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This reissue completely supercedes and replaces the 14 December 1962 issue of this report

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SID 62-1434

WEIGHT, BALANCE AND INERTIA

FOR

THE APOLLO BOILERPLATE CONFIGURATIONS

CONTRACT NAS 9-150

(U)

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PREPARED BY

WEIGHT CONTROL GROUP

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BOILERPLATE CONFIGURATION

INTRODUCTION

This report presents a complete package of weight, balance and inertia data for all boilerplate configurations through Boilerplate No. 23, except for Boilerplate No. 14 (House Spacecraft No. 1). These data are based on current calculated values.

The boilerplate numbers shown in this report represent the stack numbers for each configuration.

The weight and balance shown for Boilerplates No. 1 and 2 are based on the most recent impact test for which each was tested. Boilerplates No. 1 and 2 are ballasted to requirements defined by the Apollo Project Office, and these requirements will change from time to time.

Boilerplates No. 3 and 19 are based on desired weight and center of gravity for the airplane drops. These two boilerplates will be dropped numerous times and the weight and center of gravity for each actual weighing will be shown in the actual weight and balance report for each boilerplate.

Boilerplate No. 6, pad abort configuration, is based on the desired weight and center of gravity. The Launch Escape System of 6410 pounds is required to obtain a longitudinal center of gravity of X_a = 1109.0 inches for the combination of the Launch Escape System and the Command Module at Launch Escape burnout.

Boilerplate No. 9, dynamic test configuration, is based on the latest available information to obtain an in-orbit payload of 18,600 pounds. A launch weight of 24,960 pounds is obtained in lieu of 25,200 pounds due to the lighter Launch Escape System required to obtain longitudinal center of gravity of 1109.0 inches at Launch Escape System burnout.

Boilerplates No. 12 and 23, maximum "q" abort configurations, are based on current calculated values, and ballasted to desired Command Module weight and center of gravity. The Service Module has 902 pounds of ballast located to bring the center of gravity of the launch payload back to the center line.

The Launch Escape System of 6410 pounds is required to obtain a longitudinal center of gravity of X_a = 1109.0 inches for the combination of the Launch Escape System and Command Module at Launch Escape System burnout.

Boilerplates No. 13 and 15, booster compatibility configurations, are based on preliminary data except that the Launch Escape System shown is taken from the actual Weight and Balance Report, SID 63-143, dated 4 March 1963, for Boilerplate No. 9.

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BOILERPLATE CONFIGURATION

INTRODUCTION

(CONTINUED)

Boilerplate No. 16, booster compatibility, is basically the same as Boilerplates No. 13 and 15, except for anticipated equipment. There is more ballast in the Command Module; and, therefore, the inertia is greater. The Launch Escape System from Boilerplate No. 9 is also used for this configuration.

Boilerplate No. 18, qualification of separation and booster compatibility, is based on preliminary data. The Launch Escape System and Command Module are basically the same as that of Boilerplates No. 12 and 23 except that the Command Module will have more equipment installed but will be ballasted to the same desired Command Module weight and center of gravity for abort capability. The Service Module structure is based on the May Spacecraft Monthly Weight and Balance Report, SID 62-99-15, except that the insulation has been removed. The Service Module has 8,895 pounds of ballast so as to meet an orbital payload of 22,500 pounds. The adapter is a spacecraft structure designed for Saturn V strength requirements but will be used on Saturn I flights.

Boilerplate No. 22, hi-altitude abort, is ballasted to the same condition as Boilerplates No. 12 and 23, except that the Command Module has a reaction control system and requires less ballast.

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BOILERPLATE CONFIGURATION SUMMARY

WEIGHT, CENTER OF GRAVITY AND INERTIA

AT LAUNCH

BOILERPLATE STACK NUMBER	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA (SLUG-FT.^{2})			REMARKS**
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)	
1	8783	1039.9	0.1	6.8	4825	3735	3200	SID 63-143-4 (12 June 1963)
2	7840	1039.6	0.0	8.1	4341	3329	2967	SID 63-143-5 (12 June 1963)
3 & 19	9500	1043.8	1.3	7.8	5185	4550	4395	SID 63-143-2 (11 June 1963) SID 63-143-3 (11 June 1963)
6	15410	1148.1	0.6	4.4	5484	64523	64727	SID 63-143-6 (21 June 1963)
9	24960	1045.0	0.0	1.8	18152	172958	173179	SID 63-143 (4 March 1963)
12 & 23	24500	1068.8	-0.1	-0.1	16390	132218	131034	
13 & 15	24960	1044.9	0.1	1.4	17773	172986	172971	
16	24960	1044.8	0.0	1.8	18147	172479	172684	
18	28910	1030.3	2.6	1.2	15370	179115	179728	
22	24500	1068.8	-0.1	-0.1	16239	132231	130915	

NOTES: *Centers of gravity are in the NASA reference system except that the longitudinal has an origin 998.7 below the tangency of the command module structure mold line.

