

NASA Contractor Report 178416, Part 2

SPACE SHUTTLE PHASE B WIND TUNNEL
MODEL AND TEST INFORMATION

VOLUME 3 - LAUNCH CONFIGURATION

J. L. Glynn and D. E. Poucher

CHRYSLER CORPORATION
Military Public Electronic Systems
Michoud Engineering Office
New Orleans, Louisiana

Contract NAS1-18276
July 1988

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PHASE B WIND TUNNEL MODEL AND TEST
INFORMATION. VOLUME 3: LAUNCH CONFIGURATION
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G3/02



National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia 23665

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*Pages i and 1-439 published under separate cover as NASA CR-178416, Part 1.

DELTA WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1052 C-1- 346

ORIGINAL PAGE IS
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TEST GDHST 304.0 DATA SET COLLATION SHEET

PRETEST
 POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	SCHD.		CONTROL DEFLECTION		NO. OF RUNS	Z DISPLACEMENT, FULL SCALE		75.75
		XW	B	L	R		4.38	29.38	
BCA 003	B9J + 130G	A	0	0	0	4	3	↑	61
BCA 051							51	↑	67
BCA 053							53	↑	XN
BCA 052							52	↑	9
BCA 008							8	↑	55
BCA 009							9	↑	49
BCA 010							10	↑	43
BCA 012							12	↑	37
BCA 013							13	↑	31
BCA 014							14	↑	25
BCA 015							15	↑	19
BCA 016							16	↑	13
BCA 017							17	↑	7
BCA 019							19	↑	
BCA 020							20	↑	
BCA 021							21	↑	
BCA 022							22	↑	
BCA 023							23	↑	
BCA 024							24	↑	
BCA 025							25	↑	

COEFFICIENTS:
 a or b SCHEDULES
 X WA = -180 to +80 ft. FROM MATED POSITION

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TEST GDHST 304-0 DATA SET COLLATION SHEET

PRETEST
 POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	SCHD.		CONTROL DEFLECTION		NO. of RUNS	Z DISPLACEMENT, FULL SCALE									
		A	B	1	2		3	4	5	6	7					
BCA026	B9J + 130G	A	0	0	0	4	4.30	13.30	29.30	54.30	→					
BCA027	+ 134G										→					
BCA028											→					
BCA029											→					
BCA031											→					
BCA032											→					
BCA033											→					
BCA034											→					
BCA035											→					
BCA036											→					
BCA037											→					
BCA038											→					
BCA039											→					
BCA040											→					
BCA041											→					
BCA042											→					

1
7
13
19
25
31
37
43
49
55
61
67
75.76
C/LM C/F CA CL CDF E/D F/D ALPHA XW
IDPVAR(1) IDPVAR(2) NDV

COEFFICIENTS: XWA = -180 to +50 Ft. FROM MATED POSITION

a of 8 SCHEDULES

DELTA WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1052 C-1- 347

DELTA WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1052 C-1- 348

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TEST GDHST 304-0 DATA SET COLLATION SHEET

PRETEST
 POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	SCHED.		CONTROL DEFLECTION		NO. of RUNS	Z DISPLACEMENT, FULL SCALE	
		X	B	56	58e		4.58	13.38
BCA043	A8X +1348	A	0	0	0	4	43	27.38
BCA045							45	27.38
BCA046							46	27.38
BCA047							47	27.38
BCA048							48	27.38
BCA049	+130G						49	27.38
BCA050							50	27.38

1 7 13 19 25 31 37 43 49 55 61 67 75.76
 CN ICLM CAF CA CL CDF L/D ZW ALPHA Z XW
 IDPVAR(1) IDPVAR(2) NDV

COEFFICIENTS:
 G OR B SCHEDULES
 XWA = -180 to +80 ft. FROM HATED POSITION

DELTA WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1052 C-1- 350

TEST GDHST 304-0 DATA SET COLLATION SHEET

PRETEST
 POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	SCHD.		CONTROL DEFLECTION		NO. of RUNS	2 DISPLACEMENT FULL SCALE		7576
		XW	B	h	h		4.38	13.38	
ØCA003	130G + 89J	A	0	0		4	3		
ØCA051							51		
ØCA053							53		
ØCA052							52		
ØCA008							8		
ØCA009							9		
ØCA010							10		
ØCA012							12		
ØCA013							13		
ØCA014							14		
ØCA015							15		
ØCA016							16		
ØCA017							17		
ØCA019							19		
ØCA020							20		
ØCA021							21		
ØCA022							22		
ØCA023							23		
ØCA024							24		
ØCA025							25		

COEFFICIENTS:
 α or β
 SCHEDULES

XWA = -180 to +80 FT from MATED Position

ORIGINAL PAGE IS
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TEST GDH5T 304-0 DATA SET COLLATION SHEET

PRETEST
 POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	SCHD. XM B	CONTROL DEFLECTION			NO. OF RUNS	Z DISPLACEMENT, FULL SCALE	Z																																									
			sh	se	sf			4.38	4.39	4.40	4.41	4.42	4.43	4.44	4.45	4.46	4.47	4.48	4.49	4.50	4.51	4.52	4.53	4.54	4.55	4.56	4.57	4.58	4.59	4.60	4.61	4.62	4.63	4.64	4.65	4.66	4.67	4.68	4.69	4.70	4.71	4.72	4.73	4.74	4.75	4.76			
ØCA026	130G + B9J	A	0	-	-	4	4.38	4.39	4.40	4.41	4.42	4.43	4.44	4.45	4.46	4.47	4.48	4.49	4.50	4.51	4.52	4.53	4.54	4.55	4.56	4.57	4.58	4.59	4.60	4.61	4.62	4.63	4.64	4.65	4.66	4.67	4.68	4.69	4.70	4.71	4.72	4.73	4.74	4.75	4.76				
ØCA027	134B																																																
ØCA028																																																	
ØCA029																																																	
ØCA031																																																	
ØCA032																																																	
ØCA033																																																	
ØCA034																																																	
ØCA035																																																	
ØCA036																																																	
ØCA037																																																	
ØCA038																																																	
ØCA039																																																	
ØCA040																																																	
ØCA041																																																	
ØCA042																																																	

7 13 19 25 31 37 43 49 55 61 67 75.76
 CN CLM CAF CA CL CDF L/D EW IDPVAR(1) IDPVAR(2) INDY

COEFFICIENTS:
 a or b SCHEDULES XWA = -180 to 80 Ft From Mated Position

DELTA WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1052 C-1- 351

DELTA WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1052 C-1- 352

TEST 304-0 DATA SET COLLATION SHEET

PRETEST
 POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	SCHD.		CONTROL DEFLECTION			NO. OF RUNS	MACH NUMBERS	
		a	B	h	e	r		1.1	1.6
ØCA122	130G(86W10H12)	0	0	-	-	-	1	22	
ØCA126		5		-	-	-	1	26	
ØCA152		0		-	-	-	1	52	
ØCA112		5		-	-	-	1	12	
ØCA115		-5		-	-	-	1	15	
ØCA117		-10		-	-	-	1	17	
ØCA129	1348(85W13E2114R)	0	0	0	0	0	1	29	
ØCA134		0		-	-	-	1	34	
ØCA138		5		-	-	-	1	38	
ØCA141		-5		-	-	-	1	41	
ØCA142		-10		-	-	-	1	42	

1 7 13 19 25 31 37 43 49 55 61 67 75.76
 CN CLM CAF CA PL CDF L/D
 IDPVAR(1) IDPVAR(2) NDV

COEFFICIENTS:
 a of B
 SCHEDULES

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TEST GDHST-304-0 DATA SET COLLATION SHEET

PRETEST
 POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	SCHD. B	CONTROL DEFLECTION		NO. of RUNS	Z DISPLACEMENT, FULL SCALE	
			h	e		4.38	13.30
ØCA043	134B + B8X	A	0	0	4	43	→
ØCA045						45	→
ØCA046						46	→
ØCA047						47	→
ØCA048						48	→
ØCA049	130G		0	↓		49	→
ØCA050			↓	↓		50	→

1 7 13 19 25 31 37 43 49 55 61 67 7576
 CN CLM CAF CA CL CDF LID ZW XW
 IDPVAR(1) IDPVAR(2) NDV

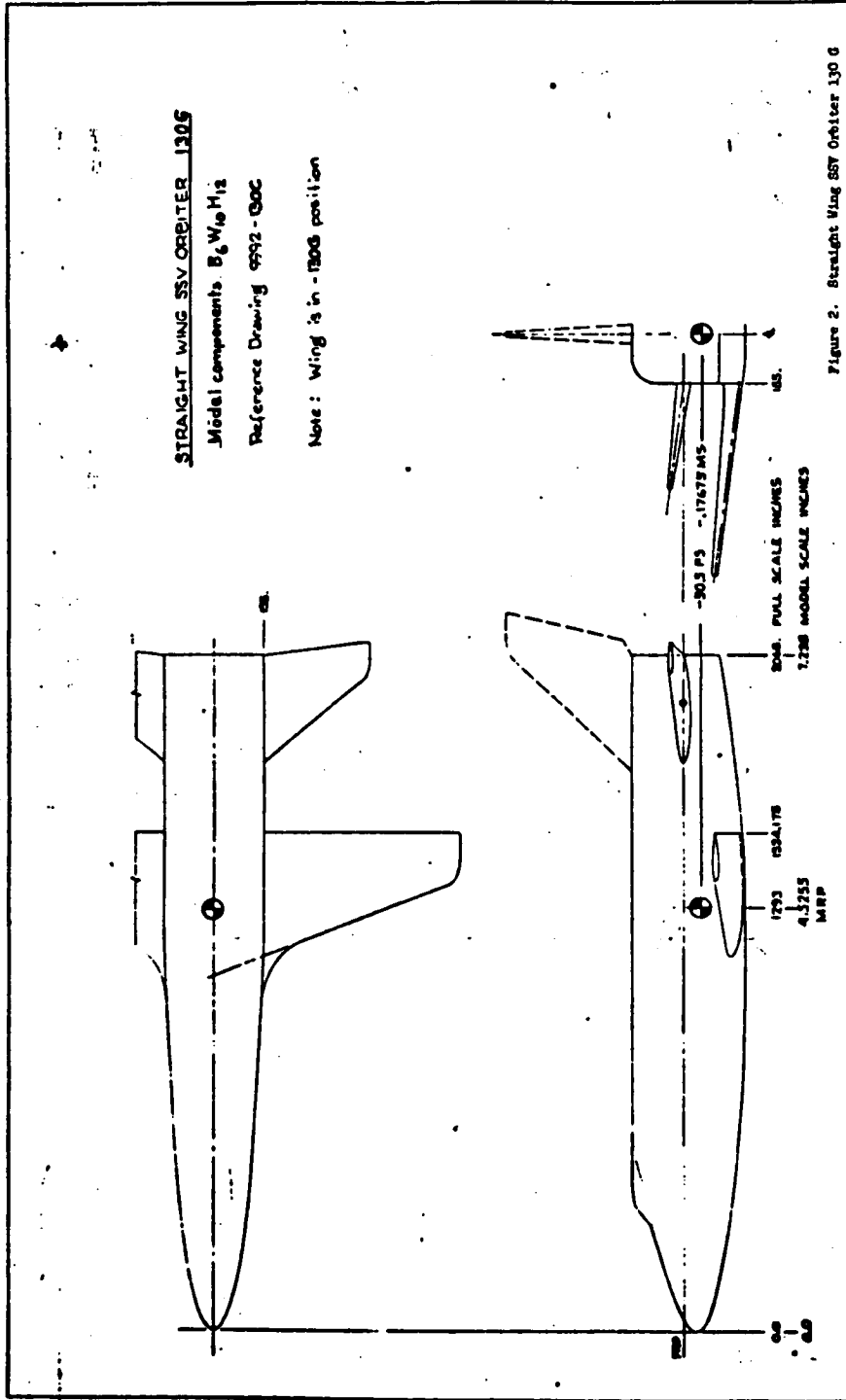
COEFFICIENTS:

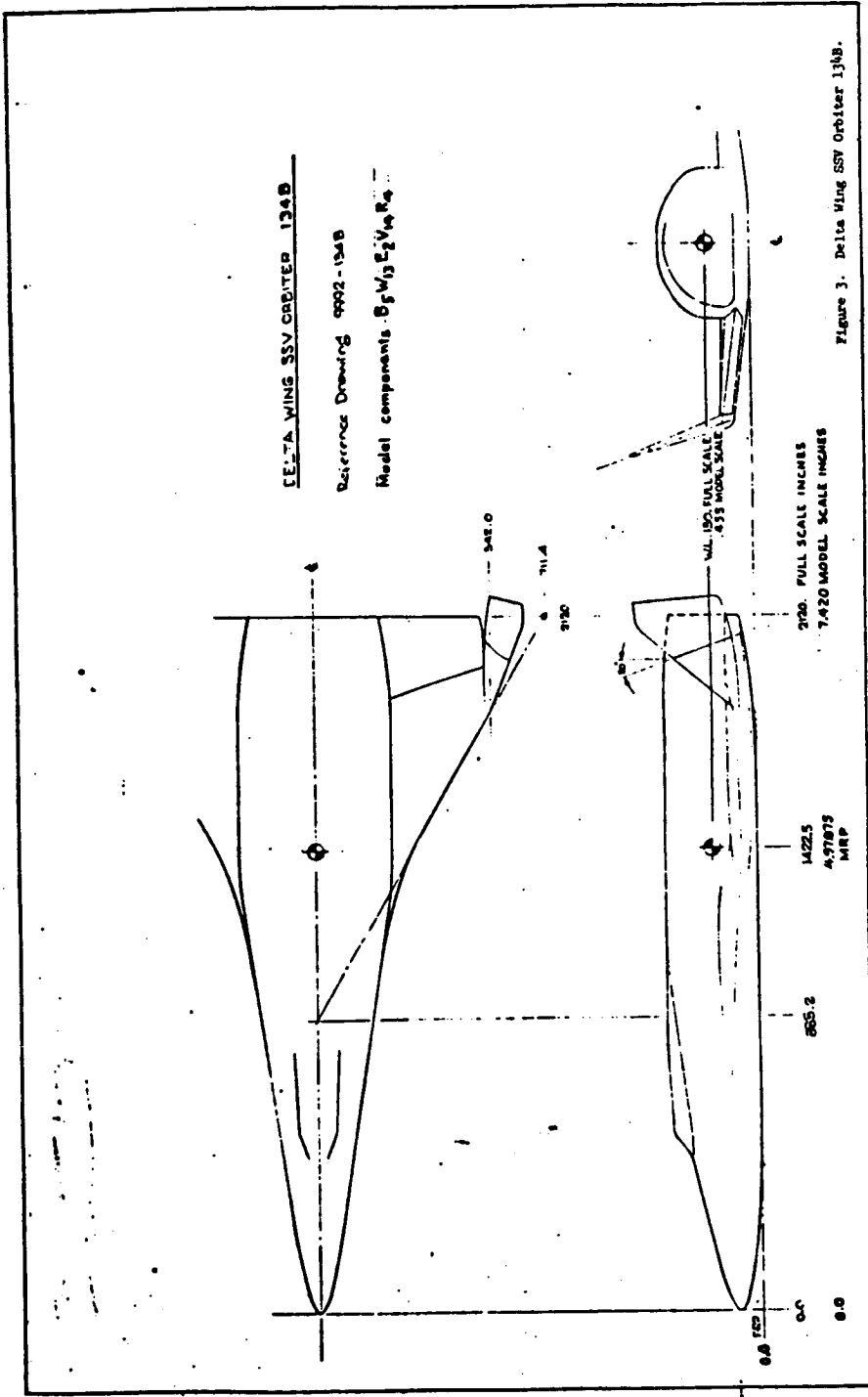
a or b SCHEDULES

XWA = -180 to +80 ft. from mated Position

DELTA WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1052 C-1- 353

DELTA WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1052 C-1- 354





DELTA WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1052 C-1- 355

DELTA WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1052 C-1- 356

STRAIGHT-WING BOOSTER BBX

Model components B, W, T, C

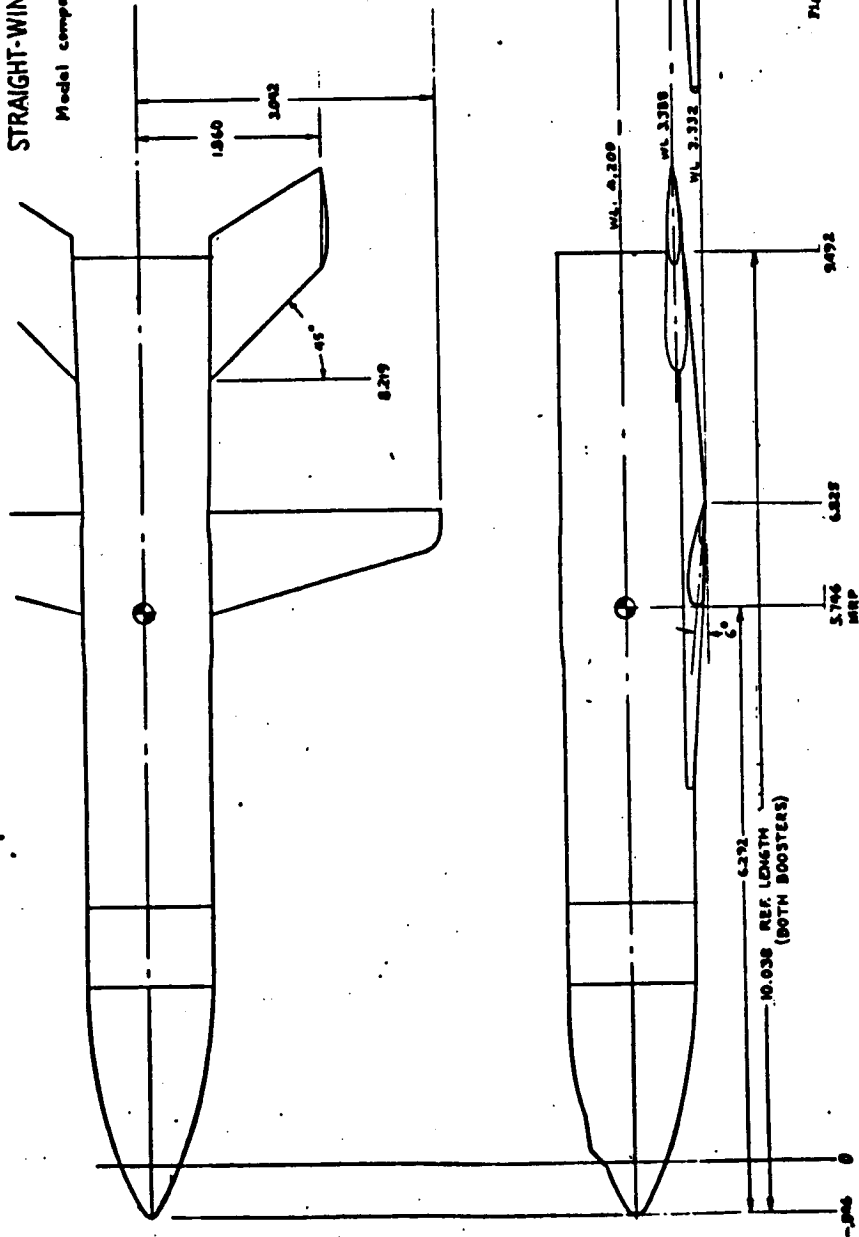


Figure 4. Straight Wing Booster BBX.

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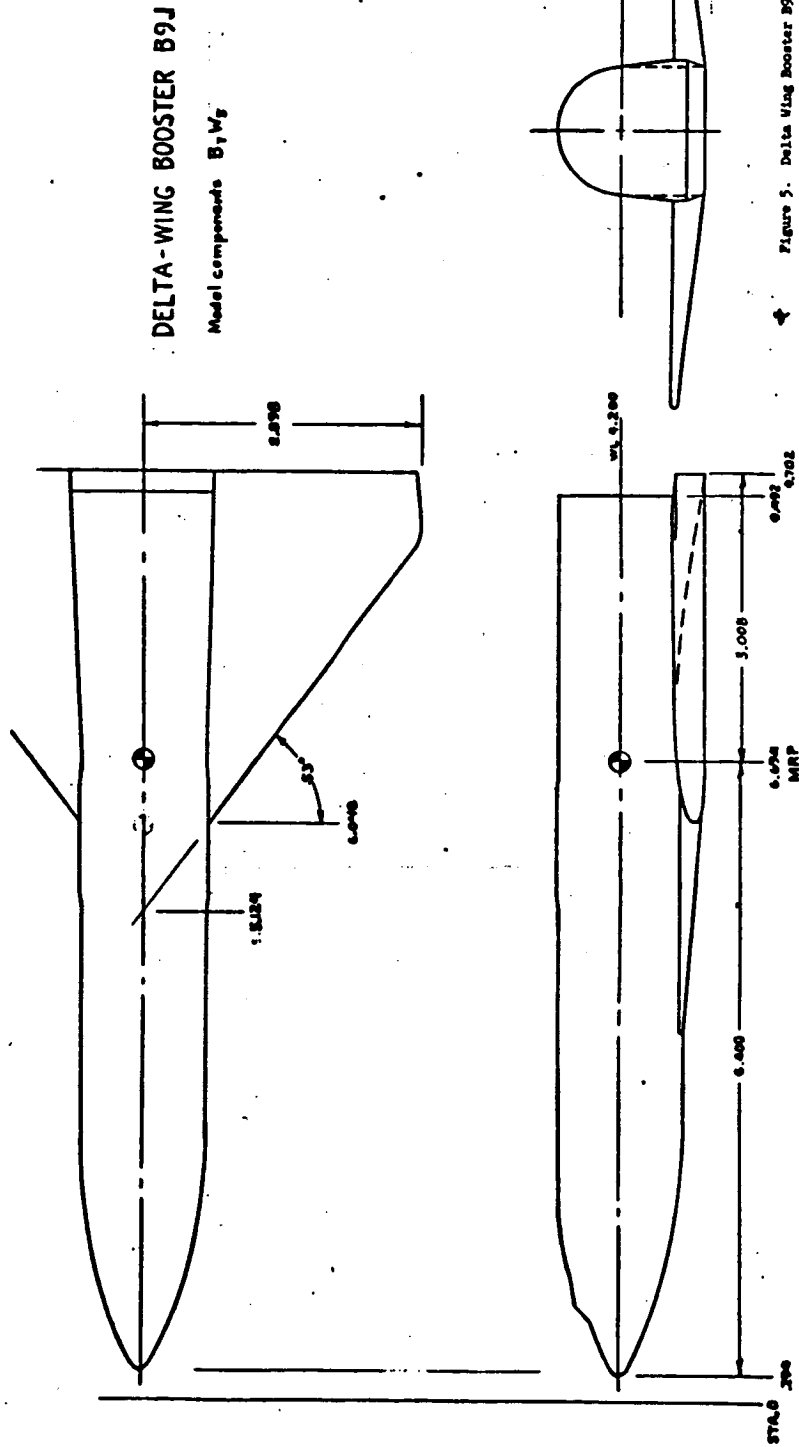
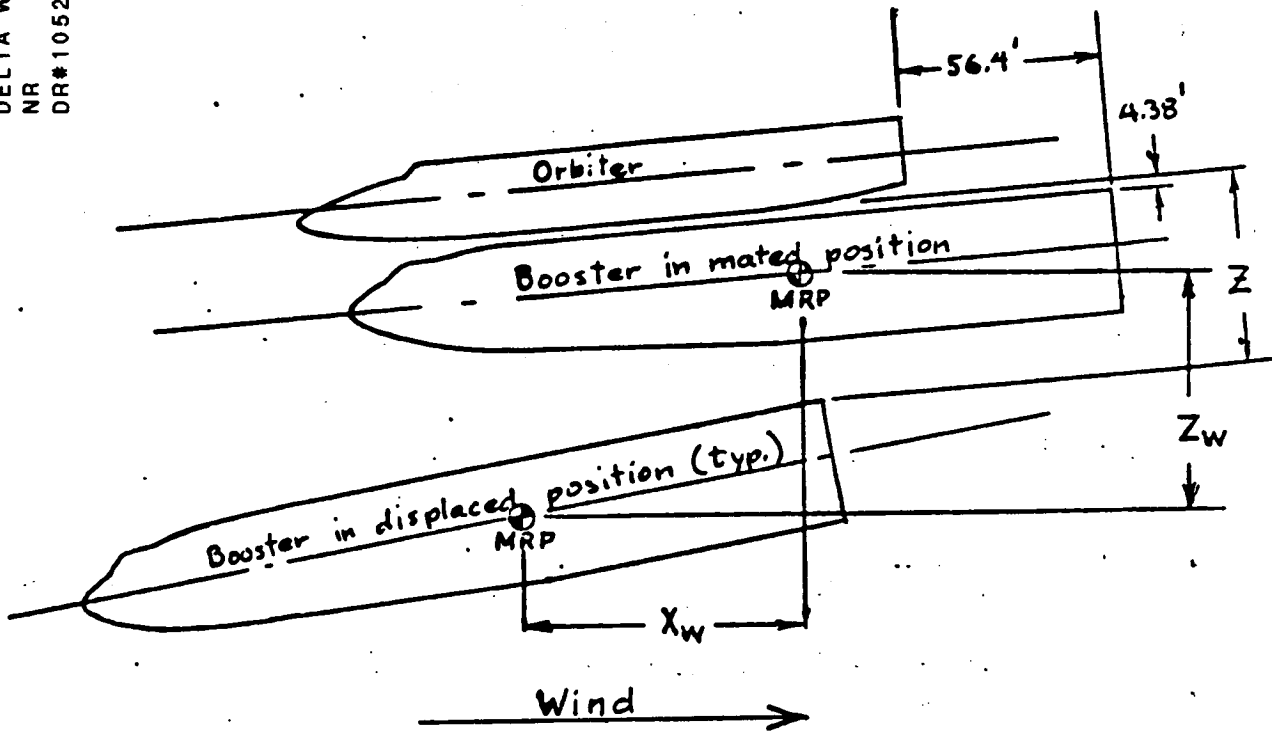


Figure 5. Delta Wing Booster B9J.

DELTA WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1052 C-1- 357



In the mated position the fuselage reference planes were parallel, and the gaps between bodies and the base-to-base dimension were as noted. The same mated dimensions applied to all four combinations of the two boosters and the two orbiters. The dimensions are in feet, full scale.

With the booster in the displaced position that is shown, the displacement coordinates X_w and Z_w are positive. X_w and Z_w are the displacement coordinates of the moment reference point (MRP), for which see the general arrangement drawings.

Figure 6. Identification of the "mated" position and displacement Coordinates Z , X_w , and Z_w .

DELTA WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1127 C-1- 360

TABLE I (Concluded)
TEST AMES 6x6-548 DATA SET/RUN NUMBER
COLLATION SUMMARY

PRETEST
 POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	SCHD.		PARAMETERS/VALUES				NO. of RUNS	MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE)							TEST RUN NUMBERS
		α	β	δ	ϵ	η	ρ		0.6	0.9	1.2	1.5	2.0			
RAZ 114	B22C8M19+B4ZM16V26	0	F	0	0	0	5	67	66	65	64	63	63			
214	↓							72	71	70	69	68	68			
115	B22M19V10+B4ZM16V26							77	76	75	74	73	73			
215	↓							82	81	80	79	78	78			
116	↓	A	0					87	86	85	84	83	83			
216	↓							92	91	90	89	88	88			
117	B22C8M19V10+B4ZM16V26	-5	F					97	96	95	94	93	93			
217	↓							102	101	100	99	98	98			
118	↓			+15	-15			107	106	105	104	103	103			
218	↓			+10	-10			112	111	110	109	108	108			
119	↓							117	116	115	114	113	113			
219	↓							122	121	120	119	118	118			
120	↓	5						127	126	125	124	123	123			
220	↓							131	130	129	128	127	127			
121	↓			0	0			137	136	135	134	133	133			
221	↓							143	142	141	140	139	139			
122	B22C8M19V10							149	148	147	146	145	145			
123	↓							155	154	153	152	151	151			
124	↓	-5						161	160	159	158	157	157			
125	↓	0						167	166	165	164	163	163			
126	↓	A	0					173	172	171	170	169	169			
		A	0					179	178	177	176	175	175			

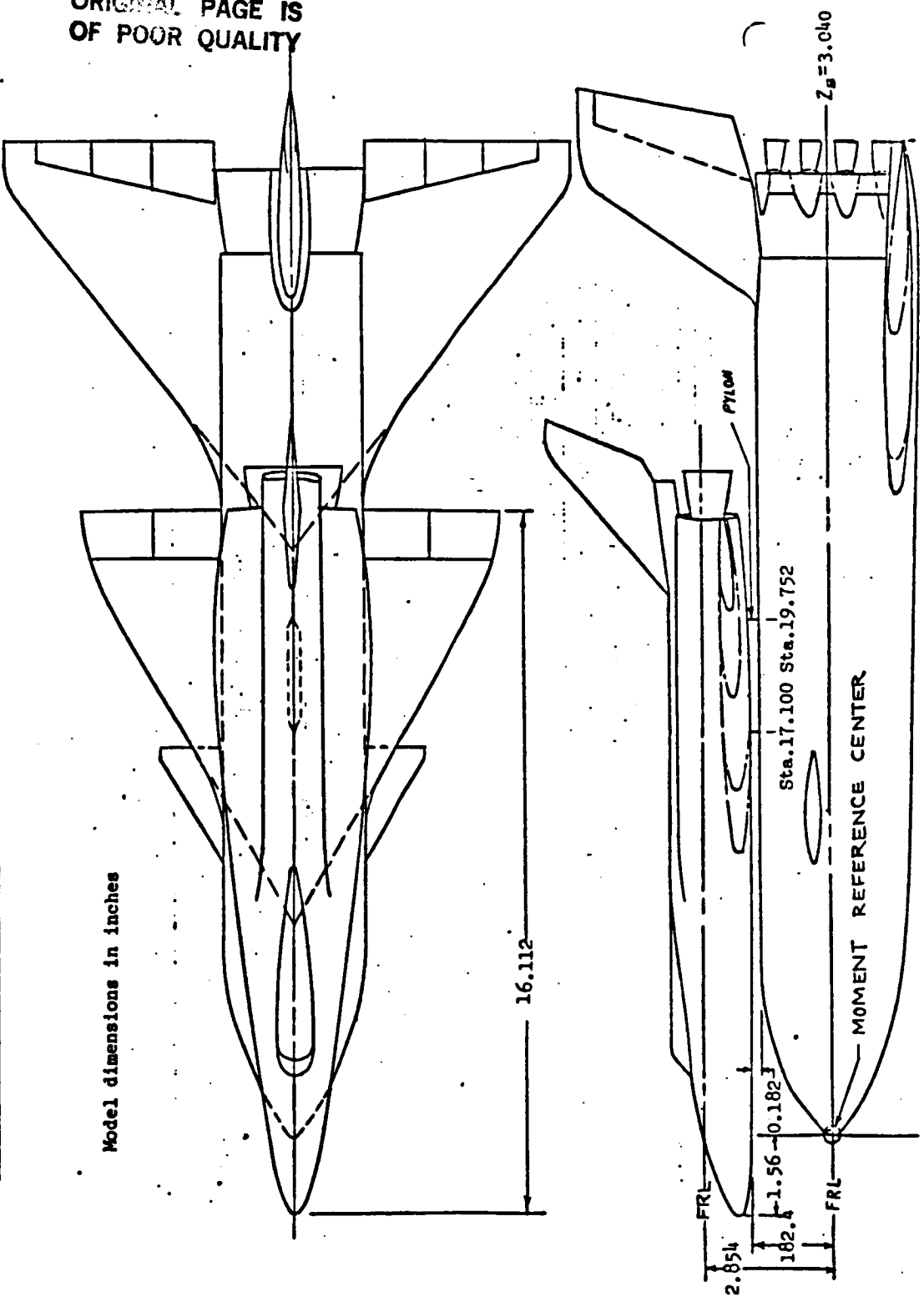
COEFFICIENTS:
 $\alpha(A) = -15, -12, -8, -4, -2, 0, 2, 4, 8, 11$
 $\alpha(B) = -5, -2, 0, 2, 4, 8, 10, 14, 18, 20$
 SCHEDULES
 $\beta(F) = -5, -2, -1, 0, 1, 2, 4, 6, 10$

NASA-MSFC-MAF

DESCRIPTION OF I34D/B9U SPACE SHUTTLE CONFIGURATION

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Model dimensions in inches



Sta. 30.909
DELTA WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1127 C-1- 361

Figure B Launch Configuration

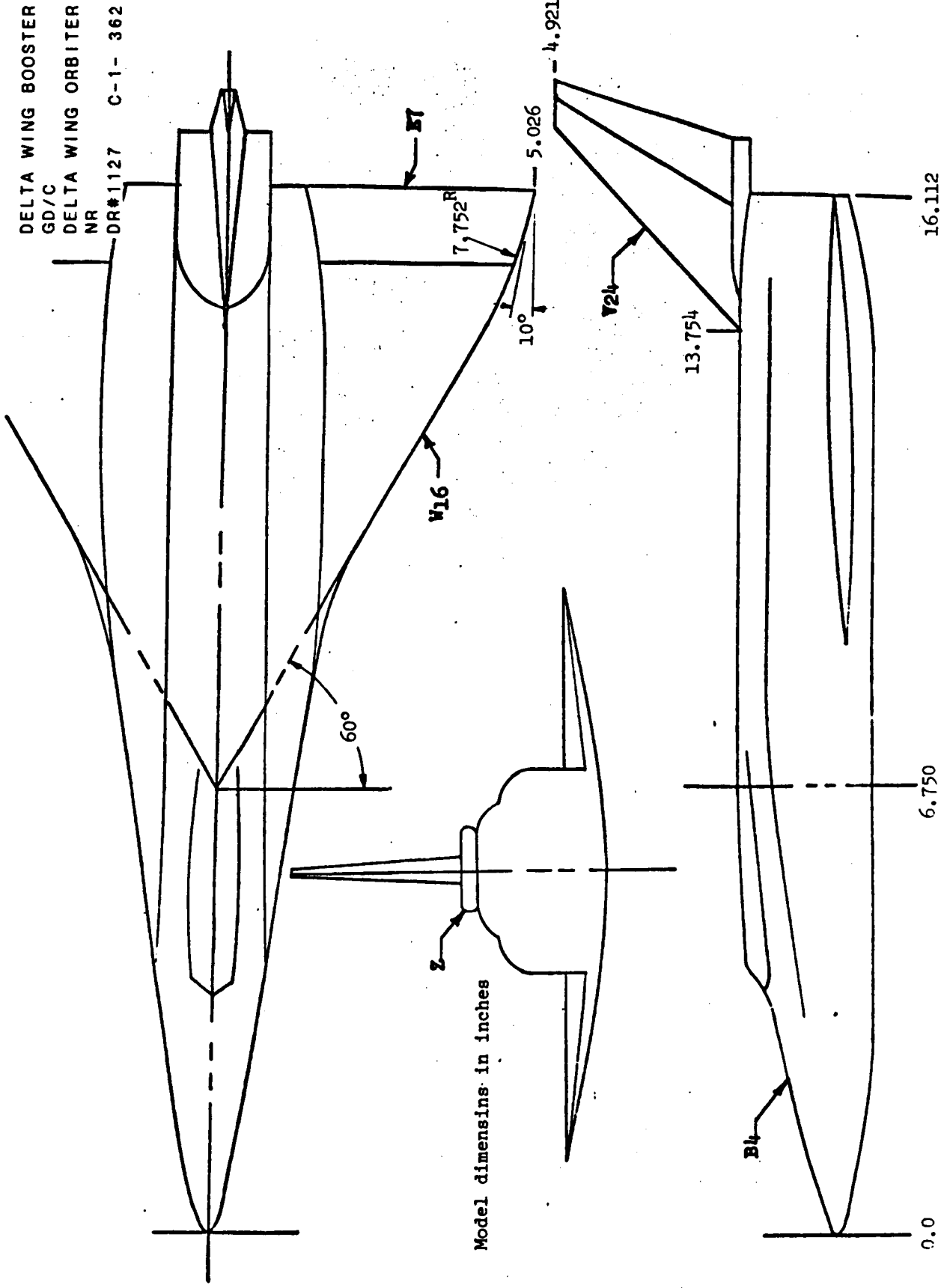
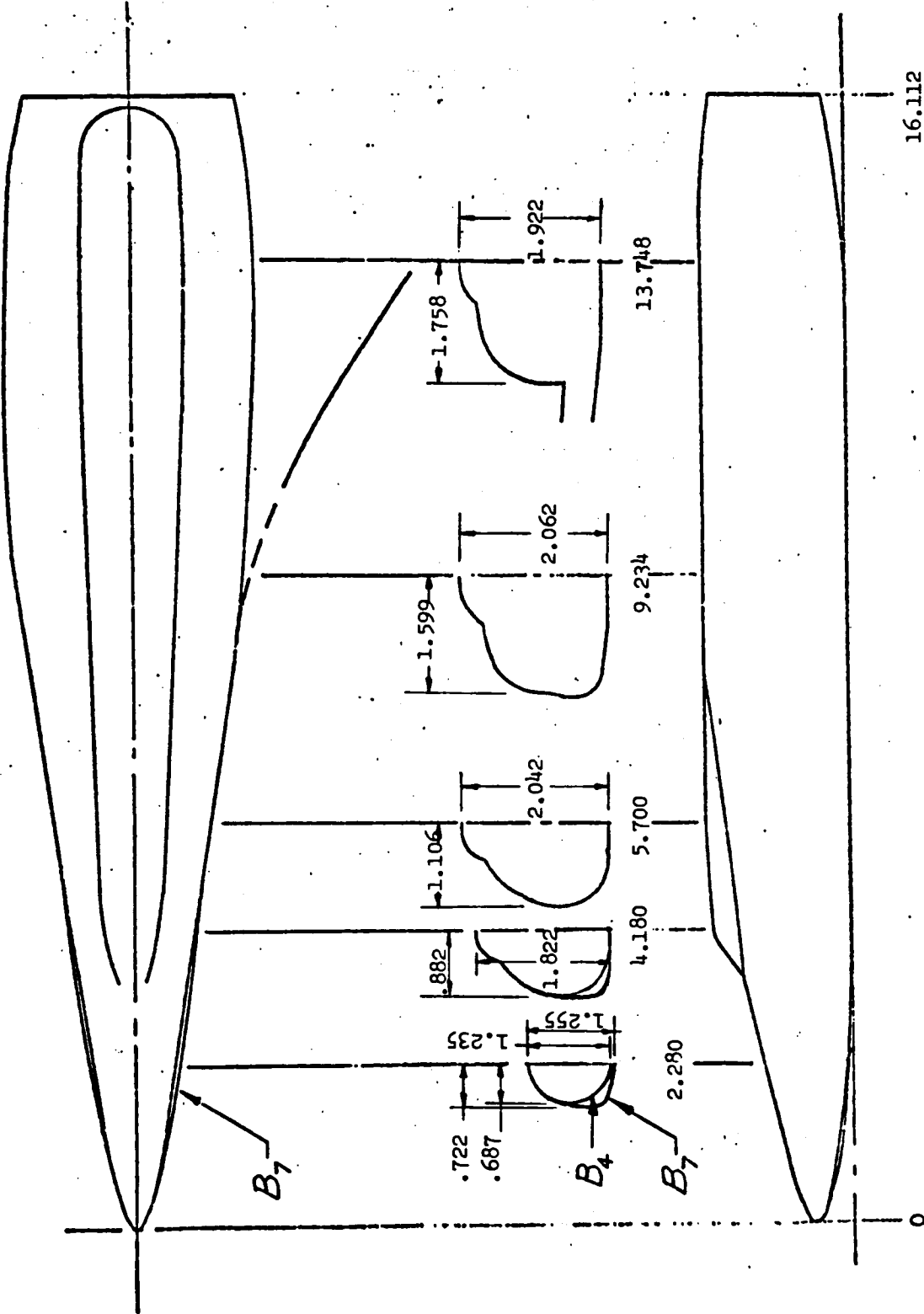


Figure C 3 View Delta Wing Orbiter

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Model dimensions in inches

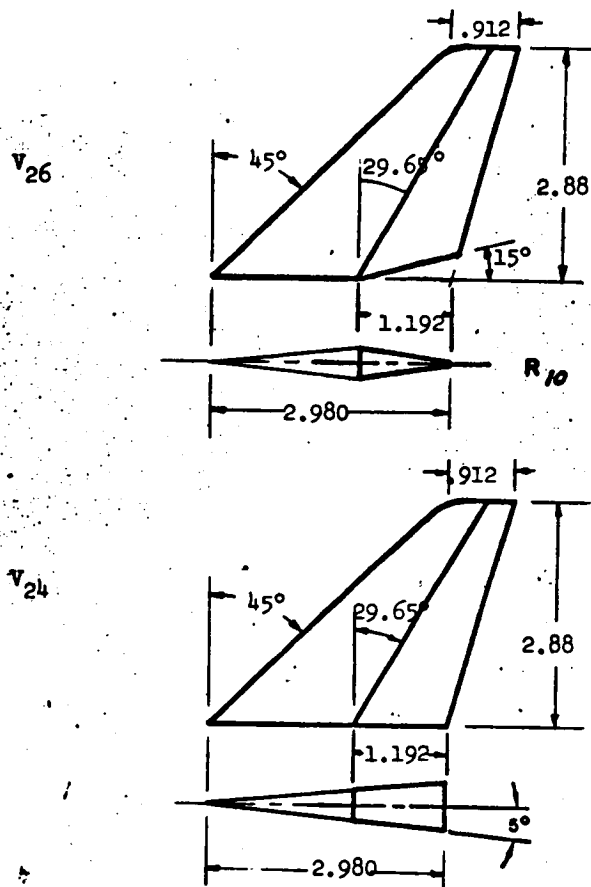


BODY B4 9992-129 CONFIGURATION

Body B7 9992-129 Configuration With 161 Nose Modification
DELTA WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1127 C-1- 363

Figure D Orbiter Body

DELTA WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1127 C-1- 364



Model dimensions in inches

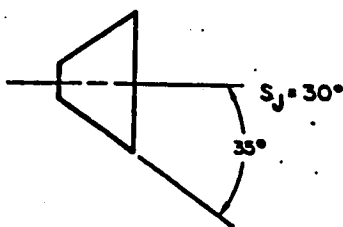
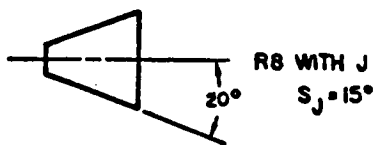


Figure E Flared Rudder, Delta Wing Orbiter

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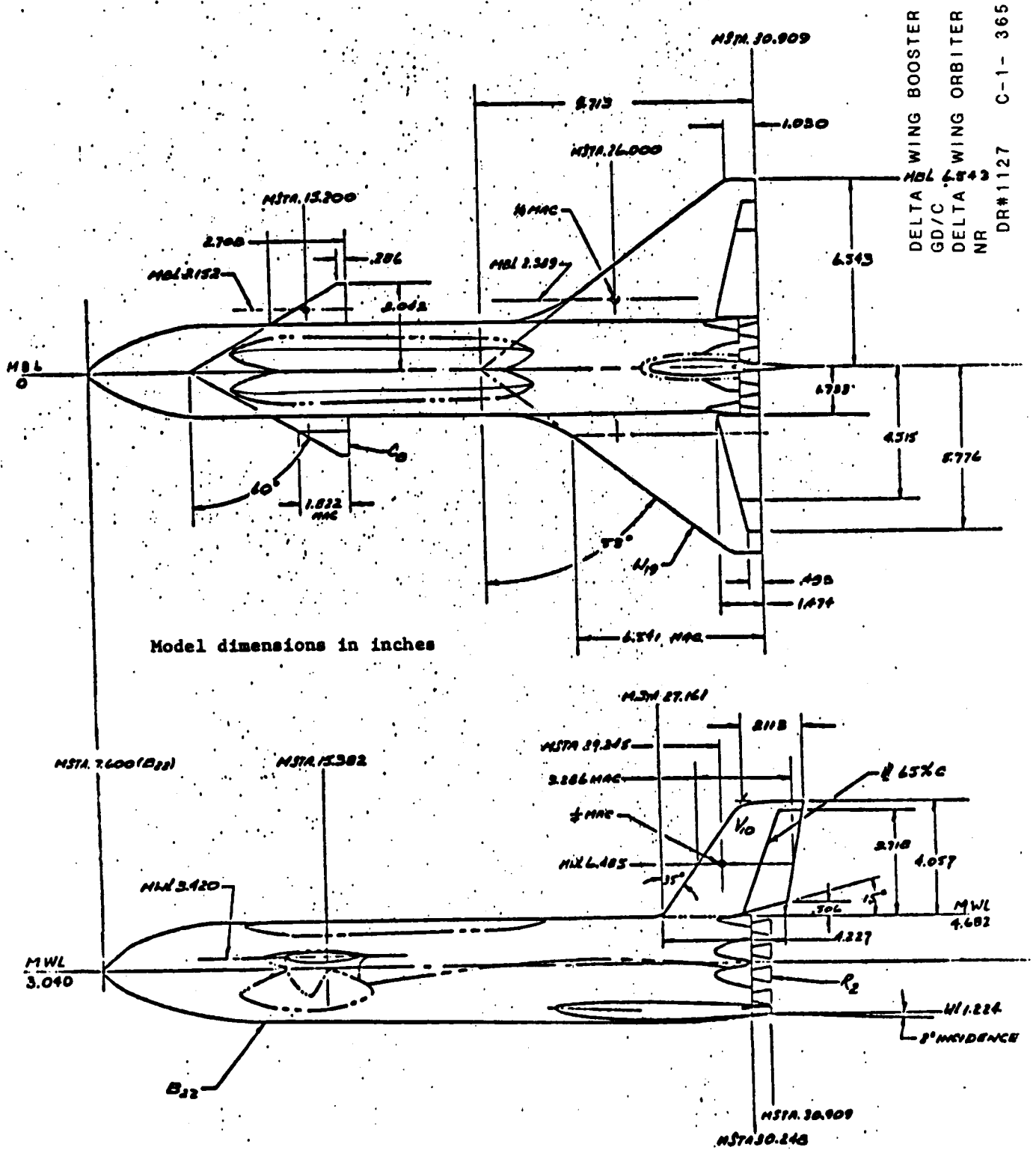


Figure F Delta Wing Booster

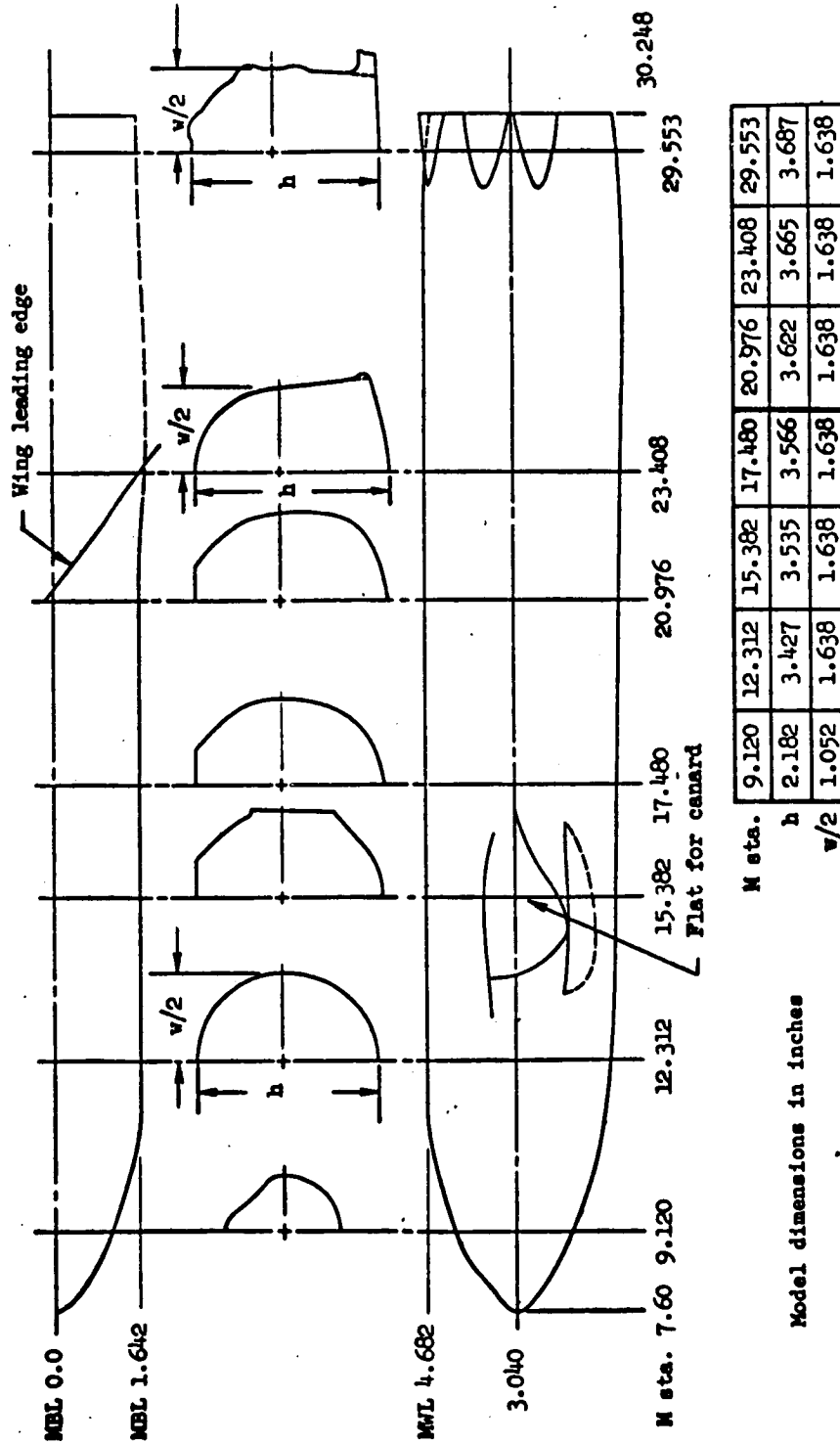
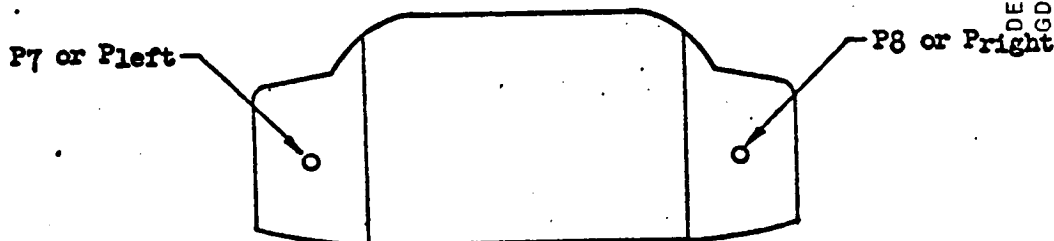


Figure G Booster Body

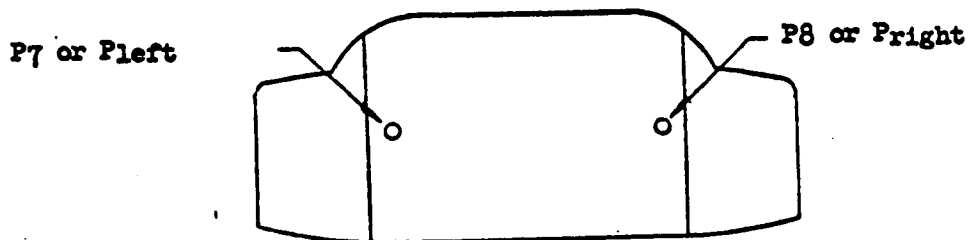
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DELTA WING BOOSTER
GGD/C
DELTA WING ORBITER
NR
DR#1127 C-1- 367

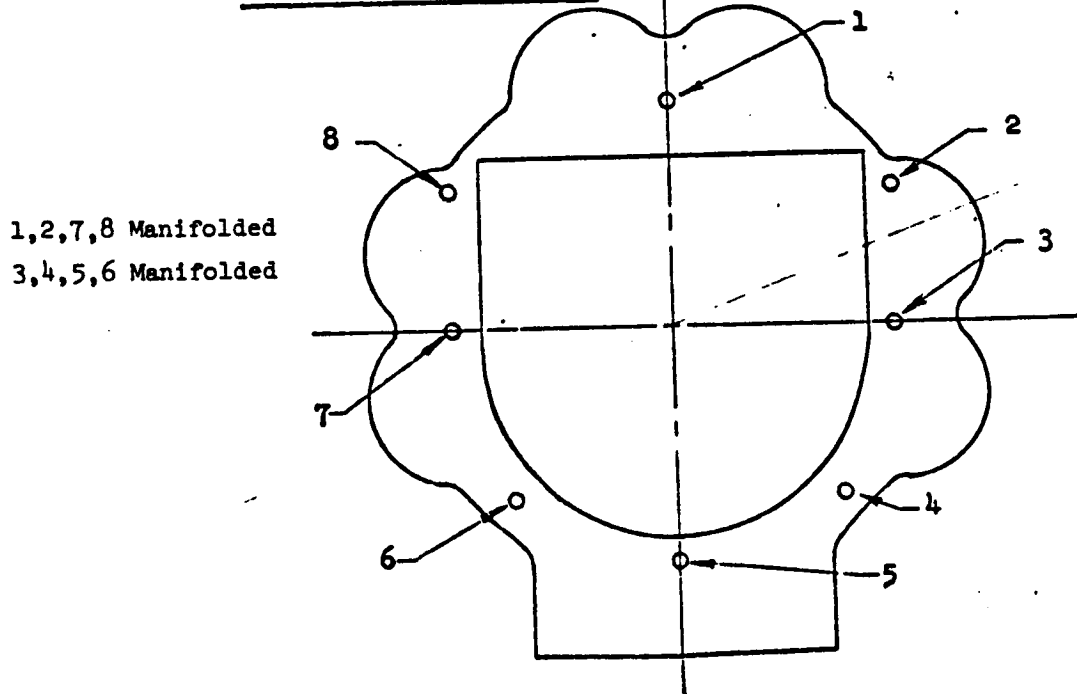
Isolated Orbiter



Mated Orbiter



Isolated & Mated Booster



1,2,7,8 Manifoldd
3,4,5,6 Manifoldd

Figure H Base Pressure Taps

DELTA WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1130 C-1- 368

TEST TWT- 490 DATA SET COLLATION SHEET
 Force- Booster, 0.0035-Scale, Stability and Control

PRETEST
 POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	Sched. u	K	CONTROL DEFLECTION	NO. of RUNS	MACH NUMBERS											
						0.6	0.9	1.0	1.1	1.2	1.46	1.96	2.99	4.96			
02A	B20C4B	A	0	SE	5	153/0	159/0	169/0	169/0	213/0	208/1						
03A	B20C4BW14			0	5	140/0	141/0	142/0	142/0	212/0	206/0						
04A	B20W14			0	7	110/0	111/0	112/0	112/0	904/0	220/0	164/0					
05A	B20C4BW14V8			0	5	115/0	114/0	113/0	113/0	218/0	165/0						
06A				FOR -DR	9	001/0	002/0	003/0	004/0	005/0	221/0	162/0	263/0	267/0			
07A	B20C4BW14V8			0	7	010/0	009/0	008/0	007/0	006/0	222/0	163/0					
08A		B	6	0	5	334/0	333/1	332/0	331/0	285/0	290/0						
09A	B20	A	6	0	9	334/0	330/0	329/0	328/0	317/0	219/0	296/0	274/0	273/0			
10A		O	C	0	9	082/0	084/0	085/0	084/0	087/0	223/0	161/0	244/0	245/0			
11A		B	0	10	1												

CLM ICN ICY KBL KYN CAF CAB CPEL CPC ICL IDPVAR(1) IDPVAR(2) INDY

COEFFICIENTS:
 A = -10 -8 -6 -4 -2 0 2 4 6 8 10
 B = 6 8 10 12 14 16 18 20 22 24
 C = -10 -8 -6 -4 -2 0 2 4 6 8 10

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OF POOR QUALITY

TEST TW-490 DATA SET COLLATION SHEET

Force-Booster + Orbiter, 0.0035-Scale, Launch Stability
and Control

PRETEST
 POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	SCHU. CONTROL DEFLECTIONS			RU. OF PINS	POS	i	MACH NUMBERS											
		u	r	e				0.6	0.9	1.0	1.1	1.2	1.46	1.96	2.99	4.96			
08A	B20+BS				5	1	0	157/6	156/6										
09A	B20W14+BS				5			134/6	135/6										
10A	B20W14+BSW17				5			121/6	120/6										
11A	B20C48W14+BSW17				5			122/6	123/6										
12A	B20C48+BS				5			137/6	138/6										
13A	B20+BSW17				5			152/6	153/6										
14A	B20+BSW17V17				5			151/6	150/6										
15A	B20C48+BSW17V17				5			147/6	147/6										
16A	B20C48W14V8+BSV17				5			127/6	126/6										
17A	B20+BS				5			340/6	339/6										
18A	B20C48W14V8+BSW17				5			323/6	322/6										
19A	B20C48W14+BSW17V17				5			318/6	319/6										
20A	B20+BSW17V17				5			335/6	334/6										
21A	B20C48W14V8+BSW17V17				9			317/6	316/6										
22A					9			025/6	024/6										
23A					5			024/6	023/6										
24A					5			019/6	020/6										
25A					5			018/6	017/6										
26A					8			011/6	012/6										
27A					5			032/6	031/6										

CLM K.N. KY. CBL ICYN CAF CAB CPB1 CPC CL
 COEFFICIENTS: α A = -10 - 8 - 6 - 4 - 2 0 2 4 6 8 10
 or β IDPVAR(1) IDPVAR(2) INDV
 SCHEDULES Pos 1: P/B-BASE Pos 4: P/B-BASE
 2: P/B-N/A S: B/B-AFT
 3: P/B-AFT

DELTA WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1130 C-1-369

DELTA WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1130 C-1- 370

TEST TWT-490 DATA SET COLLATION SHEET
 Force - Booster + Orbiter, 0.0035-Scale, Launch Stability
 and Control

PRETEST
 POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	SCHID.	CONTROL DEFLECTION:			NO. OF RUNS	OLB. ATT.	MACH NUMBERS									
			SE	SC	SD			0.6	0.9	1.0	1.1	1.2	1.46	1.96	2.99	4.96	
23A	B20C4Bw4V8+B5SW17V17	A	0	0	0	5	1	0	033/2	034/0	035/0	241/0	183/0				
29A		B	0	0	OFF	5	1	0	039/0	037/0	036/0	242/0	184/0				
22B		B	0	0	0	1	1	0	039/0	037/0							
23B		B	-20			1	1	0	030/0								
24B		B	-10			1	1	0	031/0								
25B		B	10			1	1	0	032/0								
26B		B	+10			1	1	0	033/0								
30B		B	-10B			1	1	0	034/0								
31B		B	0	-15		1	1	0	035/0								
22C		O	0	-30		9	1	0	046/0	045/0	044/0	042/0	043/0	186/0	244/0	262/0	
32C		O	0	0		9	1	0	046/0	045/0	044/0	042/0	043/0	186/0	244/0	262/0	
33C		O	0	0		5	1	0	047/0	048/0	049/0	246/0	187/0				
34C		O	0	0		5	1	0	052/0	051/0	050/0	245/0	188/0				
35C		O	0	OFF		5	1	0	039/0	040/0	041/0	244/0	185/0				
36A		A	0	0		5	1	0	053/0	054/0	055/0	247/0	176/0				
37A		A	0	0		5	1	0	058/0	057/0	056/0	248/0	175/0				
38A		A	0	0		5	1	0	059/0	060/0	061/0	249/0	191/0				
38C		O	0	0		5	1	0	070/0	069/0	068/0	252/0	192/0				
39A		A	0	0		5	1	0	064/0	063/0	062/0	250/0	190/0				
40A		A	0	0		5	1	0	065/0	066/0	067/0	251/0	189/0				

7 11 19 25 31 37 43 49 55 61 67 7576
 C.L.M. K.N. K.Y. K.B.L. K.Y.N. C.A.F. C.A.B. K.P.B.1. C.P.C. K.L. IDPVAR(1) IDPVAR(2) INDV

COEFFICIENTS:
 a or b
 SCHEDULES
 A = 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24
 B = 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24
 C = 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24

TEST TWT-490 DATA SET COLLATION SHEET
Force - Booster + Orbiter, 0.0035-Scale, Launch Stability
and Control

PRETEST
 POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	Sched. No.	CONTROL DEFLECTION			ORB. ATT. Pos	MACH NUMBERS										
			SE	SC	SE		0.6	0.9	1.0	1.1	1.2	1.46	1.96	2.99	4.96		
R32-41A	B20C4BN14V8+85W17V17	A	0	0	0	3	0	074/0	074/0	074/0	074/0	074/0	074/0	074/0	074/0	074/0	074/0
42C		O	0	0	0	3	0	071/0	071/0	071/0	071/0	071/0	071/0	071/0	071/0	071/0	071/0
43A		A	0	0	0	3	0	077/0	077/0	077/0	077/0	077/0	077/0	077/0	077/0	077/0	077/0
44A		O	0	0	0	3	0	081/0	081/0	081/0	081/0	081/0	081/0	081/0	081/0	081/0	081/0
45A	B20W14+85	A	0	0	0	4	0	133/0	133/0	133/0	133/0	133/0	133/0	133/0	133/0	133/0	133/0
46A	B20W14+85W17	O	0	0	0	4	0	116/0	116/0	116/0	116/0	116/0	116/0	116/0	116/0	116/0	116/0
47A	B20C4BN14+85	O	0	0	0	4	0	128/0	128/0	128/0	128/0	128/0	128/0	128/0	128/0	128/0	128/0
48A	B20C4BN14+85W17V17	O	0	0	0	4	0	109/0	109/0	109/0	109/0	109/0	109/0	109/0	109/0	109/0	109/0
49A	B20C4B+85	O	0	0	0	4	0	145/0	145/0	145/0	145/0	145/0	145/0	145/0	145/0	145/0	145/0
50A	B20C4BN14V8+85W17V17	O	0	0	0	4	0	097/0	097/0	097/0	097/0	097/0	097/0	097/0	097/0	097/0	097/0
51A		B	10	0	0	4	0	098/0	098/0	098/0	098/0	098/0	098/0	098/0	098/0	098/0	098/0
51B		B	10	0	0	4	0	307/0	307/0	307/0	307/0	307/0	307/0	307/0	307/0	307/0	307/0
50B		B	10	0	0	4	0	306/0	306/0	306/0	306/0	306/0	306/0	306/0	306/0	306/0	306/0
50C		O	10	0	0	4	0	088/0	088/0	088/0	088/0	088/0	088/0	088/0	088/0	088/0	088/0
51A		A	0	0	0	4	0	103/0	103/0	103/0	103/0	103/0	103/0	103/0	103/0	103/0	103/0
53A		O	10	0	0	4	0	090/0	090/0	090/0	090/0	090/0	090/0	090/0	090/0	090/0	090/0
54A		O	10	0	0	4	0	091/0	091/0	091/0	091/0	091/0	091/0	091/0	091/0	091/0	091/0
55A		O	10	0	0	4	0	104/0	104/0	104/0	104/0	104/0	104/0	104/0	104/0	104/0	104/0
56A		O	10	0	0	4	0	331/0	331/0	331/0	331/0	331/0	331/0	331/0	331/0	331/0	331/0

CLM 7 13 19 25 31 37 43 49 55 61 67 7576
KN KY KBL CYN CAF CAB CPB1 CPC CL
INDPVAR(1) INDV(2) INDV(3) POS 4: B/B - DASE S: B/B - AFT
INDPVAR(1) INDV(2) INDV(3) POS 1: P/B - BASE POS 2: P/B - N/N S: P/B - AFT
INDPVAR(1) INDV(2) INDV(3) POS 1: P/B - BASE POS 2: P/B - N/N S: P/B - AFT

COEFFICIENTS:
a or b
SCHEDULES

DELTA WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1130 C-1-371

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DELTA WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1130 C-1- 372

SSV LAUNCH CONFIGURATION

P166Y Back - Baseline
(Position 1)

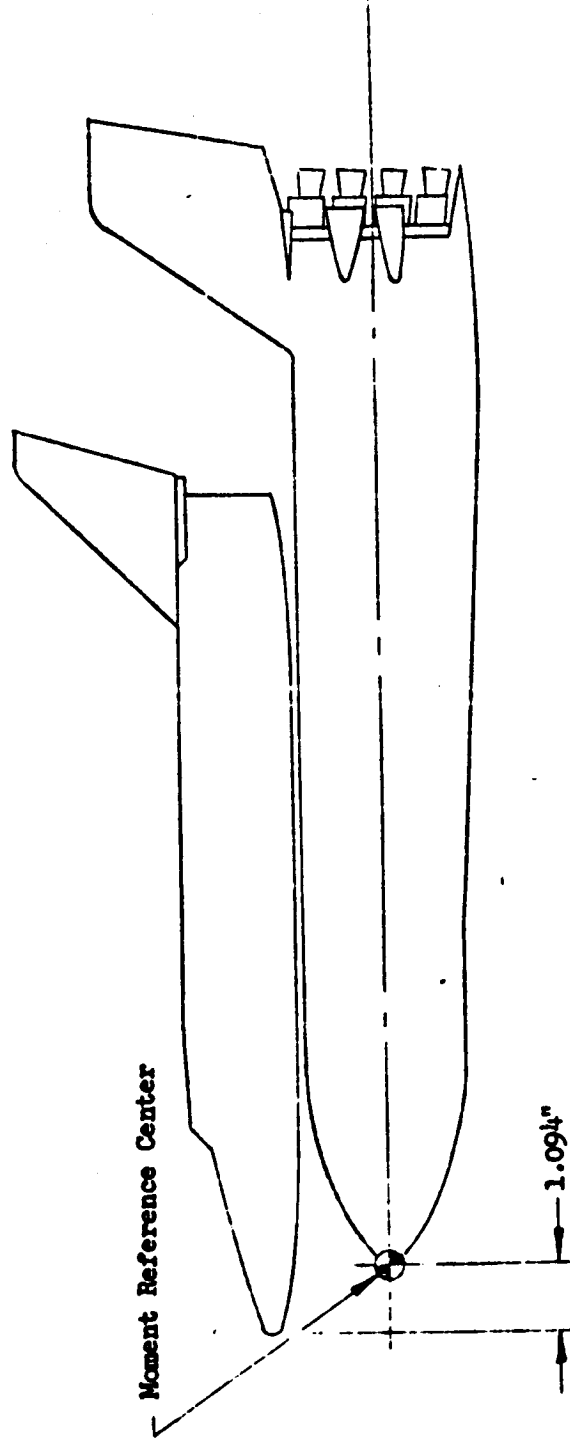


FIGURE 6. BOOSTER ORBITER MOUNTING RELATIONSHIPS

SSV LAUNCH CONFIGURATION

Piggy Back - Nose To Nose
(Position 2)

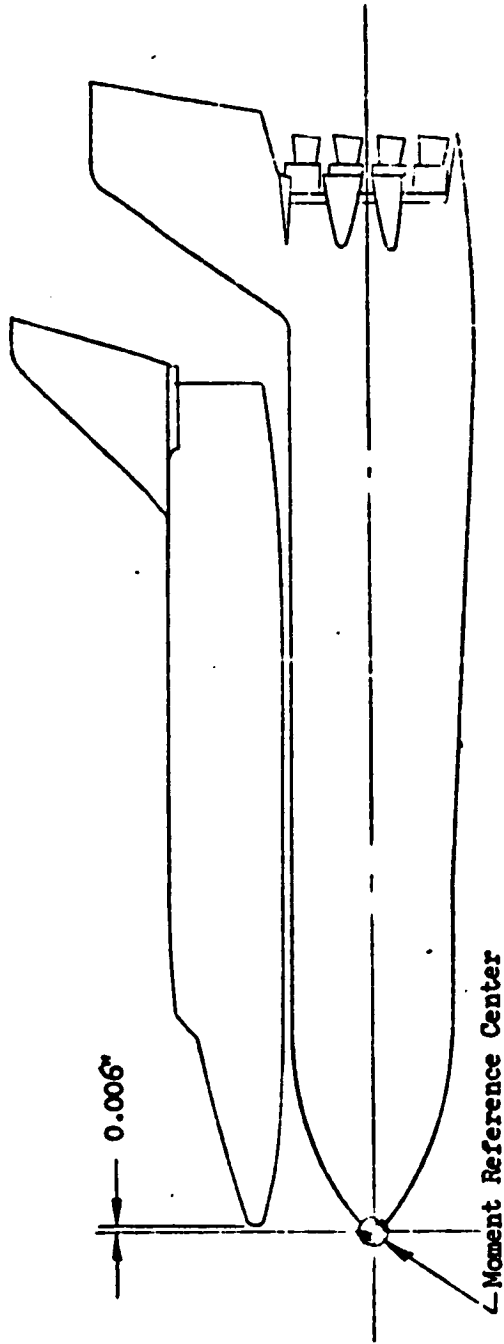


FIGURE 6. BOOSTER ORBITER MOUNTING RELATIONSHIPS (Continued)

DELTA WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1130 C-1- 373

DELTA WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1130 C-1- 374

SSV LAUNCH CONFIGURATION

Piggy Back - Orbiter Aft
(Position 3)

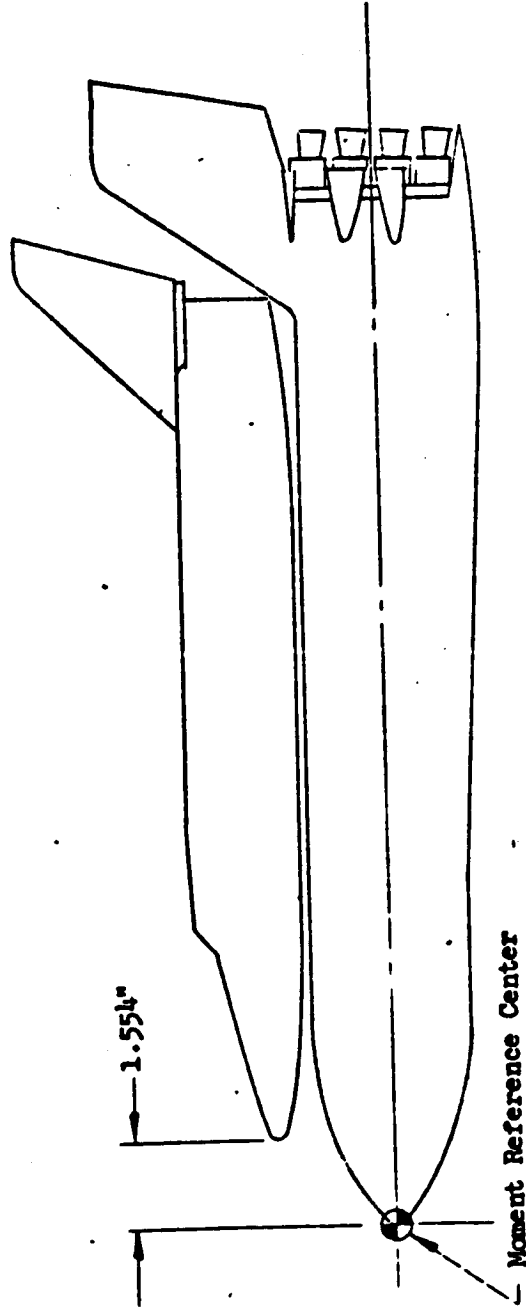


FIGURE 6. BOOSTER ORBITER MOUNTING RELATIONSHIPS (Continued)

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SSV LAUNCH CONFIGURATION

Belly To Belly - Baseline
(Position 4)

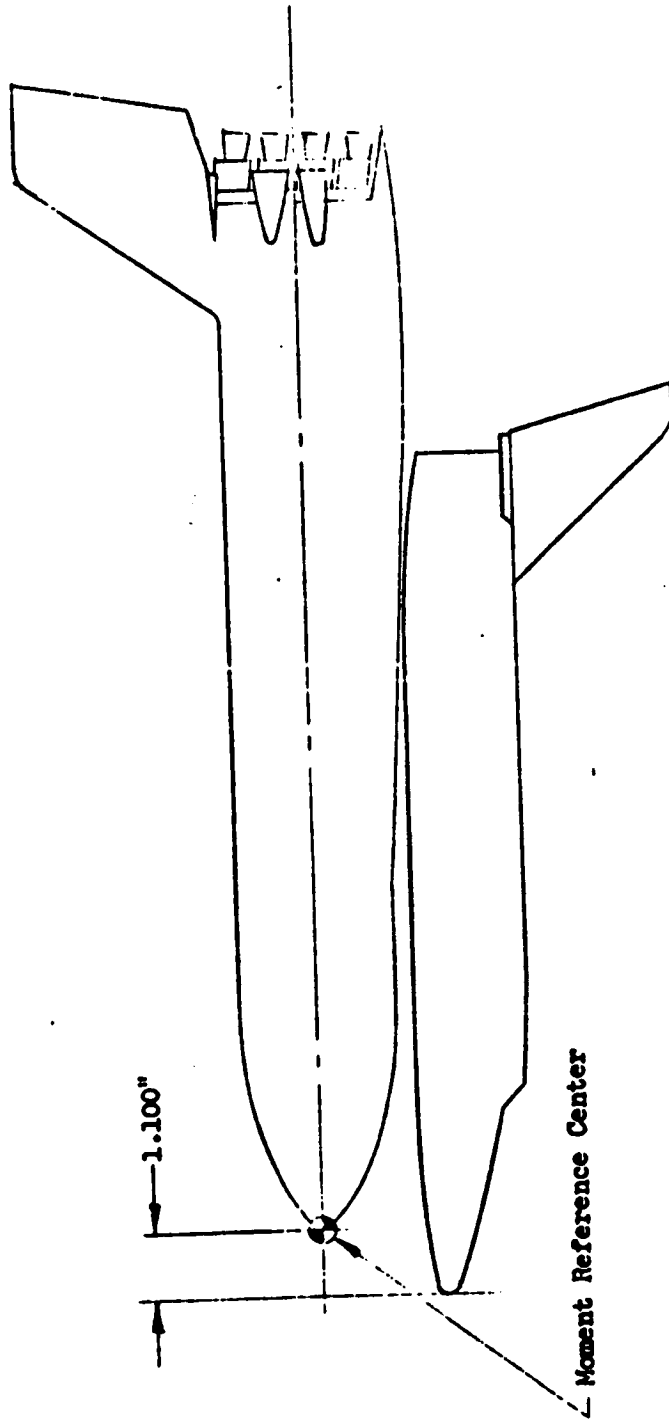


FIGURE 6. BOOSTER ORBITER MOUNTING RELATIONSHIPS (Continued)

DELTA WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1130 C-1- 375

DELTA WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1130 C-1- 376

SSV LAUNCH CONFIGURATION

Belly To Belly - Ast
(Position 5)

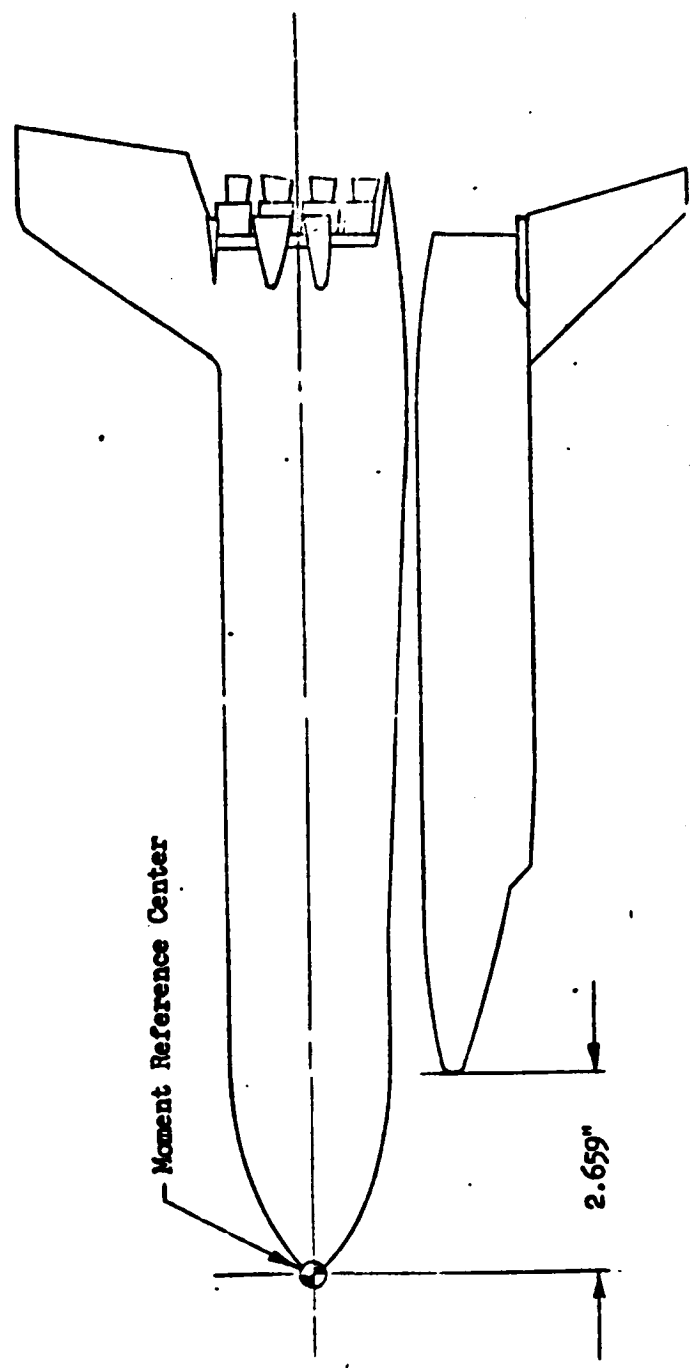


FIGURE 6. BOOSTER ORBITER MOUNTING RELATIONSHIPS (Continued)

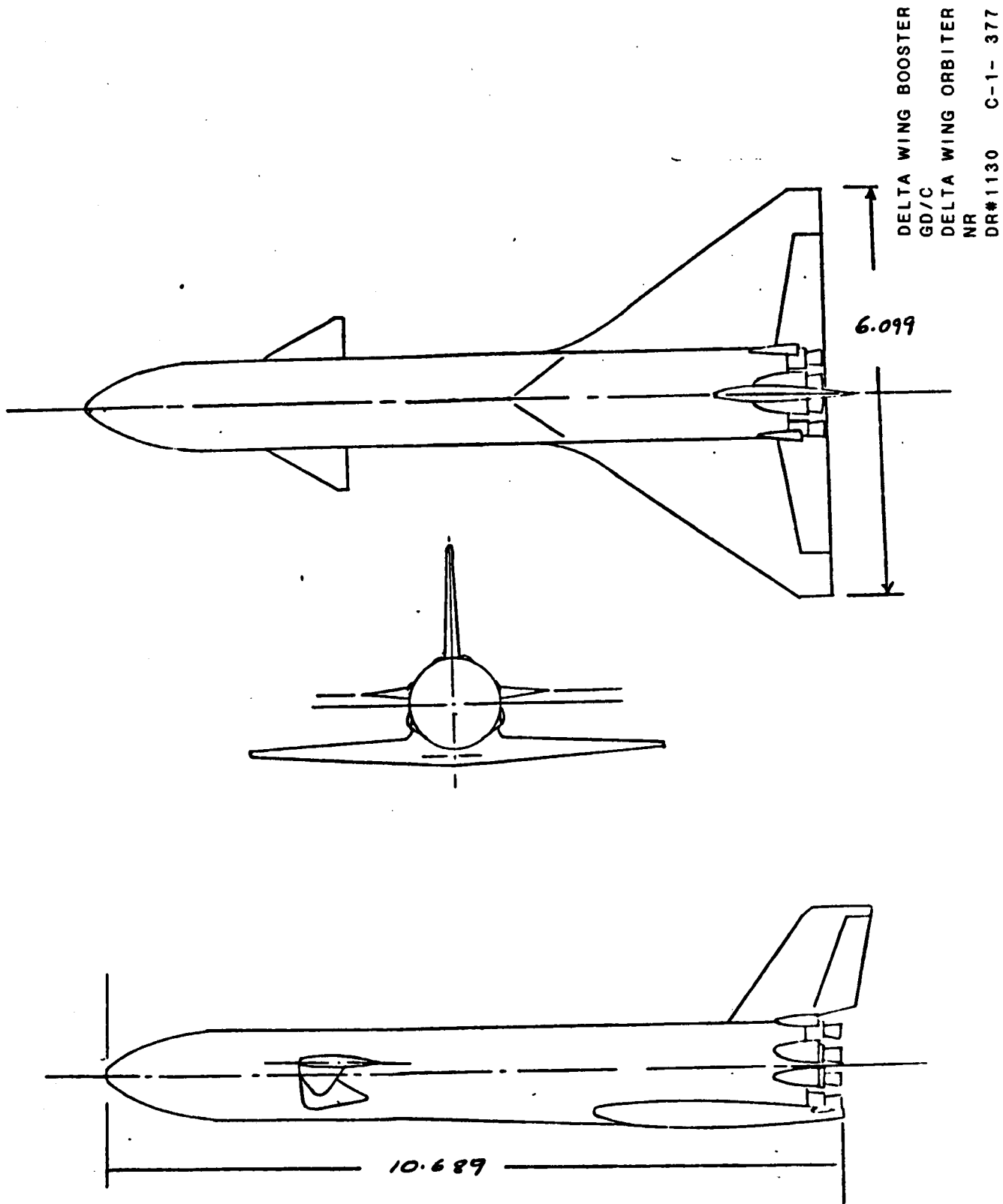


FIGURE 7. THREE-VIEW SKETCH OF BOOSTER $B_{20} W_{11} C_{48} V_8$

DELTA WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1130 C-1- 378

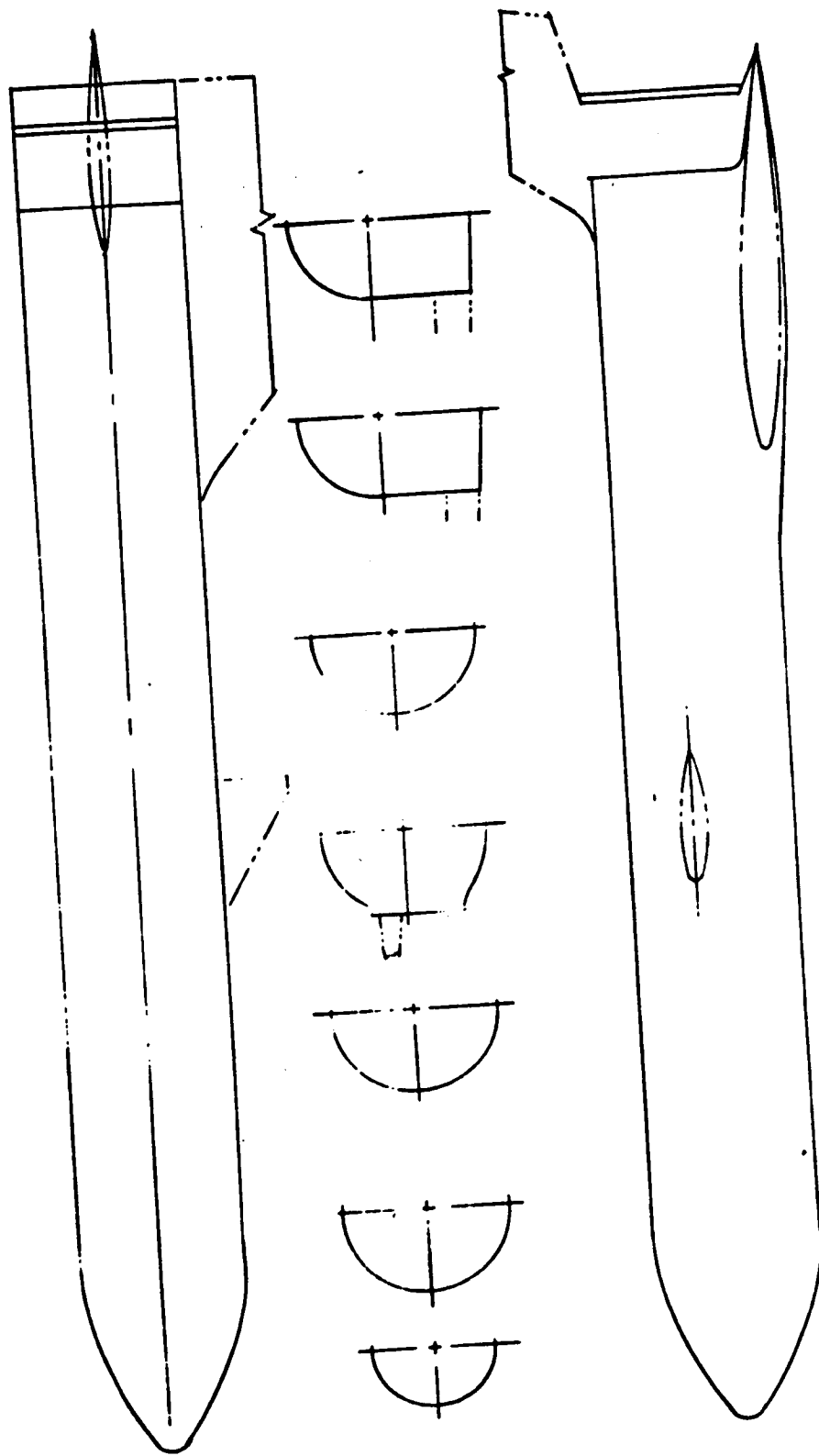


FIGURE 8.
BODY B20 - BOOSTER B-15 B-1 (LENGTHENED 10%) CONFIGURATION

DELTA WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1130 C-1- 379

MODEL DESCRIPTION

Delta Wing Booster - (Cont'd)

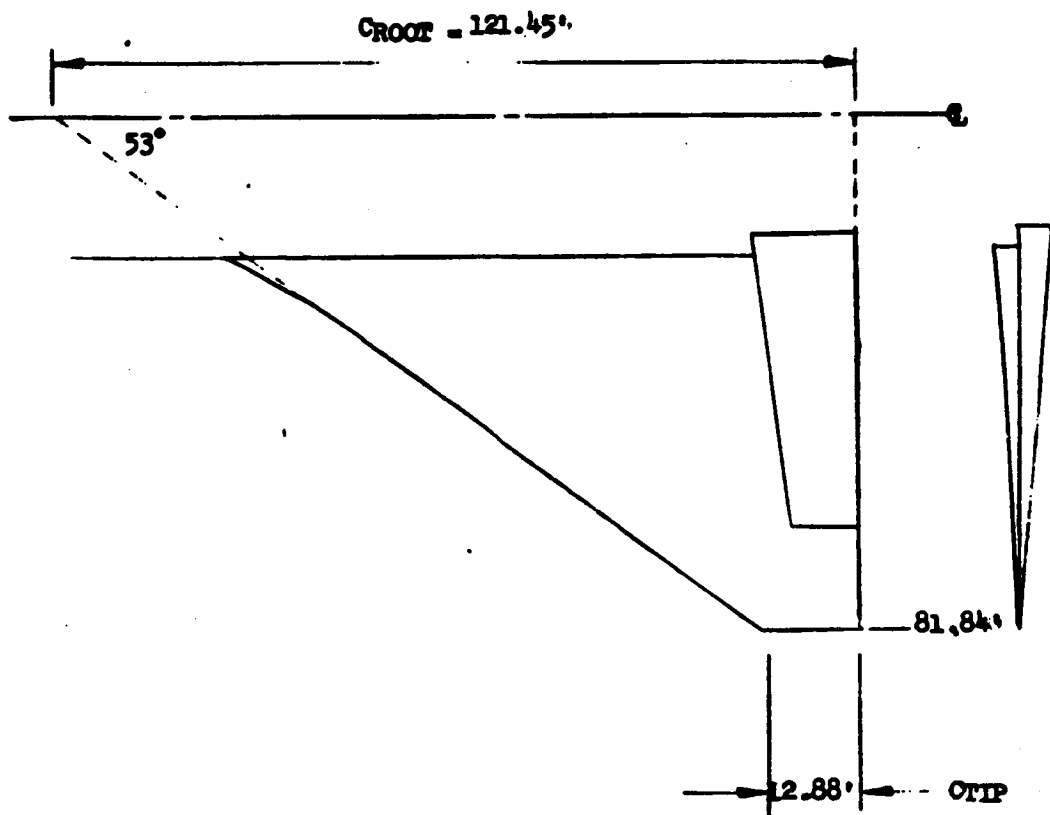


FIGURE 9. WING W₁₄ - BOOSTER CONFIGURATION

DELTA WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1130 C-1- 380

LOS ANGELES DIVISION
NORTH AMERICAN ROCKWELL CORPORATION

MODEL DESCRIPTION

Delta Wing Booster - (Cont'd)

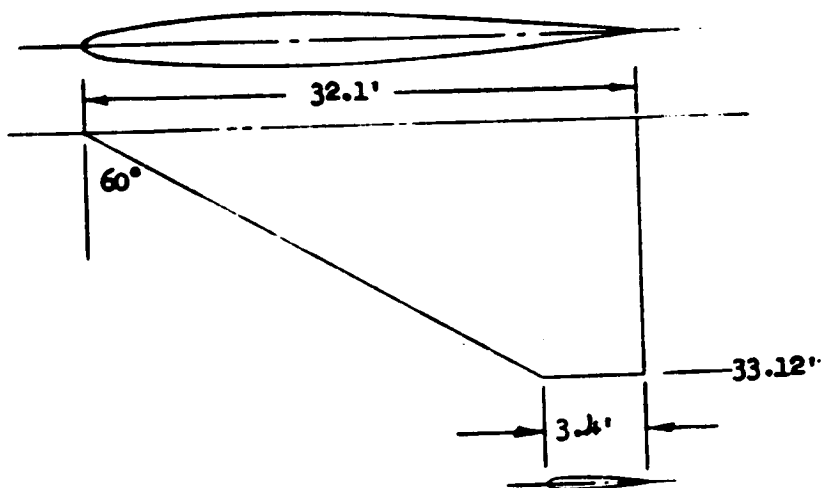


FIGURE 10. CANARD - C4

LOS ANGELES DIVISION
NORTH AMERICAN ROCKWELL CORPORATION

MODEL DESCRIPTION

Delta Wing Booster - (Cont'd)

DELTA WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1130 C-1-381

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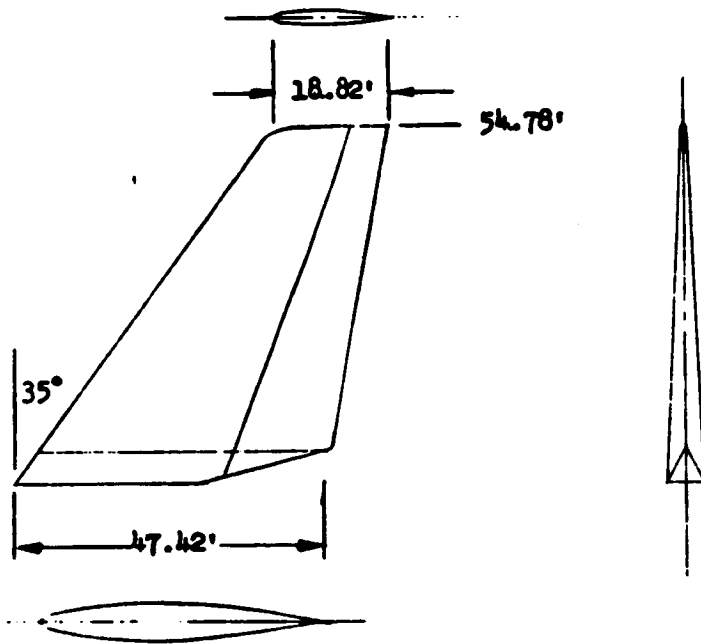


FIGURE 11. VERTICAL TAIL - V8

DELTA WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1130 C-1- 382

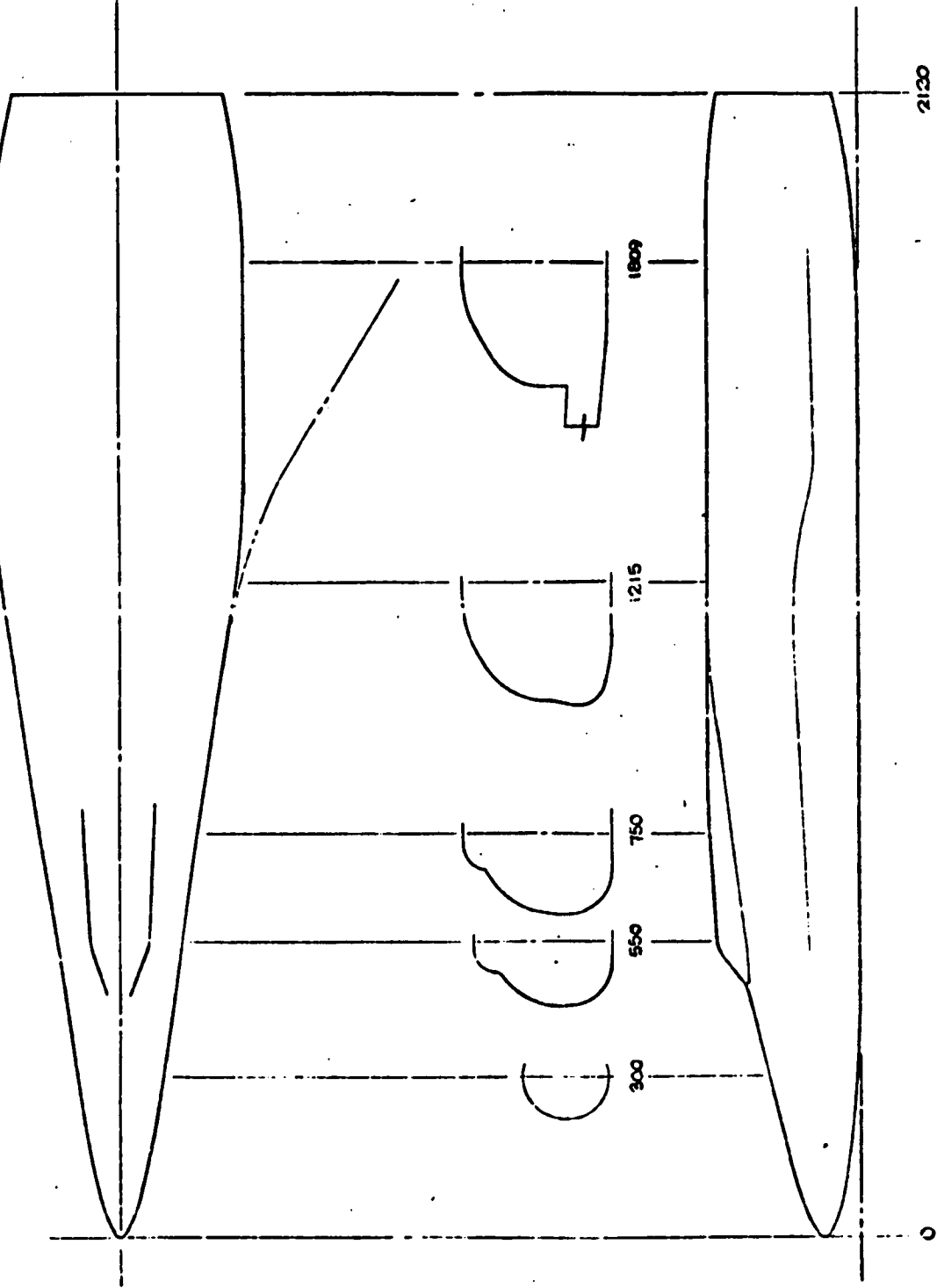


FIGURE 12. BODY 25 - 9302-134B CONFIGURATION

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LOS ANGELES DIVISION
 NORTH AMERICAN ROCKWELL CORPORATION

DELTA WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1130 C-1-383

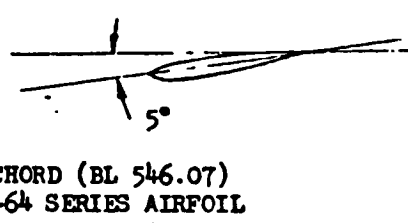
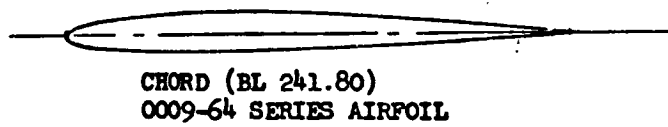
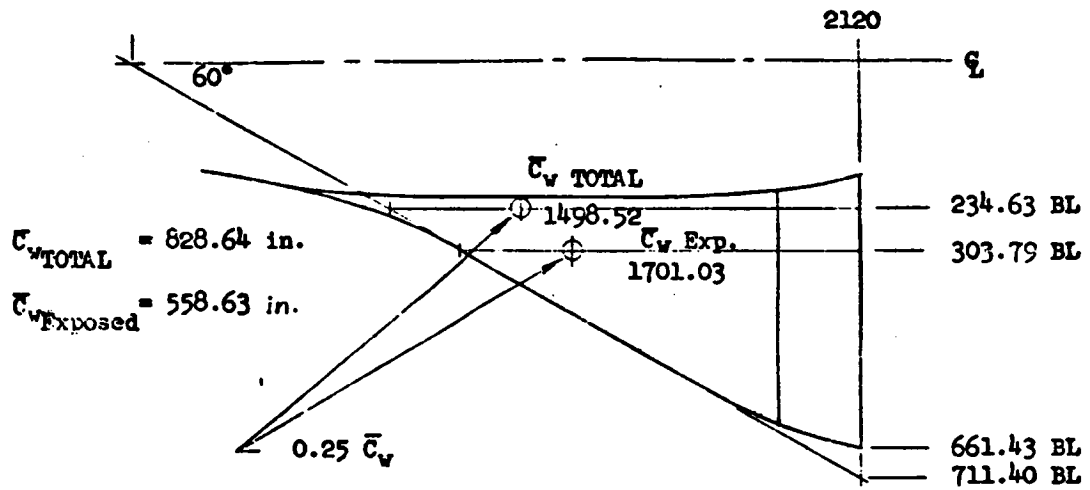


FIGURE 13. WING W₁₇ 9992-134 D Configuration

DELTA WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1130 C-1-384

LOS ANGELES DIVISION
NORTH AMERICAN ROCKWELL CORPORATION

MODEL DESCRIPTION - CONTINUED
Dimensional Data - Continued
Delta Wing Orbiter - Continued

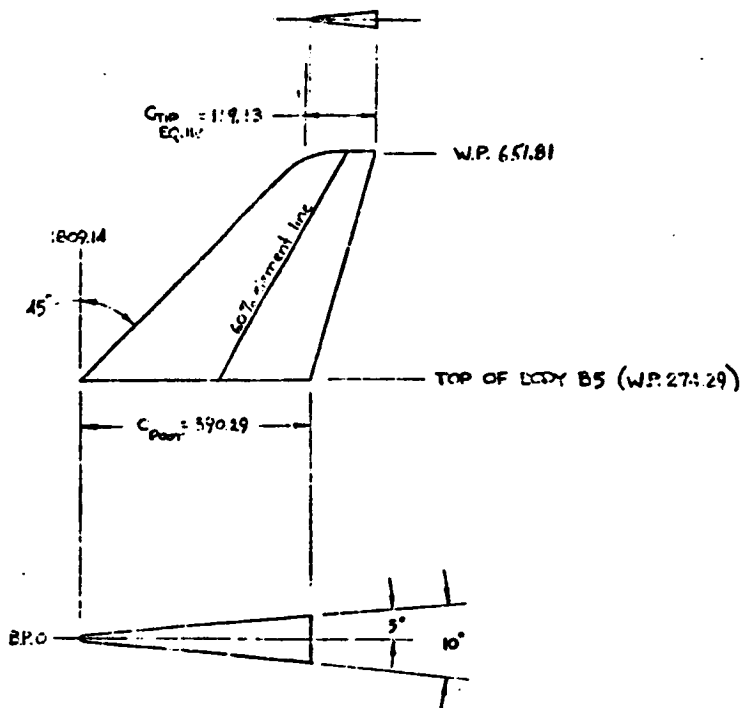
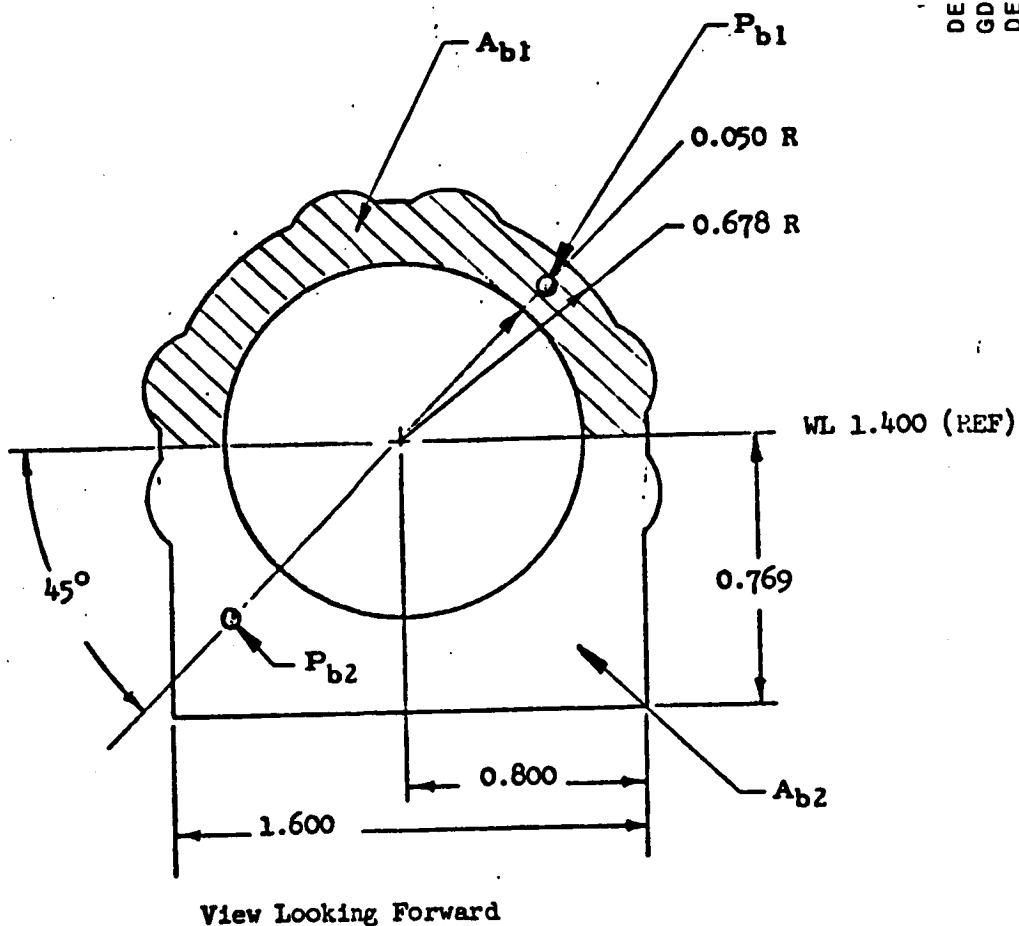


FIGURE 14.
VERTICAL STABILIZER V17

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DELTA WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1130 C-1- 385



NOTE: Location of pressure taps may vary slightly as installation will be made during test setup.

FIGURE 15. BOOSTER BASE PRESSURE ORIFICE LOCATIONS

DELTA WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1237 C-1- 388

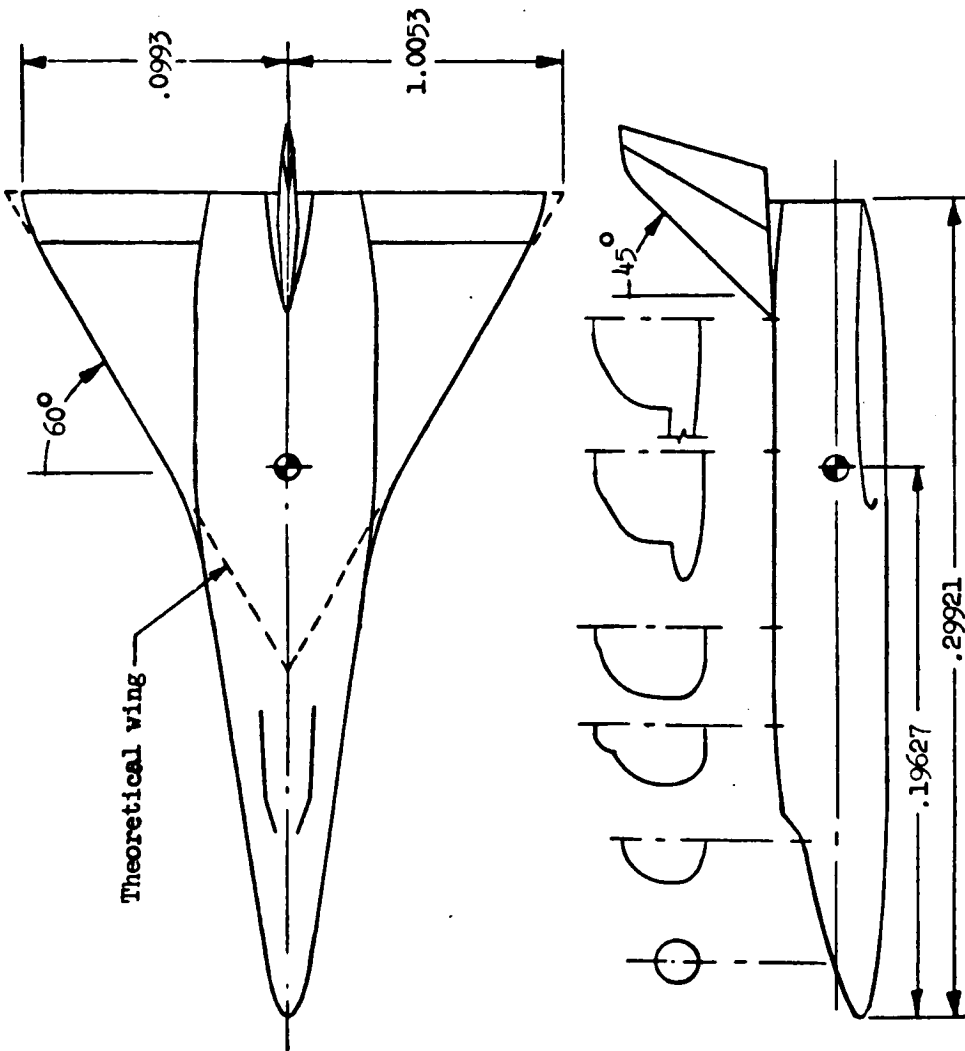
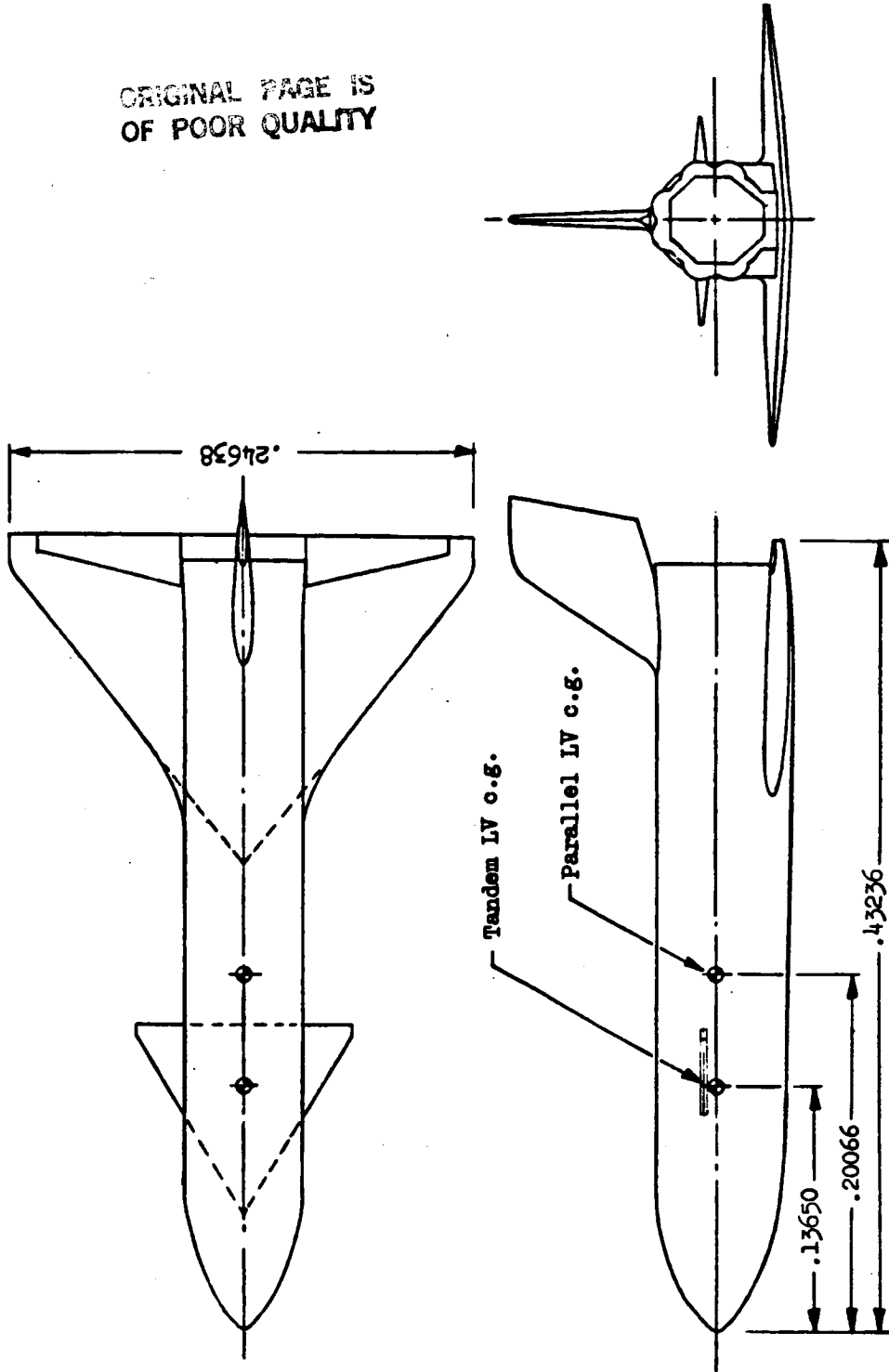


Figure 2. - North American Rockwell 134 D Orbiter
All dimensions are in meters.

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DELTA WING BOOSTER
DELTA WING ORBITER
NR
DR#1237 C-1- 389

Figure 3.- General Dynamics B9U booster. All dimensions are given in meters.

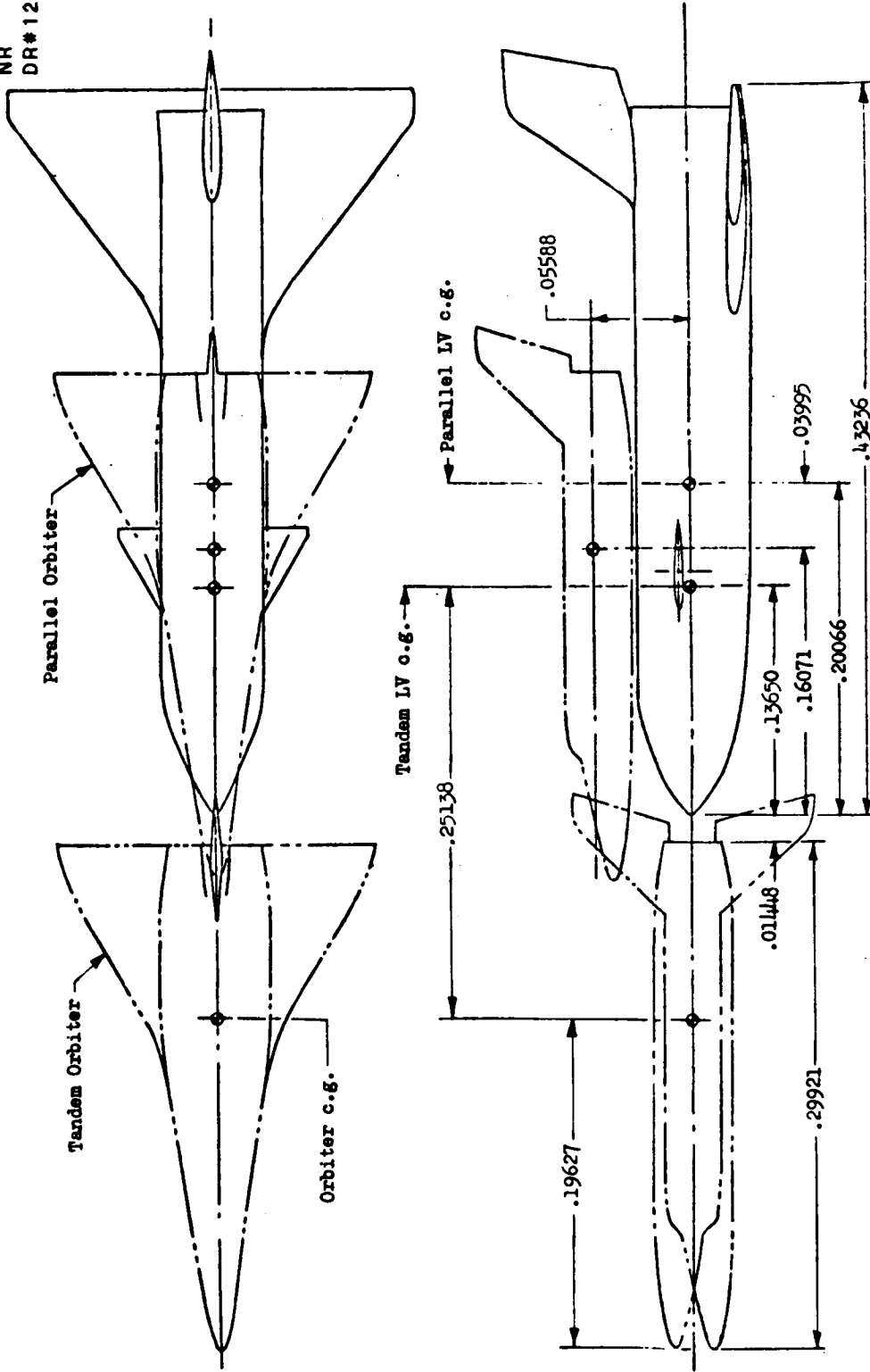


Figure 4.- Tandem and parallel launch configurations. All dimensions are given in meters.

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TABLE II

TEST TWT 517 DATA SET/RUN NUMBER

COLLATION SUMMARY

S-0440
DMS-DR-1213

PRETEST
 POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	SCHD.		PARAMETERS/VALUES			NO. of RUNS	MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE)					TEST RUN NUMBERS		
		A	B	SE	SE	SE		SC	SC	SC	SC	SC			
R56001	B1 C1	A	0	-	-	-	0	.6	.9	1.0	1.2	1.96	2.74	3.98	4.96
002		B						0.37	0.42	0.47	0.63	0.82	0.91	0.92	0.92
003		C						0.38	0.39	0.40	0.62	0.70	0.70	0.89	0.89
004	B1 W1 C1	A		0				0.33	0.34	0.35	0.41	0.44	0.44	0.59	0.59
005		B						0.33	0.33	0.33	0.40	0.40	0.40	0.49	0.49
006		C						0.33	0.34	0.35	0.41	0.44	0.44	0.59	0.59
007	B1 W1	A						0.33	0.33	0.33	0.40	0.40	0.40	0.49	0.49
008		B						0.33	0.33	0.33	0.40	0.40	0.40	0.49	0.49
009		C						0.33	0.33	0.33	0.40	0.40	0.40	0.49	0.49
010		D						0.33	0.33	0.33	0.40	0.40	0.40	0.49	0.49
011		15						0.29	0.29	0.29	0.39	0.49	0.49	0.49	0.49
012		30						0.29	0.29	0.29	0.39	0.49	0.49	0.49	0.49
013		50						0.29	0.29	0.29	0.39	0.49	0.49	0.49	0.49
014	B1 W1 V1	A	0	0	0	0	0	0.20	0.21	0.22	0.58	0.68	0.68	0.68	0.68
015		B						0.20	0.21	0.22	0.58	0.68	0.68	0.68	0.68
016		C						0.20	0.21	0.22	0.58	0.68	0.68	0.68	0.68
017		D						0.20	0.21	0.22	0.58	0.68	0.68	0.68	0.68
018		15						0.24	0.24	0.24	0.58	0.68	0.68	0.68	0.68
019		30						0.24	0.24	0.24	0.58	0.68	0.68	0.68	0.68
020		50						0.24	0.24	0.24	0.58	0.68	0.68	0.68	0.68

CLM CN CY CZ CAB CAC CL CD
 IDPVAR(1) IDPVAR(2) NDY

COEFFICIENTS:
 A: $\alpha = 0^\circ$ TO 20° D: $\beta = -10^\circ$ TO 10°
 B: $\alpha = 20^\circ$ TO 40° A $\alpha = \Delta\beta = 2^\circ$
 C: $\alpha = 40^\circ$ TO 60°

DELTA WING BOOSTER
 MMC
 DELTA WING ORBITER
 MSC
 DR#1213 C-1-391

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DELTA WING BOOSTER
MMC
DELTA WING ORBITER
MSC
DR#1213 C-1- 392
POSTTEST

TABLE II (Continued)
TEST TWT517 DATA SET/RUN NUMBER
COLLATION SUMMARY

DATA SET IDENTIFIER	CONFIGURATION	SCHD.			PARAMETERS/VALUES			NO. of RUNS	MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE)						TEST RUN NUMBERS		
		A	B	C	δE	δRL	δSZ		δC	.6	.9	1.0	1.2	1.96		2.74	3.48
R56021	B W C V I	A	0	0	0	0	0	00%	00%	00%	00%	00%	00%	00%	00%	00%	00%
022		B						120%				114%	08%	05%	08%	08%	
023		C						00%				05%	08%	08%	08%		
024		D						00%	00%	00%	00%	05%					
025		15						00%	00%	00%	00%	11%	06%	06%	06%	08%	
026		30						00%	00%	00%	00%	11%	06%	06%	06%	08%	
027		50						01%				06%	06%	06%	06%	08%	
028		A	0				10					06%				08%	
029		C					-50					015%				08%	
030		D					-20-20	0				010%	05%				
031		15										010%	05%				
032		30										010%	05%				
033		50										010%	05%				
034		30					20					017%	07%				
035		50										017%	07%				
036		30					-40					015%	07%				
037		50										014%	05%				
038		A	0	-10			0					014%	05%				
039		B										015%	07%				
040		C					10					015%	07%				

COEFFICIENTS:
 A: $\alpha = 0^\circ$ TO 20° D: $B = -10^\circ$ TO 10°
 B: $\alpha = 20^\circ$ TO 40° $\Delta \alpha = \Delta B = 2^\circ$
 C: $\alpha = 40^\circ$ TO 60°

NASA-MSC-MAF

DELTA WING BOOSTER
 MMC
 DELTA WING ORBITER
 MSC
 DR#1213 C-1- 394

NOTE: 1. Dimensions are in inches.
 2. Model values are shown in parenthesis.

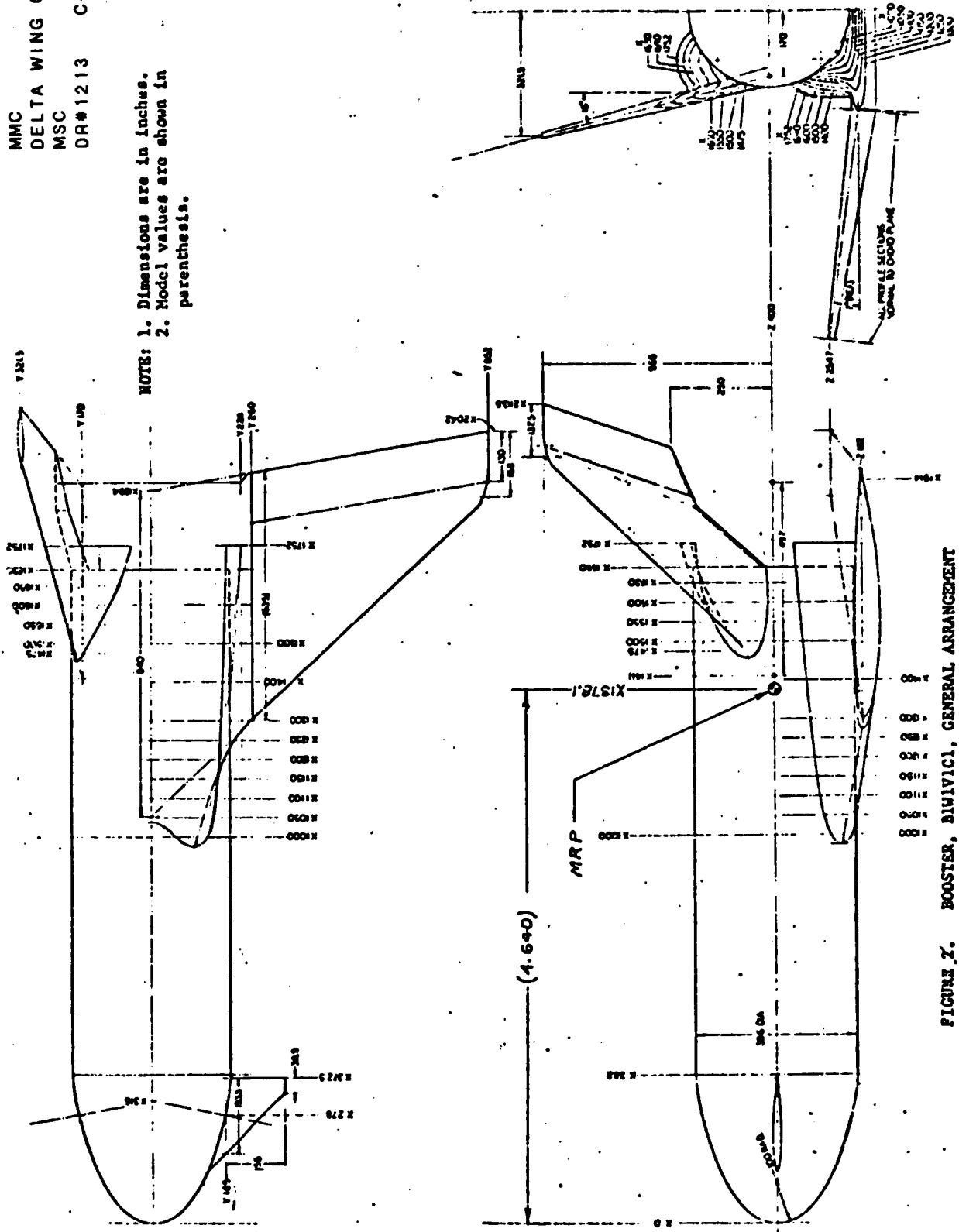
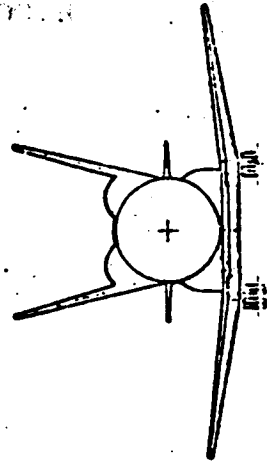
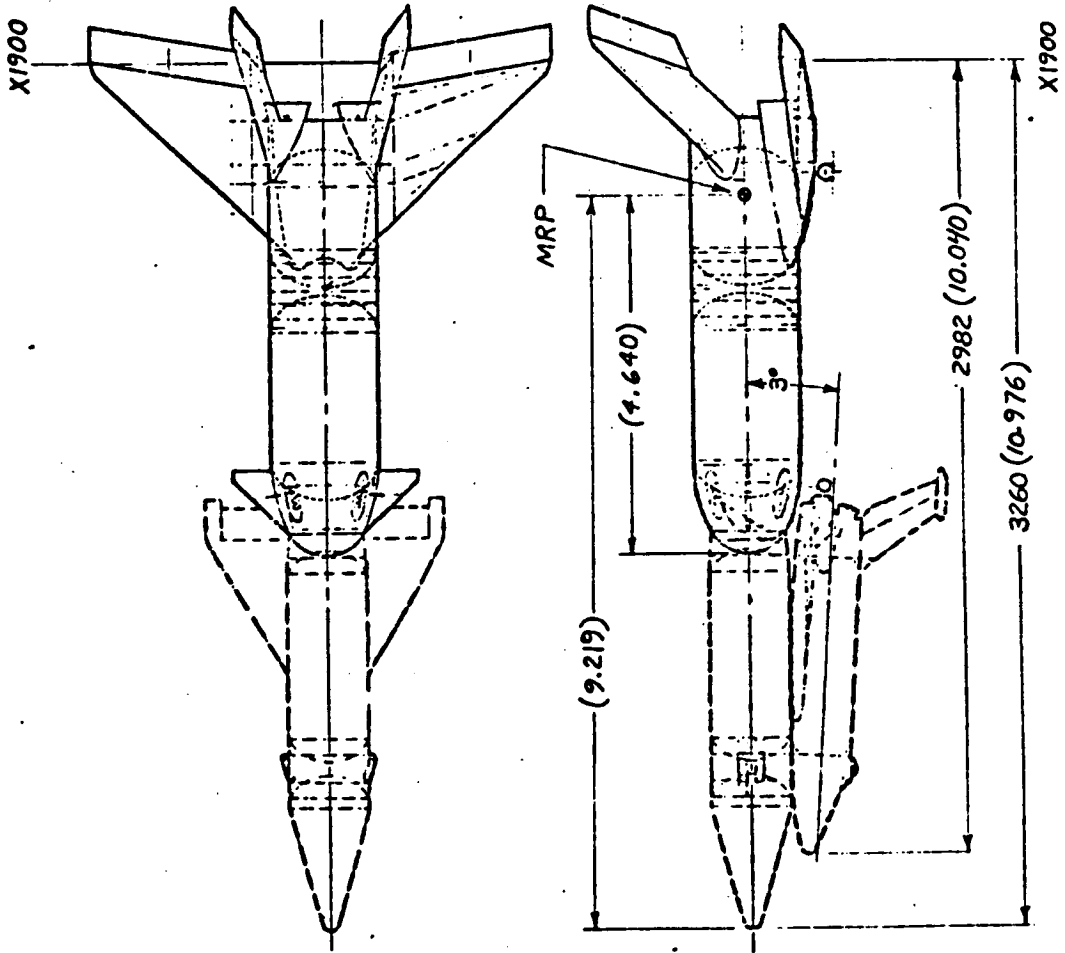


FIGURE 2. BOOSTER, BIVIVICI, GENERAL ARRANGEMENT

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NOTE: 1. Dimensions are in inches
2. Model values are shown in
parenthesis



DELTA WING BOOSTER
MMC
DELTA WING ORBITER
MSC
DR#1213 C-1- 395

FIGURE 3. LAUNCH CONFIGURATION, L1 O1 D1, GENERAL ARRANGEMENT

DELTA WING BOOSTER
 MMC
 DELTA WING ORBITER
 MSC

DR#1213 C-1-396
 NOTES: 1. All dimensions are full scale
 in inches unless otherwise
 indicated.
 2. Model values are shown in
 inches in parenthesis.

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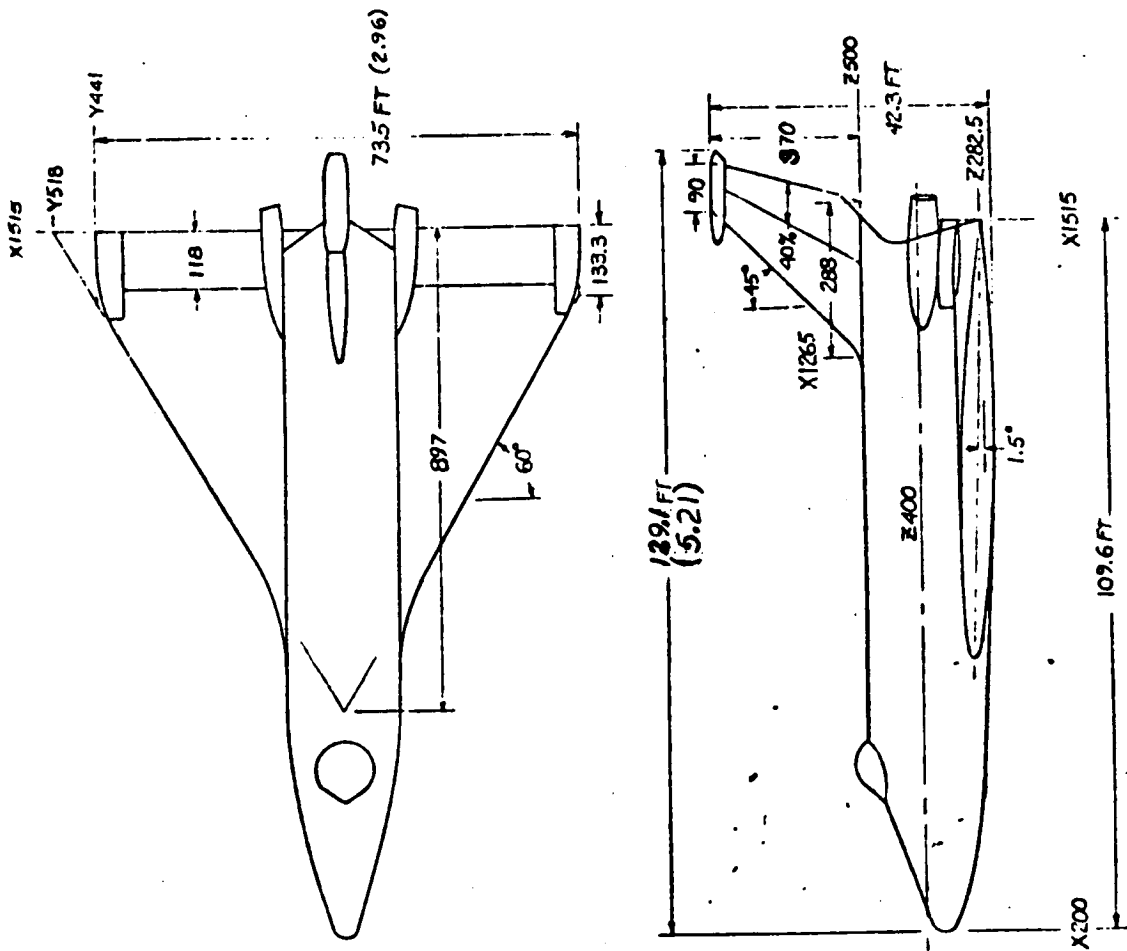
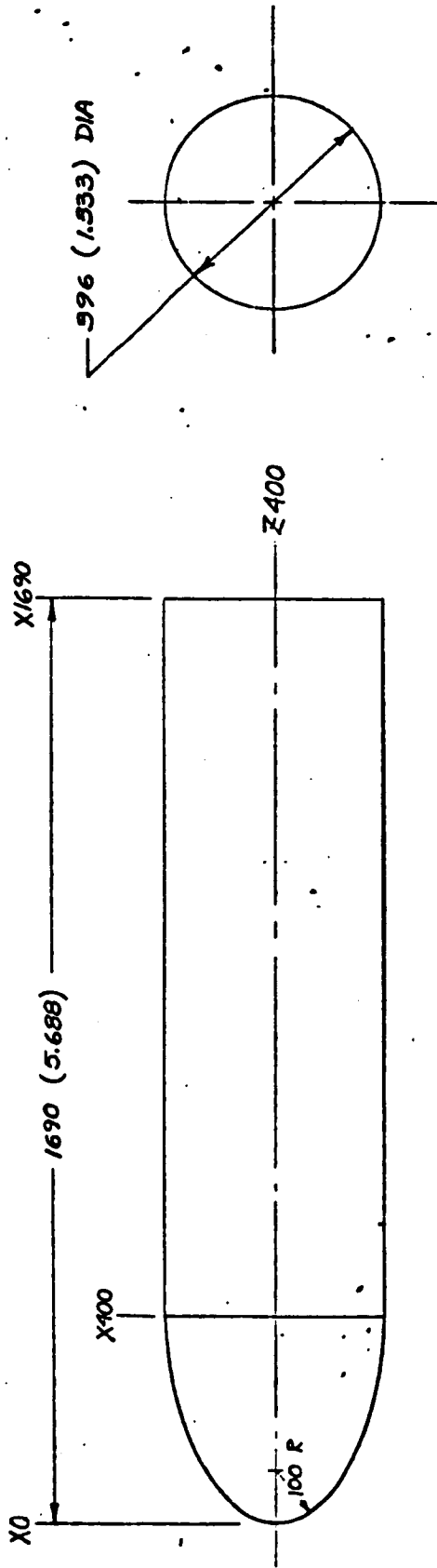


FIGURE 4. GENERAL ARRANGEMENT OF 040A ORBITER

- NOTES:**
1. All dimensions are in inches
 2. Model values are shown in parenthesis



DELTA WING BOOSTER
 MMC
 DELTA WING ORBITER
 MSC
 DR#1213 C-1- 397

FIGURE 5. BOOSTER BODY, B1

DELTA WING BOOSTER
 MMC
 DELTA WING ORBITER
 MSC
 DR#1213 C-1- 398

NOTES:

1. All dimensions are in inches
2. Model values are shown in parenthesis

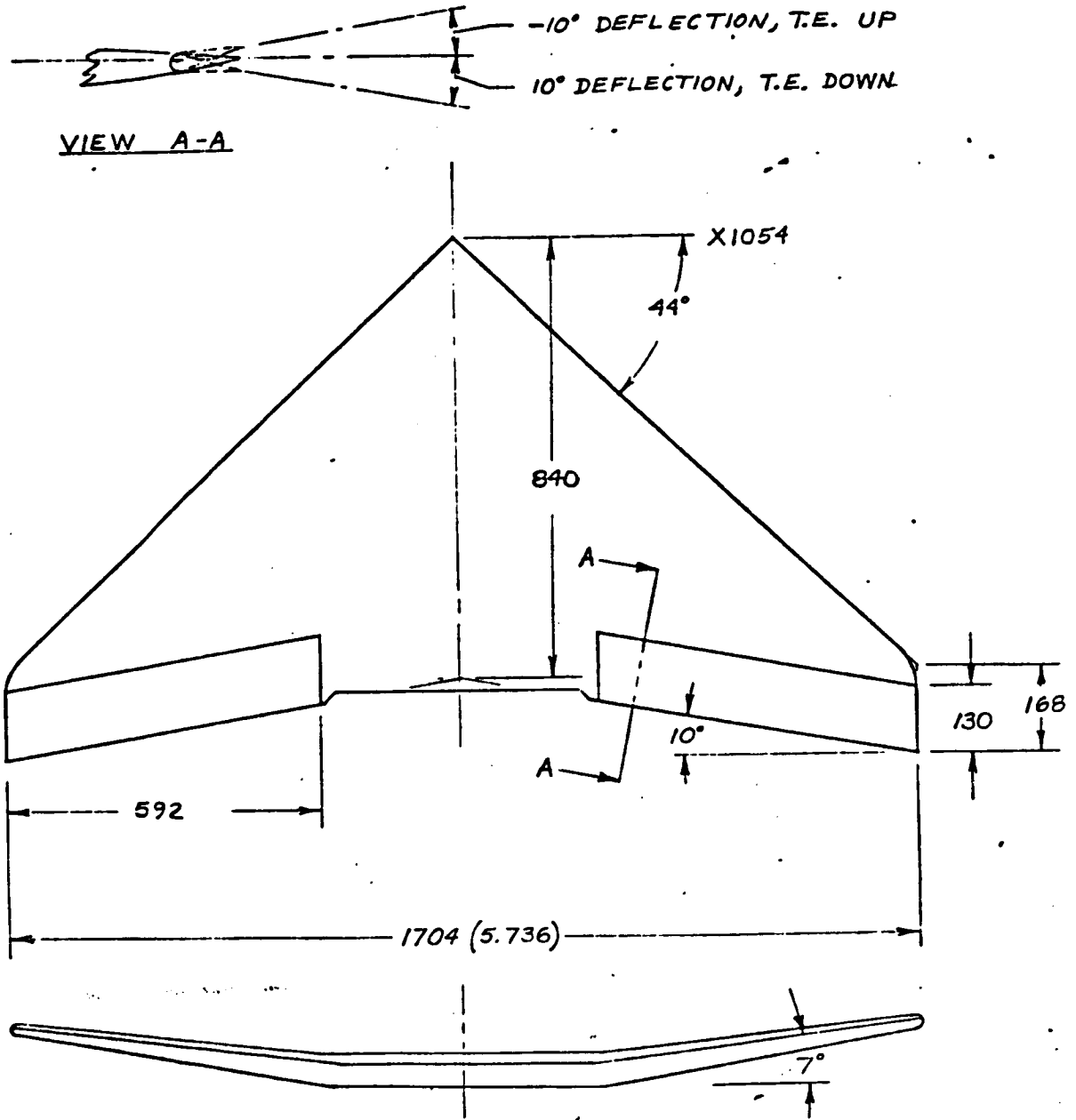


FIGURE 6. BOOSTER WING AND ELEVON, W1

DELTA WING BOOSTER
MMC
DELTA WING ORBITER
MSC
DR#1213 C-1-399

NOTES:

- 1. All dimensions are in inches
- 2. Model values are shown in parentheses

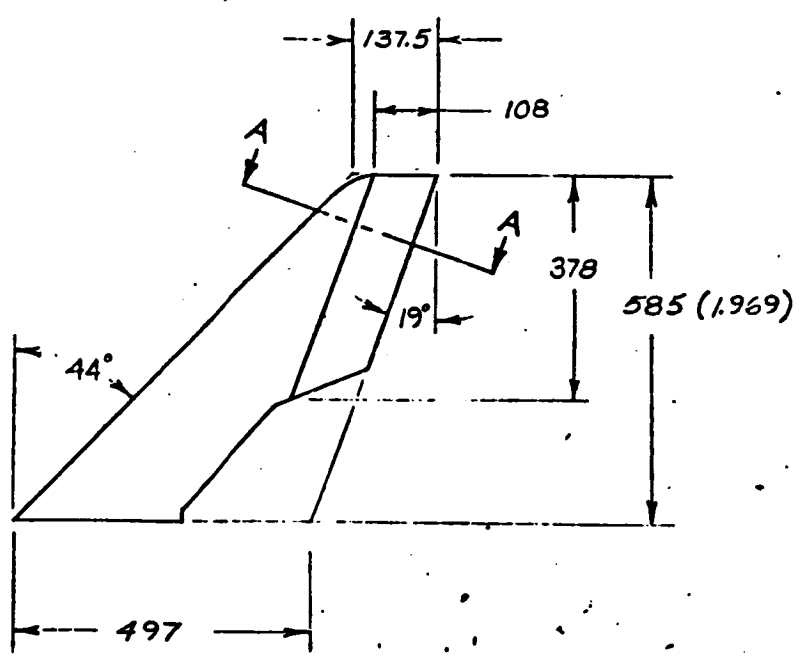
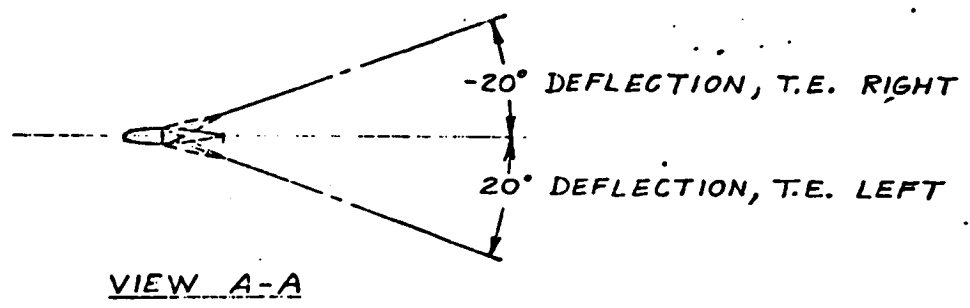


FIGURE 7 . BOOSTER VERTICAL TAIL AND RUDDER, V1

DELTA WING BOOSTER
MMC
DELTA WING ORBITER
MSC
DR#1213 C-1- 400

NOTES:

- 1. All dimensions are in inches
- 2. Model values are shown in parenthesis

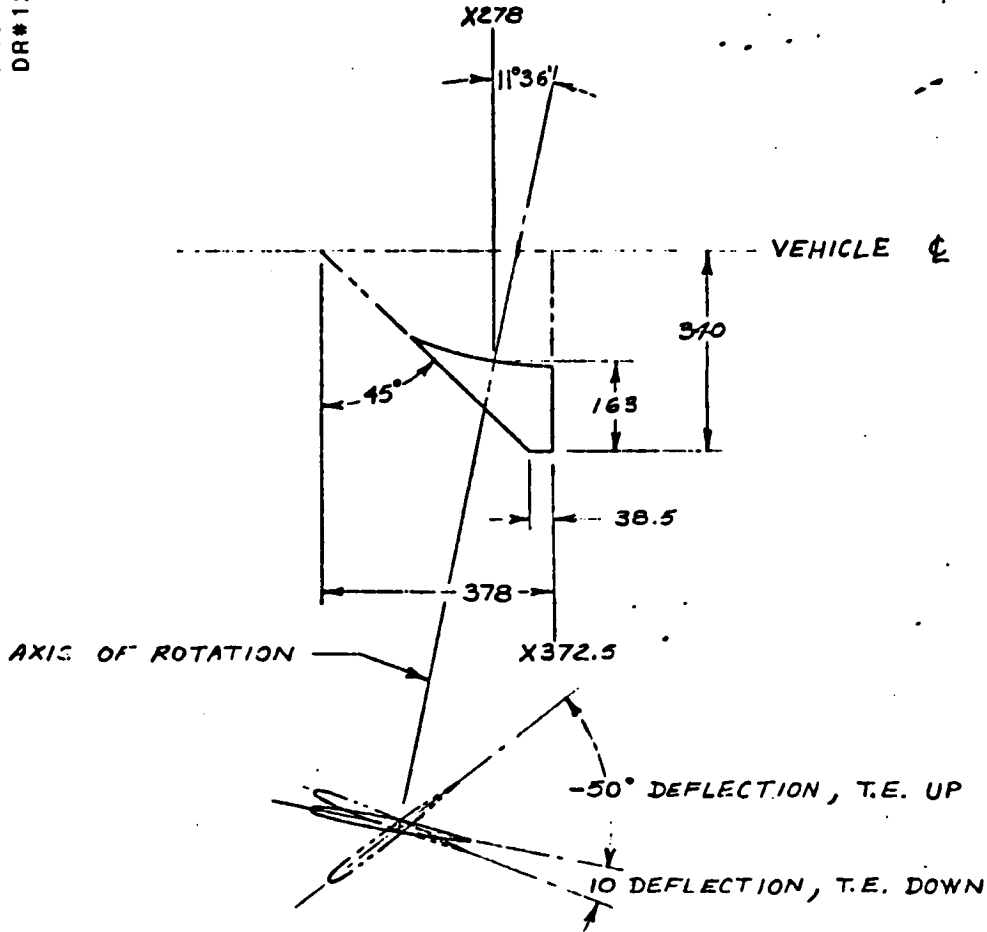


FIGURE 8. BOOSTER CANARD, C1 (LEFT SURFACE SHOWN)

DELTA WING BOOSTER
 MSC
 DELTA WING ORBITER
 MSC
 DR#11115 C-1-402
 PRETEST
 POSTTEST

ORIGINAL PAGE IS
 OF POOR QUALITY

TEST S-XXX DATA SET COLLATION SHEET

DATA SET IDENTIFIER	CONFIGURATION		Critical Angle	Azimuth	RACI NO.	SEPARATION POSITIONS														
	ORBITER	BOOSTER				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
RCU 021	B ₁ W ₁ V ₅	B ₀₃ W ₀₆ C	-5°	0°	1.1												103	104	105	
RCU 022			4°	0°	1.1												94	95	96	
RCU 023			Y	0°	0.9												97	98	99	
RCU 024			0°	0°	1.38												112	113	114	
RCU 025			4°	0°													115	116	117	
RCU 026			-5°	0°													118	119	120	
RCU 027		B ₀₃ W ₀₆ C	A	0°		139	140	141	136	137	138	133	134	135	130	131	132			
RCU 028			Y	0°																
RCU 029			Y	0°																
RCU 030			0°	0°																
RCU 031	B ₀₁ W ₀₁		Y	0°																
RCU 032	B ₀₁ W ₀₁ V ₅	B ₀₃ W ₀₆ V ₀₁	Y	0°																
RCU 033			Y	5°																
RCU 034		B ₀₃ W ₀₆ C	A	0°																
RCU 035			-5°	0°																
RCU 036			Y	0°																
RCU 037			4°	0°																
RCU 038			0°	0°																
RCU 039			A	0°		178	179	180	187	188	189	184	185	186	181	182	183			
RCU 040			Y	0°															190	

1 7 19 33 37 43 49 55 61 67 73 79
 CA ICY CN CBL CLM CYN CPC CPB SEPOS
 COEFFICIENTS: SEPOS
 SCHEDULE: SEPOS

A = ±10° (DATA AT SMALL INCREMENTS - NOT CONSTANT FOR EACH RUN)
 B = ±6° (DATA AT SMALL INCREMENTS - NOT CONSTANT FOR EACH RUN)

ORIGINAL PAGE IS
OF POOR QUALITY

TEST S-XXX DATA SET COLLATION SHEET

PRETEST
 POSTTEST

DATA SET IDENTIFIER	CONFIGURATION		Coefficients		MIR NO.	SEPARATION POSITIONS															
	ORBITER	BOOSTER	1	2		3	4	5	6	7	8	9	10	11	12	13	14	15	16		
RCU 041	B ₁₁ W ₁₁ V ₅		0°	B															191		
RCU 042	B ₁₁ W ₁₁																		192		
RCU 043	B ₁₁ W ₁₁ V ₅	B ₁₁ W ₁₁ V ₁₀	0°	0°															196 197		
RCU 044			5°	Y															199 200		
RCU 045			0°	A															204		
RCU 046	B ₁₁ W ₁₁ V ₅	B ₁₁ W ₁₁ V ₁₀	0°	0°															214 215 216 217 218 219 220 221 222		

1 CA CY CN CBL CLM CLN CYN CYP CYPB CPG CPGC CPB CPGS SEPPDS IDPVAR(1) IDPVAR(2) IDPVAR(3) IDPVAR(4) IDPVAR(5) IDPVAR(6) IDPVAR(7) IDPVAR(8) IDPVAR(9) IDPVAR(10) IDPVAR(11) IDPVAR(12) IDPVAR(13) IDPVAR(14) IDPVAR(15) IDPVAR(16)

COEFFICIENTS:
A = ±10° (DATA AT SMALL INCREMENTS - NOT CONSTANT FOR EACH RUN)
B = ±6° (DATA AT SMALL INCREMENTS - NOT CONSTANT FOR EACH RUN)

DELTA WING BOOSTER
MSC
DELTA WING ORBITER
MSC
DR#1115 C-1-403

DELTA WING BOOSTER
 MSC
 DELTA WING ORBITER
 MSC
 DR# 11115 C-1-404

ORIGINAL PAGE IS
 OF POOR QUALITY

TEST S-XXX DATA SET COLLATION SHEET

PRETEST
 POSTTEST

DATA SET IDENTIFIER	CONFIGURATION		YAC NO.	SEPARATION POSITIONS															
	ORBITER	BOOSTER		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
RCU 047	B ₁ W ₁ V ₃	B ₂ W ₆	1.1	0°	0°	516	511	512	513	505	526	507	506	509	510				
RCU 048		Y	0.9	Y		519	520	521	522	523	524	525	526	527	528				
RCU 049		B ₂ W ₆ V ₁	0.9	Y		529	530		531		532	533		534					
RCU 050		Y	1.1	Y		538	539		540		541	542	543	544	545	546			
RCU 051		Y	1.1	Y		541	542		543		544	545		546					
RCU 052		Y	0.9	Y		550	551		552		553	554	555	556	557	558	559	560	561
RCU 053		B ₂ W ₆	0.9	A	0°														
RCU 054		Y	1.1	Y															
RCU 055		Y	1.1	Y															
RCU 056		Y	0.9	Y															
RCU 057		Y	0.6	Y															
RCU 058		Y	1.1	Y															
RCU 059		Y	0.9	Y															
RCU 060		Y	0.9	Y															
RCU 061		Y	1.1	Y															
RCU 062		Y	1.1	Y															
RCU 063		Y	0.9	Y															
RCU 064		Y	1.30	Y															
RCU 065		Y	Y	Y															
RCU 066		Y	Y	Y															

1 7 11 13 19 25 31 37 43 49 55 61 67 73
 CA ICY ICN CBL CLM GYN CGC CPB
 SEPPDS
 CONFIDENTIAL
 SCHEDULE 3
 A = ±10° (Data at small increments - API constant for each run)
 B = ±6° (Data at small increments - API constant for each run)

TEST S-XXX DATA SET COLLATION SHEET

PRETEST
 POSTTEST

DATA SET IDR	CONFIGURATION	PITCH	MACH	SEPARATION POSITIONS																
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
RCU 067	B ₀₁ W ₁₁ V ₅ Bo ₂ W _{0c}	A 0°	1.30	639	640	641	636	637	623	624	625	626	627	628	629					
RCU 068	Bo ₂ W _{0c}	0°				645	646	647			648	649			650					
RCU 069	Bo ₂ W _{0c} V ₁	0°				654	655	656			657	658			659					
RCU 070	Bo ₂ W _{0c}	5°																		
RCU 071	Bo ₂ W _{0c}	0°																		
RCU 072	Bo ₂ W _{0c}	5°																		
RCU 073	Bo ₂ W _{0c}	1°	0.6																	
RCU 074	Bo ₂ W _{0c}	0°																		
RCU 075	Bo ₂ W _{0c}	0°																		
RCU 076	Bo ₂ W _{0c}	0°																		
RCU 077	Bo ₂ W _{0c}	0°																		
RCU 078	Bo ₂ W _{0c}	5°																		
RCU 079	Bo ₂ W _{0c}	0°																		
RCU 080	SCFF	0°																		
RCU 081	Bo ₂ W _{0c}	0°	0.9																	
RCU 082	Bo ₂ W _{0c}	0°	1.1																	
RCU 083	Bo ₂ W _{0c}	0°	1.1																	
RCU 084	Bo ₂ W _{0c}	0°	0.9																	
RCU 085	Bo ₂ W _{0c}	5°	0.6																	
RCU 086	Bo ₂ W _{0c}	5°	0.6																	

1 7 11 13 19 25 31 37 43 49 55 61 67 73 79

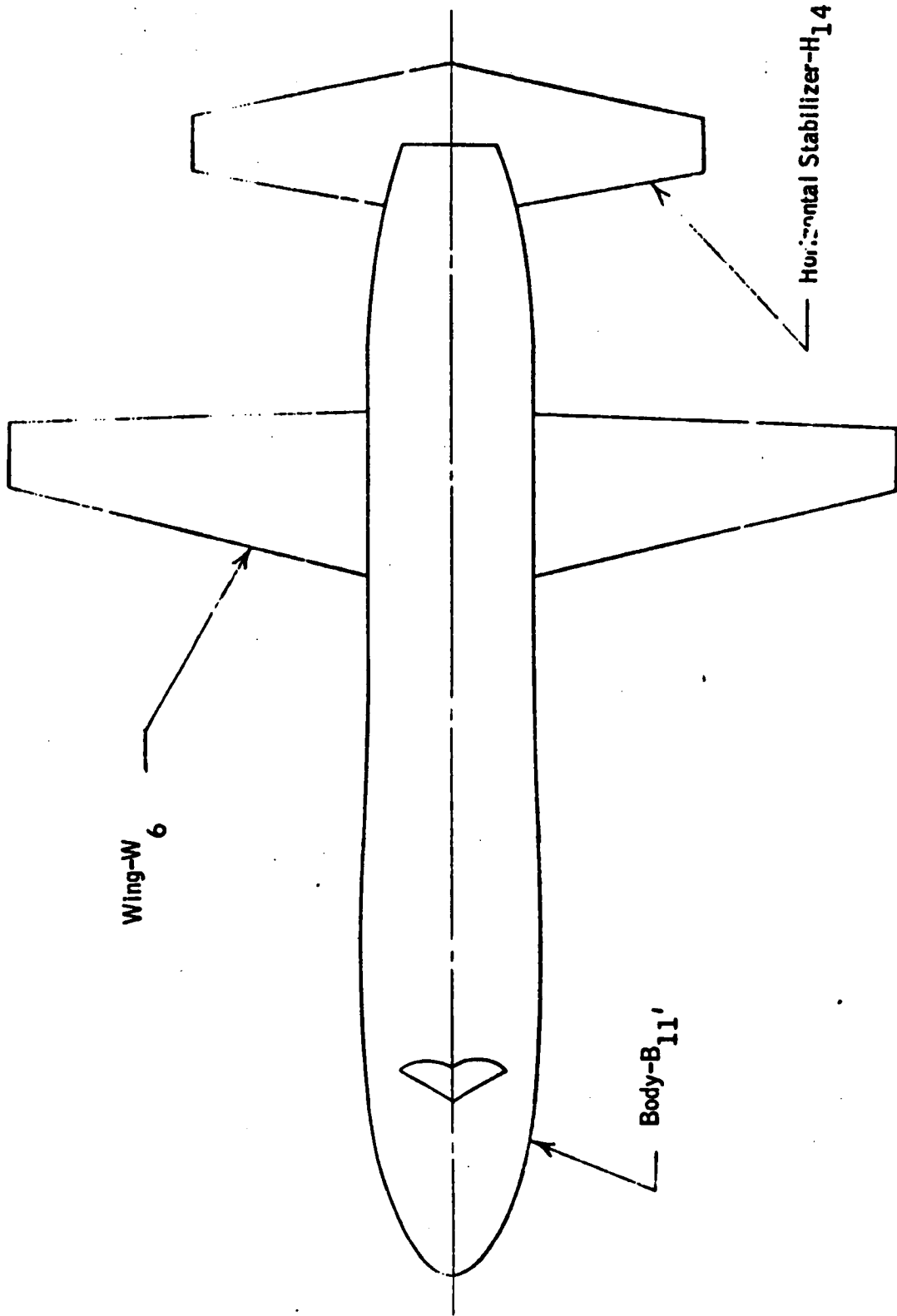
CA CY CN CBL CLM CLM CYN CYP CPC CCB

SEPPAS
IDFVAR(1) IDFVAR(2) IDV

COEFFICIENTS:
α or β

SCHEDULES
A = ±10° (DATA AT SMALL INCREMENTS - NOT CONSTANT FOR EACH RUN)
B = ±6° (DATA AT SMALL INCREMENTS - NOT CONSTANT FOR EACH RUN)

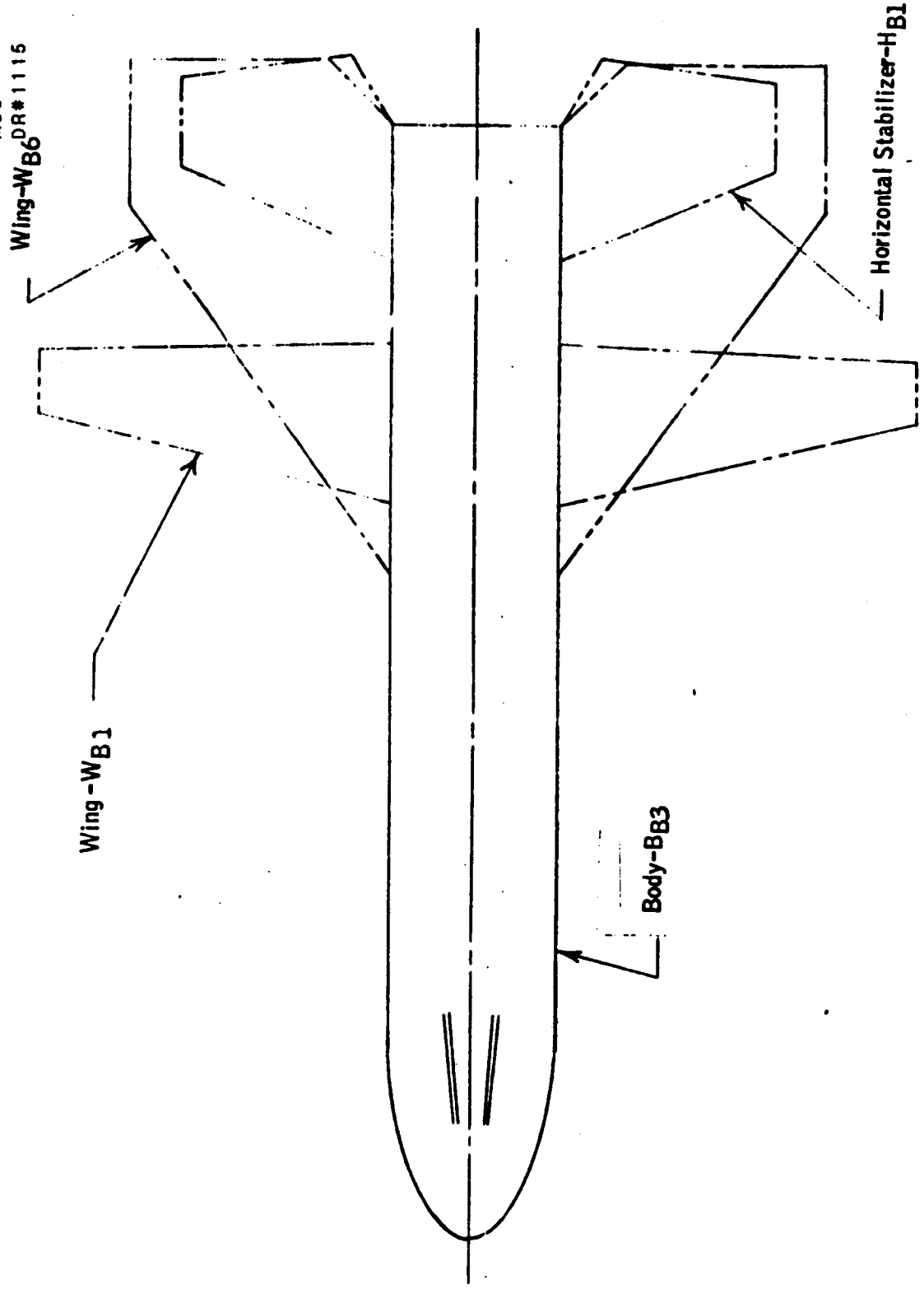
- DELTA WING BOOSTER
- MSC
- DELTA WING ORBITER
- MSC
- DR#1115 C-1-405



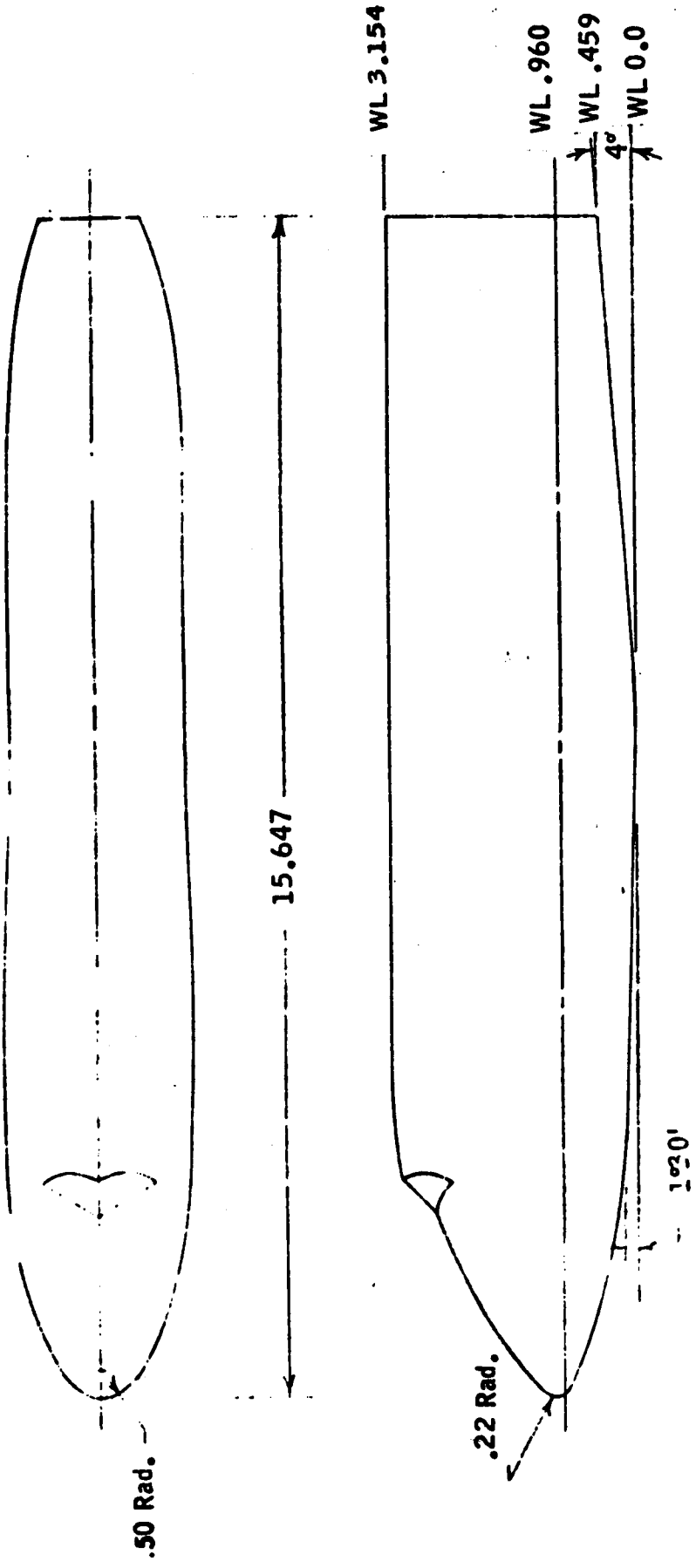
DELTA WING BOOSTER
 MSC
 DELTA WING ORBITER
 MSC
 DR#1115 C-1- 407

(a) Model Assembly
 Figure 5. - 245 Orbiter Configuration, Model S-13A.
 All Dimensions are in Inches.

DELTA WING BOOSTER
MSC
DELTA WING ORBITER
MSC
Wing-WB6 DR#1115 C-1-408



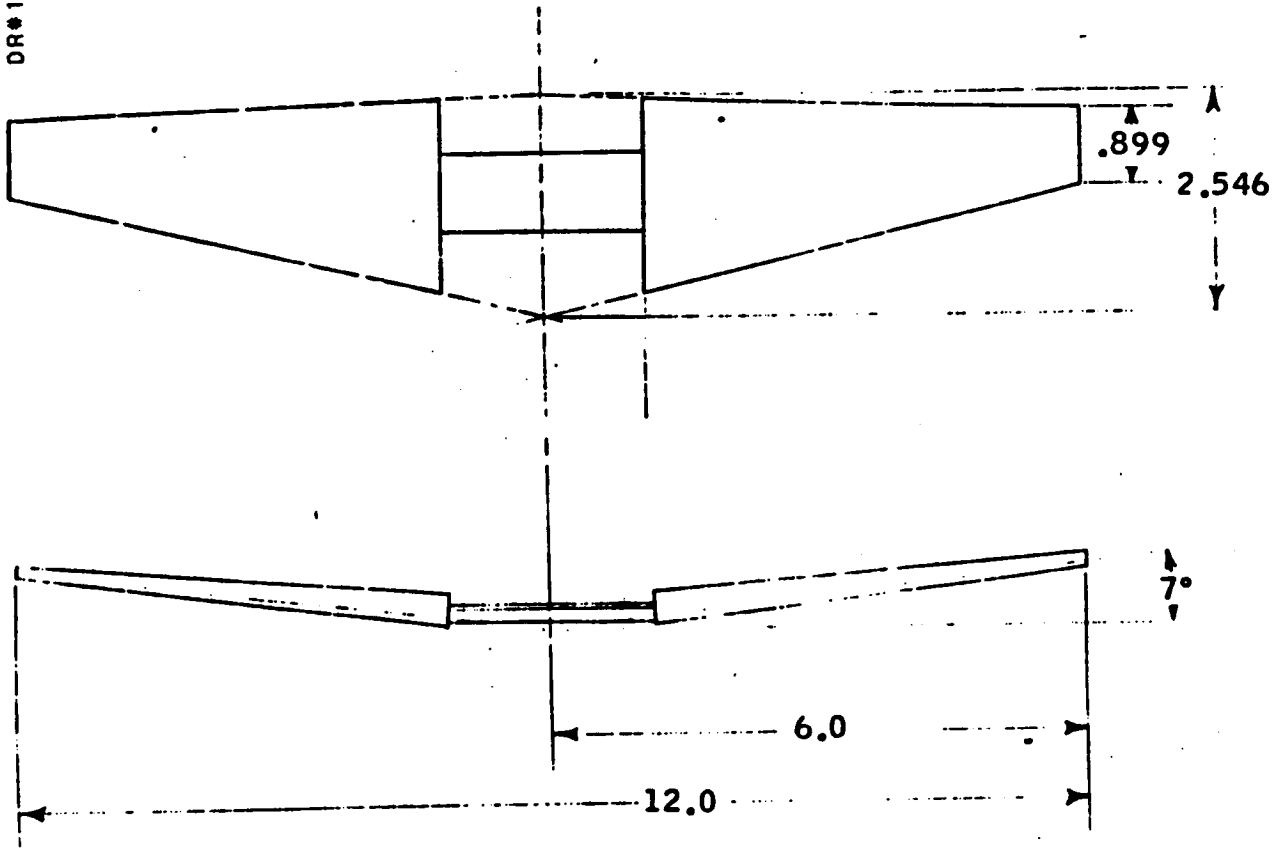
(a) Model Assembly
Figure 6 - 251 Booster Configuration, Model SB-13A. All dimensions are in inches.



(b) Body - B11
Figure 5 - Continued.

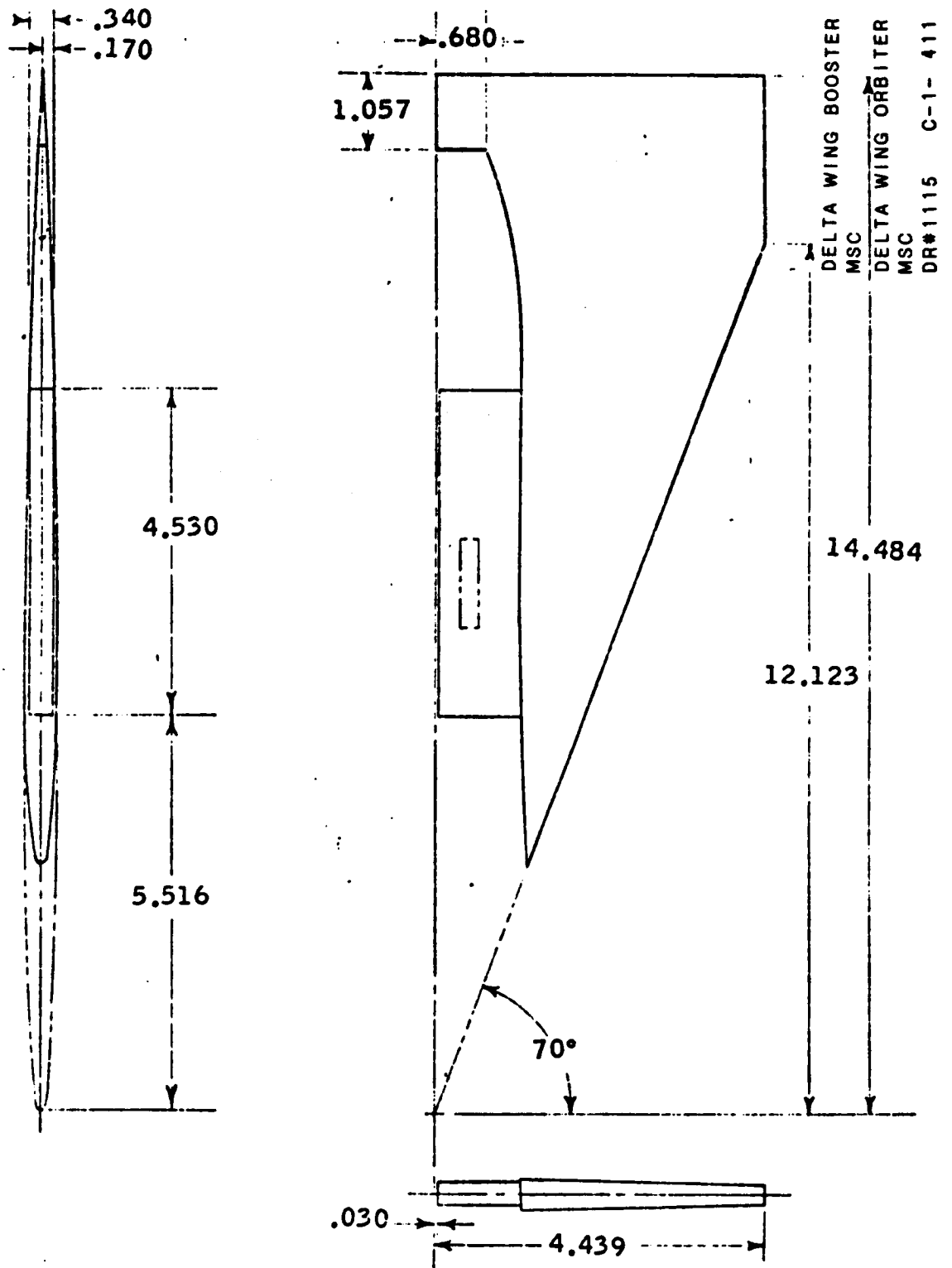
DELTA WING BOOSTER
MSC
DELTA WING ORBITER
MSC
DR#1115 C-1- 409

DELTA WING BOOSTER
MSC
DELTA WING ORBITER
MSC
DR#1115 C-1- 410



(c) Wing - W₆

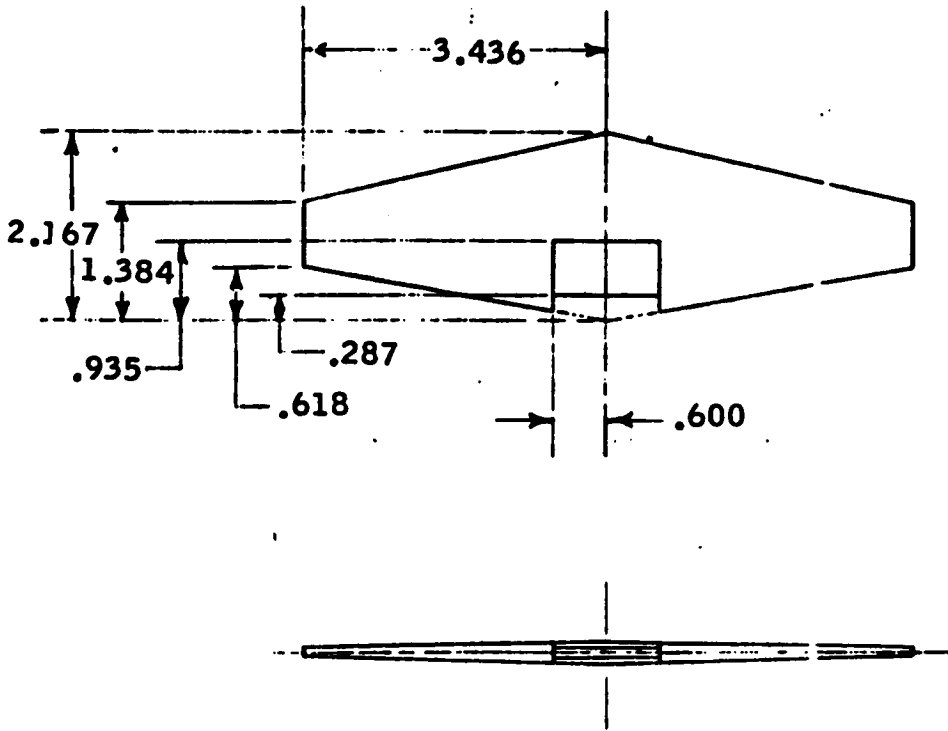
Figure 5 - Continued.



(A) Wing - W₁₁

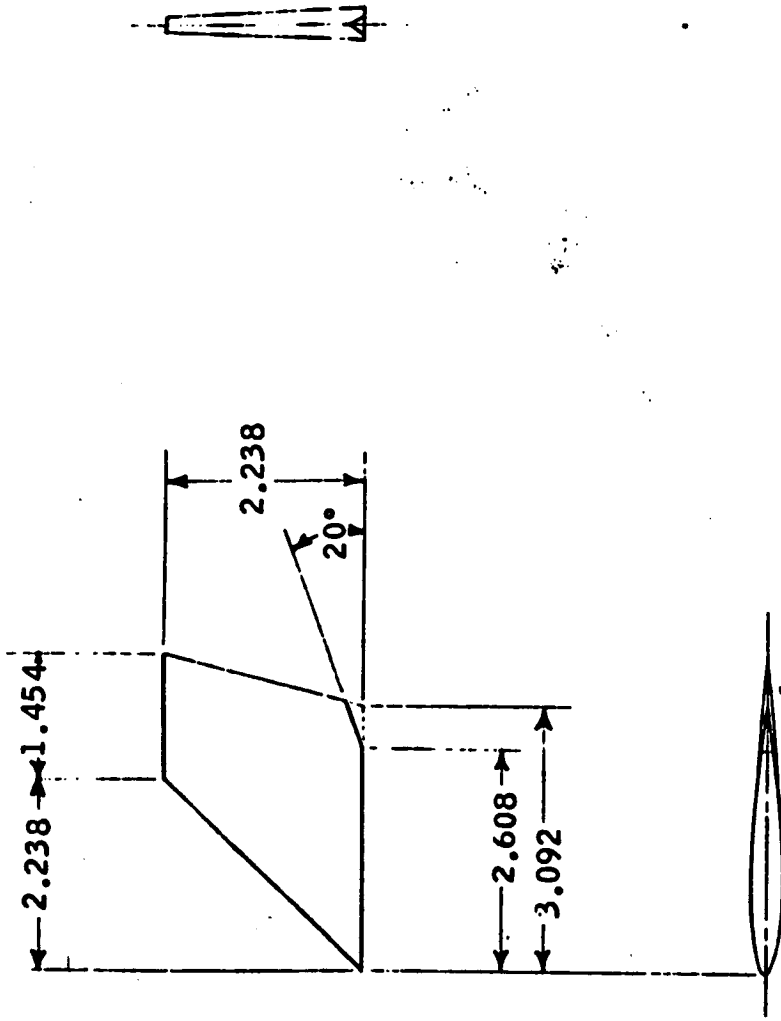
Figure 5 - Continued.

DELTA WING BOOSTER
MSC
DELTA WING ORBITER
MSC
DR#1115 C-1- 412



(e) Horizontal stabilizer - H₁₄

Figure 5 - Continued.

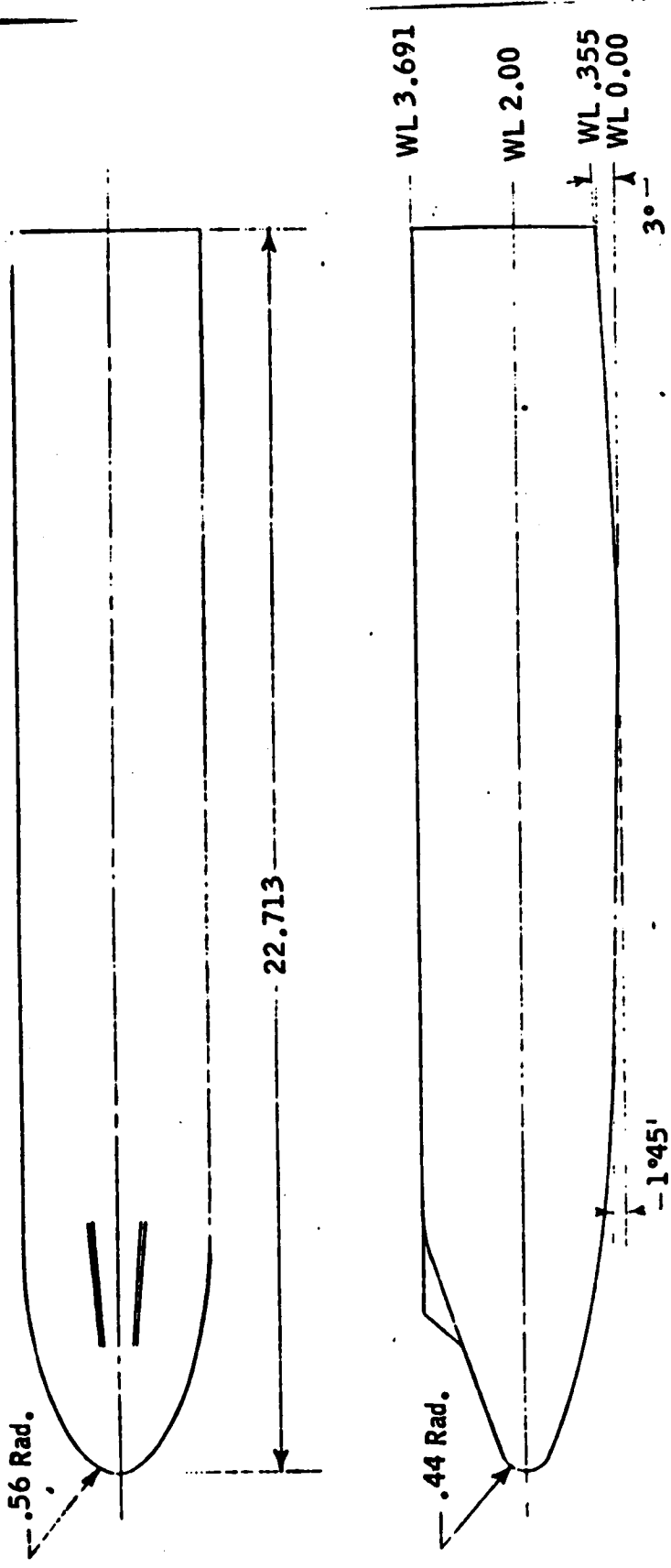


(e) Vertical tail - V5

Figure 5 - Concluded.

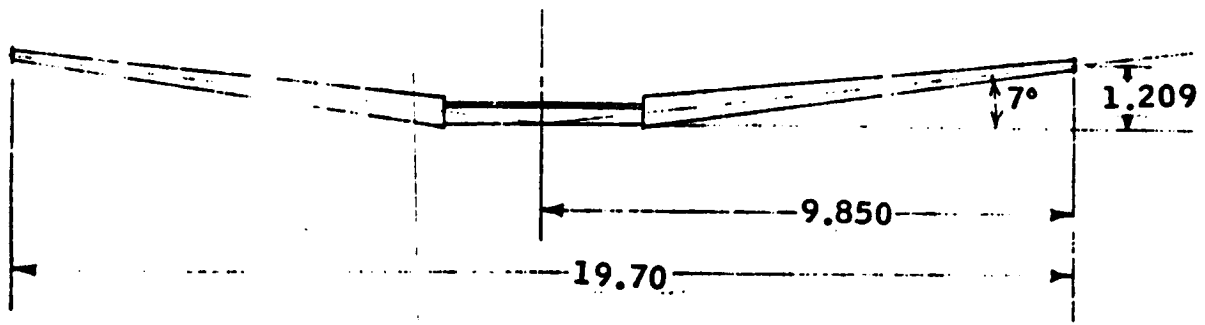
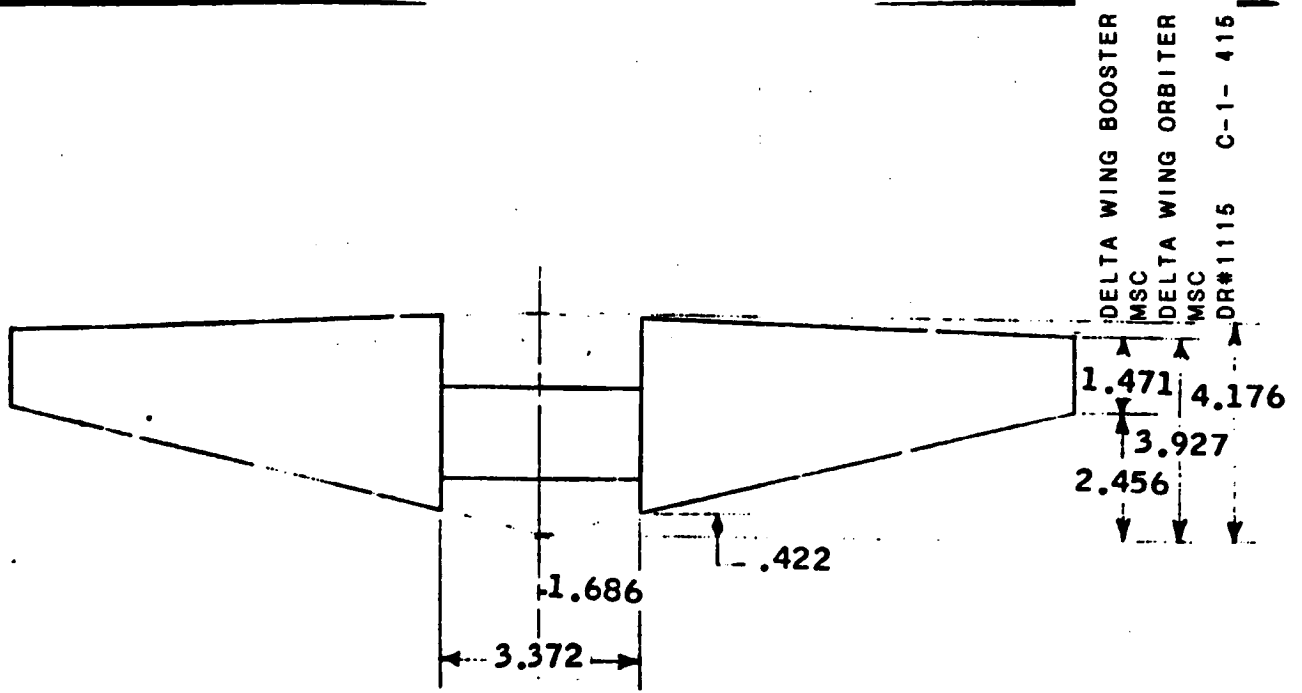
DELTA WING BOOSTER
 MSC
 DELTA WING ORBITER
 MSC
 DR#1115 C-1- 413

DELTA WING BOOSTER
MSC
DELTA WING ORBITER
MSC
DR#1115 C-1- 414



(b) Body - B₈₃

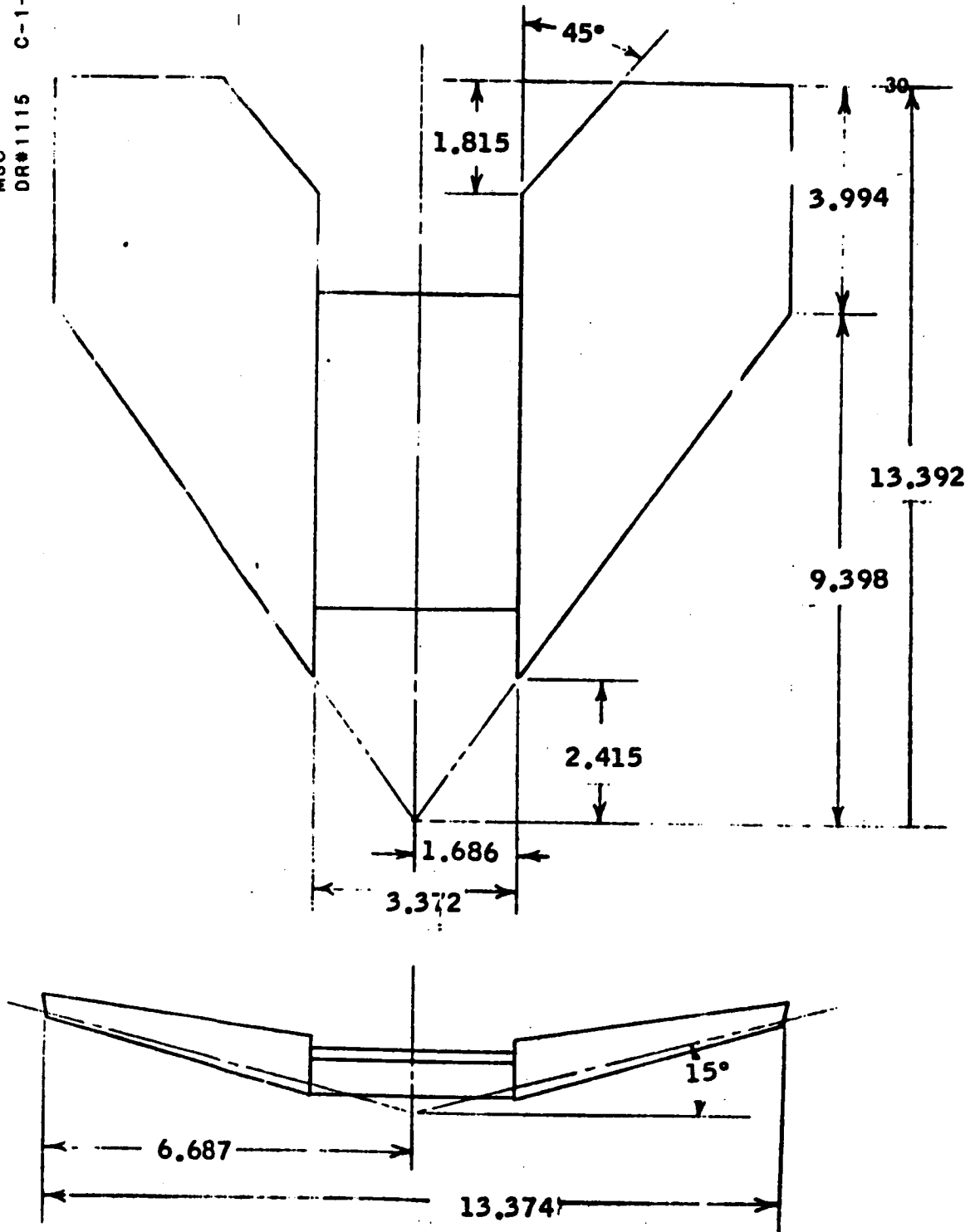
Figure 6 . - Continued .



(c) Wing - W B1

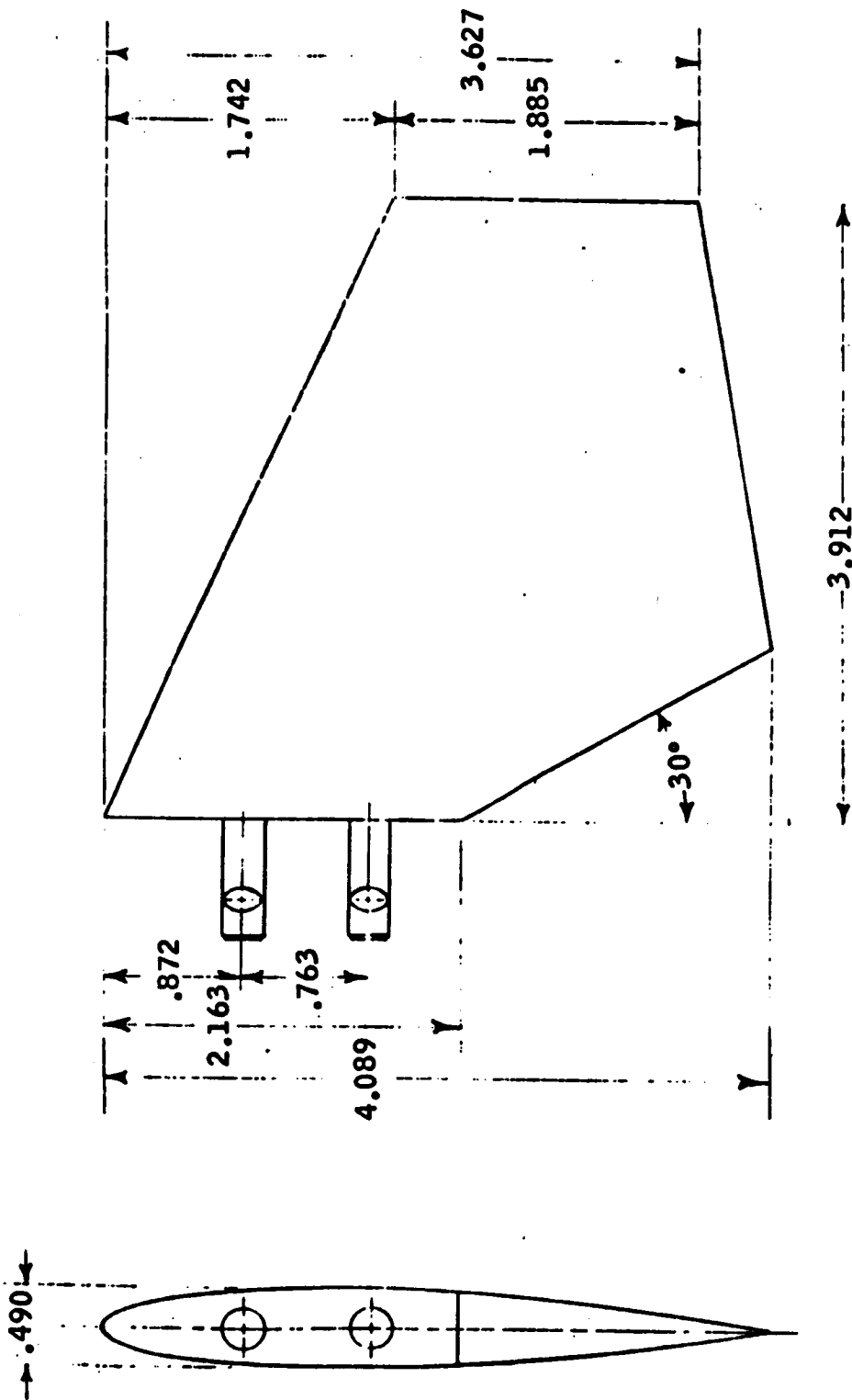
Figure 6 - Continued.

DELTA WING BOOSTER
MSC
DELTA WING ORBITER
MSC
DR#1115 C-1- 416



(d) Wing-W_{B6}

Figure 6 - Continued.

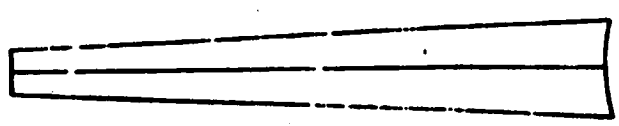
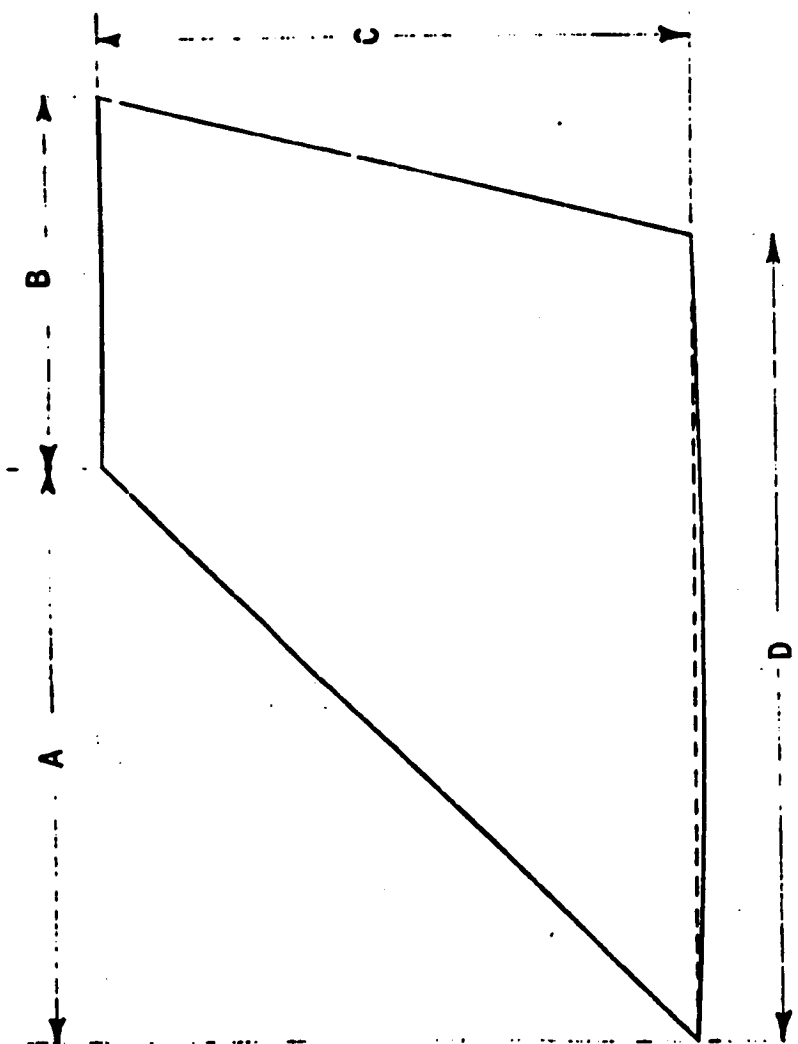


(e) Horizontal stabilizer - H
B1

Figure 6. - Continued.

