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THE FOLLOWING PAGES ARE CHANGES

TO BASIC DOCUMENT

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	PAGE NO.	REV SYM
	1	A								49	B						
	2	C								50	B						
	3	C								51	B						
	4	B	4.1	C						52	B						
	5									53	B						
	6									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	B						
	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	C						
			40	A													
			41	A													
			42	A													
			43	B													
			44	B													
			45	B													
			46	B													
			47	B													
			48	B													

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BOEING NO. D2-13943-1

SECT. PAGE 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
B	Added Sections 5.0, 6.0 and 7.0 to the document.	6-17-63	D. Brenden
C	Added Sections 8.0 and 9.0 to the document.	7-17-63	D. Brenden

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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-MMPD-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 CTLI KIT INSTALLATION
CTLI WAFER S/N 0000024

REPORT NO. _____
DATE _____

LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY LONG.	CENTER OF GRAVITY LAT.	CENTER OF GRAVITY VERT.	INERTIA SLUG FT2x10-3 ROLL	INERTIA SLUG FT2x10-3 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	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			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	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)

8.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT CONDITIONS)

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)

8.2 [redacted] INSTALLED AT [redacted] AIR FORCE BASE

REPORT NO. _____

DATE _____

LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY LONG.*	CENTER OF GRAVITY LAT.	CENTER OF GRAVITY VERT.	INERTIA SLUG FT^{2}x10^{-3} ROLL	INERTIA SLUG FT^{2}x10^{-3} PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			.8	58.5	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	108.0	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)

** Ref: D2-13954-5SA

[redacted]

CHECK LIST NO. _____

DATE _____

8.3 MISSILE WEIGHING CHECK LIST

MODEL _____ FINAL ASSEMBLY DRAWING NO. _____

RECORD OF CHECKING (DATE)

Mo								
Day								
Yr								

SECTION 39 THRU 49

MISSILE NO. _____

MISSILE COMPONENT _____

COMPONENT PART NO. _____

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT:	COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: LAUNCH
	[redacted] SECTION 39 THRU 49 ARE IDENTICAL TO THOSE												
	FOUND ON PAGES 13 THROUGH 20.												

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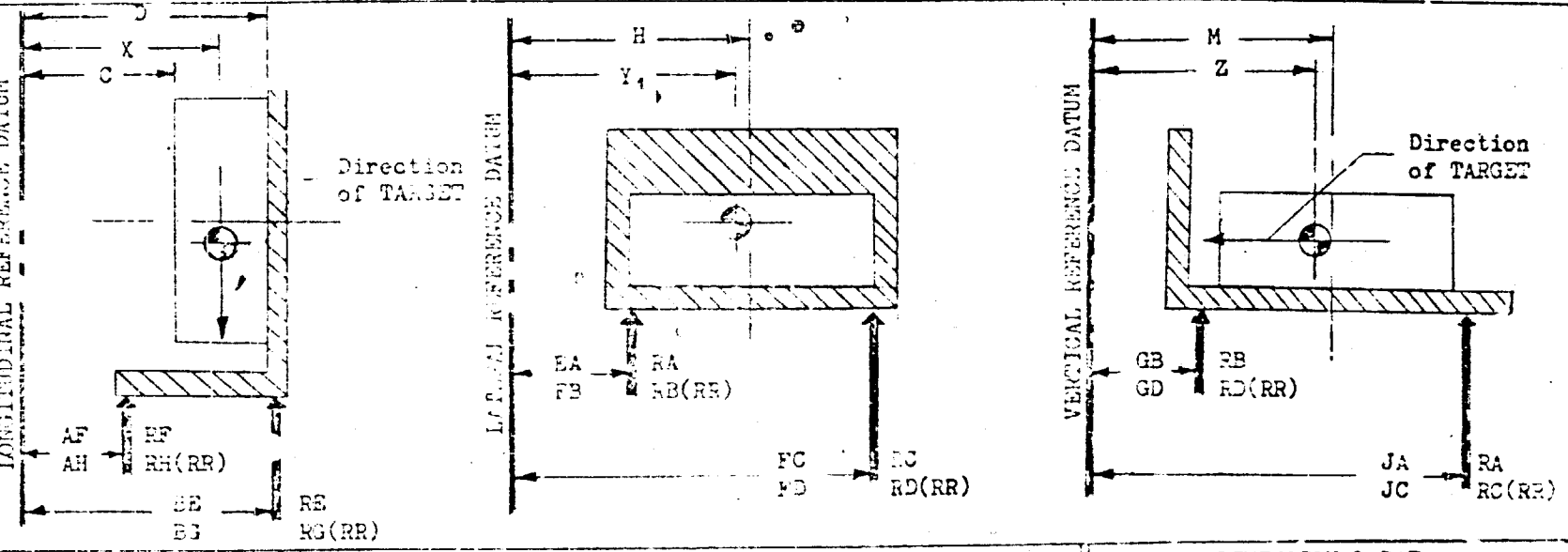
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PAGE 74

8.4.1

ACTUAL WEIGHT RECORD - CTLI SECTION

U/O MISSILE 0000024	DRAWING NO. 25-25402-35	CHECK LIST NO. 39	REPORT NO. WTR-1033-024
MISSILE MODEL MB-133A	DON *J	REPORTED BY CB/RB	PAGE NO.
CONFIGURATION	ADON	CHECKED BY	DATE 7/9/63



WEIGHING DATA

REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	GR. WT.	TARE	CORR.	NET WT.
RF	58.60	27.00		31.60	RC	60.85	24.80		36.05
RH	46.95	20.55		26.40	RD	88.25	58.50		29.75
RE	97.85	55.05		42.80	RA	84.15	38.25		45.90
RG	102.50	63.15		39.35	RB	72.50	44.05		28.45
TOTAL	305.90	165.75		140.15	TOTAL	305.75	165.60		140.15

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	31.60	42.007	
RH	26.40	42.023	
RE	42.80	62.996	
RG	39.35	62.999	
AS WGD	140.15	54.31	7,612.1

LATERAL C.G.

REACTION	NET WT.	ARM	MOMENT
RA	45.90	84.510	
RB	28.45	84.505	
RC	36.05	115.490	
RD	29.75	115.495	
AS WGD	140.15	99.06	13,882.1

VERTICAL C.G.

REACTION	NET WT.	ARM	MOMENT
RB	28.45	77.478	
RD	29.75	77.481	
RA	45.90	115.500	
RC	36.05	115.500	
AS WGD	140.15	99.71	13,974.5

(RR) = Rear Reaction

SERIAL NUMBER: 0000024

CHECK LIST NO. 39

DATE

8.4.2 MISSILE WEIGHING CHECK LIST

MODEL WS-138A FINAL ASSEMBLY DRAWING NO. 25-25402-35

SECTION 39 MISSILE NO.

MISSILE COMPONENT CTLI COMPONENT PART NO. Noted

RECORD OF CHECKING (DATE)													
Mo		7											
Day		9											
Yr		63											
	COMPONENT									MISSILE			

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
39	Instrumentation Group-Trainer Test	25-37501-35					-	-					
39a	CTLI Structure Assy.	25-25403-11					-	-					
	Support Structure	25-29094-5					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-35B	55018-106					-	-					
	Cable	AN3127-315					x	x					
	Cable	AN3128 315					x	o					
	Cable	AN3129-315					x	o					
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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BOEING NO. D2-13943-1

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8.4.3

WEIGHT AND BALANCE CHANGE RECORD

ASSOCIATE CONTRACTOR	BOEING	CONTRACT NO.	AF04(647)-289	REPORT NO.	WEB-1033-024
COMPONENT	SECTION 39	LOT NO.		DATE	7/9/63
MODEL NO.	WS-133A	DRAWING NO.	25-25402-35	PREPARED	CB/RB
SERIAL NO.	0000024	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									
2	25-25402-	Instr. Group Trainer (As Weighed)	140.15	54.31	7,612.1	99.06	13,882.6	99.71	13,974.5
3									
4									
5									
6		ADD:							
7	AN31278-315	Cable - Autonetics	3.86	74.2		115.5		102.8	
8	AN31279-315	Cable - Autonetics	2.08	50.4		106.9		111.4	
9									
10									
11									
12									
13	25-25402-	Instr. Group Trainer (Complete)	146.09	54.78	8,003.3	99.60	14,550.8	99.96	14,603.1
14									
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 CTLI SECTION S/N 0000004 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. (MS-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, SAA Installation and Envelope Change	2	Negl.	Yes
236	Second Stage CTLI and Operational Raceway Foam Revision	2	Negl.	Yes
240	Interference of SAC Bracket, Detonator Cord & CTLI Cable in Stage XXI Operational Wing I Missiles	3	Negl.	Yes
261	Modification of CTLI C/B Receiver, 10-80885	3	Negl.	Yes
373	Work-Around for 10-80942-1 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.

9.1 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 MCP 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 CTLI 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 MCP 116.

Aerojet weights used in this report reflect the data transmitted to Boeing by Aerojet document 0162-01DR-MSD-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.

9.2 WEIGHT & BALANCE SUMMARY
TOTAL CTLI KIT INSTALLATION
CTLI WAFER S/N 0000023

REPORT NO. _____
DATE _____

LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT2x10-3	
						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	.003
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	.007
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							

* Boeing Section Stations (See Missile Station Diagram)

9.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT CONDITIONS)

REPORT NO. _____

DATE _____

LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT2x10-3	
						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	68.9	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	110.2	120.6		
30		(Fwd)	Silo							
31			Aero							
32			Base							
33			Silo							
34		Jettisoned	Aero							
35		Portion	Base							
36			Jett	- 1.41		55.6	110.2	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							

* Ripping Section Stations (See Missile Station Diagram)

9.2 [illegible] CHARGES INSTALLED AT [illegible] AIR FORCE BASE**

REPORT NO. _____

DATE _____

LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY LONG.*	CENTER OF GRAVITY LAT.	CENTER OF GRAVITY VERT.	INERTIA SLUG FT^{2}x10-3 ROLL	INERTIA SLUG FT^{2}x10-3 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	86.9	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	108.0		
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			.8	101.3	119.2	131.9		
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 D2-13954-5A

REV. SYM. C

CHECK LIST NO. 9-3

MISSILE WEIGHING CHECK LIST

DATE

PART ASSEMBLY DRAWING NO. 21-2900-4

SECTION 39 THRU 49

MISSILE

RECORD OF CHECKING (DATE)

Mo.

Day

Yr.

COMPONENT

MISSILE

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

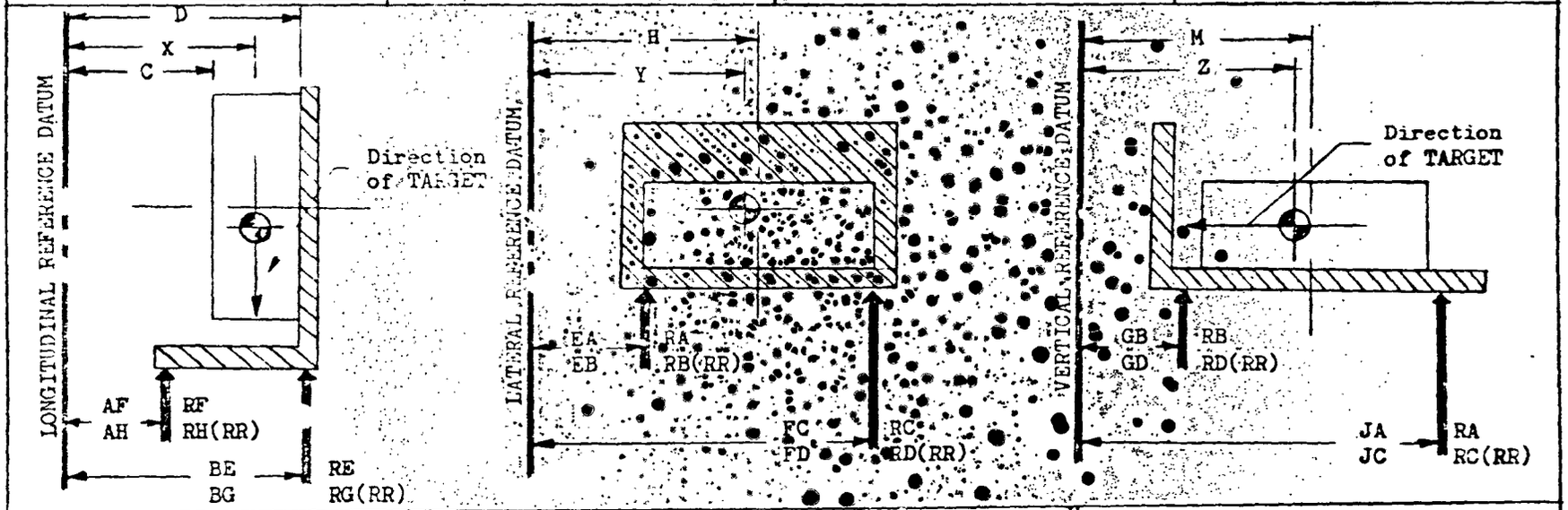
2-5550-0-53 R1

REV. SYM. C

9.4.1

ACTUAL WEIGHT RECORD - CTLI SECTION

U/O MISSILE 0000025	DRAWING NO. 25-25402-35	CHECK LIST NO. 39	REPORT NO. WTS-1023-085
MISSILE MODEL WS-133A	DCN H	REPORTED BY RS/TV	PAGE NO.
CONFIGURATION TAR	ADCN 23	CHECKED BY GB	DATE 6/20/63



WEIGHING DATA

REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	GR. WT.	TARE	CORR.	NET WT.
RF	50.85	27.00		23.85	RC	81.30	39.90		41.40
RH	55.15	20.55		34.60	RD	67.35	43.35		24.00
RE	105.80	55.00		50.80	RA	63.75	23.30		40.45
RG	99.30	63.15		31.15	RB	93.10	59.15		33.95
TOTAL	395.90	165.70		139.80	TOTAL	395.50	165.70		139.80

DIMENSIONAL DATA

DIM.	INCHES	DIM.	INCHES	DIM.	INCHES
AF	42.007	EA	84.520	GB	77.478
AH	42.083	EB	84.505	GD	77.468
BE	42.996	FC	115.480	JA	115.520
BG	42.999	FD	115.495	JC	115.520
C	50.000	H	100.000	M	100.000
D	60.000				

LONGITUDINAL C.G.

REACTION	NET WT.	ARM	MOMENT
RF	23.85	42.007	
RH	34.60	42.083	
RE	50.80	42.996	
RG	31.15	42.999	
AS WGD	139.80	54.23	7,580.7

LATERAL C.G.

REACTION	NET WT.	ARM	MOMENT
RA	40.45	84.520	
RB	33.95	84.505	
RC	41.40	115.480	
RD	24.00	115.495	
AS WGD	139.80	99.00	13,840.5

VERTICAL C.G.

REACTION	NET WT.	ARM	MOMENT
RB	33.95	77.478	
RD	24.00	77.468	
RA	40.45	115.520	
RC	41.40	115.520	
AS WGD	139.80	99.74	13,943.6

(RR) = Rear Reaction

BOEING

NO. D8-1343-1

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SERIAL NUMBER: 0000025

CHECK LIST NO. 39

DATE

9.4.2 MISSILE WEIGHING CHECK LIST

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

RECORD OF CHECKING (DATE)

| | | |

REV. SYM. G

2-1550-0-11 R1

9.4.3

WEIGHT AND BALANCE CHANGE RECORD

ASSOCIATE CONTRACTOR	BOEING	CONTRACT NO.	AF04(647)-289	REPORT NO.	WES-1023-025
COMPONENT	SECTION 39	LOT NO.		DATE	6/20/63
MODEL NO.	WS-133A	DRAWING NO.	25-25402-35	PREPARED	R. ST. ROMAIN
SERIAL NO.	0000025	U.S. MISSILE		APPROVED	B. WARRENDER

EQUIPMENT CHANGE RECORD

PART NO.	DESCRIPTION OF EQUIPMENT	WEIGHT	WEIGHT AND BALANCE X AXIS ARM	X AXIS MOMENT	Y AXIS ARM	Y AXIS MOMENT	Z AXIS ARM	Z AXIS 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:							
AN3194-315	Cable - Autonetics	3.32	74.2		115.5		102.8	
AN3196-315	Cable - Autonetics	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

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9.5 ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION APPLICABLE TO CTLI SECTION S/N 0008085 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	FSS, SSA 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.

FOR ERRATA

AD 404 314

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					
			PAGE NO.	REV SYM	PAGE NO.	REV SYM	PAGE NO.	REV SYM				PAGE NO.	REV SYM	PAGE NO.	REV SYM	PAGE NO.	REV SYM
	1	A								49	B						
	2	B								50	B						
	3	B								51	B						
	4	B	4.1	B						52	B						
	5									53	B						
	6									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	B						
	19									67	B						
	20									68	B						
	21									69	B						
	22																
	23																
	24																
			25	A													
			26	A													
			27	A													
			28	A													
			29	A													
			30	A													
			31	A													
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			35	A													
			36	A													
			37	A													
			38	A													
			39	A													
			40	A													
			41	A													
			42	A													
			43	B													
			44	B													
			45	B													
			46	B													
			47	B													
			48	B													

D1 4801 0610 ORIG. 8/62

2-5142-2

REV SYM B

BOEING | NO. D2-13943-1

SECT. | PAGE 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
B	Revised pages 2, 3, 4. Added Sections 5.0 thru 7.0 to the document; and page 4.1	6/17/63	D. Brenden DCB

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3.0	CTLI SECTION, S/N 0000017	
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CTLI SECTION, S/N 0000019

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 0000019). 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-MPD-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 0000019

REPORT NO. _____

DATE _____

LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT2x10-3	
						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	117.2		
22	45	Interstage 2-3			21.1	63.6	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)

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 FT2x10-3	
						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	73.3	115.1	125.6		
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			20.00	102.7	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)

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 FT2x10-3	
						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	40	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

*Boeing Section Stations (See Missile Station Diagram)

SERIAL NUMBER: 0000019

CHECK LIST NO. _____

DATE _____

MISSILE WEIGHING CHECK LIST

MODEL _____ FINAL ASSEMBLY DRAWING NO. _____

SECTION 39 THRU 49 MISSILE NO. _____

MISSILE COMPONENT _____ COMPONENT PART NO. _____

RECORD OF CHECKING (DATE)							
Mo							
Day							
Yr							
COMPONENT						MISSILE	

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

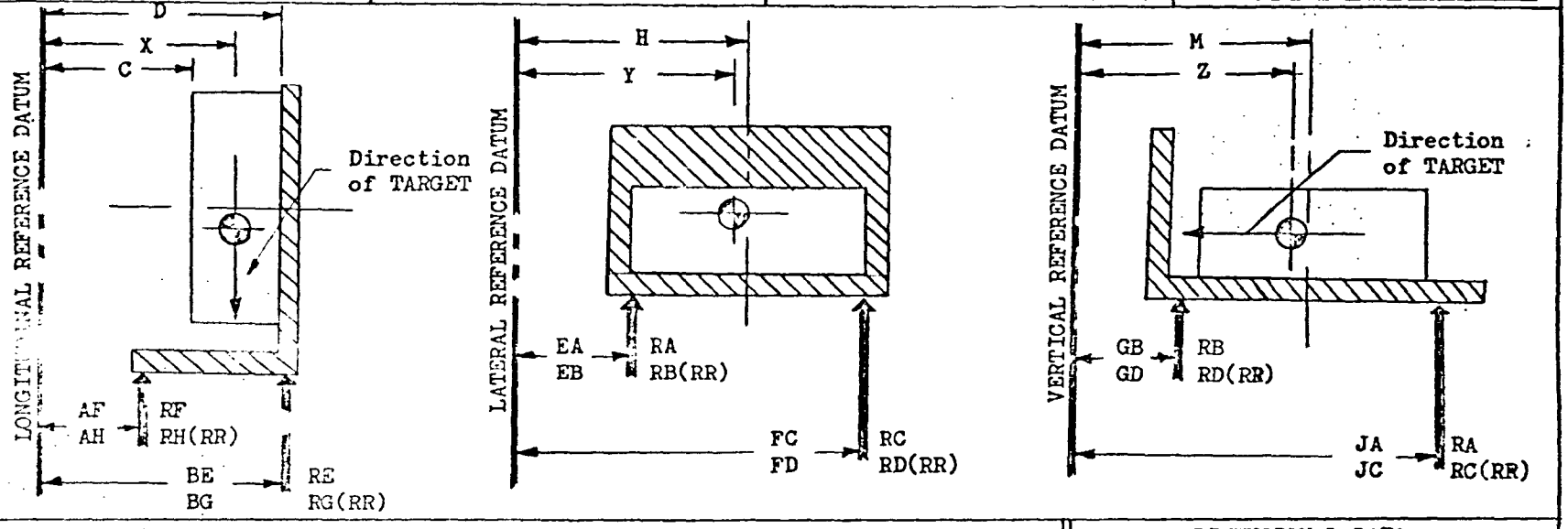
2-5550-0-21

REV. SYM. B

5.4.1

ACTUAL WEIGHT RECORD - CTLI SECTION

U/O MISSILE C000019	DRAWING NO. 25-25402-35	CHECK LIST NO. 39	REPORT NO. WTS-1018-019
MISSILE MODEL WS-133A	DCN • H	REPORTED BY JH & TV	PAGE NO.
CONFIGURATION	ADCN 23	CHECKED BY CB	DATE 6/10/63



WEIGHING DATA

REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	GR. WT.	TARE	CORR.	NET WT.
RF	25.85	6.15		19.70	RC	68.40	23.40		45.00
RH	79.55	41.00		38.55	RD	80.25	59.55		20.70
RE	130.10	75.50		54.60	RA	76.70	39.50		37.20
RG	69.95	42.35		27.60	RB	80.10	42.55		37.55
TOTAL	305.45	165.00		140.45	TOTAL	305.45	165.00		140.45

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	19.70	42.007	
RH	38.55	42.023	
RE	54.60	62.996	
RG	27.60	62.999	
AS WGD	140.45	54.30	7,625.9

LATERAL C.G.

REACTION	NET WT.	ARM	MOMENT
RA	37.20	84.510	
RB	37.55	84.505	
RC	45.00	115.490	
RD	20.70	115.495	
AS WGD	140.45	99.00	13,904.7

VERTICAL C.G.

REACTION	NET WT.	ARM	MOMENT
RB	37.55	77.478	
RD	20.70	77.481	
RA	37.20	115.500	
RC	45.00	115.500	
AS WGD	140.45	99.73	14,007.3

(RR) = Rear Reaction

SERIAL NUMBER: 0000019

CHECK LIST NO. 39

DATE

MISSILE WEIGHING CHECK LIST

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

RECORD OF CHECKING (DATE)							
Mo		6					
Day		10					
Yr		63					

SECTION 39 MISSILE NO.

MISSILE COMPONENT CTLI COMPONENT PART NO. Noted

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED		COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: LAUNCH
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	o					
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					

2-5550-0-21
REV. SYM. B

BOEING NO. D2-13943-1
PAGE 49

5.4.3 WEIGHT AND BALANCE CHANGE RECORD

ASSOCIATE CONTRACTOR	BOEING	CONTRACT NO.	AF04(647)-269	REPORT NO.	WTS-1018-019
COMPONENT	SECTION 39	LOT NO.		DATE	6/10/63
MODEL NO.	WS-133A	DRAWING NO.	25-25402-35	PREPARED	JH/TV
SERIAL NO.	0000019	U.O. MISSILE		APPROVED	GO

LINE	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	25-25402-35	Instr. Group Trainer (As Weighed)	140.45	54.30	7,625.9	99.00	13,904.7	99.73	14,007.3
3									
4									
5									
6		ADD:							
7	AN31278-315	Cable-Autonetics	3.84	74.2		115.5		102.8	
8	AN31278-315	Cable-Autonetics	2.11	50.4		106.9		111.4	
9									
10									
11									
12	25-25402-35	Instr. Group 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 0000019 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 0000020

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 0000020). 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-MPD-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 0000020

REPORT NO. _____

DATE _____

LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT2x10-3	
						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			284.9					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

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 FT2x10-3	
						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)

6.2 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 * Boeing Section Stations

M.V. SYM. B (See Missile Station Diagram)

CHECK LIST NO. _____

DATE _____

6.3 MISSILE WEIGHING CHECK LIST

MODEL _____ FINAL ASSEMBLY DRAWING NO. _____

SECTION 39 THRU 49 MISSILE NO. _____

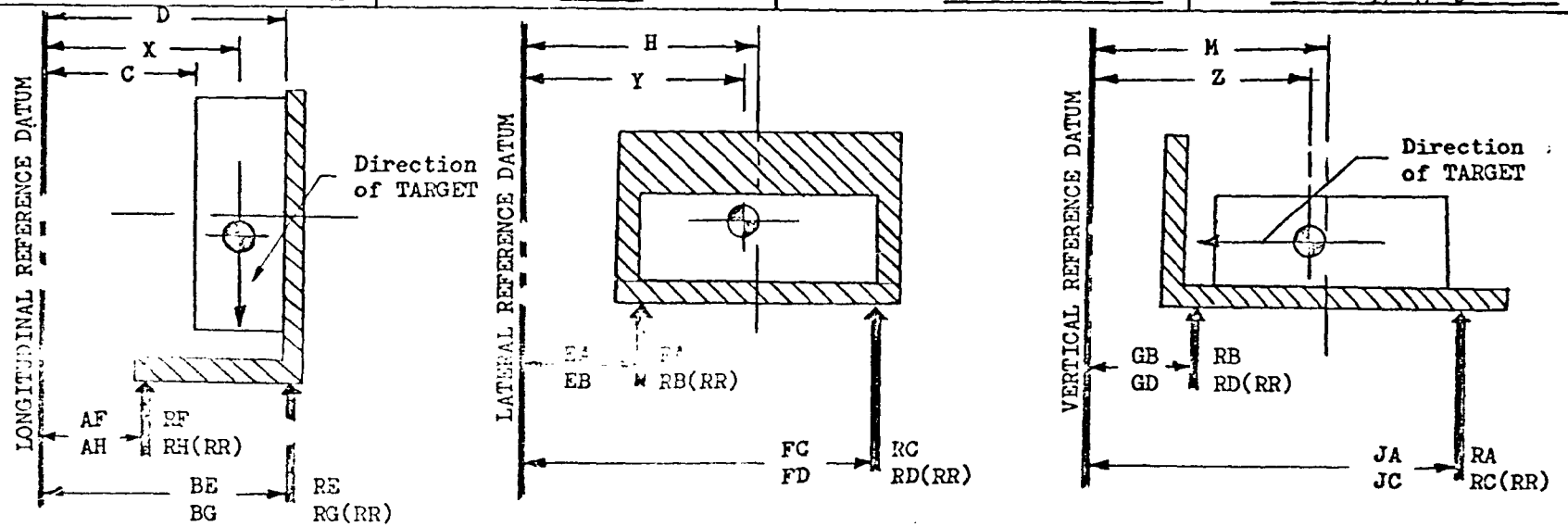
MISSILE COMPONENT _____ COMPONENT PART NO. _____

RECORD OF CHECKING (DATE)								
Mo								
Day								
Yr								
	COMPONENT						MISSILE	
	BASIC WEIGHT	AS WEIGHED		REMOTE SITE SHIPMENT	AS RECEIVED REMOTE SITE		AS WEIGHED REMOTE SITE	LAUNCH

ITEM NUMBER	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.					

