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DATE: 25 January 1969

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MASS PROPERTIES STATUS REPORT

MOL

GE AVE

AS OF: 1 January 1968

REPORT NO. CAP-22

CDRI ITEM NO. 116/S015

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SUBNUMBER 2.2

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JAN 30 1969

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INTRODUCTION

The weight status for the GE AVE (Manned/Automatic) as of 1 January 1969 was 2744 pounds which constitutes a net weight change of minus 7.0 pounds since the 10 December 1968, CAP 21 Report. Tables 1-5, 1-6, and 1-7 contain detail explanations of individual changes by functional code.

The GE AVE allocated weight was changed from 2435 to 2745 pounds (CEI Specification CP1000BI, dated 10 October 1968). Specification CP1000BI, paragraph 3.1.1.1.8, Weight, states: "The allocated weight of the GE AVE shall be 2745 pounds (MA) exclusive of all Government Furnished Equipment (GFE)". The CEI does not delineate the + 45 pound tolerance on 2745 (2700 to 2790) pounds.

The 2745-pound allocated weight has been reflected in the revised specified weight base for the first and second generation functional codes. A summary of the revised allocation is as follows:

CEI (Specification CP1000BI) Weight

- Change in CEI Weight
  - CEI, October 1966 2435 lb
  - CEI, October 1968 2745 lb
  - Delta + 310 lb
  
- Derivation of Delta
  - GE-Submitted Changes +343 lb
  - GE Growth - Contingency +166 lb
  - GE Total +509 lb
  - Customer - Directed Delta +310 lb
  - Customer Directed Reduction -199\*lb  
in Allocated Weight

\*The only identified change included in the Customer-directed reduction was the use of "Light Weight" Kapton wire (-40 pounds).

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MANNED/AUTOMATIC MODE

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MANAGEMENT REVIEW Mode: Manned/Automatic

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SUMMARY WEIGHT DATA										
DESCRIPTION	BASELINE SPECIFIED WEIGHT (pounds)	PROCURING ACTIVITY AND GFE CHANGES		REVISED SPECIFIED WEIGHT (pounds)	CURRENT WEIGHT	CHANGES LAST TO CURRENT	PERCENTAGE BREAKDOWN OF CURRENT WEIGHT			
		THIS REPORT	NET TO DATE				EST	CALC	ACT.	
Total	2435	+121	+310	2745	2744.	-7.	49	49	2	
GE AVE	--	0	95	95	95.	0.	100	0	0	
GFE	2435	+121	+405	2840	2839	-7.	51	47	2	
Lab Module										
GE AVE	918	+ 3	+268	1186	1359.	0.	54	42	4	
GFE	0	0	95	95	95	0.	100	0	0	
GE AVE & GFE	918	+ 3	+363	1281	1454	0.	57	39	4	
Mission Module										
GE AVE	1517	+118	+42	1559	1385	-7.	44	55	1	
GFE (None)										
SUMMARY MASS PROPERTY DATA										
DESCRIPTION	CURRENT WEIGHT (pounds)	CENTER OF GRAVITY (inches from ref datum)			MOMENT OF INERTIA (slug feet-squared)			PRODUCT OF INERTIA (slug feet-squared)		
		$\bar{X}$	$\bar{Y}$	$\bar{Z}$	ROLL	PITCH	YAW	$I_{XY}$	$I_{XZ}$	$I_{YZ}$
GE AVE & GFE	2839	504.6	4.4	-10.0	1424	3319	3754	99	-292	-66
Lab Module	1454	560.6	6.1	-17.6	800	398	776	-1	-79	-26
Mission Module	1385	446.0	2.7	- 2.0	585	867	959	31	-60	-33
DATA RECOVERY VEHICLE MASS PROPERTIES (STOWED POSITION) (REPORTED FOR REFERENCE ONLY AND IS EXCLUDED FROM OTHER REPORTED DATA)										
GE AVE	63	628.1	1.8	32.5	4.5	2.7	3.6			
GFE	310	640.5	36.0	3.0	12.7	6.7	12.4			
GE AVE & GFE	373	638.4	30.2	8.0	40.3	21.0	31.0			

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Table 1-1. Lab Module Mass Properties Summary - Form 1, Part I

CODE	DESCRIPTION	SPECIFIED WEIGHT BASE	PROCURING ACTIVITY AND GFE CHANGES	REVISED SPECIFIED WEIGHT BASE	CURRENT WEIGHT	CHANGES LAST TO CURRENT	PERCENTAGE BREAKDOWN OF CURRENT WEIGHT		CHANGE ANALYSIS NOTES
							EST.	ACT.	
29.00.00	LAB MODULE TOTAL	918.	363.	1281.	1453.85	-0.10	57.02	59.15	3.84
30.00.00	NAVIGATION	5.	0.	5.	0.		0.00	0.00	0.00
30.01.00	LOW G ACCELEROMETER ASSEMBLY	5.	0.	5.	0.		0.00	0.00	0.00
31.00.00	TRACKING MIRROR INSTALL. AND CONTR	16.	0.	16.	42.60		88.26	0.	11.74
31.01.00	MANUAL CONTROLLER STICKS ASSEMBLY	12.	0.	12.	5.00		0.	0.	100.00
31.02.00	MANUAL CONTROLLER ELECTRONICS	4.	0.	4.	13.50		100.00	0.	0.
31.03.00	HEAD RESTS	0.	0.	0.	5.00		100.00	0.	0.
31.04.00	DRIVE ELECTRONICS	0.	0.	0.	19.10		100.00	0.	0.
32.00.00	ACQUISITION	310.	246.	546.	616.03	+3.40	41.21	54.31	4.47
32.01.00	VISUAL OPTICS AND INSTALLATION	135.	244.	379.	360.70		16.15	83.85	0.
32.02.00	CONTROLS	78.	39.	117.	196.02	-3.40	86.89	0.	13.11
32.03.00	DISPLAYS	97.	-37.	60.	57.31		43.87	52.83	3.30
34.00.00	DATA RECOVERY	55.	-55.	0.	0.		0.00	0.00	0.00
34.01.00	DRV-GFE (STORED POSITION)	0.	0.	0.	0.		100.00	0.	0.
34.02.00	LAUNCH SYSTEM	16.	-16.	0.	0.		100.00	0.	0.
34.03.00	ELECTRICAL COUPLING AND SUPPORTS	5.	-5.	0.	0.		100.00	0.	0.
34.04.00	LAUNCH CONTROLS	7.	-7.	0.	0.		100.00	0.	0.
34.05.00	CHECKOUT SET	18.	-18.	0.	0.		100.00	0.	0.
34.06.00	STORAGE COMPARTMENT	9.	-9.	0.	0.		100.00	0.	0.
35.00.00	SECONDARY STRUCTURE	62.	25.	87.	60.37		0.	100.00	0.
35.01.00	STRUCTURE	62.	25.	87.	60.37		0.	100.00	0.

