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October 1967

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VEHICLE 726 ANOMALY INVESTIGATION REPORT (U)

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PREPARED BY:

Systems and Technologies Section

Flight Operations Laboratory

ISSUED BY:

[redacted] Manager

Program TA

[redacted]

[redacted]

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[redacted]

CY # [redacted]

PAGES 1

[redacted]

[redacted]

8 November 1967

To: [redacted]

From: [redacted]

Dear Sir:

Three copies of our final report on the Use 726 anomaly are attached and additional copies are being distributed per your direction.

You will note that our final conclusion is the same as our preliminary one which was documented in [redacted] dated 7/27/67 - the most probable cause was a partial failure of the phenolic nylon heat shield which precipitated an unusual chain of events. These events, in turn, resulted in parachute deployment at such a low altitude that air recovery was virtually impossible.

In parallel with our post-flight analysis of Use 726, we conducted a thorough investigation of all heat shields in the field to ascertain whether any contain potential failure characteristics. All of these shields have now been reapproved for flight. We also conducted a complete review of the design, manufacturing and inspection of phenolic nylon heat shields. Certain minor improvements are being made in each of these areas as the result of this review.

Very truly yours,

[redacted] Manager

[redacted] Program

/rl

cc: [redacted]

[redacted]

[redacted]

FOREWORD

Anomalous performance of the General Electric Satellite Re-entry Vehicle (SRV) No. 726 was observed during re-entry on 1 July 1967. An investigation of the SRV No. 726 Pre-Flight, Flight, and Post-Flight history was conducted, and the results are presented herein.

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1.0 Introduction

During the re-entry portion of the Program TA Vehicle 726 flight the SRV experienced an erratic motion history. This resulted in a delayed parachute deployment which necessitated a water recovery.

To determine the possible reason or reasons for this failure the available data, consisting of recovery subsystem and axial acceleration data were examined to determine the cause of the anomaly. A point mass trajectory was calculated based on initial conditions at deboost, and from axial acceleration data and a roll rate history derived from the signal strength, the vehicle dynamics were investigated as far as practical based on the amount of data available. The shield process and inspection histories were investigated and the recovered capsule was subjected to system and component tests. The results of these investigations are presented herein.

2.0 Flight Summary [redacted]

Program TA SRV 726 was launched from AFWTR on June 16, 1967. The flight duration was 15 days of an on-orbit operation, terminated by deboost recovery which occurred during revolution 240 on 1 July 1967.

The launch, orbital, and deboost phases were normal. However, during re-entry, an apparent roll acceleration was initiated shortly after the end of blackout, at an altitude of approximately 89,000 feet. About 12 seconds later a perturbation in the SRV axial accelerometer data was observed. This motion data was monitored by three different telemetry receiving stations. The data received by these stations, indicating anomalous SRV behavior, was as follows:

(a) The telemetry signal strength exhibited the typical periodic variations in signal strength. However, the frequency increased rapidly, which signified a corresponding increase in roll rate.

(b) Axial accelerometer data, which normally increases from saturation (-5g's) to -1g, remained essentially at the -5g saturation level with spurious excursions above zero. On one spurious excursion the level reached +3.9g's.

(c) The recovery subsystem inerital switches repeatedly opened and closed in response to the anomalous axial acceleration. This caused repeated recycling of the programmer 34 second timers, so that drogue ejection was delayed until an altitude of about 20,000 feet. The planned drogue ejection altitude was about 55,000 feet.

After thermal cover ejection, the presence of spurious noise pulses was observed on the axial accelerometer data channel for a period of approximately 31 seconds.

Because of the delayed chute deployment, the capsule was not sighted until it was too low for an air snatch. Consequently, a water recovery was necessary.

A visual examination of the recovered capsule revealed numerous dents and scratches on the capsule skin.

The aforementioned anomalies are analyzed and correlated in paragraph 4.

2.1 Conclusions

From the analysis given in paragraph 4, the following conclusions were made:

(a) The orbital temperature data does not indicate any abnormal temperature environment

(b) The re-entry trajectory of SRV 726 was very close to the planned trajectory. The anomaly occurred after the peak deceleration, dynamic pressure and heating rate altitudes.

(c) The thrust cone separation sequency was normal with clean electrical disconnect and separation.

(d) Early re-entry of SRV was normal until 89,000 feet as indicated by axial acceleration data and roll rate derived from signal strength measurements.

(e) At 89,000 feet the presence of a "fin" of about 5 square inches effective area could have caused a roll torque of about 8 ft. lbs. The vehicle experienced a roll acceleration until apparent removal of the "fin" at approximately 69,000 feet altitude. At this time the roll rate peaked at 300 rpm and began to decrease.

(f) It is postulated that the effective "fin" was most likely created by a circumferential section of the shield breaking loose and thereby, providing a protuberance in the airstream.

(g) The capsule internal temperature sensors indicated that the internal skin temperatures were greater than 100°F but less than 150°F. These temperatures are consistent with temperatures experienced on other flights of the SRV 726 type configuration where re-entry anomalies did not occur.

(h) Repeated closures of the inertial switches repeatedly recycled the 34 sec. timers, resulting in a delayed chute deployment.

(i) As verified by post-flight component and subsystems tests, all subsystems and subsystem components operated normally. The telemetered accelerometer data was representative of the axial component of acceleration, as sensed by the accelerometer in its location off the C.G. The recovery subsystem inertial switches operated normally by opening and closing in response to the axial component of acceleration, as sensed in their location off the C.G.

(j) The process and assembly inspection histories of shield no. 306 indicates that it was a prime shield. No reason could be found to reflect doubt in the integrity of the shield.

(k) The anomaly experienced by SRV 726 was probably caused by a random structural failure of the shield.

C[redacted]

2.2 Vehicle Configuration

The configuration of SRV 726 was similar to other TA vehicles previously flown, i.e. there were no distinct differences or significant changes in vehicle configuration.

The SRV system consists of the necessary hardware to survive the powered flight, orbital and re-entry environmerts. The SRV is comprised of two major assemblies, the thrust cone (T/C) assembly and the capsule/forebody assembly.

The thrust cone assembly provides the deboost capability of the SRV for de-orbit operations. Upon receiving the transfer signals from the spacecraft, the T/C thermal batteries are activated and the SRV/spacecraft electrical separation is accomplished. Electrical separation initiates the T/C programmer sequence. The T/C programmer provides a sequence of output signals which spins up the SRV, fires the retrorocket, despins the SRV, and finally electrically and physically separates the T/C assembly from the capsule/forebody assembly.

The capsule/forebody assembly is comprised of the recovery capsule which is enclosed in the heat shield. The capsule contains the recovery subsystem components which enable an air snatch or water recovery, and the tracking beacon and telemetry components. Upon ejection of the thermal cover, the recovery capsule is free to disengage from the heat shield. However, the capsule remains in the heat shield due to aerodynamic drag until deployment of the drogue, which is attached to the capsule structure. Deployment of the drogue and deceleration chute decreases the capsule velocity, introducing a difference between the capsule and heat shield velocities. This velocity difference causes the capsule to separate from the heat shield. Deployment of the recovery chute decreases the capsule rate of descent sufficiently to enable an air snatch recovery or structural survival of the capsule upon water impact.

On the date of recovery, the SRV 726 heat shield (S/N 306) was 9½ months old. The history of this heat shield and post-flight tests of some recovered capsule components are discussed in paragraph 4.0.

2.3 SRV Mass Properties

The weight and balance data of the capsule and available data of the SRV are presented in Table 2-1.

2.4 Sequence of Events

Table 2-2 lists the sequence of events from arming of the recovery subsystem through deboost, thrust cone separation, and recovery subsystem operations.

The predicted times were supplied to General Electric by an associate contractor. The actual values were obtained from analog records from the [redacted] Tracking Station (deboost area) and a telemetry ship (recovery area). Aircraft data were also available from the recovery area but it was not as clean as the ship data.

Table 2-1 S/N 726 Weight and Balance Data

	Weight	C.G. Position			Moments of Inertia			Products of Inertia		
		X INCHES	Y INCHES	Z INCHES	I_X lbs in^2	I_Y lbs in^2	I_Z lbs in^2	I_{XY} lbs in^2	I_{XZ} lbs in^2	I_{YZ} lbs in^2
RV	285	13.72	+.001	-.001	24878	27465	25842	+59	-19	-85
SRV	374.5	18.24	0.00	0.00	29804	NA*	NA*	+115	+10	NA*

NA* not available at this time.

[redacted]

[redacted]

[redacted]

2.5 Observed Anomalies

During the re-entry of vehicle no. 726, various anomalies were indicated by vehicle telemetry. These anomalies are described in the following paragraphs.

2.5.1 Roll Acceleration

After despin the vehicle roll rate was approximately 10 rpm. This was within the specified value of 10 ± 6 rpm. After blackout, the roll rate was approximately 8 rpm. However, during re-entry between approximate altitudes of 96,000 and 69,000 feet, the vehicle experienced an anomalous roll acceleration which resulted in a peak roll rate of 300 rpm at an approximate altitude of 69,000 feet. The roll rate history after blackout, as derived from signal strength variations, is shown in Figure 2-2.

2.5.2 Axial Acceleration

Upon acquisition of telemetry data, after blackout, the telemetry ship data (channel 7) indicated that the recovery subsystem G switch closure had occurred as planned. This data is shown in figure A-2.

A comparison between measured axial acceleration and the axial acceleration calculated from point mass trajectory are shown in figure 2-3. After blackout, when axial acceleration decreased in magnitude below the accelerometer saturation level, the accelerometer output and the calculated acceleration remain in very close agreement for approximately thirteen seconds. Therefore, from this correlation, it was concluded that the deboost phase was satisfactory and re-entry, until approximately 76586 seconds (altitude 89,000 feet), was normal. However, after this time, the axial accelerometer data indicates an anomalous motion history which repeatedly saturated at the -5G level and spuriously peaked as high as +3.8 G's.

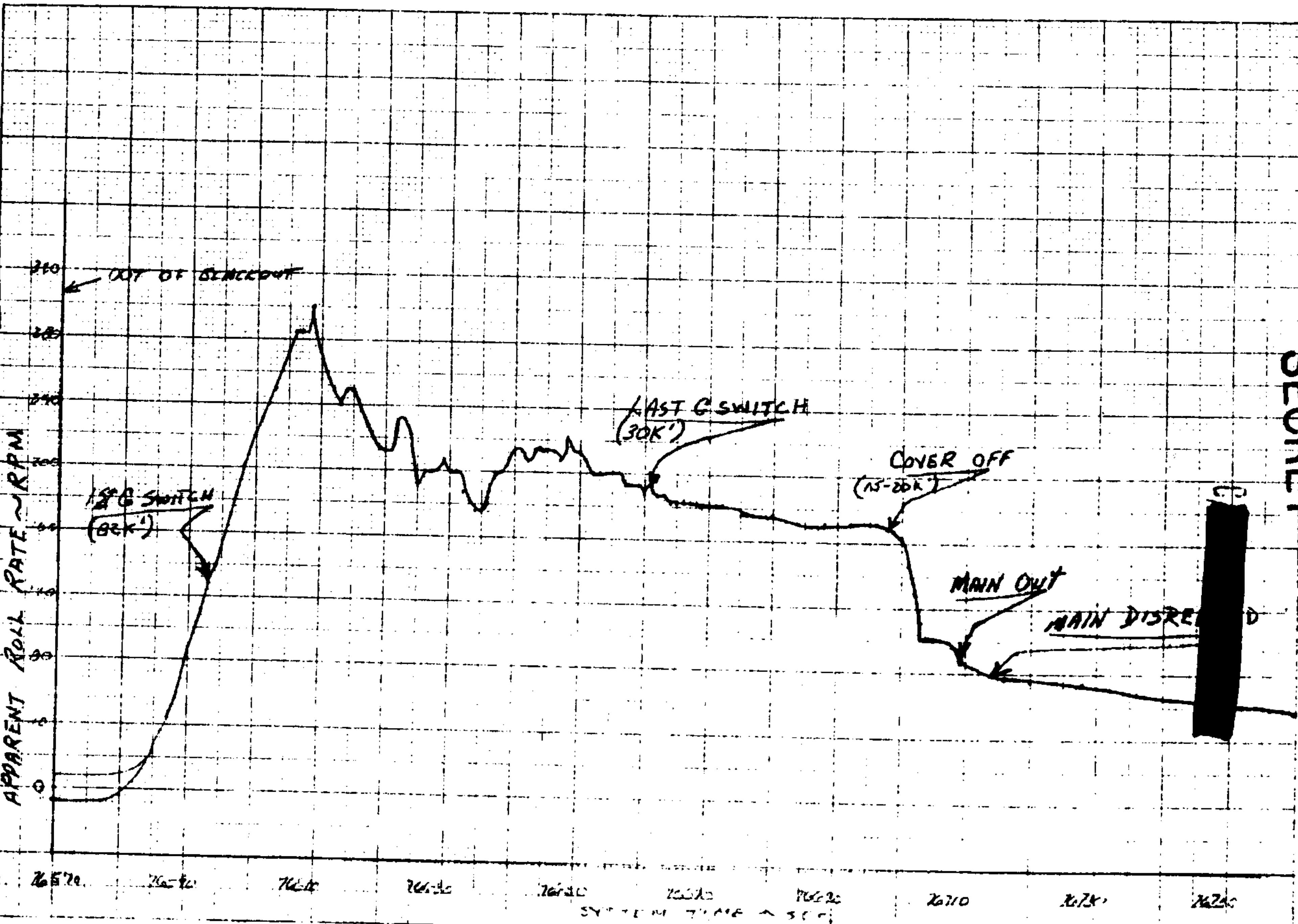


Figure 2-2 SRV 726 Derived Roll Rate History

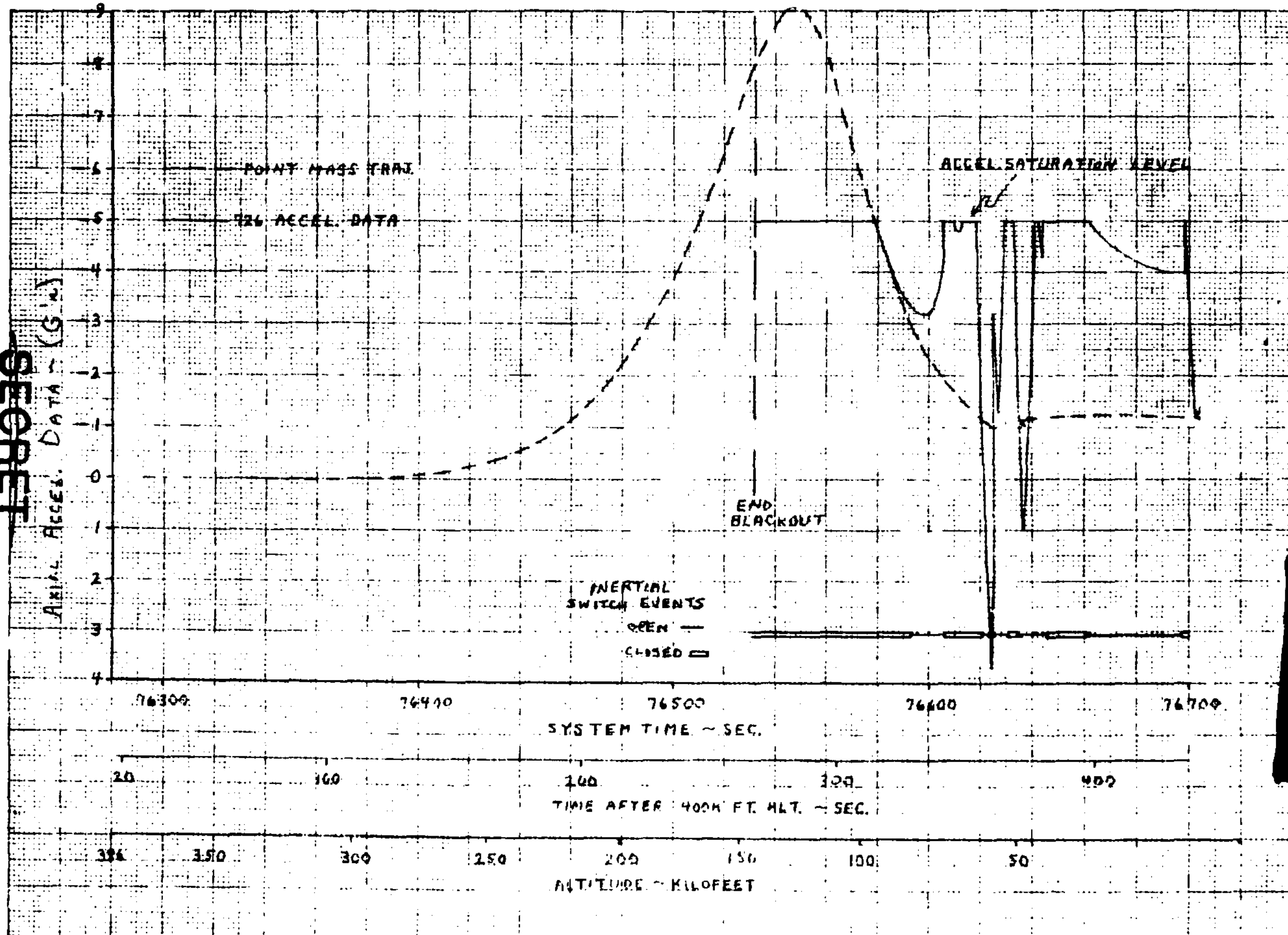


Figure 2-3 SRV Axial Acceleration Data and Inertial Switch Events

[redacted]

2.5.3 Inertial Switch (3G's)

Anomalous indications were also present on the inertial switch telemetry monitor (see figure A-2). The switch contact openings and closures are shown with the axial acceleration data in figure 2-3. As shown, the switch opening and closure times correspond fairly well, in time, to excursions of the axial accelerometer data above and below the 3G level. Therefore, the switch is responding to the anomalous axial accelerations. (Note: Only one of four inertial switches is monitored.)

[redacted]

Table 2-2 SRV 726 Sequence of Events

Event	Planned Occurrence Δt (sec)	Planned Occurrence Tolerance (sec)	Predicted Time (sec)	Measured Occurrence Δt (sec)	Measured Occurrence Event Time (sec)	Remarks
Arm	0	----	76042.35	0	75968.06	
Transfer	75	---	76042.35	74.89	76042.95	
Electrical Disconnect	0.9	+0.43 -0.40	-----	0.85	76043.80	
Separation(SRV)	1.10	±0.50	-----	1.16	76044.96	
Spin	2.30	±0.30	----	2.22	76047.18	Roll rate = 60.6 rpm
Retro	7.55	±0.45	76054.20	7.26	76054.44	
Despin	10.75	±0.54		10.39	76065.03	Roll rate = 10 rpm
Electrical Separation(T/C)	1.50	±0.15	76066.45	1.51	76066.54	Mechanical separation: 760[redacted]4
G Switch Closed**	---	----	----	---	------	Planned A_x = 3 G's Rising
G Switch Open*	535.95	----	76602.40	526.52	76661.76	A_x = 3.2 G;s falling
Chute Thermal Cover	34.0	±1.5	76636.40	36.26	76698.02	Relays K9 and K10 actuated indicating piston fire at 76697.99 sec.
Drogue Out	0.63	±0.08	----	0.43	76698.45	Time out of tolerance

*Last G switch opening and closing event times. Anomalous switch openings and closures followed. See paragraph 2.3.2.

**Occurred during blackout. Therefore, event time not available.

[redacted]

[redacted]

Table 2-2 SRV 726 Sequence of Events (continued)

Event	Planned Occurrence Δ t (sec)	Planned Occurrence Tolerance (sec)	Predicted Time (sec)	Measured Occurrence Δ t (sec)	Measured Occurrence Event Time (sec)	Remarks
Main Chute Out	10.25	+3.00 -2.20	-----	10.39	76708.84	
Main Chute Reefed	0.52	±0.13	---	0.49	76709.33	
Main Chute Dereefed	4.50	±0.80	76652.30	4.61	76713.94	

3.0 Anomaly Investigation

3.1 Mission Profile

The following orbital parameters for the SRV 726 flight were supplied by an associate contractor. These conditions apply for deorbit.

Height or perigee (h_p)	102 nautical miles
Height of apogee (h_a)	196 nautical miles
Inclination angle (i)	80^o
Latitude of Perigee (θ_p)	65.8^o north latitude
SRV 726 Weight	374.5 lbs.

The boost phase of flight was normal with no unusual shocks or vibration transients reported.

The temperature history given in table 3-1 was obtained from an associate contractor (Reference 2). These temperatures are within the expected values.

Table 3-1 SRV 726 Orbital Temperature History

Revolution No.	Bat. Temp. (°F)	T/C temp. °F near retro	T/C temp. skin (°F)
95	65	76	34
105	74	70	62
111	79	68	60
120	80	66	60
127	81	66	60
136	75	67	61
143	77	64	58
152	75	65	61
159	73	64	58
168	80	64	60
175	76	61	58
184	82	62	60
191	76	61	58
200	81	64	60
207	73	60	59
215	80	59	60
223	80	62	60
232	79	64	64

3.2 Deorbit/Re-entry Parameters [redacted]

The following deorbit/re-entry parameters, as obtained from an associate contractor, were normal.

Latitude at retrofire	55° N. Latitude
Velocity (relative)	25,250 ft./sec.
Path Angle (relative	2°
Impact	22° N. Latitude
	149° W. Longitude

A profile of deboost/recovery events during re-entry is given in figure 3-1. During the deboost phase, telemetry coverage was available from [redacted] only. [redacted] acquired at 79568 seconds and faded at 76211 seconds.

3.3 Recovery

Late deployment of the recovery chute precluded successful air snatch of the vehicle. Therefore, a water recovery was made at a location 23 nautical miles uprange and 5 nautical miles west of the predicted impact location. These locations, as well as the reported locations of the telemetry ship and aircraft, are shown in figure 3-2.

After blackout, telemetry coverage was available from the ship and aircraft from the end of blackout at 76533 seconds until 77376 sec. The telemetry ship data was much cleaner than the aircraft data. Therefore, the ship data was utilized as the basis for the analysis presented in paragraph 4.

[redacted]

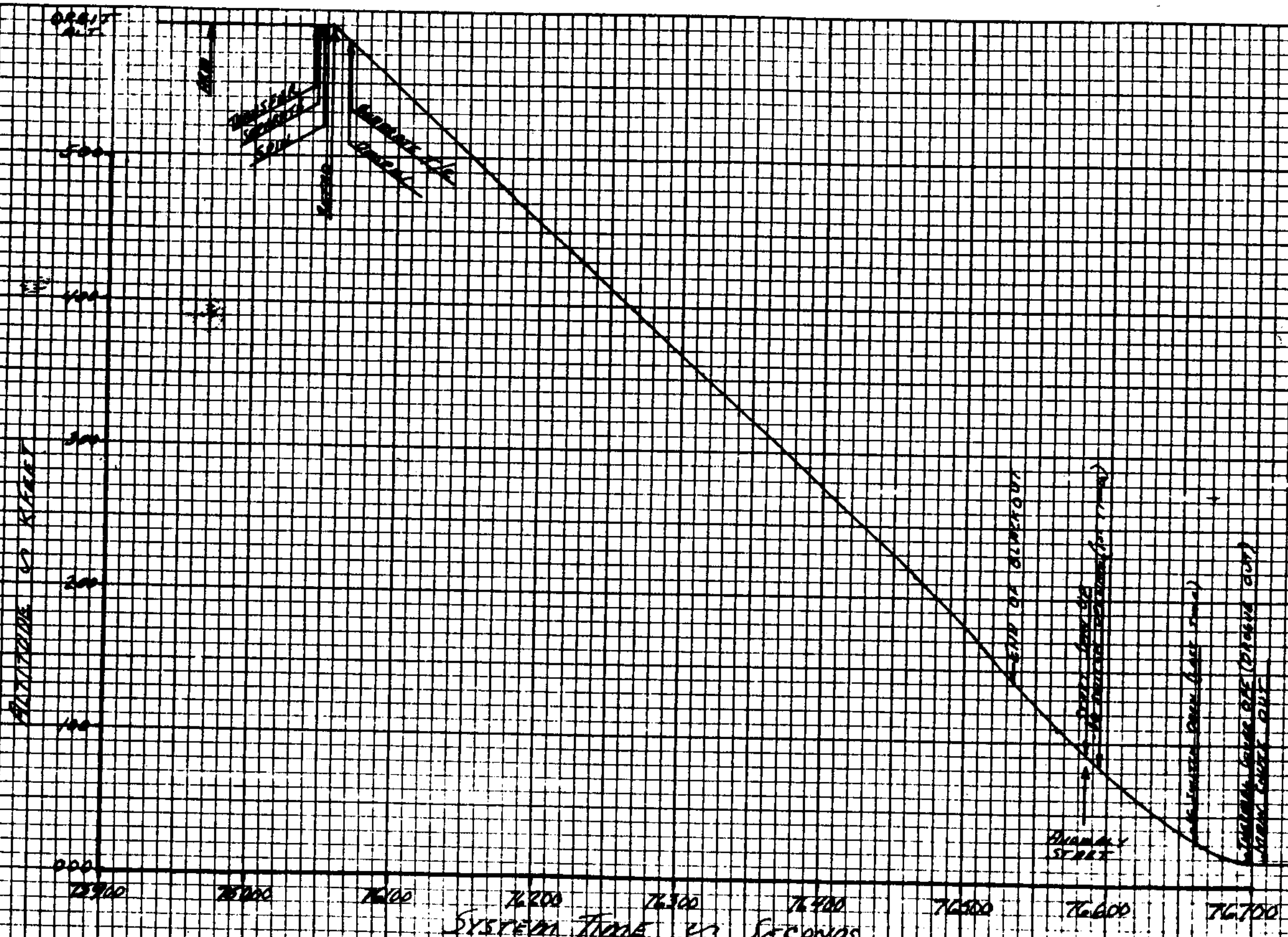
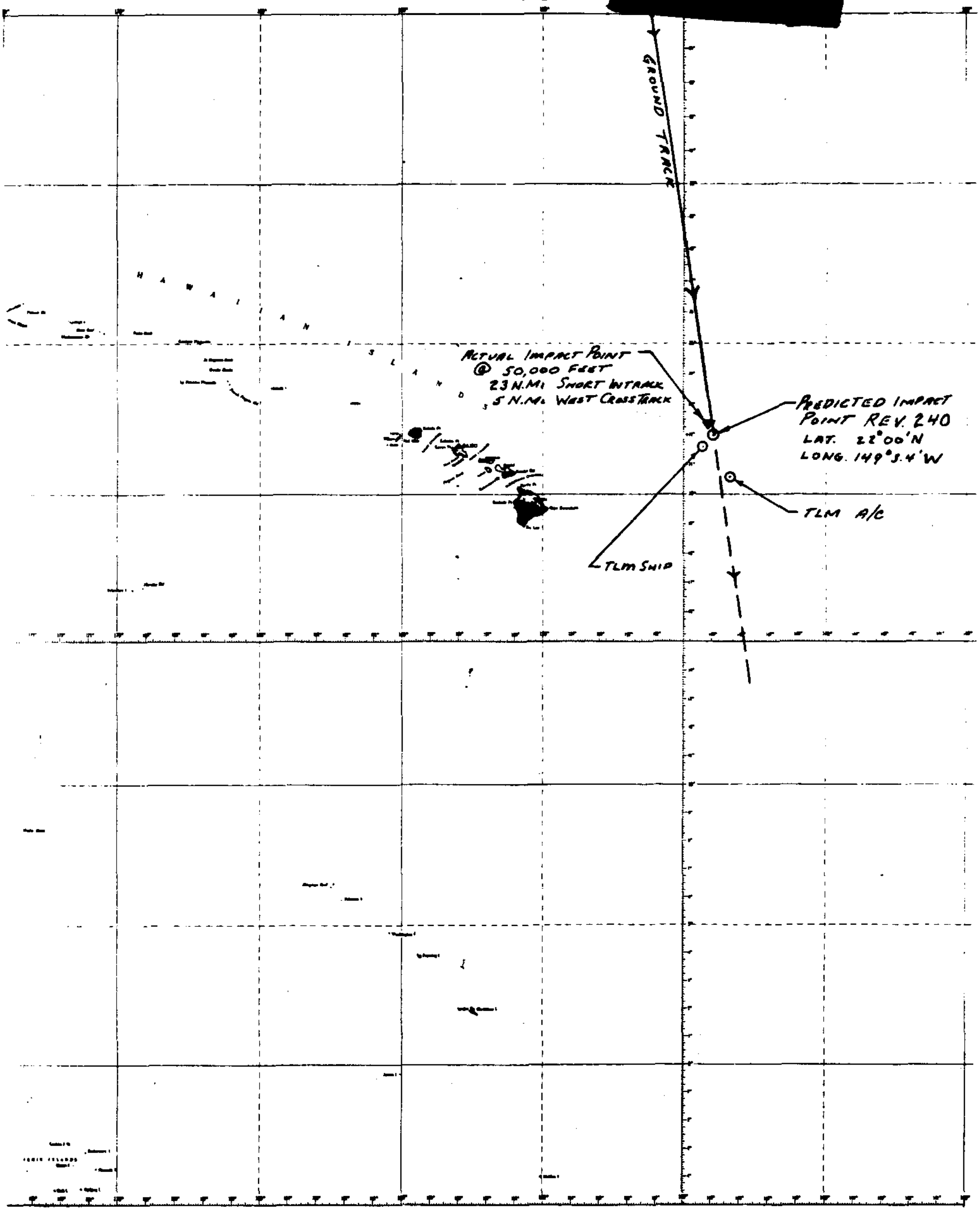


FIGURE 3-1 DEBOOST/RECOVERY PROFILE



LONGITUDE - DEGREES WEST

FIGURE 3-2 RECOVERY MAP VEHICLE 726

Table 3-2 Previous TA Vehicle Roll Rate Histories

Shield S/N	SRV S/N	Recovery Date	After Spin-up	After Despin	After Blackout	Peak	Drogue Out
225			N/A	N/A	62.8	92	60
229			N/A	N/A	32.2	43	41.4
230			N/A	N/A	49.0	54.6	53.6
243			N/A	N/A	*	4-5 RPM	(only 1 cyc. visible)
259			23	14	-	-	25-27
279			37	34	No sig. strength avail.		
271			60	48	46.2	46.2	46.6
256			N/A	N/A	*10	(very noisy)	
277			N/A	N/A	*12	(very noisy)	
281			57	8	-	-	23*
306			60.6	10.2	8-9	300	171

* These rates are difficult to determine and should be considered as approximate values only.

** These R/V's records were from [redacted] and all four have a 10 cps modulation on the signal strength trace. This is believed to be put on the tape by the receiving station antenna which has a 10 cps sweep rate.

3.4 Other Flights [redacted]

Analog records of re-entry roll rate data on past TA flights sent to GE-RSD for further analysis of roll rate data after spinup, exhibited apparent roll rates which were higher than the planned roll rate value after despin. However, in these cases, the magnitudes of the peak roll rate values were not as high as the roll rate of SRV 726.

A limited investigation was performed to determine the cause of the high roll rates. From this investigation it was concluded that the mass asymmetries of these vehicles were not sufficient to cause the high roll rates (Refer to paragraph 4.2.1). The roll rates during re-entry for each of these vehicles are given in table 3-2.

[redacted]

4.0 Analysis

4.1 Hardware Review

To achieve a high degree of confidence in the vehicle flight performance, the recovered capsule was subjected to a thorough inspection procedure. This procedure included a visual inspection to assess any apparent structural damage, an inspection of the internal temperature indicating tapes to ascertain the maximum internal temperature experienced by the capsule, and electrical system and selected component tests. The results of these investigations are presented in the following paragraphs.

4.1.1 Shield History (Reference 1)

Shield S/N 306 was manufactured on 13 September 1966 and subsequently designated for use on vehicle no. 726. Based on manufacturing records of phenolic this shield and other shields fabricated from the same lots of phenolic nylon and glass, no significant processing incidents occurred which would have degraded shield integrity.

During assembly a discrepancy was noted with two 0.358" holes which were mislocated through the aft edge of the forebody and interface bushing bosses. The bossess were removed and new ones were installed. The mislocated holes in the shield were filled with compound M&P 100; and after proper curing, new holes were drilled. The radial and circumferential position of the pin puller lugs and all components installed in the aft phenolic glass ring were checked.

This dimensional discrepancy was not of a critical nature. Thus, the manufacturing and process and assembly inspection records indicate that shield no. 306 was a prime shield and no incident occurred which would degrade shield integrity.

At the date of recovery from orbit (7/1/67), the shield age was slightly less than 10 months. This age is well within the maximum allowable age of seventeen months.

4.1.2 Post Flight Visual Inspection

During the visual inspection of the recovered capsule, specific attention was given to the internal temperature indicators, the capsule attachment ring shape and flatness, and the condition of the capsule outer skin.

Five temp sticks were located on the interior capsule wall. Each indicator covered the temperature range of 50 to 250°F in 50° F. steps. Four indicators were located at station 19.7, at radial locations of 0, 90, 180 and 270 degrees. The last indicator was located on the inside of the nose tip.