6.4.1 ACTUAL WEIGHT RECORD - CTLI SECTION

U/O MISSILE 0000020	DRAWING NO. 20-25002-35	CHECK LIST NO. 39	REPORT NO.
MISSILE MODEL WS-138A	DCN *H	REPORTED BY CB/CW	PAGE NO.
CONFIGURATION	ADCN 23	CHECKED BY GO	DATE 5/27/63



WEIGHING DATA

REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	GR. WT.	TARE	CORR.	NET WT.
RF	19.25	5.30		13.95	RC	98.55	52.90		45.65
RH	86.50	41.80		44.70	RD	50.50	30.20		20.30
RE	137.80	76.65		61.15	RA	46.65	10.05		36.60
RG	62.60	41.35		21.25	RB	110.40	71.90		38.50
TOTAL	306.15	165.10		141.05	TOTAL	306.10	165.05		141.05

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	13.95	42.007	
RH	44.70	42.023	
RE	61.15	62.996	
RG	21.25	62.999	
AS WGD	141.05	54.10	7,655.4

LATERAL C.G.

REACTION	NET WT.	ARM	MOMENT
RA	36.60	84.510	
RB	38.50	84.505	
RC	45.65	115.490	
RD	20.30	115.495	
AS WGD	141.05	98.99	13,963.2

VERTICAL C.G.

REACTION	NET WT.	ARM	MOMENT
RB	38.50	77.478	
RD	20.30	77.481	
RA	36.60	115.500	
RC	45.65	115.500	
AS WGD	141.05	99.65	14,055.6

(RR) = Rear Reaction

SERIAL NUMBER: 0000000

CHECK LIST NO. 39

DATE

6.4.2 MISSILE WEIGHING CHECK LIST

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

RECORD OF CHECKING (DATE)							
Mo		5					
Day		27					
Yr		63					

SECTION 39 MISSILE NO.

MISSILE COMPONENT CTLI COMPONENT PART NO. Noted

ITEM NUMBER	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
39	Instrumentation Group-Trainer Test	25-25402-35					-	-					
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	25-25404-12					-	-					
	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	o					
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					

2-5550-0-21 REV. CTL. B

BOEING NO. D2-13943-1 PAGE 58

6.4.3 WEIGHT AND BALANCE CHANGE RECORD

ASSOCIATE CONTRACTOR	BOEING	CONTRACT NO.	AF04(647)-289	REPORT NO.	
COMPONENT	SECTION 39	LOT NO.		DATE	5/27/63
MODEL NO.	WS-133A	DRAWING NO.	25-25402-35	PREPARED	CB/CW
SERIAL NO.	0000020	U.O. MISSILE		APPROVED	GO

LINE	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	25-25402-35	Instr. Group Trainer (As Weighed)	141.05	54.10	7,655.4	98.99	13,963.2	99.65	14,055.6
3									
4									
5									
6		ADD:							
7	A/N31278-315	Cable - Autonetics	3.85	74.2		115.5		102.8	
8	A/N31279-315	Cable - Autonetics	2.12	50.		106.9		111.4	
9									
10									
11									
12	25-25402-35	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									
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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**
595	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 0000021

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 0000021). 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 FT2x10-3	
						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			90.8	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)

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			- 1.88	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	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	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)

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)

** Reference D2-13954-

CHECK LIST NO. 7.3 MISSILE WEIGHING CHECK LIST

DATE

MODEL _____ FINAL ASSEMBLY DRAWING NO. 21-52900-4

SECTION 39 THRU 49 MISSILE NO. _____

MISSILE COMPONENT _____ COMPONENT PART NO. _____

RECORD OF CHECKING (DATE)							
Mo							
Day							
Yr							
COMPONENT						MISSILE	

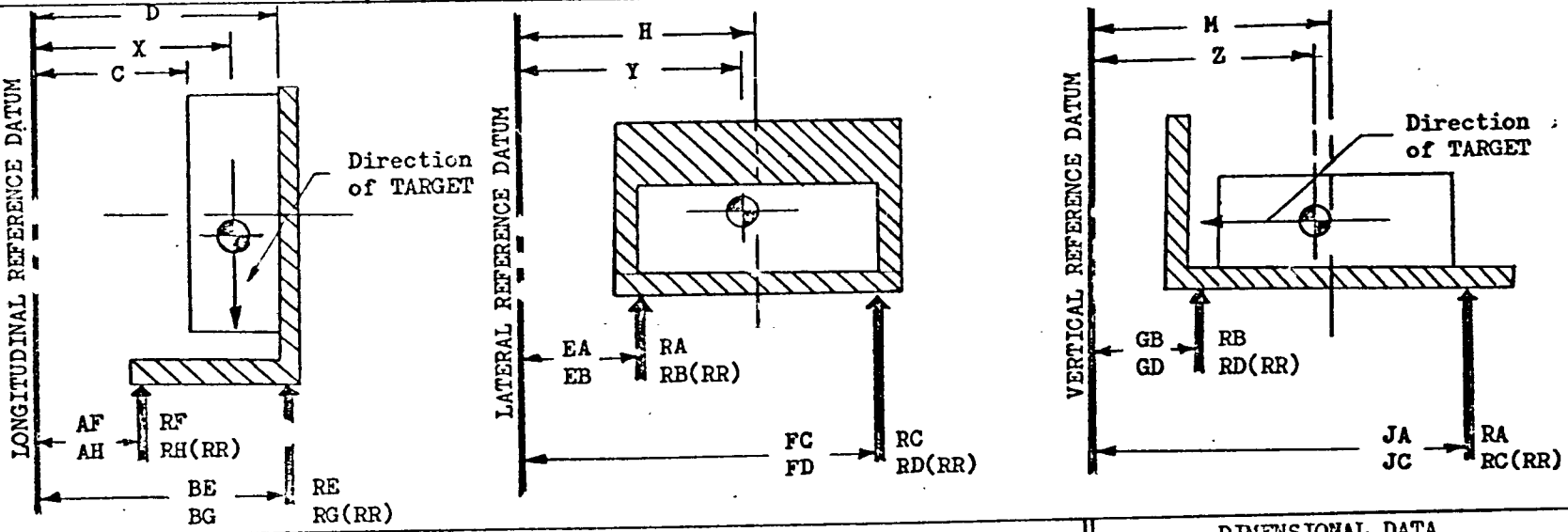
ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	BASIC WEIGHT	AS WEIGHED		REMOTE SITE SHIPMENT	AS RECEIVED REMOTE SITE	AS WEIGHED REMOTE SITE	LAUNCH
	SUMMARY CHECK LISTS FOR SECTIONS 39 THROUGH 49 ARE IDENTICAL TO THOSE FOUND ON PAGES 13 THROUGH 20.												

2-5550-0-21
REV. SYM. B

BOEING
NO. D2-13943-1
PAGE 65

7.4.1 ACTUAL WEIGHT RECORD - CTLI SECTION

U/O MISSILE 0000021	DRAWING NO. 25-25402-35	CHECK LIST NO. 39	REPORT NO. WTS-1019-021
MISSILE MODEL WS-133A	DCN • H	REPORTED BY JH/TV	PAGE NO.
CONFIGURATION	ADCN 23	CHECKED BY CB	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

SERIAL NUMBER: 0000021

CHECK LIST NO. 39	7.4.2 MISSILE WEIGHING CHECK LIST	RECORD OF CHECKING (DATE)
DATE	MODEL WS-133A FINAL ASSEMBLY DRAWING NO. 25-25402	Mo 6 / Day 11 / Yr 63

SECTION 39 MISSILE NO.

MISSILE COMPONENT CTLI COMPONENT PART NO. Noted

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: LAUNCH
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	x				
	Cable	AN31279-315					x	x				
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				

7.4.3

WEIGHT AND BALANCE CHANGE RECORD

ASSOCIATE CONTRACTOR	BOEING	CONTRACT NO.	AF04(647)-289	REPORT NO.	[illegible]-1019-021
COMPONENT	SECTION 39	LOT NO.		DATE	6/11/63
MODEL NO.	WS-133	DRAWING NO.	25-25402-35	PREPARED	[illegible]/TV
SERIAL NO.	0000021	U.O. MISSILE		APPROVED	[illegible]

LINE	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	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
3									
4									
5		ADD:							
6	AN31278-315	Cable-Autonetics	3.77	74.2		115.5		102.8	
7	AN31279-315	Cable-Autonetics	2.13	50.4		106.9		111.4	
8									
9									
10									
11	25-25402-35	Instr. Group Trainer (Complete)	145.55	54.73	7,965.4	99.51	14,483.2	99.94	14,546.7
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
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32									

7.5 ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION APPLICABLE TO CTLI SECTION S/N 0000021 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 C&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.

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					
			PAGE NO.	REV SYM	PAGE NO.	REV SYM	PAGE NO.	REV SYM				PAGE NO.	REV SYM	PAGE NO.	REV SYM	PAGE NO.	REV SYM
	1	A										49	B				
	2	E	2.1	E								50	B				
	3	E										51	B				
	4	B	4.1	E	4.2	E						52	B				
	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	B				
	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				

404314

FROM: MS

TO:

US GOVT PRINTING OFFICE: 1962

REV SYM E

NO. NP-1 324 1-1

SECT. PAGE 2

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	PAGE NO.	REV SYM
			97	E								145	E				
			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													

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 D. Brenden
B	Added Sections 5.0, 6.0 and 7.0 to the document.	6-17-63	D. Brenden D. Brenden
C	Added Sections 8.0 and 9.0 to the document.	7-17-63	D. Brenden D. Brenden
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 D. Brenden
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 D. Brenden

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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 0000027

10.1 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 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 0000027). 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 0000027

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			149.5	54.7	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			- 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			283.2					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

10.2 WEIGHT & BALANCE SUMMARY CTLI
(AVERAGE WEIGHT COMPONENTS)

REPORT NO. _____

DATE _____

LINE	STA.	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			- 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			9.73	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)

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

REPORT NO. _____

DATE _____

LINE	STA.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY LONG*	CENTER OF GRAVITY LAT.	CENTER OF GRAVITY VERT.	INERTIA SLUG FT²x10-3 ROLL	INERTIA SLUG FT²x10-3 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)

2-5550-0-21
REV. SYM: E

CHECK LIST NO.	10.3.1 MISSILE WEIGHING CHECK LIST	RECORD OF CHECKING (DATE) Mo / Day / Yr
DATE	MODEL _____ FINAL ASSEMBLY DRAWING NO. 21-52900-20 (Using 25-25406-9)	COMPONENT / MISSILE

SECTION 39 MISSILE NO. _____

MISSILE COMPONENT _____ COMPONENT PART NO. _____

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	BASIC UNIT WEIGHT	ADDED WEIGHT		LAUNCH WEIGHT CHANGE	LAUNCH CG CHANGE	ADDED WEIGHT AT LAUNCH	LAUNCH
3a	Body Sect. - Trainer Test 1>	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		*										
	1> 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							

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

2-5550-0-21

REV. SYM. B

CHECK LIST NO. _____

DATE _____

10.3.2 MISSILE WEIGHING CHECK LIST

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

RECORD OF CHECKING (DATE)

Mo								
Day								
Yr								

SECTION 42 MISSILE NO. _____

MISSILE COMPONENT GUIDANCE SECTION COMPONENT PART NO. _____

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT: REMOVAL SITE ADJUSTMENT	COMPONENT: AS RECEIVED LAUNCH SITE	COMPONENT: AS WEIGHED LAUNCH SITE	MISSILE: LAUNCH
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	BMS 5-62 Installed at VAFB		*									
	The following items are deleted from the missile assembly in order to accommodate the CTLI Installations											
2e	Raceway Inst.	25-23214-5	.20	66.6	111.0	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. _____

DATE _____

10.3.3 MISSILE WEIGHING CHECK LIST

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

RECORD OF CHECKING (DATE)

Mo								
Day								
Yr								

SECTION 44 MISSILE NO. _____

MISSILE COMPONENT 3rd STAGE MOTOR COMPONENT PART NO. _____

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: LAUNCH
4a	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	25-31677-17	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	359764	4.03	58.1	99.8	114.0						
	The following items are deleted from the missile assembly in order to accommodate the CTLI 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	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

2-5550-0-21

REV. SEQ. 8

CHECK LIST NO. _____

DATE _____

10.3.4 MISSILE WEIGHING CHECK LIST

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

SECTION 45 MISSILE NO. _____

MISSILE COMPONENT 2-3 INTERSTAGE COMPONENT PART NO. _____

RECORD OF CHECKING (DATE)							
Mo							
Day							
Yr							

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT AS DESIGNED	COMPONENT: AS MODIFIED	COMPONENT: REMOVED AT REMOTE SITE INSTALLMENT	COMPONENT: ADDED AT REMOTE SITE INSTALLMENT	MISSILE: AS WEIGHED AT REMOTE SITE	MISSILE: AT LAUNCH
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 CTLI 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. _____

DATE _____

10.3.5 MISSILE WEIGHING CHECK LIST

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

RECORD OF CHECKING (DATE)

Mo																			
Day																			
Yr																			

SECTION 46 MISSILE NO. _____

MISSILE COMPONENT 2nd STAGE MOTOR COMPONENT PART NO. _____

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT:	COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: LAUNCH
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 CSLI Installation												
6h	Raceway 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.	10.3.6 MISSILE WEIGHING CHECK LIST	RECORD OF CHECKING (DATE)
DATE	MODEL _____ FINAL ASSEMBLY DRAWING NO. 21-52900-20	Mo / Day / Yr

SECTION 47 MISSILE NO. _____

MISSILE COMPONENT 1-2 INTERSTAGE COMPONENT PART NO. _____

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT: [blank]	COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: LAUNCH
7a	Cable Assy. Set - Electrical	25-26878-5	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	BMS 5-62 Installed at VAFB		*										
	The following items are deleted from the missile assembled in order to accommodate the OTLI Installations												
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	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. 10.3.7 MISSILE WEIGHING CHECK LIST

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

RECORD OF CHECKING (DATE)

ITEM NUMBER	SECTION 48 — MISSILE NO. — MISSILE SEGMENT 1st STAGE MOTOR — WORK ORDER PART NO.						COMPONENT: FACTORY WEIGHT	COMPONENT: AS WEIGHED	COMPONENT: REMOTE SITE INSTALLED	COMPONENT: AS REMOVED AT VAFB	MISSILE: AS WEIGHED AT REMOTE SITE	MISSILE: LAUNCH
	DESCRIPTION	PART NO.	WT.	X ARM	Y ARM	Z ARM						
8a	Cable Assy. Set - Electrical	25-26878-5	12.12	156.4	118.2	130.5						
8b	Conduit Supt. Set	25-29239-18	13.13	79.2	117.5	130.0						
8c	Instl. Kit - Trainer Test	25-31077-17	2.81	84.1	117.2	129.6						
8d	Timer - Interval	29-22327-1	1.25	72.6	117.7	130.5						
8e	Battery - Squib Activated	10-20942-3	1.40	60.7	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 CTU Installation											
8h	Raceway Instl.	25-23214-5	8.07	82.8	117.2	129.8						
8i	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

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CHECK LIST NO.	10.3.8 MISSILE WEIGHING CHECK LIST	RECORD OF CHECKING (DATE) Mo / Da / Yr
DATE	MODEL ___ FINAL ASSEMBLY DRAWING NO. 21-52900-20	

SECTION 49 MISSILE NO. ___

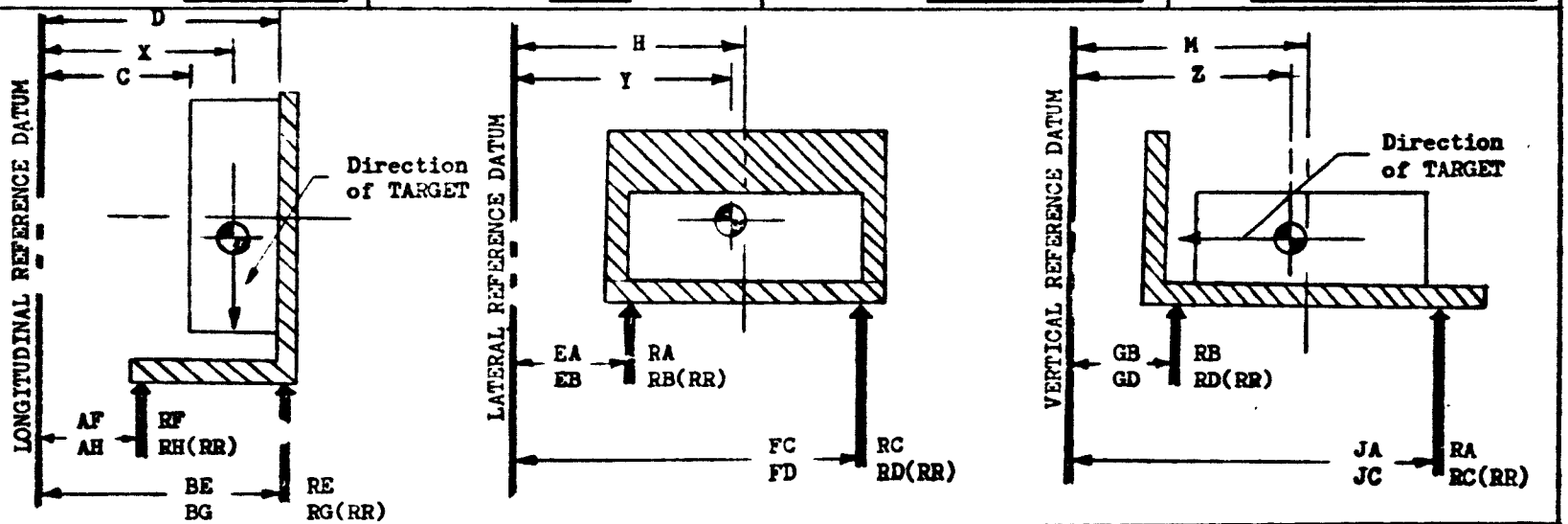
MISSILE MOMENT AFT SKIRT TO MOMENT PART NO. ___

ITEM NO.	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT AS WEIGHED	COMPONENT: REMOVE SITE SHIPMENT	COMPONENT: AS RECEIVED RANGE SITE	MISSILE: AS WEIGHED AT RANGE SITE	MISSILE: LAUNCH
9a	Cable Assy. Set - Electrical	25-26878-5	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					
	The following items are deleted from the missile assembly in order to accommodate the CTLI Installations										
9d	Standards Instl.	25-30133-1	.28	57.9	116.4	128.4					
9e	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

10.4.1 ACTUAL WEIGHT RECORD - CTLI SECTION

U/O MISSILE 0000027	DRAWING NO. 25-25402-36	CHECK LIST NO. 39	REPORT NO. WTS-1109-027
MISSILE MODEL WS-133A	DCN • J	REPORTED BY CB/RH	PAGE NO.
CONFIGURATION	ADCN	CHECKED BY RW	DATE 10/21/63



WEIGHING DATA

REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	GR. WT.	TARE	CORR.	NET WT.
RF	44.50	12.65		31.85	RC	59.65	29.45		30.20
RH	66.40	39.70		26.70	RD	94.60	59.20		35.40
RE	116.80	74.45		42.35	RA	90.50	39.00		51.50
RG	88.85	49.60		39.25	RB	71.90	48.85		23.05
TOTAL	316.55	176.40		140.15	TOTAL	316.65	176.50		140.15

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	31.85	42.007	
RH	26.70	42.023	
RE	42.35	62.996	
RG	39.25	62.999	
AS WGD	140.15	54.23	7,600.5

LATERAL C.G.

REACTION	NET WT.	ARM	MOMENT
RA	51.50	84.510	
RB	23.05	84.505	
RC	30.20	115.490	
RD	35.40	115.495	
AS WGD	140.15	99.01	13,876.4

VERTICAL C.G.

REACTION	NET WT.	ARM	MOMENT
RB	23.05	77.478	
RD	35.40	77.481	
RA	51.50	115.500	
RC	30.20	115.500	
AS WGD	140.15	99.64	13,965.0

(RR) = Rear Reaction

SERIAL NUMBER: 0000027

CHECK LIST NO.	10.4.2	MISSILE WEIGHING CHECK LIST	RECORD OF CHECKING (DATE) Mo 10 Day 21 Yr 63
DATE	MODEL WS-133	FINAL ASSEMBLY DRAWING NO. 25-25402-36	

SECTION 39 MISSILE NO. _____

MISSILE COMPONENT CTLI COMPONENT PART NO. Noted

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT:	COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: LAUNCH
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 Installati 1	25-25404-16					-	-					
	Battery, Squib	10-20942-2					x	x					
	Battery, Squib	10-2094204					x	x					
	Cable Set SE-35B	55018-106					-	-					
	Cable	AN37192-315					x	x					
	Cable	AN37194-315					x	o					
	Cable	AN37196-315					x	o					

10.4.3

WEIGHT AND BALANCE CHANGE RECORD

ASSOCIATE CONTRACTOR	BOEING	CONTRACT NO.	AF04(647)-289	REPORT NO.	WTS-1109-027
COMPONENT	SECTION 39	LOT NO.		DATE	10/21/63
MODEL NO.	WS-133A	DRAWING NO.	25-25402-36	PREPARED	CB/RH
SERIAL NO.	0000027	U.O. MISSILE		APPROVED	GO

LINE	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	25-25402-36	Instr. Group Trainer (As Weighed)	140.15	54.23	7,600.5	99.01	13,876.4	99.64	13,965.0
3									
4									
5		ADD:							
6	AN3719 4-315	Cable-Autonetics	3.35	74.2		115.5		102.8	
7	AN3719 6-315	Cable-Autonetics	1.36	50.4		106.9		111.4	
8									
9									
10	25-25402-36	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									
18									
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32									

10.5 ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION APPLICABLE TO CTLI SECTION S/N 0000027 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/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 0000027 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 0000028

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 0000035). 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-MMPD-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 _____

ITEM	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY LONG.*	CENTER OF GRAVITY LAT.	CENTER OF GRAVITY VERT.	INERTIA SLUG FT2x10-3 ROLL	INERTIA SLUG FT2x10-3 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			- 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		
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			282.8					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

11.2 WEIGHT & BALANCE SUMMARY CTLI
(AVERAGE WEIGHT COMPONENTS)

REPORT NO. _____

DATE _____

LINE	SEC	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY LONG.*	CENTER OF GRAVITY LAT.	CENTER OF GRAVITY VERT.	INERTIA SLUG FT^{2}x10-3 ROLL	INERTIA SLUG FT^{2}x10-3 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	112.1	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	113.5	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)

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

REPORT NO. _____

DATE _____

LINE	STA.	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	CTAI 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		.5					
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)

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

SERIAL NUMBER: 0000028

CHECK LIST NO.	11.3 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. _____

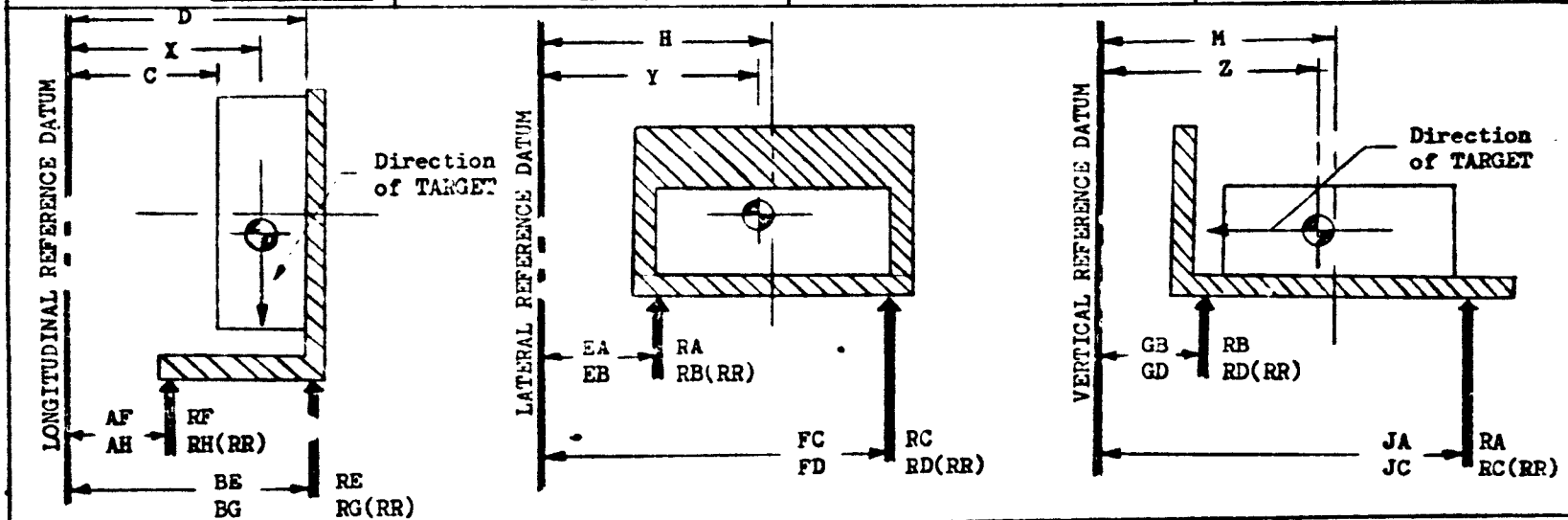
ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT:	COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: LAUNCH
	SUMMARY CHECK LISTS FOR SECTIONS 39 THROUGH 49 ARE IDENTICAL TO THOSE FOUND ON PAGES 92 THROUGH 99.												