**SID reports indicated show the actual weight and balance data for these configurations.

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COMMAND MODULE-BOILERPLATE NO. 1

LAND IMPACT TEST

WEIGHT SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY* Xa-STATIONS
Structure	5918	1031.6
Internal Ballast	1549	1045.9
External Ballast	921	1083.4
Communication and Instrumention	131	1057.9
Electrical Poiner System	100	1047.3
Impact Attenuation (Dummy)	164	1018.9
Total at Impact	8783	1039.9

INERTIA SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENT OF INERTIA (SLUG-FT.^{2})		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
Total at Impact	8783	1039.9	0.1	6.8	4825	3735	3200

*NOTE: Centers of gravity are in the NASA reference system except that the longtudinal has an origin 998.7 inches below the tangency of the command module structure mold line.

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COMMAND MODULE-BOILERPLATE NO. 2

WATER IMPACT TEST

WEIGHT SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY* Xa-STATIONS
Structure	5875	1032.2
Internal Ballast	732	1042.7
External Ballast	890	1084.7
Communication and Instrumention	131	1057.9
Electrical Power System	100	1047.3
Impact Attenuation (Dummy)	112	1022.9
TOTAL AT IMPACT	7840	1039.6

INERTIA SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA (SLUG-FT.^{2})		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
TOTAL AT IMPACT	7840	1039.6	0.0	8.1	4341	3329	2967

NOTE:* Centers of Gravity are in the NASA reference System except that the Longtudinal has an origin 998.7 inches below the Tangency of the Command Module Structure Mold Line.

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WEIGHT, CENTER OF GRAVITY AND INERTIA SUMMARY

COMMAND MODULE - BOILERPLATES NO. 3 AND 19

AIRPLANE DROP - PARACHUTE TEST

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA (SLUG-FT.2)		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
Command Module - Initial	9500	1043.8	1.3	7.8	5185	4550	4395
Less: Forward Cover	-378	1102.1	1.1	3.0	86	43	49
Less: Drogue Chute	-28	1091.0	9.8	-22.1	-	-	-
PRIOR TO MAIN CHUTE DEPLOYMENT	9094	1041.2	1.3	8.1	5091	4324	4170
Less: Main Chutes	-411	1091.5	-1.1	7.6	43	16	35
IMPACT	8683	1038.9	1.4	8.1	5048	3758	3584

NOTE: *Centers of gravity are in the NASA reference system except that the longitudinal has an origin 998.7 inches below the tangency of the command module structure mold line.

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COMMAND MODULE - BOILERPLATES NO. 3 AND 19

AIRPLANE DROP - PARACHUTE TEST

WEIGHT SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY* Xa - STATIONS
Structure	6033	1039.8
Internal Ballast	1982	1045.6
Separation System - Forward Cover	25	1090.0
Northrop-Ventura-Earth Landing System and Instrumentation	1095	1068.6
Impact Attenuation and Release Systems	365	1022.4
COMMAND MODULE - INITIAL	9500	1043.8

NOTE: *Longitudinal centers of gravity are in the NASA reference system except that they have an origin 998.7 inches below the tangency of the command module structure mold line.

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WEIGHT, CENTER OF GRAVITY AND INERTIA SUMMARY

PAD ABORT

(INITIAL AND BURNOUT)

BOILERPLATE NO. 6

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA (SLUG-FT.^{2})		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
Launch Escape System	6410	1297.0	0.0	0.0	208	8109	8109
Command Module	9000	1042.0	1.0	7.5	5483	4094	4255
ABORT - INITIAL	15410	1148.1	0.6	4.4	5484	64523	64727
Less: Escape Motor Prop.	-3193	1295.8	0.0	0.0	69	1265	1265
Less: Pitch Motor Prop.	-17	1429.0	0.0	0.0	-	-	-
C/M AND L.E.S. AT BURNOUT	12200	1109.0	0.7	5.5	5399	44015	44204

NOTE: *Centers of gravity are in the NASA reference system except that the longitudinal has an origin 998.7 inches below the tangency of the command module structure mold line.

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WEIGHT, CENTER OF GRAVITY AND INERTIA SUMMARY

PAD ABORT

(C/M AT IMPACT)

BOILERPLATE NO. 6

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA (SLUG-FT.^{2})		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
Command Module	9000	1042.0	1.0	7.5	5483	4094	4255
Less: Forward Cover	-394	1100.2	-0.1	2.8	76	51	47
Less: Drogue Chute	-28	1091.0	9.8	-22.1	-	-	-
C/M PRIOR TO MAIN CHUTE DEPLOYMENT	8578	1039.2	0.9	7.8	5399	3591	3762
Less: Main Chutes	-411	1091.5	-1.1	7.6	43	16	35
C/M AT IMPACT	8167	1036.5	1.0	7.8	5356	3569	3721

NOTES: *Centers of gravity are in the NASA reference system except that the longitudinal has an origin 998.7 inches below the tangency of the command module structure mold line.

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LAUNCH ESCAPE SYSTEM - BOILERPLATE NO. 6

PAD ABORT

WEIGHT SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY* X_a - STATIONS
Tower	352	1135.3
Skirt Assembly	265	1209.9
Nose Cone and Cover Assembly	89	1454.3
Pitch Motor Housing and Nut	158	1426.7
Pitch Control Motor	55	1429.0
Escape Motor	4765	1288.2
Jettison Motor	534	1401.6
Ballast and Attaching Plate	166	1436.5
Attaching Parts	26	1344.2
LAUNCH ESCAPE SYSTEM - INITIAL	6410	1297.0

INERTIA SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA (SLUG-FT.2)		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
L.E.S. - INITIAL	6410	1297.0	0.0	0.0	208	8109	8109
L.E.S. - BURNOUT	3200	1297.4	0.0	0.0	139	6936	6935

NOTE: *Centers of gravity are in the NASA reference system except that the longidutinal has an origin 998.7 inches below the tangency of the command module structure mold line.