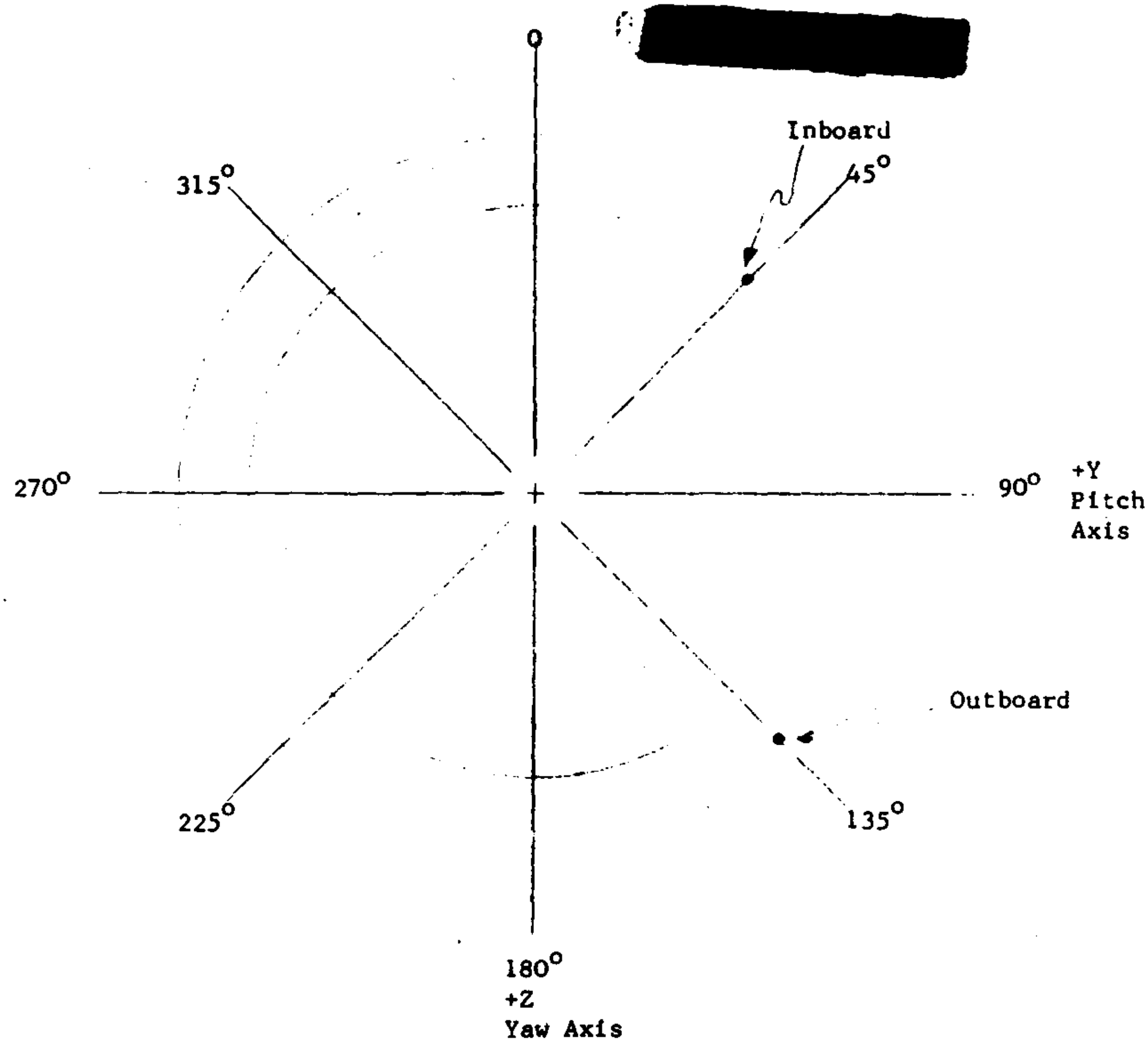
All temp sticks at station 19.7 indicated that the inner capsule wall temperature was greater than 100°F. but less than 150°F. The nose tip temp stick did not indicate any temperature rise at all, which means that the temperature at this location was less than 50°F.

The range of capsule temperatures experienced by vehicle 726 is consistent with temperature ranges which were experienced by previous recovered vehicles.

Measurements were taken on the aft mounting ring to determine the ring flatness. An outboard reference point (see table 4-1) was established at the 180° radial location, and measurements with respect to this point were made at inboard and outboard points, spaced 45°, around the ring. The inboard and outboard points were approximately one-half inch from the inner and outer edges, respectively. The measurements are listed in table 4-1. The deviations

Table 4-1 Mounting Ring Plane Measurements

[redacted]



Radial Location	Inboard (inches)	Outboard (inches)
180°	+.003	0.000
225°	-0.004	-0.006
270°	+0.008	+0.016
315°	+0.010	+0.014
0°	+0.016	+0.023
45°	+0.003	+0.002
90°	+0.013	+0.020
135°	+0.003	+0.002

 [redacted]

C [redacted]

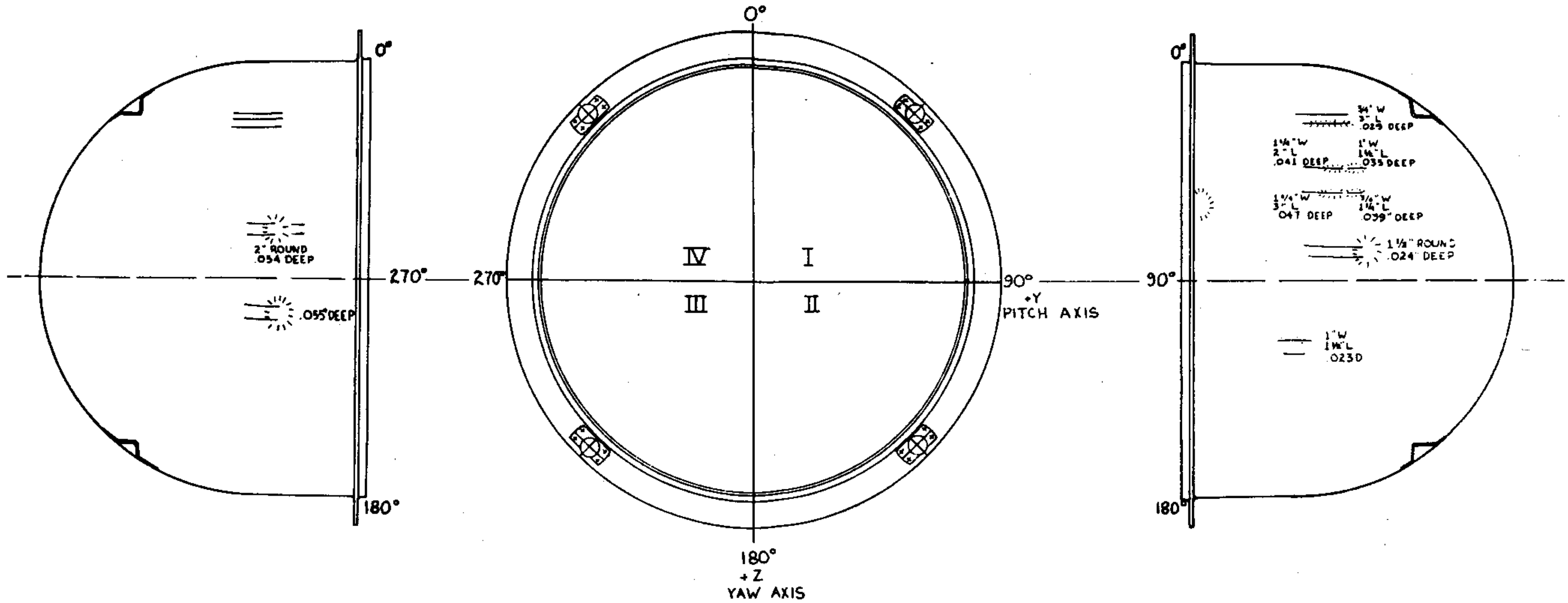
listed are expected as a result of stress from the chute deployment shock. However, the values do not reflect any effects of overheating.

Post flight inspection of the recovered capsule exterior showed numerous dents and abrasions of the skin. The location of these dents and abrasions is shown in figure 4-1.

On the basis of accelerometer data (see Appendix figure A-2), it was concluded that the capsule damage was caused by the capsule "hanging up" on the shield at the time of chute deployment.

Approximately 0.1 seconds after the firing of the chute thermal cover pistons, the accelerometer data shows an abnormal peak. For the next 32 seconds, spurious noise pulses are present in the accelerometer data. Post-flight accelerometer test data (see paragraph 4.1.4.2) did not show any noise indications, such as those shown in figure A-2, when subjected to acceleration along its sensitive axis. However, when the accelerometer was subjected to lateral shocks, at about 45 degrees from its sensitive axis, similar noise pulses appeared in the test data. Therefore, on the basis of the accelerometer test data, and the capsule damage, it was concluded that upon deceleration of the capsule by ejection of the thermal cover (at this time the deceleration normally separates the capsule from the shield), the capsule bound in the shield and relative motion between the capsule and the shield damaged the walls of the capsule. The spurious noise pulses which appear in the accelerometer data for approximately 32 seconds after chute thermal cover ejection are indicative of lateral shocks which were a result of capsule and shield relative motion. Further, if the capsule temporarily bound in the shield it is apparent

[redacted]



Figu [redacted]

that the vehicle centerline was angularly displaced significantly from the velocity vector. No estimates are available on what the magnitude of this displacement would have to be in order to cause this binding condition.

4.1.3 Post-Flight System Test

To achieve a high degree of confidence in the capsule electrical systems flight performance, the recovered capsule was subjected to the pre-flight systems test.

In the test procedure (reference 2), external power supplies were used to simulate the vehicle batteries, the spacecraft generated discretes and the arm and transfer signals.

Initially, the telemetry system and the recovery beacons were energized. After proper operation of these components was noted, the telemetry subsystem was reset and the command reset was applied to the recovery programmer. The programmer circuits reset properly and the test sequence was initiated. The programmer events, during flight and during the systems test are compared in table 4-2. The system test events were monitored from existing telemetry monitoring points.

All events occurred within the specified tolerances. It may be noted that during flight (see Appendix figure A-1 and table 4-2) the drogue ejection time did not occur within the 34 ± 1.5 second tolerance after the final G switch opening. The cause of this is attributed to the anomalous motions experienced during re-entry and the effect of axial components of this motion on the inertial switches, which are offset from the vehicle centerline (see paragraph 4.2.1).

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Table 4-2 Comparison of Post-Flight .est Data and Flight Data

Post Flight Test Events	Event Designation	Event Tolerance (sec)	Flight Data Δt (sec)	Post Flight Test Data Δt (sec)	Remarks
Simulated arm signal	-----	-------	-------	-----	Recovery batteries activated. Recovery beacons no.1&2 energize by battery voltages.
Simulated Transfer signal	T_o	------	------	-----	Ignite no.1 & 2 thermal battery matches. Initiate SRV-adapter IFD and separation
Simulated SRV-adapter IFD (T/C programmer gate removed from ground)	T_1	------	------	-----	Initiate T/C programmer sequence
T/C Programmer Sequence:					
Spin	T_2	T_1+3.4 ±0.3	3.38	3.29	Ignite spin rockets. Initiate [redacted] spin timer.
Retro	T_3	T_2+7.55 ±0.45	7.26	7.39	Ignite despin rockets. Init[redacted] retro timer.
Despin	T_4	T_3+10.75±0.54	10.39	10.6	Ignite retro rocket. Initia[redacted] separation timer.
T/C Disconnect	----	T_4+1.5 ±0.15	1.51	1.48	Ignite T/C disconnect and separation squibs.
[redacted]imulated G switch [redacted]losure	----	-----	----	----	Set relays K1,K2,K3, K4. [redacted] hibit recovery programmer [redacted]ec timers.
[redacted]imulated G switch [redacted]pening	T_5	------	----	----	Enable 34 sec. timers.

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Table 4-2 Comparison of Post flight Test Data and Flight Data (continued)

Post Flight Events	Event Designation	Event Tolerance (sec)	Flight Data Δt (sec)	Post Flight Test Data Δt (sec)	Remarks
Recovery programmer 34 sec. timer timeout	----	34 ± 1.5	36.26*	K7,K8: 33.93 K9,K10: 33.56	Fire thermal oover ejection pistons. Set relays K7,K8, K K10. De-energize backup tir Reset relays K1,K2, K3, K4, K7, K9, and K11.

[redacted]

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*Out of specification

[redacted]

4.1.4 Component Tests

4.1.4.1 Inertial Switches

The four inertial switches (Serial Numbers 680, 686, 690, and 694) were removed from the recovered vehicle and tested on an accelerator table (reference 4). Each inertial switch, in turn, was fastened on the table at 5.4 inches from the center, so that a radial acceleration of 3G's was present when the table was rotated at approximately 140 rpm. To simulate 3G's rising and falling, the rotation rate of the table was varied between 135.3 and 144.9 rpm to obtain radial acceleration levels between 2.8 and 3.2 G's, respectively. For each switch, the rotation rate of the table was changed at three different rates so as to subject each inertial switch to acceleration rates of 0.1G/second, and 0.25G/second. As the radial acceleration was varied above and below the 3G level, the table rotation rate at which the switch contacts opened and closed were recorded. Corresponding levels of radial acceleration were calculated for each of these table rotation rates. These data are presented in table 4-3.

The calculated G levels at which the switch contacts operated were all within the specified tolerance of 3 $\pm$ 0.15 G's. Therefore, it was concluded that the inertial switches performed satisfactorily during flight.

4.1.4.2 Axial Accelerometer

The axial accelerometer was removed from the recovered capsule and tested on the accelerator table (reference 3). The speed of the table was varied to obtain various levels of acceleration. In order to obtain calibration data for each half of the accelerometer range, the accelerometer position was changed 180 degrees. For the various acceleration levels, the $\frac{\text{output voltage}}{\text{supply voltage}}$ ($\frac{V_o}{V_s}$) were recorded. Acceleration was then plotted as a function of $\frac{V_o}{V_s}$. The resulting curve, as shown in figure 4-2, indicated that the accelerometer

SECRET [redacted]

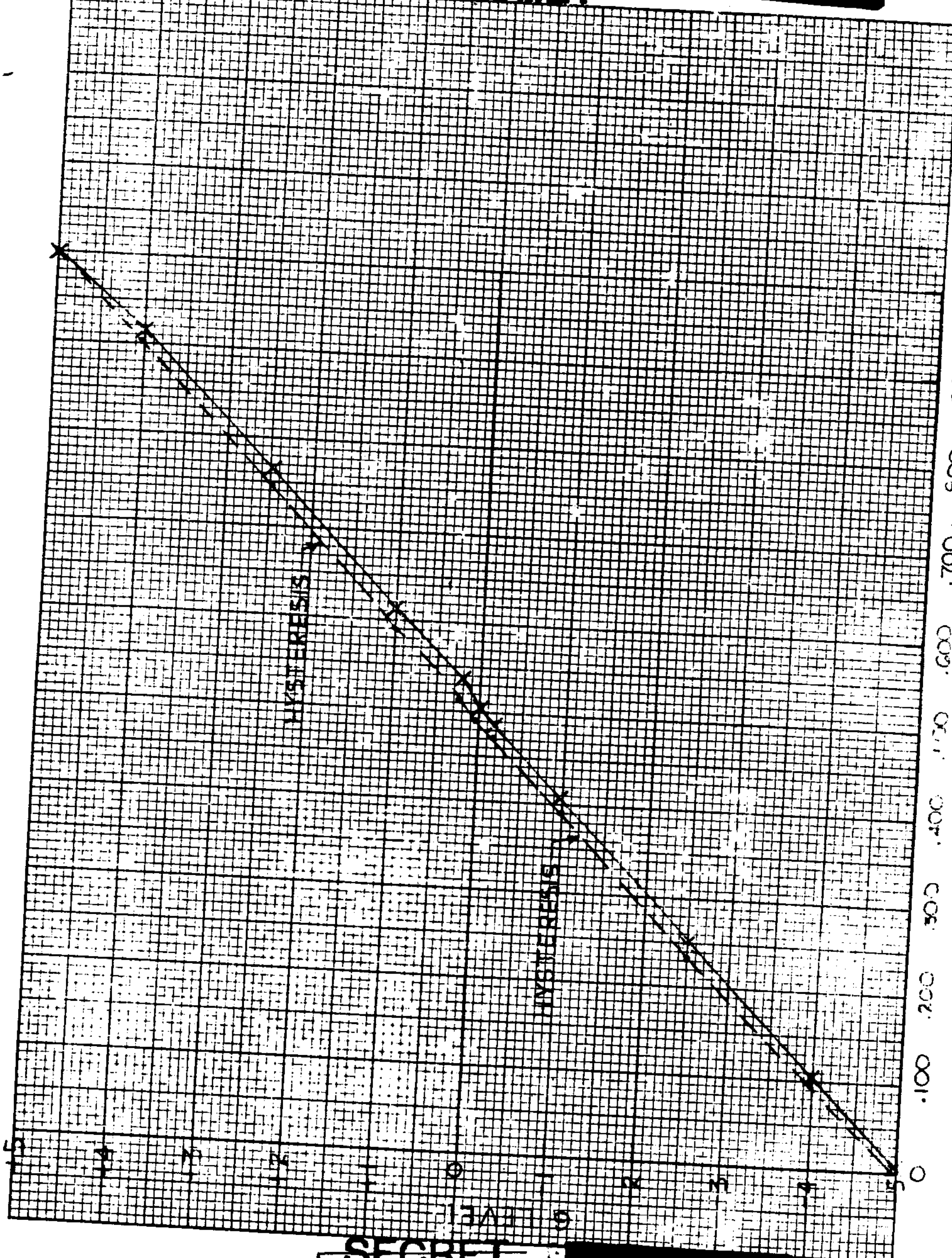

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Table 4-3 Inertial Switch Test Data

Acceleration Rate (G's/second)	Switch Contact Events	Table Speed (rpm)	Calculated Radial Acceleration(G's)
	Switch S/N 680		
+0.1	Open	143	3.128
-0.1	Close	140	2.998
+0.143	Open	141.6	3.067
-0.143	Close	140.1	3.003
+0.25	Open	143	3.128
-0.25	Close	140	2.998
	Switch S/N 686		
+0.1	Open	142	3.084
-0.1	Close	140	2.998
+0.143	Open	141.8	3.076
-0.143	Close	140.1	3.003
+0.25	Open	142	3.084
-0.25	Close	140	2.998
	Switch S/N 690		
+0.1	Open	142	3.084
-0.1	Close	139	2.995
_0.143	Open	140.6	3.024
-0.143	Close	139.6	2.981
_0.25	Open	142	3.084
-0.25	Close	139	2.955
	Switch S/N 694		
+0.1	Open	143	3.128
-0.1	Close	140	2.998
+0.43	Open	141.6	3.067
-0.43	Close	140.7	3.028
+0.25	Open	143	3.128
-0.25	Close	140	2.998

response was near linear over the entire range. The maximum hysteresis was approximately 0.2G. During this test, no noise was present on the accelerometer output.

The second portion of the test consisted of subjecting the accelerometer to shocks from a direction of approximately 45° from its sensitive axis to simulate relative motion between the capsule and the shield. The shocks consisted of tapping the accelerometer with a hard object. The test data indicated noise pulses which were very similar to the noise pulses on the accelerometer flight data. It is believed that the noise pulses present in the flight data are the result of lateral shocks for the following reasons:

a) The noise pulses are unidirectional towards -5G's. This level is also representative of zero volts input, or an open circuit condition which could be caused by lifting the accelerometer wiperarm from the resistive element as a result of lateral shock. If the pulses were the result of an axial component of the shocks, the direction would be randomly above and below the ambient acceleration level.

b) An intermittent connection between the accelerometer and the subcarrier oscillator was considered as the noise source. However, during post flight systems test, the telemetry system did not exhibit any type of noise condition. If the telemetry system was the source, this would have been readily apparent during systems test.

4.1.4.3 Parachute Swivel

The parachute swivel assembly was tested (reference 4) to ensure its integrity under the high roll rate conditions imposed at the time of chute deployment (86 rpm).

The swivel was placed in a bench test fixture and 200 lbs of weight was suspended from the free end. The test fixture rotated the swivel at 100 rpm for a 10 minute period. During this period, the swivel showed no sign of binding. This test served to ascertain the performance of the swivel.

The major correlatable parameter is the flight time from end of retro burn to 3G descending. This time interval agreed to within 3 seconds indicating that the computed trajectory is a good simulation of the actual one. Figures 4-3 and 4-4 present the trajectory parameters vs. altitude. The significant features to be noted are that data was recorded during peak loading and the anomaly did not occur until well after the time of peak loads and pressures. Figure 4-5 shows a typical angle of attack convergence history. Again although there is no way to determine the actual angle of attack, the vehicle has good mass properties so there is no reason to think that the angle of attack would have varied from the typical by a significant amount.

At approximately 89,000 feet a very abrupt change occurs in the flight. The vehicle begins a very rapid spin-up which appears to be accompanied by large lateral rates. The spin rate history as derived from signal strength, is shown in Figure 4-6. The spin rate quickly reaches a peak value of 300 rpm then abruptly stops spinning-up. Beyond this the spin begins to decrease and vary erratically, the dotted curve in this region indicates that the rates are approximate because of the vehicle motions which result in a signal strength record from which it is difficult to derive the spin rate.

Using the dynamic pressure history arrived at in the simulated trajectory and the relationship

$$I_x \dot{p} = C_l \; q_\infty S d$$

or

$$C_l = \frac{I_x \dot{p}}{q_\infty S d}$$

where

I_x = roll moment of inertia

$\dot{p}$ = roll acceleration

q_∞ = free stream dynamic [redacted]

[redacted]

4.2 Re-entry Dynamics

4.2.1 Flight Dynamics

It is believed that vehicle 726 experienced a violent motion history near the time of planned chute deployment as a result of a large "effective fin", on the heat shield. As a result of these motions, the axial acceleration components sensed by the recovery programmer G switches caused repeated recycling of the programmer 34 seconds timers. Consequently, chute deployment was delayed for approximately 35,000 feet below the planned chute deployment altitude.

Flight data, from SRV separation to [redacted] (rev. 240) loss of signal, indicates normal performance from SRV separation through spinup to approximately 60 rpm, retrofire, and despin ato about -10rpm. The vehicle roll rate after blackout is constant and near the despin rate (approximately -8rpm), indicating that the vehicle trajectory and motion were normal. (Combinations of mass asymmetries can account for roll rate variations of approximately ±5 rpm even without the development of aerodynamic asymmetries. Aerodynamic asymmetries can account for roll rate variations up to ±20 rpm by the time of G switch opening.) Also the measured axial acceleration history follows the predicted values, down to an approximate altitude of 89,000 feet. Therefore, although data is not available from [redacted] loss of signal to 140,000 feet during re-entry, the re-entry is considered normal until 89,000 feet altitude.

Tracking data is not taken on these flights so a composite trajectory was put together coupling a Keplerian orbit section from de-boost to re-entry (400,000 feet) then a point mass simulation to the ground. The re-entry conditions thus arrived at are:

h = 400,000 feet

V = 25252 fps

γ = 2.005 deg. (relative geodetic)

[redacted]

