729	.2377	.0000	.0000
3652.12	9.99	.00	.7783	.2369	.0000	.0000

AS-500 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

ENCLOSURE

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (LB/FT <sup>2</sup> )	ATTACK OF ANGLE (DEG)	DRAG ALONG VELOCITY VECTOR (LB)	AERODYNAMIC LOAD (LB/FT <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (FT)
3740.12	9.99	.00	.9749	.2366	.0000	.0000
3828.13	9.99	.00	1.1606	.2367	.0000	.0000
3916.12	9.99	.00	1.3332	.2372	.0000	.0000
4004.12	10.00	.00	1.4908	.2379	.0000	.0000
4092.12	10.00	.00	1.6315	.2386	.0000	.0000
4180.12	10.00	.00	1.7537	.2393	.0000	.0000
4268.12	10.00	.00	1.8562	.2399	.0000	.0000
4356.12	10.00	.00	1.9376	.2401	.0000	.0000
4444.12	10.00	.00	1.9971	.2399	.0000	.0000
4532.12	10.00	.00	2.0340	.2392	.0000	.0000
4620.12	10.00	.00	2.0479	.2380	.0000	.0000
4708.12	9.99	.00	2.0386	.2363	.0000	.0000
4795.12	9.98	.00	2.0063	.2340	.0000	.0000
4884.12	9.98	.00	1.9512	.2312	.0000	.0000
4972.12	9.97	.00	1.8740	.2281	.0000	.0000
5060.12	9.95	.00	1.7756	.2246	.0000	.0000
5148.12	9.94	.00	1.6570	.2209	.0000	.0000
5236.12	9.93	.00	1.5196	.2172	.0000	.0000
5324.12	9.92	.00	1.3649	.2136	.0000	.0000
5412.12	9.91	.00	1.1946	.2103	.0000	.0000
5500.12	9.90	.00	1.0106	.2072	.0000	.0000
5588.12	9.89	.00	.8154	.2046	.0000	.0000
5676.12	9.88	.00	.6107	.2026	.0000	.0000
5764.12	9.87	.00	.3990	.2012	.0000	.0000
5852.12	9.87	.00	.1831	.2004	.0000	.0000
5940.12	9.87	.00	.0404	.2004	.0000	.0000
6028.12	9.87	.00	.2553	.2012	.0000	.0000
6116.12	9.88	.00	.4706	.2027	.0000	.0000
6204.12	9.89	.00	.6808	.2049	.0000	.0000
6292.12	9.90	.00	.8834	.2079	.0000	.0000
6372.12	9.91	.00	1.0590	.2112	.0000	.0000
6460.12	9.92	.00	1.2408	.2153	.0000	.0000
6548.12	9.94	.00	1.4086	.2200	.0000	.0000
6636.12	9.96	.00	1.5605	.2250	.0000	.0000
6724.12	9.97	.00	1.6947	.2303	.0000	.0000
6812.12	9.99	.00	1.8098	.2356	.0000	.0000
6900.12	10.01	.00	1.9043	.2407	.0000	.0000
6988.12	10.02	.00	1.9775	.2456	.0000	.0000
7076.12	10.03	.00	2.0282	.2499	.0000	.0000
7164.12	10.04	.00	2.0560	.2536	.0000	.0000
7252.12	10.06	.00	2.0605	.2568	.0000	.0000
7340.12	10.06	.00	2.0416	.2584	.0000	.0000

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH#72.067 DEG. 1ST OMP.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (LB/FT <sup>2</sup> )	ATTACK ANGLE OF (DEG)	DRAG ALONG VELOCITY VECTOR (LB)	AERODYNAMIC LOAD (LB/FT <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (FT)
7428.2	10.07	.00	1.9996	.2592	.0000	.0000
7516.12	10.06	.00	1.9349	.2590	.0000	.0000
7604.12	10.06	.00	1.8482	.2777	.0000	.0000
7692.12	10.05	.00	1.7406	.2554	.0000	.0000
7780.12	10.04	.00	1.6131	.2523	.0000	.0000
7868.12	10.03	.00	1.4673	.2487	.0000	.0000
7956.12	10.02	.00	1.3048	.2447	.0000	.0000
8044.12	10.00	.00	1.1273	.2404	.0000	.0000
8132.12	9.99	.00	.9369	.2360	.0000	.0000
8220.12	9.98	.00	.7358	.2316	.0000	.0000
8308.12	9.96	.00	.5263	.2275	.0000	.0000
8396.12	9.95	.00	.3108	.2237	.0000	.0000
8484.12	9.95	.00	.1820	.2216	.0000	.0000
8572.12	9.94	.00	.1548	.2212	.0000	.0000
8660.12	9.94	.00	.1523	.2211	.0000	.0000

TIME BASE 6



AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (LB/FT <sup>2</sup> )	ATTACK ANGLE OF (DEG)	DRAG ALONG VELOCITY VECTOR (LB)	AERODYNAMIC LOAD (LB/FT <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (FT)
8460.12	9.94	.00	.1523	.0000	.0000	.0000
8465.12	9.94	.00	.3493	.0000	.0000	.0000
8470.12	9.94	.00	.6802	.0000	.0000	.0000
8475.12	9.94	.00	1.0294	.0000	.0000	.0000
8480.12	9.94	.00	1.3849	.0000	.0000	.0000
8485.12	9.94	.00	1.6456	.0000	.0000	.0000
8490.12	9.94	.00	1.6671	.0000	.0000	.0000
8495.12	9.94	.00	1.4781	.0000	.0000	.0000
8500.12	9.94	.00	1.2355	.0100	.0000	.0000
8502.12	9.94	.00	1.1431	.0000	.0000	.0000
8502.32	9.94	.00	1.1340	.0000	.0000	.0000
8505.12	9.94	.00	1.0118	.0000	.0000	.0000
8510.12	9.94	.00	.8234	.0000	.0000	.0000
8515.12	9.94	.00	.7002	.0000	.0000	.0000
8520.12	9.94	.00	.6805	.0000	.0000	.0000
8525.12	9.94	.00	.7732	.0000	.0000	.0000
8530.12	9.94	.00	.9490	.0000	.0000	.0000
8535.12	9.94	.00	1.1748	.0000	.0000	.0000
8540.12	9.94	.00	1.4104	.0000	.0000	.0000
8545.12	9.93	.00	1.4679	.0000	.0000	.0000
8550.12	9.93	.00	1.4494	.0000	.0000	.0000
8555.12	9.93	.00	1.4686	.0000	.0000	.0000
8560.12	9.93	.00	1.4297	.0000	.0000	.0000
8565.12	9.93	.00	1.2912	.0000	.0000	.0000
8570.12	9.93	.00	1.1073	.0000	.0000	.0000
8575.12	9.93	.00	.9243	.0000	.0000	.0000
8580.12	9.93	.00	.7433	.0000	.0000	.0000
8585.12	9.93	.00	.5629	.0000	.0000	.0000
8590.12	9.93	.00	.3819	.0000	.0000	.0000
8595.12	9.93	.00	.1991	.0000	.0000	.0000
8600.12	9.93	.00	.0200	.0000	.0000	.0000
8605.12	9.93	.00	.1796	.0000	.0000	.0000
8610.12	9.93	.00	.3760	.0000	.0000	.0000
8615.12	9.93	.00	.5796	.0000	.0000	.0000
8620.12	9.93	.00	.7912	.0000	.0000	.0000
8625.12	9.93	.00	1.0118	.0000	.0000	.0000
8630.12	9.93	.00	1.2422	.0000	.0000	.0000
8635.12	9.93	.00	1.4713	.0000	.0000	.0000
8640.12	9.93	.00	1.6089	.0000	.0000	.0000
8645.12	9.93	.00	1.6059	.0000	.0000	.0000
8650.12	9.93	.00	1.5272	.0000	.0000	.0000
8655.12	9.92	.00	1.4706	.0000	.0000	.0000

02/42 BURNER ON  
02/42 BURNER OFF

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

ENCLOSURE 4

MACH NUMBR	DYNAMIC PRESSURE (LB/FT <sup>2</sup> )	TOTAL ANGLE OF ATTACK (DEG)	DRAG ALONG VELOCITY VECTOR (LB)	AERODYNAMIC LOAD (LB/FT <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (FT)
9.92	.00	1.4617	.0000	.0000	.0000
9.92	.00	1.5051	.0000	.0000	.0000
9.92	.00	1.5992	.0000	.0000	.0000
9.92	.00	1.7329	.0000	.0000	.0000
9.92	.00	1.6615	.0000	.0000	.0000
9.92	.00	1.4530	.0000	.0000	.0000
9.92	.00	1.2659	.0000	.0000	.0000
9.92	.00	1.1024	.0000	.0000	.0000
9.92	.00	.9645	.0000	.0000	.0000
9.92	.00	.8545	.0000	.0000	.0000
9.92	.00	.7738	.0000	.0000	.0000
9.92	.00	.7233	.0000	.0000	.0000
9.92	.00	.7020	.0000	.0000	.0000
9.92	.00	.7057	.0000	.0000	.0000
9.92	.00	.7288	.0000	.0000	.0000
9.92	.00	.7461	.0000	.0000	.0000
9.92	.00	.8131	.0000	.0000	.0000
9.92	.00	.8675	.0000	.0000	.0000
9.92	.00	.9279	.0000	.0000	.0000
9.92	.00	.9936	.0000	.0000	.0000
9.92	.00	1.0683	.0000	.0000	.0000
9.92	.00	1.1451	.0000	.0000	.0000
9.92	.00	1.2345	.0000	.0000	.0000
9.92	.00	1.3354	.0000	.0000	.0000
9.92	.00	1.4494	.0000	.0000	.0000
9.92	.00	1.5767	.0000	.0000	.0000
9.92	.00	1.7182	.0000	.0000	.0000
9.92	.00	1.8764	.0000	.0000	.0000
9.92	.00	2.0463	.0000	.0000	.0000
9.92	.00	2.0560	.0000	.0000	.0000
9.91	.00	1.9239	.0000	.0000	.0000
9.91	.00	1.7382	.0000	.0000	.0000
9.91	.00	1.5831	.0000	.0000	.0000
9.91	.00	1.4450	.0000	.0000	.0000
9.91	.00	1.3171	.0000	.0000	.0000
9.91	.00	1.2009	.0000	.0000	.0000
9.91	.00	1.0964	.0000	.0000	.0000
9.91	.00	1.0037	.0000	.0000	.0000
9.91	.00	.9239	.0000	.0000	.0000
9.91	.00	.8591	.0000	.0000	.0000
9.91	.00	.8129	.0000	.0000	.0000
9.91	.00	.7902	.0000	.0000	.0000

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

ENCLOSURE 4

TIME FROM FIXST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (LB/FT <sup>2</sup> )	ATTACK ANGLE OF (DEG)	DRAG ALONG VELOCITY VECTOR (LB)	AERODYNAMIC LOAD (LB/FT <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (FT)
8870.12	9.91	.00	.7934	.0000	.0000	.0000
8875.12	9.91	.00	.8260	.0000	.0000	.0000
8880.12	9.91	.00	.8602	.0000	.0000	.0000
8885.12	9.91	.00	.9793	.0000	.0000	.0000
8890.12	9.91	.00	1.0971	.0000	.0000	.0000
8895.12	9.91	.00	1.2394	.0000	.0000	.0000
8900.12	9.91	.00	1.4039	.0000	.0000	.0000
8905.12	9.91	.00	1.5892	.0000	.0000	.0000
8910.12	9.91	.00	1.7913	.0000	.0000	.0000
8915.12	9.91	.00	2.0120	.0000	.0000	.0000
8920.12	9.91	.00	2.2510	.0000	.0000	.0000
8925.12	9.91	.00	2.5013	.0000	.0000	.0000
8930.12	9.91	.00	2.6761	.0000	.0000	.0000
8935.12	9.91	.00	2.4141	.0000	.0000	.0000
8940.12	9.91	.00	1.9823	.0000	.0000	.0000
8945.12	9.91	.00	1.5807	.0000	.0000	.0000
8950.12	9.91	.00	1.2319	.0000	.0000	.0000
8955.12	9.91	.00	.9698	.0000	.0000	.0000
8956.42	9.91	.00	.9218	.0000	.0000	.0000
8956.92	9.91	.00	.9061	.0000	.0000	.0000
8960.12	9.91	.00	.8455	.0000	.0000	.0000
8965.12	9.91	.00	.7587	.0000	.0000	.0000
8970.12	9.91	.00	.6956	.0000	.0000	.0000
8975.12	9.91	.00	1.0211	.0000	.0000	.0000
8980.12	9.91	.00	1.5258	.0000	.0000	.0000
8985.12	9.91	.00	2.0913	.0000	.0000	.0000
8990.12	9.91	.00	2.5770	.0000	.0000	.0000
8995.12	9.91	.00	2.5454	.0000	.0000	.0000
9000.12	9.91	.00	1.9914	.0000	.0000	.0000
9005.12	9.91	.00	1.3388	.0000	.0000	.0000
9010.12	9.91	.00	.7010	.0000	.0000	.0000
9015.12	9.91	.00	.0848	.0000	.0000	.0000
9020.12	9.91	.00	.3354	.0000	.0000	.0000
9025.12	9.91	.00	.1975	.0000	.0000	.0000
9030.12	9.91	.00	.5463	.0000	.0000	.0000
9033.12	9.91	.00	1.0162	.0000	.0000	.0000
9035.12	9.91	.00	1.3333	.0000	.0000	.0000
9038.12	9.91	.00	1.7950	.0000	.0000	.0000
9040.12	9.92	.00	1.9345	.0000	.0000	.0000
9040.62	9.92	.00	1.8055	.0000	.0000	.0000
9044.62	9.95	.00	.9453	.0000	.0000	.0000
9045.12	9.95	.00	.9879	.0000	.0000	.0000

ULLAGE IGNITION  
02742 BURNER OFF

J-2 7-L INI  
ULL CUT OFF

REIGN

905 THR  
1GM INI

AS-509 TRA) DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (LB/FT <sup>2</sup> )	ATTACK ANGLE OF (DEG)	DRAG ALONG VELOCITY VECTOR (LB)	AERODYNAMIC LOAD (LB/FT <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (FT)
9050.12	9.99	.00	2.1519	.0000	.0000	.0000
9055.17	10.03	.00	5.9523	.0000	.0000	.0000
9060.12	10.07	.00	5.0660	.0000	.0000	.0000
9065.12	10.11	.00	5.4495	.0000	.0000	.0000
9070.12	10.15	.00	5.2954	.0000	.0000	.0000
9075.12	10.19	.00	5.2144	.0000	.0000	.0000
9080.12	10.23	.00	5.0648	.0000	.0000	.0000
9085.12	10.28	.00	4.9180	.0000	.0000	.0000
9090.12	10.32	.00	4.7639	.0000	.0000	.0000
9095.12	10.36	.00	4.6123	.0000	.0000	.0000
9100.12	10.40	.00	4.4606	.0000	.0000	.0000
9105.12	10.44	.00	4.3083	.0000	.0000	.0000
9110.12	10.49	.00	4.1601	.0000	.0000	.0000
9115.12	10.53	.00	4.0140	.0000	.0000	.0000
9120.12	10.57	.00	3.8715	.0000	.0000	.0000
9125.12	10.62	.00	3.7325	.0000	.0000	.0000
9130.12	10.66	.00	3.5977	.0000	.0000	.0000
9135.12	10.70	.00	3.4686	.0000	.0000	.0000
9140.12	10.74	.00	3.3456	.0000	.0000	.0000
9145.12	10.78	.00	3.2313	.0000	.0000	.0000
9150.12	10.82	.00	3.1277	.0000	.0000	.0000
9155.12	10.87	.00	3.0325	.0000	.0000	.0000
9160.12	10.91	.00	2.9492	.0000	.0000	.0000
9165.12	10.94	.00	2.8795	.0000	.0000	.0000
9170.12	10.98	.00	2.8214	.0000	.0000	.0000
9175.12	11.02	.00	2.7767	.0000	.0000	.0000
9180.12	11.06	.00	2.7445	.0000	.0000	.0000
9185.12	11.11	.00	2.7229	.0000	.0000	.0000
9190.12	11.15	.00	2.7246	.0000	.0000	.0000
9195.12	11.19	.00	2.7306	.0000	.0000	.0000
9200.12	11.23	.00	2.7387	.0000	.0000	.0000
9205.12	11.27	.00	2.7479	.0000	.0000	.0000
9210.12	11.31	.00	2.6164	.0000	.0000	.0000
9215.12	11.34	.00	2.1156	.0000	.0000	.0000
9220.12	11.38	.00	2.3002	.0000	.0000	.0000
9225.12	11.41	.00	2.3972	.0000	.0000	.0000
9230.12	11.44	.00	2.4952	.0000	.0000	.0000
9235.12	11.47	.00	2.5907	.0000	.0000	.0000
9240.12	11.50	.00	2.6838	.0000	.0000	.0000
9245.12	11.53	.00	2.7757	.0000	.0000	.0000
9250.12	11.56	.00	2.8662	.0000	.0000	.0000
9255.12	11.58	.00	2.9530	.0000	.0000	.0000

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (LB/FT <sup>2</sup> )	ATTACK OF (DEG)	DRAG ALONG VELOCITY VECTOR (LB)	AERODYNAMIC LOAD (LB/FT <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (FT)
9260.12	11.60	.00	3.0352	.0000	.0000	.0000
9265.12	11.63	.00	3.1144	.0000	.0000	.0000
9270.12	11.64	.00	3.1901	.0000	.0000	.0000
9275.12	11.66	.00	3.2608	.0000	.0000	.0000
9280.12	11.68	.00	3.3266	.0000	.0000	.0000
9285.12	11.69	.00	3.3898	.0000	.0000	.0000
9290.12	11.71	.00	3.4483	.0000	.0000	.0000
9295.12	11.73	.00	3.5020	.0000	.0000	.0000
9300.12	11.75	.00	3.5516	.0000	.0000	.0000
9305.12	11.77	.00	3.5964	.0000	.0000	.0000
9310.12	11.78	.00	3.6365	.0000	.0000	.0000
9315.12	11.79	.00	3.6764	.0000	.0000	.0000
9320.12	11.81	.00	3.7162	.0000	.0000	.0000
9325.12	11.82	.00	3.7477	.0000	.0000	.0000
9330.12	11.82	.00	3.7756	.0000	.0000	.0000
9335.12	11.83	.00	3.8010	.0000	.0000	.0000
9340.12	11.84	.00	3.8277	.0000	.0000	.0000
9345.12	11.84	.00	3.8591	.0000	.0000	.0000
9350.12	11.84	.00	3.8999	.0000	.0000	.0000
9355.12	11.84	.00	3.9518	.0000	.0000	.0000
9360.12	11.84	.00	4.0218	.0000	.0000	.0000
9365.12	11.84	.00	4.1714	.0000	.0000	.0000
9370.12	11.84	.00	5.3303	.0000	.0000	.0000
9375.12	11.84	.00	5.7997	.0000	.0000	.0000
9380.12	11.85	.00	4.8897	.0000	.0000	.0000
9385.12	11.85	.00	4.7050	.0000	.0000	.0000
9390.12	11.86	.00	4.5381	.0000	.0000	.0000
9393.76	11.86	.00	4.4453	.0000	.0000	.0000
9393.97	11.86	.00	4.4301	.0000	.0000	.0000
9395.12	11.84	.00	4.4301	.0000	.0000	.0000
9400.12	11.77	.00	4.4005	.0000	.0000	.0000
9403.76	11.71	.00	4.4040	.0000	.0000	.0000

GCS:  
TB:

7.1

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (LB/FT <sup>2</sup> )	TOTAL ANGLE OF ATTACK (DEG)	DRAW ALONG VELOCITY VECTOR (LB)	AERODYNAMIC LOAD (LB/FT <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (FT)
9403.76	11.71	.00	4.4040	.0198	.0000	.0000
9413.76	11.56	.00	4.2978	.0154	.0000	.0000
9424.76	11.36	.00	4.2324	.0116	.0000	.0000
9435.76	11.21	.00	4.2223	.0086	.0000	.0000
9446.76	11.04	.00	4.2672	.0064	.0000	.0000
9457.76	10.90	.00	4.3642	.0048	.0000	.0000
9468.76	10.75	.00	4.5091	.0035	.0000	.0000
9479.76	10.60	.00	4.6965	.0026	.0000	.0000
9490.76	10.45	.00	4.9204	.0019	.0000	.0000
9501.76	10.33	.00	5.1752	.0014	.0000	.0000
9512.76	10.23	.00	5.4557	.0010	.0000	.0000
9523.76	10.12	.00	5.7572	.0007	.0000	.0000
9534.75	10.01	.30	6.0756	.0005	.0000	.0000
9544.66	9.93	.00	14.3424	.0004	.0000	.0000

CVS OFF

AS-9 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. ENCLOSURE 4

TIME FROM MOTION (SEC)	X POSI COORD (FT)	Y POSI COORD (FT)	Z POSI COORD (FT)	SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)	SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)	SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)	X VEL. COMP. EARTH CENTER PLUMBLIN SYS (FT/S)	Y VEL. COMP. EARTH CENTER PLUMBLIN SYS (FT/S)	Z VEL. COMP. EARTH CENTER PLUMBLIN SYS (FT/S)
00	2090958.2	63174.7	3842.4	-1.481	412.032	1275.787			
04	20909857.7	63339.5	4372.8	-0.186	412.016	1275.798			
5.00	20909922.2	65234.4	10241.7	29.299	412.491	1275.877			
10.00	20910159.0	67310.0	16621.0	66.167	417.527	1275.846			
15.00	20910597.7	69403.9	22999.9	108.268	418.585	1275.863			
20.00	20911250.2	71494.4	29399.0	155.595	417.885	1280.298			
25.00	20912157.7	73582.2	35855.8	208.405	417.204	1288.587			
30.00	20913344.0	75666.5	42285.7	267.054	416.483	1303.351			
35.00	20914430.7	77746.9	48855.6	331.832	415.685	1326.067			
40.00	20916677.7	79823.2	55567.0	402.921	414.872	1358.213			
45.00	20918878.2	81895.4	62456.8	480.780	414.035	1401.788			
50.00	20921485.7	83963.6	69602.1	563.672	413.250	1458.662			
55.00	20924524.5	86028.0	77067.9	652.751	412.489	1530.231			
60.00	20928022.0	88088.6	84931.3	747.155	411.756	1617.926			
65.00	20932703.5	90145.5	93275.6	846.081	411.034	1722.610			
69.00	20935550.5	91788.6	100354.7	927.582	410.506	1818.776			
70.00	20936488.2	92199.0	102186.3	948.030	410.366	1844.557			
75.00	20941485.7	94249.1	111751.5	1051.565	409.638	1984.728			
80.00	20947011.5	96295.4	122066.7	1159.457	408.885	2144.894			
85.37	20953088.2	98337.9	133239.4	1271.870	408.120	2328.379			
90.00	20953567.0	98490.9	134115.3	1280.177	408.064	2343.095			
95.00	20959731.7	100376.7	145397.4	1385.757	407.427	2537.374			
100.00	20966944.2	102412.3	158667.0	1498.948	406.828	2774.694			
105.00	20974716.7	104451.1	173188.7	1609.738	406.286	3041.509			
110.00	20983041.7	106452.2	189119.5	1720.416	405.749	3335.19			
115.00	20991921.2	108507.4	206585.5	1831.985	405.096	3655.178			
120.00	21001370.2	110525.7	225710.7	1947.697	404.127	3999.532			
125.00	21011391.5	112544.1	246633.9	2059.818	403.168	4375.433			
13.00	21021963.0	114557.4	269519.1	2169.013	402.184	4783.701			
135.00	21033087.2	116565.9	294521.5	2281.415	401.170	5222.534			
140.00	21044783.2	118569.0	321800.0	2397.510	400.013	5694.759			
145.00	21056937.0	120566.0	351289.8	2460.415	398.876	6098.675			
150.00	21069387.7	122558.0	382825.7	2520.026	397.880	6520.150			
155.00	21082139.2	124544.6	416537.2	2580.899	396.776	6969.218			
160.00	21095199.5	126525.7	452568.4	2643.522	395.622	7448.600			
164.80	21108578.5	128500.7	491079.1	2708.422	394.396	7961.567			
164.81	21121739.0	130391.6	530542.5	2773.026	393.139	8488.247			
165.00	21122288.0	130395.6	530647.3	2773.157	393.137	8489.360			
165.5F	21123900.5	130469.5	532245.2	2774.817	393.088	8508.286			
		130698.2	537204.1	2763.371	392.981	8525.181			

AS-509 TPAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	X POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)	Y POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)	Z POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)	X VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)	Y VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)	Z VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)
S-10/S-11 SEP	2112390.5	13069.2	53720.1	2763.371	392.981	8525.181
S-11 ENGINE START	21125635.5	130945.8	542575.2	2743.988	392.883	8525.841
S-11 MAINSTAGE	21133731.0	132123.7	568162.9	2655.987	392.386	8539.891
	21135816.2	132432.8	574897.2	2636.386	392.226	8552.448
	21148707.0	134390.9	617933.0	2522.268	390.953	8658.194
	21161044.5	136342.4	661461.7	2412.916	389.646	8768.787
	21172837.7	138287.3	705593.6	2304.537	388.323	8884.260
	21184091.5	140225.6	750306.8	2197.082	386.977	9001.258
	21194810.0	142157.1	795608.3	2090.452	385.609	9119.870
	21204997.5	144081.7	841505.6	1984.825	384.231	9239.876
	21214659.7	145999.3	888007.0	1880.222	382.832	9361.323
	21215432.7	146157.0	891865.9	1871.642	382.715	9371.428
	21223800.5	147910.0	935120.9	1776.805	381.248	9484.131
	21232450.2	149810.0	982840.3	1685.441	378.810	9602.677
	21240661.2	151698.5	1031146.7	1598.380	376.601	9720.419
	21248432.2	153575.9	1080047.9	1510.112	374.358	9840.244
	21255762.7	155442.1	1129551.3	1422.075	372.130	9961.389
	21262652.5	157297.4	1179664.3	1333.841	369.950	10084.086
	21269100.5	159141.4	1230394.9	1245.339	367.676	10208.417
	21275105.7	160974.7	1281751.1	1156.658	365.698	10334.362
	21280667.0	162798.6	1333741.1	1067.802	363.811	10461.942
	21285783.2	164613.4	1386373.3	978.709	362.078	10591.225
	21290451.7	166419.5	1439656.3	889.377	360.380	10722.250
	21294476.5	168217.3	1493598.7	799.771	358.738	10855.059
	21298451.0	170007.0	1548209.9	709.874	357.134	10989.727
	21301774.7	171788.7	1603499.2	619.673	355.564	11126.344
	21304645.7	173562.7	1659476.6	529.085	354.023	11264.953
	21307664.7	175329.0	1716152.0	438.045	352.506	11405.557
	21309020.5	177087.8	1773535.5	346.569	351.008	11548.177
	21310529.7	178839.1	1831637.1	254.645	349.523	11692.835
	21311572.0	180583.0	1890467.2	162.236	348.051	11839.572
	21312511.0	182319.6	1950036.3	69.313	346.590	11988.433
	21312264.2	184048.7	2010355.1	-24.163	345.140	12139.472
	21311908.5	185771.0	2071434.7	-118.232	343.695	12292.751
	21311581.0	187485.9	2133286.3	-212.937	342.269	12448.335
	21309778.0	189193.7	2195921.8	-308.328	340.845	12606.286
	21307996.2	190894.4	2259353.1	-404.451	339.425	12765.666
	21305732.0	192586.0	2323592.5	-501.350	338.020	12929.530
	21302981.5	194274.6	2388652.6	-599.071	336.631	13094.942
	21299740.0	195954.3	2454546.2	-697.659	335.250	13262.959
	21296003.2	197627.1	2521286.5	-797.161	333.875	13433.645
	21291714.7	199293.1	2588887.1	-897.621	332.515	13607.084

INITIATE 16M



AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.67 DEG.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	X POSI COORD (FT)	Y POSI COORD (FT)	Z POSI COORD (FT)	SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)	X VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)	Y VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)	Z VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)
360.00	21267025.5	200952.3	2657362.0	-999.087	331.163	13783.363	
365.00	21281774.2	202604.7	2726725.4	-1101.595	329.689	13962.654	
370.00	21276007.2	204248.3	2776992.4	-1205.363	327.755	14144.778	
375.00	21269718.5	205882.9	2868176.2	-1310.331	326.176	14330.080	
380.00	21262902.2	207510.4	2940298.3	-1416.476	324.791	14518.522	
385.00	21255551.7	209130.8	3013368.7	-1523.936	323.396	14710.211	
390.00	21247660.5	210744.5	3087405.9	-1632.765	322.101	14905.241	
395.00	21239221.7	212351.9	3162426.7	-1743.022	320.870	15103.705	
400.00	21230227.7	213953.2	3238448.7	-1854.788	319.670	15305.706	
405.00	21220671.2	215548.7	3315489.7	-1968.135	318.513	15511.353	
410.00	21210543.7	217138.4	3393568.4	-2083.137	317.393	15720.760	
415.00	21199836.7	218722.7	3472703.7	-2199.875	316.306	15934.049	
420.00	21188542.0	220301.6	3552915.4	-2318.431	315.252	16151.348	
425.00	21176649.2	221875.2	3634224.0	-2438.892	314.225	16372.790	
430.00	21164149.6	223443.8	3716650.3	-2561.346	313.217	16598.512	
435.00	21151032.2	225007.5	3800216.2	-2685.886	312.248	16828.650	
440.00	21137287.0	226566.4	3884944.3	-2812.607	311.310	17063.351	
445.00	21122902.2	228120.6	3970857.6	-2941.601	310.390	17302.775	
450.00	21107867.0	229670.3	4057980.0	-3072.966	309.500	17547.093	
455.00	21092168.5	231215.7	4146336.6	-3206.832	308.652	17796.489	
460.00	21075794.2	232756.9	4235953.4	-3343.311	307.830	18051.146	
465.00	21062848.2	233299.2	4305140.2	-3449.192	307.224	18248.954	
465.00	21058730.5	234294.0	4326851.2	-3482.874	306.997	18299.750	
470.00	21049958.2	235827.3	4416858.7	-3626.323	306.391	18503.822	
475.00	21022480.7	237357.2	4511891.9	-3762.059	305.421	18707.014	
480.00	21003339.0	238881.1	4605886.4	-3895.894	304.155	18889.503	
485.00	20983513.0	240398.8	4700784.9	-4034.860	302.928	19070.240	
490.00	20962992.0	241910.2	4796592.1	-4173.436	301.603	19253.117	
495.00	20941774.2	243414.8	4893320.4	-4314.279	300.279	19438.680	
500.00	20919842.7	244913.1	4990983.4	-4459.009	299.023	19627.058	
505.00	20897179.2	246405.1	5089595.5	-4606.963	297.811	19818.270	
510.00	20873768.5	247891.2	5189170.5	-4757.723	296.637	20012.238	
515.00	20849597.7	249371.6	5289722.4	-4911.015	295.498	20209.075	
520.00	20824654.2	250848.3	5391264.2	-5066.789	294.393	20408.970	
525.00	20798925.5	252315.6	5493817.2	-5225.136	293.327	20612.011	
530.00	20772398.6	253779.6	5597391.4	-5386.168	292.30	20818.283	
535.00	20745059.2	255238.7	5702005.2	-5549.992	291.327	21027.872	
540.00	20716893.7	256693.0	5807675.6	-5716.697	290.393	21240.883	
545.00	20687887.5	258142.7	5914419.4	-5886.367	289.498	21467.328	
550.00	20658025.0	259588.0	6022254.4	-6059.070	288.649	21677.304	
555.00	20627291.5	261029.3	6131198.0	-6234.850	287.848	21900.704	
560.66	20616861.2	261508.3	6167725.1	-6294.056	287.589	21975.717	

S-11 CECO

S11 OECO

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AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.007 DEG.
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          00 ENCLOSURE 4 00
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TIME FROM FIRST MOTION (SEC)
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          556.67
          557.75
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T04
S-11/S-1VB SEP
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X POSI COORD Y POSI COORD Z POSI COORD X VEL. COMP. Y VEL. COMP. Z VEL. COMP.
SPACE FIXED SPACE FIXED SPACE FIXED SPACE FIXED SPACE FIXED SPACE FIXED SPACE FIXED
EARTH CENTER EARTH CENTER EARTH CENTER EARTH CENTER EARTH CENTER EARTH CENTER
PLUMBLIN SYS PLUMBLIN SYS PLUMBLIN SYS PLUMBLIN SYS PLUMBLIN SYS PLUMBLIN SYS
(FT) (FT) (FT) (FT/S) (FT/S) (FT/S) (FT/S) (FT/S)
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          20616798.2      261511.2      6167944.8      -62.94412      207.587      21976.157
          20610013.7      261820.2      6191574.6      -63.27146      207.272      21978.531
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AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG.

ENCLOSURE 4

TIME FROM MOTION (SEC)	X POST COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)	Y POST COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)	Z POST COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)	X VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)	Y VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)	Z VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)	
S-11/S-1VB SEP	557.75	20610213.7	261820.2	6191574.6	-6327.146	287.272	21978.531
S-1VB ENGINE START	557.77	20609855.5	261827.4	6192124.0	-6327.876	287.264	21978.326
S-1VB MAINTAGE	560.00	20595703.7	262465.7	6241005.5	-6392.772	286.538	21959.977
	563.27	20574610.0	263402.4	6312887.9	-6490.187	285.459	21946.910
	565.00	20563368.0	263894.3	6350757.2	-6543.846	284.963	21959.673
S-1VB MLLAGE JETT	569.47	20533775.0	265167.2	6449105.9	-6682.352	283.854	21995.405
	570.00	20530262.2	265316.2	6460654.7	-6698.926	283.639	21999.618
	575.00	20496368.5	266728.7	6570752.9	-6858.651	281.467	22039.824
	580.00	20461677.0	268131.8	6681053.7	-7018.106	279.795	22000.574
	585.00	20426184.7	269524.9	6791557.9	-7179.031	278.278	22121.096
	590.00	20389884.7	270914.9	6902263.7	-7341.097	276.926	22161.199
	595.00	20352772.2	272296.3	7013169.1	-7504.084	275.678	22200.884
	600.00	20314647.5	273671.8	7124271.7	-7667.945	274.509	22240.219
	605.00	20276091.2	275041.5	7235570.6	-7832.656	273.393	22279.284
	610.00	20236514.5	276405.8	7347063.1	-7998.176	272.305	22317.708
	615.00	20196108.2	277764.6	7458746.7	-8164.466	271.237	22355.740
	620.00	20154868.5	279118.2	7570619.8	-8331.594	270.180	22393.583
	625.00	20112791.2	280466.4	7682680.6	-8499.496	269.124	22430.757
	630.00	20069872.2	281809.4	7794926.1	-8668.173	268.067	22467.526
	635.00	20026108.2	283147.1	7907354.6	-8837.621	267.007	22503.895
	640.00	19981495.0	284479.5	8019963.9	-9007.866	265.941	22539.862
	645.00	19936028.2	285806.5	8132752.1	-9178.911	264.863	22575.423
	650.00	19890704.2	287128.1	8245717.2	-9350.819	263.776	22610.760
	655.00	19842518.7	288444.2	8358858.6	-9523.567	262.680	22645.735
	660.00	19794467.5	289754.9	8472173.1	-9697.091	261.576	22680.118
	665.00	19745546.7	291060.0	8585658.5	-9871.363	260.465	22714.082
	670.00	19695753.0	292359.5	8699312.7	-10046.383	259.348	22747.625
	675.00	19645380.0	293653.6	8813132.9	-10224.072	258.232	22779.948
	680.00	19593510.7	294943.2	8927111.0	-10403.406	257.116	22811.476
	685.00	19541047.5	296228.1	9041247.4	-10581.970	256.006	22843.225
	690.00	19487691.2	297508.2	9155542.5	-10760.467	254.899	22874.889
	695.00	19433443.5	298783.4	9269995.9	-10938.738	253.792	22906.545
	700.00	19378304.5	300053.4	9384607.5	-11116.860	252.682	22938.162
S-1VB GCSI	703.34	19340924.2	300900.1	9461360.7	-11235.986	251.569	22959.270
TBS	703.55	19338563.7	300953.1	9466182.1	-11243.301	252.742	22960.211
	705.00	19322283.7	301318.1	9499356.7	-11283.131	252.198	22941.892
	710.00	19265527.7	302574.3	9613898.0	-11419.197	250.282	22874.579
EP01	713.34	19227183.7	303409.2	9690327.6	-11509.988	248.994	22829.098

ENCLOSURE 4

AS-5C9 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	X POSI COORD (FT)	Y POSI COORD (FT)	Z POSI COORD (FT)	SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)	X VEL. COMP. (FT/S)	Y VEL. COMP. (FT/S)	Z VEL. COMP. (FT/S)
713.12	19229714.5	303333.6	9685320.2	-11504.007	249.023	22832.101	22832.101
722.12	19125376.5	305580.6	9890246.7	-11747.472	245.597	22767.988	22767.988
732.12	19006254.5	308017.1	10116624.1	-12016.395	241.695	22567.048	22567.048
743.12	18872455.2	310651.9	10363991.9	-12310.258	237.363	22468.342	22468.342
754.12	18735434.2	313238.9	10609592.7	-12602.024	232.991	22245.814	22245.814
765.12	18595216.0	315777.5	10853384.7	-12891.655	228.579	22079.511	22079.511
776.12	18451823.5	318267.4	11095327.2	-13179.124	224.129	21909.498	21909.498
787.12	18305281.5	320708.2	11335379.0	-13464.348	219.640	21735.744	21735.744
798.12	18155614.7	323099.3	11573498.4	-13747.215	215.112	21558.181	21558.181
844.12	17496470.2	332552.2	12547425.6	-14904.079	195.781	20775.971	20775.971
932.12	16091822.6	348097.2	14303961.5	-16990.684	157.181	19108.948	19108.948
1020.12	14511538.2	360163.1	15904480.5	-18892.208	116.774	17233.362	17233.362
1108.12	12772829.9	368608.2	17331507.7	-20587.972	74.961	15169.552	15169.552
1196.12	10894635.4	373327.1	18569453.2	-22059.451	32.158	12939.919	12939.919
1284.12	8897420.0	374251.6	19604776.0	-23290.517	-11.205	10569.662	10569.662
1372.12	6802955.5	371351.5	20426136.2	-24267.627	-54.689	8041.553	8041.553
1460.12	4634986.1	364635.7	21024521.7	-24979.979	-97.852	5565.661	5565.661
1548.12	2414480.5	354152.0	21393349.0	-25419.644	-140.250	2869.070	2869.070
1636.12	166375.6	339987.0	21528539.0	-25581.664	-181.444	200.572	200.572
1724.12	-2079688.9	322265.7	21428567.2	-25464.120	-221.005	-2470.646	-2470.646
1812.12	-4305139.6	301150.3	21094481.2	-25068.167	-258.515	-5115.326	-5115.326
1900.12	-6483440.2	276838.8	20529897.0	-24398.033	-293.577	-7704.466	-7704.466
1988.12	-8591360.0	249563.5	19740957.2	-23460.978	-325.816	-10209.447	-10209.447
2076.12	-10605238.5	219588.3	18736268.0	-22267.220	-354.881	-12663.358	-12663.358
2164.12	-12503240.4	187206.8	17526806.2	-20829.828	-380.455	-14859.304	-14859.304
2252.12	-14264600.6	152738.9	16125797.4	-19164.578	-402.254	-16952.720	-16952.720
2340.12	-15970054.9	116528.0	14548568.5	-17289.769	-420.032	-18860.640	-18860.640
2428.12	-17302553.5	78937.2	12812379.5	-15226.014	-433.583	-20562.163	-20562.163
2516.12	-18549952.5	40346.1	10936228.7	-12996.003	-442.744	-22038.687	-22038.687
2604.12	-19585184.0	1146.5	8940644.2	-10424.242	-447.398	-23274.109	-23274.109
2692.12	-20411421.2	-38261.5	6847453.2	-8136.770	-447.471	-24255.005	-24255.005
2780.12	-21014662.0	-77473.3	4679542.5	-5560.867	-442.940	-24970.767	-24970.767
2868.12	-21388364.5	-116084.4	2460603.5	-2924.747	-433.827	-25413.707	-25413.707
2956.12	-21528495.0	-153694.4	214873.0	-257.239	-420.202	-25579.138	-25579.138
3044.12	-21433570.7	-189911.0	-2033133.1	2412.523	-402.182	-25465.406	-25465.406
3132.12	-21104677.0	-224354.3	-4258897.2	5055.423	-379.930	-25073.899	-25073.899
3220.12	-20545447.2	-256660.5	-6438117.2	7642.674	-353.652	-24409.024	-24409.024
3308.12	-19762023.2	-288486.1	-8547069.2	10146.125	-323.596	-23478.146	-23478.146
3396.12	-18862445.2	-311177.8	-10383959.1	12326.346	-293.237	-22469.629	-22469.629
3476.12	-17676813.2	-335401.8	-12295793.4	14595.261	-256.804	-21001.685	-21001.685
3564.12	-16298352.9	-356292.0	-14073544.6	16704.825	-217.533	-19365.070	-19365.070
3652.12	-14792109.9	-373616.7	-15697857.5	18432.125	-176.814	-17517.634	-17517.634