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FORM 1 PART I

Table 1-1. Lab Module Mass Properties Summary - Form 1, Part I (Cont)

MASS PROPERTIES SUMMARY									
CODE	DESCRIPTION	SPECIFIED WEIGHT BASE	PROCURING ACTIVITY AND CPE CHANGES	REVISED SPECIFIED WEIGHT BASE	CURRENT WEIGHT	CHANGES LAST TO CURRENT	PERCENTAGE BREAKDOWN OF CURRENT WEIGHT		CHANGE ANALYSIS NOTES
							EST.	ACT.	
36.00.00	ENVIRONMENTAL CONTROL	73.	12.	85.	79.76		25.08	74.92	0.
36.01.00	COLD PLATES	54.	10.	64.	59.76		0.	100.00	0.
36.02.00	TUBING AND FITTING/SUPPORT	19.	2.	21.	20.00		100.00	0.	0.
37.00.00	POWER DISTRIBUTION	97.	16.	113.	122.20	-3.5	100.00	0.	0.
37.01.00	ELECTRICAL COUPLING	65.	11.	76.	60.10		100.00	0.	0.
37.02.00	POWER CONTROLS	32.	5.	37.	62.10	-3.5	100.00	0.	0.
38.00.00	INSTRUMENTATION	42.	8.	50.	41.94		71.53	28.46	0.
38.01.00	SCREWS	2.	8.	2.	0.		0.00	0.00	0.00
38.03.00	SIGNAL CONDITIONING	17.	1.	18.	30.00		100.00	0.	0.
38.04.00	CONTROLS AND ELECTRONICS	23.	7.	30.	11.94		0.	100.00	0.
38.05.00	ELECTRICAL COUPLING	0.	0.	0.	0.		0.	0.	0.
39.00.00	DATA MANAGEMENT/COMPUTATION	40.	116.	156.	187.98		100.00	0.	0.
39.01.00	COMPUTER ASSEMBLY	0.	85.	85.	85.00		100.00	0.	0.
39.02.00	DATA ADAPTER ASSEMBLY	39.	30.	69.	84.98		100.00	0.	0.
39.03.00	CONTROLS - ELECTRONICS	1.	8.	1.	8.00		100.00	0.	0.
39.04.00	ELECTRICAL COUPLING	0.	8.	0.	0.		0.	0.	0.
39.05.00	MODE CONTROL	0.	1.	1.	10.00		100.00	0.	0.
40.00.00	DISPLAYS AND CONSOLES	196.	33.	229.	275.67		62.14	37.86	0.
40.01.00	CONTROLS	5.	6.	11.	34.00		100.00	0.	0.
40.02.00	CLOSURE PANEL	10.	0.	10.	15.54		0.	100.00	0.

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FORM 1 PART I

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Table 1-1. Lab Module Mass Properties Summary - Form 1, Part I (Cont)

CCODE	DESCRIPTION	MASS PROPERTIES SUMMARY										CHANGE BREAKDOWN OF ANALYSIS NOTES
		MODE: MANNED AUTOMATIC										
		SPECIFIED WEIGHT BASE	PROCURING ACTIVITY AND GPE CHANGES	REVISED SPECIFIED WEIGHT BASE	CURRENT WEIGHT	CHANGES LAST TO CURRENT	PERCENTAGE BREAKDOWN OF CURRENT WEIGHT		ACT.			
EST.		CALC.		ACT.								
40.03.00	DISPLAY PANELS AND ELECTRONICS	86.	-2.		84.	76.60		9.41	90.59	0.		
40.04.00	ELECTRICAL COUPLING AND SUPPORTS	95.	29.	124.	149.53		87.01	12.99	0.			
41.00.00	IMAGE VELOCITY SENSOR SYSTEM	0.	52.	52.	27.30		14.29	0.	85.71			
41.01.00	BETA HEAD	0.	0.	0.	15.50		0.	0.	100.00			
41.01.00	BETA ELECTRONICS	0.	0.	0.	7.90		0.	0.	100.00			
41.01.00	BETA ADAPTER AND SHJM	0.	0.	0.	2.50		100.00	0.	0.			
41.01.00	A/D CONVERTER	0.	0.	0.	1.40		100.00	0.	0.			
41.02.00	ELECTRICAL COUPLING	0.	0.	0.	0.		0.	0.	0.			
42.00.00	CONSOLE NO. 1-INTEGRATED	22.	0.	22.	0.		0.	0.	0.			
42.01.00	INTEGRATED CONSOLE NO. 1	22.	0.	22.	0.		0.	0.	0.			
46.00.00	CEI (CPI000B) ADJUSTMENTS	0.	-90.	-90.	0.		0.	0.	0.			
46.01.00	GE GROWTH CONTINGENCY	0.	83.	83.	0.		0.	0.	0.			
46.02.00	CI'S/OMER-DIRECTED REDUCTION	0.	-173.	-173.	0.		0.	0.	0.			
	LAB MODULE TOTAL	918.	363.	1281.	1453.85		57.01	39.15	3.84			
	LAB MODULE RECAPITULATION											
GE-AVE		918.	288.	1186.	1358.85		54.00	41.90	4.1			
GPE		0.	95.	95.	95.00		100.00	0.	0.			

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FORM 1 PART 1

IDENTIFICATION

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Table 1-2. Mission Module Mass Properties Summary - Form 1, Part I

CCDC	DESCRIPTION	MASS PROPERTIES SUMMARY										CHANGE ANALYSIS NOTES	
		MODE: MANMED AUTOMATIC											
		SPECIFIED WEIGHT BASE	PROCURING ACTIVITY AND GFE CHANGES	REVISED SPECIFIED WEIGHT BASE	CURRENT WEIGHT	CHANGES LAST TO CURRENT	PERCENTAGE BREAKDOWN OF CURRENT WEIGHT		ACT.				
					EST.	CALC.							
49.00.00	MISSION MODULE TOTAL	1517.	42.	1559.	1384.51	+1.68	44.01	55.37	0.63				
50.00.00	NAVIGATION	98.	15.	113.	126.40		73.13	26.87	0.				
50.01.00	STAR TRACKER (LAUNCH)	71.	3.	72.	91.08		75.14	24.86	0.				
50.02.00	ALIGNMENT MONITORING	27.	14.	41.	24.60		97.56	2.44	0.				
50.03.00	LOW G ACCELEROMETER ASSEMBLY	0.	0.	0.	10.72		0.	100.00	0.				
51.00.00	TRACKING MIRROR INSTALL. AND CONTR	568.	44.	612.	446.06		2.59	95.46	1.96				
51.01.00	STRUCTURE (LAUNCH)	322.	48.	382.	260.67		1.92	98.08	0.				
51.02.00	LOCKOUT DEVICES	9.	0.	9.	4.07		0.	100.00	0.				
51.03.00	DRIVES AND CONTROLS	237.	4.	241.	172.58		3.79	91.15	5.05				
51.05.00	ELECTRICAL COUPLING AND SUPPORTS	0.	0.	0.	8.74		0.	100.00	0.				
53.00.00	THERMAL DOOR (LAUNCH)	380.	-392.	-12.	0.		0.00	0.00	0.00				
53.01.00	DOOR-ORBITAL (LAUNCH)	83.	-86.	-3.	0.		0.	0.	0.				
53.02.00	CRADLE-ROLL ASSEMBLY (LAUNCH)	213.	-228.	-7.	0.		0.	0.	0.				
53.03.00	RACK ASSEMBLY	13.	-13.	0.	0.		0.	0.	0.				
53.04.00	DRIVES, SUPPORTS AND CONTROLS	70.	-72.	-2.	0.		0.	0.	0.				
53.06.00	POSITION SENSORS AND INDICATORS	1.	-1.	0.	0.		0.	0.	0.				
53.07.00	ELECTRICAL COUPLING	0.	0.	0.	0.		0.	0.	0.				
54.00.00	INTERNAL SLIDING MASK	0.	233.	233.	209.11	-11.20	41.94	58.06	0.				
54.01.00	STRUCTURE	0.	94.	94.	94.33	+1.70	0.	100.00	0.			(4)	
54.02.00	DRIVES	0.	64.	64.	65.28	-0.60	45.46	54.54	0.			(5)	
54.03.00	CONTROLS	0.	75.	75.	24.00	-13.50	100.00	0.	0.			(5)	
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FORM 1 PART I													

Table 1-2. Mission Module Mass Properties Summary - Form 1, Part I (Cont)