DELTA WING BOOSTER
MSC
DELTA WING ORBITER
MSC
DR#1115 C-1- 417

DELTA WING BOOSTER
 MSC
 DELTA WING ORBITER
 MSC
 DR#1115 C-1- 418



Tail	A	B	C	D
V _{B1}	3.5310	2.1150	3.3310	4.6340
V _{B5}	6.9070	2.7490	6.9070	6.6520

- *NOT APPLICABLE TO THIS TEST

(f) Vertical tail - V_{B1}, V_{B5}

Figure 6. - Continued. -

TABLE I
TEST 6 x 6 -486 DATA SET / RUN NUMBER
COLLATION SUMMARY

DATA SET IDENTIFIER	SCHED.	PARAMETERS VALUES	NO. OF RUNS	MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE)							TAPE
				0.60	0.80	0.90	1.20	1.50	2.00		
AA111	A O		6	6	5	4	3	2	1	R1	
121	A O		3				9	8	7		
131	A O		6		14	13	12	11	10		
141	A O		5		20	19	18	17	16		
142	O B		5		25	24	23	22	21		
132	O B		5		30	29	28	27	26		
122	O B		5		35	34	33	32	31		
112	O B		5		40	39	38	37	36		
152	O B		5		45	44	43	42	41		
151	A O		5		50	49	48	47	46		
161	A O		5		55	54	53	52	51		
RAA211	A O		6		6	5	4	3	2	1	
221	A O		3				9	8	7		
231	A O		6		15	14	13	12	11	10	
241	A O		5		20	19	18	17	16		
242	O B		5		25	24	23	22	21		
232	O B		5		30	29	28	27	26		
222	O B		5		35	34	33	32	31		
212	O B		5		40	39	38	37	36		

TEST RUN NUMBERS

7576 67 61 55 49 43 37 31 25 19 13 7

RAA 1-2-76

MACH ALPHA 7.6

INDPVAR(1) INDPVAR(2) INDV
DELTA WING BOOSTER
MSC/MDAC
DELTA WING ORBITER
MSC/MDAC
DR#1038 C-1- 419

COEFFICIENTS:
A = -12°, -10°, -8°, -6°, -4°, -2°, 0°, 2°, 4°, 6°, 8°, 10°, 12°
B = -4°, -2°, -1°, 0°, 1°, 2°, 4°, 6°

SCHEDULES

J.D. 7/15/70

DELTA WING BOOSTER
MSC/MDAC
DELTA WING ORBITER
MSC/MDAC
DR#1038 C-1- 420

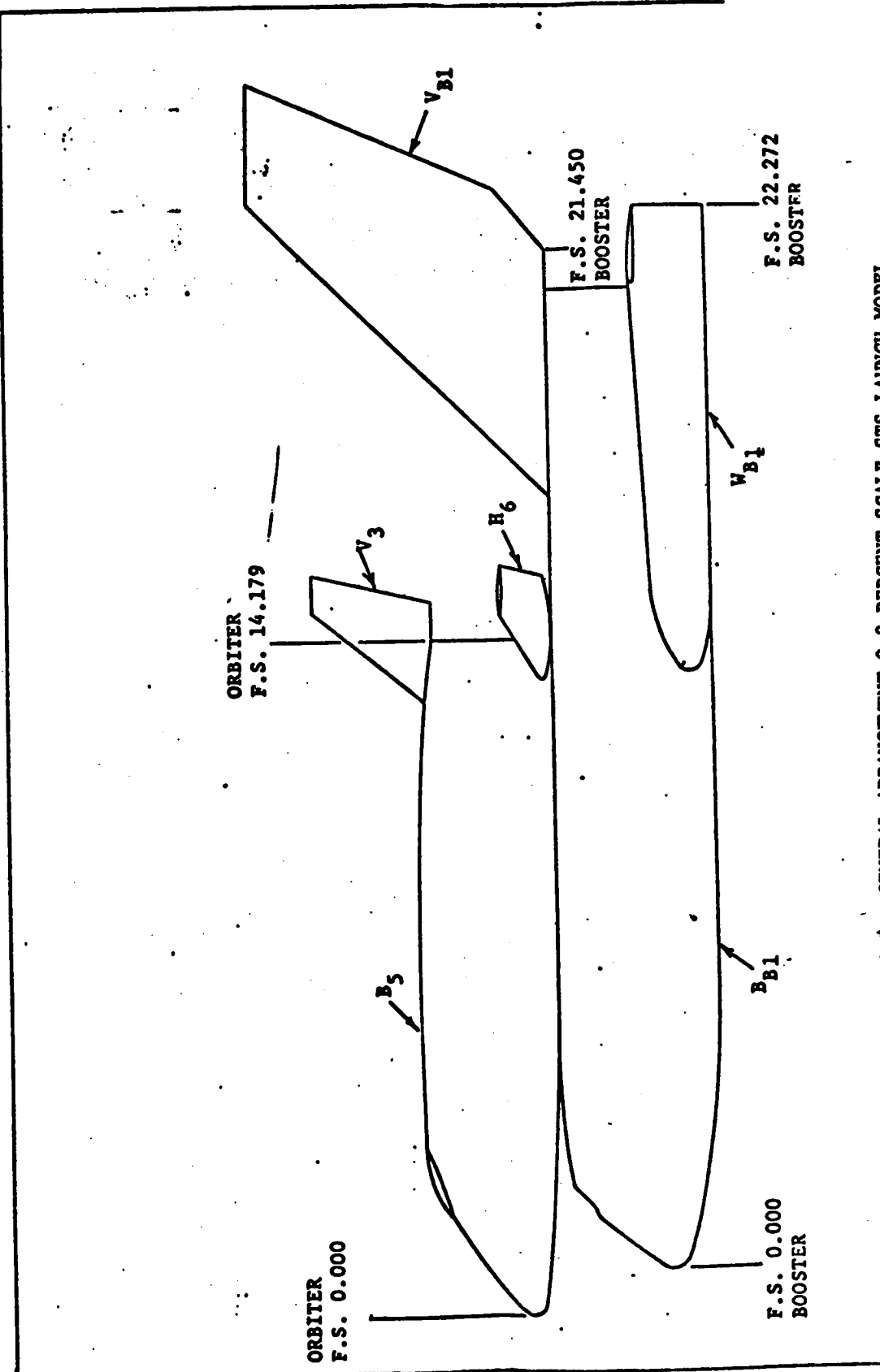
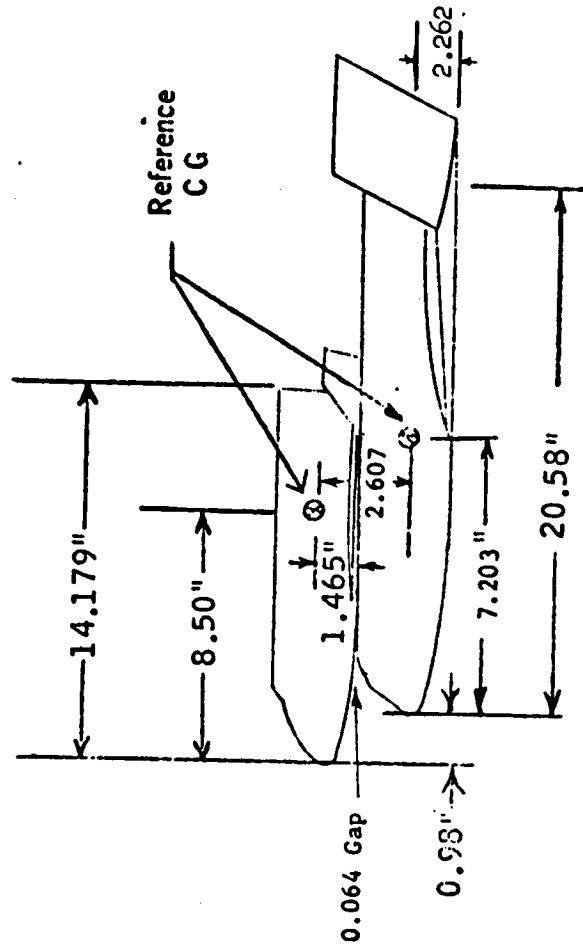
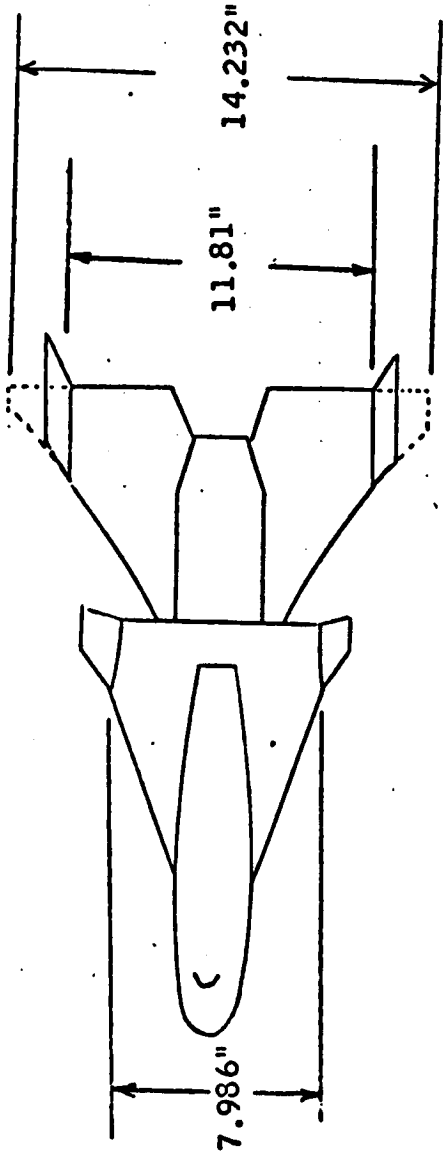


FIGURE 4. GENERAL ARRANGEMENT 0.8 PERCENT SCALE STS LAUNCH MODEL

a) Side View

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REFERENCE LENGTHS AND AREA

ORBITER
BOOSTER and LAUNCH CONFIGURATION

S	60.925 in ²	101.3 in ²
b	7.986 in	14.232 in
c	8.964 in	8.248 in

CG LOCATIONS

ORBITER	MRP	MRP
BOOSTER	8.50 in.	1.465 in.
COMPOSITE	12.34	1.675 in.
	7.203 in.	2.262 in.

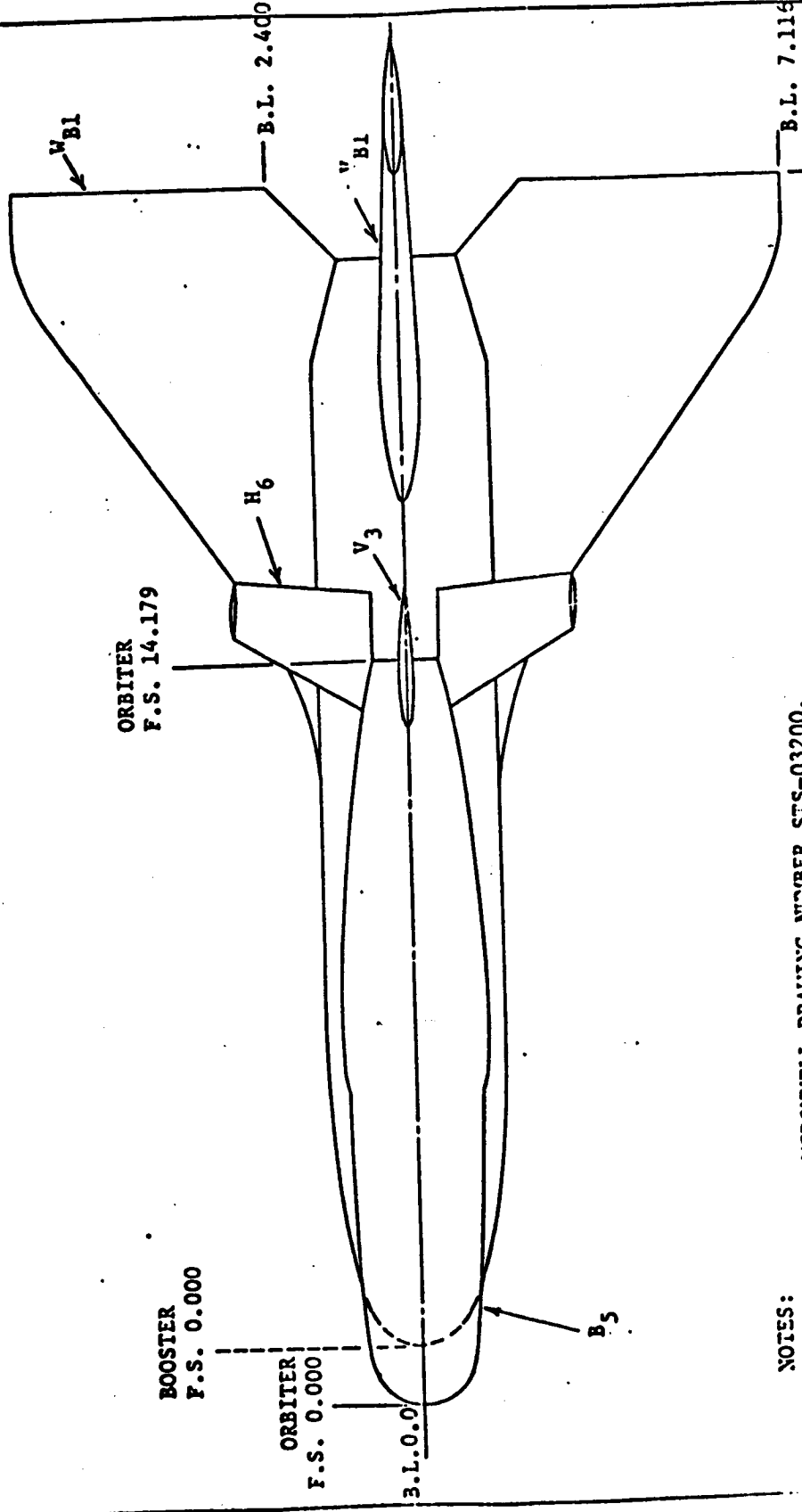
Aerodynamic data on the delta wing booster was reduced using a theoretical (non-clipped) delta wing.

DELTA WING BOOSTER
MSC/MDAC
DELTA WING ORBITER
MSC/MDAC
DR#1038 C-1- 421

a) Delta Wing Orbiter Mated to the Delta Wing Booster

Figure 6. - Delta Wing Booster Launch Configuration

DELTA WING BOOSTER
 MSC/MDAC
 DELTA WING ORBITER
 MSC/MDAC
 DR#1038 C-1- 422

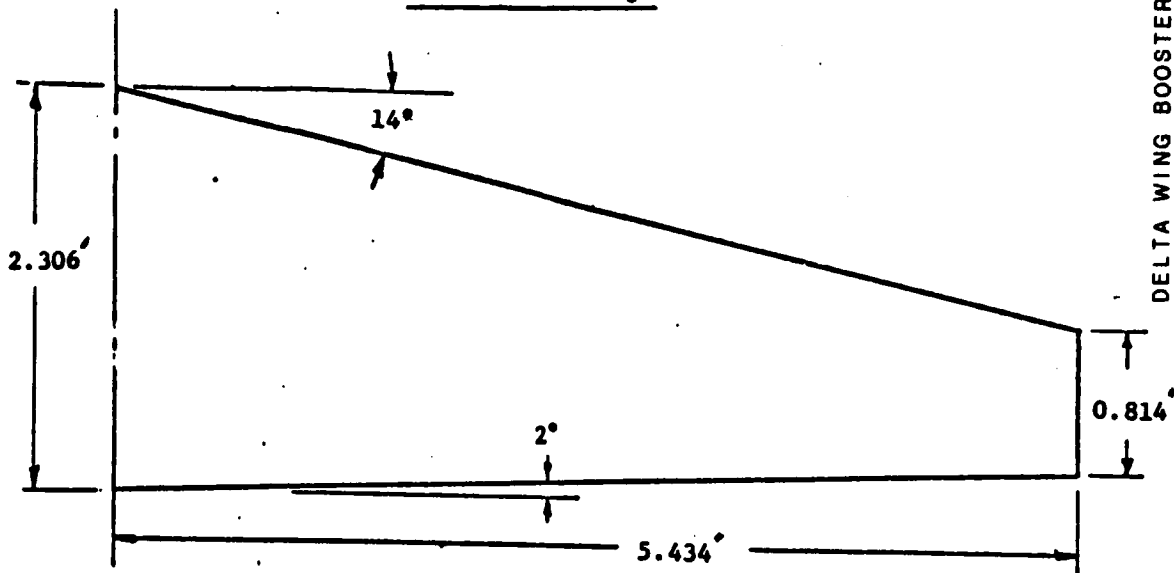


NOTES:
 1. REFERENCE: MCDONNELL DRAWING NUMBER SIS-03200.
 2. ALL DIMENSIONS ARE MODEL SCALE IN INCHES.

F.S. 22.272
 BOOSTER

FIGURE 4. GENERAL ARRANGEMENT 0.8 PERCENT SCALE SIS LAUNCH MODEL
 b) Top View

ORBITER WING, w_6 (STRAIGHT)



DELTA WING BOOSTER
MSC/MDAC
DELTA WING ORBITER
MSC/MDAC
DR#1038 C-1- 423

ORBITER VERTICAL TAIL, v_3

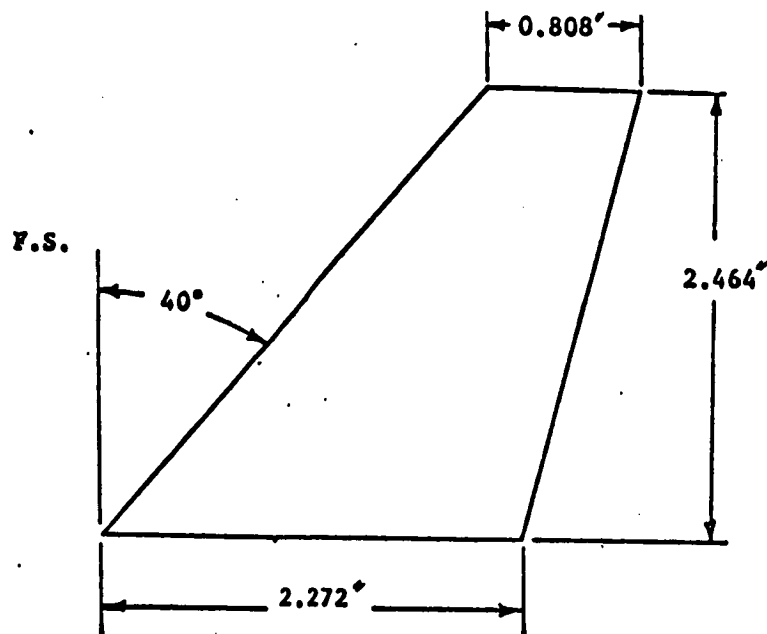
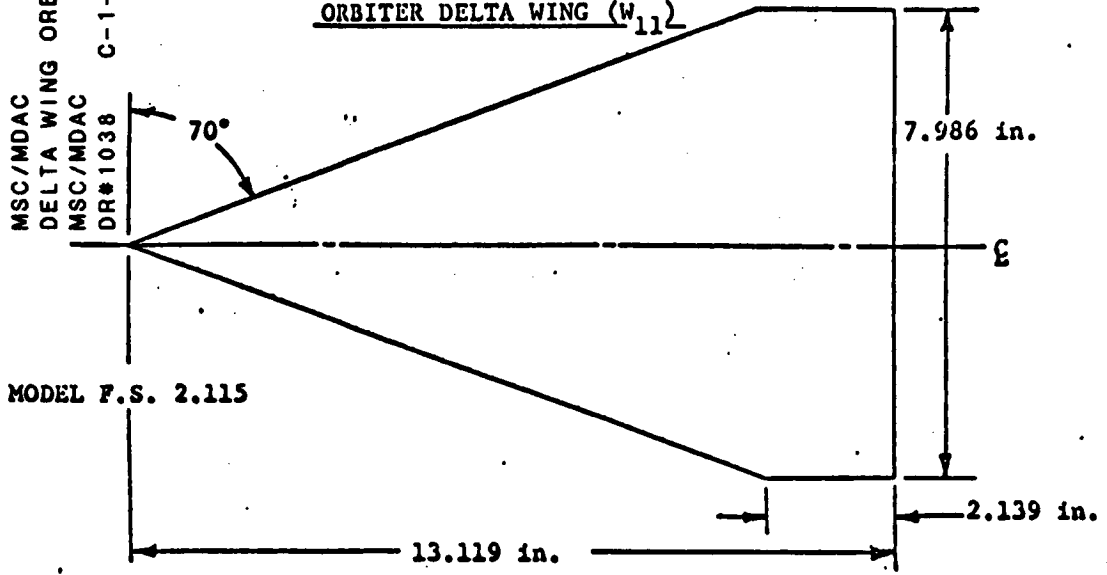


Figure 7.

DELTA WING BOOSTER
 MSC/MDAC
 DELTA WING ORBITER
 MSC/MDAC
 DR#1038 C-1-424

ORBITER DELTA WING (W₁₁)



GEOMETRY AND ORIENTATION OF WING TIP FIN (V₇)

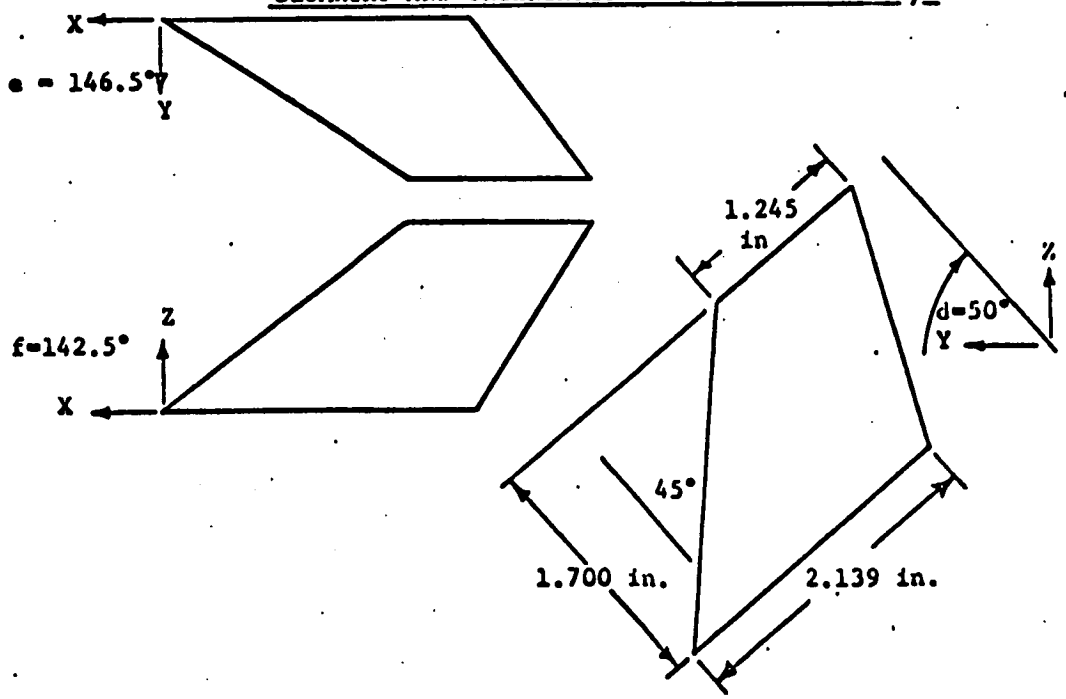
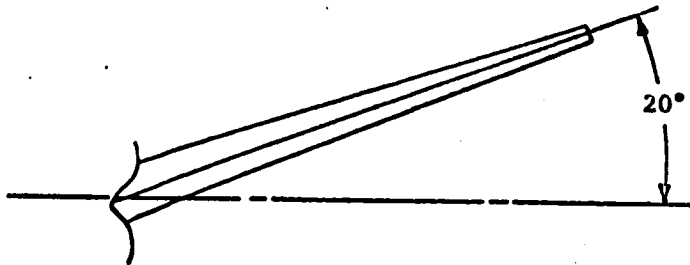
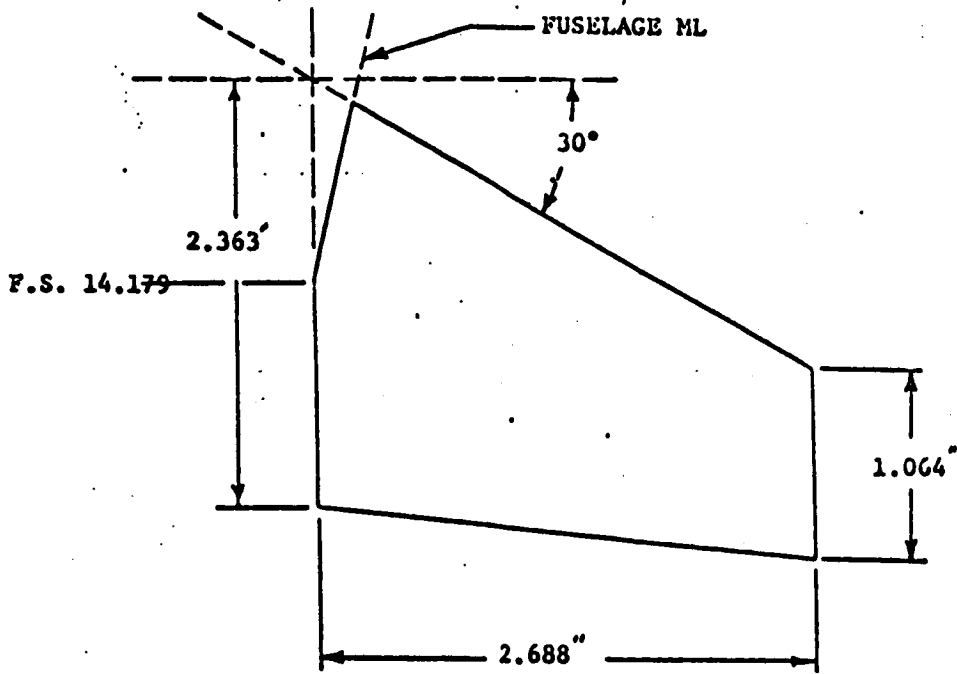


Figure 8.

ORBITER HORIZONTAL TAIL, H₁₃

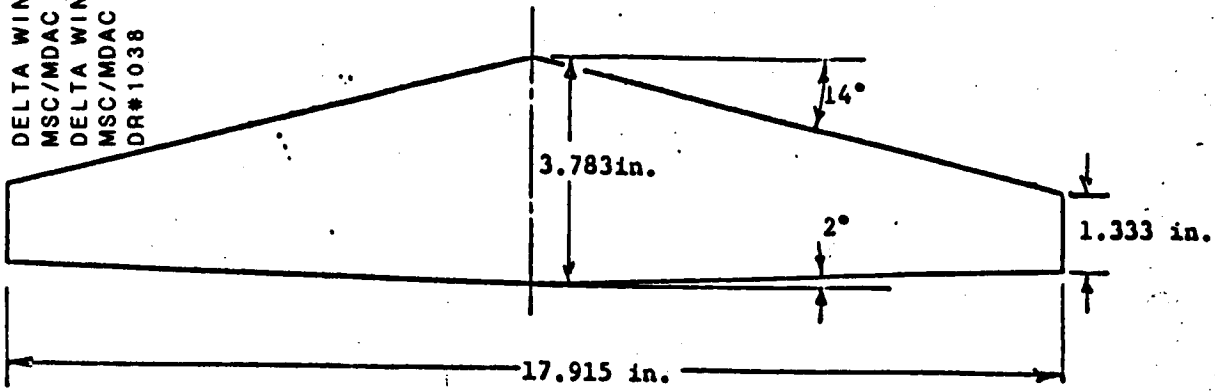


DELTA WING BOOSTER
MSC/MDAC
DELTA WING ORBITER
MSC/MDAC
DR#1038 C-1- 425

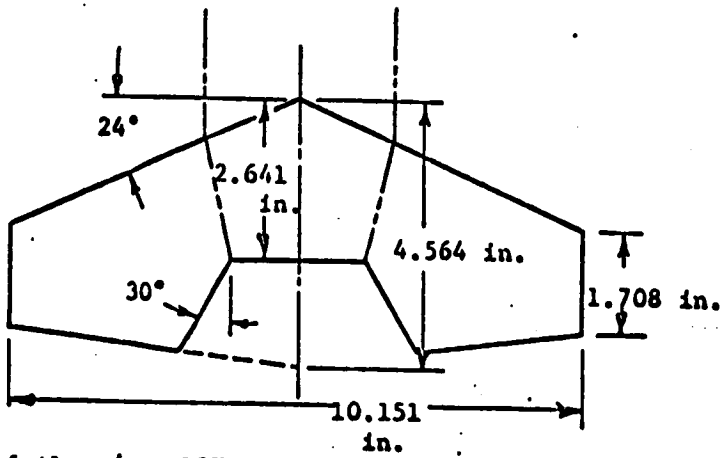
Figure 9

DELTA WING BOOSTER
 MSC/MDAC
 DELTA WING ORBITER
 MSC/MDAC
 DR#1038 C-1- 426

BOOSTER TRAPEZOIDAL PLANFORM WING (W_{B1}) (STRAIGHT)



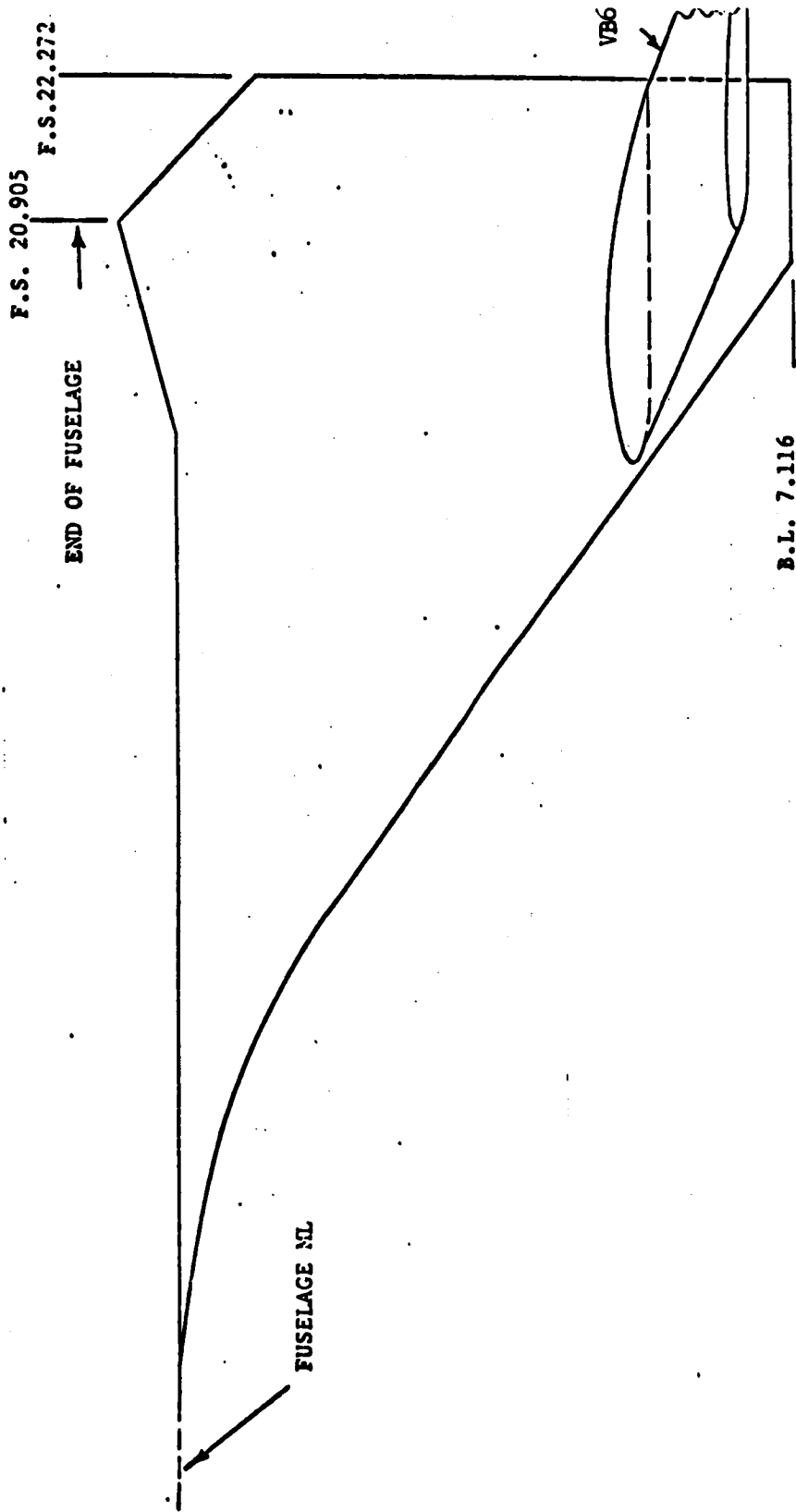
BOOSTER HORIZONTAL TAIL (H_{B1})



0064 Airfoil, $t/c = 12\%$

Figure 10.

FIGURE 11. BOOSTER WING, W_{B2} & W_{B3} (DELTA)



DELTA WING BOOSTER
MSC/MDAC
DELTA WING ORBITER
MSC/MDAC
DR#1038 C-1- 427

DELTA WING BOOSTER
MSC/MDAC
DELTA WING ORBITER
MSC/MDAC
DR#1038 C-1- 428

BOOSTER VERTICAL TAIL, V_{B5}

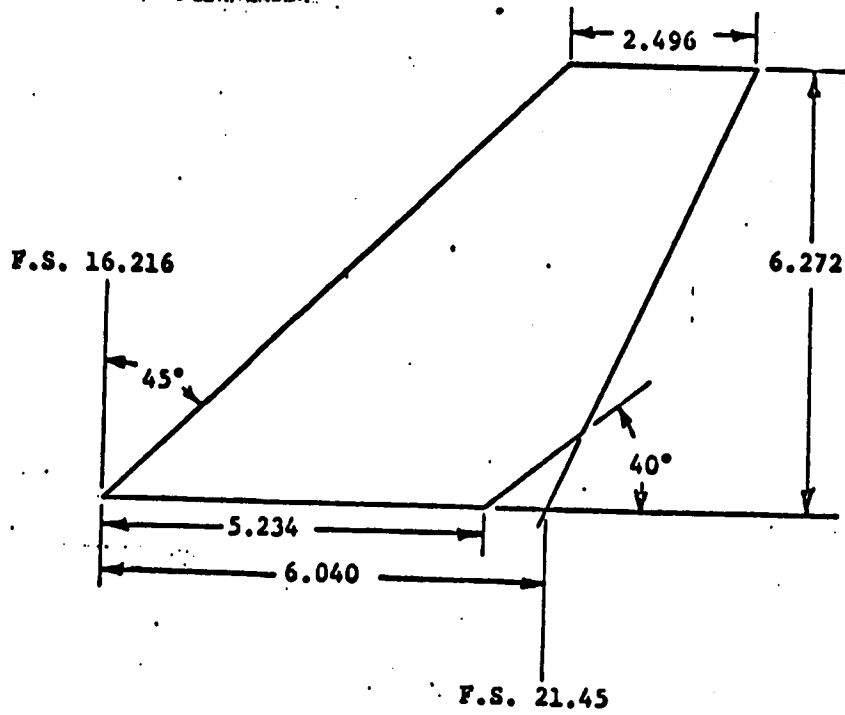
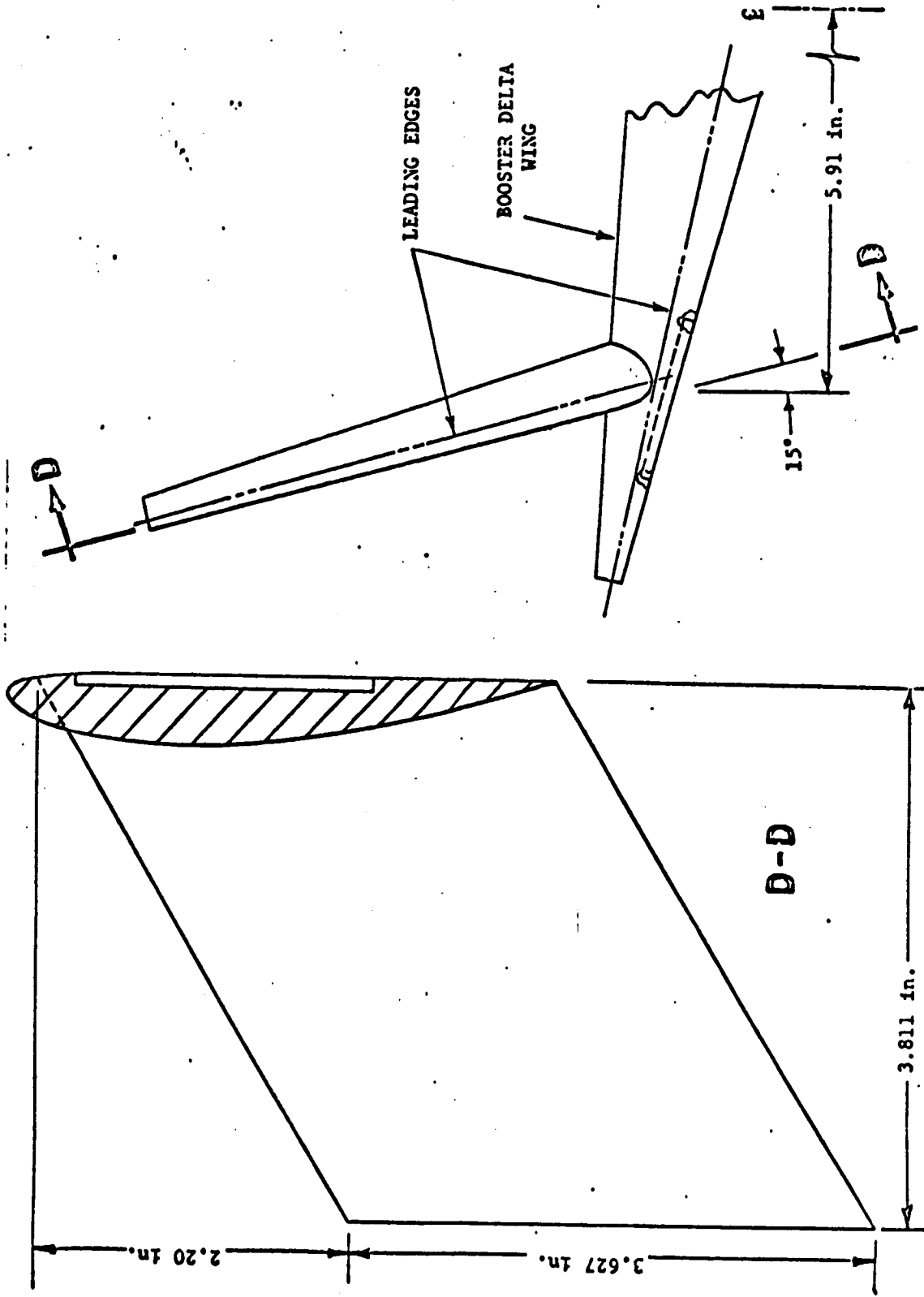


Figure 12.

FIGURE 13. BOOSTER TIP FIN, V B6



DELTA WING BOOSTER
 MSC/MDAC
 DELTA WING ORBITER
 MSC/MDAC
 DR#1038 C-1- 429

DELTA WING BOOSTER
 TBC
 DELTA WING ORBITER
 MSC
 DR#1183 C-1-430
 POST TEST

TEST MSEC 526 DATA SET/RUN NUMBER
 COLLATION SUMMARY

Booster Alone ($Wing W_{10}$)

DATA SET IDENTIFIER	CONFIGURATION	SCHD.	PARAMETERS/VALUES					NO. OF RUNS	MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE)											TEST RUN NUMBERS																		
			a	b	δ_{CL}	δ_{CR}	δ_{FL}		4.5	0.6	0.9	1.0	1.1	1.2	1.46	1.96	2.74	3.5	4.96																			
R4901A	B ₁	A	0	0	-	-	-	119	118																													
01M		M	0	0	-	-	-																															
01N		N	0	0	-	-	-																															
01Q		Q	0	0	-	-	-																															
02B	B ₄ W ₁₀	B	0	0	0	0	0	64	61																													
02H		B	0	0	0	0	0	57	58																													
02L		B	0	0	0	0	0																															
02X	B ₄ W ₁₀ V/4	B	0	0	0	0	0	62																														
04A	B ₄ W ₁₀ V/4	A	0	0	0	0	0	302	29	27																												
04B		B	0	0	0	0	0	35	36																													
04C		C	0	0	0	0	0	23	24																													
04H		B	0	0	0	0	0	40	39																													
04M		M	0	0	0	0	0																															
04N		N	0	0	0	0	0																															
04P		B	0	0	0	0	0																															
04S		C	0	0	0	0	0																															
04L	B ₄ W ₁₀	B	0	0	0	0	0																															
27A		A	0	0	0	0	0	300																														
27B		B	0	0	0	0	0	303																														
27G		B	0	0	0	0	0	301																														

CLM	ICN	ICY	ICX	ICBL	ICYN	CAF	CAB	CAC	CFC	CL	CDF	IDPVAR(1)	IDPVAR(2)	INDV

COEFFICIENTS: $\alpha_A = 0^\circ \rightarrow 10^\circ$
 $\alpha_N = -10^\circ \rightarrow 10^\circ$
 $\alpha_M = 20^\circ \rightarrow 40^\circ$
 $\alpha_R = 30^\circ \rightarrow 50^\circ$
 $\alpha_N = 50^\circ \rightarrow 70^\circ$
 $\beta_A = -6^\circ \rightarrow 6^\circ$
 $\beta_N = -6^\circ \rightarrow 6^\circ$

SHEET 1 of 5
 NASA-MSFC-144F

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TEST MAR 506 DATA SET/RUN NUMBER

COLLATION SUMMARY

Booster Alone (Wing No.)

PRETEST

POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	SCHD.		PARAMETERS/VALUES			NO. of RUNS	MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE)											TEST RUN NUMBER	
		A	B	δ _a	δ _b	δ _c														
								0.6	0.9	1.0	1.1	1.2	1.46	1.96	2.74	3.5	4.96			
R4B05A	B ₄ W ₁₀ V ₄	A	0	0	0	0	0	29	30				31		133	183	274	35	496	
05B		0	B	0	0	0	0	34	33				32		152	213	212	212	211	
05G		0	B	0	0	0	0								153					
05H		0	B	0	0	0	0								165					
05M		0	M	0	0	0	0								284	242	243		268	
05N		0	N	0	0	0	0													
05Q		0	Q	0	0	0	0													
07A	B ₄ W ₁₀ V ₄ C ₁	A	0	0	0	0	0						82		137				247	
07H		0	B	0	0	0	0	83					55		166					
08A	B ₄ W ₁₀ V ₄ R ₁	A	0	0	0	30/30	0	77	78	79	80	81			136	190	191	192		
08B		0	B	0	0	30/30	0	51	50	49	48	47			155	220				
01H		0	B	0	0	30/30	0	52	53			54			161	237				
08M		0	M	0	0	30/30	0								238	239				
01P		0	B	0	0	30/30	0													
01Q		0	Q	0	0	30/30	0								250					
19A	B ₄ W ₁₀ V ₄ R ₀	A	0	0	0	15	0	76	75			74			134			249		
20A		A	0	0	0	30	0	71	72			73			135					
								7	13	19	25	31	37	43	49	55	61	67	75	76

COEFFICIENTS: _____
 a of b _____
 SCHEDULES _____

NASA-MSC-MAF

Sheet 2 of 5

DELTA WING BOOSTER
 TBC
 DELTA WING ORBITER
 MSC
 DR# 1183 C-1-431

Booster Alone (Wing W₁₀)

DATA SET IDENTIFIER	CONFIGURATION	SCHD.		PARAMETERS/VALUES								NO. of RUNS	MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE)										TEST RUN NUMBERS																	
		a	b	δa	δb	δc	δd	δe	δf	δg	δh		0.6	0.9	1.0	1.1	1.2	1.46	1.96	2.74	3.5	4.96																		
R18 BA	B ₄ W ₁₀ V ₄	A	0	0	0	0	0	0	0	0	84	85																												
18B		Q	B	0	0	0	0	0	0	0	89	88																												
18G		10	B	0	0	0	0	0	0	0												154																		
18H		15	B	0	0	0	0	0	0	0												164																		
18M		M	0	0	0	0	0	0	0	0												205	245	244																
18N		N	0	0	0	0	0	0	0	0												213	274	272																
18Q		Q	0	0	0	0	0	0	0	0												216																		
18N		N	0	0	0	0	0	OFF	0	0																														
21B	B ₄ W ₁₀ V ₄ V ₆	0	B	0	0	0	0	0	0	0												156	227	228	229															
21H		15	B	0	0	0	0	0	0	0												162	230																	
22B	B ₄ W ₁₀ V ₅	0	B	0	0	0	0	0	0	0																														
22H		15	B	0	0	0	0	0	0	0												157	226	225	224															
22P		40	B	0	0	0	0	0	0	0												160	234																	
22L		50	B	0	0	0	0	0	0	0																														
24H	B ₄ W ₁₀ V ₅ V ₆	15	B	0	0	0	0	0	0	0												207	250	257	256															
24L		30	B	0	0	0	0	0	0	0																														
24S		60	B	0	0	0	0	0	0	0																														

COEFFICIENTS: a or b SCHEDULES

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OF POOR QUALITY

TEST MSFC 506 DATA SET/RUN NUMBER
COLLATION SUMMARY

Booster Alone (Wing W₁₁)

PRETEST
 POSTTEST

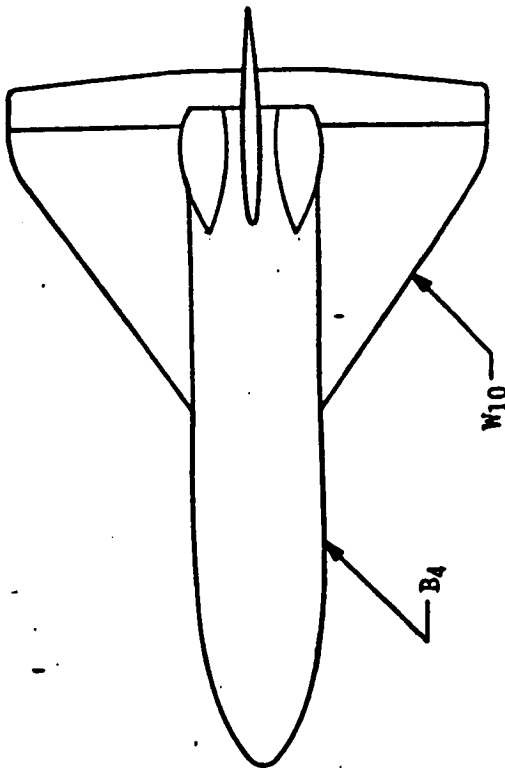
DATA SET IDENTIFIER	CONFIGURATION	SCHD. α	SCHD. n	PARAMETERS/VALUES			NO. OF RUNS	MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE)							TEST RUN NUMBERS																																						
				S ₁	S ₂	S ₃		0.6	0.9	1.0	1.1	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.4	4.6	4.8	5.0	5.2	5.4	5.6	5.8	6.0	6.2	6.4	6.6	6.8	7.0	7.2	7.4	7.6	7.8	8.0							
R4823A	B ₄ W ₁₁ V ₄	A	0	0	0	0	0	0.6	0.9	1.0	1.1	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.4	4.6	4.8	5.0	5.2	5.4	5.6	5.8	6.0	6.2	6.4	6.6	6.8	7.0	7.2	7.4	7.6	7.8	8.0							
23C		C	0	0	0	0	0	129	121			122			127	219	218	217																																			
25A	B ₄ W ₁₁ V ₅	A	0	0	0	0	0	125	124			123			126	214	215	216																																			
25H		15	B	0	0	0	0	299	298			297																																									
26H	B ₄ W ₁₁ V ₅	15	B	0	0	0	0	295				296																																									
								294				293																																									

COEFFICIENTS: _____
 α or β _____
 SCHEDULES _____

Sheet 4 of 5

NASA-MSFC-MAF

DELTA WING BOOSTER
 TBC
 DELTA WING ORBITER
 MSC
 DR#1183 C-1-433



$S = 13.0528 \text{ sq. in. (9000 sq. ft.)}$
 $l_{\text{LONG}} = 4.515 \text{ in. (112 ft)}$
 $l_{\text{LAT}} = 4.908 \text{ (121.5 ft)}$
 $A_B = 1.5580 \text{ (Nom.) (955 x)}$

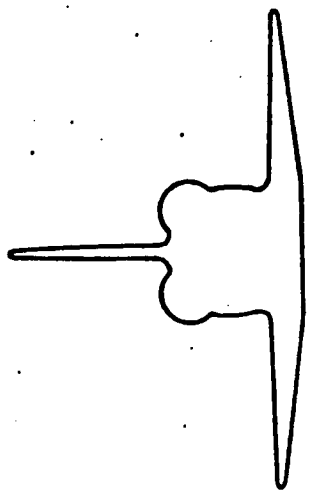
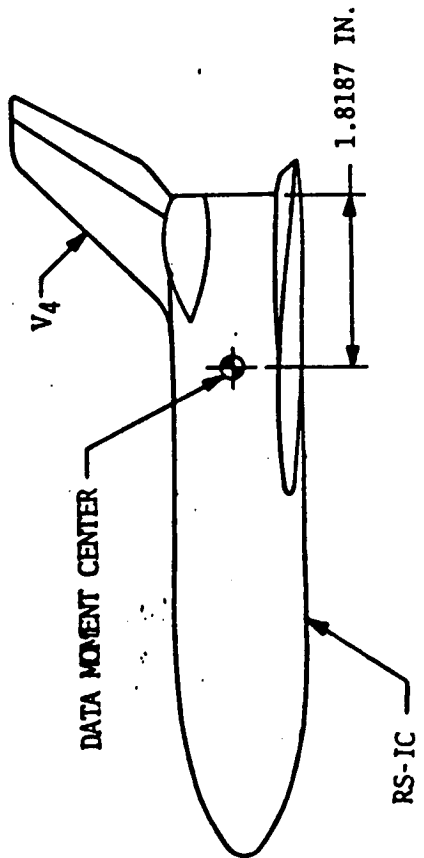


FIGURE 4. 0.003366 SCALE AR12161-1 BOOSTER

DELTA WING BOOSTER
 TBC
 DELTA WING ORBITER
 MSC
 DR#1183 C-1- 435

$S = 13.0528 \text{ sq. in. (8000 sq. ft.)}$
 $L_{\text{LONG}} = 4.515 \text{ in. (112 ft)}$
 $L_{\text{LAT}} = 4.908 \text{ in. (121.5 ft)}$
 $A_g = 1.5580 \text{ in. (955 sq.ft. Nom.)}$

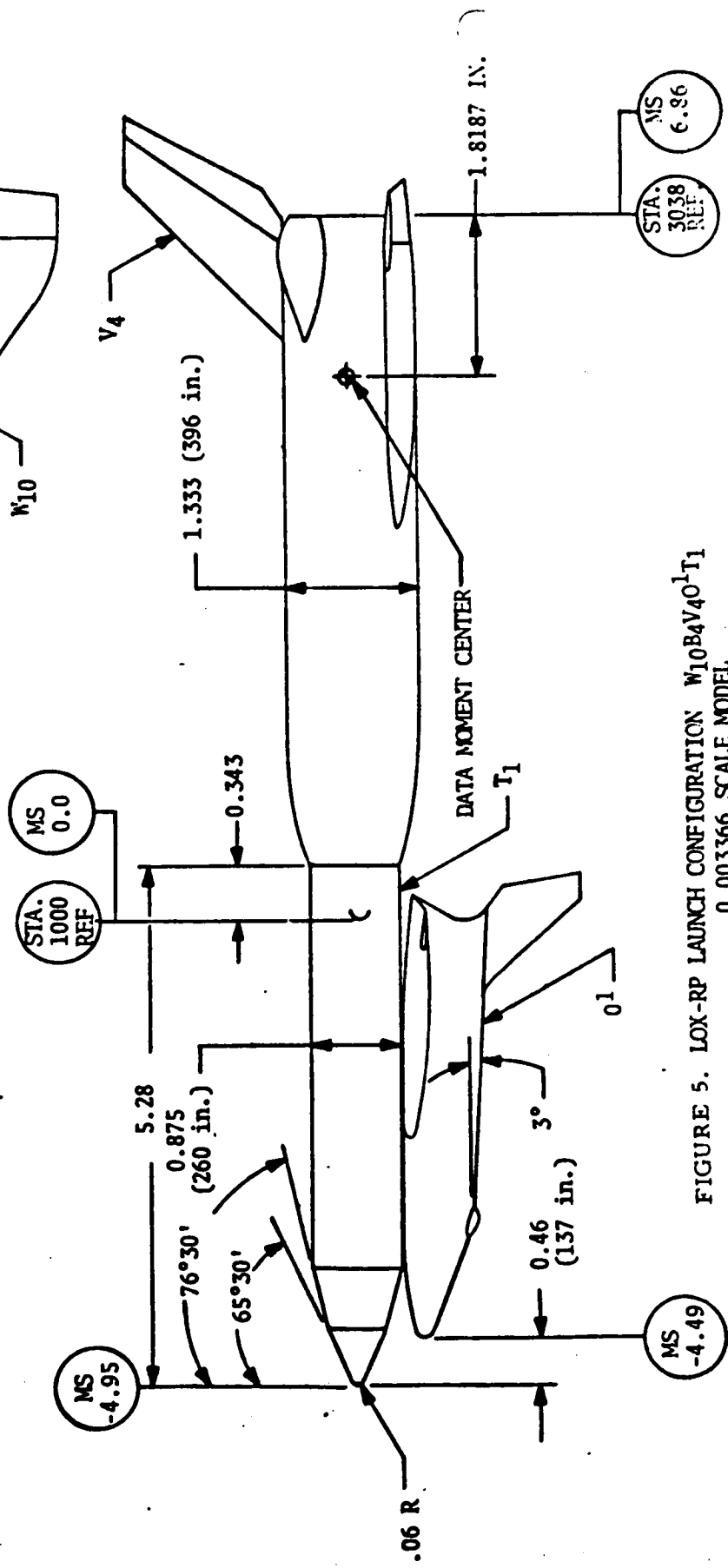
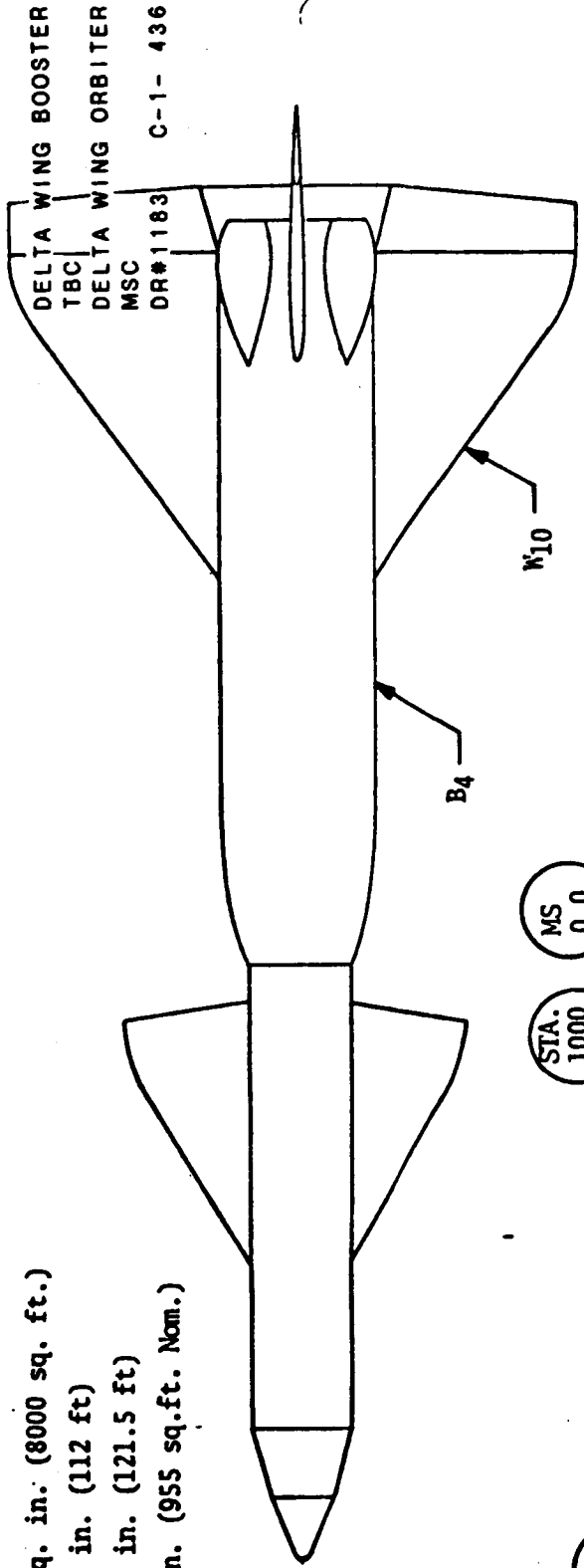


FIGURE 5. LOX-RP LAUNCH CONFIGURATION W10B4V40¹T1
 0.003366 SCALE MODEL

$S = 13.0528$ sq. in. (8000 sq. ft.)
 $L_{LONG} = 4.515$ in. (112 ft)
 $L_{LAT} = 4.908$ in. (121.5 ft)
 $A_B = 1.5580$ in. (955 sq. ft. Nom.)

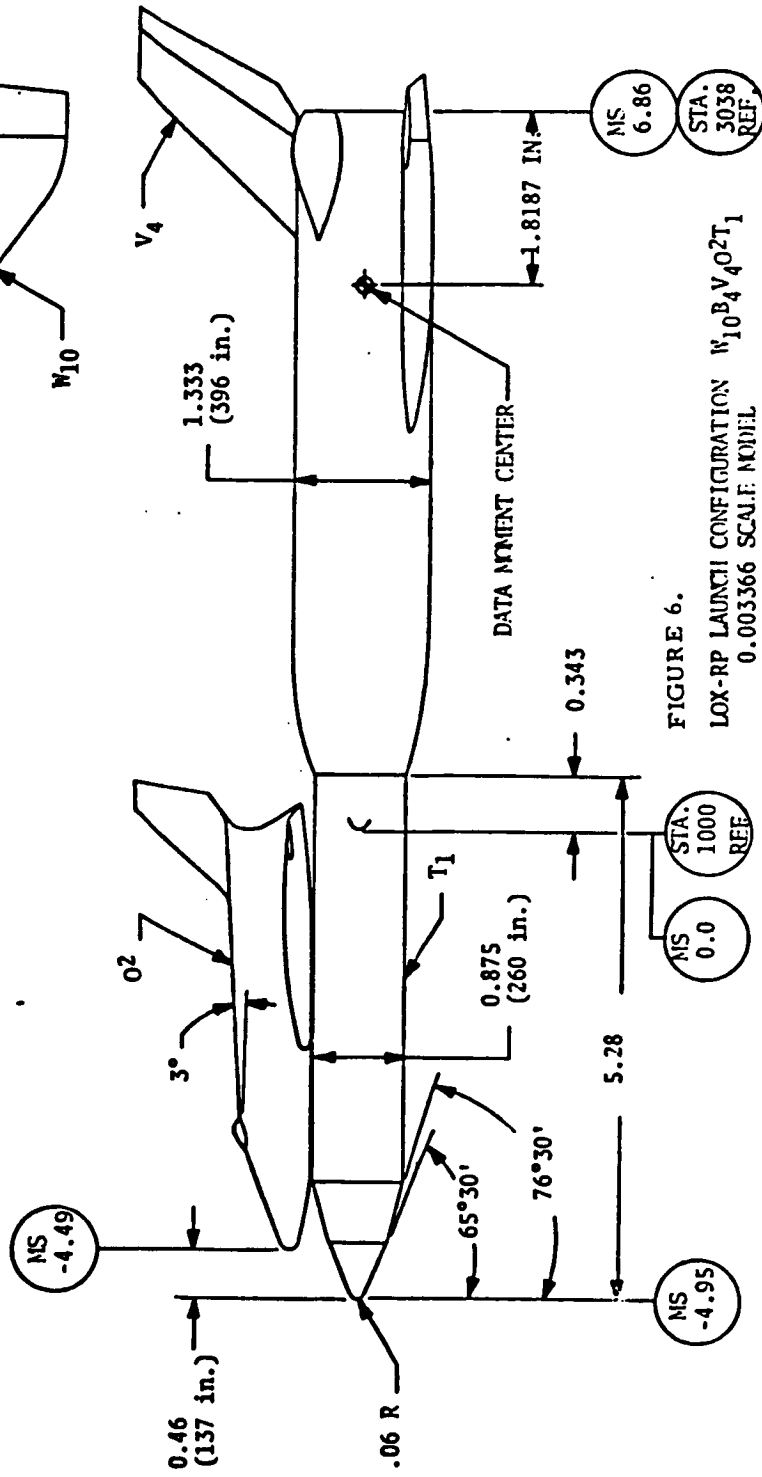
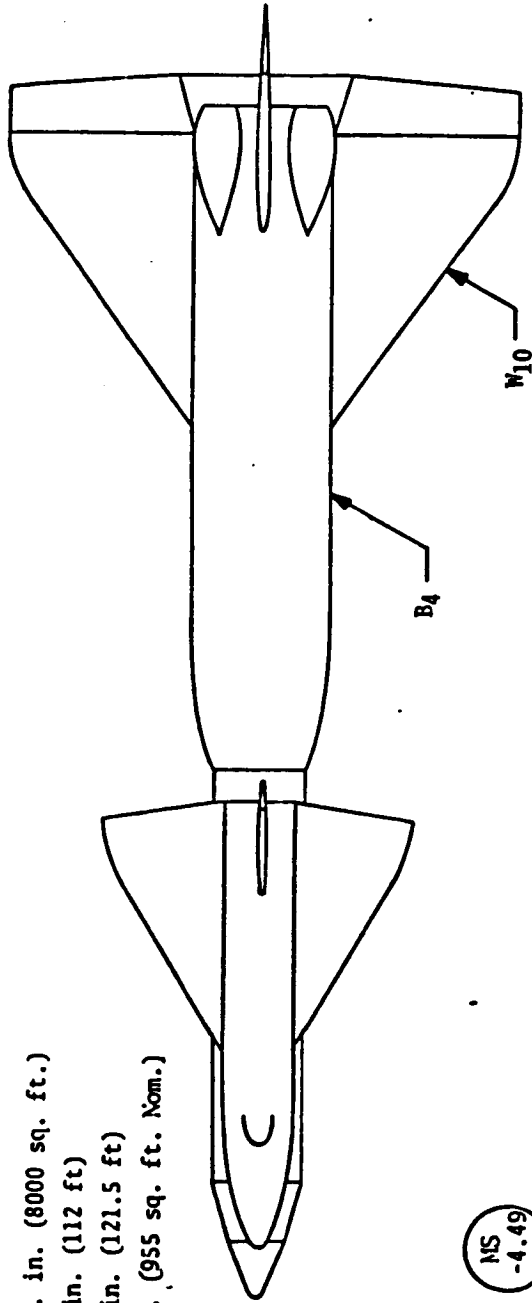


FIGURE 6.
 LOX-RP LAUNCH CONFIGURATION $W_{10}B_4V_{402}T_1$
 0.003366 SCALE: NOMEL

DELTA WING BOOSTER
 TBC
 DELTA WING ORBITER
 MSC
 DR#1183 C-1- 437

DELTA WING BOOSTER
 TBC
 DELTA WING ORBITER
 MSC
 DR#1183 C-1- 438

S = 13.0528 sq. in. (8000 sq. ft.)
 L_{LONG} = 4.515 in. (112 ft)
 L_{LAT} = 4.908 in. (121.5 ft)
 A_B = 1.5580 in. (955 sq. ft. Nom.)

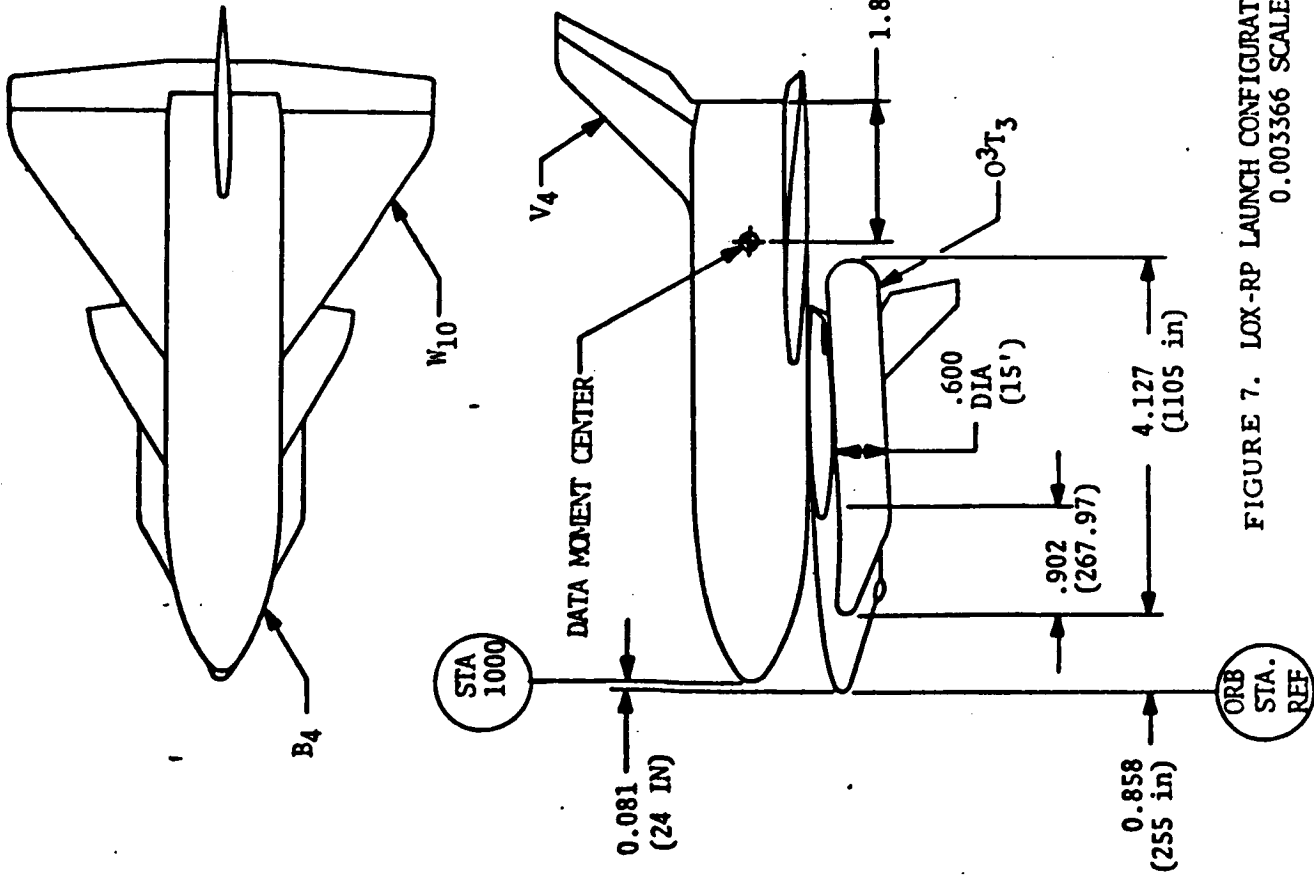
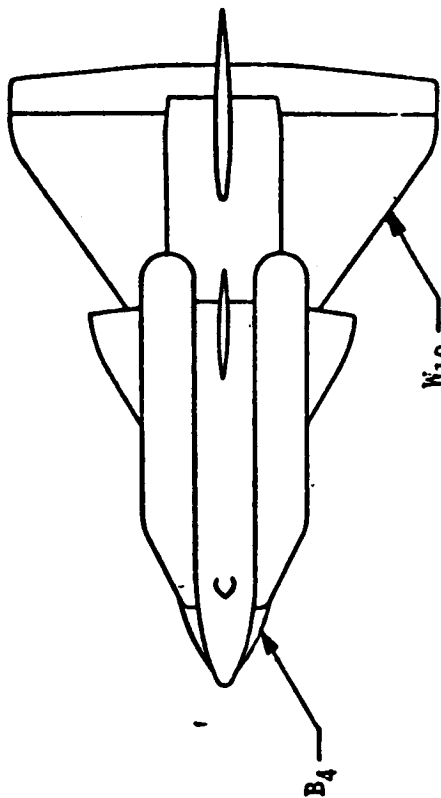


FIGURE 7. LOX-RP LAUNCH CONFIGURATION W10B4V4O3T3
 0.003366 SCALE MODEL



S = 13.0528 sq. in. (8000 sq. ft.)
 l_{LONG} = 4.515 in. (112 ft)
 l_{LAT} = 4.908 in. (121.5 ft)
 A_B = 1.5580 in. (955 sq. ft. Nom.)

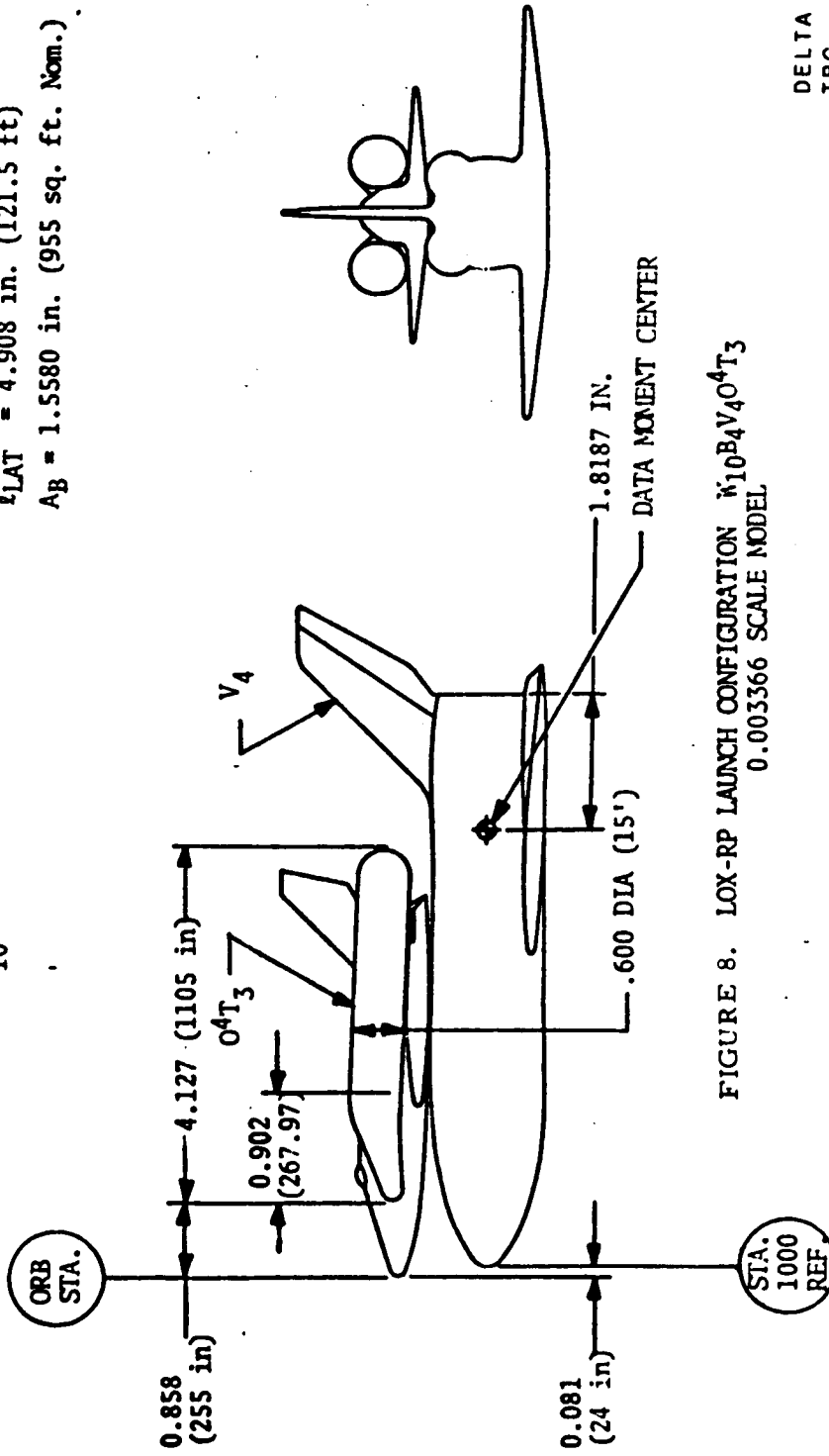
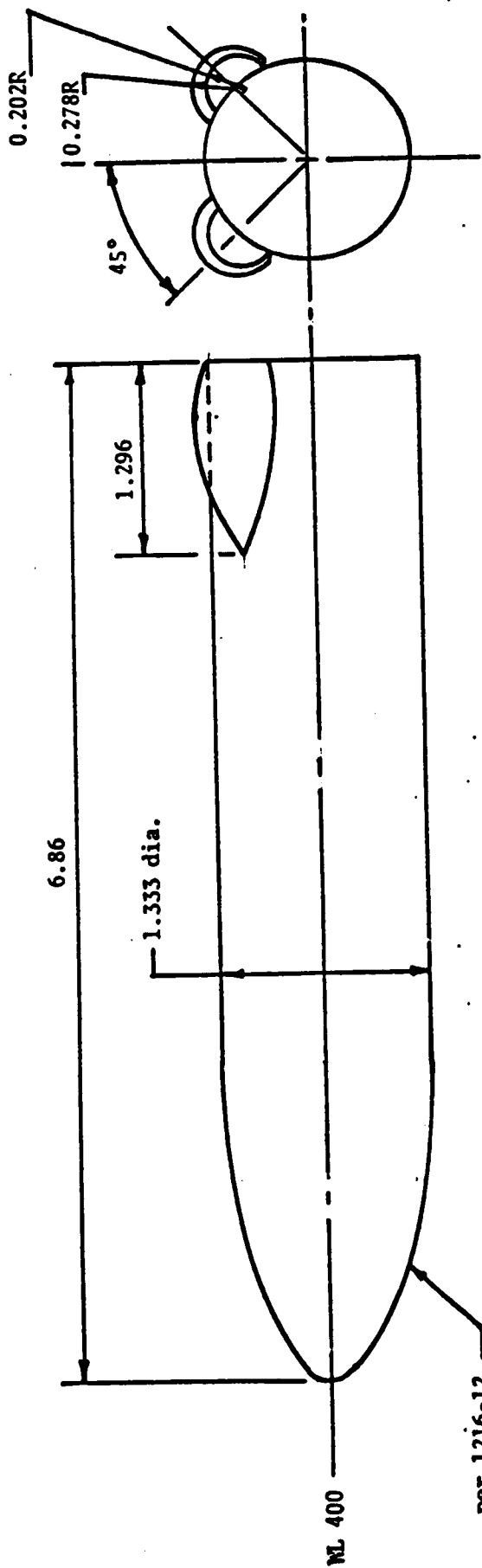


FIGURE 8. LOX-RP LAUNCH CONFIGURATION W₁₀B₄V₄O^AT₃
 0.003366 SCALE MODEL

DELTA WING BOOSTER
 TBC
 DELTA WING ORBITER
 MSC
 DR#1183 C-1- 439

DELTA WING BOOSTER
TBC
DELTA WING ORBITER
MSC
DR#1183 C-1- 440



REF. DWGS.
1216-10
1216-11
1216-18

FIGURE 9. REUSABLE LOX-RP (-049) BOOSTER BODY - B4
0.003366 SCALE ARI2161-1 MODEL

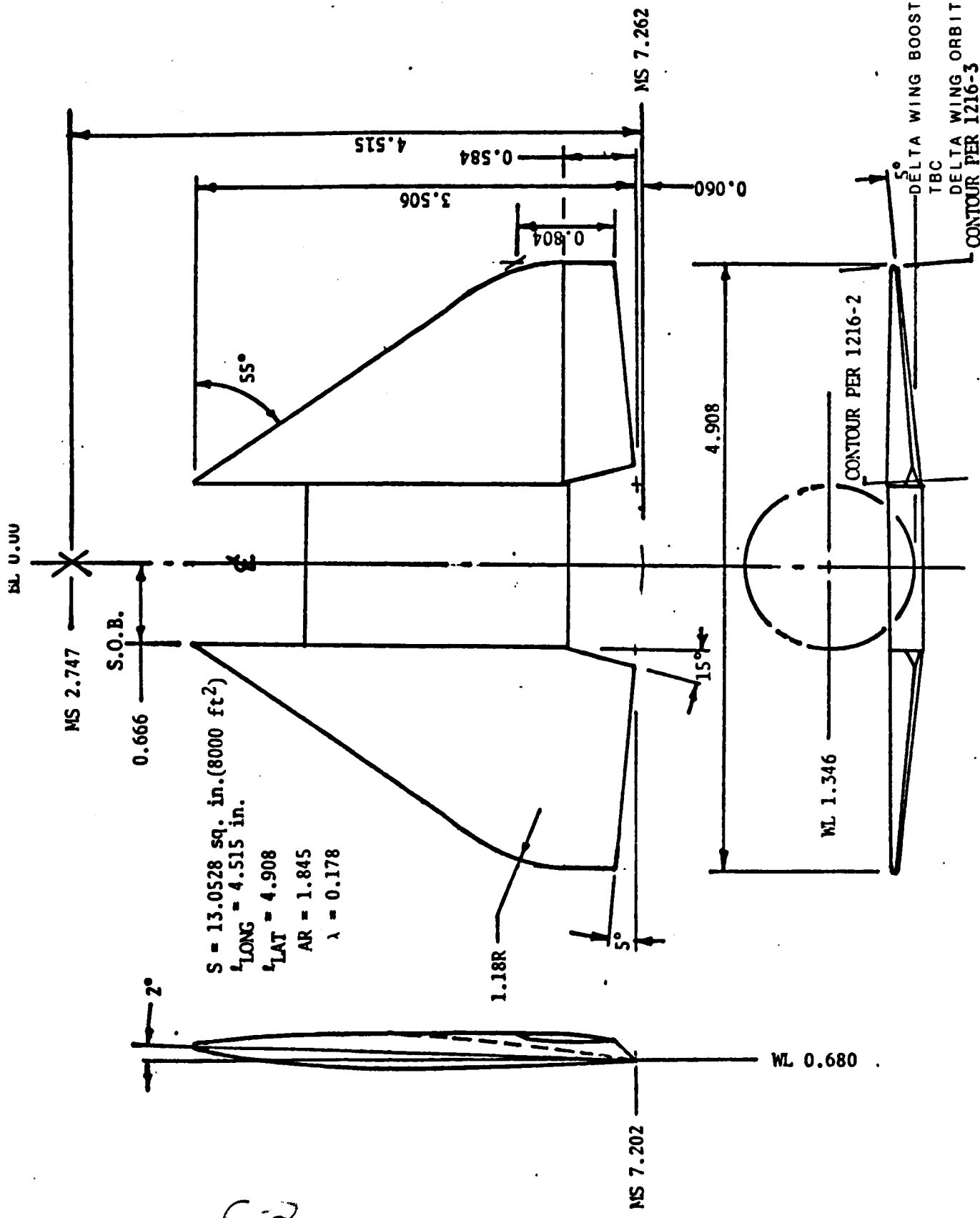
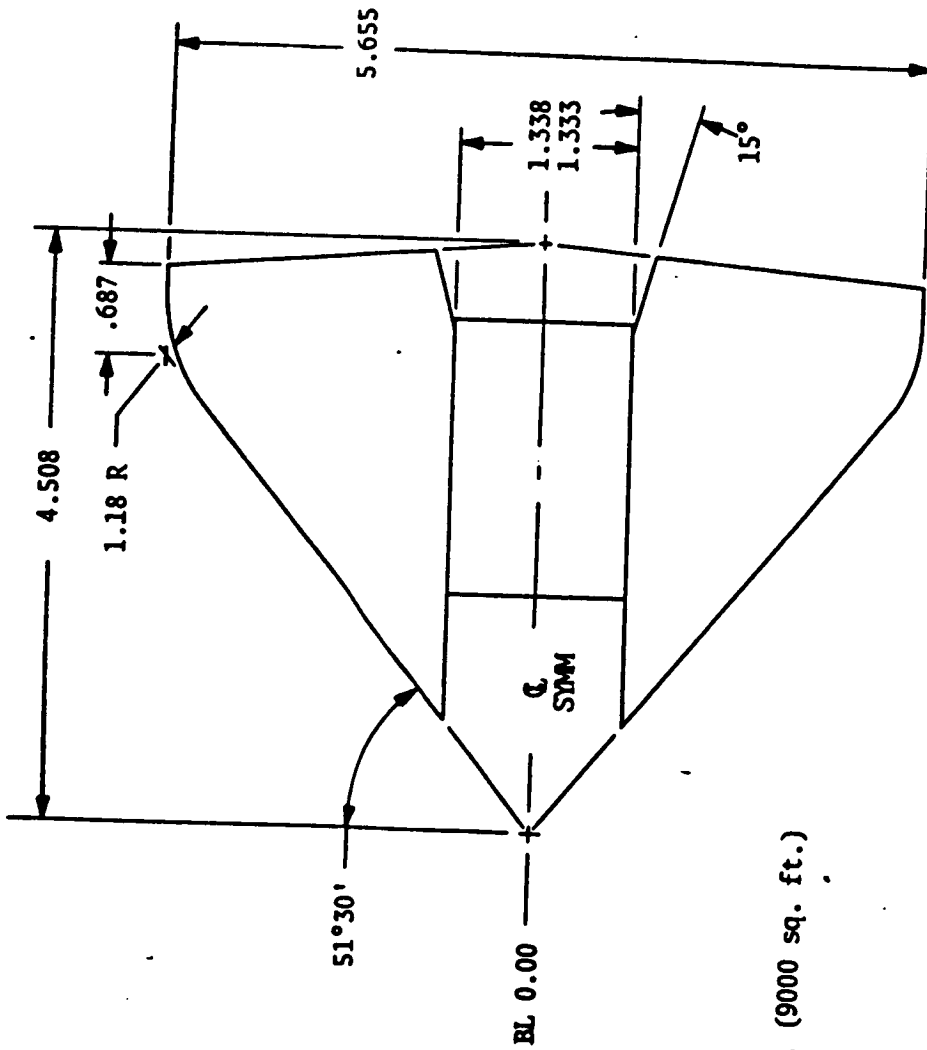


FIGURE 10. REUSABLE LOX-RP (-049) BOOSTER WING - W10
 0.003366 SCALE AR12161-1 MODEL

MS 2.754



S = 14.6836 sq.in. (9000 sq. ft.)

λ_{LONG} = 4.508 in.

λ_{LAT} = 5.655 in.

AR = 2.18

λ = 0.15

DELTA WING BOOSTER
 TBC
 DELTA WING ORBITER
 MSC
 DR#1183 C-1- 442

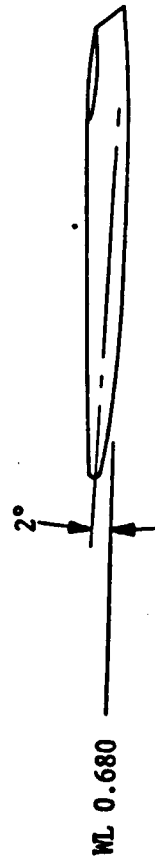
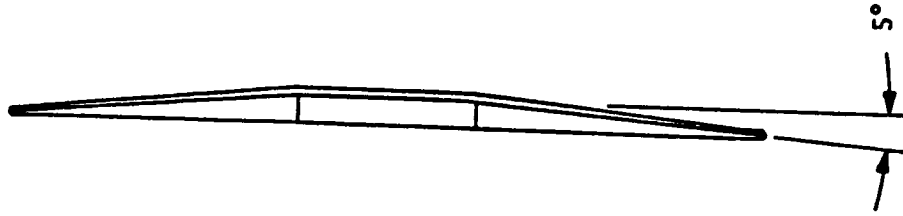
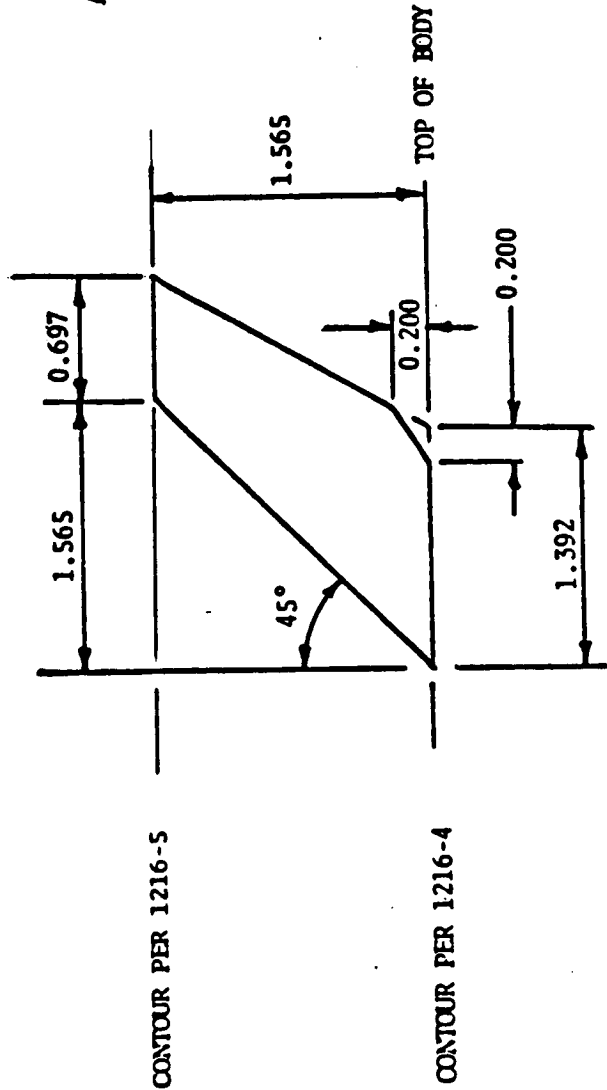


FIGURE 11. REUSABLE LOX-RP (-049) BOOSTER WING - W11
 0.003366 SCALE AR 12161-1 MODEL



$S = 1.630 \text{ in}^2 \text{ (1000 ft}^2\text{)}$
 $AR = 1.5$
 $\lambda = 0.5$



DELTA WING BOOSTER
TBC
DELTA WING ORBITER
MSC
DR#1183 C-1- 443

FIGURE 12. REUSABLE LCX-RP (-049) BOOSTER VERTICAL TAIL - V4
0.003566 SCALE AR1216I-1 MODEL

DELTA WING BOOSTER
 TBC
 DELTA WING ORBITER
 S = 2.447 sq. in. (1500 sq. ft.)
 AR = 1.50 MSC
 λ = 0.5 DR#1183 C-1- 444

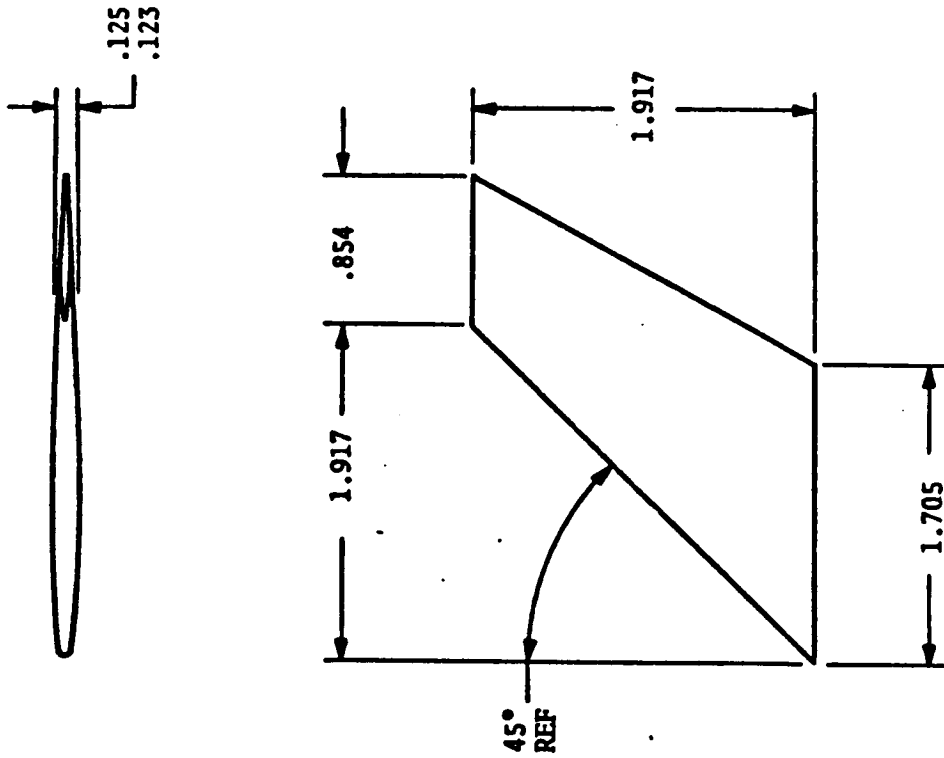


FIGURE 13. REUSABLE LOX-RP (-049) BOOSTER VERTICAL TAIL - V5
 0.003566 SCALE AR 12161-1 MODEL

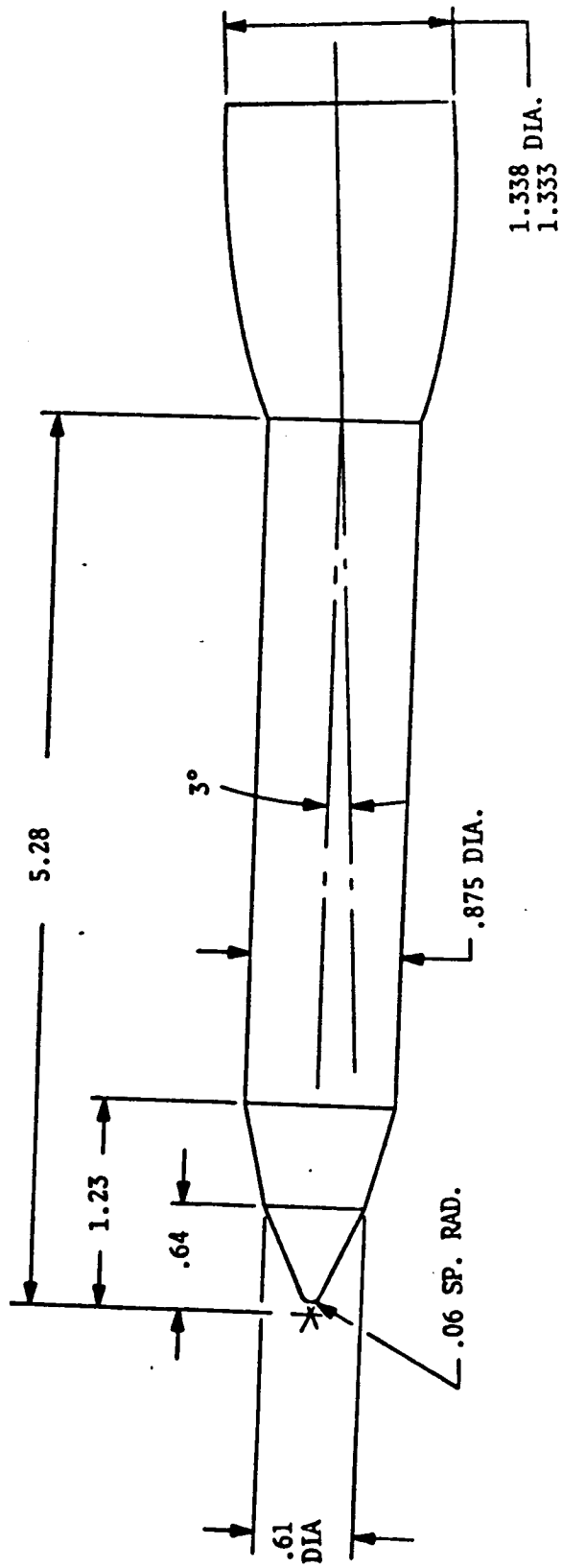
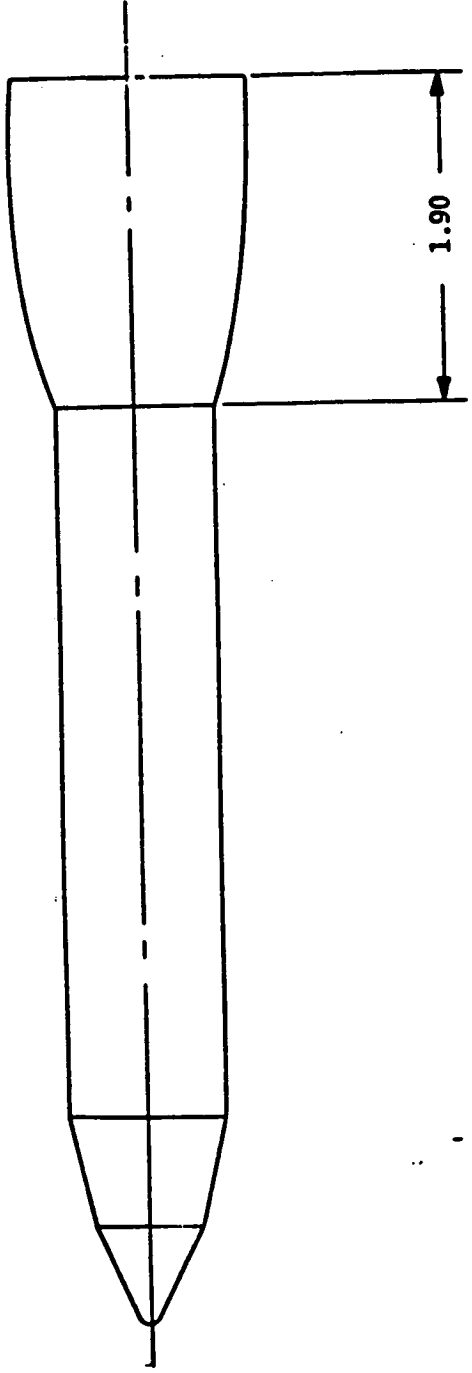


FIGURE 14. LOX-RP ORBITER TANK, DEFLECTED T2
0.003366 SCALE MODEL

DELTA WING BOOSTER
TBC
DELTA WING ORBITER
MSC
DR#1183 C-1- 445

DELTA WING BOOSTER
TBC
DELTA WING ORBITER
MSC
DR#1183 C-1- 446

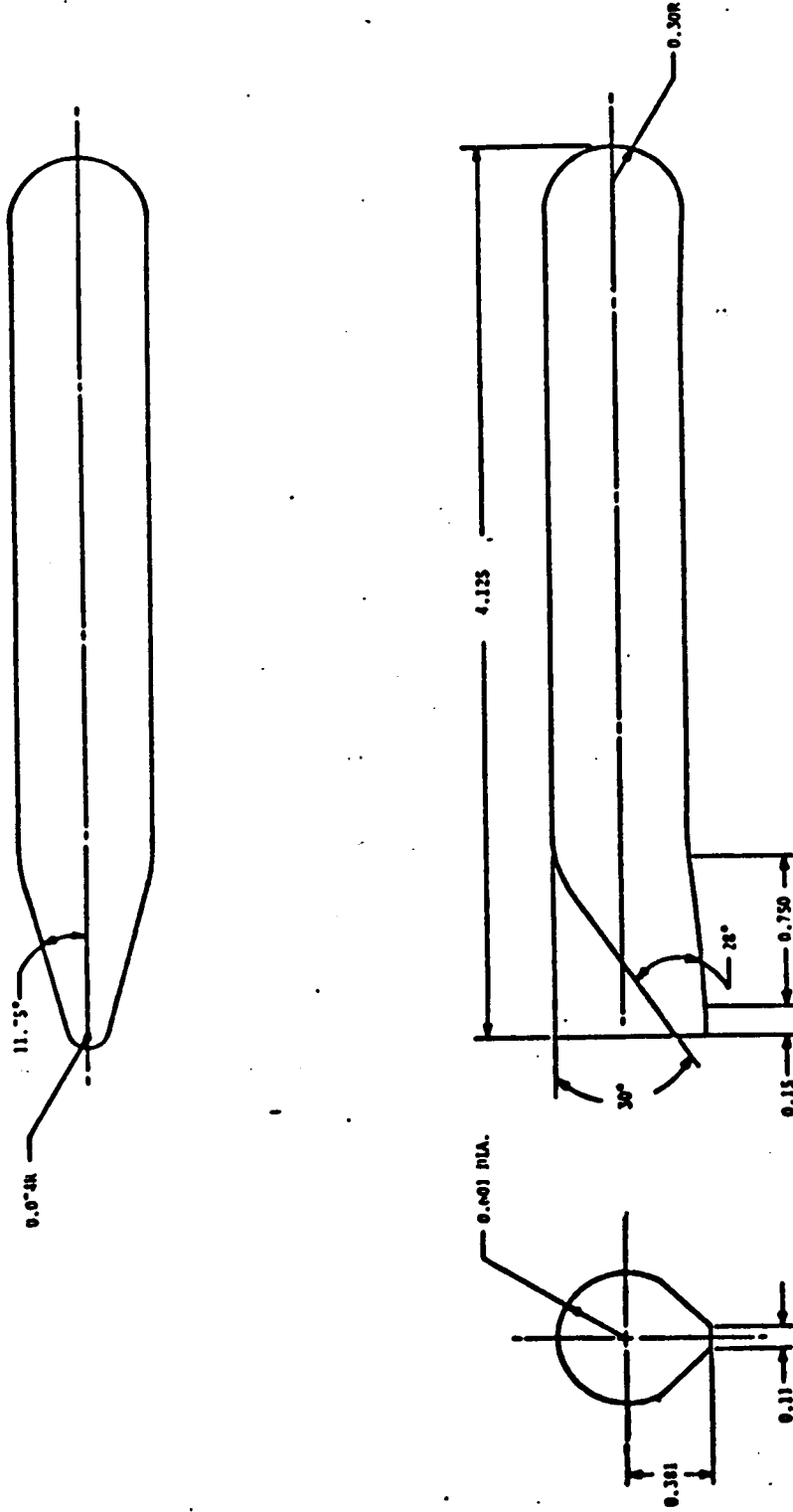
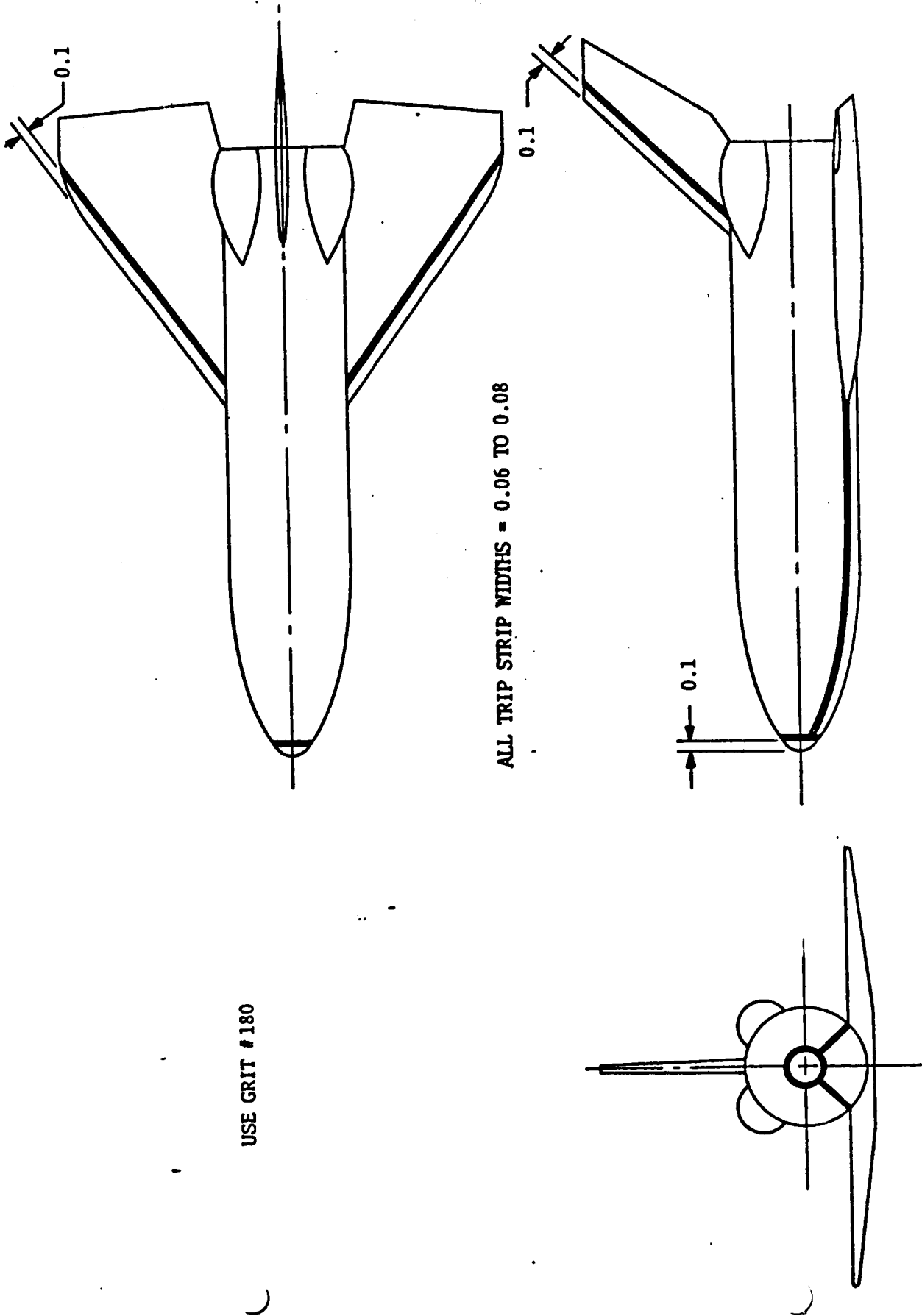


FIGURE 15. ORBITER DROP TANKS - T₃
0.003366 SCALE MODEL AR 12161-1



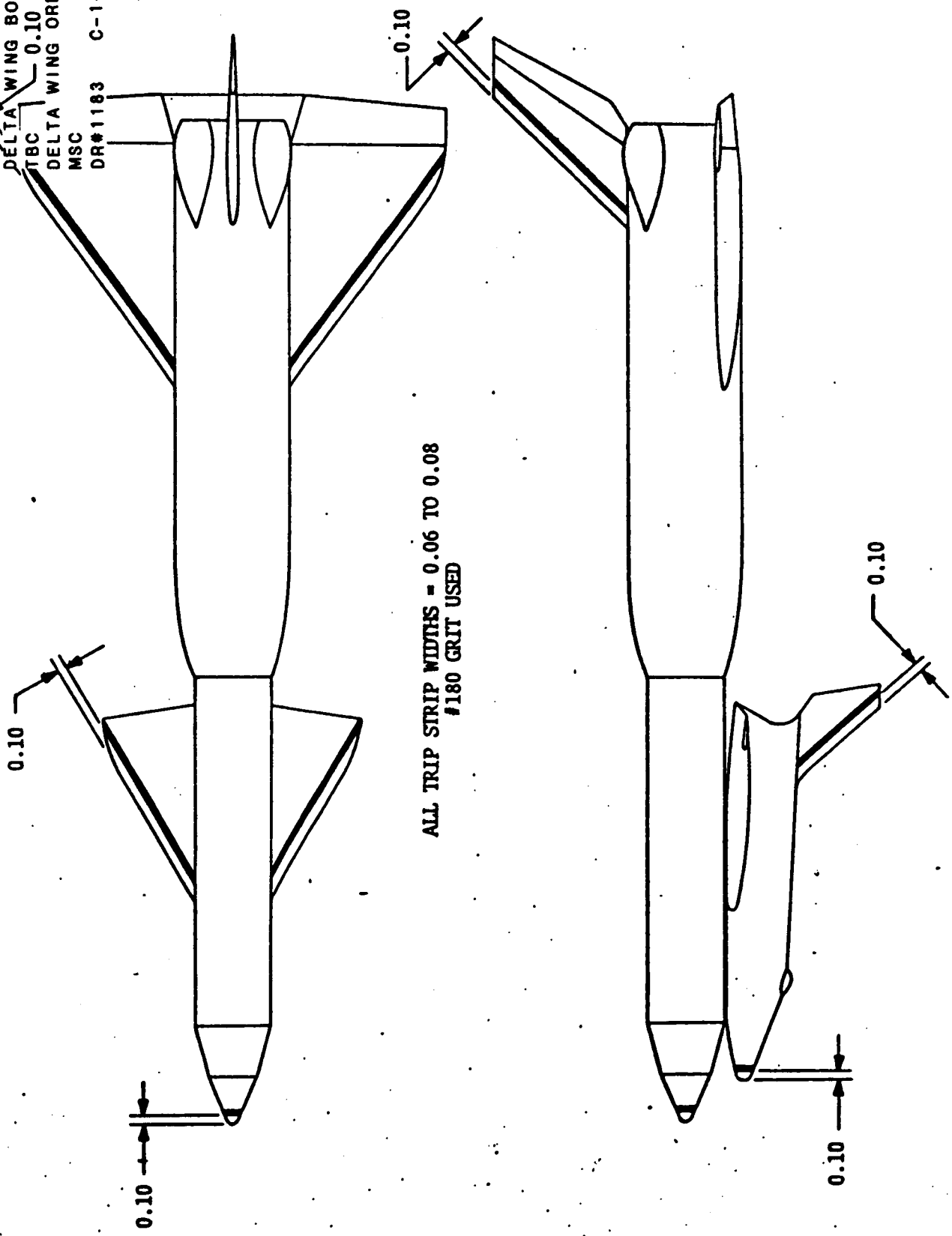
USE GRIT # 180

ALL TRIP STRIP WIDTHS = 0.06 TO 0.08

FIGURE 16A. TRIP STRIP CHART
ARI2161-1 MODEL

DELTA WING BOOSTER
TBC
DELTA WING ORBITER
MSC
DR#1183 C-1- 447

DELTA WING BOOSTER
TBC 0.10
DELTA WING ORBITER
MSC
DR#1183 C-1- 448



ALL TRIP STRIP WIDTHS = 0.06 TO 0.08
#180 GRIT USED

FIGURE 16B. TRIP STRIP CHART
ARI2161-1 MODEL

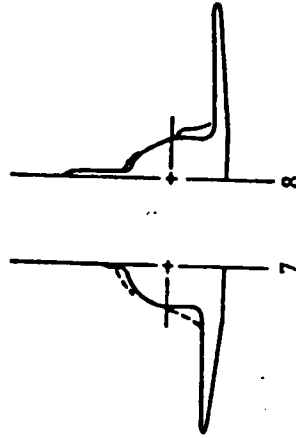
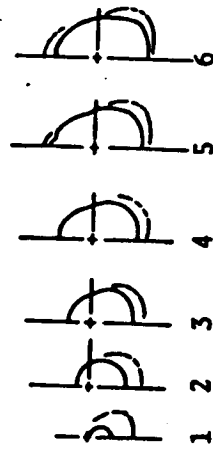
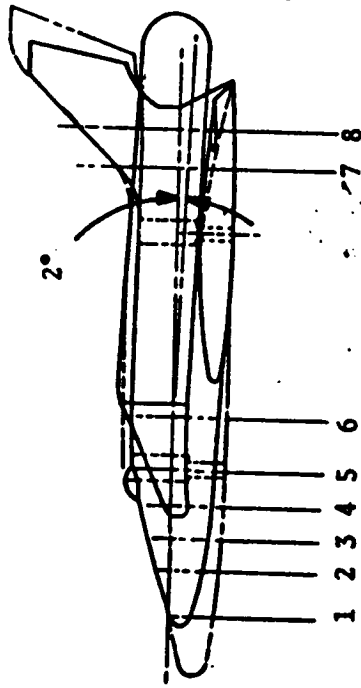
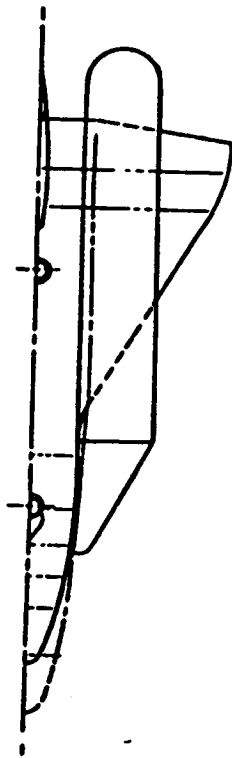
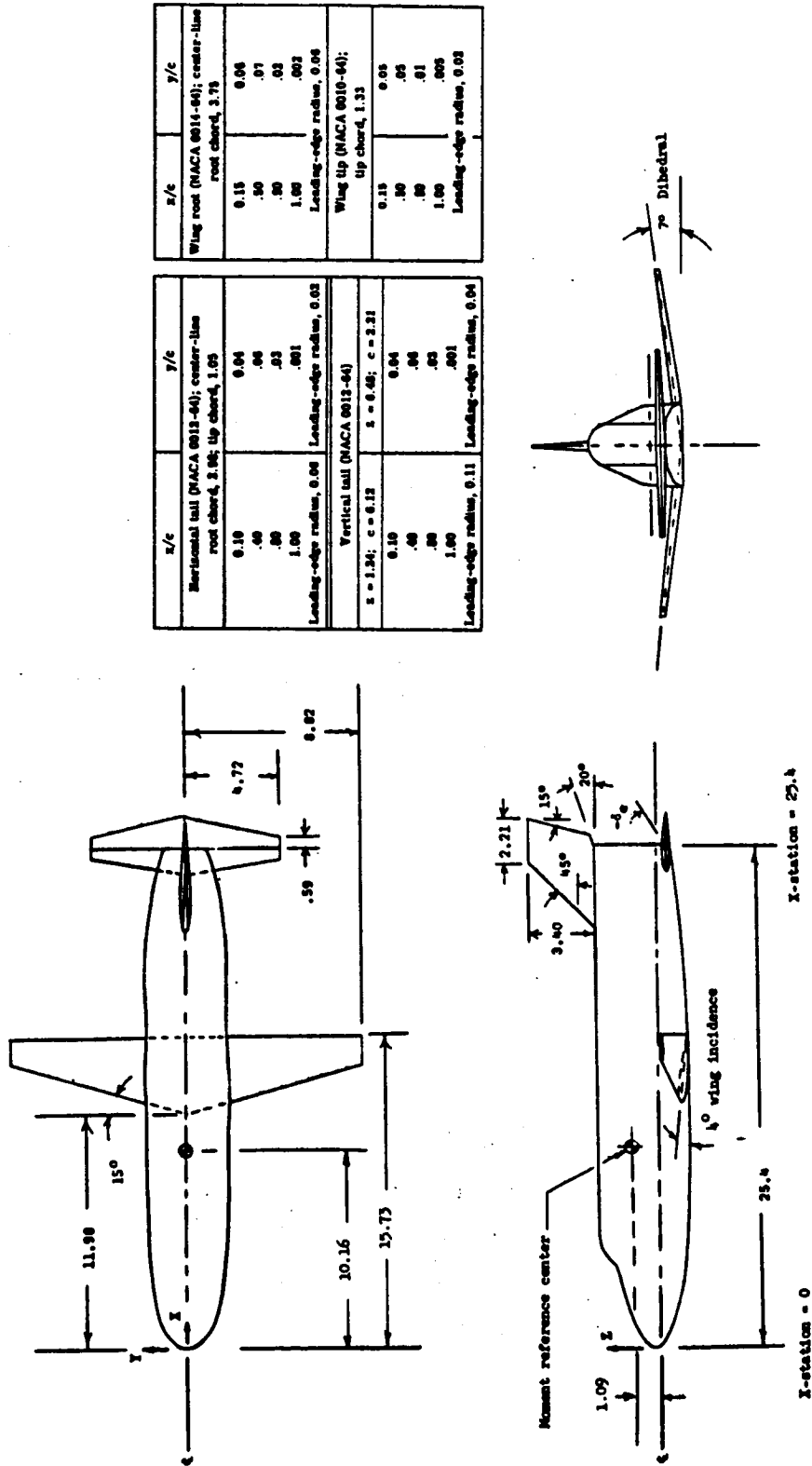


FIGURE 18. MSC-040A ORBITER
0.003366 Scale Model

DELTA WING BOOSTER
TBC
DELTA WING ORBITER
MSC
DR#1183 C-1- 449



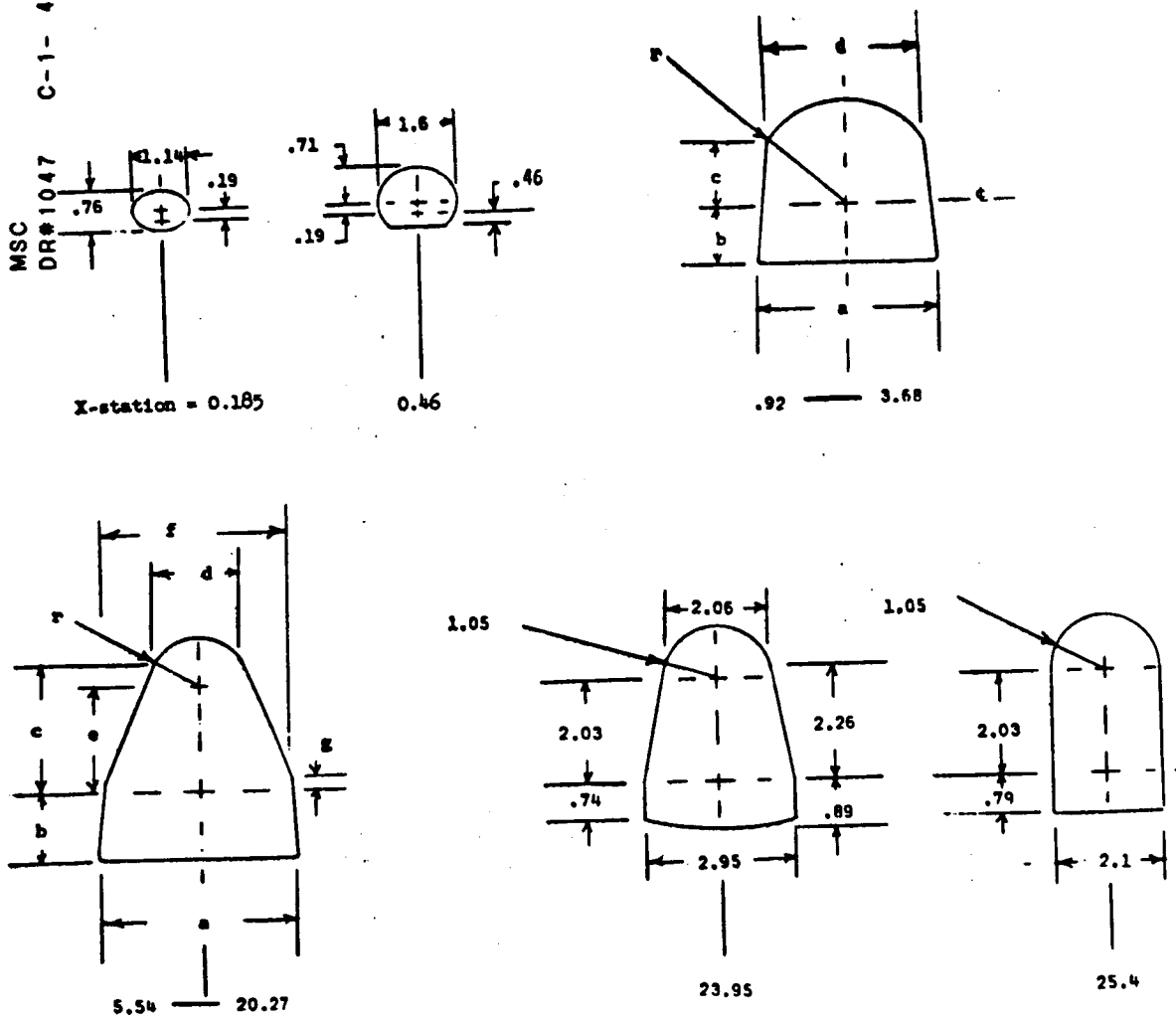
(a) General arrangement.

FIGURE 2 Orbiter model details. All dimensions are in centimeters.

DELTA WING BOOSTER
MDAC
STRAIGHT WING ORBITER
MSC
DR#1047 C-1-451

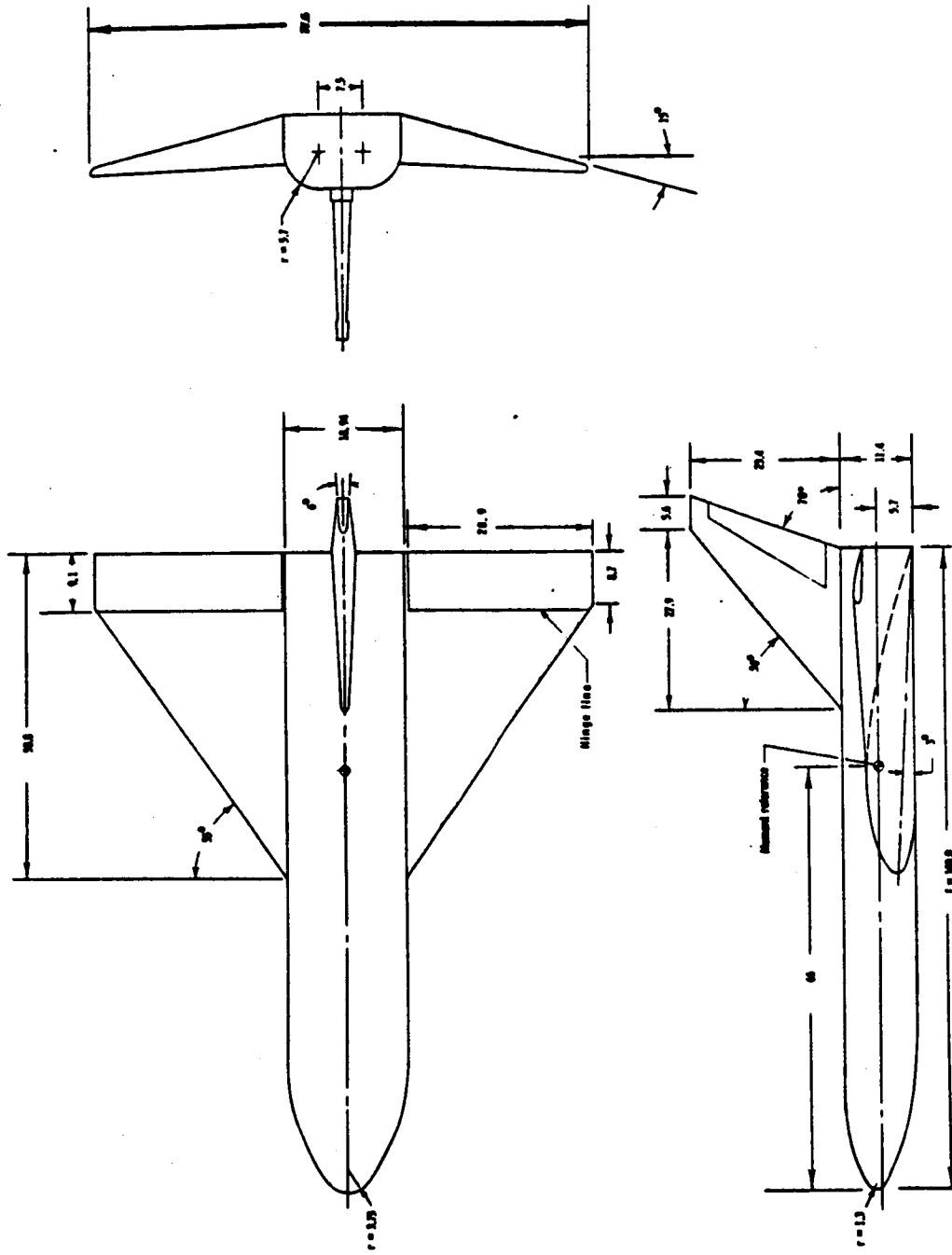
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OF POOR QUALITY

DELTA WING BOOSTER
MDAC
STRAIGHT WING ORBITER
MSC
DR#1047 C-1-452



X-station	a	b	c	d	e	f	g	r
0.92	3.22	0.46	0.66	1.93				1.14
1.85	2.79	.73	1.02	2.11				1.47
2.78	3.25	.97	1.12	2.62				1.78
3.68	3.56	1.14	1.27	3.05				2.03
5.54	3.91	1.37	2.41	1.75	2.03	3.68	0.25	.99
7.37	4.06	1.42	2.49	1.91	2.03	3.81	.25	1.05
11.05	4.19	1.52	2.49	1.91	2.03	3.94	.29	1.05
13.82	4.14	1.63	2.49	1.91	2.03	3.94	.29	1.05
15.55	3.94	1.52	2.48	1.91	2.03	3.94	.29	1.05
20.27	3.94	1.21	2.48	1.91	2.03	3.94	.29	1.05

FIGURE 3 Orbiter model cross-sections



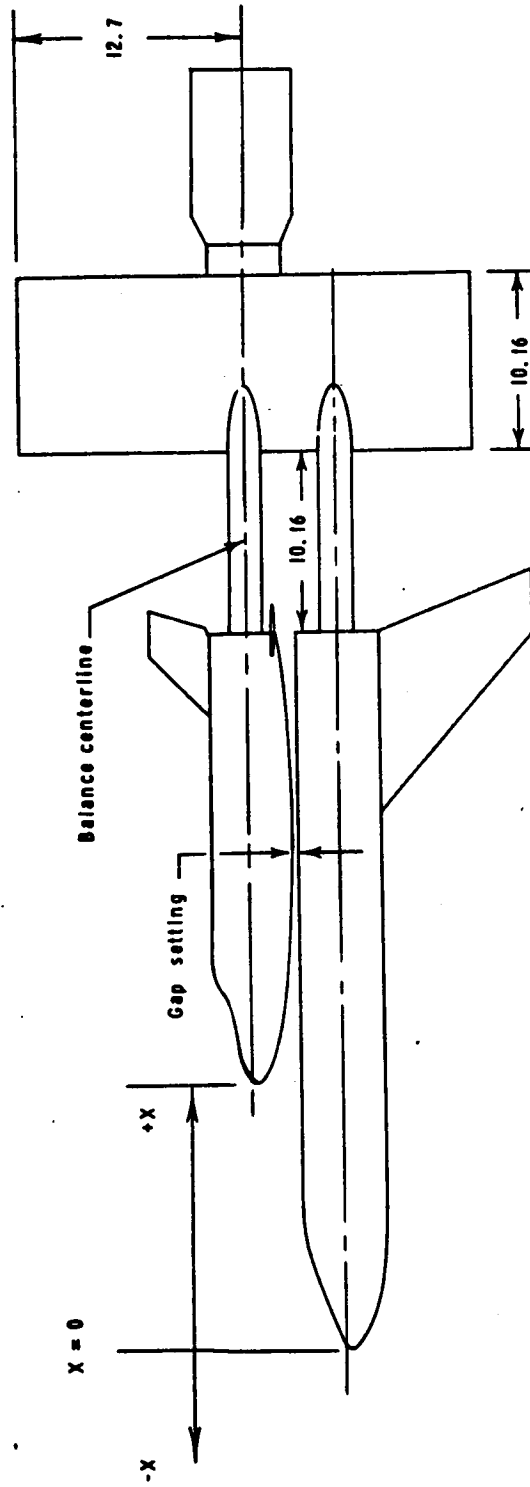
1 = 16 Inch (40.6 cm.)

DELTA WING BOOSTER
 MDAC
 STRAIGHT WING ORBITER
 MSC
 DR#1047 C-1- 453

FIGURE 4 Booster model details. Linear dimensions are in percent of model length.

DELTA WING BOOSTER
 MDAC
 STRAIGHT WING ORBITER
 MSC
 DR#1047 C-1- 454

Axial location	Gap setting	
	X, cm.	cm.
L1	-5.08	G1 0.19
L2	8.89	G1 0.19
L3	15.24	G1 0.19
L2	8.89	G2 0.69
L0	Booster removed	

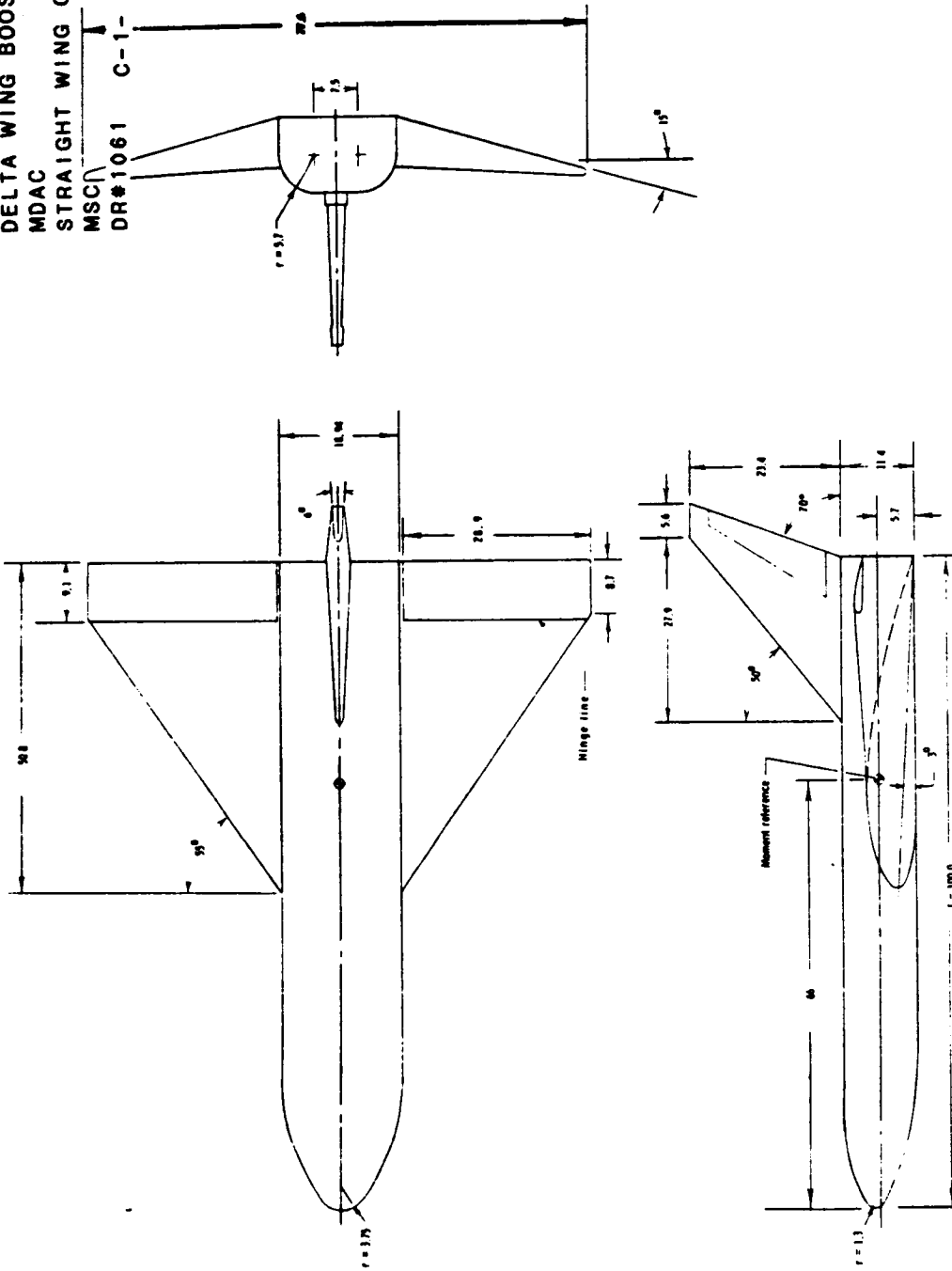


Wings omitted for clarity

Orbiter shown here in axial location L3

FIGURE 5 Drawing of orbiter - booster arrangement. All dimensions in centimeters.

DELTA WING BOOSTER
MDAC
STRAIGHT WING ORBITER
MSC
DR#1061 C-1- 456



1 = 16 inch (40.6 cm.)

FIGURE 2. Booster model details. Linear dimensions are in percent of model length.

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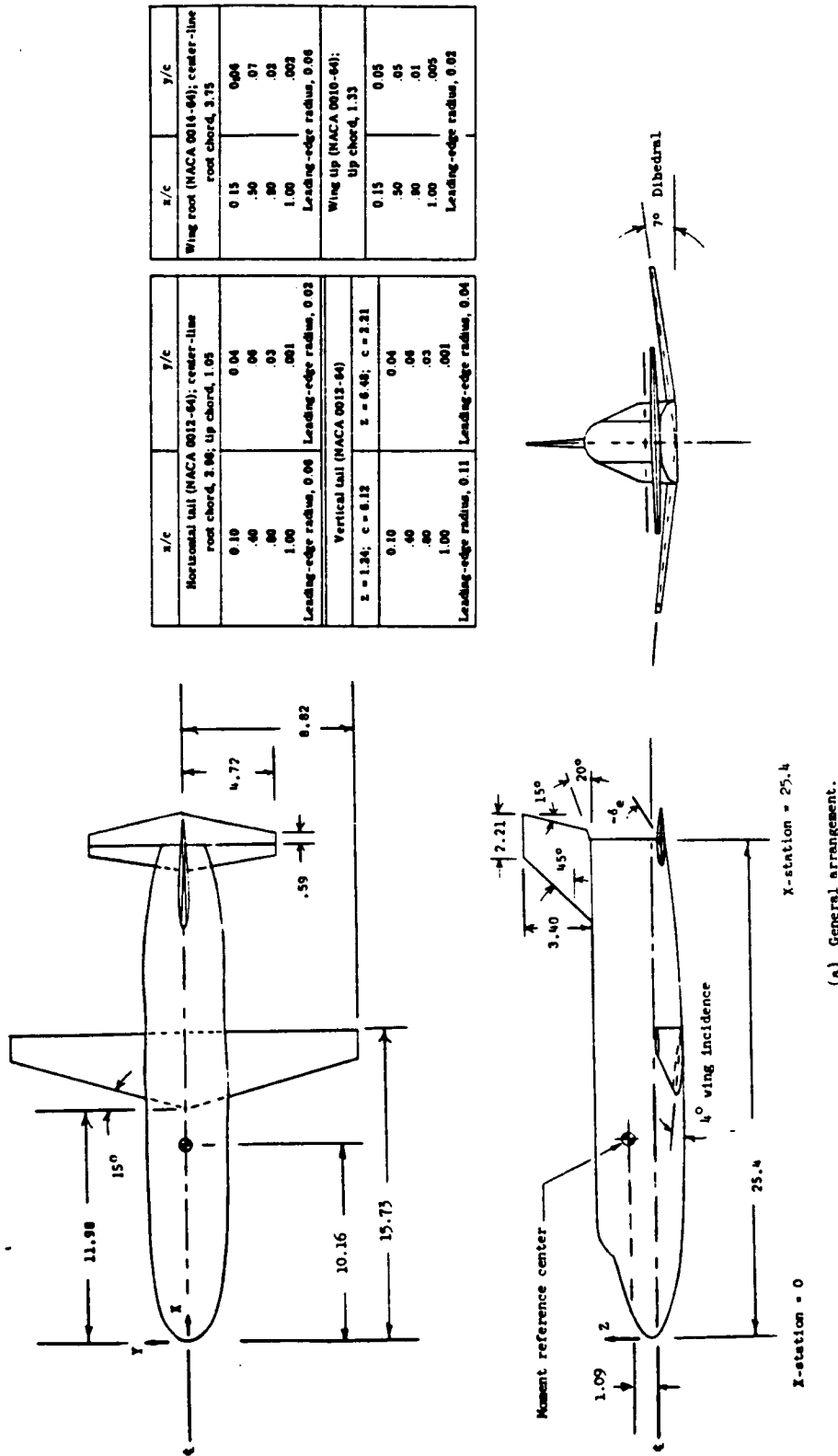
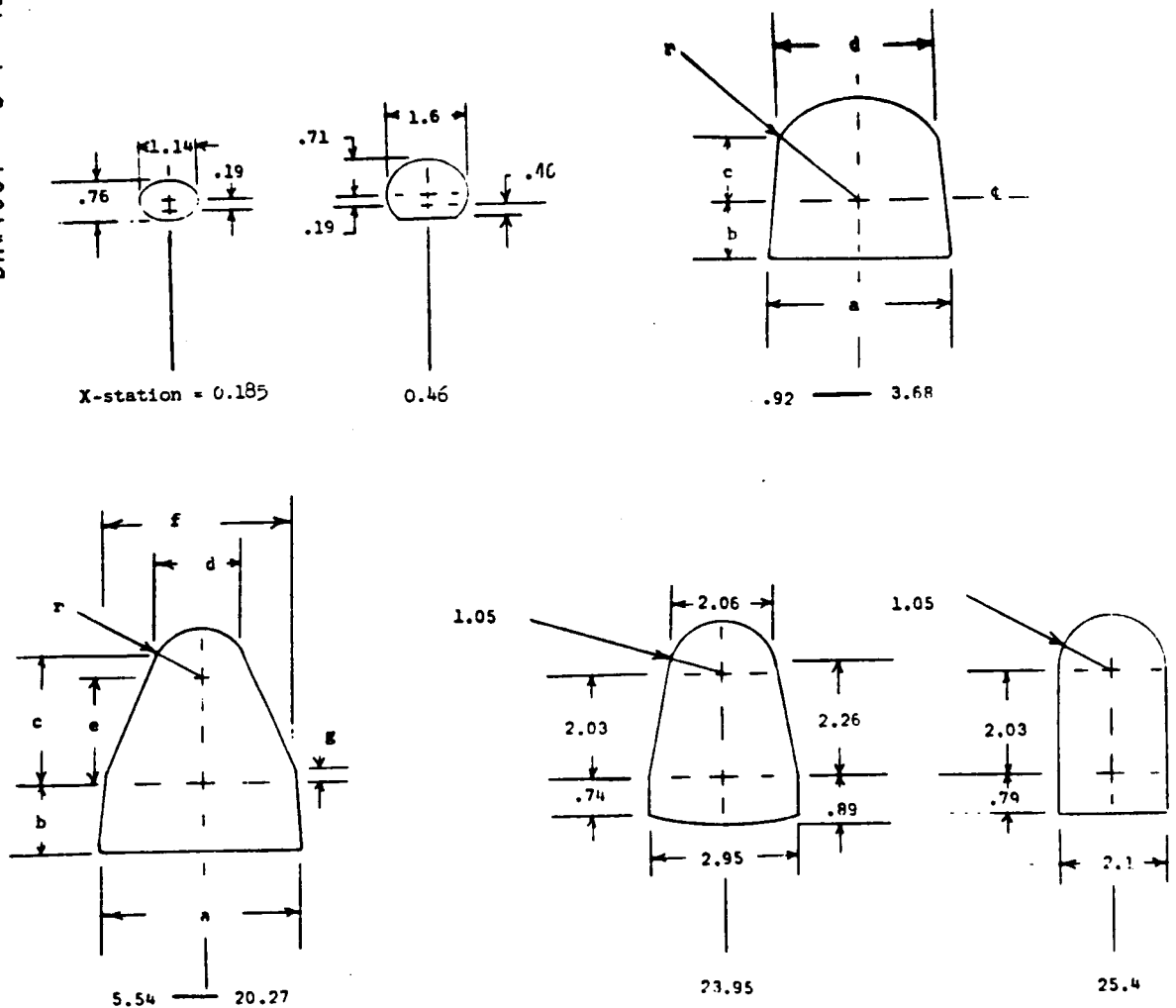


FIGURE 3. Orbiter model details. All dimensions are in centimeters.

DELTA WING BOOSTER
MDAC
STRAIGHT WING ORBITER
MSC
DR#1061 C-1- 457



X-station	a	b	c	d	e	f	g	r
0.92	2.22	0.46	0.66	1.93				1.14
1.85	2.79	.73	1.02	2.11				1.47
2.76	3.25	.97	1.12	2.62				1.78
3.68	3.56	1.14	1.27	3.05				2.03
5.54	3.91	1.37	2.41	1.75	2.03	3.68	0.25	.99
7.37	4.06	1.42	2.49	1.91	2.03	3.81	.25	1.05
11.05	4.19	1.52	2.49	1.91	2.03	3.94	.29	1.05
13.82	4.14	1.63	2.49	1.91	2.03	3.94	.29	1.05
15.55	3.94	1.52	2.48	1.91	2.03	3.94	.29	1.05
20.27	3.94	1.21	2.48	1.91	2.03	3.94	.29	1.05

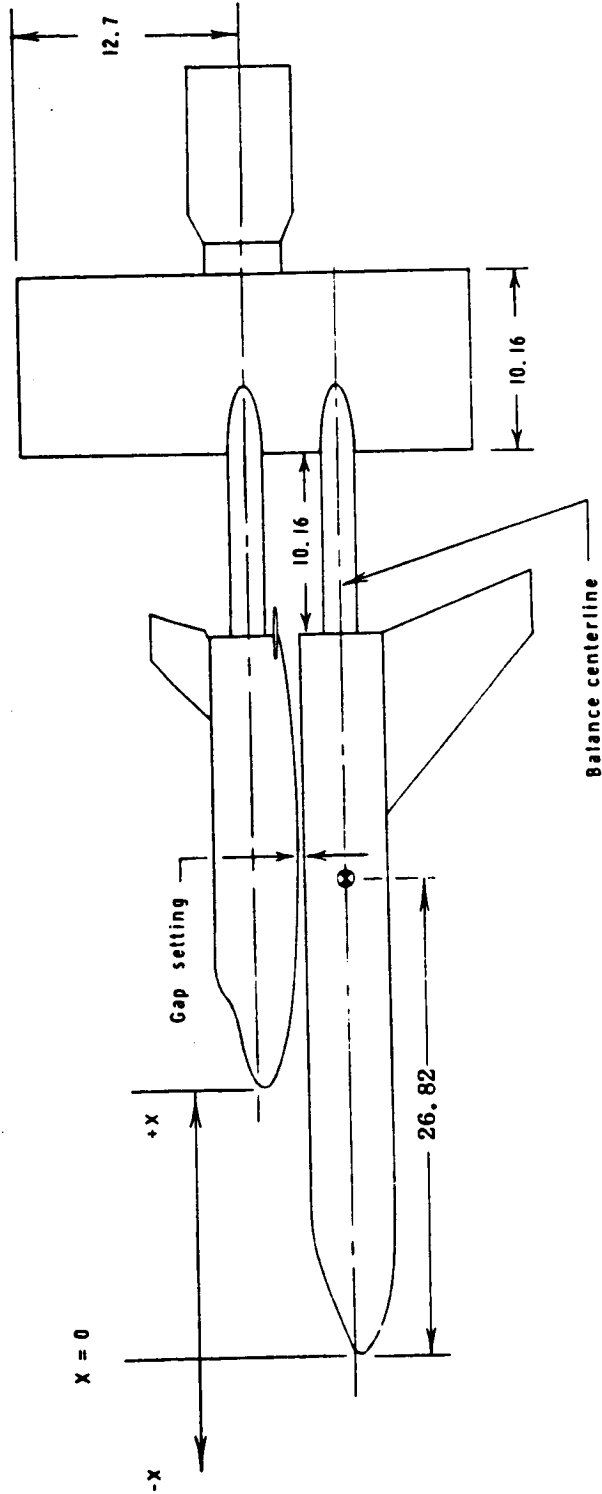
FIGURE 4.

(b) Orbiter model cross-sections.

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ORIGINAL PAGE IS
OF POOR QUALITY

Axial location		Gap setting
X	cm.	cm.
L1	-5.08	G1 0.19
L2	8.89	G1 0.19
L3	15.24	G1 0.19
L2	8.89	G2 0.69
L0		Orbiter removed



Wings omitted for clarity

Orbiter shown here in axial location L3

DELTA WING BOOSTER
MDAC
STRAIGHT WING ORBITER
MSC
DR#1061 C-1- 459

FIGURE 5. Sketch of booster - orbiter arrangement. All dimensions in centimeters.

TEST DATA SHEET / DATASET COLLATION SHEET

PRETEST
 POSTTEST

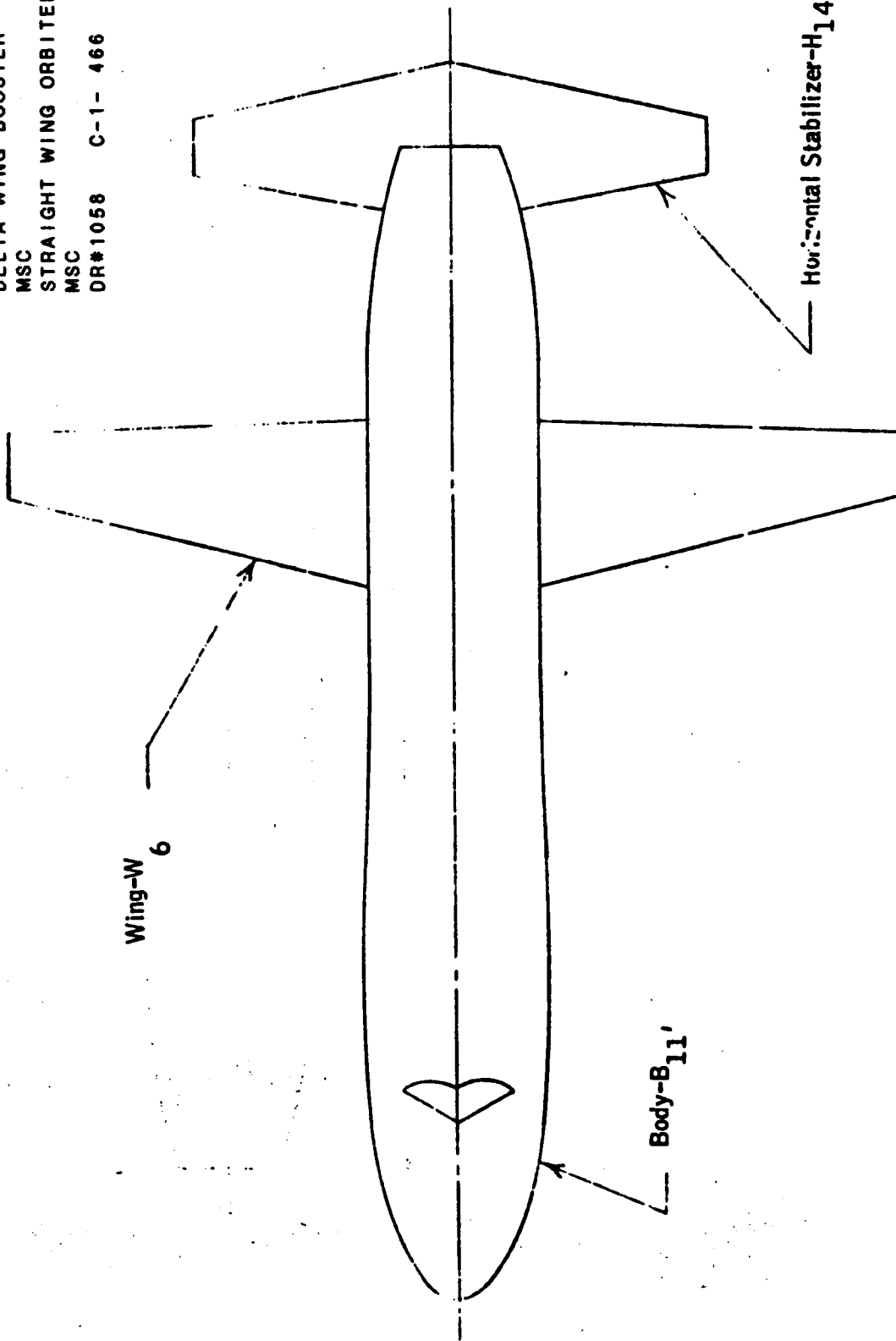
DATA SET IDENTIFIER	CONFIGURATION		ORBITER	ROOSTER		MACH NO.	SEPARATION POSITIONS														
	ORBITER	ROOSTER		ORBITER	ROOSTER		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
RCH 052	R ₁ W ₁ H ₁ V ₁	B ₂₁ W ₂ H ₂ V ₂	C ⁰	C ⁰	C ⁰	2.99												674	675		
RCH 053			C ⁰	C ⁰	C ⁰	4.39												676	677		
RCH 054			C ⁺⁵	C ⁺⁵	C ⁺⁵													678	679		
RCH 055			C ⁻⁵	C ⁻⁵	C ⁻⁵													680	681		
RCH 056	DEF		C ⁻⁵	C ⁻⁵	C ⁻⁵																
RCH 057			C ⁺⁵	C ⁺⁵	C ⁺⁵																
RCH 058			C ⁰	C ⁰	C ⁰																
RCH 059			C ⁰	C ⁰	C ⁰																
RCH 060		B ₂₃ W ₂₃ H ₂₃ V ₂₃	C ⁰	C ⁰	C ⁰	2.99															
RCH 061			C ⁰	C ⁰	C ⁰																
RCH 062			C ⁺⁵	C ⁺⁵	C ⁺⁵																
RCH 063			C ⁰	C ⁰	C ⁰																
RCH 064			C ⁺⁵	C ⁺⁵	C ⁺⁵																
RCH 065			C ⁰	C ⁰	C ⁰																
RCH 066			C ⁻⁵	C ⁻⁵	C ⁻⁵																
RCH 067			C ⁻⁵	C ⁻⁵	C ⁻⁵	1.81															
RCH 068			C ⁺⁵	C ⁺⁵	C ⁺⁵																
RCH 069			C ⁰	C ⁰	C ⁰																
RCH 070			C ⁰	C ⁰	C ⁰																
RCH 071			C ⁺⁵	C ⁺⁵	C ⁺⁵																

COEFFICIENTS: CA, CGY, ICN, CBL, ICLM, CYN, CPB, IDPVAR(1), IDPVAR(2), HDV

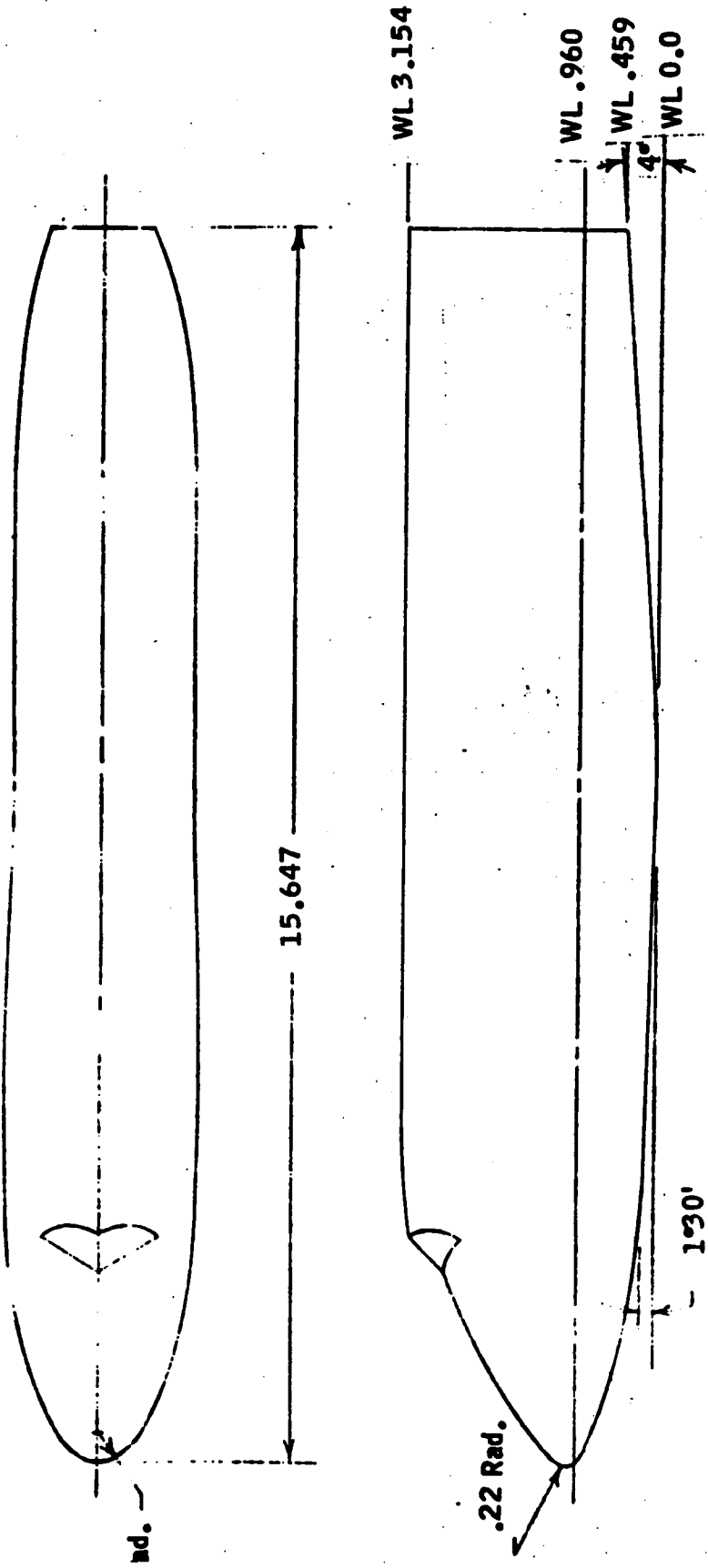
A = ±10° (DATA AT SMALL INCREMENTS - NOT CONSTANT FOR EACH RUN)
B = ±6° (DATA AT SMALL INCREMENTS - NOT CONSTANT FOR EACH RUN)

DELTA WING BOOSTER
MSC
STRAIGHT WING ORBITER
MSC
DR#1058 C-1-463

DELTA WING BOOSTER
MSC
STRAIGHT WING ORBITER
MSC
DR#1058 C-1- 466



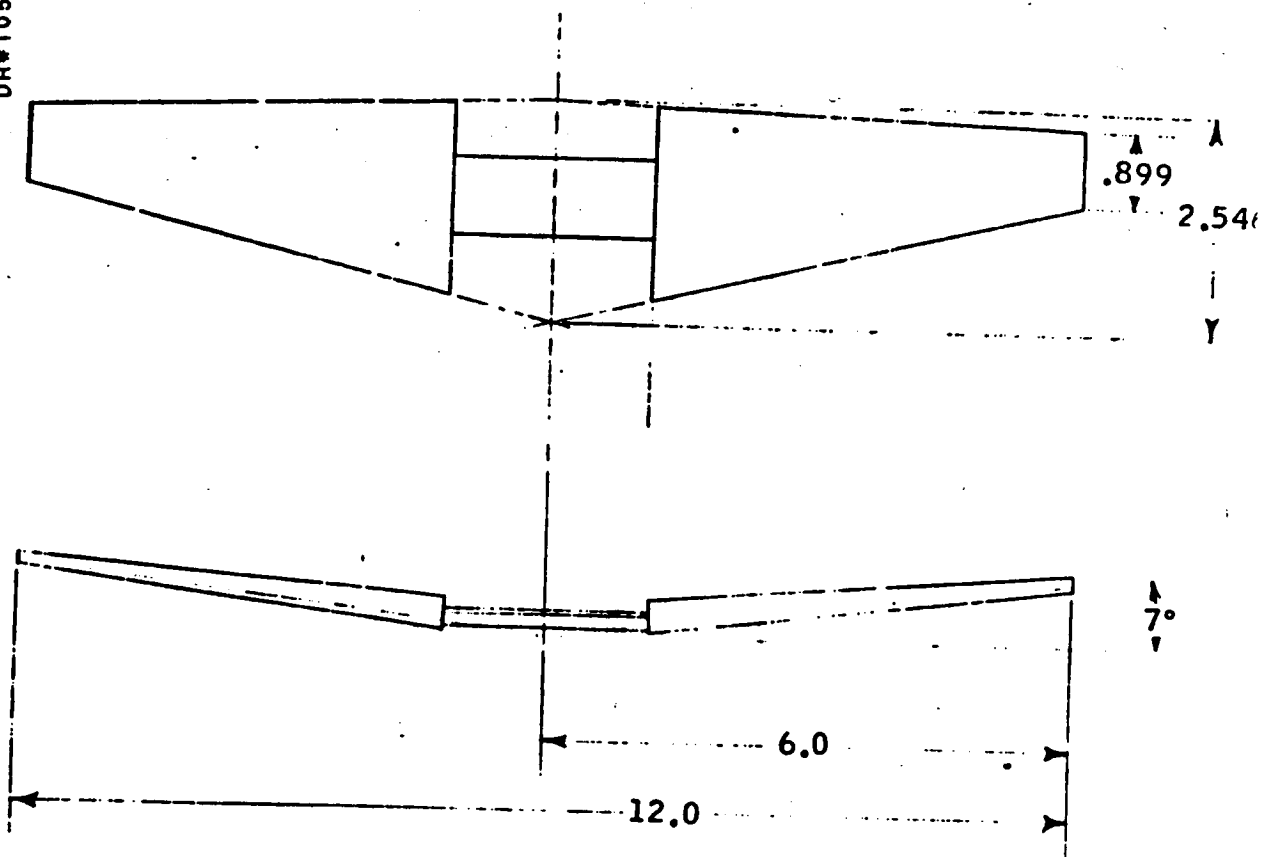
(a) Model Assembly
Figure 1. - 245 Orbiter Configuration. Model S-13A.
All Dimensions are in Inches.



(b) Body - B₁₁
 Figure 1. - Continued.

DELTA WING BOOSTER
 MSC
 STRAIGHT WING ORBITER
 MSC
 DR#1058 C-1- 467

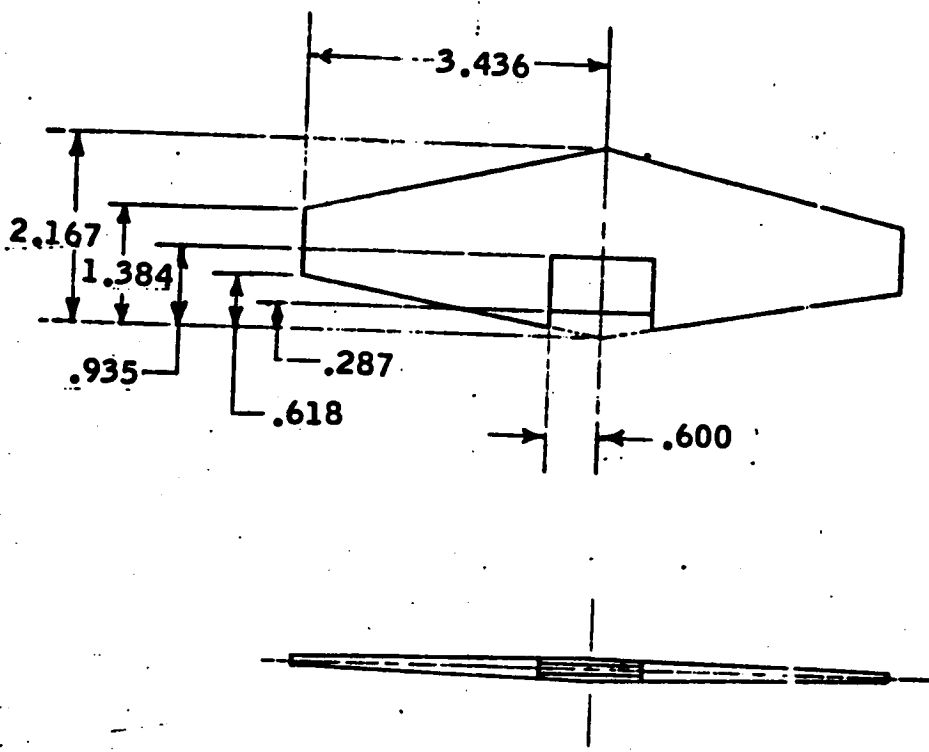
DELTA WING BOOSTER
MSC
STRAIGHT WING ORBITER
MSC
DR#1058 C-1- 468



(c) Wing - W_6

Figure 1. - Continued.

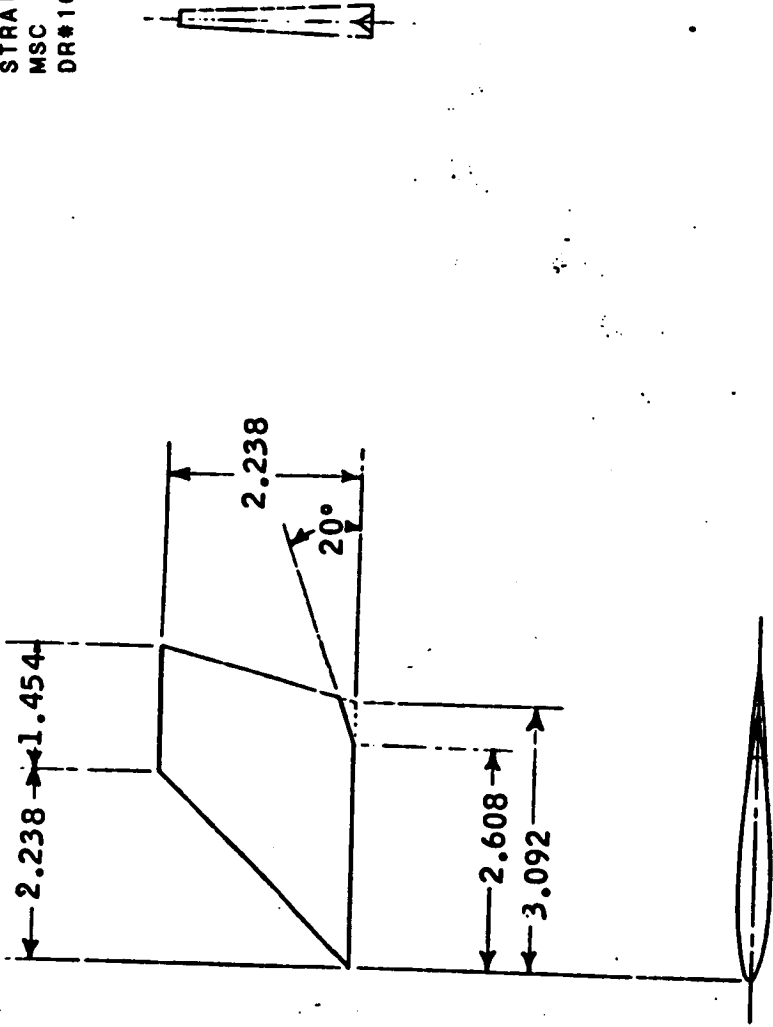
DELTA WING BOOSTER
MSC
STRAIGHT WING ORBITER
MSC
DR#1058 C-1- 469



(d) Horizontal stabilizer - H₁₄

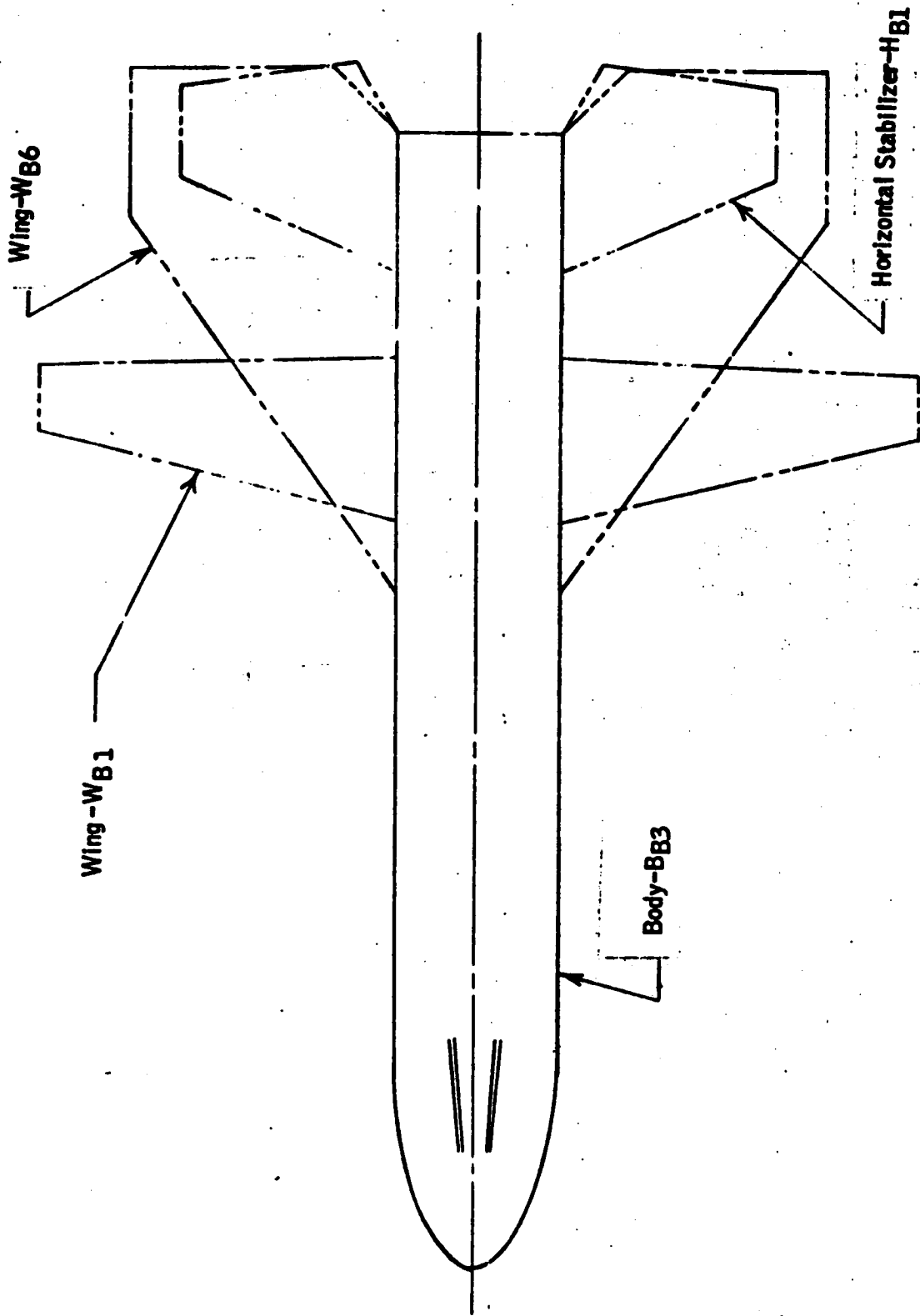
Figure 1. - Continued.

DELTA WING BOOSTER
MSC
STRAIGHT WING ORBITER
MSC
DR#1058 C-1- 470



(e) Vertical tail - V₅

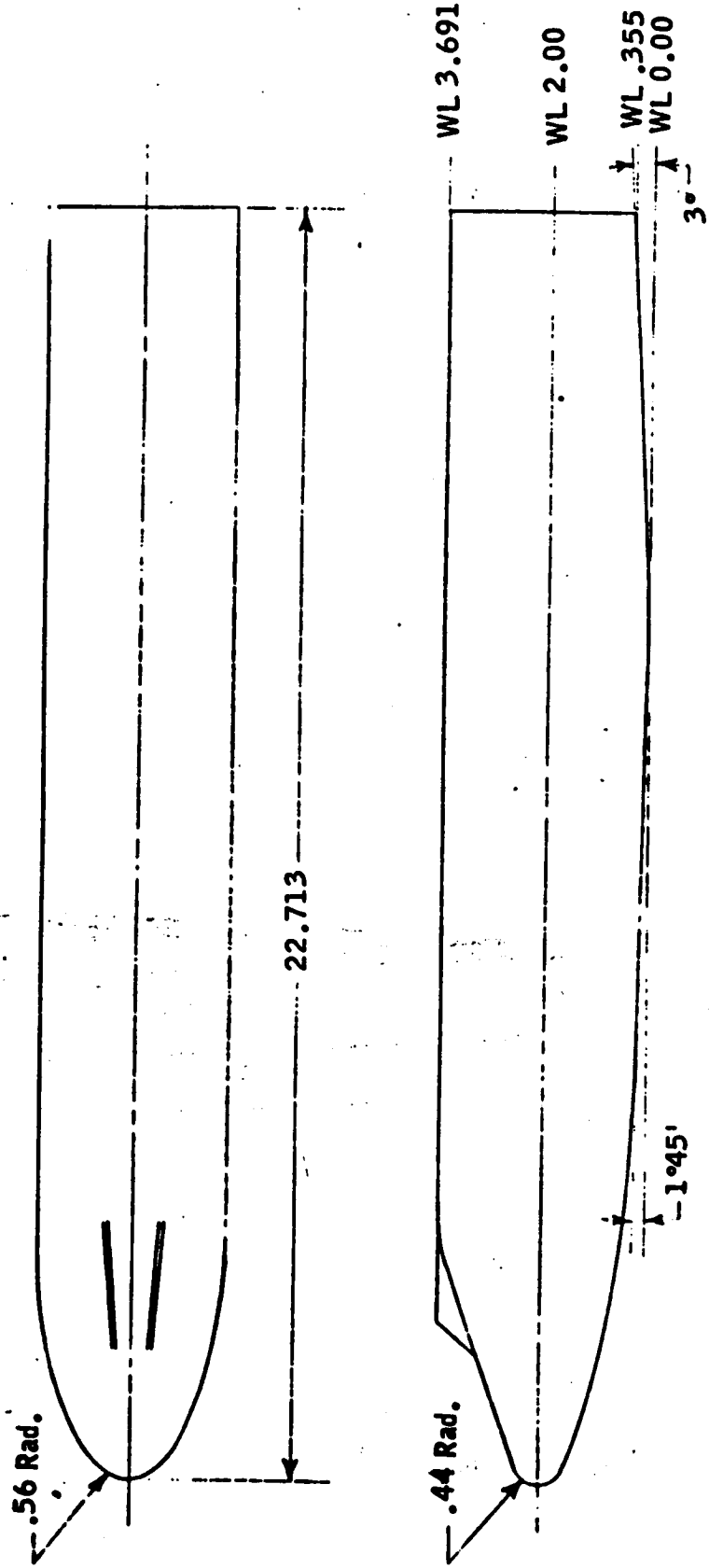
Figure 1. - Concluded.



(a) Model Assembly
 Figure 2. - 251 Booster Configuration. Model 6B-13A. All Dimensions are in Inches.

DELTA WING BOOSTER
 MSC
 STRAIGHT WING ORBITER
 MSC
 DR#1058 C-1- 471

DELTA WING BOOSTER
MSC
STRAIGHT WING ORBITER
MSC
DR#1058 C-1- 472

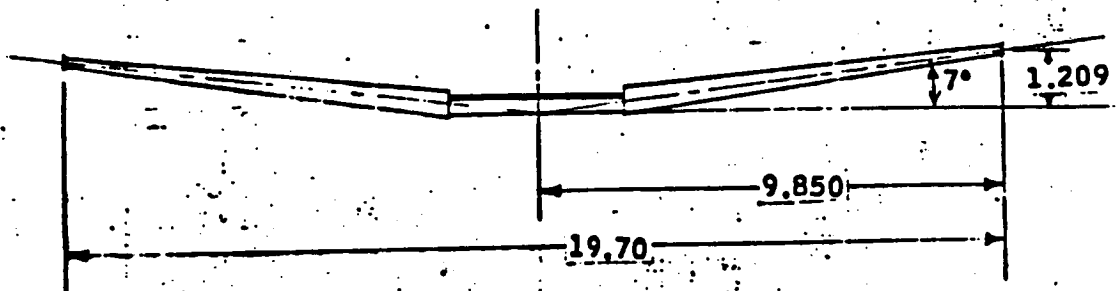
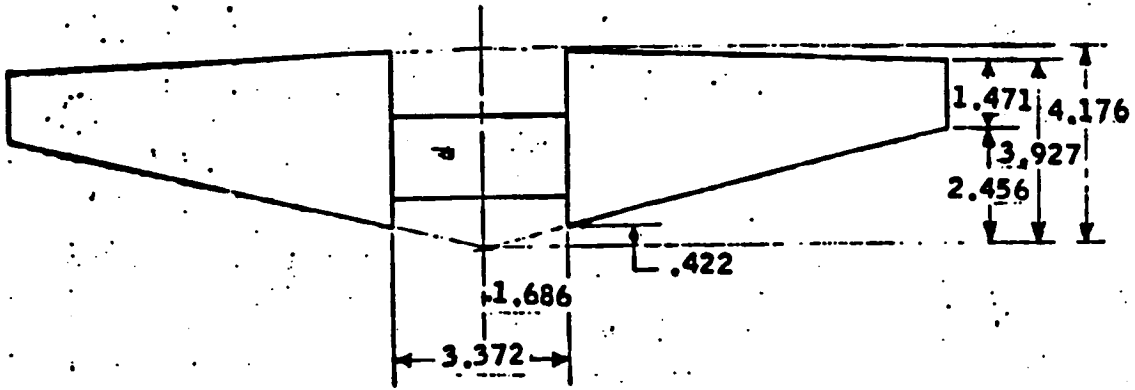


(b) Body - B_{B3}

Figure 2. - Continued.

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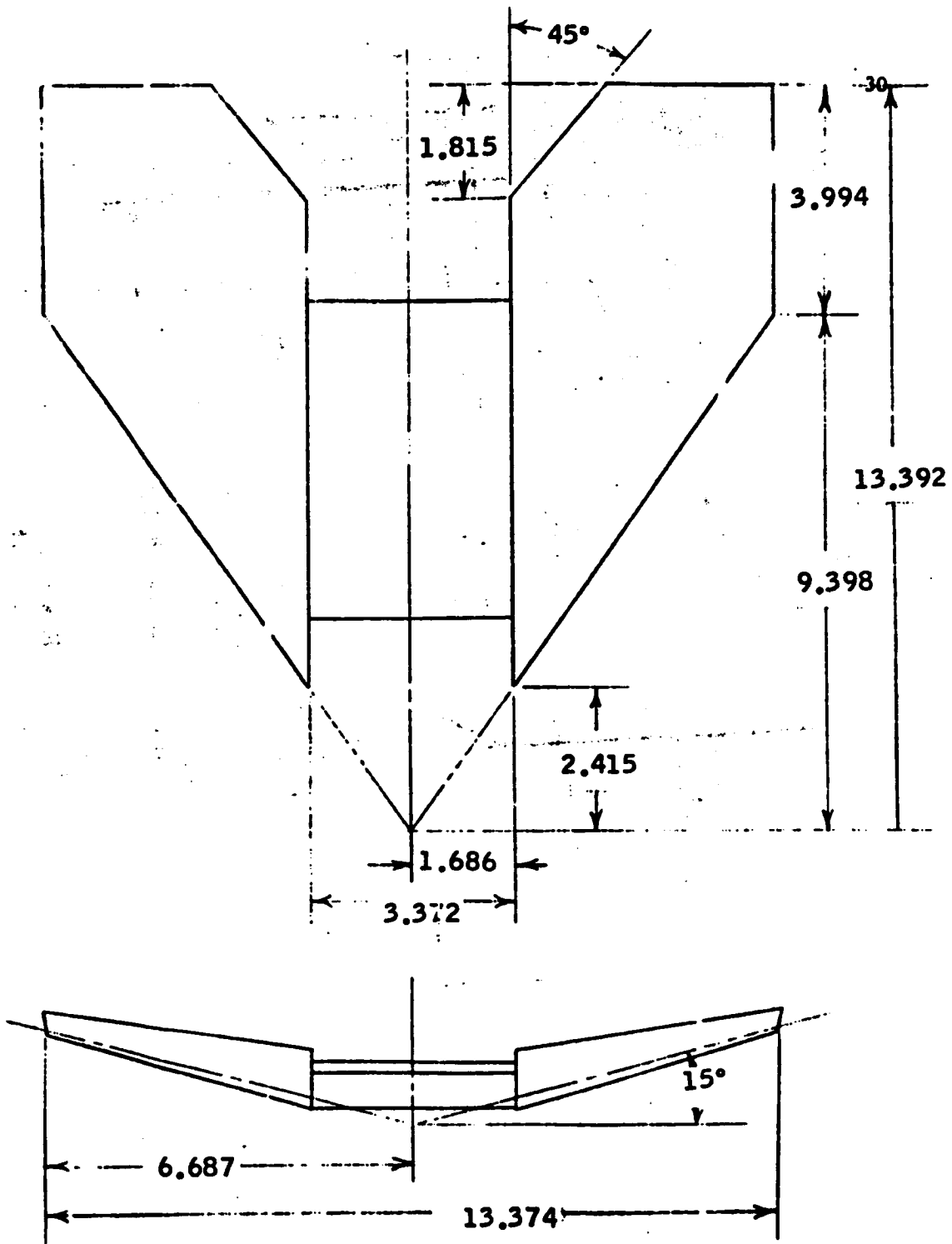
DELTA WING BOOSTER
MSC
STRAIGHT WING ORBITER
MSC
DR#1058 C-1- 473



(c) Wing - W
B1

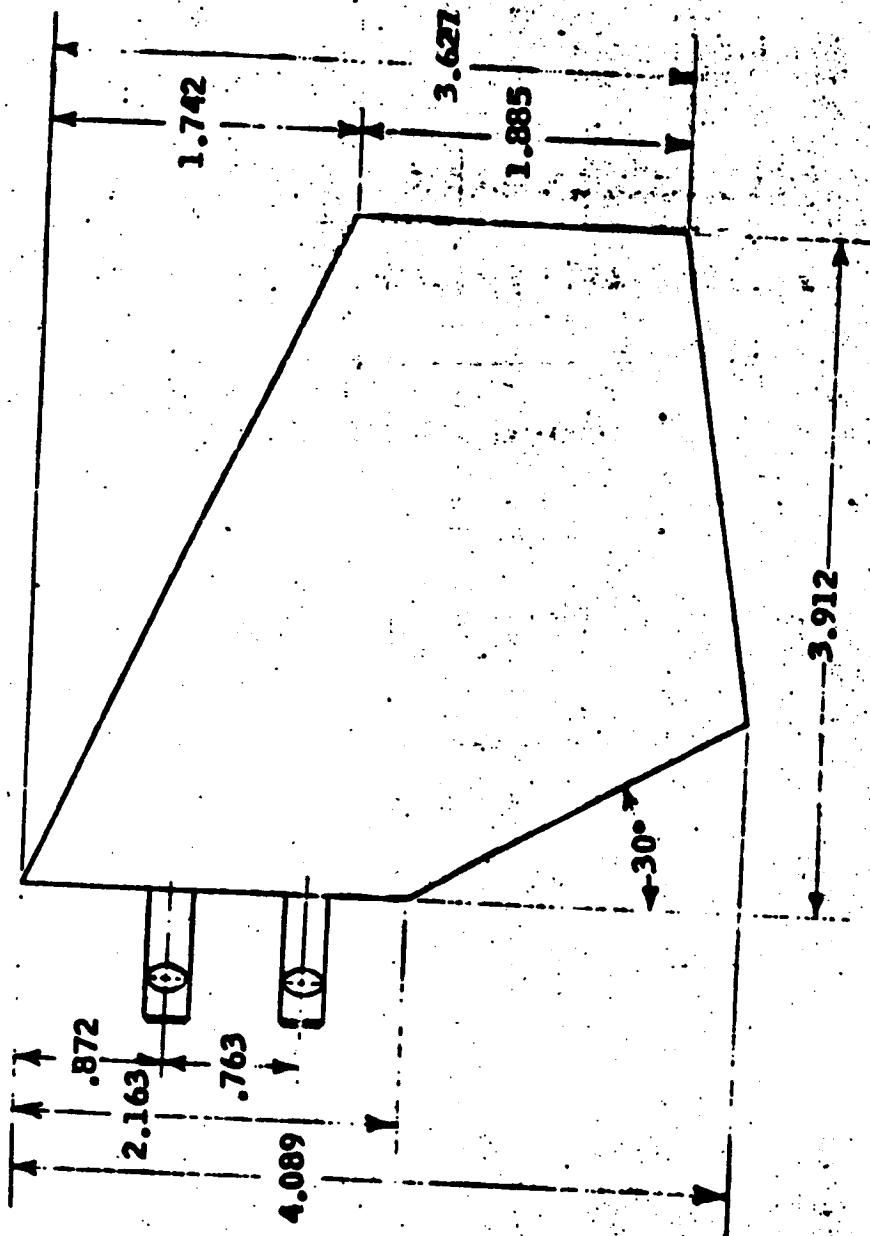
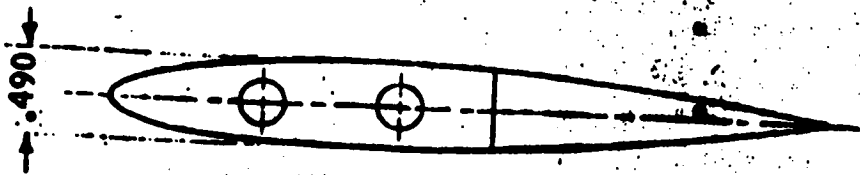
Figure 2. - Continued.

DELTA WING BOOSTER
MSC
STRAIGHT WING ORBITER
MSC
DR#1058 C-1- 474



(d) Wing-W_{B6}

Figure 2. - Continued.



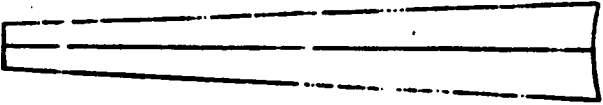
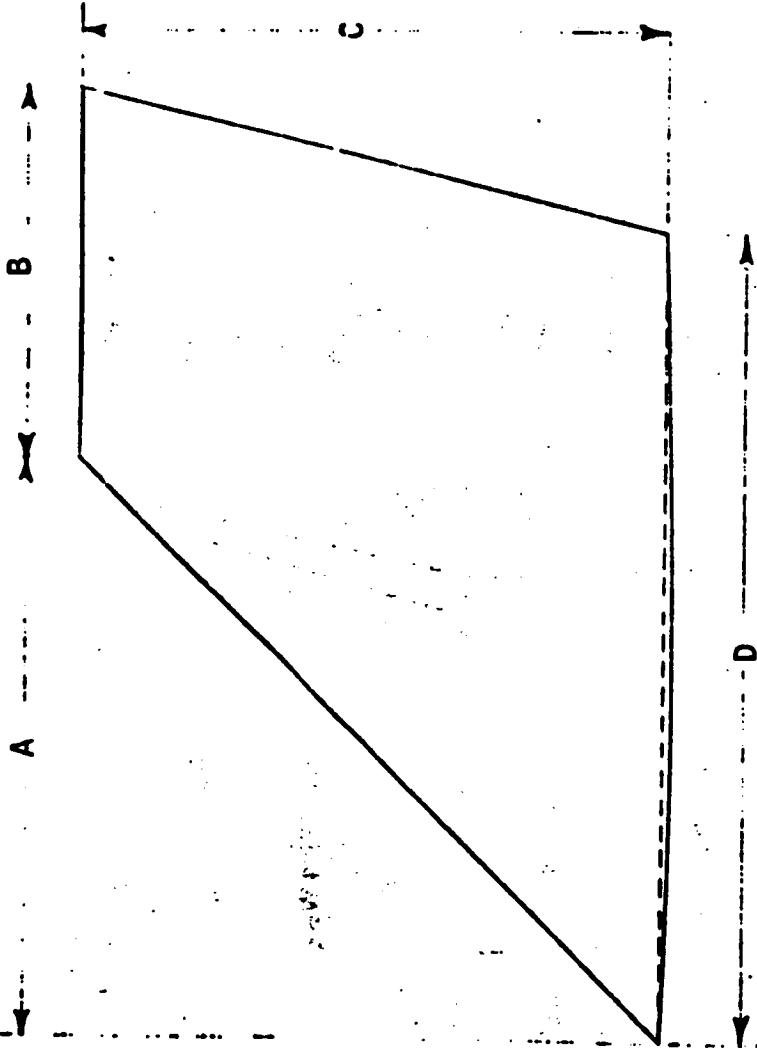
(c) Horizontal stabilizer - H 81

Figure 2, - Continued.

DELTA WING BOOSTER
 MSC
 STRAIGHT WING ORBITER
 MSC
 DR#1058 C-1- 475

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DELTA WING BOOSTER
 MSC
 STRAIGHT WING ORBITER
 MSC
 DR#1058 C-1- 476

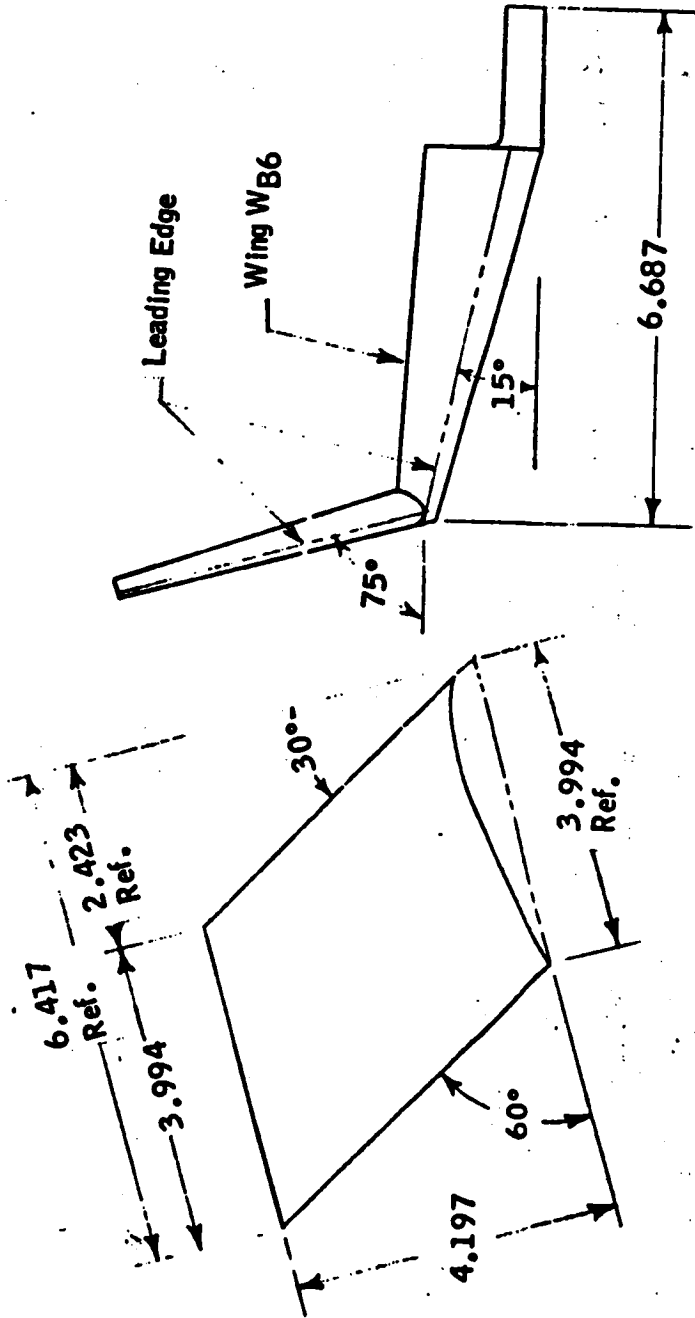


Tail	A	B	C	D
V _{B1}	3.5210	2.1150	3.3310	4.6340
V _{B5} *	6.9070	2.7490	6.9070	5.6520

* NOT APPLICABLE TO THIS TEST

(f) Vertical tail - V_{B1}, V_{B5}

Figure 2. - Continued. -



(g) Vertical - V B6
 Figure 2. - Concluded.