\*\* ENCLOSURE 4 \*\*

49-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	X POST COOR (FT)	Y POST COOR (FT)	Z POST COOR (FT)	SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)	X VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)	Y VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)	Z VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)
3740.12	-13025360.0	-387175.6	-17151050.2	20356.221	-132.062	-15479.506	
3828.13	-11165926.4	-396811.7	-16417304.0	21858.374	-86.714	-13272.682	
3916.12	-9184977.0	-402403.9	-19482836.0	23122.246	-40.230	-10921.785	
4004.12	-7103805.5	-403872.7	-20336047.5	24134.078	6.918	-8451.815	
4092.12	-4995097.6	-401180.9	-20967653.7	24882.844	54.249	-5889.875	
4180.12	-2732383.5	-394333.9	-21370783.7	25360.378	101.274	-3263.882	
4268.12	-489782.8	-383379.9	-21541055.5	25561.466	147.507	-602.465	
4356.12	1758258.4	-368410.1	-21476627.7	25483.918	192.464	2065.345	
4444.12	3987235.2	-349557.5	-21178218.7	25128.586	235.674	4710.442	
4532.12	6172852.2	-326996.2	-20649101.2	24499.370	276.679	7303.956	
4620.12	8291289.3	-300939.5	-19895064.2	23603.172	315.073	9817.597	
4708.12	10319463.7	-271638.2	-18924353.0	22449.824	350.353	12223.910	
4796.12	12235282.6	-239378.0	-17747573.0	21051.978	382.228	14496.690	
4884.12	14017885.9	-204477.1	-16377578.0	19474.961	410.317	16611.171	
4972.12	15647872.7	-167282.4	-14829325.1	17586.600	434.311	18544.348	
5060.12	17107514.5	-128166.5	-13119707.5	15557.020	453.938	20275.225	
5148.12	18380946.2	-87524.1	-11267371.0	13358.414	468.972	21785.037	
5236.12	19454337.5	-45767.5	-9292506.0	11014.794	479.233	23057.456	
5324.12	20316042.2	-3322.9	-7216626.4	8551.717	484.591	24078.757	
5412.12	20956719.5	39374.3	-5062334.7	5996.006	484.963	24837.962	
5500.12	21369434.2	81883.5	-2893073.9	3375.451	480.320	25326.944	
5588.12	21549728.7	123764.1	-612874.1	718.508	470.683	25540.507	
5676.12	21495667.2	164579.2	1633908.5	-1946.006	456.123	25476.432	
5764.12	21207854.5	203900.8	3862853.3	-4589.218	436.764	25135.486	
5852.12	20689427.2	241313.8	6049738.7	-7182.507	412.778	24521.410	
5940.12	19946019.5	276420.5	8170801.7	-9697.800	384.387	23640.875	
6028.12	18985700.0	308844.5	10202992.2	-12107.865	351.858	22503.407	
6116.12	17818866.5	338239.2	12124221.1	-14386.597	315.503	21121.285	
6204.12	16458235.4	364271.0	13913595.5	-16509.763	275.672	19509.416	
6292.12	14918505.7	386663.1	15551644.9	-18452.874	232.758	17685.183	
6372.12	13377375.9	403643.9	16894421.5	-20046.521	191.425	15859.029	
6460.12	11543652.0	418409.8	18195577.5	-21591.253	143.828	13685.803	
6548.12	9584196.5	428905.8	19296734.7	-22901.446	94.464	11363.115	
6636.12	7520301.1	434998.2	20191835.7	-23962.708	43.833	8916.118	
6724.12	5374407.4	436598.4	20865100.2	-24783.321	-7.546	6371.357	
6812.12	3169865.5	433663.8	21311135.0	-25294.384	-59.142	3756.492	
6900.12	930680.5	426198.8	21525018.7	-25549.921	-110.418	1099.993	
6988.12	-1318748.7	414255.2	21504359.7	-25526.968	-160.838	-1569.159	
7076.12	-3553896.3	397932.0	21249328.5	-25225.611	-209.869	-4221.801	
7164.12	-5750378.7	377374.4	20762666.5	-24649.001	-256.987	-6828.908	
7252.12	-7884224.4	352773.2	20049612.6	-23803.333	-301.688	-9361.922	
7340.12	-9932138.2	324362.5	19117944.7	-22697.778	-343.487	-11793.076	

.. ENCLOSURE 4 ..  
 A9-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	X POST COORD (FT)	Y POST COORD (FT)	Z POST COORD (FT)	SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)	X VEL. COMP. (FT/S)	Y VEL. COMP. (FT/S)	Z VEL. COMP. (FT/S)	SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)
7428.12	-11871759.9	292418.0	17977799.7	-21344.390	-381.929	-14095.714	-14095.714	-14095.714
7516.12	-13681911.9	257254.0	16641608.7	-19757.973	-416.590	-16244.588	-16244.588	-16244.588
7604.12	-15342834.0	219220.5	15123952.7	-17955.909	-447.084	-18216.156	-18216.156	-18216.156
7692.12	-16836401.7	178699.5	13441399.4	-15957.963	-473.068	-19988.840	-19988.840	-19988.840
7780.12	-18146328.0	136101.6	11612319.7	-13786.052	-494.243	-21543.274	-21543.274	-21543.274
7868.12	-19258338.7	91861.1	9656683.7	-11463.994	-510.362	-22862.513	-22862.513	-22862.513
7956.12	-20160331.0	46432.0	7595838.6	-9017.254	-521.228	-23932.223	-23932.223	-23932.223
8044.12	-20842501.0	283.3	5452273.4	-6472.608	-526.700	-24740.829	-24740.829	-24740.829
8132.12	-21297451.7	-46106.4	3249369.2	-3857.889	-526.692	-25279.633	-25279.633	-25279.633
8220.12	-21520268.7	-92253.0	1011143.0	-1201.653	-521.177	-25542.900	-25542.900	-25542.900
8308.12	-21508572.0	-137672.8	-1238016.1	1467.132	-510.183	-25527.909	-25527.909	-25527.909
8396.12	-21262536.0	-181887.0	-3473612.7	4119.402	-493.798	-25234.969	-25234.969	-25234.969
8484.12	-21008002.7	-207256.2	-4778378.7	5667.162	-481.638	-24932.447	-24932.447	-24932.447
8459.12	-20943875.2	-212538.9	-5052220.2	5991.985	-478.834	-24856.260	-24856.260	-24856.260
8460.12	-20937868.5	-213017.6	-5077072.9	6021.464	-478.575	-24849.124	-24849.124	-24849.124

TIME BASE 6

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP. ENCLOSURE 4

TIME FROM	X POSI COORD	Y POSI COORD	Z POSI COORD	X VEL. COMP.	Y VEL. COMP.	Z VEL. COMP.
SPACE FIXED	SPACE FIXED	SPACE FIXED	SPACE FIXED	SPACE FIXED	SPACE FIXED	SPACE FIXED
EARTH CENTER	EARTH CENTER	EARTH CENTER	EARTH CENTER	EARTH CENTER	EARTH CENTER	EARTH CENTER
PLUMBLIN SYS	PLUMBLIN SYS	PLUMBLIN SYS	PLUMBLIN SYS	PLUMBLIN SYS	PLUMBLIN SYS	PLUMBLIN SYS
(FT)	(FT)	(FT)	(FT)	(FT/S)	(FT/S)	(FT/S)
8460.12	-20937868.5	-213017.6	-5077072.9	6021.464	-478.575	-24849.124
8465.12	-20907392.7	-215407.2	-5201228.3	6168.732	-477.271	-24812.921
8470.12	-20876181.5	-217790.3	-5325200.6	6315.781	-475.950	-24775.846
8475.12	-20844235.5	-220166.7	-5448985.4	6462.606	-474.613	-24737.899
8480.12	-20811555.7	-222536.4	-5572578.2	6609.200	-473.259	-24699.084
8485.12	-20778144.0	-224899.2	-5695974.7	6755.536	-471.890	-24659.407
8490.12	-20744000.7	-227255.2	-5819170.7	6901.624	-470.504	-24618.865
8495.12	-20709128.0	-229604.3	-5942162.0	7047.483	-469.100	-24577.455
8500.12	-20673526.2	-231946.2	-6064943.9	7193.112	-467.681	-24535.175
8502.12	-20659082.0	-232881.0	-6113997.1	7251.293	-467.109	-24518.022
8502.32	-20657631.5	-232974.4	-6118899.3	7257.107	-467.052	-24516.299
8505.12	-20637197.2	-234281.0	-6187512.2	7338.486	-466.246	-24492.031
8510.12	-20600142.0	-236608.6	-6309862.7	7483.602	-464.795	-24448.029
8515.12	-20562361.7	-238929.0	-6431991.0	7628.453	-463.328	-24403.167
8520.12	-20523857.7	-241241.9	-6553892.9	7773.035	-461.845	-24357.449
8525.12	-20484631.7	-243547.4	-6675564.1	7917.342	-460.346	-24310.875
8530.12	-20444665.0	-245845.3	-6797000.2	8061.369	-458.830	-24263.446
8535.12	-20404018.5	-248135.7	-6918197.1	8205.111	-457.299	-24215.166
8540.12	-20362634.2	-250418.3	-7039150.5	8348.563	-455.736	-24166.034
8545.12	-20320533.5	-252693.0	-7159856.0	8491.719	-454.133	-24116.054
8550.12	-20277717.5	-254959.7	-7280309.6	8634.577	-452.554	-24068.227
8555.12	-20234188.0	-257218.5	-7400506.9	8777.138	-450.959	-24013.551
8560.12	-20189946.5	-259469.3	-7520443.7	8919.400	-449.349	-23961.027
8565.12	-20144994.7	-261711.9	-7640115.8	9061.340	-447.724	-23907.664
8570.12	-20099333.7	-263946.5	-7759518.9	9202.950	-446.083	-23853.465
8575.12	-20052965.7	-266172.7	-7878649.1	9344.234	-444.426	-23798.430
8580.12	-20005892.0	-268390.7	-7997501.9	9485.187	-442.754	-23742.559
8585.12	-19958114.5	-270600.3	-8116073.2	9625.806	-441.067	-23685.854
8590.12	-19909634.5	-272801.4	-8234359.1	9766.085	-439.364	-23628.316
8595.12	-19860454.0	-274993.9	-8352355.0	9906.020	-437.646	-23569.949
8600.12	-19810574.7	-277177.8	-8470570.1	10045.605	-435.913	-23510.755
8605.12	-19759998.5	-279353.0	-8587461.1	10184.836	-434.165	-23450.735
8610.12	-19708727.0	-281519.4	-8704563.0	10323.708	-432.401	-23389.891
8615.12	-19656762.0	-283677.0	-8821358.7	10462.215	-430.623	-23328.225
8620.12	-19604105.5	-285825.6	-8937844.0	10600.353	-428.829	-23265.741
8625.12	-19550759.2	-287965.2	-9054014.7	10738.118	-427.021	-23202.439
8630.12	-19496725.0	-290095.8	-9169867.0	10875.504	-425.197	-23138.323
8635.12	-19442004.7	-292217.2	-9285396.6	11012.500	-423.359	-23073.397
8640.12	-19386600.7	-294329.4	-9400599.6	11149.096	-421.505	-23007.666
8645.12	-19330514.5	-296432.2	-9515472.0	11285.297	-419.637	-22941.128
8650.12	-19273748.5	-298525.7	-9630009.5	11421.114	-417.754	-22873.779
8655.12	-19216304.0	-300609.7	-9744208.4	11556.535	-415.856	-22806.623

02/M2 BURNER ON  
ENGINE OFF

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	X POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)	Y POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)	Z POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)	X VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)	Y VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)	Z VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)
8660.12	-19158183.7	-302684.2	-9858064.4	11691.549	-413.944	-22736.667
8665.12	-19099389.2	-304749.1	-9971573.7	11826.151	-412.017	-22666.911
8670.12	-19039923.0	-306804.4	-10084732.2	11960.336	-410.076	-22596.361
8675.12	-18979786.5	-308849.9	-1017536.0	12094.099	-408.112	-22525.016
8680.12	-18919982.5	-310885.4	-10309981.0	12227.435	-406.093	-22452.881
8685.12	-18857513.0	-312910.9	-10422063.6	12360.342	-404.107	-22379.958
8690.12	-18795379.7	-314926.4	-10533779.4	12492.814	-402.109	-22306.248
8695.12	-18732585.5	-316931.9	-10645124.7	12624.845	-400.097	-22231.756
8700.12	-18669132.0	-318927.4	-10756095.6	12756.432	-398.070	-22156.483
8705.12	-18605022.0	-320912.6	-10866688.2	12887.569	-396.030	-22080.432
8710.12	-18540257.2	-322887.6	-10976898.6	13018.253	-393.975	-22003.605
8715.12	-18474840.0	-324852.4	-11086723.0	13148.478	-391.907	-21926.006
8720.12	-18408773.2	-326806.7	-11196157.5	13278.241	-389.825	-21847.638
8725.12	-18342058.5	-328750.6	-11305198.1	13407.535	-387.729	-21768.502
8730.12	-18274698.7	-330684.0	-11413841.1	13536.358	-385.620	-21698.602
8735.12	-18206695.7	-332606.8	-11522082.9	13664.704	-383.497	-21607.941
8740.12	-18138052.5	-334518.9	-11629919.4	13792.569	-381.360	-21526.521
8745.12	-18068771.0	-336420.3	-11737346.9	13919.949	-379.210	-21444.345
8750.12	-17998853.7	-338311.0	-11844361.5	14046.838	-377.046	-21361.417
8755.12	-17928303.5	-340190.8	-11950959.7	14173.233	-374.869	-21277.738
8760.12	-17857122.2	-342059.7	-12057137.7	14299.129	-372.679	-21193.312
8765.12	-17785313.0	-343917.5	-12162891.6	14424.522	-370.476	-21108.143
8770.12	-17712877.7	-345764.4	-12268217.9	14549.407	-368.259	-21022.232
8775.12	-17639819.5	-347600.1	-12373112.7	14673.780	-366.029	-20935.583
8780.12	-17566141.0	-349424.7	-12477572.5	14797.636	-363.787	-20848.199
8785.12	-17491844.0	-351238.0	-12581593.5	14920.972	-361.531	-20760.084
8790.12	-17416932.0	-353039.9	-12685172.0	15043.782	-359.262	-20671.239
8795.12	-17341407.2	-354830.6	-12788304.6	15166.063	-356.981	-20581.669
8800.12	-17265272.2	-356609.7	-12890987.5	15287.810	-354.678	-20491.375
8805.12	-17188530.0	-358377.3	-12993217.2	15409.018	-352.337	-20400.363
8810.12	-17111183.0	-360133.1	-13094990.0	15529.684	-350.002	-20308.634
8815.12	-17033234.2	-361877.3	-13196302.4	15649.804	-347.670	-20216.192
8820.12	-16954684.0	-363609.8	-13297150.7	15769.373	-345.326	-20123.040
8825.12	-16875541.5	-365330.5	-13397531.6	15888.387	-342.970	-20029.181
8830.12	-16795803.0	-367039.4	-13497441.4	16006.842	-340.601	-19934.619
8835.12	-16715474.0	-368736.5	-13596876.6	16124.734	-338.220	-19839.357
8840.12	-16634556.6	-370421.6	-13695833.7	16242.058	-335.827	-19743.399
8845.12	-16553054.1	-372094.8	-13794309.5	16358.810	-333.422	-19646.747
8850.12	-16470969.6	-373755.6	-13892300.0	16474.987	-331.005	-19549.406
8855.12	-16388305.4	-375404.8	-13989802.2	16590.584	-328.577	-19451.377
8860.12	-16305064.7	-377041.6	-14086812.7	16705.598	-326.137	-19352.666
8865.12	-16221250.4	-378666.1	-14183327.9	16820.023	-323.684	-19253.276



\*\* ENCLOSURE 4 \*\*  
 AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	X POSI COORD (FT)	Y POSI COORD (FT)	Z POSI COORD (FT)	SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)	X VEL. COMP. (FT/S)	Y VEL. COMP. (FT/S)	Z VEL. COMP. (FT/S)
8870.12	-16136865.5	-380278.4	-14279344.4	16933.857	-321.221	-318.745	-19153.210
8875.12	-16051912.9	-381878.3	-14374858.9	17047.095	-318.745	-316.258	-19052.471
8880.12	-15966395.5	-383465.8	-14469867.9	17159.734	-316.258	-313.760	-18951.063
8885.12	-15882316.5	-385040.9	-14564368.4	17271.768	-313.760	-311.250	-18848.990
8890.12	-15793678.7	-386603.4	-14658356.9	17383.195	-311.250	-308.729	-18746.256
8895.12	-15706485.5	-388153.4	-14751829.7	17494.011	-308.729	-306.197	-18642.863
8900.12	-15618739.6	-389690.7	-14844784.2	17604.211	-306.197	-303.654	-18538.816
8905.12	-15530444.5	-391215.3	-14937217.0	17713.792	-303.654	-301.099	-18434.117
8910.12	-15441602.7	-392727.2	-15029124.4	17822.749	-301.099	-298.534	-18328.772
8915.12	-15352218.0	-394226.3	-15120503.5	17931.080	-298.534	-295.958	-18222.783
8920.12	-15262293.0	-395712.5	-15211351.2	18038.780	-295.958	-293.370	-18116.155
8925.12	-15171831.2	-397185.9	-15301664.1	18145.842	-293.370	-290.740	-18008.895
8930.12	-15080935.7	-398646.2	-15391439.0	18252.257	-290.740	-288.069	-17901.009
8935.12	-14989309.7	-400093.2	-15480673.1	18358.029	-288.069	-285.451	-17792.495
8940.12	-14897256.5	-401527.0	-15569363.0	18463.166	-285.451	-282.822	-17683.349
8945.12	-14804679.2	-402947.7	-15657505.5	18567.656	-282.822	-280.183	-17573.578
8950.12	-14711581.1	-404355.2	-15745097.7	18671.493	-280.183	-277.534	-17463.191
8955.12	-14617965.4	-405749.5	-15832136.4	18774.674	-277.534	-274.880	-17352.190
8956.42	-14593542.2	-406109.6	-15854674.2	18801.392	-274.880	-272.292	-17323.232
8956.92	-14584138.9	-406248.2	-15863333.0	18811.661	-272.292	-269.656	-17312.087
8960.12	-14523835.2	-407130.5	-15918618.6	18877.225	-269.656	-266.968	-17240.609
8965.12	-14429194.0	-408498.4	-16004541.4	18979.120	-266.968	-264.267	-17128.429
8970.12	-14334045.0	-409853.4	-16089901.9	19080.348	-264.267	-261.558	-17015.649
8975.12	-14236391.7	-411194.9	-16174696.9	19180.906	-261.558	-258.790	-16902.272
8980.12	-14142237.0	-412523.0	-16258923.6	19280.791	-258.790	-255.979	-16788.301
8985.12	-14045584.9	-413837.6	-16342579.1	19379.997	-255.979	-253.191	-16673.740
8990.12	-13948438.2	-415138.5	-16425660.0	19478.521	-253.191	-250.444	-16558.594
8995.12	-13850800.9	-416425.4	-16508163.9	19576.359	-250.444	-247.688	-16442.867
9000.12	-13752675.9	-417698.3	-16590087.6	19673.510	-247.688	-244.925	-16326.562
9005.12	-13654066.9	-418957.4	-16671428.5	19769.971	-244.925	-242.215	-16209.683
9010.12	-13554977.4	-420202.7	-16752183.7	19865.737	-242.215	-239.513	-16092.235
9015.12	-13455410.6	-421434.3	-16832350.0	19960.805	-239.513	-236.765	-15974.221
9020.12	-13355370.5	-422652.1	-16911925.0	20055.170	-236.765	-235.087	-15855.646
9025.12	-13254860.1	-423856.4	-16990905.5	20148.829	-235.087	-233.366	-15736.513
9030.12	-13153883.2	-425047.2	-17069289.2	20241.781	-233.366	-232.275	-15616.828
9033.12	-13093074.6	-425754.9	-17116031.5	20297.295	-232.275	-230.922	-15544.817
9035.12	-13052443.0	-426224.0	-17147073.0	20334.232	-230.922	-229.510	-15496.753
9038.12	-12991357.2	-426923.4	-17193455.0	20389.562	-229.510	-229.120	-15424.597
9040.12	-12950537.4	-427386.7	-17224259.0	20435.011	-229.120	-228.020	-15382.867
9040.62	-12940315.9	-427502.0	-17231948.7	20451.032	-228.020	-227.020	-15375.925
9044.62	-12858250.0	-428420.4	-17293346.7	20582.071	-227.020	-226.020	-15323.465
9045.12	-12847954.9	-428535.0	-17301006.7	20598.494	-226.020	-225.020	-15316.979

ULLAGE IGNITION  
 D2/H2 BURNER OFF

J-2 F-L INI  
 JLL CUT OFF

REIGN

905 THR  
 1GM INI

●● ENCLOSURE 4 ●●

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM MOTION (SEC)	X POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)	Y POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)	Z POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)	X VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)	Y VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)	Z VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)
9050.12	-12744551.0	-429675.6	-17377429.5	20763.502	-227.018	-15251.755
9055.12	-12646308.4	-430805.0	-17453510.2	20934.548	-224.781	-15179.321
9060.12	-12535203.9	-431923.2	-17529223.0	21107.096	-222.490	-15106.113
9065.12	-12429236.2	-433029.4	-17604570.2	21280.105	-219.930	-15032.565
9070.12	-12322402.4	-434122.2	-17679547.7	21453.449	-217.149	-14958.378
9075.12	-12214701.6	-435200.5	-17754153.2	21626.896	-214.160	-14883.741
9080.12	-12106133.4	-436263.5	-17828384.5	21800.384	-210.986	-14808.669
9085.12	-11996697.6	-437310.1	-17902239.2	21973.893	-207.648	-14733.199
9090.12	-11886394.4	-438339.7	-17975716.0	22147.418	-204.164	-14657.348
9095.12	-11775223.5	-439351.6	-18048812.2	22320.946	-200.554	-14581.114
9100.12	-11663184.9	-440345.0	-18121526.2	22494.483	-196.824	-14504.504
9105.12	-11550278.6	-441319.6	-18193856.7	22668.068	-192.980	-14427.559
9110.12	-11436509.1	-442274.7	-18265801.5	22841.718	-189.029	-14350.292
9115.12	-11321861.2	-443209.7	-18337359.0	23015.449	-184.975	-14272.720
9120.12	-11206349.5	-444124.2	-18408528.2	23189.270	-180.821	-14194.854
9125.12	-11089968.5	-445017.8	-18479307.2	23363.182	-176.574	-14116.701
9130.12	-10972717.6	-445889.8	-18549694.7	23537.180	-172.226	-14038.277
9135.12	-10854596.5	-446739.9	-18619689.5	23711.248	-167.779	-13959.582
9140.12	-10735604.9	-447567.4	-18689290.0	23885.384	-163.233	-13880.628
9145.12	-10615742.5	-448372.0	-18758495.5	24059.592	-158.592	-13801.423
9150.12	-10495009.0	-449153.2	-18827303.7	24233.874	-153.850	-13721.973
9155.12	-10373403.7	-449910.4	-18895714.7	24408.245	-149.007	-13642.299
9160.12	-10250926.2	-450643.1	-18963726.5	24582.712	-144.067	-13562.411
9165.12	-10127576.4	-451350.9	-19031338.5	24757.272	-139.023	-13482.313
9170.12	-10003353.5	-452033.2	-19098549.2	24931.920	-133.877	-13402.008
9175.12	-9878257.0	-452689.5	-19165358.0	25106.655	-128.630	-13321.503
9180.12	-9752263.1	-453318.8	-19231776.0	25292.422	-123.035	-13246.391
9185.12	-9625331.6	-453919.7	-19297822.0	25480.255	-117.319	-13171.977
9190.12	-9497459.9	-454491.7	-19363495.5	25668.503	-111.487	-13097.390
9195.12	-9368645.9	-455034.3	-19428795.7	25857.173	-105.529	-13022.649
9200.12	-9238887.4	-455546.8	-19493721.7	26046.284	-99.456	-12947.768
9205.12	-9108182.2	-456028.7	-19558273.2	26235.862	-93.280	-12872.765
9210.12	-8976528.0	-456479.4	-19622449.5	26425.922	-86.965	-12797.666
9215.12	-8843921.9	-456901.4	-19686249.2	26616.416	-82.159	-12722.684
9220.12	-8710363.4	-457300.3	-19749677.0	26807.124	-77.286	-12648.280
9225.12	-8575849.5	-457673.9	-19812731.7	26998.521	-72.110	-12573.576
9230.12	-8440377.1	-458021.2	-19875412.5	27190.570	-66.717	-12498.718
9235.12	-8303942.7	-458340.7	-19937718.7	27383.285	-61.061	-12423.712
9240.12	-8166543.1	-458631.4	-19999649.5	27576.690	-55.160	-12348.570
9245.12	-8028174.7	-458891.9	-20061204.0	27770.814	-49.011	-12273.293
9250.12	-7888833.7	-459121.0	-20122382.2	27965.689	-42.605	-12197.889
9255.12	-7748516.5	-459317.6	-20183183.0	28161.344	-35.940	-12122.368

\*\* ENCLOSURE 4 \*\*

ENGLISH UNITS: JANUARY 31 1971 AZIMUTH=72.067 DEG. 1ST OPP.

TIME FROM FIRST MOTION (SEC)	A5-509 TRAJ	X POSI COORD (FT)	Y POSI COORD (FT)	Z POSI COORD (FT)	X " L. C. MP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)	Y " L. C. MP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)	Z " L. C. MP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)
9260.12	-7607218.9	-459480.0	-20243605.7	28357.816	-29.015	-12046.731	
9265.12	-7464934.9	-459607.2	-20303650.0	28555.142	-21.831	-11970.986	
9270.12	-7321466.0	-459697.9	-20363315.2	28753.360	-14.378	-11895.130	
9275.12	-717401.7	-459750.6	-20422601.2	28952.507	-6.657	-11819.168	
9280.12	-7032139.2	-459764.0	-20481506.7	29152.627	1.333	-11743.092	
9285.12	-6885873.8	-459736.8	-20540031.7	29353.767	8.590	-11666.895	
9290.12	-6738599.9	-459667.5	-20598175.5	29555.972	18.151	-11590.575	
9295.12	-6590312.2	-459554.8	-20655937.2	29759.297	26.988	-11514.122	
9300.12	-6441005.0	-459397.1	-20713316.5	29963.794	36.118	-11437.524	
9305.12	-6290672.2	-459193.1	-20770312.2	30169.523	45.551	-11360.760	
9310.12	-6139307.6	-458941.1	-20826923.7	30376.544	55.285	-11283.817	
9315.12	-5986904.9	-458639.8	-20883149.7	30584.712	65.321	-11206.586	
9320.12	-5833458.1	-458287.4	-20938989.2	30794.285	75.698	-11129.102	
9325.12	-5678954.6	-457882.2	-20994440.5	31005.351	86.467	-11051.344	
9330.12	-5523402.0	-457422.7	-21049502.2	31217.982	97.445	-10973.282	
9335.12	-5366777.1	-456907.2	-21104172.7	31432.255	108.811	-10894.873	
9340.12	-5209076.5	-456334.1	-21158450.2	31648.257	120.510	-10816.051	
9345.12	-5050291.4	-455701.6	-21212332.5	31866.081	132.548	-10736.742	
9350.12	-4890412.5	-455008.0	-21265816.7	32085.823	144.940	-10656.861	
9355.12	-4729429.9	-454251.6	-21318900.0	32307.581	157.701	-10576.312	
9360.12	-4567333.1	-453430.4	-21371578.5	32531.465	170.831	-10494.965	
9365.12	-4404111.5	-452542.6	-21423848.0	32757.566	184.331	-10412.768	
9370.12	-4239750.3	-451585.3	-21475692.7	32987.688	198.752	-10323.542	
9375.12	-4074230.9	-450554.8	-21527082.5	33220.381	213.450	-10232.598	
9380.12	-3907543.4	-449450.6	-21578021.0	33454.930	228.280	-10142.908	
9385.12	-3739678.3	-448271.8	-21628513.7	33691.439	243.264	-10054.457	
9390.12	-3570625.6	-447017.6	-21678567.5	33930.001	258.414	-9967.288	
9393.76	-3446676.6	-446057.4	-21714712.7	34104.918	269.555	-9904.747	
9393.97	-3439714.8	-446000.7	-21716791.7	34114.135	270.149	-9900.907	
9395.12	-3400403.2	-445688.9	-21728181.2	34121.476	270.923	-9868.324	
9400.12	-3229739.7	-444327.2	-21777163.5	34143.572	273.755	-9724.601	
9403.76	-3105503.8	-443227.6	-21812349.7	34158.805	275.800	-9620.088	

6C52  
Y87  
YLI

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG, 1ST OPP.

ENCLOSURE 4

TIME FROM MOTION (SEC)	X POSI COORD SPACE FIXED EARTH CENTER PLUMB IN SYS (FT)	Y POSI COORD SPACE FIXED EARTH CENTER PLUMB IN SYS (FT)	Z POSI COORD SPACE FIXED EARTH CENTER PLUMB IN SYS (FT)	X VEL. COMP. SPACE FIXED EARTH CENTER PLUMB IN SYS (FT/S)	Y VEL. COMP. SPACE FIXED EARTH CENTER PLUMB IN SYS (FT/S)	Z VEL. COMP. SPACE FIXED EARTH CENTER PLUMB IN SYS (FT/S)
9403.76	-3105503.8	-443327.6	-21812349.7	34158.805	275.800	-9420.088
9413.76	-2763718.1	-440541.7	-21907115.0	34197.509	281.380	-9333.218
9424.76	-2387336.0	-437413.1	-22008047.2	34234.635	287.438	-9018.484
9435.76	-2010576.6	-434218.3	-22105522.7	34266.114	293.411	-8709.794
9446.76	-1633501.6	-430958.3	-22199554.5	34292.017	299.295	-8392.328
9457.76	-1256172.1	-427634.1	-22290157.0	34312.419	305.089	-8081.260
9468.76	-878648.1	-424248.6	-22377345.7	34327.406	310.792	-7771.760
9479.76	-500988.6	-420797.0	-22461139.5	34337.067	316.400	-7463.991
9490.76	-123251.7	-417286.2	-22541858.0	34341.499	321.912	-7158.109
9501.76	254505.6	-413715.2	-22618623.5	34340.800	327.327	-6854.265
9512.76	632227.4	-410085.3	-22692358.0	34335.076	332.644	-6552.602
9523.76	1009659.1	-406397.4	-22762786.7	34324.438	337.861	-6253.255
9534.76	1387347.3	-402652.7	-22829935.7	34309.000	342.977	-5956.355
9544.66	1726917.5	-399234.8	-22887888.5	34291.097	347.495	-5691.338

CVS OFF

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG, 2ND OPP.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	TOTAL VEHICLE ENGINE THRUST (LB)	TOTAL VEHICLE WEIGHT (LB)	ALTITUDE ABOVE ORLATE EARTH (FT)	MAGNITUDE OF SPACE FIXED VELOCITY IN XPP SYSTEM (FT/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (FT/S <sup>2</sup> )
713.12	141.81	300453.21	627810.6	25567.73	-0.00	.015
722.12	141.81	300447.78	627811.9	25567.87	-0.00	.015
732.12	141.81	300441.45	627814.3	25568.02	-0.00	.015
743.12	141.81	300434.47	627810.2	25568.19	-0.00	.015
754.12	141.81	300427.51	627797.7	25568.37	-0.00	.015
765.12	216.02	300419.33	627778.2	25568.57	-0.00	.023
776.12	212.47	300407.22	627751.2	25568.84	-0.00	.023
787.12	208.92	300395.11	627716.5	25569.11	-0.00	.022
798.12	64.78	300388.34	627674.9	25569.27	-0.00	.007
844.12	57.30	300370.24	627426.2	25569.73	-0.00	.004
922.12	42.99	300335.45	626612.5	25570.70	-0.00	.008
1020.12	39.50	300301.03	625386.9	25571.82	-0.00	.004
1108.12	39.50	300266.42	623801.1	25573.14	-0.00	.004
1196.12	39.50	300231.80	621919.9	25574.63	-0.00	.004
1284.12	39.39	300197.19	619818.3	25576.26	-0.00	.004
1372.12	39.26	300162.57	617580.4	25577.96	-0.00	.004
1460.12	39.14	300127.96	615294.5	25579.70	-0.00	.004
1548.12	39.02	300093.34	613051.0	25581.43	-0.00	.004
1636.12	38.69	300058.73	610938.7	25583.09	-0.01	.004
1724.12	38.79	300024.11	609040.1	25584.65	-0.01	.004
1812.12	38.76	299977.35	607428.8	25586.06	-0.01	.004
1900.12	38.72	299932.89	606168.4	25587.28	-0.01	.004
1988.12	38.27	299888.43	605306.3	25588.29	-0.01	.004
2076.12	37.18	299843.96	604874.7	25589.05	-0.01	.004
2164.12	36.09	299799.50	604890.1	25589.56	-0.01	.004
2252.12	35.01	299757.95	605349.4	25589.79	-0.01	.004
2340.12	33.93	299718.76	606234.2	25589.77	-0.01	.004
2428.12	32.86	299679.56	607509.6	25589.49	-0.00	.003
2516.12	31.79	299640.39	609126.1	25588.98	-0.00	.003
2604.12	30.71	299601.21	611022.4	25588.26	-0.00	.003
2692.12	29.64	299562.02	613128.7	25587.35	-0.00	.003
2780.12	28.66	299522.03	615369.7	25586.30	-0.00	.003
2868.12	27.69	299483.41	617666.5	25585.13	-0.01	.003
2956.12	26.72	299444.79	619943.0	25583.88	-0.01	.003
3044.12	25.75	299406.18	622124.7	25582.59	-0.01	.003
3132.12	24.74	299417.56	624147.4	25581.28	-0.02	.003
3220.12	23.85	299389.41	625954.7	25579.99	-0.02	.003
3308.12	23.06	299363.25	627504.9	25578.74	-0.03	.002
3396.12	22.34	299339.48	628665.7	25577.65	-0.03	.002
3476.12	21.55	299313.34	629655.7	25576.62	-0.03	.002
3564.12	20.75	299287.19	630345.3	25575.47	-0.04	.002
3652.12	19.96	299261.04	630749.9	25574.49	-0.04	.002

\*\* ENCLOSURE 4 \*\*  
 A3-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	TOTAL VEHICLE ENGINE THRUST (LBS)	TOTAL VEHICLE WEIGHT (LBS)	ALTITUDE ABOVE OBLATE EARTH (FT)	MAGNITUDE OF SPACE FIXED VELOCITY IN XPP SYSTEM (FT/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (FT/S**2)
3740.12	19.30	299237.82	630898.8	25573.59	.04	.002
3826.13	18.80	299218.71	630832.1	25572.75	.04	.002
3916.12	18.31	299199.61	630602.6	25571.96	.04	.002
4004.12	17.82	299180.51	630269.0	25571.21	.04	.002
4092.12	17.32	299161.40	629895.8	25570.44	.04	.002
4180.12	16.83	299142.30	629548.7	25569.75	.04	.002
4268.12	16.44	299123.20	629290.5	25568.99	.04	.002
4354.12	16.09	299104.09	629181.2	25568.20	.04	.002
4444.12	15.74	299084.99	629270.8	25567.35	.04	.002
4532.12	15.39	299065.88	629601.0	25566.45	.03	.002
4620.12	15.03	299046.79	630177.9	25565.48	.03	.002
4708.12	14.70	299027.68	631074.9	25564.45	.03	.002
4796.12	14.66	299008.57	632235.1	25563.37	.02	.002
4884.12	14.63	298989.47	633655.1	25562.25	.02	.002
4972.12	14.59	298970.36	635306.7	25541.10	.01	.002
5060.12	14.56	298951.26	637144.0	25559.96	.01	.002
5148.12	14.52	298932.15	639109.0	25558.85	.00	.002
5236.12	14.53	298913.05	641135.6	25557.81	.00	.002
5324.12	14.62	298893.94	643150.4	25556.86	.00	.002
5412.12	14.71	298874.84	645077.3	25556.05	-.01	.002
5500.12	14.80	298855.73	646839.1	25555.40	-.01	.002
5588.12	14.88	298836.62	648362.0	25554.95	-.01	.002
5676.12	14.97	298817.52	649679.6	25554.72	-.01	.002
5764.12	15.06	298797.62	650433.6	25554.73	-.01	.002
5852.12	15.15	298777.37	650878.6	25555.01	-.02	.002
5940.12	15.24	298757.11	650884.0	25555.55	-.02	.002
6028.12	15.32	298736.86	650434.3	25554.36	-.02	.002
6116.12	15.41	298716.60	649530.2	25557.43	-.02	.002
6204.12	15.50	298696.35	648191.2	25558.75	-.02	.002
6292.12	15.52	298676.09	646451.1	25560.29	-.02	.002
6372.12	15.53	298657.68	644564.3	25561.86	-.02	.002
6460.12	15.55	298637.43	642211.3	25563.73	-.02	.002
6548.12	15.57	298617.17	639640.7	25565.71	-.02	.002
6636.12	15.59	298596.91	636934.7	25567.76	-.02	.002
6724.12	15.59	298577.28	634182.9	25569.83	-.02	.002
6812.12	15.53	298559.67	631476.0	25571.87	-.02	.002
6900.12	15.46	298542.05	628904.2	25573.83	-.02	.002
6988.12	15.43	298524.44	626551.4	25575.66	-.02	.002
7076.12	15.38	298506.83	624495.2	25577.32	-.02	.002
7164.12	15.32	298489.22	622800.6	25578.77	-.01	.002
7252.12	15.24	298471.61	621520.0	25579.98	-.01	.002
7340.12	15.14	298454.00	620699.2	25580.93	-.01	.002

.. ENCLOSURE " ..