CODE	DESCRIPTION	MASS PROPERTIES SUMMARY										CHANGE BREAKDOWN OF ANALYSIS NOTES	
		MOCE* MANNED AUTOMATIC											
		SPECIFIC WEIGHT BASE	PROCURING ACTIVITY AND GFE CHANGES	REVISED SPECIFIED WEIGHT BASE	CURRENT WEIGHT	CHANGES LAST TO CURRENT	PERCENTAGE BREAKDOWN OF CURRENT WEIGHT		CHANGE ANALYSIS NOTES				
					EST.	CALC.	ACT.						
54.04.00	ELECTRICAL CABLE	0.	0.	0.	25.50		100.00	0.	0.				
55.00.00	SECONDARY STRUCTURE	29.	0.	29.	46.04		13.53	86.47	0.				
55.01.00	EQUIPMENT TRAY STRUCTURE NO. 2	15.	8.	15.	20.64		0.	100.00	0.				
55.02.00	EQUIPMENT TRAY STRUCTURE NO. 8	14.	0.	14.	20.90		0.	100.00	0.				
55.03.00	COMPONENT MOUNTING HARDWARE	0.	0.	0.	6.50		100.00	0.	0.				
56.00.00	ENVIRONMENTAL CONTROL	216.	67.	283.	253.18	+5.20	55.88	44.12	0.				
56.01.00	INSULATION	84.	11.	95.	59.90		17.53	82.47	0.				
56.02.00	THERMAL COATINGS-INT AND EXT	15.	-16.	-1.	0.		0.	0.	0.				
56.03.00	COMPARTMENT HEATERS	95.	44.	139.	123.88	+8.20	95.36	4.64	0.	(6)			
56.04.00	GROUND COMPARTMENT CONDITIONING	22.	0.	22.	23.60		0.	100.00	0.				
56.05.00	BAFFLES	0.	28.	28.	45.80	+2.00	29.68	70.32	0.	(7)			
57.00.00	POWER DISTRIBUTION	179.	17.	196.	224.41		92.01	7.99	0.				
57.01.00	ELECTRICAL COUPLING	158.	17.	175.	190.80		100.00	0.	0.				
57.02.00	POWER CONTROLS-SEPARATION	14.	0.	14.	14.44		48.48	51.52	0.				
57.03.00	SUPPORTS	7.	0.	7.	19.17		45.123	54.77	0.				
58.00.00	INSTRUMENTATION	42.	0.	42.	60.61	-1.22	77.26	22.74	0.				
58.01.00	SENSORS	11.	0.	11.	25.25	+2.28	100.00	0.	0.	(8)			
58.02.00	INDICATORS	0.	0.	0.	0.		0.	0.	0.				
58.03.00	SIGNAL CONDITIONING	14.	0.	14.	15.30		100.00	0.	0.	(9)			
58.04.00	CONTROLS AND ELECTRONICS	17.	0.	17.	20.06		29.31	70.09	0.				

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FORM 1 PART 1

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Table 1-2. Mission Module Mass Properties Summary - Form 1, Part I (Cont)

Table 1-2. Mission Module Mass Properties Summary - Form 1, Part I (Cont)

CODE	DESCRIPTION	MASS PROPERTIES SUMMARY										CHANGE ANALYSIS NOTES
		SPECIFIED WEIGHT BASE	PROCURING ACTIVITY AND GFE CHANGES	REVISED SPECIFIED WEIGHT BASE	CURRENT WEIGHT	CHANGES LAST TO CURRENT	PERCENTAGE BREAKDOWN OF CURRENT WEIGHT		PERCENTAGE BREAKDOWN OF CURRENT WEIGHT			
							EST.	CALC.	ACT.			
58.05.00	ELECTRICAL COUPLING	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	
59.00.00	DATA MANAGEMENT/COMPUTATION	5.	1.	6.	16.80		100.00	0.	0.	0.	0.	
59.01.00	MODE CONTROL	5.	1.	6.	16.80		100.00	0.	0.	0.	0.	
66.00.00	CEI (CP1000B) ADJUSTMENTS	0.	57.	57.	0.							
66.01.00	GE GROWTH CONTINGENCY	0.	83.	83.	0.							
66.02.00	CUSTOMER DIRECTED REDUCTION	0.	-26.	-26.	0.							
	MISSION MODULE TOTAL	1517.	42.	1559.	1384.51		44.01	55.37	0.63			
	MISSION MODULE RECAPITULATION	1517.	42.	1559.	1384.51		44.01	55.37	0.63			
	GFE-AVE	0	0	0	0		0	0	0			
	GFE	0	0	0	0		0	0	0			

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FORM 1 PART I

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Table 1-3. Lab Module Mass Properties Summary - Form 1, Part II

Table 1-3. Lab Module Mass Properties Summary - Form 1, Part II

CODE	DESCRIPTION	MASS PROPERTIES SUMMARY												
		CURRENT WEIGHT (POUNDS)			MODE MAINTAINED AUTOMATIC			CENTER OF GRAVITY INCHES FROM REFERENCE DATUM			MOMENT OF INERTIA (SLUG FEET SQUARED)			
		X	Y	Z	X	Y	Z	ROLL	PITCH	YAW				
29.00.00	LAB MODULE TOTAL	1453.85	560.63	6.08	-17.62	800.00	397.75	776.12						
30.00.00	NAVIGATION	0.	0.00	0.00	0.00	0.	0.	0.						
30.01.00	LOC ACCELEROMETER ASSEMBLY	0.	0.00	0.00	0.00	0.	0.	0.						
31.00.00	TRACKING MIRROR INSTALL. AND CONTR	42.60	548.80	29.12	-35.29	7.35	6.70	12.20						
31.01.00	MANUAL CONTROLLER STICKS ASSEMBLY	5.00	546.00	-7.70	-24.75	0.75	0.00	0.75						
31.02.00	MANUAL CONTROLLER ELECTRONICS	13.50	580.71	27.20	-48.75	0.01	0.01	0.01						
31.03.00	HEAD RESTS	5.00	561.50	0.	-23.00	1.82	0.	1.82						
31.04.00	DRIVE ELECTRONICS	19.10	523.65	47.75	-31.75	0.10	0.08	0.05						
32.00.00	ACQUISITION	616.00	552.82	0.32	-1.49	493.34	146.28	408.26						
32.01.00	VISUAL OPTICS AND INSTALLATION	360.70	545.82	0.	15.45	350.33	61.50	297.40						
32.02.00	CONTRLS	118.02	566.64	0.57	26.56	98.44	16.92	88.10						
32.03.00	DISPLAYS	57.31	549.96	1.48	-22.95	10.09	1.48	10.79						
34.00.00	DATA RECOVERY	0.	0.00	0.00	0.00	0.	0.	0.						
34.01.00	DRV-GFE (STOWED POSITION)	0.	0.	0.	0.	0.	0.	0.						
34.02.00	LAUNCH SYSTEM	0.	0.	0.	0.	0.	0.	0.						
34.03.00	ELECTRICAL COUPLING AND SUPPORTS	0.	0.	0.	0.	0.	0.	0.						
34.04.00	LAUNCH CONTROLS	0.	0.	0.	0.	0.	0.	0.						
34.05.00	CHECKOUT SET	0.	0.	0.	0.	0.	0.	0.						
34.06.00	STOWAGE COMPARTMENT	0.	0.	0.	0.	0.	0.	0.						
35.00.00	SECONDARY STRUCTURE	60.37	566.97	2.01	-30.41	16.75	13.33	25.21						
35.01.00	STRUCTURE	60.37	566.97	2.01	-30.41	16.75	13.33	25.21						
PREPARED BY: MASS PROPERTIES CONTROL										IDENTIFICATION			REPORT NO., CAP 22	
DATE: 1 JANUARY 1969														
FORM 1 PART II														