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COMMAND MODULE - BOILERPLATE NO. 6

PAD ABORT

WEIGHT SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY* X_a - STATIONS
Structure	5429	1038.4
Internal Ballast	2386	1038.2
Communications and Instrumentation	369	1046.6
Electrical Power Supply	180	1040.2
Earth Landing System	570	1091.7
Impact Attenuation - Dummy	66	1027.5
COMMAND MODULE - INITIAL	9000	1042.0

INERTIA SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA (SLUG-FT.^{2})		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
C/M - INITIAL	9000	1042.0	1.0	7.5	5483	4094	4255
** PRIOR TO MAIN CHUTE DEPLOYMENT	8578	1039.2	0.9	7.8	5399	3591	3762
C/M - AT IMPACT	8167	1036.5	1.0	7.8	5356	3569	3721

NOTE: *Centers of gravity are in the NASA reference system except that the longitudinal has an origin 998.7 inches below the tangency of the command module structure mold line.

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WEIGHT, CENTER OF GRAVITY AND INERTIA SUMMARY

DYNAMIC TEST - SATURN I PAYLOAD

BOILERPLATE NO. 9

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA (SLUG-FT.^{2})		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
Launch Escape System	6360	1297.7	0.0	0.0	215	7620	7620
Command Module	8760	1041.6	1.8	6.6	5854	3870	4110
Service Module	6600	931.2	-2.3	-2.0	7942	6535	6573
Insert	1140	840.1	0.0	0.0	1432	789	789
Adapter	2100	762.4	0.0	0.0	2625	1745	1745
TOTAL LIFT-OFF PAYLOAD	24960	1045.0	0.0	1.8	18152	172958	173179
Less: Launch Escape System	-6360	1297.7	0.0	0.0	215	7620	7620
TOTAL IN ORBIT PAYLOAD	18600	958.6	0.0	2.4	17932	47643	47869

NOTE: *Centers of gravity are in the NASA reference system except that the longitudinal has an origin 998.7 inches below the tangency of the command module structure mold line.

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LAUNCH ESCAPE SYSTEM-BOILERPLATE NO. 9

DYNAMIC TEST

WEIGHT SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY* Xa-STATIONS
Tower	348	1141.7
Skirt Assembly	255	1210.7
Nose Cone and Cover Assembly	96	1455.1
Pitch Motor Housing and Nut	157	1429.0
Pitch Control Motor	55	1429.0
Escape Motor	4692	1287.0
Jettison Motor	519	1401.3
Ballast and Attaching Plate	213	1436.6
Attaching Parts	25	1325.2
TOTAL - INITIAL	6360	1297.7

INERTIA SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA (SLUG-FT.^{2})		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
LES - INITIAL**	6360	1297.7	0.0	0.0	215	7620	7620
LES - AT BURNOUT	3149	1298.9	0.0	0.0	145	6319	6320

NOTE: * Centers of Gravity are in the NASA reference system except that the longitudinal has an origin 998.7 inches below the tangency of the command module structure mold line.

** Reference - Actual Weight and balance report SID 63-143 Dated 4 March 1963

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COMMAND MODULE - BOILERPLATE NO. 9

DYNAMIC TEST

WEIGHT SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY* X_a - STATIONS
Structure	4479	1039.5
Internal Ballast	4228	1044.0
Impact Attenuation - Dummy	53	1027.5
TOTAL - COMMAND MODULE	8760	1041.6

INERTIA SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA (SLUG-FT.^{2})		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
TOTAL COMMAND MODULE	8760	1041.6	1.8	6.6	5854	3870	4110

NOTE: *Centers of gravity are in the NASA reference system except that the longitudinal has an origin 998.7 inches below the tangency of the command module structure mold line.

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SERVICE MODULE - BOILERPLATE NO. 9

DYNAMIC TEST

WEIGHT SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY* X_a - STATIONS
Structure	3501	944.4
Internal Ballast	3082	915.8
Tension Ties	17	1014.0
TOTAL - SERVICE MODULE	6600	931.2

INERTIA SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA (SLUG-FT.^{2})		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
TOTAL - SERVICE MODULE	6600	931.2	-2.3	-2.0	7942	6535	6573

NOTE: *Centers of gravity are in the NASA reference system except that the longitudinal has an origin 998.7 below the tangency of the command module structure mold line

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INSERT - BOILERPLATE NO. 9

DYNAMIC TEST

WEIGHT SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY* X_a - STATIONS
Structure - Insert	1140	840.1

INERTIA SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA (SLUG-FT.^{2})		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
TOTAL - INSERT	1140	840.1	0.0	0.0	1432	789	789

NOTE: *Centers of gravity are in the NASA reference system except that the longitudinal has an origin 998.7 inches below the tangency of the command module structure mold line.

