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THE FOLLOWING PAGES ARE CHANGES

TO BASIC DOCUMENT

#21 DDC AD 404314

SECTION	ORIG REL PAGE NO.	REV SYM	ADDED PAGES					SECTION	ORIG REL PAGE NO.	REV SYM	ADDED PAGES				
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	5							9	B						
	6							10	B						
	7							11	B						
	8							12	B						
	9							13	B						
	10							14	B						
	11							15	B						
	12							16	B						
	13							17	B						
	14							18	B						
	15							19	B						
	16							20	B						
	17							21	B						
	18							22	B						
	19							23	B						
	20							24	B						
	21							25	B						
	22							26	B						
	23							27	B						
	24							28	B						
	25							29	B						
	26							30	B						
	27							31	B						
	28							32	B						
	29							33	B						
	30							34	B						
	31							35	B						
	32							36	B						
	33							37	B						
	34							38	B						
	35							39	B						
	36							40	B						
	37							41	B						
	38							42	B						
	39							43	B						
	40							44	B						
	41							45	B						
	42							46	B						
	43							47	B						
	44							48	B						
	45														
	46														
	47														
	48														

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REV SYM C

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REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
A	Revised pages 1, 4, 10. Added pages 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42. Added Moments of Inertia to page 10. Added Sections 3.0 and 4.0 to the document.	5-17-63	D. Brenden <i>D. Brenden</i>
B	Added Sections 5.0, 6.0 and 7.0 to the document.	6-17-63	D. Brenden <i>D. Brenden</i>
C	Added Sections 8.0 and 9.0 to the document.	7-17-63	D. Brenden <i>D. Brenden</i>

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CTLI SECTION, S/N 0000024

8.1 This section of the document describes the data changes created by converting a production line Minuteman missile into a CTL missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries, check list, and ECP lists applicable to this installation. Page 71 summarizes the complete installation mass properties and consists of data from page 72 (average mass properties of downstage components), page 73 (predicted sealant changes), and page 77 (actual weight of CTLI section S/N 0000024). In addition, page 74 presents summary check lists by production section as backup data for page 72. Page 78 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-01BR-NMFD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODS" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

8.2 WEIGHT & BALANCE SUMMARY TOTAL CELL KIT IMPBALLASTON CELL WAFER 3/W 0000024						REPORT NO. _____ DATE _____				
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³	
						LONG.	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			150.4	54.8	99.8	100.3	.004	.002
5			Silo							
6			Aero							
7	42	G&C Section			7.4	66.8	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			16.1	61.9	108.3	117.2	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			- 1.7	58.2	110.2	117.9	0	0
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett	- 1.7		58.2	110.2	117.9		
22	45	Interstage 2-3			21.1	68.6	111.6	120.2	0	.001
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			25.7	102.3	112.6	121.4	0	.008
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			- 1.4	55.6	112.2	120.6	0	0
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett	- 1.4		55.6	112.2	120.6		
37	47	Interstage 1-2			85.7	73.9	114.8	125.2	0	.002
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			30.8	111.0	117.7	130.0	0	.027
41			Silo							
42			Aero							
43			Base							
44	40	Skirt			9.6	74.7	119.3	128.6	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			284.0					
49			Silo							
50			Aero							
51			Base							
52			Jett.							

* Boeing Section Stations (See Missile Station Diagram)

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8.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)					REPORT NO. _____					
					DATE _____					
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³	
						LONG. *	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			4.39	53.9	107.5	110.6		
5			Silo							
6			Aero							
7	42	G&C Section			6.96	66.9	112.0	114.3		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			15.94	81.9	108.3	117.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.88	57.7	110.3	117.8		
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett	- 1.88		57.7	110.3	117.8		
22	45	Interstage 2-3 (Aft)			20.94	68.4	111.7	120.4		
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.73	102.3	112.6	121.4		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			- 1.41	55.6	112.2	120.6		
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett	- 1.41		55.6	112.2	120.6		
37	47	Interstage 1-2 (Aft)			25.21	73.5	115.1	125.6		
38			Silo							
39			Aero							
40	48	1st Stage Engine			23.98	109.7	117.7	130.1		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.43	74.1	119.3	128.5		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			135.29					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

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8.2 THE 3-62 GROUND INSTALLED AT VANDENBERG AIR FORCE BASE					REPORT NO. _____ DATE _____					
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² X10 ⁻³	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			.2	55.5	111.5	111.5		
5			Silo							
6			Aero							
7	42	G&C Section			.4	65.4	110.5	113.5		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			.2	80.9	109.3	116.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			.2	55.6	110.8	116.7		
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	.2		53.6	110.8	116.7		
22	45	Interstage 2-3			.2	85.0	103.0	101.8		
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			0	-	-	-		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			0	-	-	-		
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett							
37	47	Interstage 1-2			.5	94.7	108.0	103.6		
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			.8	161.3	116.2	128.0		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			.2	101.3	119.2	133.9		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			2.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boozing Section Stations (See Missile Station Diagram)
 2-5550-0-58 ** Ref: D2-1394-534
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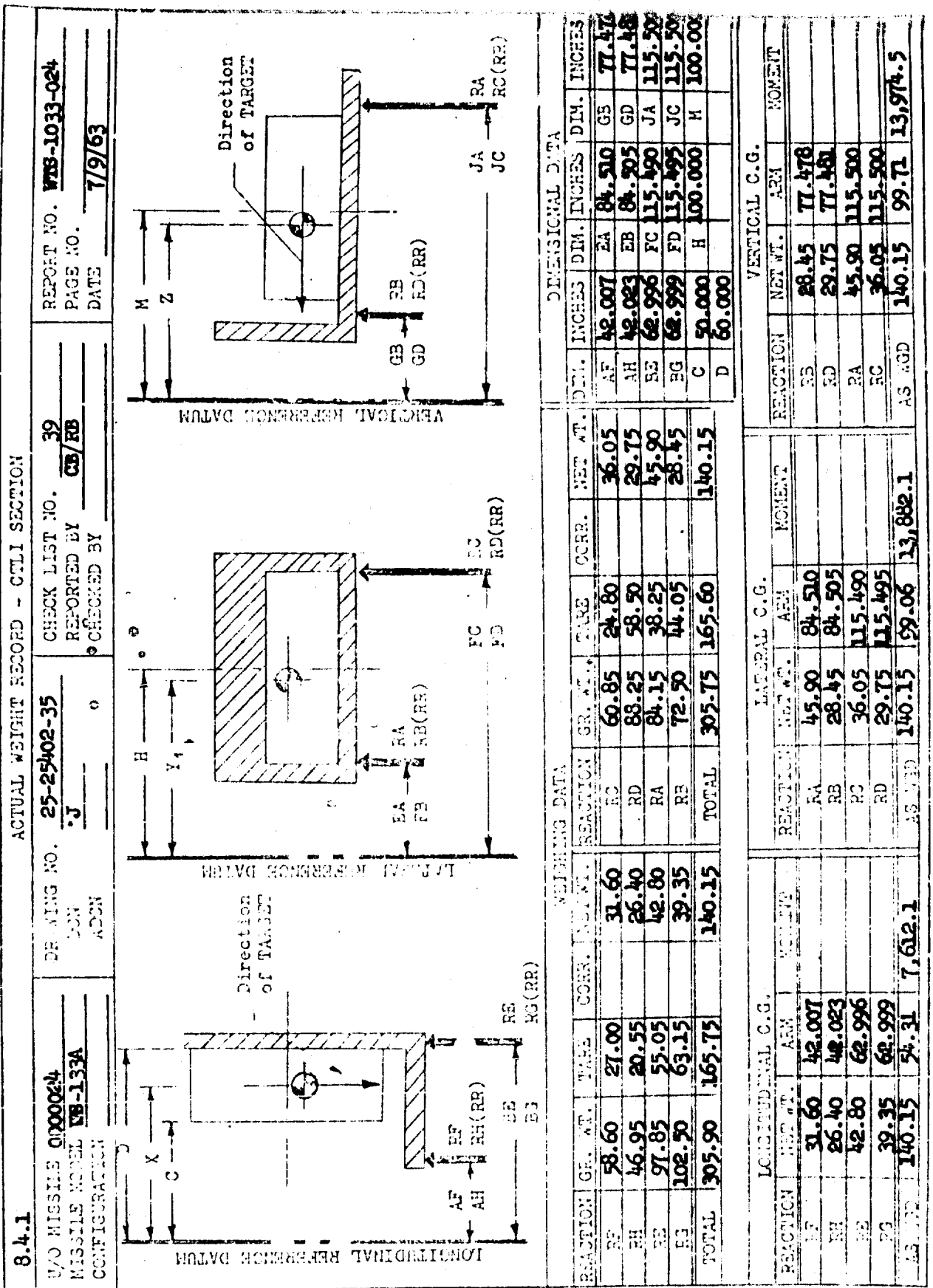
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(RR) = Rear Reaction

SERIAL NUMBER: 0000024

CHECK LIST NO. 39

DATE

8.4.2 MISSILE WEIGHING CHECK LIST
 MODEL: WS-135A FINAL ASSEMBLY DRAWING NO. 25-25402-35

ITEM NUMBER	SECTION	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	RECORD OF CHECKING (DATE)			LAUNCH	
								Mo	Day	Yr		
39	39	Instrumentation Group-Trainer Test	25-37501-35									
39a	39	CTMI Structure Assy.	25-25403-11									
		Support Structure	25-29094-58									
		Primary Structure	25-29094-156									
		Insulation & External Markings	25-29095-32									
		Antenna & Spacers	25-29096-38									
		Plate-Identification	25-1600-329									
39b		Cable & Equipment Installation	25-25404-12									
		Battery, Squib	10-20942-2									
		Battery, Squib	10-20942-1									
		Cable Set SE-35B	55018-106									
		Cable	AMS1277-315									
		Cable	AMS1278-315									
		Cable	AMS1279-315									
39c		Kit Installation (ECP 525)	25-25402-21									
39d		Kit Installation (ECP 551)	25-25402-26									
39e		Kit Installation (ECP 578)	25-25402-34									

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8.4.3 WEIGHT AND BALANCE CHANGE RECORD

ASSOCIATE CONTRACTOR BOEING
 COMPONENT SECTION 39
 MODEL NO. W-133A
 SERIAL NO. 0000024

CONTRACT NO. AF04(647)-289
 LOT NO. _____
 DRAWING NO. 25-25402-35
 U.O. MISSILE _____

REPORT NO. WFB-1033-024
 DATE 7/9/63
 PREPARED CB/RB
 APPROVED OO

LINE	EQUIPMENT CHANGE RECORD	DESCRIPTION OF EQUIPMENT	WEIGHT AND BALANCE						
			WEIGHT	X AXIS ARM	X AXIS MOMENT	Y AXIS ARM	Y AXIS MOMENT	Z AXIS ARM	Z AXIS MOMENT
2	25-25402-	Instr. Group Trainer (As Weighed)	140.15	54.31	7,612.1	99.06	13,888.6	99.71	13,976.5
3									
4									
5									
6		ADD:							
7	AN31276-315	Cable - Acoustics	3.86	74.2		115.5		102.8	
8	AN31279-315	Cable - Acoustics	2.08	50.4		106.9		111.4	
9									
10									
11									
12									
13									
14	25-25402-	Instr. Group Trainer (Complete)	146.09	54.78	8,003.3	99.60	14,520.8	99.96	14,603.1
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									
32									

8.5

**ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION
APPLICABLE TO OELI SUBSECTION S/N 000008+ AND INSTALLATION KIT**

The following ECP's have not been incorporated into "Model Specification, Trainer-Test Group, Guided Missile, (S-113-1006)" as revised on 15 April 1963. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WB-139A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Cap Change	3	+5	Yes
208 Part 2	PSS, SMA Installation and Envelope Change	2	Negl.	Yes
236	Second Stage OELI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of SAC Bracket, Detonator Cord & OELI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of OELI C/D Receiver, 10-20885	3	Negl.	Yes
373	Work-Around for 10-20942-1 OELI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415 / 540	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
506	OELI Raceway Cover Revision	1	-.2	Yes
525	OELI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	OELI Missile System Grounding Change, MACH 6301	3	-	Yes**
555	Stage 3 OELI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Restruct Incompatibility Interim Fix, MACH 6301	3	Negl.	Yes
606	Revision to OELI Umbilical Bracket- Section 49	1	Negl.	Yes

* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

** These ECP's were incorporated during manufacture of the OELI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

CCLI SECTION, S/N 0000025

9.1

This section of the document describes the data changes created by converting a production line Minuteman missile into a CCL missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CCLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CCLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will then supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries, check lists, and ECP lists applicable to this installation. Page 80 summarizes the complete installation mass properties and consists of data from page 81 (average mass properties of downstage components), page 82 (predicted sealant changes), and page 86 (actual weight of CCLI section S/N 0000025). In addition, page 83 presents summary check lists by production section as backup data for page 81. Page 87 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-01ER-NMD-1, "Nominal Mass Properties and Dispersions for Minuteman CCLI/ACDS" dated January 28, 1963.

Average values have been used for all Boeing items other than the CCLI section which is an actual weight.

9.2 WEIGHT & BALANCE SUMMARY TOTAL CTEI KIT INSTALLATION CTEI WAYER S/N 0000025					REPORT NO. _____ DATE _____					
LINE	SEQ.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² X10 ⁻³	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			149.0	54.7	99.7	100.3	.004	.002
5			Silo							
6			Aero							
7	42	G&C Section			7.4	66.8	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			16.1	81.9	108.3	117.2	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			-1.7	58.2	110.2	117.9	0	0
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	-1.7		58.2	110.2	117.9		
22	45	Interstage 2-3			21.1	68.6	111.6	120.2	0	.001
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			25.7	102.3	112.6	121.4	0	.002
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			-1.4	55.6	112.2	120.6	0	0
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	-1.4		55.6	112.2	120.6		
37	47	Interstage 1-2			25.7	73.9	114.8	125.2	0	.002
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			30.8	111.0	117.7	130.0	0	.027
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.6	74.7	119.3	128.6	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			282.3					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Being Section Stations (See Missile Station Diagram)

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9.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)						REPORT NO. _____				
						DATE _____				
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³	
						LONG.	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			4.39	55.9	107.5	110.6		
5			Silo							
6			Aero							
7	42	G&C Section			6.96	66.9	112.0	114.3		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			15.94	81.9	108.3	117.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.88	57.7	110.3	117.8		
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.88		57.7	110.3	117.8		
22	45	Interstage 2-3 (Aft)			20.94	68.4	111.7	120.4		
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.73	102.3	112.6	121.4		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			- 1.41	55.6	112.2	120.6		
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.41		55.6	112.2	120.6		
37	47	Interstage 1-2 (Aft)			25.21	73.3	115.1	123.6		
38			Silo							
39			Aero							
40	48	1st Stage Engine			29.98	109.7	117.7	130.1		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.43	74.1	119.3	122.5		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			135.29					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Basing Section Stations (See Missile Station Diagram)

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9.2 MS 5-62 CHANGES INSTALLED AT WALLINGFORD AIR FORCE BASE**					REPORT NO. _____					
					DATE _____					
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			.2	94.5	111.5	111.5		
5			Silo							
6			Aero							
7	42	G&C Section			.4	65.4	110.5	113.5		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			.2	88.9	109.3	116.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			.2	53.6	110.8	116.7		
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett		.2	53.6	110.8	116.7		
22	45	Interstage 2-3			.2	85.0	109.0	101.8		
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			0	-	-	-		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			0	-	-	-		
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett							
37	47	Interstage 1-2			.5	94.7	102.0	103.4		
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			.8	141.3	116.2	108.0		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			.2	101.3	119.2	131.9		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			2.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* See Section Stations (See Missile Station Diagram)

2-5550-0-58** Reference DE-1394-53*

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CHECK LIST NO.	9-3		MISSILE WEIGHING CHECK LIST																	
	DATE		MISSILE ASSEMBLY DRAWING NO. <u>21-52900-4</u>																	
	TITLE		SECTION <u>39 THRU 49</u>																	
	ISSUE NO.		ISSUE NO.																	

2-5550-0-21
 REV. 524. C

SUMMARY CHECK LISTS FOR SECTION 39 THROUGH 49 ARE IDENTICAL TO
 THOSE FOUND ON PAGES 13 THROUGH 20.

ACTUAL WEIGHT RECORD - CTLI SECTION							
U/O MISSILE 000025 MISSILE MODEL MB-134 CONFIGURATION FAI	REPORT NO. WTS-1023-083 PAGE NO. _____ DATE 6/20/63						
DRAWING NO. 252502-15 PCN _____ AOCN _____	CHECK LIST NO. 39 REPORTED BY RS/TV CHECKED BY CB						
LONGITUDINAL REFERENCE DATUM 	LATERAL REFERENCE DATUM 						
LONGITUDINAL C.G. 	LATERAL C.G. 						
WEIGHING DATA							
REACTION	GR. WT.	TARE	CORR. NET WT.	DIM. INCHES	DIM. INCHES	DIM. INCHES	
RF	50.85	27.00	23.85	EA	42.007	EA	
RH	55.15	20.55	34.60	EB	42.083	EB	
RE	105.80	55.00	70.80	FC	66.986	FC	
RG	99.30	63.15	36.15	FD	66.989	FD	
TOTAL	305.70	165.70	139.80	H	70.680	H	
				D	60.600	D	
LONGITUDINAL C.G.		LATERAL C.G.		DIMENSIONAL DATA			
REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT
RF	23.85	81.30	1940.05	RA	40.45	84.500	3400.00
RH	34.60	67.35	2328.90	RB	33.95	84.505	2870.00
RE	70.80	63.75	4513.20	RC	41.40	115.498	4775.00
RG	36.15	91.10	3291.15	RD	28.00	115.495	3225.00
TOTAL	139.80	305.50	165.70	AS	139.80	99.00	13,860.5
				AS	139.80	99.74	13,933.6

(RR) = Rear Reaction

SERIAL NUMBER: 0000025

9.4.2 MISSILE WEIGHING CHECK LIST

MODEL WS-133A FINAL ASSEMBLY DRAWING NO. 25-25402-35

CHECK LIST NO. 39	DATE	SECTION 39	MISSILE NO.	RECORD OF CHECKING (DATE)						LAUNCH			
				AS WEIGHED	AS RECEIVED	SHIPMENT	REMOTE SITE	AS WEIGHED	AS RECEIVED				
DESCRIPTION		PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	BASIC WEIGHT	AS WEIGHED	AS RECEIVED	SHIPMENT	REMOTE SITE	AS WEIGHED	AS RECEIVED
39		Instrumentation Group-Trainer Test	25-37501-35										
39a		CTLI Structure Assy.	25-25403-11										
		Support Structure	25-29094-45				X	X					
		Primary Structure	25-29093-15				X	X					
		Insulation & External Markings	25-29095-3				X	X					
		Antenna & Spacer	25-29096-3				X	X					
		Plate-Identification	21-51600-329				X	X					
39b		Cable & Equipment Installation	25-25404-14										
		Battery, Squib	10-20942-				X	X					
		Battery, Squib	10-20942-				X	X					
		Cable Set SE-35B	55018-106										
		Cable	AN37192-315				X	X					
		Cable	AN37194-315				X	X					
		Cable	AN37196-315				X	X					
39c		Kit Installation (ECP 525)	25-37501-21				X	X					
39d		Kit Installation (ECP 521)	25-25402-26				X	X					
39e		Kit Installation (ECP 578)	25-25402-34				X	X					

9.4.3

WEIGHT AND BALANCE CHANGE RECORD

ASSOCIATE CONTRACTOR **BOEING**
 COMPONENT **FUNCTION 39**
 MODEL NO. **MS-133A**
 SERIAL NO. **0000025**

CONTRACT NO. **AF04(647)-289**
 LOT NO.
 DRAWING NO. **25-25402-35**
 U.S. MISSILE

REPORT NO. **WBS-1023-085**
 DATE **6/20/63**
 PREPARED **R. ST. ROMA**
 APPROVED **B. WARRINDER**

EQUIPMENT CHANGE RECORD

PART NO.	DESCRIPTION OF EQUIPMENT	WEIGHT	X AXIS		Y AXIS		Z AXIS	
			ARM	MOMENT	ARM	MOMENT	ARM	MOMENT
25-25402-35	Instr. Group Trainer (As Weighed)	139.80	54.23	7,580.7	99.00	13,840.5	99.74	13,943.6
AND:								
AN3794-315	Cable - Antennetics	3.32	74.2		115.5		102.8	
AN3796-315	Cable - Antennetics	1.32	50.4		106.9		111.4	
25-25402-35	Instr. Group Trainer (Complete)	144.44	54.64	7,893.6	99.45	14,365.1	99.92	14,431.9
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								
31								
32								

9.5

**ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION
APPLICABLE TO CRLI SECTION 8/W COORDS AND INSTALLATION KIT**

The following ECP's have not been incorporated into "Model Specification, Trainer-Fast Group, Guided Missile, (8-133-1006)" as revised on 15 April 1963. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WS-133A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part 2	PBS, SBA Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CRLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of GBC Bracket Detonator Cord & CRLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CRLI C/D Receiver, 10-20885	3	Negl.	Yes
373	Work-Around for 10-20942-1 CRLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415 / 540	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	Ng*
506	CRLI Raceway Cover Revision	1	- .2	Yes
525	CRLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CRLI Missile System Grounding Change, MRCH 6301	3	-	Yes**
555	Stage 3 CRLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MRCH 6301	3	Negl.	Yes
606	Revision to CRLI Umbilical Bracket- Section 49	1	Negl.	Yes

* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

** These ECP's were incorporated during manufacture of the CRLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

FOR ERRATA

AD 404 314

THE FOLLOWING PAGES ARE CHANGES

TO BASIC DOCUMENT

ACTIVE PAGE RECORD

FROM MS 4-1-60
 TO 4-1-60
 #125
 404.314

SECTION	ORIG REL PAGE NO.	REV SYM	ADDED PAGES					SECTION	ORIG REL PAGE NO.	REV SYM	ADDED PAGES				
			PAGE NO.	REV SYM	PAGE NO.	REV SYM	PAGE NO.				REV SYM	PAGE NO.	REV SYM	PAGE NO.	REV SYM
	1	B						49	B						
	2	B						50	B						
	3	B						51	B						
	4	B						52	B						
	5	B						53	B						
	6	B						54	B						
	7	B						55	B						
	8	B						56	B						
	9	B						57	B						
	10	B						58	B						
	11	B						59	B						
	12	B						60	B						
	13	B						61	B						
	14	B						62	B						
	15	B						63	B						
	16	B						64	B						
	17	B						65	B						
	18	B						66	B						
	19	B						67	B						
	20	B						68	B						
	21	B						69	B						
	22	B													
	23	B													
	24	B													
	25	B													
	26	B													
	27	B													
	28	B													
	29	B													
	30	B													
	31	B													
	32	B													
	33	B													
	34	B													
	35	B													
	36	B													
	37	B													
	38	B													
	39	B													
	40	B													
	41	B													
	42	B													
	43	B													
	44	B													
	45	B													
	46	B													
	47	B													
	48	B													

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
A	<p>Revised pages 1, 4, 10.</p> <p>Added pages 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42.</p> <p>Added Moments of Inertia to page 10 Added Sections 3.0 and 4.0 to the document.</p>	5/17/63	D. Brenden
B	<p>Revised pages 2, 3, 4.</p> <p>Added Sections 5.0 thru 7.0 to the document; and page 4.1</p>	6/17/63	D. Brenden <i>DCB</i>

U3 4287 9025 ORIG. 8/62

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1a

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CTLI SECTION, S/N 000019

5.1-

This section of the document describes the data changes created by converting a production line Minuteman missile into a CTL missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries, check lists, and ECP lists applicable to this installation. Page 44 summarizes the complete installation mass properties and consists of data from page 45 (average mass properties of downstage components), page 46 (predicted sealant changes), and page 50 (actual weight of CTLI section S/N 000019). In addition, page 47 presents summary check lists by production section as backup data for page 45. Page 51 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-01DR-IMPD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/ACDS" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

5.2		WEIGHT AND BALANCE SUMMARY TOTAL CTLI KIT INSTALLATION CTLI WAFER S/N 000019				REPORT NO. _____ DATE _____				
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			151.0	54.8	99.8	100.3	.004	.002
5			Silo							
6			Aero							
7	42	G&C Section			7.4	66.8	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			16.1	81.9	108.3	117.2	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			- 1.7	58.2	110.2	117.9	0	0
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.7		58.2	110.2	117.9		
22	45	Interstage 2-3			21.1	68.6	111.6	120.2	0	.001
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			25.7	102.3	112.6	121.4	0	.008
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			- 1.4	55.6	112.2	120.6	0	0
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.4		55.6	112.2	120.6		
37	47	Interstage 1-2			25.7	73.9	114.8	125.2	0	.002
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			30.8	111.0	117.7	130.0	0	.027
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.6	74.7	119.3	128.6	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			281.3					
49			Silo							
50			Aero							
51			Base							
52			Jett							

*Boeing Section Stations (See Missile Station Diagram)

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5.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)						REPORT NO. _____ DATE _____				
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x 10 ⁻³	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			4.39	55.9	107.5	110.6		
5			Silo							
6			Aero							
7	42	G&C Section			6.96	66.9	112.0	114.3		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			15.94	81.9	108.3	117.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			- 1.85	57.7	110.3	117.8		
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.88		57.7	110.3	117.8		
22	45	Interstage 2-3			20.94	68.4	111.7	120.4		
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			25.73	102.3	112.6	121.4		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			- 1.41	55.6	112.2	120.6		
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.41		55.6	112.2	120.6		
37	47	Interstage 1-2			25.21	73.5	115.1	125.6		
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			20.00	105.7	117.7	130.1		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.43	74.1	119.3	128.5		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			130.20					
49			Silo							
50			Aero							
51			Base							
52			Jett							

*Boeing Section Stations (See Missile Station Diagram)

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5.2 BMS 5-62 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE**					REPORT NO. _____ DATE _____					
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			.2	54.5	111.5	111.5		
5			Silo							
6			Aero							
7	42	G&C Section			.4	65.4	110.5	113.5		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			.2	80.9	109.3	116.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			.2	53.6	110.8	116.7		
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	.2		53.6	110.8	116.7		
22	45	Interstage 2-3			.2	85.0	103.0	101.8		
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			0	-	-	-		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			0	-	-	-		
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett							
37	47	Interstage 1-2			.5	94.7	102.0	103.4		
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			.8	161.3	116.2	128.0		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			.2	101.3	119.2	133.9		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			2.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

** Reference D2-13954-534

2-5550-0-58 *Being Section Stations
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SERIAL NUMBER: 3000019

MISSILE WEIGHING CHECK LIST

CHECK LIST NO. _____

DATE _____

MODEL _____

FINAL ASSEMBLY DRAWING NO. _____

RECORD OF CHECKING (DATE)

Mo						
Day						
Yr						

COMPONENT		MISSILE
BASIC WEIGHT		
AS WEIGHED		
REMOTE SITE		
SHIPMENT		
AS RECEIVED		
REMOTE SITE		
AS WEIGHED		
LAUNCH		

SECTION 39 THRU 49

MISSILE NO. _____

MISSILE COMPONENT _____

COMPONENT PART NO. _____

DESCRIPTION

PART NO.

WEIGHT

X ARM

Y ARM

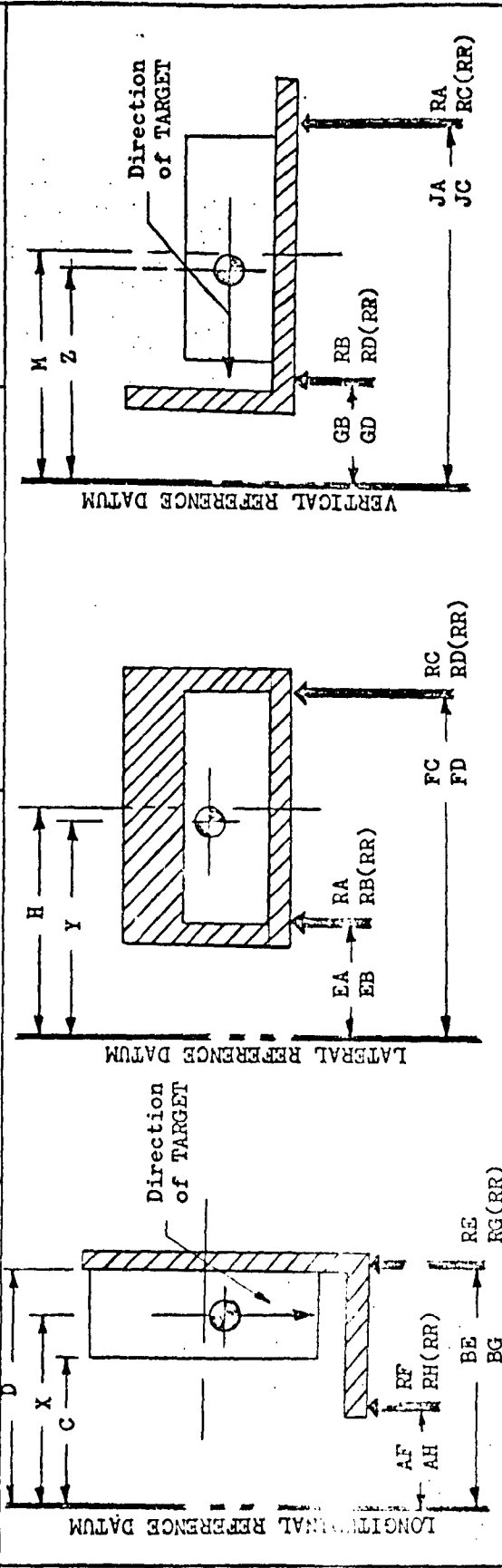
Z ARM

SUMMARY CHECK LISTS FOR SECTIONS 39 THROUGH 49 ARE IDENTICAL TO THOSE

FOUND ON PAGES 13 THROUGH 20.

5.4.1 ACTUAL WEIGHT RECORD - CTLI SECTION

U/O MISSILE CO00019 DRAWING NO. 25-25/02-35 CHECK LIST NO. 39 REPORT NO. WTS-1018-019
 MISSILE MODEL WS-100A DCN H ADCN 23 REPTED BY JH & TV PAGE NO.
 CONFIGURATION ADCN 23 CHECKED BY CB DATE 6/10/63



WEIGHING DATA				DIMENSIONAL DATA				
REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	INCHES	DIM. INCHES	DIM. INCHES
RF	25.85	6.15		19.70	AF	42.007	EA	84.510
RH	79.55	41.00		38.55	AH	42.023	EB	84.505
RE	130.10	75.50		54.60	BE	62.996	FC	115.490
RG	69.95	42.35		27.60	BG	62.999	FD	115.495
TOTAL	305.45	165.00		140.45	C	50.000	H	100.000
					D	60.000	M	100.000

LONGITUDINAL C.G.				LATERAL C.G.				VERTICAL C.G.			
REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT
RF	19.70	42.007		RA	37.20	84.510		RB	37.55	77.478	
RH	38.55	42.023		RB	37.55	84.505		RD	20.70	77.481	
RE	54.60	62.996		RC	45.00	115.490		RA	37.20	115.500	
RG	27.60	62.999		RD	20.70	115.495		RC	45.00	115.500	
AS WGD	140.45	54.30	7,625.9	AS WGD	140.45	99.00	13,904.7	AS WGD	140.45	99.73	14,007.3

(RR) = Rear Reaction

SERIAL NUMBER: 0000019

MISSILE WEIGHING CHECK LIST

CHECK LIST NO.
39

DATE

MODEL MS-132A

FINAL ASSEMBLY DRAWING NO. 25-25402

ITEM NUMBER	SECTION	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	RECORD OF CHECKING (DATE)			LAUNCH	
								Mo	Day	Yr		
39	39	Instrumentation Group-Trainer Test	25-25402									
39a	CTLI	Structure Assy.	25-25403-11									
		Support Structure	25-29094-45					X				
		Primary Structure	25-29095-15					X				
		Insulation & External Markings	25-29095-3					X				
		Antenna & Spacer	25-29096-3					X				
		Plate-Identification	21-51600-329					X				
39b		Cable & Equipment Installation	25-25404-12									
		Battery Squib	10-20942-2					X				
		Battery Squib	10-20942-1					X				
		Cable Set SE-35A	55008-106									
		Cable	AN31277-315					X				
		Cable	AN31278-315					X				
		Cable	AN31279-315					X				
39c		Kit Installation (ECP 525)	25-25402-21					X				
39d		Kit Installation (ECP 551)	25-25402-26					X				
39e		Kit Installation (ECP 578)	25-25402-34					X				

5.4.3		WEIGHT AND BALANCE CHANGE RECORD	
ASSOCIATE CONTRACTOR		CONTRACT NO.	
COMPONENT		LOT NO.	
MODEL NO.		DRAWING NO.	
SERIAL NO.		U.O. MISSILE	
FOUNTING SECTION 39		AF04(64)-269	
MS-132A		25-27402-35	
0000019		GO	
REPORT NO.		WTS-1018-019	
DATE		6/10/63	
PREPARED		JH/TV	
APPROVED		GO	

EQUIPMENT CHANGE RECORD		WEIGHT AND BALANCE							
LINE	PART NO.	DESCRIPTION OF EQUIPMENT	WEIGHT	X AXIS		Y AXIS		Z AXIS	
				ARM	MOMENT	ARM	MOMENT	ARM	MOMENT
1	225-25402-35	Instr. Ground Trainer (As Weighed)	140.45	54.30	7,625.9	99.00	13,904.7	99.73	14,007.3
2									
3									
4									
5									
6		ADD:							
7	7AN131278-315	Cable-Autometrics	3.84	74.2		115.5		102.8	
8	8AN131279-315	Cable-Autometrics	2.11	50.4		106.9		111.4	
9									
10									
11									
12	1225-25402-35	Instr. Ground Trainer (Complete)	146.40	54.76	8,017.2	99.55	14,573.8	99.98	14,637.1
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									
32									

5.5

ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION
APPLICABLE TO CTLI SECTION S/N 000019 AND INSTALLATION KIT

The following ECP's have not been incorporated into "Model Specification, Trainer-Test Group, Guided Missile; (S-133-1006)" as revised on 15 April 1963. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WS-133A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part 2	PSS, S&A Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of G&C Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-20885	3	Negl.	Yes
373	Work-Around for 10-20942-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415 / 540	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
506	CTLI Raceway Cover Revision	1	- .2	Yes
525	CTLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MRCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MRCN 6301	3	Negl.	Yes
606	Revision to CTLI Umbilical Bracket- Section 49	1	Negl.	Yes

* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

** These ECP's were incorporated during manufacture of the CTLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

CTLI SECTION, S/N 000020

6.1 This section of the document describes the data changes created by converting a production line Minuteman missile into a CTL missile. The mass data reported herein reflect the predicted jet changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries check lists, and ECP lists applicable to this installation. Page 53 summarizes the complete installation mass properties and consists of data from page 54 (average mass properties of downstage components), page 55 (predicted sealant changes), and page 59 (actual weight of CTLI section S/N 000020). In addition, page 56 presents summary check lists by production section as backup data for page 57. Page 60 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-01DR-REFD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODS" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

6.2 WEIGHT & BALANCE SUMMARY TOTAL CTLI KIT INSTALLATION CTLI WAFER S/N 000020						REPORT NO. _____ DATE _____				
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³	
						LONG. *	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			151.6	54.8	99.8	100.2	.004	.002
5			Silo							
6			Aero							
7	42	G&C Section			7.4	66.8	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			16.1	81.9	108.3	117.2	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			- 1.7	58.2	110.2	117.9	0	0
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.7		58.2	110.2	117.9		
22	45	Interstage 2-3			21.1	68.6	111.6	120.2	0	.001
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			25.7	102.3	112.6	121.4	0	.008
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			- 1.4	55.6	112.2	120.6	0	0
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.4		55.6	112.2	120.6		
37	47	Interstage 1-2			25.7	73.9	114.8	125.2	0	.002
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			30.8	111.0	117.7	130.0	0	.027
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.6	74.7	119.3	128.6	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			284.0					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

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6.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)						REPORT NO. _____ DATE _____				
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³	
						LONG. *	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			4.39	55.9	107.5	110.6		
5			Silo							
6			Aero							
7	42	G&C Section			6.96	66.9	112.0	114.3		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			15.94	81.9	108.3	117.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			- 1.88	57.7	110.3	117.8		
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.88		57.7	110.3	117.8		
22	45	Interstage 2-3			20.94	68.4	111.7	120.4		
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			25.73	102.3	112.6	121.4		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			- 1.41	55.6	112.2	120.6		
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.41		55.6	112.2	120.6		
37	47	Interstage 1-2			25.21	73.5	115.1	125.6		
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			29.93	109.7	117.7	130.1		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.43	74.1	119.3	128.5		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			135.29					
49			Silo							
50			Aero							
51			Base							
52			Jett							

2-5550-0-58 * Boeing Section Stations (See Missile Station Diagram)
REV. SYM. B

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6.2 RMS 5-62 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE**					REPORT NO. _____ DATE _____					
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² X10 ⁻³	
						LONG*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			.2	54.5	111.5	111.5		
5			Silo							
6			Aero							
7	42	G&C Section			.4	65.4	110.5	113.5		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			.2	80.9	109.3	116.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			.2	53.6	110.8	116.7		
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	.2		53.6	110.8	116.7		
22	45	Interstage 2-3			.2	85.0	103.0	101.8		
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			0	-	-	-		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			0	-	-	-		
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett							
37	47	Interstage 1-2			.5	94.7	102.0	103.4		
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			.8	161.3	116.2	128.0		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			.2	101.3	119.2	133.9		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			2.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

** Reference D2-13954-534
2-5550-0-58 * Boeing Section Stations
I.I.V. SYM. B (See Missile Station
Diagram)

BOEING

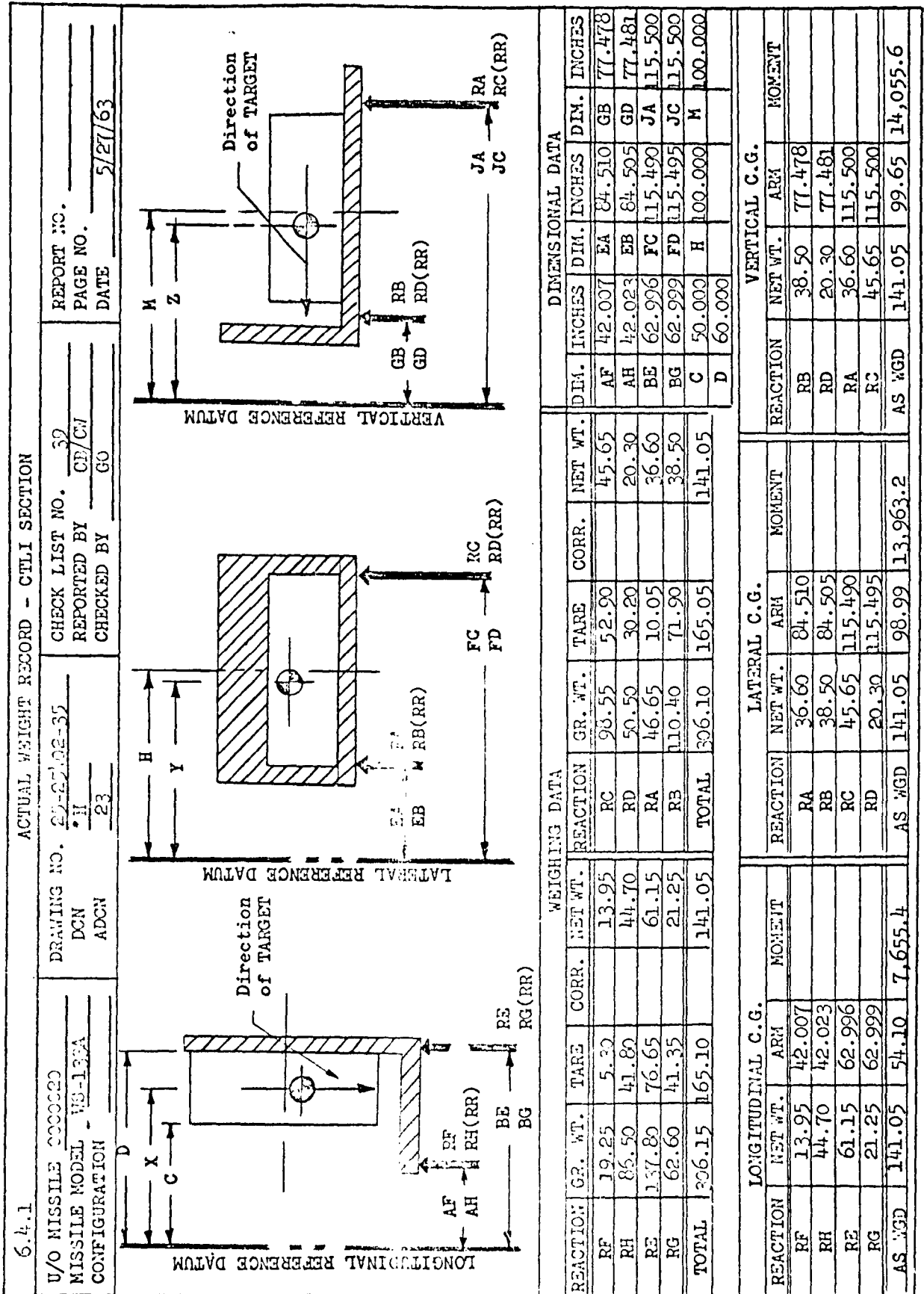
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CHECK LIST NO.	6.3 MISSILE WEIGHING CHECK LIST			RECORD OF CHECKING (DATE)				
	DATE	MODEL	FINAL ASSEMBLY DRAWING NO.	Mo	Day	Yr		
	SECTION 39 THRU 49	MISSILE NO. _____						
	MISSILE COMPONENT _____	COMPONENT PART NO. _____						
	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	BASIC WEIGHT	AS WEIGHED
								REMOTE SITE SHIPMENT
								AS RECEIVED
								REMOTE SITE
								AS WEIGHED
								REMOTE SITE
								LAUNCH
	SUMMARY CHECK LISTS FOR SECTIONS 39 THROUGH 49 ARE IDENTICAL TO THOSE FOUND ON PAGES 13 THROUGH 20.							