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Table 1-3. Lab Module Mass Properties Summary - Form 1, Part II (Cont)

MASS PROPERTIES SUMMARY		CURRENT WEIGHT (POUNDS)		CENTER OF GRAVITY INCHES FROM REFERENCE DATUM*			MOMENT OF INERTIA (SLUG FEET SQUARED)		
DESCRIPTION		MOLE= MANNED AUTOMATIC		X	Y	Z	ROLL	PITCH	YAW
36.00.00	ENVIRONMENTAL CONTROL	79.76		561.75	-4.96	-38.18	27.50	11.22	37.01
36.01.00	COLD PLATES	59.76		564.48	-6.62	-37.24	25.19	9.99	33.96
36.02.00	TUBING AND FITTING/SUPPORT	20.00		553.60	0.	-41.00	2.13	0.80	2.53
37.00.00	POWER DISTRIBUTION	122.20		548.31	16.25	-10.29	27.63	22.12	28.47
37.01.00	ELECTRICAL COUPLING	60.10		564.74	-9.95	7.40	1.89	7.09	4.04
37.02.00	POWER CONTROLS	62.10		533.25	40.25	-26.50	0.90	0.54	0.66
38.00.00	INSTRUMENTATION	41.94		596.31	-42.87	-35.44	0.59	0.66	0.58
38.01.00	SENSORS	0.		0.00	0.00	0.00	0.	0.	0.
38.03.00	SIGNAL CONDITIONING	30.00		596.47	-45.60	-32.55	0.21	0.39	0.33
38.04.00	CONTROLS AND ELECTRONICS	11.94		595.91	-36.00	42.72	0.02	0.08	0.07
38.05.00	ELECTRICAL COUPLING	0.		0.	0.	0.	0.	0.	0.
39.00.00	DATA MANAGEMENT/COMPUTATION	187.98		591.73	32.88	31.85	16.03	7.45	21.15
39.01.00	COMPLER ASSEMBLY	85.00		599.00	26.60	-32.60	1.40	0.80	0.80
39.02.00	DATA ADAPTER ASSEMBLY	84.98		591.11	44.50	-31.25	0.56	0.50	0.37
39.03.00	CONTROLS - ELECTRONICS	8.00		580.21	-44.00	-36.10	0.01	0.01	0.01
39.04.00	ELECTRICAL COUPLING	0.		0.	0.	0.	0.	0.	0.
39.05.00	MODE CONTROL	10.00		544.40	49.00	-27.20	0.01	0.01	0.01
40.00.00	DISPLAYS AND CONSOLES	275.67		563.02	2.09	-31.76	67.81	24.97	80.90
40.01.00	CONTROLS	34.00		580.44	-0.17	-43.25	9.46	0.17	9.46
40.02.00	CLOSURE PANEL	15.54		547.07	0.98	-21.12	2.24	2.22	4.18

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FORM 1 PART II

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Table 1-3. Lab Module Mass Properties Summary - Form 1, Part II (Cont)

Table 1-3. Lab Module Mass Properties Summary - Form 1, Part II (Cont)

CODE	DESCRIPTION	CURRENT HEIGHT (POUNDS)	MASS PROPERTIES SUMMARY			MODE= MANNED AUTOMATIC			MOMENT OF INERTIA (SLUG FEET SQUARED)		
			CENTER OF GRAVITY INCHES FROM REFERENCE DATUM			ROLL	PITCH	YAW			
			X	Y	Z						
40.03.00	DISPLAY PANELS AND ELECTRONICS	76.60	569.33	2.48	-21.39	11.06	3.23	13.29			
40.04.00	ELECTRICAL COUPLING AND SUPPORTS	149.53	557.48	2.52	-35.57	41.40	11.03	49.20			
41.00.00	IMAGE VELOCITY SENSORS SYSTEM	27.30	500.96	25.01	+29.34	2.76	6.89	7.85			
41.01.00	BETA HEAD	15.50	478.20	15.20	-25.30	1.51	0.83	0.83			
41.01.00	BETA ELECTRONICS	7.90	545.00	44.00	-35.50	0.02	0.02	0.02			
41.01.00	BETA ADAPTER AND SHIM	2.50	478.20	15.20	-31.50	0.00	-0.00	0.00			
41.01.00	A/C CONVERTER	1.40	545.00	44.00	-35.50	-0.00	-0.00	0.00			
41.02.00	ELECTRICAL COUPLING	0.	0.	0.	0.	0.	0.	0.			
42.00.00	CONSOLE NO. 1-INTEGRATED	0.00	0.	0.	0.	0.	0.	0.			
42.01.00	INTEGRATED CONSOLE NO. 1	0.00	0.	0.	0.	0.	0.	0.			
LAB MODULE TOTAL		1453.85	560.63	6.08	-17.62	800.00	397.75	776.12			
LAB MODULE RECAPITULATION											
GE-AVE		1358.85	558.30	4.85	-16.59	781.57	364.48	742.58			
GFE		95.00	594.01	23.70	-32.30	6.90	4.10	2.30			

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DATE: 1 JANUARY 1969

FORM 1 PART II

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Table 1-4. Mission Module Mass Properties Summary - Form 1, Part II

Table 1-4. Mission Module Mass Properties Summary - Form 1, Part II

MASS PROPERTIES SUMMARY									
CODE	DESCRIPTION	CURRENT WEIGHT (POUNDS)	CENTER OF GRAVITY INCHES FROM REFERENCE DATUM			MOMENT OF INERTIA (SLUG FEET SQUARED)			YAW
			X	Y	Z	ROLL	PITCH	YAW	
MODE = MANNED AUTOMATIC									
49.00.00	MISSION MODULE TOTAL	1384.51	445.97	2.87	-2.09	585.06	866.51	950.71	
50.00.00	NAVIGATION	126.40	487.08	35.10	-19.63	30.40	21.20	13.19	
50.01.00	STAR TRACKER (LAUNCH)	91.08	484.96	46.77	-33.99	0.71	1.06	0.98	
50.02.00	ALIGNMENT MONITORING	24.60	489.77	8.81	24.32	4.51	4.32	1.92	
50.03.00	LOW G ACCELEROMETER ASSEMBLY	10.72	498.95	-3.72	1.53	0.00	0.01	0.00	
51.00.00	TRACKING MIRROR INSTALL. AND CONTR	446.06	466.73	0.80	7.21	106.16	113.78	170.57	
51.01.00	STRUCTURE (LAUNCH)	260.67	477.41	-2.51	8.92	38.62	27.92	51.83	
51.02.00	LOCKOUT DEVICES	4.07	485.80	0.	31.00	-0.00	-8.00	0.00	
51.03.00	DRIVES AND CONTROLS	172.58	449.57	5.87	4.22	64.91	64.88	99.17	
51.05.00	ELECTRICAL COUPLING AND SUPPORTS	8.74	478.00	0.	4.10	0.04	0.01	0.04	
53.00.00	THERMAL DOOR (LAUNCH)	0.	8.00	0.00	0.00	0.	0.	0.	
53.01.00	DOCR-CRBITAL (LAUNCH)	0.	0.	0.	0.	0.	0.	0.	
53.02.00	CRADLE-ROLL ASSEMBLY (LAUNCH)	0.	0.	0.	0.	0.	0.	0.	
53.03.00	RACK ASSEMBLY	0.	0.	0.	0.	0.	0.	0.	
53.04.00	DRIVES, SUPPORTS AND CONTROLS	0.	0.	0.	0.	0.	0.	0.	
53.06.00	POSITION SENSORS AND INDICATORS	0.	0.	0.	0.	0.	0.	0.	
53.07.00	ELECTRICAL COUPLING	0.	0.	0.	0.	0.	0.	0.	
54.00.00	INTERNAL SLIDING MASK	209.11	406.41	-4.52	12.34	137.07	147.88	179.78	
54.01.00	STRUCTURE	94.33	420.92	0.96	38.86	32.96	55.93	80.01	
54.02.00	DRIVES	65.28	391.60	2.54	7.25	40.71	20.30	57.54	
54.03.00	CONTRCLS	24.00	389.15	-33.75	-40.00	0.13	2.99	2.99	