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ADAPTER - BOILERPLATE NO. 9

DYNAMIC TEST

WEIGHT SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY*
		X_a - STATIONS
Structure - Adapter	2100	762.4

INERTIA SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA (SLUG-FT.^{2})		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
TOTAL - ADAPTER	2100	762.4	0.0	0.0	2625	1745	1745

NOTE: *Centers of gravity are in the NASA reference system except that the longitudinal has an origin 998.7 inches below the tangency of command module structure mold line.

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WEIGHT, CENTER OF GRAVITY AND INERTIA SUMMARY

MAX "Q" LES VARIFICATION
LAUNCH AND ABORT PAYLOAD
BOILERPLATES 12 AND 23

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA (SLUG-FT.^{2})		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
Launch Escape System - Initial	6410	1297.0	0.0	0.0	208	8109	8109
Command Module	9000	1042.0	1.0	7.5	5050	4258	4267
Service Module and Extension	9090	934.4	-1.2	-7.7	10902	10803	9831
TOTAL LAUNCH PAYLOAD	24500	1068.8	-0.1	-0.1	16390	132218	131034
Launch Escape System - Initial	6410	1297.0	0.0	0.0	208	8109	8109
Command Module	9000	1042.0	1.0	7.5	5050	4258	4267
TOTAL ABORT INITIAL	15410	1148.1	0.6	4.4	5362	64789	64696
Launch Escape System-Burnout	3200	1297.4	0.0	0.0	139	6936	6936
Command Module	9000	1042.0	1.0	7.5	5050	4258	4267
TOTAL ABORT AT LES BURNOUT	12200	1109.0	0.7	5.5	5219	44403	44383

NOTE:* Centers of Gravity are in the NASA reference system except that the Longitudinal has an origin 998.7 inches below the tangency of the Command Module Structure Mold Line.

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WEIGHT, CENTER OF GRAVITY AND INERTIA SUMMARY

MAX "Q" LES VARIFICATION
LAND IMPACT

BOILERPLATES 12 AND 23

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA (SLUG-FT.^{2})		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
Command Module	9000	1042.0	1.0	7.5	5050	4258	4267
Less: Forward Cover	-394	1100.2	-0.1	2.8	76	51	47
Less: Drogue	- 28	1091.0	9.8	-22.1	----	----	----
TOTAL PRIOR TO DEPLOYMENT OF CHUTES	8578	1039.2	0.9	7.8	4960	3797	3809
Less: Main Chutes	-411	1091.5	-1.1	7.6	43	16	35
TOTAL C/M AT IMPACT	8167	1036.5	1.0	7.8	4916	3775	3767

NOTE:* Centers of Gravity are in the NASA reference system except that the Longitudinal has an origin 998.7 inches below the Tangency of the Command Module Structure Mold Line.

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LAUNCH ESCAPE SYSTEM-BOILERPLATES 12 AND 23

MAX "Q" LES VARIFICATION

WEIGHT SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY* Xa-STATIONS
Tower	352	1135.3
Skirt Assembly	265	1209.9
Nose Cone and Cover Assembly	89	1454.3
Pitch Motor Housing and Nut	158	1426.7
Pitch Control Motor	55	1429.0
Escape Motor	4765	1288.2
Jettison Motor	534	1401.6
Ballast and Attaching Plate	166	1436.5
Attaching Parts	26	1344.2
TOTAL - INITIAL	6410	1297.0

INERTIA SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA (SLUG-FT.^{2})		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
LES - INITIAL	6410	1297.0	0.0	0.0	208	8109	8109
LES AT BURNOUT	3200	1297.4	0.0	0.0	139	6936	6935

NOTE:* Centers of Gravity are in the NASA reference System except that the Longitudinal has an origin 998.7 inches below the Tangency of the Command Module Structure Mold Line.

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COMMAND MODULE-BOILERPLATES 12 and 23

MAX "Q" LES VARIFICATION

WEIGHT SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY* Xa-STATIONS
Structure	5523	1037.8
Internal Ballast	1967	1040.5
Communications & Instrumentation	492	1047.4
Electrical Power Supply	266	1036.1
Enviromental Control System	164	1039.8
Earth Landing System	535	1091.2
Impact Attenuation - Dummy	53	1027.5
TOTAL - COMMAND MODULE - INITIAL	9000	1042.0

INERTIA SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA (SLUG-FT.^{2})		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
TOTAL - INITIAL **	9000	1042.0	1.0	7.5	5050	4258	4267
TOTAL - PRIOR TO MAIN CHUTE DEPLOYMENT	8578	1039.2	0.9	7.8	4960	3797	3809
TOTAL - AT IMPACT	8167	1036.5	1.0	7.8	4916	3775	3767

NOTES:* Centers of Gravity are in the NASA reference system except that the Longitudinal has an origin 998.7 inches below the tangency of the Command Module Structure Mold Line.

** This total is with the upper Heat Shield Jettisoned and Drogue deployed.

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SERVICE MODULE-BOILERPLATES 12 AND 23

MAX "Q" LES VARIFICATION

WEIGHT SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY* Xa-STATIONS
Structure	7074	946.5
Internal Ballast	902	909.2
Communication & Instrumentation	68	934.8
Electrical Power Supply	73	974.9
Shockwave Barrier Instl.	214	865.5
Tension Ties	32	1014.0
Extension	727	860.6
TOTAL - SERVICE MODULE	9090	934.4

INERTIA SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA (SLUG-FT.^{2})		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
TOTAL SERVICE MODULE	9090	934.4	-1.2	-7.7	10902	10803	9831

NOTE:* Center of Gravity are in the NASA reference system except that the Longitudinal has an origin 998.7 inches below the tangency of the Command Module Structure Mold Line.