DELTA WING BOOSTER
 MSC
 STRAIGHT WING ORBITER
 MSC
 DR#1058 C-1- 477

DELTA WING BOOSTER
 GD/C
 UNIQUE CONFIGS. ORBITER
 NR

TEST MSEC-TWT 482 DATA SET COLLATION SHEET DR#1119 C-1- 478

PRETEST
 POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	SCID.		PARAMETERS/VALUES				NO. OF RUNS	MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE)											
		A	B	δ_1	δ_2	δ_3	δ_4		0.6	0.9	1.0	1.2	1.96	2.99	4.96					
R310A	U	A	0	-	-	-	-													
01B	U	-6	B	-	-	-	-		585	584	583	582	581	580	579	578	577	576		
02A	U2	A	0	-	-	-	-		592	591	590	589	588	587	586	585	584	583		
02B	U2	-6	B	-	-	-	-		580	581	582	583	584	585	586	587	588	589		
03A	U3	A	0	-	-	-	-		598	597	596	595	594	593	592	591	590	589		
03B	U3	-6	B	-	-	-	-		581	582	583	584	585	586	587	588	589	590		
04C	B19WitC+AV1+U	C	0	0	0	0	0		500	501	502	503	504	505	506	507	508	509		
05C		T		10^{-10}	0	10	0		507	506	505	504	522	528	529		530			
06C				10^{-10}	-5	15	0										531			
07C				10^{-10}	-15	25	0										510			
08C				0	0	0	10										511			
09C				10^{-10}	0	10	0										527			
04B		-6	B	0	0	0	0		554	553	552	551	542	543			546			
05B		T		10^{-10}	0	10	0										547			
06B				10^{-10}	-5	15	0										548			
07B				10^{-10}	-15	25	0										549			
08B				0	0	0	10										544			
09B				10^{-10}	0	10	0										545			
10B		0		0	0	0	0		514	513	512	523	535	536			534			
11B		0		10^{-10}	0	10	0										515			

7 13 19 25 31 37 43 49 55 61 67 75.76
 CLM ICN ICY CBL ICYN CAV CAF CFB CAB CPB1 CPC ICCL IDPVAR(1) IDPVAR(2) NDV

COEFFICIENTS:
 a or b
 SCHEDULES

A) -4 -2 0 2 4 6 8 10 12 14 16
 B) -10 -8 -6 -4 -2 0 2 4 6 8 10

δ_1 - aileron deflection
 δ_2 - aileron deflection

DELTA WING BOOSTER
GD/C
UNIQUE CONFIGS. ORBITER
NR
DR#1119 C-1- 480

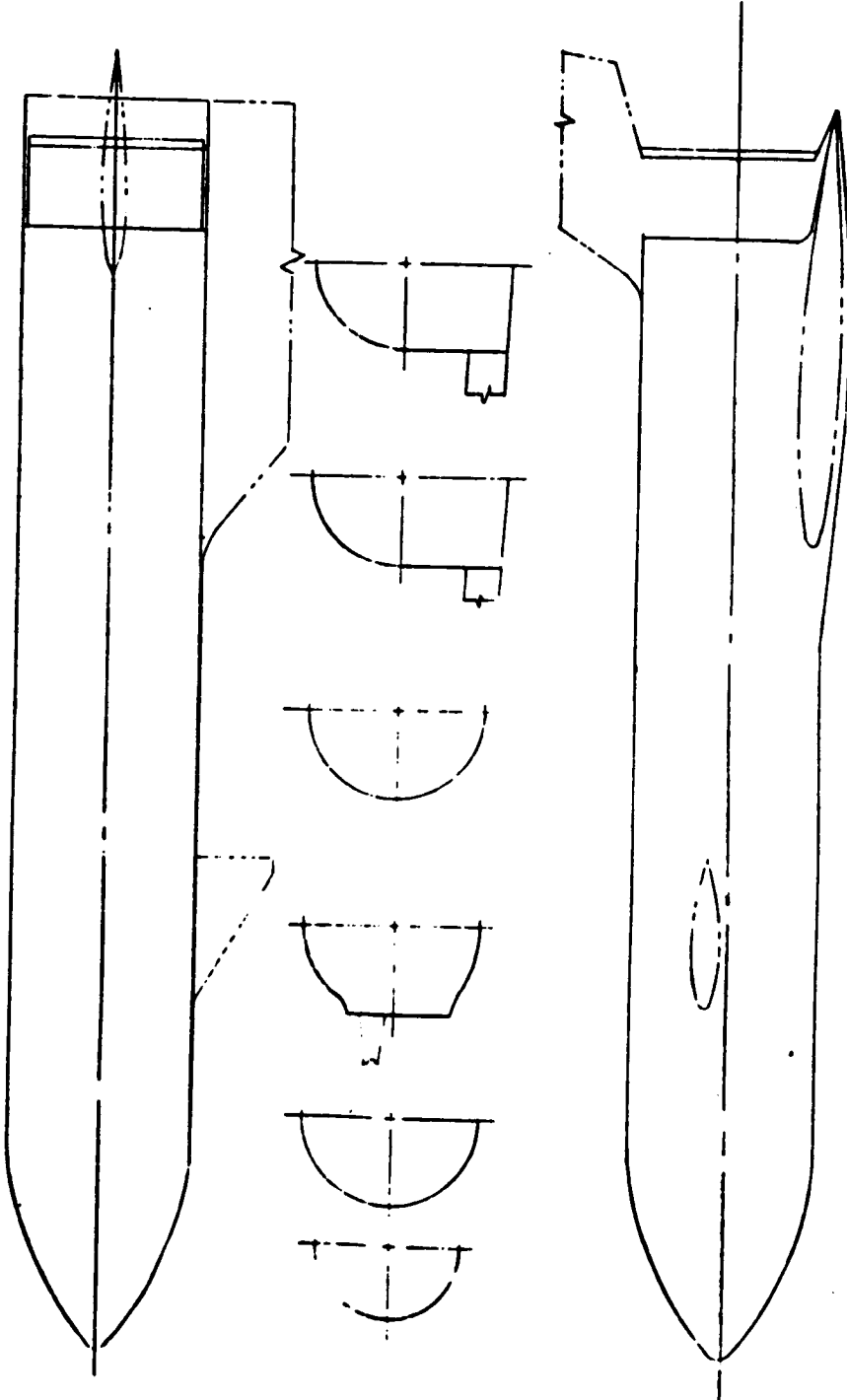


FIGURE 6. BODY B19 - BOOSTER B-15 B-1 CONFIGURATION

Los Angeles Division
North American Rockwell

DELTA WING BOOSTER
GD/C
UNIQUE CONFIGS. ORBITER
NR
DR#1119 C-1-481

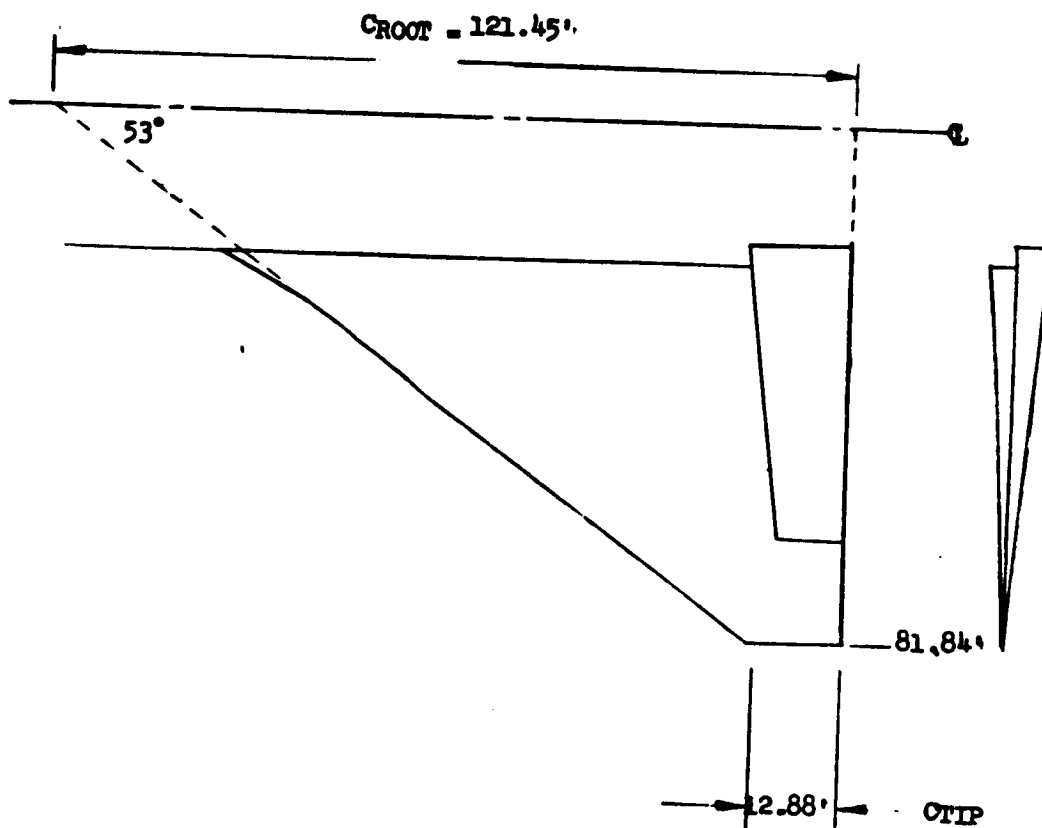


FIGURE 7. WING W₁₄ - BOOSTER CONFIGURATION

DELTA WING BOOSTER
GD/C
UNIQUE CONFIGS. ORBITER
NR
DR#1119 C-1-482

LOS ANGELES DIVISION
NORTH AMERICAN ROCKWELL CORPORATION

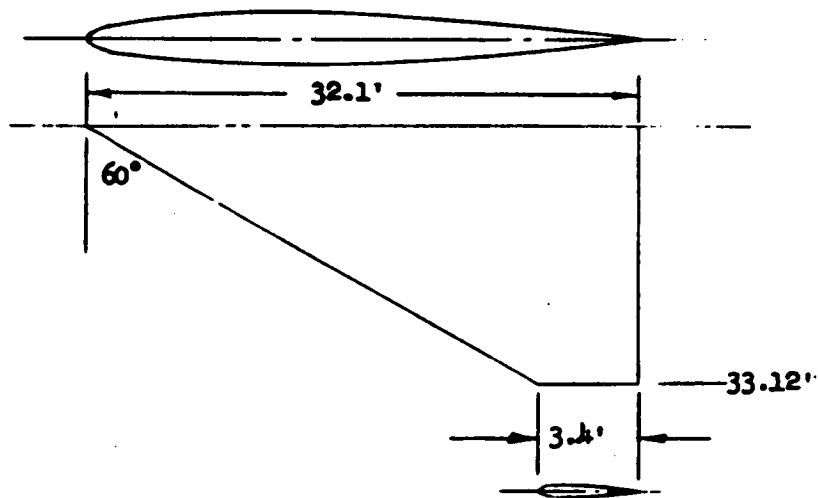


FIGURE 8. CANARD - C4

Los Angeles Division
North American Rockwell

DELTA WING BOOSTER
GD/C
UNIQUE CONFIGS. ORBITER
NR
DR#1119 C-1- 483

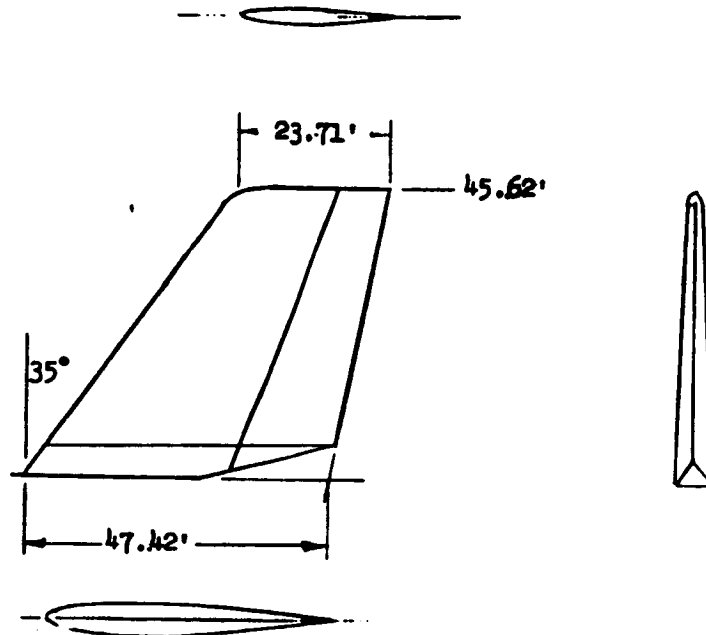


FIGURE 9. VERTICAL TAIL - V₇

DELTA WING BOOSTER
GD/C
UNIQUE CONFIGS. ORBITER
NR
DR#1119 C-1- 484

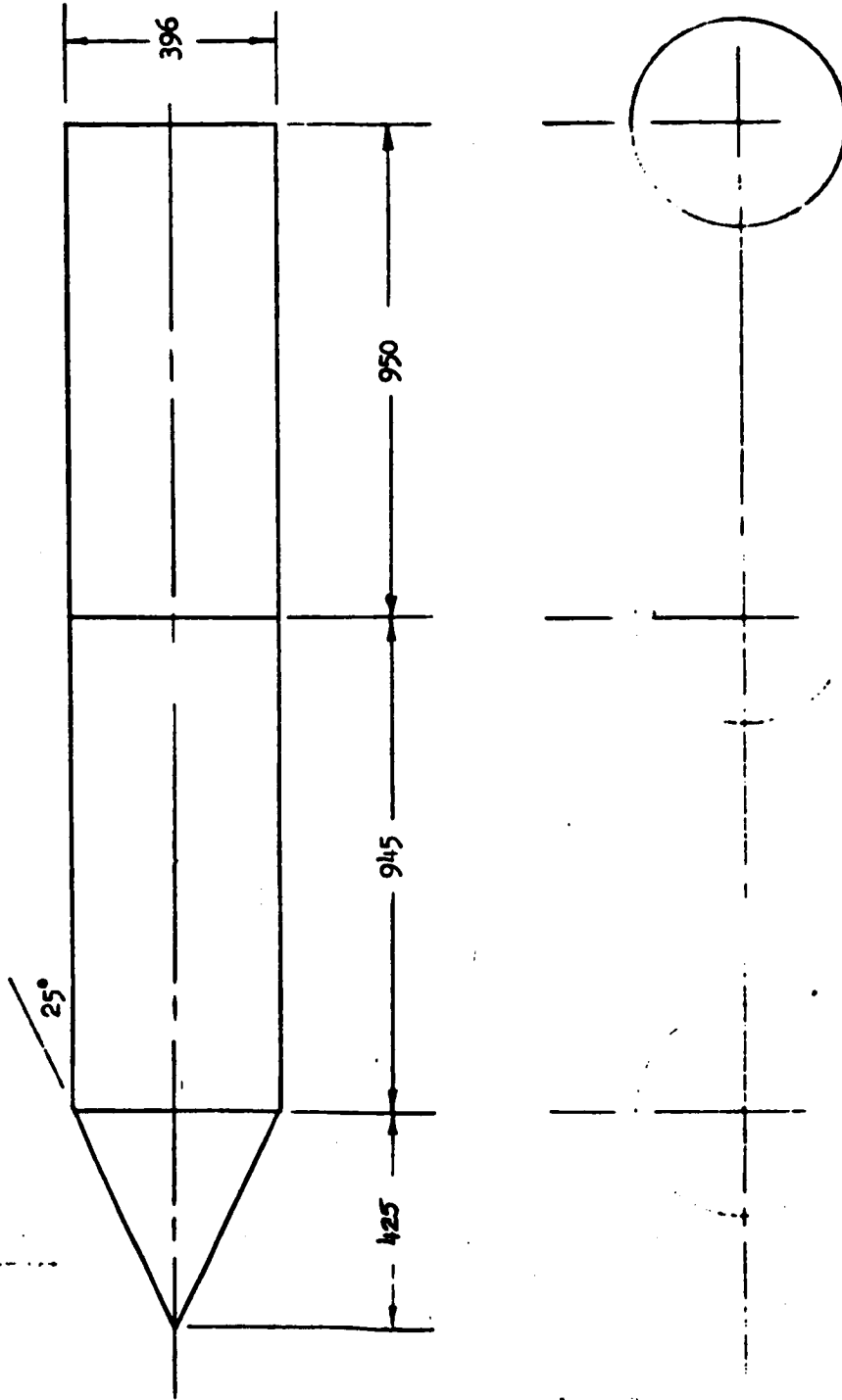


FIGURE 10. ESS VEHICLE - U

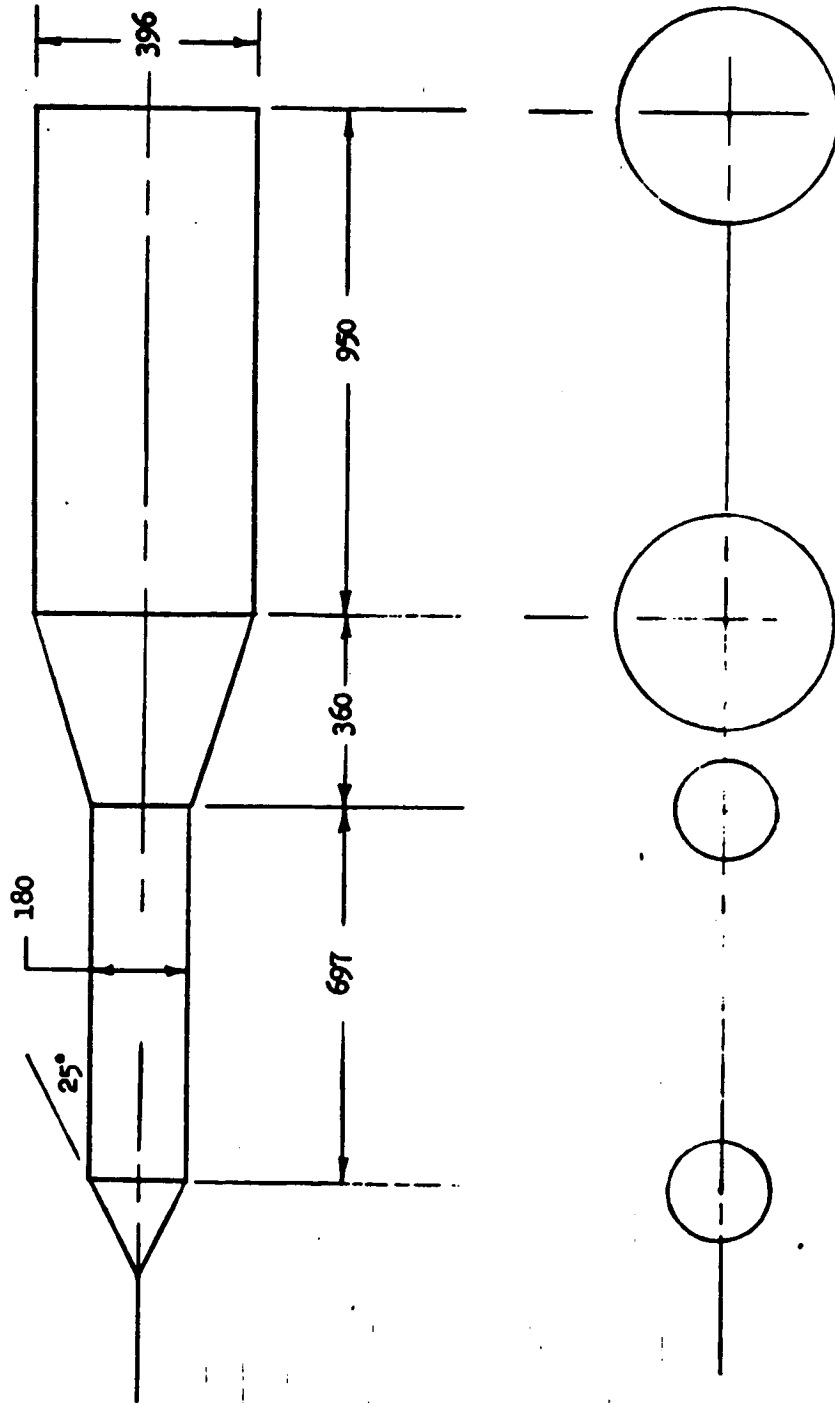


FIGURE 12. ESS VEHICLE - U₃

DELTA WING BOOSTER
 GD/C
 UNIQUE CONFIGS. ORBITER
 NR
 DR#1119 C-1- 485

DELTA WING BOOSTER
GD/C
UNIQUE CONFIGS. ORBITER
NR
DR#1119 C-1-486

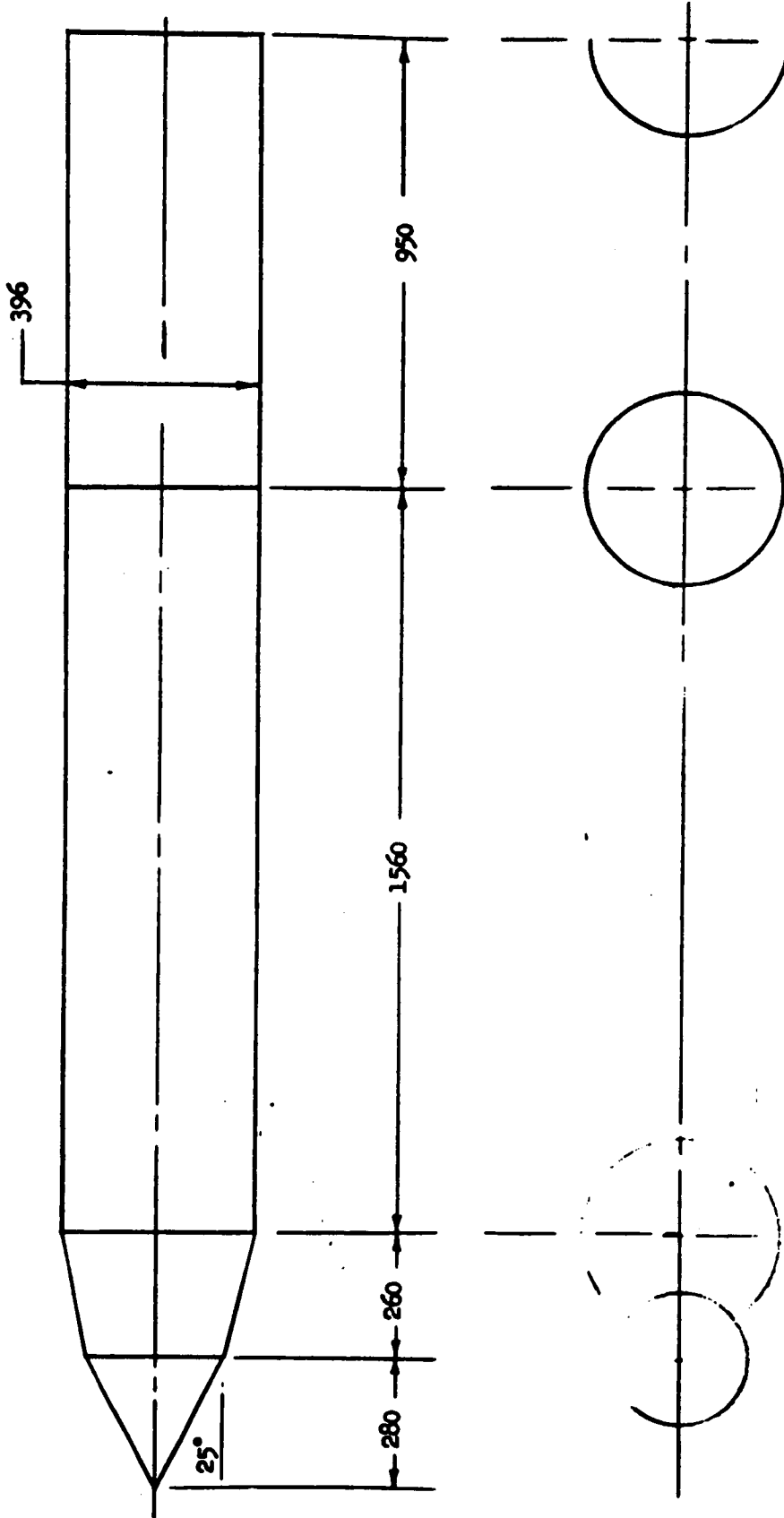
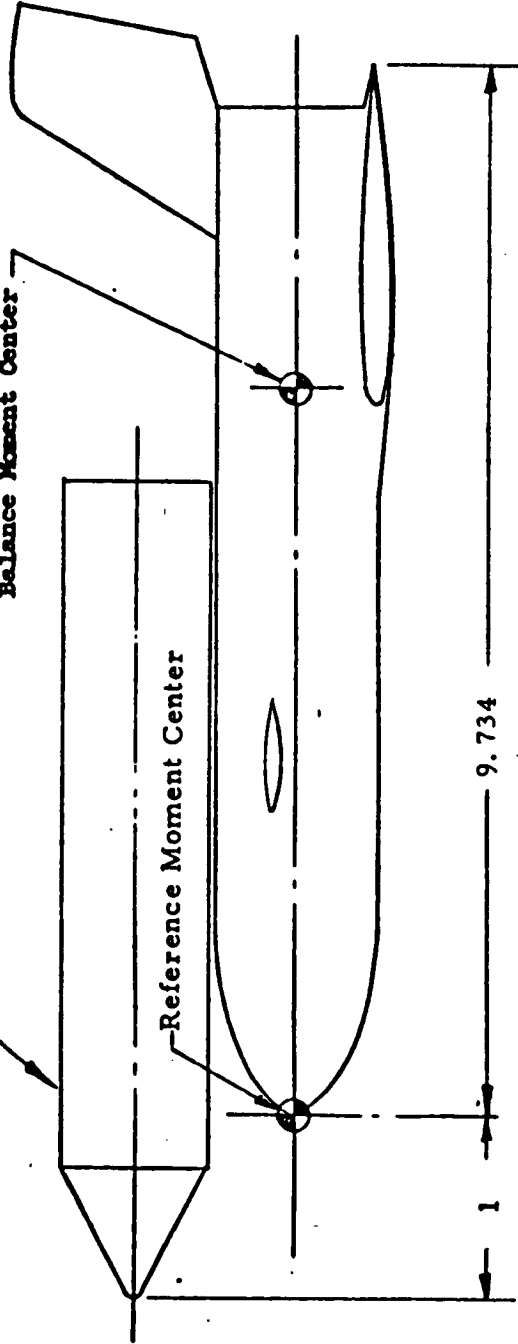


FIGURE 11. ESS VEHICLE - U2

Typical ESS Plus Bayload Vehicle

Balance Moment Center

Reference Moment Center

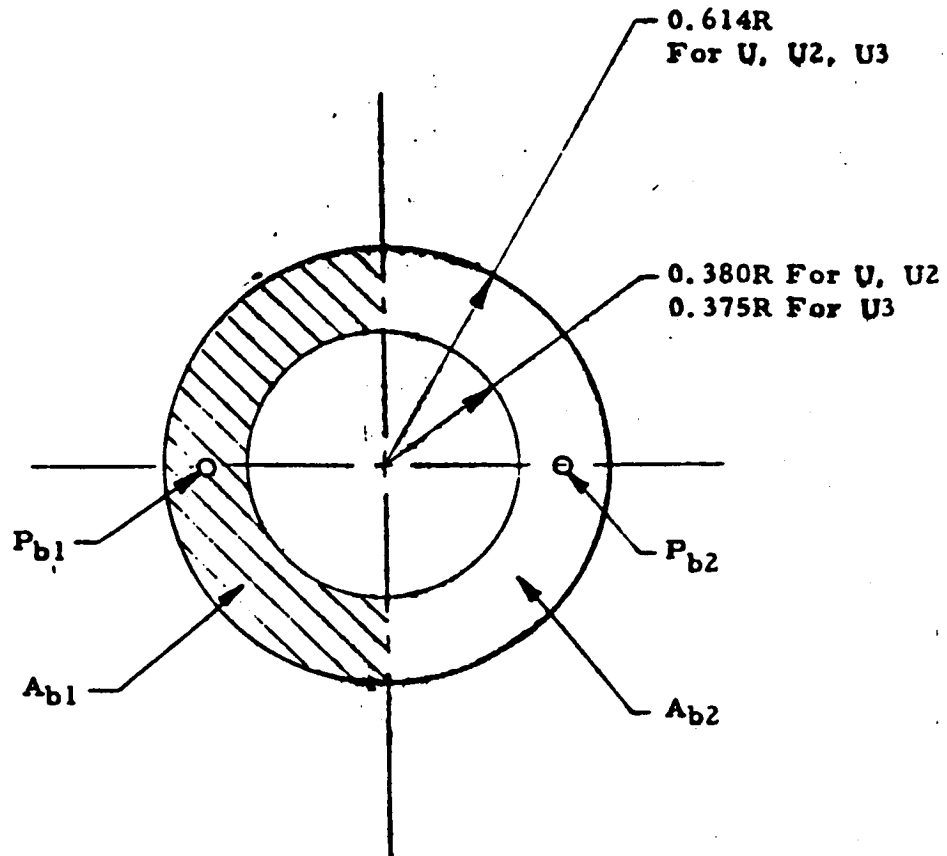


1 for U = 1.717
U2 = 3.980
U3 = 1.355

DELTA WING BOOSTER
GD/C
UNIQUE CONFIGS. ORBITER
NR
DR#1119 C-1- 487

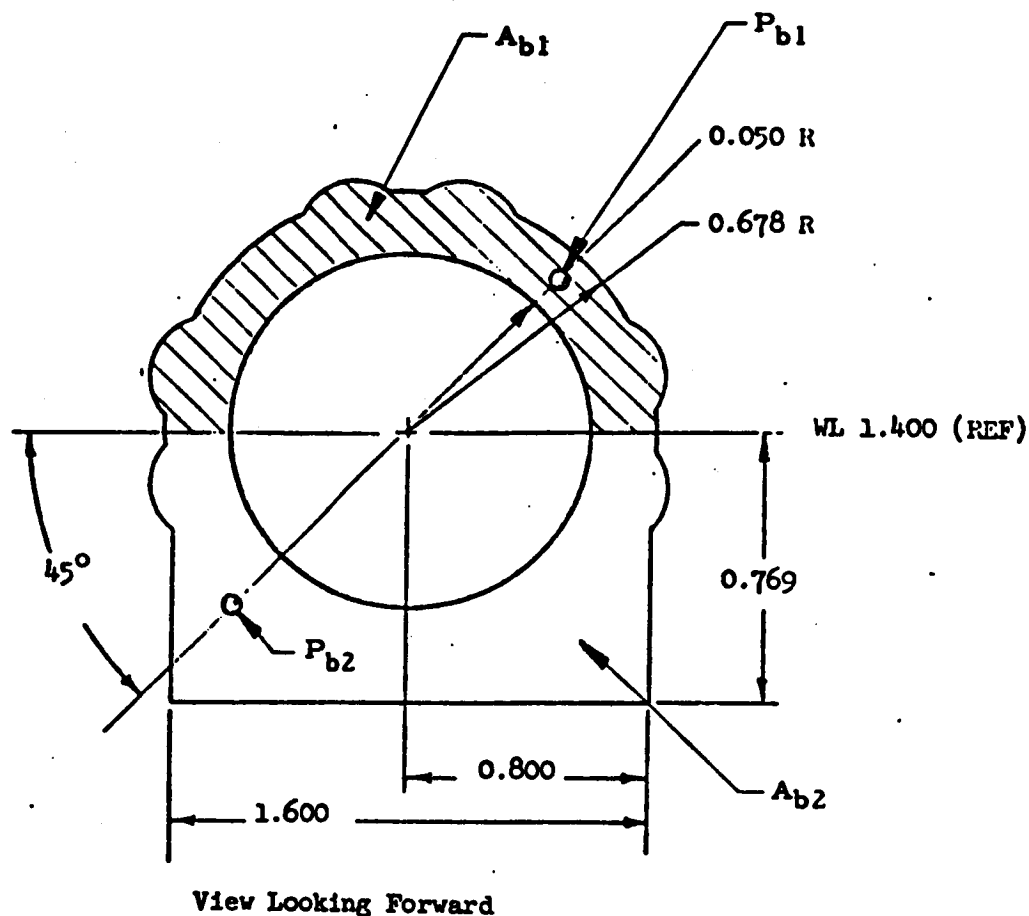
FIGURE 13. MOMENT REFERENCE CENTER LOCATION

DELTA WING BOOSTER
GD/C
UNIQUE CONFIGS. ORBITER
NR
DR#1119 C-1- 488



Note: Location of pressure taps may vary slightly as installation will be made during test setup.

Figure 14 . Location of Base Pressure Taps for ESS Alone.



NOTE: Location of pressure taps may vary slightly as installation will be made during test setup.

Figure 15 . Location of Base Pressure Taps for Launch Configurations.

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TEST TWT-497 DATA SET COLLATION SHEET
Force - Reuseable Nuclear Stage + Booster, and RNS Alone,
Stability and Control

PRETEST
 POSTTEST

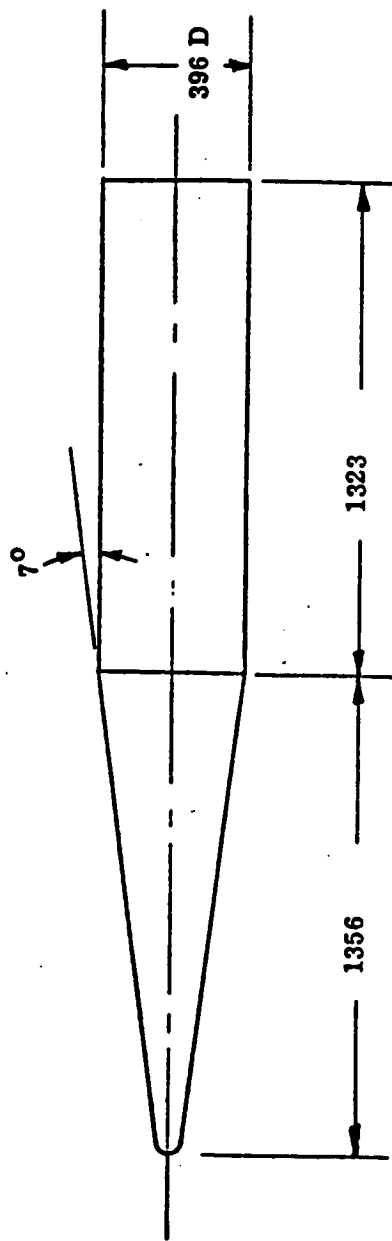
DATA SET IDENTIFIER	CONFIGURATION	SCALING		CONTROL DEFLECTIONS				NO. OF RUNS	MACH NUMBERS						
		u	R	REL	SEA	SE	SE		TEST	0.6	0.95	1.0	1.2	2.99	4.96
R29 ODB	BNJICCAV7+RNS	-6	B	10	-10	0	ON	1							
	CFB	↑	↑	↑	↑	-20	↑	1				0376			
	12A	A	0	0	0	0	↑	1				0346			
	13A RNS ALONE	A	0	-	-	-	ON	4	53/6	52/6	51/6	50/6			
	13B	-6	B	-	-	-	↑	4	51/6	51/6	50/6	51/6			

CLM CN CV CBL KYN CAF FAB ICPB1 ICP2 ICP3 ICP4 ICP5 ICP6 ICP7 ICP8 ICP9 ICP10 ICP11 ICP12 ICP13 ICP14 ICP15 ICP16 ICP17 ICP18 ICP19 ICP20 ICP21 ICP22 ICP23 ICP24 ICP25 ICP26 ICP27 ICP28 ICP29 ICP30 ICP31 ICP32 ICP33 ICP34 ICP35 ICP36 ICP37 ICP38 ICP39 ICP40 ICP41 ICP42 ICP43 ICP44 ICP45 ICP46 ICP47 ICP48 ICP49 ICP50 ICP51 ICP52 ICP53 ICP54 ICP55 ICP56 ICP57 ICP58 ICP59 ICP60 ICP61 ICP62 ICP63 ICP64 ICP65 ICP66 ICP67 ICP68 ICP69 ICP70 ICP71 ICP72 ICP73 ICP74 ICP75 ICP76 ICP77 ICP78 ICP79 ICP80 ICP81 ICP82 ICP83 ICP84 ICP85 ICP86 ICP87 ICP88 ICP89 ICP90 ICP91 ICP92 ICP93 ICP94 ICP95 ICP96 ICP97 ICP98 ICP99 ICP100

COEFFICIENTS: α A = -14, -14, -12, -10, -8, -6, -4, -2, 0, 2, 4
β B = -10, -8, -6, -4, -2, 0, 2, 4, 6, 8, 10

DELTA WING BOOSTER
GD/C
UNIQUE CONFIGS. ORBITER
NR
DR#1162 C-1-491

DELTA WING BOOSTER
GD/C
UNIQUE CONFIGS. ORBITER
NR
DR#1162 C-1- 492



RNS

Figure 5. General Arrangement - Reusable Nuclear Stage

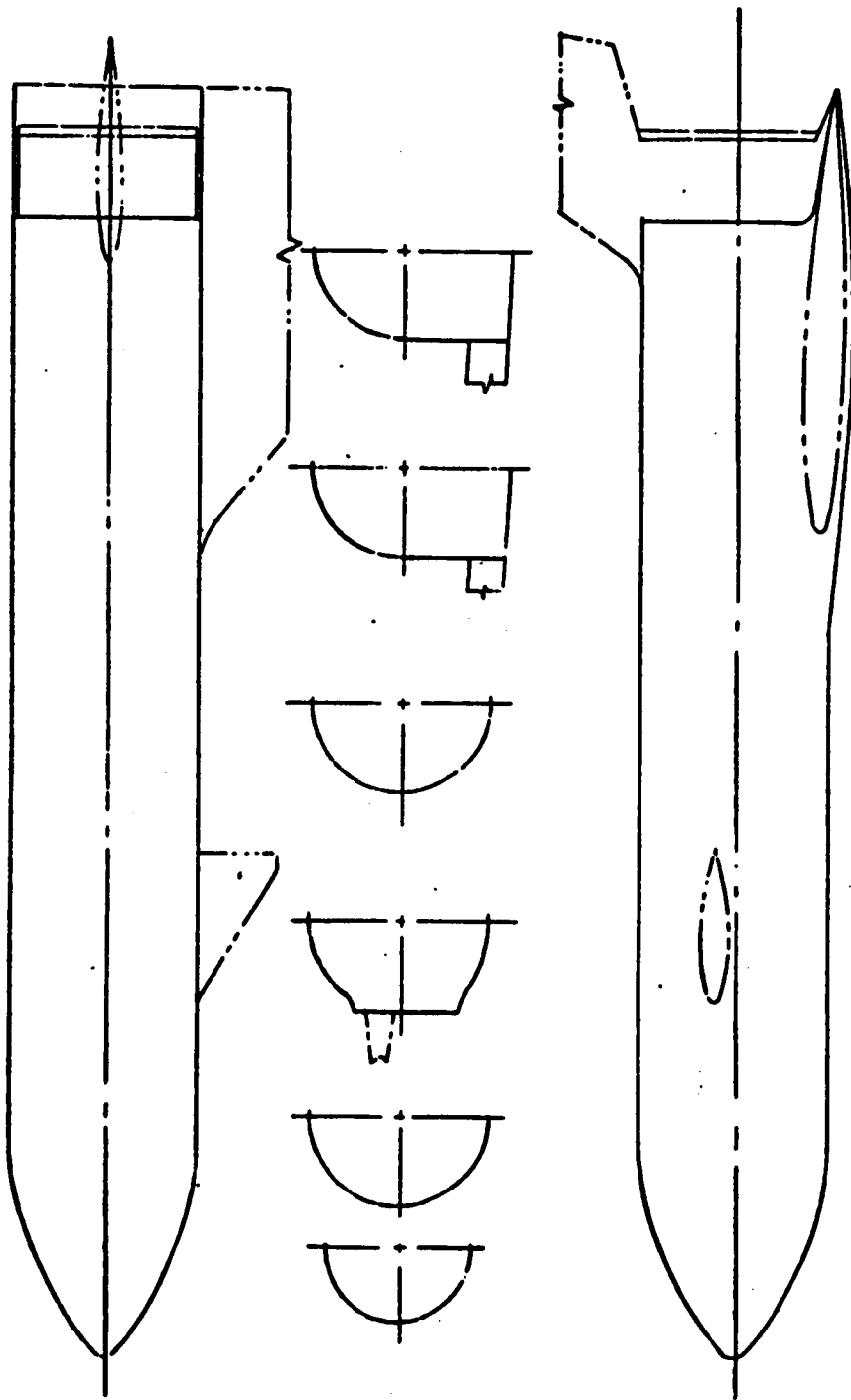


Figure 6. BODY B19 - BOOSTER B-15 B-1 CONFIGURATION

DELTA WING BOOSTER
GD/C
UNIQUE CONFIGS. ORBITER
NR
DR#1162 C-1- 493

DELTA WING BOOSTER
GD/C
UNIQUE CONFIGS. ORBITER
NR
DR#1162 C-1- 494

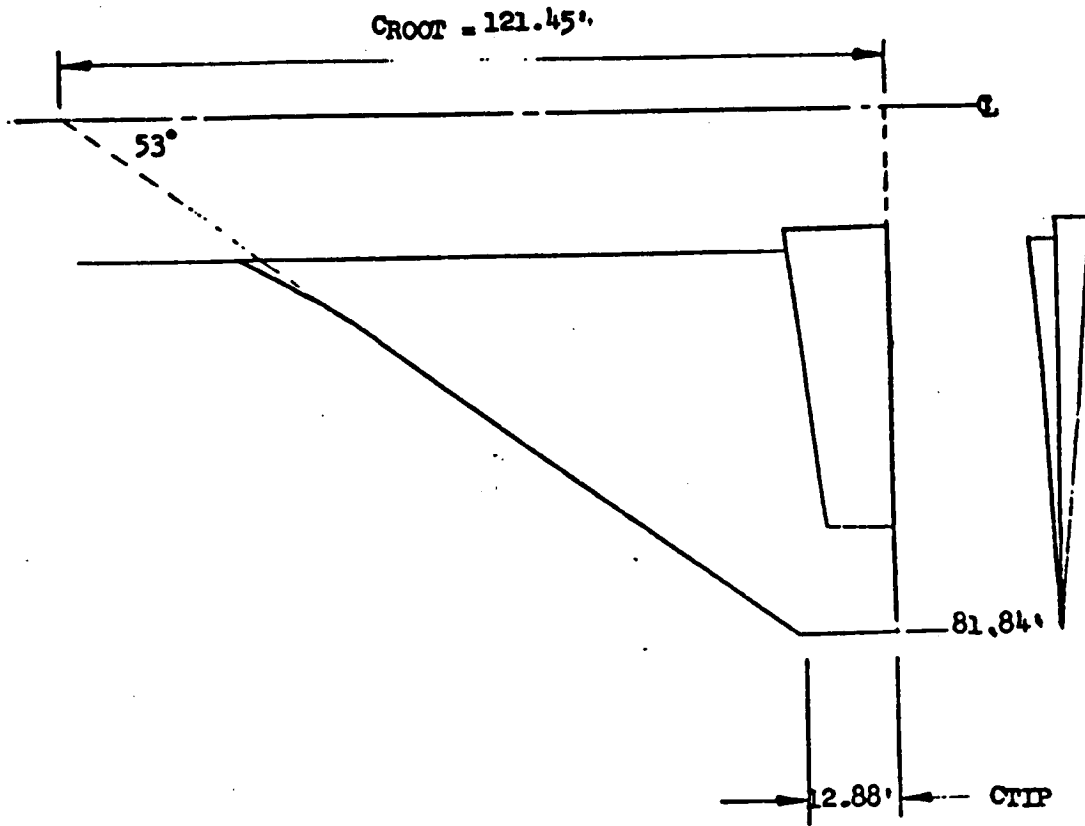


Figure 7. WING W₁₄ - BOOSTER CONFIGURATION

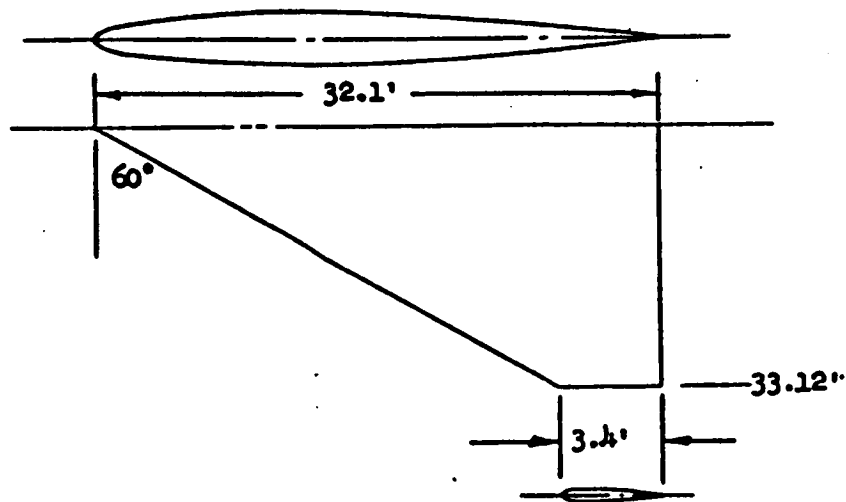


Figure 8. CANARD - C₄

DELTA WING BOOSTER
GD/C
UNIQUE CONFIGS. ORBITER
NR
DR#1162 C-1- 496

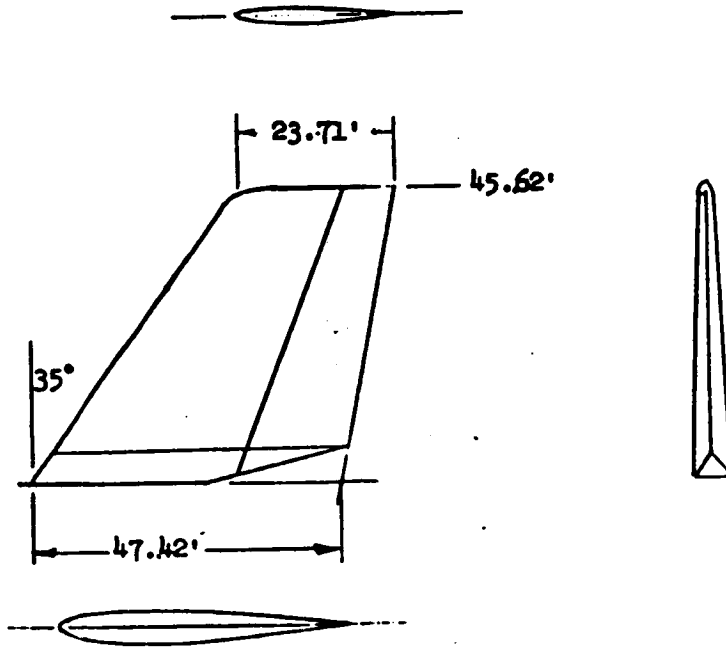


Figure 9. VERTICAL TAIL - V₇

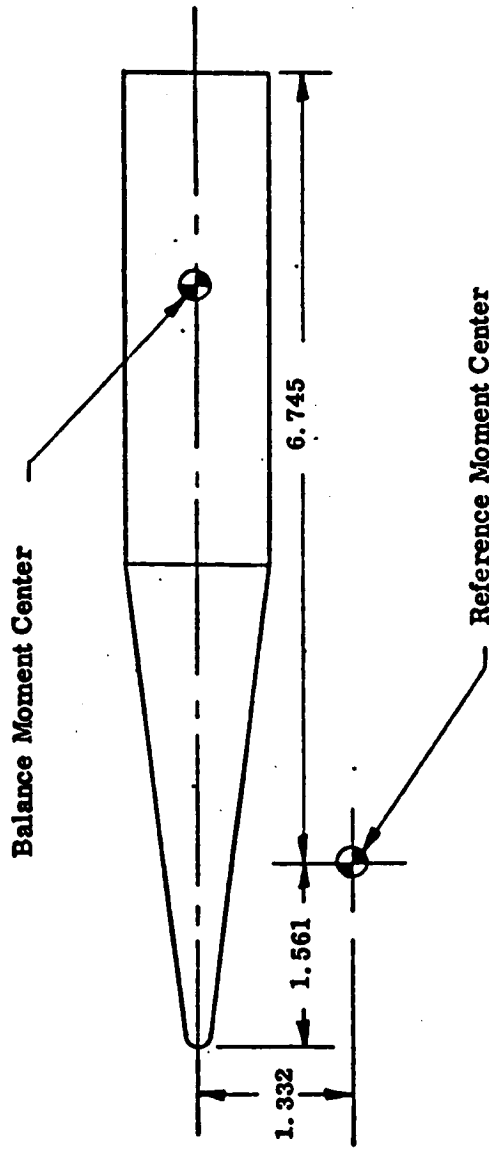


Figure 10. Reusable Nuclear Stage Reference c.g. Location

DELTA WING BOOSTER
 GD/C
 UNIQUE CONFIGS. ORBITER
 NR
 DR#1162 C-1- 497

DELTA WING BOOSTER
GD/C
UNIQUE CONFIGS. ORBITER
NR
DR#1162 C-1- 498

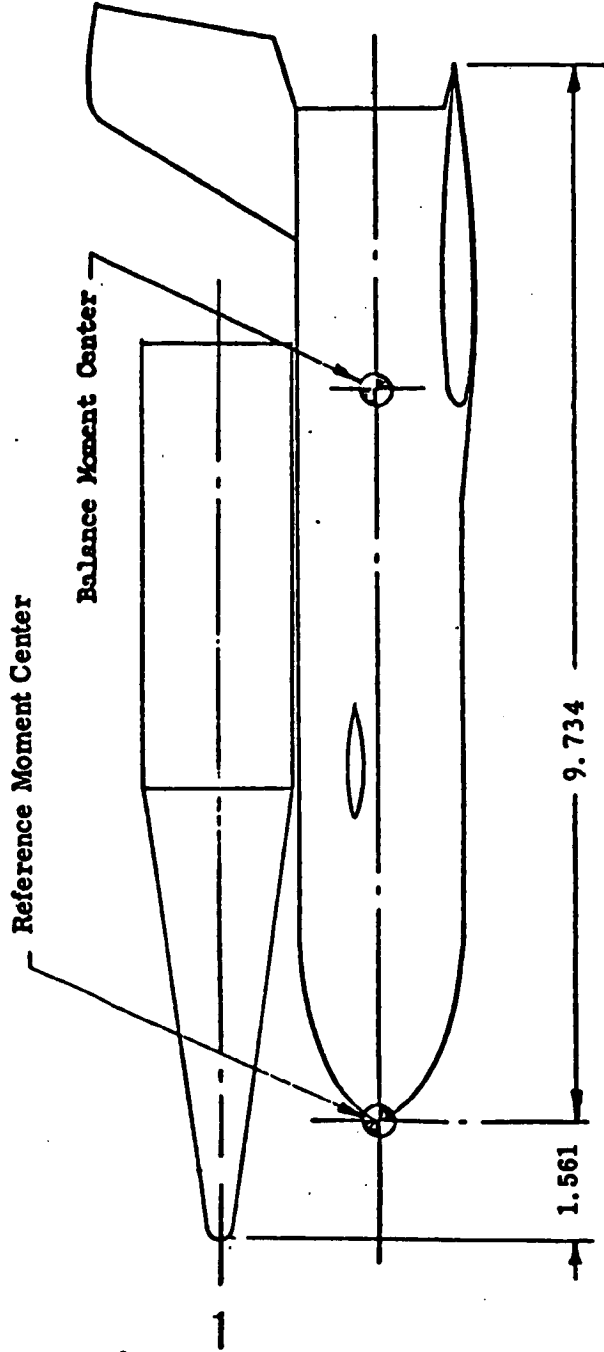
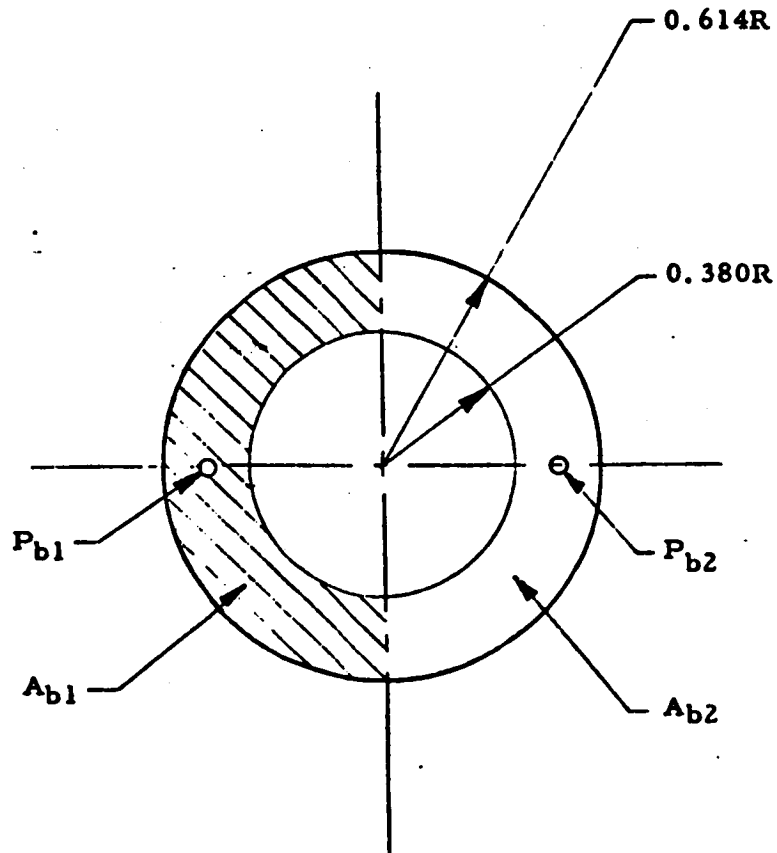
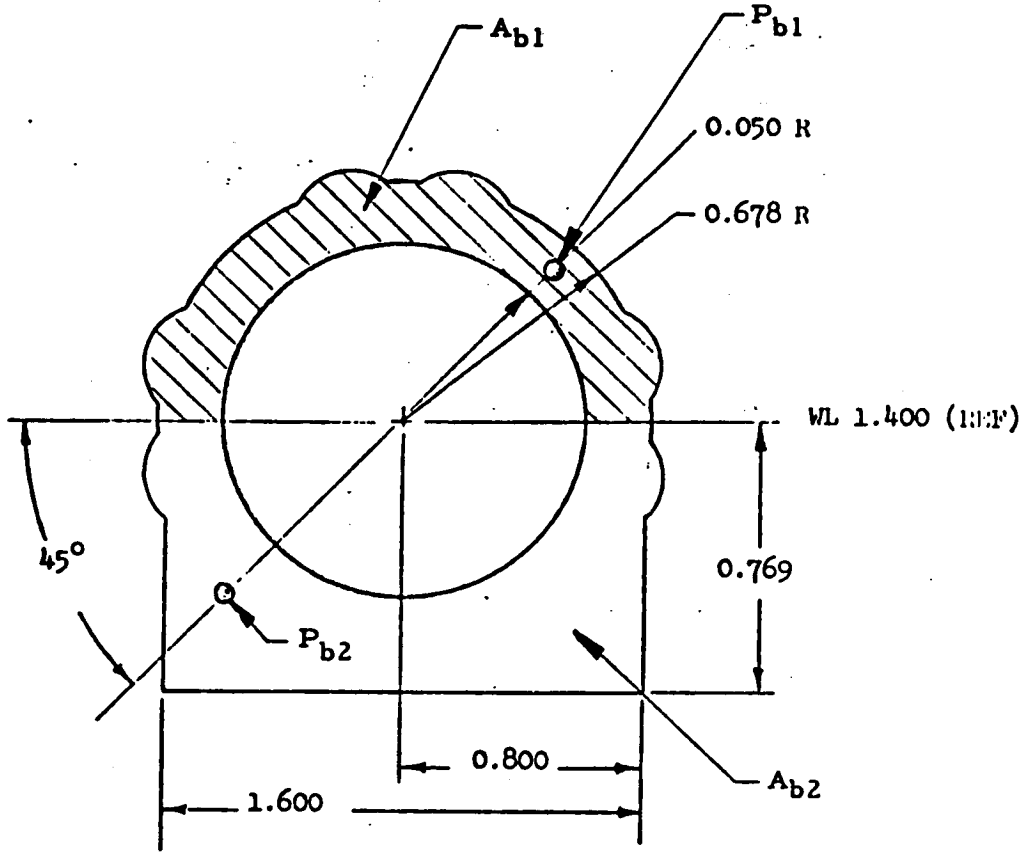


Figure 11. HNS Launch and Booster Alone Reference c.g. Location



Note: Location of pressure taps may vary slightly as installation will be made during test setup.

Figure 12. Location of Base Pressure Taps for RNS Alone.



View Looking Forward

NOTE: Location of pressure taps may vary slightly as installation will be made during test setup.

Figure 13. Location of Base Pressure Taps for Booster Alone and RNS Launch Configurations

UJ
830
Σ 30

9-16-70
 PRETEST

POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	SCHD.		VARIABLE				NO. of RUNS	MACH NUMBERS					
		α	β	P	A	R	Rr		0.6	0.9	1.2	1.5	2.0	
BAG 1 1 1	B1 W3 T1	E	0	-	0	0	0	5	6	5	4	3	2	
BAG 1 1 2	B1 W3 T1	0	X	-	0	0	0	5	68	67	66	65	64	
BAG 2 2 1	B+O1	E	0	1	0	0	0	5	38	37	36	35	34	
OAG 8 2 1		E	0	1	0	0	0	5	38	37	36	35	34	
BAG 3 3 1	B+O1	E	0	2	0	0	0	5	11	10	9	8	7	
OAG 8 3 1		E	0	2	0	0	0	5	11	10	9	8	7	
BAG 3 4 1	B+O1	E	0	2	+5	0	0	5	18	17	16	15	14	
OAG 8 4 1		E	0	2	+5	0	0	5	18	17	16	15	14	
BAG 3 5 1	B+O1	E	0	2	0	30	10	2	-	13	12	-	-	
OAG 8 5 1		E	0	2	0	30	10	2	-	13	12	-	-	
BAG 4 6 1	B+O1	E	0	3	0	0	0	5	43	42	41	40	39	
OAG 8 6 1		E	0	3	0	0	0	5	43	42	41	40	39	
BAG 2 2 3	B+O1	-5	X	1	0	0	0	5	63	62	61	60	59	
OAG 8 2 3		-5	X	1	0	0	0	5	63	62	61	60	59	
BAG 3 3 3	B+O1	-5	X	2	0	0	0	5	48	47	46	45	44	
OAG 8 3 3		-5	X	2	0	0	0	5	48	47	46	45	44	

1 7 13 19 25 31 37 43 49 55 61 67 75.76
BETA CN CA CAB CLM CY CYN CBL
 COEFFICIENTS: IDPVAR(1) IDPVAR(2) IDV 7

α or β SCHEDULES
 α E = -15, -13, -8, -4, -2, 0, +2, 4, 8, 12
 β X = -5, -2, 0, +2, 4, 6, 10

STRAIGHT WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1050 C-1- 501

STRAIGHT WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1050 C-1- 502

TEST ARC 6-6-505 DATA SET COLLATION SHEET

050
 N20
 300

POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	SCHD.		VARIABLE				NO. of RUNS	MACH NUMBERS					
		α	β	P	A	R	R		06	09	12	15	20	
BAG 571	B+O2	E	0	1	0	0	0	5	33	32	31	30	29	
OAG 971		E	0	1	0	0	0	5	33	32	31	30	29	
BAG 681	B+O2	E	0	2	0	0	0	5	28	27	26	25	24	
OAG 981		E	0	2	0	0	0	5	28	27	26	25	24	
BAG 691	B+O2	E	0	2	5	0	0	5	23	22	21	20	19	
OAG 991		E	0	2	5	0	0	5	23	22	21	20	19	
BAG 573	B+O2	-5	X	1	0	0	0	5	58	57	56	55	54	
OAG 973		-5	X	1	0	0	0	5	58	57	56	55	54	
BAG 683	B+O2	-5	X	2	0	0	0	5	53	52	51	50	49	
OAG 983		-5	X	2	0	0	0	5	53	52	51	50	49	

1	7	13	19	25	31	37	43	49	55	61	67	7576
BETA	CN	CA	CAB	CLM	CLY	CYN	CRF					
COEFFICIENTS:												
α or β												
SCHEDULES												
												IDPVAR(1) IDPVAR(2) INDV

BE POOR QUALITY

NAR Straight-wing orbiter model for Ames 6' x 6' wind tunnel tests

STRAIGHT WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1050 C-1- 503

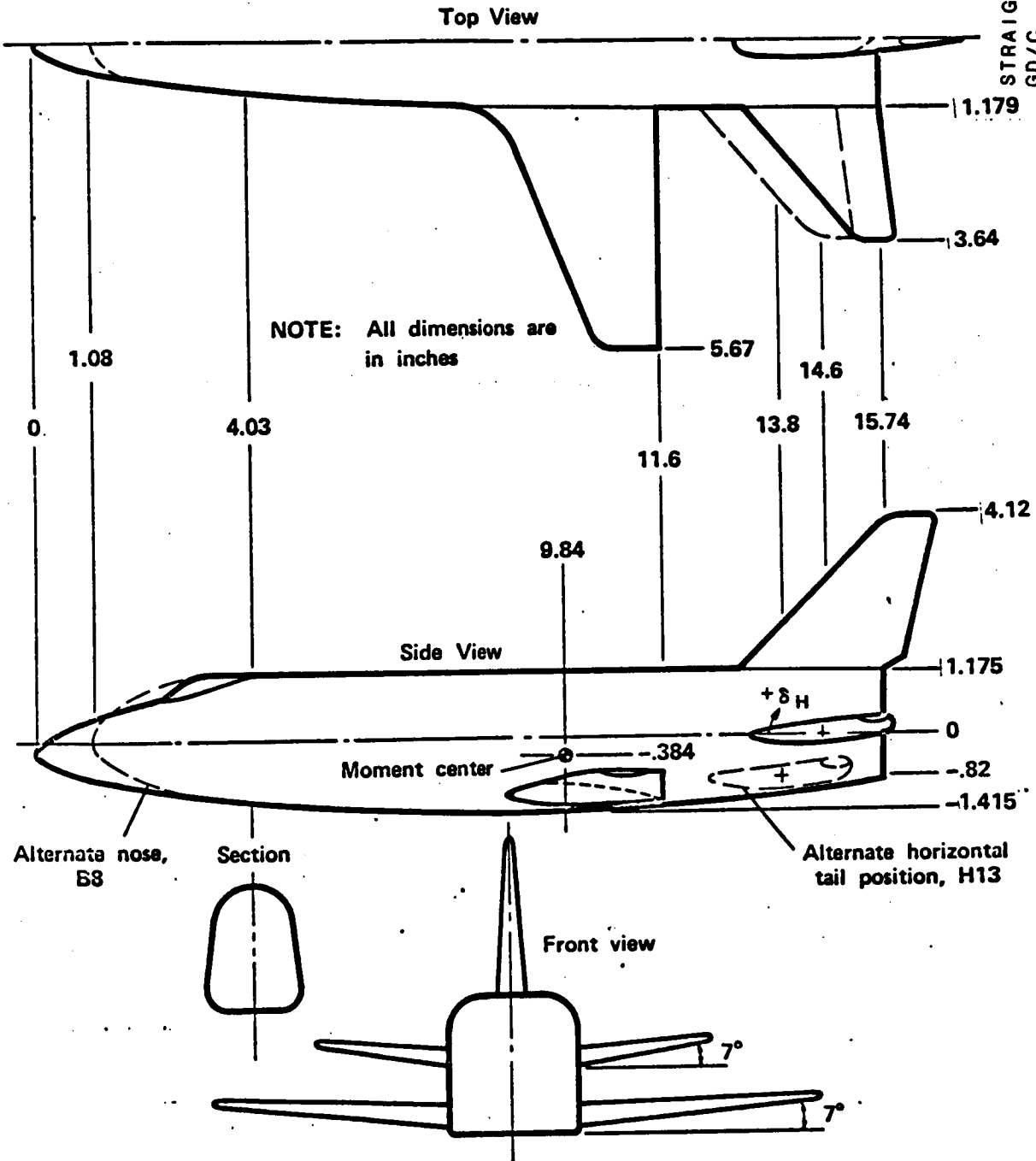


Figure 3 - NAR Straight Wing Orbiter, Three-View

STRAIGHT WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1050 C-1-504

NAR Delta-wing orbiter model for Ames 6' x 6' wind tunnel tests

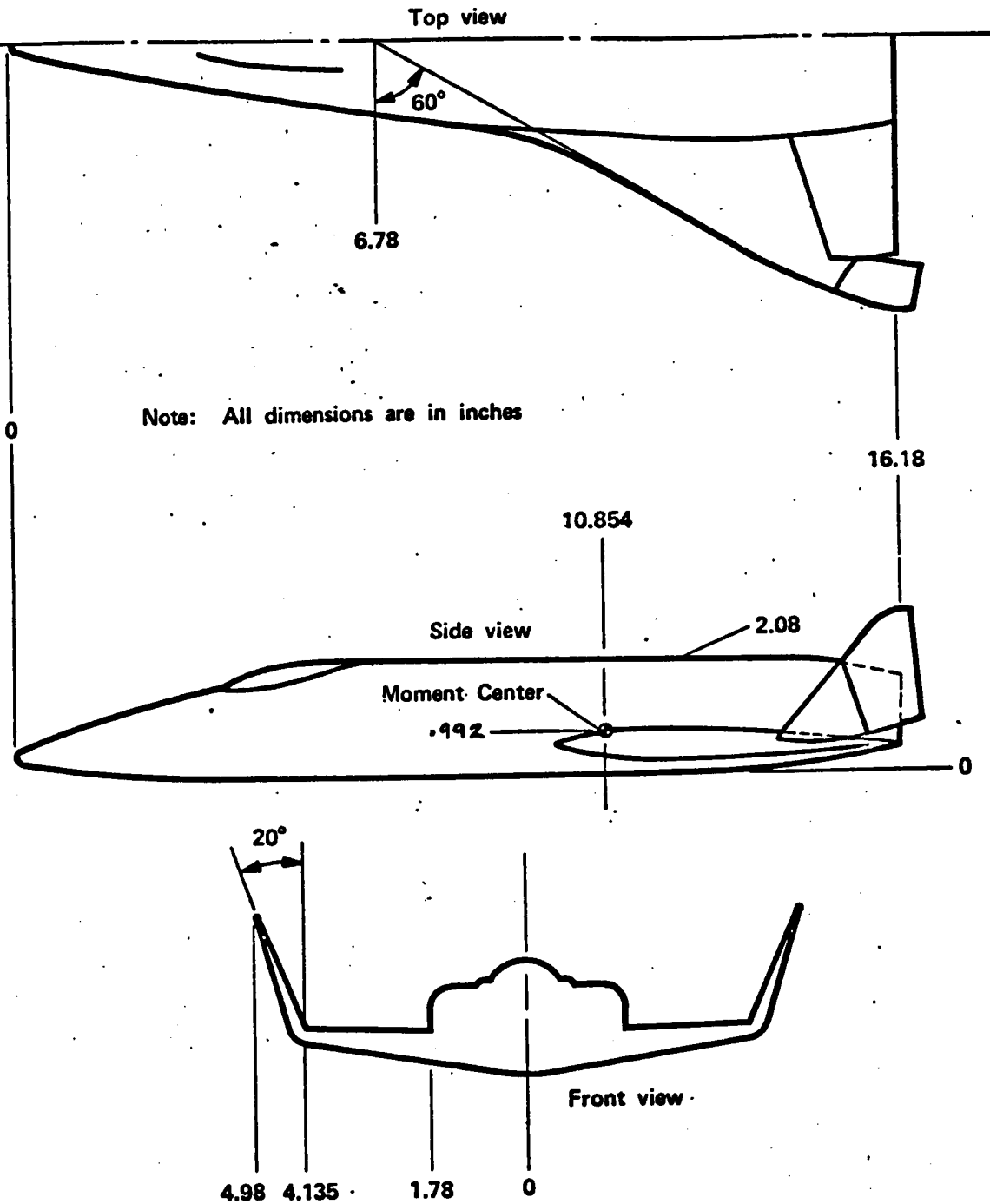
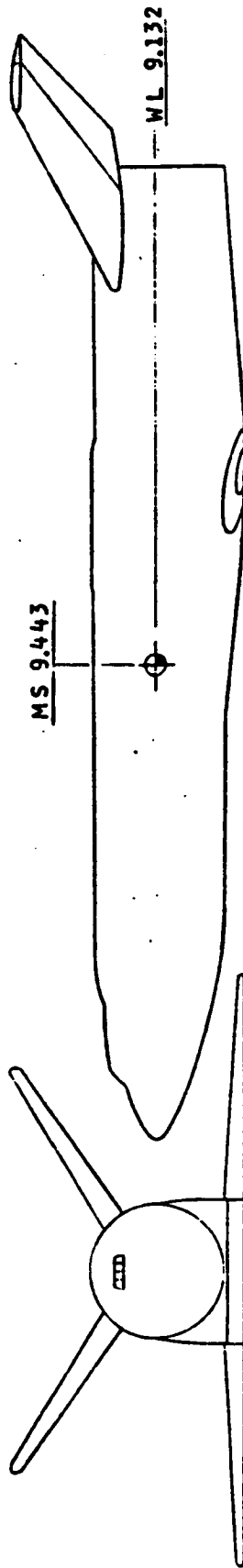
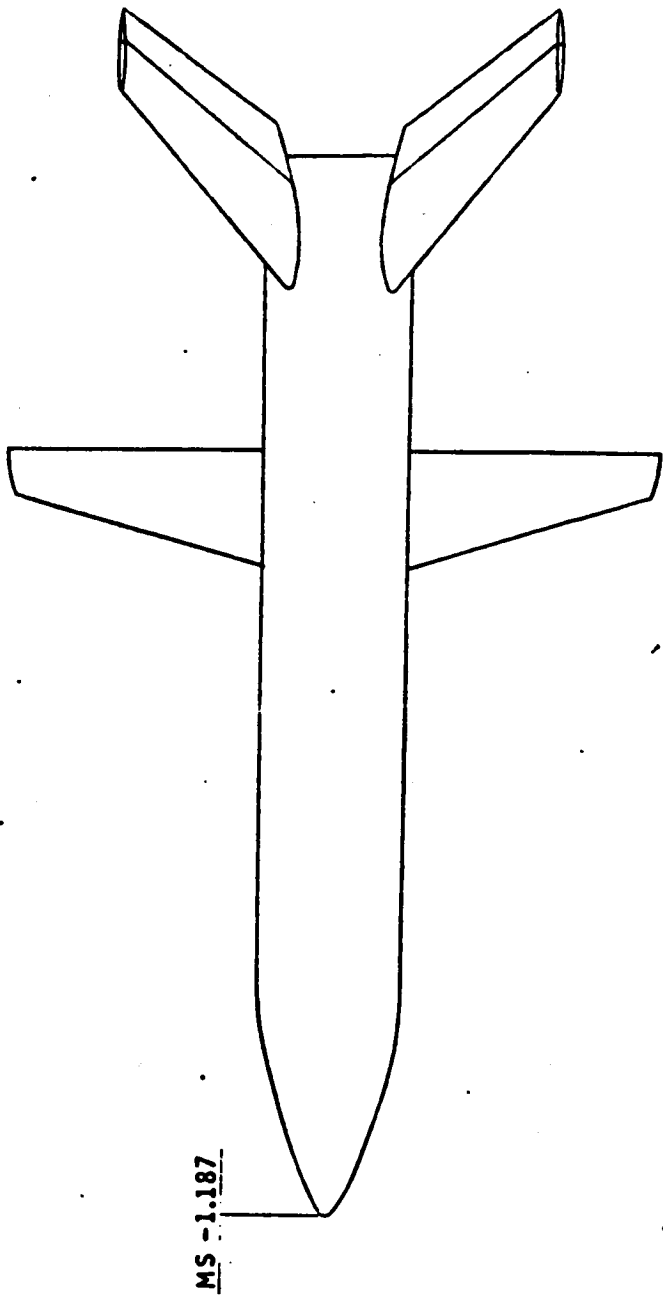


Figure 4.- NAR Delta Wing Orbiter, Three-View



STRAIGHT WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1050 C-1- 505

Figure 5. General Dynamics Straight Wing Booster, Three-View Sketch.

STRAIGHT WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1050 C-1- 506

Position	Dimension		ΔX	ΔZ	$\Delta X'$	$\Delta Z'$
	A	B				
1 (FWD)	4.715	5.836	5.742	.996	6.316	.940
2 (MID)	0.267	0.918	4.395	.904	5.052	.940
3 (AFT)	-3.860	-	3.269	.889	-	-

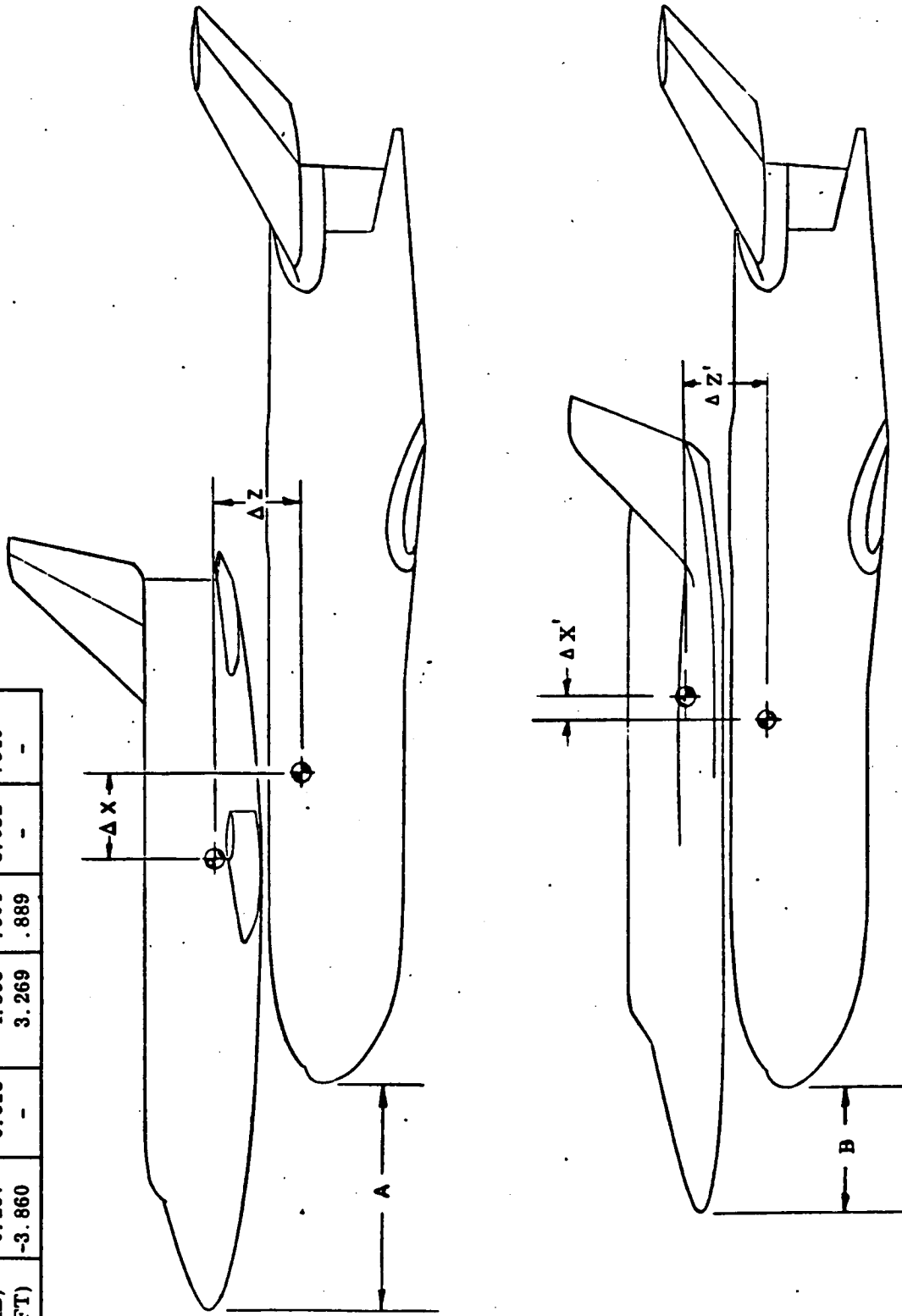


Figure 6. Relative Positions between Booster and Orbiters

ORIGINAL PAGE IS
OF POOR QUALITY

TEST TWT-466 DATA SET COLLATION SHEET
Force-Booster + Orbiter, 0.0025 Scale Launch Situation
used Control

PRETEST
 POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	SCHD.		PARAMETERS/VALUES				NO. OF RUNS	MACH. NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
		a	b	S1	S2	S3	GRIT		0.8	0.9	1.0	1.05	1.1	1.2	1.2	1.46	1.96	2.19	4.96																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
R22 01A	B16W6T8V6+85W13E2V14R4	A	0	0	0	0	120	12	0.74/0	0.75/0	0.76/0	0.77/0	0.78/0	0.79/0	0.80/0	0.81/0	0.82/0	0.83/0	0.84/0	0.85/0	0.86/0	0.87/0	0.88/0	0.89/0	0.90/0	0.91/0	0.92/0	0.93/0	0.94/0	0.95/0	0.96/0	0.97/0	0.98/0	0.99/0	1.00/0	1.01/0	1.02/0	1.03/0	1.04/0	1.05/0	1.06/0	1.07/0	1.08/0	1.09/0	1.10/0	1.11/0	1.12/0	1.13/0	1.14/0	1.15/0	1.16/0	1.17/0	1.18/0	1.19/0	1.20/0	1.21/0	1.22/0	1.23/0	1.24/0	1.25/0	1.26/0	1.27/0	1.28/0	1.29/0	1.30/0	1.31/0	1.32/0	1.33/0	1.34/0	1.35/0	1.36/0	1.37/0	1.38/0	1.39/0	1.40/0	1.41/0	1.42/0	1.43/0	1.44/0	1.45/0	1.46/0	1.47/0	1.48/0	1.49/0	1.50/0	1.51/0	1.52/0	1.53/0	1.54/0	1.55/0	1.56/0	1.57/0	1.58/0	1.59/0	1.60/0	1.61/0	1.62/0	1.63/0	1.64/0	1.65/0	1.66/0	1.67/0	1.68/0	1.69/0	1.70/0	1.71/0	1.72/0	1.73/0	1.74/0	1.75/0	1.76/0	1.77/0	1.78/0	1.79/0	1.80/0	1.81/0	1.82/0	1.83/0	1.84/0	1.85/0	1.86/0	1.87/0	1.88/0	1.89/0	1.90/0	1.91/0	1.92/0	1.93/0	1.94/0	1.95/0	1.96/0	1.97/0	1.98/0	1.99/0	2.00/0	2.01/0	2.02/0	2.03/0	2.04/0	2.05/0	2.06/0	2.07/0	2.08/0	2.09/0	2.10/0	2.11/0	2.12/0	2.13/0	2.14/0	2.15/0	2.16/0	2.17/0	2.18/0	2.19/0	2.20/0	2.21/0	2.22/0	2.23/0	2.24/0	2.25/0	2.26/0	2.27/0	2.28/0	2.29/0	2.30/0	2.31/0	2.32/0	2.33/0	2.34/0	2.35/0	2.36/0	2.37/0	2.38/0	2.39/0	2.40/0	2.41/0	2.42/0	2.43/0	2.44/0	2.45/0	2.46/0	2.47/0	2.48/0	2.49/0	2.50/0	2.51/0	2.52/0	2.53/0	2.54/0	2.55/0	2.56/0	2.57/0	2.58/0	2.59/0	2.60/0	2.61/0	2.62/0	2.63/0	2.64/0	2.65/0	2.66/0	2.67/0	2.68/0	2.69/0	2.70/0	2.71/0	2.72/0	2.73/0	2.74/0	2.75/0	2.76/0	2.77/0	2.78/0	2.79/0	2.80/0	2.81/0	2.82/0	2.83/0	2.84/0	2.85/0	2.86/0	2.87/0	2.88/0	2.89/0	2.90/0	2.91/0	2.92/0	2.93/0	2.94/0	2.95/0	2.96/0	2.97/0	2.98/0	2.99/0	3.00/0	3.01/0	3.02/0	3.03/0	3.04/0	3.05/0	3.06/0	3.07/0	3.08/0	3.09/0	3.10/0	3.11/0	3.12/0	3.13/0	3.14/0	3.15/0	3.16/0	3.17/0	3.18/0	3.19/0	3.20/0	3.21/0	3.22/0	3.23/0	3.24/0	3.25/0	3.26/0	3.27/0	3.28/0	3.29/0	3.30/0	3.31/0	3.32/0	3.33/0	3.34/0	3.35/0	3.36/0	3.37/0	3.38/0	3.39/0	3.40/0	3.41/0	3.42/0	3.43/0	3.44/0	3.45/0	3.46/0	3.47/0	3.48/0	3.49/0	3.50/0	3.51/0	3.52/0	3.53/0	3.54/0	3.55/0	3.56/0	3.57/0	3.58/0	3.59/0	3.60/0	3.61/0	3.62/0	3.63/0	3.64/0	3.65/0	3.66/0	3.67/0	3.68/0	3.69/0	3.70/0	3.71/0	3.72/0	3.73/0	3.74/0	3.75/0	3.76/0	3.77/0	3.78/0	3.79/0	3.80/0	3.81/0	3.82/0	3.83/0	3.84/0	3.85/0	3.86/0	3.87/0	3.88/0	3.89/0	3.90/0	3.91/0	3.92/0	3.93/0	3.94/0	3.95/0	3.96/0	3.97/0	3.98/0	3.99/0	4.00/0	4.01/0	4.02/0	4.03/0	4.04/0	4.05/0	4.06/0	4.07/0	4.08/0	4.09/0	4.10/0	4.11/0	4.12/0	4.13/0	4.14/0	4.15/0	4.16/0	4.17/0	4.18/0	4.19/0	4.20/0	4.21/0	4.22/0	4.23/0	4.24/0	4.25/0	4.26/0	4.27/0	4.28/0	4.29/0	4.30/0	4.31/0	4.32/0	4.33/0	4.34/0	4.35/0	4.36/0	4.37/0	4.38/0	4.39/0	4.40/0	4.41/0	4.42/0	4.43/0	4.44/0	4.45/0	4.46/0	4.47/0	4.48/0	4.49/0	4.50/0	4.51/0	4.52/0	4.53/0	4.54/0	4.55/0	4.56/0	4.57/0	4.58/0	4.59/0	4.60/0	4.61/0	4.62/0	4.63/0	4.64/0	4.65/0	4.66/0	4.67/0	4.68/0	4.69/0	4.70/0	4.71/0	4.72/0	4.73/0	4.74/0	4.75/0	4.76/0	4.77/0	4.78/0	4.79/0	4.80/0	4.81/0	4.82/0	4.83/0	4.84/0	4.85/0	4.86/0	4.87/0	4.88/0	4.89/0	4.90/0	4.91/0	4.92/0	4.93/0	4.94/0	4.95/0	4.96/0	4.97/0	4.98/0	4.99/0	5.00/0	5.01/0	5.02/0	5.03/0	5.04/0	5.05/0	5.06/0	5.07/0	5.08/0	5.09/0	5.10/0	5.11/0	5.12/0	5.13/0	5.14/0	5.15/0	5.16/0	5.17/0	5.18/0	5.19/0	5.20/0	5.21/0	5.22/0	5.23/0	5.24/0	5.25/0	5.26/0	5.27/0	5.28/0	5.29/0	5.30/0	5.31/0	5.32/0	5.33/0	5.34/0	5.35/0	5.36/0	5.37/0	5.38/0	5.39/0	5.40/0	5.41/0	5.42/0	5.43/0	5.44/0	5.45/0	5.46/0	5.47/0	5.48/0	5.49/0	5.50/0	5.51/0	5.52/0	5.53/0	5.54/0	5.55/0	5.56/0	5.57/0	5.58/0	5.59/0	5.60/0	5.61/0	5.62/0	5.63/0	5.64/0	5.65/0	5.66/0	5.67/0	5.68/0	5.69/0	5.70/0	5.71/0	5.72/0	5.73/0	5.74/0	5.75/0	5.76/0	5.77/0	5.78/0	5.79/0	5.80/0	5.81/0	5.82/0	5.83/0	5.84/0	5.85/0	5.86/0	5.87/0	5.88/0	5.89/0	5.90/0	5.91/0	5.92/0	5.93/0	5.94/0	5.95/0	5.96/0	5.97/0	5.98/0	5.99/0	6.00/0	6.01/0	6.02/0	6.03/0	6.04/0	6.05/0	6.06/0	6.07/0	6.08/0	6.09/0	6.10/0	6.11/0	6.12/0	6.13/0	6.14/0	6.15/0	6.16/0	6.17/0	6.18/0	6.19/0	6.20/0	6.21/0	6.22/0	6.23/0	6.24/0	6.25/0	6.26/0	6.27/0	6.28/0	6.29/0	6.30/0	6.31/0	6.32/0	6.33/0	6.34/0	6.35/0	6.36/0	6.37/0	6.38/0	6.39/0	6.40/0	6.41/0	6.42/0	6.43/0	6.44/0	6.45/0	6.46/0	6.47/0	6.48/0	6.49/0	6.50/0	6.51/0	6.52/0	6.53/0	6.54/0	6.55/0	6.56/0	6.57/0	6.58/0	6.59/0	6.60/0	6.61/0	6.62/0	6.63/0	6.64/0	6.65/0	6.66/0	6.67/0	6.68/0	6.69/0	6.70/0	6.71/0	6.72/0	6.73/0	6.74/0	6.75/0	6.76/0	6.77/0	6.78/0	6.79/0	6.80/0	6.81/0	6.82/0	6.83/0	6.84/0	6.85/0	6.86/0	6.87/0	6.88/0	6.89/0	6.90/0	6.91/0	6.92/0	6.93/0	6.94/0	6.95/0	6.96/0	6.97/0	6.98/0	6.99/0	7.00/0	7.01/0	7.02/0	7.03/0	7.04/0	7.05/0	7.06/0	7.07/0	7.08/0	7.09/0	7.10/0	7.11/0	7.12/0	7.13/0	7.14/0	7.15/0	7.16/0	7.17/0	7.18/0	7.19/0	7.20/0	7.21/0	7.22/0	7.23/0	7.24/0	7.25/0	7.26/0	7.27/0	7.28/0	7.29/0	7.30/0	7.31/0	7.32/0	7.33/0	7.34/0	7.35/0	7.36/0	7.37/0	7.38/0	7.39/0	7.40/0	7.41/0	7.42/0	7.43/0	7.44/0	7.45/0	7.46/0	7.47/0	7.48/0	7.49/0	7.50/0	7.51/0	7.52/0	7.53/0	7.54/0	7.55/0	7.56/0	7.57/0	7.58/0	7.59/0	7.60/0	7.61/0	7.62/0	7.63/0	7.64/0	7.65/0	7.66/0	7.67/0	7.68/0	7.69/0	7.70/0	7.71/0	7.72/0	7.73/0	7.74/0	7.75/0	7.76/0	7.77/0	7.78/0	7.79/0	7.80/0	7.81/0	7.82/0	7.83/0	7.84/0	7.85/0	7.86/0	7.87/0	7.88/0	7.89/0	7.90/0	7.91/0	7.92/0	7.93/0	7.94/0	7.95/0	7.96/0	7.97/0	7.98/0	7.99/0	8.00/0	8.01/0	8.02/0	8.03/0	8.04/0	8.05/0	8.06/0	8.07/0	8.08/0	8.09/0	8.10/0	8.11/0	8.12/0	8.13/0	8.14/0	8.15/0	8.16/0	8.17/0	8.18/0	8.19/0	8.20/0	8.21/0	8.22/0	8.23/0	8.24/0	8.25/0	8.26/0	8.27/0	8.28/0	8.29/0	8.30/0	8.31/0	8.32/0	8.33/0	8.34/0	8.35/0	8.36/0	8.37/0	8.38/0	8.39/0	8.40/0	8.41/0	8.42/0	8.43/0	8.44/0	8.45/0	8.46/0	8.47/0	8.48/0	8.49/0	8.50/0	8.51/0	8.52/0	8.53/0	8.54/0	8.55/0	8.56/0	8.57/0	8.58/0	8.59/0	8.60/0	8.61/0	8.62/0	8.63/0	8.64/0	8.65/0	8.66/0	8.67/0	8.68/0	8.69/0	8.70/0	8.71/0	8.72/0	8.73/0	8.74/0	8.75/0	8.76/0	8.77/0	8.78/0	8.79/0	8.80/0	8.81/0	8.82/0	8.83/0	8.84/0	8.85/0	8.86/0	8.87/0	8.88/0	8.89/0	8.90/0	8.91/0	8.92/0	8.93/0	8.94/0	8.95/0	8.96/0	8.97/0	8.98/0	8.99/0	9.00/0	9.01/0	9.02/0	9.03/0	9.04/0	9.05/0	9.06/0	9.07/0	9.08/0	9.09/0	9.10/0	9.11/0	9.12/0	9.13/0	9.14/0	9.15/0	9.16/0	9.17/0	9.18/0	9.19/0	9.20/0	9.21/0	9.22/0	9.23/0	9.24/0	9.25/0	9.26/0	9.27/0	9.28/0	9.29/0	9.30/0	9.31/0	9.32/0	9.33/0	9.34/0	9.35/0	9.36/0	9.37/0	9.38/0	9.39/0	9.40/0	9.41/0	9.42/0	9.43/0	9.44/0	9.45/0	9.46/0	9.47/0	9.48/0	9.49/0	9.50/0	9.51/0	9.52/0	9.53/0	9.54/0	9.55/0	9.56/0	9.57/0	9.58/0	9.59/0	9.60/0	9.61/0	9.62/0	9.63/0	9.64/0	9.65/0	9.66/0	9.67/0	9.68/0	9.69/0	9.70/0	9.71/0	9.72/0	9.73/0	9.74/0	9.75/0	9.76/0	9.77/0	9.78/0	9.79/0	9.80/0	9.81/0	9.82/0	9.83/0	9.84/0	9.85/0	9.86/0	9.87/0	9.88/0	9.89/0	9.90/0	9.91/0	9.92/0	9.93/0	9.94/0	9.95/0	9.96/0	9.97/0	9.98/0	9.99/0	10.00/0	10.01/0	10.02/0	10.03/0	10.04/0	10.05/0	10.06/0	10.07/0	10.08/0	10.09/0	10.10/0	10.11/0	10.12/0	10.13/0	10.14/0	10.15/0	10.16/0	10.17/0	10.18/0	10.19/0	10.20/0	10.21/0	10.22/0	10.23/0	10.24/0	10.25/0	10.26/0	10.27/0	10.28/0	10.29/0	10.30/0	10.31/0	10.32/0	10.33/0	10.34/0	10.35/0	10.36/0	10.37/0	10.38/0	10.39/0	10.40/0	10.41/0	10.42/0	10.43/0	10.44/0	10.45/0	10.46/0	10.47/0	10.48/0	10.49/0	10.50/0	10.51/0	10.52/0	10.53/0	10.54/0

STRAIGHT WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1051 C-1- 508

TEST TWT-466 DATA SET COLLATION SHEET
 Force - Booster + Orbiter, 0.0025 Scale, Launch Stability
 and Control

PRETEST
 POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	SCHD.		CONTROL DEFLECTION			NO. of RUNS	MACH NUMBERS											
		a	B	SH	FA	FL		0.5	0.9	0.95	1.0	1.05	1.1	1.2	1.3	1.46	1.96	2.99	4.96
R22 05A	B16W6TBV6 + B6W10H12VS	A	0	0	0	0	11	0.87/0	0.87/0	0.87/0	0.87/0	0.87/0	0.87/0	0.87/0	0.87/0	0.87/0	0.87/0	0.87/0	0.87/0
21A						120	4	104/0	103/0	102/0									
05B		0	B				11	0.32/0	0.33/0	0.34/0	0.35/0	0.37/0	0.38/0	0.39/0	0.41/0	0.41/0	0.41/0	0.41/0	0.41/0
05C		-6					7	2.29/0	2.34/0	2.31/0									
05D		6					7	2.09/0	2.08/0	2.07/0									
06A		A	0	-10			5	1.21/0	1.24/0	1.19/0									
07A				-20			5	1.26/0	1.25/0	1.24/0									
08A				0		-10L -10R	5	1.21/0	1.30/0	1.29/0									
08B		0	B				3	1.97/0	1.96/0	1.96/0									
26B						6.5	3	2.42/0	2.43/0	2.44/0									
R22 09B	B16W6TBV6 + B6W10H12VS	0	B	0	0	0	5	0.47/0	0.45/0	0.49/0									
12A	B16						5	1.44/0	1.42/0	1.42/0									
12B		0	B				5	0.72/0	0.72/0	0.71/0									
13A	B16W6	A	0				5	1.37/0	1.38/0	1.39/0									
13B		0	B				5	0.66/0	0.67/0	0.68/0									
14B	B16TB			0	0		4	0.55/0	0.54/0	0.63/0									
15B	B16W6TB						5	0.58/0	0.59/0	0.60/0									

1 7 13 19 25 31 37 43 49 55 61 67 75.76
 C L M I C L I C L N I C Y I C S L C A B C D E K N K C P I
 IDPVAR(1) IDPVAR(2) INDY
 COEFFICIENTS: $\alpha A = -10.5, -6, -4, -2, 0, 2, 4, 6, 8, 10$
 $\beta B = -4, -2, 0, 2, 4, 6, 8, 10$
 $S_H + S_A = TE DOWN$
 $S_{01} = TE LEFT$

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OF POOR QUALITY

TEST TW-166 DATA SET COLLATION SHEET

Force-Booster + Orbiter, 0.0035-Scale, Launch Stability
and Control

PRETEST
 POSTTEST

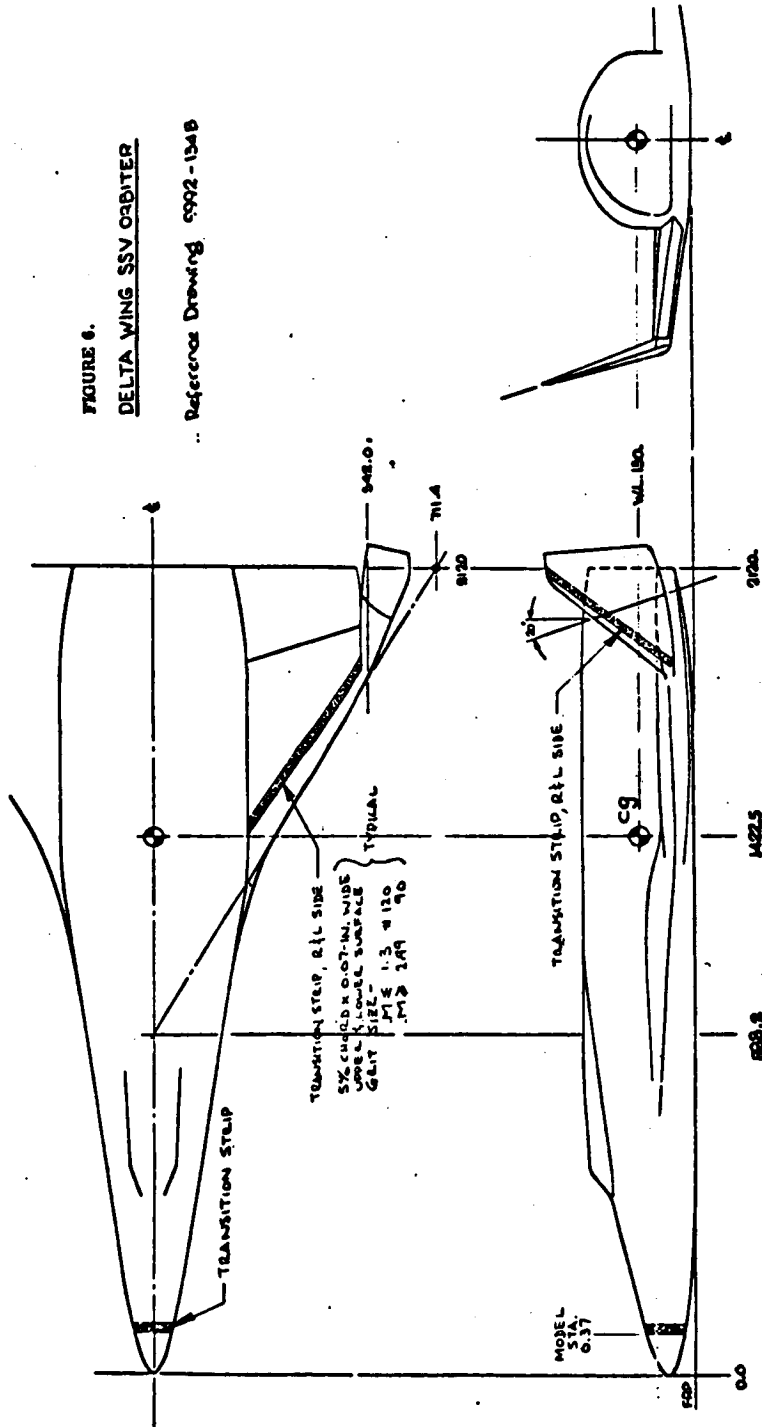
DATA SET IDENTIFIER	CONFIGURATION	SCHD.		CONTROL DEFLECTION			NO. of RUNS	MACH NUMBERS									
		a	B	S14	SA	SR		FRIT	0.6	0.8	0.9	0.95	1.0	1.05	1.1	1.2	1.3
22.16A	016W4TEVL	A	0	0	0	0	7			0.90/0	1.50/0	0.11/0	1.49/3	0.92/0	0.93/0	1.73/2	
16B		0	B				2			0.57/0	0.56/0	0.55/0	0.54/0	0.53/0	0.52/0	0.51/0	1.82/0
16C		-6	V				5			2.37/0		2.38/0		2.39/0		2.40/0	2.41/0

1 7 13 19 25 31 37 43 49 55 61 67 7576
 CLM CL CLN CLY KSL KSL CAB CDE ICN IKCP IDPVAR(1) IDPVAR(2) INDV

COEFFICIENTS:
 a or B
 SCHEDULES
 A = -10, -8, -6, -4, -2, 0, 2, 4, 6, 8, 10
 B = -4, -2, 0, 2, 4, 6, 8, 10

STRAIGHT WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1051 C-1- 509

FIGURE 6.
DELTA WING SSV ORBITER
Reference Drawing 6992-134B



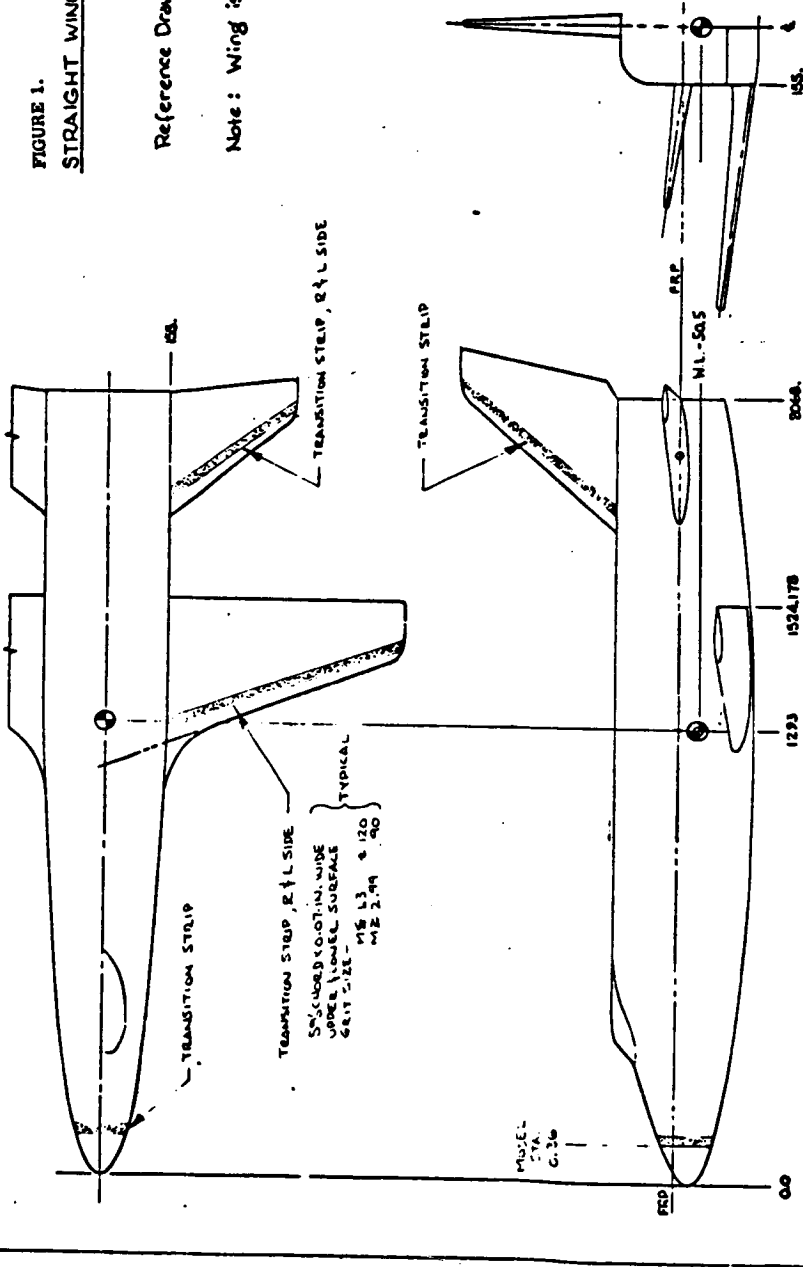
STRAIGHT WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1051 C-1- 511

STRAIGHT WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1051 C-1- 512

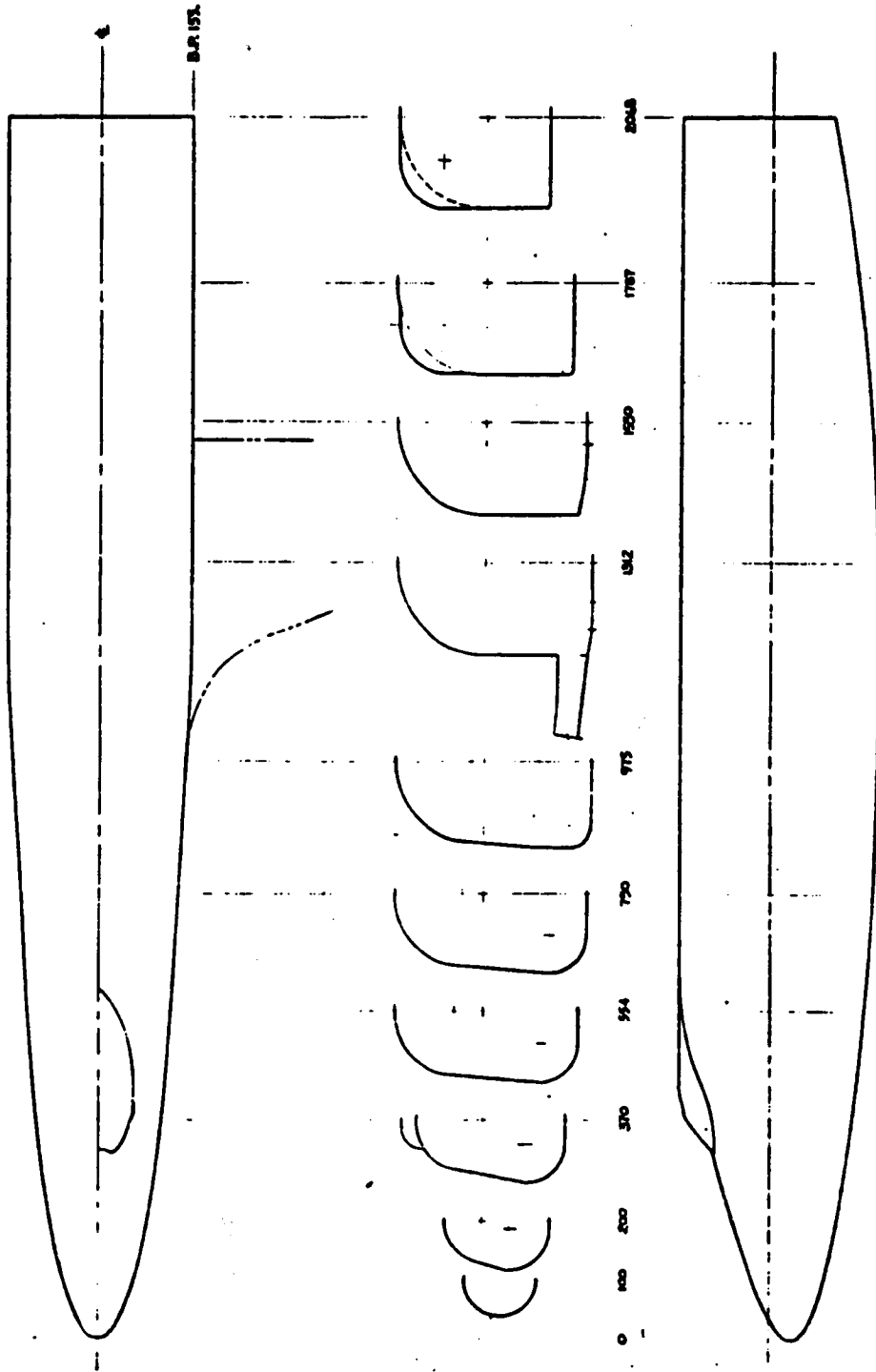
FIGURE 1.
 STRAIGHT WING SSV ORBITER

Reference Drawing 9992-130C

Note: Wing is in -130G position



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STRAIGHT WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1051 C-1- 513

FIGURE 2 BODY B6 9992-130 C CONFIGURATION

STRAIGHT WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1051 C-1- 514

LOS ANGELES DIVISION
 NORTH AMERICAN ROCKWELL CORPORATION

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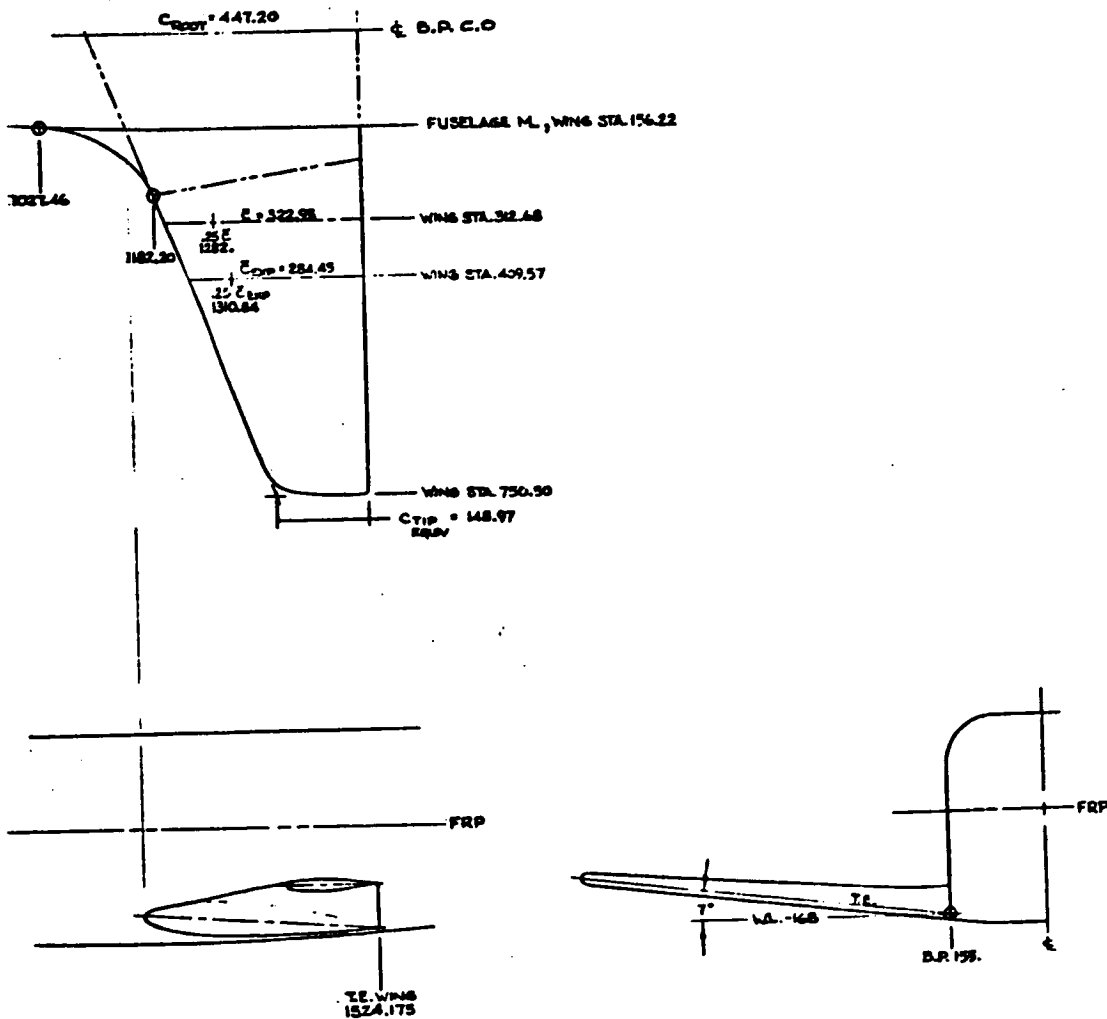


FIGURE 3

WING W10

9992-130 C CONFIGURATION
 9992-130 G WING POSITION

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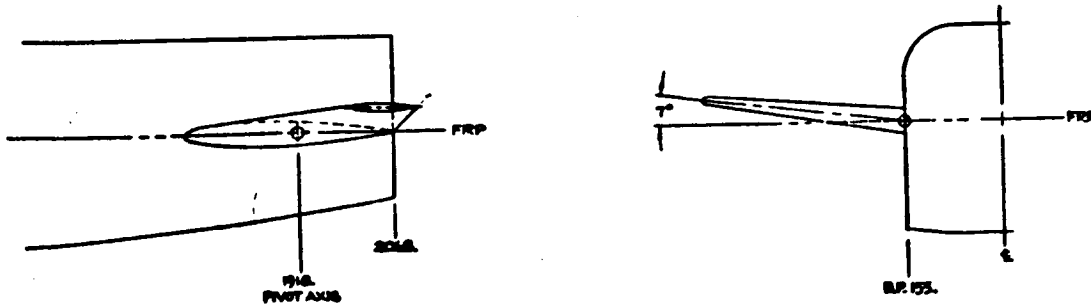
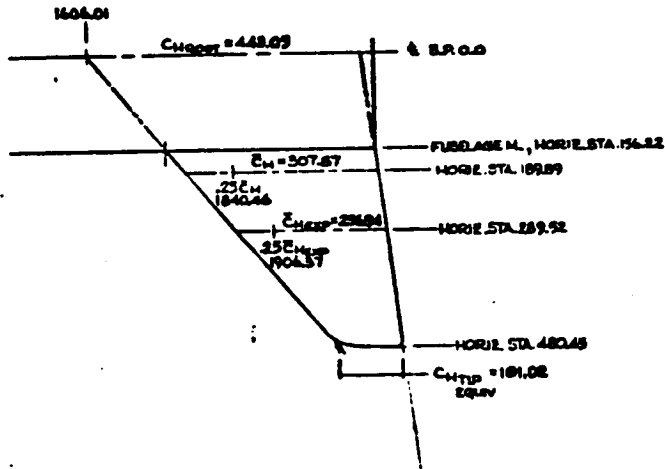


FIGURE 4
 HORIZONTAL STABILIZER H12 9992-130C CONFIGURATION

STRAIGHT WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1051 C-1- 516
 LOS ANGELES DIVISION
 NORTH AMERICAN ROCKWELL CORPORATION

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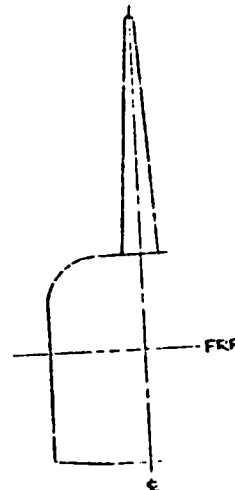
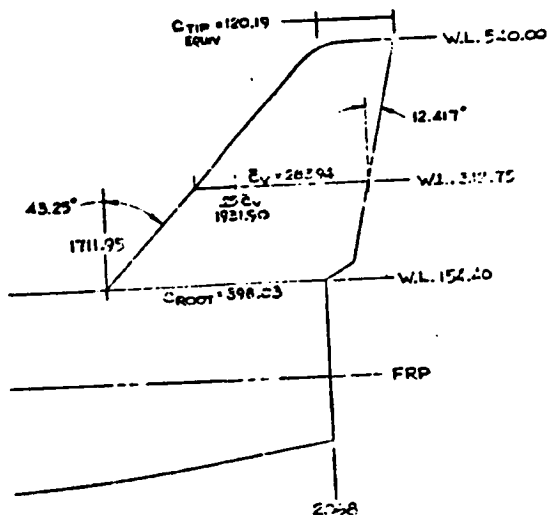
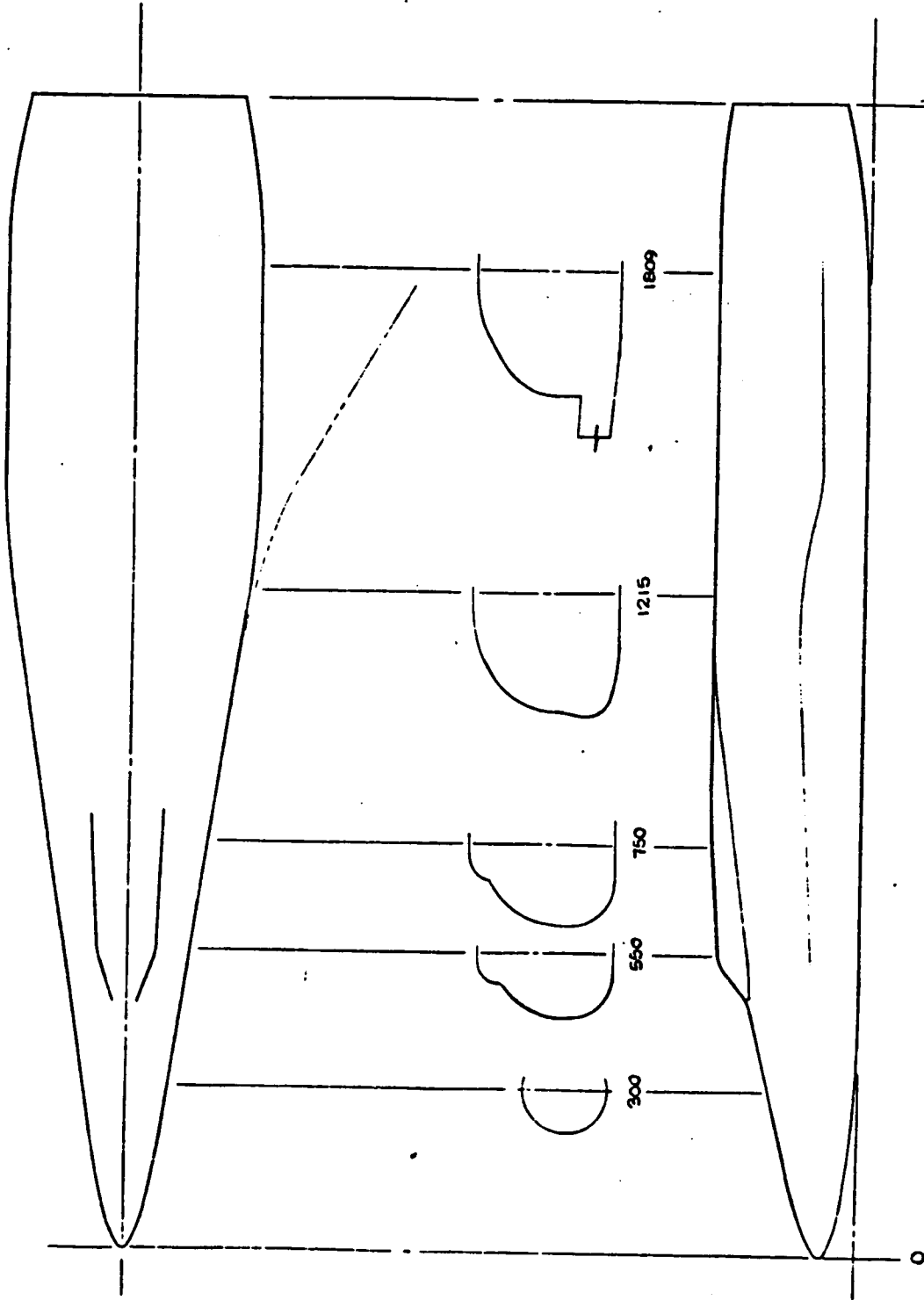


FIGURE 5
 VERTICAL STABILIZER V5

9992-1300 CONSTRUCTION

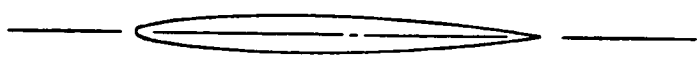
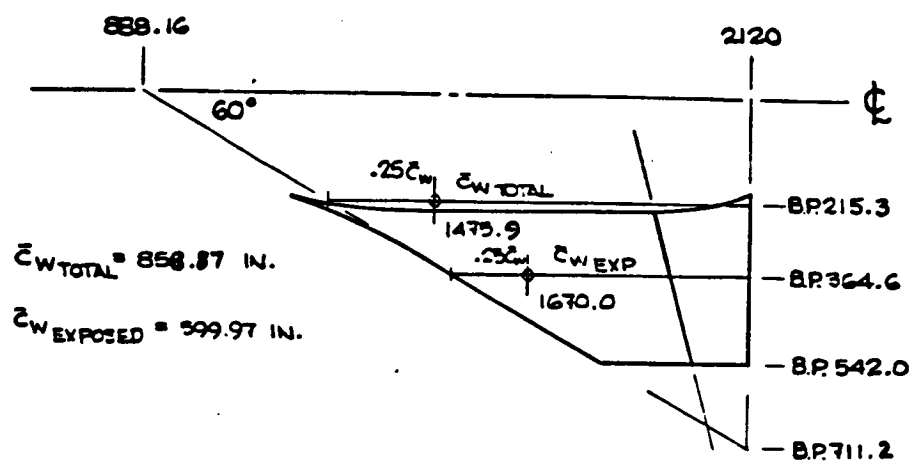


2120
 STRAIGHT WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1051 C-1- 517

FIGURE 7 ECDY B5 9992-134 B CONFIGURATION

STRAIGHT WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1051 C-1-518

3.0 MODEL DESCRIPTION - Continued
 3.3 Dimensional Data - Continued
 3.3.2 Delta Wing Orbiter - Continued



CHORD (B.P. 240.0)
 OCC9 - 64 SERIES AIRFOIL

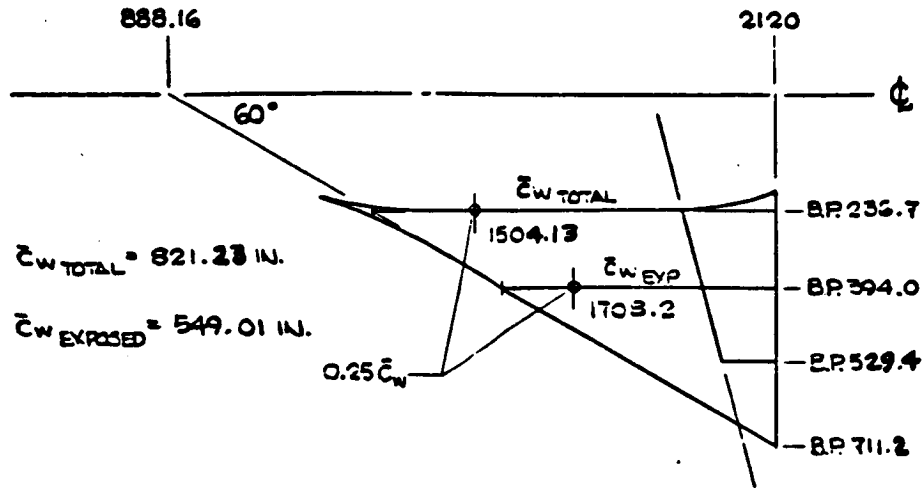


TIP CHORD (B.P. 542.0)
 0012 - 64 SERIES AIRFOIL

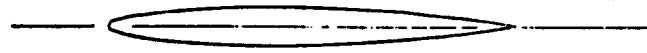
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FIGURE 8.
 WING WISE 9992-1348 CONFIGURATION

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STRAIGHT WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1051 C-1-519



CHORD (B.P. 243.0)

0009-64 SERIES AIRFOIL



TIP CHORD (B.P. 542.0)

C012-64 SERIES AIRFOIL

FIGURE 9. WING W14 3002-12A B CONFIGURATION
COMPLETE DELTA AND SHARPER TIP

STRAIGHT WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1051 C-1- 520

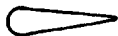
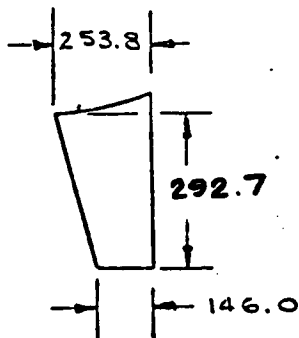


FIGURE 10.

ELEVON, E_2 - Elevon Used with Wing W_{13}
 E_3 - Elevon Used with Wing W_{14}

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STRAIGHT WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1051 C-1- 521

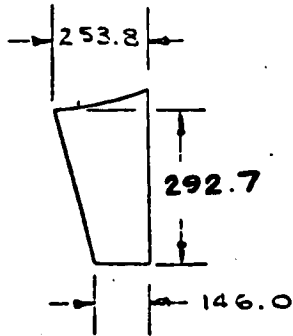
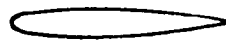
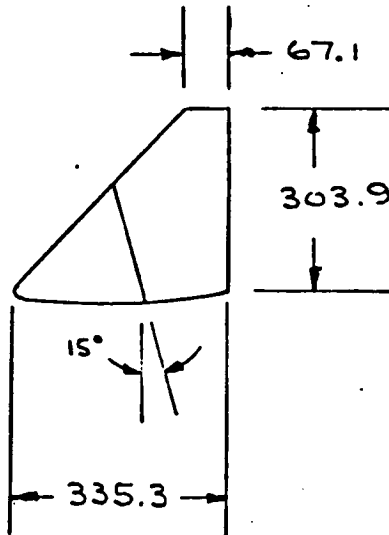


FIGURE 11.

ELEVON, E_2 - Elevon Used with Wing W_{13}
 E_3 - Elevon Used with Wing W_{14}

STRAIGHT WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1051, C-1- 522

ORIGINAL PAGE IS
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0012-64 SERIES AIRFOIL

FIGURE 12
VERTICAL STABILIZER V_{14} 9992-134B CONFIGURATION

STRAIGHT WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1051 C-1- 523

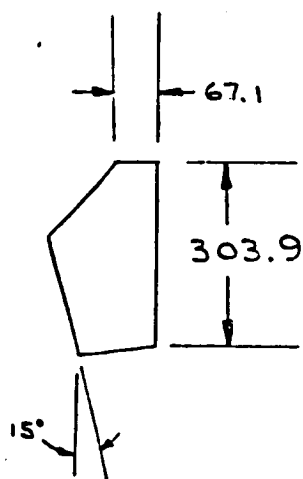


FIGURE 13
RUDDER - R4

STRAIGHT WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1051 C-1-524

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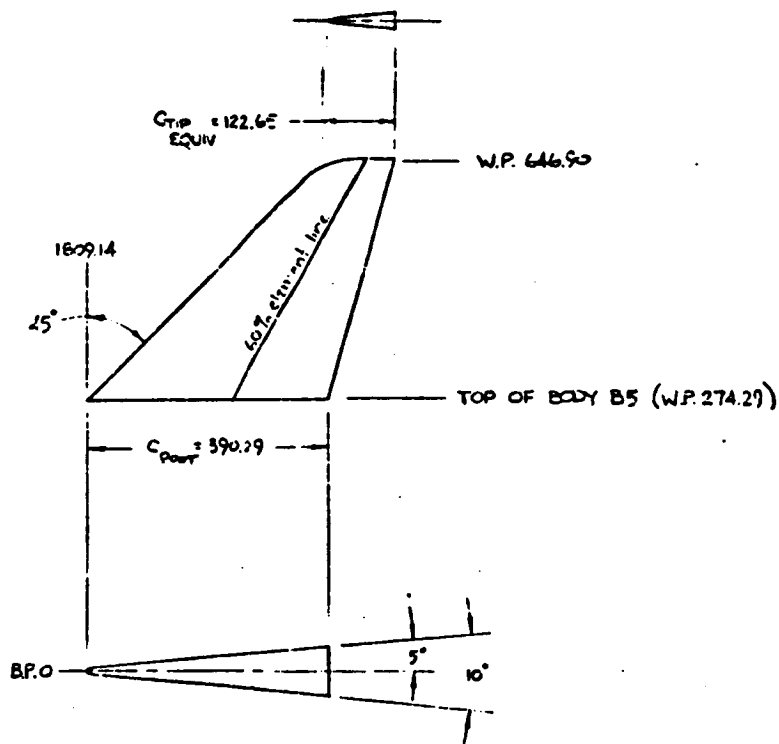
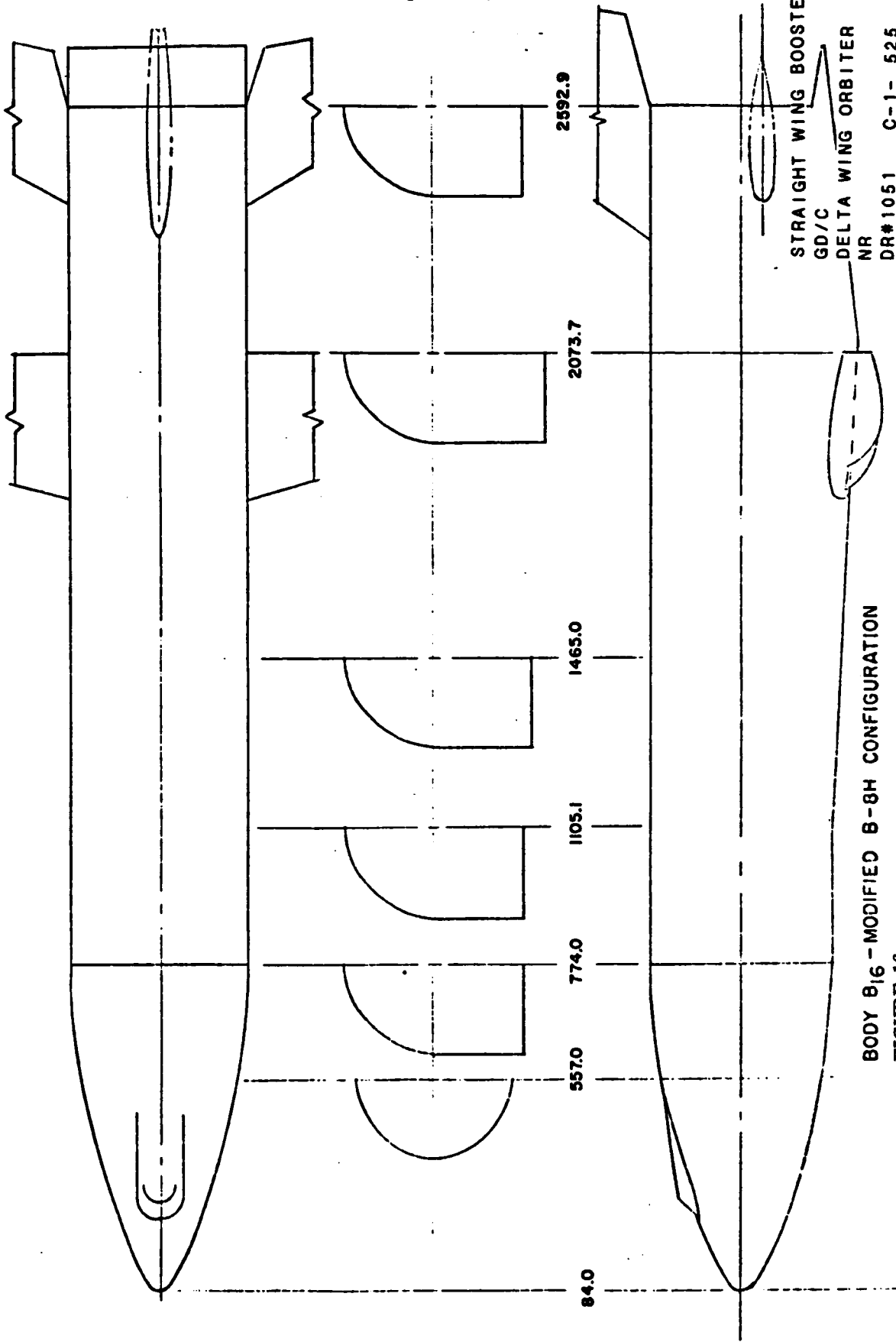


FIGURE 14.

VERTICAL STABILIZER V17

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STRAIGHT WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1051 C-1- 525

BODY B₁₆ - MODIFIED B-8H CONFIGURATION
FIGURE 16.

STRAIGHT WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1051 C-1- 526

LOS ANGELES DIVISION
 NORTH AMERICAN ROCKWELL CORPORATION

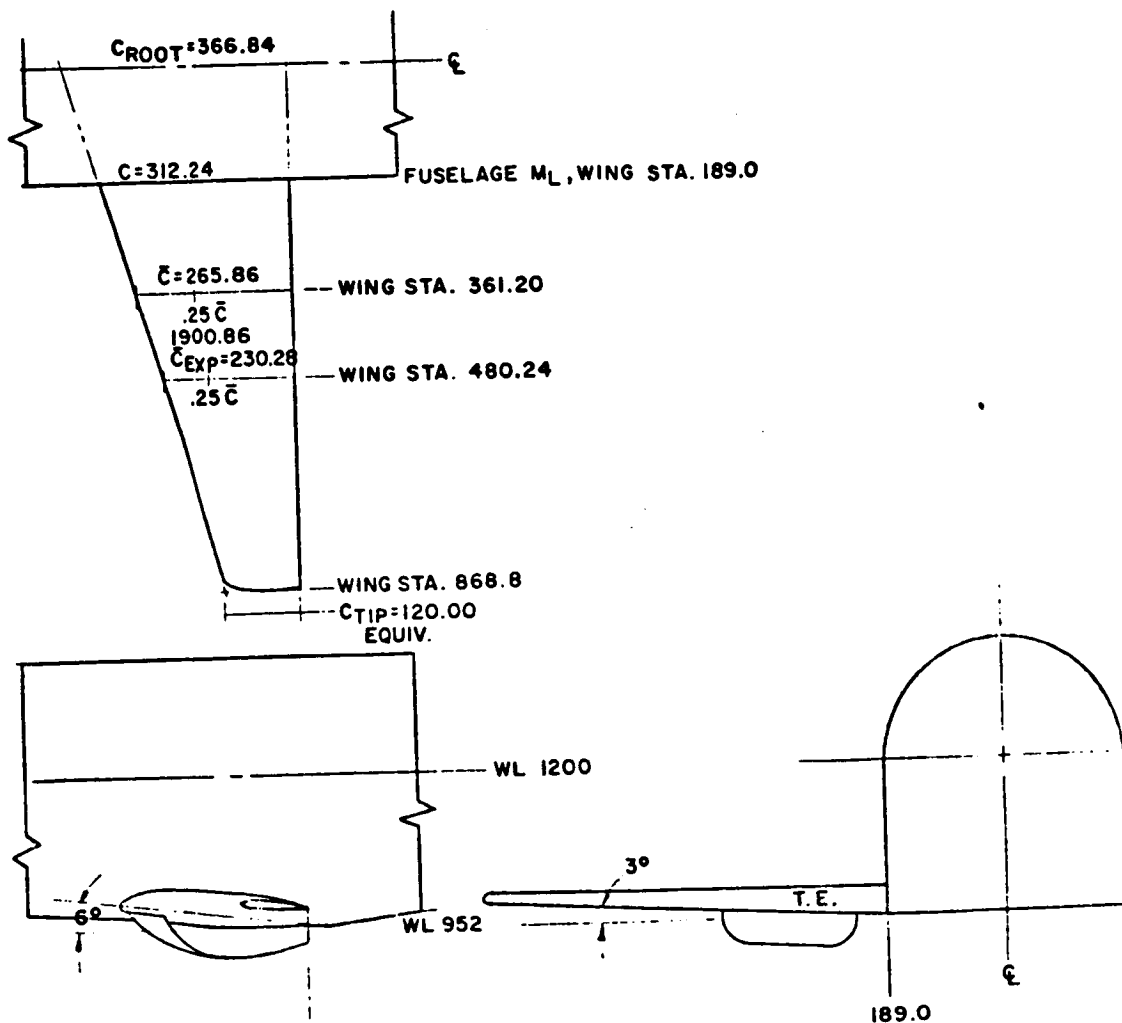
-70-435
 10-9-70

10-23-70 Revision

MODEL DESCRIPTION - Continued

Dimensional Data - Continued

Straight Wing Booster - Continued



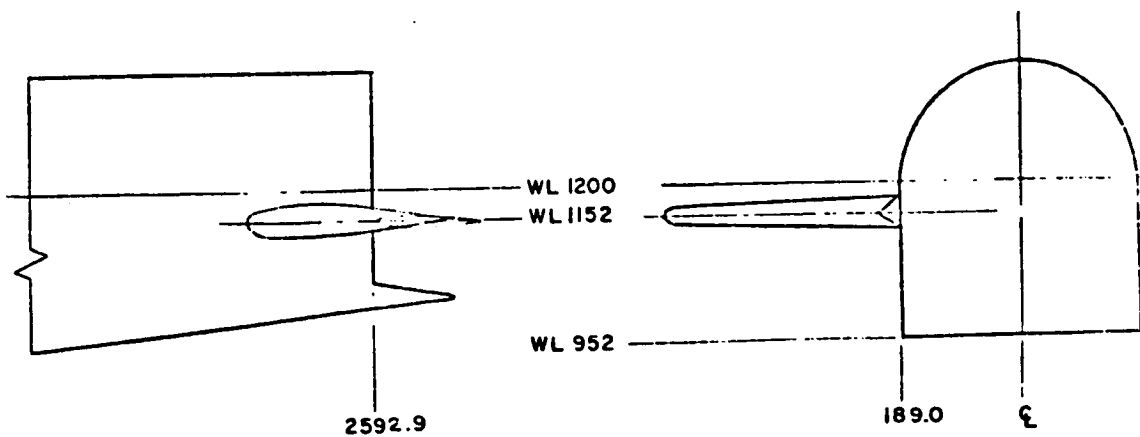
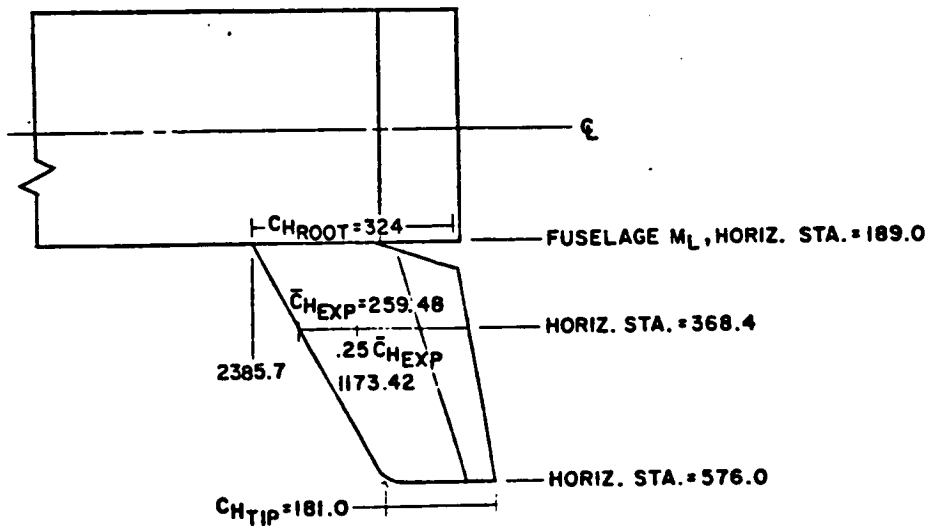
WING W_6 MODIFIED B-8H CONFIGURATION
 FIGURE 17.

MODEL DESCRIPTION - Continued

Dimensional Data - Continued

Straight Wing Booster - Continued

STRAIGHT WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1051 C-1- 527



HORIZONTAL TAIL T₈
 FIGURE 18.

STRAIGHT WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1051 C-1- 528

LOS ANGELES DIVISION
NORTH AMERICAN ROCKWELL CORPORATION

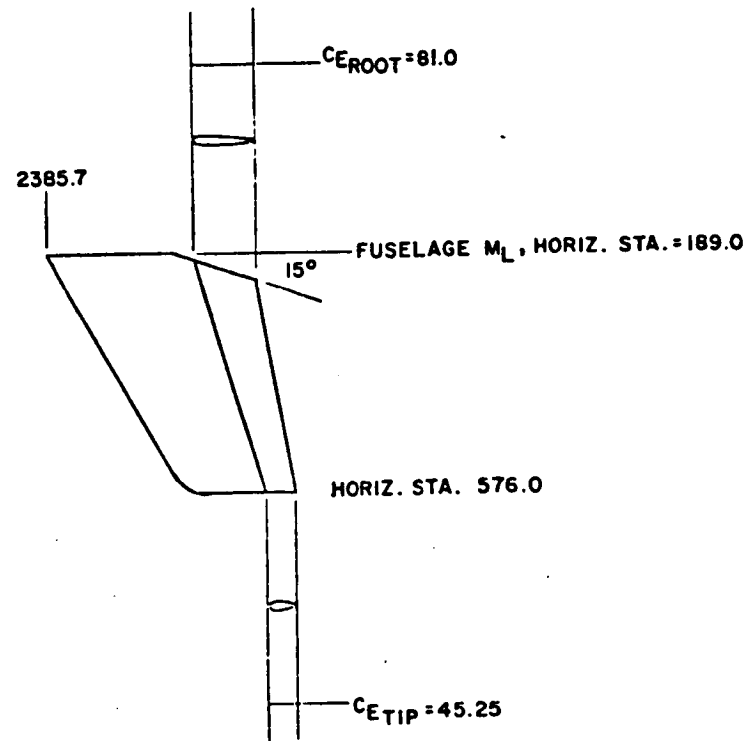
10-9-70

10-23-70 Revision

MODEL DESCRIPTION - Continued

Dimensional Data - Continued

Straight Wing Booster - Continued



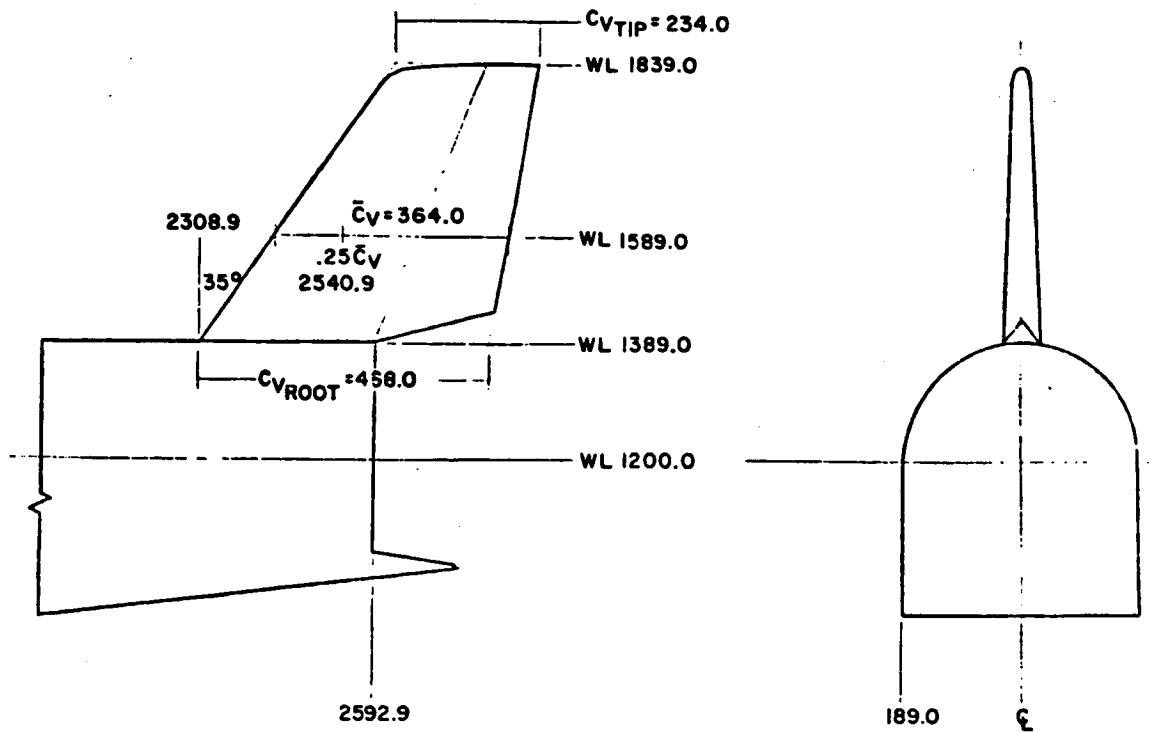
HORIZONTAL TAIL ELEVATOR (T_8)
FIGURE 18. (Cont.)

MODEL DESCRIPTION - Continued

Dimensional Data - Continued

Straight Wing Booster - Continued

STRAIGHT WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1051 C-1- 529



VERTICAL TAIL V₆
 FIGURE 19.

STRAIGHT WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1051 C-1-530

LOS ANGELES DIVISION
NORTH AMERICAN ROCKWELL CORPORATION

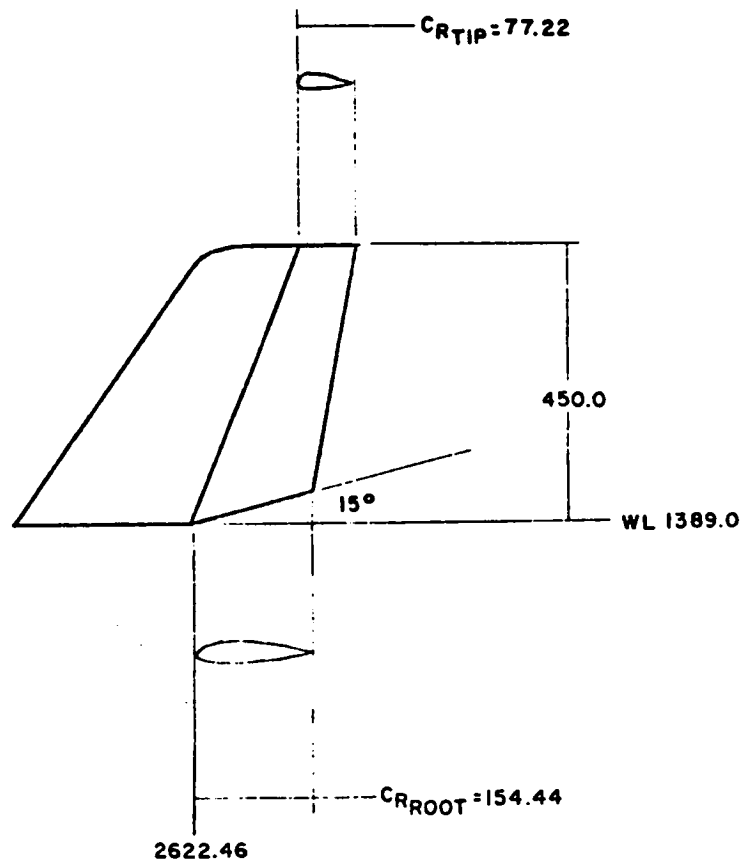
NA-70-435
10-9-70

10-23-70 Revision

MODEL DESCRIPTION - Continued

Dimensional Data - Continued

Straight Wing Booster - Continued



VERTICAL TAIL RUDDER (V₆)
FIGURE 19. (Cont.)

STRAIGHT WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1075 C-1- 534

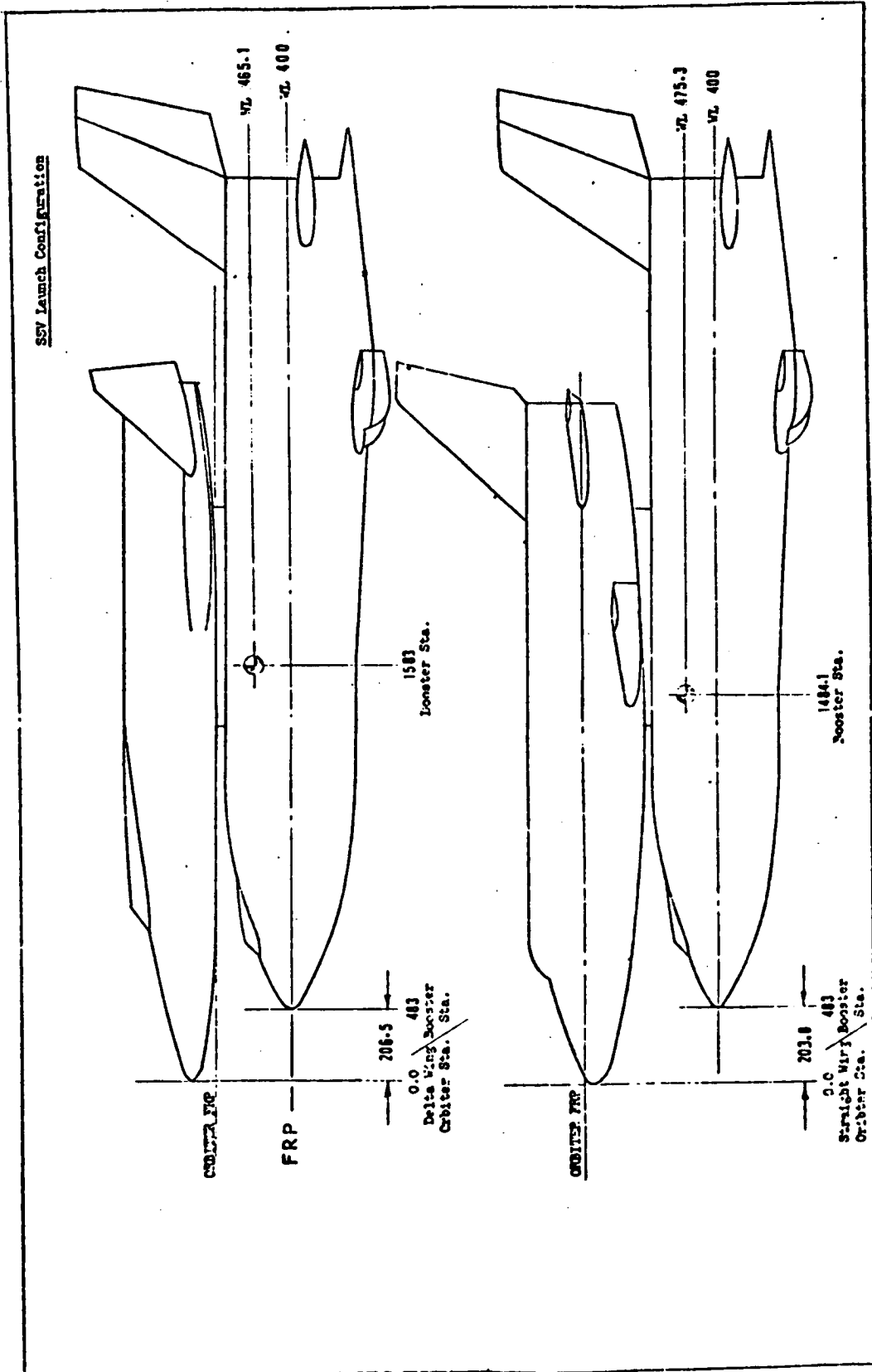


FIGURE B. LAUNCH CONFIGURATIONS, GENERAL ARRANGEMENT

X_{c.g.} = 2162.8 in (16.437 M.S.)
 Z_{c.g.} = 400.0 in (3.040 M.S.)

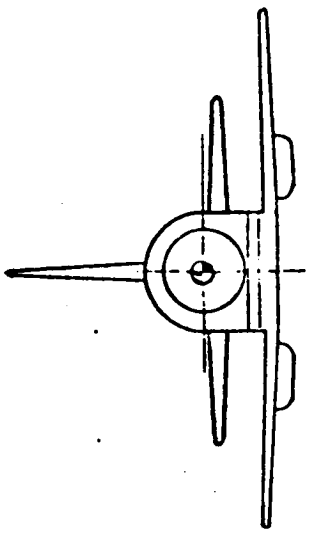
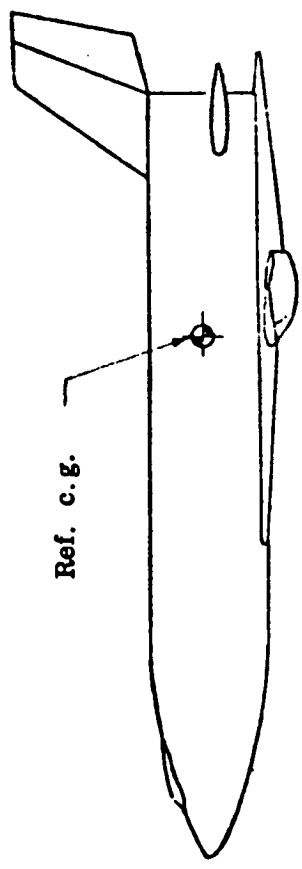
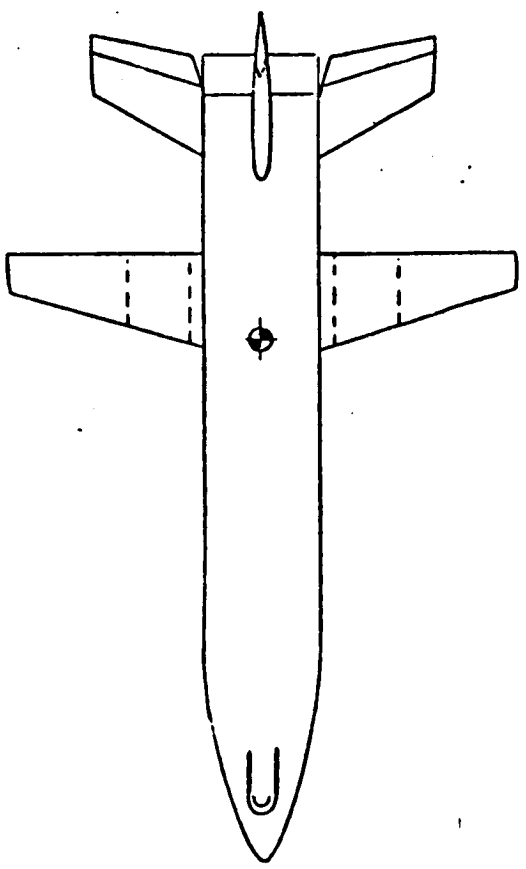


FIGURE C. - GENERAL ARRANGEMENT, BOOSTER

STRAIGHT WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1075 C-1- 535

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STRAIGHT WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1075 C-1- 536

$X_{c.g.} = 1422.5 \text{ in (10.854 M.S.)}$

$Z_{c.g.} = 130.0 \text{ in (0.992 M.S.)}$

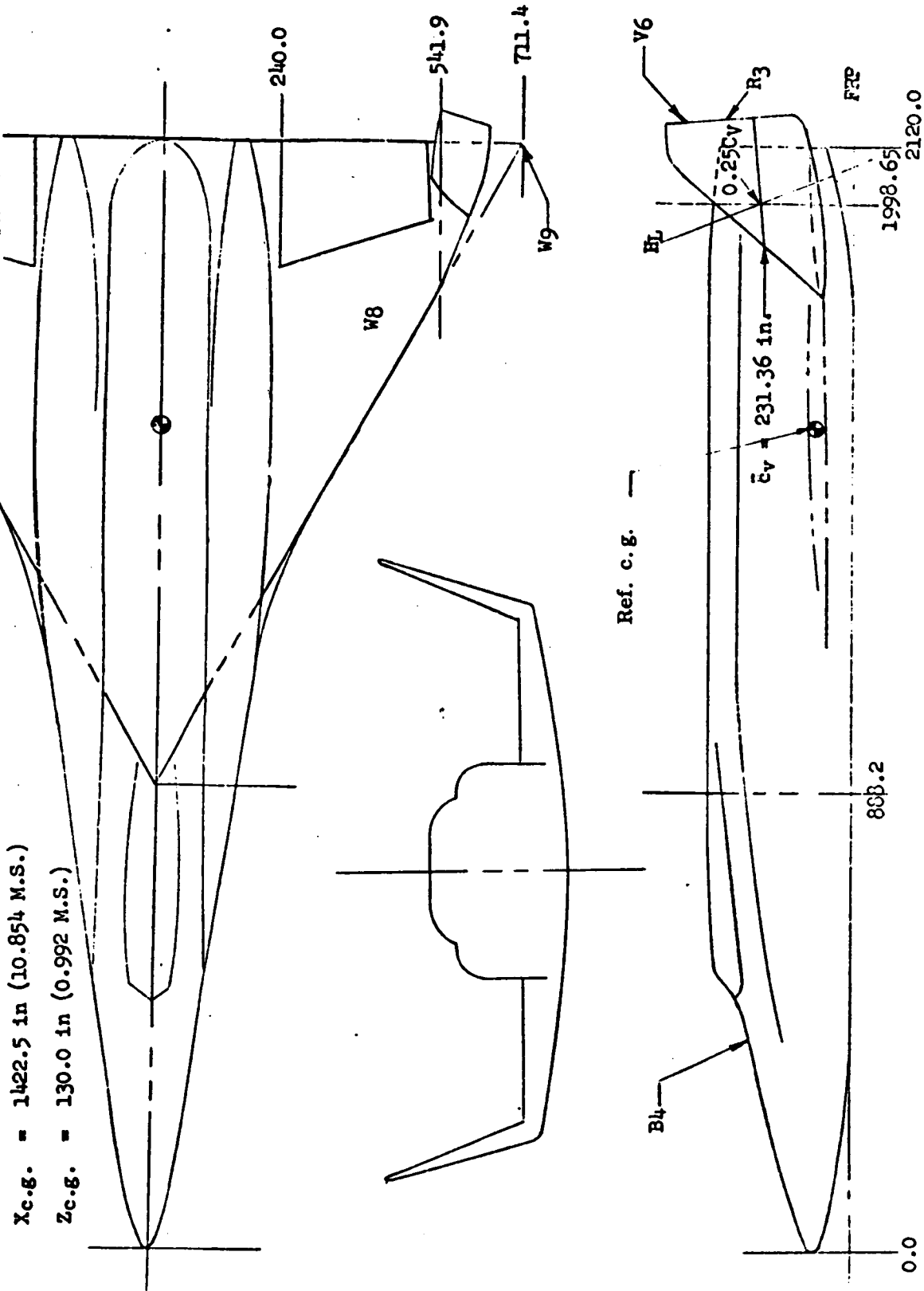
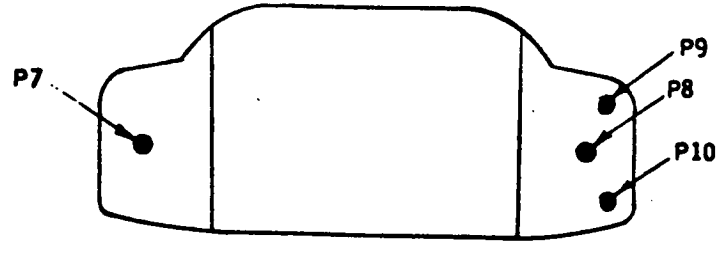
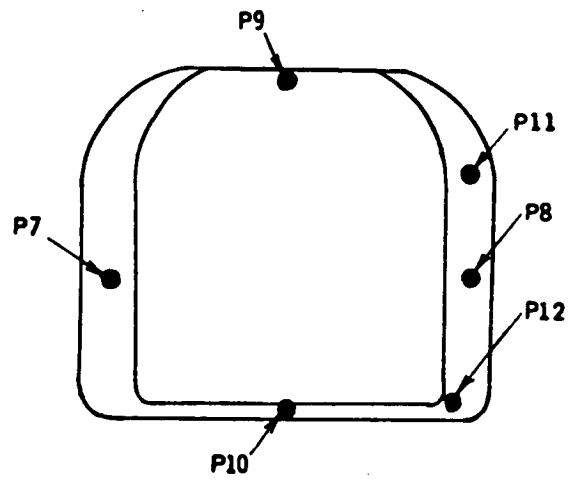


FIGURE D.- ORBITER (NO. 1) GENERAL ARRANGEMENT

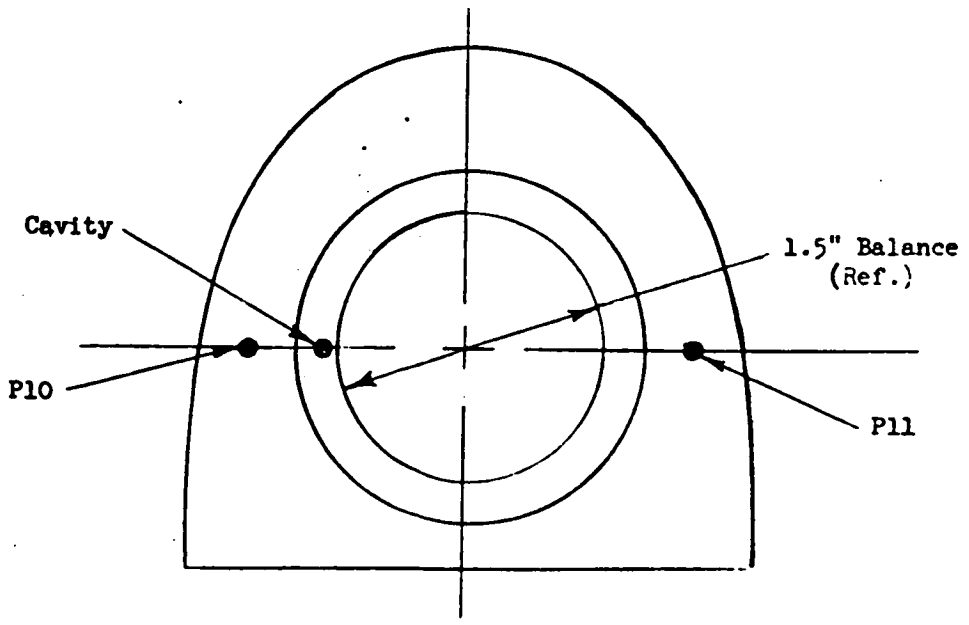
STRAIGHT WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1075 C-1- 537



Delta Wing Orbiter



Straight Wing Orbiter



Booster

FIGURE F. BASE PRESSURE ORIFICE LOCATIONS

STRAIGHT WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1075 C-1- 538

$X_{c.g.} = 1293 \text{ in. (9.840 M.S.)}$
 $Y_{c.g.} = 50.5 \text{ in. (-0.384 M.S.)}$

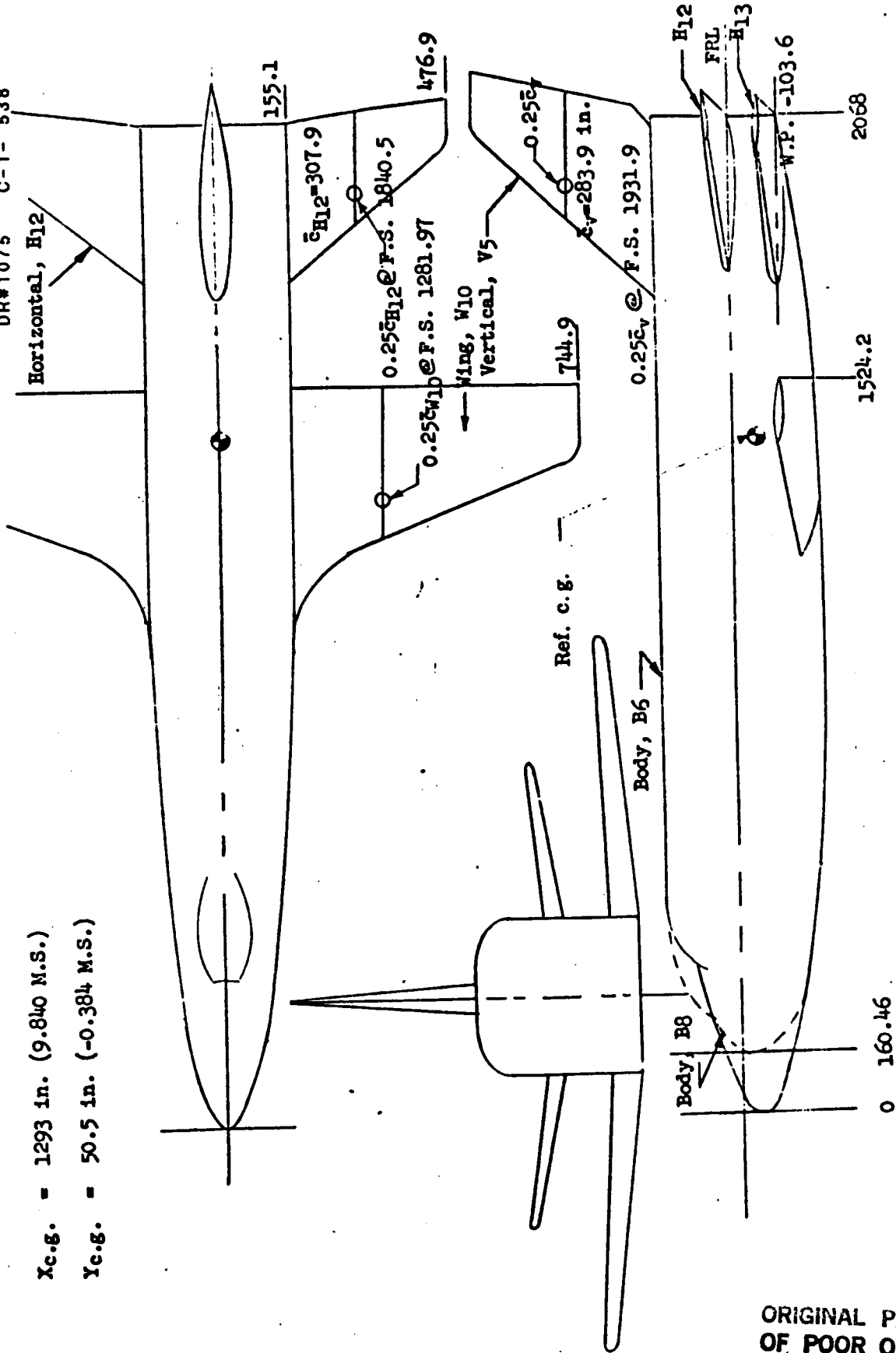


FIGURE E.- ORBITER (NO. 2) GENERAL ARRANGEMENT

632

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C-3

STRAIGHT WING BOOSTER
MSC
STRAIGHT WING ORBITER
MSC
DR#1042 C-1- 540

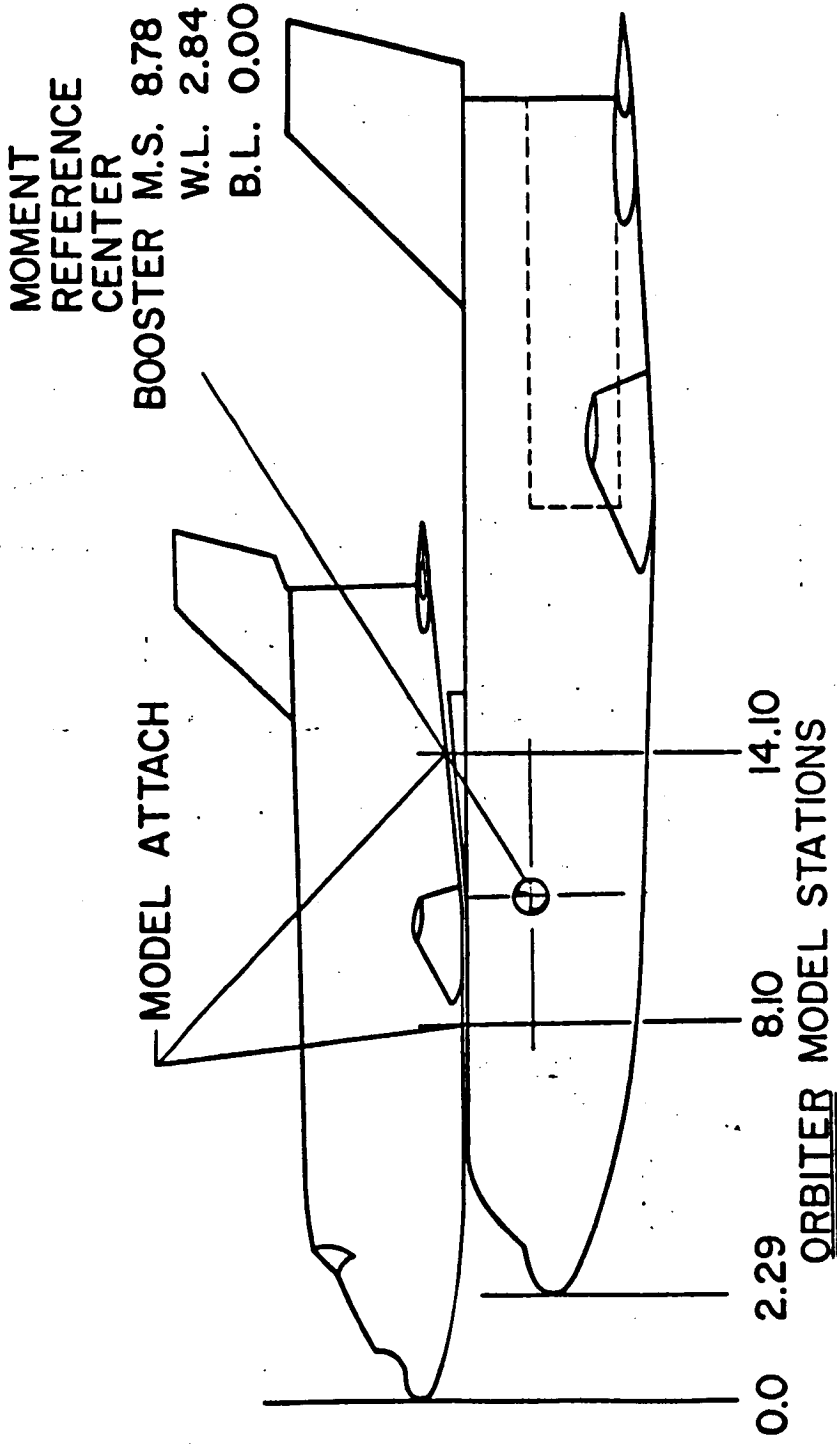
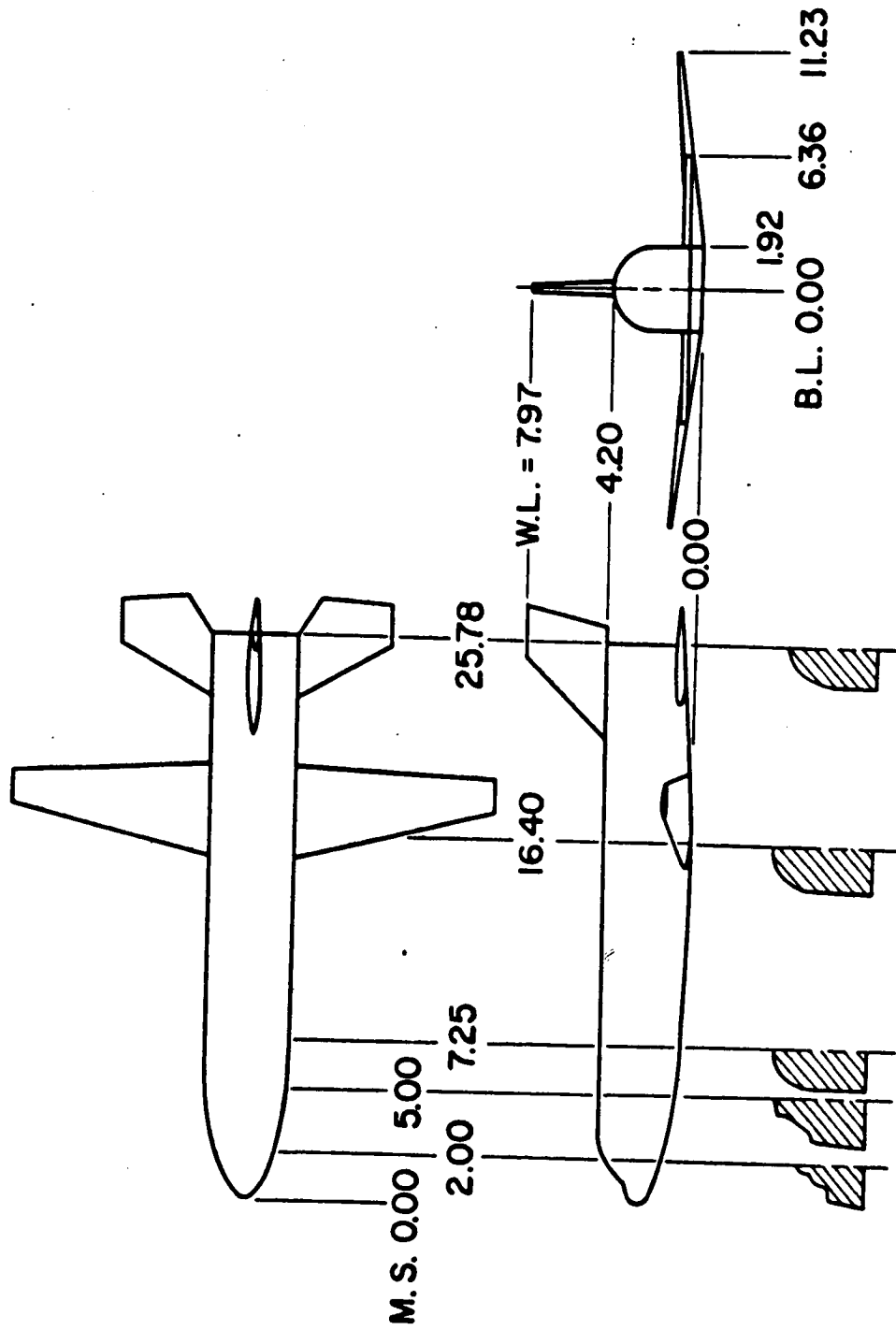


Figure 2. Sketch of MSC Launch Configuration Model

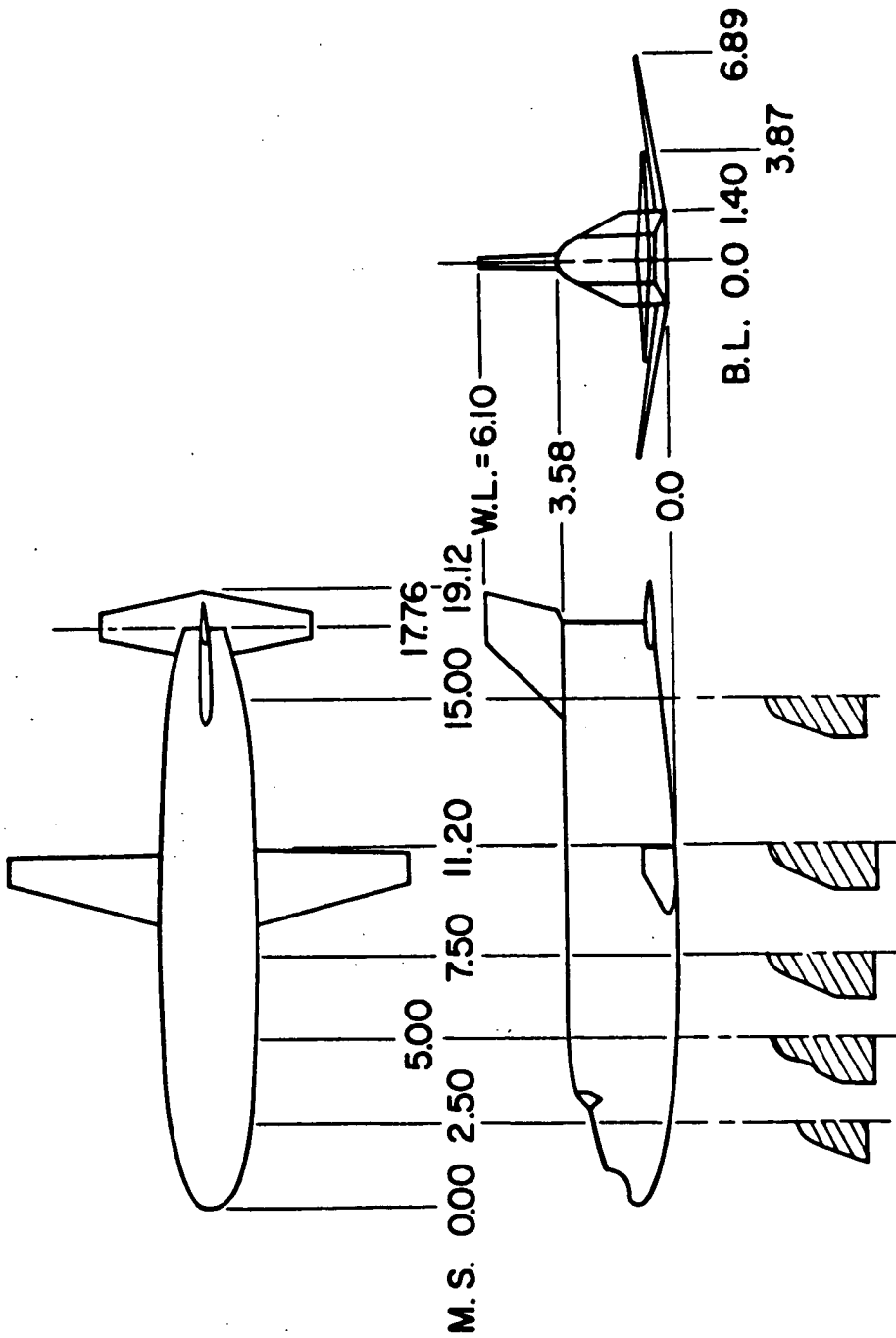


ALL DIMENSIONS IN INCHES

Figure 3. Plan, Elevation and End View of MSC Booster Model

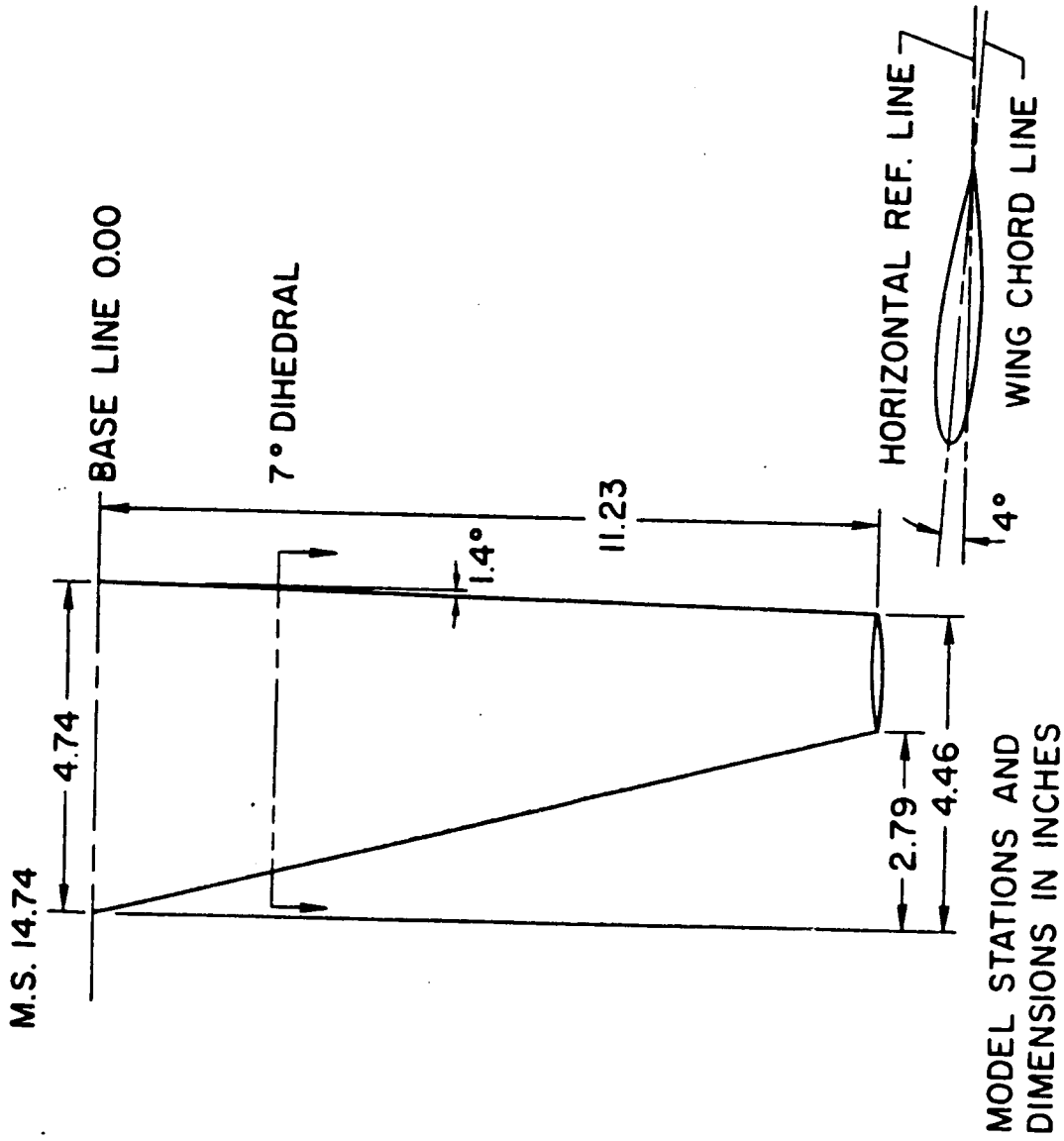
STRAIGHT WING BOOSTER
 MSC
 STRAIGHT WING ORBITER
 MSC
 DR#1042 C-1- 541

STRAIGHT WING BOOSTER
 MSC
 STRAIGHT WING ORBITER
 MSC
 DR#1042 C-1- 542



ALL DIMENSIONS IN INCHES

Figure 4. Plan, Elevation and End View of MSC Orbiter Model

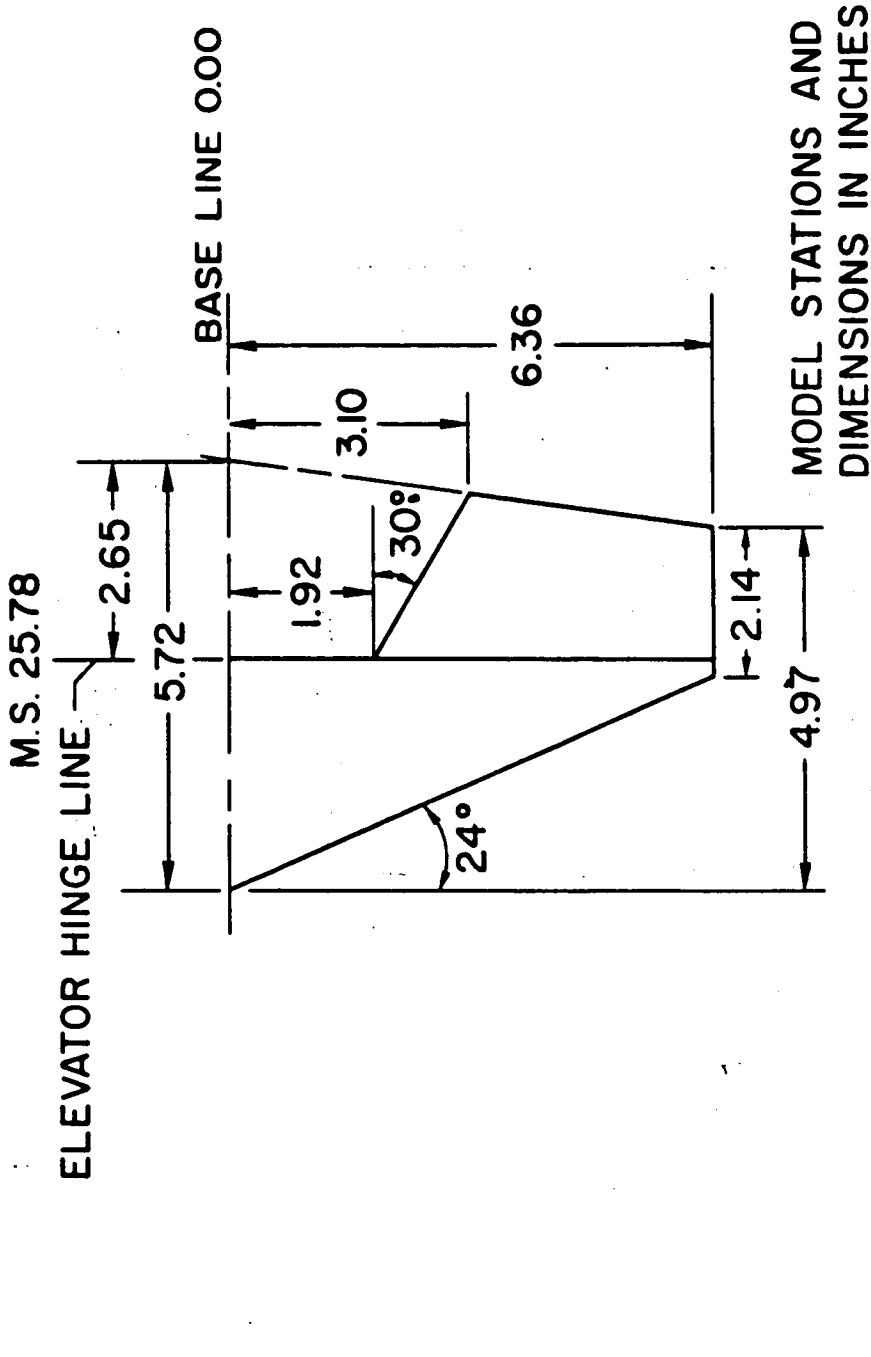


(a) Wing, W_{B1}

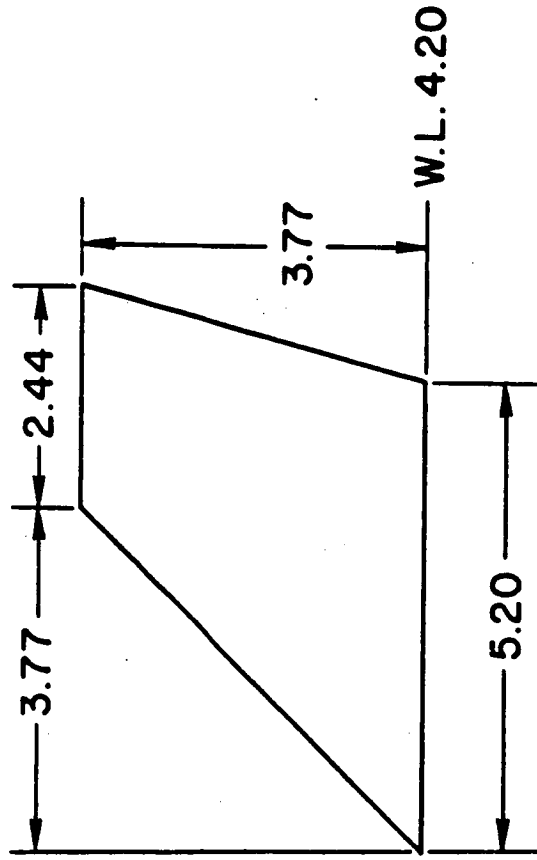
Figure 5. Sketches of Wing, Horizontal and Vertical Stabilizers for the Booster Model

STRAIGHT WING BOOSTER
MSC
STRAIGHT WING ORBITER
MSC
DR#1042 C-1- 543

STRAIGHT WING BOOSTER
MSC
STRAIGHT WING ORBITER
MSC
DR#1042 C-1- 544



(b) Horizontal stabilizer, H_{B1}
Figure 5.- Continued.



M.S. 21.28

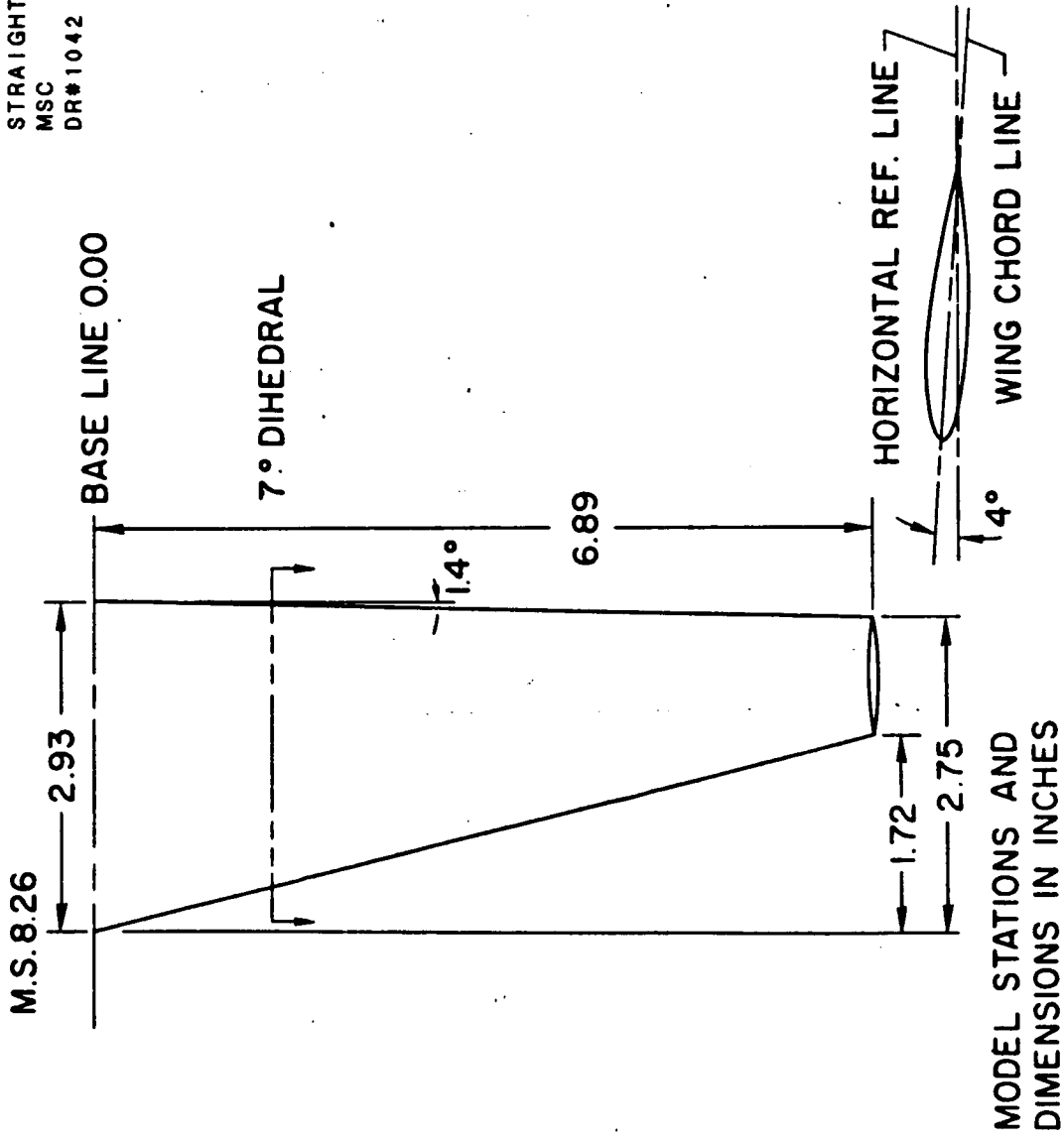
MODEL STATIONS AND
DIMENSIONS IN INCHES

(c) Vertical stabilizer, V_{B1}

Figure 5.- Concluded.

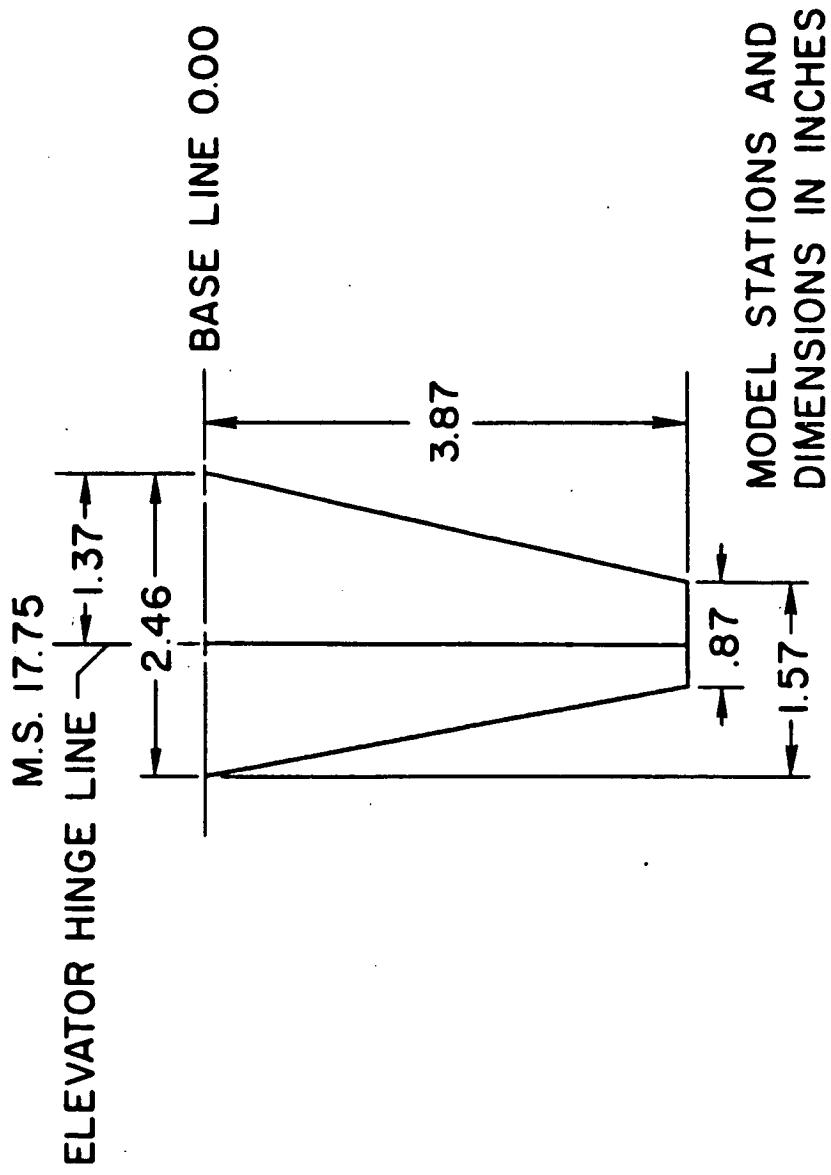
STRAIGHT WING BOOSTER
MSC
STRAIGHT WING ORBITER
MSC
DR#1042 C-1- 545

STRAIGHT WING BOOSTER
 MSC
 STRAIGHT WING ORBITER
 MSC
 DR#1042 C-1- 546



(a) Wing, W_6

Figure 6. Sketches of Wing, Horizontal and Vertical Stabilizers for the Orbiter Model

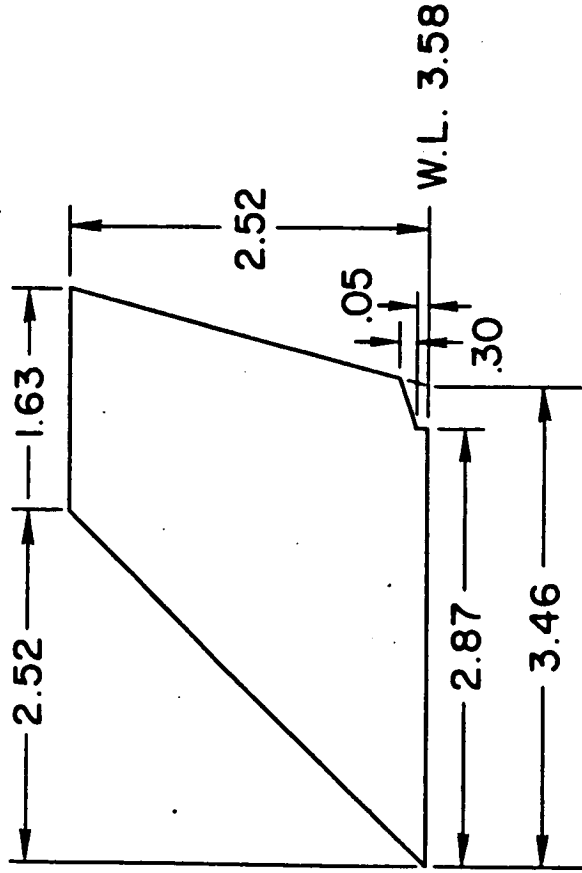
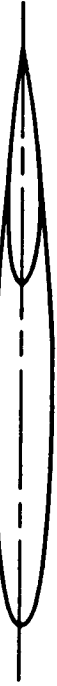


(b) Horizontal stabilizer, H₁₄

Figure 6.- Continued.

STRAIGHT WING BOOSTER
 MSC
 STRAIGHT WING ORBITER
 MSC
 DR#1042 C-1- 547

STRAIGHT WING BOOSTER
MSC
STRAIGHT WING ORBITER
MSC
DR#1042 C-1- 548



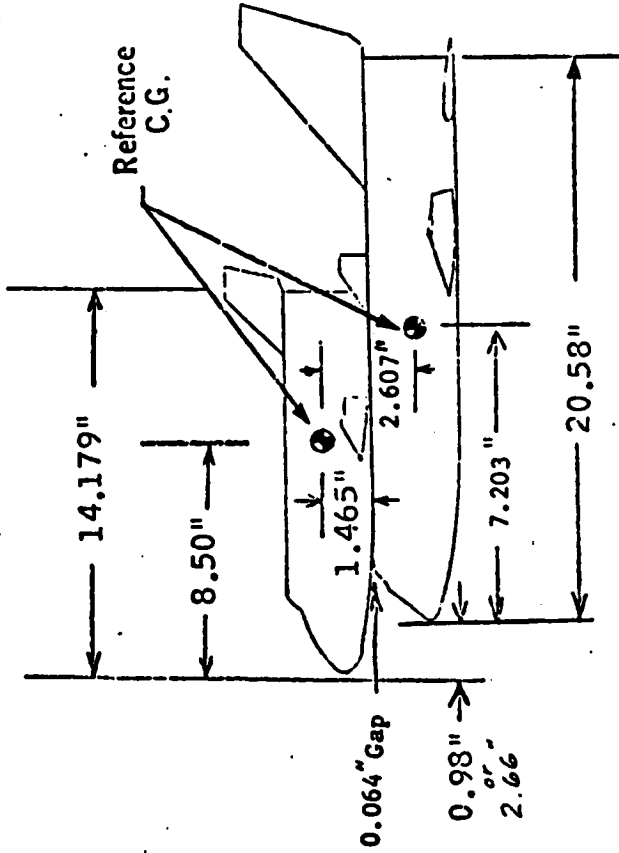
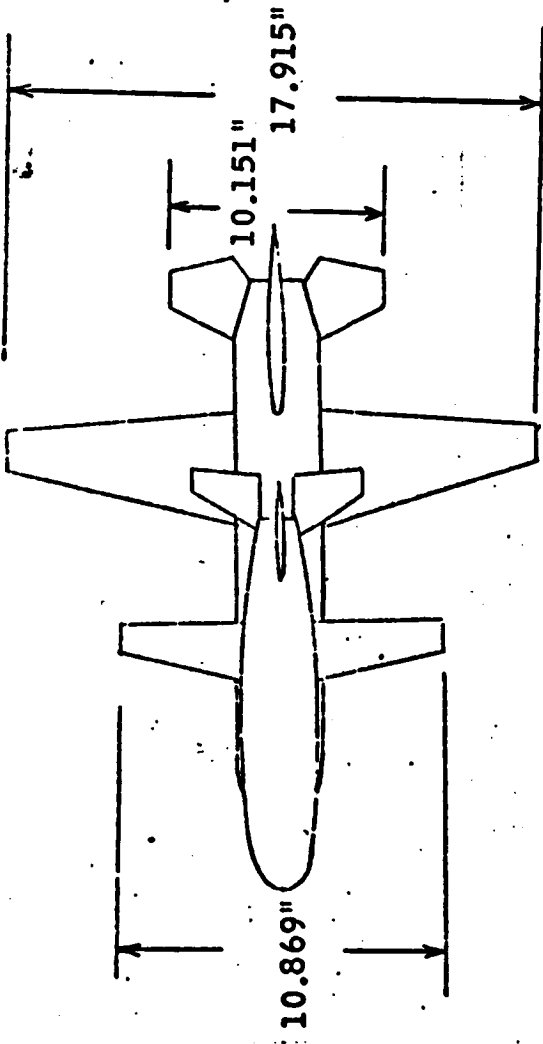
M.S. 14.87

MODEL STATIONS AND
DIMENSIONS IN INCHES

(c) Vertical stabilizer, V₅

Figure 6.- Concluded.

STRAIGHT WING BOOSTER
 MSC
 STRAIGHT WING ORBITER
 MSC
 DR#1063 C-1- 550



REFERENCE LENGTHS AND AREA

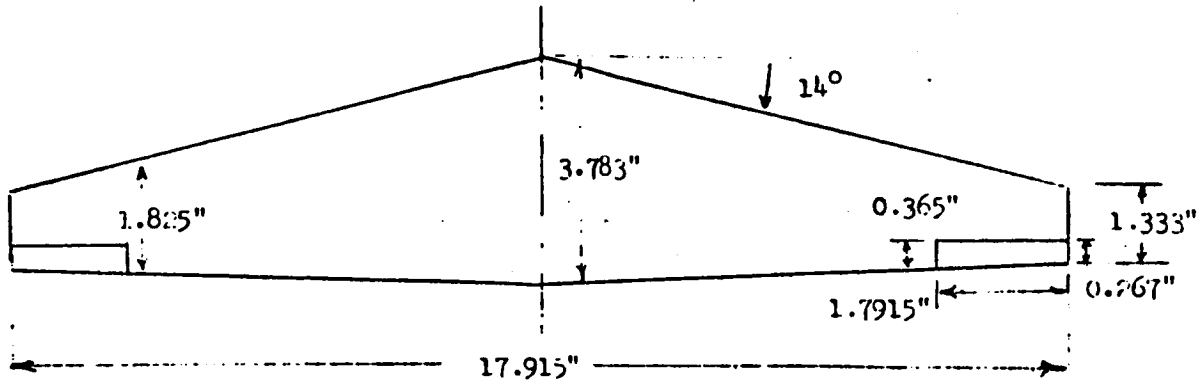
	ORBITER	BOOSTER and LAUNCH CONFIGURATION
S	16.956 in ²	45.827 in ²
b	10.869 in	17.915 in
\bar{c}	1.679 in	2.754 in

a) Straight Wing Orbiter Mated to the Straight Wing Booster

Figure 4. - Straight Wing Booster Launch Configuration

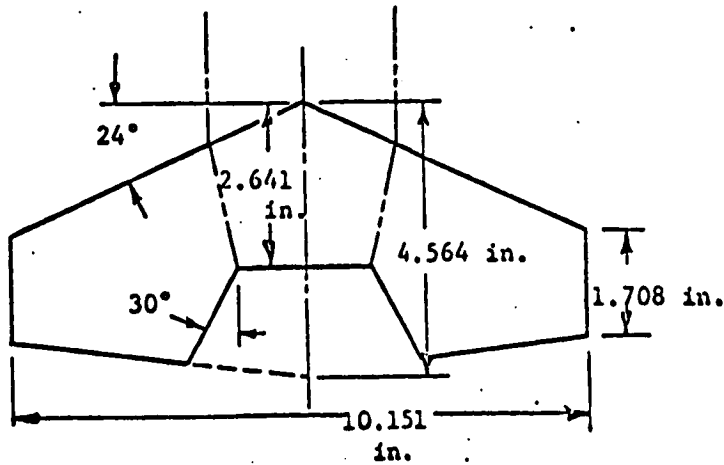
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BOOSTER TRAPEZOIDAL PLANFORM WING (W_{B1})



STRAIGHT WING BOOSTER
MSC
STRAIGHT WING ORBITER
MSC
DR#1063 C-1- 551

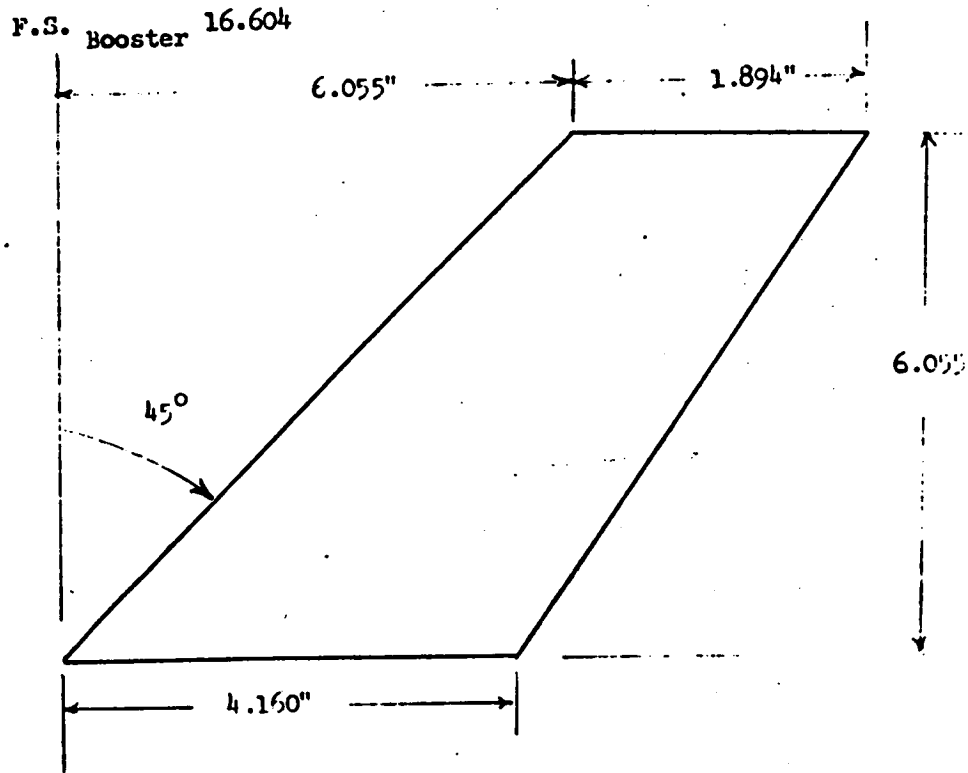
BOOSTER HORIZONTAL TAIL (H_{B1})



0064 Airfoil, $t/c = 12\%$

FIGURE 5. BOOSTER TRAPEZOIDAL PLANFORM WING (W_{B1})
AND HORIZONTAL TAIL (H_{B1})

STRAIGHT WING BOOSTER
 MSC
 STRAIGHT WING ORBITER
 MSC
 DR#1063 C-1- 552



Tail Parameters:

Aspect Ratio = 2.0
 Taper Ratio = 0.455
 Airfoil - 0012-64

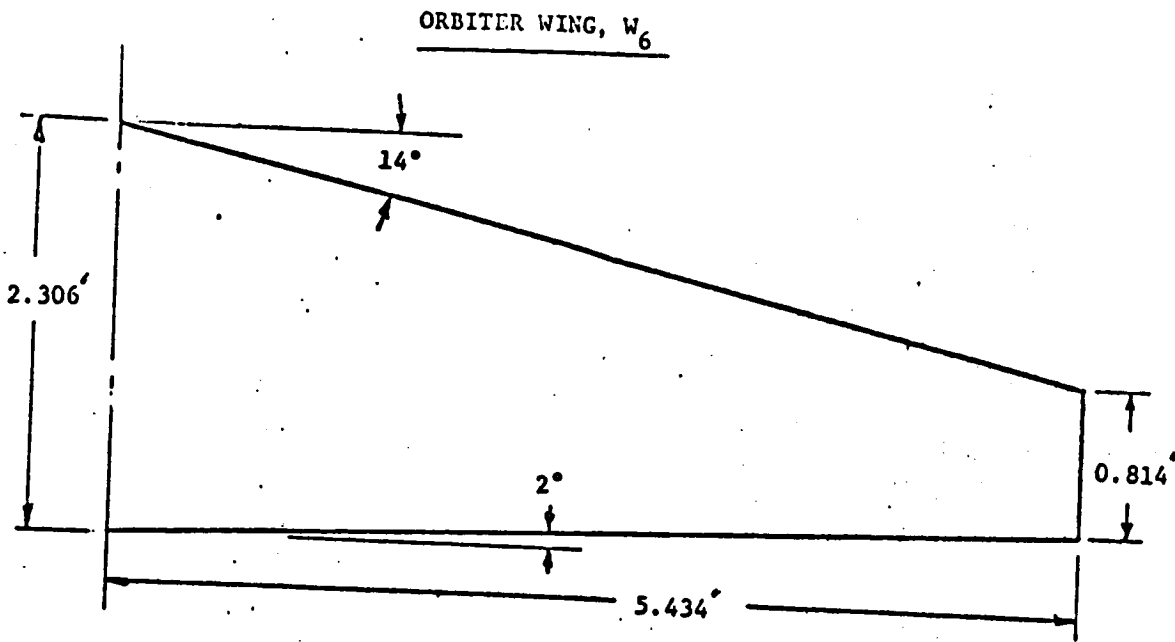
Full Scale:

Area = 1988.75 ft.²
 Span = 63.073 ft.

Model Scale:

Area = 18.3284 in.²
 Span = 6.055 ft.

Figure 6. - Booster vertical stabilizer, V_{B7}.