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	TOTAL VEHICLE ENGINE THRUST (LR)	TOTAL VEHICLE WEIGHT (LB)	ALTITUDE ABOVE ORLATE EARTH (FT)	MAGNITUDE OF SPACE FIXED VELOCITY IN XPP SYSTEM (FT/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (FT/S**2)
7478.12	15.03	298436.38	620327.9	25581.60	-01	.002
7516.12	14.92	298418.77	620437.6	25581.98	-01	.002
7634.12	14.82	298401.16	621003.1	25582.08	-01	.002
7692.12	14.71	298383.55	621992.5	25581.91	-01	.002
7780.12	14.44	298368.23	623359.6	25581.48	-01	.002
7868.12	14.14	298353.26	625044.7	25580.82	-00	.001
7956.12	13.84	298338.29	626979.0	25579.95	-00	.001
8044.12	13.54	298323.32	629066.5	25578.91	.00	.001
8132.12	13.24	298308.35	631267.9	25577.74	.00	.001
8220.12	12.94	298293.38	633503.9	25576.46	.01	.001
8308.12	12.62	298278.41	635658.8	25575.12	.01	.001
8396.12	12.31	298263.44	637683.1	25573.76	.02	.001
8484.12	11.99	298248.46	639516.3	25572.39	.02	.001
8572.12	11.67	298233.49	641110.6	25571.05	.03	.001
8660.12	11.36	298218.52	642431.3	25569.77	.03	.001
8748.12	11.12	298204.09	643458.0	25568.55	.03	.001
8836.12	10.96	298190.17	644186.6	25567.41	.04	.001
8924.12	10.80	298176.26	644626.2	25566.36	.04	.001
9012.12	10.64	298162.35	644802.3	25565.38	.04	.001
9100.12	10.49	298148.43	644752.5	25564.48	.04	.001
9188.12	10.33	298134.52	644524.7	25563.64	.04	.001
9276.12	10.20	298120.61	644175.9	25562.85	.04	.001
9364.12	10.08	298106.69	643768.5	25562.09	.04	.001
9452.12	9.95	298092.78	643366.5	25561.34	.04	.001
9540.12	9.83	298078.87	643034.0	25560.59	.04	.001
9628.12	9.71	298064.95	642829.7	25559.82	.04	.001
9716.12	9.60	298051.12	642806.5	25559.01	.04	.001
9804.12	9.58	298037.73	643035.9	25558.15	.03	.001
9892.12	9.56	298024.35	643459.8	25557.25	.03	.001
9980.12	9.54	298010.96	644182.9	25556.29	.02	.001
10068.12	9.53	297997.58	645178.2	25555.29	.02	.001
10156.12	9.51	297984.20	646432.5	25554.26	.01	.001
10244.12	9.52	297970.81	647916.9	25553.22	.01	.001
10332.12	9.58	297957.43	649589.3	25552.18	.01	.001
10420.12	9.63	297944.04	651396.2	25551.18	.00	.001
10508.12	9.68	297930.66	653272.6	25550.24	-00	.001
10596.12	9.74	297917.27	655149.1	25549.40	-01	.001
10684.12	9.79	297903.89	656949.0	25548.69	-01	.001
10772.12	9.90	297892.01	658897.0	25548.14	-01	.001
10860.12	10.02	297880.56	660019.7	25547.78	-02	.001
10948.12	10.14	297869.11	661148.1	25547.65	-02	.001
11036.12	10.27	297857.66	661924.8	25547.76	-02	.001

\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	TOTAL VEHICLE THRUST (LB)	TOTAL VEHICLE WEIGHT (LB)	ALTITUDE ABOVE OBLATE EARTH (FT)	MAGNITUDE OF SPACE FIXED XPP SYSTEM (FT/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (FT/S**2)
11124.12	10.39	297846.22	662301.9	25548.12	-0.02	.001
11212.12	10.51	297834.77	662245.7	25548.75	-0.02	.001
11300.12	10.60	297823.32	661738.0	25549.65	-0.02	.001
11388.12	10.68	297811.87	660777.6	25550.81	-0.02	.001
11476.12	10.77	297800.43	659379.5	25552.21	-0.02	.001
11564.12	10.84	297788.98	657575.7	25553.84	-0.02	.001
11652.12	10.95	297777.53	655414.4	25555.16	-0.02	.001
11740.12	11.04	297765.36	652956.9	25557.64	-0.02	.001
11828.12	11.12	297752.14	650276.8	25559.72	-0.02	.001
11916.12	11.21	297738.93	647456.9	25561.88	-0.02	.001
12004.12	11.30	297725.72	644586.4	25564.05	-0.02	.001
12092.12	11.39	297712.52	641755.5	25566.19	-0.02	.001
12180.12	11.48	297699.31	639055.3	25568.24	-0.02	.001
12268.12	11.54	297686.10	636572.5	25570.17	-0.02	.001
12356.12	11.59	297672.89	634304.4	25571.91	-0.02	.001
12444.12	11.64	297659.68	632258.4	25573.45	-0.02	.001
12532.12	11.70	297646.47	631149.7	25574.74	-0.02	.001
12620.12	11.75	297633.26	630195.4	25575.76	-0.02	.001
12708.12	11.80	297620.07	629718.9	25576.49	-0.01	.001
12796.12	11.73	297607.30	629724.0	25576.93	-0.01	.001
12884.12	11.66	297594.54	630197.5	25577.07	-0.01	.001
12972.12	11.59	297581.77	631109.9	25576.93	-0.01	.001
13060.12	11.51	297569.00	632417.2	25576.52	-0.01	.001
13148.12	11.44	297556.23	634060.4	25575.86	-0.00	.001
13236.12	11.38	297543.46	635971.7	25574.98	-0.00	.001
13324.12	11.33	297530.69	638075.8	25573.93	-0.00	.001
13412.12	11.27	297517.92	640293.6	25572.72	-0.00	.001
13500.12	11.22	297505.15	642544.7	25571.40	-0.01	.001
13588.12	11.17	297492.38	644751.9	25570.01	-0.01	.001
13676.12	11.12	297479.62	646844.0	25568.59	-0.02	.001
13764.12	10.97	297466.84	648758.0	25567.15	-0.02	.001
13774.12	10.94	297468.39	648961.2	25566.99	-0.02	.001
13777.12	10.94	297464.96	649021.5	25566.94	-0.02	.001

TIME BASE 4



AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	TOTAL ENGINE THRUST (LB)	TOTAL VEHICLE WEIGHT (LB)	ALTITUDE ABOVE EARTH (FT)	MAGNITUDE OF SPACE FIXED VELOCITY IN XPP SYSTEM (FT/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (FT/S <sup>2</sup> )
1377.12	10.94	297464.96	649021.5	25566.94	.02	.001
1378.12	10.94	297464.18	649122.0	25566.86	.02	.001
1379.12	10.94	297463.39	649221.6	25566.78	.02	.001
1380.12	10.94	297462.60	649320.7	25566.70	.02	.001
1381.12	10.94	297461.82	649418.7	25566.62	.02	.001
1382.12	10.94	297461.03	649516.1	25566.54	.02	.001
1383.12	10.94	297460.24	649612.9	25566.46	.02	.001
1384.12	10.94	297459.46	649708.8	25566.37	.02	.001
1385.12	10.94	297458.67	649804.4	25566.29	.02	.001
1386.12	13.02	297458.35	649842.1	25566.26	.02	.001
1387.12	7.97	297458.32	649845.8	25566.26	.02	.001
1388.12	8.33	297458.22	649898.5	25566.21	.02	.001
1389.12	12.81	297458.05	649992.6	25566.13	.02	.001
1390.12	13.33	297457.87	650085.3	25566.05	.02	.001
1391.12	13.84	297457.70	650177.4	25565.98	.02	.001
1392.12	14.36	297457.52	650268.8	25565.90	.02	.002
1393.12	14.88	297457.34	650358.8	25565.82	.03	.002
1394.12	15.39	297457.16	650448.6	25565.74	.03	.002
1395.12	15.91	297456.99	650537.2	25565.66	.03	.002
1396.12	16.43	297456.82	650624.6	25565.59	.03	.002
1397.12	16.95	297456.64	650711.7	25565.51	.03	.002
1398.12	17.46	297456.46	650797.6	25565.44	.03	.002
1399.12	17.98	297456.29	650882.5	25565.36	.03	.002
1400.12	18.50	297456.11	650966.8	25565.29	.03	.002
1401.12	19.01	297455.93	651049.9	25565.21	.03	.002
1402.12	19.53	297455.76	651131.9	25565.14	.03	.002
1403.12	20.05	297455.58	651213.5	25565.07	.03	.002
1404.12	20.57	297455.40	651293.9	25564.99	.03	.002
1405.12	21.08	297455.23	651373.4	25564.92	.03	.002
1406.12	21.60	297455.05	651452.0	25564.85	.03	.002
1407.12	22.12	297454.88	651529.7	25564.78	.03	.002
1408.12	22.63	297454.70	651606.4	25564.71	.03	.002
1409.12	23.15	297454.52	651682.2	25564.64	.03	.003
1410.12	23.67	297454.35	651757.1	25564.57	.03	.003
1411.12	24.18	297454.17	651831.3	25564.50	.03	.003
1412.12	24.70	297454.00	651904.3	25564.43	.03	.003
1413.12	25.22	297453.82	651976.5	25564.36	.03	.003
1414.12	25.74	297453.65	652047.9	25564.30	.03	.003
1415.12	26.25	297453.47	652118.0	25564.23	.03	.003
1416.12	26.77	297453.29	652187.7	25564.16	.03	.003
1417.12	27.29	297453.12	652256.2	25564.09	.03	.003
1418.12	27.78	297452.94	652323.9	25564.03	.03	.003

02/M2 BURNER ON  
ENGINE OFF

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP. ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	TOTAL ENGINE THRUST (LB)	TOTAL VEHICLE WEIGHT (LB)	ALTITUDE ABOVE ORLATE EARTH (FT)	MAGNITUDE OF SPACE FIXED VELOCITY IN XPP SYSTEM (FT/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (FT/S <sup>2</sup> )
13977.12	28.25	297452.77	652390.7	25563.96	.03	.003
13982.12	28.73	297452.59	652456.5	25563.90	.03	.003
13987.12	29.21	297452.41	652521.3	25563.83	.03	.003
13992.12	29.68	297452.23	652585.3	25563.77	.03	.003
13997.12	30.16	297452.06	652649.2	25563.70	.03	.003
14002.12	30.63	297451.89	652710.2	25563.64	.03	.003
14007.12	31.11	297451.71	652771.5	25563.58	.03	.003
14012.12	31.58	297451.53	652831.6	25563.52	.03	.003
14017.12	32.06	297451.36	652890.8	25563.45	.03	.003
14022.12	32.53	297451.18	652948.9	25563.39	.03	.004
14027.12	33.01	297451.00	653006.5	25563.33	.03	.004
14032.12	33.49	297450.83	653062.9	25563.27	.03	.004
14037.12	33.96	297450.65	653118.2	25563.21	.03	.004
14042.12	34.44	297450.48	653172.6	25563.15	.03	.004
14047.12	34.91	297450.30	653226.1	25563.09	.03	.004
14052.12	35.39	297450.12	653278.8	25563.04	.03	.004
14057.12	35.86	297449.95	653330.2	25562.98	.03	.004
14062.12	36.34	297449.77	653381.1	25562.92	.03	.004
14067.12	36.81	297449.59	653430.7	25562.86	.03	.004
14072.12	37.18	297449.42	653479.5	25562.81	.04	.004
14077.12	37.48	297449.24	653527.3	25562.75	.04	.004
14082.12	37.78	297449.07	653574.5	25562.70	.04	.004
14087.12	38.08	297448.89	653620.4	25562.64	.04	.004
14092.12	38.38	297448.71	653665.5	25562.59	.04	.004
14097.12	38.68	297448.54	653709.4	25562.53	.04	.004
14102.12	38.83	297448.36	653753.1	25562.48	.04	.004
14107.12	38.88	297448.19	653795.1	25562.42	.04	.004
14112.12	38.93	297448.01	653836.5	25562.37	.04	.004
14117.12	38.98	297447.83	653877.1	25562.31	.04	.004
14122.12	38.91	297447.66	653916.5	25562.26	.04	.004
14127.12	38.76	297447.48	653955.2	25562.21	.04	.004
14132.12	38.61	297447.31	653993.0	25562.16	.04	.004
14137.12	38.46	297447.13	654030.1	25562.10	.04	.004
14142.12	38.31	297446.96	654065.8	25562.05	.04	.004
14147.12	38.16	297446.78	654101.2	25562.00	.04	.004
14152.12	38.01	297446.60	654135.3	25561.95	.04	.004
14157.12	37.86	297446.43	654168.7	25561.89	.04	.004
14162.12	37.71	297446.25	654200.9	25561.84	.04	.004
14167.12	37.56	297446.07	654232.5	25561.79	.04	.004
14172.12	37.50	297445.89	654263.2	25561.74	.04	.004
14177.12	37.50	297445.72	654293.0	25561.68	.04	.004
14182.12	37.50	297445.55	654322.1	25561.63	.04	.004

ENCLOSURE 4  
 A9-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	TOTAL VEHICLE ENGINE THRUST (LR)	TOTAL VEHICLE WEIGHT (LR)	ALTITUDE ABOVE ORLATE EARTH (FT)	MAGNITUDE OF SPACE FIXED VELOCITY IN XPP SYSTEM (FT/SEC)	FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (FT/S**2)
14187.12	37.50	297445.37	654350.4	25561.58	.04	.004
14192.12	37.50	297445.20	654377.7	25561.53	.04	.004
14197.12	37.50	297445.02	654404.1	25561.48	.04	.004
14202.12	37.50	297444.84	654429.5	25561.43	.04	.004
14207.12	37.50	297444.66	654454.4	25561.38	.04	.004
14212.12	37.50	297444.49	654478.3	25561.33	.04	.004
14217.12	37.50	297444.31	654501.7	25561.28	.04	.004
14222.12	37.50	297444.14	654523.9	25561.23	.04	.004
14227.12	37.50	297443.96	654545.4	25561.17	.04	.004
14232.12	37.50	297443.79	654566.3	25561.12	.04	.004
14237.12	37.50	297443.61	654586.2	25561.07	.04	.004
14242.12	37.50	297443.43	654605.7	25561.02	.04	.004
14247.12	37.50	297443.26	654623.9	25560.97	.04	.004
14252.12	37.50	297443.08	654641.6	25560.93	.04	.004
14257.12	37.50	297442.90	654658.4	25560.88	.04	.004
14262.12	37.50	297442.73	654674.6	25560.83	.04	.004
14267.12	37.50	297442.55	654690.0	25560.78	.04	.004
14272.12	37.50	297442.38	654704.9	25560.73	.04	.004
14273.42	175.37	297442.33	654708.6	25560.72	.04	.019
14273.92	137.87	297442.06	654709.6	25560.72	.04	.015
14277.12	137.87	297440.38	654718.2	25560.73	.04	.015
14282.12	137.87	297437.75	654731.8	25560.73	.04	.015
14287.12	137.87	297435.11	654744.3	25560.73	.04	.015
14292.12	137.87	297432.48	654756.0	25560.74	.04	.015
14297.12	137.87	297429.85	654767.3	25560.75	.04	.015
14302.12	137.87	297427.21	654777.7	25560.76	.04	.015
14307.12	137.87	297424.58	654787.6	25560.76	.04	.015
14312.12	137.87	297421.95	654796.8	25560.77	.04	.015
14317.12	137.87	297419.32	654805.4	25560.78	.04	.015
14322.12	137.87	297416.68	654813.6	25560.78	.04	.015
14327.12	137.87	297414.05	654820.8	25560.79	.04	.015
14332.12	137.87	297411.41	654827.5	25560.80	.04	.015
14337.12	137.87	297408.79	654833.7	25560.80	.04	.015
14342.12	137.87	297406.15	654839.9	25560.81	.04	.015
14347.12	137.87	297403.52	654845.0	25560.82	.04	.015
14350.12	647.63	297396.61	654847.4	25560.93	.04	.070
14352.12	1079.38	297389.92	654849.3	25561.09	.04	.117
14355.12	1727.00	297379.71	654851.7	25561.50	.05	.187
14357.12	151729.46	297113.46	654853.6	25572.66	.05	16.429
14357.62	165095.58	297046.89	654854.2	25581.31	.05	17.881
14361.62	191957.74	295404.26	654861.2	25657.93	.05	20.907
14362.12	192164.87	295198.93	654862.0	25668.39	.05	20.944

ULLAGE IGNITION  
 02/M2 BURNER OFF

J-2 F-L INI  
 ULL CUT OFF

REIGN

908 THR  
 1GM INI

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. ZND OPP.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	TOTAL VEHICLE ENGINE THRUST (LB)	TOTAL VEHICLE WEIGHT (LB)	ALTITUDE ABOVE ORLATE EARTH (FT)	MAGNITUDE OF SPACE FIXED VELOCITY IN XPP SYSTEM (FT/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (FT/S <sup>2</sup> )
14367.12	194337.02	292953.75	65482.3	25773.94	.06	21.343
14372.12	196727.22	290659.80	654898.1	25881.25	.04	21.776
14377.12	198162.74	288337.59	654887.4	25990.75	.04	22.112
14382.12	198632.89	286004.94	654867.9	26101.64	.04	22.342
14387.12	198778.91	283668.56	654846.8	26213.62	.04	22.546
14392.12	198807.91	281331.23	654831.2	26326.57	.04	22.736
14397.12	198791.04	278994.11	654828.0	26440.44	.05	22.925
14402.12	198776.51	276657.00	654843.3	26555.24	.06	23.117
14407.12	198743.81	274320.26	654885.6	26670.98	.07	23.310
14412.12	198689.20	271983.92	654962.1	26787.67	.09	23.504
14417.12	198680.87	269648.34	655081.6	26905.30	.11	23.706
14422.12	198736.40	267312.48	655252.8	27023.43	.13	23.920
14427.12	198804.45	264976.40	655484.5	27143.59	.16	24.139
14432.12	198894.42	262639.85	655786.4	27264.31	.19	24.265
14437.12	198978.94	260302.71	656166.7	27386.09	.23	24.594
14442.12	199055.93	257965.06	656635.7	27508.94	.26	24.827
14447.12	199137.83	255627.09	657202.9	27632.87	.31	25.060
14452.12	199130.07	253789.00	657878.3	27757.85	.35	25.294
14457.12	199152.75	250951.17	658671.7	27883.91	.40	25.533
14462.12	199176.02	248613.46	659593.4	28011.04	.45	25.776
14467.12	199200.17	246275.67	660653.3	28139.27	.51	26.024
14472.12	199226.79	243938.14	661863.1	28268.60	.57	26.277
14477.12	199245.02	241600.55	663232.6	28399.05	.64	26.533
14482.12	199251.66	239263.13	664773.0	28530.63	.71	26.793
14487.12	199251.76	236926.00	666495.4	28663.33	.78	27.058
14492.12	199240.68	234589.17	668411.2	28797.18	.85	27.326
14497.12	199223.83	232252.73	670532.1	28932.18	.93	27.598
14502.12	199193.85	229916.87	672869.5	29068.34	1.02	27.874
14507.12	199160.81	227581.61	675435.1	29205.67	1.11	28.156
14512.12	199123.85	225246.86	678241.5	29344.19	1.20	28.442
14517.12	199095.31	222912.79	681300.9	29483.91	1.29	28.736
14522.12	199078.38	220579.06	684625.0	29624.86	1.39	29.038
14527.12	199059.53	218245.81	688227.3	29767.08	1.49	29.345
14532.12	199035.37	215912.79	692120.2	29910.57	1.60	29.659
14537.12	199025.08	213580.24	696316.8	30055.36	1.71	29.981
14542.12	199033.95	21117.56	700830.5	30201.50	1.83	30.314
14547.12	199036.01	208915.12	705674.4	30349.01	1.95	30.652
14552.12	199024.55	206582.63	710862.6	30497.90	2.07	30.997
14557.12	199011.95	204250.41	716408.3	30648.21	2.20	31.349
14562.12	198997.89	201918.30	722326.1	30799.96	2.33	31.708
14567.12	198983.78	199586.29	728629.8	30953.18	2.46	32.077
14572.12	198966.16	197264.88	735333.8	31107.90	2.60	32.453

\*\* ENCLOSURE 4 \*\*  
 A5-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	TOTAL VEHICLE ENGINE THRUST (LB)	TOTAL VEHICLE WEIGHT (LB)	ALTITUDE ABOVE ORLATE EARTH (FT)	MAGNITUDE OF SPACE FIXED VELOCITY IN XPP SYSTEM (FT/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (FT/S <sup>2</sup> )
14577.12	198948.37	194923.04	742452.4	31764.17	2.74	32.838
14582.12	198930.59	192591.81	750001.0	31422.00	2.89	33.233
14587.12	198912.64	190260.61	757993.6	31581.45	3.04	33.637
14592.12	198896.29	187929.77	766445.6	31742.54	3.19	34.049
14597.12	198879.80	185599.33	775172.2	31905.32	3.35	34.472
14602.12	198863.30	183269.29	784789.0	32069.84	3.51	34.906
14607.12	198846.47	180939.37	794709.4	32236.13	3.67	35.351
14612.12	198829.03	178609.83	805151.7	32404.24	3.84	35.806
14617.12	198811.54	176280.70	816129.8	32574.23	4.01	36.273
14622.12	198794.00	173951.76	827460.3	32746.15	4.19	36.753
14627.12	198776.39	171623.79	839758.4	32920.06	4.37	37.241
14632.12	198758.92	169297.31	852439.5	33095.77	4.55	37.699
14637.12	198741.72	166971.55	865719.9	33273.56	4.74	38.218
14642.12	198724.21	164646.03	879615.5	33453.51	4.93	38.750
14647.12	198706.48	162321.16	894141.2	33635.69	5.12	39.297
14652.12	198688.09	159996.90	909312.9	33820.18	5.31	39.860
14657.12	198669.76	157672.97	925146.0	34007.05	5.51	40.440
14662.12	198651.20	155349.44	941655.2	34196.37	5.71	41.037
14667.12	198632.38	153026.38	958855.8	34388.23	5.91	41.652
14672.12	198613.98	150703.84	976755.7	34582.61	6.11	42.284
14677.12	198595.87	148381.96	995342.6	34779.65	6.30	42.935
14682.12	198577.37	146060.70	1014636.0	34979.57	6.50	43.606
14687.12	198558.73	143739.95	1034663.5	35182.44	6.71	44.297
14692.12	198540.24	141420.24	1055450.9	35388.34	6.92	45.007
14695.31	197780.72	139942.10	1069111.1	35521.22	7.06	45.471
14695.52	57510.78	139834.17	1070022.3	35529.09	7.07	45.232
14697.12	.00	139804.73	1077020.4	35525.65	7.15	.000
14702.12	.00	139804.73	1099301.6	35507.33	7.37	.000
14705.31	.00	139804.73	1113660.9	35495.37	7.52	.000

GCS2  
 T87  
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.. ENCLASURE 4 ..  
 A5-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	TOTAL VEHICLE ENGINE THRUST (LB)	TOTAL VEHICLE WEIGHT (LB)	ALTITUDE ABOVE OBLATE EARTH (FT)	MAGNITUDE OF SPACE FIXED VELOCITY IN XPP SYSTEM (FT/SEC)	SPACE FIXED PATH ANGLE (DEG)	VEHICLE LONGITUDINAL ACCELERATION (FT/S <sup>2</sup> )
14705.31	32.11	139795.42	1113860.9	35495.37	7.52	.007
14715.31	32.11	139785.41	1161332.4	35456.55	7.96	.007
14726.31	32.11	139774.38	1216666.7	35411.46	8.46	.007
14737.31	32.11	139763.36	1275234.6	35363.92	8.95	.007
14748.31	32.11	139752.34	1337000.5	35314.00	9.43	.007
14759.31	32.11	139741.32	1401929.1	35261.76	9.92	.007
14770.31	32.11	139730.30	1469983.0	35207.25	10.40	.007
14781.31	32.11	139719.28	1541124.3	35150.53	10.88	.007
14792.31	32.11	139708.25	1615312.3	35091.68	11.35	.007
14803.31	32.11	139697.23	1692567.4	35030.75	11.82	.007
14814.31	32.11	139686.21	1772666.5	34967.82	12.29	.007
14825.31	32.11	139675.19	1855748.4	34902.96	12.76	.007
14836.31	32.11	139664.17	1941707.5	34836.22	13.22	.007
14846.21	32.11	139654.25	2021494.4	34774.61	13.63	.007

CVS OFF

\*\* ENCLOSURE 4 \*\*  
AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	RADIAL DISTANCE OF THE C G (FT)	MAGNITUDE OF THE EARTH FIXED VELOCITY (FT/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON OBLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (NM)
713.12	21533215.25	24243.846	32.6776	-52.82	1454.36
722.12	21533204.50	24243.976	32.6884	-52.13	1489.22
732.12	21533199.00	24244.121	32.6956	-51.37	1517.95
743.12	21533191.75	24244.291	32.6975	-50.52	1570.56
754.12	21533185.25	24244.470	32.6931	-49.68	1613.17
765.12	21533177.25	24244.681	32.6825	-48.84	1655.78
776.12	21533169.25	24244.965	32.6656	-48.00	1698.37
787.12	21533160.00	24245.255	32.6425	-47.16	1741.00
798.12	21533151.00	24245.435	32.6131	-46.32	1783.61
804.12	21533112.75	24246.056	32.4230	-42.81	1961.09
932.12	21533026.50	24247.585	31.7605	-36.17	2302.70
1020.12	21532927.00	24249.558	30.7196	-29.65	2643.63
1108.12	21532816.75	24251.997	29.3228	-23.30	2984.60
1196.12	21532697.00	24254.824	27.5982	-17.15	3325.61
1284.12	21532565.50	24257.937	25.5779	-11.22	3666.67
1372.12	21532420.75	24261.227	23.2956	-5.51	4007.77
1460.12	21532260.00	24264.575	20.7853	-0.01	4348.90
1548.12	21532081.00	24267.863	18.0806	5.30	4690.06
1636.12	21531881.50	24270.976	15.2137	10.43	5031.23
1724.12	21531661.50	24273.805	12.2154	15.41	5372.39
1812.12	21531420.00	24276.255	9.1148	20.27	5713.52
1900.12	21531161.00	24278.245	5.9399	25.04	6054.60
1988.12	21530887.75	24279.710	2.7173	29.75	6395.61
2076.12	21530606.75	24280.603	-0.5270	34.44	6736.52
2164.12	21530327.25	24280.902	-3.7672	39.13	7077.32
2252.12	21530060.25	24280.610	-6.9776	43.86	7417.96
2340.12	21529817.75	24279.752	-10.1320	48.65	7758.44
2428.12	21529615.50	24278.378	-13.2033	53.55	8098.72
2516.12	21529467.75	24276.550	-16.1631	58.58	8438.77
2604.12	21529391.50	24274.350	-18.9816	63.76	8778.51
2692.12	21529402.75	24271.871	-21.6277	69.13	9117.84
2780.12	21529517.75	24269.213	-24.0683	74.70	9456.54
2868.12	21529750.75	24266.479	-26.2698	80.49	9794.07
2956.12	21530115.50	24263.771	-28.1977	86.50	10128.79
3044.12	21530621.25	24261.187	-29.8189	92.72	10452.90
3132.12	21531276.00	24258.811	-31.1022	99.13	10660.29
3220.12	21532083.50	24256.716	-32.0211	105.70	10424.30
3308.12	21533044.75	24254.961	-32.5552	112.38	10097.94
3396.12	21534049.25	24253.693	-32.6964	118.57	9793.27
3476.12	21535290.50	24252.675	-32.4694	125.22	9455.76
3564.12	21536664.00	24252.052	-31.9474	131.87	9117.29
3652.12	21538154.75	24251.802	-30.8454	138.41	8778.41

\*\*\*\*\* MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM

AS-209 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	RADIAL DISTANCE OF THE CG (FT)	MAGNITUDE OF THE EARTH FIXED VELOCITY (FT/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON OBLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (NM)
3740.12	21539744.75	24251.888	-29.4849	144.77	8439.33
3828.13	21541412.25	24252.255	-27.7940	150.94	8100.15
3916.12	21543133.75	24252.835	-25.8045	156.84	7760.93
4004.12	21544883.00	24253.544	-23.5501	162.63	7421.67
4092.12	21546634.00	24254.310	-21.0649	168.14	7082.39
4180.12	21548359.75	24255.032	-18.3827	173.46	6743.09
4268.12	21550033.00	24255.630	-15.5358	178.60	6403.78
4356.12	21551729.50	24256.026	-12.5550	176.41	6064.44
4444.12	21553124.50	24256.152	-9.4697	171.55	5725.10
4532.12	21554498.50	24255.952	-6.3076	166.78	5385.75
4620.12	21555732.75	24235.391	-3.0956	162.07	5046.41
4708.12	21556814.25	24254.450	.1406	157.39	4707.10
4796.12	21557731.50	24253.130	3.3753	152.72	4367.83
4884.12	21558478.25	24251.455	6.5832	148.01	4028.63
4972.12	21559053.00	24249.466	9.7383	143.23	3689.53
5060.12	21559457.25	24247.222	12.8139	138.36	3350.58
5148.12	21559795.75	24244.799	15.7822	133.37	3011.82
5236.12	21559777.25	24242.284	18.6139	128.22	2673.34
5324.12	21559713.75	24239.773	21.2781	122.89	2335.22
5412.12	21559518.75	24237.370	23.7427	117.36	1997.65
5500.12	21559204.00	24235.176	25.9740	111.62	1660.91
5588.12	21558797.00	24233.287	27.9382	105.66	1325.61
5676.12	21558303.50	24231.795	29.6019	99.49	993.15
5764.12	21557743.25	24230.776	30.9339	93.12	667.70
5852.12	21557132.50	24230.290	31.9067	86.58	348.22
5940.12	21556486.00	24230.379	32.4992	79.93	235.78
6028.12	21555816.50	24231.066	32.6975	73.22	123.68
6116.12	21555135.00	24232.349	32.4968	66.51	19.71
6204.12	21554450.50	24234.203	31.9019	59.86	1094.13
6292.12	21553769.00	24236.584	30.9264	53.33	1427.70
6372.12	21553157.00	24239.150	29.7270	47.53	1732.95
6460.12	21552494.00	24242.335	28.0890	41.33	2049.91
6548.12	21551843.00	24245.807	26.1472	35.35	2407.64
6636.12	21551203.50	24249.456	23.9344	29.38	2745.89
6724.12	21550574.75	24253.163	21.4858	24.03	3084.49
6812.12	21549955.25	24256.811	18.8338	18.68	3423.35
6900.12	21549344.00	24260.280	16.0114	13.52	3762.41
6988.12	21548740.00	24263.461	13.0495	8.50	4101.61
7076.12	21548143.25	24266.252	9.9776	3.62	4440.90
7164.12	21547555.75	24268.570	6.8240	1.17	4780.25
7252.12	21546981.00	24270.346	3.6154	5.89	5119.62
7340.12	21546424.00	24271.832	.3780	10.57	5458.97

MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM



ENCLOSURE 4  
AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	RADIAL DISTANCE OF THE C G (FT)	MAGNITUDE OF THE FATH FLUJ VELOCITY (FT/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (NM)
7420.12	21545892.00	24272.105	-2.8626	15.25	5798.28
7516.12	21545394.25	24272.063	-6.0807	19.96	6137.52
7604.12	21544942.50	24271.426	-9.2503	24.73	6476.65
7692.12	21544548.25	24270.237	-12.3448	29.59	6815.05
7780.12	21544226.75	24268.888	-15.3361	34.57	7154.49
7868.12	21543991.75	24266.466	-18.1951	39.71	7493.14
7956.12	21543859.00	24264.051	-20.8910	45.02	7831.55
8044.12	21543842.00	24261.413	-23.3915	50.52	8169.66
8132.12	21543954.00	24258.658	-25.6629	56.24	8507.37
8220.12	21544207.50	24255.889	-27.6712	62.18	8844.50
8308.12	21544612.00	24253.208	-29.3827	68.33	9180.73
8396.12	21545173.25	24250.703	-30.7657	74.69	9515.37
8484.12	21545895.50	24248.455	-31.7921	81.21	9849.74
8572.12	21546778.25	24246.528	-32.4396	87.85	10189.75
8660.12	21547818.00	24244.967	-32.6935	94.56	10460.18
8748.12	21549006.25	24243.799	-32.3478	101.29	10554.46
8836.12	21550331.25	24243.028	-32.0062	107.95	10321.54
8924.12	21551777.00	24242.643	-31.0813	114.51	10008.73
9012.12	21553325.00	24242.607	-29.7937	120.91	9680.66
9100.12	21554952.50	24242.873	-28.1703	127.11	9347.61
9188.12	21556635.25	24243.375	-26.2420	133.10	9012.17
9276.12	21558347.25	24244.035	-24.0423	138.88	8675.98
9364.12	21560061.00	24244.773	-21.6051	144.43	8338.90
9452.12	21561748.50	24245.499	-18.9643	149.78	8001.36
9540.12	21563387.50	24246.132	-16.1523	154.95	7663.50
9628.12	21564937.00	24246.591	-13.2004	159.97	7325.39
9716.12	21566367.75	24246.805	-10.1380	164.85	6987.07
9804.12	21567712.00	24246.719	-6.9932	169.63	6648.60
9892.12	21568893.00	24246.293	-3.7928	174.35	6309.98
9980.12	21569914.00	24245.502	-0.5628	179.02	5971.25
10068.12	21570764.75	24244.344	2.6717	-176.31	5632.44
10156.12	21571438.75	24242.635	5.8843	-171.61	5293.56
10244.12	21571932.25	24241.013	9.0503	-166.86	4954.64
10332.12	21572246.50	24238.931	12.1430	-162.02	4615.70
10420.12	21572387.25	24236.663	15.1347	-157.06	4276.76
10508.12	21572362.25	24234.291	17.9968	-151.95	3937.86
10596.12	21572184.00	24231.910	20.6988	-146.07	3599.01
10684.12	21571865.75	24229.618	23.2097	-141.20	3260.25
10772.12	21571423.75	24227.518	25.4916	-136.51	2921.60
10860.12	21570875.25	24225.706	27.5192	-129.60	2583.13
10948.12	21570236.75	24224.274	29.2523	-123.48	2244.88
11036.12	21569527.00	24223.300	30.6611	-117.16	1906.98

MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED. EARTH: CENTERED PLUMBLINE SYSTEM

\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	RADIAL DISTANCE OF THE C G (FT)	MAGNITUDE OF THE EARTH FIXED VELOCITY (FT/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON OBLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (NM)
11124.12	21568762.75	24222.848	31.7172	-110.66	1569.64
11212.12	21567959.75	24222.943	32.3977	-104.04	2233.31
11300.12	21567131.75	24223.670	32.6871	-97.34	899.12
11388.12	21566292.00	24224.972	32.5784	-90.63	570.90
11476.12	21565449.75	24226.849	32.0742	-83.97	271.37
11564.12	21564613.75	24229.259	31.1860	-77.41	227.33
11652.12	21563790.00	24232.139	29.9334	-71.00	510.09
11740.12	21562982.25	24235.410	28.3424	-64.78	836.28
11828.12	21562192.50	24238.974	26.4435	-58.77	1170.20
11916.12	21561422.00	24242.721	24.2694	-52.98	1506.80
12004.12	21560670.25	24246.537	21.8542	-47.40	1844.66
12092.12	21559936.50	24250.301	19.2315	-42.03	2183.25
12180.12	21559219.75	24253.893	16.4338	-36.84	2522.29
12268.12	21558520.50	24257.202	13.4924	-31.81	2861.66
12356.12	21557838.00	24260.124	10.4370	-26.91	3201.23
12444.12	21557173.75	24262.573	7.2957	-22.12	3541.02
12532.12	21556532.50	24264.478	4.0957	-17.39	3880.90
12620.12	21555917.50	24265.789	0.8630	-12.71	4220.87
12708.12	21555337.00	24266.479	-2.3766	-8.03	4560.88
12796.12	21554799.75	24266.540	-5.5977	-3.33	4900.92
12884.12	21554315.50	24265.991	-8.7744	1.42	5240.97
12972.12	21553897.50	24264.871	-11.8807	6.27	5581.00
13060.12	21553559.25	24263.240	-14.8871	11.22	5921.01
13148.12	21553314.00	24261.175	-17.7665	16.33	6260.99
13236.12	21553176.00	24258.765	-20.4878	21.60	6600.94
13324.12	21553159.75	24256.110	-23.0189	27.08	6940.86
13412.12	21553278.25	24253.314	-25.3266	32.76	7280.76
13500.12	21553542.50	24250.483	-27.3768	38.66	7620.65
13588.12	21553961.75	24247.719	-29.1357	44.77	7960.54
13676.12	21554542.25	24245.116	-30.5712	51.09	8300.44
13764.12	21555287.00	24242.754	-31.6547	57.54	8640.36
13774.12	21555381.50	24242.503	-31.7545	58.33	8678.99
13777.12	21555410.25	24242.429	-31.7838	58.56	8690.58

TIME BASE 6

\*\*\*\*\* MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG, 2ND OPP.