(RR) = Rear Reaction

SERIAL NUMBER: 000000

6.4.2 MISSILE WEIGHING CHECK LIST

CHECK LIST NO. 39

DATE

MODEL WS-133A

FINAL ASSEMBLY DRAWING NO. 25-25402-35

ITEM NUMBER	SECTION 39	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	RECORD OF CHECKING (DATE)			MISSILE	
								Mo	Day	Yr		
39		Instrumentation Group-Trainer Test	25-25402-35									
39a		CTLI Structure Assy.	25-25403-11									
		Support Structure	25-29094-45									
		Primary Structure	25-29093-15									
		Insulation & External Markings	25-29095-3									
		Antenna & Spacer	25-29096-3									
		Plate-Identification	21-51600-329									
39b		Cable & Equipment Installation	25-25404-12									
		Battery, Squib	10-20942-2									
		Battery, Squib	10-20942-1									
		Cable Set SE-35A	55008-106									
		Cable	AN31277-315									
		Cable	AN31278-315									
		Cable	AN31279-315									
39c		Kit Installation (ECP 525)	25-25402-21									
39d		Kit Installation (ECP 551)	25-25402-26									
39e		Kit Installation (ECP 578)	25-25402-34									

6.4.3 WEIGHT AND BALANCE CHANGE RECORD

ASSOCIATE CONTRACTOR BOEING CONTRACT NO. AF04(647)-289 REPORT NO. _____
 COMPONENT SECTION 59 LOT NO. _____ DATE 5/27/63
 MODEL NO. WS-133A DRAWING NO. 25-25402-35 PREPARED CB/CM
 SERIAL NO. 0000020 U.O. MISSILE APPROVED GO

LINE	EQUIPMENT CHANGE RECORD		WEIGHT AND BALANCE						
	PART NO.	DESCRIPTION OF EQUIPMENT	WEIGHT	X AXIS ARM	X AXIS MOMENT	Y AXIS ARM	Y AXIS MOMENT	Z AXIS ARM	Z AXIS MOMENT
1	225-25402-35	Instr. Group Trainer (As Weighed)	141.05	54.10	7,655.4	98.99	13,963.2	99.65	14,055.6
2									
3									
4									
5									
6		ADD:							
7	7A/N31278-315	Cable - Autonetics	3.85	74.2		115.5		102.8	
8	8/N31279-315	Cable - Autonetics	2.12	50.1		106.9		111.4	
9									
10									
11									
12	1225-25402-35	Instr. Group Trainer (Complete)	147.02	54.74	8,047.9	99.54	14,634.5	99.90	14,687.5
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									
32									



6.5

ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION
APPLICABLE TO CTLI SECTION S/N 0000020 AND INSTALLATION KIT

The following ECP's have not been incorporated into "Model Specification, Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 15 April 1963. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WS-133A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part 2	PSS, S&A Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of G&C Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-20885	3	Negl.	Yes
373	Work-Around for 10-20942-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415 / 540	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
506	CTLI Raceway Cover Revision	1	- .2	Yes
525	CTLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MRCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MRCN 6301	3	Negl.	Yes
606	Revision to CTLI Umbilical Bracket- Section 49	1	Negl.	Yes

* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

** These ECP's were incorporated during manufacture of the CTLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

CTLI SECTION, S/N 000021

7.1 This section of the document describes the data changes created by converting a production line Minuteman missile into a CTL missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries check list, and ECP lists applicable to this installation. Page 62 summarizes the complete installation mass properties and consists of data from page 63 (average mass properties of downstage components), page 64 (predicted sealant changes), and page 68 (actual weight of CTLI section S/N 000021). In addition, page 65 presents summary check lists by production section as backup data for page 63. Page 69 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-01DR-IMPD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODS" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

7.2 WEIGHT & BALANCE SUMMARY TOTAL CTLI KIT INSTALLATION CTLI WAFER S/N 0000021						REPORT NO. _____ DATE _____				
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² ×10 ⁻³	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			150.1	54.8	99.8	100.3	.004	.002
5			Silo							
6			Aero							
7	42	G&C Section			7.4	66.8	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			16.1	81.9	108.3	117.2	0	.001
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			- 1.7	58.2	110.2	117.9	0	0
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.7		58.2	110.2	117.9		
22	45	Interstage 2-3			21.1	68.6	111.6	120.2	0	.001
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			25.7	102.3	112.6	121.4	0	.008
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			- 1.4	55.6	112.2	120.6	0	0
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.4		55.6	112.2	120.6		
37	47	Interstage 1-2			25.7	73.9	114.8	125.2	0	.002
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			22.8	111.0	117.7	130.0	0	.027
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.6	74.7	119.3	128.6	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			283.4					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

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7.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)						REPORT NO. _____ DATE _____				
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			4.39	55.9	107.5	110.6		
5			Silo							
6			Aero							
7	42	G&C Section			6.96	66.9	112.0	114.3		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			15.94	81.9	108.3	117.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			- 1.68	57.7	110.3	117.8		
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.88		57.7	110.3	117.8		
22	45	Interstage 2-3			20.94	66.4	111.7	120.4		
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			25.73	102.3	112.6	121.4		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			- 1.41	55.6	112.2	120.6		
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.41		55.6	112.2	120.6		
37	47	Interstage 1-2			25.21	73.5	115.1	125.6		
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			29.96	109.7	117.7	130.1		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.43	70.1	119.3	128.5		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			135.29					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

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7.2 BMS 5-62 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE**					REPORT NO. _____ DATE _____					
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			.2	54.5	111.5	111.5		
5			Silo							
6			Aero							
7	42	G&C Section			.4	65.4	110.5	113.5		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			.2	80.9	109.3	116.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			.2	53.6	110.8	116.7		
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	.2		53.6	110.8	116.7		
22	45	Interstage 2-3			.2	85.0	103.0	101.8		
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			0	-	-	-		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			0	-	-	-		
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett							
37	47	Interstage 1-2			.5	94.7	102.0	103.4		
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			.6	161.3	116.2	128.0		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			.2	101.3	119.2	133.9		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			2.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

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** Reference D2-1394-

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AC

CHECK LIST NO.	7.3 MISSILE WEIGHING CHECK LIST			RECORD OF CHECKING (DATE)									
	DATE	MODEL	FINAL ASSEMBLY DRAWING NO.	Mo	Day	Yr	AS WEIGHED	REMOTE SITE SHIPMENT	AS RECEIVED	REMOTE SITE	AS WEIGHED	REMOTE SITE	LAUNCH
			21-52900-4										
ITEM NUMBER	SECTION 39 THRU 49		MISSILE NO.										
	DESCRIPTION		PART NO.	WEIGHT	X ARM	Y ARM	Z ARM						
	MISSILE COMPONENT		COMPONENT PART NO.										
	SUMMARY CHECK LISTS FOR SECTIONS 39 THROUGH 49 ARE IDENTICAL TO												
	THOSE FOUND ON PAGES 12 THROUGH 20												

7.4.1

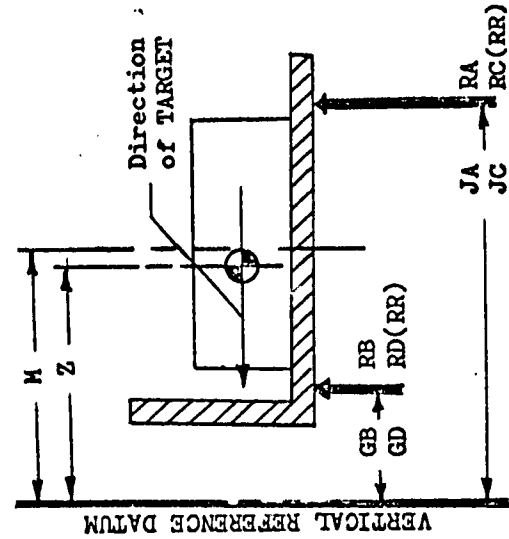
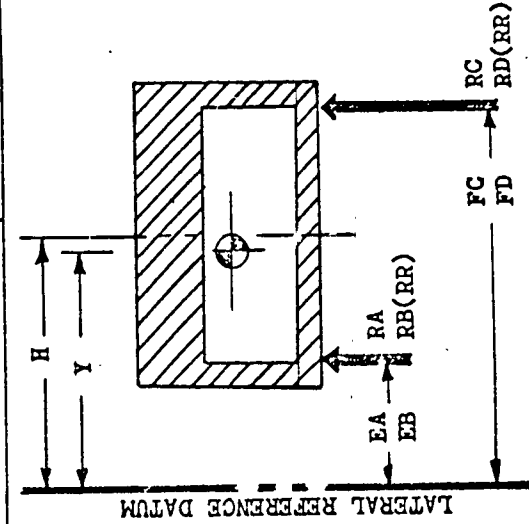
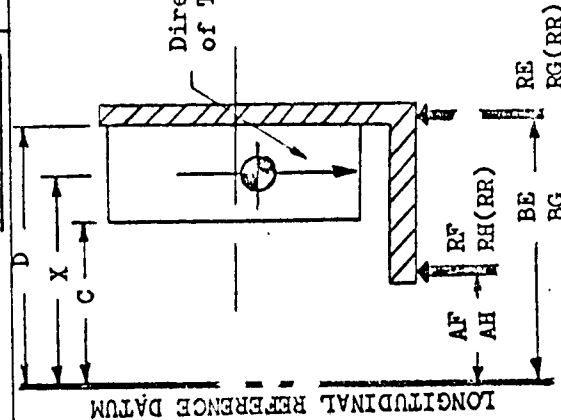
ACTUAL WEIGHT RECORD - CTLI SECTION

U/O MISSILE 0000021
 MISSILE MODEL MS-132A
 CONFIGURATION

DRAWING NO. 25-25402-35
 DCN H
 ADCN 23

CHECK LIST NO. 39
 REPORTED BY JH/TV
 CHECKED BY CB

REPORT NO. WTS-1019-021
 PAGE NO.
 DATE 6/11/63



WEIGHING DATA

REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	GR. WT.	TARE	CORR.	NET WT.
RF	88.25	40.45		47.80	RC	77.80	36.05		41.75
RH	16.80	6.50		10.30	RD	70.40	47.00		23.40
RE	68.20	41.56		26.65	RA	66.70	26.85		39.85
RG	131.45	76.55		54.90	RB	89.80	55.15		34.65
TOTAL	304.70	165.05		139.65	TOTAL	304.70	165.05		139.65

DIMENSIONAL DATA

DIM.	INCHES	DIM.	INCHES	DIM.	INCHES
AF	42.007	EA	84.510	GB	77.478
AH	42.023	EB	84.505	GD	77.481
BE	62.996	FC	115.490	JA	115.500
BG	62.999	FD	115.495	JC	115.500
C	50.000	H	100.000	M	100.000
D	60.000				

LONGITUDINAL C.G.

REACTION	NET WT.	ARM	MOMENT
RF	47.80	42.007	
RH	10.30	42.023	
RE	26.65	62.996	
RG	54.90	62.999	
AS WGD	139.65	54.27	7,578.3

LATERAL C.G.

REACTION	NET WT.	ARM	MOMENT
RA	39.85	84.510	
RB	34.65	84.505	
RC	41.75	115.490	
RD	23.40	115.495	
AS WGD	139.65	98.96	13,820.1

VERTICAL C.G.

REACTION	NET WT.	ARM	MOMENT
RB	34.65	77.478	
RD	23.40	77.481	
RA	39.85	115.500	
RC	41.75	115.500	
AS WGD	139.65	99.70	13,922.5

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SERIAL NUMBER: 0000021

7.4.2 MISSILE WEIGHING CHECK LIST

MODEL WS-133A FINAL ASSEMBLY DRAWING NO. 25-25402

CHECK LIST NO. 39	DATE	SECTION 39	MISSILE NO.	RECORD OF CHECKING (DATE)				COMPONENT			MISSILE			
				Mo	Day	Yr	WEIGHED	BASIC WEIGHT	AS WEIGHTED	REMOTE SITE SHIPMENT	AS RECEIVED	REMOTE SITE	AS WEIGHED	REMOTE SITE
ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM								
39	Instrumentation Group-Trainer Test	25-25402												
39a	CTLI Structure Assy.	25-25403-11												
	Support Structure	25-29094-45							X	X				
	Primary Structure	25-29093-15							X	X				
	Insulation & External Markings	25-29095-3							X	X				
	Antenna & Spacer	25-29096-3							X	X				
	Plate-Identification	21-51600-329							X	X				
39b	Cable & Equipment Installation	25-25404-12												
	Battery, Squib	10-20942-2							X	X				
	Battery, Squib	10-20942-1							X	X				
	Cable Set SE-35A	55008-106												
	Cable	AN31277-315							X	X				
	Cable	AN31278-315							X	O				
	Cable	AN31279-315							X	C				
39c	Kit Installation (ECP 525)	25-25402-21							X	X				
39d	Kit Installation (ECP 551)	25-25402-26							X	X				
39e	Kit Installation (ECP 578)	25-25402-34							X	X				

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WEIGHT AND BALANCE CHANGE RECORD									
7.4.3		WEIGHT AND BALANCE CHANGE RECORD		WEIGHT AND BALANCE		WEIGHT AND BALANCE		WEIGHT AND BALANCE	
LINE	PART NO.	DESCRIPTION OF EQUIPMENT	WEIGHT	X AXIS ARM	X AXIS MOMENT	Y AXIS ARM	Y AXIS MOMENT	Z AXIS ARM	Z AXIS MOMENT
ASSOCIATE CONTRACTOR <u>BOEING</u> CONTRACT NO. <u>AF04(647)-289</u> REPORT NO. <u>W3-1019-021</u> COMPONENT <u>SECTION 39</u> LOT NO. DATE <u>5/11/63</u> MODEL NO. <u>MS-133</u> DRAWING NO. <u>25-25402-35</u> PREPARED <u>SM/TV</u> SERIAL NO. <u>0000021</u> U.O. MISSILE APPROVED <u>CS</u>									
1	25-25402-35	Instr. Group Trainer (As Weighed)	139.65	54.27	7,578.3	98.96	13,820.1	99.70	13,922.5
2									
3									
4									
5		ADD:							
6	AN31278-315	Cable-Autometrics	3.77	74.2		115.5		102.8	
7	AN31279-315	Cable-Autometrics	2.12	59.4		106.9		111.4	
8									
9									
10									
11	25-25402-35	Instr. Group Trainer (Complete)	145.55	54.73	7,965.4	99.51	14,183.2	99.94	14,546.7
12									
13									
14									
15									
16									
17									
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32									

7.5

**ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION
APPLICABLE TO CTLI SECTION S/W 000021 AND INSTALLATION KIT**

The following ECP's have not been incorporated into "Model Specification, Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 15 April 1963. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WS-133A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Cap Change	3	+.5	Yes
208 Part 2	PSS, S&A Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of CSC Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-20885	3	Negl.	Yes
373	Work-Around for 10-20942-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415 / 540	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
506	CTLI Raceway Cover Revision	1	-.2	Yes
525	CTLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MRCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MRCN 6301	3	Negl.	Yes
606	Revision to CTLI Umbilical Bracket- Section 49	1	Negl.	Yes

* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

** These ECP's were incorporated during manufacture of the CTLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

FOR ERRATA

AD 404314

THE FOLLOWING PAGES ARE CHANGES

TO BASIC DOCUMENT

ACTIVE PAGE RECORD

SECTION	ORIG REL PAGE NO.	REV SYM	ADDED PAGES				SECTION	ORIG REL PAGE NO.	REV SYM	ADDED PAGES			
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	5								53	B			
	6	E							54	B			
	7								55	B			
	8								56	B			
	9								57	B			
	10								58	B			
	11								59	B			
	12								60	B			
	13								61	B			
	14								62	B			
	15								63	B			
	16								64	B			
	17								65	B			
	18								66	E			
	19								67	B			
	20								68	B			
	21								69	B			
	22								70	C			
	23								71	C			
	24								72	C			
			25	A					73	C			
			26	A					74	C			
			27	A					75	C			
			28	A					76	C			
			29	A					77	C			
			30	A					78	C			
			31	A					79	C			
			32	A					80	C			
			33	A					81	C			
			34	A					82	C			
			35	A					83	C			
			36	A					84	C			
			37	A					85	C			
			38	A					86	C			
			39	A					87	E			
			40	A					88	E			
			41	A					89	E			
			42	A					90	E			
			43	B					91	E			
			44	B					92	E			
			45	B					93	E			
			46	B					94	E			
			47	B					95	E			
			48	B					96	E			

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			98	E							146	E			
			99	E							147	E			
			100	E							148	E			
			101	E							149	E			
			102	E							150	E			
			103	E	103.1	E					151	E			
			104	E							152	E			
			105	E							153	E			
			106	E							154	E			
			107	E							155	E			
			108	E							156	E			
			109	E							157	E			
			110	E											
			111	E											
			112	E	112.1	E									
			113	E											
			114	E											
			115	E											
			116	E											
			117	E											
			118	E											
			119	E											
			120	E											
			121	E											
			122	E											
			123	E											
			124	E											
			125	E											
			126	E											
			127	E											
			128	E											
			129	E											
			130	E	130.1	E									
			131	E											
			132	E											
			133	E											
			134	E											
			135	E											
			136	E											
			137	E											
			138	E											
			139	E	139.1	E									
			140	E											
			141	E											
			142	E											
			143	E											
			144	E											

U3 4001 0600 ORIG. 8/62

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REV SYM E

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SECT. PAGE 2.1

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
A	Revised pages 1, 4, 10. Added pages 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42. Added Moments of Inertia to page 10. Added Sections 3.0 and 4.0 to the document.	5-17-63	D. Brenden <i>D. Brenden</i>
B	Added Sections 5.0, 6.0 and 7.0 to the document.	6-17-63	D. Brenden <i>D. Brenden</i>
C	Added Sections 8.0 and 9.0 to the document.	7-17-63	D. Brenden <i>D. Brenden</i>
D	Revised pages 2, 3, 4.1 Added pages 2.1, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112.	8-16-63	D. Brenden <i>D. Brenden</i>
E	Revised pages 2, 2.1, 3, 4.1, 6, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112. Added pages 4.2, 103.1, 112.1, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 130.1, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 139.1	10-23-63	D. Brenden <i>D. Brenden</i>

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1.0 INTRODUCTION

1.1 REFERENCES

- 1.1.1 BSD Exhibit 62-45, "Mass Properties Control Data for WS-133A", dated 3 August 1962.
- 1.1.2 Supplemental Agreement No. 6 to Contract AF04(694)-46.
- 1.1.3 Boeing Document D2-13943, "Flight Article Mass Properties Report for CTLI Installations for MRCN 6301 S/N 0000001 - 0000015."
- 1.1.4 Boeing Document D2-13944-501, "Flight Article Mass Properties Report for Missile 501 Components."
- 1.1.5 Boeing Document D2-13945-xxx, "Air Force Plant 77 Flight Article Mass Properties Report for Missile xxx."
- 1.1.6 Boeing Document D2-13954-xxx, "Vandenberg Air Force Base Flight Article Mass Properties Report for CTL Missile xxx."
- 1.1.7 Boeing Document D2-13957-x, "Statistical Means and Dispersions for the Mass Properties of Boeing Components for the Wing I Operational Minuteman Missile."

1.2 DISCUSSION

This weight report for a series of CTLI Installations for Wing I Minuteman missiles is presented in accordance with section 3.1.1 of BSD Exhibit 62-45 (reference 1.1.1) as authorized by CCN 258 to AF04(647)-580 (reference 1.1.2). This report presents summary mass properties data for all CTLI components to be installed at VAFB including kit weights supplied by other Associate Contractors. It does not include data for CTLI provisions which are incorporated into every production missile (the CTLI "weight penalty") or data remaining unchanged after the original assembly of the missile at Air Force Plant 77. The following pages, therefore, list only the items to be added or changed in the course of the conversion and the mass properties data given on check lists or weight and balance summaries are net changes which must be combined with the appropriate missile data from Plant 77 (reference 1.1.5) and Vandenberg Air Force Base (reference 1.1.6) in order to obtain the mass properties of the complete missile.

Each section of this report will contain one complete CTLI installation data package consisting of (1) a brief discussion of the data, (2) sectional distribution of CTLI components, (3) check lists and change records as required, and (4) a list of Engineering Change Proposals incorporated on the components. Average weights will be used for all components other than the CTLI section which will be an actual weight. Background data for these average weights can be found in reference 1.1.7. Refer to reference 1.1.3 for data covering the installation of CTLI sections from S/N 0000001 through S/N 0000015.

CTLI SECTION, S/N 000027

10.1 This section of the document describes the data changes created by converting a production line Minuteman missile into a CTLI missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries, check lists, and ECP lists applicable to this installation. Page 89 summarizes the complete installation mass properties and consists of data from page 90 (average mass properties of downstage components), page 91 (predicted sealant changes), and page 102 (actual weight of CTLI section S/N 000027). In addition, page 92 presents summary check lists by production section as backup data for page 90. Page 103 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-01DR-NMPD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODS" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

10.2		WEIGHT & BALANCE SUMMARY TOTAL CTLI KIT INSTALLATION CTLI WAFER S/N 000027			REPORT NO. _____ DATE _____					
LINE	32:	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³	
						LONG. #	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			149.5	54.7	99.7	100.2	.004	.003
5			Silo							
6			Aero							
7	42	O&C Section			7.3	67.4	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			17.9	84.6	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.7	58.2	110.2	117.9	0	0
15			Silo							
16			Aero							
17			Base							
18		Jettisoned Portion	Silo							
19			Aero							
20			Base							
21			Jett	- 1.7		58.2	110.2	117.9		
22	45	Interstage 2-3 (Aft)			19.45	65.1	111.7	120.1	0	.001
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.7	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			- 1.45	55.4	112.1	120.5	0	0
30			Silo							
31			Aero							
32			Base							
33		Jettisoned Portion	Silo							
34			Aero							
35			Base							
36			Jett	- 1.45		55.4	112.1	120.5		
37	47	Interstage 1-2 (Aft)			26.0	74.1	114.8	125.2	0	.002
38			Silo							
39			Aero							
40	48	1st Stage Engine			30.6	112.8	117.6	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.9	74.5	119.5	128.4	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			283.2					
49			Silo							
50			Aero							
51			Base							
52			Jett							

2-5950 0-58 * Boeing Section Stations (See Missile Station Diagram)

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10.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)						REPORT NO. _____ DATE _____				
LINE	STATION	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² X10 ⁻³	
						LONG. #	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			4.39	56.0	107.5	110.7	0	0
5			Silo							
6			Aero							
7	42	G&C Section			6.94	67.5	112.0	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			17.65	84.6	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.90	57.7	110.3	117.8	0	0
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett		- 1.90	57.7	110.3	117.8		
22	45	Interstage 2-3 (Aft)			19.25	64.9	111.8	120.3	0	.001
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.73	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			- 1.45	55.4	112.1	120.5	0	0
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett		- 1.45	55.4	112.2	120.6		
37	47	Interstage 1-2 (Aft)			25.46	73.7	115.0	125.6	0	.002
38			Silo							
39			Aero							
40	48	1st Stage Engine			29.83	111.5	117.7	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.73	74.0	119.5	128.3	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			135.63					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

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10.2 EMS 5-62 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE**					REPORT NO. _____ DATE _____					
LINE	STATION	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² X10 ⁻³	
						LONG*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			.2	54.5	111.5	111.5		
5			Silo							
6			Aero							
7	42	O&C Section			.4	65.4	110.5	113.5		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			.2	80.9	109.3	116.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			.2	53.6	110.8	116.7		
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett	.2		53.6	110.8	116.7		
22	45	Interstage 2-3 (Aft)			.2	85.0	103.0	101.8		
23			Silo							
24			Aero							
25	46	2nd Stage Engine			0	-	-	-		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			0	-	-	-		
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett							
37	47	Interstage 1-2 (Aft)			.5	94.7	102.0	103.4		
38			Silo							
39			Aero							
40	48	1st Stage Engine			.8	161.3	116.2	128.0		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			.2	101.3	119.2	133.9		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			2.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

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REV. SYM. E ** Reference D2-13954-534

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CHECK LIST NO.	10.3.1 MISSILE WEIGHING CHECK LIST							RECORD OF CHECKING (DATE)							
	DATE	MODEL	FINAL ASSEMBLY DRAWING NO. 21-52900-20 (Using 25-25406-9)				No	Day	Yr	COMPONENT					
ITEM NUMBER	SECTION 39	MISSILE NO.	COMPONENT PART NO.			DESCRIPTION			WEIGHT	X ARM	Y ARM	Z ARM	MISSILE		
	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM									
3a	Body Sect. - Trainer Test	25-25402-18	SEE CHANGE RECORD												
3b	Cable Assy. Set - Electrical	25-26878-5	2.21	56.5	109.8	116.0									
3c	Conduit Supt. Set - Raceway	25-29239-18	.91	56.3	111.6	111.6									
3d	Instl. Kit - Trainer Test Group	25-31677-17	1.27	54.5	100.6	100.6									
3e	BMS 5-62 Installed VAFB		*												
	<input type="checkbox"/> The following items included in 25-25402-18 are furnished by Autometrics														
	SE 35A Cable Set	55008-106	7.5	62.6	109.7	107.2									
	D 24A Analog Multiplexer	55007-106	16.9	53.9	101.4	103.3									
	D 20C Data Programmer	55006-106	16.1	53.9	101.9	97.0									

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REV. SYM: 2

* See page 12 for the net weight and balance effect of BMS 5-62 installed at VAFB

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CHECK LIST NO.	10.3.2 MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)									
	DATE	MODEL	No	Day	Yr							
		FINAL ASSEMBLY DRAWING NO. 21-52900-20										
ITEM NUMBER	SECTION	DESCRIPTION	PART I.D.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT			MISSILE	
								MISSILE NO.	COMPONENT PART NO.	DESCRIPTION		
MISSILE COMPONENT		GUIDANCE SECTION										
2a		Cable Assy. Set - Electrical	25-26878-5	1.98	65.8	110.5	117.2					
2b		Conduit Supt. Set - Raceway	25-29239-18	4.54	68.9	112.6	113.2					
2c		Instl. Kit-Trainer Test Group	25-31677-17	.62	62.7	111.8	112.1					
2d		RMS 5-62 Installed at VAFB		*								
The following items are deleted from the missile assembly in order to accommodate the CUL Installation												
2e		Raceway Inst.	25-23214-5	.20	66.6	111.0	109.8					
2f		RMS 5-62 Removed at VAFB		*								

2-5550-0-21

REV. 55M. 3

* See page 12 for a summary of the net weight and balance change of RMS 5-62 at VAFB

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REV. 524. **B**

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CHECK LIST NO.	10.3.3 MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)												
	DATE	MODEL	Mo	Day	Yr										
		FINAL ASSEMBLY DRAWING NO. 21-52900-20													
ITEM NUMBER	SECTION	MISSILE COMPONENT	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT				MISSILE		
									3rd STAGE MOTOR	AS REQUIRED BY	AS REQUIRED BY	AS REQUIRED BY		AS REQUIRED BY	AS REQUIRED BY
4a	44		Cable Assy. Set - Electrical	25-26878-5	6.47	92.9	111.2	118.4							
4b			Conduit Supt. Set - Raceway	25-29239-18	15.68	85.5	110.5	117.9							
4c			Instl. Kit - Trainer Test Group	25-21677-17	1.49	80.2	110.7	118.2							
4d			MS 5-62 Installed at VAFB		*										
The following items are furnished by Aerojet															
4e			Reconstruct System, AODE	359764	4.03	58.1	99.8	114.0							
The following items are deleted from the missile assembly in order to accommodate the CWT Installation															
4f			Recovery Instl.	25-23214-5	9.93	80.2	110.2	117.6							
4g			Standards Instl.	25-30133-1	.09	68.5	109.4	116.2							
4h			MS 5-62 Removed at VAFB		*										

* See page 12 for a summary of the net weight and balance change of MS 5-62 at VAFB

CHECK LIST NO.	10.3.4 MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)			
	DATE	MODEL	Mo	Day	Yr	
		FINAL ASSEMBLY DRAWING NO. 21-52900-20				
	SECTION 45	MISSILE NO. _____				
	MISSILE COMPONENT 2-3 INTERSTAGE	COMPONENT PART NO. _____				
ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ASM	Y ASM	Z ASM
5a	Cable Assy. Set - Electrical	25-26878-5	4.36	64.9	112.0	119.9
5b	Conduit Supt. Set - Raceway	25-29239-18	15.75	66.9	111.7	120.0
5c	Instl. Kit - Trainer Test Group	25-31677-17	1.78	74.7	111.7	119.4
5d	BMS 5-62 Installed at VAFB		*			
The following items are deleted from the missile assembly in order to accommodate the CTM Installation						
5e	Standards Instl.	25-30133-1	.07	78.6	109.6	119.5
5f	Raceway Instl.	25-23214-5	4.47	72.6	110.9	117.3
5g	BMS 5-62 Removed at VAFB		*			

* See page 12 for a summary of the net weight and balance change of BMS 5-62 at VAFB

CHECK LIST NO.	10.3.5 MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)																											
	DATE	MODEL	Mo	Day	Yr																									
		FINAL ASSEMBLY DRAWING NO. 21-52900-20																												
ITEM NUMBER	SECTION	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT			MISSILE																			
								BASIC WEIGHT	WEIGHED	REMOTE SITE SHIPMENT		AS RECEIVED	REMOTE SITE	LAUNCH																
MISSILE COMPONENT		2nd STAGE MOTOR		MISSILE NO. _____																										
MISSILE COMPONENT		2nd STAGE MOTOR		COMPONENT PART NO. _____																										
6a		Cable Assy. Set - Electrical	25-26878-5	10.75	111.1	112.8	121.2																							
6b		Conduit Supt. Set - Raceway	25-29239-18	21.93	109.2	112.2	121.2																							
6c		Instl. Kit - Trainer Test Group	25-31677-17	2.05	90.4	111.7	120.3																							
6d		Timer - Interval	29-22327-2	1.25	67.1	112.5	121.8																							
6e		Battery - Squib Activated	10-20942-3	1.40	63.9	112.5	121.8																							
6f		BMS 5-62 Installed at VAFB		*																										
The following items are furnished by Aerojet																														
6g		Destruct System, AODS	359764	4.19	74.8	111.8	120.4																							
The following items are deleted from the missile assembly in order to accommodate the CMI installation																														
6h		Raceway Instl.	25-23214-5	15.84	107.1	111.9	120.7																							
6i		BMS 5-62 Removed At VAFB		*																										

* See page 12 for a summary of the net weight and balance change of BMS 5-62 at VAFB

CHECK LIST NO.	10.3.6 MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)															
	DATE	MODEL	Mo	Day	Yr													
		FINAL ASSEMBLY DRAWING NO. 21-52900-20																
ITEM NUMBER	SECTION 47	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT				MISSILE						
								LAUNCH	AS WEIGHED	REMOTE SITE	AS RECEIVED		SHIPMENT	REMOTE SITE	AS WEIGHED	REMOTE SITE		
MISSILE COMPONENT 1-2 INTERSTAGE		MISSILE NO. _____																
DESCRIPTION		COMPONENT PART NO. _____																
7a		Cable Assy. Set - Electrical	25-26678-5	5.48	71.2	115.8	126.4											
7b		Conduit Supt. Set - Raceway	25-29239-18	23.03	78.9	115.0	125.9											
7c		Instl. Kit - Trainer Test Group	25-31677-17	1.32	87.4	115.3	125.9											
7d		MSB 5-62 Installed at VAFB		*														
The following items are deleted from the missile assembled in order to accommodate the final installation																		
7e		Standards Instl.	25-30133-3	.10	99.8	115.8	126.0											
7f		Raceway Instl.	25-23214-5	5.72	89.7	114.8	126.4											
7g		MSB 5-62 Removed at VAFB		*														

* See page 12 for a summary of the net weight and balance change of MSB 5-62 at VAFB

CHECK LIST NO.	10-3-7	MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)			
		DATE	MODEL	7%	10%	15%	
ITEM NUMBER	SECTION	DESCRIPTION	WEIGHT	TOLERANCE	COMPONENT		MISSILE
					WEIGHT	TOLERANCE	
MISSILE NO. _____							
SECTION 48							
MISSILE NO. 25-26878-5							
1st STAGE MOTOR							
8a	Cable Assy. Set - Electrical	12.12	156.4	118.2	130.5		
8b	Conduit Supt. Set	13.15	79.2	117.5	130.0		
8c	Instl. Kit - Trainer Test	2.81	84.1	117.2	129.6		
8d	Timer - Interval	1.25	77.6	117.7	130.5		
8e	Battery - Squib Activated	1.40	69.7	117.7	130.5		
8f	BMS 5-62 Instl. at VAFB	*					
The following items are furnished by Aerojet							
8g	Destruct System, AODS	359764	6.19	118.1	116.9	129.3	
The following items are deleted from the missile assembly in order to accommodate the C-117 Installation							
8h	Receiver Instl.	25-23214-5	8.07	82.8	117.2	129.8	
8i	BMS 5-62 Received at VAFB	*					

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* See page 12 for a summary of the net weight and balance change of BMS 5-62 at VAFB

CHECK LIST NO.	DATE	MODEL	10.3.8	RECORD OF CHECKING (DATE)										
				No.	By	IT	COMPONENT							
MISSILE ASSEMBLY DRAWING NO. 21-52900-20			MISSILE NO.	MISSILE										
MISSILE COMPONENT APT SIGHT			COMPONENT PART NO.	COMPONENT										
REASON FOR			WGT.	WGT.	X ASM	Y ASM	Z ASM	WEIGHT				MOMENT		
								1	2	3	4	5	6	7
9a		Cable Assy. Set - Electrical	25-26876-2	6.63	73.2	118.2	130.5							
9b		Instl. Kit - Trainer Test Group	25-31677-17	3.38	74.0	121.7	124.1							
9d		Standards Instl.	25-30133-1	.28	57.9	116.4	126.4							
9e		BMS 5-62 Removed at VAFB												

The following items are deleted from the missile assembly in order to accommodate the CTR installations.

* See page 12 for a summary of the net weight and balance change of BMS 5-62 at VAFB

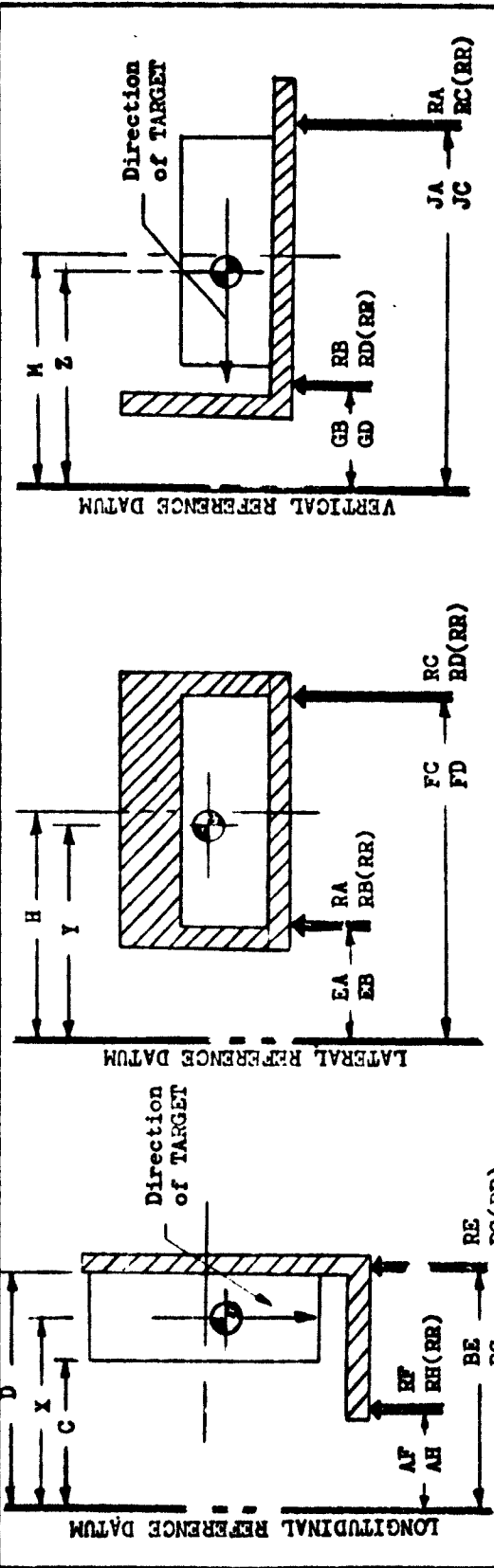


10.4.1 ACTUAL WEIGHT RECORD - CILI SECTION

U/O MISSILE 000027 DRAWING NO. 25-25402-36 CHECK LIST NO. 39 REPORT NO. WTS-1109-027

MISSILE MODEL WS-133A DCN J RECORDED BY CB/RB PAGE NO. 10/21/63

CONFIGURATION ADCN REW CHECKED BY RW



WEIGHING DATA				DIMENSIONAL DATA				
REACTION	GR. WT.	TARE	CORR.	NET WT.	DIM. INCHES	DIM. INCHES	DIM. INCHES	
RF	44.50	12.65		31.85	AF	42.007	EA	84.510
RH	66.40	39.70		26.70	AH	42.023	EB	84.505
RE	116.80	74.45		42.35	BE	62.996	FC	115.490
RG	88.85	49.60		39.25	BG	62.999	FD	115.495
TOTAL	316.55	176.40		140.15	C	50.000	H	100.000
					D	60.000		

LONGITUDINAL C.G.				LATERAL C.G.				VERTICAL C.G.			
REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT
RF	31.85	42.007		RA	51.50	84.510		RB	23.05	77.478	
RH	26.70	42.023		RB	23.05	84.505		RD	35.40	77.481	
RE	42.35	62.996		RC	30.20	115.490		RA	51.50	115.500	
RG	39.25	62.999		RD	35.40	115.495		RC	30.20	115.500	
AS WGD	140.15	54.23	7,600.5	AS WGD	140.15	99.01	13,876.4	AS WGD	140.15	99.64	13,965.0

(RR) = Rear Reaction

SERIAL NUMBER: 0000027

10.4.2 MISSILE WEIGHING CHECK LIST
 MODEL WS-133 FINAL ASSEMBLY DRAWING NO. 25-25402-36

CHECK LIST NO.	DATE	SECTION	MISSILE COMPONENT	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	BASIC WEIGHT	AS WEIGHED	RECORD OF CHECKING (DATE)				LAUNCH	
												Mo	Day	Yr	REMOTE SITE SHIPMENT		AS RECEIVED
ITEM NUMBER	MISSILE NO.	COMPONENT PART NO.		Noted													
39				Instrumentation Group-Trainer Test	25-25402-36												
39a				CVI Structure Assy.	25-25403-11												
				Support Structure	25-29094-45					X	X						
				Primary Structure	25-29093-15					X	X						
				Insulation & External Markings	25-29095-3					X	X						
				Antenna & Spacer	25-29096-3					X	X						
				Flash-Identification	21-51600-329					X	X						
39b				Cable & Equipment Installati 1	25-25404-16												
				Battery, Equip	10-20942-2					X	X						
				Battery, Equip	10-2094204					X	X						
				Cable Set SR-35B	55018-106												
				Cable	AE37192-315					X	X						
				Cable	AE37194-315					X	X						
				Cable	AE37196-315					X	X						

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2-5550-0-11 R1
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WEIGHT AND BALANCE CHANGE RECORD									
10.4.3		BOEING		AF04(647)-289		WTS-1109-027			
ASSOCIATE CONTRACTOR		SECTION 49		LOT NO.		DATE			
MODEL NO.		WS-133A		DRAWING NO.		PREPARED		CB/RR	
SERIAL NO.		0000027		U.O. MISSILE		APPROVED		OO	
EQUIPMENT CHANGE RECORD					WEIGHT AND BALANCE				
PART NO.	DESCRIPTION OF EQUIPMENT	WEIGHT	X AXIS ARM	X AXIS MOMENT	Y AXIS ARM	Y AXIS MOMENT	Z AXIS ARM	Z AXIS MOMENT	
1	225-25402-36 Instr. Group Trainer (As Weighed)	140.15	54.23	7,600.5	99.01	13,876.4	99.64	13,965.0	
2									
3									
4									
5	ADD:								
6	37194-315 Cable-Autonetics	3.32	74.2		115.5			102.8	
7	37196-315 Cable-Autonetics	1.36	50.4		106.9			111.4	
8									
9									
10	225-25402-36 Instr. Group Trainer (Complete)	144.86	54.66	7,917.6	99.47	14,408.7	99.83	14,460.9	
11									
12									
13									
14									
15									
16									
17									
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10.5

**ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION
APPLICABLE TO CTLI SECTION S/N 000027 AND INSTALLATION KIT**

The following ECP's have not been incorporated into "Model Specification, Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 8 July 1963. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WS-133A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part 2	PSS, S&A Installation and Envelope change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of G&C Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-20885	3	Negl.	Yes
373	Work-Around for 10-20942-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415 540	Puttng & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
525	CTLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MRCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MRCN 6301	3	Negl.	Yes
606	Revision to CTLI Umbilical Bracket- Section 49	1	Negl.	Yes

* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

** These ECP's were incorporated during manufacture of the CTLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

10.5

**ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION
APPLICABLE TO CTLI SECTION S/N 000027 AND INSTALLATION KIT**

(Cont.)

ECP NO. (WS-133A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
62-	Addition of Static Dissipators in 47 Section and 1st Stage Skirt	1	Negl.	Yes
635	PCM R/F Section Digital Data Programmer	3	Negl.	Yes
639	Prevent Interference of Linear Shape Charge With Cable Strap	3	Negl.	Yes
657	Revision of Ordnance Supports in Interstage 2-3	2	Negl.	Yes

CTLI SECTION, S/N 000028

11.1 This section of the document describes the data changes created by converting a production line Minuteman missile into a CTL missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries, check lists, and ECP lists applicable to this installation. Page 105 summarizes the complete installation mass properties and consists of data from page 106 (average mass properties of downstage components), page 107 (predicted sealant changes), and page 111 (actual weight of CTLI section S/N 000035). In addition, page 108 presents summary check lists by production section as backup data for page 106. Page 112 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-01DR-NMPD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODS" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

11.2 WEIGHT & BALANCE SUMMARY TOTAL CTLI KIT INSTALLATION CTLI WAFER S/N 0000028						REPORT NO. _____ DATE _____				
STATION	STATION	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² X10 ⁻³	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			149.1	54.7	99.7	100.1	.004	.003
5			Silo							
6			Aero							
7	42	G&C Section			7.3	67.4	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			17.9	84.6	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			-1.7	58.2	110.2	117.9	0	0
15			Silo							
16			Aero							
17			Base							
18		Jettisoned Portion	Silo							
19			Aero							
20			Base							
21			Jett.		-1.7	58.2	110.2	117.9		
22	45	Interstage 2-3 (Aft)			19.45	65.1	111.7	120.1		
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.7	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			-1.45	55.4	112.1	120.5	0	0
30			Silo							
31			Aero							
32			Base							
33		Jettisoned Portion	Silo							
34			Aero							
35			Base							
36			Jett.		-1.45	55.4	112.1	120.5		
37	47	Interstage 1-2 (Aft)			26.0	74.1	114.8	125.2	0	.002
38			Silo							
39			Aero							
40	48	1st Stage Engine			30.6	112.8	117.6	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Strt			9.9	74.5	119.5	128.4	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			282.8					
49			Silo							
50			Aero							
51			Base							
52			Jett.							

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11.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)					REPORT NO. _____ DATE _____					
NO.	STATION	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² X10 ⁻³	
						LONG. #	LAT.	VERT.	ROLL	PITCH
1	41	KV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			4.39	56.0	107.5	110.7	0	0
5			Silo							
6			Aero							
7	42	G&C Section			6.94	67.5	112.0	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			17.65	84.6	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.90	57.7	110.3	117.8	0	0
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett		- 1.90	57.7	110.3	117.8		
22	45	Interstage 2-3 (Aft)			19.25	64.9	111.8	120.3	0	.001
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.73	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			- 1.45	55.4	112.1	120.5	0	0
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett		- 1.45	55.4	112.1	120.5		
37	47	Interstage 1-2 (Aft)			25.46	73.7	115.0	125.6	0	.002
38			Silo							
39			Aero							
40	48	1st Stage Engine			29.83	111.5	117.7	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.73	74.0	119.5	128.3	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			135.63					
49			Silo							
50			Aero							
51			Base							
52			Jett							

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11.2 BMS 5-62 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE**					REPORT NO. _____ DATE _____					
NO	REV	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTI Section			.2	54.5	111.5	111.5		
5			Silo							
6			Aero							
7	42	G&C Section			.4	65.4	110.5	113.5		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			.2	80.9	109.3	116.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			.2	53.6	110.8	116.7		
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett		.2	53.6	110.8	116.7		
22	45	Interstage 2-3 (Aft)			.2	85.0	103.0	101.8		
23			Silo							
24			Aero							
25	46	2nd Stage Engine			0	-	-	-		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			0	-	-	-		
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett		.5					
37	47	Interstage 1-2 (Aft)			.5	94.7	102.0	103.4		
38			Silo							
39			Aero							
40	48	1st Stage Engine			.8	161.3	116.2	128.0		
41			Silo							
42			Aero							
43			Base							
44	49	5.irt			.2	101.3	119.2	133.9		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			2.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

REV. SYM. E ** Reference D2-13954-534

VOL
100

NO D2-13943-1

107

SERIAL NUMBER: 0000028

CHECK LIST NO.