STRAIGHT WING BOOSTER
MSC
STRAIGHT WING ORBITER
MSC
DR#1063 C-1- 553

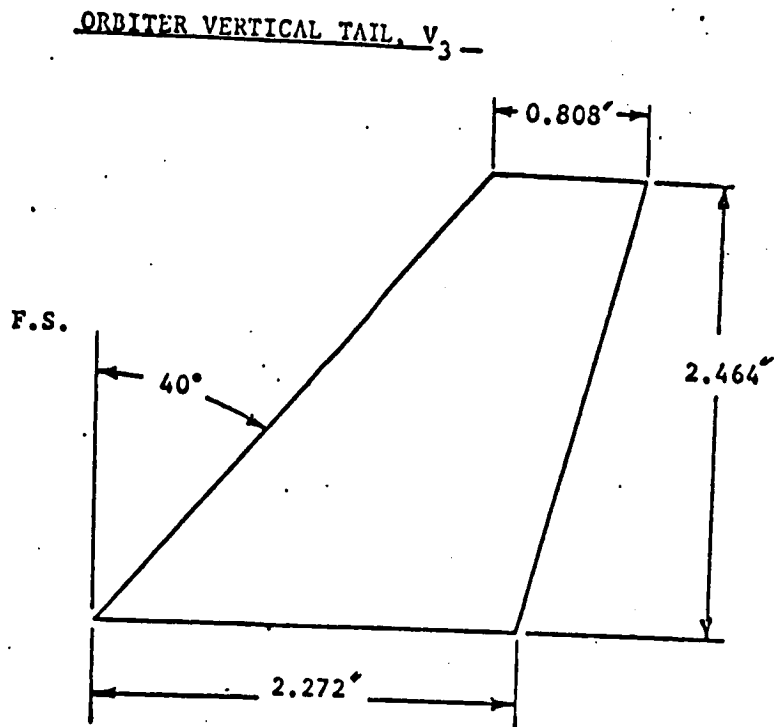


FIGURE 7. ORBITER TRAPEZOIDAL PLANFORM WING (W_6) AND VERTICAL TAIL (V_3)

STRAIGHT WING BOOSTER
MSC
STRAIGHT WING ORBITER
MSC
DR#1063 C-1- 554

ORBITER HORIZONTAL TAIL, H₁₃

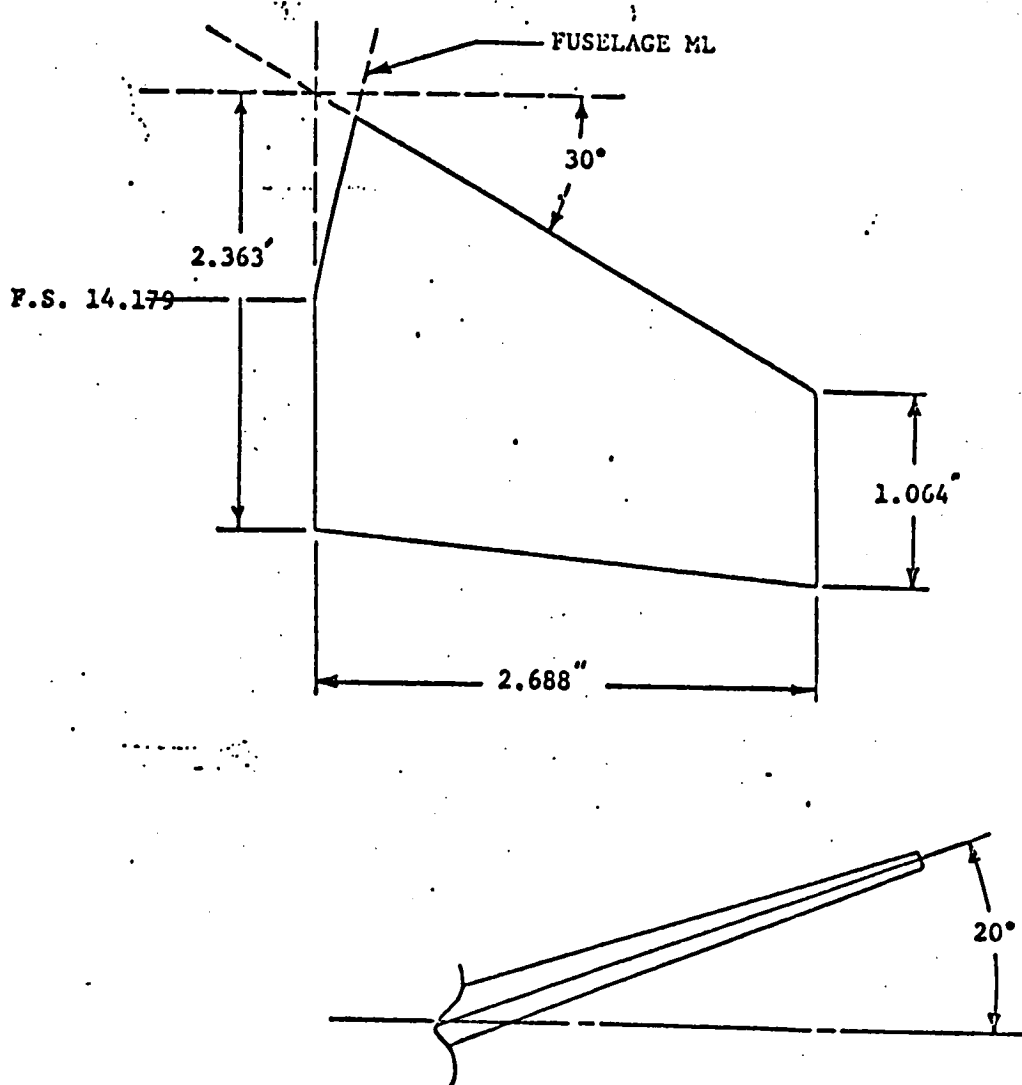


FIGURE 8. ORBITER HORIZONTAL TAIL

TEST AMES 66-546 DATA SET/RUN NUMBER

COLLATION SUMMARY
 BOOSTER ALONE DATA AT HIGH ANGLES OF ATTACK IN THE AMES
 6- by 6-Foot Supersonic Wind Tunnel

PRETEST
 POSTTEST

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DATA SET IDENTIFIER	CONFIGURATION	SCHD.		PARAMETERS/VALUES	NO. of RUNS	MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE)							TEST RUN NUMBERS
		a	B			.25	.6	.9	1.2	1.5	2.0		
RAWB13	B2W3H3V2	E	0		6	71	70	69	68	67	66		
RAWB14	B2W3H3V2	E	0		3		74	73	72				
RAWB15	B2W3	E	0		6	75	80	79	78	77	76		
RAWB16	B2W3H3V2	F	64		6	86	85	84	83	82	81		
RAWB17	B2W3H3V2	C	0		5		59	58	57	56	55		
RAWB18	B2W3H3V2	D	0		6	65	64	63	62	61	60		

C.L. IC.D.P. IC.I.M. IC.Y. IC.S.I. IC.D.R. IC.A.P. IC.N. 7 13 19 25 31 37 43 49 55 61 67 75.76
 COEFFICIENTS: IC.D.P. IC.I.M. IC.Y. IC.S.I. IC.D.R. IC.A.P. IC.N. IDPVAR(1) IDPVAR(2) IDV
 a E = 44, 48, 52, 56, 60, 64, 68, 72
 b or B F = -4, -2, 0, 2, 4, 6, 8, 10
 SCHEDULES BC = -5, 0, 5, 10
 NASA-MSFC-MAF

STRAIGHT WING BOOSTER
 TBC
 UNIQUE CONFIGS. ORBITER
 GAC
 DR#1122 C-1- 557

STRAIGHT WING BOOSTER
 TBC
 UNIQUE CONFIGS. ORBITER
 GAC
 DR#1122 C-1- 558

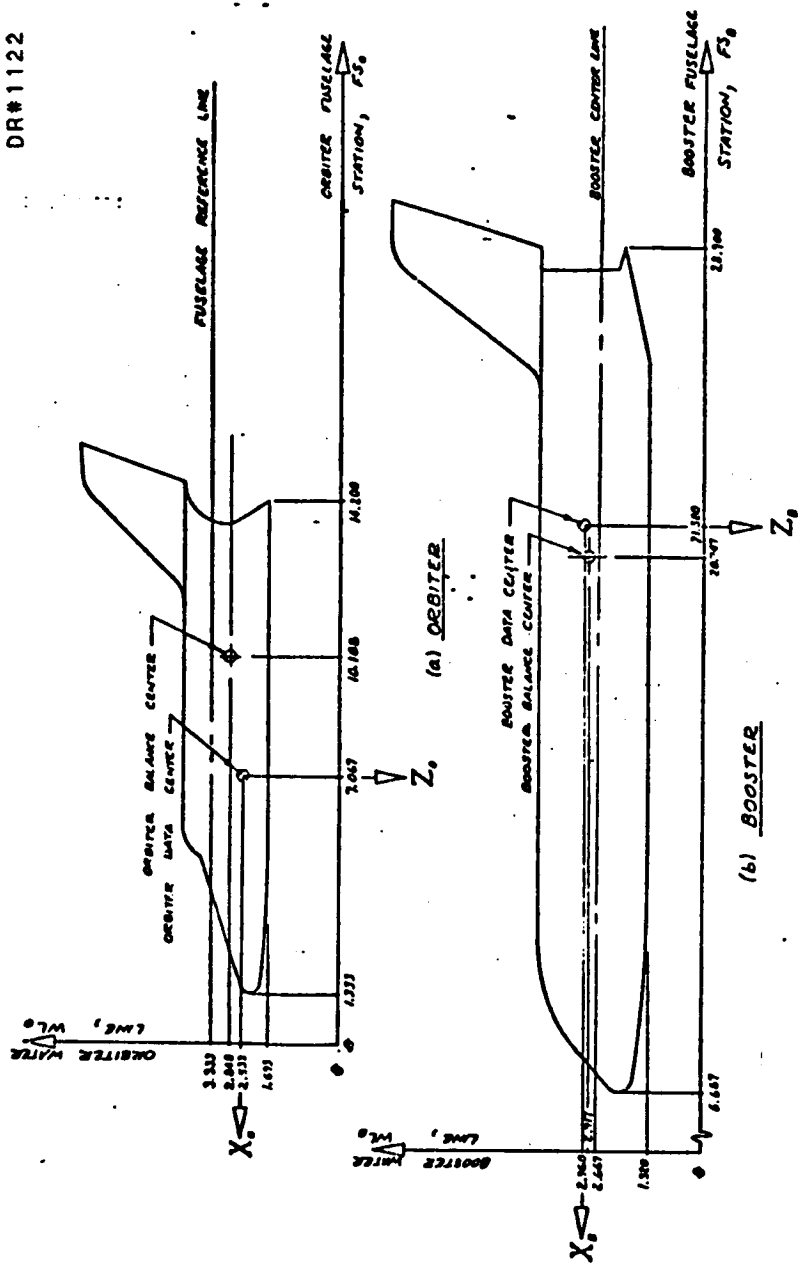
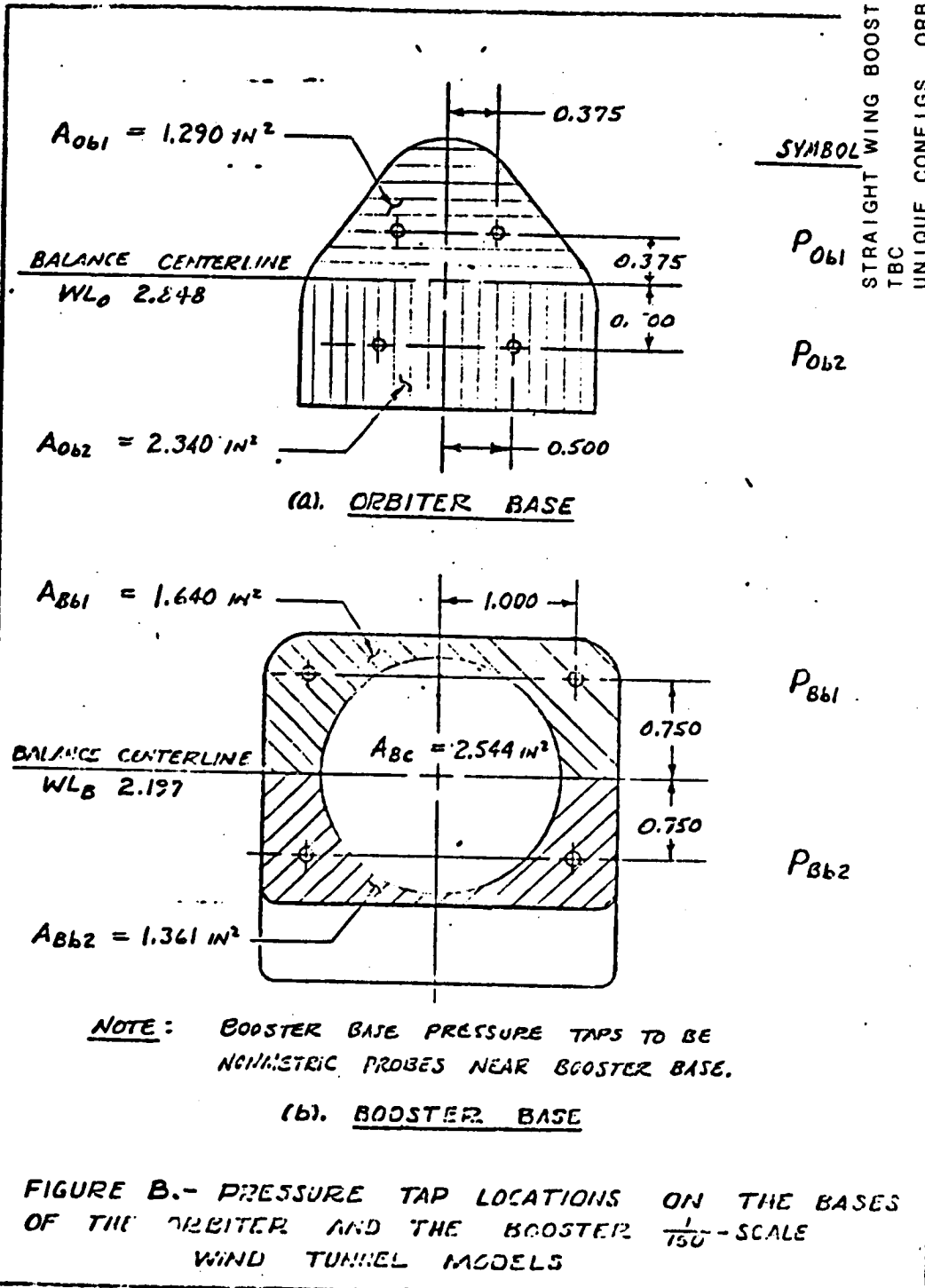


FIGURE A. ILLUSTRATION OF ORBITER AND BOOSTER $\frac{1}{50}$ -SCALE WIND TUNNEL MODELS (ALL DIMENSIONS ARE MODEL SCALE)

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OF POOR QUALITY

SYMBOL
STRAIGHT WING BOOSTER
TBC
UNIQUE CONFIGS. ORBITER
GAC
DR#1122 C-1-559



STRAIGHT WING BOOSTER
TBC
UNIQUE CONFIGS. ORBITER
GAC
DR#1122 C-1- 560

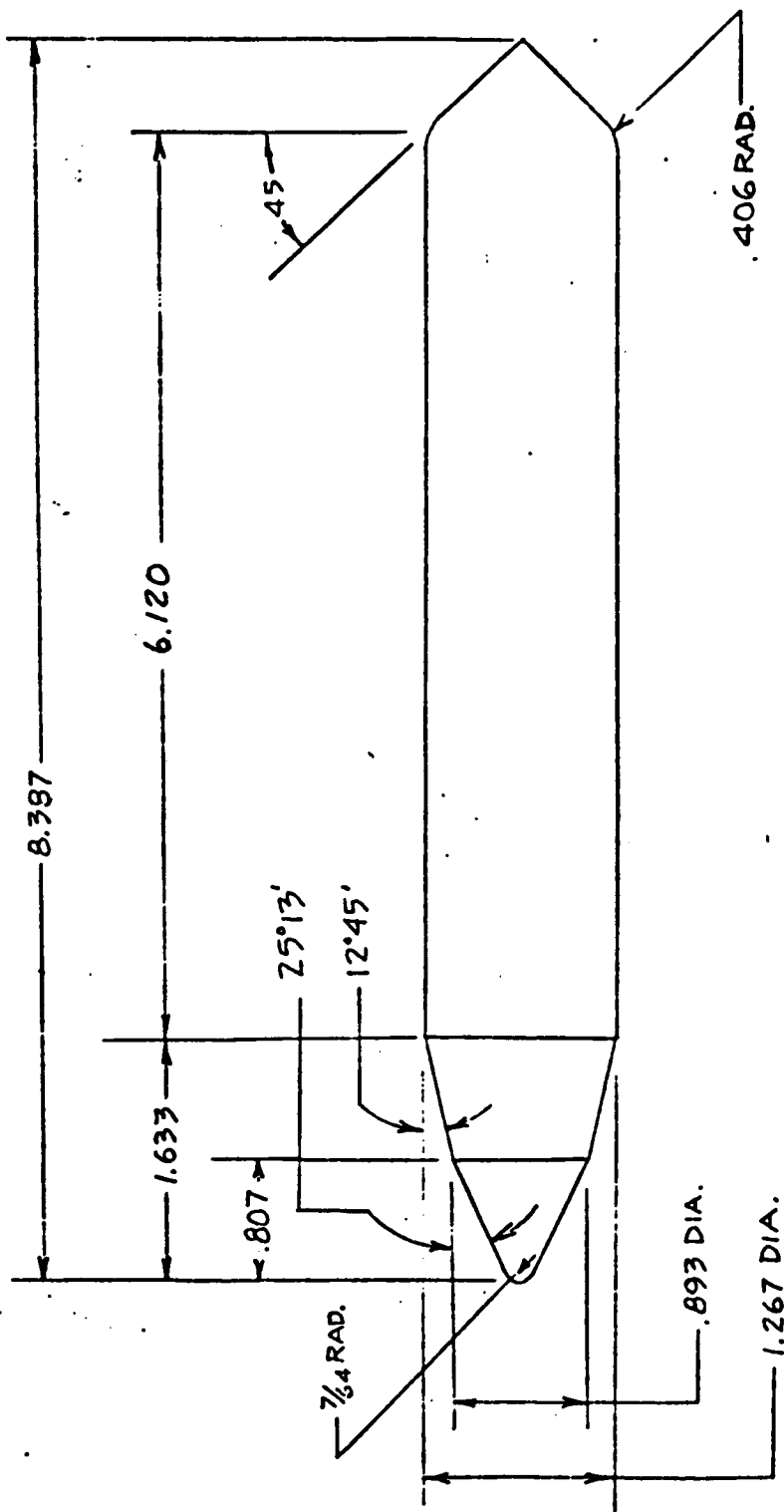


Figure C.- I₁ external tanks (1/150 scale).

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NOTE: NUMBERS IN
PARENTHESES ARE MODEL
SCALE, INCHES.

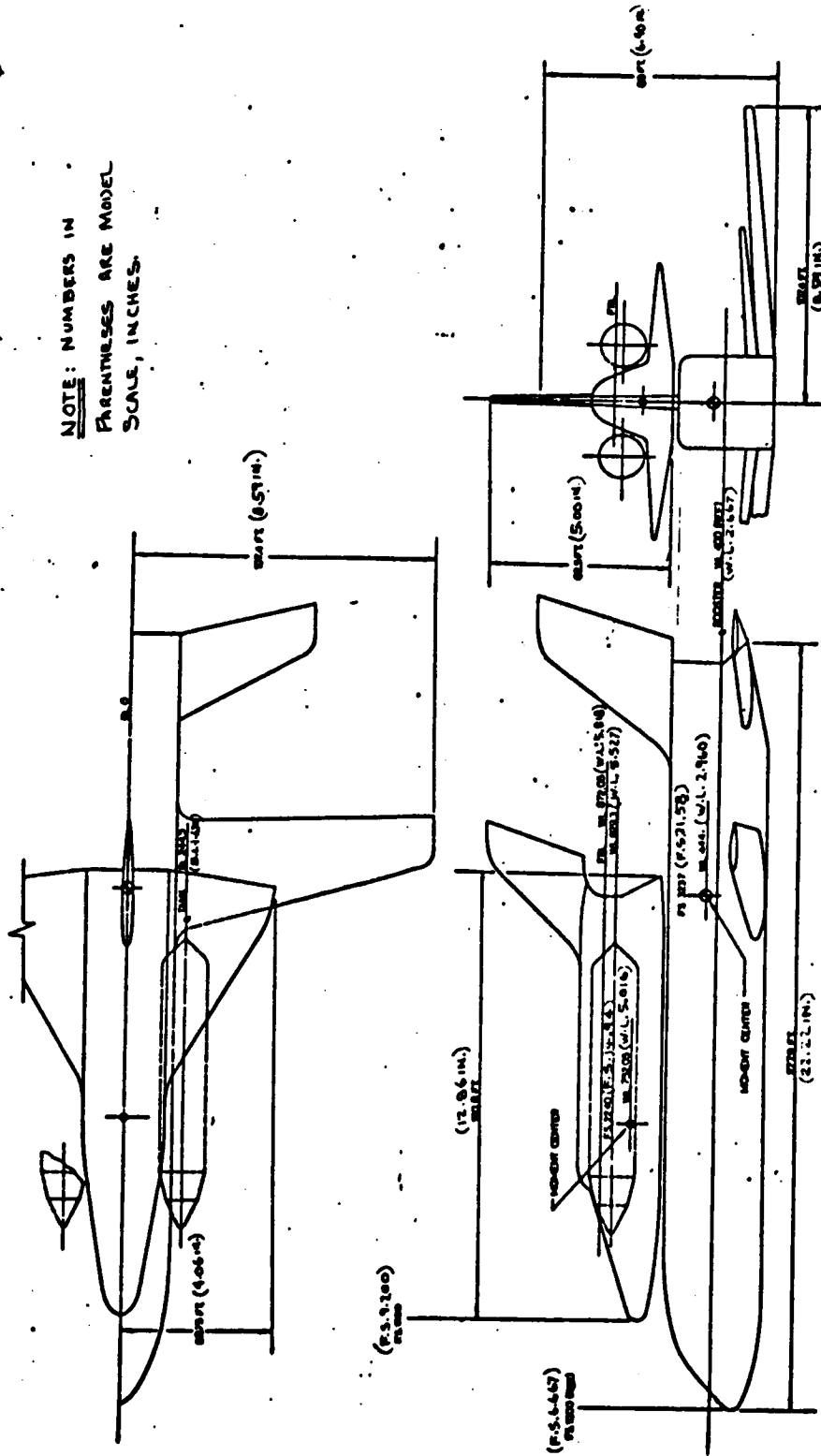
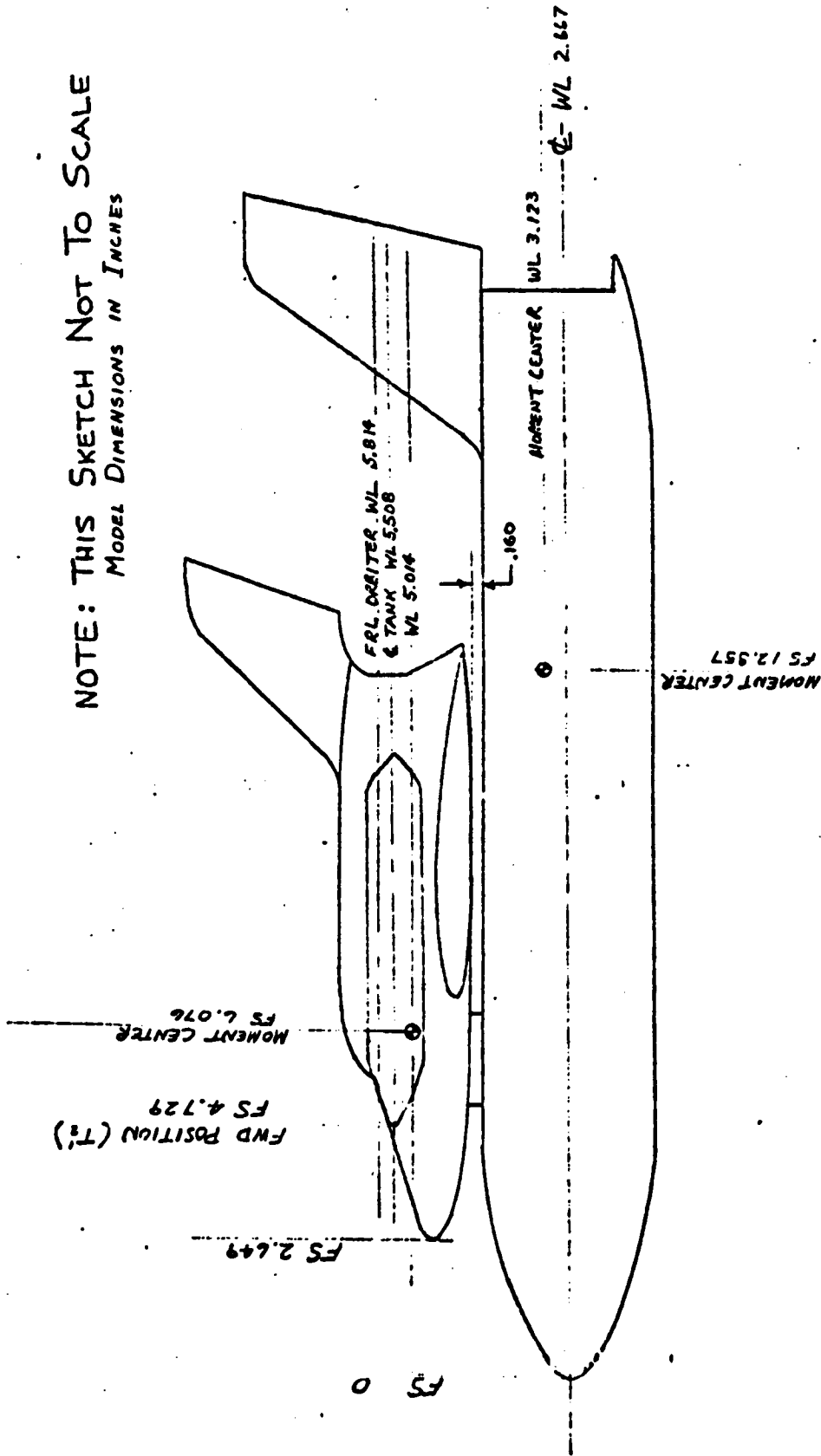


Figure D.- Launch configuration with orbiter mounted in the A₁ position, showing moment center locations.

STRAIGHT WING BOOSTER
TBC
UNIQUE CONFIGS. ORBITER
GAC
DR#1122 C-1- 561

STRAIGHT WING BOOSTER
 TBC
 UNIQUE CONFIGS. ORBITER
 GAC
 DR#1137 C-1- 564

NOTE: THIS SKETCH NOT TO SCALE
 MODEL DIMENSIONS IN INCHES



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 OF POOR QUALITY

FIG. B LAUNCH CONFIGURATION USING BOOSTER REFERENCE SYSTEM

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AX-1202.I-1

MODEL ASSEMBLY
DRAWING 25-56543
MODEL DIMENSIONS IN INCHES

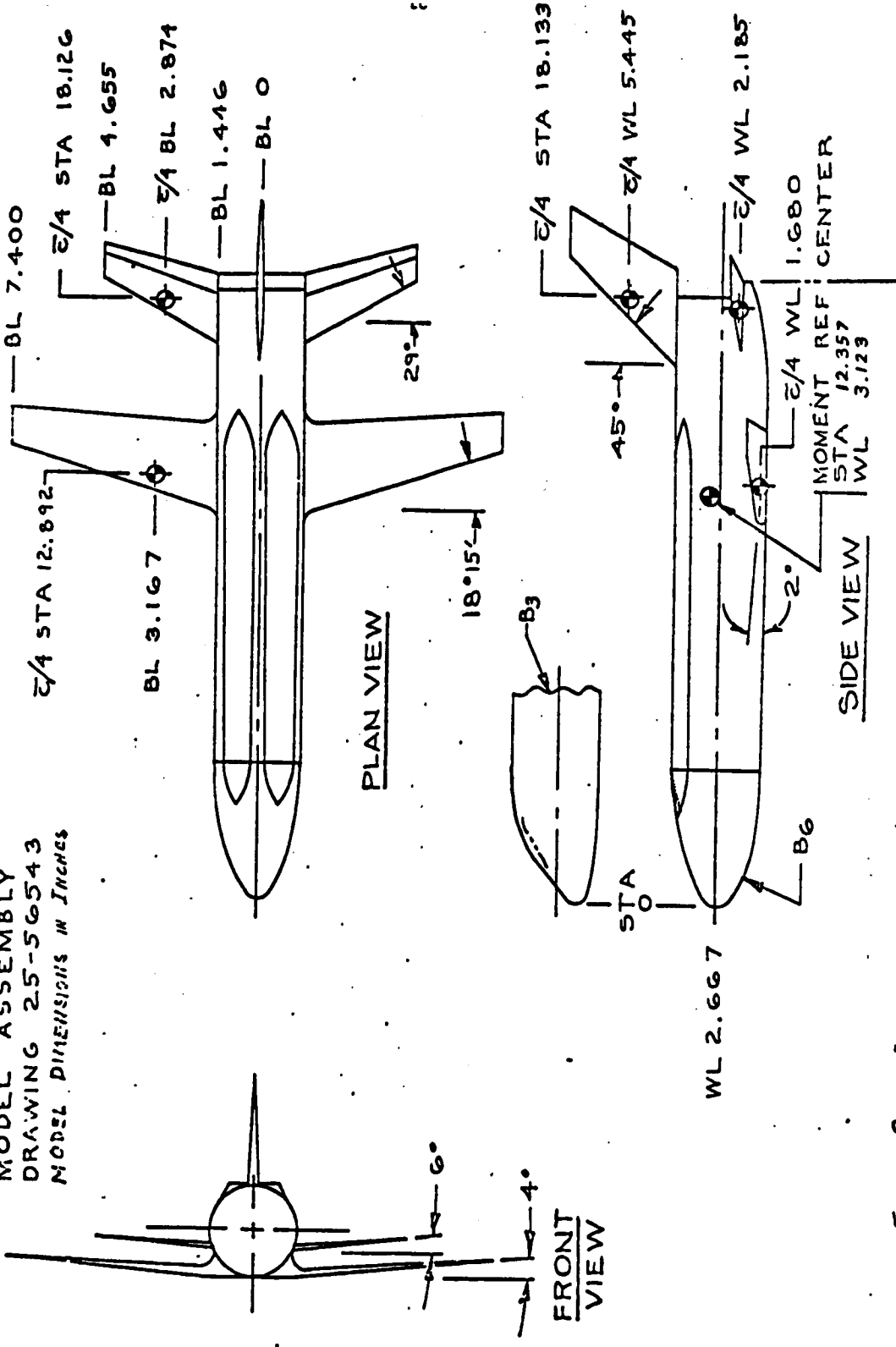
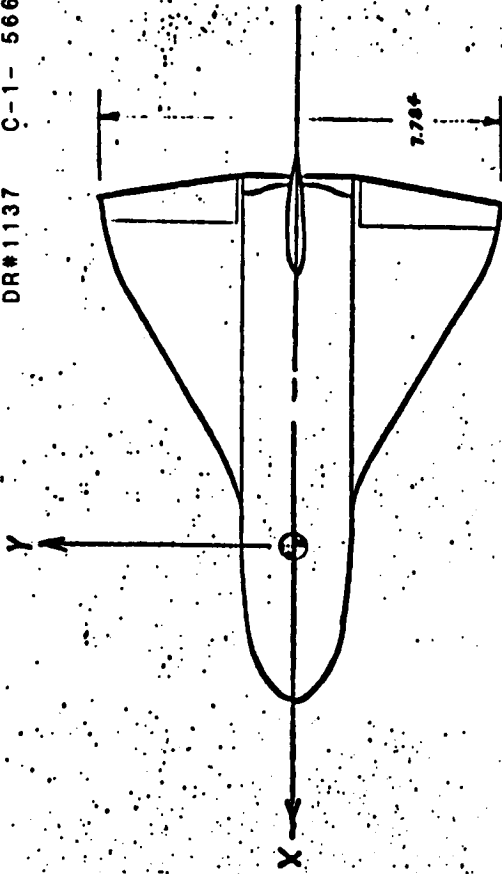


Figure C Illustration of 1/50 Scale Booster

19.020
STRAIGHT WING BOOSTER
TBC
UNIQUE CONFIGS. ORBITER
GAC
DR#1137 C-1- 565

STRAIGHT WING BOOSTER
 TBC
 UNIQUE CONFIGS. ORBITER
 GAC
 DR#1137 C-1- 566



Model dimensions in inches

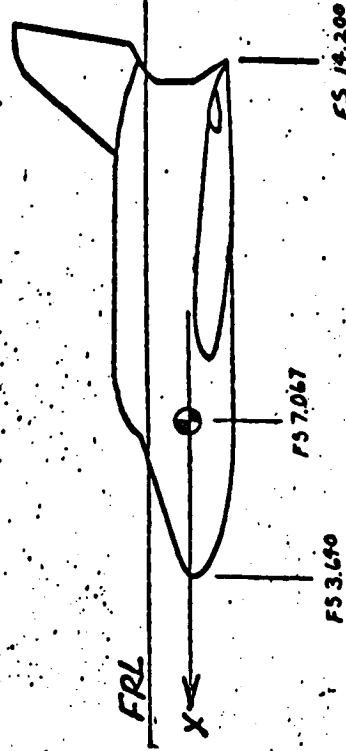
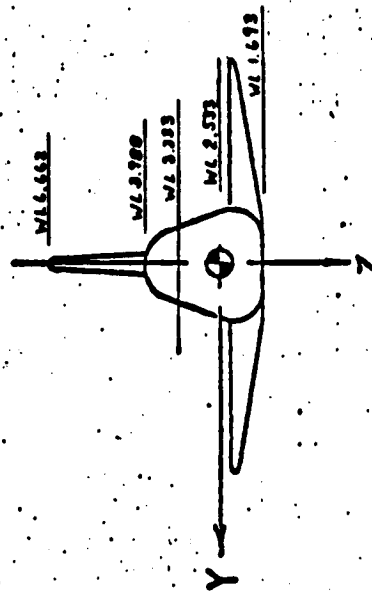
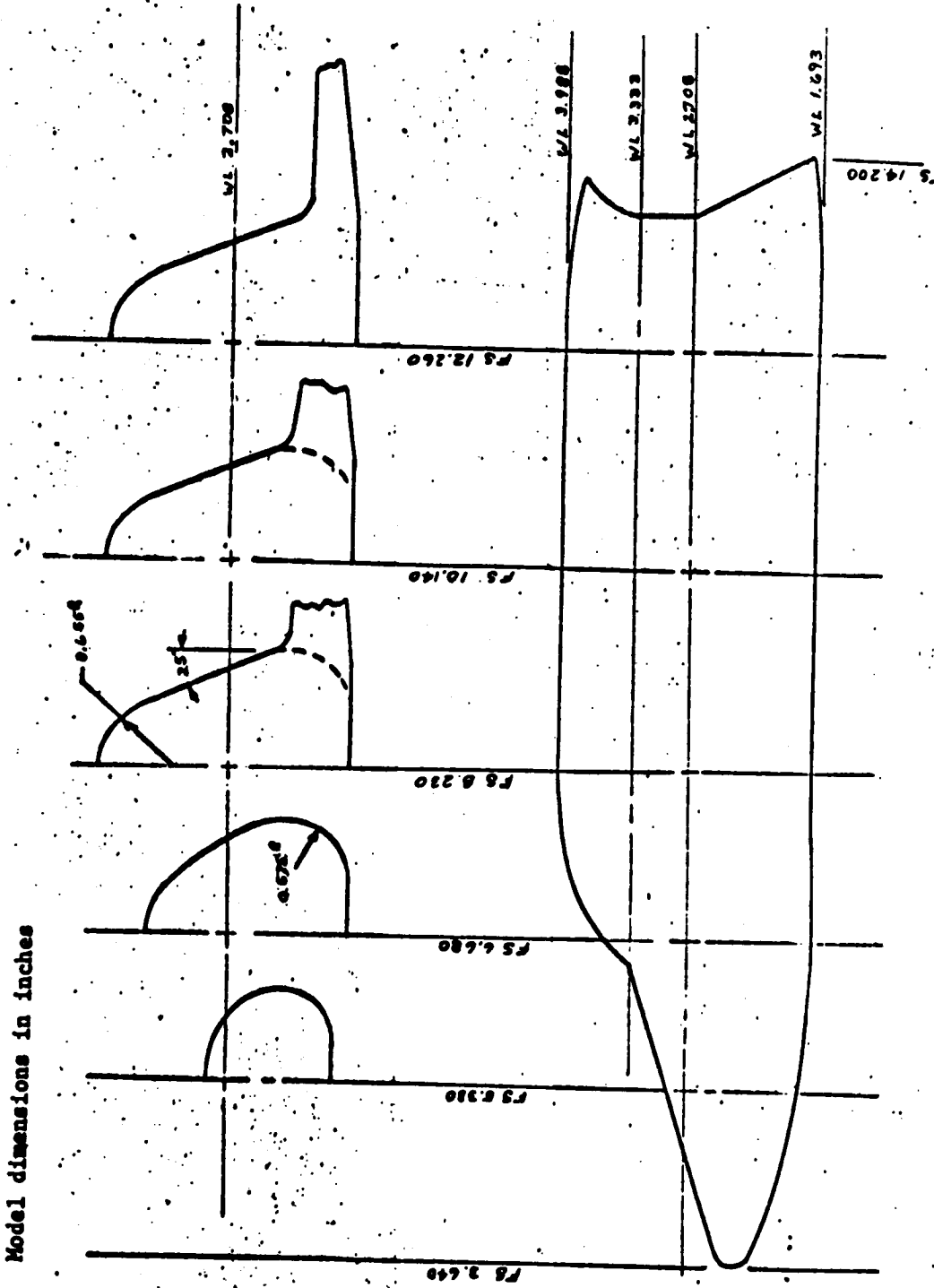


FIGURE D CONFIGURATION ROS-NB2

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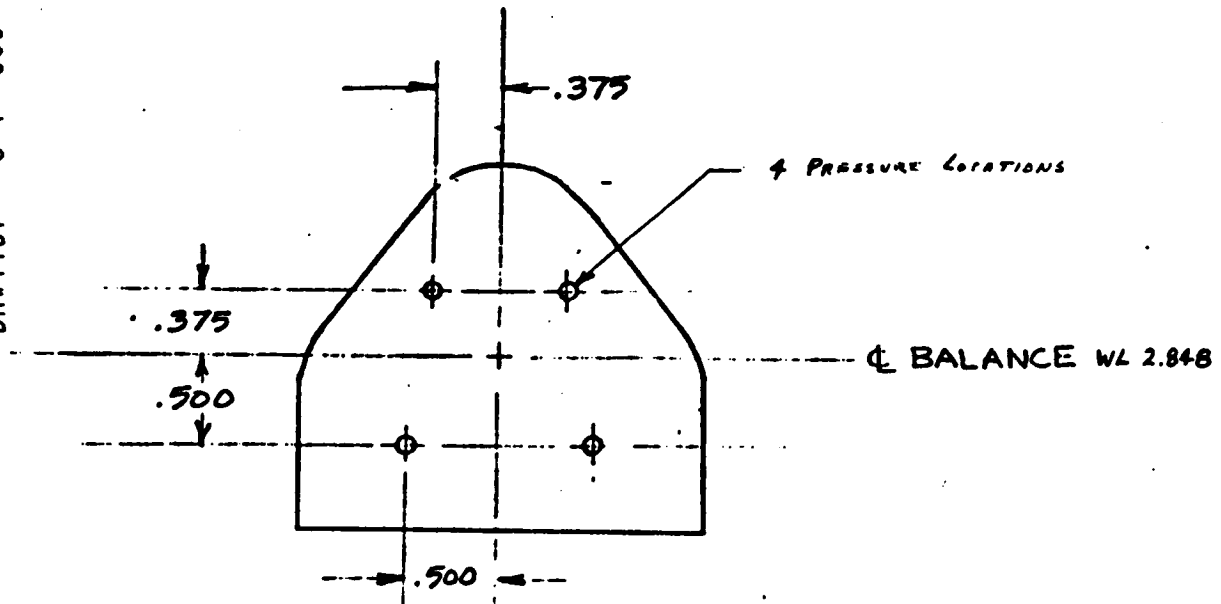
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OF POOR QUALITY



STRAIGHT WING BOOSTER
TBC
UNIQUE CONFIG. ORBITER
GAC
DR#1137 C-1- 567

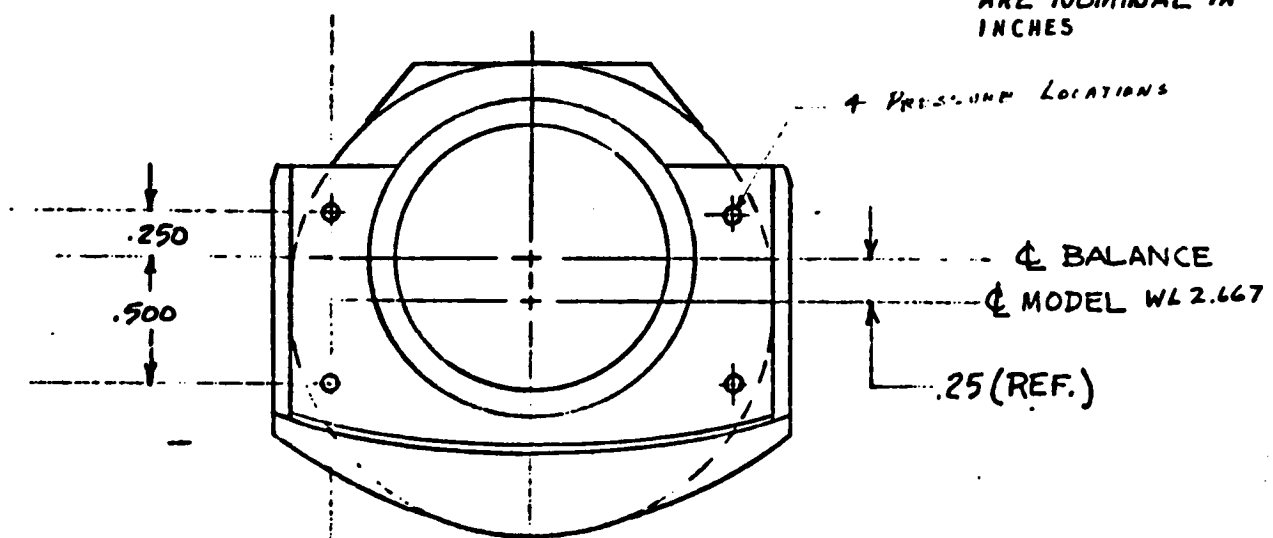
FIGURE E
ROS-NB2 BODY

STRAIGHT WING BOOSTER
 TBC
 UNIQUE CONFIGS. ORBITER
 GAC
 DR#1137 C-1-568



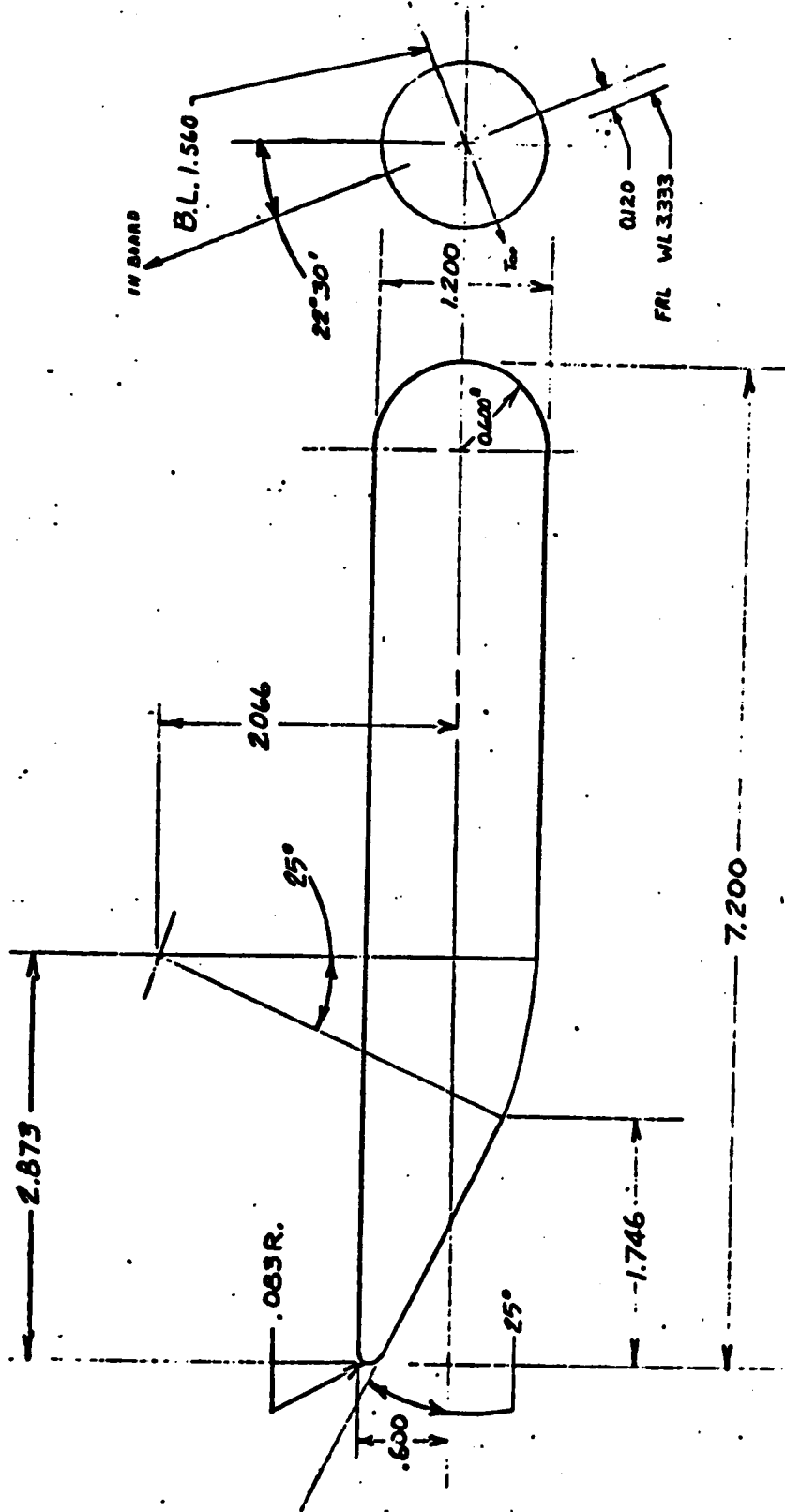
(a) ORBITER BASE

NOTE: ALL DIMENSIONS
 ARE NOMINAL IN
 INCHES



(b) BOOSTER BASE

FIGURE F ORBITER AND BOOSTER BASE PRESSURE TAPS



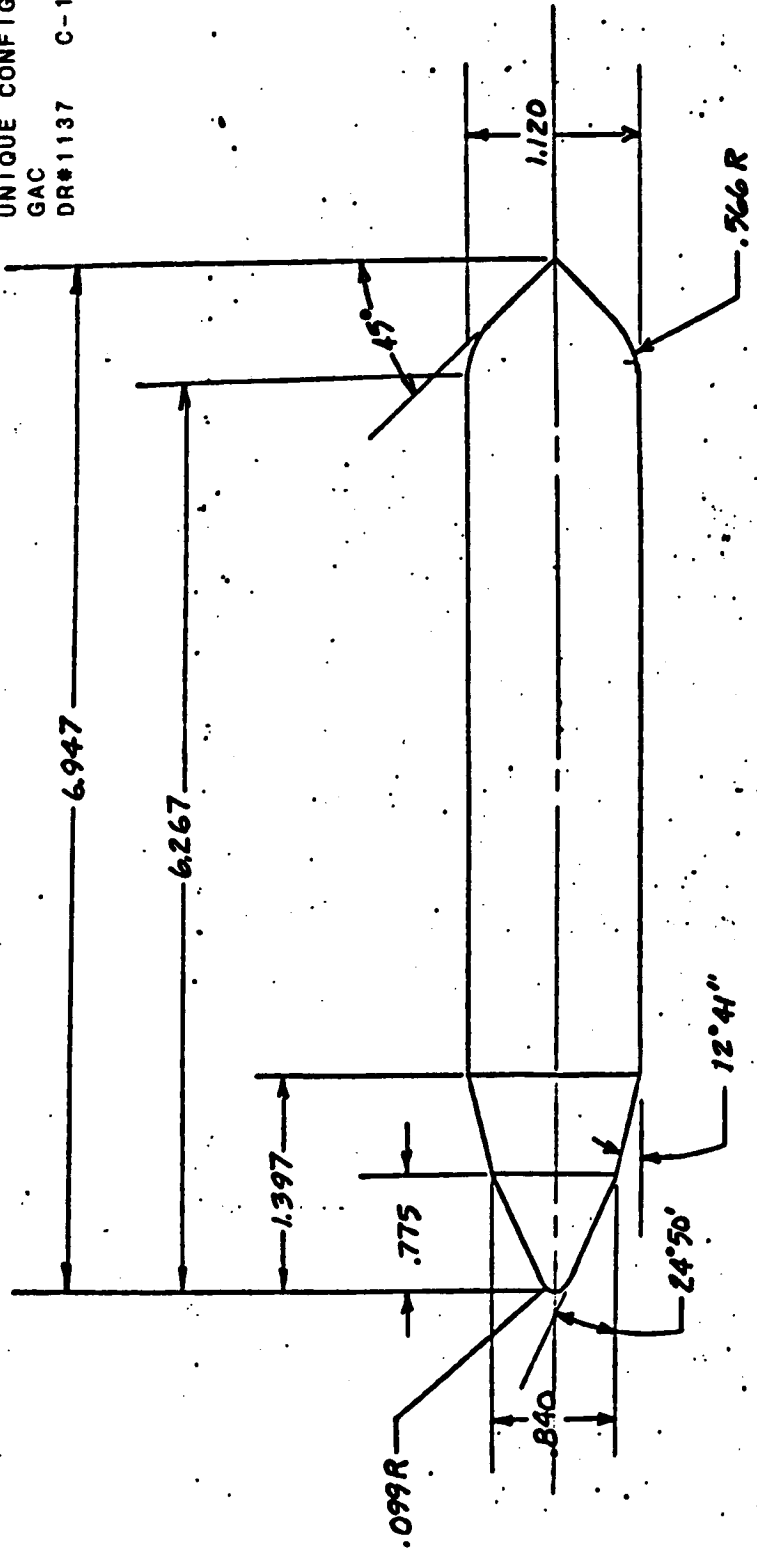
Model Dimensions in Inches

FIGURE 9 CONTOURED NOSE TANK - T₃
(1/150 SCALE, LEFT TANK SHOWN)

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OF POOR QUALITY

STRAIGHT WING BOOSTER
TBC
UNIQUE CONFIGS. ORBITER
GAC
DR#1137 C-1- 569

STRAIGHT WING BOOSTER
 TBC
 UNIQUE CONFIGS. ORBITER
 GAC
 DR#1137 C-1- 570



MODEL DIMENSIONS IN INCHES

Figure H CONICAL TANK - T₂ (1/50 SCALE)

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OF POOR QUALITY

TEST ARC-66-592 DATA SET COLLATION SHEET

PRETEST
 POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	SCHD. a B	CONTROL DEFLECTION	NO. of RUNS	MACH NUMBERS										
					0.75	0.8	0.9	1.0	1.1	1.2	1.6	2.0			
RAV001	T2B4F16	A 0	-15	6	1	6	5	2	8	7					
002		A 0		2			4	3							
003		75 B		7	15	14	13	12	11	10	9				
004		75 C		6	21	20	19		18	17	16				
005		0 C		7	28	27	26	25	24	23	22				
101	B4F16E2	D 0	0	5	33		32		31	30	29				
102				5	38		37		36	35	34				
103				5	43		42		41	40	39				
104				4	47		46		45	44	44				
105				2					47	46	45				
106				2	50	51									
107	B4F16E3		0	3	60		59		64	63	62				
108			0	5	61		65		68	67	66				
109			10	5	70		69		73	72	71				
110		V	15	5	75		74		78	77	76				
111		75 B	0	5	80		79		83	82	81				
112		75 C	0	5	85		84		88	87	86				
113		15 B	0	5	90		89		93	92	91				
114		15 B	0	5	95		94								
115	B4F21E3	D 0	0	2	96		97								

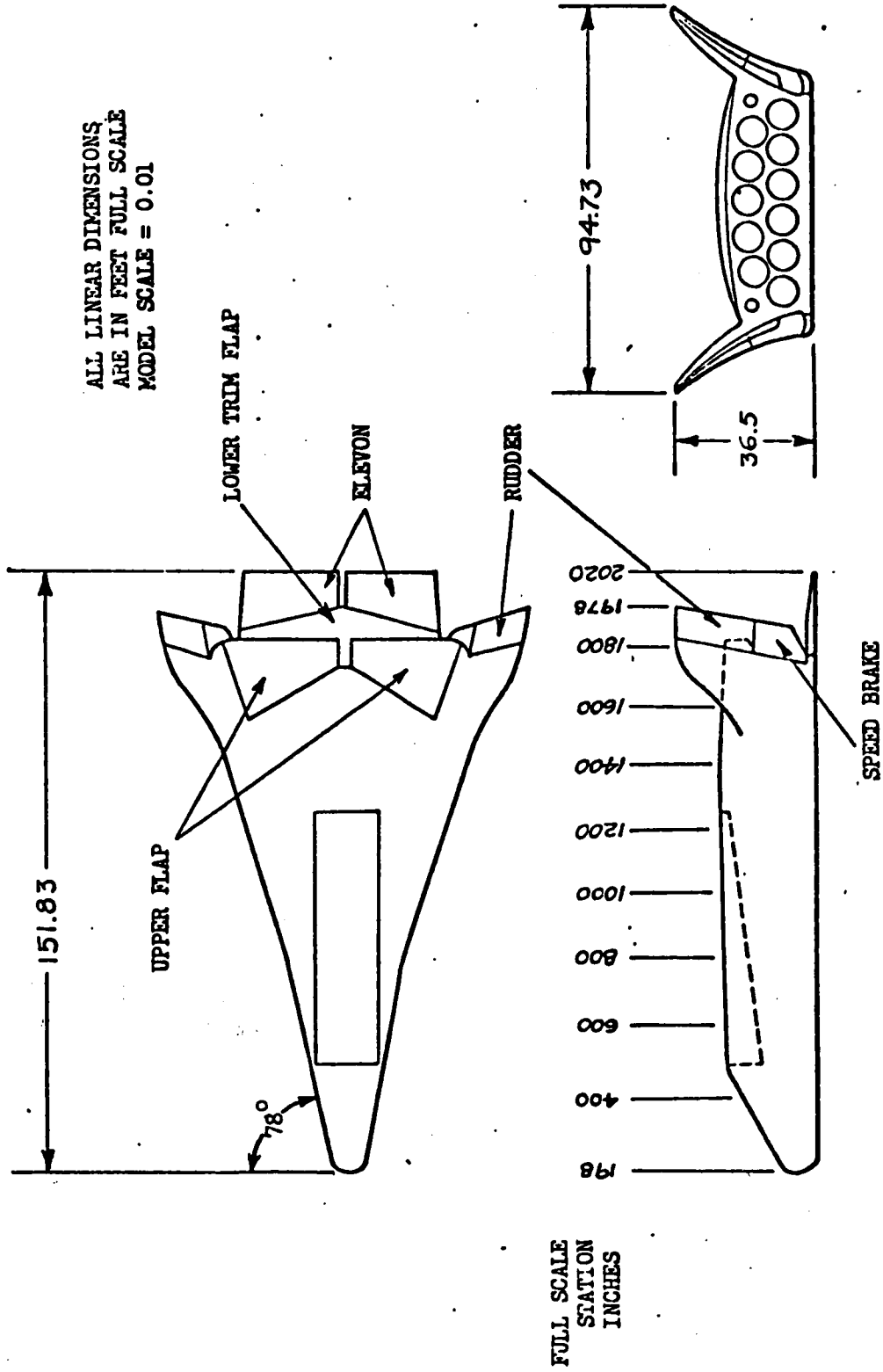
7 13 19 25 31 37 43 49 55 61 67 75.76
 CN CY CA CLM CYN CBL CAB MACH
 IDPVAR(1) IDPVAR(2) NDV

UNIQUE CONFIGS. BOOSTER
 LMSC
 DELTA BODY ORBITER
 LMSC
 DR#1085 C-1-571

COEFFICIENTS:
 a or B SCHEDULES
 A = -6 -4 -2 0 2 4 6 8 10 DEG.
 B = -4 -2 0 2 4 6 10 C = -10 -6 -4 -2 0 2 4 DEG.
 D = -4 -2 0 2 4 6 8 10 12 14 16 18 20 22 DEG.

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OF POOR QUALITY

ALL LINEAR DIMENSIONS
ARE IN FEET FULL SCALE
MODEL SCALE = 0.01



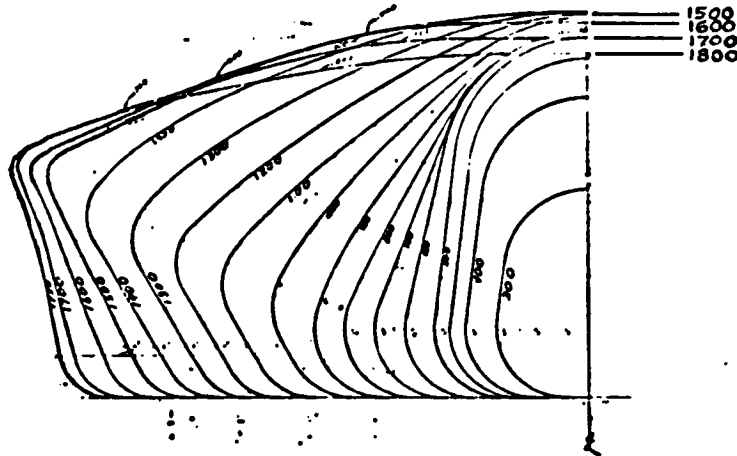
UNIQUE CONFIGS. BOOSTER
LMSC
DELTA BODY ORBITER
LMSC
DR#1085 C-1- 573

FIGURE 1. ORBITER CONFIGURATION B4F16E2 THREE-VIEW

UNIQUE CONFIGS. BOOSTER
 LMSC
 DELTA BODY ORBITER
 LMSC
 DR#1085 C-1-574

Prepared by:	Date	LOCKHEED MISSILES & SPACE CO ANY <small>A GROUP DIVISION OF LOCKHEED AIRCRAFT CORPORATION</small>	Page	Temp.	Form.
Checked by:	Date		Model		
Approved by:	Date				

BODY STATIONS ARE IN INCHES
 FULL SCALE
 MODEL SCALE = 0.01

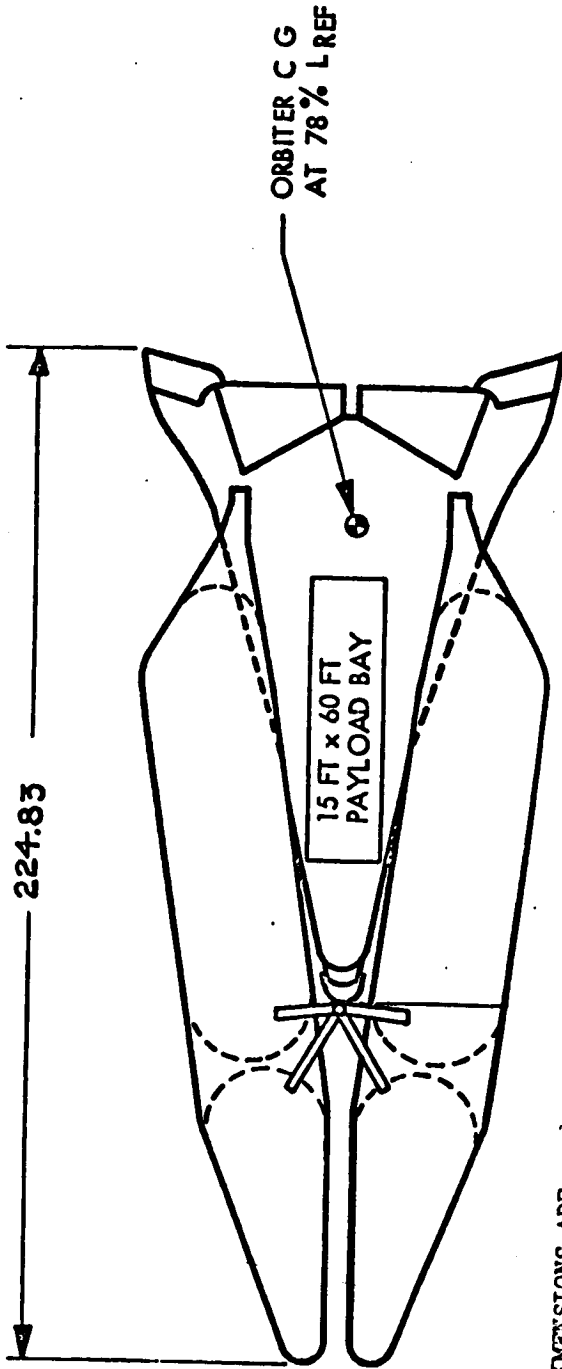


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FIGURE 2. BODY CONTOURS - CONFIGURATION B1

FORM LMSC 342 B-2

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OF POOR QUALITY



ALL DIMENSIONS ARE
IN FEET FULL SCALE.
MODEL SCALE = 0.01.

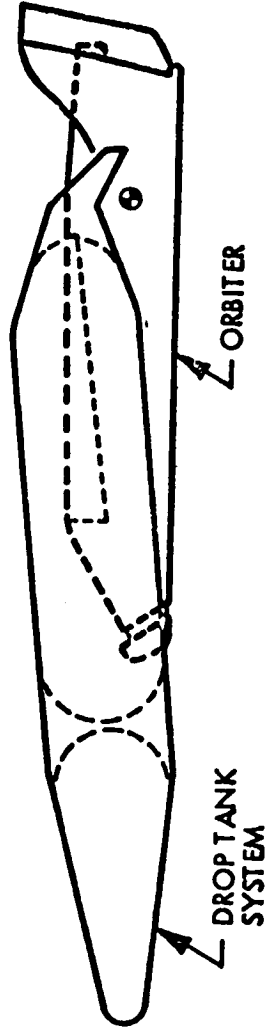
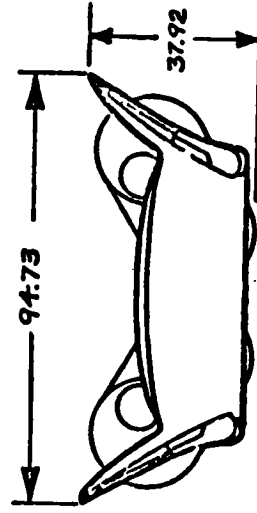


FIGURE 3. LAUNCH VEHICLE CONFIGURATION T₂B₄F₁₆ THREE-VIEW.

UNIQUE CONFIGS. BOOSTER
LMSC
DELTA BODY ORBITER
LMSC
DR#1085 C-1- 575

UNIQUE CONFIGS. BOOSTER
 LMSC
 DELTA BODY ORBITER
 LMSC
 DR#1085 C-1- 576

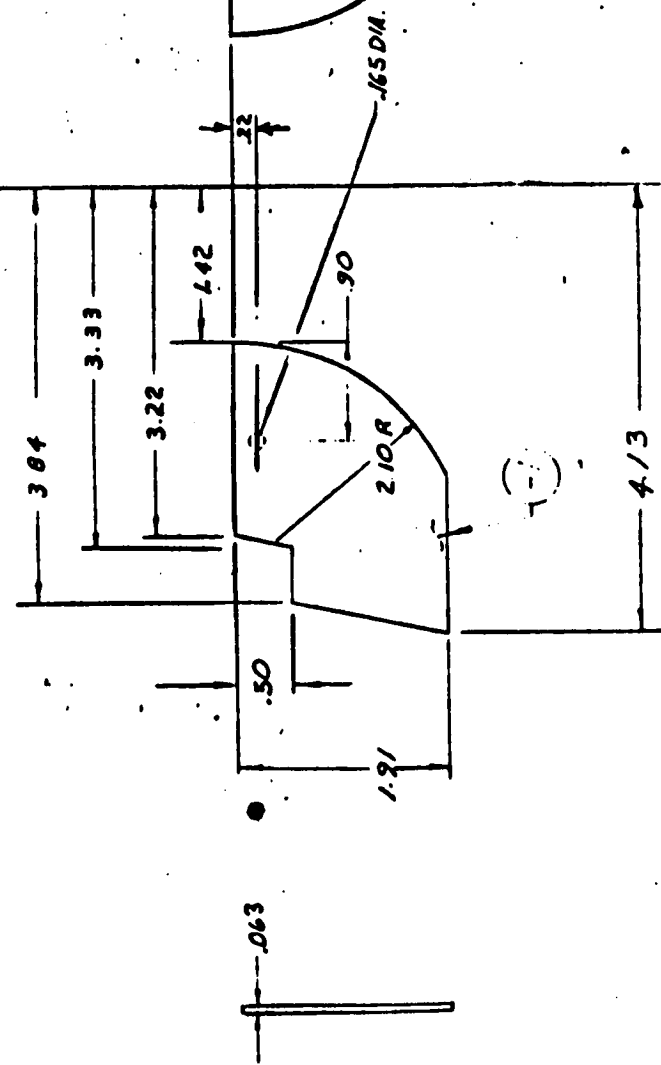
ZONE/UTRI	REVIS	DESCRIP

4
3
2

LIMITED
 CALENDAR
 LIFE

LIMITED
 OPERATING
 LIFE

SYM ABOUT



STA 1750

TRAILING EDGE UPPER FLAP

EDGE IN CONTACT WITH INSIDE SURFACE OF FLOOR

FIGURE 4. EXTENSION FLAP B8

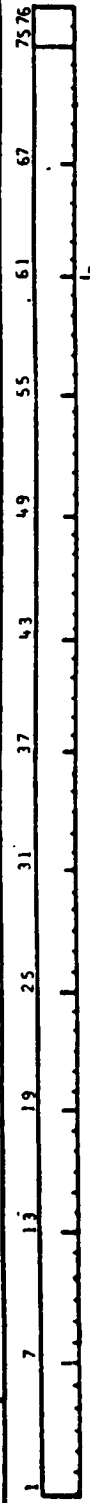
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OF POOR QUALITY

TABLE II.
TEST UFWT 962 DATA SET/RUN NUMBER
COLLATION SUMMARY

PRETEST
 POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	SCHD.		BSTR. CONTROL DEFL.		NO. of RUNS	MACH NUMBERS				TEST RUN NUMBERS
		α	β	δe_L	δe_R		i_c	1.5	1.9	2.16	
FWWB 01	BW1V1	B	0	0	0	0	3	37	42	47	
02		B	5	0	0	-		38	43	48	
03		O	C	0	0	-		39	44	49	
04		1.0	C	0	0	-		40	45	50	
05		2.0	C	0	0	-		41	46	51	
06		B	0	-10	-10	-		53	55	57	
07		B	5	-10	-10	-		54	56	58	
08		B	0	-20	-20	-		59	61	63	
09		B	5	-20	-20	-		60	62	64	
10		B	0	-30	-30	-		65	67	69	
11		B	5	-30	-30	-		66	68	70	
12		B	0	0	-10	-		71	73	75	
13		B	5	0	-10	-		72	74	76	
14	BW1V1C	B	0	0	0	0		77	79	81	
15		B	5	0	0	0		78	80	82	
16		B	0	0	0	-10		83	85	87	
17		B	5	0	0	-10		84	86	88	
18		B	0	0	0	-20		89	91	93	
19		B	5	0	0	-20		90	92	94	
20		B	0	0	0	-30		95	97	99	



COEFFICIENTS:

α or β SCHEDULES
 ALPHA ~ B = -4, -2, 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26
 BETA ~ C = -4, -2, -1, 0, 1, 2, 4, 6, 8

UNIQUE CONFIGS. BOOSTER
 LARC
 DELTA WING ORBITER
 NR
 DR#1197 C-1- 577

UNIQUE CONFIGS. BOOSTER
LARC
DELTA WING ORBITER
NR
DR#1197 C-1- 580

TABLE II. (CONTINUED)
TEST UFWT 962 DATA SET/RUN NUMBER
COLLATION SUMMARY

PRETEST
 POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	SCHD.		BSTR. CONTROL DEFL.			NO. of RUNS	MACH NUMBERS			TEST RUN NUMBERS
		α	β	δ_{cl}	δ_{er}	i_c		1.5	1.9	2.16	
RUNO 01	$B_0 M_{16} V_{24}$	A	0	0	0	0	3	1	7	11	
02		A	5	0	0	0		4	10	14	
03		0	C	0	0	0		2	8	12	
04		10	C	0	0	0		3	9	13	
05		A	0	0	0	-		16	18	20	
06		A	5	0	0	-		17	19	21	
07		A	0	-10	-10	-		22	24	26	
08		A	5	-10	-10	-		23	25	27	
09		A	0	0	-10	-		28	30	32	
10		A	5	0	-10	-		29	31	33	

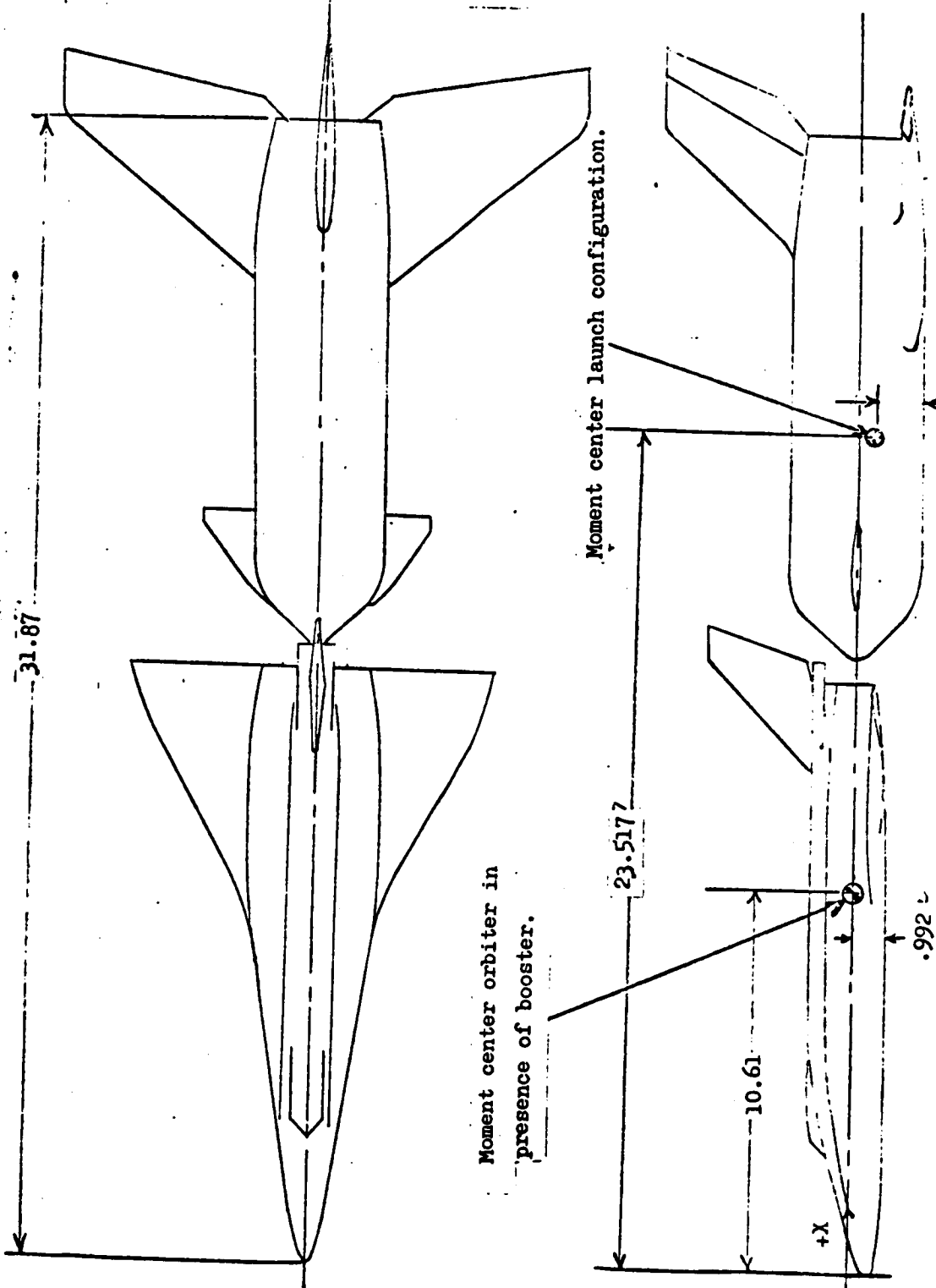
7 11 19 25 31 37 43 49 55 61 67 7576
IDPVAR(1) IDPVAR(2) IDPVAR(3)

COEFFICIENTS:

α or β ALPHA ~ A = -8, -6, -4, -2, 0, 2, 4, 6, 8, 10, 12
SCHEDULES BETA ~ C = -4, -2, -1, 0, 1, 2, 4, 6, 8

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COPIED FROM ORIGINAL OF POOR QUALITY

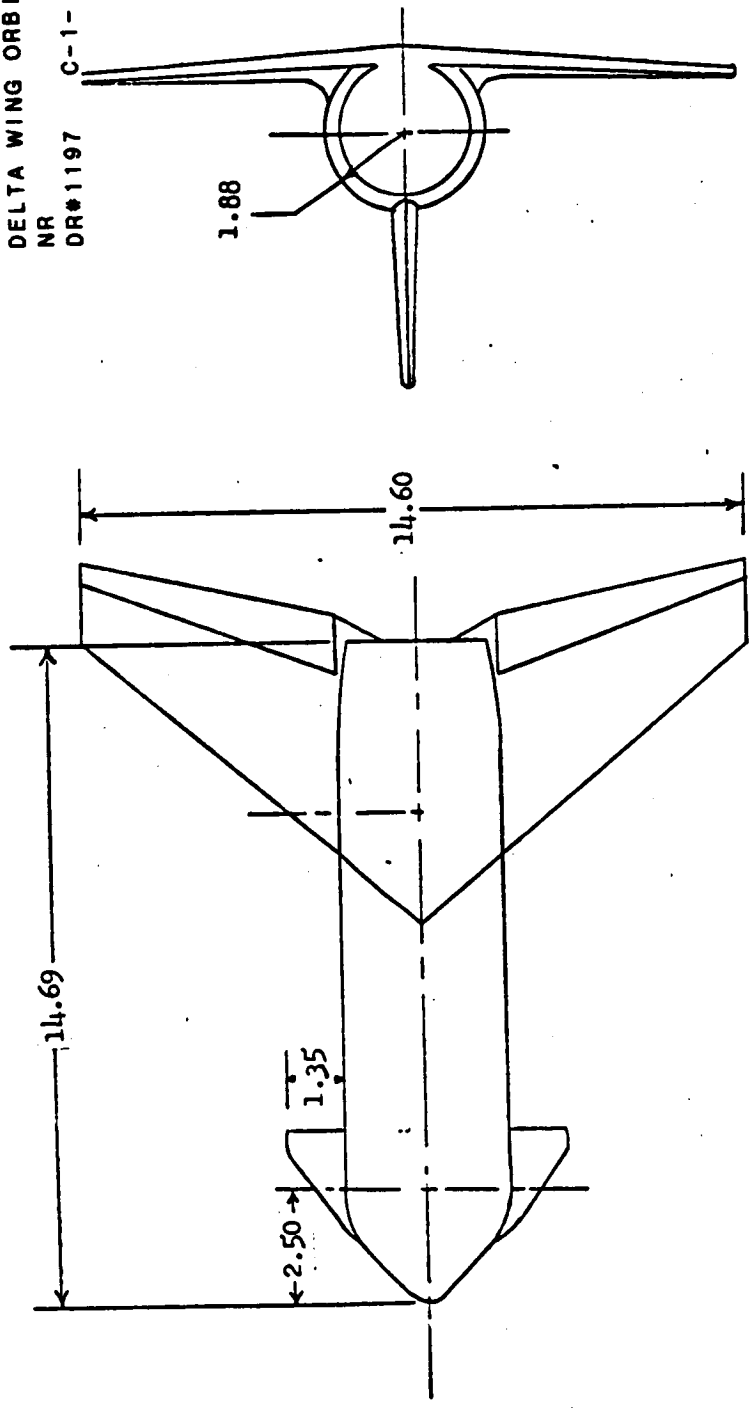


All dimensions in inches.

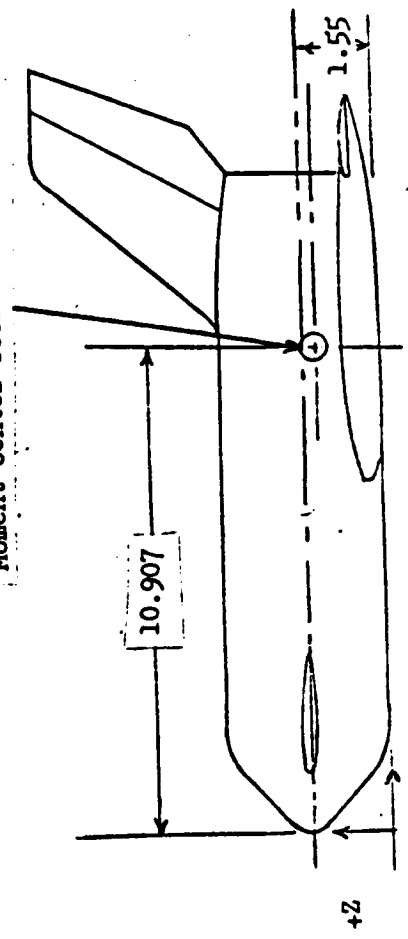
FIGURE 2. MOMENT CENTER OF LAUNCH CONFIGURATION
675

UNIQUE CONFIGS. BOOSTER
LARC
DELTA WING ORBITER
NR
DR#1197 C-1- 581

UNIQUE CONFIGS. BOOSTER
 LARC
 DELTA WING ORBITER
 NR
 DR#1197 C-1- 582



Moment center booster alone.



All dimensions in inches.

+X

FIGURE 3. BOOSTER DIMENSIONS

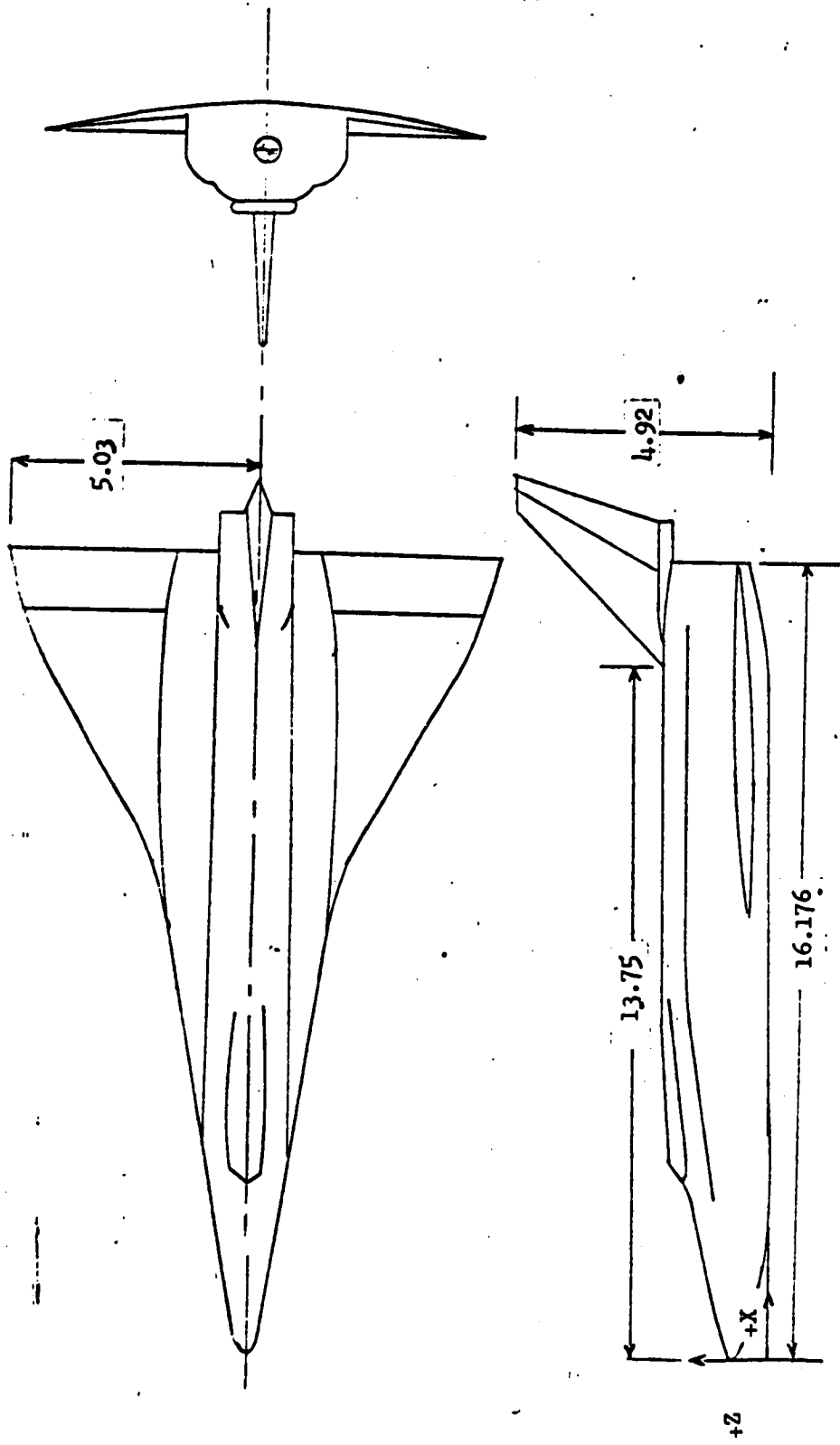


FIGURE 4. ORBITER DIMENSIONS

UNIQUE CONFIGS. BOOSTER
 LARC
 DELTA WING ORBITER
 NR
 DR#1197 C-1- 583

All dimensions in inches.

UNIQUE CONFIGS. BOOSTER
LARC
DELTA WING ORBITER
NR
DR#1198 C-1- 584

TEST CFT - 74 DATA SET/RUN NUMBER
COLLATION SUMMARY

PRETEST
 POSTTEST

DATA SET IDENTIFIED	CONFIGURATION	SCHD.			CONTROL DEFLECTION			NO. of RUNS	MACH NUMBERS																															
		α	β		δ_c	δ_r			10.23	TEST RUN NUMBERS																														
RMYB 01	BCW	A	0	0	-60	-	1	3																																
02				-5	0			4																																
03				0	-15			13																																
04				-5	-15			14																																
05				0	-30			11																																
06				-5	-30			12																																
07				0	-45			15																																
08				-5	-45			16																																
09			B	0	0	-30		7																																
10				-5		-30		8																																
11				0		-75		9																																
12				-5		-75		10																																
13	BCW (Rudder Off)			0		-60		17																																
14				-5		-60		18																																
15	BH			0		-		21																																
16				-5		-		22																																
17	B			0		-		23																																
18				-5		-		24																																
19	BCW		C	0	0	0	0	34																																
20			C	4	0	0	0	35																																

7 13 19 25 31 37 43 49 55 61 67 7576
 IDPVAR(1) IDPVAR(2) NDV

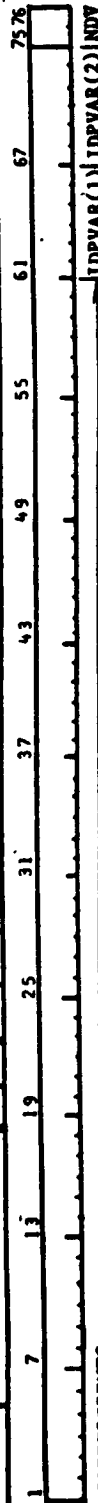
COEFFICIENTS:
 α or β
 SCHEDULES
 A - ALPHA - 20, 25, 30, 35, 40, 45, 50, 55, 60
 B - ALPHA - 25, 30, 35, 40, 45, 50, 55, 60
 C - ALPHA - -11, -8, -4, -2, 0, 2, 5, 10, 15, 20, 25, 28

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 64, 100, 1000 QUALITY

TEST CFTT - 74 DATA SET/RUN NUMBER
COLLATION SUMMARY

PRETEST
 POSTTEST

DATA SET IDENTIFIED	CONFIGURATION	SCHD.		CONTROL DEFLECTION				NO. OF RUNS	MACH NUMBERS		TEST RUN NUMBERS
		α	β	δ_c	δ_e	δ_r	δ_r		10.23		
RMVB 21	BCW	30	D	0	-60	-		1	5		
22		50	D	0	-60	-		1	6		
RMVL 01	BCW + MR 134D ORB.	E	0	0	0	0		1	31		
02		E	4						32		
03		O	F						30		



COEFFICIENTS:

- α or β SCHEDULES
- D - BETA - -5, -2, 0, 2, 4
- E - ALPHA - -11, -9, -6, -4, -2, 0, 2, 4, 6, 9, 11
- F - BETA - 0, 1, 2, 3, 4

UNIQUE CONFIGS. BOOSTER
LARC
DELTA WING ORBITER
NR
DR#1198 C-1- 585

UNIQUE CONFIGS. BOOSTER
 LARC
 DELTA WING ORBITER
 NR
 DR#1198 C-1- 586

ORIGINAL PARTS
 OF HIGH QUALITY

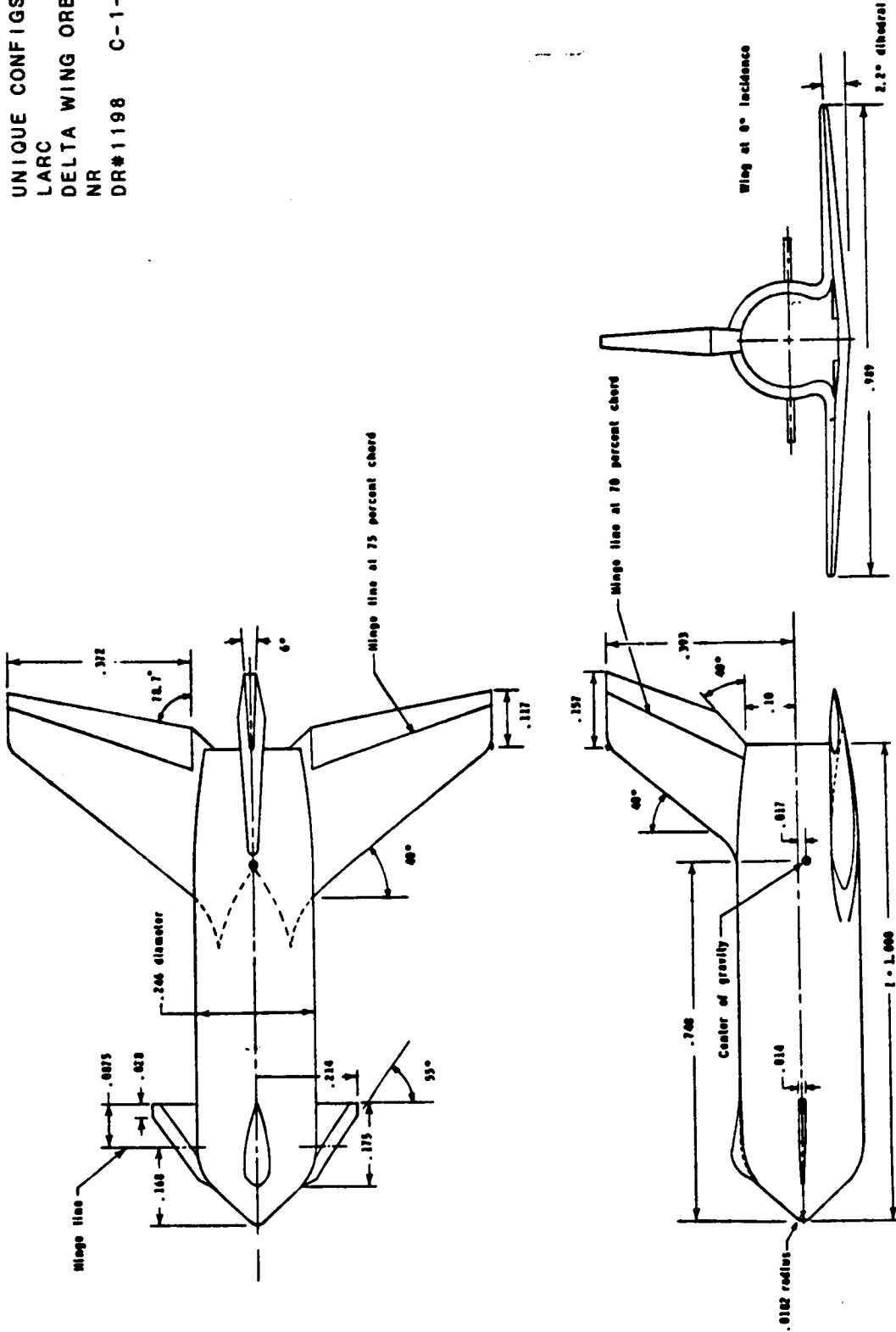


Figure 2. Booster model. All dimensions in percent of fuselage length (8.90-inch)

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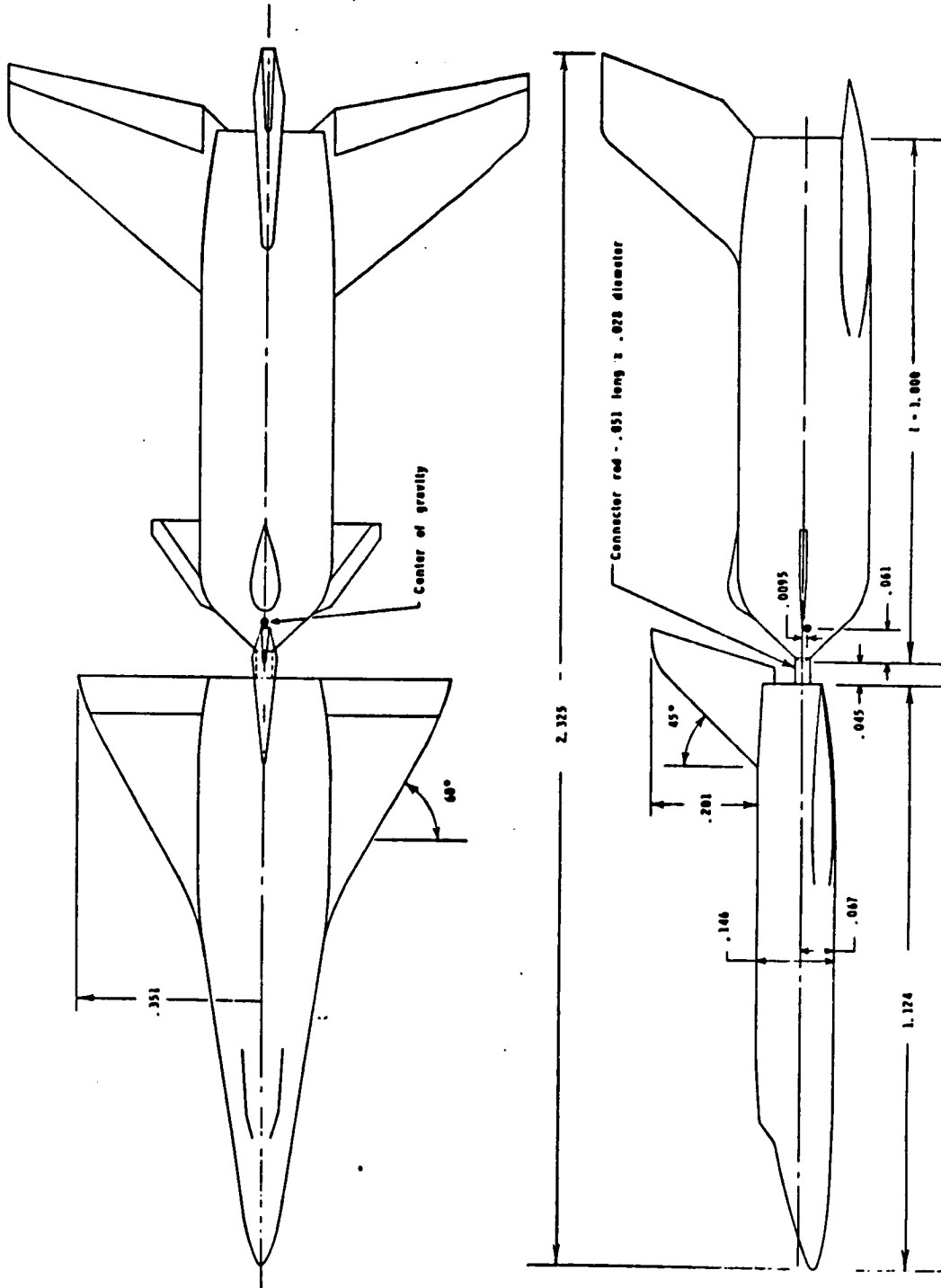


Figure 3. Ascent configuration. All dimensions in percent of booster fuselage length (8.90-inch) UNIQUE CONFIGS. BOOSTER
LARC
DELTA WING ORBITER
NR
DR#1198 C-1- 587

UNIQUE CONFIGS. BOOSTER
LARC
DELTA WING ORBITER
NR
DR#1200 C-1-588

TABLE II.
TEST 8' TPT 605 DATA SET/RUN NUMBER
COLLATION SUMMARY

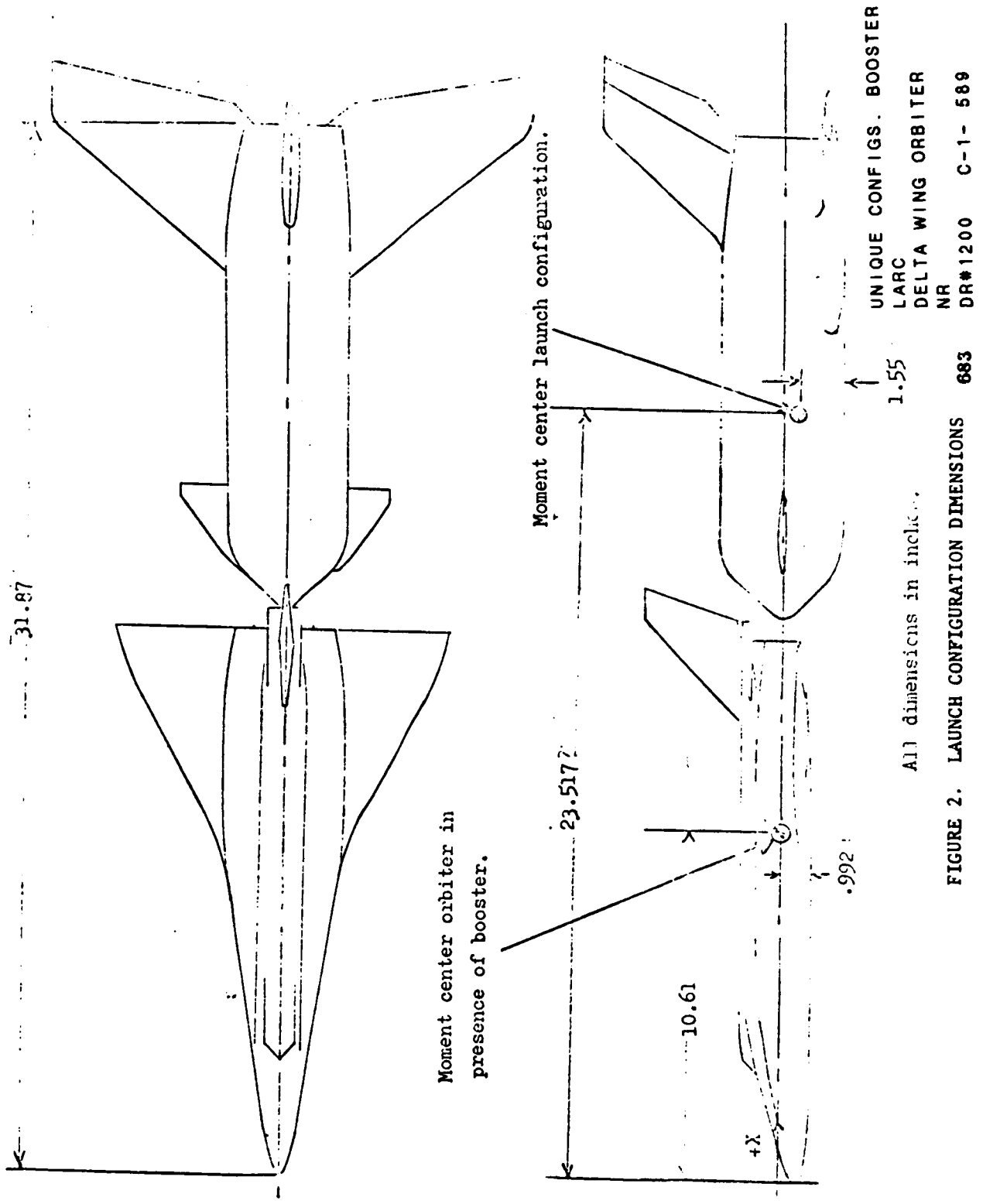
PRETEST
 POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	SCHD.			BSTR. CONTROL DEFL.			NO. of RUNS	MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE)							TEST RUN NUMBERS
		α	β	δ	e	i	c		0.4	0.6	0.9	1.0	1.2			
RMZB 01	BW ₁ V ₁	B	0	0	0	-	-	5	45	44	43	42	41			
02		B	0	-10	-	-	-		50	49	48	47	46			
03		B	0	-30	-	-	-		55	54	53	52	51			
04	BW ₁ V ₁ C	B	0	0	0	0	0		60	59	58	57	56			
05		B	0	0	10	0	0		65	64	63	62	61			
06		B	5	0	0	0	0		35	34	33	32	31			
07	BW ₁ V ₁	B	5	0	-	-	-		40	39	38	37	36			
RMZL 01	BW ₁ V ₁ C+B ₄ W ₁₆ V ₂₄	A	0	0	0	0	0		1	2	3	4	5			
02	BW ₁ V ₁ + B ₄ W ₁₆ V ₂₄	A	0	0	-	-	-		10	9	8	7	6			
03		A	0	-10	-	-	-		15	14	13	12	11			
04		A	5	0	-	-	-		25	24	23	22	21			
05	BW ₁ V ₁ C + B ₄ W ₁₆ V ₂₄	A	5	0	0	0	0		27	26	30	29	28			
RMZO 01	B ₄ W ₁₆ V ₂₄ (Pres. Booster)	A	0	0	0	0	0		1	2	3	4	5			
03		A	0	-10	-	-	-		15	14	13	12	11			
04		A	5	0	-	-	-		25	24	23	22	21			
05		A	5	0	0	0	0		27	26	30	29	28			
06	B ₄ W ₁₆ V ₂₄ (Orbiter Alone)	A	0	-	-	-	-		85	84	76	80	82			
07	B ₄ W ₁₆ V ₂₄ (Pres. Booster)	A	0	0	0	0	0		71	70	74	73	72			

COEFFICIENTS: Schedule
 α A -8, -6, -4, -2, 0, 2, 4, 6, 8
 α B -1, 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24

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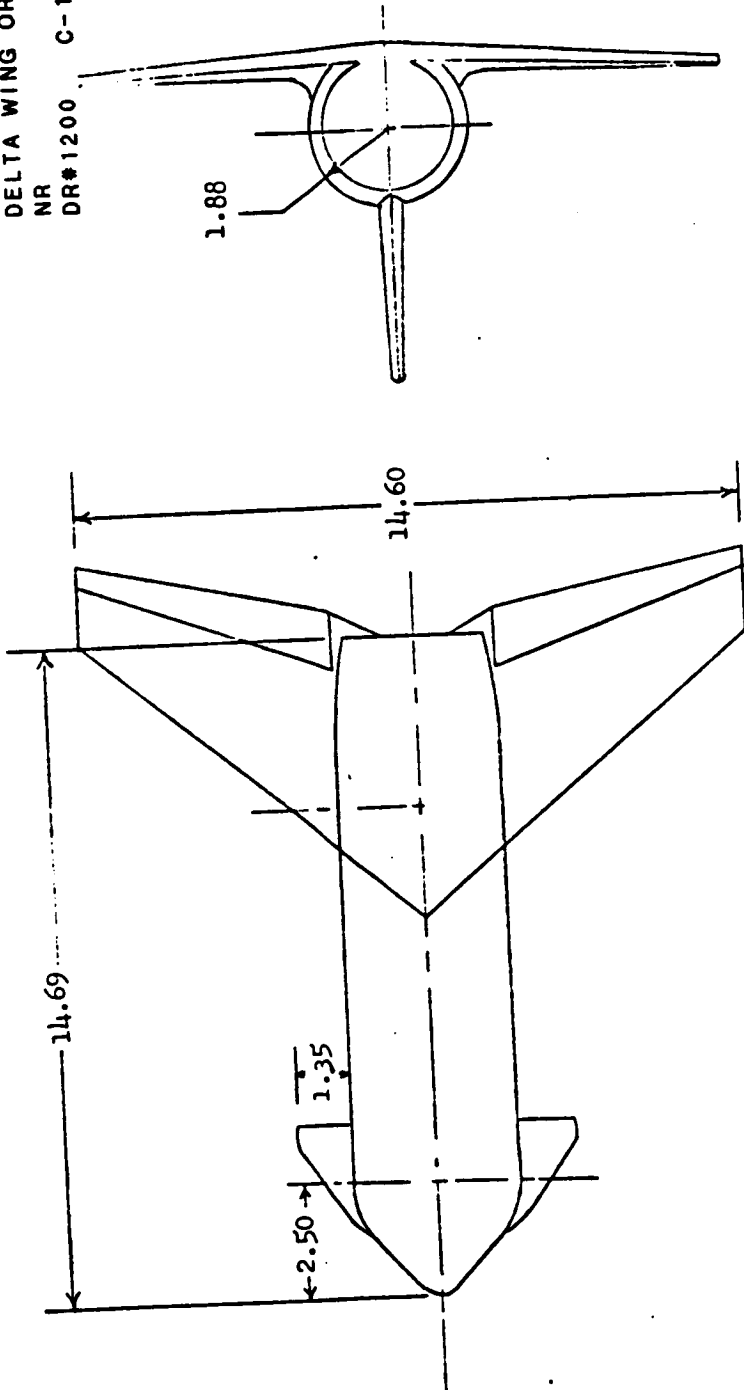


UNIQUE CONFIGS. BOOSTER
LARC
DELTA WING ORBITER
NR
DR#1200 C-1- 589

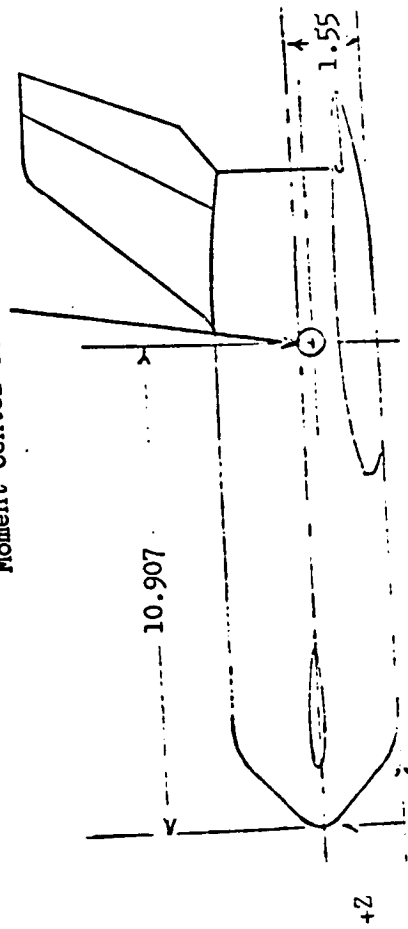
All dimensions in inches.

FIGURE 2. LAUNCH CONFIGURATION DIMENSIONS 683

UNIQUE CONFIGS. BOOSTER
 LARC
 DELTA WING ORBITER
 NR
 DR#1200 C-1- 590



Moment center booster alone.

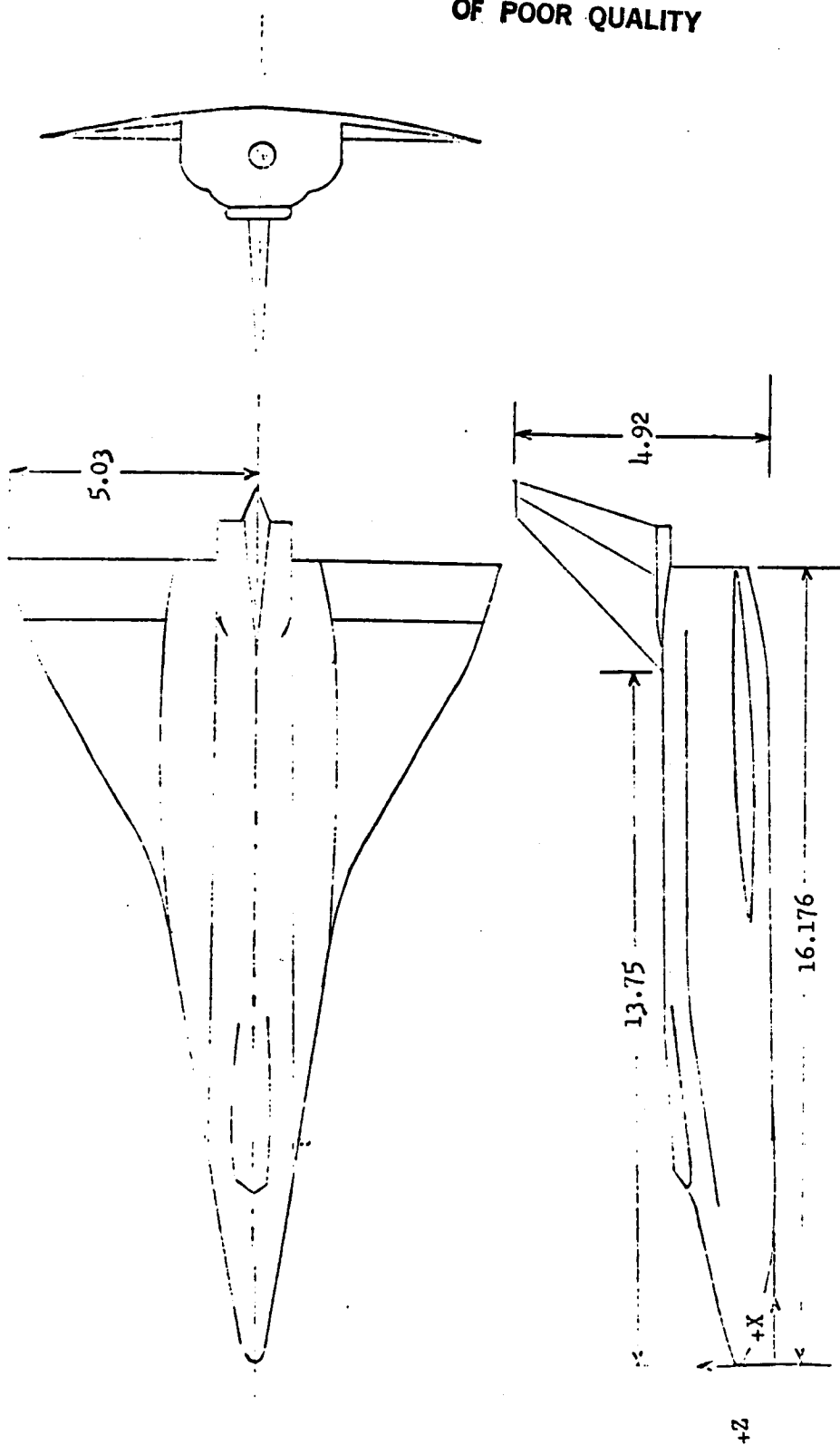


All dimensions in inches.

FIGURE 3. BOOSTER DIMENSIONS
 684

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ORIGINAL PAGE IS
OF POOR QUALITY



UNIQUE CONFIGS. BOOSTER
LARC
DELTA WING ORBITER
NR
DR#1200 C-1-591

FIGURE 4. ORBITER DIMENSIONS

All dimensions in inches.

UNIQUE CONFIGS. BOOSTER
 TBC
 DELTA WING ORBITER
 NR
 DR#1055 C-1- 592

TEST M2EC DW7470 DATA SET COLLATION SHEET

PRETEST POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	SCHEM.		CONTROL DEFLECTOR		NO. of RUNS	MACH NUMBERS													
		A	B	70	75		80	85	90	95	100	105								
R25021	BFS+B5W14E3V17	A	0	+1°		7	8	11	12	13	14									
R25031		A	0	+4°		7	15	16	17	18	19	21								
R25041		A	0	-2°		7	22	23	24	25	26	27	28							
R25061	B5+C5W14E3V17	A	0	+1°		7	29	30	31	32	33	34	35							
R25071		A	0	+4°		7	36	37	38	39	40	41	42							
R25081		A	0	-2°		7	43	44	45	46	47	48	49							
R25053	BFS+B5W14E3V17	0	B	+1°		7	57	58	59	60	61	62	63							
R25093	BFS+B5W14E3V17	0	B	+1°		7	64	65	66	67	68	69	70							
R25091		A	0	+1°		7	71	72	73	74	75	76	77							

1 7 14 19 25 31 37 43 49 55 61 67 75.76

C.M. ICN ICYN ICY ICRL CA ICPEL ICPE ICPCAV ICPCAV

COEFFICIENTS: IDPVAR(1) IDPVAR(2) INDV

a or b

SCHEDULES

SA: -12, -10, -8, -6, -4, -2, 0, 2, 4, 6, 8, 10, 12

SB: -1.5, -1.0, -0.5, 0.0, 0.5, 1.0, 1.5

NOTE: ALL DIMENSIONS ARE
MODEL SCALE (INCHES)

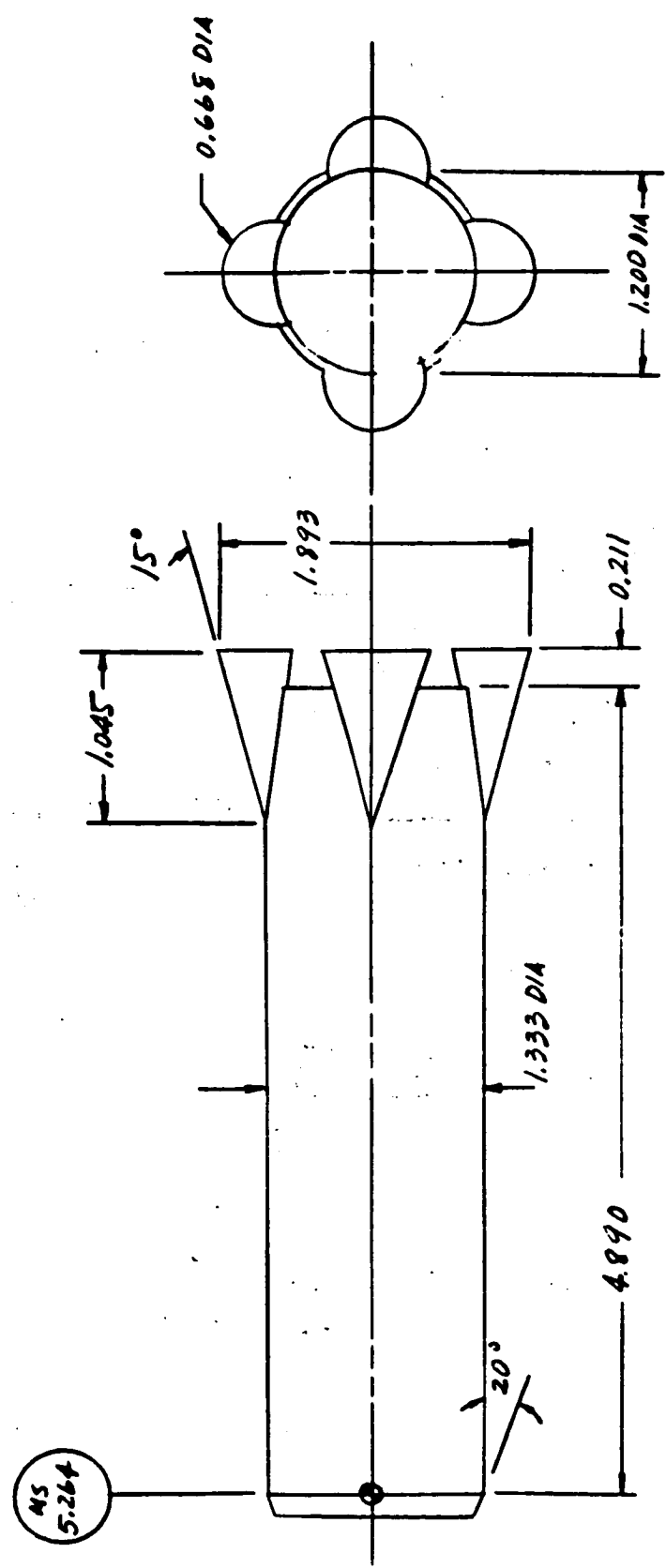


FIGURE 9. SATURN V/JIC BOOSTER

UNIQUE CONFIGS. BOOSTER
TBC
DELTA WING ORBITER
NR
DR#1055 C-1- 593

UNIQUE CONFIGS. BOOSTER
TBC
DELTA WING ORBITER
NR
DR#1055 C-1- 594

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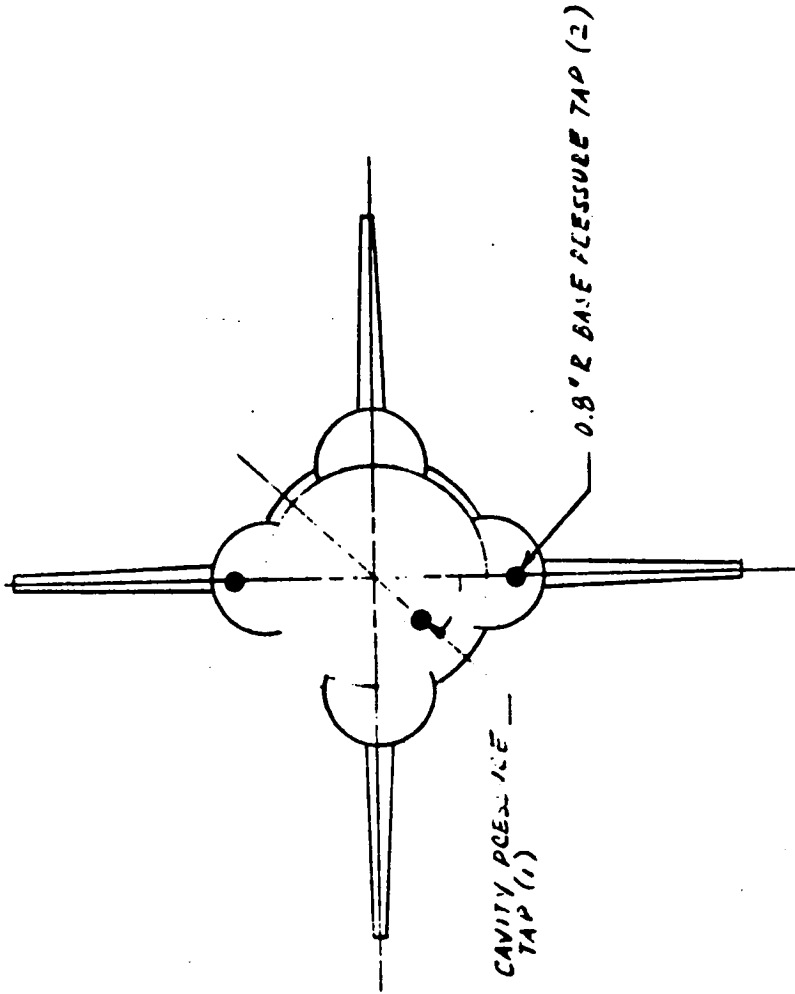
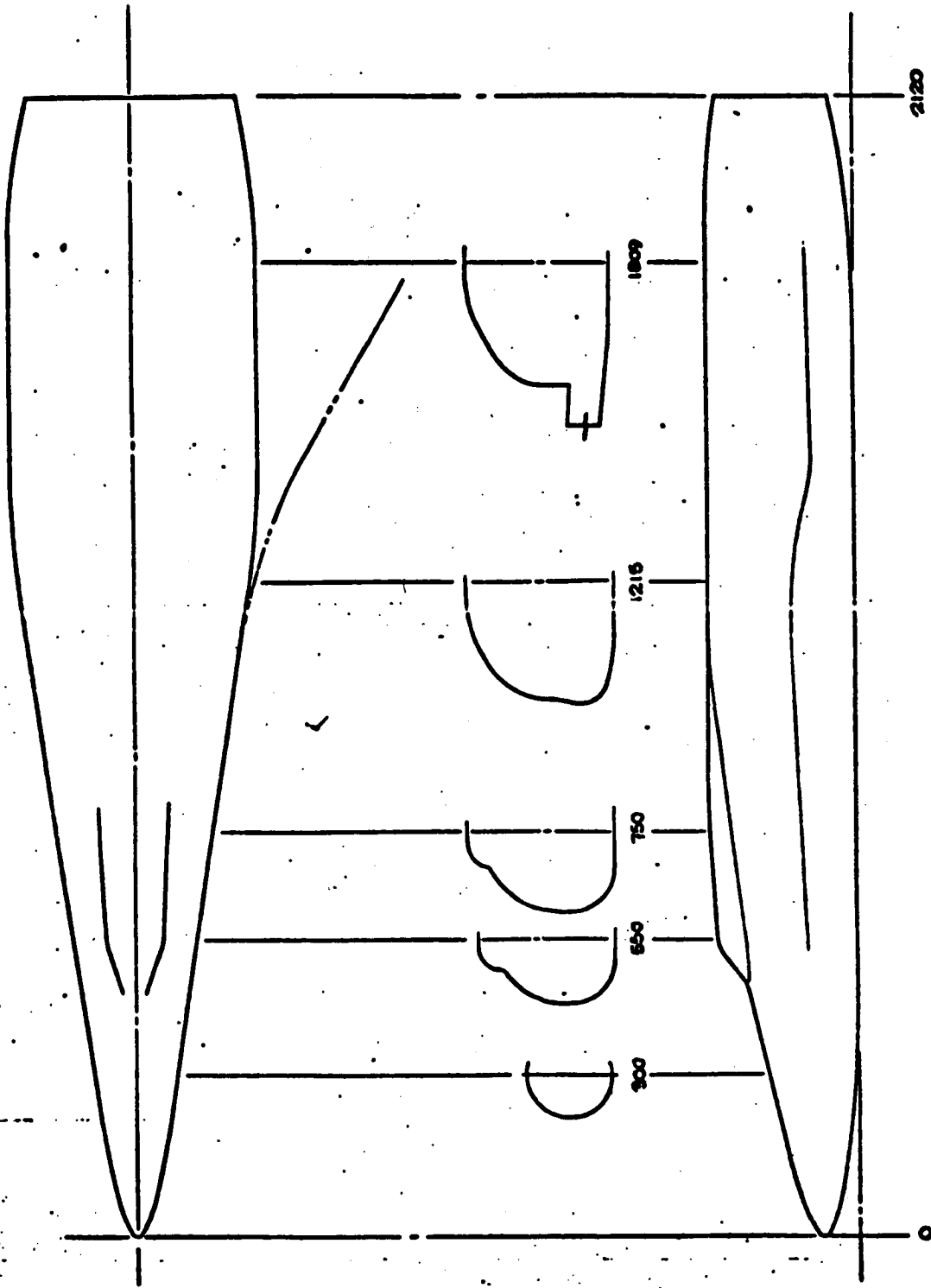


FIGURE 3. TYPICAL BASE PRESSURE LOCATIONS

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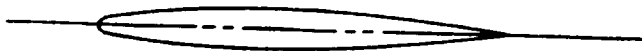
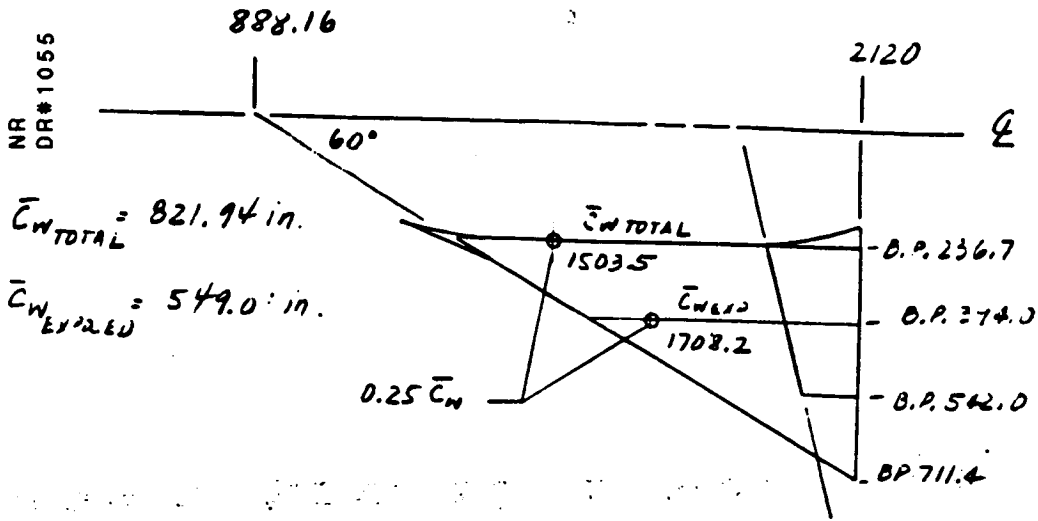
2120

UNIQUE CONFIGS. BOOSTER
TBC
DELTA WING ORBITER
NR
DR#1055 C-1- 595

FIGURE 5. BODY B5 9922-134B CONFIGURATION

689

UNIQUE CONFIGS. BOOSTER
 TBC
 DELTA WING ORBITER
 NR
 DR#1055 C-1-596



CHORD (B.P. 343.0)
 0009-64 SERIES AIRFOIL



TIP CHORD (B.P. 542.0)
 -5°
 0012-64 SERIES AIRFOIL

NOTE: ALL DIMENSIONS ARE
 FULL SCALE (INCHES)

FIGURE 6. WING W14 9992-134B CONFIGURATION
 COMPLETE DELTA - NO CLIPPED TIP

ORIGINAL FACE IS
OF POOR QUALITY.

UNIQUE CONFIGS. BOOSTER
TBC
DELTA WING ORBITER
NR
DR#1055 C-1- 597

NOTE: ALL DIMENSIONS ARE FULL
SCALE (INCHES)

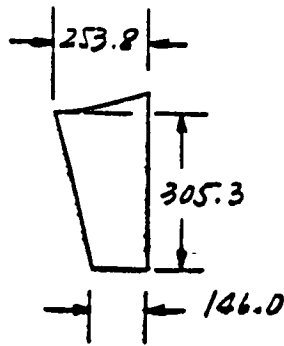


FIGURE 7. ELEVON E3 - ELEVON USED WITH WING W14

UNIQUE CONFIGS. BOOSTER
TBC
DELTA WING ORBITER
NR
DR#1055 C-1- 598

NOTE: ALL DIMENSIONS ARE
FULL SCALE (INCHES)

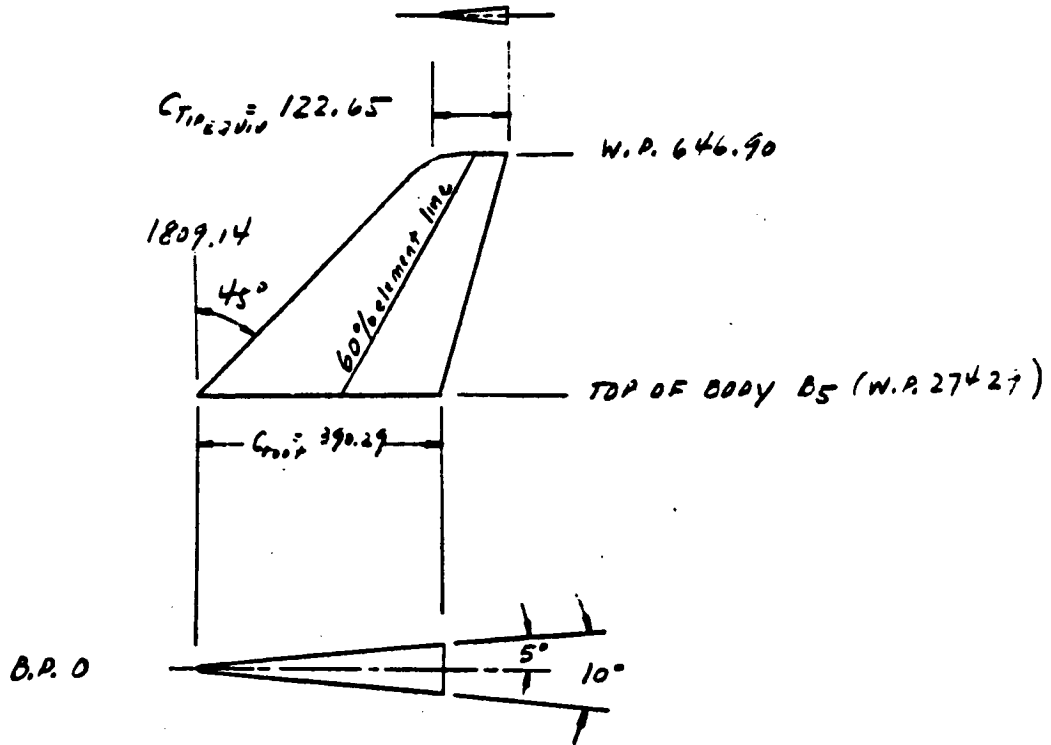


FIGURE 8. VERTICAL STABILIZER V17

NOTE: ALL DIMENSIONS ARE
MODE-SCALE (INCHES)

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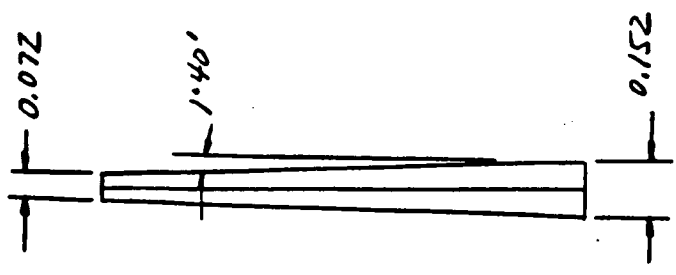
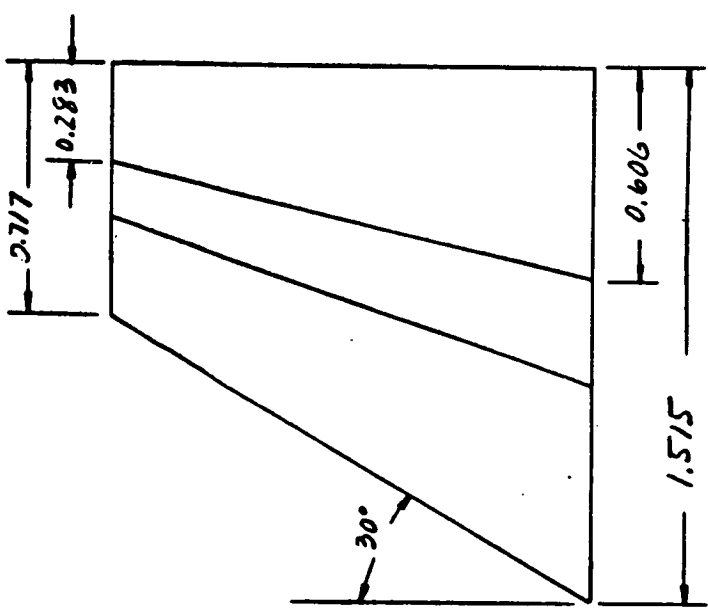
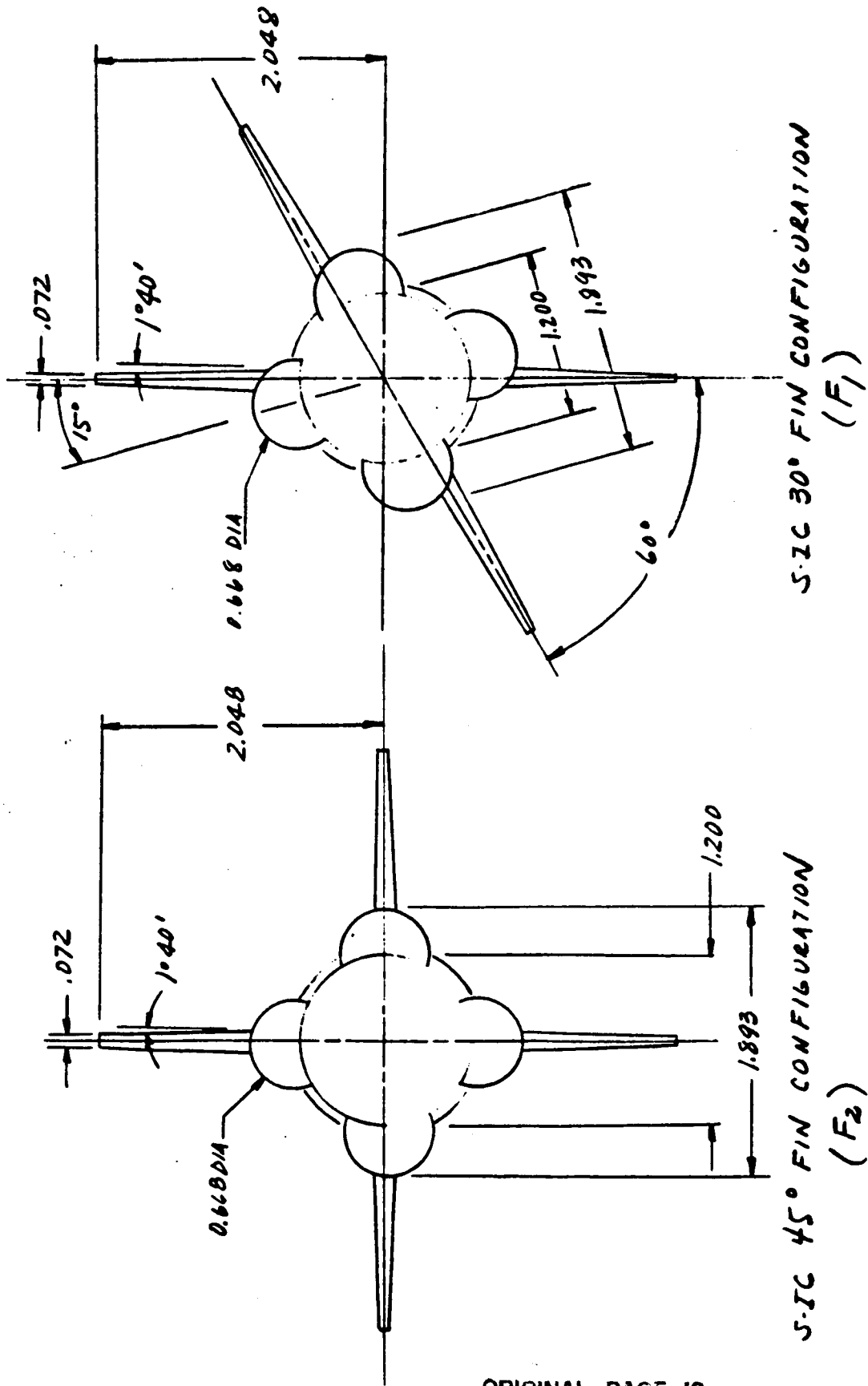


FIGURE 10. 900 FT² S-IG FIN

UNIQUE CONFIGS. BOOSTER
TBC
DELTA WING ORBITER
NR
DR#1055 C-1- 599

UNIQUE CONFIGS. BOOSTER
TBC
DELTA WING ORBITER
NR
DR#1055 C-1- 600

NOTE: ALL DIMENSIONS
ARE MODEL SCALE (INCHES)



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FIGURE 10. (CONTINUED) 694

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TEST # INT 485 DATA SET COLLATION SHEET
SHEET 1 of 2

PRETEST
 POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	SCHED.		PARAMETERS VALUES		# OF RUNS	NO. OF REPEATS (OR ALTERNATE INDEPENDENT VARIABLE)											
		1	2	1	2		3	4	5	6	7	8						
	OB (SHADOW GRAPH)	E	O			3	0.60	0.90	1.00	1.10	1.20	1.96						
	OB	O	E			3	00%	00%	00%	00%	00%							
R30021	OB	A	O			6	00%	00%	00%	01%	01%	08%						
R30022	OB	O	B			6	01%	01%	01%	01%	01%	08%						
R30041	OBFS ₁	A	O			3	01%	01%	01%	01%	01%	07%						
R30061	OBFS ₂					3	02%	02%	02%	02%	02%	12%						
R30081	OBFVD ₁					3	02%	02%	02%	02%	02%	13%						
R30101	OBFVD ₂					3	02%	02%	02%	02%	02%	18%						
R30091	OBVD ₂					3	03%	03%	03%	03%	03%	19%						
R30071	OBVD ₁					3	03%	03%	03%	03%	03%	19%						
R30051	OB5 ₂					3	03%	03%	03%	03%	03%	19%						
R30031	OB5 ₁					3	03%	03%	03%	03%	03%	19%						
R30011	OB					6	04%	04%	04%	04%	04%	08%						
R30072	OB	O	B			6	04%	04%	04%	04%	04%	08%						
R30111	GB	A	O			3	05%	05%	05%	05%	05%	11%						
R30122	GBF	O	B			3	05%	05%	05%	05%	05%	17%						
R30121	GBF	A	O			3	05%	05%	05%	05%	05%	17%						

7 13 19 25 31 37 43 49 55 61 67 75.76

CLM ICN ICYN CY CBL CPC CL CD CAB CAF IDPVAR(1) IDPVAR(2) NDV

COEFFICIENTS: $\alpha A = -1 - 8^\circ - 6^\circ - 4^\circ - 3^\circ - 0^\circ + 2^\circ + 4^\circ + 6^\circ + 8^\circ$
 $\beta B = -3^\circ - 0^\circ + 3^\circ + 4^\circ + 6^\circ + 8^\circ$
 SCHEDULES $\alpha = 0^\circ$, $\beta = 0^\circ$, $\alpha + \beta E = 0^\circ + 10^\circ$

UNIQUE CONFIGS. BOOSTER
TBC
DELTA WING ORBITER
NR
OR#1091 C-1- 601

UNIQUE CONFIGS. BOOSTER
 TBC
 DELTA WING ORBITER
 NR
 DR#1091 C-1- 602

TEST TWT #485 DATA SET COLLATION SHEET

POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	SCHD.		PARAMETERS/VALUES	NO. of RUNS	MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE)								
		a	b			0.60	0.90	1.00	1.10	1.20	1.96			
R30131	OBFS3	A	O		3		0.6%	0.6%						
R30132	OBFS3	O	B		3		0.6%	0.6%						
R30202	OBFVD ₂ (25% DEV)	O	B		6	0.7%	0.7%	0.7%	0.7%	0.7%	0.8%			
R30201	OBFVD ₂ "	A	O		5	0.7%	0.6%	0.6%	0.6%	0.6%	0.8%			
	OBFVD ₂ (5% DEV)	A	O		1		0.7%							
	OBFVD ₂ "	O	B		1		0.6%							
	OBFS3 "	O	B		1		0.9%							
	OBFS3 "	A	O		1		0.8%							

1	7	13	19	25	31	37	43	49	55	61	67	7576
CLM	ICN	ICVN	ICY	ICBL	CPC	CL	CD	CAB	CAF	IDPVAR(1)	IDPVAR(2)	NDV
												10

COEFFICIENTS:
 $\alpha A = -8^\circ, -6^\circ, -4^\circ, -2^\circ, 0^\circ, +2^\circ, +4^\circ, +6^\circ, +8^\circ$
 $\alpha B = -2^\circ, 0^\circ, +2^\circ, +4^\circ, +6^\circ, +8^\circ$
 SCHEDULES
 $\alpha + \beta E = 0^\circ, +10^\circ$

NASA-MSFC-MAP

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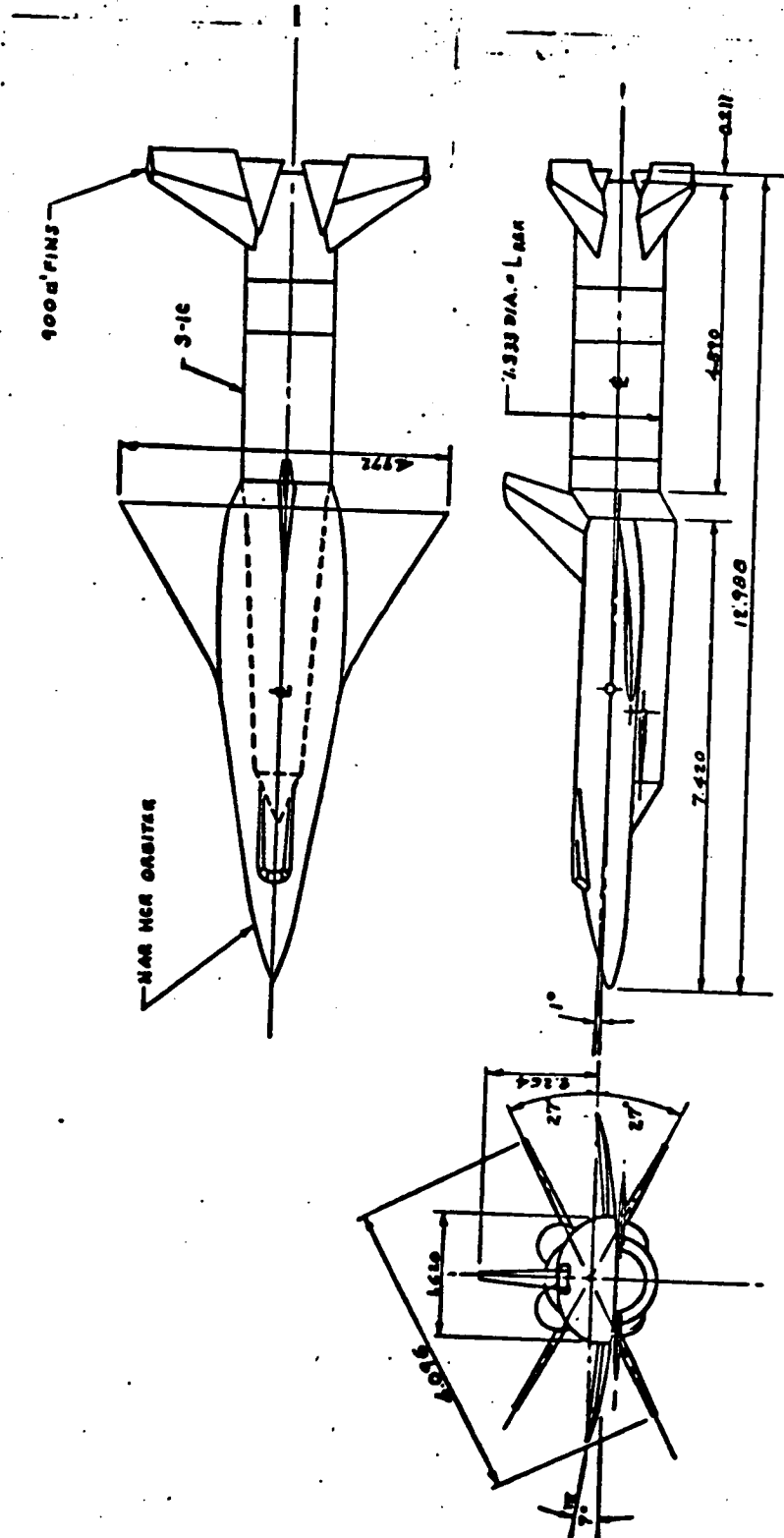


FIGURE 10. 0.003366 SCALE S-1C/MAR HCR ORBITER MODEL
DRAWING NOT TO SCALE

UNIQUE CONFIGS. BOOSTER
TBC
DELTA WING ORBITER
NR
DR#1091 C-1-603

697

UNIQUE CONFIGS. BOOSTER
 TBC
 DELTA WING ORBITER
 NR
 DR#1091 C-1- 604

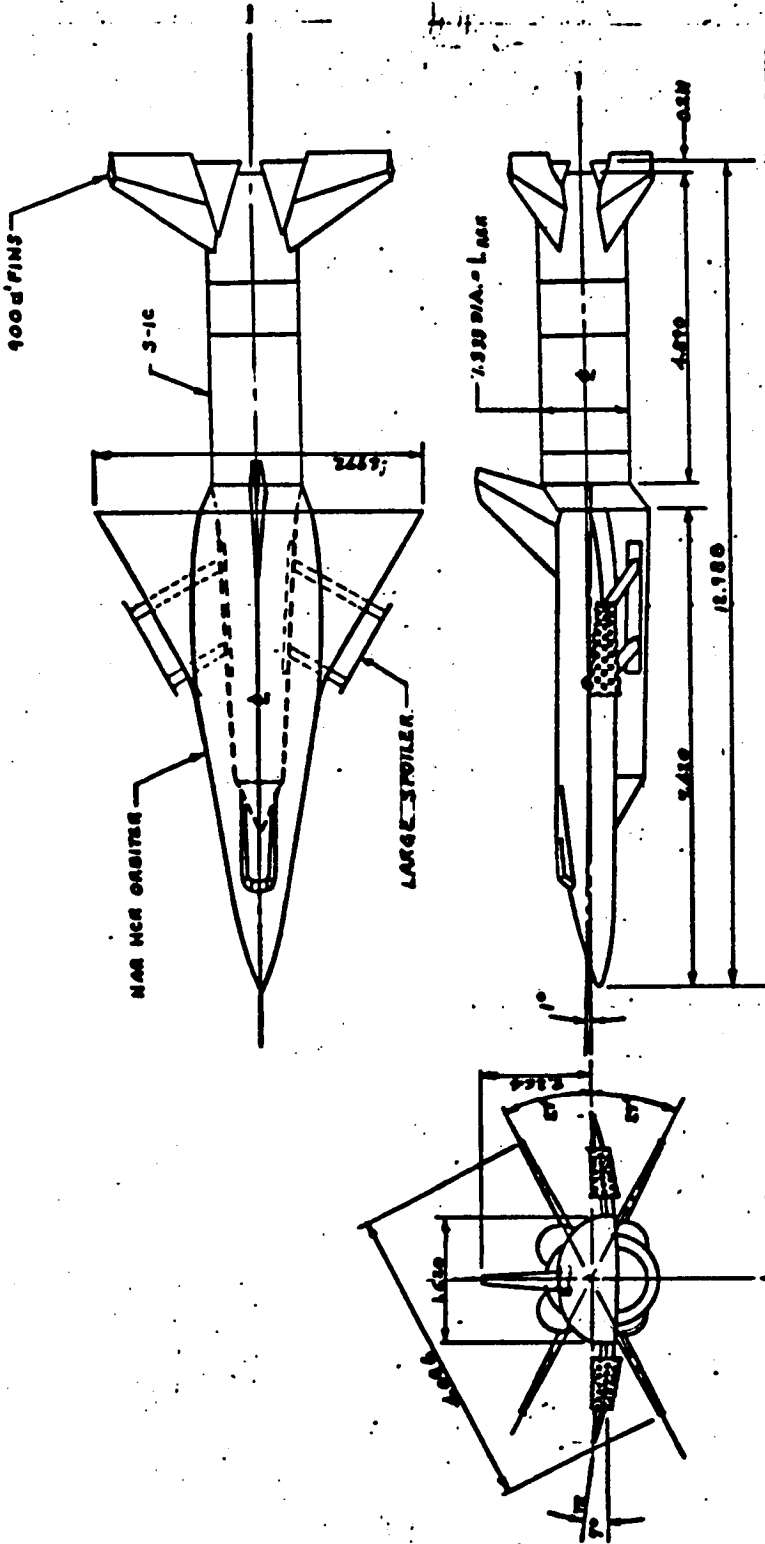


FIGURE 11. S-IC/NAR HCR ORBITER WITH SPOILERS, 0.003366 SCALE MODEL

DRAWING NOT TO SCALE

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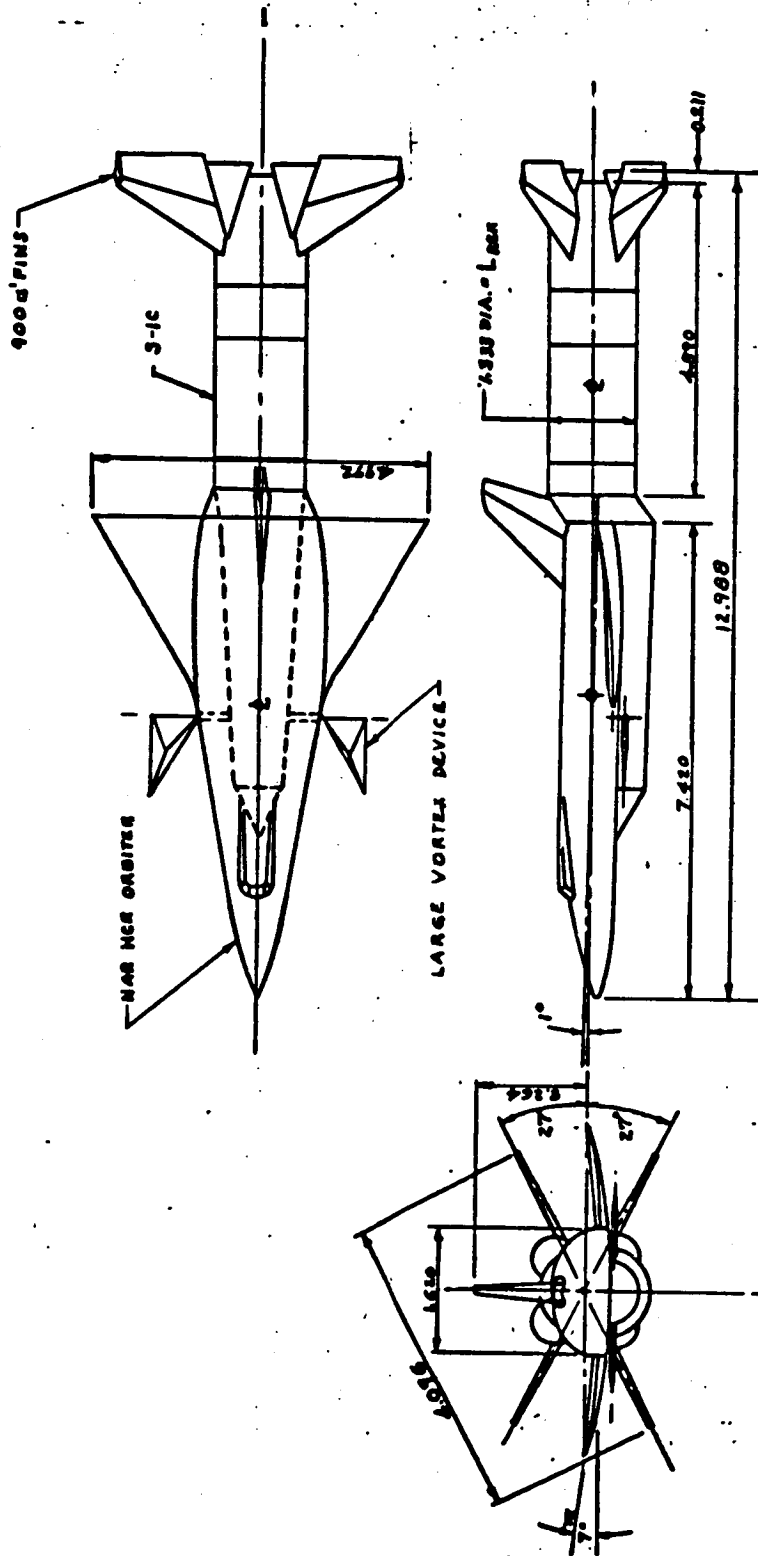


FIGURE 12. S-IC/NAR HCR ORBITER WITH VORTEX DEVICE, 0.003366 SCALE MODEL

DRAWING NOT TO SCALE

UNIQUE CONFIGS. BOOSTER
TBC
DELTA WING ORBITER
NR
DR#1091 C-1-605

UNIQUE CONFIGS. BOOSTER
TBC
DELTA WING ORBITER
NR
DR#1091 C-1- 606

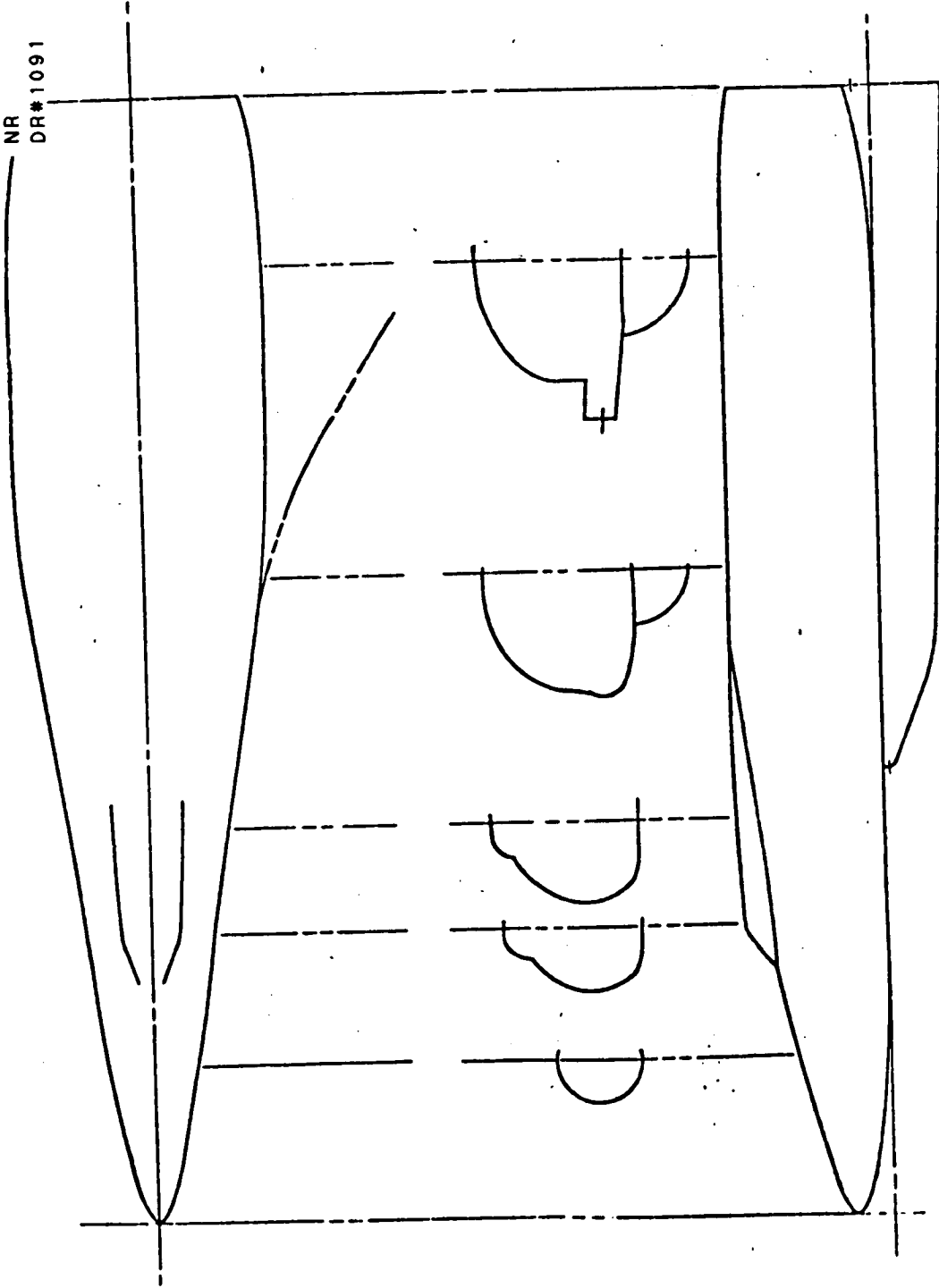


FIGURE 13. NAR HCR ORBITER BODY WITH CRADLE

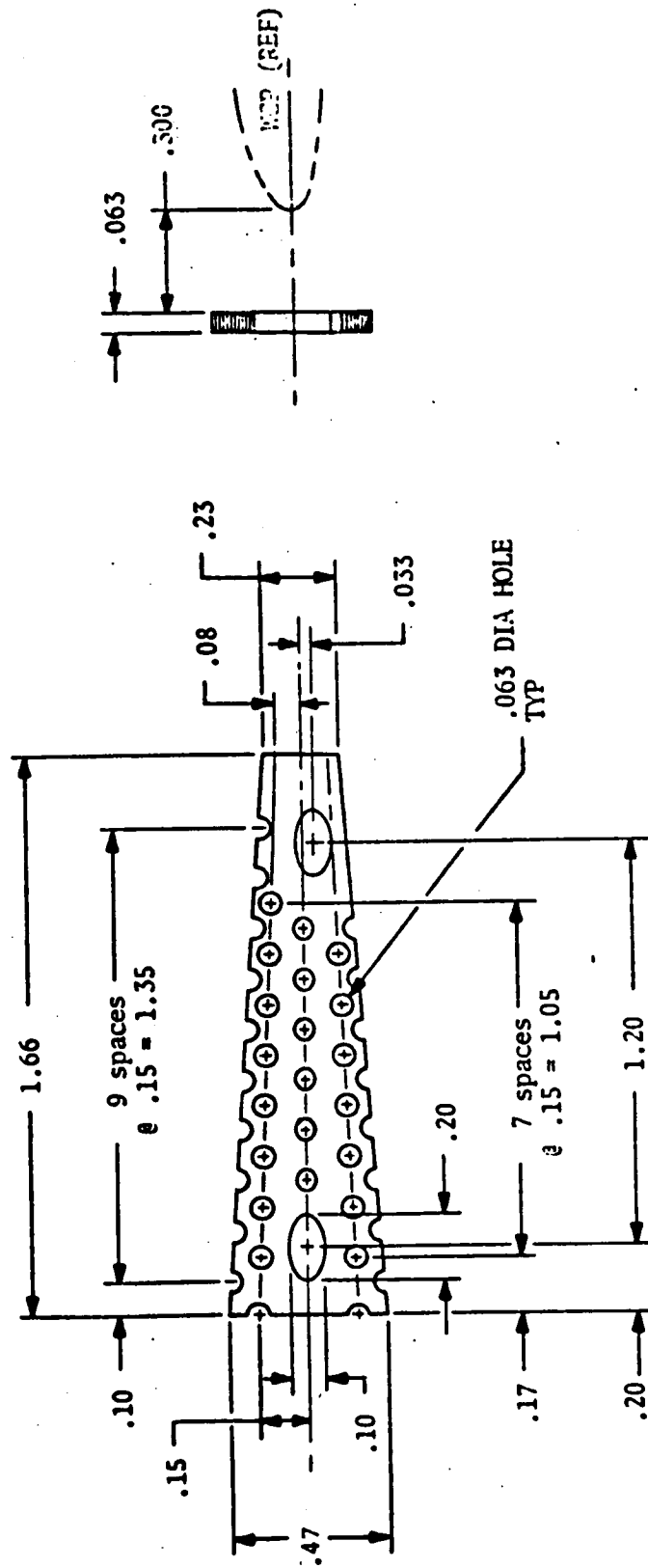


FIGURE 14. LARGE SPOILER - S1

UNIQUE CONFIGS. BOOSTER
TBC
DELTA WING ORBITER
NR
DR#1091 C-1- 607

UNIQUE CONFIGS. BOOSTER
 TBC
 DELTA WING ORBITER
 NR
 DR#1091 C-1- 608

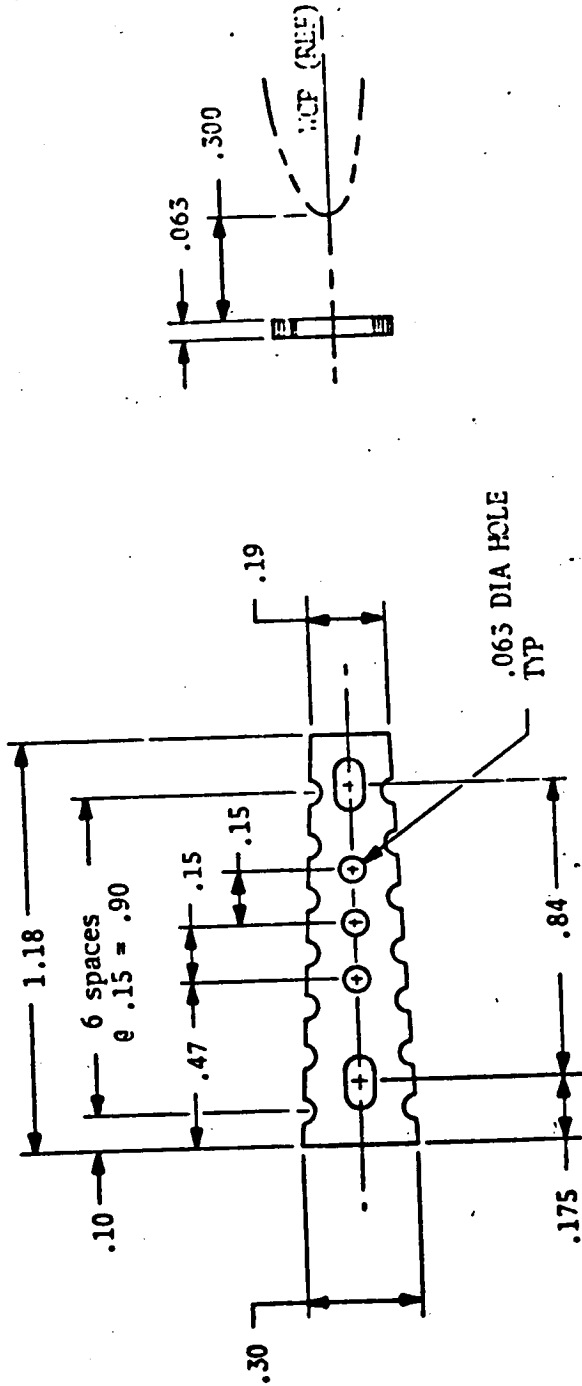


FIGURE 15. SMALL SPOILER - S2

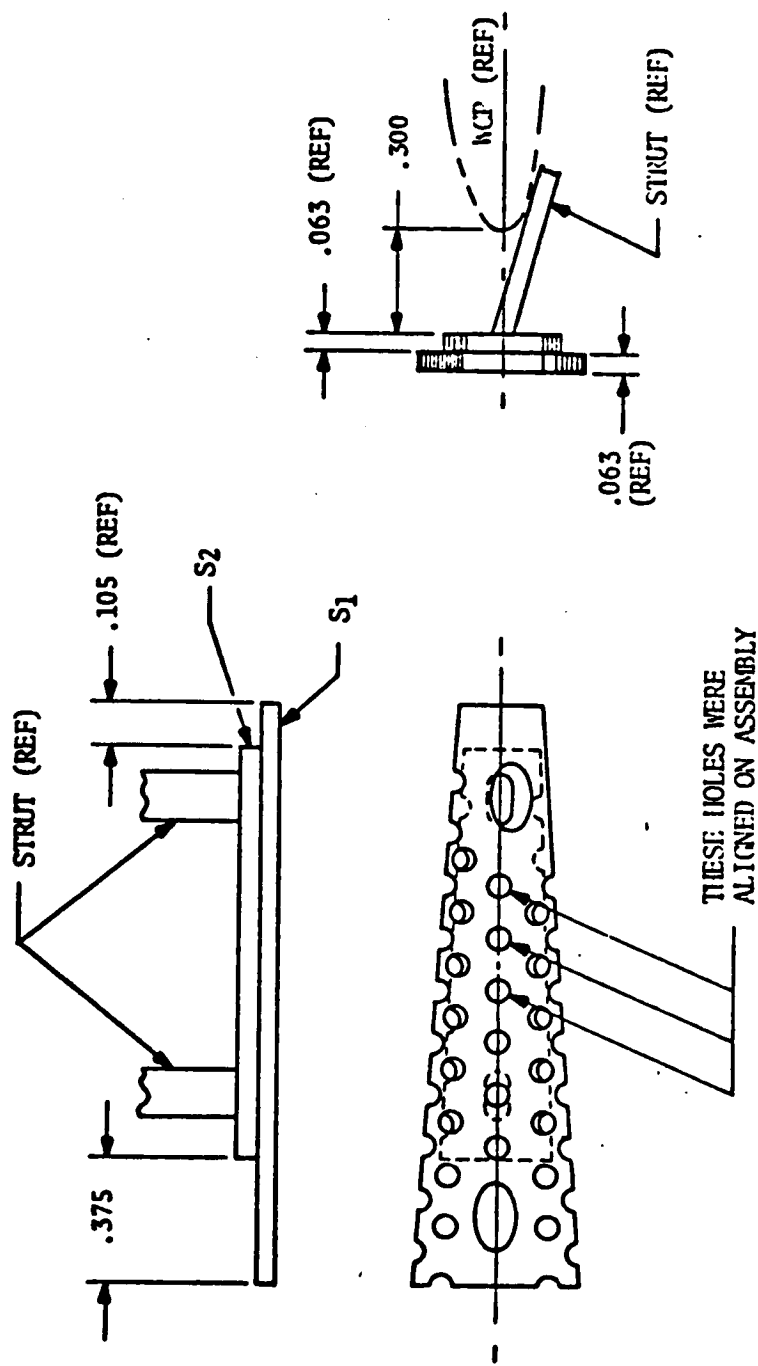


FIGURE 16. SPOILER S₃
(MODIFIED S₁/S₂)

UNIQUE CONFIGS. BOOSTER
TBC
DELTA WING ORBITER
NR
DR#1091 C-1- 609

UNIQUE CONFIGS. BOOSTER
TBC
DELTA WING ORBITER
NR
DR#1091 C-1- 610

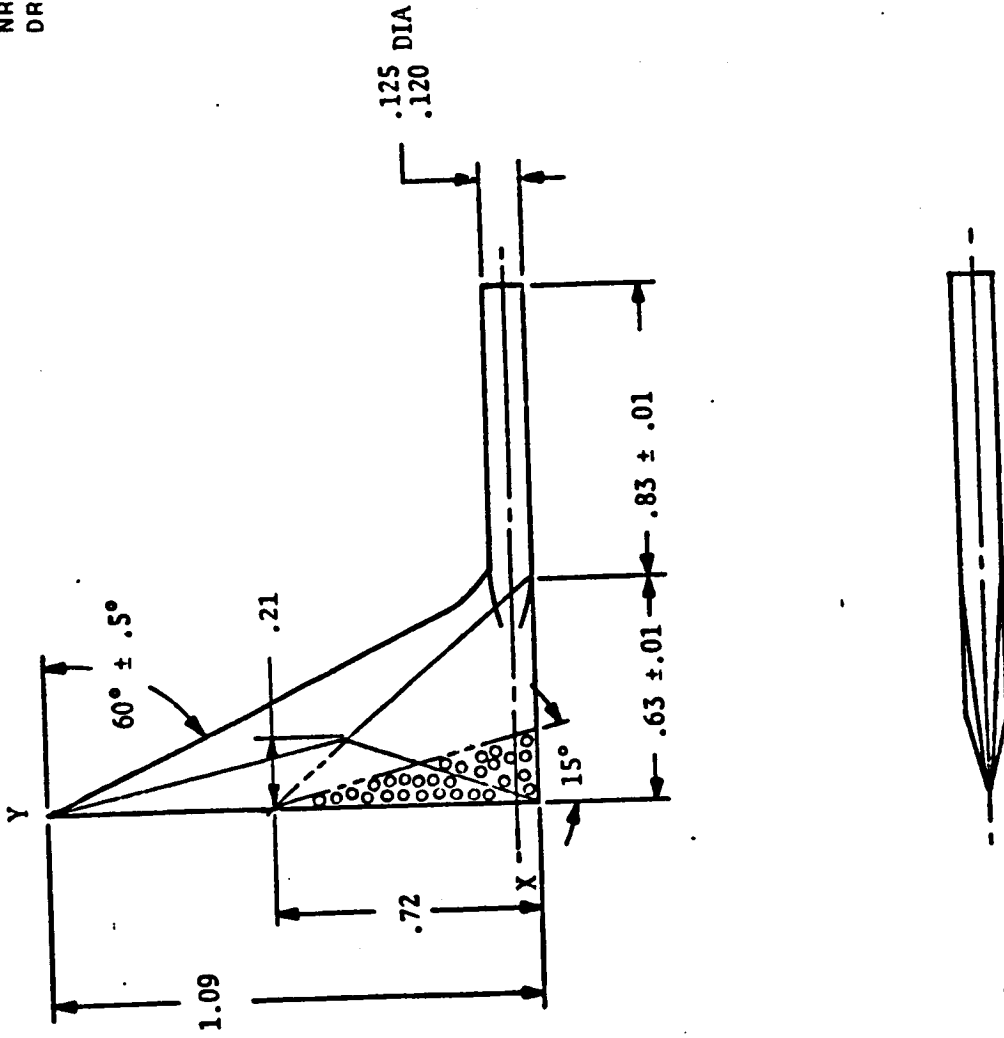


FIGURE 17. LARGE VORTEX DEVICE - VD1

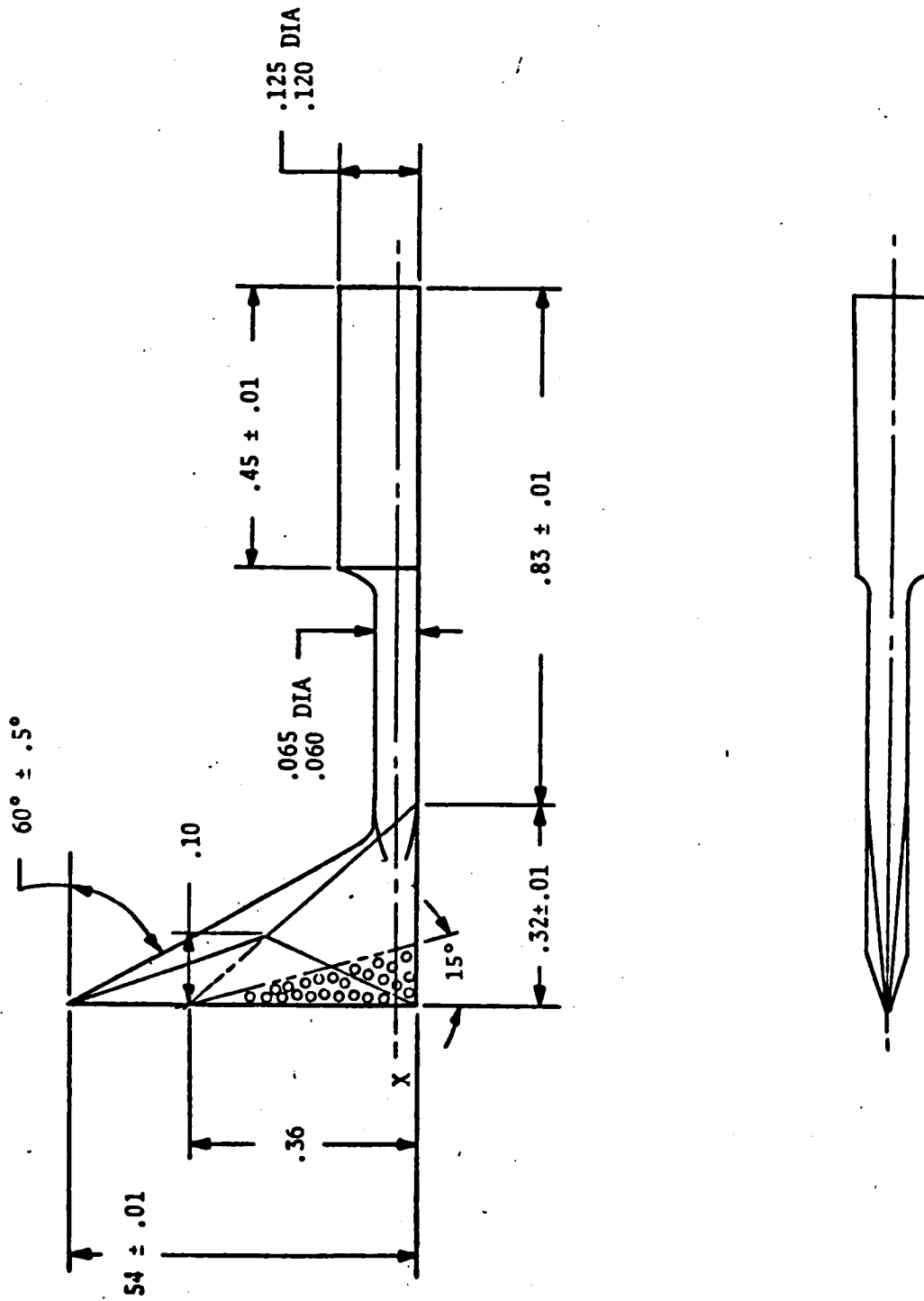


FIGURE 18. SMALL VORTEX DEVICE - VD2

UNIQUE CONFIGS. BOOSTER
 TBC
 DELTA WING ORBITER
 NR
 DR#1091 C-1- 611

UNIQUE CONFIGS. BOOSTER
 TBC
 DELTA WING ORBITER
 NR
 DR#1091 C-1- 612

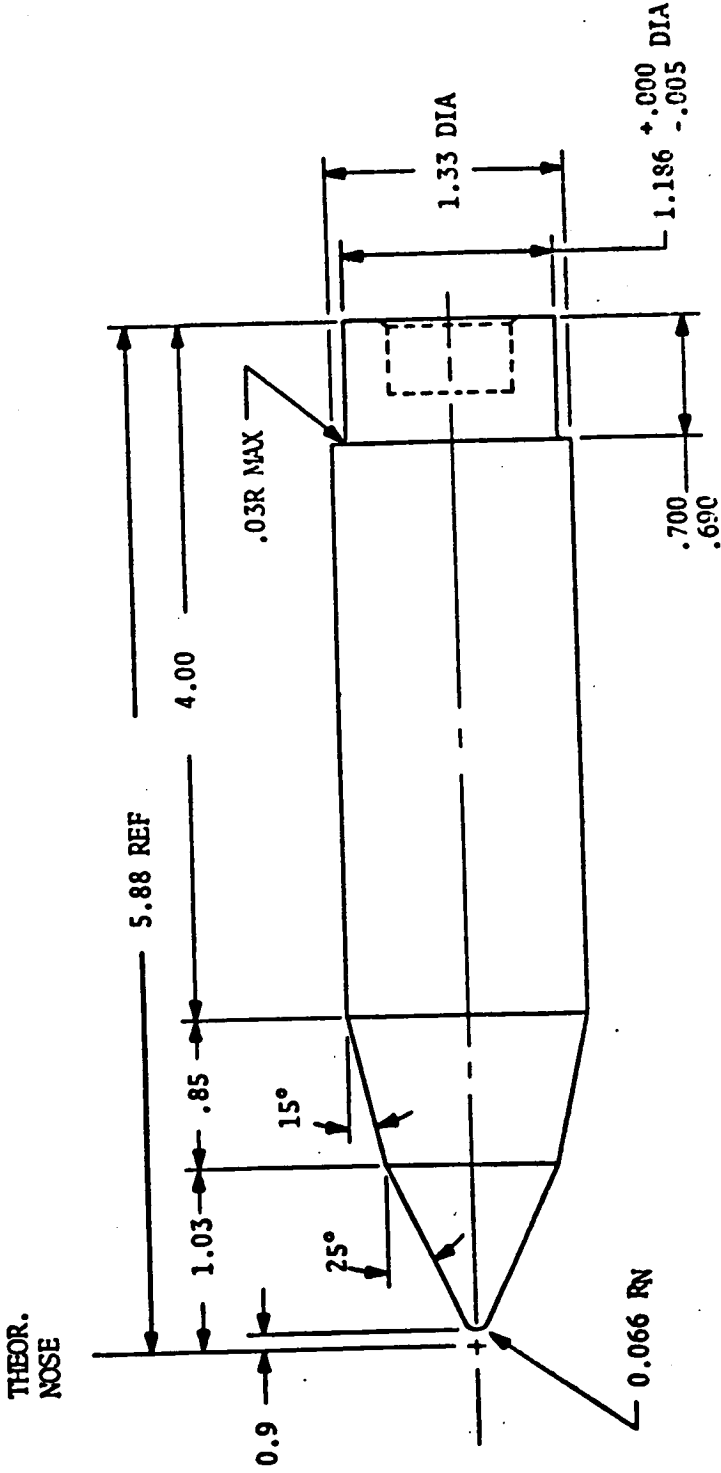


FIGURE 19. MLV CONE FRUSTUM CYLINDER FOREBODY - G

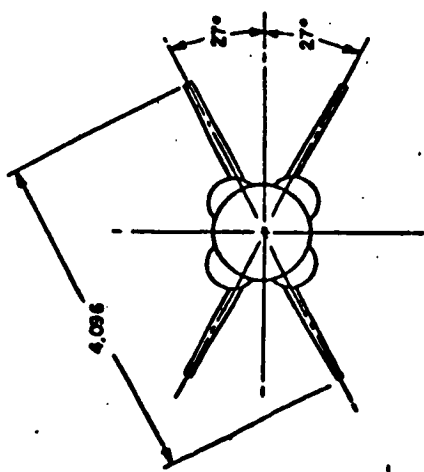
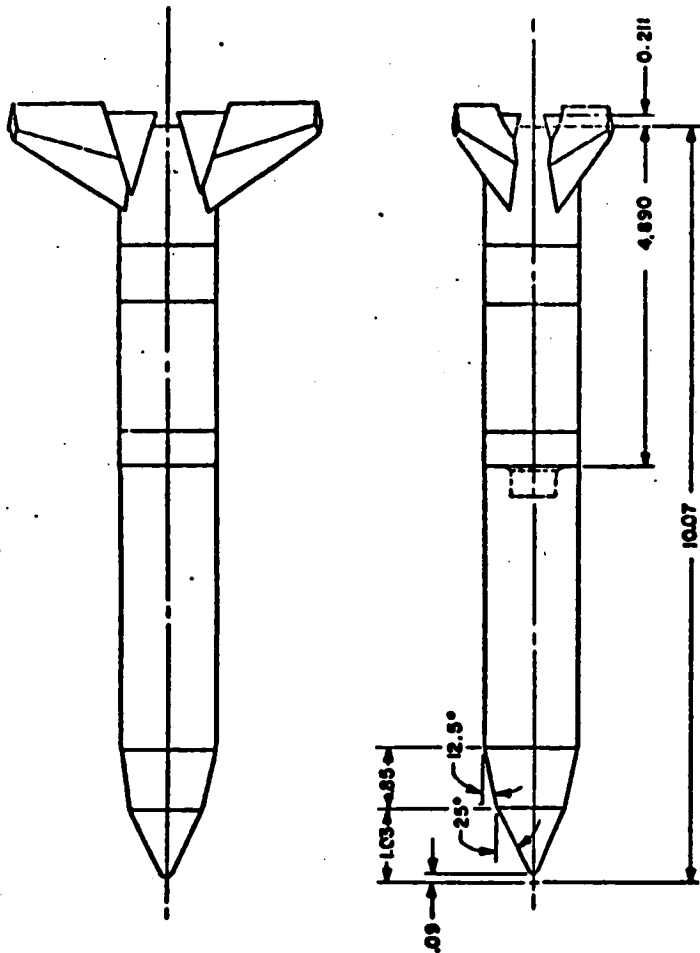


FIGURE 20.
0.003366 SCALE S-IC/MLV CONE FRUSTUM CYLINDER (G)

UNIQUE CONFIGS. BOOSTER
TBC
DELTA WING ORBITER
NR
DR#1091 C-1- 613

UNIQUE CONFIGS. BOOSTER
 TBC
 DELTA WING ORBITER
 NR
 DR#1091 C-1- 614

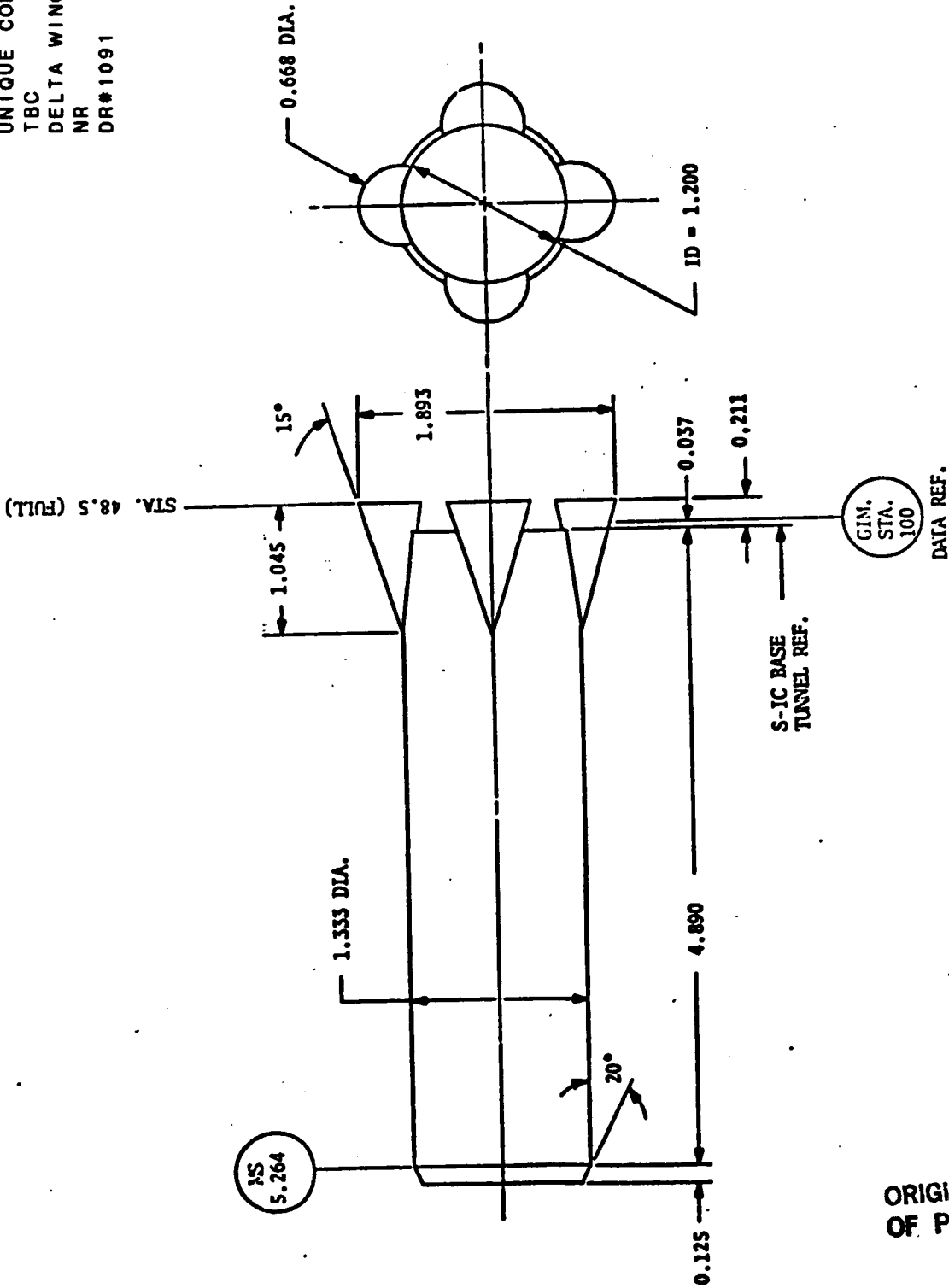


FIGURE 21. SATURN V/S-IC BOOSTER
 0.003366 SCALE

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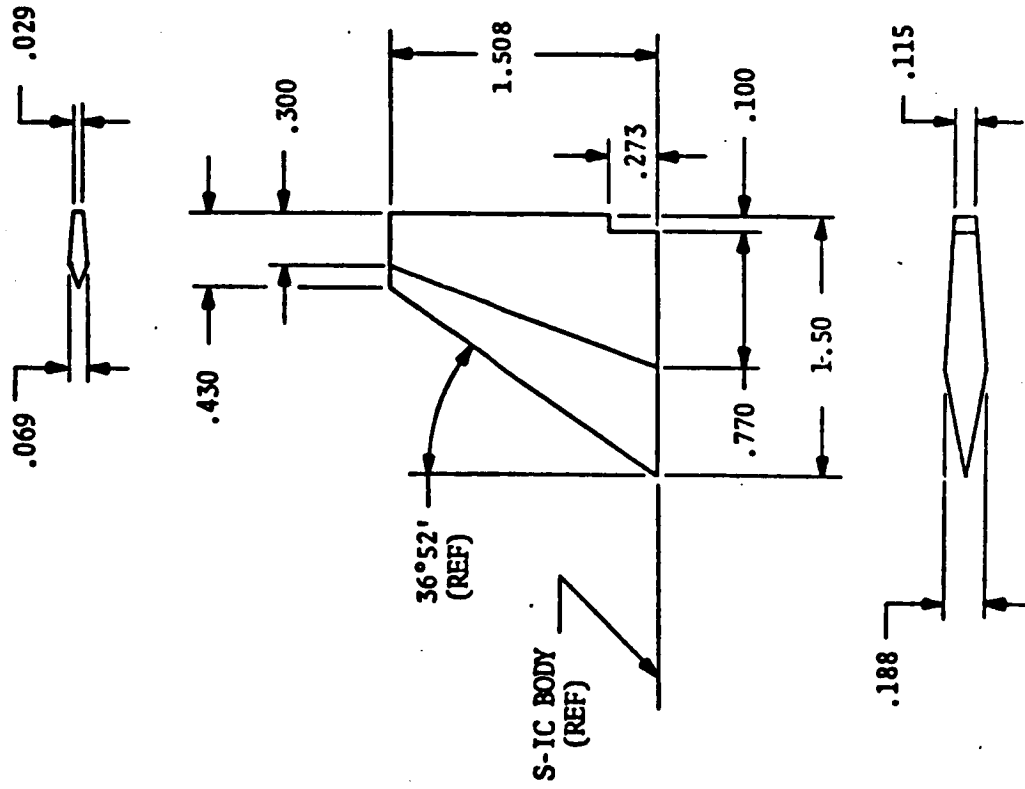
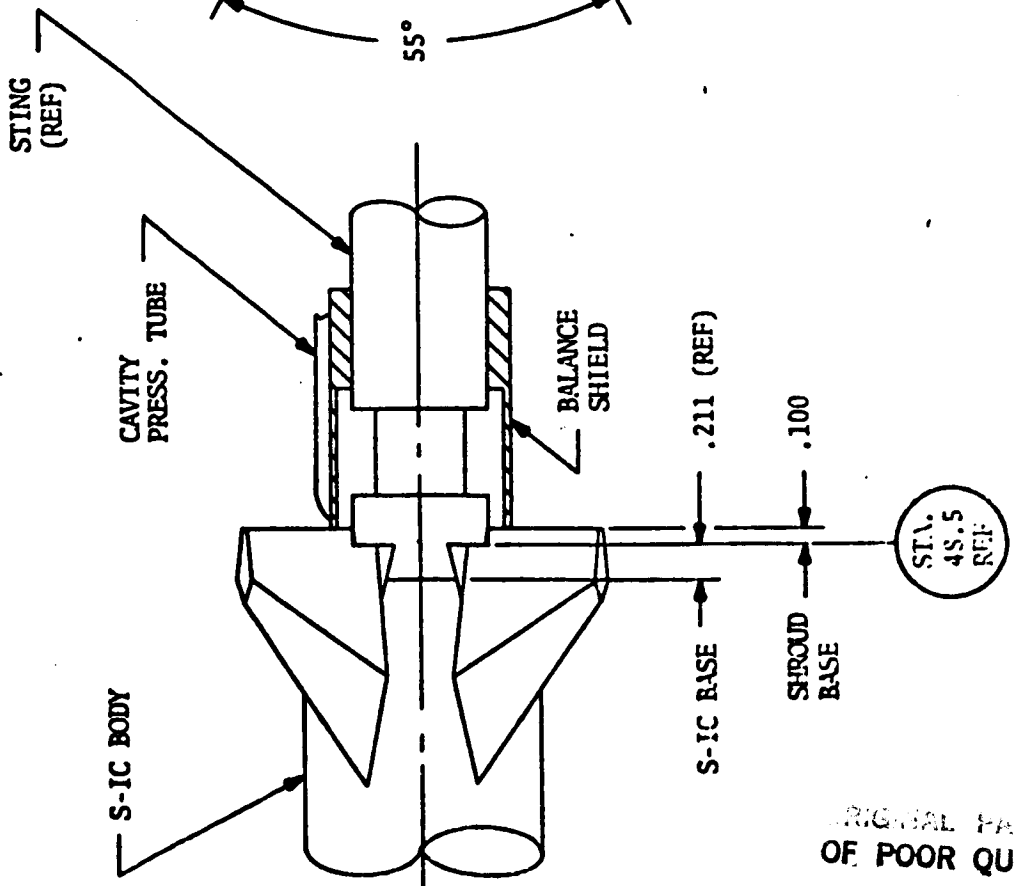
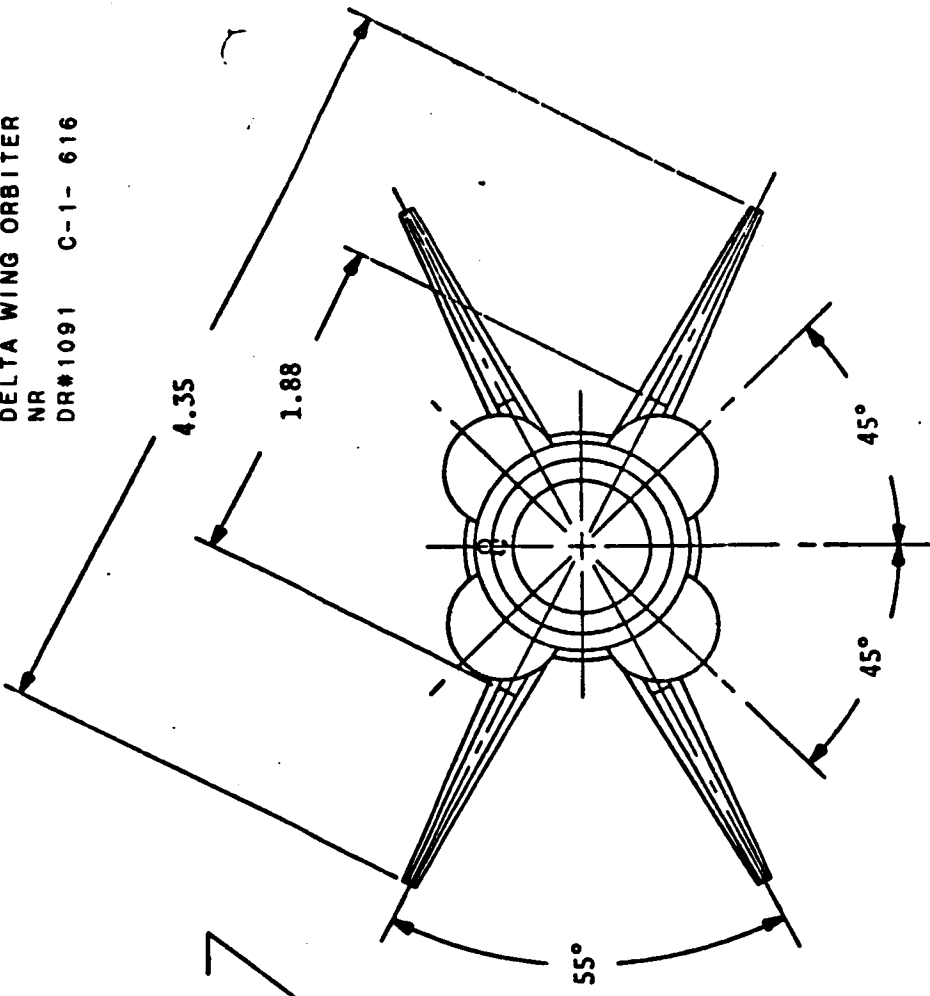


FIGURE 22. 884 SQ. FT. S-IC FIN

UNIQUE CONFIGS. BOOSTER
 TBC
 DELTA WING ORBITER
 NR
 DR#1091 C-1- 615

UNIQUE CONFIGS. BOOSTER
 TBC
 DELTA WING ORBITER
 NR
 DR#1091 C-1- 616



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FIGURE 23. 884 SQ. FT. S-IC 27° FIN CONFIGURATION

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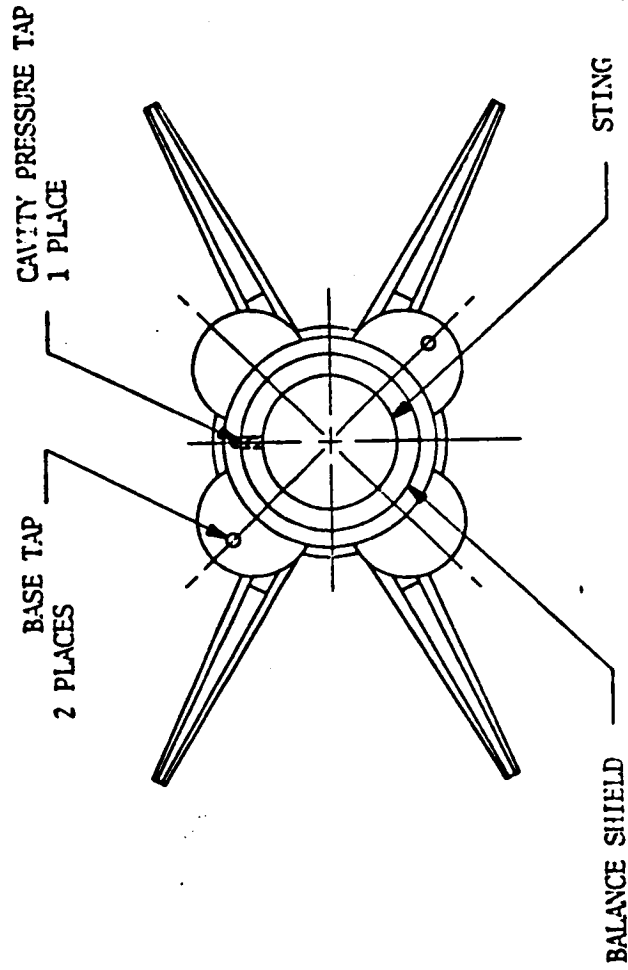


FIGURE 24. BASE PRESSURE TAP LOCATIONS

UNIQUE CONFIGS. BOOSTER
TBC
DELTA WING ORBITER
NR
DR#1091 C-1- 617

UNIQUE CONFIGS. BOOSTER
 TBC
 STRAIGHT WING ORBITER
 GAC
 DR#1044 C-1- 618
 POSTTEST

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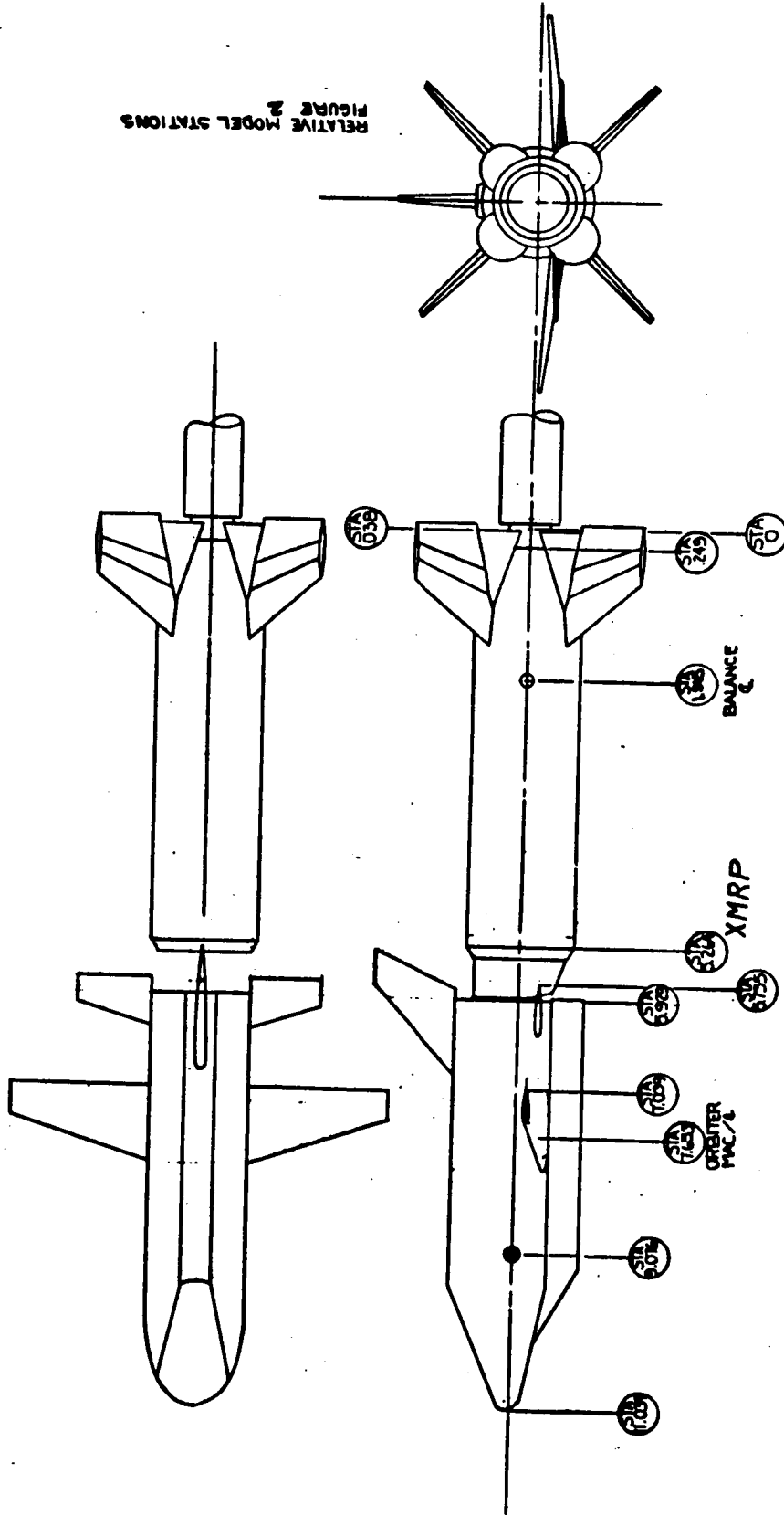
TEST MSFC TWT 470 DATA SET COLLATION SHEET

DATA SET IDENTIFIER	CONFIGURATION	SCHD.		PARAMETERS/VALUES			NO. of RUNS	MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE)									
		a	B	i ₀	i _{we}	i _{he}		Q _B	0.6	0.9	1.0	1.1	1.2	1.46	1.96		
R24011	BE ₁ OWHVS	A	0	0	+4	0	0	001/0	002/003/004/005/006/007/0	0.6	0.9	1.0	1.1	1.2	1.46	1.96	1.5
R24021		A	0	0			7	023/0	024/0	0.6	0.9	1.0	1.1	1.2	1.46	1.96	1.5
R24031		C	-2				7	029/0	030/0	0.6	0.9	1.0	1.1	1.2	1.46	1.96	1.5
R24041			-4				7	035/0	036/0	0.6	0.9	1.0	1.1	1.2	1.46	1.96	1.5
R24051	BOWHVS		0				7	043/0	044/0	0.6	0.9	1.0	1.1	1.2	1.46	1.96	1.5
R24061			-2				7	050/0	051/0	0.6	0.9	1.0	1.1	1.2	1.46	1.96	1.5
R24071			-4				7	057/0	058/0	0.6	0.9	1.0	1.1	1.2	1.46	1.96	1.5
R24081	BE ₁ OWHVS		-105				8	064/0	065/0	0.6	0.9	1.0	1.1	1.2	1.46	1.96	1.5
R24091					-5		7	071/0	072/0	0.6	0.9	1.0	1.1	1.2	1.46	1.96	1.5
R24101	BOHVS				0		1	078/0	079/0	0.6	0.9	1.0	1.1	1.2	1.46	1.96	1.5
R24111	BE ₁ OWHVS						4	085/0	086/0	0.6	0.9	1.0	1.1	1.2	1.46	1.96	1.5
R24121	BE ₂ OWHVS			+4		45	4	092/0	093/0	0.6	0.9	1.0	1.1	1.2	1.46	1.96	1.5
R24131						0	4	100/0	101/0	0.6	0.9	1.0	1.1	1.2	1.46	1.96	1.5
R24132	BE ₁ OWHVS	O	B				7	107/0	108/0	0.6	0.9	1.0	1.1	1.2	1.46	1.96	1.5
R24022	BE ₁ OWHVS	O	B				8	114/0	115/0	0.6	0.9	1.0	1.1	1.2	1.46	1.96	1.5
R24141		C	O	+2			4	143/0	144/0	0.6	0.9	1.0	1.1	1.2	1.46	1.96	1.5
R24151	BE ₁ OWHY			+4			4	151/0	152/0	0.6	0.9	1.0	1.1	1.2	1.46	1.96	1.5
R24161	BE ₁ OW,HVS			+4			8	160/0	161/0	0.6	0.9	1.0	1.1	1.2	1.46	1.96	1.5

1 7 13 19 25 31 37 43 49 55 61 67 7576
 CLM ICN CYN CY CBL CA CAF CFB1 CPB2 CPCAV IDPVAR(1) IDPVAR(2) NDV
 10

COEFFICIENTS:
 a or B
 SCHEDULES
~~CA = -10, -8, -6, -4, -3, -2, -1, 0, 1, 2, 3, 4, 6, 8, 10~~
~~CB = -8, -6, -4, -3, -2, -1, 0, 1, 2, 3, 4, 6, 8~~
~~AB = -1.5, -1.0, 0, 1, 2, 4, 6, 8, 10, 12, 14, 16~~