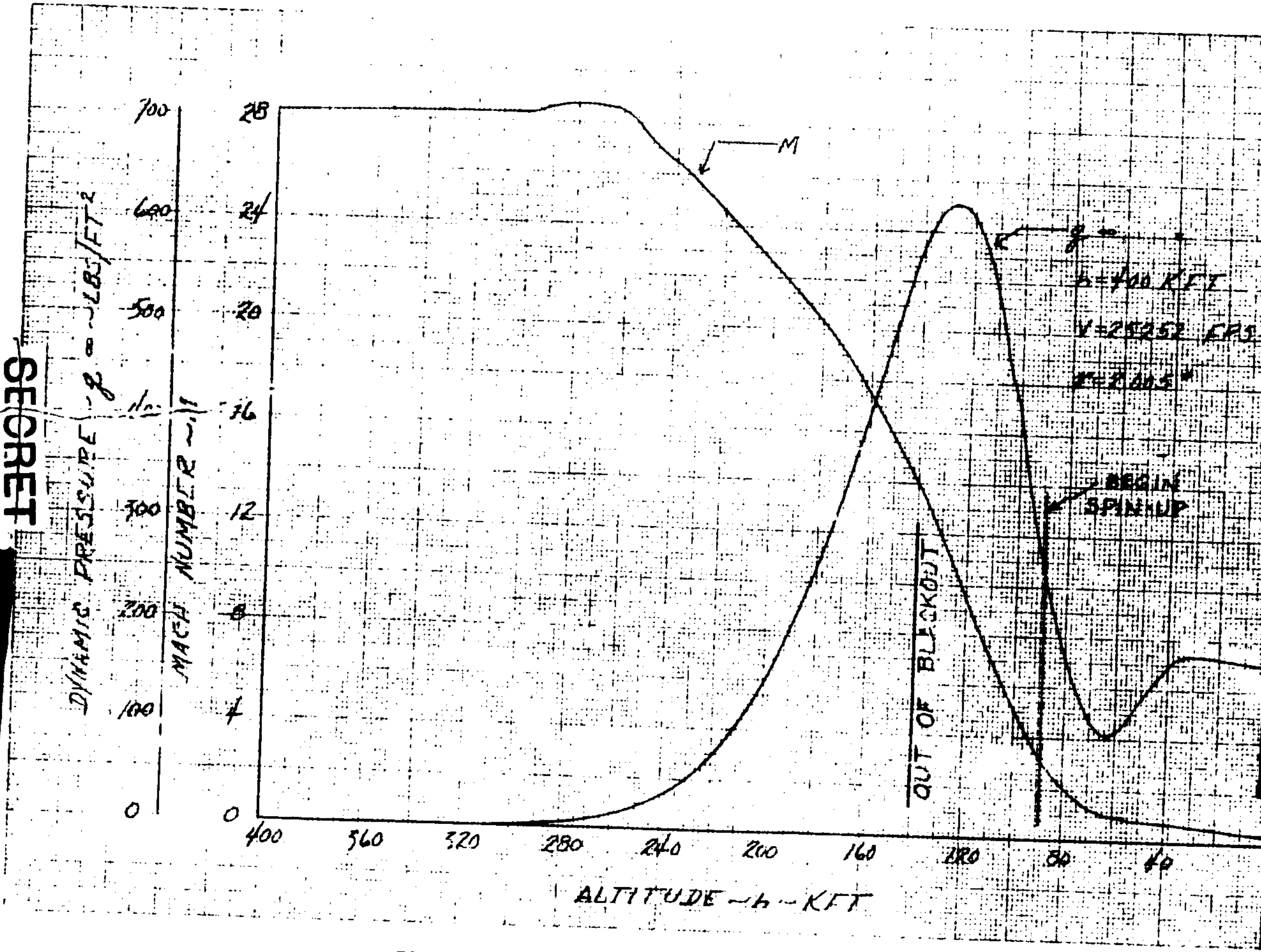

Figure 4-3 Point Mass Trajectory Parameter

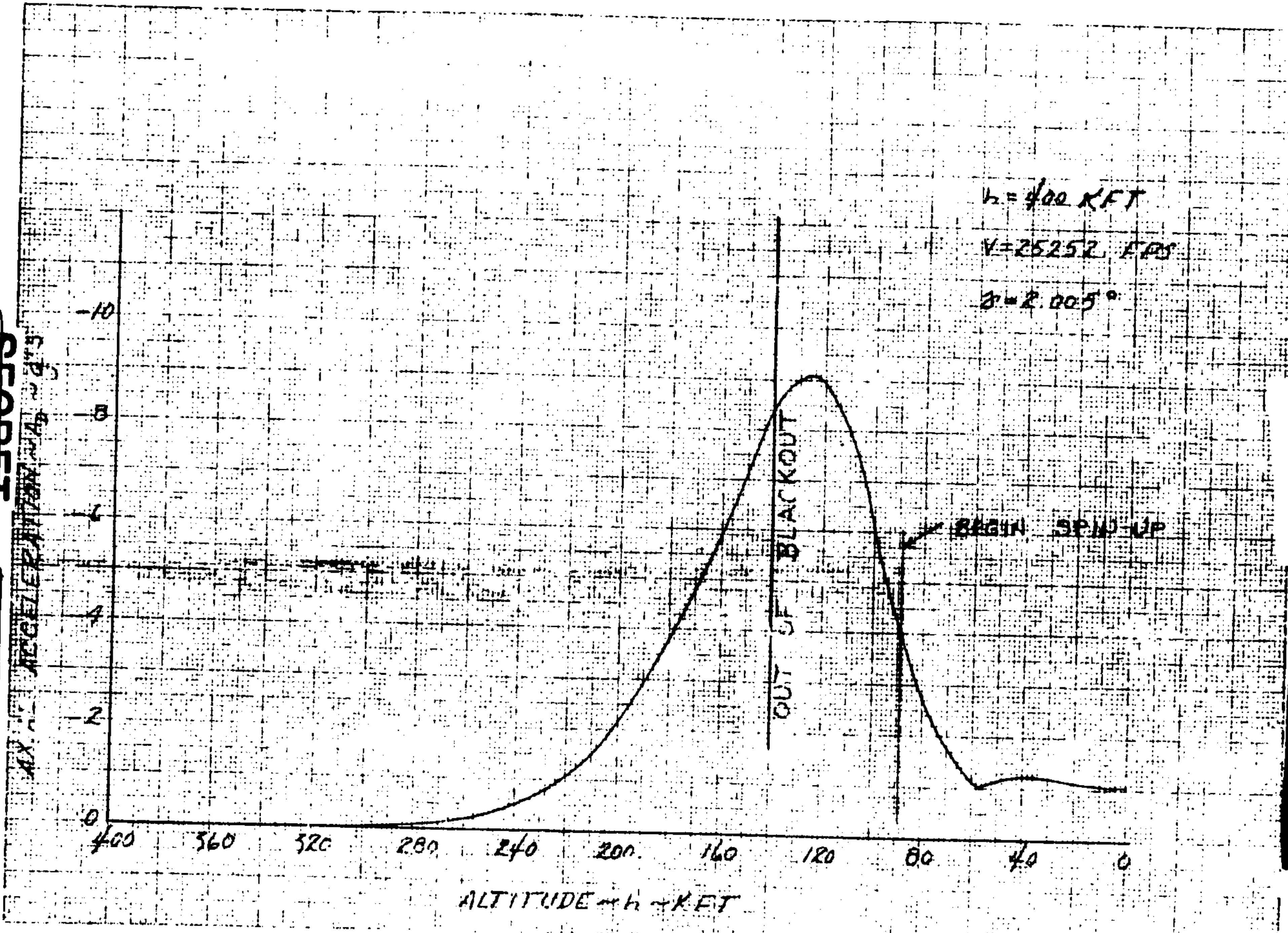

Figure 4-4 Point Mass Trajectory Axial Accel. History

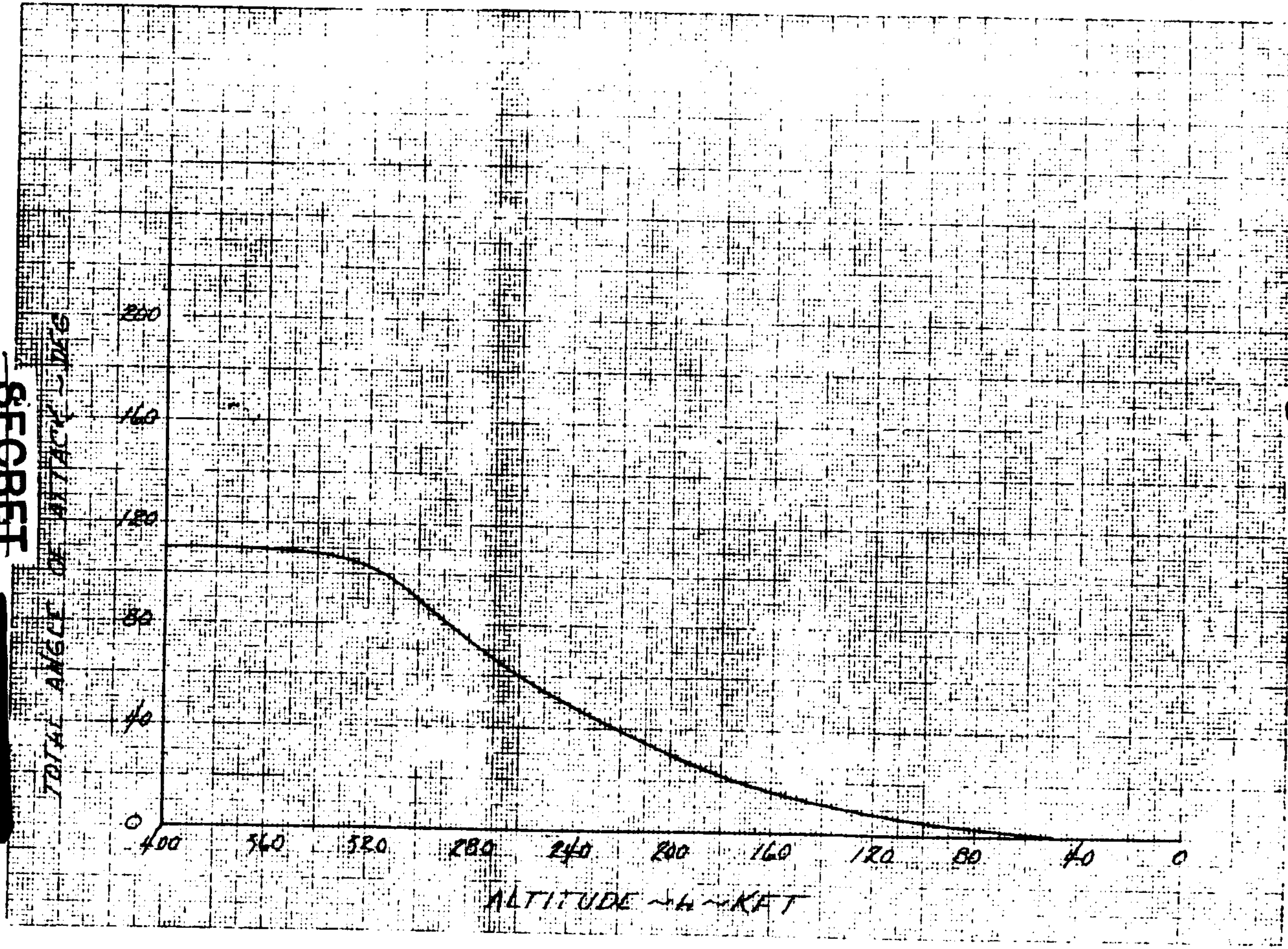

Figure 4-5 Typical Mean Angle of Attack Convergence

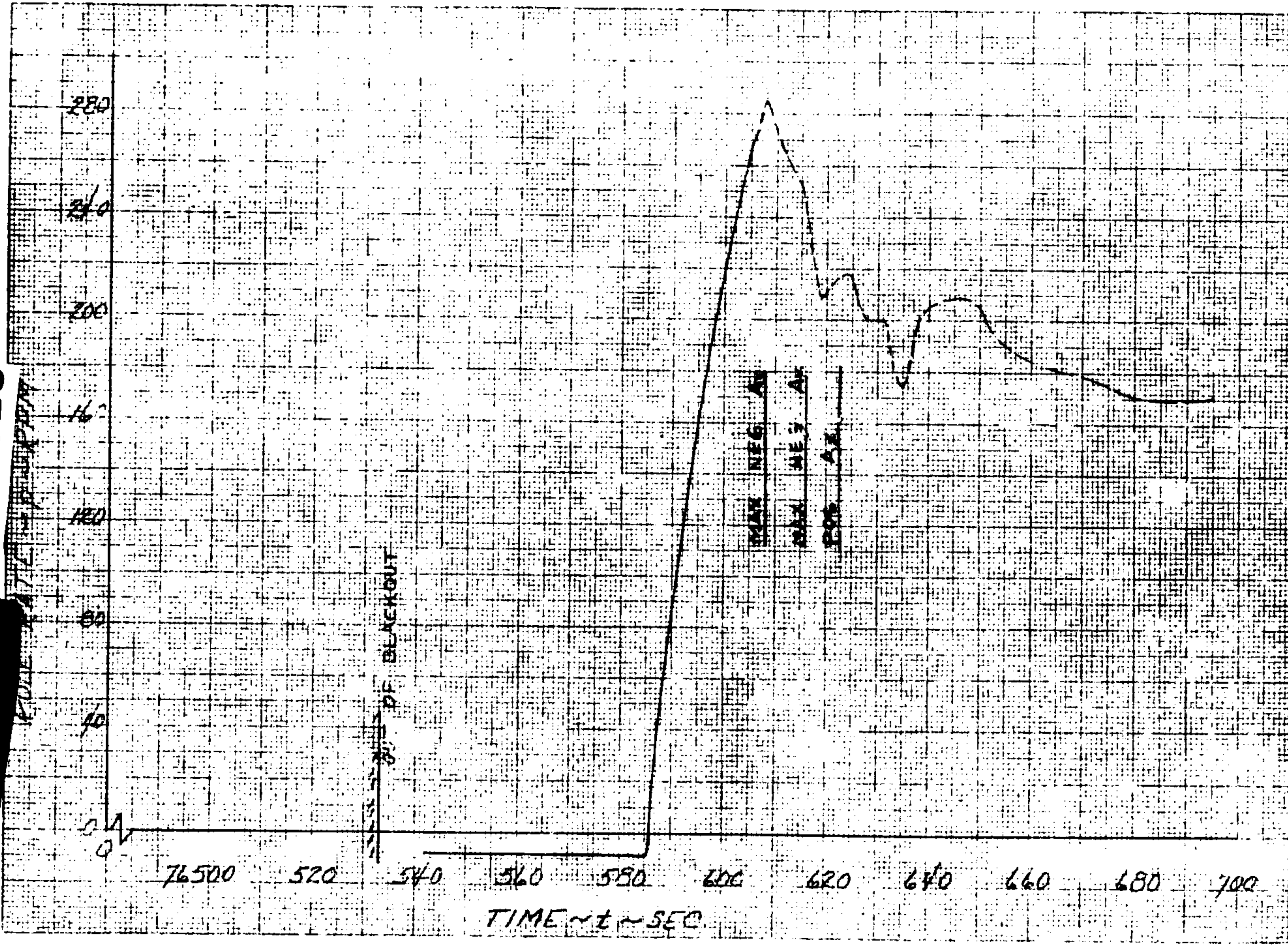

Figure 4-6 Roll Rate History

[redacted]

S = vehicle reference area(5.95 sq.ft.=base area)

d = vehicle reference length(2.75ft=base diameter)

the aerodynamic roll coefficient, C_l, required to spin the vehicle up was derived. This coefficient was found to be almost constant during the spin-up with a value of about 0.0025. (By comparison the worst of the ballistic vehicle shields has produced a roll coefficient of about 0.0005, and they are generally less than 0.0001.)

The sudden peak/reversal in the roll acceleration is probably a result of the "effective fin" breaking loose or changing configuration rather than the vehicle reaching its equilibrium roll rate. If the vehicle were approaching its equilibrium roll rate (where the angle of attack induced by rolling equals the fin effective angle of incidence, $\tan i_f = \frac{pd}{2V}$) there would be a gradual decrease in roll acceleration as the roll rate asymmetrically approached the equilibrium. Furthermore, the centrifugal force ($\frac{\omega^2 r}{g}$) is about 35G's at the outer edge of the shield.

Further insight into the motion has been extracted from the differences in accelerations measured at two points on the body not at the c.g. While the vehicle is stablized in the general direction of the flight path ($\alpha < 30$ degrees) the axial deceleration is about that predicted using the point mass simulation, accelerometer variations from the aerodynamic drag deceleration are due to body rates and angular accelerations. The expression for differential accelerations is:

$$\Delta A_x = \frac{1}{g} \left[Z\dot{q} - y\dot{r} + yqp - X(q^2 + r^2) + Z \; rp \right]$$

where

g = acceleration of gravity (32.2 ft/sec^2)

x = distance of accelerometer ahead of c.g.

y,z= lateral coordinates of accelerometer

p = roll rate (about x)

[redacted]

~~SECRET~~

q = pitch rate (about y)

r = yaw rate (about z)

$\dot{q}$ = pitch acceleration

$\dot{r}$ = yaw acceleration

Analysis of the contributors in the equation yields the following (for the particular case at hand only):

1. the values of $\dot{q}$ and $\dot{r}$ are approximately less than 5
2. the values of qp and rp are about 200
3. the values of $q^2 + r^2$ are about 100

The terms involving q and r can be dropped without compromising the results since the values of x,y and z are all about equal.

The accelerometer and G switch locations are as follows: (See Figure 4-7)

	x	y	z
Accel.	.56	-.72	.42
3G Switch	.51	-.56	-.42

A small computer program was written and parametric data generated to determine the ΔAx and Δg values at instrument locations as a function of lateral rates. This information is presented in Figure 4-8. By looking at times when the 3G switch changes position (when $\Delta G \approx -2$, since aerodynamic "G"$\approx$-1) and the corresponding accelerometer reading, a rough approximation of the lateral rates can be determined. Table 4-4 shows the approximate rates at the g switch openings and closings. The "normal" total lateral rates during this period are ~ 10 degrees per second with a very conservative 3σ high of 250 degrees per second existing for a very short time (several seconds) at Mach No.$\approx$0.85 damping to ~ 20 degrees per second within 10 seconds. The high 3σ rates are due to the uncertainty in predicting the aerodynamic damping parameter, Cmq,

Table 4-4 Body Rates at Times of Inertial Switch Events

Time (sec)	Ax (g)	G (g)	P (rpm)	Q (Deg/Sec)	R (Deg/Sec)
76593.06	-0.2	0	140	15	-15
76607.41	(-3.7)	-1.1	280	130	-280
76621.12	+4.0	-1.7	214	-400	170
76624.55	0	-1.8	218	-150	-150
76626.05	0	-1.8	208	-150	-150
76631.16	(-6)	-1.8	200	280	-480
76634.58	+0.8	-1.9	175	-170	-110
76646.34	(-5)	-1.9	209	200	-450
76661.76	-3.8	-1.9	184	110	-400

(Ax) indicates approximate value since instrument is saturated

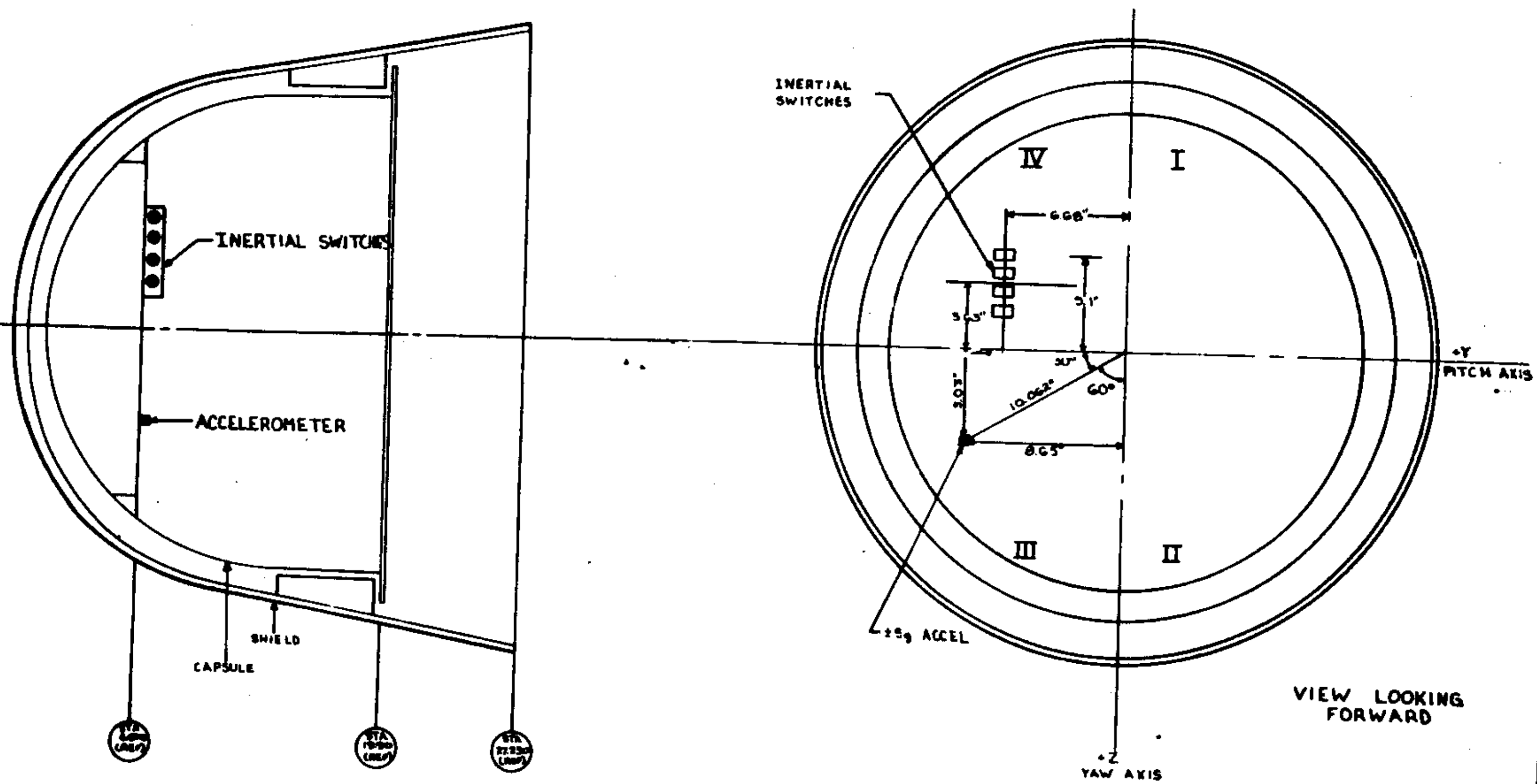

Figure 4-7 Location of Accelerometer and Inertial Switches

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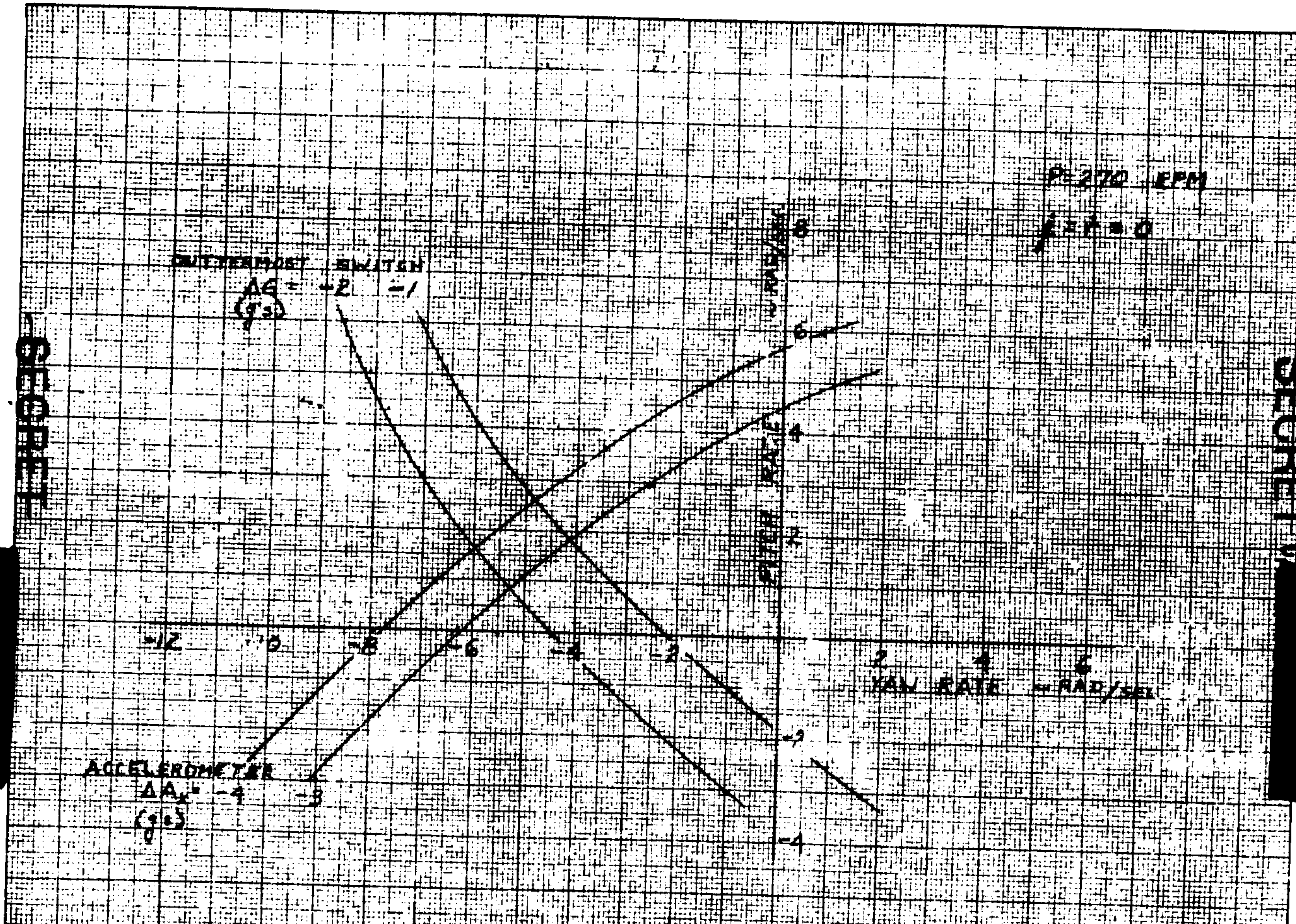

Figure 4-8 Accel. Increment due to Body Rates

SECRET [redacted]

in the transonic regime. Rates on the order of 250 degrees per second do not normally pose a problem, rather it is in combination with high roll rate as seen in the equation for ΔAx where the dependence is on pq, pr, and $q^2 + r^2$. Even if the vehicle were to reach the 250 degrees/sec peak (which is would not since it occurs about 15 seconds after nominal drogue deployment) the acceleration at the g switch would be a maximum of ~1.5g's instead of its nominal ~ 1.2 g's.

The accelerometer trace is shown in Figure 4-9. Marked on the figure are the times when the g switch opened or closed since those are the only times when the acceleration level at the g switch are known.

Having established the foregoing, an attempt was made to simulate the data using the six degree of freedom computer program. The major desire here was to determine the trim angle of attack required to generate the rates derived from the accelerations. This would aid in the determination of the protuberance configuration. In way of explanation:

A protuberance on the forebody can give a rolling moment and a lateral moment. This lateral moment can be expressed in coefficient form as $C_{mo} = \frac{m_o}{q_\infty S d}$ which can be further interpreted as a trim angle of attack where the trim angle is such that the total moment coefficient goes to zero. By iteration the proper combinations of C_{mo} and C_{no} can be found which yield the desired rates.

The iteration process was carried out only to the extent that the approximate α_T was determined during the initial spin-up. At 76,608 seconds (end of spin-up) another configuration change apparently takes place and no attempt was made to simulate data beyond that point. The trim angle thus derived is 4 to 5 degrees.

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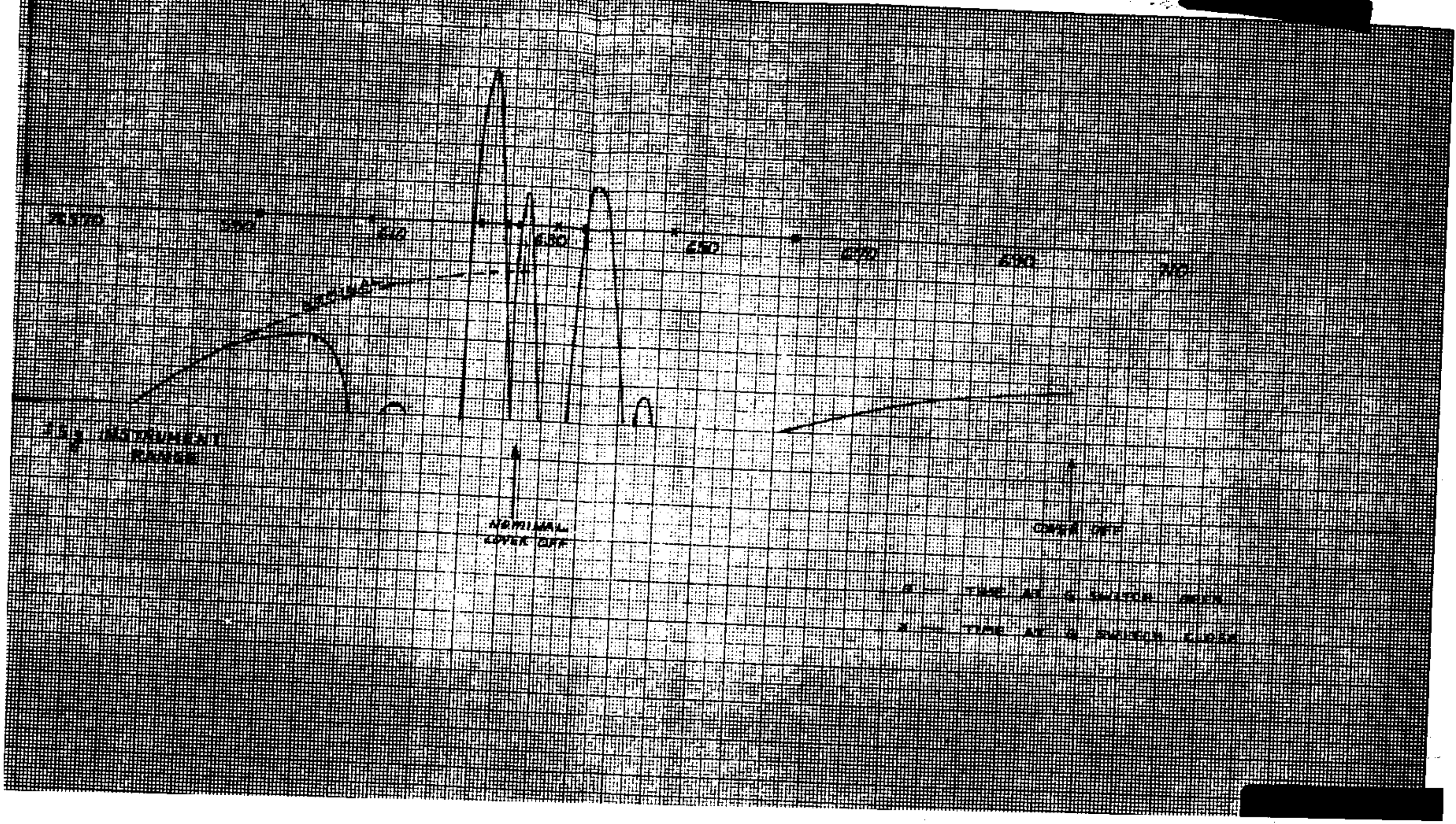
[redacted]



[redacted]

Combining this information with "fin" data from paragraph 4.2.2 yields:

"Fin" incidence angle	22 to 28°
Fin effective area	4 to 5 in^2

Three other flights with some degree of spin-up were investigated on a cursory basis. The spin-up on those flights was not as drastic as on the 726, nor was any recovery problem encountered.

The spin torque coefficient, C_l, was found from the roll acceleration in the period just following 3 g switch opening. Then assuming that the coefficient was constant, the altitude at which spin-up started was determined. In each case there are two altitudes quoted for the beginning of spin-up depending on whether a spin direction reversal occurred.

In no case were the mass asymmetries large enought to be responsible for the roll histories.

Flight	Max Spin (rpm)	C_l	Alt. C_l(Ft)	Alt. C_l(ft)
702	103	0.0004	95000	99000
703	43	0.0005	90000	94000
704	55	0.0002	100000	106000
726	300	0.0025	—	89000

4.2.2 Aerodynamics

At the time the vehicle began to spin-up the freestream conditions were $M \approx 4.0$ and $q_\infty = 250$ PSF. Considering a roll torque coefficient (C_{l_0}) of .0025, the roll torque produced is approximately 8 foot pounds. Many different causes of vehicle spin-up are possible, and with the available information no one particular cause can be isolated. However, the assumption that the failure resulted in a "fin" protruding into the air stream will point out the large perturbation to the vehicle configuration which is required to produce the observed roll acceleration. Figure 4-10 shows the relation between the assumed "fin" area and incidence angle that would be required to produce the

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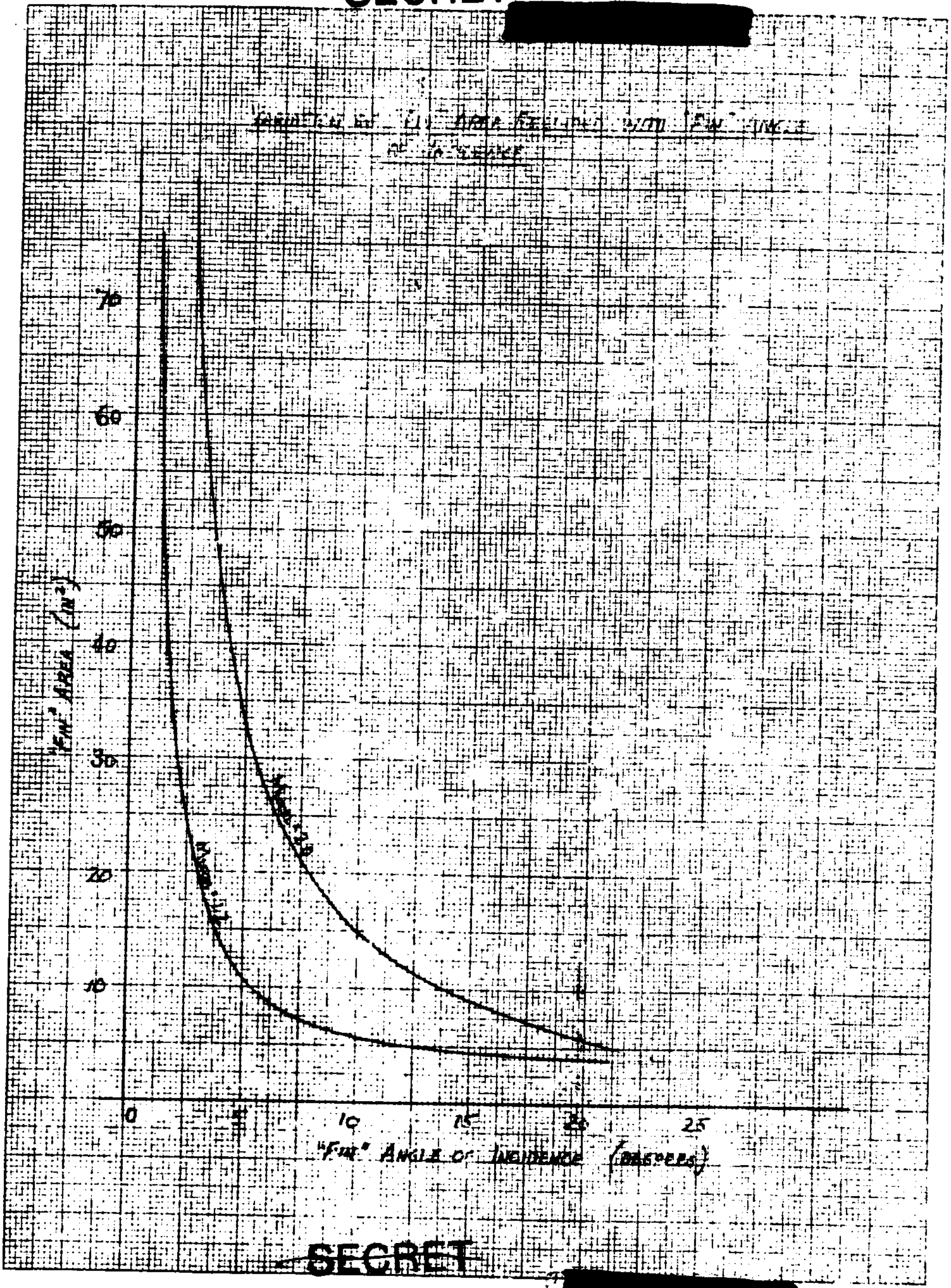
[redacted]



SECRET

Figure 4-10 Variation of "Fin" Area Required with Fin An[redacted] the roll moment. It should be pointed out that another assumption that was made that the vehicle roll did not reached an equilibrium condition at p = 270 rpm. This assumption was based on the shape of the p vs. time curve and the fact that significant vehicle angle of attack also occurred. In figure 4-10 the M_{local} = 1.2 is felt to be representative of the local condition at the rear portion of the vehicle. As shown for an incidence angle of 15°, the required area would be about 5 in.^{2}.

In addition to the roll-up, vehicle trims were indicated by the vehicle accelerations to be on the order of 4 to 5 degrees angle of attack (see paragraph 4.3.1). For the combination of "fin" area and angle of Figure 4-10 the induced trim angle of attack was estimated. From Figure 4-11, an induced angle of attack of 4 to 5 degrees would require a "fin" incidence angle of about 22 to 28 degrees. This angle corresponds to a "fin" area of a about 4 in^2.

On-board accelerometer data indicates that a combined vehicle trim angle and roll torque developed after emergence from blackout. It appears that an instantaneous perturbation to the vehicle configuration occurred at this time. The assumption that an effective fin was produced on the vehicle conical surface results in the requirement that this "fin" have an "effective" area on the order of 5 in^2. Since this is a rather large area it is felt that a significant failure of possibly one section of the heat shield allowing it to "spring" into the airstream could explain the large roll torque.

4.2.3 Thermodynamics

An estimate of the SRV 726 aerothermodynamic environment was made utilizing the trajectory parameters discussed in paragraph 4.2.1. Convective heat transfer rate predictions, based upon a zero angle-of-attack and laminar boundary layer flow conditions, are presented in Figure 4-12 for representative

[redacted]