11.3

MISSILE WEIGHING CHECK LIST

DATE

MODEL

MISSILE NO.

FINAL ASSEMBLY DRAWING NO.

ITEM NUMBER

SECTION 39 THRU 49

MISSILE COMPONENT

DESCRIPTION

PART NO.

WEIGHT

X ARM

Y ARM

Z ARM

BASIC WEIGHT

AS WEIGHED

REMOTE SITE SHIPMENT

AS RECEIVED

REMOTE SITE

AS WEIGHED

REMOTE SITE

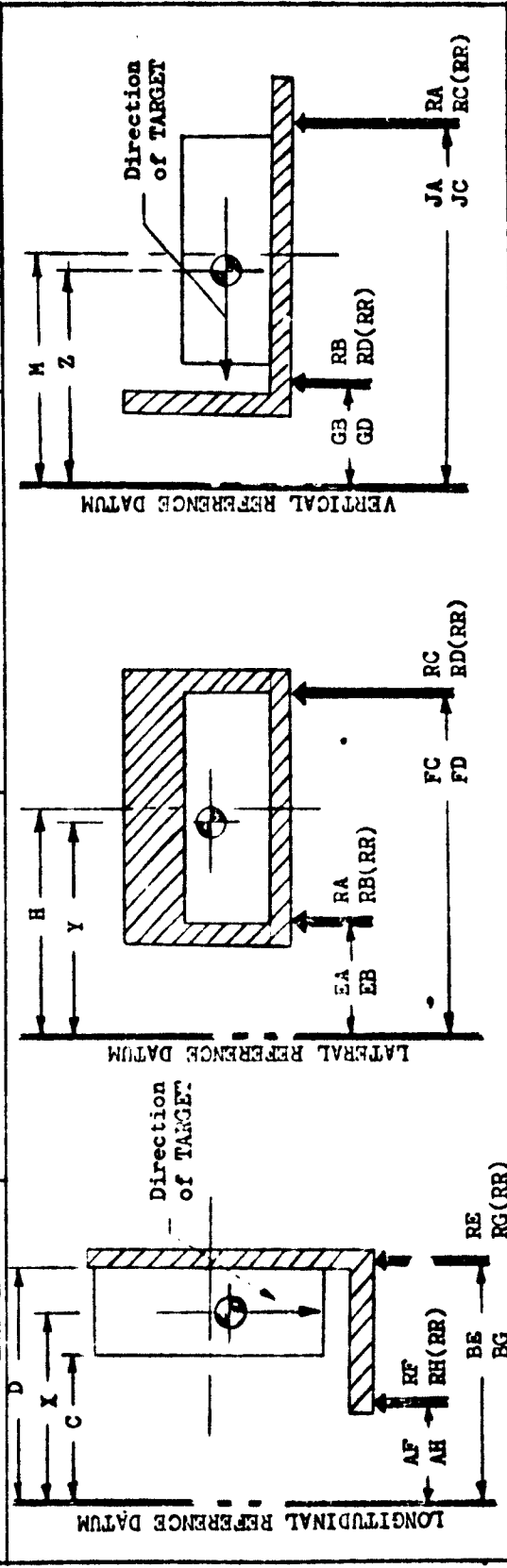
CHECK LIST NO.	DATE	MODEL	MISSILE NO.	FINAL ASSEMBLY DRAWING NO.	RECORD OF CHECKING (DATE)			COMPONENT	MISSILE							
					Mo	Day	Yr									
ITEM NUMBER	SECTION	MISSILE COMPONENT	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	BASIC WEIGHT	AS WEIGHED	REMOTE SITE SHIPMENT	AS RECEIVED	REMOTE SITE	AS WEIGHED	REMOTE SITE	LAUNCH
SUMMARY CHECK LISTS FOR SECTIONS 39 THROUGH 49 ARE IDENTICAL TO THOSE FOUND ON PAGES 92 THROUGH 99.																

11.4.1 ACTUAL WEIGHT RECORD - CTLI SECTION

U/O MISSILE 000028 DRAWING NO. 25-25402-36 CHECK LIST NO. 39 REPORT NO. WTS-1108-208

MISSILE MODEL WS-133A DCN J CB/RR PAGE NO. 10/18/63

CONFIGURATION ADCN EM



WEIGHING DATA				DIMENSIONAL DATA				
REACTION	GR. WT.	TARE	CORR.	NET WT.	DIM. INCHES	DIM. INCHES	DIM. INCHES	
RF	43.85	12.65		31.20	AF	42.007	EA	84.510
RH	66.90	39.70		27.20	AH	42.023	EB	84.505
RE	116.95	74.45		42.50	BE	62.996	FC	115.490
RG	88.50	49.60		38.90	BG	62.999	FD	115.495
TOTAL	316.20	176.40		139.80	C	50.000	H	100.000
					D	60.000	M	100.000

LONGITUDINAL C.G.				LATERAL C.G.				VERTICAL C.G.			
REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT
RF	31.20	42.007		RA	45.30	84.510		RB	29.30	77.478	
RH	27.20	42.023		RB	29.30	84.505		RD	29.20	77.481	
RE	42.50	62.996		RC	36.00	115.490		RA	45.30	115.500	
RG	38.90	62.999		RD	29.20	115.495		RC	36.00	115.500	
AS WGT	139.80	54.23	7,581.6	AS WGT	139.80	98.96	13,834.4	AS WGT	139.80	99.59	13,922.7

(RR) = Rear Reaction

2-5550-0-53 R1

REV. SYM. - E

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CHECK LIST NO.	11.4.2 MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)			
	DATE	MODEL	Mo	Day	Yr	
39	WS-13A	FINAL ASSEMBLY DRAWING NO. 25-25402-36	10	18	63	
SECTION	39	MISSILE NO.				
MISSILE COMPONENT	CTLI	COMPONENT PART NO.	Noted			
DESCRIPTION		PART NO.	WEIGHT	X ARM	Y ARM	Z ARM
39	Instrumentation Group-Trainer Test	25-25402-36				
39a	CTLI Structure Assy.	25-25403-11				
	Support Structure	25-29094-45		X	X	
	Primary Structure	25-29093-15		X	X	
	Insulation & External Markings	25-29095-3		X	X	
	Antenna & Spacer	25-29096-3		X	X	
	Plate-Identification	21-51600-329		X	X	
39b	Cable & Equipment Installation	25-25404-16				
	Battery, Squib	10-20942-2		X	X	
	Battery, Squib	10-20942-4		X	X	
	Cable Set SE-35	55018-106				
	Cable	AN37192-315		X	X	
	Cable	AN37194-315		X	O	
	Cable	AN37196-315		X	O	

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REV. SYM.

WEIGHT AND BALANCE CHANGE RECORD

11.4.3	ASSOCIATE CONTRACTOR BOEING	CONTRACT NO. AFO4(647)-289	REPORT NO. WTS-1108-028
COMPONENT	SECTION 39	LOT NO.	DATE 10/18/63
MODEL NO.	WS-133A	DRAWING NO.	PREPARED CB/RH
SERIAL NO.	0000028	U.O. MISSILE	APPROVED GO

EQUIPMENT CHANGE RECORD		WEIGHT AND BALANCE						
		WEIGHT	X AXIS		Y AXIS		Z AXIS	
PART NO.	DESCRIPTION OF EQUIPMENT		ARM	MOMENT	ARM	MOMENT	ARM	MOMENT
1								
2	Instr. Group Trainer (As Weighed)	129.80	54.23	7,581.6	98.96	13,834.4	99.59	13,922.7
3								
4								
5	ADD:							
6	Cable-Autonetics	3.30	74.2		115.5			102.8
7	Cable-Autonetics	1.37	50.4		106.9			111.4
8								
9								
10								
11	Instr. Group Trainer (Complete)	144.47	54.65	7,895.5	99.41	14,362.0	99.76	14,414.6
12								
13								
14								
15								
16								
17								
18								
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32								

11.5

**ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION
APPLICABLE TO CTLI SECTION S/N 000028 AND INSTALLATION KIT**

The following ECP's have not been incorporated into "Model Specifications, Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 8 July 1963. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WS-133A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part 2	PSS, S&A Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of G&C Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-20885	3	Negl.	Yes
373	Work-Around for 10-20942-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415 / 540	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
525	CTLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MRCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MRCN 6301	3	Negl.	Yes
606	Revision to CTLI Umbilical Bracket- Section 49	1	Negl.	Yes

* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

** These ECP's were incorporated during manufacture of the CTLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

11.5

**ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION
APPLICABLE TO CTLI SECTION S/N 000028 AND INSTALLATION KIT**

(Cont.)

ECP NO. (WS-133A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATION IN THIS CHANGE
620	Addition of Static Dissipators on 47 Section and 1st Stage Skirt	1	Negl.	Yes
635	PCM R/F Section Digital Data Programmer	3	Negl.	Yes
639	Prevent Interference of Linear Shape Charge with Cable Strap	3	Negl.	Yes
657	Revisions of Ordnance Supports in Interstage 2-3	2	Negl.	Yes

CTLI SECTION, S/N 0000029

12.1 This section of the document describes the data changes created by converting a production line Minuteman missile into a CTL missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries check lists, and ECP lists applicable to this installation. Page 114 summarizes the complete installation mass properties and consists of data from page 115 (average mass properties of downstage components), page 116 (predicted sealant changes), and page 120 (actual weight of CTLI section S/N 0000029). In addition, page 117 presents summary check lists by production section as backup data for page 115. Page 121 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-01DR-NMPD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODS" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

12.2 WEIGHT & BALANCE SUMMARY TOTAL ORLE KIT INSTALLATION CTLI WAFER S/W 0000029					REPORT NO. _____ DATE _____					
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA	
						LONG, °	LAT.	VERT.	SLUG FT ² X10 ⁻³	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			149.4	54.7	99.8	100.1	1004	.003
5			Silo							
6			Aero							
7	42	G&C Section			7.3	67.4	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			17.9	84.6	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			- 1.7	58.2	110.2	117.9	0	0
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.7		58.2	110.2	117.9		
22	45	Interstage 2-3			19.45	65.1	111.7	120.1	0	.001
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			25.7	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			- 1.45	55.4	112.1	120.5	0	0
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.45		55.4	112.1	120.5		
37	47	Interstage 1-2			26.0	74.1	114.8	125.2	0	.002
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			30.6	112.8	117.6	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.9	74.5	119.5	128.4	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			283.1					
49			Silo							
50			Aero							
51			Base							
52			Jett							

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12.2 WEIGHT & BALANCE SUMMARY ONLY (AVERAGE WEIGHT COMPONENTS)					REPORT NO. _____ DATE _____						
LINE	SEC.	DESCRIPTION	DATA	EXPANDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³		
						LONG.	LAT.	VERT.	ROLL	PITCH	
1	41	RV Spacer									
2		Silo									
3		Aero									
4	39	CTLI Section			4.39	56.0	107.5	110.7	0	0	
5		Silo									
6		Aero									
7	42	G&C Section			6.94	67.5	112.0	114.3	0	0	
8		Silo									
9		Aero									
10	44	3rd Stage Engine			17.65	84.6	108.5	117.4	0	.002	
11		Silo									
12		Aero									
13		Base									
14	45	Interstage 2-3			- 1.90	57.7	110.3	117.8	0	0	
15		(Fwd)									
16		Silo									
17		Aero									
18		Base									
19		Silo									
19		Jettisoned	}								
20		Portion		Aero							
20		Base									
21		Jett		- 1.90		57.7	110.3	117.8	0	0	
22	45	Interstage 2-3			10.25	64.9	111.8	120.3	0	.001	
23		(Aft)									
24		Silo									
24		Aero									
25	46	2nd Stage Engine			25.73	102.1	112.6	121.4	0	.009	
26		Silo									
27		Aero									
28		Base									
29	47	Interstage 1-2			- 1.45	55.4	112.1	120.5	0	0	
30		(Fwd)									
31		Silo									
32		Aero									
33		Base									
34		Silo									
34		Jettisoned	}								
35		Portion		Aero							
35		Base									
36		Jett		- 1.45		55.4	112.1	120.5	0	0	
37	47	Interstage 1-2			25.46	73.7	113.0	123.6	0	.002	
38		(Aft)									
39		Silo									
39		Aero									
40	48	1st Stage Engine			29.83	111.5	117.7	130.1	0	.025	
41		Silo									
42		Aero									
43		Base									
44	49	Skirt			9.73	74.0	119.5	128.3	0	0	
45		Silo									
46		Aero									
47		Base									
48		MISSILE			135.63						
49		Silo									
50		Aero									
51		Base									
52		Jett									

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* Boeing Section Stations (See Missile Station Diagram)

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12.2 BMS 5-62 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE**					REPORT NO. _____ DATE _____						
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³		
						LONG.*	LAT.	VERT.	ROLL	PITCH	
1	41	RV Spacer									
2			Silo								
3			Aero								
4	39	CTLI Section			.2	54.5	111.5	111.5			
5			Silo								
6			Aero								
7	42	G&C Section			.4	65.4	110.5	113.5			
8			Silo								
9			Aero								
10	44	3rd Stage Engine			.2	80.9	109.3	116.2			
11			Silo								
12			Aero								
13			Base								
14	45	Interstage 2-3 (Fwd)			.2	53.6	110.8	116.7			
15			Silo								
16			Aero								
17			Base								
18			Silo								
19		Jettisoned Portion	Aero								
20			Base								
21			Jett		.2		53.6	110.8	116.7		
22	45	Interstage 2-3 (Aft)			.2	85.0	103.0	101.8			
23			Silo								
24			Aero								
25	46	2nd Stage Engine			0	-	-	-			
26			Silo								
27			Aero								
28			Base								
29	47	Interstage 1-2 (Fwd)			0	-	-	-			
30			Silo								
31			Aero								
32			Base								
33			Silo								
34		Jettisoned Portion	Aero								
35			Base								
36			Jett								
37	47	Interstage 1-2 (Aft)			.5	94.7	102.0	103.4			
38			Silo								
39			Aero								
40	48	1st Stage Engine			.8	161.3	116.2	128.0			
41			Silo								
42			Aero								
43			Base								
44	49	Skirt			.2	101.3	119.2	133.9			
45			Silo								
46			Aero								
47			Base								
48		MISSILE			2.7						
49			Silo								
50			Aero								
51			Base								
52			Jett								

* Boozing Section Stations (See Missile Station Diagram)

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CHECK LIST NO.		12.3				MISSILE WEIGHING CHECK LIST												RECORD OF CHECKING (DATE)								
DATE		MODEL		FINAL ASSEMBLY DRAWING NO. 21-52900-4										No		Day		Yr								
ITEM NUMBER	SECTION 39 THRU 49			MISSILE NO.												COMPONENT			MISSILE							
	MISSILE COMPONENT			COMPONENT PART NO.												AS WEIGHED			REMOTE SITE							
	DESCRIPTION			PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	AS WEIGHED			REMOTE SITE			SHIPMENT			AS RECEIVED			REMOTE SITE			LAUNCH		
	SUMMARY CHECK LISTS FOR SECTIONS 39 THROUGH 49 ARE IDENTICAL TO THOSE FOUND ON PAGES 92 THROUGH 99.																									

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ACTUAL WEIGHT RECORD - CTLI SECTION											
12.4.1	DRAWING NO. 25-25402-36 DCN J ADCN	CHECK LIST NO. 39 REPORTED BY RS/JH CHECKED BY	REPORT NO. WTB-1044-029 PAGE NO. DATE 7/30/63								
U/O MISSILE 000029 MISSILE MODEL WS-133A CONFIGURATION											
Direction of TARGET											
<p>LONGITUDINAL REFERENCE DATUM</p>	<p>LATERAL REFERENCE DATUM</p>										
Direction of TARGET											
<p>VERTICAL REFERENCE DATUM</p>											
WEIGHING DATA											
REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	GR. WT.	TARE	CORR.	NET WT.		
RF	6.50	9.30		27.20	RC	63.10	30.50		32.60		
RH	67.45	37.65		29.80	RD	84.15	52.50		31.65		
RE	117.15	72.15		45.00	RA	80.10	32.35		47.75		
RG	80.55	45.70		34.85	RB	74.30	49.45		24.85		
TOTAL	301.65	164.80		136.85	TOTAL	301.65	164.80		136.85		
LONGITUDINAL C.G.				LATERAL C.G.				VERTICAL C.G.			
REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT
RF	27.20	42.007		RA	47.75	84.510		RB	24.85	77.476	
RH	29.80	42.023		RB	24.85	84.505		RD	31.65	77.481	
RE	45.00	62.996		RC	32.60	115.490		RA	47.75	115.500	
RG	34.85	62.999		RD	31.65	115.495		RC	32.60	115.500	
AS CG	136.85	54.26	7,425.2	AS CG	136.85	99.06	13,555.7	AS WGD	136.85	99.80	13,658.0

(RR) = Rear Reaction

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SERIAL NUMBER: 0000029

MISSILE WEIGHING CHECK LIST

CHECK LIST NO. 39

DATE

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MODEL MS-133A

FINAL ASSEMBLY DRAWING NO. 25-25402-36

ITEM NUMBER	SECTION	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	RECORD OF CHECKING (DATE)				LAUNCH								
								Mo	Day	Yr	AS WEIGHED		AS RECEIVED	SHIPMENT	REMOTE SITE					
								7	30	63	BASIC WEIGHT		AS WEIGHED	REMOTE SITE	REMOTE SITE	REMOTE SITE				
39	39	Instrumentation Group-Trainer Test	25-25402-36																	
39a		CTLI Structure Asay.	25-25403-11																	
		Support Structure	25-29094-45																	
		Primary Structure	25-29093-15																	
		Insulation & External Markings	25-29095-3																	
		Antenna & Spacer	25-29096-3																	
		Plate-Identification	21-51600-329																	
39b		Cable & Equipment Installation	25-25404-16																	
		Battery, Squib	10-20942-4																	
		Battery, Squib	10-20942-2																	
		Cable Set SE-35B	55018-106																	
		Cable	AN37192-315																	
		Cable	AN37194-315																	
		Cable	AN37196-315																	

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12.4.3		WEIGHT AND BALANCE CHANGE RECORD						
ASSOCIATE CONTRACTOR COMPONENT	BOEING SECTION 39	CONTRACT NO. AF04(647)-289	REPORT NO. WBS-1044-029					
MODEL NO. MB-133A	DRAWING NO. 25-25402-36		DATE 7/30/63					
SERIAL NO. 000029	U.O. MISSILE		PREPARED					
			APPROVED					
EQUIPMENT CHANGE RECORD		WEIGHT AND BALANCE						
PART NO.	DESCRIPTION OF EQUIPMENT	WEIGHT	X AXIS ARM	Y AXIS ARM	Z AXIS ARM			
			MOMENT	MOMENT	MOMENT			
1	25-25402-36 Instr. Group Trainer (As Veched)	136.85	54.26	7,425.2	99.06	13,555.7	99.80	13,658.0
2								
3								
4								
5	ADD:							
6	AM37194-315 Cable - Autometrics	3.20	74.2		115.5			102.8
7	AM37196-315 Cable - Autometrics	1.35	50.4		106.9			111.4
8	10-20942-2 Battery	3.38	53.9		100.2			92.0
9								
10								
11								
12								
13	25-25402-36 Instr. Group Trainer (Complete)	144.78	54.66	7,913.14	99.52	14,408.95	99.79	14,447.94
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								
31								
32								

12.5

**ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION
APPLICABLE TO CTLI SECTION S/N 0300029 AND INSTALLATION KIT**

The following ECP's have not been incorporated into "Model Specification, Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 15 April 1963. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WS-133A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Cap Change	3	+5	Yes
208 Part 2	PSS, S&A Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of G&C Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-20885	3	Negl.	Yes
373	Work-Around for 10-2042-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415 / 540	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
506	CTLI Raceway Cover Revision	3	-.2	Yes
525	CTLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MRCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MRCN 6301	3	Negl.	Yes
606	Revision to CTLI Umbilical Bracket- Section 49	1	Negl.	Yes

* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in the report.

** These ECP's were incorporated during manufacture of the CTLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

CTLI SECTION, S/N 0000031

13.1 This section of the document describes the data changes created by converting a production line Minuteman missile into a CTL missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries, check lists, and ECP lists applicable to this installation. Page 123 summarizes the complete installation mass properties and consists of data from page 124 (average mass properties of downstage components), page 125 (predicted sealant changes), and page 129 (actual weight of CTLI section S/N 0000031). In addition, page 126 presents summary check lists by production section as backup data for page 124. Page 130 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-01DR-NMPD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODS" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

13.2 WEIGHT & BALANCE SUMMARY TOTAL CTLI KIT INSTALLATION CTLI WAFER S/N 000031						REPORT NO. _____ DATE _____				
LINE	SEC	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			147.6	54.8	99.7	100.2	.004	.003
5			Silo							
6			Aero							
7	42	O&C Section			7.3	67.4	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			17.9	84.6	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			-1.7	58.2	110.2	117.9	0	0
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett	-1.7		58.2	110.2	117.9		
22	45	Interstage 2-3 (Aft)			19.45	65.1	111.7	120.1	0	.001
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.7	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			-1.45	55.4	112.1	120.5	0	0
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett	-1.45		55.4	112.1	120.5		
37	47	Interstage 1-2 (Aft)			26.0	74.1	114.8	125.2	0	.002
38			Silo							
39			Aero							
40	48	1st Stage Engine			30.6	112.8	117.6	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.9	74.5	119.5	128.4	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			281.3					
49			Silo							
50			Aero							
51			Base							
52			Jett							

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* Boeing Section Stations (See Missile Station Diagram)

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13.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)					REPORT NO. _____ DATE _____					
LINE	STATION	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³	
						LONG.	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			4.39	56.0	107.5	110.7	0	0
5			Silo							
6			Aero							
7	42	G&C Section			6.94	67.5	112.0	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			17.65	84.6	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.90	57.7	110.3	117.8	0	0
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett	- 1.90		57.7	110.3	117.8		
22	45	Interstage 2-3 (Aft)			19.25	64.9	111.8	120.3	0	.001
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.73	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			- 1.45	55.4	112.1	120.5	0	0
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett	- 1.45		55.4	112.2	120.6		
37	47	Interstage 1-2 (Aft)			25.46	73.7	115.0	125.6	0	.002
38			Silo							
39			Aero							
40	48	1st Stage Engine			29.83	111.5	117.7	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.73	74.0	119.5	128.3	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			135.63					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

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13.2 BMS 5-62 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE**						REPORT NO. _____ DATE _____				
LINE	ITEM NO.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA	
						LONG. "	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			.2	54.5	111.5	111.5		
5			Silo							
6			Aero							
7	42	G&C Section			.4	65.4	110.5	113.5		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			.2	80.9	109.3	116.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			.2	53.6	110.8	116.7		
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett	.2		53.6	110.8	116.7		
22	45	Interstage 2-3			.2	85.0	103.0	101.8		
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			0	-	-	-		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			0	-	-	-		
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett							
37	47	Interstage 1-2			.5	94.7	102.0	103.4		
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			.8	161.3	116.2	128.0		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			.2	101.3	119.2	133.9		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			2.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

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* Boeing Section Stations (See Missile Station Diagram)

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SERIAL NUMBER 0000031

MISSILE WEIGHING CHECK LIST

CHECK LIST NO. _____

DATE _____

13.3

MODEL _____

FINAL ASSEMBLY DRAWING NO. _____

RECORD OF CHECKING (DATE)

Mo	
Day	
Yr	

COMPONENT

MISSILE

ITEM NUMBER	SECTION 39 THRU 49	MISSILE NO. _____			
	MISSILE COMPONENT	COMPONENT PART NO. _____			
DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM

BASIC WEIGHT	WEIGHTS	REMOTE SITE SHIPMENT	AS RECEIVED	AS WEIGHED	REMOTE SITE LAUNCH

SUMMARY CHECK LISTS FOR SECTIONS 39 THROUGH 49 ARE IDENTICAL TO THOSE

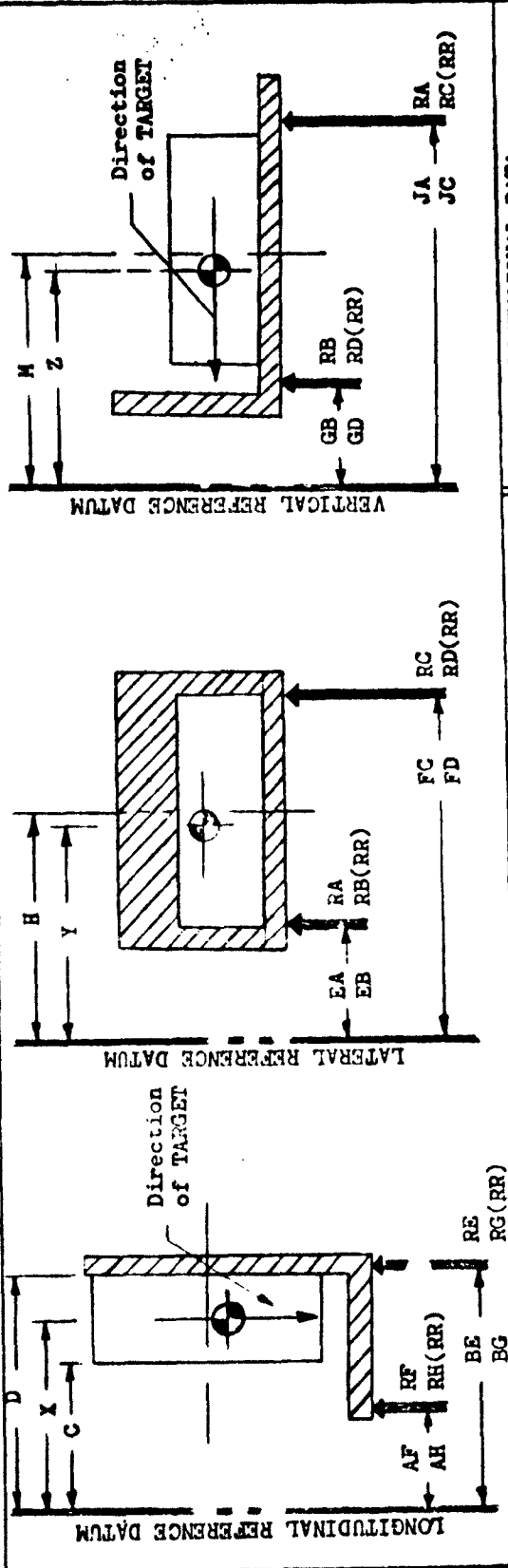
FOUND ON PAGES 92 THROUGH 99.

1.3.4.1 ACTUAL WEIGHT RECORD - CTLI SECTION

U/O MISSILE 000031 DRAWING NO. 25-25402-36 CHECK LIST NO. 39 REPORT NO. WTS-1101-031

MISSILE MODEL WS-133A DCN J RECORDED BY CB/WB PAGE NO. 10/16/63

CONFIGURATION ADCN EWM CHECKED BY EWM



WEIGHING DATA				DIMENSIONAL DATA				
REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	INCHES	DIM. INCHES	DIM. INCHES
RF	59.20	20.25		38.95	AF	42.007	EA	84.510
RH	50.50	32.15		18.15	AH	42.023	EB	84.503
RE	100.70	66.80		33.90	BE	62.996	FC	115.490
RG	104.35	56.95		47.40	BG	62.999	FD	115.493
TOTAL	314.75	176.35		138.40	C		H	M
					D			

LONGITUDINAL C.G.				LATERAL C.G.				VERTICAL C.G.			
REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT
RF	38.95	42.007		RA	16.65	84.510		RB	26.85	77.478	
RH	18.15	42.023		RB	26.85	84.503		RD	30.80	77.481	
RE	33.90	62.996		RC	34.10	115.490		RA	46.65	115.500	
RG	47.40	62.999		RD	30.80	115.493		RC	34.10	115.500	
AS WGD	138.40	54.34	7,520.6	AS WGD	138.40	99.04	13,706.8	AS WGD	138.40	99.66	13,793.3

(RR) = Rear Reaction

SERIAL NUMBER: 000031

13.4.2 MISSILE WEIGHING CHECK LIST

MODEL MS-133A FINAL ASSEMBLY DRAWING NO. 25-25402-36

CHECK LIST NO.	DATE	SECTION	MISSILE COMPONENT	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	RECORD OF CHECKING (DATE)			LAUNCH		
										Mo	Day	Yr			
											10				
											16				
											63				
ITEM NUMBER	SECTION	MISSILE NO.	MISSILE COMPONENT	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	BASIC WEIGHT	BY WEIGHT	AS RECEIVED	REMOTE SITE	AS WEIGHED	REMOTE SITE
39	39		CTLI	Instrumentation Group-Trainer Test	25-25402-36					-	-				
39a			CTLI	Structure Assy.	25-25403-11					-	-				
				Support Structure	25-29094-45					X	X				
				Primary Structure	25-29093-15					X	X				
				Insulation & External Markings	25-29095-3					X	X				
				Antenna & Spacer	25-29096-3					X	X				
				Plate-Identification	21-51600-329					X	X				
39b				Cable & Equipment Installation	25-25404-16					-	-				
				Battery, Squib	10-20942-2					X	X				
				Battery, Squib	10-20942-4					X	X				
				Cable Set SE-35B	55018-106					-	-				
				Cable	AM37192-315					X	X				
				Cable	AM37194-315					X	X				
				Cable	AM37196-315					X	X				

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WEIGHT AND BALANCE CHANGE RECORD									
13.4.3		WEIGHT AND BALANCE CHANGE RECORD		CONTRACT NO. <u>AF04(647)-289</u>		REPORT NO. <u>WTS-1101-031</u>			
ASSOCIATE CONTRACTOR <u>BOEING</u>		LOT NO.		DATE		PREPARED		APPROVED	
COMPONENT <u>SECTION 39</u>		DRAWING NO. <u>25-25402-36</u>		CB/WB		GO			
MODEL NO. <u>WS-133A</u>		U.O. MISSILE							
SERIAL NO. <u>0000031</u>									
EQUIPMENT CHANGE RECORD					WEIGHT AND BALANCE				
PART NO.	DESCRIPTION OF EQUIPMENT	WEIGHT	X AXIS ARM	X AXIS MOMENT	Y AXIS ARM	Y AXIS MOMENT	Z AXIS ARM	Z AXIS MOMENT	
1	<u>25-25402-36 Instr. Group Trainer (As Weighed)</u>	138.40	54.34	7,520.6	99.04	13,706.8	99.66	13,793.3	
2									
3									
4									
5	<u>ADD:</u>								
6	<u>6AN37193-315 Cable-Autonetics</u>	3.29	74.2		115.5		102.8		
7	<u>7AN37196-315 Cable-Autonetics</u>	1.35	50.4		106.9		111.4		
8									
9									
10									
11	<u>25-25402-36 Instr. Group Trainer (Complete)</u>	143.04	54.76	7,832.8	99.49	14,231.1	99.85	14,281.9	
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
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27									
28									
29									
30									
31									
32									

13.5

**ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION
APPLICABLE TO CTLI SECTION S/N 000031 AND INSTALLATION KIT**

The following ECP's have not been incorporated into "Model Specification, Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 8 July 1963. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WB-133A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part 2	PSS, S&A Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of G&C Bracket Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-20885	3	Negl.	Yes
373	Work-Around for 10-20942-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415 / 540	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No**
525	CTLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MRCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MRCN 6301	3	Negl.	Yes
606	Revision to CTLI Umbilical Bracket- Section 49	1	Negl.	Yes

* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

** These ECP's were incorporated during manufacture of the CTLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

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**ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION
APPLICABLE TO CTLI SECTION S/N 000031 AND INSTALLATION KIT**

(Continued)

ECP NO. (WS-133A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
626	Installation of Static Dissipators on Operational Missiles	1	Negl.	Yes
635	PCM R/F Section Digital Data Programmer	3	Negl.	Yes
639	Prevent Interference of Linear Shape Change with Lable Strap	3	Negl.	Yes
657	Revision of Ordnance Supports in Interstage 2-3	2	Negl.	Yes

CTLI SECTION, S/N 000032

14.1 This section of the document describes the data changes created by converting a production line Minuteman missile into a CTL missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries, check lists, and ECP lists applicable to this installation. Page 132 summarizes the complete installation mass properties and consists of data from page 133 (average mass properties of downstage components), page 134 (predicted sealant changes), and page 138 (actual weight of CTLI section S/N 000032). In addition, page 135 presents summary check lists by production section as backup data for page 133. Page 139 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document O162-01DR-NMPD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODS" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

14.2 WEIGHT & BALANCE SUMMARY TOTAL CTLI KIT INSTALLATION CTLI WAFER S/N 0000032					REPORT NO. _____ DATE _____					
LINE	ID	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³	
						LONG.#	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			147.8	54.8	99.7	100.2	.004	.003
5			Silo							
6			Aero							
7	42	G&C Section			7.3	67.4	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			17.9	84.6	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.7	58.2	110.2	117.9	0	0
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett		- 1.7	58.2	110.2	117.9		
22	45	Interstage 2-3 (Aft)			19.45	65.1	111.7	120.1	0	.001
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.7	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			- 1.45	55.4	112.1	120.5	0	0
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett		- 1.45	55.4	112.1	120.5		
37	47	Interstage 1-2 (Aft)			26.0	74.1	114.8	125.2	0	.002
38			Silo							
39			Aero							
40	49	1st Stage Engine			30.6	112.8	117.6	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.9	74.5	119.5	128.4	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			281.5					
49			Silo							
50			Aero							
51			Base							
52			Jett							

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* Boeing Section Stations (See Missile Station Diagram)

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14.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)						REPORT NO. _____ DATE _____				
LINE	33	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			4.39	56.0	107.5	110.7	0	0
5			Silo							
6			Aero							
7	42	G&C Section			6.94	67.5	112.0	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			17.65	84.6	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.90	57.7	110.3	117.8	0	0
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett		- 1.90	57.7	110.3	117.8		
22	45	Interstage 2-3 (Aft)			19.25	64.9	111.8	120.3	0	.001
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.73	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			- 1.45	55.4	112.1	120.5	0	0
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett		- 1.45	55.4	112.2	120.6		
37	47	Interstage 1-2 (Aft)			25.46	73.7	115.0	125.6	0	.002
38			Silo							
39			Aero							
40	48	1st Stage Engine			29.83	111.5	117.7	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Scirt			9.73	74.0	119.5	128.3	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			135.63					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

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14.2 IMS 9-62 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE**					REPORT NO. _____ DATE _____						
LINE	STATION	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³		
						LONG.*	LAT.	VERT.	ROLL	PITCH	
1	41	RV Spacer									
2			Silo								
3			Aero								
4	39	OTLI Section			.2	54.5	111.5	111.5			
5			Silo								
6			Aero								
7	42	G&C Section			.4	65.4	110.5	113.5			
8			Silo								
9			Aero								
10	44	3rd Stage Engine			.2	80.9	109.3	116.2			
11			Silo								
12			Aero								
13			Base								
14	45	Interstage 2-3 (Fwd)			.2	53.6	110.8	116.7			
15			Silo								
16			Aero								
17			Base								
18			Silo								
19		Jettisoned Portion	Aero								
20			Base								
21			Jett		.2		53.6	110.8	116.7		
22	45	Interstage 2-3 (Aft)			.2	85.0	103.0	101.8			
23			Silo								
24			Aero								
25	46	2nd Stage Engine			0	-	-	-			
26			Silo								
27			Aero								
28			Base								
29	47	Interstage 1-2 (Fwd)			0	-	-	-			
30			Silo								
31			Aero								
32			Base								
33			Silo								
34		Jettisoned Portion	Aero								
35			Base								
36			Jett								
37	47	Interstage 1-2 (Aft)			.5	94.7	102.0	103.4			
38			Silo								
39			Aero								
40	48	1st Stage Engine			.8	161.3	116.2	128.0			
41			Silo								
42			Aero								
43			Base								
44	49	Skirt			.2	101.3	119.2	133.9			
45			Silo								
46			Aero								
47			Base								
48		MISSILE			2.7						
49			Silo								
50			Aero								
51			Base								
52			Jett								

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* Boeing Section Stations (See Missile Station Diagram)
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REV. SYM. E ** Reference D2-13954-534

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ACTUAL WEIGHT RECORD - CTLI SECTION

14.4.1	DRAWING NO. 25-25402-36	CHECK LIST NO. 39	REPORT NO. WTS-1102-032
U/O MISSILE 0000032	DCN J	REPORTED BY CB/WB	PAGE NO.
MISSILE MODEL WS-133A	ADCN	CHECKED BY	DATE 10/16/63
CONFIGURATION			

LONGITUDINAL REFERENCE DATUM

LATERAL REFERENCE DATUM

VERTICAL REFERENCE DATUM

Direction of TARGET

WEIGHING DATA				DIMENSIONAL DATA				
REACTION	GR. WT.	TARE	CORR.	NET WT.	DIM. INCHES	DIM. INCHES	DIM. INCHES	
RF	31.40	8.35		23.05	EA	84.510	GB	77.471
RH	78.60	44.30		34.30	EB	84.505	GD	77.481
RE	129.00	78.90		50.10	FC	115.490	JA	115.500
RG	76.15	44.95		31.20	FD	115.495	JC	115.500
TOTAL	315.15	176.50		138.65	C	50.000	H	100.000
					D	60.000	M	100.000

LONGITUDINAL C.G.				LATERAL C.G.				VERTICAL C.G.			
REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT
RF	23.05	42.007		RA	49.00	84.510		RB	24.80	77.478	
RH	34.30	42.023		RB	24.80	84.505		RD	32.75	77.481	
RE	50.10	62.996		RC	32.10	115.490		RA	49.00	115.500	
RG	31.20	62.999		RD	32.75	115.495		RC	32.10	115.500	
AS WGD	138.65	54.32	7,531.3	AS WGD	138.65	99.00	13,726.4	AS WGD	138.65	99.72	13,826.1

(RR) = Rear Reaction

SERIAL NUMBER: 0000032

ITEM NUMBER	CHECK LIST NO. 39	DATE	14.4.2	MISSILE WEIGHING CHECK LIST	RECORD OF CHECKING (DATE)				LAUNCH							
					No	Day	Yr	AS WEIGHED		AS RECEIVED	SHIPMENT	REMOTE SITE				
			MODEL	MISSILE NO.	COMPONENT				MISSILE							
			MS-133A	25-25402-36	WEIGHT	X ARM	Y ARM	Z ARM	BASIC WEIGHT	AS WEIGHED	REMOTE SITE	SHIPMENT	REMOTE SITE	AS WEIGHED	REMOTE SITE	
			SECTION 39	MISSILE NO.	COMPONENT PART NO. Noted											
			DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	BASIC WEIGHT	AS WEIGHED	REMOTE SITE	SHIPMENT	REMOTE SITE	AS WEIGHED	REMOTE SITE	
39			Instrumentation Group-Trainer Test	25-25402-36												
39a			CGI Structure Assy.	25-25403-11												
			Support Structure	25-29094-45					X	X						
			Primary Structure	25-29093-15					X	X						
			Insulation & External Markings	25-29095-3					X	X						
			Antenna & Spacer	25-29096-3					X	X						
			Plate-Identification	21-51600-329					X	X						
39b			Cable & Equipment Installation	25-25404-16												
			Battery, Squib	10-20942-2					X	X						
			Battery, Squib	10-20942-4					X	X						
			Cable Set SE-35B	55018-106												
			Cable	AM37192-315					X	X						
			Cable	AM37194-315					X	X						
			Cable	AM37196-315					X	X						

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WEIGHT AND BALANCE CHANGE RECORD											
14.4.3		WEIGHT AND BALANCE CHANGE RECORD		CONTRACT NO. AF04(647)-289		REPORT NO. WBS-1102-032					
ASSOCIATE CONTRACTOR BOEING		SECTION 39		LOT NO.		DATE 10/16/63					
COMPONENT		WB-133A		DRAWING NO. 25-25402-36		PREPARED CR/MB					
MODEL NO.		000032		U.O. MISSILE		APPROVED		OO			
SERIAL NO.											
		EQUIPMENT CHANGE RECORD		WEIGHT AND BALANCE							
PART NO.		DESCRIPTION OF EQUIPMENT		WEIGHT		X AXIS		Y AXIS		Z AXIS	
				ARM		MOMENT		ARM		MOMENT	
1	25-25402-36	Instr. Group Trainer (As Weighed)	138.65	54.32	7,531.3	99.00	13,126.4	99.72	11,826.1		
2											
3											
4											
5		ADD:									
6	AW37094-315	Cable-Autonetics	3.25	74.2		115.5		102.8			
7	AW37096-315	Cable-Autonetics	1.35	50.4		106.9		111.4			
8											
9											
10	25-25402-36	Instr. Group Trainer (Complete)	143.25	54.73	7,840.5	99.45	14,246.1	99.90	14,310.6		
11											
12											
13											
14											
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14.5 ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION
 APPLICABLE TO CTLI SECTION S/N 0000032 AND INSTALLATION KIT

The following ECP's have not been incorporated into "Model Specification, Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 8 July 1963. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WS-133A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part 2	PSS, S&A Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of G&C Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-20885	3	Negl.	Yes
373	Work-Around for 10-20942-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415 / 540	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
525	CTLI A/E Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MRCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MRCN 6301	3	Negl.	Yes
606	Revision to CTLI Umbilical Bracket- Section 49	1	Negl.	Yes

* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

** These ECP's were incorporated during manufacture of the CTLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

14.5

**ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION
APPLICABLE TO CTLLI SECTION S/N 0000032 AND INSTALLATION KIT**

(Continued)

ECP NO. (WS-133A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
620	Installation of Static Dissipators on Operational Missiles	1	Negl.	Yes
635	PCM R/F Section Digital Data Programmers	3	Negl.	Yes
639	Prevent Interference of Linear Shape Charge With Cable Strap	3	Negl.	Yes
657	Revision of Ordnance Supports in Interstage 2-3	2	Negl.	Yes

CTLI SECTION, S/N 000034

15.1 DISCUSSION

Data are not available for CTLI section 25-25402-36, S/N 000034 at this time. When data are available, this section of the document will be revised to reflect a CTLI Installation similar to the other sections.