TIME FROM FIRST MOTION (SEC)	RADIAL DISTANCE OF THE C G (FT)	MAGNITUDE OF THE EARTH FIXED VELOCITY (FT/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON OBLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (NM)
1377.12	2155410.25	24242.429	-31.7835	58.56	8690.5A
1378.12	2155459.00	24242.304	-31.830A	58.93	8709.89
1379.12	2155508.25	24242.184	-31.8769	59.31	8729.21
1380.12	2155558.00	24242.063	-31.9217	59.68	8748.52
1381.12	2155608.50	24241.944	-31.9653	60.06	8767.84
1382.12	2155659.25	24241.825	-32.0077	60.43	8787.15
1383.12	2155710.75	24241.706	-32.0489	60.81	8806.47
1384.12	2155763.00	24241.589	-32.0886	61.19	8825.78
1385.12	2155816.25	24241.473	-32.1274	61.56	8845.10
1386.12	2155870.25	24241.357	-32.1648	61.94	8864.41
1387.12	2155923.50	24241.243	-32.2010	62.32	8883.73
1388.12	2155977.75	24241.132	-32.2359	62.70	8903.04
1389.12	2156032.75	24241.022	-32.2695	63.07	8922.36
1390.12	2156088.50	24240.914	-32.3019	63.45	8941.68
1391.12	2156144.25	24240.807	-32.3331	63.83	8960.99
1392.12	2156201.00	24240.702	-32.3629	64.21	8980.31
1393.12	2156257.75	24240.597	-32.3915	64.59	8999.62
1394.12	2156315.25	24240.494	-32.4188	64.97	9018.94
1395.12	2156373.75	24240.393	-32.4449	65.35	9038.25
1396.12	2156432.25	24240.292	-32.4697	65.73	9057.57
1397.12	2156491.75	24240.194	-32.4932	66.11	9076.89
1398.12	2156550.75	24240.097	-32.5155	66.49	9096.20
1399.12	2156610.50	24240.002	-32.5364	66.87	9115.52
1400.12	2156670.75	24239.909	-32.5561	67.25	9134.83
1401.12	2156732.00	24239.817	-32.5745	67.63	9154.15
1402.12	2156793.50	24239.726	-32.5916	68.01	9173.47
1403.12	2156855.25	24239.637	-32.6075	68.39	9192.78
1404.12	2156918.00	24239.550	-32.6220	68.77	9212.10
1405.12	2156980.75	24239.464	-32.6353	69.16	9231.41
1406.12	2157044.25	24239.379	-32.6473	69.54	9250.73
1407.12	2157108.50	24239.297	-32.6580	69.92	9270.05
1408.12	2157172.50	24239.215	-32.6674	70.30	9289.36
1409.12	2157238.00	24239.135	-32.6755	70.68	9308.68
1410.12	2157303.25	24239.057	-32.6823	71.06	9327.99
1411.12	2157369.25	24238.980	-32.6879	71.45	9347.31
1412.12	2157435.75	24238.905	-32.6921	71.83	9366.63
1413.12	2157502.75	24238.830	-32.6951	72.21	9385.94
1414.12	2157570.50	24238.757	-32.6967	72.59	9405.26
1415.12	2157638.75	24238.684	-32.6971	72.97	9424.57
1416.12	2157707.25	24238.616	-32.6962	73.36	9443.89

02/M2 BURNER ON  
ENGINE OFF

MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM

\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SFC)	RADIAL DISTANCE OF THE C G (FT)	MAGNITUDE OF THE EARTH FIXED VELOCITY (FT/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON OBLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (NM)
13977.12	21557776.75	24238.546	-32.6940	73.74	9463.20
13982.12	21557846.50	24238.480	-32.6905	74.12	9482.52
13987.12	21557916.50	24238.416	-32.6857	74.50	9501.83
13992.12	21557987.25	24238.352	-32.6796	74.88	9521.15
13997.12	21558058.50	24238.290	-32.6723	75.27	9540.46
14002.12	21558130.00	24238.230	-32.6636	75.65	9559.78
14007.12	21558202.25	24238.171	-32.6537	76.03	9579.09
14012.12	21558274.75	24238.114	-32.6425	76.41	9598.40
14017.12	21558347.75	24238.058	-32.6299	76.79	9617.72
14022.12	21558421.25	24238.004	-32.6161	77.17	9637.03
14027.12	21558495.50	24237.951	-32.6011	77.56	9656.34
14032.12	21558570.00	24237.900	-32.5847	77.94	9675.66
14037.12	21558644.75	24237.851	-32.5670	78.32	9694.97
14042.12	21558720.25	24237.803	-32.5481	78.70	9714.28
14047.12	21558796.25	24237.756	-32.5279	79.08	9733.59
14052.12	21558872.50	24237.711	-32.5064	79.46	9752.90
14057.12	21558949.75	24237.668	-32.4836	79.84	9772.21
14062.12	21559026.75	24237.626	-32.4596	80.22	9791.52
14067.12	21559104.25	24237.585	-32.4343	80.60	9810.83
14072.12	21559182.50	24237.546	-32.4077	80.98	9830.13
14077.12	21559261.00	24237.509	-32.3799	81.36	9849.44
14082.12	21559340.25	24237.473	-32.3508	81.74	9868.75
14087.12	21559419.75	24237.438	-32.3204	82.12	9888.05
14092.12	21559499.50	24237.405	-32.2887	82.49	9907.35
14097.12	21559580.00	24237.373	-32.2558	82.87	9926.66
14102.12	21559661.00	24237.343	-32.2217	83.25	9945.96
14107.12	21559742.00	24237.313	-32.1863	83.63	9965.26
14112.12	21559824.00	24237.284	-32.1496	84.01	9984.56
14117.12	21559906.00	24237.255	-32.1117	84.38	10003.85
14122.12	21559988.50	24237.230	-32.0725	84.76	10023.15
14127.12	21560071.50	24237.205	-32.0321	85.14	10042.44
14132.12	21560154.75	24237.182	-31.9905	85.51	10061.73
14137.12	21560239.00	24237.160	-31.9476	85.89	10081.02
14142.12	21560323.00	24237.139	-31.9035	86.26	10100.31
14147.12	21560408.00	24237.119	-31.8582	86.64	10119.59
14152.12	21560493.00	24237.100	-31.8116	87.01	10138.87
14157.12	21560578.50	24237.083	-31.7638	87.39	10158.15
14162.12	21560664.50	24237.066	-31.7148	87.76	10177.42
14167.12	21560750.75	24237.050	-31.6646	88.13	10196.69
14172.12	21560837.50	24237.031	-31.6132	88.50	10215.96
14177.12	21560924.75	24237.015	-31.5605	88.88	10235.22
14182.12	21561012.25	24237.001	-31.5067	89.25	10254.47

\*\*\*\*\* MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM

ENCLOSURE 4

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=2.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	RADIAL DISTANCE OF THE C G (FT)	MAGNITUDE OF THE EARTH FIXED VELOCITY (FT/SEC)	SU3 VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON OBLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (NM)
14187.12	21561100.25	24236.991	-31.4516	89.62	10273.72
14192.12	21561188.50	24236.981	-31.3954	89.99	10292.96
14197.12	21561277.25	24236.972	-31.3379	90.36	10312.20
14202.12	21561366.25	24236.964	-31.2793	90.73	10331.42
14207.12	21561456.00	24236.957	-31.2195	91.10	10350.64
14212.12	21561545.75	24236.952	-31.1585	91.47	10369.84
14217.12	21561636.25	24236.948	-31.0963	91.84	10389.03
14222.12	21561726.75	24236.943	-31.0330	92.21	10408.21
14227.12	21561817.75	24236.936	-30.9685	92.57	10427.38
14232.12	21561909.75	24236.931	-30.9028	92.94	10446.52
14237.12	21562001.25	24236.929	-30.8360	93.31	10465.64
14242.12	21562093.25	24236.930	-30.7680	93.67	10484.73
14247.12	21562185.75	24236.932	-30.6988	94.04	10503.80
14252.12	21562278.50	24236.935	-30.6286	94.40	10522.82
14257.12	21562372.00	24236.939	-30.5571	94.77	10541.80
14262.12	21562465.50	24236.943	-30.4846	95.13	10560.72
14267.12	21562559.25	24236.950	-30.4109	95.49	10579.58
14272.12	21562653.75	24236.957	-30.3361	95.86	10598.34
14273.42	21562678.25	24236.959	-30.3164	95.95	10603.20
14273.92	21562687.50	24236.967	-30.3089	95.99	10605.07
14277.12	21562747.75	24237.004	-30.2601	96.22	10616.99
14282.12	21562843.00	24237.063	-30.1831	96.58	10635.49
14287.12	21562938.25	24237.122	-30.1050	96.94	10653.78
14292.12	21563033.75	24237.186	-30.0257	97.30	10671.79
14297.12	21563130.00	24237.251	-29.9453	97.66	10689.39
14302.12	21563226.75	24237.319	-29.8639	98.02	10706.37
14307.12	21563323.00	24237.386	-29.7814	98.38	10722.36
14312.12	21563420.00	24237.455	-29.6977	98.74	10736.74
14317.12	21563517.50	24237.524	-29.6130	99.09	10748.38
14322.12	21563615.25	24237.595	-29.5273	99.45	10755.53
14327.12	21563713.25	24237.666	-29.4404	99.80	10756.40
14332.12	21563811.75	24237.735	-29.3525	100.16	10750.74
14337.12	21563910.50	24237.802	-29.2635	100.51	10740.08
14342.12	21564010.00	24237.871	-29.1735	100.87	10726.31
14347.12	21564109.75	24237.942	-29.0825	101.22	10710.69
14350.12	21564169.50	24238.092	-29.0274	101.43	10700.75
14352.12	21564209.75	24238.278	-28.9904	101.57	10693.96
14355.12	21564269.50	24238.734	-28.9346	101.78	10683.57
14357.12	21564309.75	24249.920	-28.8973	101.93	10676.54
14357.62	21564320.00	24268.575	-28.8879	101.96	10674.77
14361.62	21564404.75	24335.241	-28.8124	102.24	10660.43
14362.12	21564415.50	24345.699	-28.8029	102.28	10658.62

ULLAGE IGNITION  
02/M2 BURNER OFF

J-2 F-L INI  
ULL CUT OFF

REIGN

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TEM INI

..... MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	RADIAL DISTANCE OF THE C G (FT)	MAGNITUDE OF THE EARTH FIXED VELOCITY (FT/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON EARTH (DEG)	ARC RANGE ALONG SPHERE EARTH TO SUB VEHICLE PT. (NM)
14367.12	21564534.25	24451.300	-28.7071	102.63	10640.32
14372.12	21564649.75	24558.635	-28.6099	102.98	10621.70
14377.12	21564739.75	24668.165	-28.5113	103.34	10602.84
14382.12	21564822.75	24779.075	-28.4113	103.69	10583.76
14387.12	21564905.00	24891.076	-28.3098	104.05	10564.50
14392.12	21564994.00	25004.041	-28.2068	104.41	10545.08
14397.12	21565076.75	25117.930	-28.1024	104.77	10525.51
14402.12	21565219.25	25232.749	-27.9965	105.12	10505.79
14407.12	21565369.75	25348.509	-27.8892	105.48	10485.95
14412.12	21565556.00	25465.204	-27.7803	105.85	10465.98
14417.12	21565786.25	25582.845	-27.6699	106.21	10445.88
14422.12	21566069.50	25701.490	-27.5581	106.57	10425.67
14427.12	21566414.50	25821.157	-27.4446	106.93	10405.35
14432.12	21566830.50	25941.874	-27.3297	107.30	10384.91
14437.12	21567324.50	26063.653	-27.2132	107.66	10364.36
14442.12	21567912.50	26186.499	-27.0951	108.03	10343.69
14447.12	21568597.75	26310.417	-26.9755	108.40	10322.92
14452.12	21569392.25	26435.391	-26.8543	108.77	10302.04
14457.12	21570306.25	26561.427	-26.7315	109.14	10281.06
14462.12	21571349.50	26688.537	-26.6070	109.51	10259.96
14467.12	21572532.25	26816.733	-26.4810	109.88	10238.76
14472.12	21573866.00	26946.029	-26.3533	110.25	10217.45
14477.12	21575360.50	27076.437	-26.2240	110.62	10196.03
14482.12	21577027.25	27207.961	-26.0931	110.99	10174.50
14487.12	21578877.00	27340.610	-25.9605	111.37	10152.87
14492.12	21580921.25	27474.393	-25.8262	111.75	10131.12
14497.12	21583171.75	27609.321	-25.6902	112.12	10109.27
14502.12	21585640.00	27745.400	-25.5526	112.50	10087.31
14507.12	21588337.50	27882.643	-25.4133	112.88	10065.24
14512.12	21591276.75	28021.064	-25.2722	113.26	10043.06
14517.12	21594470.00	28160.681	-25.1294	113.64	10020.78
14522.12	21597929.25	28301.524	-24.9849	114.02	9998.38
14527.12	21601667.75	28443.616	-24.8387	114.40	9975.87
14532.12	21605697.75	28586.975	-24.6907	114.78	9953.25
14537.12	21610032.50	28731.624	-24.5409	115.17	9930.52
14542.12	21614685.00	28877.606	-24.3894	115.55	9907.68
14547.12	21619669.75	29024.949	-24.2361	115.94	9884.73
14552.12	21624998.50	29173.671	-24.0810	116.32	9861.67
14557.12	21630686.25	29323.794	-23.9241	116.71	9838.49
14562.12	21636747.00	29475.347	-23.7655	117.10	9815.20
14567.12	21643194.25	29628.362	-23.6050	117.49	9791.79
14572.12	21650043.00	29782.870	-23.4427	117.88	9768.28

MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM

\*\* ENCLOSURE 4 \*\*

A5-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SFC)	RADIAL DISTANCE OF THE C G (FT)	MAGNITUDE OF THE EARTH FIXED VELOCITY (FT/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON OBLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (NM)
14577.12	21657307.00	29938.902	-23.2785	118.27	9744.65
14582.12	21665001.75	30096.497	-23.1126	118.66	9720.90
14587.12	21673141.50	30255.691	-22.9448	119.05	9697.04
14592.12	21681741.25	30416.521	-22.7751	119.45	9673.07
14597.12	21690816.25	30579.027	-22.6036	119.84	9648.98
14602.12	21700381.75	30743.251	-22.4303	120.24	9624.77
14607.12	21710453.00	30909.241	-22.2550	120.63	9600.45
14612.12	21721045.75	31077.042	-22.0779	121.03	9576.01
14617.12	21732175.25	31246.705	-21.8989	121.43	9551.46
14622.12	21743857.50	31418.283	-21.7181	121.83	9526.79
14627.12	21756108.00	31591.833	-21.5353	122.22	9502.00
14632.12	21768942.25	31767.179	-21.3506	122.63	9477.09
14637.12	21782376.00	31944.589	-21.1641	123.03	9452.07
14642.12	21796425.25	32124.147	-20.9756	123.43	9426.93
14647.12	21811105.25	32305.920	-20.7852	123.83	9401.67
14652.12	21826431.50	32489.981	-20.5929	124.23	9376.29
14657.12	21842419.75	32676.407	-20.3987	124.64	9350.79
14662.12	21859084.25	32865.275	-20.2026	125.04	9325.18
14667.12	21876440.25	33056.664	-20.0045	125.45	9299.44
14672.12	21894496.00	33250.542	-19.8045	125.86	9273.58
14677.12	21913238.75	33447.058	-19.6025	126.26	9247.60
14682.12	21932688.50	33646.439	-19.3986	126.67	9221.51
14687.12	21952872.00	33848.764	-19.1927	127.08	9195.28
14692.12	21973815.75	34054.115	-18.9849	127.49	9168.94
14695.31	21987575.50	34186.625	-18.8514	127.75	9152.09
14695.52	21988493.25	34194.474	-18.8426	127.77	9150.97
14697.12	21995541.50	34190.856	-18.7752	127.90	9142.48
14702.12	22017978.00	34171.971	-18.5646	128.31	9116.04
14705.31	22032635.75	34159.646	-18.4300	128.57	9099.21

\*\*\* MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM

ENCLOSURE 4

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	RADIAL DISTANCE OF THE C G (FT)	MAGNITUDE OF THE EARTH FIXED VELOCITY (FT/SEC)	SUB VEHICLE LATITUDE ON SPHERICAL EARTH (DEG)	LONGITUDE ON OBLATE EARTH (DEG)	ARC RANGE ALONG SPHER. EARTH TO SUB VEHICLE PT. (NM)
14705.31	22032635.75	34159.646	-19.4300	128.57	9099.21
14715.31	22080413.75	34119.614	-18.0065	129.38	9046.57
14726.31	22136078.25	34073.105	-17.5386	130.27	8988.94
14737.31	22194970.75	34024.062	-17.0687	131.14	8931.61
14748.31	22257054.25	33972.544	-16.5973	132.00	8874.61
14759.31	22322293.50	33918.609	-16.1247	132.86	8817.94
14770.31	22390650.75	33862.323	-15.6511	133.70	8761.61
14781.31	22462087.50	33803.750	-15.1769	134.54	8705.65
14792.31	22536562.75	33742.954	-14.7023	135.36	8650.07
14803.31	22614037.00	33680.005	-14.2277	136.16	8594.87
14814.31	22694466.75	33614.971	-13.7534	136.98	8540.06
14825.31	2277810.25	33547.920	-13.2795	137.78	8485.67
14836.31	22864022.25	33478.921	-12.8064	138.57	8431.69
14846.21	22944029.00	33415.216	-12.3815	139.27	8383.47

CVS OFF

MEASURED FROM THE CENTER OF THE EARTH IN THE SPACE FIXED, EARTH CENTERED PLUMBLINE SYSTEM



\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM MOTION (SEC)	X COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (FT)	Y COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (FT)	Z COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (FT)	X COMPONENT OF VEL. IN THE XXXE SYSTEM (FT/S)	Y COMPONENT OF VEL. IN THE XXXE SYSTEM (FT/S)	Z COMPONENT OF VEL. IN THE XXXE SYSTEM (FT/S)
713.12	19645324.750	259357.934	8813245.000	-9926.666	916.145	22099.459
722.12	19554972.250	267691.867	9011675.375	-10150.311	931.136	21997.149
732.12	19452230.500	277085.762	9231067.125	-10397.560	947.623	21880.817
743.12	19336367.250	287608.656	9471037.375	-10668.009	965.622	21749.639
754.12	19217537.750	298328.793	9709546.125	-10936.818	983.473	21615.113
765.12	19095761.000	309244.520	9946556.625	-11203.957	1001.148	21477.280
776.12	18971054.750	320353.867	10182033.375	-11469.405	1018.705	21336.198
787.12	18843438.250	331655.305	10415940.000	-11733.090	1036.072	21191.328
798.12	18712931.750	343146.762	10648240.000	-11994.915	1053.260	21044.092
844.12	18136325.000	392215.941	11601466.625	-13069.290	1123.089	20391.262
932.12	16899185.500	497572.156	13335710.500	-15024.455	1246.165	18991.001
1020.12	15496345.500	612059.930	14938393.375	-16832.155	1352.891	17403.719
1108.12	13941568.000	735107.973	16393733.250	-18474.778	1440.254	15645.052
1196.12	12250098.875	864901.109	17687398.000	-19736.245	1505.734	13732.275
1284.12	10438523.875	999404.852	18806641.750	-21202.220	1546.947	11684.192
1372.12	8524608.625	1136392.875	19740435.250	-22260.753	1561.891	9520.966
1460.12	6527126.500	1273479.031	20479576.750	-23099.905	1548.944	7263.934
1548.12	4465676.250	1408152.750	21016787.000	-23712.872	1506.894	4935.396
1636.12	2360490.781	1537815.594	21346782.250	-24093.063	1434.972	2558.406
1724.12	232238.633	1659821.781	21466334.000	-24236.679	1332.866	156.533
1812.12	-1898183.016	1771518.922	21374299.250	-24142.258	1200.746	-2246.368
1900.12	-4009440.281	1870291.062	21071641.500	-23810.701	1039.263	-4626.404
1988.12	-6082000.312	1953400.656	20561416.250	-23245.269	849.554	-6959.892
2076.12	-8094308.000	2019031.500	19848745.750	-22451.546	633.237	-9223.600
2164.12	-10027003.750	2064330.312	18940768.500	-21437.404	392.394	-11394.996
2252.12	-11861118.000	2087446.937	17846566.250	-20212.913	129.553	-13452.487
2340.12	-13578659.750	2086571.891	16577070.375	-18790.236	-152.344	-15375.637
2428.12	-15162796.875	2060172.547	15144953.375	-17183.503	-449.967	-17145.390
2516.12	-16598021.375	2007073.531	13564494.625	-15408.659	-759.650	-18744.254
2604.12	-17870301.500	1926236.375	11851439.125	-13483.293	-1077.425	-20156.490
2692.12	-18967221.000	1817282.531	10022833.375	-11426.457	-1399.080	-21368.254
2780.12	-19878094.500	1680013.109	8294853.500	-9258.468	-1720.214	-22247.752
2868.12	-20594074.500	1514673.141	6092620.187	-7000.694	-2036.286	-23145.320
2956.12	-21108232.000	1321910.437	4030006.500	-4675.343	-2342.686	-23693.535
3044.12	-21415620.000	1102779.766	1929438.047	-2305.237	-2634.787	-24047.269
3132.12	-21513319.750	858741.469	-188310.506	86.408	-2908.016	-24083.726
3220.12	-21400464.000	591653.742	-2302322.344	2476.211	-3157.909	-23922.464
3308.12	-21078242.500	303759.992	-4391744.312	4840.850	-3380.181	-23525.384
3396.12	-20606313.500	26173.921	-6252552.625	6949.285	-3554.862	-22963.276
3484.12	-19895057.000	-293900.191	-8238267.875	9202.304	-3713.400	-22129.630
3572.12	-18989365.500	-628253.672	-10140991.000	11364.674	-3833.400	-21078.692
3660.12	-17898148.250	-967358.531	-11942052.125	13415.374	-3911.825	-19821.082

\*\* ENCLOSURE 4 \*\*  
AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM MOTION (SEC)	X COORDINATE EARTH FIXED, PAD CENTERED, PLUMBIN SYS. (FT)	Y COORDINATE EARTH FIXED, PAD CENTERED, PLUMBIN SYS. (FT)	Z COORDINATE EARTH FIXED, PAD CENTERED, PLUMBIN SYS. (FT)	COMPONENT OF VEL. IN THE XXE SYSTEM (FT/S)	COMPONENT OF VEL. IN THE YYE SYSTEM (FT/S)	COMPONENT OF VEL. IN THE ZZE SYSTEM (FT/S)
3743.12	-1313438.859	-13623806.125	15334.472	-3946.090	-18369.443	-16738.315
3828.13	-1520368.375	-1660512.922	17103.318	-3934.106	-14943.999	-13004.393
3916.12	-1362684.500	-2004438.625	18704.720	-3765.749	-3401.339	-8767.856
4004.12	-11917026.000	-2340961.500	20123.109	-3146.601	-2845.303	-6513.094
4092.12	-10090952.375	-2665767.344	21344.694	-2499.582	-2112.196	-4196.961
4180.12	-816682.000	-2974535.187	22357.598	-1686.506	-1842.474	526.486
4268.12	-6162426.437	-3262992.156	23151.979	-2458.066	24023.731	2887.916
4356.12	-4098371.250	-3526970.281	23770.130	24056.564	5216.929	5216.929
4444.12	-1994482.391	-3752461.469	24056.564	-1226.441	7490.998	7490.998
4532.12	128690.457	-3965673.562	24158.066	-736.466	9687.690	11785.393
4620.12	2250416.904	-4133083.469	24023.731	-221.533	312.969	13763.537
4708.12	434988.187	-42614.250	23654.975	861.274	1417.300	15602.797
4796.12	6406922.500	-4348058.687	23055.517	19943.697	1974.723	17285.285
4884.12	840164.625	-4390374.250	22231.344	1974.723	18794.718	20116.579
4972.12	10313284.500	-4386473.500	21190.639	3589.989	21238.239	22149.081
5060.12	12124664.500	-4334885.937	19943.697	4087.439	22840.583	23306.391
5148.12	13817682.875	-4234662.125	18502.817	4553.599	23542.373	23542.373
5236.12	15375883.250	-4085399.562	16882.172	4982.264	23546.644	23319.579
5324.12	16784134.500	-3887259.969	15097.656	5367.516	22863.802	22184.157
5412.12	18028773.000	-3640982.062	13166.730	6464.891	21287.667	21287.667
5500.12	19097734.000	-3347886.437	11108.236	6491.179	20292.146	19008.733
5588.12	19980665.500	-3009873.375	8942.220	6452.515	17540.538	15902.368
5676.12	20669025.250	-2629414.969	6689.727	6370.279	12182.950	10138.897
5764.12	21156159.000	-2209539.750	4372.606	6464.891	7998.776	7998.776
5852.12	21437363.750	-1753810.047	2013.303	6491.179	5783.949	5783.949
5940.12	21509929.750	-1266293.531	-365.353	6452.515	3516.511	3516.511
6028.12	21373165.750	-751527.789	-2740.356	6341.804	1219.068	1219.068
6116.12	21028405.250	-214478.885	-5088.740	6158.543	-1085.506	-1085.506
6204.12	20478992.750	339505.465	-7387.781	5903.057		
6292.12	19730254.250	904749.000	-9615.718	5576.514		
6372.12	1888684.500	1423377.000	-11559.834	511.930		
6460.12	1775136.750	1993424.062	-13591.319	4719.167		
6548.12	16494479.875	2556905.156	-15490.939	4194.917		
6636.12	15053143.000	3107452.094	-17240.161	3612.677		
6724.12	13465125.000	3638688.969	-18821.874	2977.709		
6812.12	11745861.875	4144304.656	-20220.562	2295.996		
6900.12	9912078.875	4618128.875	-21472.464			
6988.12	7981629.312	5054205.812	-22415.722			
7076.12	5973321.375	5446867.875	-23190.508			
7164.12	3906735.437	5790808.562	-23739.129			
7252.12	1802031.266	6081151.062	-24056.118			
7340.12	-320251.493	6313512.937	-24138.297			

\*\* ENCLOSURE 4 \*\*  
 A5-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM MOTION (SEC)	X COORDINATE (FT)		Y COORDINATE (FT)		Z COORDINATE (FT)		EARTH FIXED, PAD CENTERED PLUMBIN SYS, (FT)		EARTH FIXED, PAD CENTERED PLUMBIN SYS, (FT)		COMPONENT OF VEL. IN THE XXXE SYSTEM (FT/S)		COMPONENT OF VEL. IN THE XXXE SYSTEM (FT/S)	
	EARTH FIXED, PAD CENTERED	PLUMBIN SYS,	EARTH FIXED, PAD CENTERED	PLUMBIN SYS,	EARTH FIXED, PAD CENTERED	PLUMBIN SYS,	EARTH FIXED, PAD CENTERED	PLUMBIN SYS,	EARTH FIXED, PAD CENTERED	PLUMBIN SYS,	XXXE SYSTEM	YYYE SYSTEM	XXXE SYSTEM	YYYE SYSTEM
742.12	-243939.187	6484068.625	20401756.500	-23944.811	1574.180	-3374.299	-23944.811	1574.180	-3374.299	-3374.299	-3374.299	-3374.299	-3374.299	
751.12	-4534706.812	6589603.250	20005438.500	-23597.146	819.498	-5624.606	-23597.146	819.498	-5624.606	-5624.606	-5624.606	-5624.606	-5624.606	
760.12	-6585731.937	6627562.250	19413605.750	-22979.107	39.701	-7814.165	-22979.107	39.701	-7814.165	-7814.165	-7814.165	-7814.165	-7814.165	
769.12	-8572447.625	6596093.000	18632559.000	-22136.787	-757.023	-9421.391	-22136.787	-757.023	-9421.391	-9421.391	-9421.391	-9421.391	-9421.391	
778.12	-10475467.500	6494078.687	17670461.500	-21078.491	-1562.177	-11925.596	-21078.491	-1562.177	-11925.596	-11925.596	-11925.596	-11925.596	-11925.596	
786.12	-12276229.375	6321165.187	16537249.750	-19214.653	-2366.824	-13807.198	-19214.653	-2366.824	-13807.198	-13807.198	-13807.198	-13807.198	-13807.198	
795.12	-13957179.375	6077777.625	15244526.875	-18357.721	-3162.338	-15547.921	-18357.721	-3162.338	-15547.921	-15547.921	-15547.921	-15547.921	-15547.921	
804.12	-15501942.000	5765129.312	13805440.625	-16722.025	-3939.508	-17130.976	-16722.025	-3939.508	-17130.976	-17130.976	-17130.976	-17130.976	-17130.976	
813.12	-16875480.000	5385221.437	12234544.750	-14923.627	-4689.484	-18541.213	-14923.627	-4689.484	-18541.213	-18541.213	-18541.213	-18541.213	-18541.213	
822.12	-18124241.250	4940834.500	10547648.750	-12980.153	-5403.504	-19765.271	-12980.153	-5403.504	-19765.271	-19765.271	-19765.271	-19765.271	-19765.271	
830.12	-19176286.000	4435508.750	8761655.250	-10910.614	-6073.065	-20791.692	-10910.614	-6073.065	-20791.692	-20791.692	-20791.692	-20791.692	-20791.692	
839.12	-20041401.250	3873518.281	6894386.875	35.219	-6690.014	-21611.021	35.219	-6690.014	-21611.021	-21611.021	-21611.021	-21611.021	-21611.021	
848.12	-20711198.250	3259835.344	4964407.437	75.170	-7246.654	-22215.890	75.170	-7246.654	-22215.890	-22215.890	-22215.890	-22215.890	-22215.890	
857.12	-21179190.000	2600016.500	2990836.062	4152.463	-7735.826	-22601.066	4152.463	-7735.826	-22601.066	-22601.066	-22601.066	-22601.066	-22601.066	
866.12	-21440852.750	1900501.187	993155.484	-1789.673	-8150.998	-22763.496	-1789.673	-8150.998	-22763.496	-22763.496	-22763.496	-22763.496	-22763.496	
874.12	-21493667.000	1167853.031	-1008978.375	590.257	-8486.346	-22702.320	590.257	-8486.346	-22702.320	-22702.320	-22702.320	-22702.320	-22702.320	
883.12	-21337140.250	9394.082	-2995930.750	2964.234	-8736.830	-22418.866	2964.234	-8736.830	-22418.866	-22418.866	-22418.866	-22418.866	-22418.866	
892.12	-20972810.000	-347216.055	-4848278.625	5307.229	-8898.257	-21916.634	5307.229	-8898.257	-21916.634	-21916.634	-21916.634	-21916.634	-21916.634	
901.12	-20404231.250	-1153989.172	-6847002.687	7602.495	-8967.340	-21201.248	7602.495	-8967.340	-21201.248	-21201.248	-21201.248	-21201.248	-21201.248	
910.12	-19636939.500	-1942689.612	-8673668.250	9821.779	-8941.756	-20280.398	9821.779	-8941.756	-20280.398	-20280.398	-20280.398	-20280.398	-20280.398	
918.12	-18678399.000	-2724921.125	-10410606.500	11945.535	-8820.179	-19163.765	11945.535	-8820.179	-19163.765	-19163.765	-19163.765	-19163.765	-19163.765	
927.12	-17537931.750	-3492215.562	-12041084.250	13953.124	-8602.315	-17862.915	13953.124	-8602.315	-17862.915	-17862.915	-17862.915	-17862.915	-17862.915	
936.12	-16226628.500	-4216125.312	-13549464.375	15825.024	-8288.927	-16391.196	15825.024	-8288.927	-16391.196	-16391.196	-16391.196	-16391.196	-16391.196	
945.12	-14757242.000	-4948316.750	-14921359.250	17543.009	-7881.838	-14763.594	17543.009	-7881.838	-14763.594	-14763.594	-14763.594	-14763.594	-14763.594	
954.12	-13144064.750	-5670663.250	-16143765.250	19090.337	-7383.933	-12996.595	19090.337	-7383.933	-12996.595	-12996.595	-12996.595	-12996.595	-12996.595	
963.12	-11402791.875	-6245338.750	-17205193.250	20451.919	-6799.143	-11108.008	20451.919	-6799.143	-11108.008	-11108.008	-11108.008	-11108.008	-11108.008	
972.12	-9550366.375	-6814907.375	-18095761.750	21614.465	-6132.417	-9116.795	21614.465	-6132.417	-9116.795	-9116.795	-9116.795	-9116.795	-9116.795	
981.12	-760418.062	-7322412.812	-18807317.750	22566.627	-5389.684	-7042.873	22566.627	-5389.684	-7042.873	-7042.873	-7042.873	-7042.873	-7042.873	
990.12	-5585085.437	-7761461.750	-19333485.500	23299.113	-457.799	-4906.914	23299.113	-457.799	-4906.914	-4906.914	-4906.914	-4906.914	-4906.914	
999.12	-3510829.375	-8126301.937	-19669735.000	23804.781	3704.481	-2730.128	23804.781	3704.481	-2730.128	-2730.128	-2730.128	-2730.128	-2730.128	
1008.12	-1402243.250	-841896.000	-19813419.500	24078.713	-2779.232	-534.050	24078.713	-2779.232	-534.050	-534.050	-534.050	-534.050	-534.050	
1017.12	720146.906	-8613986.750	-19763794.750	24118.765	-1808.257	1659.682	24118.765	-1808.257	1659.682	1659.682	1659.682	1659.682	1659.682	
1026.12	2835683.625	-8729153.125	-19522014.000	23973.090	-804.367	3829.550	23973.090	-804.367	3829.550	3829.550	3829.550	3829.550	3829.550	
1035.12	4923779.587	-8754861.250	-19091113.000	23495.138	223.129	5954.371	23495.138	223.129	5954.371	5954.371	5954.371	5954.371	5954.371	
1044.12	6964120.375	-8689502.625	-18475969.250	22838.629	1263.525	80.3513	22838.629	1263.525	80.3513	80.3513	80.3513	80.3513	80.3513	
1053.12	8936860.000	-8532423.250	-17683243.000	21960.008	2305.840	9927.094	21960.008	2305.840	9927.094	9927.094	9927.094	9927.094	9927.094	
1062.12	10822815.500	-8283944.250	-16721305.125	20867.871	3318.931	11856.178	20867.871	3318.931	11856.178	11856.178	11856.178	11856.178	11856.178	
1071.12	12603651.500	-7945369.062	-15500142.625	19572.875	4351.617	13642.955	19572.875	4351.617	13642.955	13642.955	13642.955	13642.955	13642.955	
1080.12	14262057.375	-7189893.000	-14331256.625	18087.625	5352.798	15210.957	18087.625	5352.798	15210.957	15210.957	15210.957	15210.957	15210.957	
1089.12	157819.2875	-7008040.187	-12927538.000	16426.548	6271.572	16664.956	16426.548	6271.572	16664.956	16664.956	16664.956	16664.956	16664.956	
1098.12	1714841.500	-6415740.375	-11403135.625	14605.746	7157.358	17951.598	14605.746	7157.358	17951.598	17951.598	17951.598	17951.598	17951.598	
1107.12	18348352.500	-5750197.062	-9773314.375	12642.843	7940.008	19059.020	12642.843	7940.008	19059.020	19059.020	19059.020	19059.020	19059.020	

AS-509 TAIL DATA (ENGLISH UNITS) JANUARY 31 1971 TIMUTM=72.067 DEG. 2ND OPP. ●● ENCLOSURE 4 ●●

TIME FROM MOTION (SEC)	X COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (FT)	Y COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (FT)	Z COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (FT)	X COMPONENT OF VEL. IN THE XXXE SYSTEM (FT/S)	Y COMPONENT OF VEL. IN THE XXXE SYSTEM (FT/S)	Z COMPONENT OF VEL. IN THE XXXE SYSTEM (FT/S)
11124.12	1936997.250	-5014392.475	-8054300.125	10554.815	8729.919	19977.207
11212.12	20203328.750	-4216127.750	-6263118.187	8367.807	9398.134	20697.989
11300.12	20840297.500	-3362957.437	-4417427.750	6096.956	9976.470	21215.769
11388.12	21274632.250	-2463122.000	-2535346.562	3766.184	10457.560	21524.511
11476.12	21502046.000	-1525468.016	-635276.773	1398.006	10034.993	21623.800
11564.12	21520252.500	-559363.016	1264273.375	-984.678	11103.370	21512.846
11652.12	21328991.000	425398.684	3144869.219	-3358.796	11258.373	21193.487
11740.12	20930029.000	1418692.094	4988324.500	-5701.316	11296.857	20665.70
11828.12	20327152.000	2410167.937	6776880.125	-7789.463	11216.845	19716.845
11916.12	19526130.500	-389358.531	8493372.250	-10230.936	11017.626	19716.845
12004.12	1853469.000	4345798.062	1012139.125	-14308.316	10699.754	17931.0
12092.12	17362334.250	5269087.000	11645467.500	-17622.638	10245.071	16672.657
12180.12	16020469.875	6149103.875	13051168.875	-16163.916	9716.703	15250.075
12268.12	14522086.750	6976019.187	14325290.125	-17862.638	9059.055	13684.718
12356.12	12881740.000	7740455.687	15455952.750	-19387.499	8297.771	11992.405
12444.12	1118389.375	8433585.875	16432725.875	-20723.994	7439.700	10100.163
12532.12	9240243.875	9047235.875	17246773.750	-21858.262	6492.828	8296.052
12620.12	7274592.937	9573982.250	17890668.250	-22779.225	5466.209	6328.982
12708.12	5237627.562	10007241.750	18359055.250	-23477.712	4369.873	4308.538
12796.12	3149247.719	10341352.875	18648003.500	-23946.756	3214.723	2254.637
12884.12	1029867.789	10571647.750	18755482.750	-24181.673	2012.421	187.610
12972.12	-1099768.141	10694514.625	18681228.750	-24180.107	775.267	-1872.305
13060.12	-321891.031	10707446.250	18426753.000	-23942.044	-483.938	-3905.021
13148.12	-5306716.187	10609019.500	17995319.000	-23469.833	-1752.027	-5890.838
13236.12	-7342846.625	10399220.175	17391900.500	-22788.127	-3015.15	-7810.642
13324.12	-9307374.875	10078857.000	16623119.625	-21843.846	-4261.239	-9646.092
13412.12	-11181098.750	9650161.000	15697172.250	-20706.094	-5475.510	-11379.796
13500.12	-12945710.500	9116472.625	14623737.000	-19366.054	-6645.255	-12495.476
13588.12	-14583974.000	8482277.625	13413870.750	-17836.891	-7757.660	-14478.119
13676.12	-16079892.000	7753167.500	12079890.250	-16133.584	-8800.410	-15814.104
13764.12	-17418861.750	6935791.125	10635245.250	-14272.800	-9761.819	-16991.327
13774.12	-17560487.500	6837653.750	10464713.625	-14052.179	-9865.427	-17114.572
13777.12	-17602544.000	6808011.125	10413314.875	-13985.646	-9896.275	-17151.117