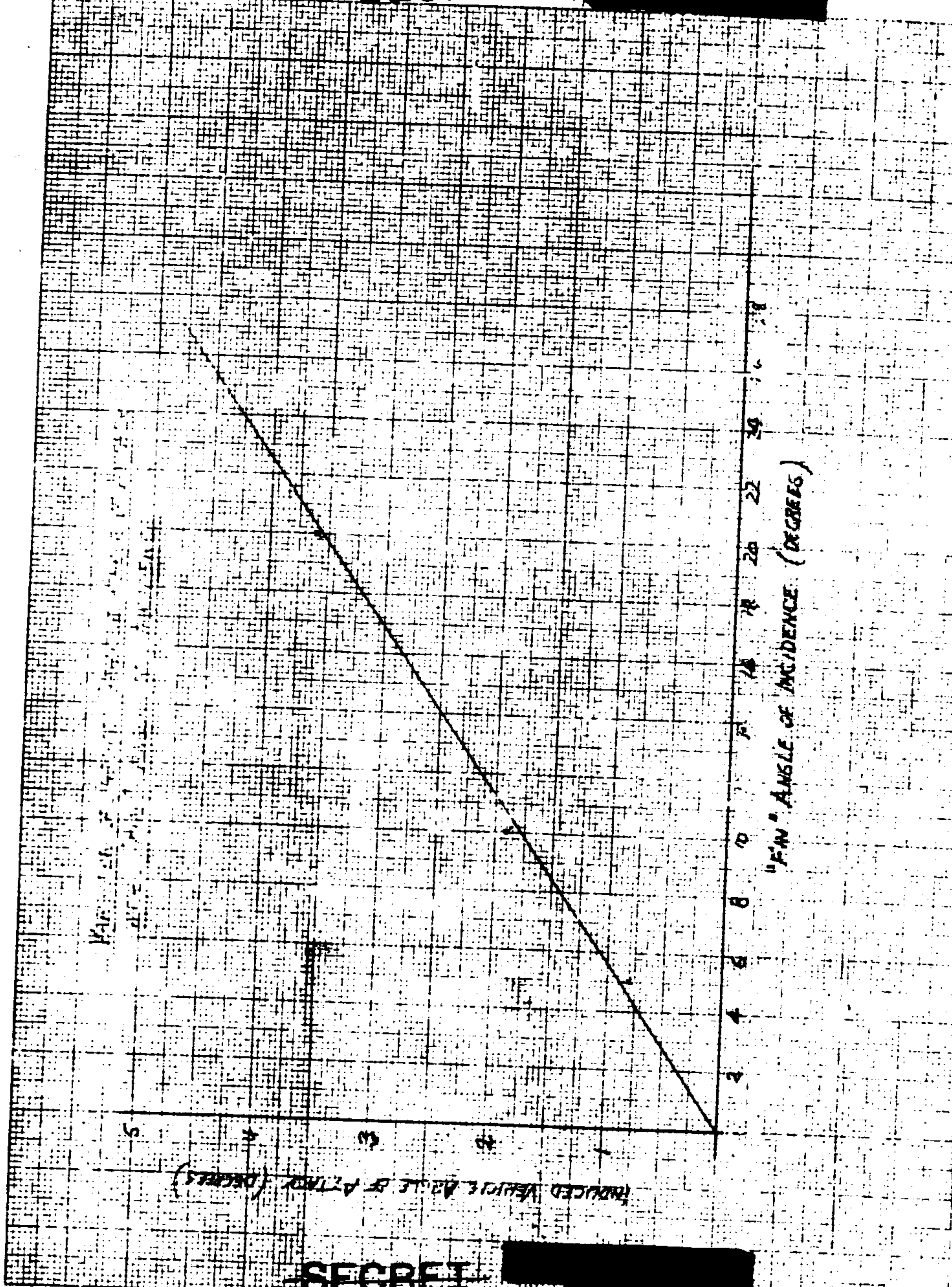


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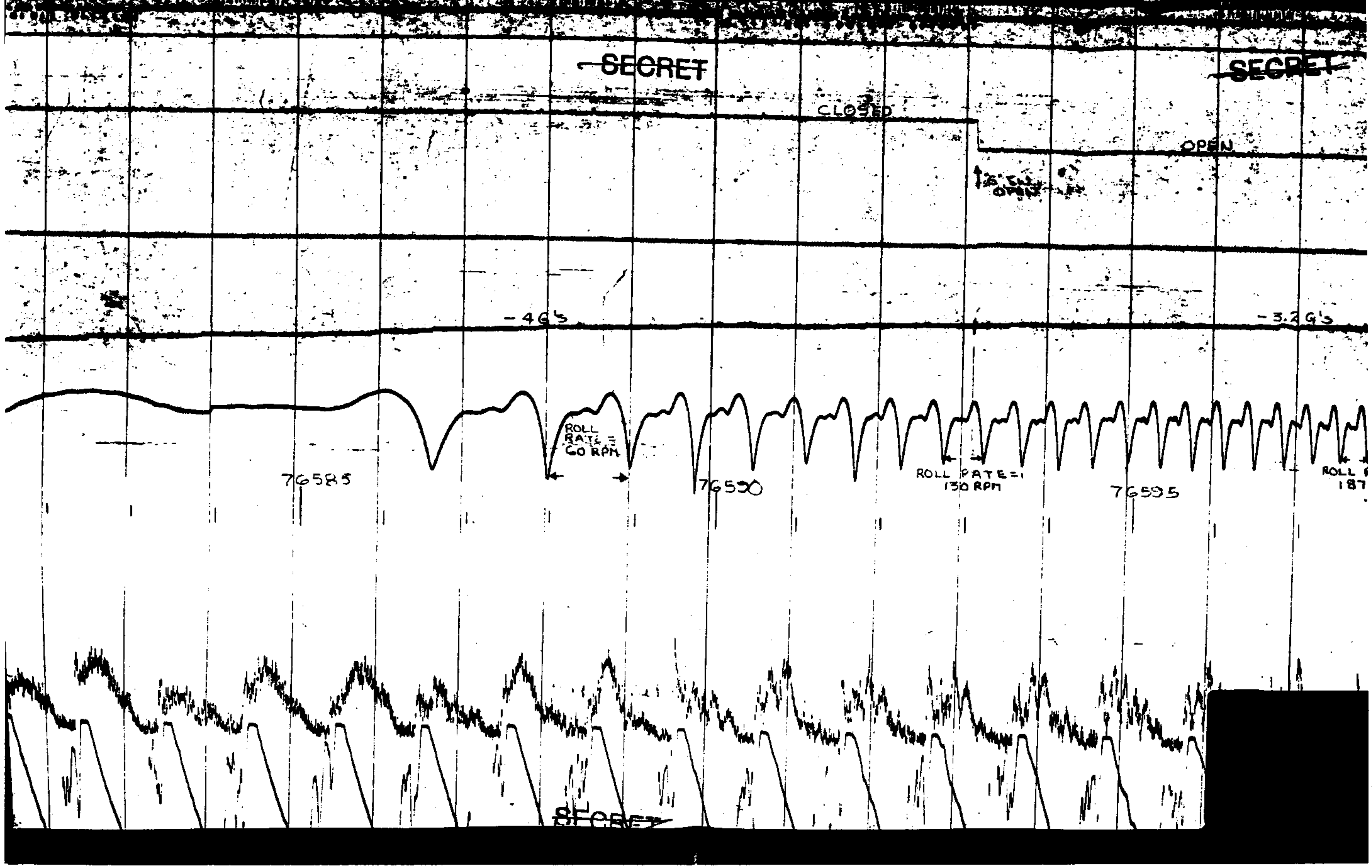
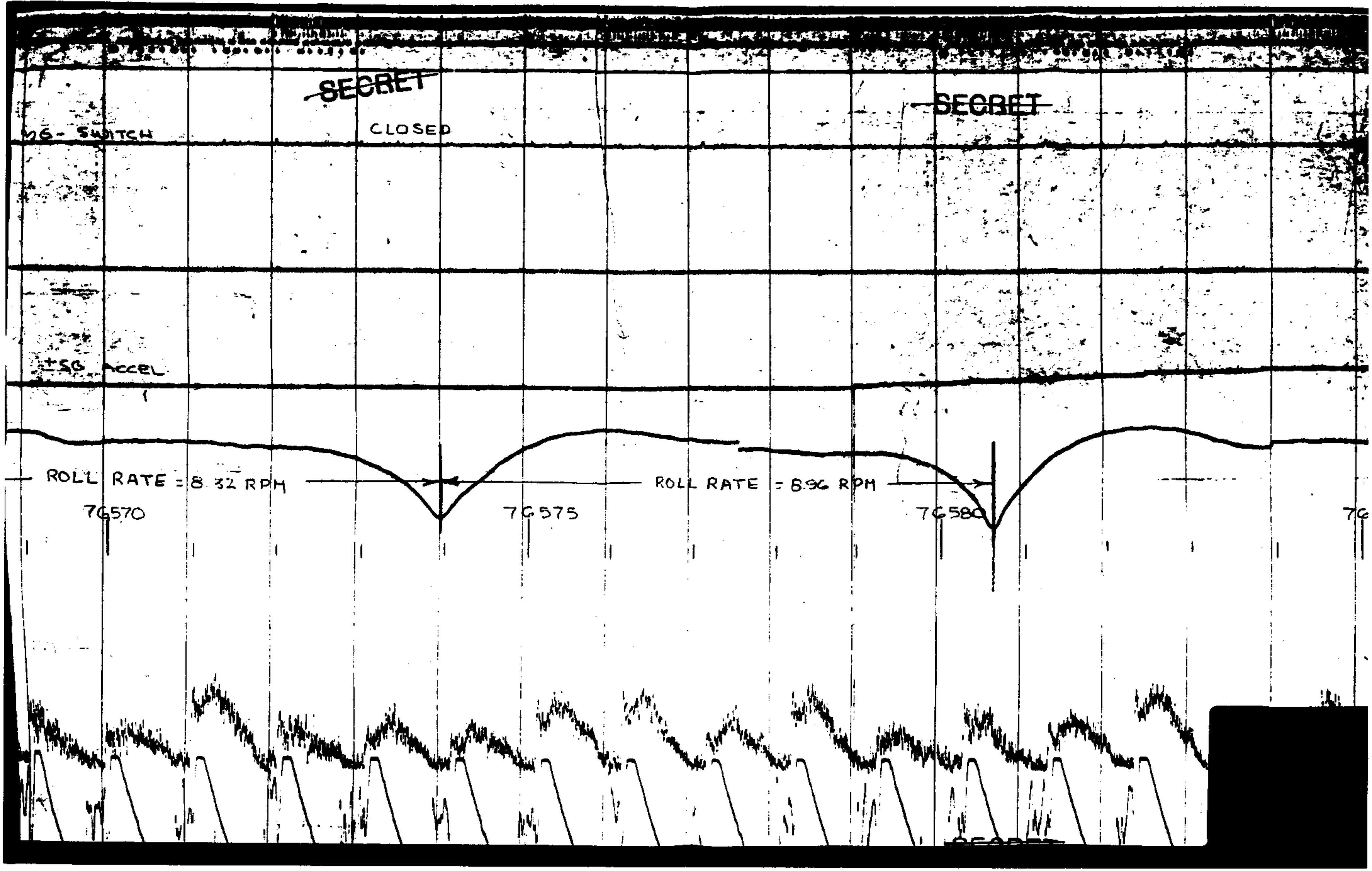
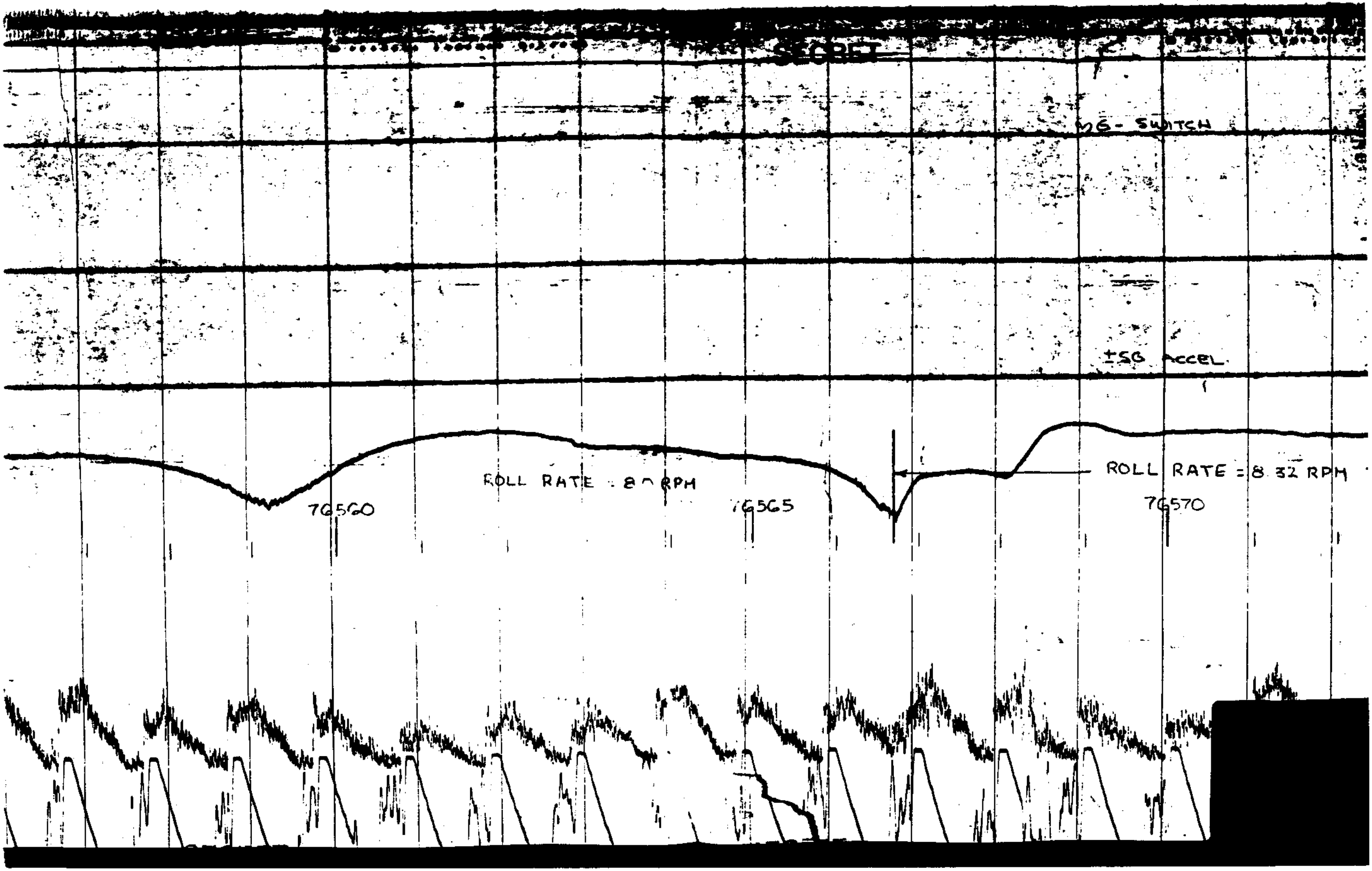
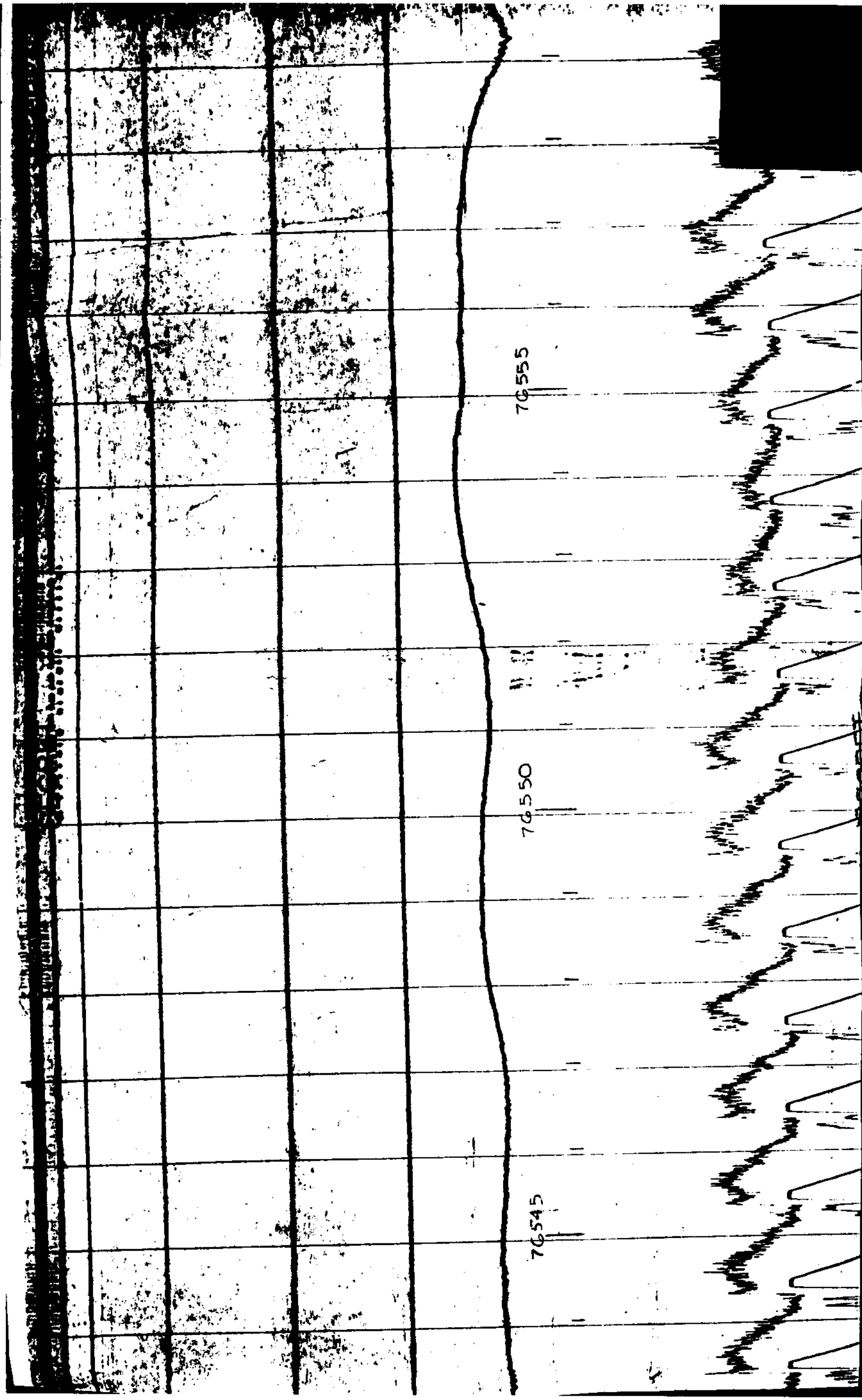
Figure 4-11 Variation of Induced Vehicle Angle of Attack with Fin Incidence Angle

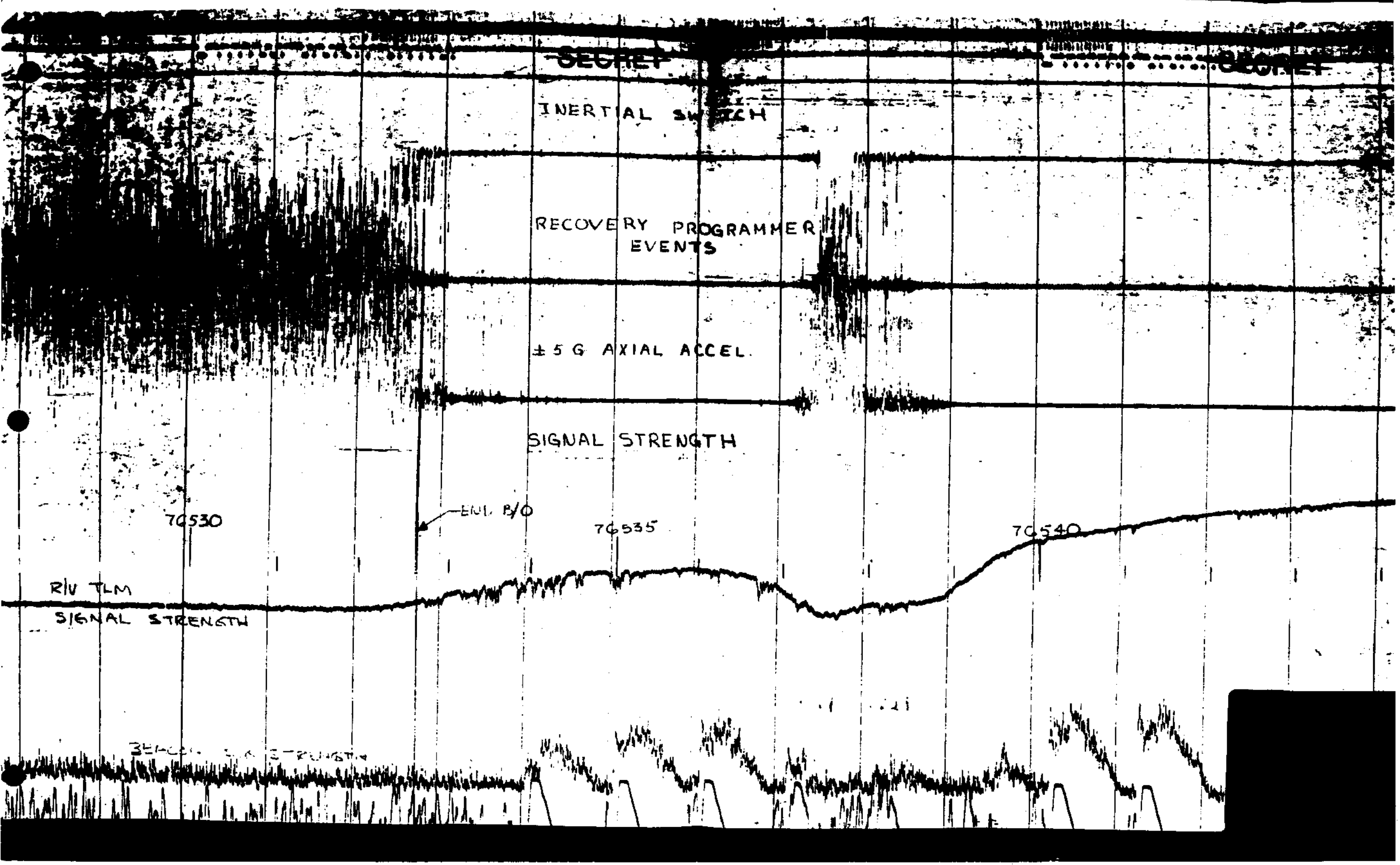

SECRET
SECRET
CLOSED
OPEN
-4G's
-3.2G's
ROLL RATE = 60 RPM
76585
76590
ROLL RATE = 130 RPM
76595
SECRET


SECRET
CLOSED
SECRET
6G - SWITCH
+5G ACCEL
ROLL RATE = 8.32 RPM
ROLL RATE = 8.96 RPM
76570
76575
76580
SECRET



MG - SWITCH
±5G ACCEL
ROLL RATE
ROLL RATE = 8.32 RPM
76560
76565
76570


76555
76550
76545


SECRET
SECRET
INERTIAL
RECOVERY PROGRAMMER EVENTS
±5 G AXIAL ACCEL.
SIGNAL STRENGTH
7C530
7C535
7C540
R/V TLM
SIGNAL STRENGTH

Appendix 2

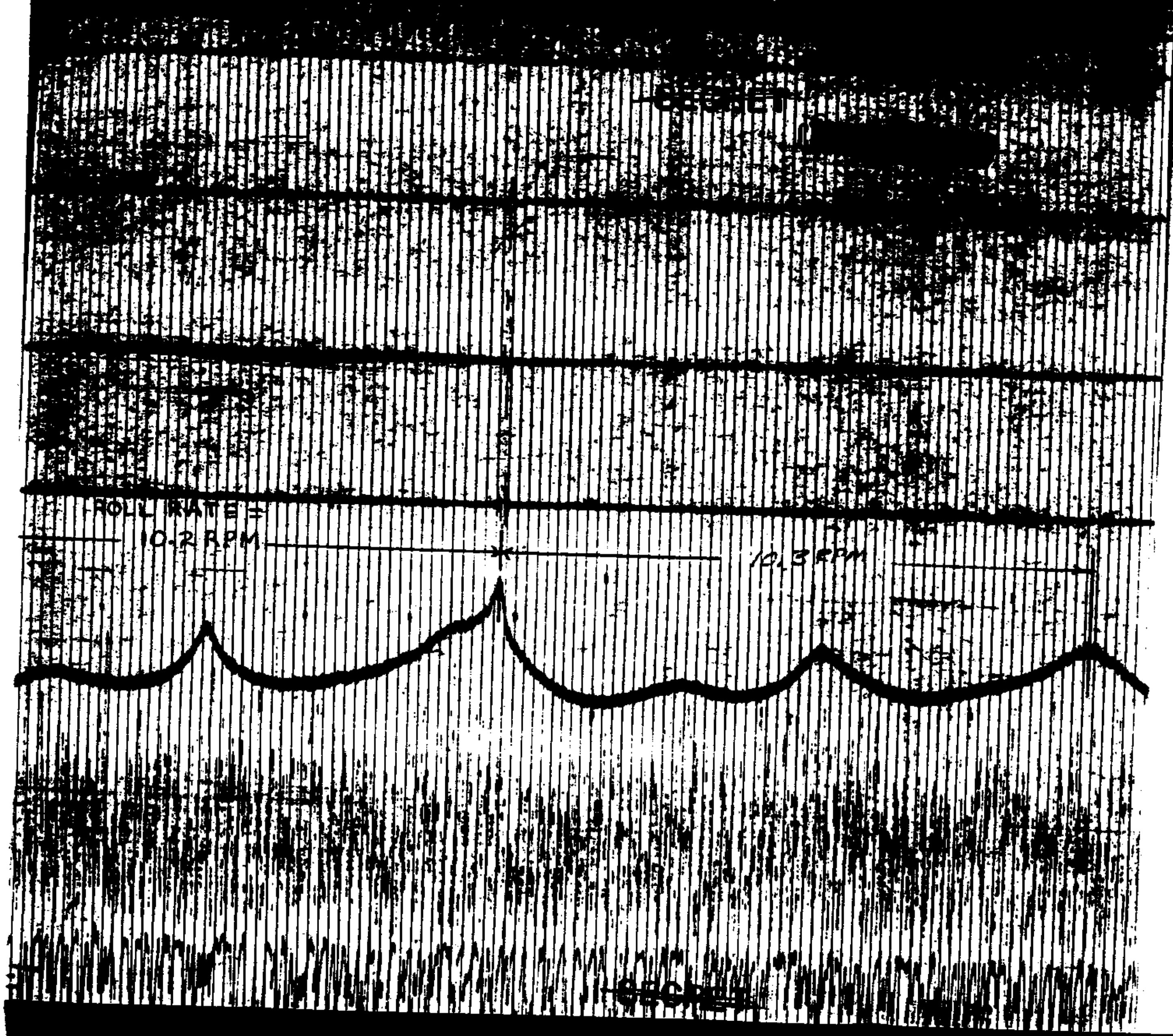
Reference Documents

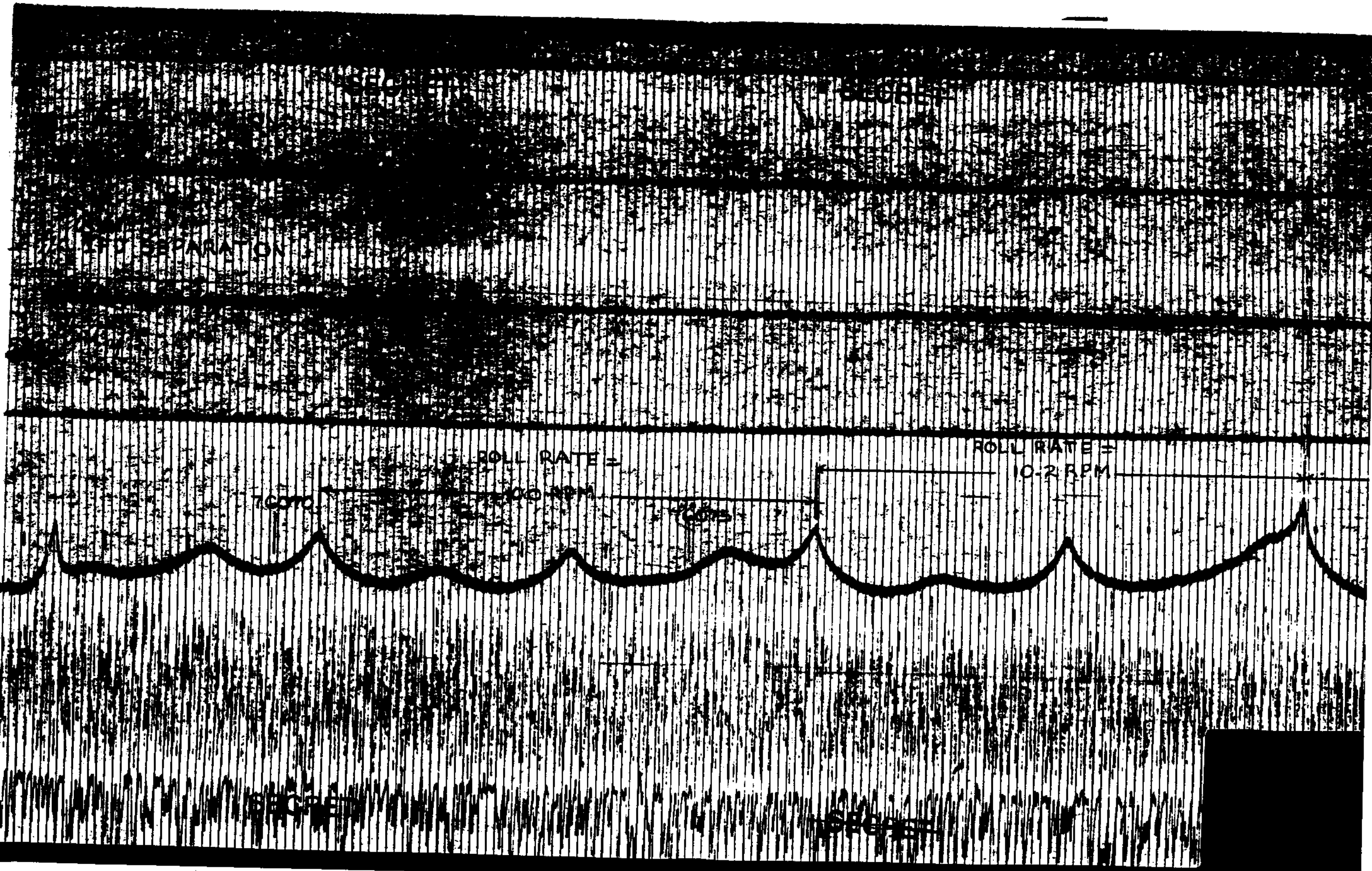
1. Summary Report for Forebody S/N 306, [redacted] (rev. A), 17 July 1967 (U).

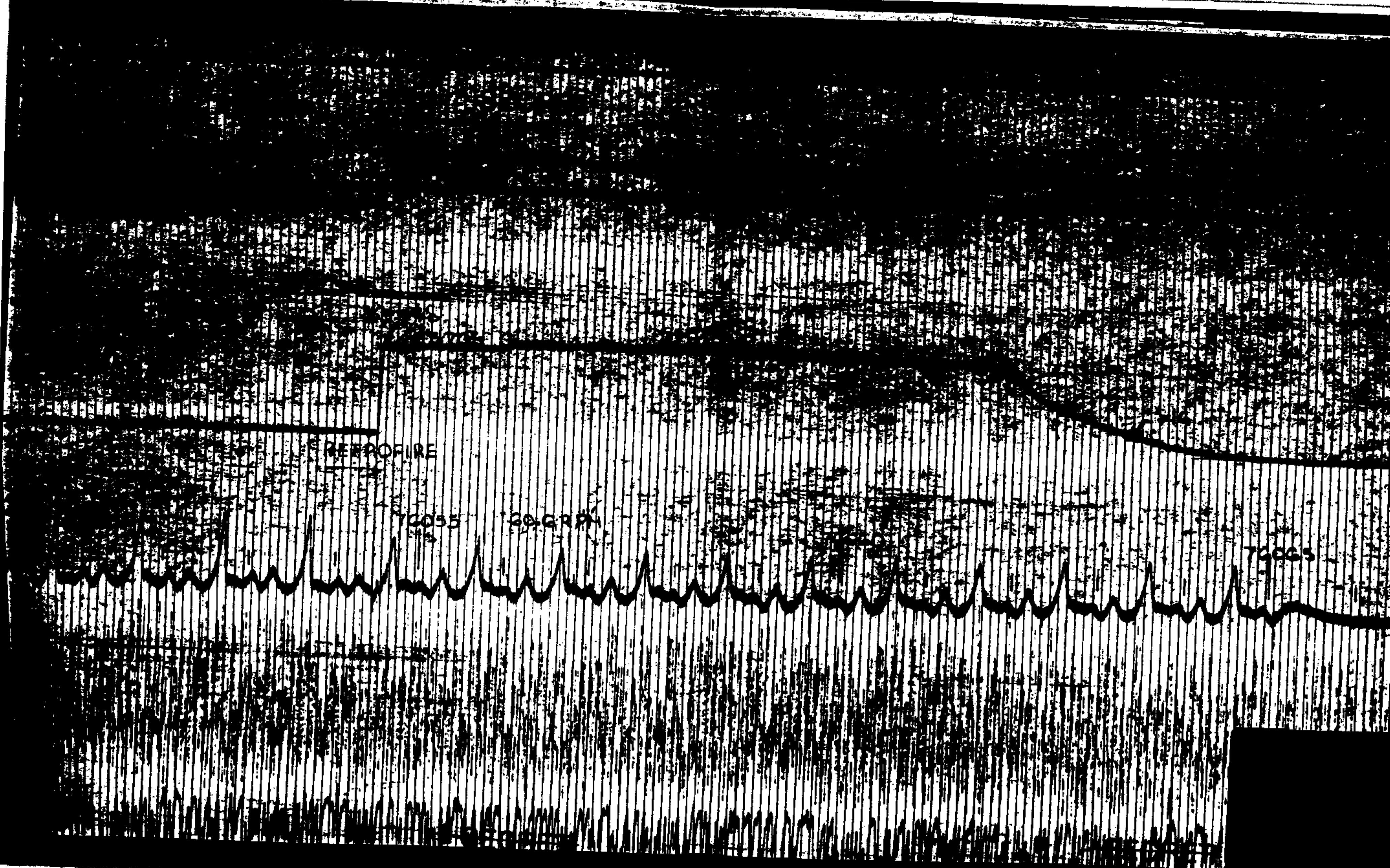
2. Systems Quality Control Test Data, Standing Instruction No. 237377, System Test Data.

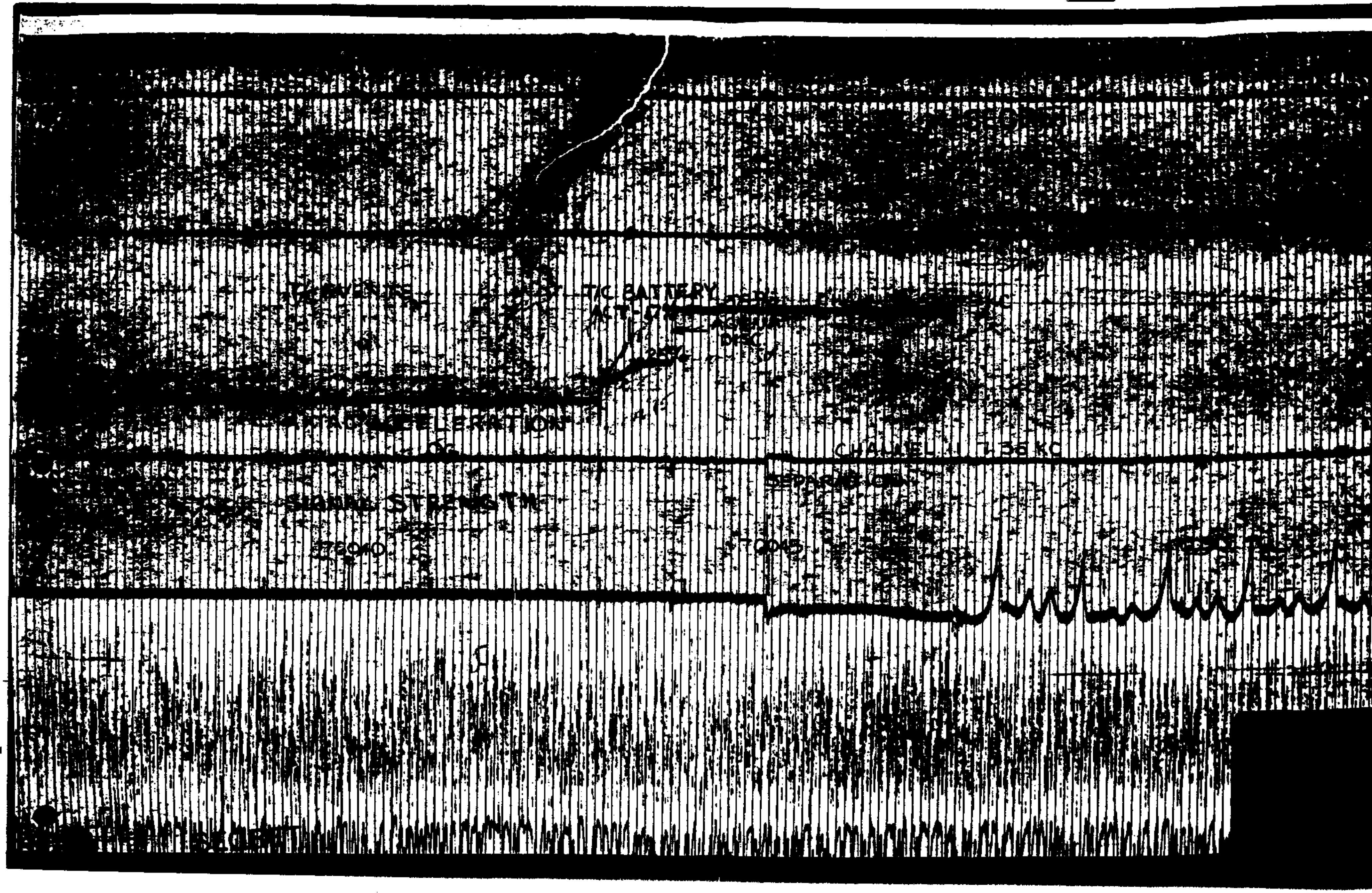
3. Inertia Switch and Accelerometer Testing, [redacted] 24 August 1967 (U).