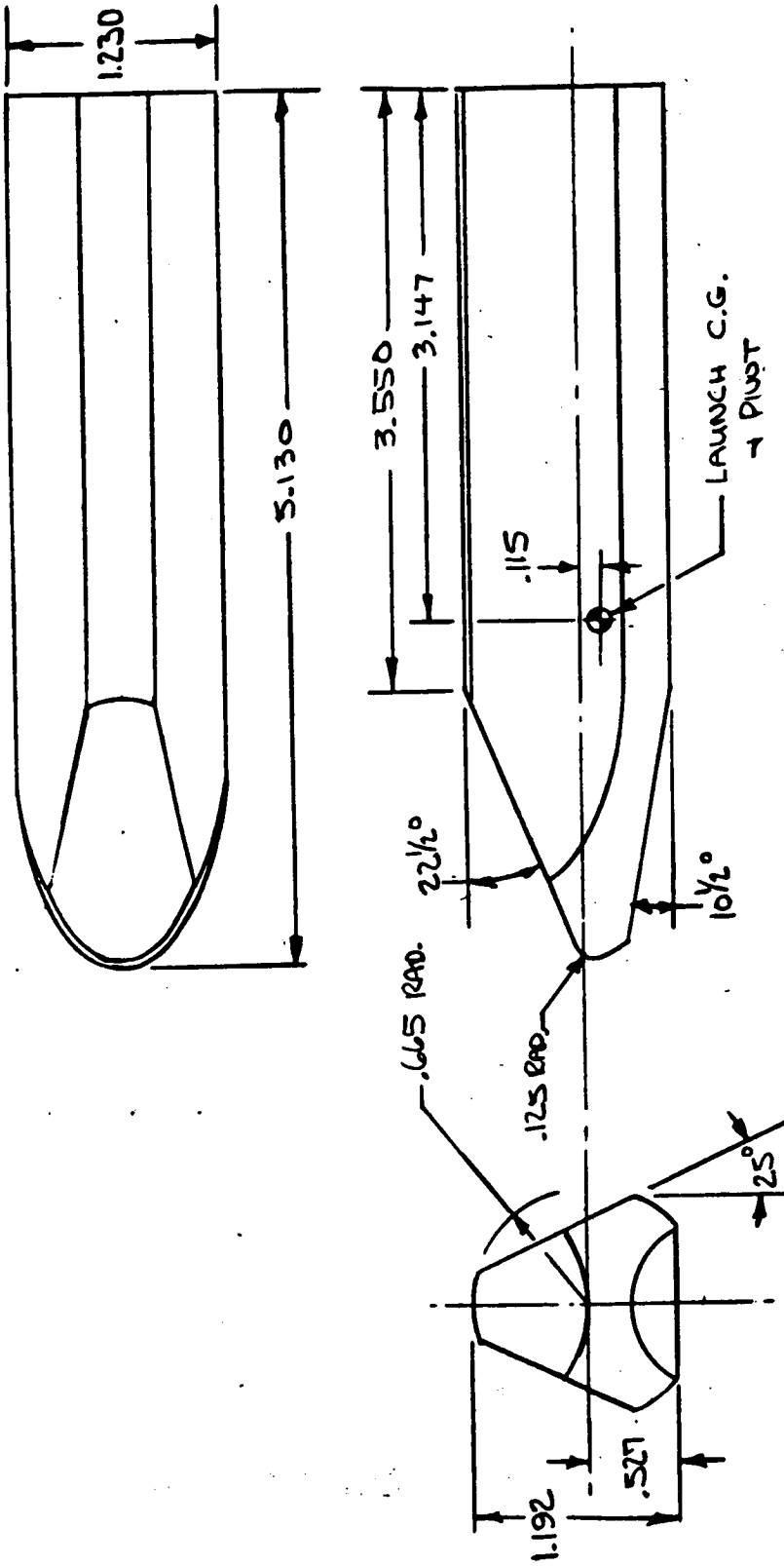
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OF POOR QUALITY



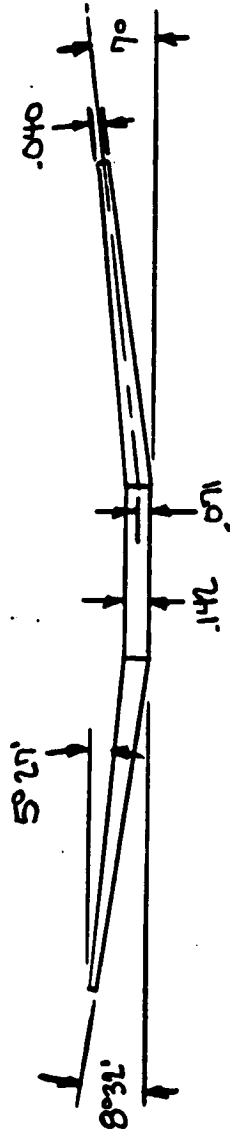
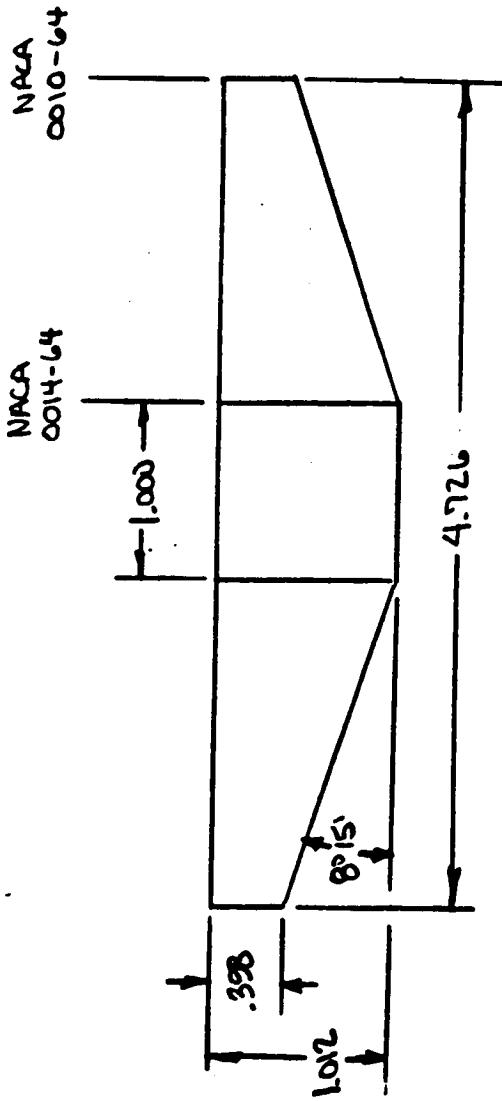
RELATIVE MODEL STATIONS
FIGURE 2

UNIQUE CONFIGS. BOOSTER
TBC
STRAIGHT WING ORBITER
GAC
DR#1044 C-1- 619

UNIQUE CONFIGS. BOOSTER
 TBC
 STRAIGHT WING ORBITER
 GAC
 DR#1044 C-1- 620



ORBITER BODY - 0
 FIGURE 3



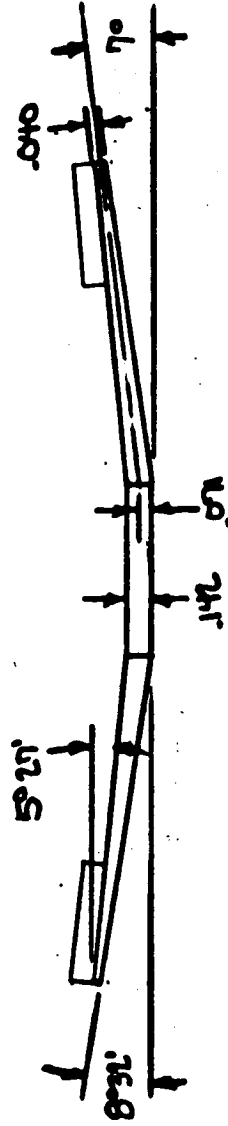
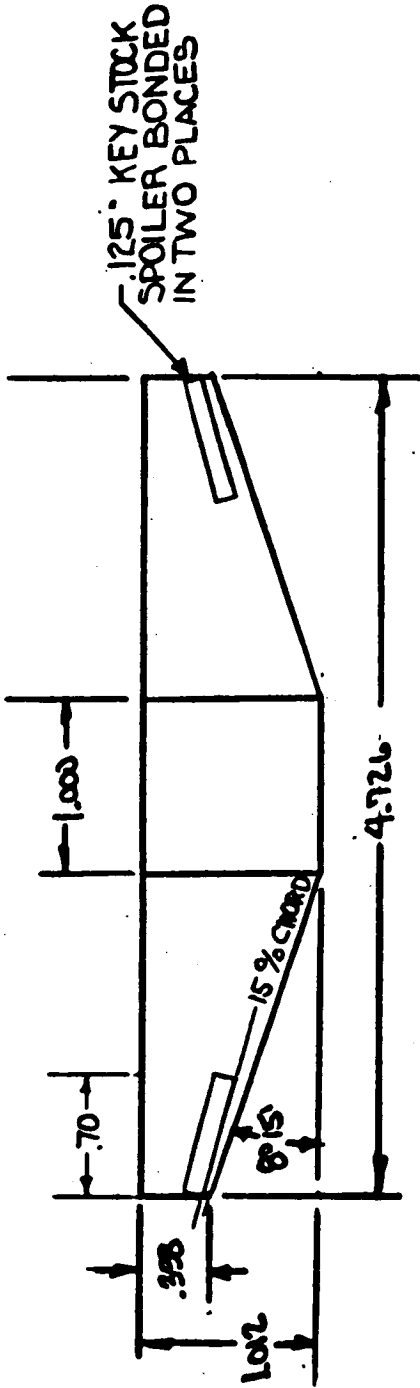
ORBITER WING - W
FIGURE 4

UNIQUE CONFIGS. BOOSTER
 TBC
 STRAIGHT WING ORBITER
 GAC
 DR#1044 C-1- 621

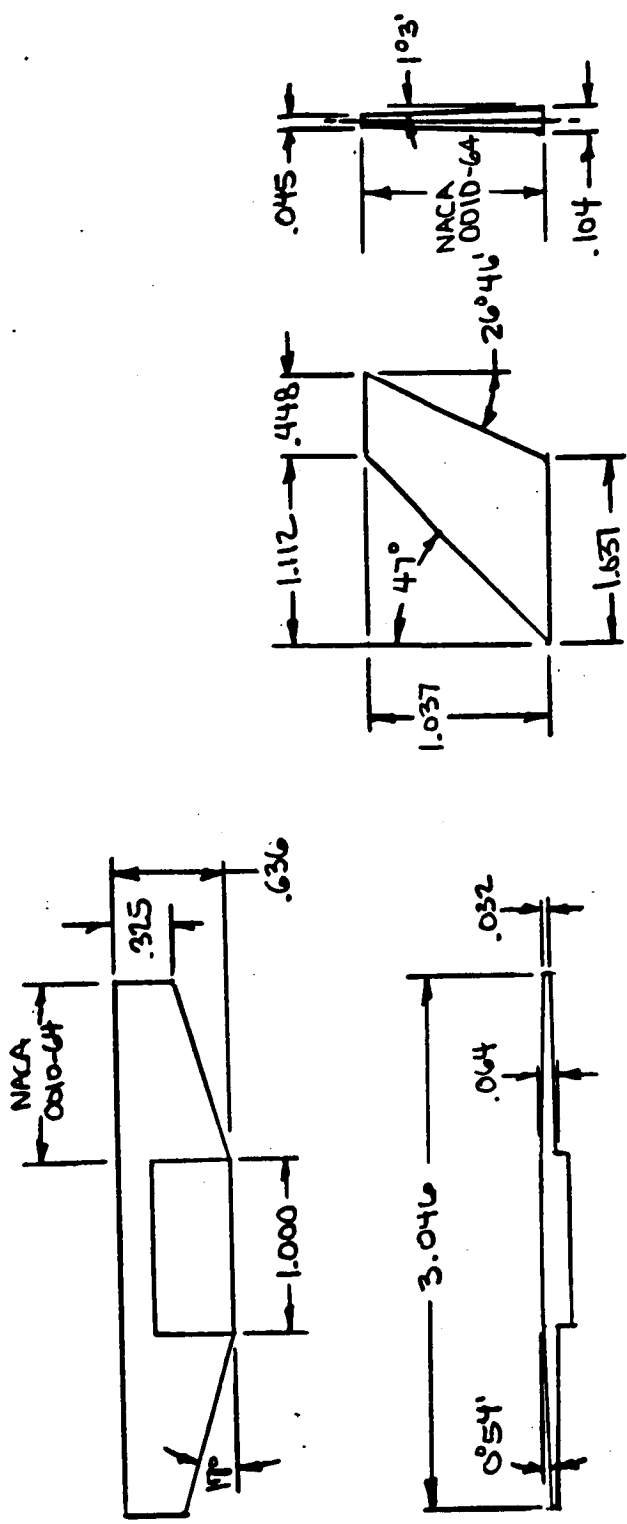
UNIQUE CONFIGS. BOOSTER
 TBC
 STRAIGHT WING ORBITER
 GAC
 DR#1044 C-1- 622

NACA
 0010-64

NACA
 0014-64



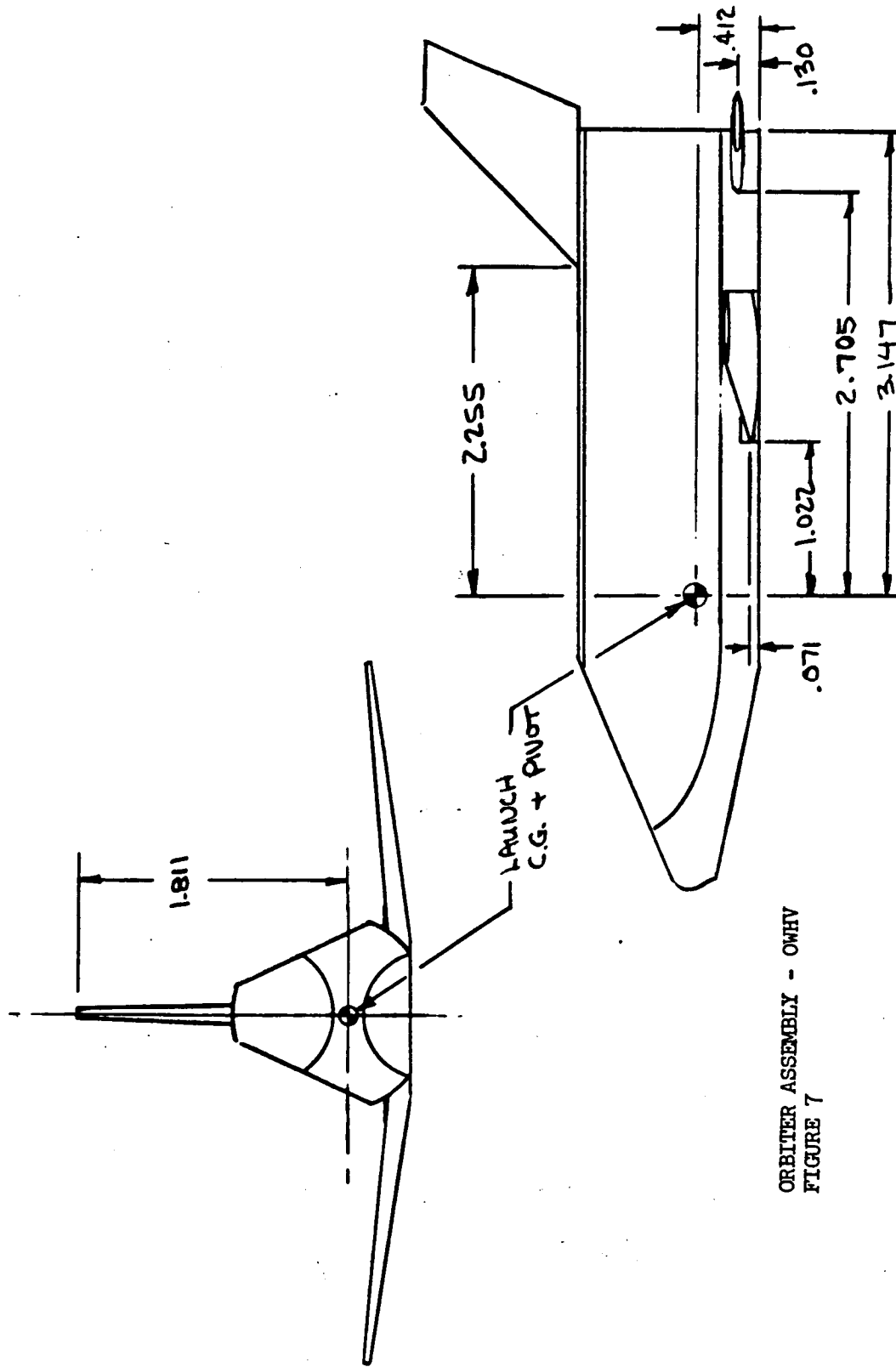
ORBITER WING WITH SPOILERS W1
 FIGURE 5



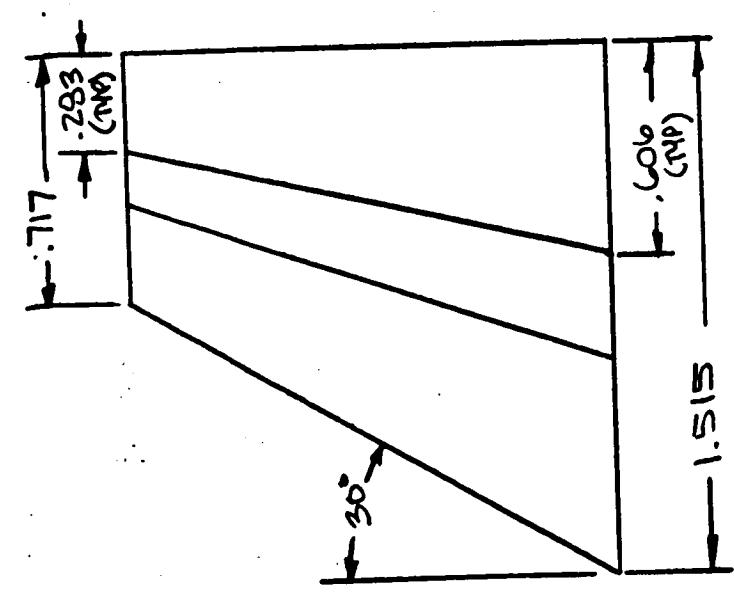
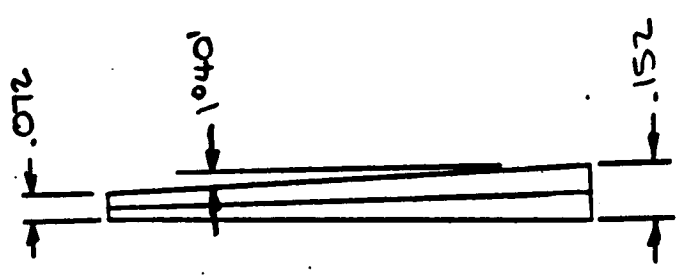
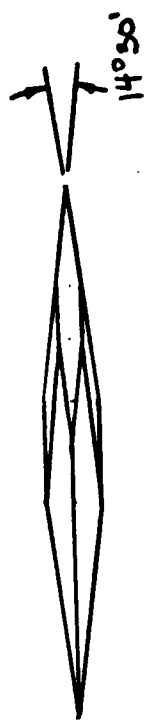
ORBITER HORIZONTAL TAIL H,
 VERTICAL TAIL - V
 FIGURE 6

UNIQUE CONFIGS. BOOSTER
 TBC
 STRAIGHT WING ORBITER
 GAC
 DR#1044 C-1- 623

UNIQUE CONFIGS. BOOSTER
TBC
STRAIGHT WING ORBITER
GAC
DR#1044 C-1- 624



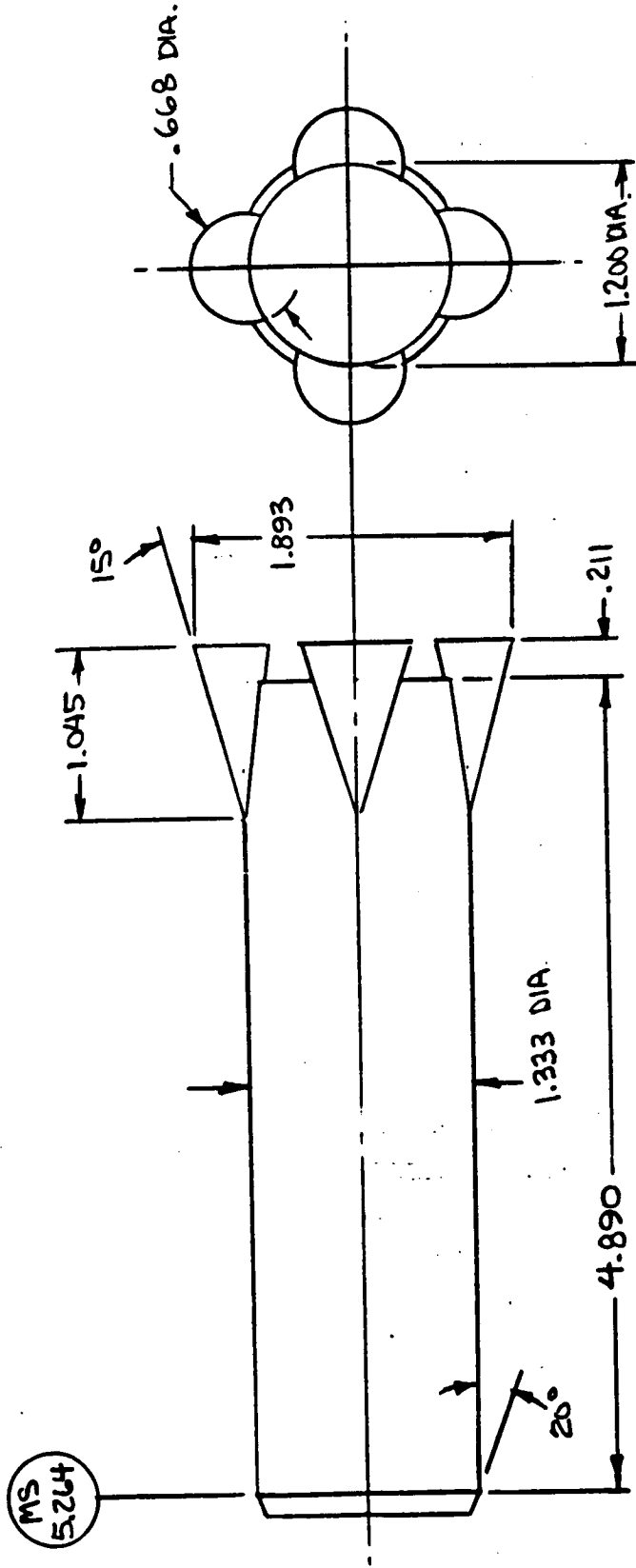
ORBITER ASSEMBLY - OWHV
FIGURE 7



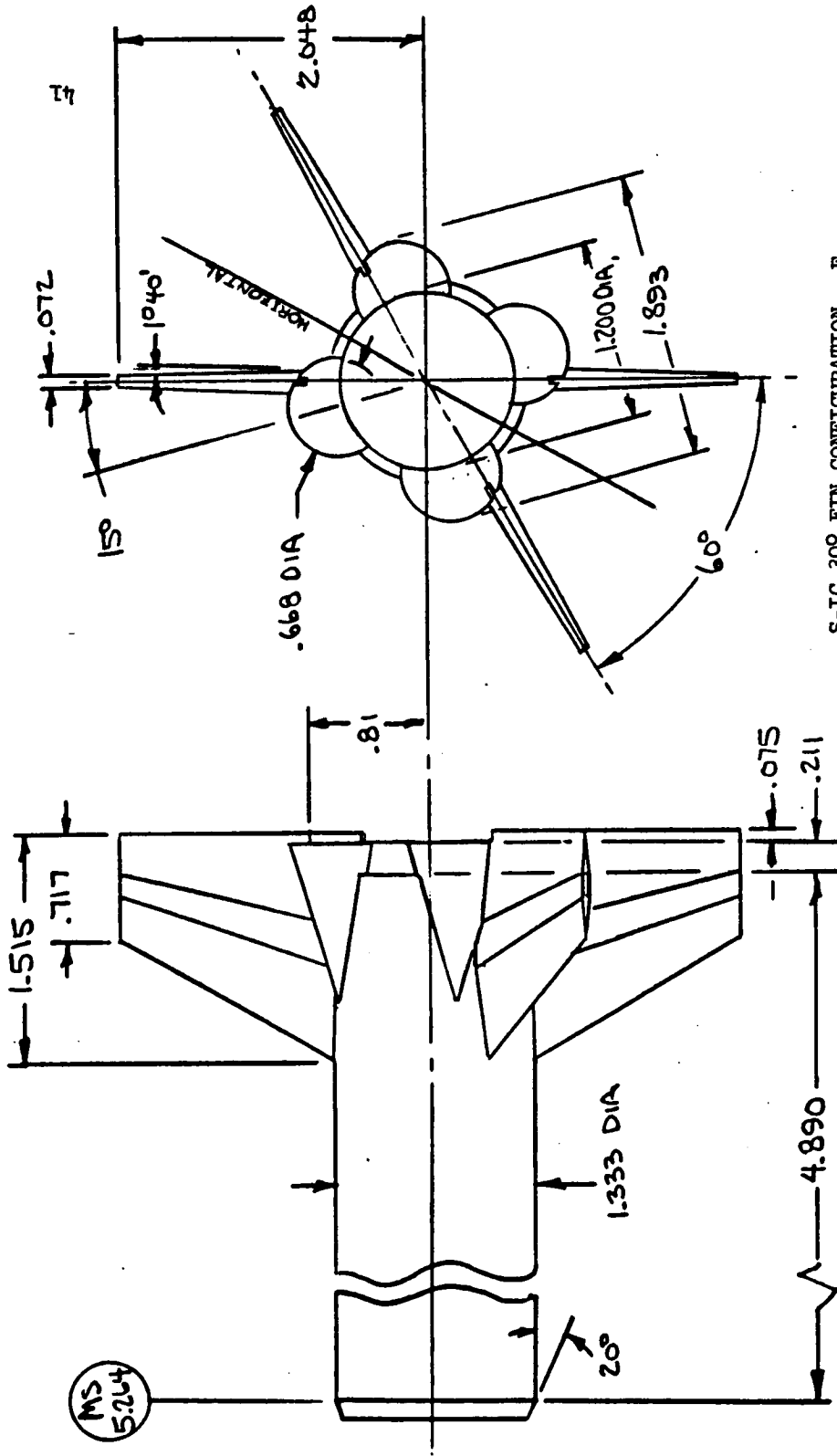
900 FT² S-IC FIN
FIGURE 8

UNIQUE CONFIGS. BOOSTER
TBC
STRAIGHT WING ORBITER
GAC
DR#1044 C-1- 625

UNIQUE CONFIGS. BOOSTER
TBC
STRAIGHT WING ORBITER
GAC
DR#1044 C-1- 626

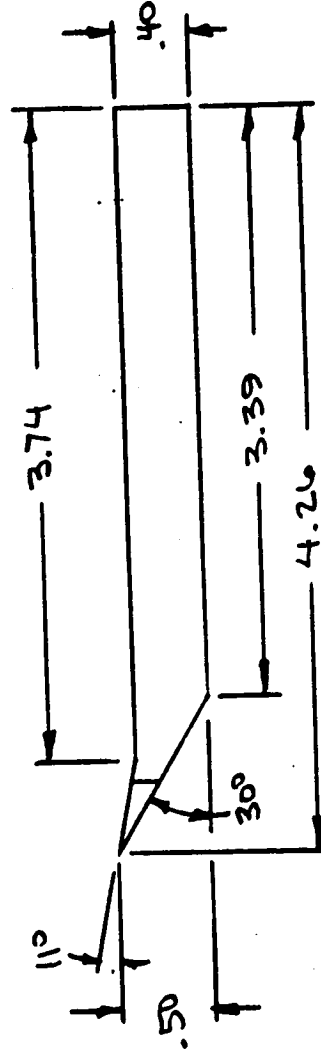
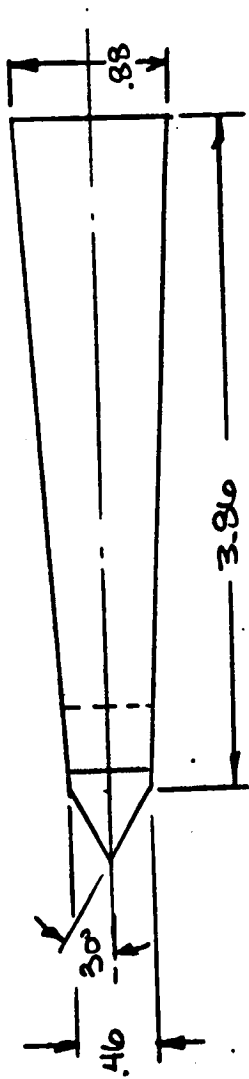


S-IC BODY - B
FIGURE 9



S-IC 30° FIN CONFIGURATION - F1
FIGURE 10

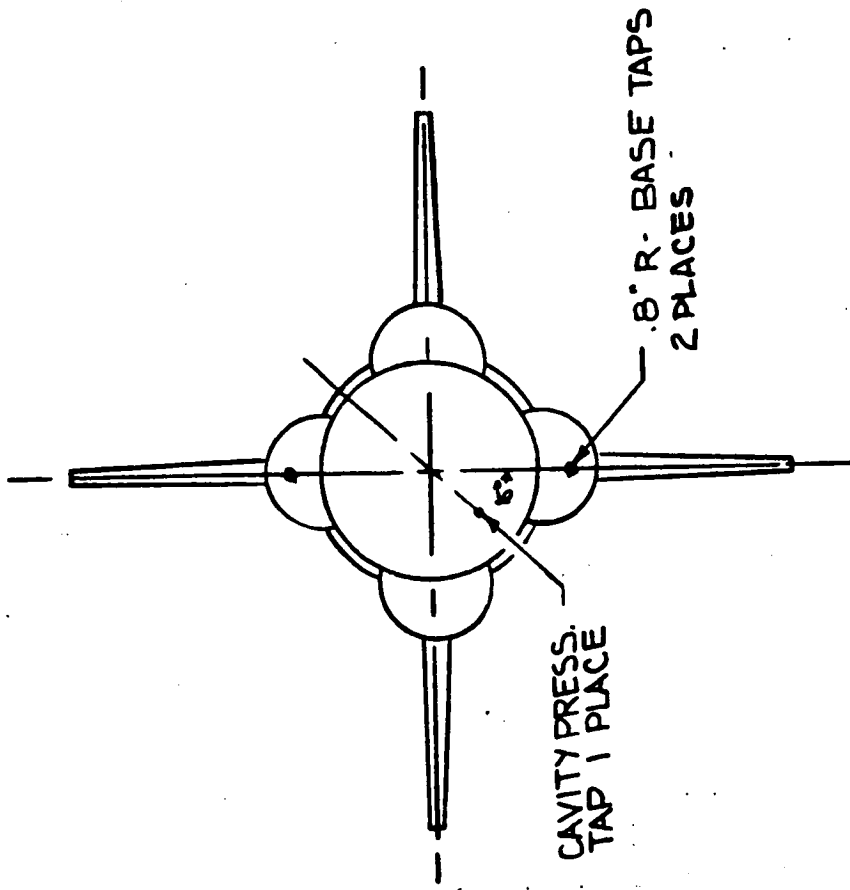
UNIQUE CONFIGS. BOOSTER
TBC
STRAIGHT WING ORBITER
GAC
DR#1044 C-1- 627



STRONGBACK - S
FIGURE 12

UNIQUE CONFIGS. BOOSTER
TBC
STRAIGHT WING ORBITER
GAC
DR#1044 C-1- 629

UNIQUE CONFIGS. BOOSTER
TBC
STRAIGHT WING ORBITER
GAC
DR#1044 C-1- 630



BASE PRESSURE TAP LOCATIONS
FIGURE 13

ORIGINAL PAGE IS
OF POOR QUALITY

TEST DESCRIPTION #503 DATA SET COLLATION SHEET

PRETEST
 POSTTEST

T III L 4-33 PIGGYBACK

DATA SET IDENTIFIER	CONFIGURATION	SCHD.		PARAMETERS/VALUES	NO. OF RUNS	MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE)																																																																																																																																																																																																																																																																																																															
		a	b			0.6	0.9	1.0	1.1	1.2	1.46	1.96	3.48	4.56																																																																																																																																																																																																																																																																																																							
3451C1	L1 + O1	A	O		7	002	003	004	005	006	007	008	009	010	011	012	013	014	015	016	017	018	019	020	021	022	023	024	025	026	027	028	029	030	031	032	033	034	035	036	037	038	039	040	041	042	043	044	045	046	047	048	049	050	051	052	053	054	055	056	057	058	059	060	061	062	063	064	065	066	067	068	069	070	071	072	073	074	075	076	077	078	079	080	081	082	083	084	085	086	087	088	089	090	091	092	093	094	095	096	097	098	099	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	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	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305

7 13 19 25 31 37 43 49 55 61 67 7576

C.L.M. J.C.M. J.S.Y. J.B.S. J.E.X. J.C.F. J.C.B.B. J.C.B.B. J.C.B.S. J.C.B.T.

COEFFICIENTS: UNIQUE CONFIGS. BOOSTER
 a or b MMC
 SCHEDULES UNIQUE CONFIGS. ORBITER
 B = ±10, ±B, ±6 = ±2, 0 D = 0 ± 2, ±4, ±6, ±8, ±10, ±12, ±14, ±16 GAC
 C = 0, ±2, ±4, ±6, ±8, ±10
 DR#1188 C-1- 631

725

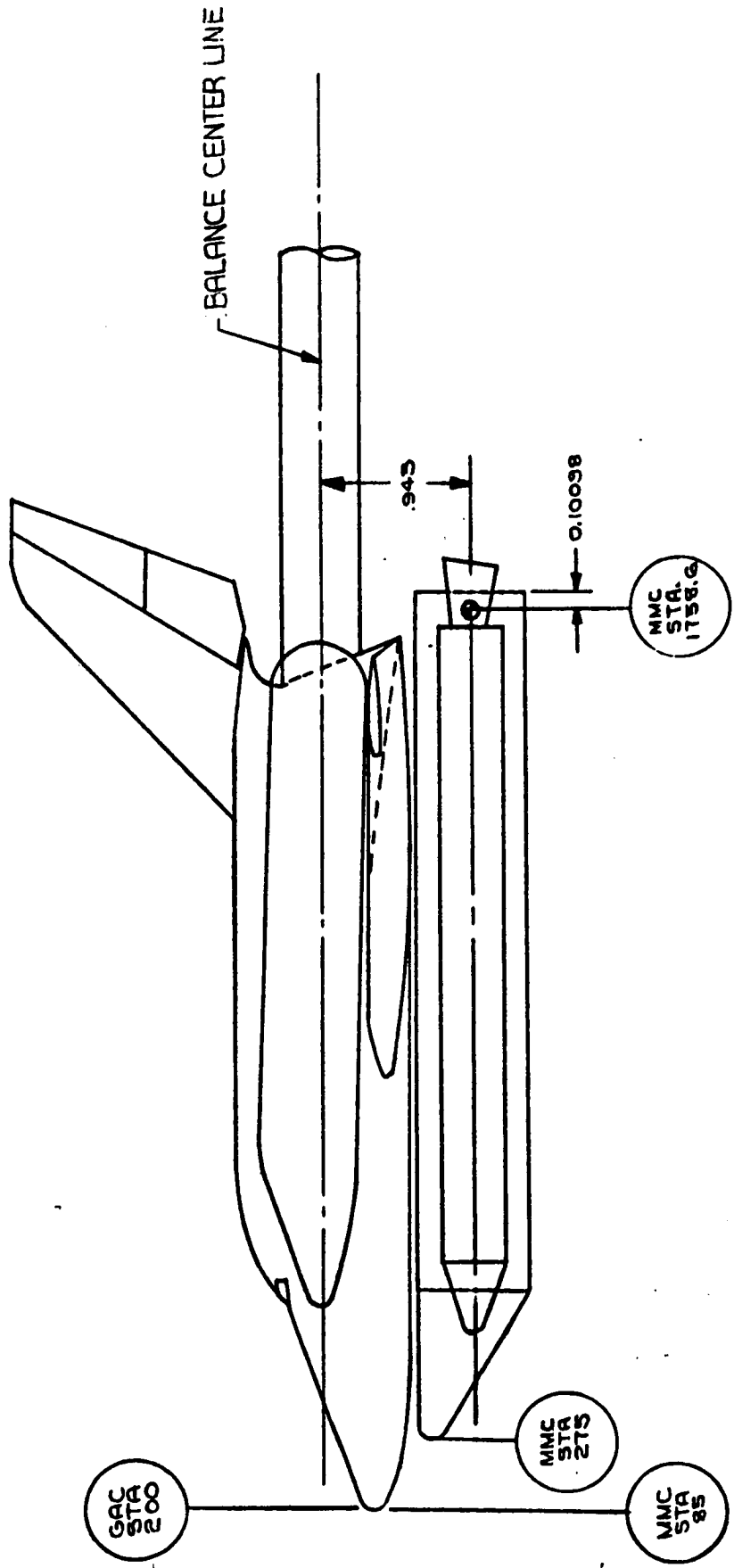
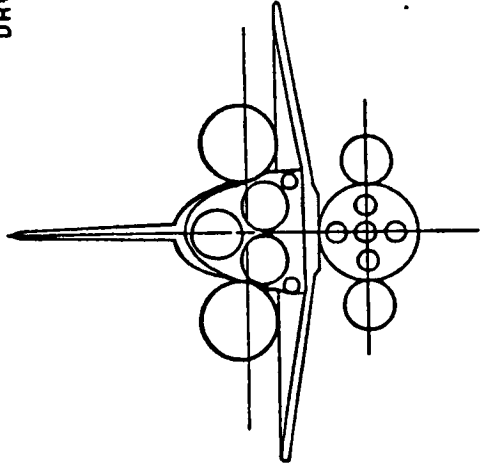


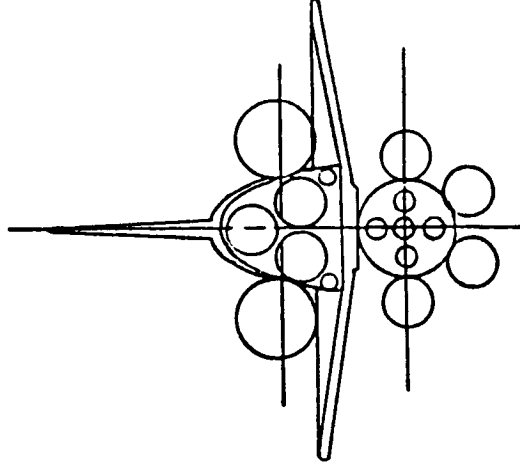
FIGURE 3. T III L (1207-4)/GAC H-33 PIGGYBACK SPREAD CONFIGURATION

UNIQUE CONFIGS. BOOSTER
 MMC
 UNIQUE CONFIGS. ORBITER
 GAC
 DR#1188 C-1- 633

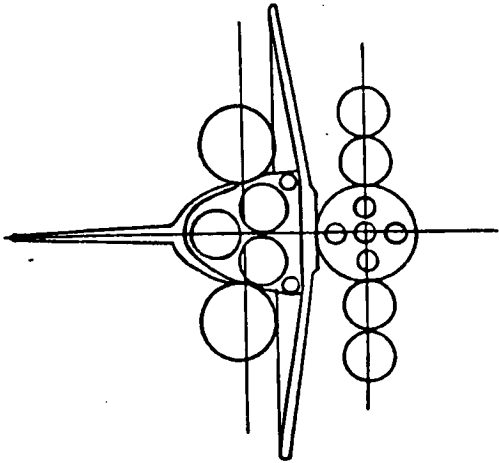
FIGURE 3. (CONTINUED)
 TILL (1207-4)/GAC H-33 PIGGYBACK CONFIGURATIONS



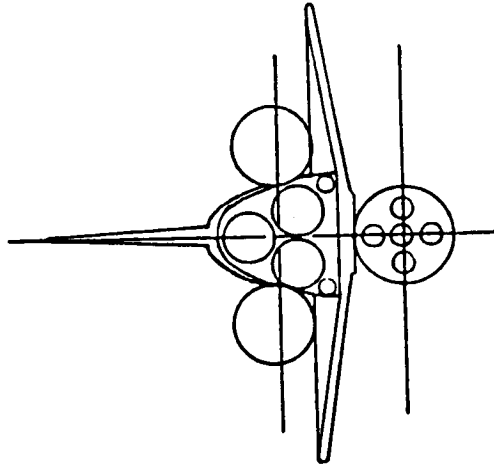
PIGGYBACK SPREAD
 $C_1S_{12} + O_1$



PIGGYBACK CLUSTER
 $L_3 + O_1$

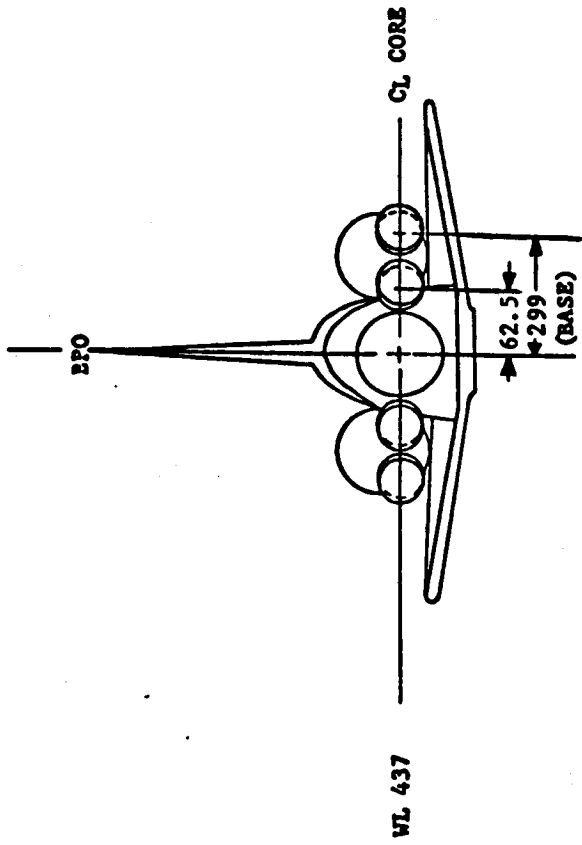


PIGGYBACK SPREAD
 $L_1 + O_1$



PIGGYBACK
 $C_1 + O_1$

NOTE: OUTBOARD SFMS
 CANTED ON 0.50
 BASE OUT
 ALL DIMENSIONS
 IN INCHES (FULL SCALE)



FS 1821
 MS 378.38

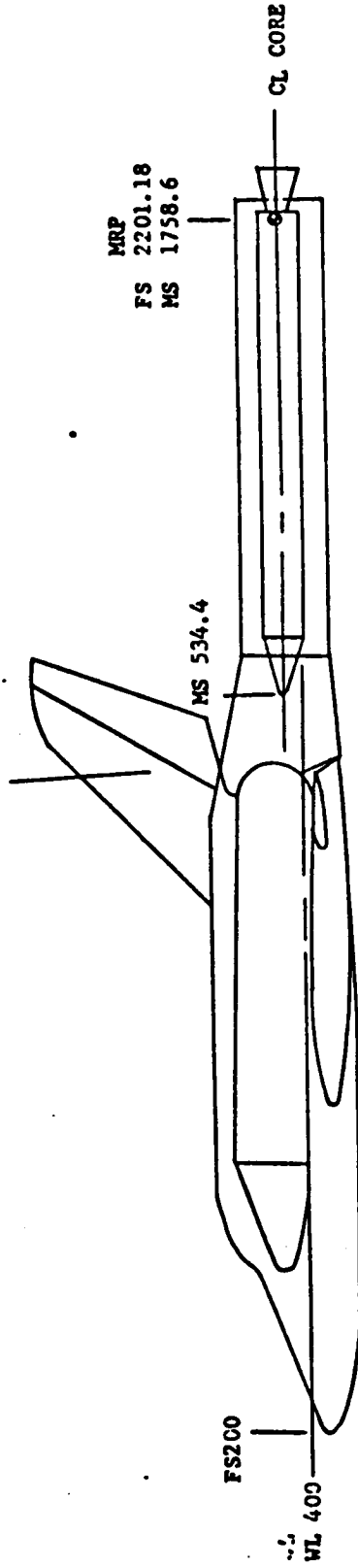


FIGURE 4. TIIIL (1207-4)/GAC H-33 (SPREAD) TANDEM CONFIGURATION

UNIQUE CONFIGS. BOOSTER
 MMC
 UNIQUE CONFIGS. ORBITER
 GAC
 DR#1188 C-1- 635

UNIQUE CONFIGS. BOOSTER
MMC
UNIQUE CONFIGS. ORBITER
GAC
DR#1168 C-1- 636

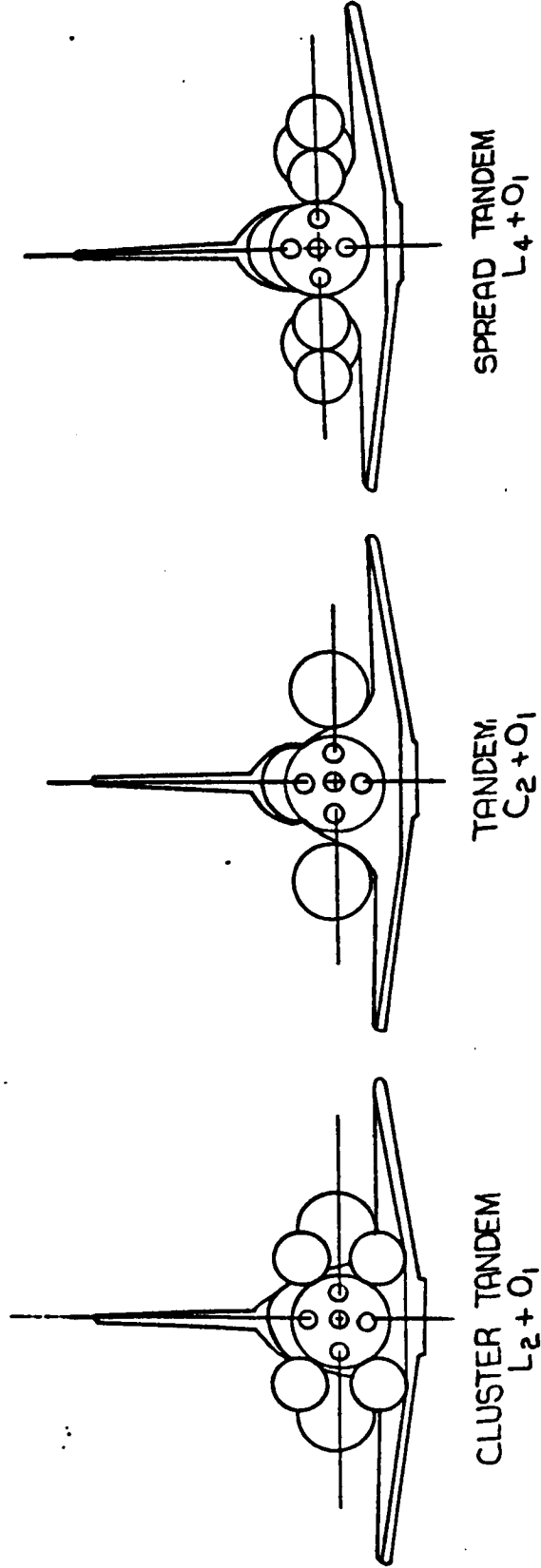


FIGURE 4. (CONT) T III L (1207-4)/GAC. H33 TANDEM CONFIGURATIONS

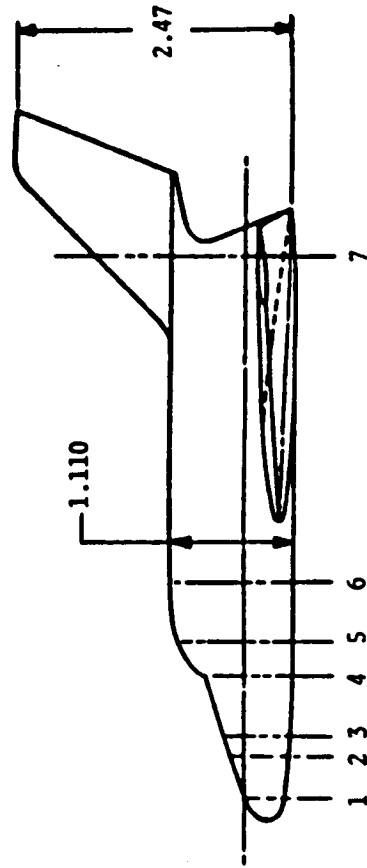
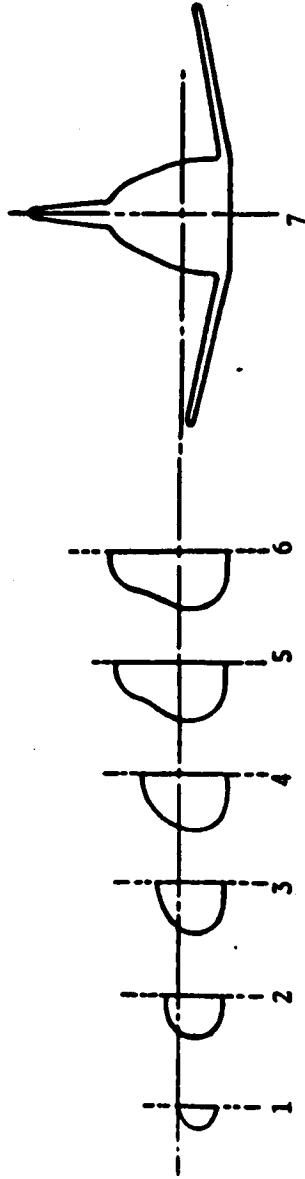
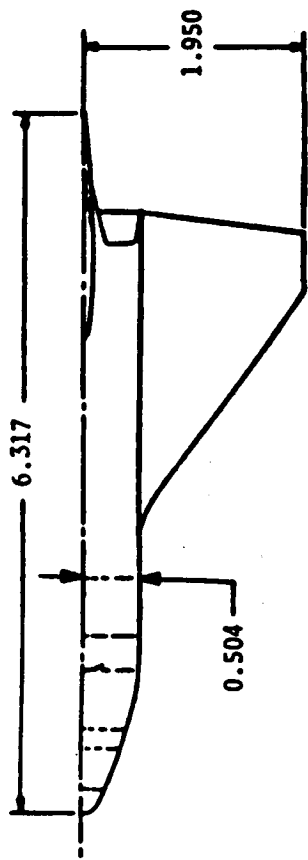


FIGURE 5. H-33 ORBITER (3-VIEW)

UNIQUE CONFIGS. BOOSTER
 MMC
 UNIQUE CONFIGS. ORBITER
 GAC
 DR#1188 C-1- 637

UNIQUE CONFIGS. BOOSTER
MMC
UNIQUE CONFIGS. ORBITER
GAC
DR#1188 C-1- 638

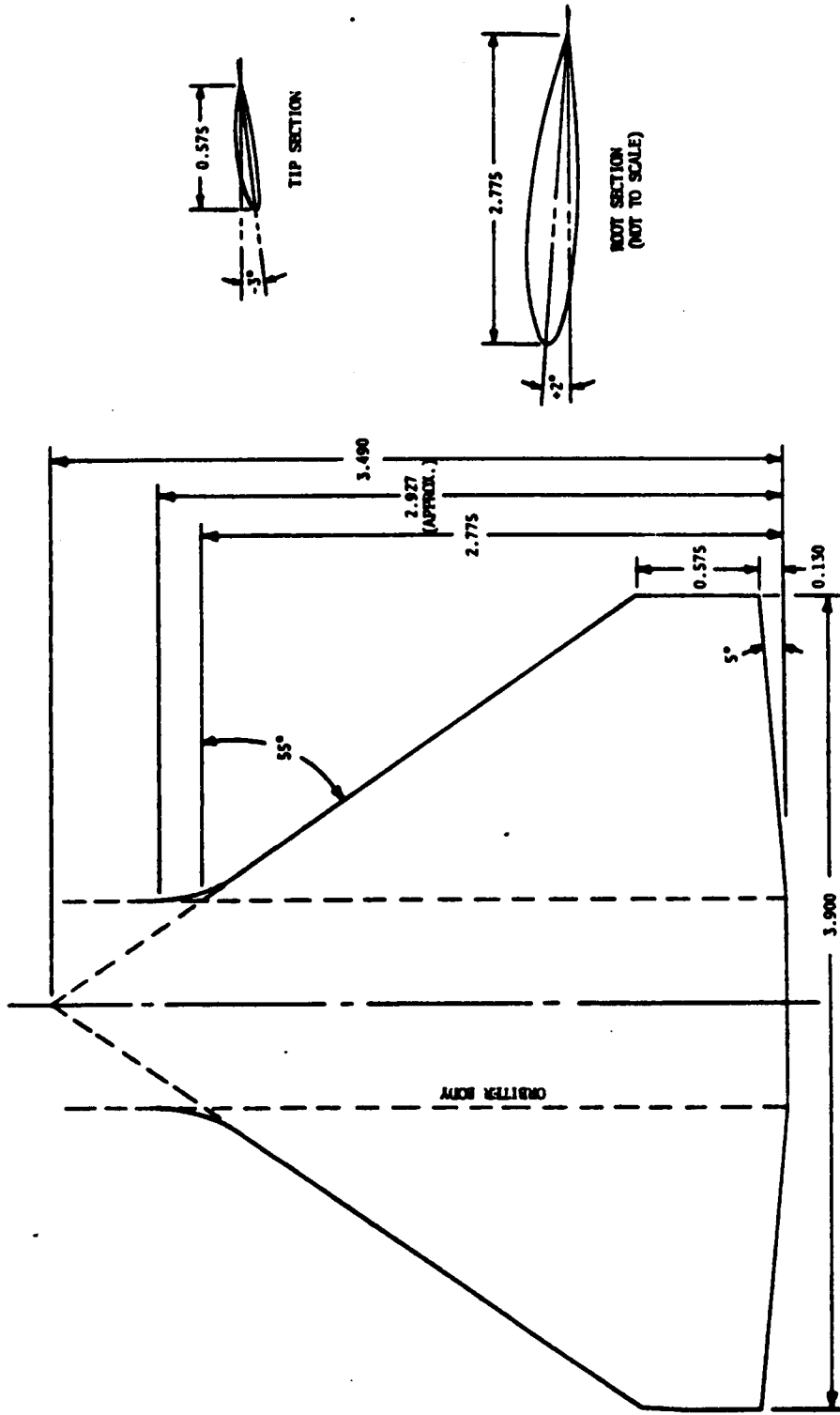


FIGURE 6. GRIMMAN H-33 ORBITER WING 0.003366 SCALE.

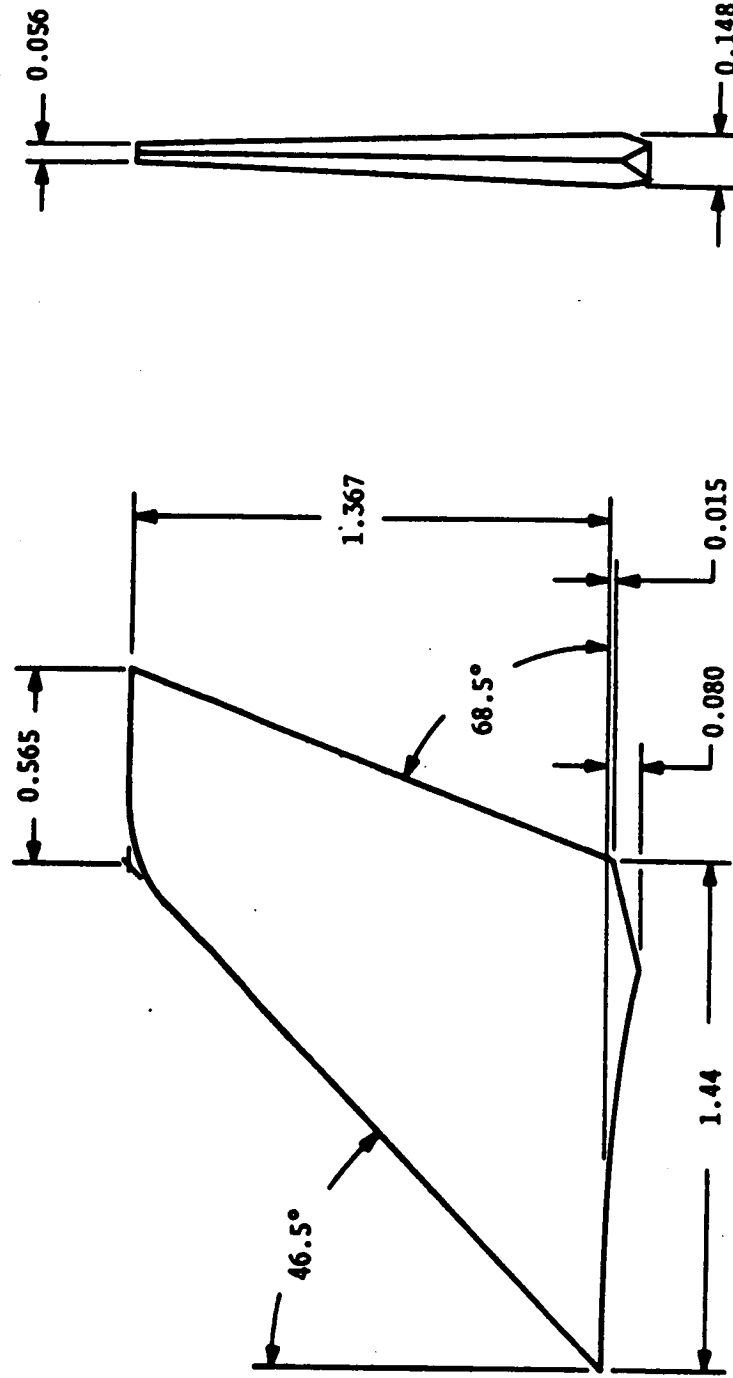


FIGURE 7. GRUMMAN H-33 ORBITER VERTICAL TAIL 0.003366 SCALE

UNIQUE CONFIGS. BOOSTER
MMC
UNIQUE CONFIGS. ORBITER
GAC
DR#1188 C-1- 639

UNIQUE CONFIGS. BOOSTER
MMC
UNIQUE CONFIGS. ORBITER
GAC
DR#1188 C-1- 640

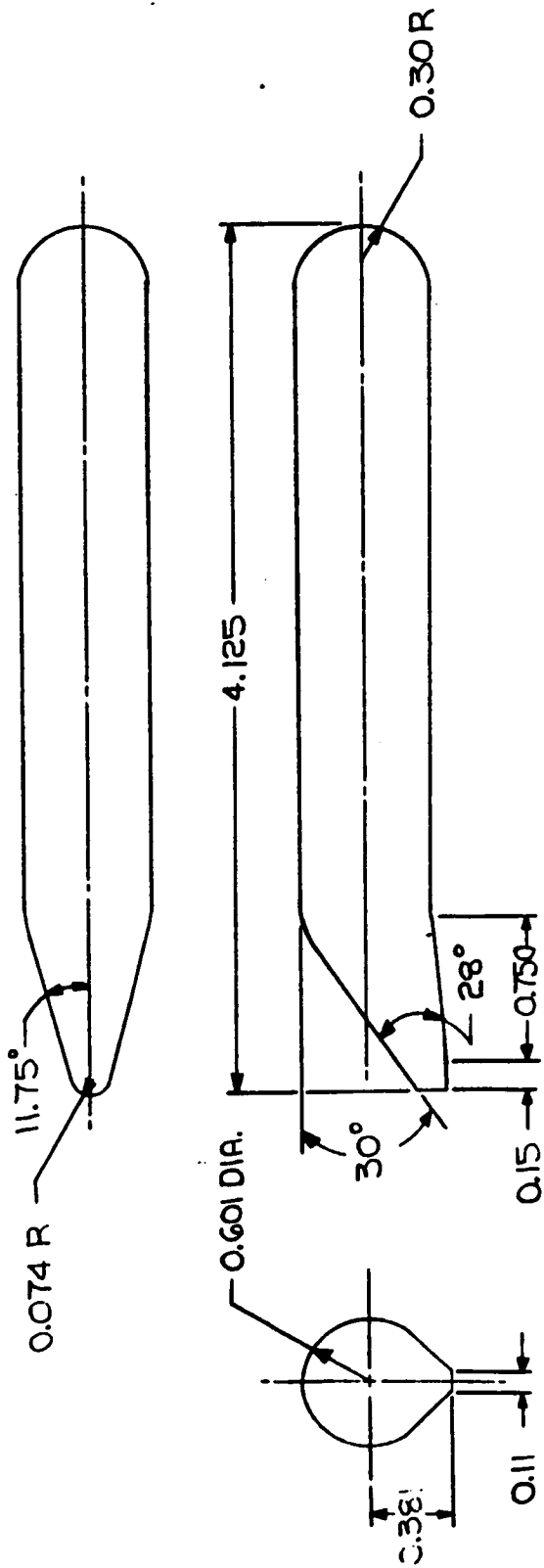
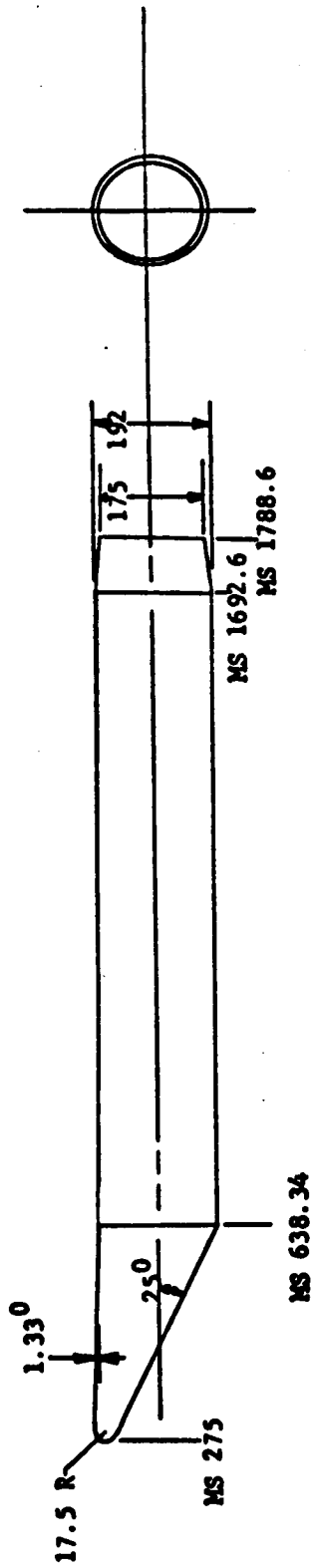
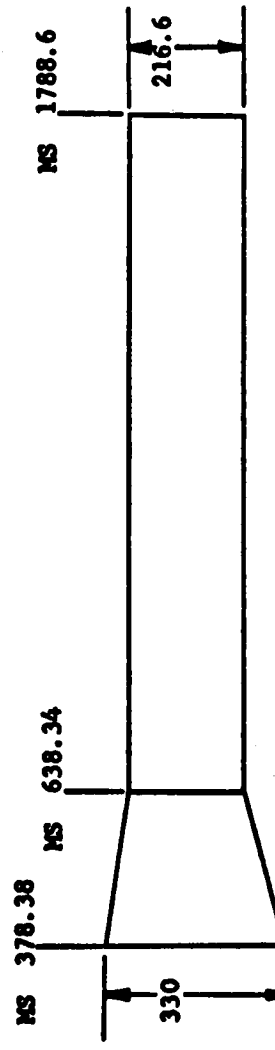


FIGURE 8. GRUMMAN H-33 ORBITER EXTERNALLY MOUNTED DROP TANK



A. PB CONFIGURATIONS

**NOTE: ALL DIMENSIONS
IN INCHES (FULL SCALE)**

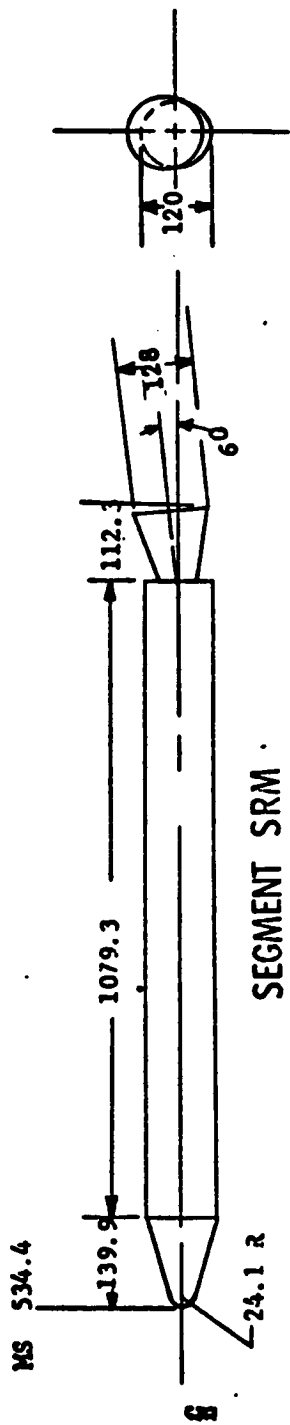


B. TANDEM CONFIGURATIONS

FIGURE 9. TAIL CORE

UNIQUE CONFIGS. BOOSTER
MMC
UNIQUE CONFIGS. ORBITER
GAC
DR#1188 C-1- 641

UNIQUE CONFIGS. BOOSTER
MMC
UNIQUE CONFIGS. ORBITER
GAC
DR#1188 C-1- 642



NOTE: ALL DIMENSIONS IN INCHES (FULL SCALE)

FIGURE 10. TIIIL SOLID ROCKET MOTOR (SRM)

TEST WSEC INT # 50E DATA SET COLLATION SHEET

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PRETEST
 POSTTEST

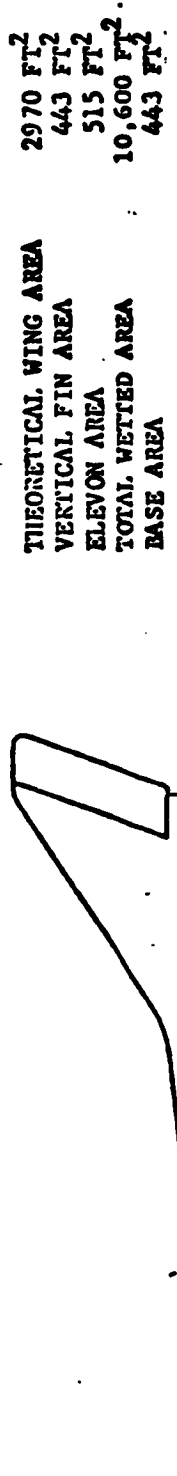
DATA SET IDENTIFIER	CONFIGURATION	SCHD.		PARAMETERS/VALUES	NO. of RUNS	MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE)											
		a	b			.6	.9	1.0	1.1	1.2	1.46	1.96	2.74	3.48			
R47001	O ₁	A	O		8	0.46	0.45	0.49	0.43	0.42	0.49	0.49	0.49	0.49	0.49	0.49	0.49
	Y	A	G		4	0.52	0.51	0.51	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
	Y	O	B		8	0.51	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
	D ₁ D ₁	A	O		7	0.51	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
	Y	O	B		7	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
	O ₁ D ₁ L ₂	A	O		9	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
	Y	C	B		9	0.10	0.18	0.19	0.20	0.21	0.16	0.15	0.15	0.13	0.12	0.11	0.10
	O ₁ D ₂ L ₄	A	O		9	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
	Y	A	G		5	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
	Y	O	B		9	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
	O ₁ D ₁ =	A	O		8	0.10	0.11	0.10	0.09	0.08	0.08	0.13	0.08	0.08	0.08	0.08	0.08
	Y	A	E		8	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
	D ₂ L ₄	A	O		2	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50

1	7	13	19	25	31	37	43	49	55	61	67	73.76
C.A.	IC.A.	IC.B.	IC.C.	IC.D.	IC.E.	IC.F.	IC.G.	IC.H.	IC.I.	IC.J.	IC.K.	IC.L.
COEFFICIENTS:												
a or b												
SCHEDULES												

UNIQUE CONFIGS. BOOSTER
MMC
UNIQUE CONFIGS. ORBITER
MMC
DR#1182 C-1- 643

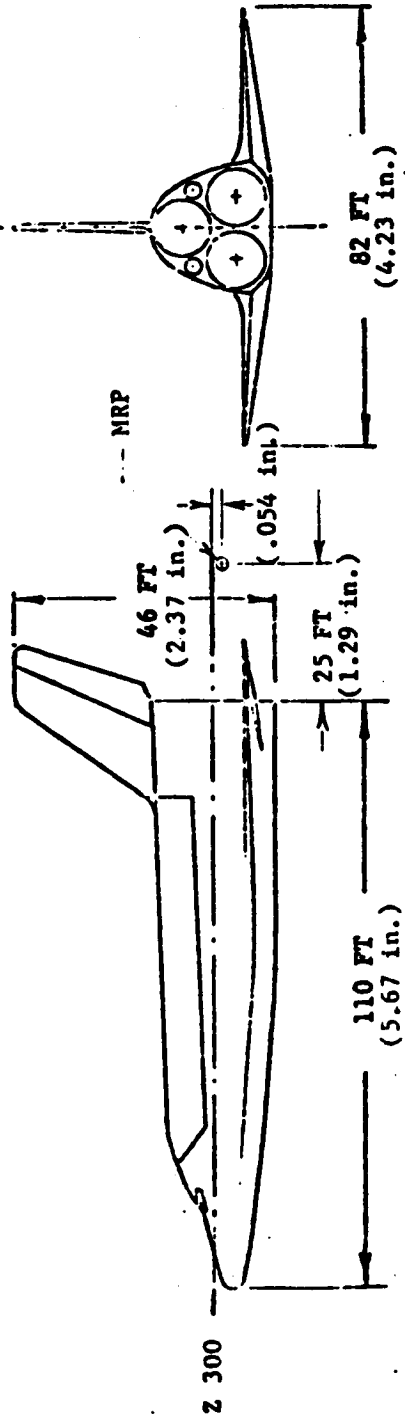
UNIQUE CONFIGS. BOOSTER
 MMC
 UNIQUE CONFIGS. ORBITER
 MMC
 DR#1182 C-1- 644

FIGURE 4. DTO-7 ORBITER REENTRY CONFIGURATION, 01



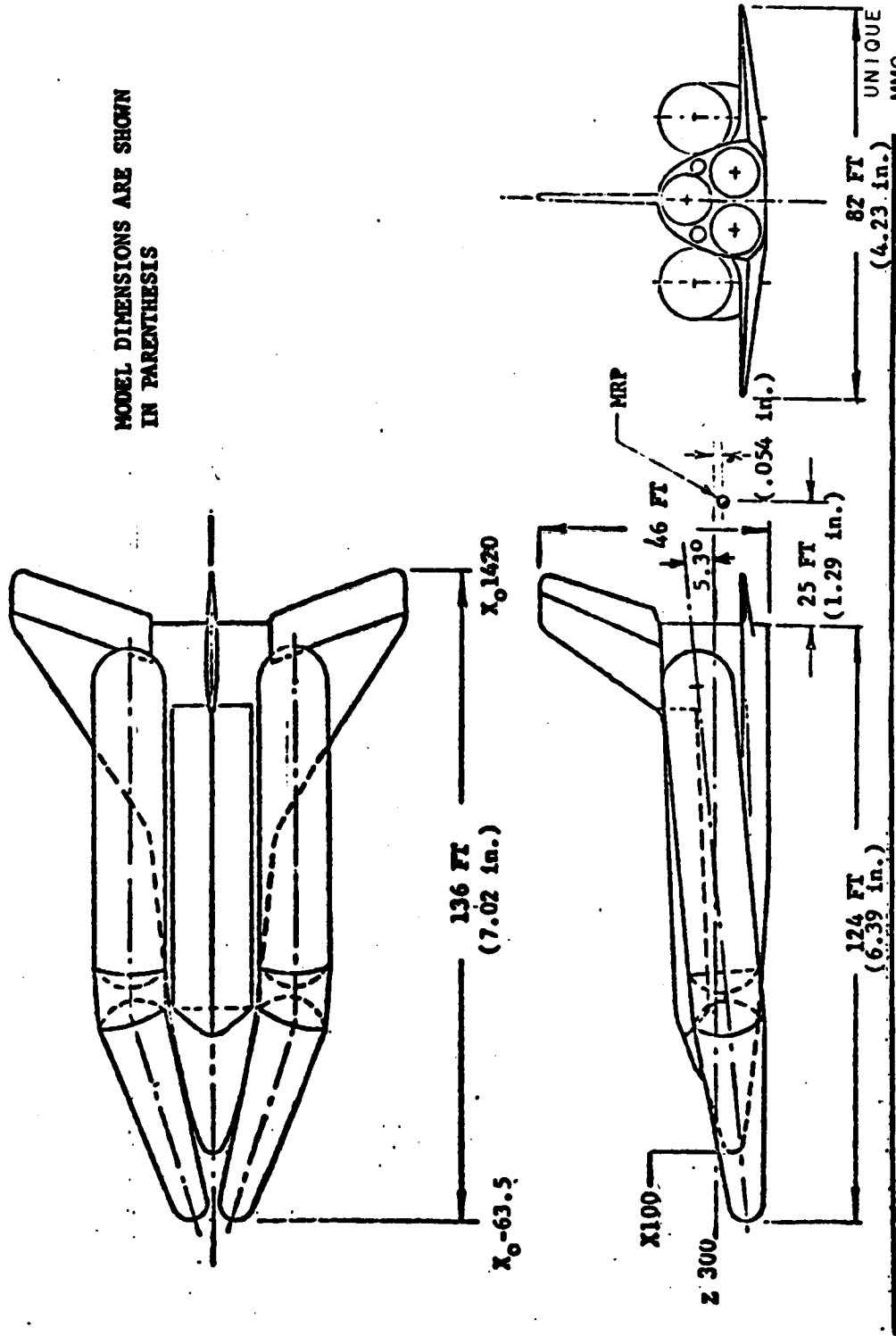
THEORETICAL WING AREA 2970 FT²
 VERTICAL FIN AREA 443 FT²
 ELEVON AREA 515 FT²
 TOTAL WETTED AREA 10,600 FT²
 BASE AREA 443 FT²

MODEL DIMENSIONS ARE SHOWN
 IN PARENTHESES



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FIGURE 5. DTO-7 ORBITER ASCENT CONFIGURATION, :01 D1



UNIQUE CONFIGS. BOOSTER
MMC
UNIQUE CONFIGS. ORBITER
MMC

DR#1182 C-1- 646

MODEL DIMENSIONS ARE SHOWN IN
PARENTHESES

FIGURE 6. DTO-7/1205-4 OZEL LAUNCH CONFIGURATION, O1 D1 L2

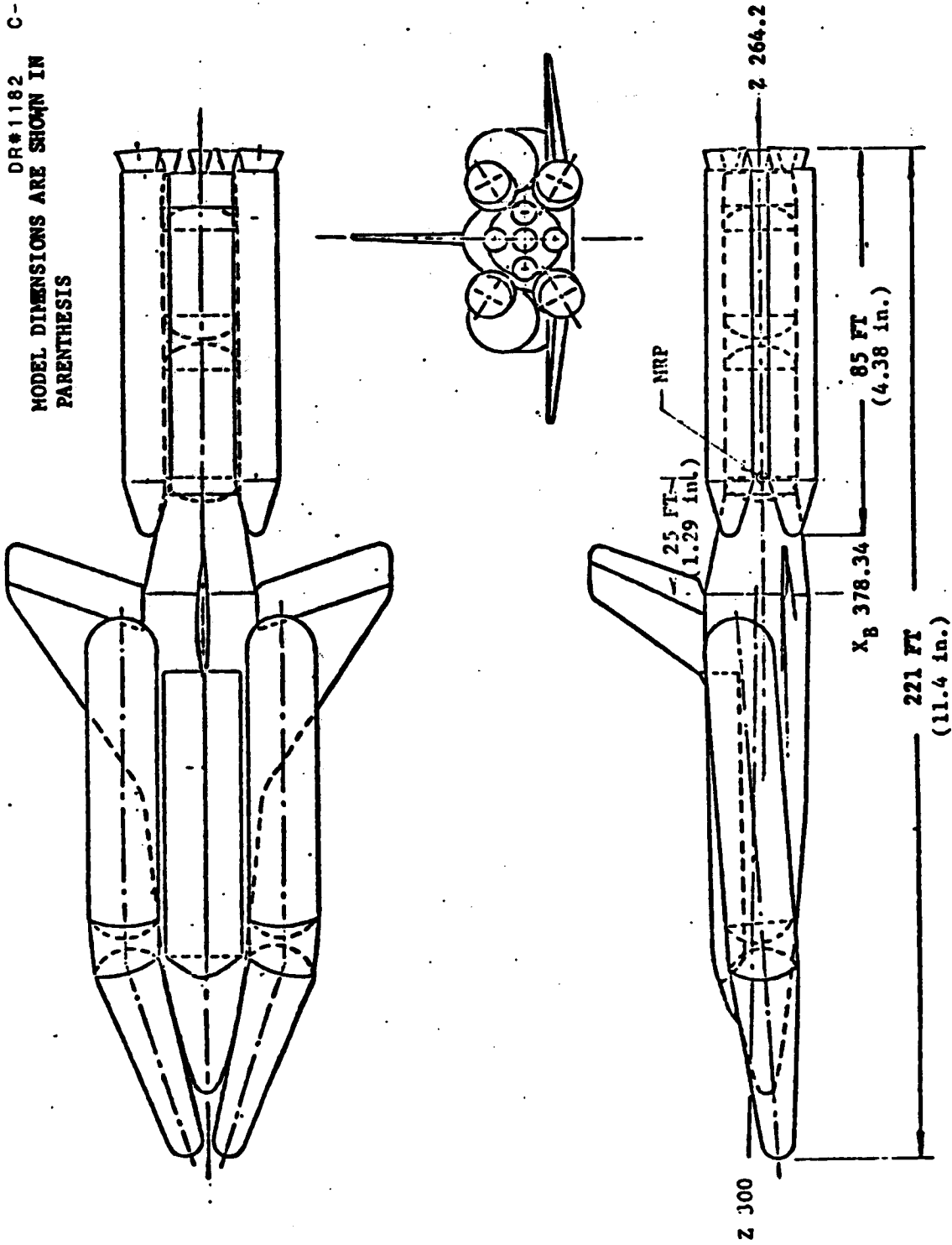
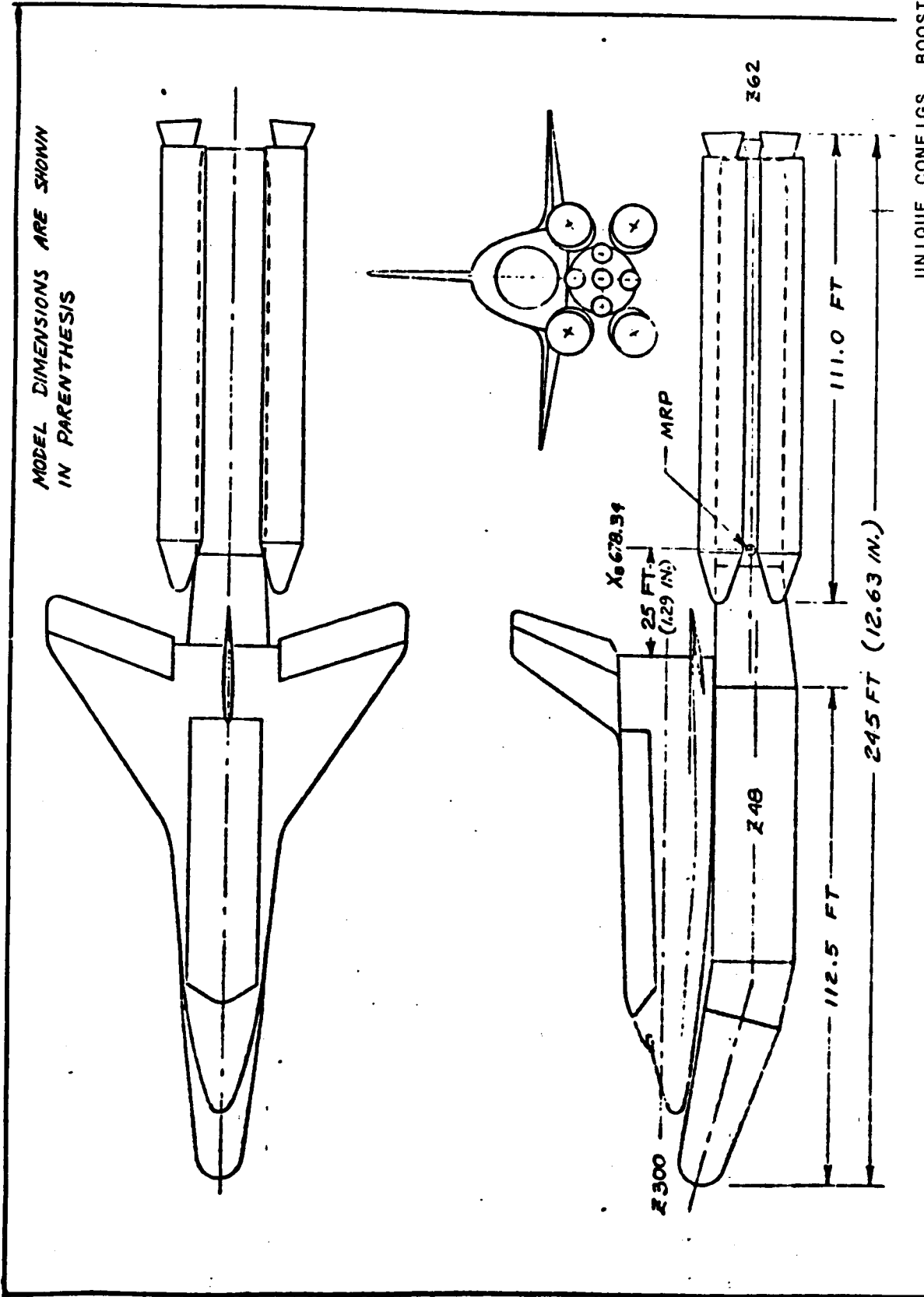


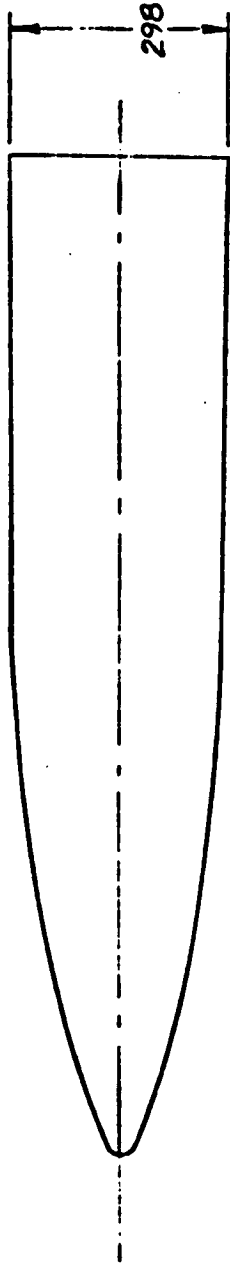
Figure 7. DTO-7/1207-4 TEL LAUNCH CONFIGURATION, O1D2L4



UNIQUE CONFIGS. BOOSTER
MMC
UNIQUE CONFIGS. ORBITER
MMC
DR#1182 C-1- 647

UNIQUE CONFIGS. BOOSTER
MMC
UNIQUE CONFIGS. ORBITER
MMC
DR#1162 C-1- 648

FIGURE 8. ORBITER BODY ~ BI



NOTES
1. ALL DIMENSIONS ARE IN INCHES.
2. MODEL VALUES ARE SHOWN
IN PARENTHESIS.

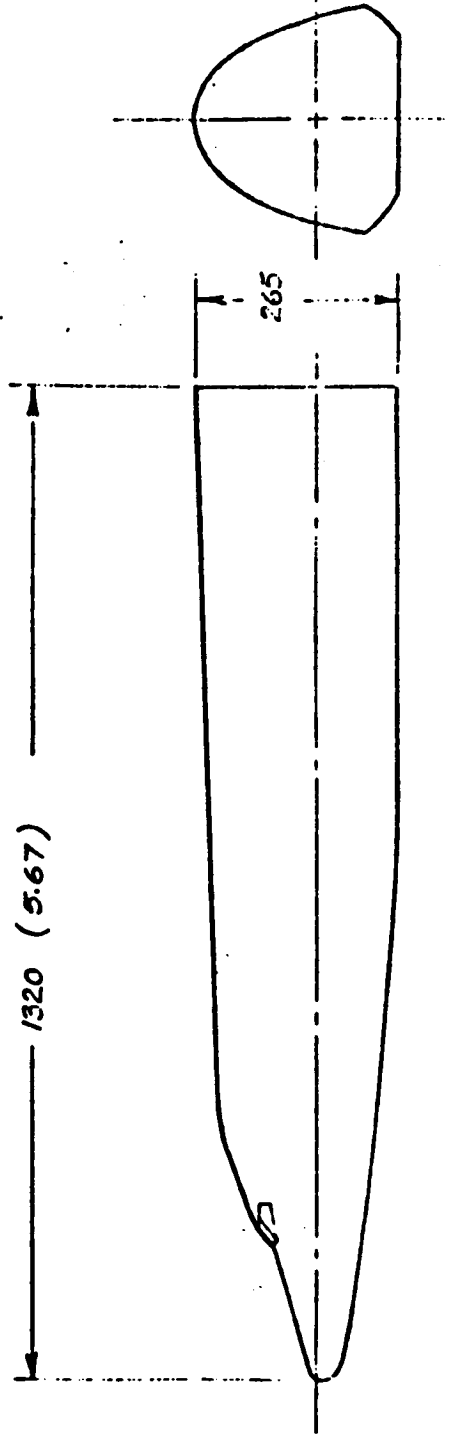
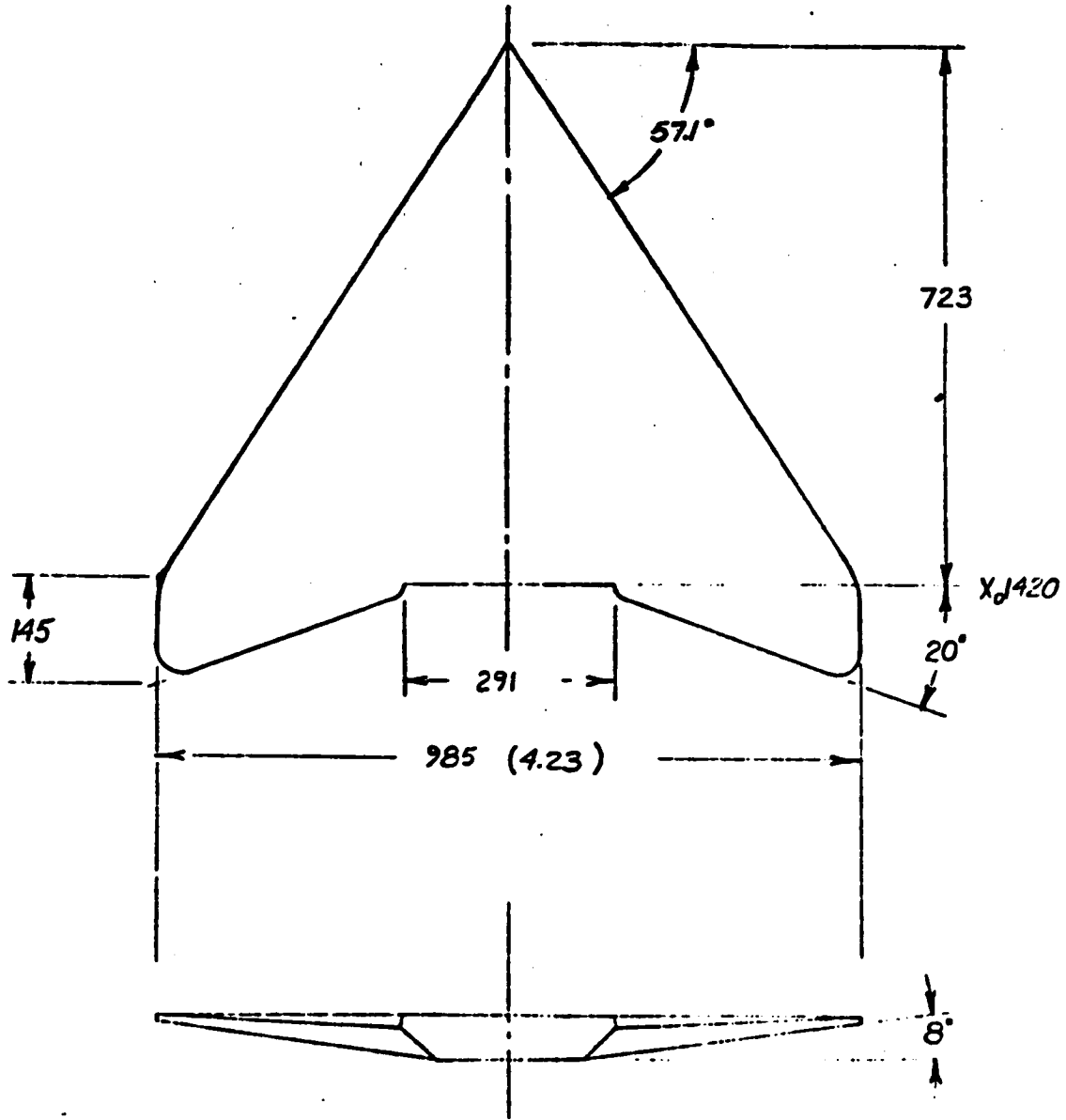


FIGURE 9. ORBITER WING ~ WI

- 1. ALL DIMENSIONS ARE IN INCHES.
- 2. MODEL VALUES ARE SHOWN IN PARENTHESIS.



UNIQUE CONFIGS. BOOSTER
MMC
UNIQUE CONFIGS. ORBITER
MMC
DR#1182 C-1- 649

UNIQUE CONFIGS. BOOSTER
MMC
UNIQUE CONFIGS. ORBITER
MMC
DR#1182 C-1- 650

FIGURE 10. ORBITER VERTICAL FIN ~ VI

1. ALL DIMENSIONS ARE IN INCHES.
2. MODEL VALUES ARE SHOWN IN PARENTHESIS.

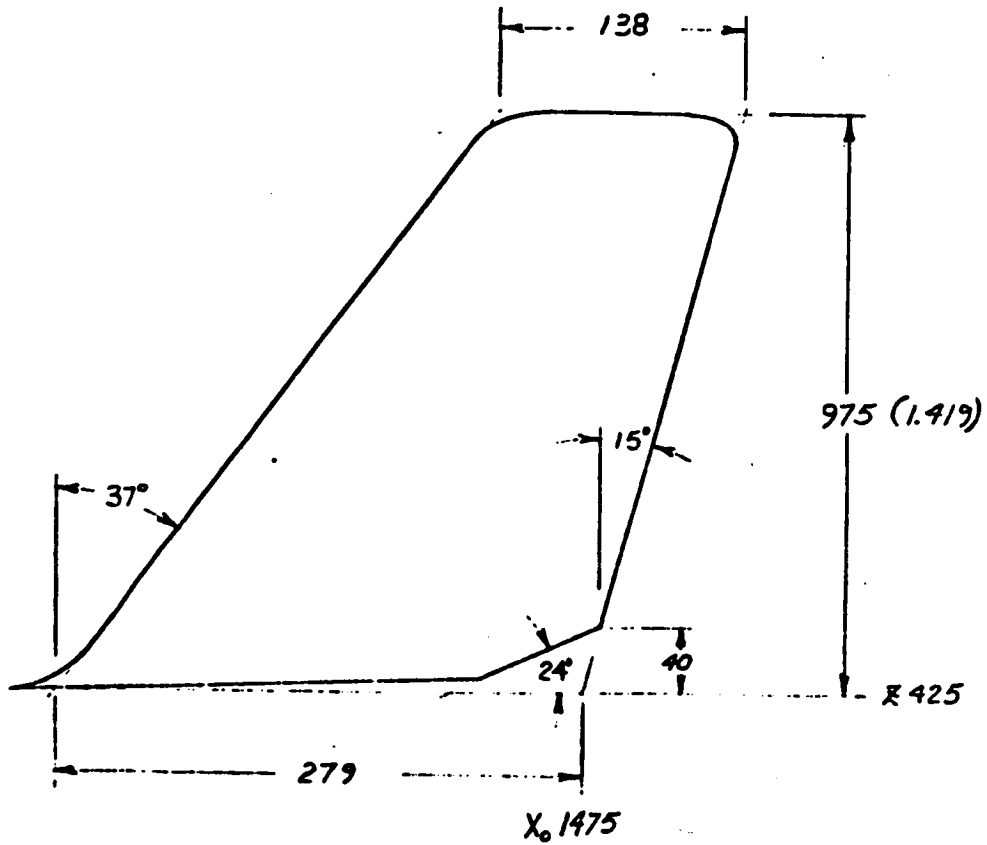
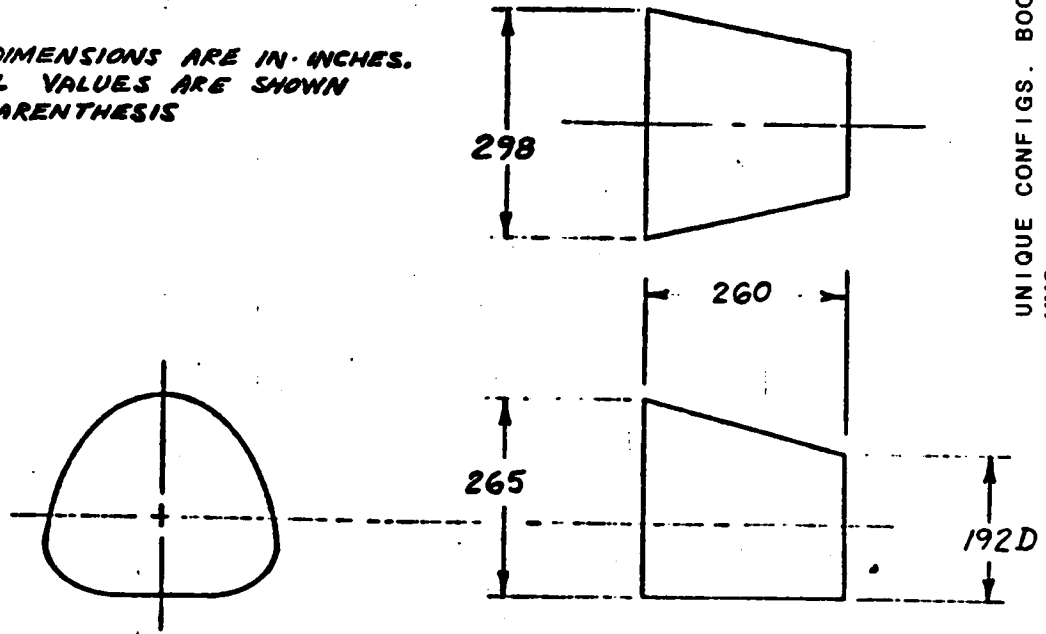


FIGURE 11. ADAPTER ~ A1

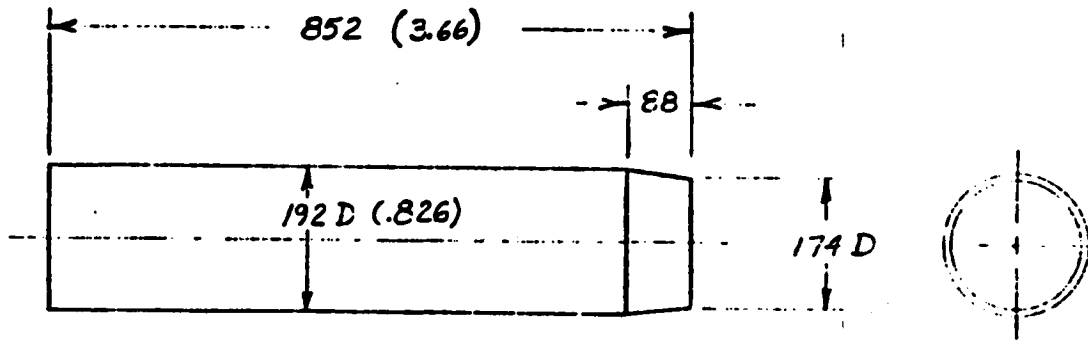
NOTES

- 1. ALL DIMENSIONS ARE IN INCHES.
- 2. MODEL VALUES ARE SHOWN IN PARENTHESIS



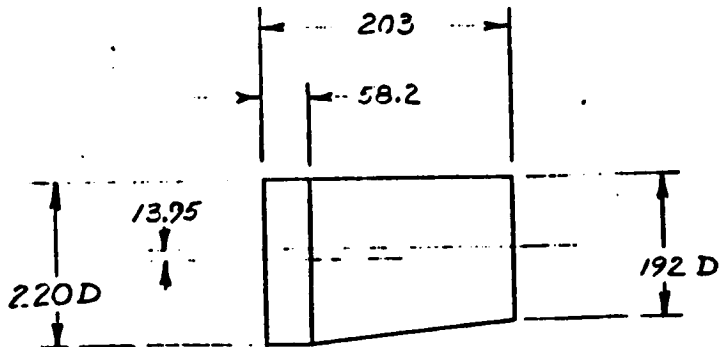
UNIQUE CONFIGS. BOOSTER
MMC
UNIQUE CONFIGS. ORBITER
MMC
DR#1182 C-1- 651

BOOSTER CORE ~ C1



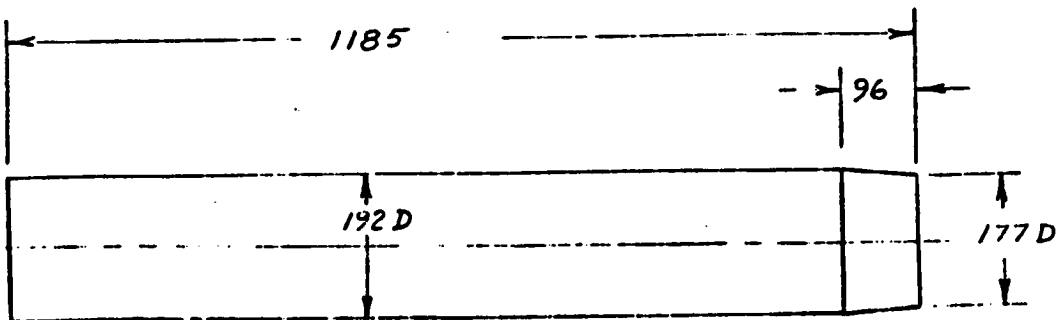
UNIQUE CONFIGS. BOOSTER
MMC
UNIQUE CONFIGS. ORBITER
MMC
DR#1182 C-1- 652

FIGURE 12. ADAPTOR ~ A2



ALL DIMENSION ARE FOR
FULL SCALE IN INCHES

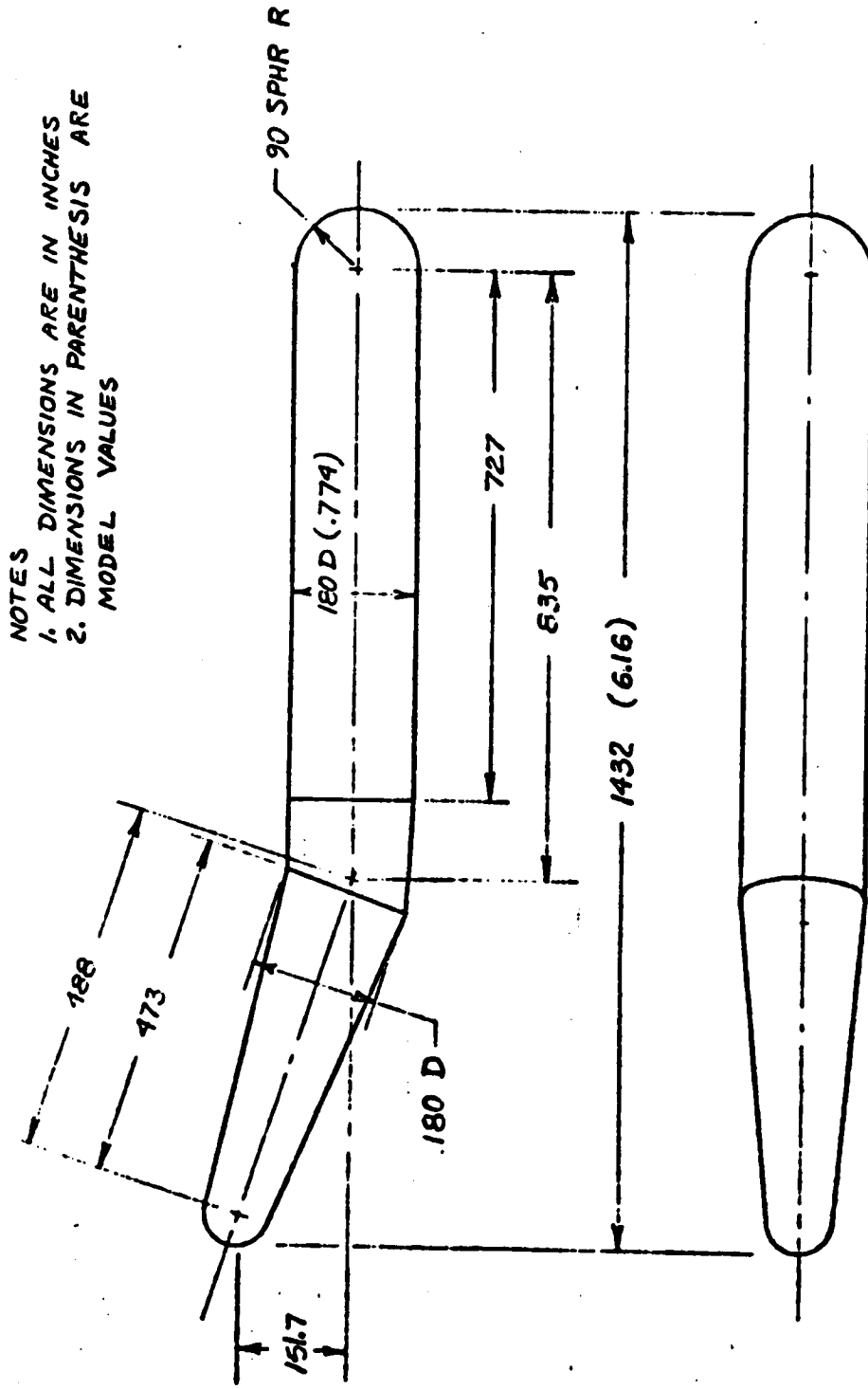
BOOSTER CORE ~ C2



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FIGURE

FIGURE 13. DROP TANK ~DI



NOTES
 1. ALL DIMENSIONS ARE IN INCHES
 2. DIMENSIONS IN PARENTHESIS ARE MODEL VALUES

UNIQUE CONFIGS. BOOSTER
 MMC
 UNIQUE CONFIGS. ORBITER
 MMC
 DR#1182 C-1- 653

UNIQUE CONFIGS. BOOSTER
MMC
UNIQUE CONFIGS. ORBITER
MMC
DR#1182 C-1- 654

NOTES

- 1. ALL DIMENSIONS ARE INCHES
- 2. DIMENSIONS IN PARENTHESIS ARE MODEL VALUES

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OF POOR QUALITY

FIGURE 14. DROP TANK ~ D2

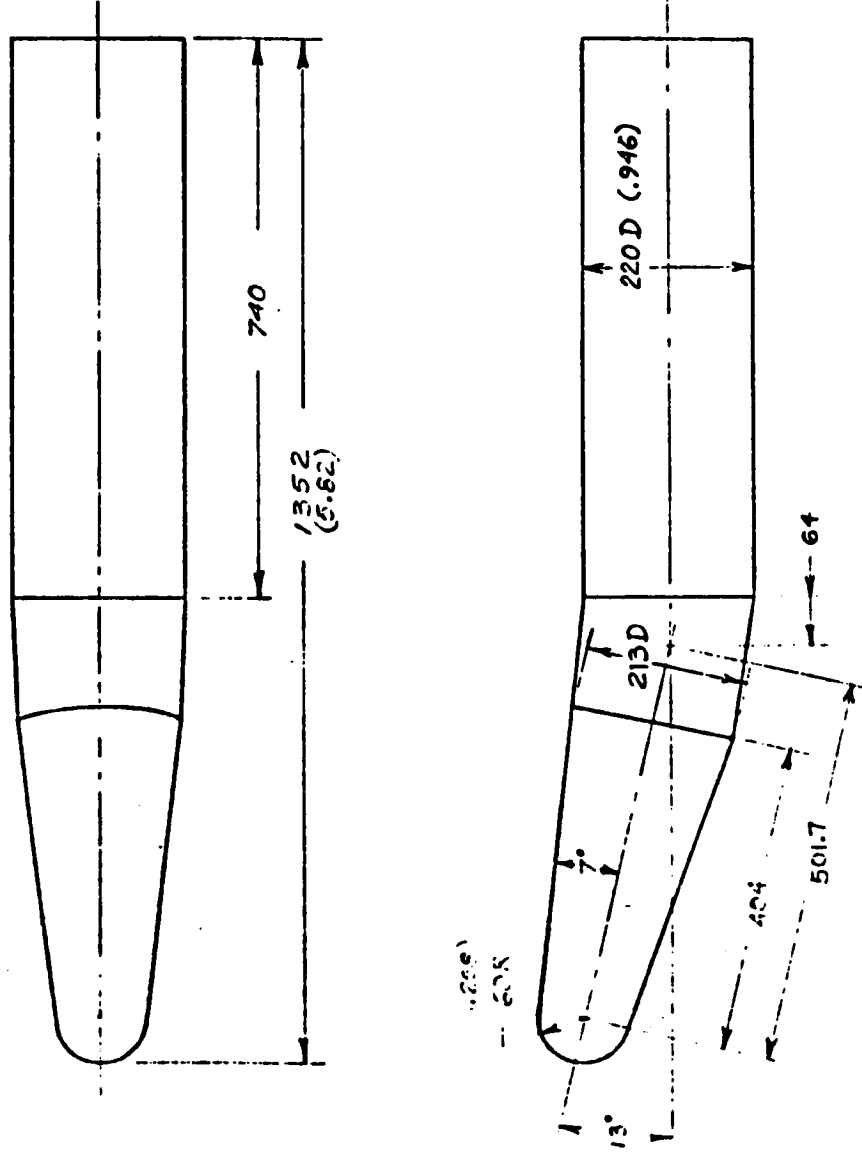
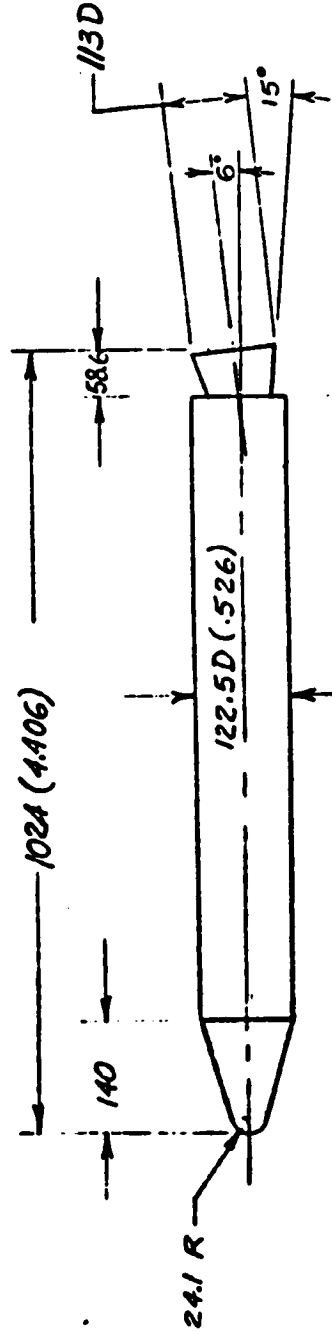


FIGURE 15. 5 SEGMENT SOLID ROCKET MOTOR (SRM) ~ S1

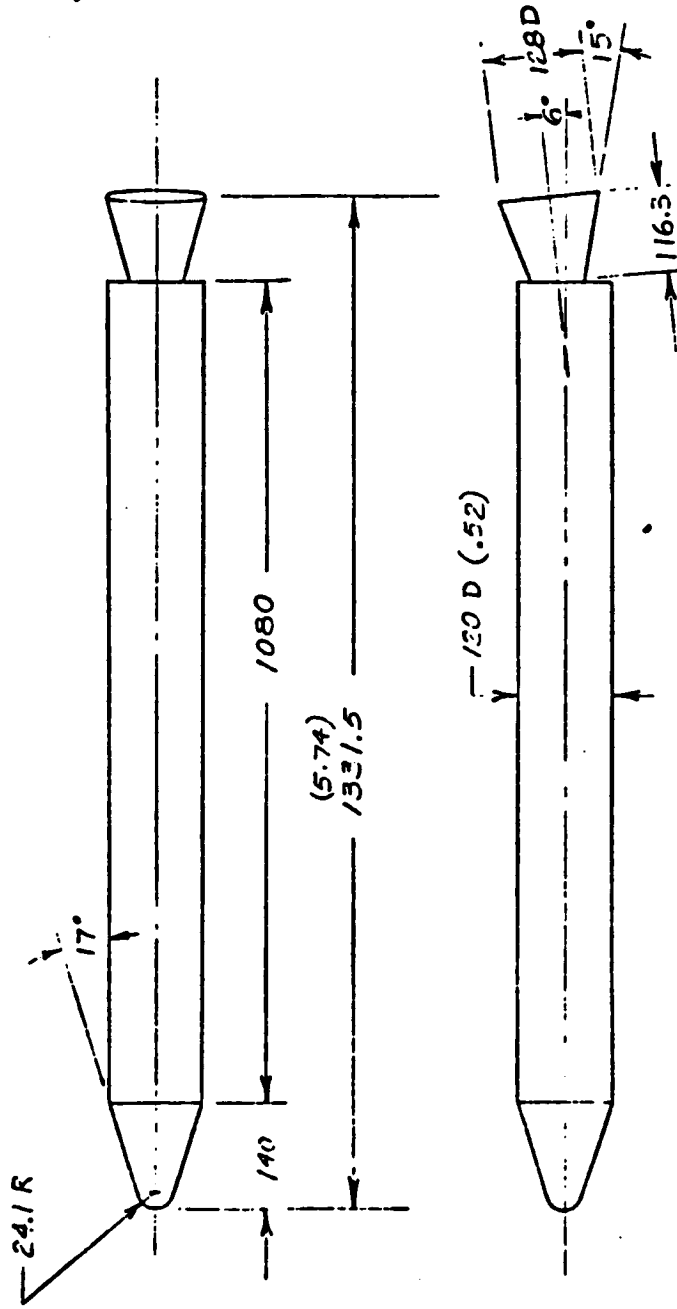


UNIQUE CONFIGS. BOOSTER
MMC
UNIQUE CONFIGS. ORBITER
MMC
DR#1182 C-1- 655

UNIQUE CONFIGS. BOOSTER
MMC
UNIQUE CONFIGS. ORBITER
MMC
DR#1182 C-1- 656

FIGURE 16 7 SEGMENT SOLID ROCKET MOTOR (SRM) ~ S2

NOTES
1. ALL DIMENSIONS ARE IN INCHES
2. DIMENSIONS IN PARENTHESIS ARE
MODEL VALUES



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TEST MSFC TWT 491 DATA SET COLLATION SHEET

PRETEST
 POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	SCHD.		PARAMETERS/VALUES		NO. of RUNS	MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE)									
		A	B	L	φ		0.6	0.7	1.0	1.1	1.2	1.4	1.96	2.99	%	4.76
R33011	ΦVWCBT.F	A	O	+1°	0°		0.6	0.7	1.0	1.1	1.2	1.4	1.96	2.99	%	4.76
R33051	ΦVWCBT.F	A	O	+1°	0°		0.6	0.7	1.0	1.1	1.2	1.4	1.96	2.99	%	4.76
R33151	ΦVWCBT.F	D	O	0°	0°		0.6	0.7	1.0	1.1	1.2	1.4	1.96	2.99	%	4.76
R33111	ΦVWCBT.F	D	O	0°	0°		0.6	0.7	1.0	1.1	1.2	1.4	1.96	2.99	%	4.76
R33211	ΦVWCBT.F	D	O	-2°	0°		0.6	0.7	1.0	1.1	1.2	1.4	1.96	2.99	%	4.76
R33251	ΦVWCBT.F	D	O	-2°	0°		0.6	0.7	1.0	1.1	1.2	1.4	1.96	2.99	%	4.76
R33351	ΦVWCBT.F	D	O	-4°	0°		0.6	0.7	1.0	1.1	1.2	1.4	1.96	2.99	%	4.76
R33311	ΦVWCBT.F	D	O	-4°	0°		0.6	0.7	1.0	1.1	1.2	1.4	1.96	2.99	%	4.76
R33411	ΦVWCBT.F	D	O	-31°	0°		0.6	0.7	1.0	1.1	1.2	1.4	1.96	2.99	%	4.76
R33412	ΦVWCBT.F	O	G	90°	0°		0.6	0.7	1.0	1.1	1.2	1.4	1.96	2.99	%	4.76
R33032	ΦVWCBT.F	O	G	90°	0°		0.6	0.7	1.0	1.1	1.2	1.4	1.96	2.99	%	4.76
R33031	ΦVWCBT.F	D	O	0°	0°		0.6	0.7	1.0	1.1	1.2	1.4	1.96	2.99	%	4.76
R33041	ΦVWCBT.F	D	O	0°	0°		0.6	0.7	1.0	1.1	1.2	1.4	1.96	2.99	%	4.76
R33042	ΦVWCBT.F	O	G	90°	0°		0.6	0.7	1.0	1.1	1.2	1.4	1.96	2.99	%	4.76
R33022	ΦVWCBT.F	O	G	90°	0°		0.6	0.7	1.0	1.1	1.2	1.4	1.96	2.99	%	4.76
R33021	ΦVWCBT.F	D	O	0°	0°		0.6	0.7	1.0	1.1	1.2	1.4	1.96	2.99	%	4.76
R33101	ΦVWCBT.F	D	O	180°	0°		0.6	0.7	1.0	1.1	1.2	1.4	1.96	2.99	%	4.76
R33071	ΦVWCBT.F	D	O	0°	0°		0.6	0.7	1.0	1.1	1.2	1.4	1.96	2.99	%	4.76
R33072	ΦVWCBT.F	O	G	90°	0°		0.6	0.7	1.0	1.1	1.2	1.4	1.96	2.99	%	4.76
R33081	ΦVWCBT.F	D	O	0°	0°		0.6	0.7	1.0	1.1	1.2	1.4	1.96	2.99	%	4.76

7 13 19 25 31 37 43 49 55 61 67 75.76
 CLM ICN ICY ICBL CPC CAB CAC CPB ICAT
 IDPVAR(1) IDPVAR(2)

COEFFICIENTS: $\alpha_A = -8^\circ - 6^\circ - 4^\circ - 2^\circ + 2^\circ + 4^\circ + 6^\circ + 8^\circ$
 $\alpha_D = -8^\circ - 6^\circ - 4^\circ - 2^\circ - 2^\circ - 4^\circ - 6^\circ - 8^\circ$
 SCHEDULES: UNIQUE CONFIGS. BOOSTER
 TBC
 UNIQUE CONFIGS. ORBITER
 GAC
 DR#1140 C-1-657

UNIQUE CONFIGS. BOOSTER
 TBC
 UNIQUE CONFIGS. ORBITER
 GAC
 DR#1140 C-1- 658
 POSTTEST

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TEST MSEC TWT 49% DATA SET COLLATION SHEET

DATA SET IDENTIFIER	CONFIGURATION	SCIID.		PARAMETERS/VALUES		NO. OF PLANS	PACH NUMBERS (OR APPROXIMATE INDEPENDENT VARIABLE)																																																																																														
		A	B	1	2		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97
R33082	ΦVWB.T	0	G	3.1	0°		0.6	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9	6.0	6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.9	7.0	7.1	7.2	7.3	7.4	7.5	7.6	7.7	7.8	7.9	8.0	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9	10.0		
R33091	ΦVNCB.T.E	D	O	3.1	0°		0.6	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9	6.0	6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.9	7.0	7.1	7.2	7.3	7.4	7.5	7.6	7.7	7.8	7.9	8.0	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9	10.0		

COEFFICIENTS:
 a of B
 SCHEDULES

$AD = -3.1i - 4j - 2k - 1.0l + 1.2m + 1.4n + 1.6o$
 $BG = -5.1i - 4j - 2k - 1.0l + 1.2m + 1.4n + 1.6o$

MACAMSEC.MLT

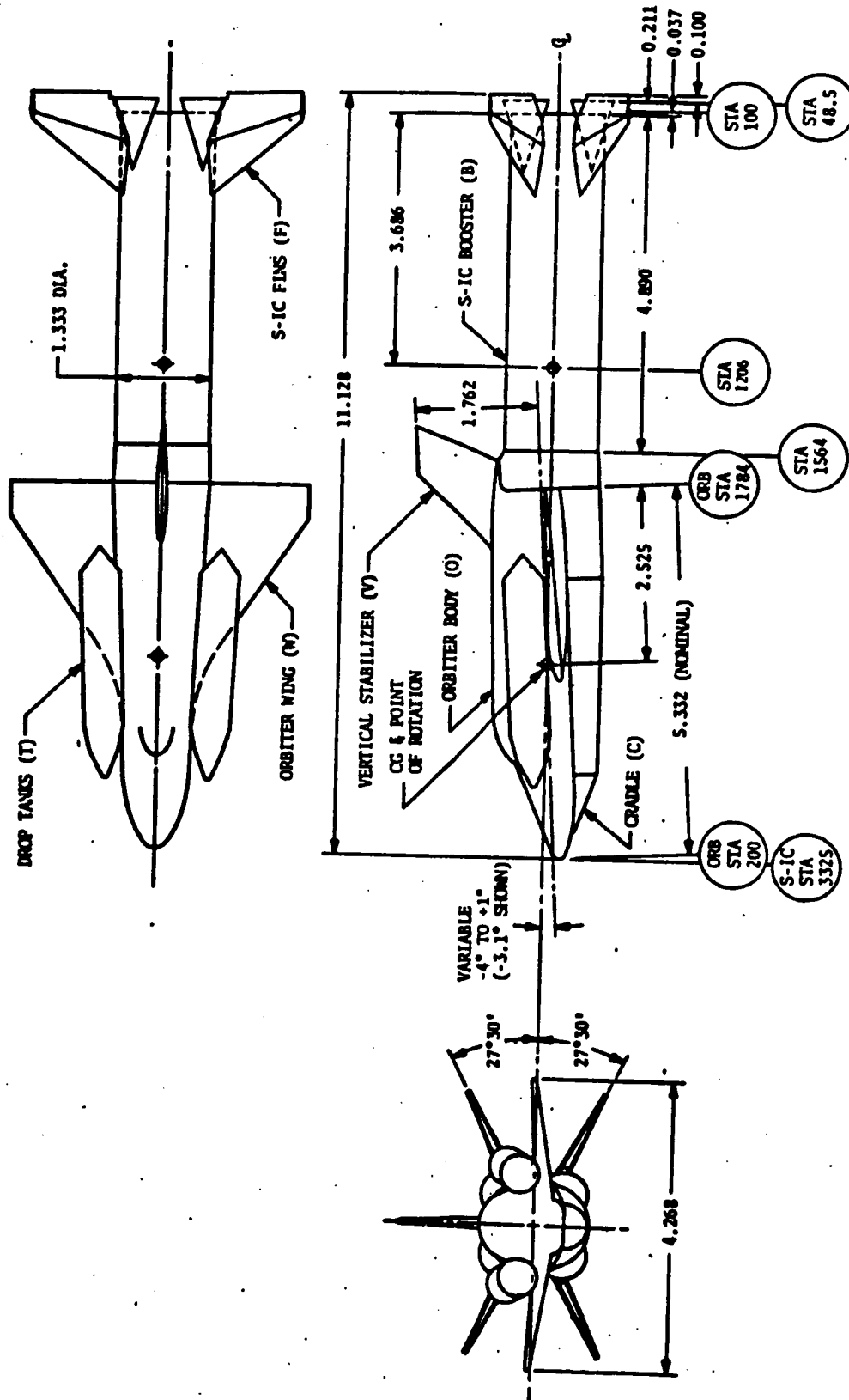


FIGURE 2. G-11 Orbiter/S-IC 0.003366 Scale Model

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UNIQUE CONFIGS. BOOSTER
TBC
UNIQUE CONFIGS. ORBITER
GAC
DR#1140 C-1- 659

UNIQUE CONFIGS. BOOSTER
TBC
UNIQUE CONFIGS. ORBITER
GAC
DR#1140 C-1- 660

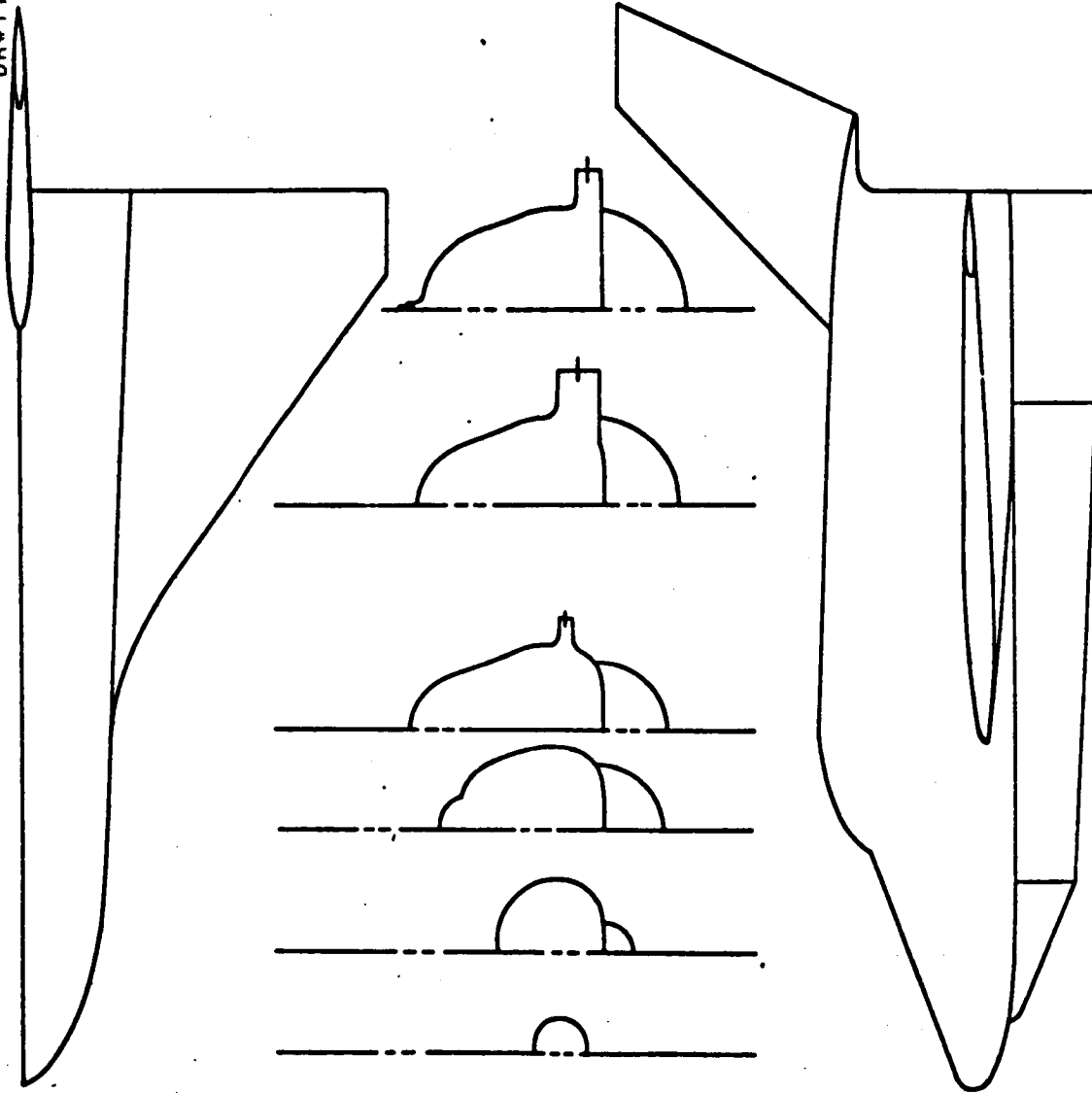


FIGURE 6. G-11 ORBITER WITH CRADLE
754

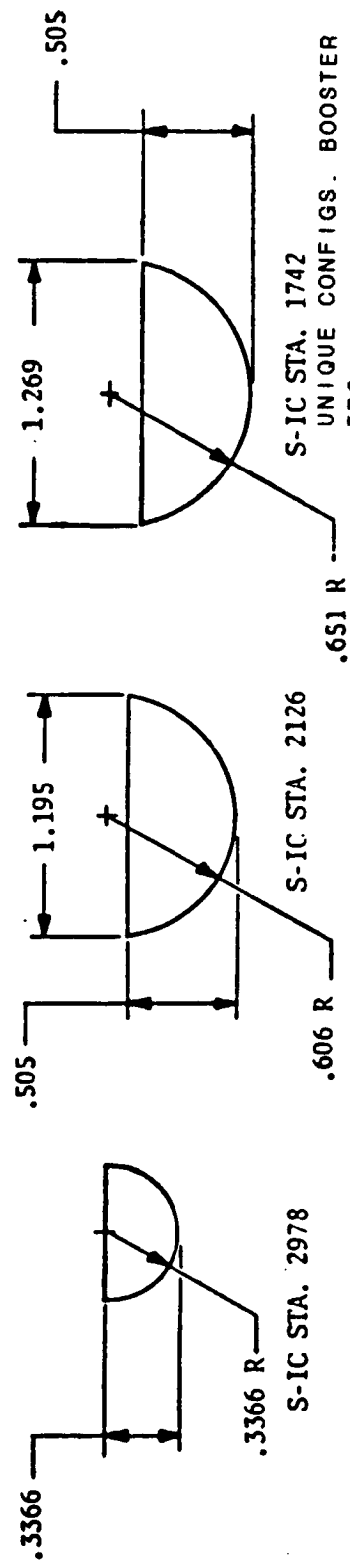
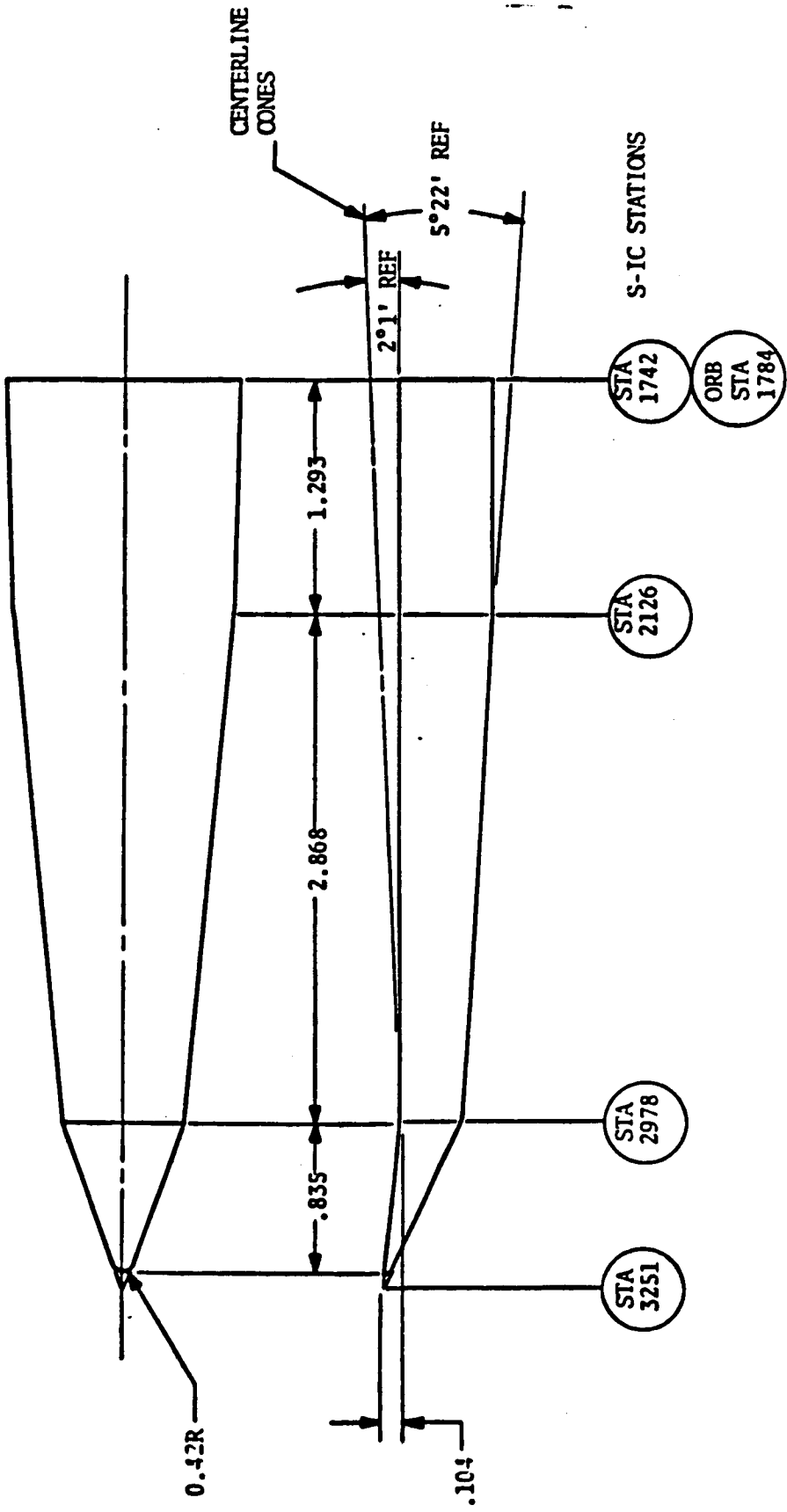


FIGURE 7. S-IC/G-11 ORBITER CRADLE
 S-IC STA. 1742
 UNIQUE CONFIGS. BOOSTER
 TBC
 UNIQUE CONFIGS. ORBITER
 GAC
 DR#1140 C-1- 661

UNIQUE CONFIGS. BOOSTER
 TBC
 UNIQUE CONFIGS. ORBITER
 GAC
 DR#1140 C-1- 662

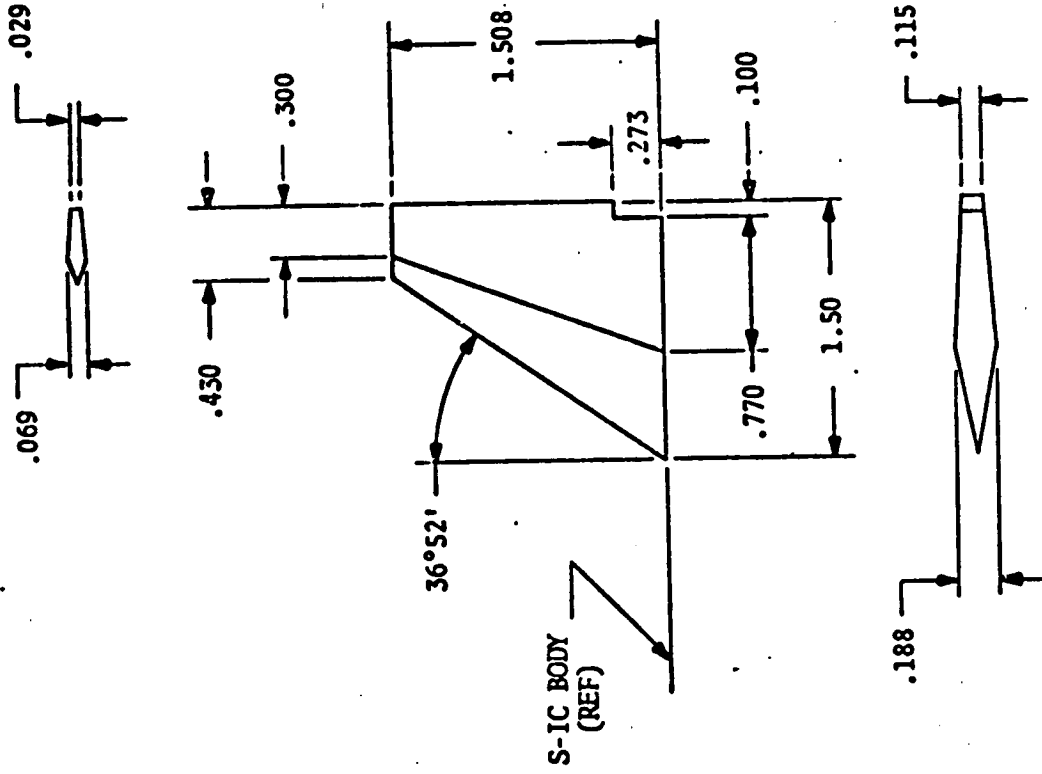


FIGURE 9. 884 SQ. FT. S-IC FIN - F

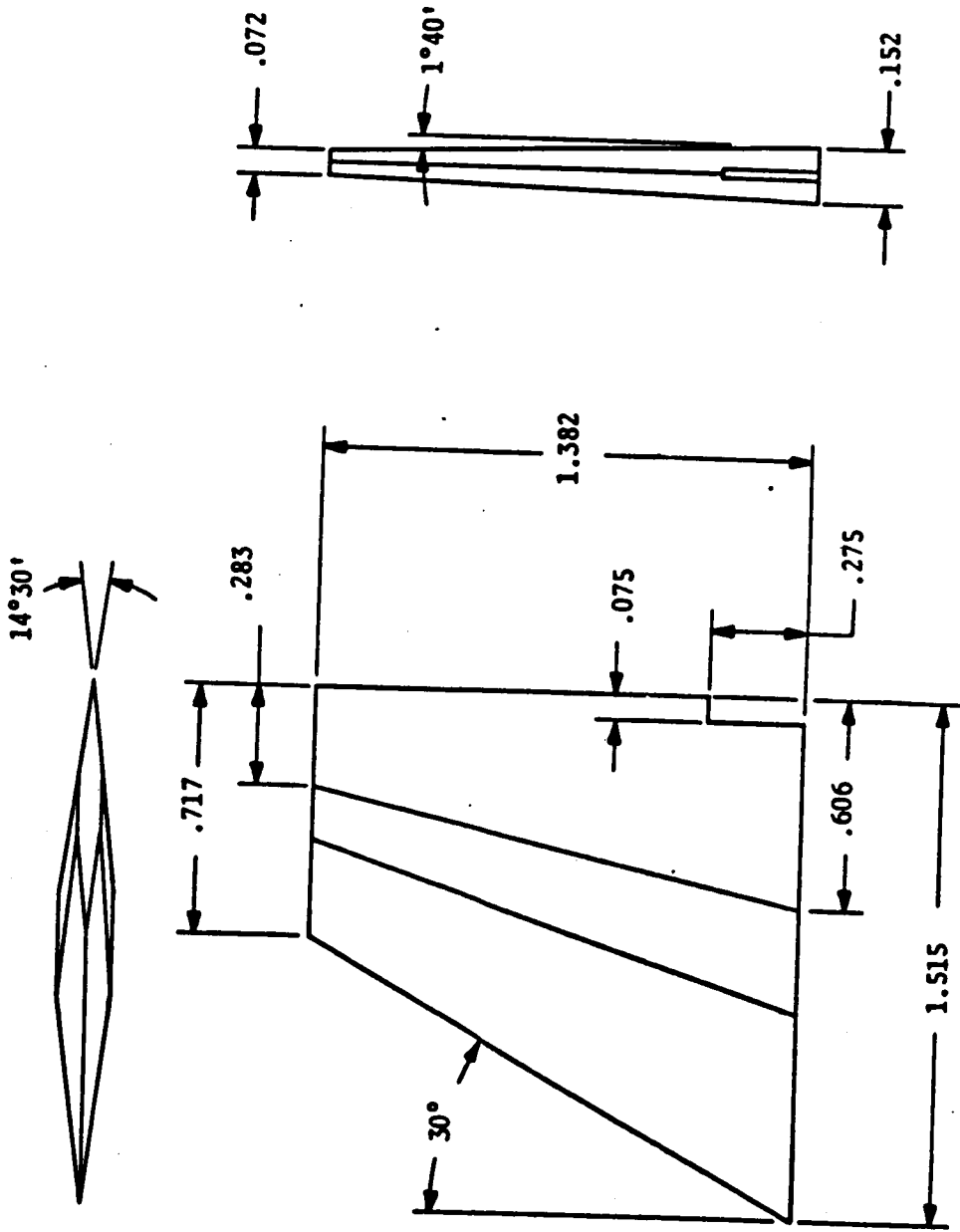


FIGURE 10. 900 FT² S-IC FIN - F₁

UNIQUE CONFIGS. BOOSTER
 TBC
 UNIQUE CONFIGS. ORBITER
 GAC
 DR#1140 C-1- 663

UNIQUE CONFIGS. BOOSTER
TBC
UNIQUE CONFIGS. ORBITER
GAC
DR#1140 C-1- 664

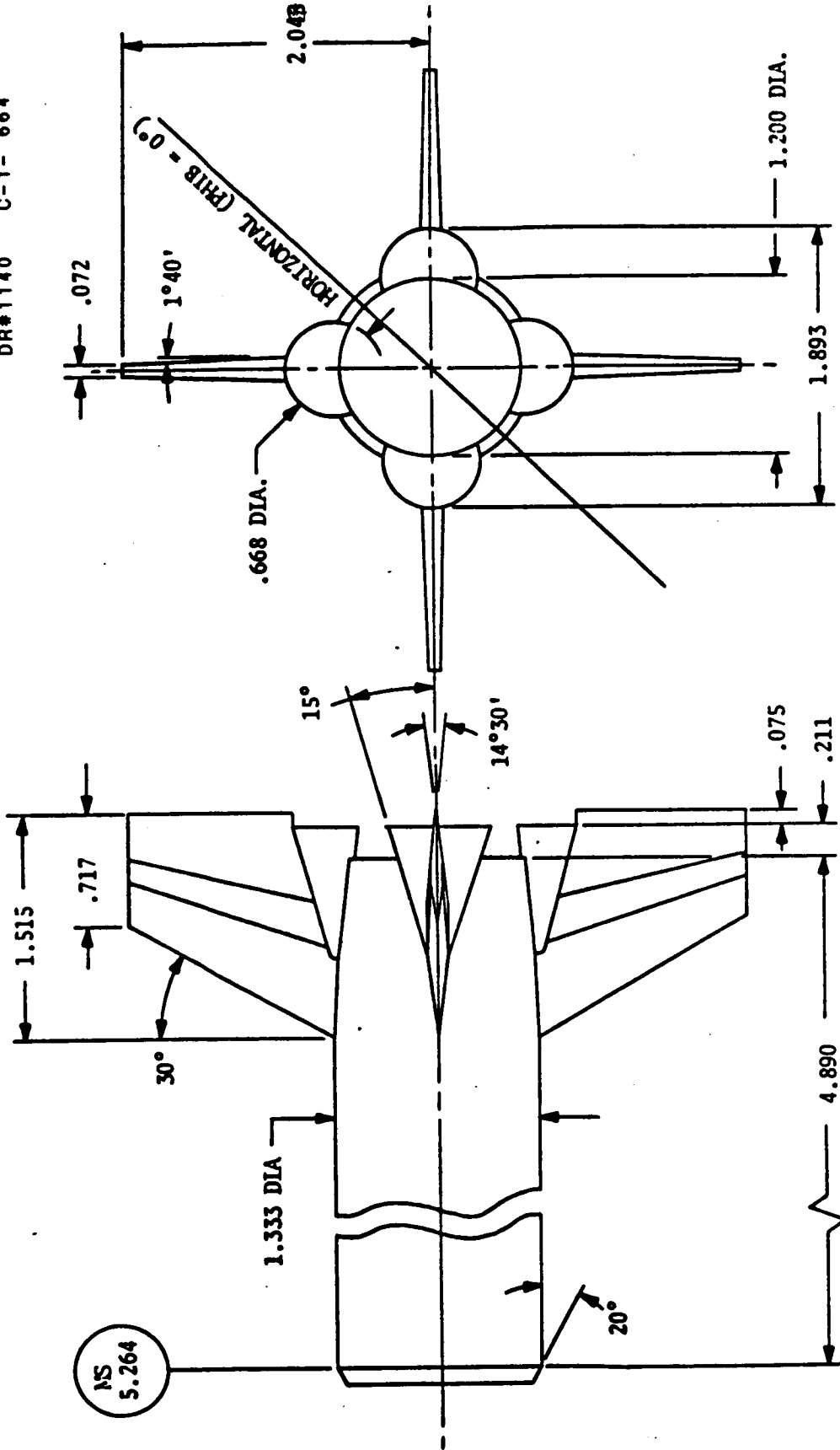
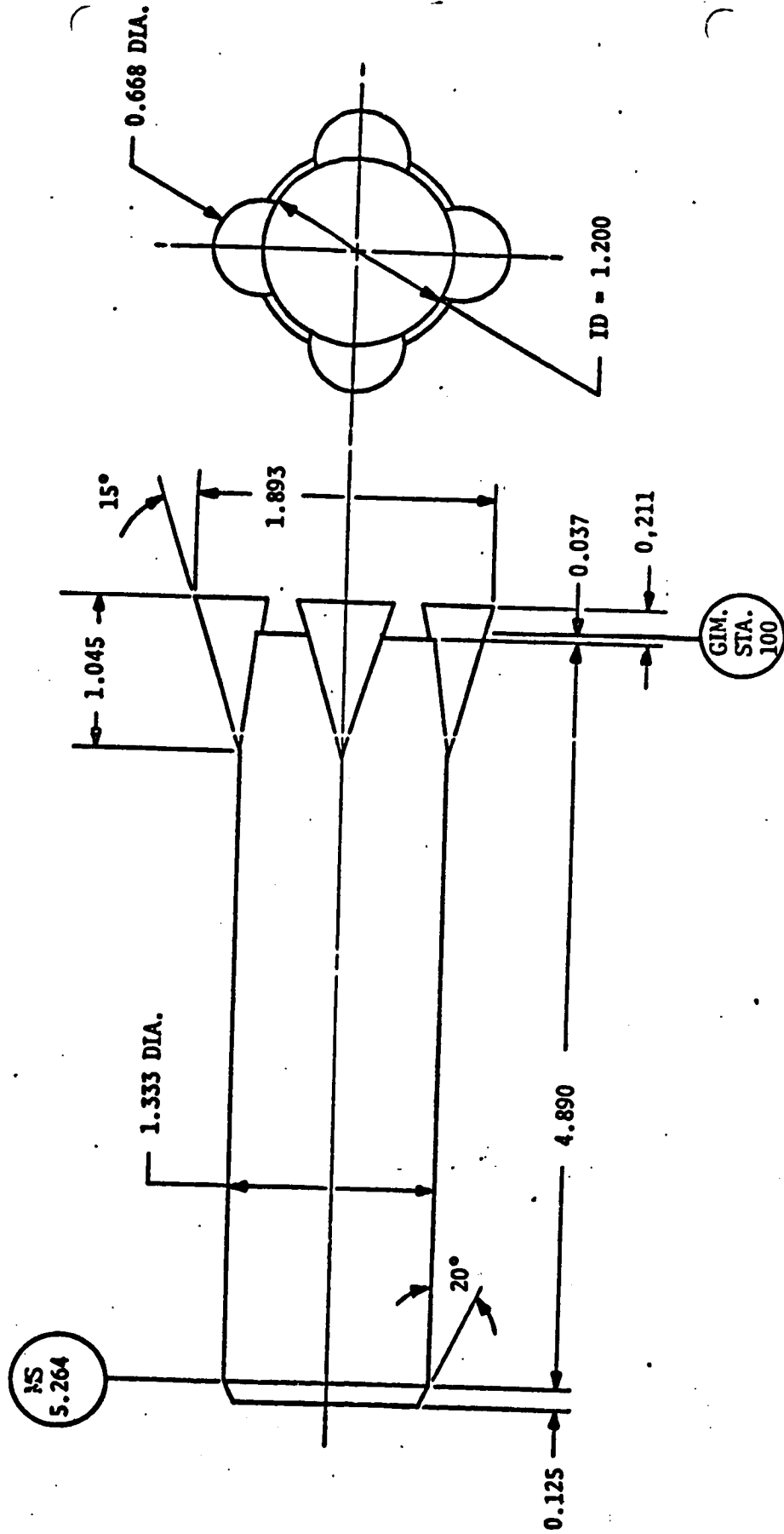


FIGURE 11. S-IC 45° FIN CONFIGURATION - F1



UNIQUE CONFIGS. BOOSTER
 TBC
 UNIQUE CONFIGS. ORBITER
 GAC
 DR#1140 C-1- 665

FIGURE 12. SATURN V/S-IC BOOSTER FINS OFF

UNIQUE CONFIGS. BOOSTER
 TBC
 UNIQUE CONFIGS. ORBITER
 GAC
 DR#1140 C-1- 666

- USED FOR BOTH 120 AND 90 GRIT
- 101 BACK OF LEADING EDGES EXCEPT AS NOTED
- 0.10" WIDTH AT ROOT TAPERING TO 0.05" AT TIP ON WINGS AND FINS
- STRIP ON LOWER SURFACE OF WING SAME AS TOP

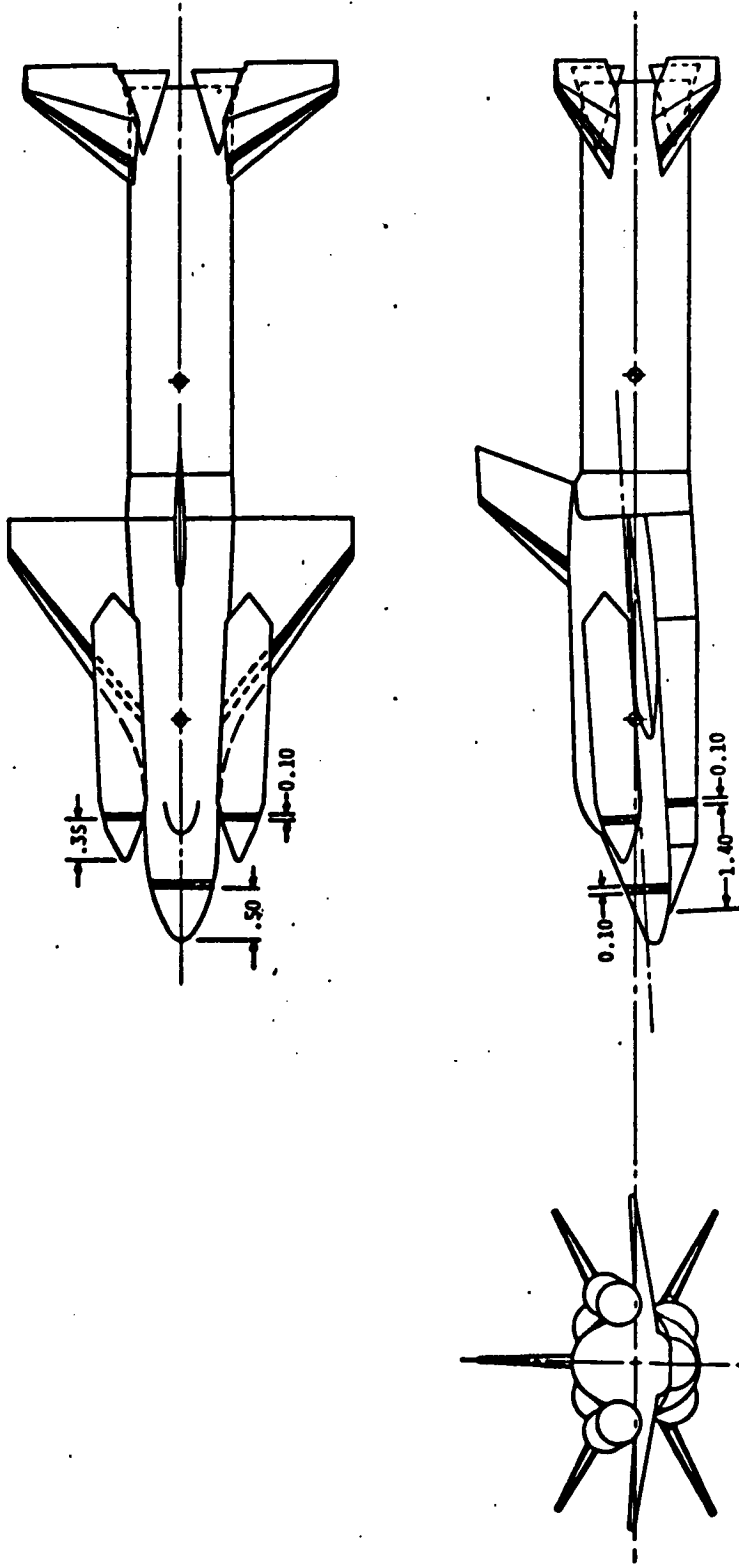


FIGURE 13. TRIP STRIP CHART S-IC/G-11 ORBITER

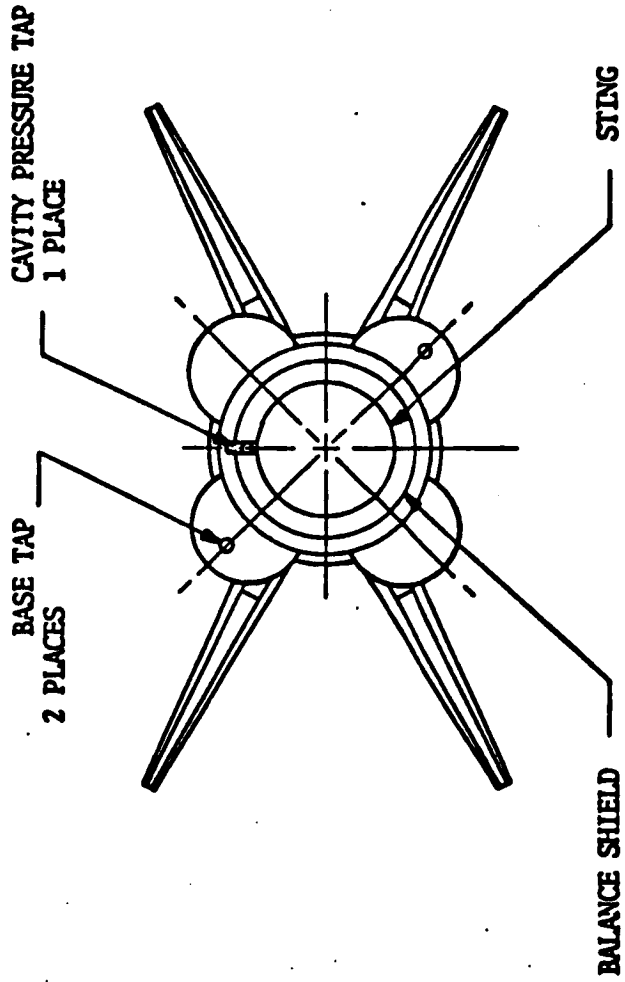
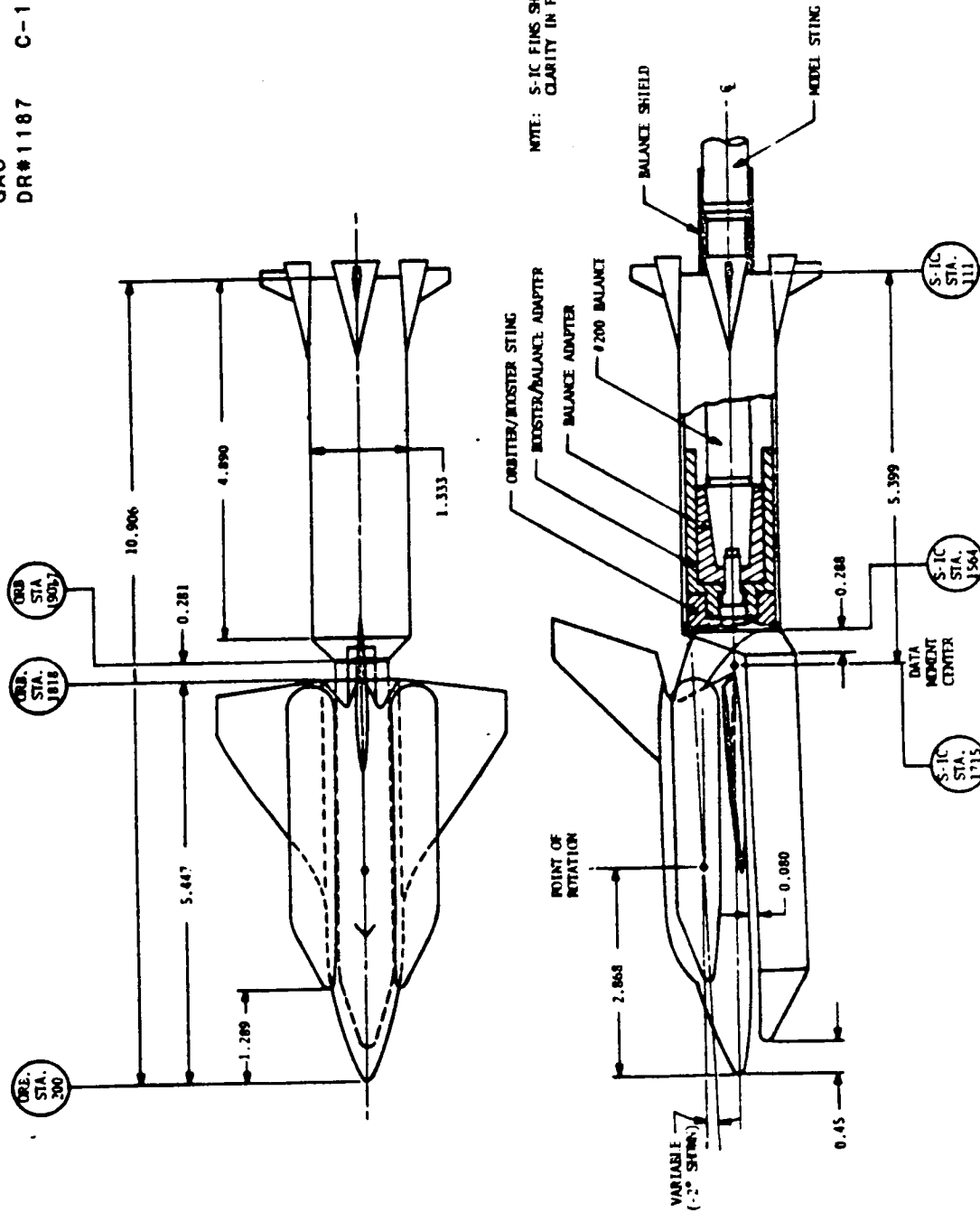


FIGURE 14. BASE PRESSURE TAP LOCATIONS

UNIQUE CONFIGS. BOOSTER
TBC
UNIQUE CONFIGS. ORBITER
GAC
DR#1140 C-1- 667

UNIQUE CONFIGS. BOOSTER
 TBC
 UNIQUE CONFIGS. ORBITER
 GAC
 DR#1187 C-1- 670



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Figure 2. S-IC/H-33 Grumman Orbiter

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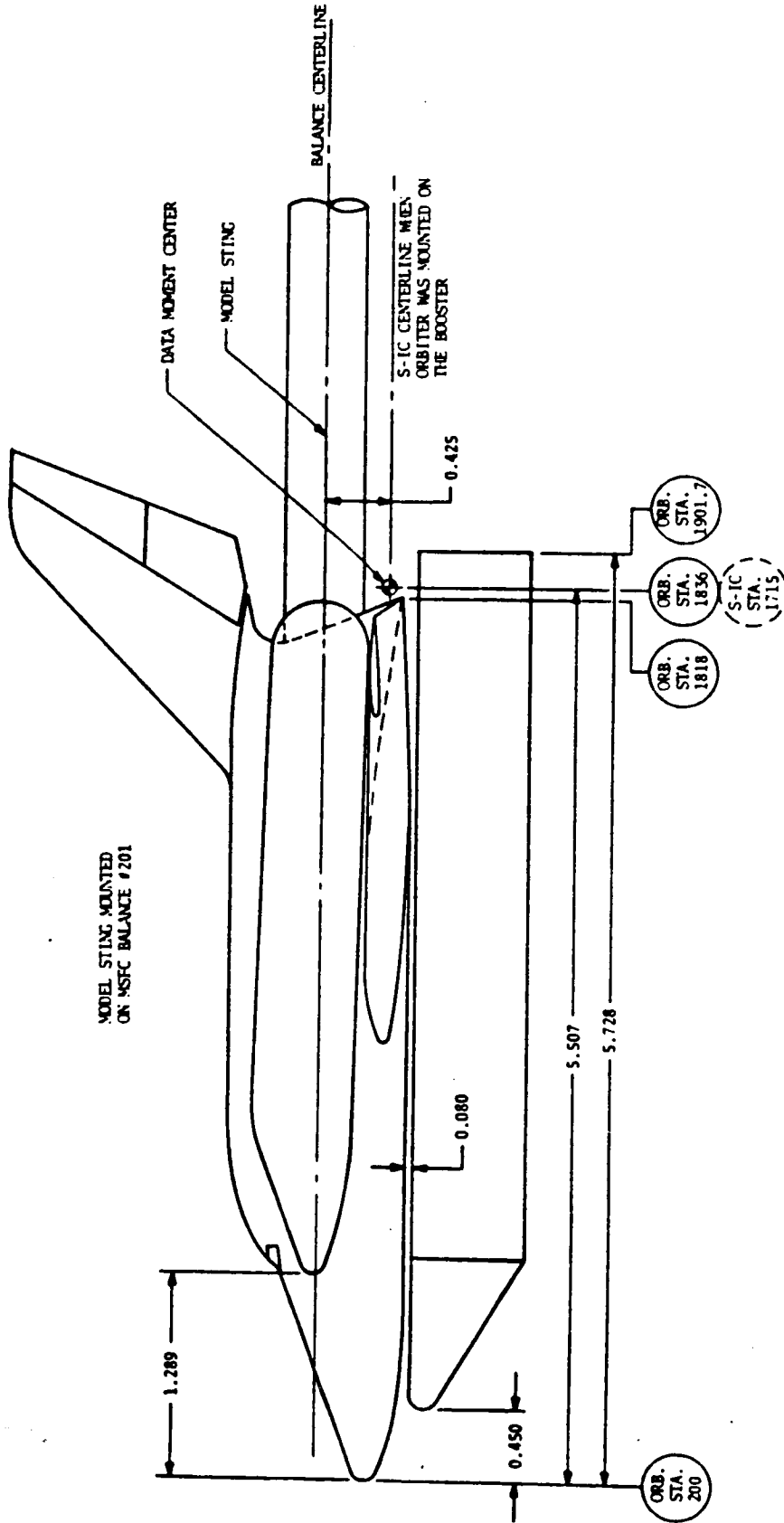
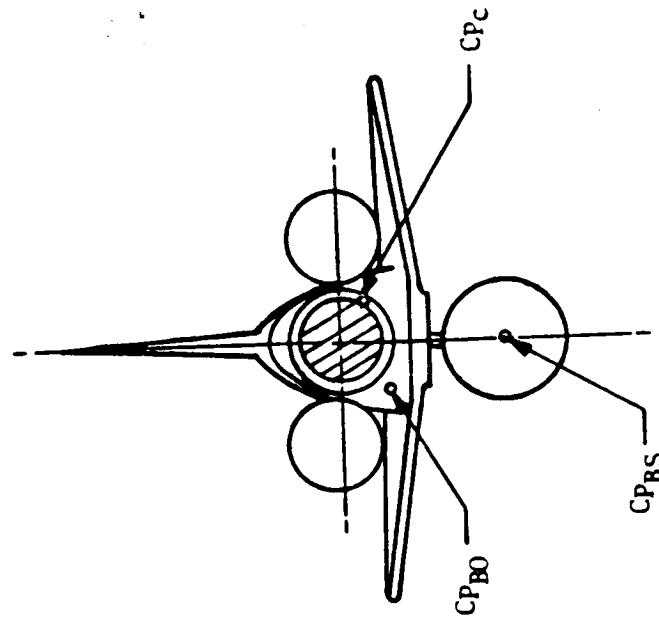


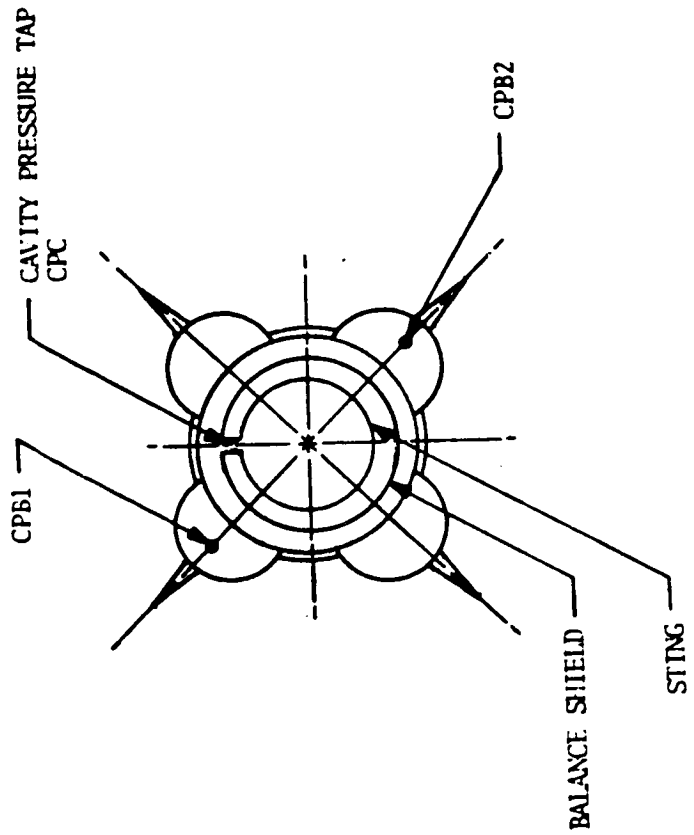
FIGURE 3. F-33 GRUMMAN ORBITER WITH S-IC CRADLE

UNIQUE CONFIGS. BOOSTER
TBC
UNIQUE CONFIGS. ORBITER
GAC
DR#1187 C-1-671

UNIQUE CONFIGS. BOOSTER
 TBC
 UNIQUE CONFIGS. ORBITER
 GAC
 DR#1187 C-1- 672

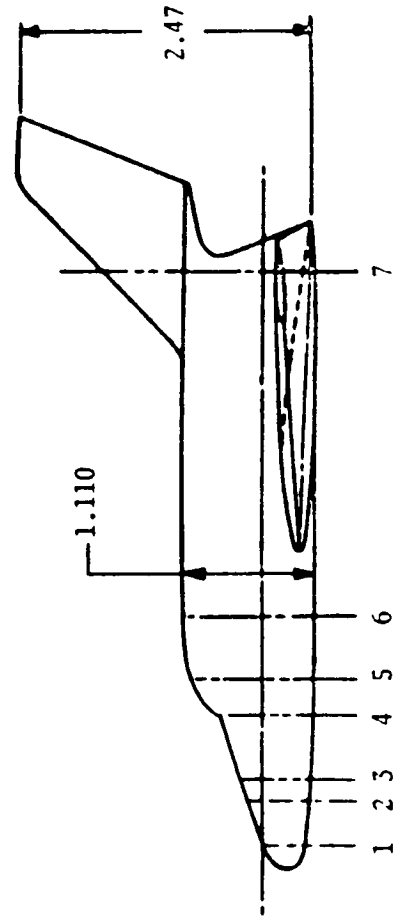
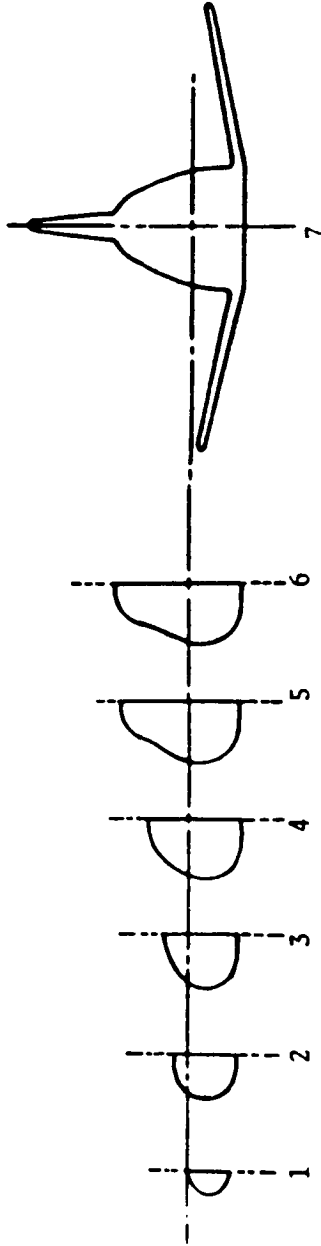
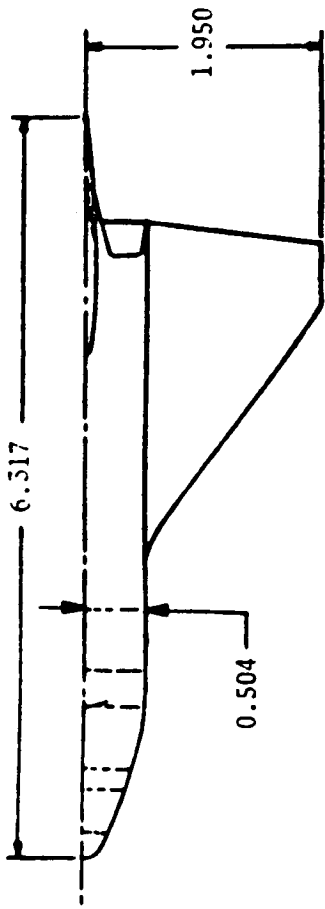


ORBITER + CRADLE BASE PRESSURE LOCATIONS



BOOSTER BASE PRESSURE LOCATIONS

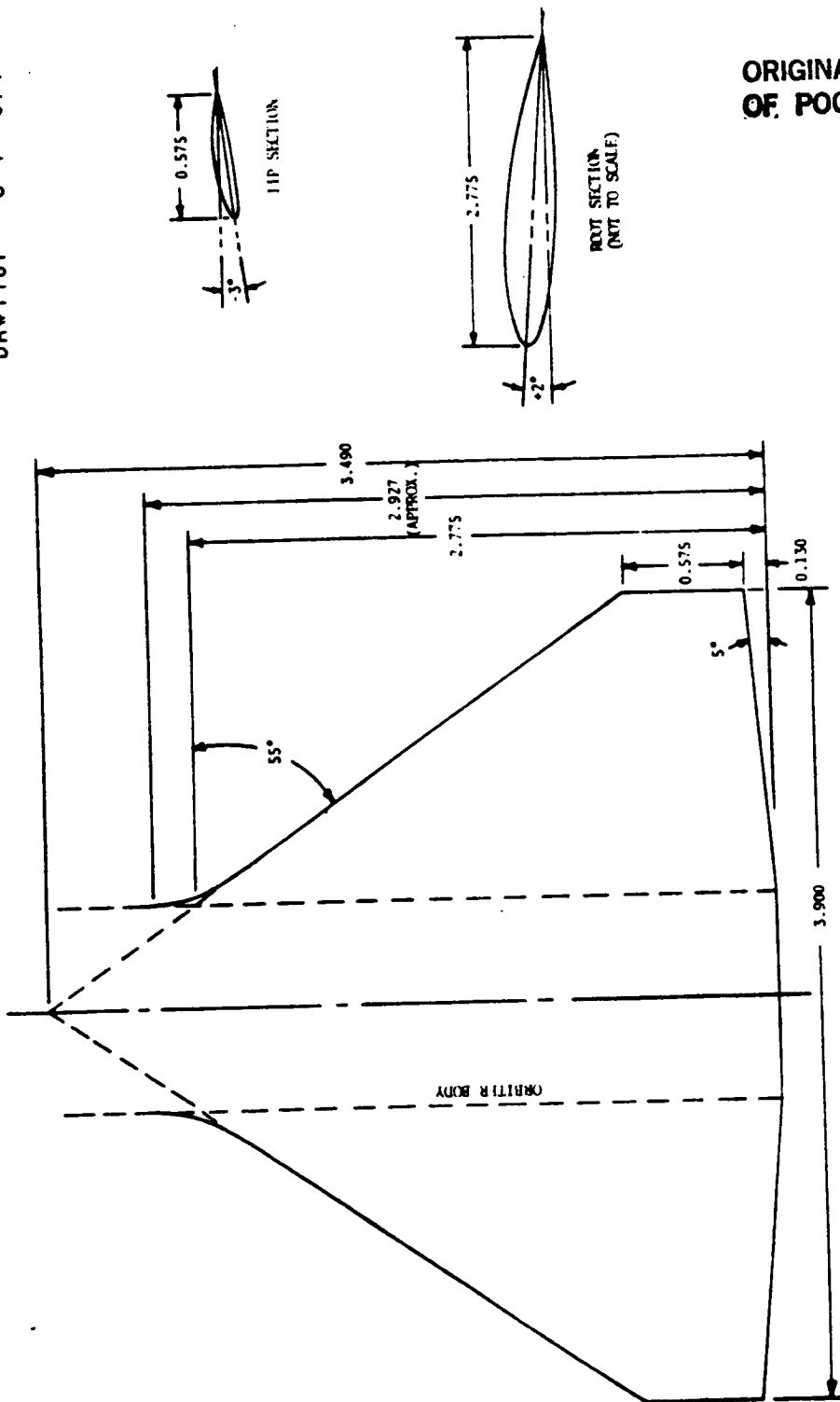
Figure 1. Booster and Orbiter Plus Cradle Base Pressure Locations



UNIQUE CONFIGS. BOOSTER
 TBC
 UNIQUE CONFIGS. ORBITER
 GAC
 DR#1187 C-1- 673

Figure 5. Orbiter Body Model Component (0)

UNIQUE CONFIGS. BOOSTER
TBC
UNIQUE CONFIGS. ORBITER
GAC
DR#1187 C-1- 674



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Figure 6. Grumman H-33 Orbiter W/Booster

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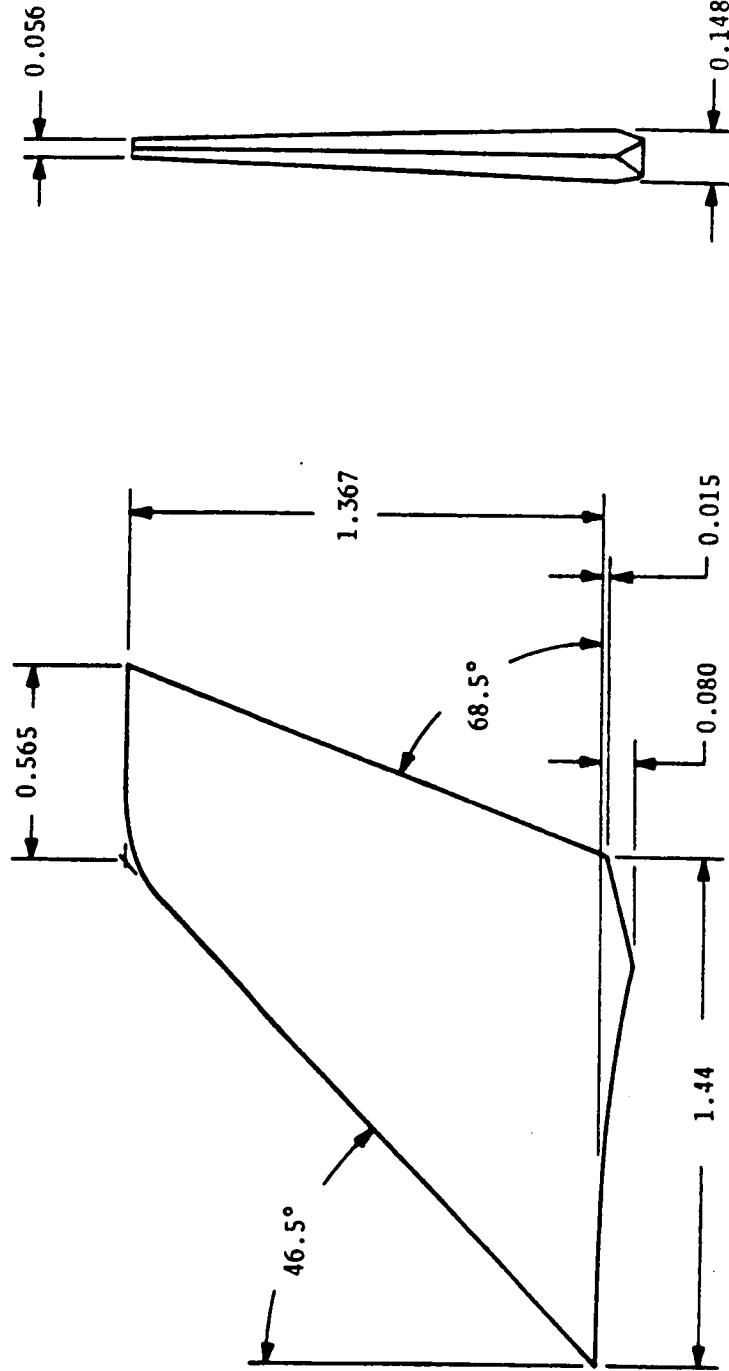


FIGURE 7. GRUMMAN H-33 ORBITER VERTICAL TAIL

UNIQUE CONFIGS. BOOSTER
TBC
UNIQUE CONFIGS. ORBITER
GAC
DR#1187 C-1- 675

UNIQUE CONFIGS. BOOSTER
TBC
UNIQUE CONFIGS. ORBITER
GAC
DR#1187 C-1- 676

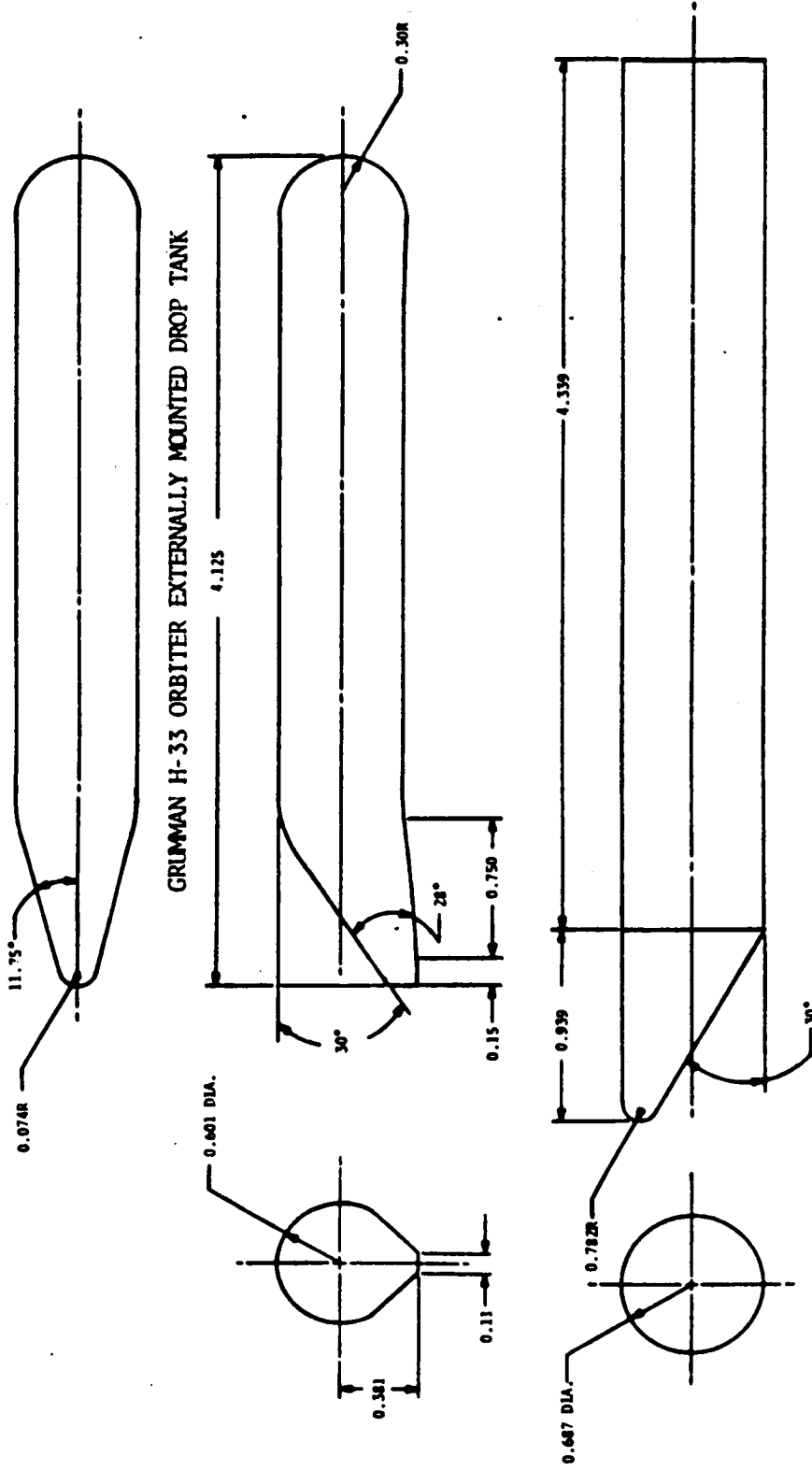


Figure 8. Grumman H-33 Orbiter/S-IC Cradle Assembly

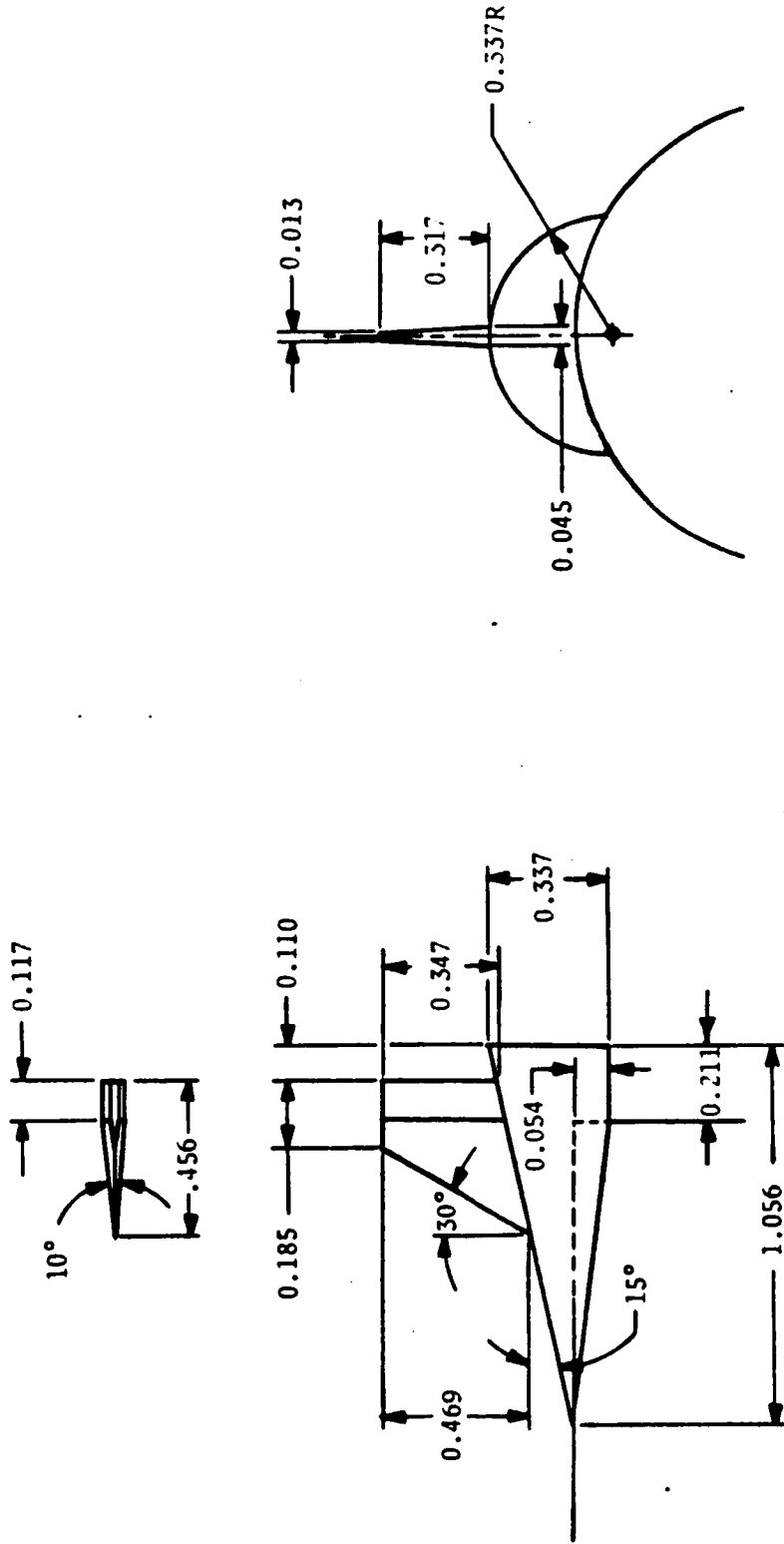


FIGURE 9. S-IC ENGINE SHROUD AND 75 SQ. FT. FIN

UNIQUE CONFIGS. BOOSTER
 TBC
 UNIQUE CONFIGS. ORBITER
 GAC
 DR#1187 C-1- 677

APPENDIX C-2

MODEL FIGURES
LAUNCH AIRLOADS

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TABLE I
TEST AEDC 1163 PRESSURE DATASET COLLATION SHEET

PRETEST
 POSTTEST

DATASET IDENTIFIER	CONFIGURATION	SCHD.		P ₀ PSIA	T ₀ °F	PARAMETER VALUES				NO. OF RUNS	DELTA Z						
		α	β			M	α _L	α _U	β _U		β _L	.105	.112	.120	.151	.228	.908
(1) T851 (2)	BOOSTER/ORBITER	A	0°	22	135	5.0	0°	0	0	0	116	A	B	B	B	C	C
T852		A					0°	100	50	22		A				C	
T853		A					0°	50	100	114		A	B	B	B	C	
T854		A					5°	50	100	24			D	D	D		
T855		B					5°	0	0	18			D	D	D		
T856		B					0°	50	100	20		D	D	D		C	
T857		B			Y		0°	0	0	21		D	D	D		C	
T858		0°		150	180		0°	0	0	20		D	D	D		C	
T859		A		22	135		0°	0	0	20		E					
T860		A					0°	100	100	8		E					
T861		A					0°	100	0	20		E					
T862	(CANARD OFF)	B					0°	0	0	9		F		F		C	
T863	(CANARD AND TRIP OFF)	B					0°	0	0	6		F		F			

Refer to page 14 for DELTA Z schedules.

NOTES: (1)-Characters A through I refer to booster body, upper wing, lower wing, canard, & base, and orbiter body, upper wing, lower wing, & base, respectively.
(2)-Characters 1 through 5 refer to angles of attack of -10, -5, 0, +5, & +10 degrees, respectively.

α or β SCHEDULES
A(α) = -10, -5, 0, +5, +10
B(α) = -5, 0, +5

CANARD BOOSTER
MDAC
DELTA WING ORBITER
MDAC
DR#1174 C-2- 1

TABLE I (Continued)
 TEST AEDC 1163 PRESSURE DATASET COLLATION SHEET

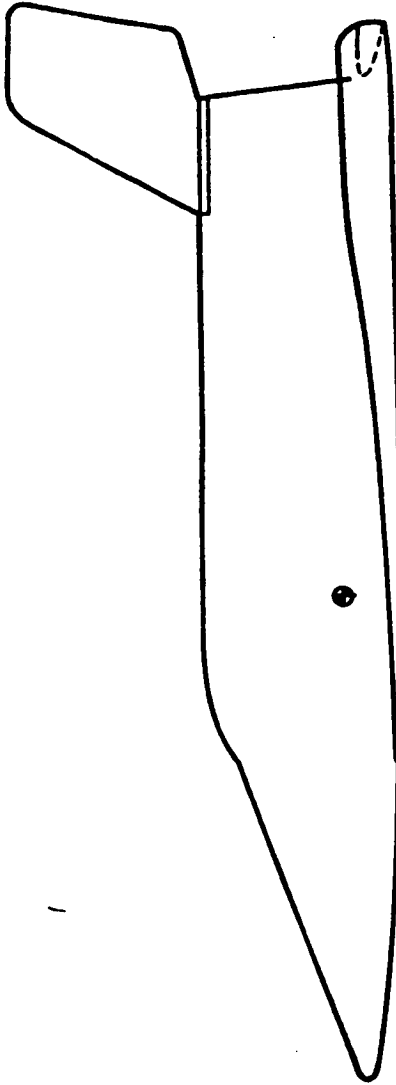
PRETEST
 POSTTEST

DATASET IDENTIFIER	CONFIGURATION	SCHD.		P ₀ PSIA	T ₀ °F	PARAMETER VALUES				NO. OF RUNS	DELTA Z						
		α	β			M	α _c	α _w	α _b		α _r	.105	.112	.120	.151	.228	.408
(1) TR31	BOOSTER/ORBITER	A	0°	11.5	120	3.0	0°	50	100	70							
TR32		A					0°	0	0	55		D	D	D	D	G	
TR33		A						0°	0	0	15	H					
(1) TR21	BOOSTER/ORBITER	A	0°	7.5	120	2.0	0°	50	100	55							
TR22		A					0°	0	0	15	H						
TR23		A						5°	50	100	18		D	D	D	D	G
TR24		B						5°	0	0	18						
TR25		B						0°	100	0	15	H					
TR26		A						0°	100	100	5	I					
TR27		A						0°	0	0	12						
(1) TR013	BOOSTER/ORBITER	0°	0°	-	-	0.0	5°	0	100	12					B	B	
TR023		0°	0°	-	-	0.0	5°	0	100	6					B		

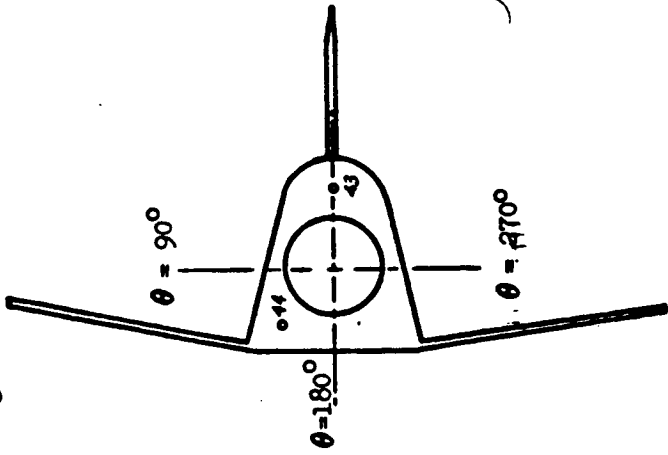
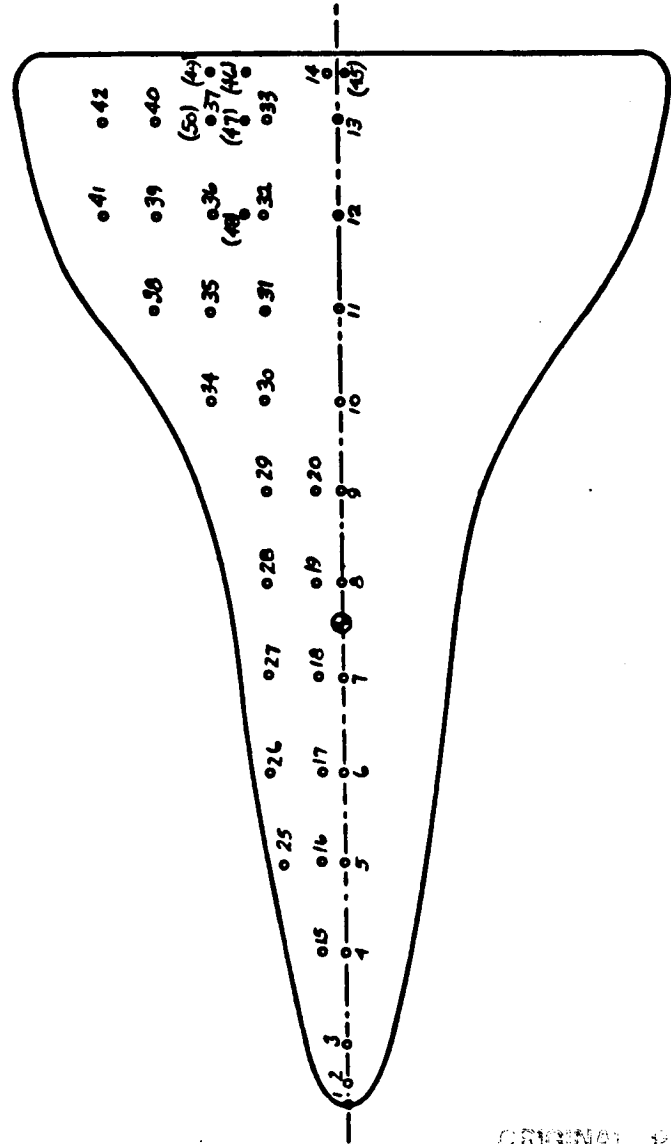
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NOTES: (1)-Characters A through I refer to booster body, upper wing, lower wing, canard, & base, and orbiter body, upper wing, lower wing, & base, respectively.
 (2)-Characters 1 through 5 refer to angles of attack of -10, -5, 0, +5, & +10 degrees, respectively.

α or β SCHEDULES
 A(α) = -10, -5, 0, +5, +10
 B(α) = -5, 0, +5



NOTE: Tap numbers in parentheses with solid symbols are on upper side of wing.