2-5550-0-21
REV. SYM. I

BOEING
NO. D2-13243-1
PAGE 108

11.4.1 ACTUAL WEIGHT RECORD - CTLI SECTION

U/O MISSILE 0000028	DRAWING NO. 25-25402-36	CHECK LIST NO. 39	REPORT NO. WTS-1108-208
MISSILE MODEL WS-133A	DCN J	REPORTED BY CB/RH	PAGE NO.
CONFIGURATION	ADCN	CHECKED BY BW	DATE 10/18/63



WEIGHING DATA

REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	GR. WT.	TARE	CORR.	NET WT.
RF	43.85	12.65		31.20	RC	76.85	40.85		36.00
RH	66.90	39.70		27.20	RD	77.25	48.05		29.20
RE	116.95	74.45		42.50	RA	72.95	27.65		45.30
RG	88.50	49.60		38.90	RB	89.15	59.85		29.30
TOTAL	316.20	176.40		139.80	TOTAL	316.20	176.40		139.80

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	31.20	42.007	
RH	27.20	42.023	
RE	42.50	62.996	
RG	38.90	62.999	
AS WGD	139.80	54.23	7,581.6

LATERAL C.G.

REACTION	NET WT.	ARM	MOMENT
RA	45.30	84.510	
RB	29.30	84.505	
RC	36.00	115.490	
RD	29.20	115.495	
AS WGD	139.80	98.96	13,834.4

VERTICAL C.G.

REACTION	NET WT.	ARM	MOMENT
RB	29.30	77.478	
RD	29.20	77.481	
RA	45.30	115.500	
RC	36.00	115.500	
AS WGD	139.80	99.59	13,922.7

(RR) = Rear Reaction

&

CHECK LIST NO. 39	11.4.2 MISSILE WEIGHING CHECK LIST	RECORD OF CHECKING (DATE)
DATE	MODEL WS-133A FINAL ASSEMBLY DRAWING NO. 25-25402-36	Mo 10 / Day 18 / Yr 63

SECTION 39 MISSILE NO. _____

MISSILE COMPONENT CTLI COMPONENT PART NO. Noted

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT: [blank]	COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: LAUNCH
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-358	55018-106					-	-					
	Cable	AN37192-315					x	x					
	Cable	AN37194-315					x	o					
	Cable	AN37196-315					x	o					

REV. SYM. E

2-5550-0-21

BOEING NO. D2-13943-1 PAGE 110

2-5550-0-11 R1
REV. STM. I

11.4.3 WEIGHT AND BALANCE CHANGE RECORD

ASSOCIATE CONTRACTOR	BOEING	CONTRACT NO.	AF04(647)-289	REPORT NO.	WTS-1108-028
COMPONENT	SECTION 39	LOT NO.		DATE	10/18/63
MODEL NO.	WS-133A	DRAWING NO.	25-25402-36	PREPARED	CB/RH
SERIAL NO.	0000028	U.O. MISSILE	0000028	APPROVED	GO

LINE	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	25-25402-36	Instr. Group Trainer (As Weighed)	139.80	54.23	7,581.6	98.96	13,834.4	99.59	13,922.7
3									
4									
5		ADD:							
6	AN37194-315	Cable-Autonetics	3.30	74.2		115.5		102.8	
7	AN37196-315	Cable-Autonetics	1.37	50.4		106.9		111.4	
8									
9									
10									
11	25-25402-36	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									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									
32									

11.5 ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION APPLICABLE TO CTLI SECTION S/N 0000028 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 0000028 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-MMPD-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 CTLI KIT INSTALLATION
CTLI WAFER S/N 0000029

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			149.4	54.7	99.8	100.1	100k	.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							
42			Base							
48		MISSILE			283.1					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

12.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)

REPORT NO. _____

DATE _____

LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY LONG.	CENTER OF GRAVITY LAT.	CENTER OF GRAVITY VERT.	INERTIA SLUG FT²x10-3 ROLL	INERTIA SLUG FT²x10-3 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)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	- 1.90		57.7	110.3	117.8	0	0
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	112.1	120.5	0	0
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			9.73	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)

12.2 MM 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 FT2x10-3	
						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)

CHECK LIST NO.	12.3 MISSILE WEIGHING CHECK LIST	RECORD OF CHECKING (DATE)							
DATE	MODEL _____ FINAL ASSEMBLY DRAWING NO. 21-52900-4	Mo							
		Day							
		Yr							

SECTION 39 THRU 49 MISSILE NO. _____

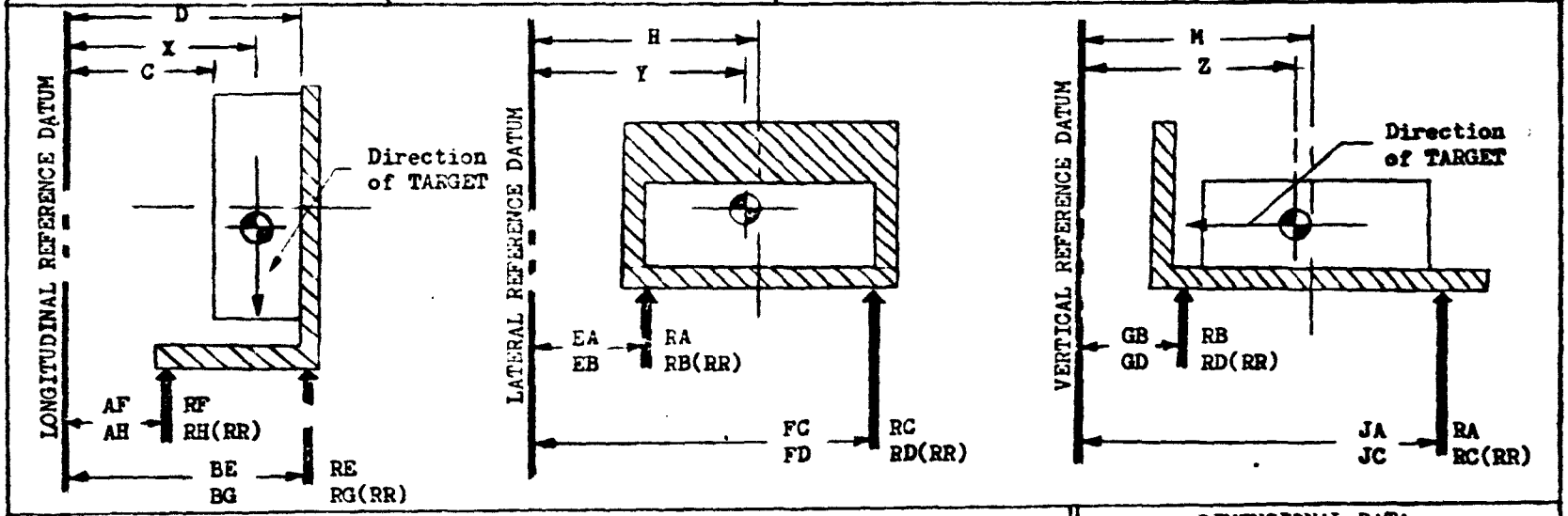
MISSILE COMPONENT _____ COMPONENT PART NO. _____

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT:	COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: LAUNCH

SUMMARY CHECK LISTS FOR SECTIONS 39 THROUGH 49 ARE IDENTICAL TO THOSE FOUND ON PAGES 92 THROUGH 99.

12.4.1 ACTUAL WEIGHT RECORD - CTLI SECTION

U/O MISSILE 0000029	DRAWING NO. 25-25402-36	CHECK LIST NO. 39	REPORT NO. WTS-1044-029
MISSILE MODEL WS-133A	DCN * J	REPORTED BY RS/JH	PAGE NO.
CONFIGURATION	ADCN	CHECKED BY	DATE 7/30/63



WEIGHING DATA

REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	GR. WT.	TARE	CORR.	NET WT.
RF	36.50	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

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	27.20	42.007	
RH	29.80	42.023	
RE	45.00	62.996	
RG	34.85	62.999	
AS WGD	136.85	54.26	7,425.2

LATERAL C.G.

REACTION	NET WT.	ARM	MOMENT
RA	47.75	84.510	
RB	24.85	84.505	
RC	32.60	115.490	
RD	31.65	115.495	
AS WGD	136.85	99.06	13,555.7

VERTICAL C.G.

REACTION	NET WT.	ARM	MOMENT
RB	24.85	77.478	
RD	31.65	77.481	
RA	47.75	115.500	
RC	32.60	115.500	
AS WGD	136.85	99.80	13,658.0

(RR) = Rear Reaction

SERIAL NUMBER: 0000029

CHECK LIST NO. 39	12 4.2 MISSILE WEIGHING CHECK LIST	RECORD OF CHECKING (DATE) Mo 7 Day 30 Yr 63
DATE	MODEL WS-133A FINAL ASSEMBLY DRAWING NO. 25-25402-36	

SECTION 39 MISSILE NO. _____

MISSILE COMPONENT CTLI COMPONENT PART NO. Noted

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: LAUNCH
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	10-20942-4					x	x				
	Battery, Squib	10-20942-2					x	o				
	Cable Set SE-35B	55018-106					-	-				
	Cable	AN37192-315					x	x				
	Cable	AN37194-315					x	o				
	Cable	AN37196-315					x	o				

2-5550-0-21 REV. STM. E

BOEING NO. D2-13943-1 PAGE 110

2-5550-0-11 R1

REV. SYM. F

12.4.3 WEIGHT AND BALANCE CHANGE RECORD

ASSOCIATE CONTRACTOR	BOEING	CONTRACT NO.	AF04(647)-289	REPORT NO.	WTS-1044-029
COMPONENT	SECTION 39	LOT NO.		DATE	7/30/63
MODEL NO.	WS-133A	DRAWING NO.	25-25402-36	PREPARED	
SERIAL NO.	0000029	U.O. MISSILE		APPROVED	

LINE	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	25-25402-36	Instr. Group Trainer (As Weighed)	136.85	54.26	7,425.2	99.06	13,555.7	99.80	13,658.0
3									
4									
5		ADD:							
6	AN3194-315	Cable - Autonetics	3.20	74.2		115.5		102.8	
7	AN3196-315	Cable - Autonetics	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 0000029 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 10-20842-1 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 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 0000031

REPORT NO. _____
DATE _____

LINE	STA.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY LONG.*	CENTER OF GRAVITY LAT.	CENTER OF GRAVITY VERT.	INERTIA SLUG FT^{2}x10-3 ROLL	INERTIA SLUG FT^{2}x10-3 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	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	42	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			281.3					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

13.2 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	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)	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			9.73	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)

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

REPORT NO. _____

DATE _____

LINE	STA	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY LONG.*	CENTER OF GRAVITY LAT.	CENTER OF GRAVITY VERT.	INERTIA SLUG FT²x10⁻³ ROLL	INERTIA SLUG FT²x10⁻³ 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)

SERIAL NUMBER 0000031

CHECK LIST NO.	13.3	MISSILE WEIGHING CHECK LIST	RECORD OF CHECKING (DATE)
DATE	MODEL _____	FINAL ASSEMBLY DRAWING NO. _____	Mo / Day / Yr

SECTION 39 THRU 49 MISSILE NO. _____

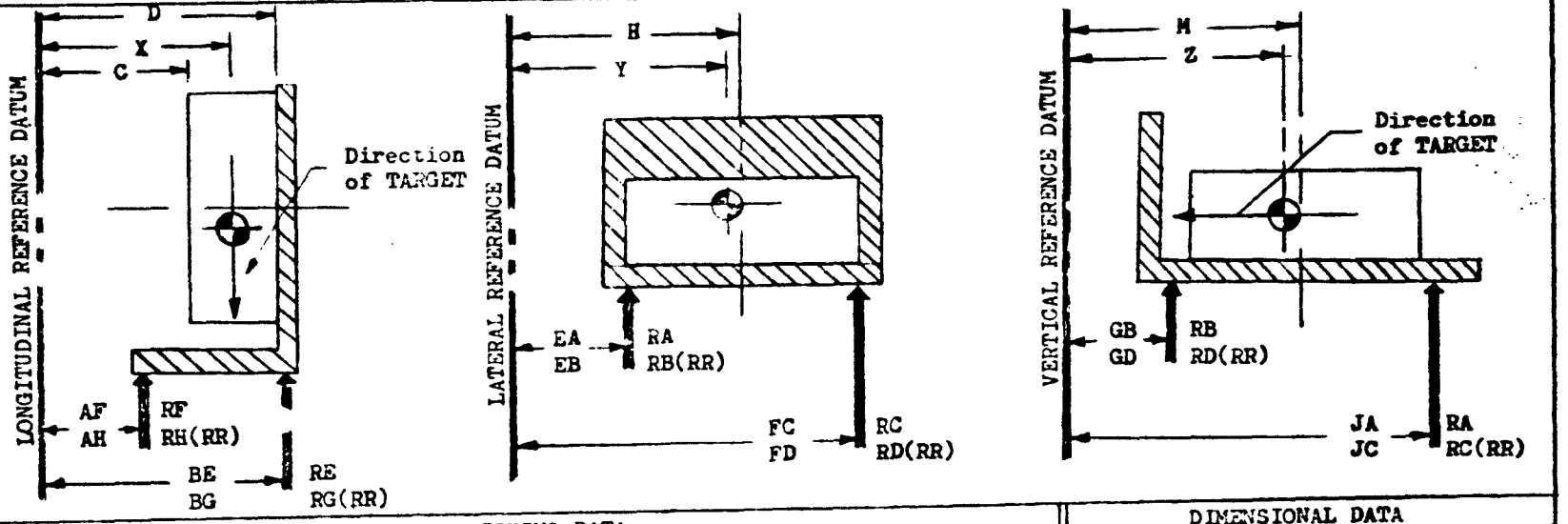
MISSILE COMPONENT _____ COMPONENT PART NO. _____

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: LAUNCH
	SUMMARY CHECK LISTS FOR SECTIONS 39 THROUGH 49 ARE IDENTICAL TO THOSE FOUND ON PAGES 92 THROUGH 99.											

13.4.1

ACTUAL WEIGHT RECORD - CTLI SECTION

U/O MISSILE 0000031	DRAWING NO. 25-25402-36	CHECK LIST NO. 39	REPORT NO. WTS-1101-031
MISSILE MODEL WS-133A	DCN • J	REPORTED BY CB/WB	PAGE NO.
CONFIGURATION	ADCN	CHECKED BY EW	DATE 10/16/63



WEIGHING DATA

REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	GR. WT.	TARE	CORR.	NET WT.
RF	59.20	20.25		38.95	RC	73.45	39.35		34.10
RH	50.50	32.35		18.15	RD	80.20	49.40		30.80
RE	100.70	66.80		33.90	RA	75.80	29.15		46.65
RG	104.35	56.95		47.40	RB	85.40	58.55		26.85
TOTAL	314.75	176.35		138.40	TOTAL	314.85	176.45		138.40

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		H		M	
D					

LONGITUDINAL C.G.

REACTION	NET WT.	ARM	MOMENT
RF	38.95	42.007	
RH	18.15	42.023	
RE	33.90	62.996	
RG	47.40	62.999	
AS WGD	138.40	54.34	7,520.6

LATERAL C.G.

REACTION	NET WT.	ARM	MOMENT
RA	46.65	84.510	
RB	26.85	84.505	
RC	34.10	115.490	
RD	30.80	115.495	
AS WGD	138.40	99.04	13,706.8

VERTICAL C.G.

REACTION	NET WT.	ARM	MOMENT
RB	26.85	77.478	
RD	30.80	77.481	
RA	46.65	115.500	
RC	34.10	115.500	
AS WGD	138.40	99.66	13,793.3

(RR) = Rear Reaction

SERIAL NUMBER: 0000031

CHECK LIST NO. _____

DATE _____

13.4.2 MISSILE WEIGHING CHECK LIST

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

RECORD OF CHECKING (DATE)							
Mo		10					
Day		16					
Yr		63					

SECTION 39 MISSILE NO. _____

MISSILE COMPONENT CTLI COMPONENT PART NO. Noted

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT:	COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: LAUNCH
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-35B	55018-106					-	-					
	Cable	AN37192-315					x	x					
	Cable	AN37194-315					x	e					
	Cable	AN37196-315					x	o					

2-5550-0-21
REV. STA. I

BOEING NO. D2-13943-1
PAGE 128

13.4.3

WEIGHT AND BALANCE CHANGE RECORD

ASSOCIATE CONTRACTOR	BOEING	CONTRACT NO.	AF04(647)-289	REPORT NO.	WTS-1101-031
COMPONENT	SECTION 39	LOT NO.		DATE	10/16/63
MODEL NO.	WS-133A	DRAWING NO.	25-25402-36	PREPARED	CB/WB
SERIAL NO.	0000031	U.O. MISSILE		APPROVED	GO

LINE	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	25-25402-36	Instr. Group Trainer (As Weighed)	138.40	54.34	7,520.6	99.04	13,706.8	99.66	13,793.3
3									
4									
5		ADD:							
6	AN37193-315	Cable-Autonetics	3.29	74.2		115.5		102.8	
7	AN37196-315	Cable-Autonetics	1.35	50.4		106.9		111.4	
8									
9									
10									
11	25-25402-36	Instr. Group Trainer (Complete)	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									
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32									

13.5 ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION APPLICABLE TO CTLI SECTION S/N 0000031 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.

13.5 ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION
APPLICABLE TO CTLI SECTION S/N 0000031 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 Programmer	3	Negl.	Yes
639	Prevent Interference of Linear Shape Change with Cable Strap	3	Negl.	Yes
657	Revision of Ordnance Supports in Interstage 2-3	2	Negl.	Yes

CTLI SECTION, S/N 0000032

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 0000032). 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 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.

14.2 WEIGHT & BALANCE SUMMARY
TOTAL CTLI KIT INSTALLATION
CTLI WAFER S/N 0000032

REPORT NO. _____
DATE _____

LINE	STA	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			- 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			281.5					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

14.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)

REPORT NO. _____

DATE

LINE	STA.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT²x10⁻³	
						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)	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			9.73	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)

14.2 IMS 9-62 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE**

REPORT NO. _____

DATE _____

LINE	STA.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY LONG.*	CENTER OF GRAVITY LAT.	CENTER OF GRAVITY VERT.	INERTIA SLUG FT²x10-3 ROLL	INERTIA SLUG FT²x10-3 PITCH
1	41	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			.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	102.9	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)

SERIAL NUMBER 0000032

CHECK LIST NO.	14.3 MISSILE WEIGHING CHECK LIST	RECORD OF CHECKING (DATE)
DATE	MODEL 39 THRU 49 FINAL ASSEMBLY DRAWING NO.	Mo / Day / Yr

SECTION _____ MISSILE NO. _____

MISSILE COMPONENT _____ COMPONENT PART NO. _____

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT:	COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: LAUNCH

SUMMARY CHECK LISTS FOR SECTIONS 39 THROUGH 49 ARE IDENTICAL TO THOSE FOUND ON PAGES 92 THROUGH 99.

MAY. 8TH. 1

8-5960-0-21

BOEING

NO 82-1394-3-1

PAGE 135

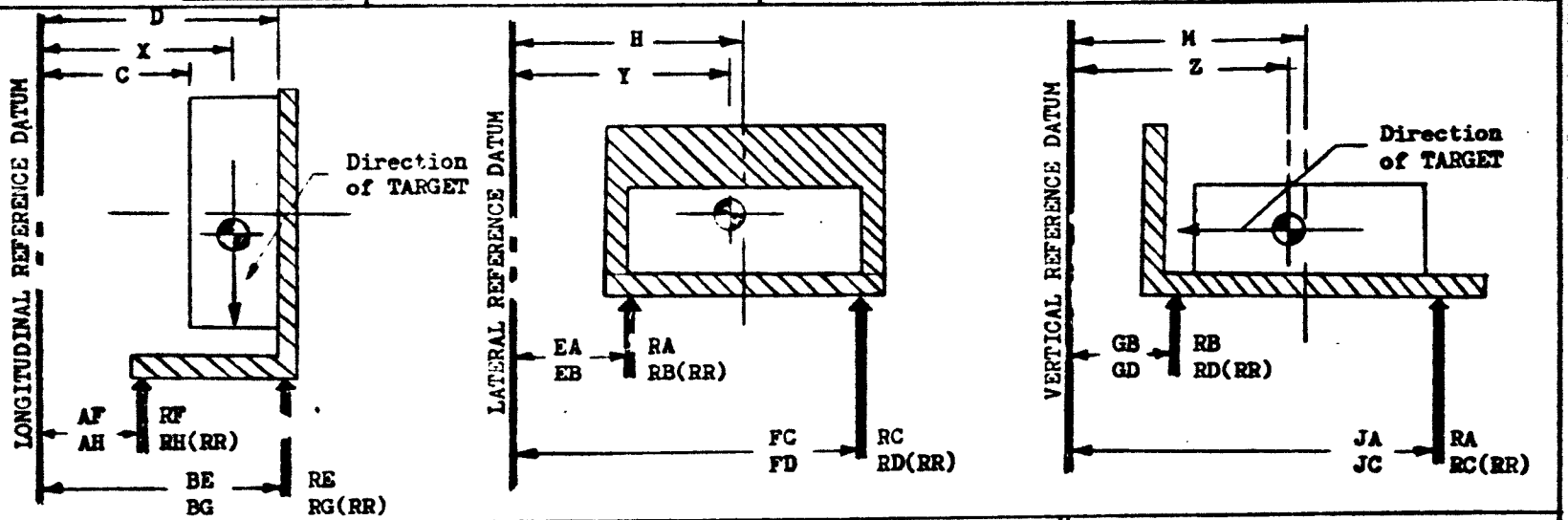
REV. SYM. E

2-55500-053 R1

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14.4.1 ACTUAL WEIGHT RECORD - CTLI SECTION

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



WEIGHING DATA

REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	GR. WT.	TARE	CORR.	NET WT.
RF	31.40	8.35		23.05	RC	67.25	35.15		32.10
RH	78.60	44.30		34.30	RD	86.25	53.50		32.75
RE	129.00	78.90		50.10	RA	82.30	33.30		49.00
RG	76.15	44.95		31.20	RB	79.35	54.55		24.80
TOTAL	315.15	176.50		138.65	TOTAL	315.15	176.50		138.65

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	23.05	42.007	
RH	34.30	42.023	
RE	50.10	62.996	
RG	31.20	62.999	
AS WGD	138.65	54.32	7,531.3

LATERAL C.G.

REACTION	NET WT.	ARM	MOMENT
RA	49.00	84.510	
RB	24.80	84.505	
RC	32.10	115.490	
RD	32.75	115.495	
AS WGD	138.65	99.00	13,726.4

VERTICAL C.G.

REACTION	NET WT.	ARM	MOMENT
RB	24.80	77.478	
RD	32.75	77.481	
RA	49.00	115.500	
RC	32.10	115.500	
AS WGD	138.65	99.72	13,826.1

(RR) = Rear Reaction

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SERIAL NUMBER: 0000032

CHECK LIST NO. 39	14.4.2 MISSILE WEIGHING CHECK LIST	RECORD OF CHECKING (DATE) Mo 10 Day 16 Yr 63
DATE	MODEL WS-133A FINAL ASSEMBLY DRAWING NO. 25-25402-36	

SECTION 39 MISSILE NO. _____

MISSILE COMPONENT CTLI COMPONENT PART NO. Noted

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT: [blank]	COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: LAUNCH
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-35B	55018-106					-	-					
	Cable	AN37192-315					x	x					
	Cable	AN37194-315					x	o					
	Cable	AN37196-315					x	o					

2-8560-0-21 REV. STM. H

BOEING NO. D6-13043-1 PAGE 137

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REV. SYM. I

14.4.3

WEIGHT AND BALANCE CHANGE RECORD

ASSOCIATE CONTRACTOR	BOEING	CONTRACT NO.	AF04(647)-289	REPORT NO.	WEB-1102-032
COMPONENT	SECTION 39	LOT NO.		DATE	10/16/63
MODEL NO.	WS-133A	DRAWING NO.	25-25402-36	PREPARED	CB/WB
SERIAL NO.	0000032	U.O. MISSILE		APPROVED	GO

LINE	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	25-25402-36	Instr. Group Trainer (As Weighed)	138.65	54.32	7,531.3	99.00	13,126.4	99.72	13,826.1
3									
4									
5		ADD:							
6	AN3719A-315	Cable-Autonetics	3.25	74.2		115.5		102.8	
7	AN3719B-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									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									
32									

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/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.