4. Parachute Swivel Assembly, Performance Data Sheet of Test performed 1 August 1967 (U).


ROLL RATE =
10.2 RPM
10.3 RPM
SECRET


SEPARATION
ROLL RATE =
ROLL RATE =
10.2 RPM
SECRET


RETROFIRE
72055


T/C BATTERY
ACCELERATION
SIGNAL STRENGTH

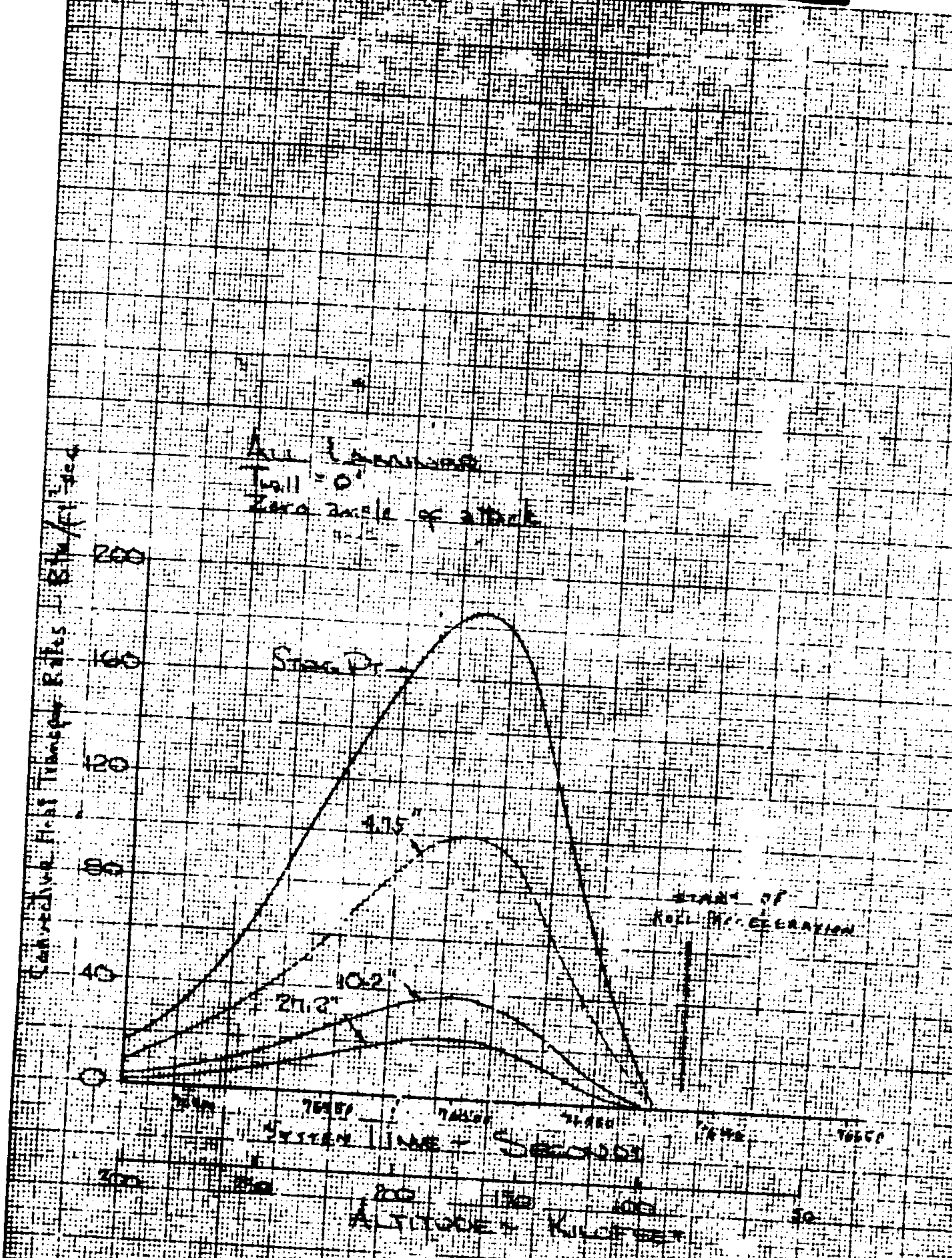


Figure 4-12 Typical Convective Heat Transfer Rates

body locations. These predictions indicate that the thermal environment experienced by the SRV 726 was essentially a nominal re-entry environment as indicated by the magnitudes and duration of the predicted heat pulses. Hence, the thermal performance of the SRV 726 heat protection system, assuming a nominal angle-of-attack envelope, should have been comparable to that of all other previous R/V's with similar trajectories. However, the onset of a significant roll torque was evidenced in the motion data, see Section 4.3.1, at approximately 89,000 feet altitude, shortly after the end of the heating period. The magnitude of the roll torque is such that it could not be reflecting R/V configurational asymmetries resulting from surface recession alone, since the surface recession depths for a typical SRV re-entry are quite small. Therefore, the "apparent fin" postulation considered, discussed in Section 4.3.1, requires the occurrence of a severe thermal shield anomaly, a random thermo-structural failure resulting in a protruding segment. Although the heat penetration to the phenolic nylon-phenolic glass liner interface is substantial at the end of the heating period, a thermal structural failure would not be expected.

Appendix 1

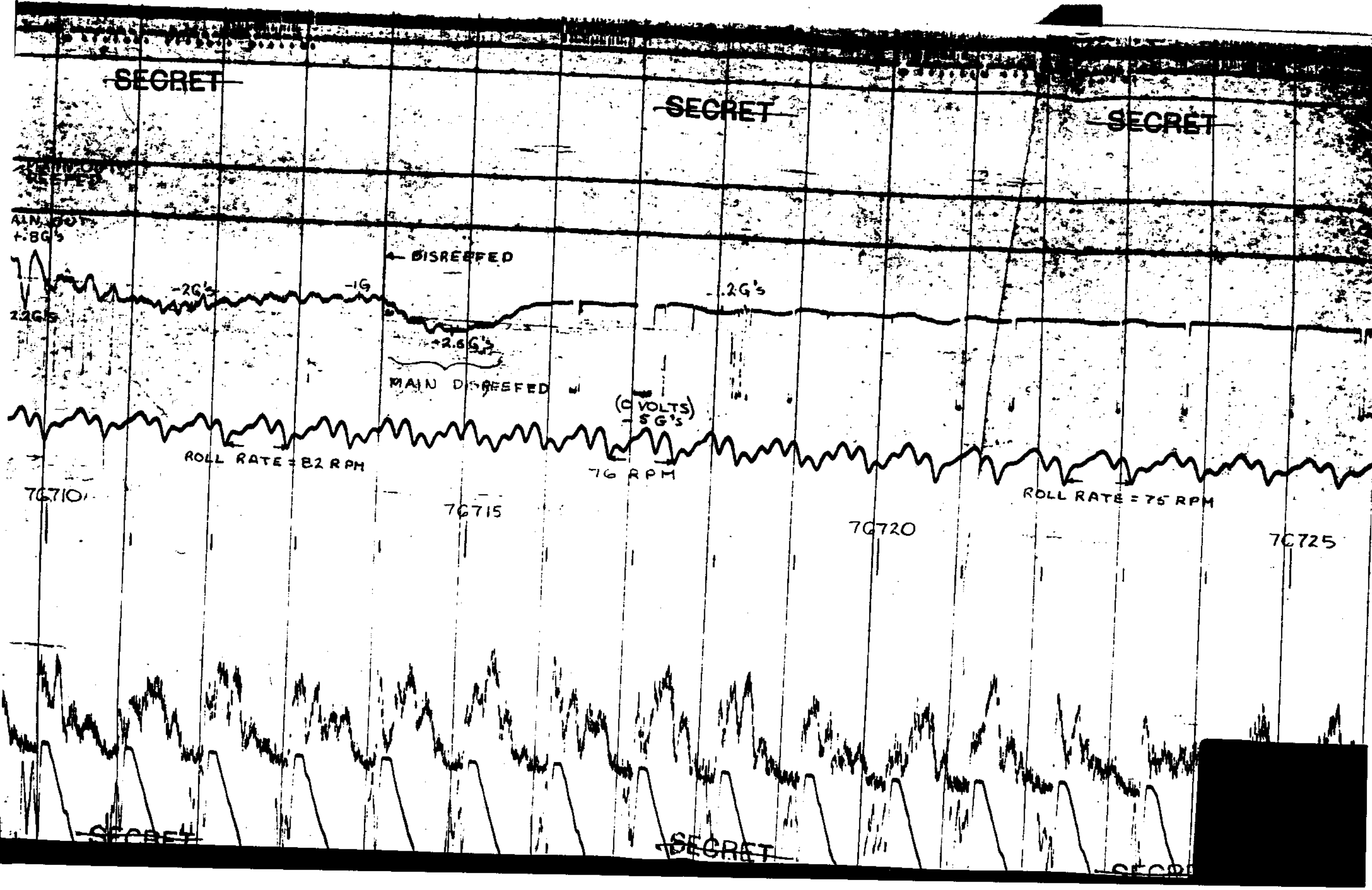
Flight Data

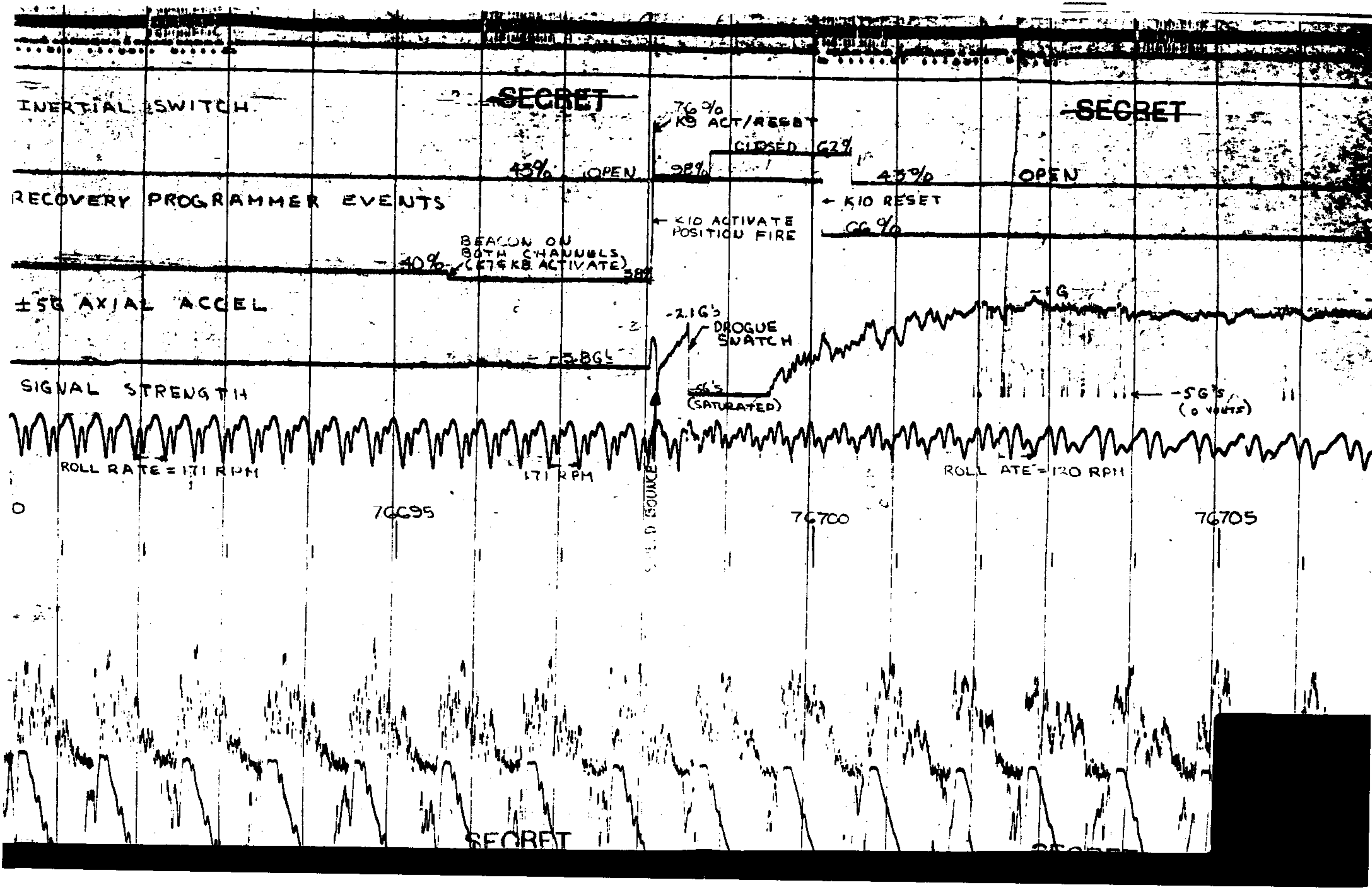
Figure A-1

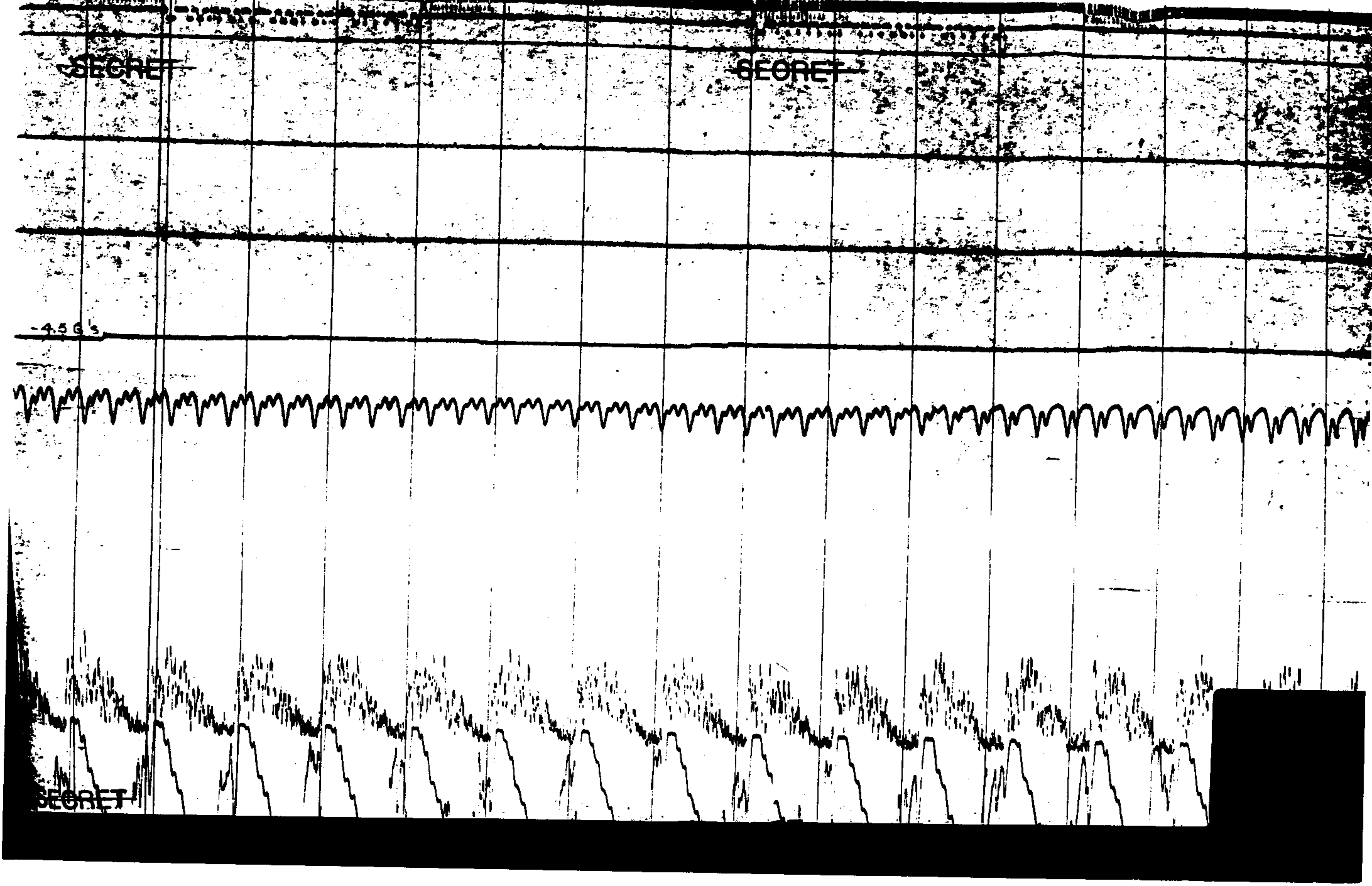
Deboost Events [redacted]

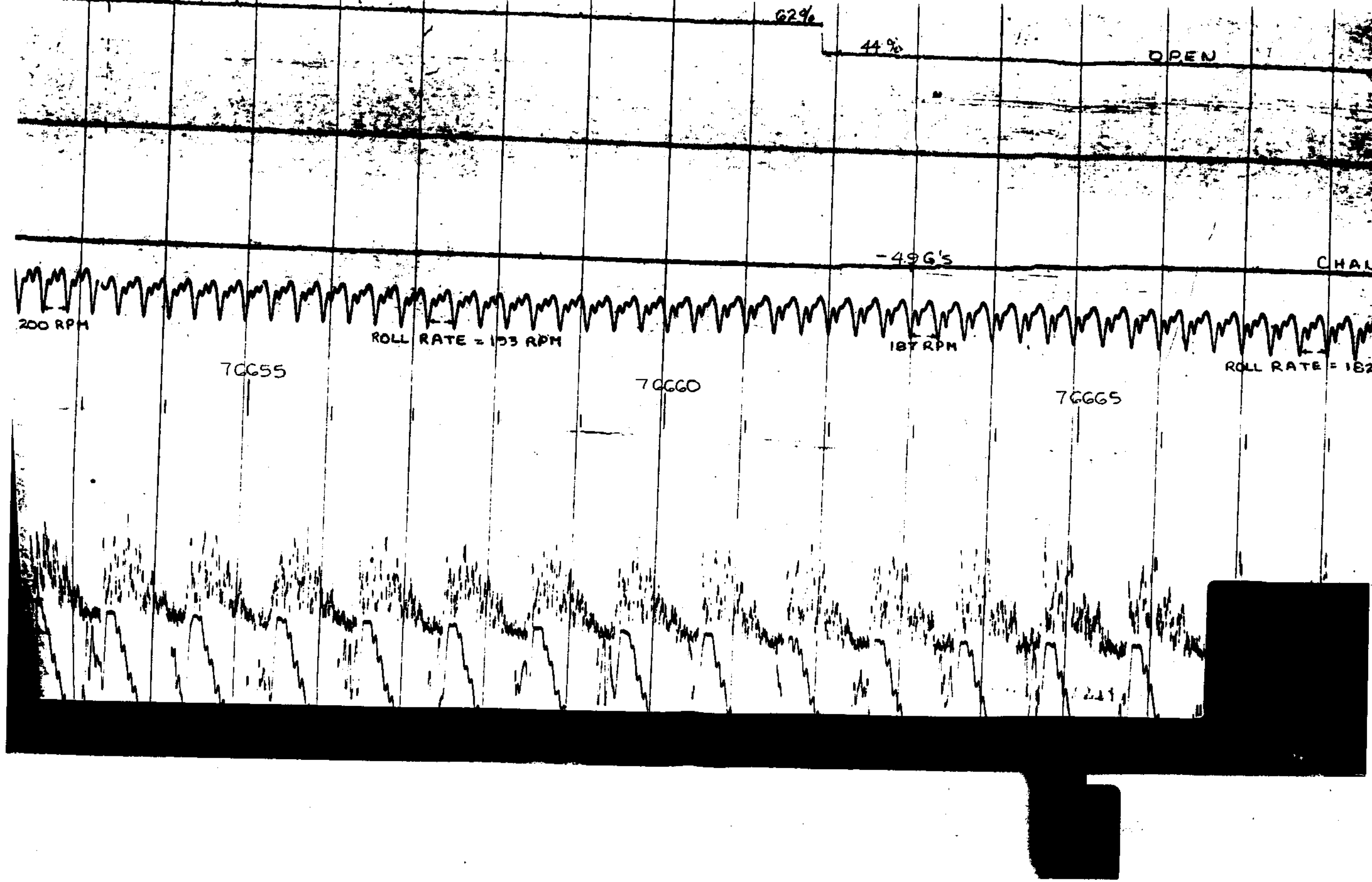
Figure A-2

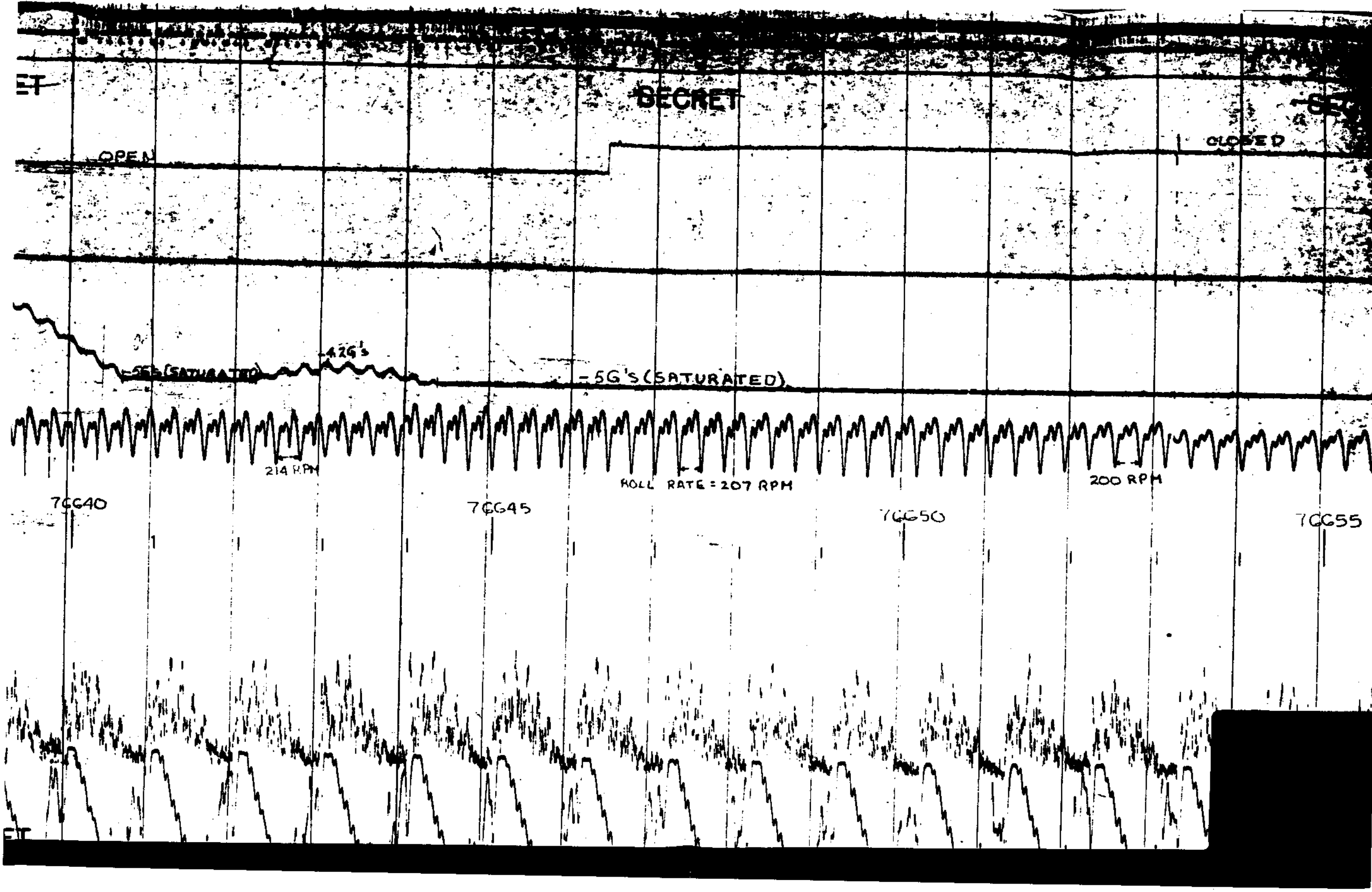
Recovery Events and Axial Acceleration (Ship)

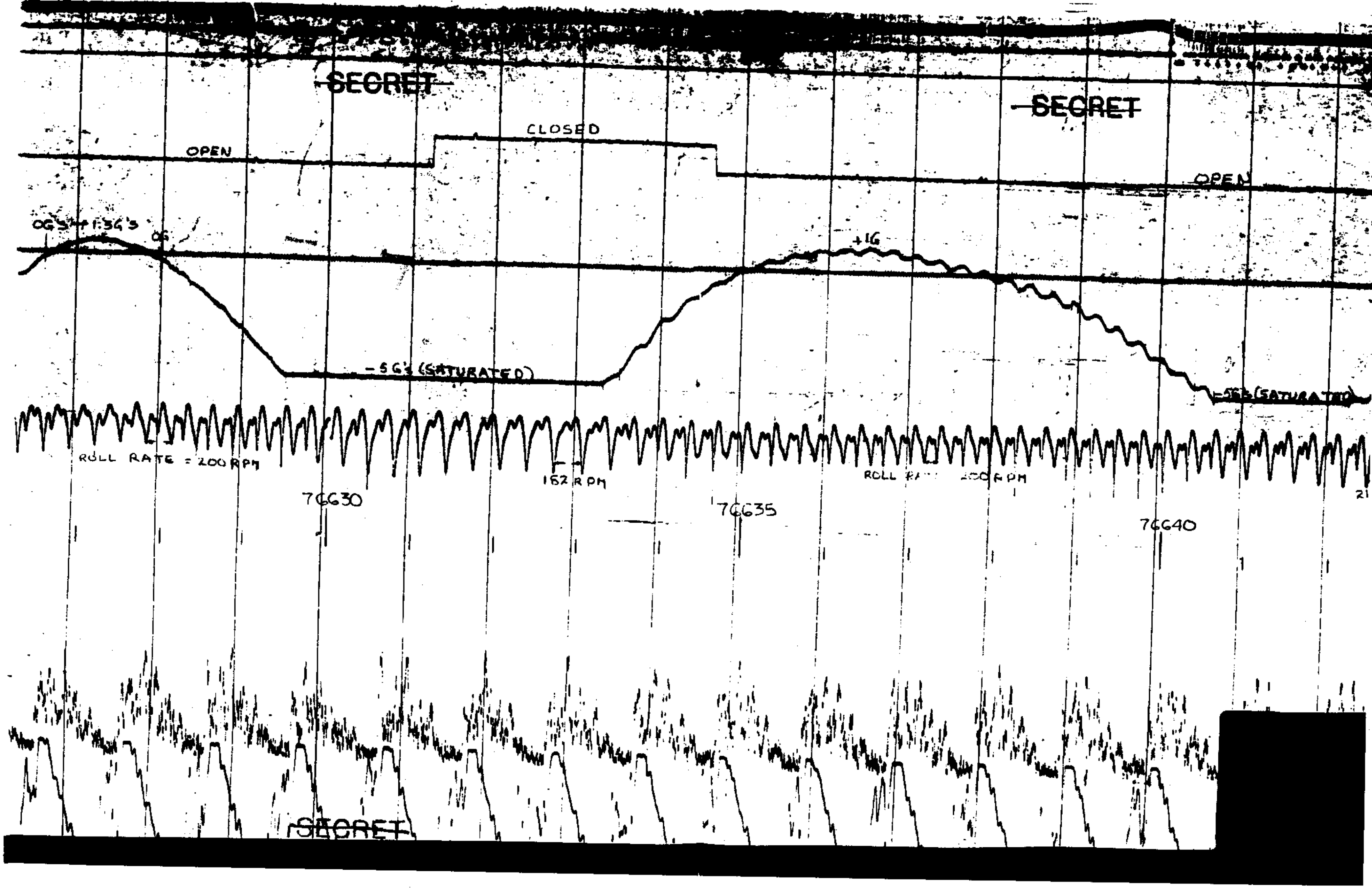

SECRET
SECRET
SECRET
+8G's
2.2G's
-2G's
-1G
DISREEFED
.2G's
+2.6G's
MAIN DISREEFED
(0 VOLTS)
- 5G's
ROLL RATE = 82 RPM
76 RPM
ROLL RATE = 75 RPM
76710
76715
76720
76725
SECRET
SECRET
[redacted]

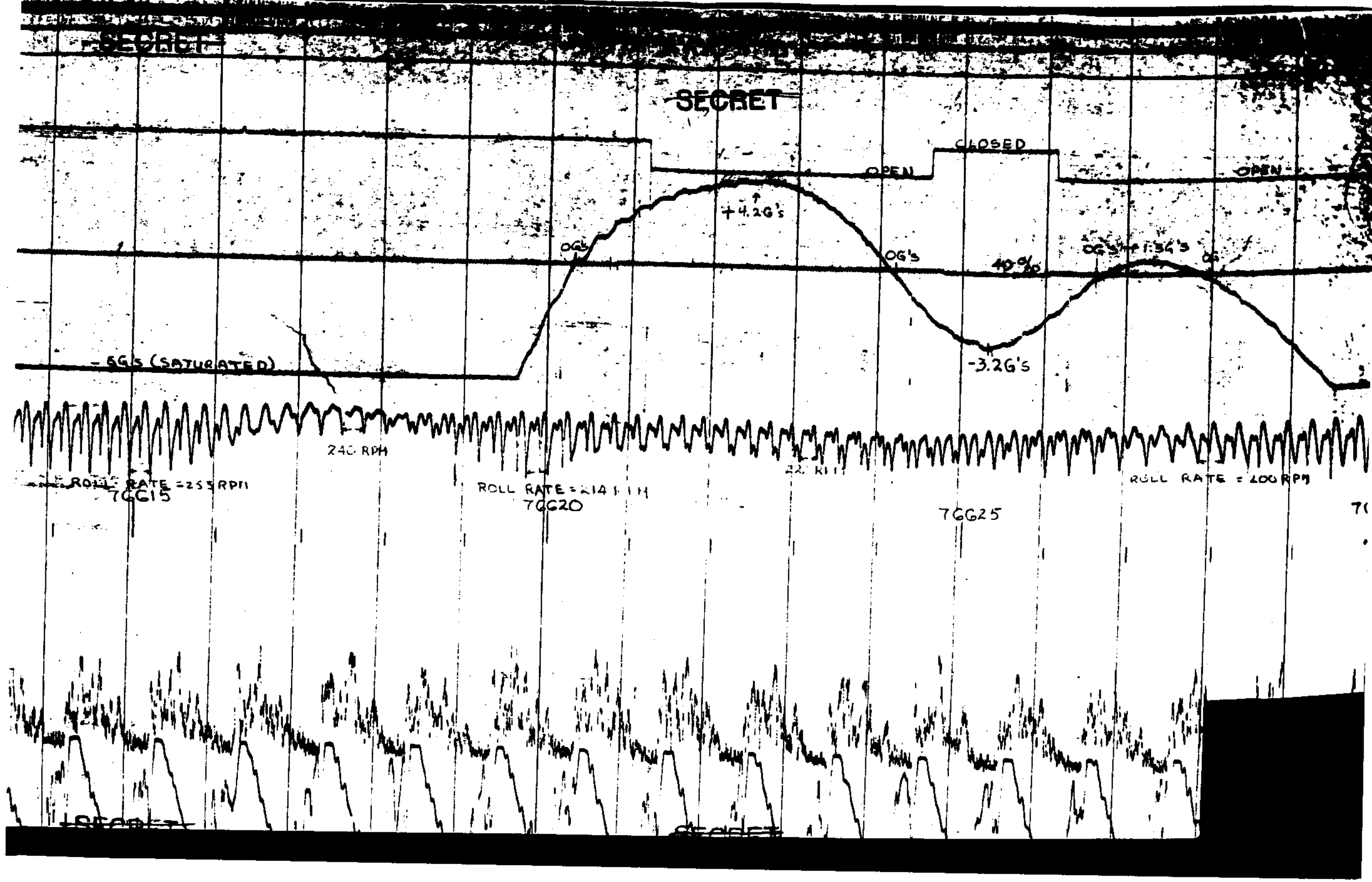

SECRET
INERTIAL SWITCH
76%
K9 ACT/RESET
CLOSED
62%
43%
OPEN
98%
RECOVERY PROGRAMMER EVENTS
K10 RESET
K10 ACTIVATE
POSITION FIRE
66%
BEACON ON
BOTH CHANNELS
(K76 K8 ACTIVATE)
40%
38%
±5G AXIAL ACCEL
-2.1G's
DROGUE
SNATCH
-3.8G's
-5G's
(SATURATED)
-5G's
(0 VOLTS)
SIGNAL STRENGTH
ROLL RATE = 171 RPM
171 RPM
ROLL RATE = 120 RPM
0
76695
76700
76705