CANARD BOOSTER
MDAC
DELTA WING ORBITER
MDAC
DR#1174 C-2-3

Fig.1.- Pressure Tap Layout - Orbiter

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CANARD BOOSTER
 MDAC
 DELTA WING ORBITER
 MDAC
 DR#1174 C-2-4

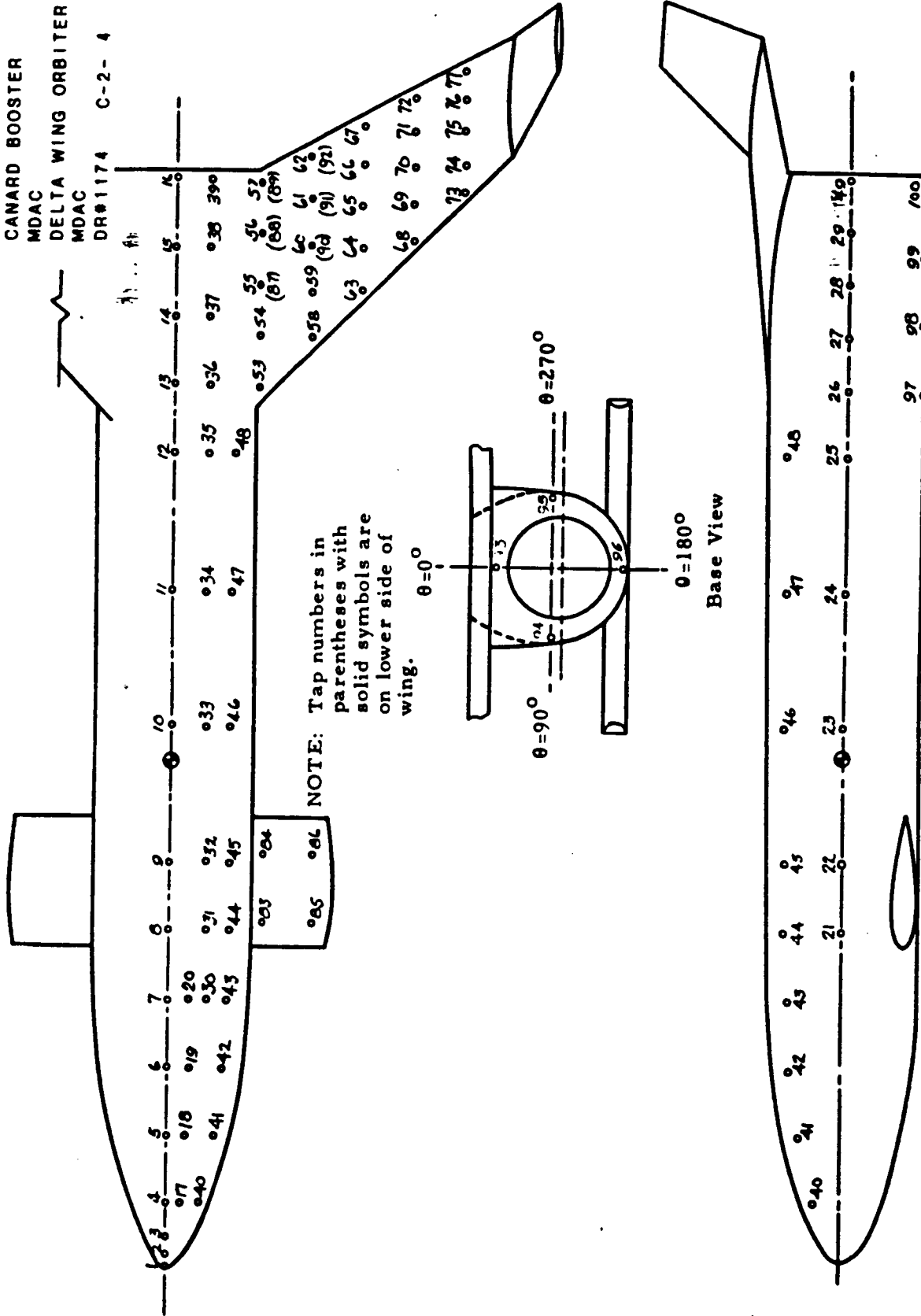


Fig. 2 - Pressure Tap Layout - Booster

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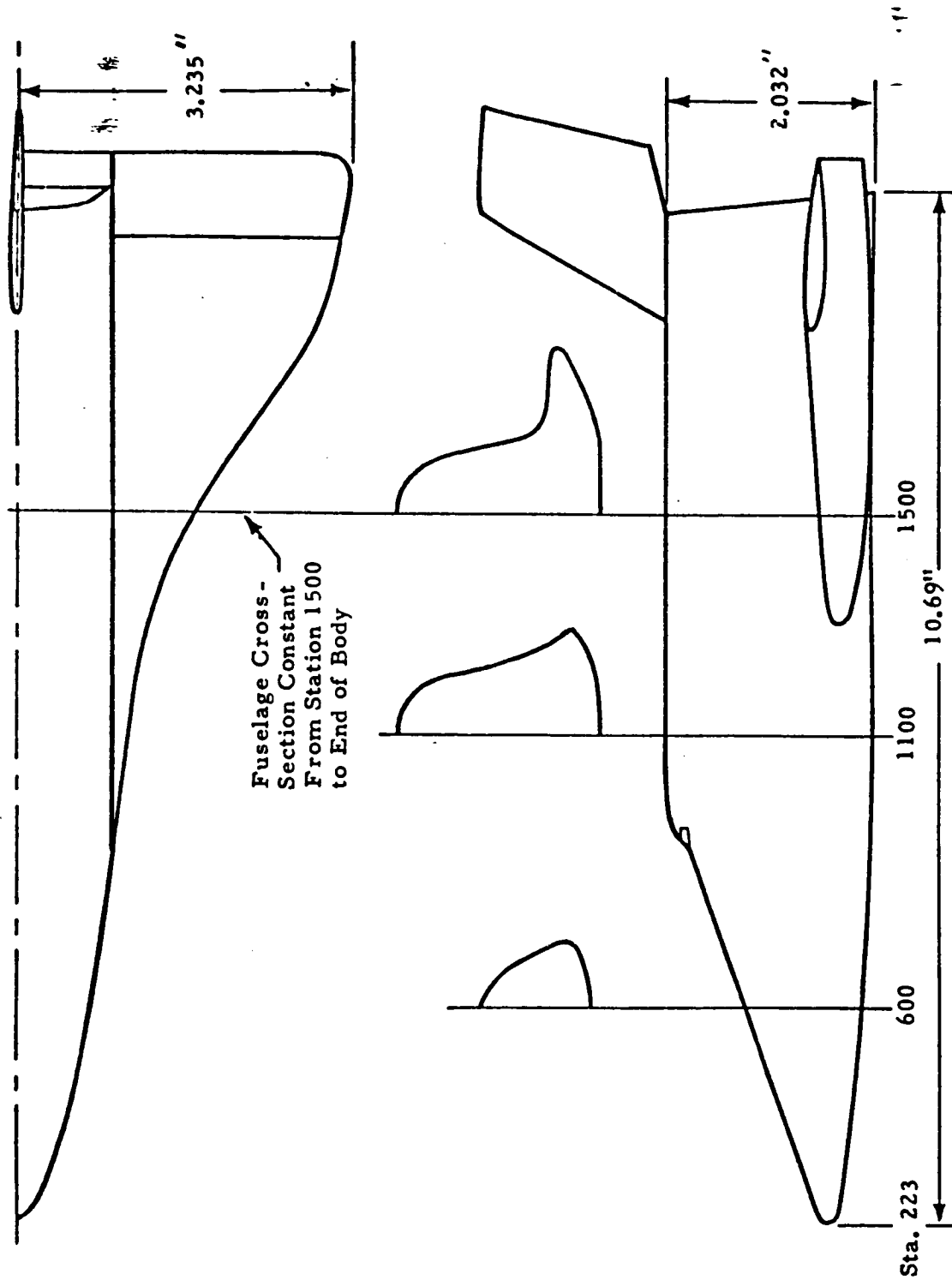


Fig. 3 - Modifications to Orbiter Model

CANARD BOOSTER
MDAC
DELTA WING ORBITER
MDAC
DR#1174 C-2-5

CANARD BOOSTER
MDAC
DELTA WING ORBITER
MDAC
DR#1174 C-2-6

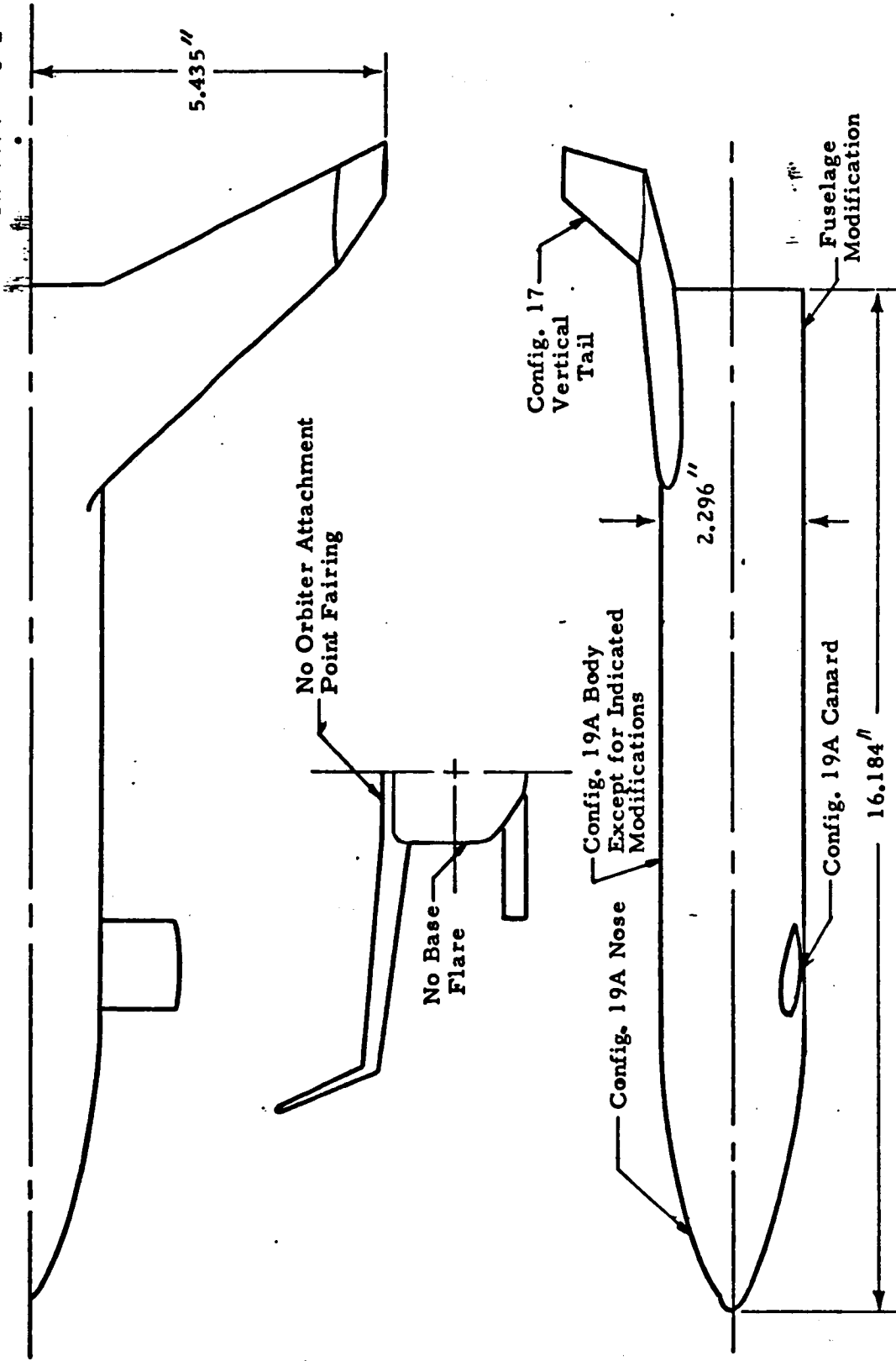
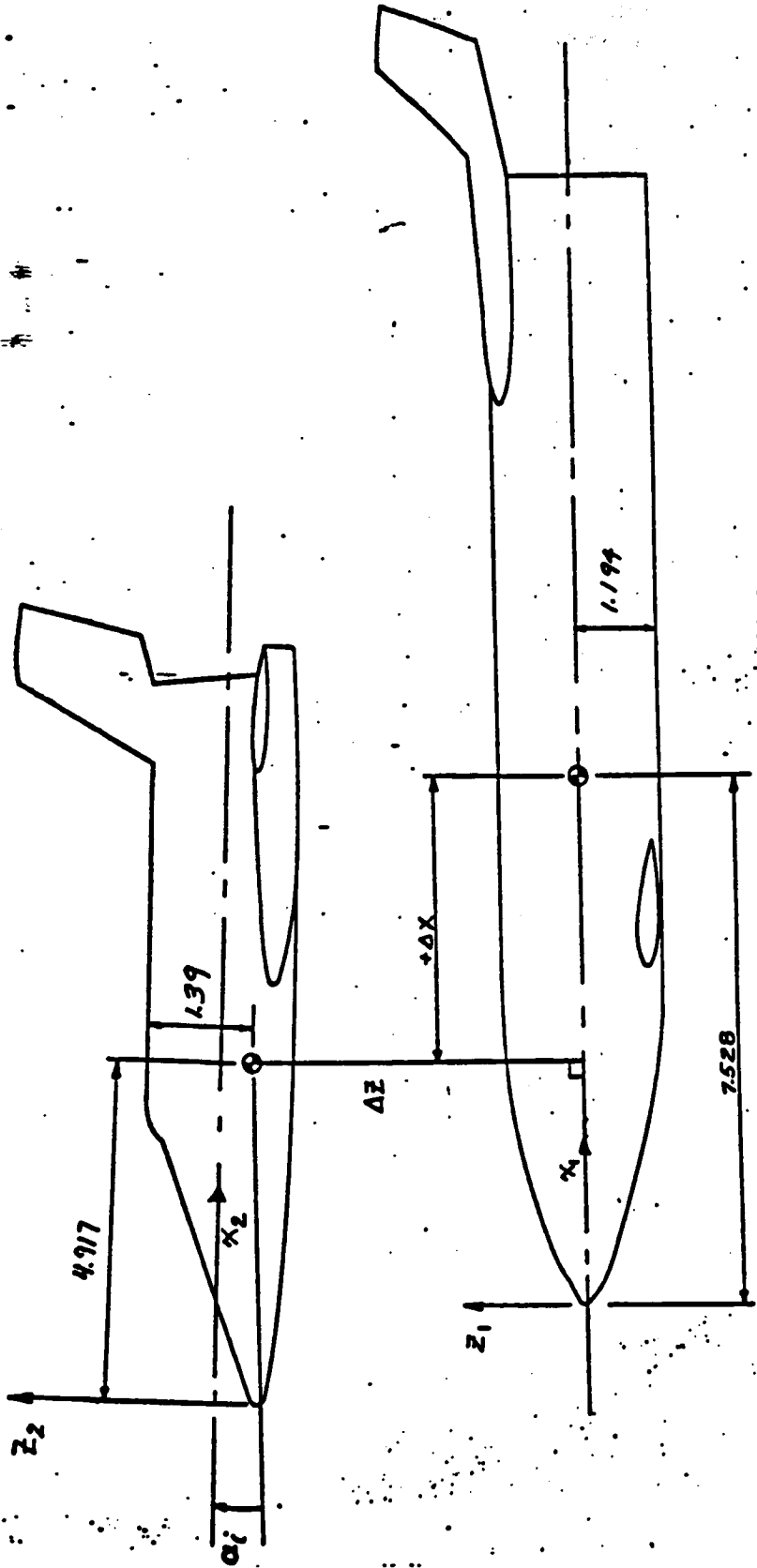


Fig. 4 - Modifications to Booster Model



All dimensions are model scale, in inches.

Figure 6. Separation Nomenclature and Center of Gravity Locations

CANARD BOOSTER
 MDAC
 DELTA WING ORBITER
 MDAC
 DR#1174 C-2-7

TABLE II
 TEST AEDC TC 176 PRESSURE DATASET COLLATION SHEET

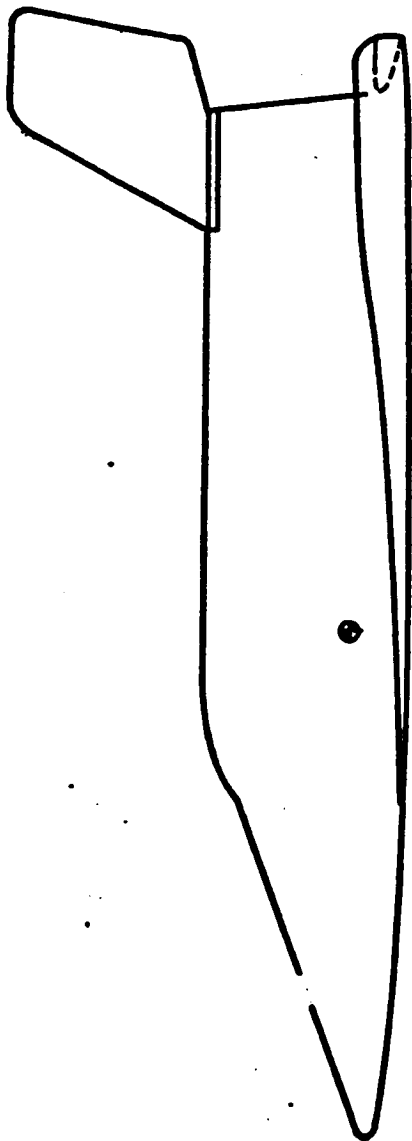
PRETEST
 POSTTEST

DATASET IDENTIFIER	CONFIGURATION	MODEL SECTION	GEO. CONFIG.	SCHD.		PARAMETER/VALUES		NO. OF RUNS	MACH NUMBERS						
				α	β	λ	$\Delta X/L$.6	.9	1.0	1.1	1.2	1.3	
TC001	BOOSTER/ORBITER	A through I		A	0°	0°	0		✓	✓	✓	✓	✓	✓	✓
TC002				0°	B				✓	✓	✓	✓	✓	✓	✓
TC003				-6°	C				✓	✓	✓	✓	✓	✓	✓
TC004				+6°	B				✓	✓	✓	✓	✓	✓	✓
TC005				A	0°		.0367		✓	P	✓	✓	✓	✓	✓
TC006				0°	B				✓	✓	✓	✓	✓	✓	✓
TC007				-6°	D				✓	✓	✓	✓	✓	✓	✓
TC008				+6°	D				✓	✓	✓	✓	✓	✓	✓
TC009				A	0°		1.9°		✓	✓	✓	✓	✓	✓	✓
TC010				A	0°		3.8°		P	✓	✓	✓	✓	✓	P
TC011				A	0°		0°	1.943	✓	✓	✓	✓	✓	✓	✓
TC012	BOOSTER ALONE	A, B, C, D, E		A	0°				✓	✓	✓	✓	✓	✓	✓
TC013	BOOSTER ALONE / CANARD DEF	A, B, C, E		0°	B				✓	✓	✓	✓	✓	✓	✓
TC014				A	0°				✓	✓	✓	✓	✓	✓	✓

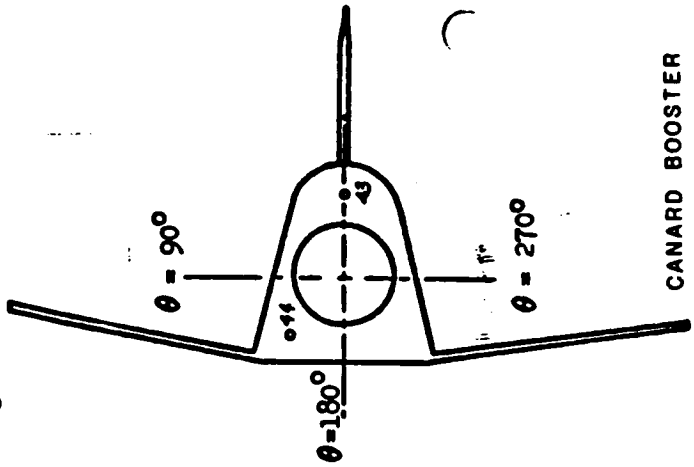
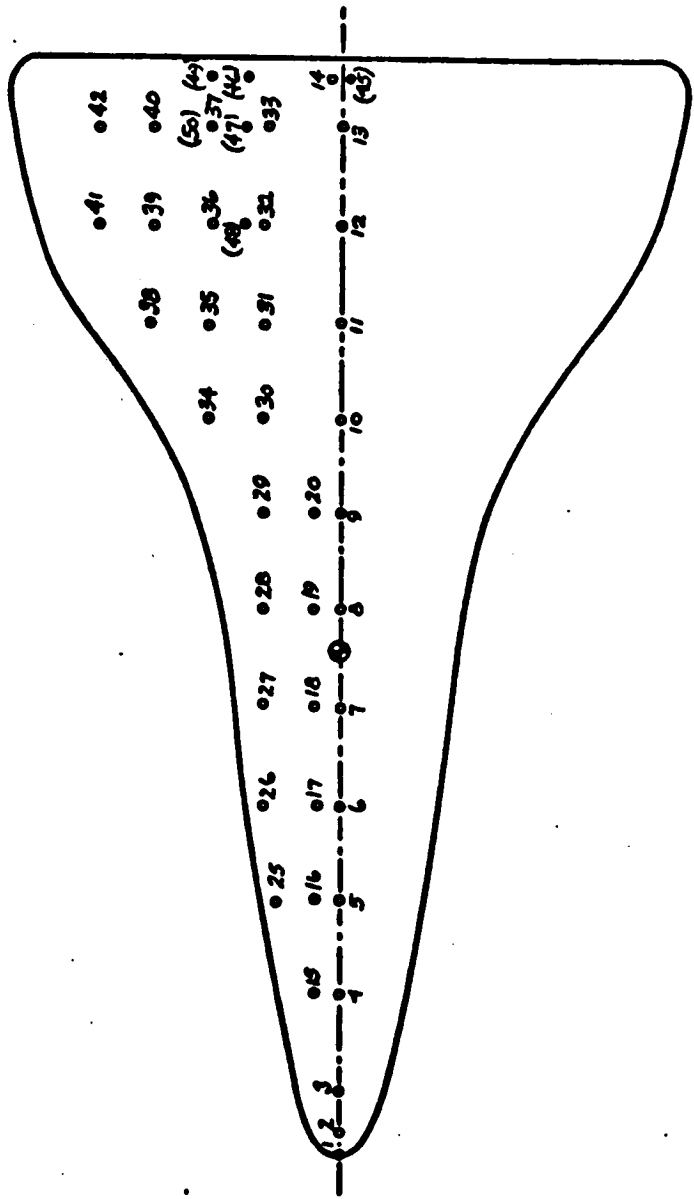
NOTE (1): First character of each dataset identifier denotes model section: A through I refer to booster body, upper wing, lower wing, canard, base, and orbiter body, upper wing, lower wing, and base, respectively.

α OR β SCHEDULES

A(α)=-8,-6,-4,-2, 0,+2,+4,+6,+8,+10 degrees P(α)=partial schedule A
 B(β)=-6,-4,-2, 0,+2,+4,+6 degrees C(β)=-4,-2, 0,+2,+4 degrees
 D(β)=-4,+4 degrees (plotted data includes $\beta=0$ at $\alpha=-6$ or $+6$ from corresponding α -variant dataset)



NOTE: Tap numbers in parentheses with solid symbols are on upper side of wing.



CANARD BOOSTER
MDAC
DELTA WING ORBITER
MDAC
DR#1222 C-2-9

Fig. 1.- Pressure Tap Layout - Orbiter

CANARD BOOSTER
 MDAC
 DELTA WING ORBITER
 MDAC
 DR#1222 C-2-10

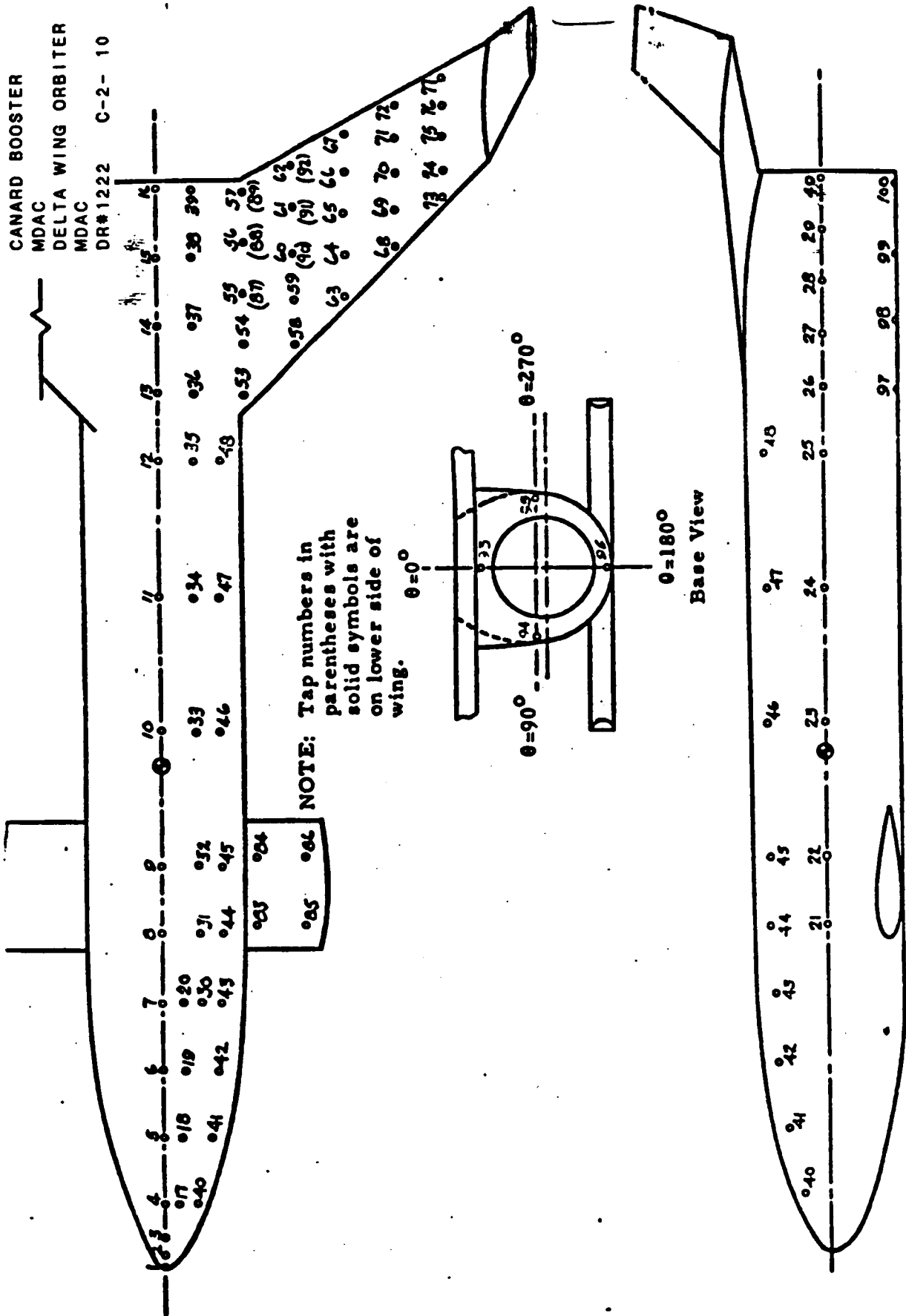


Fig. 2 - Pressure Tap Layout - Booster

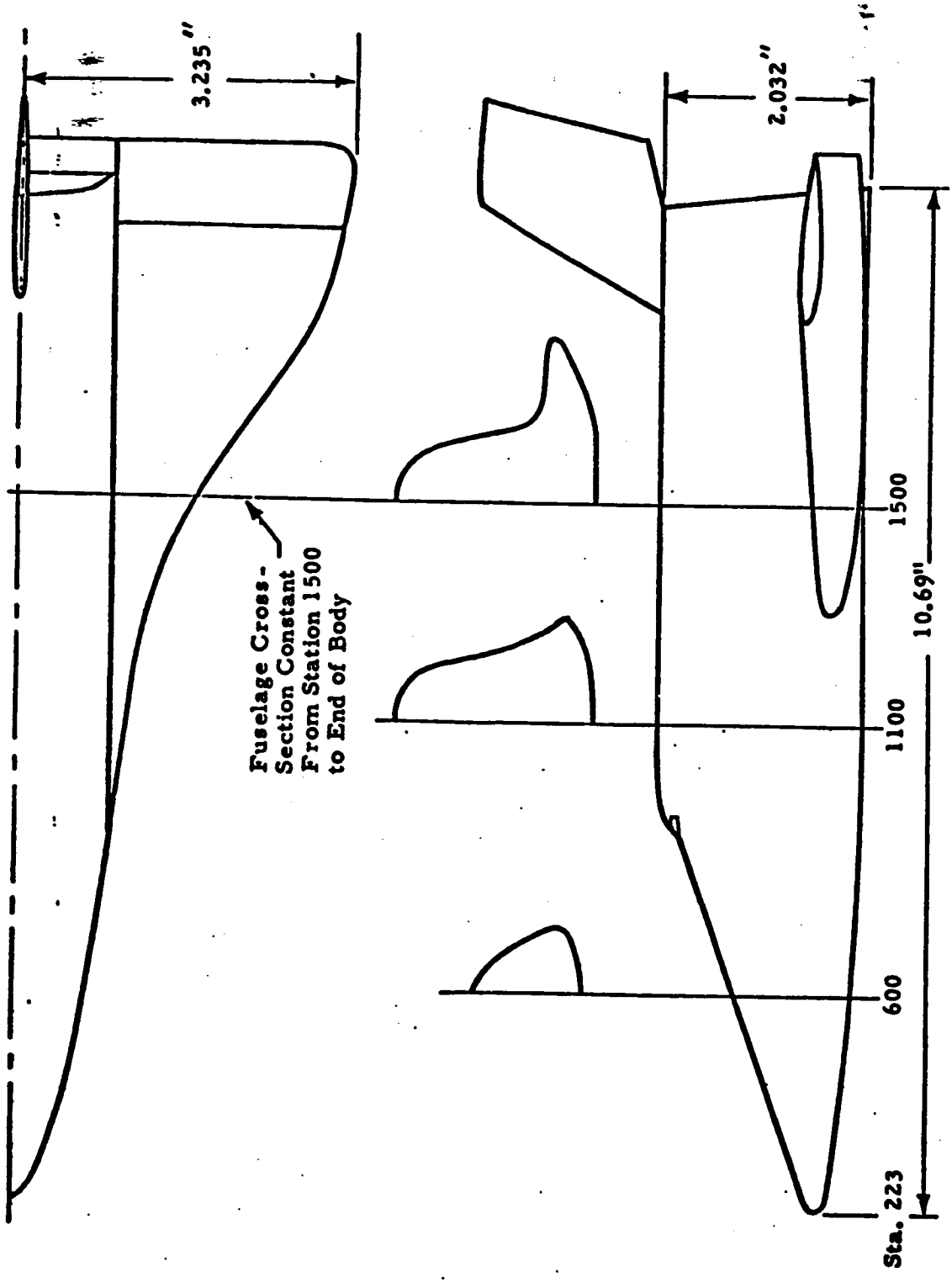


Fig. 3 - Modifications to Orbiter Model

CANARD BOOSTER
MDAC
DELTA WING ORBITER
MDAC
DR#1222 C-2- 11

CANARD BOOSTER
MDAC
DELTA WING ORBITER
MDAC
DR#1222 C-2-12

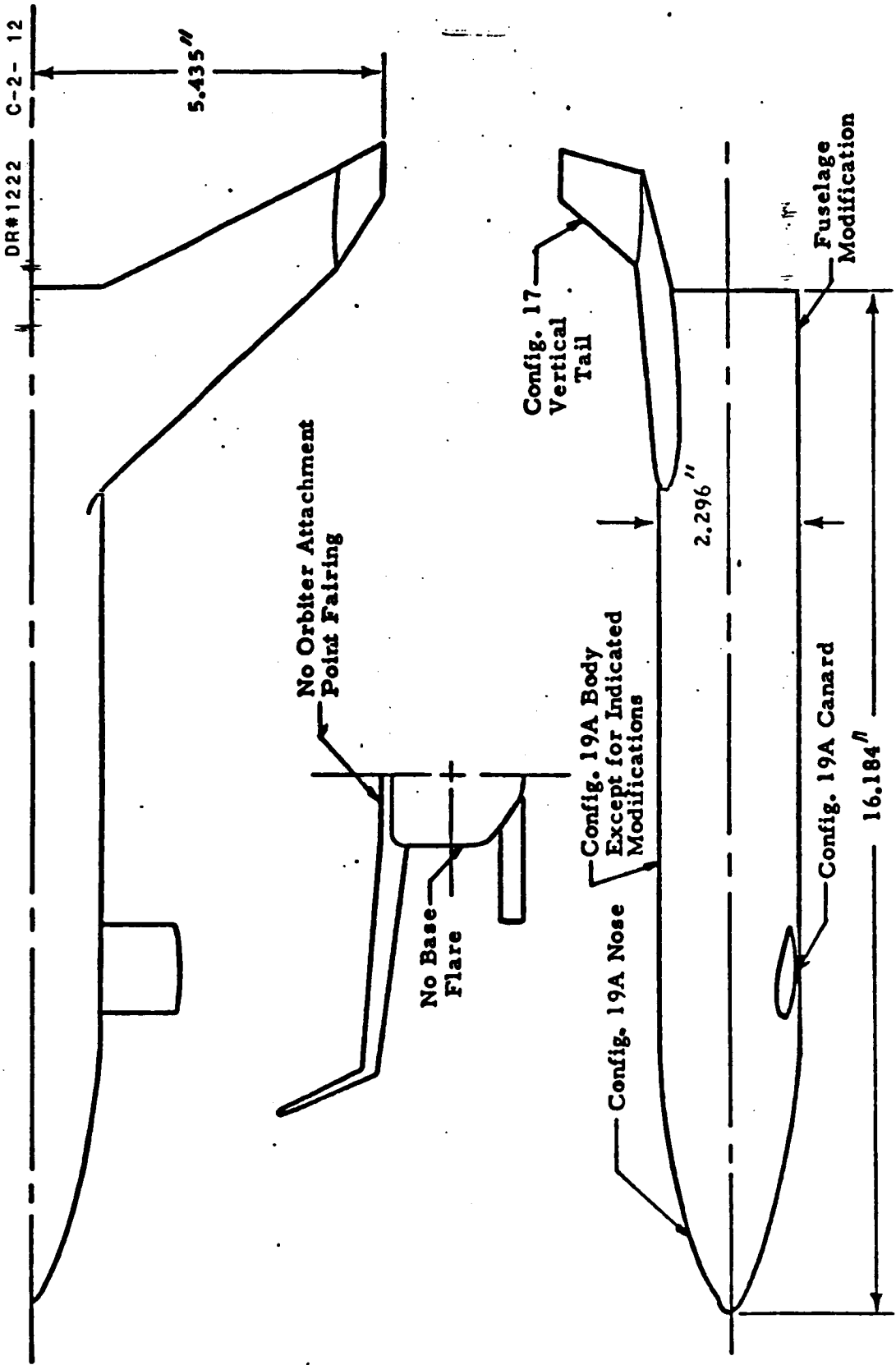


Fig. 4 - Modifications to Booster Model

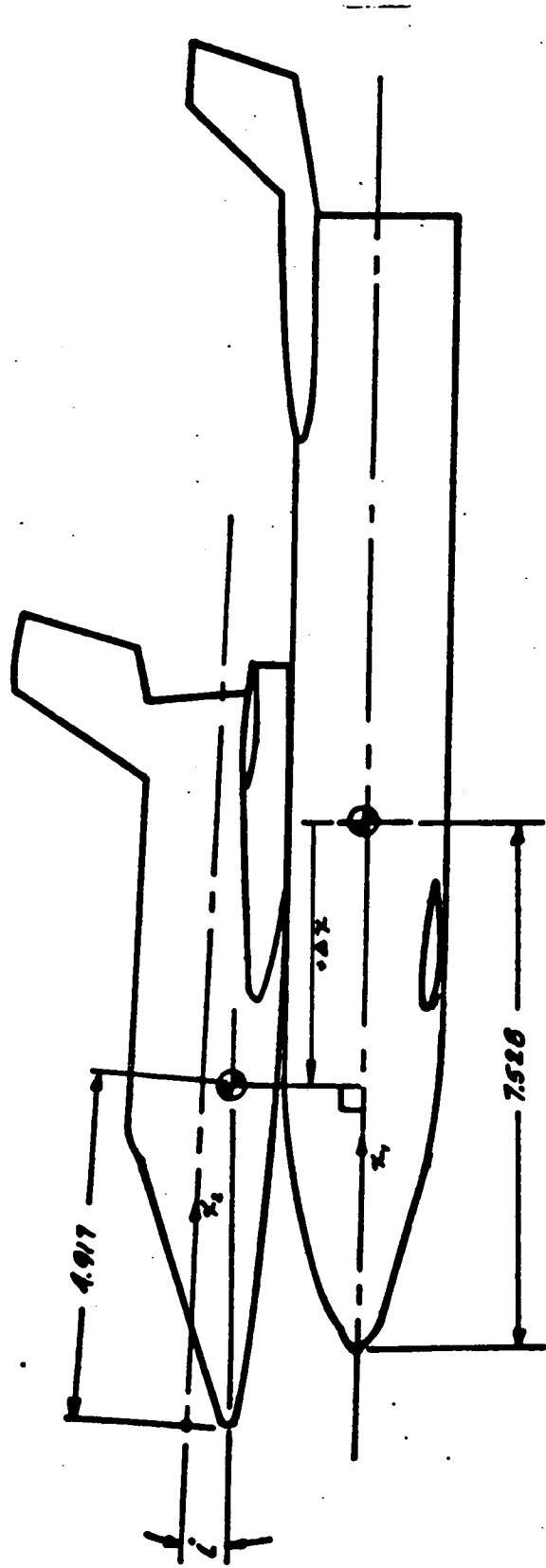
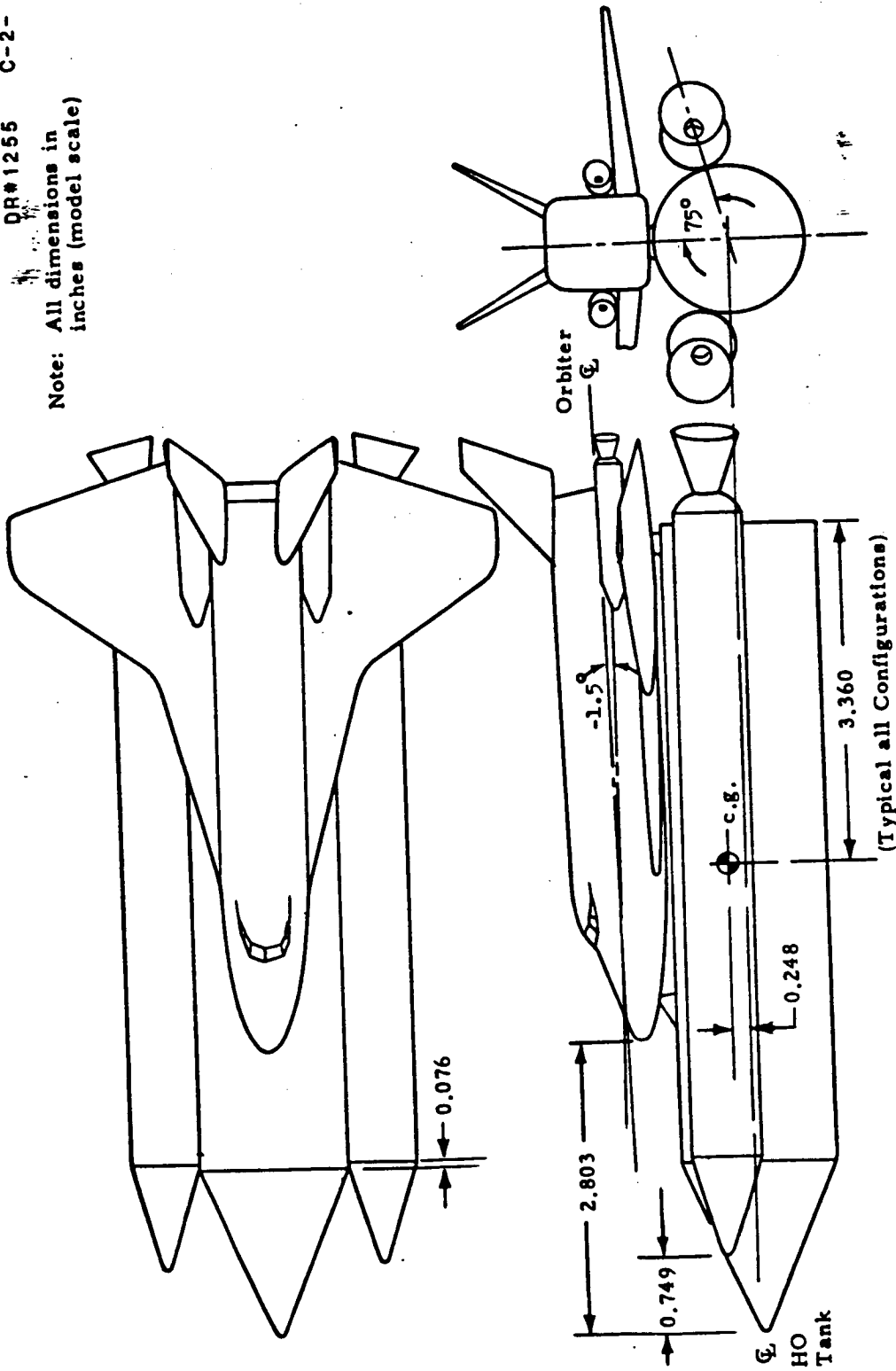


Figure 5: Model Separation Variables

CANARD BOOSTER
 MDAC
 DELTA WING ORBITER
 MDAC
 DR#1222 C-2- 13

CYLINDRICAL BOOSTER
 MSFC
 DELTA WING ORBITER
 LMSC
 DR#1255 C-2-16

Note: All dimensions in inches (model scale)



LMSC-HREC D306027

Fig. 2 - Baseline Launch Vehicle

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CYLINDRICAL BOOSTER
MSFC
DELTA WING ORBITER
LMSC
DR#1255 C-2- 17

NOTE:
All dimensions in inches
(model scale).

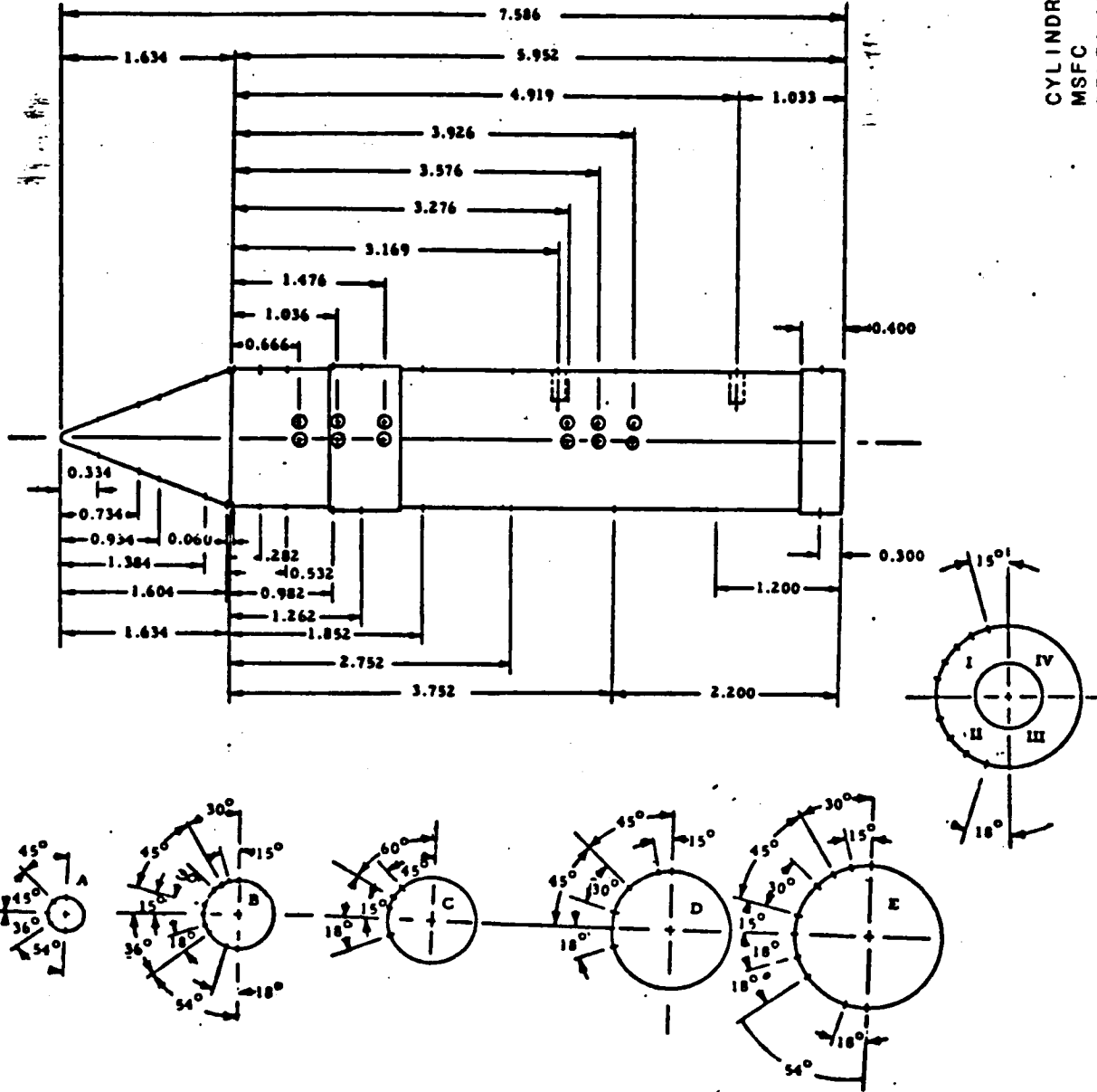


Fig. 4 - NO Tank Pressure Orifice Location

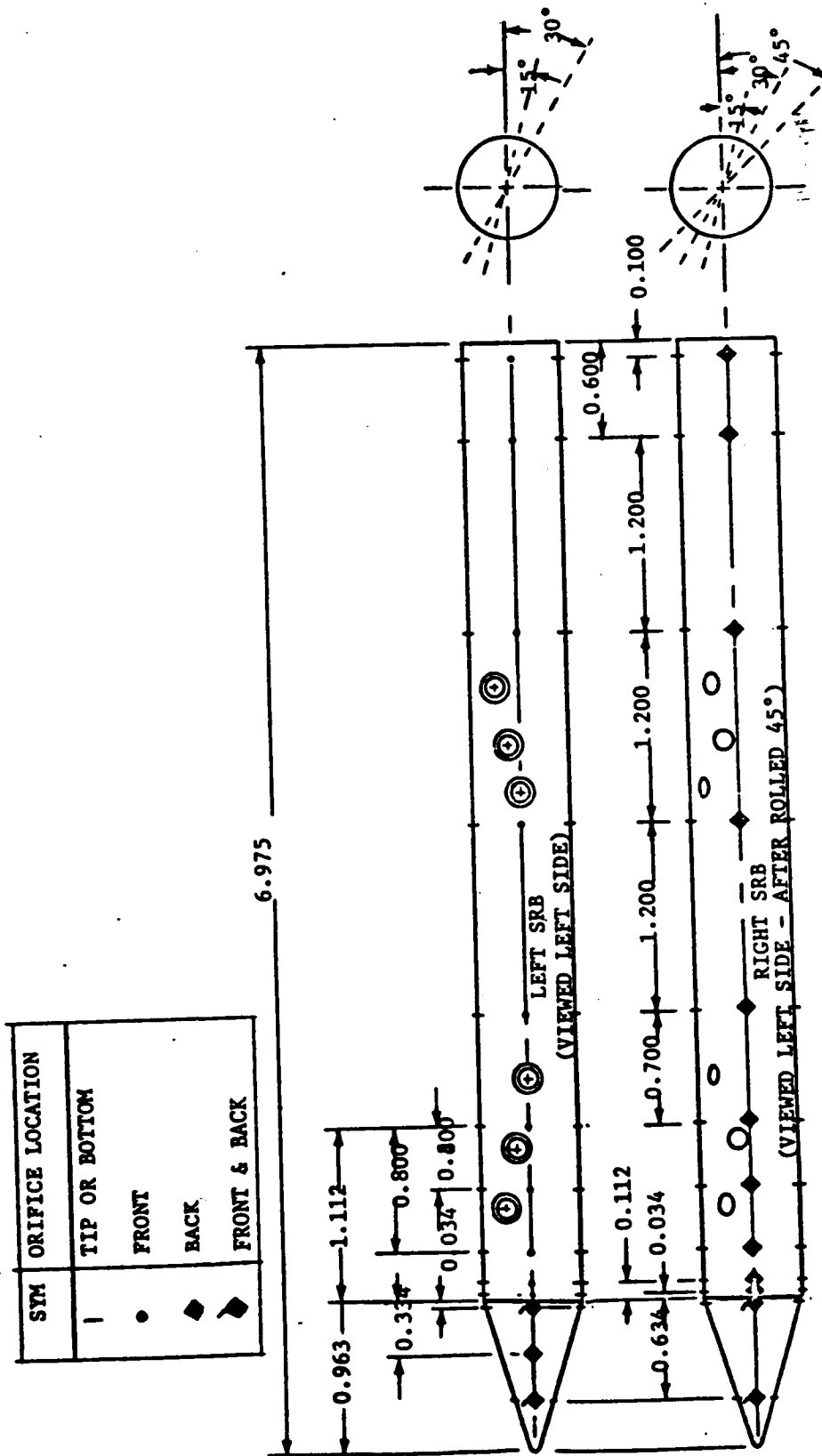
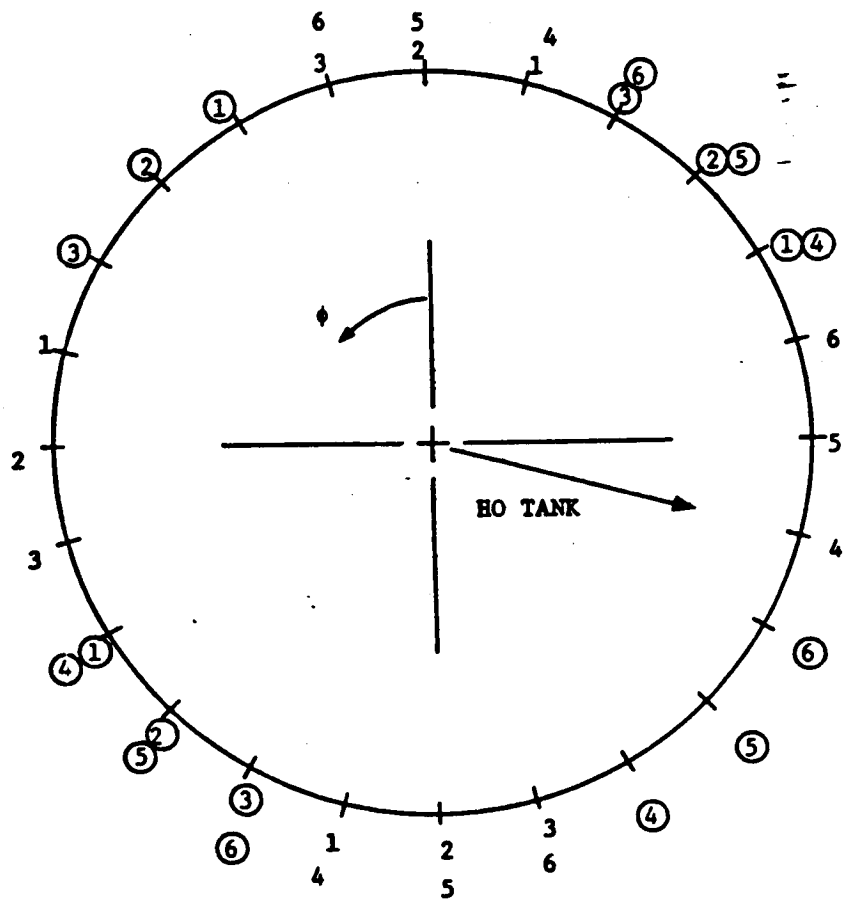


FIGURE 5. ORIFICE LOCATIONS ON SRB'S

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CYLINDRICAL BOOSTER
MSFC
DELTA WING ORBITER
LMSC
DR#1255 C-2- 19



AFT VIEW (REFERENCED TO LEFT SRB)

- 1 - SRB POSITION I (LEFT SRB)
- 2 - SRB POSITION II
- 3 - SRB POSITION III
- 4 - SRB POSITION I + 180
- 5 - SRB POSITION II + 180
- 6 - SRB POSITION III + 180

NOTE: CIRCLED NUMBER, (3), REPRESENTS ORIFICE
LOCATED ON RIGHT SRB REFERRED TO THE LEFT SRB

FIGURE 6. COMPOSITE OF RADIAL LOCATIONS OF ORIFICES ON SRB FOR
VARIOUS BOLT PATTERNS

TABLE III

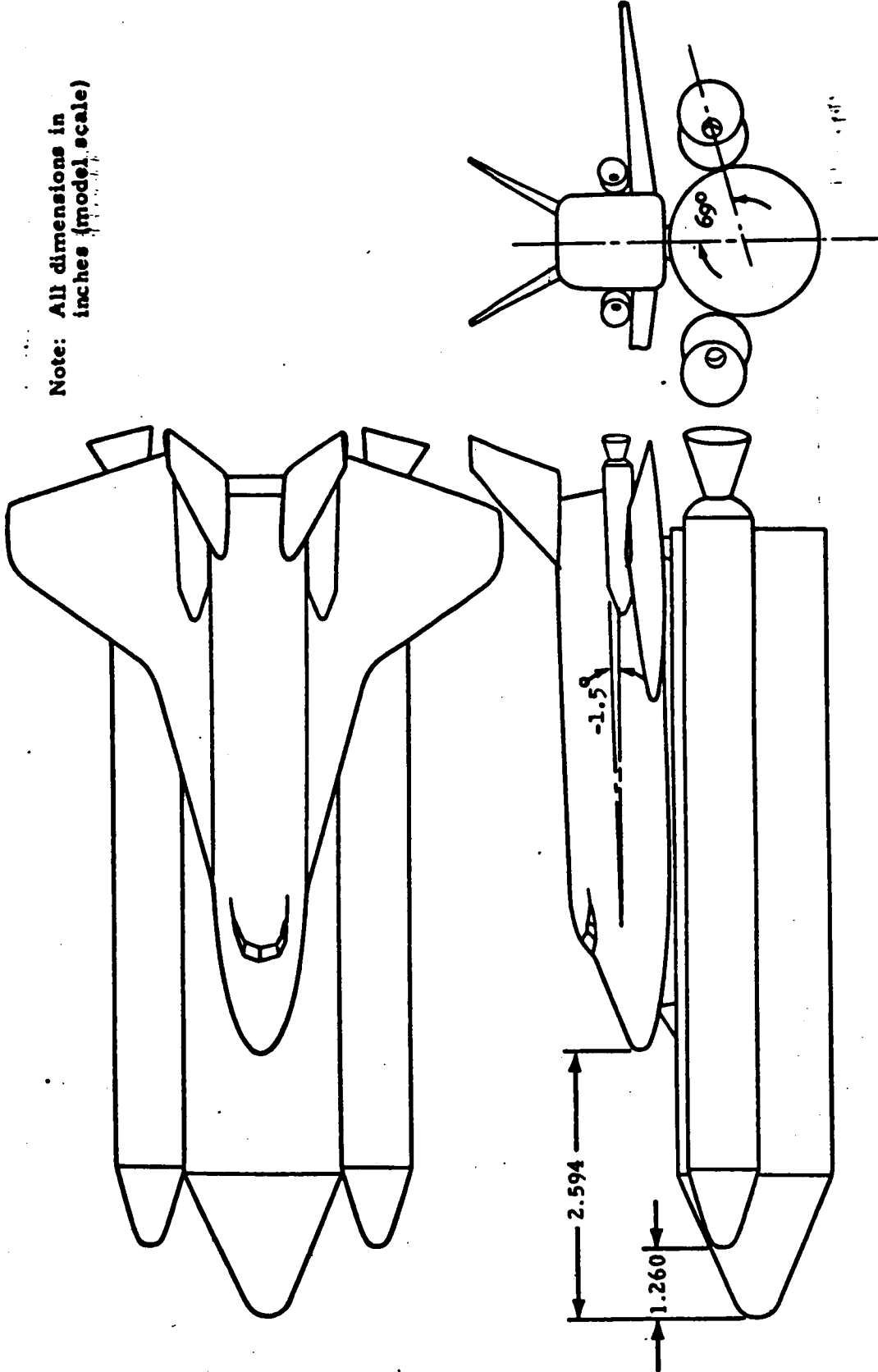
TEST MSFC IWI 540 DATA SET/RUN NUMBER
COLLATION SUMMARY

CYLINDRICAL BOOSTER
MSFC
DELTA WING ORBITER
MSFC
DR#1259 C-2- 20

DATA SET IDENTIFIER	CONFIGURATION	SCHD.		PARAMETERS/VALUES		NO. of RUNS	MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE)										TEST RUN NUMBERS	
		A	B	C ₀	θ ₀		C.6	C.F	C.S	1.1	1.2	1.26	2.74	4.52				
R67001	T101	A	0	1.5	-	42	16	16	26	36	46	50	430	436	400	590	402	572
002		B	0			6												
003		0	C			42	100	90	86	86	66	70	430	436	490	500	492	502
004		C	D			6	300	290	280	270	260	260	410	410	470	500	472	512
005	T101K1	B	0			24	102	120	130	140	150	150	470	470	520	570	520	570
006		D	D			24	112	122	132	142	152	152	470	470	520	570	520	570
007	T101K1S1	A	0	210		42	210	220	230	240	246	246	450	456	560	550	562	552
008		B	0			6	300	190	180	170	160	160	410	410	560	550	562	552
009		0	C			42	206	196	186	176	166	166	466	466	530	540	532	542
010		0	D			6	310	320	330	350	340	340	420	420	610	620	612	622
011	C1	A	0	-		42	316	326	336	356	346	346	426	426	610	620	612	622
012		B	0			6	400	390	380	360	370	370	410	410	640	630	642	632
013		0	C			42	406	396	386	366	376	376	416	416	650	652	652	662
014		C	D			6												
015		E	0			3												
016		F	0			3												

TAPN X/L CP
 COEFFICIENTS:
 α OF β SCHEDULES
 αA = -6° TO 6° Δα = 2° BC = -6° TO 6° Δβ = 2° αE = 12°, 20°, 26°
 αB = -6° TO 6° Δα = 6° BD = -6° TO 6° Δβ = 6° αF = 12°, 20°, 22°

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Note: All dimensions in inches (model scale)

Fig. 1 - Baseline Launch Vehicle

CYLINDRICAL BOOSTER
 MSFC
 DELTA WING ORBITER
 MSFC
 DR#1259 C-2- 21

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CYLINDRICAL BOOSTER
MSFC
DELTA WING ORBITER
MSFC
DR#1259 C-2-22

NOTE: All dimensions in inches
(model scale)

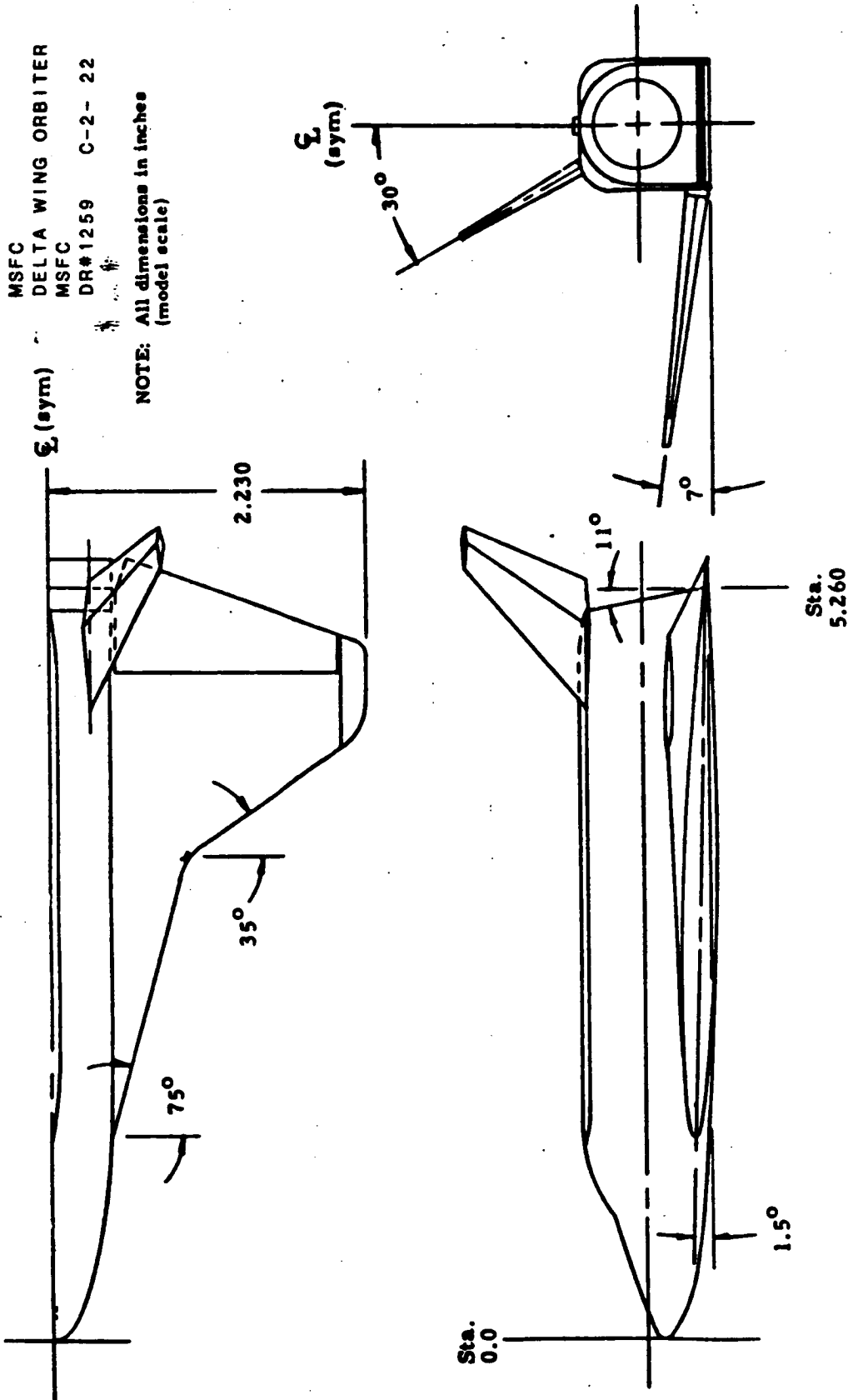


Fig. 2- General Arrangement, Space Shuttle Orbiter

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Note: All dimensions in inches (model scale)

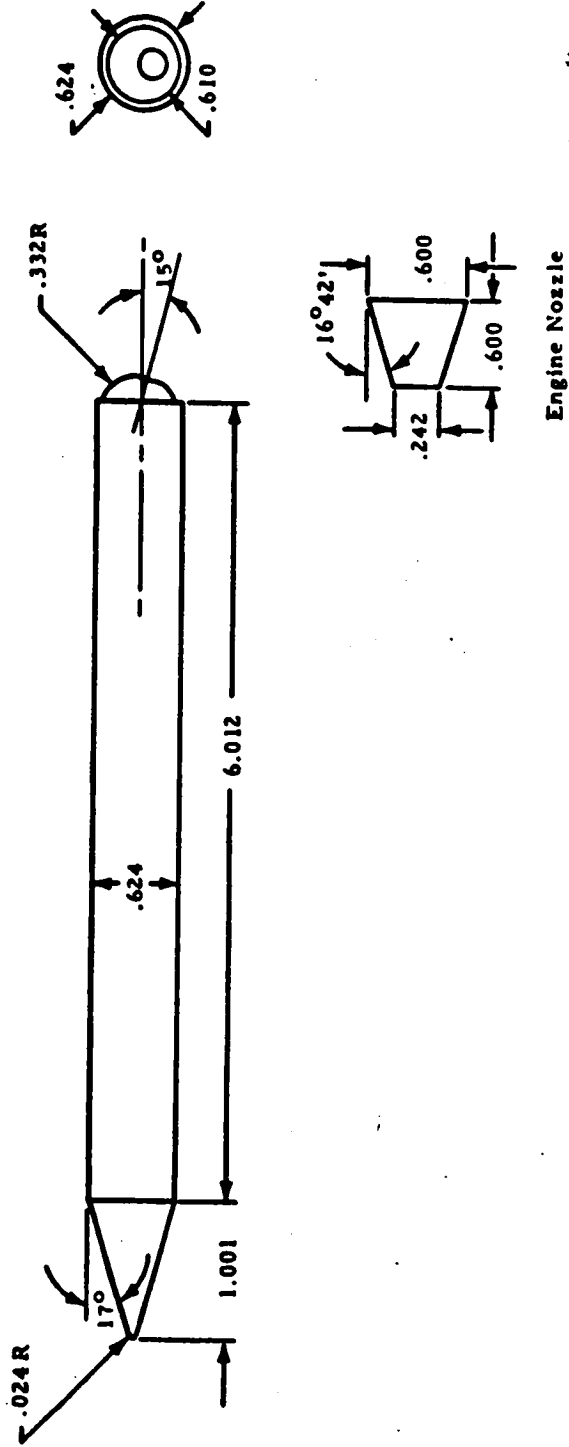


Fig. 3 - 156-Inch Solid Rocket Motor

CYLINDRICAL BOOSTER
MSFC
DELTA WING ORBITER
MSFC
DR#1259 C-2-23

CYLINDRICAL BOOSTER
MSFC
DELTA WING ORBITER
MSFC
DR#1259 C-2- 24

Numbers in parenthesis are on the lower surface

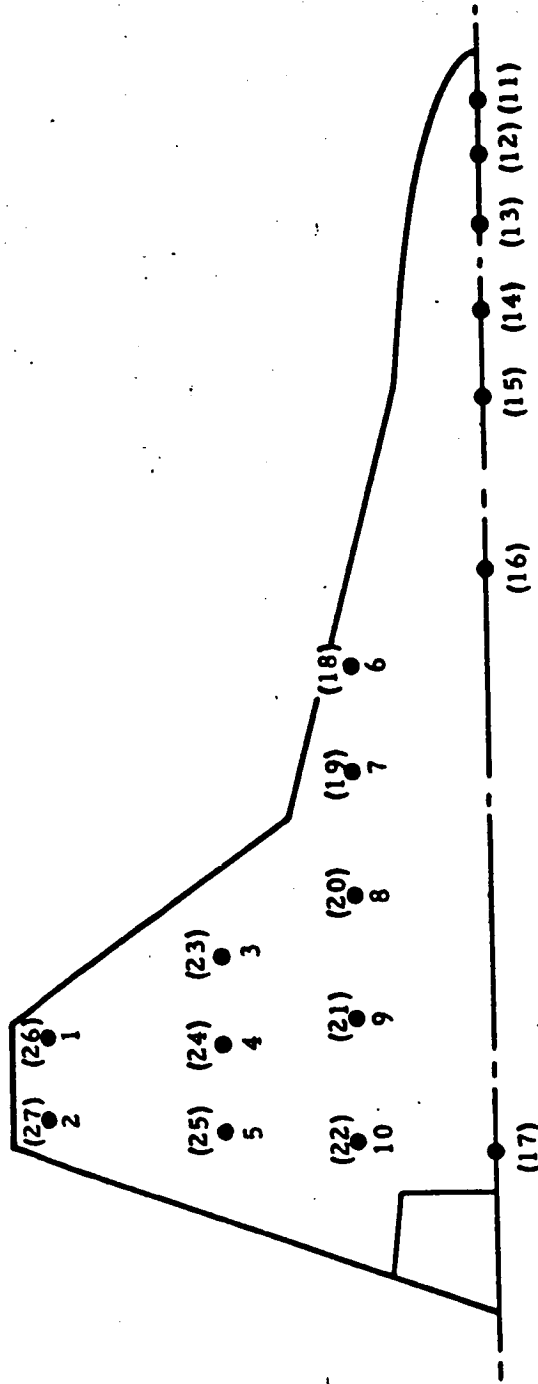


Fig. 4 - Static Pressure Tap Positions

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TABLE III. TEST TWT 550 DATA SET COLLATION SHEET

PRETEST
 POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	SCID.		PARAMETERS/VALUES		NO. OF RUNS	MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
		α	β	α	β		0.6	0.9	1.0	1.1	1.2	1.46	1.96	4.96																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
R73 001	T301S1	A	O	-1.5	75	45	491	471	461	451	441	431	421	411	401	391	381	371	361	351	341	331	321	311	301	291	281	271	261	251	241	231	221	211	201	191	181	171	161	151	141	131	121	111	101	91	81	71	61	51	41	31	21	11	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
002		O	A			35	501	511	521	531	541	551	561	571	581	591	601	611	621	631	641	651	661	671	681	691	701	711	721	731	741	751	761	771	781	791	801	811	821	831	841	851	861	871	881	891	901	911	921	931	941	951	961	971	981	991	1001	1011	1021	1031	1041	1051	1061	1071	1081	1091	1101	1111	1121	1131	1141	1151	1161	1171	1181	1191	1201	1211	1221	1231	1241	1251	1261	1271	1281	1291	1301	1311	1321	1331	1341	1351	1361	1371	1381	1391	1401	1411	1421	1431	1441	1451	1461	1471	1481	1491	1501	1511	1521	1531	1541	1551	1561	1571	1581	1591	1601	1611	1621	1631	1641	1651	1661	1671	1681	1691	1701	1711	1721	1731	1741	1751	1761	1771	1781	1791	1801	1811	1821	1831	1841	1851	1861	1871	1881	1891	1901	1911	1921	1931	1941	1951	1961	1971	1981	1991	2001	2011	2021	2031	2041	2051	2061	2071	2081	2091	2101	2111	2121	2131	2141	2151	2161	2171	2181	2191	2201	2211	2221	2231	2241	2251	2261	2271	2281	2291	2301	2311	2321	2331	2341	2351	2361	2371	2381	2391	2401	2411	2421	2431	2441	2451	2461	2471	2481	2491	2501	2511	2521	2531	2541	2551	2561	2571	2581	2591	2601	2611	2621	2631	2641	2651	2661	2671	2681	2691	2701	2711	2721	2731	2741	2751	2761	2771	2781	2791	2801	2811	2821	2831	2841	2851	2861	2871	2881	2891	2901	2911	2921	2931	2941	2951	2961	2971	2981	2991	3001	3011	3021	3031	3041	3051	3061	3071	3081	3091	3101	3111	3121	3131	3141	3151	3161	3171	3181	3191	3201	3211	3221	3231	3241	3251	3261	3271	3281	3291	3301	3311	3321	3331	3341	3351	3361	3371	3381	3391	3401	3411	3421	3431	3441	3451	3461	3471	3481	3491	3501	3511	3521	3531	3541	3551	3561	3571	3581	3591	3601	3611	3621	3631	3641	3651	3661	3671	3681	3691	3701	3711	3721	3731	3741	3751	3761	3771	3781	3791	3801	3811	3821	3831	3841	3851	3861	3871	3881	3891	3901	3911	3921	3931	3941	3951	3961	3971	3981	3991	4001	4011	4021	4031	4041	4051	4061	4071	4081	4091	4101	4111	4121	4131	4141	4151	4161	4171	4181	4191	4201	4211	4221	4231	4241	4251	4261	4271	4281	4291	4301	4311	4321	4331	4341	4351	4361	4371	4381	4391	4401	4411	4421	4431	4441	4451	4461	4471	4481	4491	4501	4511	4521	4531	4541	4551	4561	4571	4581	4591	4601	4611	4621	4631	4641	4651	4661	4671	4681	4691	4701	4711	4721	4731	4741	4751	4761	4771	4781	4791	4801	4811	4821	4831	4841	4851	4861	4871	4881	4891	4901	4911	4921	4931	4941	4951	4961	4971	4981	4991	5001	5011	5021	5031	5041	5051	5061	5071	5081	5091	5101	5111	5121	5131	5141	5151	5161	5171	5181	5191	5201	5211	5221	5231	5241	5251	5261	5271	5281	5291	5301	5311	5321	5331	5341	5351	5361	5371	5381	5391	5401	5411	5421	5431	5441	5451	5461	5471	5481	5491	5501	5511	5521	5531	5541	5551	5561	5571	5581	5591	5601	5611	5621	5631	5641	5651	5661	5671	5681	5691	5701	5711	5721	5731	5741	5751	5761	5771	5781	5791	5801	5811	5821	5831	5841	5851	5861	5871	5881	5891	5901	5911	5921	5931	5941	5951	5961	5971	5981	5991	6001	6011	6021	6031	6041	6051	6061	6071	6081	6091	6101	6111	6121	6131	6141	6151	6161	6171	6181	6191	6201	6211	6221	6231	6241	6251	6261	6271	6281	6291	6301	6311	6321	6331	6341	6351	6361	6371	6381	6391	6401	6411	6421	6431	6441	6451	6461	6471	6481	6491	6501	6511	6521	6531	6541	6551	6561	6571	6581	6591	6601	6611	6621	6631	6641	6651	6661	6671	6681	6691	6701	6711	6721	6731	6741	6751	6761	6771	6781	6791	6801	6811	6821	6831	6841	6851	6861	6871	6881	6891	6901	6911	6921	6931	6941	6951	6961	6971	6981	6991	7001	7011	7021	7031	7041	7051	7061	7071	7081	7091	7101	7111	7121	7131	7141	7151	7161	7171	7181	7191	7201	7211	7221	7231	7241	7251	7261	7271	7281	7291	7301	7311	7321	7331	7341	7351	7361	7371	7381	7391	7401	7411	7421	7431	7441	7451	7461	7471	7481	7491	7501	7511	7521	7531	7541	7551	7561	7571	7581	7591	7601	7611	7621	7631	7641	7651	7661	7671	7681	7691	7701	7711	7721	7731	7741	7751	7761	7771	7781	7791	7801	7811	7821	7831	7841	7851	7861	7871	7881	7891	7901	7911	7921	7931	7941	7951	7961	7971	7981	7991	8001	8011	8021	8031	8041	8051	8061	8071	8081	8091	8101	8111	8121	8131	8141	8151	8161	8171	8181	8191	8201	8211	8221	8231	8241	8251	8261	8271	8281	8291	8301	8311	8321	8331	8341	8351	8361	8371	8381	8391	8401	8411	8421	8431	8441	8451	8461	8471	8481	8491	8501	8511	8521	8531	8541	8551	8561	8571	8581	8591	8601	8611	8621	8631	8641	8651	8661	8671	8681	8691	8701	8711	8721	8731	8741	8751	8761	8771	8781	8791	8801	8811	8821	8831	8841	8851	8861	8871	8881	8891	8901	8911	8921	8931	8941	8951	8961	8971	8981	8991	9001	9011	9021	9031	9041	9051	9061	9071	9081	9091	9101	9111	9121	9131	9141	9151	9161	9171	9181	9191	9201	9211	9221	9231	9241	9251	9261	9271	9281	9291	9301	9311	9321	9331	9341	9351	9361	9371	9381	9391	9401	9411	9421	9431	9441	9451	9461	9471	9481	9491	9501	9511	9521	9531	9541	9551	9561	9571	9581	9591	9601	9611	9621	9631	9641	9651	9661	9671	9681	9691	9701	9711	9721	9731	9741	9751	9761	9771	9781	9791	9801	9811	9821	9831	9841	9851	9861	9871	9881	9891	9901	9911	9921	9931	9941	9951	9961	9971	9981	9991	10001	10011	10021	10031	10041	10051	10061	10071	10081	10091	10101	10111	10121	10131	10141	10151	10161	10171	10181	10191	10201	10211	10221	10231	10241	10251	10261	10271	10281	10291	10301	10311	10321	10331	10341	10351	10361	10371	10381	10391	10401	10411	10421	10431	10441	10451	10461	10471	10481	10491	10501	10511	10521	10531	10541	10551	10561	10571	10581	10591	10601	10611	10621	10631	10641	10651	10661	10671	10681	10691	10701	10711	10721	10731	10741	10751	10761	10771	10781	10791	10801	10811	10821	10831	10841	10851	10861	10871	10881	10891	10901	10911	10921	10931	10941	10951	10961	10971	10981	10991	11001	11011	11021	11031	11041	11051	11061	11071	11081	11091	11101	11111	11121	11131	11141	11151	11161	11171	11181	11191	11201	11211	11221	11231	11241	11251	11261	11271	11281	11291	11301	11311	11321	11331	11341	11351	11361	11371	11381	11391	11401	11411	11421	11431	11441	11451	11461	11471	11481	11491	11501	11511	11521	11531	11541	11551	11561	11571	11581	11591	11601	11611	11621	11631	11641	11651	11661	11671	11681	11691	11701	11711	11721	11731	11741	11751	11761	11771	11781	11

CYLINDRICAL BOOSTER
MSFC
DELTA WING ORBITER
MSFC

TABLE III. TEST TWT 550 DATA SET COLLATION SHEET (CONCL)

DR#1273 C-2- 26

PRETEST
 POSTEST

DATA SET IDENTIFIER	CONFIGURATION	SCHD.		PARAMETERS/VALUES		NO. OF RUNS	MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE)												
		u	B	λ	ϕ		.6	.9	1.0	1.1	1.2	1.46	1.96	4.96					
R73021	T302S1	C	0	0.0	90	8													
Q22	↓	O	C	↓		6													
Q23	T301S1	A	0	-1.5	↓	45	55	60	65	70	75	80	85	90	95	100	105	110	115
Q24	↓	O	A	↓		35	51	57	63	69	75	81	87	93	99	105	111	117	123
Q25	↓	A	0	↓	135	45	61	67	73	79	85	91	97	103	109	115	121	127	133
Q26	↓	O	A	↓		35	51	57	63	69	75	81	87	93	99	105	111	117	123
Q27	↓	A	0	0.0	↓	45	61	67	73	79	85	91	97	103	109	115	121	127	133
Q28	↓	O	A	↓		35	51	57	63	69	75	81	87	93	99	105	111	117	123
Q29	T302S1	A	0	↓		27	41	47	53	59	65	71	77	83	89	95	101	107	113
Q30	↓	O	A	↓		21	31	37	43	49	55	61	67	73	79	85	91	97	103
Q31	↓	A	0	-1.5	↓	27	41	47	53	59	65	71	77	83	89	95	101	107	113
Q32	↓	O	A	↓		21	31	37	43	49	55	61	67	73	79	85	91	97	103
Q33	T101S1	A	0	↓	75	9	13	17	21	25	29	33	37	41	45	49	53	57	61
Q34	↓	O	A	↓		7	10	13	17	21	25	29	33	37	41	45	49	53	57

TAPN IX/L ICP 7 13 19 25 31 37 43 49 55 61 67 75 76 03
 IDPVAR(1) IDPVAR(2) IDV

COEFFICIENTS:
 a: $A = -0.16 \cdot b \cdot \Delta \alpha = 2^\circ$; $B = -C + 0^\circ$; $2^\circ C$; $C = -8^\circ - C$; $-4^\circ 10'$; $2^\circ 4'$; C ; 0°
 b: $A = -C + 6^\circ$; $b \cdot \Delta \beta = 2^\circ$; $B = -C + 0^\circ$; $2^\circ C$; $C = -6^\circ - C$; $-4^\circ 0'$; $2^\circ 4'$; $6^\circ 0'$

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Note: All dimensions in
inches (model scale)

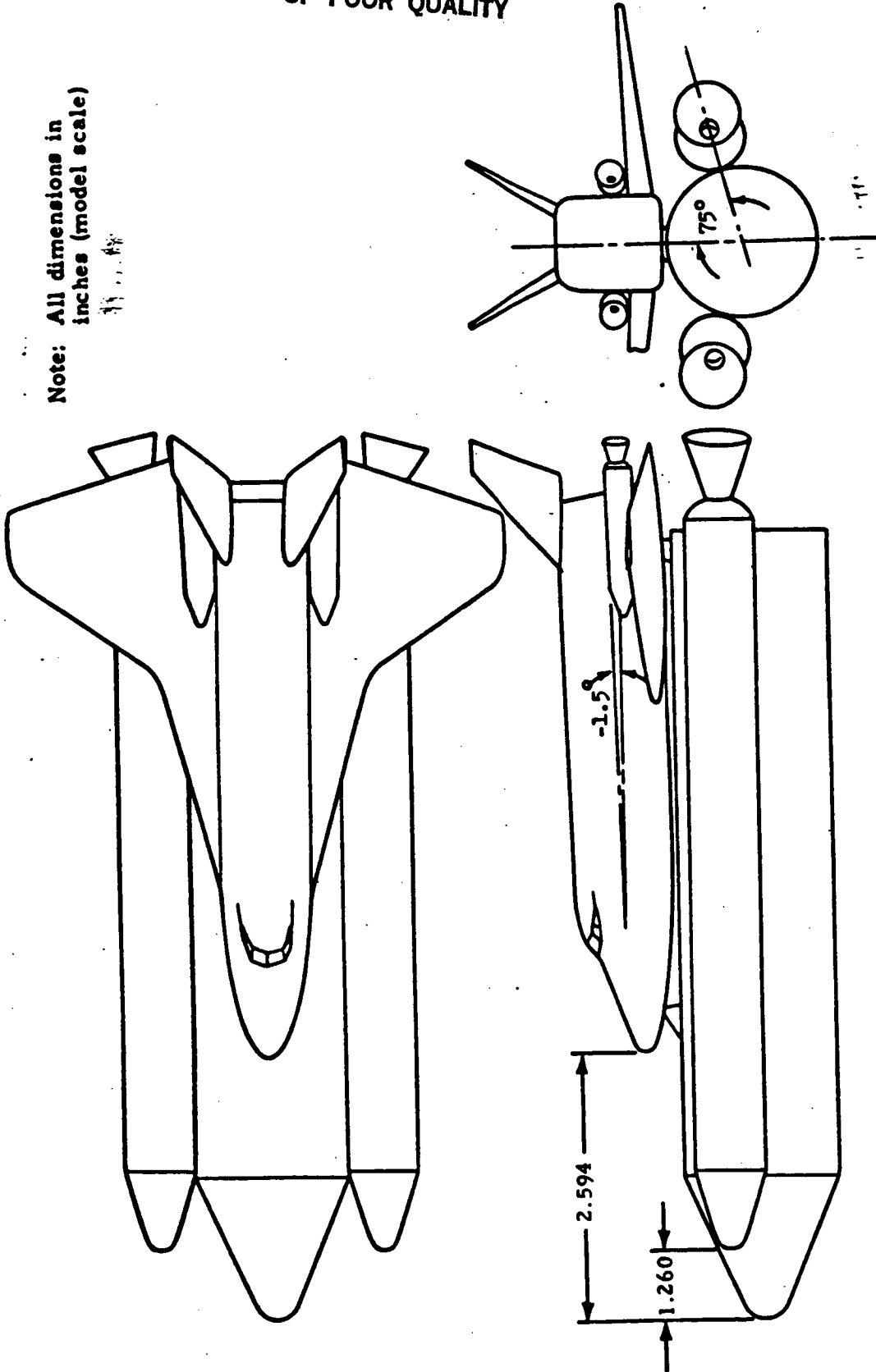


Fig. 1 - Baseline Launch Vehicle

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MSFC
DR#1273 C-2- 27

CYLINDRICAL BOOSTER
 MSFC
 DELTA WING ORBITER
 MSFC
 DR#1273 C-2-28

NOTE: All dimensions in inches
 (model scale)

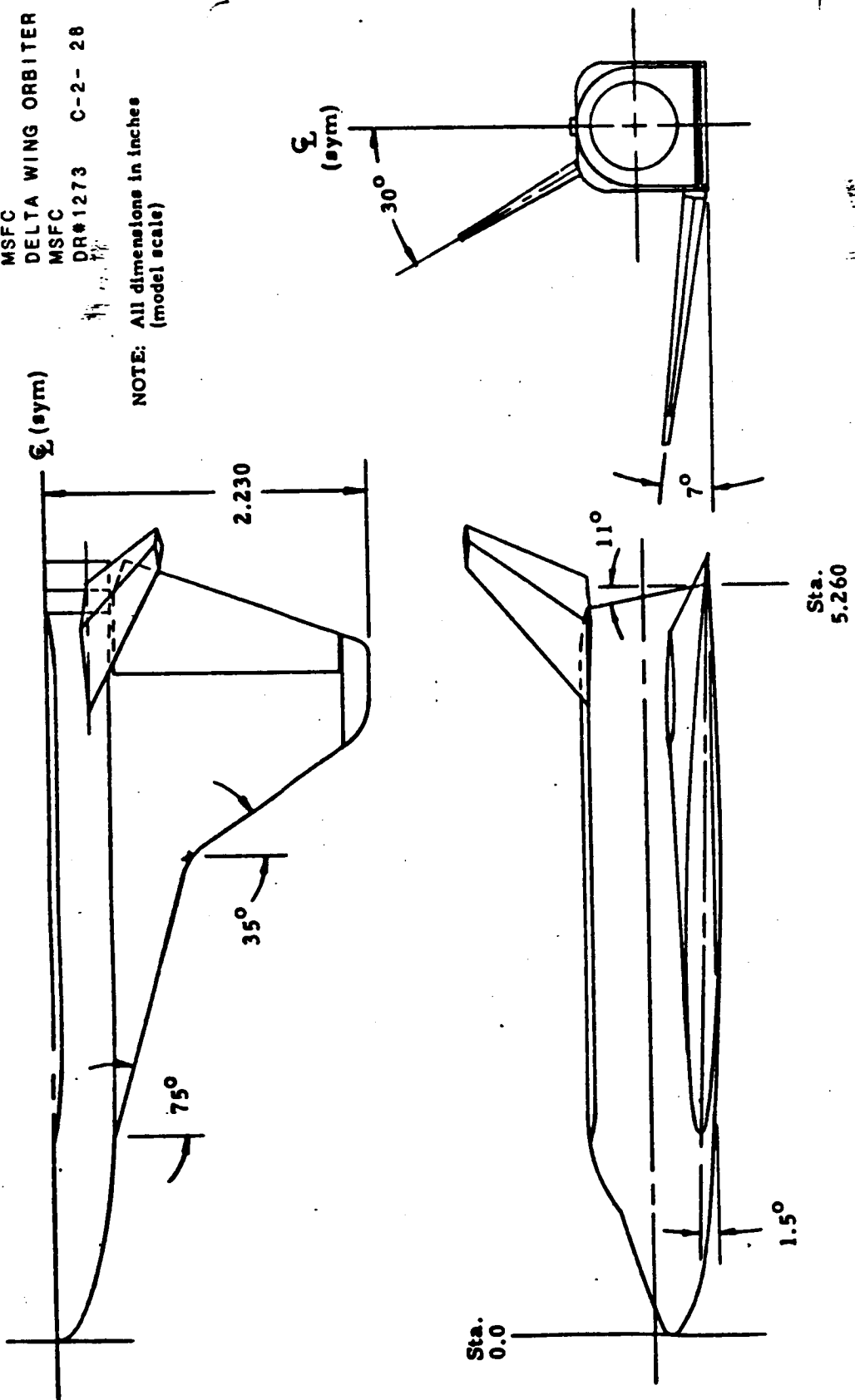


Fig. 2- General Arrangement, Space Shuttle 049 Orbiter

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Note: All dimensions in inches (model scale)

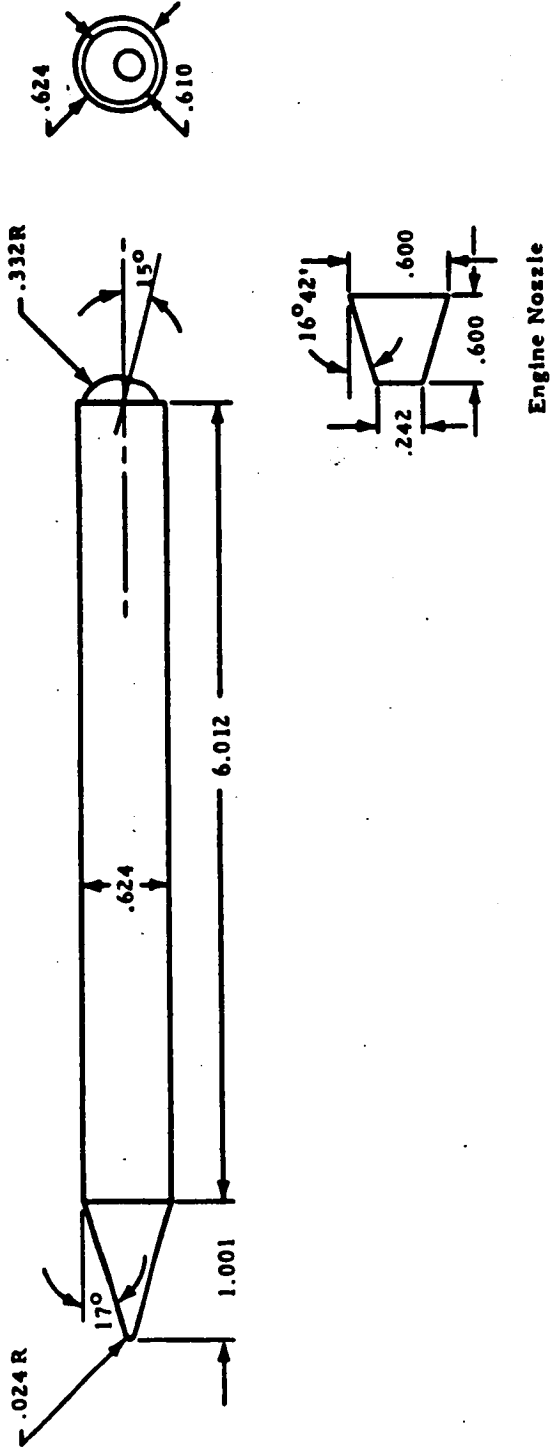


Fig. 3 - 156-Inch Solid Rocket Motor

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CYLINDRICAL BOOSTER
MSFC
DELTA WING ORBITER
MSFC
DR#1273 C-2-30

NOTE: All dimensions in inches
(model scale)

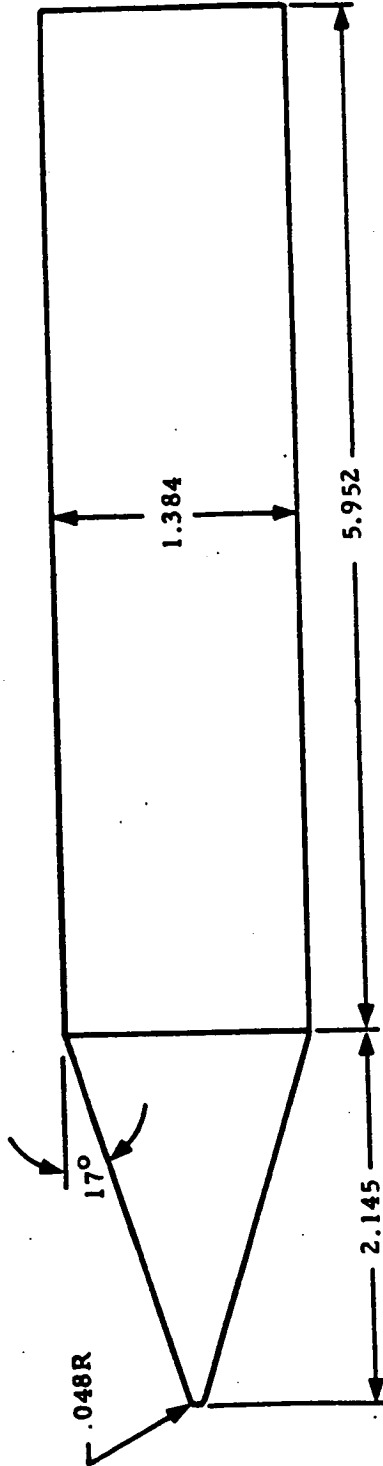


Fig. 4 - 346-Inch Diameter HO Tank with 17-Degree Nosecone

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Numbers in parenthesis are on the lower surface

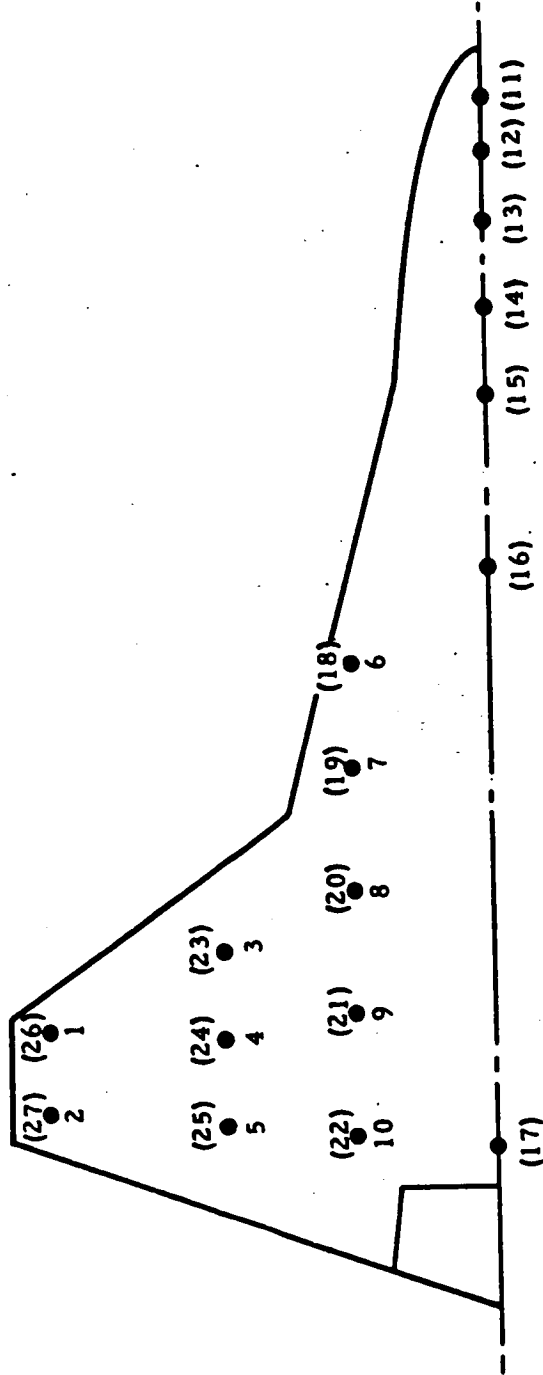


Fig. 5 - Static Pressure Tap Positions

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MSFC
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TABLE 7
 TEST ANES 6x6 509 PRESSURE DATASET COLLATION SHEET

STRAIGHT WING BOOSTER ALONE DATA

DATASET IDENTIFIER	CONFIGURATION	MODEL SECTION	GEO. CONFIG.	SCHD.		PARAMETER/VALUES		NO. OF RUNS	MACH NUMBERS									
				α	β				0.6	0.9	1.2	1.5	2.0					
BAXB11	BW3AV17	BODY	1	0	N			5										
BAXW11		UPPER WING	2															
BAXW16		LOWER WING	2															
BAXH11		UPPER HORIZ. TAIL	2															
BAXH16		LOWER HORIZ. TAIL	2															
BAXV11		VERTICAL TAIL	2															
BAXB12		BODY	1	-5	N				15	14	13	12	11					
BAXW12		UPPER WING	2															
BAXW17		LOWER WING	2															
BAXH12		UPPER HORIZ. TAIL	2															
BAXH17		LOWER HORIZ. TAIL	2															
BAXV12		VERTICAL TAIL	2															
BAXB13		BODY	1	L	0				10	9	8	7	6					
BAXW13		UPPER WING	2															
BAXW18		LOWER WING	2															
BAXH13		UPPER HORIZ. TAIL	2															
BAXH18		LOWER HORIZ. TAIL	2															
BAXV13		VERTICAL TAIL	2															

GEOMETRY CONFIGURATION
 1) X, THETA, R
 2) Y/(B/2), X/C, Z/C
 L (α) -16°, -12°, -8°, -5°, -2°, 0°, 2°, 4°, 6°, 8°, 12°
 R (α) 30°, 35°, 40°, 45°, 50°, 55°
 P (α) 16°, 20°, 25°, 30°, 35°, 40°
 Q (α) 40°, 45°, 50°, 55°, 60°, 65°
 T (α) 16°, 20°, 25°, 30°
 N (β) -1.0°, -5°, 0°, 5°, 10°
 S (α) -12°, -5°, 0°, 4°, 12°

α OR β
 SCHEDULES

TABLE V (CONTINUED)
TEST AMES 6x6 509 PRESSURE DATASET COLLATION SHEET

PRETEST
 POSTTEST

STRAIGHT WING BOOSTER DATA - IN PRESENCE OF DELTA WING ORBITER

DATASET IDENTIFIER	CONFIGURATION	MODEL SECTION	GEO. CONFIG.	SCHD. α β	PARAMETER/VALUES	NO. OF RUNS	MACH NUMBERS							
							0.6	0.9	1.2	1.5	2.0	2.0	3.0	3.1
BAXB21	BW3AVL17/B5MLBVL0	BODY	1	L 0		5	27	28	29	30	31			
BAXW21		UPPER WING	2											
BAXW26		LOWER WING	2											
BAXH21		UPPER HORIZ. TAIL	2											
BAXH26		LOWER HORIZ. TAIL	2											
BAXV21		VERTICAL TAIL	2											
BAXB22		BODY	1	-5° N			36	35	34	33	32			
BAXW22		UPPER WING	2											
BAXW27		LOWER WING	2											
BAXH22		UPPER HORIZ. TAIL	2											
BAXH27		LOWER HORIZ. TAIL	2											
BAXV22		VERTICAL TAIL	2											
BAXB23		BODY	1	L 0°			41	40	39	38	37			
BAXW23		UPPER WING	2											
BAXW28		LOWER WING	2											
BAXH23		UPPER HORIZ. TAIL	2											
BAXH28		LOWER HORIZ. TAIL	2											
BAXV23		VERTICAL TAIL	2											

1) X, THETA, R

2) Y/(B/2), X/C, Z/C

GEOMETRY CONFIGURATION

α OR β SCHEDULES

L (a)	-16°, -12°, -8°, -5°, -2°, 0°, 2°, 4°, 6°, 8°, 12°	R (a)	30°, 35°, 40°, 45°, 50°, 55°
P (a)	16°, 20°, 25°, 30°, 35°, 40°	Q (a)	40°, 45°, 50°, 55°, 60°, 65°
T (a)	16°, 20°, 25°, 30°	S (a)	-12°, -5°, 0°, 4°, 12°
W (b)	-10°, -5°, 0°, 5°, 10°		

STRAIGHT WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1129 C-2- 33

TEST AVES 6 x 6 509 PRESSURE DATASET COLLATION SHEET
STRAIGHT WING BOOSTER DATA - IN PRESENCE OF STRAIGHT WING ORBITER

DR# 1129 C-2-34

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DATASET IDENTIFIER	CONFIGURATION	MODEL SECTION	GEO. CONFIG.	SCHD.		PARAMETER/VALUES	NO. OF RUNS	MACH NUMBERS						
				α	β			0.6	0.9	1.2	1.5	2.0		
BAXB31	B1V3AV177/B6H10BL2V5	BODY	1	L	0°		5	25*	24	23	22	21		
BAXW31		UPPER WING	2											
BAXW36		LOWER WING	2											
BAXH31		UPPER HORIZ. TAIL	2											
BAXH36		LOWER HORIZ. TAIL	2											
BAXV31		VERTICAL TAIL	2											
BAXB32		BODY	1	-5°	N			20	19	18	17	16		
BAXW32		UPPER WING	2											
BAXW37		LOWER WING	2											
BAXH31		UPPER HORIZ. TAIL	2											
BAXH37		LOWER HORIZ. TAIL	2											
BAXV31		VERTICAL TAIL	2											

*RUN 25 USES a SCHEDULE S

GEOMETRY CONFIGURATION	1) X, THETA, R	2) Y/(B/2), X/C, Z/C
α OR β SCHEDULES	L (a) -16°, -12°, -8°, -5°, -2°, 0°, 2°, 4°, 6°, 8°, 12°	R (a) 30°, 35°, 40°, 45°, 50°, 55°
	P (a) 16°, 20°, 25°, 30°, 35°, 40°	a (a) 40°, 45°, 50°, 55°, 60°, 65°
	T (a) 16°, 20°, 25°, 30°	S (a) -12°, -5°, 0°, 4°, 12°
	H (b) -10°, -5°, 0°, 5°, 10°	

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TABLE V (CONTINUED)
TEST AMES 6 x 6 509 PRESSURE DATASET COLLATION SHEET
DELTA WING ORBITER ALONE DATA

PRETEST
 POSTTEST

DATASET IDENTIFIER	CONFIGURATION	MODEL SECTION	GEO. CONFIG.	SCHD.		PARAMETER/VALUES	NO. OF RUNS	MACH NUMBERS						
				α	β			0.6	0.9	1.2	1.5	2.0		
DAXW41	B5M13V10	BODY	1	-5°	N		5	46	45	44	43	42		
DAXW41		UPPER WING	2	↑	↑			↑	↑	↑	↑	↑		
DAXW46		LOWER WING	2	↑	↑			↑	↑	↑	↑	↑		
DAXV41		INBOARD VERT. STAB.	2	↑	↑			↑	↑	↑	↑	↑		
DAXV46		OUTBOARD VERT. STAB.	2	↑	↑			↑	↑	↑	↑	↑		
DAXB42		BODY	1	1°	0°			51	50	49	48	47		
DAXW42		UPPER WING	2	↑	↑			↑	↑	↑	↑	↑		
DAXW47		LOWER WING	2	↑	↑			↑	↑	↑	↑	↑		
DAXV42		INBOARD VERT. STAB.	2	↑	↑			↑	↑	↑	↑	↑		
DAXV47		OUTBOARD VERT. STAB.	2	↑	↑			↑	↑	↑	↑	↑		
DAXB43		BODY	1	R	0°			56	55	54	53	52		
DAXW43		UPPER WING	2	↑	↑			↑	↑	↑	↑	↑		
DAXW48		LOWER WING	2	↑	↑			↑	↑	↑	↑	↑		
DAXV43		INBOARD VERT. STAB.	2	↑	↑			↑	↑	↑	↑	↑		
DAXV48		OUTBOARD VERT. STAB.	2	↑	↑			↑	↑	↑	↑	↑		
DAXB44		BODY	1	0°	N			61	60	59	58	57		
DAXW44		UPPER WING	2	↑	↑			↑	↑	↑	↑	↑		
DAXW49		LOWER WING	2	↑	↑			↑	↑	↑	↑	↑		
DAXV44		INBOARD VERT. STAB.	2	↑	↑			↑	↑	↑	↑	↑		
DAXV49		OUTBOARD VERT. STAB.	2	↑	↑			↑	↑	↑	↑	↑		

1) X, THETA, R

2) Y/(B/2), X/C, Z/C

GEOMETRY CONFIGURATION	α OR β SCHEDULES
L (a)	-16°, -12°, -8°, -5°, -2°, 0°, 2°, 4°, 6°, 8°, 12°
P (a)	16°, 20°, 25°, 30°, 35°, 40°
T (a)	16°, 20°, 25°, 30°
R (a)	30°, 35°, 40°, 45°, 50°, 55°
Q (a)	40°, 45°, 50°, 55°, 60°, 65°
S (a)	-12°, -5°, 0°, 4°, 12°

STRAIGHT WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1129 C-2-35

TABLE V (CONTINUED)
 TEST AVES 6 x 6 509 PRESSURE DATASET COLLATION SHEET

DELTA WING ORBITER ALONE DATA
 (Continued)

DATASET IDENTIFIER	CONFIGURATION	MODEL SECTION	GEO. CONFIG.	SCHD.		PARAMETER/VALUES	NO. OF RUNS	MACH NUMBERS						
				α	β			0.6	0.9	1.2	1.5	2.0		
DAXB45	B5W13V10	BODY	1	P	0°		3			64	63	62		
DAXM45		UPPER WING	2											
DAXV50		LOWER WING	2											
DAXV45		INBOARD VERT. STAB.	2											
DAXV50		OUTBOARD VERT. STAB.	2											

1) X, THETA, R
 2) Y/(B/2), X/C, Z/C
 L (a) -16°, -12°, -8°, -5°, -2°, 0°, 2°, 4°, 6°, 8°, 12°
 R (a) 30°, 35°, 40°, 45°, 50°, 55°
 P (a) 16°, 20°, 25°, 30°, 35°, 40°
 Q (a) 40°, 45°, 50°, 55°, 60°, 65°
 T (a) 16°, 20°, 25°, 30°
 S (a) -12°, -5°, 0°, 4°, 12°
 N (beta) -10°, -5°, 0°, 5°, 10°

TABLE V (CONTINUED)
TEST AMES 6 x 6 509 PRESSURE DATASET COLLATION SHEET
DELTA WING ORBITER DATA - IN PRESENCE OF STRAIGHT WING BOOSTER

PRETEST
 POSTTEST

DATASET IDENTIFIER	CONFIGURATION	MODEL SECTION	GEO. CONFIG.	SCHD.		PARAMETER/VALUES	NO. OF RUNS	MACH NUMBERS					
				α	β			0.6	0.9	1.2	1.5	2.0	
DAXB21	BSW13V10/BLV3AV17T	BODY	1	1	0°		5	27	28	29	30	31	
DAXV21		UPPER WING	2		↑			↑	↑	↑	↑	↑	
DAXV26		LOWER WING	2		↑			↑	↑	↑	↑	↑	
DAXV21		INBOARD VERT. STAB.	2		↑			↑	↑	↑	↑	↑	
DAXV26		OUTBOARD VERT. STAB.	2		↑			↑	↑	↑	↑	↑	
DAXB22		BODY	1	-5°	N			36	35	34	33	32	
DAXV22		UPPER WING	2		↑			↑	↑	↑	↑	↑	
DAXV27		LOWER WING	2		↑			↑	↑	↑	↑	↑	
DAXV22		INBOARD VERT. STAB.	2		↑			↑	↑	↑	↑	↑	
DAXV27		OUTBOARD VERT. STAB.	2		↑			↑	↑	↑	↑	↑	
DAXB23		BODY	1	0°	N			41	40	39	38	37	
DAXV23		UPPER WING	2		↑			↑	↑	↑	↑	↑	
DAXV28		LOWER WING	2		↑			↑	↑	↑	↑	↑	
DAXV23		INBOARD VERT. STAB.	2		↑			↑	↑	↑	↑	↑	
DAXV28		OUTBOARD VERT. STAB.	2		↑			↑	↑	↑	↑	↑	

GEOMETRY CONFIGURATION
 1) X, THETA, R
 2) Y/(B/2, X/C, Z/C
 L (a) -16°, -12°, -8°, -5°, -2°, 0°, 2°, 4°, 6°, 8°, 12° R (a) 30°, 35°, 40°, 45°, 50°, 55°
 P (a) 16°, 20°, 25°, 30°, 35°, 40° Q (a) 40°, 45°, 50°, 55°, 60°, 65°
 T (a) 16°, 20°, 25°, 30° S (a) -12°, -5°, 0°, 4°, 12°
 W (b) -10°, -5°, 0°, 5°, 10°

STRAIGHT WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1129 C-2- 37

TABLE V (CONTINUED)
TEST ANES 6 x 6 509 PRESSURE DATASET COLLATION SHEET
STRAIGHT WING ORBITER ALONE DATA

DATASET IDENTIFIER	CONFIGURATION	MODEL SECTION	GEO. CONFIG.	SCHD.		PARAMETER VALUES	NO. OF RUNS	MACH NUMBERS									
				α	β			0.6	0.9	1.2	1.5	2.0					
SAXB51	B6M10H12V5	BODY	1	L	0°		5	69	68	67	66	65					
SAXW51		UPPER WING	2														
SAXW56		LOWER WING	2														
SAXH51		UPPER HORIZ. TAIL	2														
SAXH56		LOWER HORIZ. TAIL	2														
SAXV51		VERTICAL TAIL	2					74	73	72	71	70					
SAXB52		BODY	1	-5°	N												
SAXW52		UPPER WING	2														
SAXW57		LOWER WING	2														
SAXH52		UPPER HORIZ. TAIL	2														
SAXH57		LOWER HORIZ. TAIL	2														
SAXV52		VERTICAL TAIL	2														
SAXB53		BODY	1	0°	N			79	78	77	76	75					
SAXW53		UPPER WING	2														
SAXW58		LOWER WING	2														
SAXH53		UPPER HORIZ. TAIL	2														
SAXH58		LOWER HORIZ. TAIL	2														
SAXV53		VERTICAL TAIL	2														
SAXB54		BODY	1	Q	0°			84	83	82	81	80					
SAXW54		UPPER WING	2														

GEOMETRY CONFIGURATION 1) X, THETA, R
2) Y/(B/2), X/C, Z/C
L (a) -16°, -12°, -8°, -5°, -2°, 0°, 2°, 4°, 6°, 8°, 12° R (a) 30°, 35°, 40°, 45°, 50°, 55°
P (a) 16°, 20°, 25°, 30°, 35°, 40° Q (a) 40°, 45°, 50°, 55°, 60°, 65°
T (a) 16°, 20°, 25°, 30° S (a) -12°, -5°, 0°, 4°, 12°
N (a) -10°, -5°, 0°, 5°, 10°

TABLE V (CONTINUED)
 TEST AMES 6x6 509 PRESSURE DATASET COLLATION SHEET

PRETEST
 POSTTEST

STRAIGHT WING ORBITER ALONE DATA
 (Continued)

DATASET IDENTIFIER	CONFIGURATION	MODEL SECTION	GEO. CONFIG.	SCHD.		PARAMETER/VALUES	NO. OF RUNS	MACH NUMBERS						
				α	β			0.6	0.9	1.2	1.5	2.0		
SAXW59	B6M10HL2V5	LOWER WING	2	q	0°		5	84	83	82	81	80		
SAXR54		UPPER HORIZ. TAIL	2	↑	↑			↑	↑	↑	↑	↑		
SAXH59		LOWER HORIZ. TAIL	2	↑	↑			↑	↑	↑	↑	↑		
SAXV54		VERTICAL TAIL	2	↑	↑			↑	↑	↑	↑	↑		
SAXB55		BODY	1	T	0°			89	88	87	86	85		
SAXW55		UPPER WING	2	↑	↑			↑	↑	↑	↑	↑		
SAXW60		LOWER WING	2	↑	↑			↑	↑	↑	↑	↑		
SAXH55		UPPER HORIZ. TAIL	2	↑	↑			↑	↑	↑	↑	↑		
SAXB60		LOWER HORIZ. TAIL	2	↑	↑			↑	↑	↑	↑	↑		
SAXV55		VERTICAL TAIL	2	↑	↑			↑	↑	↑	↑	↑		

GEOMETRY
 CONFIGURATION 1) X, THETA, R
 2) Y/(B/2), X/C, Z/C
 α OR β
 SCHEDULES
 L (α) -16°, -12°, -8°, -5°, -2°, 0°, 2°, 4°, 6°, 8°, 12°
 R (α) 30°, 35°, 40°, 45°, 50°, 55°
 P (α) 16°, 20°, 25°, 30°, 35°, 40°
 Q (α) 40°, 45°, 50°, 55°, 60°, 65°
 T (α) 16°, 20°, 25°, 30°
 B (α) -12°, -5°, 0°, 4°, 12°
 R (β) -10°, -5°, 0°, 5°, 10°

STRAIGHT WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1129 C-2-39

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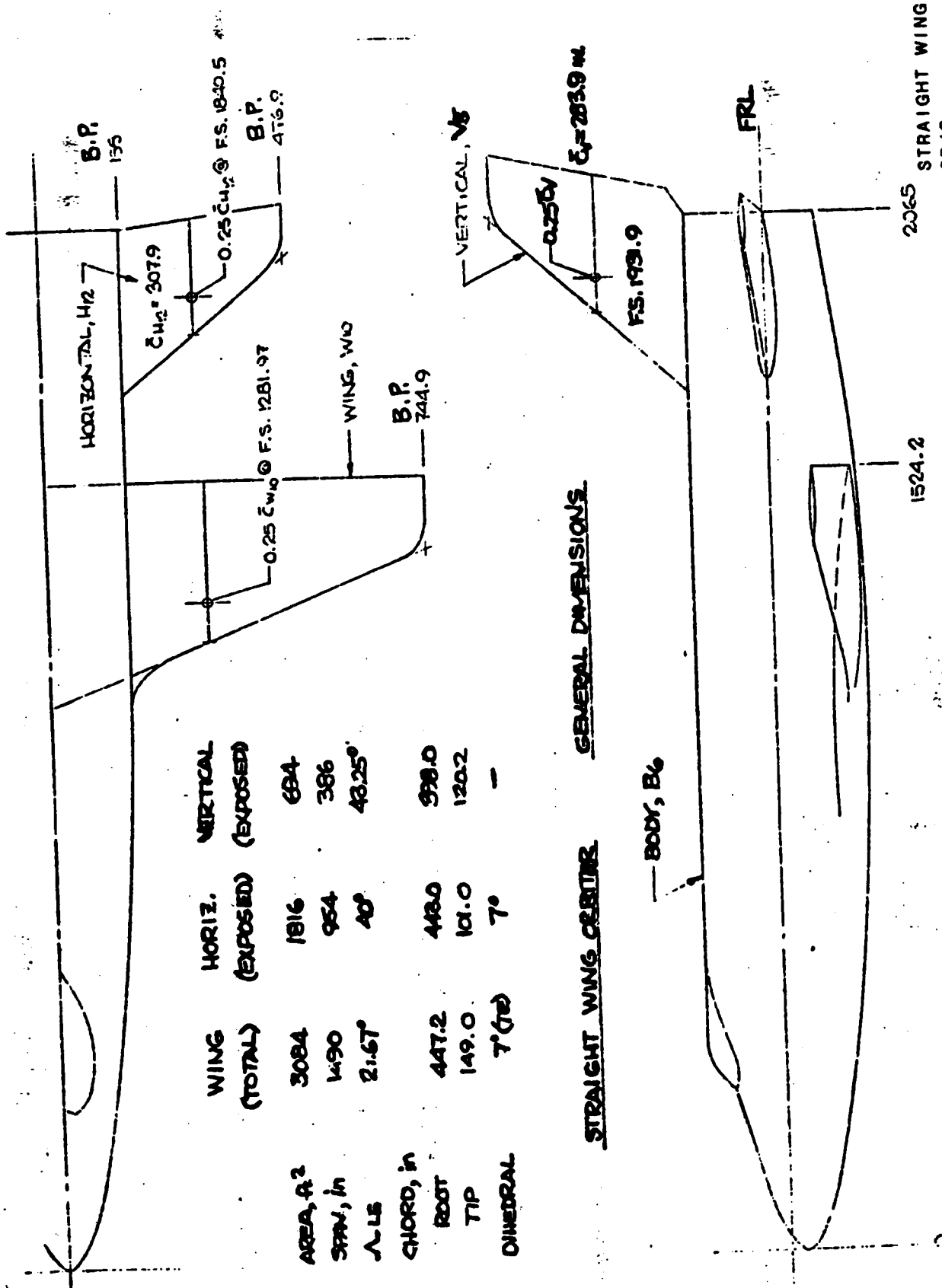
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DATASET IDENTIFIER	CONFIGURATION	MODEL SECTION	GEO. CONFIG.	SCND.		PARAMETER/VALUES	NO. OF RUNS	MACH NUMBERS						
				α	β			0.6	0.9	1.2	1.5	2.0		
SAXB31	B6W10H12V5/B1W3AV1T7	BODY	1	L	0°		5	25*	24	23	22	21		
SAXW31		UPPER WING	2											
SAXW36		LOWER WING	2											
SAXH31		UPPER HORIZ. TAIL	2											
SAXH36		LOWER HORIZ. TAIL	2											
SAXV31		VERTICAL TAIL	2											
SAXB32		BODY	1	-5°	N			20	19	18	17	16		
SAXW32		UPPER WING	2											
SAXW36		LOWER WING	2											
SAXH32		UPPER HORIZ. TAIL	2											
SAXH36		LOWER HORIZ. TAIL	2											
SAXV32		VERTICAL TAIL	2											

* RUN 25 USES a SCHEDULE S

- GEOMETRY CONFIGURATION
- X, THETA, R
 - Y/(B/2), X/C Z/C
- α OR β SCHEDULES
- L (α) -16°, -12°, -8°, -5°, -2°, 0°, 2°, 4°, 6°, 8°, 12°
R (α) 30°, 35°, 40°, 45°, 50°, 55°
P (α) 16°, 20°, 25°, 30°, 35°, 40°
Q (α) 40°, 45°, 50°, 55°, 60°, 65°
T (α) 16°, 20°, 25°, 30°
N (β) -10°, -5°, 0°, 5°, 10°
S (α) -12°, -5°, 0°, 4°, 12°

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	WING (TOTAL)	HORIZ. (EXPOSED)	VERTICAL (EXPOSED)
AREA, ft ²	3084	1816	684
SPAN, in	1490	954	386
A.L.E	2.67°	40°	43.25°
CHORD, in	447.2	440.0	998.0
ROOT	149.0	101.0	120.2
TIP	7° (70)	7°	-

STRAIGHT WING ORBITER GENERAL DIMENSIONS

STRAIGHT WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1129 C-2- 41

FIGURE 1. STRAIGHT-WING ORBITER

STRAIGHT WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1129 C-2-42

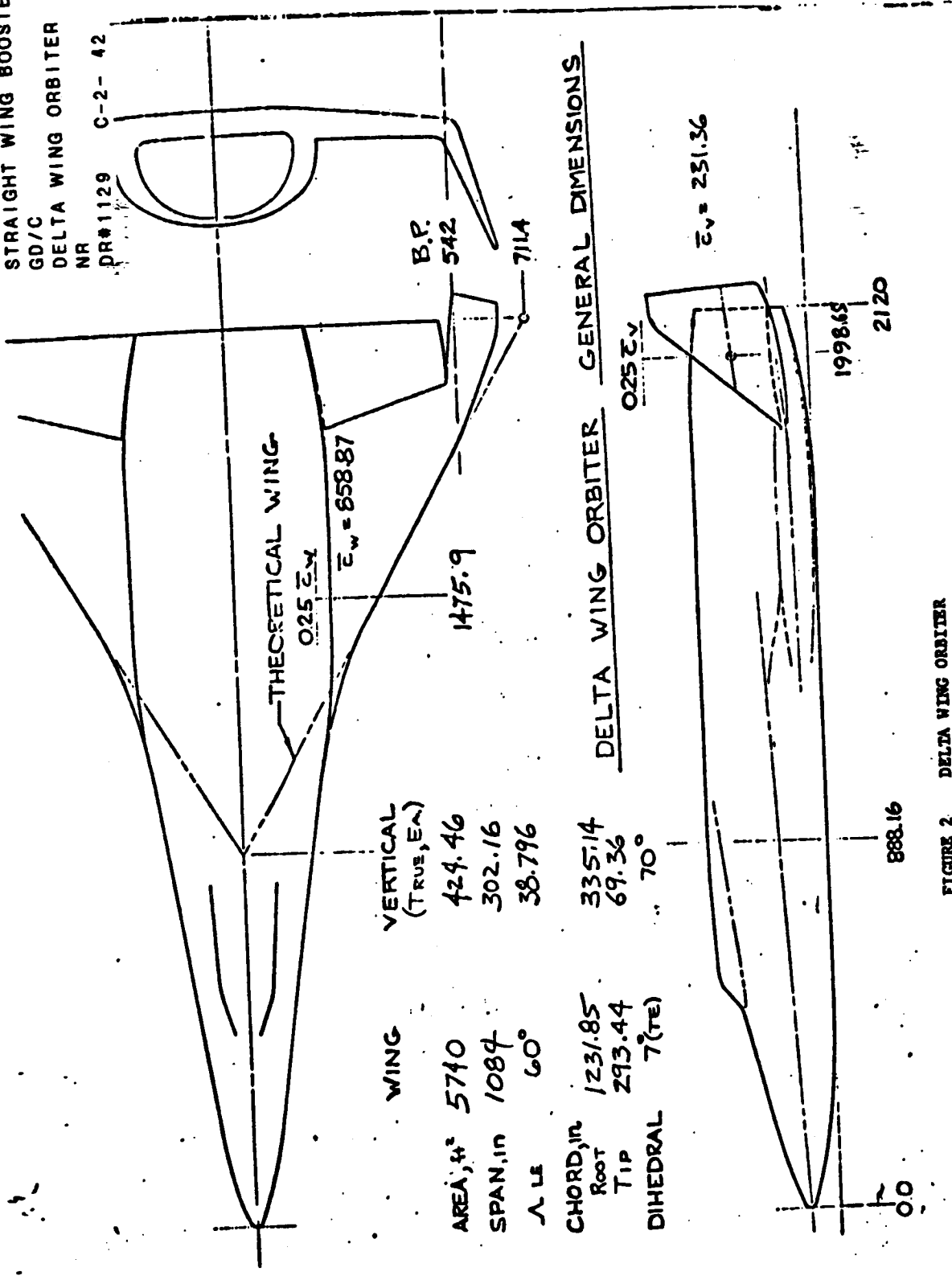
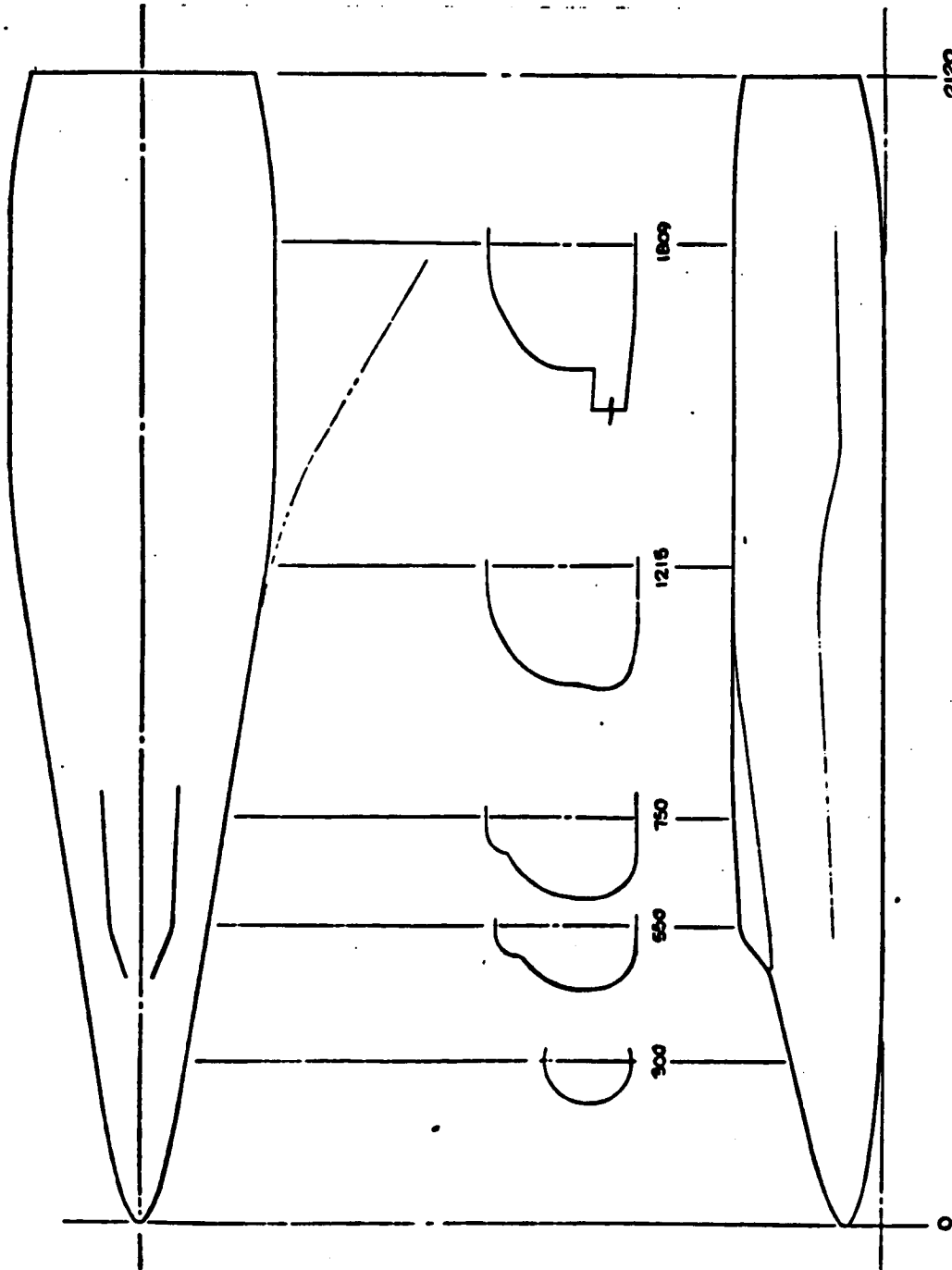


FIGURE 2 DELTA WING ORBITER

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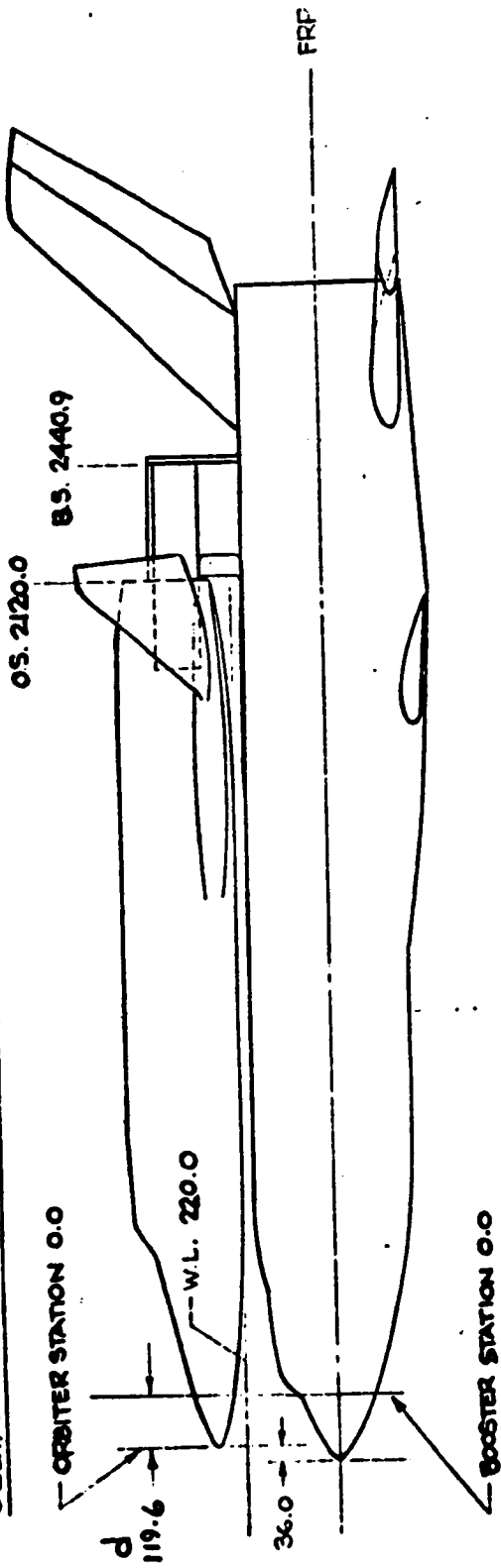
BCDY B5 9992-134 B CONFIGURATION

STRAIGHT WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1129 C-2- 43

FIGURE 3 DELTA WING ORBITER BODY

STRAIGHT WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1129 C-2-44

DELTA WING ORBITER / STRAIGHT WING BOOSTER



STRAIGHT WING ORBITER / STRAIGHT WING BOOSTER

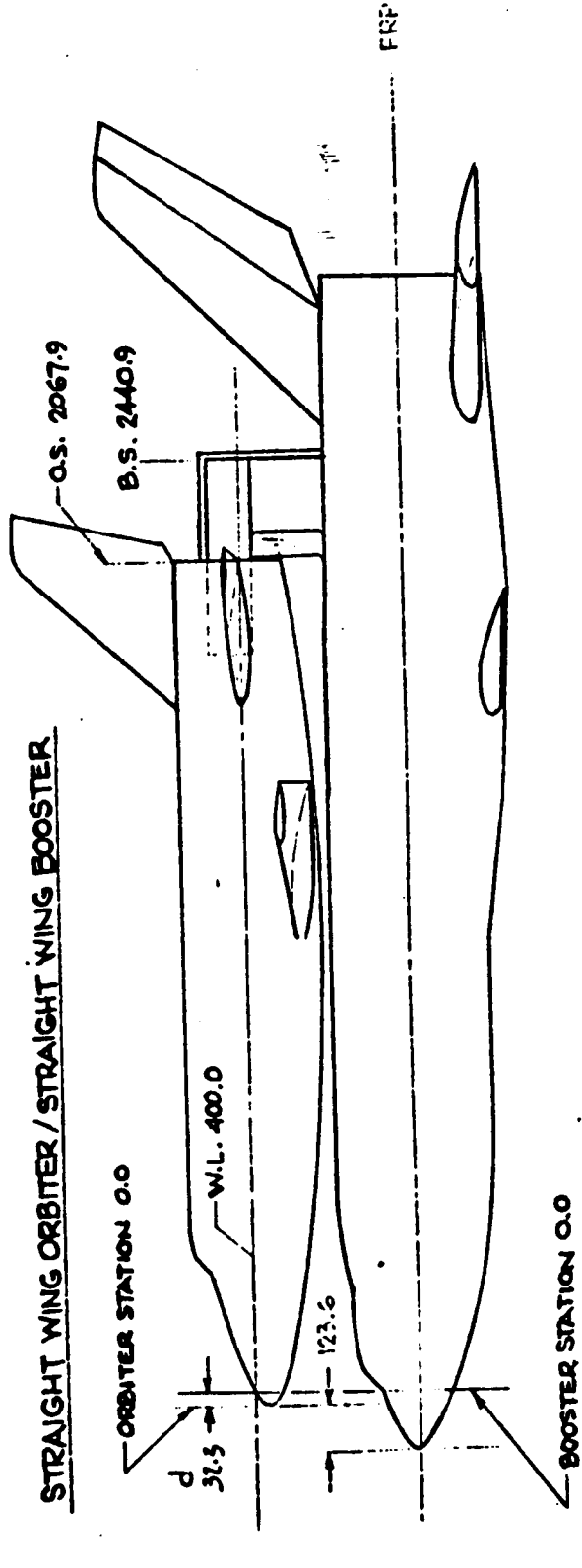


FIGURE 4 LAUNCH CONFIGURATIONS 815

STRAIGHT WING ORBITER

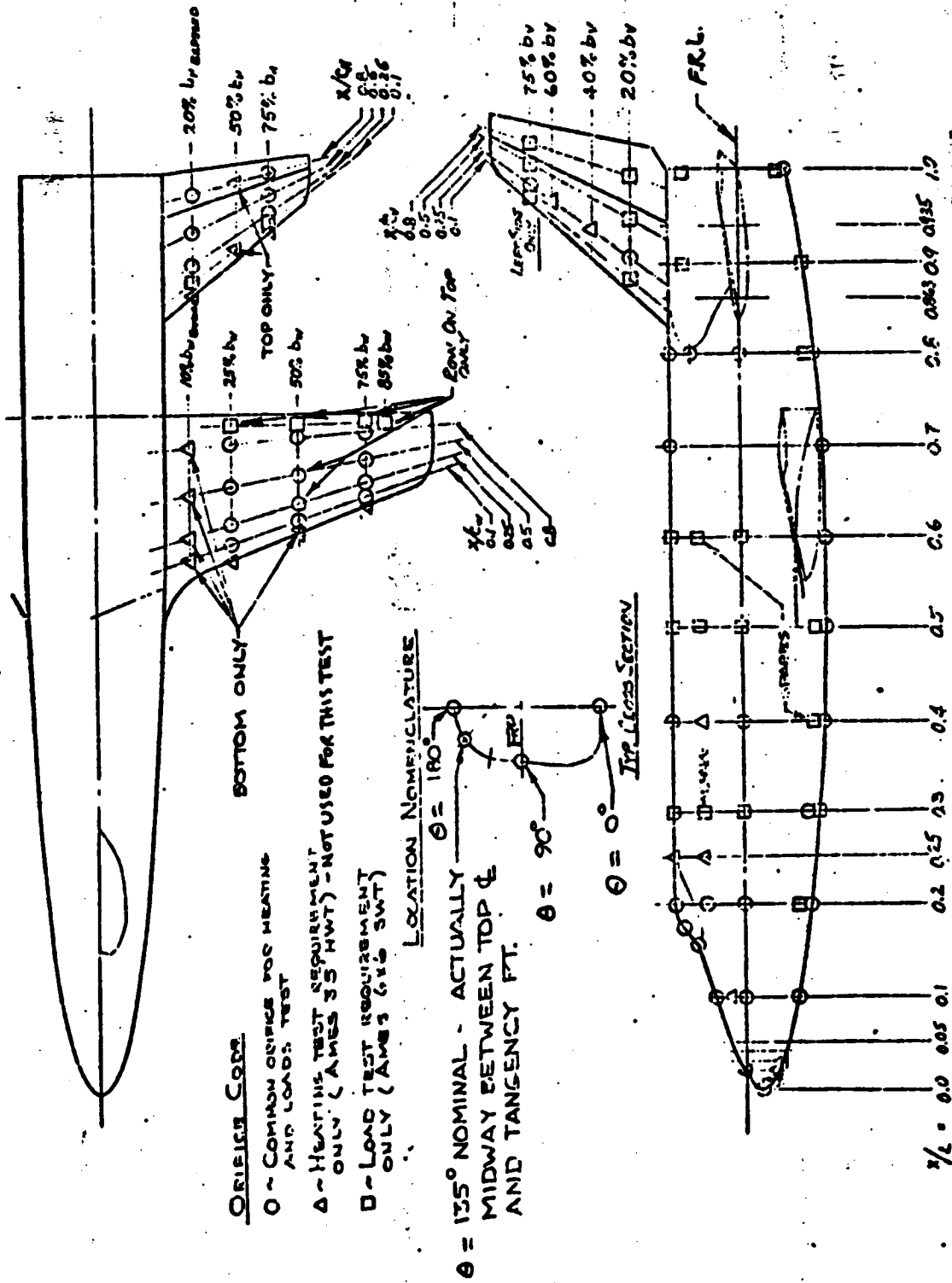


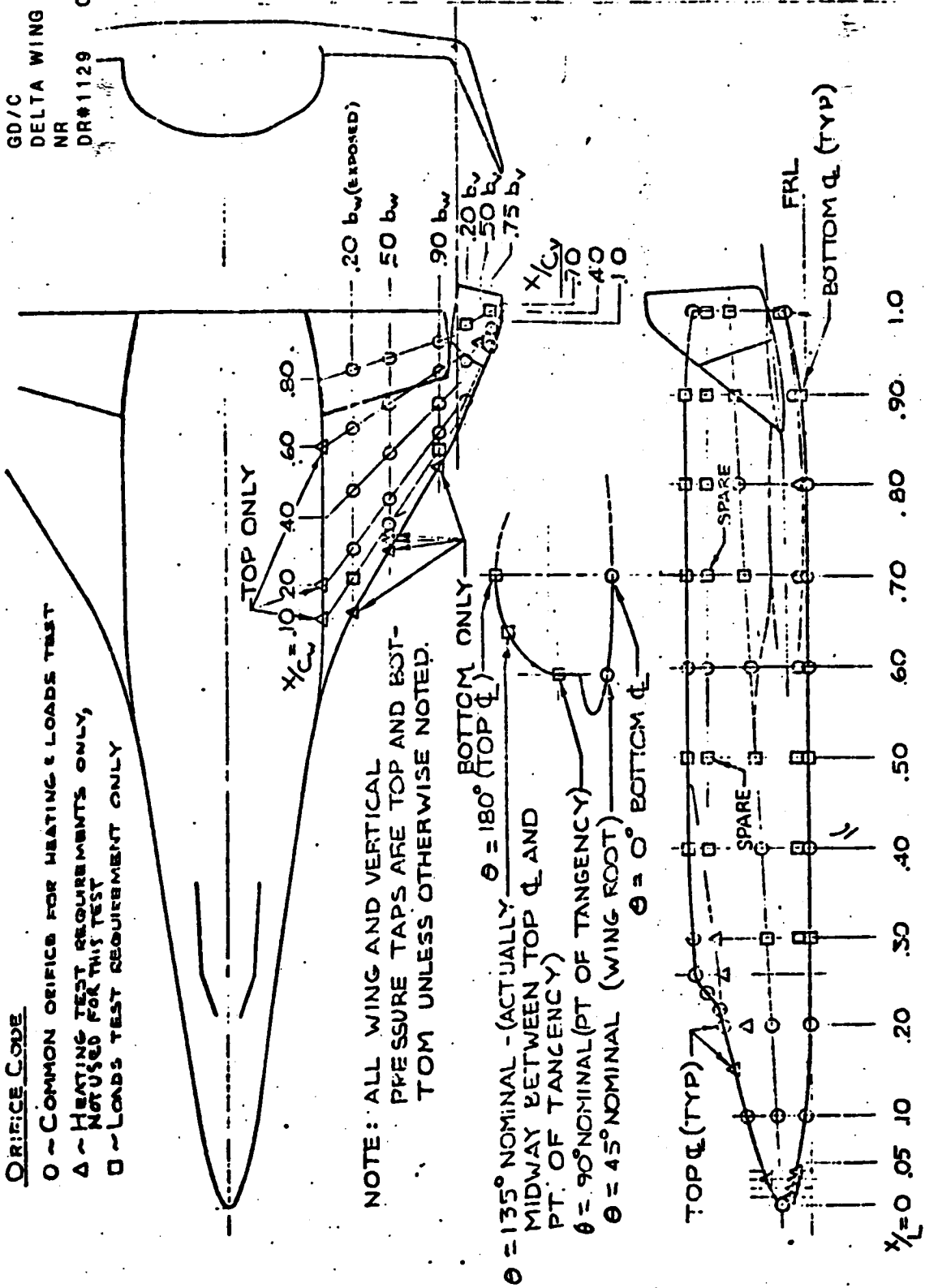
FIGURE 6 PRESSURE ORIFICE LOCATIONS, STRAIGHT WING ORBITER

STRAIGHT WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1129 C-2-45

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STRAIGHT WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1129 C-2-46

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ORIFICE CODE
 O ~ COMMON ORIFICE FOR HEATING & LOADS TEST
 Δ ~ HEATING TEST REQUIREMENTS ONLY,
 NOT USED FOR THIS TEST
 □ ~ LOADS TEST REQUIREMENT ONLY

NOTE: ALL WING AND VERTICAL
 PRESSURE TAPS ARE TOP AND BOT-
 TOM UNLESS OTHERWISE NOTED.

$\theta = 135^\circ$ NOMINAL - (ACTUALLY
 MIDWAY BETWEEN TOP Q AND
 PT. OF TANGENCY)
 $\theta = 90^\circ$ NOMINAL (PT OF TANGENCY)
 $\theta = 45^\circ$ NOMINAL (WING ROOT)
 $\theta = 0^\circ$ BOTTOM Q

FIGURE 7 DELTA WING ORBITER PRESSURE ORIFICE LOCATIONS

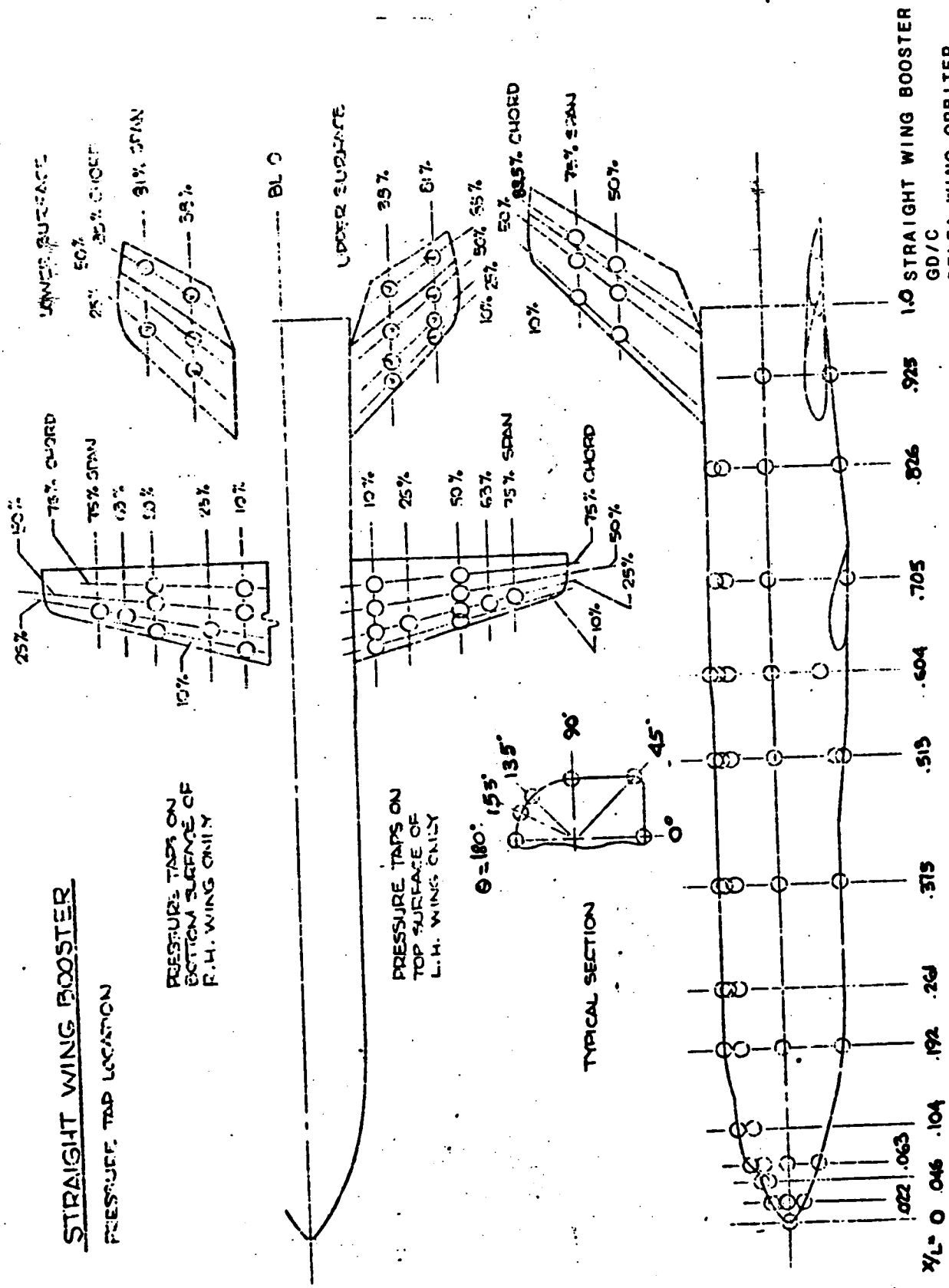
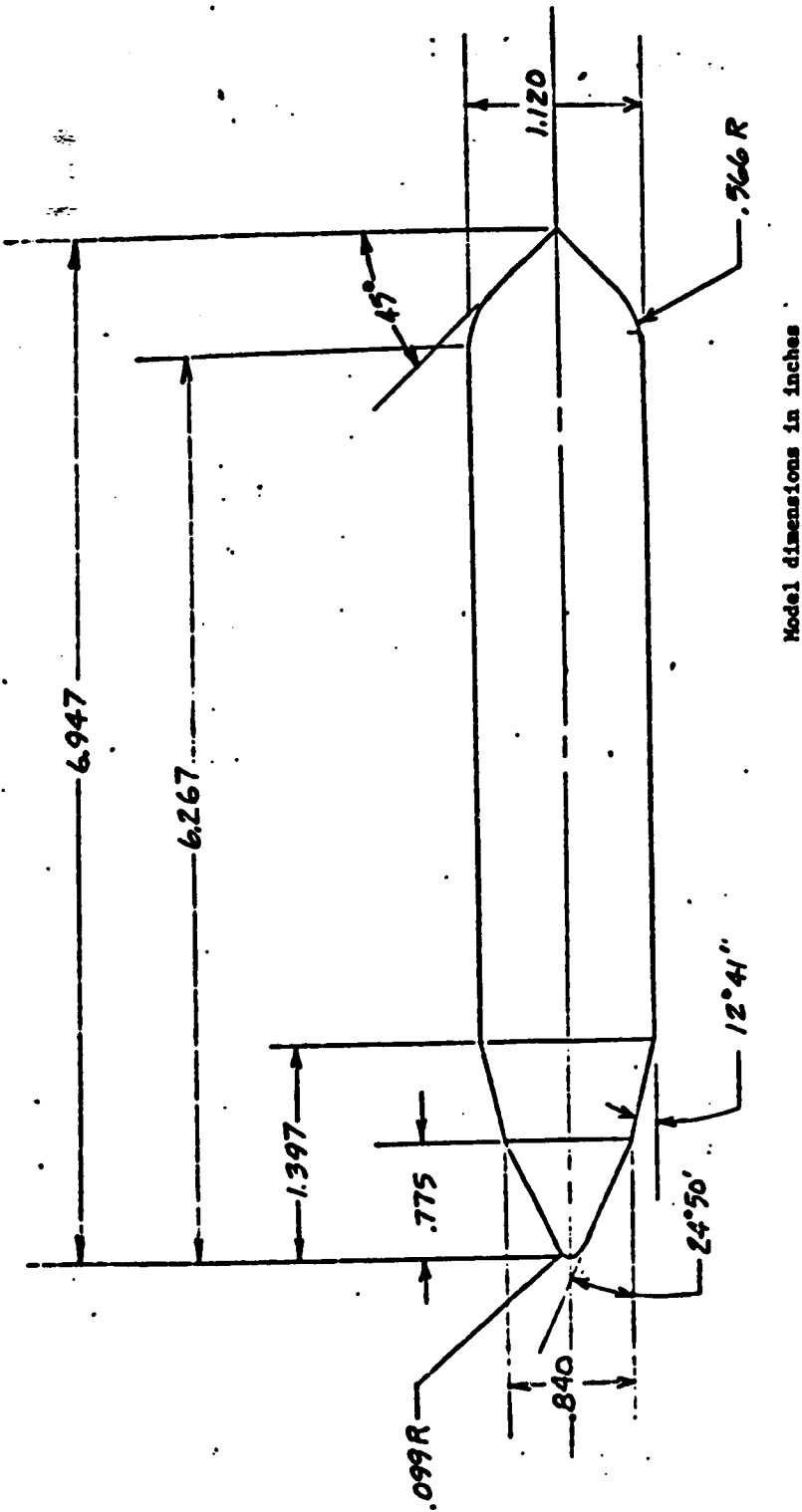


FIGURE 8 BOOSTER PRESSURE ORIFICE LOCATIONS

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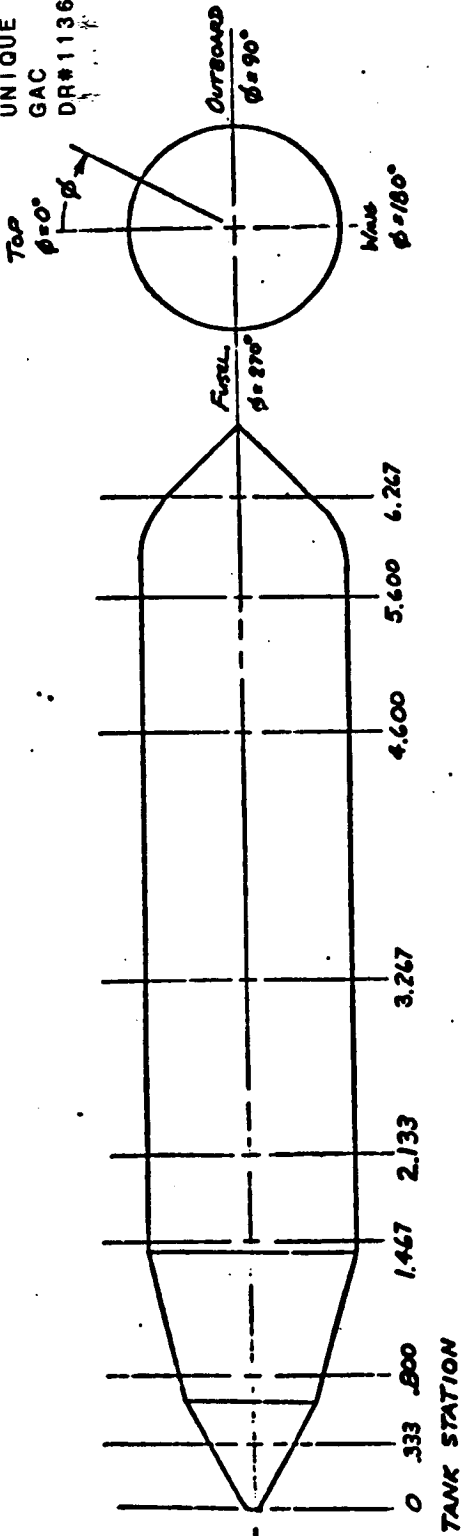


(a) Dimensions

Figure D.- Conical-Nose Tanks - T₂ (1/150 Scale)

STRAIGHT WING BOOSTER
TBC
UNIQUE CONFIGS. ORBITER
GAC
DR#1136 C-2- 49

STRAIGHT WING BOOSTER
 TBC
 UNIQUE CONFIGS. ORBITER
 GAC
 DR#1136 C-2-50

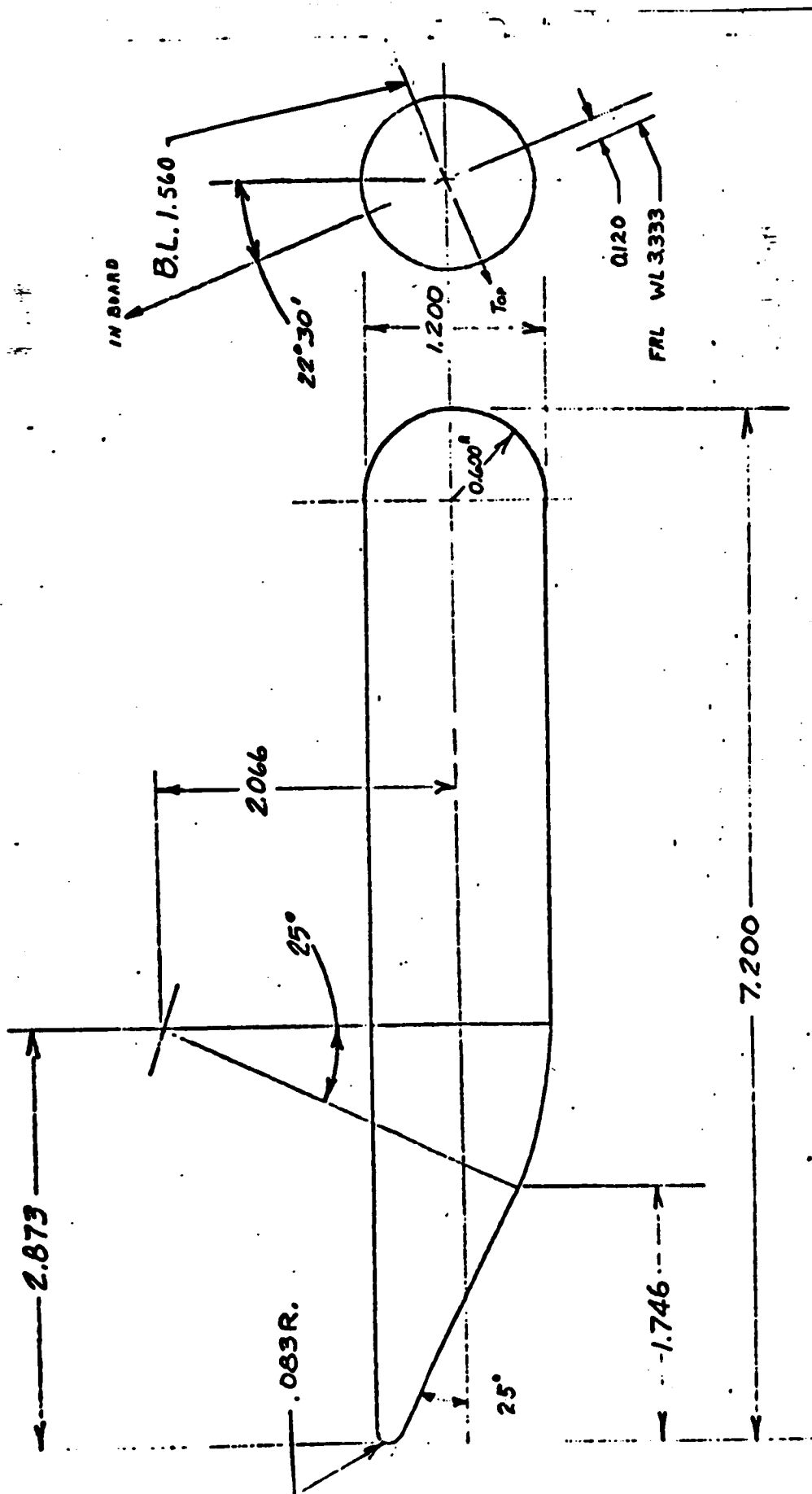


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TANK STATION	NO. OF TAPS	TAP NOS.	PRESSURE TAP LOCATIONS (ϕ in DEG.)
0.333	4	2-5	0, 90, 180, 270
0.800	8	6-13	0, 45, 90, 135, 180, 225, 270, 315
1.467	8	14-21	0, 45, 90, 135, 180, 225, 270, 315
2.133	8	22-29	0, 45, 90, 135, 180, 225, 270, 315
3.267	4	30-33	0, 90, 180, 270
4.600	6	34-39	0, 45, 90, 135, 180, 270
5.600	4	40-43	0, 90, 180, 270
6.267	2	44-45	0, 180
TOTAL	44 TAPS		

(b) PRESSURE TAP LOCATIONS

Figure D. - concluded.



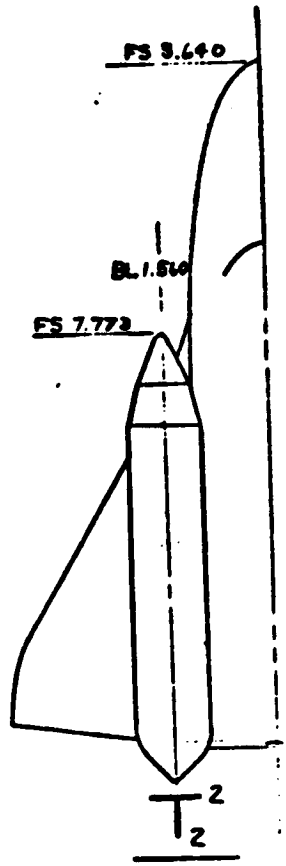
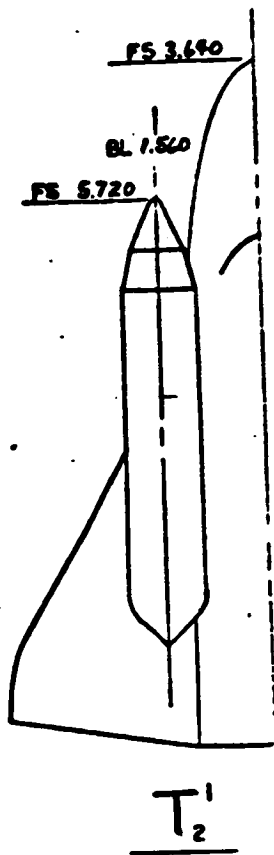
STRAIGHT WING BOOSTER
 TBC
 UNIQUE CONFIGS. ORBITER
 GAC
 DR#1136 C-2- 51

FIGURE E.- CONTOURED-NOSE TANK - T₃
 (1/150 SCALE, LEFT TANK SHOWN)

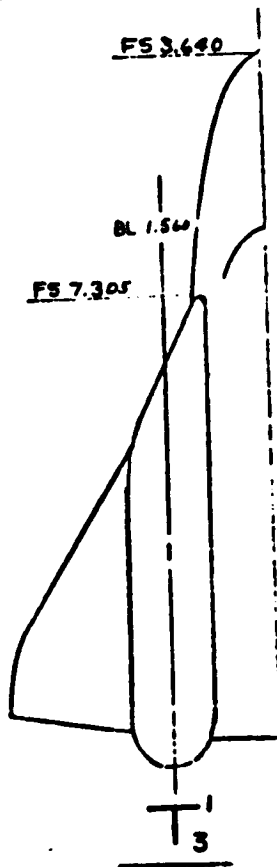
822

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STRAIGHT WING BOOSTER
 TBC
 UNIQUE CONFIGS. ORBITER
 GAC
 DR#1136 C-2- 52



CONICAL
 NOSE
 TANK



CONTOURED
 NOSE
 TANK

Dimensions in orbiter reference
 system in inches.

Figure F.- Tank Mounting
 Positions.

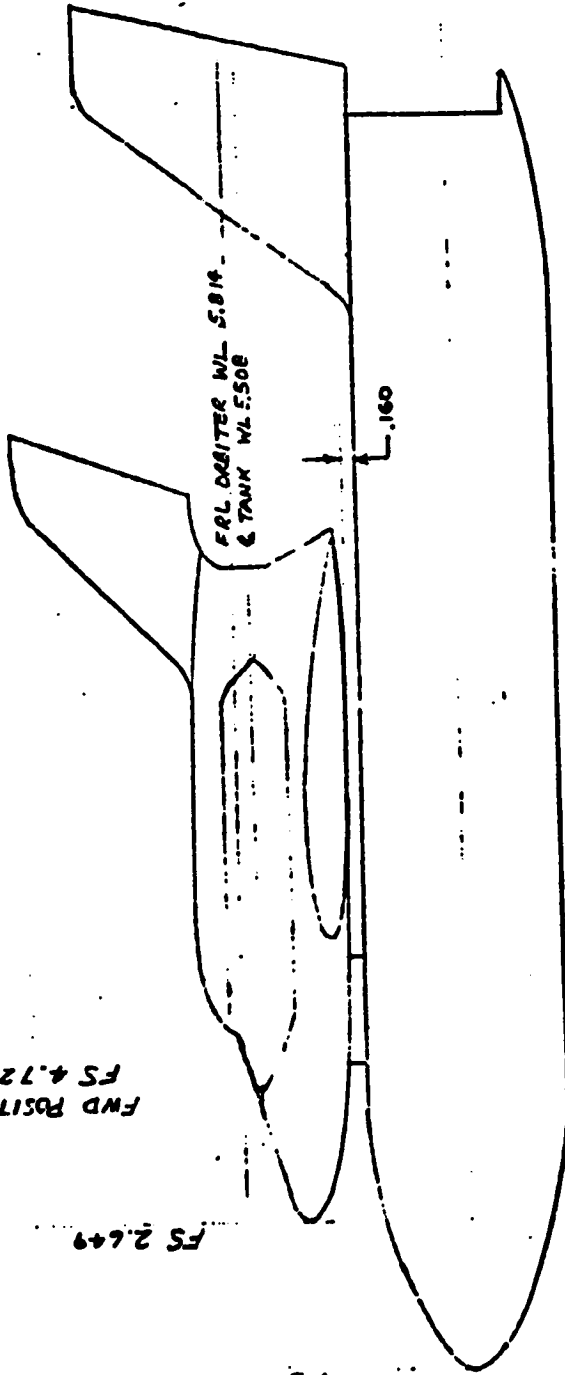
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Note: This sketch not to scale
All stations and waterlines referenced
to the booster
Model dimensions in inches

FWD POSITION (T₁)
FS 4.729

FS 2.649

FS 0



Φ-WL 2.667

STRAIGHT WING BOOSTER
TBC
UNIQUE CONFIGS. ORBITER
GAC
DR#1136 C-2- 53

Figure G.- Launch Configuration

STRAIGHT WING BOOSTER
TBC
UNIQUE CONFIGS. ORBITE

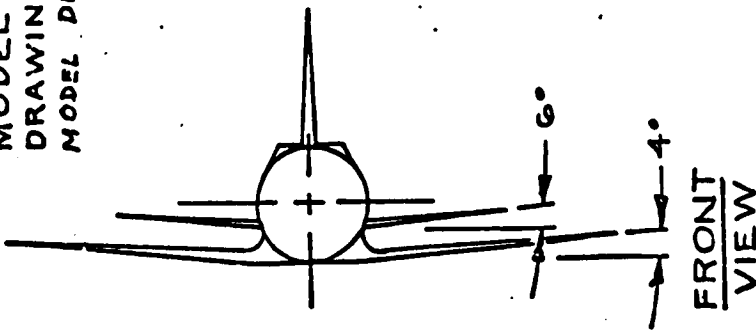
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AX-1202I-1

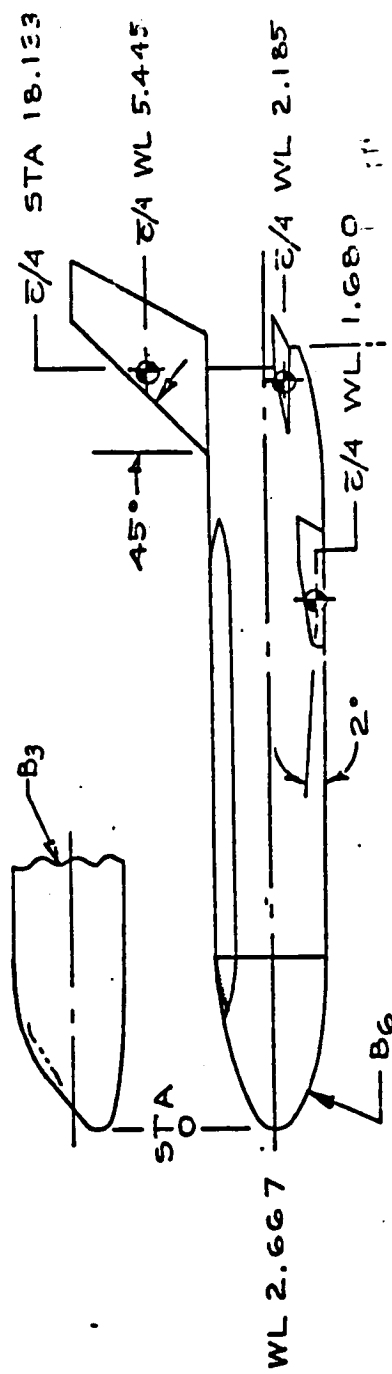
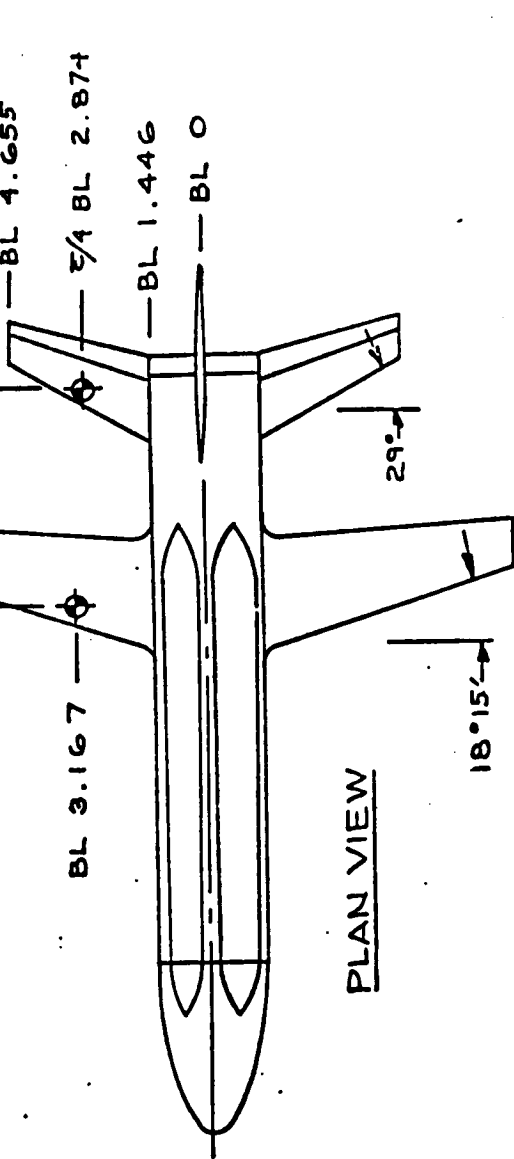
MODEL ASSEMBLY
DRAWING 25-56543
MODEL DIMENSIONS IN INCHES

BL 7.400 GAC
1/4 STA 12.892
1/4 STA 18.126

BL 3.167
BL 4.655
1/4 BL 2.874
BL 1.446
BL 0



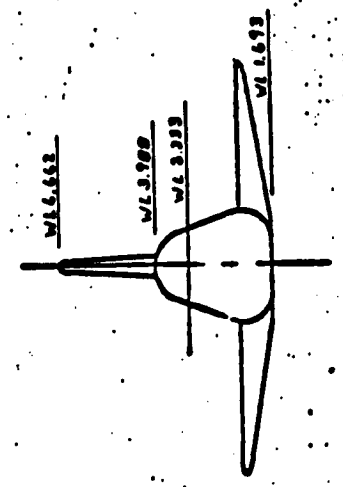
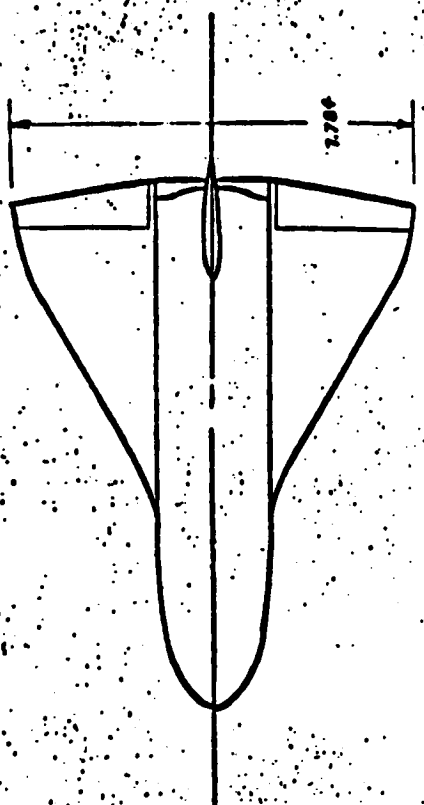
PLAN VIEW



SIDE VIEW

STA 19.020

FIGURE H.- ILLUSTRATION OF 1/50-SCALE BOOSTER



FRL

FS 3.650

FS 14.200

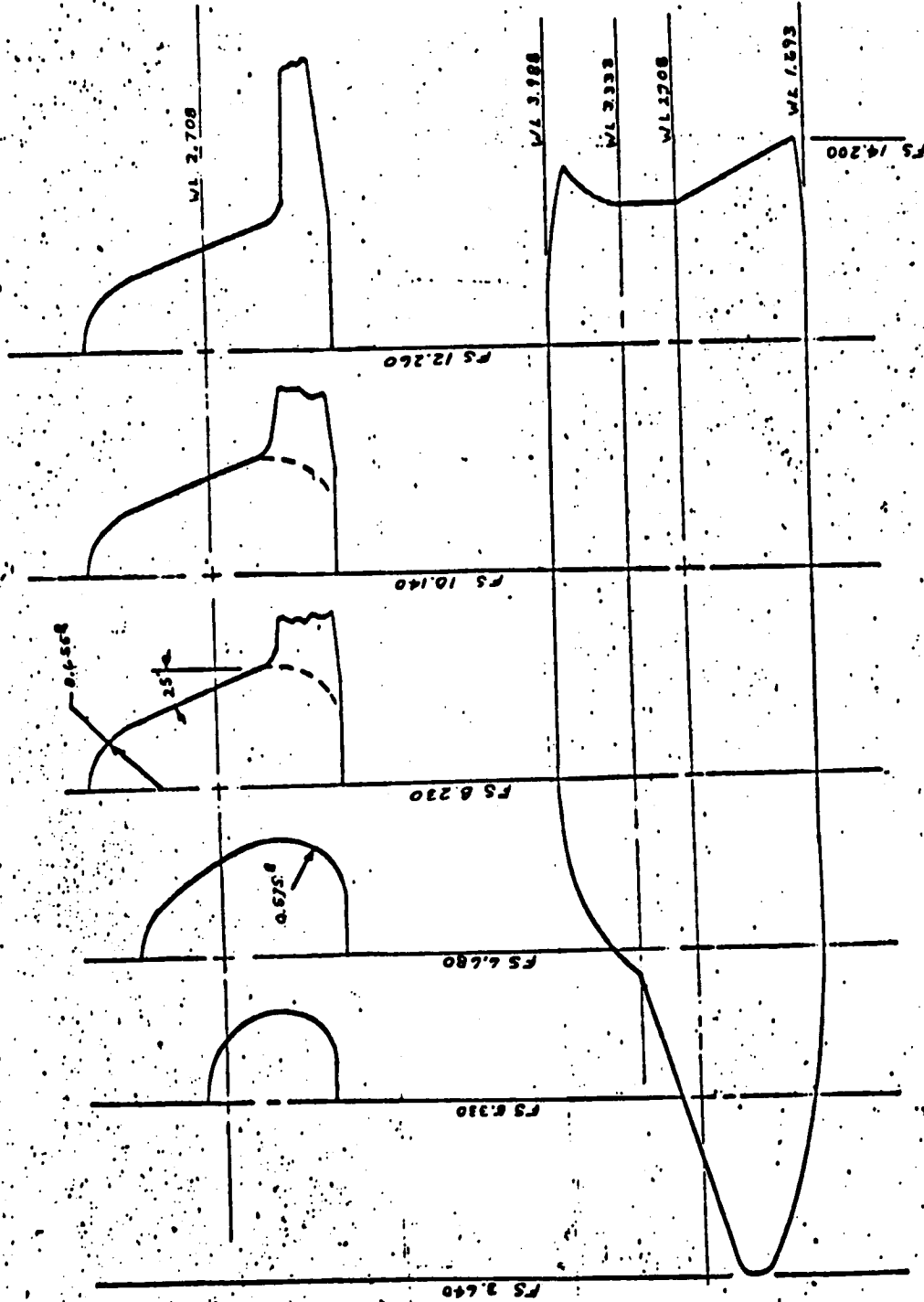
(a) Three View

Figure I.- Illustration of Orbiter ROS-NB2

STRAIGHT WING BOOSTER
 TBC
 UNIQUE CONFIGS. ORBITER
 GAC
 DR#1136 C-2- 55

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STRAIGHT WING BOOSTER
 TBC
 UNIQUE CONFIGS. ORBITER
 GAC
 DR#1136 C-2- 56



(b) ROS-NB2 Body Dimensions

Figure 1:- concluded.

APPENDIX C-3

MODEL FIGURES

LAUNCH HEAT TRANSFER

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TABLE 4
RUN SCHEDULE - MDAC SPACE SHUTTLE
CAL 96" RST

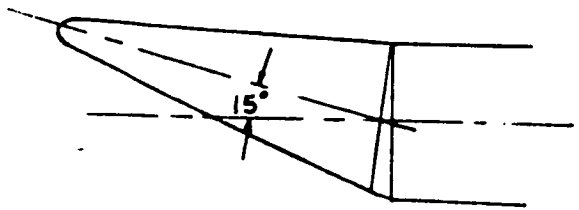
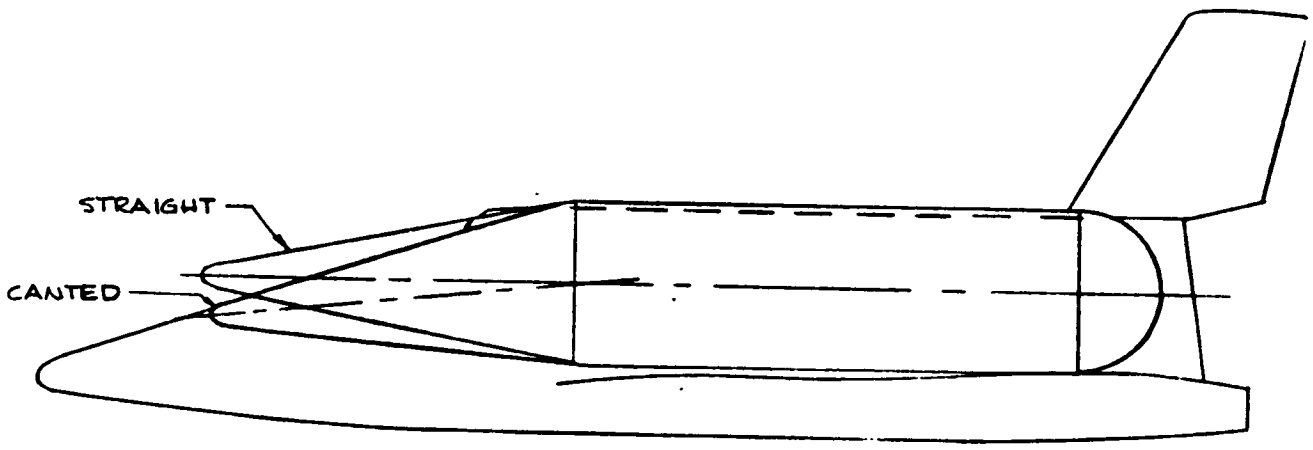
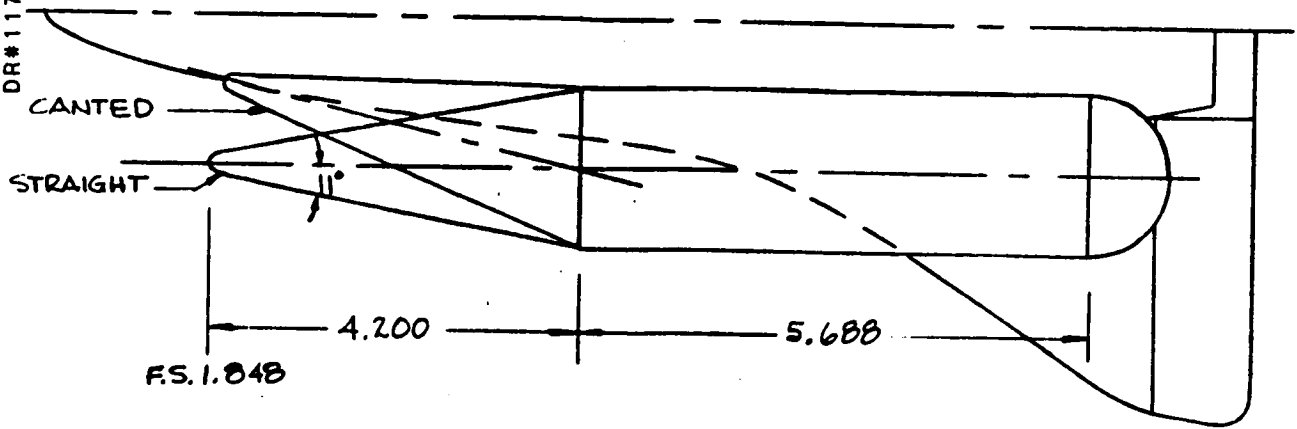
CANARD BOOSTER
MDAC
DELTA WING ORBITER
MDAC

DR#1170 C-3-1

RUN NO.	CONFIGURATION	T _w /T ₀	M _∞	Re _w × 10 ⁻⁴ ft ⁻¹	Angle of Attack deg	Yaw deg	CONTROL DEFLECTIONS	
							ELEVON	FLAP
							deg.	deg.
1	Orbiter	.155	11.7	.31	0	0	+10	+10
2	Orbiter	.156	11.7	.31	25	0	0	+10
3	Orbiter	.162	12.7	2.8	25	0	0	+10
4	Orbiter	.160	13	4.7	25	0	0	+10
5	Orbiter	.160	13	4.7	25	+5	0	+10
6	Orbiter	.157	13	4.5	25	-5	0	+10
7	Orbiter	.157	11.7	.32	45	0	-40	0
8	Orbiter	.162	13	4.8	45	0	-40	0
9	Orbiter	.160	13	4.6	45	+5	-40	0
10	Orbiter + Straight External Tanks	.160	11.8	.32	0	0	0	0
11	Orbiter + Straight External Tanks	.160	13	4.6	0	0	0	0
12	Orbiter + Straight External Tanks	.141	7.6	.31	0	0	0	0
13	Orbiter + Straight External Tanks	.334	7.7	2.2	0	0	0	0
14	Orbiter + Straight External Tanks	.312	7.5	9.4	0	0	0	0
15	Orbiter	.141	7.6	.31	0	0	+10	+10
16	Orbiter	.328	7.5	10.4	0	0	+10	+10
17	Orbiter	.137	7.6	.32	20	0	+10	+10
18	Orbiter	.345	7.6	10.3	20	0	+10	+10
19	Orbiter	.326	7.5	10.4	25	0	+10	0
20	Orbiter	.139	7.6	.31	25	0	0	+10
21	Orbiter	.332	7.7	2.2	25	0	0	+10
22	Orbiter	.325	7.5	10.4	25	0	0	+10
23	Orbiter	.345	7.6	10.3	25	+5	0	+10
24	Orbiter	.324	7.5	10.2	25	-5	0	+10
25	Orbiter	.339	7.6	27.8	25	0	0	+10
26	Orbiter	.137	7.6	.32	45	0	-40	0
27	Orbiter	.340	7.6	27.4	45	0	-40	0
28	Orbiter	.140	7.6	.32	60	0	-40	0
29	Orbiter	.329	7.5	10.5	60	0	-40	0
30	Orbiter	.327	7.5	10.4	45	0	0	0
31	Orbiter + Canted External Tanks	.136	7.6	.32	0	0	0	0
32	Orbiter + Canted External Tanks	.336	7.7	2.3	0	0	0	0
33	Orbiter + Canted External Tanks + Tip Pairing	.332	7.7	2.2	0	0	0	0
34	Orbiter	.130	7.8	11.4	45	0	-40	0
35	Orbiter	.116	7.2	10.6	25	0	0	+10
36	Orbiter	.340	7.6	10.4	60	0	0	+10
37	Mated, Position 2	.329	7.6	24.4	0	0	0	0
38	Mated, Position 2	.324	7.6	24.0	0	0	0	0
39	Mated, Position 3	.330	7.6	24.7	0	0	0	0
40	Mated, Position 3 + Canted External Tanks	.330	7.7	2.4	0	0	0	0
41	Mated, Position 1 + Canted External Tanks	.337	7.7	2.2	0	0	0	0
42	Mated, Position 1	.332	7.7	2.3	0	0	0	0
43	Mated, Position 1	.139	7.6	.31	0	0	0	0
44	Mated, Position 1	.324	7.6	24.4	0	0	0	0
45	Mated, Position 1	.322	7.6	24.1	-5	0	0	0
46	Booster	.134	7.6	.30	0	0	0	0
47	Booster	.327	7.7	2.4	0	0	0	0
48	Booster	.324	7.6	27.1	0	0	0	0
49	Booster	.322	7.6	24.6	0	0	0	0
50	Mated, Position 1	.166	10.3	.37	0	0	0	0
51	Mated, Position 1	.166	10.2	.35	0	0	0	0
52	Booster	.169	10.3	.37	0	0	0	0
53	Booster	.190	11.2	10.1	15	0	0	0
54	Booster	.166	10.3	.37	30	0	0	0
55	Booster	.186	11.2	9.9	30	0	0	0
56	Booster	.165	10.3	.35	45	0	0	0
57	Booster	.161	10.5	.87	45	0	0	0
58	Booster	.162	10.9	5.4	45	0	0	0
59	Booster	.185	11.2	9.7	45	0	0	0
60	Booster	.167	10.3	.36	60	0	0	0
61	Booster	.161	10.5	.87	60	0	0	0
62	Booster	.159	10.9	4.6	60	0	0	0
63	Booster	.186	11.2	9.9	60	0	0	0
64	Booster	.160	10.9	4.5	60	+5	0	0
65	Booster	.189	11.2	9.8	50	0	0	0
66	Booster	.184	11.2	10.2	55	0	0	0
67	Booster	.182	11.2	9.7	15	0	0	+25
68	Booster	.180	11.2	9.3	60	0	0	+25