15.2 WEIGHT AND BALANCE SUMMARY TOTAL CTLI KIT INSTALLATION CTLI WAFER S/N 000034					REPORT NO. _____ DATE _____					
ITEM NO.	QTY	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² X10 ⁻³	
						LONG.	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section								
5			Silo							
6			Aero							
7	42	G&C Section								
8			Silo							
9			Aero							
10	44	3rd Stage Engine								
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3								
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett							NO DATA AVAILABLE
22	45	Interstage 2-3								
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine								
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2								
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett							
37	47	Interstage 1-2								
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine								
41			Silo							
42			Aero							
43			Base							
44	49	Skirt								
45			Silo							
46			Aero							
47			Base							
48		MISSILE								
49			Silo							
50			Aero							
51			Base							
52			Jett							

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1530 0 58

WIRING VOL
SEC

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15.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENT)						REPORT NO. _____ DATE _____				
ITEM NO.	SERIAL NO.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³	
						LONG.	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section								
5			Silo							
6			Aero							
7	42	G&C Section								
8			Silo							
9			Aero							
10	44	3rd Stage Engine								
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)								
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett							
						NO DATA AVAILABLE				
22	45	Interstage 2-3 (Aft)								
23			Silo							
24			Aero							
25	46	2nd Stage Engine								
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)								
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett							
37	47	Interstage 1-2 (Aft)								
38			Silo							
39			Aero							
40	48	1st Stage Engine								
41			Silo							
42			Aero							
43			Base							
44	49	Skirt								
45			Silo							
46			Aero							
47			Base							
48		MISSILE								
49			Silo							
50			Aero							
51			Base							
52			Jett							

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BURING VOL
S&C

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15.2 BMS 5-62 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE					REPORT NO. _____ DATE _____					
LINE NO.	ITEM NO.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³	
						LONG.	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section								
5			Silo							
6			Aero							
7	42	O&C Section								
8			Silo							
9			Aero							
10	44	3rd Stage Engine								
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3								
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett							
22	45	Interstage 2-3								
23		(Aft)	Silo							
24			Aero							NO DATA AVAILABLE
25	46	2nd Stage Engine								
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2								
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett							
37	47	Interstage 1-2								
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine								
41			Silo							
42			Aero							
43			Base							
44	49	Skirt								
45			Silo							
46			Aero							
47			Base							
48		MISSILE								
49			Silo							
50			Aero							
51			Base							
52			Jett							

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10-10-1949

CHECK LIST NO.		MISSILE WEIGHING CHECK LIST										RECORD OF CHECKING (DATE)								
		MODEL		FINAL ASSEMBLY DRAWING NO. 21-52900-6								Mo	Day	Yr						
DATE	SECTION 39	THRU 49	MISSILE COMPONENT	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT			MISSILE							
										BASIC WEIGHT	AS WEIGHED	REMOTE SITE SHIPMENT	AS RECEIVED	REMOTE SITE	AS WEIGHED	REMOTE SITE	LAUNCH			
				NO DATA AVAILABLE																

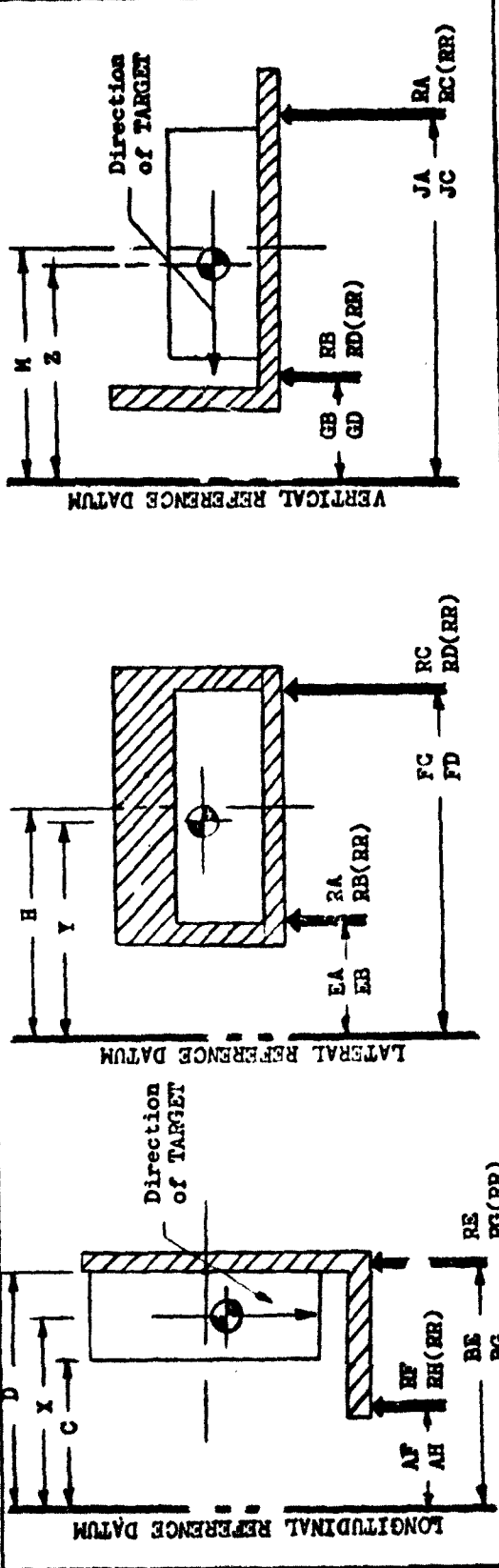
2-5550-0-21

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ACTUAL WEIGHT RECORD - CTLI SECTION

15.4.1 U/O MISSILE MISSILE MODEL CONFIGURATION
 DRAWING NO. DCN ADCN
 CHECK LIST NO. REPORTED BY CHECKED BY
 REPORT NO. PAGE NO. DATE



WEIGHING DATA				DIMENSIONAL DATA								
REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	GR. WT.	TARE	CORR.	NET WT.	DIM. INCHES	DIM. INCHES	DIM. INCHES
RF					EA					EA		GB
RH					EB					EB		GD
RE		NO DATA AVAILABLE			FC					FC		JA
RG					FD					FD		JC
TOTAL					H					H		N
					D					D		

LONGITUDINAL C.G.				LATERAL C.G.				VERTICAL C.G.			
REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT
RF				RA				RB			
RH				RB				RD			
RE		NO DATA AVAILABLE		RC		NO DATA AVAILABLE		RA		NO DATA AVAILABLE	
RG				RD				RC			
AS WGD				AS WGD				AS WGD			

(RR) = Rear Reaction

2-5550-0-53 R1

REV. SKN. E

WEIGHT AND BALANCE CHANGE RECORD

15.4.3

ASSOCIATE CONTRACTOR BOEING CONTRACT NO. AF04(647)-289 REPORT NO. _____
 COMPONENT SECTION 39 LOT NO. _____ DATE _____
 MODEL NO. WS-133A DRAWING NO. 25-25402-36 PREPARED _____
 SERIAL NO. 0000034 U.O. MISSILE 0000034 APPROVED _____

LINE	EQUIPMENT CHANGE RECORD		WEIGHT AND BALANCE						
	PART NO.	DESCRIPTION OF EQUIPMENT	WEIGHT	X AXIS		Y AXIS		Z AXIS	
				ARM	MOMENT	ARM	MOMENT	ARM	MOMENT
1									
2									
3									
4									
5									
6									
7									
8									
9		NO DATA AVAILABLE							
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									
32									

2-5550-0-11 R1

REV. SYM. F

15.5

**ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION
APPLICABLE TO CTLI SECTION S/N 00003¹ AND INSTALLATION KIT**

The following ECP's have not been incorporated into "Model
Specification, Trainer-Test Group, Guided Missiles (S-133-1006-0-1).

NO DATA AVAILABLE

CTLI SECTION, S/N 0000035

16.1 This section of the document describes the data changes created by converting a production line Minuteman missile into a CTLI missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries, check lists, and ECP lists applicable to this installation. Page 150 summarizes the complete installation mass properties and consists of data from page 151 (average mass properties of downstage components), page 152 (predicted sealant changes), and page 156 (actual weight of CTLI section S/N 0000035). In addition, page 153 presents summary check lists by production section as backup data for page 151. Page 157 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-01DR-NMPD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODE" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

14.2 WEIGHT & BALANCE SUMMARY TOTAL ONLY FOR INSTALLATION ONLY WAFER S/N 0000035					REPORT NO. _____ DATE _____					
LINE	QTY	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	GTLI Section			147.4	54.8	99.7	100.2	.004	.003
5			Silo							
6			Aero							
7	42	G&G Section			7.3	67.4	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			17.9	84.6	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			- 1.7	58.2	110.2	117.9	0	0
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett	- 1.7		58.2	110.2	117.9		
22	45	Interstage 2-3			19.45	65.1	111.7	120.1	0	.001
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			25.7	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			- 1.45	55.4	112.1	120.5	0	0
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett	- 1.45		55.4	112.1	120.5		
37	47	Interstage 1-2			26.0	74.1	114.8	125.2	0	.002
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			30.6	112.8	117.6	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.9	74.5	119.5	128.4	0	0
45			Silo							
46			Aero							
47			Base							
48		MISILE			281.1					
49			Silo							
50			Aero							
51			Base							
52			Jett							

2-3550-0-58 * Boozing Section Stations (See Missile Station Diagram)

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16.2 WEIGHT & BALANCE SUMMARY CGLI (AVERAGE WEIGHT COMPONENTS)					REPORT NO. _____ DATE _____					
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² X10 ⁻³	
						LONGP	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CGLI Section			4.39	96.6	107.5	110.7	0	0
5			Silo							
6			Aero							
7	42	G&C Section			6.94	67.5	112.0	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			17.65	84.6	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			- 1.90	57.7	110.3	117.8	0	0
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.90		57.7	110.3	117.8		
22	45	Interstage 2-3			19.25	64.9	111.8	120.3	0	.001
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			25.73	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			- 1.45	55.4	112.1	120.5	0	0
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.45		55.4	112.2	120.6		
37	47	Interstage 1-2			25.46	73.7	115.0	125.6	0	.002
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			29.83	111.5	117.7	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.71	74.0	119.5	128.3	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			135.63					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Being Section Stations (See Missile Station Diagram)

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REV. STA.

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16.2 NOS 5-62 CHANGES INSTALLED AT VANHORN AIR FORCE BASE					REPORT NO. _____ DATE _____					
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³	
						LONG.°	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			.2	54.5	111.5	111.5		
5			Silo							
6			Aero							
7	42	G&C Section			.4	65.4	110.5	113.5		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			.2	80.9	109.3	116.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			.2	53.6	110.8	116.7		
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	.2		53.6	110.8	116.7		
22	45	Interstage 2-3			.2	85.0	103.0	101.8		
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			0	-	-	-		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			0	-	-	-		
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett							
37	47	Interstage 1-2			.5	94.7	102.0	103.4		
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			.8	161.3	116.2	128.0		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			.2	101.3	119.2	133.9		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			2.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Housing Section Stations (See Missile Station Diagram)

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REV. SYL. 2 * Reference DE-13954-534

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ACTUAL WEIGHT RECORD - CTLI SECTION

16.4.1	DRAWING NO. 25-25402-36	CHECK LIST NO. 39	REPORT NO. WTB-1043-035
U/O MISSILE 000035	DCN	REPORTED BY RB/JM	PAGE NO.
MISSILE MODEL W-133A	ADCN	CHECKED BY	DATE 7/30/63
CONFIGURATION			

LONGITUDINAL REFERENCE DATUM

LATERAL REFERENCE DATUM

VERTICAL REFERENCE DATUM

Direction of TARGET

WEIGHING DATA				DIMENSIONAL DATA				
REACTION	GR. WT.	TARE	CORR.	NET WT.	DIM. INCHES	DIM. INCHES	DIM. INCHES	
RF	63.15	33.66		29.95	EA	84.510	GB	77.478
RH	39.40	13.75		25.65	EB	84.505	GD	77.481
RE	89.35	48.87		41.10	FC	115.490	JA	115.500
RG	107.95	69.17		38.20	FD	115.495	JC	115.500
TOTAL	299.85	164.95		134.90	C	30.000	H	100.000
					D	60.000		

LONGITUDINAL C.G.				LATERAL C.G.				VERTICAL C.G.			
REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT
RF	29.95	42.007		RA	44.40	84.510		RB	27.40	77.478	
RH	25.65	42.023		RB	27.40	84.505		RD	28.15	77.481	
RE	41.10	68.996		RC	34.95	115.490		RA	44.40	115.500	
RG	38.20	68.999		RD	28.15	115.495		RC	34.95	115.500	
AS WGD	134.90	54.35	7.331.7	AS WGD	134.90	99.00	13,355.2	AS WGD	134.90	99.84	13,468.9

(RR) = Rear Reaction

SERIAL NUMBER: 0000035

16.4.2 MISSILE WEIGHING CHECK LIST

MODEL MB-133A FINAL ASSEMBLY DRAWING NO. 25-25402-36

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	RECORD OF CHECKING (DATE)			MISSILE COMPONENT			LAUNCH					
							AS WEIGHED	AS RECEIVED	AS SHIPPED	REMOTE SITE	AS RECEIVED	AS SHIPPED		REMOTE SITE				
							AS WEIGHED	AS RECEIVED	AS SHIPPED	REMOTE SITE	AS RECEIVED	AS SHIPPED		REMOTE SITE				
39	Instrumentation Group-Trainer Test	25-25402-36																
39a	CALI Structure Assy.	25-25403-11																
	Support Structure	25-29994-45								X	X							
	Primary Structure	25-29991-15								X	X							
	Insulation & External Markings	25-29995-3								X	X							
	Antenna & Spacer	25-29986-3								X	X							
	Plate-Identification	21-51600-329								X	X							
39b	Cable & Equipment Installation	25-25404-16																
	Battery, Bond	10-29942-2								X	X							
	Battery, Bond	10-29942-4								X	X							
	Cable Set BR-35A	55008-106																
	Cable	AM37192-315								X	X							
	Cable	AM37194-315								X	X							
	Cable	AM37196-315								X	X							

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WEIGHT AND BALANCE CHANGE RECORD									
EQUIPMENT CHANGE RECORD		WEIGHT AND BALANCE							
LINE	PART NO.	DESCRIPTION OF EQUIPMENT	WEIGHT	X AXIS		Y AXIS		Z AXIS	
				ARM	MOMENT	ARM	MOMENT	ARM	MOMENT
1	25-25402-36	Instr. Group Trainer (As Weighed)	134.90	54.35	7.331.7	99.00	13.355.2	99.84	13.468.9
2									
3									
4									
5									
6		AID:							
7	7AE-3719-315	Cable-Antennetics	3.20	74.2		115.5		102.8	
8	8AE37196-315	Cable-Antennetics	1.35	50.4		106.9		111.4	
9	10-20942-8	Battery	3.38	53.9		100.2		98.0	
10									
11									
12									
13	1325-25402-36	Instr. Group Trainer (Complete)	142.83	54.75	7.819.48	99.47	14.207.69	99.83	14.258.73
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									
32									

2-5550-0-11 R1

16.5

**ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION
 APPLICABLE TO CELI SECTION S/N 000035 AND INSTALLATION KIT**

The following ECP's have not been incorporated into "Modal Specification, Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 15 April 1963. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP No. (WB-133A-NO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Gap Change	3	+ .5	Yes
208 Part 2	PSS, SAA Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CELI and Operational Raceway Form Revision	2	Negl.	Yes
240	Interference of GAC Bracket, Rotator Cord & CELI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CELI C/D Receiver, 10-20885	3	Negl.	Yes
373	Work-Around for 10-20942-1 CELI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415 / 540	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
506	CELI Raceway Cover Revision	1	- .2	Yes
525	CELI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CELI Missile System Grounding Change, MACH 6301	3	-	Yes**
555	Stage 3 CELI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MACH 6301	3	Negl.	Yes
606	Revision to CELI Umbilical Bracket- Section 49	1	Negl.	Yes

* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

** These ECP's were incorporated during manufacture of the CELI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

ACTIVE PAGE RECORD

SECTION	ORIG REL PAGE NO.	REV SYM	ADDED PAGES				SECTION	ORIG REL PAGE NO.	REV SYM	ADDED PAGES										
			PAGE NO.	REV SYM	PAGE NO.	REV SYM				PAGE NO.	REV SYM	PAGE NO.	REV SYM							
	1	A																		
	2	F	2.1	F	2.2	F						49	B							
	3	F										50	B							
	4	B	4.1	E	4.2	F	4.3	F				51	B							
	5											52	B							
	6	E										53	B							
	7											54	B							
	8											55	B							
	9											56	B							
	10											57	B							
	11											58	B							
	12											59	B							
	13											60	B							
	14											61	B							
	15											62	B							
	16											63	B							
	17											64	B							
	18											65	B							
	19											66	B							
	20											67	B							
	21											68	B							
	22											69	B							
	23											70	C							
	24											71	C							
	25											72	C							
	26											73	C							
	27											74	C							
	28											75	C							
	29											76	C							
	30											77	C							
	31											78	C							
	32											79	C							
	33											80	C							
	34											81	C							
	35											82	C							
	36											83	C							
	37											84	C							
	38											85	C							
	39											86	C							
	40											87	E							
	41											88	E							
	42											89	E							
	43											90	E							
	44											91	E							
	45											92	E							
	46											93	E							
	47											94	E							
	48											95	E							
												96	F							

FROM: W. 4-12-44

REV SYM. F

BOEING NO. DP-13943-1
 SECT. PAGE 2

ACTIVE PACE RECORD

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			PAGE NO.	REV SYM	PAGE NO.	REV SYM	PAGE NO.				REV SYM	PAGE NO.	REV SYM	PAGE NO.	REV SYM
			97	E							145	F			
			98	E							146	F			
			99	E							147	F			
			100	E							148	F	148.1	F	
			101	E							149	E			
			102	E							150	E			
			103	E	103.1	E					151	E			
			104	E							152	E			
			105	E							153	E			
			106	E							154	E			
			107	E							155	E			
			108	E							156	E			
			109	E							157	E			
			110	E							158	F			
			111	E							159	F			
			112	E	112.1	E					160	F			
			113	E							161	F			
			114	E							162	F			
			115	E							163	F			
			116	E							164	F			
			117	E							165	F			
			118	E							166	F			
			119	E							167	F			
			120	E							168	F			
			121	E							169	F			
			122	E							170	F			
			123	E							171	F			
			124	E							172	F			
			125	E							173	F	173.1	F	
			126	E							174	F			
			127	E							175	F			
			128	E							176	F			
			129	E							177	F			
			130	E	130.1	E					178	F			
			131	E							179	F			
			132	E							180	F			
			133	E							181	F			
			134	E							182	F	182.1	F	
			135	E							183	F			
			136	E							184	F			
			137	E							185	F			
			138	E							186	F			
			139	E	139.1	E					187	F			
			140	F							188	F			
			141	F							189	F			
			142	F							190	F			
			143	F							191	F	191.1	F	
			144	F							192	F			

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
A	<p>Revised pages 1, 4, 10.</p> <p>Added pages 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42.</p> <p>Added Moments of Inertia to page 10.</p> <p>Added Sections 3.0 and 4.0 to the document.</p>	5-17-63	D. Brenden <i>D. Brenden</i>
B	<p>Added Sections 5.0, 6.0 and 7.0 to the document.</p>	6-17-63	D. Brenden <i>D. Brenden</i>
C	<p>Added Sections 8.0 and 9.0 to the document.</p>	7-17-63	D. Brenden <i>D. Brenden</i>
D	<p>Revised pages 2, 3, 4.1</p> <p>Added pages 2.1, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112.</p>	8-16-63	D. Brenden <i>D. Brenden</i>
E	<p>Revised pages 2, 2.1, 3, 4.1, 6, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112.</p> <p>Added pages 4.2, 103.1, 112.1, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 130.1, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 133.1</p>	10-23-63	D. Brenden <i>D. Brenden</i>
F	<p>Revised pages 2, 2.1, 3, 4.2, 140, 141, 142, 143, 144, 145, 146, 147, 148.</p> <p>Added pages 2.2, 4.3, 148.1, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 173.1, 174, 175, 176, 177, 178, 179, 180, 181, 182, 182.1, 183, 184, 185, 186, 187, 188, 189, 190, 191, 191.1, 192, 193, 194, 195, 196, 197, 198, 199, 200, 200.1</p>	11-25-63	D. Brenden <i>D. Brenden</i>

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CTLI SECTION, S/N 0000034

15.1 This section of the document describes the data changes created by converting a production line Minuteman missile into a CTL missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries check lists, and ECP lists applicable to this installation. Page 141 summarizes the complete installation mass properties and consists of data from page 142 (average mass properties of downstage components), page 143 (predicted sealant changes), and page 147 (actual weight of CTLI section S/N 0000034). In addition, page 144 presents summary check lists by production section as backup data for page 142. Page 148 list the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-CLDR-NMPD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODK" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

The following drawings are incorporated in the above section:

10-20942, Battery Instl., DCN G 4-30-63.
21-52900, Missile Instl., DCN K 9-25-63.
25-23214, Raceway Instl., DCN F 4-29-63.
25-25402, 39 Sect. Instl., DCN J 6-17-63.
25-25406, HMS 5-62 Instl., DCN J 9-13-63.
25-26878, Cable Assy., DCN J 9-3-63.
25-29239, Conduit Assy., DCN F 4-4-63, ADCN S-34 7-26-63.
25-30133, Stand. Instl., DCN D 5-23-63.
25-31677, Instl. Kit, DCN E 5-4-63, ADCN S-22 7-10-63.
29-22327, Timer Instl., DCN D 6-24-63, ADCN S-6 9-5-63.

15.2 WEIGHT & BALANCE SUMMARY TOTAL OTLI KIT INSTALLATION OTLI WAFER S/N 000034					REPORT NO. _____ DATE _____				
STATION	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³	
					LONG.*	LAT.	VERT.	ROLL	PITCH
1	41 RV Spacer								
2		Silo							
3		Aero							
4	39 OTLI Section			149.4	54.7	99.8	100.1	.004	.003
5		Silo							
6		Aero							
7	42 O&C Section			7.3	67.4	111.9	114.3	0	0
8		Silo							
9		Aero							
10	44 3rd Stage Engine			17.9	84.6	108.5	117.4	0	.002
11		Silo							
12		Aero							
13		Base							
14	45 Interstage 2-3 (Fwd)			-1.7	58.2	110.2	117.9	0	0
15		Silo							
16		Aero							
17		Base							
18		Silo							
19	Jettisoned Portion	Aero							
20		Base							
21		Jett		-1.7	58.2	110.2	117.9		
22	45 Interstage 2-3 (Aft)			19.45	65.1	111.7	120.1	0	.001
23		Silo							
24		Aero							
25	46 2nd Stage Engine			25.7	102.1	112.6	121.4	0	.009
26		Silo							
27		Aero							
28		Base							
29	47 Interstage 1-2 (Fwd)			-1.45	55.4	112.1	120.5	0	0
30		Silo							
31		Aero							
32		Base							
33		Silo							
34	Jettisoned Portion	Aero							
35		Base							
36		Jett		-1.45	55.4	112.1	120.5		
37	47 Interstage 1-2 (Aft)			26.0	74.1	114.8	125.2	0	.002
38		Silo							
39		Aero							
40	48 1st Stage Engine			30.6	112.8	117.6	130.1	0	.025
41		Silo							
42		Aero							
43		Base							
44	49 Orbit			9.9	74.5	119.5	128.4	0	0
45		Silo							
46		Aero							
47		Base							
48	MISILE			283.1					
49		Silo							
50		Aero							
51		Base							
52		Jett							

* Boeing Section Stations (See Missile Station Diagram)

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15.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)						REPORT NO. _____ DATE _____				
LINE NO.	STATION	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³	
						LONG.	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			4.39	56.0	107.5	110.7	0	0
5			Silo							
6			Aero							
7	42	G&C Section			6.94	67.5	112.0	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			17.65	84.6	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.90	57.7	110.3	117.8	0	0
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett	- 1.90		57.7	110.3	117.8		
22	45	Interstage 2-3 (Aft)			19.25	64.9	111.8	120.3	0	.001
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.73	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			- 1.45	55.4	112.1	120.5	0	0
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett	- 1.45		55.4	112.2	120.6		
37	47	Interstage 1-2 (Aft)			25.40	73.7	115.0	125.6	0	.002
38			Silo							
39			Aero							
40	48	1st Stage Engine			29.83	111.5	117.7	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Script			9.73	74.0	119.5	128.3	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			135.63					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

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15.2 BMS 5-62 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE**						REPORT NO. _____ DATE _____				
NO	STATION	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	OTLI Section			.2	54.5	111.5	111.5		
5			Silo							
6			Aero							
7	42	O&C Section			.4	65.4	110.5	113.5		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			.2	80.9	109.3	116.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			.2	53.6	110.8	116.7		
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett	.2		53.6	110.8	116.7		
22	45	Interstage 2-3 (Aft)			.2	85.0	103.0	101.8		
23			Silo							
24			Aero							
25	46	2nd Stage Engine			0	-	-	-		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			0	-	-	-		
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett							
37	47	Interstage 1-2 (Aft)			.5	94.7	102.0	103.4		
38			Silo							
39			Aero							
40	48	1st Stage Engine			.8	161.3	110.2	128.0		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			.2	101.3	119.2	133.9		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			2.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

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* Boeing Section Stations (See Missile Station Diagram)

REF. SK. F ** Reference D2-13954-534

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 REV. SYM. F

ACTUAL WEIGHT RECORD - CTLI SECTION											
15.4.1 U/O MISSILE 0000034 MISSILE MODEL MS-133A CONFIGURATION	DRAWING NO. 25-25402-36 DCN J ADCN	CHECK LIST NO. 39 REPORTED BY CRB/RH CHECKED BY RM REPORT NO. WTS-1112-034 PAGE NO. DATE 10/31/63									
<p>LONGITUDINAL REFERENCE DATUM</p>	<p>LATERAL REFERENCE DATUM</p>	<p>VERTICAL REFERENCE DATUM</p>									
WEIGHING DATA											
REACTION	GR. WT.	TARE	CORR.	NET WT.	DIM. INCHES	DIM. INCHES					
RF	54.60	23.95		30.65	EA	84.510					
RH	56.30	28.60		27.70	EB	84.505					
RE	107.15	63.65		43.50	FC	115.490					
RG	98.70	60.40		38.30	FD	115.495					
TOTAL	316.75	176.60		140.15	H	100.000					
					D	60.000					
LONGITUDINAL C.G.			LATERAL C.G.			VERTICAL C.G.					
REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT
RF	30.65	42.007		RA	49.10	84.510		RB	25.40	77.478	
RH	27.70	42.023		RB	25.40	84.505		RD	33.15	77.481	
RE	43.50	62.996		RC	32.50	115.490		RA	49.10	115.500	
RG	38.30	62.999		RD	33.15	115.495		FC	32.50	115.500	
AS CGD	140.15	54.26	7,604.7	AS CGD	140.15	99.02	13,878.0	AS CGD	140.15	99.62	13,961.2

STANDARD NUMBER: 0000034

15.4.2 MISSILE WEIGHING CHECK LIST

RECORD OF OPERATIONS (DATE)		
No	Mo	Yr
	10	
	31	
	03	

MODEL: WA 1964 FINAL ASSEMBLY DRAWING NO. 25-25100-36

SECTION: 39 MISSILE NO. _____

MISSILE COMPONENT: CONT COMPOUND PART NO. Total

DESCRIPTION	PART NO.	WEIGHT	Y	ARM	Y	ARM	Z	ARM	CONTAINER			MISSILE					
									NO	NO	NO	NO	NO	NO	NO		
Primary Injection Control Trainer (No 1)	25-25100-16																
CONT Instruction 477	25-25100-17																
SUSPECT SENSORS	25-25100-18								X								
Primary SENSORS	25-25100-19								X								
Insulation & Systems Manual	25-25100-20								X								
Antenna & Signal	25-25100-21								X								
Plate Identification	25-25100-22								X								
Cable & Repair at Installation	25-25100-16																
Battery South	10-0000-2									X							
Battery South	10-0000-4									X							
Cable Set South	50-0000-1										X						
Cable	AM317-315											X					
Cable	AM317-317												X				
Cable	AM317-315													X			

REVISION: 1

15.4.3 WEIGHT AND BALANCE CHANGE RECORD

ASSOCIATE CONTRACTOR BOEING
 COMPONENT SECTION 39
 MODEL NO. WB-133A
 SERIAL NO. 0000034

CONTRACT NO. AFO4(647)-289
 LOT NO. _____
 DRAWING NO. 25-25402-36
 U.O. MISSILE _____

REPORT NO. WTS-1112-034
 DATE 10/31/63
 PREPARED CRB-RR
 APPROVED RM

EQUIPMENT CHANGE RECORD

WEIGHT AND BALANCE

PART NO.	DESCRIPTION OF EQUIPMENT	WEIGHT	X AXIS		Y AXIS		Z AXIS	
			ARM	MOMENT	ARM	MOMENT	ARM	MOMENT
1								
2	25-25402-36 Instr. Group Trainer (As Weighed)	140.15	54.26	7,604.7	99.02	13,878.0	99.62	13,961.2
3								
4								
5	ADD:							
6	WB17194-315 Cable-Autonetics	3.25	74.2		115.5		102.8	
7	WB17196-315 Cable-Autonetics	1.37	50.4		106.9		111.4	
8								
9								
10	25-25402-36 Instr. Group Trainer (Complete)	144.77	54.67	7,914.9	99.52	14,399.8	99.80	14,447.9
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
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26								
27								
28								
29								
30								
31								
32								

2-5570-0-11 21

15.5

ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION
APPLICABLE TO CTLI SECTION S/N 000034 AND INSTALLATION KIT

The following ECP's have not been incorporated into "Model Specification Trainer-Best Group, Guided Missile, (S-133-1006)" as revised on 8 July 1965. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WS-133A-B0-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-1	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part 2	PSS, S&A Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of G&C Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-2088	3	Negl.	Yes
373	Work-Around for 10-20942-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415 / 540	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
525	CTLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MRCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MRCN 6301	3	Negl.	Yes
606	Revision to CTLI Umbilical Bracket-Section 49	1	Negl.	Yes

* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

** These ECP's were incorporated during manufacture of the CTLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

15.5

**ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION
APPLICABLE TO CTLI SECTION S/N 0000034 AND INSTALLATION KIT**

(Continued)

ECP NO. (WS-135A-E0-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
620	Installation of Static Dissipators on Operational Missiles	1	Negl.	Yes
635	PCM R/F Section Digital Data Programmers	3	Negl.	Yes
639	Prevent Interference of Linear Shape Charge With Cable Strap	3	Negl.	Yes
657	Revision of Ordnance Supports in Interstage 2-3	2	Negl.	Yes

CTLI SECTION, S/N 0000036

17.1 This section of the document describes the data changes created by converting a production line Minuteman missile into a CTL missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries, check lists, and ECP lists applicable to this installation. Page 159 summarizes the complete installation mass properties and consists of data from page 160 (average mass properties of downstage components), page 161 (predicted sealant changes), and page 172 (actual weight of CTLI section S/N 0000036). In addition, page 162 presents summary check lists by production section as backup data for page 160. Page 173 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-C1DR-NMPD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODS" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

The following drawings are incorporated in the above section:

- 10-20942, Battery Instl., DCN G 4-30-63.
- 21-52900, Missile Instl., DCN K 9-23-63.
- 25-23214, Raceway Instl., DCN F 4-29-63.
- 25-25402, 39 Sect. Instl., DCN J 6-17-63.
- 25-25406, EMS 5-62 Instl., DCN J 9-13-63.
- 25-26878, Cable Assy., DCN J 9-3-63.
- 25-29239, Conduit Assy., DCN F 4-4-63, ADCN S-34 7-26-63.
- 25-30133, Stand. Instl., DCN D 5-27-63.
- 25-31677, Instl. Kit, DCN E 5-4-63, ADCN S-22 7-10-63.
- 29-22327, Timer Instl., DCN D 6-24-63, ADCN S-6 9-5-63.

17.2		WEIGHT & BALANCE SUMMARY TOTAL CTLI KIT INSTALLATION CTLI WAFER S/N 0000036				REPORT NO. _____		DATE _____		
LINE	ITEM	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			150.1	54.8	99.7	100.2	.004	.003
5			Silo							
6			Aero							
7	42	G&C Section			7.3	67.4	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			18.0	84.5	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.7	58.2	110.2	117.9	0	0
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion								
20			Base							
21			Jett	- 1.7		58.2	110.2	117.9		
22	45	Interstage 2-3 (Aft)			19.5	65.1	111.7	120.2	0	.001
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.8	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			- 1.5	55.4	112.1	120.5	0	0
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion								
35			Aero							
36			Base							
37	47	Interstage 1-2 (Aft)			26.0	74.1	114.7	125.2	0	.002
38			Silo							
39			Aero							
40	48	1st Stage Engine			30.6	112.8	117.6	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.9	74.5	119.5	128.4	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			284.0					
49			Silo							
50			Aero							
51			Base							
52			Jett							

2 1330 0 58 * Boeing Section Stations (See Missile Station Diagram)

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SEC

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17.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)					REPORT NO. _____ DATE _____				
STATION	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY *			INERTIA SLUG FT ² x10 ⁻³	
					LONG.*	LAT.	VERT.	ROLL	PITCH
1	41 RV Spacer								
2		Silo							
3		Aero							
4	39 CTLI Section			4.39	55.9	107.5	110.6	0	0
5		Silo							
6		Aero							
7	42 O&C Section			6.94	67.5	112.0	114.3	0	0
8		Silo							
9		Aero							
10	44 3rd Stage Engine			17.75	84.5	108.5	117.4	0	.002
11		Silo							
12		Aero							
13		Base							
14	45 Interstage 2-3 (Fwd)			- 1.20	57.7	110.3	117.8	0	0
15		Silo							
16		Aero							
17		Base							
18		Silo							
19	Jettisoned Portion								
20		Aero							
21		Base							
22		Jett	- 1.20		57.7	110.3	117.8		
23	45 Interstage 2-3 (Aft)			19.26	64.9	111.8	120.4	0	.001
24		Silo							
25		Aero							
26	46 2nd Stage Engine			25.77	102.1	112.6	121.4	0	.009
27		Silo							
28		Aero							
29		Base							
30	47 Interstage 1-2 (Fwd)			- 1.45	55.4	112.1	120.5	0	0
31		Silo							
32		Aero							
33		Base							
34		Silo							
35	Jettisoned Portion								
36		Aero							
37		Base							
38		Jett	- 1.45		55.4	112.1	120.5		
39	47 Interstage 1-2 (Aft)			25.47	73.7	115.0	125.6	0	.002
40		Silo							
41		Aero							
42	48 1st Stage Engine			29.83	111.5	117.7	130.2	0	.025
43		Silo							
44		Aero							
45		Base							
46	49 Start			9.73	73.9	119.5	128.3	0	0
47		Silo							
48		Aero							
49		Base							
50	MISSILE			135.79					
51		Silo							
52		Aero							
		Base							
		Jett							

17.2 **BMS 5-62 CHANGES INSTALLED AT
VANDENBERG AIR FORCE BASE****

REPORT NO. _____
DATE _____

LINE NO.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³	
					LONG.*	LAT.	VERT.	ROLL	PITCH
1	RV Spacer								
2		Silo							
3		Aero							
4	39 GTLI Section			.2	54.5	111.5	111.5		
5		Silo							
6		Aero							
7	42 G&C Section			.4	65.4	110.5	113.5		
8		Silo							
9		Aero							
10	44 3rd Stage Engine			.2	80.9	109.3	116.2		
11		Silo							
12		Aero							
13		Base							
14	45 Interstage 2-3 (Fwd)			.2	53.6	110.8	116.7		
15		Silo							
16		Aero							
17		Base							
18		Silo							
19	Jettisoned Portion	Aero							
20		Base							
21		Jett	.2		53.6	110.8	116.7		
22	45 Interstage 2-3 (Aft)			.2	85.0	103.0	101.8		
23		Silo							
24		Aero							
25	46 2nd Stage Engine			0	-	-	-		
26		Silo							
27		Aero							
28		Base							
29	47 Interstage 1-2 (Fwd)			0	-	-	-		
30		Silo							
31		Aero							
32		Base							
33		Silo							
34	Jettisoned Portion	Aero							
35		Base							
36		Jett							
37	47 Interstage 1-2 (Aft)			.5	94.7	102.0	103.4		
38		Silo							
39		Aero							
40	48 1st Stage Engine			.8	161.3	116.2	128.0		
41		Silo							
42		Aero							
43		Base							
44	49 Skirt			.2	101.3	119.2	133.9		
45		Silo							
46		Aero							
47		Base							
48	MISSILE			2.7					
49		Silo							
50		Aero							
51		Base							
52		Jett							

* Boeing Section Stations (See Missile Station Diagram)

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CHECK LIST NO.	MISSILE WEIGHING CHECK LIST			RECORD OF CHECKING (DATE)					
	DATE	MODEL	FINAL ASSEMBLY DRAWING NO. 21-52900-20 (Using 25-25406-9)	Mo	Day	Yr	Mo	Day	Yr
ITEM NUMBER	SECTION 39	MISSILE NO.	COMPONENT PART NO.	BASIC WEIGHT	AS WEIGHED	REMOTE SITE SHIPMENT	AS RECEIVED	REMOTE SITE	LAUNCH
DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	AS WEIGHED	AS RECEIVED	REMOTE SITE	LAUNCH
3a	Body Sect. - Trainer Test	25-25402-36	SEE CHANGE RECORD						
3b	Cable Assy. Set - Electrical	25-26878-5	2.21	56.5	109.8	116.0			
3c	Conduit Supt. Set - Raceway	25-29239-23	.91	56.3	111.6	111.6			
3d	Instl. Kit - Trainer Test Group	25-31677-17	1.27	54.5	100.6	100.6			
3e	BMS 5-62 Installed VAFB		*						
The following items included in 25-25402-36 are furnished by Autonetics SE 35A Cable Set D 24A Analog Multiplexer D 20C Data Programmer									
		55008-106	7.5	62.6	109.7	107.2			
		55007-106	16.9	53.9	101.4	103.3			
		55006-106	16.1	53.9	101.9	97.0			

See page 12 for the net weight and balance effect of BMS 5-62 installed at VAFB

CHECK LIST NO.	17.3.2 MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)													
	DATE	MODEL	Mo	Day	Yr	COMPONENT						MISSILE				
ITEM NUMBER	SECTION	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	BASIC WEIGHT	AS WEIGHED	REMOTE SITE	SHIPMENT	AS RECEIVED	REMOTE SITE	AS WEIGHED	REMOTE SITE	LAUNCH
	MISSILE COMPONENT	GUIDANCE SECTION	COMPONENT PART NO.													
2a	Cable Assy. Set - Electrical		25-26878-5	1.98	65.8	110.5	117.2									
2b	Conduit Supt. Set - Raceway		25-29239-23	4.54	68.9	112.6	113.2									
2c	Instl. Kit-Trainer Test Group		25-31677-17	.62	62.7	111.8	112.1									
2d	BMS 5-62 Installed at VAFB			*												
The following items are deleted from the missile assembly in order to accommodate the CII installations.																
2e	Raceway Inst.		25-23214-5	.20	66.6	110.0	109.8									
2f	BMS 5-62 Removed at VAFB			*												

* See page 12 for a summary of the net weight and balance change of BMS 5-62 at VAFB

CHECK LIST NO.	17.3.3 MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)										
	DATE	MODEL	Mo	Day	Yr								
		FINAL ASSEMBLY DRAWING NO. 21-52900-20											
ITEM NUMBER	SECTION	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	BASIC WEIGHT	AS WEIGHED	REMOTE SITE SHIPMENT	AS RECEIVED	REMOTE SITE	LAUNCH
4a	44	Cable Assy. Set - Electrical	25-26878-5	6.47	92.9	111.2	118.4						
4b		Conduit Supt. Set - Raceway	25-29239-23	15.78	85.4	110.5	117.9						
4c		Instl. Kit - Trainer Test Group	25-31677-17	1.49	80.2	110.7	118.2						
4d		BMS 5-62 Installed at VAFB		*									
The following items are furnished by Aerojet													
4e		Destruct System, AODS	359704	4.03	58.1	99.8	114.0						
The following items are deleted from the missile assembly in order to accommodate the C.I.I. Installations													
4f		Raceway Instl.	25-23214-5	9.93	80.2	110.2	117.6						
4g		Standards Instl.	25-30133-9	.09	68.5	109.4	116.2						
4h		BMS 5-62 Removed at VAFB		*									

* See page 12 for a summary of the net weight and balance change of BMS 5-62 at VAFB

CHECK LIST NO.	17.3.4 MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)				
	DATE	MODEL	Mo	Day	Yr		
		FINAL ASSEMBLY DRAWING NO. 21-52900-20					
ITEM NUMBER	SECTION	MISSILE NO.	COMPONENT				LAUNCH
	MISSILE COMPONENT	COMPONENT PART NO.	BASIC WEIGHT	AS WEIGHED	REMOTE SITE SHIPMENT	AS RECEIVED	
	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	
5a	Cable Assy. Set - Electrical	25-26878-5	4.36	64.9	112.0	119.9	
5b	Conduit Supt. Set - Recevay	25-29239-23	15.75	66.9	111.7	120.0	
5c	Instl. Ket - Trainer Test Group	25-31677-17	1.79	74.7	111.6	119.3	
5d	BMS 5-62 Installed at VAFB		*				
The following items are deleted from the missile assembly in order to accommodate the CUI Installation							
5e	Standards Instl.	25-30133-9	.07	78.6	109.6	119.5	
5f	Receway Instl.	25-23214-5	4.47	72.5	110.9	117.2	
5g	BMS 5-62 Removed at VAFB						

* See page 12 for a summary of the net weight and balance change of BMS 5-62 at VAFB

CHECK LIST NO.	17.3.5 MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)											
	DATE	MODEL	Mo	Day	Yr									
		FINAL ASSEMBLY DRAWING NO. 21-52900-20												
ITEM NUMBER	SECTION 46	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT				LAUNCH		
								BASIC WEIGHT	AS WEIGHED	REMOTE SITE SHIPMENT	AS RECEIVED		REMOTE SITE	AS WEIGHED
MISSILE COMPONENT		2nd STAGE MOTOR		MISSILE NO.		COMPONENT PART NO.								
6a		Cable Assy. Set - Electrical	25-26878-5	10.75	111.1	112.8	121.2							
6b		Conduit Supt. Set - Recevay	25-29239-23	21.93	109.2	112.2	121.2							
6c		Instl. Kit - Trainer Test Group	25-34677-17	2.09	89.9	111.7	120.3							
6d		Timer - Interval	29-22327-2	1.25	67.1	112.5	121.8							
6e		Battery - Squib Activated	10-20942-3	1.40	63.9	112.5	121.8							
6f		BMS 5-62 Installed at VAFB		*										
		The following items are furnished by Aerojet												
6g		Destruct System, AODS	359764	4.19	74.8	111.8	120.4							
		The following items are deleted from the missile assembly in order to accommodate the CILI Installation												
6h		Recevay Instl.	25-23214-5	15.84	103.1	111.9	120.7							
6i		BMS 5-62 Removed at VAFB		*										

* See page 12 for a summary of the net weight and balance change of BMS 5-62 at VAFB

CHECK LIST NO.	17.3.6 MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)														
	DATE	MODEL	Mo	Day	Yr												
		FINAL ASSEMBLY DRAWING NO. 21-52900-20															
ITEM NUMBER	SECTION 47	MISSILE NO.	COMPONENT PART NO.				COMPONENT				LAUNCH						
			DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	BASIC WEIGHT	AS WEIGHED		REMOTE SITE	SHIPMENT	AS RECEIVED	REMOTE SITE	AS WEIGHED	
7a			Cable Assy. Set - Electrical	25-28878-5	5.48	71.2	115.8	126.4									
7b			Conduit Supt. Set - Raceway	25-29239-23	23.04	78.9	115.0	125.9									
7c			Instl. Kit - Trainer Test Group	25-31677-17	1.32	87.4	115.3	125.9									
7d			BMS 5-62 Installed at VAFB		*												
<p>The following items are deleted from the missile assembled in order to accommodate the full installations</p>																	
7e			Standards Instl.	25-30133-9	.10	99.8	115.8	126.0									
7f			Raceway Instl.	25-23214-5	5.72	89.7	114.8	126.4									
7g			BMS 5-62 Removed at VAFB		*												

* See page 12 for a summary of the net weight and balance change of BMS 5-62 at VAFB

CHECK LIST NO.	17-3-7 MISSILE WEIGHING CHECK LIST		MODEL		FINAL ASSEMBLY DRAWING NO. 21-52900-20		RECORD OF CHECKING (DATE)		MISSILE							
	DATE	SECTION 48	MISSILE NO.	DESCRIPTION	WEIGHT	PART NO.	X ARM	Y ARM	Z ARM	BASIC WEIGHT	AS WEIGHED	REMOTE SITE	SHIPMENT	AS RECEIVED	REMOTE SITE	LAUNCH
ITEM NUMBER	MISSILE COMPONENT 1st STAGE MOTOR		COMPONENT PART NO.													
8a	Cable Assy. Set - Electrical		25-26878-5		13.12		156.4	118.2	130.5							
8b	Conduit Supt. Set		25-29239-23		13.13		79.3	117.3	130.9							
8c	Instl. Kit - Trainer Test		25-31677-17		2.01		84.1	117.2	129.6							
8d	Timer - Interval		29-22327-1		1.25		70.6	117.7	130.5							
8e	Battery - Squib Activated		10-20942-3		1.40		66.7	117.7	130.5							
8f	RMS 5-62 Instl. at VAFB				*											
8g	Destruct System, AODS		359764		6.19		78.1	116.9	129.3							
8h	Recovery Instl.		25-23214-5		8.07		82.8	117.2	129.8							
8i	RMS 5-62 Removed at VAFB				*											
<p>The following items are furnished by Aerojet</p> <p>The following items are deleted from the missile assembly in order to accommodate the C-11 Installation</p>																

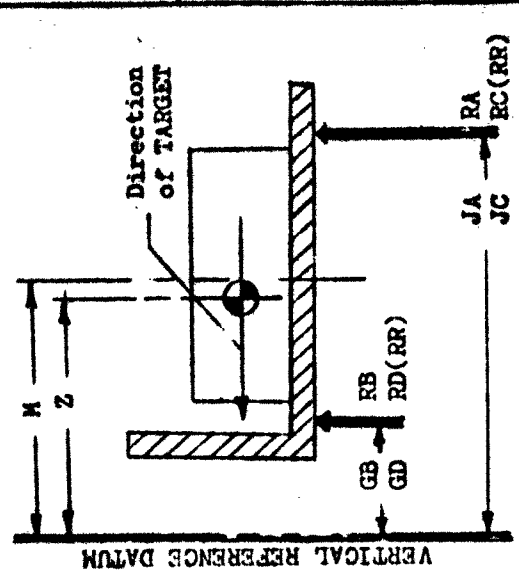
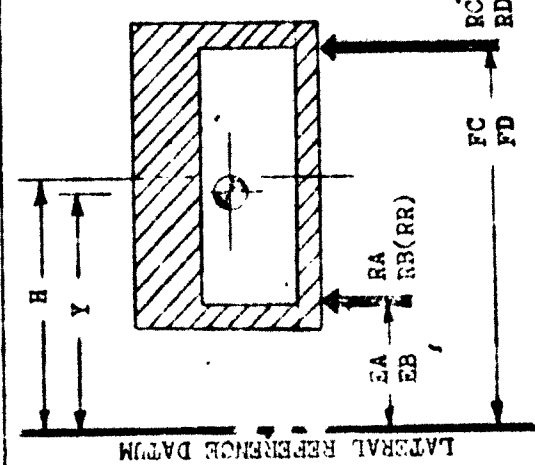
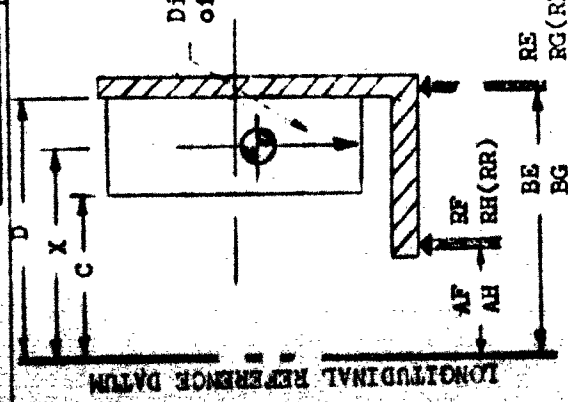
See page 12 for a summary of the net weight and balance change of RMS 5-62 at VAFB

17.4.1 ACTUAL WEIGHT RECORD - CTLI SECTION

U/O MISSILE 0000036 CHECK LIST NO. 39 REPORT NO. WS-1110-036

MISSILE MODEL WS-133A DRAWING NO. 25-25402-36 REPORTED BY CB/RE PAGE NO.