TIME BASE 6

ENCLOSURE 4

A-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEg. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	X COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS, (FT)	Y COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS, (FT)	Z COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS, (FT)	X COMPONENT OF VEL. IN THE XXE SYSTEM (FT/S)	Y COMPONENT OF VEL. IN THE XXE SYSTEM (FT/S)	Z COMPONENT OF VEL. IN THE XXE SYSTEM (FT/S)
1377.12	-18512219.000	4751950.625	10431457.625	-13985.846	-9896.275	-17151.117
1378.12	-18581869.500	6702341.125	10345550.500	-13874.405	-9947.116	-17211.584
1379.12	-18650962.000	6652476.562	10257342.375	-13762.726	-9998.111	-17271.498
1380.12	-18719495.500	6602358.562	10172836.500	-13650.614	-10048.670	-17330.857
1381.12	-18787467.500	6551988.375	10086034.875	-13538.073	-10099.119	-17389.659
1382.12	-18854876.500	6501367.812	9998940.875	-13425.125	-10149.049	-17447.891
1383.12	-18921718.500	6450498.250	9911556.875	-13311.761	-10198.644	-17505.559
1384.12	-18987993.000	6399381.687	9823886.125	-13197.968	-10247.969	-17562.671
1385.12	-19055979.000	6348019.250	9735931.125	-13083.740	-10296.964	-17619.231
1386.12	-19124829.500	6296412.437	9647694.500	-12969.098	-10345.641	-17675.228
1387.12	-19194749.500	6244563.375	9559179.875	-12854.048	-10394.000	-17730.655
1388.12	-19264739.500	6192473.175	9470389.125	-12738.543	-10442.037	-17785.517
1389.12	-19335772.500	6140143.437	9381325.500	-12622.736	-10489.750	-17839.811
1390.12	-19407856.000	6087876.062	9291991.750	-12506.482	-10537.139	-17892.534
1391.12	-19480993.000	6034772.687	9202399.375	-12389.833	-10584.200	-17944.685
1392.12	-19555244.500	5981734.750	9112526.125	-12272.794	-10630.932	-17999.262
1393.12	-19630615.500	5928463.937	9022399.500	-12155.367	-10677.311	-18051.278
1394.12	-19707156.500	5874962.125	8932014.250	-12037.557	-10723.360	-18102.715
1395.12	-19784859.000	5821230.875	8841373.500	-11919.368	-10769.097	-18153.563
1396.12	-19863720.000	5767271.887	8750479.750	-11800.797	-10814.500	-18203.835
1397.12	-19943746.500	5713086.375	8659336.125	-11681.843	-10859.568	-18253.530
1398.12	-20024937.500	5658676.687	8567945.375	-11562.527	-10904.295	-18302.640
1399.12	-20107294.500	5604044.000	8476310.500	-11442.855	-10948.680	-18351.164
1400.12	-20190827.500	5549190.187	8384434.500	-11322.825	-10992.720	-18399.101
1401.12	-20275539.000	5494117.312	8292320.312	-11202.437	-11036.417	-18446.452
1402.12	-20361420.500	5438826.812	8199971.125	-11081.698	-11079.768	-18493.217
1403.12	-20448485.500	5383320.750	8107389.312	-10960.608	-11122.771	-18539.392
1404.12	-20536735.000	5327599.625	8014578.062	-10839.173	-11165.425	-18584.978
1405.12	-20626170.500	5271666.500	7921540.625	-10717.346	-11207.729	-18629.972
1406.12	-20716800.000	5215522.937	7828279.562	-10595.282	-11249.680	-18674.374
1407.12	-20808625.500	5159170.312	7734797.750	-10472.833	-11291.277	-18718.182
1408.12	-20901646.000	5102610.887	7641098.500	-10350.054	-11332.519	-18761.396
1409.12	-20995861.500	5045845.875	7547185.000	-10226.949	-11373.402	-18804.013
1410.12	-21091272.000	4988877.312	7453059.562	-10103.521	-11413.927	-18846.034
1411.12	-21187879.500	4931707.125	7358725.562	-9979.775	-11454.092	-18887.457
1412.12	-21285693.000	4874317.125	7264185.875	-9855.717	-11493.894	-18928.279
1413.12	-21384724.500	4816768.750	7169443.750	-9731.361	-11533.329	-18968.496
1414.12	-21484975.000	4759004.750	7074501.875	-9606.703	-11572.398	-19008.109
1415.12	-21586446.500	4701045.437	6979363.562	-9481.732	-11611.103	-19047.128
1416.12	-21689128.000	4642893.875	6884031.687	-9356.652	-11649.421	-19085.552

02/42 BURNER ON  
ENGINE OFF

\*\* ENCL(S) 4 \*\*

A9-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM MOTION (SEC)	X COORDINATE EARTH FIXED, PAD CENTERED, PLUMB IN SYS, (FT)	Y COORDINATE EARTH FIXED, PAD CENTERED, PLUMB IN SYS, (FT)	Z COORDINATE EARTH FIXED, PAD CENTERED, PLUMB IN SYS, (FT)	X COMPONENT OF VEL. IN THE XXXX SYSTEM (FT/S)	Y COMPONENT OF VEL. IN THE XXXX SYSTEM (FT/S)	Z COMPONENT OF VEL. IN THE XXXX SYSTEM (FT/S)
1377.12	-40843681.000	484551.812	678509.250	-9230.878	-11687.363	-19123.379
1382.12	-40889520.500	4526020.750	6692799.000	-9105.039	-11724.463	-19160.584
1387.12	-40934730.500	4467302.875	6596904.312	-8978.855	-11762.190	-19197.183
1392.12	-40979308.500	4408399.675	6500628.187	-8852.418	-11799.043	-19233.174
1397.12	-41023254.000	4349313.062	6404573.625	-8725.702	-11835.521	-19268.557
1402.12	-41066565.000	4290045.000	6308143.500	-8598.709	-11871.821	-19303.331
1407.12	-41109240.500	4230597.500	6211541.375	-8471.447	-11907.344	-19337.494
1412.12	-41151279.000	4170972.281	6114769.875	-8343.914	-11942.687	-19371.047
1417.12	-41192679.500	4111171.250	6017831.812	-8216.122	-11977.649	-19403.987
1422.12	-41233440.000	4051196.250	5920730.937	-8088.069	-12012.229	-19436.315
1427.12	-41273559.500	3991049.594	5823469.812	-7959.761	-12046.425	-19468.029
1432.12	-41313037.000	3930732.687	5726051.625	-7831.201	-12080.235	-19499.128
1437.12	-41351871.000	3870247.719	5628479.375	-7702.395	-12113.659	-19529.613
1442.12	-41390060.500	3809596.781	5530756.375	-7573.345	-12146.695	-19559.482
1447.12	-41427604.500	3748781.562	5432885.687	-7444.057	-12179.342	-19588.733
1452.12	-41464500.500	3687804.031	5334870.000	-7314.533	-12211.598	-19617.368
1457.12	-41500749.000	3626466.094	5236712.875	-7184.778	-12243.463	-19645.384
1462.12	-41536348.000	3565370.156	5138417.437	-7054.797	-12274.934	-19672.782
1467.12	-41571297.000	3503917.500	5039986.312	-6924.593	-12306.011	-19699.560
1472.12	-41605594.000	3442310.562	4941422.687	-6794.170	-12336.692	-19725.718
1477.12	-41639237.500	3380551.250	4842729.937	-6663.532	-12366.974	-19751.256
1482.12	-41672228.500	3318441.500	4743911.375	-6532.684	-12396.661	-19776.172
1487.12	-41704564.500	3256543.250	4644969.312	-6401.630	-12426.348	-19800.486
1492.12	-41736245.000	3194378.687	4545907.500	-6270.374	-12455.433	-19824.137
1497.12	-41767268.000	3132029.719	4446729.250	-6138.919	-12484.117	-19847.185
1502.12	-41797633.500	3069538.187	4347436.875	-6007.271	-12512.397	-19869.610
1507.12	-41827340.000	3006906.344	4248034.000	-5875.433	-12540.273	-19891.411
1512.12	-41856387.500	2944136.125	4148523.687	-5743.438	-12567.699	-19912.613
1517.12	-41884774.000	2881230.094	4048909.062	-5611.231	-12594.719	-19933.188
1522.12	-41912499.500	2818189.687	3949193.031	-5478.819	-12621.376	-19953.114
1527.12	-41939562.000	2755016.844	3849378.719	-5346.263	-12647.623	-19972.412
1532.12	-41965961.500	2691714.094	3749470.031	-5213.537	-12673.461	-19991.083
1537.12	-41991697.000	2628283.031	3649469.094	-5080.647	-12698.868	-20009.128
1542.12	-42016768.000	2564725.781	3549379.656	-4947.598	-12723.928	-20026.578
1547.12	-42041173.000	2501044.250	3449204.781	-4814.394	-12748.597	-20043.274
1552.12	-42064911.500	2437240.719	3348948.000	-4681.035	-12772.808	-20059.420
1557.12	-42087983.000	2373317.000	3248611.812	-4547.528	-12796.579	-20074.953
1562.12	-42110386.500	2309275.562	3148199.344	-4413.876	-12819.932	-20089.854
1567.12	-42132121.000	2245118.271	3047714.094	-4280.084	-12842.884	-20104.146
1572.12	-42153218.000	2180847.844	2947158.937	-4146.156	-12865.297	-20117.833
1577.12	-42173583.000	2116466.031	2846536.644	-4012.097	-12887.326	-20130.892
1582.12	-42193307.500	2051975.266	2745851.094	-3877.912	-12908.981	-20143.293

\*\* ENCLOSURE 4 \*\*  
AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. LND OPP.

TIME FROM MOTION (SEC)	X COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (FT)	Y COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (FT)	Z COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (FT)	COMPONENT OF VEL. IN THE XXXE SYSTEM (FT/S)	COMPONENT OF VEL. IN THE YYYE SYSTEM (FT/S)	COMPONENT OF VEL. IN THE ZZE SYSTEM (FT/S)
1417.12	-42212361.500	1987377.016	2645105.156	-3743.604	-12930.239	-20155.051
1419.12	-42230743.500	1922673.594	2544301.687	-3409.178	-12951.075	-20166.178
1419.17	-42248453.500	1857866.828	2443444.406	-3474.640	-12971.540	-20176.641
1422.17	-42265493.000	1792958.766	2342536.344	-3339.991	-12991.596	-20186.464
1420.17	-42281853.000	1727951.625	2241580.875	-3205.737	-13011.214	-20195.664
1421.12	-42297542.000	1662847.547	2140580.719	-3070.379	-13030.351	-20204.271
1421.17	-42312556.500	1597648.750	2039539.000	-2935.423	-13049.059	-20212.248
1422.12	-42328496.500	1532357.797	1938459.406	-2800.374	-13067.303	-20219.616
1422.17	-42340560.500	1466976.656	1837344.156	-2665.735	-13085.086	-20226.373
1423.12	-42353548.500	1401507.444	1736196.547	-2530.012	-13102.438	-20232.499
1423.17	-42365860.000	1335952.719	1635019.891	-2394.708	-13119.391	-20237.977
1424.17	-42377495.000	1270314.406	1533818.047	-2259.330	-13135.954	-20242.799
1424.17	-42388453.500	1204594.094	1432593.187	-2123.879	-13152.086	-20246.991
1425.12	-42398734.000	1138793.969	1331348.953	-1988.363	-13167.846	-20250.513
1425.17	-42408334.500	1072916.281	1230089.047	-1852.784	-13183.179	-20253.399
1426.12	-42417262.000	1006962.953	1128816.250	-1717.146	-13198.077	-20255.656
1426.12	-42425508.000	940936.406	1027533.430	-1581.451	-13212.482	-20257.321
1427.12	-42433076.500	874838.820	926243.906	-1445.05	-13226.441	-20258.363
1427.42	-42434932.500	857643.273	899909.570	-1410.406	-13229.997	-20258.532
1427.92	-42435634.000	851027.844	88980.766	-1396.827	-13231.355	-20258.595
1427.12	-42439965.000	808672.789	824950.867	-1309.915	-13239.932	-20258.842
1428.12	-42446175.000	742440.258	723656.508	-1174.083	-13252.974	-20258.712
1428.12	-42451705.500	676143.648	622364.414	-1038.214	-13265.580	-20257.952
1429.12	-42456557.000	609785.039	521077.945	-902.311	-13277.776	-20256.546
1429.12	-42460728.500	543366.578	419800.207	-766.380	-13289.574	-20254.486
1430.12	-42464221.000	476890.790	318534.402	-630.423	-13300.945	-20251.791
1430.12	-42467033.000	410357.762	217283.381	-494.449	-13311.934	-20248.1428
1431.12	-42469165.000	343771.582	116051.216	-358.458	-13322.485	-20244.434
1431.12	-42470617.500	277133.641	14840.710	-222.455	-13332.591	-20239.815
1432.12	-42471389.500	210446.819	-86346.174	-86.443	-13342.189	-20234.612
1432.17	-42471482.000	143712.555	-187504.893	49.567	-13351.341	-20228.783
1433.12	-42470894.000	76933.992	-288632.832	185.572	-13360.004	-20222.355
1433.12	-42469626.000	10113.733	-389727.406	321.580	-13368.197	-20215.315
1434.12	-42467678.500	-56747.358	-490785.109	457.583	-13375.948	-20207.648
1434.12	-42465050.500	-123645.568	-591803.031	593.574	-13383.268	-20199.347
1435.12	-42463147.000	-163801.730	-692777.828	675.159	-13387.536	-20194.136
1435.12	-42461742.000	-190579.537	-792777.828	729.545	-13390.340	-20190.610
1435.12	-42459431.500	-230756.848	-853341.617	811.119	-13394.511	-20185.277
1435.12	-42457755.000	-287551.408	-93712.711	865.624	-13403.293	-20190.618
1435.62	-42457318.500	-317979.492	-803809.500	879.370	-13408.732	-20196.809
1436.12	-42453579.000	-317979.492	-884705.273	990.571	-13454.760	-20253.201
1436.12	-42453060.500	-324708.488	-894833.711	1004.494	-13460.904	-20261.001

ULLAGE IGNITION  
D2/H2 BURNER OFF

J-2 F-L INI  
ULL CUT OFF

REIGN

908 THR  
16M INI

\*\* ENCLOSURE 4 \*\*  
AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	X COORDINATE (FT)			Y COORDINATE (FT)			Z COORDINATE (FT)			COMPONENT OF VEL. IN THE XXXE SYSTEM (FT/S)			COMPONENT OF VEL. IN THE XXXE SYSTEM (FT/S)		
	EARTH FIXED, PAD CENTERED, PLUMBIN SYS.			EARTH FIXED, PAD CENTERED, PLUMBIN SYS.			EARTH FIXED, PAD CENTERED, PLUMBIN SYS.			XXXE SYSTEM			XXXE SYSTEM		
	EARTH FIXED, PAD CENTERED, PLUMBIN SYS.			EARTH FIXED, PAD CENTERED, PLUMBIN SYS.			EARTH FIXED, PAD CENTERED, PLUMBIN SYS.			XXXE SYSTEM			XXXE SYSTEM		
	PLUMBIN SYS.	PLUMBIN SYS.	PLUMBIN SYS.	PLUMBIN SYS.	PLUMBIN SYS.	PLUMBIN SYS.	PLUMBIN SYS.	PLUMBIN SYS.	PLUMBIN SYS.	XXXE SYSTEM	XXXE SYSTEM	XXXE SYSTEM	XXXE SYSTEM	XXXE SYSTEM	XXXE SYSTEM
14367.12	-4744771.000	-392148.500	-996333.500	1143.801	-13523.156	-20339.175									
14372.12	-47441621.000	-459937.207	-1098227.797	1293.581	-13584.479	-20418.500									
14377.12	-47434779.500	-528015.477	-120520.344	1442.678	-13646.864	-20498.784									
14382.12	-47427193.500	-596405.766	-1303216.766	1591.783	-13709.219	-20579.750									
14387.12	-47418861.000	-665107.758	-1406318.281	1741.255	-13771.632	-20660.275									
14392.12	-47409782.000	-734121.953	-1509826.641	1891.417	-13834.025	-20742.333									
14397.12	-47399946.000	-803448.148	-1613741.969	2042.217	-13896.427	-20823.762									
14402.12	-47389356.500	-873086.227	-1718064.250	2193.579	-13958.858	-20905.265									
14407.12	-47378009.500	-943036.781	-1822794.625	2345.417	-14021.344	-20986.850									
14412.12	-47365902.000	-1013299.930	-1927932.984	2497.644	-14083.899	-21068.510									
14417.12	-47353032.500	-1083875.937	-2033479.984	2650.285	-14146.545	-21150.254									
14422.12	-47339396.500	-1154765.531	-2139435.687	2803.270	-14209.315	-21232.136									
14427.12	-47324999.000	-1225969.312	-2245801.562	2956.611	-14272.231	-21314.175									
14432.12	-47309832.000	-1297488.156	-2352577.875	3110.295	-14335.317	-21396.392									
14437.12	-47293895.500	-1369322.781	-2459745.812	3264.318	-14398.582	-21478.806									
14442.12	-47277188.000	-1441474.234	-2567366.125	3418.676	-14462.040	-21561.419									
14447.12	-47259708.000	-1513943.453	-2675380.187	3573.368	-14525.694	-21644.244									
14452.12	-47241454.000	-1586731.547	-2783809.125	3728.387	-14589.546	-21727.268									
14457.12	-47222424.000	-1659839.281	-2892653.187	3883.734	-14653.600	-21810.503									
14462.12	-47202614.000	-1733247.906	-3001914.312	4039.410	-14717.871	-21893.960									
14467.12	-47182029.000	-1807018.766	-3111593.281	4195.413	-14782.367	-21977.655									
14472.12	-47160661.000	-1881092.047	-3221691.469	4351.743	-14847.104	-22061.603									
14477.12	-47138511.000	-1955499.937	-3332209.719	4508.398	-14912.090	-22145.821									
14482.12	-47115576.500	-2030213.391	-3443149.937	4665.376	-14977.336	-22230.313									
14487.12	-47091856.500	-2105263.719	-3554513.437	4822.678	-15042.852	-22315.094									
14492.12	-47067349.000	-2180642.219	-3666301.281	4980.301	-15108.643	-22400.174									
14497.12	-47042053.000	-2256350.562	-3778515.562	5138.244	-15174.720	-22485.572									
14502.12	-47015964.500	-2332390.062	-3891157.656	5296.514	-15241.094	-22571.292									
14507.12	-4700087.800	-2408762.031	-4004229.125	5455.114	-15307.777	-22657.350									
14512.12	-4706144.500	-2485468.281	-4117731.687	5614.044	-15374.781	-22743.761									
14517.12	-47032946.500	-2562510.406	-4231667.375	5773.308	-15442.119	-22830.546									
14522.12	-47003681.000	-2639890.062	-4346037.875	5932.910	-15509.813	-22917.734									
14527.12	-47073617.000	-2717609.156	-4460845.500	6092.862	-15577.878	-23005.348									
14532.12	-47042752.000	-2795669.531	-4576092.762	6253.168	-15646.329	-23093.406									
14537.12	-47011084.500	-2874073.062	-4691780.312	6413.833	-15715.184	-23181.933									
14542.12	-47078613.000	-2952822.125	-4807912.437	6574.876	-15784.467	-23270.964									
14547.12	-47045335.000	-3031918.531	-4924490.687	6736.306	-15854.201	-23360.527									
14552.12	-47011249.500	-3111364.875	-5041518.500	6898.131	-15924.396	-23450.639									
14557.12	-47076353.000	-3191163.281	-5158998.187	7060.369	-15995.072	-23541.320									
14562.12	-47040645.000	-3271316.437	-5276932.812	7223.033	-16066.251	-23632.594									
14567.12	-47004122.000	-3351826.625	-5395325.000	7386.146	-16137.947	-23724.489									
14572.12	-47066782.500	-3432696.687	-5514178.500	7549.723	-16210.182	-23817.032									



\* \* \* ENCLOSURE 4 \* \* \*

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM MOTION (SEC)	X COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (FT)	Y COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (FT)	Z COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS. (FT)	COMPONENT OF VEL. IN THE XXE SYSTEM (FT/S)	COMPONENT OF VEL. IN THE XYYE SYSTEM (FT/S)	COMPONENT OF VEL. IN THE ZZZE SYSTEM (FT/S)
14577.12	-41528624.000	-3713979.437	-5633496.625	7713.792	-16282.979	-23910.247
14582.12	-41489643.500	-3595527.469	-5753282.125	7878.380	-16356.356	-24004.164
14587.12	-41449839.500	-3677493.937	-5873539.312	8043.511	-16430.341	-24098.811
14592.12	-41409208.000	-3759031.875	-5994271.625	8209.215	-16504.952	-24194.217
14597.12	-41367746.000	-3842544.531	-6115483.000	8375.534	-16580.207	-24290.411
14602.12	-41325451.500	-3925635.187	-6237176.937	8542.501	-16656.136	-24387.421
14607.12	-41283320.000	-4009107.031	-6359358.437	8710.163	-16732.764	-24485.278
14612.12	-41241348.000	-4092963.906	-6482031.375	8878.567	-16810.114	-24584.012
14617.12	-41199532.500	-4177209.406	-6605200.375	9047.771	-16888.209	-24683.655
14622.12	-41157869.000	-4261847.250	-6728869.375	9217.832	-16967.077	-24784.238
14627.12	-41116353.000	-4346881.437	-6853044.187	9388.820	-17046.741	-24885.792
14632.12	-41075379.500	-4432315.937	-6977728.687	9560.743	-17127.107	-24988.158
14637.12	-41035743.500	-4518153.937	-7102927.312	9733.755	-17208.314	-25091.577
14642.12	-40996643.000	-4604400.437	-7228645.687	9907.947	-17290.392	-25195.948
14647.12	-40958062.500	-4691059.437	-7354888.687	10083.416	-17373.365	-25301.451
14652.12	-4092003.500	-4778135.625	-7481662.125	10260.284	-17457.255	-25408.065
14657.12	-4088257.000	-4865633.625	-7608971.125	10438.688	-17542.090	-25515.809
14662.12	-4084571.500	-4953558.125	-7736822.062	10618.795	-17627.887	-25624.697
14667.12	-408097865.500	-5041914.000	-7865220.187	10800.788	-17714.664	-25734.737
14672.12	-407743397.000	-5130705.625	-7994169.062	10984.851	-17801.906	-25844.456
14677.12	-407397972.000	-5219934.437	-8123666.187	11181.120	-17889.845	-25954.609
14682.12	-407051585.500	-5309606.437	-8253718.875	11373.403	-17979.150	-26066.813
14687.12	-406704237.500	-5399728.250	-8384337.812	11565.757	-18069.854	-26181.147
14692.12	-40635928.000	-5490307.437	-8515533.750	11758.193	-18162.004	-26297.705
14695.31	-406018257.500	-5580286.875	-8646468.375	11950.907	-18251.515	-26413.202
14695.52	-405675762.000	-5670113.000	-8777506.125	12144.660	-18342.976	-26529.492
14697.12	-405336676.500	-57601321.000	-8908724.500	12339.402	-18436.323	-26646.259
14702.12	-404996783.000	-5850350.687	-9040139.500	12532.734	-18531.481	-26764.642
14705.31	-404656324.000	-5940310.062	-9171787.875	12721.395	-18628.392	-26884.233

6CS2  
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AS-509 TRAJ DATA (ENG. 13M UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.  
 .. ENCLASURE 4 ..

TIME FROM FIRST MOTION (SEC)	X COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS, (FT)	Y COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS, (FT)	Z COORDINATE EARTH FIXED, PAD CENTERED PLUMBIN SYS, (FT)	X COMPONENT OF VEL. IN THE XXE SYSTEM (FT/S)	Y COMPONENT OF VEL. IN THE XXE SYSTEM (FT/S)	Z COMPONENT OF VEL. IN THE XXE SYSTEM (FT/S)
14705.31	-19348649.000	-5674749.500	-8880860.625	12101.395	-18177.392	-26260.233
14715.31	-19226564.750	-5855766.562	-9142966.125	12314.839	-18125.690	-26152.479
14726.31	-19089825.750	-6054826.250	-9429930.250	12546.018	-18066.668	-26022.480
14737.31	-18950565.000	-6253224.750	-9715450.125	12773.319	-18005.469	-25889.810
14748.31	-18808825.500	-6450938.375	-9999496.125	12996.646	-17942.176	-25754.597
14759.31	-18664651.750	-6647944.500	-10282041.375	13215.913	-17876.872	-25616.970
14770.31	-18518088.750	-6844221.812	-10563060.000	13431.040	-17809.640	-25477.065
14781.31	-18369182.500	-7039749.187	-10842527.875	13641.958	-17740.565	-25335.012
14792.31	-18217979.500	-7234507.000	-11120421.875	13848.603	-17669.734	-25190.945
14803.31	-18064527.250	-7428476.437	-11396720.750	14050.923	-17597.232	-25044.995
14814.31	-17908873.250	-7621639.562	-11671404.375	14248.869	-17523.147	-24897.297
14825.31	-17751066.500	-7813979.437	-11944454.000	14442.402	-17447.564	-24747.980
14836.31	-17591155.000	-8005479.875	-12215853.000	14631.491	-17370.570	-24597.175
14846.21	-17445477.250	-8177098.687	-12458685.000	14797.850	-17300.139	-24460.285

CVS OFF

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (LB/FT <sup>2</sup> )	ATTACK ANGLE OF (DEG)	DRAG ALONG VELOCITY VECTOR (LB)	AERODYNAMIC LOAD (LB/FT <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (FT)
713.12	10.00	.00	3.6508	.2426	.0000	.0000
722.12	10.00	.00	4.2625	.2426	.0000	.0000
732.12	10.00	.00	.0178	.2426	.0000	.0000
743.12	10.01	.00	.0095	.2426	.0000	.0000
754.12	10.01	.00	.0366	.2426	.0000	.0000
765.12	10.01	.00	.0637	.2427	.0000	.0000
776.12	10.01	.00	.0909	.2427	.0000	.0000
787.12	10.01	.00	.1180	.2428	.0000	.0000
798.12	10.01	.00	.1451	.2429	.0000	.0000
844.12	10.01	.00	.2581	.2434	.0000	.0000
932.12	10.01	.00	.4717	.2451	.0000	.0000
1020.12	10.02	.00	.6800	.2477	.0000	.0000
1108.12	10.03	.00	.8805	.2510	.0000	.0000
1196.12	10.05	.00	1.0709	.2552	.0000	.0000
1284.12	10.06	.00	1.2792	.2601	.0000	.0000
1372.12	10.08	.00	1.4132	.2654	.0000	.0000
1460.12	10.10	.00	1.5612	.2710	.0000	.0000
1548.12	10.12	.00	1.6914	.2766	.0000	.0000
1636.12	10.14	.00	1.8023	.2819	.0000	.0000
1724.12	10.16	.00	1.8928	.2869	.0000	.0000
1812.12	10.17	.00	1.9617	.2912	.0000	.0000
1900.12	10.18	.00	2.0084	.2946	.0000	.0000
1988.12	10.19	.00	2.0322	.2969	.0000	.0000
2076.12	10.20	.00	2.0329	.2981	.0000	.0000
2164.12	10.20	.00	2.0106	.2981	.0000	.0000
2252.12	10.19	.00	1.9654	.2968	.0000	.0000
2340.12	10.18	.00	1.8978	.2944	.0000	.0000
2428.12	10.17	.00	1.8087	.2910	.0000	.0000
2516.12	10.16	.00	1.6990	.2867	.0000	.0000
2604.12	10.14	.00	1.5700	.2818	.0000	.0000
2692.12	10.12	.00	1.4231	.2765	.0000	.0000
2780.12	10.10	.00	1.2600	.2709	.0000	.0000
2868.12	10.08	.00	1.0825	.2653	.0000	.0000
2956.12	10.07	.00	.8927	.2600	.0000	.0000
3044.12	10.05	.00	.6927	.2549	.0000	.0000
3132.12	10.03	.00	.4848	.2504	.0000	.0000
3220.12	10.02	.00	.2719	.2466	.0000	.0000
3308.12	10.01	.00	.0608	.2434	.0000	.0000
3396.12	10.00	.00	.1471	.2411	.0000	.0000
3476.12	10.00	.00	.3614	.2391	.0000	.0000
3564.12	9.99	.00	.5729	.2377	.0000	.0000
3652.12	9.99	.00	.7783	.2369	.0000	.0000

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

ENCLOSURE 4

TIME FROM MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (LB/FT <sup>2</sup> )	ATTACK ANGLE OF (DEG)	DRAG ALONG VELOCITY VECTOR (LB)	AERODYNAMIC LOAD (LB/FT <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (FT)
3740.12	9.99	.00	.9749	.2366	.0000	.0000
3828.13	9.99	.00	1.1606	.2367	.0000	.0000
3916.12	9.99	.00	1.3332	.2372	.0000	.0000
4004.12	10.00	.00	1.4908	.2379	.0000	.0000
4092.12	10.00	.00	1.6315	.2386	.0000	.0000
4180.12	10.00	.00	1.7537	.2393	.0000	.0000
4268.12	10.00	.00	1.8562	.2399	.0000	.0000
4356.12	10.00	.00	1.9376	.2401	.0000	.0000
4444.12	10.00	.00	1.9971	.2399	.0000	.0000
4532.12	10.00	.00	2.0340	.2392	.0000	.0000
4620.12	10.00	.00	2.0479	.2380	.0000	.0000
4708.12	9.99	.00	2.0386	.2363	.0000	.0000
4796.12	9.98	.00	2.0063	.2340	.0000	.0000
4884.12	9.98	.00	1.9512	.2312	.0000	.0000
4972.12	9.97	.00	1.8740	.2281	.0000	.0000
5060.12	9.95	.00	1.7756	.2246	.0000	.0000
5148.12	9.94	.00	1.6570	.2209	.0000	.0000
5236.12	9.93	.00	1.5196	.2172	.0000	.0000
5324.12	9.92	.00	1.3649	.2136	.0000	.0000
5412.12	9.91	.00	1.1946	.2103	.0000	.0000
5500.12	9.90	.00	1.0108	.2072	.0000	.0000
5588.12	9.89	.00	.8154	.2046	.0000	.0000
5676.12	9.88	.00	.6107	.2026	.0000	.0000
5764.12	9.87	.00	.3990	.2012	.0000	.0000
5852.12	9.87	.00	.1831	.2004	.0000	.0000
5940.12	9.87	.00	.0404	.2004	.0000	.0000
6028.12	9.87	.00	.2553	.2012	.0000	.0000
6116.12	9.88	.00	.4706	.2027	.0000	.0000
6204.12	9.89	.00	.6808	.2049	.0000	.0000
6292.12	9.90	.00	.8834	.2079	.0000	.0000
6372.12	9.91	.00	1.0590	.2112	.0000	.0000
6460.12	9.92	.00	1.2408	.2153	.0000	.0000
6548.12	9.94	.00	1.4086	.2200	.0000	.0000
6636.12	9.96	.00	1.5605	.2250	.0000	.0000
6724.12	9.97	.00	1.6947	.2303	.0000	.0000
6812.12	9.99	.00	1.8098	.2356	.0000	.0000
6900.12	10.01	.00	1.9045	.2407	.0000	.0000
6988.12	10.02	.00	1.9775	.2456	.0000	.0000
7076.12	10.03	.00	2.0282	.2499	.0000	.0000
7164.12	10.04	.00	2.0560	.2536	.0000	.0000
7252.12	10.06	.00	2.0605	.2565	.0000	.0000
7340.12	10.06	.00	2.0416	.2584	.0000	.0000

\*\* ENCLOSURE 4 \*\*  
AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (LB/FT <sup>2</sup> )	ATTACK ANGLE OF (DEG)	DRAG ALONG VELOCITY VECTOR (LB)	AERODYNAMIC LOAD (LB/FT <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (FT)
7428.12	10.07	.00	1.9996	.2592	.0000	.0000
7510.12	10.06	.00	1.9349	.2590	.0000	.0000
7604.12	10.06	.00	1.8482	.2577	.0000	.0000
7692.12	10.04	.00	1.7406	.2554	.0000	.0000
7780.12	10.04	.00	1.6131	.2523	.0000	.0000
7868.12	10.03	.00	1.4673	.2487	.0000	.0000
7956.12	10.02	.00	1.3048	.2447	.0000	.0000
8044.12	10.00	.00	1.1273	.2404	.0000	.0000
8132.12	9.99	.00	.9369	.2360	.0000	.0000
8220.12	9.98	.00	.7358	.2316	.0000	.0000
8308.12	9.96	.00	.5263	.2275	.0000	.0000
8396.12	9.95	.00	.3108	.2237	.0000	.0000
8484.12	9.94	.00	.0934	.2203	.0000	.0000
8572.12	9.93	.00	.1324	.2174	.0000	.0000
8660.12	9.92	.00	.3506	.2150	.0000	.0000
8748.12	9.92	.00	.5660	.2132	.0000	.0000
8836.12	9.91	.00	.7763	.2119	.0000	.0000
8924.12	9.91	.00	.9761	.2111	.0000	.0000
9012.12	9.91	.00	1.1660	.2108	.0000	.0000
9100.12	9.91	.00	1.3429	.2109	.0000	.0000
9188.12	9.91	.00	1.5048	.2113	.0000	.0000
9276.12	9.91	.00	1.6498	.2119	.0000	.0000
9364.12	9.92	.00	1.7762	.2126	.0000	.0000
9452.12	9.92	.00	1.8826	.2134	.0000	.0000
9540.12	9.92	.00	1.9679	.2140	.0000	.0000
9628.12	9.92	.00	2.0310	.2143	.0000	.0000
9716.12	9.92	.00	2.0712	.2144	.0000	.0000
9804.12	9.92	.00	2.0981	.2140	.0000	.0000
9892.12	9.92	.00	2.0914	.2132	.0000	.0000
9980.12	9.91	.00	2.0512	.2119	.0000	.0000
10068.12	9.91	.00	1.9978	.2102	.0000	.0000
10156.12	9.90	.00	1.9219	.2080	.0000	.0000
10244.12	9.89	.00	1.8242	.2055	.0000	.0000
10332.12	9.88	.00	1.7058	.2027	.0000	.0000
10420.12	9.87	.00	1.5681	.1997	.0000	.0000
10508.12	9.86	.00	1.4126	.1966	.0000	.0000
10596.12	9.85	.00	1.2409	.1936	.0000	.0000
10684.12	9.84	.00	1.0551	.1908	.0000	.0000
10772.12	9.83	.00	.8572	.1883	.0000	.0000
10860.12	9.82	.00	.6494	.1861	.0000	.0000
10948.12	9.81	.00	.4342	.1844	.0000	.0000
11036.12	9.81	.00	.2142	.1832	.0000	.0000

\*\* ENCLOSURE 4 \*\*  
AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (LB/FT <sup>2</sup> )	ATTACK ANGLE OF (DEG)	TOTAL ANGLE OF (DEG)	DRAG ALONG VELOCITY VECTOR (LB)	AERODYNAMIC LOAD (LB/FT <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (FT)
11124.12	9.81	.00	.0233	.1827	.0000	.0000	.0000
11212.12	9.81	.00	.2341	.1828	.0000	.0000	.0000
11300.12	9.81	.00	.4545	.1835	.0000	.0000	.0000
11388.12	9.82	.00	.6702	.1850	.0000	.0000	.0000
11476.12	9.83	.00	.8787	.1871	.0000	.0000	.0000
11564.12	9.84	.00	1.0774	.1899	.0000	.0000	.0000
11652.12	9.85	.00	1.2642	.1932	.0000	.0000	.0000
11740.12	9.86	.00	1.4368	.1972	.0000	.0000	.0000
11828.12	9.88	.00	1.5934	.2016	.0000	.0000	.0000
11916.12	9.90	.00	1.7320	.2063	.0000	.0000	.0000
12004.12	9.91	.00	1.8512	.2113	.0000	.0000	.0000
12092.12	9.93	.00	1.9496	.2163	.0000	.0000	.0000
12180.12	9.95	.00	2.0260	.2212	.0000	.0000	.0000
12268.12	9.96	.00	2.0796	.2258	.0000	.0000	.0000
12356.12	9.97	.00	2.1097	.2300	.0000	.0000	.0000
12444.12	9.99	.00	2.1160	.2336	.0000	.0000	.0000
12532.12	9.99	.00	2.0984	.2363	.0000	.0000	.0000
12620.12	10.00	.00	2.0571	.2383	.0000	.0000	.0000
12708.12	10.00	.00	1.9925	.2392	.0000	.0000	.0000
12796.12	10.00	.00	1.9054	.2392	.0000	.0000	.0000
12884.12	10.00	.00	1.6674	.2363	.0000	.0000	.0000
12972.12	10.00	.00	1.5192	.2338	.0000	.0000	.0000
13060.12	9.99	.00	1.3536	.2306	.0000	.0000	.0000
13148.12	9.98	.00	1.1728	.2270	.0000	.0000	.0000
13236.12	9.97	.00	.9784	.2230	.0000	.0000	.0000
13324.12	9.95	.00	.7727	.2189	.0000	.0000	.0000
13412.12	9.94	.00	.5581	.2149	.0000	.0000	.0000
13500.12	9.93	.00	.3370	.2110	.0000	.0000	.0000
13588.12	9.91	.00	.1128	.2074	.0000	.0000	.0000
13676.12	9.90	.00	.1176	.2041	.0000	.0000	.0000
13764.12	9.89	.00	.1431	.2038	.0000	.0000	.0000
13777.12	9.89	.00	.1507	.2037	.0000	.0000	.0000

\*\* ENCLOSURE 4 \*\*  
AS-EO9 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (LB/FT <sup>2</sup> )	TOTAL ANGLE OF ATTACK (DEG)	DRAG ALONG VELOCITY VECTOR (LB)	AERODYNAMIC LOAD (LB/FT <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (FT)
13777.12	9.89	.00	.1507	.0000	.0000	.0000
13782.12	9.89	.00	.3602	.0000	.0000	.0000
13787.12	9.89	.00	.6958	.0000	.0000	.0000
13792.12	9.89	.00	1.0491	.0000	.0000	.0000
13797.12	9.88	.00	1.4097	.0000	.0000	.0000
13802.12	9.88	.00	1.6871	.0000	.0000	.0000
13807.12	9.88	.00	1.7334	.0000	.0000	.0000
13812.12	9.88	.00	1.5704	.0000	.0000	.0000
13817.12	9.88	.00	1.3551	.0000	.0000	.0000
13819.12	9.88	.00	1.2764	.0000	.0000	.0000
13822.12	9.88	.00	1.2688	.0000	.0000	.0000
13827.12	9.88	.00	1.1702	.0000	.0000	.0000
13832.12	9.88	.00	1.0369	.0000	.0000	.0000
13837.12	9.88	.00	.9762	.0000	.0000	.0000
13842.12	9.88	.00	1.0025	.0000	.0000	.0000
13847.12	9.88	.00	1.1122	.0000	.0000	.0000
13852.12	9.88	.00	1.2848	.0000	.0000	.0000
13857.12	9.88	.00	1.5008	.0000	.0000	.0000
13862.12	9.88	.00	1.6949	.0000	.0000	.0000
13867.12	9.88	.00	1.6815	.0000	.0000	.0000
13872.12	9.88	.00	1.6587	.0000	.0000	.0000
13877.12	9.88	.00	1.6659	.0000	.0000	.0000
13882.12	9.88	.00	1.6264	.0000	.0000	.0000
13887.12	9.88	.00	1.5045	.0000	.0000	.0000
13892.12	9.87	.00	1.3453	.0000	.0000	.0000
13897.12	9.87	.00	1.1904	.0000	.0000	.0000
13902.12	9.87	.00	1.0460	.0000	.0000	.0000
13907.12	9.87	.00	.9169	.0000	.0000	.0000
13912.12	9.87	.00	.8109	.0000	.0000	.0000
13917.12	9.87	.00	.7424	.0000	.0000	.0000
13922.12	9.87	.00	.7278	.0000	.0000	.0000
13927.12	9.87	.00	.7738	.0000	.0000	.0000
13932.12	9.87	.00	.8769	.0000	.0000	.0000
13937.12	9.87	.00	1.0258	.0000	.0000	.0000
13942.12	9.87	.00	1.2092	.0000	.0000	.0000
13947.12	9.87	.00	1.4192	.0000	.0000	.0000
13952.12	9.87	.00	1.6511	.0000	.0000	.0000
13957.12	9.87	.00	1.8989	.0000	.0000	.0000
13962.12	9.87	.00	2.1078	.0000	.0000	.0000
13967.12	9.87	.00	2.2161	.0000	.0000	.0000
13972.12	9.87	.00	2.2577	.0000	.0000	.0000
13977.12	9.87	.00	2.2786	.0000	.0000	.0000

D2/M2 BURNER ON  
ENGINE OFF

ENCLOSURE 4  
 A9-509 TR-J DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.04/ DEG. 2ND QPP.