IDENTIFICATION

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PREPARED BY= MASS PROPERTIES CONTROL

DATE= 1 JANUARY 1969

FORM 1 PART II



Table 1-4. Mission Module Mass Properties Summary - Form I, Part II (Cont)

CODE	DESCRIPTION	MASS PROPERTIES SUMMARY																
		MODE= MANNED AUTOMATIC																
		CURRENT HEIGHT (POUNDS)			CENTER OF GRAVITY INCHES FROM REFERENCE DATUM			MOMENT OF INERTIA (SLUG FEET SQUARED)		ROLL		PITCH		YAW				
			X	Y	Z													
54.04.00	ELECTRICAL CABLE	25.50	416.65	2.94	5.88	17.97	21.58	20.50										
55.00.00	SECONDARY STRUCTURE	48.04	388.78	0.19	-35.05	13.11	1.90	13.69										
55.01.00	EQUIPMENT TRAY STRUCTURE NO. 2	20.64	388.75	-36.25	-35.07	0.67	0.95	0.96										
55.02.00	EQUIPMENT TRAY STRUCTURE NO. 8	20.90	388.75	36.22	-35.06	0.67	0.95	0.96										
55.03.00	COMPONENT MOUNTING HARDWARE	6.50	389.00	0.	-35.00	0.	0.	0.										
56.00.00	ENVIRONMENTAL CONTROL	253.18	451.89	-0.92	7.38	105.29	157.26	163.09										
56.01.00	INSULATION	59.90	467.75	0.68	-0.30	23.91	36.44	39.21										
56.02.00	THERMAL COATINGS-INT AND EXT	0.	0.	0.	0.	0.	0.	0.										
56.03.00	COMPARTMENT HEATERS	123.88	441.12	0.46	14.66	59.06	69.41	70.12										
56.04.00	GROUND COMPARTMENT CONDITIONING	23.60	477.07	-13.93	2.91	6.37	8.59	8.55										
56.05.00	BAFFLES	15.80	446.29	0.09	0.25	12.26	30.30	34.45										
57.00.00	POWER DISTRIBUTION	224.41	441.57	4.21	-20.41	69.78	116.02	125.89										
57.01.00	ELECTRICAL COUPLING	190.80	445.00	0.	-20.00	57.50	98.30	93.00										
57.02.00	POWER CONTROLS-SEPARATION	14.44	388.00	27.56	-29.48	1.43	2.35	2.25										
57.03.00	SUPPCRTS	19.17	447.74	28.48	-17.64	5.70	13.49	16.15										
58.00.00	INSTRUMENTATION	60.61	400.56	-29.19	-21.62	7.92	11.27	12.43										
58.01.00	SEASCRS	25.25	428.66	-2.82	-2.67	0.88	0.74	0.78										
58.02.00	INDICATORS	0.	0.	0.	0.	0.	0.	0.										
58.03.00	SIGNAL CONDITIONING	15.30	378.73	-40.71	-31.36	0.02	0.22	0.22										
58.04.00	CONTROLS AND ELECTRONICS	20.06	388.66	-36.25	-34.19	0.18	1.03	1.00										

IDENTIFICATION

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DATE: 1 JANUARY 1969

FORM 1 PART II

Table 1-4. Mission Module Mass Properties Summary - Form 1, Part II (Cont)

Table 1-4. Mission Module Mass Properties Summary - Form 1, Part II (Cont.)

CODE	DESCRIPTION	MASS PROPERTIES SUMMARY						
		CURRENT WEIGHT (POUNDS)	CENTER OF GRAVITY INCHES FROM REFERENCE DATUM			MOMENT OF INERTIA (SLUG FEET SQUARED)		
			X	Y	Z	ROLL	PITCH	YAW
58.05.00	ELECTRICAL COUPLING	0.	0.	0.	0.	0.	0.	0.
59.00.00	DATA MANAGEMENT/COMPUTATION	16.80	406.50	41.70	-31.50	0.06	0.11	0.11
59.01.00	MODE CONTROL	16.80	406.50	41.70	-31.50	0.06	0.11	0.11
MISSION MODULE TOTAL		1384.51	445.97	2.67	-2.05	585.06	866.51	958.71
MISSION MODULE RECAPITULATION		1884.51	445.97	2.67	-2.05	585.06	866.51	958.71
GE-AVE		0	0	0	0	0	0	0
GFE								

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FORM 1 PART II

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Table 1-5. Incorporated Mass Properties Change Analysis (By Functional Code) - Form 3, Part I

INCORPORATED MASS PROPERTIES CHANGE ANALYSIS (BY FUNCTIONAL CODE) Mode: Manned/Automatic											
NOTE NO.	CODE	EFF POINT	WEIGHT CHANGE (pounds)			NET CHANGE IN CENTER OF GRAVITY (inches from ref datum)			NET CHANGE IN MOMENT OF INERTIA (slug feet-squared)		
			TOTAL	DESIGN ACTIVITY	PROCUR ACTIVITY	$\bar{X}$	$\bar{Y}$	$\bar{Z}$	PITCH	ROLL	YAW
1	32.02		+3.40	+3.40		--	--	--	--	--	--
2	37.02		-3.50	-3.50		--	--	--	--	--	--
4	54.01		+1.70	+1.70		--	--	--	--	--	--
5	{ 54.02 } { 54.03 }		-12.90	-12.90		--	--	--	--	--	--
6	56.03		+3.20	+3.20		--	--	--	--	--	--
7	56.05		+2.00	+2.00		--	--	--	--	--	--
8	58.01		+2.28	+2.28		--	--	--	--	--	--
9	58.03		-3.50	-3.50		--	--	--	--	--	--
(NOTE NO. 3 NOT USED IN THIS REPORT)											
PREPARED BY: Mass Properties Control						IDENTIFICATION			REPORT NO. CAP:2		
DATE: 2 January 1969											
FORM 3 PART I											

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Table 1-6. Incorporated Mass Properties Change Analysis (By Functional Code) - Form 3, Part II

INCORPORATED MASS PROPERTIES CHANGE ANALYSIS (BY FUNCTIONAL CODE) Mode: Manned/Automatic			
NOTE NO.	CODE	TOTAL WEIGHT CHANGE (pounds)	REMARKS
1	32.02	+3.40	Short Circuit Protection Added to Main Drive K Electronics (1.70 pounds each). Deletion of 11 Circuit Breakers From Power Controller. Inclusion of Internal Sliding Mask - Track Fittings and Shims Mounted on Mission Module Shell. Modification of Drive J (Internal Sliding Mask) to Delete Boost Regulator.  Addition of 36 Temperature Control Sensors to Environmental Control Thermal Mask - (Layout to Design). Addition of 24 Telemetry Temperature Sensors to Mission Module Instrumentation. Deletion of Service Signal Conditioner (5-Volt Power Supply) Function Performed by Digital Multiplexers.  (NOTE NO. 3 NOT USED IN THIS REPORT)
2	37.02	-3.50	
4	54.01	+1.70	
5	54.02	-12.90	
	&		
6	54.03	+3.20	
7	56.03	+2.0	
8	56.05	+2.28	
9	58.01	-3.5	
	58.03		
	NET	-7.32	

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DATE: 2 January 1969

FORM 3 PART II

Table 1-7. Incorporated Mass Properties Change Analysis (By Change Type) - Form 3, Part III