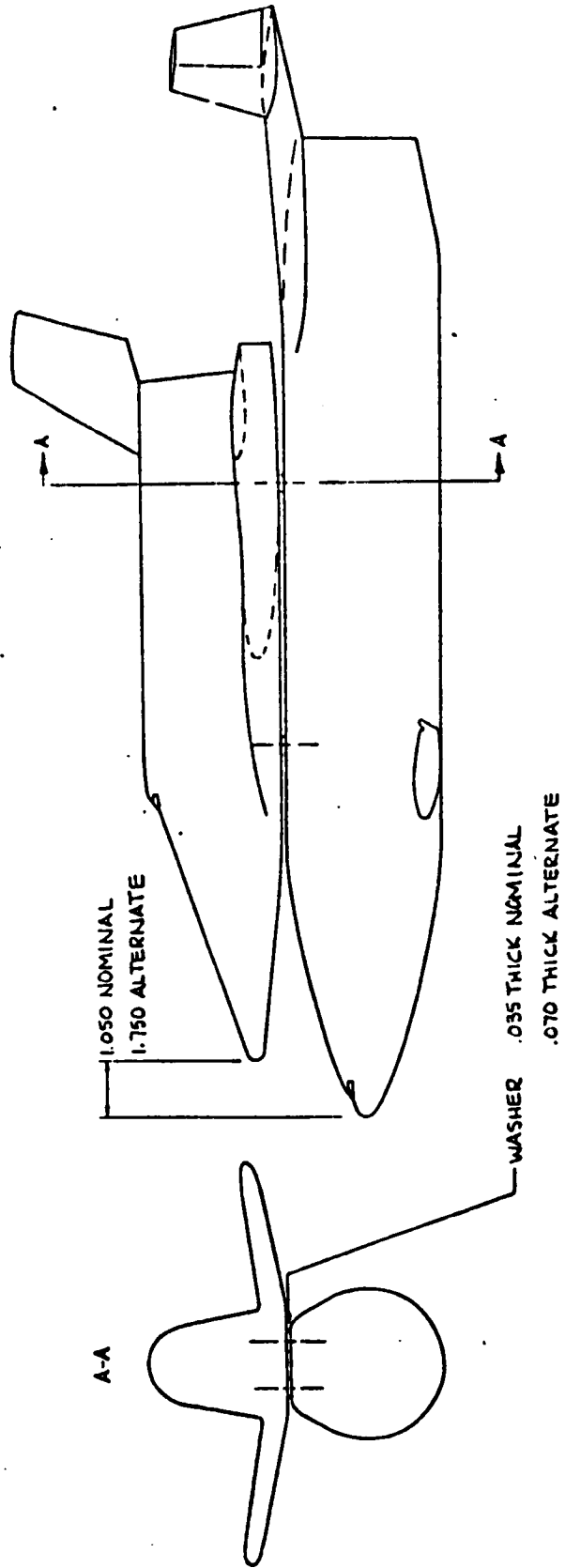
FIGURE 5.
EXTERNAL TANK CONFIGURATIONS

CANARD BOOSTER
 MDAC
 DELTA WING ORBITER
 MDAC
 DR#1170 C-3-4



CANTED TANK DETAIL —
 FORWARD CONE CANTED 15°
 AND ROTATED 30° CLOCKWISE
 LOOKING FORWARD

FIGURE 4 MATED CONFIGURATION



CANARD BOOSTER
MDAC
DELTA WING ORBITER
MDAC
DR#1170 C-3-5

CANARD BOOSTER
MDAC
DELTA WING ORBITER
MDAC
DR#1238 C-3-8

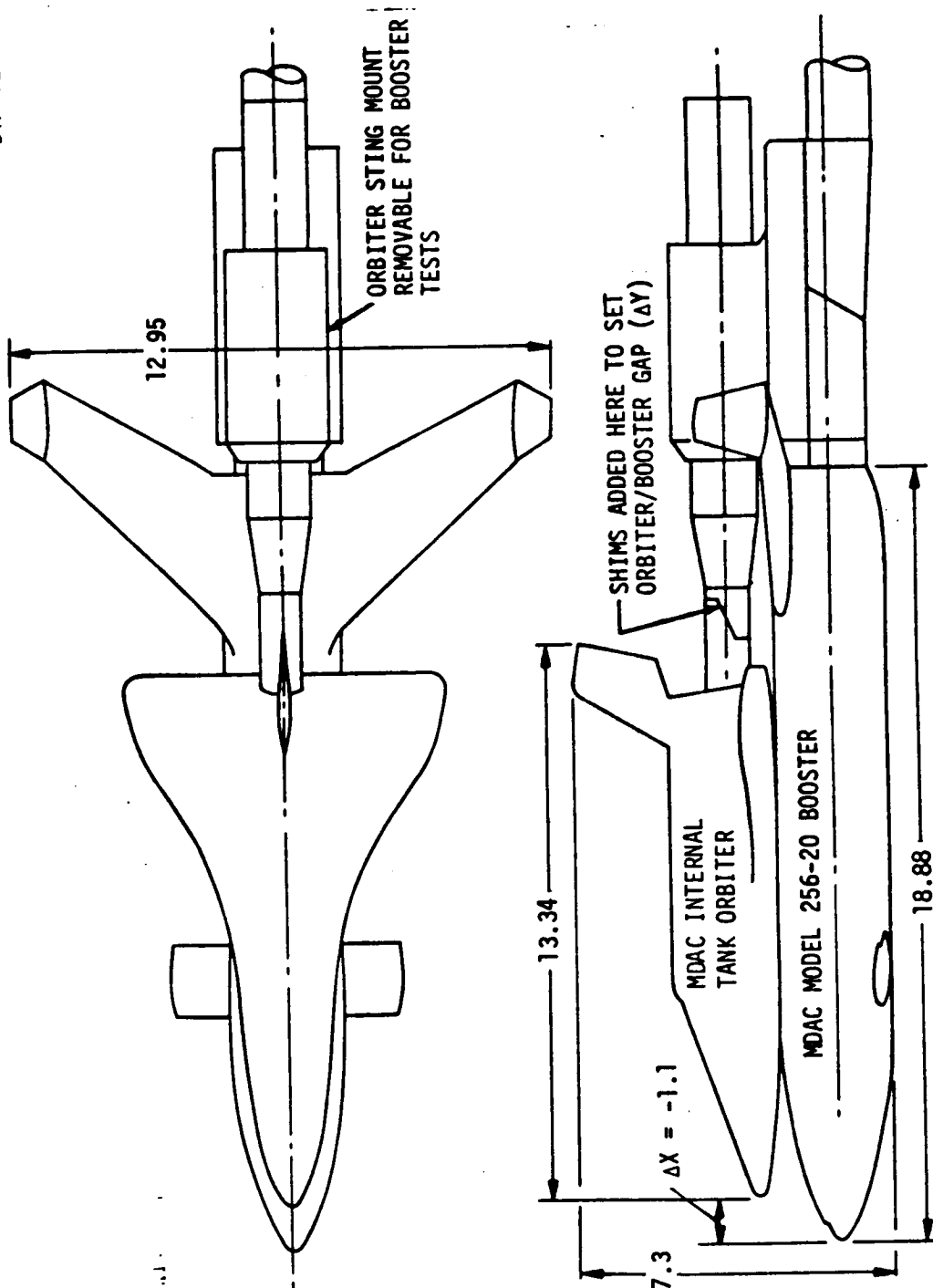


Figure 1. MATED MODEL ARRANGEMENT

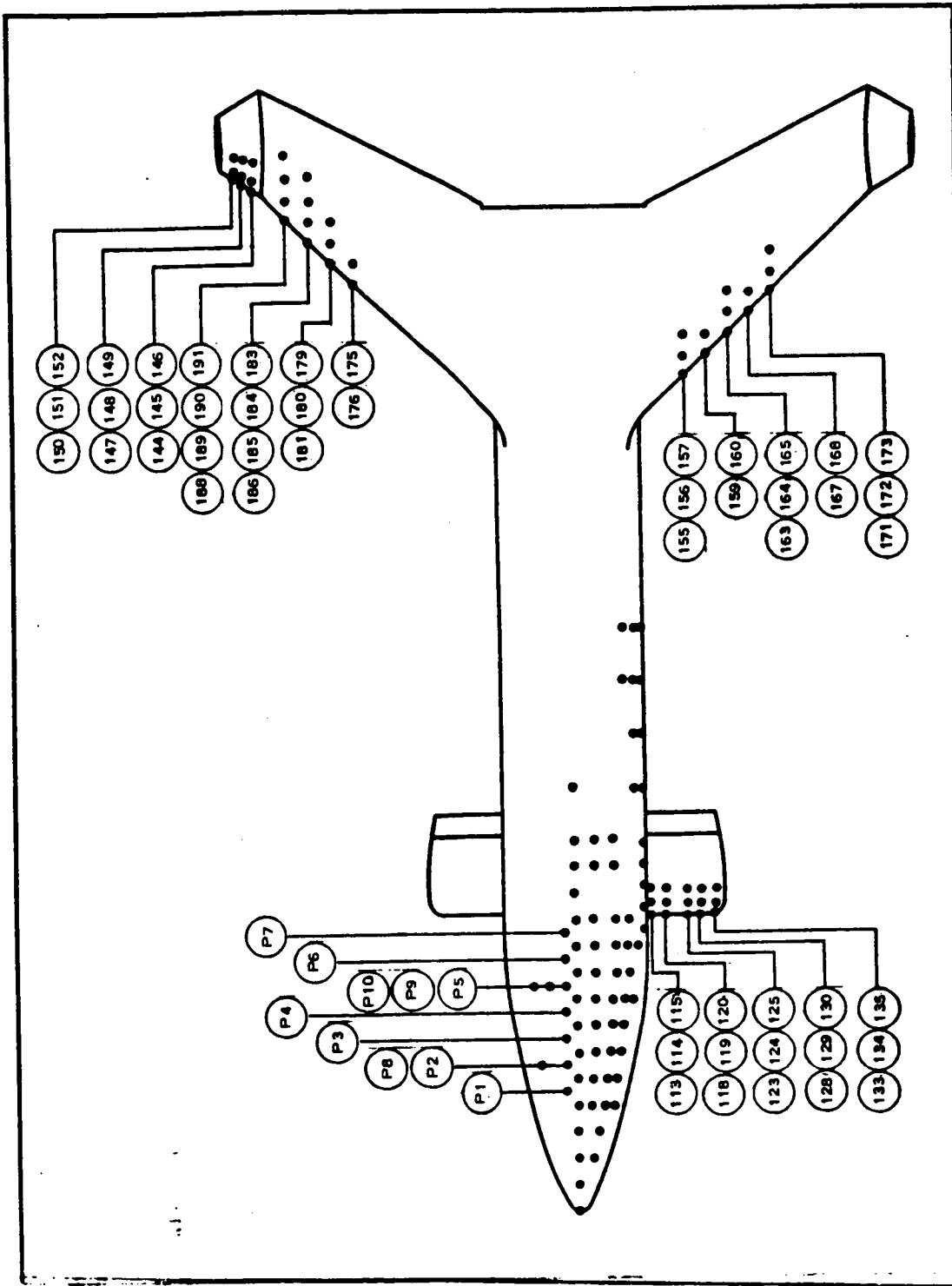


Figure 3. BOOSTER THERMOCOUPLE LOCATIONS

CANARD BOOSTER
 MDAC
 DELTA WING ORBITER
 MDAC
 DR#1238 C-3- 9

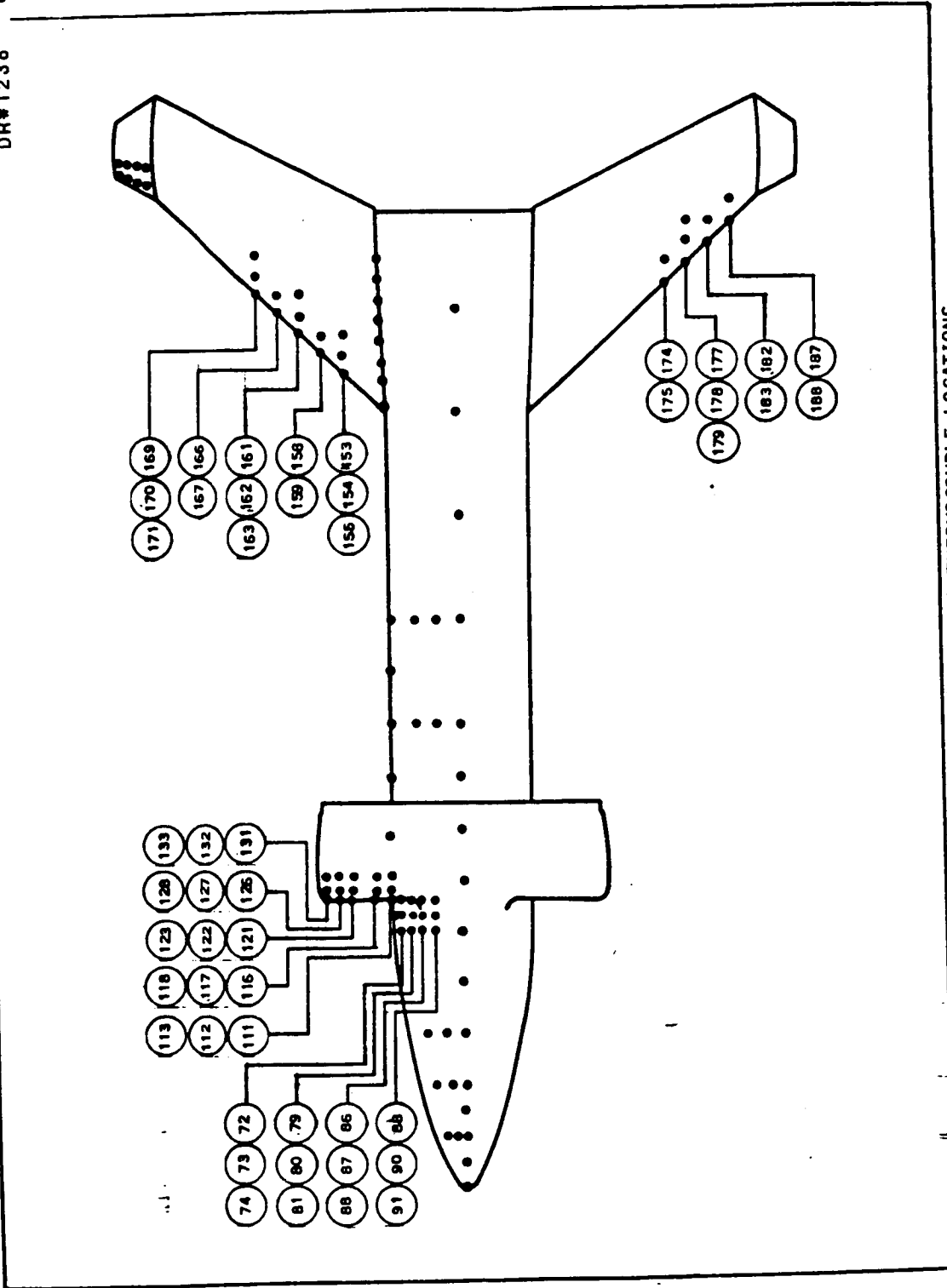


Figure 3 (Continued) BOOSTER THERMOCOUPLE LOCATIONS

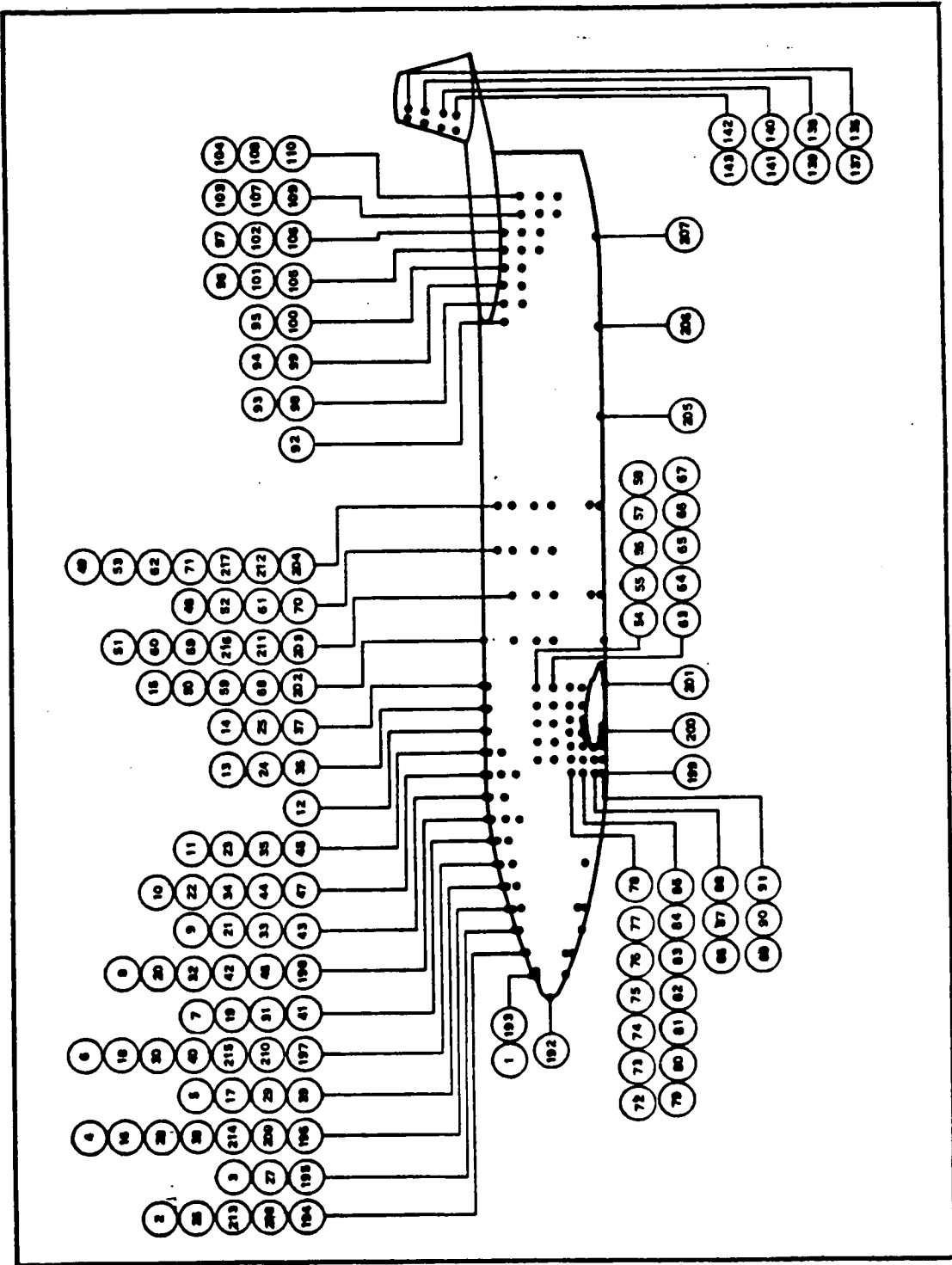


Figure 3 (Concluded) BOOSTER THERMOCOUPLE LOCATIONS

CANARD BOOSTER
 MDAC
 DELTA WING ORBITER
 MDAC
 DR#1238 C-3- 11

CANARD BOOSTER
 MDAC
 DELTA WING ORBITER
 MDAC
 DR#1238 C-3- 12

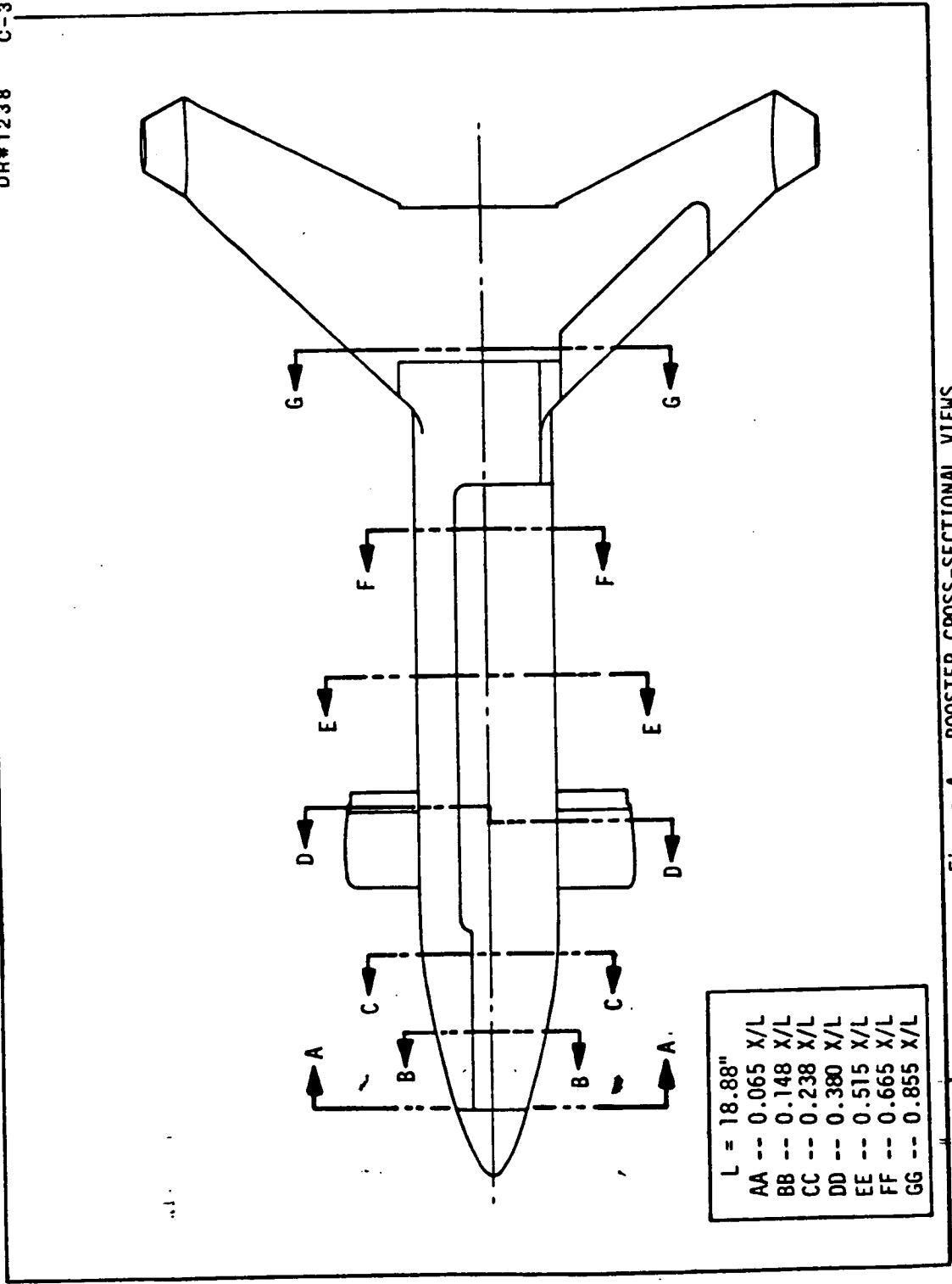


Figure 4. BOOSTER CROSS-SECTIONAL VIEWS

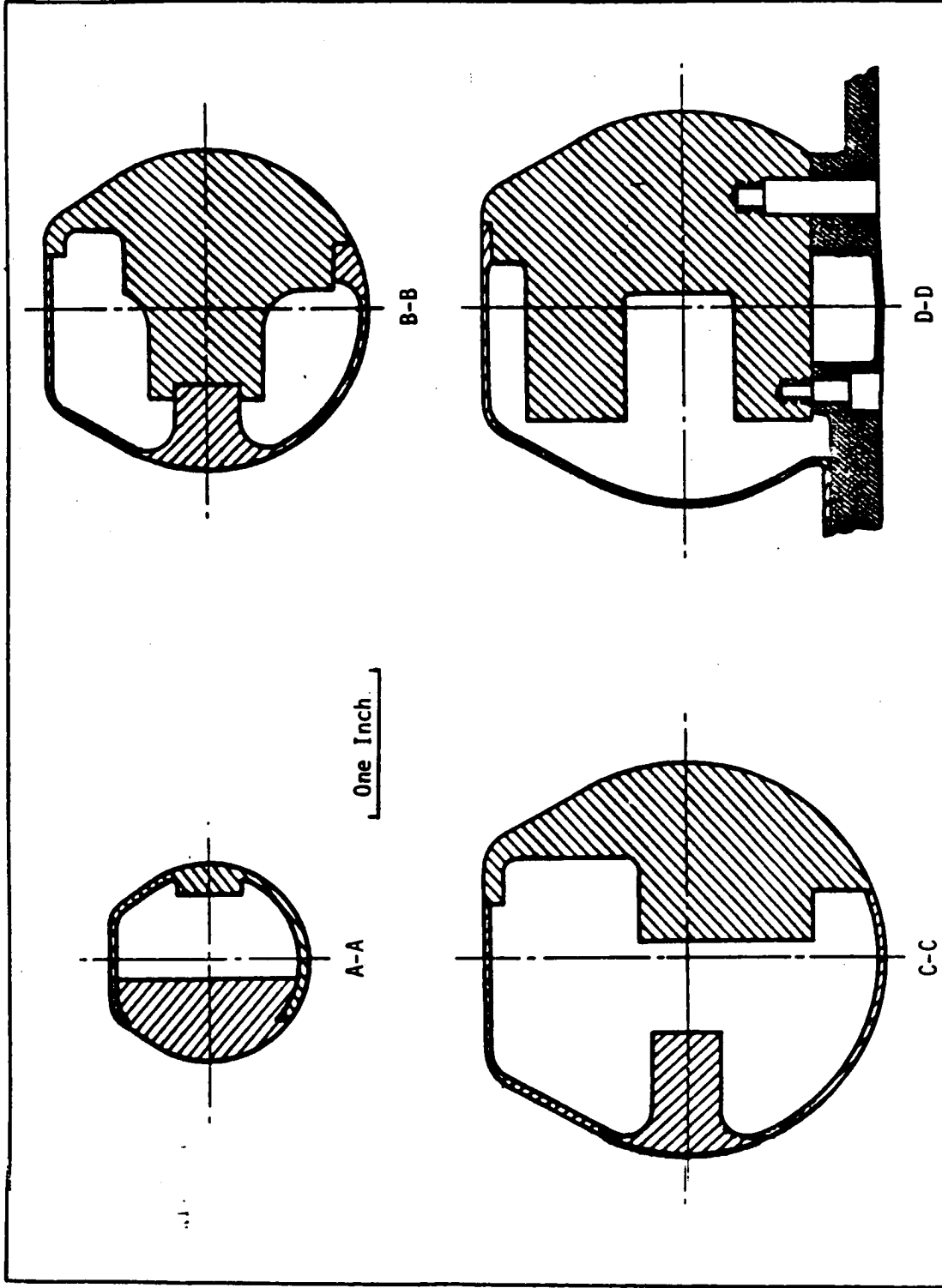


Figure 4 (Continued) BOOSTER CROSS-SECTIONAL VIEWS

CANARD BOOSTER
 MDAC
 DELTA WING ORBITER
 MDAC
 DR#1238 C-3-13

CANARD BOOSTER
MDAC
DELTA WING ORBITER
MDAC
DR#1238 C-3-14

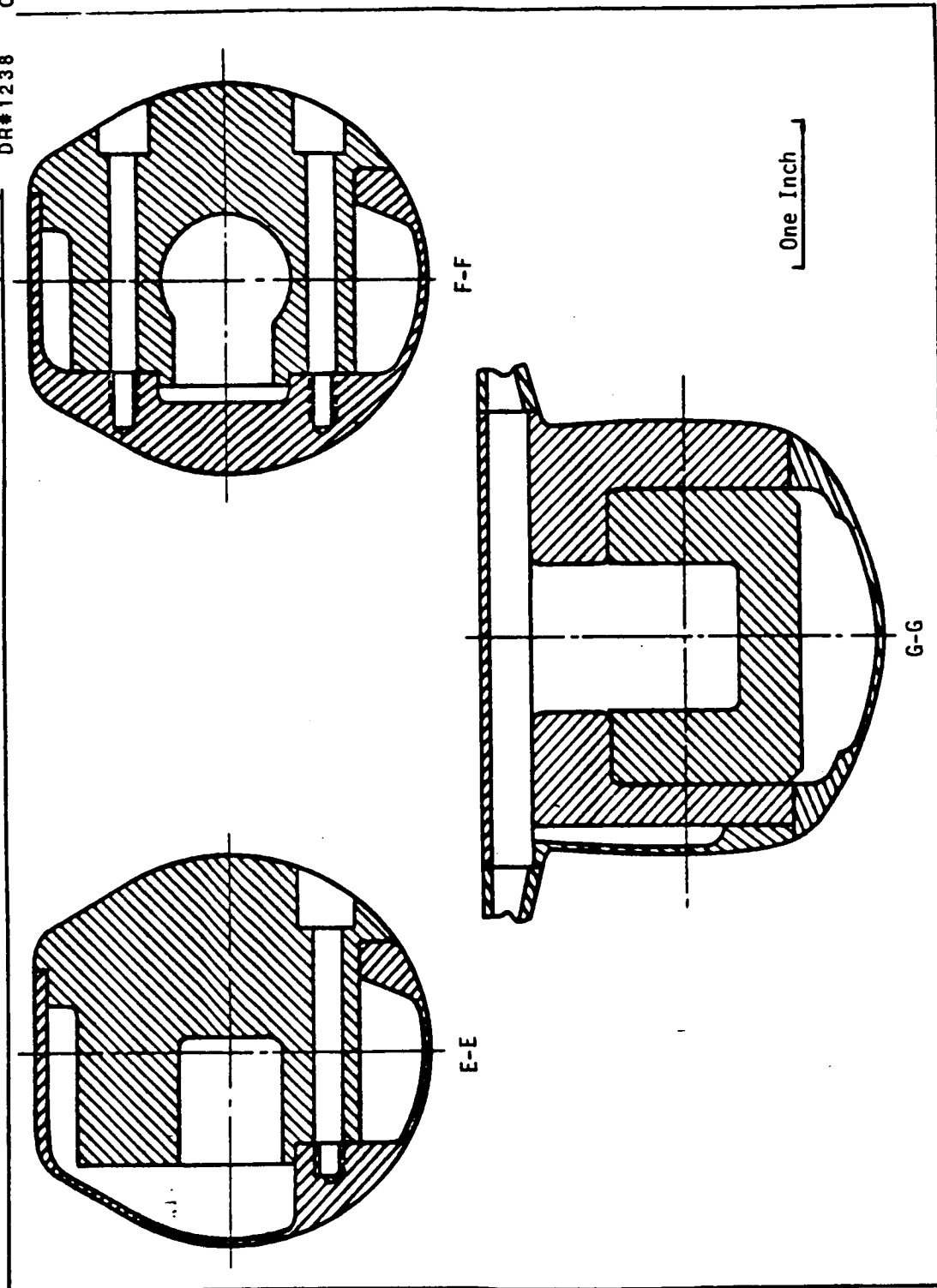


Figure 4 (Concluded) BOOSTER CROSS-SECTIONAL VIEWS

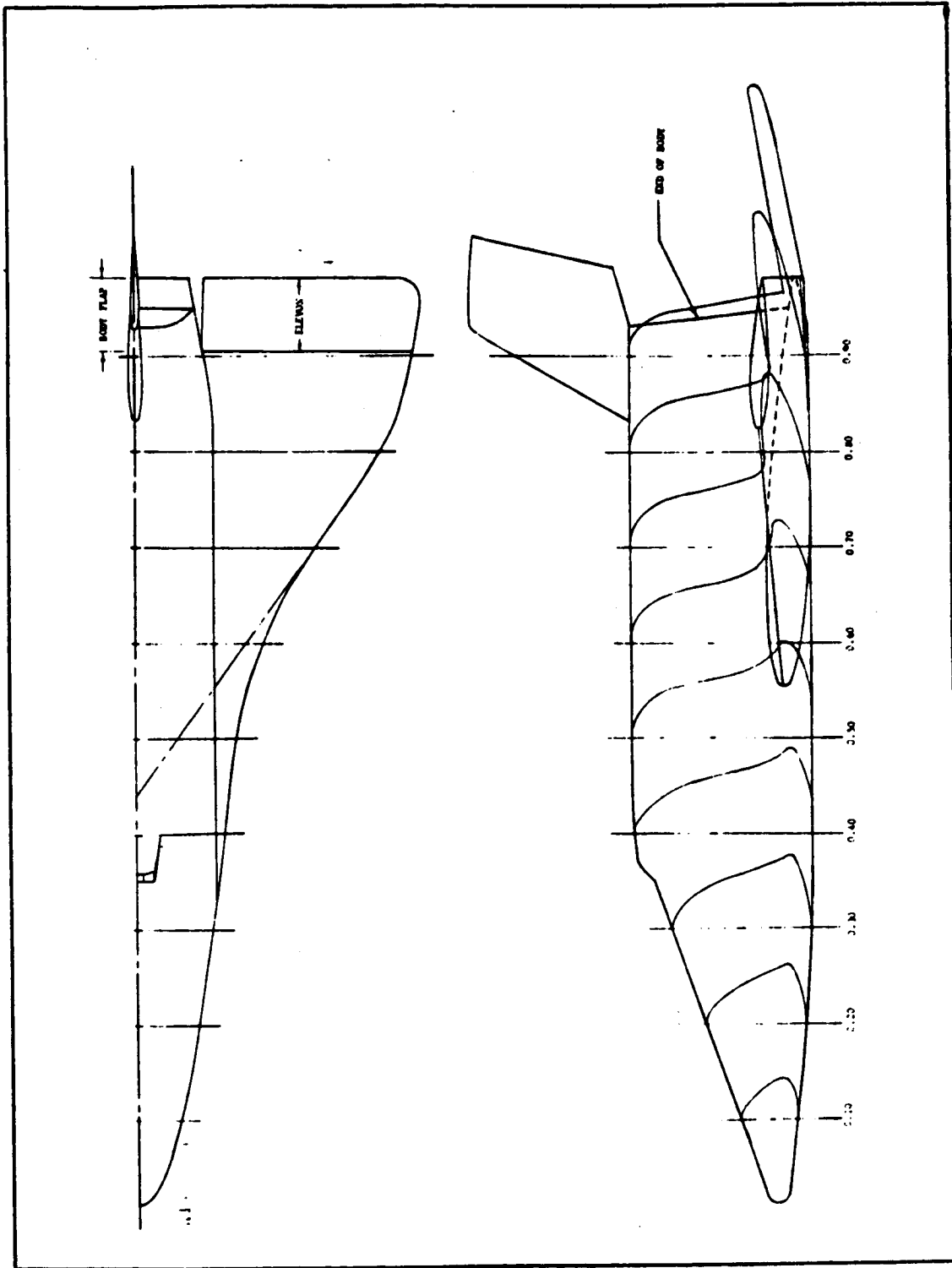


Figure 5. ORBITER CROSS-SECTIONAL VIEWS

CANARD BOOSTER
 MDAC
 DELTA WING ORBITER
 MDAC
 DR#1238 C-3-15

CANARD BOOSTER
MDAC
DELTA WING ORBITER
MDAC
DR#1238 C-3- 16

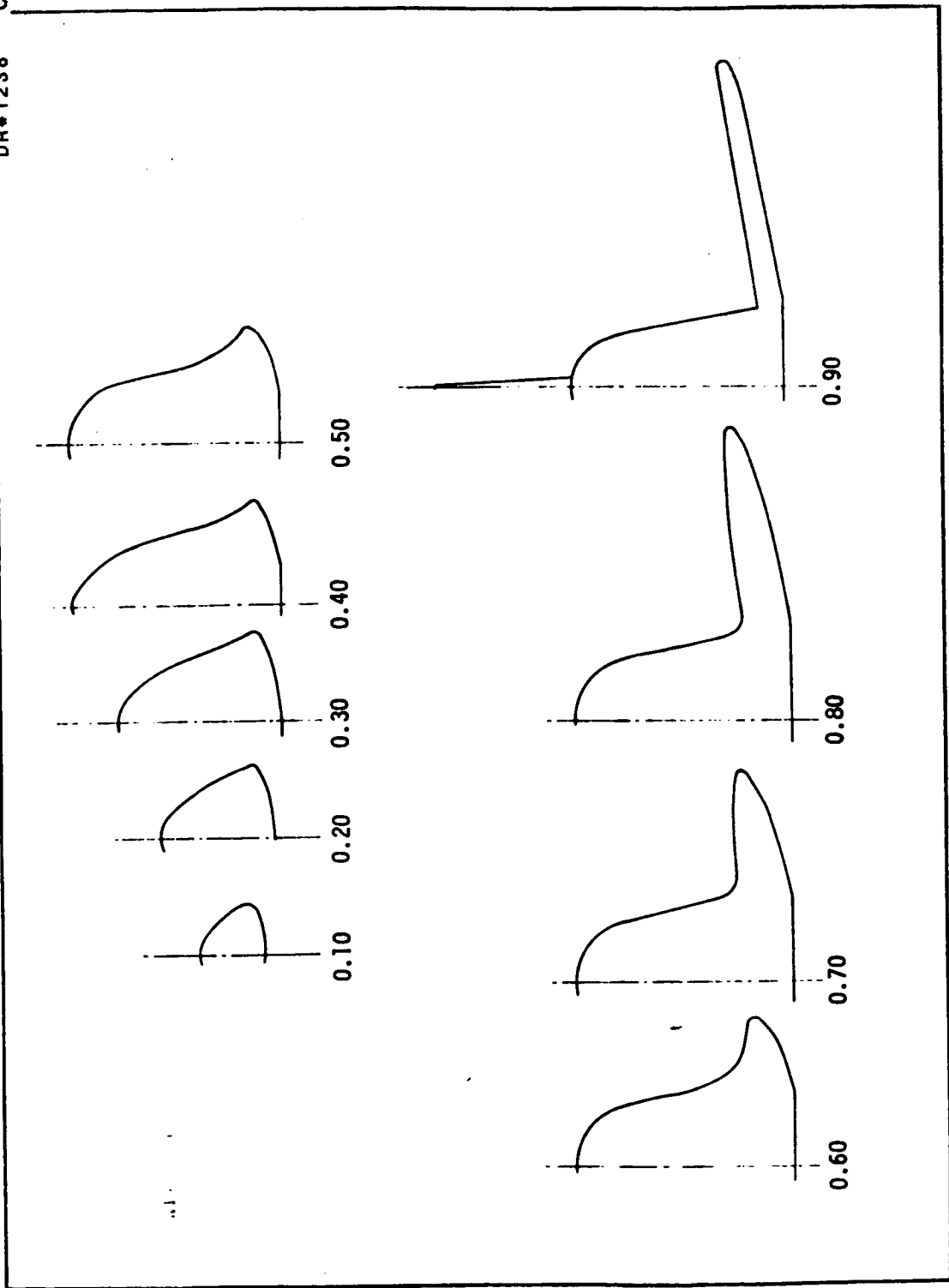


Figure 5 (Concluded) ORBITER CROSS-SECTIONAL VIEWS

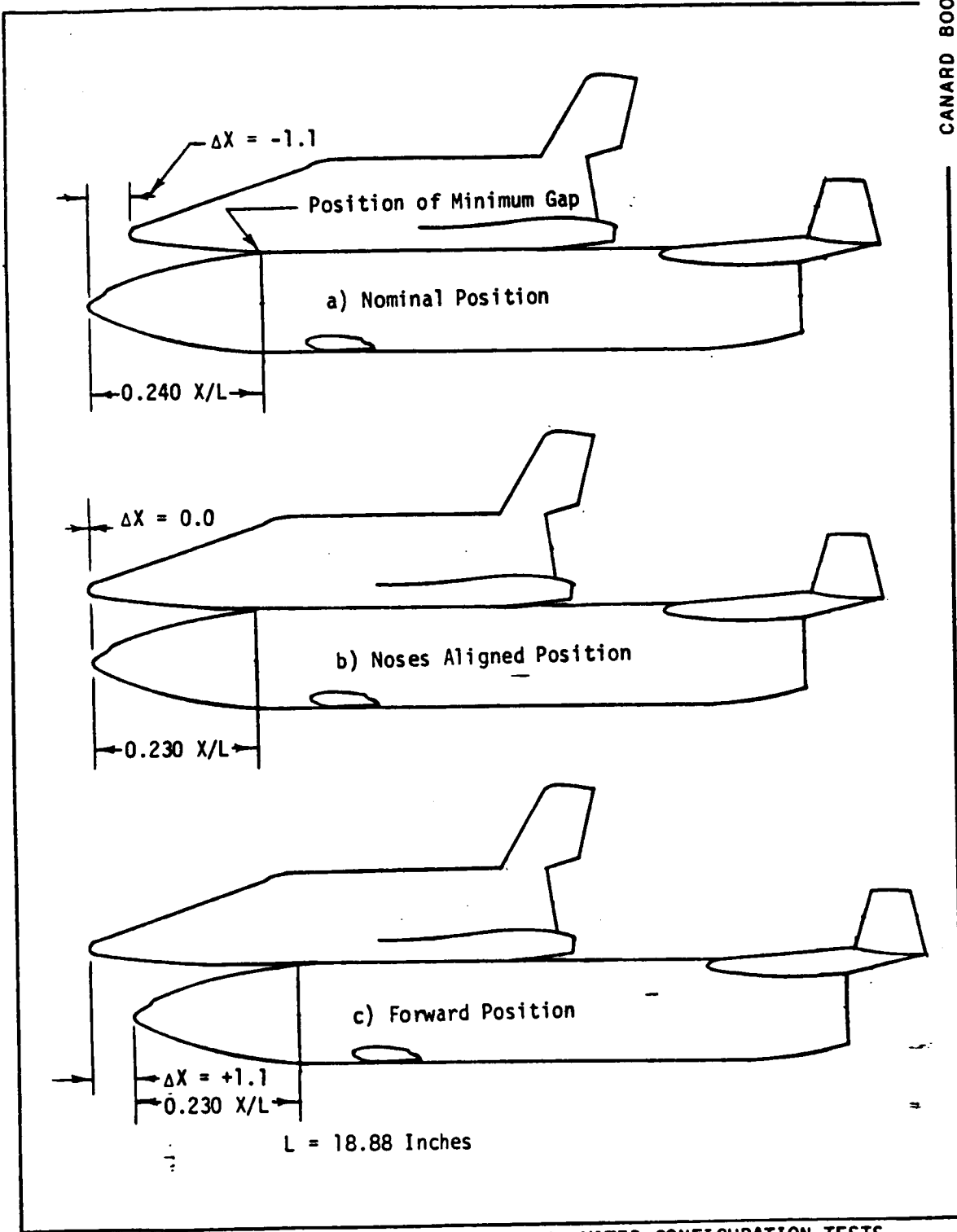


Figure 22. ORBITER POSITIONS USED IN MATED CONFIGURATION TESTS

CANARD BOOSTER
MDAC
DELTA WING ORBITER
MDAC
DR#1260 C-3-20

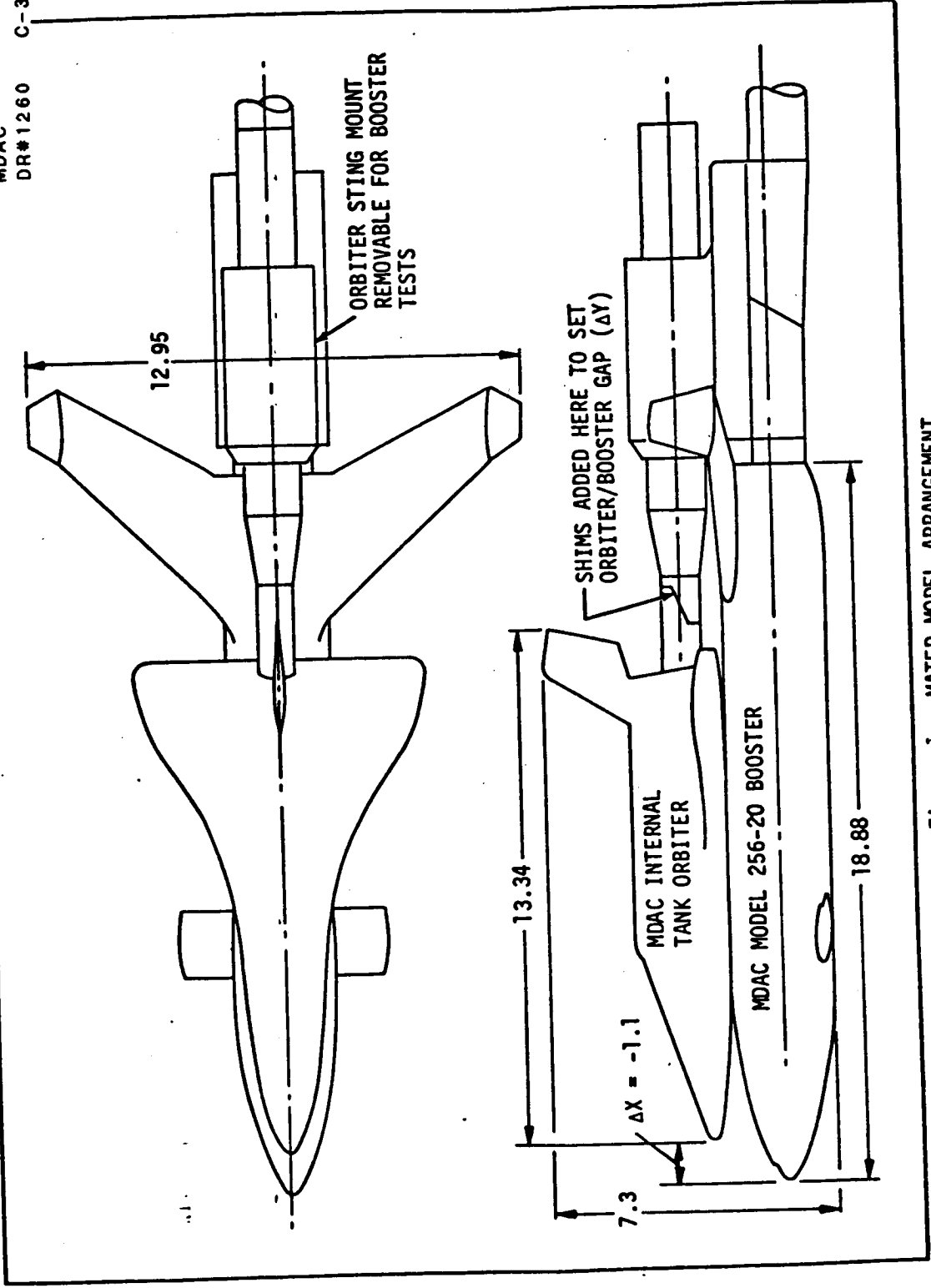
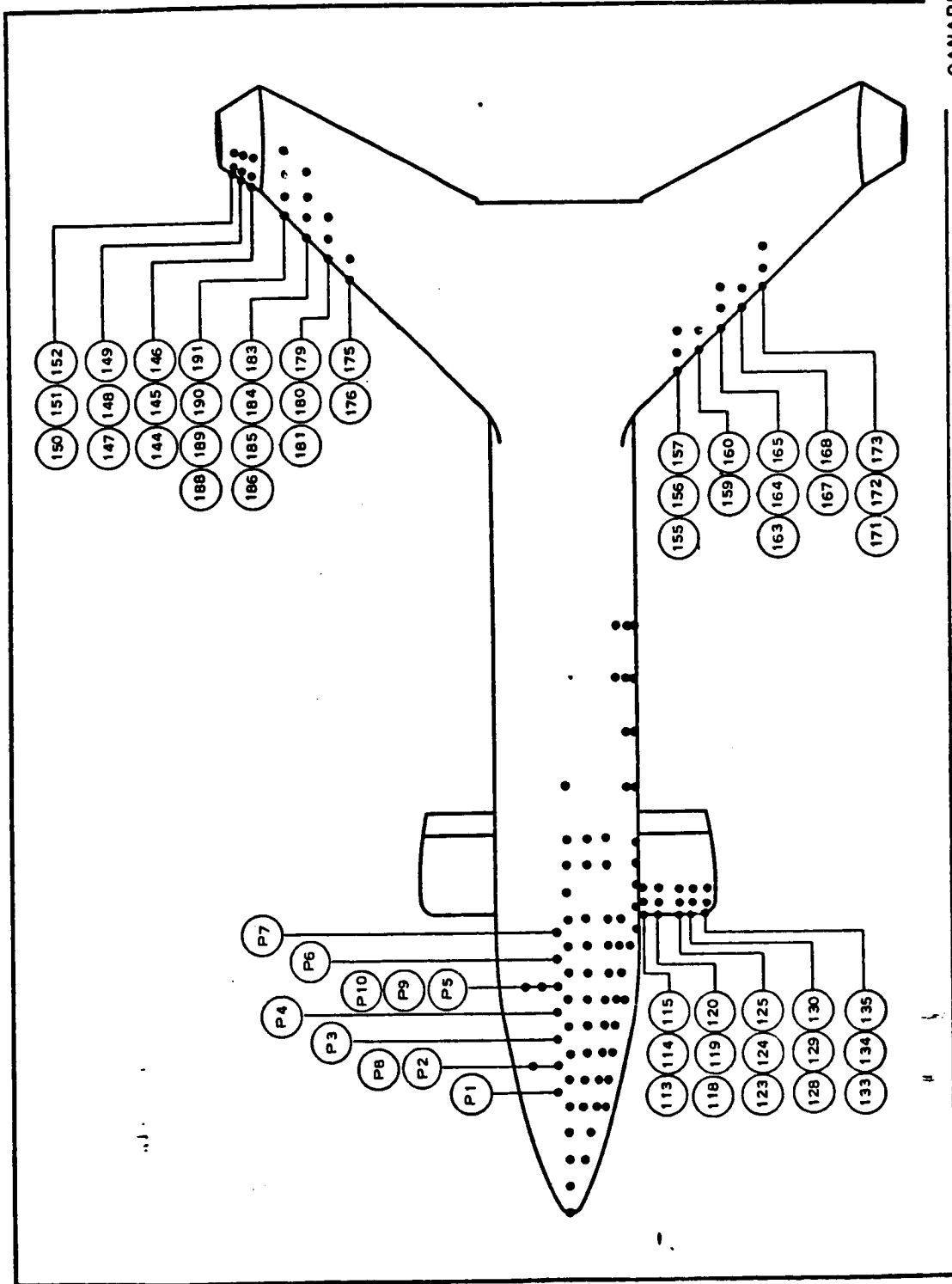


Figure 1. MATED MODEL ARRANGEMENT

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CANARD BOOSTER
MDAC
DELTA WING ORBITER
MDAC
DR#1260 C-3- 21

Figure 3. BOOSTER THERMOCOUPLE LOCATIONS

CANARD BOOSTER
MDAC
DELTA WING ORBITER
MDAC
DR#1260 C-3- 22

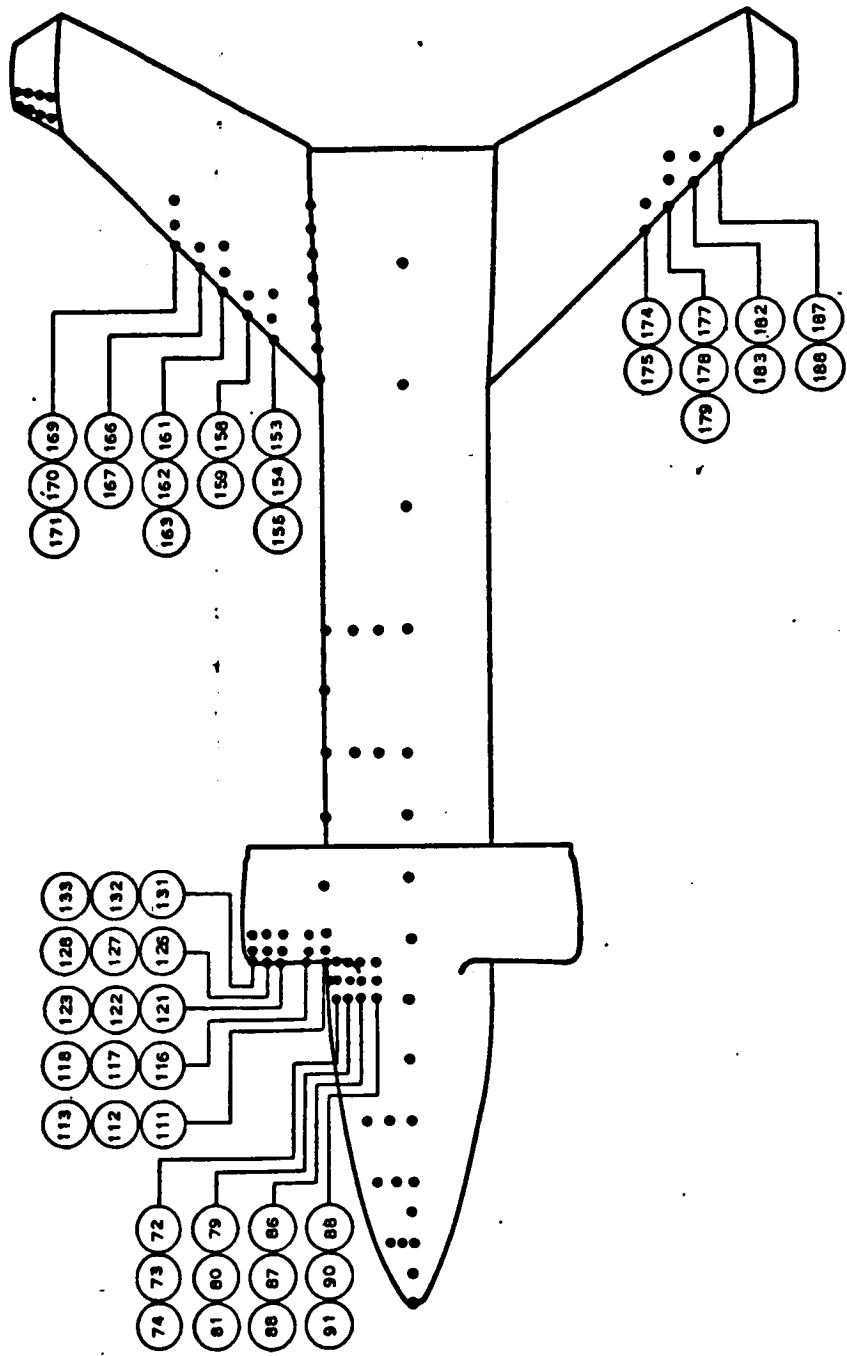


Figure 3 (Continued) BOOSTER THERMOCOUPLE LOCATIONS

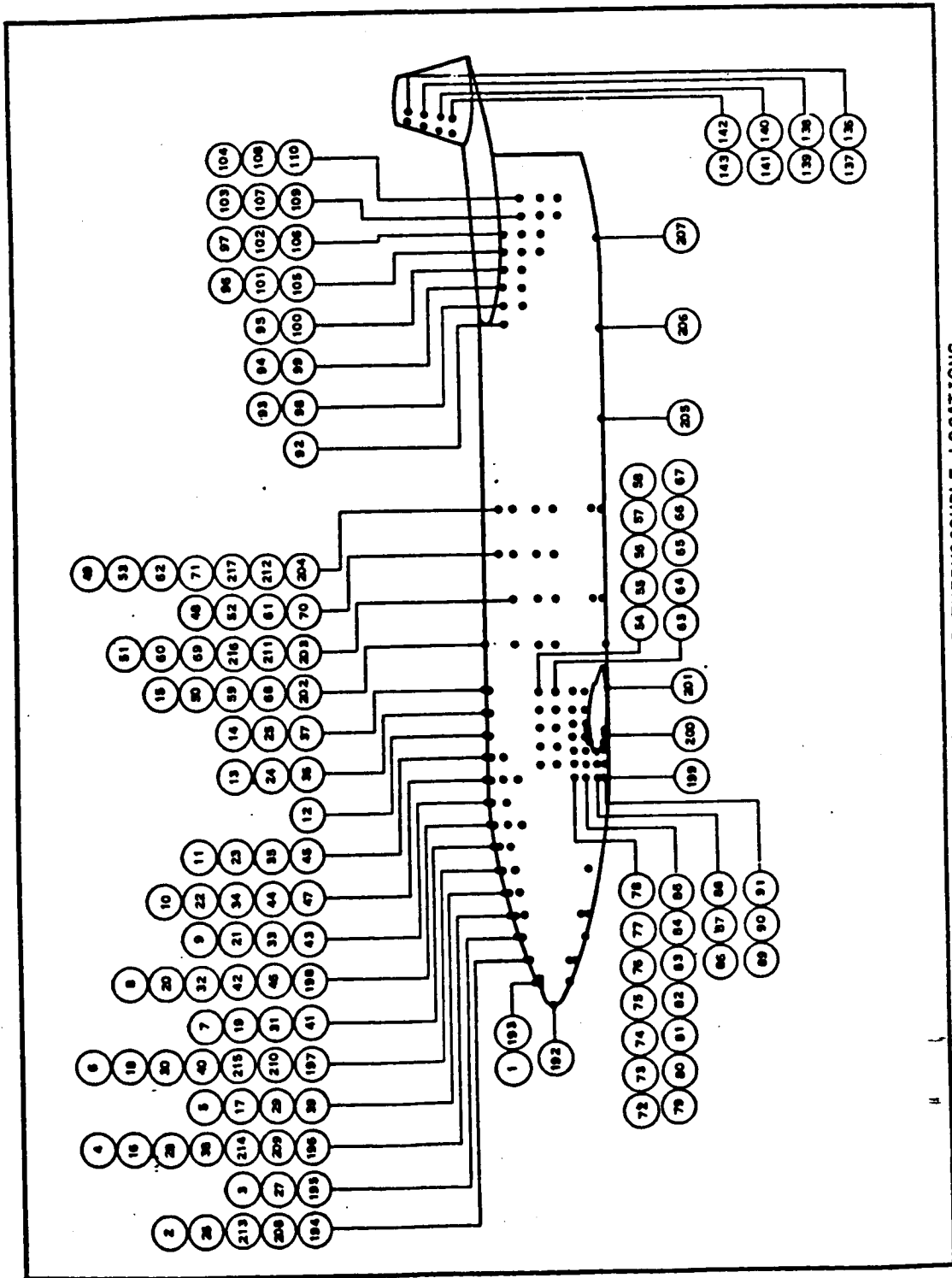
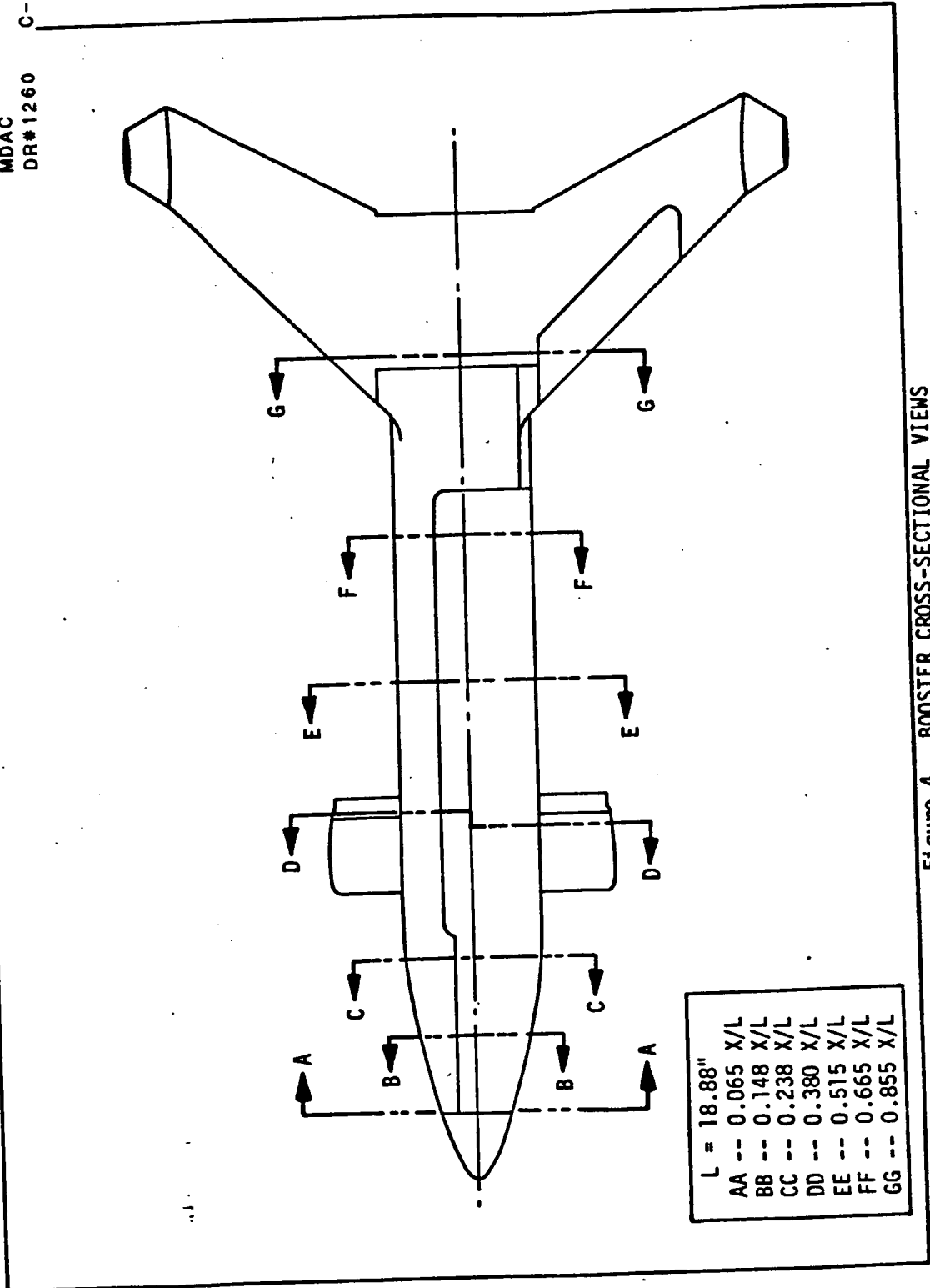


Figure 3 (Concluded) BOOSTER THERMOCOUPLE LOCATIONS

CANARD BOOSTER
 MDAC
 DELTA WING ORBITER
 MDAC
 DR#1260 C-3- 23

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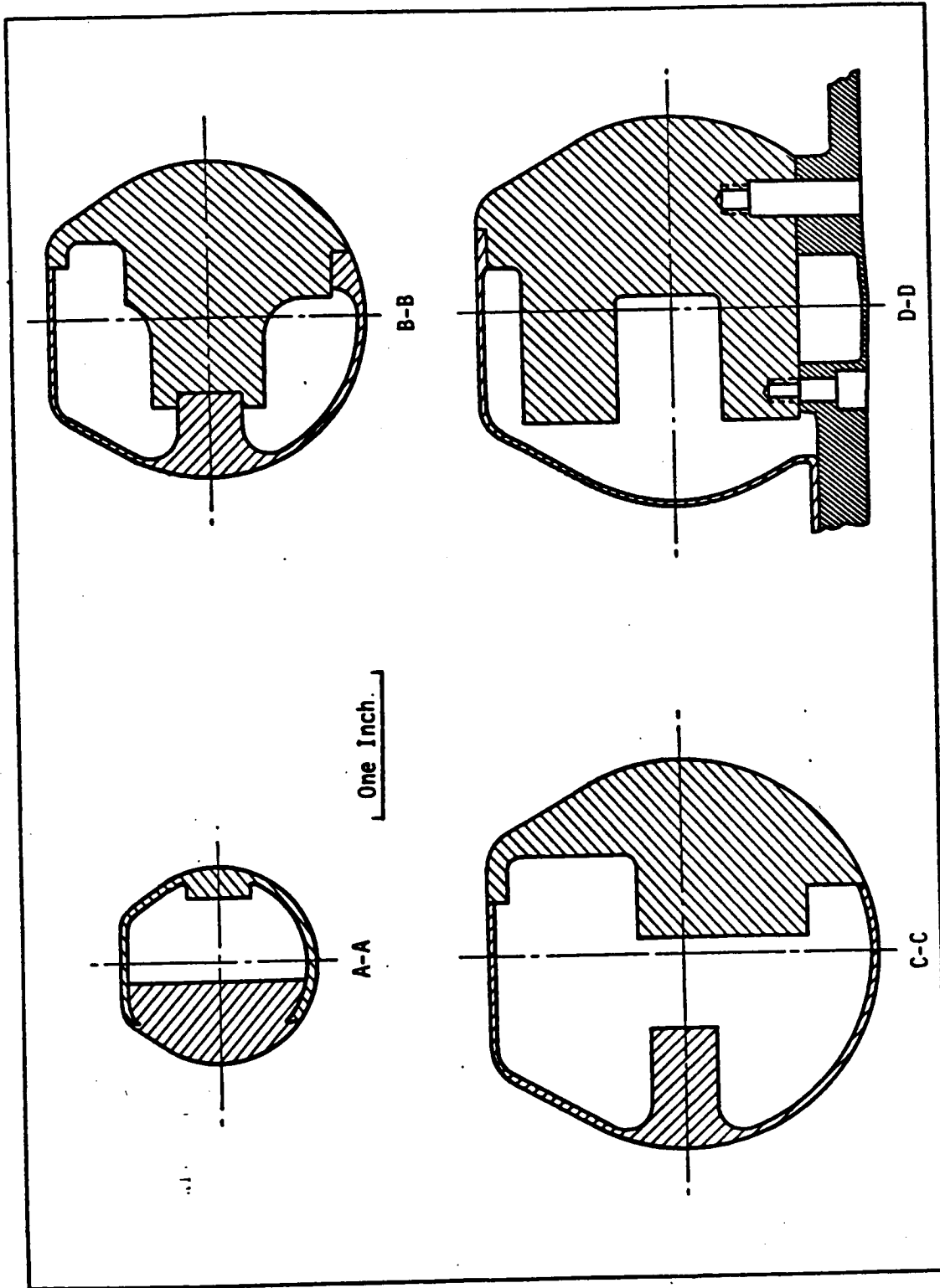
CANARD BOOSTER
 MDAC
 DELTA WING ORBITER
 MDAC
 DR#1260 C-3-24



L	=	18.88"
AA	--	0.065 X/L
BB	--	0.148 X/L
CC	--	0.238 X/L
DD	--	0.380 X/L
EE	--	0.515 X/L
FF	--	0.665 X/L
GG	--	0.855 X/L

Figure 4. BOOSTER CROSS-SECTIONAL VIEWS

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CANARD BOOSTER
MDAC
DELTA WING ORBITER
MDAC
DR#1260 C-3-25

Figure 4 (Continued) BOOSTER CROSS-SECTIONAL VIEWS

CANARD BOOSTER
MDAC
DELTA WING ORBITER
MDAC
DR#1260 C-3- 26

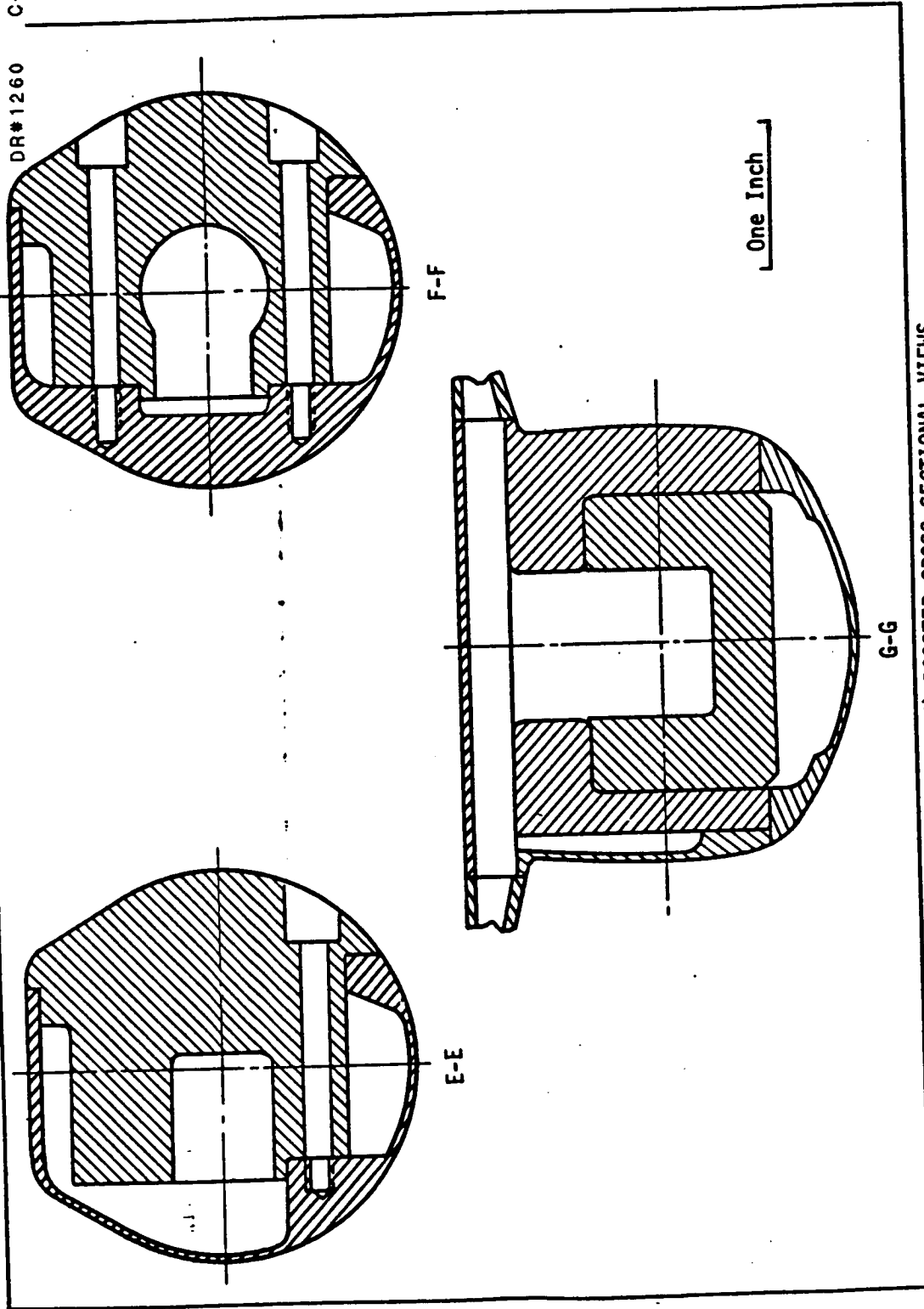


Figure 4 (Concluded) BOOSTER CROSS-SECTIONAL VIEWS

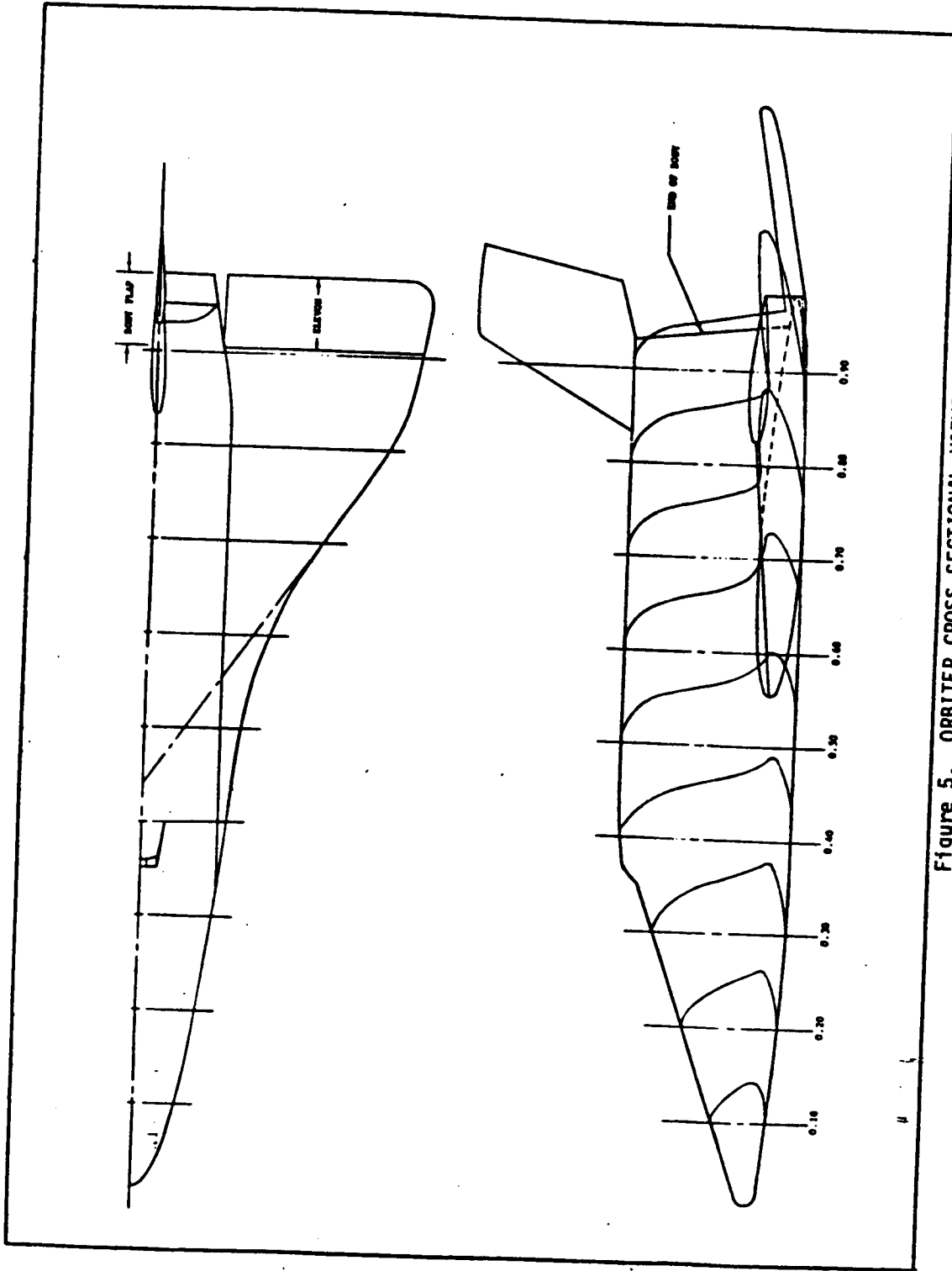


Figure 5. ORBITER CROSS-SECTIONAL VIEWS

CANARD BOOSTER
 MDAC
 DELTA WING ORBITER
 MDAC
 DR#1260 C-3- 27

CANARD BOOSTER
MDAC
DELTA WING ORBITER
MDAC
DR#1260 C-3- 28

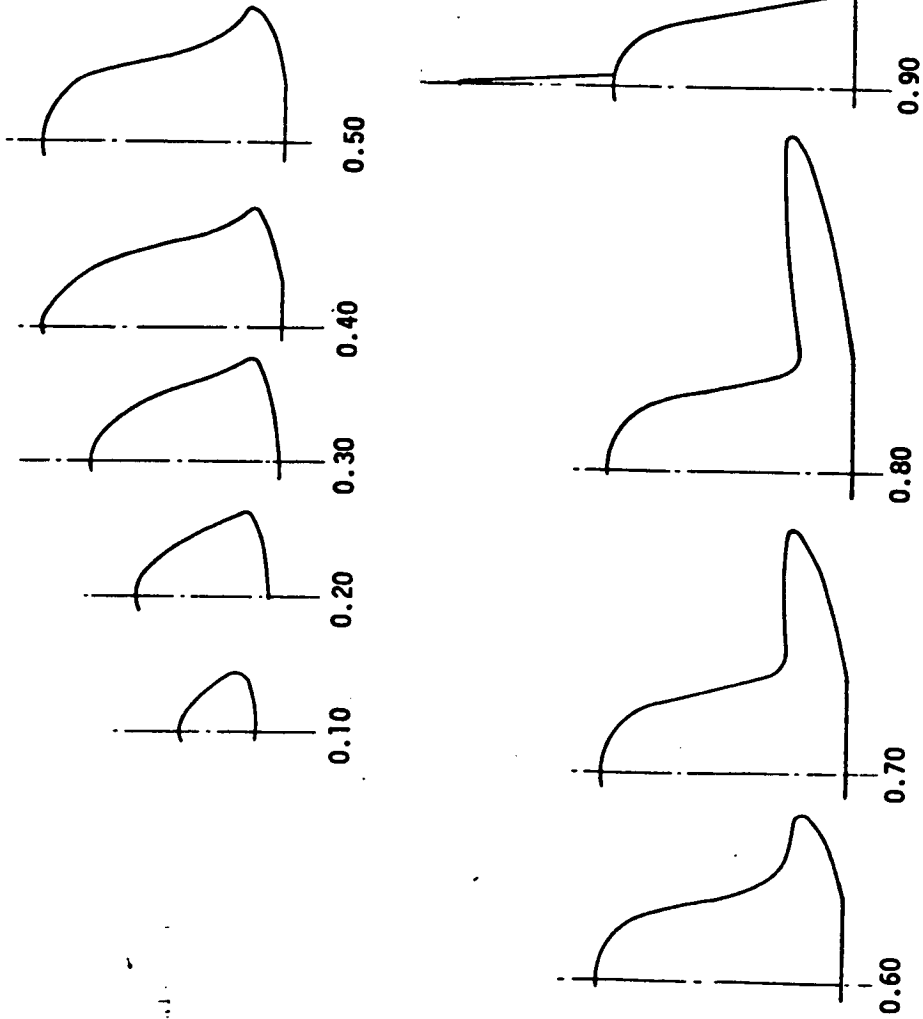


Figure 5 (Concluded) ORBITER CROSS-SECTIONAL VIEWS

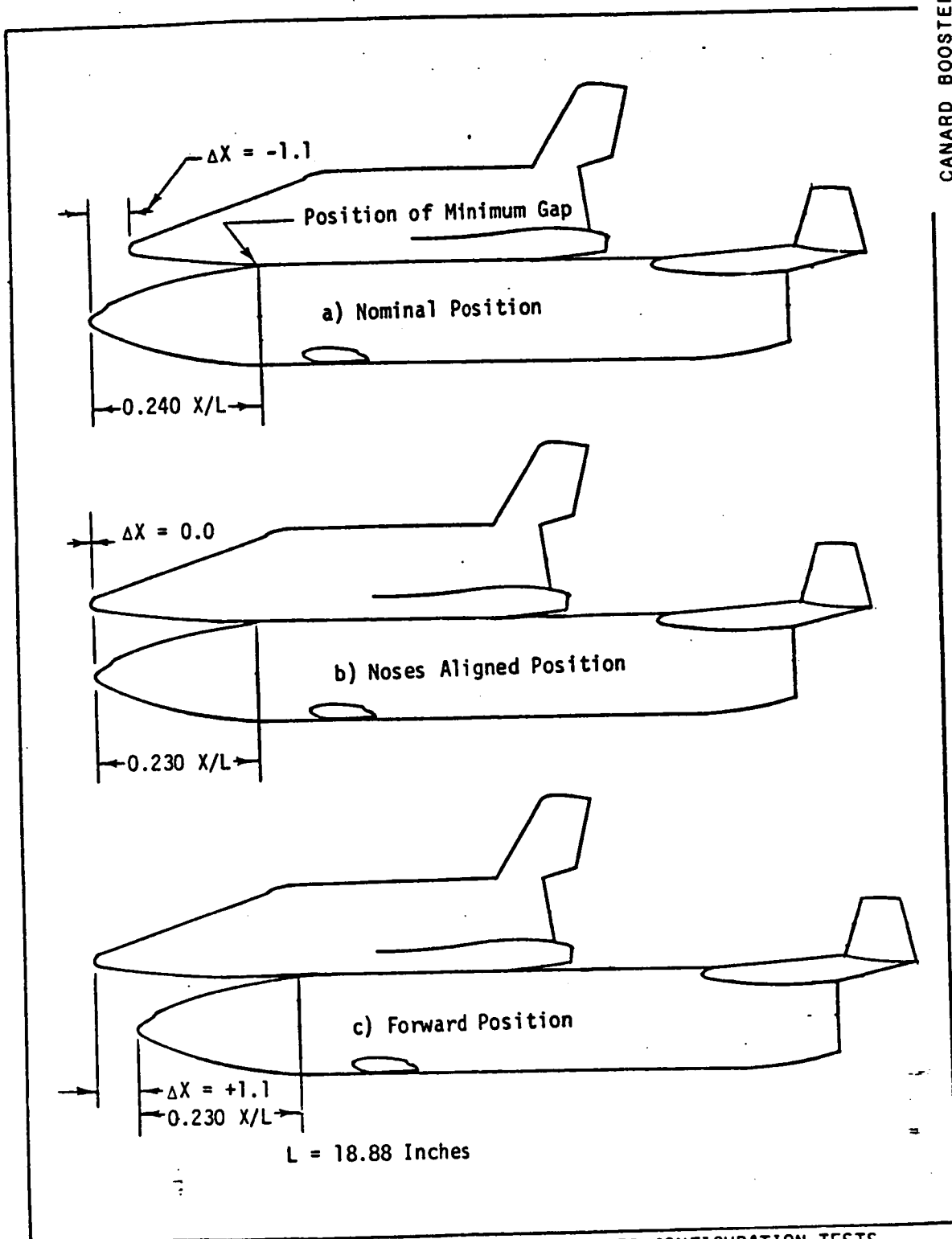


Figure 6. ORBITER POSITIONS USED IN MATED CONFIGURATION TESTS

Table 3
 PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: Ascent Heat Transfer Test of the MDAC Configurations
 TEST NUMBER: VT1162-9 TEST FACILITY: VKF Tunnel B
 TEST DATE: June 1971 TEST ENGINEER: R. K. Matthews & M. R. Martindale

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	T _{aw} * Total	RNX10 ⁶ Ft	Phase Change Temp. (°F)	Model Position (degrees)		Model Surface
									α	φ	
194	MDAC-B + DM0	0.011	8.0	150	1180	1.0	0.8	400	0	0	Side
195								250	0		
196								150	0		
201								113/400	0		
197								250	-5		
198								113/500	-5		
199								250/400	5		
200								113	5		
202		0.011	8.0	555	1310	1.0	2.5	300/500	0		
203								125/500	0		
208								200	0		
204								250/500	5		
205								150	5		

* T_{aw} = adiabatic wall temperature
 † Post-test photograph

+ + + + +

PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: Ascent Heat Transfer Test of the MDAC Configurations

TEST NUMBER: VTI 162-9 TEST FACILITY: VKF Tunnel B

TEST DATE: June 1971 TEST ENGINEER: R. K. Matthews & M. R. HartIndale

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Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	T _{aw} / T _{total}	RNX10 ⁶ Ft	Phase Change Temp. (°F)	Model Position (degrees)		Model Surface
									α	φ	
206	MDAC-B + DM0	0.011	8.0	555	1310	1.0	2.5	250/500	-5	0	0 Side
207		"	"	"	"	"	"	150	-5		
209		0.011	8.0	860	1340	1.0	3.7	300/500	0		
210		"	"	"	"	"	"	200	0		
222		0.011	8.0	555	1310	N/A	2.5	0 ¹	0		Top/Side
221								Flow	-5		
220									5		
224								Shado	0	0	N/A
227									0	0	90
225									5		0
226									-5		

* T_{aw} = adiabatic wall temperature

+ Post-test photograph

CANARD BOOSTER
MDAC
DELTA WING ORBITER
MDAC
DR#1262 C-3- 31

CANARD BOOSTER
 MDAC
 DELTA WING ORBITER
 MDAC
 DR#1262 C-3- 32

Table 3
 PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: Ascent Heat Transfer Test of MDAC Configurations (Not Mated)

TEST NUMBER: VT1162-9 TEST FACILITY: VKF Tunnel B

TEST DATE: June 1971 TEST ENGINEER: R. K. Matthews & W. R. Martindale

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	T _{aw} / T _{total}	RNx10 ⁶ Ft	Phase Change Temp. (°F)	Model Position (degrees)		Model Surface
									α	β	
213	MDAC-Booster	0.011	8	555	1310	1.0	2.5	125	0	0	Top/Side
214								200	0		
219								113	0		
215								150	5		
216								150	-5		
218								113	-5		
211			8	860	1340	1.0	3.7	300	0		
212								200	0		✓
265		0.011	8	555	1310	N/A	2.5	Shado	0	0	Side
262									0	90	Top
263									5	0	Side
264	✓								-5	0	"

* T_{aw} :: adiabatic wall temperature

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PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: Ascent Heat Transfer Test of MDAC Configurations (Not Mated)

TEST NUMBER: VT1162-9 TEST FACILITY: VKF Tunnel B

TEST DATE: June 1971 TEST ENGINEER: R. K. Matthews & W. R. Martindale

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	Taw * Total	RNX10 ⁶ Ft	Phase Change Temp. (°F)	Model Position (degrees)			Model Surface
									α	β	φ	
291	MDAC-DMO	0.011	8.0	150	1220	1.0	0.8	100	0	0	180	Bottom
289								113	-5			Side
292								113				Bottom
290								113				Side
293								100	-5			Bottom
								100				Side
								113	5			Bottom
								113				Side
								100	5			Bottom
								100				Side
280		0.011	8.0	555	1310	1.0	2.5	100	0			Bottom
												Side
												Bottom
												Side

* Taw :: adiabatic wall temperature

CANARD BOOSTER
MDAC
DELTA WING ORBITER
MDAC
DR#1262 C-3-33

CANARD BOOSTER
 MDAC
 DELTA WING ORBITER
 MDAC
 DR#1262 C-3-34

PHASE CHANGE COATING TEST DATA SUMMARY SHEET

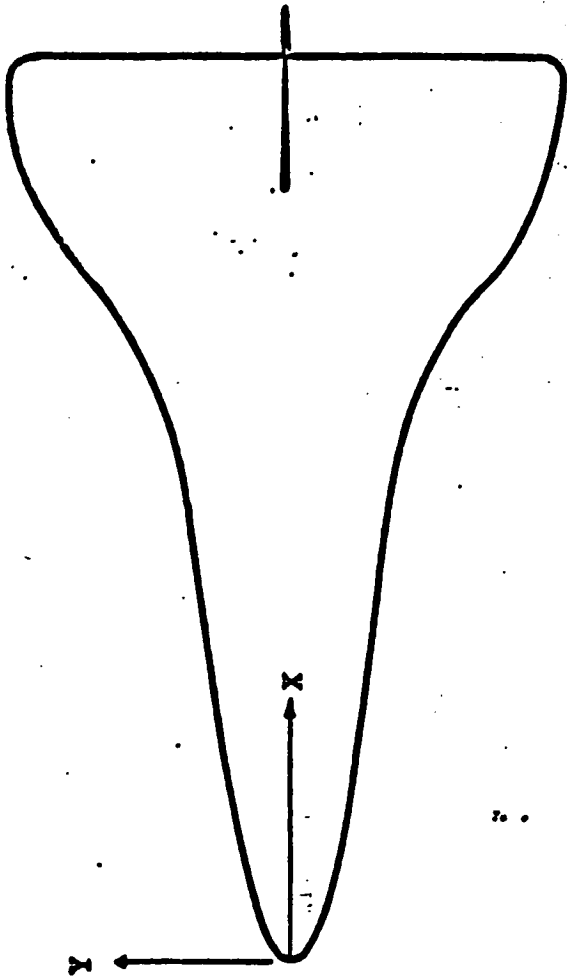
TEST TITLE: Ascent Heat Transfer Test of MDAC Configurations (Not Mated)

TEST NUMBER: VT1162-9 TEST FACILITY: VKF Tunnel B

TEST DATE: June 1971 TEST ENGINEER: R. K. Matthews & W. R. Martindale

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	Taw * / Ttotal	RNX106 Ft	Phase Change Temp. (°F)	Model Position (degrees)			Model Surface
									α	β	φ	
279	MDAC-DWO	0.011	8.0	555	1310	1.0	2.5	100	-5	0	180	Bottom
278								113				Side
								113	5			Bottom
281		0.011	8.0	860	1340	1.0	3.7	113	"			Side
								150	0			Bottom
282								100				Side
								113				Bottom
285		0.011	8.0	555	1310	N/A	0.8	Flow	0	0	180	Bottom/Side
283												
284									-5			Side
									5			Bottom

* Taw = adiabatic wall temperature



Pressure Orifice	X/L
1	0.1
2	0.2
3	0.3
4	0.4
5	0.5
6	0.6
7	0.7
8	0.8
9	0.916
10	0.970

All Dimensions in Inches

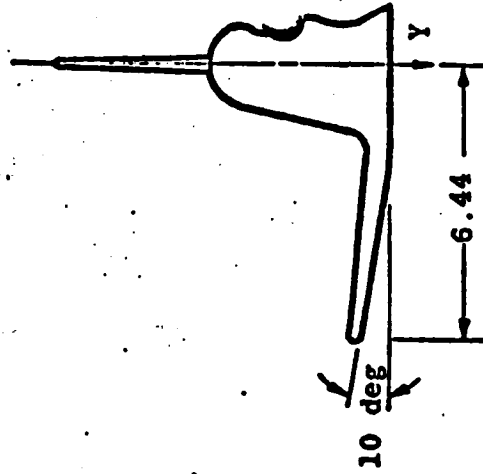
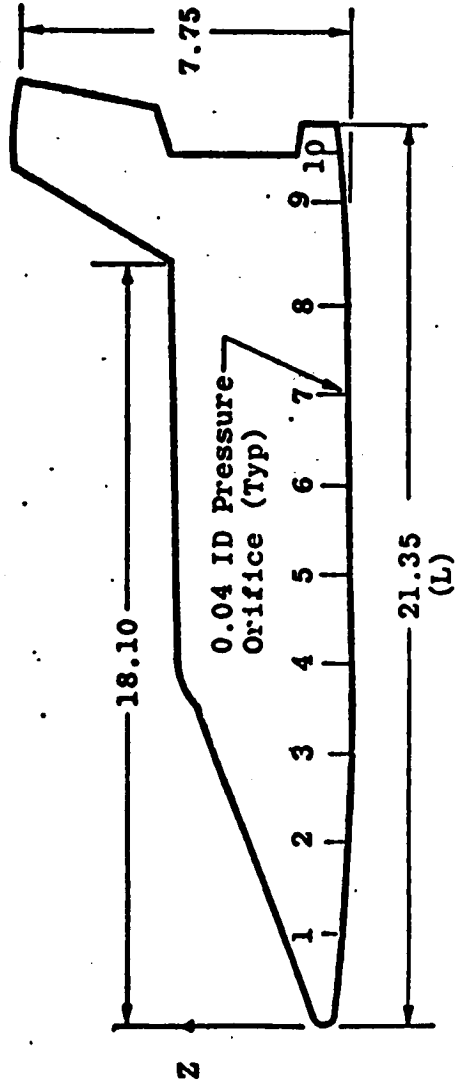
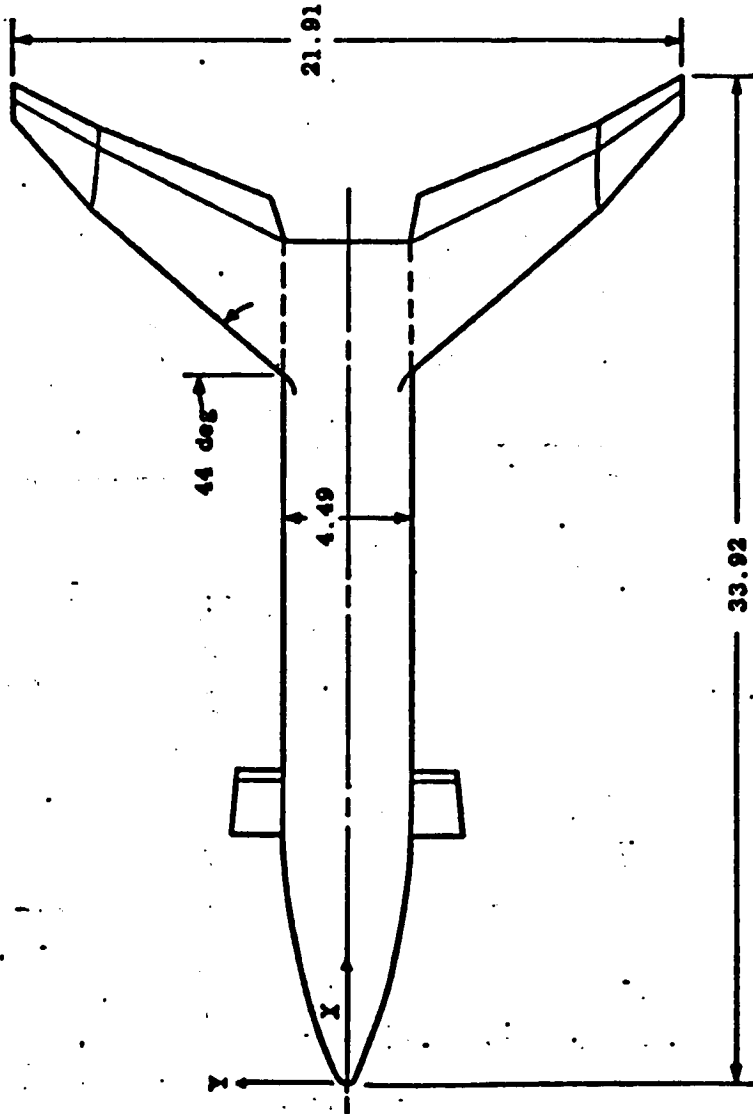
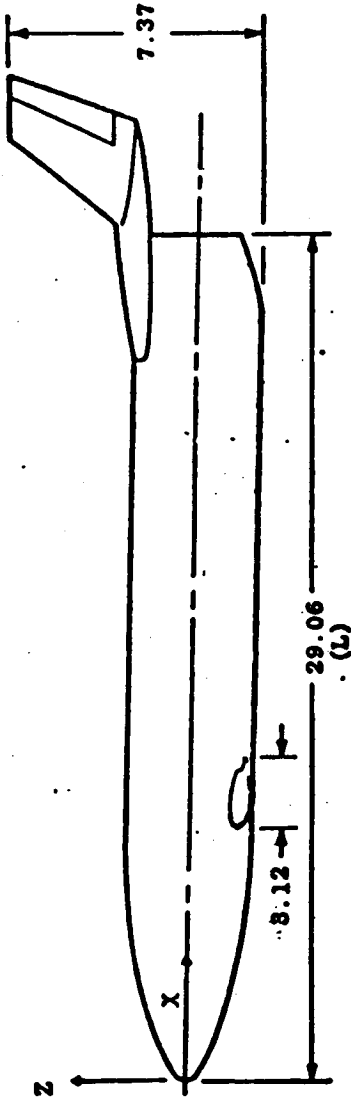
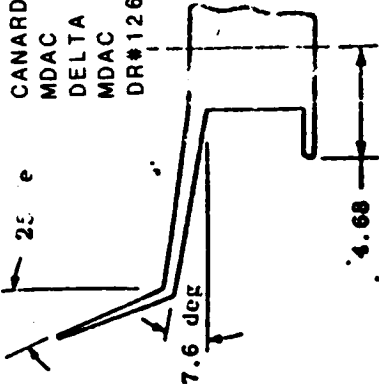


Fig. 1 McDonnell Douglas Delta Wing Orbiter Model Sketch (0.011 Scale)

CANARD BOOSTER
 MDAC
 DELTA WING ORBITER
 MDAC
 DR#1262 C-3- 35

CANARD BOOSTER
 MDAC
 DELTA WING ORBITER
 MDAC
 DR#1262 C-3-36



All Dimensions in Inches
 Model Scale 0.011

FIG. 2 McDonnell-Douglas Booster (MDAC-B)

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TABLE 16
TEST UPWT-267 DATA SET/RUN NUMBER

COLLATION SUMMARY

B-Body

PRETEST
 POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	SCHD.		PARAMETERS/VALUES		NO. OF RUNS	MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE)		PRETEST	POSTTEST
		a	B	R/W	AY AX		2-3	3-7		
AHVB01	Booster Alone	-5	0	3.98	-		1-2	1-7		
1	↓	0	T	T	-		1-1	1-5		
1		5			-		1-3	1-8		
2	Booster + orbiter	-5			0		2-11	2-8		
2	↓	0	T	T	T		2-10	2-7		
2		5			T		2-12	2-9		
3		-5			0		3-11	3-8		
3	↓	0	T	T	T		3-10	3-7		
3		5			T		3-12	3-9		
4	Booster Alone	0		5.51	-		6-3			
4	↓	T	T	3.98	-		1-5			
4				1.31	-		6-4			
5	Booster + orbiter			5.51	0		5-9			
5	↓	T	T	3.98	T		4-7			
5		T	T	1.29	T		5-5			

LRC TEST RUN NUMBERS

CANARD BOOSTER
MDAC
DELTA WING ORBITER
MDAC
DR#1263 C-3-37

CANARD BOOSTER
 MDAC
 DELTA WING ORBITER
 MDAC
 DR#1263 C-3-38
 PRETEST
 POSTTEST

TEST UPWT-967 DATA SET/RUN NUMBER
 COLLATION SUMMARY

"X" C: CANARD
 "W" wing

Orbits 1,2,3 on upper surface
 4,5,6 on lower surface

DATA SET IDENTIFIER	CONFIGURATION	SCRD.		PARAMETERS/VALUES	NO. of RUNS	MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE)		LRC TEST RUN NUMBERS
		a	B			2-3	3-7	
ANVROL	Booster Above	-5	0	AY AX		2-3	3-7	
1	↓	0		-		1-2	1-7	
1		5		-		1-1	1-5	
2	Booster + Orbiter	-5		0 -11		1-3	1-8	
2	↓	0		Y		2-11	2-8	
2		5		Y		2-10	2-7	
3		-5		0		2-12	2-9	
3		0		Y		3-11	3-8	
3	↓	5		Y		3-10	3-7	
4	Booster Above	-5		-		3-12	3-9	
4	↓	0		-		1-2	1-7	
4		5		-		1-1	1-5	
5	Booster + Orbiter	-5		0 -11		1-3	1-8	
5	↓	0		Y		2-11	2-8	
5		5		Y		2-10	2-7	
6		-5		Y		2-12	2-9	
6		0		0		3-11	3-8	
6	↓	5		Y		3-10	3-7	
				Y		3-12	3-9	

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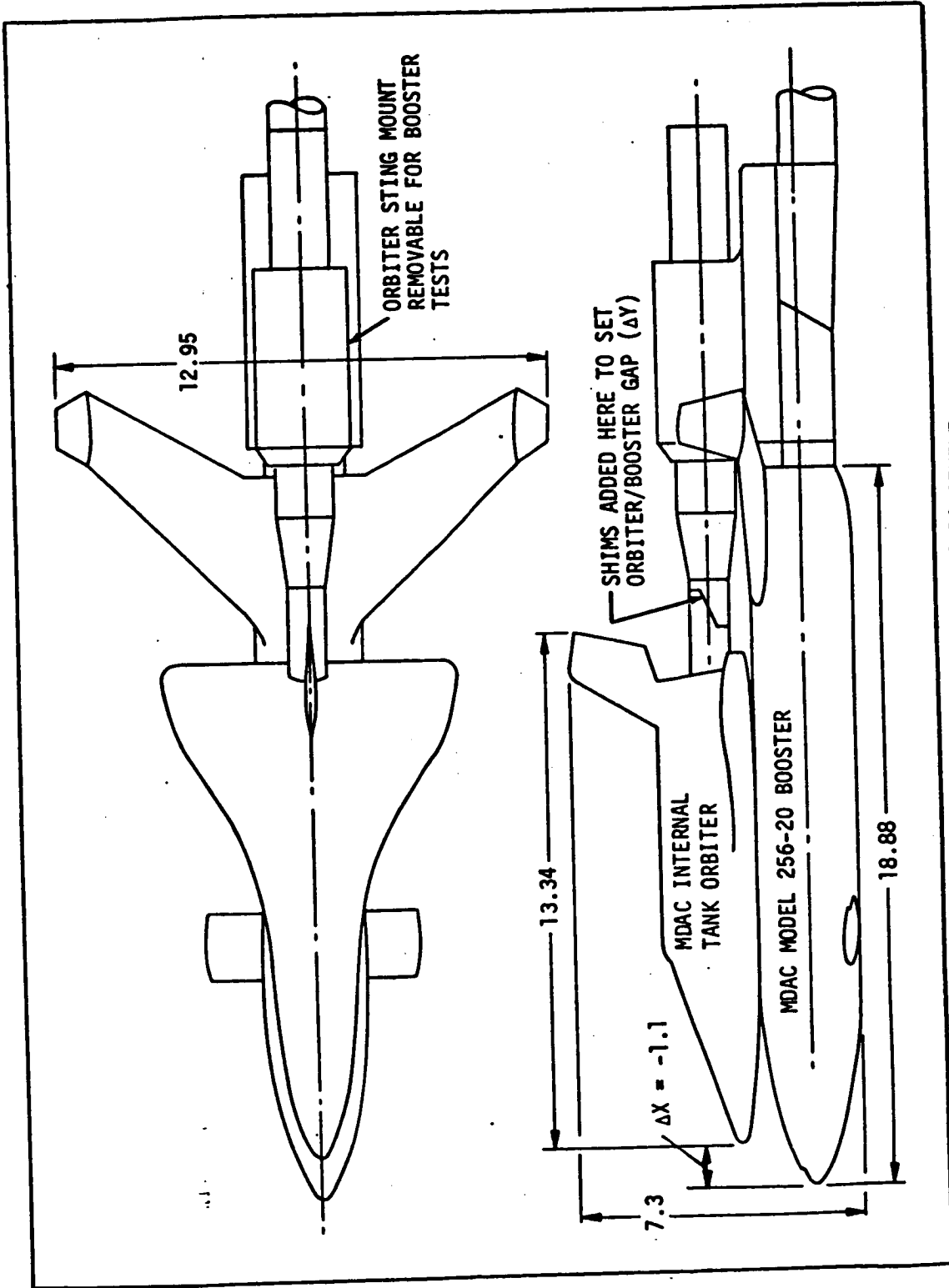
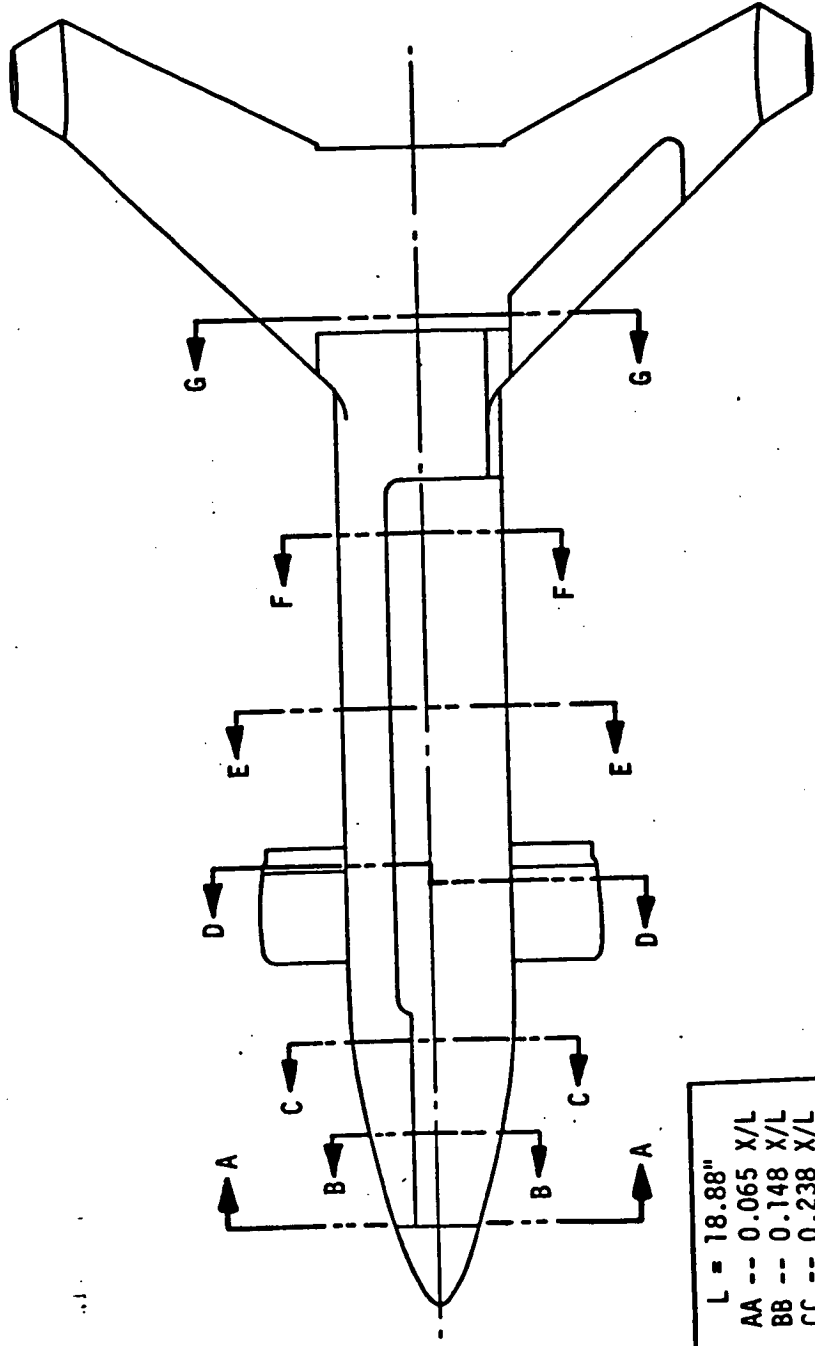


Figure 1. MATED MODEL ARRANGEMENT

CANARD BOOSTER
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DELTA WING ORBITER
MDAC
DR#1263 C-3-39

CANARD BOOSTER
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 DELTA WING ORBITER
 MDAC
 DR#1263 C-3-40



L	=	18.88"
AA	--	0.065 X/L
BB	--	0.148 X/L
CC	--	0.238 X/L
DD	--	0.380 X/L
EE	--	0.515 X/L
FF	--	0.665 X/L
GG	--	0.855 X/L

Figure 4. BOOSTER CROSS-SECTIONAL VIEWS

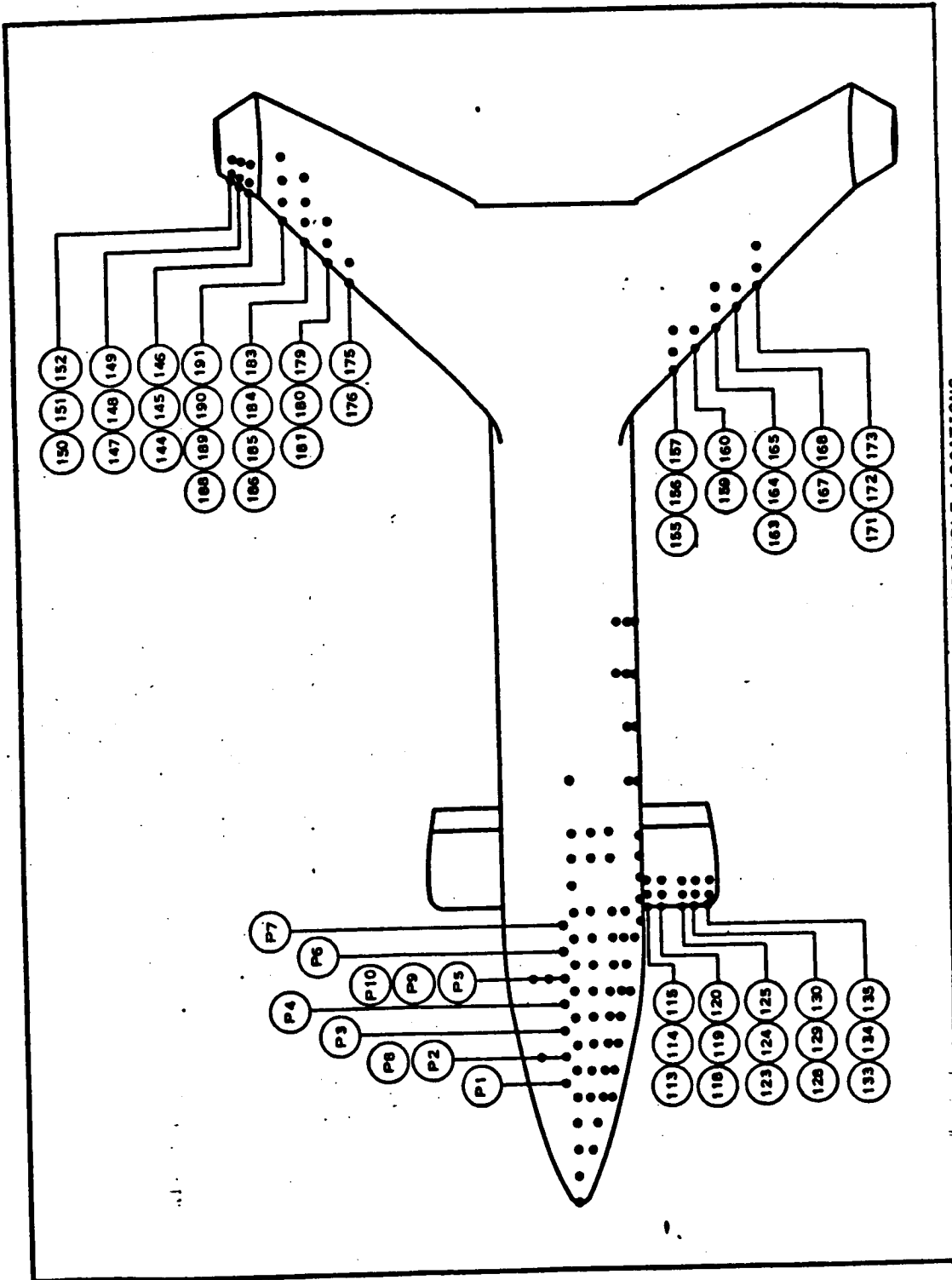


Figure 3. BOOSTER THERMOCOUPLE LOCATIONS

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 MDAC
 DR#1263 C-3- 41

CANARD BOOSTER
MDAC
DELTA WING ORBITER
MDAC
DR#1263 C-3-42

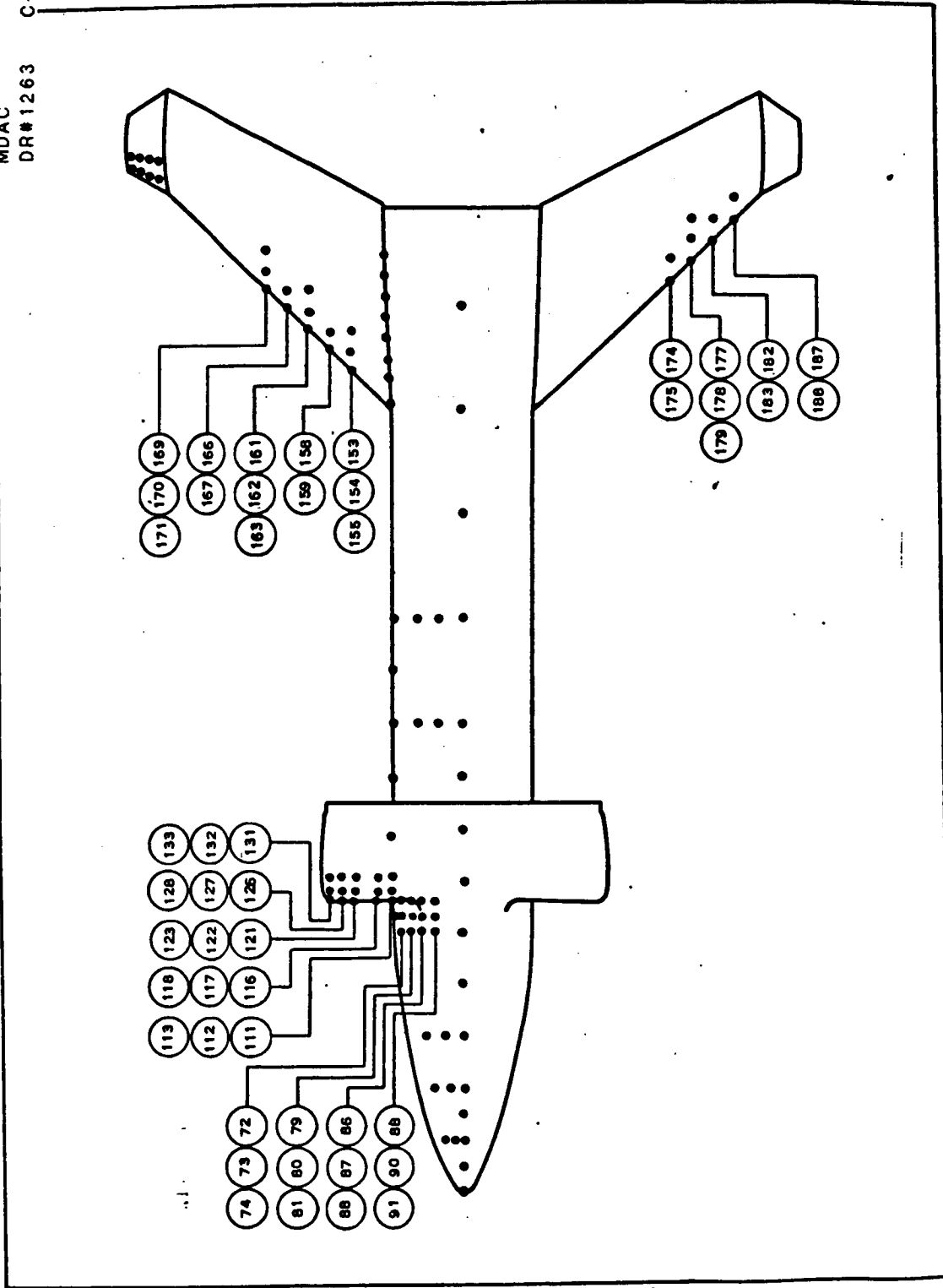


Figure 3 (Continued) BOOSTER THERMOCOUPLE LOCATIONS

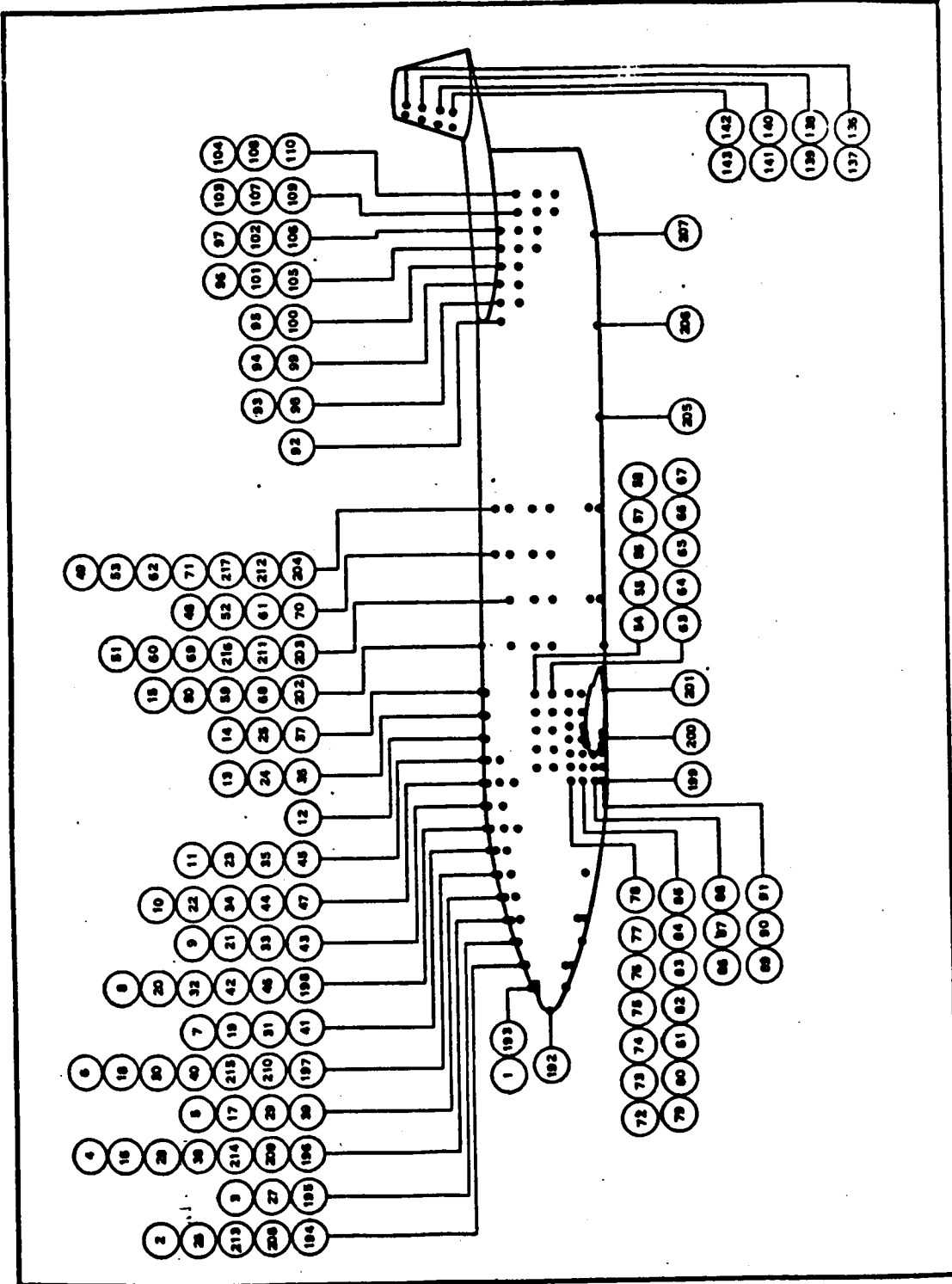


Figure 3 (Concluded) BOOSTER THERMOCOUPLE LOCATIONS

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 DR#1263 C-3- 43

CANARD BOOSTER
MDAC
DELTA WING ORBITER
MDAC
DR#1263 C-3-44

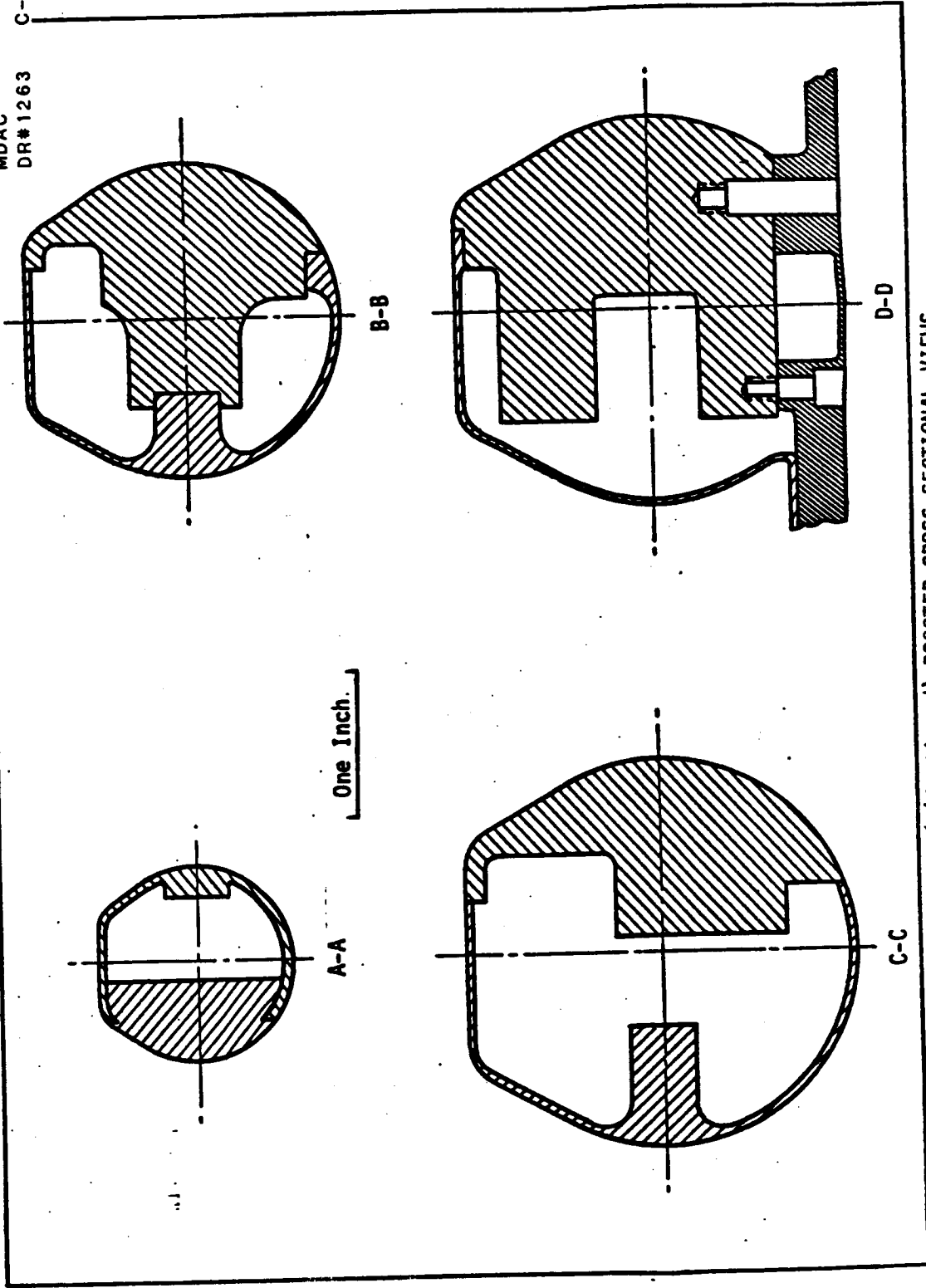


Figure 4 (Continued) BOOSTER CROSS-SECTIONAL VIEWS

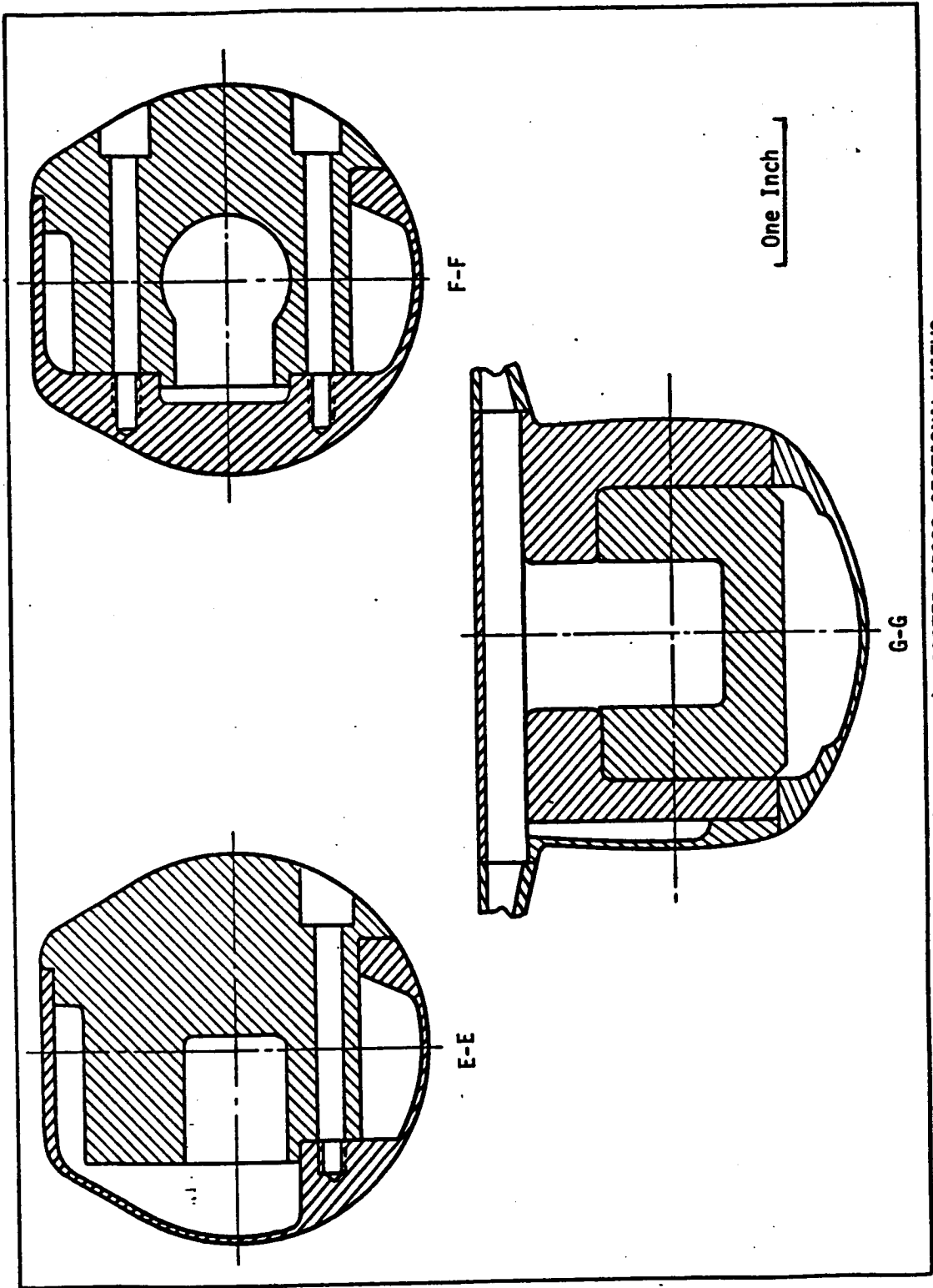


Figure 4 (Concluded) BOOSTER CROSS-SECTIONAL VIEWS

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 DELTA WING ORBITER
 MDAC
 DR#1263 C-3- 45

CANARD BOOSTER
MDAC
DELTA WING ORBITER
MDAC
DR#1263 C-3-46

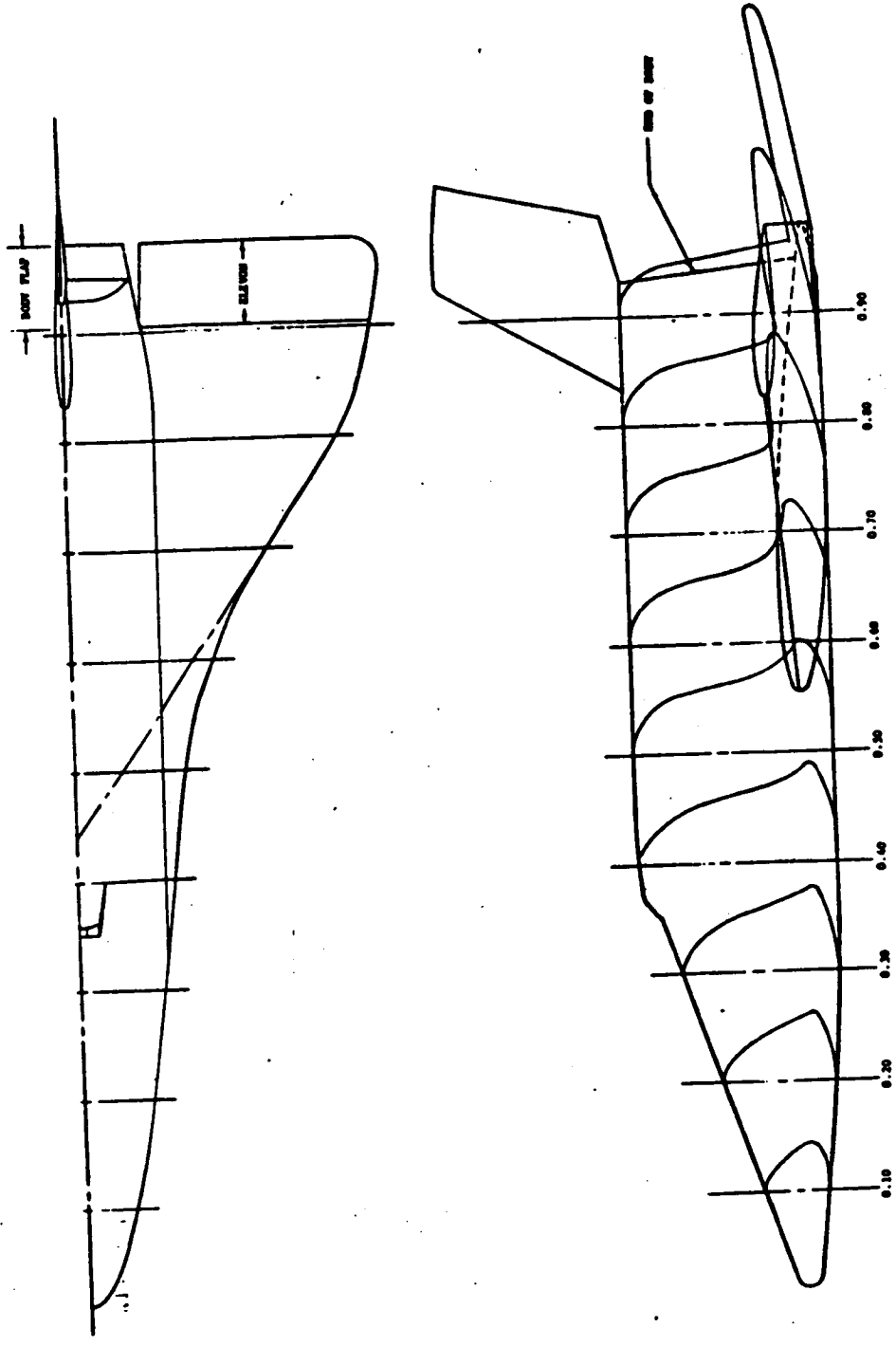


Figure 5. ORBITER CROSS-SECTIONAL VIEWS

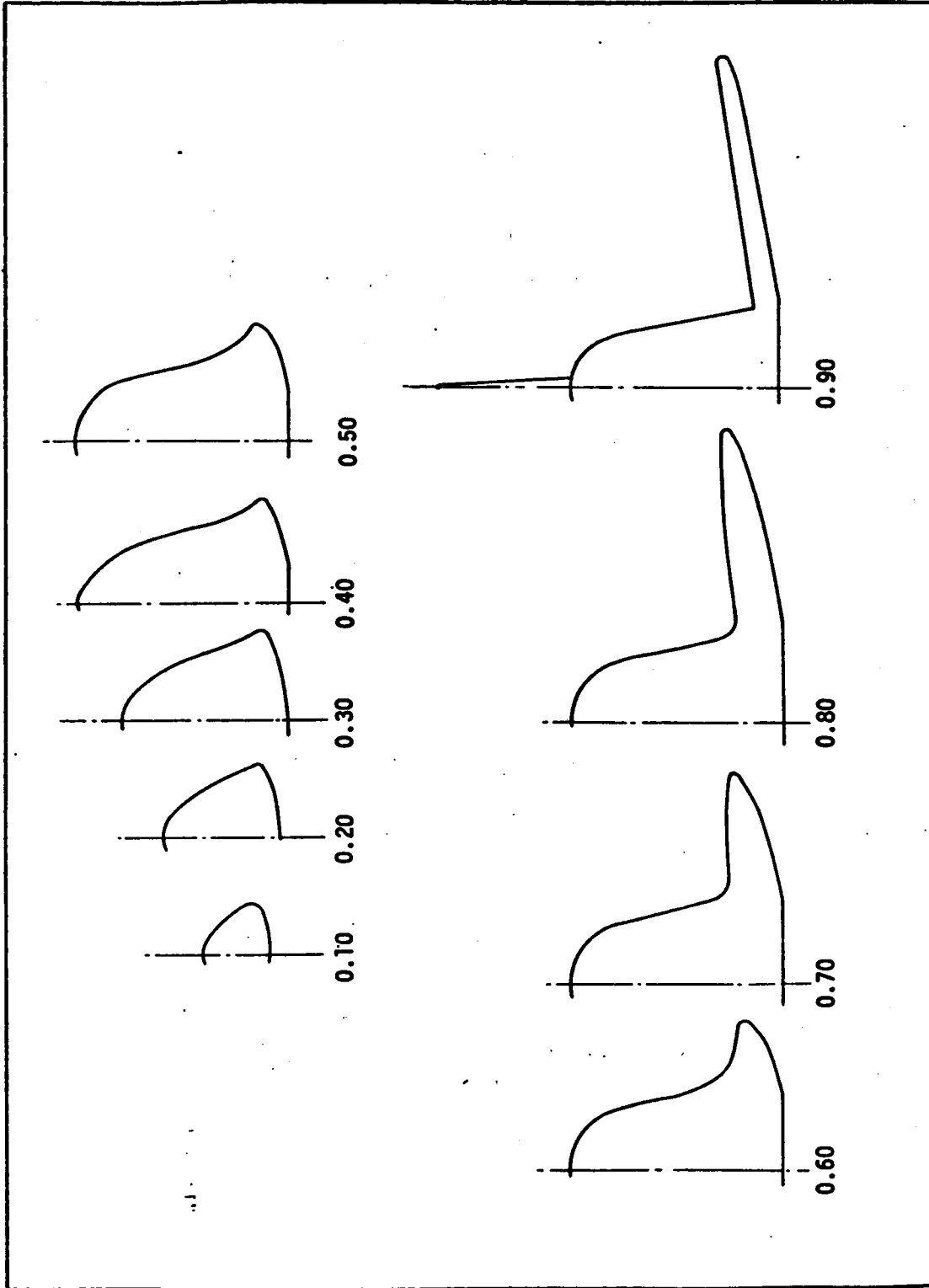


Figure 5 (Concluded) ORBITER CROSS-SECTIONAL VIEWS

CANARD BOOSTER
 MDAC
 DELTA WING ORBITER
 MDAC
 DR#1263 C-3- 47

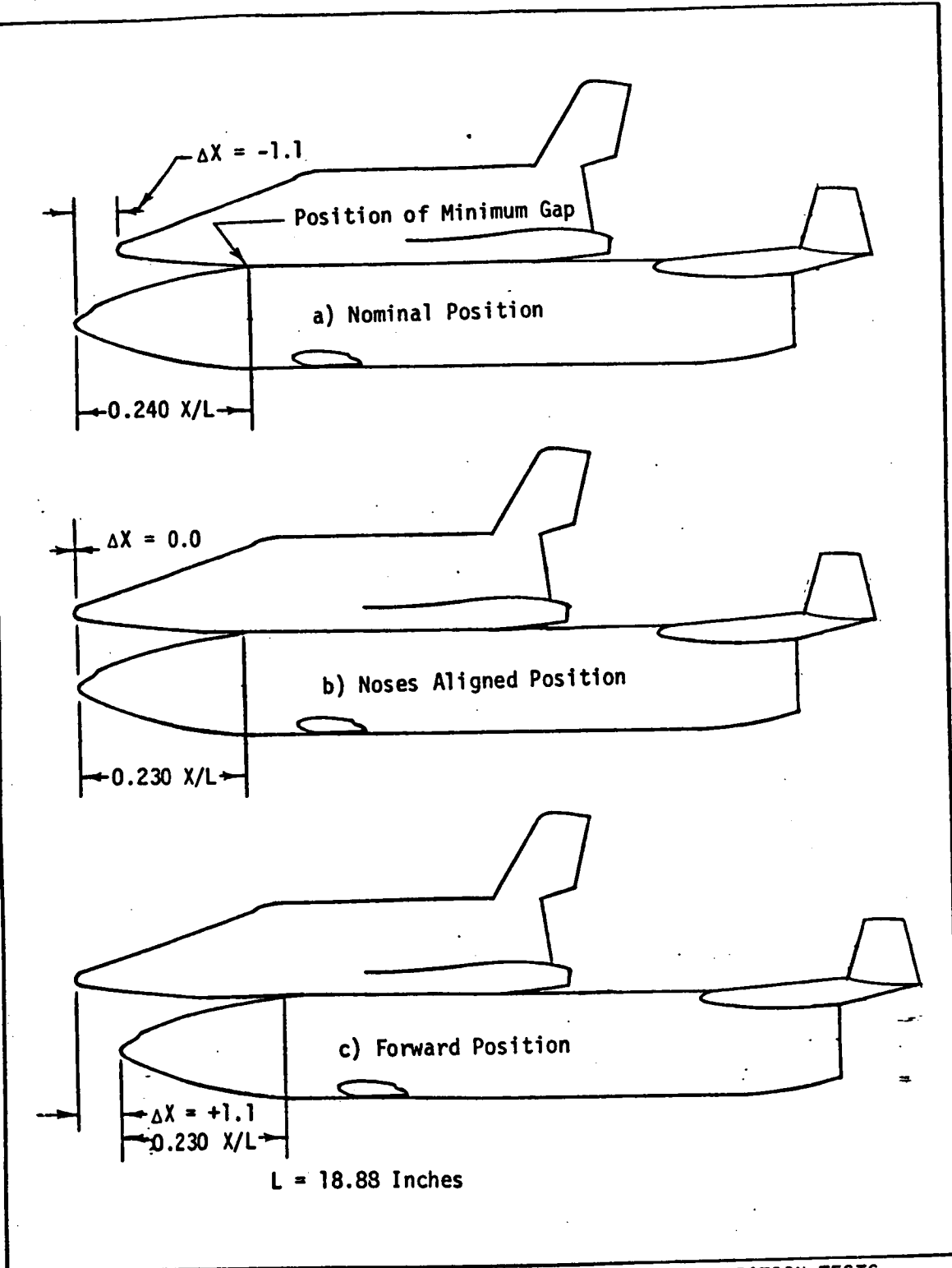


Figure 36. ORBITER POSITIONS USED IN MATED CONFIGURATION TESTS

TABLE III PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: MDC/MMC THERMAL MAPPING TEST

TEST NUMBER: None TEST FACILITY: LRC Mach 8 VDT

TEST DATE: 8/20/70 TEST ENGINEER: Click & Schmitt

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	Taw * Ttotal	RNX106 Ft	Phase Change Temp. (°F)	Model Position (degrees)		Grid Figure No. Camera Loc.		
									α	φ	Top	Side	
147	O1	00325	7.71	115	1310	0.95	0.605	250	20	0	180	G85	G86
148	O1	"	"	115	1260	"	0.645	150	"	"	"	"	"
149	O1	"	7.95	1415	1435	"	5.967	400	"	"	"	"	"
150	O1	"	"	1415	1420	"	6.069	250	"	"	"	"	"
151	O1	"	7.71	115	1265	"	0.641	109	"	"	"	"	"
152	O2	"	"	115	1270	"	0.636	250	"	"	"	G87	G88
153	O2	"	"	115	1310	"	0.605	150	"	"	"	"	"
154	O2	"	7.95	1415	1470	"	5.738	350	"	"	"	"	"
155	O2(s)	"	7.71	115	1285	"	0.624	150	"	"	"	"	"
156	O2(s)	"	7.95	535	1440	"	2.242	300	"	"	"	"	"
157	O1 (no side camera contour tracing)	"	7.71	125	1325	"	0.650	300	40	"	"	G89	--
158	O1 (no top or side camera contour tracing)	"	"	145	1335	"	--	150	"	"	"	--	--
159	O1 (camera tracing)	"	7.95	1415	1405	"	6.174	300	"	"	"	G89	--

* Taw = adiabatic wall temperature

** Tunnel Log Run No.

(Run 147 thru 179, 1st entry, 8/20/70 thru 8/21/70)
 (Run 206 thru 322, 2nd entry, 9/16/70 thru 9/28/70)

CANARD BOOSTER
 Sheet 1 of 12 MDAC/MMC
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 MDAC/MMC
 DR#1036 C-3-49

TABLE III (cont'd.) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: MDC/MMC THERMAL MAPPING TEST
 TEST NUMBER: None TEST FACILITY: LRC Mach 8 VDT
 TEST DATE: 8/20/70-----9/28/70 TEST ENGINEER: Click & Schmitt

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	T _{aw} * T _{total}	RNX10 ⁶ Ft	Phase Change Temp. (°F)	Model Position (degrees)			Grid Figure No.	
									α	β	φ	Camera Loc.	Top Side
160	O1 (no side camera contour tracing)	00325	7.95	1415	1450	0.95	5.933	400	40	0	180	G89	--
161	O2	"	"	115	1370	"	0.563	250	"	"	"	G90	G91
162	O2 (no top camera contour tracing)	"	"	115	1310	"	0.605	109	"	"	"	--	"
163	O2	"	"	115	1310	"	"	125	"	"	"	G90	"
164	O2 (no grid for side camera tracing)	"	"	115	1360	"	0.569	300	60	"	"	G92	--
165	O2	"	"	115	1335	"	0.587	200	"	"	"	"	--
166	O1 (no side camera contour tracing)	"	"	115	1315	"	0.601	250	"	"	"	G93	--
167	O1 (no top camera cont. trac)	"	"	115	1320	"	0.598	125	"	"	"	--	--
168	O1 (no side camera contour tracing)	"	7.95	1415	1490	"	5.614	400	"	"	"	G93	--
169	O1	"	"	1015	1485	"	4.049	400	"	"	"	"	--
170	O2 (no grid for side camera tracing)	"	"	1455	1415	"	6.276	400	"	"	"	G92	--
171	O2 (no top camera cont. trac)	"	"	1415	1470	"	5.738	125	"	"	"	--	--
172	O2 (no side camera contour tracing)	"	"	1045	1500	"	4.102	400	"	"	"	G92	--

* T_{aw} = adiabatic wall temperature
 ** Tunnel Log Run No.
 (Run 147 thru 179, 1st entry, 8/20/70 thru 8/21/70)
 (Run 206 thru 322, 2nd entry, 9/16/70 thru 9/28/70)

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TABLE III (cont'd.) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: MDC/MMC THERMAL MAPPING TEST

TEST NUMBER: None TEST FACILITY: LRC Mach 8 VDT

TEST DATE: 8/20/70 -----9/28/70 TEST ENGINEER: Click & Schmitt

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	T _{aw} * / T _{total}	RNx10 ⁶ Ft	Phase Change Temp. (°F)	Model Position (degrees)			Grid Figure No.	
									α	β	φ	Top	Side
173	O2 (No grid for side camera tracing)	.00325	7.95	615	1460	0.95	2.521	300	60	0	180	G92	--
174	O2 "	"	7.87	315	1390	"	1.433	300	"	"	"	"	--
175	O2	"	7.95	1415	1460	"	5.802	300	0	"	"	G94	G95
176	O2	"	"	1415	1475	"	6.578	125	"	"	"	"	"
177	O1 (No top camera contour tracing)	"	"	1415	1480	"	5.676	250	"	"	"	---	G97
178	O1	"	"	1435	1475	"	5.788	175	"	"	"	G96	"
179	O1	"	"	1435	1490	"	5.694	125	"	"	"	"	"
206	B1	"	7.71	120	1375	"	0.584	350	60	"	"	G98	G99
207	B1	"	7.81	220	1380	"	1.032	250	"	"	"	"	"
208	B1	"	"	220	1370	"	1.044	150	"	"	"	"	"
209	B1	"	7.95	1415	1475	"	5.707	350	"	"	"	"	"
210	B2 (No top camera contour tracing)	"	"	1415	1450	"	5.867	500	"	"	"	--	G100
211	B2 "	"	7.81	215	1375	"	1.014	150	"	"	"	--	"

* T_{aw} = adiabatic wall temperature

** Tunnel Log Run No.

(Run 147 thru 179, 1st entry, 8/20/70 thru 8/21/70)
 (Run 206 thru 322, 2nd entry, 9/16/70 thru 9/28/70)

Sheet 3 of CANARD BOOSTER
 MDC/MMC
 DELTA WING ORBITER
 MDC/MMC
 DR#1036 C-3-51

TABLE III (cont'd) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: MDC/MMC THERMAL MAPPING TEST

TEST NUMBER: None TEST FACILITY: LRC Mach 8 VDT

TEST DATE: 8/20/70 ---9/28/70 TEST ENGINEER: Click & Schmitt

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	T _{aw} * / T _{total}	RNx10 ⁶ Ft	Phase Change Temp. (°F)	Model Position (degrees)			Grid Figure No.	
									α	β	φ	Camera Loc.	Top Side
212	B2 (No Top Camera Contour Tracing)	00325	7.81	215	1385	0.95	1.002	250	60	0	180	--	G100
213	B2	"	"	215	1360	"	1.033	400	"	"	"	--	"
214	O2 MA (No side cam. cont. trace) (no top or side grids)	"	7.71	120	1310	"	0.632	300	"	"	"	--	--
215	O2 MA	"	"	115	1295	"	0.617	200	"	"	"	--	--
216	O2 MA	"	"	115	1310	"	0.586	350	"	"	"	--	--
217	B2	"	7.81	220	1350	"	1.069	150	45	"	"	G101	G102
218	B1	"	"	215	1365	"	1.026	150	"	"	"	G103	G104
219	B2	"	"	220	1390	"	1.020	350	"	"	"	G101	G102
220	B1	"	"	215	1390	"	0.997	350	"	"	"	G103	G104
221	B2	"	"	220	1395	"	1.014	275	"	"	"	G101	G102
222	B1	"	"	220	1390	"	1.020	275	"	"	"	G103	G104
223	B2	"	"	220	1350	"	1.069	300	30	"	"	G105	G106
224	B1 (no grid for side camera tracing)	"	"	225	1360	"	1.081	300	"	"	"	G107	--

* T_{aw} = adiabatic wall temperature

** Tunnel Log Run No.

(Run 147 thru 179, 1st entry, 8/20/70 thru 8/21/70)

(Run 206 thru 322, 2nd entry, 9/16/70 thru 9/28/70)

TABLE III (cont'd.) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: MDC/MMC THERMAL MAPPING TEST

TEST NUMBER: None TEST FACILITY: LRC Mach 8 VDT

TEST DATE: 8/20/70 TEST ENGINEER: Click & Schmitt

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	Taw * Ttotal	RNx10 ⁶ Ft	Phase Change Temp. (°F)	Model Position (degrees)		Grid Figure No.	
									α	β	φ	Side
225	B2	00325	7.81	225	1390	0.95	1.043	225	30	0	180	G105 G106
226	B1 (No grid for side camera tracing)	"	"	225	1375	"	1.062	225	"	"	"	G107 --
227	B2	"	"	215	1400	"	0.985	150	"	"	"	G105 G106
228	B1 (No grid for side camera tracing)	"	"	215	1400	"	"	150	"	"	"	G107 --
229	B2	"	"	215	1360	"	1.033	250	15	"	"	G108 G109
230	B1	"	"	215	1380	"	1.008	250	"	"	"	G110 G111
231	B2	"	"	215	1395	"	0.991	150	"	"	"	G108 G109
232	B1	"	"	225	1420	"	1.008	150	"	"	"	G110 G111
233	O1 + B1	"	7.71	120	1370	"	0.587	175	0	0	237	G112 G113
234	O1 + B2	"	"	125	1335	"	0.638	175	"	"	"	G114 G115
235	O1 + B1	"	"	115	1330	"	0.590	113	"	"	"	G112 G113
236	O1 + B2	"	"	112	1320	"	0.582	113	"	"	"	G114 G115
237	O1 + B1	"	7.95	1415	1445	"	5.834	175	"	"	"	G112 G113

* Taw = adiabatic wall temperature

** Tunnel Log Run No.

(Run 147 thru 179, 1st entry, 8/20/70 thru 8/21/70)

(Run 206 thru 322, 2nd entry, 9/16/70 thru 9/28/70)

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TABLE III (cont'd.) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: MDC/MMC THERMAL MAPPING TEST

TEST NUMBER: None TEST FACILITY: LRC Mach 8 VDT

TEST DATE: 8/20/70 TEST ENGINEER: Click & Schmitt

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	Taw * Ttotal	RNX106 Ft	Phase Change Temp. (°F)	Model Position (degrees)		Grid	
									α	φ	Camera	Loc. Side
238	O1 + B2	00325	7.95	1415	1475	0.95	5.707	175	0	237	G114	G115
239	O1 + B1	"	"	1415	1490	"	5.614	275	"	"	G112	G113
240	O1 + B2	"	"	1415	1520	"	5.437	275	"	"	G114	G115
241	O3 + B1	"	"	1415	1485	"	5.645	175	"	"	G116	G117
242	O3 + B2	"	"	1415	1490	"	5.614	175	"	"	G118	G119
243	O3 + B1	"	"	1435	1495	"	5.663	275	"	"	G116	G117
244	O3 + B2	"	"	1415	1510	"	5.495	275	"	"	G118	G119
245	O2 + B1	"	7.71	135	1360	"	0.669	175	"	"	G120	G121
246	O2 + B1	"	"	125	1335	"	0.638	113	"	"	"	"
247	O2 + B2	"	"	120	1395	"	0.570	113	"	"	G122	G123
248	O2 + B2	"	"	120	1350	"	0.601	175	"	"	"	"
249	O2 + B1	"	7.95	1440	1510	"	5.592	175	"	"	G120	G121
250	O2 + B2	"	"	1415	1505	"	5.524	175	"	"	G122	G123

* Taw = adiabatic wall temperature

** Tunnel Log Run No.

(Run 147 thru 179, 1st entry, 8/20/70 thru 8/21/70)
 (Run 206 thru 322, 2nd entry, 9/16/70 thru 9/28/70)

TABLE III (cont'd.) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: MDC/MMC THERMAL MAPPING TEST

TEST NUMBER: None TEST FACILITY: LRC Mach 8 VDT

TEST DATE: 8/20/70 TEST ENGINEER: Click & Schmitt

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	Taw * Ttotal	RNX10 ⁶ Ft	Phase Change Temp. (°F)	Model Position (degrees)			Grid Figure No.	
									α	β	φ	Camera Loc.	Top Side
251	O1 + B1	.00325	7.71	115	1385	0.95	0.553	150	0	270		G124	G125
252	O1 + B2	"	7.81	215	1435	"	0.947	150	"	"	"	G126	G127
253	O2 + B1	"	"	220	1395	"	1.104	150	"	"	"	G128	G129
254	O2 + B2	"	"	215	1410	"	0.974	150	"	"	"	G130	G131
255	O1 + B1	"	"	220	1400	"	1.008	150	"	"	"	G124	G125
256	B1	"	"	220	1400	"	"	125	"	"	"	G132	G133
257	B2	"	"	220	1410	"	0.997	"	"	"	"	G134	G135
258	B1	"	7.71	115	1360	"	0.569	113	"	90	"	G136	G137
259	B2	"	"	115	1385	"	0.553	113	"	"	"	G138	G139
260	B1	"	7.95	1415	1520	"	5.437	175	"	270	"	G132	G133
261	B2	"	"	1415	1495	"	5.584	175	"	"	"	G134	G135
262	B1	"	7.81	215	1375	"	1.014	150	"	180	"	G140	G141
263	B2 (No optic for side camera tracing)	"	"	215	1435	"	0.947	150	"	"	"	G142	--

* Taw = adiabatic wall temperature
 ** Tunnel Log Run No.
 (Run 147 thru 179, 1st entry, 8/20/70 thru 8/21/70)
 (Run 206 thru 322, 2nd entry, 9/16/70 thru 9/28/70)

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 MDAC/MMC
 DR#1036 C-3-55

Sheet 7 of 12

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TABLE III (cont'd.) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: MDC/MMC THERMAL MAPPING TEST
 TEST NUMBER: None TEST FACILITY: LRC Mach 8 VDT
 TEST DATE: 8/20/70 TEST ENGINEER: Click & Schmitt

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	Taw * Ttotal	RNX106 Ft	Phase Change Temp. (°F)	Model Position (degrees)			Grid Figure No. Camera Loc.	
									α	β	φ	Top	Side
264	B1	.00325	7.95	1415	1470	0.95	5.738	150	0	0	180	G140	G141
265	B2 (No grid for side camera tracing)	"	"	1415	1475	"	5.707	"	"	"	"	G142	--
266	O1 + B1	"	7.81	220	1445	"	0.958	150	+5	0	0	G143	G144
267	O1 + B2	"	"	220	1410	"	0.997	150	"	"	"	G145	G146
268	O2 + B1	"	"	225	1400	"	1.031	150	"	"	"	G147	G148
269	O2 + B2	"	"	225	1410	"	1.019	150	"	"	"	G149	G150
270	O1 + B1	"	7.95	1415	1480	"	5.676	175	"	"	"	G143	G144
271	O1 + B2	"	"	1415	1470	"	5.739	175	"	"	"	G145	G146
272	O1 + B1	"	"	1415	1480	"	5.676	175	-5	"	"	G151	G152
273	O1 + B2	"	"	1415	1485	"	5.645	175	"	"	"	G153	G154
274	O1 + B1	"	7.81	220	1345	"	1.076	150	"	"	"	G151	G152
275	O1 + B2	"	"	220	1390	"	1.020	150	"	"	"	G153	G154
276	O2 + B1	"	"	220	1420	"	0.985	150	"	"	"	G155	G156

* Taw = adiabatic wall temperature
 ** Tunnel Log Run No.
 (Run 147 thru 179, 1st entry, 8/20/70 thru 8/21/70)
 (Run 206 thru 322, 2nd entry, 9/16/70 thru 9/28/70)

TABLE III (cont'd.) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: MDC/MMC THERMAL MAPPING TEST
 TEST NUMBER: None TEST FACILITY: LRC Mach 8 VDT
 TEST DATE: 8/20/70 TEST ENGINEER: Click & Schmitt

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	Taw * / Ttotal	RNx10 ⁶ Ft	Phase Change Temp. (°F)	Model Position (degrees)		Grid Figure No. Camera Loc.	
									α	β	Top	Side
277	O2 + B2	.00325	7.81	220	1410	0.95	0.997	150	-5	0	G157	G158
278	O2 + B1	"	7.95	1415	1520	"	5.437	175	"	"	G155	G156
279	O2 + B2	"	"	1415	1500	"	5.554	175	"	"	G157	G158
280	O3 + B1	"	7.71	115	1405	"	0.540	175	0	"	237G159	G160
281	O3 + B2	"	"	115	1370	"	0.563	175	"	"	G161	G162
282	O3 + B1	"	"	115	1365	"	0.566	113	"	"	G159	G160
283	O3 + B2	"	"	115	1355	"	0.573	113	"	"	G161	G162
284	O1 (No side camera contour tracing)	"	"	115	1320	"	0.598	250	60	"	180G163	--
285	O3 (No top camera contour tracing)	"	7.95	1415	1510	"	5.495	350	"	"	--	G164
286	O1 (No side camera contour tracing)	"	"	1015	1560	"	3.740	400	"	"	G163	--
287	O3 (No top camera contour tracing)	"	"	1415	1535	"	5.351	125	"	"	--	G164
288	O1 (No side camera contour tracing)	"	"	1415	1515	"	5.466	400	"	"	G163	--
289	O2 (No top camera contour tracing)	"	"	615	1485	"	2.453	125	"	"	--	G165

* Taw = adiabatic wall temperature

** Tunnel Log Run No.

(Run 147 thru 179, 1st entry, 8/20/70 thru 8/21/70)
 (Run 206 thru 322, 2nd entry, 9/16/70 thru 9/28/70)

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 MDAC/MMC
 DR#1036 C-3-57

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TABLE III (cont'd.) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: MDC/MMC THERMAL MAPPING TEST
 TEST NUMBER: None TEST FACILITY: LRC Mach 8 VDT
 TEST DATE: 8/20/70 TEST ENGINEER: Click & Schmitt

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	Taw * Ttotal	RNX10 ⁶ Ft	Phase Change Temp. (°F)	Model Position (degrees)		Grid Figure No.		
									α	φ	Camera Loc.	Top Side	
290	O2R (No top camera contour tracing)	.00325	7.71	115	1320	0.95	0.598	113	60	0	180	--	G165
291	O2	"	"	120	1335	"	0.612	175	"	"	"	G166	"
292	O2R (No side camera contour tracing)	"	"	120	1350	"	0.601	200	"	"	"	"	--
293	O2 (No top camera contour tracing)	"	"	120	1360	"	0.594	113	"	"	"	--	G165
294	O2R (" "	"	7.95	1415	1515	"	5.466	125	"	"	"	--	"
295	O2R (" "	"	"	1490	1520	"	5.725	175	"	"	"	--	"
296	O2 (" "	"	"	1045	1465	"	4.261	125	"	"	"	--	"
297	O2 (" "	"	"	1415	1515	"	5.466	175	"	"	"	--	"
298	O3 (" "	"	"	1415	1520	"	5.437	113	0	"	"	--	G167
299	O3	"	"	1435	1520	"	5.503	150	"	"	"	G168	"
300	O3 (No top camera contour tracing)	"	"	1435	1505	"	5.603	150	20	"	"	--	G169
301	O3	"	"	1435	1515	"	5.543	300	"	"	"	G170	"
302	O1 (No side camera contour tracing)	"	7.81	265	1425	"	1.180	250	60	"	"	G163	--

* Taw = adiabatic wall temperature

** Tunnel Log Run No.

(Run 147 thru 179, 1st entry, 8/20/70 thru 8/21/70)
 (Run 206 thru 322, 2nd entry, 9/16/70 thru 9/28/70)

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TABLE III (cont'd.) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: MDC/MMC THERMAL MAPPING TEST
 TEST NUMBER: None TEST FACILITY: LRC Mach 8 VDT
 TEST DATE: 8/20/70 TEST ENGINEER: Click & Schmitt

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	T _{aw} / T _{total}	RNX10 ⁶ Ft	Phase Change Temp. (°F)	Model Position (degrees)		Grid Figure No. Camera Loc.		
									α	β	Top	Side	
303	O1 (No side camera contour tracing)	00325	7.95	515	1475	0.95	2.077	350	60	0	180	G163	--
304	O2F (No top camera contour tracing)	"	7.71	120	1345	"	0.605	113	"	"	"	--	G165
305	O2F	"	7.81	315	1400	"	1.444	125	"	"	"	--	"
306	O2F	"	"	615	1465	"	2.621	175	"	"	"	--	"
307	O2F	"	7.95	1415	1500	"	5.554	175	"	"	"	--	"
308	B2	"	"	1415	1465	"	5.770	350	"	"	"	G171	G172
309	B1	"	"	1415	1485	"	5.645	500	"	"	"	G173	G174
310	B2	"	"	1415	1505	"	5.524	500	"	"	"	G171	G172
311	B2	"	"	1415	1500	"	5.554	400	45	"	"	G175	G176
312	B1	"	"	1415	1540	"	5.323	400	"	"	"	G177	G178
?	B1	"	"	1315	1560	"	4.845	300	30	"	"	G179	G180
314	B2	"	"	1325	1500	"	5.201	300	"	"	"	G181	G182
315	B1	"	"	1415	1510	"	5.495	250	15	"	"	G183	G184

* T_{aw} = adiabatic wall temperature
 ** Tunnel Log Run No.
 (Run 147 thru 179, 1st entry, 8/20/70 thru 8/21/70)
 (Run 206 thru 322, 2nd entry, 9/16/70 thru 9/28/70)
 CANARD BOOSTER

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 MDAC/MMC
 DELTA WING ORBITER
 MDAC/MMC
 DR#1036 C-3-59

TABLE III (cont'd.) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: MDC/MMC THERMAL MAPPING TEST
 TEST NUMBER: None TEST FACILITY: LRC Mach 8 VDT
 TEST DATE: 8/20/70 TEST ENGINEER: Click & Schmitt

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	Taw * / Ttotal	RNx10 ⁶ Ft	Phase Change Temp. (°F)	Model Position (degrees)			Grid Figure No. Camera Loc.	
									α	β	φ	Top	Side
316	B2	00325	7.95	1415	1510	0.95	5.495	250	15	0	180	G185	G186
317	(O2 + B1)G	"	7.71	115	1320	"	0.598	113	0	"	237	G187	G188
318	(O2 + B1)G	"	7.95	1415	1485	"	5.645	175	"	"	"	"	"
319	(O2 + B1)A	"	7.71	115	1280	"	0.628	113	"	"	"	G189	G190
320	(O2 + B1)A	"	7.95	1415	1480	"	5.676	175	"	"	"	"	"
321	O1 (No top or side camera contour tracings)	"	7.71	115	1290	"	0.620	350	60	"	180	--	--
322	O1 (No side camera contour tracing)	"	"	115	1335	"	0.587	250	"	"	"	G163	--

* Taw = adiabatic wall temperature
 ** Tunnel Log Run No.
 (Run 147 thru 179, 1st entry, 8/20/70 thru 8/21/70)
 (Run 206 thru 322, 2nd entry, 9/16/70 thru 9/28/70)

TABLE IV PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: MDC/MMC THERMAL MAPPING TEST
 TEST NUMBER: 53 TEST FACILITY: LRC 31" CFHT
 TEST DATE: 8/24/70 thru 9/11/70 TEST ENGINEER: Click & Schmitt

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	Taw / Ttotal	RNx10 ⁶ Ft	Phase Change Temp. (°F)	Model Position (degrees)			Grid Figure No.
									α	β	φ	
1	01	00325	10.28	400	1770	0.9	0.525	131	20	0	90	G-1
2	01	"	"	"	1780	"	"	200	"	"	"	"
3	02	"	"	"	"	"	0.520	131	"	"	"	G-2
4	02	"	"	"	1790	"	"	200	"	"	"	"
5	01	"	"	"	1800	"	0.513	113	"	"	180	G-3
6	01	"	"	"	1810	"	0.508	"	"	+5	"	G-4
7	01	"	"	"	1740	"	0.510	131	"	"	90	G-5
8	01	"	"	"	1790	"	"	200	"	"	"	"
9	02 (No good, flow breakdown)	"	"	"	-	-	-	"	60	0	"	-
10	02	"	"	"	1800	"	0.513	300	"	"	"	G-6
11	02	"	"	"	1820	"	"	350	"	"	"	"
12	02	"	"	"	1830	"	0.500	"	"	"	+5	G-7
13	02	"	"	"	1790	"	"	275	"	"	"	"

* Taw = adiabatic wall temperature

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 MDAC/MMC
 DR#1036 C-3-61

TABLE IV (cont'd.) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: MDC/MMC THERMAL MAPPING TEST
 TEST NUMBER: 53 TEST FACILITY: LRC 31" CFHT
 TEST DATE: 8/24/70 thru 9/11/70 TEST ENGINEER: Click & Schmitt

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	T _{aw} * / T _{total}	RNX10 ⁶ Ft	Phase Change Temp. (°F)	Model Position (degrees)			Grid Figure No.
									α	β	φ	
14	02	.00325	10.28	400	1800	0.9	0.513	113	60	0	180	G-8
15	02	"	"	"	1780	"	0.523	125	"	+5	"	G-9
16	02	"	"	"	"	"	"	113	"	0	0	G-10
17	02	"	"	"	1820	"	0.503	125	"	-5	"	G-11
18	01	"	"	"	1800	"	0.523	131	10	0	90	G-12
19	01	"	"	"	1760	"	"	200	"	"	"	"
20	01	"	"	"	1750	"	0.525	150	30	"	"	G-13
21	01	"	"	"	1800	"	"	200	"	"	"	"
22	01 (Use grid G-14 & adjust scale)	"	"	"	1790	"	0.518	"	40	"	"	G-14
23	01	"	"	"	1780	"	"	250	"	"	"	"
24	01	"	"	"	"	"	0.523	113	10	"	180	G-15
25	01	"	"	"	1820	"	0.503	"	30	"	"	G-16
26	B1	"	"	"	1760	"	0.534	275	60	"	90	G-17

* T_{aw} = adiabatic wall temperature

TABLE IV (cont'd.) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: MDC/MMC THERMAL MAPPING TEST TEST FACILITY: LRC 31" CFHT
 TEST NUMBER: 53 TEST ENGINEER: Click & Schmitt
 TEST DATE: 8/24/70 thru 9/11/70

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	T _{aw} * T _{total}	RNX106 Ft	Phase Change Temp. (°F)	Model Position (degrees)			Grid Figure No.
									α	β	φ	
27	B1	.00325	10.28	400	1790	0.9	0.518	350	60	0	90	G-17
28	B2	"	"	"	1780	"	0.523	275	"	"	"	G-18
29	B2	"	"	"	"	"	"	350	"	"	"	"
30	B2	"	"	"	1820	"	0.503	"	"	"	0	G-19
31	B2	"	"	"	1790	"	0.518	113	"	"	"	"
32	B2	"	"	"	"	"	"	200	"	"	"	"
33	B1	"	"	"	1820	"	0.503	"	"	"	"	G-20
34	B1	"	"	"	1800	"	0.513	113	"	"	"	"
35	B1	"	"	"	"	"	"	350	"	"	"	"
36	B1	"	"	"	1820	"	0.503	131	"	-5	"	G-21
37	B1 (Bad film, no contour tracing)	"	"	"	1730	"	-	350	"	"	"	-
38	B1 (Bad film, no contour tracing)	"	"	"	1760	"	-	200	"	"	"	-
39	B2 (No grid taken)	"	"	"	1800	"	0.513	131	"	"	"	G-22

* T_{aw} = adiabatic wall temperature

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 MDAC/MMC
 DR#1036 C-3-63

TABLE IV (cont'd.) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: MDC/MMC THERMAL MAPPING TEST
 TEST NUMBER: 53 TEST FACILITY: LRC 31" CFHT
 TEST DATE: 8/24/70 thru 9/11/70 TEST ENGINEER: Click & Schmitt
 Hanner & Sarver

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	T _{aw} / T _{total}	RNXL06 Ft	Phase Change Temp. (°F)	Model Position (degrees)			Grid Figure No.
									α	β	φ	
40	B2	00325	10.28	400	1750	0.9	0.539	350	60	-5	0	G-22
41	B2	"	"	"	1800	"	0.513	200	"	"	"	"
42	01 (Bad film, no contour / Repeat Run #1) tracing)	"	"	"	1830	"	-	131	20	0	90	-
43	02	"	"	"	1790	"	0.518	400	70	"	"	G-23
44	02	"	"	"	1840	"	0.493	275	"	"	"	"
45	02	"	"	"	1810	"	0.508	113	"	"	180	G-24
46	02	"	"	"	1740	"	0.544	325	50	"	90	G-25
47	02	"	"	"	1780	"	0.523	200	"	"	"	"
48	02	"	"	"	1820	"	0.503	113	"	"	180	G-26
49	02	"	"	"	"	"	"	200	40	"	90	G-27
50	02	"	"	"	"	"	"	275	"	"	"	"
51	02	"	"	"	1800	"	0.513	113	"	"	180	G-28
52	02	"	"	"	"	"	"	175	30	"	90	G-29

* T_{aw} = adiabatic wall temperature

TABLE IV (cont'd.) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: MDC/MMC THERMAL MAPPING TEST
 TEST NUMBER: 53 TEST FACILITY: LRC 31" CFHT
 TEST DATE: 8/24/70 thru 9/11/70 TEST ENGINEER: Schmitt, Hanner, Sarver

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	Taw * / Ttotal	RNX106 Ft	Phase Change Temp. (°F)	Model Position (degrees)			Grid Figure No.
									α	β	φ	
53	02	00325	10.28	400	1830	0.9	0.498	225	30	0	90	G-29
54	02	"	"	"	1810	"	0.508	113	"	"	180	G-30
55	02	"	"	"	"	"	"	"	20	"	"	G-31
56	02	"	"	"	1720	"	0.556	"	"	"	0	G-32
57	01	"	"	"	1810	"	0.508	150	0	"	90	G-33
58	01	"	"	"	"	"	"	113	"	"	"	"
59	01	"	"	"	1800	"	0.513	"	"	"	180	G-34
60	01	"	"	"	1790	"	0.518	200	"	"	"	"
61	B1	"	"	"	"	"	"	113	"	"	90	G-35
62	B1	"	"	"	1780	"	0.523	175	"	"	"	"
	B1	"	"	"	1790	"	0.518	113	"	"	180	G-36
64	B1	"	"	"	1810	"	0.508	175	"	"	"	"
65	B1	"	"	"	1720	"	0.556	113	"	"	270	G-37

* Taw = adiabatic wall temperature

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 MDAC/MMC
 DR#1036 C-3-65

TABLE IV (cont'd.) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: MDAC/MMC THERMAL MAPPING TEST
 TEST NUMBER: 53 TEST FACILITY: LRC31" CFHT
 TEST DATE: 8/24/70 thru 9/11/70 TEST ENGINEER: Hanner, Sarver

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	T _{aw} * / T _{total}	RNX10 ⁶ / Ft	Phase Change Temp. (°F)	Model Position (degrees)			Grid Figure No.
									α	β	φ	
66	B1	.00325	10.28	400	1810	0.9	0.508	175	0	0	270	G-37
67	O1	"	"	"	1760	"	0.536	131	20	0	90	G-44
68	B1	"	"	"	"	"	0.534	350	60	-5	0	G-38
69	B1	"	"	"	1710	"	0.561	200	"	"	"	"
70	O2	"	"	430	1835	"	0.532	113	40	0	"	G-39
71	O2	"	"	400	1790	"	0.534	"	30	"	"	G-40
72	O1 + B1	"	"	"	1805	"	0.510	"	0	"	35	G-41
73	O1 + B1	"	"	"	1800	"	0.513	275	"	"	"	"
74	O1 + B1	"	"	"	"	"	"	113	"	"	-25	G-42
75	O1 + B1	"	"	"	1830	"	0.498	175	"	"	"	"
76	O1 + B1	"	"	"	1820	"	0.503	"	"	"	35	G-41
77	O2	"	"	"	1800	"	0.513	"	"	"	"	G-43
78	O1	"	"	"	1710	"	0.561	131	20	0	90	G-44

* T_{aw} = adiabatic wall temperature

TABLE IV (cont'd.) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: MDC/MMC THERMAL MAPPING TEST
 TEST NUMBER: 53 TEST FACILITY: LRC 31" CFHT
 TEST DATE: 8/24/70 thru 9/11/70 TEST ENGINEER: Hanner, Sarver

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	T _{aw} * / T _{total}	RNX106 Ft	Phase Change Temp. (°F)	Model Position (degrees)			Grid Figure No.
									α	β	φ	
79	03	00325	10.28	400	1820	0.9	0.503	250	60	0	90	G-45
80	03	"	"	"	"	"	"	400	"	"	"	"
81	03	"	"	"	1790	"	0.518	250	40	"	"	G-46
82	03	"	"	"	1810	"	0.477	325	"	"	"	"
83	02	"	"	"	1780	"	0.523	113	0	"	"	G-47
84	03	"	"	"	1795	"	0.515	225	30	"	"	G-48
85	03	"	"	"	1770	"	0.528	175	"	"	"	"
86	03	"	"	"	1730	"	0.550	"	20	"	"	G-49
87	03	"	"	"	1810	"	0.508	131	"	"	"	"
88	03	"	"	"	1825	"	0.500	200	"	+	5	G-50
89	03 (No film, no contour tracing)	"	"	"	1820	"	0.503	150	"	"	"	"
90	03	"	"	"	1810	"	0.508	175	10	0	"	G-51
91	03	"	"	410	1830	"	0.510	113	"	"	"	"

* T_{aw} = adiabatic wall temperature

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 MDAC/MMC
 DR#1036 C-3-67

TABLE IV (cont'd.) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: MDC/MMC THERMAL MAPPING TEST
 TEST NUMBER: 53 TEST FACILITY: LRC 31" CFHT
 TEST DATE: 8/24/70 thru 9/11/70 TEST ENGINEER: Hanner, Sarver & Click

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	T _{aw} * / T _{total}	RNX106 Ft	Phase Change Temp. (°F)	Model Position (degrees)			Grid Figure No.
									α	β	φ	
92	03	00325	10.28	400	1810	0.9	0.508	175	0	0	90	G-52
93	03	"	"	"	1790	"	0.518	113	"	"	"	"
94	03 + B1	"	"	410	1820	"	0.515	175	"	"	-20	G-53
95	03 + B1	"	"	400	1810	"	0.508	113	"	"	+20	G-54
96	03 + B1	"	"	415	1835	"	0.514	325	"	"	-20	G-53
97	03 + B1	"	"	400	1785	"	0.520	"	"	"	+20	G-54
98	03	"	"	"	1820	"	0.503	113	"	"	180	G-55
99	03 (No good) (faulty injection)	"	"	"	-	"	-	175	"	"	"	-
100	03	"	"	"	1810	"	0.508	"	"	"	"	G-55
101	03	"	"	"	1840	"	0.493	113	10	10	"	G-56
102	03	"	"	"	1810	"	0.508	"	20	20	"	G-57
103	03	"	"	"	1800	"	0.513	"	"	-5	"	"
104	03	"	"	"	1820	"	0.503	"	30	0	"	G-58

* T_{aw} = adiabatic wall temperature

TABLE IV (cont'd.) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: MDC/MMC THERMAL MAPPING TEST
 TEST NUMBER: 53 TEST FACILITY: JRC 31" CFHT
 TEST DATE: 8/24/70 thru 9/ /70 TEST ENGINEER: Click & Hanner

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	Taw * Total	RNX106 Ft	Phase Change Temp. (°F)	Model Position (degrees)		Grid Figure No.		
									α	ϕ			
105	03	00325	10.28	400	1840	0.9	0.493	113	40	0	180	G-58	
106	02 (Repeat of Run #46 w/re-furbished Model)	"	"	"	1830	"	0.498	325	50	"	90	G-59	
107	03	"	"	"	1760	"	0.533	113	60	"	180	G-60	
108	03 + B1	"	"	"	1790	"	0.518	175	0	"	+20	G-61	
109	03 + B1	"	"	"	1820	"	0.503	113	"	"	-20	G-62	
110	02	"	"	"	"	"	"	"	"	"	180	G-63	
111	02	"	"	"	1810	"	0.508	175	"	"	"	"	
112	02	"	"	"	1800	"	0.513	113	"	"	0	G-64	
113	02 (Use Grid G-65, adjust scale)	"	"	"	1840	"	0.493	"	20	-5	"	G-65	
114	02	"	"	"	"	"	"	"	"	+5	180	G-66	
115	01 + B1 (Repeat of Run #75 w/ Revised Alignment)	"	"	"	"	"	"	175	0	0	-25	G-67	
116	01 + B1 (Repeat of Run #76 w/ Revised Alignment)	"	"	"	1740	"	0.544	"	"	"	"	+35	G-68
117	02	"	"	"	1780	"	0.520	400	55	0	90	G-69	

* Taw = adiabatic wall temperature

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TABLE IV (cont'd.) PHASE CHANGE COATING TEST DATA SUMMARY SHEET

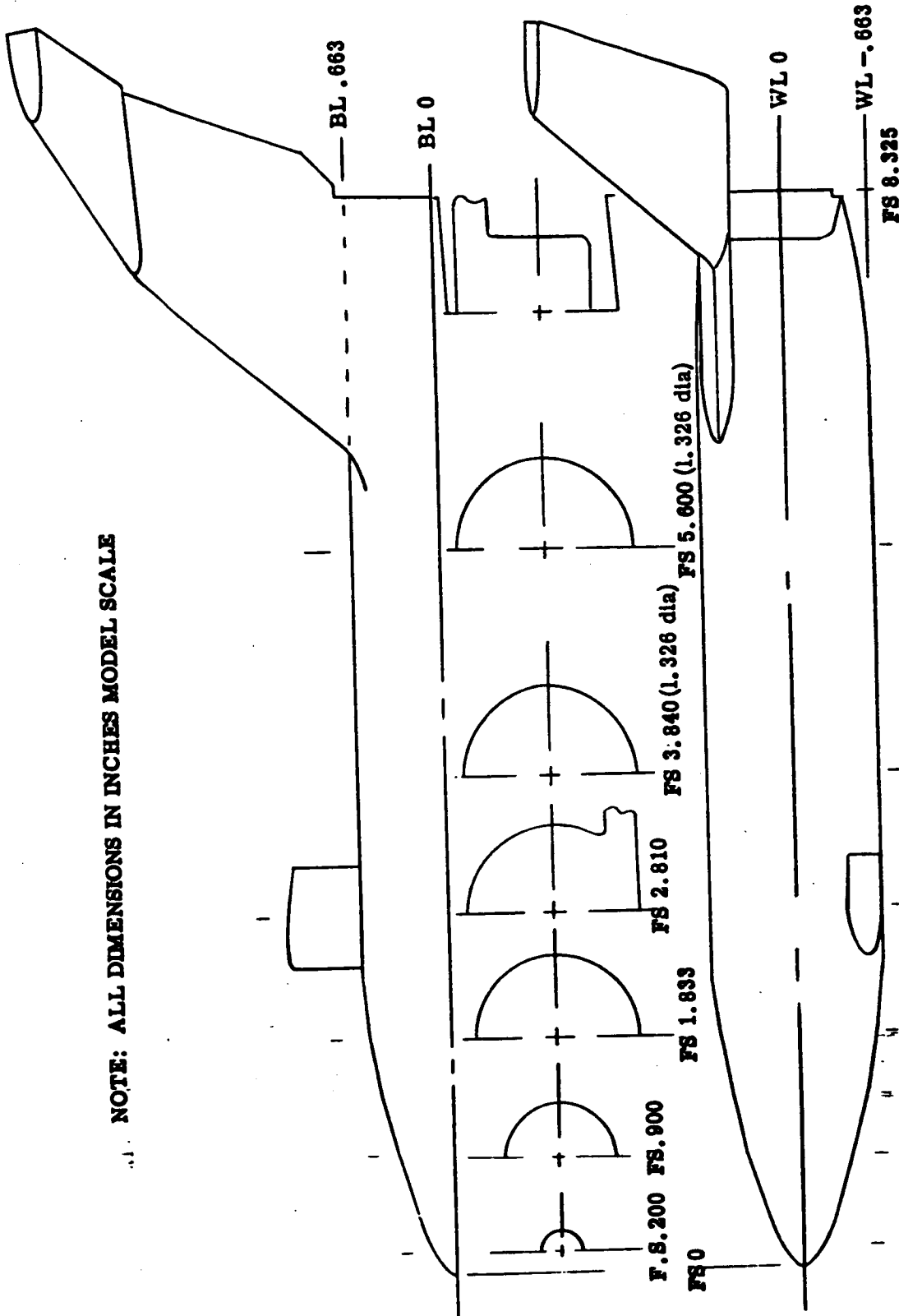
TEST TITLE: MDC/MMC THERMAL MAPPING TEST
 TEST NUMBER: 53 TEST FACILITY: LBC 31" CFHT
 TEST DATE: 8/24/70 thru 9/11/70 TEST ENGINEER: Click & Hanner

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	Taw * / Ttotal	RNx10 ⁶ Ft	Phase Change Temp. (°F)	Model Position (degrees)			Grid Figure No.
									α	β	φ	
118	02	00325	10.28	400	1860	0.9	0.484	275	55	0	90	G-69
119	02	"	"	"	1840	"	0.493	400	45	"	"	G-70
120	02	"	"	"	1850	"	0.488	275	"	"	"	"
121	02	"	"	"	1810	"	0.508	400	50	"	"	G-71
122	02	"	"	"	"	"	"	"	40	"	"	G-72
123	02	"	"	"	"	"	"	"	20	+5	"	G-73
124	02	"	"	"	1860	"	0.484	225	"	"	"	"
125	02	"	"	"	1820	"	0.503	175	0	0	"	G-74
126	02	"	"	"	1840	"	0.493	131	"	"	"	"
127	01 + B2	"	"	"	1750	"	0.539	175	"	"	-25	G-75
128	01 + B2	"	"	"	1820	"	0.503	"	"	"	"	+35
129	B2	"	"	"	1810	"	0.508	"	"	"	"	0
130	03 + B2	"	"	"	1850	"	0.488	"	"	"	+20	G-78

* Taw = adiabatic wall temperature

CANARD BOOSTER
MDAC/MMC
DELTA WING ORBITER
MDAC/MMC
DR#1036 C-3- 72

NOTE: ALL DIMENSIONS IN INCHES MODEL SCALE



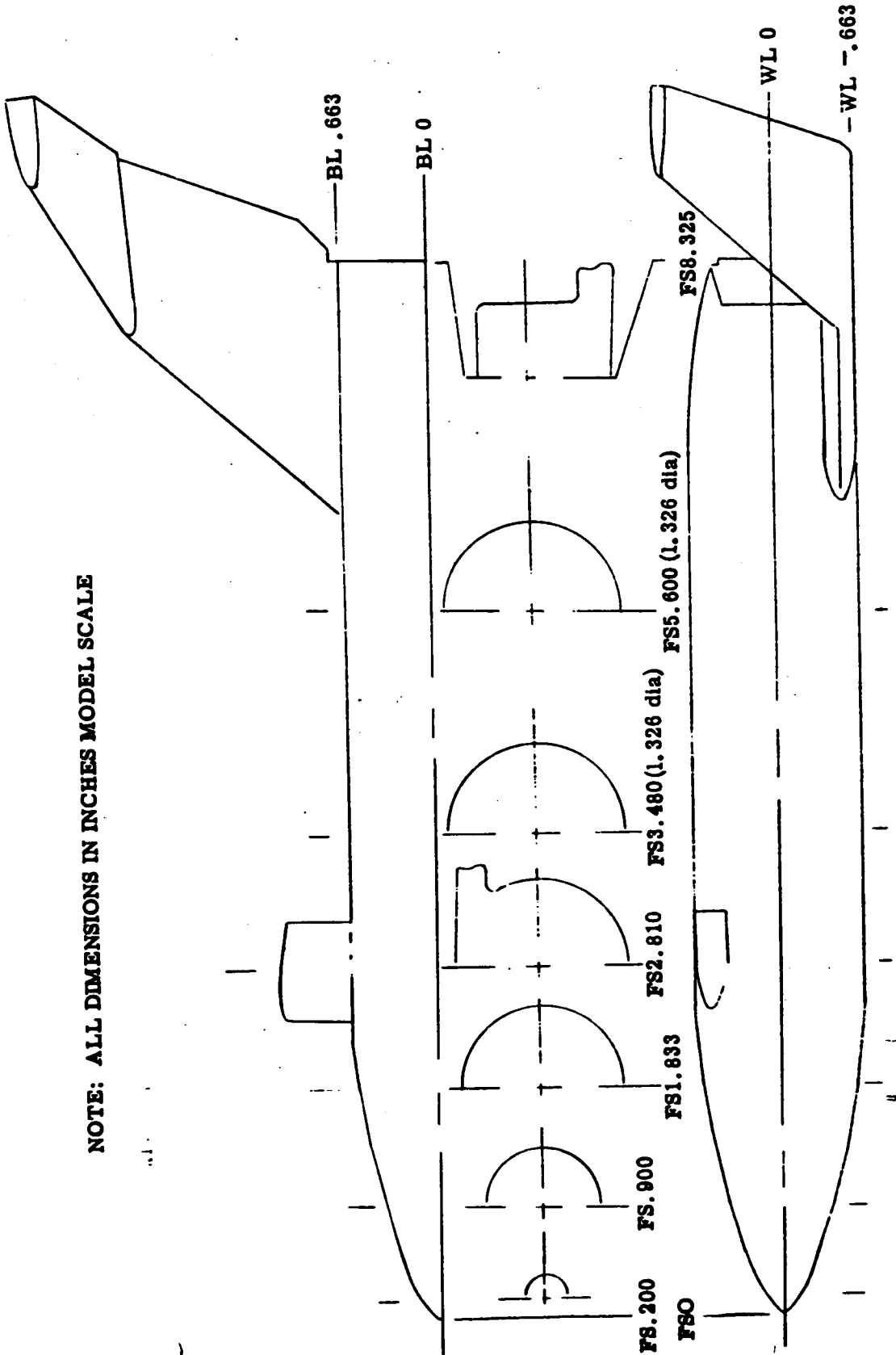
BASELINE BOOSTER CONFIGURATION (BI)

FIGURE 1

899

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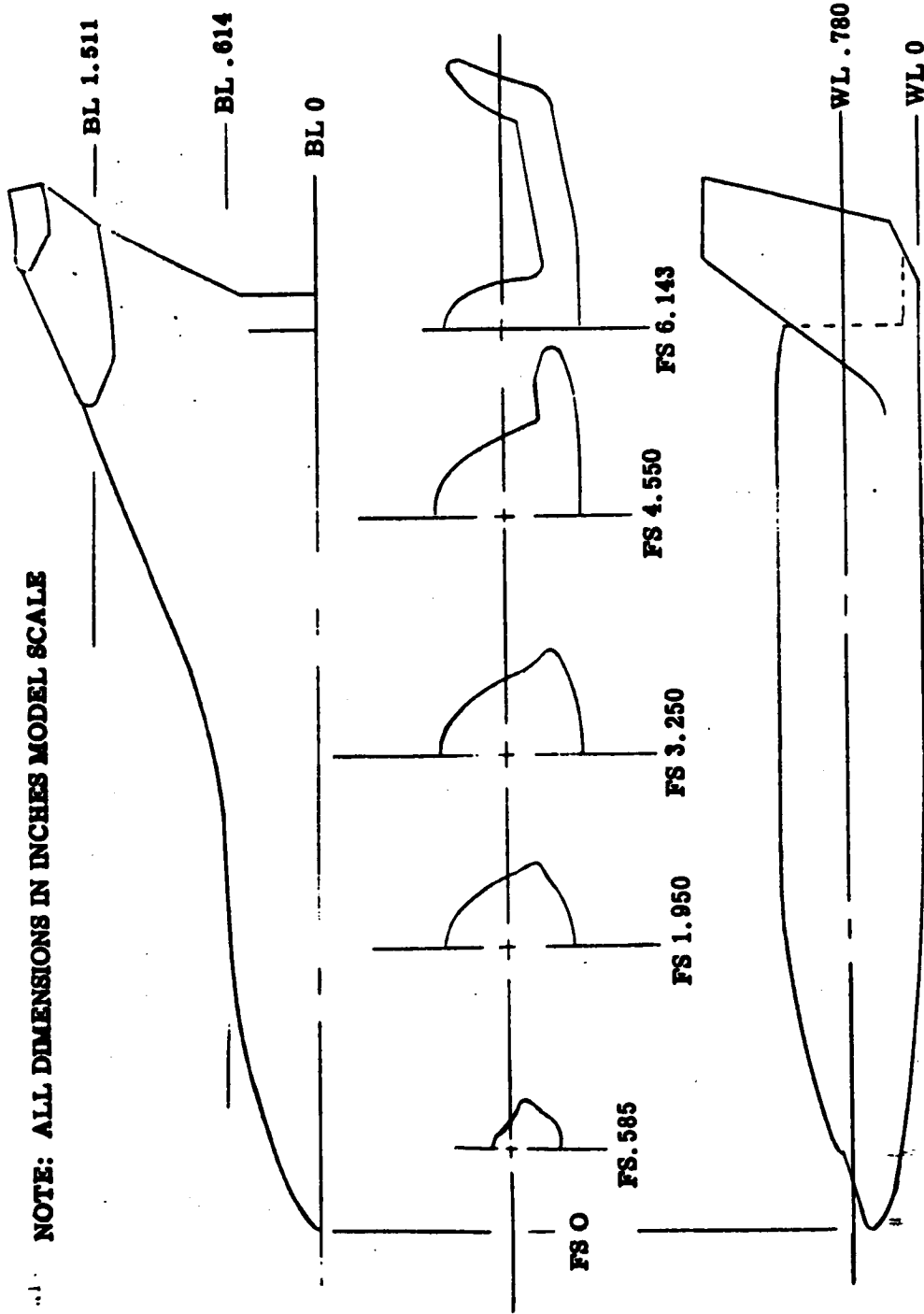
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ALTERNATE BOOSTER CONFIGURATION (B2)

FIGURE 2

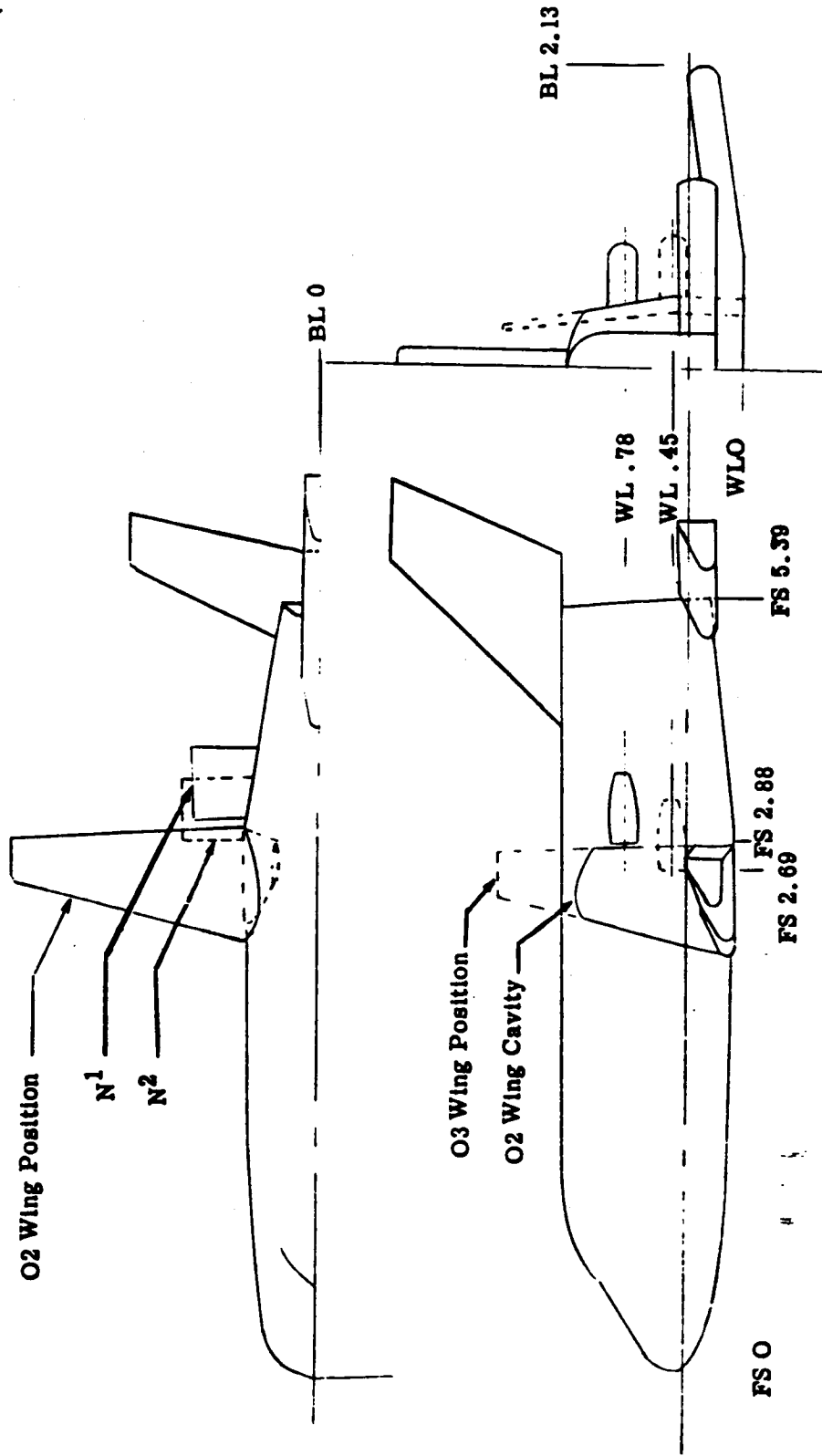
CANARD BOOSTER
MDAC/MMC
DELTA WING ORBITER
MDAC/MMC
DR#1036 C-3-73



HIGH CROSS RANGE ORBITER (O1)

FIGURE 3 901

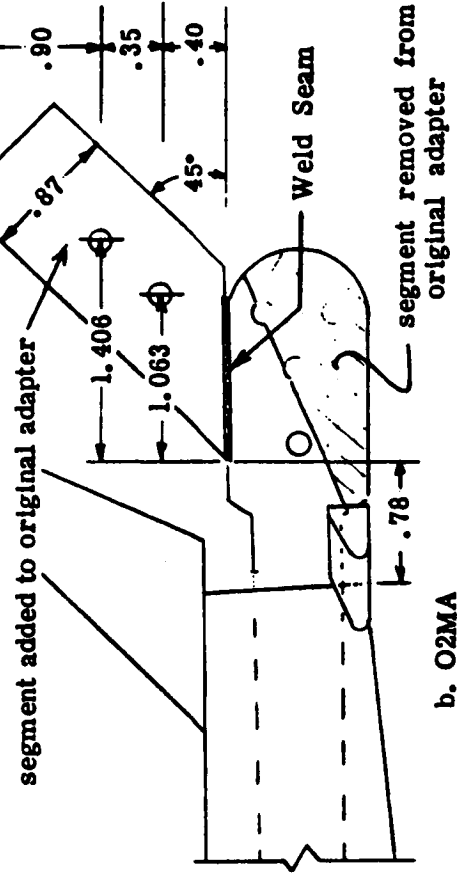
NOTE: ALL DIMENSIONS IN INCHES
MODEL SCALE



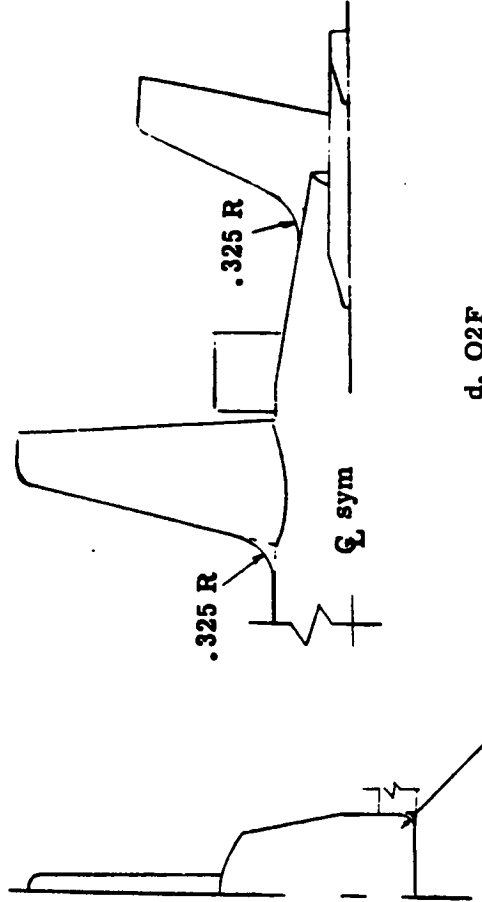
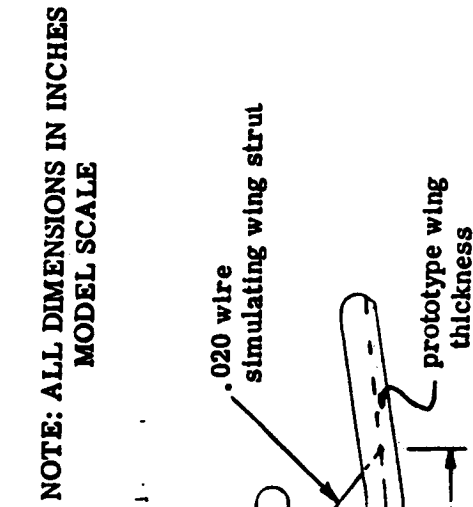
CANARD BOOSTER
MDAC/MMC
DELTA WING ORBITER
MDAC/MMC
DR#1036 C-3-75

LOW CROSS RANGE ORBITER (O2 and O3)

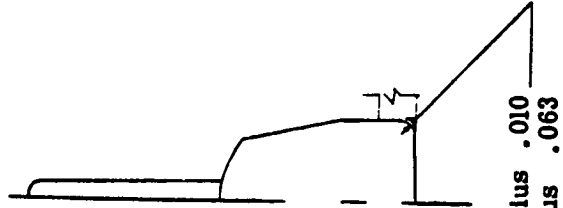
FIGURE 4



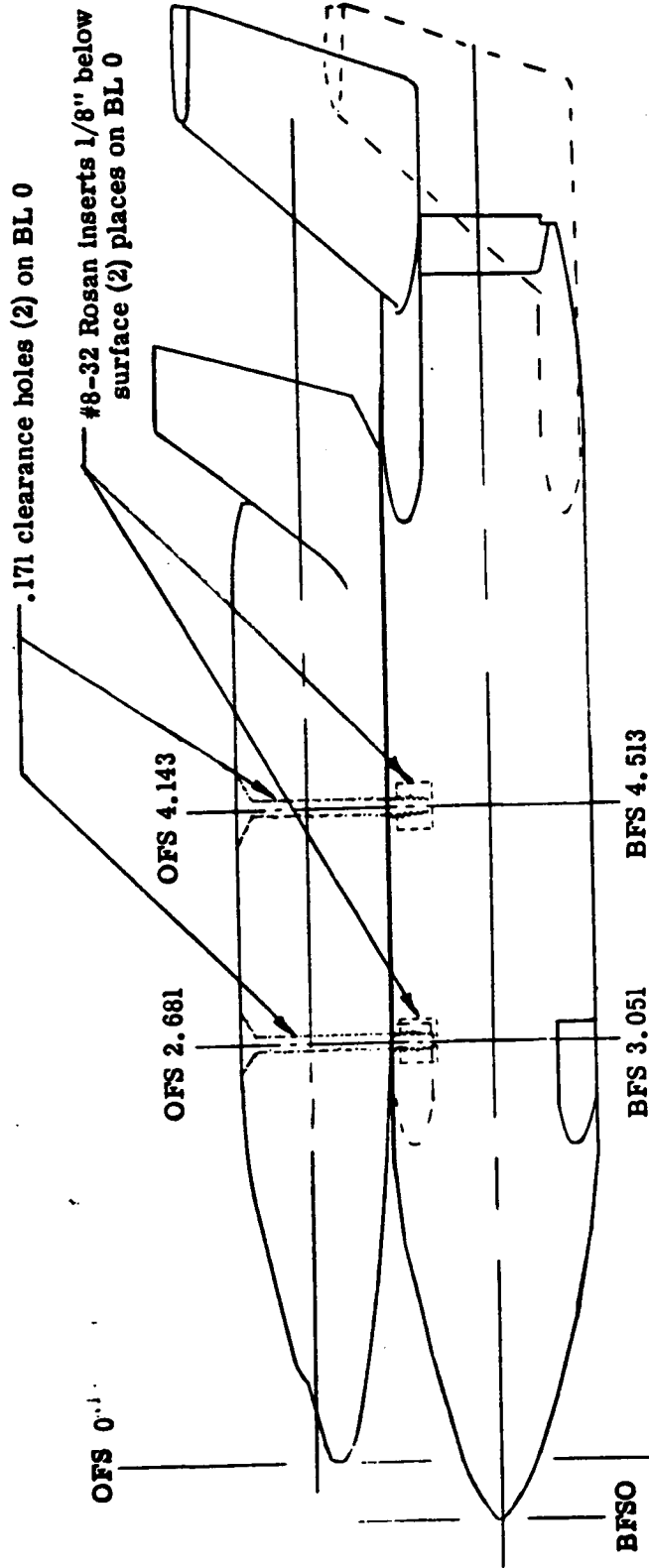
a. O2(s)



c. O2R



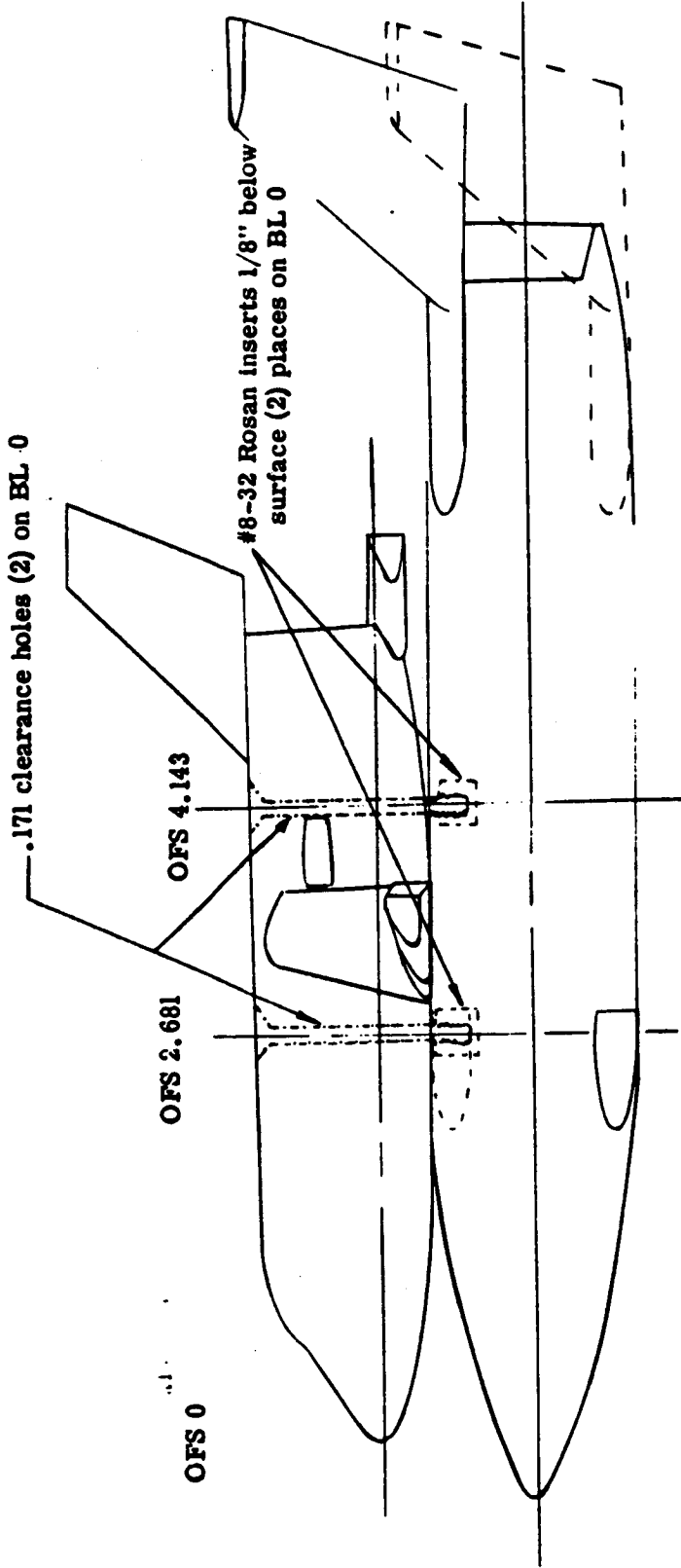
MODIFICATIONS TO (O2) CONFIGURATION
 FIGURE 5



- NOTE:
- BFS = booster fuselage station, inches model scale
 - OFS = orbiter fuselage station, inches model scale
 - orbiter lower surface rests on booster upper surface with orbiter and booster WL's parallel and Q 's concentric in planview
 - solid line (—) designates B1, dashed line (----) designates B2

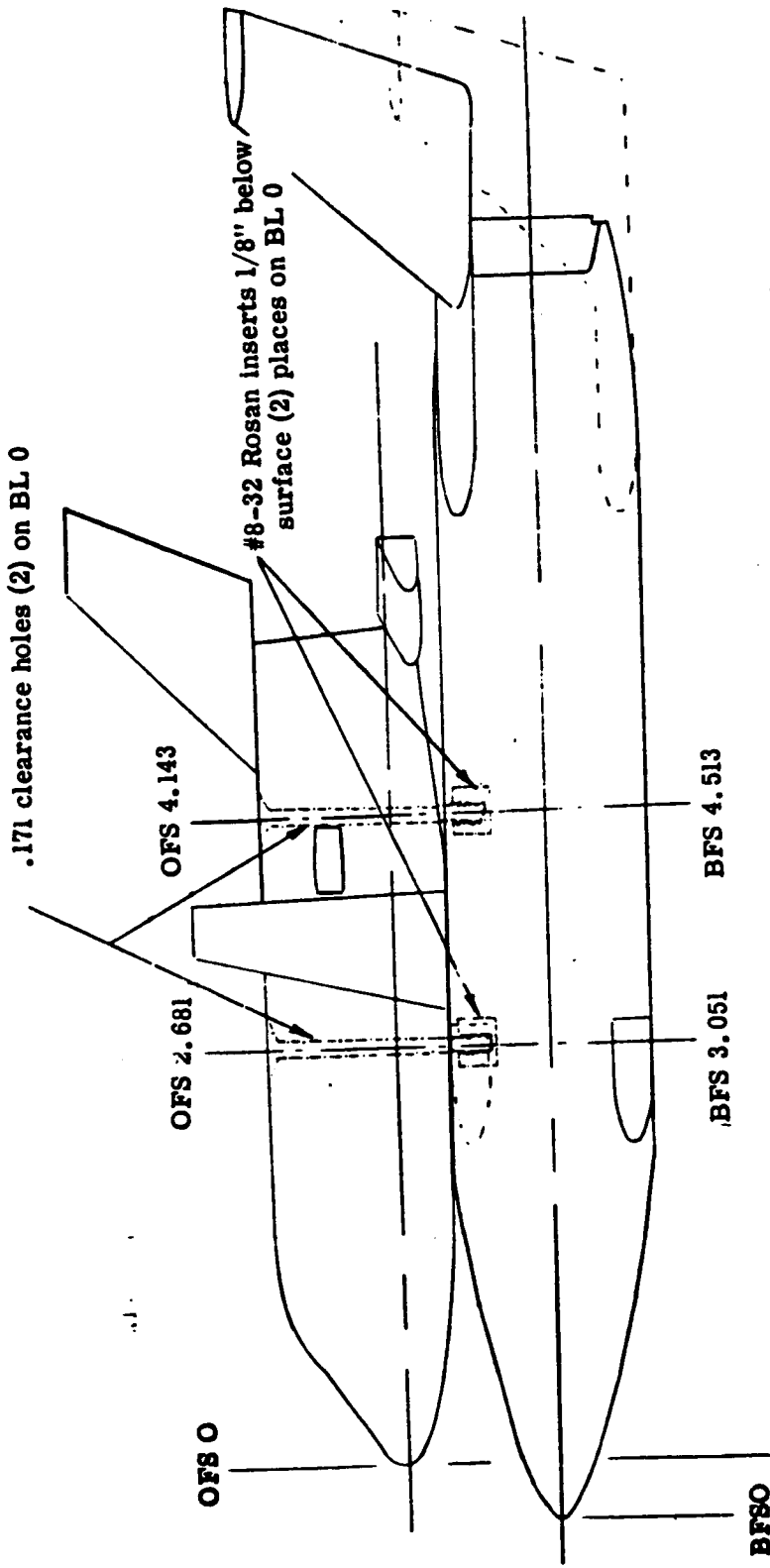
CANARD BOOSTER
 MDAC/MMC
 DELTA WING ORBITER
 MDAC/MMC
 DR#1036 C-3- 77

LAUNCH VEHICLE(High Cross Range Orbiter + Booster), O1 + B1 & O1 + B2
 FIGURE 6



NOTE: ● BFS= booster fuselage station, inches model scale
 ● OFS= orbiter fuselage station, inches model scale
 ● Orbiter lower surface rests on booster upper surface with orbiter and booster WL's parallel and \mathcal{C} 's concentric in planview
 ● Solid line (—) designates Bl, dashed line (---) designates B2

LAUNCH VEHICLE(Low Cross Range, wings unfolded Orbiter + Booster), O2 + B1 & O2 + B2
 FIGURE 7



.171 clearance holes (2) on BL 0

OFS 0

OFS 4.143

OFS 2.681

#8-32 Rosan inserts 1/8" below surface (2) places on BL 0

BFS 3.051

BFS 4.513

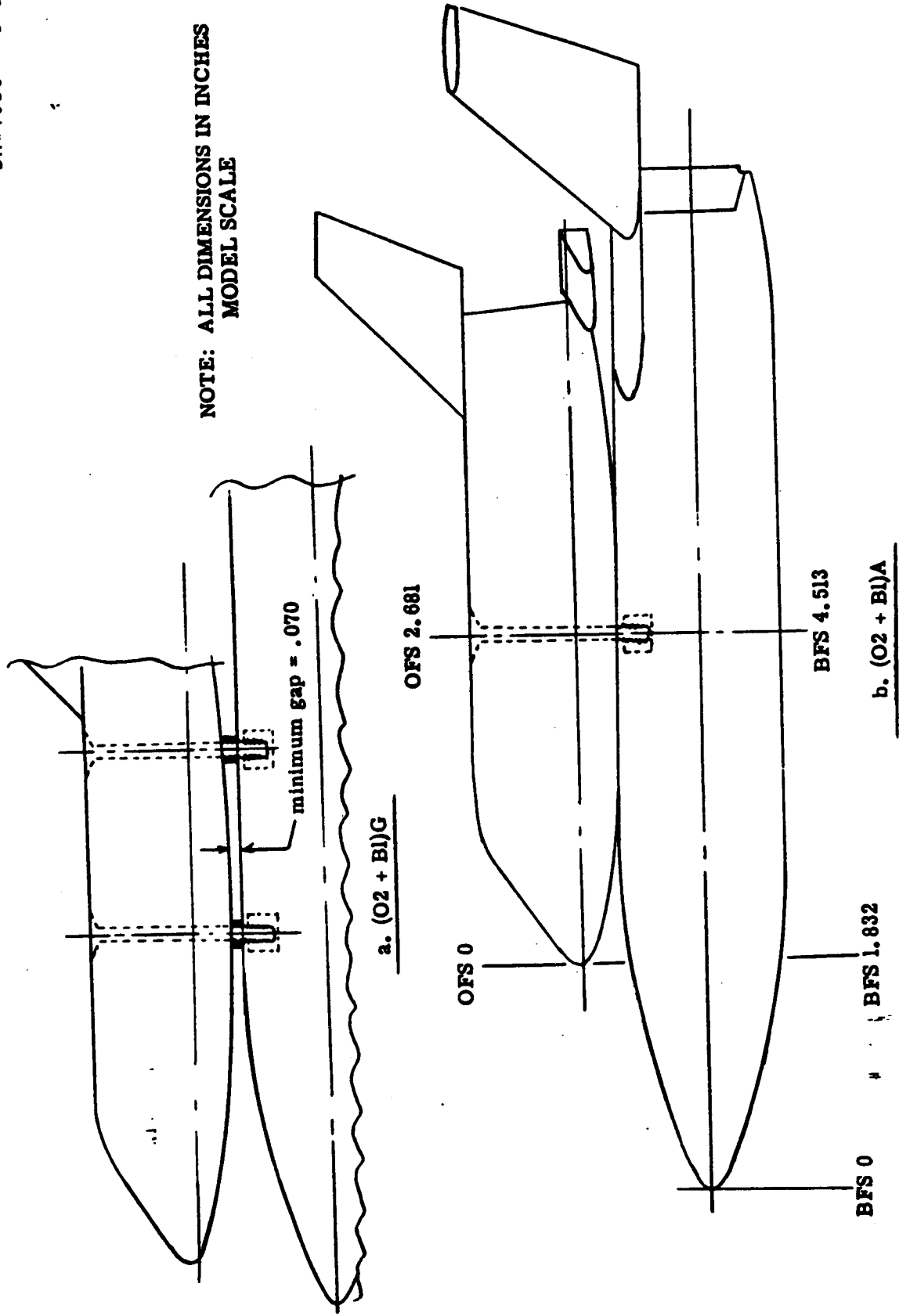
BFSO

BFS 0

- NOTE:**
- BFS = booster fuselage station, inches model scale
 - OFS = orbiter fuselage station, inches model scale
 - Orbiter lower surface rests on booster upper surface with orbiter and booster WL's parallel and ϕ 's concentric in plan view
 - Solid lines (————) designate B1, dashed lines (-----) designates B2

LAUNCH VEHICLE (Low Cross Range, wings folded Orbiter + Booster), O3 + B1 & O3 + B2

FIGURE 8



MODIFICATIONS TO (O2 + BI) CONFIGURATIONS

FIGURE 9

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TABLE 4

THIN SKIN THERMOCOUPLE TEST DATA SUMMARY SHEET

TEST TITLE: HEAT TRANSFER STUDY OF THE GRUMMAN F-33/HO ORBITER
 TEST NUMBER: 546 TEST FACILITY: NASA/LRC-VDT
 TEST DATE: OCTOBER 14-21, 1971 TEST ENGINEER: A. D'Errico

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°F)	T _{aw} / T _{total}	RNX (ft)	Phase Change Temp. (°F)	Model Position (degrees)			Camera** Location (in)		
									α	β	φ	X	Y	Z
1944	P ₁ , W ₁ , V ₅ , Q ₁	.005	7.9	304	1312	1.0	1.6	N/A	0	0	0			
1946				306	1271		1.7		5					
1948				292	1276		1.6		15					
1951				295	1279		1.6		-5					
1952	P ₁ , W ₁ , V ₅			300	1263		1.6		-5					
1955				295	1278		1.6		0					
1956				300	1245		1.7		5					
1959				299	1270		1.6		5					
1958				292	1275		1.6		15					
1957				297	1270		1.6		27					
1958				296	1279		1.6							
1959				102	1199		0.6							
1960				1015	1303		0.0							

** T_{aw} ... adiabatic wall temperature

** X axis: parallel to stream (+downstream, -upstream)
 Y axis (+right, -left, as viewed from the rear)
 Z axis (+up, -down)

CYLINDRICAL BOOSTER
 GAC
 DELTA WING ORBITER
 GAC
 DR#1234 C-3-81

CYLINDRICAL BOOSTER
 GAC
 DELTA WING ORBITER
 GAC
 DR#1234 C-3- 82

TABLE 4 (Continued)

THIN SKIN THERMOCOUPLE TEST DATA SUMMARY SHEET

TEST TITLE: HEAT TRANSFER STUDY OF THE GRUMAN X-33/RO ORBITER

TEST NUMBER: 546 TEST FACILITY: NASA/LSC-VDT

TEST DATE: OCTOBER 14-21, 1977 TEST ENGINEER: A. PERRICO

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	$\frac{T_{aw}}{T_{total}}$	$\frac{RNX \cdot 10^4}{F}$	Phase Change Temp. (°F)	Model Position (degrees)			Camera** Location (in)		
									α	β	ϕ	X	Y	Z
1961	15 U _h V ₅	.005	7.9	1847	1348	1.0	8.5	H/A	27	0	0			
1962				1856	1332		8.5							
1963				2519	1326		12.0							
1964				101	1172		0.6		20					
1965				1107	1302		5.1							
1966				1866	1341		8.6							
1967				2501	1274		12.8							
1968				293	1236		1.7							
1969				283	1250		1.6		0					
1970				292	1270		1.6							

** X axis parallel to stream (+downstream, -upstream)
 Y axis (+right, -left, as viewed from the rear)
 Z axis (+up, -down)
 * Taw :: adiabatic wall temperature

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TABLE 6

PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: HEAT TRANSFER STUDY OF THE GRUMMAN E-33/HO ORBITER

TEST NUMBER: 546 TEST FACILITY: NASA/LRC-VDT

TEST DATE: OCTOBER 14-21, 1971 TEST ENGINEER: A. D'ERRICO

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	Taw / Ttotal	RNX106 / Fl	Phase Change Temp. (°F)	Model Position (degrees)			Camera** Location (in)		
									α	β	φ	X	Y	Z
1971	B5 WHI V5	.005	7.9	305	1250	1.0	1.7	119	27	0	0			
1972				305	1260		1.7	150						
1973				305	1238		1.7	300						
1976				305	1285		1.6	119						
1977				1135	1390		5.2	150						
1978				1115	1400		5.0	250						
1979				1165	1400		5.2	200						
1980				1865	1415		7.9	200						
1981				1865	1415		7.9	300						
1982				2515	1395		10.8	300						
1983				2515	1385		10.8	450						
1984	B5 WHI V5 Fl			1115	1375		5.1	250						
1985				305	1270		1.7	250						

** X axis parallel to stream (+downstream, -upstream)
 Y axis (+right, -left, as viewed from the rear)
 Z axis (+up, -down)
 * Taw = adiabatic wall temperature

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TABLE 6 (Continued)

PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: HEAT TRANSFER STUDY OF THE GRUMMAN H-33/HO ORBITER
 TEST NUMBER: 546 TEST FACILITY: NASA/LRC-VDT
 TEST DATE: OCTOBER 14-21, 1971 TEST ENGINEER: A. D'ERRICO

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	Taw / Ttotal	RNX10 ⁶ Ft	Phase Change Temp. (°F)	Model Position (degrees)			Camera** Location (in)		
									α	β	φ	X	Y	Z
0986	B ₅ W ₁₁₁ V ₅ P ₁	.005	7.9	1115	1365	1.0	5.3	125	27	0	0			
0987	B ₅ W ₁₁₁ V ₅			1115	1400		5.0	200						
0988	B ₅ W ₁₁₁ V ₅ P ₁			1115	1405		5.0	200						
0989				305	1275		1.7	125						
0990				2515	1360		11.3	125						
0991				2515	1370		11.3	200						
0992				1865	1405		7.9	125						
0995	B ₅ W ₁₁₁ V ₅ T ₅			1115	1375		5.1	300	0		45			
0996				1115	1385		5.1	150						
0997	B ₅ W ₁₁₁ V ₅ Q ₁			305	1250		1.7	150						
0998	B ₅ W ₁₁₁ V ₅ T ₅ Q ₁			305	1260		1.7	150			0			
0999	P ₅ W ₁₁₁ V ₅ Q ₁			1145	1260		6.2	150						
0000				305	1270		1.7	200						

* Taw = adiabatic wall temperature

** X axis parallel to stream (+downstream, -upstream)
 Y axis (+right, -left, as viewed from the rear)
 Z axis (+up, -down)

CYLINDRICAL BOOSTER
 GAC
 DELTA WING ORBITER
 GAC
 DR#1234 C-3-85

CYLINDRICAL BOOSTER
GAC
DELTA WING ORBITER
GAC
DR#1234 C-3-86

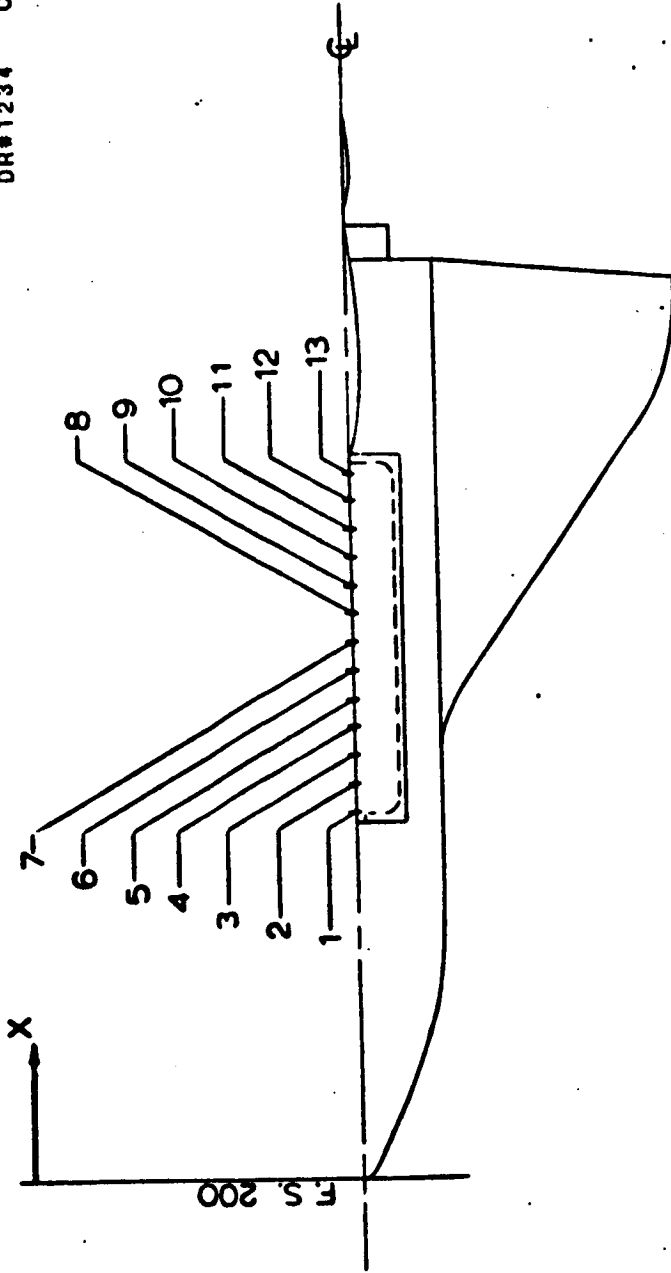


FIGURE 1. ORBITER THERMOCOUPLE LOCATIONS (UPPER SURFACE)

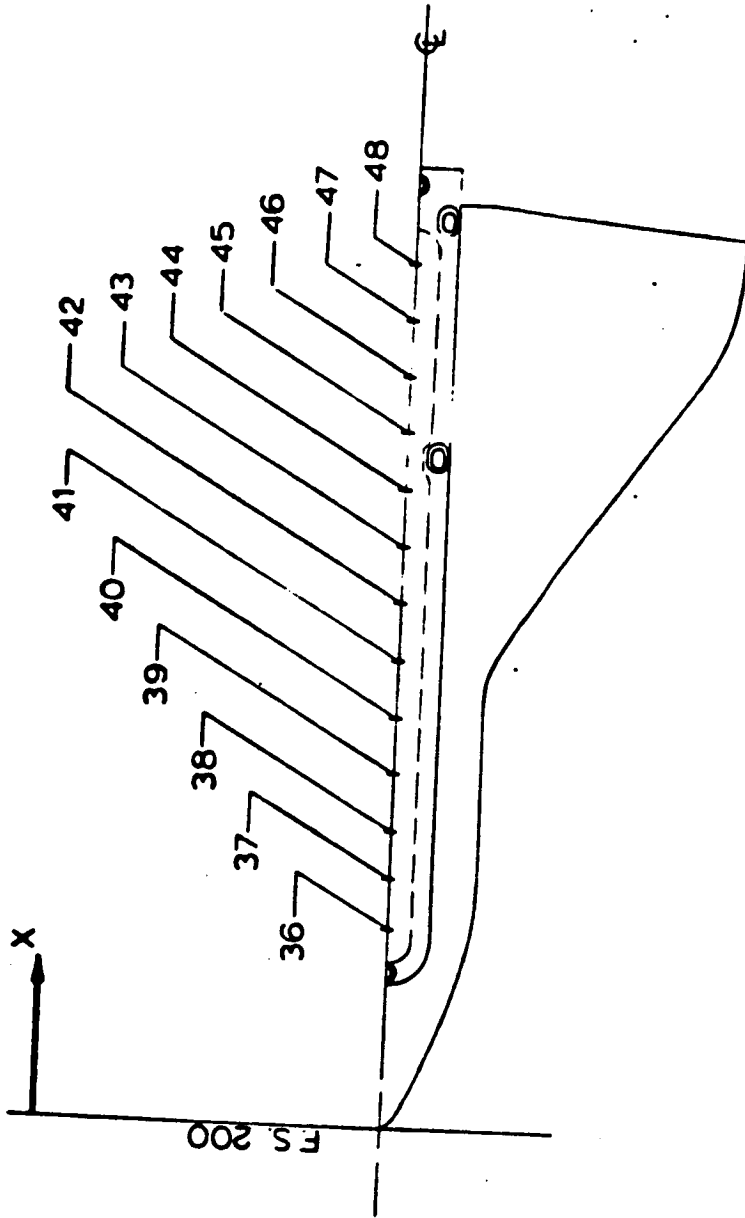
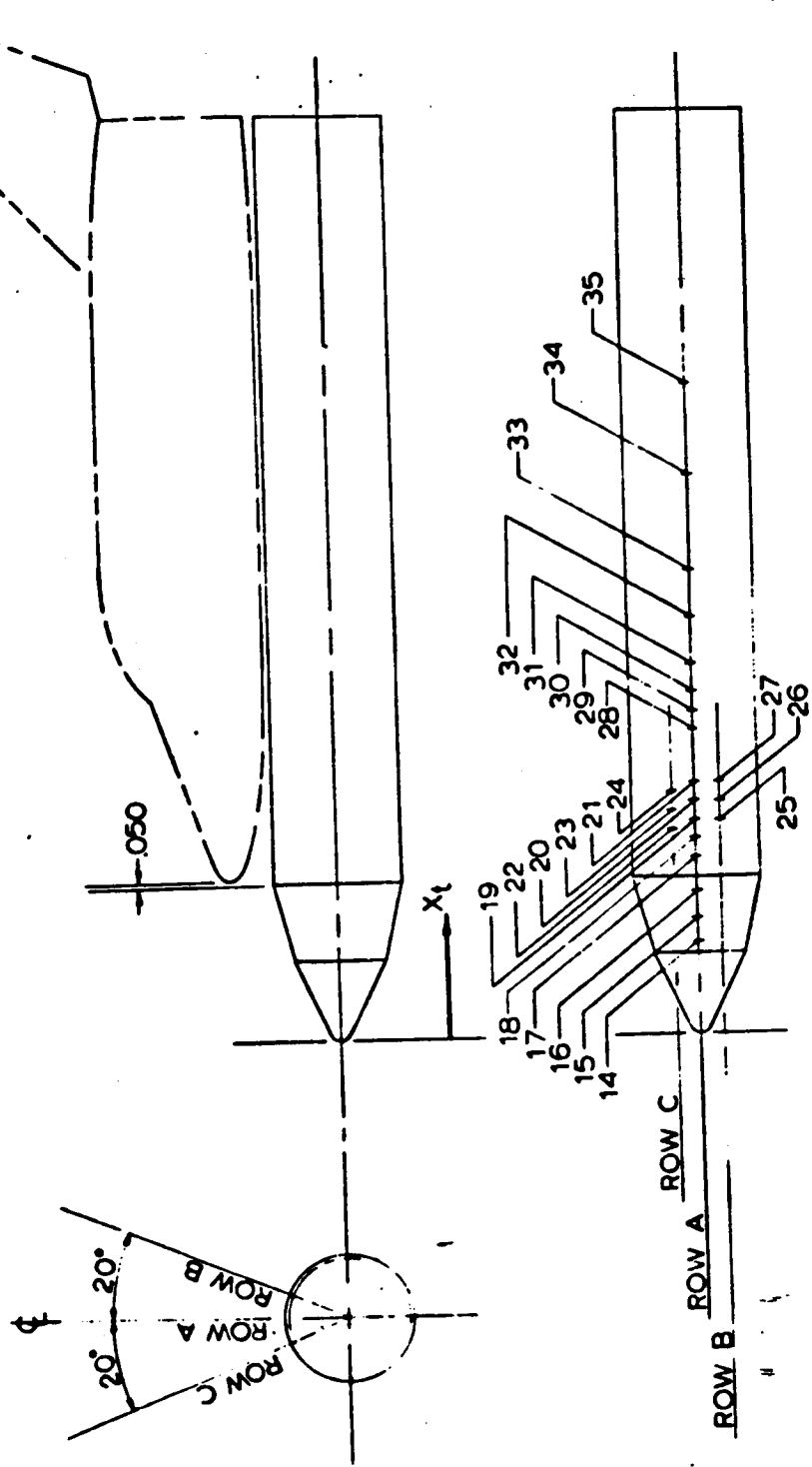


FIGURE 2. ORBITER THERMOCOUPLE LOCATIONS (LOWER SURFACE)

CYLINDRICAL BOOSTER
 GAC
 DELTA WING ORBITER
 GAC
 DR#1234 C-3-87

FIGURE 3. HO TANK THERMOCOUPLE LOCATIONS



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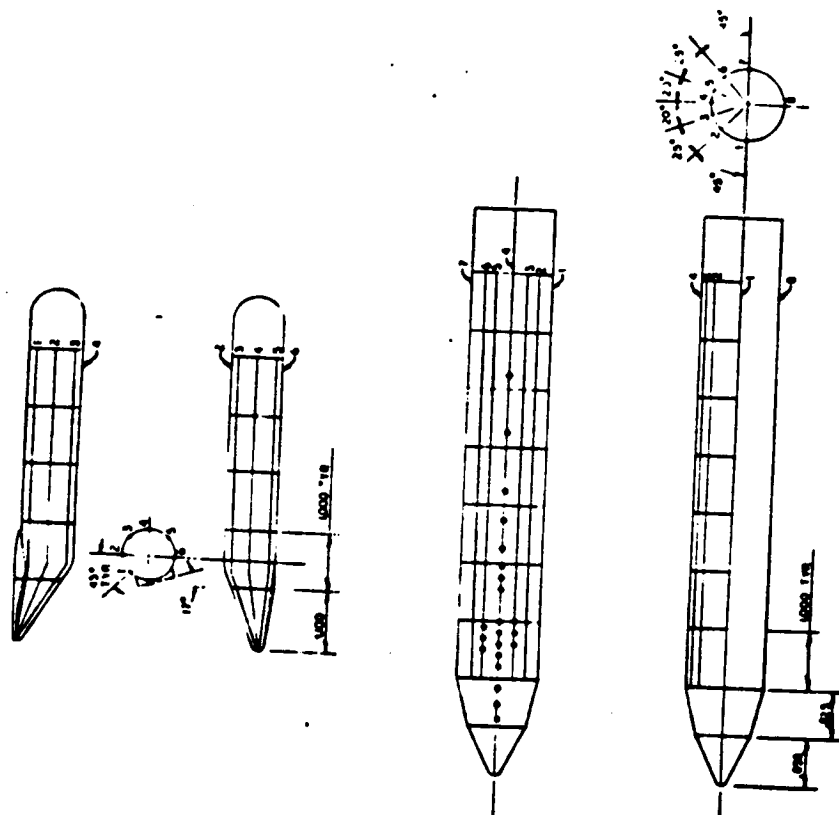
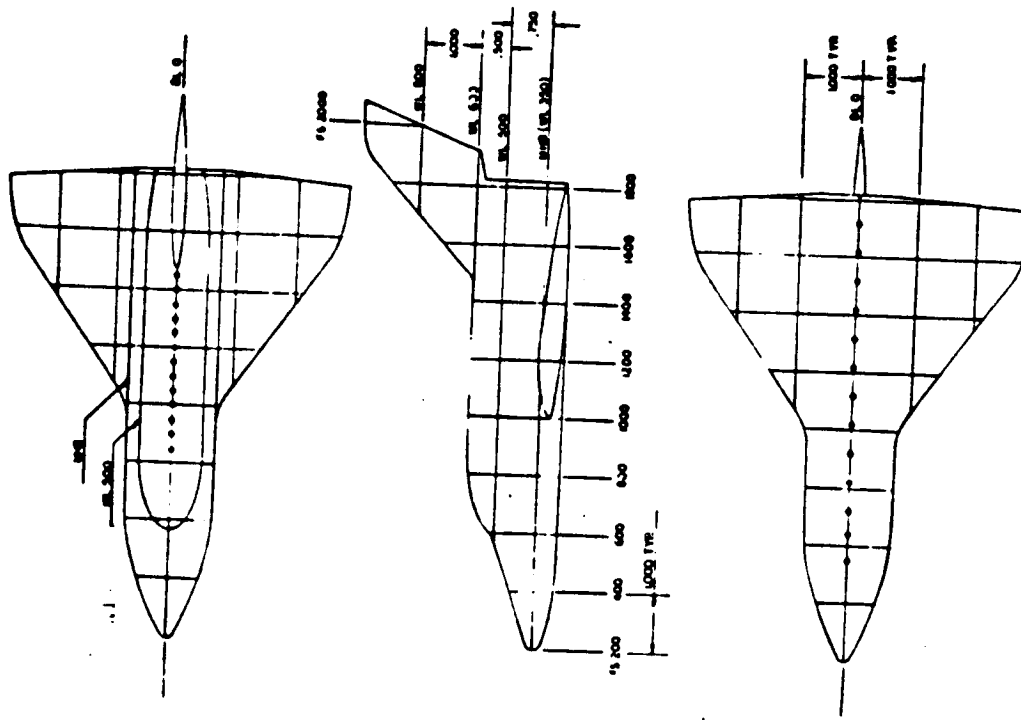


FIGURE 4. REFERENCE GRID SYSTEMS - PHASE CHANGE POINT MODELS

CYLINDRICAL BOOSTER
 GAC
 DELTA WING ORBITER
 GAC
 DR#1234 C-3-89

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Table 1. TEST CONDITIONS

MSFC RUN NO.	LaRC RUN NO.	P _t PSIG	Re/FT x 10 ⁻⁶	T _c °F	INSERT. TIME	INITIAL TEMP. °F	PHASE CHG. TEMP. °F	MACH NO.	ANGLE OF ATTACK	DATE	TIME EDT	ΔX ₀	ΔZ	ΔX _B	ΔY	MODEL*	CONF.
1	2886	26.5	.29	780	29.6	82	119/150	7.53	0	5/15	2:00					H/M1	
2	2887	185	1.00	835	30.4	86	119/150	7.78	0	5/15	2:15					H/M1	
3	2888	1185	5.00	930	15.4	87	150/200	8.01	0	5/15	2:35					H/M3	
4	2889	1175	4.90	930	15.1	91	150/200	8.00	0	5/15	3:00					H/M2	
5	2890	1190	5.05	930	15.5	87	300/150	8.00	0	5/16	8:40					H/M1	
6	2891	2590	10.0	1025	8.3	82	119/100	7.5	0	5/16	10:00					TMR/M2	
7	2892	25	0.29	650	30.4	88	119/100	7.5	0	5/16	10:45					T/M3	
8	2893	26	0.29	795	30.5	91	119/100	7.5	0	5/16	11:20					TMR/M2	
9	2894	185	1.00	850	32.2	88	150/100	7.78	0	5/16	12:46					TMR/M2	
10	2895	1193	5.00	925	15.7	91	200/103	8.0	0	5/16	1:14					T/M1	
11	2896	186	1.00	835	23.9	89	150/103	7.78	0	5/16	1:48					T/M3	
12	2897	1195	5.00	930	19.0	89	200/103	8.0	0	5/16	1:58					T/M1	
13	2898	2600	10.0	990	10.4	89	250/119	8.0	0	5/16	2:20					TMR/M2	
14	2899	2590	10.0	975	11.4	89	250/119	8.0	0	5/17	2:50					B/1	
15	2900	2590	10.0	985	10.6	89	300/150	8.0	0	5/16	3:18					T01	A
16	2901	30	0.29	750	10.3	86	300/103	7.5	0	5/17	10:00	3.68	0.0715			T01	A
17	2902	26	0.29	765	32	87	250/103	7.5	0	5/17	10:45	3.68	0.0715			T01	A
18	2903	30	0.29	725	27	89	200/103	7.5	0	5/17	11:12	3.68	0.0715			T01	A
19	2904	25	0.29	775	33.4	90	150	7.5	0	5/17	1:10	3.68	0.0715			T01	B
20	2905	30	0.29	725	30.4	90	150	7.5	0	5/17	1:40	3.68	0.0715			T01	B
21	2906	30	0.29	700	30.2	91	250	7.5	0	5/17	2:20	2.68	0.0715			T01	B
22	2907	22.5	0.29	810	33.4	92	150	7.5	0	5/17	3:00	3.68	0.084			T03	A
23	2908	25	0.29	740	30.2	91	150	7.5	0	5/17	3:27	3.68	0.084			T03	A
24	2909	27	0.29	815	30.1	83	250	7.5	0	5/18	8:30	3.68	0.084			T03	A
25	2910	25	0.29	700	32.9	87	150	7.5	0	5/18	9:25	3.68	0.084			T01	A
26	2911	1195	5.0	950	11.7	92	300	8.0	0	5/18	10:00	3.68	0.084	0.97	0.048	L1	C
27	2912	1185	5.0	930	10.3	92	350	8.0	0	5/18	10:40	3.68	0.084	0.97	0.048	L1	C
28	2913	2595	10.0	930	8.8	85	450	8.0	0	5/18	12:25	3.68	0.084	0.97	0.048	L1	C
29	2914	2600	10.0	960	5.4	84	350/125	8.0	0	5/18	1:04	3.68	0.084	0.97	0.048	L2	C
30	2915	2590	10.0	965	5.7	86	500	8.0	0	5/18	1:55	3.68	0.084	0.97	0.048	TMR/M2	C
31	2916	2590	10.0	985	15.2	85	138	8.0	0	5/18	2:30					T/M1	D
32	2917	2605	10.0	925	22.0	87	138	8.0	0	5/18	2:53	3.68	0.084	2.00	0.048	L2	D
33	2918	1185	5.0	950	12.8	88	500	8.0	0	5/18	3:30	3.68	0.084	2.00	0.048	L2	D
34	2919	1180	5.0	975	8.5	81	400	8.0	0	5/19	8:33	3.68	0.084	0.97	0.048	L2	E
35	2920	1185	5.0	955	10.3	89	400	8.0	0	5/19	9:00	2.68	0.084	0.97	0.048	L2	E
36	2921	1205	5.0	955	10.4	88	500	8.0	0	5/19	9:35	2.68	0.084	0.97	0.048	L2	C
37	2922	1180	5.0	940	8.2	88	500	8.0	0	5/19	10:10	3.68	0.042	0.97	0.048	L2	C
38	2923	1195	5.0	950	8.4	88	400	8.0	0	5/19	10:35	3.68	0.042	0.97	0.048	L2	C
39	2924	1200	5.0	950	8.6	87	500	8.0	0	5/19	11:15	3.68	0.084	0.97	0.096	L2	C
40	2925	1195	5.0	945	8.1	86	400	8.0	0	5/19	12:25	3.68	0.084	0.97	0.096	L2	C
41	2926	1205	5.0	940	10.8	85	138	8.0	0	5/19	1:00	3.68	0.084	0.97	0.048	L2	C
42	2927	25	0.29	780	32.3	87	138/200	7.5	+10	5/19	2:10	3.68	0.084	0.97	0.048	T02	C
43	2928	24	0.29	710	25.4	86	138/103	7.5	+10	5/19	2:38	3.68	0.084	0.97	0.048	T02	C
44	2929	27	0.29	695	20.0	84	103	7.5	+10	5/19	3:05	3.68	0.084	0.97	0.048	T/M3	C

*See Table 2.