14.5 ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION APPLICABLE TO CTLI 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 0000034

15.1 DISCUSSION

Data are not available for CTLI section 25-25402-36, S/N 0000034 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 0000034

REPORT NO. _____
DATE _____

LINE	STA	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY LONG.	CENTER OF GRAVITY LAT.	CENTER OF GRAVITY VERT.	INERTIA SLUG FT^{2}x10^{-3} ROLL	INERTIA SLUG FT^{2}x10^{-3} 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	42	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							

GE

15.2 WEIGHT & BALANCE SUMMARY CTLI
(AVERAGE WEIGHT COMPONENT)

REPORT NO. _____

DATE _____

LINE	STA.	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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15.2 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								
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							
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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2-5550-0-21

REV. NOV. 1

CHECK LIST NO.	15.3 MISSILE WEIGHING CHECK LIST	RECORD OF CHECKING (DATE)
DATE	MODEL _____ FINAL ASSEMBLY DRAWING NO. 21-52900-6	Mo / Day / Yr

SECTION 39 THRU 49 MISSILE NO. _____

MISSILE COMPONENT _____ COMPONENT PART NO. _____

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT:	COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: LAUNCH
	NO DATA AVAILABLE												

BOEING

NO. D2-13943-1

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15.4.1

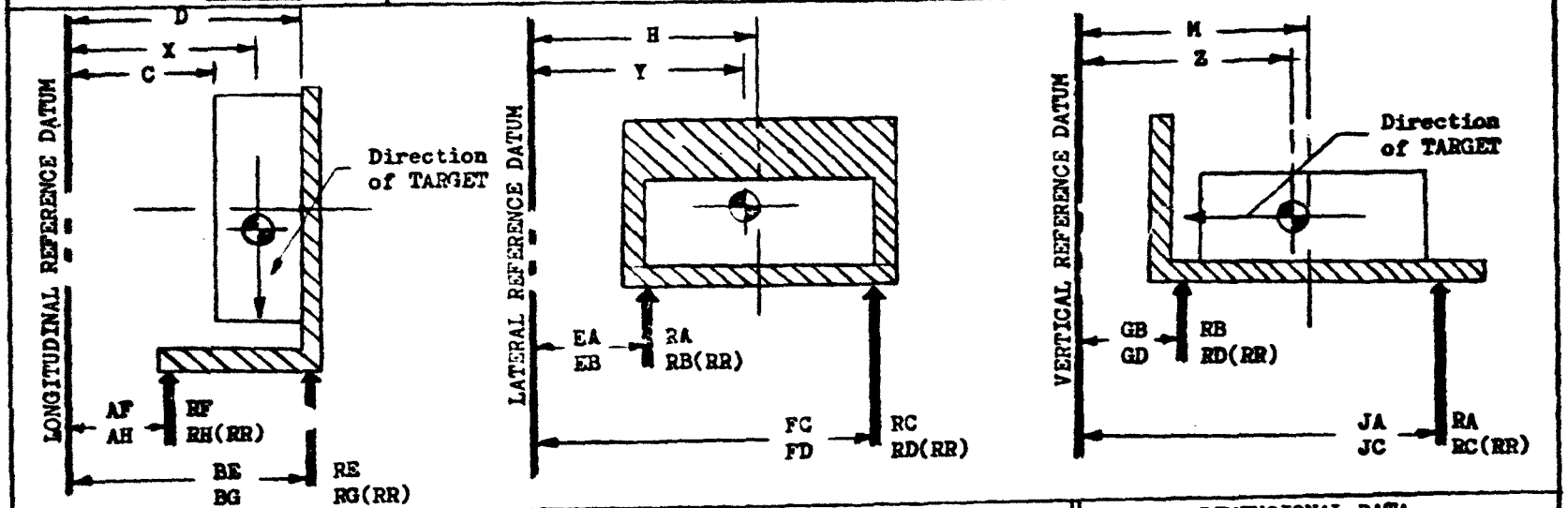
ACTUAL WEIGHT RECORD - CTLI SECTION

U/O MISSILE _____
MISSILE MODEL _____
CONFIGURATION _____

DRAWING NO. _____
DCN _____
ADCN _____

CHECK LIST NO. _____
REPORTED BY _____
CHECKED BY _____

REPORT NO. _____
PAGE NO. _____
DATE _____



WEIGHING DATA

REACTION	GR. WT.	TARE	CORR.	NET WT.
RF				
RH				
RE	NO DATA AVAILABLE			
RG				
TOTAL				

REACTION	GR. WT.	TARE	CORR.	NET WT.
RC				
RD				
RA	NO DATA AVAILABLE			
RB				
TOTAL				

DIMENSIONAL DATA

DIM.	INCHES	DIM.	INCHES	DIM.	INCHES
AF		EA		GB	
AH		EB		GD	
BE		FC		JA	
BG		FD		JC	
C		H		M	
D					

LONGITUDINAL C.G.

REACTION	NET WT.	ARM	MOMENT
RF			
RH			
RE	NO DATA AVAILABLE		
RG			
AS WGD			

LATERAL C.G.

REACTION	NET WT.	ARM	MOMENT
RA			
RB			
RC	NO DATA AVAILABLE		
RD			
AS WGD			

VERTICAL C.G.

REACTION	NET WT.	ARM	MOMENT
RB			
RD			
RA	NO DATA AVAILABLE		
RC			
AS WGD			

(RR) = Rear Reaction

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SERIAL NUMBER: 0000039

CHECK LIST NO. 39	15.4.2 MISSILE WEIGHING CHECK LIST	RECORD OF CHECKING (DATE)
DATE	MODEL _____ FINAL ASSEMBLY DRAWING NO. 25-25402-36	Mo / Day / Yr

SECTION 39 MISSILE NO. _____

MISSILE COMPONENT _____ COMPONENT PART NO. _____

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT:	COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: LAUNCH
	NO DATA AVAILABLE												

2-5550-0-21 REV. SEQ. 1

BOEING NO. 88-1394-1 PAGE 146

15.4.3

WEIGHT AND BALANCE CHANGE RECORD

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

LINE	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									
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									

15.5 ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION APPLICABLE TO CTLI SECTION S/N 00000 3 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 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 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/AODS" dated January 28, 1963.

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

16.2 WEIGHT & BALANCE SUMMARY
TORAL CELI KSF INSTALLATION
CELI WAFER S/S 0000035

REPORT NO. _____
DATE _____

LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY LONG.*	CENTER OF GRAVITY LAT.	CENTER OF GRAVITY VERT.	INERTIA SLUG FT²x10-3 ROLL	INERTIA SLUG FT²x10-3 PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			147.4	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			- 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			30.8	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			281.1					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

16.2 WEIGHT & BALANCE SUMMARY (ALL (AVERAGE WEIGHT COMPONENTS)						REPORT NO. _____ DATE _____				
LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG $FT^2 \times 10^{-3}$	
						LONG*	LAT.	VERT.	ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			4.39	96.6	107.5	110.7	0	0
5			Silo							
6			Aero							
7	42	G&C Section			6.94	87.5	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			9.73	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)

16.2 [illegible] 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 LONG.*	CENTER OF GRAVITY LAT.	CENTER OF GRAVITY VERT.	INERTIA SLUG FT²x10⁻³ ROLL	INERTIA SLUG FT²x10⁻³ PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	GTLI 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	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			.8	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)

SERIAL NUMBER 0000035

CHECK LIST NO.	16.3 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. _____

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: LAUNCH
	SUMMARY CHECK LISTS FOR SECTIONS 39 THROUGH 49 ARE IDENTICAL TO THOSE FOUND ON PAGES 92 THROUGH 99.											

2-5550-0-53 R1

REV. NO. 1

16.4.1

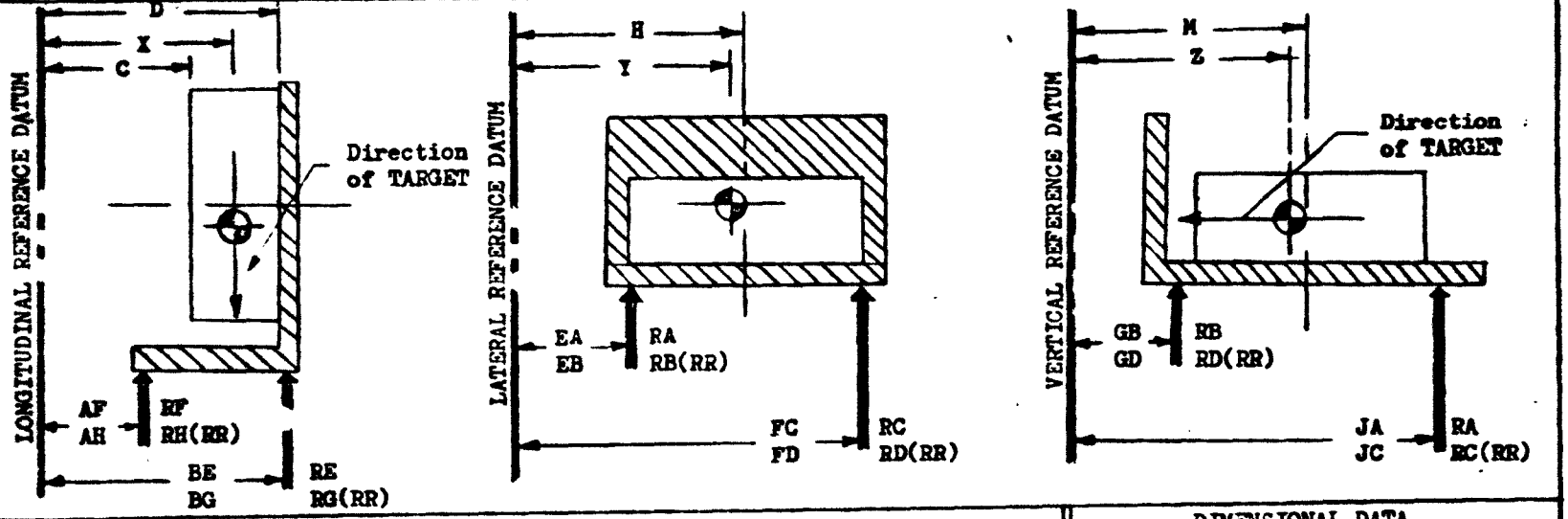
ACTUAL WEIGHT RECORD - CTLI SECTION

U/O MISSILE 0000035
MISSILE MODEL MM-133A
CONFIGURATION

DRAWING NO. 25-25402-36
DCN
ADCN

CHECK LIST NO. 39
REPORTED BY MS/JK
CHECKED BY

REPORT NO. WTR-1043-035
PAGE NO.
DATE 7/30/63



WEIGHING DATA

REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	GR. WT.	TARE	CORR.	NET WT.
RF	63.15	33.60		29.95	RC	52.55	17.60		34.95
RH	39.40	13.75		25.65	RD	93.45	65.30		28.15
RE	89.35	48.25		41.10	RA	89.65	45.25		44.40
RG	107.95	69.75		38.20	RB	64.20	36.80		27.40
TOTAL	299.85	164.95		134.90	TOTAL	299.85	164.95		134.90

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	30.000	H	180.000	M	100.000
D	60.000				

LONGITUDINAL C.G.

REACTION	NET WT.	ARM	MOMENT
RF	29.95	42.007	
RH	25.65	42.023	
RE	41.10	62.996	
RG	38.20	62.999	
AS WGD	134.90	54.35	7,331.7

LATERAL C.G.

REACTION	NET WT.	ARM	MOMENT
RA	44.40	84.510	
RB	27.40	84.505	
RC	34.95	115.490	
RD	28.15	115.495	
AS WGD	134.90	99.00	13,355.2

VERTICAL C.G.

REACTION	NET WT.	ARM	MOMENT
RB	27.40	77.478	
RD	28.15	77.481	
RA	44.40	115.500	
RC	34.95	115.500	
AS WGD	134.90	99.04	13,468.9

(RR) = Rear Reaction

BOEING NO. RE-1343-1 PAGE 154

SERIAL NUMBER: 0000035

CHECK LIST NO. 39

DATE

16.4.2 MISSILE WEIGHING CHECK LIST

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

SECTION 39 MISSILE NO.

MISSILE COMPONENT CTLI COMPONENT PART NO. Noted

RECORD OF CHECKING (DATE)								
Mo		7						
Day		30						
Yr		63						

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT: [blank]	COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: LAUNCH
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-35A	55008-106					-	-					
	Cable	AN37192-315					X	X					
	Cable	AN37194-315					X	X					
	Cable	AN37196-315					X	X					

REV. STA. 1

2-5660-0-81

BOEING

NO. 88-1585-1

PAGE 15

2-5550-0-11 R1

MW, MM, II

M 4.3

WEIGHT AND BALANCE CHANGE RECORD

ASSOCIATE CONTRACTOR	BOEING	CONTRACT NO.	AF04(647)-289	REPORT NO.	WPE-1043-035
COMPONENT	SECTION 39	LOT NO.		DATE	7/30/63
MODEL NO.	WB-133A	DRAWING NO.	25-25402-36	PREPARED	
SERIAL NO.	0000035	U.O. MISSILE		APPROVED	

LINE	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	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
3									
4									
5									
6		ADD:							
7	AN-3719h-315	Cable-Autonetics	3.20	74.2		115.5		102.8	
8	AN3719G-315	Cable-Autonetics	1.35	50.4		106.9		111.4	
9	10-20942-2	Battery	3.38	53.9		100.2		92.0	
10									
11									
12									
13	25-25402-36	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									

16.5 ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION APPLICABLE TO CTLI SECTION S/N 0000035 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. (WS-133A-BO-)	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, 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&?	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.

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	PAGE NO.	REV SYM
	1	A										49	B				
	2	F	2.1	F	2.2	F						50	B				
	3	F										51	B				
	4	B	4.1	E	4.2	F	4.3	F				52	B				
	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	B				
	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				

ACTIVE PACE 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	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				

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	PAGE NO.	REV SYM
			19[illegible]	F													
			19[illegible]	F													
			1[illegible]	F													
			1[illegible]	F													
			1[illegible]	F													
			1[illegible]	F													
			1[illegible]	F													
			20[illegible]	F	20[illegible]	F											

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
B	**Added Sections 5.0, 6.0 and 7.0 to the document.**	6-17-63	D. Brenden
C	**Added Sections 8.0 and 9.0 to the document.**	7-17-63	D. Brenden
D	Revised pages 2 3, 4.1 Added pages 4.1, 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
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
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	11-25-3	D. Brenden

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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 chec 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 0162-01DR-NMPD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODC" 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, BMS 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 _____

ITEM	STA.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT²x10⁻³	
						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	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							

* Boeing Section Stations (See Missile Station Diagram)

15.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)

REPORT NO. _____

DATE _____

LINE No.	STA.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY LONG.	CENTER OF GRAVITY LAT.	CENTER OF GRAVITY VERT.	INERTIA SLUG FT^{2}x10-3 ROLL	INERTIA SLUG FT^{2}x10-3 PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			4.39	56.9	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			9.73	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)

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

REPORT NO. _____

DATE _____

	Sec.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY LONG.*	CENTER OF GRAVITY LAT.	CENTER OF GRAVITY VERT.	INERTIA SLUG FT²x10⁻³ ROLL	INERTIA SLUG FT²x10⁻³ 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	111.5		
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)

SERIAL NUMBER: 0000034

CHECK LIST NO.	15.3	MISSILE WEIGHING CHECK LIST	RECORD OF CHECKING (DATE)											
			Mo											
DATE	MODEL 39 THRU 49	FINAL ASSEMBLY DRAWING NO.	Day											
			Yr											
									COMPONENT					MISSILE

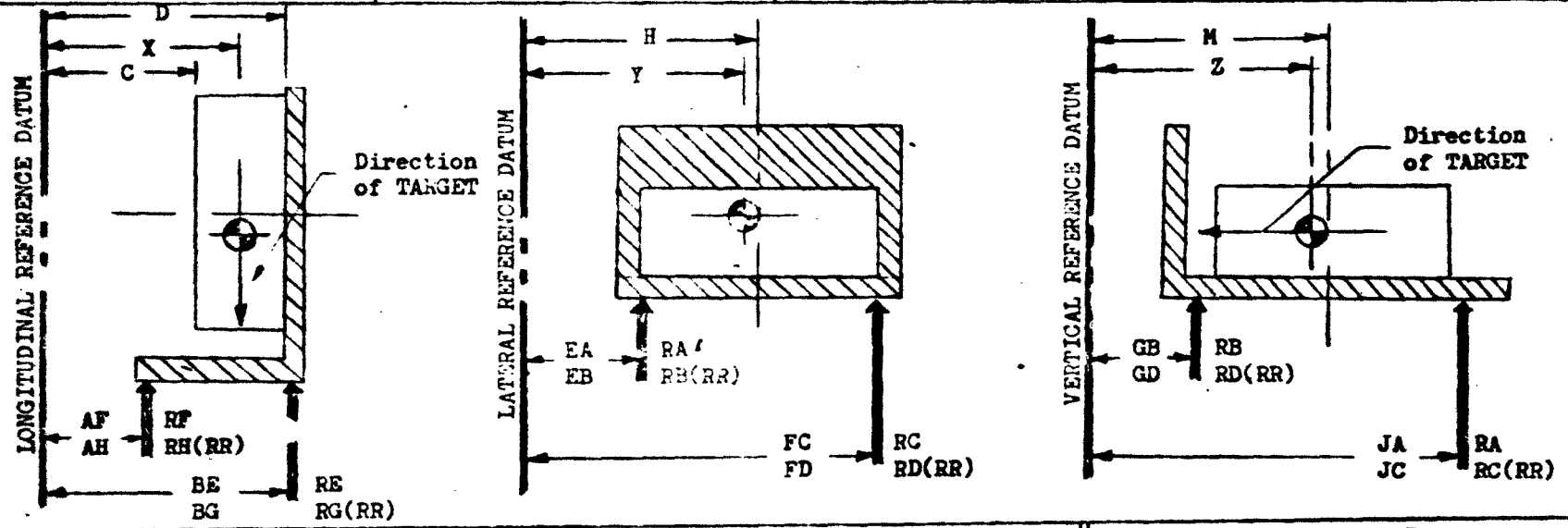
SECTION _____ MISSILE NO. _____

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
	SUMMARY CHECK LISTS FOR SECTIONS 39 THROUGH 49 ARE IDENTICAL TO THOSE FOUND ON PAGES 92 THROUGH 99.												

15.4.1 ACTUAL WEIGHT RECORD - CTLI SECTION

U/O MISSILE 0000034	DRAWING NO. 25-25402-36	CHECK LIST NO. 39	REPORT NO. WTS-1112-034
MISSILE MODEL WS-133A	DCN J	REPORTED BY CRB/RH	PAGE NO.
CONFIGURATION	ADCN	CHECKED BY RW	DATE 10/31/63



WEIGHING 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	316.75	176.60		140.15	TOTAL	316.60	176.45		140.15

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	30.65	42.007	
RH	27.70	42.023	
RE	43.50	62.996	
RG	38.30	62.999	
AS WGD	140.15	54.26	7,604.7

LATERAL C.G.

REACTION	NET WT.	ARM	MOMENT
RA	49.10	84.510	
RB	25.40	84.505	
RC	32.50	115.490	
RD	33.15	115.495	
AS WGD	140.15	99.02	13,878.0

VERTICAL C.G.

REACTION	NET WT.	ARM	MOMENT
RB	25.40	77.478	
RD	33.15	77.481	
RA	49.10	115.500	
RC	32.50	115.500	
AS WGD	140.15	99.62	13,961.2

(RR) = Rear Reaction

SERIAL NUMBER: 0000034

CHECK LIST NO. 30

DATE

15.4.2 MISSILE WEIGHING CHECK LIST

MODEL MR 134

FINAL ASSEMBLY DRAWING NO. 25-25[illegible]-36

RECORD OF CHANGING (DATE)						
Mo	10					
Day	31					
Yr	63					

SECTION: 59

MISSION NO.

MISSILE COMPONENT C.M.T

COMPONENT PART NO. Noted

DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT MISSILE	COMPONENT CHECK LIST	MISSILE CHECK LIST	LAUNCH
30 Installation Group-Trainer Pod	25-25[illegible]-36					-	-		
35 C.M.T Structure Assy.	25-25[illegible]					-	-		
Support Structure	25-25[illegible]					X	X		
Primary Structure	25-25[illegible]					X	X		
Insulation & External Moldings	25-25[illegible]					X	X		
Antenna & Sensor	25-25[illegible]					X	X		
Plate-Identification	21-5[illegible]						X		
36 Cable & Equipment Installation	25-25[illegible]					-	-		
Bottom South	10-[illegible]						X		
Battery South	10-[illegible]					X	X		
Cable Set	5[illegible]					-			
Cable	AN3127-3[illegible]					X	X		
Cable	AN3127-3[illegible]					X	O		
Cable	AN3127-3[illegible]					X	O		

15.4.3

WEIGHT AND BALANCE CHANGE RECORD

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

CONTRACT NO.: AF04(647)-289
LOT NO.:
DRAWING NO.: 25-25402-36
U.O. MISSILE:

REPORT NO.: WTS-1112-034
DATE: 10/31/63
PREPARED: CRB-RH
APPROVED: BW

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									
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	AN3194-315	Cable-Autonetics	3.25	74.2		115.5		102.8	
7	AN3196-315	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									
25									
26									
27									
28									
29									
30									
31									
32									

2-55400-11 REV. DEC. 1962
BOEING
NO. 2E-1394-1
REV. 1962

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-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-B0-)	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, 10-2088	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 000034 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 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 173 (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 0162-01DR-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.
21-52900, 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, BMS 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.

17.2 WEIGHT & BALANCE SUMMARY
TOTAL CTLI KIT INSTALLATION
CTLI WAFER S/N 0000036

REPORT NO. _____
DATE _____

LINE	STA	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY LONG.*	CENTER OF GRAVITY LAT.	CENTER OF GRAVITY VERT.	INERTIA SLUG FT²x10⁻³ ROLL	INERTIA SLUG FT²x10⁻³ 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		Jettisoned Portion	Silo							
19			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		Jettisoned Portion	Silo							
34			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			284.0					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

17.2 WEIGHT & BALANCE SUMMARY CTLI
(AVERAGE WEIGHT COMPONENTS)

REPORT NO. _____

DATE _____

LINE NO.	STA. NO.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY * LONG.*	LAT.	VERT.	INERTIA SLUG FT²x10-3 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	43	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			19.26	64.9	111.8	120.4	0	.001
23		(Aft)	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			- 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			25.47	73.7	115.0	125.6	0	.002
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			29.83	111.5	117.7	130.2	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)

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

REPORT NO. _____

DATE _____

LINE	STA	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY LONG.*	CENTER OF GRAVITY LAT.	CENTER OF GRAVITY VERT.	INERTIA SLUG FT²x10-3 ROLL	INERTIA SLUG FT²x10-3 PITCH
1	41	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			.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)

CHECK LIST NO. _____

DATE _____

17.3.1 MISSILE WEIGHING CHECK LIST

MODEL _____ FINAL ASSEMBLY DRAWING NO. 21-52900-20 (Using 25-25406-9)

RECORD OF CHECKING (DATE)

Mo													
Day													
Yr													

SECTION 39 MISSILE NO. _____

MISSILE COMPONENT _____ COMPONENT PART NO. _____

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: 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	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

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

SECTION 42 MISSILE NO. _____

MISSILE COMPONENT GUIDANCE SECTION COMPONENT PART NO. _____

RECORD OF CHECKING (DATE)								
	COMPONENT						MISSILE	
Mo / Day / Yr	BASIC WEIGHT	AS WEIGHED		REMOTE SITE SHIPMENT	AS RECEIVED REMOTE SITE		AS WEIGHED REMOTE SITE	LAUNCH

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM
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 CTLI 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

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

SECTION 44 MISSILE NO. _____

MISSILE COMPONENT 3rd STAGE MOTOR COMPONENT PART NO. _____

RECORD OF CHECKING (DATE)								
Mo								
Day								
Yr								
COMPONENT						MISSILE		

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
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	359764	4.03	58.1	99.8	114.0							
	The following items are deleted from the missile assembly in order to accomodate the CTLI 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

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CHECK LIST NO.	17.3.4 MISSILE WEIGHING CHECK LIST	RECORD OF CHECKING (DATE) Mo / Day / Yr
DATE	MODEL _____ 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 ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: LAUNCH
5a	Cable Assy. Set - Electrical	25-26878-5	4.36	64.9	112.0	119.9						
5b	Conduit Supt. Set - Raceway	25-29239-23	15.75	66.9	111.7	120.0						
5c	Instl. Kit - 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 CTLI Installation											
5e	Standards Instl.	25-30133-9	.07	78.6	109.6	119.5						
5f	Raceway 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

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

SECTION 46 MISSILE NO. _____

MISSILE COMPONENT 2nd STAGE MOTOR COMPONENT PART NO. _____

RECORD OF CHECKING (DATE)													
Mo													
Day													
Yr													
	COMPONENT										MISSILE		

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
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		*										
	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 CTLI Installation												
6h	Raceway 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

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

RECORD OF CHECKING (DATE)

Mo								
Day								
Yr								

SECTION 47 MISSILE NO. _____

MISSILE COMPONENT 1-2 INTERSTAGE COMPONENT PART NO. _____

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: LAUNCH
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	BMS 5-62 Installed at VAFB		*									
	The following items are deleted from the missile assembled in order to accommodate the CTLI 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	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. _____

DATE _____

17.3.7 MISSILE WEIGHING CHECK LIST

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

SECTION 48 MISSILE NO. _____

MISSILE COMPONENT 1st STAGE MOTOR COMPONENT PART NO. _____

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	RECORD OF CHECKING (DATE) Mo / Day / Yr — COMPONENT: BASIC WEIGHT	AS WEIGHED		REMOTE SITE SHIPMENT	AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	LAUNCH
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	130.0							
8c	Instl. Kit - Trainer Test	25-31677-17	2.81	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	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 CTLI Installation												
8h	Raceway Instl.	25-23214-5	8.07	82.8	117.2	129.8							
8i	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

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CHECK LIST NO. 17.3.8 MISSILE WEIGHING CHECK LIST

DATE

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

RECORD OF CHECKING (DATE)

Mo								
Day								
Yr								

SECTION 49 MISSILE NO. _____

MISSILE COMPONENT AFT SKIRT COMPONENT PART NO. _____

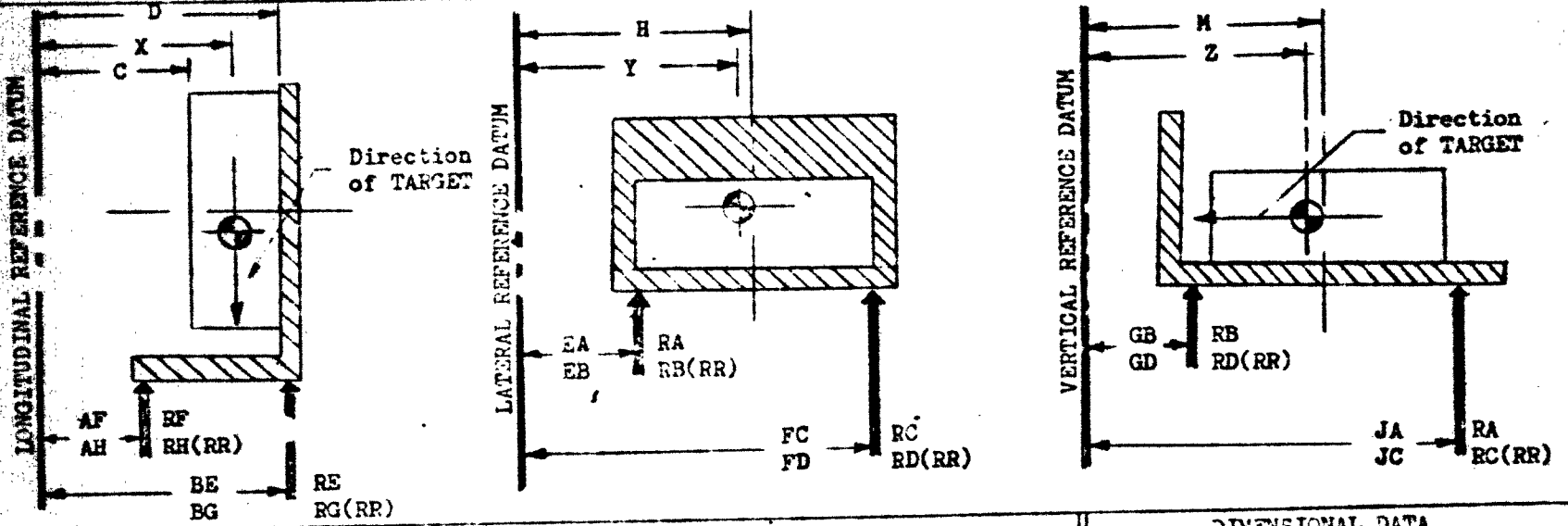
ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: LAUNCH
9a	Cable Assy. Set - Electrical	25-26878-5	6.03	73.2	118.2	130.5						
9b	Inst. Kit - 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 CTLI Installations											
9d	Standards Instl.	25-30133-9	.28	57.0	116.4	128.4						
9e	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

17.4.1

ACTUAL WEIGHT RECORD - CTLI SECTION

B/O MISSILE 0000036	DRAWING NO. 25-25402-36	CHECK LIST NO. 39	REPORT NO. WTS-1110-036
MISSILE MODEL WS-133A	DCN J	REPORTED BY CB/RH	PAGE NO.
CONFIGURATION	ADCN	CHECKED BY RW	DATE 10-24-63



WEIGHING DATA

REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	GR. WT.	TARE	CORR.	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	RA	54.95	33.30		21.65
RG	82.85	52.60		30.25	RB	107.00	54.55		52.45
TOTAL	316.05	176.45		139.60	TOTAL	316.10	176.50		139.60

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	22.20	42.007	
RH	35.55	42.023	
RE	51.60	62.996	
RG	30.25	62.999	
AS WGD	139.60	54.32	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 WGD	139.60	99.04	13,826.6

VERTICAL C.G.