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WEIGHT, CENTER OF GRAVITY AND INERTIA SUMMARY

BOOSTER COMPATIBILITY-SATURN C-1 PAYLOAD

BOILERPLATES 13 and 15

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA (SLUG-FT.^{2})		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
Launch Escape System	6360	1297.7	0.0	0.0	215	7620	7620
Command Module	8760	1041.3	1.9	5.6	5491	3970	3957
Service Module	6600	931.2	-2.3	-2.0	7942	6535	6573
Insert	1140	840.1	0.0	0.0	1432	789	789
Adapter	2100	762.4	0.0	0.0	2625	1745	1745
TOTAL LIFT-OFF PAYLOAD	24960	1044.9	0.1	1.4	17773	172986	172971
Less: Launch Escape System	-6360	1297.7	0.0	0.0	215	7620	7620
TOTAL IN ORBIT PAYLOAD	18600	958.4	0.1	1.9	17554	48086	48075

NOTE: * Centers of Gravity are in the NASA Reference System except that the Longitudinal has an origin 998.7 inches below the tangency of the Command Module Structure Mold line.

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LAUNCH ESCAPE SYSTEM-BOILERPLATES 13 AND 15

BOOSTER COMPATIBILITY

WEIGHT SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY* Xa-STATIONS
Tower	348	1141.7
Skirt Assembly	255	1210.7
Nose Cone and Cover Assembly	96	1455.1
Pitch Motor Housing and Nut	157	1429.0
Pitch Control Motor	55	1429.0
Escape Motor	4692	1287.0
Jettison Motor	519	1401.3
Ballast and Attaching Plate	213	1436.6
Attaching Parts	25	1325.2
TOTAL - INITIAL	6360	1297.7

INERTIA SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA (SLUG-FT.^{2})		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
LES - INITIAL **	6360	1297.7	0.0	0.0	215	7620	7620
LES - AT BURNOUT	3149	1298.9	0.0	0.0	145	6319	6320

NOTE: * Centers of Gravity are in the NASA reference system except that the Longitudinal has an origin 998.7 inches below the tangency of the Command Module structure Mold Line.

** Reference - Actual Weight and Balance Report SID 63-143 dated 4 March 1963.

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COMMAND MODULE-BOILERPLATES 13 AND 15

BOOSTER COMPATIBILITY

WEIGHT SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY* Xa-STATIONS
Structure	4607	1036.3
Internal Ballast	3051	1047.7
Internal Insulation	144	1049.8
External Insulation	111	1056.6
Communications and Instrumentation	335	1047.3
Electrical Power System	264	1041.5
Enviromental Control System	195	1038.0
Impact Attenuation - Dummy	53	1027.5
TOTAL - COMMAND MODULE	8760	1041.3

INERTIA SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA(SLUG-FT.^{2})		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
TOTAL - COMMAND MODULE	8760	1041.3	1.9	5.6	5491	3970	3957

NOTE:* Centers of Gravity are in the NASA reference System except that the Longitudinal has an origin 998.7 inches below the tangency of the Command Module Structure Mold Line.

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SERVICE MODULE-BOILERPLATES 13 AND 15

BOOSTER COMPATIBILITY

WEIGHT SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY* Xa-STATIONS
Structure	3658	949.5
Internal Ballast	2648	902.2
Tension Ties	17	1014.0
Reaction Control System-Dummy	246	958.0
Communications and Electrical	31	992.4
TOTAL - SERVICE MODULE	6600	931.2

INERTIA SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA (SLUG-FT.^{2})		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
TOTAL-SERVICE MODULE	6600	931.2	-2.3	-2.0	7942	6535	6573

NOTE:* Centers of Gravity are in the NASA reference system except that the longitudinal has an origin 998.7 inches below the tangency of the Command Module structure Mold Line.

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INSERT-BOILERPLATES 13 AND 15

BOOSTER COMPATIBILITY

WEIGHT SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY* Xa-STATIONS
Structure - Insert	1140	840.1

INERTIA SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA (SLUG-FT.^{2})		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
TOTAL - INSERT	1140	840.1	0.0	0.0	1432	789	789

NOTE:* Centers of Gravity are in the NASA reference system except that the longitudinal has an origin 998.7 inches below the tangency of the Command Module structure mold line.

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ADAPTER-BOILERPLATES 13 and 15

BOOSTER COMPATIBILITY

WEIGHT SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY* Xa-STATIONS
STRUCTURE - ADAPTER	2100	762.4

INERTIA SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA (SLUG-FT.^{2})		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
TOTAL - ADAPTER	2100	762.4	0.0	0.0	2625	1745	1745

NOTE:* Centers of gravity are in the NASA reference system except that the longitudinal has an origin 998.7 inches below the tangency of the Command Module structure Mold Line.