INCORPORATED MASS PROPERTIES CHANGE ANALYSIS (BY CHANGE TYPE) Mode: Manned/Automatic		
TOTAL WEIGHT CHANGE (pounds)	NOTE NO.	REMARKS
-11.0	1, 2, 5, 7	Design Modifications
+1.7	4	Inclusion of Omitted Interface Hardware
+5.48	6, 8	Addition of Instrumentation (Temperature Sensors)
-3.5	9	Deletion of Component and Transfer of Function to other Components
<hr/>		
-7.32	NET	
(NOTE NO. 3 NOT USED IN THIS REPORT)		
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FORM 3 PART III		

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Table 1-8. Pending Mass Properties Change Analysis - Form 3, Part I

PENDING MASS PROPERTIES CHANGE ANALYSIS Mode: Manned/Automatic																				
CASE NO.	CODE	EFF POINT	WEIGHT CHANGE (pounds)			CENTER OF GRAVITY (inches from ref datum)			MOMENT OF INERTIA (slug feet-squared)											
			TOTAL	DESIGN ACTIVITY	PROCUR ACTIVITY	RESPONSIBILITY	$\bar{X}$	$\bar{Y}$	$\bar{Z}$	ROLL	PITCH	YAW								

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 FORM 3 PART I

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Table 1-9. Pending Mass Properties Change Analysis - Form 3, Part IV  
PENDING MASS PROPERTIES CHANGE ANALYSIS Mode: Manned/Automatic

CASE NO.	CODE	EFF POINT	WEIGHT CHANGE (pounds)			REMARKS
			TOTAL	DESIGN ACTIVITY	PROCUR ACTIVITY	
						-NONE-

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FORM 3 PART IV

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Table 1-10. Mass Properties Improvement Potentials - Form 3, Part IV

MASS PROPERTIES IMPROVEMENT POTENTIALS Mode: Manned/Automatic					
CASE NO.	CODE	EFF POINT	WEIGHT CHANGE (pounds)		REMARKS
			TOTAL	RESPONSIBILITY	
			DESIGN ACTIVITY	PROCUR ACTIVITY	
			-40		
			-4		Thin Wall Kapton Wire
			+10		PCM Telemeter
			+1		Crew Restraint(Dynamic Loads and Protection)
			+7		Black Box Captive Hardware
				+15	Functional Redundant Telemetry(Block Redundancy +40 lbs)
				+10	TSOM No. 8
				+9	Multi-use Star Tracker Alignment System
				+9	Fourth Load Cycle Impact on Tracking Mirror Support Structure

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DATE: 1 January 1969

FORM 3 PART IV

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Table 1-11. Sequenced Mass Properties Data - Form 5

SEQUENCED MASS PROPERTIES DATA Mode: Manned/Automatic									
CODE	DESCRIPTION	CURRENT WEIGHT (pounds)	CENTER OF GRAVITY (inches from ref datum)			MOMENT OF INERTIA (slug feet-squared)			NOTE NO.
			$\bar{X}$	$\bar{Y}$	$\bar{Z}$	ROLL	PITCH	YAW	
32.00.00	Acquisition System (2 Systems)  <u>At Launch</u> Shroud (Closed) Tracking Pedestal (Launch)	28.00 110.80	542.2 533.6	0 0	31.3 31.5	27.6 99.4	3.6 ---	30.8 ---	(1)
50.01.03	<u>On-Orbit</u> Shroud (Closed) (Open) Tracking Pedestal - Roll (Min) (Max) Tracking Pedestal - Pitch  Star Tracker Cover (Ejectable)	28.00 28.00 110.80 110.80 67.80  15.00	542.2 542.2 533.6 533.6 535.3  483.8	0 0 0 0 0  49.0	31.3 24.1 31.5 31.5 31.5  -37.0	27.6 35.9 99.4 99.4 ---	3.6 3.6 ---	30.8 39.1 ---	0.3 0.2 0.1 0.3

NOTE: 1. The sequenced data for the Visual Optics Acquisition System is based on the total effect of both systems acting simultaneously. Independent sequenced data for each system will be furnished in future monthly status reports.

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FORM 5

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Table 1-11. Sequenced Mass Properties Data - Form 5 (Cont)

SEQUENCED MASS PROPERTIES DATA Mode: Manned/Automatic									
CODE	DESCRIPTION	CURRENT WEIGHT (pounds)	CENTER OF GRAVITY (inches from ref datum)			MOMENT OF INERTIA (slug feet-squared)			NOTE NO.
			$\bar{X}$	$\bar{Y}$	$\bar{Z}$	ROLL	PITCH	YAW	
51.00.00	Tracking Mirror Installation	360.36	464.0	-2.7	10.8	72.0	36.1	102.9	
	<u>At Launch</u>								
	<u>On-Orbit</u>								
	(Roll 40° Counterclockwise)	360.36	464.0	-3.5	13.1	72.0	63.1	75.9	
	(Roll 40° Clockwise)	360.36	464.0	-0.6	9.7	72.0	64.3	74.7	
54.00.00	Internal Sliding Mask	143.5	425.0	0	28.0	26.1	44.0	69.4	
56.00.00	<u>At Launch</u> (Closed)	143.5	425.0	0	28.0	26.1	44.0	69.4	(2)
	<u>On-Orbit</u> (Closed)	143.5	318.0	0	28.0	26.1	44.0	69.4	
	(Open)								

NOTE: 2. The sliding mask sequenced properties for the on-orbit condition is both open and closed.

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FORM 5

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GOVERNMENT FURNISHED EQUIPMENT  
(INCLUDED IN GE AVE REPORTED WEIGHT)

Mode: Manned/Automatic

Component	Weight (lb)
Cue Film Modules	10 *
Computer (Qty 1)	85

\*Film Module

Current weight from vendor-Lear Siegler - (5 November 1968)  
specification weight is 1.3 pounds each and status is 1.197 pounds  
(75% calc. and 25% actual).

$$16 \text{ (qty)} \times 1.197 \text{ (unit empty weight)} = 19.152 \text{ lb}$$

\*Film For Modules

$$16 \text{ (qty)} \times 0.25 \text{ (unit film weight)} = 4.000 \text{ lb}$$

---

$$23.152 \text{ lb}$$

(Based on actual weight by Lear  
Siegler of correct size - spec.  
value is 0.30 pounds each).

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SUMMARY OF CRITICAL MASS PROPERTIES

(GE AVE ONLY)

Mode: Manned/Automatic

	CURRENT VALUE	ALLOCATED VALUE	ACCURACY OR UNCERTAINTY	EXISTING TOLERANCE
Weight	2744	2745 (1)	(2)	(4)
Center/Gravity	X = 501.5 Y = 3.7 Z = -9.8	(3)	(3)	(3)

- (1) Reference: Specification No. CP1000BI (CEI), dated 30 October 1968, Para 3.1.1.1.8. The nominal allocated weight is 2745 pounds with a minimum of 2700 pounds and a maximum of 2790 pounds.
- (2) Reference: Estimated Detail Mass Properties Report re-issue, dated 1 September 1967.
- (3) Reference: TWX - Charge 6818, dated 20 April 1967. There are no allocated CG limits on the GE AVE; however, GE is instructed to move equipment in the -Y and/or -Z directions if the option is available.
- (4) Based on Mix of ECA.