REACTION	NET WT.	ARM	MOMENT
RB	52.45	77.478	
RD	5.75	77.481	
RA	21.65	115.500	
RC	59.75	115.520	
AS WGD	139.60	99.65	13,910.9

(RR) = Rear Reaction

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BOEING
PAGE NO. M-4.39.2.2

SERIAL 1 0000036

CHECK LIST NO. 32

DATE

17.4.2 MISSILE [illegible] CHECK LIST

BOOST [illegible] FINAL ASSY DRAWING NO. [illegible]-25402-36

SECTION [illegible]

MISSILE NO.

MISSILE COMPONENT [illegible]

COMPONENT PART NO. [illegible]

REPORT OF CHECKING (DATA)

Mo		10					
Day		24					
Yr		63					

COMPONENT | MISSILE

BEGIN NEXT	DESCRIPTION	PART NO.	QUALITY	X AXIS	Y AXIS	Z AXIS						
30	Instrumentation Cover Assy	25-25402-36										
30A	Cable Assembly	[illegible]-11										
	Sub Assy							x				
	Printed Circuit							x				
	Interconnection Board Assembly							x				
	Antenna & Support							x				
	Misc Hardware							x				
30B	Cable & Wiring Interconnection							-				
	Jettison Cable	[illegible]-2						x	x			
	Jettison Cable	[illegible]-4						x	x			
	Cable Assembly A	[illegible]										
	Cable	[illegible]-1277-[illegible]							x			
	Cable	[illegible]-1278							o			
	Cable	[illegible]-1279							o			

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.	WS-133A	DRAWING NO.	25-25402-36	PREPARED	CB/RH
SERIAL NO.	0000036	U.O. MISSILE		APPROVED	GO

LINE	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	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
3									
4									
5		ADD:							
6	AE31278-315	Cable-Autonetics	3.81	74.2		111.5		102.8	
7	AE31279-315	Cable-Autonetics	2.11	50.4		106.9		111.8	
8									
9									
10	25-25402-36	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									
18									
19									
20									
21									
22									
23									
24									
25									
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27									
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29									
30									
31									
32									

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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 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 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**
559	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 CELI 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

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, RMS 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	STA.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY LONG.*	CENTER OF GRAVITY LAT.	CENTER OF GRAVITY VERT.	INERTIA SLUG FT² x10-3 ROLL	INERTIA SLUG FT² x10-3 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	C&C Section			2.3	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			- 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			19.5	65.1	111.7	120.2	0	.001
23		(Aft)	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			- 1.9	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	- 1.5		55.4	112.1	120.5		
37	47	Interstage 1-2			36.0	74.1	114.7	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			282.5					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

18.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)

REPORT NO. _____

DATE _____

LINE	STA.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY LONG.*	CENTER OF GRAVITY LAT.	CENTER OF GRAVITY VERT.	INERTIA SLUG FT^{2}x10-3 ROLL	INERTIA SLUG FT^{2}x10-3 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			- 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			19.26	64.9	111.3	120.4	0	.001
23		(Aft)	Silo							
24			Aero							
25	46	2nd Stage Engine			25.27	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			25.47	73.7	115.0	125.6	0	.002
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			29.83	111.5	117.7	130.2	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)

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

REPORT NO. _____

DATE _____

LINE	STA	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY LONG.*	CENTER OF GRAVITY LAT.	CENTER OF GRAVITY VERT.	INERTIA SLUG FT^{2}x10-3 ROLL	INERTIA SLUG FT^{2}x10-3 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	102.[illegible]	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	101.0	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	110.2	133.9		
45			Silo							
46			Aero							
47			Base							
48		MISSILE			2.2					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

SERIAL NUMBER 0000037

CHECK LIST NO.	18.3 MISSILE WEIGHING CHECK LIST	RECORD OF CHECKING (DATE)
DATE	MODEL 39 thru 49 FINAL ASSEMBLY DRAWING NO.	Mo / Day / Yr

SECTION _____ MISSILE NO. _____

MISSILE COMPONENT _____ COMPONENT PART NO. _____

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: LAUNCH
	SUMMARY CHECK LISTS FOR SECTIONS 39 THROUGH 49 ARE IDENTICAL TO											
	THOSE FOUND ON PAGES 162 through 169.											

2-0550-0-21

REV. SYS. ____

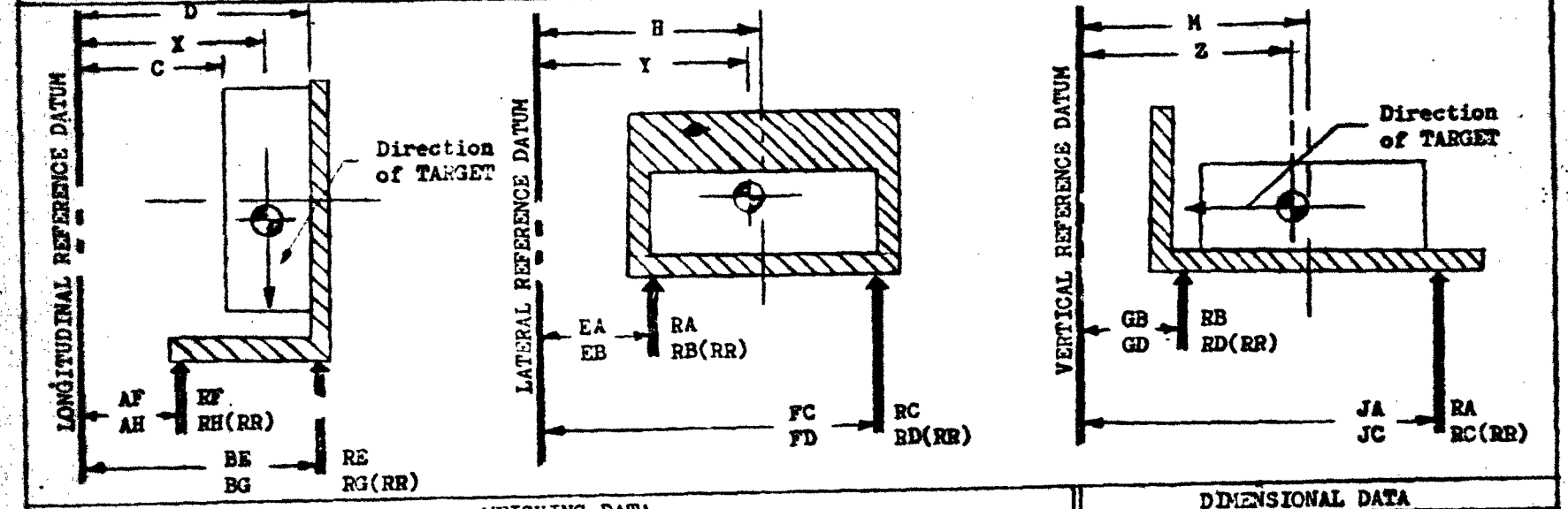
BOEING NO. D2-13943-1

MAR 178

18.4.1

ACTUAL WEIGHT RECORD - CTLI SECTION

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



WEIGHING DATA

REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	GR. WT.	TARE	CORR.	NET WT.
RF	46.75	15.75		31.05	RC	77.30	38.65		38.65
RH	53.20	36.75		26.45	RD	77.00	50.10		26.90
RE	114.20	71.70		42.50	RA	72.50	29.95		42.55
RG	91.95	52.50		39.45	RB	89.15	57.80		31.35
TOTAL	316.10	176.65		139.45	TOTAL	315.95	176.50		139.45

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	31.05	42.007	
RH	26.45	42.023	
RE	42.50	62.996	
RG	39.45	62.999	
AS WGD	139.45	54.35	7,578.5

LATERAL C.G.

REACTION	NET WT.	ARM	MOMENT
RA	42.55	84.510	
RB	31.35	84.505	
RC	38.65	115.490	
RD	26.90	115.495	
AS WGD	139.45	99.07	13,815.6

VERTICAL C.G.

REACTION	NET WT.	ARM	MOMENT
RB	31.35	77.478	
RD	26.90	77.481	
RA	42.55	115.500	
RC	38.65	115.500	
AS WGD	139.45	99.62	13,891.8

(RR) = Rear Reaction

2-5590-0-53 RL
REV. SYM. F
BOEING
PART NO. D2-13491-1

BOOKLET #: 0000037

CHECK LIST NO. 39

DATE

18.4.2 MISSILE WEIGHING CHECK LIST

MODEL [illegible] FINAL ASSY NO. [illegible]

RECORD OF CHECK-OUT (GMT)

Mo		11						
Day		1						
Yr		63						

SECTION 12

MISSILE NO.

MISSILE COMPONENT GSE

COMPONENT PART NO.

CHECK LIST ITEM	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT					MISSILE	
36	[illegible]	[illegible] 25402-36					-						
36a	[illegible]	[illegible]-11											
	[illegible]	[illegible]					x	x					
	[illegible]	[illegible]						x					
	[illegible]	[illegible]					x	x					
	[illegible]	[illegible]						x					
	[illegible]	[illegible]						x					
36b	Cable [illegible]	[illegible] 16											
	[illegible], South	[illegible] 4						x					
	[illegible], South	[illegible]						x					
	[illegible]	[illegible]											
	Cable						x	x					
	Cable							o					
	Cable							o					

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.		DATE	11-1-63
MODEL NO.	WS-133A	DRAWING NO.	25-25402-36	PREPARED	CB / RH
SERIAL NO.	0000037	U.O. MISSILE		APPROVED	GO

LINE	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	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-1[illegible]A-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 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 10-2[illegible]-2-1 CTLI Airframe 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, MCN 6301	3	-	Yes**
555	Stage 3 CTLI Raceway Cover Revision	3	Negl.	Yes
578	C Band Beacon/Command Destruct Incompatibility Interim Fix, MCN 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 CTLI 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.
21-52900, 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, MMS 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	STA.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY LONG.*	CENTER OF GRAVITY LAT.	CENTER OF GRAVITY VERT.	INERTIA SLUG FT²x10-3 ROLL	INERTIA SLUG FT²x10-3 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			- 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			19.5	65.1	111.7	120.2	0	.001
23		(Aft)	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			- 1.5	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	- 1.5		55.4	112.1	120.5		
37	47	Interstage 1-2			26.0	74.1	114.7	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			284.1					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

19.2 WEIGHT & BALANCE SUMMARY STEP I
(AVERAGE WEIGHT COMPONENTS)

REPORT NO. _____

DATE _____

		DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY STA. (IN.) LONG.*	LAT.	VERT.	INERTIA SLUG FT² ROLL	PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	42	PIT Section			4.32	55.2	107.5	119.6	0	0
5			Silo							
6			Aero							
7	43	C&C Section			6.94	67.5	112.	118.3	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			- 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	- 1.2?		57.7	110.3	117.8		
22	46	Interstage 2-3			19.26	64.2	111.8	120.4	0	.001
23		(Aft)	Silo							
24			Aero							
25	47	2nd Stage Engine			25.71	102.1	112.6	121.4	0	.002
26			Silo							
27			Aero							
28			Base							
29	48	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	49	Interstage 1-2			25.47	73.7	115.6	125.6	0	.002
38		(Aft)	Silo							
39			Aero							
40	50	1st Stage Engine			29.83	111.5	117.7	130.2	0	.025
41			Silo							
42			Aero							
43			Base							
44	51	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)

19.2 BMS S-02 CHANGES INSTALLED AT VANDENBERG AIR FORCE BASE**

REPORT NO. _____

DATE _____

		DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY LONG.*	CENTER OF GRAVITY LAT.	CENTER OF GRAVITY VERT.	INERTIA SLUG FT²x10⁻³ ROLL	INERTIA SLUG FT²x10⁻³ PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	42	RVM Section			.2	54.5	111.5	111.5		
5			Silo							
6			Aero							
7	43	RVC Section			.4	65.4	110.5	113.5		
8			Silo							
9			Aero							
10	44	3rd Stage Engine			.2	80.9	109.5	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		Jettisoned Portion	Silo							
19			Aero							
20			Base							
21			Jett	.2		53.6	110.8	116.7		
22	46	Interstage 2-3 (Aft)			.2	85.0	103.6	121.8		
23			Silo							
24			Aero							
25	47	2nd Stage Engine				-	-	-		
26			Silo							
27			Aero							
28			Base							
29	48	Interstage 1-2 (Fwd)			2	-	-	-		
30			Silo							
31			Aero							
32			Base							
33		Jettisoned Portion	Silo							
34			Aero							
35			Base							
36			Jett							
37	49	Interstage 1-2 (Aft)			.5	94.7	102.2	113.4		
38			Silo							
39			Aero							
40	50	1st Stage Engine			.8	161.3	116.2	128.2		
41			Silo							
42			Aero							
43			Base							
44	60	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)

SERIAL NUMBER: 0000039

CHECK LIST NO. 19.3 MISSILE WEIGHING CHECK LIST

DATE

MODEL 39 THRU 49 FINAL ASSEMBLY DRAWING NO. _____

SECTION _____ MISSILE NO. _____

MISSILE COMPONENT _____ COMPONENT PART NO. _____

RECORD OF CHECKING (DATE)								
Mo								
Day								
Yr								

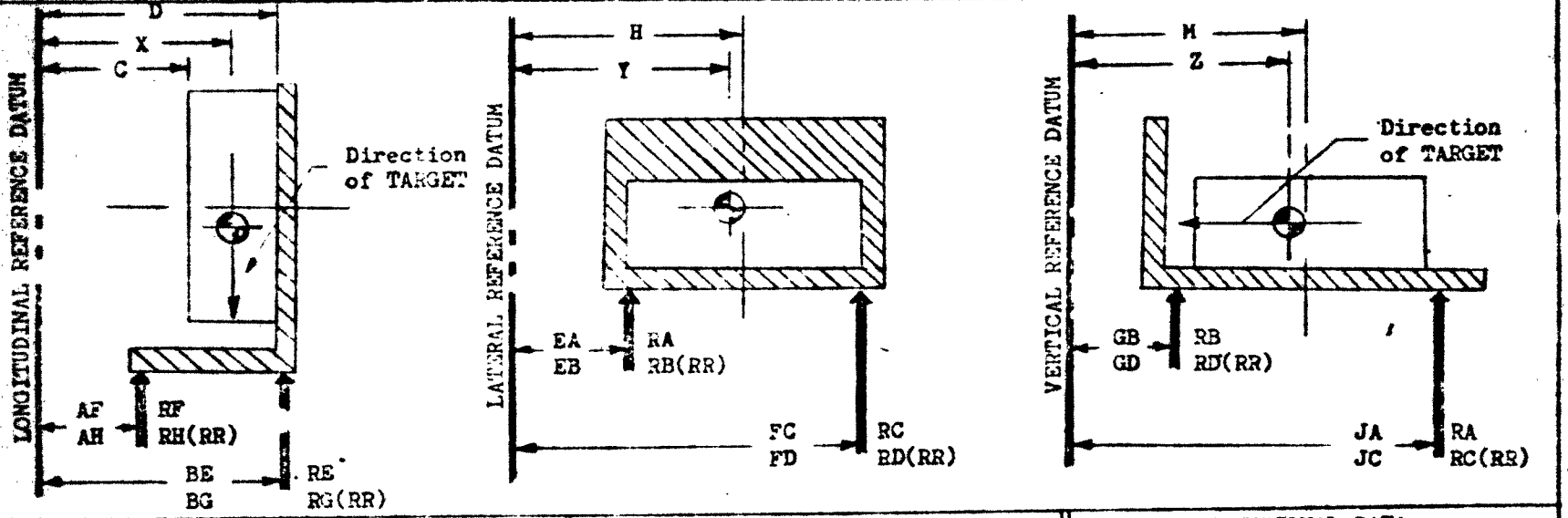
ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT:	COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: LAUNCH

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

REVISED NO. 28-1-63-1
MAR 1961
8-0000-21 REV. SHT. 1

19.4.1 ACTUAL WEIGHT RECORD - CTLI SECTION

U/O MISSILE 0000039	DRAWING NO. 25-25402-36	CHECK LIST NO. 39	REPORT NO.
MISSILE MODEL WS-133A	DCN •	REPORTED BY	PAGE NO.
CONFIGURATION	ADCN	CHECKED BY	DATE



WEIGHING DATA

REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	GR. WT.	TARE	CORR.	NET WT.
RF	45.30	32.70		12.60	RC	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	RB	91.80	54.85		36.95
TOTAL	316.20	176.55		139.65	TOTAL	316.25	176.60		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	12.60	42.007	
RH	45.10	42.023	
RE	60.85	62.996	
RG	21.10	62.999	
AS WGD	139.65	54.32	7,587.1

LATERAL C.G.

REACTION	NET WT.	ARM	MOMENT
RA	37.10	84.510	
RB	36.95	84.505	
RC	44.20	115.490	
RD	21.40	115.495	
AS WGD	139.65	99.06	13,834.0

VERTICAL C.G.

REACTION	NET WT.	ARM	MOMENT
RB	36.95	77.478	
RD	21.40	77.481	
RA	37.10	115.500	
RC	44.20	115.500	
AS WGD	139.65	99.61	13,911.1

(RR) = Rear Reaction

SERIAL NO. : 0000039

CHECK LIST NO. 39

DATE

19.4.2 MISSILE [illegible] CHECK LIST

MODEL [illegible] FINAL ASSEMBLY DRAWING NO. [illegible]

RECORD OF CHANGES (DAY)

Mo	11					
D/M	14					
Yr	63					

SECTION [illegible] MISSILE [illegible]

MISSILE CONFIGURATION [illegible] CONFIGURATION PART NO. [illegible]

ITEM NUMBER	DESCRIPTION	PART NO.	MFG. CO.	X AXIS	Y AXIS	Z AXIS	CONCURRENT					MISSILES	
32	Instrument Wiring Group [illegible]	[illegible]						-					
32a	Cable Installation Set	[illegible]						-					
	Structural Support	[illegible]						x					
	Telemetry Equipment	[illegible]						x					
	Instrumentation & Radar Beacon	[illegible]						x					
	Airborne Electronics	[illegible]						x					
	Power-Ignition Cable	[illegible]						x					
32b	Cable & Conduit Assembly	[illegible]											
	[illegible]	[illegible]						x					
	[illegible]	[illegible]						x					
	Cable Assembly	[illegible]											
	Cable	[illegible]						x					
	Cable	[illegible]						o					
	Cable	[illegible]						o					

REV. SYM. T

12-0-0330-2

GENERAL ELECTRIC NO D2-13043-1

PAGE 189

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.	WS-133	DRAWING NO.	25-25402-36	PREPARED	
SERIAL NO.	0000039	U.C. MISSILE		APPROVED	

LINE	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	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
3									
4									
5		ADD:							
6	AN31278-315	Cable-Autonetics	3.91	74.2		115.5		102.8	
7	AN31279-315	Cable-Autonetics	2.08	50.4		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									
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
BOEING
NO. D2-125351

19.5 ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION APPLICABLE TO CTLI SECTION S/N 000039 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 A/T	2&3	Negl.	Yes
415	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-1[illegible]-BO-)	ECP TITLE	STAGE	WEIGHT CHANGE	WEIGHT CHANGE INCORPORATED IN THIS REPORT
620	Installation of Static Dissipaters 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-MPD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/AODC" 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, BMS 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	STA.	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			- 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			19.5	65.1	111.7	120.2	0	.001
23		(Aft)	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			- 1.5	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	- 1.5		55.4	112.1	120.5		
37	47	Interstage 1-2			26.0	74.1	114.7	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			282.4					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

20.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)

REPORT NO. _____

DATE _____

LINE	STA.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY LONG.*	CENTER OF GRAVITY LAT.	CENTER OF GRAVITY VERT.	INERTIA SLUG FT²x10⁻³ ROLL	INERTIA SLUG FT²x10⁻³ 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			- 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			19.26	64.9	111.8	120.4	0	.001
23		(Aft)	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			- 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			25.47	73.7	115.0	125.6	0	.002
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			29.83	111.5	117.7	130.2	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)

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

REPORT NO. _____

DATE _____

LINE	STA	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY LONG.*	CENTER OF GRAVITY LAT.	CENTER OF GRAVITY VERT.	INERTIA SLUG FT^{2}x10-3 ROLL	INERTIA SLUG FT^{2}x10-3 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)

SERIAL NUMBER: 0000102

CHECK LIST NO.	20.3 MISSILE WEIGHING CHECK LIST	RECORD OF CHECKING (DATE)							
		Mo							
DATE	MODEL 39 THRU 49 FINAL ASSEMBLY DRAWING NO.	Day							
		Yr							
		COMPONENT						MISSILE	

SECTION _____ MISSILE NO. _____

MISSILE COMPONENT _____ COMPONENT PART NO. _____

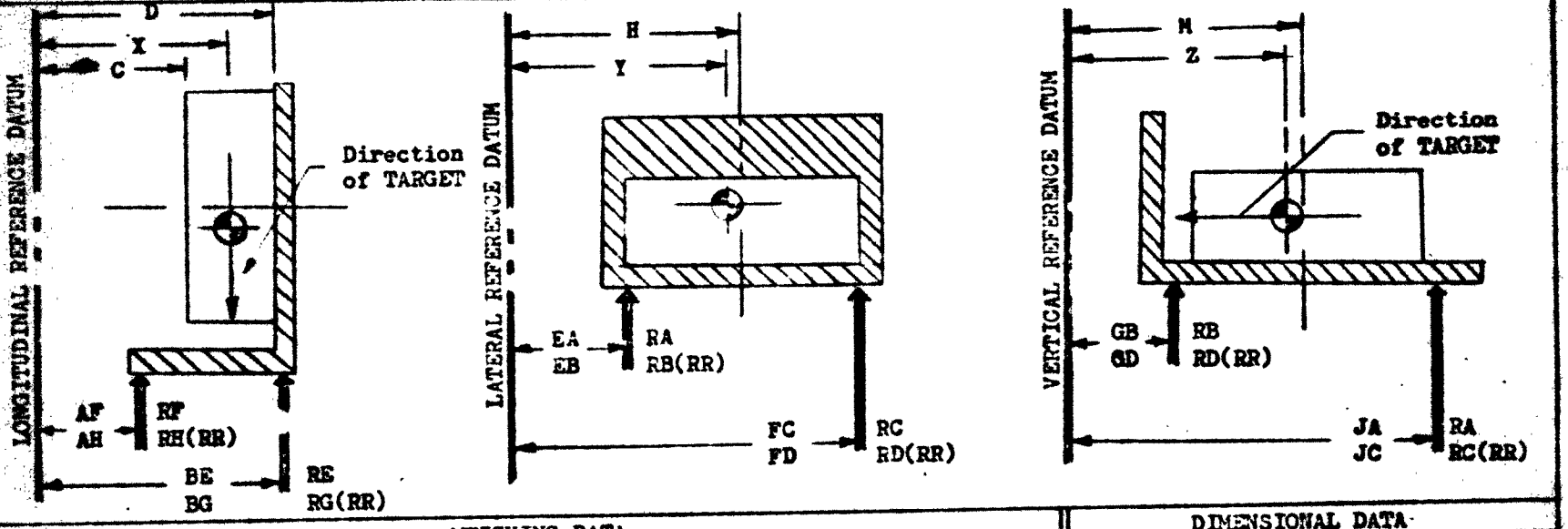
ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	BASIC WEIGHT	AS WEIGHED		REMOTE SITE SHIPMENT	AS RECEIVED REMOTE SITE	AS WEIGHED REMOTE SITE	LAUNCH

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

20.4.1

ACTUAL WEIGHT RECORD - CTLI SECTION

U/O MISSILE 0000102	DRAWING NO. 25-25402-36	CHECK LIST NO. 39	REPORT NO.
MISSILE MODEL MB-133A	DCN J	REPORTED BY CB/RR	PAGE NO.
CONFIGURATION	ADCN	CHECKED BY EH	DATE 11/21/63



WEIGHING DATA

REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	GR. WT.	TARE	CORR.	NET WT.
RF	60.65	30.65		30.00	RC	74.40	34.00		40.40
RH	49.00	21.85		27.15	RD	79.75	54.75		25.00
RE	100.20	56.65		43.55	RA	75.45	34.60		40.85
RG	106.05	67.40		38.65	RB	86.30	53.20		33.10
TOTAL	315.90	176.55		139.35	TOTAL	315.90	176.55		139.35

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	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	84.505	
RC	40.40	115.490	
RD	25.00	115.495	
AS WGD	139.35	99.05	13,802.5

VERTICAL C.G.