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WEIGHT, CENTER OF GRAVITY AND INERTIA SUMMARY

BOOSTER COMPATIBILITY-SATURN C-1 PAYLOAD

BOILERPLATE NO. 16

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA (SLUG-FT.^{2})		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
LAUNCH ESCAPE SYSTEM	6360	1297.7	0.0	0.0	215	7620	7620
COMMAND MODULE B/P 22**	8760	1040.7	1.4	6.2	5860	3880	4110
SERVICE MODULE	6600	931.8	-1.8	-1.6	7926	5930	5956
INSERT	1140	840.1	0.0	0.0	1432	789	789
ADAPTER	2100	762.2	0.0	0.0	2647	1737	1737
TOTAL LIFT-OFF PAYLOAD	24960	1044.8	0.0	1.8	18147	172479	172684
LESS: LAUNCH ESCAPE SYSTEM	-6360	1297.7	0.0	0.0	215	7620	7620
TOTAL IN ORBIT PAYLOAD	18600	958.3	0.0	2.4	17927	47247	47459

NOTE:* Centers of Gravity are in the NASA reference system except that the longitudinal has an origin 998.7 inches below the tangency of the Command Module structure Mold Line.

** For the stacked combination of serial number 16, Command Module number 22 is used.

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LAUNCH ESCAPE SYSTEM-BOILERPLATE 16

BOOSTER COMPATIBILITY

WEIGHT SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY* Xa-STATIONS
Tower	348	1141.7
Skirt Assembly	255	1210.7
Nose Cone and Cover Assembly	96	1455.1
Pitch Motor Housing and Nut	157	1429.0
Pitch Control Motor	55	1429.0
Escape Motor	4692	1287.0
Jettison Motor	519	1401.3
Ballast and Attaching Plate	213	1436.6
Attaching Parts	25	1325.2
TOTAL - INITIAL	6360	1297.7

INERTIA SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA (SLUG-FT.^{2})		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
LES - INITIAL **	6360	1297.7	0.0	0.0	215	7620	7620
LES - AT BURNOUT	3149	1298.9	0.0	0.0	145	6319	6320

NOTES:* Centers of Gravity are in the NASA reference System except that the longitudinal has an origin 998.7 inches below the tangency of the Command Module Structure Mold Line.

** Reference - Actual Weight and Balance Report SID 63-143 dated 4 March 1963.

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COMMAND MODULE-BOILERPLATE 16 (C/M 22)

BOOSTER COMPATIBILITY

WEIGHT SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY* Xa-STATIONS
Structure	4474	1037.5
Internal Ballast	4122	1043.9
External Insulation	111	1056.6
Impact Attenuation-Dummy	53	1027.5
TOTAL - COMMAND MODULE	8760	1040.7

INERTIA SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA (SLUG-FT.^{2})		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
TOTAL - COMMAND MODULE	8760	1040.7	1.4	6.2	5860	3880	4110

NOTES:* Centers of Gravity are in the NASA reference system except that the longitudinal has an origin 998.7 inches below the tangency of the Command Module Structure Mold Line.

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SERVICE MODULE-BOILERPLATE 16

BOOSTER COMPATIBILITY

WEIGHT SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY* Xa-STATIONS
Structure	3503	941.4
Internal Ballast	2834	917.2
Tension Ties	17	1014.0
Reaction Control System-Dummy	246	958.0
TOTAL - SERVICE MODULE	6600	931.8

INERTIA SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA(SLUG-FT.^{2})		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
TOTAL - SERVICE MODULE	6600	931.8	-1.8	-1.6	7926	5930	5956

NOTE:* Centers of Gravity are in the NASA reference system except that the Longitudinal has an origin 998.7 inches below the tangency of the Command Module Structure Mold Line.

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INSERT-BOILERPLATE 16

BOOSTER - COMPATIBILITY

WEIGHT SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY* Xa-STATIONS
Structure - Insert	1140	840.1

INERTIA SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA (SLUG-FT.^{2})		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
TOTAL - INSERT	1140	840.1	0.0	0.0	1432	789	789

NOTE:* Centers of Gravity are in the NASA reference ystem except that the longitudinal has an origin 998.7 inches below the tangency of the Command Module Structure Mold Line.

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ADAPTER-BOILERPLATE 16

BOOSTER COMPATIBILITY

WEIGHT SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY* Xa-STATIONS
Structure - Adapter	2100	762.2

INERTIA SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA (SLUG-FT.^{2})		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
TOTAL - ADAPTER	2100	762.2	0.0	0.0	2647	1737	1737

NOTE:* Centers of Gravity are in the NASA reference System except that the Longitudinal has an origin 998.7 inches below the tangency of the Command Module Structure Mold Line.

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WEIGHT, CENTER OF GRAVITY AND INERTIA SUMMARY

QUALIFICATION OF SEPARATION AND BOOSTER COMPATIBILITY

LIFT-OFF AND ORBITAL PAYLOAD

BOILERPLATE 18

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA(SLUG-FT.^{2})		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
Launch Escape System	6410	1297.0	0.0	0.0	208	8109	8109
Command Module	9000	1042.0	1.0	7.5	5230	4094	4255
Service Module	12675	903.4	5.2	-2.5	8752	12202	12738
Adapter	825	780.0	0.0	0.0	1029	752	752
TOTAL - LIFT - OFF PAYLOAD	28910	1030.3	2.6	1.2	15370	179115	179728
Less: Launch Escape System	-6410	1297.0	0.0	0.0	208	8109	8109
TOTAL - IN ORBIT PAYLOAD	22500	954.3	3.3	1.6	15148	44743	45349

NOTE:* Centers of Gravity are in the NASA reference system except that the Longitudinal has an origin 998.7 inches below the tangency of the Command Module Structure Mold Line.