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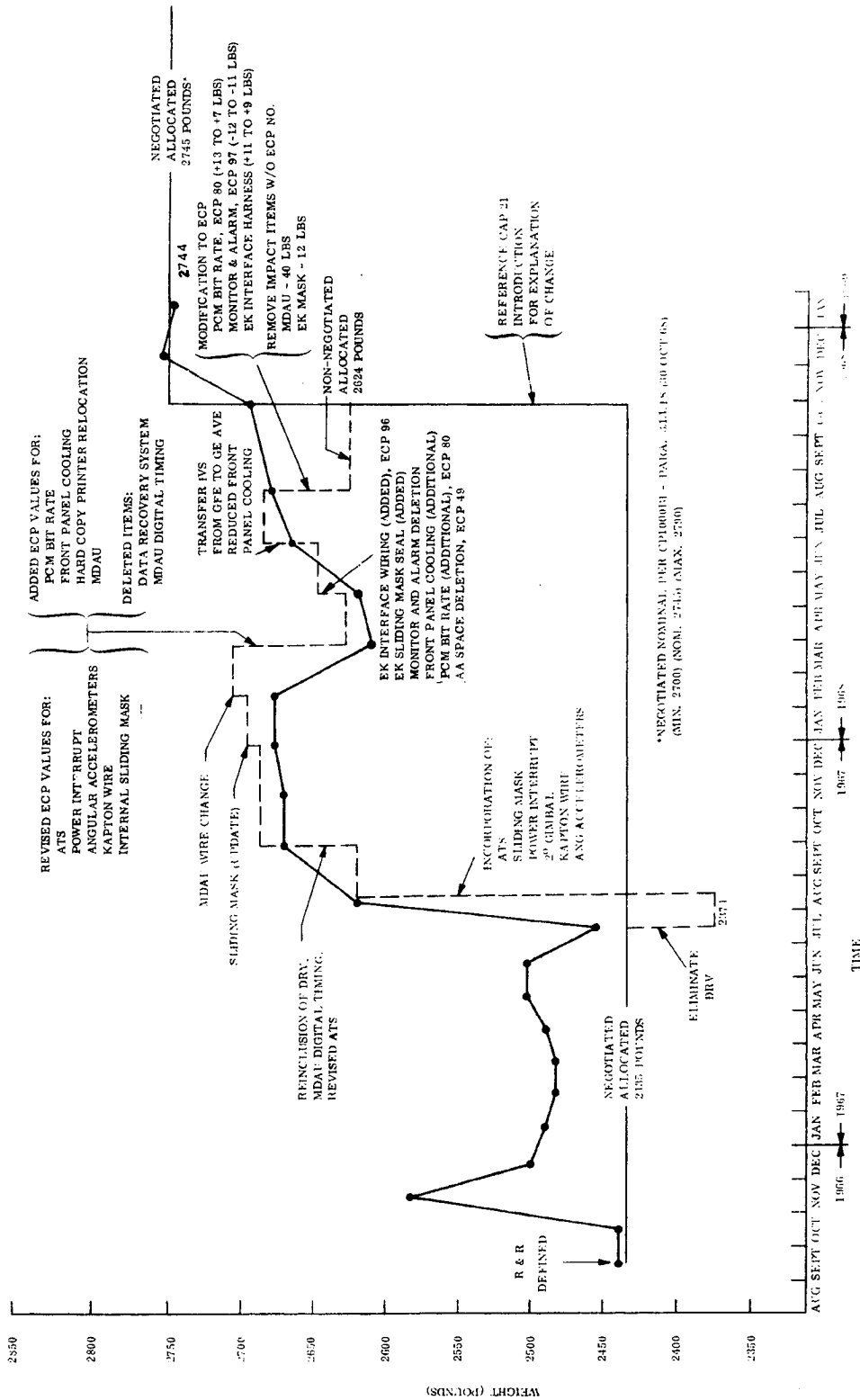
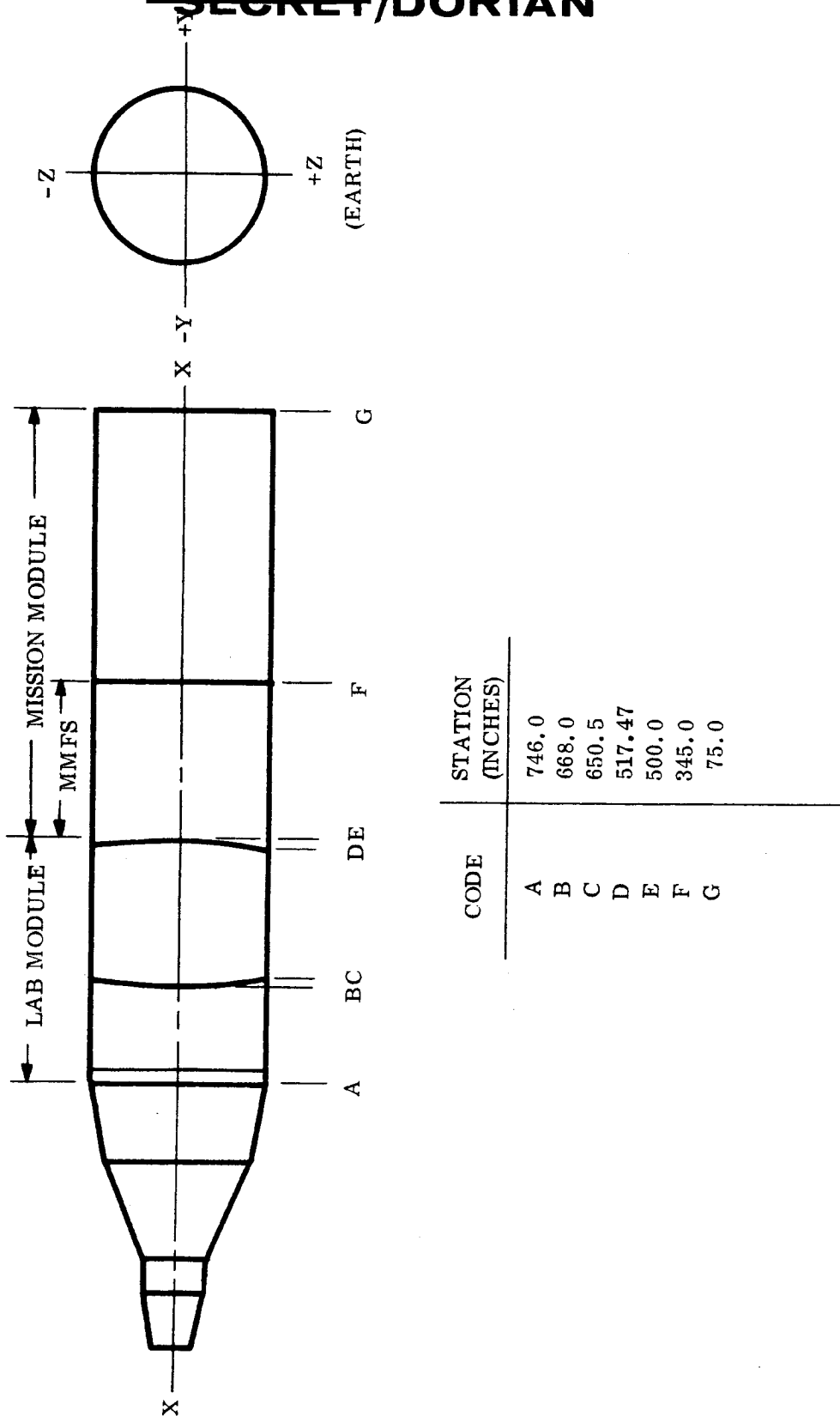


Figure 1-1. GE-AVE Weight Trend Curve Reported Versus Allocated Weights (Excludes GFE Weights)

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CODE	STATION (INCHES)
A	746.0
B	668.0
C	650.5
D	517.47
E	500.0
F	345.0
G	75.0