REACTION	NET WT.	ARM	MOMENT
RB	33.10	77.478	
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

2-5550-0-53 RE
REV. DCN 1
WEIGHING NO. RR-133A-1
Page 197

S/N [illegible] 0000102

CHECK LIST NO. 80	20.4.2 MISSILE WEIGHING CHECK LIST	RECORD OF CHECKING (DATE)
DATE	MODEL [illegible] FINAL ASSEMBLY DRAWING NO. [illegible]-36	Mo 11
		Day 21
		Yr 63

SECTION 30 MISSILE NO. ____

MISSILE COMPONENT C2LT COMPUTER PART NO. Note1

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT					MISSILE	
32	Instrument Section Group-Guidance [illegible]	[illegible]					-	-					
32a	C2LT Structure Assy.	[illegible]					-	-					
	Support Structure	[illegible]					X	X					
	Inertial Stabilized Platform	[illegible]					X	X					
	Insulation & Enclosure Packing	25-2, 25-3					X	X					
	Antenna & Cables	[illegible]					Y	X					
	Photo-Theodolite Window	[illegible]						X					
32b	Cable & Equipment Installation	[illegible]					-						
	Battery Sealb	[illegible]					X	X					
	Battery Sealb	[illegible]					X	X					
	Cable Set SE-25	[illegible]					-	-					
	Cable	[illegible]						X					
	Cable	[illegible]						O					
	Cable	[illegible]						O					

2-5550-0-21
REV. NO. 4

CODING NO. RE-LSM3-LV
PAGE 108

20.4.3

WEIGHT AND BALANCE CHANGE RECORD

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/RE
SERIAL NO.	0000102	U.O. MISSILE		APPROVED	GO

LINE	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	25-25402-36	Instr. Group Trainer (As Weighed)	139.35	54.39	7,579.5	99.05	13,802.5	99.65	13,885.9
3									
4									
5		ADD:							
6	AN3719A-315	Cable-Autonetics	3.22	74.2		115.5		102.8	
7	AN3719B-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									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									
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-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, 10-20685	3	Negl.	Yes
373	Work-Around for 10-20942-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions S-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.

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

(Continued)

ECP NO. (WS-1[illegible]A-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
RESHOT
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	PAGE NO.	REV SYM
	1	A										49	B				
	2	F	2.1	F	2.2	F						50	B				
	3	F										51	B				
	4	E	4.1	E	4.2	F	4.3	F				52	B				
	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	B				
	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				

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	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				

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	PAGE NO.	REV SYM
			193	F													
			194	F													
			19[illegible]	F													
			196	F													
			197	F													
			198	F													
			199	F													
			200	F	200.1	F											

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 D. Brenden
B	**Added Sections 5.0, 6.0 and 7.0 to the document.**	6-17-63	D. Brenden D. Brenden
C	**Added Sections 8.0 and 9.0 to the document.**	7-17-63	D. Brenden D. Brenden
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 D. Brenden
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 D. Brenden
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 D. Brenden

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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 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 in 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.
21-52900, 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, 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 _____

ITEM	STA.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY LONG.*	CENTER OF GRAVITY LAT.	CENTER OF GRAVITY VERT.	INERTIA SLUG FT2x10-3 ROLL	INERTIA SLUG FT2x10-3 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	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			283.1					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

15.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)

REPORT NO. _____

DATE _____

LINE	STA*	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	56.9	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			9.73	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)

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

REPORT NO. _____

DATE _____

ITEM NO.	STA. 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	54.5	111.5	111.5		
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	111.5		
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	73.6	110.8	116.7		
15		(Fwd)	Silo							
16			Aero							
17			Base							
18			Silo							
19		Jettisoned	Aero							
20		Portion	Base							
21			Jett	.2		73.6	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	119.2	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)

** Reference D2-13954-534

SERIAL NUMBER: 0000034

CHECK LIST NO.	15.3	MISSILE WEIGHING CHECK LIST	RECORD OF CHECKING (DATE)
DATE	MODEL 39 THRU 49	FINAL ASSEMBLY DRAWING NO.	Mo / Day / Yr

SECTION _____ MISSILE NO. _____

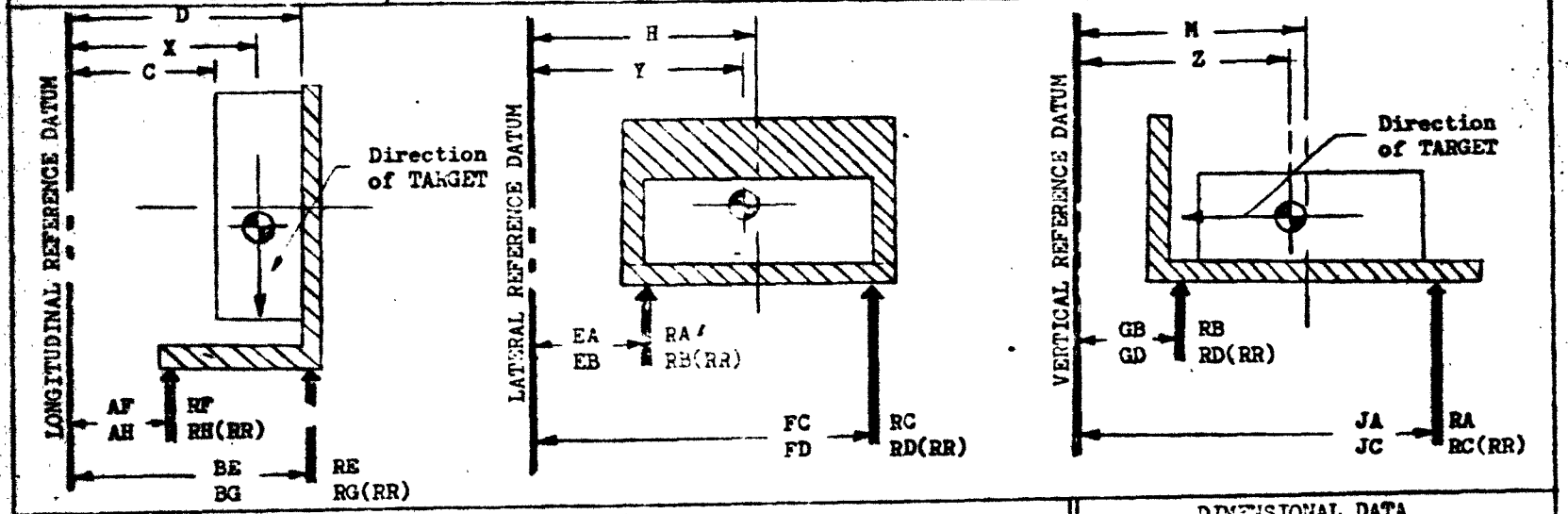
MISSILE COMPONENT _____ COMPONENT PART NO. _____

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: LAUNCH

SUMMARY CHECK LISTS FOR SECTIONS 39 THROUGH 49 ARE IDENTICAL TO THOSE FOUND ON PAGES 92 THROUGH 99.

15.4.1 ACTUAL WEIGHT RECORD - CTLI SECTION

U/O MISSILE 0000034	DRAWING NO. 25-25402-36	CHECK LIST NO. 39	REPORT NO. WTR-1112-034
MISSILE MODEL WS-133A	DCN J	REPORTED BY CRB/RH	PAGE NO.
CONFIGURATION	ADCN	CHECKED BY RW	DATE 10/31/63



WEIGHING 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	316.75	176.60		140.15	TOTAL	316.60	176.45		140.15

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	30.65	42.007	
RH	27.70	42.023	
RE	43.50	62.996	
RG	38.30	62.999	
AS WGD	140.15	54.26	7,604.7

LATERAL C.G.

REACTION	NET WT.	ARM	MOMENT
RA	49.10	84.510	
RB	25.40	84.505	
RC	32.50	115.490	
RD	33.15	115.495	
AS WGD	140.15	99.02	13,878.0

VERTICAL C.G.

REACTION	NET WT.	ARM	MOMENT
RB	25.40	77.478	
RD	33.15	77.481	
RA	49.10	115.500	
RC	32.50	115.500	
AS WGD	140.15	99.62	13,961.2

(RR) = Rear Reaction

2-5550-0-53 R1
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CHECK LIST NO. 32

DATE

15.4.2 MISSILE WEIGHING CHECK LIST

MODEL

FINAL ASSEMBLY DRAWING NO.

SECTION 32

MISSILE NO.

MISSILE COMPONENT

COMPONENT IDENTIFICATION NO.

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	CONFIGURATION			MISSILE
32	[illegible]	[illegible]-36								
32a	[illegible]	[illegible]								
	[illegible]	[illegible]						X		
	[illegible]	[illegible]						X		
	[illegible]	[illegible]						X		
	[illegible]	[illegible]						X		
	[illegible]	[illegible]						X		
32b	Cable & Harness Installation	[illegible]-36								
	[illegible]	[illegible]-2						A		
	[illegible]	[illegible]-4						X		
	[illegible]	[illegible]								
	Cable	[illegible]						X		
	Cable	[illegible]						J		
	Cable	[illegible]						Q		

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REV. SYM. F

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D2-138431-1

15.4.3

WEIGHT AND BALANCE CHANGE RECORD

ASSOCIATE CONTRACTOR	BOEING	CONTRACT NO.	AF04(647)-289	REPORT NO.	WTS-1112-034
COMPONENT	SECTION 39	LOT NO.		DATE	10/31/63
MODEL NO.	WS-133A	DRAWING NO.	25-25402-36	PREPARED	CRB-RH
SERIAL NO.	000034	U.O. MISSILE		APPROVED	BW

LINE	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	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	AN3194-315	Cable-Autonetics	3.25	74.2		115.5		102.8	
7	AN3196-315	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									
25									
26									
27									
28									
29									
30									
31									
32									

15.5 ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION APPLICABLE TO CTLI SECTION S/N [illegible]034 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
198-1	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, 10-20885	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.

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

(Continued)

ECP NO. (WS-13A-80-)	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 168 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 0162-01DR-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.
21-52900, 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, BMS 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.

17.2 WEIGHT & BALANCE SUMMARY
TOTAL CTLI KIT INSTALLATION
CTLI WAFER S/N 0000036

REPORT NO. _____

DATE _____

LINE	STA.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY LONG.*	CENTER OF GRAVITY LAT.	CENTER OF GRAVITY VERT.	INERTIA SLUG FT²x10⁻³ ROLL	INERTIA SLUG FT²x10⁻³ 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			- 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			19.5	65.1	111.7	120.2	0	.001
23		(Aft)	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			- 1.5	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	- 1.5		55.4	112.1	120.5		
37	47	Interstage 1-2			26.0	74.1	114.7	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			284.0					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

17.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)

REPORT NO. _____

DATE _____

		DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT²x10-3	
						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	46	Interstage 2-3 (Fwd)			- 1.90	57.7	110.3	117.8	0	0
15			Silo							
16			Aero							
17			Base							
18		Jettisoned Portion	Silo							
19			Aero							
20			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	40	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		Jettisoned Portion	Silo							
34			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)

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

REPORT NO. _____

DATE _____

LINE	STA	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY LONG.*	CENTER OF GRAVITY LAT.	CENTER OF GRAVITY VERT.	INERTIA SLUG FT²x10-3 ROLL	INERTIA SLUG FT²x10-3 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	85.9	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)

CHECK LIST NO. _____ 17.3.1 MISSILE WEIGHING CHECK LIST

DATE _____ MODEL _____ FINAL ASSEMBLY DRAWING NO. 21-52900-20 (Using 25-25406-9)

RECORD OF CHECKING (DATE)

	COMPONENT						MISSILE	
Mo								
Day								
Yr								

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 - 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	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

CHECK LIST NO. 17.3.2 MISSILE WEIGHING CHECK LIST

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

RECORD OF CHECKING (DATE)

Mo / Day / Yr

SECTION 42 MISSILE NO.

MISSILE COMPONENT GUIDANCE SECTION COMPONENT PART NO.

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: 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		*									
	The following items are deleted from the missile assembly in order to accommodate the CTLI 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 _____ FINAL ASSEMBLY DRAWING NO. 21-52900-20	Mo / Day / Yr

SECTION 44 MISSILE NO. _____

MISSILE COMPONENT 3rd STAGE MOTOR COMPONENT PART NO. _____

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: LAUNCH
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	35970-4	4.03	58.1	99.8	114.0						
	The following items are deleted from the missile assembly in order to accommodate the CTLI 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

DATE

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

RECORD OF CHECKING (DATE)

Mo																		
Day																		
Yr																		

SECTION 45 MISSILE NO. _____

MISSILE COMPONENT 2-3 INTERSTAGE COMPONENT PART NO. _____

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: LAUNCH
5a	Cable Assy. Set - Electrical	25-26878-5	4.36	64.9	112.0	119.9						
5b	Conduit Supt. Set - Raceway	25-29239-23	15.75	66.9	111.7	120.0						
5c	Instl. Kit - 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 CTLI Installation											
5e	Standards Instl.	25-30133-9	.07	78.6	109.6	119.5						
5f	Raceway 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

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

SECTION 46 MISSILE NO. _____

MISSILE COMPONENT 2nd STAGE MOTOR COMPONENT PART NO. _____

RECORD OF CHECKING (DATE)													
Mo													
Day													
Yr													
	COMPONENT										MISSILE		
	BASIC WEIGHT	AS WEIGHED		REMOTE SITE SHIPMENT	AS RECEIVED REMOTE SITE						AS WEIGHED REMOTE SITE	LAUNCH	

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM
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		*			
	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 CTLI Installation					
6h	Raceway 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 _____ FINAL ASSEMBLY DRAWING NO. 21-52900-20	Mo / Day / Yr

SECTION 47 MISSILE NO. _____

MISSILE COMPONENT 1-2 INTERSTAGE COMPONENT PART NO. _____

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: LAUNCH
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	BMS 5-62 Installed at VAFB		*									
	The following items are deleted from the missile assembled in order to accommodate the GTLI 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	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	* RECORD OF CHECKING (DATE) Mo / Day / Yr
DATE	MODEL _____ FINAL ASSEMBLY DRAWING NO. 21-52900-20	

SECTION 48 MISSILE NO. _____

MISSILE COMPONENT 1st STAGE MOTOR COMPONENT PART NO. _____

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: LAUNCH
8a	Cable Assy. Set - Electrical	25-26878-5	13.12	156.4	118.2	130.5						
8b	Conduit Asmt. 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 - 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	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 CTLI Installation											
8h	Raceway Instl.	25-23214-5	8.07	82.8	117.2	129.8						
8i	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

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CHECK LIST NO.	17.3.8 MISSILE WEIGHING CHECK LIST	RECORD OF CHECKING (DATE)
DATE	MODEL _____ FINAL ASSEMBLY DRAWING NO. 21-52900-20	Mo / Day / Yr

SECTION 49 MISSILE NO. _____

MISSILE COMPONENT AFT SKIRT COMPONENT PART NO. _____

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: LAUNCH
9a	Cable Assy. Set - Electrical	25-26878-5	6.63	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 CTLI Installations											
9d	Standards Instl.	25-30133-9	.28	57.0	116.4	128.4						
9e	BMS 5-62 Removed at VAFB											

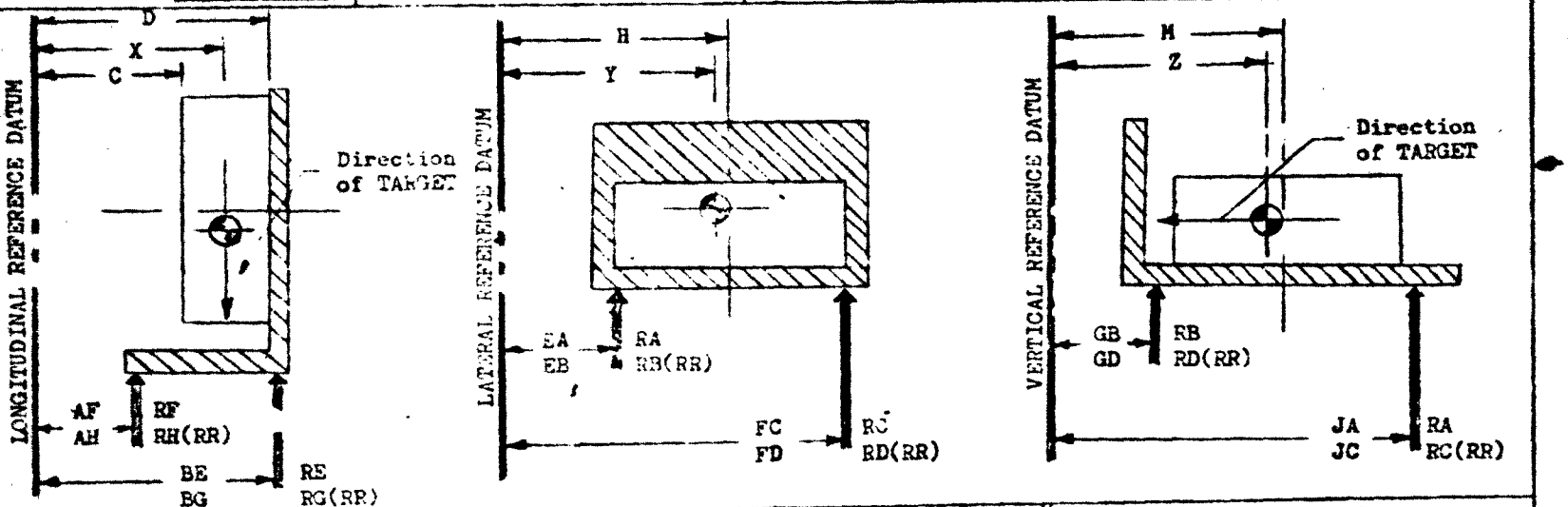
* See page 12 for a summary of the net weight and balance change of BMS 5-62 at VAFB

BOEING NO 21-52900-1 PAGE 169

17.4.1

ACTUAL WEIGHT RECORD - CTLI SECTION

U/O MISSILE 0000036	DRAWING NO. 25-25402-36	CHECK LIST NO. 39	REPORT NO. WTS-1110-036
MISSILE MODEL WS-133A	DCN J	REPORTED BY CB/RH	PAGE NO.
CONFIGURATION	ADCN	CHECKED BY RW	DATE 10-24-63



WEIGHING DATA

REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	GR. WT.	TARE	CORR.	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	RA	54.95	33.30		21.65
RG	82.85	52.60		30.25	RB	107.00	54.55		52.45
TOTAL	316.05	176.45		139.60	TOTAL	316.10	176.50		139.60

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	22.20	42.007	
RH	35.55	42.023	
RE	51.60	62.996	
RG	30.25	62.999	
AS WGD	139.60	54.32	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 WGD	139.60	99.04	13,826.6

VERTICAL C.G.

REACTION	NET WT.	ARM	MOMENT
RB	52.45	77.478	
RD	5.75	77.481	
RA	21.65	115.500	
RC	59.75	115.500	
AS WGD	139.60	99.65	13,910.9

(RR) = Rear Reaction

REV. SYM. T

2-55500-55 E1

BOEING

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NO. BE-1343-1

SERIAL 0000036

CHECK LIST NO. 32

DATE

17.4.2 MISSILE WEIGHTS CHECK LIST

BOOSTER [illegible]

FINAL ASSEMBLY DRAWING NO. 25-25402-36

PERIOD OF CONTROL (DATE)

	COMPONENT	MISSILE
Mo	10	
Day	24	
Yr	63	

STATION [illegible]

MISSILE NO.

MISSILE CONFIGURATION [illegible]

COMPONENT PART NO. [illegible]

SECTION NEXT	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	Component			Missile	
29	[illegible]	25-25402-36									
30	[illegible]	-11									
	[illegible]						x				
	[illegible]						x				
	[illegible]						x				
	[illegible]						x				
	[illegible]						x				
39	[illegible]										
	[illegible]	-2					x	x			
	[illegible]	-4					x	x			
	[illegible] A										
	[illegible]	1277						x			
	[illegible]	1278						o			
	[illegible]	1279						o			

2-6550-0-21

REV. SYM. T

BOEING | NO D2-13954-1

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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.	WS-133A	DRAWING NO.	25-25402-36	PREPARED	CB/RH
SERIAL NO.	0000036	U.O. MISSILE		APPROVED	GO

LINE	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	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
3									
4									
5		ADD:							
6	AN31278-315	Cable-Autonetics	3.81	74.2		111.5		102.8	
7	AN31279-315	Cable-Autonetics	2.11	50.4		106.9		111.8	
8									
9									
10	25-25402-36	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									
18									
19									
20									
21									
22									
23									
24									
25									
26									
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28									
29									
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, 10-20885	3	Negl.	Yes
373	Work-Around for 10-2088[illegible]2-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Aft	2&3	Negl.	Yes
415	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**
559	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 CTLI SECTION S/N 0000036 AND INSTALLATION KIT

(Continued)

ECP NO. (WS-1[illegible]A-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 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	STA	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY LONG.*	CENTER OF GRAVITY LAT.	CENTER OF GRAVITY VERT.	INERTIA SLUG FT² x10-3 ROLL	INERTIA SLUG FT² x10-3 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	C&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			- 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			19.5	65.1	111.7	120.2	0	.001
23		(Aft)	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			- 1.9	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	- 1.5		55.4	112.1	120.5		
37	47	Interstage 1-2			26.0	74.1	114.7	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			282.5					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

18.2 WEIGHT & BALANCE SUMMARY CTLI
(AVERAGE WEIGHT COMPONENTS)

REPORT NO. _____

DATE _____

LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY LONG.*	CENTER OF GRAVITY LAT.	CENTER OF GRAVITY VERT.	INERTIA SLUG FT²x10-3 ROLL	INERTIA SLUG FT²x10-3 PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	39	CTLI Section			4.39	55.9	102.5	110.6	0	0
5			Silo							
6			Aero							
7	43	G&C Section			6.94	62.5	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			- 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			19.26	64.9	111.3	120.4	0	.001
23		(Aft)	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			- 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			25.47	73.7	115.0	125.6	0	.002
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			29.83	111.5	117.7	130.2	0	.025
41			Silo							
42			Aero							
43			Base							
44	49	Skirt			9.73	23.9	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)

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

REPORT NO. _____

DATE _____

STA	ITEM	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY LONG.*	CENTER OF GRAVITY LAT.	CENTER OF GRAVITY VERT.	INERTIA SLUG FT^{2}x10-3 ROLL	INERTIA SLUG FT^{2}x10-3 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			.3	85.9	102.4	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	161.4	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)

SERIAL NUMBER 0000037

CHECK LIST NO.	18.3 MISSILE WEIGHING CHECK LIST	RECORD OF CHECKING (DATE)								
		Mo								
DATE	MODEL 39 thru 49 FINAL ASSEMBLY DRAWING NO.	Day								
		Yr								

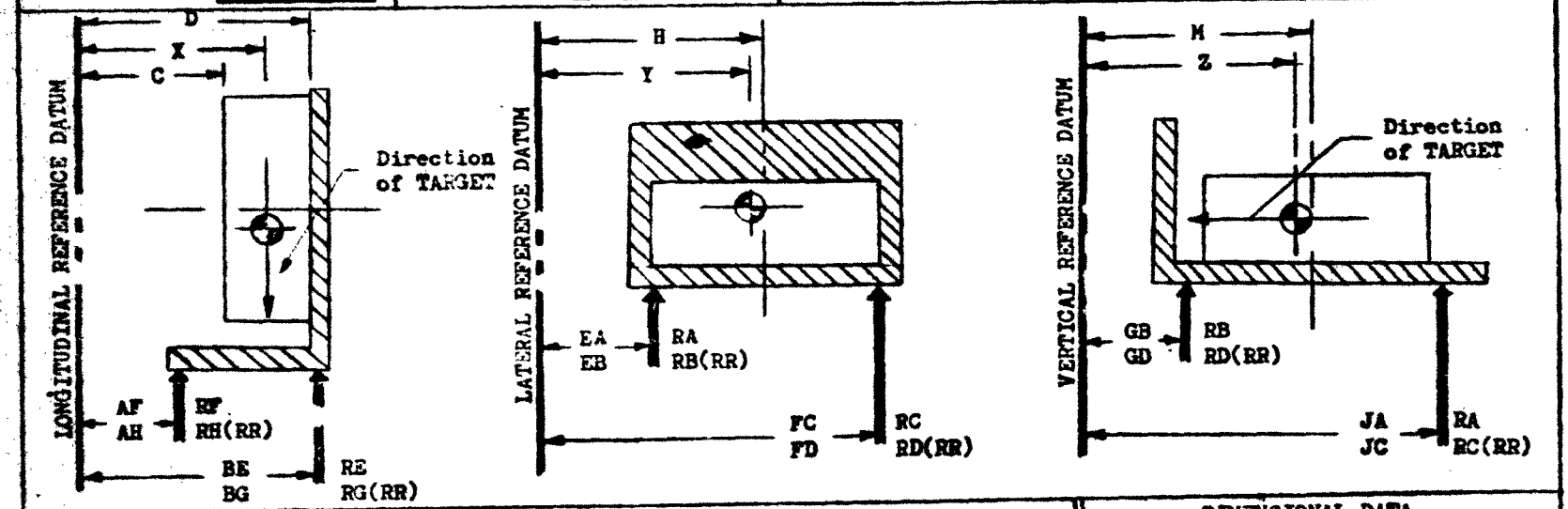
SECTION _____ MISSILE NO. _____

MISSILE COMPONENT _____ COMPONENT PART NO. _____

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT:	COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: LAUNCH
	SUMMARY CHECK LISTS FOR SECTIONS 39 THROUGH 49 ARE IDENTICAL TO												
	THOSE FOUND ON PAGES 162 through 169.												