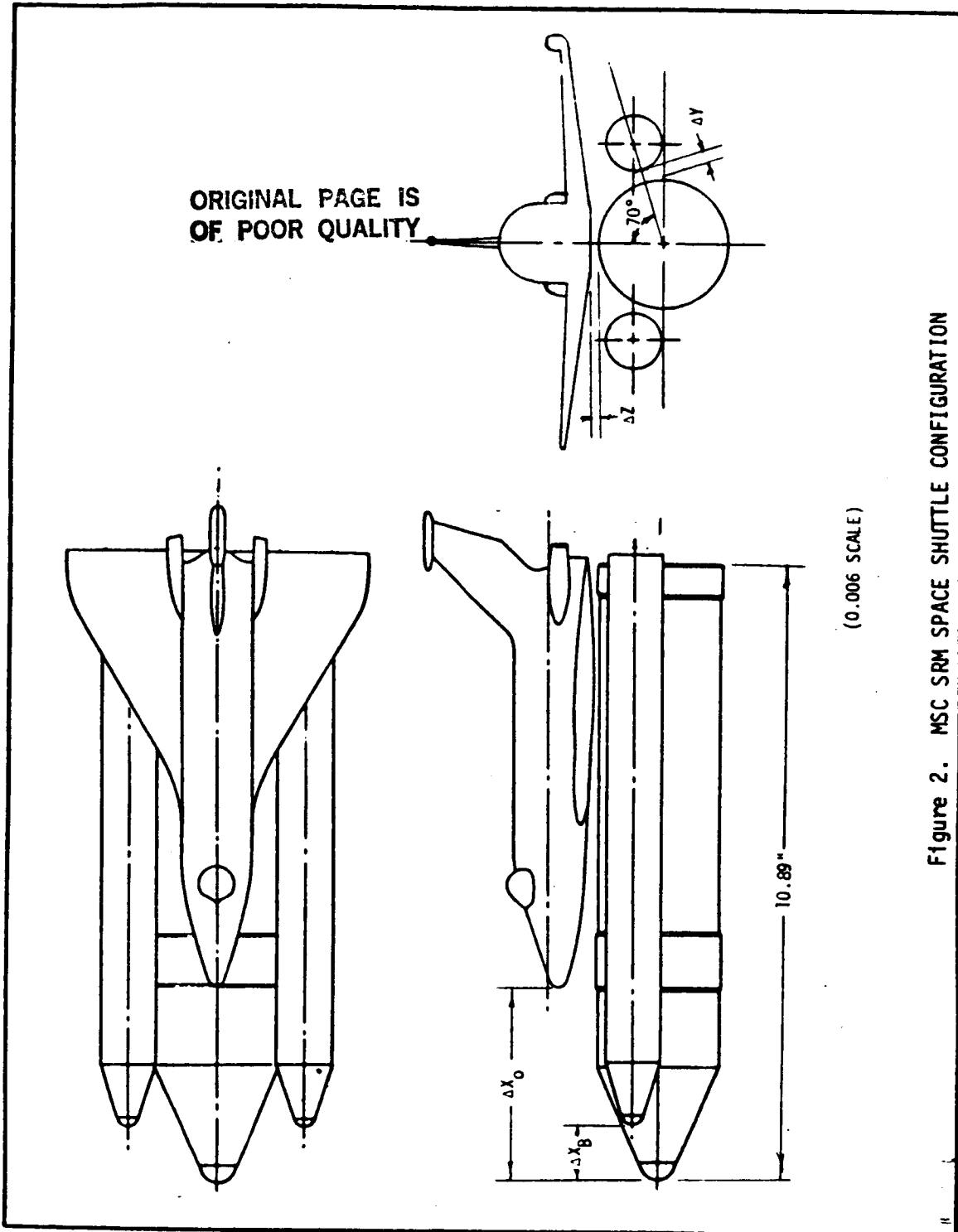
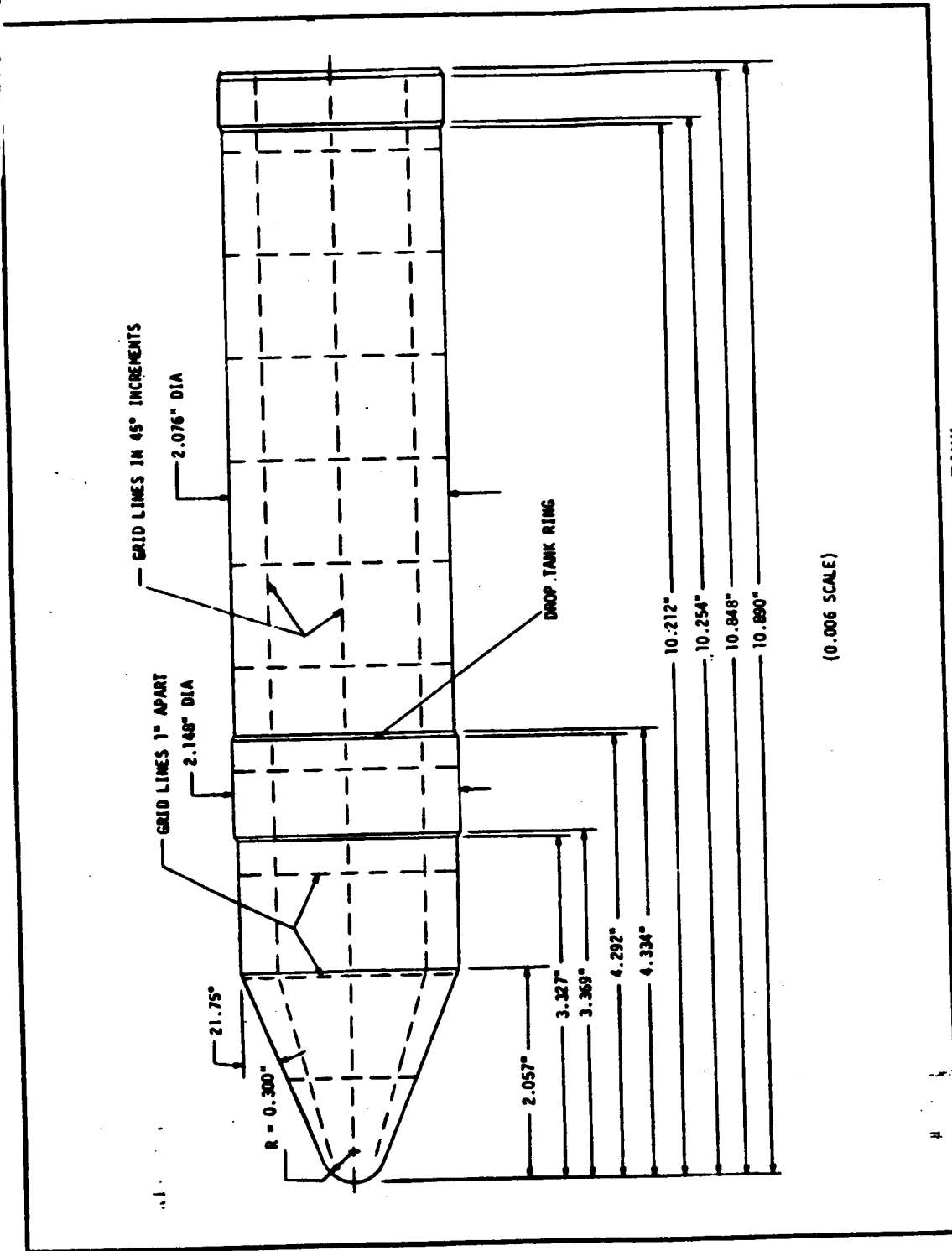


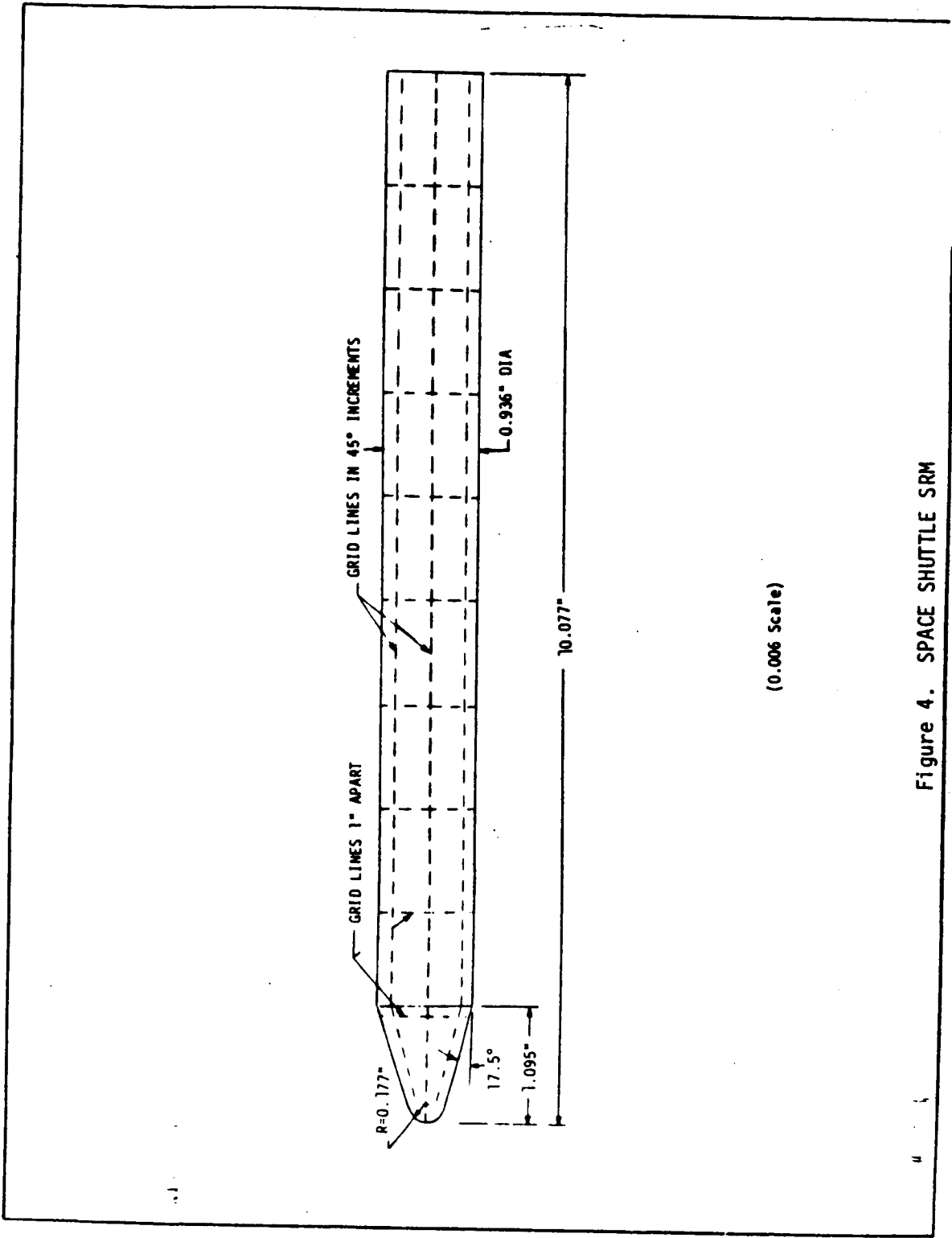
Figure 2. MSC SRM SPACE SHUTTLE CONFIGURATION

CYLINDRICAL BOOSTER
MSFC
DELTA WING ORBITER
MSC
DR#1278 C-3- 91



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Figure 3. SPACE SHUTTLE HO DROP TANK

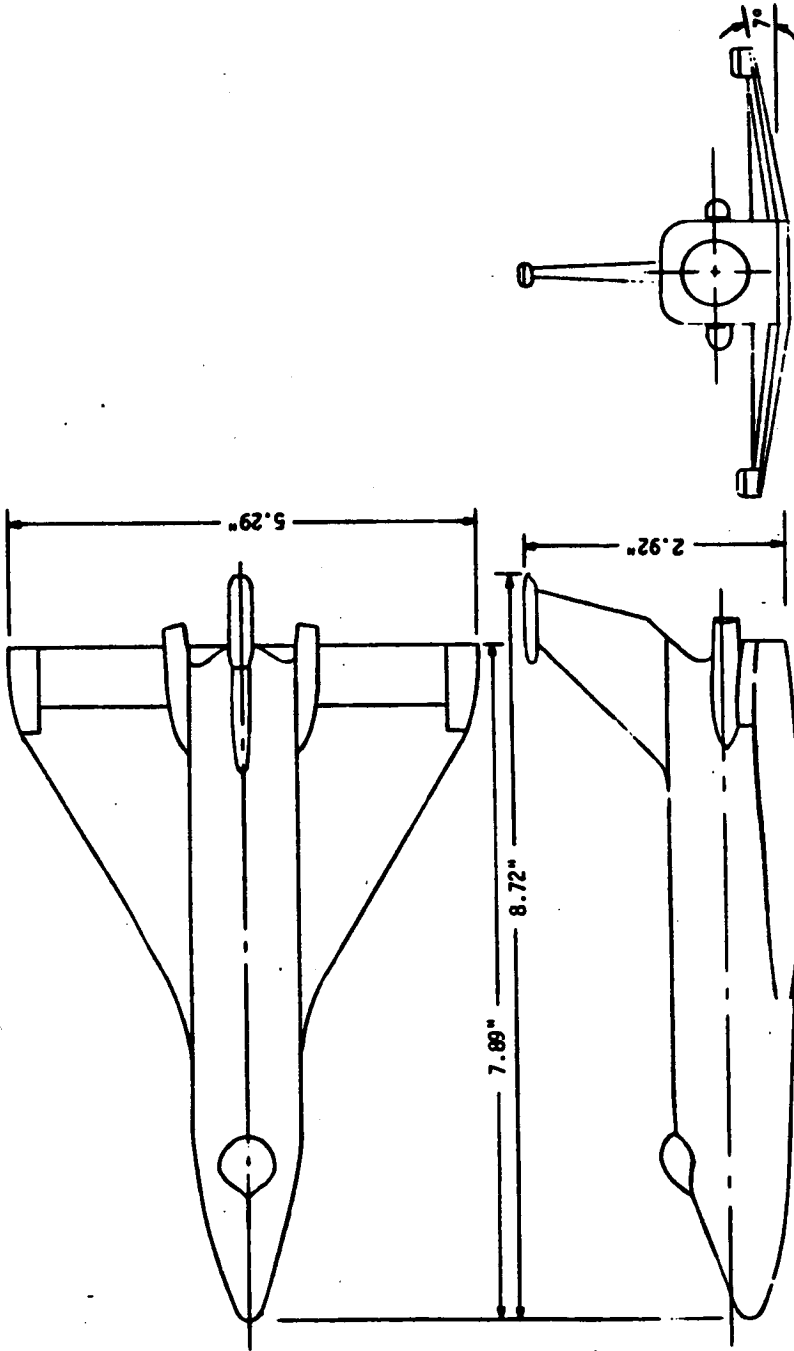


(0.006 Scale)

Figure 4. SPACE SHUTTLE SRM

CYLINDRICAL BOOSTER
MSFC
DELTA WING ORBITER
MSC
DR#1278 C-3-93

CYLINDRICAL BOOSTER
MSFC
DELTA WING ORBITER
MSC
DR#1278 C-3-94



(0.006 SCALE)

Figure 1. SPACE SHUTTLE 040A ORBITER

TABLE I.

PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: *Investigation of Heating Rates on 14 and 19 givers by Confinement*

TEST NUMBER: R08

TEST FACILITY: LERC D-8 10T

TEST DATE: Dec 3-10, 1972

TEST ENGINEER: J. Houser

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	Taw* / Ttotal	RNX106 Ft (Wmi.)	Phase Change Temp. (°F)	Model Position (degrees)			Camera** Location (in)		
									α	β	φ	X	Y	Z
250	O.B.S.V.T.	0033	7.85	315	1285	1.0	1.65	125	0	0	0	-	-	-
05	-	-	-	320	1315	-	-	200	-	-	180	-	-	-
06	-	-	-	325	-	-	-	-	-	-	-	-	-	-
07	-	-	-	325	1320	-	-	-	-	-	-	-	-	-
08	-	-	-	325	-	-	-	125	-	-	0	-	-	-
09	-	-	6.1	2525	1415	-	10.0	250	-	-	-	-	-	-
10	-	-	-	-	-	-	-	400	-	-	90	-	-	-
11	B.S.V.T.	-	-	2585	-	-	-	150	-	-	0	-	-	-
12	O.B.S.V.T.	-	-	-	1415	-	-	-	-	-	-	-	-	-
13	-	-	-	2525	1410	-	-	-	-	-	180	-	-	-
14	-	-	7.85	315	1310	-	1.65	200	-	-	0	-	-	-
15	-	-	-	320	-	-	-	125	-	-	180	-	-	-
2516	-	-	-	325	-	-	-	200	-	-	0	-	-	-
								125	-	-	-	-	-	-

* Taw : adiabatic wall temperature

** X axis parallel to stream (+downstream, -upstream)
 Y axis (+right, -left, as viewed from the rear)
 Z axis (+up, -down)

*** 14 giver mounted upright gives φ=0; nose up with respect to givers α=0
 Booster alone with fins up gives φ=0

CYLINDRICAL BOOSTER
 TBC
 DELTA WING ORBITER
 GAC
 DR#1261 C-3-95

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TABLE I. (Continued)
 PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: *Investigation of Heating Rates on Wall and Secondary Configuration*
 TEST NUMBER: R08 TEST FACILITY: LaRC N-8 VDT
 TEST DATE: Mar 3-10 1972 TEST ENGINEER: A. Hauser

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	Taw Ttotal	RNX10 ⁶ Ft (Hours)	Phase Change Temp. (°F)	Model Position (degrees)			Camera** Location (in)		
									α	θ	ϕ	X	Y	Z
2517	O.B. S.V.T.	.0033	8.1	25225	1445	1.0	10	320	-	0	7.1	1	1.0	
15	-	-	7.85	315	1340	-	1.65	125	-	15	-	-	-	
19	-	-	8.1	25245	1440	-	10	150	-	0	-	-	-	
20	-	-	-	25225	1465	-	-	-	-	180	-	-	-	
22	-	-	7.85	320	1335	-	1.65	300	-5	0	-	-	-	
23	-	-	8.1	25225	1465	-	10	320	-	-	-	-	-	
24	-	-	-	25225	1425	-	-	150	-	-	-	-	-	
25	-	-	7.85	320	1305	-	1.65	125	-	-	-	-	-	
26	-	-	8.1	25230	1375	-	10	150	-	180	-	-	-	
27	-	-	7.85	325	1305	-	1.65	175	-	-	-	-	-	
28	-	-	-	-	1320	-	-	-	0	-	-	-	-	
30	Reference Hemisphere	-	-	-	1325	-	-	400	-	0	-	-	-	
2531	-	-	-	320	1330	-	-	150	-	-	-	-	-	

** X axis parallel to stream (+ downstream, - upstream)
 Y axis (+ right, - left, as viewed from the rear)
 Z axis (+ up, - down)

* Taw :: adiabatic wall temperature

see 14 model mounted upright pins 1.0, press up with respect to pins 270
Booster alone with pins top pins 1.0.

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TABLE I. (Continued)
PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: *Investigation of Heating Rates on UV and Epoxy Coatings*
 TEST NUMBER: *R28* TEST FACILITY: *606 N-S VDI*
 TEST DATE: *Mar 3-10, 1972* TEST ENGINEER: *J. Hesser*

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	T _w / T _{total}	RNX10 ⁶ / Ft (Nom)	Phase Change Temp. (°F)	Model Position (degrees)			Camera** Location (in)		
									α	β	φ	X	Y	Z
33	<i>Reference hemisphere</i>	<i>1:1</i>	<i>8.0</i>	<i>1020</i>	<i>1355</i>	<i>1.0</i>	<i>4.8</i>	<i>100</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>7.5</i>	<i>8.5</i>	<i>0</i>
34	-	-	<i>7.5</i>	<i>320</i>	<i>1315</i>	-	<i>1.65</i>	<i>250</i>	-	-	-	-	-	-
35	-	-	<i>8.0</i>	<i>1025</i>	<i>1345</i>	-	<i>4.8</i>	<i>250</i>	-	-	-	-	-	-
36	<i>B.5.V.</i>	-	<i>7.5</i>	<i>320</i>	<i>1315</i>	-	<i>1.65</i>	<i>150</i>	-	-	-	-	-	-
37	-	-	-	-	<i>1305</i>	-	-	<i>200</i>	-	-	-	-	-	-
38	-	-	-	<i>325</i>	<i>1315</i>	-	-	<i>150</i>	-	-	-	-	-	-
39	-	-	<i>8.1</i>	<i>2520</i>	<i>1440</i>	-	<i>10.0</i>	-	-	-	-	-	-	-
40	-	-	<i>7.85</i>	<i>320</i>	<i>1255</i>	-	<i>1.65</i>	<i>200</i>	-	-	-	-	-	-
41	-	-	-	-	<i>1315</i>	-	-	<i>125</i>	-	-	-	-	-	-
42	-	-	<i>8.1</i>	<i>2525</i>	<i>1415</i>	-	<i>10.0</i>	<i>250</i>	-	-	-	-	-	-
43	-	-	-	<i>3515</i>	<i>1425</i>	-	-	<i>150</i>	-	-	-	-	-	-
44	-	-	-	<i>2535</i>	<i>1325</i>	-	-	<i>250</i>	-	-	-	-	-	-
259	-	-	<i>7.85</i>	<i>320</i>	<i>1310</i>	-	<i>1.65</i>	<i>150</i>	-	-	-	-	-	-

** X axis parallel to stream (+downstream, -upstream)
 Y axis (+right, -left, as viewed from the rear)
 Z axis (+up, -down)

**** 12V metal mounted upright gives 90°, more up with respect to givis axis*
Booster above with fins up gives 60°
4 Run 44-55 were made with low La melting configuration on string at 60° CYLINDRICAL BOOSTER

TABLE I. (Continued)

PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: *Investigation of Heating Rates on W and Rectangular Configurations*

TEST NUMBER: *288* TEST FACILITY: *LRRL D-2 VOT*

TEST DATE: *Mar 3-10, 1972* TEST ENGINEER: *J. Houser*

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	Taw Ttotal	RNX106 Ft (diam)	Phase Change Temp. (°F)	Model Position (degrees)			Camera** Location (in)		
									α	β	φ	X	Y	Z
2546	B5.1V	.0033	7.85	320	1325	1.0	1.65	150	5	0	180	7.5	2.6	2.6
47	-	-	8.1	2575	1430	-	10.0	-	-	0	-	-	-	-
48	-	-	-	2550	1470	-	-	300	-	-	-	-	-	-
49	-	-	7.65	325	1300	-	1.65	150	-5	-	-	-	-	-
50	-	-	-	325	1340	-	-	200	-	-	-	-	-	-
51	-	-	-	320	1310	-	-	150	-	-	180	-	-	-
52	-	-	8.1	2330	1470	-	10.0	-	-	-	-	-	-	-
53	-	-	-	2320	1435	-	-	300	-	-	0	-	-	-
54	-	-	-	-	1445	-	-	150	-	-	180	-	-	-
55	-	-	-	2570	1490	-	-	300	-	-	-	-	-	-
56	-	-	7.85	320	1285	-	1.65	300	0	-	180	-	-	-
57	-	-	-	-	1525	-	-	400	-	-	-	-	-	-
2558	-	-	8.1	2325	1430	-	10.0	-	-	-	-	-	-	-

** X axis parallel to stream (+downstream, -upstream)
 Y axis (+right, -left, as viewed from the rear)
 Z axis (+up, -down)

* Taw : adiabatic wall temperature

*4.4 1/2 inch model mounted upright gives 4.0. the up with respect to y gives 2.0.
 Booster alone with fins up gives 4.0
 † Fins 56 on were made with high-α reentry configuration on sting at 75°*

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TABLE I. (Continued)

PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: *Investigation of Heating Rates on 1/4" and 1/2" Round Rods by Signatures*

TEST NUMBER: *288*

TEST FACILITY: *LEET A-8 1DT*

TEST DATE: *Apr 3-10, 1972*

TEST ENGINEER: *J. H. Gesser*

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	T _{aw} / T _{total}	RNX106 Ft	Phase Change Temp. (°F)	Model Position (degrees)			Camera** Location (in)		
									α	φ	ψ	X	Y	Z
<i>2559</i>	<i>B-5, H</i>	<i>1:633</i>	<i>6.1</i>	<i>2030</i>	<i>1435</i>	<i>1.0</i>	<i>10.0</i>	<i>550</i>	<i>0</i>	<i>0</i>	<i>180</i>	<i>100</i>	<i>100</i>	<i>100</i>
<i>60</i>	<i>-</i>	<i>-</i>	<i>7.5</i>	<i>310</i>	<i>1315</i>	<i>-</i>	<i>1.65</i>	<i>510</i>	<i>10</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>
<i>61</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>315</i>	<i>1315</i>	<i>-</i>	<i>-</i>	<i>500</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>
<i>62</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>320</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>10</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>
<i>63</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>400</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>
<i>2560</i>	<i>-</i>	<i>-</i>	<i>6.1</i>	<i>2535</i>	<i>1425</i>	<i>-</i>	<i>10.0</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>
				<i>2525</i>	<i>1350</i>	<i>-</i>	<i>-</i>	<i>550</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>

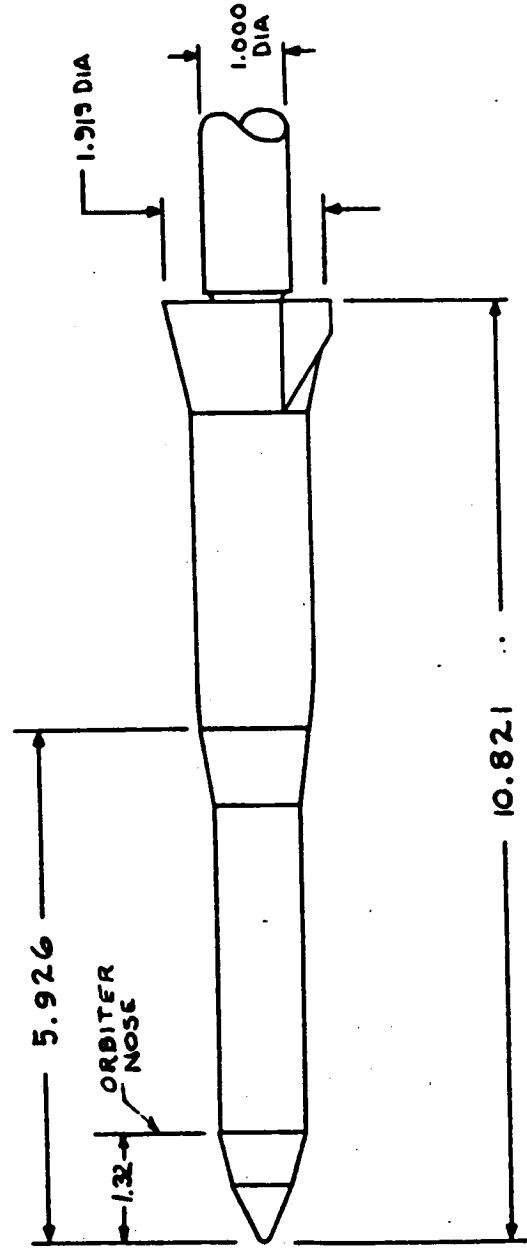
** X axis parallel to stream (+downstream, -upstream)
Y axis (+right, -left, as viewed from the rear)
Z axis (+up, -down)

* T_{aw} = adiabatic wall temperature

*1/4" model mounted upright gives φ=0. Base up with respect to g gives α<0
Booster above with fins up gives ψ=0*

CYLINDRICAL BOOSTER
TBC
DELTA WING ORBITER
GAC
DR#1261 C-3-99

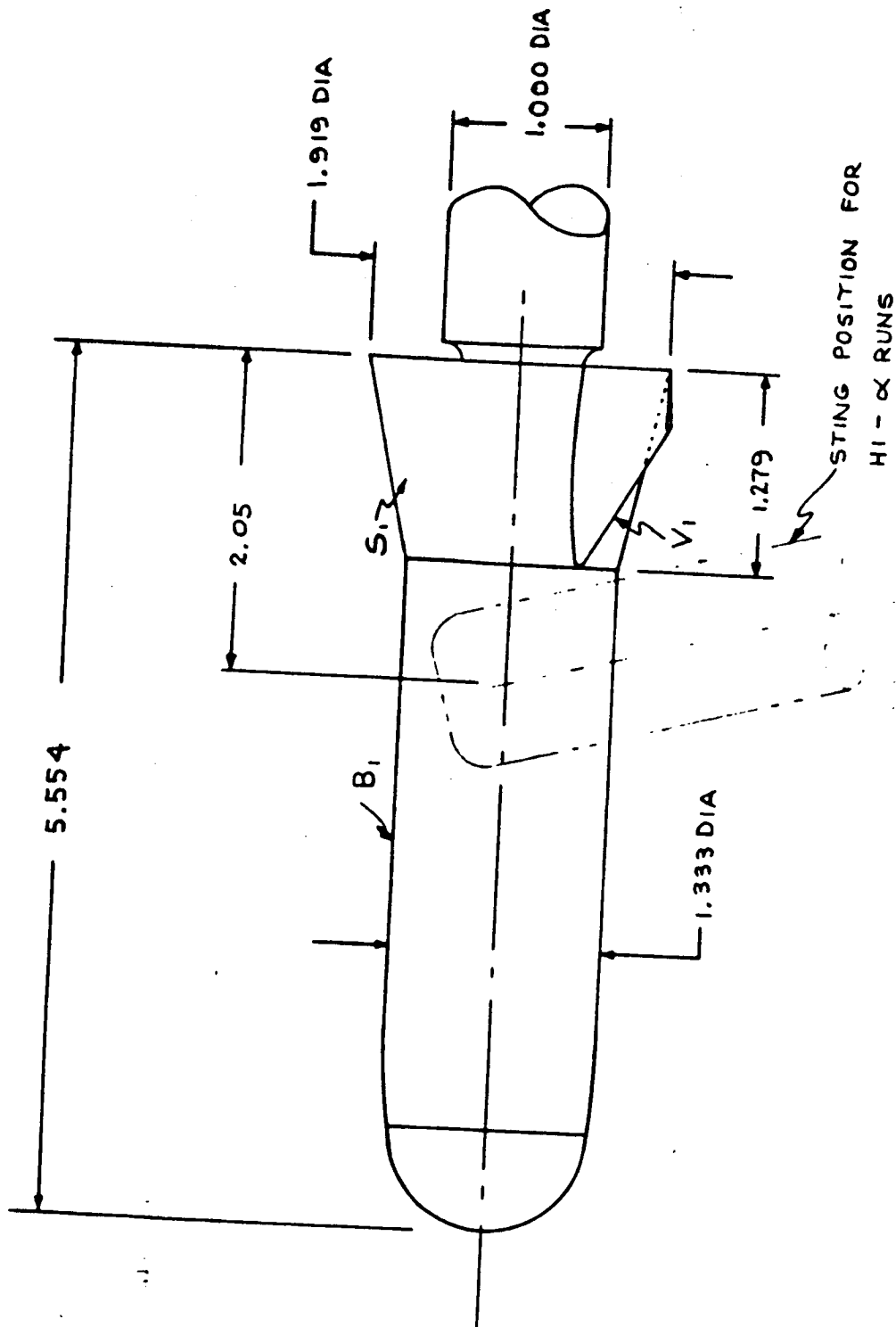
CYLINDRICAL BOOSTER
TBC
DELTA WING ORBITER
GAC
DR#1261 C-3- 100



AX - 1234 M-1
BOOSTER - TANK ASSEMBLY; B, S, V, T,

FIGURE 4. BOOSTER-TANK ASSEMBLY DRAWING

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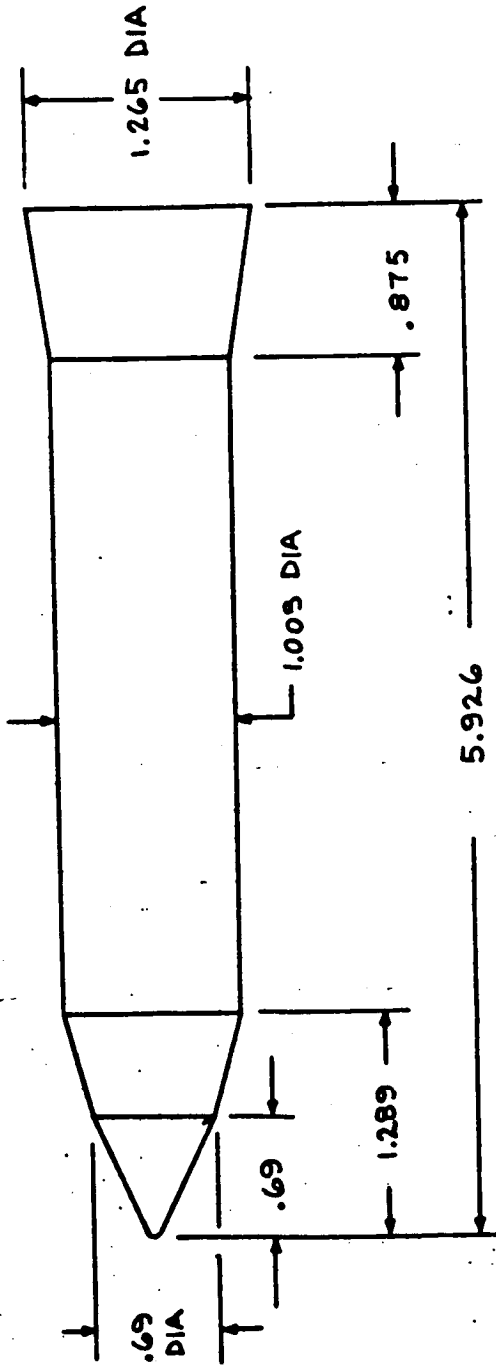
AX - 1234 M - 1

BOOSTER ASSEMBLY ; B_1, S_1, V_1

FIGURE 5. BOOSTER ASSEMBLY DRAWING

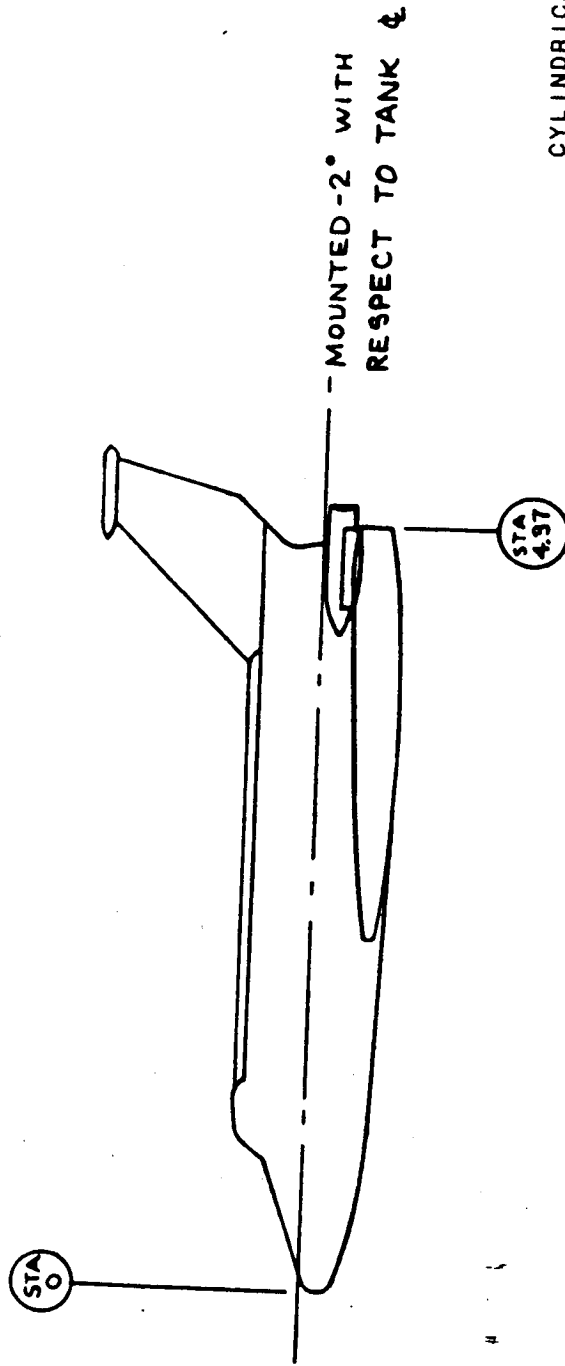
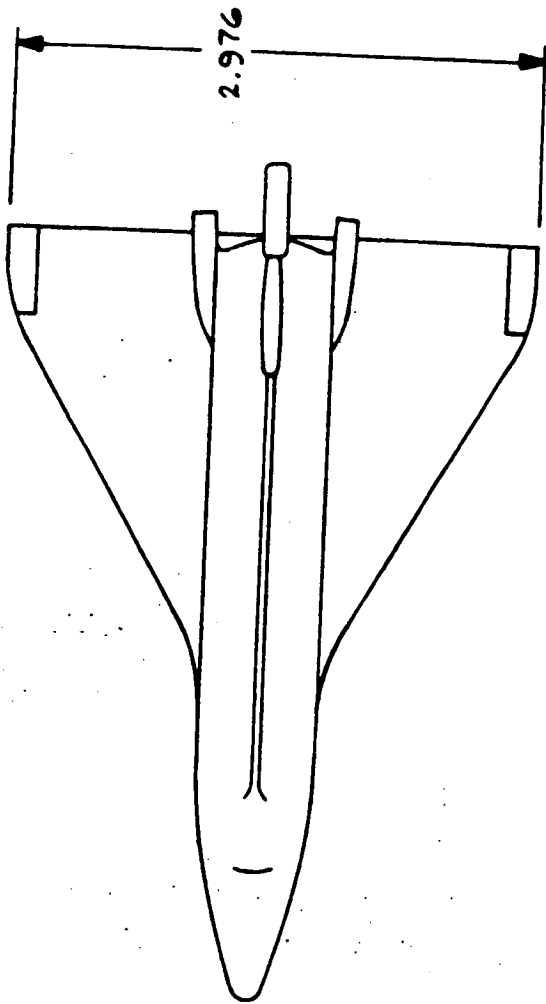
CYLINDRICAL BOOSTER
TBC
DELTA WING ORBITER
GAC
DR#1261 C-3-101

CYLINDRICAL BOOSTER
TBC
DELTA WING ORBITER
GAC
DR#1261 C-3- 102



AX - 1234 M-1
ORBITER TANK; T₁

FIGURE 6. ORBITER TANK DRAWING



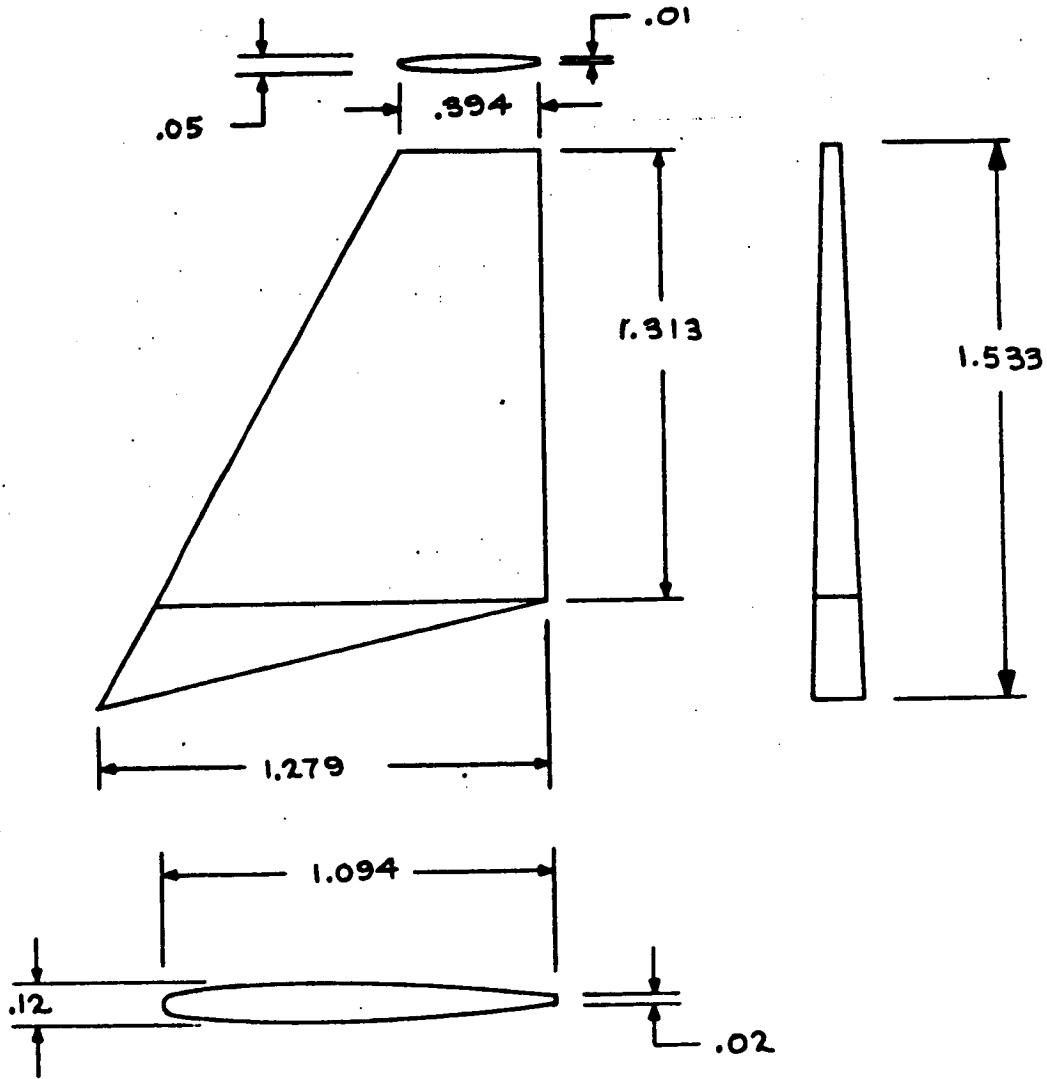
CYLINDRICAL BOOSTER
TBC
DELTA WING ORBITER
GAC
DR#1261 C-3- 103

AX-1234 M-1

040 A ORBITER ; O₁

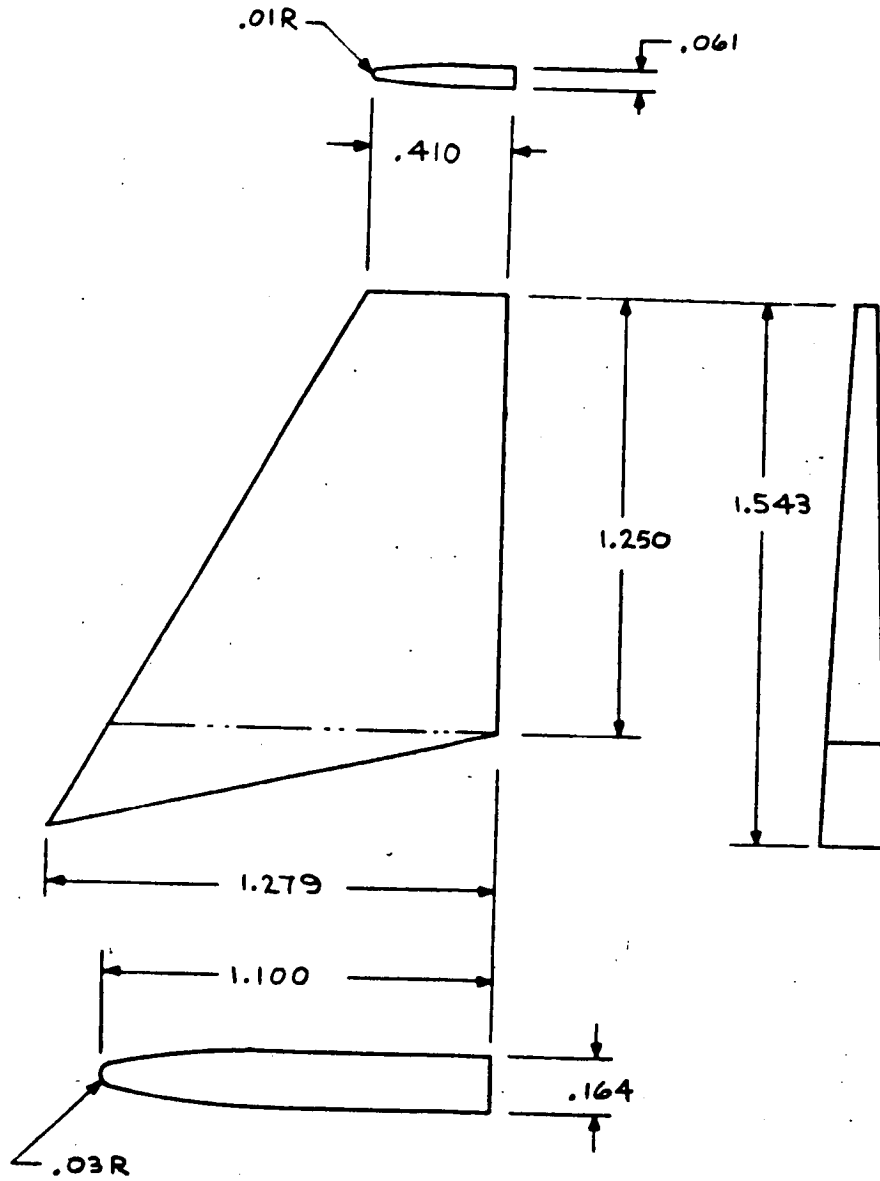
FIGURE 7. 040-A ORBITER DRAWING

CYLINDRICAL BOOSTER
TBC
DELTA WING ORBITER
GAC
DR#1261 C-3- 104



AX-1234 M-1
SCALE FIN; V₁

FIGURE 8. SCALE FIN DRAWING



AX-1234M-1

FIN; V₁

FIGURE 9. TEST FIN DRAWING

TABLE 4

CYLINDRICAL BOOSTER
 TBC
 UNIQUE CONFIGS. ORBITER
 GAC
 DR#1178 C-3-106

THIN SKIN THERMOCOUPLE TEST DATA SUMMARY SHEET

RE-ENTRY HEAT TRANSFER TO ORBITER SURFACES AND INTERFERENCE
 HEATING DURING LAUNCH, BOOST AND HIGH ALTITUDE ABOUT RE-ENTRY

TEST NUMBER: 69 TEST FACILITY: NASA/LJG 31 INCL-CFIT
 TEST DATE: June 2-11, 1971 TEST ENGINEER: A. D'Errico

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	T _{aw} * / T _{total}	RNX10 ⁶ / Ft	Phase Change Temp. (°F)	Model Position (degrees)			Camera** Location (in)		
									α	β	φ	X	Y	Z
8	(O) ₃ T ₅	.0067	10.35	750.0	1818	1.0	.97	N/A	0	0	0			
9				750.5	1834		.95		-5					
10				749.4	1837		.95		0	-5				
11				748.1	1838		.94			0				
12				745.2	1854		.92			+5				
13				754.7	1842		.95		-5	0				
14				753.4	1844		.94		+5					
15				753.3	1846		.94		+10					
16				753.6	1846		.94		+20					
17	(B) _{2H} (b) ₃ A ₇ T ₅			753.9	1821		.97		0					
18				753.5	1840		.95		-5					
19				753.1	1800		.99		0					
20	(U) _{3L} (O) ₃ A ₁ T ₅			755.0	1813		.91							

* T_{aw} = adiabatic wall temperature

** X axis parallel to stream (+downstream, -upstream)
 Y axis (+right, -left, as viewed from the rear)
 Z axis (+up, -down)

TABLE 4 (CONTINUED)

THIN SKIN THERMOCOUPLE TEST DATA SUMMARY SHEET
 HEAT FLUX TRANSFER TO ORBITER SURFACES AND INTERFERENT
 TEST TITLE: HEATING DURING LAUNCH, BOOST AND HIGH ALTITUDE ABOVE RE-ENTRY

TEST NUMBER: 69 TEST FACILITY: NASA/LRC 31 INCH-CFHT
 TEST DATE: JUNE 2-11, 1971 TEST ENGINEER: A. D'Errico

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	Taw * Ttotal	RNX10 ⁶ Ft	Phase Change Temp. (°F)	Model Position (degrees)			Camera ** Location (in)		
									α	β	φ	X	Y	Z
21	(B)2H (0) ₃ A ₈ T ₅	.0067	10.35	754.2	1813	1.0	.98	N/A	-5	0	0			
22	(B)2H (0) ₃ A ₉ T ₅			754.7	1807		.98		0					
23				754.0	1798		.99		-5					
24				753.1	1803		.99		+5					
25	(B)2H (0) ₃ A ₁₀ T ₅			753.6	1818		.97		-5					
26				751.6	1817		.97		0					
27				750.5	1824		.96		+5					
28	(B)2H (0) ₃ A ₁₁ T ₅			749.0	1828		.95		0					
29				753.1	1819		.97		-5					
30	(B)2H (0) ₃ A ₁₂ T ₅			750.2	1823		.96		0					
31				750.3	1821		.96		-5					
32				749.4	1829		.95		+5					
33	(0) ₃			749.2	1798		.99		-5					

** X axis parallel to stream (+ downstream, - upstream)
 Y axis (+ right, - left, as viewed from the rear)
 Z axis (+ up, - down)

* Taw = adiabatic wall temperature

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CYLINDRICAL BOOSTER
 TBC
 UNIQUE CONFIGS. ORBITER
 GAC
 DR#1178 C-3- 107

TABLE 4 (CONTINUED)

CYLINDRICAL BOOSTER
 TBC
 UNIQUE CONFIGS. ORBITER
 GAC
 DR#1178 C-3- 108

THIN SKIN THERMOCOUPLE TEST DATA SUMMARY SHEET
 RE-ENTRY HEAT TRANSFER TO ORBITER SURFACES AND INTERFERENCE

TEST TITLE: HEATING DURING LAUNCH, BOOST AND HIGH ALTITUDE ABORT RE-ENTRY
 TEST NUMBER: 69 TEST FACILITY: NASA/LRC 31 INCH-CFRT
 TEST DATE: June 2-11, 1971 TEST ENGINEER: A. D'Errico

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	Taw * Ttotal	RNX10 ⁶ Ft	Phase Change Temp. (°F)	Model Position (degrees)			Camera** Location (in)		
									α	β	φ	X	Y	Z
34	(0)3	.0067	10.35	749.2	1798	1.0	.99	N/A	0	0	0			
35				749.3	1799		.98			-5				
36				757.8	1829		.96			+5				
37				754.4	1823		.97		10	0				
38				751.8	1807		.98		20					
39				751.3	1802		.98		27	-5				
40				749.3	1803		.98			0				
41				750.8	1814		.97			+5				
42				751.2	1812		.97		-5	0				
43				754.2	1813		.98		0	-5				
44				751.4	1837		.95			0				
45				751.4	1821		.96			+5				
46				750.2	1816		.97							

* Taw adiabatic wall temperature

** X axis parallel to stream (+downstream, -upstream)
 Y axis (+right, -left, as viewed from the rear)
 Z axis (+up, -down)

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TABLE 4 (CONTINUED)

THIN SKIN THERMOCOUPLE TEST DATA SUMMARY SHEET
RE-ENTRY HEAT TRANSFER TO ORBITER SURFACES AND INTERFERENCE

TEST TITLE: HEATING DURING LAUNCH, BOOST AND HIGH ALTITUDE ABOUT RE-ENTRY

TEST NUMBER: 69 TEST FACILITY: NASA/LRC 31 INCH-CFRT

TEST DATE: June 2-11, 1971 TEST ENGINEER: A. D'Errico

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	$\frac{T_{aw}}{T_{total}}$	$\frac{RNX10^6}{Ft}$	Phase Change Temp. (°F)	Model Position (degrees)			Camera** Location (in)		
									α	β	ϕ	X	Y	Z
47	(0)3	.0067	10.35	748.3	1828	1.0	.95	N/A	+5	0	0			
48				748.5	1749		1.07		10					
49				751.3	1811		.91		20					
50				753.8	1833		.95		27	-5				
51				750.6	1842		.94			0				
52				751.8	1849		.94			+5				
54				761.9	1777		1.03		40	0				
55				771.2	1756		1.06		45					
57				777.1	1737		1.10							
58				768.0	1728		1.09		40					

** X axis parallel to stream (+downstream, -upstream)
Y axis (+right, -left, as viewed from the rear)
Z axis (+up, -down)

* T_{aw} :: adiabatic wall temperature

TABLE 6

PHASE CHANGE COATING TEST DATA SUMMARY SHEET
 RE-ENTRY HEAT TRANSFER TO ORBITER SURFACES AND INTERFERENCE
 HEATING DURING LAUNCH, BOOST AND HIGH ALTITUDE ABORT RE-ENTRY

TEST NUMBER: 69 TEST FACILITY: NASA/LRC 31 IICH-CFHT
 TEST DATE: June 2-11, 1971 TEST ENGINEER: A. D'Errico

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	Taw * Ttotal	RNX106 Ft	Phase Change Temp. (°F)	Model Position (degrees)			Camera** Location (in)		
									α	β	φ	X	Y	Z
64	(0) ₃ T ₅	.0067	10.35			1.0		250	0	0	RWD			
65								150 L50LT			LWD			
66								325			RWD			
68								150						
69								250 150 RT			LWD			
70								150	10	0				
71								250 125 LT	0					
72								150 325 LT	20					
73	(B)2H (0) ₃ A ₇ T ₅							250	0					
74								150						
75	(0) ₃							125						
76	(B)2H (0) ₃ A ₈ T ₅							150						
77	(B)2H (0) ₃ A ₁₀ T ₅							150						

** X axis parallel to stream (+downstream, -upstream)
 Y axis (+right, -left, as viewed from the rear)
 Z axis (+up, -down)

* Taw adiabatic wall temperature
 RWD = Right wing down
 LWD = Left wing down
 LT = Left tank
 RT = Right tank

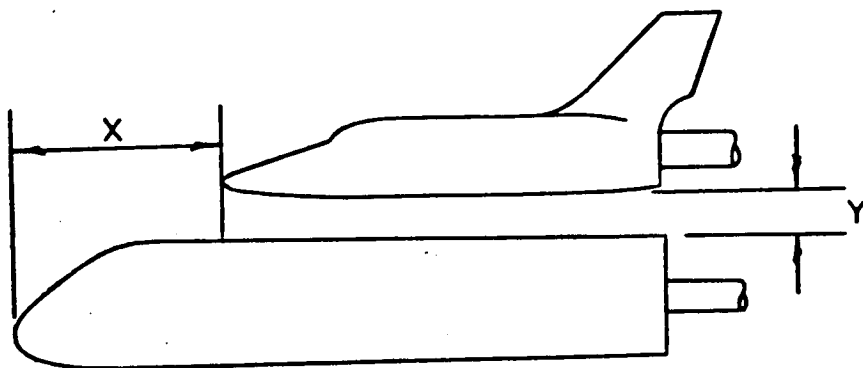
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CYLINDRICAL BOOSTER
 TBC
 UNIQUE CONFIGS. ORBITER
 GAC
 DR#1178 C-3-111

CONFIGURATION DESCRIPTION (CONTINUED)

CYLINDRICAL BOOSTER
 TBC
 UNIQUE CONFIGS. ORBITER
 GAC
 DR#1178 C-3- 112

The attachment points designated by A_x were as follows:



	<u>X(IN)</u>	<u>Y(IN)</u>	<u>ORBITER-BOOSTER ORIENTATION</u>
A_7	4.286	.160	belly to back
A_8	3.006	.160	belly to back
A_9	4.286	.080	belly to belly
A_{10}	4.286	.160	belly to belly
A_{11}	3.006	.160	belly to belly
A_{12}	4.286	0	belly to belly

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PHASE-CHANGE-COOLING TEST DATA SUMMARY SHEET
Table 1

TEST TITLE: Space Shuttle Booster/Orbiter Mated-Model Heat Transfer
Wind Tunnel Runs Mach 8 Variable Density
 TEST NUMBER: 137-146, 189-192 TEST FACILITY: Hypersonic Wind Tunnel
 TEST DATE: 19, 25 August 1970 TEST ENGINEER: W. R. Ginsky/R. Raparelli

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (*R)	T _{aw} / T _{total}	RNX106 Ft	Phase Change Temp. (*F)	Model Position (degrees)			Camera** Location (in.)		
									α	β	φ	X	Y	Z
1	B11/01 (Baseline Orbiter Position)	.0035	7.84	265	1302	0.9	1.353	250	0°	0°	0°			
2	B11/01 (Baseline Orbiter Position)		7.84	265	1357		1.265	150						
3	B11/01 (Aft Orbiter Position)		7.84	265	1395		1.210	200						
4	B11/01 (Fwd Orbiter Position)		7.84	265	1390		1.217	200						
5	B11/01 (Fwd Orbiter Position)		7.95	990	1430		4.198	300						
6	B11/01 (Aft Orbiter Position)		7.95	965	1495		3.808	300						
7	B11/01 (Baseline Orbiter Position)		7.95	955	1470		3.873	300						
8	B11/01 (Baseline Orbiter Position)		7.95	965	1460		3.957	300			-5°			
9	B11/01 (Baseline Orbiter Position)		7.84	265	1380		1.231	200			-5°			
10	B11/02 (Baseline Orbiter Position)		7.84	265	1385		1.224	150			0°			
11	B11/02 (Baseline Orbiter Position)		7.95	955	1535		3.612	250			0°			
12	B11/02 (Baseline Orbiter Position)		7.84	265	1335		1.299	150			-5°			
13	B11/02 (Baseline Orbiter Position)		7.95	945	1515		3.650	250			-5°			

** X axis parallel to stream (+ downstream, - upstream)
 Y axis (+ right, - left, as viewed from the rear)
 Z axis (+ up, - down)
 † T_{aw} = adiabatic wall temperature

DELTA WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1032 C-3- 113

PHASE-CHANGE-CO...ING TEST DATA SUMMARY SHEET
 Table 2

TEST TITLE: Space Shuttle Booster/Orbiter Mated-Model Heat Transfer
 Mach 8 Variable Density
 Wind Tunnel Runs
 193-205
 TEST NUMBER: 193-205
 TEST FACILITY: Hypersonic Wind Tunnel
 TEST DATE: 26, 27 August 1970
 TEST ENGINEER: W. R. Ginsky/R. Raparelli

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	T _{aw} * / T _{total}	RNX106 / Ft	Phase Change Temp. (°F)	Model Position (degrees)			Camera** Location (in.)		
									α	β	φ	X	Y	Z
14	B2/02 (Baseline Orbiter Position)	.0035	7.95	965	1490	0.9	3.829	250	0°	0°	0°			
15	B2/01 (Baseline Orbiter Position)		7.95	965	1520		3.708	250						
16	01		7.84	265	1365		1.253	125						
17	01		7.95	965	1490		3.829	175						
18	02		7.84	265	1335		1.299	125						
19	02		7.95	965	1470		3.914	175						
20	02		7.84	265	1380		1.231	125			-5°			
21	02		7.95	965	1485		3.850	175						
22	01		7.84	265	1405		1.196	125						
23	01		7.95	965	1495		3.808	175						
24	B11		7.84	265	1400		1.203	125						
25	B11		7.95	965	1500		3.788	175						
26	B11		7.84	265	1385		1.224	109			0°			

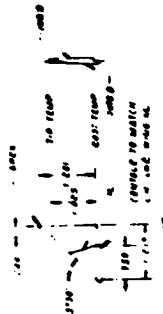
* T_{aw} = adiabatic wall temperature

** X axis parallel to stream (+ downstream, - upstream)

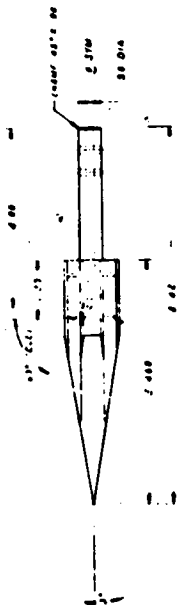
Y axis (+ right, - left, as viewed from the rear)

Z axis (+ up, - down)

NO.	DATE	BY	DESCRIPTION
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3	7-12-70
4	7-12-70
5	7-12-70
6	7-12-70
7	7-12-70
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9	7-12-70
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49	7-12-70
50	7-12-70



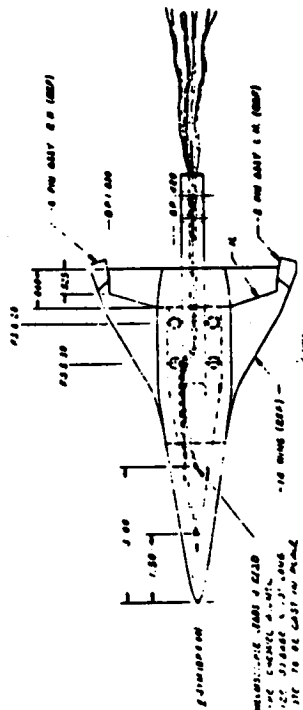
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 DETAIL - 1/2 MODEL ASST. 2 REAR (DET)



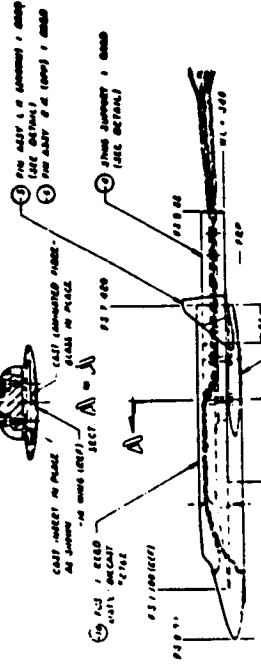
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 DETAIL - 1/2 MODEL ASST. 2 REAR (DET)



DETAIL - 1/2 MODEL ASST. 2 REAR (DET)
 DETAIL - 1/2 MODEL ASST. 2 REAR (DET)



DETAIL - 1/2 MODEL ASST. 2 REAR (DET)
 DETAIL - 1/2 MODEL ASST. 2 REAR (DET)



DETAIL - 1/2 MODEL ASST. 2 REAR (DET)
 DETAIL - 1/2 MODEL ASST. 2 REAR (DET)

DETAIL - 1/2 MODEL ASST. 2 REAR (DET)
 DETAIL - 1/2 MODEL ASST. 2 REAR (DET)

DETAIL - 1/2 MODEL ASST. 2 REAR (DET)
 DETAIL - 1/2 MODEL ASST. 2 REAR (DET)

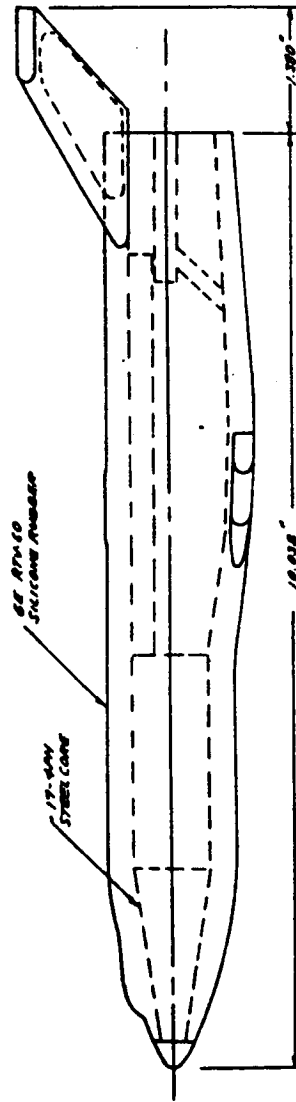
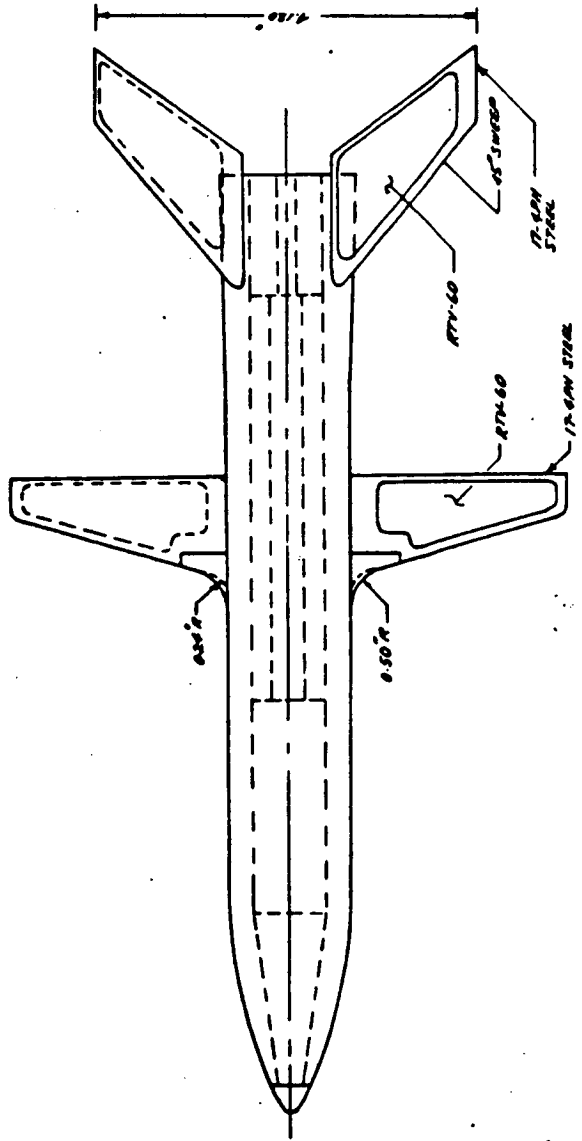
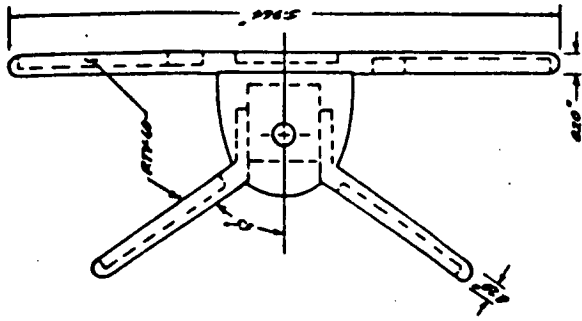
DETAIL - 1/2 MODEL ASST. 2 REAR (DET)
 DETAIL - 1/2 MODEL ASST. 2 REAR (DET)

REV.	DATE	BY	DESCRIPTION
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3	7-12-70
4	7-12-70
5	7-12-70
6	7-12-70
7	7-12-70
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47	7-12-70
48	7-12-70
49	7-12-70
50	7-12-70

DETAIL - 1/2 MODEL ASST. 2 REAR (DET)
 DETAIL - 1/2 MODEL ASST. 2 REAR (DET)

Figure 4

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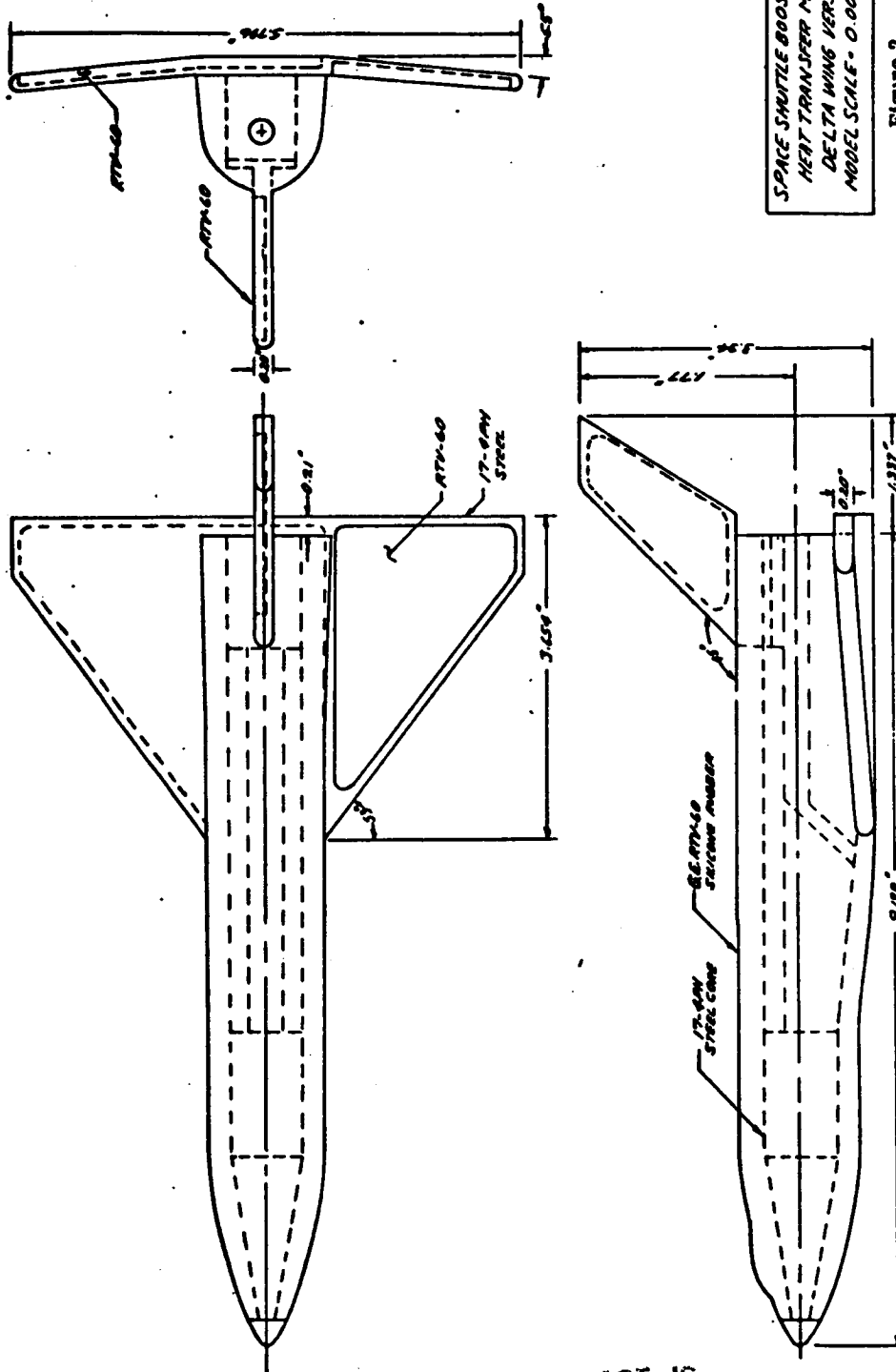


SPACE SHUTTLE BOOSTER
HEAT TRANSFER MODEL
STRAIGHT WING VERSION
MODEL SCALE = 0.0035

Figure 1.

DELTA WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1032 C-3- 117

DELTA WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1032 C-3- 118



SPACE SHUTTLE BOOSTER
 HEAT TRANSFER MODEL
 DELTA WING VERSION
 MODEL SCALE - 0.0035

Figure 2

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DELTA WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1098 C-3- 119

Table 16. Test Data Summary - Heat Transfer Runs

Run/ Point	Configu- ration	M _a	P ₀ (psfa)	T ₀ (°R)	Re _w x10 ⁻⁶ /ft	α (deg)	β (deg)	Orbiter Position (In)	Orbiter- Booster Gap (In.)	Remarks
9/2	B2+O2	2.5	4918	722	4.59	0	0	1.34	0.02	
9/3		2.5	4899	727	4.53	-5				
9/4		2.5	2709	721	2.54	0				
9/5		2.5	2715	715	2.56	-5				
9/6		3.7	9889	721	4.81	0				
9/7		3.7	9918	715	4.90	-5				
9/8		3.7	5041	714	2.49	0				
9/9		3.7	5013	709	2.50	0				
9/10		3.7	4994	705	2.51	-5			0.02	Repeat of 9/8
10/2		2.5	4903	724	4.56	0			0.14	
10/3		2.5	2690	716	2.54	-5				
10/4		3.7	9912	717	4.86	0				
10/5		3.7	5007	714	2.48	-5				
11/2		2.5	4897	722	2.57	0		1.34	0.14	
11/3		2.5	2672	715	2.53	-5		0.0	0.02	
11/4		3.7	9960	714	4.93	0				
11/5		3.7	5017	714	2.48	-5				
12/2		2.5	4910	724	4.56	0		0.0		
12/3		2.5	2686	725	2.49	-5		2.5		
12/4		3.7	9929	719	4.86	0				
12/5	B2+O2	3.7	8005	713	2.48	-5		2.5	0.02	
13/2	B2	2.5	4922	724	4.57	0				
13/3			4893	724	4.55	-5				
13/4			2684	724	2.49	0				
13/5		2.5	2685	717	2.53	-5				
13/6		3.7	9808	715	4.85	0				
13/7			9874	710	4.92	-5				
13/8			5064	706	2.54	0				
13/9	B2	3.7	5035	707	2.53	-5				
14/2	O2	2.5	4914	723	4.58	0				
14/3			4905	726	4.54	-5				
14/4			2680	723	2.50	0				
14/5		2.5	2682	721	2.51	-5				
14/6		3.7	9906	709	4.94	0				
14/7			9905	709	4.93	-5				
14/8			4980	708	2.50	0				
14/9	O2	3.7	4980	702	2.52	-5				
15/2	O1	2.5	4905	722	4.58	0				
15/3			4905	720	4.60	-5				
15/4			2685	718	2.51	0				
15/5		2.5	2686	718	2.53	-5				
15/6		3.7	9905	717	4.85	0				
15/7			9905	718	4.85	-5				
15/8			4990	713	2.47	0				
15/9	O1		5000	709	2.49	-5				
16/2	B2+O1		5008	710	2.49	0		1.43	0.02	
16/3		3.7	5017	713	2.48	-5				
16/4	B2+O1	2.5	2696	713	2.56	0				
16/5	B2+O1	2.5	2698	714	2.56	-5		1.43	0.02	

B2 = Delta Wing Booster, O1 = Straight Wing Orbiter, O2 = Delta Wing Orbiter

Table 17. Test Data Summary - Schlieren and Shadowgraph Runs

Run/Point	Configu- ration	M _∞	P ₀ (psia)	T ₀ (°R)	Re _∞ x 10 ⁻⁶ / ft	α (deg)	β (deg)	Orbiter Position (in.)	Orbiter- Booster Gap(in)	Remarks	
										Schlieren	Shadow- graph
1/630 & 631	B2	2.5	2550	610	3.0	0	0	-	-	Side View	No. 2
1/628 & 629	B2	3.7	4790	↓	↓	↓	↓	-	-	Side View	No. 1
2/635 & 636	B2	3.7	4790	↓	↓	↓	↓	-	-	Top View	
3/643 & 644	O2	2.5	2550	↓	↓	↓	↓	-	-	Side View	
3/645 & 646	O2	2.5	2550	↓	↓	↓	↓	-	-	Top View	
3/639 & 640	O2	3.7	4790	↓	↓	↓	↓	-	-	Side View	No. 4
3/641 & 642	O2	3.7	4790	↓	↓	↓	↓	-	-	Top View	
4/648 & 649	O1	2.5	2550	↓	↓	↓	↓	-	-	Side View	
4/650 & 651	O1	2.5	2550	↓	↓	↓	↓	-	-	Top View	No. 3 & 5
4/652 & 653	O1	3.7	4790	↓	↓	↓	↓	-	-	Side View	
4/654 & 655	O1	3.7	4790	↓	↓	↓	↓	-	-	Top View	No. 6 & 7
5/671 & 678	B2+O1	2.5	2550	↓	↓	0	↓	1.43	0.02	Side View	No. 11
5/672 & 677	↓	2.5	↓	↓	↓	-5	↓	↓	↓	Side View	No. 12
5/673 & 676	↓	2.5	↓	↓	↓	-5	↓	↓	↓	Top View	
5/674 & 675	↓	2.5	2550	↓	↓	0	↓	↓	↓	Top View	
5/658 & 665	↓	3.7	4790	↓	↓	0	↓	↓	↓	Side View	No. 8 & 9
5/659 & 664	↓	3.7	4790	↓	↓	-5	↓	↓	↓	Side View	No. 10
5/660 & 663	↓	3.7	4790	↓	↓	-5	↓	↓	↓	Top View	
5/661 & 662	↓	3.7	4790	↓	↓	0	↓	1.43	↓	Top View	
6/680 & 683	↓	2.5	2550	↓	↓	0	↓	2.50	↓	Side View	No. 13
6/681 & 682	↓	2.5	2550	↓	↓	0	↓	2.50	↓	Top View	
6/684 & 687	↓	3.7	4790	↓	↓	0	↓	2.50	↓	Side View	No. 14 & 15
6/685 & 686	↓	3.7	4790	↓	↓	0	↓	2.50	↓	Top View	
7/692 & 693	↓	2.5	2550	↓	↓	0	↓	0.0	↓	Side View	No. 16
7/694 & 695	↓	2.5	2550	↓	↓	0	↓	0.0	↓	Top View	
7/696 & 697	↓	3.7	4790	↓	↓	0	↓	0.0	↓	Side View	No. 17
7/698 & 699	B2+O1	3.7	4790	↓	↓	0	↓	0.0	↓	Top View	No. 18 & 19
8/713 & 720	B2+O2	2.5	2550	↓	↓	0	↓	1.34	↓	Side View	No. 23
8/714 & 719	↓	2.5	2550	↓	↓	-5	↓	↓	↓	Side View	No. 22
8/716 & 717	↓	2.5	2550	↓	↓	0	↓	↓	↓	Top View	
8/715 & 718	↓	2.5	2550	↓	↓	-5	↓	↓	↓	Top View	
8/705 & 712	↓	3.7	4790	↓	↓	0	↓	↓	↓	Side View	No. 20
8/706 & 711	↓	3.7	4790	↓	↓	-5	↓	↓	↓	Side View	No. 21
8/708 & 709	↓	3.7	4790	↓	↓	0	↓	↓	↓	Top View	
8/707 & 710	↓	3.7	4790	↓	↓	-5	↓	1.34	↓	Top View	
17/2 & 3	↓	2.5	2550	↓	↓	0	↓	0.0	↓	Side View	No. 24
17/4 & 5	↓	2.5	2550	↓	↓	↓	↓	↓	↓	Top View	
17/8 & 9	↓	3.7	4790	↓	↓	↓	↓	↓	↓	Side View	No. 25
17/6 & 7	↓	3.7	4790	↓	↓	↓	↓	0.0	↓	Top View	
18/1 & 2	↓	2.5	2550	↓	↓	↓	↓	2.5	↓	Side View	No. 26 & 27
18/3 & 4	↓	2.5	2550	↓	↓	↓	↓	↓	↓	Top View	
18/5 & 6	↓	3.7	4790	↓	↓	↓	↓	↓	↓	Side View	No. 28 & 29
18/7 & 8	B2+O2	3.7	4790	610	3.0	0	0	2.5	0.02	Top View	No. 30

B2 = Delta Wing Booster, O1 = Straight Wing Orbiter, O2 = Delta Wing Orbiter

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DELTA WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1098 C-3- 121

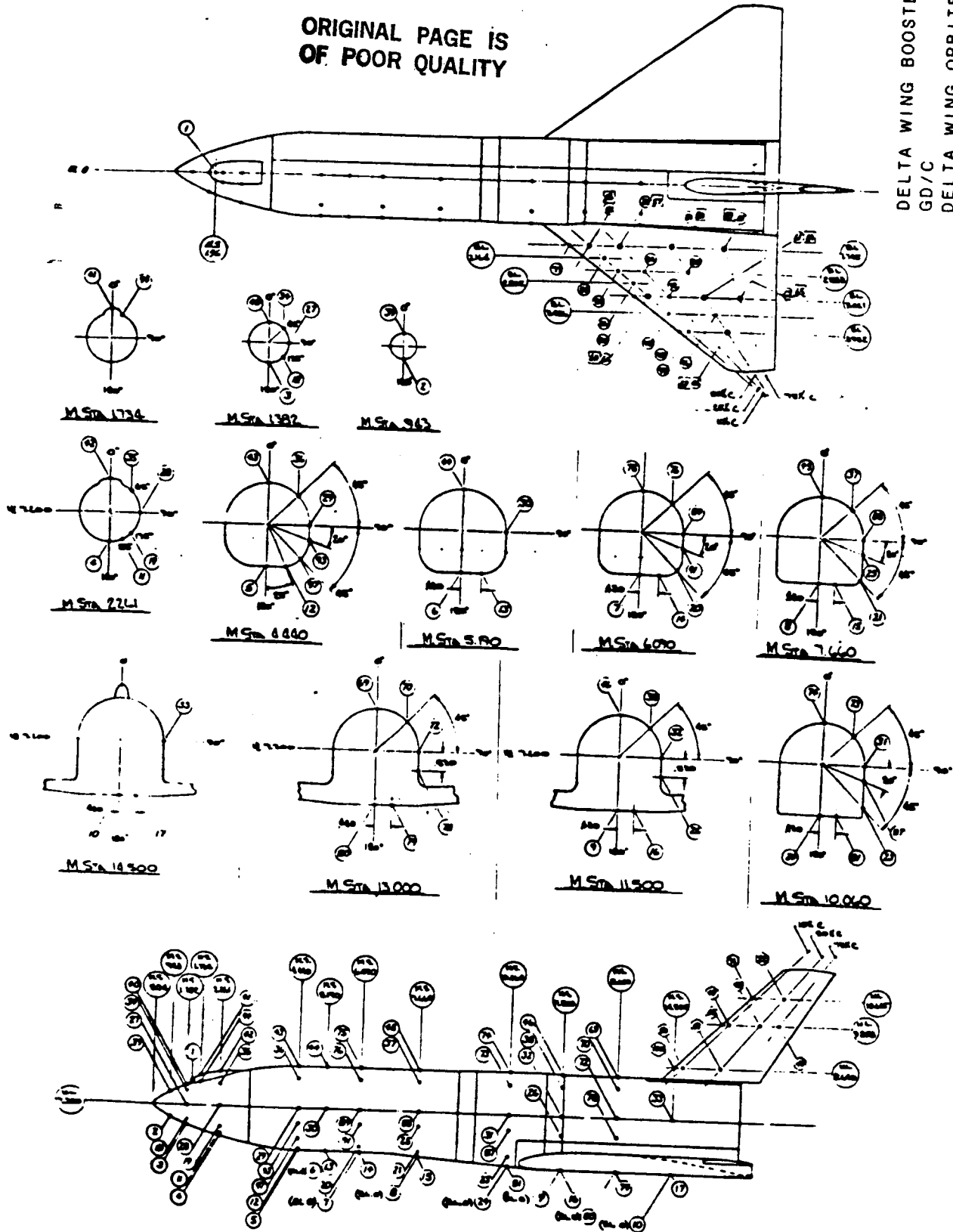


Figure 5. Thermocouples Location - Delta Wing Booster Model

DELTA WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1098 C-3- 122

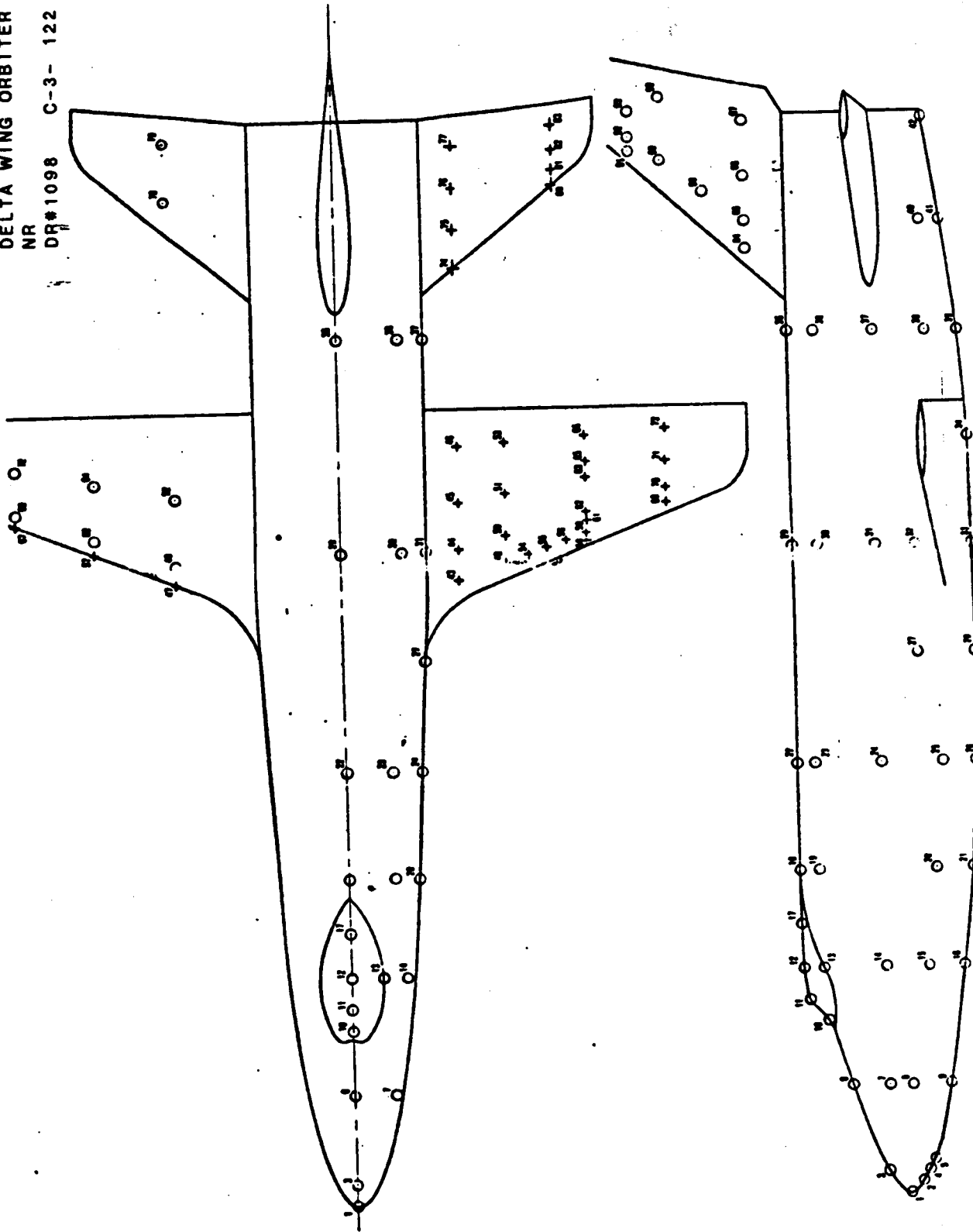


Figure 6. Thermocouples Location - Straight Wing Orbiter Model

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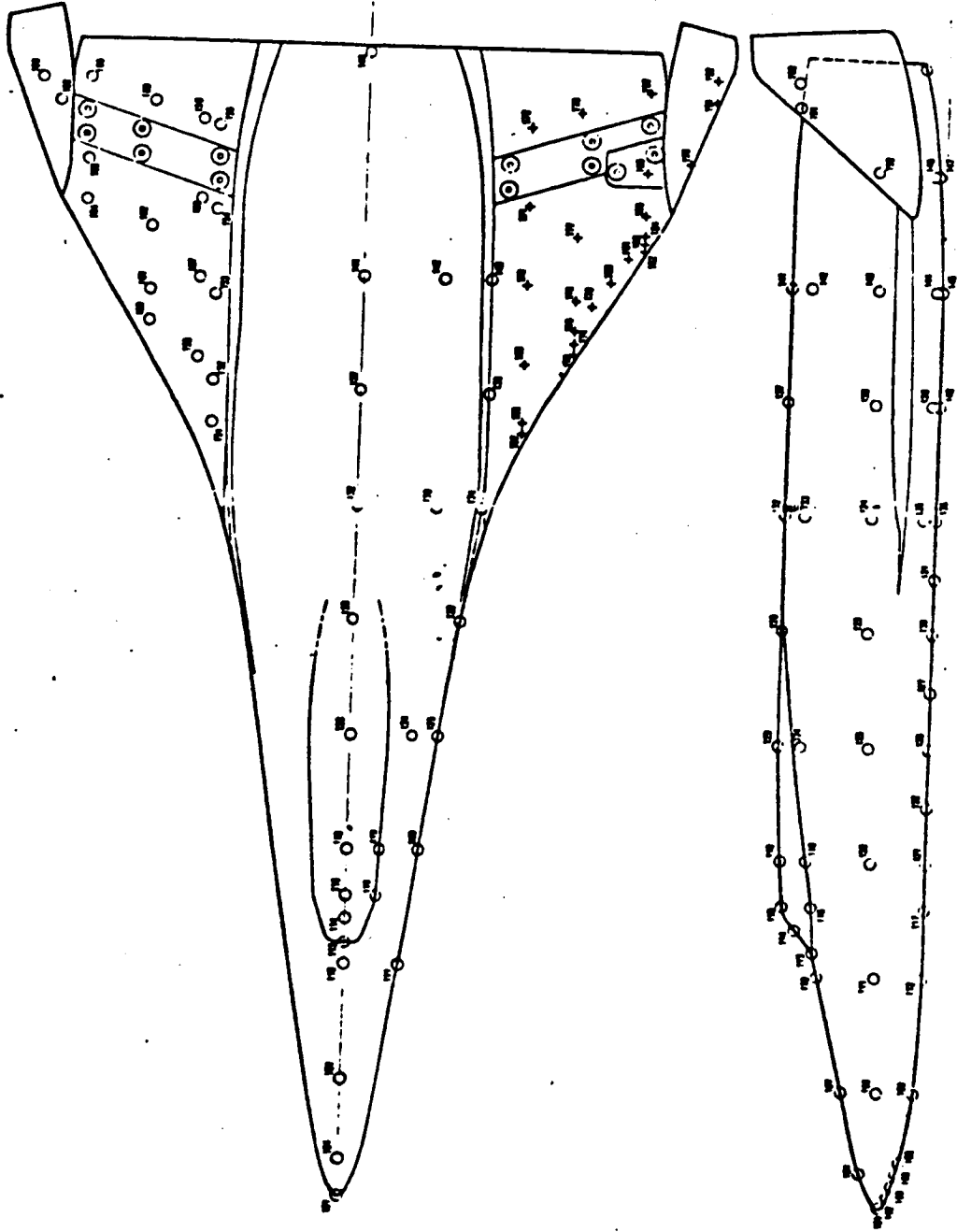


Figure 7. Thermocouples Location - Delta Wing Orbiter Model

DELTA WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1098 C-3-123

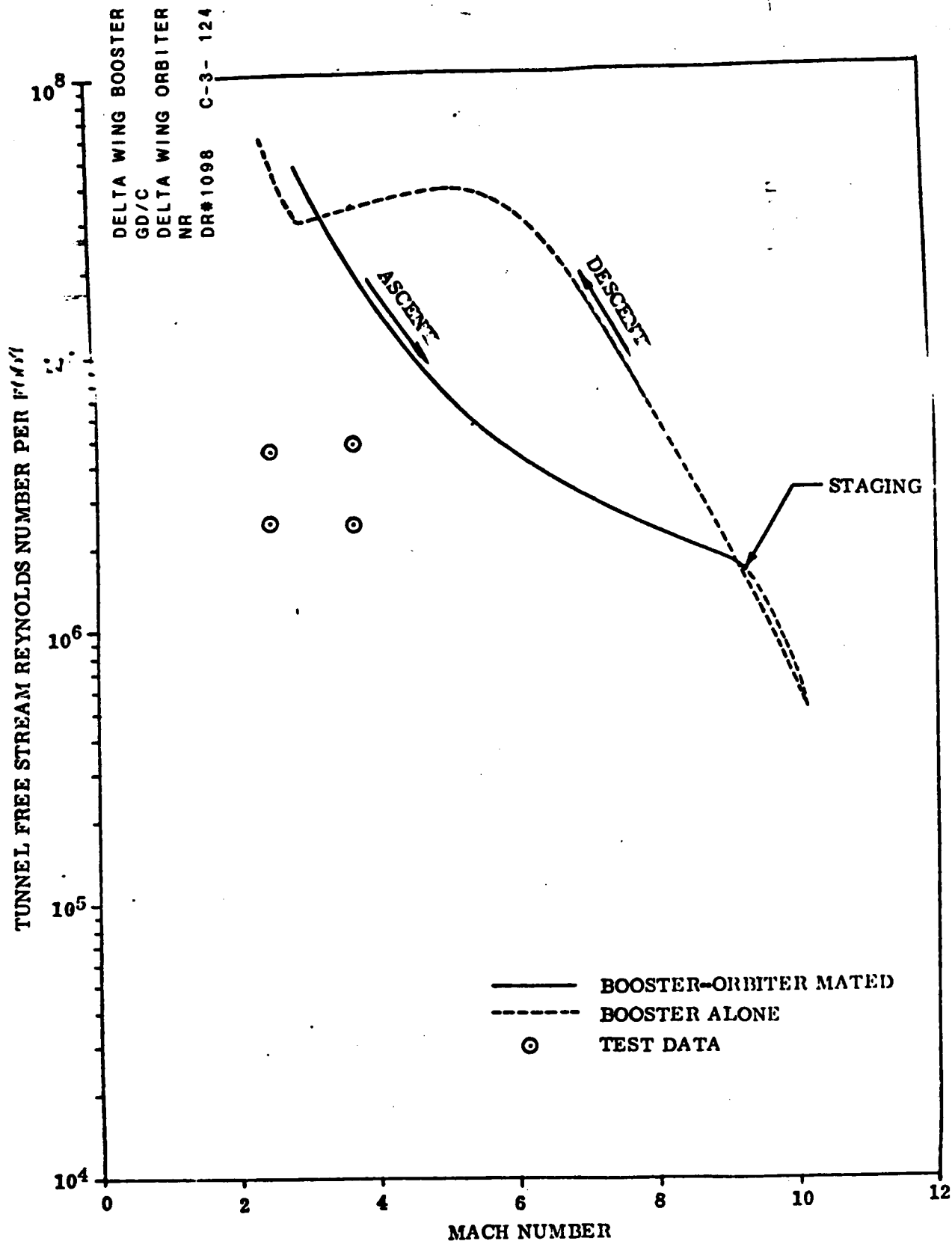


Figure 13. Space Shuttle Booster-Orbiter and Booster Mach Number and Reynolds Number Simulation (0.006 Scale Model)

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Table 7
PHASE CHANGE COATING TEST DATA SUMMARY

Tunnel Run Number	Configuration	RN/ft x 10 ⁶	Free Stream Mach No.	Angle of Attack, deg.	Body Flap	Canard Position degree	Phase Change Temp. of	Total Temperature, °F	Total Pressure PSIA	Camera Designation Side Top Bottom	Test Duration sec.	h ² ft ² sec ²
1237	B	6.3	7.95	50	-	0	450	985	1490	1	6.3	0.1370
1238	C	6.5	7.95	50	-	0	450	975	1530	1	7.0	0.1316
1240	C	6.5	7.95	50	-	0	700	950	1480	1	6.5	0.1350
1241	C	6.5	7.95	50	-	0	700	960	1505	1	6.5	0.1357
1242	B	6.4	7.95	50	On	-10	550	960	1475	1	6.7	0.1368
1243	B	6.9	7.95	60	-	0	450	930	1530	1	6.7	0.1358
1244	C	6.5	7.95	60	-	0	450	950	1485	1	6.7	0.1391
1245	C	6.6	7.95	60	-	0	700/138	965	1485	1	6.6	0.1365
1246	AO	2.2	7.92	0	-	0	138	890	465	1	6.7	0.1316
1247	C	6.5	7.95	20	-	0	200	950	1490	1	12.5	0.0756
1248	AO	3.8	7.95	0	-	0	200	910	830	1	6.5	0.1492
1249	E	6.5	7.95	20	-	0	200	945	1475	1	6.6	0.1016
1250	E	6.6	7.95	20	-	0	350	950	1500	1	6.3	0.1348
1251	AO	6.7	7.92	0	-	0	300	940	1505	1	6.5	0.1501
1252	AO	2.3	7.92	0	-	0	300	870	465	1	6.8	0.1384
1253	E	6.7	7.95	20	-	0	350	950	1530	1	12.4	0.0770
1254	AO	4.5	7.95	0	-	0	450	785	830	1	6.7	0.1377
1255	C	6.5	7.95	20	-	0	550	950	1490	1	10.3	0.1014
1256	AO	3.8	7.95	0	-	0	200	910	825	1	7.2	0.1491
1257	E	6.5	7.95	20	-	0	550	960	1490	1	10.9	0.0853
1258	AO	6.5	7.95	0	-	0	550	965	1510	1	8.6	0.1355
1259	A	6.4	7.95	0	-	0	300	970	1500	1	9.3	0.1365
1260	A	6.5	7.95	0	-	0	300	955	1500	1	8.5	0.1356
1261	A	6.8	7.95	20	-	0	300	920	1490	1	8.5	0.1363
1262	C	6.7	7.95	40	-	0	450	940	1505	1	7.4	0.1361
1263	E	7.1	7.95	40	-	0	350	915	1545	1	7.8	0.1500
1264	B	6.5	7.95	40	On	-10	550	955	1490	1	7.5	0.1386
1265	E	6.7	7.95	40	-	0	550	960	1540	1	4.1	0.1565
1266	C	6.5	7.95	40	-	0	700	970	1515	1	7.6	0.1378
1267	B	6.3	7.95	40	On	-20	700	985	1500	1	6.6	0.1507
1268	A	6.5	7.95	20	-	0	550	975	1510	1	4.5	0.1574
1269	A	6.7	7.95	30	-	0	300	940	1505	1	7.3	0.1368
											6.3	0.1364

DELTA WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1145 C-3-125

Table 7 (Cont'd)
 PHASE CHANGE COATING TEST DATA SUMMARY

Tunnel Run Number	Config-uration *	R _w /ft x 10 ⁶	Free Stream Mach No.	Angle of Attack, deg.	Body Flap	Canard Position deg. **	Phase Change Temp., °F	Total Temperature, °F	Total Pressure PSIA	Camera Designation		Total T _{aw}	Test Duration, sec.	h _{r-1} ' 3IU/ft ² sec ^{0.8}
										Side	Top Bottom			
1270	E	6.7	7.95	50	-	-	450	935	1510	1	2	0.939	6.5	0.1366
1271	A	6.5	7.95	30	-	0	700	970	1510	1	2	0.890	6.4	0.1366
1272	E	6.4	7.95	50	-	-	700	965	1490	1	2	0.939	6.3	0.1357
1273	B	1.2	7.83	50	On	-20	550	810	215	1	2	0.939	9.1	0.0632
1274	A	6.6	7.95	40	-	0	450	935	1485	1	2	0.914	7.2	0.1354
1275	B	1.1	7.80	60	On	-10	450	810	198	1	2	0.964	9.1	0.0614
1276	E	6.4	7.95	60	-	-	550	970	1500	1	2	0.964	6.7	0.1361
1277	A	6.5	7.95	40	-	0	700	950	1490	1	2	0.914	6.7	0.1355
1278	B	6.7	7.95	60	On	-20	700	925	1490	1	2	0.964	4.8	0.1567
1279	E	1.2	7.82	60	-	-	350	810	210	1	2	0.964	12.6	0.0544
1280	E	1.1	7.80	60	-	-	200	815	198	1	2	0.964	9.5	0.0531
1281	A	6.5	7.95	40	-	-20	138/350	960	1500	1	2	0.853	0	0.1559
1282	B	6.6	7.95	60	-	-30	150	940	1490	1	2	0.853	9.1	0.1492
1283	C	6.5	7.95	60	-	-10	138/350	955	1500	1	2	0.853	6.3	0.1509
1284	C	6.9	7.95	60	-	-10	175/350	925	1525	1	2	0.853	6.8	0.1560
1285	B	6.6	7.95	50	-	-20	150	935	1490	1	2	0.853	8.3	0.1552
1286	E	6.7	7.95	50	-	-	103	930	1500	1	2	0.853	8.0	0.1567
1287	C	6.6	7.95	50	-	-10	175/450	940	1500	1	2	0.853	6.0	0.1011
1288	E	3.9	7.95	50	-	-	103	890	825	1	2	0.853	7.1	0.1495
1289	C	6.5	7.95	50	-	-20	138/550	960	1505	1	2	0.853	6.5	0.1500
1290	C	6.5	7.95	40	-	-10	250	960	1500	1	2	0.853	8.7	0.1004
1291	E	3.8	7.95	40	-	-	103	900	815	1	2	0.853	8.4	0.1557
1292	B	6.5	7.95	40	-	-20	150	950	1485	1	2	0.853	8.6	0.1491
1293	C	6.6	7.95	40	-	-20	138/350	940	1500	1	2	0.853	10.7	0.1569
1294	B	6.6	7.95	40	-	-10	250	945	1495	1	2	0.853	8.7	0.1569
1295	D	3.9	7.95	0	-	-	103	890	815	1	2	0.853	10.1	0.1124
1296	D	3.8	7.95	0	-	-	125	915	825	1	2	0.853	13.1	0.1130
1297	D	6.5	7.95	0	-	-	138	960	1500	1	2	0.853	12.9	0.1516

Model Configurations:

- A - 0.004-scale B-9U booster with slab canard (20° sting angle)
- AO - Mated booster/orbiter (0.004-scale B-9U with 161C orbiter: 20° sting angles)
- B - 0.003-scale B-9U booster with contoured canard (40° sting angle)
- C - 0.0033-scale B-15B-2 booster (40° sting angle)
- D - 0.0032-scale B-15B booster (fuselage only; no fairings, wings, or canard: 55° sting angle)
- E - 0.004-scale B-9U delta wing (no fuselage or body flap: 40° sting angle)

*Canard angle of attack measured from freestream

†Numbers following / indicate canard point temperatures on all runs except 1245, where 138°F point was used on sting.
 ‡Phase-Change-Temperature is the temperature used for T_{aw} in the calculation of h_{r-1}'.

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DELTA WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1145 C-3-127

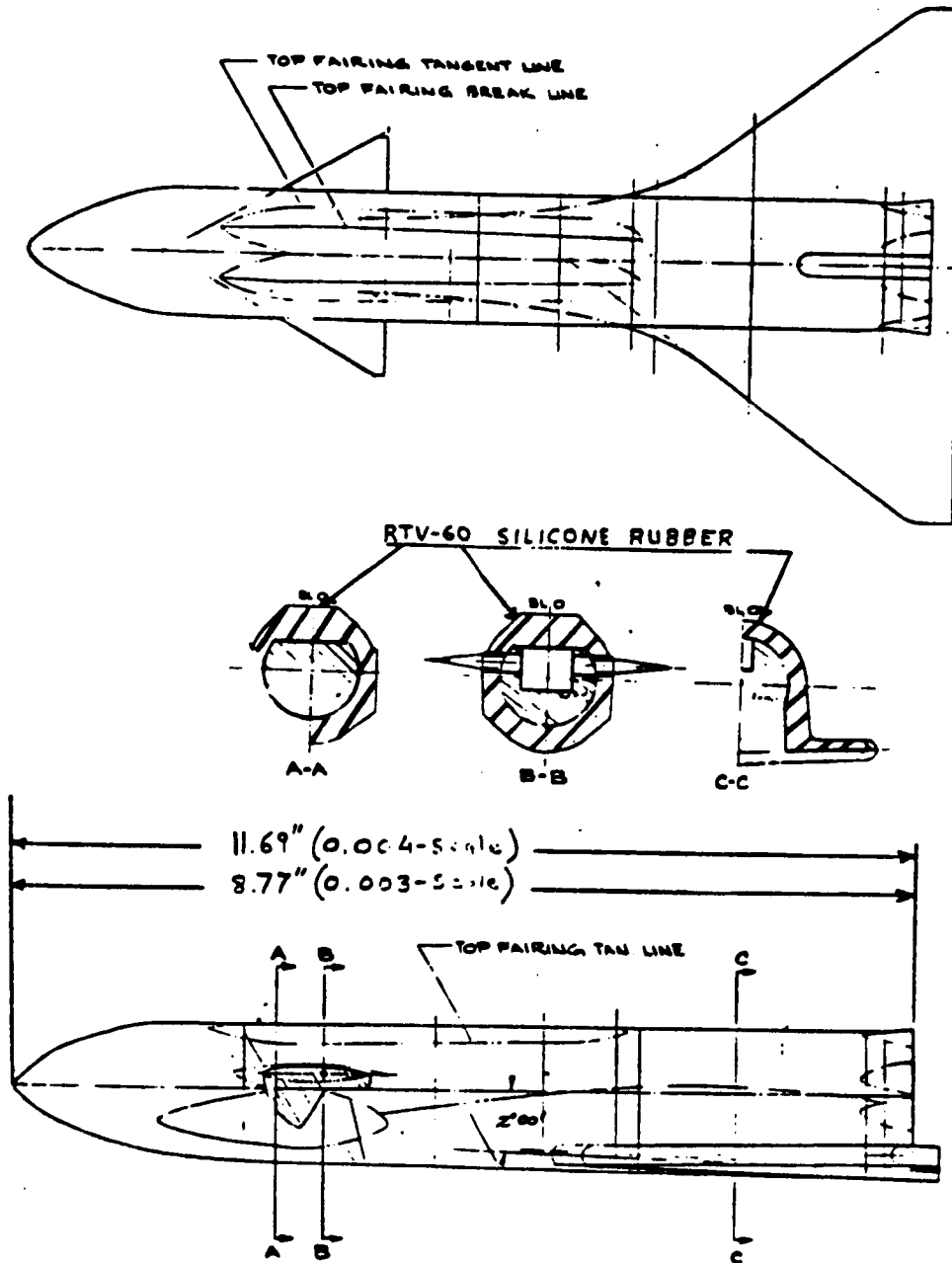


Figure 3 Space Shuttle Booster
B9U Heat Transfer Model

DELTA WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1145 C-3- 128

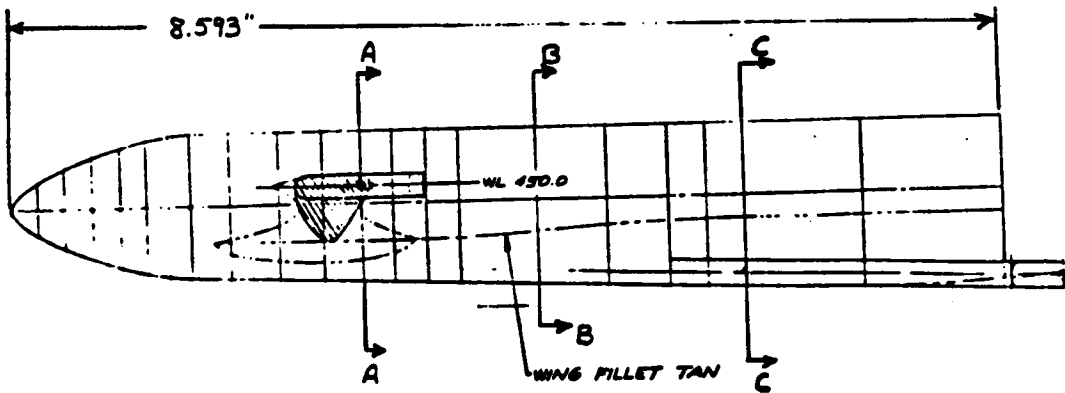
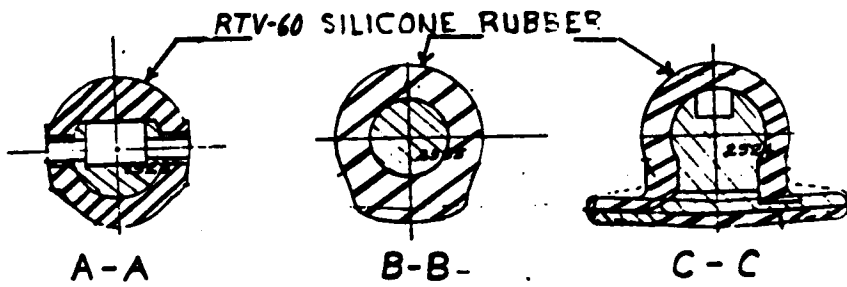
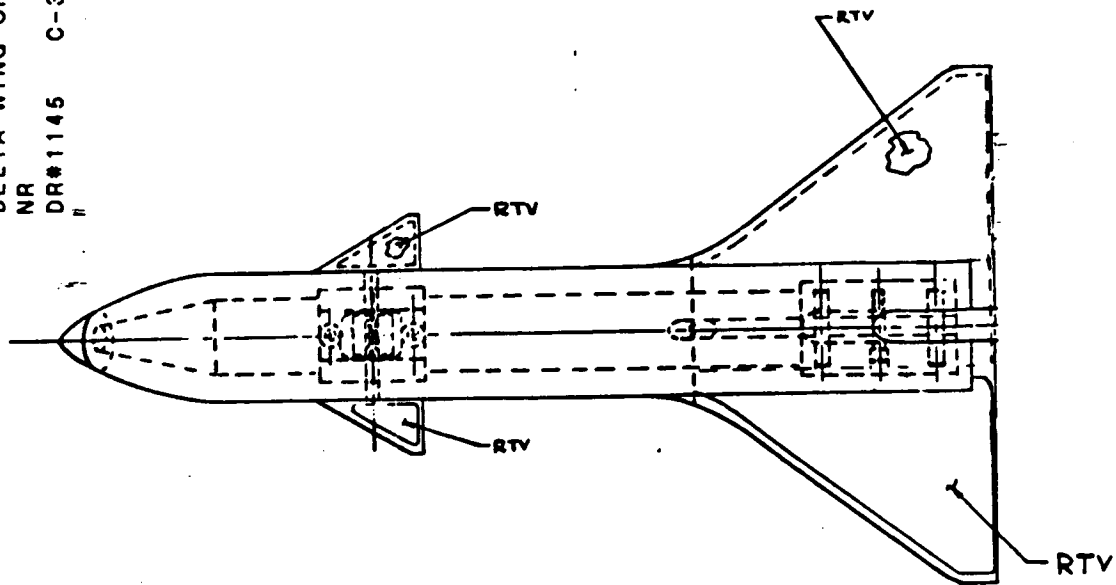


Figure 4 Space Shuttle Booster B-15B-2
 Heat Transfer Model

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DELTA WING ORBITER
NR
DR#1145 C-3- 129

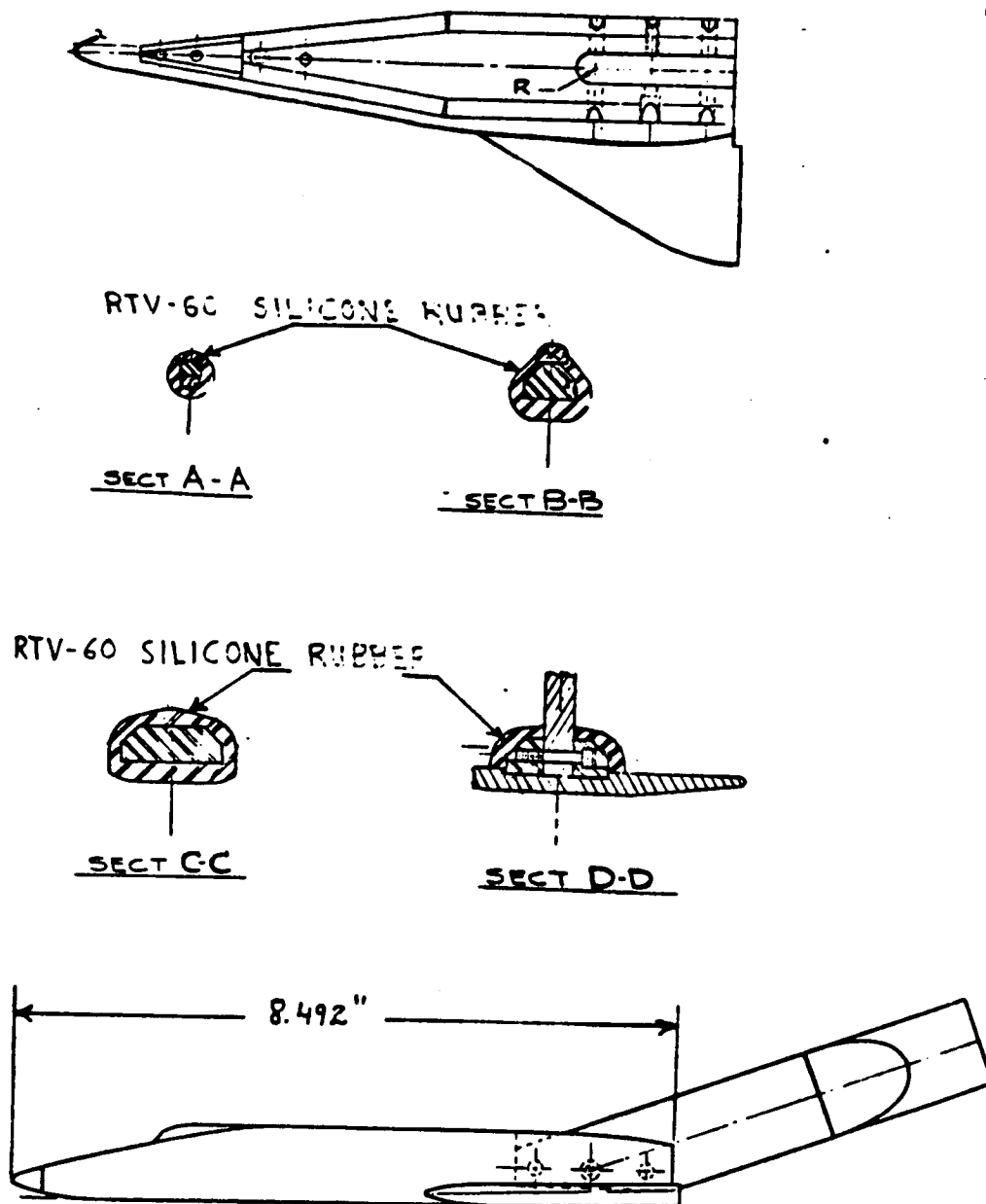


Figure 5 Space Shuttle Orbiter 161C
for Mated Ascent Tests

DELTA WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1145 C-3-130

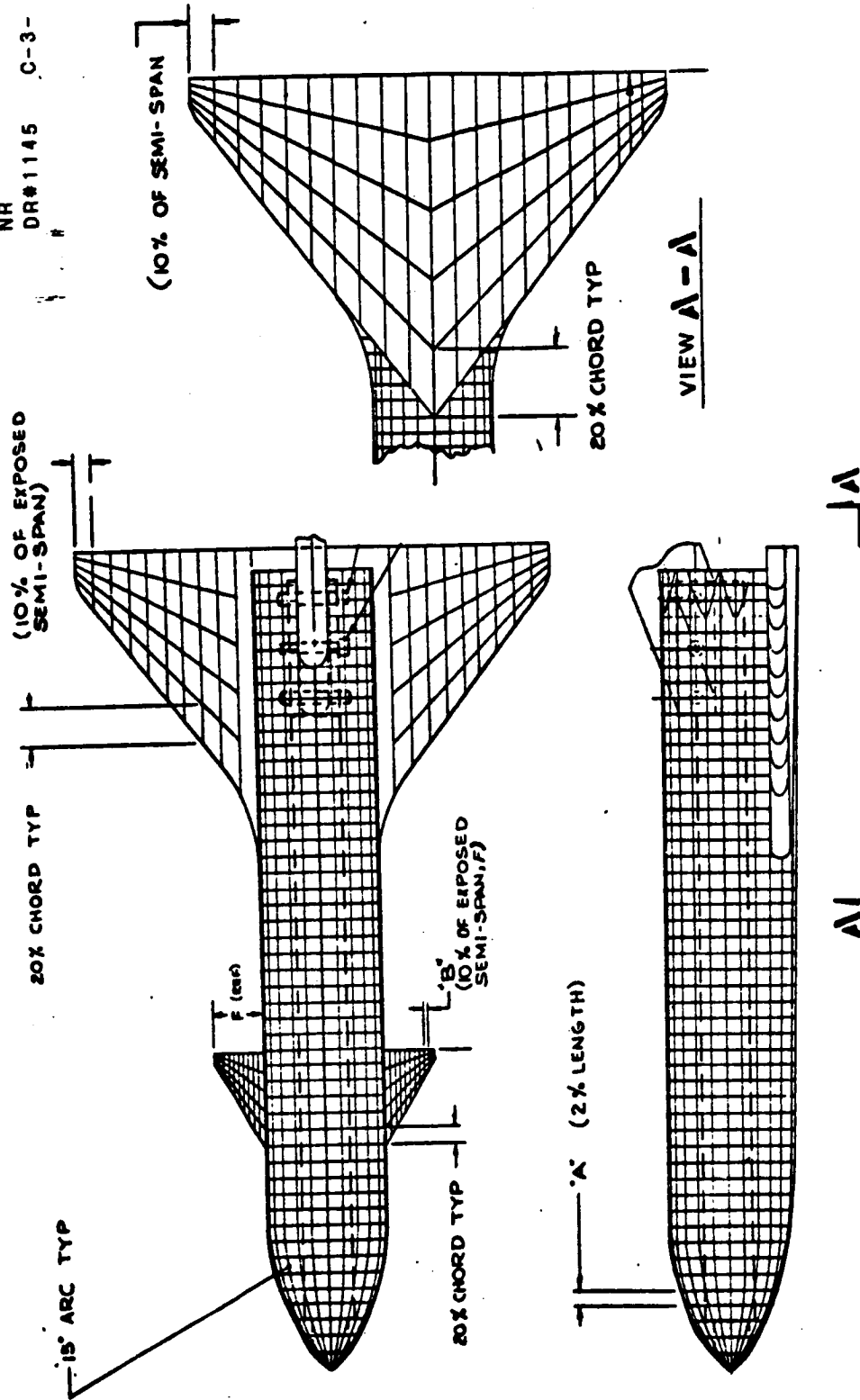


Figure 7 Typical Heat Transfer Grid Model

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TABLE 2

TEST CONDITIONS

TEST TITLE: AEDC-MSFC Phase B Heating Study - Thin-Skin Thermocouple Phase

TEST NUMBER: VT1162

TEST FACILITY: AEDC Tunnel 0

TEST DATE: May 26-29, 1971

TEST ENGINEER: W. R. Martindale & R. K. Matthews

Run No.	Model Configuration Identification		Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	Taw * Ttotal	RNX106 Ft.	Phase Change Temp. (°F)	Booster-Orbiter Spacing (in.)		Model Position (degrees)	
	δc	δe								XD	ZD	β	α
1	Booster + Orbiter	0 0	1.009	8.00	857	1339	1.00	3.75	NA	2.22	.234	0	0
2					858	1347		3.72					
3					856	1346		3.72					-5
4					858	1341		3.75		1.72			5
5					859	1347		3.73		2.72			0
6					858	1330		3.76		2.22	.118		
7					859	1346		3.73			.318		
8				7.93	149	1249		0.74			.234		
9					148	1234		0.75					
10					151	1233		0.77					
11				8.00	857	1342		3.74				-5	0
12	Booster				861	1342		3.76				0	
13					860	1341		3.75					-5

* Taw = adiabatic wall temperature
 ** X axis parallel to stream (+downstream, -upstream)
 Y axis (+right, -left, as viewed from the rear)
 Z axis (+up, -down)

DELTA WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1177 C-3-131

TABLE 2 - Continued

TEST CONDITIONS

TEST TITLE: AEDC-MSFC Phase B Heating Study - Thin-Skin Thermocouple Phase

TEST NUMBER: VT1162 TEST FACILITY: AEDC Tunnel B

TEST DATE: May 26-29, 1971 TEST ENGINEER: W. R. Martindale & R. K. Matthews

Run No.	Model Configuration Identification		Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	Taw / Ttotal	RNx10 ⁶ Ft.	Phase Change Temp. (°F)	Booster-Orbiter Spacing (in.)			Model Position (G:greus)		
	δc	δc								XD	ZD	GRIT	β	α	
14	Booster	0	0	1.009	857	1347	1.00	3.72	NA	-	-	Off	0	0	5
15					149	1225		0.76							0
16					150	1223		0.77							-5
17					149	1219		0.77							5
18		60			857	1353		3.69							60
19		50			855	1340		3.74							50
20		40			857	1338		3.76							40
21		40			856	1342		3.73							40
22		60			860	1343		3.75							60
23		10			856	1344		3.73							10
24		20			856	1342		3.73							20
25		30			857	1346		3.72							30
26		30	-15		857	1342		3.74							

** X axis parallel to stream (+downstream, -upstream)
 Y axis (+right, -left, as viewed from the rear)
 Z axis (+up, -down)

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TABLE 2 - Continued

TEST CONDITIONS

TEST TITLE: AEDC-115FC Phase B Heating Study - Thin-Skin Thermocouple Phase

TEST NUMBER: VT1162

TEST FACILITY: AEDC Tunnel 8

TEST DATE: May 26-29, 1971

TEST ENGINEER: H. R. Martindale & R. K. Matthews

Run No.	Model Configuration Identification		Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	Taw Ttotal	RNX10 ⁶ Ft	Phase Change Temp. (°F)	Booster-Orbiter Spacing (in.)			Model Position (degrees)				
	δc	δc								XD	ZD	GRIT	β	γ	α		
27	Booster		30	15	7,009	8.00	859	1342	1.00	3.74	NA	-	-	Off	0	0	30
28	Booster		0	0			858	1342		3.74							0
29	Orbiter						859	1339		3.76				0h			50
30							857	1337		3.76				0h			40
31							857	1343		3.74				0h			30
32							856	1340		3.74				Off			30
33							856	1343		3.73							40
34							858	1347		3.72							50
35							555	1305		2.52							50
36							553	1311		2.50							40
37							554	1311		2.50							30
38							554	1308		2.51							20
39							553	1307		2.51							10

** X axis parallel to stream (+downstream, -upstream)
Y axis (+right, -left, as viewed from the rear)
Z axis (+up, -down)

* Taw = adiabatic wall temperature

DELTA WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1177 C-3-133

TABLE 2 - Concluded

TEST CONDITIONS

TEST TITLE: AEDC-MSFC Phase B Heating Study - Thin-Skin Thermocouple Phase

TEST NUMBER: VT1162 TEST FACILITY: AEDC Tunnel B

TEST DATE: May 26-29, 1971 TEST ENGINEER: M. R. Martindale & R. K. Matthews

Run No.	Model Configuration Identification		Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	Taw / Ttotal	RNXL106 Ft	Phase Change Temp. (°F)	Booster-Orbiter Spacing (in.)		Hole Position (degrees)	
	δc	δc								XD	ZD	GRIT	θ
40	Orbiter	-	0.009	7.94	165	1254	1.00	0.02	NA	-	Off	0	10
41					165	1237		0.03					20
42					166	1228		0.04					30
43					167	1232		0.05					5
44					167	1237		0.04					0
45					165	1241		0.03					-5
46				8.00	856	1324		3.81					-5
47					863	1335		3.79					0
48					861	1344		3.75					20
49					856	1342		3.74					10
50					856	1344		3.74				***	10
51					858	1346		3.73				Off	30

** X axis parallel to stream (+downstream, -upstream)

Y axis (+right, -left, as viewed from the rear)

Z axis (+up, -down)

* Taw = adiabatic wall temperature

***nose only

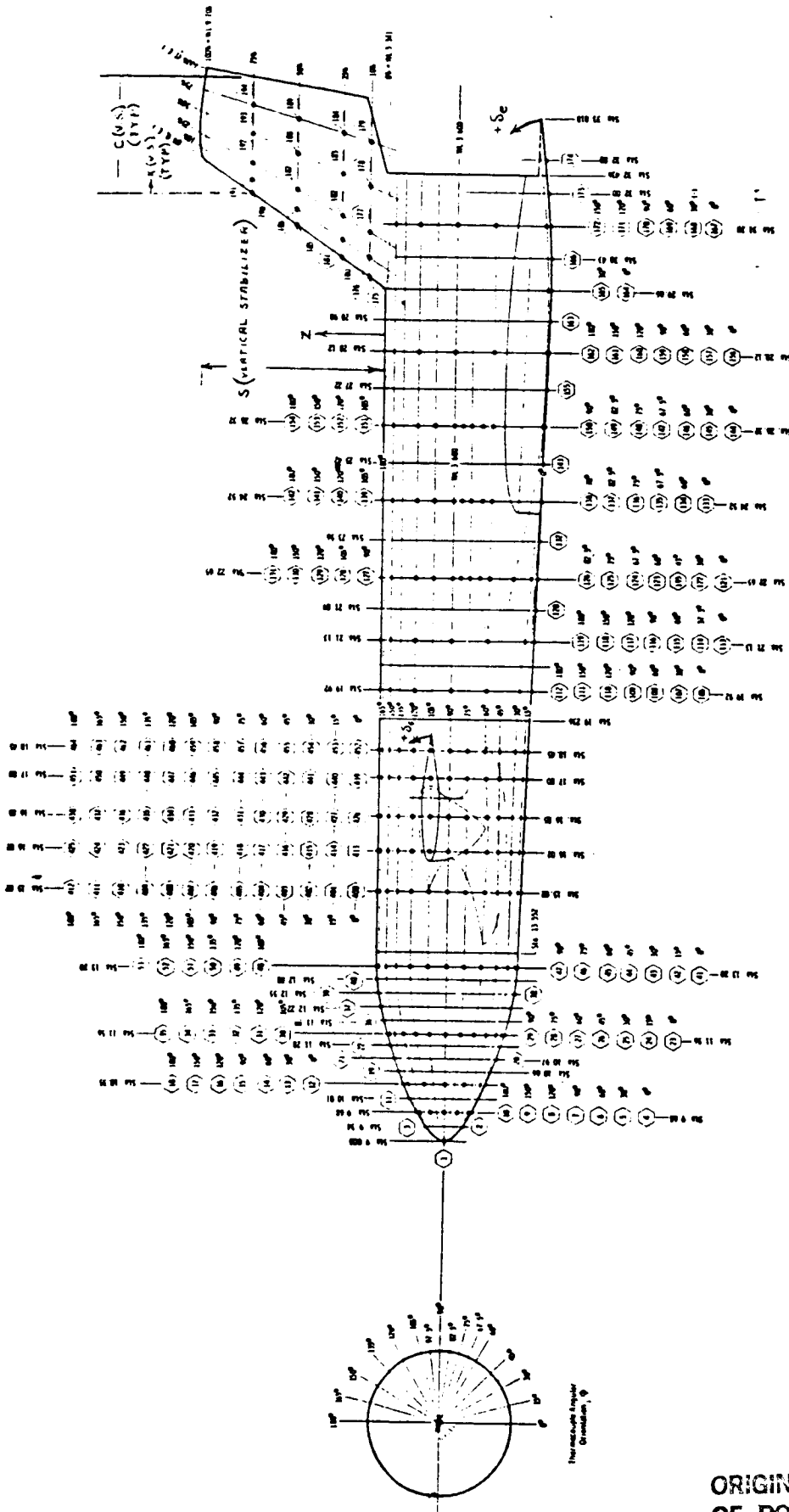


Figure 2. Booster Thermocouple Locations

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DELTA WING BOOSTER
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DR#1177 C-3- 137

WING THERMOCOUPLE IDENTIFICATION NUMBERS													
	<ul style="list-style-type: none"> ○ - Lower Surface ● - Upper Surface 												
% Span	% Chord												
	0% (L.E.)	5%	10%	15%	20%	33%	40%	50%	60%	70%	81%		
10% Upper	200		201		202	203	204		205	206	207		
10% Lower			208		209	210				213	214		
15% Upper	215												
15% Lower		216					211		212				
20% Upper	217	218	219		220		221		222	223			
20% Lower		224	225		226		227		228	229	83.3%	86.7%	90.1%
25% Upper	230		231				232	233	234		235	236	237
25% Lower		239	240				241	242	243		244	245	246
30% Upper	248		249		250		251		252				
30% Lower		253	254	255	256		257		258				
35% Upper	259		260										
35% Lower		261	262										
40% Upper	263		264				265		266				
40% Lower		267	268	269	270		271		272				
45% Upper	273		274										
45% Lower		275	276								87.7%		
50% Upper	277		278		279		280	281	282		283		
50% Lower		284	285	286	287		288	289	290		291		
55% Upper	292		293										
55% Lower		294	295								82%	88.1%	
60% Upper	296		297		298		299		300		301	302	
60% Lower		303	304		305		306	307	308		309	310	
65% Upper		311	312										
65% Lower		313	314										
70% Upper			315		316			317					
70% Lower			318		319			320					

Figure 4. Concluded

DELTA WING BOOSTER
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 DELTA WING ORBITER
 NR
 DR#1177 C-3- 138

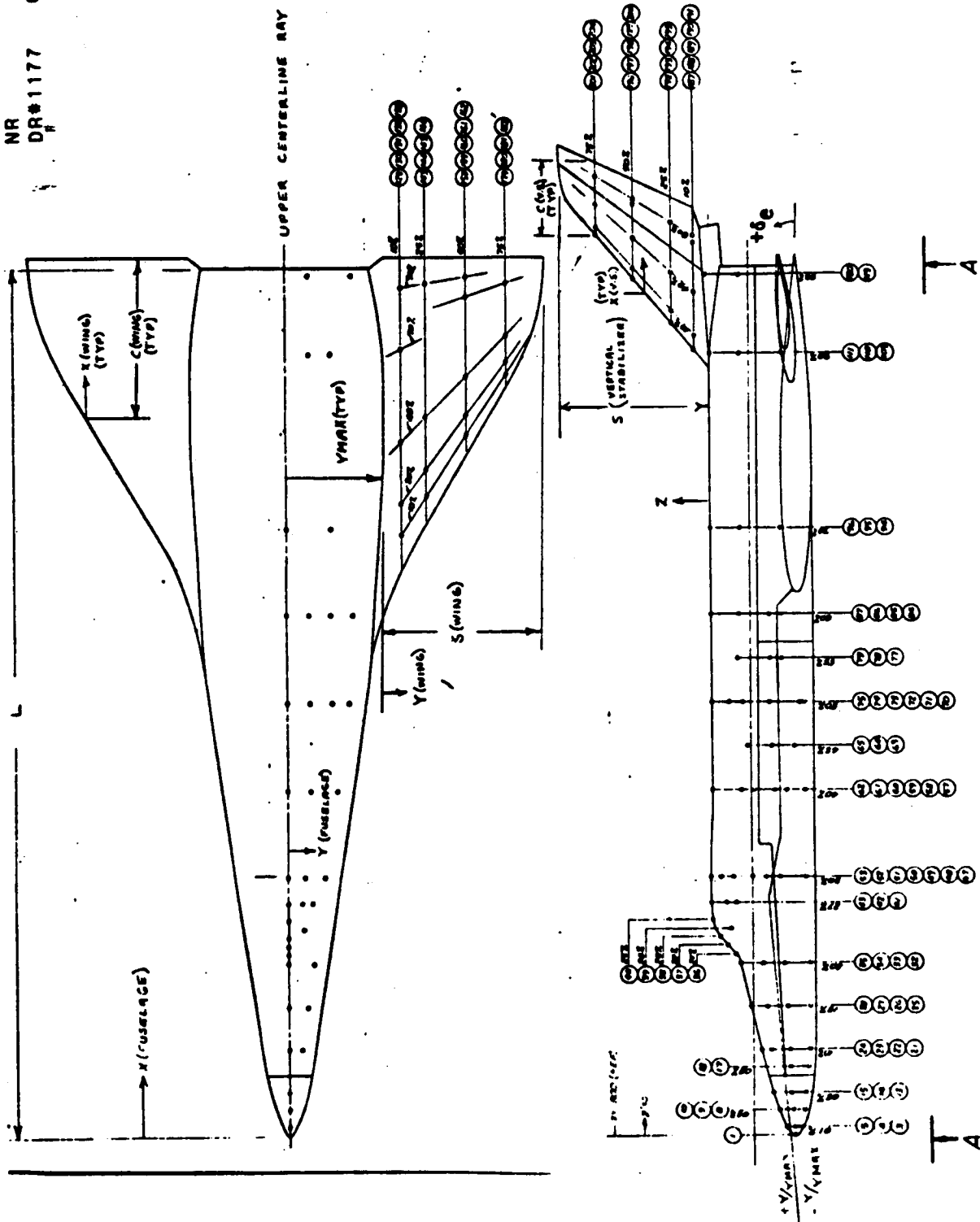
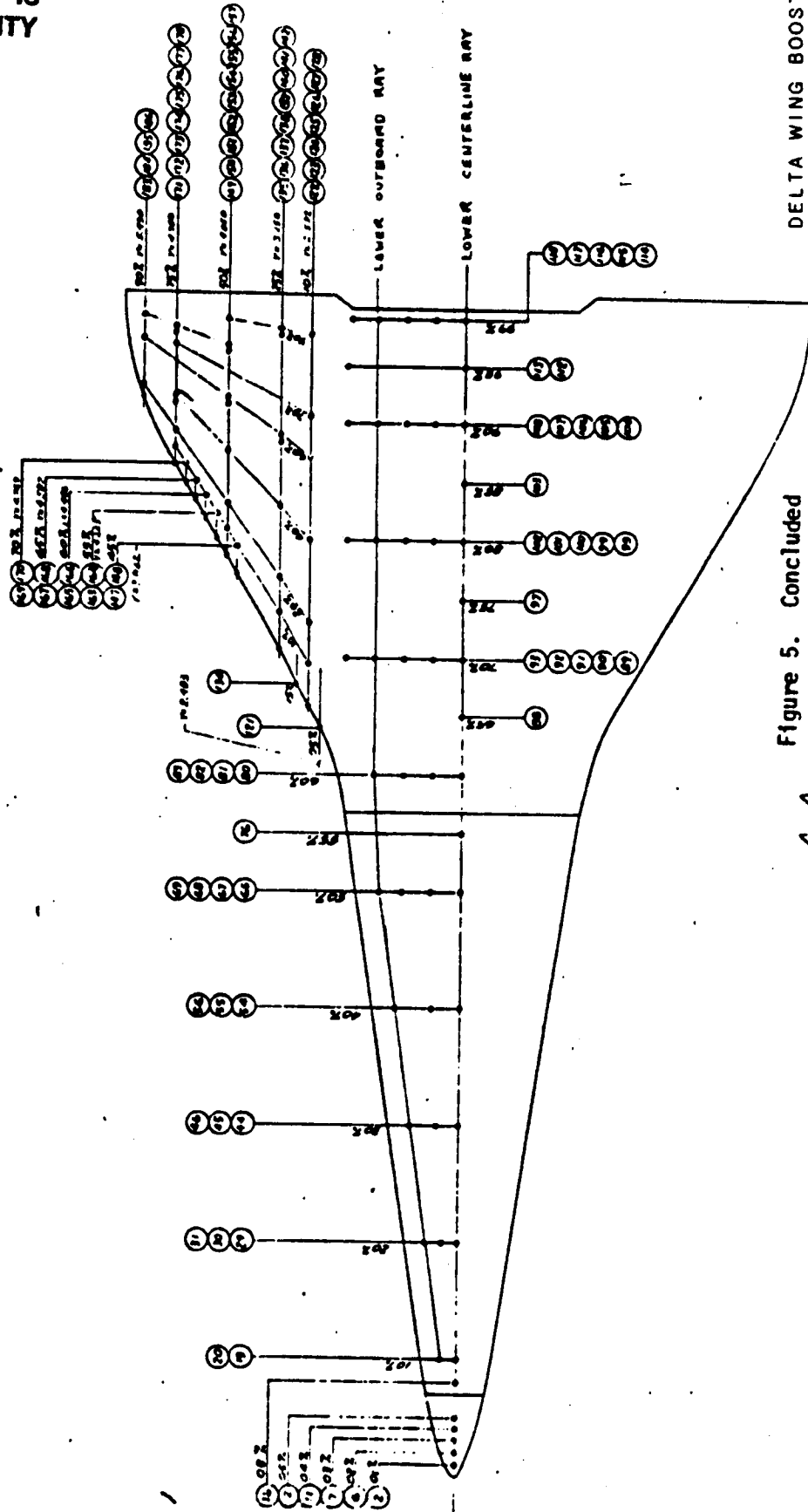


Figure 5. Orbiter Thermocouple Locations

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DELTA WING BOOSTER
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NR
DR#1177 C-3-139

Figure 5. Concluded

VIEW A-A

DELTA WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1264 C-3- 140

Table 3
 PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: Ascent Heat Transfer Test of GDC-8+MAR-DWO
 TEST NUMBER: VTI162-11 TEST FACILITY: VKF Tunnel B
 TEST DATE: June 1971 TEST ENGINEER: R. K. Matthews & W. R. Martindale

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	$T_{aw} \cdot \frac{\rho}{\rho_{total}}$	RNX106 Ft	Phase Change Temp. (°F)	Model Position (degrees)		Model Surface
									α	ϕ	
232	GDC-8 + MAR-DWO	0.013	8.0	265	1270	1.0	1.25	250	0	0	Side
233								125	0		
230								250	-5		
231								125	-5		
228								250	5		
229								125	5		
238				567	1310		2.55	275	0		
239								150	0		
236								275	-5		
237								150	-5		
234								300	5		
235								150	5		
242						N/A		0.F**	0		

* T_{aw} = adiabatic wall temperature
 **0.F. = 011 Flow

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DELTA WING BOOSTER
 GD/C
 DELTA WING ORBITER
 NR
 DR#1264 C-3- 142

Table 3
 PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: Ascent Heat Transfer Test of GDC-8 + MAR-DMO

TEST NUMBER: VT1162-11

TEST FACILITY: VKF Tunnel B

TEST DATE: June 1971

TEST ENGINEER: R. K. Matthews & M. R. Martindale

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	Taw * Total	RNK106 Ft	Phase Change Temp. (°F)	Model Position (degrees)		Model Surface
									α	φ	
250	GDC-8	0.013	8.0	265	1270	1.0	1.26	113	0	0	Side
251								113	-5		
249								113	5		
"								100	.		Top
247				565	1315	1.0	2.54	125	0		Side
248								150	0		
"								113	.		Top
244								200	-5		Side
"								113	.		Top
245								125	-5		Side
243								200	5		
"								113	.		Top
246								125	5		Side

* Taw :: adiabatic wall temperature

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PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: Ascent Heat Transfer Test of GDC-8 + MAR-DMO

TEST NUMBER: VT1162-11 TEST FACILITY: VKF Tunnel B

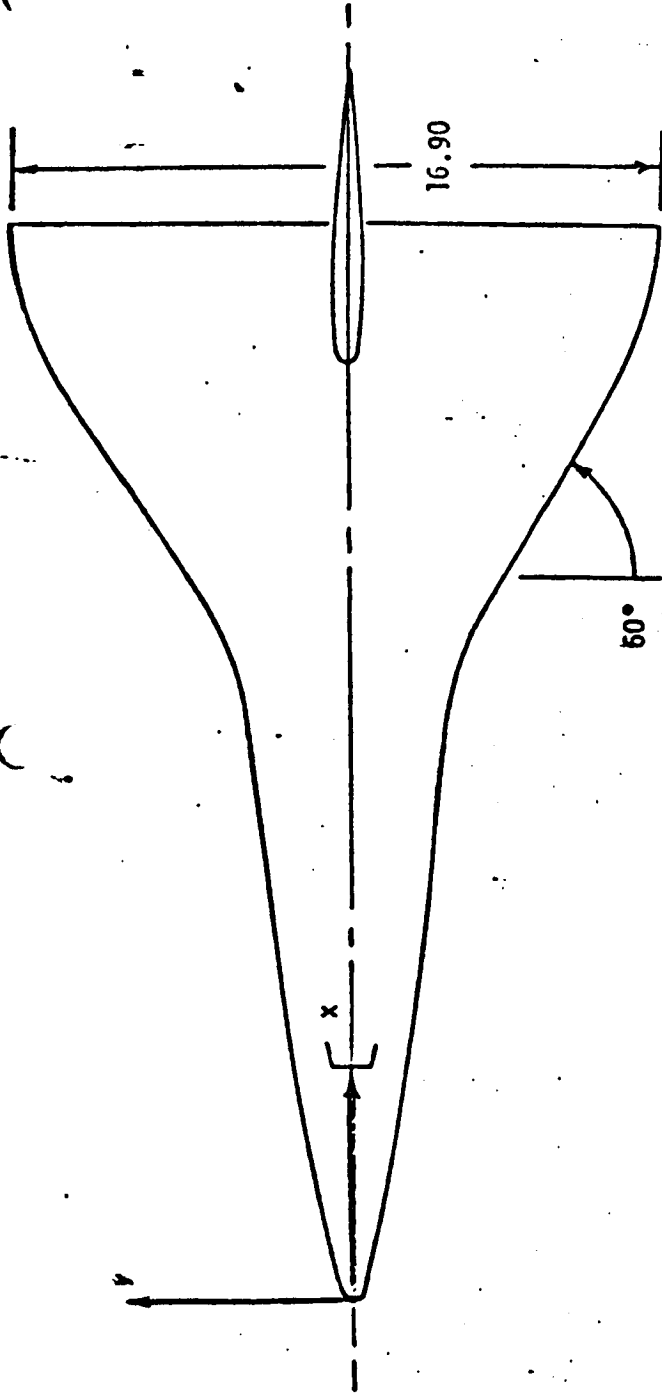
TEST DATE: June 1971 TEST ENGINEER: R. K. Matthews & W. R. Martindale

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	Taw * Ttotal	RNX106 Fl	Phase Change Temp. (°F)	Model Position (degrees)		Model Surface
									α	φ	
270	MAR-DMO	0.013	8.0	265	1250	1.0	1.30	113	0	180	Bottom
.								113	.		Side
266								113	-5		Bottom
.								113	.		Side
267								100	-5		Bottom
.								150	.		Side
268								125	5		Bottom
.								125	.		Side
269								100	5		Bottom
276								113	0		Bottom
274		0.013	8.0	565	1315	1.0	2.54	113	-5	180	Bottom
275								100	-5		.
.								150	.		Side

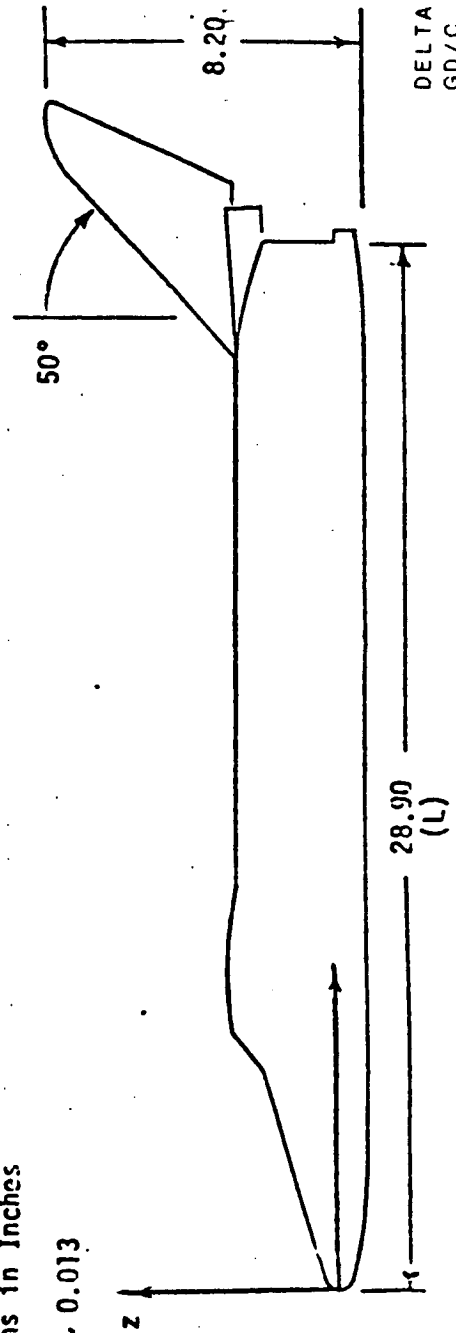
* Taw = adiabatic wall temperature

DELTA WING BOOSTER
GD/C
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NR
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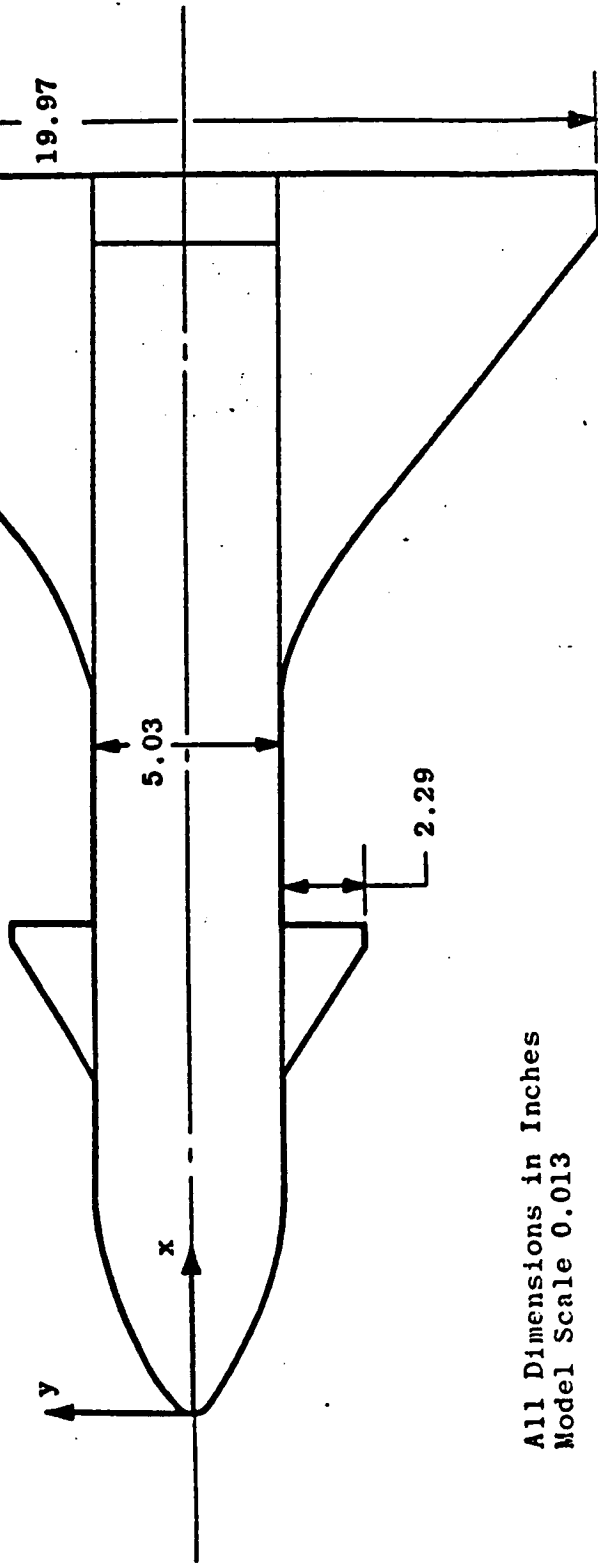
All Dimensions in Inches
Model Scale ~ 0.013



DELTA WING BOOSTER
GD/C
DELTA WING ORBITER
NR
DR#1264 C-3- 145

Fig. 1 North American Rockwell Delta Wing Orbiter Model Sketch
972

DELTA WING BOOSTER
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DELTA WING ORBITER
NR
DR#1264 C-3-146



All Dimensions in Inches
Model Scale 0.013

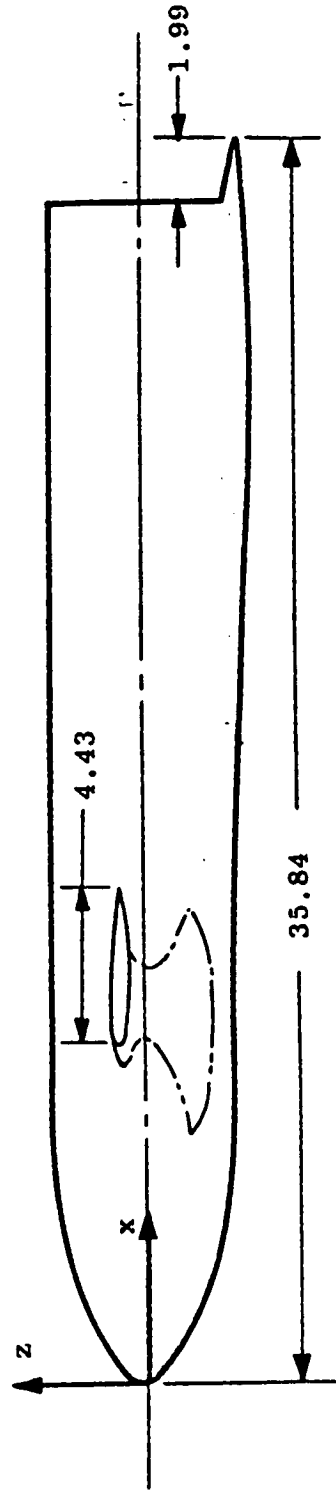


Fig. 2 General Dynamics - Convair Booster (GDC-B)

DELTA WING BOOSTER
 LARC
 STRAIGHT WING ORBITER
 MSC
 DR#1016 C-3-148

NOTE: REFER TO TABLE II
 FOR LOCATION DIMENSIONAL
 DATA.

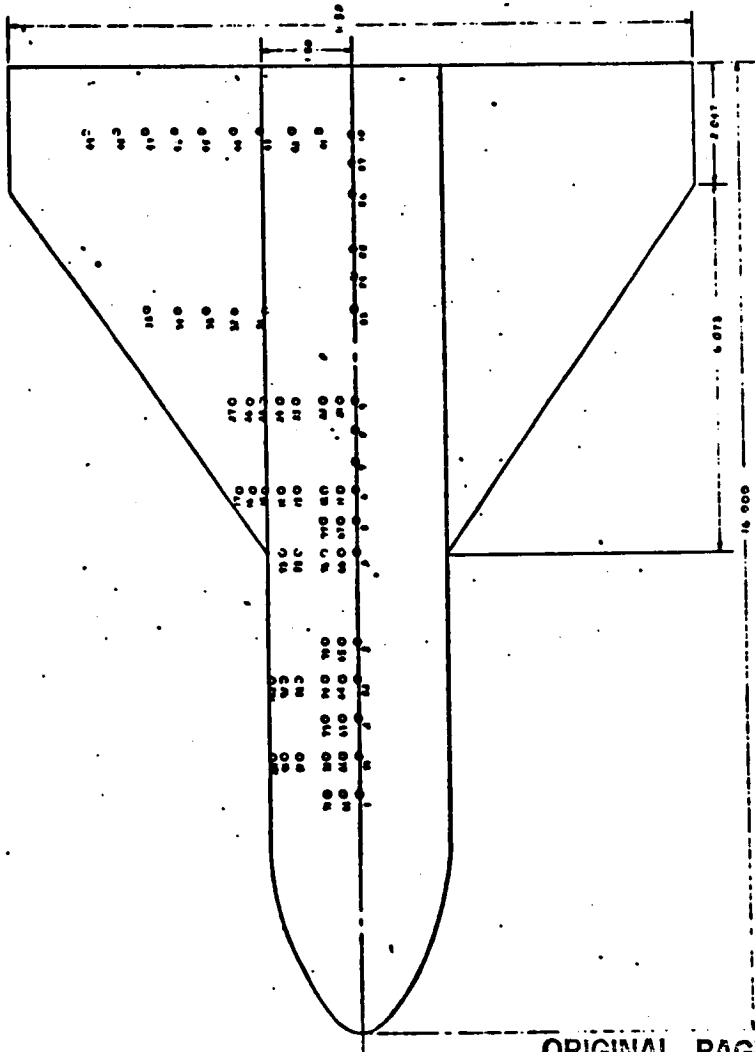
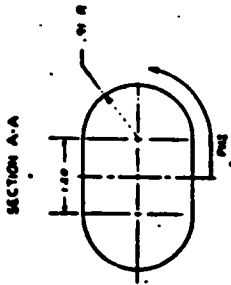
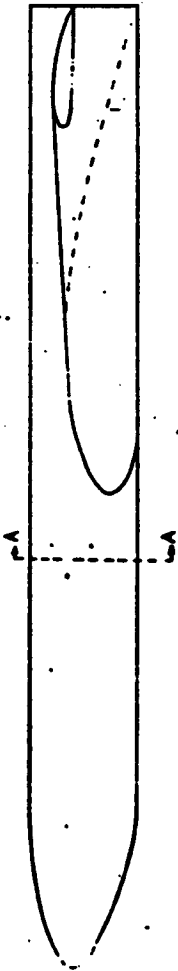
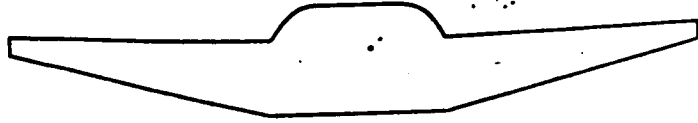
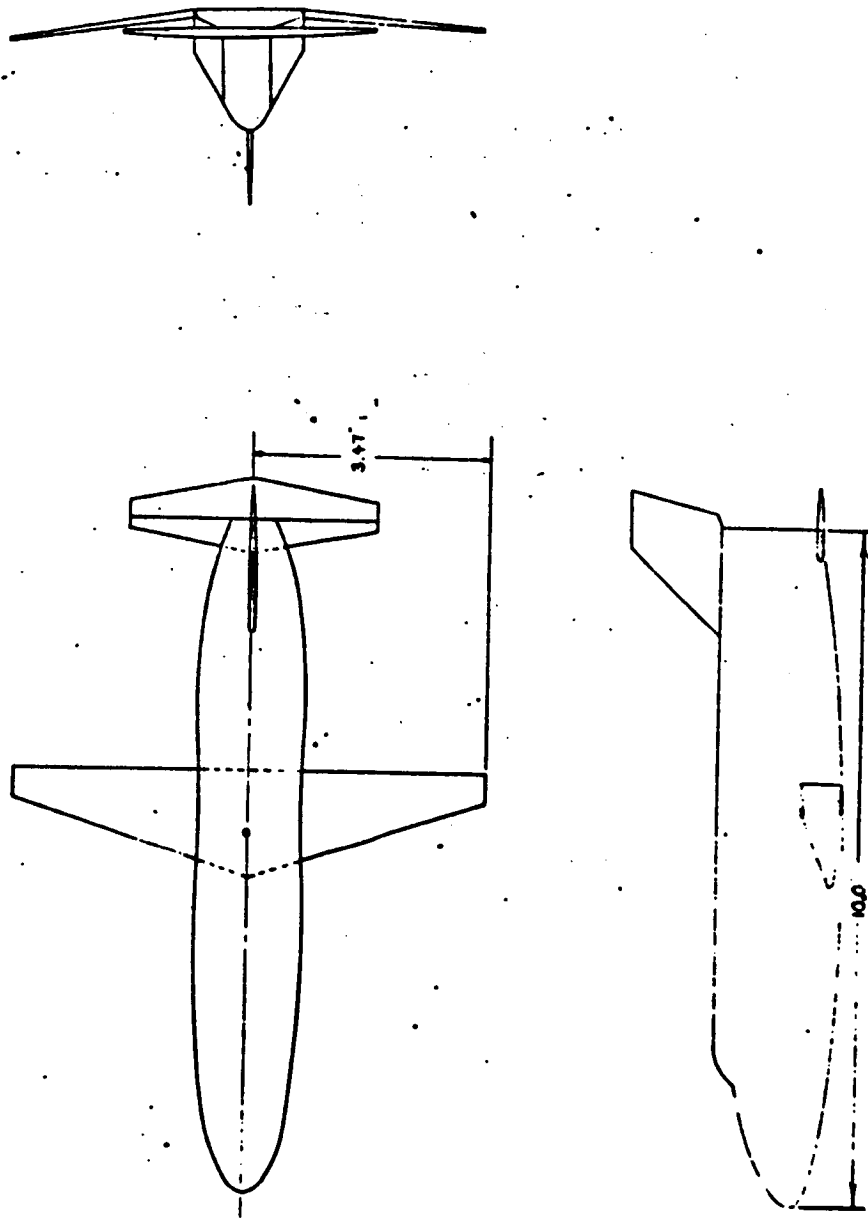


FIGURE 2. CLIPPED WING BOOSTER AND THERMOCOUPLE LOCATION



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DELTA WING BOOSTER
LARC
STRAIGHT WING ORBITER
MSC
DR#1016 C-3- 149

FIGURE 3. MSC ORBITER, 3-VIEW

DELTA WING BOOSTER
LARC
STRAIGHT WING ORBITER
MSC
DR#1016 C-3- 150

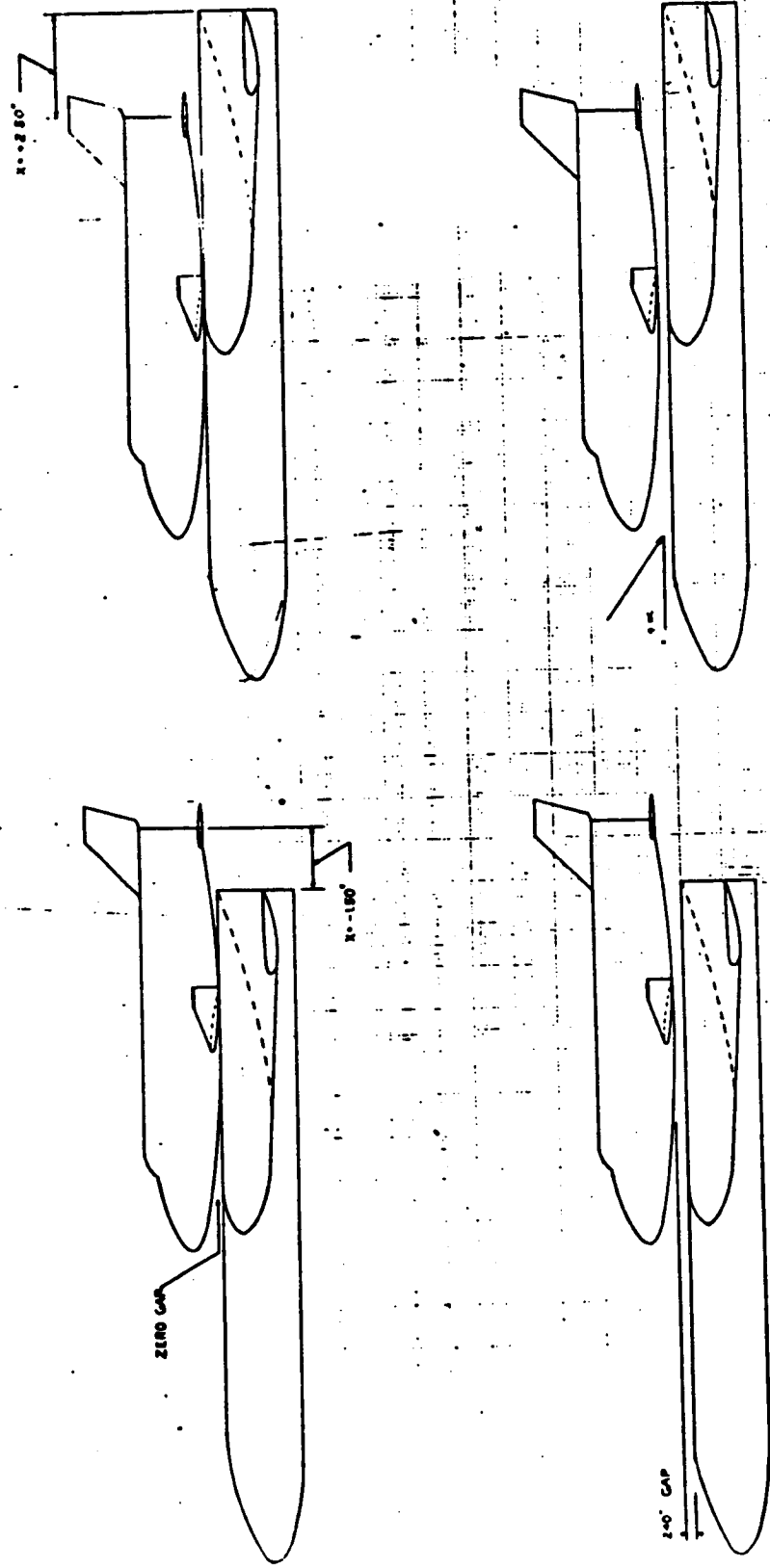


FIGURE 4. RELATIVE POSITIONS OF BOOSTER AND ORBITER

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LMSC-A99

Table 1

PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: LMSC DELTA-BODY ORBITER
 TEST NUMBER: RM075-RM106 TEST FACILITY: LRG Mach 8 VDT
 TEST DATE: 1/5/71 - 1/9/71 TEST ENGINEER: Schultz and McGee

RUN NO.	MODEL CONFIGURATION IDENTIFICATION	MODEL SCALE	FREE STREAM MACH NUMBER	TOTAL PRESSURE (PSIA)	TOTAL TEMP. (°R)	TAW TOTAL	RN X 10 ⁶ FT	PHASE CHNG TEMP. (°F)	MODEL POSITION (DEGREES)			h _{T=1} REU
									α	β	φ	
075	12 in. Orbiter	.00770	7.80	215	1310	0.861*	1.04	138	0	0	180	.0396
076	1-1/2 Stage Ascent	.00558	7.98	815	1365	1.000	3.46	225	0	0	180	.0864 +
077	1-1/2 Stage Ascent	.00558	7.98	815	1360	1.000	3.49	225	0	0	0	.0863
078	12 in. Orbiter	.00770	7.80	215	1260	0.884*	1.10	225	20	0	180	.0394 -
079	12 in. Orbiter	.00770	7.80	215	1325	0.884*	1.01	175	20	0	180	.0395
080	12 in. Orbiter	.00770	7.91	465	1270	0.884*	2.26	175	20	0	180	.0562
081	12 in. Orbiter	.00770	7.98	815	1310	0.884*	3.68	225	20	0	180	.0732
082	12 in. Orbiter	.00770	8.03	1215	1405	0.884*	4.88	225	20	0	180	.0890
083	9 in. Orbiter	.00558	7.80	215	1270	0.915*	1.09	225	32	0	180	.0462
084	9 in. Orbiter	.00558	7.86	325	1285	0.915*	1.58	225	32	0	180	.0562
085	9 in. Orbiter	.00558	7.85	315	1270	0.915*	1.57	400	32	0	180	.0562
086	9 in. Orbiter	.00558	7.85	315	1320	0.900	1.48	100	32	0	0	.0554
087	9 in. Orbiter	.00558	7.91	470	1290	0.900	2.22	100	32	0	0	.0662

*Value of 0.900 was used for reduction of sideview data.
 # Also value used in h_{T=1} calculation.

UNIQUE CONFIGS. BOOSTER
 LMSC
 DELTA BODY ORBITER
 LMSC
 DR#1143 C-3- 151

UNIQUE CONFIGS. BOOSTER
 LMSC
 DELTA BODY ORBITER
 LMSC
 QR#1143 C-3-152

LMSC-A990562

Table 1 (cont'd)
 PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: LMSC DELTA-BODY ORBITER TEST
 TEST NUMBER: RMA075-RMA106 TEST FACILITY: LRC Mach 8 VDT
 TEST DATE: 4/5/72 - 4/9/72 TEST ENGINEER: Schultz and McGee

RUN NO.	MODEL CONFIGURATION IDENTIFICATION	MODEL SCALE	FREE STREAM MACH NUMBER	TOTAL PRESSURE (PSIA)	TOTAL TEMP. (°R)	TAW TOTAL	RN _X 10 ⁶ / FT	PHASE CHNG TEMP. (°F)†	MODEL POSITION (DEGREES)			h ₂₋₁ / h ₁ sec-ft ⁻² / g ₀
									α	β	φ	
088	9 in. Orbiter	.00558	7.85	815	1360	0.900	3.51	100	32	0	0	.0859
089	9 in. Orbiter	.00558	7.85	315	1340	0.910*	1.44	400	32	0	30	.0564
090	9 in. Orbiter	.00558	7.85	315	1310	0.900	1.50	400	32	0	0	.0564
091	9 in. Orbiter	.00558	7.85	315	1330	0.900	1.47	100	20	0	0	.0558
092	9 in. Orbiter	.00558	7.85	315	1300	0.900	1.51	400	20	0	0	.0564
093	9 in. Orbiter	.00558	7.85	315	1285	0.900	1.54	100	25	0	0	.0552
094	9 in. Orbiter	.00558	7.85	315	1310	0.900	1.50	156	25	0	0	.0554
095	9 in. Orbiter	.00558	7.85	315	1280	0.900	1.55	100	35	0	0	.0551
096	9 in. Orbiter	.00558	7.85	315	1275	0.900	1.56	100	40	0	0	.0551
097	9 in. Orbiter	.00558	7.85	315	1310	0.900	1.50	400	40	0	0	.0564
098	9 in. Orbiter	.00558	7.85	315	1325	0.960*	1.48	225	45	0	180	.0557
099	9 in. Orbiter	.00558	7.80	215	1290	0.947*	1.06	225	40	0	180	.0463
100	9 in. Orbiter	.00558	7.80	215	1275	0.926*	1.09	225	35	0	180	.0462

*Value of 0.900 was used for reduction of sideview data.
 † Also value used in h₂₋₁ calculation.

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UNIQUE CONFIGS. BOOSTER
LMSC
DELTA BODY ORBITER
LMSC
DR#1143 C-3- 154

LMSC-A990562

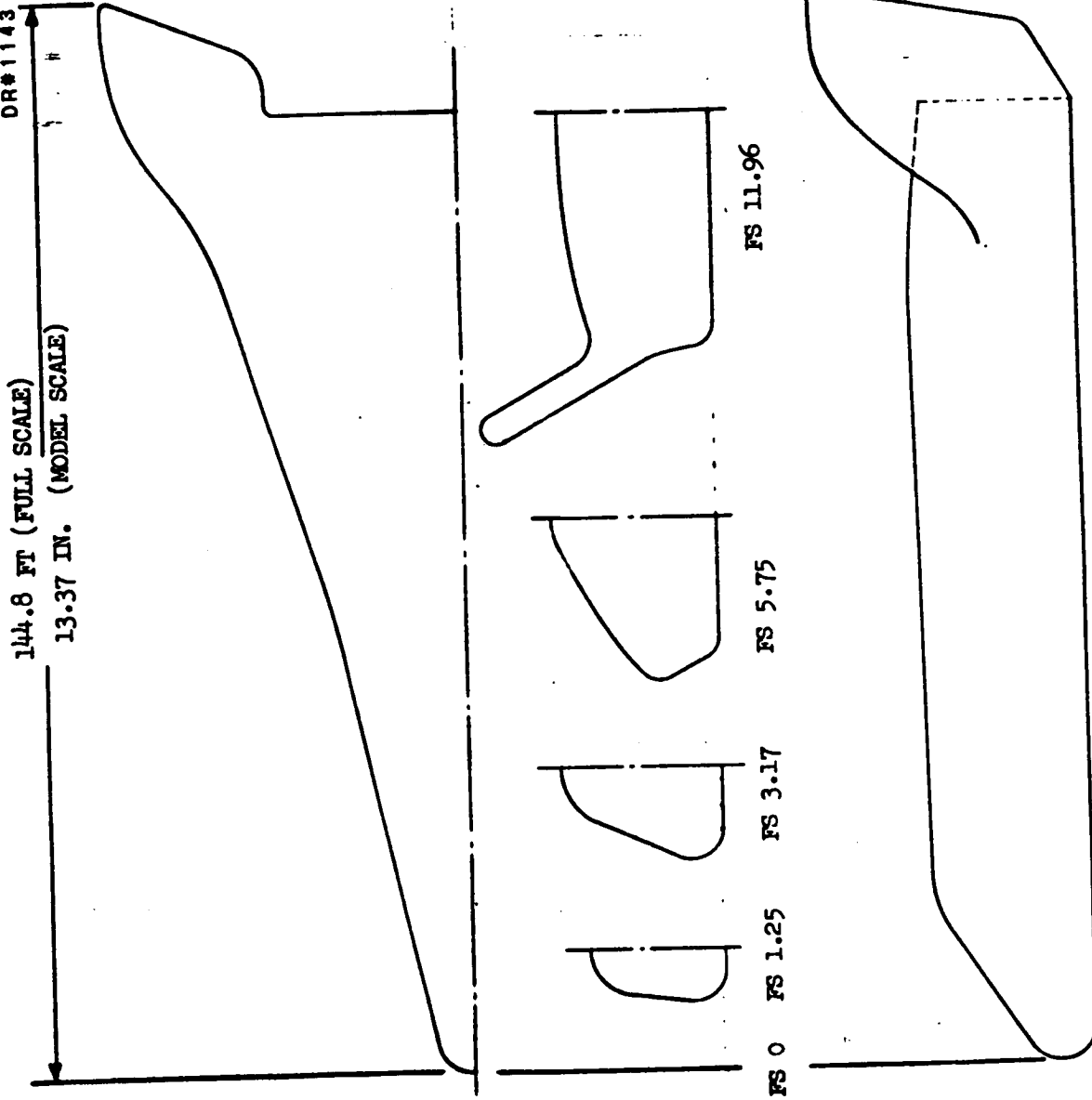


Fig. 1 Delta-Body Orbiter 0.00770 Scale Model

981

LOCKHEED MISSILES & SPACE COMPANY

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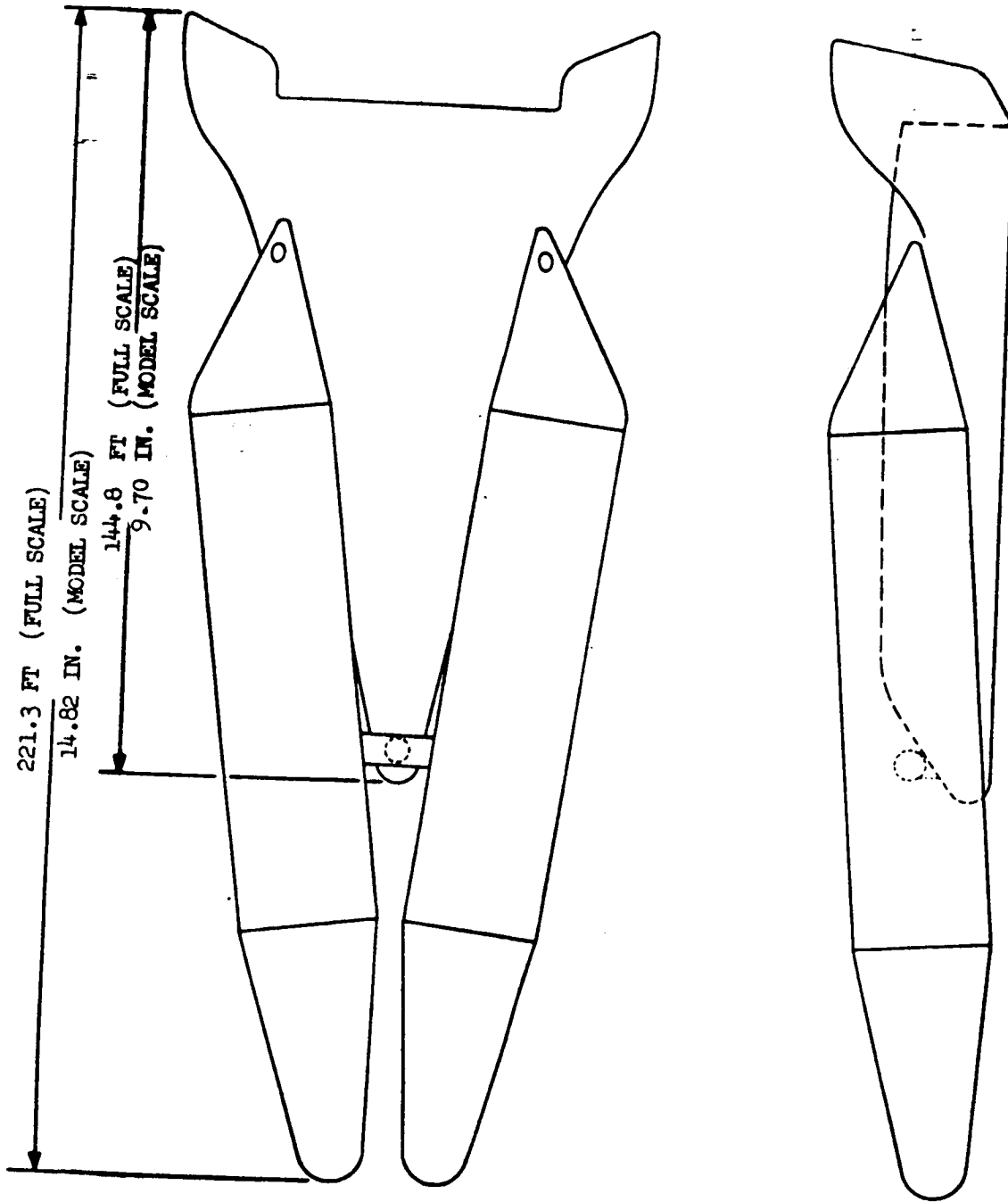


Fig. 2 Stage-and-One-Half C.00558 Scale Model

LMSC-A99056

UNIQUE CONFIGS. BOOSTER
 LMSC
 DELTA BODY ORBITER
 LMSC
 DR#1143 C-3-155

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Standard Bibliographic Page

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		6. Performing Organization Code	
7. Author(s) J. L. Glynn and D. E. Poucher		8. Performing Organization Report No. DMS-DB-02, Vol. 3	
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		15. Supplementary Notes Langley Technical Monitor: James C. Young Volume 1 - NASA CR-178414; Volume 2 - NASA CR-178415	
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16. Abstract Archived wind tunnel test data are available for flyback booster or other alternate recoverable configurations as well as reusable orbiters studied during initial development (Phase B) of the Space Shuttle. Considerable wind tunnel data was acquired by the competing contractors and the NASA centers for an extensive variety of configurations with an array of wing and body planforms. All contractor and NASA wind tunnel test data acquired in the Phase B development have been compiled into a database and are available for applying to current winged flyback or recoverable booster aerodynamic studies. The Space Shuttle Phase B Wind Tunnel Database is structured by vehicle component and configuration type. Basic components include the booster, the orbiter and the launch vehicle. Booster configuration types include straight and delta wings, canard, cylindrical, retro-glide and twin body. Orbiter configuration types include straight and delta wings, lifting body, drop tanks and double delta wings. Launch configuration types include booster and orbiter components in various stacked and tandem combinations.			
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