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (LB/FT**2)	ATTACK ANGLE (DEG)	DRAG ALONG VELOCITY VECTOR (LB)	AERODYNAMIC LOAD (LB/FT**2)	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (FY)
13977.12		.60	2.0443	.0000	.0000	.0000
13982.12	9.87	.60	1.8439	.0000	.0000	.0000
13987.12	9.87	.60	1.6118	.0000	.0000	.0000
13992.12	9.87	.60	1.3985	.0000	.0000	.0000
13997.12	9.87	.60	1.252	.0000	.0000	.0000
14002.12	9.87	.60	1.0332	.0000	.0000	.0000
14007.12	9.87	.60	.8850	.0000	.0000	.0000
14012.12	9.86	.60	.7638	.0000	.0000	.0000
14017.12	9.86	.60	.6756	.0000	.0000	.0000
14022.12	9.86	.60	.6226	.0000	.0000	.0000
14027.12	9.86	.60	.6051	.0000	.0000	.0000
14032.12	9.86	.60	.6194	.0000	.0000	.0000
14037.12	9.86	.60	.6588	.0000	.0000	.0000
14042.12	9.86	.60	.7159	.0000	.0000	.0000
14047.12	9.86	.60	.7853	.0000	.0000	.0000
14052.12	9.86	.60	.8636	.0000	.0000	.0000
14057.12	9.86	.60	.9492	.0000	.0000	.0000
14062.12	9.86	.60	1.0418	.0000	.0000	.0000
14067.12	9.86	.60	1.1421	.0000	.0000	.0000
14072.12	9.86	.60	1.2508	.0000	.0000	.0000
14077.12	9.86	.60	1.3691	.0000	.0000	.0000
14082.12	9.86	.60	1.4971	.0000	.0000	.0000
14087.12	9.86	.60	1.6372	.0000	.0000	.0000
14092.12	9.86	.60	1.7896	.0000	.0000	.0000
14097.12	9.86	.60	1.9562	.0000	.0000	.0000
14102.12	9.86	.60	2.1379	.0000	.0000	.0000
14107.12	9.86	.60	2.3343	.0000	.0000	.0000
14112.12	9.86	.60	2.5446	.0000	.0000	.0000
14117.12	9.86	.60	2.7695	.0000	.0000	.0000
14122.12	9.86	.60	3.0087	.0000	.0000	.0000
14127.12	9.86	.60	3.2624	.0000	.0000	.0000
14132.12	9.86	.60	3.5307	.0000	.0000	.0000
14137.12	9.86	.60	3.8136	.0000	.0000	.0000
14142.12	9.86	.60	4.1111	.0000	.0000	.0000
14147.12	9.86	.60	4.4232	.0000	.0000	.0000
14152.12	9.86	.60	4.7500	.0000	.0000	.0000
14157.12	9.86	.60	5.0915	.0000	.0000	.0000
14162.12	9.86	.60	5.4487	.0000	.0000	.0000
14167.12	9.86	.60	5.8216	.0000	.0000	.0000
14172.12	9.86	.60	6.2103	.0000	.0000	.0000
14177.12	9.86	.60	6.6148	.0000	.0000	.0000
14182.12	9.86	.60	7.0351	.0000	.0000	.0000



\*\* ENCLOSURE 4 \*\*  
A9-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (LB/FT <sup>2</sup> )	ATTACK ANGLE OF (DEG)	DRAG ALONG VELOCITY VECTOR (LB)	AERODYNAMIC LOAD (LB/FT <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (FT)
14187.12	9.84	.00	1.0469	.0000	.0000	.0000
14192.12	9.84	.00	.5470	.0000	.0000	.0000
14197.12	9.84	.00	.6592	.0000	.0000	.0000
14202.12	9.84	.00	.5798	.0000	.0000	.0000
14207.12	9.84	.00	.4449	.0000	.0000	.0000
14212.12	9.84	.00	1.1580	.0000	.0000	.0000
1.217.12	9.84	.00	2.0084	.0000	.0000	.0000
14222.12	9.84	.00	2.8002	.0000	.0000	.0000
14227.12	9.84	.00	3.0845	.0000	.0000	.0000
14232.12	9.84	.00	2.7840	.0000	.0000	.0000
14237.12	9.84	.00	1.9618	.0000	.0000	.0000
14242.12	9.85	.00	1.0563	.0000	.0000	.0000
14247.12	9.85	.00	.2743	.0000	.0000	.0000
14252.12	9.85	.00	.4925	.0000	.0000	.0000
14257.12	9.85	.00	.5314	.0000	.0000	.0000
14262.12	9.85	.00	.3883	.0000	.0000	.0000
14267.12	9.85	.00	1.2218	.0000	.0000	.0000
14272.12	9.85	.00	2.2116	.0000	.0000	.0000
14273.42	9.85	.00	2.4726	.0000	.0000	.0000
14273.92	9.85	.00	2.5689	.0000	.0000	.0000
14277.12	9.85	.00	3.0516	.0000	.0000	.0000
14282.12	9.85	.00	3.3261	.0000	.0000	.0000
14287.12	9.85	.00	3.0285	.0000	.0000	.0000
14292.12	9.85	.00	3.2423	.0000	.0000	.0000
14297.12	9.85	.00	1.4550	.0000	.0000	.0000
14302.12	9.85	.00	1.0145	.0000	.0000	.0000
14307.12	9.85	.00	1.1406	.0000	.0000	.0000
14312.12	9.85	.00	1.2164	.0000	.0000	.0000
14317.12	9.85	.00	1.3162	.0000	.0000	.0000
14322.12	9.85	.00	1.8958	.0000	.0000	.0000
14327.12	9.85	.00	2.7063	.0000	.0000	.0000
14332.12	9.85	.00	3.4584	.0000	.0000	.0000
14337.12	9.85	.00	3.7123	.0000	.0000	.0000
14342.12	9.85	.00	3.4137	.0000	.0000	.0000
14347.12	9.85	.00	2.5941	.0000	.0000	.0000
14350.12	9.85	.00	2.0208	.0000	.0000	.0000
14352.12	9.85	.00	1.4562	.0000	.0000	.0000
14355.12	9.85	.00	1.1683	.0000	.0000	.0000
14357.12	9.84	.00	.9061	.0000	.0000	.0000
14357.62	9.84	.00	.8604	.0000	.0000	.0000
14361.62	9.84	.00	1.5747	.0000	.0000	.0000
14362.12	9.90	.00	1.5700	.0000	.0000	.0000

ULLAGE IGNITION  
02/M2 BURNER OFF

J-2 FOL IMI  
ULL CUT OFF

REIGN

908 THR  
16M IMI

\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (LB/FT <sup>2</sup> )	ATTACK ANGLE (DEG)	DRAG VELOCITY VECTOR (LB)	AERODYNAMIC LOAD (LB/FT <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (FT)
14367.12	9.94	.00	2.6066	.0000	.0000	.0000
14372.12	9.98	.00	6.5558	.0000	.0000	.0000
14377.12	10.03	.00	4.1217	.0000	.0000	.0000
82.12	10.07	.00	4.1909	.0000	.0000	.0000
37.12	10.12	.00	4.1415	.0000	.0000	.0000
92.12	10.17	.00	4.1830	.0000	.0000	.0000
14377.12	10.21	.00	4.1753	.0000	.0000	.0000
14402.12	10.26	.00	4.1263	.0000	.0000	.0000
14407.12	10.31	.00	4.2414	.0000	.0000	.0000
14412.12	10.35	.00	3.4338	.0000	.0000	.0000
14417.12	10.40	.00	3.8153	.0000	.0000	.0000
14422.12	10.45	.00	3.6928	.0000	.0000	.0000
14427.12	10.49	.00	3.5652	.0000	.0000	.0000
14432.12	10.54	.00	3.4359	.0000	.0000	.0000
14437.12	10.59	.00	3.3074	.0000	.0000	.0000
14442.12	10.64	.00	3.1805	.0000	.0000	.0000
14447.12	10.68	.00	3.0558	.0000	.0000	.0000
14452.12	10.73	.00	2.9340	.0000	.0000	.0000
14457.12	10.78	.00	2.8159	.0000	.0000	.0000
14462.12	10.82	.00	2.7011	.0000	.0000	.0000
14467.12	10.87	.00	2.5900	.0000	.0000	.0000
14472.12	10.91	.00	2.4828	.0000	.0000	.0000
14477.12	10.96	.00	2.3802	.0000	.0000	.0000
14482.12	11.00	.00	2.2821	.0000	.0000	.0000
14487.12	11.05	.00	2.1904	.0000	.0000	.0000
14492.12	11.09	.00	2.1054	.0000	.0000	.0000
14497.12	11.13	.00	2.0277	.0000	.0000	.0000
14502.12	11.17	.00	1.9563	.0000	.0000	.0000
14507.12	11.21	.00	1.8927	.0000	.0000	.0000
14512.12	11.25	.00	1.8369	.0000	.0000	.0000
14517.12	11.29	.00	1.7890	.0000	.0000	.0000
14522.12	11.32	.00	1.7493	.0000	.0000	.0000
14527.12	11.36	.00	1.7177	.0000	.0000	.0000
14532.12	11.39	.00	1.6936	.0000	.0000	.0000
14537.12	11.43	.00	1.6765	.0000	.0000	.0000
14542.12	11.46	.00	1.6656	.0000	.0000	.0000
14547.12	11.49	.00	1.6608	.0000	.0000	.0000
14552.12	11.51	.00	1.6603	.0000	.0000	.0000
14557.12	11.54	.00	1.6623	.0000	.0000	.0000
14562.12	11.57	.00	1.6671	.0000	.0000	.0000
14567.12	11.59	.00	1.6734	.0000	.0000	.0000
14572.12	11.61	.00	1.6796	.0000	.0000	.0000

\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (LR/FT**2)	ATTACK ANGLE OF (DEG)	DRAG ALONG VELOCITY VECTOR (LB)	AERODYNAMIC LOAD (LB/FT**2)	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (FT)
14577.12	11.63	.00	1.6843	.0000	.0000	.0000
14582.12	11.65	.00	1.6870	.0000	.0000	.0000
14587.12	11.67	.00	1.6862	.0000	.0000	.0000
14592.12	11.69	.00	1.6815	.0000	.0000	.0000
14597.12	11.71	.00	1.6711	.0000	.0000	.0000
14602.12	11.73	.00	1.6538	.0000	.0000	.0000
14607.12	11.75	.00	1.6289	.0000	.0000	.0000
14612.12	11.77	.00	1.5961	.0000	.0000	.0000
14617.12	11.78	.00	1.5539	.0000	.0000	.0000
14622.12	11.80	.00	1.5025	.0000	.0000	.0000
14627.12	11.81	.00	1.4409	.0000	.0000	.0000
14632.12	11.82	.00	1.3674	.0000	.0000	.0000
14637.12	11.83	.00	1.2842	.0000	.0000	.0000
14642.12	11.84	.00	1.1983	.0000	.0000	.0000
14647.12	11.84	.00	1.1137	.0000	.0000	.0000
14652.12	11.84	.00	1.0369	.0000	.0000	.0000
14657.12	11.85	.00	.9860	.0000	.0000	.0000
14662.12	11.85	.00	.9484	.0000	.0000	.0000
14667.12	11.85	.00	1.0736	.0000	.0000	.0000
14672.12	11.85	.00	2.9814	.0000	.0000	.0000
14677.12	11.85	.00	2.6777	.0000	.0000	.0000
14682.12	11.86	.00	2.3603	.0000	.0000	.0000
14687.12	11.87	.00	2.0632	.0000	.0000	.0000
14692.12	11.87	.00	1.7729	.0000	.0000	.0000
14695.31	11.87	.00	1.6464	.0000	.0000	.0000
14695.52	11.87	.00	1.6390	.0000	.0000	.0000
14697.12	11.85	.00	1.5842	.0000	.0000	.0000
14702.12	11.78	.00	1.4269	.0000	.0000	.0000
14705.31	11.73	.00	1.3443	.0000	.0000	.0000

SCS2  
T87  
TL1

\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 '71 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	MACH NUMBER	DYNAMIC PRESSURE (LB/FT <sup>2</sup> )	ATTACK OF ANGLE (DEG)	DRAG ALONG VELOCITY VECTOR (LB)	AERODYNAMIC LOAD (LB/FT <sup>2</sup> )	MAGNITUDE OF THE AERODYNAMIC FORCE VECTOR (FT)
14705.31	11.73	.00	1.3443	.0203	.0000	.0000
14715.31	11.57	.00	1.0745	.0158	.0000	.0000
14726.31	11.40	.00	.9456	.0119	.0000	.0000
14737.31	11.23	.00	1.0521	.0079	.0000	.0000
14748.31	11.06	.00	1.3355	.0066	.0000	.0000
14759.31	10.92	.00	1.7076	.0049	.0000	.0000
14770.31	10.77	.00	2.1201	.0037	.0000	.0000
14781.31	10.62	.00	2.5517	.0027	.0000	.0000
14792.31	10.47	.00	2.9926	.0020	.0000	.0000
14803.31	10.35	.00	3.4377	.0015	.0000	.0000
14814.31	10.24	.00	3.8842	.0011	.0000	.0000
14825.31	10.14	.00	4.3306	.0008	.0000	.0000
14836.31	10.03	.00	4.7757	.0006	.0000	.0000
14846.21	9.95	.00	14.2951	.0004	.0000	.0000

CVS OFF

\*\* ENCLOSURE 4 \*\*

A9-509 TRAJ -ATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME	X POSI COORD	Y POSI COORD	Z POSI COORD	SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)	X VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)	Y VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)	Z VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)
713.12	19229714.5	30333.6	9485320.2	-11504.007	249.023	22832.101	22832.101
722.12	19125076.5	305580.6	9890244.7	-11747.472	245.597	22707.988	22707.988
732.12	19006254.5	308017.1	10116624.1	-12016.395	241.695	22567.048	22567.048
743.12	18872455.2	310651.9	10363991.9	-12310.258	237.363	22408.342	22408.342
754.12	18735434.2	313238.9	10609592.7	-12602.024	232.991	22245.814	22245.814
765.12	18595216.0	315777.5	10853384.7	-12891.655	228.579	22079.511	22079.511
776.12	18451823.5	318267.4	11095377.2	-13179.124	224.129	21909.498	21909.498
787.12	18305281.5	320708.2	11335379.0	-13464.348	219.630	21735.744	21735.744
798.12	18155614.7	323099.3	11573498.4	-13747.215	215.112	21558.161	21558.161
844.12	17496470.2	332552.2	12547425.6	-14904.079	195.781	20775.971	20775.971
932.12	16091822.6	348097.2	1303961.5	-16990.686	167.181	19108.948	19108.948
1020.12	14511538.2	360163.1	15904480.5	-18892.208	116.774	17233.362	17233.362
1108.12	12772829.9	368608.2	17331577.7	-20587.972	74.961	15169.552	15169.552
1196.12	10894635.4	373327.1	18569453.2	-22059.451	32.158	12939.919	12939.919
1284.12	8897420.0	374251.6	19604776.0	-23290.517	-11.205	10568.662	10568.662
1272.12	6802955.5	371351.5	20426136.2	-24267.627	-54.689	8081.553	8081.553
140.12	4634086.1	364635.7	21024521.7	-24979.979	-97.852	5505.661	5505.661
48.12	2414480.5	354152.0	21393349.0	-25419.644	-140.250	2869.070	2869.070
36.12	168375.6	33997.0	21528539.0	-25581.664	-181.444	200.572	200.572
24.12	-2079688.9	322265.7	21428567.2	-25441.120	-221.005	-2470.646	-2470.646
12.12	-4305139.6	301150.3	21094461.2	-25068.167	-258.515	-5115.326	-5115.326
00.12	-6483640.2	276838.8	20529897.0	-24398.033	-293.577	-7704.466	-7704.466
198.12	-8591360.0	249563.5	1770957.2	-23460.978	-325.816	-10209.647	-10209.647
2076.12	-10605238.5	219587.3	18736268.0	-22267.220	-354.881	-12603.358	-12603.358
2164.12	-12503240.4	187206.8	17526806.2	-20829.828	-380.455	-14859.304	-14859.304
2252.12	-14264600.6	152738.9	16125797.4	-19164.578	-402.254	-16952.720	-16952.720
2340.12	-15870054.9	116528.0	14548568.5	-17289.769	-420.032	-18880.640	-18880.640
2428.12	-17302353.5	78937.2	12812379.5	-15226.014	-433.583	-20562.163	-20562.163
2516.12	-18544952.5	40346.1	10936228.7	-12996.003	-442.744	-22038.687	-22038.687
2604.12	-19585188.0	1146.5	8940644.2	-10624.242	-447.398	-23274.109	-23274.109
2692.12	-20411421.2	-38261.5	6847453.2	-8136.770	-447.471	-24255.005	-24255.005
2780.12	-21014662.0	-77473.3	4679542.5	-5560.867	-442.940	-24970.767	-24970.767
2868.12	-21388364.5	-116084.4	2460603.5	-2924.747	-433.827	-25413.707	-25413.707
2956.12	-21520495.0	-153694.4	214873.0	-757.239	-420.202	-25579.138	-25579.138
3044.12	-21433570.7	-189911.0	-2033133.1	2412.523	-402.182	-25465.406	-25465.406
3132.12	-21104677.0	-224354.3	-4258887.2	5055.423	-379.930	-25073.899	-25073.899
3220.12	-20545447.2	-256640.5	-6438117.2	7642.674	-353.652	-24409.024	-24409.024
3308.12	-19762023.2	-286486.1	-8547069.2	10146.125	-323.596	-23478.146	-23478.146
3396.12	-18862445.2	-311177.8	-10383959.1	12326.346	-293.237	-22409.629	-22409.629
3484.12	-17676813.2	-335401.8	-12295793.4	14595.261	-256.804	-21001.685	-21001.685
3572.12	-16298352.9	-356292.0	-14073544.6	16704.825	-217.533	-19365.070	-19365.070
3660.12	-14742109.9	-373615.7	-15697857.5	18632.125	-175.814	-17617.634	-17617.634

\*\* ENCLOSURE 4 \*\*

A5-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	X POSI COORD (FT)	Y POSI COORD (FT)	Z POSI COORD (FT)	SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)	X VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)	Y VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)	Z VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)
3740.12	-13025060.0	-387175.6	-17151050.2	20356.221	-132.062	-15479.506	
3828.13	-11165926.4	-394811.7	-18417304.0	21858.374	-86.714	-13272.882	
3916.12	-9144977.0	-402403.9	-19482836.0	23122.246	-40.230	-10921.785	
4004.12	-7103855.5	-403872.7	-20336047.5	24134.078	6.918	-8451.815	
4092.12	-4945097.6	-401180.9	-20967653.7	24882.844	54.249	-5889.875	
4180.12	-2732383.5	-394333.9	-21370783.7	25360.378	101.274	-3263.882	
4268.12	-489782.8	-383379.9	-21541355.5	25561.466	147.507	-602.465	
4356.12	1758258.4	-368410.1	-21476627.7	25483.918	192.464	2065.345	
4444.12	3967235.2	-349587.5	-21178218.7	25128.586	235.674	4710.442	
4532.12	6172852.2	-326994.2	-20649171.2	24499.370	276.679	7303.956	
4620.12	8291289.3	-300939.5	-19895064.2	23603.172	318.043	9817.587	
4708.12	10319463.7	-271638.2	-18924353.0	22449.824	350.353	12223.910	
4796.12	12235282.6	-239378.0	-17747573.0	21051.978	382.228	14496.690	
4884.12	14017885.9	-204477.1	-16377578.0	19424.961	410.317	16611.171	
4972.12	15647872.7	-167282.4	-14829325.1	17586.600	434.311	18544.348	
5060.12	17107514.5	-128166.5	-13119707.5	15557.020	453.938	20275.225	
5148.12	18380946.2	-87524.1	-11267371.0	13358.414	468.972	21785.037	
5236.12	19454337.5	-45767.5	-9292506.0	11014.794	479.233	23057.456	
5324.12	20316242.2	-3322.9	-7216626.4	8551.717	484.591	24078.757	
5412.12	20956719.5	39374.3	-5062334.7	5996.006	484.963	24837.962	
5500.12	21369434.2	11883.5	-2853073.9	3375.451	480.320	25326.944	
5588.12	21549728.7	123764.1	-612874.1	378.508	470.683	25540.507	
5676.12	21495667.2	164579.2	1633908.5	-1946.006	456.123	25476.432	
5764.12	21207854.5	203900.8	3862853.3	-4589.218	436.764	25115.484	
5852.12	20689427.2	241313.8	6049738.7	-7182.507	412.778	24521.410	
5940.12	1746319.5	276420.5	8170801.7	-9697.800	384.387	23640.875	
6028.12	148886.5	308844.5	10202992.2	-12107.865	351.858	22503.407	
6116.12	1458235.4	338235.2	12124221.1	-14386.597	315.503	21121.285	
6204.12	14918505.7	364271.0	13913595.5	-16509.783	275.672	19509.416	
6292.12	14918505.7	386663.1	15551644.9	-18452.874	232.758	17683.183	
6372.12	13377375.9	403643.9	16894421.5	-20046.521	191.425	15859.079	
6460.12	11543652.0	418409.8	18195577.5	-21591.253	143.828	13685.803	
6548.12	9584196.5	428905.8	19298734.7	-22901.446	94.464	11363.115	
6636.12	7520301.1	434998.2	20191835.7	-23962.708	43.833	8916.118	
6724.12	537407.4	436598.4	20865100.2	-24763.321	-7.546	6371.357	
6812.12	3169865.5	433663.7	2131135.0	-25294.384	-59.142	3756.492	
6900.12	936680.5	426198.8	21525018.7	-25549.921	-110.418	1099.993	
6988.12	-1313748.7	414255.2	21504359.7	-25526.968	-160.838	-1569.159	
7076.12	-3553896.3	397932.0	21249328.5	-25275.611	-209.869	-4221.801	
7164.12	-5750378.7	377374.4	20762656.5	-24649.001	-256.987	-6828.908	
7252.12	-7884224.4	352773.2	20049612.5	-23803.333	-301.688	-9361.922	
7340.12	-9932138.2	324362.8	19117944.7	-22697.778	-343.487	-11793.076	

\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. ZND OPP.

TIME FROM FIRST MOTION (SEC)	X POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)	Y POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)	Z POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)	X VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)	Y VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)	Z VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)
7428.12	-11871759.9	292418.0	17977799.7	-21344.390	-381.929	-14095.714
7516.12	-13681911.9	257254.0	16641608.7	-19757.973	-416.590	-16244.588
7604.12	-15342834.0	219220.5	15123952.7	-17955.909	-447.084	-18216.156
7692.12	-16836401.7	178670.5	13441399.4	-15957.963	-473.068	-19908.840
7780.12	-18146328.0	136101.6	11612319.7	-13786.052	-494.243	-21543.274
7868.12	-19258338.7	91861.1	9656683.7	-11463.999	-510.362	-22862.513
7956.12	-20160331.0	46432.0	7595838.6	-9017.254	-521.228	-23932.223
8044.12	-20842501.0	283.3	5452273.4	-6472.608	-526.700	-24740.829
8132.12	-21297451.7	-46104.4	3249369.2	-3857.889	-526.692	-25279.633
8220.12	-21520268.7	-92253.0	1011143.0	-1201.653	-521.177	-25542.900
8308.12	-21508572.0	-137672.8	-1238316.1	1467.132	-510.183	-25527.909
8396.12	-21262536.0	-181887.0	-3473612.7	4119.402	-493.798	-25234.969
8484.12	-20744885.7	-224427.2	-5671311.7	6726.312	-472.165	-24667.406
8572.12	-20080864.7	-264839.9	-7807201.9	9259.539	-445.483	-23831.519
8660.12	-19158173.5	-302691.4	-9858054.2	11691.590	-414.004	-22736.500
8748.12	-18026885.5	-337572.7	-11801872.6	13996.086	-378.032	-21394.334
8836.12	-16699336.6	-369103.4	-13616633.6	16148.041	-337.918	-19819.666
8924.12	-15189989.2	-396936.3	-15283513.1	18124.126	-294.060	-18029.645
9012.12	-13515278.0	-420760.9	-16784101.0	19922.918	-246.895	-16043.739
9100.12	-11693429.9	-440306.7	-18102094.0	21465.120	-196.898	-13883.532
9188.12	-9744268.7	-455346.6	-19223174.0	22793.776	-144.576	-11572.495
9276.12	-7689000.8	-465699.4	-20135161.7	23874.451	-90.463	-9135.740
9364.12	-5549985.7	-471231.9	-20828150.0	24695.396	-35.117	-6599.752
9452.12	-3350494.2	-471860.5	-21294613.0	25247.673	20.890	-3992.105
9540.12	-1114455.2	-467552.9	-21529488.2	25525.266	76.975	-1341.170
9628.12	1133803.7	-458327.9	-21530233.5	25525.149	132.549	1324.202
9716.12	336821.8	-444256.4	-21296854.7	25247.325	187.026	39.1989
9804.12	5569272.6	-425460.4	-20831908.2	24694.833	239.828	6582.319
9892.12	7708229.3	-402112.2	-20140473.0	23873.719	290.392	9117.795
9980.12	9763427.4	-37432.9	-19230093.2	22792.967	338.174	11553.806
10068.12	11712518.7	-342690.3	-18110697.7	21464.405	382.657	13863.838
10156.12	13534316.4	-307196.3	-16794490.0	19902.566	423.356	16022.766
10244.12	15209024.6	-268303.8	-15295811.5	18124.527	459.824	18007.137
10332.12	16718456.9	-226403.2	-13630945.7	16149.715	491.657	19795.425
10420.12	18046230.5	-181910.7	-11818137.2	13999.684	518.495	21368.263
10508.12	19177944.7	-135303.6	-9876991.1	11697.871	540.034	22708.652
10596.12	20101335.0	-87035.7	-7828658.2	9269.338	556.019	23802.142
10684.12	20806402.2	-37612.8	-5654403.1	6740.486	566.256	24636.977
10772.12	21286520.0	12452.7	-3500402.0	4138.771	570.608	25204.214
10860.12	21533513.5	62639.3	-1267490.8	1492.402	568.999	25497.809
10948.12	21547711.5	112421.3	979092.1	-1169.960	561.416	25514.671
11036.12	21327974.2	161274.6	3214967.3	-3819.510	547.907	25254.681

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

ENCLOSURE 4

TIME FROM FIRST MOTION (SEC)	X POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)	Y POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)	Z POSI COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)	X VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)	Y VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)	Z VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)
1124.12	20876692.2	208682.1	5415875.9	-6427.599	528.581	24720.702
11212.12	20196758.7	254139.1	7557940.1	-6966.037	503.609	23918.514
11300.12	19301516.5	297158.3	9617917.5	-11407.383	473.221	22856.780
11388.12	18174680.7	337275.4	11573451.7	-13725.231	437.704	21546.934
11476.12	16890233.7	374053.7	13403310.1	-15894.488	397.402	20003.075
11564.12	15402299.0	407089.1	15087612.1	-17891.632	352.707	18241.818
11652.12	13746991.4	436014.2	16608045.4	-19694.967	304.063	16282.126
11740.12	11942246.6	460502.6	17948060.7	-21284.849	251.957	14145.120
11828.12	10007629.9	480272.4	19093057.2	-22643.909	196.924	11853.863
11916.12	7964128.0	495089.8	20030538.5	-23757.238	139.497	9433.120
12004.12	5833925.7	504771.4	20750253.7	-24612.566	80.294	6909.107
12092.12	3640165.2	509187.1	21244312.0	-25200.432	19.920	4309.207
12180.12	1406697.3	508261.4	21507274.2	-25514.155	-40.095	1661.685
12268.12	-842177.8	501974.9	21536215.5	-25550.220	-101.810	-1004.625
12356.12	-3081976.2	490234.7	21330760.5	-25308.030	-161.880	-3660.633
12444.12	-5288298.7	473524.6	20843095.0	-24790.078	-220.565	-6277.321
12532.12	-7437099.6	451604.4	20227943.5	-24001.897	-277.233	-8826.063
12620.12	-9504952.2	424808.8	19342518.0	-22952.013	-331.271	-11278.956
12708.12	-11469308.2	393395.2	18246445.5	-21651.845	-382.090	-13609.136
12796.12	-13308747.7	357671.7	16951658.0	-20115.590	-429.133	-15791.082
12884.12	-15003215.7	317993.9	15472263.2	-18360.053	-471.879	-17800.912
12972.12	-16534244.9	274761.1	13824370.1	-16404.464	-509.851	-19616.649
13060.12	-17885158.0	228412.8	12026008.1	-14270.253	-542.621	-21218.475
13148.12	-19041251.7	179423.4	10096726.6	-11980.830	-569.815	-22568.942
13236.12	-19989956.5	128298.1	8057579.1	-9561.175	-591.118	-23713.167
13324.12	-20720973.0	75567.0	5930790.6	-7037.844	-606.274	-24578.992
13412.12	-21226380.7	21779.9	3739531.5	-4438.377	-615.093	-25177.102
13500.12	-21500723.2	-32499.8	1507663.1	-1741.134	-617.453	-25501.122
13588.12	-21541062.7	-86700.6	-740524.1	875.041	-613.297	-25547.676
13676.12	-21347009.2	-140249.3	-2980575.2	3531.144	-602.640	-25316.406
13764.12	-20920721.0	-192576.8	-5188136.7	6148.317	-585.563	-24809.970
13774.12	-20857767.7	-198420.8	-5435865.3	6441.987	-583.222	-24750.230
13777.12	-20838309.7	-200169.4	-5510036.4	6529.912	-582.504	-24712.130

TIME BASE 6



02/M2 BURNER ON  
ENGINE OFF

\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM MOTION (SEC)	X POSI COORD (FT)	Y POSI COORD (FT)	Z POSI COORD (FT)	SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)	X VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)	Y VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)	Z VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)
1377.12	-20838309.7	-200169.4	-5510036.4	6529.912	-582.504	-24712.130	-24672.938
1378.12	-20805294.0	-203078.9	-5633499.4	6676.269	-581.291	-24632.879	-24591.956
1379.12	-20771547.5	-205982.2	-5756764.3	6822.389	-580.058	-24550.170	-24567.529
1380.12	-20737070.7	-208879.4	-5879826.7	6968.268	-578.805	-24464.031	-24419.670
1381.12	-20701865.2	-211770.3	-6002682.4	7113.900	-577.532	-24374.447	-24354.277
1382.12	-20665932.2	-214654.7	-6125327.0	7259.256	-576.239	-24328.366	-24281.433
1383.12	-20629273.0	-217537.6	-6247756.2	7404.347	-574.926	-24233.649	-24185.016
1384.12	-20591889.0	-220403.9	-6369965.9	7549.188	-573.592	-24135.533	-24085.204
1385.12	-20553781.7	-223268.5	-6491951.5	7693.784	-572.239	-24034.030	-23982.013
1386.12	-20515336.2	-226124.3	-6613708.9	7838.109	-571.692	-23929.155	-23875.457
1387.12	-20475400.7	-228977.1	-6735233.7	7982.157	-570.866	-23820.919	-23765.541
1388.12	-20435130.5	-231821.0	-6856521.8	8125.924	-569.474	-23709.332	-23652.795
1389.12	-20394142.0	-234657.7	-6977568.7	8269.404	-568.061	-23591.29	-23535.37
1390.12	-20352437.0	-237487.2	-7098370.5	8412.593	-566.629	-23476.219	-23415.877
1391.12	-20310016.7	-240309.4	-7218922.7	8555.185	-565.177	-23354.714	-23292.732
1392.12	-20266882.7	-243124.2	-7339221.2	8698.075	-563.705	-23229.934	-23166.321
1393.12	-20223036.2	-245931.5	-7459261.6	8840.357	-562.214	-23101.895	-23036.659
1394.12	-20176479.5	-248731.0	-7579039.9	8982.329	-559.121	-22970.616	-22903.767
1395.12	-20132213.7	-251527.7	-7698551.7	9123.984	-557.571	-22836.116	-22767.670
1396.12	-20087240.2	-254306.7	-7817793.1	9265.324	-556.002	-22698.429	-22628.387
1397.12	-20040560.7	-257082.7	-7936759.5	9406.348	-554.414	-22557.547	-22484.97
1398.12	-19993177.2	-259850.8	-8055447.1	9547.035	-552.806	-22415.877	-22335.714
1399.12	-19945091.0	-262610.7	-8173851.4	9687.376	-551.179	-23270.616	-23166.321
1400.12	-19896304.0	-265362.5	-8291968.7	9827.373	-549.533	-23101.895	-23036.659
1401.12	-19846817.7	-268104.0	-8409794.4	9967.024	-547.867	-22970.616	-22903.767
1402.12	-19796634.2	-270841.2	-8527324.6	10106.324	-546.183	-22836.116	-22767.670
1403.12	-19745755.2	-273567.8	-8644555.1	10245.767	-544.479	-22698.429	-22628.387
1404.12	-19694182.2	-276285.9	-8761482.0	10383.850	-542.757	-22557.547	-22484.97
1405.12	-19641917.2	-278995.4	-8878100.9	10522.067	-541.015	-22415.877	-23270.616
1406.12	-19588962.2	-281698.1	-8994408.0	10659.913	-539.255	-23229.934	-23166.321
1407.12	-19535319.0	-284387.9	-9110399.0	10797.384	-537.476	-23101.895	-23036.659
1408.12	-19480999.0	-287070.8	-9226069.7	10934.474	-535.678	-22970.616	-22903.767
1409.12	-19425974.7	-289744.6	-9341416.5	11071.179	-533.861	-22836.116	-22767.670
1410.12	-19370278.0	-292409.4	-9456435.1	11207.495	-532.025	-22698.429	-22628.387
1411.12	-19313900.5	-295064.9	-9571121.4	11343.416	-530.171	-22557.547	-22484.97
1412.12	-19256844.5	-297711.0	-9685471.5	11478.935	-528.298	-22415.877	-22335.714
1413.12	-19199111.7	-300347.8	-9799481.2	11614.037	-526.407	-22270.616	-22184.97
1414.12	-19140704.7	-302975.1	-9913146.7	11748.724	-524.497	-22101.895	-22036.659
1415.12	-19081625.2	-305592.7	-10026464.2	11883.010	-522.569	-21970.616	-21884.97
1416.12	-19021875.2	-308200.7	-10139429.4	12016.885	-520.597	-21836.116	-21735.714

\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM FIRST MOTION (SEC)	X POST COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)	Y POST COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)	Z POST COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)	X VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)	Y VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)	Z VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)
13977.12	-1161457.2	-31079A.7	-10252038.4	12150.339	-518.600	-22485.916
13982.12	-18900372.7	-31338A.7	-10364287.1	12283.365	-516.617	-22413.496
13987.12	-18838624.2	-31596A.8	-10476177.0	12415.960	-514.616	-22340.290
13992.12	-18776213.7	-31853A.9	-1058768A.7	1254A.118	-512.597	-22266.301
13997.12	-18713143.7	-321090.8	-10698833.6	12679.834	-510.560	-22191.531
14002.12	-18649416.2	-32363A.4	-10809602.9	12811.104	-508.505	-22116.984
14007.12	-18585333.5	-326175.8	-10919992.2	12941.924	-506.432	-22039.660
14012.12	-18519997.7	-328702.7	-1102999A.1	13072.289	-504.342	-21962.564
14017.12	-18454311.2	-331219.2	-11134616.6	13202.193	-502.234	-21884.698
14022.12	-18387976.5	-333725.0	-11248843.9	13331.634	-500.108	-21806.065
14027.12	-18320995.7	-336220.2	-11357676.0	13460.606	-497.964	-21726.667
14032.12	-18253371.2	-338704.7	-11466109.2	13589.104	-495.803	-21646.508
14037.12	-18185105.5	-34117A.2	-11574139.9	13717.124	-493.625	-21565.589
14042.12	-18116100.7	-343640.9	-11681763.9	13844.663	-491.429	-21483.915
14047.12	-1804661.7	-346092.5	-11788977.7	13971.714	-489.215	-21401.487
14052.12	-1797644.5	-348533.0	-11895777.5	14098.274	-486.985	-21318.309
14057.12	-17905477.7	-350962.3	-12002159.5	14224.339	-484.737	-21234.384
14062.12	-1783422.0	-353380.3	-12108120.1	14349.904	-482.472	-21149.714
14067.12	-17762179.5	-355787.0	-12213655.4	14474.964	-480.190	-21064.303
14072.12	-17690493.2	-358182.2	-12318761.9	14599.515	-477.891	-20978.153
14077.12	-17618185.2	-360565.9	-12423435.7	14723.553	-475.575	-20891.268
14082.12	-17542258.5	-362937.9	-12527673.4	14847.074	-473.242	-20803.650
14087.12	-17467715.2	-36529A.3	-12631471.1	14970.073	-470.892	-20715.304
14092.12	-17392558.7	-36764A.8	-12734825.2	15092.545	-468.526	-20626.230
14097.12	-17316790.7	-369983.5	-12837732.1	15214.487	-466.143	-20536.434
14102.12	-17240414.7	-37230A.2	-12940188.4	15335.895	-463.743	-20445.918
14107.12	-17163432.7	-374620.9	-13042190.1	15456.763	-461.327	-20354.685
14112.12	-17085848.0	-376921.4	-13143734.0	15577.087	-458.842	-20262.739
14117.12	-17007642.7	-379209.3	-13244816.2	15696.862	-456.343	-20170.082
14122.12	-16928880.2	-381484.9	-13345433.6	15816.088	-453.878	-20076.718
14127.12	-16849502.7	-38374A.1	-13445582.4	15934.758	-451.398	-19982.649
14132.12	-16769533.6	-38599A.8	-13545259.0	16052.868	-448.901	-19887.880
14137.12	-16688975.2	-388237.1	-13644460.0	16170.414	-446.389	-19792.414
14142.12	-16607830.5	-390462.7	-13743181.9	16287.390	-443.892	-19696.253
14147.12	-16526102.2	-39267A.0	-13841421.4	16403.743	-441.429	-19599.400
14152.12	-16443793.6	-39487A.9	-13939174.7	16519.621	-438.897	-19501.862
14157.12	-16360907.1	-397065.0	-14036438.7	16634.869	-436.321	-19403.639
14162.12	-16277445.7	-399240.1	-14133210.0	16749.532	-433.728	-19304.737
14167.12	-16193412.6	-401407.2	-14229485.0	16863.606	-431.098	-19205.158
14172.12	-16108810.6	-403550.9	-14325260.6	16977.085	-428.395	-19104.905
14177.12	-16023442.9	-405686.1	-14420533.0	17089.968	-425.676	-19003.983
14182.12	-15937912.1	-407807.8	-14515299.1	17202.252	-422.995	-18902.395

TIME FROM FIRST MOTION (SEC)	X POST COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)	Y POST COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)	Z POST COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)	X VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)	Y VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)	Z VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)
1417.12	-15851621.2	-409914.1	-14609555.7	17313.933	-420.328	-18800.144
1419.12	-15764773.7	-412011.0	-14703299.6	17425.005	-417.645	-18697.233
1419.12	-15677372.4	-414092.6	-14796527.1	17535.464	-415.011	-18593.666
1420.12	-15589420.0	-416161.1	-14889235.1	17645.306	-412.280	-18489.447
1420.12	-15500920.2	-418216.4	-14981420.5	17754.529	-409.720	-18384.540
1421.12	-15411875.7	-420257.1	-15073079.7	17863.130	-406.977	-18279.069
1421.12	-15322290.0	-422286.1	-15164213.0	17971.103	-404.216	-18172.918
1422.12	-15232165.9	-424300.2	-15254838.0	18078.443	-401.403	-18066.130
1422.12	-15141506.6	-426300.1	-15344870.4	18185.146	-398.534	-17958.709
1423.12	-15050315.5	-428285.6	-15434394.0	18291.211	-395.651	-17850.658
1423.12	-14958595.5	-430256.0	-15523375.9	18396.635	-392.789	-17741.981
1424.12	-14866350.1	-432213.5	-15611812.7	18501.414	-389.961	-17632.682
1424.12	-14773582.6	-434156.2	-15699701.6	18605.544	-387.119	-17522.765
1425.12	-14680295.7	-436084.8	-15787039.4	18709.018	-384.336	-17412.233
1425.12	-14586493.5	-437999.5	-15873822.9	18811.837	-381.548	-17301.070
1426.12	-14492178.6	-439900.3	-15960049.4	18913.991	-378.743	-17189.340
1426.12	-14397354.5	-441786.8	-16045715.4	19015.484	-375.856	-17076.989
1427.12	-14302024.7	-443658.8	-16130818.2	19116.310	-372.943	-16964.040
1427.12	-14207158.1	-445516.1	-16215354.5	19216.494	-370.011	-16850.525
1427.12	-14109860.6	-447358.3	-16299322.2	19316.011	-366.929	-16736.427
1427.12	-14013033.2	-449185.4	-16382717.9	19414.850	-363.894	-16621.742
1429.12	-13915713.2	-450997.2	-16465538.6	19513.008	-360.879	-16506.474
1429.12	-13817904.2	-452794.2	-16547781.6	19610.583	-357.900	-16390.627
1430.12	-13719609.7	-454576.2	-16629444.0	19707.270	-354.918	-16274.206
1430.12	-13620832.9	-456343.5	-16710522.7	19803.363	-351.996	-16157.212
1431.12	-13521577.2	-458096.2	-16791015.0	19898.760	-349.063	-16039.651
1431.12	-13421846.4	-459834.1	-16870918.2	19993.459	-346.115	-15921.579
1432.12	-13321643.9	-461557.1	-16950229.5	20087.457	-343.074	-15802.851
1432.12	-13220973.1	-463264.8	-17028946.0	20180.746	-340.018	-15683.624
1433.12	-13119837.6	-464957.2	-17107064.7	20273.321	-336.895	-15563.851
1433.12	-13018241.0	-466633.7	-17184583.5	20365.188	-333.730	-15443.526
1434.12	-12916186.9	-468294.4	-17261499.2	20456.344	-330.554	-15322.655
1434.12	-12813678.7	-469939.3	-17337809.0	20546.782	-327.383	-15201.247
1435.12	-12751957.4	-470918.6	-17383303.2	20600.784	-325.514	-15128.211
1435.12	-12710719.7	-471568.4	-17413510.7	20636.708	-324.267	-15079.468
1435.12	-12648728.9	-472338.4	-17458639.5	20690.517	-322.401	-15006.300
1435.12	-12607308.2	-473182.1	-17488606.2	20734.914	-321.556	-14963.986
1435.12	-1259695.9	-473342.9	-17496086.5	20750.694	-321.529	-14956.891
1436.12	-12513672.9	-474626.3	-17555804.7	20883.286	-319.779	-14903.543
1436.12	-12503226.9	-474786.1	-17563254.7	20900.536	-319.493	-14897.369

ULLAGE IGNITION  
 02/12 BURNER OFF

J-2 F-L INT  
 ULL CUT OFF  
 REIGN  
 .08 THR  
 15X INT

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.037 DEG. ZND OPP.