18.4.1 ACTUAL WEIGHT RECORD - CTLI SECTION

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



WEIGHING DATA

REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	GR. WT.	TARE	CORR.	NET WT.
RF	46.75	15.75		31.05	RC	77.30	38.65		38.65
RH	63.20	36.75		26.45	RD	77.00	50.10		26.90
RE	114.20	71.70		42.50	RA	72.50	29.95		42.55
RG	91.95	52.50		39.45	RB	89.15	57.80		31.35
TOTAL	316.10	176.65		139.45	TOTAL	315.95	176.50		139.45

DIMENSIONAL DATA

DIM.	INCHES	DIM.	INCHES	DIM.	INCHES
AF	42.007	EA	84.510	GB	77.428
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	31.05	42.007	
RH	26.45	42.023	
RE	42.50	62.996	
RG	39.45	62.999	
AS WGD	139.45	54.35	7,578.5

LATERAL C.G.

REACTION	NET WT.	ARM	MOMENT
RA	42.55	84.510	
RB	31.35	84.505	
RC	38.65	115.490	
RD	26.90	115.495	
AS WGD	139.45	99.07	13,815.6

VERTICAL C.G.

REACTION	NET WT.	ARM	MOMENT
RB	31.35	77.478	
RD	26.90	77.481	
RA	42.55	115.500	
RC	38.65	115.500	
AS WGD	139.45	99.62	13,891.8

(RR) = Rear Reaction

REV. SYM. J

2-55530-53 R1

BOEING NO. D2-13943-1 PAGE 179

RECORD LIST #: 0000037

CHECK LIST NO. 32

DATE

18.4.2 MISSILE WEIGHING CHECK LIST

MODEL

FINAL ASSEMBLY NO.

RECORD OF CHECK (CONT.)

Mo		11					
Dy		1					
Yr		63					
		COMPONENT				MISSILE	

SECTION 32

MISSILE NO.

MISSILE COMPONENT CELL

COMPONENT PART NO.

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM						
30	[illegible]	25402-36										
30A	[illegible]	-11					x	x				
	[illegible]							x				
	[illegible]							x				
	[illegible]							x				
	[illegible]							x				
30b	Cable & Seal [illegible]	[illegible] 16										
	[illegible]	[illegible] 4						x				
	[illegible]							x				
	Cable							x				
	Cable							o				
	Cable							o				

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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.		DATE	11-1-63
MODEL NO.	WS-133A	DRAWING NO.	25-25402-36	PREPARED	CB / RH
SERIAL NO.	000037	U.O. MISSILE		APPROVED	GO

LINE	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	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									

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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-133A-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 Beam 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, 10-23883	3	Negl.	Yes
373	Work-Around for 10-2[illegible]-2-1 CTLI Airframe Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-5 Interstage Aft	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.

18.5 ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION APPLICABLE TO CTLI 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 0168-01DR-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.
21-52900, 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, BMS 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	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY LONG.*	CENTER OF GRAVITY LAT.	CENTER OF GRAVITY VERT.	INERTIA SLUG FT²x10-3 ROLL	INERTIA SLUG FT²x10-3 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		Jettisoned Portion	Silo							
19			Aero							
20			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		Jettisoned Portion	Silo							
34			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							

* Boeing Section Stations (See Missile Station Diagram)

19.2 WEIGHT & BALANCE SUMMARY (STH)
(AVERAGE WEIGHT COMPONENTS)

REPORT NO. _____
DATE _____

		DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY LONG.*	LAT.	VERT.	SLOSH ROLL	SLOSH PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	42	[illegible] Section			4.22	95.2	107.5	119.6	0	0
5			Silo							
6			Aero							
7	42	R/S Section			6.94	87.3	112.	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	46	Interstage 2-3 (Jett)			- 1.90	57.7	110.3	117.8	0	0
15			Silo							
16			Aero							
17			Base							
18		Jettisoned Portion	Silo							
19			Aero							
20			Base							
21			Jett	- 1.90		57.7	110.3	117.8		
22	45	Interstage 2-3 (Aft)			19.26	64.9	111.5	120.4	0	.001
23			Silo							
24			Aero							
25	43	2nd Stage Engine			25.77	102.1	112.3	121.4	0	.002
26			Silo							
27			Aero							
28			Base							
29	47	Interstage 1-2 (Jett)			- 1.45	55.4	112.1	120.2	0	0
30			Silo							
31			Aero							
32			Base							
33		Jettisoned Portion	Silo							
34			Aero							
35			Base							
36			Jett	- 1.45		55.4	112.1	120.2		
37	48	Interstage 1-2 (Aft)			25.47	73.7	115.3	125.6	0	.002
38			Silo							
39			Aero							
40	49	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)

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

REPORT NO. _____

DATE _____

		DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY LONG.*	CENTER OF GRAVITY LAT.	CENTER OF GRAVITY VERT.	INERTIA SLUG FT²x10⁻³ ROLL	INERTIA SLUG FT²x10⁻³ PITCH
1	41	RV Spacer								
2			Silo							
3			Aero							
4	3[illegible]	[illegible] Section			.2	54.5	111.5	111.5		
5			Silo							
6			Aero							
7	4[illegible]	[illegible] Section			.4	65.4	110.5	113.5		
8			Silo							
9			Aero							
10	[illegible]	3rd Stage Engine			.2	80.9	109.5	116.2		
11			Silo							
12			Aero							
13			Base							
14	5[illegible]	Interstage 2-3 (Forward)			.2	53.6	110.8	116.7		
15			Silo							
16			Aero							
17			Base							
18		Jettisoned Portion	Silo							
19			Aero							
20			Base							
21			Jett	.2		53.6	110.8	116.7		
22	45	Interstage 2-3 (Aft)			.2	85.0	103.6	101.8		
23			Silo							
24			Aero							
25	[illegible]	2nd Stage Engine				-	-	-		
26			Silo							
27			Aero							
28			Base							
29	4[illegible]	Interstage 1-2 (Forward)			.2	-	-	-		
30			Silo							
31			Aero							
32			Base							
33		Jettisoned Portion	Silo							
34			Aero							
35			Base							
36			Jett							
37	[illegible]	Interstage 1-2 (Aft)			.5	94.7	102.[illegible]	103.[illegible]		
38			Silo							
39			Aero							
40	[illegible]	1st Stage Engine			.8	161.3	116.2	128.[illegible]		
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)

SERIAL NUMBER: 0000039

CHECK LIST NO.	19.3	MISSILE WEIGHING CHECK LIST	RECORD OF CHECKING (DATE) Mo / Day / Yr
DATE	MODEL 39 THRU 49	FINAL ASSEMBLY DRAWING NO.	

SECTION _____ MISSILE NO. _____

MISSILE COMPONENT _____ COMPONENT PART NO. _____

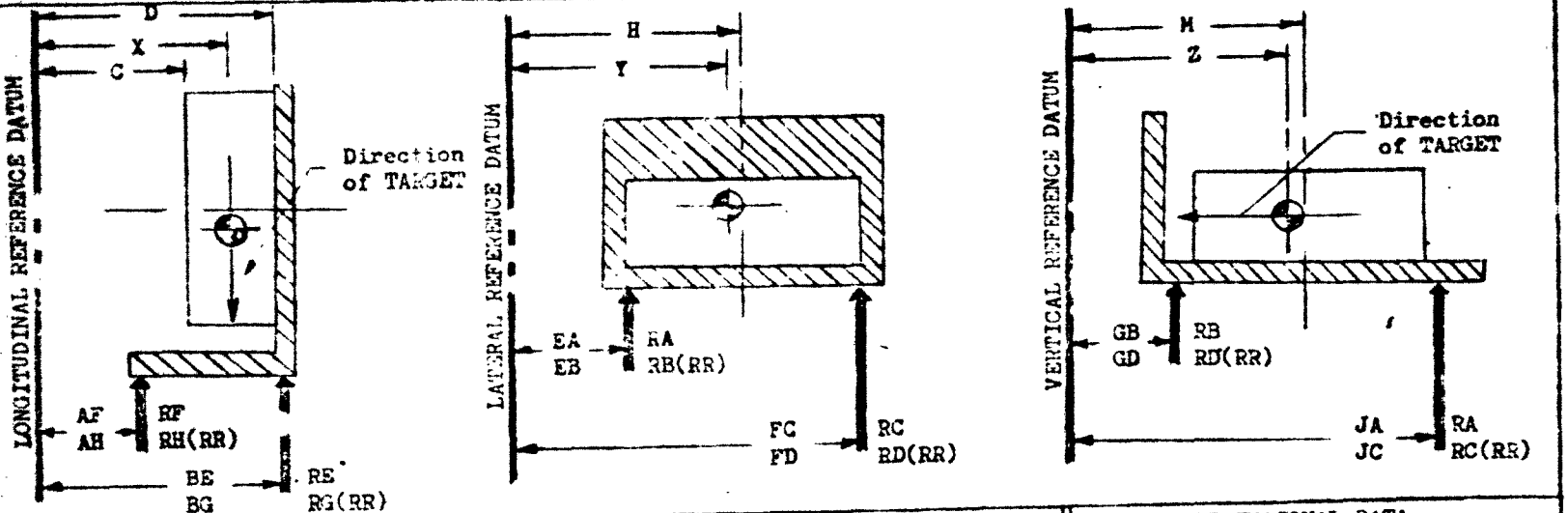
ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: LAUNCH

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

19.4.1

ACTUAL WEIGHT RECORD - GTLI SECTION

U/O MISSILE 0000039	DRAWING NO. 25-25402-36	CHECK LIST NO. 39	REPORT NO.
MISSILE MODEL WS-133A	DCN	REPORTED BY	PAGE NO.
CONFIGURATION	ADCN	CHECKED BY	DATE



WEIGHING DATA

REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	GR. WT.	TARE	CORR.	NET WT.
RF	45.30	32.70		12.60	RC	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	RB	91.80	54.85		36.95
TOTAL	316.20	176.55		139.65	TOTAL	316.25	176.60		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	12.60	42.007	
RH	45.10	42.023	
RE	60.85	62.996	
RG	21.10	62.999	
AS WGD	139.65	54.32	7,587.1

LATERAL C.G.

REACTION	NET WT.	ARM	MOMENT
EA	37.10	84.510	
EB	36.95	84.505	
FC	44.20	115.490	
FD	21.40	115.495	
AS WGD	139.65	99.06	13,834.0

VERTICAL C.G.

REACTION	NET WT.	ARM	MOMENT
RB	36.95	77.478	
RD	21.40	77.481	
RA	37.10	115.500	
RC	44.20	115.500	
AS WGD	139.65	99.61	13,911.1

(RR) = Rear Reaction

: 0000039

CHECK LIST NO. 39	19.4.2	MISSILE FINAL CHECK LIST	RECORD OF CHANGES (DA)
DATE	MODEL [illegible]	FINAL ASSY OF DRAWING NO. [illegible]	No 11
			Dash 14
			Ltr 63

REVISION LETTER	SECTION 3	MISSILE [illegible]	CONFIGURATION							MISSILE
	MISSILE CONFIGURATION [illegible]	CONFIGURATION PART NO. [illegible]								
	DESCRIPTION	CABLE NO.	[illegible]	X AXIS	Y AXIS	Z AXIS				
39	[illegible]	[illegible]								
39a	[illegible]	[illegible]								
	[illegible]	[illegible]					-	x		
	[illegible]	[illegible]					-	x		
	[illegible]	[illegible]					-	x		
	[illegible]	[illegible]					-	x		
	[illegible]	[illegible]					-	x		
39b	[illegible]	[illegible]					-			
	[illegible]	[illegible]					-	x		
	[illegible]	[illegible]					-	x		
	[illegible]	[illegible]					-			
	Cable	[illegible]					-	x		
	Cable	[illegible]					-	o		
	Cable	[illegible]					-	o		

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.	WS-133	DRAWING NO.	25-25402-36	PREPARED	
SERIAL NO.	0000039	U.C. MISSILE		APPROVED	

LINE	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	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
3									
4									
5		ADD:							
6	AN31278-315	Cable-Autonetics	3.91	74.2		115.5		102.8	
7	AN31279-315	Cable-Autonetics	2.08	50.4		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									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									
32									

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BOEING
NO 25-25402-1
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19.5 ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION APPLICABLE TO CTLI SECTION S/N 000003 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-B0-)	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, 10-21885	3	Negl.	Yes
373	Work-Around for 10-20042-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions 2-3 Interstage Kit	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.

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

(Continued)

ECP NO. (WS-1[illegible]-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-MPD-1, "Nominal Mass Properties and Dispersions for Minuteman CTLI/ADC" 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, BMS 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	STA.	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			- 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	46	Interstage 2-3			13.5	65.1	111.7	120.2	0	.001
23		(Aft)	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			- 1.5	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	- 1.5		55.4	112.1	120.5		
37	47	Interstage 1-2			26.0	74.1	114.7	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			282.4					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

20.2 WEIGHT & BALANCE SUMMARY CTLI (AVERAGE WEIGHT COMPONENTS)

REPORT NO. _____

DATE _____

LINE	STA.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY LONG. *	CENTER OF GRAVITY LAT.	CENTER OF GRAVITY VERT.	INERTIA SLUG FT^{2}x10-3 ROLL	INERTIA SLUG FT^{2}x10-3 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			- 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			19.26	64.9	111.8	120.4	0	.001
23		(Aft)	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			- 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			25.47	73.7	115.0	125.6	0	.002
38		(Aft)	Silo							
39			Aero							
40	48	1st Stage Engine			29.83	111.5	117.7	130.2	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)

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

REPORT NO. _____

DATE _____

LINE	STA	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY LONG.*	CENTER OF GRAVITY LAT.	CENTER OF GRAVITY VERT.	INERTIA SLUG FT2x10-3 ROLL	INERTIA SLUG FT2x10-3 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	40	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)

SERIAL NUMBER: 0000102

CHECK LIST NO. _____

DATE _____

20.3 MISSILE WEIGHING CHECK LIST

MODEL 39 THRU 49 FINAL ASSEMBLY DRAWING NO. _____

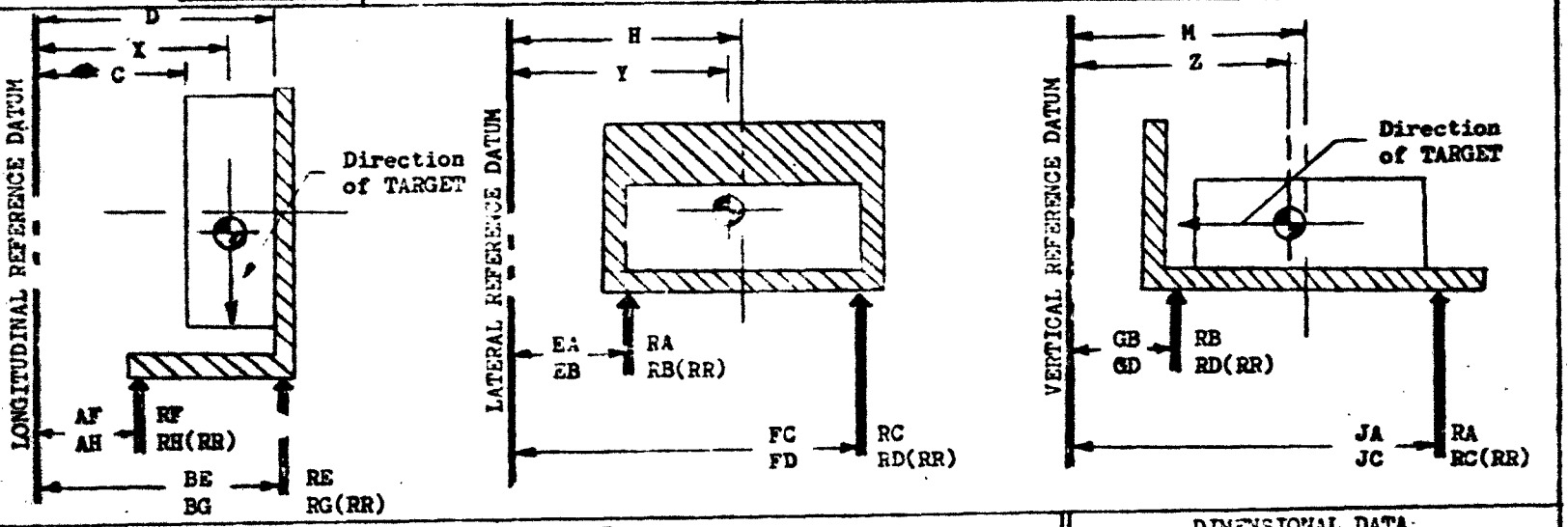
RECORD OF CHECKING (DATE)

| | | |

20.4.1

ACTUAL WEIGHT RECORD - CTLI SECTION

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



WEIGHING DATA

REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	GR. WT.	TARE	CORR.	NET WT.
RF	60.65	30.65		30.00	RC	74.40	34.00		40.40
RH	49.00	21.85		27.15	RD	79.75	54.75		25.00
RE	100.20	56.65		43.55	RA	75.45	34.60		40.85
RG	106.05	67.40		38.65	RB	86.30	53.20		33.10
TOTAL	315.90	176.55		139.35	TOTAL	315.90	176.55		139.35

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	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	84.505	
RC	40.40	115.490	
RD	25.00	115.495	
AS WGD	139.35	99.05	13,802.5

VERTICAL C.G.

REACTION	NET WT.	ARM	MOMENT
RB	33.10	77.478	
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

REV. STA. 1
2-55500-53 R1
REFERENCE NO. DRL 3043-1
PAGE 197

CHECK LIST NO. 20.4.2

DATE

MODEL

SECTION

MISSILE CONNECTOR

SECTION ITEM	DESCRIPTION
32	
33	
33a	
33b	

2-5500-0-21

REV. SYM. F

20.4.3

WEIGHT AND BALANCE CHANGE RECORD

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/RH
SERIAL NO.	0000102	U.O. MISSILE		APPROVED	GO

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	25-25402-36	Instr. Group Trainer (As Weighed)	139.35	54.39	7,579.5	99.05	13,802.5	99.65	13,885.9
3									
4									
5		ADD:							
6	AN3194-315	Cable-Autonetics	3.22	74.2		115.5		102.8	
7	AN3196-315	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									
17									
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29									
30									
31									
32									

2-5550-0-11 REV. FEB. 1

BOEING NO. D2-13241-1 PAGE 139

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-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-[illegible]	3	Negl.	Yes
373	Work-Around for 10-20[illegible]-2-1 CTLI Airborne Batteries	3	Negl.	Yes
398	Ordnance Support Revisions [illegible] 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.

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

(Continued)

ECP NO. (WS-1[illegible]-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

(14)

NUMBER D2-139431

(6)

TITLE CTLI FLIGHT ARTICLE MASS PROPERTIES REPORTS FOR WING I MRCN 6301 S/N 0000016 AND ON, (UR

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

MODEL NO. WS-133A CONTRACT NO. (15) AF04(694)-46

ISSUE NO. _____ ISSUED TO _____

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

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(16—19) NA

(20) 4

(21) NA.

(10)

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R. G. Grey (DATE)

REV SYM _____

VOL. NO. _____ OF _____
SECT. _____ PAGE 1

U3 4287 2035 ORIG. 8/62

2-9142-2

#77 Quota 25-877555

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	PAGE NO.	REV SYM
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SUMMARY

This report presents summary mass properties data for all CTLI 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 AF04(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 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.

1.3 WEIGHING PROCEDURES

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

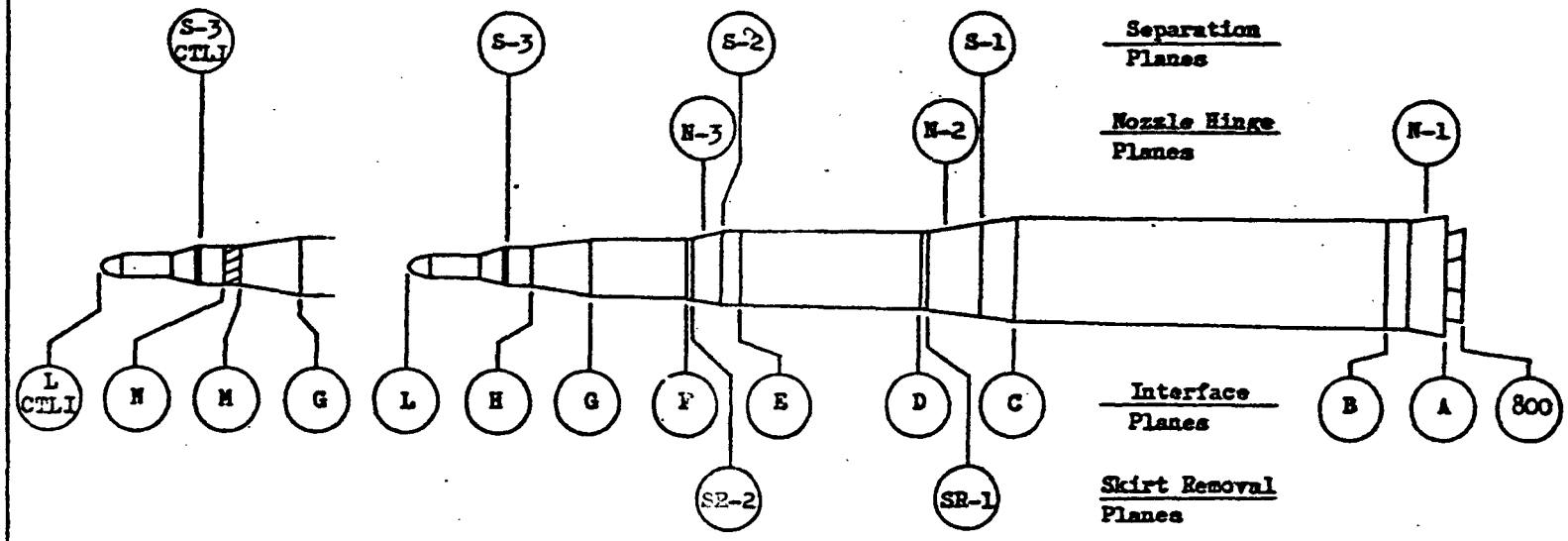
1.4 ENGINEERING CHANGE PROPOSAL (ECP) SUMMARY

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.