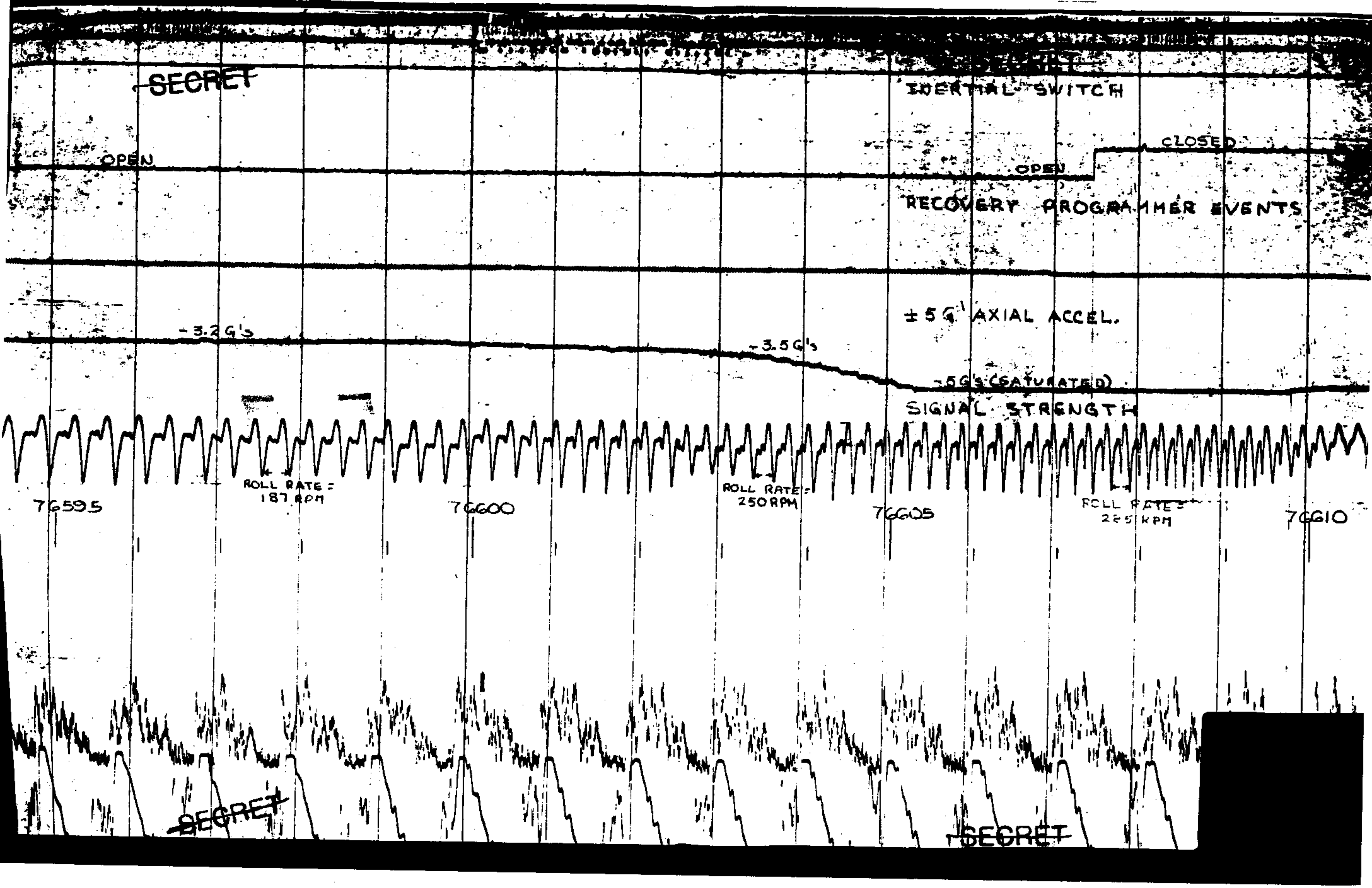

SECRET
SECRET
-4.5 G's
SECRET

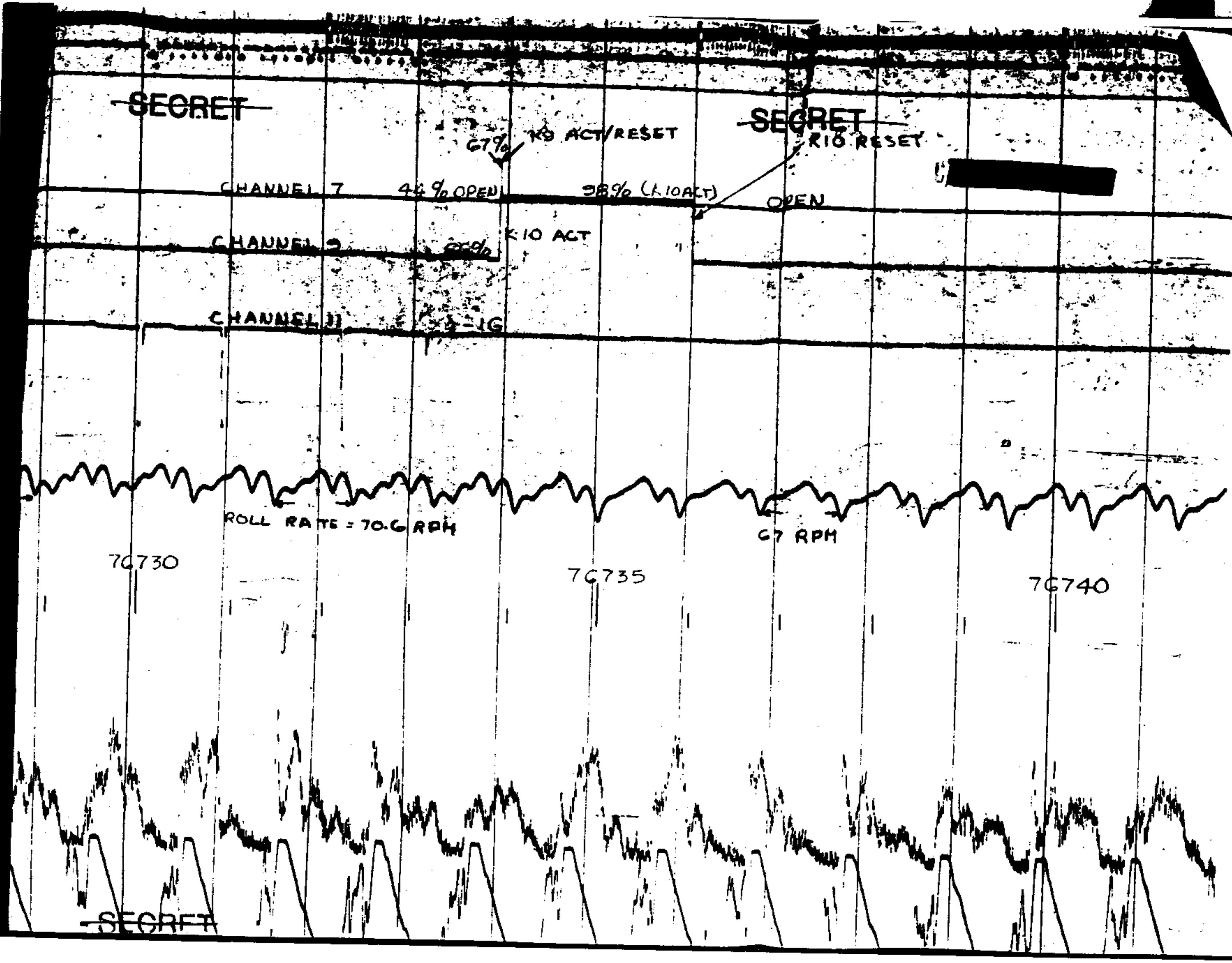

62%
44%
OPEN
-49G's
200 RPM
ROLL RATE = 193 RPM
187 RPM
76655
76660
76665


SECRET
OPEN
CLOSED
-5G's (SATURATED)
-4.2G's
-5G's (SATURATED)
214 RPM
ROLL RATE = 207 RPM
200 RPM
7CC40
7CC45
7CC50
7CC55


SECRET
SECRET
OPEN
CLOSED
OPEN
OG's
+1.5G's
OG
+1G
-5G's (SATURATED)
-5G's (SATURATED)
ROLL RATE = 200 RPM
162 RPM
200 RPM
76630
76635
76640
SECRET


SECRET
CLOSED
OPEN
OPEN
+4.2G's
0G's
0G's
40%
0G's +1.3G's
0G
-5G's (SATURATED)
-3.2G's
240 RPM
ROLL RATE = 253 RPM
7GG15
ROLL RATE = 214 RPM
7GG20
7GG25
ROLL RATE = 200 RPM
SECRET
SECRET


SECRET
INERTIAL SWITCH
OPEN
OPEN
CLOSED
RECOVERY PROGRAMMER EVENTS
±5G AXIAL ACCEL.
-3.2 G's
-3.5 G's
-5 G's (SATURATED)
SIGNAL STRENGTH
ROLL RATE = 187 RPM
ROLL RATE = 250 RPM
ROLL RATE = 265 RPM
76595
76600
76605
76610
SECRET
SECRET



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GENERAL ELECTRIC
MISSILE AND SPACE DIVISION
PHILADELPHIA

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PROGRAM INFORMATION REQUEST / RELEASE

*USE "C" [redacted] CLASSIFIED

FROM [redacted], QCE
S & SS - MQC & T
Room 5000 MB Ext. 2777

TO [redacted]
Program Manager
Room 6715 Chestnut

DATE SENT	DATE INFO. REQUIRED	PROJECT AND REQ. NO.	REFERENCE DIR. NO.
7/17/67		S/N 306 F/B Summary	

SUBJECT

Summary Report for Forebody S/N 306, Dwg. #198R301 Rev. AH - AN 50
NCS-2392-B Manufactured 9/13/66 (Cold Soak)

INFORMATION REQUESTED/RELEASED

1.0 <u>Materials Testing</u>

1.1 Phenolic Impregnated Reinforcing Cloth - US Polymeric

1.1.1 Glass per specification 156A9855-P2-Rev. E - Lot E-7186-2, 3 - Tested and accepted under MA 35282.

1.1.2 Nylon per specification 156A9743, Type I, Rev. D - Lot 7072-5 - Tested and accepted under MA 33635.

1.2 Adhesive - Adlock#642 - per specification 147A1219 Rev. A - Lot 553 Tested and accepted under MA 33441.

2.0 <u>In-Process Testing</u> (226E590 Rev. K AN 15)

Per NCS - 2392 - B (Job Lot #WT-304-X2)

2.1 Non-Destructive Testing

2.1.1 Radiographic inspection - accepted after inspection on MA 36750

2.1.2 Ultrasonic Inspection - Tested and accepted on MA 36665

2.2 Trim Ring Chemical, Mechanical and Physical Properties Tests - Tested and accepted on MA 36418.

3.0 <u>Final Inspection</u>

3.1 Visual per NCS-2392B, accepted per planning.

3.2 Dimensional per dwg. #198R301 Rev. AH - AN 50 - Job Lot #WT-804-C2, IR 59086

<u>Discrepancy</u>

Phenolic ring, Dwg. 67D122-P1, displace circumferentially by 1/4" (i.e. ring not centered with when referenced to shield lug flats and magnesium ring location).

- con't. -

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PAGE NO.

RETENTION REQUIREMENTS

COPIES FOR	MASTERS FOR
1 MO.	3 MOS.
3 MOS.	6 MOS.
6 MOS.	12 MOS.
MOS.	MOS.
	DO NOT DEST

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Disposition

"Misplaced location of phenolic/glass ring is acceptable off center position of ring and joggle will not effect strength of lug installation and forebody assembly." By [redacted] SVE, [redacted] MQC & T

4.0 Assembly Discrepancy - IR 55267

Discrepancy

Two 0.358" Diameter holes are mislocated through aft edge of the forebody and interface bushing bosses.

Disposition

(1) "Remove two bosses, install new ones with correct riviting.

(2) Fill up mislocated holes in shield with M & P 100.

(3) Drill new holes per view T and Section N.N of 198R301.

(4) Check radial and circumferential position of pin puller lugs and all components installed in aft phenolic/glass ring. Use magnesium ring position as reference.

(5) Before drilling bosses, the M & P 100 must have the proper cure time." Signed - [redacted] SVE - [redacted] MQC & T

5.0 Conclusion

Shield S/N 306 had no processing deviations and all acceptance and in-process tests were conforming. The dimensional discrepancies on IR's 59086 and 55267 are not of a critical nature and were either reworked or accepted. One other IR, 50250, concerned the "Bath tub fittings" which stated that the tensile values obtained on the test bar did not conform to the minimum values. This item was bought off by SVE.

[redacted]

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STANDING INST. TION NO.	GENERAL ELECTRIC — RE-ENTRY SYSTEMS DEPT.	MODEL		SHEET
737377		SRV		10 OF 43
REVISION NO. G	SYSTEMS QUALITY CONTROL TEST DATA	SEQ. NO.	SECTION	CONTRACT NO. A45
DATE 7-17-67	TEST NOMENCLATURE: MARK 5A SYSTEMS ACCEPTANCE TEST	ASSEMBLY NO. 198R358		SERIAL NO. 726

SPEC PARA.	ITEM	STIMULUS OR EVENT	REQUIRED RESPONSE	OBSERVATION	PASS-FAIL
2.2.2		Recovery Subsystem Test			
2.2.2.1		Continuity Test	No Failures		
2.2.2.2		Hipot & Megger Test	No Failures		
2.2.2.3		Power Supply Settings			
		Power Supply #1	28.5 to 29.5 VDC	29.24 VDC	Pass
		Power Supply #2	14.0 to 15.0 VDC	14.70 VDC	Pass
		Power Supply #3	25.5 to 26.5 VDC	26.11 VDC	Pass
		T.M. Int. Supply	27.5 to 28.5 VDC	28.05 VDC	Pass
2.2.4		Diode Resistance Test			
		Positive Negative			
		W2J1-X To W2J1-CC	150 Ohms Max.	120 Ohms	Pass
		W2J1-M To W2J1-CC	150 Ohms Max.	120 Ohms	Pass
		W2J1-CC To W2J1-X	10K Ohms Min.	> 10K Ohms	Pass
		W2J1-CC To W2J1-M	10K Ohms Min.	> 10K Ohms	Pass

TESTER [redacted]
ENGINEERING
DATE

REMARKS

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STANDING INSPECTION NO.	GENERAL ELECTRIC — RE-ENTRY SYSTEMS DEPT.	MODEL		SHEET
237377		SRV		11 OF 43
REVISION NO. G	SYSTEMS QUALITY CONTROL TEST DATA	SEQ. NO	SECTION	CONTRACT NO. A45
DATE 7-17-'67	TEST NOMENCLATURE: MARK 5A SYSTEMS ACCEPTANCE TEST	ASSEMBLY NO. 198R358		SERIAL NO. 726

S-I PARA.	ITEM	STIMULUS OR EVENT	REQUIRED RESPONSE	OBSERVATION	PASS-FAIL
2.2.2.8		Ambient Telemetry Test			
	9	T.M H.V. On	T/M Operative	T/M OPERATIVE	PASS
			Beacon Operative	BEACON OPERATIVE	PASS
	10	Telemetry Reset	T/M Inoperative	T/M INOPERATIVE	PASS
	11	Command Reset	Beacon Inoperative	BEACON INOPERATIVE	PASS
2.2.2.9		Agena Telemetry Signals			
	4	Battery #1 Signal (14.5VDC)	4.53 to 5.13 VDC	4.84 VDC	PASS
		Battery #1 Signal (12 VDC)	3.70 to 4.30 VDC	4.01 VDC	PASS
	5	Battery #2 Signal (14.5VDC)	4.53 to 5.13 VDC	4.74 VDC	PASS
		Battery #2 Signal (12 VDC)	3.70 to 4.30 VDC	3.94 VDC	PASS
[redacted]	8	W/S T/M Signal			
		(All In Condition)	5.15 to 5.55 VDC	5.38 VDC	PASS
		W/S T/M Signal			
		(Dimple Motors Out)	4.07 to 4.47 VDC	4.35 VDC	PASS

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TESTER [redacted]

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STANDING [illegible] TION NO. 23/377	GENERAL ELECTRIC — RE-ENTRY SYSTEMS DEPT.	MODEL SRV		SHEET 12 OF 43
REVISION NO. G	SYSTEMS QUALITY CONTROL TEST DATA	SEQ. NO.	SECTION	CONTRACT NO. A45
DATE 7-17-67	TEST NOMENCLATURE MARK 5A SYSTEMS ACCEPTANCE TEST	ASSEMBLY NO. 198R358		SERIAL NO. 726

S-I PARA.	ITEM	STIMULUS OR EVENT	REQUIRED RESPONSE	OBSERVATION	PASS-FAIL
	11	W/S T/M Signal			
		(W/S Out Condition)	2.94 to 3.34 VDC	3.16 VDC	Pass
	13	W/S T/M Signal			
		(All Out Condition)	1.62 to 2.02 VDC	1.83 VDC	Pass
2.2.2.10		Recovery Circuit Resistance			
	16	2A1P4-D or E To	Total Resistance		
		2A1P4-G or H	must be less than .83 Ohms	.50 Ohms	Pass
		2A1P3-D or E To	Total Resistance		
		2A1P3-G or H	must be less than .83 Ohms	.50 Ohms	[redacted]
[redacted]					
	17	Positive Negative			
		2A1P4-E To P355-6	25 to 150 Ohms	70 Ohms	
		P355-6 To 2A1P4-E	Greater than 10M Ohms	> 10 M Ohms	
		2A1P3-D To P355-6	25 to 150 Ohms	70 Ohms	Pass
		P355-6 To 2A1P3-D	Greater than 10M Ohms	> 10 M Ohms	Pass

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TESTER [redacted]
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STANDING INSTRUCTION NO. 237377	GENERAL ELECTRIC — RE-ENTRY SYSTEMS DEPT.	MODEL SRV	SHEET 13 OF 43
REVISION NO. G	SYSTEMS QUALITY CONTROL TEST DATA	SEQ. NO. / SECTION	CONTRACT NO. A45
DATE 7-18-'67	TEST NOMENCLATURE MARK 5A SYSTEMS ACCEPTANCE TEST	ASSEMBLY NO. 198R358	SERIAL NO. 726

S-1 PARA.	ITEM	STIMULUS OR EVENT	REQUIRED RESPONSE	OBSERVATION	PASS-FAIL
2.2.2.11		Recovery Circuit #1 Test			
	6	Battery #1 Voltage	14.5 to 15.0 VDC	14.67 VDC	Pass
	13	K7 K8 Time	32.5 to 35.5 Sec	33.93 Sec	Pass
		K9 K10 Time	32.5 to 35.5 Sec	33.56 Sec	Pass
2.2.2.12		Recovery Circuit #2 Test			
	7	Battery #2 Voltage	14.5 to 15.0 VDC	14.67 VDC	Pass
	13	K7 K8 Time	32.5 to 35.5 Sec	33.77 Sec	Pass
		K9 K10 Time	32.5 to 35.5 Sec	33.77 Sec	Pass
	[redacted]	Ballast Cutter Time	25 to 31 Sec	• Sec	
2.2.2.13		Circuit K7 and K10 Test			
	7	Battery #1 Voltage	14.5 to 15.0 VDC	14.67 VDC	Pass
		Battery #2 Voltage	14.5 to 15.0 VDC	14.68 VDC	Pass
	16	K7 K8 Time	32.5 to 35.5 Sec	33.96 Sec	Pass
		K9 K10 Time	No Indication	No Indication	Pass
		Ballast Cutter Time	25 to 31 Sec	Sec	

TESTER [redacted]
ENGINEERING

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STANDING INS[illegible]TION NO. 237377
REVISION NO. G
DATE 7-18-67

GENERAL ELECTRIC — RE-ENTRY SYSTEMS DEPT.

SYSTEMS QUALITY CONTROL TEST DATA

TEST NOMENCLATURE: MARK 5A SYSTEMS ACCEPTANCE TEST

MODEL: SRV
SEC. NO. -
SECTION:
SHEET 14 OF 43
CONTRACT NO. A45
ASSEMBLY NO. 198R358
SERIAL NO. 726

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S-I PARA.	ITEM	STIMULUS OR EVENT	REQUIRED RESPONSE	OBSERVATION	PASS-FAIL
2.2.2.14		Circuit K8 and K9 Test			
	7	Battery #1 Voltage	14.5 to 15.0 VDC	14.66 VDC	Pass
		Battery #2 Voltage	14.5 to 15.0 VDC	14.66 VDC	Pass
	16	K7 K8 Time	32.5 to 35.5 Sec	33.97 Sec	Pass
		K9 K10 Time	No Indication	No Indication	Pass
		Ballast Cutter Time	25 to 31 Sec.	Sec.	
2.2.2.15		Complete Recovery Test			
	8	Battery #1 Voltage	14.5 to 15.0 VDC	14.66 VDC	Pass
		Battery #2 Voltage	14.5 to 15.0 VDC	14.66 VDC	Pass
	16	Beacon Light	52 to 75 FPM	56 FPM	Pass
	17	K7 K8 Time	32.5 to 35.5 Sec	33.91 Sec	Pass
		K9 K10 Time	32.5 to 35.5 Sec	33.56 Sec	Pass
		Ballast Cutter Time	25 to 31 Sec	Sec	
		Light Indications	Per S.I. Para. 2.2.2	Per S.I Para.2.2.2	Pass

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TESTER [redacted]
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...TION NO. 2.7377	GENERAL ELECTRIC — RE-ENTRY SYSTEMS DEPT.	MODEL SRV	SHEET 15 OF 43
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DATE 7-18-'67	TEST NOMENCLATURE MARK 5A SYSTEMS ACCEPTANCE TEST	ASSEMBLY NO. 198R358	SERIAL NO. 726

S-I PARA.	ITEM	STIMULUS OR EVENT	REQUIRED RESPONSE	OBSERVATION	PASS-FAIL
	21	Operations Monitor			
		1 - Timing	Occur	Occur	Pass
		2 - Command Reset	Occur	Occur	Pass
		3 - Arm Signal	Occur	Occur	Pass
		4 - Arm Ckt. 1	Occur	Occur	Pass
		5 - Arm Ckt. 2	Occur	Occur	Pass
		9 - Transfer Signal	Occur	Occur	Pass
		10 - Transfer Ckt.	Occur	Occur	Pass
		11 - W/S #1	Occur	Occur	Pass
		15 - T/M Battery	Occur	Occur	Pass
		21 - 3G Sw. Closed	Occur	Occur	Pass
		22 - 3G Sw. Open	Occur	Occur	Pass
		23 - Piston Ckt. 1	Occur	Occur	Pass
		24 - Piston Ckt. 2	Occur	Occur	Pass
		25 - Piston Event	Occur	Occur	Pass
		26 - Beacon Light	Occur	Occur	Pass
		30 - Timing	Occur	Occur	Pass

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TESTER [redacted]
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STANDING INST. / REVISION NO.	GENERAL ELECTRIC — RE-ENTRY SYSTEMS DEPT.	MODEL	SHEET
237377	SYSTEMS QUALITY CONTROL TEST DATA	SRV	33 OF 43
REVISION NO.: G		SEQ. NO.: / SECTION:	CONTRACT NO.: A45
DATE: 7-18-'67	TEST NOMENCLATURE: MARK 5A SYSTEMS ACCEPTANCE TEST	ASSEMBLY NO.: 198R358	SERIAL NO.: 726

PARA.	ITEM	STIMULUS OR EVENT	REQUIRED RESPONSE	OBSERVATION	PASS-FAIL
2.2.11		Recovery Vehicle Post OA			
		Systems Test			
		T/C [illegible]			
2.2.11.1	3	Power Supply Settings			
		Power Supply #1	28.5 to 29.5 VDC	29.15 VDC	Pass
		Power Supply #2	14.0 to 15.0 VDC	14.75 VDC	Pass
		Power Supply #3	25.5 to 26.5 VDC	26.06 VDC	Pass
		Telemetry Supply	27.5 to 28.5 VDC	28.10 VDC	Pass
		Thermal Battery Supply	27.5 to 28.5 VDC	28.12 VDC	Pass
2.2.3.10		Circuit Resistances			[redacted]
[redacted]		Command #1			
		Pins FF to HH	.3 to .5 Ohms	Ohms	
		Command #2			
		Pins v to u	.3 to .5 Ohms	Ohms	
		Arm #1			
		Pins X to Y	3.2 to 5.2 Ohms	Ohms	

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...NDING INSTR... ...ION NO. 237377	GENERAL ELECTRIC — RE-ENTRY SYSTEMS DEPT.	MODEL SRV		SHEET 34 OF 43
...VISION NO. G	SYSTEMS QUALITY CONTROL TEST DATA	SEQ. NO.	SECTION	CONTRACT NO. - A45
...TE 7-18-'67	TEST NOMENCLATURE MARK 5A SYSTEMS ACCEPTANCE TEST	ASSEMBLY NO. 198R358		SERIAL NO. 726

...-I PARA.	ITEM	STIMULUS OR EVENT	REQUIRED RESPONSE	OBSERVATION	PASS-FAIL
		Arm #2			
		Pins M to N	540 to 660 Ohms	Ohms	
		Transfer #1			
		Pins G to H	1.2 to 1.8 Ohms	Ohms	
		Transfer #2			
		Pins s to t	1.2 to 1.8 Ohms	Ohms	
2.2.3.38		Timer Readings			
		Timer 1	140 to 220 Sec	170 Sec	Pass
		Timer 2	85 to 135 Sec	121 Sec	Pass
		Timer 3	2058 to 2142 Sec	2095 Sec	Pass
		Timer 4	85 to 135 Sec	109 Sec	Pass
		Light Indications	Per S.I. Para. 2.2.3.37	Per S.I. Para. 22337	Pass

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TESTER [redacted]
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[illegible]NDING INSTR[illegible]ION NO. 237377	GENERAL ELECTRIC — RE-ENTRY SYSTEMS DEPT.	MODEL SRV	SHEET 35 OF 43
[illegible]VISION NO. G	SYSTEMS QUALITY CONTROL TEST DATA	SEQ. NO. / SECTION	CONTRACT NO. A45
[illegible]ATE 7-18-'67	TEST NOMENCLATURE MARK 5A SYSTEMS ACCEPTANCE TEST	ASSEMBLY NO. 198R358	SERIAL NO. 726

S-I PARA.	ITEM	STIMULUS OR EVENT	REQUIRED RESPONSE	OBSERVATION	PASS-FAIL
2.2.3.44		Telemetry Data	Nominal Level		
		2.3KC Ambient	1.50 VDC	1.53 VDC	Pass
		Timer 1	3.00 VDC	3.06 VDC	Pass
		Timer 2	2.00 VDC	2.21 VDC	Pass
		Timer 3	3.75 VDC	4.08 VDC	Pass
		Timer 4	2.00 VDC	2.29 VDC	Pass
2.2.3.21		Timer Readings	3.4 ± 3		
	73	T1 Spin	3.1 to 3.7 Sec 7.55 ± .45	3.29 Sec	Pass
	[redacted]	T2 Retro	T1 + 7.1 to 8.0 Sec	T1+ 7.39 Sec	Pass
		T3 Despin	T2 + 10.2[illegible] to 11.29 Sec.	T2+ 10.60 Sec	Pass
		T4 Disc & Bolt	~~[illegible]~~ to 1.65 Sec	~~T3+ 1.48~~ Sec	Pass
		K7 K8	32.5 to 35.5 Sec	33.97 Sec	Pass
		K9 K10	32.5 to 35.5 Sec	33.59 Sec	Pass
		Ballast Cutter	25 to 31 Sec	Sec	
		Light Indications	Per S.I. Para. 2.2.3.21	Per S.I. PARA 2.2.3.21	Pass

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REMARKS

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STANDING INSTRUCTION NO.	GENERAL ELECTRIC — RE-ENTRY SYSTEMS DEPT.	MODEL	SHEET
237377		SRV	36 OF 43
REVISION NO. G	SYSTEMS QUALITY CONTROL TEST DATA	SEQ. NO. / SECTION	CONTRACT NO. A45
DATE 7-18-'67	TEST NOMENCLATURE: MARK 5A SYSTEMS ACCEPTANCE TEST	ASSEMBLY NO. 198R358	SERIAL NO. 726

S-I PARA.	ITEM	STIMULUS OR EVENT	REQUIRED RESPONSE	OBSERVATION	PASS-FAIL
2.2.3.25		Operations Monitor			
		1 - Timing	Occur	Occur	Pass
		2 - Command Reset	Occur	Occur	Pass
		3 - Arm Signal	Occur	Occur	Pass
		4 - Arm Ckt 1	Occur	Occur	Pass
		5 - Arm Ckt. 2	Occur	Occur	Pass
		9 - Transfer Signal	Occur	Occur	Pass
		10 - Transfer Ckt.	Occur	Occur	Pass
		11 - W/S #1	Occur	Occur	Pass
		12 - Thermal Battery #1	Occur	Occur	Pass
	[redacted]	13 - Thermal Battery #2	Occur	Occur	Pass
		15 - TM Battery	Occur	Occur	Pass
		16 - Continuity Loop	Occur	Occur	Pass
		17 - Spin	Occur	Occur	Pass
		18 - Retro	Occur	Occur	Pass
		19 - Despin	Occur	Occur	Pass
		20 - Disc & Bolts	Occur	Occur	Pass

TESTER [redacted]
ENGINEERING [redacted]

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AT:
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STANDING IN[STRUCTION] NO. 227377	GENERAL ELECTRIC — RE-ENTRY SYSTEMS DEPT.	MODEL SRV		SHEET 37 OF 43
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S-I PARA.	ITEM	STIMULUS OR EVENT	REQUIRED RESPONSE	OBSERVATION	PASS-FAIL
		21 - 3G Sw Closed	Occur	Occur	Pass
		22 - 3G Sw Open	Occur	Occur	Pass
		23 - Piston Ckt 1	Occur	Occur	Pass
		24 - Piston Ckt 2	Occur	Occur	Pass
		25 - Piston Event	Occur	Occur	Pass
		26 - Beacon Light	Occur	Occur	Pass
		27 - Plug Supervision	Occur	Occur	Pass
		30 - Timing	Occur	Occur	Pass
2.2.3.		Telemetry Data	Nominal Level *		
		2.3KC Retro	3.00 VDC	2.97 VDC	Pass
		Despin	5.00 VDC	5.10 VDC	Pass
		T.C. Off	2.20 VDC	2.21 VDC	Pass
		G Sw Closed	3.20 VDC	3.23 VDC	Pass
		G Sw Open	2.20 VDC	2.21 VDC	Pass
		K9 Activate	4.10 VDC	3.91 VDC	Pass
		K9 Reset	2.20 VDC	2.21 VDC	Pass

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TESTER [redacted]
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REMARKS

~~Slave~~ Telemetry Tray Serial No. 1005 .

* Event Levels Measured Only To Establish System Compatibility

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437377		SRV		38 OF 43
REVISION NO. G . L	SYSTEMS QUALITY CONTROL TEST DATA	SEQ. NO.	SECTION	CONTRACT NO. A45
DATE 7-18-'67	TEST NOMENCLATURE MARK 5A SYSTEMS ACCEPTANCE TEST	ASSEMBLY NO. 198R358		SERIAL NO. 726

S-I PARA.	ITEM	STIMULUS OR EVENT	REQUIRED RESPONSE	OBSERVATION	PASS-FAIL
		3.9KC T.C. Battery	0.85 VDC	1.02 VDC	Pass
		Agena Disc.	2.20 VDC	2.21 VDC	Pass
		Spin	4.40 VDC	4.33 VDC	Pass
		T.C. Off	2.00 VDC	1.95 VDC	Pass
		K10 Activate	2.75 VDC	2.80 VDC	Pass
		Para Cover Off	4.90 VDC	5.01 VDC	Pass
		K10 Reset	3.40 VDC	3.40 VDC	Pass
		Agena Telemetry Signals			
	4	Battery #1 Signal	4.53 to 5.13 VDC	VDC	
		Battery #2 Signal	4.53 to 5.13 VDC	VDC	
	[redacted]	W/S T/M Signal	1.62 to 2.02 VDC	VDC	[redacted]
		Beacon Light	52 to 75 FPM	FPM	
		Recovery Circuit Resistance			
		2A1P4-D or E To	Total Resistance		
		2A1P4-G ro H	Must be less than .83 Ohms	Ohms	

TESTER [redacted]
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REMARKS

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FORM RS 1303 (2-64)

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SECRET

[redacted]

Project Engr.

Rm. 6405

[redacted]

[redacted]

DATE SENT: 8/24/67

TA

[redacted]

SUBJECT

Inertia Switch and Accelerometer Testing

INFORMATION

Per your request, Inertia Switch S/N 69, Dwg. 111C5548 from TA Recovery Tray, Dwg. 47E189361G2 was bench tested per SI 24636, para. 2.5. In addition, the Inertia Switch ramp rates were varied from 1G/7 seconds to: 1G/4 seconds, 1G/10 seconds, and at random ramp rates between those two limits. The data obtained conclusively shows proper operation at all ramp rates, with absolutely no chatter, or intermittent operation.