ENCLOSURE 4

TIME FROM MOTION (SEC)	X POST COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)	Y POST COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)	Z POST COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)	X VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)	Y VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)	Z VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)
14367.12	-12398293.0	-47637A.1	-1763758A.7	21073.527	-317.221	-14835.830
14372.12	-1229247A.5	-477954.0	-17711597.0	21253.244	-313.17A	-14766.207
14377.12	-12185761.0	-479510.9	-17785255.5	21433.576	-309.534	-14697.797
14382.12	-12078141.6	-481048.6	-17858574.2	21614.299	-305.484	-14629.574
14387.12	-11969617.5	-482565.6	-17931551.0	21795.384	-301.314	-14561.057
14392.12	-11860186.9	-484061.5	-18004183.7	21976.913	-297.015	-14491.899
14397.12	-11749847.7	-485535.7	-18076469.0	22158.826	-292.644	-14422.117
14402.12	-11638598.1	-486987.8	-18148404.0	22341.087	-288.220	-14351.775
14407.12	-11526436.4	-488417.8	-18219986.0	22523.658	-283.766	-14280.955
14412.12	-11413361.1	-489825.5	-18291213.0	22706.531	-279.298	-14209.709
14417.12	-11299370.9	-491210.8	-18362022.5	22889.609	-274.829	-14138.077
14422.12	-11184444.5	-492573.8	-18432593.2	23073.024	-270.363	-14066.105
14427.12	-11068640.1	-493914.4	-18502743.0	23256.765	-265.906	-13993.815
14432.12	-10951896.2	-495232.9	-18572530.7	23440.848	-261.470	-13921.235
14437.12	-10834231.1	-496529.2	-18641954.7	23625.285	-257.051	-13848.381
14442.12	-10715642.7	-497803.4	-18711014.0	23810.083	-252.659	-13775.262
14447.12	-10596129.6	-499055.8	-18779707.0	23995.250	-248.291	-13701.885
14452.12	-10475689.7	-500286.4	-18848032.5	24180.774	-243.956	-13628.248
14457.12	-10354321.2	-501495.4	-18915989.2	24366.665	-239.651	-13554.359
14462.12	-10232022.5	-502683.0	-18983575.7	24552.937	-235.382	-13480.226
14467.12	-10108791.2	-503849.3	-19050791.0	24739.604	-231.148	-13405.862
14472.12	-9984625.7	-504994.5	-19117634.0	24926.681	-226.953	-13331.279
14477.12	-9859523.7	-50611A.9	-19184103.5	25114.182	-222.796	-13256.482
14482.12	-9733483.1	-507222.5	-1925019A.5	25302.114	-218.685	-13181.497
14487.12	-9606501.9	-508305.8	-1931591A.0	25490.490	-214.619	-13106.316
14492.12	-9478577.5	-509368.8	-19381261.2	25679.320	-210.597	-13030.953
14497.12	-9349707.9	-510411.8	-19446227.2	25868.617	-206.618	-12955.420
14502.12	-9219890.5	-511435.1	-19510815.2	26058.396	-202.689	-12879.719
14507.12	-9089123.1	-51243A.8	-19575024.2	26248.671	-198.812	-12803.859
14512.12	-8957402.9	-513423.3	-19638853.5	26439.440	-194.988	-12727.849
14517.12	-8824727.6	-51438A.0	-19702302.5	26630.785	-191.217	-12651.700
14522.12	-8691094.1	-515335.5	-19765370.5	26822.677	-187.502	-12575.432
14527.12	-8556499.7	-516263.9	-19828056.7	27015.163	-183.843	-12499.050
14532.12	-8420941.6	-517174.1	-19890360.7	27208.266	-180.242	-12422.565
14537.12	-8284416.1	-51806A.4	-19952282.2	27402.011	-176.701	-12345.990
14542.12	-8146920.2	-518941.2	-20013820.5	27596.448	-173.221	-12269.336
14547.12	-8008450.4	-51979A.7	-20074975.5	27791.608	-169.804	-12192.614
14552.12	-7869002.9	-520639.3	-20135746.7	27987.513	-166.452	-12115.833
14557.12	-7728574.0	-521461.3	-20196133.5	28184.194	-163.167	-12038.991
14562.12	-7587159.7	-522271.1	-20256136.8	28381.686	-159.957	-11962.096
14567.12	-7444755.7	-523063.0	-20315754.5	28580.027	-156.815	-11885.148
14572.12	-7301357.9	-523839.4	-20374987.7	28779.258	-153.746	-11808.153

\*\* ENCLOSURE 4 \*\*

AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.

TIME FROM MOTION (SEC)	X POST COORD (FT)	Y POST COORD (FT)	Z POST COORD (FT)	SPACE FIXED EARTH CENTER PLUMBLIN SYS	X VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS	Y VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS	Z VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS
1457.12	-7156961.6	-524600.6	-20433636.0	28979.412	-150.756	-11731.115	
1458.12	-7011562.1	-525347.1	-20492299.0	29180.542	-147.842	-1154.022	
1459.12	-6865154.5	-526079.2	-20550376.0	29382.692	-145.010	-11576.884	
1459.12	-6717733.4	-526797.3	-20608067.7	29585.907	-142.261	-11499.693	
1459.12	-6569793.6	-527501.9	-20665373.0	29790.238	-139.592	-11422.435	
1460.12	-6419829.1	-528193.4	-20722292.0	29995.738	-137.011	-11345.107	
1460.12	-6269334.1	-528872.2	-20778823.7	30202.467	-134.521	-11267.695	
1461.12	-6117902.3	-529538.7	-20834968.7	30410.484	-132.123	-11170.180	
1461.12	-5965227.1	-530193.6	-20890725.5	30619.854	-129.819	-11112.539	
1462.12	-5811601.4	-530837.1	-20946093.7	30830.645	-127.611	-11034.748	
1462.12	-5656918.1	-531469.8	-21001072.7	31042.930	-125.501	-10956.775	
1463.12	-5501170.0	-532092.3	-21055661.0	31256.566	-123.493	-10878.500	
1463.12	-5344349.7	-532705.0	-21109857.2	31471.834	-121.598	-10799.937	
1464.12	-5186448.7	-533308.4	-21163659.7	31688.836	-119.811	-10721.050	
1464.12	-5027458.3	-533903.2	-21217067.0	31907.658	-118.134	-10641.778	
1465.12	-4867349.0	-534490.0	-21270076.7	32128.402	-116.565	-10562.047	
1465.12	-4706170.9	-535069.1	-21322686.7	32351.177	-115.111	-10481.760	
1466.12	-4543853.6	-535641.3	-21374893.2	32576.099	-113.777	-10400.795	
1466.12	-4380406.1	-536207.1	-21426693.2	32803.288	-112.565	-10319.012	
1467.12	-4215815.1	-536767.4	-21478076.0	33034.039	-111.714	-10232.142	
1467.12	-4050061.2	-537324.4	-21529011.2	33267.836	-111.068	-10142.132	
1468.12	-3883133.6	-537878.2	-21579499.5	33503.544	-110.443	-10053.375	
1468.12	-3715022.4	-538428.8	-21629547.0	33741.268	-109.819	-9965.874	
1469.12	-3545717.4	-538976.3	-21679160.2	33981.097	-109.184	-9879.679	
1469.12	-337169.9	-539523.6	-21710561.7	34135.110	-108.765	-9825.438	
1469.12	-320001.8	-539346.5	-21712624.0	34144.396	-108.728	-9821.635	
1469.12	-3035263.1	-539519.9	-21728331.2	34153.881	-107.649	-9776.114	
1470.12	-2864438.7	-540049.5	-21776852.0	34178.688	-104.196	-9632.323	
1470.12	-2695494.9	-540378.1	-21807408.7	34188.965	-101.998	-9540.731	

6CS2  
T87  
TL1

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AS-509 TRAJ DATA (ENGLISH UNITS) JANUARY 31 1971 AZIMUTH=72.067 DEG. 2ND OPP.
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** ENCLOSURE 4 **
-----
TIME FROM FIRST MOTION (SEC)
X POST COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)
Y POST COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)
Z POST COORD SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT)
X VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)
Y VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)
Z VEL. COMP. SPACE FIXED EARTH CENTER PLUMBLIN SYS (FT/S)
-----
14705.31 -3095494.9 -540378.1 -21807405.7 34188.967 -101.998 -9540.731
14715.31 -2753408.3 -541363.6 -21901377.2 34227.558 -95.118 -9253.754
14726.31 -2376696.3 -542368.4 -22001434.5 34264.559 -87.582 -8938.898
14737.31 -1999608.4 -543290.5 -22098034.5 34295.907 -80.084 -8625.050
14748.31 -1622206.5 -544130.3 -22191188.2 34321.674 -72.628 -8312.423
14759.31 -1244551.6 -544888.4 -22280910.7 34341.935 -65.218 -8001.180
14770.31 -866703.7 -545565.2 -22367218.0 34356.772 -57.857 -7691.492
14781.31 -488722.0 -546161.4 -22450127.7 34366.276 -50.550 -7383.524
14792.31 -110669.8 -546677.5 -22529659.7 34370.541 -43.300 -7077.431
14803.31 267411.0 -547114.1 -22605836.2 34369.667 -36.109 -6773.365
14814.31 645449.4 -547472.0 -22678679.5 34363.760 -28.982 -6471.471
14825.31 1023395.6 -547751.9 -22748214.7 34352.929 -21.922 -6171.884
14836.31 1401196.1 -547954.5 -22814467.5 34337.287 -14.930 -5874.735
14846.21 1741045.3 -548071.4 -22871311.0 34319.192 -8.699 -5609.488
-----
CVS OFF
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APPENDIX B

TABLE B-1  
DEAD STAGE TRAJECTORY PARAMETER DEFINITIONS

<u>Printed Symbol</u>	<u>Units</u>	<u>Definition</u>
<u>Geocentric Reference</u>		
X	km	Position vector components.
Y	km	
Z	km	
DX	km/sec	Velocity vector components.
DY	km/sec	
DZ	km/sec	
R	km	Position vector magnitude.*
DEC	deg	Declination.*
RA	deg	Right ascension.*
V	km/sec	Velocity vector magnitude.*
PTH	deg	Flight-path angle.*
AZ	deg	Azimuth.*
ALT	km	Altitude.**
LAT	deg	Latitude.**
LON	deg	Longitude.**
VE	km/sec	Relative velocity vector magnitude.**
PTE	deg	Relative flight-path angle.**
AZE	deg	Relative azimuth.**
* Inertial geocentric polar coordinates.		
** Rotational geodetic polar coordinates.		
<u>Planetary Coords</u>		
XM	km	Components of the moon position vector (Geocentric).
YM	km	
ZM	km	

TABLE B-1  
DEAD STAGE TRAJECTORY PARAMETER DEFINITIONS

<u>Printed Symbol</u>	<u>Units</u>	<u>Definition</u>
DXM	km/sec	Components of moon velocity vector (Geocentric.)
DYM	km/sec	
DZM	km/sec	
RM	km	Radius vector magnitude. <sup>2</sup>
DEM	deg	Declination. <sup>2</sup>
RAM	deg	Right ascension. <sup>2</sup>
LOM	deg	Right ascension of moon wrt the Greenwich meridian. <sup>2</sup>
VM	km/sec	Velocity vector magnitude. <sup>2</sup>
GHA	deg	Greenwich hour angle.
XS	km	Position vector components of the sun (Geocentric).
YS	km	
ZS	km	
RAS	deg	Right ascension. <sup>3</sup>
LOS	deg	Right ascension of the sun wrt the Greenwich meridian. <sup>3</sup>
DES	deg	Declination. <sup>3</sup>

<sup>1</sup> Geocentric polar coordinates of the moon.

<sup>2</sup> Geocentric polar coordinates of the sun.

Keplerian Osculating Elements

SMA	km	Semi-major axis.
ECC		Eccentricity.
INC	deg	Inclination of vehicle flight plane to the earth's MNB equatorial plane.
RAN	deg	Right ascension of ascending node.
APF	deg	Argument of pericenter vector.
RP	km	Radius at pericenter.



TABLE B-1 (CONTINUED)  
DEAD STAGE TRAJECTORY PARAMETER DEFINITIONS

<u>Printed Symbol</u>	<u>Units</u>	<u>Definition</u>
VH	km/sec	Excess hyperbolic velocity for a hyperbola or the current escape velocity deficit for an ellipse.
RNMP	deg	Right ascension of ascending node measured from the X-axis of the EMP coordinate system.
APMP	deg	Argument of pericenter vector relative to the earth-moon plane.
INMP	deg	Inclination of the vehicle relative to the earth-moon plane.
APO	km	Apocenter radius.
TFP	hr	Time from lift-off to pericentric passage.
TA	deg	True anomaly.
EA	deg	Eccentric anomaly.
MA	deg	Mean anomaly.
SLR	km	Semilatus rectum.
PER	hr	Period.
MTA	deg	Maximum true anomaly.
<u>Unit Vectors</u>		
WX WY WZ		Components of the unit angular momentum vector of the flight plane.
PX PY PZ		Components of unit pericenter vector.
QX QY QZ		Components of the unit velocity vector at pericenter.

TABLE B-1 (CONTINUED)  
DEAD STAGE TRAJECTORY PARAMETER DEFINITION

<u>Printed Symbol</u>	<u>Units</u>	<u>Definition</u>
SXO SYO SZO		Components of unit vector of outgoing asymptote.
<u>2-Body and XI Terms</u>		
XTB YTB ZTB	km km km	Vehicle position vector components based on the two-body reference conic.
DXTB DYTB DZTB	km/sec km/sec km/sec	Vehicle velocity vector components based on the two-body reference conic.
XI YI ZI	km km km	Components of vehicle position vector.
DXI DYI DZI	km/sec km/sec km/sec	Components of vehicle velocity vector.
DDXI DDYI DDZI	km/sec <sup>2</sup> km/sec <sup>2</sup> km/sec <sup>2</sup>	Components of vehicle acceleration vector.
RTB	km	Two-body position vector magnitude.
RDTB	km/sec	Two-body velocity vector magnitude.
ACC	km/sec <sup>2</sup>	Magnitude of vehicle acceleration vector.

TABLE B-1 (CONTINUED)  
DEAD STAGE TRAJECTORY PARAMETER DEFINITIONS

<u>Printed Symbol</u>	<u>Units</u>	<u>Definition</u>
<u>Perturbation Accelerations</u>		
SPX	km/sec <sup>2</sup>	Components of acceleration vector due to the presence of non-central bodies.
SPY	km/sec <sup>2</sup>	
SPZ	km/sec <sup>2</sup>	
ENX	km/sec <sup>2</sup>	Central-body acceleration vector components (Cowell) or Encke acceleration.
ENY	km/sec <sup>2</sup>	
ENZ	km/sec <sup>2</sup>	
DGX	km/sec <sup>2</sup>	Atmospheric drag acceleration vector components. (Not used)
DGY	km/sec <sup>2</sup>	
DGZ	km/sec <sup>2</sup>	
ATX	km/sec <sup>2</sup>	Thrust acceleration vector components.
ATY	km/sec <sup>2</sup>	
ATZ	km/sec <sup>2</sup>	
TRX	km/sec <sup>2</sup>	Moon non-spherical potential acceleration vector components (printed only if the moon is reference body).
TRY	km/sec <sup>2</sup>	
TRZ	km/sec <sup>2</sup>	
OBX	km/sec <sup>2</sup>	Earth non-spherical potential acceleration vector components (printed only if the earth is reference body).
OBY	km/sec <sup>2</sup>	
OBZ	km/sec <sup>2</sup>	

Selenocentric (Vehicle) Reference

X	km	Position vector components.
Y	km	
Z	km	

TABLE B-1 (CONTINUED)  
DEAD STAGE TRAJECTORY PARAMETER DEFINITIONS

<u>Printed Symbol</u>	<u>Units</u>	<u>Definition</u>
DX	km/sec	Velocity vector components.
DY	km/sec	
DZ	km/sec	
R	km	Radius vector magnitude. <sup>1</sup>
DEC	deg	Declination. <sup>1</sup>
RA	deg	Right ascension. <sup>1</sup>
V	km/sec	Velocity vector magnitude. <sup>1</sup>
PTH	deg	Flight-path angle. <sup>1</sup>
AZ	deg	Azimuth. <sup>1</sup>

<sup>1</sup> Inertial selenocentric polar coordinates.

Selenographic (Vehicle) Reference

X	km	Selenographic position vector components.	
Y	km		
Z	km		
DX	km/sec	Selenographic velocity vector components.	
DY	km/sec		
DZ	km/sec		
ALT	km	Altitude. <sup>2</sup>	
LAT	deg	Latitude. <sup>2</sup>	
LON	deg	Longitude. <sup>2</sup>	
VR	km/sec	Relative velocity vector magnitude. <sup>2</sup>	
PTR	deg	Relative flight-path angle. <sup>2</sup>	
AZR	deg	Relative azimuth. <sup>2</sup>	
LTS	deg	Latitude	Selenographic
LNS	deg	Longitude	Subsolar point
LTE	deg	Latitude	Selenographic
LNE	deg	Longitude	Subearth point
DSMP	deg	Declination	Sun's location wrt
RSMP	deg	Right Ascension	EMP coordinate system

<sup>2</sup> Selenographic polar coordinates.

TABLE B-1 (CONTINUED)  
DEAD STAGE TRAJECTORY PARAMETER DEFINITIONS

<u>Printed Symbol</u>	<u>Units</u>	<u>Definition</u>
LIN	deg	Selenographic inclination of the vehicle flight plane.
LAN	deg	Selenographic longitude of ascending node.
LAP	deg	Selenographic argument of periapsis.

TABLE B-2: S-IVB DEAD STAGE TRAJECTORY

T 0.26512951944444+00 31 JAN. 1971, 23 HRS., 2 MIN., 4.663 SEC. G.M.T. ECKE COAST  
 T 0.95446627000000+00

GEOCENTRIC REFERENCE

X 9.034596+02 Y -6.7672397+03 Z -1.5318562+03 DX 9.2226185+00 DY -2.3613578+00 DZ -4.4470240+00  
 R 6.9970247+03 DEC -1.2646174+01 RA -8.2395704+01 PTH -1.3725393+01 AZ 6.0159169+01  
 ALT 6.1988887+02 LAT -1.2721278+01 LON 1.6158002+02 PTE 1.4258963+01 AZE 5.8703758+01

PLANETARY COORDS

XM 3.4564859+05 YM 1.0495154+05 ZM 7.6430252+04 OX1 -3.2194039+01 OYM 9.0339294+01 OZM 4.5451052+01  
 RM 3.5921385+05 DEM 1.1947076+01 RAM 1.6882618+01 LOM 2.6088834+02 VM 1.0613065+00 GMA 1.1602427+02  
 XS 9.7542541+07 YS -1.0138782+08 ZS -4.3964205+07 RNS -4.6107276+01 LOS -1.6213165+02 UES -1.7353349+01

KEPLERIAN OSCULATING ELEMENTS

SMA 2.3842660+05 ECC 9.7232918+01 INC 3.2181171+01 RAN -6.1506758+01 APF -5.2120802+01 RP 6.5975073+03  
 VH -7.8601233+02 RNMP 4.7782148+01 APMP 5.4392049+02 INMP 2.6910724+01 APO 4.7025570+05 TFP 2.5663917+00  
 TA 2.7849380+01 EA -3.3542163+00 MA -9.4970586+02 SLR 1.3012455+04 PER 3.2183928+02 MTA 3.6000000+02

UNIT VECTORS

UX -4.6008636+01 UY -2.5407867+01 UZ 8.4636924+01 PX -2.9421527+01 PY -8.5832137+01 PZ -4.2030349+01  
 QX 4.3326619+01 QY -4.4579223+01 QZ 3.2701457+01 SXU 0.0000000 SYO 0.0000000 SZO 0.0000000

2-BODY AND XI TERMS

XTR 9.034596+02 YTB -3.7672397+03 ZTR -1.5318562+03 DXTB 9.2226185+00 DYT8 -2.3613578+00 DZTB 4.4470240+00  
 XI 0.0000000 YI 0.0000000 ZI 0.0000000 OXI 0.0000000 OYI 0.0000000 OZI 0.0000000

PERTURBATION ACCELERATIONS

DDX1 -1.1023073+06 DDY1 8.2054881+06 DDZ1 6.6818307+06 RTH 6.9970247+03 ROT8 1.0595435+01 ACC 1.0639172+05  
 SPX -5.0265797+11 SPY 3.2359233+10 SPZ -8.8249226+11 ENX 0.0000000 ENY 0.0000000 ENZ 0.0000000  
 DGX 0.0000000 DGY 0.0000000 DGZ 0.0000000 ATX 0.0000000 ATY 0.0000000 ATZ 0.0000000  
 OBX -1.102257+06 OBY 8.2051645+06 OBZ 6.6819189+06

TABLE B-2: S-1/2 DEAD STAGE TRAJECTORY

T 27137951044444001 31 JAN. 1971, 23 HRS., 5 MIN., 49.663 SEC. G.M.T. ENCKE COAST

GEOCENTRIC REFERENCE

X 2.9588149+03 Y -7.1120935+03 Z -4.4857671+02 DX 8.8905604+00 DY 7.6906673+01 DZ 4.6866736+00  
 R 7.7791345+03 DEC -3.7032761+00 RA -6.7411426+01 V -1.0079695+01 PTH 2.2232069+01 AZ 5.8007033+01  
 ALT 1.3410591+03 LAT -3.7238336+00 LON 1.7562423+02 VE 9.6449025+00 PTE 2.3280201+01 ALE 5.6074550+01

PLANETARY COORDS

XM 3.4557609+05 YM 1.0510478+05 ZM 7.6532538+04 OXM -3.2256455+03 OYM 9.0319998+01 OZM 4.5400073+01  
 XM 3.6922496+05 DEM 1.1972931+01 RAM 1.6916007+01 LOM 2.5995247+02 VM 1.0612719+00 GHA 1.1696434+02  
 XS 9.7547674+07 YS -1.0138373+08 ZS -4.3962429+07 RAS -4.6104714+01 LUS -1.6306975+02 UES -1.7352620+01

KEPLERIAN OSCULATING ELEMENTS

SMA 2.3751556+05 ECC 9.7221962+01 INC 3.2183973+01 TAN -6.1508396+01 APP -5.2099974+01 RP 6.5782719+03  
 VM -8.2907301+07 RNMP 4.7749316+01 APMP 5.4549171+03 INMP 2.6912966+01 APO 4.6843285+05 TFP 2.5664384+00  
 TA 4.5134948+01 EA -5.6475675+00 MA 1.6577827+01 SLX 1.3013241+04 PER 3.1999639+02 MTA 3.6000000+02

UNIT VECTORS

WX -4.6812999+01 WY -2.540850+01 WZ 8.4634219+01 PX -2.9391883+01 PY -8.5846413+01 PZ -4.2029724+01  
 QX 8.3334629+01 QY -4.4550965+01 QZ 3.2719278+01 SXU 0.0000000 SYO 0.0000000 SZO 0.0000000

2-BODY AND XI TERMS

XTR 2.958825+03 YTR -7.1122998+03 ZTR -4.9869604+02 DXT 8.8910565+00 DYT 8.8910565+00 DZT 4.6868142+00  
 XI -4.7665576+02 YI 2.0626485+01 ZI 1.1933423+01 DXI -4.9614604+04 DYI 1.7306998+03 DZI 8.5935596+04  
 DDYI -3.0130643+06 DDYI 7.0900753+06 DDZI 1.3573240+06 RTB 7.7193506+03 RDTB 1.0079780+01 ACC 7.8224071+06

PERTURBATION ACCELERATIONS

SPX 3.1764493+10 SPY 4.3899061+10 SPZ -1.5598437+10 ENX -1.7396390+07 ENY 3.3870050+07 ENZ -6.7136223+08  
 OGX 0.0000000 OGY 0.0000000 OGZ 0.0000000 ATX 0.0000000 ATY 0.0000000 ATZ 0.0000000  
 CMX -2.8394101+06 CMY 6.7507358+06 CMZ 1.4246162+06

TABLE B-2: S-IVB DEAD STAGE TRAJECTORY

T 0.2995045194444444+001 31 JAN. 1971, 23 HRS., 22 MIN., 42.163 SEC. G.M.T. ENCKE COAST

GEOCENTRIC REFERENCE

X -1.0528489+04 Y -5.9146665+03 Z -4.0476113+03 OX -6.2106584+00 OY -7.3005047+00 OZ -4.1252683+00  
 R -1.2736386+04 DEC -1.8929873+01 RA -2.9326290+01 V -7.8027200+00 PTH -4.3557257+01 AZ -6.3209186+01  
 ALT -6.3603835+03 CAT -1.4567914+01 LON -2.0947907+02 VE -7.2641663+00 P1C -4.7775850+01 AZL -5.8602767+01

PLANETARY COORDS

XM -3.4524007+05 YM -1.0601963+05 ZM -7.692270+04 DXM -3.2537099+01 OYM -9.0232741+01 OZM -4.5376960+01  
 QM -3.6927501+05 QEM -1.7034214+01 QAM -1.7373683+01 LOM -2.5587804+02 VM -1.0611163+00 GMA -1.2117464+02  
 XS -9.7570774+07 YS -1.0136530+08 ZS -4.3754439+07 RAS -4.6092733+01 LUS -1.6726737+02 DES -1.7349337+01

KEPLERIAN OSCILLATING ELEMENTS

SMA -2.3304832+05 ECC -9.7169212+01 INC -3.2179815+01 RAN -6.1512051+01 APP -5.2086739+01 RP -6.5994336+03  
 VM -1.0084293+01 RNMP -4.7572722+01 APMP -5.4720726+03 INMP -2.6912368+01 APO -4.5949721+05 TFP -2.5663998+00  
 YA -0.8723953+01 EA -1.3369483+01 MA -4.9616340+01 SLR -1.3011985+04 PER -3.1101114+02 MTA -3.6000000+02

UNIT VECTORS

XA -4.6807199+01 XY -2.5402628+01 WZ -6.4630885+01 PX -2.9383622+01 PY -8.5654829+01 PZ -4.2710462+01  
 QX -6.3339676+01 QY -4.4538240+01 QZ -3.2723745+01 SX0 -0.0000000 SY0 -0.0000000 SZ0 -0.0000000

2-BODY AND XI TERMS

XTB -1.0530513+04 YTB -5.9186002+03 ZTB -4.0471710+03 DXTB -6.2137447+00 DYTB -2.2960209+00 DZTB -4.1257917+00  
 X1 -2.0235358+03 Y1 -3.9426786+00 Z1 -4.4032019+01 DX1 -3.0862808+03 DY1 -4.4838169+03 DZ1 -5.2335880+04  
 DDX1 -1.6268664+06 DDY1 -3.6734639+07 DDDZ1 -1.4966281+08 RTB -1.2739750+04 KDTB -7.8041330+00 ACC -2.2408797+06

PERTURBATION ACCELERATIONS

SPX -1.8152550+04 SPY -8.0578294+04 SPZ -3.8851702+06 ENX -1.2186322+06 ENY -1.4368342+07 ENZ -7.0334873+07  
 UGX -0.0000000 UGY -0.0000000 UGZ -0.0000000 ATX -0.0000000 ATY -0.0000000 ATZ -0.0000000  
 OHX -4.1005196+07 OHY -2.2285719+07 OHZ -7.9289090+07



TABLE B-2: S-IVB DEAD STAGE TRAJECTORY

T .52137951944444001 I FEB. 1971. 1 HRS. 35 MIN. 49.663 SEC. G.M.T. ECKE COAST

GEOCENTRIC REFERENCE

X 3.5740465+04 Y 1.6429456+04 Z 2.5250704+04  
 M 4.7518213+04 DEC 3020 537+01 RA 2.409898+01  
 ALT 4.1146077+09 LAT 3.2122741+01 LON 2.2295213+02

PLANETARY COORDS

XM 3.4256112+05 YM 1.131979+05 ZM 1.0596529+04  
 RM 3.6967243+05 DEM 1.2592851+01 RAM 1.8289937+01  
 XS 9.7752055+07 YS 1.3121987+08 ZS 4.3891338+07

REPULSIAN OSCILLATING ELEMENTS

SMA 2.3228944+05 ECC 9.7159132+01 INC 3.2175175+01  
 VH -2.1512111+01 RUMP 4.6242159+01 APMP 5.482996+00  
 TA 1.3836834+02 EA 3.5045795+01 MA 3.0794576+02

UNIT VECTORS

WX 4.6809806+01 WY 2.5386971+01 WZ 8.4642397+01  
 QX 9.333934+01 QY 4.4548174+01 QZ 3.2724848+01

2-BODY AND XI TERMS

XTB 3.674831+04 YTB 1.6429423+04 ZTB 2.5251118+04  
 XI 1.0372721+01 YI 3.5951218+02 ZI 3.3421507+01

PERTURBATION ACCELERATIONS

SPX 7.1668028+09 SPY 1.6157941+09 SPZ 1.2058596+09  
 OGX 0.7000000 OGY 0.0000000 OGZ 0.0000000  
 OBX 1.6711212+09 OBY 7.2596400+10 OBZ 4.3292137+09

TABLE B-2: S-IVE DEAD STAGE TRAJECTORY

T 1.021379519444+00Z 1 FEB. 1971. 6 HRS. 35 MIN. 49.663 SEC. G.M.T. ENCKE COAST

1.021379519444+00Z 1 FEB. 1971. 6 HRS. 35 MIN. 49.663 SEC. G.M.T. ENCKE COAST

PLA JETARY COORDS  
 X 5.304723+04 Y -5.632189+04 Z -5.175800+04 DX -1.086149+00 DY -1.936940+00 DZ -1.181407+00  
 R 9.912618+04 DEC 3.147630+01 RA 4.177531+01 Y 2.515306+00 PH 7.321521+01 A2 9.704932+01  
 ALT 9.275384+04 CAT 3.148738+01 COM 1.720029+02 VE 5.953446+00 PTE 2.346017+01 AZE 9.094301+01

PLA JETARY COORDS  
 XM 3.358926+05 YM 1.291561+05 ZM 0.956382+04 DXM 0.960579+01 OYM 9.775686+01 UZM 4.364116+01  
 44 3.705837+05 DEM 1.392662+01 RAY 2.133394+01 COM 1.512618+02 VM 1.057022+00 GMA 2.297723+02  
 XS 9.816222+07 YS 1.008932+08 ZS 4.374871+07 RAS 4.578538+01 LUS 2.755577+02 DES 1.726485+01

KEPLERIAN OSCULATING ELEMENTS  
 SMA 2.323989+05 ECC 9.716131+01 INC 3.217633+01 RAN 6.154849+01 APF 5.296673+01 RP 6.597065+03  
 VM -3.205149+01 RVP 4.328493+01 APMP 5.489851+03 INMP 2.692729+01 APO 4.582008+05 TFP 2.566716+03  
 TA 1.534016+01 EA 5.382739+01 MA 0.808732+00 SLR 1.300686+04 PER 3.097121+02 HTA 3.600000+02

UNIT VECTORS  
 WX -4.682117+01 WY 2.537498+01 WZ 0.464135+01 PX -2.940837+01 PY -8.585438+01 PZ -4.200205+01  
 UX 8.332425+01 UY 4.455740+01 UZ 3.273492+01 SX 0.000000 SY 0.000000 SZ 0.000000

2-800Y AND 1 TERMS  
 XTB 6.304376+04 YTB 5.632128+04 ZTB 5.176226+04 DXTB 1.085804+00 DYTB 1.936883+00 DZTB 1.181521+00  
 XI 3.478723+03 YI 6.366724+01 ZI -2.222149+00 DXI 3.403261+04 DYI 5.194652+05 UZI -1.137705+04  
 DDXI 2.169735+03 DDYI 2.486938+09 DDZI -8.499605+13 RTB 9.912479+04 RDTB 2.515253+03 ACC 2.185564+08

PERTURBATION ACCELERATIONS  
 SPX 2.196731+08 SPY 1.705834+09 SPZ -2.420260+09 ENX -3.328534+10 ENY 7.261854+10 ENZ 1.877931+09  
 D6X 0.000000 D6Y 0.000000 D6Z 0.000000 AFX 0.000000 AFY 0.000000 AFZ 0.000000  
 OBX 6.258533+11 OBY 5.494895+11 OBT -2.346319+10

TABLE B-2: S-IVB DEAD STAGE TRAJECTORY

T 2213775194444+002 I PER. 1971, 16 HRS., 15 MIN., 49.663 SEC. G.M.T. ENCKE COAST  
 7276962730050+009  
 GEOMETRIC REFERENCE  
 X 0.167027+04 Y 1.1542425+05 Z 4.529479+04 DA 6.035310+01 DX 1.423540+00 DZ 7.5971389+01  
 R 1.7030306+09 DEC 3.0096137+01 RA 5.1544274+01 RM 1.72275+000 PH 7.5616235+01 PZ 1.0213729+02  
 ALT 1.6392785+05 CAT 3.0002369+01 CON 3.0136126+01 VE 1.00470427+01 PTE 9.1789443+00 AZE 9.0492995+01  
 PLANETARY COORDS  
 XM 3.1991525+05 YM 1.6702812+05 ZM 1.00379077+05 OXM 4.8924453+01 OYM 8.3606739+01 OZM 4.088288+01  
 RM 3.7246226+05 DEN 1.6180945+01 RAN 2.6574869+01 COM 6.3418505+00 VM 1.0514692+00 QMA 2.0183013+01  
 XS 9.8976968+07 YS 1.0022912+06 ZS 4.433461716+07 RAS 4.5360141+01 LOS 6.5543154+01 OLS 1.7147057+01  
 KEPLERIAN OSCULATION ELEMENTS  
 SMA 2.3265301+05 ECC 9.7173440+01 INC 3.2200616+01 RAN 4.41694227+01 APF 5.172586+01 RP 6.5736331+00  
 VM 6.4084722+01 RNMP 3.7393951+01 APMP 5.5032573+01 INMP 2.7006037+01 APO 4.5873199+05 TFP 2.87715150+00  
 TA 1.6194111+02 FA 7.3990097+01 MA 2.0473165+01 SLR 1.2965416+04 PER 3.1022175+02 HTA 3.6000000+02  
 UNIT VECTORS  
 NX 4.691684+01 NY 2.5268174+01 NZ 6.7461674+01 PX 2.9474394+01 PY 8.5844368+01 PZ 4.1976238+01  
 QX 8.3247063+01 QY 4.4634771+01 QZ 3.2827787+01 SX0 0.0000000 SY0 0.0000000 SZ0 0.0000000  
 2-BODY AND XI TERMS  
 XT8 9.1634689+04 YT8 1.1542391+05 ZT8 6.5301861+04 OXT8 4.0192075+01 OYT8 1.4233787+00 OZT8 7.5127598+01  
 XT1 3.5549020+01 YT1 4.3394971+00 ZT1 7.0701027+00 OXT1 1.6102629+03 OYT1 1.6142799+04 OZT1 1.6209359+04  
 ODX1 5.0013379+04 ODY1 3.5163452+04 OZT1 1.9016529+09 RT8 1.7028213+05 RDT8 1.7221286+00 ACC 5.0172891+08  
 PERTURBATION ACCELERATIONS  
 SPX 5.3462977+08 SPY 8.1454722+10 SPZ 4.6928917+09 ENX 4.5405312+10 ENY 2.6914842+09 ENZ 2.8189895+09  
 OGX 0.0000000 OGY 0.0000000 OGT 0.0000000 ATX 0.0000000 ATY 0.0000000 ATZ 0.0000000  
 OBX 4.4549306+12 OBY 5.3137477+12 OBZ 2.7310696+12