CONFIGURATION J J CHECKED BY RW DATE 10-24-63



WEIGHING DATA

REACTION	GR. WT.	TARE	CORRN.	NET WT.	REACTION	GR. WT.	TARE	CORRN.	NET WT.
RF	38.30	16.10		22.20	RC	94.90	35.15		59.75
RH	71.95	36.40		35.55	RD	59.25	53.50		5.75
RE	122.95	71.35		51.60	EA	54.95	33.30		21.65
RG	62.85	52.60		10.25	EB	107.00	54.55		52.45
TOTAL	316.05	176.45		139.60	TOTAL	316.10	176.50		139.60

WEIGHING DATA

REACTION	GR. WT.	TARE	CORRN.	NET WT.	REACTION	GR. WT.	TARE	CORRN.	NET WT.
EA	54.95	33.30		21.65	FC	107.00	54.55		52.45
EB	107.00	54.55		52.45	FD	316.10	176.50		139.60
FC	107.00	54.55		52.45					
FD	316.10	176.50		139.60					

DIMENSIONAL DATA

D.D.M.	INCHES	DIM.	INCHES	DIM.	INCHES
AF	42.007	EA	84.510	GB	77.478
AH	42.023	EB	84.505	GD	77.480
BE	62.996	FC	115.490	JA	115.500
BG	62.999	FD	115.495	JC	115.500
C	50.000	H	100.000	M	100.000
D	60.000				

LONGITUDINAL C.G.

REACTION	NET WT.	ARM	MOMENT
RF	22.20	42.007	
RH	35.55	42.023	
RE	51.60	62.996	
RG	30.25	62.999	
AS AGD	139.60	58.32	7,582.8

LATERAL C.G.

REACTION	NET WT.	ARM	MOMENT
RA	21.65	84.510	
RB	52.45	84.505	
RC	59.75	115.490	
RD	5.75	115.495	
AS AGD	139.60	99.04	13,826.6

VERTICAL C.G.

REACTION	NET WT.	ARM	MOMENT
RB	52.45	77.478	
RD	5.75	77.480	
RA	21.65	115.500	
RC	59.75	115.500	
AS AGD	139.60	99.65	13,910.9

(RR) = Rear Reaction

0000036

17.4.2 MISSILE WEAPONS CHECK LIST

CHECK LIST NO. 32

DATE

MOUSE 1122 FINAL ASSEMBLY DRAWING NO. 25-25402-36

PERIOD OF CHECKING (DATE)

Mo	10
Day	24
Yr	63

SECTION	MISSILE NO.	COMPONENT PART NO.	PART NO.	DESCRIPTION	MISSILE			COMPONENT			MISCELL										
					X	Y	Z	X	Y	Z											
39			25-25402-36	Instrumentation Control Unit																	
39A			25-25402-11	Control Panel																	
			25-25402-11	Switch																	
			25-25402-11	Indicator																	
			25-25402-11	Indicator																	
			25-25402-11	Indicator																	
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			25-25402-11	Indicator																	
			25-25402-11	Indicator																	

17.4.3

WEIGHT AND BALANCE CHANGE RECORD

ASSOCIATE CONTRACTOR	BOEING	CONTRACT NO.	AF04(647)-289	REPORT NO.	WTS-1110-036
COMPONENT	SECTION 39	LOT NO.		DATE	10-24-63
MODEL NO.	WB-133A	DRAWING NO.	25-25402-36	PREPARED	CR/MT
SERIAL NO.	000036	U.O. MISSILE		APPROVED	GO

EQUIPMENT CHANGE RECORD

WEIGHT AND BALANCE

PART NO.	DESCRIPTION OF EQUIPMENT	WEIGHT	X AXIS		Y AXIS		Z AXIS	
			ARM	MOMENT	ARM	MOMENT	ARM	MOMENT
1								
2	Instr. Group Trainer (As Weighed)	139.60	54.82	7,532.8	99.04	13,826.6	99.65	13,910.9
3								
4								
5	ADD:							
6	Cable-Autonetics	3.81	74.2		111.5			102.8
7	Cable-Autonetics	2.11	50.4		106.9			111.8
8								
9								
10	Instr. Group Trainer (Complete)	145.52	54.78	7,971.8	99.59	14,492.2	99.91	14,538.5
11								
12								
13								
14								
15								
16								
17								
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22								
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30								
31								
32								

17.5

**ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION
APPLICABLE TO CTLI SECTION S/N 0000036 AND INSTALLATION KIT**

The following ECP's have not been incorporated into "Model Specification Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 8 July 1963. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WS-133A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part 2	PSS, S&A Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of G&C Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-20855	3	Negl.	Yes
373	Work-Around for 10-209-2-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415 540	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
525	CTLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MRCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MRCN 6301	3	Negl.	Yes
606	Revision to CTLI Umbilical Bracket- Section 49	1	Negl.	Yes

* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

** These ECP's were incorporated during manufacture of the CTLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

17.5

ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION
APPLICABLE TO CELL SECTION S/N 0000036 AND INSTALLATION KIT

(Continued)

ECP NO. (WS-133A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
620	Installation of Static Dissipators on Operational Missiles	1	Negl.	Yes
635	PCM R/F Section Digital Data Programmers	3	Negl.	Yes
639	Prevent Interference of Linear Shape Charge With Cable Strap	3	Negl.	Yes
657	Revision of Ordnance Supports in Interstage 2-3	2	Negl.	Yes

CTLI SECTION, S/N 000037

18.1 This section of the document describes the data changes created by converting a production line Minuteman missile into a CTLI missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries, check lists, and ECP lists applicable to this installation. Page 175 summarizes the complete installation mass properties and consists of data from page 176 (average mass properties of downstage components), page 177 (predicted sealant changes), and page 181 (actual weight of CTLI section S/N 000037). In addition, page 178 presents summary check lists by production section as backup data for page 176. Page 182 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document O162-01DR-NMPD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODS" dated January 28, 1963.

Average values have been used for all boeing items other than the CTLI section which is an actual weight.

The following drawings are incorporated in the above section:

10-20942,	Battery Installation,	DCN G	4-30-63
21-52900,	Missile Installation,	DCN K	9-23-63
25-23210,	Raceway Installation,	DCN F	4-29-63
25-25402,	39 Section Installation,	DCN J	6-17-63
25-25406,	BMS 5-62 Installation,	DCN J	9-13-63
25-26878,	Cable Assembly,	DCN J	9-3-63
25-29239,	Conduit Assembly,	DCN F	4-4-63 - ADCN S-34 7-26-63
25-30133,	Standard Installation,	DCN D	5-22-63
25-31677,	Installation Kit,	DCN E	5-4-63 - ADCN S-22 7-10-63
29-22327,	Timer Installation,	DCN D	6-24-63 - ADCN S-6 9-5-63

18.2 WEIGHT & BALANCE SUMMARY TOTAL CTLI KIT INSTALLATION CTLI WAFER S/N 0000037					REPORT NO. _____ DATE _____					
LINE	STATION	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² X10 ⁻³	
						LONG. °	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			148.6	54.8	99.8	100.1	.004	.003
5			Silo							
6			Aero							
7	42	O&C Section			7.3	67.4	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			18.0	84.5	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.7	58.2	110.5	117.9	0	0
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett		- 1.7	58.2	110.2	117.9		
22	45	Interstage 2-3 (Aft)			19.5	65.1	111.7	120.2	0	.001
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.8	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			- 1.5	55.4	112.1	120.5	0	0
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett		- 1.5	55.4	112.1	120.5		
37	47	Interstage 1-2 (Aft)			26.0	74.1	114.7	125.2	0	.002
38			Silo							
39			Aero							
40	48	1st Stage Engine			30.6	112.8	117.6	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Start			9.9	74.5	119.5	128.4	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			282.5					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

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18.2		WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)				REPORT NO. _____ DATE _____				
1	2	3	4	5	6	CENTER OF GRAVITY			INERTIA SLUG FT ² X10 ⁻³	
						7	8	9	10	11
12	13	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	LONG. °	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			4.39	55.9	107.5	110.6	0	0
5			Silo							
6			Aero							
7	42	G&C Section			6.94	67.5	112.0	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			17.75	84.5	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.90	57.7	110.3	117.8	0	0
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett		- 1.90	57.7	110.3	117.8		
22	45	Interstage 2-3 (Aft)			19.26	54.9	111.3	120.4	0	.001
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.77	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			- 1.45	55.4	112.1	120.5	0	0
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett		- 1.45	55.4	112.1	120.5		
37	47	Interstage 1-2 (Aft)			25.47	73.7	115.0	125.6	0	.002
38			Silo							
39			Aero							
40	48	1st Stage Engine			29.83	111.5	117.7	130.2	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.73	73.9	119.5	128.3	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			135.79					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

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18.2 * BMS 5-62 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE **					REPORT NO. _____				
					DATE _____				
STATION	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA	
					LONG.°	LAT.	VERT.	SLUG FT ² X10 ⁻³	ROLL
1	41 RV Spacer								
2		Silo							
3		Aero							
4	39 CTLI Section			.2	54.5	111.5	111.5		
5		Silo							
6		Aero							
7	42 G&C Section			.4	65.4	110.5	113.5		
8		Silo							
9		Aero							
10	44 3rd Stage Engine			.2	80.9	109.3	116.2		
11		Silo							
12		Aero							
13		Base							
14	45 Interstage 2-3			.2	53.6	110.8	116.7		
15	(Fwd)	Silo							
16		Aero							
17		Base							
18		Silo							
19	Jettisoned	Aero							
20	Portion	Base							
21		Jett	.2		53.6	110.8	116.7		
22	45 Interstage 2-3			.2	85.0	107.7	101.8		
23	(Aft)	Silo							
24		Aero							
25	46 2nd Stage Engine			0	-	-	-		
26		Silo							
27		Aero							
28		Base							
29	47 Interstage 1-2			0	-	-	-		
30	(Fwd)	Silo							
31		Aero							
32		Base							
33		Silo							
34	Jettisoned	Aero							
35	Portion	Base							
36		Jett							
37	47 Interstage 1-2			.5	94.2	101.0	103.4		
38	(Aft)	Silo							
39		Aero							
40	48 1st Stage Engine			.8	161.3	116.2	129.0		
41		Silo							
42		Aero							
43		Base							
44	49 Shirt			.2	101.3	119.2	133.9		
45		Silo							
46		Aero							
47		Base							
48	MISSILE			2.7					
49		Silo							
50		Aero							
51		Base							
52		Jett							

* Boeing Section Stations (See Missile Station Diagram)

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ACTUAL WEIGHT RECORD - CTLLI SECTION

18.4.1	U/O MISSILE 000 0037	DRAWING NO. 25-25402-36	CHECK LIST NO. 39	REPORT NO. WTS-1114-037
	MISSILE MODEL WS-133A	DCN	REPORTED BY LB/RH	PAGE NO. 1 of 4
	CONFIGURATION	ADCN	CHECKED BY BW	DATE 11-1-63

LONGITUDINAL REFERENCE DATUM

LATERAL REFERENCE DATUM

VERTICAL REFERENCE DATUM

WEIGHING DATA				DIMENSIONAL DATA				
REACTION	GR. WT.	TARE	CORR.	NET WT.	DIM.	DIM.	DIM.	
					INCHES	INCHES	INCHES	
RF	46.75	15.75		31.05	AF	42.007	EA	84.510
RH	53.20	36.75		26.45	AH	42.023	EB	84.505
RE	114.20	71.70		42.50	BE	62.996	FC	115.490
RG	91.95	52.50		39.45	BG	62.999	FD	115.493
TOTAL	316.10	176.65		139.45	C	50.000	H	100.000
					D	60.000		

LONGITUDINAL C.G.				LATERAL C.G.				VERTICAL C.G.			
REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT
RF	31.05	42.007		RA	42.55	84.510		RB	31.35	77.478	
RH	26.45	42.023		RB	31.35	84.505		RD	26.90	77.481	
RE	42.50	62.996		RC	38.65	115.490		RA	42.55	115.500	
RG	39.45	62.999		RD	26.90	115.495		RC	38.65	115.500	
AS WGD	139.45	54.35	7,578.5	AS WGD	139.45	99.07	13,815.6	AS WGD	139.45	99.62	13,891.8

(RR) = Rear Reaction

REPORT OF CHECKS (CONT.)

CHECK LIST NO.	18.4.2 MISSILE ASSEMBLING CHECK LIST	REPORT OF CHECKS (CONT.)		
		Mo	Yr	Yr
52		11	1	63
DATE	FORM NO. 100-100-100	COMP-JURY		
SECTION 72	SECTION 72	MISSILE		
MISSILE COMPONENT C70	COMPONENT PART NO. 1	COMPONENT		
DESCRIPTION	MODEL	Y A 1	Y A 2	Y A 3
35. 1. 25402-36				
36. 1. 25402-11				
37. 1. 25402-11				
38. 1. 25402-11				
39. 1. 25402-11				
40. 1. 25402-11				
41. 1. 25402-11				
42. 1. 25402-11				
43. 1. 25402-11				
44. 1. 25402-11				
45. 1. 25402-11				
46. 1. 25402-11				
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71. 1. 25402-11				
72. 1. 25402-11				
73. 1. 25402-11				
74. 1. 25402-11				
75. 1. 25402-11				
76. 1. 25402-11				
77. 1. 25402-11				
78. 1. 25402-11				
79. 1. 25402-11				
80. 1. 25402-11				
81. 1. 25402-11				
82. 1. 25402-11				
83. 1. 25402-11				
84. 1. 25402-11				
85. 1. 25402-11				
86. 1. 25402-11				
87. 1. 25402-11				
88. 1. 25402-11				
89. 1. 25402-11				
90. 1. 25402-11				
91. 1. 25402-11				
92. 1. 25402-11				
93. 1. 25402-11				
94. 1. 25402-11				
95. 1. 25402-11				
96. 1. 25402-11				
97. 1. 25402-11				
98. 1. 25402-11				
99. 1. 25402-11				
100. 1. 25402-11				

10

18.4.3 WEIGHT AND BALANCE CHANGE RECORD

ASSOCIATE CONTRACTOR Boeing CONTRACT NO. AF 04(647)-289 REPORT NO. WTS-1114-037
 COMPONENT Section 39 LOT NO. 11-1-63 DATE 11-1-63
 MODEL NO. WS-133A DRAWING NO. 25-25402-36 PREPARED CB / RH
 SERIAL NO. 000037 U.O. MISSILE APPROVED GO

EQUIPMENT CHANGE RECORD		WEIGHT AND BALANCE						
PART NO.	DESCRIPTION OF EQUIPMENT	WEIGHT	X AXIS		Y AXIS		Z AXIS	
			ARM	MOMENT	ARM	MOMENT	ARM	MOMENT
1	25-25402-36 Instr. Group Trainer (as weighed)	139.45	54.35	7,578.5	99.07	13,815.6	99.62	13,891.8
2								
3								
4								
5	ADD:							
6	AN37194-315 Cable	3.24	74.2		115.5		102.8	
7	AN37196-315 Cable	1.34	50.4		106.9		111.4	
8								
9								
10								
11	25-25402-36 Instr. Group Trainer (Complete)	144.03	54.76	7,886.4	99.51	14,333.1	99.80	14,374.1
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								
31								
32								

18.5

ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION
 APPLICABLE TO CTLI SECTION S/N 0000037 AND INSTALLATION KIT

The following ECP's have not been incorporated into "Model Specification Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 8 July 1963. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WS-133A-EO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part 2	PSS, S&A Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of G&C Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-20885	3	Negl.	Yes
373	Work-Around for 10-2094-2-1 CTLI Alarm and Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415 540	Potting & Bonding Deletions For Vandenberg Air Force Base Missiles	All	-	NO*
525	CTLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MFCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MFCN 6301	3	Negl.	Yes
606	Revision to CTLI Umbilical Bracket- Section 49	1	Negl.	Yes

* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers in a Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

** These ECP's were incorporated during manufacture of the CTLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

18.5

ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION
 APPLICABLE TO CTLI SECTION S/N 0000037 AND INSTALLATION KIT

(Continued)

ECP NO. (WS-132A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
620	Installation of Static Dissipators on Operational Missiles	1	Negl.	Yes
635	PCM R/F Section Digital Data Programmers	3	Negl.	Yes
639	Prevent Interference of Linear Shape Charge With Cable Strap	3	Negl.	Yes
657	Revision of Ordnance Supports in Interstage 2-3	2	Negl.	Yes

CTLI SECTION, S/N 0000039

19.1 This section of the document describes the data changes created by converting a production line Minuteman missile into a CTL missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries, check lists, and ECP lists applicable to this installation. Page 184 summarizes the complete installation mass properties and consists of data from page 185 (average mass properties of downstage components), page 186 (predicted sealant changes), and page 190 (actual weight of CTLI section S/N 0000039). In addition, page 187 presents summary check lists by production section as backup data for page 185. Page 191 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-0LDR-NMPD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODS" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

The following drawings are incorporated in the above section:

- 10-20942, Battery Instl., DCN G 4-30-63.
- 21-52900, Missile Instl., DCN K 9-23-63.
- 25-23214, Raceway Instl., DCN F 4-29-63.
- 25-25402, 39 Sect. Instl., DCN J 6-17-63.
- 25-25406, HMS 5-62 Instl., DCN J 9-13-63.
- 25-26878, Cable Assy., DCN J 9-3-63.
- 25-29239, Conduit Assy., DCN F 4-4-63, ADCN S-34 7-26-63.
- 25-30133, Stand. Instl., DCN D 5-22-63.
- 25-31677, Instl. Kit, DCN E 5-4-63, ADCN S-22 7-10-63.
- 29-22327, Timer Instl., DCN D 6-24-63, ADCN S-6 9-5-63.

19.2 WEIGHT & BALANCE SUMMARY TOTAL CTLI KIT INSTALLATION CTLI WAFER S/N 0000039						REPORT NO. _____ DATE _____				
LINE	STATION	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			150.2	54.8	99.9	100.2	.004	.003
5			Silo							
6			Aero							
7	42	G&C Section			7.3	67.4	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			18.0	84.5	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.7	58.2	110.2	117.9	0	0
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett		- 1.7	58.2	110.2	117.9		
22	45	Interstage 2-3 (Aft)			19.5	65.1	111.7	120.2	0	.001
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.8	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			- 1.5	55.4	112.1	120.5	0	0
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett		- 1.5	55.4	112.1	120.5		
37	47	Interstage 1-2 (Aft)			26.0	74.1	114.7	125.2	0	.002
38			Silo							
39			Aero							
40	48	1st Stage Engine			30.6	112.8	117.6	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.9	74.5	119.5	128.4	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			284.1					
49			Silo							
50			Aero							
51			Base							
52			Jett							

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* Boeing Section Stations (See Missile Station Diagram)

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NO. DD-13243-1
PAGE 18A

19.2 WEIGHT & BALANCE SUMMARY (AVERAGE WEIGHT COMPONENTS)					REPORT NO.				
					DATE				
QTY	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			NEWTON'S	
					LONG.*	LAT.	VERT.	SING. FT. TO I	ROLL
1	RV Stracer								
2		Silo							
3		Aero							
4	31 Section			4.32	55.2	107.5	110.6	0	0
5		Silo							
6		Aero							
7	32 Section			6.94	67.5	112.0	115.2	0	0
8		Silo							
9		Aero							
10	33 1st Stage Engine			17.75	84.5	108.5	117.4	0	.002
11		Silo							
12		Aero							
13		Base							
14	34 Interstage 2-3 (Fwd)			-1.92	57.7	110.3	117.8	0	0
15		Silo							
16		Aero							
17		Base							
18		Silo							
19	Jettisoned Portion								
20		Aero							
21		Base							
22		Jett		-1.20	57.7	110.3	117.8		
23	35 Interstage 2-3 (Aft)			19.26	64.9	111.8	120.4	0	.001
24		Silo							
25		Aero							
26	36 2nd Stage Engine			25.71	102.1	112.5	121.4	0	.002
27		Silo							
28		Aero							
29		Base							
30	37 Interstage 1-2 (Fwd)			-1.45	55.4	112.1	120.2	0	0
31		Silo							
32		Aero							
33		Base							
34		Silo							
35	Jettisoned Portion								
36		Aero							
37		Base							
38		Jett		-1.45	55.4	112.1	120.2		
39	38 Interstage 1-2 (Aft)			25.47	73.7	115.2	125.6	0	.002
40		Silo							
41		Aero							
42	39 1st Stage Engine			29.83	111.5	117.7	130.2	0	.025
43		Silo							
44		Aero							
45		Base							
46	40 3rd Stret			9.73	73.9	119.5	128.3	0	0
47		Silo							
48		Aero							
49		Base							
50	MISSILE			135.79					
51		Silo							
52		Aero							
53		Base							
54		Jett							

19.2 EMS 5-02 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE**					REPORT NO. _____				
					DATE _____				
STATION	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA	
					LONG.*	LAT.	VERT.	SLUG FT ² x10 ⁻³	PINW
1	RV Spacer								
2		Silo							
3		Aero							
4	1st Section			.2	54.5	111.5	111.5		
5		Silo							
6		Aero							
7	2nd Section			.4	65.4	110.5	113.5		
8		Silo							
9		Aero							
10	3rd Stage Engine			.2	80.9	109.5	116.2		
11		Silo							
12		Aero							
13		Base							
14	Interstage 2-3 (FWI)			.2	53.6	110.8	116.7		
15		Silo							
16		Aero							
17		Base							
18		Silo							
19	Jettisoned Portion	Aero							
20		Base							
21		Jett	.2		55.6	110.8	115.7		
22	Interstage 2-3 (AWI)			.2	82.0	103.0	101.8		
23		Silo							
24		Aero							
25	3rd Stage Engine			.6					
26		Silo							
27		Aero							
28		Base							
29	Interstage 1-2 (AWI)			.2					
30		Silo							
31		Aero							
32		Base							
33		Silo							
34	Jettisoned Portion	Aero							
35		Base							
36		Jett							
37	Interstage 1-2 (AWI)			.5	24.7	102.2	103.4		
38		Silo							
39		Aero							
40	4th Stage Engine			.8	161.3	116.2	128.2		
41		Silo							
42		Aero							
43		Base							
44	5th Part			.2	101.3	119.2	133.9		
45		Silo							
46		Aero							
47		Base							
48	MISSILE			2.7					
49		Silo							
50		Aero							
51		Base							
52		Jett							

* Boeing Section Stations (See Missile Station Diagram)

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REV. 501. F ** Reference D2-1394-534

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NO D2-1394-1-1

SEC.

PAGE 186

SERIAL NUMBER: 000039

MISSILE WEIGHING CHECK LIST

CHECK LIST NO. _____

DATE _____

19.3

MODEL 39 THRU 49

FINAL ASSEMBLY DRAWING NO. _____

RECORD OF CHECKING (DATE)

Mo
Day
Yr

MISSILE

COMPONENT

ITEM NUMBER

SECTION _____

MISSILE NO. _____

MISSILE COMPONENT _____

COMPONENT PART NO. _____

DESCRIPTION

PART NO.

WEIGHT

X ARM

Y ARM

Z ARM

BASIC WEIGHT

AS WEIGHED

REMOTE SITE SHIPMENT

AS RECEIVED

REMOTE SITE

LAUNCH

SUMMARY CHECK LISTS FOR SECTIONS 39 THROUGH 49 ARE IDENTICAL TO THOSE FOUND ON PAGES 162 THROUGH 169.

ACTUAL WEIGHT RECORD - CTLI SECTION

19.4.1	DRAWING NO. 25-25402-30	CHECK LIST NO. 39	REPORT NO. _____
U/O MISSILE 0000039	LCN _____	REPORTED BY _____	PAGE NO. _____
MISSILE MODEL WS-133A	ADCN _____	CHECKED BY _____	DATE _____
CONFIGURATION _____			

LONGITUDINAL REFERENCE DATUM

LATERAL REFERENCE DATUM

VERTICAL REFERENCE DATUM

WEIGHING DATA				DIMENSIONAL DATA											
REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	NET WT.	REACTION	NET WT.	REACTION	NET WT.
RF	45.30	32.70		12.60	RC	80.00	35.80		44.20	AF	42.007	EA	84.510	GB	77.478
RH	65.10	20.00		45.10	RD	74.50	53.10		21.40	AH	42.023	EB	84.505	GD	77.481
RE	115.90	55.05		60.85	RA	69.95	32.85		37.10	BE	62.996	FC	115.490	JA	115.500
RG	89.90	68.80		21.10	RE	91.80	54.85		36.95	BG	62.999	FD	115.495	JC	115.500
TOTAL	316.20	176.55		139.65	TOTAL	316.25	176.60		139.65	C	50.000	H	100.000	M	100.000
										D	60.000				

LONGITUDINAL C.G.				LATERAL C.G.				VERTICAL C.G.			
REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT
RF	12.60	42.007		RA	37.10	84.510		RB	36.95	77.478	
RH	45.10	42.023		RB	36.95	84.505		RD	21.40	77.481	
RE	60.85	62.996		RC	44.20	115.490		RA	37.10	115.500	
RG	21.10	62.999		RD	21.46	115.495		RC	44.20	115.500	
AS XGD	139.65	54.32	7.587.1	AS XGD	139.65	99.06	13,834.0	AS XGD	139.65	99.61	13,911.1

(RR) - Rear Reaction

19.4.3 WEIGHT AND BALANCE CHANGE RECORD

ASSOCIATE CONTRACTOR BOEING CONTRACT NO. AF04(647)-289 REPORT NO. _____
 COMPONENT SECTION 39 LOT NO. _____ DATE _____
 MODEL NO. MS-133 DRAWING NO. 25-25402-36 PREPARED _____
 SERIAL NO. 0000039 U.C. MISSILE APPROVED _____

PART NO.	EQUIPMENT CHANGE RECORD	DESCRIPTION OF EQUIPMENT	WEIGHT AND BALANCE								
			WEIGHT	X AXIS ARM	X AXIS MOMENT	Y AXIS ARM	Y AXIS MOMENT	Z AXIS ARM	Z AXIS MOMENT		
1											
2		Instr. Group Trainer (As Weighed)	139.65	54.32	7,587.1	99.06	13,834.0	99.61	13,911.1		
3											
4											
5		ADD:									
6		AM31278-315 Cable-Autonetics	3.91	74.2		115.5		102.8			
7		AM31279-315 Cable-Autonetics	2.08	50.4		106.9		111.4			
8											
9											
10											
11		Instr. Group Trainer (Complete)	145.64	54.81	7,982.1	99.62	14,508.0	99.87	14,544.8		
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											
24											
25											
26											
27											
28											
29											
30											
31											
32											

19.5

**ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION
APPLICABLE TO CTLI SECTION S/N 000009 AND INSTALLATION KIT**

The following ECP's have not been incorporated into "Model Specification Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 8 July 1963. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WS-133A-EO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part 2	PSS, S&A Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of G&C Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-20865	3	Negl.	Yes
373	Work-Around for 10-20942-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415 / 540	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
525	CTLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MRCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MRCN 6301	3	Negl.	Yes
606	Revision to CTLI Umbilical Bracket- Section 49	1	Negl.	Yes

* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

** These ECP's were incorporated during manufacture of the CTLI wafer. However, the portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

19.5

ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION
 APPLICABLE TO CTLI SECTION S/N 0000039 AND INSTALLATION KIT

(Continued)

ECP NO. (WS-138A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
620	Installation of Static Dissipators on Operational Missiles	1	Negl.	Yes
635	PCM R/F Section Digital Data Programmers	3	Negl.	Yes
639	Prevent Interference of Linear Shape Charge With Cable Strap	3	Negl.	Yes
657	Revision of Ordnance Supports in Interstage 2-3	2	Negl.	Yes

CTLI SECTION, S/N 0000102

20.1 This section of the document describes the data changes created by converting a production line Minuteman missile into a CTL missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries, check lists, and ECP lists applicable to this installation. Page 193 summarizes the complete installation mass properties and consists of data from page 194 (average mass properties of downstage components), page 195 (predicted sealant changes), and page 197 (actual weight of CTLI section S/N 0000102). In addition, page 196 presents summary check lists by production section as backup data for page 194. Page 200 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-01DR-NMPD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODG" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

The following drawings are incorporated in the above section:

- 10-20942, Battery Instl., DCN G 4-30-63.
- 21-52900, Missile Instl., DCN K 9-23-63.
- 25-23214, Raceway Instl., DCN F 4-29-63.
- 25-25402, 39 Sect. Instl., DCN J 6-17-63.
- 25-25406, HMS 5-62 Instl., DCN J 9-13-63.
- 25-26878, Cable Assy., DCN J 9-3-63.
- 25-29239, Conduit Assy., DCN F 4-4-63, ADCN S-34 7-26-63.
- 25-30133, Stand. Instl., DCN D 5-22-63.
- 25-31677, Instl. Kit, DCN E 5-4-63, ADCN S-22 7-10-63.
- 29-22327, Timer Instl., DCN D 6-24-63, ADCN S-6 9-5-63.

WEIGHT & BALANCE SUMMARY
 TOTAL CTLI KIT INSTALLATION
 CTLI WAFER S/N 0000102

REPORT NO. _____

DATE _____

LINE	STATION	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			148.5	54.8	99.7	100.2	.004	.003
5			Silo							
6			Aero							
7	42	G&C Section			7.3	67.4	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			18.0	84.5	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.7	58.2	110.2	117.9	0	0
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett		- 1.7	58.2	110.2	117.9		
22	45	Interstage 2-3 (Aft)			19.5	65.1	111.7	120.2	0	.001
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.8	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			- 1.5	55.4	112.1	120.5	0	0
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett		- 1.5	55.4	112.1	120.5		
37	47	Interstage 1-2 (Aft)			26.0	74.1	114.7	125.2	0	.002
38			Silo							
39			Aero							
40	48	1st Stage Engine			30.6	112.8	117.6	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.9	74.5	119.5	128.4	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			282.4					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

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20.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)					REPORT NO. _____ DATE _____					
LINE	ID	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³	
						LONG. *	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			4.39	55.9	107.5	110.6	0	0
5			Silo							
6			Aero							
7	42	O&C Section			6.94	67.5	112.0	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			17.75	84.5	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.90	57.7	110.3	117.8	0	0
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.90		57.7	110.3	117.8		
22	45	Interstage 2-3 (Aft)			19.26	64.9	111.8	120.4	0	.001
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.77	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			- 1.45	55.4	112.1	120.5	0	0
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.45		55.4	112.1	120.5		
37	47	Interstage 1-2 (Aft)			25.47	73.7	115.0	125.6	0	.002
38			Silo							
39			Aero							
40	48	1st Stage Engine			29.83	111.5	117.7	130.2	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.73	73.9	119.5	128.3	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			135.79					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boozing Section Stations (See Missile Station Diagram)

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20.2		BMS 5-62 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE**				REPORT NO. _____				
						DATE _____				
LINE	STATION	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			.2	54.5	111.5	111.5		
5			Silo							
6			Aero							
7	42	G&C Section			.4	65.4	110.5	113.5		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			.2	80.9	109.3	116.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			.2	53.6	110.8	116.7		
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett		.2	53.6	110.8	116.7		
22	45	Interstage 2-3 (Aft)			.2	85.0	103.0	101.8		
23			Silo							
24			Aero							
25	46	2nd Stage Engine			0	-	-	-		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			0	-	-	-		
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett							
37	47	Interstage 1-2 (Aft)			.5	94.7	102.0	103.4		
38			Silo							
39			Aero							
40	48	1st Stage Engine			.8	161.3	116.2	128.0		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			.2	101.3	119.2	133.9		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			2.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

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REV. 501. P ** Reference D2-13954-53

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20.4.1

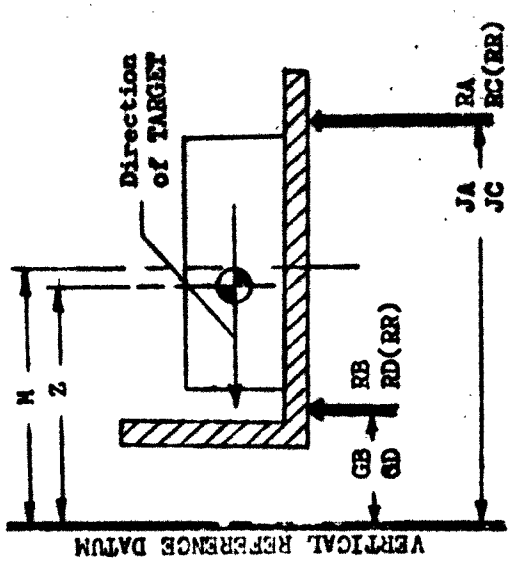
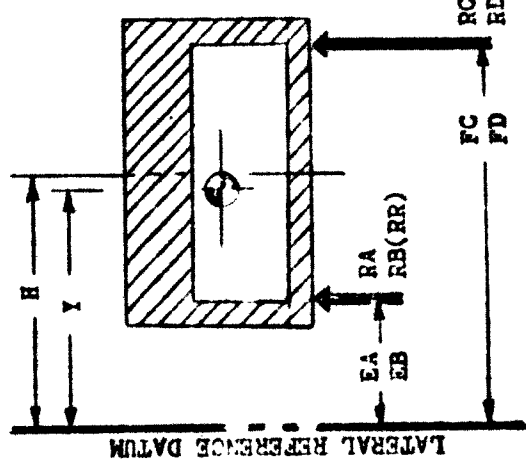
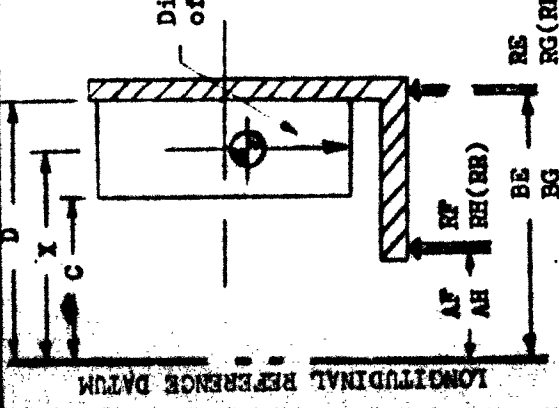
U/O MISSILE 0000102
 MISSILE MODEL MB-133A
 CONFIGURATION

DRAWING NO. 25-25402-36
 DCN J
 ADCN

CHECK LIST NO. 39
 REPORTED BY CR/RR
 CHECKED BY RM

REPORT NO. _____
 PAGE NO. _____
 DATE 11/21/63

ACTUAL WEIGHT RECORD - CTLI SECTION



WEIGHING DATA

REACTION	GR. WT.	TARE	CORR.	NET WT.
RF	60.65	30.65		30.00
RH	49.00	21.85		27.15
RE	100.20	56.65		43.55
RG	106.05	67.40		38.65
TOTAL	315.90	176.55		139.35

WEIGHING DATA

REACTION	GR. WT.	TARE	CORR.	NET WT.
RC	74.40	34.00		40.40
RD	79.75	54.75		25.00
RA	75.45	34.60		40.85
RB	86.30	53.20		33.10
TOTAL	315.90	176.55		139.35

DIMENSIONAL DATA

DIM.	INCHES	DIM. INCHES	DIM. INCHES
AF	42.007	EA	84.510
AH	42.023	EB	84.509
BE	62.996	FC	115.490
BG	62.999	FD	115.493
C	50.000	H	100.000
D	60.000		

LONGITUDINAL C.G.

REACTION	NET WT.	ARM	MOMENT
RF	30.00	42.007	
RH	27.15	42.023	
RE	43.55	62.996	
RG	38.65	62.999	
AS WGD	139.35	54.39	7,579.5

LATERAL C.G.

REACTION	NET WT.	ARM	MOMENT
RA	40.85	84.510	
RB	33.10	84.509	
RC	40.40	115.490	
RD	25.00	115.493	
AS WGD	139.35	99.05	13,802.5

VERTICAL C.G.

REACTION	NET WT.	ARM	MOMENT
RB	33.10	77.476	
RD	25.00	77.481	
RA	40.85	115.500	
RC	40.40	115.500	
AS WGD	139.35	99.65	13,885.9

(RR) - Rear Reaction

0000102

20.4.2 MISSILE WEARING CHECK LIST

CHECK LIST NO. 20.4.2

MODEL NUMBER FINAL AND PAY BARCODE NO. 0000102-36

CHECK LIST NO.	DATE	SECTION	MISSILE COMPONENT	RECORD OF CHECKS (TYPE)		
				NO.	DAY	YR.
30		TESTING	MISSILE	11		
31		QUALIFICATION	MISSILE	21		
32		OPERATIONAL	MISSILE	63		
33		REPAIR	MISSILE			
34		DISMANTLING	MISSILE			
35		REWORK	MISSILE			
36		REWORK	MISSILE			
37		REWORK	MISSILE			
38		REWORK	MISSILE			
39		REWORK	MISSILE			
40		REWORK	MISSILE			
41		REWORK	MISSILE			
42		REWORK	MISSILE			
43		REWORK	MISSILE			
44		REWORK	MISSILE			
45		REWORK	MISSILE			
46		REWORK	MISSILE			
47		REWORK	MISSILE			
48		REWORK	MISSILE			
49		REWORK	MISSILE			
50		REWORK	MISSILE			
51		REWORK	MISSILE			
52		REWORK	MISSILE			
53		REWORK	MISSILE			
54		REWORK	MISSILE			
55		REWORK	MISSILE			
56		REWORK	MISSILE			
57		REWORK	MISSILE			
58		REWORK	MISSILE			
59		REWORK	MISSILE			
60		REWORK	MISSILE			
61		REWORK	MISSILE			
62		REWORK	MISSILE			
63		REWORK	MISSILE			
64		REWORK	MISSILE			
65		REWORK	MISSILE			
66		REWORK	MISSILE			
67		REWORK	MISSILE			
68		REWORK	MISSILE			
69		REWORK	MISSILE			
70		REWORK	MISSILE			
71		REWORK	MISSILE			
72		REWORK	MISSILE			
73		REWORK	MISSILE			
74		REWORK	MISSILE			
75		REWORK	MISSILE			
76		REWORK	MISSILE			
77		REWORK	MISSILE			
78		REWORK	MISSILE			
79		REWORK	MISSILE			
80		REWORK	MISSILE			
81		REWORK	MISSILE			
82		REWORK	MISSILE			
83		REWORK	MISSILE			
84		REWORK	MISSILE			
85		REWORK	MISSILE			
86		REWORK	MISSILE			
87		REWORK	MISSILE			
88		REWORK	MISSILE			
89		REWORK	MISSILE			
90		REWORK	MISSILE			
91		REWORK	MISSILE			
92		REWORK	MISSILE			
93		REWORK	MISSILE			
94		REWORK	MISSILE			
95		REWORK	MISSILE			
96		REWORK	MISSILE			
97		REWORK	MISSILE			
98		REWORK	MISSILE			
99		REWORK	MISSILE			
100		REWORK	MISSILE			

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REV. 5/61

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20.5

ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION
APPLICABLE TO CTLI SECTION S/N 000102 AND INSTALLATION KIT

The following ECP's have not been incorporated into "Model Specification Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 8 July 1963. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WS-133A-EO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part 2	PSS, S&A Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of G&C Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-00005	3	Negl.	Yes
373	Work-Around for 10-20942-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415 540	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
525	CTLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MERCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MERCN 6301	3	Negl.	Yes
606	Revision to CTLI Umbilical Bracket-Section 49	1	Negl.	Yes

* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

** These ECP's were incorporated during manufacture of the CTLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

20.5

ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION
APPLICABLE TO CELL SECTION S/N 0000102 AND INSTALLATION KIT
 (Continued)

ECP NO. (WS-131A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
620	Installation of Static Dissipators on Operational Missiles	1	Negl.	Yes
635	PCM R/F Section Digital Data Programmers	3	Negl.	Yes
639	Prevent Interference of Linear Shape Charge With Cable Strap	3	Negl.	Yes
657	Revision of Ordnance Supports in Interstage 2-3	2	Negl.	Yes

SYMBOL F
RESHOT
BECAUSE FIELD
WAS NOT OPEN.