The 5 VDC Potentiometric Accelerometer also from Recovery Tray, was tested for linearity and hysteresis on the 24" radius accelerator. The data obtained shows near perfect linearity and very little hysteresis. The accelerometer appears to be functioning properly.

The Inertia Switch and Accelerometer test data is enclosed for your review.

[redacted]

[redacted]

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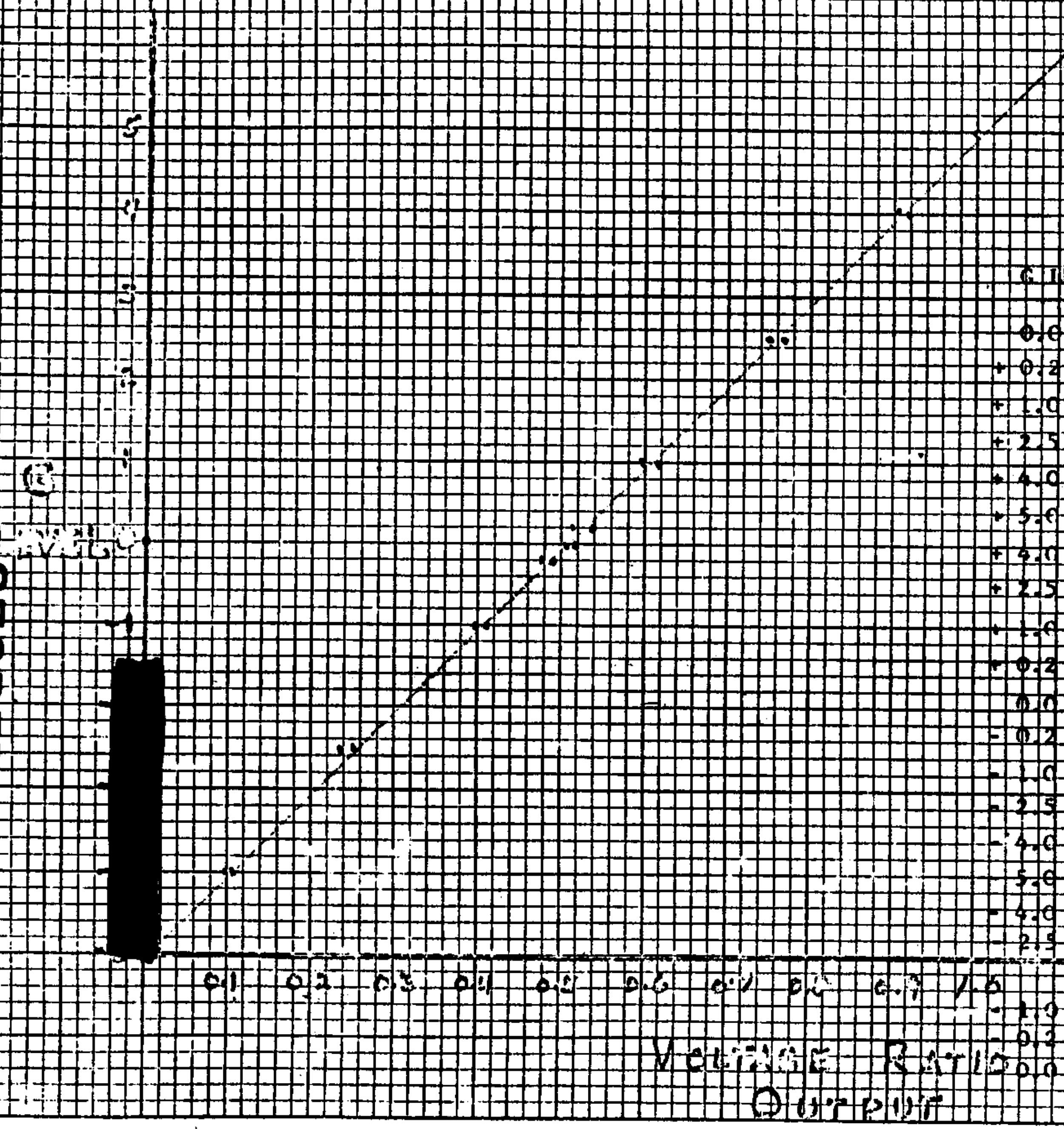
77

1 of 1

SECRET [redacted]



G LEVEL	RPM	V/R Output
0.0	0	.518
+ 0.2	17.1	.540
+ 1.0	38.3	.617
+ 2.5	60.6	.766
+ 4.0	76.6	.918
+ 5.0	85.6	1.000
+ 4.0	76.6	.906
+ 2.5	60.6	.750
+ 1.0	38.3	.596
+ 0.2	17.1	.515
0.0	0	.503
- 0.2	17.1	.489
- 1.0	38.3	.411
- 2.5	60.6	.250
- 4.0	76.6	.105
- 5.0	85.6	.013
- 4.0	76.6	.099
- 2.5	60.6	.237
- 1.0	38.3	.394
- 0.2	17.1	.474
0.0	0	.495

[redacted]

SECRET

RE-ENTRY SYSTEMS DEPARTMENT

PERFORMANCE DATA [redacted]

~~SECRET~~

UNCLASSIFIED

SITE REPT. NO.	PART NOMENCLATURE	DRAWING NO.	REV.	RSD SER. NO.	VENDOR SER. NO.
3A 1	Inertia Switch 2	111C5548 3	B 4	5	69 6

REF RPT NO.	LEV	TYPE	PROGRAM	VENDOR NO.	P.O. NUMBER	U.C.I.	MFG. DATE
7	FC 8	OA 9	10	11	NA 12	NONE 13	14

S I NUMBER	S I REV.	S I CIS	SETS	ALS NO.	PDS REV.	PDS REV. DATE
24636 15	8 16	NONE 17	"NN" 18	19	E 20	1/13/66 21

EQUIPMENT NAME 22	MAKE 23	MODEL NO. 24	IDENT. NO. 25	CAL. DUE 26
Circuit Tester				
DC Power Supply	LAMDA	LH124FM	501256	6-13-65
Digital Voltmeter	NLS	481	BAC232	7-26-67
Test Panel	RSD	SKHB1086-1	BA1311	3-29-68
CURRENT ~~Chatter~~ Indicator	RSD	SKHB1086-1	BA1311	3-29-68
PWR SUPPLY	U/E		BAC1280	3-17-67
ACCELLERATOR	SCHAEVITZ	M2A	BAC233	NCR
RPM COUNTER	H/P	~~H43-5~~	BAC232	5-20-67
		H43-521CR	BA1387	5-19-67

S I PARA. 27	TEST DATE 28	ENVIRONMENT 29	TEST NO. 30	CODE 31	COND. 32	TIME HRS 33	TIME MIN 34	TIME CYC 35	P/F 36	FAILURE DOC. 37
3.1.1	7-24-67	Bench	8	E1	C	NA	NA	12	P	NA
3.1.2	NA	High Temp	NA	AJ	A			NA	NA	NA
3.1.2.2	↓	High Temp	↓	AJ	C	NA	NA		↓	↓
3.1.3.2	↓	Vibration	↓	HC	B			NA	↓	↓
3.1.4.1	↓	Low Temp	↓	AZ	A			NA	↓	↓
3.1.4.2	↓	Low Temp	↓	AZ	C	NA	NA		↓	↓
3.1.5	↓	Final Bench	↓	E1	C	NA	NA		↓	↓

REMARKS: 38 [redacted] 39

(A) CHANGE IN SPEED PRESENT'S NO SERIOUS CHANGE IN OPENING OR CLOSING POINT.

(B) ALL READING'S ARE WITHIN SPEC ~~SECRET~~

NO CHATTER OBSERVED.

[redacted]	DATE	Q.C. ENG. SIGNATURE	DATE	ACC	REJ
40	7/24/67 41	42	43	44	45

FORM RS 1676 E (1-65) HO

PERFORMANCE DATA SHEET (CONTINUATION)
ACCEPTANCE – Q. A.

FORM 7-2020F REV. (12-61)

REPORT NO./NOMENCLATURE	DRAWING NO.	REV.	SCHEMATIC NO.	REV.	SECURITY CLASS	PAGE
DA ... Switch	111C5548/	13	NA	NA	UNCLASSIFIED	2 OF

[illegible]	D.O.S. REV.	G.E. SERIAL NO.	VENDOR SERIAL NO.	P.O. – DWG. NO.	G.C.E. SIGNATURE/TESTER SIGNATURE
7	E		69		RMC

Speed 16/10 sec

S.I. PARA.	DESCRIPTION OF TEST	UNIT OF MEAS.	CLASS OF CHAR.	SPECIFICATION BENCH – POST TEMP/VIB TOLERANCE	BENCH – POST TEMP/VIB REV. TOL.	ACTUAL READINGS BENCH 1	BENCH 2	BENCH 3	Post. Env. 1	Post. Env. 2	Post. Env. 3	SPECIFICATION DURING TEMP./VIB. TOLERANCE	DURING TEMP./VIB. REV. TOL.	ACTUAL READING During Environment Hi Temp	Lo Temp
	INDIVIDUAL SWITCH NO.														
						NA	NA	NA	NA	NA	NA			NA	NA
2.5.1	Visual Inspection	None	0	OK/NG		ok	NA	NA	NA	NA	NA			NA	NA
2.5.2	Insulation Resis.	Megohm	0	20 Min.		ok	NA	NA		NA	NA	OK/NG		NA	NA
2.5.3.1	Test Current IT	MA	0	85 max		N/A	NA	NA		NA	NA	20 Min		NA	NA
	Volt Drop VT	Volts	0	None		NA	NA	[illegible]	NA	NA		85 max			
	Res. RT = VT/IT	Ohms	0	None		NA	NA	.010	NA	NA		None			
2.5.3.2	Pre-Actuation	MA	N	No current		NA	NA	1.8	NA	NA		None			
2.5.3.3	Actuation Accuracy	RPM	C	135.3 to	144.9	NC	NC	NC				No Current		NC	
2.5.3.4	Test Current Isr	MA	0	85 max 3.15	3.15	143	143	143				135.3 to	144.9		
	Volt Drop Vsr	Volts	0	None		NA	NA	50	NA	NA		85 max			
	Res. Rsr=Vsr/Isr	Ohms	0	None		NA	NA	.020	NA	NA		None			
2.5.3.5	RS = Rt – Rsr	Ohms	0	5 max		NA	NA	1.0	NA	NA		None			
2.5.3.6	Hi-G Acceleration	MA	M	1 max		NA	NA	0.5	NA	NA		5 max			
2.5.3.7	Re-Actuation	RPM	C	135.3 to	144.9	/	/	/				1 max			
						140	140	140				135.3 to	144.9	±6%	
	INDIVIDUAL SWITCH NO.	656													

16/10 sec

S.I. PARA.	DESCRIPTION OF TEST	UNIT OF MEAS.	CLASS OF CHAR.	BENCH TOLERANCE	BENCH REV. TOL.	BENCH 1	BENCH 2	BENCH 3	Post. Env. 1	Post. Env. 2	Post. Env. 3	DURING TOLERANCE	DURING REV. TOL.	Hi Temp	Lo Temp
2.5.1	Visual Inspection	None	0	OK/NG		ok	NA	NA		NA	NA	OK/NG		NA	[redacted]
2.5.2	Insulation Resis.	Megohm	0	20 min	NA	~~ok~~ NA	NA		NA	NA	NA	20 min		NA	
2.5.3.1	Test Current IT	MA	0	85 max		NA	NA	50	NA	NA		85 max			
	Volt Drop VT	Volts	0	None		NA	NA	.050	NA	NA		None			
	Res. RT = VT/IT	Ohms	0	None		NA	NA	1.0	NA	NA		None			
2.5.3.2	Pre-Actuation	MA	N	No current		NC	NC	NC				No current			
2.5.3.3	Actuation Accuracy	RPM	C	135.3 to	144.9	142	142	142				135.3 to	144.9		
2.5.3.4	Test Current Isr	MA	0	85 max		NA	NA	50	NA	NA		85 max			
	Volt Drop Vsr	Volts	0	None		NA	NA	.050	NA	NA		None			
	Res. Rsr=Vsr/Isr	Ohms	0	None		NA	NA	1.0	NA	NA		None			
2.5.3.5	Rs = Rt – Rsr	Ohms	0	5 max		NA	NA	0.0	NA	NA		5 max			
2.5.3.6	Hi-G Acceleration	MA	M	1 max		/	/	/				1 max			
2.5.3.7	Re-Actuation	RPM	C	135.3 to	144.9	140	141	140				135.3 to	144.9		
	Tunnel #	656													

REMARKS:

SECRET

SECRET

SECRET

PERFORMANCE DATA SHEET (CONTINUATION)
ACCEPTANCE — Q. A.

FORM 7-9000 REV. (12-61)

REPORT NO.	NOMENCLATURE	DRAWING NO.	REV.	SCHEMATIC NO.	REV.	SECURITY CLASS	PAGE
RA	Inertia Switch	111C5548/	B	NA	NA	UNCLASSIFIED	3 OF 3

S.I. NO.	REV.	P.D.S. REV.	G.E. SERIAL NO.	VENDOR SERIAL NO.	P.O. - DWO. NO.	Q.C.E. SIGNITURE	TESTER SIGNITURE
24636		E		69			RWC

S.I. PARA.	DESCRIPTION OF TEST	UNIT OF MEAS.	CLASS OF CHAR.	SPECIFICATION BENCH - POST TEMP/VIB TOLERANCE	REV. TOL.	ACTUAL READINGS (Speed 1G/1 sec) BENCH 1	BENCH 2	BENCH 3	Post Env. 1	Post Env. 2	Post Env. 3	SPECIFICATION DURING TEMP./VIB. TOLERANCE	REV. TOL.	ACTUAL READINGS During Environmen. Hi Temp	Lo Temp
	INDIVIDUAL SWITCH NO.					1	2	3	1	2	3			NA	NA
						NA	NA	NA	NA	NA	NA			NA	NA
2.5.1	Visual Inspection	None	0	OK /NG		ck	NA	NA		NA	NA	OK/NG		NA	NA
2.5.2	Insulation Resis.	Megohm	0	20 min		W/I	NA	NA		NA	NA	20 min		NA	NA
2.5.3.1	Test Current I_T	MA	0	85 max		NA	NA	52	NA	NA		85 max			
	Volt Drip V_T	Volts	0	None		NA	NA	.094	NA	NA		None			
	Res. $R_T=V_T/I_T$	Ohms	0	None		NA	NA	1.8	NA	NA		None			
2.5.3.2	Pre-Actuation	MA	M	No current		NC	NC	NC				No current			
2.5.3.3	Actuation Accuracy	RPM	C	135.3 to	144.9	142	142	14				135.3 to	144.9		
2.5.3.4	Test Current Isr	MA	0	85 max		NA	NA	50	NA	NA		85 max			
	Volt Drop Vsr	Volts	0	None		NA	NA	.050	NA	NA		None			
	Res. Rsr=Vsr/Isr	Ohms	0	None		NA	NA	1.0	NA	NA		None			
2.5.3.5	Rs = Rt - Rsr	Ohms	0	5 max		NA	NA	0.5	NA	NA		5 max			
2.5.3.6	Hi-G [redacted]Acceleration	MA	M	1 max		/	/	/				1 max		[redacted]	
2.5.3.7	Re[redacted]uation	RPM	C	135.3 to	144.9	139	139	139				135.3 to	144.9		
(3)															
	[redacted]DUAL SWITCH NO.		690	Speed 1G/10sec											
2.5.1	Vi[redacted] Inspection	None	0	OK/NG		ck	NA	NA		NA	NA	OK/NG		NA	NA
2.5.2	Ins[redacted]tion Resis.	Megohm	0	20 min		NA	NA	NA		NA	NA	20 min		NA	NA
2.5.3.1	Tes[redacted]rrent I_T	MA	0	85 max		NA	NA	50	NA	NA		85 max			
	Vol[redacted]ip V_T	Volts	0	None		NA	NA	.090	NA	NA		None			
	Res[redacted]$=V_T/I_T$	Ohms	0	None		NA	NA	1.8	NA	NA		None			
2.5.3.2	Pre[redacted]uation	MA	M	No current		NC	NC	NC				No current			
2.5.3.3	Act[redacted]on Accuracy	RPM	C	135.3 to	144.9	143	143	14				135.3 to	144.9		
2.5.3.4	Test Current Isr	MA	0	85 max		NA	NA	50	NA	NA		85 max			
	Volt Drop Vsr	Volts	0	None		NA	NA	.050	NA	NA		None			
	Res. Rsr-Vsr/Isr	Ohms	0	None		NA	NA	1.0	NA	NA		None			
2.5.3.5	Rs = Rt - Rsr	Ohms	0	5 max		NA	NA	0.8	NA	NA		5 max			
2.5.3.6	Hi-G Acceleration	MA	M	1 max		/	/	/				1 max			
2.5.3.7	Re-Actuation	RPM	C	135.3 to	144.9	140	140	140				135.3 to	144.9		
(2)															
	Switch #	194													

REMARKS:

(5)

SECRET

PERFORMANCE DATA SHEET (CONTINUATION)
ACCEPTANCE — Q. A.

4 5

FORM 7-5037F REV. (12-61)

REPORT NO.	NOMENCLATURE	DRAWING NO.	REV.	SCHEMATIC NO.	REV.	SECURITY CLASS	PAGE
3A	Inertia Switch	111C5540	B	NA	NA	UNCLASSIFIED	2 OF 2

S.I. NO.	REV.	P.O.S. REV.	G.E. SERIAL NO.	VENDOR SERIAL NO.	P.O. - DWO. NO.	Q.C.E. SIGNITURE	TESTER SIGNITURE
24636	5	E		69			BAC

SECRET

S.I. PARA.	DESCRIPTION OF TEST	UNIT OF MEAS.	CLASS OF CHAR.	SPECIFICATION BENCH - POST TEMP/VIB TOLERANCE	REV. TOL.	ACTUAL READINGS (Speed 16/4 sec) BENCH 1	BENCH 2	BENCH 3	Post. Env. 1	Post. Env. 2	Post. Env. 3	SPECIFICATION DURING TEMP./VIB. TOLERANCE	REV. TOL.	ACTUAL READINGS During Environment Hi Temp	Lo Temp
	INDIVIDUAL SWITCH NO.					1	2	3	1	2	3			NA	NA
						NA	NA	NA	NA	NA	NA			NA	NA
2.5.1	Visual Inspection	None	0	OK/NG		ok	NA	NA		NA	NA	OK/NG		NA	NA
2.5.2	Insulation Resis.	Megohm	0	20 Min.		NA	NA	NA		NA	NA	20 Min		NA	NA
2.5.3.1	Test Current I_T	MA	C	85 max		NA	NA	50	NA	NA		85 max			
	Volt Drip V_T	Volts	C	None		NA	NA	.070	NA	NA		None			
	Res. $R_T = V_T/I_T$	Ohms	0	None		NA	NA	1.5	NA	NA		None			
2.5.3.2	Pre-Actuation	MA	M	No current		NC	NC	NC				No Current			
2.5.3.3	Actuation Accuracy	RPM	C	135.3 to	144.9	143	143	143				135.3 to	144.9		
2.5.3.4	Test Current Isr	MA	0	85 max		NA	NA	50	NA	NA		85 max			
	Volt Drop Vsr	Volts	0	None		NA	NA	.050	NA	NA	-	None			
(1)	Res. Rsr=Vsr/Isr	Ohms	0	None		NA	NA	1.0	NA	NA		None			
2.5.3.5	RS = Rt - Rsr	Ohms	C	5 max		NA	NA	.5	NA	NA	-	5 max			
2.5.3.6	Hi-G Acceleration	MA	M	1 max		/	/	/				1 max			
2.5.3.7	Re-Actuation	RPM	C	135.3 to	144.9	140	140	140				135.3 to	144.9		
	INDIVIDUAL SWITCH NO.		682			Speed 16/4 Sec									
2.5.1	Visual Inspection	None	0	OK/NG		ok	NA	NA		NA	NA	OK/NG		NA	NA
2.5.2	Insulation Resis.	Megohm	0	20 min		NA	NA	NA		NA	NA	20 min		NA	NA
2.5.3.1	[redacted]st Current I_T	MA	0	85 max		NA	NA	50	NA	NA		85 max			[redacted]
	[redacted]lt Drip V_T	Volts	0	None		NA	NA	.050	NA	NA		None			
	[redacted]s. $R_T = V_T/I_T$	Ohms	0	None		NA	NA	1.0	NA	NA		None			
2.5.3.2	[redacted]-Actuation	MA	M	No current		NC	NC	NC				No current			
2.5.3.3	[redacted]tuation Accuracy	RPM	C	135.3 to	144.9	142	142	142				135.3 to	144.9		
2.5.3.4	[redacted]st Current Isr	MA	C	85 max		NA	NA	50	NA	NA		85 max			
	[redacted]lt Drop Vsr	Volts	0	None		NA	NA	.050	NA	NA		None			
(2)	[redacted]s. Rsr=Vsr/Isr	Ohms	0	None		NA	NA	1.0	NA	NA		None			
2.5.3.5	[redacted] = Rt - Rsr	Ohms	0	5 max		NA	NA	.00	NA	NA		5 max			
2.5.3.6	[redacted]G Acceleration	MA	M	1 max		/	/	/				1 max			
2.5.3.7	[redacted]Actuation	RPM	C	135.3 to	144.9	140	141	140				135.3 to	144.9		
	Summit 2		682												

SECRET

REMARKS:

(51)

PERFORMANCE DATA SHEET (CONTINUATION)
ACCEPTANCE – Q. A.

FORM 7-9009F REV. (12-61)

5 5

REPORT NO.	NOMENCLATURE	DRAWING NO.	REV.	SCHEMATIC NO.	REV.	SECURITY CLASS	PAGE
DA	Inertia Switch	111C5548/	B	NA	NA	UNCLASSIFIED	5 OF 5

S.I. NO.	REV.	P.D.S. REV.	G.E. SERIAL NO.	VENDOR SERIAL NO.	P.O. – GWO. NO.	Q.C.E. SIGNITURE	TESTER SIGNITURE
24636	S	E		69		RWC	

SECRET [redacted]

S.I. PARA.	DESCRIPTION OF TEST	UNIT OF MEAS.	CLASS OF CHAR.	SPECIFICATION BENCH – POST TEMP/VIB TOLERANCE	REV. TOL.	ACTUAL READINGS (Speed 1G/4sec) BENCH 1	BENCH 2	BENCH 3	Post Env. 1	Post Env. 2	Post Env. 3	SPECIFICATION DURING TEMP./VIB. TOLERANCE	REV. TOL.	ACTUAL READINGS During Environmen Hi Temp	Lo Temp
	INDIVIDUAL SWITCH NO.													NA	NA
						NA	NA	NA	NA	NA	NA			NA	NA
2.5.1	Visual Inspection	None	0	OK /NG		ok	NA	NA		NA	NA	OK/NG		NA	NA
2.5.2	Insulation Resis.	Megohm	0	20 min		NA	NA	NA		NA	NA	20 min		NA	NA
2.5.3.1	Test Current I_T	MA	0	85 max		NA	NA	50	NA	NA		85 max			
	Volt Drip V_T	Volts	0	None		NA	NA	[illegible]	NA	NA		None			
	Res. $R_T=V_T/I_T$	Ohms	0	None		NA	NA	1.5	NA	NA		None			
2.5.3.2	Pre-Actuation	MA	M	No current		NC	NC	NC				No current			
2.5.3.3	Actuation Accuracy	RPM	C	135.3 to	144.9	[illegible]	[illegible]	[illegible]				135.3 to	144.9		
2.5.3.4	Test Current Isr	MA	0	85 max		NA	NA	50	NA	NA		85 max			
	Volt Drop Vsr	Volts	0	None		NA	NA	[illegible]	NA	NA		None			
	Res. Rsr=Vsr/Isr	Ohms	0	None		NA	NA	[illegible]	NA	NA		None			
2.5.3.5	Rc = Rt - Rsr	Ohms	0	5 max		NA	NA	[illegible]	NA	NA		5 max			
2.5.3.6	Hi-G Acceleration	MA	M	1 max		/	/	/				1 max			
2.5.3.7	Re-Actuation	RPM	C	135.3 to	144.9	[illegible]	139	[illegible]				135.3 to	144.9		
	INDIVIDUAL SWITCH NO.	690													
2.5.1	[redacted]isual Inspection	None	0	OK/NG		ok	NA	NA		NA	NA	OK/NG		NA	[redacted]
2.5.2	[redacted]ation Resis.	Megohm	0	20 min		NA	NA	NA		NA	NA	20 min		NA	[redacted]
2.5.3.1	[redacted] Current I_T	MA	0	85 max		NA	NA	50	NA	NA		85 max			[redacted]
	[redacted] Drip V_T	Volts	0	None		NA	NA	[illegible]	NA	NA		None			[redacted]
	[redacted] $R_T=V_T/I_T$	Ohms	0	None		NA	NA	1.5	NA	NA		None			[redacted]
2.5.3.2	[redacted]-Actuation	MA	M	No current		NC	NC	NC				No current			[redacted]
2.5.3.3	[redacted]uation Accuracy	RPM	C	135.3 to	144.9	143	143	144				135.3 to	144.9		[redacted]
2.5.3.4	[redacted]t Current Isr	MA	0	85 max		NA	NA	50	NA	NA		85 max			
	[redacted]t Drop Vsr	Volts	0	None		NA	NA	[illegible]	NA	NA		None			
	[redacted]s. Rsr=Vsr/Isr	Ohms	0	None		NA	NA	[illegible]	NA	NA		None			
2.5.3.5	[redacted] = Rt - Rsr	Ohms	0	5 max		NA	NA	[illegible]	NA	NA		5 max			
2.5.3.6	Hi-G Acceleration	MA	M	1 max		/	/	/				1 max			
2.5.3.7	Re-Actuation	RPM	C	135.3 to	144.9	140	140	140				135.3 to	144.9		
	Serial #	690													

SECRET

REMARKS:

(5)

PERFORMANCE DATA SHEET (CONTINUATION)
ACCEPTANCE — O. A.

FORM 7-5030F REV. (12-61)

REPORT NO.	NOMENCLATURE	DRAWING NO.	REV.	SCHEMATIC NO.	REV.	SECURITY CLASS	PAGE
RA	Inertia Switch	11105548/		NA	NA	UNCLASSIFIED	2 OF 3

S.I. NO.	REV.	P.D.S. REV.	G.E. SERIAL NO.	VENDOR SERIAL NO.	P.O. – DWG NO.	Q.C.E. SIGNATURE	TESTER SIGNATURE
24636		E					

SECRET

S.I. PARA.	DESCRIPTION OF TEST	UNIT OF MEAS.	CLASS OF CHAR.	SPECIFICATION BENCH – POST TEMP/VIB: TOLERANCE	REV. TOL.	ACTUAL READINGS: BENCH 1	BENCH 2	BENCH 3	Post. Env. 1	Post. Env. 2	Post. Env. 3	SPECIFICATION DURING TEMP./VIB.: TOLERANCE	REV. TOL.	ACTUAL READINGS During Environmen.: Hi Temp	Lo Temp
	INDIVIDUAL SWITCH NO. A160					1	2	3	1	2	3			NA	NA
						NA	NA	NA	NA	NA	NA			NA	NA
2.5.1	Visual Inspection	None	C	OK/NG		OK	NA	NA		NA	NA	OK/NG		NA	NA
2.5.2	Insulation Resis.	Megohm	O	20 Min.		20K	NA	NA		NA	NA	20 Min		NA	NA
2.5.3.1	Test Current IT	MA	O	85 max		NA	NA	50	NA	NA		85 max			
	Volt Drip VT	Volts	C	None		NA	NA	.074	NA	NA		None			
	Res. RT = VT/IT	Ohms	O	None		NA	NA	.92	NA	NA		None			
2.5.3.2	Pre-Actuation	MA	M	No current		NO	NO	NO				No Current			
2.5.3.3	Actuation Accuracy	RPM	C	135.3 to	144.9	141.6	141.8	141.8				135.3 to	144.9		
2.5.3.4	Test Current Isr	MA	O	85 max		NA	NA	50	NA	NA		85 max			
	Volt Drop Vsr	Volts	O	None		NA	NA	.048	NA	NA		None			
	Res. Rsr=Vsr/Isr	Ohms	C	None		NA	NA	.94	NA	NA		None			
2.5.[illegible]	RS = Rt - Rsr	Ohms	O	5 max		NA	NA	.02	NA	NA		5 max			
2.5.[illegible]	[illegible]-G Acceleration	MA	M	1 max		1	1	1				1 max			
2.5.[illegible]	Re-Actuation	RPM	C	135.3 to	144.9	140.1	140.7	140.6				135.3 to	144.9		
	INDIVIDUAL SWITCH NO. A-686														
2.5.1	Vis[redacted] Inspection	None	O	OK/NG		OK	NA	NA		NA	NA	OK/NG		NA	[redacted]
2.5.2	Ins[redacted]tion Resis.	Megohm	O	20 min		20K	NA	NA		NA	NA	20 min		NA	
2.5.3.1	Te[redacted]urrent IT	MA	O	85 max		NA	NA	50	NA	NA		85 max			
	Vo[redacted]rip VT	Volts	O	None		NA	NA	.076	NA	NA		None			
	R[redacted] = VT/IT	Ohms	O	None		NA	NA	.72	NA	NA		None			
2.5.3.2	P[redacted]ctuation	MA	M	No current		NO	NO	NO				No current			
2.5.3.3	A[redacted]tion Accuracy	RPM	C	135.3 to	144.9	141.8	142.2	142.4				135.3 to	144.9		
2.5.3.4	T[redacted] Current Isr	MA	O	85 max		NA	NA	50	NA	NA		85 max			
	V[redacted] Drop Vsr	Volts	O	None		NA	NA	.040	NA	NA		None			
	R[redacted] Rsr=Vsr/Isr	Ohms	O	None		NA	NA	.60	NA	NA		None			
2.5.3.5	[redacted] Rt - Rsr	Ohms	O	5 max		NA	NA	.08	NA	NA		5 max			
2.5.3.6	[redacted] Acceleration	MA	M	1 max		1	1	1				1 max			
2.5.3.7	Re-Actuation	RPM	C	135.3 to	144.9	140.1	140.5	139.9				135.3 to	144.9		

SECRET

REMARKS:

PERFORMANCE DATA SHEET (CONTINUATION)
ACCEPTANCE — Q. A.