TABEL B-2: S-IVB DEAD STAGE TRAJECTORY

T 030213795194444+002 2 FEB. 1971, 2 HRS., 35 MIN., 47.663 SEC. G.M.T. ENCKE COAST

GEOCENTRIC REFERENCE

X 1.0961948+05 Y 1.6159968+05 Z 1.0390703+05 DX 4.1425500+00 DY 1.1624025+00 DZ 5.7520199+01  
 W 2.2363769+03 DEC 2.9171702+01 RA 5.5504927+00 PH 7.6411236+01 AZ 1.0440313+02  
 ALT 2.0172645+03 LAT 2.9174641+01 LON 2.4525559+02 VE 1.3992662+01 PFE 5.4264064+00 AZE 9.0329500+01

PLANETARY COORDS

XH 3.0071767+05 YH 1.6872019+05 ZH 1.1795941+05 OXH 5.7618323+01 OYH 7.8689970+01 OZH 3.7768895+01  
 RH 3.7433698+04 RH 1.6365251+01 RAY 3.2159129+02 VM 1.0456712+00 OM1 1.7059368+02  
 XS 9.1706359+07 YS 9.9114680+07 ZS 4.3772398+07 RAS 4.4435506+01 LOS 2.1552919+02 UES 1.7028397+01

KEPLERIAN OSCILLATING ELEMENTS

SMA 2.3295430+05 ECC 9.7205251+01 INC 3.7220325+01 RAN 4.2071023+01 APP 5.1724661+01 RP 6.5104872+03  
 VH 5.2656142+01 RNMP 3.1521916+01 APMP 5.9377401+00 INMP 2.7223398+01 APO 4.5939012+03 TFP 2.5897030+00  
 TA 1.6585737+02 EA 8.7642003+01 MA 3.1994655+01 SLK 1.2639023+04 PE4 3.1982295+02 MTA 3.6000000+02

UNIT VECTORS

NX 4.7190488+01 NY 2.5016642+01 WZ 8.4541265+01 PX 2.9625360+01 PY 8.5814478+01 PZ 4.1930237+01  
 QX 8.3032521+01 QY 4.4032738+01 QZ 3.3085189+01 SXU 0.0000000 SYO 0.0000000 SZO 0.0000000

2-BODY AND XI TERMS

XTB 1.0948628+05 YTB 1.6158711+05 ZTB 1.0902270+05 DXTB 4.1017234+01 DYTB 1.1620939+00 DZTB 5.7545332+01  
 XI 1.3369982+02 YI 1.2602692+01 ZI 1.4376669+01 DXI 4.0826618+03 DYI 3.0862842+04 UZI 2.5633125+04  
 UDXI 9.0242755+08 DDYI 4.8004047+04 DDZI 2.9865851+09 RTB 2.2357003+05 ROTB 1.3600915+00 ACC 9.0420122+08

PERTURBATION ACCELERATIONS

SPX 4.1463597+04 SPY 3.0054968+01 SPZ 7.0170645+09 ENX 1.2218515+09 ENY 4.7775198+09 ENZ 4.0402064+09  
 OSX 0.0000000 OSY 0.0000000 OSZ 0.0000000 ATX 0.0000000 ATY 0.0000000 ATZ 0.0000000  
 ORX 1.0094353+12 ORY 1.4731067+12 ORZ 9.2270297+12

TABLE B-2: S-IVB DEAD STAGE TRAJECTORY

Y 04213795194444+002 2 FEB. 1971, 12 HRS., 35 MIN., 49.663 SEC. G.M.T. ENCKE COAST

Z 14476962733333+006

GEOCENTRIC REFERENCE:  
 X 2.2242132+05 Y 2.0411153+05 Z 1.2756489+05 DX 3.0528242+01 DY 9.8445372+01 DZ 4.5954407+01  
 M 2.6700019+09 UEC 2.0152525+01 RA 5.0543149+01 Y 1.1302599+00 PTH 7.6442453+01 A2 1.0625115+02  
 ALT 2.4526297+05 LAT 2.0952913+01 LON 9.7538792+01 VE 1.6888012+01 PVE 3.7333869+00 AZE 9.0252347+01

PLANETARY COORDS  
 XM 2.7851357+05 YH 2.1659934+05 ZH 1.3094562+05 DXM 6.5616577+01 OYM 7.3075113+01 UZH 3.4326594+01  
 RM 3.7634436+09 DEM 2.0361671+01 RAM 3.7707212+01 LOM 7.6867769+01 VM 1.0403760+00 OMA 3.2100435+02  
 XS 1.0059035+08 YS 9.8889496+07 ZS 4.2887811+07 RAS 4.4511482+01 LUS 3.6551583+02 DES 1.6908878+01

KEPLERIAN OSCULATION ELEMENTS  
 SMA 2.3333296+05 ECC 7.7272323+01 JNC 3.2799283+01 RAN 6.7285884+01 APP 5.1192376+01 RP 6.3645709+03  
 VM 5.7766356+01 RM 2.5671088+01 APH 5.4884299+01 INP 2.7684793+01 APO 4.6030134+09 TFP 2.7638809+00  
 TA 1.6843519+02 EA 9.8530419+01 MA 4.3414043+01 SLR 1.2555536+04 PER 3.1158110+02 MTA 3.6000000+02

UNIT VECTORS  
 MX 4.779731+01 MY 2.4504959+01 WZ 8.4357131+01 PX 2.9899966+01 PY 8.5755919+01 PZ 4.1855877+01  
 QX 9.2591828+01 QY 4.5226640+01 QZ 3.3662160+01 SXU 0.0000000 SYO 0.0000000 SZO 0.0000000

2-BODY AND XI-TERMS  
 XTB 1.2206971+05 YTB 2.0008417+05 ZTB 1.2753044+05 DXTB 2.9686206+01 OYTB 9.8593020+01 DZTB 4.5994192+01  
 XT 3.5158724+02 YT 2.7639344+01 ZT 2.5558613+01 OXT 8.4203659+03 OYT 5.2372040+04 OZT 3.7784506+04  
 DDXI 1.5713785+07 DDYI 7.4273998+09 DDXI 4.1627902+07 DDTB 2.8683086+09 DDYB 1.7277138+00 ACC 1.5738834+07

PERTURBATION ACCELERATIONS  
 SPX 1.5963357+07 SPY 1.7939449+01 SPZ 9.7832865+09 ENX 2.4930333+09 ENY 7.4088877+09 ENZ 5.6227783+09  
 OSX 3.3000000 OSY 0.0000000 OSZ 0.0000000 ATX 0.0000000 ATY 0.0000000 ATZ 0.0000000  
 OOX 3.1878463+11 OXY 9.7249933+13 OXZ 4.5819337+12

TABLE B-2: S-IVB DEAD STAGE TRAJECTORY

T 50213795194444+002 2 FEB. 1971, 22 HRS., 35 MIN., 49.663 SEC. G.M.T. ENCKE CNAST

T 180769662700000000

---X--- 1.320467+05 ---Y--- 2.331204+05 ---Z--- 1.424690+05 ---OX--- 2.342570+01 ---OY--- 0.525134+01 ---OZ--- 3.7555016+01  
 ---R--- 3.034444+05 ---DEC--- 2.800225+01 ---RA--- 6.047150+01 ---Y--- 9.605693+01 ---PTM--- 7.6290336+01 ---AZ--- 1.0814394+02  
 ---ALT--- 2.9707103+05 ---LAT--- 2.800555+01 ---CON--- 3.009864+02 ---VE--- 1.79343350+01 ---PTE--- 2.7652427+00 ---AIE--- 9.0210396+01

PLANETARY COORDS  
 ---XM--- 2.5356430+05 ---YM--- 2.4180180+05 ---ZM--- 1.4264116+05 ---DXM--- 7.7286048+01 ---OYM--- 6.6842183+01 ---UZM--- 3.0605941+01  
 ---QM--- 3.7829812+05 ---QDM--- 2.2151702+01 ---QAM--- 4.3639764+01 ---COM--- 2.9222474+02 ---VM--- 1.0350484+00 ---GMA--- 1.7141902+02  
 ---XS--- 1.0130891+08 ---YS--- 9.8211742+07 ---ZS--- 4.2586877+07 ---KAS--- 4.4088063+01 ---LUS--- 1.55550309+02 ---UES--- 1.6788508+01

KEPLERIAN OSCULATING ELEMENTS  
 ---SMA--- 2.338530+05 ---ECC--- 9.740897+01 ---INC--- 3.2762438+01 ---RAM--- 6.54442228+01 ---APF--- 9.0088702+01 ---RF--- 6.0649161+03  
 ---VH--- 6.6029157+01 ---RMPP--- 1.9827011+01 ---APMP--- 5.4162981+00 ---INMP--- 2.8866094+01 ---APO--- 4.6164299+05 ---TFF--- 2.7982592+03  
 ---TA--- 1.7044248+02 ---EA--- 1.0778852+02 ---MA--- 5.4646893+01 ---SLR--- 1.71972346+04 ---PER--- 3.126254+02 ---MTA--- 3.6000000+02

UNIT VECTORS  
 ---WX--- 4.9085038+01 ---WY--- 2.3473149+01 ---WZ--- 8.3902744+01 ---PX--- 3.0379389+01 ---PY--- 8.5646879+01 ---PZ--- 4.1733737+01  
 ---QX--- 6.1656303+01 ---QY--- 4.5974167+01 ---QZ--- 3.4908805+01 ---SX0--- 0.0000000 ---SY0--- 0.0000000 ---SZ0--- 0.0000000

2-BODY AND-X1 TERMS  
 ---XTB--- 1.319290+05 ---YTB--- 2.331191+05 ---ZTB--- 1.4247191+05 ---DXTB--- 2.2900958+01 ---DYTB--- 8.5249671+01 ---DZTB--- 3.7582226+01  
 ---XTI--- 5.3173766+01 ---YTI--- 1.3376385+01 ---ZTI--- 2.8311950+00 ---DXI--- 5.2474835+03 ---DYI--- 1.6776894+05 ---DZI--- 2.7209811+04  
 ---DDXI--- 2.9168666+07 ---DDYI--- 1.4796551+07 ---DDZI--- 1.4065233+08 ---RTB--- 3.0342258+05 ---RDTB--- 9.5939481+01 ---ACC--- 2.9202932+07

PERTURBATION ACCELERATIONS  
 ---SPX--- 2.9203720+07 ---SPY--- 7.6087382+10 ---SPZ--- 1.4543148+08 ---ENX--- 3.5066086+10 ---ENY--- 7.1653717+10 ---ENZ--- 4.8064225+10  
 ---D6X--- 0.0000000 ---D6Y--- 0.0000000 ---D6Z--- 0.0000000 ---ATX--- 0.0000000 ---ATY--- 0.0000000 ---ATZ--- 0.0000000  
 ---OBX--- 1.1912391+13 ---OBY--- 2.4409454+13 ---OBZ--- 2.7765479+12

TABLE B-2: S-IVB DEAD STAGE TRAJECTORY

T	.60213795194444+002	3	FEB. 1971,	8	MRS.,	35	MIN.,	49.663	SEC.	G.M.T.	ENCKE	COAST
	.21676966273333-00A											
GEOCENTRIC REFERENCE												
X	1.3959754+05	Y	2.6178511+05	Z	1.5475314+05	0A	1.0954896+01	0Y	7.4320199+01	0Z	3.0911808+01	
R	3.3461538+05	DEC	2.7547297+01	RA	6.1931124+01	HA	0.2694135+01	PTH	7.6319292+01	AZ	1.111761+02	
ALT	3.2824178+05	LAT	2.7551297+01	CON	1.7601054+02	VE	2.1460945+01	PTE	2.1449982+00	AZE	9.0188316+01	
PLANETARY COORDS												
KM	2.2615026+05	YM	2.6466100+05	ZM	1.5295387+05	0XM	7.9302796+01	0YM	6.0070832+01	0ZM	2.6651729+01	
RM	3.8024245+05	YM	2.3719134+01	RAM	4.9486442+01	COM	1.4766075+02	VM	1.0299395+00	0HA	2.6182569+02	
KS	1.0218201+08	YS	9.7528745+07	RAS	4.3665250+01	LOS	3.0549094+02	DES	1.6667295+01			
KEPLERIAN OSCULATING ELEMENTS												
SMA	2.3466242+05	ICC	9.7683733+01	INC	3.4199461+01	RAN	6.7734384+01	APF	4.7605626+01	RP	5.4354084+03	
VH	7.1657929+01	RIMP	1.3961399+01	APMP	5.2136656+00	INHP	3.0950076+01	APO	4.6388942+05	TFP	3.0520343+00	
TA	1.7223888+02	EA	1.1585172+02	MA	6.5484093+01	SLR	1.0744918+04	PER	3.1424783+02	MTA	3.6000000+02	
UNIT VECTORS												
WX	5.2050595+01	WY	2.1115392+01	WZ	8.2708586+01	PX	3.1127940+01	PY	8.5431130+01	PZ	4.1510494+01	
QX	7.9423983+01	QY	4.7443813+01	QZ	3.7896816+01	SX0	0.0000000	SY0	0.0000000	SZ0	0.0000000	
2-BODY AND XI TERMS												
XTB	1.3959376+05	YTB	2.6178512+05	ZTB	1.5475332+05	0XTB	1.0742198+01	0YTB	7.4320974+01	0ZTB	3.0921861+01	
XI	3.7740444+00	YI	1.2738675+02	ZI	1.7812401+01	DXI	2.1269828+03	OYI	7.7556091+06	0ZI	1.0053468+04	
DDXI	6.1659003+07	DDYI	2.7452880+04	DDZI	2.9275133+08	RTB	3.3461390+05	RDTB	8.2650098+01	ACC	6.1729072+07	
PERTURBATION ACCELERATIONS												
SPX	6.1661039+07	SPY	2.7825357+09	SPZ	2.9296988+08	ENX	2.0417475+01	ENY	3.714886+01	ENZ	2.3773019+01	
DSX	0.0000000	DSY	0.0000000	DSZ	0.0000000	ATX	0.0000000	ATY	0.0000000	ATZ	0.0000000	
OSX	5.5386463+14	OXY	1.0279332+13	OSZ	1.9881907+12							

TABLE B-2: S-IVB DEAD STAGE TRAJECTORY

RECTIFICATION -5  
 T .68213795194444+002 3 FEB. 1971, 16 HRS., 35 MIN., 49.663 SEC. G.M.T. ENCKE COAST  
 Y .29556966275555+000

SELENOCENTRIC REFERENCE

X -5.783469+04 Y 9.3507287+02 Z 2.8307081+03 DX -1.0155866+00 DY 1.2396925+01 DZ 2.9964610+02  
 R 5.7911472+04 DEC 2.8917295+00 RA 1.7907372+02 Y 1.0235515+00 PTH -8.0937768+01 AZ -6.0467605+01  
 SELENOGRAPHIC REFERENCE  
 X -3.4676931+04 Y -4.6361917+04 Z 1.33496887+03 DX -8.5698090+01 DY 6.2150800+01 DZ -2.7548449+03  
 ALT 5.6173382+04 LAT 1.3354445+00 LON -5.3204924+01 VM -1.0586293+00 PTR -7.2706840+01 KZK -8.6208762+01  
 LTS -2.6305592+01 LNS 8.2786852+01 LTF -6.7958453+00 LML -6.5218734+00 DSMF -8.6869141+01 RSMF -7.6329863+01  
 LIN -1.7254816+02 LAN -4.2438235+01 LAP 1.2015290+02

GEOCENTRIC REFERENCE

X 1.1480784+05 Y 2.8207503+05 Z 1.0299748+05 DX 1.7704087+01 DY 6.6706991+01 DZ 2.6346566+01  
 R 3.5651162+05 DEC 2.7204835+01 RA -6.2825556+01 Y 7.3874210+01 PTH 7.7118782+01 AZ -1.1668083+02  
 ALT 3.5013742+05 LAT 2.7207627+01 LON 4.0671329+01 VE 2.2985616+01 PIE 1.7953910+00 AZE -9.0184508+01

PLANETARY COORDS

XM 2.0264253+05 YN 2.8113942+05 ZM 1.6015677+05 DXM -8.3854575+01 DYM 5.4320066+01 DZM 2.3350105+01  
 RM 3.8177722+05 DEN 2.4833227+01 RAM 5.4216356+01 LOM -3.2062128+01 VM -1.0260354+00 GMA 2.2154228+01  
 XS 1.0281251+08 YS -9.6478599+07 ZS -4.2052144+07 RAS -4.3327434+01 LOS -6.5481662+01 DES -1.6569722+01

KEPLERIAN OSCILLATING ELEMENTS

SMA -5.5818013+03 ECC 2.31457576+00 INC 1.5034694+02 JNC 1.7597495+02 APF 1.1547059+02 RP 5.8372944+03  
 VH 9.3719684+01 RNMP 1.1835589+01 APMP 1.8173092+02 INMP 1.7455439+02 APO -1.7011057+04 TFP -8.2754253+01  
 TA -1.0980064+02 EA -1.3754437+02 MA -5.0356257+02 SLR 1.7778985+04 PER 1.0395064+01 MTA -1.1926282+02

UNIT VECTORS

WX -3.455531+02 WY 4.9353869+01 WZ -8.6903710+01 PX -3.7419952+01 PY 8.1269248+01 PZ 4.4666057+01  
 QX 7.2670419+01 QY -3.0975977+01 QZ -7.1276478+01 SXO -6.2552948+01 SYO -6.6748688+01 SZO -4.0394819+01



TABLE B-2: S-I.R. DEAD STAGE TRAJECTORY

PERTURBATION ACCELERATIONS

SPX -1.7229113-07 SPY -3.0993132-07 SPZ -2.3694443-07 ENX -3.1253521-10 ENY -2.9765151-10 ENZ -1.6607261-10  
 OGX 0.0000000 OGY 0.0000000 OGT 0.0000000 ATX 0.0000000 ATY 0.0000000 ATZ 0.0000000  
 TRX 4.9878690-13 TRY -2.3139641-13 TRZ -1.5118899-13

T 0721379519444+002 3 FEB. 1971, 18 HRS., 35 MIN., 49.663 SEC. G.M.T. ENCKE COAST  
 T 2527696627000+006

SELENOCENTRIC REFERENCE

X -5.0476586+04 Y 1.8147124+03 Z 3.0373486+03 DX 1.0288633+00 DY 1.2052361-01 DZ 2.7446822-02  
 W 5.0600438+04 VEC 3.4413127+00 WA 1.7794101+02 VB 1.0362620+00 VTW 7.9954314+01 AZ -6.055931-01

SELENOGRAPHIC REFERENCE

X 2.8583486+04 Y -4.1732986+04 Z 1.3247001+03 DX -8.3575084+01 DY -6.6465422-01 DZ -3.6320843-03  
 ALT 4.8862348+04 LAT 1.5001530+00 LON -5.5592166+01 VK 1.0678286+00 PTP -7.2854788+01 AZK -8.5793757+01  
 LIG -2.6059746-01 LMS 8.1773800+01 LTE -6.7853552+00 LNE -6.5377730+00 OSMP -8.6090478-01 RSNP -7.5308395+01  
 LIN 1.7257427+02 LAN -4.4000563+01 LAP 1.2086389+02

GEOCENTRIC REFERENCE

X 1.1609033+05 Y 2.8801254+05 Z 1.6484506+05 DX 1.7797397-01 DY 6.4693741-01 DZ 2.5253113+01  
 R 3.6163201+05 DEC 2.7118768+01 RA 6.3007607+01 V 7.1517842-01 PTH 7.7607330+01 AZ 1.1950545+02  
 ALT 3.5525028+05 LAT 2.7121514+01 LON 1.0771745+01 VE 2.3347896+01 PTE 1.7239946+00 AZE -9.0186708+01

PLANETARY COORDS

XM 1.9656691+05 YM 2.8499783+05 ZM 1.6180771+05 DXM -8.4906932-01 DYM 5.2841379-01 DZM 2.2508431-01  
 RM 3.8215710+05 UEM 2.5019827+01 RAM 5.5405438+01 LOM 3.1690764+00 VM 1.0250867+00 GHA 9.2236362+01  
 XS 1.0296959+08 YS 9.6842545+07 ZS 4.1792280+07 RAS -4.3243041+01 LOS 9.5479403+01 UES -1.6545246+01

TABLE B-2: S-IVB DEAD STAGE TRAJECTORY

KEPLERIAN OSCILLATING ELEMENTS	
SM4	-5.5709913+09 ECC 2.0156626+00 INC 1.5037342+02 RAN 1.7598908+02 APF 1.1617131+02 RP 5.6582473+03
VM	0.3811242-01 RNMP 1.0977429+01 APMP 1.8269333-02 RNMP 1.7456227+02 PO 1.6800229+04 FFP 0.2728256+01
TK	-1.0919693+02 CA -1.3137244+02 MA -4.3467003+02 SLK 1.7063365+04 PER 1.0364657+01 MTA 1.1974329+02
UNIT PREFIXES	
MX	-3.4157732-02 WY -4.9313443-01 WZ -8.6926569-01 PX -3.8540766-01 PY -8.0908756-01 PZ -4.4366497-01
QX	0.2209832-01 QY -3.1948074-01 QZ -2.1803419-01 SX0 -6.0941185-01 SY0 -6.7896532-01 SZ0 -4.0911824-01
2-BODY AND XI-TERMS	
XT9	-5.0481120 YTB 1.325939+03 ZTB 3.0442771+03 DXTB 1.0276073+00 DYT8 1.2355474-01 DZTB 2.9308021-02
XI	4.9419617+03 YI -1.1281537+01 ZI -0.7284335+00 DXI 1.2560195-03 DYI -3.0311289-03 DZI -1.8611985-03
DDX1	1.7187851-07 DDYT -3.7854675-07 DDZ1 -2.3232720+07 RT8 5.060592+04 ROT8 1.0354233+00 ACC 4.7625279-07
PERTURBATION ACCELERATIONS	
SPX	1.7144371-07 SPY -3.7895149-07 SPZ -2.3255468-07 ENX -4.3426957-10 ENY -4.0499451-10 ENZ -2.2563504-10
DGX	11.0000050 DGY 0.0000000 DGT 0.0000000 ATX 0.0000000 ATY 0.0000000 ATZ 0.0000000
TRX	5.3090601-13 TRY -2.4877372-13 TRZ -1.6301562-13
T	70463795194444+002
T	.25366766270000+000
SELENOCENTRIC REFERENCE	
X	-4.9549757+04 Y -1.9230027+03 Z -3.0619099+03 DX -1.0307679+00 DY -1.2012178+01 DZ -2.7133612-02
R	4.9681501+04 DEC -3.5334231+00 RA -1.777749+02 V -1.0380983+00 PTH -7.9806556+01 AZ -6.0568470+01
SELENOGRAPHIC REFERENCE	
X	2.7832486+04 Y -4.1132211+04 Z -1.3211543+03 DX -8.33146-01 DY -6.7010053-01 DZ -3.7426519-03
ALT	4.7943411+04 LAT -1.5238165+00 LON -5.5915395+01 VR -1.0692580+00 PTR -7.2849665+01 AZR -8.5737444+01
LTS	-2.6029049-01 LVS -8.1647171+01 LTR -6.7838660+00 LNE -6.5396074+00 DSMP 8.5993111-01 R5MP 7.5180862+01
LIN	1.7257680+02 LAN -4.4134142+01 LAP 1.2096030+02

ENCKE COAST

49.663 SEC. G.M.T.

50 MIN.

3

FEB. 1971.

18 HRS.

7.5180862

TABLE B-2: S-IV3 DEAD STAGE TRAJECTORY

PERTURBATION ACCELERATIONS

SPX 5.1586148-06 SPY 1.9771144-08 SPZ 1.472044-08 ENX 5.7912254-08 ENY 1.78930762-08 ENZ 1.72686304-08  
 UGX 0.000000 UGY 0.000000 UGZ 0.000000 ATX 0.000000 ATY 0.000000 ATZ 0.000000  
 TRX 4.2184105-11 TRY 2.8268734-11 TRZ 3.2125223-11

T 0.00262951944444+002 4 FEB. 1971. 4 HRS. 24 MIN. 34.663 SEC. G.M.T. ENCKE COAST  
 T 0.28809462700000+006

SELENOCENTRIC REFERENCE

X 1.500684+04 Y 5.5864292+03 Z 3.6060143+03 DX 1.2745706+03 DY 5.490. 99-02 DZ -1.9670327-02  
 R 1.3271994+04 DEC 1.75765759+01 RA 1.8421308+02 V 1.2759041+00 PTH 5.78409318+01 AZ -6.4627499+01

SELENOGRAPHIC REFERENCE

X 6.3763601+02 Y 1.3214558+04 Z 1.0545345+03 DX 7.5180272+01 DY 1.0537913+00 DZ -1.869296-02  
 ALT 1.183384+04 LAT 4.5573098+00 LON -8.7237476+01 VR 1.2946082+00 PTR -9.7087935+01 AZR -8.4459352+01  
 LTS -2.4851399+01 LNS 7.6804403+01 LTE -6.69767-00 LNE 6.5845027+00 USMP 8.2263682+01 RSMP 7.0327467+01  
 LIN 1.7260638+02 LAN 4.9339671+01 LAP 1.22054+02

GEOCENTRIC REFERENCE

X 1.5422524+05 Y 3.0791213+05 Z 1.7267329+05 DX 3.7891634+01 DY 8.0889783+01 DZ 1.6334215+01  
 R 3.8522045+05 DEC 2.6823179+01 RA 6.3394892+01 V 6.5500514+01 PTH 7.4606675+01 AZ -1.9033451+02  
 ALT 3.7884658+05 LAT 2.6625724+01 LON 2.2356806+02 VE 2.5231884+01 PTE 1.4341614+00 AZL -9.0304084+01

PLANETARY COC DS

XH 1.6 2593+08 YH 3.0235570+05 ZH 1.6901925+05 DXH -8.9563422+01 DYH 4.5379493+01 DZH 1.8301248+01  
 RH 3.8399422+05 DEH 2.6114149+01 RAN 6.1272158+01 LOM 2.2144533+02 VM 1.0205978+00 GHA 1.9982683+02  
 RS 1.0373701+08 YS -9.6160226+07 ZS 4.169278+07 RAS 4.2829335+01 LOS 2.4265617+02 DES -1.6424682+01

TABLE B-2: S-IVB DEAD STAGE TRAJECTORY

KEPLERIAN OSCULATING ELEMENTS

SMA -5.5142521+03 ECC 1.7779239+00 INC 1.7504064+02 RAN 1.7997777+02 RPF 1.1730311+02 RP 5.13903132+03

VM 9.9292642+01 RNMP 5.9432275+00 APMP 1.8415737+02 INMM 1.7456979+02 APD 1.6418817+04 JFP 0.2681491+01

TA -8.3924203+01 EA -6.5243136+01 MA -9.3651107+01 SLR 1.4049786+04 CR 1.0206719+01 MTA 1.2037669+02

UNIT VECTORS

WX -3.4639935-02 WY 4.9202745-01 WZ -8.6955033+01 PX 4.0338259+01 PY 8.0294256+01 PZ 4.3882113+01

QX 9.1437550-01 QY -3.3556046+01 QZ -2.2653142+01 SXU 5.8466584+01 SYO -6.9552901+01 SZO -4.1733840+01

2-BODY AND X1-TERMS

XTR -1.1500686+04 YTR 5.5584247+03 ZTR 3.8060426+03 OXTR 1.2745500+00 OYTR 5.44937117+02 OZTR 1.9667136+02

XI 2.3116779+03 YI 4.7833800+04 ZI 2.0819232+03 OXI 2.0819232+03 OYI 4.7818440+06 OZI 3.71905244+06

DDXI 9.0721262+08 DDYI 1.7707804+08 DDZI 1.03271897+04 MOI 1.2758838+00 ACC 9.3422293+08

PERTURBATION ACCELERATIONS

SFX 9.0668.53+08 SFT 1.7681846+08 SPZ 1.3519738+08 ENX 7.7154823+12 ENY 9.0564703+12 ENZ 3.1756743+12

OGX 0.0000000 OGY 0.0000000 OZ 0.0000000 ATX 0.0000000 ATY 0.0000000 ATZ 0.0000000

TRX 0.5392959+11 TRY 2.0901091+11 TRZ 3.4509603+11

PERIOD: 19.663 SEC. G.M.T.

4 FEB. 1971, 4 HRS., 28 MIN., 19.663 SEC. G.M.T. ENCKE COAST

SELENOCENTRIC REFERENCE

X -1.1213287+04 Y 5.5664812+03 Z 3.0014212+03 OX 1.2601011+00 OY 5.7219988+02 OZ 2.1421908+02

R 1.3627513+04 DEC 1.6046288+01 RA 1.5359116+02 Y 1.2813441+00 PFH 5.7898994+01 AL 6.4797933+01

SELENOGRAPHIC REFERENCE

X 4.6859119+02 Y 1.2476647+04 Z 1.0532883+03 OX 7.5881028+01 OY 1.0610339+00 OZ 1.9165462+02

ALT 1.3289420+04 LAT 4.6241622+00 LON 8.7931928+01 VR 1.2999525+00 PIR 5.6614425+01 AZR 8.4499646+01

LTS 2.4843688+01 LNS 7.6772452+01 LTR 6.6896924+00 LNE 6.5846356+00 USMP 8.2239256+01 RSM 7.0295901+01

LIN 1.7260638+02 LAN 4.4374094+01 LAN 1.72205362+02

TABLE B-2: S-IVB DEAD STAGE TRAJECTORY

PERTURBATION ACCELERATIONS  
 SPX -6.2562723+06 SPY -4.9599304+06 SPZ -3.1000511+06 ENX -4.6566604+09 ENY -4.0253212+09 ENZ -2.6665272+09  
 OGX 0.0000000 OGY 0.0000000 OGZ 0.0000000 ATX 0.0000000 ATY 0.0000000 ATZ 0.0000000  
 TRX -9.4679850+11 TRY 5.7466634+11 TRZ 5.0321077+11

RECTIFICATION 5  
 Y .8500000000000+002 4 FEB. 1971, 9 HRS., 22 MIN., 60.000 SEC. G.M.T. ENRKE COAST  
 Y .3660000000000+003

SELENOCENTRIC REFERENCE  
 X 1.1615818+04 Y -2.2657993+03 Z -1.7577000+03 DX -0.6826808+01 DY -0.7499992+01 DZ -5.0761025+01  
 R 1.1968369+04 DEC -8.4451323+00 RA -1.1132608+01 Y -1.3071676+00 PTM -8.8985977+01 AZ -1.1896908+02

SELENOGRAPHIC REFERENCE  
 X -3.3040134+03 Y 1.1480733+04 Z -5.7802922+02 DX -4.4177074+01 DY -1.2416321+00 DZ -1.4046019+01  
 ALT 1.0230269+04 LAT -2.7682395+00 LON 1.0604456+02 VM -1.3253455+00 PTR -5.4330427+01 AZR -9.6580350+01  
 LTS -2.4237232+01 LHS -7.426547+01 LTE -6.6307825+00 LNE -6.5886559+00 OSMP -8.0320329+01 RSMR 6.7821618+01  
 LIM 1.7260625+02 LAN -5.2078471+01 LAP -2.3802436+02

GEOCENTRIC REFERENCE  
 X 1.6111907+05 Y 3.0784737+05 Z 1.7034424+05 DX -4.7765067+02 DY -4.2012478+01 DZ -3.4632844+01  
 R 3.8697095+05 DEC 2.6116501+01 RA 6.2373645+01 Y 5.4656172+01 PTM -6.7944086+01 AZ -1.3201214+02  
 ALT 3.8089693+05 LAT 2.6119081+01 LON 1.4773699+02 VE -2.5495175+01 PTE -1.1384972+00 AZE -9.0308715+01

PLANETARY COORDS  
 XM 1.4950325+05 YH 3.1913317+05 ZH 1.7210194+05 OXM -9.1603014+01 OYM -4.1982114+01 OZM -1.6128181+01  
 RM 3.8990633+05 DEM 2.6589492+01 RANM -6.4263076+01 LOM -1.4962642+02 VM -1.0164300+00 GMA -2.7463666+02  
 XS 1.0412395+08 YS -9.581357+07 ZS -4.1546932+07 RAS -11.2619859+01 LOS -3.1725652+02 OES -1.6363270+01

TABLE B-2: S-IVB DEAD STAGE TRAJECTORY

KEPLERIAN OSCILLATING ELEMENTS  
 SMA -5.5124731+U3 ECC -1.9778403+U0 INC -1.5040449+U2 RAN -1.7597784+U2 RPP -5.73903184+U3  
 VM -9.4307856+U1 RNMP -3.2283882+U0 APMP -1.7591275+U2 INMP -1.7456961+U2 APO -1.6415265+U4 TFP -8.2679568+U1  
 TA -8.0067251+U1 EA -6.013954+U1 MA -8.188300+U1 SLK -1.6091507+U4 PER -1.0201781+U1 MTA -1.2737132+U2

UNIT VECTORS  
 XX -3.4639264+U2 XY -4.9262698+U1 XZ -8.76955091+U1 PX -4.0229856+U1 PY -8.0335470+U1 PZ -4.3910053+U1  
 UX 9.1487058+U1 UY -3.3457419+U1 UZ -2.2599104+U1 SXO -5.8593727+U1 SYO -6.9483724+U1 SZO -4.1698767+U1

2-BODY AND XI TERMS  
 XTB 1.1615838+U4 YTB -2.2878058+U3 ZTB -1.7588442+U3 OXTB -8.6840187+U1 OYTB -8.3540506+U1 DLTB -5.0787862+U1  
 XI -2.0179397+U2 YI -2.0068056+U0 ZI -1.7141610+U0 OXI -1.3679238+U4 OYI -4.5913801+U4 OZI -2.6837181+U4  
 ODXI -6.7647666+U8 ODXI -4.4785735+U8 ODI -2.8457795+U8 OYI -1.968930+U4 OZI -1.3076560+U0 ACC -8.5965248+U8

PERTURBATION ACCELERATIONS  
 SPX -4.2856892+U8 SPY -4.9511546+U6 SPZ -3.0960037+U8 ENK -4.6972594+U9 ENY -4.8025803+U9 ENZ -2.5521056+U9  
 OGX 0.0000000 OGY 0.0000000 OZ 0.0000000 ATX 0.0000000 ATY 0.0000000 ATZ 0.0000000  
 TRX -9.3514421+U1 TRY -5.6769155+U1 TRZ -4.9864965+U1

TMAX CONVERGENCE

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2. OMSF Document, "Mission Implementation Plan for the Apollo 14 Mission," dated October 1970.
3. MSFC memorandum S&E-ASTN-ADL-69-3, "Control Release Mechanism Rod Force Characteristics for AS-505 and Subs," dated May 14, 1969.
4. MSFC memorandum S&E-ASTN-PA-69-M-187, "F-1 Engine Altitude Thrust Decay Curves for S-IC-5 and Subs," dated April 9, 1969.
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6. MSFC memorandum R-P&VE-PPE-68-M-71, "S-IVB/V Stage Thrust Buildup and Decay Characteristics," dated August 20, 1968.
7. NASA TMX-53517, "Static Aerodynamic Characteristics of Apollo/Saturn V Vehicle," dated September 16, 1966.
8. MSFC memorandum R-AERO-AD-68-37, "Saturn V Axial Force Characteristics," dated June 18, 1968.
9. MSFC memorandum R-AERO-AD-68-35, "Effects of Flow Separation on Apollo Saturn V First Stage Aerodynamics," dated June 10, 1968.
10. MSFC memorandum R-AERO-AD-66-41, "Second Stage Axial Force Coefficients for the Apollo/Saturn Vehicle," dated September 20, 1966.
11. MSFC memorandum R-AERO-AD-69-6, "Apollo/Saturn V Second Stage Base Axial Force," dated February 3, 1969.
12. MSFC memorandum R-AERO-AD-65-18, "Design Criteria: Hypersonic Aerodynamic Characteristics of the Saturn V LOR Second Stage Flight Configuration," dated March 2, 1965.

REFERENCES (Continued)

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14. MSFC memorandum S&E-ASTN-SAE-70-75, "Saturn V/AS-509 Revised Final Predicted Operational Mass Characteristics, Depletion Cutoff (Apollo 14 Mission) (January-March Launch)," dated October 7, 1970.
15. MSFC memorandum S&E-ASTN-SAS-70-27, "Revised Propulsion Performance Prediction Data Tapes for AS-509 Mission," dated October 26, 1970.
16. MSFC memorandum R-ASTR-F-68-164R, "Control Gains, Shaping Networks and Frequency Responses, AS-501 through AS-508, S-IC, S-II, and S-IVB Stages," dated November 4, 1968.
17. MSFC memorandum S&E-ASTR-F-69-29, "M/F Filter, SMC Gain, and Guidance Freeze Times for AS-507 and Subsequent Saturn V Vehicles," dated March 14, 1969.
18. NASA TMX-53139, "A Reference Atmosphere for Patrick AFB, Florida, Annual (1963 Revision)," dated September 23, 1964.
19. NASA TMX-53956, "Cape Kennedy Wind Component Statistics Monthly and Annual Reference Periods for All Flight Azimuths from 0 to 70 KM Altitude," dated October 9, 1969.
20. IBM document, MSFC No. III-4-423-15, "LVDC Equation Defining Document for the Saturn V Flight Program," Revision E, dated March 12, 1970.
21. MSFC memorandum S&E-ASTN-SAB-70-18, "Final S-IC Stage Prediction for a January 31, 1971, Launch," dated July 23, 1970.



APPROVAL

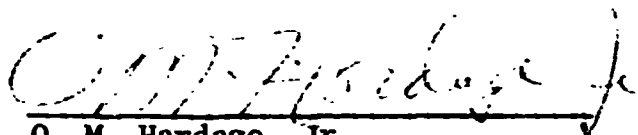
APOLLO 14 (AS-509) OPERATIONAL TRAJECTORY  
FOR JANUARY 31, 1971, LAUNCH WINDOW

By


Gerald Wittenstein  
Dewey C. Bell  
Jerry D. Weiler  
C. L. Varnado

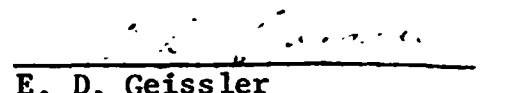
The information in this report has been reviewed for security classification. Review of any information concerning Department of Defense or Atomic Energy Commission programs has been made by the MSFC Security Classification Officer. This report, in its entirety, has been determined to be unclassified.

This document has also been reviewed and approved for technical accuracy.

  
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