SYMBOL F
RE SHOT
BECAUSE FIELD
WAS NOT OPEN.

ACTIVE PAGE RECORD

SECTION	ORIG REL PAGE NO.	REV SYM	ADDED PAGES					SECTION	ORIG REL PAGE NO.	REV SYM	ADDED PAGES				
			PAGE NO.	REV SYM	PAGE NO.	REV SYM	PAGE NO.				REV SYM	PAGE NO.	REV SYM	PAGE NO.	REV SYM
			97	E							145	F			
			98	E							146	F			
			99	E							147	F			
			100	E							148	F			
			101	E							149	F	148.1	F	
			102	E							150	E			
			103	E	103.1	E					151	E			
			104	E							152	E			
			105	E							153	E			
			106	E							154	E			
			107	E							155	E			
			108	E							156	E			
			109	E							157	E			
			110	E							158	F			
			111	E							159	F			
			112	E	112.1	E					160	F			
			113	E							161	F			
			114	E							162	F			
			115	E							163	F			
			116	E							164	F			
			117	E							165	F			
			118	E							166	F			
			119	E							167	F			
			120	E							168	F			
			121	E							169	F			
			122	E							170	F			
			123	E							171	F			
			124	E							172	F			
			125	E							173	F	173.1	F	
			126	E							174	F			
			127	E							175	F			
			128	E							176	F			
			129	E							177	F			
			130	E	130.1	E					178	F			
			131	E							179	F			
			132	E							180	F			
			133	E							181	F			
			134	E							182	F	182.1	F	
			135	E							183	F			
			136	E							184	F			
			137	E							185	F			
			138	E							186	F			
			139	E	139.1	E					187	F			
			140	F							188	F			
			141	F							189	F			
			142	F							190	F			
			143	F							191	F	191.1	F	
			144	F							192	F			

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REV SYM F

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SECT . PAGE 2.1

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SECTION	ORIG REL PAGE NO.	REV SYM	ADDED PAGES				SECTION	ORIG REL PAGE NO.	REV SYM	ADDED PAGES				
			PAGE NO.	REV SYM	PAGE NO.	REV SYM				PAGE NO.	REV SYM	PAGE NO.	REV SYM	
			193	F										
			194	F										
			195	F										
			196	F										
			197	F										
			198	F										
			199	F										
			200	F										
						200.1	F							

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REV SYM F

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SECT.

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REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
A	Revised pages 1, 4, 10. Added pages 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42. Added Moments of Inertia to page 10. Added Sections 3.0 and 4.0 to the document.	5-17-63	D. Brenden <i>D. Brenden</i>
B	Added Sections 5.0, 6.0 and 7.0 to the document.	6-17-63	D. Brenden <i>D. Brenden</i>
C	Added Sections 8.0 and 9.0 to the document.	7-17-63	D. Brenden <i>D. Brenden</i>
D	Revised pages 2, 3, 4.1 Added pages 2.1, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112.	8-16-63	D. Brenden <i>D. Brenden</i>
E	Revised pages 2, 2.1, 3, 4.1, 6, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112. Added pages 4.2, 103.1, 112.1, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 130.1, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 159.1	10-23-63	D. Brenden <i>D. Brenden</i>
F	Revised pages 2, 2.1, 3, 4.2, 140, 141, 142, 143, 144, 145, 146, 147, 148. Added pages 2.2, 4.3, 148.1, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 173.1, 174, 175, 176, 177, 178, 179, 180, 181, 182, 182.1, 183, 184, 185, 186, 187, 188, 189, 190, 191, 191.1, 192, 193, 194, 195, 196, 197, 198, 199, 200, 200.1	11-25-63	D. Brenden <i>D. Brenden</i>

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REV SYM F

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SECT.

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CTLI SECTION, S/N 0000034

15.1 This section of the document describes the data changes created by converting a production line Minuteman missile into a CTLI missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries, check lists, and ECP lists applicable to this installation. Page 141 summarizes the complete installation mass properties and consists of data from page 142 (average mass properties of downstage components), page 143 (predicted sealant changes), and page 147 (actual weight of CTLI section S/N 0000034). In addition, page 144 presents summary check lists by production section as backup data for page 142. Page 148 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-OLDR-NMPD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODS" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

The following drawings are incorporated in the above section:

- 10-20942, Battery Instl., DCN G 4-30-63.
- 21-52900, Missile Instl., DCN K 9-23-63.
- 25-23214, Raceway Instl., DCN F 4-29-63.
- 25-25402, 39 Sect. Instl., DCN J 6-17-63.
- 25-25406, EMS 5-62 Instl., DCN J 9-13-63.
- 25-26878, Cable Assy., DCN J 9-3-63.
- 25-29239, Conduit Assy., DCN F 4-4-63, ADCN S-34 7-26-63.
- 25-30133, Stand. Instl., DCN D 5-23-63.
- 25-31677, Instl. Kit, DCN E 5-4-63, ADCN S-22 7-10-63.
- 29-22327, Timer Instl., DCN D 6-24-63, ADCN S-6 9-5-63.

15.2		WEIGHT & BALANCE SUMMARY TOTAL CTLI KIT INSTALLATION CTLI WAFER S/N 000034			REPORT NO. _____		DATE _____			
LINE NO.	STATION	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			149.4	54.7	99.8	100.1	.004	.003
5			Silo							
6			Aero							
7	42	G&C Section			7.3	07.4	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			17.9	84.6	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			-1.7	58.2	110.2	117.9	0	0
15			Silo							
16			Aero							
17			Base							
18		Jettisoned Portion	Silo							
19			Aero							
20			Base							
21			Jett	-1.7						
22	45	Interstage 2-3 (Aft)			19.45	65.1	111.7	120.1	0	.001
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.7	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			-1.45	55.4	112.1	120.5	0	0
30			Silo							
31			Aero							
32			Base							
33		Jettisoned Portion	Silo							
34			Aero							
35			Base							
36			Jett	-1.45						
37	47	Interstage 1-2 (Aft)			26.0	74.1	114.8	125.2	0	.002
38			Silo							
39			Aero							
40	48	1st Stage Engine			30.6	112.8	117.6	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.9	74.5	119.5	128.4	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			283.1					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

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15.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)						REPORT NO. _____ DATE _____				
NO.	STATION	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³	
						LONG.	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			4.39	56.0	107.5	110.7	0	0
5			Silo							
6			Aero							
7	42	G&C Section			6.94	67.5	112.0	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			17.65	84.6	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.90	57.7	110.3	117.8	0	0
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett	- 1.90		57.7	110.3	117.8		
22	45	Interstage 2-3 (Aft)			19.25	64.9	111.8	120.3	0	.001
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.73	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			- 1.45	55.4	112.1	120.5	0	0
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett	- 1.45		55.4	112.2	120.6		
37	47	Interstage 1-2 (Aft)			25.46	73.7	115.0	125.6	0	.002
38			Silo							
39			Aero							
40	48	1st Stage Engine			29.83	111.5	117.7	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Wairt			9.73	74.0	119.5	128.3	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			135.63					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

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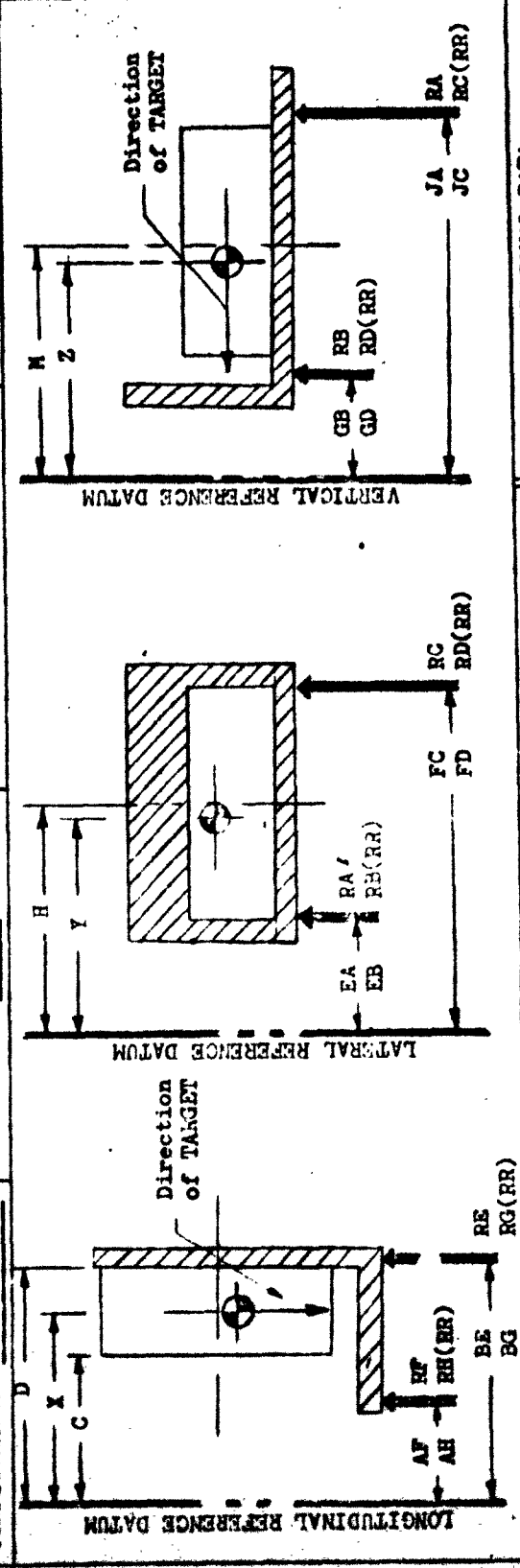
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15.2 BMS 5-62 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE**					REPORT NO. _____ DATE _____					
NO	STATION	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			.2	54.5	111.5	111.5		
5			Silo							
6			Aero							
7	42	O&C Section			.4	65.4	110.5	113.5		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			.2	80.9	109.3	116.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			.2	53.6	110.8	116.7		
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett		.2	55.5	110.8	116.7		
22	45	Interstage 2-3 (Aft)			.2	85.0	103.0	101.8		
23			Silo							
24			Aero							
25	46	2nd Stage Engine			0	-	-	-		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			0	-	-	-		
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett							
37	47	Interstage 1-2 (Aft)			.5	94.7	102.0	103.4		
38			Silo							
39			Aero							
40	48	1st Stage Engine			.8	161.3	110.2	128.0		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			.2	101.3	119.2	133.9		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			2.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

15.4.1 ACTUAL WEIGHT RECORD - CTLLI SECTION

U/O MISSILE 000034 CHECK LIST NO. 39 REPORT NO. WTS-1112-034
 MISSILE MODEL WS-133A DRAWING NO. 25-25402-36 REPORTED BY CFB/RR PAGE NO.
 CONFIGURATION DCN J CHECKED BY RW DATE 10/31/63



WEIGHING DATA				DIMENSIONAL DATA					
REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	GR. WT.	TARE	CORR.	NET WT.
RF	54.60	23.95		30.65	RC	68.80	36.30		32.50
RH	56.30	28.60		27.70	RD	85.70	52.55		33.15
RE	107.15	63.65		43.50	RA	81.30	32.20		49.10
RG	98.70	60.40		38.30	RB	80.80	55.40		25.40
TOTAL	316.15	176.60		140.15	TOTAL	316.60	176.45		140.15

LONGITUDINAL C.G.			LATERAL C.G.			VERTICAL C.G.		
REACTION	NET WT.	MOMENT	REACTION	NET WT.	MOMENT	REACTION	NET WT.	MOMENT
RF	30.65	42.007	RA	49.10	84.510	RB	25.40	77.478
RH	27.70	42.023	RB	25.40	84.505	RD	33.15	77.481
RE	43.50	62.996	RC	32.50	115.490	RA	49.10	115.500
RG	38.30	62.999	RD	33.15	115.495	RC	32.50	115.500
AS CGD	140.15	54.26	AS CGD	140.15	99.02	AS CGD	140.15	99.62
		7.604.7			13.878.0			13.961.2

(RR) = Rear Reaction

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WEIGHT AND BALANCE CHANGE RECORD									
15.4.3		WEIGHT AND BALANCE CHANGE RECORD		CONTRACT NO. AF04(647)-289		REPORT NO. WTS-11112-034			
ASSOCIATE CONTRACTOR BOEING		LOT NO.		DATE		PREPARED			
COMPONENT SECTION 39		DRAWING NO. 25-25402-36		APPROVED		BY			
MODEL NO. WS-133A		U.O. MISSILE							
SERIAL NO. 0000034									
EQUIPMENT CHANGE RECORD				WEIGHT AND BALANCE					
LINE	PART NO.	DESCRIPTION OF EQUIPMENT	WEIGHT	X AXIS ARM	X AXIS MOMENT	Y AXIS ARM	Y AXIS MOMENT	Z AXIS ARM	Z AXIS MOMENT
1	25-25402-36	Instr. Group Trainer (As Weighed)	140.15	54.26	7,604.7	99.02	13,878.0	99.62	13,961.2
2									
3									
4									
5		ADD:							
6	AN37194-315	Cable-Autonetics	3.25	74.2		115.5		102.8	
7	AN37196-315	Cable-Autonetics	1.37	50.4		106.9		111.4	
8									
9									
10	25-25402-36	Instr. Group Trainer (Complete)	144.77	54.67	7,914.9	99.52	14,399.8	99.80	14,447.9
11									
12									
13									
14									
15									
16									
17									
18									
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31									
32									

15.5

ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION
APPLICABLE TO CTLI SECTION S/N 000034 AND INSTALLATION KIT

The following ECP's have not been incorporated into "Model Specification Trainer-Best Group, Guided Missile, (S-133-1006)" as revised on 8 July 1965. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WS-133A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part 2	PSS, S&A Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of G&C Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-20885	2	Negl.	Yes
373	Work-Around for 10-20942-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415 / 540	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
525	CTLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MRCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MRCN 6301	3	Negl.	Yes
606	Revision to CTLI Umbilical Bracket-Section 49	1	Negl.	Yes

* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

** These ECP's were incorporated during manufacture of the CTLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

15.5

ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION
APPLICABLE TO CTLI SECTION S/N 0000034 AND INSTALLATION KIT

(Continued)

ECP NO. (WS-133A-E)-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
620	Installation of Static Dissipators on Operational Missiles	1	Negl.	Yes
635	PCM R/F Section Digital Data Programmers	3	Negl.	Yes
639	Prevent Interference of Linear Shape Charge With Cable Strap	3	Negl.	Yes
657	Revision of Ordnance Supports in Interstage 2-3	2	Negl.	Yes

CTLI SECTION, S/N 0000036

17.1 This section of the document describes the data changes created by converting a production line Minuteman missile into a CTLI missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries, check lists, and ECP lists applicable to this installation. Page 159 summarizes the complete installation mass properties and consists of data from page 160 (average mass properties of downstage components), page 161 (predicted sealant changes), and page 172 (actual weight of CTLI section S/N 0000036). In addition, page 162 presents summary check lists by production section as backup data for page 160. Page 173 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-CIDR-NMPD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODS" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

The following drawings are incorporated in the above section:

10-20942, Battery Instl., DCN G 4-30-63.
21-52900, Missile Instl., DCN K 9-23-63.
25-23214, Raceway Instl., DCN F 4-29-63.
25-25402, 39 Sect. Instl., DCN J 6-17-63.
25-25406, EMS 5-62 Instl., DCN J 9-13-63.
25-26878, Cable Assy., DCN J 9-3-63.
25-29239, Conduit Assy., DCN F 4-4-63, ADCN S-34 7-26-63.
25-30133, Stand. Instl., DCN D 5-27-63.
25-31677, Instl. Kit, DCN E 5-4-63, ADCN S-22 7-10-63.
29-22327, Timer Instl., DCN D 6-24-63, ADCN S-6 9-5-63.

17.2 WEIGHT & BALANCE SUMMARY TOTAL CTLI KIT INSTALLATION CTLI WAFER S/N 0000036					REPORT NO. _____ DATE _____					
LINE NO.	ITEM NO.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³	
						LONG.#	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			150.1	54.8	99.7	100.2	.004	.003
5			Silo							
6			Aero							
7	42	G&C Section			7.3	67.4	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			18.0	84.5	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.7	58.2	110.2	117.9	0	0
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett		- 1.7	58.2	110.2	117.9		
22	45	Interstage 2-3 (Aft)			19.5	65.1	111.7	120.2	0	.001
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.8	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			- 1.5	55.4	112.1	120.5	0	0
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett		- 1.5	55.4	112.1	120.5		
37	47	Interstage 1-2 (Aft)			26.0	74.1	114.7	125.2	0	.002
38			Silo							
39			Aero							
40	48	1st Stage Engine			30.6	112.8	117.6	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Script			9.9	74.5	119.5	128.4	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			284.0					
49			Silo							
50			Aero							
51			Base							
52			Jett							

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* Boeing Section Stations (See Missile Station Diagram)

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17.2		WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)				REPORT NO. _____ DATE _____					
STATION	SUB-STATION	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³		
						LONG.*	LAT.	VERT.	ROLL	PITCH	
1	41	RV Spacer									
2		Silo									
3		Aero									
4	39	CTLI Section			4.39	55.9	107.5	110.6	0	0	
5		Silo									
6		Aero									
7	42	O&C Section			6.94	67.5	112.0	114.3	0	0	
8		Silo									
9		Aero									
10	44	3rd Stage Engine			17.75	84.5	108.5	117.4	0	.002	
11		Silo									
12		Aero									
13		Base									
14	45	Interstage 2-3 (Fwd)			- 1.90	57.7	110.3	117.8	0	0	
15		Silo									
16		Aero									
17		Base									
18		Silo									
19		Jettisoned	}								
20		Portion		Aero							
21		Base		Jett	- 1.90	57.7	110.3	117.8			
22	45	Interstage 2-3 (Aft)			19.26	64.9	111.8	120.4	0	.001	
23		Silo									
24		Aero									
25	46	2nd Stage Engine			25.77	102.1	112.6	121.4	0	.009	
26		Silo									
27		Aero									
28		Base									
29	47	Interstage 1-2 (Fwd)			- 1.45	55.4	112.1	120.5	0	0	
30		Silo									
31		Aero									
32		Base									
33		Silo									
34		Jettisoned	}								
35		Portion		Aero							
36		Base		Jett	- 1.45	55.4	112.1	120.5			
37	47	Interstage 1-2 (Aft)			25.47	73.7	115.0	125.6	0	.002	
38		Silo									
39		Aero									
40	48	1st Stage Engine			29.83	111.5	117.7	130.2	0	.025	
41		Silo									
42		Aero									
43		Base									
44	49	Start			9.73	73.9	119.5	128.3	0	0	
45		Silo									
46		Aero									
47		Base									
48		MISSILE			135.79						
49		Silo									
50		Aero									
51		Base									
52		Jett									

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17.2 HMS 5-62 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE**					REPORT NO. _____ DATE _____				
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² X10 ⁻³	
					LONG.#	LAT.	VERT.	ROLL	PITCH
1	41 RV Spacer								
2		Silo							
3		Aero							
4	39 CTLI Section			.2	54.5	111.5	111.5		
5		Silo							
6		Aero							
7	42 G&C Section			.4	65.4	110.5	113.5		
8		Silo							
9		Aero							
10	44 3rd Stage Engine			.2	80.9	109.3	116.2		
11		Silo							
12		Aero							
13		Base							
14	45 Interstage 2-3 (Fwd)			.2	53.6	110.8	116.7		
15		Silo							
16		Aero							
17		Base							
18		Silo							
19	Jettisoned Portion	Aero							
20		Base							
21		Jett	.2		53.6	110.8	116.7		
22	45 Interstage 2-3 (Aft)			.2	85.0	103.0	101.8		
23		Silo							
24		Aero							
25	46 2nd Stage Engine			0	-	-	-		
26		Silo							
27		Aero							
28		Base							
29	47 Interstage 1-2 (Fwd)			0	-	-	-		
30		Silo							
31		Aero							
32		Base							
33		Silo							
34	Jettisoned Portion	Aero							
35		Base							
36		Jett							
37	47 Interstage 1-2 (Aft)			.5	94.7	102.0	103.4		
38		Silo							
39		Aero							
40	48 1st Stage Engine			.8	161.3	116.2	128.0		
41		Silo							
42		Aero							
43		Base							
44	49 Scirt			.2	101.3	119.2	133.9		
45		Silo							
46		Aero							
47		Base							
48	MISSILE			2.7					
49		Silo							
50		Aero							
51		Base							
52		Jett							

* Boeing Section Stations (See Missile Station Diagram)

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CHECK LIST NO.	17.3.1 MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)											
	DATE	MODEL	Mo	Day	Yr									
		FINAL ASSEMBLY DRAWING NO. 21-52900-20 (Using 25-25406-9)												
	SECTION 39	MISSILE NO. _____												
	MISSILE COMPONENT	COMPONENT PART NO. _____												
ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	BASIC WEIGHT	AS WEIGHED	REMOTE SITE SHIPMENT	AS RECEIVED	REMOTE SITE	AS WEIGHED	REMOTE SITE	LAUNCH
3a	Body Sect. - Trainer Test	25-25402-36	SEE CHANGE RECORD											
3b	Cable Assy. Set - Electrical	25-26878-5	2.21	56.5	109.8	116.0								
3c	Conduit Supt. Set - Recevay	25-29239-23	.91	56.3	111.6	111.6								
3d	Instl. Kit - Trainer Test Group	25-31677-17	1.27	54.5	100.6	100.6								
3e	BMS 5-62 Installed VAFB		*											
	The following items included in 25-25402-36 are furnished by Autonetics													
	SE 35A Cable Set	55008-106	7.5	62.6	109.7	107.2								
	D 24A Analog Multiplexer	55007-106	16.9	53.9	101.4	103.3								
	D 20C Data Programmer	55006-106	16.1	53.9	101.9	97.0								

See page 12 for the net weight and balance effect of BMS 5-62 installed at VAFB

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CHECK LIST NO.	17.3-2 MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)																
	DATE	MODEL	FINAL ASSEMBLY DRAWING NO. 21-52900-20			COMPONENT				MISSILE									
ITEM NUMBER	SECTION 42	MISSILE NO.	MISSILE COMPONENT	GUIDANCE SECTION	COMPONENT PART NO.	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	BASIC WEIGHT	AS WEIGHED	REMOTE SITE SHIPMENT	AS RECEIVED	REMOTE SITE	AS WEIGHED	REMOTE SITE	LAUNCH	
2a	Cable Assy. Set - Electrical				25-26878-5	1.98	65.8	110.5	117.2										
2b	Conduit Supt. Set - Raceway				25-29239-23	4.54	68.9	112.6	113.2										
2c	Instl. Kit-Trainer Test Group				25-31677-17	.62	62.7	111.8	112.1										
2d	BMS 5-62 Installed at VAFB																		
<p>The following items are deleted from the missile assembly in order to accommodate the CMI Installation</p>																			
2e	Raceway Inst.				25-23214-5	.20	66.6	110.0	109.8										
2f	BMS 5-62 Removed at VAFB																		

* See page 12 for a summary of the net weight and balance change of BMS 5-62 at VAFB

CHECK LIST NO.	17.3-3 MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)				
	DATE	MODEL	Mo	Day	Yr		
		FINAL ASSEMBLY DRAWING NO. 21-52900-20					
ITEM NUMBER	SECTION 44	MISSILE NO.	COMPONENT				MISSILE
			WEIGHT	AS WEIGHED	REMOTE SITE	SHIPPING	
MISSILE COMPONENT 3rd STAGE MOTOR		COMPONENT PART NO.					
DESCRIPTION		PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	
4a	Cable Assy. Set - Electrical	25-26878-5	6.47	92.9	111.2	118.4	
4b	Conduit Supt. Set - Raceway	25-29239-23	15.78	85.4	110.5	117.9	
4c	Instl. Kit - Trainer Test Group	25-31677-17	1.49	80.2	110.7	118.2	
4d	BMS 5-62 Installed at VAFB		*				
The following items are furnished by Aerojet							
4e	Destruct System, AODS	359704	4.03	58.1	99.8	114.0	
The following items are deleted from the missile assembly in order to accommodate the C.I.I. Installation							
4f	Raceway Instl.	25-23214-5	9.93	80.2	110.2	117.6	
4g	Standards Instl.	25-30133-9	.09	68.5	109.4	116.2	
4h	BMS 5-62 Removed at VAFB		*				

* See page 12 for a summary of the net weight and balance change of BMS 5-62 at VAFB

CHECK LIST NO.	17.3.4 MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)											
	DATE	MODEL	Mo	Day	Yr									
		FINAL ASSEMBLY DRAWING NO. 21-52900-20												
ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT							
							MISSILE NO.	COMPONENT PART NO.	BASIC WEIGHT	AS WEIGHED	REMOTE SITE SHIPMENT	AS RECEIVED	REMOTE SITE	LAUNCH
5a	Cable Assy. Set - Electrical	25-26878-5	4.36	64.9	112.0	119.9								
5b	Conduit Supt. Set - Recevay	25-29239-23	15.75	66.9	111.7	120.0								
5c	Instl. Kit - Trainer Test Group	25-31677-17	1.39	74.7	111.6	119.3								
5d	BMS 5-62 Installed at VAFB		*											
The following items are deleted from the missile assembly in order to accommodate the CFMII Installation														
5e	Standards Instl.	25-30133-9	.07	78.6	109.6	119.5								
5f	Receway Instl.	25-23214-5	4.47	72.5	110.9	117.2								
5g	BMS 5-62 Removed at VAFB													

* See page 12 for a summary of the net weight and balance change of BMS 5-62 at VAFB

CHECK LIST NO.	17.3-5		MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)						
	DATE	MODEL	FINAL ASSEMBLY DRAWING NO. 21-52900-20		Mo	Day	Yr				
ITEM NUMBER	SECTION 46	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT			MISSILE
								LAUNCH	AS WEIGHED	AS RECEIVED	
MISSILE NO.		COMPONENT PART NO.		WEIGHT		SHIPPING		REMOTE SITE		REMOTE SITE	
6a		Cable Assy. Set - Electrical	25-26878-5	10.75	111.1	112.8	121.2				
6b		Conduit Supt. Set - Raceway	25-29239-23	21.93	109.2	112.2	121.2				
6c		Instl. Kit - Trainer Test Group	25-31677-17	2.09	89.9	111.7	120.3				
6d		Timer - Interval	29-22327-2	1.25	67.1	112.5	121.8				
6e		Battery - Squib Activated	10-20942-3	1.40	63.9	112.5	121.8				
6f		BMS 5-62 Installed at VAFB		*							
6g		Destruct System, AODS	399764	4.19	74.8	111.8	120.4				
6h		Receiver Instl.	25-23214-5	15.84	103.1	111.9	120.7				
6i		BMS 5-62 Removed at VAFB		*							

* See page 12 for a summary of the net weight and balance change of BMS 5-62 at VAFB

CHECK LIST NO.	17.3.6 MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)										
	DATE	MODEL	Mo	Day	Yr								
		FINAL ASSEMBLY DRAWING NO. 21-52900-20											
ITEM NUMBER	SECTION 47	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT				LAUNCH	
								MISSILE NO.	COMPONENT PART NO.	BASIC WEIGHT	AS WEIGHED		REMOTE SITE
MISSILE COMPONENT 1-2 INTERSTAGE													
7a		Cable Assy. Set - Electrical	25-26878-5	5.48	71.2	115.8	126.4						
7b		Conduit Supt. Set - Raceway	25-29239-23	23.04	78.9	115.0	125.9						
7c		Instl. Kit - Trainer Test Group	25-31677-17	1.32	87.4	115.3	125.9						
7d		INS 5-62 Installed at VAFB		*									
The following items are deleted from the missile assembled in order to accommodate the CTR1 installations													
7e		Standards Instl.	25-30133-9	.10	99.8	115.8	126.0						
7f		Raceway Instl.	25-23214-5	5.72	89.7	114.8	126.4						
7g		INS 5-62 Removed at VAFB		*									

* See page 12 for a summary of the net weight and balance change of INS 5-62 at VAFB

CHECK LIST NO.	17.3.7 MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)		MISSILE										
	DATE	MODEL	Mo	Day											
MISSILE COMPONENT		FINAL ASSEMBLY DRAWING NO. 21-58900-20		COMPONENT											
ITEM NUMBER	SECTION 48	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	BASIC WEIGHT	AS WEIGHED	REMOTE SITE SHIPMENT	AS RECEIVED	REMOTE SITE	AS WEIGHED	REMOTE SITE	LAUNCH
8a		Cable Assy. Set - Electrical	25-26678-5	13.12	156.4	118.2	130.5								
8b		Conduit Spnt. Set	25-29239-23	13.13	79.3	117.3	130.0								
8c		Instl. Kit - Trainer Test	25-31677-17	2.81	84.1	117.2	129.6								
8d		Timer - Internal	29-22327-1	1.25	70.6	117.7	130.5								
8e		Battery - Squib Activated	10-20942-3	1.40	66.7	117.7	130.5								
8f		RMS 5-62 Instl. at VAFB		*											
8g		The following items are furnished by Aerojet													
		Destruct System, AODS	359764	6.19	78.1	116.9	129.3								
8h		The following items are deleted from the missile assembly in order to accommodate the CILI installation													
		Recovery Instl.	25-23214-5	8.07	82.8	117.2	129.8								
8i		RMS 5-62 Removed at VAFB		*											

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* See page 12 for a summary of the net weight and balance change of RMS 5-62 at VAFB

17.3.8 MISSILE WEIGHING CHECK LIST

MODEL _____ FINAL ASSEMBLY DRAWING NO. 21-52900-20

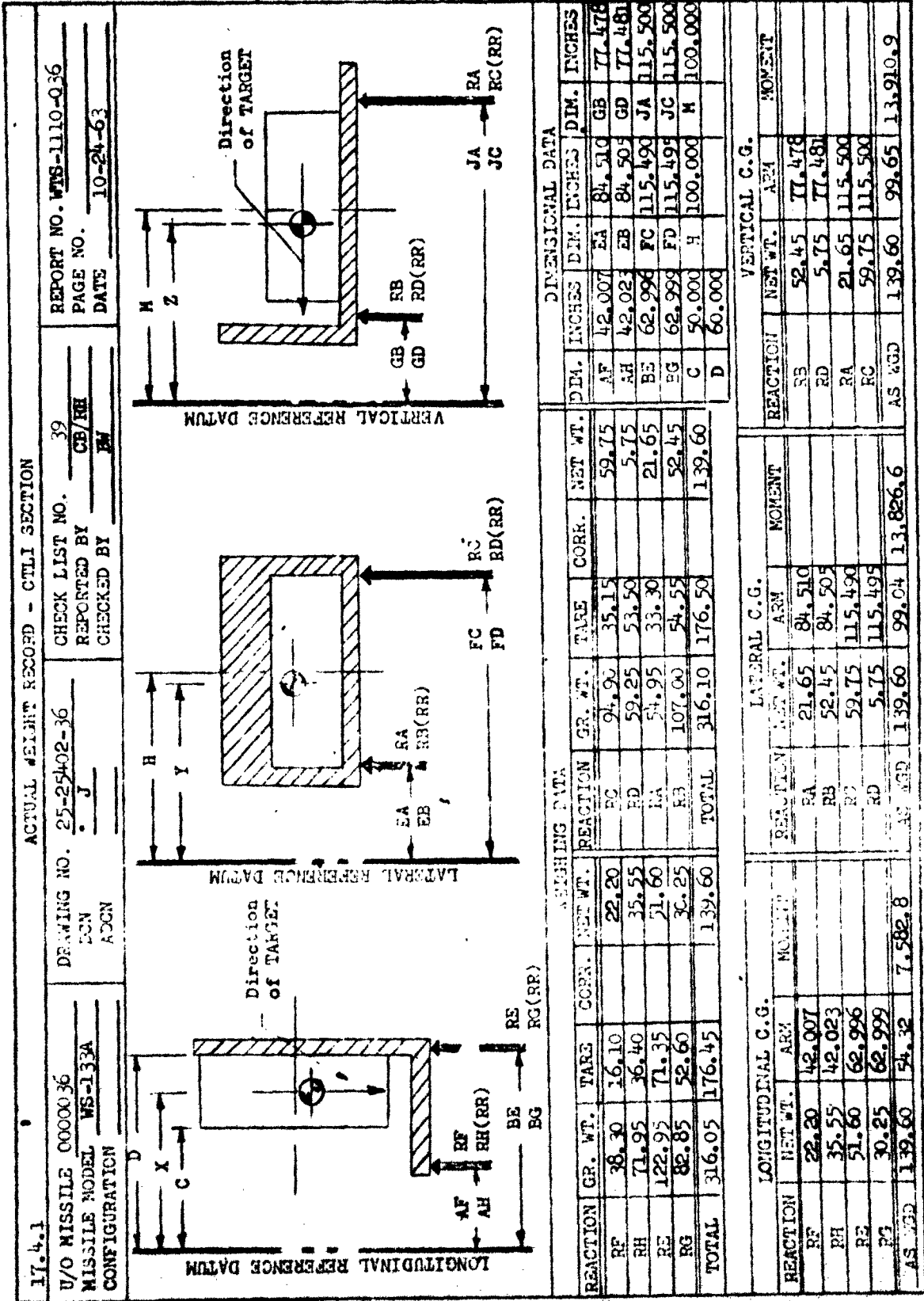
CHECK LIST NO.	RECORD OF CHECKING (DATE)			COMPONENT							LAUNCH		
	Mo	Day	Yr	AS WEIGHED	REMOTE SITE SHIPMENT	AS RECEIVED	REMOTE SITE	AS WEIGHED	REMOTE SITE				
DATE	SECTION 49 MISSILE NO. _____												
ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	BASIC WEIGHT	WEIGHED	REMOTE SITE	AS RECEIVED	REMOTE SITE	AS WEIGHED	REMOTE SITE
9a	Cable Assy. Set - Electrical	25-26878-5	6.03	73.2	118.2	130.5							
9b	Inst. Kit - Trainer Test Group	25-31677-17	3.38	74.0	121.7	124.1							
The following items are deleted from the missile assembly in order to accommodate the CMI Installations													
9d	Standards Instl.	25-30133-9	.28	57.0	116.4	128.4							
9e	MS 5-62 Removed at VAFB												

* See page 12 for a summary of the net weight and balance change of MS 5-62 at VAFB

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17.4.2 MISSING PERSON CHECK LIST

FORM NO. 17.4.2 MISSING PERSON NO. 25-25402-36

CHECK LIST NO.	DATE	SPECIATION	MISSING COMMENTS	SEARCHER	SEARCH NO.	SEARCH DATE	SEARCH TIME	PERIOD OF CHECKING (MINS)			REMARKS
								10	24	63	
29		DECEASED									
30											
31											
32											
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WEIGHT AND BALANCE CHANGE RECORD											
EQUIPMENT CHANGE RECORD		WEIGHT AND BALANCE									
PART NO.	DESCRIPTION OF EQUIPMENT	WEIGHT	X AXIS ARM	X AXIS MOMENT	Y AXIS ARM	Y AXIS MOMENT	Z AXIS ARM	Z AXIS MOMENT			
1	25-25402-36 Instr. Group Trainer (As Weighed)	139.60	54.82	7,532.8	99.04	13,826.6	99.65	13,910.9			
2											
3											
4											
5	ADD:										
6	AF31276-315 Cable-Autonetics	3.81	74.2		111.5		102.8				
7	AF31279-315 Cable-Autonetics	2.11	50.4		106.9		111.8				
8											
9											
10	25-25402-36 Instr. Group Trainer (Complete)	145.52	54.18	7,971.8	99.59	14,192.2	99.91	14,538.5			
11											
12											
13											
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17.5

**ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION
APPLICABLE TO CTLI SECTION S/N 0000036 AND INSTALLATION KIT**

The following ECP's have not been incorporated into "Model Specification Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 8 July 1963. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WS-133A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part 1	PSS, S&A Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of G&C Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-20885	3	Negl.	Yes
373	Work-Around for 10-20882-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415 Part 1	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
525	CTLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MRCM 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MRCM 6301	3	Negl.	Yes
606	Revision to CTLI Umbilical Bracket- Section 49	1	Negl.	Yes

* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

** These ECP's were incorporated during manufacture of the CTLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

17.5 ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION
 APPLICABLE TO CELL SECTION S/N 0000036 AND INSTALLATION KIT
 (Continued)

ECP NO. (WS-1JEA-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
620	Installation of Static Dissipators on Operational Missiles	1	Negl.	Yes
635	PCM R/F Section Digital Data Programmers	3	Negl.	Yes
639	Prevent Interference of Linear Shape Charge With Cable Strap	3	Negl.	Yes
657	Revision of Ordnance Supports in Interstage 2-3	2	Negl.	Yes

CTLI SECTION, S/N 0000037

18.1 This section of the document describes the data changes created by converting a production line Minuteman missile into a CTLI missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries, check lists, and ECP lists applicable to this installation. Page 175 summarizes the complete installation mass properties and consists of data from page 176 (average mass properties of downstage components), page 177 (predicted sealant changes), and page 181 (actual weight of CTLI section S/N 0000037). In addition, page 178 presents summary check lists by production section as backup data for page 176. Page 182 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-01DR-NMPD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODS" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

The following drawings are incorporated in the above section:

10-20942,	Battery Installation,	DCN G	4-30-63		
21-52900,	Missile Installation,	DCN K	9-23-63		
25-23210,	Raceway Installation,	DCN F	4-29-63		
25-25402,	39 Section Installation,	DCN J	6-17-63		
25-25406,	BMS 5-62 Installation,	DCN J	9-13-63		
25-26878,	Cable Assembly,	DCN J	9-3-63		
25-29239,	Conduit Assembly,	DCN F	4-4-63	- ADCN 3-34	7-26-63
25-30133,	Standard Installation,	DCN D	5-22-63		
25-31677,	Installation Kit,	DCN E	5-4-63	- ADCN 5-22	7-10-63
29-22327,	Timer Installation,	DCN D	6-24-63	- ADCN 5-6	9-5-63

18.2		WEIGHT & BALANCE SUMMARY TOTAL CTLI KIT INSTALLATION CTLI WAFER S/N 0000037				REPORT NO. _____ DATE _____				
L71	13 15	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² X10 ⁻³	
						LONG.	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			148.6	54.8	99.8	100.1	.004	.003
5			Silo							
6			Aero							
7	42	O/C Section			7.3	62.4	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			18.0	84.5	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.7	58.2	110.2	117.9	0	0
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett	- 1.7		58.2	110.2	117.9		
22	45	Interstage 2-3 (Aft)			19.5	65.1	111.7	120.2	0	.001
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.8	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			- 1.5	55.4	112.1	120.5	0	0
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett	- 1.5		55.4	112.1	120.5		
37	47	Interstage 1-2 (Aft)			26.0	74.1	114.7	125.2	0	.002
38			Silo							
39			Aero							
40	48	1st Stage Engine			30.6	112.8	117.6	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Sirt			9.9	74.5	119.5	128.4	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			282.5					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Being Section Stations (See Missile Station Diagram)

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18.2		WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)				REPORT NO. _____ DATE _____				
18 23 3	13 12	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³	
						LONG. °	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			4.39	55.9	107.5	110.6	0	0
5			Silo							
6			Aero							
7	42	G&C Section			6.94	67.5	112.0	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			17.75	84.5	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.90	57.7	110.3	117.8	0	0
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett		- 1.90	57.7	110.3	117.8		
22	45	Interstage 2-3 (Aft)			19.26	64.9	111.3	120.4	0	.001
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.77	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			- 1.45	55.4	112.1	120.5	0	0
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett		- 1.45	55.4	112.1	120.5		
37	47	Interstage 1-2 (Aft)			25.47	73.7	115.0	125.6	0	.002
38			Silo							
39			Aero							
40	48	1st Stage Engine			29.83	111.5	117.7	130.2	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.73	73.9	119.5	128.3	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			135.79					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

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FIG. 176

18.7		BMS 5-62 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE **				REPORT NO. _____				
						DATE _____				
STATION	STATION	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA	
						LONG.°	LAT.	VERT.	SLUG FT ² X10 ⁻³	ROLL
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			.2	54.5	111.5	111.5		
5			Silo							
6			Aero							
7	42	G&C Section			.4	65.4	110.5	113.5		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			.2	80.9	109.3	116.2		
11			Silo							
12			Aero							
13			Base							
14	43	Interstage 2-3 (Fwd)			.2	53.6	110.8	116.7		
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett		.2	53.6	110.8	116.7		
22	45	Interstage 2-3 (Aft)			.2	85.0	101.4	101.5		
23			Silo							
24			Aero							
25	46	2nd Stage Engine			.0	-	-	-		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			.0	-	-	-		
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett							
37	47	Interstage 1-2 (Aft)			.5	94.7	101.0	103.4		
38			Silo							
39			Aero							
40	48	1st Stage Engine			.8	161.3	116.2	128.0		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			.2	101.3	119.2	133.9		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			2.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

REV. SYN. F ** Reference 02-13964-534

BOEING

NO.

NO D2-13963-1

REV.