FORM 7-9609F REV. (12-61)

REPORT NO.	NOMENCLATURE	DRAWING NO.	REV.	SCHEMATIC NO.	REV.	SECURITY CLASS	PAGE
BA	Inertia Switch	111C5548/		NA	NA	UNCLASSIFIED	3 OF 3

S.I. NO.	REV.	P.D.S. REV.	G.E. SERIAL NO.	VENDOR SERIAL NO.	P.O. - DWO. NO.	Q.C.E. SIGNATURE	TESTER SIGNATURE
24636		E					

SECRET

S.I. PARA.	DESCRIPTION OF TEST	UNIT OF MEAS.	CLASS OF CHAR.	SPECIFICATION BENCH - POST TEMP./VIB. TOLERANCE	REV. TOL.	ACTUAL READINGS BENCH 1	BENCH 2	BENCH 3	POST ENV. 1	POST ENV. 2	POST ENV. 3	SPECIFICATION DURING TEMP./VIB. TOLERANCE	REV. TOL.	ACTUAL READINGS During Environment Hi Temp	Lo Temp
	INDIVIDUAL SWITCH NO. A690													NA	NA
						NA	NA	NA	NA	NA	NA			NA	NA
2.5.1	Visual Inspection	None	0	OK/NG		OK	NA	NA		NA	NA	OK/NG		NA	NA
2.5.2	Insulation Resis.	Megohm	0	20 min		20K	NA	NA		NA	NA	20 min		NA	NA
2.5.3.1	Test Current I_T	MA	0	85 max		NA	NA	50	NA	NA		85 max			
	Volt Drop V_T	Volts	0	None		NA	NA	.031	NA	NA		None			
	Res. $R_T=V_T/I_T$	Ohms	0	None		NA	NA	.62	NA	NA		None			
2.5.3.2	Pre-Actuation	MA	M	No current		NO	NO	NO				No current			
2.5.3.3	Actuation Accuracy	RPM	C	135.3 to	144.9	140.6	140.6	140.5				135.3 to	144.9		
2.5.3.4	Test Current I_{SR}	MA	0	85 max		NA	NA	50	NA	NA		85 max			
	Volt Drop V_{SR}	Volts	0	None		NA	NA	.034	NA	NA		None			
	Res. $R_{SR}=V_{SR}/I_{SR}$	Ohms	0	None		NA	NA	.68	NA	NA		None			
2.5.3.5	$R_D = R_T - R_{SR}$	Ohms	0	5 max		NA	NA	.06	NA	NA		5 max			
2.5.3.6	Hi-G Acceleration	MA	M	1 max		1	1	1				1 max			
2.5.3.7	Re-Actuation	RPM	C	135.3 to	144.9	135.5	139.6	139.7				135.3 to	144.9		[redacted]
	INDIVIDUAL SWITCH NO. A644														[redacted]
2.5.1	[redacted]l Inspection	None	0	OK/NG		OK	NA	NA		NA	NA	OK/NG		NA	[redacted] NA
2.5.2	[redacted]ation Resis.	Megohm	0	20 min		20K	NA	NA		NA	NA	20 min		NA	[redacted] NA
2.5.3.1	[redacted] Current I_T	MA	0	85 max		NA	NA	50	NA	NA		85 max			[redacted]
	[redacted] Drop V_T	Volts	0	None		NA	NA	.037	NA	NA		None			[redacted]
	[redacted] $R_T=V_T/I_T$	Ohms	0	None		NA	NA	.74	NA	NA		None			[redacted]
2.5.3.2	[redacted]Actuation	MA	M	No current		NO	NO	NO				No current			[redacted]
2.5.3.3	[redacted]ation Accuracy	RPM	C	135.3 to	144.9	141.6	141.6	141.6				135.3 to	144.9		[redacted]
2.5.3.4	[redacted] Current I_{SR}	MA	0	85 max		NA	NA	50	NA	NA		85 max			[redacted]
	[redacted] Drop V_{SR}	Volts	0	None		NA	NA	.044	NA	NA		None			
	[redacted] $R_{SR}=V_{SR}/I_{SR}$	Ohms	0	None		NA	NA	.80	NA	NA		None			
2.5.3.5	[redacted]= $R_T - R_{SR}$	Ohms	0	5 max		NA	NA	.14	NA	NA		5 max			
2.5.3.6	[redacted]C Acceleration	MA	M	1 max		1	1	1				1 max			
2.5.3.7	[redacted]Actuation	RPM	C	135.3 to	144.9	140.7	140.6	140.8				135.3 to	144.9		

SECRET

REMARKS:

SECRET

[redacted]

GENERAL ELECTRIC FORM 2-0809A

PERFORMANCE DATA [redacted] of 2

SITE RPT NO	PART/TEST NOMENCLATURE	DRAWING NO	IN.V/AN	G.E. SER NO	AF/VENDOR SERIAL NO
CA	Parachute Swivel Assy	8870540-62	NA		129

REF. RPT. NO	LEV	TYPE	PROGRAM	VEN NO	SCHEMATIC NO	IN.V/AN	PO/DWO	PO AM	HCN LOT NO
	FC	QU	TA	39848	NA	NA		NA	NA

SI/TR NO	SI REV	NCS/RVS NO	MAT'L LAB RPT	MAT'L CERT	MAT'L LOT
24312	9	NCS 2290	NA	NA	NA

PDS REV	PDS REV DATE	UCI NO	WEIGHT	REQUAL LOT NO	SECURITY CLASS
B	7/24/63			NA	Unclassified

TEST EQUIP. USED

EQUIPMENT NAME	MAKE	MODEL NO	IDENT. NO	CAL DUE DATE
Vibration Machine	↕	↕	↕	↕
Temperature Chamber				
Humidity Chamber				
Load Testing Machine				
Altitude Chamber				

SI PARA	DATE	ENVIRONMENT	CODE	COND	TMR	HRS	MIN	CYCLES	P/F	FAULT ISOL	FAIL DOC NO
3.2.2	NA	High Temp.	AJ	A	NA	NA	NA	NA	NA	NA	NA
3.2.3	↓	Low Temp	B7	A	NA	↓	↓	NA	↓	NA	↓
3.2.4	↓	Vibration	MU	A	NA	↓	↓	NA	↓	NA	↓
3.2.5	↓	Humidity	G5	A	NA	↓	↓	NA	↓	NA	↓
3.2.6	↓	Altitude	C5	A	NA	↓	↓	NA	↓	NA	↓
3.2.7.1	NA	Endurance	WM	A	NA	NA	NA		↓	NA	↓
3.2.7.2	8-1-67	Rotation	WM	B	NA	NA	NA	NA	NA	* NA	↓
31.1	7-27-67	Bench	NA	NA	NA	NA	NA	NA	P	NA	NA

REMARKS

* Component Rotated with 200 lbs. Set in Bench Test Fixture. Rotation was Performed [redacted] By Hand For 10 min. & Approx. 120 RPM.

SECRET

[redacted] DATE 8-1-67 [redacted] DATE 8-1-67

FORM 7-9609 R (3-62)

PERFORMANCE DATA S ET (CONTINUATION)
QUALIFICATION/PROD. SAMPLE

REPORT NO.	NOMENCLATURE	DRAWING NO.	REV./AN	SCHEMATIC NO.	REV./AN	SECURITY CLASS	L.R. NO.	PAGE
	PARACHUTE SWIVEL ASSY.	887C540 -G2		NA	NA	Unclassified		2 OF

S.I./T.R. NO.	S.I. REV.	P.D.S. REV.	G.E. SERIAL NO.	VENDOR SERIAL NO.	LOT NO.	P.O./DWG.	Q.C.E. INITIAL	TESTER INITIAL
24.312	G	E-7/24/63		129	NA	NA	[illegible]	[illegible]

S.I. PARA.	DESCRIPTION OF TEST	UNIT OF MEAS.	CLASS OF CHAR	TOLERANCE	BENCH	DUR. H/T	DUR. L/T	POST L/T	POST VIB.	POST HUM.	POST ALT.	POST ENV.	
2.5.1	Visual Inspection	P/F	O	No Defects	P	NA	NA	NA	NA	NA	NA	NA	P
2.5.1	Tension-No Load	P/F	M	No Binding	P	NA	NA	NA	NA	NA		NA	P
2.5.2.4	Tension - 100 lb.	P/F	C	"	P	NA	NA	NA	NA	NA		NA	NA
2.5.2.5	Tension - 350 lb.	P/F	C	"	P	NA	NA	NA	NA	NA		NA	NA
2.5.2.6	Tension - 600 lb.	P/F	C	"	P	NA	NA	NA	NA	NA	NA	NA	NA

SECRET

[redacted]

[redacted]

REMARKS: CRITICAL = 9 MINOR = 9 MAJOR = 4

[illegible]

[redacted]

Appendix 3

Related Reference Documents

Additional data pertaining to the history of shield S/N 306 was gathered during the course of this investigation. This material is included as supplemental information.

MISSILE AND SPACE DIVISION
PHILADELPHIA

PROGRAM INFORMATION REQUEST / RELEASE

PIR NO. U — 8382 — VJ/TA — [redacted] 885 A

*USE "C" FOR CLASSIFIED AND "U" FOR UNCLASSIFIED

FROM [redacted] QCE Oz 8/17/67
S & SS - MQC & T
Room 5000 MB Ext. 2777

TO [redacted]
VJ/TA Program Manager
Room 6715 Chestnut

DATE SENT	DATE INFO. REQUIRED	PROJECT AND REQ. NO.	REFERENCE DIR. NO.
8/17/67		VJ/TA F/B Summary	

SUBJECT

USE AND PROCESS SUMMARY FOREBODIES 300 - 309 (Dwg. #198R301)

INFORMATION REQUESTED/RELEASED

1.0 SUMMARY (USE)

The table below shows the program and vehicle or disposition of Forebodies 300 - 309: (No forebodies other than 306 have flown)

S/N	Program	Shipped on Vehicle	Subsequent Application
300	A-45	738	741
301	A-45	739	725
302	H-30	3075	3075
303	TT	1515	1515
304	--	Rejected for prime use for liner wrinkles	--
305	--	"	--
306	A-45	740	726
307	TT	1516	1516
308	A-45	741	739
309	A-45	742	740

2.0 PROCESS AND MATERIALS DATA

The data summary on the attached sheet shows the phenolic glass and phenolic nylon used on shields 302 - 309. This includes all shields made with nylon and/or glass of the same lot as shield S/N 306.

3.0 DISCUSSION AND CONCLUSIONS

It can be seen that F/B 305 & 306 were fabricated from the same lots of nylon and glass. However, F/B 305 was rejected for wrinkles in the nylon after cure. F/B 306 showed no such discrepancy. Due to the wrinkles, F/B 305 was not subject to the shield physical, chemical and non-destructive tests. F/B S/N 307 also used the same lot of phenolic glass and like F/B S/N 306 was an acceptable forebody. There were no significant processing incidents recorded on S/N 306 which would indicate potential failure.

Based on this review of S/N 306, and comparison with other shields made before and after, S/N 306 was a prime shield from the materials and processing history.

[redacted]

SECRET

PAGE NO. — OF —

✓ RETENTION REQUIREMENTS

COPIES FOR	MASTERS FOR
☐ 1 MO.	☐ 3 MOS.
[redacted]	☐ 6 MOS.
	☐ 12 MOS.
☐ MOS.	☐ MOS.
☐	☐ CONTRACT

[redacted]

S/N	Mfg. Date	P/Glass Lot #	P/Glass MA #	P/Nylon Lot #	P/Nylon MA #	Adlock Lot #	Adlock MA #	X-Ray Accept. MA #	Ultra-Sonic	Trim Ring
300	8/5/66	7158-3	34965	7072-1,3	33636	553	33441	36584	36127	35827

Discrepancy Summary

IR 550 94 - Adlock cure cycle was completed 7-7-66 at 2215. Phenolic nylon layup was started 7-11-66 at 0730. Req'd. within 48 hours. Disposition: Material shelf life 90 days at room temperature. Verify bond by lap shear machined from trim ring P/N - P/G. Trim ring P/N - P/G lap shear tested and accepted on MA 36141.

301	8/12/66	7158-3,4	34965	7072,3	33636	553	33441	37010	36234	36074

Discrepancy Summary

None

302	8/15/66	7158-4	34965	7072-4	33630	553	33441	36340	36266	36070

Discrepancy Summary

IR 43395 - 198R-306-P2 Magnesium Ring - Gouge 0.120" from forward edge of 4 pads 0.030" deep. Disposition: Discrepancy is acceptable. Extra step will not substantially reduce ring to F/ bond area.

303	9/1/66	7186-1	35282	7072-9	33635	553	33441	36661	36495	36269

Discrepancy Summary

1.488 ± .005 hole location of interface lug is 1.496 - Disposition: O.K. as is. (IR 55927)
IR 49730 - Depression on ID of shield. Disposition: Build up with M & P 100 and blend to normal contour of shield.

304	----	7186-1&2	35282	7072-9	33635	553	33441	----	----	----

Discrepancy Summary

Scrap per IR 49727 8/19/66 [redacted] Excessive wrinkles

305	----	7186-2&3	35282	7072-2	35781	553	33441	----	----	----

Discrepancy Summary

Not acceptable for prime use per IR 55968. Excessive wrinkles.

306	9/13/66	7186-2&3	35282	7072-5	33635	553	33441	36750	36665	36418

Discrepancy Summary

IR's 59086, 55267 ring & hole loc. IR 59086 - Phenolic ring, Dwg. 67D122-P1, displace circumferentially by 1/4" (i.e. ring not centered with when referenced to shield lug flats and magnesium ring location). Disposition: "Misplace location of phenolic/glass ring is acceptable off center position of ring and joggle will not effect strength of lug installation and forebody assembly." By [redacted]-SVE, [redacted] MQC & [redacted]

- con't. -

~~SECRET~~ [redacted]

Discrepancy Summary

55267 - Two 0.358" diameter holes are mislocated through aft edge of the forebody and interface bushing bosses. Disposition: Rework and check location of components in aft P/G ring. Before drilling bosses, the M & P 100 must have the proper cure time." Signed [redacted] SVE - [redacted] MQC & T

S/N	Mfg. Date	P/Glass Lot #	P/Glass MA #	P/Nylon Lot #	P/Nylon MA #	Adlock Lot #	Adlock MA #	X-Ray Accept. MA #	Ultra-Sonic	Trim Ring
307	10/13/66	7186-2&3	35282	7224-1	35950	553	33441	37341	37043	37066

Discrepancy Summary

MA #35950 non-conforming IR 43495 - High flow accepted based on Vol. Index and model study. Discrepant rolls 3 & 4 returned to vendor.

308	10/20/66	7297-1	36175	7291-5	36653	553	33441	37448A	37344	37217

Discrepancy Summary

IR 59089 - (1) Two depressed areas on ID near aft end. Disp.-Fill with M & P 100 and blend to normal contour of shield. (2) Depth from aft edge to inside of nose should be 26.41 $\pm^{+040}_{-000}$. Actual depth is 26.386. Disposition: Accept as is.

309	10/14/66	7297-1&2	36175	7291-5&6	36653	553	33441	37449	37323	37180

Discrepancy Summary

IR 59093 - three depressed areas at aft end of shield .030 to .060 deep. Disposition - Fill with M & P 100 and blend to normal contour of shield.

[redacted]

SECRET

8*242—

GENERAL ELECTRIC

RE-ENTRY SYSTEMS DEPARTMENT
3198 CHESTNUT ST.
PHILADELPHIA 1, PA.

[redacted]

COPIES: [redacted]

July 13, 1967

SUBJECT

MEMO #19

TO: [redacted] QAE
Room 5012 MarBar

FROM: [redacted] CQCE
Room 5008 MarBar

SUBJECT: Data Review - Dual Ejection Programmer P.O. #68784

Per your request of 7/11/67 the writer has reviewed the acceptance data for the subject serial number and cannot find any out of tolerance degradation.

NOTE: This unit has been cycled through the test area once. A copy of the data is attached. U.C.I. No. 1-47D168535 & IR 34407 affects TLM readings only, no effect on performance.

[redacted]

[redacted] CQCE
Room 5008 MarBar

[redacted]

ZERO DEFECTS

SECRET

SECRET [redacted]

GENERAL ELECTRIC FORM PERFORMANCE DATA SHEET C 6

Site	Part/Test Nomenclature	Drawing No.	Rev/Ltr	G.E. Ser. No.	
BA 4	Dual Ejection Prog	47E168535?1	D	PC(S?)70	NA

Ref. Rpt. No.	Lev.	Test Program	Vend. No.	Schematic No.	Rev/Ltr			
NA	FO 04	TAB	99214	47E187470	A	NA	NA	NA

Serial No.	Del.	Mod/Avo. No.	Date Lab. Rev.	Date Cert	Date Lot
243459	1	7640-03-?1204	NA	NA	NA

P.D.S. Rev.	P.D.S. Rev. Date		Weight	Accept Lot No.	Security Class
A	1-17-4-65	1-47D11?5?5	(3.5 lbs.)	NA	Unclassified

	Equipment Name	Make	Model No.	Ident. No.	Cal. Due Date
TEST EQUIP. USED	Test Panel	GE-RSD	47D169274	[illegible]	[illegible]
	Timer Panel	GE-RSD	47D189034	[illegible]	[illegible]
	Simult Ancity Test Panel	GE-RSD	47E189031	[illegible]	[illegible]
	Volt Meter	[illegible]	NA	[illegible]	[illegible]
	Oscilloscope	Tektronix	[illegible]	[illegible]	[illegible]
	Power Supply	[illegible]	NA	[illegible]	[illegible]
	Vibrator	MB	E1250	[illegible]	[illegible]
	Thermometer	[illegible]	NA	[illegible]	[illegible]
	[illegible]	[illegible]	NA	[illegible]	[illegible]

SI Para	Date	Environment	Code	Cond				Cycles	P/F	Faulty Loc.	Fail. Rpt. No.
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4.1	12-23-65	Initial Bench (4.2)	ZZ	C	NA	NA	NA	86 *	F	NA	[illegible]
4.2	12-24-65	Vibration (3.3)	RD	D	NA	0	15	NA	P	NA	NA
4.3	12-24-65	High Temp (4.2)	AI	C	NA	NA	NA	18 *	P	NA	
4.3	12-24-65	High Temp. (4.2)	AI	D	NA	L	0	NA	P	NA	
4.4	12-24-65	Low Temp (4.2)	AZ	C	NA	NA	NA	16 *	P	NA	
4.4	12-24-65	Low Temp (4.2)	AZ	D	NA	1	0	NA	P	NA	
4.5	12-24-65	Final Bench (3.3)	ZZ	C	NA	NA	NA	15 *	P	NA	↓
4.2.2	12-24-65	Post Vib (4.2)	ZH	C	NA	NA	NA	3 *	P	NA	NA

RECEIVED
JUL 14 1967
[redacted]

REMARKS
"S.T.C. "B" SET "EE"
[illegible] 12-65
Temp. Chamber - Tenney - [illegible] [redacted]
* Reference PIR - [illegible] 2-3-66

~~SECRET~~

Tester	Date		Date	Acc	Reject
[redacted]	[illegible]	[redacted]	12-24-6?		

PERFORMANCE DATA S[illegible]ET (CONTINUATION)
ACCEPTANCE – Q.A.

FORM 7-[illegible] (6-62)

Unit No./Nomenclature		Drawing No.	Rev./AN	Schematic No.	Rev./AN	Security Class	Page
[illegible]	[illegible] Ejection Prog.	47 1683561	D	47B187470	A	Unclassified	[illegible]
[illegible]	A	[illegible]		NA	[illegible] NA	[illegible]	

S.I. Para.	Description of Test	Unit of Meas.	Class of Char.	Specification Bench – Post Environment: Tolerance	Rev. Tol.	Actual Readings: Bench	Post Environment: Post Hot	Post Vib.	Specification During Environment: Tolerance	Rev. Tol.	Actual Readings During Environment	
[illegible].1	Insulation Resis.	Ohms	N	50Mohms Min	[illegible]	[illegible]	[illegible]	[illegible]	NA	NA	NA	[illegible]
[illegible].2	Arm/Reset	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	[illegible]
[illegible].2.6	Arm #1 Light Off	On/Off	N	OFF	[illegible]	OFF	[illegible]	OFF	[illegible]	[illegible]	[illegible]	OFF
[illegible].2.8	Arm #2 Light On	On/Off	N	OFF	[illegible]	OFF	[illegible]	OFF	[illegible]	[illegible]	[illegible]	[illegible]
[illegible].4	[illegible] Test Ch#1(26V)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
[illegible].4.10	Telemetry Voltage	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	After T1	VDC	M	[illegible] to 1.[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	After T2	VDC	M	[illegible]	[illegible]	[illegible]	[illegible]				[illegible]	[illegible]
	After T3	VDC	M	[illegible]	[illegible]	[illegible]	[illegible]				[illegible]	[illegible]
	After T4	VDC	M	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3.79?	[illegible]
[illegible].4.10	[illegible] 26VDC Input	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	T1	Sec	C	3.10-3.70	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible] T2	Sec	N	*Line 14		11.01?	11.0[illegible]				11.11?	10.[illegible]
	T2 – T1	Sec	C	7.10-8.00		[illegible]	[illegible]				[illegible]	[illegible]
	[redacted] + T2 + T3	Sec	N	*Line 16		[illegible]	[illegible]				[illegible]	[illegible]
	[redacted] T2	Sec	C	10.21-11.29		[illegible]	10.70				10.65?	[redacted]
	[redacted] T2 + T3 + T4	Sec	N	*Line 18		[illegible]	[illegible]				[illegible]	[redacted]
	[redacted] T3	Sec	C	1.35-1.65		[illegible]	[illegible]				[illegible]	[redacted]
	[redacted]	NA	NA	NA		[illegible]	NA				[illegible]	[redacted]
	[redacted]	NA	NA								[illegible]	[redacted]
	[redacted]	NA	NA									[redacted]
	[redacted]	NA	NA									[redacted]
[illegible].4.13	[redacted]rent Monitor	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	[redacted]
	[redacted]uence #1 Amp.	VDC	M	0.80 to 1.47 [illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[redacted]
	[redacted]quence #1 Dur.	Sec	M	.020 to .040	[illegible]	[illegible]	[illegible]				[illegible]	[redacted]
	Sequence #2 Amp.	VDC	M	0.40 to 0.68	[illegible]	[illegible]	[illegible]				[illegible]	[redacted]
	Sequence #2 Dur.	Sec	M	.040-.060	[illegible]	[illegible]	[illegible]				[illegible]	[redacted]
	Sequence #3 Amp.	VDC	M	0.80 to 1.47	[illegible]	[illegible]	[illegible]				[illegible]	[illegible]
	Sequence #3 Dur.	Sec	M	.020 to .040	[illegible]	[illegible]	[illegible]				[illegible]	[illegible]
	Sequence #4 Amp.	VDC	M	0.70 to 1.50	[illegible]	[illegible]	[illegible]				[illegible]	[illegible]
	Sequence #4 Dur.	Sec	M	.040-to .060	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]

~~SECRET~~

Notes: * Referenced Data for .....

[illegible] B * Per UCI 1-47D[illegible]

(42) (32) (42) (42) (4[illegible])

MISSILE AND SPACE DIVISION

GENERAL ( ) ELEC.

PERFORMANCE DATA SHEET (CONTINUATION)
ACCEPTANCE — Q.A.

FORM 7-2999 ? REV. (4-63)

Control No.	Nomenclature	Drawing No.	Rev./AN	Schematic No.	Rev./AN	Security Class	Page
60.1	Dual Ejection Prog.	47 1685061	D	47E187470	A	Unclassified	3 of

Q.A. No.	Dwg. Rev.	S.P.C. Rev.	S.C. Serial No.	Vendor Serial No.	Lot No.	D.C./DWG	Q.A. Initial	Tester
243499	4	A	10 677 CL	NA	N/A	NA		

S.I. Para.	Description of Test	Unit of Meas.	Class of Char.	Specification Bench – Post Environment: Tolerance	Specification Bench – Post Environment: Rev. Tol.	Actual Readings: Bench	Actual Readings: Post Environment: Post Hot	Actual Readings: Post Environment: Post Vib.	Specification During Environment: Tolerance	Specification During Environment: Rev. Tol.	Actual Readings During Environment	Actual Readings During Environment: H...
2.4	Timing Test Ch#1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2.4.10	Time @ 31VDC Input	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	T1	Sec	C	3.10-3.70	↑	3.52	3.47	↑	↑	↑	3.43	3.49
	T1 + T2	Sec	N	*Line 5	|	11.07	11.02	|	|	|	11.29	11.91
	T2 - T1	Sec	C	7.10-8.00	|	7.57	7.57	|	|	|	7.86	7.53
	T1 + T2 + T3	Sec	N	*Line 7	|	21.84	21.75	|	|	|	21.96	22.29
	T3 - T2	Sec	C	10.21-11.29	|	10.75	10.73	|	|	|	10.67	11.?
	T1 + T2 + T3 + T4	Sec	N	*Line 9	|	23.33	23.24	|	|	|	23.46	23.7?
	T4 - T3	Sec	C	1.35-1.65	↓	1.49	1.49	↓	↓	↓	1.50	1.50
		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		NA	N	↑	↑	↑	↑	↑	↑	↑	↑	↑
		NA	N	|	|	|	|	|	|	|	|	|
		NA	N	↓	↓	↓	↓	↓	↓	↓	↓	↓
2.4	Timing Test Ch#1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2.4.10	Time @ 36 VDC Input	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	T1	Sec	C	3.10-3.70	↑	3.46	3.44	↑	↑	↑	3.43	3.4[redacted]
	T1 + T2	Sec	N	*Line 18	|	11.05	11.04	|	|	|	11.30	[redacted]
	T2 - T1	Sec	C	7.10-8.0	|	7.59	7.60	|	|	|	7.87	
	T1 + T2 + T3	Sec	N	*Line 20	|	21.73	21.72	|	|	|	22.01	
	T3 - T2	Sec	C	10.21-11.29	|	10.72	10.75	|	|	|	10.??	
	T1 + T2 + T3 + T4	Sec	N	*Line 22	|	23.23	23.28	|	|	|	23.51	
	T4 + T3	Sec	C	1.35-1.65	↓	1.50	1.49	↓	↓	↓	1.50	
		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		NA	N	↑	↑	↑	↑	↑	↑	↑	↑	
		NA	N	↓	↓	↓	↓	↓	↓	↓	↓	
		NA	N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

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REMARKS: * Referenced Data for .... (50) (32) (42) (10)

PERFORMANCE DATA SHEET (CONTINUATION)
ACCEPTANCE – Q.A.

FORM 7-2229 J REV. (6-62)

TEST NO.	NOMENCLATURE	DRAWING NO.	REV./AN	SCHEMATIC NO.	REV./AN	SECURITY CLASS	PAGE
[illegible]	Dual Ejection Prog	47 [illegible]	D	47E187470	A	Unclassified	4 OF 6

[illegible] NO.	S.I. REV.	P.D.S. REV.	G.E. SERIAL NO.	VENDOR SERIAL NO.	LOT NO./P.O./DWG	[illegible]
242139	1	A	F06871A4	NA	NA / NA	[illegible] RMP D.S. [illegible]

S.I. PARA.	DESCRIPTION OF TEST	UNIT OF MEAS.	CLASS OF CHAR.	SPECIFICATION BENCH – POST ENVIRONMENT: TOLERANCE	SPECIFICATION BENCH – POST ENVIRONMENT: REV. TOL.	ACTUAL READINGS: BENCH	ACTUAL READINGS: POST ENVIRONMENT Post Hot	ACTUAL READINGS: POST ENVIRONMENT Post Vib	SPECIFICATION DURING ENVIRONMENT: TOLERANCE	SPECIFICATION DURING ENVIRONMENT: REV. TOL.	ACTUAL READINGS DURING ENVIRONMENT: [illegible]	ACTUAL READINGS DURING ENVIRONMENT: [illegible]
2.4	Timing Test Ch2(26)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2.4.10	Telemetry Voltage	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	After T1	VDC	M	[illegible]	.90±.120	.95	.95				[illegible]	[illegible]
	After T2	VDC	M	[illegible]	[illegible]	1.44	1.44				[illegible]	[illegible]
	After T3	VDC	M	2.20 [illegible]	[illegible] ±.240	1.94	1.93				[illegible]	[illegible]
	After T4	VDC	M	[illegible]	[illegible]	3.33	3.32	↓	↓	↓	[illegible]	[illegible]
2.4.10	Time C26VDC Input	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	T1	SEC	C	3.10-3.70	↑	3.52	3.42				[illegible]	3.41
	T1 + T2	SEC	N	*Line 10		11.05	10.95				[illegible]	11.11
	T2 - T1	SEC	C	7.10-8.00		7.53	7.53				[illegible]	[illegible]
	T1 + T2 + T3	SEC	N	*Line 12		21.77	21.67				[illegible]	[illegible]
	T3 - T2	SEC	C	10.21-11.29		10.72	10.72				[illegible]	[illegible]
	T1 + T2 + T3 + T4	SEC	N	*Line 14		23.27	23.16				[illegible]	[illegible]
	T4 - T3	SEC	C	1.35-1.65	↓	1.50	1.49	↓	↓	↓	[illegible]	[illegible]
	[redacted]	NA	NA	NA	NA	NA	NA	NA	NA	NA	[redacted]	NA
		NA	N6		↑	↑	↑					
		NA	N6									
		NA	NA		↓	↓	↓	↓	↓	↓		↓
2.4.13	nt Monitor	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA
	nce #1 Amp	VDC	M	0.8? to [illegible]	47.68 min	.90	.95					[illegible]
	nce #1 Dur	SEC	M	.0?? to .0?0	NA	.030	.030					[illegible]
	nce #2 Amp	VDC	M	0.40 to 0.68	.33 min	.40	.44					[illegible]
	nce #2 Dur	SEC	M	.040-.060	NA	.050	.050					[illegible]
	nce #3 Amp	VDC	M	[illegible] to [illegible]	47.68 min	.90	.96				[illegible]	[illegible]
	nce #3 Dur	SEC	M	.020-to .0?0	NA	.030	.030				[illegible]	[illegible]
	nce #4 Amp	VDC	M	[illegible] to 0.50	.44 min	.58	.56				[illegible]	[illegible]
	Sequence #4 Dur	SEC	M	.040 to .060	NA	.050	.050	↓	↓	↓	.050	[illegible]

REMARKS: * Referenced data for...

(50) (33) (4/2) (4/2)

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PERFORMANCE DATA SHE[ET] (CONTINUATION)
ACCEPTANCE — C.A.

M 7-2020 J REV. (4-63)

SECRET

PART NO.	NOMENCLATURE	DRAWING NO.	REV./AN	SCHEMATIC NO.	REV./AN	SECURITY CLASS	PAGE
	Dual Ejection Prog	470186535G1	D	47E187470	A	Unclassified	5 OF 6

ITEM NO.	C.I. REV.	P.D.S. REV.	G.E. SERIAL NO.	VENDOR SERIAL NO.	LOT NO.	P.O./DWO	Q.A. REPRESENTATIVE / TESTER INITIAL
3459			A		NA	NA	NA	

C.I. PARA.	DESCRIPTION OF TEST	UNIT OF MEAS.	CLASS OF CHAR.	SPECIFICATION BENCH — POST ENVIRONMENT: TOLERANCE	REV. TOL.	ACTUAL READINGS: BENCH	POST ENVIRONMENT: Post Hot	Post Vib	SPECIFICATION DURING ENVIRONMENT: TOLERANCE	REV. TOL.	ACTUAL READINGS DURING ENVIRONMENT	
4	Timing Test CH#2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4.10	Time @ 21VDC Input	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	T1	SEC	C	3.10-3.70		3.64	3.42				3.05	3.47
	T1 + T2	SEC	N	*Line 5		11.08	10.97				11.13	11.01
	T2 - T1	SEC	C	7.10-8.0		7.59	7.56				7.78	7.54
	T1 + T2 + T3	SEC	N	*Line 7		21.80	21.70				22.16	21.85
	T3 - T2	SEC	C	10.21-11.29		10.72	10.72				10.89	10.80
	T1 + T2 + T3 + T4	SEC	N	*Line 9		22.25	22.19				23.42	22.87
	T4 - T3	SEC	C	1.35-1.65		1.50	1.47				1.46	1.52
		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		NA	NA									
		NA	NA									
		NA	NA									
4	Timing Test CH#2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4.10	Time @ 26VDC Input	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	T1	SEC	C	3.10-3.70		3.38	3.42					
	T1 + T2	SEC	N	*Line 18		10.26	10.28					
	T2 - T1	SEC	C	7.10-8.0		7.56	7.56				[redacted]	
	T1 + T2 + T3	SEC	N	*Line 20		21.68	21.72				[redacted]	
	T3 - T2	SEC	C	10.21-11.29		10.70	10.75				[redacted]	
	T1 + T2 + T3 + T4	SEC	N	*Line 22		23.18	22.22				[redacted]	
	T4 - T3	SEC	C	1.35-1.65		1.50	1.49				[redacted]	
		NA	NA	NA	NA	NA	NA	NA	NA	NA	[redacted]	NA
		NA	NA								[redacted]	
		NA	NA								[redacted]	
		NA	NA	NA	NA	NA	NA	NA	NA	NA	[redacted]	NA

SECRET

[redacted]

NOTES: *Referenced Data for .....

(50) (32) (42) (42) (42)

PERFORMANCE DATA SHEET (CONTINUATION)
ACCEPTANCE – O.A.

M 7-2239 J REV. (4-63)

TEL NO.	NOMENCLATURE	DRAWING NO.	REV./AN	SCHEMATIC NO.	REV./AN	SECURITY CLASS	PAGE
4	Dual Ejection Prog	47E186966	D	47E187470	A	Unclassified	6 OF 6

T.P. NO.	S.I. REV.	P.D.S. REV.	G.E. SERIAL NO.	VENDOR SERIAL NO.	LOT NO.	P.O./DWO	D.C.P. INITIAL	TESTER INITIAL
3459	A	A	PO637/4U	NA	N/A	NA	[illegible]	[illegible]

S.I. PARA.	DESCRIPTION OF TEST	UNIT OF MEAS.	CLASS OF CHAR.	SPECIFICATION BENCH – POST ENVIRONMENT: TOLERANCE	SPECIFICATION BENCH – POST ENVIRONMENT: REV. TOL.	ACTUAL READINGS: BENCH	ACTUAL READINGS: POST ENVIRONMENT: Post Hot	ACTUAL READINGS: POST ENVIRONMENT: Post Vib	SPECIFICATION DURING ENVIRONMENT: TOLERANCE	SPECIFICATION DURING ENVIRONMENT: REV. TOL.	ACTUAL READINGS: DURING ENVIRONMENT: L. Temp	ACTUAL READINGS: DURING ENVIRONMENT: H. Temp
	Time Ch 1 & 2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
.7	T1	SEC	M	3.1-3.7	↑	3.45	3.05	3.81	↑	↑	3.45	3.47
	T1 + T2	SEC	M	*Line 4	|	11.01	11.01	10.99	|	|	11.20	10.26
	T2 - T1	SEC	M	7.10-8.0	|	7.56	7.56	7.43	|	|	7.75	7.49
	T1 + T2 + T3	SEC	M	*Line 6	|	21.75	21.76	21.71	|	|	21.87	21.77
	T3 - T2	SEC	M	10.21-11.29	|	10.74	10.74	10.77	|	|	10.67	10.81
	T1 + T2 + T3 + T4	SEC	M	*Line 8	|	23.25	23.25	23.21	|	|	23.34	23.27
	T4 - T3	SEC	M	1.35-1.65	↓	1.50	1.50	1.50	↓	↓	1.47	1.50
.8	[illegible]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Counter #1	NA	NA	540010 Mfg	↑	↑	4000	4000	↑	↑	4000	4000
	Counter #2	NA	NA	540010 Mfg	↓	↓	1	20	↓	↓	20	1
	Counter #3	NA	NA	540010 Mfg	NA	NA	20	20	NA	NA	20	20

SECRET [redacted]

C[redacted]

SECRET