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WEIGHT, CENTER OF GRAVITY AND INERTIA SUMMARY

QUALIFICATION OF SEPARATION AND BOOSTER COMPATIBILITY

AFTER SEPARATION

BOILERPLATE 18

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA(SLUG-FT.^{2})		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
Total - In orbit	22500	954.3	3.3	1.6	15148	44743	45349
Less: Adapter	- 825	780.0	0.0	0.0	1029	752	752
Less: Reaction Control Prop.	- 200	964.0	0.0	0.0	--	--	--
TOTAL - AFTER SEPARATION	21475	960.9	3.5	1.7	14114	38425	39028

NOTE:* Centers of Gravity are in the NASA reference System except that the Longitudinal has an origin 998.7 inches below the Tangency of the Command Module Structure Mold Line.

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LAUNCH ESCAPE SYSTEM-BOILERPLATE 18

QUALIFICATION OF SEPARATION AND BOOSTER COMPATIBILITY

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WEIGHT SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY* Xa-STATIONS
Tower	352	1135.3
Skirt Assembly	265	1209.9
Nose Cone and Cover Assembly	89	1454.3
Pitch motor housing and Nut	158	1426.7
Pitch Control Motor	55	1429.0
Escape Motor	4765	1288.2
Jettison Motor	534	1401.6
Ballast and Attaching Plate	166	1436.5
Attaching Parts	26	1344.2
TOTAL - INITIAL	6410	1297.0

INERTIA SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA(SLUG-FT.^{2})		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
LES - INITIAL	6410	1297.0	0.0	0.0	208	8109	8108
LES - AT BURNOUT	3200	1297.4	0.0	0.0	139	6936	6935

NOTE:* Centers of Gravity are in the NASA reference system except that the Longitudinal has an origin 998.7 inches below the tangency of the Command Module Structure Mold Line.

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COMMAND MODULE - BOILERPLATE 18

QUALIFICATION OF SEPARATION AND BOOSTER COMPATIBILITY

WEIGHT SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY* Xa-STATIONS
Structure	4607	1036.3
Internal Ballast	3241	1049.1
Internal Insulation	144	1049.8
External Insulation	111	1056.7
Communications and Instrumentation	385	1047.3
Electrical Power System	264	1041.5
Enviromental Control System	195	1038.0
Impact Attenuation - Dummy	53	1027.5
TOTAL - COMMAND MODULE	9000	1042.0

INERTIA SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA (SLUG-FT.2)		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
TOTAL-COMMAND MODULE	9000	1042.0	1.0	7.5	5230	4094	4255

NOTE:* Centers of Gravity are in the NASA reference system except that the Longitudinal has an origin 998.7 inches below the tangency of the Command Module Structure Mold Line.

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SERVICE MODULE (SPACECRAFT)-BOILERPLATE 18

QUALIFICATION OF SEPARATION AND BOOSTER COMPATIBILITY

WEIGHT SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY* Xa-STATIONS
Structure	2116	913.3
Internal Ballast	8895	899.5
Reaction Control System	593	962.5
Reaction Control Propellant	250	964.0
Service Propulsion System		
Bell - Dummy	170	791.4
Electronics	151	844.3
Instrumentation and Electrical	500	885.6
TOTAL - SERVICE MODULE	12675	903.4

INERTIA SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA (SLUG-FT.^{2})		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
TOTAL - SERVICE MODULE	12675	903.4	5.2	-2.5	8752	12202	12738

NOTE:* Centers of Gravity are in the NASA reference system except that the Longitudinal has an origin 998.7 inches below the tangency of Command Module Structure Mold Line.

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ADAPTER (SPACECRAFT)-BOILERPLATE 18

QUALIFICATION OF SEPARATION AND BOOSTER COMPATIBILITY

WEIGHT SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY* Xa-STATIONS
Structure	730	780.0
Separation Provisions	75	780.0
Electrical	20	780.0
TOTAL - ADAPTER	825	780.0

INERTIA SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA (SLUG-FT.^{2})		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
TOTAL - ADAPTER	825	780.0	0.0	0.0	1029	752	752

NOTE: * Centers of Gravity are in the NASA reference System except that the Longitudinal has an origin 998.7 inches below the tangency of the Command Module Structure Mold Line.