177

ACTUAL WEIGHT RECORD - CTLI SECTION	
18.4.1	DRAWING NO. 25-25402-36
U/O MISSILE 000 0037	CHECK LIST NO. 39
MISSILE MODEL WS-135A	REPORTED BY LB / RH
CONFIGURATION	CHECKED BY BW
REPORT NO. WTS-1114-037	PAGE NO. 1 of 4
DATE 11-1-63	

LONGITUDINAL REFERENCE DATUM

LATERAL REFERENCE DATUM

DIMENSIONAL DATA

WEIGHING DATA				DIMENSIONAL DATA				
REACTION	GR. WT.	TARE	CORR.	NET WT.	DIM. INCHES	DIM. INCHES	DIM. INCHES	
RC	77.30	38.65		38.65	EA	84.510	GB	77.478
RD	77.00	50.10		26.90	EB	84.505	GD	77.481
RA	72.50	29.95		42.55	FC	115.490	JA	115.500
RB	89.15	57.80		31.35	FD	115.495	JC	115.500
TOTAL	315.95	176.50		139.45	C	50.000	H	100.000
					D	60.000		

LONGITUDINAL C.G.				LATERAL C.G.				VERTICAL C.G.			
REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT
RF	31.05	42.007	1304.1	RA	42.55	84.510	3595.4	RB	31.35	77.481	2428.5
RH	26.45	42.023	1112.1	RB	31.35	84.505	2650.0	RD	26.90	115.500	3100.0
RE	42.50	62.996	2678.1	RC	38.65	115.490	4450.0	RA	42.55	115.500	4910.0
RG	39.45	62.999	2484.1	RD	26.90	115.495	3105.0	RC	38.65	115.500	4450.0
AS WGD	139.45	54.35	7578.5	AS WGD	139.45	99.07	13815.6	AS WGD	139.45	99.62	13891.8

(RR) = Rear Reaction

FORM NO. 8 000037

CHG. LIST NO.
50

18.4.2

MISSILE WEIGHING CHECK LIST

DATE

NAME

FIRM AND OFFICE ADDRESS

SECTION	MISSILE COMPONENT	DESCRIPTION	PART NO.	WEIGHT	X	Y	Z	RECORD OF CHECKS (CONT.)				
								Mo	Yr	63		
SECTION 72	MISSILE D.O.											
MISSILE COMPONENT	COMPONENT											
DESCRIPTION												
30		25402-36										
31		25402-11										
32												
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36												
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2-5580-0-21

REV. SYN. F

ENGINE

NO. D2-13943-1

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18.5

ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION
APPLICABLE TO CTLI SECTION S/N 0000037 AND INSTALLATION KIT

The following ECP's have not been incorporated into "Model Specification Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 8 July 1963. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WS-10A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part 2	PSS, S&A Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Flare Revision	2	Negl.	Yes
240	Interference of G&C Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-23885	3	Negl.	Yes
373	Work-Around for 10-2442-1 CTLI Air and Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-5 Interstage Aft	200	Negl.	Yes
415 540	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
525	CTLI A/E Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MRCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MRCN 6301	3	Negl.	Yes
606	Revision to CTLI Umbilical Bracket-Section 49	1	Negl.	Yes

* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

** These ECP's were incorporated during manufacture of the CTLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

18.5

ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION
 APPLICABLE TO OTLI SECTION S/N 0000037 AND INSTALLATION KIT

(Continued)

ECP NO. (WS-133A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
620	Installation of Static Dissipators on Operational Missiles	1	Negl.	Yes
635	PCM R/F Section Digital Data Programmers	3	Negl.	Yes
639	Prevent Interference of Linear Shape Charge With Cable Strap	3	Negl.	Yes
657	Revision of Ordnance Supports in Interstage 2-3	2	Negl.	Yes

CTLI SECTION, S/N 0000039

19.1 This section of the document describes the data changes created by converting a production line Minuteman missile into a CTL missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries, check lists, and ECP lists applicable to this installation. Page 184 summarizes the complete installation mass properties and consists of data from page 185 (average mass properties of downstage components), page 186 (predicted sealant changes), and page 190 (actual weight of CTLI section S/N 0000039). In addition, page 187 presents summary check lists by production section as backup data for page 185. Page 191 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-01DR-NMPD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODS" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

The following drawings are incorporated in the above section:

- 10-20942, Battery Instl., DCN G 4-30-63.
- 21-52910, Missile Instl., DCN K 9-23-63.
- 25-23214, Raceway Instl., DCN F 4-29-63.
- 25-25402, 39 Sect. Instl., DCN J 6-17-63.
- 25-25406, HMS 5-62 Instl., DCN J 9-13-63.
- 25-26878, Cable Assy., DCN J 9-3-63.
- 25-29239, Conduit Assy., DCN F 4-4-63, ADCN S-34 7-26-63.
- 25-30133, Stand. Instl., DCN D 5-22-63.
- 25-31677, Instl. Kit, DCN E 5-4-63, ADCN S-22 7-10-63.
- 29-22327, Timer Instl., DCN D 6-24-63, ADCN S-6 9-5-63.

19.2 WEIGHT & BALANCE SUMMARY TOTAL CTLI KIT INSTALLATION CTLI WAFER S/N 000039					REPORT NO. _____ DATE _____					
LINE NO.	ITEM NO.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x 10 ⁻³	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	FV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			150.2	54.8	99.9	100.2	.004	.003
5			Silo							
6			Aero							
7	42	O&C Section			7.3	67.4	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			18.0	84.5	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.7	58.2	110.2	117.9	0	0
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.7		58.2	110.2	117.9		
22	46	Interstage 2-3 (Aft)			19.5	65.1	111.7	120.2	0	.001
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.8	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			- 1.5	55.4	112.1	120.5	0	0
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.5		55.4	112.1	120.5		
37	47	Interstage 1-2 (Aft)			26.0	74.1	114.7	125.2	0	.002
38			Silo							
39			Aero							
40	48	1st Stage Engine			30.6	112.8	117.6	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.9	74.5	119.5	128.4	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			284.1					
49			Silo							
50			Aero							
51			Base							
52			Jett							

2-550-0-58

* Boxing Section Stations (See Missile Station Diagram)

REV. SYL. F

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SEC. PAGE 184

19.2 WEIGHT & BALANCE SUMMARY (AVERAGE WEIGHT COMPONENTS)					REPORT NO. _____				
					DATE _____				
NO.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			STABILITY	
					LONG.*	LAT.	VERT.	ROLL	PITCH
1	RV Cracer								
2		Silo							
3		Aero							
4	1st Section			4.22	51.2	107.5	119.6	0	0
5		Silo							
6		Aero							
7	2nd Section			6.94	67.7	112.0	119.3	0	0
8		Silo							
9		Aero							
10	3rd Stage Engine			17.75	84.5	108.5	117.4	0	.002
11		Silo							
12		Aero							
13		Base							
14	Interstage 2-3			-1.90	57.7	110.3	117.8	0	0
15	(part)	Silo							
16		Aero							
17		Base							
18		Silo							
19	Jettisoned								
20	Portion	Aero							
21		Base							
22		Jett	-1.70		57.7	110.3	117.8		
23	Interstage 2-3			19.26	64.9	111.5	117.4	0	.001
24	(part)	Silo							
25		Aero							
26	2nd Stage Engine			25.77	102.1	112.0	101.9	0	.002
27		Silo							
28		Aero							
29		Base							
30	Interstage 1-2			-1.45	55.4	112.1	118.2	0	0
31	(part)	Silo							
32		Aero							
33		Base							
34		Silo							
35	Jettisoned								
36	Portion	Aero							
37		Base							
38		Jett	-1.45		55.4	112.1	118.2		
39	Interstage 1-2			25.47	73.7	115.0	125.6	0	.002
40	(part)	Silo							
41		Aero							
42	1st Stage Engine			29.83	111.5	117.7	130.2	0	.025
43		Silo							
44		Aero							
45		Base							
46	4th			9.73	73.9	119.5	128.3	0	0
47	part	Silo							
48		Aero							
49		Base							
50	MISSILE			135.79					
51		Silo							
52		Aero							
53		Base							
54		Jett							

19.2 BMS 5-62 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE**					REPORT NO. _____				
					DATE _____				
NO.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA	
					LONG.*	LAT.	VERT.	SLUG STP ¹⁰⁻³	PI ¹⁰⁻³
1	RV Spacer	Silo							
2		Aero							
3	1st Section	Silo		.2	54.2	111.2	111.5		
4		Aero							
5	2nd Section	Silo		.4	65.4	110.2	113.2		
6		Aero							
7	3rd Stage Engine	Silo		.2	80.2	109.2	116.2		
8		Aero							
9		Base							
10	Interstage 2-3 (Swi)	Silo		.2	53.6	110.8	116.7		
11		Aero							
12		Base							
13	Jettisoned Portion	Silo							
14		Aero							
15		Base							
16		Jett	.2		53.6	110.8	115.7		
17	Interstage 2-3 (Swi)	Silo		.2	82.0	103.0	101.8		
18		Aero							
19	3rd Stage Engine	Silo							
20		Aero							
21		Base							
22	Interstage 1-2 (Swi)	Silo		.2					
23		Aero							
24		Base							
25	Jettisoned Portion	Silo							
26		Aero							
27		Base							
28		Jett							
29	Interstage 1-2 (Swi)	Silo		.5	94.7	102.2	103.4		
30		Aero							
31	3rd Stage Engine	Silo		.8	161.3	116.2	128.2		
32		Aero							
33		Base							
34	4th Stage	Silo		.2	101.3	119.2	133.9		
35		Aero							
36		Base							
37		Jett							
38	MISSILE	Silo		2.7					
39		Aero							
40		Base							
41		Jett							

* Boeing Section Stations (See Missile Station Diagram)

REV. SDI. P

** Reference DD-13954-534

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SEC.

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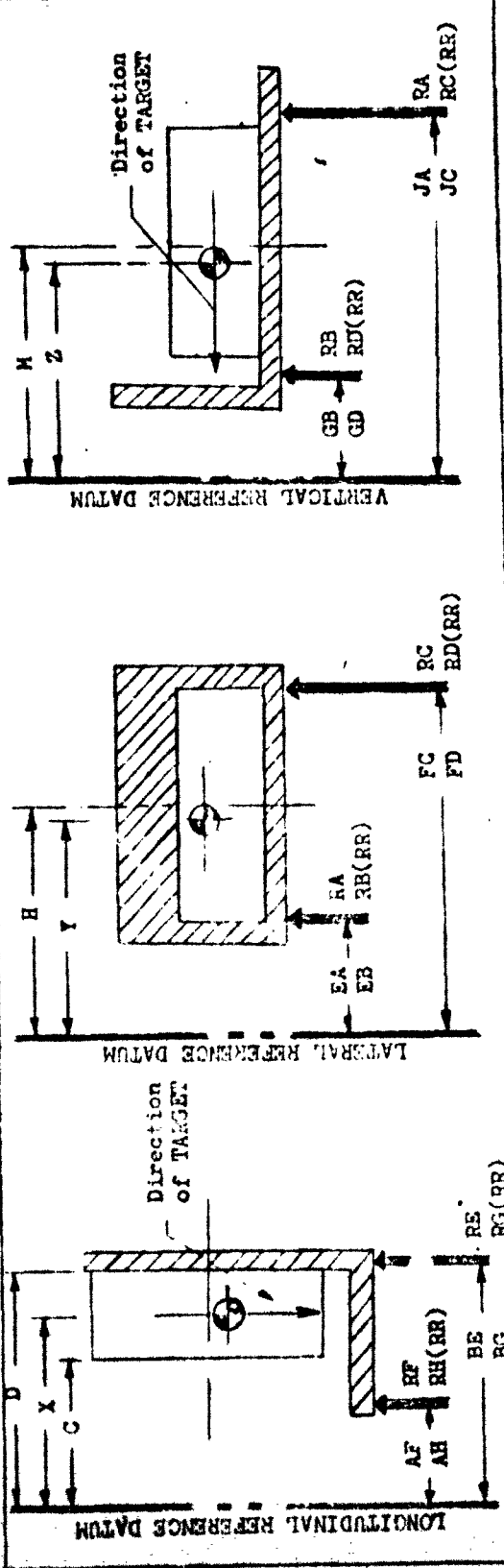
ACTUAL WEIGHT RECORD - CTLI SECTION

19.4.1
 U/O MISSILE 000039
 MISSILE MODEL WS-13A
 CONFIGURATION

DRAWING NO. 25-29402-46
 WCN
 ADON

CHECK LIST NO. 39
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REPORT NO.
 PAGE NO.
 DATE



WEIGHING DATA				DIMENSIONAL DATA					
REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	GR. WT.	TARE	CORR.	NET WT.
RF	45.30	32.70		12.60	RF	80.00	35.80		44.20
RH	65.10	20.00		45.10	RD	74.50	53.10		21.40
RE	115.90	55.05		60.85	RA	69.95	32.85		37.10
RG	89.90	68.80		21.10	RE	91.80	54.85		36.95
TOTAL	316.20	176.55		139.65	TOTAL	316.25	176.60		139.65

LONGITUDINAL C.G.				LATERAL J.G.				VERTICAL C.G.			
REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT
RF	12.60	42.007		RA	37.10	84.510		RB	36.95	77.478	
RH	45.10	42.023		RD	36.95	84.505		RD	21.40	77.481	
RE	60.85	62.996		RC	44.20	115.490		RA	37.10	115.500	
RG	21.10	62.999		RD	21.46	115.495		RC	44.20	115.500	
AS WGD	139.65	54.32	7,587.1	AS WGD	139.65	92.06	13,834.0	AS WGD	139.65	99.61	13,911.1

(RR) = Rear Reaction

WEIGHT AND BALANCE CHANGE RECORD									
19.4.3		WEIGHT AND BALANCE CHANGE RECORD		CONTRACT NO. AF04(647)-289		REPORT NO.			
ASSOCIATE CONTRACTOR BOEING		SECTION 39		LOT NO.		DATE PREPARED			
COMPONENT		WS-133		DRAWING NO. 25-25402-36		APPROVED			
MODEL NO.		0000039		U.C. MISSILE					
SERIAL NO.									
EQUIPMENT CHANGE RECORD				WEIGHT AND BALANCE					
LINE	PART NO.	DESCRIPTION OF EQUIPMENT	WEIGHT	X AXIS		Y AXIS		Z AXIS	
				ARM	MOMENT	ARM	MOMENT	ARM	MOMENT
1	25-25402-36	Instr. Group Trainer (As Weighed)	139.65	54.32	7,587.1	99.06	13,834.0	99.61	13,911.1
2									
3									
4									
5		ADD:							
6	AN31278-315	Cable-Autonetics	3.91	74.2		115.5		102.8	
7	AN31279-315	Cable-Autonetics	2.08	20.4		106.9		111.4	
8									
9									
10									
11	25-25402-36	Instr. Group Trainer (Complete)	145.64	54.81	7,982.1	99.62	14,508.0	99.87	14,544.8
12									
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14									
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REV. 1

19.5

**ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION
 APPLICABLE TO CTLI SECTION S/II 0000039 AND INSTALLATION KIT**

The following ECP's have not been incorporated into "Model Specification Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 8 July 1963. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WS-133A-E0-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part 2	PSS, SAA Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of G&C Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-20885	3	Negl.	Yes
373	Work-Around for 10-20942-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Mt	2&3	Negl.	Yes
415	Pepping & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
525	CTLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MRCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MRCN 6301	3	Negl.	Yes
606	Revision to CTLI Umbilical Bracket- Section 49	1	Negl.	Yes

* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

** These ECP's were incorporated during manufacture of the CTLI wafer. However, the portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

19.5

ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION
 APPLICABLE TO CTLI SECTION S/N 0000039 AND INSTALLATION KIT

(Continued)

ECP NO. (WS-100A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
620	Installation of Static Dissipators on Operational Missiles	1	Negl.	Yes
635	PCM R/F Section Digital Data Programmers	3	Negl.	Yes
639	Prevent Interference of Linear Shape Charge With Cable Strap	3	Negl.	Yes
657	Revision of Ordnance Supports in Interstage 2-3	2	Negl.	Yes

CTLI SECTION, S/N 0000102

20.1 This section of the document describes the data changes created by converting a production line Minuteman missile into a CTLI missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries, check lists, and ECP lists applicable to this installation. Page 193 summarizes the complete installation mass properties and consists of data from page 194 (average mass properties of downstage components), page 195 (predicted sealant changes), and page 197 (actual weight of CTLI section S/N 0000102). In addition, page 196 presents summary check lists by production section as backup data for page 194. Page 200 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-01DR-NMPD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AGDB" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

The following drawings are incorporated in the above section:

- 10-20942, Battery Instl., DCN G 4-30-63.
- 21-52000, Missile Instl., DCN K 9-23-63.
- 25-23214, Raceway Instl., DCN F 4-29-63.
- 25-25402, 39 Sect. Instl., DCN J 6-17-63.
- 25-25406, HMS 5-62 Instl., DCN J 9-13-63.
- 25-26878, Cable Assy., DCN J 9-3-63.
- 25-29239, Conduit Assy., DCN F 4-4-63, ADCN S-34 7-26-63.
- 25-30133, Stand. Instl., DCN D 5-22-63.
- 25-31677, Instl. Kit, DCN E 5-4-63, ADCN S-22 7-10-63.
- 29-22327, Timer Instl., DCN D 6-24-63, ADCN S-6 9-5-63.

WEIGHT & BALANCE SUMMARY
 TOTAL CTLI KIT INSTALLATION
 CTLI WAFER S/N 0000102

REPORT NO. _____

DATE _____

LINE	CTI	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³	
						LONG.#	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			148.5	54.8	99.7	100.2	.004	.003
5			Silo							
6			Aero							
7	42	G&C Section			7.3	67.4	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			18.0	84.5	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.7	58.2	110.2	117.9	0	0
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett		- 1.7	58.2	110.2	117.9		
22	45		Interstage 2-3 (Aft)			19.5	65.1	111.7	120.2	0
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.8	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			- 1.5	55.4	112.1	120.5	0	0
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett		- 1.5	55.4	112.1	120.5		
37	47		Interstage 1-2 (Aft)			26.0	74.1	114.7	125.2	0
38			Silo							
39			Aero							
40	48	1st Stage Engine			30.6	112.8	117.6	130.1	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.9	74.5	119.5	128.4	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			282.4					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

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20.2 WEIGHT & BALANCE SUMMARY OTLI (AVERAGE WEIGHT COMPONENTS)					REPORT NO. _____ DATE _____					
LINE NO.	STATION	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² X10 ⁻³	
						LONG. *	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	OTLI Section			4.39	55.9	107.5	110.6	0	0
5			Silo							
6			Aero							
7	42	O&C Section			6.94	67.5	112.0	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			17.75	84.5	108.5	117.4	0	.002
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.90	57.7	110.3	117.8	0	0
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett		- 1.20		57.7	110.3	117.8	
22	45	Interstage 2-3 (Aft)			19.26	64.9	111.8	120.4	0	.001
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.77	102.1	112.6	121.4	0	.009
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			- 1.45	55.4	112.1	120.5	0	0
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett		- 1.45		55.4	112.1	120.5	
37	47	Interstage 1-2 (Aft)			25.47	73.7	115.0	125.6	0	.002
38			Silo							
39			Aero							
40	48	1st Stage Engine			29.83	111.5	117.7	130.2	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.73	73.9	119.5	128.3	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			135.79					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

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20.2 HMS 5-62 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE**					REPORT NO. _____ DATE _____					
LINE NO.	ITEM NO.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA	
						LONG.*	LAT.	VERT.	SLUG FT ² x10 ⁻³	ROLL
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTBI Section			.2	54.5	111.5	111.5		
5			Silo							
6			Aero							
7	40	O&C Section			.4	65.4	110.5	113.5		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			.2	80.9	109.3	116.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			.2	53.6	110.8	116.7		
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett	.2		53.6	110.8	116.7		
22	45		Interstage 2-3 (Aft)			.2	85.0	103.0	101.8	
23			Silo							
24			Aero							
25	46	2nd Stage Engine			0	-	-	-		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			0	-	-	-		
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett							
37	47		Interstage 1-2 (Aft)			.5	94.7	102.0	103.4	
38			Silo							
39			Aero							
40	48	1st Stage Engine			.8	161.3	116.2	128.0		
41			Silo							
42			Aero							
43			Base							
44	49	Wirt			.2	101.3	119.2	133.9		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			2.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

ACTUAL WEIGHT RECORD - CTLI SECTION

20.4.1	DRAWING NO. 25-25402-36	CHECK LIST NO. 39	REPORT NO.
U/O MISSILE 0000102	DCN	REPORTED BY CB/RH	PAGE NO.
MISSILE MODEL RB-133A	ADCN	CHECKED BY JH	DATE 11/21/63
CONFIGURATION			

LONGITUDINAL REFERENCE DATUM

LATERAL REFERENCE DATUM

VERTICAL REFERENCE DATUM

WEIGHING DATA				DIMENSIONAL DATA				
REACTION	GR. WT.	TARE	CORR.	NET WT.	DIM. INCHES	DIM. INCHES	DIM. INCHES	
RF	60.65	30.65		30.00	AF	42.007	EA	84.510
RH	49.00	21.85		27.15	AH	42.023	EB	84.503
RE	100.20	56.65		43.55	BE	62.996	FC	115.490
RG	106.05	67.40		38.65	BG	62.999	FD	115.493
TOTAL	315.90	176.55		139.35	C	50.000	H	100.000
					D	60.000	M	100.000

LONGITUDINAL C.G.				LATERAL C.G.				VERTICAL C.G.			
REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT
RF	30.00	42.007		RA	40.85	84.510		RB	33.10	77.478	
RH	27.15	42.023		RB	33.10	84.503		RD	25.00	77.481	
RE	43.55	62.996		RC	40.40	115.490		RA	40.85	115.500	
RG	38.65	62.999		RD	25.00	115.493		RC	40.40	115.500	
AS	139.35	54.39	7,579.5	AS	139.35	99.05	13,802.5	AS	139.35	99.65	13,885.9

(RR) = Rear Reaction

FORM NO. 1000102

CHECK LIST NO. 20.4.2

MISSILE NUMBER OR IDENT

DATE

MODEL

FINAL REPORT NO. 1000102-36

SECTION	MISSILE COMPONENT	DESCRIPTION	PART NO.	QTY	X	Y	Z	LEVEL OF INSPECTION (V.I.P.)			MISSILE
								11	21	63	
32	Injection	Injection									
33	CGM Structure Assy.	CGM Structure Assy.									
34	Sub-assembly	Sub-assembly									
35	CGM Structure Assy.	CGM Structure Assy.									
36	CGM Structure Assy.	CGM Structure Assy.									
37	CGM Structure Assy.	CGM Structure Assy.									
38	CGM Structure Assy.	CGM Structure Assy.									
39	CGM Structure Assy.	CGM Structure Assy.									
40	CGM Structure Assy.	CGM Structure Assy.									
41	CGM Structure Assy.	CGM Structure Assy.									
42	CGM Structure Assy.	CGM Structure Assy.									
43	CGM Structure Assy.	CGM Structure Assy.									
44	CGM Structure Assy.	CGM Structure Assy.									
45	CGM Structure Assy.	CGM Structure Assy.									
46	CGM Structure Assy.	CGM Structure Assy.									
47	CGM Structure Assy.	CGM Structure Assy.									
48	CGM Structure Assy.	CGM Structure Assy.									
49	CGM Structure Assy.	CGM Structure Assy.									
50	CGM Structure Assy.	CGM Structure Assy.									
51	CGM Structure Assy.	CGM Structure Assy.									
52	CGM Structure Assy.	CGM Structure Assy.									
53	CGM Structure Assy.	CGM Structure Assy.									
54	CGM Structure Assy.	CGM Structure Assy.									
55	CGM Structure Assy.	CGM Structure Assy.									
56	CGM Structure Assy.	CGM Structure Assy.									
57	CGM Structure Assy.	CGM Structure Assy.									
58	CGM Structure Assy.	CGM Structure Assy.									
59	CGM Structure Assy.	CGM Structure Assy.									
60	CGM Structure Assy.	CGM Structure Assy.									
61	CGM Structure Assy.	CGM Structure Assy.									
62	CGM Structure Assy.	CGM Structure Assy.									
63	CGM Structure Assy.	CGM Structure Assy.									
64	CGM Structure Assy.	CGM Structure Assy.									
65	CGM Structure Assy.	CGM Structure Assy.									
66	CGM Structure Assy.	CGM Structure Assy.									
67	CGM Structure Assy.	CGM Structure Assy.									
68	CGM Structure Assy.	CGM Structure Assy.									
69	CGM Structure Assy.	CGM Structure Assy.									
70	CGM Structure Assy.	CGM Structure Assy.									
71	CGM Structure Assy.	CGM Structure Assy.									
72	CGM Structure Assy.	CGM Structure Assy.									
73	CGM Structure Assy.	CGM Structure Assy.									
74	CGM Structure Assy.	CGM Structure Assy.									
75	CGM Structure Assy.	CGM Structure Assy.									
76	CGM Structure Assy.	CGM Structure Assy.									
77	CGM Structure Assy.	CGM Structure Assy.									
78	CGM Structure Assy.	CGM Structure Assy.									
79	CGM Structure Assy.	CGM Structure Assy.									
80	CGM Structure Assy.	CGM Structure Assy.									
81	CGM Structure Assy.	CGM Structure Assy.									
82	CGM Structure Assy.	CGM Structure Assy.									
83	CGM Structure Assy.	CGM Structure Assy.									
84	CGM Structure Assy.	CGM Structure Assy.									
85	CGM Structure Assy.	CGM Structure Assy.									
86	CGM Structure Assy.	CGM Structure Assy.									
87	CGM Structure Assy.	CGM Structure Assy.									
88	CGM Structure Assy.	CGM Structure Assy.									
89	CGM Structure Assy.	CGM Structure Assy.									
90	CGM Structure Assy.	CGM Structure Assy.									
91	CGM Structure Assy.	CGM Structure Assy.									
92	CGM Structure Assy.	CGM Structure Assy.									
93	CGM Structure Assy.	CGM Structure Assy.									
94	CGM Structure Assy.	CGM Structure Assy.									
95	CGM Structure Assy.	CGM Structure Assy.									
96	CGM Structure Assy.	CGM Structure Assy.									
97	CGM Structure Assy.	CGM Structure Assy.									
98	CGM Structure Assy.	CGM Structure Assy.									
99	CGM Structure Assy.	CGM Structure Assy.									
100	CGM Structure Assy.	CGM Structure Assy.									

2-5550-0-21

REV. SYM.

WEIGHT AND BALANCE CHANGE RECORD

20.4.3

ASSOCIATE CONTRACTOR BOEING CONTRACT NO. AF04(647)-289 REPORT NO. _____
 COMPONENT SECTION 39 LOT NO. _____ DATE 11/21/63
 MODEL NO. WS-133A DRAWING NO. 25-25402-36 PREPARED CB/EM
 SERIAL NO. 0000102 U.O. MISSILE APPROVED CO

EQUIPMENT CHANGE RECORD

WEIGHT AND BALANCE

LINE	PART NO.	DESCRIPTION OF EQUIPMENT	WEIGHT		X AXIS		Y AXIS		Z AXIS	
			ARM	MOMENT	ARM	MOMENT	ARM	MOMENT	ARM	MOMENT
1										
2	25-25402-36	Instr. Group Trainer (As Weighed)	132.35		54.39	7,579.5	99.05	13,802.5	99.65	13,885.9
3										
4										
5		ADD:								
6	AME1194-315	Cable-Autonetics	3.22		74.2		115.5		102.8	
7	AME1196-315	Cable-Autonetics	1.34		50.4		106.9		111.4	
8										
9										
10	25-25402-36	Instr. Group Trainer (Complete)	143.91		54.80	7,886.0	99.49	14,317.7	99.83	14,366.2
11										
12										
13										
14										
15										
16										
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32										

20.5

**ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION
 APPLICABLE TO CTLI SECTION S/N 0000102 AND INSTALLATION KIT**

The following ECP's have not been incorporated into "Model Specification Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 8 July 1963. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WS-133A-EO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part 2	PSS, S&A Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of G&C Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-0000	3	Negl.	Yes
373	Work-Around for 10-20002-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 8-5 Interstage Aft	2&3	Negl.	Yes
415 540	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
525	CTLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MRCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
576	C Band Beacon/Command Destruct Incompatibility Interim Fix, MRCN 6301	3	Negl.	Yes
606	Revision to CTLI Umbilical Bracket- Section 49	1	Negl.	Yes

* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

** These ECP's were incorporated during manufacture of the CTLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

20.5

ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION
 APPLICABLE TO CILI SECTION S/N 000102 AND INSTALLATION KIT

(Continued)

ECP NO. (WS-17A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
620	Installation of Static Dissipators on Operational Missiles	1	Negl.	Yes
635	PCM R/F Section Digital Data Programmers	3	Negl.	Yes
639	Prevent Interference of Linear Shape Charge With Cable Strap	3	Negl.	Yes
657	Revision of Ordnance Supports in Interstage 2-3	2	Negl.	Yes

THE **BOEING** COMPANY

(4) \$2.60
(5) 127300

CODE IDENT NO. 81205

27 Anita 25-87555

3

(14)

NUMBER D2-1394311

(6)

TITLE CTLI FLIGHT ARTICLE MASS PROPERTIES REPORTS FOR WING I

MRCN 6301 S/N 000016 AND ON

MODEL NO. WS-133A CONTRACT NO. AF04(604)-46

ISSUE NO. _____ ISSUED TO _____

(7) NA
(8) NA
(9) NA

(11) 23 Apr 63
(12) 24 P.

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16-19 NA

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(DATE)

(20) U
(21) NA

REV SYM _____

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SECT. _____ PAGE 1

ACTIVE PAGE RECORD

SECTION	ORIG REL PAGE NO.	REV SYM	ADDED PAGES				SECTION	ORIG REL PAGE NO.	REV SYM	ADDED PAGES			
			PAGE NO.	REV SYM	PAGE NO.	REV SYM				PAGE NO.	REV SYM	PAGE NO.	REV SYM
	1												
	2												
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REV SYM _____

BOEING

NO. D2-13943-1

SECT. _____

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1.4	ENGINEERING CHANGE PROPOSAL SUMMARY	7
1.5	MISSILE STATION DIAGRAM	8
2.0	<u>CTLI SECTION, S/N 000016</u>	
2.1	DISCUSSION	9
2.2	WEIGHT AND BALANCE SUMMARY	10
2.3	MISSILE SECTION SUMMARY CHECK LISTS	13
2.4	SECTION 39 DATA	21
2.5	ENGINEERING CHANGE PROPOSAL SUMMARY	24

SUMMARY

This report presents summary mass properties data for all CELI components to be installed at Vandenberg Air Force Base on the Minuteman missiles including kit weights supplied by other Associate Contractors. The data is to be used in conjunction with the appropriate missile data from Air Force Plant 77 by the Weight Engineer at Vandenberg Air Force Base to complete his report to the Mass Properties Integration Contractor.

1.0 INTRODUCTION

1.1 REFERENCES

- 1.1.1 BSD Exhibit 62-45, "Mass Properties Control Data for WS-133A", Dated 3 August 1962.
- 1.1.2 CCN 258 (BSD-63MSN-2597) to AFO4(647)-580 dated 5 October 1962.
- 1.1.3 Boeing Document D2-13943, "Flight Article Mass Properties Report for CTLI Installations for MRCN 6301 S/N 000001 - 000015."
- 1.1.4 Boeing Document D2-13944-501, "Flight Article Mass Properties Report for Missile 501 Components."
- 1.1.5 Boeing Document D2-13945-xxx, "Air Force Plant 77 Flight Article Mass Properties Report for Missile xxx."
- 1.1.6 Boeing Document D2-13954-xxx, "Vandenberg Air Force Base Flight Article Mass Properties Report for CTL Missile xxx."
- 1.1.7 Boeing Document D2-13957-x, "Statistical Means and Dispersions for the Mass Properties of Boeing Components for the Wing I Operational Minuteman Missile."

1.2 DISCUSSION

This weight report for a series of CTLI Installations for Wing I Minuteman missiles is presented in accordance with section 3.1.1 of BSD Exhibit 62-45 (reference 1.1.1) as authorized by CCN 258 to AFO4(647)-580 (reference 1.1.2). This report presents summary mass properties data for all CTLI components to be installed at VAFB including kit weights supplied by other Associate Contractors. It does not include data for CTLI provisions which are incorporated into every production missile (the CTLI "weight penalty") or data remaining unchanged after the original assembly of the missile at Air Force Plant 77. The following pages, therefore, list only the items to be added or changed in the course of the conversion and the mass properties data given on check lists or weight and balance summaries are net changes which must be combined with the appropriate missile data from Plant 77 (reference 1.1.5) and Vandenberg Air Force Base (reference 1.1.6) in order to obtain the mass properties of the complete missile.

Each section of this report will contain one complete CTLI installation data package consisting of (1) a brief discussion of the data, (2) sectional distribution of CTLI components, (3) check lists and change records as required, and (4) a list of Engineering Change Proposals incorporated on the components. Average weights will be used for all components other than the CTLI section which will be an actual weight. Background data for these average weights can be found in reference 1.1.7. Refer to reference 1.1.3 for data covering the installation of CTLI sections from S/N 000001 through S/N 000015.

1.3 WEIGHING PROCEDURES

A description of the weighing procedures and an accuracy statement will be found in reference 1.1.4.

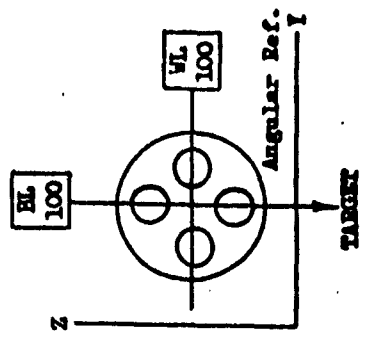
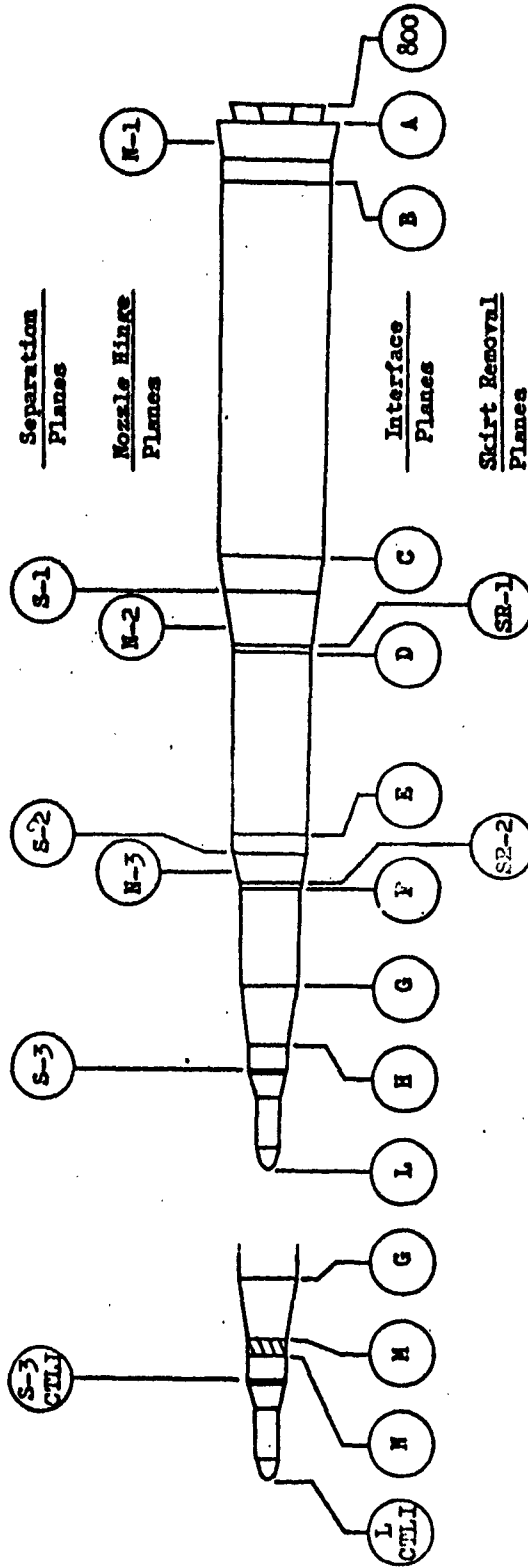
1.4 ENGINEERING CHANGE PROPOSAL (ECP) SUMMARY

See each section of this document for a list of the ECP's incorporated on the Boeing components covered by this report. The ECP's listed are those not covered by the latest revision to "Model Specification, Trainer-Test Group, Guided Missile (S-133-1006)."

1.5 MISSILE STATION DIAGRAM

See page 8 for a missile station diagram for the CTLI installation.

WING I
OPERATIONAL AND CUTL MISSILE STATION DIAGRAM



△ These Missile Stations become 50.000 when converted to Boeing Section Stations.

SEPARATION PLANES	MISSILE STA	INTERFACE PLANES	MISSILE STA
S-1	504,420	A	787,055
S-2	346,030	B	750,995
S-3	219,135	C	528,355
S-3 CUTL	209,135	D	469,273
		E	360,340
SKIRT REMOVAL PLANES		F	321,990
SR-1	469,70	G	260,215
SB-2	322,51	H	228,715
		L	155,715
NOZZLE HINGE PLANES		M	228,715
N-1	778,788	N	218,715
N-2	480,853	L CUTL	145,715
N-3	330,090		

Reference
25-19999
DCR-E

CTLI SECTION, S/N 000 001 6

2.1 DISCUSSION

This section of the document describes the data changes created by converting a production line Minuteman missile into a CTLI missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries, check lists, and ECP lists applicable to this installation. Page 10 summarizes the complete installation mass properties and consists of data from page 11 (average mass properties of downstage components), page 12 (predicted sealant changes), and page 23 (actual weight of CTLI section S/N 0000016). In addition, pages 13 through 20 present summary check lists by production section as backup data for page 11. Page 24 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet letter SRP: 62:5215:2:6 dated October 5, 1962, and amended by telecon on January 30, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

2.2 WEIGHT & BALANCE SUMMARY TOTAL CTLI KIT INSTALLATION CTLI WAFER S/N 0000016					REPORT NO. _____ DATE _____					
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³	
						LONG. *	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			150.6	54.8	99.8	100.2		
5			Silo							
6			Aero							
7	42	G&C Section			7.4	66.8	111.9	114.3		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			16.1	81.9	108.3	117.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			- 1.7	58.2	110.2	117.9		
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.7		58.2	110.2	117.9		
22	45	Interstage 2-3			21.1	68.6	111.6	120.2		
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			25.7	102.3	112.6	121.4		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			- 1.4	55.6	112.2	120.6		
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.4		55.6	112.2	120.6		
37	47	Interstage 1-2			25.7	73.9	114.8	125.2		
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			30.8	111.0	117.7	130.0		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.6	74.7	119.3	128.6		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			283.9					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

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EMINS

VOL

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SEC

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2.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)					REPORT NO. _____ DATE _____					
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³	
						LONG.	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			4.39	55.9	107.5	110.6		
5			Silo							
6			Aero							
7	42	G&C Section			6.96	66.9	112.0	114.3		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			15.94	81.9	108.3	117.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			- 1.88	57.7	110.3	117.8		
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.88		57.7	110.3	117.8		
22	45	Interstage 2-3			20.94	68.4	111.7	120.4		
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			25.73	102.3	112.6	121.4		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			- 1.41	55.6	112.2	120.6		
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.41		55.6	112.2	120.6		
37	47	Interstage 1-2			25.21	73.5	115.1	125.6		
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			29.98	109.7	117.7	130.1		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.43	74.1	119.3	128.5		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			135.29					
49			Silo							
50			Aero							
51			Base							
52			Jett							

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2.2 EMS 5-62 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE*					REPORT NO. _____					
					DATE _____					
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² -LO-3	
						LONG.	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			.2	54.5	111.5	111.5		
5			Silo							
6			Aero							
7	42	G&C Section			.4	65.4	110.5	113.5		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			.2	80.9	109.3	116.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			.2	53.6	110.8	116.7		
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned Portion	Aero							
20			Base							
21			Jett		.2		53.6	110.8	116.7	
22	45	Interstage 2-3 (Aft)			.2	85.0	103.0	101.8		
23			Silo							
24			Aero							
25	46	2nd Stage Engine			0	-	-	-		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			0	-	-	-		
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned Portion	Aero							
35			Base							
36			Jett							
37	47	Interstage 1-2 (Aft)			.5	94.7	102.0	103.4		
38			Silo							
39			Aero							
40	48	1st Stage Engine			.8	161.3	116.2	128.0		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			.2	101.3	119.2	133.9		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			2.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

2-5550-0-58 * Reference D2-13954-534

CHECK LIST NO.	2.3.1 MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)									
	DATE	MODEL	No	Day	Yr							
		FINAL ASSEMBLY DRAWING NO. 21-52900-4 (Using 25-25406-3)										
	SECTION 39	MISSILE NO.										
	MISSILE COMPONENT	COMPONENT PART NO.										
ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	BASIC WEIGHT	AS WEIGHED	REMOTE SITE SHIPMENT	REMOTE SITE AS RECEIVED	REMOTE SITE AS WEIGHED	LAUNCH
3a	Body Sect. - Trainer Test	25-25402-18	SEE CHANGE RECORD									
3b	Cable Assy. Set - Electrical	25-26878-5	2.21	56.5	109.8	116.0						
3c	Conduit Supt. Set - Raceway	25-29239-7	.93	56.3	111.6	111.6						
3d	Instl. Kit - Trainer Test Group	25-31677-12	1.27	54.5	100.6	100.6						
3e	RMS 5-62 Installed at VAFB		*									
	i> The following items included in 25-25402-18 are furnished by Autonetics											
	SE 35A Cable Set	55008-106	7.5	62.6	109.7	107.2						
	D 24A Analog Multiplexer	55007-106	16.9	53.9	101.4	103.3						
	D 20C Data Programmer	55006-106	16.1	53.9	101.9	97.0						

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* See page 12 for the net weight and balance effect of RMS 5-62 installed at VAFB

CHECK LIST NO.	2.3.3 MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)														
	DATE	MODEL	Mo	Day	Yr												
		FINAL ASSEMBLY DRAWING NO. 21-52900-4															
ITEM NUMBER	SECTION	MISSILE NO.	WEIGHT	X ARM	Y ARM	Z ARM	BASIC WEIGHT	AS WEIGHED	AS RECEIVED	AS SHIPPED	AS WEIGHED	AS RECEIVED	AS SHIPPED	AS WEIGHED	AS RECEIVED	AS SHIPPED	
	DESCRIPTION	PART NO.															COMPONENT PART NO.
4a	Cable Assy. Set - Electrical	25-26878-5	6.47	92.9	111.2	118.4											
4b	Conduit Svpt. Set - Raceway	25-29239-7	13.84	82.5	110.5	117.8											
4c	Instl. Kit - Trainer Test Group	25-31677-12	1.65	80.8	110.8	117.9											
4d	RIS 5-62 Installed at VAFB		*														
The following items are furnished by Aerojet																	
4e	Destruct System, AODS	359764	4.00	58.1	99.8	114.0											
The following items are deleted from the missile assembly in order to accommodate the CMI installations																	
4f	Raceway Instl.	25-23214-5	9.93	80.2	110.2	117.6											
4g	Standards Instl.	25-30133-1	.09	68.5	109.4	116.2											
4h	RIS 5-62 Removed at VAFB		*														

* See page 12 for a summary of the net weight and balance change of RIS 5-62 at VAFB

CHECK LIST NO.	2.3.4 MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)						
	DATE	MODEL	No	Day					
		FINAL ASSEMBLY DRAWING NO. 21-52900-4	Yr						
ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	MISSILE NO.			COMPONENT		
				X ARM	Y ARM	Z ARM	BASIS	WEIGHT	HEIGHT
SECTION 45		MISSILE PART NO.			MISSILE				
MISSILE COMPONENT 2-3 INTERSTAGE		COMPONENT PART NO.			MISSILE				
5a	Cable Assy. Set - Electrical	25-26878-5	4.36	64.9	112.0	119.9			
5b	Conduit Supt. Set - Raceway	25-29239-7	17.53	70.9	111.6	120.1			
5c	Instl. Kit - Trainer Test Group	25-31677-12	1.70	74.9	111.6	119.4			
5d	BMS 5-62 Installed at VAFB		*						
The following items are deleted from the missile assembly in order to accommodate the CMI Installation									
5e	Standards Instl.	25-30133-1	.07	78.6	109.6	119.5			
5f	Raceway Instl.	25-23214-5	4.46	72.7	110.9	117.3			
5g	BMS 5-62 Removed at VAFB		*						

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* See page 12 for a summary of the net weight and balance change of BMS 5-62 at VAFB

CHECK LIST NO.	2.3.5 MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)												
	DATE	MODEL	No	Day											
		FINAL ASSEMBLY DRAWING NO. 21-52900-4	Yr												
ITEM NUMBER	SECTION 46	MISSILE NO.	COMPONENT		MISSILE										
	MISSILE COMPONENT 2nd STAGE MOTOR	COMPONENT PART NO.	WEIGHT	AS WEIGHED											
	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	BASIC WEIGHT	AS WEIGHED	REMOVAL SITE	SHIPMENT	AS RECEIVED	REMOVAL SITE	AS WEIGHED	REMOVAL SITE	LAUNCH
6a	Cable Assy. Set - Electrical	25-26878-5	10.75	111.1	112.8	121.2									
6b	Conduit Supt. Set - Raceway	25-29239-7	21.86	109.8	112.2	121.2									
6c	Instl. Kit - Trainer Test Group	25-31677-12	1.90	88.9	111.8	120.4									
6d	Timer - Interval	29-22327-2	1.50	67.1	112.5	121.8									
6e	Battery - Squib Activated	10-20912-3	1.40	63.9	112.5	121.8									
6f	BMS 5-62 Installed at VAFB		*												
	The following items are furnished by Aerojet														
6g	Destruct System, AODS	359764	4.19	74.8	111.8	120.4									
	The following items are deleted from the missile assembly in order to accommodate the CMI Installation														
6h	Raceway Instl.	25-23214-5	15.87	103.0	111.9	120.7									
6i	BMS 5-62 Removed At VAFB		*												