Figure 1-2. Orbiting Vehicle

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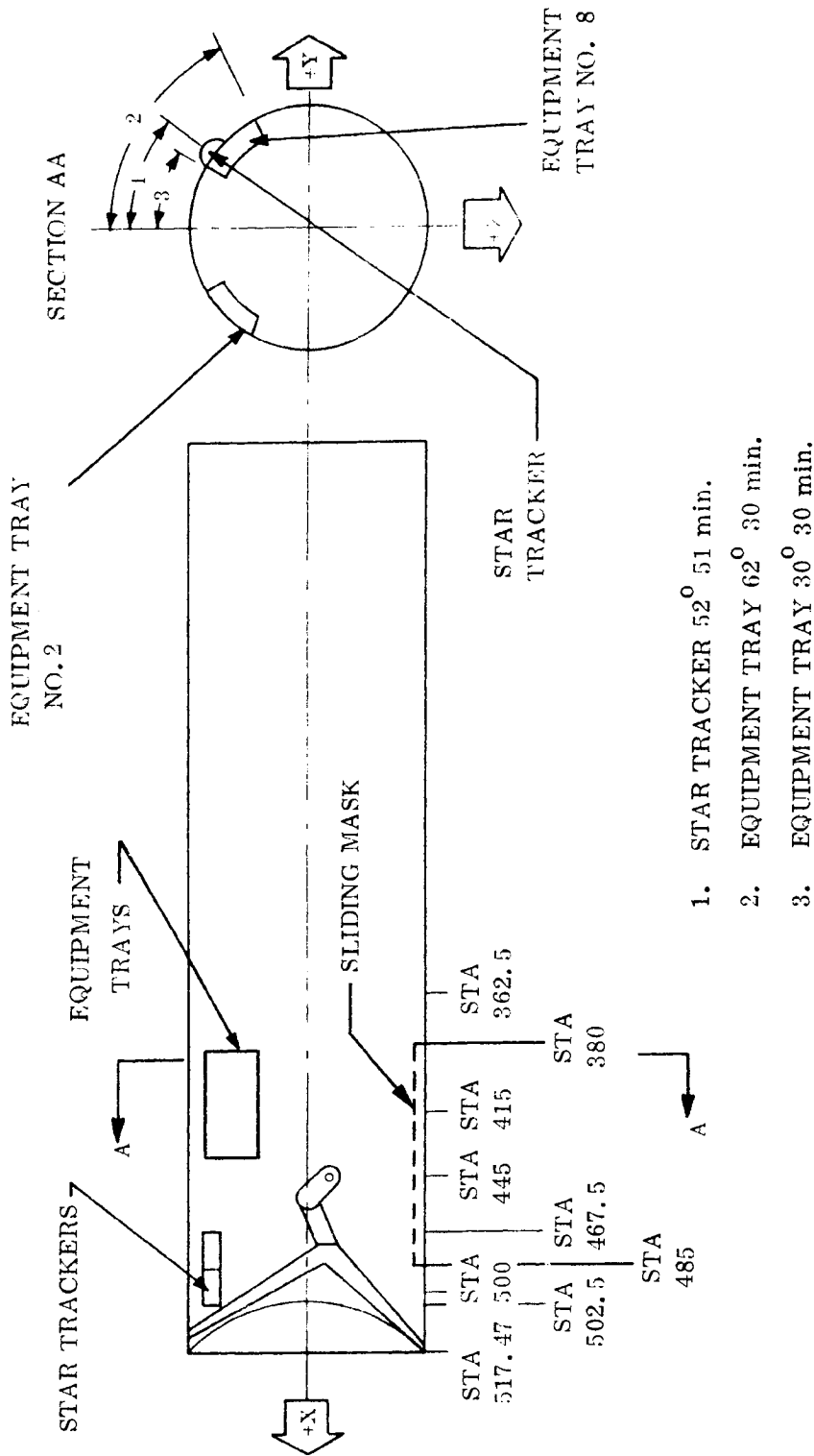


Figure 1-3. Mission Module

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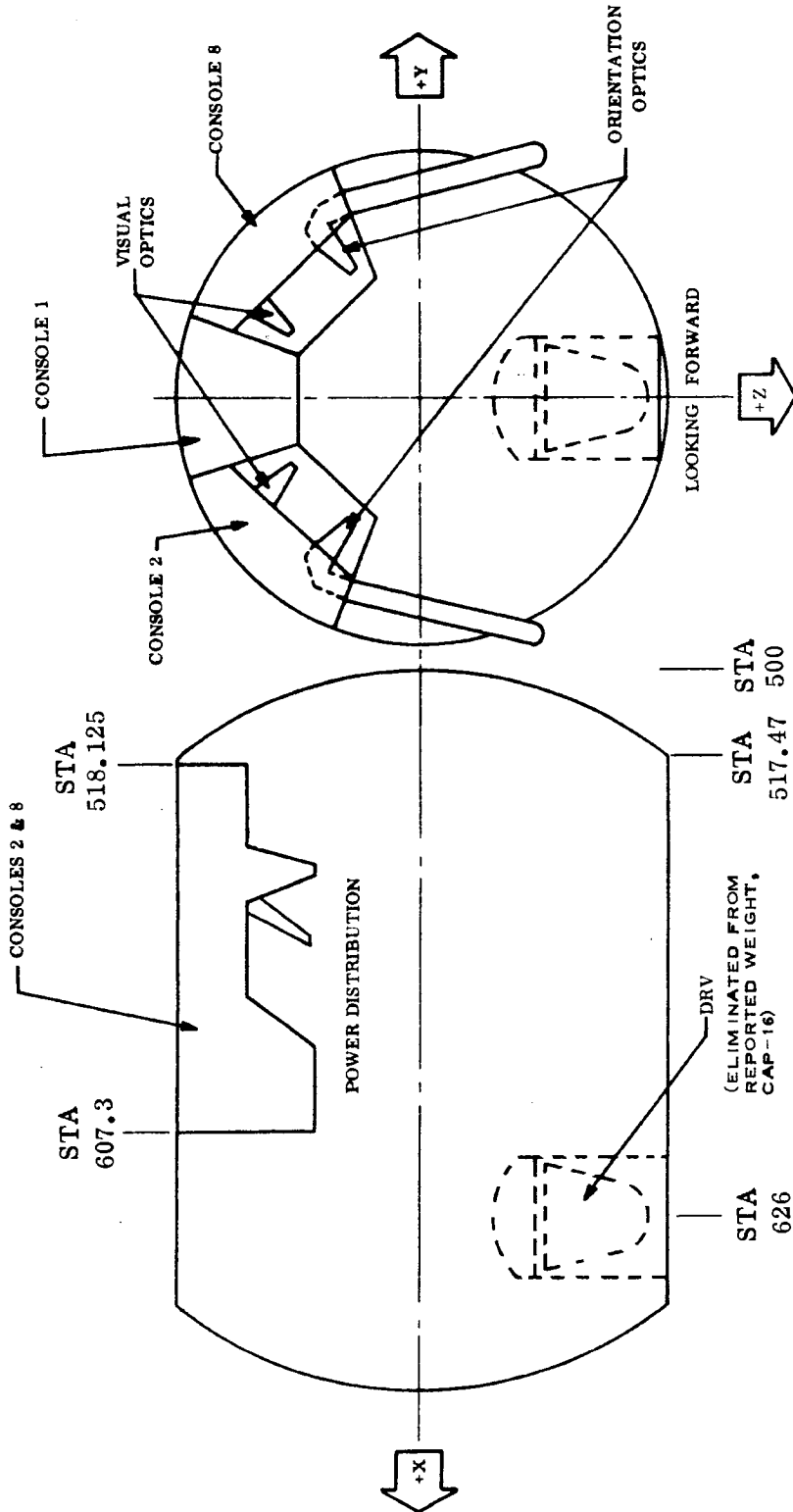


Figure 1-4. Laboratory Module

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