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WEIGHT, CENTER OF GRAVITY AND INERTIA SUMMARY

HI-ALTITUDE - LES VARIFICATION

LAUNCH AND ABORT PAYLOAD

BOILERPLATE 22

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA (SLUG-FT.^{2})		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
Launch Escape System - Initial	6410	1297.0	0.0	0.0	208	8109	8109
Command Module	9000	1042.0	1.0	7.5	4899	4271	4148
Service Module and Extension	9090	934.4	-1.2	-7.7	10902	10803	9831
TOTAL LAUNCH PAYLOAD	24500	1068.8	-0.1	-0.1	16239[illegible]	132231	130915
Launch Escape System-Initial	6410	1297.0	0.0	0.0	208	8109	8109
Command Module	9000	1042.0	1.0	7.5	4899	4271	4148
TOTAL ABORT - INITIAL	15410	1148.1	0.6	4.4	5211	64802	64577
Launch Escape System-Burnout	3200	1297.4	0.0	0.0	139	6936	6936
Command Module	9000	1042.0	1.0	7.5	4899	4271	4148
TOTAL ABORT AT LES BURNOUT	12200	1109.0	0.7	5.5	5068	44416	44264

NOTE:* Centers of Gravity are in the NASA reference system except that the Logitudinal has an origin 998.7 inches below the tangency of the Command Module Structure Mold Line.

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WEIGHT, CENTER OF GRAVITY AND INERTIA SUMMARY

HI-ALTITUDE - LES VARIFICATION

LAND IMPACT

BOILERPLATE NO. 22

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA (SLUG-FT.^{2})		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
Command Module	9000	1042.0	1.0	7.5	4899	4271	4148
Less: RCS Oxidizer	-172	1022.6	15.5	62.4	8	1	7
C/M LESS OXIDIZER	8828	1042.4	0.7	6.4	4775	4054	4037
Less: Forward Cover	-394	1102.1	-0.1	2.8	76	51	47
Less: Drogue Chute	-28	1091.0	9.8	7.8	-	-	-
C/M PRIOR TO MAIN CHUTE DEPLOYMENT	8406	1039.4	0.7	6.6	4696	3818	3806
Less: Main Chutes	-411	1091.5	-1.1	7.6	43	16	35
C/M AFTER CHUTE DEPLOYMENT	7995	1036.7	0.8	6.5	4653	3628	3596
Less: RCS Fuel	-86	1022.6	-46.5	44.9	3	2	2
C/M AT IMPACT	7909	1036.9	1.3	6.1	4580	3430	3383

NOTE: *Centers of gravity are in the NASA reference system except that the longitudinal has an origin 998.7 inches below th tangency of command module structure mold line.

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LAUNCH ESCAPE SYSTEM-BOILERPLATE 22

HI-ALTITUDE LES VARIFICATION

WEIGHT SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY* Xa-STATIONS
Tower	352	1135.3
Skirt Assembly	265	1209.9
Nose Cone and Cover Assembly	89	1454.3
Pitch Motor Housing and Nut	158	1426.7
Pitch Control Motor	55	1429.0
Escape Motor	4765	1288.2
Jettison Motor	534	1401.6
Ballast and Attaching Plate	166	1436.5
Attaching Parts	26	1344.2
TOTAL - INITIAL	6410	1297.0

INERTIA SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA(SLUG-FT.^{2})		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
LES - INITIAL	6410	1297.0	0.0	0.0	208	8109	8109
LES AT BURNOUT	3200	1297.4	0.0	0.0	139	6936	6935

NOTE:* Centers of Gravity are in the NASA reference system except that the Longitudinal has an origin 998.7 inches below the tangency of the Command Module Structure Mold Line.

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COMMAND MODULE-BOILERPLATE 22

HI-ALTITUDE LES VARIFICATION

WEIGHT SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY* Xa-STATIONS
Structure	5523	1037.8
Internal Ballast	1051	1050.1
Communications and Instrumentation	492	1047.4
Electrical Power Supply	316	1036.1
Enviromental Control System	478	1036.4
Reaction Control System	552	1025.7
Earth Landing System	535	1091.2
Impact Attenuation-Dummy	53	1027.5
TOTAL - COMMAND MODULE - INITIAL	9000	1042.0

INERTIA SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA (SLUG-FT.^{2})		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
TOTAL - INITIAL	9000	1042.0	1.0	7.5	4899	4271	4148
** TOTAL - PRIOR TO MAIN CHUTE DEPLOYMENT	8578	1039.2	0.9	7.8	4809	3810	3690
TOTAL - AT IMPACT	8167	1036.5	1.0	7.8	4765	3788	3648

NOTES:* Centers of Gravity are in the NASA reference system except that ehe Longitudinal has an origin 998.7 inches below the Tangency of the Command Module Structure Mold Line.

** This total is with the upper heat shield Jettisoned and Drogue Deployed.

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SERVICE MODULE - BOILERPLATE 22

HI-ALTITUDE LES VARIFICATION

WEIGHT SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY* Xa-STATIONS
Structure	1074	946.5
Internal Ballast	902	909.2
Communications and Instrumentation	68	934.8
Electrical Power Supply	73	974.9
Shockwave Barrier Instl.	214	865.5
Tension Ties	32	1014.0
Extension	727	860.6
TOTAL - SERVICE MODULE	9090	934.4

INERTIA SUMMARY

ITEM	WEIGHT	CENTER OF GRAVITY*			MOMENTS OF INERTIA (SLUG-FT.^{2})		
		X	Y	Z	ROLL (X)	PITCH (Y)	YAW (Z)
TOTAL SERVICE MODULE	9090	934.4	-1.2	-7.7	10902	10803	9831

NOTE:* Centers of Gravity are in the NASA reference system except that the Longitudinal has an origin 998.7 inches below the tangency of the Command Module Structure Mold Line

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