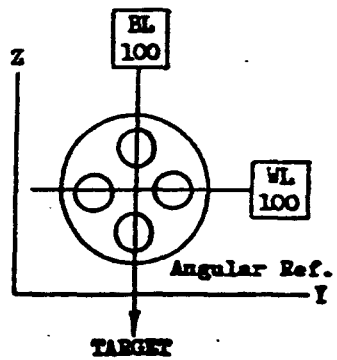
WING I
OPERATIONAL AND CTLI MISSILE STATION DIAGRAM



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

SEPARATION PLANES	MISSILE STA
S-1	504.420
S-2	346.030
S-3	219.135
S-3 CTLI	209.135
SKIRT REMOVAL PLANES	
SR-1	469.70
SR-2	322.51
NOZZLE HINGE PLANES	
N-1	778.788
N-2	480.853
N-3	330.090

INTERFACE PLANES	MISSILE STA
A	787.055
B ▷	750.995
C ▷	528.355
D ▷	469.273
E ▷	360.340
F ▷	321.990
G ▷	260.215
H ▷	228.715
L	155.715
M ▷	228.715
N ▷	218.715
L CTLI	145.715



Reference
25-19999
DCN-E

2.1 DISCUSSION

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 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 FT2x10-3	
						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)

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							

2.2 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	42	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

CHECK LIST NO. _____

DATE _____

2.3.1 MISSILE WEIGHING CHECK LIST

MODEL _____ 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	RECORD OF CHECKING (DATE) Mo / Day / Yr — COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: LAUNCH
3a	Body Sect. - Trainer Test [1]	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	BMS 5-62 Installed at VAFB		*									
	[1] 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						

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

D-6660-0-21

CHECK LIST NO. _____

DATE _____

2.3.2 MISSILE WEIGHING CHECK LIST

MODEL _____ FINAL ASSEMBLY DRAWING NO. 21-52900-4

RECORD OF CHECKING (DATE)

Mo																				
Day																				
Yr																				

SECTION 42 MISSILE NO. _____

MISSILE COMPONENT GUIDANCE SECTION COMPONENT PART NO. _____

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: LAUNCH
2a	Cable Assy. Set - Electrical	25-26878-5	1.98	65.8	110.5	117.2						
2b	Conduit Supt. Set - Raceway	25-29239-7	4.56	68.0	112.6	113.2						
2c	Instl. Kit-Trainer Test Group	25-31677-12	.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 CDLI Installations											
2e	Raceway Inst.	25-23214-5	.20	66.6	111.0	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

2-5550-0-21

CHECK LIST NO. _____

DATE _____

2.3.3 MISSILE WEIGHING CHECK LIST

MODEL _____ FINAL ASSEMBLY DRAWING NO. 21-52900-4

SECTION 44 MISSILE NO. _____

MISSILE COMPONENT 3rd STAGE MOTOR COMPONENT PART NO. _____

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	RECORD OF CHECKING (DATE) Mo / Day / Yr — COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: LAUNCH
4a	Cable Assy. Set - Electrical	25-26878-5	6.47	92.9	111.2	118.4						
4b	Conduit Supt. 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	RMS 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 CTLI 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	RMS 5-62 Removed at VAFB		*									

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

CHECK LIST NO. _____

DATE _____

2.3.4 MISSILE WEIGHING CHECK LIST

MODEL _____ FINAL ASSEMBLY DRAWING NO. 21-52900-4

SECTION 45 MISSILE NO. _____

MISSILE COMPONENT 2-3 INTERSTAGE COMPONENT PART NO. _____

RECORD OF CHECKING (DATE)								
Mo								
Day								
Yr								
	COMPONENT						MISSILE	
	BASIC WEIGHT	AS WEIGHED		REMOVE SITE SHIPMENT	AS RECEIVED REMOVE SITE		AS WEIGHED REMOTE SITE	LAUNCH

ITEM NUMBER	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 - 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 CTLI 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		*			

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

CHECK LIST NO. _____

DATE _____

2.3.5 MISSILE WEIGHING CHECK LIST

MODEL _____ FINAL ASSEMBLY DRAWING NO. 21-52900-4

SECTION 46 MISSILE NO. _____

MISSILE COMPONENT 2nd STAGE MOTOR COMPONENT PART NO. _____

RECORD OF CHECKING (DATE)								
Mo								
Day								
Yr								
	COMPONENT						MISSILE	

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
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	10-20942-3	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, ACDS	359764	4.19	74.8	111.8	120.4							
	The following items are deleted from the missile assembly in order to accommodate the CTLI 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. _____

DATE _____

2.3.6 MISSILE WEIGHING CHECK LIST

MODEL _____ FINAL ASSEMBLY DRAWING NO. 21-52900-4

SECTION 47 MISSILE NO. _____

MISSILE COMPONENT 1-2 INTERSTAGE COMPONENT PART NO. _____

RECORD OF CHECKING (DATE)													
Mo													
Day													
Yr													
	COMPONENT										MISSILE		
	BASIC WEIGHT	AS WEIGHED		REMOTE SITE SHIPMENT	AS RECEIVED REMOTE SITE						AS WEIGHED REMOTE SITE	LAUNCH	

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM
7a	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 CTLI 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		*			

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

CHECK LIST NO. _____ DATE _____

2.3.7 MISSILE WEIGHING CHECK LIST

MODEL _____ FINAL ASSEMBLY DRAWING NO. 21-52900-4

RECORD OF CHECKING (DATE)

Mo														
Day														
Yr														

SECTION 48 MISSILE NO. _____

MISSILE COMPONENT 1st STAGE MOTOR COMPONENT PART NO. _____

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: LAUNCH
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 CTLI Installation											
8h	Raceway Instl.	25-23214-5	8.08	82.9	117.2	129.8						
8i	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. _____

DATE _____

2.3.8 MISSILE WEIGHING CHECK LIST

MODEL _____ FINAL ASSEMBLY DRAWING NO. 21-52900-4

SECTION 49 MISSILE NO. _____

MISSILE COMPONENT AFT SKIRT COMPONENT PART NO. _____

RECORD OF CHECKING (DATE)								
Mo								
Day								
Yr								
	COMPONENT						MISSILE	

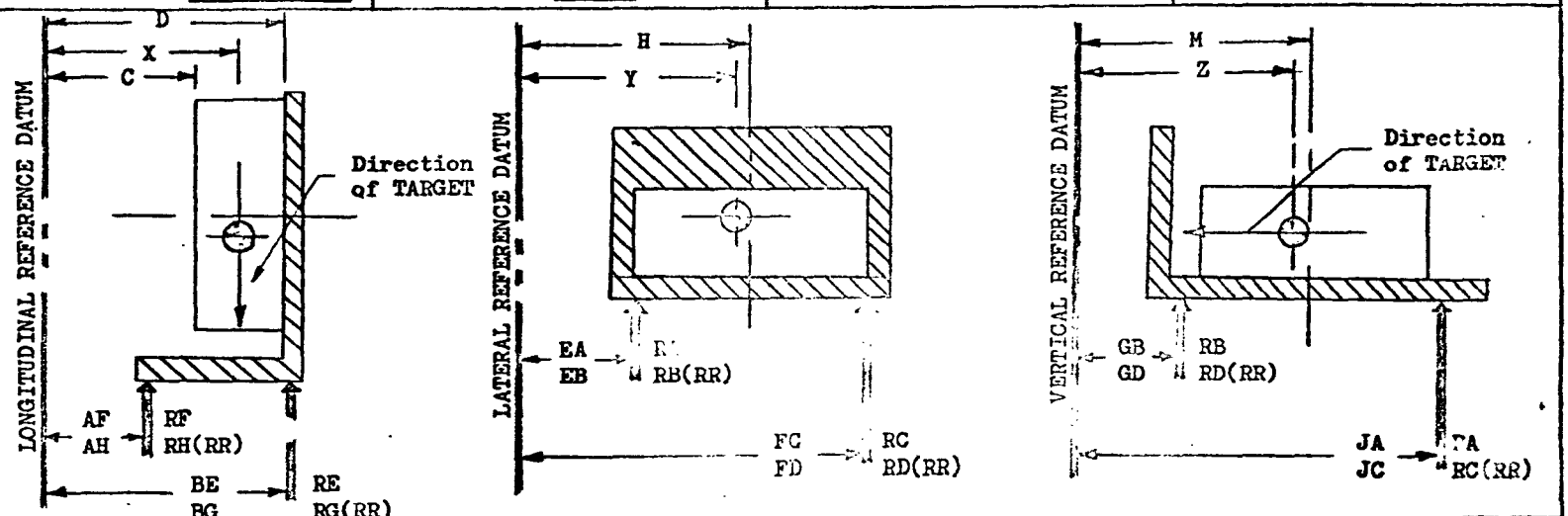
ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	BASIC WEIGHT	AS WEIGHED		REMOTE SITE SHIPMENT AS RECEIVED REMOTE SITE		AS WEIGHED REMOTE SITE	LAUNCH
9a	Cable Assy. Set - Electrical	25-26878-5	6.63	73.2	118.2	130.5							
9b	Instl. Kit - Trainer Test Group	25-31677-12	3.08	74.5	121.5	124.1							
	The following items are deleted from the missile assembly in order to accommodate the CTLI Installations												
9d	Standards Instl.	25-30133-1	.28	57.0	116.4	128.4							
9e	EMS 5-62 Removed at VAFB		*										

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

2-5550-0-53 R1

2.4.1 **ACTUAL WEIGHT RECORD - CTLI SECTION**

U/O MISSILE 0000016	DRAWING NO. 25-25402-17	CHECK LIST NO. 39	REPORT NO. Wts.-975-016
MISSILE MODEL WS-138A	DCN * F	REPORTED BY CB/WB	PAGE NO.
CONFIGURATION	ADCN 21	CHECKED BY GVR	DATE 3/11/63



WEIGHING DATA

REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	GR. WT.	TARE	CORR.	NET WT.
RF	32.65	5.1[illegible]		27.50	RC	[illegible]2.95	40.00		[illegible]2.95
RH	12.75	[illegible]2.00		30.75	RD	65.85	43.30		[illegible]2.55
RE	123.80	[illegible]6.90		46.90	RA	62.00	23.25		[illegible]8.75
RG	76.60	41.70		34.90	RB	94.95	59.15		[illegible]5.80
TOTAL	305.80	165.75		140.05	TOTAL	305.75	165.70		[illegible]0.05

DIMENSIONAL DATA

DIM.	INCHES	DIM.	INCHES	DIM.	INCHES
AF	[illegible]2.007	EA	84.510	GB	77.473
AH	42.023	EB	84.505	GD	77.481
BE	62.996	FC	115.492	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	27.50	42.007	
RH	30.75	42.023	
RE	46.90	62.996	
RG	34.90	62.999	
AS WGD	140.05	54.27	7,600.6

LATERAL C.G.

REACTION	NET WT.	ARM	MOMENT
RA	38.75	84.510	
RB	35.80	84.505	
RC	42.95	115.492	
RD	22.55	115.495	
AS WGD	140.05	99.00	13,864.7

VERTICAL C.G.

REACTION	NET WT.	ARM	MOMENT
RB	35.80	77.478	
RD	22.55	77.481	
RA	38.75	115.500	
RC	42.95	115.500	
AS WGD	140.05	99.66	13,957.3

ENGINEERING NO. D2-13943-1 PAGE 21

(RR) = Rear Reaction

SERIAL NUMBER: 0000016

CHECK LIST NO. 39

DATE

2.4.2 MISSILE WEIGHING CHECK LIST

MODEL WS-133A FINAL ASSEMBLY DRAWING NO. 25-25402-17

SECTION 39 MISSILE NO.

MISSILE COMPONENT CTLI COMPONENT PART NO. Noted

RECORD OF CHECKING (DATE)							
Mo		3					
Day		11					
Yr		63					
COMPONENT						MISSILE	

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
39	Instrumentation Group-Trainer Test	25-25402-17					-	-					
39a	CTLI 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	o					
	Cable	AN 31279-315					x	o					
39c	Kit Installation (ECP 525)	25-25402-21					x	x					

2-5550-0-21

BOEING NO. D2-13943-1

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2.4.2 **WEIGHT AND BALANCE CHANGE RECORD**

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

ENT	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	25-25402-17	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	31278-315	Cable Autonetics	3.85	74.2		115.5		102.8	
7	31279-315	Cable Autonetics	2.10	50.4		106.9		111.4	
8									
9									
10		DEDUCT:	0						
11									
12									
13									
14									
15	25-25402-17	Instr. Group-Trainer, Test (Comp.)	146.00	54.74	7,992.1	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 0000016 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	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, 10-20815	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 Resision	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.

AD 404314C

THE BOEING COMPANY

1560

CODE IDENT NO. 81205

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NUMBER D2-13943-1

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

MODEL NO. WS-133A CONTRACT NO. AF04(694)-46

ISSUE NO. 9 ISSUED TO ASTIA

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NOTE: the LIMITED category may be checked only because of actual or potential patent, proprietary, ethical, or similar implications.

PREPARED BY	Vincent Foster Vincent Foster	4-23-63
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CLASS & DISTR APPROVED BY	R. G. Grey R. G. Grey	4-23-63 (DATE)

REV SYM A

VOL. NO. OF
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	PAGE NO.	REV SYM	PAGE NO.	REV SYM
	1	A															
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			35	A													
			36	A													
			37	A													
			38	A													
			39	A													
			40	A													
			41	A													
			42	A													

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 D. Brenden

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3.0	CTLI SECTION, S/N 0000017	
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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		MISSILE			283.9					
49			Silo							
50			Aero							
51			Base							
52			Jett							

* Boeing Section Stations (See Missile Station Diagram)

CTLI SECTION, S/N 0000017

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 0000017). 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-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.

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)

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)

3.2 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 LONG.*	CENTER OF GRAVITY LAT.	CENTER OF GRAVITY VERT.	INERTIA SLUG FT2x10-3 ROLL	INERTIA SLUG FT2x10-3 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

* Boeing Section Stations (See Missile Station Diagram)

CHECK LIST NO. _____

DATE _____

3.3 MISSILE WEIGHING CHECK LIST

MODEL _____ FINAL ASSEMBLY DRAWING NO. _____

RECORD OF CHECKING (DATE)								
Mo								
Day								
Yr								

SECTION 39 THRU 49 MISSILE NO. _____

MISSILE COMPONENT _____ COMPONENT PART NO. _____

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT: [blank]	COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: LAUNCH
	SUMMARY CHECK LISTS FOR SECTIONS 39 THROUGH 49 ARE IDENTICAL TO THOSE FOUND ON PAGES 13 THROUGH 20.												

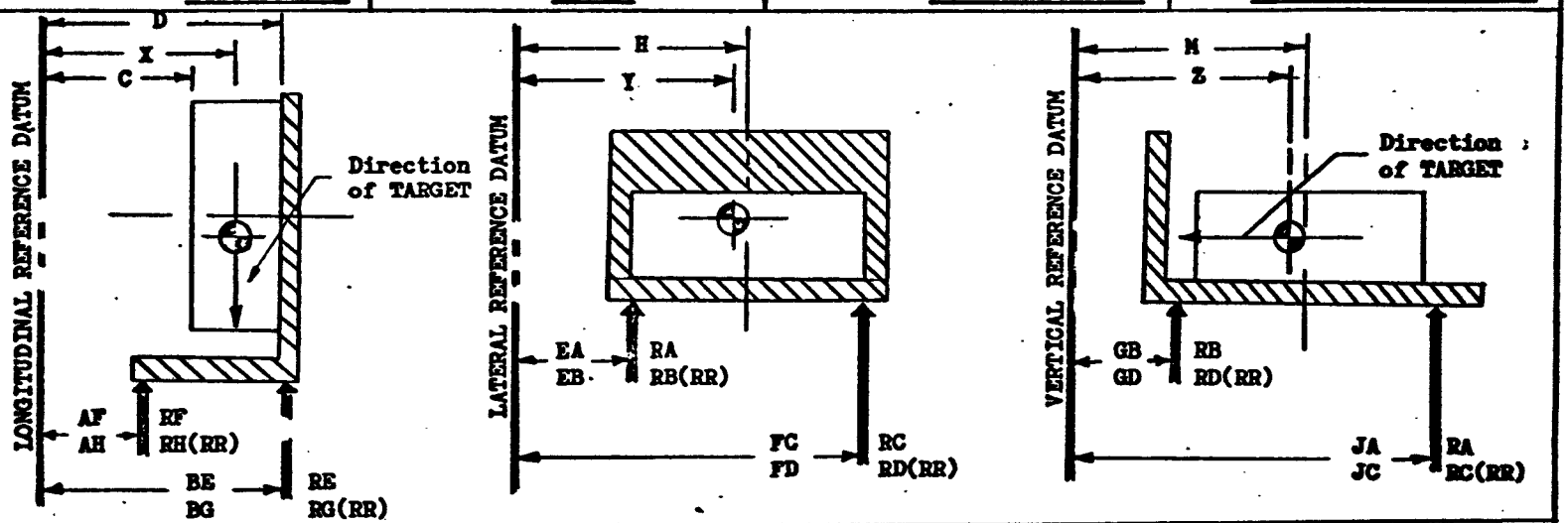
01

2-5550-0-53 R1
REV. SYM A

3.4.1

ACTUAL WEIGHT RECORD - CTLI SECTION

U/O MISSILE 0000017	DRAWING NO. 25-25402-35	CHECK LIST NO. 39	REPORT NO. WTS-997-017
MISSILE MODEL WS-133A	DCN H	REPORTED BY CB	PAGE NO.
CONFIGURATION	ADCN 23	CHECKED BY GVR	DATE 4/28/63



WEIGHING DATA

REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	GR. WT.	TARE	CORR.	NET WT.
RF	51.65	24.55		27.10	RC	72.40	38.80		33.60
RH	53.90	22.60		31.30	RD	76.15	44.55		31.60
RE	104.15	57.15		47.00	RA	72.15	24.15		48.00
RG	95.40	61.05		34.35	RB	84.40	57.85		26.55
TOTAL	305.10	165.35		139.75	TOTAL	305.10	165.35		139.75

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	27.10	42.007	
RH	31.30	42.023	
RE	47.00	62.996	
RG	34.35	62.999	
AS WGD	139.75	54.23	7,578.5

LATERAL C.G.

REACTION	NET WT.	ARM	MOMENT
RA	48.00	84.510	
RB	26.55	84.505	
RC	33.60	115.490	
RD	31.60	115.495	
AS WGD	139.75	98.96	13,830.2

VERTICAL C.G.

REACTION	NET WT.	ARM	MOMENT
RB	26.55	77.478	
RD	31.60	77.481	
RA	48.00	115.500	
RC	33.60	115.500	
AS WGD	139.75	99.68	13,930.2

(RR) = Rear Reaction

BOEING
NO. D2-13043-1
PAGE 30

SERIAL NUMBER: 0000017

CHECK LIST NO. 39

DATE

3.4.2 MISSILE WEIGHING CHECK LIST

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

SECTION 39 MISSILE NO.

MISSILE COMPONENT CTLI COMPONENT PART NO. Noted

RECORD OF CHECKING (DATE)								
Mo		4						
Day		28						
Yr		63						

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT:	COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: LAUNCH
39	Instrumentation Group, Trainer-Test	25-25402-35					-	-					
39a	CTLI Structure Assembly	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	10-20942-1					x	x					
	Battery, Squib	10-20942-2					x	x					
	Cable Set SE-35A	55008-106					-	-					
	Cable	AN 31277-315					x	x					
	Cable	AN 31278-315					x	o					
	Cable	AN 31279-315					x	o					
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					

REV. NTR A D 8-5550-0-81

BOEING NO. D2-13943-1 Sht 51

3.4.3

WEIGHT AND BALANCE CHANGE RECORD

ASSOCIATE CONTRACTOR: BOEING
COMPONENT: SECTION 39
MODEL NO.: WS-133A
SERIAL NO.: 0000017

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

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

LINE	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	25-25402-35	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	25-25402-35	Instr. Group, Trainer-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									

2-5550-0-11 R1
NAV. EXH. A
BOEING
NO. D2-13641-1
MAR. 62

3.5 ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION APPLICABLE TO CTLI SECTION S/N 0000017 AND INSTALLATION KIT

The following ECP's have not been incorporated into "Modal Specification, Trainer-Test Group, Guided Missile, (8-133-1006)" 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.

CTLI SECTION, S/N 0000018

4.1 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 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 CTLI section S/N 0000018). 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 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.

4.2 WEIGHT & BALANCE SUMMARY
TOTAL CTLI KIT INSTALLATION
CTLI WAFER S/N 0000018

REPORT NO. _____
DATE _____

LINE	SEC.	DESCRIPTION	DATA	EXPENDED WEIGHT (LB)	TOTAL WEIGHT (LB)	CENTER OF GRAVITY			INERTIA SLUG FT²x10⁻³	
						LONG. *	LAT.	VERT.	ROLL	PITCH
1	41	NV 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)

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 FT²x10-3	
						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)

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 FT2x10-3	
						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)

CHECK LIST NO.	4.3 MISSILE WEIGHING CHECK LIST	RECORD OF CHECKING (DATE)
DATE	MODEL _____ FINAL ASSEMBLY DRAWING NO. 21-52900-4	Mo / Day / Yr

SECTION 39 THRU 49 MISSILE NO. _____

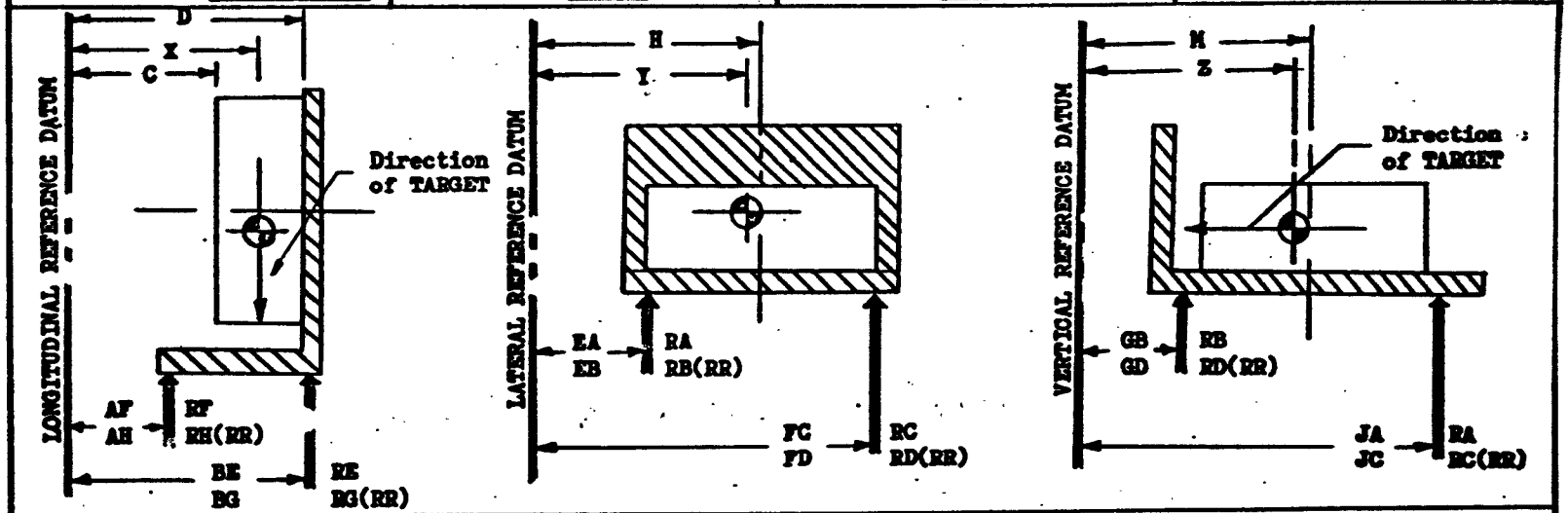
MISSILE COMPONENT _____ COMPONENT PART NO. _____

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED	COMPONENT: REMOVE S/TTE SHIPMENT	COMPONENT: AS RECEIVED REMOTE S/TTE	MISSILE: AS WEIGHED REMOTE S/TTE	MISSILE: LAUNCH
	SUMMARY CHECK LISTS FOR SECTIONS 39 THROUGH 49 ARE IDENTICAL TO											
	THOSE FOUND ON PAGES 13 THROUGH 20.											

BOEING
NO. D6-13574-1
PAGE 36

4.41 ACTUAL WEIGHT RECORD - CTLI SECTION

U/O MISSILE 0000018	DRAWING NO. 25-25402-35	CHECK LIST NO. 39	REPORT NO. WTS-1002-018
MISSILE MODEL WS-133A	DCN • H	REPORTED BY CB/CW	PAGE NO.
CONFIGURATION	ADCN 23	CHECKED BY GVR	DATE 5/7/63



WEIGHING DATA

REACTION	GR. WT.	TARE	CORR.	NET WT.	REACTION	GR. WT.	TARE	CORR.	NET WT.
RF	46.60	16.85		29.75	RC	62.30	24.00		38.30
RH	58.95	30.60		28.35	RD	86.15	59.55		26.60
RE	109.25	65.05		44.20	RA	82.50	39.00		43.50
RG	90.65	53.10		37.55	RB	74.50	43.05		31.45
TOTAL	305.45	165.60		139.85	TOTAL	305.45	165.60		139.85

DIMENSIONAL DATA

DIM.	INCHES	DIM.	INCHES	DIM.	INCHES
AF	42.007	EA	84.510	GB	77.476
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	29.75	42.007	
RH	28.35	42.023	
RE	44.20	62.996	
RG	37.55	62.999	
AS WGD	139.85	54.28	7,591.1

LATERAL C.G.

REACTION	NET WT.	ARM	MOMENT
RA	43.50	84.510	
RB	31.45	84.505	
RC	38.30	115.490	
RD	26.60	115.495	
AS WGD	139.85	98.89	13,829.3

VERTICAL C.G.

REACTION	NET WT.	ARM	MOMENT
RB	31.45	77.476	
RD	26.60	77.481	
RA	43.50	115.500	
RC	38.30	115.500	
AS WGD	139.85	99.72	13,945.6

(RR) = Rear Reaction

NAS 8-1394-1 MOD 39 BOEING 25-25402-35 REV. DEC

SERIAL NUMBER: 0000018

CHECK LIST NO. 39

DATE

4.4.2 MISSILE WEIGHING CHECK LIST

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

RECORD OF CHECKING (DATE)

Mo		5					
Day		7					
Yr		63					

SECTION 39 MISSILE NO.

MISSILE COMPONENT CTLI COMPONENT PART NO. Noted

ITEM NUMBER	DESCRIPTION	PART NO.	WEIGHT	X ARM	Y ARM	Z ARM	COMPONENT: BASIC WEIGHT	COMPONENT: AS WEIGHED		COMPONENT: REMOTE SITE SHIPMENT	COMPONENT: AS RECEIVED REMOTE SITE	MISSILE: AS WEIGHED REMOTE SITE	MISSILE: LAUNCH
39	Instrumentation Group, Trainer-Test	25-25402-35					-	-					
39a	CTLI Structure Assembly	25-25403-11					-	-					
	Support Structure	25-29094-45					x	x					
	Primary Structure	25-29093-15					x	x					
	Insulation & External Marking	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	10-20942-1					x	x					
	Battery, Squib	10-20942-2					x	x					
	Cable Set SE-35A	55008-106					-	-					
	Cable	AN 31277-315					x	x					
	Cable	AN 31278-315					x	o					
	Cable	AN 31279-315					x	o					
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					

4.4.3

WEIGHT AND BALANCE CHANGE RECORD

ASSOCIATE CONTRACTOR	BOEING	CONTRACT NO.	AF04(647)-289	REPORT NO.	WTS-1002-018
COMPONENT	SECTION 39	LOT NO.		DATE	5/7/63
MODEL NO.	WS-133A	DRAWING NO.	25-25402-35	PREPARED	CB
SERIAL NO.	0000018	U.O. MISSILE		APPROVED	GVR

LINE	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	25-25402-35	Instr. Group, Trainer-Test (As Weighed)	139.85	54.28	7,591.1	98.89	13,829.3	99.72	13,945.6
3									
4									
5		ADD:							
6	AN31278-315	Cable Autonetics	3.85	74.2		115.5		102.8	
7	AN31279-315	Cable Autonetics	2.08	50.4		106.9		111.4	
8									
9									
10		DEDUCT:	0						
11									
12									
13									
14	25-25402-35	Instr. Group, Trainer-Test (Complete)	145.78	54.75	7,981.6	99.43	14,496.3	99.97	14,573.1
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									
32									

2-5550-0-11 REV. JAN 1963
BOEING FORM NO. D6-13494-1

4.5 ENGINEERING CHANGE PROPOSAL (ECP) INCORPORATION APPLICABLE TO CTLI SECTION S/N 0000018 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 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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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

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.

DDC
MAY 21 1963
TISIA A

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

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

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 MS21046C04 PROCUREMENT SPEC. MIL-N-25027B

TORQUE – (INCH-POUNDS)

TEST	SAMPLE NO.	INSTAL-LATION TORQUE	FIRST REMOVAL		SEVENTH INSTAL-LATION	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 800°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-800°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

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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".