* See page 12 for a summary of the net weight and balance change of BMS 5-62 at VAFB

CHECK LIST NO.	2.3.6 MISSILE WEIGHING CHECK LIST		RECORD OF CHECKING (DATE)															
	DATE	MODEL	Mo	Day	Yr													
		FINAL ASSEMBLY DRAWING NO. 21-52900-4																
ITEM NUMBER	SECTION	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT										
								BASIC WEIGHT	AS WEIGHED	REMOTE SITE SHIPMENT	AS RECEIVED	REMOTE SITE	AS WEIGHED	REMOTE SITE	LAUNCH			
MISSILE COMPONENT 1-2 INTERSTAGE		MISSILE NO.		COMPONENT PART NO.														
7a	47	Cable Assy. Set - Electrical	25-26878-5	5.48	71.2	115.8	126.4											
7b		Conduit Supt. Set - Raceway	25-29239-7	22.78	78.6	115.0	125.9											
7c		Instl. Kit - Trainer Test Group	25-31677-12	1.32	87.4	115.3	125.9											
7d		BMS 5-62 Installed at VAFB		*														
The following items are deleted from the missile assembled in order to accommodate the YJL Installations																		
7e		Standards Instl.	25-30133-3	.10	99.8	115.8	126.0											
7f		Raceway Instl.	25-23214-5	5.68	90.0	114.8	126.4											
7g		BMS 5-62 Removed at VAFB		*														

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* See page 12 for a summary of the net weight and balance change of BMS 5-62 at VAFB

CHECK LIST NO.		2.3.7 MISSILE WEIGHING CHECK LIST										RECORD OF CHECKING (DATE)				
DATE		MODEL		FINAL ASSEMBLY DRAWING NO. 21-52900-4										No	Day	Yr
ITEM NUMBER	SECTION	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	BASIC WEIGHT	No WEIGHED	REMOTE SITE SHIPMENT	REMOTE SITE AS RECEIVED	REMOTE SITE AS WEIGHED	REMOTE SITE LAUNCH	COMPONENT		
														MISSILE		
MISSILE COMPONENT 1st STAGE MOTOR		MISSILE NO. _____														
DESCRIPTION		COMPONENT PART NO. _____														
8a		Cable Assy. Set - Electrical	25-26878-5	13.12	156.4	118.2	130.5									
8b		Conduit Supt. Set	25-29239-7	13.18	77.1	117.3	130.0									
8c		Instl. Kit - Trainer Test	25-31677-12	2.67	78.2	117.2	129.5									
8d		Timer - Interval	29-22327-1	1.50	70.6	117.7	130.5									
8e		Battery - Squib Activated	10-20942-3	1.40	66.7	117.7	130.5									
8f		BMS 5-62 Instl. at VAFB		*												
		The following items are furnished by Aerojet														
8g		Destruct System, AODS	359764	6.19	78.1	116.9	129.3									
		The following items are deleted from the missile assembly in order to accommodate the CMI installation														
8h		Raceway Instl.	25-23214-5	8.08	82.9	117.2	129.8									
8i		BMS 5-62 Removed at VAFB		*												

2-5550-0-21

* See page 12 for a summary of the net weight and balance change of BMS 5-62 at VAFB

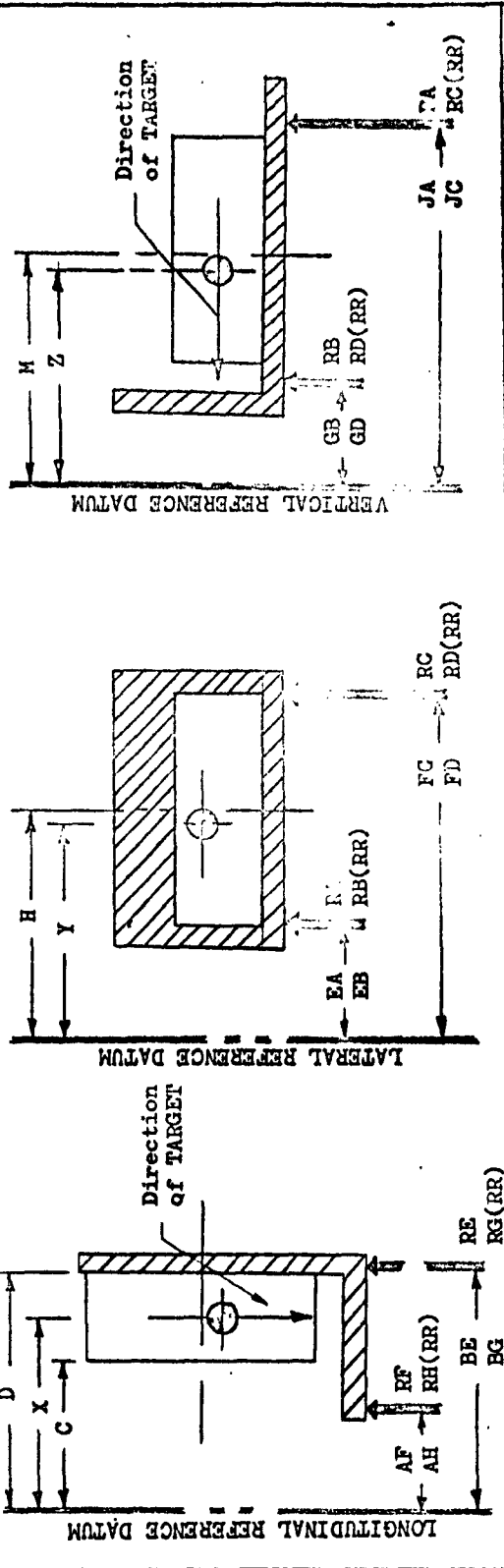
2.4.1 ACTUAL WEIGHT RECORD - CTLI SECTION

U/O MISSILE 000016
 MISSILE MODEL WS-132A
 CONFIGURATION

DRAWING NO. 25-25402-17
 DCN F
 ADCN 21

CHECK LIST NO. 39
 REPORTED BY CB/WB
 CHECKED BY GVR

REPORT NO. Wts.-975-016
 PAGE NO.
 DATE 3/11/63



WEIGHING DATA				DIMENSIONAL DATA			
REACTION	GR. WT.	TARE	CORR.	REACTION	NET WT.	TARE	CORR.
RF	32.65	5.11		FC	42.95	40.00	
RH	12.75	12.00		RD	65.85	43.50	
RE	123.80	165.00		RA	62.00	23.25	
RG	76.60	11.70		RB	64.95	59.15	
TOTAL	305.80	165.75		TOTAL	305.75	165.70	

REACTION	GR. WT.	TARE	CORR.	NET WT.	DIM. INCHES	DIM. INCHES
AF	12.007			EA	84.510	GB
AH	42.023			EB	84.505	GD
BE	62.996			FC	115.490	JA
EG	62.999			FD	115.495	JC
C	50.000			H	100.000	M
D	60.000					

LONGITUDINAL C.G.				LATERAL C.G.				VERTICAL C.G.			
REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT
RF	27.50	42.007		RA	38.75	84.510		RB	35.80	77.478	
RH	30.75	42.023		RB	35.80	84.505		RD	22.55	77.481	
RE	46.90	62.996		RC	42.95	115.490		RA	38.75	115.500	
RG	34.90	62.999		RD	22.55	115.495		RC	42.95	115.500	
AS WGD	140.05	54.27	7,600.6	AS WGD	140.05	99.00	13,864.7	AS WGD	140.05	99.66	13,957.3

(RR) = Rear Reaction

SERIAL NUMBER: 0000016

CHECK LIST NO.	2.4.2 MISSILE WEIGHING CHECK LIST	RECORD OF CHECKING (DATE)			LAUNCH					
		Mo	Day	Yr						
39			11							
DATE	MODEL MS-133A	FINAL ASSEMBLY DRAWING NO. 25-25402-17								
ITEM NUMBER	SECTION 39	MISSILE NO.			AS WEIGHED	AS RECEIVED	SHIPPING	REMOTE SITE	REMOTE SITE	REMOTE SITE
	MISSILE COMPONENT CMLI	COMPONENT PART NO.	Noted							
	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	BASIC WEIGHT	AS WEIGHED	AS RECEIVED	SHIPPING
39	Instrumentation Group-Trainer Test	25-25402-17					-			
39a	CMLI Structure Assy.	25-25403-11					-			
	Supt. Structure	25-29094-15					X	X		
	Primary Structure	25-29093-15					X	X		
	Insulation & Ext. Mark	25-29095-3					X	X		
	Antenna & Spacer	25-29096-3					X	X		
	Plate - Ident.	21-51600-329					X	X		
39b	Cable & Equipment Instl.	25-25404-12					-			
	Battery Squib	10-20942-2					X	X		
	Battery Squib	10-20942-1					X	X		
	Cable Set SE-35A	55008-106					-			
	Cable	AN 31277-315					X	X		
	Cable	AN 31278-315					X	X		
	Cable	AN 31279-315					X	X		
39c	Kit Installation (EXP 525)	25-25402-21					X	X		

WEIGHT AND BALANCE CHANGE RECORD

2.4.2

ASSOCIATE CONTRACTOR	<u>BOEING</u>	CONTRACT NO.	<u>AF04(647)-289</u>	REPORT NO.	<u>WTS-975-016</u>
COMPONENT	<u>SECTION 39</u>	LOT NO.		DATE	<u>3-11-63</u>
MODEL NO.	<u>WS-133A</u>	DRAWING NO.	<u>25-25402-17</u>	PREPARED	<u>CB/WB</u>
SERIAL NO.	<u>0000016</u>	U.O. MISSILE		APPROVED	<u>GVR</u>

EQUIPMENT CHANGE RECORD		WEIGHT AND BALANCE						
PART NO.	DESCRIPTION OF EQUIPMENT	WEIGHT	X AXIS		Y AXIS		Z AXIS	
			ARM	MOMENT	ARM	MOMENT	ARM	MOMENT
1								
2	Instr. Group-Trainer, Test (As Wgd)	140.05	54.27	7,600.6	99.00	13,864.7	99.66	13,957.3
3								
4								
5	ADD:							
6	Cable Autometrics	3.85	74.2		115.5		102.8	
7	Cable Autometrics	2.10	50.4		106.9		111.4	
8								
9	DEDUCT:							
10		0						
11								
12								
13								
14								
15	Instr. Group-Trainer, Post (Comp.)	146.00	54.74	7,522.1	99.55	14,533.9	99.91	14,587.0
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								
31								
32								

2.5

**ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION
APPLICABLE TO CTLI SECTION S/N 000016 AND INSTALLATION KIT.**

The following ECP's have not been incorporated into "Model Specification, Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 31 October 1962. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

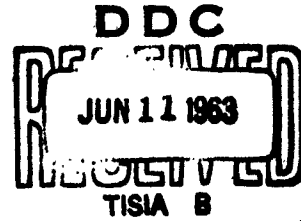
ECP NO. (WS-133A-EO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part 2	PSS, S&A Installation and Envelope Change	1	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of GSC Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-20075	3	Negl.	Yes
373	Work-Around for 10-20942-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415 540	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
506	CTLI Raceway Cover Revision	1	- .2	Yes
525	CTLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MRCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes

* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

** These ECP's were incorporated during manufacture of the CTLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

THE **BOEING** COMPANY.

CODE IDENT NO. 81205



AD 404314C3

4560

NUMBER D2-13943-1

TITLE WING I CTLL FLIGHT ARTICLE MASS PROPERTIES REPORTS FOR THE INSTALLATION OF MRCN 6301 CTLL SECTION (S/N 0000016 AND ON)

MODEL NO. WS-133A CONTRACT NO. AFO4(694)-46

ISSUE NO. 9 ISSUED TO ASTIA

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_____	_____	_____
_____	_____	_____
PREPARED BY	<u>Vincent Foster</u> Vincent Foster	<u>4-23-63</u>
SUPERVISED BY	<u>Roger C. Wierenza</u> Roger C. Wierenza	<u>4-23-63</u>
APPROVED BY	<u>Duane C. Brenden</u> Duane C. Brenden	<u>4-23-63</u>
APPROVED BY	<u>R. G. Grey</u> R. G. Grey	<u>4-28-63</u>
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APPROVED BY	<u>R. G. Grey</u> R. G. Grey	<u>(DATE)</u>

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SECT. _____ PAGE 1

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2-9142-2

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
A	Revised pages 1, 4, 10. Added pages 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42. Added Moments of Inertia to page 10. Added Sections 3.0 and 4.0 to the document.	5-17-63	D. Brenden <i>H. Brenden</i>

US 4287 2025 ORIG. 2/62

2-8142-2

REV SYM A

BOEING | NO. D2-13943-1
 | SECT. | PAGE 3

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2.2 WEIGHT & BALANCE SUMMARY TOTAL CTLI KIT INSTALLATION CTLI WAFER S/N 0000016					REPORT NO. _____ DATE _____					
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x10 ⁻³	
						LONG. *	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			150.6	54.8	99.8	100.2	.004	.002
5			Silo							
6			Aero							
7	42	G&C Section			7.4	66.8	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			16.1	81.9	108.3	117.2	0	.001
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			- 1.7	58.2	110.2	117.9	0	0
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.7		58.2	110.2	117.9		
22	45	Interstage 2-3			21.1	68.6	111.6	120.2	0	.001
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			25.7	102.3	112.6	121.4	0	.008
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			- 1.4	55.6	112.2	120.6	0	0
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.4		55.6	112.2	120.6		
37	47	Interstage 1-2			25.7	73.9	114.8	125.2	0	.002
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			30.8	111.0	117.7	130.0	0	.027
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.6	74.7	119.3	128.6	0	0
45			Silo							
46			Aero							
47			Base							
48		MISILE			283.9					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

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CTLI SECTION, S/N 000017

3.1

This section of the document describes the data changes created by converting a production line Minuteman missile into a CTL missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CTLI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CTLI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries, check lists, and ECP lists applicable to this installation. Page 26 summarizes the complete installation mass properties and consists of data from page 27 (average mass properties of downstage components), page 28 (predicted sealant changes), and page 32 (actual weight of CTLI section S/N 000017). In addition, page 29 presents summary check lists by production section as backup data for page 27. Page 33 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-01DR-NMFD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODS" dated January 28, 1963.

Average values have been used for all Boeing items other than the CTLI section which is an actual weight.

3.2 WEIGHT & BALANCE SUMMARY TOTAL CTLI KIT INSTALLATION CTLI WAFER S/N 0000017					REPORT NO. _____ DATE _____					
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² X10 ⁻³	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			150.4	54.7	99.8	100.3	.004	.002
5			Silo							
6			Aero							
7	42	G&C Section			7.4	66.8	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			16.1	81.9	108.3	117.2	0	.001
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			- 1.7	58.2	110.2	117.9	0	0
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.7		58.2	110.2	117.9		
22	45	Interstage 2-3			21.1	68.6	111.6	120.2	0	.001
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			25.7	102.3	112.6	121.4	0	.008
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			- 1.4	55.6	112.2	120.6	0	0
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.4		55.6	112.2	120.6		
37	47	Interstage 1-2			25.7	73.9	114.8	125.2	0	.002
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			30.8	111.0	117.7	130.0	0	.027
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.6	74.7	119.3	128.6	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			283.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

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3.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)					REPORT NO. _____ DATE _____					
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² X10 ⁻³	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			4.39	55.9	107.5	110.6		
5			Silo							
6			Aero							
7	42	G&C Section			6.96	66.9	112.0	114.3		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			15.94	81.9	108.3	117.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			- 1.88	57.7	110.3	117.8		
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.88		57.7	110.3	117.8		
22	45	Interstage 2-3			20.94	68.4	111.7	120.4		
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			25.73	102.3	112.6	121.4		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			- 1.41	55.6	112.2	120.6		
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.41		55.6	112.2	120.6		
37	47	Interstage 1-2			25.21	73.5	115.1	125.6		
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			29.98	109.7	117.7	130.1		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.43	74.1	119.3	128.5		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			135.29					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

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3.2 EMS 5-62 CHANGES INSTALLED AT VANDEMBERG AIR FORCE BASE**					REPORT NO. _____					
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² ×10 ⁻³	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			.2	54.5	111.5	111.5		
5			Silo							
6			Aero							
7	42	G&C Section			.4	65.4	110.5	113.5		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			.2	80.9	109.3	116.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			.2	53.6	110.8	116.7		
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	.2		53.6	110.8	116.7		
22	45	Interstage 2-3			.2	85.0	103.0	101.8		
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			0	-	-	-		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			0	-	-	-		
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett							
37	47	Interstage 1-2			.5	94.7	102.0	103.4		
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			.8	161.3	116.2	128.0		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			.2	101.3	119.2	133.9		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			2.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

** Reference D2-13954-534

2-5550-0-58 * Boeing Section Stations
REV. SYM. A (See Missile Station
Diagram)

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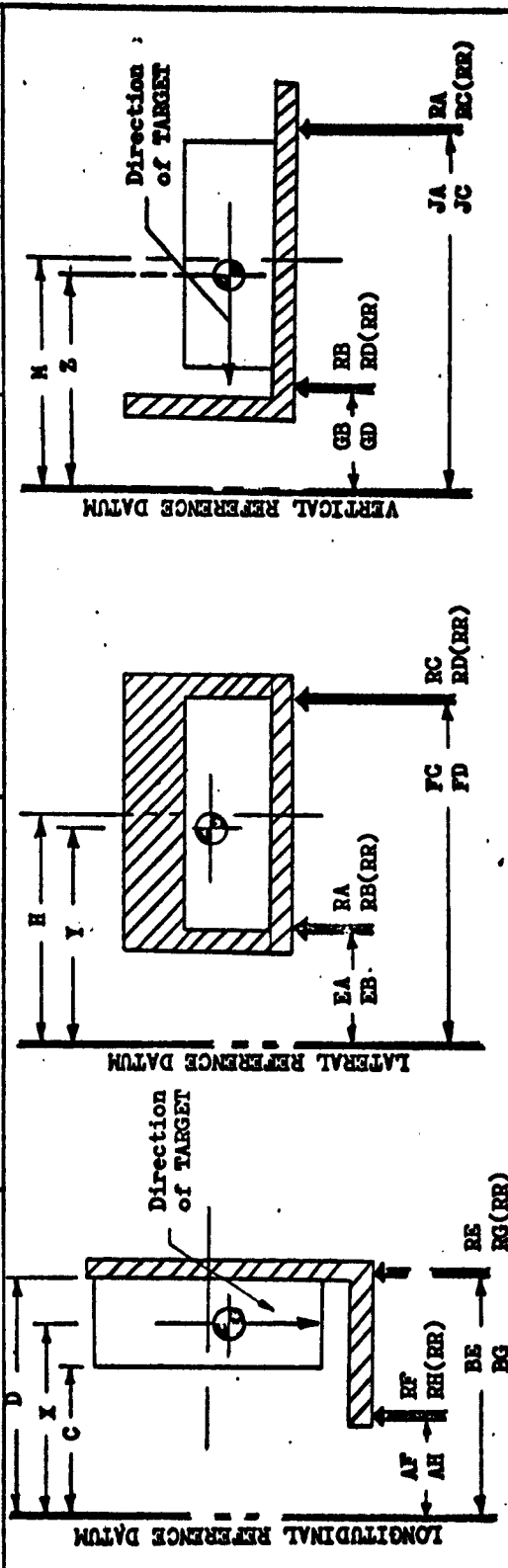
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ACTUAL WEIGHT RECORD - CTLI SECTION

3.4.1
 U/O MISSILE 000017
 DRAWING NO. 25-25402-35
 CHECK LIST NO. 39
 REPORT NO. WTS-997-017
 MISSILE MODEL WS-133A
 DCN H
 REPORTED BY CB
 CONFIGURATION ADCN 23
 CHECKED BY GVR
 DATE 4/28/63
 PAGE NO.



WEIGHING DATA				DIMENSIONAL DATA						
REACTION	GR. WT.	TARE	CORR.	NET WT.	DIM.	INCHES	DTM.	INCHES	DIM.	INCHES
RF	51.65	24.55		27.10	AF	42.007	EA	84.510	GB	77.478
RH	53.90	22.60		31.30	RD	76.15	EB	84.505	GD	77.481
RE	104.15	57.15		47.00	RA	72.15	FC	115.499	JA	115.500
RG	95.40	61.05		34.35	RB	84.40	FD	115.495	JC	115.500
TOTAL	305.10	165.35		139.75	TOTAL	305.10	165.35		H	100.000
					D	60.000			M	100.000

LONGITUDINAL C. G.				LATERAL C. G.				VERTICAL C. G.			
REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT
RF	27.10	42.007		RA	48.00	84.510		RB	26.55	77.478	
RH	31.30	42.023		RB	26.55	84.505		RD	31.60	77.481	
RE	47.00	62.996		RC	33.60	115.499		RA	48.00	115.500	
RG	34.35	62.999		RD	31.60	115.495		RC	33.60	115.500	
AS WGD	139.75	54.23	7,578.5	AS WGD	139.75	98.96	13,830.2	AS WGD	139.75	99.68	13,930.2

(RR) = Rear Reaction

SERIAL NUMBER: 0000017

CHECK LIST NO. 39 3-A.2 MISSILE WEIGHING CHECK LIST
 DATE MODEL WS-133A FINAL ASSEMBLY DRAWING NO. 25-25402-35

ITEM NUMBER	SECTION <u>39</u>	MISSILE COMPONENT <u>CTLI</u>	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	BASIC WEIGHT	AS WEIGHED	RECORD OF CHECKING (DATE)			LAUNCH	
											Mo	Day	Yr		
39			Instrumentation Group, Trainer-Test	25-25402-35								4	28		
39a			CTLI Structure Assembly	25-25403-11									63		
			Support Structure	25-29094-45					X	X					
			Primary Structure	25-29093-15					X	X					
			Insulation & External Markings	25-29095-3					X	X					
			Antenna & Spacer	25-29096-3					X	X					
			Plate - Identification	21-51600-329					X	X					
39b			Cable & Equipment Installation	25-25404-12											
			Battery, Squib	10-20242-1					X	X					
			Battery, Squib	10-20242-2					X	X					
			Cable Set SE-35A	55008-106											
			Cable	AN 31277-315					X	X					
			Cable	AN 31278-315					X	0					
			Cable	AN 31279-315					X	0					
39c			Kit Installation (ECP 525)	25-25402-21					X	X					
39d			Kit Installation (ECP 551)	25-25402-26					X	X					
39e			Kit Installation (ECP 576)	25-25402-34					X	X					

D 2-8860-0-0-21
 REV. 824 A

BOEING
 NO. 25-13343-1

WEIGHT AND BALANCE CHANGE RECORD

3.4.3

ASSOCIATE CONTRACTOR BOEING
 COMPONENT SECTION 39
 MODEL NO. NB-133A
 SERIAL NO. 000017

CONTRACT NO. AF04(GAT)-289
 LOT NO.
 DRAWING NO. 25-25402-35
 U.O: MISSILE

REPORT NO. WTS-997-017
 DATE 4/28/63
 PREPARED CB
 APPROVED GVR

EQUIPMENT CHANGE RECORD		WEIGHT AND BALANCE						
PART NO.	DESCRIPTION OF EQUIPMENT	WEIGHT	X AXIS		Y AXIS		Z AXIS	
			ARM	MOMENT	ARM	MOMENT	ARM	MOMENT
1								
2	Instr. Group, Trainer-Test (As Weighed)	139.75	54.33	7,578.5	98.96	13,830.2	99.68	13,930.2
3								
4								
5	ADD:							
6	AN31278-315 Cable-Autonetics	3.90	74.2		115.5		102.8	
7	AN31279-315 Cable-Autonetics	2.15	50.4		106.9		111.4	
8								
9								
10	DEDUCT:	0						
11								
12								
13								
14	Instr. Group, Trainers-Test (Complete)	145.80	54.71	7,976.2	99.52	14,510.5	99.94	14,570.6
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								
31								
32								

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 WTS-997-017

**3.5 ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION
APPLICABLE TO CTLI SECTION S/N 000017 AND INSTALLATION KIT**

The following ECP's have not been incorporated into "Model Specification, Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 31 October 1962. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WS-133A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part 2	PSS, S&A Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of G&C Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-20885	3	Negl.	Yes
373	Work-Around for 10-20942-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415 / 540	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
506	CTLI Raceway Cover Revision	1	- .2	Yes
525	CTLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MRCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MRCN 6301	3	Negl.	Yes

* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

** These ECP's were incorporated during manufacture of the CTLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

CILI SECTION, S/N 000018

4.1

This section of the document describes the data changes created by converting a production line Minuteman missile into a CIL missile. The mass data reported herein reflect the predicted net changes to be applied to the total missile mass properties when this CILI section and the related downstage components are installed on a missile. A supplemental report (see reference 1.1.6) will be issued at Vandenberg Air Force Base when this CILI section is actually used on a missile. This supplemental report will reflect the actual data gathered on base during the installation and will thus supersede parts of this report. However, past experience has shown that the changes between these two reports will be slight.

The data on the following pages consist of weight and balance summaries, check list, and ECP lists applicable to this installation. Page 35 summarizes the complete installation mass properties and consists of data from page 36 (average mass properties of downstage components), page 37 (predicted sealant changes), and page 41 (actual weight of CILI section S/N 000018). In addition, page 38 presents summary check lists by production section as backup data for page 36. Page 42 lists the engineering change proposals incorporated on the components used for this installation.

All data reported in this section of the document reflect the use of a linear shaped charge destruct system on the first stage engine per ECP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-01DR-NMPD-1, "Nominal Mass Properties and Dispersions for Minuteman CILI/AODS" dated January 28, 1963.

Average values have been used for all Boeing items other than the CILI section which is an actual weight.

4.2 WEIGHT & BALANCE SUMMARY TOTAL CTLI KIT INSTALLATION CTLI WAFER S/N 0000018						REPORT NO. _____ DATE _____				
LINE	SEQ.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² x 10 ⁻³	
						LONG. °	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			150.4	54.8	99.7	100.3	.004	.002
5			Silo							
6			Aero							
7	42	G&C Section			7.4	66.8	111.9	114.3	0	0
8			Silo							
9			Aero							
10	44	3rd Stage Engine			16.1	81.9	108.3	117.2	0	.001
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			- 1.7	58.2	110.2	117.9	0	0
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.7		58.2	110.2	117.9		
22	45	Interstage 2-3			21.1	68.6	111.6	120.2	0	.001
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			25.7	102.3	112.6	121.4	0	.008
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			- 1.4	55.6	112.2	120.6	0	0
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.4		55.6	112.2	120.6		
37	47	Interstage 1-2			25.7	73.9	114.8	125.2	0	.002
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			30.8	111.0	117.7	130.0	0	.027
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.6	74.7	119.3	128.6	0	0
45			Silo							
46			Aero							
47			Base							
48		MISSILE			283.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

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4.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)					REPORT NO. _____ DATE _____					
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² X10 ⁻³	
						LONG.#	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			4.39	55.9	107.5	110.6		
5			Silo							
6			Aero							
7	42	G&C Section			6.96	66.9	112.0	114.3		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			15.94	81.9	108.3	117.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3 (Fwd)			- 1.88	57.7	110.3	117.8		
15			Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.88		57.7	110.3	117.8		
22	45	Interstage 2-3 (Aft)			20.94	68.4	111.7	120.4		
23			Silo							
24			Aero							
25	46	2nd Stage Engine			25.73	102.3	112.6	121.4		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Fwd)			- 1.41	55.6	112.2	120.6		
30			Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.41		55.6	112.2	120.6		
37	47	Interstage 1-2 (Aft)			25.21	73.5	115.1	125.6		
38			Silo							
39			Aero							
40	48	1st Stage Engine			29.98	109.7	117.7	130.1		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.43	74.1	119.3	128.5		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			135.29					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

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4.2 BMS 5-62 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE**					REPORT NO. _____ DATE _____					
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT ² 10 ⁻³	
						LONG.*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			.2	54.5	111.5	111.5		
5			Silo							
6			Aero							
7	42	G&C Section			.4	65.4	110.5	113.5		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			.2	80.9	109.3	116.2		
11			Silo							
12			Aero							
13			Base							
14	45	Interstage 2-3			.2	53.6	110.8	116.7		
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	.2		53.6	110.8	116.7		
22	45	Interstage 2-3			.2	85.0	103.0	101.8		
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			0	-	-	-		
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2			0	-	-	-		
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett							
37	47	Interstage 1-2			.5	94.7	102.0	103.4		
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			.8	161.3	116.2	128.0		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			.2	101.3	119.2	133.9		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			2.7					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

2-5550-0-58

** Reference D2-1394-534

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NO 22-13943-1

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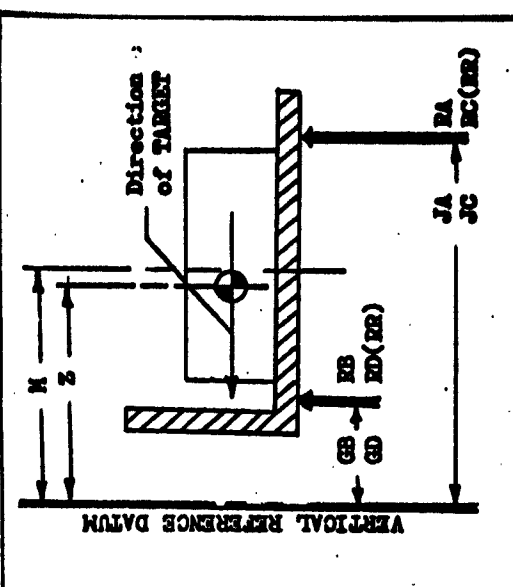
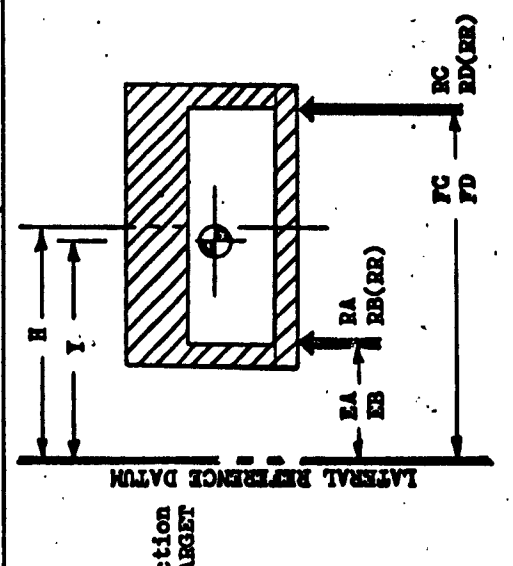
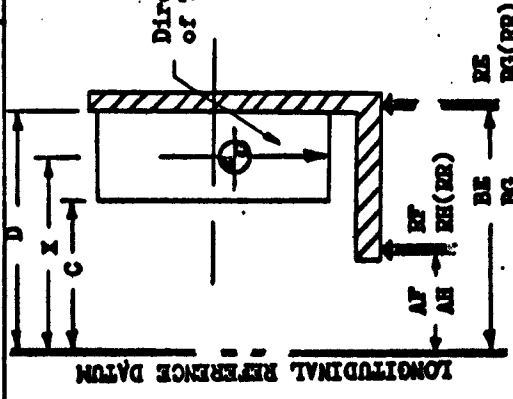
A

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PAGE 37

ACTUAL WEIGHT RECORD - CILI SECTION

4.41
 MISSILE 000018
 DRAWING NO. 25-25402-35
 CHECK LIST NO. 39
 REPORT NO. WVS-1002-018
 MISSILE MODEL WS-133A
 DCN H
 REPORTED BY CB/CM
 PAGE NO. 5/7/63
 CONFIGURATION 23
 ACDN GVR
 CHECKED BY



WEIGHING DATA				DIMENSIONAL DATA				
REACTION	GR. WT.	TARE	CORR.	NET WT.	DIM. INCHES	DIM. INCHES	DIM. INCHES	
BF	46.60	16.85		29.75	AF	42.007	EA	84.510
BH	58.95	30.60		28.35	AH	42.023	EB	84.505
BE	109.25	65.05		44.20	BE	62.996	FC	115.490
BG	90.65	53.10		37.55	BG	62.999	FD	115.495
TOTAL	305.45	165.60		139.85	C	50.000	H	100.000
					D	60.000	K	100.000

LONGITUDINAL C.G.				LATERAL C.G.				VERTICAL C.G.			
REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT	REACTION	NET WT.	ARM	MOMENT
BF	29.75	42.007		RA	43.50	84.510		RB	31.45	77.476	
BH	28.35	42.023		RB	31.45	84.505		RD	26.60	77.481	
BE	44.20	62.996		RC	38.30	115.490		RA	43.50	115.500	
BG	37.55	62.999		RD	26.60	115.495		RC	38.30	115.500	
AS WCD	139.85	4,591.1		AS WCD	139.85	98.89	13,829.3	AS WCD	139.85	99.72	13,945.6

(RR) = Rear Reaction

2-5-65 51
 IN 55-0-055-2

BOEING
 1-1-63
 1-1-63

SERIAL NUMBER: 0000018

4.4.2 MISSILE WEIGHING CHECK LIST
 MODEL VB-133A FINAL ASSEMBLY DRAWING NO. 25-25402-35

CHECK LIST NO. 39	DATE	SECTION 39	MISSILE NO.	RECORD OF CHECKING (DATE)				COMPONENT			MISSILE		
				No	5	7	63	AS WEIGHED	AS RECEIVED	SHIPPING			
		DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	AS WEIGHED	AS RECEIVED	SHIPPING	AS WEIGHED	AS RECEIVED	SHIPPING
39		Instrumentation Group, Trainer-Test	25-25402-35										
39a		CFM Structure Assembly	25-25403-11										
		Support Structure	25-29094-15					X	X				
		Primary Structure	25-29093-15					X	X				
		Insulation & External Marking	25-29095-3					X	X				
		Antenna & Spacer	25-29096-3					X	X				
		Plots - Identification	21-51600-329					X	X				
39b		Cable & Equipment Installation	25-25404-12										
		Battery, Squib	10-20942-1					X	X				
		Battery, Squib	10-20942-2					X	X				
		Cable Set SE-35A	55008-106										
		Cable	AM 31277-315					X	X				
		Cable	AM 31278-315					X	X				
		Cable	AM 31279-315					X	X				
39c		Kit Installation (EXP 525)	25-25402-21					X	X				
39d		Kit Installation (EXP 531)	25-25402-26					X	X				
39e		Kit Installation (EXP 578)	25-25402-34					X	X				

18-0-0888-1
 2-2486-0-21

OWBDB
 18-0-0888-1

2-3300-11 11

EQUIPMENT CHANGE RECORD		WEIGHT AND BALANCE RECORD						
PART NO.	DESCRIPTION OF EQUIPMENT	WEIGHT	X AXIS		Y AXIS		Z AXIS	
			ARM	MOMENT	ARM	MOMENT	ARM	MOMENT
1	225-25402-35 Instr. Group, Trainer-Test (As Weighed)	139.85	54.28	7,591.1	98.89	13,829.3	99.72	13,945.6
2								
3								
4								
5	ADD:							
6	AI31278-315 Cable Autometrics	3.85	74.2		115.5		102.8	
7	AI31279-315 Cable Autometrics	2.08	50.4		106.9		111.4	
8								
9	DEDUCT:							
10		0						
11								
12								
13								
14	225-25402-35 Instr. Group, Trainer-Test (Complete)	145.78	54.75	7,981.6	99.43	14,196.3	99.97	14,573.1
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								
31								
32								

4.4.3

ASSOCIATE CONTRACTOR BOEING CONTRACT NO. AF04(647)-289 REPORT NO. WTS-1002-018

COMPONENT SECTION 39 LOT NO. _____ DATE 5/7/63

MODEL NO. HS-133A DRAWING NO. 25-25402-35 PREPARED CB

SERIAL NO. 0000018 U.O. MISSILE APPROVED GVR

BOEING NO. 25-133A-1

**4.5 ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION
APPLICABLE TO CTLI SECTION S/N 000018 AND INSTALLATION KIT**

The following ECP's have not been incorporated into "Model Specification, Trainer-Test Group, Guided Missile, (S-133-1006)" as revised on 31 October 1962. However, the mass properties of these ECP's have been incorporated into this report unless otherwise noted.

ECP NO. (WS-133A-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
108-4	Operational Raceway Third Stage End Cap Change	3	+ .5	Yes
208 Part 2	PSS, S&A Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of G&C Bracket, Detonator Cord & CTLI Cable in Stage III Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/D Receiver, 10-20885	3	Negl.	Yes
373	Work-Around for 10-20942-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415 540	Potting & Bonding Deletions for Vandenberg Air Force Base Missiles	All	-	No*
506	CTLI Raceway Cover Revision	1	- .2	Yes
525	CTLI A/B Battery Redesign to Resolve Voltage Incompatibility	3	-	Yes**
551	CTLI Missile System Grounding Change, MRCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MRCN 6301	3	Negl.	Yes

* ECP's 415 and 540 transfer the responsibility for sealing the raceway covers from Plant 77 to Vandenberg. However, the weight is still considered part of the operational missile and is not included in this report.

** These ECP's were incorporated during manufacture of the CTLI wafer. However, that portion of ECP 551 which is to be incorporated on downstage components is not included since its properties are dependent upon installation at Vandenberg.

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SCIENTIFIC AND TECHNICAL INFORMATION

CAMERON STATION, ALEXANDRIA, VIRGINIA



UNCLASSIFIED

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NAVAL AIR ENGINEERING CENTER
PHILADELPHIA 12, PENNSYLVANIA
AERONAUTICAL MATERIALS LABORATORY
MATERIALS APPLICATION AND ENGINEERING DIVISION

DATE 29 January 1963

REPORT NO. NAEC-AML-1611

MS21046(ASG) NUTS, SELF-LOCKING,
HEXAGON-REGULAR HEIGHT, 800°F, 125 KSI FTU,
KAYNAR MANUFACTURING COMPANY, INCORPORATED,
QUALIFICATION TESTING OF

PAN C 48 AE 34-9
UNDER BUREAU OF NAVAL WEAPONS
WEPTASK NO. RAE 30C 004/200 1/F012 14 01

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BUREAU OF NAVAL WEAPONS, WASHINGTON 25, D. C.

Purpose

Reference (a) established a continuing project for the Naval Air Engineering Center to conduct evaluation tests on self-locking nuts.

2. Data

Tests were conducted for conformance to references (b) and (c), and the results are listed in Plates 1 through 4. These results cover Kaynar Manufacturing Company, Incorporated Part Number H56-04 and H56-08 as listed respectively in references (d) and (e). The samples are all-metal, one-piece, forged nuts with the upper threaded section elliptically offset to produce the self-locking action. The finish is silver plating. Samples were received in December of 1962, and the tests were completed in January 1963.

3. Conclusions

The self-locking nuts reported herein have successfully met the requirements of reference (b) and (c).

4. Action

Kaynar Manufacturing Company, Incorporated P/N's H56-04 and H56-08 are being included on the appropriate Qualified Products List.

Prepared by: M. J. Zurko
M. J. Zurko
Project Engineer

Approved by: B. R. Silverman
B. R. Silverman, Head
Mechanical Systems Branch

DDC
MAY 21 1963

CATALOGED BY ADIA
AD 1
4043

NO OTS

REFERENCES

- (a) BUWEPS ltr RAAE-343/4:GDN of 1 March 1961
- (b) Military Specification MIL-N-25027B(ASG) Amendment-1, Nut, Self-Locking, 250°F, 450°F, and 800°F, 125 ksi FTU, 60 ksi FTU, and 30 ksi FTU of 10 October 1962
- (c) Military Standard MS21046(ASG) Nuts, Self-Locking, Hexagon-Regular Height, 800°F, 125 ksi FTU of 11 September 1962
- (d) Kaynar Manufacturing Company, Incorporated, Engineering Research Test Report ERM2249C of 6 November 1962
- (e) Kaynar Manufacturing Company, Incorporated, Engineering Research Test Report ERM2251C of 10 December 1962

PLATES

- 1 - Test Results, Nuts, Self-Locking, Hexagon-Regular Height, 800°F, 125 ksi FTU, Size 4-40 (Kaynar)
- 2 - Dimensional Analysis of 4-40 Size
- 3 - Test Results, Nuts, Self-Locking, Hexagon-Regular Height, 800°F, 125 ksi FTU, Size 8-32 (Kaynar)
- 4 - Dimensional Analysis of 8-32 Size

KAYNAR P/N H56-04 SIZE 4-40 UNC-3B

GOVERNMENT DESIGNATION MS81046C04 PROCUREMENT SPEC. MIL-N-25027B
TORQUE -- (INCH-POUNDS)

TEST	SAMPLE NO.	INSTALLATION TORQUE	FIRST REMOVAL		SEVENTH INSTALLATION	SEVENTH REMOVAL		FIFTEENTH REMOVAL		MAXIMUM TORQUE
			STARTING	PREVAILING		STARTING	PREVAILING	STARTING	PREVAILING	
AS RECEIVED CONDITION	1		1.7			1.5		1.3	1.2	2.4
	2		2.1			1.8		1.7	1.6	3.0
	3		2.0			1.9		1.4	1.3	2.8
	4		2.3			1.9		2.1	2.0	2.9
	5		1.8			1.1		1.2	1.0	2.5
	6		1.7			1.0		1.0	0.9	2.3
	7		1.9			1.3		1.2	1.2	2.4
	8		1.7			1.3		1.1	1.0	2.6
	9		1.8			1.2		1.1	1.0	2.7
	10		1.8			1.3		1.3	1.2	2.4
AVERAGE VALUE										
SPECIFIED VALUE									MIN. 0	MAX. 5.0
ROOM TEMPERATURE AFTER BAKE AT 300°F	11	2.1	5.7			1.8		2.0	1.9	5.7
	12	3.0	7.9			3.5		2.2	3.0	7.9
	13	2.8	6.0			2.6		2.8	2.0	6.0
	14	2.2	5.9			2.2		2.3	1.9	5.9
	15	3.0	8.2			3.0		3.0	2.9	8.2
	16	1.9	4.7			2.0		2.0	1.9	4.7
	17	2.3	5.0			2.8		3.0	2.1	5.0
	18	2.6	6.0			2.2		3.1	2.0	6.0
	19	1.9	4.9			1.9		2.0	1.8	4.9
	20	2.0	6.1			2.2		2.2	2.0	6.1
AVERAGE VALUE										
SPECIFIED VALUE									MIN. 0	MAX. 10.0
AT HEAT - 300°F	21	1.1		5.0						
	22	1.2		2.8						
	23	2.0		7.5						
	24	1.2		2.7						
	25	1.0		4.2						
	26	1.2		6.2						
	27	0.9		2.9						
	28	1.0		2.6						
	29	1.8		6.1						
	30	1.1		4.8						
AVERAGE VALUE										
SPECIFIED VALUE									MIN. 0	MAX. 7.5

NOTE: FOR TESTS CONDUCTED UNDER MIL-N-25027 AND MIL-F-18240A THE TORQUE VALUES LISTED UNDER "STARTING TORQUE" WILL MEAN "MAXIMUM LOCKING TORQUE" AND VALUES LISTED UNDER "PREVAILING TORQUE" WILL MEAN "MINIMUM BREAKAWAY TORQUE".